

SCHOTTKY &
RECTIFIER DIODES

SCHOTTKY & RECTIFIER DIODES

DATABOOK

2nd EDITION



SGS-THOMSON
MICROELECTRONICS



000531

RYSTON Electronics

901509

M-DBDIODE #

DIODE ST/2

STM/



SGS-THOMSON
MICROELECTRONICS

4663

SCHOTTKY & RECTIFIER DIODES

DATABOOK

2nd EDITION

MARCH 1994

USE IN LIFE SUPPORT DEVICES OR SYSTEMS MUST BE EXPRESSLY AUTHORIZED.

531

SGS-THOMSON PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF SGS-THOMSON Microelectronics. As used herein:

1. Life support devices or systems are those which (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided with the product, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can reasonably be expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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SELECTOR GUIDES

ALPHABETICAL LIST OF SYMBOLS

C	Overvoltage coefficient
C_o	Junction capacitance
df/dt	Rate of decrease of forward current
δ	Duty cycle
F	Frequency
I_F	Forward continuous current
$I_F(av), I_o$	Average forward current
$I_F(RMS)$	RMS forward current
I_{FM}	Peak forward current
I_{FRM}	Repetitive peak forward current
I_{FSM}	Surge non repetitive forward current
I_M	Maximum peak forward current
I_R	Continuous reverse leakage current
I_{RM}	Peak reverse recovery current
I_{rr}	Test point of reverse recovery time on reverse recovery current
P	Power dissipation
P_{TOT}	Total power dissipation
Q_{rr}	Reverse recovery charge
Q_s	Stored charge
R_d	Dynamic resistance
R_L	Load resistance
$R_{th(c)}$	Coupling thermal resistance
$R_{th(j-a)}$	Junction-ambient thermal resistance
$R_{th(j-c)}$	Junction-case thermal resistance
$R_{th(j-l)}$	Junction-leads thermal resistance
$R_{th(j-SR)}$	Junction-substrate thermal resistance
S	Softness factor
T_{amb}	Ambient temperature
tb	Time between I_{RM} and zero crossing
T_c, T_{case}	Case temperature
t_{fr}	Forward recovery time
t_{IRM}, t_a	Time after I_{RM} is reached
T_j	Junction temperature
T_L	Maximum lead temperature for soldering
τ	Minority carrier life time
T_{oper}	Operation temperature (at zero dissipation)
t_p	Pulse width
t_{rr}	Reverse recovery time
T_{stg}	Storage temperature
V_{BR}	Breakdown voltage
V_F	Forward voltage
V_{FM}	Peak forward voltage
V_{FP}	Transient peak forward voltage
V_R	Continuous reverse voltage
V_{RP}	Transient peak reverse voltage
V_{RRM}	Repetitive peak reverse voltage
V_{RSM}	Non repetitive peak reverse voltage
V_{RWM}	Peak working reverse voltage
V_{to}	Threshold voltage
Z_{th}	Thermal impedance

STANDARD DIODES

If(av) (A)	P/N	Package	VRRM (V)								Page		
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6	BY214	AG			✓		✓		✓		✓	✓	37
6	1N3990	DO4			✓		✓		✓		✓	✓	39
10	BY239(L)	TO220AC			✓		✓		✓		✓		41
12	BYW88	DO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	43
20	1N1195..8	DO5				✓	✓	✓	✓				47
40	1N1186..90	DO5	✓	✓	✓	✓	✓	✓	✓		✓	✓	45
40	1N3766..68	DO5									✓	✓	45

FAST DIODES

If(av) (A)	P/N	Package	VRRM (V)									Page	
			50	80	100	200	300	400	500	600	800		1000
1	PLQ08..1	F126		✓	✓								51
1	BYT11	F126								✓	✓	✓	55
3	PFR856	DO27A	✓		✓	✓		✓		✓			59
3	BYT13	DO27A								✓	✓	✓	63
6	BYT71	TO220AC				✓		✓		✓	✓		67
6	BYT71F	ISOWATT220AC				✓		✓		✓	✓		67
6	1N3879..83	DO4	✓		✓	✓	✓	✓					73
10	BY233	TO220AC				✓		✓		✓			75
10	ESM765	TO220AC			✓	✓		✓		✓	✓		79
10	ESM765PI	Isol. TO220AC								✓	✓		83
12	BYX61	DO4	✓		✓	✓	✓	✓					87
12	1N3889..93	DO4	✓		✓	✓	✓	✓					89
12	BYX62	DO4								✓			89
20	1N3899..3903	DO5	✓		✓	✓	✓	✓					91
20	BYX63	DO5								✓			91
30	1N3909..13	DO5	✓		✓	✓	✓	✓					93
30	BYX64	DO5								✓			93
30	BYX65	DO4	✓		✓	✓	✓	✓					95
60	ESM243	DO5	✓		✓	✓	✓	✓					97
60	ESM244	DO5	✓		✓	✓	✓	✓	✓	✓			99

SELECTOR GUIDES

ULTRA-FAST DIODES

I _F (av) (A)	P/N	Package	V _{RRM} (V)										Page
			50	100	150	200	400	500	600	700	800	1000	
1	BYW100	F126	✓	✓	✓	✓							103
2	SMBYW02	SOD6	✓	✓	✓	✓							107
3	BYW98	DO27A	✓	✓	✓	✓							111
4	SMBYW04	SOD15	✓	✓	✓	✓							115
8	BYW29	TO220AC	✓	✓	✓	✓							119
8	BYW29F	ISOWATT220AC	✓	✓	✓	✓							119
8	BYW29M	PowerSO-10™					✓						125
8	BYW80	TO220AC	✓	✓	✓	✓							129
8	BYW80F	ISOWATT220AC	✓	✓	✓	✓							129
8	BYW80PI	Isol. TO220AC	✓	✓	✓	✓							135
15	BYW81P	TO220AC	✓	✓	✓	✓							139
15	BYW81PI	Isol. TO220AC	✓	✓	✓	✓							139
15	BYW81M	PowerSO-10™					✓						143
15	BYW81	DO4	✓	✓	✓	✓							147
2x10	BYW51	TO220AB	✓	✓	✓	✓							151
2x10	BYW51F	ISOWATT220AB	✓	✓	✓	✓							151
2x10	BYW51M	PowerSO-10™					✓						157
25	BYW77P	SOD93	✓	✓	✓	✓							161
25	BYW77PI	DOP3I	✓	✓	✓	✓							161
25	BYW77M	PowerSO-10™					✓						165
25	BYW77	DO4	✓	✓	✓	✓							169
2x15	BYW99P	SOT93	✓	✓	✓	✓							173
2x15	BYW99PI	TOP3I	✓	✓	✓	✓							173
35	BYW92	DO5	✓	✓	✓	✓							177
50	BYW78	DO5	✓	✓	✓	✓							181
2x30	BYV52	SOT93	✓	✓	✓	✓							185
2x30	BYV52PI	TOP3I	✓	✓	✓	✓							185
80	BYW08	DO5	✓	✓	✓	✓							189
2x50	BYV54(V)	ISOTOP™	✓	✓	✓	✓							193
2x50	BYV541(V)	ISOTOP™	✓	✓	✓	✓							193

ULTRA-FAST DIODES (cont'd)

If(av) (A)	P/N	Package	VRRM (V)										Page		
			50	100	150	200	400	500	600	700	800	1000			
3	STPR320	F126		✓		✓									201
3	STPR320D	TO220AC		✓		✓									205
3	STPR320F	ISOWATT220AC		✓		✓									205
5	STPR520D	TO220AC		✓		✓									209
5	STPR520F	ISOWATT220AC		✓		✓									209
2x3	STPR620CT	TO220AB		✓		✓									213
2x3	STPR620CF	ISOWATT220AB		✓		✓									213
8	STPR820D	TO220AC		✓		✓									217
8	STPR820F	ISOWATT220AC		✓		✓									217
2x5	STPR1020CT	TO220AB		✓		✓									221
2x5	STPR1020CF	ISOWATT220AB		✓		✓									221
12	STPR1220D	TO220AC		✓		✓									225
12	STPR1220F	ISOWATT220AC		✓		✓									225
15	STPR1520D	TO220AC		✓		✓									229
15	STPR1520F	ISOWATT220AC		✓		✓									229
2x8	STPR1620CT	TO220AB		✓		✓									233
2x12	STPR2420CT	TO220AB		✓		✓									237

SELECTOR GUIDES

HIGH VOLTAGE ULTRA-FAST DIODES

If(av) (A)	P/N	Package	VRRM (V)								Page
			200	300	400	500	600	800	1000	1200	
5	STTA506D	TO220AC					✓				243
5	STTA506F	ISOWATT220AC					✓				243
5	STTA506M	PowerSO-10™					✓				251
5	STTB506D	TO220AC					✓				257
5	STTB506F	ISOWATT220AC					✓				257
5	STTB506M	PowerSO-10™					✓				263
5	STTA512D	TO220AC								✓	271
5	STTA512F	ISOWATT220AC								✓	271
8	STTA806D	TO220AC					✓				277
8	STTA806DI	Isol. TO220AC					✓				277
8	STTA806M	PowerSO-10™					✓				283
8	STTB806D	TO220AC					✓				289
8	STTB806DI	Isol. TO220AC					✓				289
8	STTB806M	PowerSO-10™					✓				295
8	STTA812D	TO220AC								✓	303
8	STTA812DI	Isol. TO220AC								✓	303
12	STTA1206D	TO220AC					✓				309
12	STTA1206DI	Isol. TO220AC					✓				309
12	STTA1206M	PowerSO-10™					✓				315
12	STTB1206D	TO220AC					✓				321
12	STTB1206DI	Isol. TO220AC					✓				321
12	STTB1206M	PowerSO-10™					✓				327
12	STTA1212D	TO220AC								✓	335
15	STTA1512P	SOD93								✓	341
15	STTA1512PI	DOP3I								✓	341
20	STTA2006P	SOD93					✓				347
20	STTA2006PI	DOP3I					✓				347
20	STTA2006M	PowerSO-10™					✓				353
20	STTB2006P	SOD93					✓				359
20	STTB2006PI	DOP3I					✓				359
20	STTB2006M	PowerSO-10™					✓				365

HIGH VOLTAGE ULTRA-FAST DIODES (cont'd)

If(av) (A)	P/N	Package	VRRM (V)								Page	
			200	300	400	500	600	800	1000	1200		
25	STTA2512P	SOD93									✓	373
30	STTA3006P	SOD93					✓					379
30	STTA3006PI	DOP3I					✓					379
30	STTB3006P	SOD93					✓					385
30	STTB3006PI	DOP3I					✓					385
2x25	STTA5012T(V)1/2	ISOTOP™									✓	389
2x30	STTA6006T(V)1/2	ISOTOP™					✓					395
2x30	STTB6006T(V)1/2	ISOTOP™					✓					401
2x45	STTA9012T(V)1/2	ISOTOP™									✓	405
2x60	STTA12006T(V)1/2	ISOTOP™					✓					411
2x60	STTB12006T(V)1/2	ISOTOP™					✓					417
1	BYT01	F126	✓	✓	✓							421
1	SMBYT01	SOD6	✓	✓	✓							425
3	BYT03	DO27A	✓	✓	✓							429
3	SMBYT03	SOD15	✓	✓	✓							433
8	BYT08P	TO220AC	✓	✓	✓							437
8	BYT08PI	Isol. TO220AC	✓	✓	✓							443
8	BYT08P	TO220AC					✓	✓				449
8	BYT08PI	Isol. TO220AC					✓	✓				453
8	BYT08P	TO220AC								✓		457
8	BYT08PI	Isol. TO220AC								✓		461
12	BYT12	DO4	✓	✓	✓							465
12	BYT12P	TO220AC					✓	✓				471
12	BYT12PI	Isol. TO220AC					✓	✓				477
12	BYT12	DO4					✓	✓				483
12	BYT12P	TO220AC								✓		489
12	BYT12PI	Isol. TO220AC								✓		495
12	BYT12	DO4								✓		501
2x8	BYT16P	TO220AC	✓	✓	✓							507

SELECTOR GUIDES

HIGH VOLTAGE ULTRA-FAST DIODES (cont'd)

I _{F(av)} (A)	700	P/N	Package	V _{RRM} (V)								Page	
				200	300	400	500	600	800	1000	1200		
30		BYT30P	SOD93	✓	✓	✓							513
30		BYT30PI	DOP3I	✓	✓	✓							519
30		BYT30M	PowerSO-10™			✓							525
30		BYT30	DO5	✓	✓	✓							531
30		BYT30P	SOD93					✓	✓				537
30		BYT30PI	DOP3I					✓	✓				543
30		BYT30	DO5					✓	✓				549
30		BYT30P	SOD93								✓		555
30		BYT30PI	DOP3I								✓		561
30		BYT30	DO5								✓		567
60		BYT60P	SOD93	✓	✓	✓							573
60		BYT60	DO5	✓	✓	✓							579
60		BYT60	DO5					✓	✓				585
60		BYT60P	SOD93								✓		589
60		BYT60	DO5								✓		593
2x30		BYT230/1PI(V)	ISOTOP™	✓	✓	✓							597
2x30		BYT230/1PI(V)	ISOTOP™					✓	✓				601
2x30		BYT230/1PI(V)	ISOTOP™								✓		605
2x60		BYT260/1PI(V)	ISOTOP™	✓	✓	✓							609
2x60		BYT260/1PI(V)	ISOTOP™					✓	✓				613
2x60		BYT260/1PI(V)	ISOTOP™								✓		617

DEFLECTION DIODES

If(av) (A)	P/N	Package	VRRM (V)								Page		
			100	200	400	500	600	800	1000	1200		1500	
3	MTV32-400	DO27A			✓								623
3	MTV32-600	DO27A					✓						627
3	DTV32-1000A	DO27A							✓				627
6	DTV32-1500A	TO220AC									✓	✓	631
6	DTV32F-1500A	ISOWATT220AC									✓	✓	631
6	DTV32-1500B	TO220AC									✓	✓	637
6	DTV32F-1500B	ISOWATT220AC									✓	✓	637
6	DTV64-1200C	TO220AC									✓		643
6	DTV64F-1200C	ISOWATT220AC									✓		643

POWER SCHOTTKY DIODES

If(av) (A)	P/N	Package	VRRM (V)								Page		
			20	25	30	35	40	45	50	60		100	
1	STPS140E	SOT223	✓		✓		✓						649
1	STPS160E	SOT223									✓		651
2x1	STPS240CE	SOT223	✓		✓		✓						653
2x1	STPS260CE	SOT223									✓		655
3	STPS340U	SOD6	✓		✓		✓						657
3	STPS340S	SOD15	✓		✓		✓						661
2x3	STPS640CT	TO220AB	✓		✓		✓						665
2x3	STPS640CF	ISOWATT220AB	✓		✓		✓						665
2x3	STPS640CM	PowerSO-10™	✓		✓		✓						669
7.5	STPS745D	TO220AC					✓		✓				673
7.5	STPS745F	ISOWATT220AC					✓		✓				673
7.5	STPS745M	PowerSO-10™							✓				677
10	STPS1045D	TO220AC					✓		✓				681
10	STPS1045F	ISOWATT220AC					✓		✓				681
10	STPS1045M	PowerSO-10™							✓				685
15	STPS1545D	TO220AC					✓		✓				689
15	STPS1545F	ISOWATT220AC					✓		✓				689

SELECTOR GUIDES

POWER SCHOTTKY DIODES (cont'd)

I _F (av) (A)	P/N	Package	V _{RRM} (V)									Page
			20	25	30	35	40	45	50	60	100	
2x7.5	STPS1545CT	TO220AB				✓		✓				693
2x7.5	STPS1545CF	ISOWATT220AB				✓		✓				693
2x7.5	STPS1545CM	PowerSO-10™						✓				697
2x10	STPS2045CT	TO220AB				✓		✓				701
2x10	STPS2045CF	ISOWATT220AB				✓		✓				701
2x10	STPS2045CM	PowerSO-10™						✓				705
2x10	STPS20100CT	TO220AB									✓	709
30	STPS3045M	PowerSO-10™						✓				713
2x15	STPS3045CT	TO220AB				✓		✓				717
2x15	STPS3045CP	SOT93				✓		✓				721
2x15	STPS3045CPI	TOP3I				✓		✓				721
2x15	STPS3045CM	PowerSO-10™						✓				725
2x20	STPS4045CP	SOT93				✓		✓				729
2x30	STPS6045CP	SOT93				✓		✓				733
2x30	STPS6045CPI	TOP3I				✓		✓				733
2x40	STPS80100TV	ISOTOP™									✓	737
2x60	STPS12045T(V)	ISOTOP™				✓		✓				741
2x80	STPS16045T(V)	ISOTOP™				✓		✓				745
2x120	STPS24045T(V)	ISOTOP™				✓		✓				749

SCHOTTKY SIGNAL DIODES

I _{F(av)} (mA)	P/N	Package	V _{RRM} (V)										Page		
			4	5	10	15	20	30	40	60	70	80		100	
10	BAR18 / BAS70	SOT23										✓			767
15	1N5711	DO35										✓			755
15	1N6263	DO35									✓				761
15	BAR28	DO35										✓			773
15	TMM5711	MINIMELF										✓			827
15	TMM6263	MINIMELF									✓				833
15	TMMBAR28	MINIMELF										✓			853
20	BAR11	DO35					✓								763
20	TMMBAR11	MINIMELF					✓								847
30	BAR19	DO35	✓												771
30	BAT17	SOT23	✓												783
30	BAT19	DO35				✓									787
30	BAT29	DO35		✓											789
30	BAT45	DO35					✓								799
30	TMMBAR19	MINIMELF	✓												851
30	TMMBAT19	MINIMELF				✓									855
30	TMMBAT29	MINIMELF		✓											857
30	TMMBAT45	MINIMELF					✓								867
35	1N5712	DO35						✓							757
35	BAR10	DO35						✓							763
35	TMM5712	MINIMELF						✓							829
35	TMMBAR10	MINIMELF						✓							847
100	BAR42 / BAR43	SOT23							✓						775
100	BAR46 / BAR46A	SOT23												✓	779
100	BAT41	DO35												✓	791
100	TMMBAT41	MINIMELF												✓	859
150	BAT46	DO35												✓	803
150	TMMBAT46	MINIMEL												✓	871
200	BAT42 / BAT43	DO35							✓						795
200	TMMBAT42 / 43	MINIMELF							✓						863

SCHOTTKY SIGNAL DIODES (cont'd)

If(av) (mA)	P/N	Package	VRRM (V)										Page		
			4	5	10	15	20	30	40	60	70	80		100	
350	BAT47	DO35					✓								807
350	TMMBAT47	MINIMELF					✓								875
350	BAT48	DO35								✓					807
350	TMMBAT48	MINIMELF								✓					875
500	BAT49	DO41											✓		811
500	TMBAT49	MELF											✓		879
1A	BYV10-40	DO41					✓	✓	✓						815
1A	TMBYV10-40	MELF					✓	✓	✓						835
1A	BYV10-20A	DO41					✓								819
1A	TMBYV10-20A	MELF					✓								839
1A	BYV10-60	DO41										✓			823
1A	TMBYV10-60	MELF										✓			843

HIGH VOLTAGE STANDARD PLANAR TECHNOLOGY

I _{F(av)} (A)	P/N	Package	V _{RRM} (V)							Page	
			100	150	200	300	400	600	800		1000
6	JBY239	DICE					✓	✓	✓		891
12	JBYW88	DICE					✓	✓	✓		891
40	J1N1188 / J1N3768	DICE					✓	✓	✓		891

HIGH VOLTAGE FAST MESA TECHNOLOGY

I _{F(av)} (A)	P/N	Package	V _{RRM} (V)							Page	
			100	150	200	300	400	600	800		1000
6	JBYT71	DICE			✓		✓	✓	✓		892
8	JBY233	DICE			✓		✓	✓			892
10	JESM765	DICE			✓		✓	✓	✓		892
12	JBYX62	DICE			✓		✓	✓			892
30	JBYX64	DICE			✓		✓	✓			892
60	JESM244	DICE			✓		✓	✓			892

LOW VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

I _{F(av)} (A)	P/N	Package	V _{RRM} (V)							Page	
			100	150	200	300	400	600	800		1000
1.5	JBYW100	DICE	✓	✓	✓						893
1.5	JSBYW100	DICE	✓	✓	✓						894
3	JBYW98	DICE	✓	✓	✓						893
3	JSBYW98	DICE	✓	✓	✓						894
5	JBYW29	DICE	✓	✓	✓						895
7	JBYW80	DICE	✓	✓	✓						895
8	JBYW51	DICE	✓	✓	✓						896
12	JBYW81	DICE	✓	✓	✓						895
20	JBYW77	DICE	✓	✓	✓						895
35	JBYW92	DICE	✓	✓	✓						895
50	JBYW78	DICE	✓	✓	✓						895

SELECTOR GUIDES

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

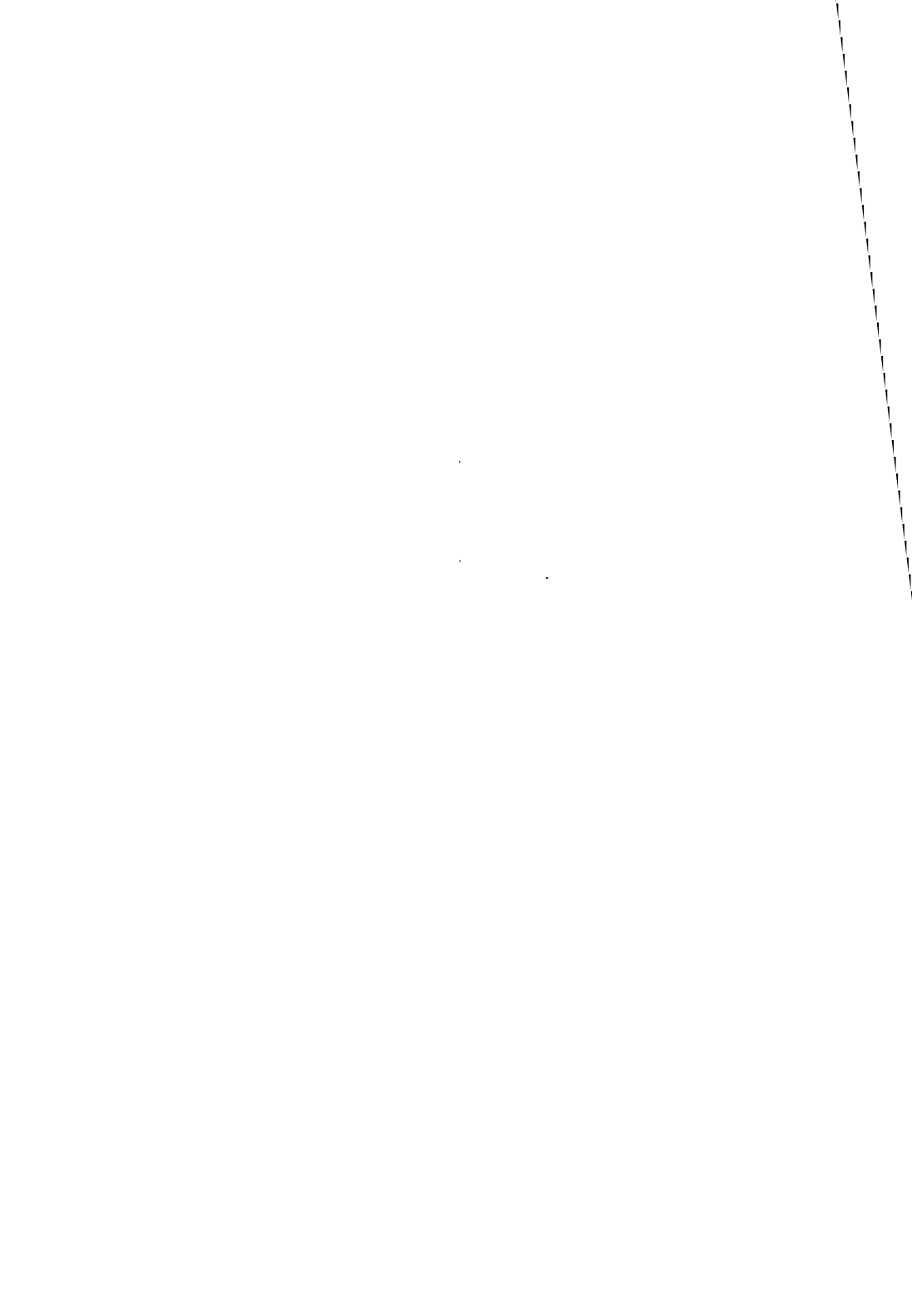
If(av) (A)	P/N	Package	VRRM (V)								Page	
			100	150	200	300	400	600	800	1000		1200
1	JBYT01	DICE			✓	✓	✓					893
1	JSBYT01	DICE			✓	✓	✓					894
1	JTA106	DICE						✓				899
1	JTB106	DICE						✓				900
1	JTA112	DICE									✓	901
2	JTA206	DICE						✓				899
2	JTB206	DICE						✓				900
2	JTA212	DICE									✓	901
3	JBYT03	DICE			✓	✓	✓					893
5	JTA506	DICE						✓				899
5	JTB506	DICE						✓				900
5	JTA512	DICE									✓	901
8	JBYT08	DICE			✓	✓	✓					897
8	JBYT16	DICE			✓	✓	✓					896
8	JTA806	DICE						✓				899
8	JTB806	DICE						✓				900
8	JTA812	DICE									✓	901
12	JBYT12	DICE			✓	✓	✓					897
12	JBYT12	DICE									✓	898
12	JTA1206	DICE						✓				899
12	JTB1206	DICE						✓				900
12	JTA1212	DICE									✓	901
15	JTA1512	DICE									✓	901
20	JTA2006	DICE						✓				899
20	JTB2006	DICE						✓				900
25	JTA2512	DICE									✓	901

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY (cont'd)

I _{F(av)} (A)	P/N	Package	V _{RRM} (V)								Page	
			100	150	200	300	400	600	800	1000		1200
30	JBYT30	DICE			✓	✓	✓					897
30	JBYT30	DICE								✓		898
30	JTA3006	DICE							✓			899
30	JTB3006	DICE							✓			900
45	JTA4512	DICE									✓	901
60	JBYT60	DICE			✓	✓	✓					897
60	JBYT60	DICE								✓		898
60	JTA6006	DICE							✓			899
60	JTB6006	DICE							✓			900

POWER SCHOTTKY

I _{F(av)} (A)	P/N	Package	V _{RRM} (V)								Page	
			20	25	30	35	40	45	50	60		100
3	JTPS3..	DICE	✓		✓		✓					902
2x3	JTPS6..	DICE	✓		✓		✓					902
7.5	JTPS7..	DICE				✓		✓				902
2x7.5	JTPS15..C	DICE				✓		✓				902
10	JTPS10..	DICE				✓		✓				902
2x10	JTPS20..C	DICE				✓		✓				902
15	JTPS15..	DICE				✓		✓				903
2x15	JTPS30..C	DICE				✓		✓				903
30	JTPS30..	DICE				✓		✓				903
2x30	JTPS60..C	DICE				✓		✓				903
60	JTPS60..	DICE				✓		✓				903
80	JTPS80..	DICE				✓		✓				903



CROSS REFERENCES

POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
1N4942		BYT11-600	BYT60P-600	STTA/B6006P	
1N4942GP		BYT11-600	BYT60P-800		BYT60P-1000
1N4944		BYT11-600	BYT79-500		STTA/B1206D
1N4944GP		BYT11-600	BYT85-1000		BYT08P-1000
1N4946		BYT11-600	BYT85-600	STTA/B506D	
1N4946GP		BYT11-600	BYT85-800		BYT08P-1000
1N4947		BYT11-800	BYT230PIV-1000		STTA5012TV2
1N4947GP		BYT11-800	BYT230PIV-600	STTA/B6006TV2	
1N4948		BYT11-1000	BYT230PIV-800		BYT230PIV-100
1N4948GP		BYT11-1000	BYT231PIV-1000		STTA5012TV1
1N5615		BYT11-600	BYT231PIV-600	STTA/B6006TV1	
1N5615GP	BYT11-600		BYT231PIV-800		BYT231PIV-1000
1N5617		BYT11-600	BYT260PIV-1000		STTA9012TV2
1N5617GP	BYT11-600	BYT11-600	BYT260PIV-600	STTA/B12006TV2	
1N5619		BYT11-600	BYT260PIV-800		BYT260PIV-1000
1N5619GP	BYT11-600		BYT261PIV-1000		STTA9012TV1
1N5621		BYT11-800	BYT261PIV-600	STTA/B12006TV1	
1N5621GP	BYT11-800		BYT261PIV-800		BYT261PIV-1000
1N5623		BYT11-1000	BYV7-250	BYW99P-50	
1N5623GP	BYT11-1000		BYV27-100		BYW98-100
31DF2		BYW98-200	BYV27-150		BYW98-150
31DF4		BYT03-400	BYV27-200		BYW98-200
31DF6		MTV32-600	BYV27-50		BYW98-50
BY229-600	STTA/B806D		BYV28-100		BYW98-100
BY329F-1200	DTV64F-1200C	DTV32F-1200A/B	BYV28-150		BYW98-150
BY329-1200	DTV64-1200C	DTV32-1200A/B	BYV28-200		BYW98-200
BY359F-1500	DTV32F-1500A/B		BYV28-50		BYW98-50
BY359-1500	DTV32-1500A/B		BYV29F-500		STTA/B806DI
BYD33D		BYT01-200	BYV29-300	BYT08-300	
BYD33G		BYT01-400	BYV29-400	BYT08-400	
BYD33J		BYT11-600	BYV29-500		STTA/B806D
BYD33K		BYT11-800	BYV32-100	BYW51-100	
BYD33M		BYT11-800	BYV32-150	BYW51-150	
BYP101	STTA1512P		BYV32-200	BYW51-200	
BYP102		STTA2512P	BYV32-500	BYW51-50	
BYR29F-600		STTA/B806DI	BYV34-300		BYT16P-300
BYR29F-700		BYT08PI-1000	BYV34-400		BYT16P-400
BYR29F-800		BYT08PI-1000	BYV36A		BYT11-600
BYR29-500	STTA/B806D		BYV36B		BYT11-600
BYR29-600	STTA/B806D		BYV36C		BYT11-600
BYR29-700		BYT08P-1000	BYV36D		BYT11-800
BYR29-800		BYT08P-1000	BYV36E		BYT11-1000
BYR79-500		STTA/B1206D	BYV42-100		BYW51-100
BYR79-600		STTA/B1206D	BYV42-150		BYW51-150
BYT08P-1000		STTA812D	BYV42-200		BYW51-200
BYT08P-600	STTA/B806D		BYV42-50		BYW51-50
BYT08P-800		BYT08P-1000	BYV72-100	BYW99P-100	
BYT12P-1000		STTA1212D	BYV72-150	BYW99P-150	
BYT12P-600	STTA/B1206D		BYV72-200	BYW99P-200	
BYT12P-800		BYT12P-1000	BYV74F-600		STTA/B2006PI
BYT30P-1000		STTA2512P	BYV79-100	BYW81P-100	
BYT30P-600	STTA/B3006P		BYV79-150	BYW81P-150	
BYT30P-800		BYT30P-1000	BYV79-200	BYW81P-200	

Note. STTA/B... means STTA... or STTB... , depending on the applications

POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
BYV79-50	BYW81P-50		DSEI8-06A	STTA/B806D	
BYV95A		BYT13-600	DSEI12-04A	BYT12P-400	
BYV95A		BYT11-600	DSEI12-06A	STTA/B1206D	
BYV95B		BYT13-600	DSEI12-08A		BYT12P-1000
BYV95B		BYT11-600	DSEI12-10A	BYT12P-1000	
BYV95C		BYT11-600	DSEI2x30-04C	BYT230PIV-400	
BYV95C		BYT13-600	DSEI2x30-06B	STTA/B6006TV2	
BYV96D		BYT11-800	DSEI2x30-06C	STTA/B6006TV2	
BYV96E		BYT11-1000	DSEI2x30-08B		BYT230PIV-1000
BYW29F-100		STPR510F	DSEI2x30-10B	BYT230PIV-1000	
BYW29F-200		STPR520F	DSEI2x31-04C	BYT231PIV-400	
BYW29-100	BYW80-100		DSEI2x31-06B	STTA/B6006TV1	
BYW29-100		STPR510D	DSEI2x31-06C	STTA/B6006TV1	
BYW29-150	BYW80-150		DSEI2x31-08B		BYT231PIV-1000
BYW29-200	BYW80-200		DSEI2x31-10B	BYT231PIV-1000	
BYW29-200		STPR520D	DSEI2x61-04C	BYT261PIV-400	
BYW29-50	BYW80-50		DSEI2x61-06B	STTA/B12006TV1	
BYW30-100	BYW81-100		DSEI2x61-06C	STTA/B12006TV1	
BYW30-150	BYW81-150		DSEI2x61-08B		BYT261PIV-1000
BYW30-200	BYW81-200		DSEI2x61-10B	BYT261PIV-1000	
BYW30-50	BYW81-50		DSEI30-04A	BYT30P-400	
BYW31-100	BYW77-100		DSEI30-06A	STTA/B3006P	
BYW31-150	BYW77-150		DSEI30-06C	STTA/B3006P	
BYW31-200	BYW77-200		DSEI30-08A		BYT30P-1000
BYW31-50	BYW77-50		DSEI30-10A	BYT30P-1000	
BYW51F-100		STPR1610CF	DSEI60-04A	BYT60P-400	
BYW51F-200		STPR1620CF	DSEI60-06A	STTA/B6006P	
BYW51-100		STPR1610CT	DSEI60-08A		BYT60P-1000
BYW51-200		STPR1620CT	DSEI60-10A	BYT60P-1000	
BYW80F-100		STPR810F	EGP10A		BYW100-50
BYW80F-200		STPR820F	EGP10B		BYW100-100
BYW80-100		STPR810D	EGP10C		BYW100-150
BYW80-200		STPR820D	EGP10D		BYW100-200
BYW81P-100		STPR1510D	EGP10F		BYT01-300
BYW81P-200		STPR1520D	EGP10G		BYT01-400
BYW92-100	BYW92-100		EGP20A		BYW98-50
BYW92-150	BYW92-150		EGP20B		BYW98-100
BYW92-200	BYW92-200		EGP20C		BYW98-150
BYW92-50	BYW92-50		EGP20D		BYW98-200
BYW93-100		BYW78-100	EGP20F		BYT03-300
BYW93-150		BYW78-150	EGP20G		BYT03-400
BYW93-2000		BYW78-200	EGP30A		BYW98-50
BYW93-50		BYW78-50	EGP30B		BYW98-100
BYW94-100	BYW08-100		EGP30C		BYW98-150
BYW94-150	BYW08-150		EGP30D		BYW98-200
BYW94-200	BYW08-200		EGP30F		BYT03-300
BYW94-50	BYW08-50		EGP30G		BYT03-400
BYW96D		BYT13-800	ES2A	SMBYW02-50	
BYW96E		BYT13-1000	ES2B	SMBYW02-100	
BYW98-100		STPR310	ES2C	SMBYW02-150	
BYW98-200		STPR320	ES2D	SMBYW02-200	
C6P40F		STTA506F	ES3A	SMBYW04-50	
CTL22S	STPR620CT		ES3B	SMBYW04-100	
D20LC20	BYW51F-200		ES3C	SMBYW04-150	
DSEI8-04A	BYT08P-400		ES3D	SMBYW04-200	

POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
ESA25M	STPR620CT		GI1001		BYW100-50
FE1A		BYW100-50	GI1002		BYW100-100
FE1B		BYW100-100	GI1003		BYW100-150
FE1C		BYW100-150	GI1004		BYW100-200
FE1D		BYW100-200	GI1101		BYW98-50
FE2A		BYW98-50	GI1102		BYW98-100
FE2B		BYW98-100	GI1103		BYW98-150
FE2C		BYW98-150	GI1104		BYW98-200
FE2D		BYW98-200	GI1401		BYW80-50
FE3A		BYW98-50	GI1402		BYW80-100
FE3B		BYW98-100	GI1403		BYW80-150
FE3C		BYW98-150	GI1404		BYW80-200
FE3D		BYW98-200	GI12401	BYW51-50	
FEP16AT		BYW51-50	GI12402	BYW51-100	
FEP16BT		BYW51-100	GI12403	BYW51-150	
FEP16CT		BYW51-150	GI12404	BYW51-200	
FEP16CT		BYW51-150	HFA08TB60	STTA/B806D	
FEP16DT		BYW51-200	HFA15PB60	STTA/B2006P	
FEP30AP		BYW99P-50	HFA15TB60	STTA/B1206D	
FEP30BP		BYW99P-100	HFA20PB120	STTA2512P	
FEP30CP		BYW99P-150	HFA25PB60	STTA/B3006P	
FEP30DP		BYW99P-200	MR812		BYT01-200
FEP30HP	STTA/B3006P		MR813		BYT01-300
FEP30JP	STTA/B3006P		MR814		BYT01-400
FEPF30HP	STTA/B3006PI		MR816		BYT11-600
FEPF30JP	STTA/B3006PI		MR817		BYT11-800
FES16AT	BYW81P-50		MR818		BYT11-1000
FES16BT	BYW81P-100		MR917	BYT13-800	
FES16CT	BYW81P-150		MR918	BYT13-1000	
FES16DT	BYW81P-200		MUR105	BYW100-50	
FES16FT		BYT12P-300	MUR110	BYW100-100	
FES16GT		BYT12P-400	MUR115	BYW100-150	
FES16HT		STTA/B2006P	MUR120	BYW100-200	
FES16HT		STTA/B1206D	MUR130	BYT01-300	
FES16JT		STTA/B1206D	MUR140	BYT01-400	
FES16JT		STTA/B2006P	MUR405	BYW98-50	
FES8AT	BYW80-50		MUR410	BYW98-100	
FES8BT	BYW80-100		MUR415	BYW98-150	
FES8CT	BYW80-150		MUR420	BYW98-200	
FES8DT	BYW80-200		MUR430	BYT03-300	
FES8FT	BYT08P-300		MUR440	BYT03-400	
FES8GT	BYT08P-400		MUR605CT	BYW51-50	
FES8HT	STTA/B806D		MUR610CT	BYW51-100	
FES8JT	STTA/B806D		MUR615CT	BYW51-150	
FESF16HT		STTA/B2006PI	MUR620CT	BYW51-200	
FESF16JT		STTA/B2006PI	MUR805	BYW80-50	
FESF8HT		STTA/B806DI	MUR810	BYW80-100	
FESF8JT		STTA/B806DI	MUR815	BYW80-150	
GI812		BYT01-200	MUR820	BYW80-200	
GI814		BYT01-400	MUR830	BYT08P-300	
GI816		BYT11-600	MUR840	BYT08P-400	
GI817		BYT11-800	MUR850	STTA/B806D	
GI818		BYT11-1000	MUR860	STTA/B806D	
GI917	BYT13-800		MUR870		BYT12P-1000
GI918	BYT13-1000		MUR880		BYT12P-1000

POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
MUR890		BYT12P-1000	PLR816	BYT11-600	
MUR1012E		DTV64-1200C	PLR817	BYT11-800	
MUR1015E		DTV32-1500B	PLR818	BYT11-1000	
MUR1505	BYW81P-50		RF1A		SMBYW02-50
MUR1510	BYW81P-100		RF1B		SMBYW02-100
MUR1515	BYW81P-150		RF1D		SMBYW02-200
MUR1520	BYW81P-200		RF1G		SMBYT01-400
MUR1550		STTA/B1206D	RF1J		STTB106U
MUR1560		STTA/B1206D	RG1D		BYT01-200
MUR1605CT	BYW51-50		RG1G		BYT01-400
MUR1610CT	BYW51-100		RG1J		BYT11-600
MUR1615CT	BYW51-150		RG1K		BYT11-800
MUR1620CT	BYW51-200		RG1M		BYT11-1000
MUR2505	BYW77-50		RG2J		BYT13-600
MUR2510	BYW77-100		RG2K		BYT13-800
MUR2515	BYW77-150		RG2M		BYT13-1000
MUR2520	BYW77-200		RG3J		BYT13-600
MUR3005PT	BYW99P-50		RG3K		BYT13-800
MUR3010PT	BYW99P-100		RG3M		BYT13-1000
MUR3015PT	BYW99P-150		RGP10D		BYT01-200
MUR3020PT	BYW99P-200		RGP10F		BYT01-300
MUR5005	BYW78-50		RGP10G		BYT01-400
MUR5010	BYW78-100		RGP10H		BYT11-600
MUR5015	BYW78-150		RGP10J		BYT11-600
MUR5020	BYW78-200		RGP10K		BYT11-800
MUR6040	BYT60P-400		RGP10M		BYT11-1000
MUR7005	BYW08-50		RGP15K		BYT13-800
MUR7010	BYW08-100		RGP15M		BYT13-1000
MUR7015	BYW08-150		RGP20K		BYT13-800
MUR7020	BYW08-200		RGP20M		BYT13-1000
MUR8100	BYT08P-1000		RGP25K		BYT13-800
MURS110T3	SMBYW02-100		RGP25M		BYT13-1000
MURS115T3	SMBYW02-150		RGP30K		BYT13-800
MURS120T3	SMBYW02-200		RGP30M		BYT13-1000
MURS130T3	SMBYT01-300		RGP80A	BYW80-50	
MURS140T3	SMBYT01-400		RGP80B	BYW80-100	
MURS160T3	STTA/B106U		RGP80D	BYW80-200	
NS502		BYT01-200	RGP80G		STTA/B1206D
NS504		BYT01-400	RGP80J	STTA/B1206D	
NS505		BYT11-600	RGP80J	STTA/B806D	
NS506		BYT11-600	RGP80K		BYT12P-1000
NS1002		BYT01-200	RMC020		BYT01-200
NS1004		BYT01-400	RMC040		BYT01-400
NS1005		BYT11-600	RMC060		BYT11-600
NS1006		BYT11-600	RMC080		BYT11-800
PHS1001	BYW100-50		RMC0100		BYT11-1000
PHS1002	BYW100-100		RP16AT	BYT13-800	BYW51-50
PHS1003	BYW100-150		RP16BT	BYT13-1000	BYW51-100
PHS2401	BYW51-50		RP16DT	SMBYW02-50	BYW51-200
PHS2402	BYW51-100		RP300K	SMBYW02-100	
PHS2403	BYW51-150		RP300M	SMBYW02-200	
PHS2404	BYW51-200		RS2A		
PLR812	BYT01-200		RS2B		
PLR813	BYT01-300		RS2D		
PLR814	BYT01-400		RS2G		SMBYT01-400

POWER RECTIFIERS and SCHOTTKY DIODES

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RS2J		STTB106U	S3A	SMBYW04-50	
RS3A		SMBYW04-50	S3A8F		BYT13-800
RS3B		SMBYW04-100	S3B	SMBYW04-100	
RS3D		SMBYW04-200	S3D	SMBYW04-200	
RS3G		SMBYT03-400	S3G		SMBYT03-400
RS3J		STTB306S	S3J		STTB306S
RS8AT		BYW80-50	S110F		BYT11-1000
RS8BT		BYW80-100	S310F		BYT13-1000
RS8DT		BYW80-200	SES5401	BYW80-50	
RS8GT		BYT08P-400	SES5401C	BYW51-50	
RS8JT		STTA/B1206D	SES5402C	BYW51-100	
RS8KT		BYT12P-1000	SES5403	BYW80-150	
RS8MT		BYT12P-1000	SES5403C	BYW51-150	
RUD805	BYW80-50		SES5404	BYW80-200	
RUD810	BYW80-100		SES5404C	BYW51-200	
RUD815	BYW80-150		SES5501	BYW81-50	
RUD820	BYW80-200		SES5502	BYW81-100	
RUR805	BYW80-50		SES5503	BYW81-150	
RUR810	BYW80-100		SES5504	BYW81-200	
RUR815	BYW80-150		SES5701	BYW77-50	
RUR820	BYW80-200		SES5702	BYW77-100	
RUR840	BYT08P-400		SES5703	BYW77-150	
RUR850	STTA/B806D		SES5801	BYW78-50	
RUR860	STTA/B806D		SES5802	BYW78-100	
RUR880		BYT08P-1000	SES5803	BYW78-150	
RUR1510	BYW81P-100		SGI5401	BYW80-50	
RUR1515	BYW81P-150		SGI5401C	BYW51-50	
RUR1520	BYW81P-200		SGI5402	BYW80-100	
RUR1540			SGI5402C	BYW51-100	
RUR1560		STTA/B1206D	SGI5403	BYW80-150	
RUR1580		BYT12P-1000	SGI5403C	BYW51-150	
RUR8100	BYT08P-1000		SGI5404	BYW80-200	
RUR15100		BYT12P-1000	SGI5404C	BYW51-200	
RURD805	BYW51-50		SRP100D		BYT01-200
RURD810	BYW51-100		SRP100G		BYT01-400
RURD815	BYW51-150		SRP100J		BYT11-600
RURD820	BYW51-200		SRP100K		BYT11-800
RURD1610	BYW99P-100		SRP300J		BYT13-600
RURD1615	BYW99P-150		SRP300K		BYT13-800
RURD1620	BYW99P-200		SRSFR120		BYT01-200
RURG3010		BYW77P-100	SRSFR140		BYT01-400
RURG3015		BYW77P-150	SRSFR150		BYT11-600
RURG3020		BYW77P-200	SRSFR160		BYT11-600
RURG3040	BYT30P-400		SRSFR180		BYT11-800
RURG3060	STTA/B3006P		TS3		BYT01-300
RURG3080		BYT30P-1000	TS5		BYT11-600
RURG50100	BYT60P-1000		TS20		BYT01-200
RURG5040	BYT60P-400		TS40		BYT01-400
RURG5060	STTA/B6006P		TS60		BYT11-600
RURG5080		BYT60P-1000	UES701	BYW77-50	
RURG30100	BYT30P-1000		UES702	BYW77-100	
S1A2F		BYT01-200	UES703	BYW77-150	
S1A3F		BYT01-300	UES704	BYW77-200	
S1A4F		BYT01-400	UES801	BYW08-50	
S1A5F		BYT11-600	UES802	BYW08-100	

POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
UES803	BYW08-150		VHE701	BYW77-50	
UES804	BYW08-200		VHE702	BYW77-100	
UES1001		BYW100-50	VHE703	BYW77-150	
UES1001		BYW100-50	VHE704	BYW77-20	
UES1002		BYW100-100	VHE801	BYW08-50	
UES1003		BYW100-150	VHE802	BYW08-100	
UES1102		BYW100-100	VHE803	BYW08-150	
UES1103		BYW100-150	VHE804	BYW08-200	
UES1104		BYT01-200	VHE1401	BYW80-50	
UES1105		BYT01-300	VHE1402	BYW80-100	
UES1106		BYT01-400	VHE1403	BYW80-150	
UES1301		BYW98-50	VHE1404	BYW80-200	
UES1302		BYW98-100	VHE2401	BYW51-50	
UES1303		BYW98-150	VHE2402	BYW51-100	
UES1304		BYW98-200	VHE2403	BYW51-150	
UES1305		BYT03-300	VHE2404	BYW51-200	
UES1306		BYT03-400			
UES1401	BYW80-50		POWER SCHOTTKY		
UES1402	BYW80-100		10TQ035	STPS1035D	
UES1403	BYW80-150		10TQ045	STPS1045D	
UES1404	BYW80-200		12CTQ035	STPS1535CT	
UES1421	STTA/B1206D		12CTQ045	STPS1545CT	
UES1422		BYT12P-1000	18TQ035		STPS1535D
UES1423	BYT12P-1000		18TQ045		STPS1545D
UES1501	BYW81P-50		200CNQ035		STPS24035TV
UES1502	BYW81P-100		200CNQ040		STPS24045TV
UES1503	BYW81P-150		200CNQ045		STPS24045TV
UES1504	BYW81P-200		20CTQ035	STPS2035CT	
UES2401	BYW51-50		20CTQ045	STPS2045CT	
UES2402	BYW51-100		28CPQ035	STPS3035CPI	
UES2403	BYW51-150		28CPQ045	STPS3045CPI	
UES2404	BYW51-200		30CPQ035	STPS3035CPI	
UES2601		BYW99P-50	30CPQ045	STPS3045CPI	
UES2602		BYW99P-100	30CTQ035	STPS3035CT	
UES2603		BYW99P-150	30CTQ045	STPS3045CT	
UES2604		BYW99P-200	30WQ03F		STPS330S
UF4001	BYW100-50		30WQ04F		STPS340S
UF4002	BYW100-100		BYV118F-35	STPS1535CF	
UF4003	BYW100-200		BYV118F-35	STPS1535CT	
UF4004	BYT01-400		BYV118F-40	STPS1545CT	
UF54001	BYW98-50		BYV118F-40	STPS1545CF	
UF54002	BYW98-100		BYV118F-45	STPS1545CF	
UF54003	BYW98-200		BYV118F-45	STPS1545CT	
UF54004	BYT03-400		BYV133F-35	STPS2035CF	
UG30BPBT	BYW99P-100		BYV133F-40	STPS2045CF	
UG30CPBT	BYW99P-150		BYV133F-45	STPS2045CF	
UG30DPBT	BYW99P-200		BYV133-35	STPS2035CT	
VHE205	BYW10-050		BYV133-40	STPS2045CT	
VHE210	BYW100-100		BYV133-45	STPS2045CT	
VHE215	BYW100-150		BYV143F-35		STPS3035CPI
VHE220	BYW100-200		BYV143F-40		STPS3045CPI
VHE605		BYW98-50	BYV143F-45		STPS3045CPI
VHE610		BYW98-100	BYV143-35	STPS3035CT	
VHE615		BYW98-150	BYV143-40	STPS3045CT	
VHE620		BYW98-200	BYV143-45	STPS3045CT	

POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
MBR735	STPS735D		PBYR1045	STPS1045D	
MBR745	STPS745D		PBYR1045F	STPS1045F	
MBR1035	STPS1035D		PBYR1535CT	STPS1535CT	
MBR1045	STPS1045D		PBYR1535CTF	STPS1535CF	
MBR1535CT	STPS1535CT		PBYR1540CT	STPS1545CT	
MBR1545CT	STPS1545CT		PBYR1540CTF	STPS1545CF	
MBR1635		STPS1535D	PBYR1545CT	STPS1545CT	
MBR1645		STPS1545D	PBYR1545CTF	STPS1545CF	
MBR2035CT	STPS2035CT		PBYR1635		STPS1535D
MBR2045CT	STPS2045CT		PBYR1635F		STPS1535F
MBR2535CT	STPS3035CT		PBYR1640		STPS1545D
MBR2545CT	STPS3045CT		PBYR1640F		STPS1545F
MBR3035PT	STPS3035CP		PBYR1645		STPS1545D
MBR3045PT	STPS3045CP		PBYR1645F		STPS1545F
MBR12035CT		STPS12035TV	PBYR2035CT	STPS2035CT	
MBR12045CT		STPS12045TV	PBYR2035CTF	STPS2035CF	
MBR20035CT		STPS24035TV	PBYR2040CT	STPS2045CT	
MBR20045CT		STPS24045TV	PBYR2040CTF	STPS3045CT	
MBR20100CT	STPS2010CT		PBYR2040CTF	STPS2045CF	
MBR240100TV	STPS80100TV		PBYR2045CT	STPS2045CT	
MBR28035CT	STPS16035TV		PBYR2045CTF	STPS2045CF	
MBR28045CT	STPS16045TV		PBYR2535CT	STPS3035CT	
MBRD320		STPS320S	PBYR2545CT	STPS3045CT	
MBRD330		STPS330S	PBYR3035PT	STPS3035CP	
MBRD340		STPS340S	PBYR3040PT	STPS3045CP	
MBRD1535CT		STPS1535CF	PBYR3045PT	STPS3045CP	
MBRD1545CT		STPS1545CF	PBYR12035TV	STPS12035TV	
MBRF735		STPS735F	PBYR12040TV	STPS12045TV	
MBRF745		STPS745F	PBYR12045TV	STPS12045TV	
MBRF1035		STPS1035F	PBYR16035TV	STPS16035TV	
MBRF1045		STPS1045F	PBYR16040TV	STPS16045TV	
MBRF1635		STPS1535F	PBYR16045TV	STPS16045TV	
MBRF1645		STPS1545F	PBYR20100CT	STPS20100CT	
MBRF2035CT		STPS2035CF	S08C35		STPS735D
MBRF2045CT		STPS2045CF	S08C45		STPS745D
MBRF3035PT	STPS3035CPI		S15SC3M		STPS1535CF
MBRF3045PT	STPS3045CPI		S15SC4M		STPS1545CF
MBRS320T3	STPS320S		S30SC3M	STPS3035CPI	STPS3035CP
MBRS330T3	STPS330S		S30SC4M	STPS3045CPI	STPS3045CP
MBRS340T3	STPS340S		S60SC3M	STPS6035CPI	STPS6035CP
PBYR235CT	STPS240CE		S60SC4M	STPS6045CPI	STPS6045CP
PBYR240CT	STPS240CE		SBL530		STPS735D
PBYR245CT	STPS260CE		SBL540		STPS745D
PBYR635CT		STPS635CT	SBL1030		STPS1035D
PBYR640CT		STPS640CT	SBL1040		STPS1045D
PBYR735	STPS735D		SBL1630CT		STPS1535CT
PBYR735F	STPS735F		SBL1640CT		STPS1545CT
PBYR740	STPS745D		SBL3030PT		STPS3035CP
PBYR740F	STPS745F		SBL3040PT		STPS3045CP
PBYR745	STPS745D		SBLF530		STPS735F
PBYR745F	STPS745F		SBLF530CT		STPS630CF
PBYR1035	STPS1035D		SBLF540		STPS745F
PBYR1035F	STPS1035F		SBLF540CT		STPS640CF
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PBYR1040F	STPS1045F		SBLF1040		STPS1045F

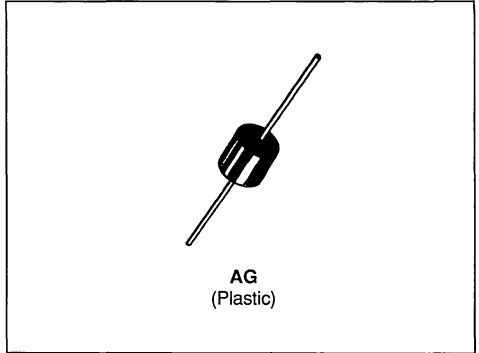
POWER RECTIFIERS and SCHOTTKY DIODES

INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT	INDUSTRY PART NUMBER	SGS-THOMSON DIRECT REPLACEMENT	SGS-THOMSON SIMILAR REPLACEMENT
SBLF1630CT SBLF1640CT SBLF3030PT SBLF3040PT SD41P SD241P SS1B SS12 SS13 SS14 SS16 SS19 SS22 SS23 SS24 SS26 SS29 SS2B SS32 SS33 SS34 UES1605S UES1610S UES1615S UES1620S UES3005C UES3005S UES3010C UES3010S UES3015C UES3015S USD3030C USD3040C USD3045C USD4530C USD4540C USD4545C	STPS3035CPI STPS3045CPI STPS3045CP STPS320U STPS330U STPS340U STPS320S STPS330S STPS340S BYW99P-50 BYW99P-100 BYW99P-150 STPS3045CP STPS3045CP STPS3045CP	STPS1535CF STPS1545CF STPS2045CT STPS1100U STPS120E STPS130E STPS140E STPS160E STPS1100U STPS1100U STPS1100U STPS1100U BYW81P-50 BYW81P-100 BYW81P-150 BYW81P-200 BYW77P-50 BYW77P-100 BYW77P-150 STPS4045CP STPS4045CP STPS4045CP			

STANDARD DIODES DATASHEETS

RECTIFIER DIODES

- STANDARD RECTIFIER
- HIGH SURGE CURRENT CAPABILITY
- LOW FORWARD VOLTAGE DROP


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_F (AV)	Average Forward Current*	$T_a = 90^\circ\text{C}$	6	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$ Sinusoidal	400	A
P_{tot}	Power Dissipation*	$T_a = 90^\circ\text{C}$	6	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ\text{C}$
T_L	Maximum Lead Temperature For Soldering During 10s at 4mm From Case		230	$^\circ\text{C}$

Symbol	Parameter	BY 214-					Unit
		200	400	600	800	1000	
V_{RRM}	Repetitive Peak Reverse Voltage	200	400	600	800	1000	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	10	$^\circ\text{C}/\text{W}$

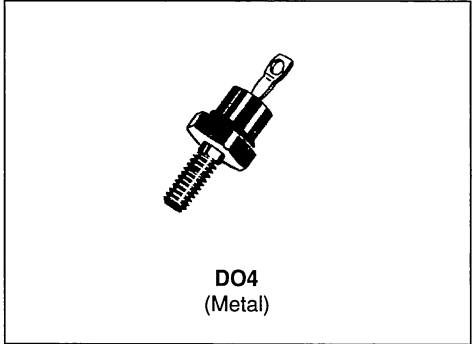
ELECTRICAL CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 100^\circ\text{C}$	$V_R = V_{RRM}$			250	μA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 20\text{A}$			1.2	V

* On infinite heatsink with 10mm lead length
 Single phase, half wave, resistive or inductive load

RECTIFIER DIODES

- STANDARD RECTIFIER
- HIGH SURGE CURRENT CAPABILITY
- LOW FORWARD VOLTAGE DROP


ABSOLUTE MAXIMUM RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(AV)}$	Average forward current *	$T_c=150^\circ\text{C}$	6	A
I_{FSM}	Surge non repetitive forward current	$t_p=10\text{ms}$ sinusoidal	450	A
P_{tot}	Power dissipation *	$T_c=150^\circ\text{C}$	25	W
T_{stg} T_j	Storage and junction temperature range		- 55 to + 175	$^\circ\text{C}$

* Single phase, half wave, resistive or inductive load.

Symbol	Parameter	1N							Unit
		1344B	1345B	1346B	1347B	1348B	3988	3990	
V_{RRM}	Repetitive peak reverse voltage	200	300	400	500	600	800	1000	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	3.5	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_j = 25^\circ\text{C}$	$I_F = 20\text{ A}$			1.2	V
I_R **	$T_j = 150^\circ\text{C}$	$V_R = V_{RRM}$			500	μA

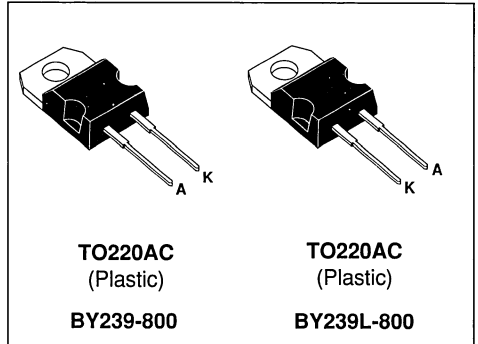
Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

** $t_p = 5\ \text{ms}$, duty cycle < 2 %

RECTIFIER DIODES
MAIN PRODUCTS CHARACTERISTICS

$I_{F(av)}$	10 A
V_{RRM}	800 V
$V_F(max)$	1.45 V

- STANDARD RECTIFIER
- HIGH SURGE CURRENT CAPABILITY
- LOW FORWARD VOLTAGE DROP


ABSOLUTE MAXIMUM RATINGS (limiting values)

Symbol	Parameter	Value	Unit
$I_{F(av)}$	Average forward current *	$T_c=100^\circ\text{C}$ 10	A
I_{FSM}	Surge non repetitive forward current	$t_p=10\text{ms}$ sinusoidal 140	A
P_{tot}	Power dissipation *	$T_c=100^\circ\text{C}$ 12.5	W
T_{stg} T_j	Storage and junction temperature range	- 40 to + 125	$^\circ\text{C}$

* Single phase, half wave, resistive or inductive load.

Symbol	Parameter	BY239(L)-				Unit
		200	400	600	800	
V_{RRM}	Repetitive peak reverse voltage	200	400	600	800	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	2	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

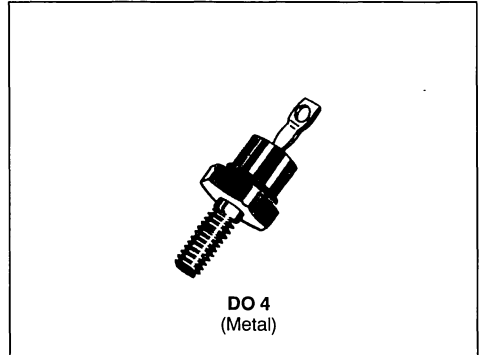
Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_j = 25^\circ\text{C}$	$I_F = 30\text{ A}$			1.45	V
I_R **	$T_j = 125^\circ\text{C}$	$V_R = V_{RRM}$			500	μA

Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

** $t_p = 5\ \text{ms}$, duty cycle < 2 %

RECTIFIER DIODES

- STANDARD RECTIFIER
- HIGH SURGE CURRENT CAPABILITY
- LOW FORWARD VOLTAGE DROP


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_F (AV)	Average Forward Current*	$T_c = 125^\circ\text{C}$	12	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$ Sinusoidal	230	A
P_{tot}	Power Dissipation*	$T_c = 125^\circ\text{C}$	12.5	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to 150	$^\circ\text{C}$

Symbol	Parameter	BYW 88-									Unit
		50	100	200	300	400	500	600	800	1000	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	500	600	800	1000	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2	$^\circ\text{C/W}$

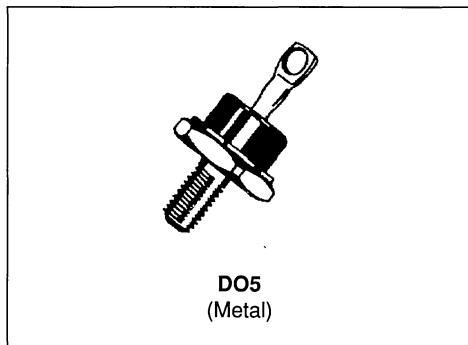
ELECTRICAL CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 125^\circ\text{C}$	$V_R = V_{RRM}$			3	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 35\text{A}$			1.25	V

* Single phase, half wave, resistive or inductive load

RECTIFIER DIODES

- STANDARD RECTIFIER
- HIGH SURGE CURRENT CAPABILITY
- LOW FORWARD VOLTAGE DROP


ABSOLUTE MAXIMUM RATINGS (limiting values)

Symbol	Parameter	Value	Unit
$I_{F(AV)}$	Average forward current *	$T_C=140^{\circ}\text{C}$ 40	A
I_{FSM}	Surge non repetitive forward current	$t_p=10\text{ms}$ sinusoidal 700	A
P_{tot}	Power dissipation *	$T_C=140^{\circ}\text{C}$ 44	W
T_{stg} T_J	Storage and junction temperature range	- 55 to + 175	$^{\circ}\text{C}$

* Single phase, half wave, resistive or inductive load.

Symbol	Parameter	1N							Unit
		1186	1187	1188	1189	1190	3766	3768	
V_{RRM}	Repetitive peak reverse voltage	200	300	400	500	600	800	1000	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	0.8	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

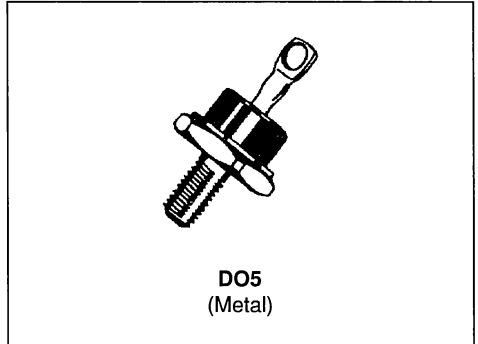
Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_J = 25^{\circ}\text{C}$	$I_F = 110\text{ A}$			1.5	V
I_R **	$T_J = 150^{\circ}\text{C}$	$V_R = V_{RRM}$			5	mA

Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

** $t_p = 5\ \text{ms}$, duty cycle < 2 %

RECTIFIER DIODES

- STANDARD RECTIFIER
- HIGH SURGE CURRENT CAPABILITY
- LOW FORWARD VOLTAGE DROP


ABSOLUTE MAXIMUM RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(AV)}$	Average forward current *	$T_c=150^\circ\text{C}$	20	A
I_{FSM}	Surge non repetitive forward current	$t_p=10\text{ms}$ sinusoidal	450	A
P_{tot}	Power dissipation *	$T_c=150^\circ\text{C}$	25	W
T_{stg} T_j	Storage and junction temperature range		- 55 to + 175	$^\circ\text{C}$

* Single phase, half wave, resistive or inductive load.

Symbol	Parameter	1N				Unit
		1195A	1196A	1197A	1198A	
V_{RRM}	Repetitive peak reverse voltage	300	400	500	600	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	1	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_j = 25^\circ\text{C}$	$I_F = 70\text{ A}$			~1.5	V
I_R **	$T_j = 150^\circ\text{C}$	$V_R = V_{RRM}$			5	mA

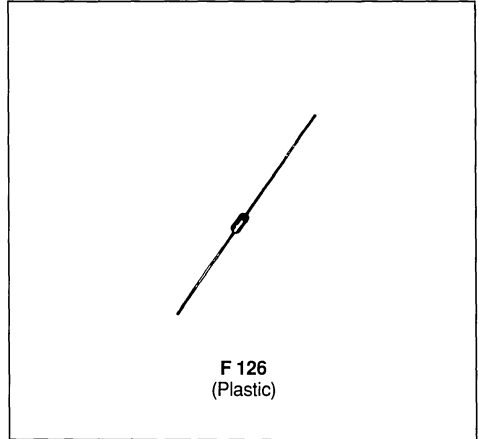
Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

** $t_p = 5\ \text{ms}$, duty cycle < 2 %

FAST DIODES

FAST RECOVERY RECTIFIER DIODES

- VERY FAST FORWARD AND REVERSE RECOVERY DIODES



SUITED FOR

- SWITCHING POWER TRANSISTORS DRIVER CIRCUITS (SERIES DIODES IN ANTISATURATION CLAMP SPEED UP DIODE IN DISCRETE DARLINGTON...)
- THYRISTORS GATE DRIVER CIRCUITS
- HIGH FREQUENCY RECTIFICATION

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	20	A
$I_F (AV)$	Average Forward Current	$T_a = 25^\circ C$ $\delta = 0.5$	1	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	20	A
P_{tot}	Power Dissipation*	$T_a = 25^\circ C$	1.7	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 125	$^\circ C$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ C$

Symbol	Parameter	PLQ 08	PLQ 1	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	80	100	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	80	100	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-a)}$	Junction-ambient*	60	$^\circ C/W$

* On infinite heatsink with 10mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _j = 25°C	V _R = V _{RRM}			10	μA
	T _j = 100°C				0.5	mA
V _F	T _j = 25°C	I _F = 1A			1.1	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C V _R = 30V	I _F = 1A See figure 12	di _F /dt = - 50A/μs			50	ns
t _{fr}	T _j = 25°C Measured at 1.1 x V _F	I _F = 1A	t _r = 20ns			50	ns

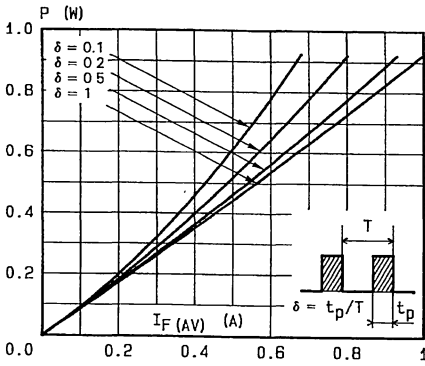


FIGURE 1 : Power losses versus average current.

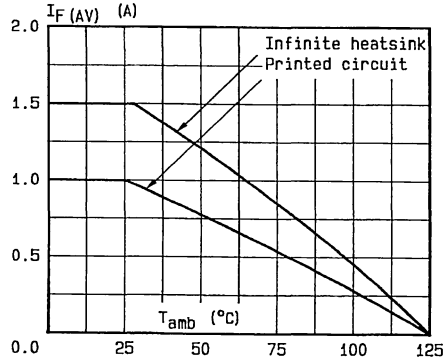


FIGURE 2 : Allowable DC current versus ambient temperature.

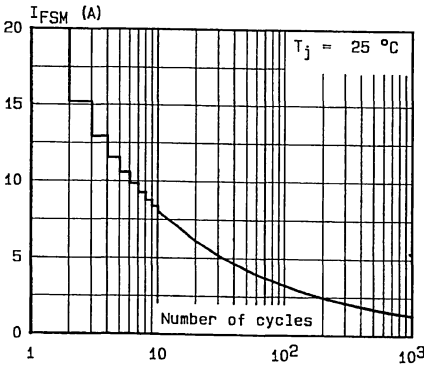


FIGURE 3 : Non repetitive surge peak current versus number of cycles.

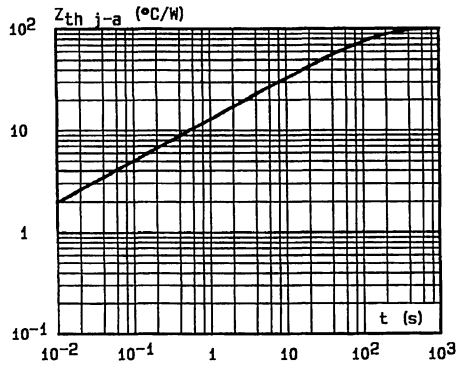


Fig.4 - Transient thermal impedance junction-ambient Printed circuit versus pulse duration (L = 10 mm).

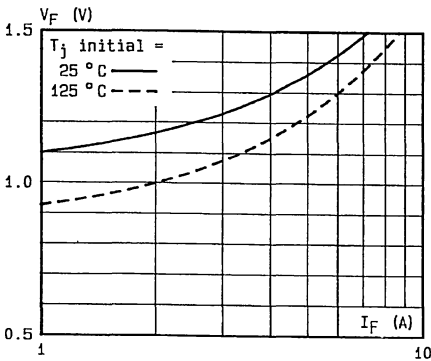


FIGURE 5 : Voltage drop versus forward current.

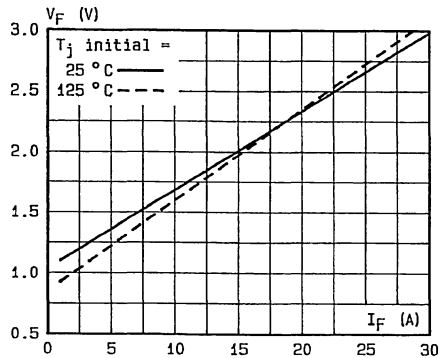


FIGURE 8 : Voltage drop versus forward current.

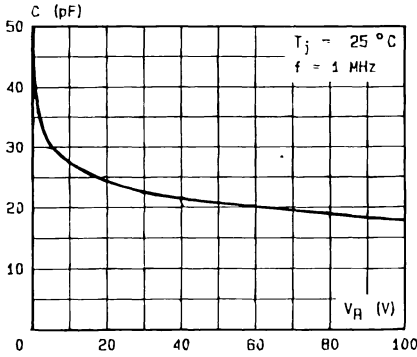


FIGURE 7 : Capacitance versus reverse voltage applied.

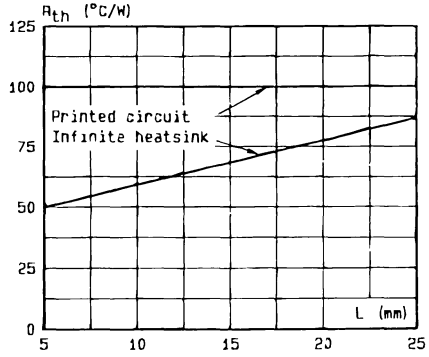


FIGURE 8 : Thermal resistance junction-ambient versus lead length.

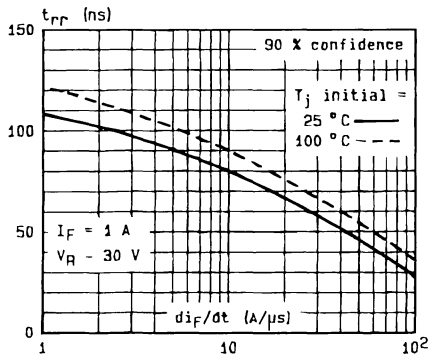


FIGURE 9 : Recovery time versus di_F/dt .

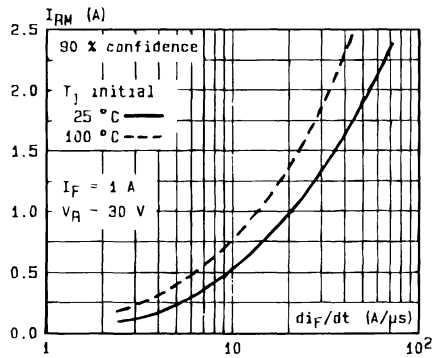


FIGURE 10 : Peak reverse current versus di_F/dt .

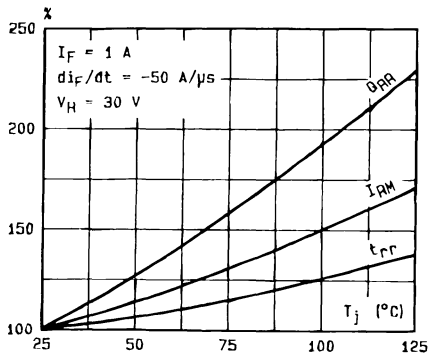


FIGURE 11 : Dynamic parameters versus junction temperature.

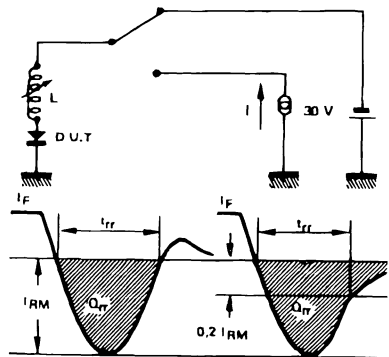


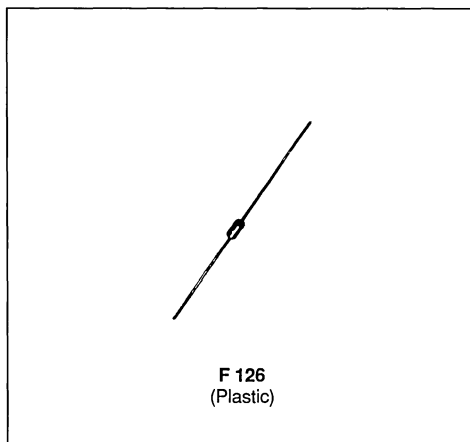
FIGURE 12 : Measurement of t_{rr} (fig.9) and I_{RM} (fig.10).

FAST RECOVERY RECTIFIER DIODES

- SOFT RECOVERY
- VERY HIGH VOLTAGE
- SMALL RECOVERY CHARGE

APPLICATIONS

- ANTISATURATION DIODES FOR TRANSISTOR BASE DRIVE
- SNUBBER DIODES


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	20	A
$I_{F(AV)}$	Average Forward Current*	$T_a = 75^\circ C$ $\delta = 0.5$	1	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	35	A
P_{tot}	Power Dissipation*	$T_a = 75^\circ C$	1.25	W
T_{stg} T_J	Storage and Junction Temperature Range		- 55 to 150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ C$

Symbol	Parameter	BYT 11-			Unit
		600	800	1000	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	1000	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	60	$^\circ C/W$

* On infinite heatsink with 10mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$				20	μA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$				1.3	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions				Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$			100	ns

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.075 I_F \quad P = 1.1 \times I_{F(AV)} + 0.075 \times I_F^2_{(RMS)}$$

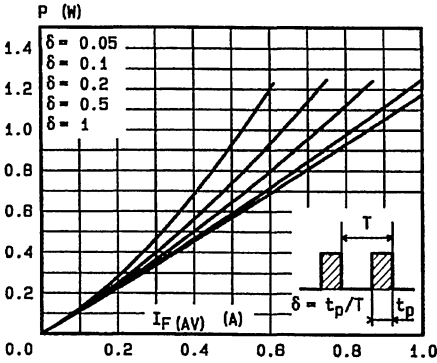


Fig. 1 - Maximum average power dissipation versus average forward current.

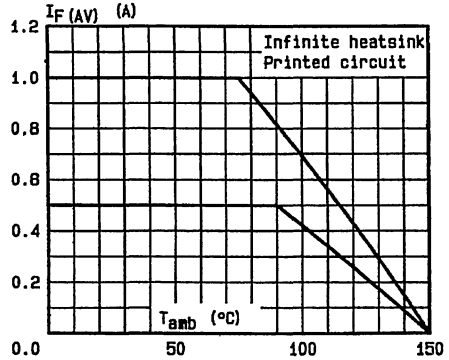


Fig. 2 - Average forward current versus ambient temperature.

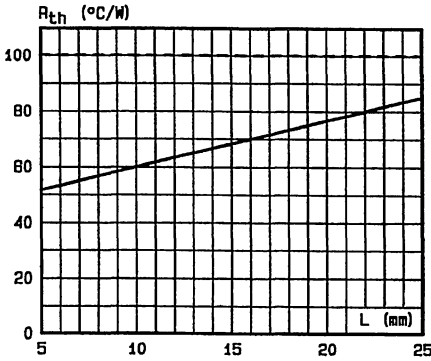


Fig. 3 - Thermal resistance versus lead length.

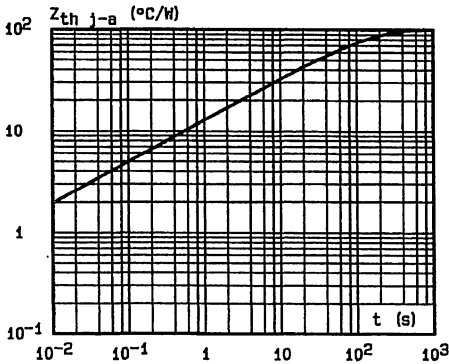


Fig. 4 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

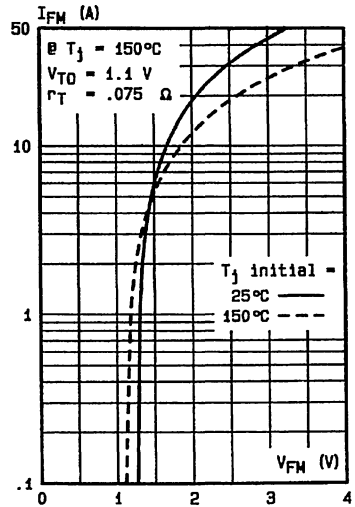
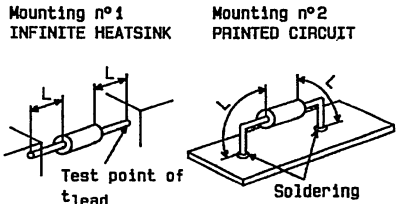


Fig. 5 - Peak forward current versus peak forward voltage drop (maximum values).

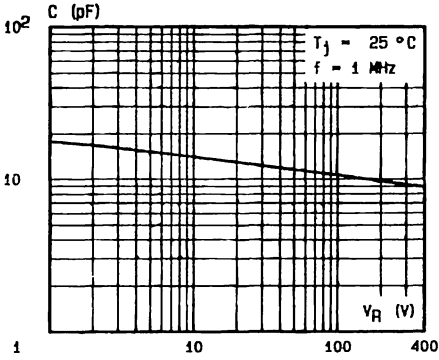


Fig.6 - Capacitance versus reverse applied voltage

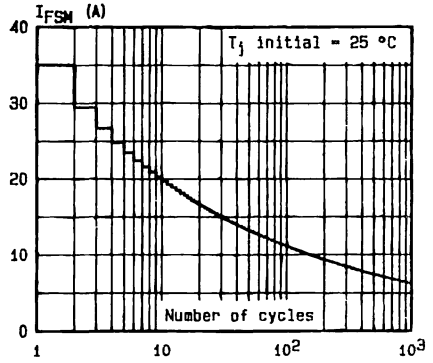


Fig.7 - Non repetitive surge peak current versus number of cycles

FAST RECOVERY RECTIFIER DIODES

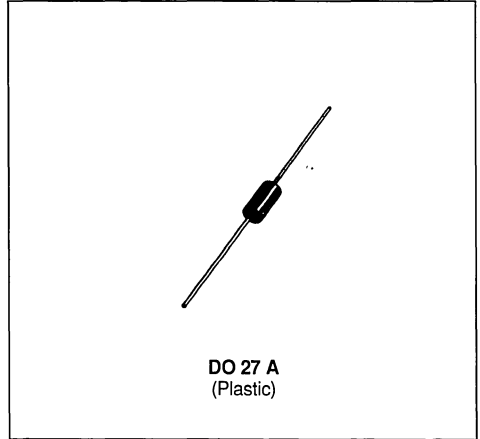
- LOW FORWARD VOLTAGE DROP
- HIGH SURGE CURRENT CAPABILITY

APPLICATIONS

- AC-DC POWER SUPPLIES AND CONVERTERS
- FREE WHEELING DIODES, etc.

DESCRIPTION

Their high efficiency and high reliability combined with small size and low cost make these fast recovery rectifier diodes very attractive components for many demanding applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	100	A
$I_F (AV)$	Average Forward Current*	$T_a = 90^\circ C$	3	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	150	A
P_{tot}	Power Dissipation*	$T_a = 90^\circ C$	3.5	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 175	$^\circ C$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ C$

Symbol	Parameter	PFR					Unit
		850	851	852	854	856	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	400	600	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	75	150	250	450	650	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-a)}$	Junction-ambient*	25	$^\circ C/W$

* On infinite heatsink with 10mm lead length.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			10	μA
	$T_j = 100^\circ\text{C}$				500	
V_F	$T_j = 25^\circ\text{C}$	$I_F = 3\text{A}$			1.25	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ $d_{IF}/dt = -25\text{A}/\mu\text{s}$	PFR 850 → 854			150	ns
			PFR 856			200	
I_{RM}	$T_j = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ $d_{IF}/dt = -25\text{A}/\mu\text{s}$				2	A

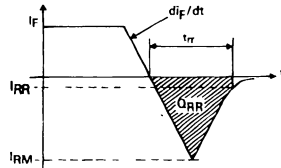
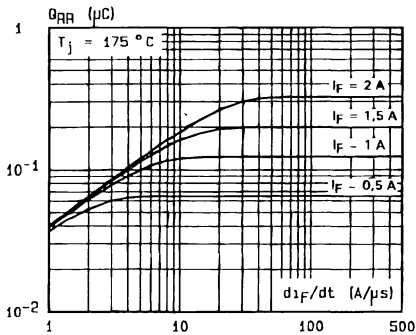


Fig.1 Recovered charge versus d_{IF}/dt (typical values).

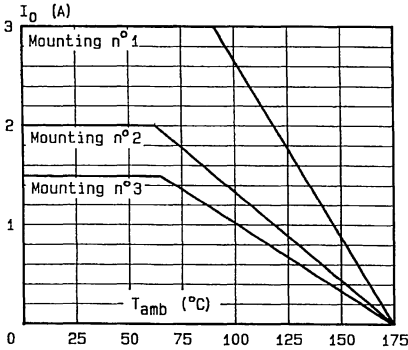


Fig.2 - Mean forward current I_0 versus ambient temperature (maximum values).

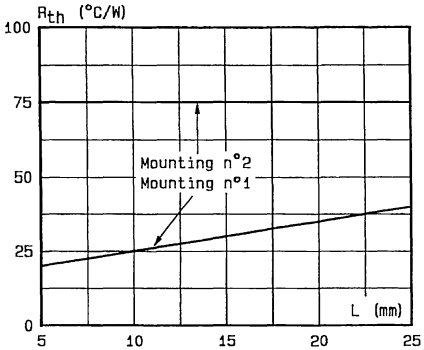
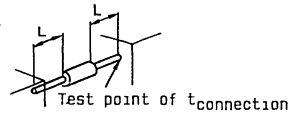
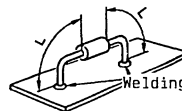


Fig.3 - Thermal resistance versus lead length (maximum values).

Mounting n°1 : INFINITE HEATSINK



Mounting n°2 : PRINTED CIRCUIT



Mounting n°3 :

$L = 10$ mm
 $R_{th} = 55$ °C/W

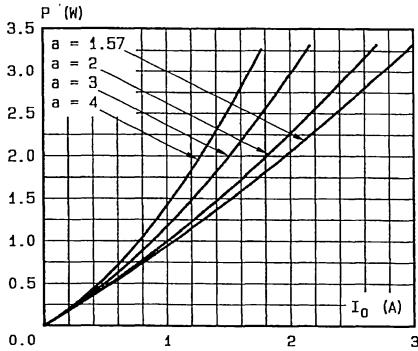
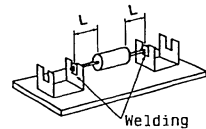


Fig.4 - Mean power dissipation versus mean forward current I for different rectifying types, in the case of :
- a resistive load ($a = 1.57$)
- a capacitive load ($a > 1.57$)

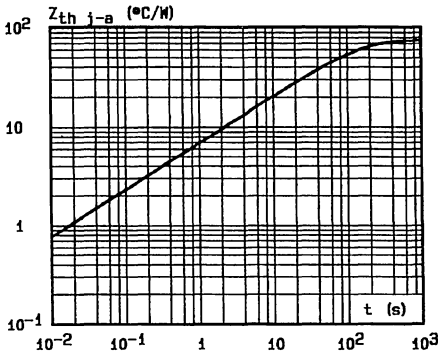


Fig.5 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration ($L = 10$ mm)

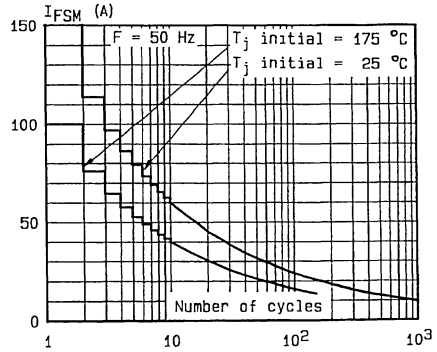


Fig.6 - Non repetitive surge peak forward current versus number of cycles.

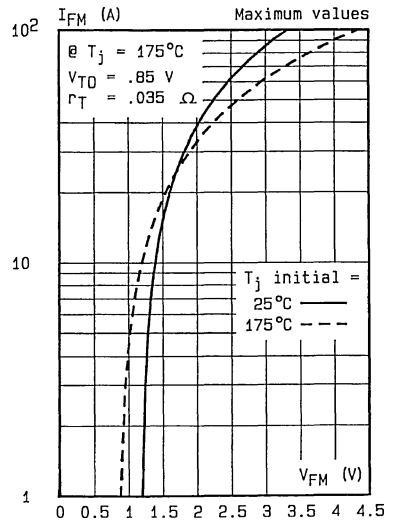
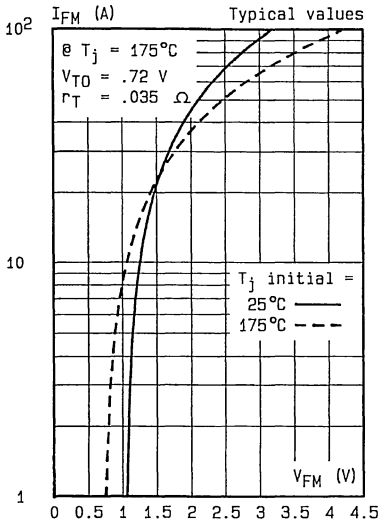


Fig.3a/3b - Peak forward current versus peak forward voltage drop.

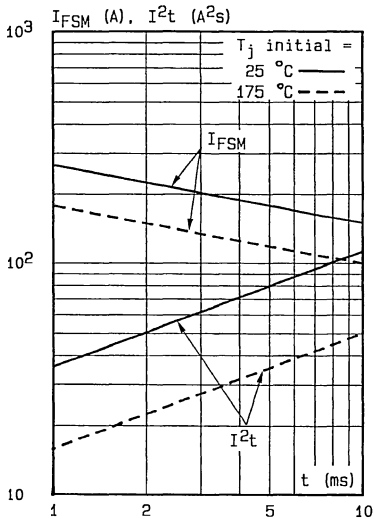


Fig.8 - Non repetitive surge peak forward current for a sinusoidal pulse with width : $t \leq 10 \text{ ms}$, and corresponding value of I^2t .

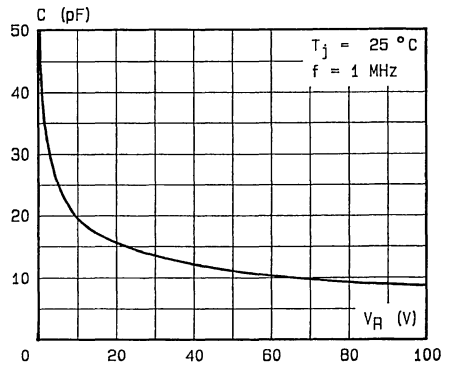
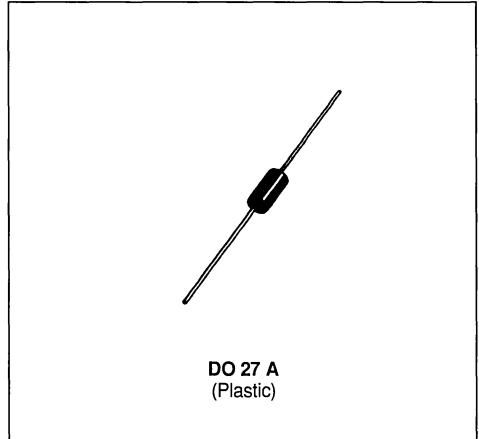


Fig.9 - Capacity C versus reverse applied voltage V_R (typical values).



FAST RECOVERY RECTIFIER DIODES

- SOFT RECOVERY
- VERY HIGH VOLTAGE
- SMALL RECOVERY CHARGE



APPLICATIONS

- ANTISATURATION DIODES FOR TRANSISTOR BASE DRIVE
- SNUBBER DIODES

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	50	A
$I_{F(AV)}$	Average Forward Current*	$T_a = 55^\circ C$ $\delta = 0.5$	3	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	100	A
P_{tot}	Power Dissipation*	$T_a = 55^\circ C$	3.75	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ C$

Symbol	Parameter	BYT 13-			Unit
		600	800	1000	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	1000	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	25	$^\circ C/W$

* On infinite heatsink with 10mm lead length.

ELECTRICAL CHARACTERISTICS**STATIC CHARACTERISTICS**

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$				20	μA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 3\text{A}$				1.3	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions				Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$			150	ns

To evaluate the conduction losses use the following equations :

$$V_F = 0.95 + 0.050 I_F \quad P = 0.95 \times I_{F(AV)} + 0.050 I_F^2_{(RMS)}$$

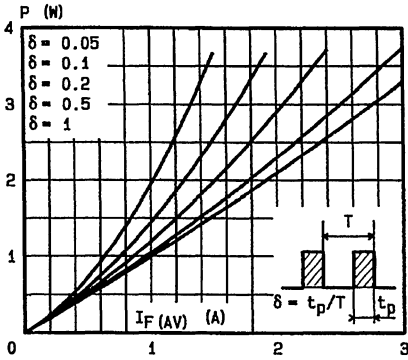


Fig.1 - Maximum average power dissipation versus average forward current.

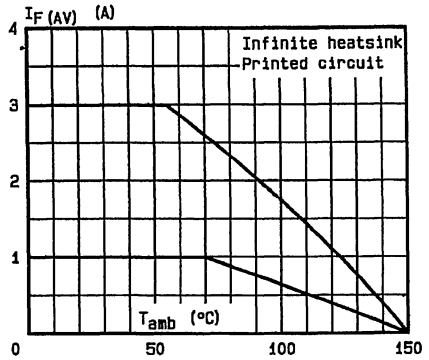


Fig.2 - Average forward current versus ambient temperature.

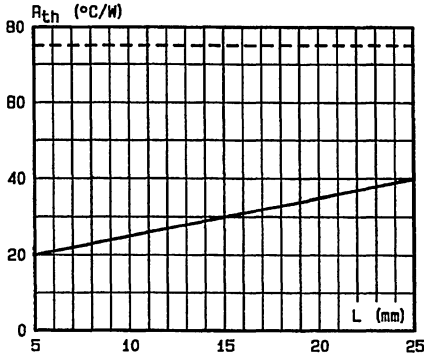


Fig.3 - Thermal resistance versus lead length.

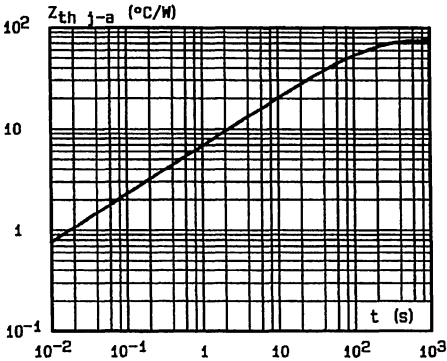
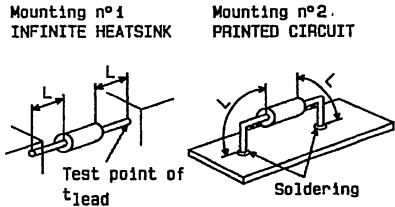


Fig.4 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

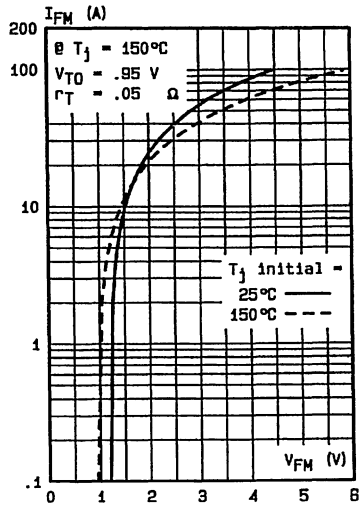


Fig.5 - Peak forward current versus peak forward voltage drop (maximum values).

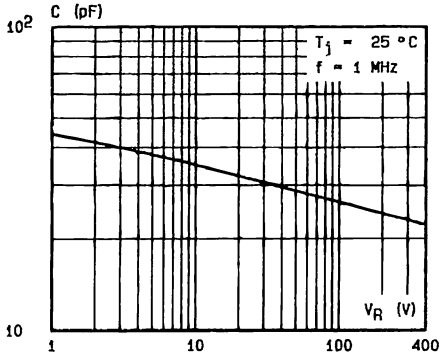


Fig.6 - Capacitance versus reverse applied voltage

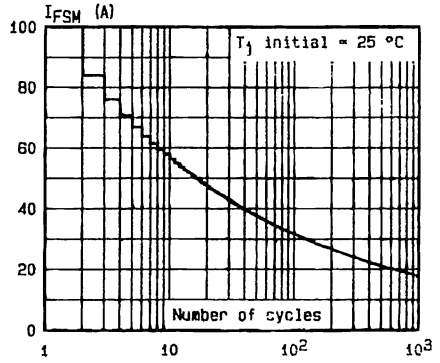


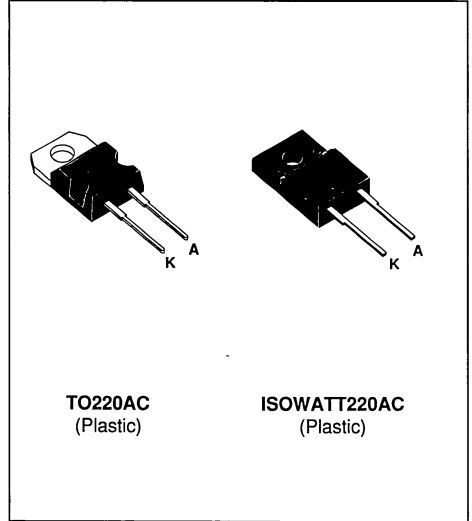
Fig.7 - Non repetitive surge peak current versus number of cycles

FAST RECOVERY RECTIFIER DIODES
FEATURES

- HIGH VOLTAGE CAPABILITY
- FAST AND SOFT RECOVERY
- INSULATED PACKAGE :
insulating voltage = 2000V_{DC}
capacitance = 12 pF

DESCRIPTION

Single chip rectifier suited for power conversion and polarity protection applications. This device is packaged in TO220AC and in ISOWATT220AC.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
I _{F(RMS)}	RMS on-state current		12	A	
I _{F(AV)}	Average forward current $\delta = 0.5$	TO220AC	T _c =130°C	6	A
		ISOWATT220AC	T _c =105°C	6	
I _{FSM}	Surge non repetitive forward current		tp=10ms sinusoidal	90	A
T _{stg} T _J	Storage and junction temperature range		- 65 to + 150 - 65 to + 150	°C °C	

Symbol	Parameter	BYT71- (F)					Unit
		100	200	400	600	800	
V _{RRM}	Repetitive peak off-state voltage	100	200	400	600	800	V

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	TO220AC	2.3	°C/W
		ISOWATT220AC	4.9	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R **	T _j = 25°C	V _R = V _{RRM}			20	μA
	T _j = 100°C				1	mA
V _F *	T _j = 100°C	I _F = 6 A			1.3	V
	T _j = 25°C	I _F = 6 A			1.4	

Pulse test : * tp = 380 μs, duty cycle < 2 %
 ** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 1A V _R = 30V			300	ns

To evaluate the conduction losses use the following equations :
 $P = 1.15 \times I_F(AV) + 0.025 \times I_F^2(RMS)$

Fig.1 : Average forward power dissipation versus average forward current.

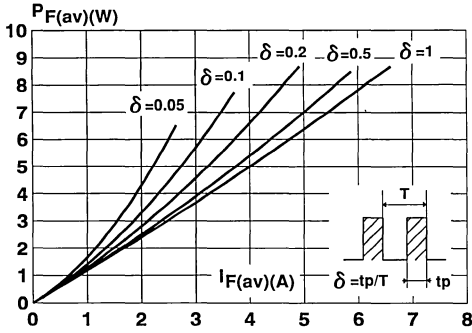


Fig.2 : Peak current versus form factor.

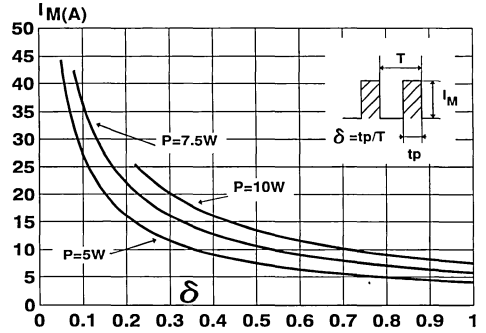


Fig.3 : Forward voltage drop versus forward current (maximum values).

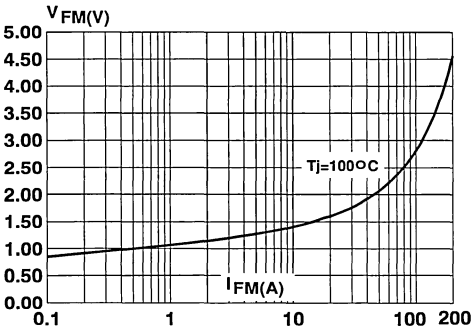


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration. (TO 220 AC)

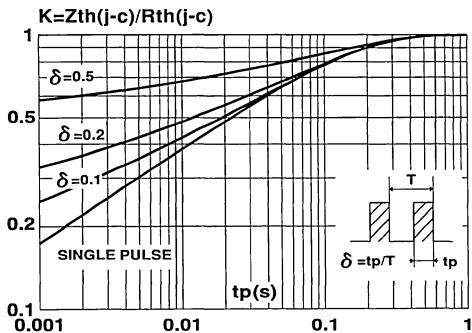


Fig.5 : Relative variation of thermal impedance junction to case versus pulse duration. (ISOWATT220AC)

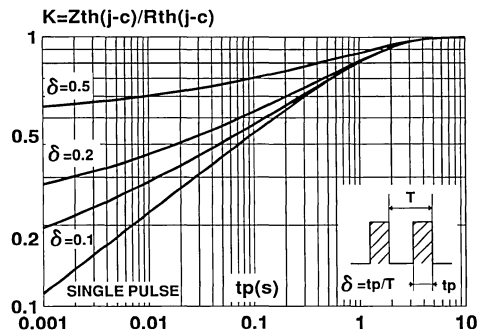


Fig.6 : Non repetitive surge peak forward current versus overload duration. (TO 220 AB)

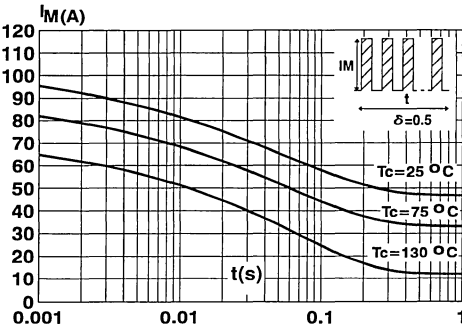


Fig.7 : Non repetitive surge peak forward current versus overload duration. (ISOWATT220AB)

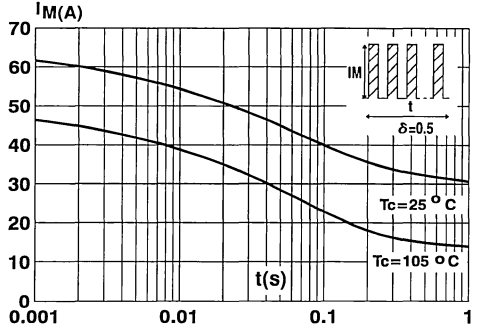


Fig.8 : Average current versus ambient temperature. (duty cycle : 0.5) (TO 220 AB)

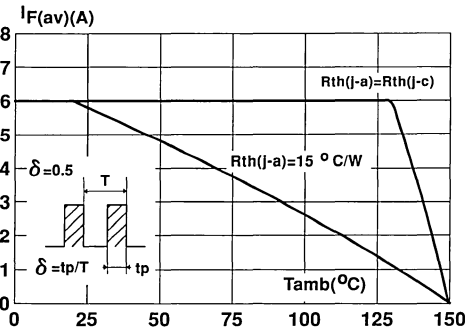


Fig.9 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AB)

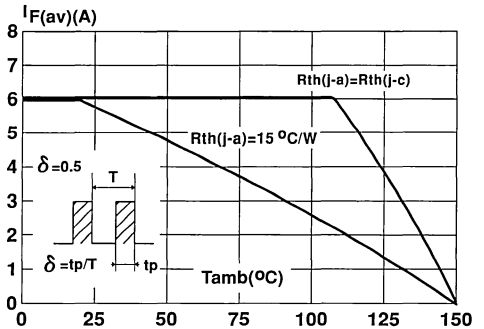


Fig.10 : Junction capacitance versus reverse voltage applied (Typical values).

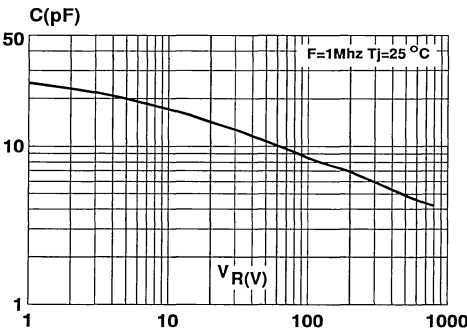


Fig.11 : Recovery charges versus di/dt.

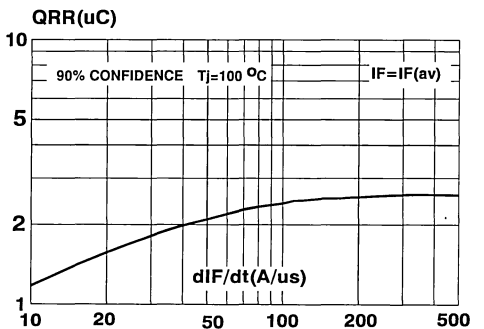


Fig.12 : Peak reverse current versus dIF/dt.

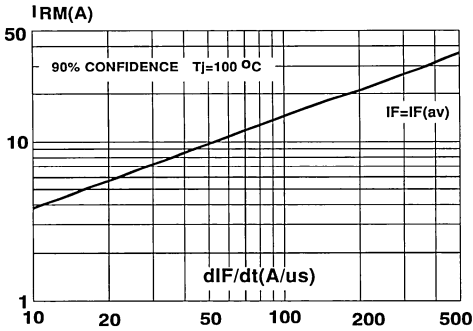


Fig.14 : Peak forward voltage versus dIF/dt.

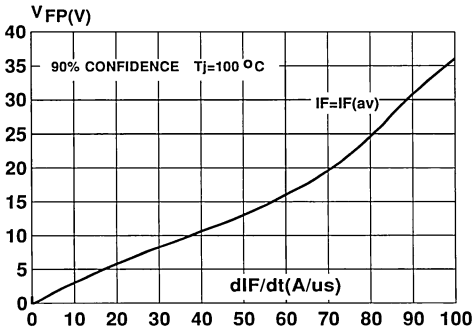


Fig.13 : Dynamic parameters versus junction temperature.

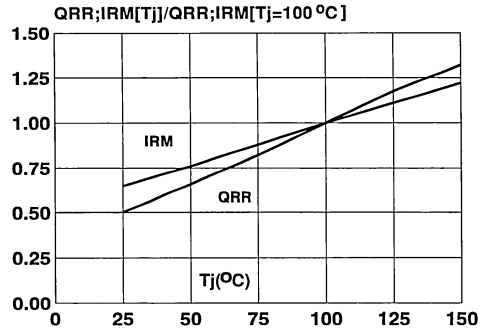
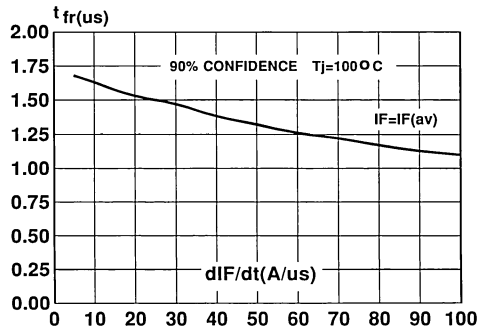


Fig.15 : Recovery time versus dIF/dt.

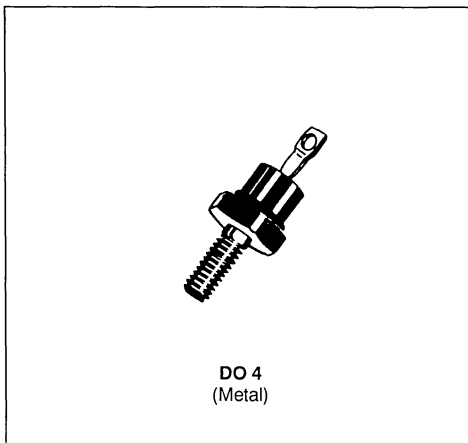


FAST RECOVERY RECTIFIER DIODES

- FAST RECOVERY TIME
- LOW FORWARD RECOVERY TIME

APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS
- HIGH FREQUENCY RECTIFIERS



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	130	A
$I_{F(AV)}$	Average Forward Current	$T_C = 100^\circ C$	6	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	150	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	20	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ C$

Symbol	Parameter	1N					Unit
		3879	3880	3881	3882	3883	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	μA
	$T_J = 100^\circ\text{C}$				1	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 6\text{A}$			1.4	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			200	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			0.2	μC
I_{RM}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			2	A

To evaluate the conduction losses use the following equations :

$$V_F = 1.2 + 0.02 I_F \quad P = 1.2 \times I_{F(AV)} + 0.02 I_F^2_{(RMS)}$$

FAST RECOVERY RECTIFIER DIODES

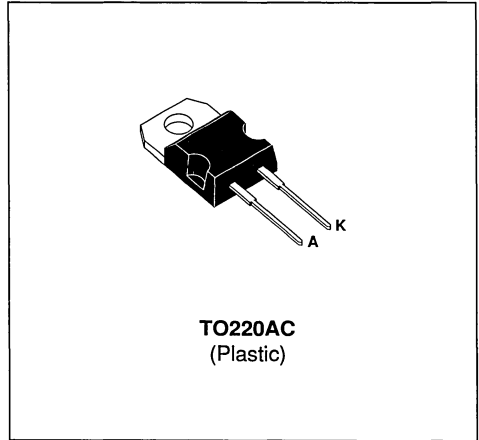
- LOW SWITCHING LOSSES
- LOW PEAK RECOVERY CURRENT I_{RM}
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS

APPLICATIONS

- MOTOR CONTROLS (FREE-WHEELING DIODE)
- SWITCHMODE POWER SUPPLIES
- SNUBBER DIODES

DESCRIPTION

Fast recovery rectifiers suited for power switching applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$ 100	A
$I_F (RMS)$	RMS Forward Current	20	A
$I_F (AV)$	Average Forward Current	$T_C = 115^\circ C$ $\delta = 0.5$ 10	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal 100	A
P_{tot}	Power Dissipation	$T_C = 90^\circ C$ 20	W
T_{stg} T_J	Storage and Junction Temperature Range	- 40 to 150	°C

Symbol	Parameter	BYX 233-			Unit
		200	400	600	
V_{RRM}	Repetitive Peak Reverse Voltage	200	400	600	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	250	450	650	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	3	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
	$T_J = 100^\circ\text{C}$				1	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 8\text{A}$			1.5	V
	$T_J = 100^\circ\text{C}$				1.25	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			150	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 100\text{V}$	$I_F = 8\text{A}$	$di_F/dt = -20\text{A}/\mu\text{s}$		2.2		μC
I_{RM}	$T_J = 25^\circ\text{C}$ $V_R = 100\text{V}$	$I_F = 8\text{A}$	$di_F/dt = -20\text{A}/\mu\text{s}$			4	A

To evaluate the conduction losses use the following equations :

$$V_F = 0.95 + 0.012 I_F \quad P = 0.95 \times I_{F(AV)} + 0.012 I_F^2(\text{RMS})$$

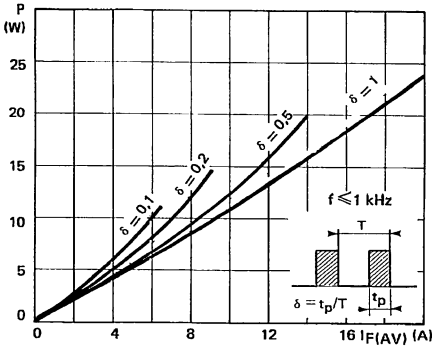


FIGURE 1 : Low frequency power losses versus average current

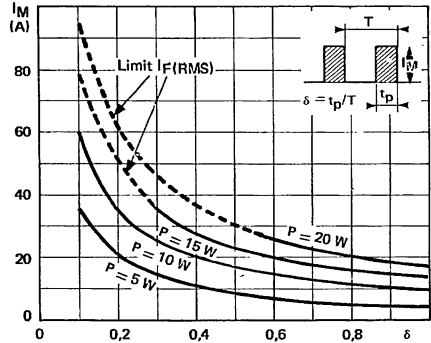


FIGURE 2 : Peak current versus form factor

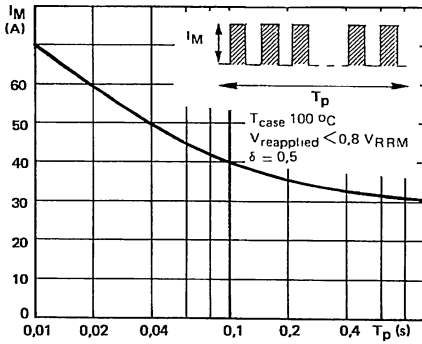


FIGURE 3 : Non repetitive peak surge current versus overload duration

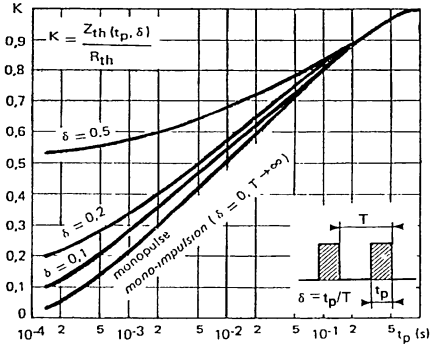


FIGURE 4 : Thermal impedance versus pulse width

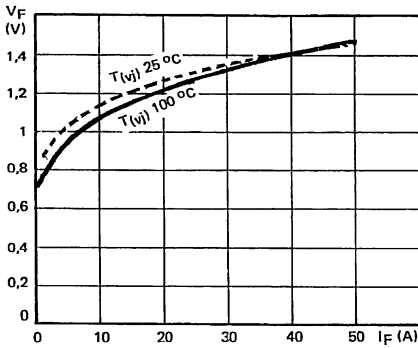


FIGURE 5 : Voltage drop versus forward current

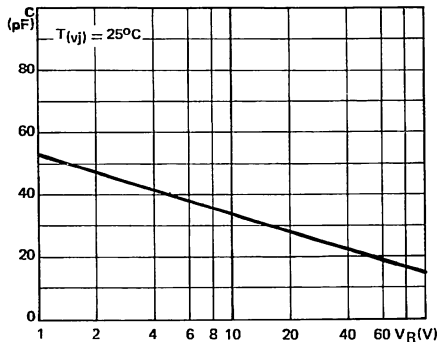


FIGURE 6 : Capacitance versus reverse voltage

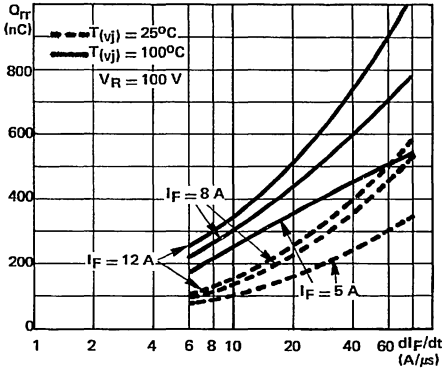


FIGURE 7 : Recovery charge versus di_F/dt

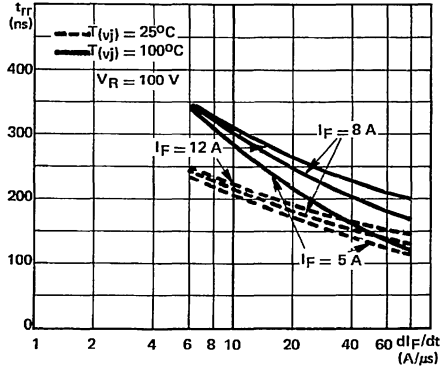


FIGURE 8 : Recovery time versus di_F/dt

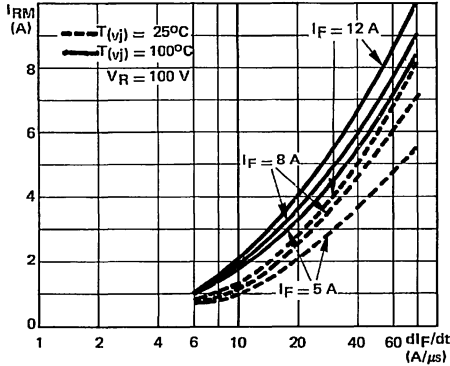


FIGURE 9 : Peak reverse current versus di_F/dt

FAST RECOVERY RECTIFIER DIODES

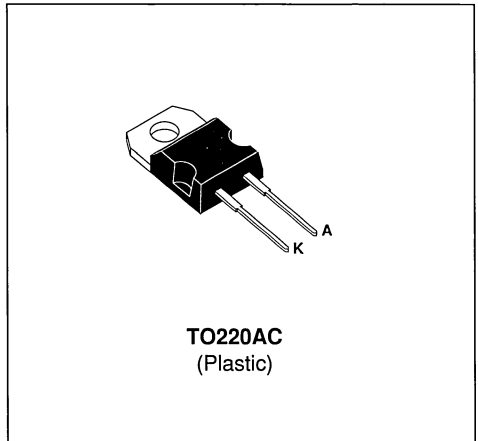
- HIGH VOLTAGE CAPABILITY
- FAST AND SOFT RECOVERY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF THE t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS

APPLICATIONS

- MOTOR CONTROLS AND CONVERTERS
- SWITCHMODE POWER SUPPLIES

DESCRIPTION

Fast recovery rectifiers suited for applications in combination with superswitch transistors



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	120	A
$I_F (RMS)$	RMS Forward Current		16	A
$I_F (AV)$	Average Forward Current	$T_C = 100^\circ C$ $\delta = 0.5$	10	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	120	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	20	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	°C

Symbol	Parameter	ESM 765-					Unit
		100	200	400	600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	100	200	400	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	100	200	400	600	800	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			20	μA
	T _J = 100°C				1	mA
V _F	T _J = 25°C	I _F = 10A			1.4	V
	T _J = 100°C				1.35	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			300	ns
Q _{rr}	T _J = 25°C V _R = 200V	I _F = 10A	di _F /dt = - 50A/μs		2.3		μC

To evaluate the conduction losses use the following equations :

$$V_F = 1.2 + 0.015 I_F$$

$$P = 1.2 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$$

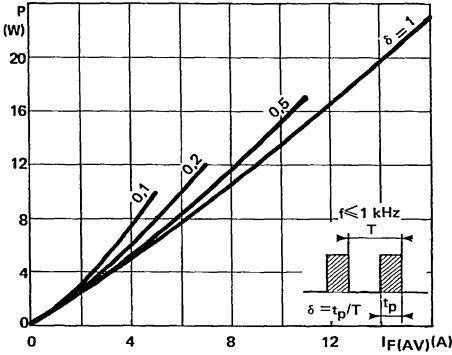


FIGURE 1: Low frequency power losses versus average current

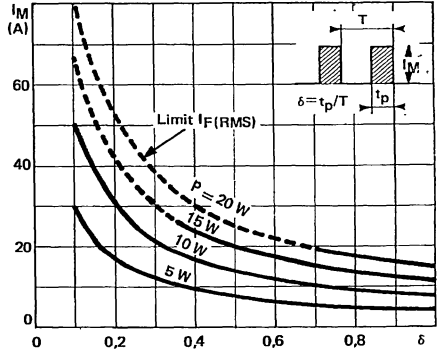


FIGURE 2: Peak current versus form factor

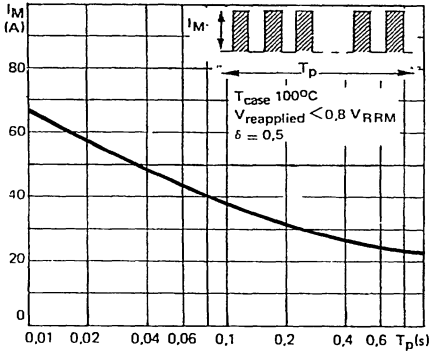


FIGURE 3: Non repetitive peak surge current versus overload duration

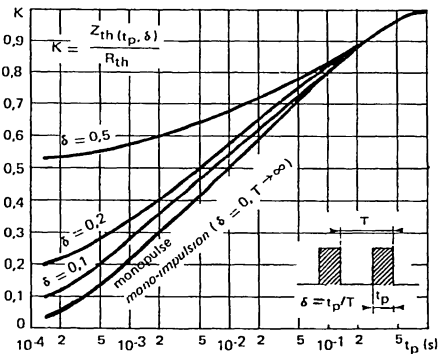


FIGURE 4: Thermal impedance versus pulse width

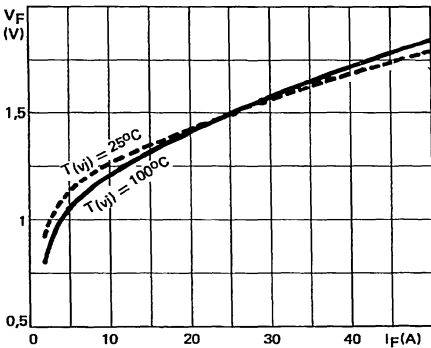


FIGURE 5: Forward voltage drop versus forward current

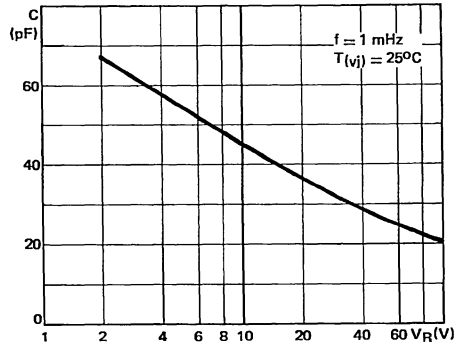


FIGURE 6: Capacitance versus applied reverse voltage

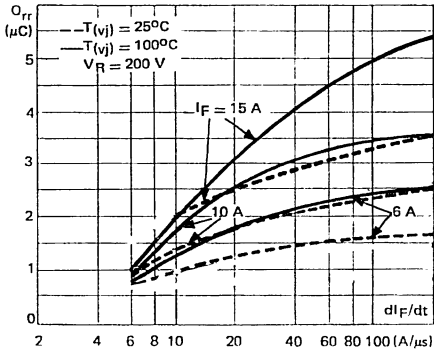


FIGURE 7: Recovery charge versus dI_F/dt

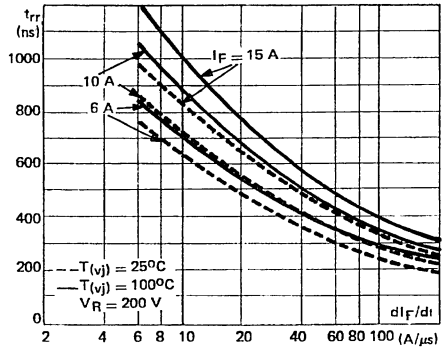


FIGURE 8: Recovery time versus dI_F/dt

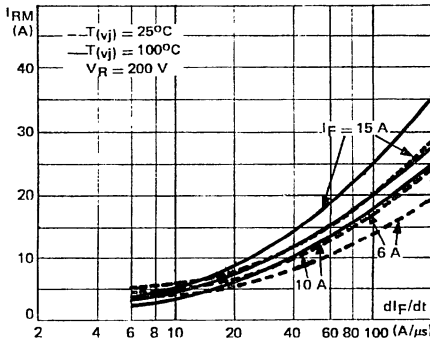


FIGURE 9: Peak reverse current versus dI_F/dt

FAST RECOVERY RECTIFIER DIODES

- HIGH VOLTAGE CAPABILITY
- FAST AND SOFT RECOVERY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS
- INSULATED

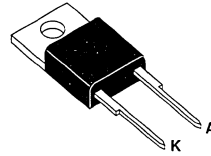
APPLICATIONS

- MOTOR CONTROLS AND CONVERTERS
- SWITCHMODE POWER SUPPLIES

DESCRIPTION

Fast recovery rectifiers suited for applications in combination with superswitch transistors.

Insulating voltage 2500 V_{RMS}



**Isolated
TO220AC
(Plastic)**

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_b \leq 20\mu s$	120	A
$I_{F(RMS)}$	RMS Forward Current		16	A
$I_{F(AV)}$	Average Forward Current	$T_C = 100^\circ C$ $\delta = 0.5$	10	A
I_{FSM}	Surge non Repetitive Forward Current	$t_b = 10ms$ Sinusoidal	120	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	20	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to 150	°C

Symbol	Parameter	ESM 765PI-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	600	800	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	3.5	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			20	μA
	T _J = 100°C				1	mA
V _F	T _J = 25°C	I _F = 10A			1.4	V
	T _J = 100°C				1.35	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C V _R = 30V	I _F = 1A di _F /dt = - 15A/μs			300	ns
Q _{rr}	T _J = 25°C V _R = 200V	I _F = 10A di _F /dt = - 50A/μs		2.3		μC

To evaluate the conduction losses use the following equations :

$$V_F = 1.2 + 0.015 I_F$$

$$P = 1.2 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$$

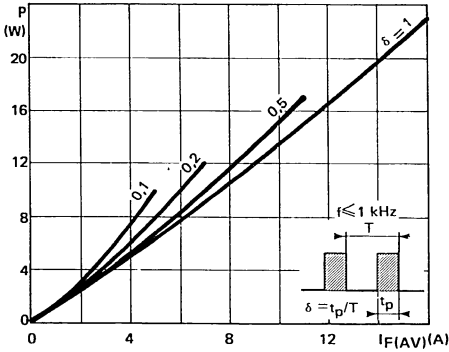


FIGURE 1: Low frequency power losses versus average current

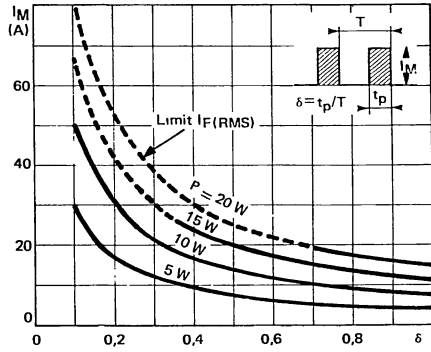


FIGURE 2: Peak current versus form factor

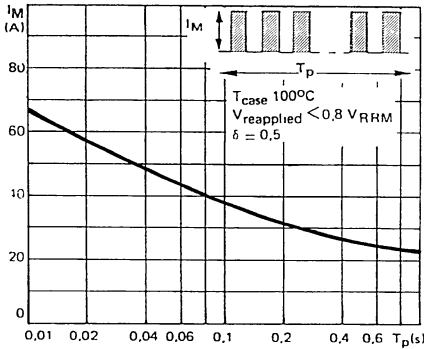


FIGURE 3: Non repetitive peak surge current versus overload duration

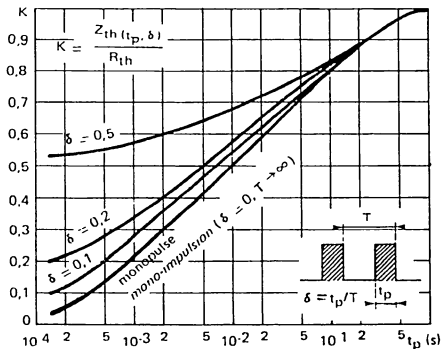


FIGURE 4: Thermal impedance versus pulse width

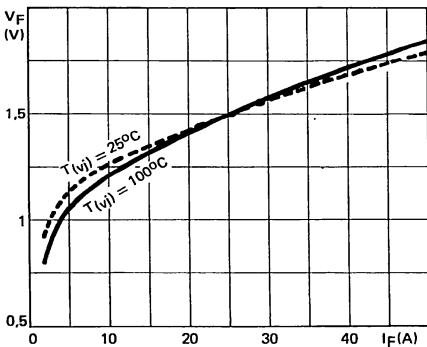


FIGURE 5: Forward voltage drop versus forward current

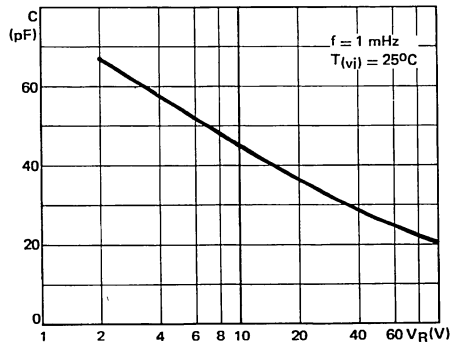


FIGURE 6: Capacitance versus applied reverse voltage

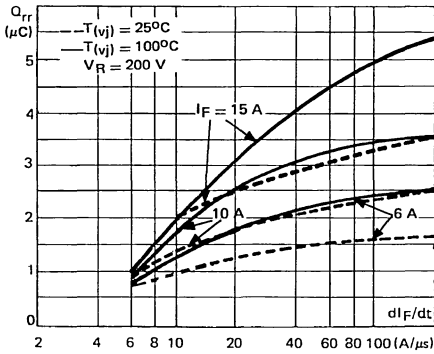


FIGURE 7: Recovery charge versus dI_F/dt

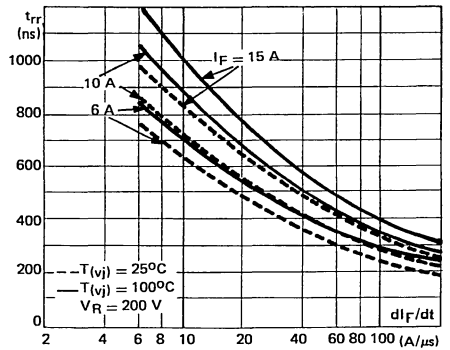


FIGURE 8: Recovery time versus dI_F/dt

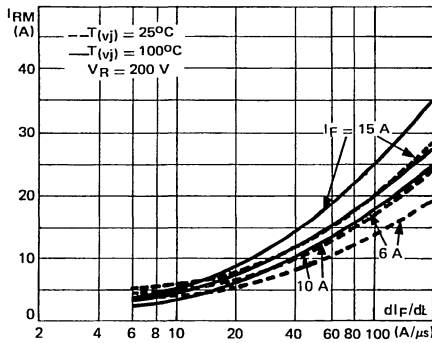
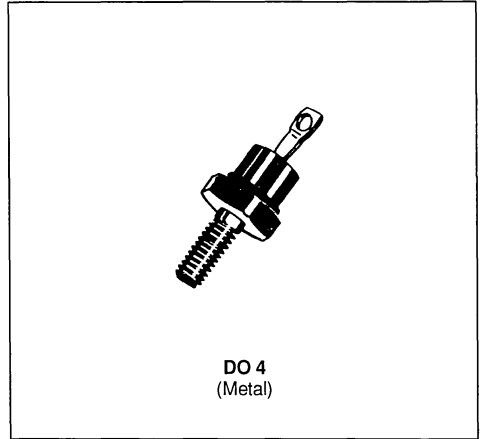


FIGURE 9: Peak reverse current versus dI_F/dt

FAST RECOVERY RECTIFIER DIODES

- VERY FAST RECOVERY TIME
- VERY LOW FORWARD RECOVERY TIME
- VERY LOW RECOVERED CHARGE



APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	130	A
$I_{F(AV)}$	Average Forward Current	$T_C = 100^\circ C$	12	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	150	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	20	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ C$

Symbol	Parameter	BYX61-					Unit
		50	100	200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
I_R	$T_J = 100^\circ\text{C}$	$V_R = V_{RRM}$				3	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 12\text{A}$				1.5	V

RECOVERY CHARACTERISTICS

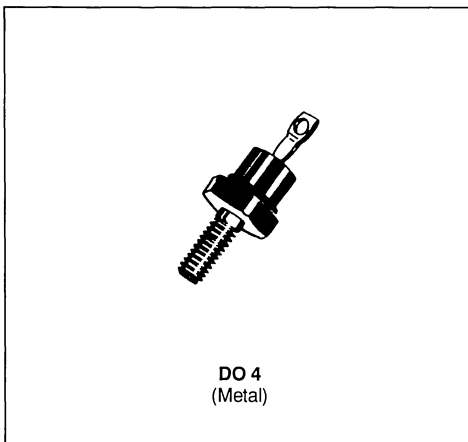
Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			100	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			0.075	μC
I_{RM}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			1.5	A

To evaluate the conduction losses use the following equations :

$$V_F = 1.15 + 0.015 I_F \qquad P = 1.5 \times I_{F(AV)} + 0.015 I_F^2_{(RMS)}$$

FAST RECOVERY RECTIFIER DIODES

- FAST RECOVERY TIME
- LOW FORWARD RECOVERY TIME
- AVAILABLE UP TO 600V



APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS
- HIGH FREQUENCY RECTIFIERS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	130	A
$I_F (AV)$	Average Forward Current	$T_C = 100^\circ C$	12	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	150	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	20	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ C$

Symbol	Parameter	1N					BYX 62-600	Unit
		3889	3890	3891	3892	3893		
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	600	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			25	μA
	$T_J = 100^\circ\text{C}$				3	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 12\text{A}$			1.4	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			200	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			0.2	μC
I_{RM}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			2	A

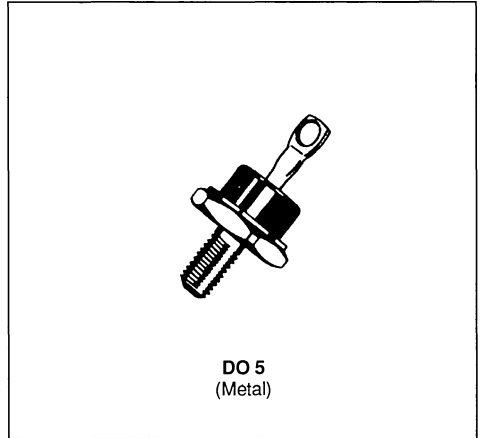
To evaluate the conduction losses use the following equations :

$$V_F = 1.2 + 0.012 I_F \quad P = 1.2 \times I_{F(AV)} + 0.012 I_F^2 (\text{RMS})$$



FAST RECOVERY RECTIFIER DIODES

- FAST RECOVERY TIME
- LOW FORWARD RECOVERY TIME
- AVAILABLE UP TO 600V



APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS
- HIGH FREQUENCY RECTIFIERS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	200	A
$I_F (AV)$	Average Forward Current	$T_C = 100^\circ C$	20	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	225	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	35	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ C$

Symbol	Parameter	1N					BYX 63-600	Unit
		3899	3900	3901	3902	3903		
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	600	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-c)}$	Junction-case	1.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}				50	μA
	T _J = 100°C				6	mA	
V _F	T _J = 25°C	I _F = 20A				1.4	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			200	ns
Q _{rr}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			0.3	μC
I _{RM}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			3	A

To evaluate the conduction losses use the following equations :

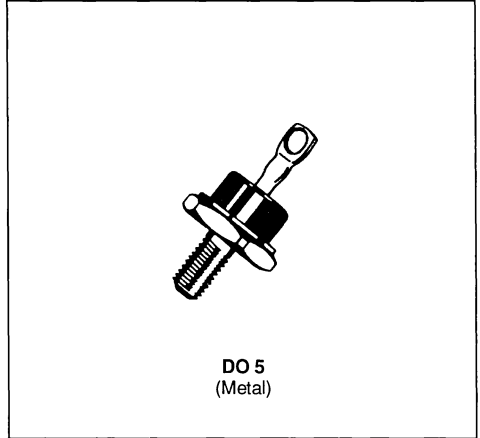
$$V_F = 1.2 + 0.008 I_F$$

$$P = 1.2 \times I_{F(AV)} + 0.008 I_F^2_{(RMS)}$$



FAST RECOVERY RECTIFIER DIODES

- FAST RECOVERY TIME
- LOW FORWARD RECOVERY TIME
- AVAILABLE UP TO 600V



APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS
- HIGH FREQUENCY RECTIFIERS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	250	A
$I_{F(AV)}$	Average Forward Current	$T_c = 100^\circ C$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	300	A
P_{tot}	Power Dissipation	$T_c = 100^\circ C$	50	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ C$

Symbol	Parameter	1N					BYX 64-600	Unit
		3909	3910	3911	3912	3913		
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	600	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			50	μA
	T _J = 100°C				6	mA
V _F	T _J = 25°C	I _F = 30A			1.4	V

RECOVERY CHARACTERISTICS

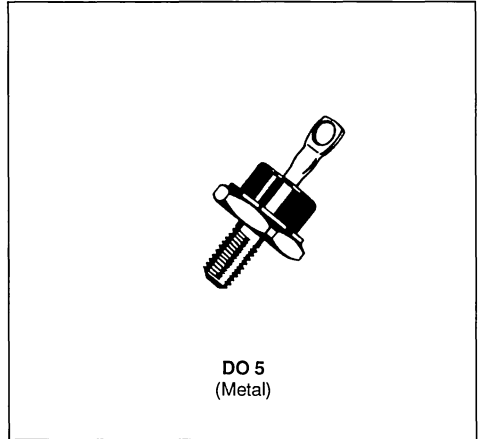
Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			200	ns
Q _{rr}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			0.3	μC
I _{RM}	T _J = 25°C V _R = 30V	I _F = 1A	di _F /dt = - 15A/μs			3	A

To evaluate the conduction losses use the following equations :

$$V_F = 1.2 + 0.006 I_F \quad P = 1.2 \times I_{F(AV)} + 0.006 I_F^2_{(RMS)}$$

FAST RECOVERY RECTIFIER DIODES

- VERY FAST RECOVERY TIME
- VERY LOW FORWARD RECOVERY TIME
- VERY LOW RECOVERED CHARGE



APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	250	A
$I_{F(AV)}$	Average Forward Current	$T_C = 100^\circ C$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	300	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	50	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150	$^\circ C$

Symbol	Parameter	BYX 65-					Unit
		50	100	200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 100^\circ\text{C}$	$V_R = V_{RRM}$			10	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.5	V

RECOVERY CHARACTERISTICS

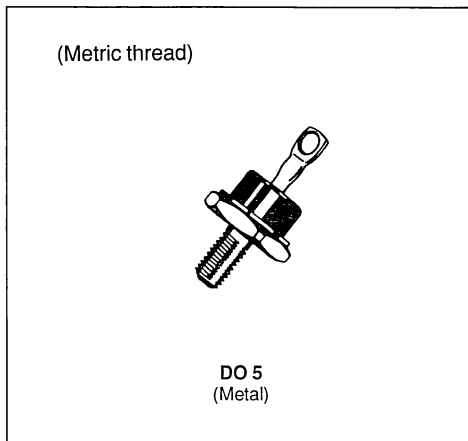
Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = - 15\text{A}/\mu\text{s}$			100	ns
Q_{rr}	$T_j = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = - 15\text{A}/\mu\text{s}$			0.075	μC
I_{RM}	$T_j = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = - 15\text{A}/\mu\text{s}$			1.5	A

To evaluate the conduction losses use the following equations :

$$V_F = 1.15 + 0.008 I_F \quad P = 1.15 \times I_{F(AV)} + 0.008 I_F^2_{(RMS)}$$

FAST RECOVERY RECTIFIER DIODES

- VERY FAST RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- VERY LOW FORWARD RECOVERY TIME
- VERY LOW RECOVERED CHARGE



APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	500	A
$I_{F(AV)}$	Average Forward Current	$T_C = 90^\circ C$	60	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	800	A
P_{tot}	Power Dissipation	$T_C = 90^\circ C$	110	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 165	$^\circ C$

Symbol	Parameter	ESM 243-					Unit
		50	100	200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	0.7	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
I_R	$T_J = 100^\circ\text{C}$	$V_R = V_{RRM}$				10	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 60\text{A}$				1.5	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			100	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			0.075	μC
I_{RM}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			1.5	A

To evaluate the conduction losses use the following equations :

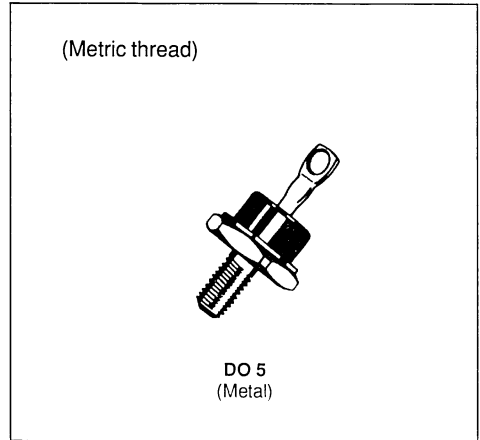
$$V_F = 1.15 + 0.004 I_F \quad P = 1.15 \times I_{F(AV)} + 0.004 I_F^2_{(RMS)}$$

FAST RECOVERY RECTIFIER DIODES

- FAST RECOVERY TIME
- LOW FORWARD RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- AVAILABLE UP TO 600V

APPLICATIONS

- DC AND AC MOTOR CONTROL
- SWITCHMODE POWER SUPPLY
- HIGH FREQUENCY CHOPPERS
- HIGH FREQUENCY RECTIFIERS


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	500	A
$I_{F(AV)}$	Average Forward Current	$T_C = 90^\circ C$	60	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	800	A
P_{tot}	Power Dissipation	$T_C = 90^\circ C$	110	W
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 165	$^\circ C$

Symbol	Parameter	ESM 244-							Unit
		50	100	200	300	400	500	600	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	200	300	400	500	600	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	0.7	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
I_R	$T_J = 100^\circ\text{C}$	$V_R = V_{RRM}$				6	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 60\text{A}$				1.5	V

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = -30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			200	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			0.3	μC
I_{RM}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$			3	A

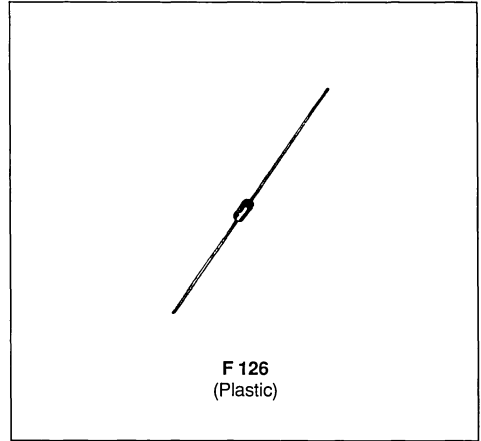
To evaluate the conduction losses use the following equations :

$$V_F = 1.15 + 0.004 I_F \qquad P = 1.15 \times I_{F(AV)} + 0.004 I_{F(RMS)}^2$$

ULTRA-FAST DIODES

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS



DESCRIPTION

Low voltage drop rectifiers suited for switching mode base drive and transistor circuits

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit	
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	50	A
$I_F (AV)$	Average Forward Current*	$T_a = 90^\circ C$ $\delta = 0.5$	1.5	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	50	A
P_{tot}	Power Dissipation*	$T_a = 90^\circ C$	1.3	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to 150	°C
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	°C

Symbol	Parameter	BYW 100-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	45	°C/W

* On infinite heatsink with 10mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			10	μA
	$T_J = 100^\circ\text{C}$				0.5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 4.5\text{A}$			1.2	V
	$T_J = 100^\circ\text{C}$	$I_F = 1.5\text{A}$			0.85	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ See figure 10	$di_F/dt = - 50\text{A}/\mu\text{s}$			35	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R \leq 30\text{V}$	$I_F = 1\text{A}$	$di_F/dt = - 20\text{A}/\mu\text{s}$		10		nC
t_{fr}	$T_J = 25^\circ\text{C}$ Measured at $1.1 \times V_F$	$I_F = 1\text{A}$	$t_r = 10\text{ns}$		30		ns
V_{FP}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$t_r = 10\text{ns}$		5		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.075 I_F$$

$$P = 0.06 \times I_{F(AV)} + 0.075 I_F^2_{(RMS)}$$

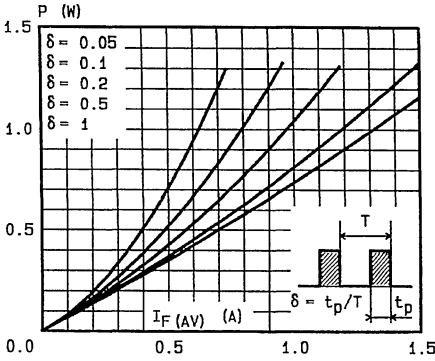


Fig.1 - Maximum average power dissipation versus average forward current.

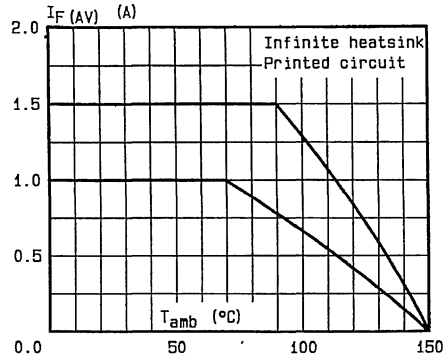


Fig.2 - Average forward current versus ambient temperature.

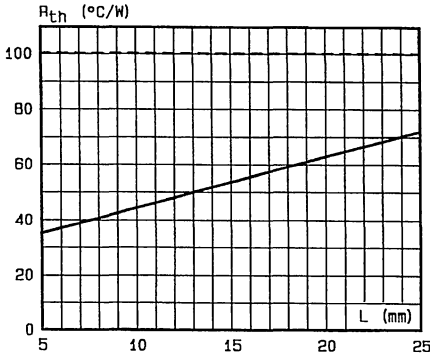


Fig.3 - Thermal resistance versus lead length.

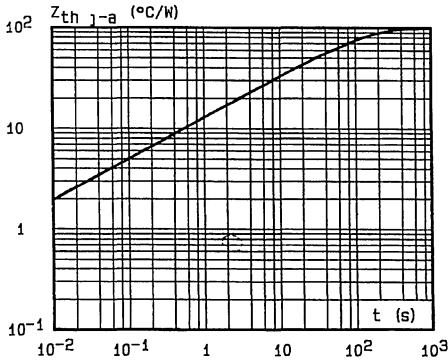


Fig.4 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

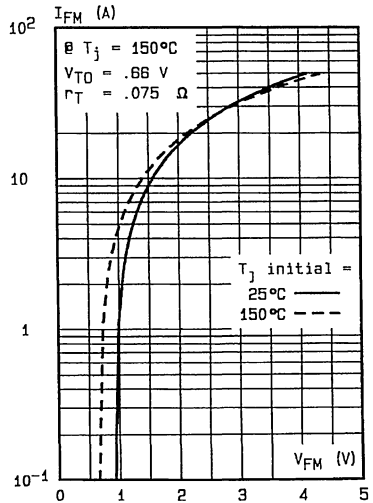
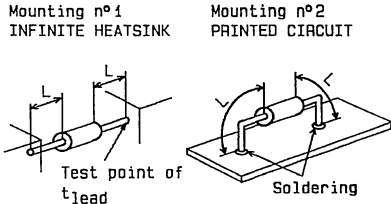


Fig.5 - Peak forward current versus peak forward voltage drop (maximum values).

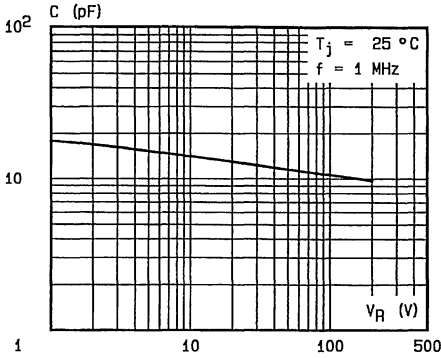


Fig. 6 - Capacitance versus reverse voltage applied.

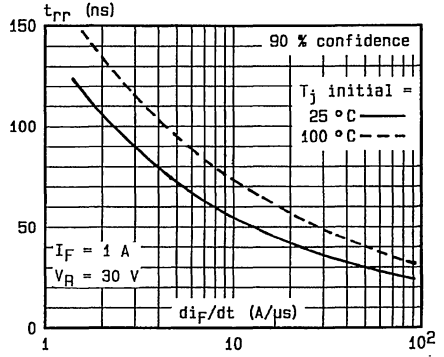


Fig. 7 - Recovery time versus di_F/dt .

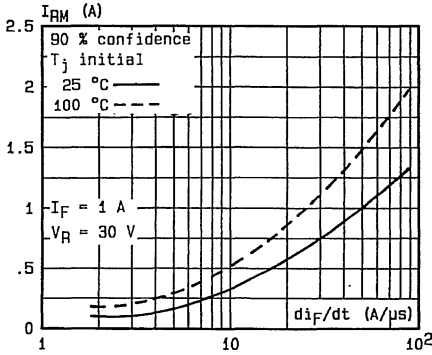


Fig. 8 - Peak reverse current versus di_F/dt .

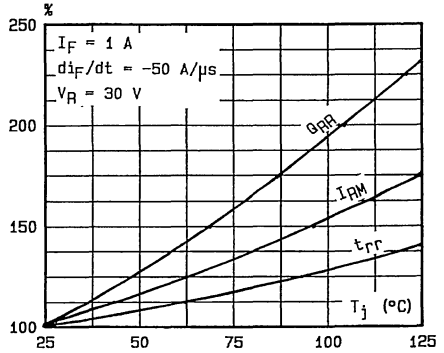


Fig. 9 - Dynamic parameters versus junction temperature.

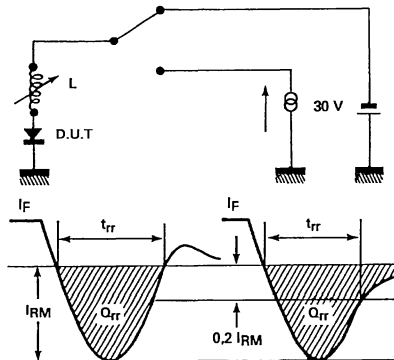


Fig. 10 - Measurement of t_{rr} (Fig. 7) and I_{RM} (Fig. 8).

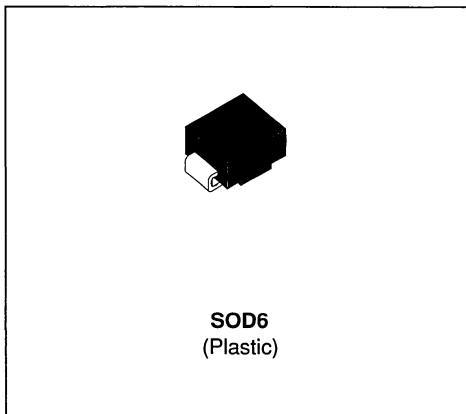
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- SURFACE MOUNT DEVICE

DESCRIPTION

Single chip rectifier suited for Switch Mode Power Supply and high frequency DC to DC converters. Packaged in SOD6, this surface mount device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$I_{F(RMS)}$	RMS forward current	10	A
$I_{F(AV)}$	Average forward current	$T_I=100^{\circ}\text{C}$ $\delta = 0.5$	A
I_{FSM}	Non repetitive surge peak forward current	$t_p=10\text{ms}$ sinusoidal	A
T_{stg} T_j	Storage and junction temperature range	- 40 to + 150 - 40 to + 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$

Symbol	Parameter	SMBYW02-				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	25	$^{\circ}\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_j = 25^\circ\text{C}$	$I_F = 6\text{ A}$			1.25	V
	$T_j = 100^\circ\text{C}$	$I_F = 2\text{ A}$			0.85	
I_R **	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
	$T_j = 100^\circ\text{C}$				0.5	mA

 Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

 ** $t_p = 5\ \text{ms}$, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$ $V_R = 30\text{V}$			35	ns
tfr	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$ $V_{FR} = 1.1 \times V_F$		30		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$		5		V

To evaluate the conduction losses use the following equation :

$$P = 0.7 \times I_{F(AV)} + 0.075 \times I_F^2_{(RMS)}$$

Voltage (V)	50	100	150	200
Marking	A05	A10	A15	A20

Laser marking

Logo indicates cathode

Fig.1 : Low frequency power losses versus average current.

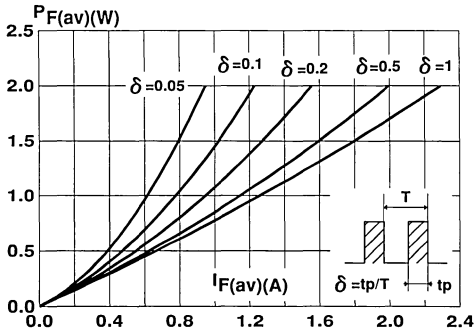


Fig.2 : Peak current versus form factor.

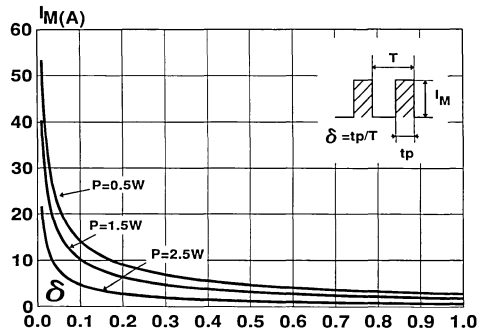


Fig.3 : Non repetitive surge peak forward current versus overload duration.

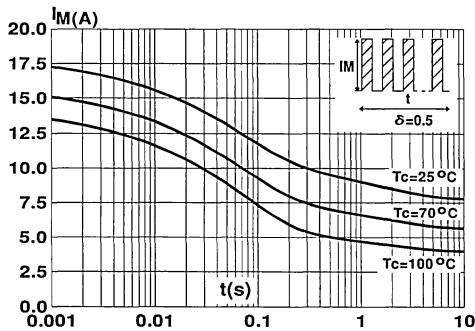


Fig.4 : Relative variation of thermal impedance junction to lead versus pulse duration.

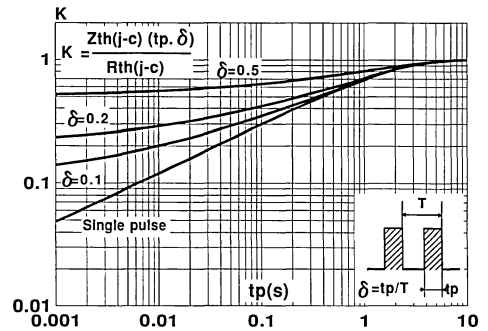


Fig.5 : Voltage drop versus forward current. (Maximum values)

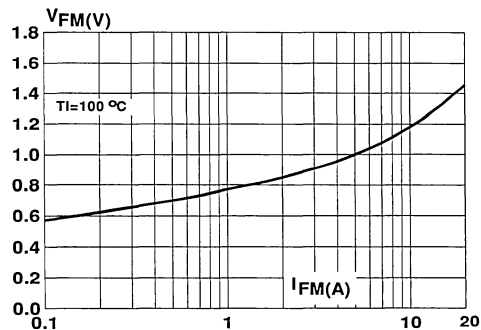


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

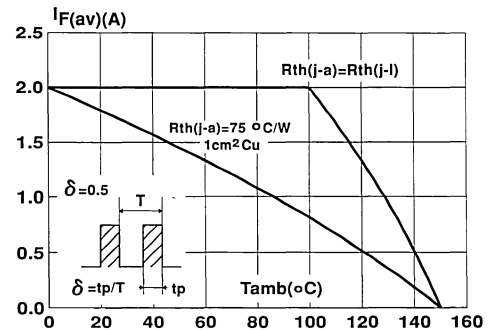


Fig.7 : Capacitance versus reverse voltage applied.

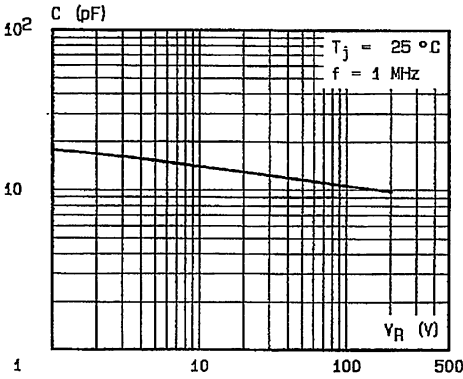


Fig.9 : Peak reverse current versus di_F/dt .

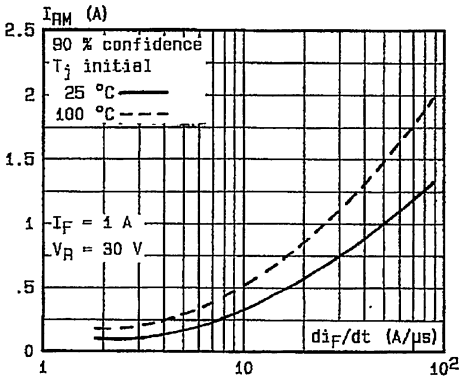


Fig.11 : Thermal resistance junction to ambient versus copper surface under each lead.

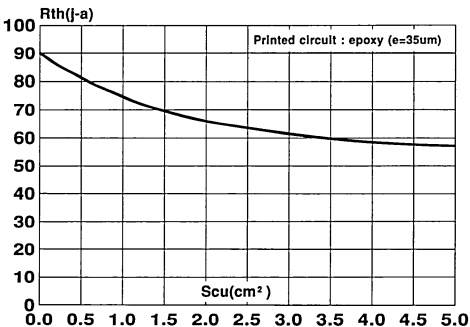


Fig.8 : Recovery time versus di_F/dt .

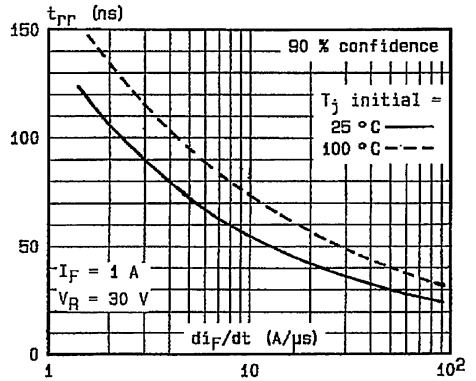
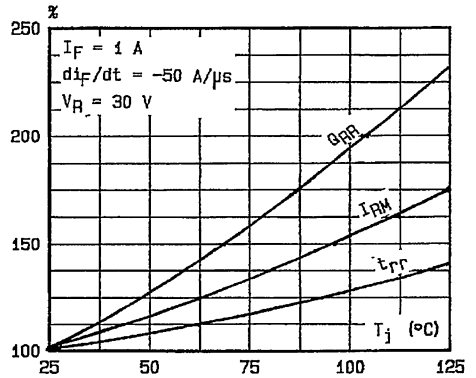
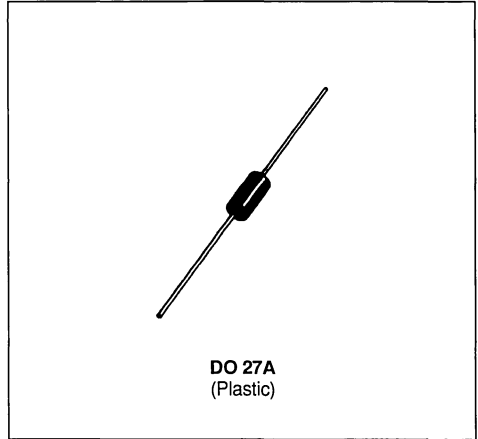


Fig.10 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS



DESCRIPTION

Low voltage drop rectifiers suited for switching mode base drive and transistor circuits.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	70	A
$I_{F(AV)}$	Average Forward Current*	$T_a = 85^\circ C$ $\delta = 0,5$	3	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	70	A
P_{tot}	Power Dissipation*	$T_a = 85^\circ C$	2.5	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	°C
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	°C

Symbol	Parameter	BYW 98-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	25	°C/W

* On infinite heatsink with 10mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			10	μA
	$T_J = 100^\circ\text{C}$				0.5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 9\text{A}$			1.1	V
	$T_J = 100^\circ\text{C}$	$I_F = 3\text{A}$			0.85	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ See figure 10	$di_F/dt = -50\text{A}/\mu\text{s}$		35	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R \leq 30\text{V}$	$I_F = 2\text{A}$	$di_F/dt = -20\text{A}/\mu\text{s}$	12		nC
t_{fr}	$T_J = 25^\circ\text{C}$ Measured at $1.1 \times V_F$	$I_F = 1\text{A}$	$t_r = 10\text{ns}$	20		ns
V_{FP}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$t_r = 10\text{ns}$	5		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.03 I_F$$

$$P = 0.06 \times I_{F(AV)} + 0.03 I_F^2(\text{RMS})$$

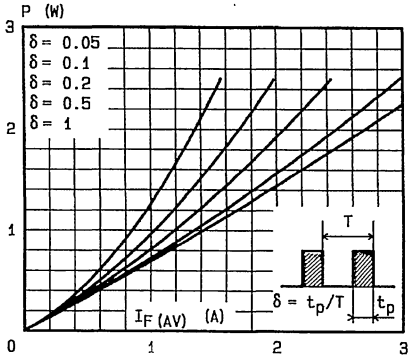


Fig.1 - Maximum average power dissipation versus average forward current.

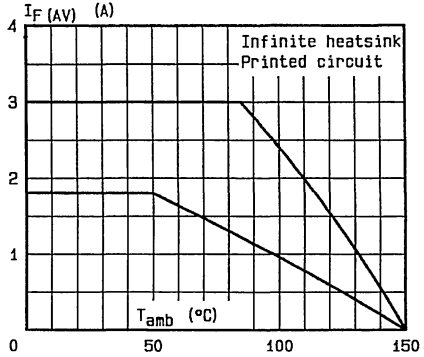


Fig.2 - Average forward current versus ambient temperature.

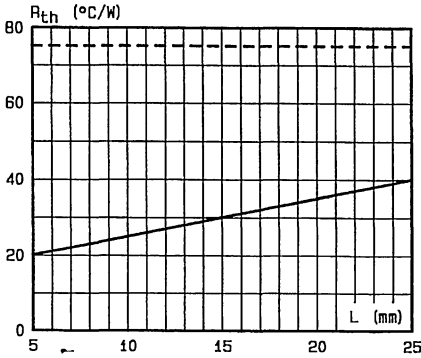


Fig.3 - Thermal resistance versus lead length.

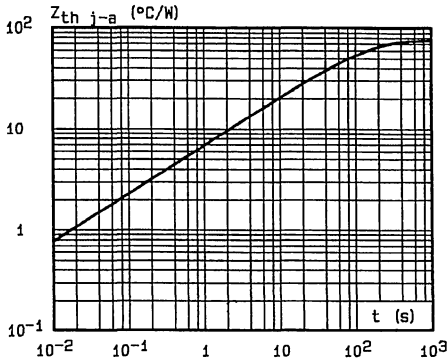


Fig.4 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

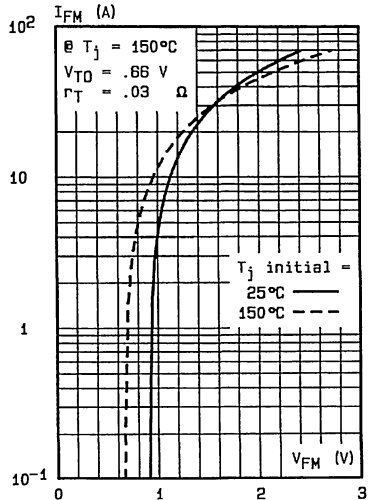
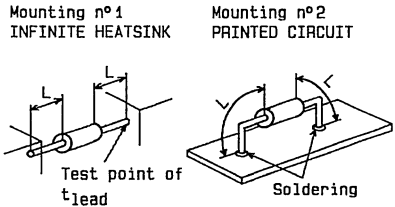


Fig.5 - Peak forward current versus peak forward voltage drop (maximum values).

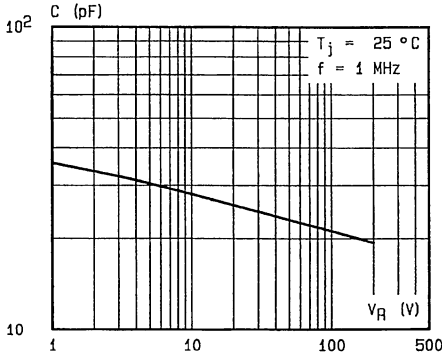


Fig. 6 - Capacitance versus reverse voltage applied.

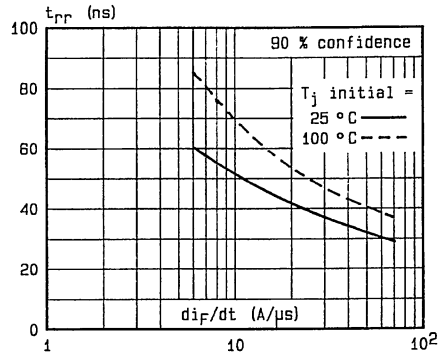


Fig. 7 - Recovery time versus di_F/dt .

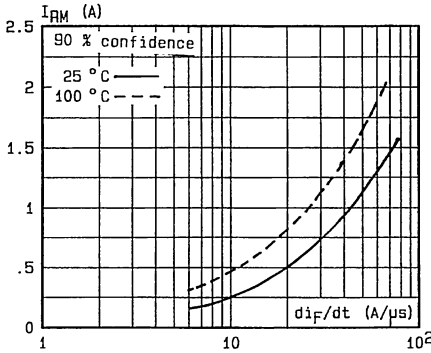


Fig. 8 - Peak reverse current versus di_F/dt .

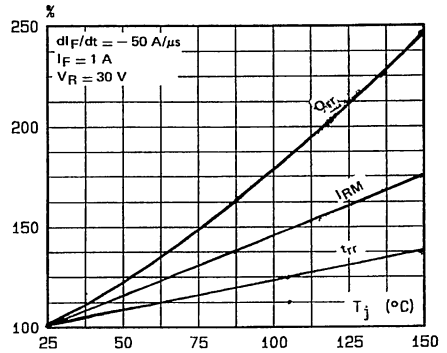


Fig. 9 - Dynamic parameters versus junction temperature.

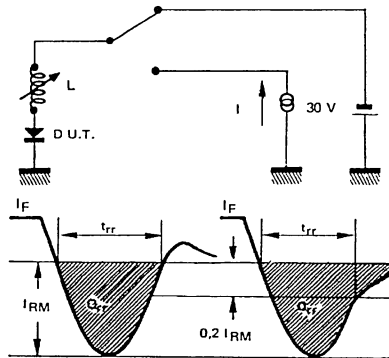


Fig. 10 - Measurement of t_{rr} (Fig. 7) and I_{RM} (Fig. 8).

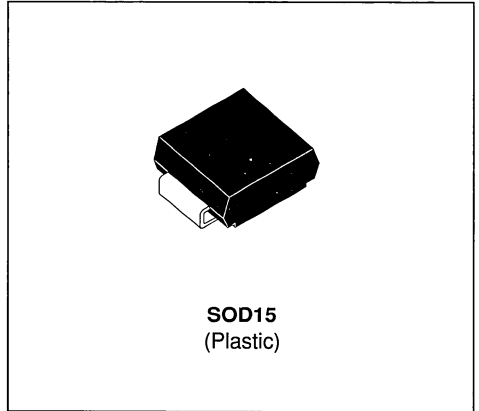
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- SURFACE MOUNT DEVICE

DESCRIPTION

Single chip rectifier suited for Switch Mode Power Supply and high frequency DC to DC converters. Packaged in SOD15, this surface mount device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS forward current		10	A
$I_{F(AV)}$	Average forward current	$T_I=70^{\circ}\text{C}$ $\delta = 0.5$	4	A
I_{FSM}	Non repetitive surge peak forward current	$t_p=10\text{ms}$ sinusoidal	70	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$

Symbol	Parameter	SMBYW04-				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	20	$^{\circ}\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_j = 25^\circ\text{C}$	$I_F = 12\text{ A}$			1.25	V
	$T_j = 100^\circ\text{C}$	$I_F = 4\text{ A}$			0.85	
I_R **	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
	$T_j = 100^\circ\text{C}$				0.5	mA

 Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

 ** $t_p = 5\ \text{ms}$, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$ $V_R = 30\text{V}$			35	ns
t_{fr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$ $V_{FR} = 1.1 \times V_F$		20		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$		5		V

To evaluate the conduction losses use the following equation :

$$P = 0.7 \times I_{F(AV)} + 0.037 \times I_F^2 (RMS)$$

Voltage (V)	50	100	150	200
Marking	D05	D10	D15	D20

Laser marking

Logo indicates cathode

Fig.1 : Low frequency power losses versus average current.

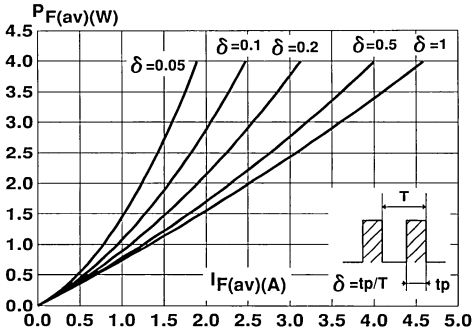


Fig.2 : Peak current versus form factor.

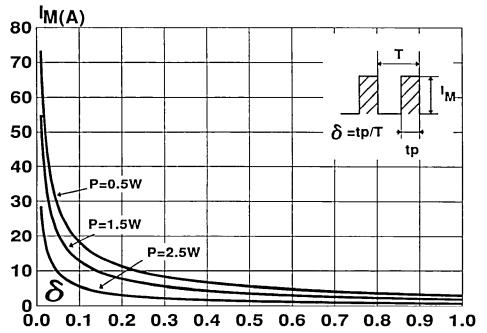


Fig.3 : Non repetitive surge peak forward current versus overload duration.

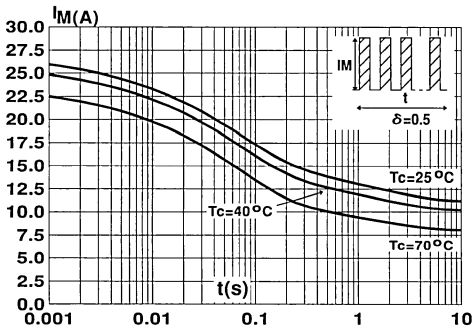


Fig.4 : Relative variation of thermal impedance junction to lead versus pulse duration.

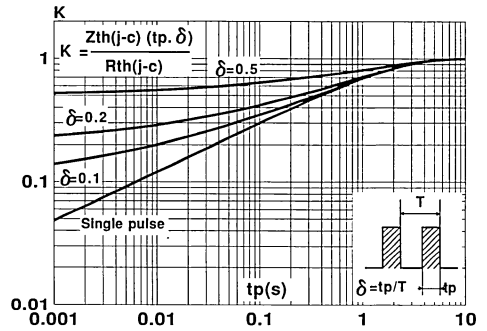


Fig.5 : Voltage drop versus forward current. (Maximum values)

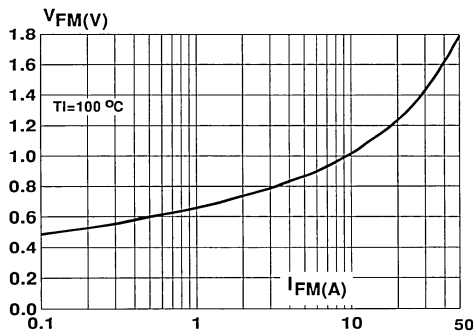


Fig.6 : Average current cycle versus ambient temperature. (duty cycle : 0.5)

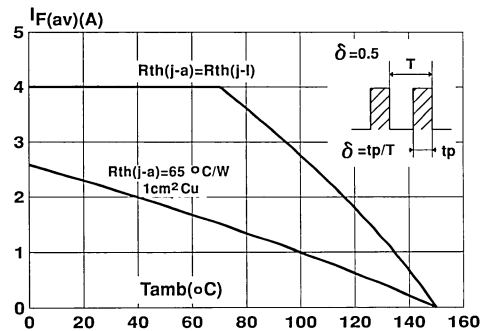


Fig.7 : Capacitance versus reverse voltage applied.

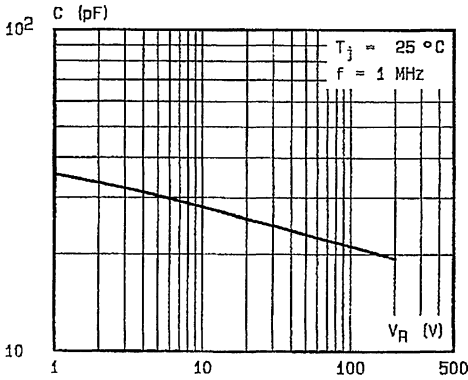


Fig.8 : Recovery time versus di_F/dt .

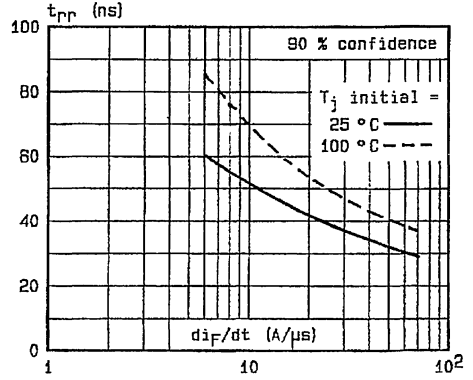


Fig.9 : Peak reverse current versus di_F/dt .

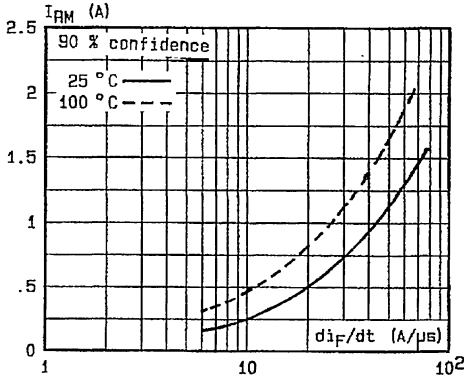


Fig.10 : Dynamic parameters versus junction temperature.

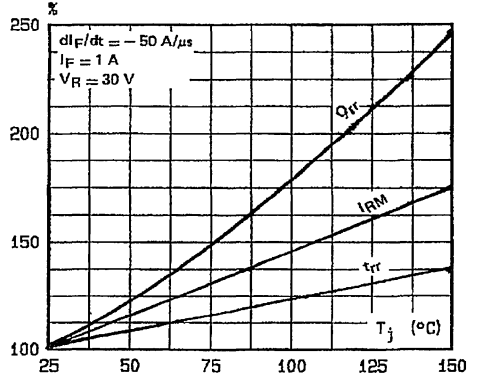
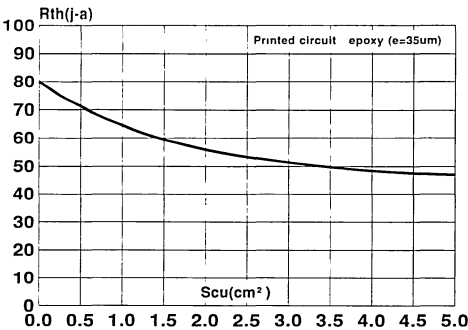


Fig.11 : Thermal resistance junction to ambient versus copper surface under each lead.



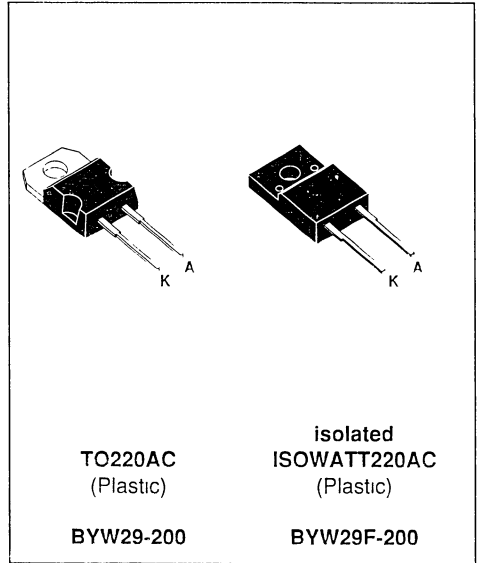
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION (ISOWATT220AC) :
 Insulating voltage = 2000 V DC
 Capacitance = 12 pF

DESCRIPTION

Single chip rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in TO220AC or ISOWATT220AC this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
$I_{F(RMS)}$	RMS forward current			16	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO220AC	$T_c = 120^\circ\text{C}$	8	A
		ISOWATT220AC	$T_c = 100^\circ\text{C}$	8	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	80	A
T_{stg} T_j	Storage and junction temperature range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$ $^\circ\text{C}$

Symbol	Parameter	BYW29-(F)				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	TO220AC	2.8	°C/W
		ISOWATT220AC	5.0	

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			10	μA
	T _j = 100°C				0.6	mA
V _F **	T _j = 125°C	I _F = 5 A			0.85	V
	T _j = 125°C	I _F = 10 A			1.05	
	T _j = 25°C	I _F = 10 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_{F(AV)} + 0.040 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _R = 1A			25	ns
		I _F = 1A V _R = 30V			35	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 × V _F		15		ns
V _{FP}	T _j = 25°C	I _F = 1A		2		V

Fig.1 : Average forward power dissipation versus average forward current.

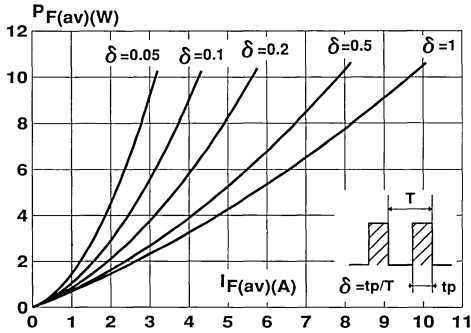


Fig.2 : Peak current versus form factor.

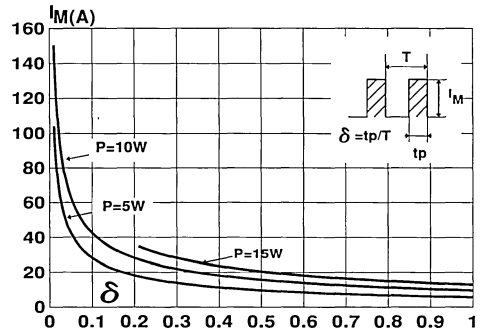


Fig.3 : Forward voltage drop versus forward current (maximum values).

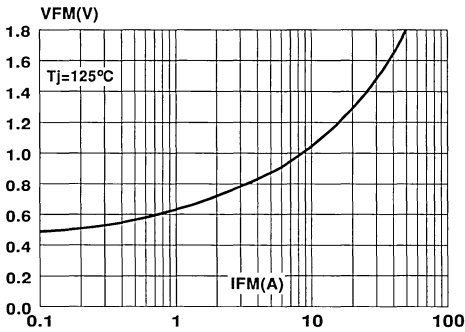


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration. (TO220AC)

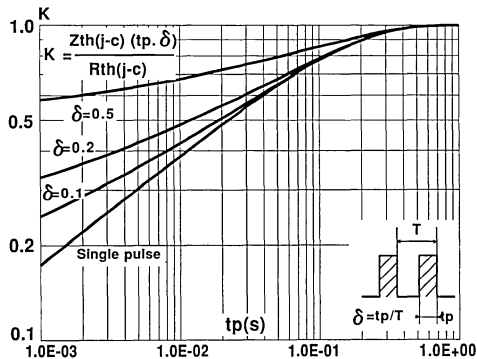


Fig.5 : Relative variation of thermal impedance junction to case versus pulse duration. (ISOWATT220AC)

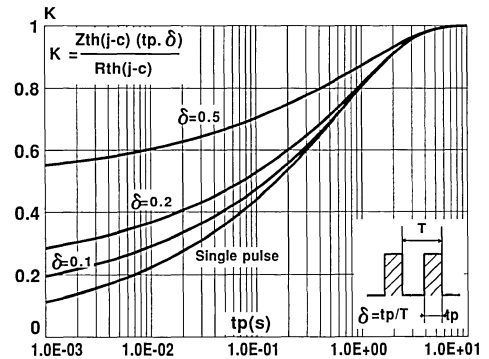


Fig.6 : Non repetitive surge peak forward current versus overload duration. (TO220AC)

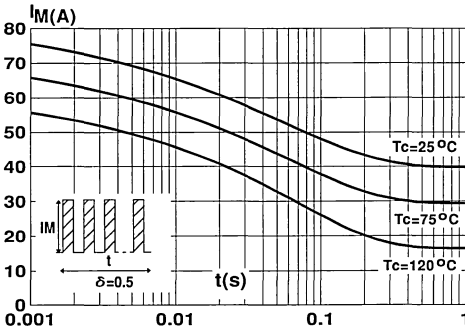


Fig.7 : Non repetitive surge peak forward current versus overload duration. (ISOWATT220AC)

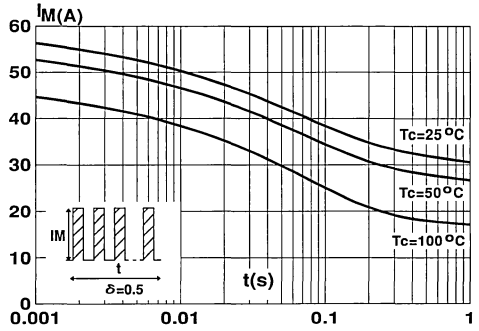


Fig.8 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

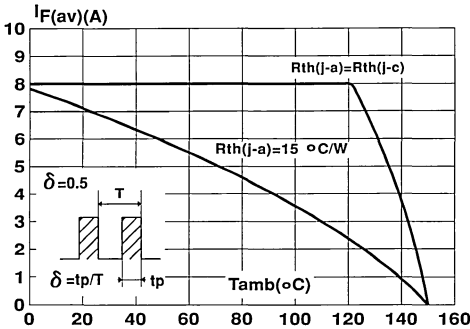


Fig.9 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

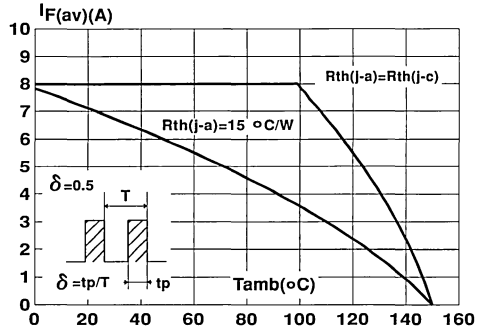


Fig.10 : Junction capacitance versus reverse voltage applied (Typical values).

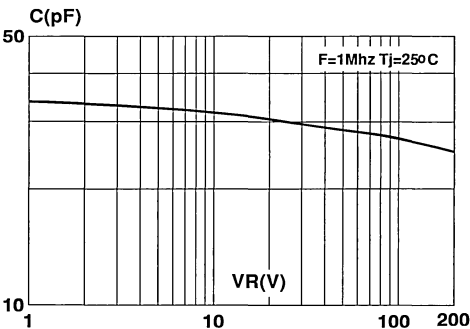


Fig.11 : Recovery charges versus di/dt.

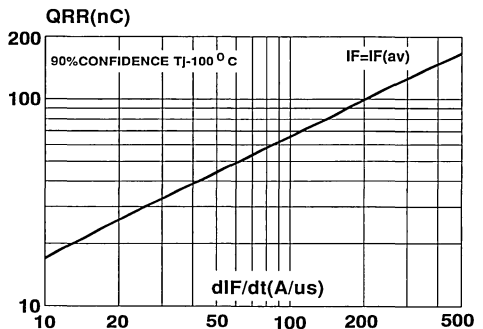


Fig.12 : Peak reverse current versus dIF/dt.

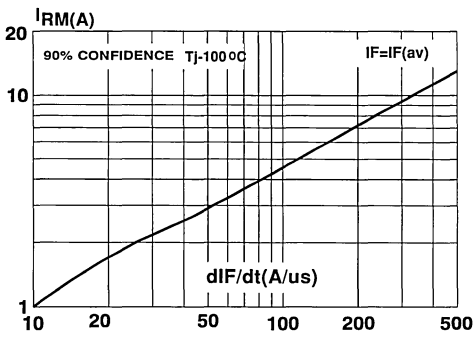
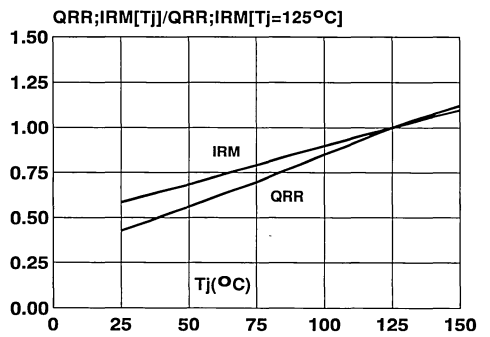


Fig.13 : Dynamic parameters versus junction temperature.



**HIGH EFFICIENCY
 FAST RECOVERY DIODES**
MAIN PRODUCT CHARACTERISTICS

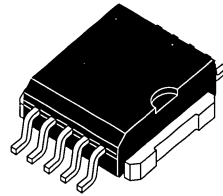
$I_{F(AV)}$	8 A
V_{RRM}	200 V
t_{rr}	35 ns
V_F	0.85 V

FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Single rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in a high performance surface mount package PSO-10, this device is intended for use in high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
 Plastic, non isolated SMD
 with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		200	V
$I_{F(RMS)}$	RMS forward current (All pins connected)		17	A
$I_{F(AV)}$	Average forward current	$T_c=120^\circ\text{C}$ $\delta = 0.5$	8	A
I_{FSM}	Surge non repetitive forward current (All pins connected)	$t_p=10\text{ms}$ sinusoidal	80	A
I_{FRM}	Repetitive peak forward current	$t_p = 5 \mu\text{s}$ $f = 5 \text{ kHz}$	75	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150	$^\circ\text{C}$

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case thermal resistance	2.8	°C/W

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RRM}	T _j = 25°C			10	μA
			T _j = 100°C			0.6	mA
V _F **	Forward voltage drop	I _F = 5 A	T _j = 125°C			0.85	V
		I _F = 10 A	T _j = 125°C			1.05	
		I _F = 10 A	T _j = 25°C			1.15	

Pulse test : *tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.65 \times I_{F(AV)} + 0.040 I_{F(RMS)}^2$

RECOVERY CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	Reverse recovery time	T _j = 25°C	I _F = 0.5A			25	ns
		I _{rr} = 0.25 A	I _R = 1A				
		T _j = 25°C	I _F = 1A			35	
		dI _F /dt = -50A/μs	V _R = 30V				
t _{fr}	Forward recovery time	T _j = 25°C	I _F = 1A		15		ns
		dI _F /dt = 100A/μs	V _{FR} = 1.1 x V _F max				
V _{FP}	Peak forward voltage	T _j = 25°C	I _F = 1A		2		V
		dI _F /dt = 100A/μs					

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5
 Cathode = connected to base tab

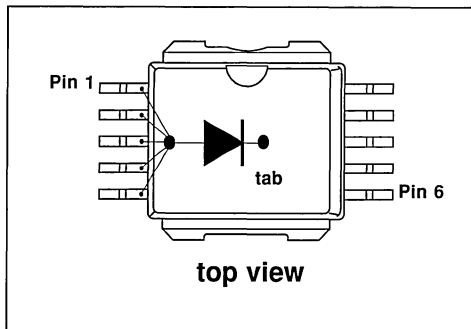


Fig. 1 : Average forward power dissipation versus average forward current.

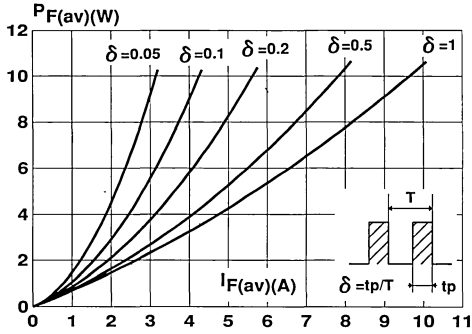


Fig. 2 : Peak current versus form factor.

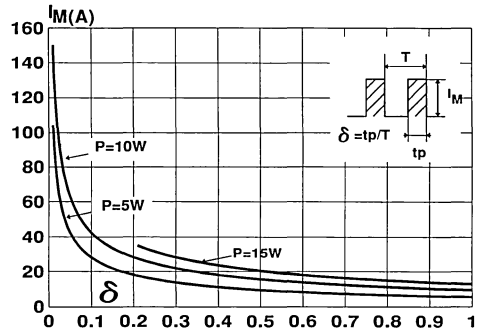


Fig. 3 : Forward voltage drop versus forward current (maximum values).

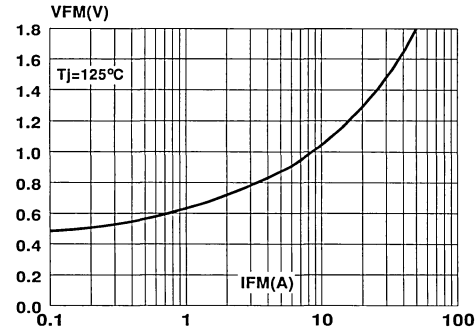


Fig. 4 : Relative variation of thermal impedance junction to case versus pulse duration.

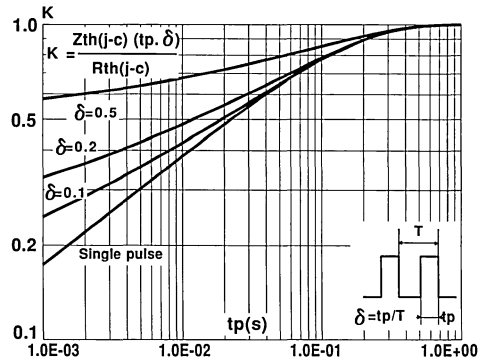


Fig. 5 : Non repetitive surge peak forward current versus overload duration.

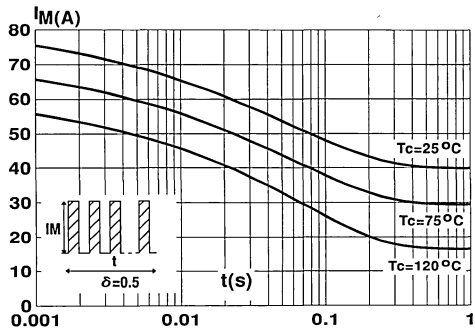


Fig. 6 : Average current versus ambient temperature. (duty cycle : 0.5)

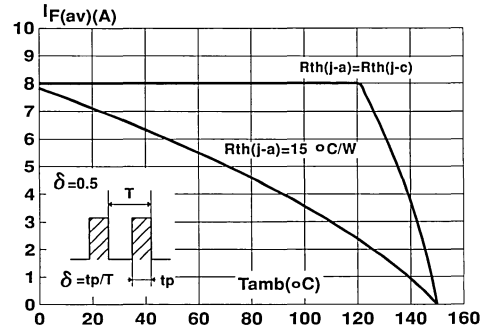


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

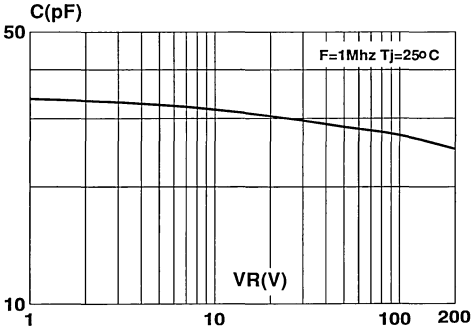


Fig.9 : Peak reverse current versus dI_F/dt .

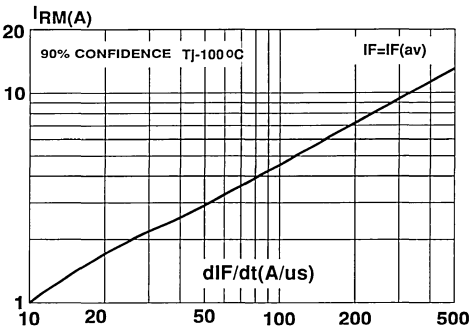


Fig.8 : Recovery charges versus dI_F/dt .

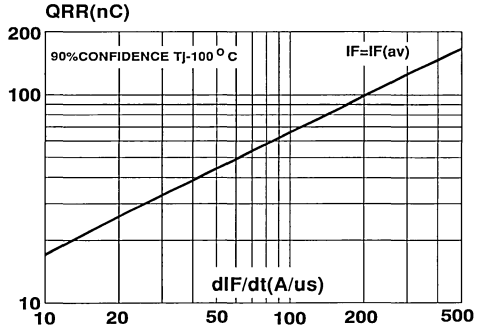
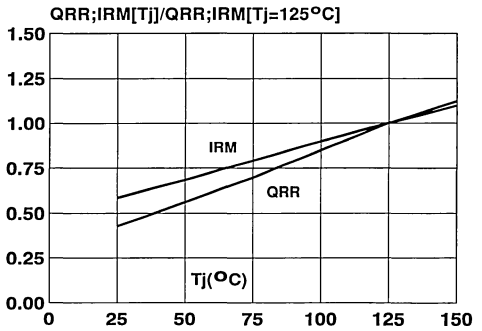


Fig.10 : Dynamic parameters versus junction temperature.



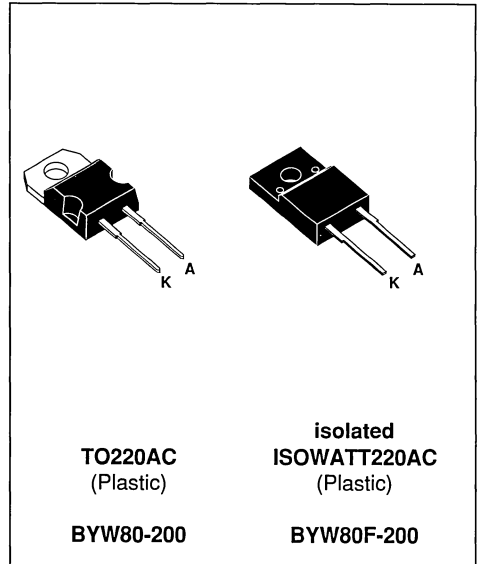
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION (ISOWATT220AC) :
 Insulating voltage = 2000 V DC
 Capacitance = 12 pF

DESCRIPTION

Single chip rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in TO220AC, or ISOWATT220AC this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS forward current		20	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO220AC	$T_c = 120^\circ\text{C}$	A
		ISOWATT220AC	$T_c = 95^\circ\text{C}$	
I_{FSM}	Surge non repetitive forward current		100	A
T_{stg} T_J	Storage and junction temperature range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$ $^\circ\text{C}$

Symbol	Parameter	BYW80-(F)				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	TO220AC	2.5	°C/W
		ISOWATT220AC	4.7	

**ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS**

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			10	μA
	T _j = 100°C				1	mA
V _F **	T _j = 125°C	I _F = 7 A			0.85	V
	T _j = 125°C	I _F = 15 A			1.05	
	T _j = 25°C	I _F = 15 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_{F(AV)} + 0.027 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit	
trr	T _j = 25°C	I _F = 0.5A I _R = 1A	I _{rr} = 0.25A			25	ns
		I _F = 1A V _R = 30V	dI _F /dt = -50A/μs			35	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 x V _F	tr = 10 ns		15	ns	
V _{FP}	T _j = 25°C	I _F = 1A	tr = 10 ns		2	V	

Fig.1 : Average forward power dissipation versus average forward current.

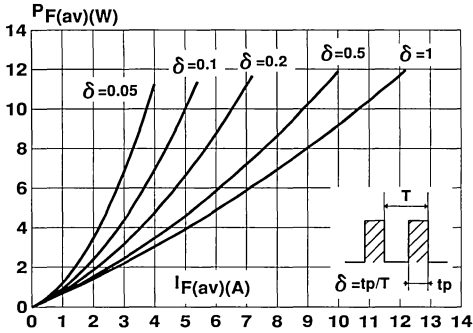


Fig.2 : Peak current versus form factor.

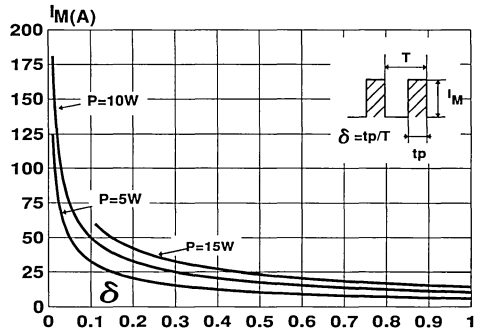


Fig.3 : Forward voltage drop versus forward current (maximum values).

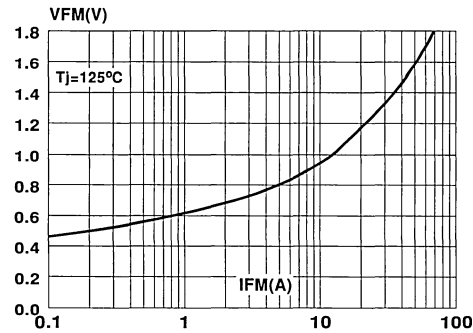


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration. (TO220AC)

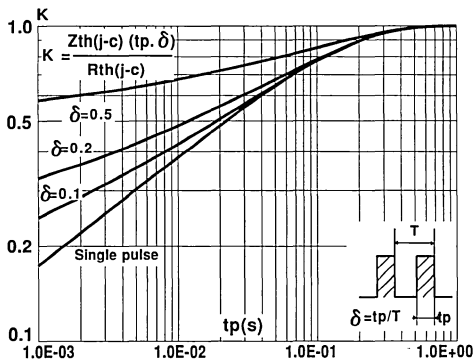


Fig.5 : Relative variation of thermal impedance junction to case versus pulse duration. (ISOWATT220AC)

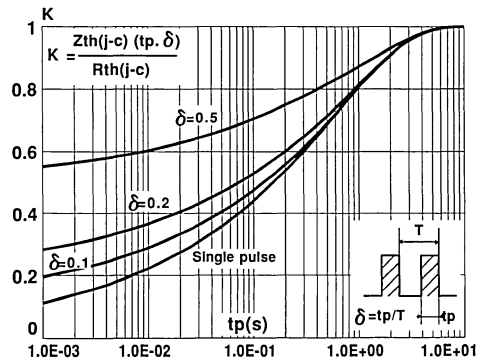


Fig.6 : Non repetitive surge peak forward current versus overload duration. (TO220AC)

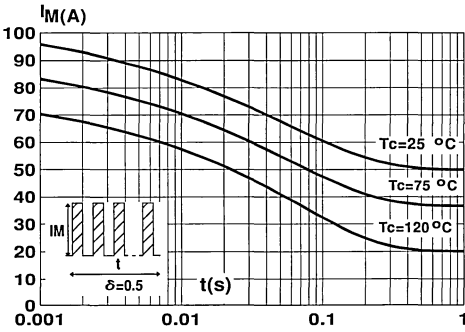


Fig.7 : Non repetitive surge peak forward current versus overload duration. (ISOWATT220AC)

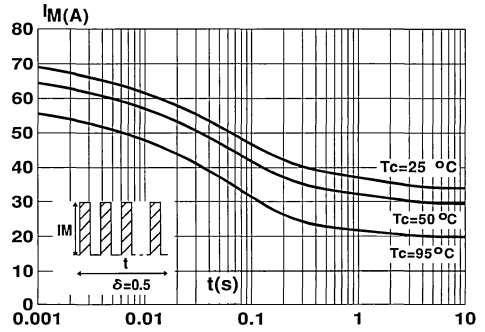


Fig.8 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

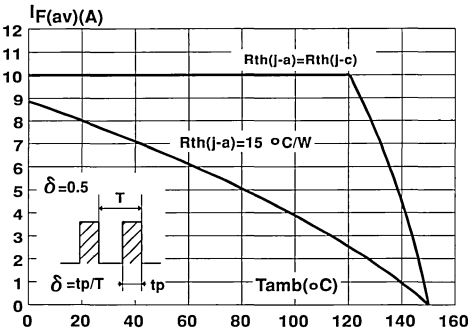


Fig.9 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

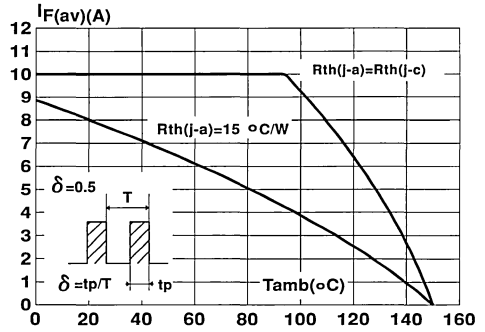


Fig.10 : Junction capacitance versus reverse voltage applied (Typical values).

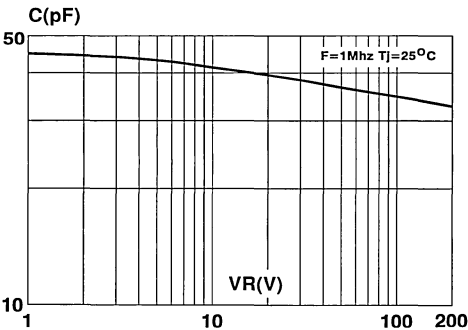


Fig.11 : Recovery charges versus diF/dt.

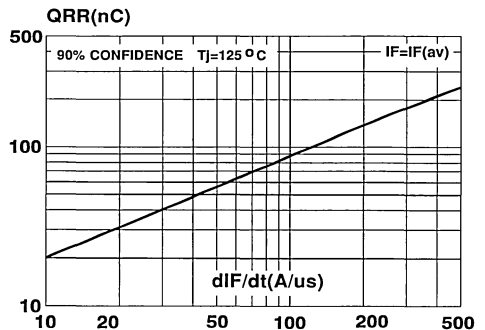


Fig.12 : Peak reverse current versus dIF/dt.

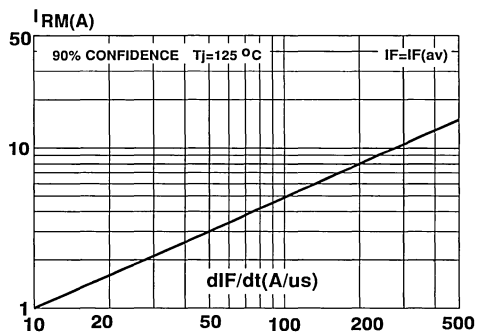
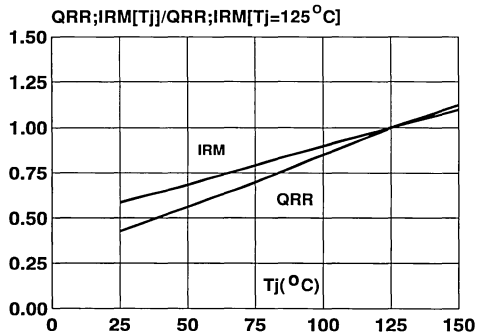


Fig.13 : Dynamic parameters versus junction temperature.



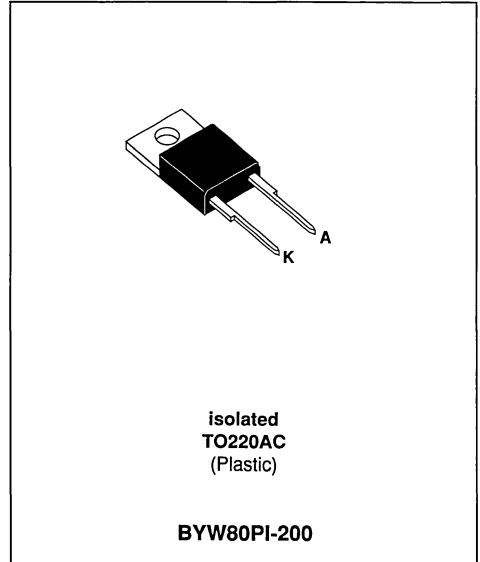
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 7 pF

DESCRIPTION

Single chip rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in Isolated TO220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{F(RMS)}	RMS forward current		20	A
I _{F(AV)}	Average forward current δ = 0.5	T _c =110°C	10	A
I _{FSM}	Surge non repetitive forward current	t _p =10ms sinusoidal	100	A
T _{stg} T _J	Storage and junction temperature range		- 65 to + 150 - 65 to + 150	°C °C

Symbol	Parameter	BYW80PI-				Unit
		50	100	150	200	
V _{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case	3.5	°C/W

**ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS**

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			10	μA
	T _j = 100°C				1	mA
V _F **	T _j = 125°C	I _F = 7 A			0.85	V
	T _j = 125°C	I _F = 15 A			1.05	
	T _j = 25°C	I _F = 15 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_{F(AV)} + 0.027 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			25	ns
		I _F = 1A dI _F /dt = -50A/μs V _R = 30V			35	
tfr	T _j = 25°C	I _F = 1A tr = 10 ns V _{FR} = 1.1 x V _F		15		ns
V _{FP}	T _j = 25°C	I _F = 1A tr = 10 ns		2		V

Fig.1 : Average forward power dissipation versus average forward current.

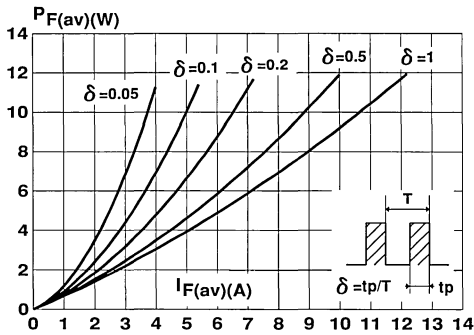


Fig.2 : Peak current versus form factor.

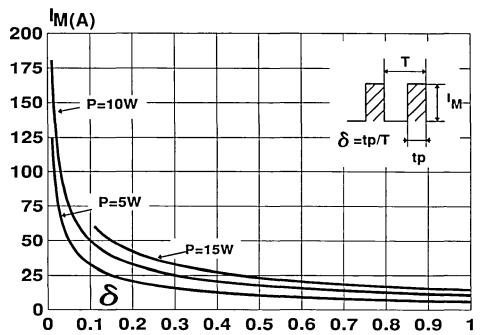


Fig.3 : Forward voltage drop versus forward current (maximum values).

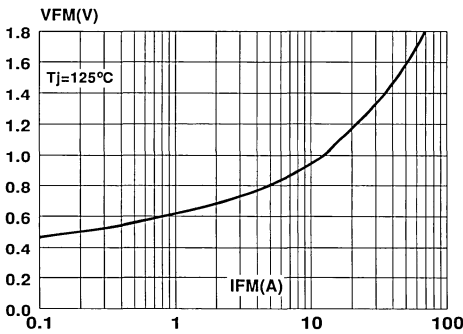


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

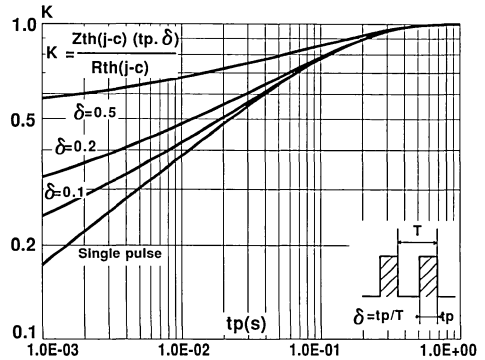


Fig.5 : Non repetitive surge peak forward current versus overload duration.

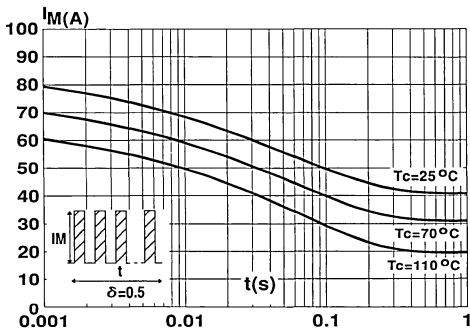


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

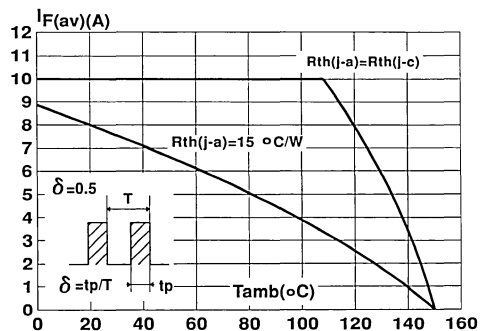


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

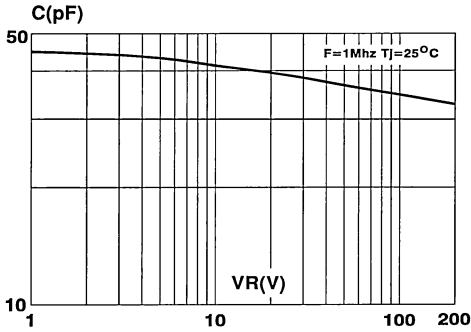


Fig.9 : Peak reverse current versus dI_F/dt .

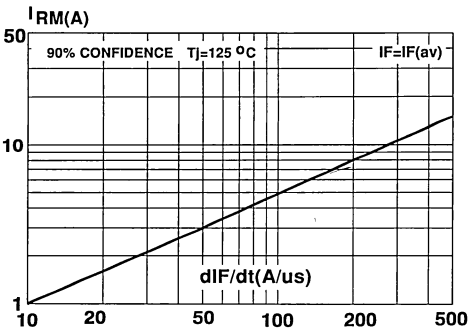


Fig.8 : Recovery charges versus dI_F/dt .

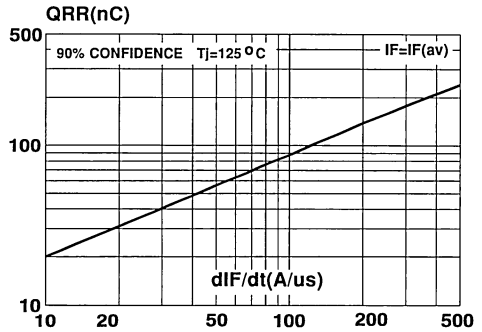
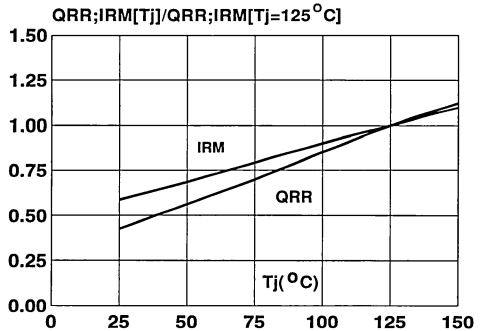


Fig.10 : Dynamic parameters versus junction temperature.



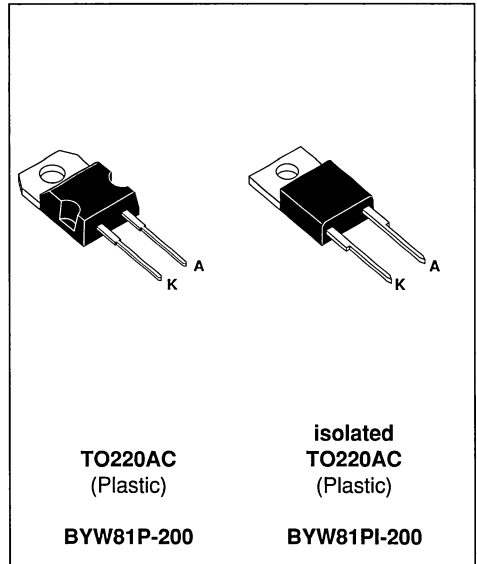
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 7 pF

DESCRIPTION

Single chip rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in TO220AC this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
I _{F(RMS)}	RMS forward current		35	A	
I _{F(AV)}	Average forward current δ = 0.5	BYW81P	T _c =115°C	15	A
		BYW81PI	T _c =90°C	15	
I _{FSM}	Surge non repetitive forward current		tp=10ms sinusoidal	200	A
T _{stg} T _J	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C	

Symbol	Parameter	BYW81P-/PI-				Unit
		50	100	150	200	
V _{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	BYW81P	2.0	°C/W
		BYW81PI	3.5	

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			20	μA
	T _j = 100°C				1.5	mA
V _F **	T _j = 125°C	I _F = 12 A			0.85	V
	T _j = 125°C	I _F = 25 A			1.05	
	T _j = 25°C	I _F = 25 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.65 \times I_{F(AV)} + 0.016 \times I_{F(RMS)}^2$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _R = 1A			25	ns
		I _F = 1A V _R = 30V			40	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 x V _F		15		ns
V _{FP}	T _j = 25°C	I _F = 1A		2		V

Fig.1 : Average forward power dissipation versus average forward current.

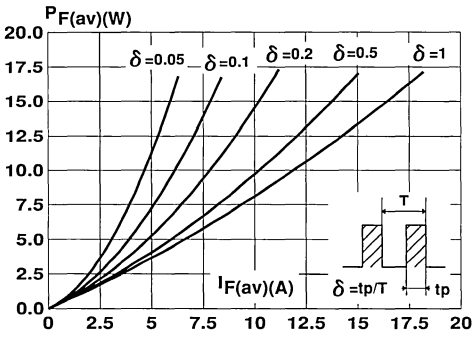


Fig.2 : Peak current versus form factor.

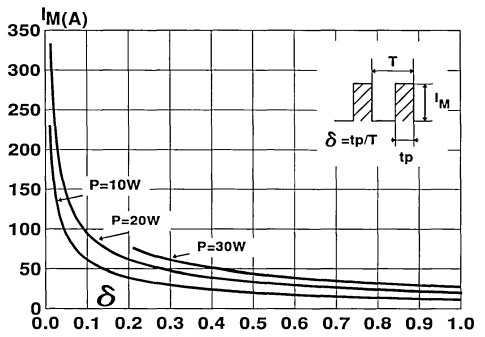


Fig.3 : Forward voltage drop versus forward current (maximum values).

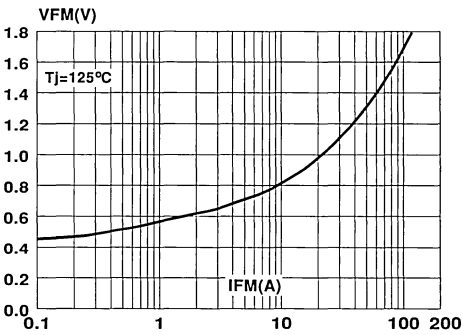


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

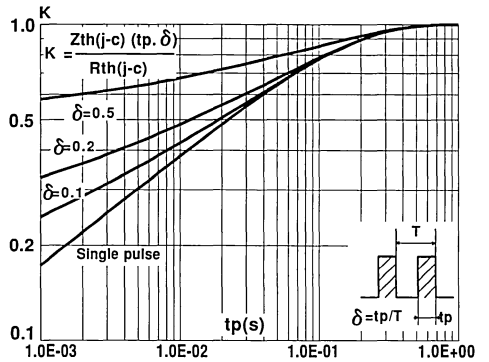


Fig.5 : Non repetitive surge peak forward current versus overload duration. (BYW81P)

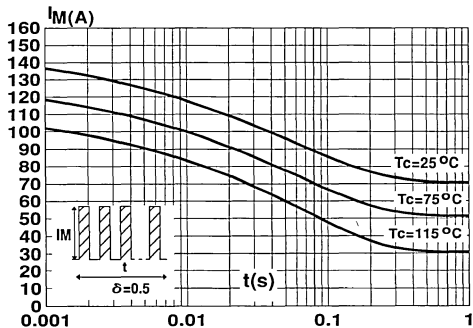


Fig.6 : Non repetitive surge peak forward current versus overload duration. (BYW81P)

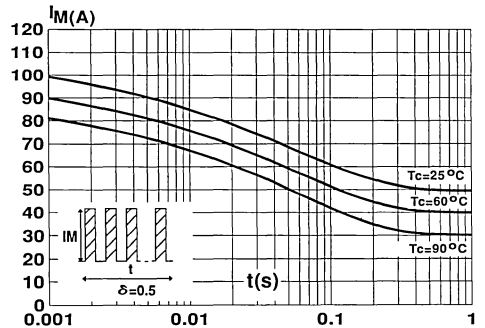


Fig.7 : Average current versus ambient temperature.
(duty cycle : 0.5) (BYW81P)

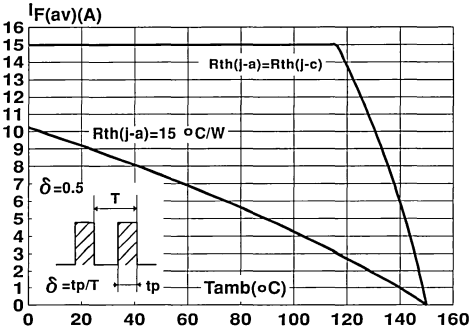


Fig.8 : Average current versus ambient temperature.
(duty cycle : 0.5) (BYW81PI)

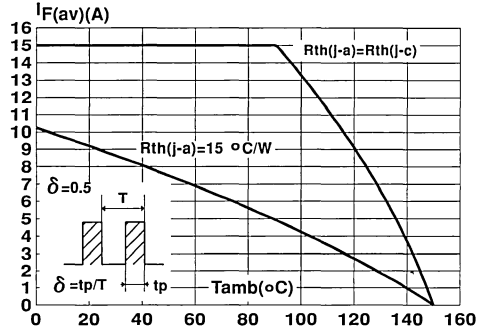


Fig.9 : Junction capacitance versus reverse voltage applied (Typical values).

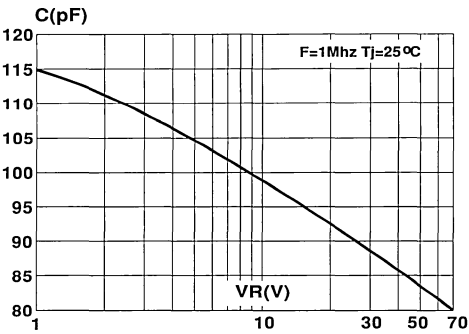


Fig.10 : Recovery charges versus diF/dt.

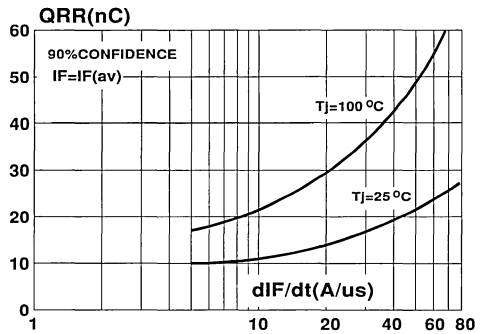


Fig.11 : Peak reverse current versus diF/dt.

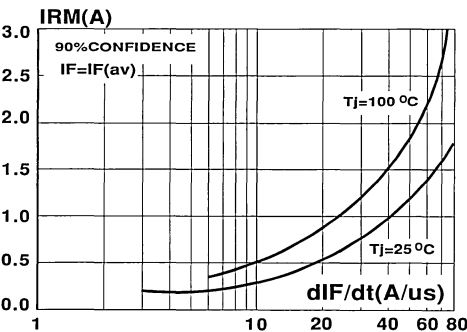
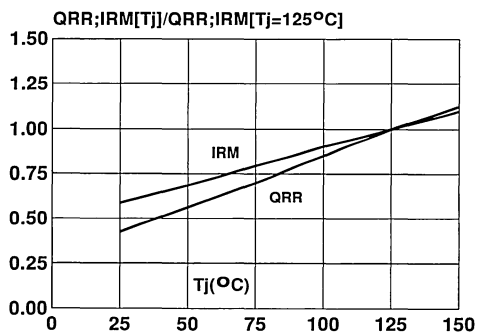


Fig.12 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY DIODES

MAIN PRODUCT CHARACTERISTICS

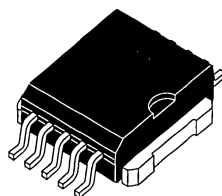
$I_{F(AV)}$	15 A
V_{RRM}	200 V
t_{rr}	35 ns
V_F	0.85 V

FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Single rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in a high performance surface mount package PSO-10, this device is intended for use in high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
Plastic, non isolated SMD
with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	200	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	27	A
$I_{F(AV)}$	Average forward current	$T_c=115^\circ\text{C}$ $\delta = 0.5$	A
I_{FSM}	Surge non repetitive forward current (All pins connected)	$t_p=10\text{ms}$ sinusoidal	A
I_{FRM}	Repetitive peak forward current	$t_p = 5 \mu\text{s}$ $f = 5 \text{kHz}$	A
T_{stg} T_j	Storage and junction temperature range	- 40 to + 150	$^\circ\text{C}$

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case thermal resistance	2.0	°C/W

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RRM}	T _j = 25°C			20	μA
			T _j = 100°C			1.5	mA
V _F **	Forward voltage drop	I _F = 12 A	T _j = 125°C			0.85	V
		I _F = 25 A	T _j = 125°C			1.05	
		I _F = 25 A	T _j = 25°C			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.65 \times I_{F(AV)} + 0.0016 I_{F(RMS)}^2$

RECOVERY CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
trr	Reverse recovery time	T _j = 25°C	I _F = 0.5A			25	ns
		I _{rr} = 0.25 A	I _R = 1A				
trf	Forward recovery time	T _j = 25°C	I _F = 1A		15		ns
		dI _F /dt = 100A/μs	V _R = 30V				
V _{FP}	Peak forward voltage	T _j = 25°C	I _F = 1A		2		V
		dI _F /dt = 100A/μs					

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5
 Cathode = connected to base tab

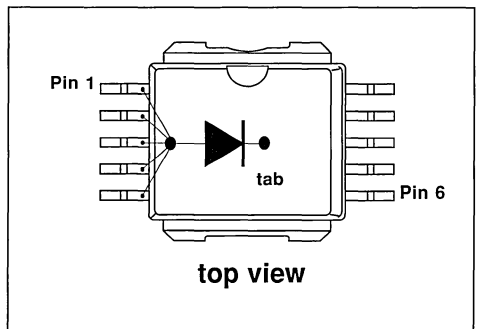


Fig.1 : Average forward power dissipation versus average forward current.

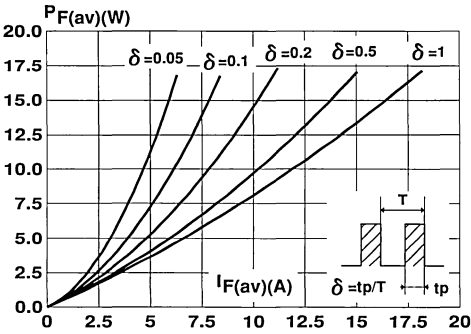


Fig.2 : Peak current versus form factor.

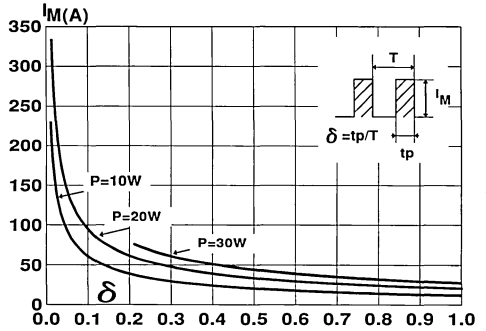


Fig.3 : Forward voltage drop versus forward current (maximum values).

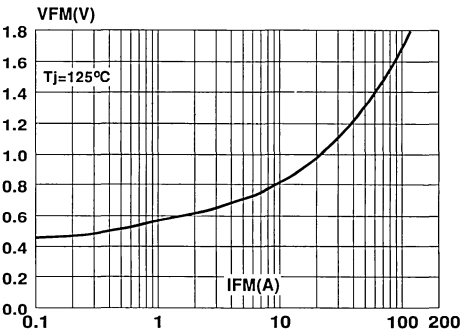


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

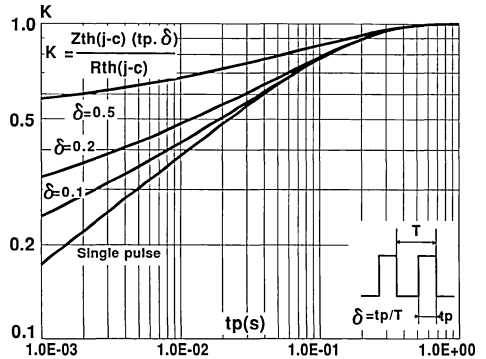


Fig.5 : Non repetitive surge peak forward current versus overload duration.

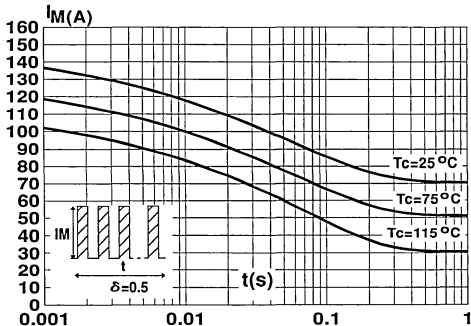


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

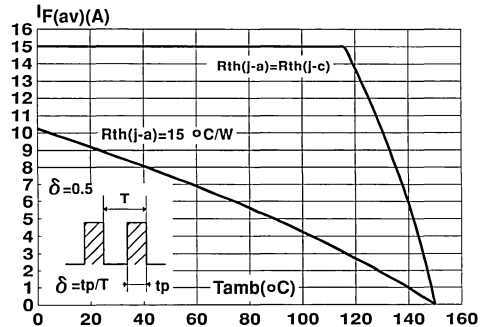


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

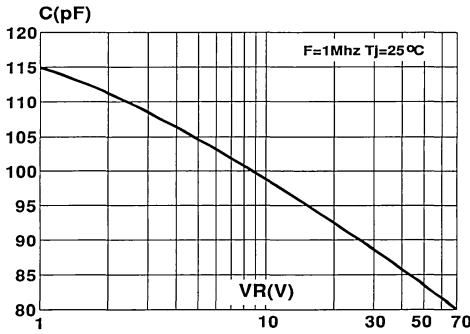


Fig.8 : Recovery charges versus dI_F/dt .

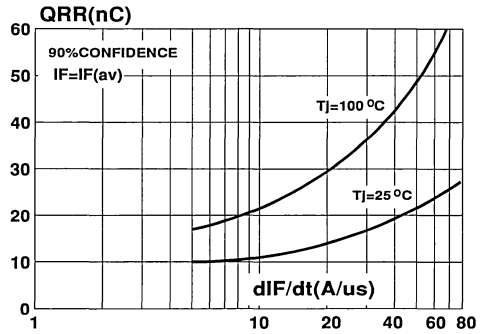


Fig.9 : Peak reverse current versus dI_F/dt .

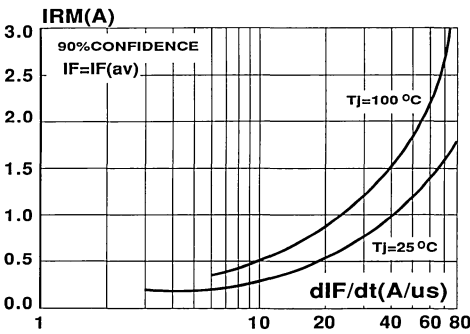
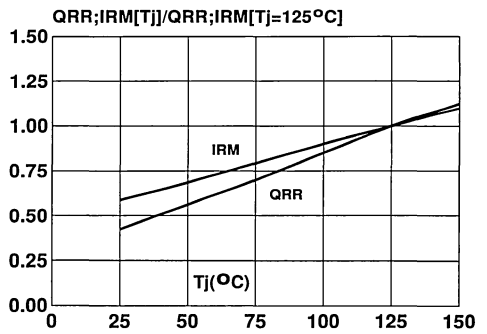
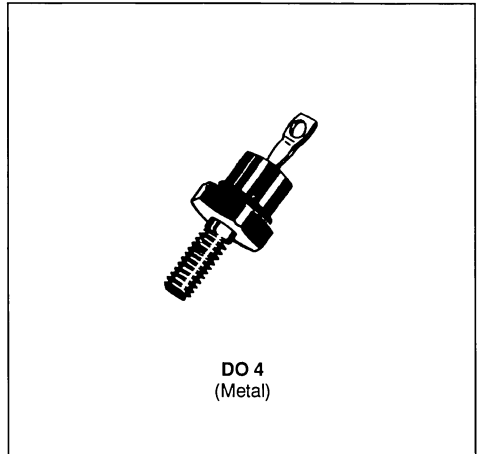


Fig.10 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT AND AVALANCHE CAPABILITY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS



DESCRIPTION

Low voltage drop rectifiers suited for switchmode power supply.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	200	A
$I_F (RMS)$	RMS Forward Current		35	A
$I_F (AV)$	Average Forward Current	$T_C = 120^\circ C$ $\delta = 0.5$	15	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	200	A
P_{tot}	Power Dissipation		22	W
T_j	Junction Temperature		- 40 to 150	°C

Symbol	Parameter	BYW 81-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-c)}$	Junction-case	2.3	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			15	μA
	T _J = 100°C				1.5	mA
V _F	T _J = 25°C	I _F = 38A			1.25	V
	T _J = 100°C	I _F = 12A			0.85	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C V _R = 30V	I _F = 1A see figure 12	di _F /dt = - 50A/μs			35	ns
Q _{rr}	T _J = 25°C V _R ≤ 30V	I _F = 2A	di _F /dt = - 20A/μs			15	nC
t _{fr}	T _J = 25°C Measured at 1.1 x V _F	I _F = 1A	t _r = 5ns		15		ns
V _{FP}	T _J = 25°C	I _F = 1A	t _r = 5ns		2		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.0077 I_F$$

$$P = 0.66 \times I_{F(AV)} + 0.0077 I_{F(RMS)}^2$$

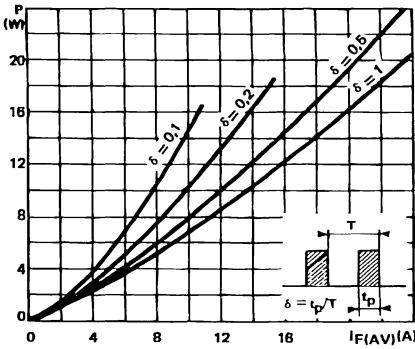


FIGURE 1 : Power losses versus average current

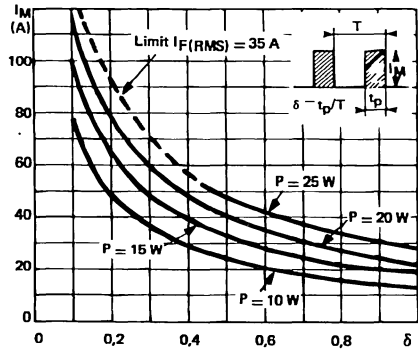


FIGURE 2 : Peak current versus form factor

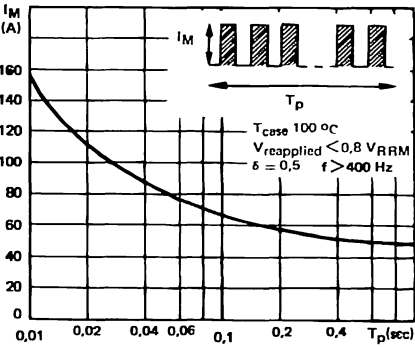


FIGURE 3 : Non repetitive peak surge current versus duration

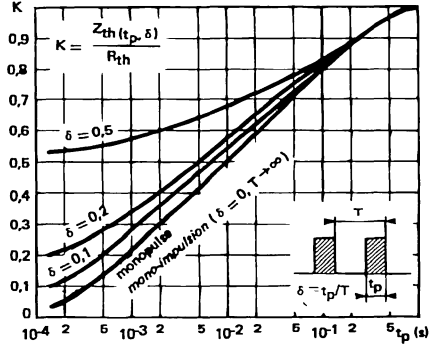


FIGURE 4 : Thermal impedance versus pulse width

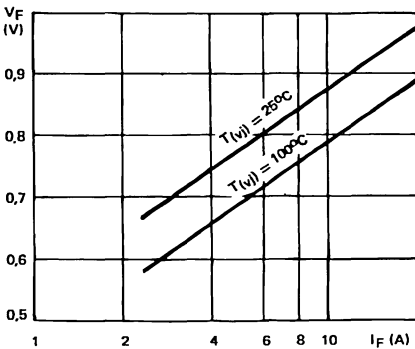


FIGURE 5 : Voltage drop versus forward current

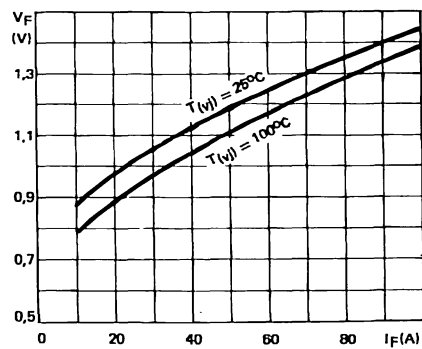


FIGURE 6 : Voltage drop versus forward current

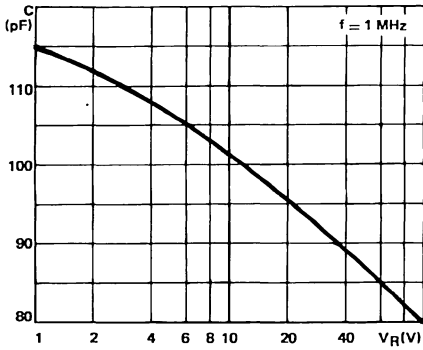


FIGURE 7 : Capacitance versus reverse voltage applied

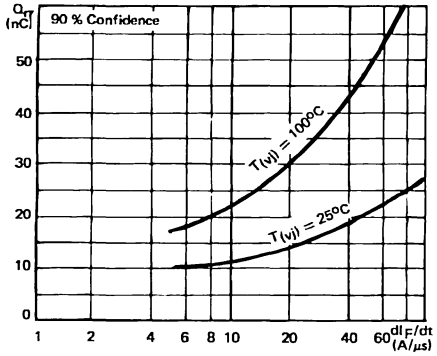


FIGURE 8 : Recovery charge versus di_F/dt

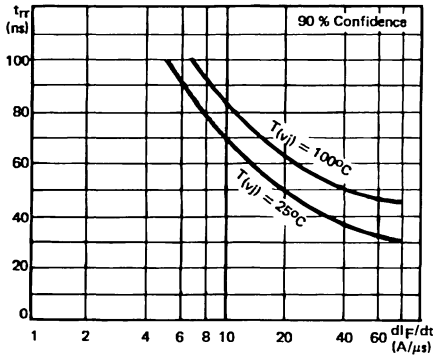


FIGURE 9 : Recovery time versus di_F/dt

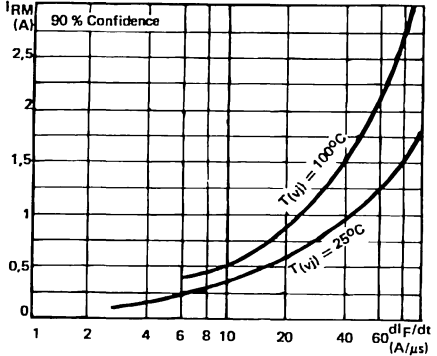


FIGURE 10 : Peak reverse current versus di_F/dt

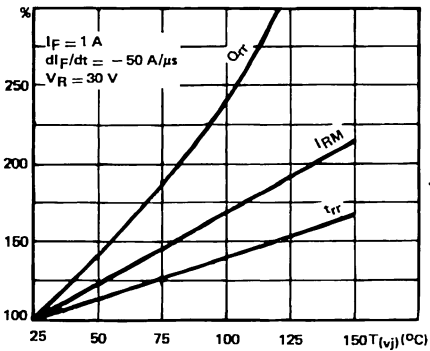


FIGURE 11 : Dynamic parameters versus junction temperature

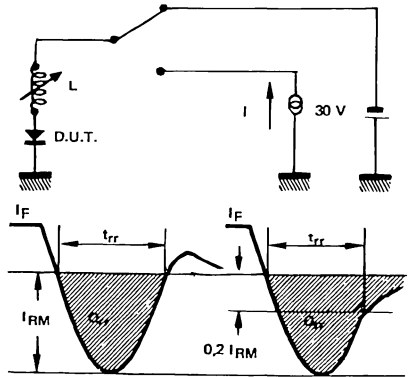


FIGURE 12 : Measurement of t_{rr} (fig. 9) and I_{RM}

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

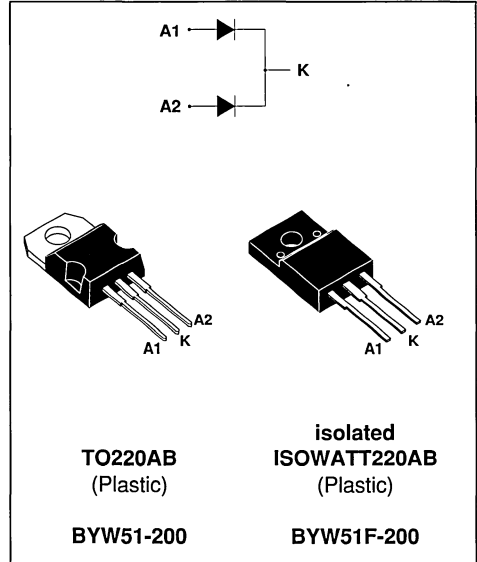
FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION (ISOWATT220AB) :
Insulating voltage = 2000 V DC
Capacitance = 12 pF

DESCRIPTION

Dual center tap rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AB, or ISOWATT220AB this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
$I_{F(RMS)}$	RMS forward current		Per diode	20	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO220AB	$T_c = 120^\circ\text{C}$	Per diode	10
		ISOWATT220AB	$T_c = 95^\circ\text{C}$	Per diode	10
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	Per diode	100
T_{stg} T_j	Storage and junction temperature range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$ $^\circ\text{C}$

Symbol	Parameter	BYW51-(F)				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit	
Rth (j-c)	Junction to case	TO220AB	Per diode	2.5	°C/W
			Total	1.4	
		ISOWATT220AB	Per diode	5.1	
			Total	4.05	
Rth (c)	Coupling	TO220AB	0.25	°C/W	
		ISOWATT220AB	3.0		

When the diodes 1 and 2 are used simultaneously :
 $T_j - T_c (\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)} (\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			15	μA
	T _j = 100°C				1	mA
V _F **	T _j = 125°C	I _F = 8 A			0.85	V
	T _j = 125°C	I _F = 16 A			1.05	
	T _j = 25°C	I _F = 16 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.65 \times I_{F(AV)} + 0.025 \times I_{F(RMS)}^2$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			25	ns
		I _F = 1A dI _F /dt = -50A/μs V _R = 30V			35	
tfr	T _j = 25°C	I _F = 1A tr = 10 ns V _{FR} = 1.1 x V _F		15		ns
V _{FP}	T _j = 25°C	I _F = 1A tr = 10 ns		2		V

Fig.1 : Average forward power dissipation versus average forward current.

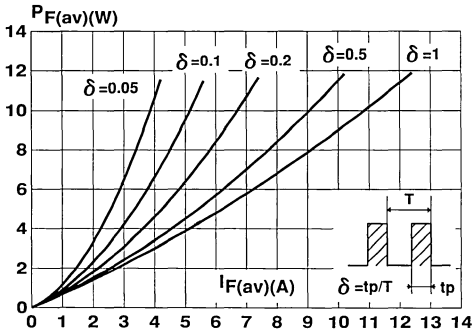


Fig.2 : Peak current versus form factor.

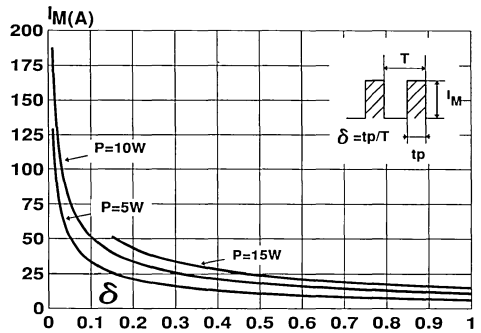


Fig.3 : Forward voltage drop versus forward current (maximum values).

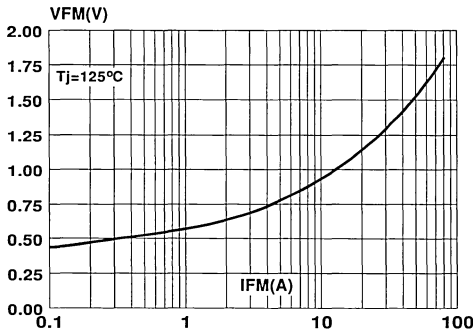


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration. (TO220AB)

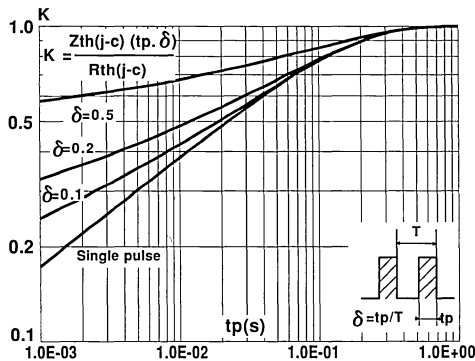


Fig.5 : Relative variation of thermal impedance junction to case versus pulse duration. (ISOWATT220AB)

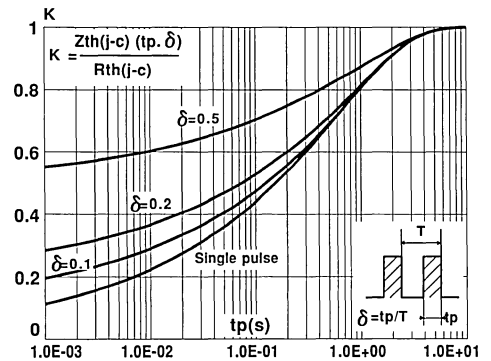


Fig.6 : Non repetitive surge peak forward current versus overload duration. (TO220AB)

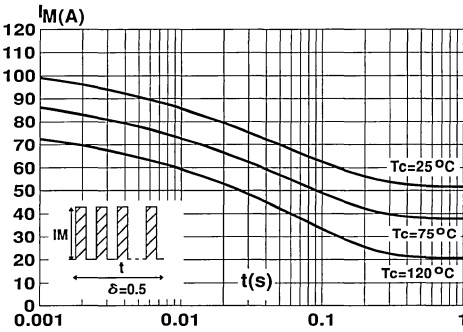


Fig.7 : Non repetitive surge peak forward current versus overload duration. (ISOWATT220AB)

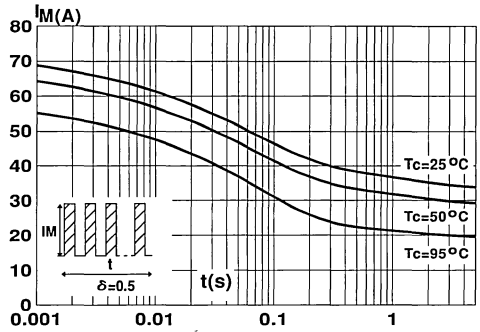


Fig.8 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AB)

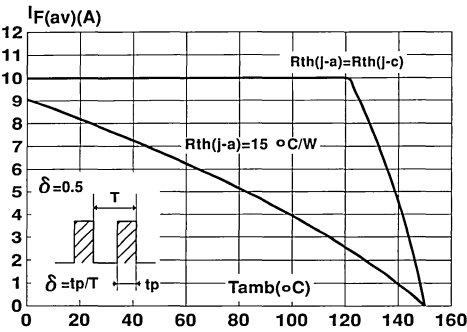


Fig.9 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AB)

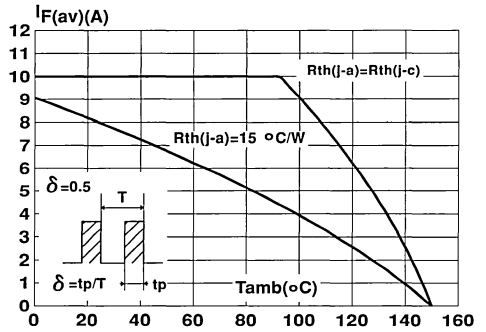


Fig.10 : Junction capacitance versus reverse voltage applied (Typical values).

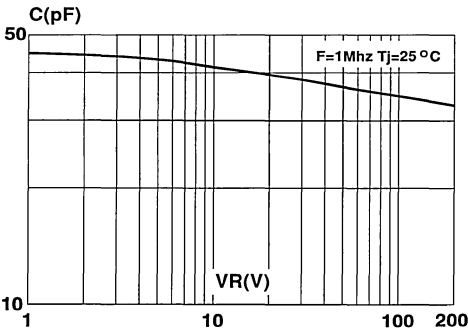


Fig.11 : Recovery charges versus diF/dt.

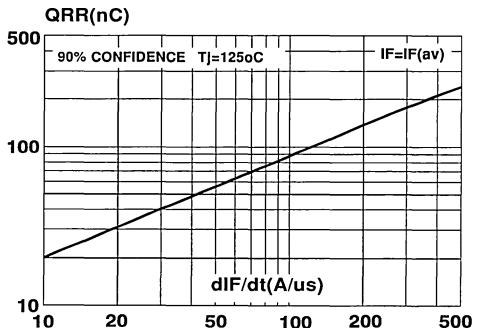


Fig.12 : Peak reverse current versus dI/dt.

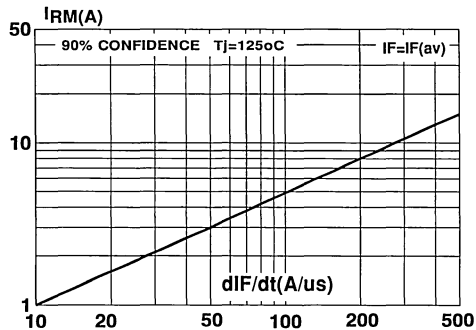
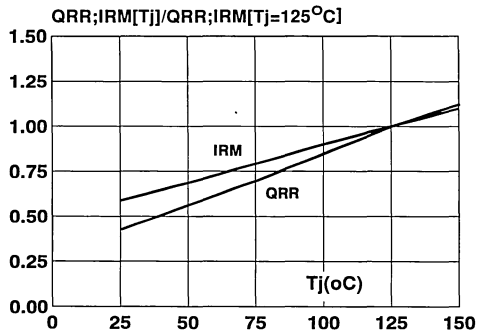


Fig.13 : Dynamic parameters versus junction temperature.



**HIGH EFFICIENCY
FAST RECOVERY DIODES**
MAIN PRODUCT CHARACTERISTICS

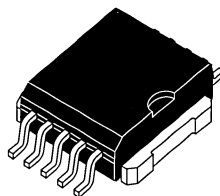
$I_{F(AV)}$	2 x 8 A
V_{RRM}	200 V
t_{rr}	35 ns
V_F	0.85 V

FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Single rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in a high performance surface mount package PSO-10, this device is intended for use in high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
Plastic, non isolated SMD
with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(RMS)}$	RMS forward current	All pins connected	Per diode	17	A
$I_{F(AV)}$	Average forward current	$T_c=120^\circ\text{C}$ $\delta = 0.5$	Per diode	10	A
			Per device	20	
I_{FSM}	Surge non repetitive forward current	$t_p=10\text{ms}$ sinusoidal All pins connected	Per diode	100	A
I_{FRM}	Repetitive peak forward current	$t_p = 5 \mu\text{s}$ $f = 5 \text{ kHz}$	Per diode	100	A
T_{stg} T_J	Storage and junction temperature range			- 40 to + 150	$^\circ\text{C}$

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case thermal resistances	Per diode	2.5	°C/W
		Total	1.4	
Rth (c)	Coupling thermal resistance		0.25	°C/W

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RRM}	T _j = 25°C			15	μA
			T _j = 100°C			1	mA
V _F **	Forward voltage drop	I _F = 8 A	T _j = 125°C			0.9	V
		I _F = 16 A	T _j = 125°C			1.05	
		I _F = 16 A	T _j = 25°C			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_{F(AV)} + 0.025 I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	Reverse recovery time	T _j = 25°C	I _F = 0.5A			25	ns
		I _{rr} = 0.25 A	I _R = 1 A				
t _{fr}	Forward recovery time	T _j = 25°C	I _F = 1A		15		ns
		dI _F /dt = 100A/μs	V _R = 30V				
V _{FP}	Peak forward voltage	T _j = 25°C	I _F = 1A		2		V
		dI _F /dt = 100A/μs					

PIN OUT configuration in PowerSO-10 :

- Anode 1 = pin 1 to 5
- Anode 2 = pin 6 to 10
- Cathodes = connected to base tab

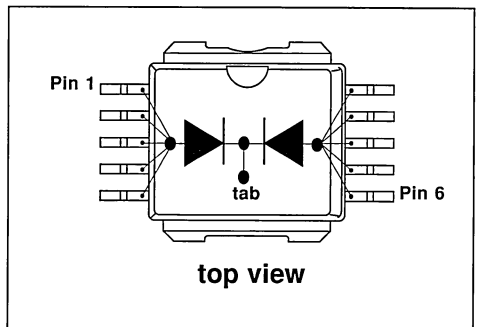


Fig.1 : Average forward power dissipation versus average forward current.

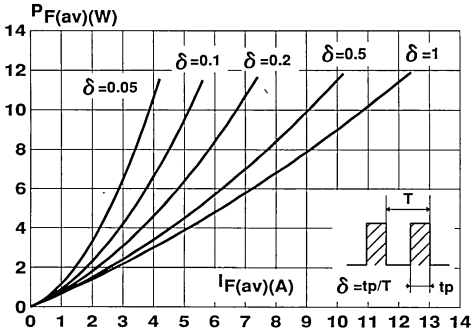


Fig.2 : Peak current versus form factor.

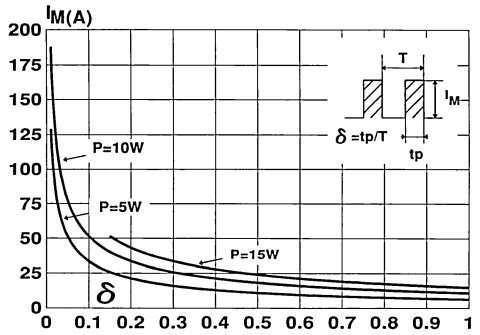


Fig.3 : Forward voltage drop versus forward current (maximum values).

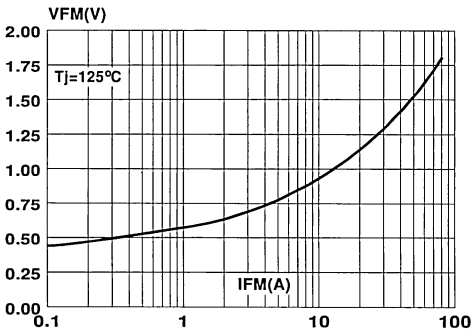


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

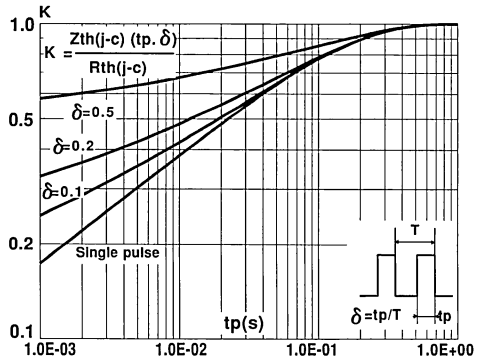


Fig.5 : Non repetitive surge peak forward current versus overload duration.

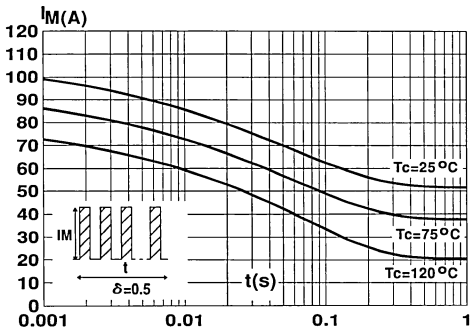


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

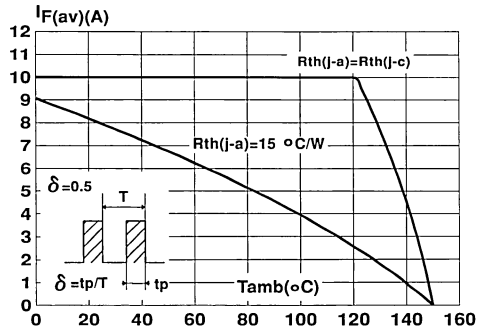


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

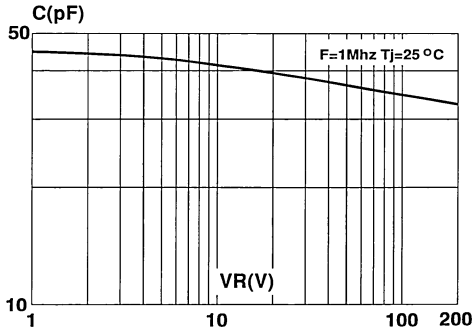


Fig.8 : Recovery charges versus dI_F/dt .

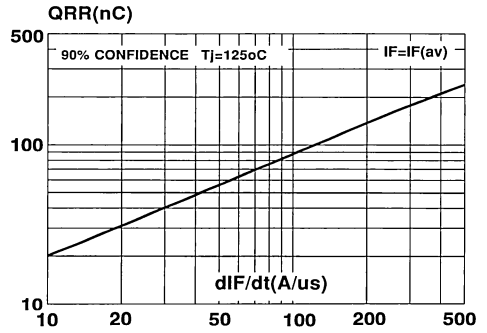


Fig.9 : Peak reverse current versus dI_F/dt .

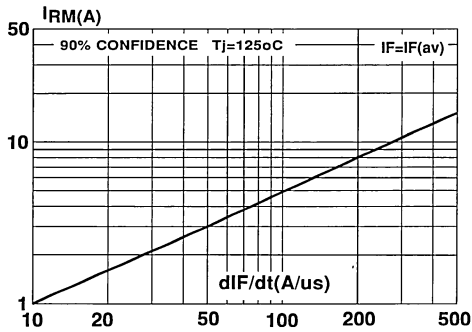
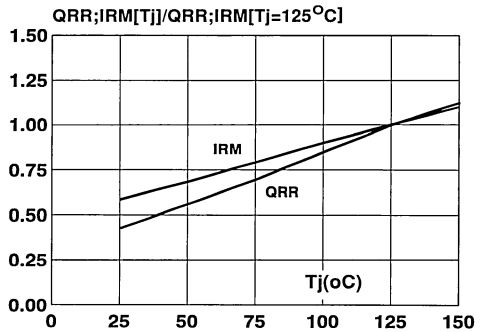


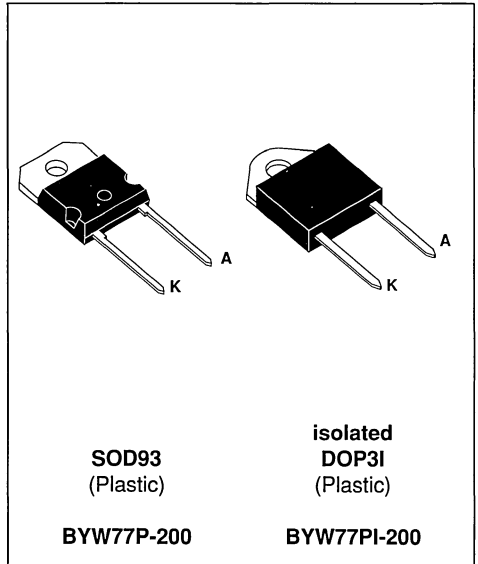
Fig.10 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION :
 Insulating voltage = 2500 V DC
 Capacitance = 12 pF



DESCRIPTION

Single chip rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in SOD93, or DOP31 this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
$I_{F(RMS)}$	RMS forward current		50	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	SOD93	$T_C=125^\circ\text{C}$	25	A
		TOP31	$T_C=100^\circ\text{C}$		
I_{FSM}	Surge non repetitive forward current		$t_p=10\text{ms}$ sinusoidal	500	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$	

Symbol	Parameter	BYW77P-/PI-				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	SOD93	1.0	°C/W
		DOP3I	1.8	

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			25	μA
	T _j = 100°C				2.5	mA
V _F **	T _j = 125°C	I _F = 20 A			0.85	V
	T _j = 125°C	I _F = 40 A			1.00	
	T _j = 25°C	I _F = 40 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.7 \times I_{F(AV)} + 0.0075 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _R = 1A			35	ns
		I _F = 1A V _R = 30V			50	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 x V _F		10		ns
V _{FP}	T _j = 25°C	I _F = 1A		1.5		V

Fig.1 : Average forward power dissipation versus average forward current.

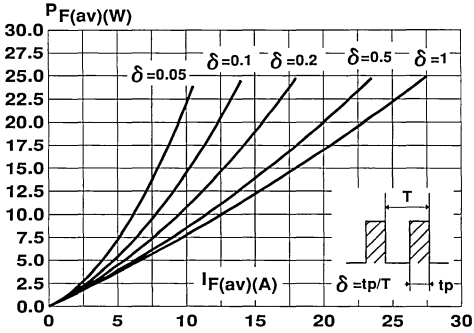


Fig.2 : Peak current versus form factor.

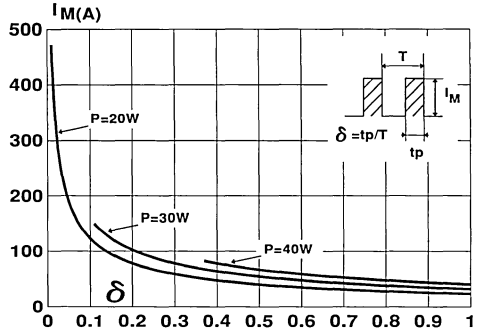


Fig.3 : Forward voltage drop versus forward current (maximum values).

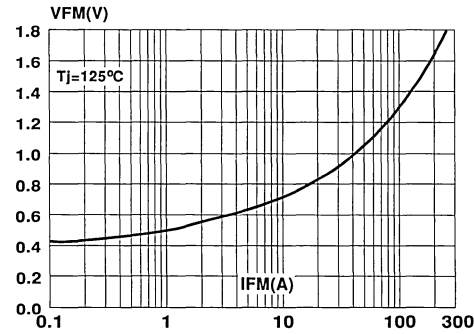


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

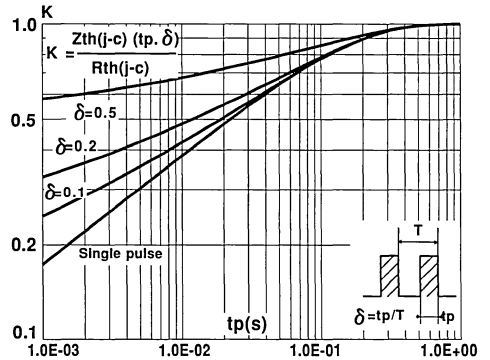


Fig.5 : Non repetitive surge peak forward current versus overload duration. (BYW81P)

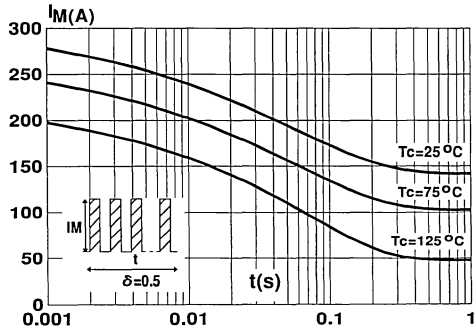


Fig.6 : Non repetitive surge peak forward current versus overload duration. (BYW81PI)

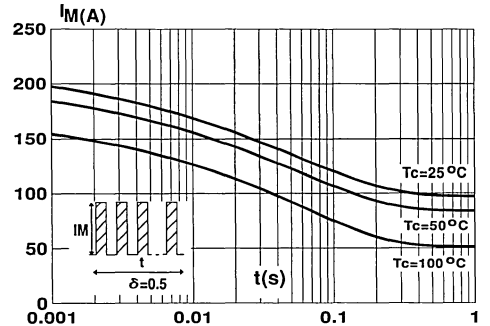


Fig.7 : Average current versus ambient temperature.
(duty cycle : 0.5) (SOD93)

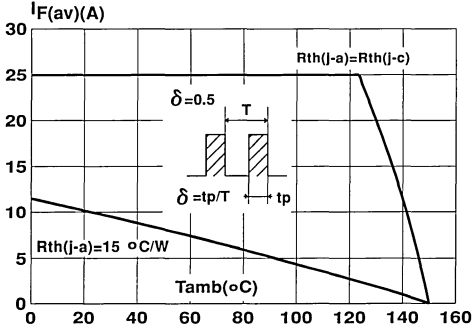


Fig.8 : Average current versus ambient temperature.
(duty cycle : 0.5) (DOP31)

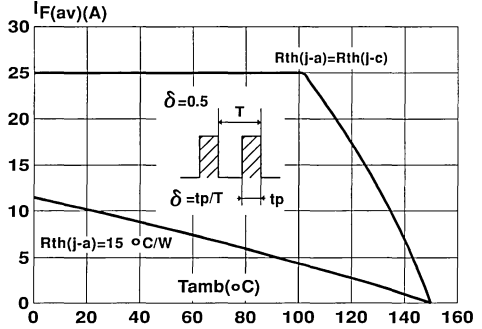


Fig.9 : Junction capacitance versus reverse voltage applied (Typical values).

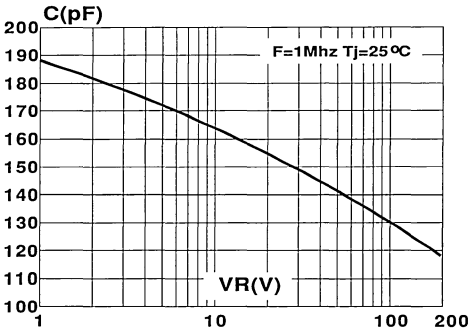


Fig.10 : Recovery charges versus dI_F/dt .

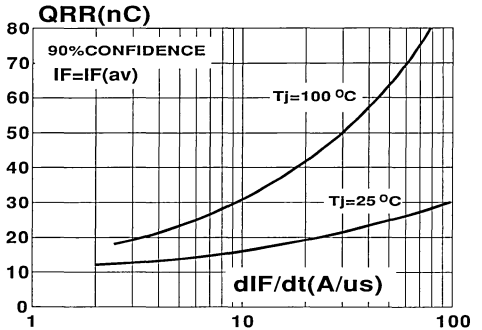


Fig.11 : Peak reverse current versus dI_F/dt .

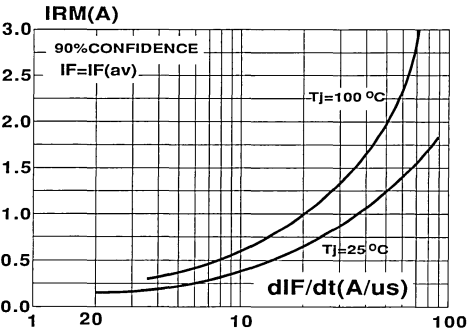
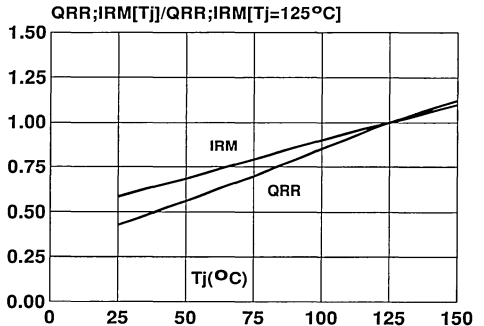


Fig.12 : Dynamic parameters versus junction temperature.



**HIGH EFFICIENCY
 FAST RECOVERY DIODES**
MAIN PRODUCT CHARACTERISTICS

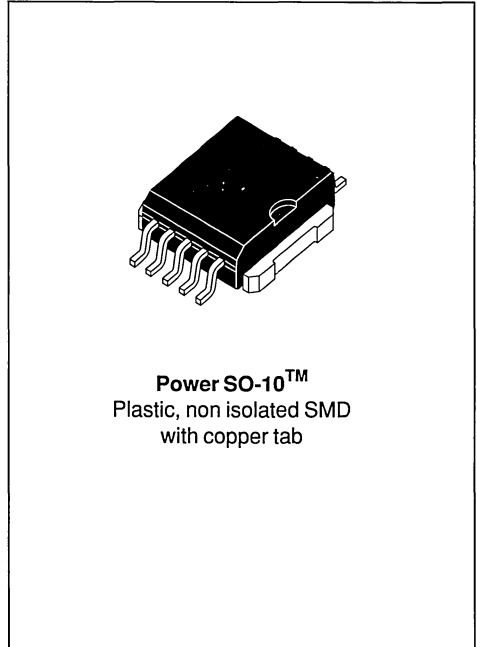
I_{F(AV)}	25 A
V_{RRM}	200 V
t_{rr}	50 ns
V_F	0.85 V

FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Single rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in a high performance surface mount package PSO-10, this device is intended for use in high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{RRM}	Repetitive peak reverse voltage	200	V
I _{F(RMS)}	RMS forward current (All pins connected)	44	A
I _{F(AV)}	Average forward current	T _c =125°C δ = 0.5	A
I _{FSM}	Surge non repetitive forward current (All pins connected)	t _p =10ms sinusoidal	A
I _{FRM}	Repetitive peak forward current	t _p = 5μs f = 5 kHz	A
T _{stg} T _j	Storage and junction temperature range	- 40 to + 150	°C

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case thermal resistance	1.0	°C/W

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RRM}	T _j = 25°C			25	μA
			T _j = 100°C			2.5	mA
V _F **	Forward voltage drop	I _F = 20 A	T _j = 125°C			0.85	V
		I _F = 40 A	T _j = 125°C			1.05	
		I _F = 40 A	T _j = 25°C			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.65 \times I_{F(AV)} + 0.0075 I_{F(RMS)}^2$

RECOVERY CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	Reverse recovery time	T _j = 25°C	I _F = 0.5A			35	ns
		I _{rr} = 0.25 A	I _R = 1A				
		T _j = 25°C	I _F = 1A			50	
		dI _F /dt = -50A/μs	V _R = 30V				
t _{fr}	Forward recovery time	T _j = 25°C	I _F = 1A		10		ns
		dI _F /dt = 100A/μs	V _{FR} = 1.1 x V _F max				
V _{FP}	Peak forward voltage	T _j = 25°C	I _F = 1A		1.5		V
		dI _F /dt = 100A/μs					

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5
 Cathode = connected to base tab

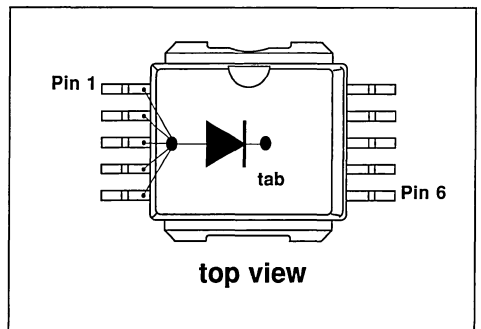


Fig.1 : Average forward power dissipation versus average forward current.

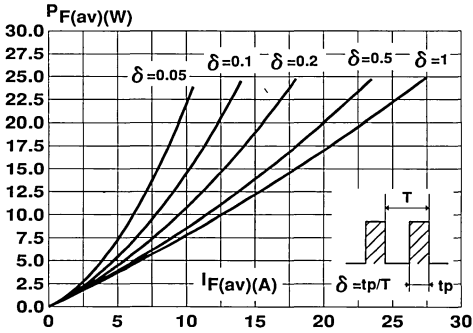


Fig.2 : Peak current versus form factor.

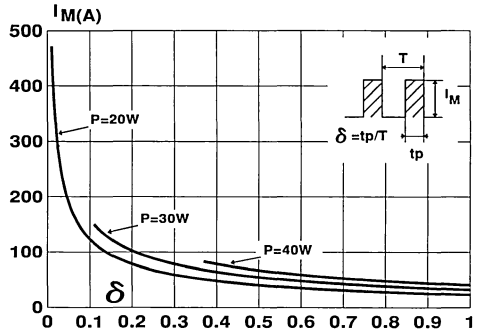


Fig.3 : Forward voltage drop versus forward current (maximum values).

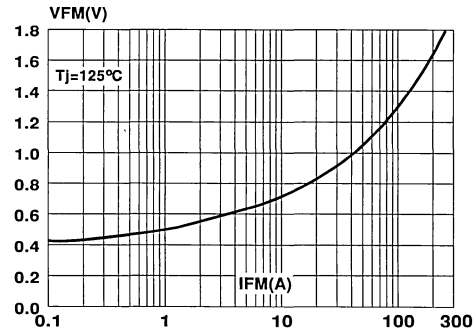


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

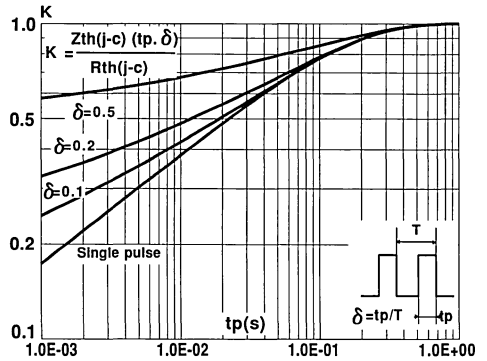


Fig.5 : Non repetitive surge peak forward current versus overload duration.

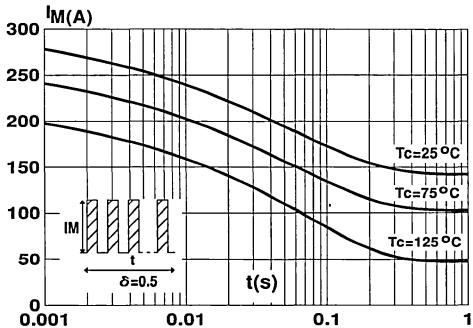


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

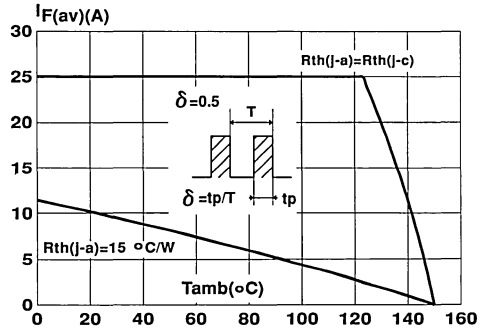


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

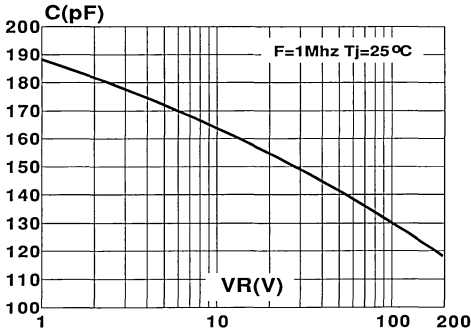


Fig.8 : Recovery charges versus dI/dt .

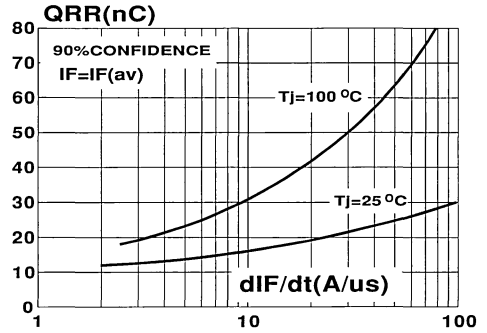


Fig.9 : Peak reverse current versus dI/dt .

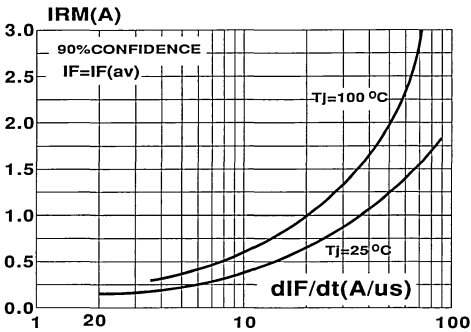
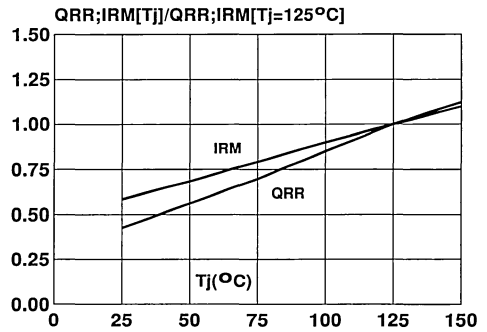
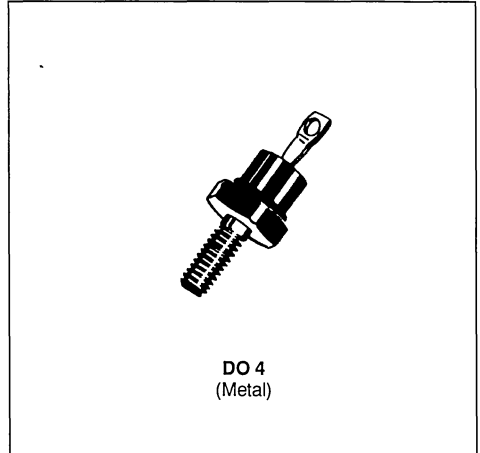


Fig.10 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT AND AVALANCHE CAPABILITY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS



DESCRIPTION

Low voltage drop rectifiers suited for switching mode power supply.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	500	A
$I_F (RMS)$	RMS Forward Current		50	A
$I_F (AV)$	Average Forward Current	$T_C = 115^\circ C$ $\delta = 0.5$	25	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	500	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	33	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	°C

Symbol	Parameter	BYW 77-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-c)}$	Junction-case	1.5	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			25	μA
	$T_j = 100^\circ\text{C}$				2.5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 63\text{A}$			1.1	V
	$T_j = 100^\circ\text{C}$	$I_F = 20\text{A}$			0.85	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ see figure 12	$di_F/dt = - 50\text{A}/\mu\text{s}$			50	ns
Q_{rr}	$T_j = 25^\circ\text{C}$ $V_R \leq 30\text{V}$	$I_F = 2\text{A}$	$di_F/dt = - 20\text{A}/\mu\text{s}$			20	nC
t_{fr}	$T_j = 25^\circ\text{C}$ Measured at $1.1 \times V_F$	$I_F = 1\text{A}$	$t_r'' = 5\text{ns}$		10		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$t_r = 5\text{ns}$		1.5		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.0047 I_F \qquad P = 0.66 \times I_{F(AV)} + 0.0047 I_{F(RMS)}^2$$

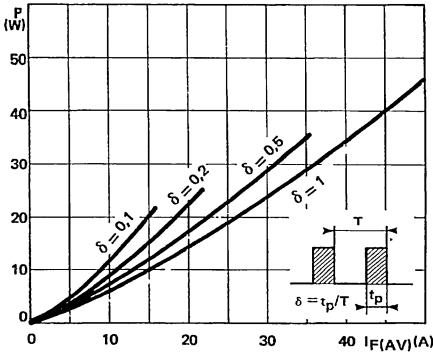


FIGURE 1 : Power losses versus average current

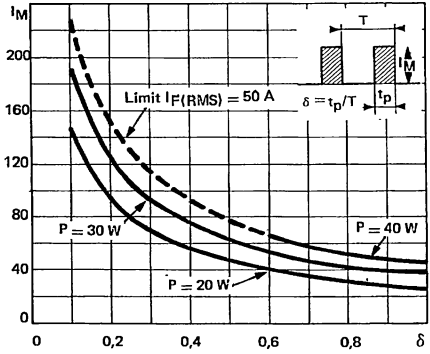


FIGURE 2 : Peak current versus form factor

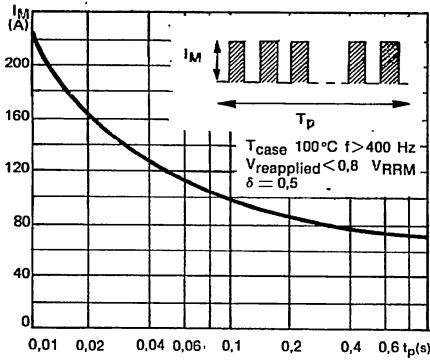


FIGURE 3 : Non repetitive peak surge current versus duration

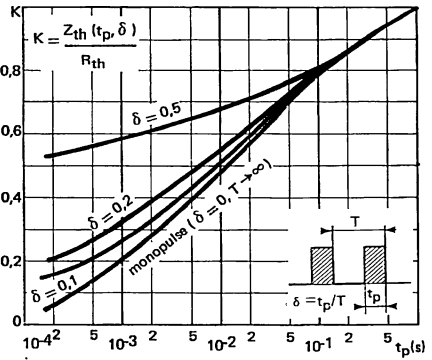


FIGURE 4 : Thermal impedance versus pulse width

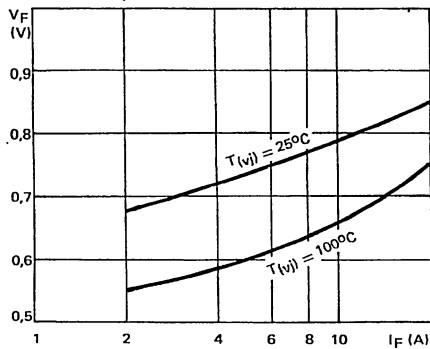


FIGURE 5 : Voltage drop and dispersion versus forward current

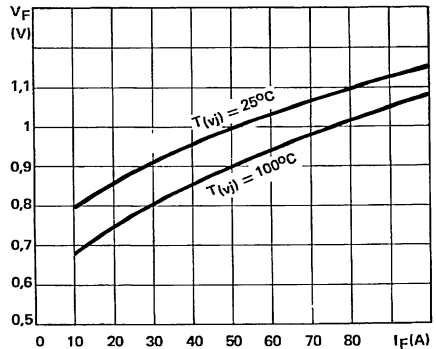


FIGURE 6 : Voltage drop versus forward current

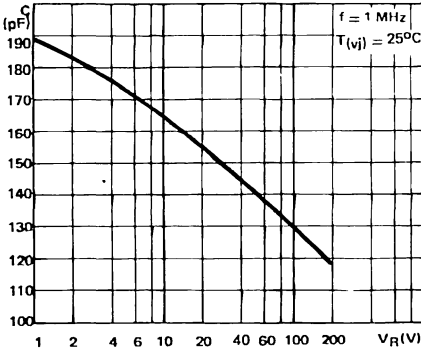


FIGURE 7 : Capacitance versus reverse voltage applied

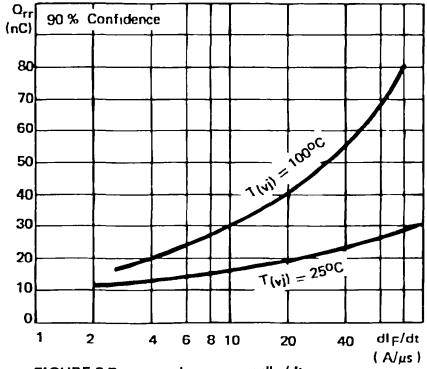


FIGURE 8 Recovery charge versus di_F/dt

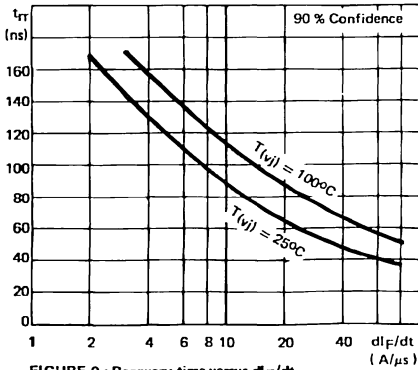


FIGURE 9 : Recovery time versus di_F/dt

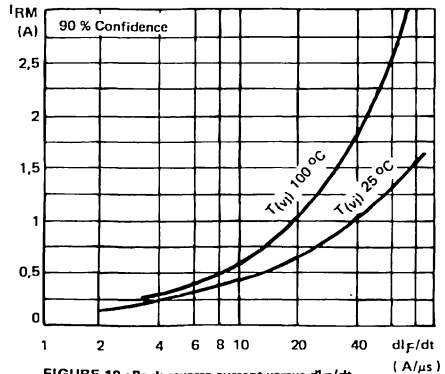


FIGURE 10 : Peak reverse current versus di_F/dt

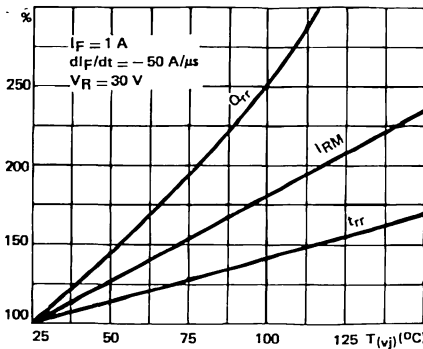


FIGURE 11 : Dynamic parameters versus junction temperature

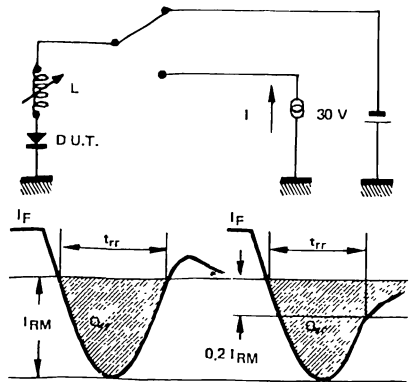


FIGURE 12 : Measurement of t_{rr} (fig. 9) and I_{RM} (fig. 10)

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

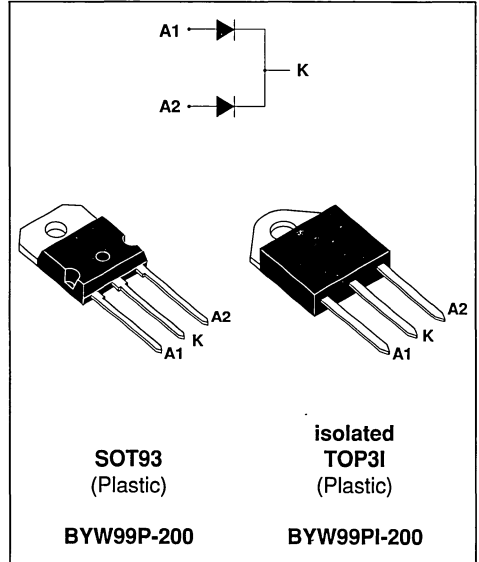
FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION TOP3I :
 Insulating voltage = 2500 V DC
 Capacitance = 12 pF

DESCRIPTION

Dual center tap rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in SOT93, or TOP3I this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
$I_{F(RMS)}$	RMS forward current			Per diode	35 A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	SOT93	$T_C = 120^\circ\text{C}$	Per diode	15 A
		TOP3I	$T_C = 115^\circ\text{C}$	Per diode	15 A
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	Per diode	200 A
T_{stg} T_j	Storage and junction temperature range			- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$

Symbol	Parameter	BYW99P-/PI-				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter			Value	Unit
Rth (j-c)	Junction to case	SOT93	Per diode	1.8	°C/W
			Total	1.0	
		TOP3I	Per diode	2.0	
			Total	1.25	
Rth (c)	Coupling	SOT93		0.2	°C/W
		TOP3I		0.5	

When the diodes 1 and 2 are used simultaneously :
 $T_j - T_c$ (diode 1) = P(diode 1) x Rth(j-c) (Per diode) + P(diode 2) x Rth(c)

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			20	μA
	T _j = 100°C				1.5	mA
V _F **	T _j = 125°C	I _F = 12 A			0.85	V
	T _j = 125°C	I _F = 25 A			1.05	
	T _j = 25°C	I _F = 25 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.65 \times I_{F(AV)} + 0.016 \times I_{F(RMS)}^2$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _R = 1A	I _{rr} = 0.25A		25	ns
		I _F = 1A V _R = 30V	dI _F /dt = -50A/μs		40	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 x V _F	tr = 10 ns		15	ns
V _{FP}	T _j = 25°C	I _F = 1A	tr = 10 ns		2	V

Fig.1 : Average forward power dissipation versus average forward current.

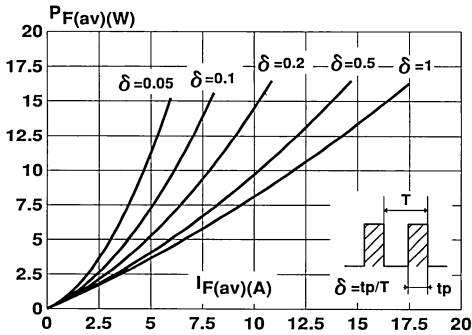


Fig.2 : Peak current versus form factor.

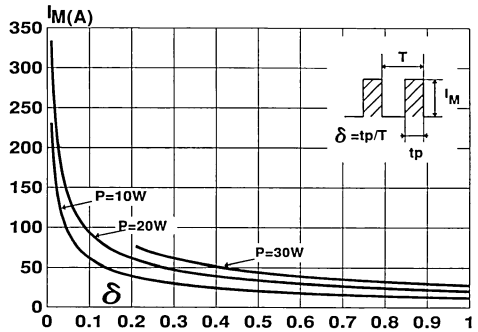


Fig.3 : Forward voltage drop versus forward current (maximum values).

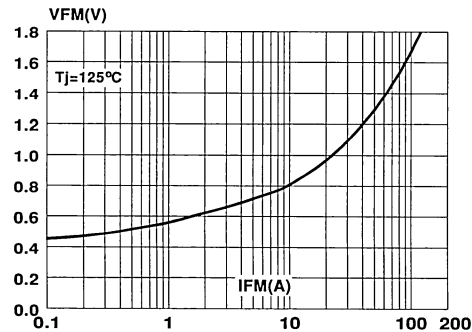


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

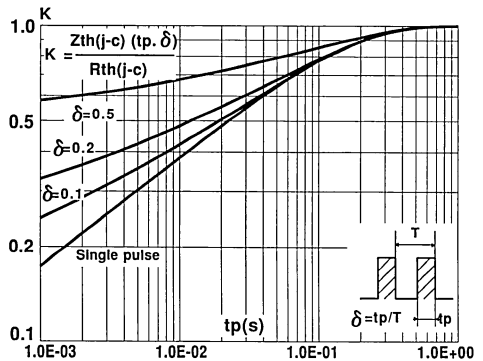


Fig.5 : Non repetitive surge peak forward current versus overload duration. (SOD93)

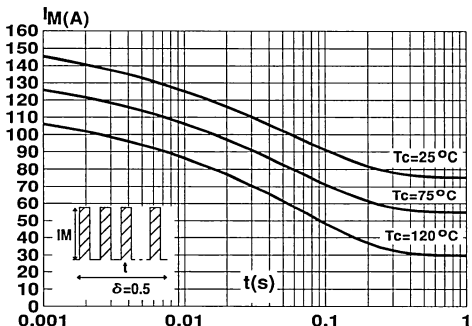


Fig.6 : Non repetitive surge peak forward current versus overload duration. (TOP31)

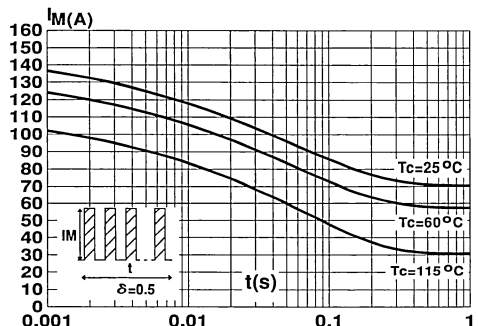


Fig.7 : Average current versus ambient temperature.
(duty cycle : 0.5) (SOD93)

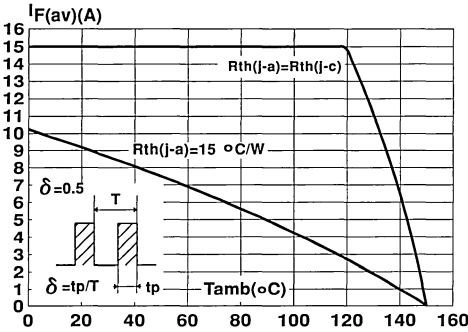


Fig.8 : Average current versus ambient temperature.
(duty cycle : 0.5) (TOP31)

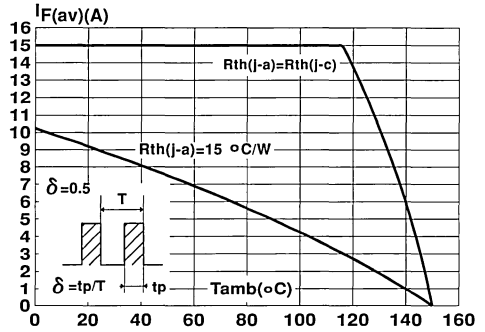


Fig.9 : Junction capacitance versus reverse voltage applied (Typical values).

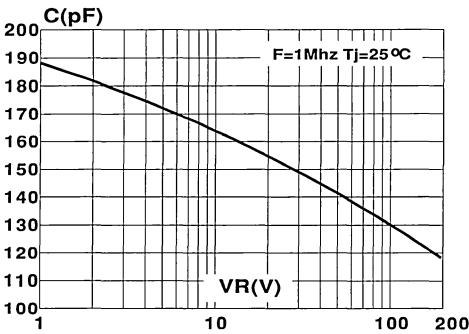


Fig.10 : Recovery charges versus dI_F/dt .

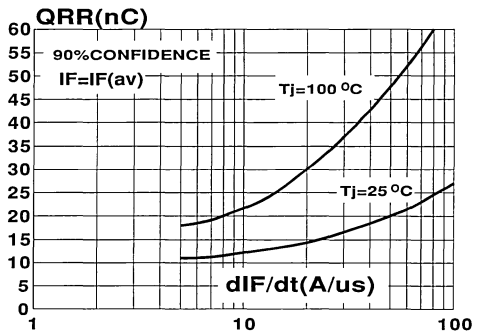


Fig.11 : Peak reverse current versus dI_F/dt .

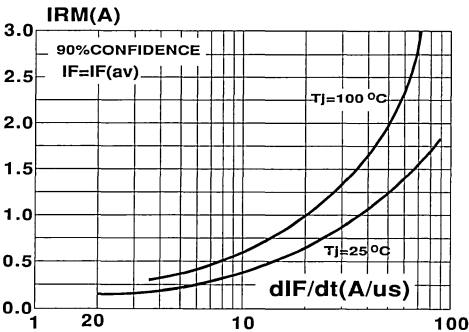
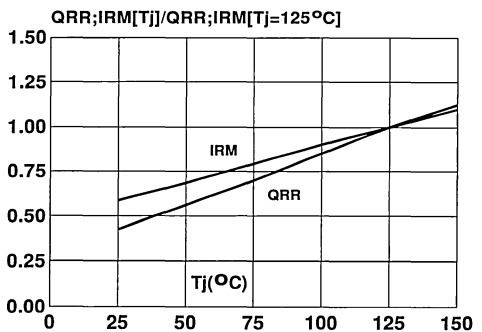
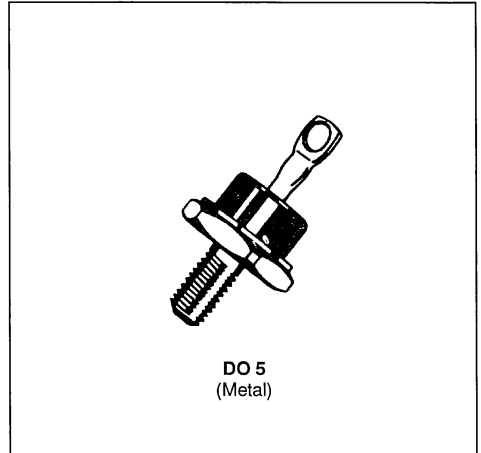


Fig.12 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT AND AVALANCHE CAPABILITY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} AND I_{RM} AT 100°C UNDER USERS CONDITIONS



DESCRIPTION

Low voltage drop rectifiers suited for switching mode power supply.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	500	A
$I_{F(RMS)}$	RMS Forward Current		70	A
$I_{F(AV)}$	Average Forward Current	$T_C = 115^\circ C$ $\delta = 0.5$	35	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	500	A
P_{tot}	Power Dissipation	$T_C = 100^\circ C$	50	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	°C

Symbol	Parameter	BYW 92-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_J = 100^\circ\text{C}$				5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 100\text{A}$			1.3	V
	$T_J = 100^\circ\text{C}$	$I_F = 35\text{A}$			0.92	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ see figure 12	$di_F/dt = -50\text{A}/\mu\text{s}$			50	ns
Q_{rr}	$T_J = 25^\circ\text{C}$ $V_R \leq 30\text{V}$	$I_F = 2\text{A}$	$di_F/dt = -20\text{A}/\mu\text{s}$			20	nC
t_{fr}	$T_J = 25^\circ\text{C}$ Measured at $1.1 \times V_F$	$I_F = 1\text{A}$	$t_r = 5\text{ns}$		10		ns
V_{FP}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$t_r = 5\text{ns}$		1.5		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.0047 I_F$$

$$P = 0.66 \times I_{F(AV)} + 0.0047 I_F^2 (\text{RMS})$$

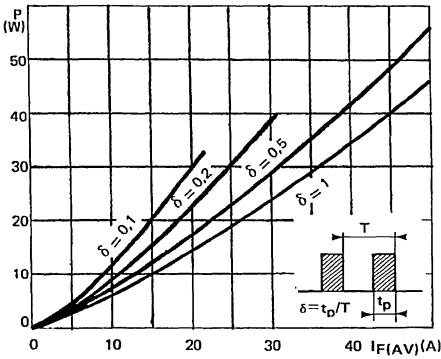


FIGURE 1 : Power losses versus average current

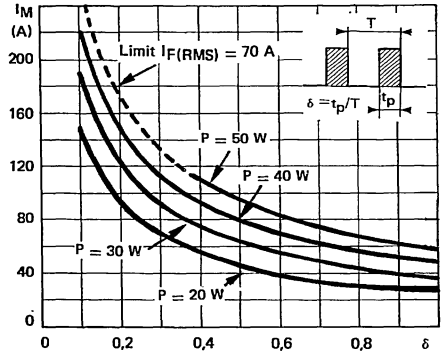


FIGURE 2 : Peak current versus form factor

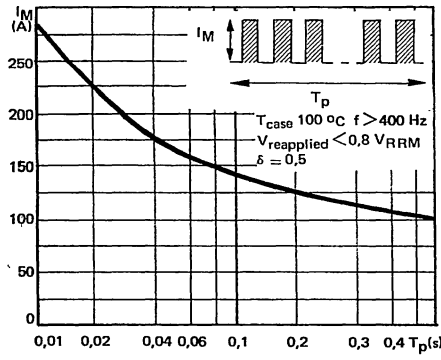


FIGURE 3 : Non repetitive peak surge current versus duration

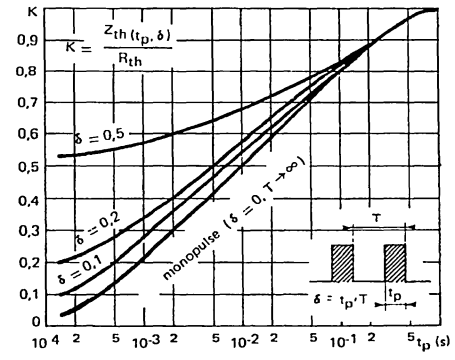


FIGURE 4 : Thermal impedance versus pulse width

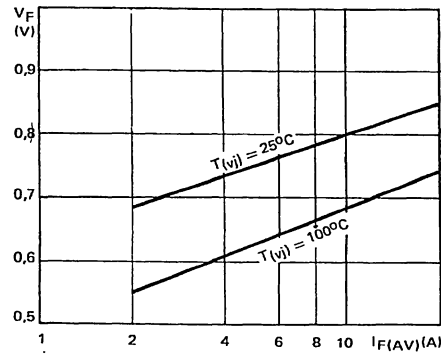


FIGURE 5 : Voltage drop versus forward current

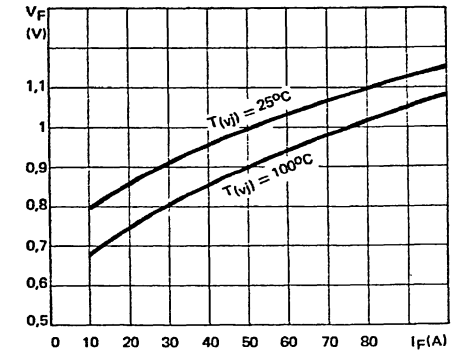


FIGURE 6 : Voltage drop versus forward current

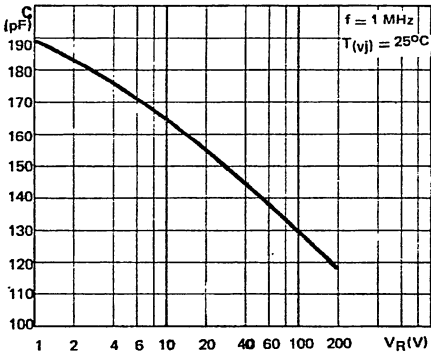


FIGURE 7 : Capacitance versus reverse voltage applied

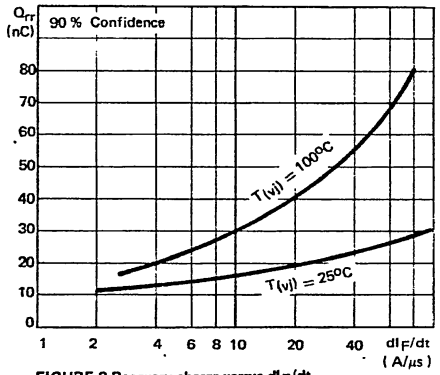


FIGURE 8 Recovery charge versus diF/dt

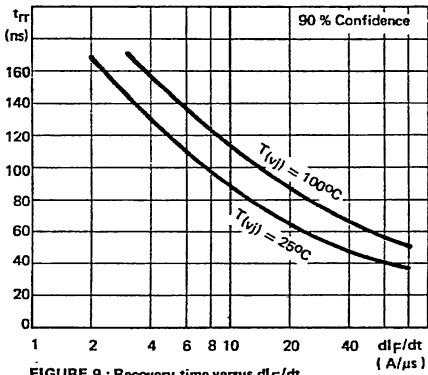


FIGURE 9 : Recovery time versus diF/dt

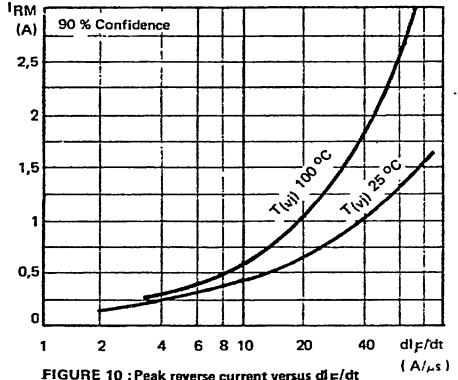


FIGURE 10 : Peak reverse current versus diF/dt

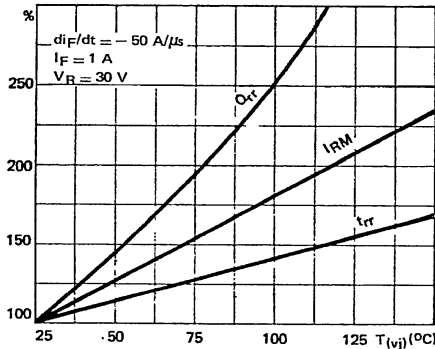


FIGURE 11 : Dynamic parameters versus junction temperature

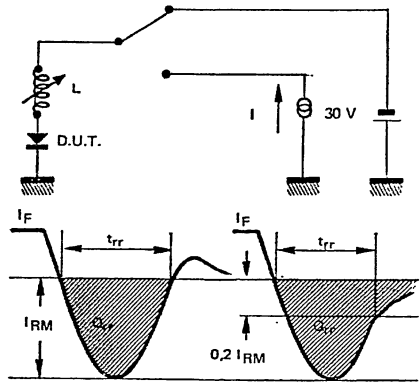


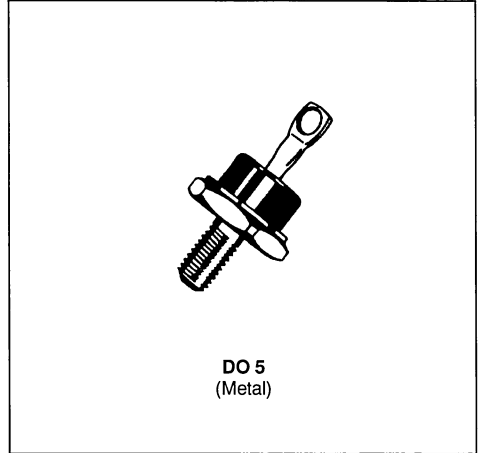
FIGURE 12 : Measurement of t_{rr} (fig. 9) and I_{RM} (fig. 10)

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT AND AVALANCHE CAPABILITY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{rr} and I_{RM} AT 100°C UNDER USERS CONDITIONS

DESCRIPTION

Low voltage drop rectifiers suited for switching mode power supply.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	1000	A
$I_F (RMS)$	RMS Forward Current		100	A
$I_F (AV)$	Average Forward Current	$T_C = 100^\circ C$ $\delta = 0.5$	50	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	1500	A
P_{tot}	Power Dissipation	$T_C = 90^\circ C$	60	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	°C

Symbol	Parameter	BYW 78-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				5	mA
V _F	T _j = 25°C	I _F = 160A			1.1	V
	T _j = 100°C	I _F = 50A			0.85	

RECOVERY CHARACTERISTICS

Symbol	Test conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C V _R = 30V	I _F = 1A see figure 12	di _F /dt = - 50A/μs			60	ns
t _{fr}	T _j = 25°C Measured at 1.1 x V _F	I _F = 1A	t _r = 5ns		10		ns
V _{FP}	T _j = 25°C	I _F = 1A	t _r = 5ns		1.5		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.0021 I_F \qquad P = 0.66 \times I_{F(AV)} + 0.0021 I_F^2_{(RMS)}$$

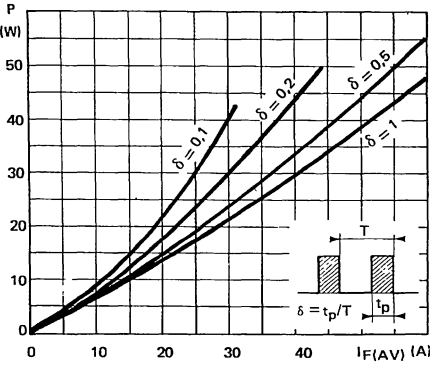


FIGURE 1 : Power losses versus average current

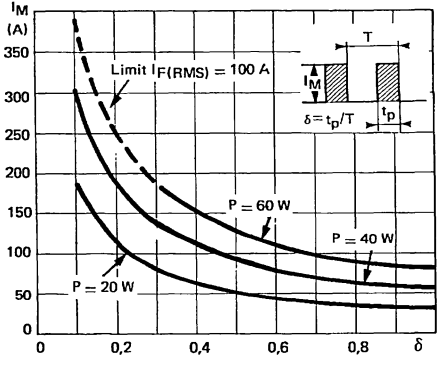


FIGURE 2 : Peak current versus form factor

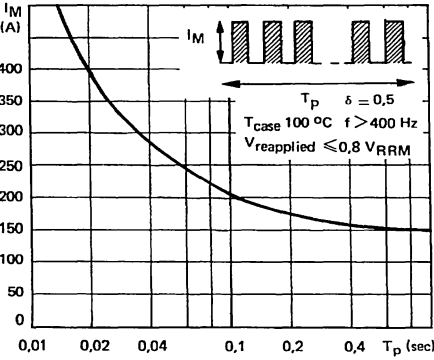


FIGURE 3 : Non repetitive peak surge current versus duration

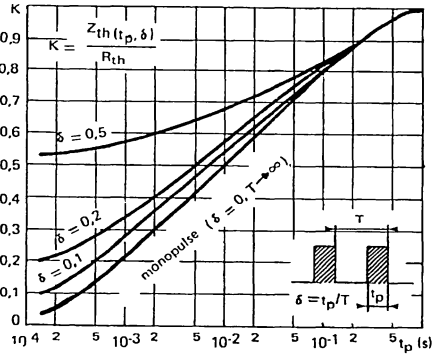


FIGURE 4 : Thermal impedance versus pulse width

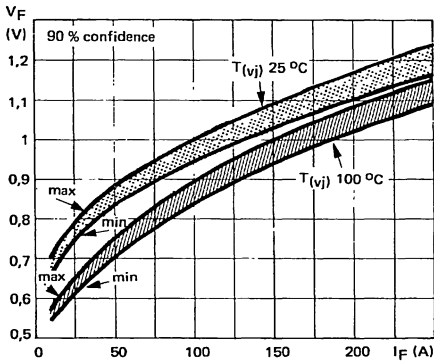


FIGURE 5 : Voltage drop and spread versus forward current

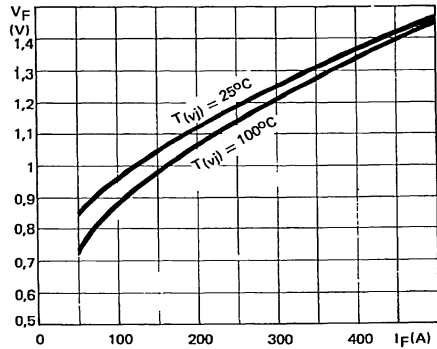


FIGURE 6 : Voltage drop versus forward current

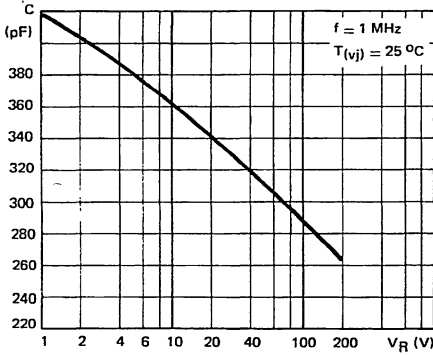


FIGURE 7 : Capacitance versus reverse voltage applied

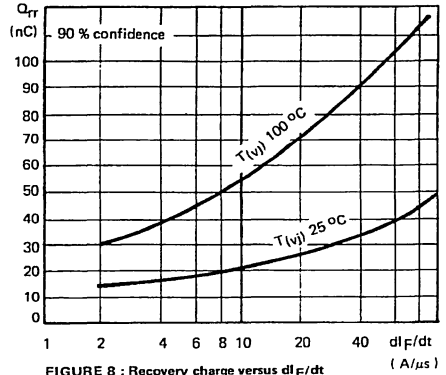


FIGURE 8 : Recovery charge versus dI_F/dt

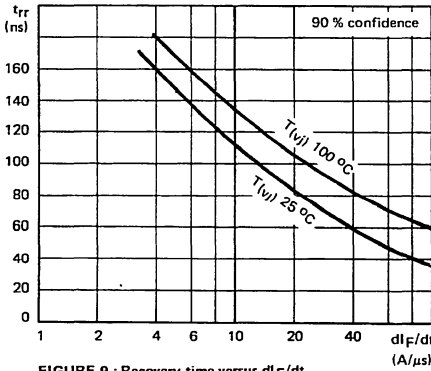


FIGURE 9 : Recovery time versus dI_F/dt

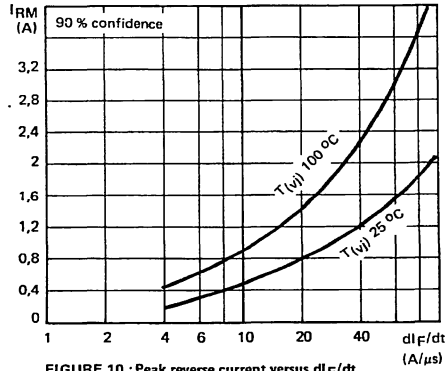


FIGURE 10 : Peak reverse current versus dI_F/dt

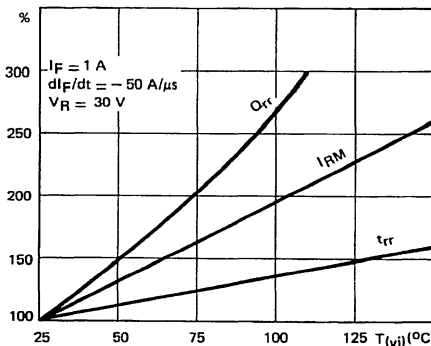


FIGURE 11 : Dynamic parameters versus junction temperature

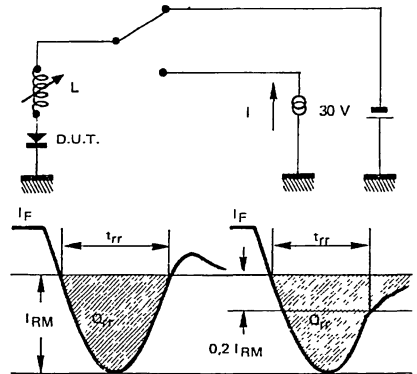


FIGURE 12 : Measurement of t_{rr} (fig. 9) and I_{RM} (fig. 10)

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

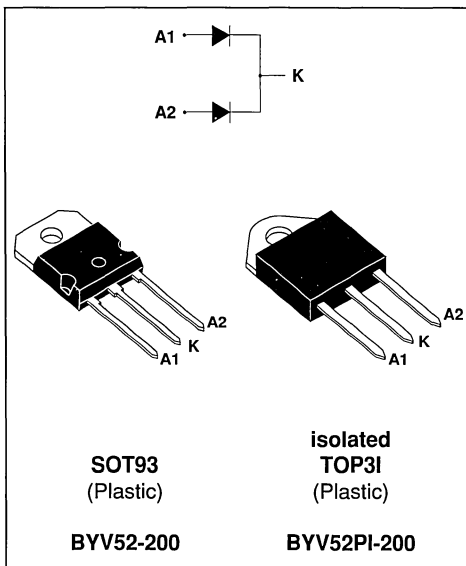
FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION TOP3I :
Insulating voltage = 2500 V DC
Capacitance = 12 pF

DESCRIPTION

Dual center tap rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in SOT93, or TOP3I this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit	
$I_{F(RMS)}$	RMS forward current			Per diode	50	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	SOT93	$T_c = 110^\circ\text{C}$	Per diode	30	A
		TOP3I	$T_c = 90^\circ\text{C}$	Per diode	30	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	Per diode	500	A
T_{stg} T_j	Storage and junction temperature range			- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$	

Symbol	Parameter	BYV52-/PI-				Unit
		50	100	150	200	
V_{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

THERMAL RESISTANCE

Symbol	Parameter			Value	Unit
Rth (j-c)	Junction to case	SOT93	Per diode	1.2	°C/W
			Total	0.75	
		TOP3I	Per diode	1.8	
			Total	1.2	
Rth (c)	Coupling	SOT93		0.3	°C/W
		TOP3I		0.6	

When the diodes 1 and 2 are used simultaneously :

$$T_j - T_c (\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _J = 25°C	V _R = V _{RRM}			25	μA
	T _J = 100°C				2.5	mA
V _F **	T _J = 125°C	I _F = 20 A			0.85	V
	T _J = 125°C	I _F = 40 A			1.00	
	T _J = 25°C	I _F = 40 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.7 \times I_{F(AV)} + 0.0075 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _J = 25°C	I _F = 0.5A I _R = 1A			35	ns
		I _F = 1A V _R = 30V			50	
tfr	T _J = 25°C	I _F = 1A V _{FR} = 1.1 x V _F		10		ns
V _{FP}	T _J = 25°C	I _F = 1A		1.5		V

Fig.1 : Average forward power dissipation versus average forward current.

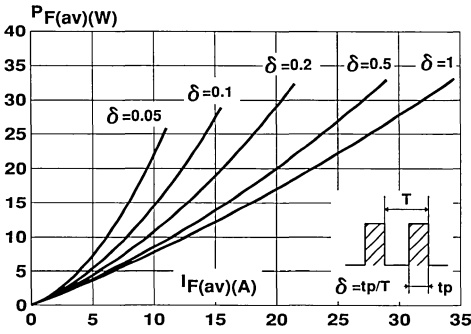


Fig.2 : Peak current versus form factor.

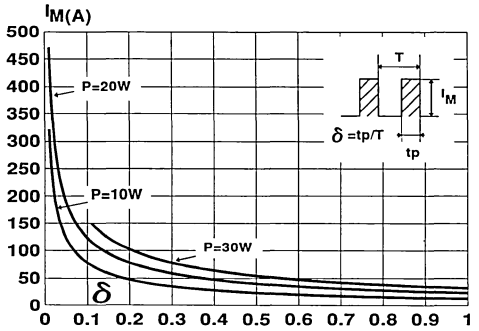


Fig.3 : Forward voltage drop versus forward current (maximum values).

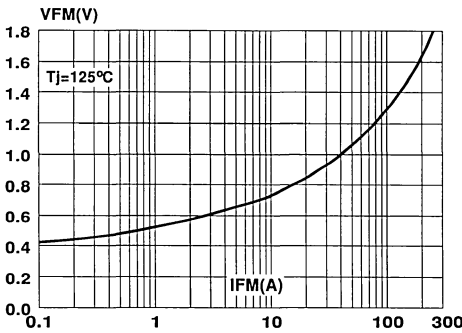


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

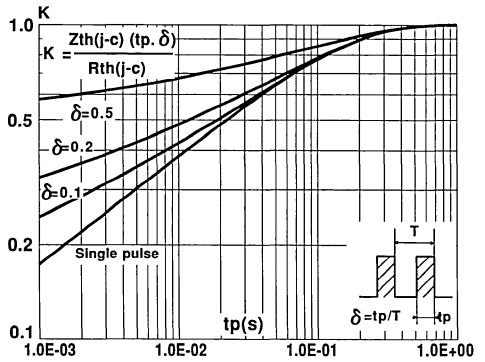


Fig.5 : Non repetitive surge peak forward current versus overload duration. (SOD93)

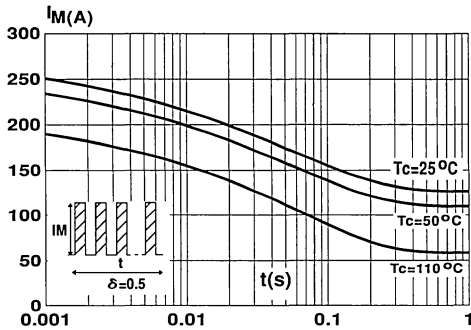


Fig.6 : Non repetitive surge peak forward current versus overload duration. (TOP3)

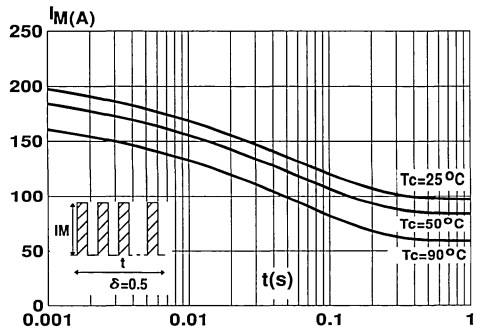


Fig.7 : Average current versus ambient temperature.
(duty cycle : 0.5) (SOD93)

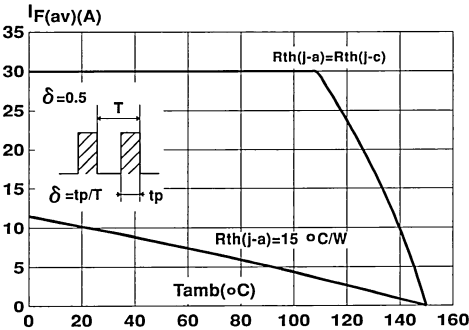


Fig.8 : Average current versus ambient temperature.
(duty cycle : 0.5) (TOP31)

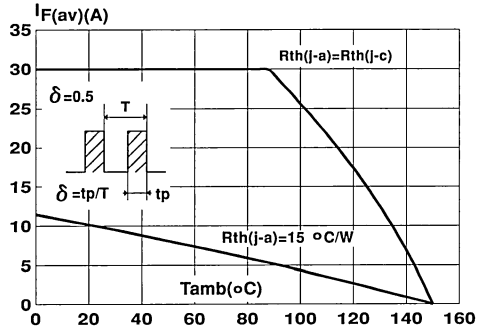


Fig.9 : Junction capacitance versus reverse voltage applied (Typical values).

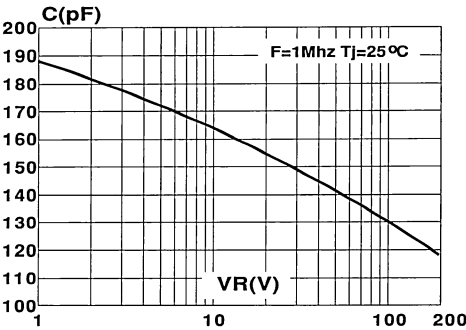


Fig.10 : Recovery charges versus diF/dt.

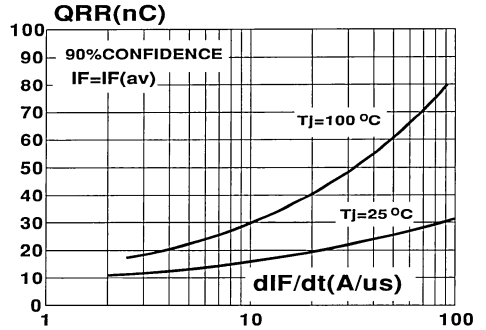


Fig.11 : Peak reverse current versus diF/dt.

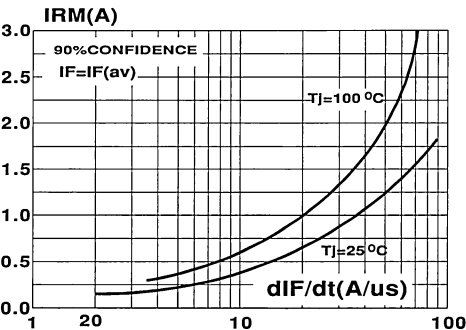
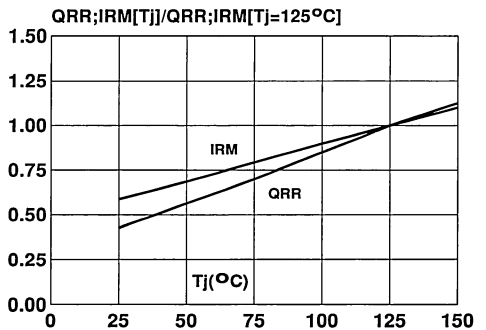
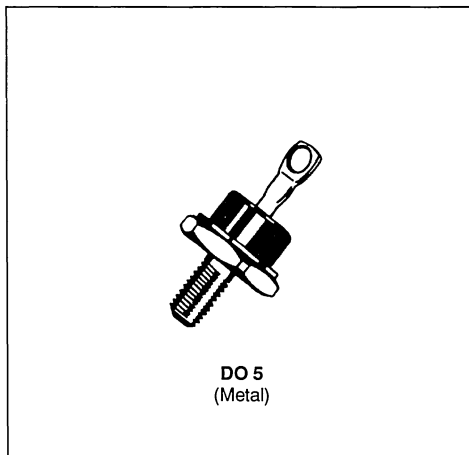


Fig.12 : Dynamic parameters versus junction temperature.



HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

- VERY LOW CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIMES
- HIGH SURGE CURRENT AND AVALANCHE CAPABILITY
- THE SPECIFICATIONS AND CURVES ENABLE THE DETERMINATION OF t_{fr} and I_{RM} AT 100°C UNDER USERS CONDITIONS
- EASE OF PARALLELING



DESCRIPTION

Low voltage drop rectifiers suited for switching mode power supply.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 20\mu s$	1000	A
$I_F (RMS)$	RMS Forward Current		100	A
$I_F (AV)$	Average Forward Current	$T_C = 85^\circ C$ $\delta = 0.5$	80	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	1500	A
P_{tot}	Power Dissipation	$T_C = 90^\circ C$	80	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to 150	°C

Symbol	Parameter	BYW 08-				Unit
		50	100	150	200	
V_{RRM}	Repetitive Peak Reverse Voltage	50	100	150	200	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	55	110	165	220	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-c)}$	Junction-case	0.75	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_J = 100^\circ\text{C}$				5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 80\text{A}$			1.05	V
	$T_J = 100^\circ\text{C}$				0.92	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$ $V_R = 30\text{V}$	$I_F = 1\text{A}$ see figure 12	$di_F/dt = - 50\text{A}/\mu\text{s}$		60	ns
t_{fr}	$T_J = 25^\circ\text{C}$ Measured at $1.1 \times V_F$	$I_F = 1\text{A}$	$t_r = 5\text{ns}$	10		ns
V_{FP}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$t_r = 5\text{ns}$	1.5		V

To evaluate the conduction losses use the following equations :

$$V_F = 0.66 + 0.0021 I_F$$

$$P = 0.66 \times I_{F(AV)} + 0.0021 I_F^2_{(RMS)}$$

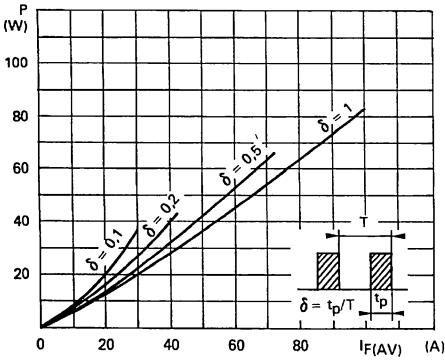


FIGURE 1 : Power losses versus average current

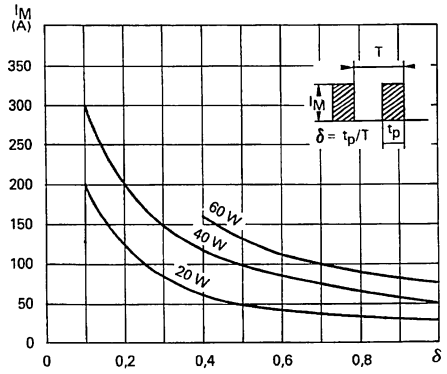


FIGURE 2 : Peak current versus form factor

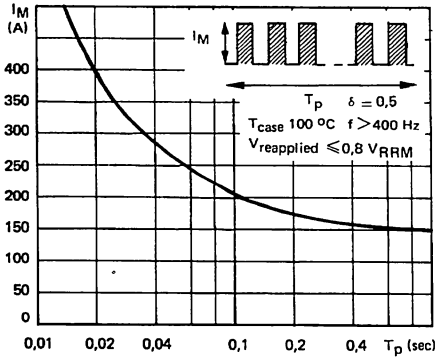


FIGURE 3 : Non repetitive peak surge current versus duration

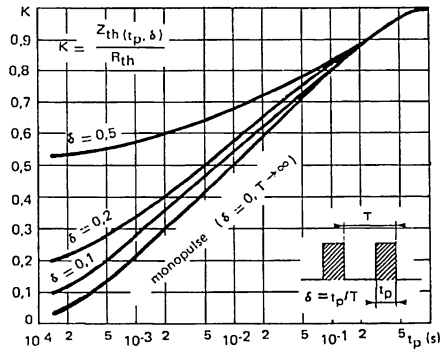


FIGURE 4 : Thermal impedance versus pulse width

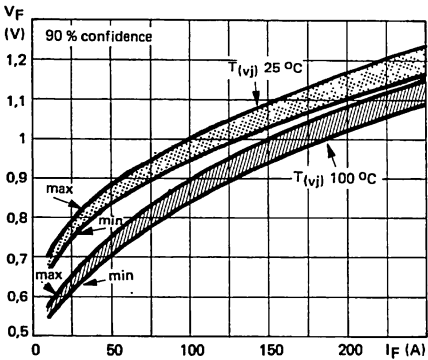


FIGURE 5 : Voltage drop and spread versus forward current

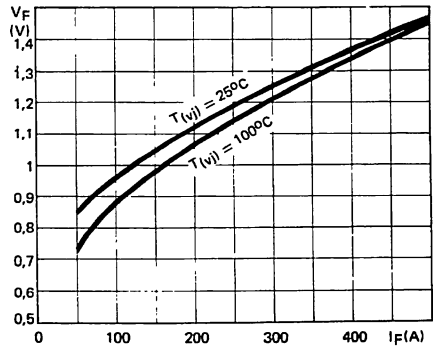


FIGURE 6 : Voltage drop versus forward current

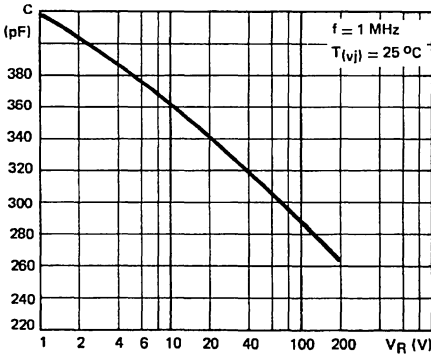


FIGURE 7 : Capacitance versus reverse voltage applied

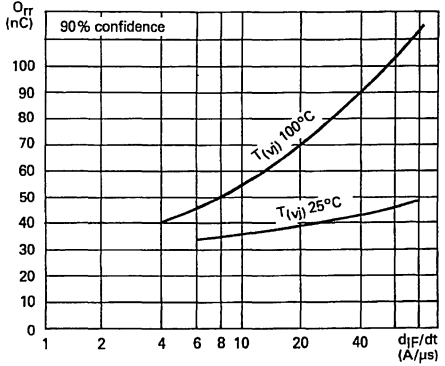


FIGURE 8 : Recovery charge versus diF/dt

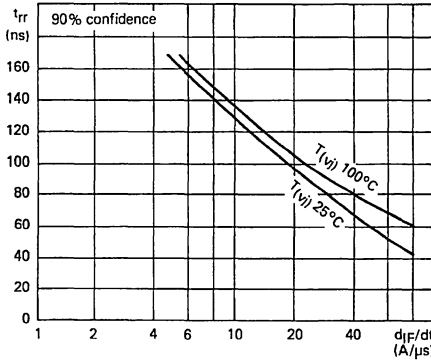


FIGURE 9 : Recovery time versus diF/dt

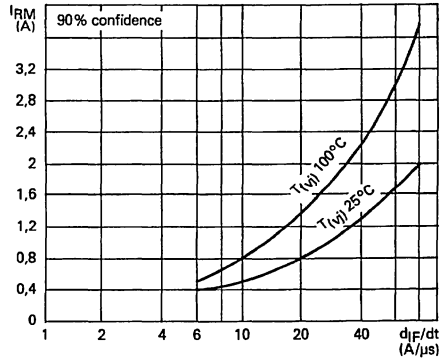


FIGURE 10 : Peak reverse current versus diF/dt

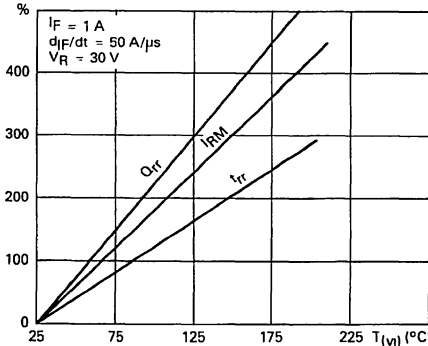


FIGURE 11 : Dynamic parameters versus junction temperature

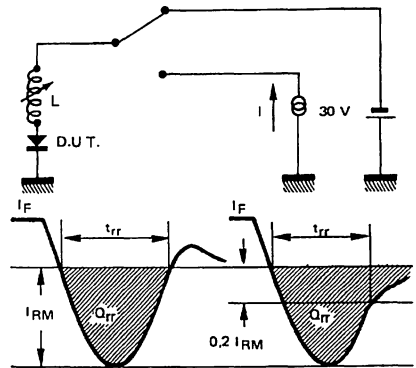


FIGURE 12 : Measurement of t_{rr} (fig. 9) and I_{RM} (fig. 10)

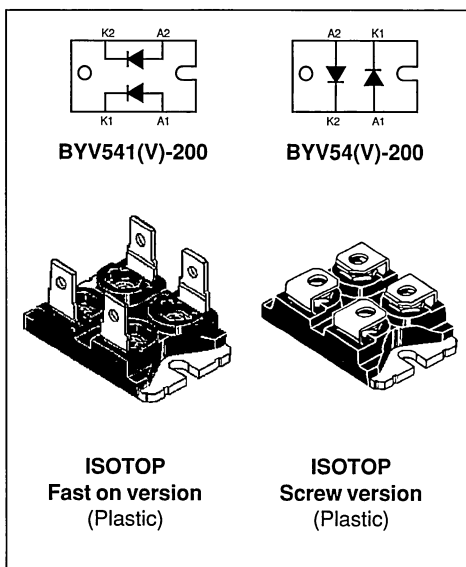
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in ISOTOP™ this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{F(RMS)}	RMS forward current		100	A
I _{F(AV)}	Average forward current $\delta = 0.5$	T _c =90°C	50	A
I _{FSM}	Surge non repetitive forward current	t _p =10ms sinusoidal	1000	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

Symbol	Parameter	BYV54(V) / BYV541(V)				Unit
		50	100	150	200	
V _{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	1.2	°C/W
		Total	0.85	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$T_j - T_c (\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				5	mA
V _F **	T _j = 125°C	I _F = 50 A			0.85	V
	T _j = 125°C	I _F = 100 A			1.00	
	T _j = 25°C	I _F = 100 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.7 \times I_{F(AV)} + 0.003 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _R = 1A			40	ns
		I _F = 1A V _R = 30V			60	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 x V _F		10		ns
V _{FP}	T _j = 25°C	I _F = 1A		1.5		V

Fig.1 : Average forward power dissipation versus average forward current.

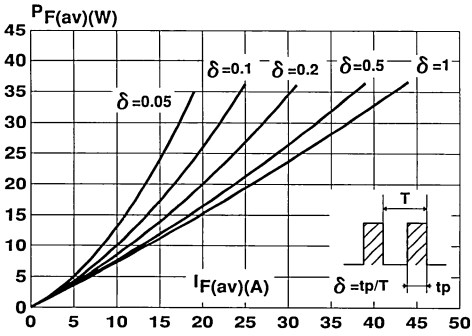


Fig.2 : Peak current versus form factor.

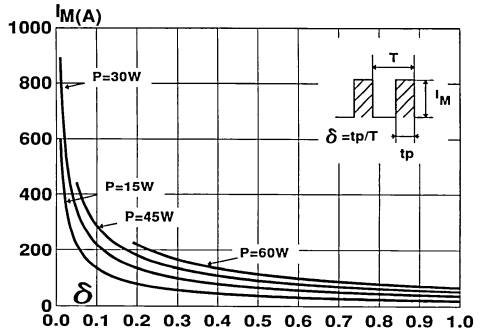


Fig.3 : Forward voltage drop versus forward current (maximum values).

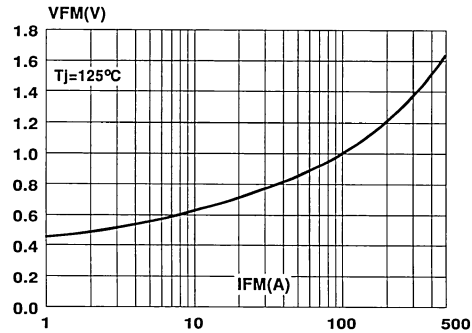


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

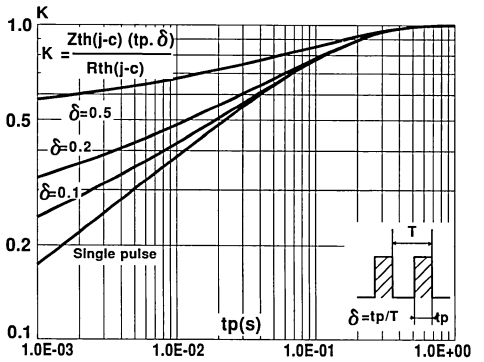


Fig.5 : Non repetitive surge peak forward current versus overload duration.

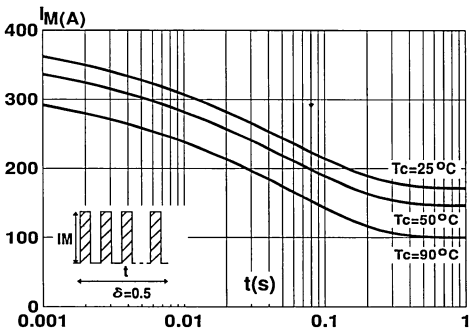


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

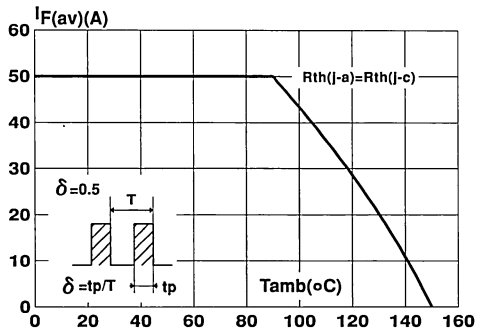


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

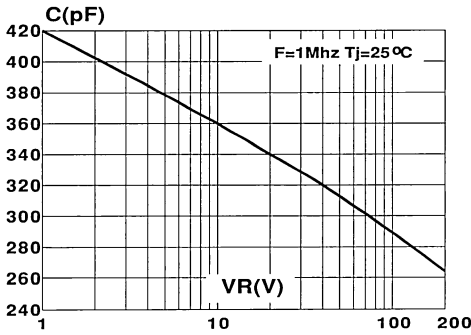


Fig.9 : Peak reverse current versus dIF/dt.

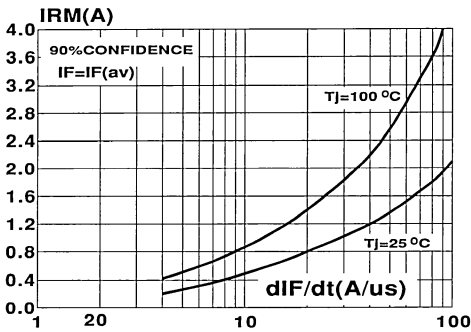


Fig.8 : Recovery charges versus dIF/dt.

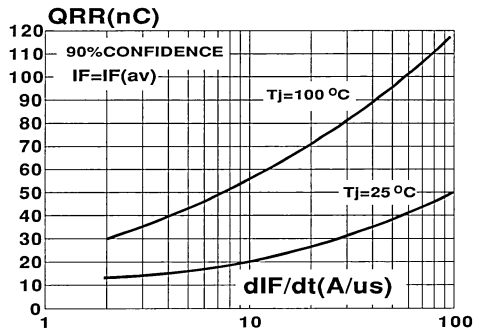
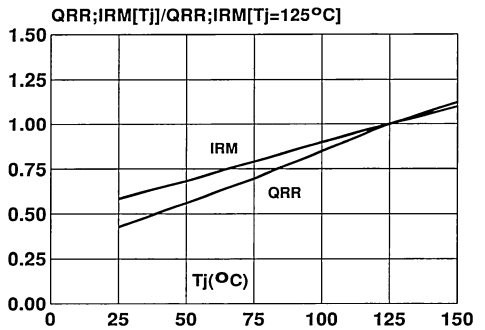


Fig.10 : Dynamic parameters versus junction temperature.



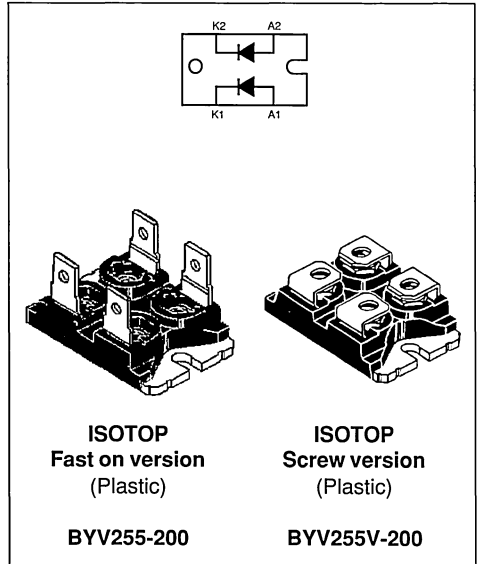
HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED :
Insulating voltage = 2500 V_{RMS}
Capacitance = 55 pF

DESCRIPTION

Dual rectifier suited for switchmode power supply and high frequency DC to DC converters. Packaged in ISOTOP™ this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{F(RMS)}	RMS forward current		150	A
I _{F(AV)}	Average forward current $\delta = 0.5$	T _C =110°C	100	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal	1600	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

Symbol	Parameter	BYV255-(V)				Unit
		50	100	150	200	
V _{RRM}	Repetitive peak reverse voltage	50	100	150	200	V

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.4	°C/W
		Total	0.25	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$T_j - T_c (\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 100°C				10	mA
V _F **	T _j = 125°C	I _F = 100 A			0.85	V
	T _j = 125°C	I _F = 200 A			1.00	
	T _j = 25°C	I _F = 200 A			1.15	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.7 \times I_{F(AV)} + 0.0015 \times I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _R = 1A			55	ns
		I _F = 1A V _R = 30V			80	
tfr	T _j = 25°C	I _F = 1A V _{FR} = 1.1 x V _F		10		ns
V _{Fp}	T _j = 25°C	I _F = 1A		1.5		V

TURN-OFF SWITCHING CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _{RM}	T _j = 100°C	I _F = 100A L _p ≤ 0.05μH V _{CC} ≤ 0.6 V _{RRM}	dI _F /dt = -200A/μs		16	A
			dI _F /dt = -400A/μs		24	

Fig.1 : Average forward power dissipation versus average forward current.

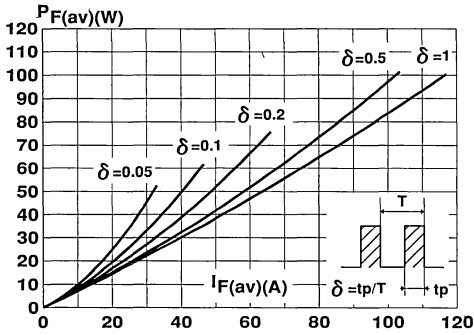


Fig.2 : Peak current versus form factor.

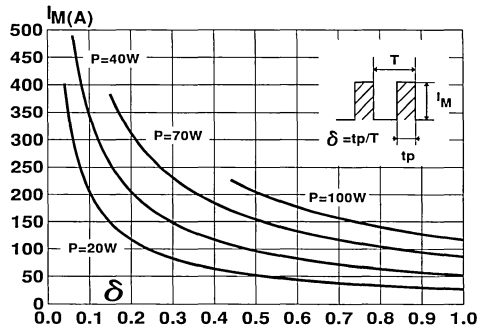


Fig.3 : Forward voltage drop versus forward current (maximum values).

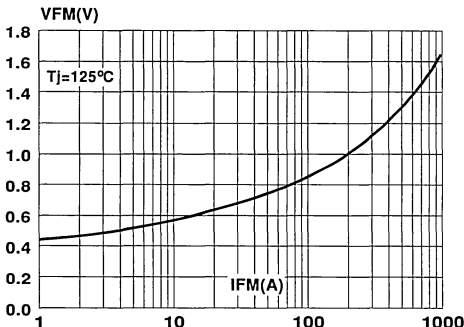


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

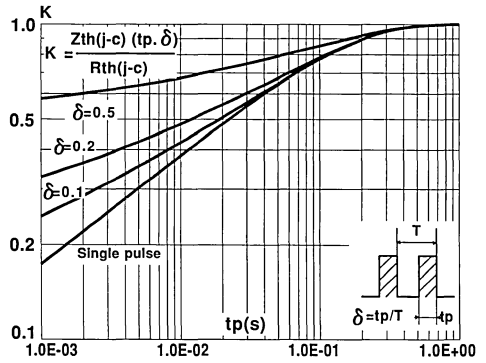


Fig.5 : Non repetitive surge peak forward current versus overload duration.

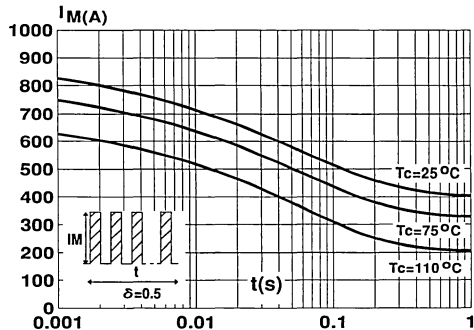


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

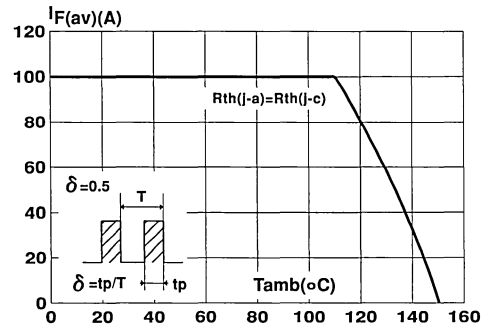


Fig.7 : Junction capacitance versus reverse voltage applied (Typical values).

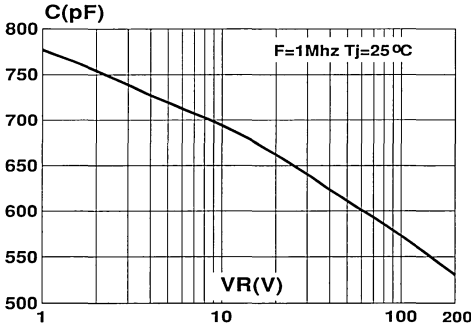


Fig.9 : Peak reverse current versus dI_F/dt .

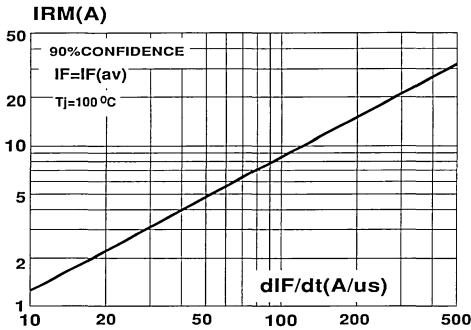


Fig.8 : Recovery charges versus dI_F/dt .

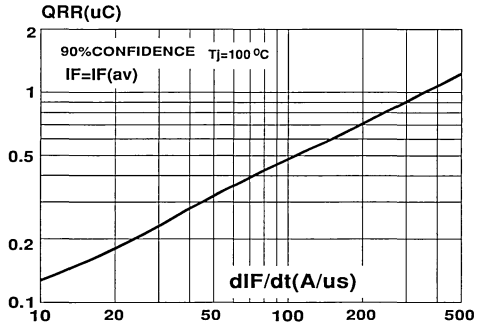
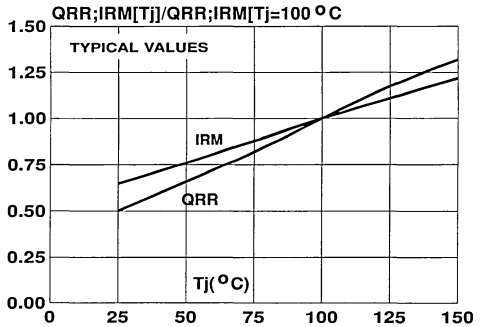


Fig.10 : Dynamic parameters versus junction temperature.





ULTRA FAST RECOVERY RECTIFIER DIODES

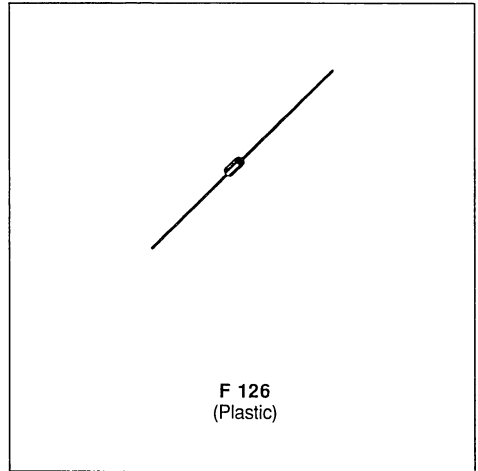
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost single chip rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in F 126, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_F(AV)$	Average Forward Current	$T_I = 60^\circ\text{C}$ $\delta = 0.5$	3	A
I_{FSM}	Surge Non Repetitive Forward Current	$T_p = 10 \text{ ms}$ Sinusoidal	30	A
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$

Symbol	Parameter	STPR		Unit
		310	320	
V_{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)^*}$	Junction-leads	25	$^\circ\text{C/W}$

* ou infinite heatsink with L = 5mm lead length.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
I _R *	T _J = 25°C	V _R = V _{RRM}				10	μA
	T _J = 100°C					0.5	mA
V _F **	T _J = 125°C	I _F = 3 A				0.99	V
	T _J = 125°C	I _F = 6 A				1.20	
	T _J = 25°C	I _F = 6 A				1.25	

Pulse test : * tp = 5 ms duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 0.5 A I _R = 1A	I _{rr} = 0.25 A			30	ns
t _{fr}	T _J = 25°C	I _F = 1 A	tr = 10 ns V _{FR} = 1.1 x V _F		20		ns
V _{FP}	T _J = 25°C	I _F = 1 A	tr = 10 ns		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_{F(AV)} + 0.070 I_{F(RMS)}^2$

Fig.1 : Average forward power dissipation versus average forward current.

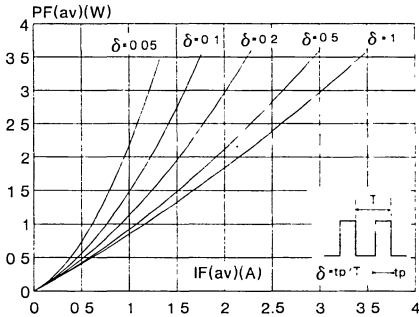


Fig.2 : Peak current versus form factor.

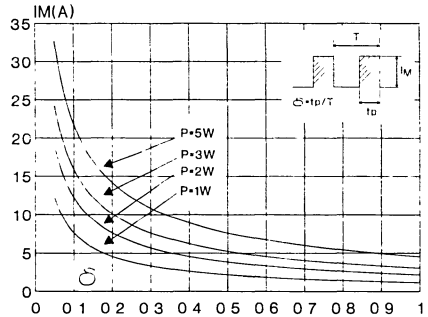


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5)

* circuit board e (Cu) = 35μm, S (cu) = 12mm²
L(LEADS)= 20mm

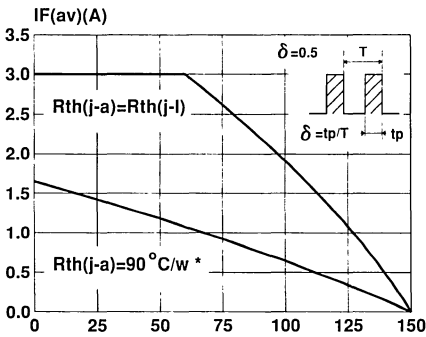


Fig.4 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

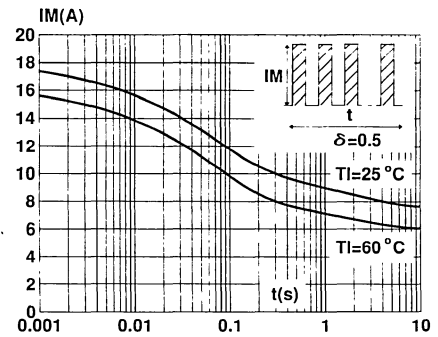


Fig.5 : Relative variation of thermal transient impedance junction to case versus pulse duration.

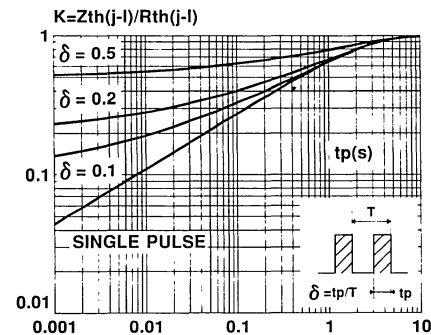


Fig.6 : Forward voltage drop versus forward current. (Maximum values)

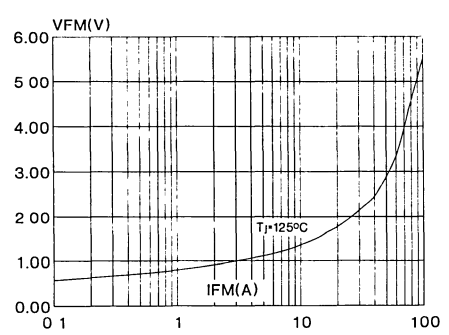


Fig.7 : Junction capacitance versus reverse voltage applied. (Typical values)

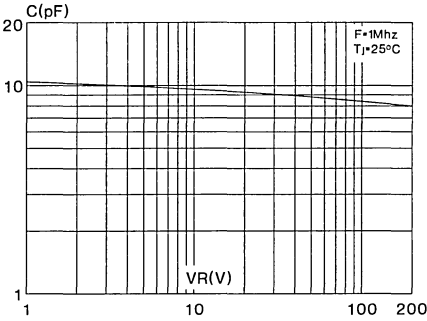


Fig.8 : Recovery charge versus dI_F/dt .

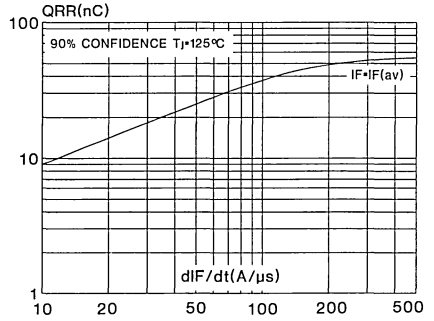


Fig.9 : Peak reverse current versus dI_F/dt .

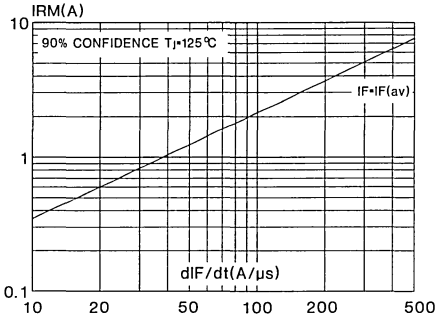
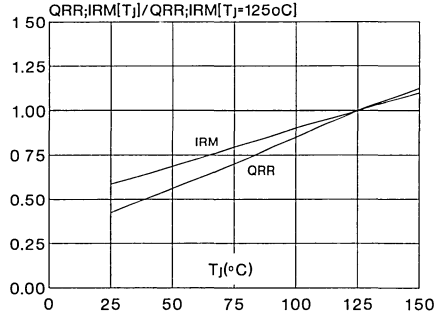


Fig.10 : Dynamic parameters versus junction temperature.



ULTRA FAST RECOVERY RECTIFIER DIODES

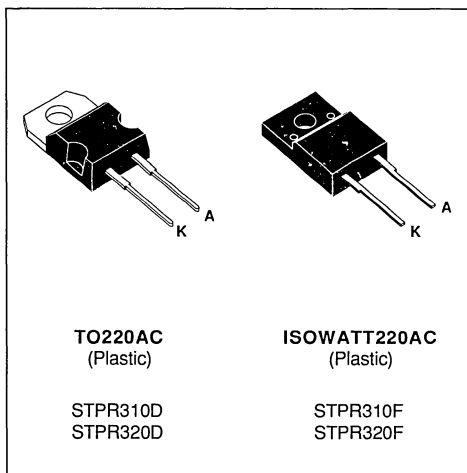
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost single chip rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit	
I _F (RMS)	RMS Forward Current		10	A	
I _F (AV)	Average Forward Current δ = 0.5	TO220AC	T _c = 125°C	3	A
		ISOWATT220AC	T _c = 120°C		
I _{FSM}	Surge Non Repetitive Forward Current		T _p = 10 ms Sinusoidal	30	A
T _{stg} T _j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150		°C

Symbol	Parameter	STPR		Unit
		310D 310F	320D 320F	
V _{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{th} (j-c)	Junction-case	TO220AC	6.5	°C/W
		ISOWATT220AC	8.5	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				0.5	mA
V _F **	T _j = 125°C	I _F = 3 A			0.99	V
	T _j = 125°C	I _F = 6 A			1.20	
	T _j = 25°C	I _F = 6 A			1.25	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C	I _F = 0.5 A	I _R = 1A	I _{rr} = 0.25 A		30	ns
t _{fr}	T _j = 25°C	I _F = 1 A	t _r = 10 ns	V _{FR} = 1.1 x V _F	20		ns
V _{FP}	T _j = 25°C	I _F = 1 A	t _r = 10 ns		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_{F(AV)} + 0.070 I_{F(RMS)}^2$

Fig.1 : Average forward power dissipation versus average forward current.

Fig.2 : Peak current versus form factor.

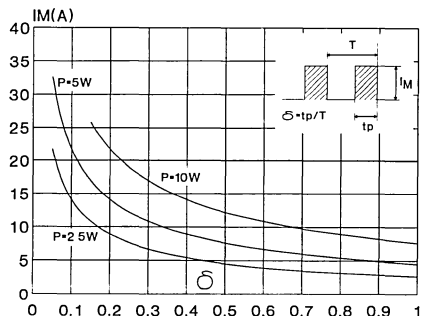
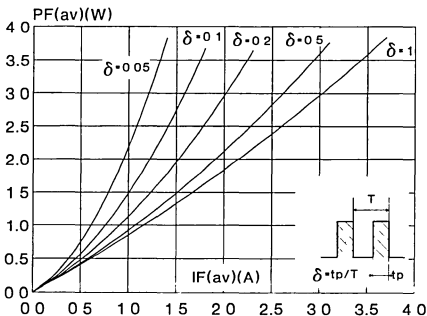


Fig.3 : Average current versus ambient temperature.
(duty cycle : 0.5) (TO220AC)

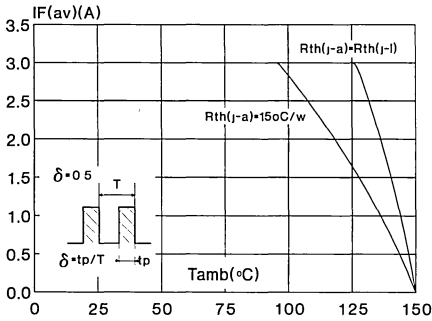


Fig.4 : Average current versus ambient temperature.
(duty cycle : 0.5) (ISOWATT220AC)

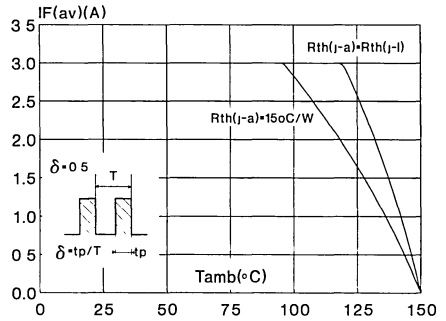


Fig.5 : Non repetitive surge peak forward current versus overload duration.
(Maximum values) (TO220AC)

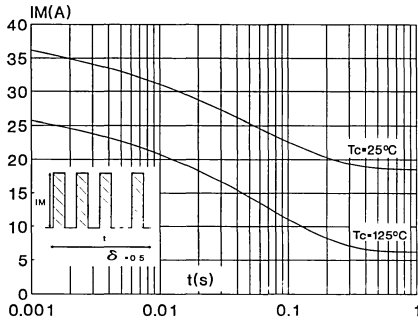


Fig.6 : Non repetitive surge peak forward current versus overload duration.
(Maximum values) (ISOWATT220AC)

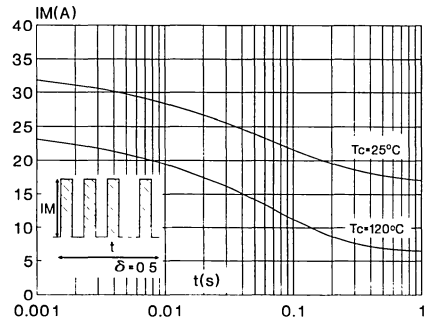


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration.
(TO220AC)

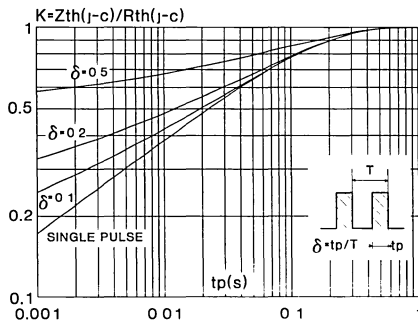


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration.
(ISOWATT220AC)

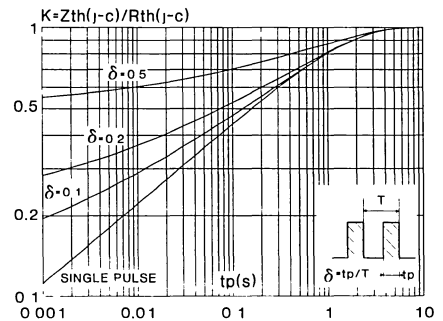


Fig.9 : Forward voltage drop versus forward current. (Maximum values)

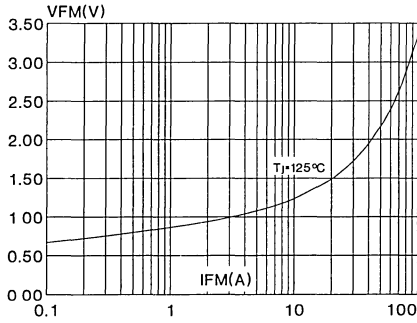


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

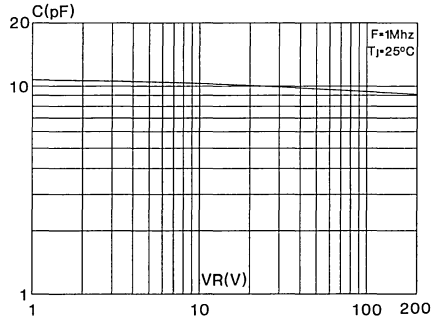


Fig.11 : Recovery charge versus dIF/dt.

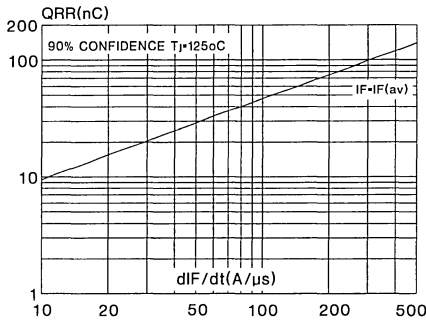


Fig.12 : Peak reverse current versus dIF/dt.

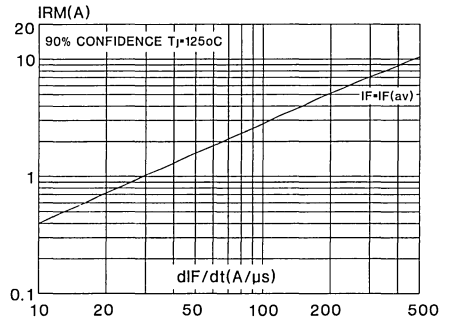
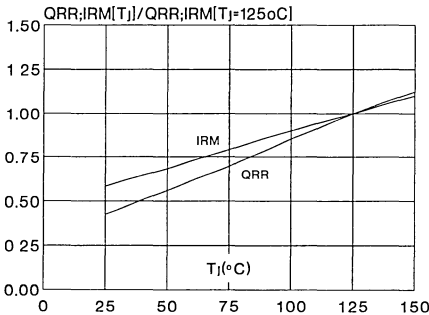


Fig.13 : Dynamic parameters versus junction temperature.



ULTRA FAST RECOVERY RECTIFIER DIODES

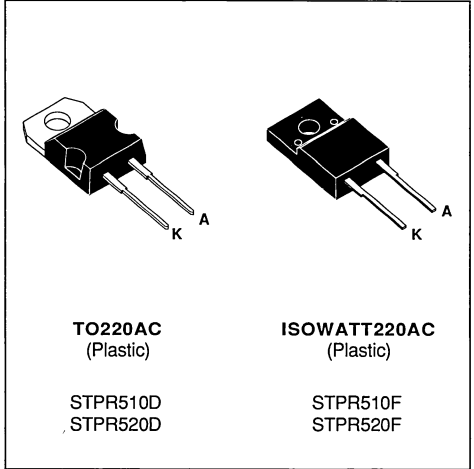
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost single chip rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit	
I _F (RMS)	RMS Forward Current		10	A	
I _F (AV)	Average Forward Current $\delta = 0.5$	TO220AC	T _c = 125°C	5	A
		ISOWATT220AC	T _c = 115°C		
I _{FSM}	Surge Non Repetitive Forward Current		T _p = 10 ms Sinusoidal	50	A
T _{stg} T _J	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150		°C

Symbol	Parameter	STPR		Unit
		510D 510F	520D 520F	
V _{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{th} (j-c)	Junction-case	TO220AC	4	°C/W
		ISOWATT220AC	6	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				0.5	mA
V _F **	T _j = 125°C	I _F = 5 A			0.99	V
	T _j = 125°C	I _F = 10 A			1.20	
	T _j = 25°C	I _F = 10 A			1.25	

Pulse test : * t_p = 5 ms, duty cycle < 2 %
 ** t_p = 380 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C	I _F = 0.5 A I _R = 1 A I _{rr} = 0.25 A			30	ns
t _{fr}	T _j = 25°C	I _F = 1 A t _r = 10 ns V _{FR} = 1.1 x V _F		20		ns
V _{FP}	T _j = 25°C	I _F = 1 A t _r = 10 ns		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_F(AV) + 0.042 I_F^2(RMS)$

Fig.1 : Average forward power dissipation versus average forward current.

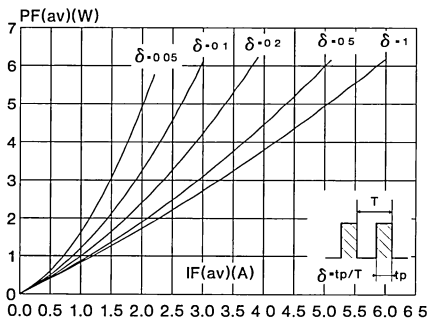


Fig.2 : Peak current versus form factor.

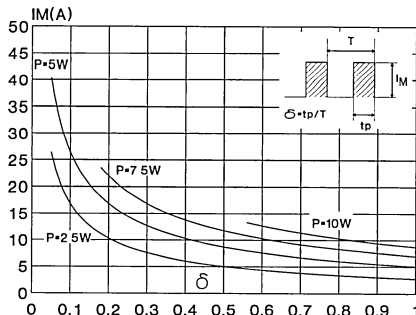


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

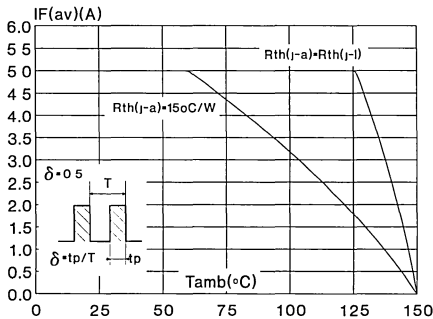


Fig.4 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

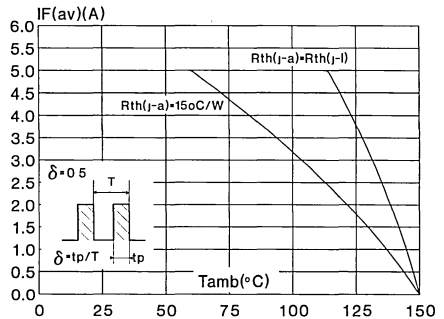


Fig.5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

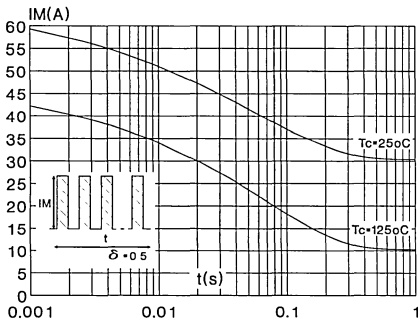


Fig.6 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

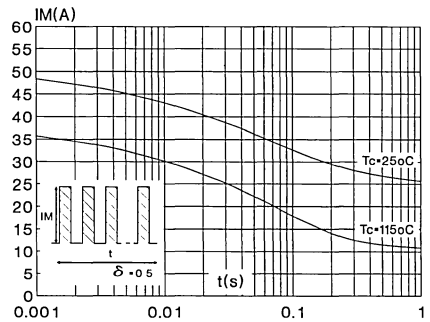


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

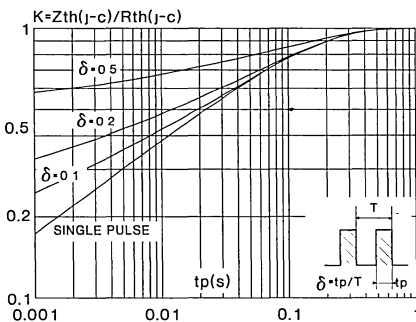


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

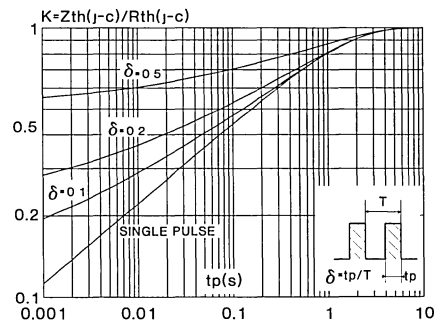


Fig.9 : Forward voltage drop versus forward current.
(Maximum values)

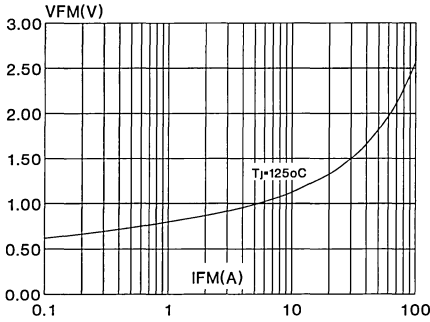


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

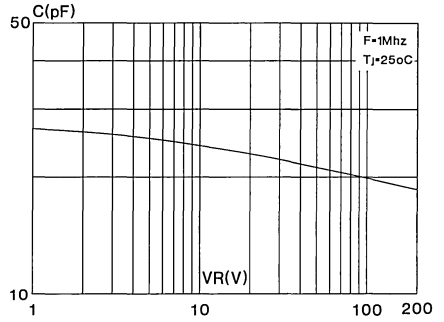


Fig.11 : Recovery charge versus dIF/dt.

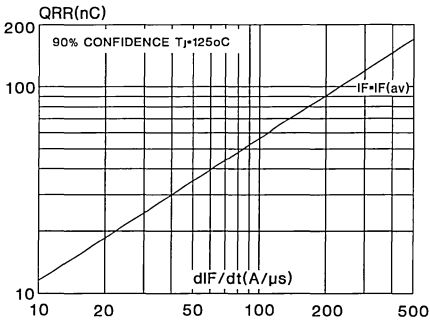


Fig.12 : Peak reverse current versus dIF/dt.

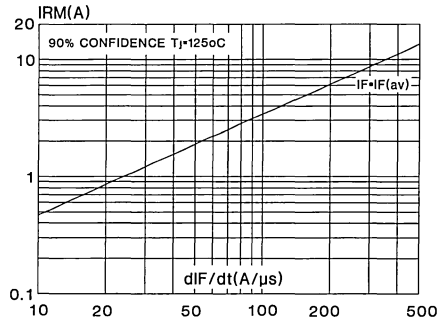
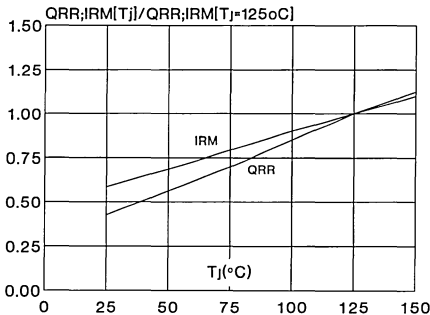


Fig.13 : Dynamic parameters versus junction temperature.



ULTRA FAST RECOVERY RECTIFIER DIODES

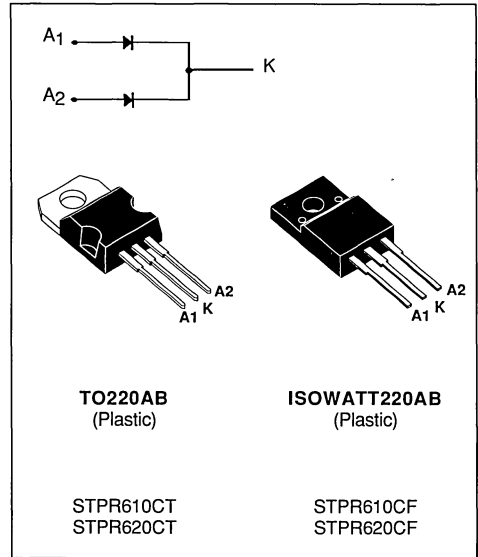
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost dual center tap rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB and ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter				Value	Unit
$I_{F(RMS)}$	RMS Forward Current			Per diode	10	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AB	$T_c = 125^\circ\text{C}$	Per diode	3	A
		ISOWATT220AB	$T_c = 120^\circ\text{C}$	Per device	6	
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10$ ms Sinusoidal	Per diode	30	A
T_{stg} T_j	Storage and Junction Temperature Range				- 65 to + 150 - 65 to + 150	$^\circ\text{C}$

Symbol	Parameter	STPR		Unit
		610CT 610CF	620CT 620CF	
V_{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction-case	TO220AB	Per diode total	6.5
		ISOWATT220AB	Per diode total	8.5
Rth (c)	Coupling			°C/W

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_{j(\text{diode } 1)} = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				0.5	mA
V _F **	T _j = 125°C	I _F = 3 A			0.99	V
	T _j = 125°C	I _F = 6 A			1.20	
	T _j = 25°C	I _F = 6 A			1.25	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C	I _F = 0.5 A I _R = 1 A I _{rr} = 0.25 A			30	ns
t _{fr}	T _j = 25°C	I _F = 1 A tr = 10 ns V _{FR} = 1.1 x V _F		20		ns
V _{FP}	T _j = 25°C	I _F = 1 A tr = 10 ns		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_{F(AV)} + 0.070 I_{F(RMS)}^2$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

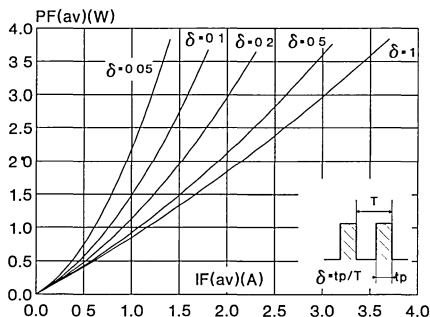


Fig.2 : Peak current versus form factor. (Per diode)

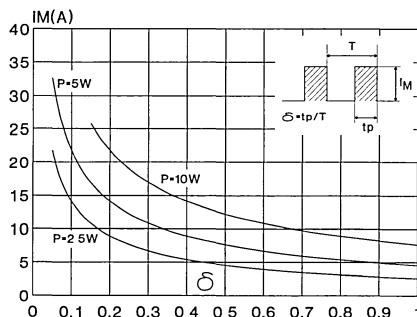


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AB)

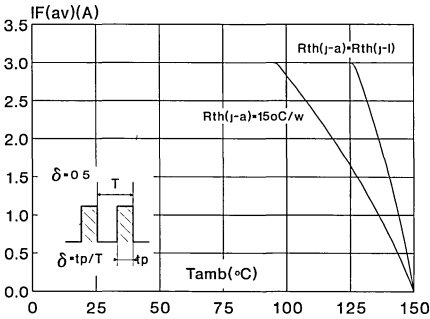


Fig.4 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AB)

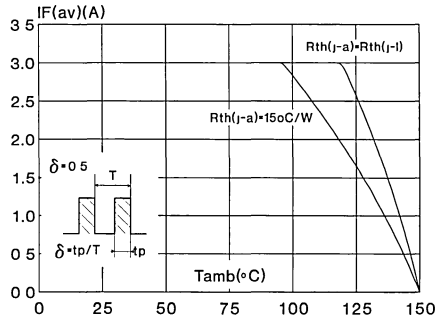


Fig.5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AB) (Per diode)

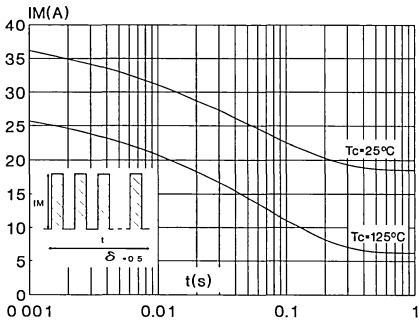


Fig.6 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AB) (Per diode)

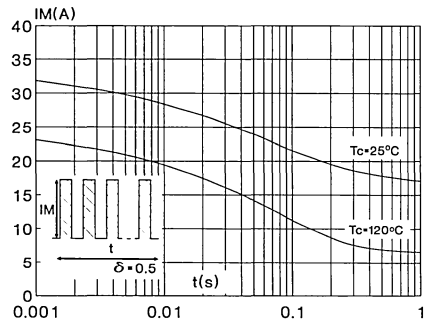


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AB) (Per diode)

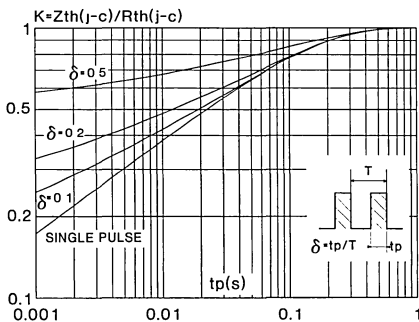
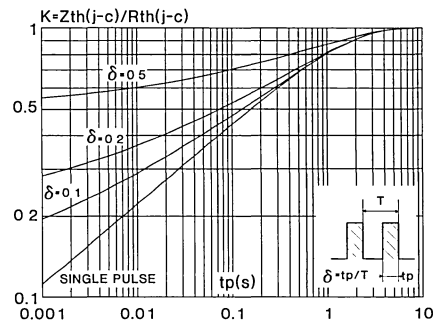


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AB) (Per diode)



STPR610CT/CF / STPR620CT/CF

Fig.9 : Forward voltage drop versus forward current.
(Maximum values) (Per diode)

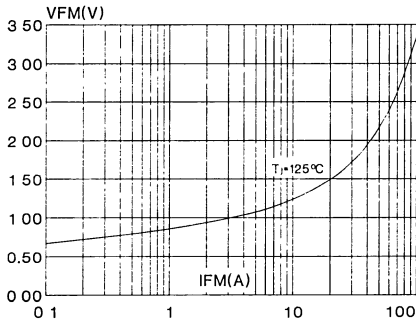


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

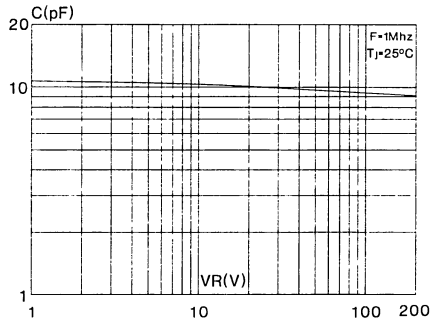


Fig.11 : Recovery charge versus dI/dt . (Per diode)

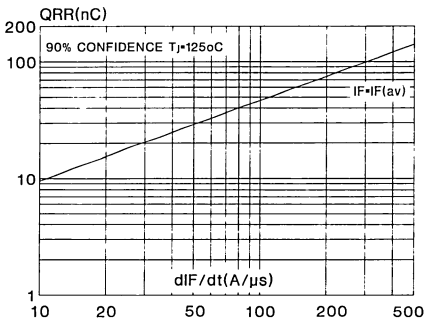


Fig.12 : Peak reverse current versus dI/dt . (Per diode)

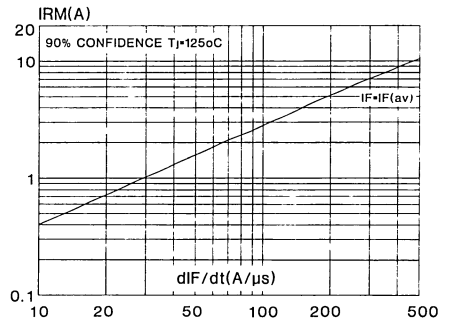
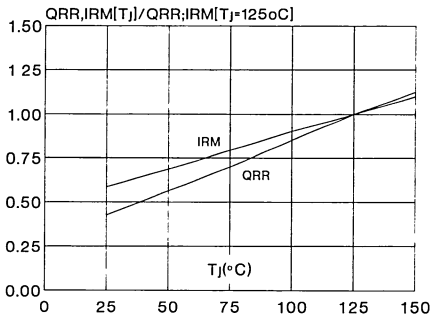


Fig.13 : Dynamic parameters versus junction temperature. (Per diode)



ULTRA FAST RECOVERY RECTIFIER DIODES

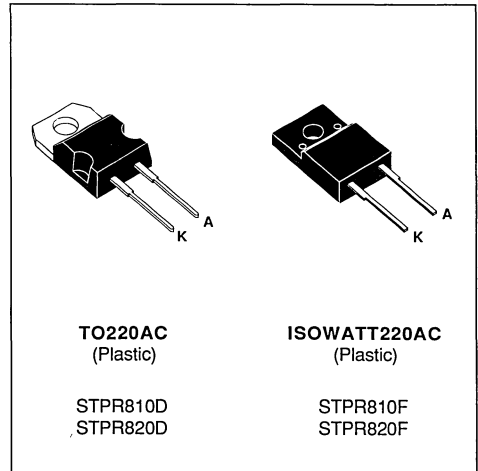
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost single chip rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I _{F(RMS)}	RMS Forward Current		20	A
I _{F(AV)}	Average Forward Current $\delta = 0.5$	TO220AC	8	A
		ISOWATT220AC		
I _{FSM}	Surge Non Repetitive Forward Current		80	A
T _{stg} T _J	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	°C

Symbol	Parameter	STPR		Unit
		810D 810F	820D 820F	
V _{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{th(j-c)}	Junction-case	TO220AC	3.0	°C/W
		ISOWATT220AC	5.5	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_j = 100^\circ\text{C}$				0.6	mA
V_F^{**}	$T_j = 125^\circ\text{C}$	$I_F = 8\text{ A}$			0.99	V
	$T_j = 125^\circ\text{C}$	$I_F = 16\text{ A}$			1.20	
	$T_j = 25^\circ\text{C}$	$I_F = 16\text{ A}$			1.25	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{ A}$	$I_R = 1\text{ A}$			30	ns
t_{fr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$t_r = 10\text{ ns}$		20		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$t_r = 10\text{ ns}$		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_F(\text{AV}) + 0.026 I_F^2(\text{RMS})$

Fig.1 : Average forward power dissipation versus average forward current.

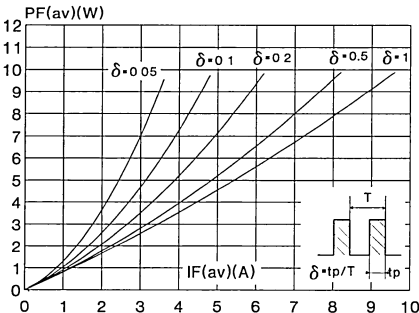


Fig.2 : Peak current versus form factor.

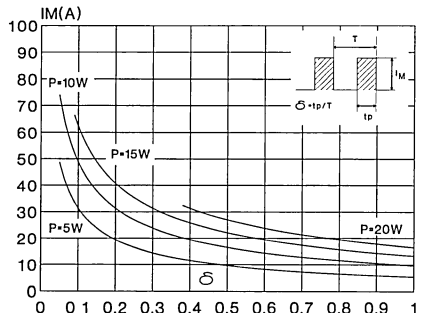


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

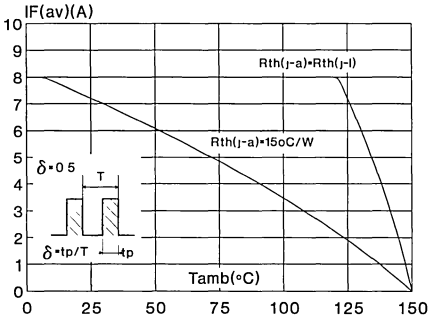


Fig.4 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

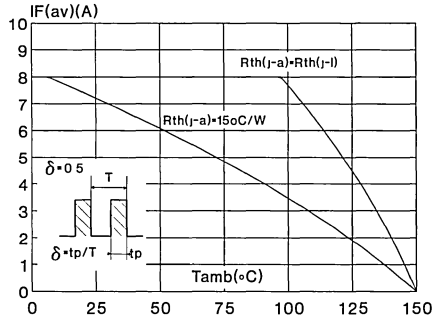


Fig.5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

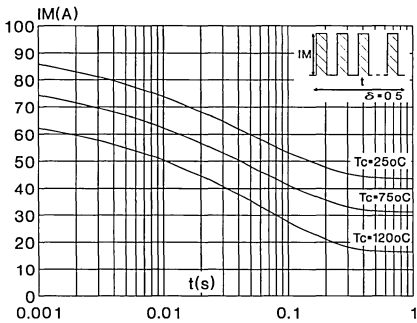


Fig.6 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

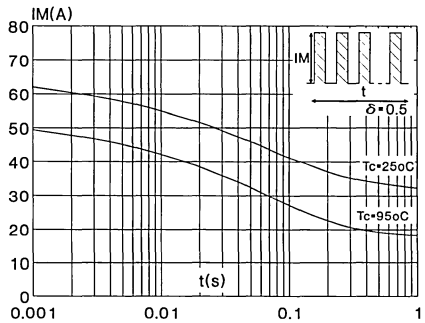


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

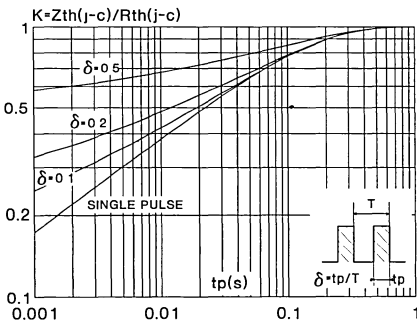


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

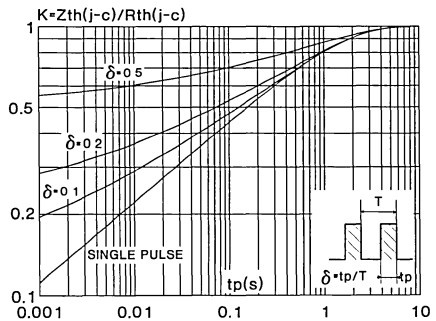


Fig.9 : Forward voltage drop versus forward current. (Maximum values)

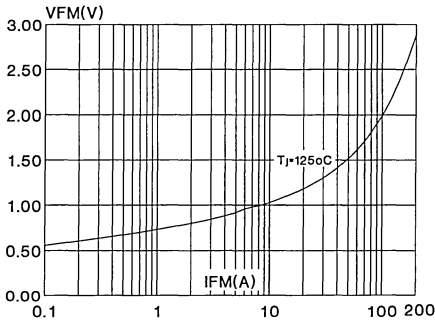


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

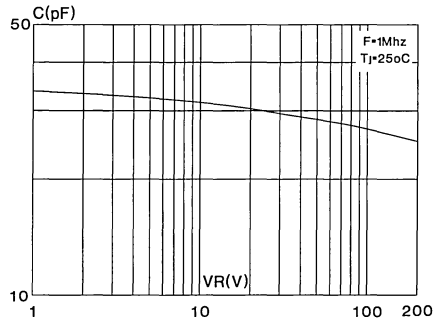


Fig.11 : Recovery charge versus dIF/dt.

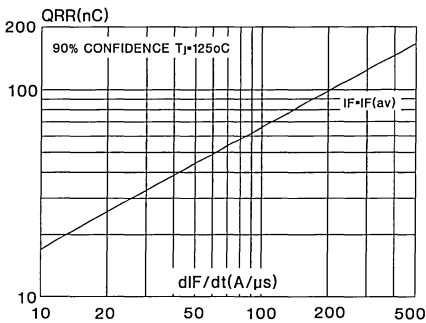


Fig.12 : Peak reverse current versus dIF/dt.

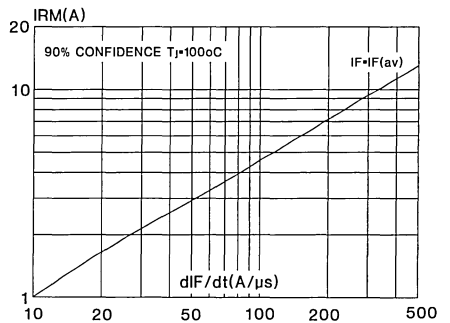
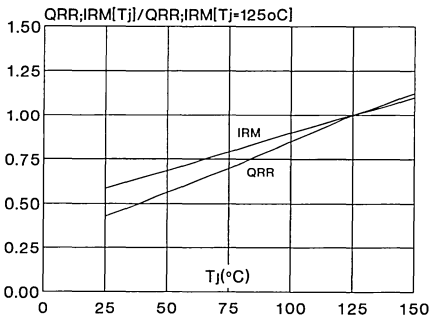


Fig.13 : Dynamic parameters versus junction temperature.



ULTRA FAST RECOVERY RECTIFIER DIODES

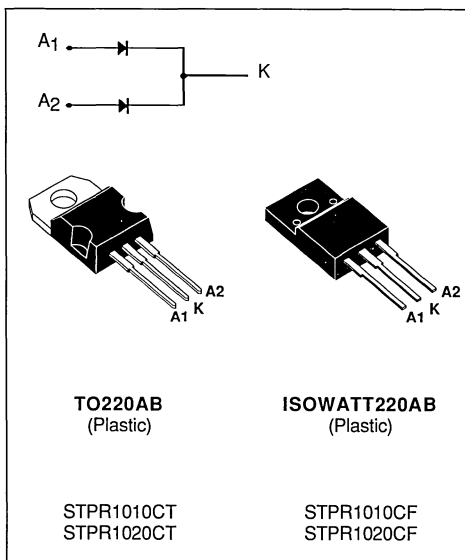
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost dual center tap rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB and ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit	
$I_{F(RMS)}$	RMS Forward Current			Per diode	10	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AB	$T_c = 125^\circ\text{C}$	Per diode	5	A
		ISOWATT220AB	$T_c = 115^\circ\text{C}$	Per device	10	
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10 \text{ ms}$ Sinusoidal	Per diode	50	A
T_{stg} T_J	Storage and Junction Temperature Range				- 65 to + 150 - 65 to + 150	$^\circ\text{C}$

Symbol	Parameter	STPR		Unit
		1010CT 1010CF	1020CT 1020CF	
V_{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit	
Rth (j-c)	Junction-case	TO220AB	Per diode total	4.0	°C/W
		ISOWATT220AB	Per diode total	6.0	
Rth (c)	Coupling			°C/W	

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				0.5	mA
V _F **	T _j = 125°C	I _F = 5 A			0.99	V
	T _j = 125°C	I _F = 10 A			1.20	
	T _j = 25°C	I _F = 10 A			1.25	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C	I _F = 0.5 A I _R = 1A I _{rr} = 0.25 A			30	ns
t _{fr}	T _j = 25°C	I _F = 1 A tr = 10 ns V _{FR} = 1.1 x V _F		20		ns
V _{FP}	T _j = 25°C	I _F = 1 A tr = 10 ns		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_F(\text{AV}) + 0.042 I_F^2(\text{RMS})$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

Fig.2 : Peak current versus form factor. (Per diode)

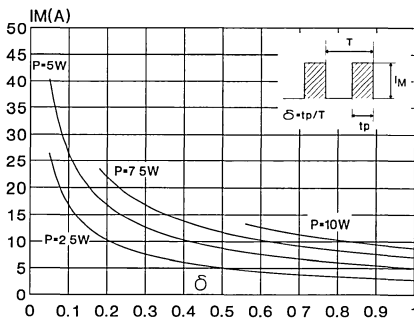
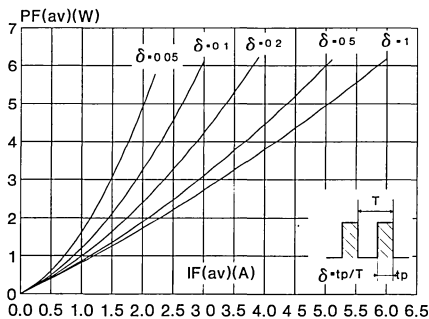


Fig.3 : Average current versus ambient temperature.
(duty cycle : 0.5) (TO220AB) .

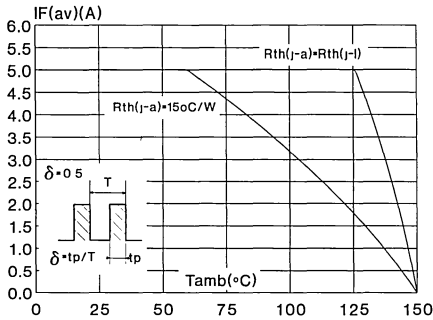


Fig.4 : Average current versus ambient temperature.
(duty cycle : 0.5) (ISOWATT220AB)

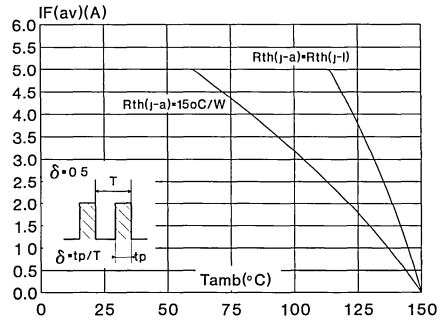


Fig.5 : Non repetitive surge peak forward current versus overload duration.
(Maximum values) (TO220AB) (Per diode)

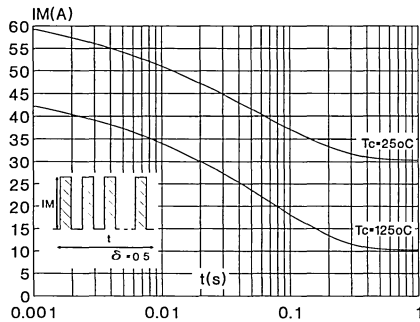


Fig.6 : Non repetitive surge peak forward current versus overload duration.
(Maximum values) (ISOWATT220AB) (Per diode)

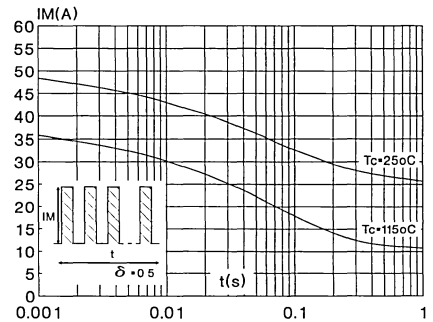


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration.
(TO220AB) (Per diode)

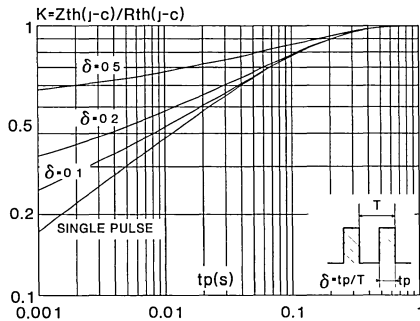


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration.
(ISOWATT220AB) (Per diode)

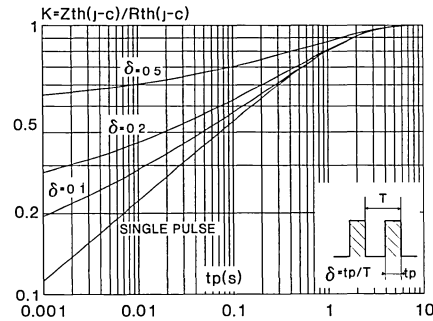


Fig.9 : Forward voltage drop versus forward current. (Maximum values) (Per diode)

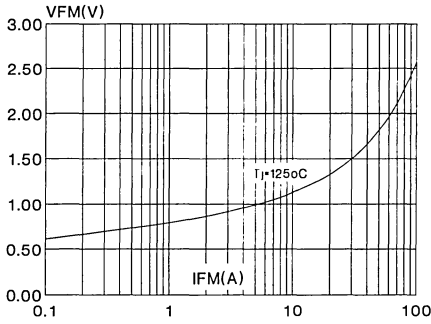


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

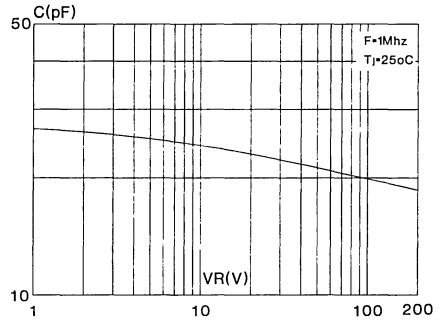


Fig.11 : Recovery charge versus dI/dt . (Per diode)

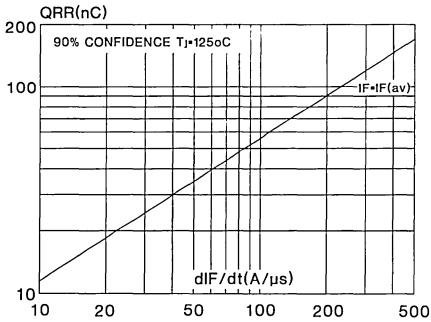


Fig.12 : Peak reverse current versus dI/dt . (Per diode)

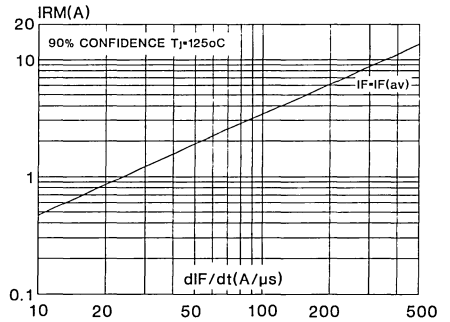
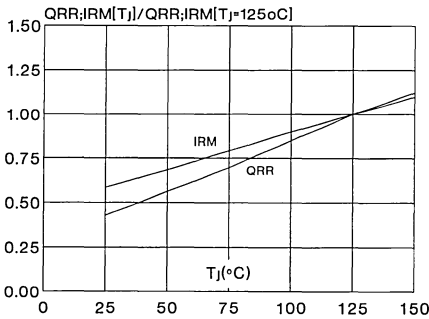


Fig.13 : Dynamic parameters versus junction temperature. (Per diode)





ULTRA FAST RECOVERY RECTIFIER DIODES

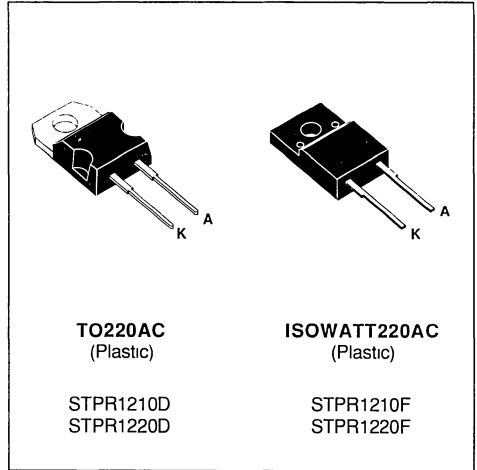
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost single chip rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit	
$I_{F(RMS)}$	RMS Forward Current		30	A	
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AC	$T_c = 115^\circ\text{C}$	12	A
		ISOWATT220AC	$T_c = 80^\circ\text{C}$		
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10 \text{ ms}$ Sinusoidal	120	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150		$^\circ\text{C}$

Symbol	Parameter	STPR		Unit
		1210D 1210F	1220D 1220F	
V_{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction-case	TO220AC	2.5	$^\circ\text{C/W}$
		ISOWATT220AC	5.0	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_j = 100^\circ\text{C}$				0.8	mA
V_F^{**}	$T_j = 125^\circ\text{C}$	$I_F = 12\text{ A}$			0.99	V
	$T_j = 125^\circ\text{C}$	$I_F = 24\text{ A}$			1.20	
	$T_j = 25^\circ\text{C}$	$I_F = 24\text{ A}$			1.25	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{ A}$	$I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$			30	ns
t_{fr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$t_r = 10\text{ ns}$ $V_{FR} = 1.1 \times V_F$		20		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$t_r = 10\text{ ns}$		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_F(\text{AV}) + 0.0175 I_F^2(\text{RMS})$

Fig.1 : Average forward power dissipation versus average forward current.

Fig.2 : Peak current versus form factor.

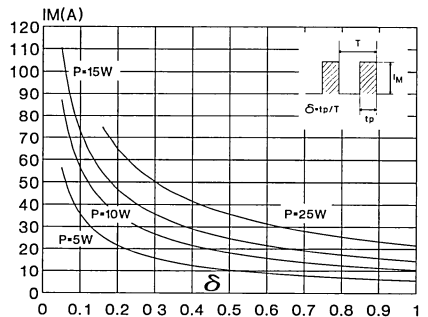
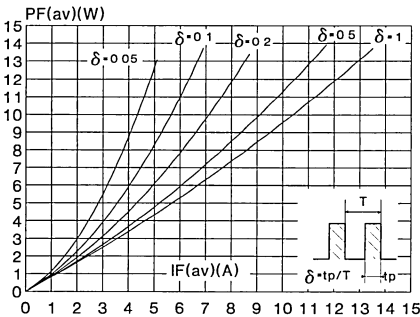


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

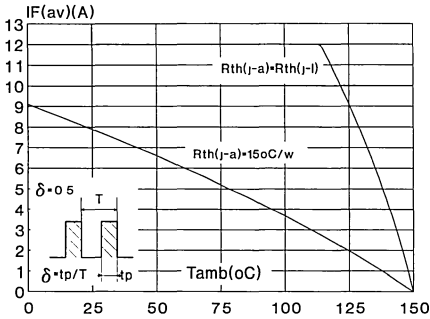


Fig.4 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

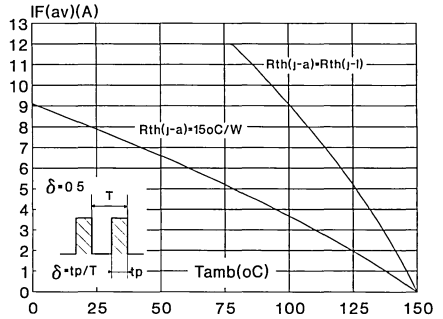


Fig.5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

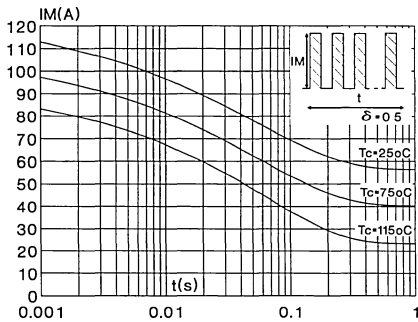


Fig.6 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

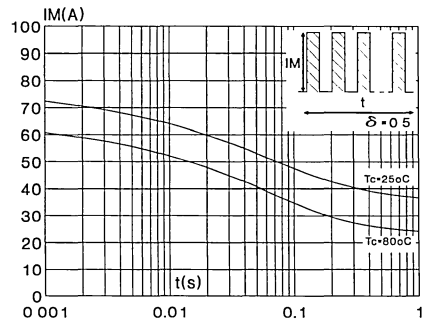


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

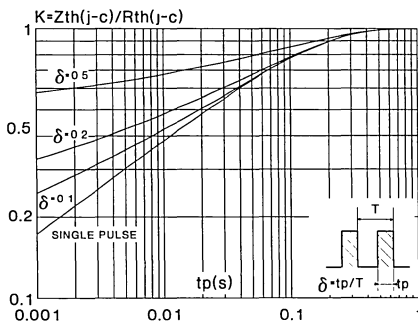


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

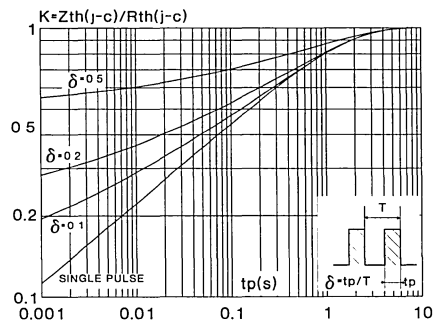


Fig.9 : Forward voltage drop versus forward current. (Maximum values)

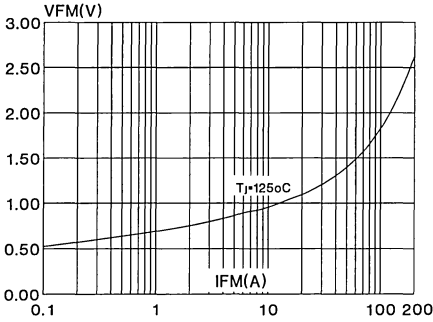


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

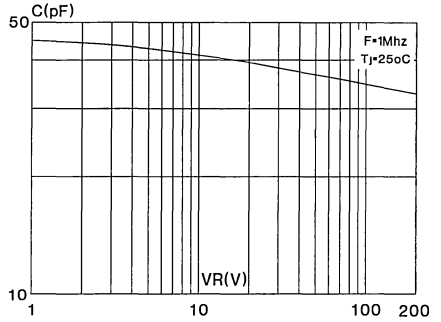


Fig.11 : Recovery charge versus dI_F/dt .

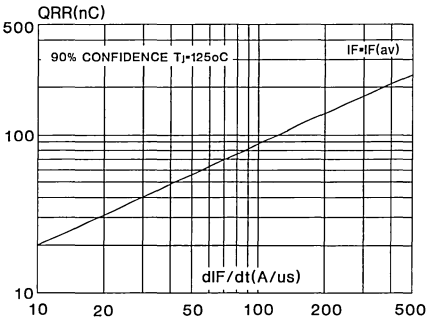


Fig.12 : Peak reverse current versus dI_F/dt .

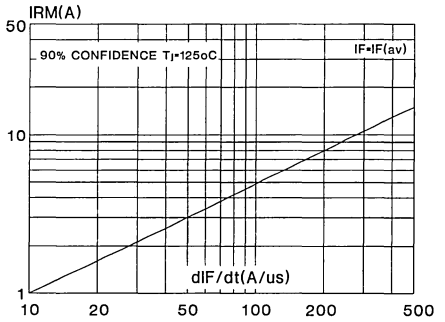
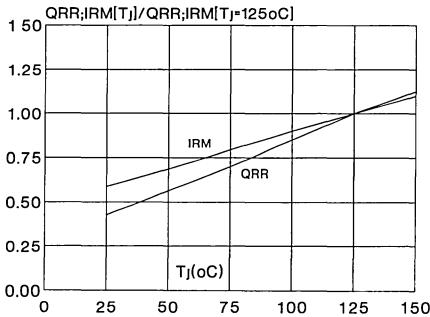


Fig.13 : Dynamic parameters versus junction temperature.





ULTRA FAST RECOVERY RECTIFIER DIODES

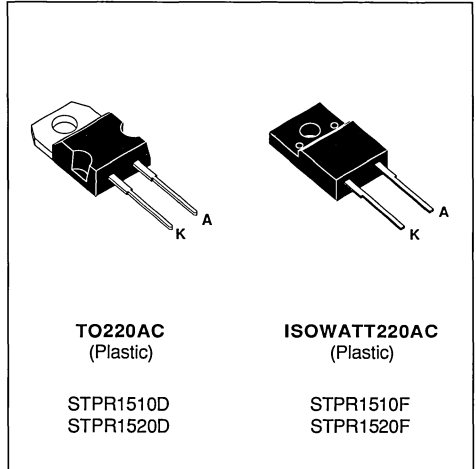
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost single chip rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I _{F(RMS)}	RMS Forward Current		30	A
I _{F(AV)}	Average Forward Current $\delta = 0.5$	TO220AC	15	A
		ISOWATT220AC		
I _{FSM}	Surge Non Repetitive Forward Current		150	A
T _{stg} T _J	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	°C

Symbol	Parameter	STPR		Unit
		1510D 1510F	1520D 1520F	
V _{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{th(j-c)}	Junction-case	TO220AC	2.0	°C/W
		ISOWATT220AC	4.5	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_j = 100^\circ\text{C}$				1.0	mA
V_F^{**}	$T_j = 125^\circ\text{C}$	$I_F = 15\text{ A}$			0.99	V
	$T_j = 125^\circ\text{C}$	$I_F = 30\text{ A}$			1.20	
	$T_j = 25^\circ\text{C}$	$I_F = 30\text{ A}$			1.25	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{ A}$	$I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$			30	ns
t_{fr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$t_r = 10\text{ ns}$ $V_{FR} = 1.1 \times V_F$		20		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$t_r = 10\text{ ns}$		3		V

To evaluate the conduction losses use the following equation :
 $P = 0.78 \times I_F(\text{AV}) + 0.014 I_F^2(\text{RMS})$

Fig.1 : Average forward power dissipation versus average forward current.

Fig.2 : Peak current versus form factor.

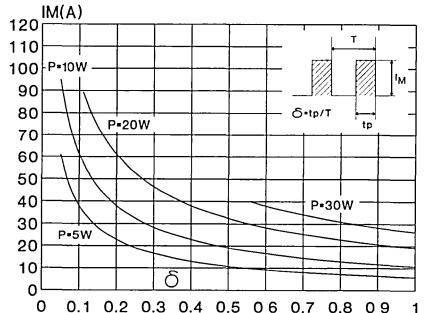
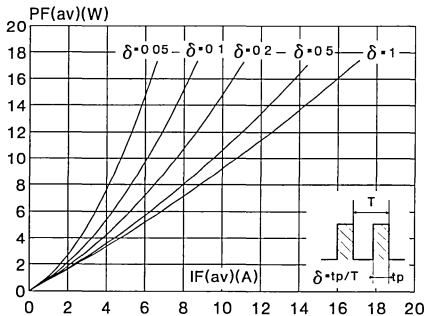


Fig.3 : Average current versus ambient temperature.
(duty cycle : 0.5) (TO220AC)

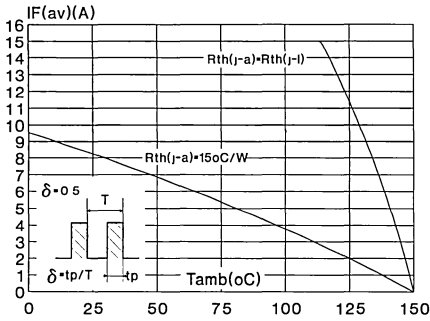


Fig.4 : Average current versus ambient temperature.
(duty cycle : 0.5) (ISOWATT220AC)

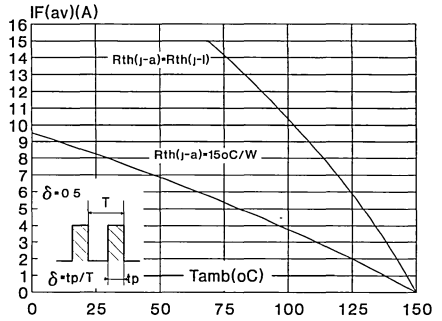


Fig.5 : Non repetitive surge peak forward current versus overload duration.
(Maximum values) (TO220AC)

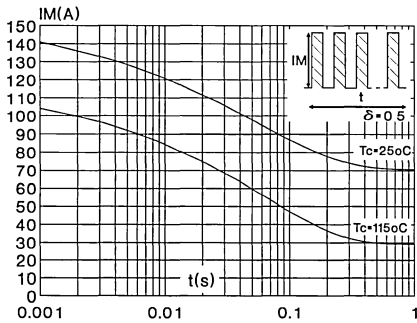


Fig.6 : Non repetitive surge peak forward current versus overload duration.
(Maximum values) (ISOWATT220AC)

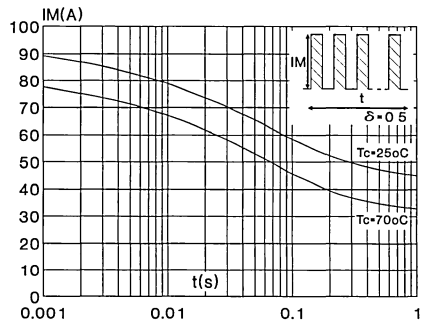


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration.
(TO220AC)

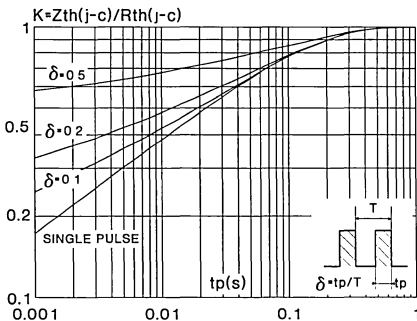


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration.
(ISOWATT220AC)

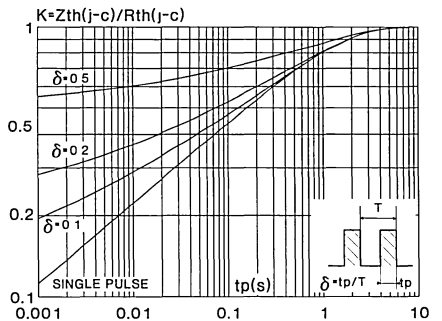


Fig.9 : Forward voltage drop versus forward current. (Maximum values)

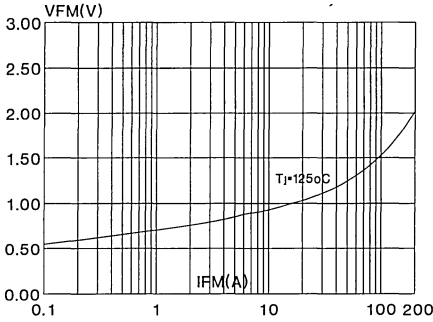


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

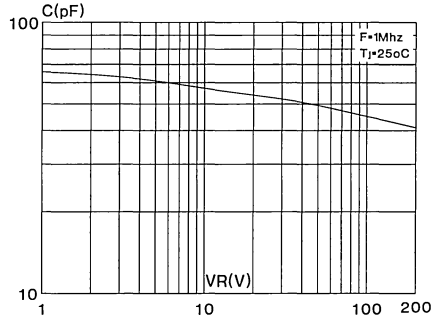


Fig.11 : Recovery charge versus diF/dt.

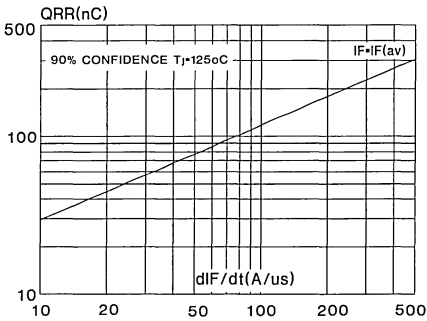


Fig.12 : Peak reverse current versus diF/dt.

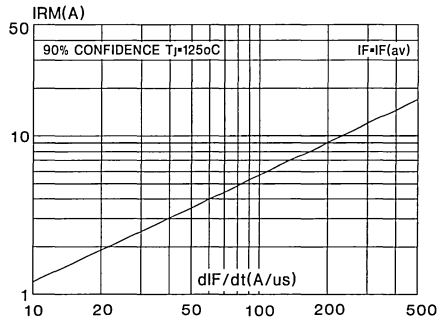
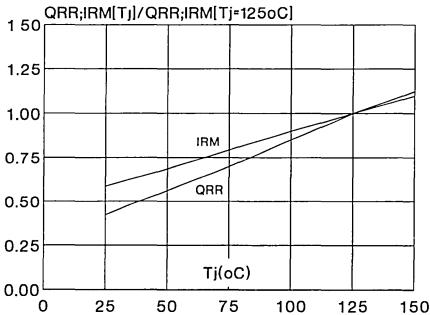


Fig.13 : Dynamic parameters versus junction temperature.



ULTRA FAST RECOVERY RECTIFIER DIODES

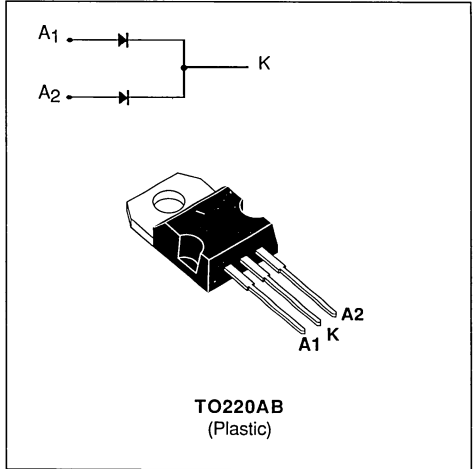
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost dual center tap rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit
I _{F(RMS)}	RMS Forward Current		Per diode	20	A
I _{F(AV)}	Average Forward Current	T _c = 120°C δ = 0.5	Per diode Per device	8 16	A
I _{FSM}	Surge Non Repetitive Forward Current	T _p = 10 ms Sinusoidal	Per diode	80	A
T _{stg} T _J	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	°C

Symbol	Parameter	STPR		Unit
		1610CT	1620CT	
V _{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{th (j-c)}	Junction-case	Per diode total	3.0	°C/W
R _{th (c)}	Coupling			°C/W

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_J(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				0.6	mA
V _F **	T _j = 125°C	I _F = 8 A			0.99	V
	T _j = 125°C	I _F = 16 A			1.20	
	T _j = 25°C	I _F = 16 A			1.25	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 360 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5 A I _R = 1A I _{rr} = 0.25 A				30	ns
tfr	T _j = 25°C	I _F = 1 A tr = 10 ns V _{FR} = 1.1 x V _F			20		ns
V _{FP}	T _j = 25°C	I _F = 1 A tr = 10 ns			3		V

To evaluate the conduction losses use the following equation :

$$P = 0.78 \times I_{F(AV)} + 0.026 I_F^2(\text{RMS})$$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

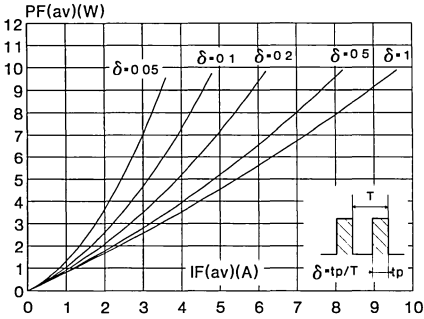


Fig.2 : Peak current versus form factor. (Per diode)

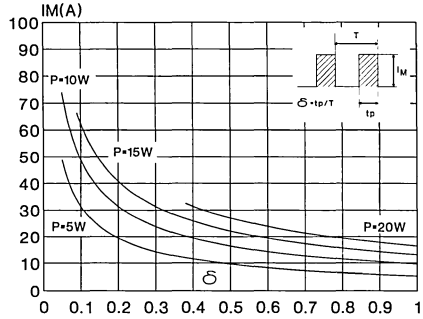


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode)

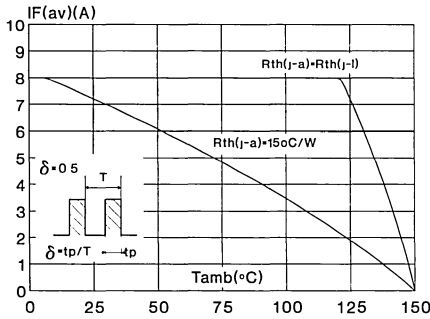


Fig.4 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

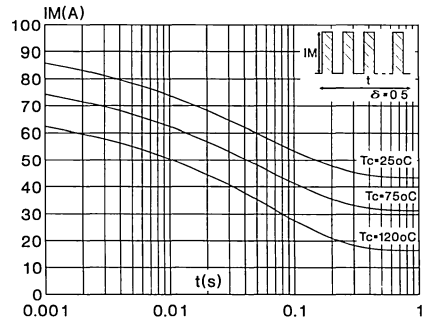


Fig.5 : Relative variation of thermal transient impedance junction to case versus pulse duration. (Per diode)

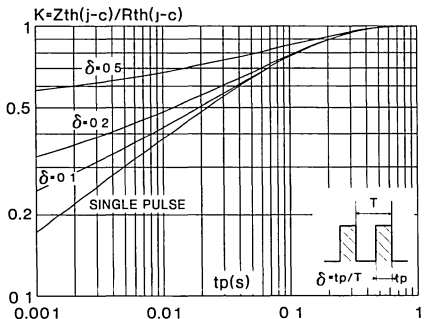


Fig.6 : Forward voltage drop versus forward current. (Maximum values) (Per diode)

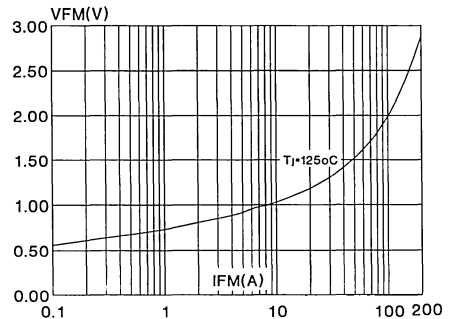


Fig.7 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

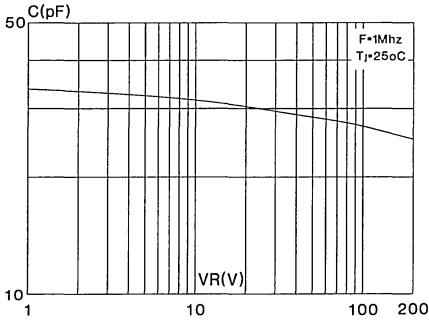


Fig.8 : Recovery charge versus dI_F/dt . (Per diode)

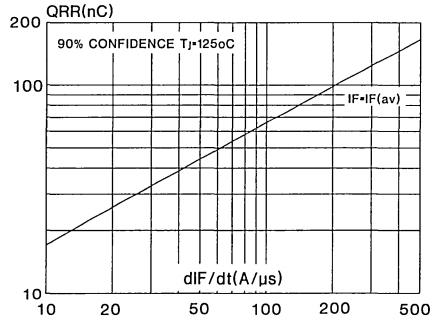


Fig.9 : Peak reverse current versus dI_F/dt . (Per diode)

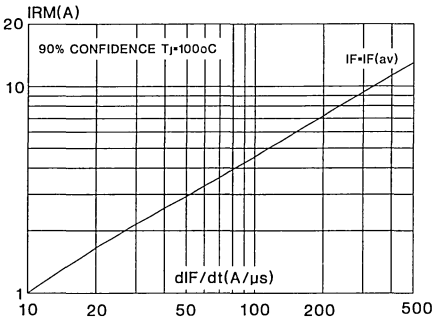
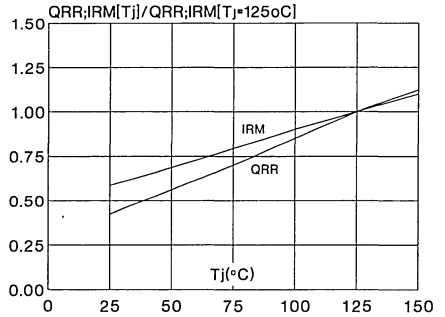


Fig.10 : Dynamic parameters versus junction temperature. (Per diode)



ULTRA FAST RECOVERY RECTIFIER DIODES

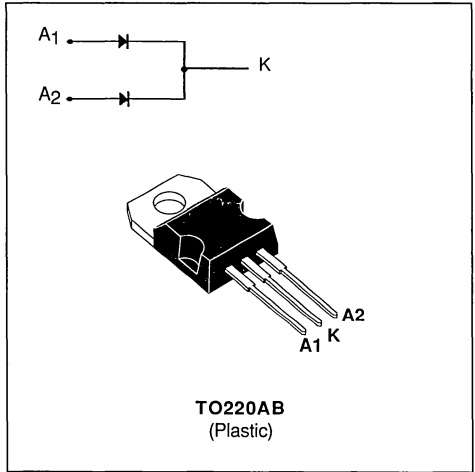
FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY

DESCRIPTION

Low cost dual center tap rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit
I _F (RMS)	RMS Forward Current		Per diode	30	A
I _F (AV)	Average Forward Current	T _c = 115°C δ = 0.5	Per diode Per device	12 24	A
I _{FSM}	Surge Non Repetitive Forward Current	T _p = 10 ms Sinusoidal	Per diode	120	A
T _{stg} T _j	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	°C

Symbol	Parameter	STPR		Unit
		2410CT	2420CT	
V _{RRM}	Repetitive Peak Reverse Voltage	100	200	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{th} (j-c)	Junction-case	Per diode total	2.5 1.4	°C/W
R _{th} (c)	Coupling		0.23	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			50	μA
	T _j = 100°C				0.8	mA
V _F **	T _j = 125°C	I _F = 12 A			0.99	V
	T _j = 125°C	I _F = 24 A			1.20	
	T _j = 25°C	I _F = 24 A			1.25	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2%

RECOVERY CHARACTERISTICS

Symbol	Tests Conditions			Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5 A I _R = 1 A	I _{rr} = 0.25 A			30	ns
tfr	T _j = 25°C	I _F = 1 A	tr = 10 ns		20		ns
V _{FP}	T _j = 25°C	I _F = 1 A	tr = 10 ns		3		V

To evaluate the conduction losses use the following equation :

$$P = 0.78 \times I_{F(AV)} + 0.0175 I_{F(RMS)}^2$$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

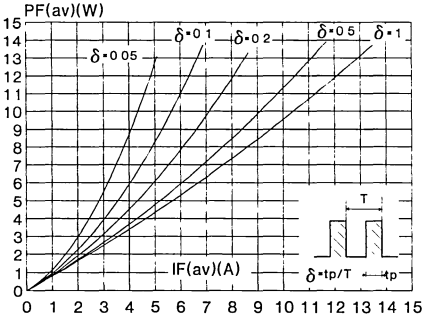


Fig.2 : Peak current versus form factor. (Per diode)

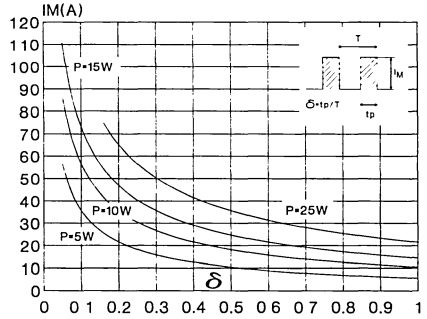


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode)

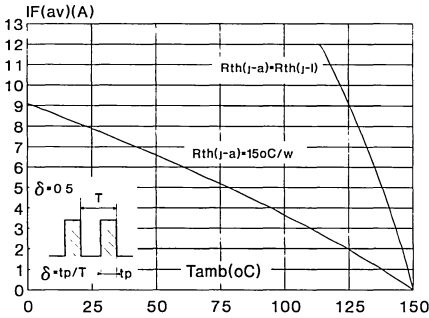


Fig.4 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

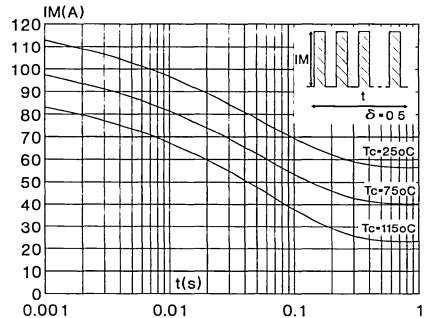


Fig.5 : Relative variation of thermal transient impedance junction to case versus pulse duration. (Per diode)

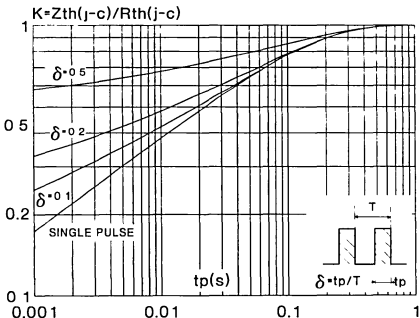


Fig.6 : Forward voltage drop versus forward current. (Maximum values) (Per diode)

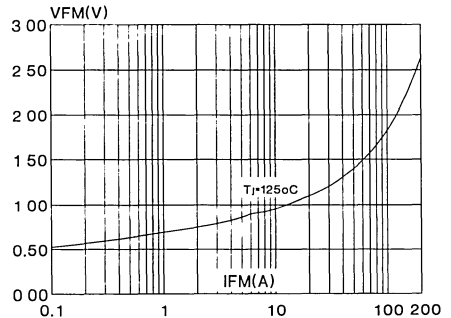


Fig.7 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

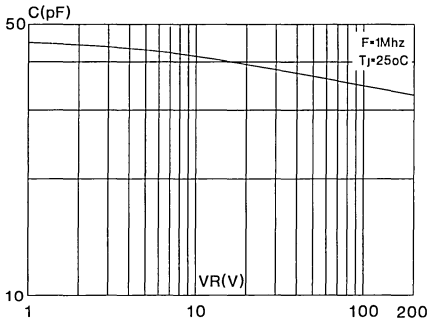


Fig.8 : Recovery charge versus dIF/dt. (Per diode)

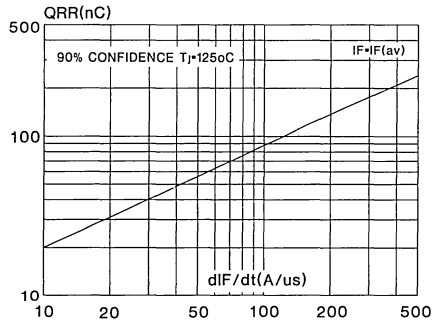


Fig.9 : Peak reverse current versus dIF/dt. (Per diode)

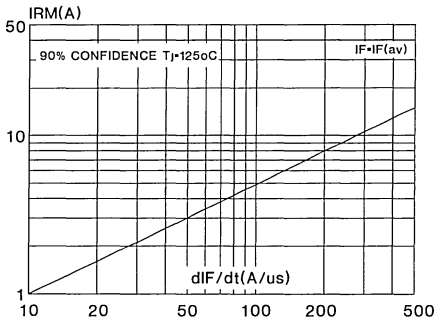
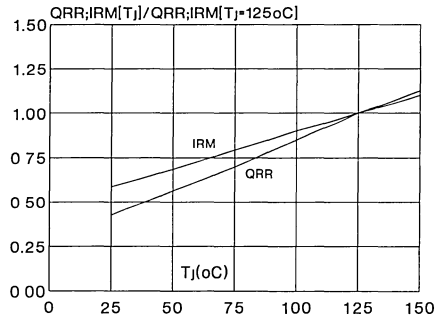


Fig.10 : Dynamic parameters versus junction temperature. (Per diode)



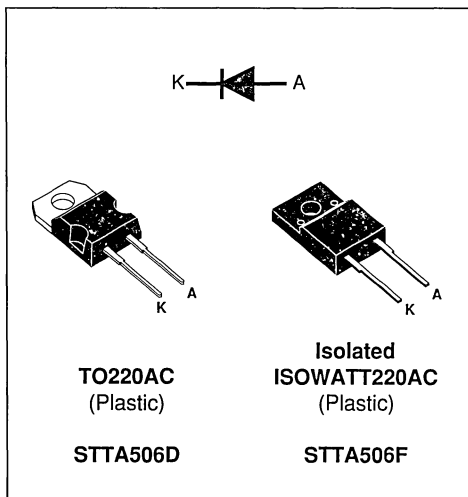
HIGH VOLTAGE ULTRA-FAST DIODES

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	5A
V_{RRM}	600V
t_{rr} (typ)	20ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.


DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries.

Packaged in TO220AC and in isolated ISOWATT220AC, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	65	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON MICROELECTRONICS.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA506D STTA506F	3.5 6.0	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_{F(AV)} = 5\text{A}$ $\delta = 0.5$ STTA506D $T_c = 118^{\circ}\text{C}$ STTA506F $T_c = 96^{\circ}\text{C}$	9	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA506D $T_c = 115^{\circ}\text{C}$ STTA506F $T_c = 90^{\circ}\text{C}$	10	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 5\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			1.75 1.5	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 2	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle $< 2\%$

** $t_p = 5 \text{ms}$, duty cycle $< 2\%$

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		20	50	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 5\text{A}$ $di_F/dt = -40 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		11	3.0	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 5\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		0.55		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 5 \text{A}$, $di_F/dt = 40 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 5\text{A}$, $di_F/dt = 40 \text{A}/\mu\text{s}$			10	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below:

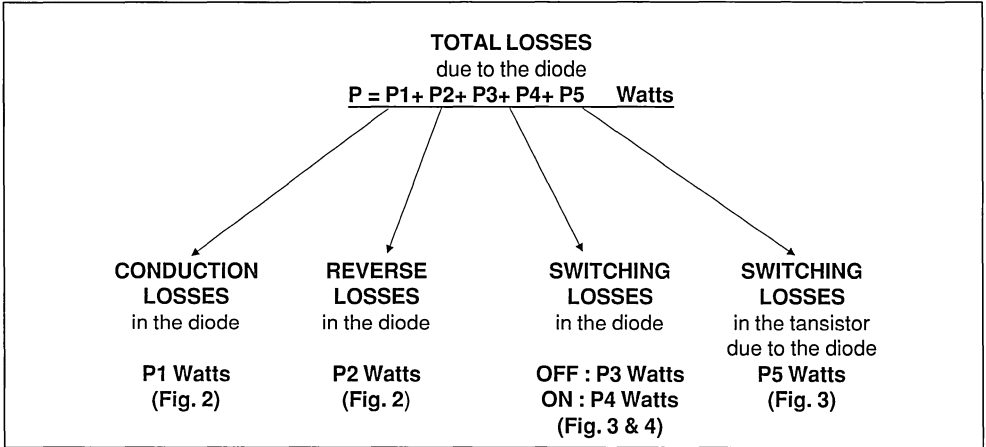
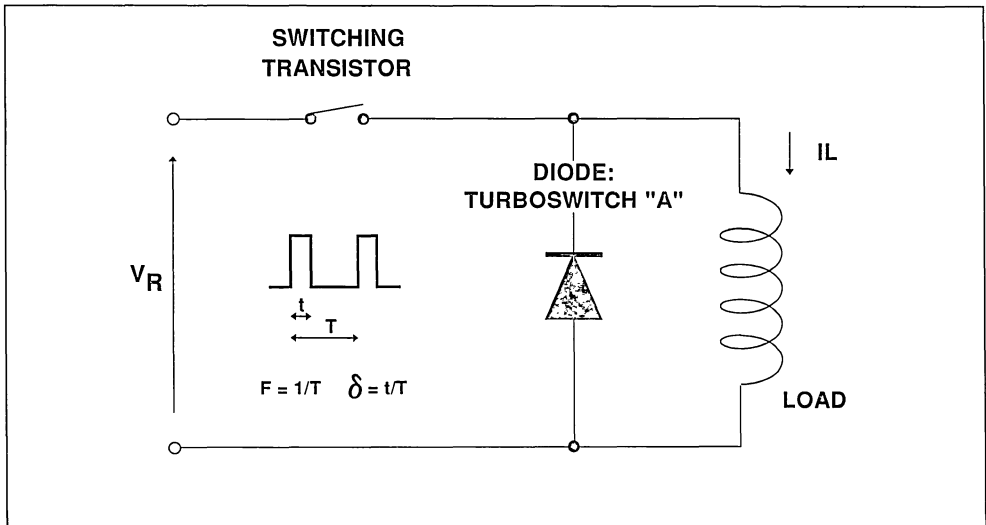
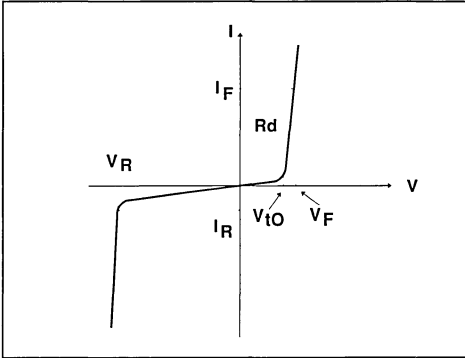


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 V$$

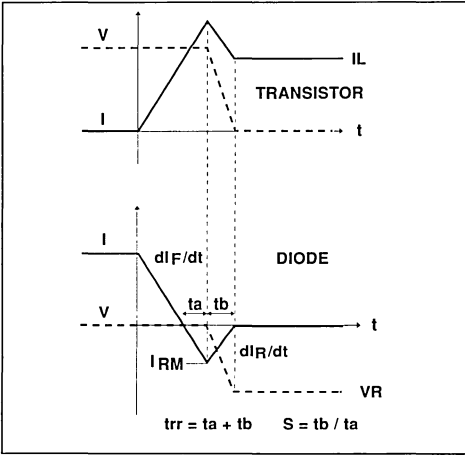
$$R_d = 0.070 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

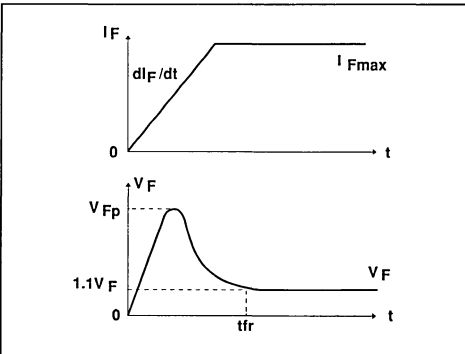
$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 5 : Conduction losses versus average current

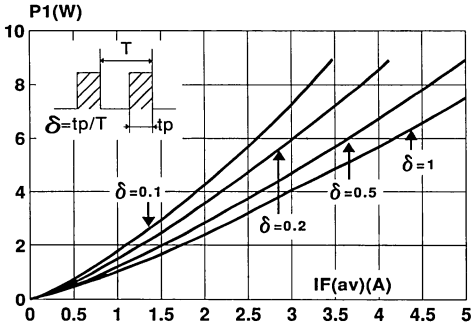


Fig 6 : Switching OFF losses versus dIF/dt

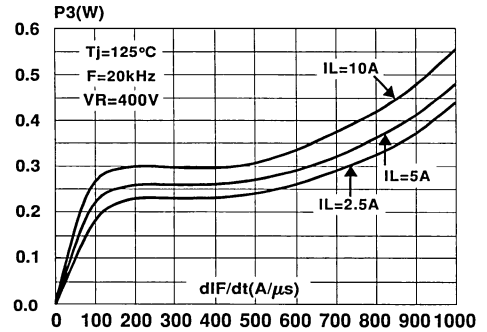


Fig 7 : Switching ON losses versus dIF/dt

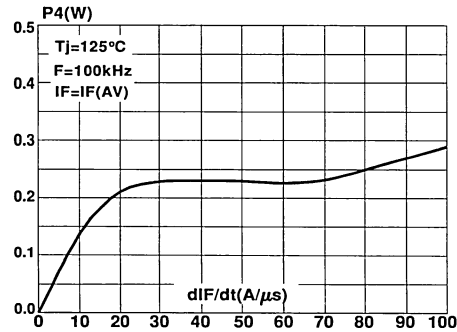


Fig 8 : Switching losses in transistor due to the diode

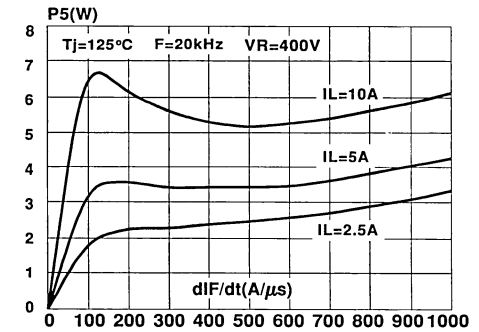


Fig 9 : Forward voltage drop versus forward current

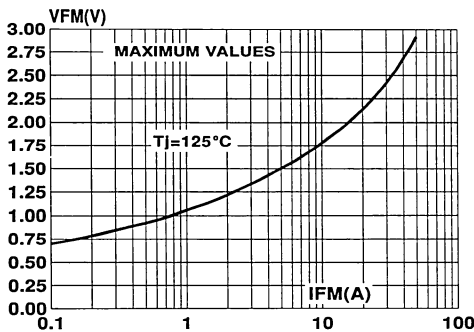


Fig 10 : Peak reverse recovery current versus dI_F/dt

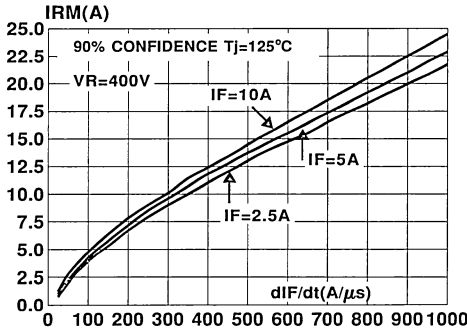


Fig 11 : Reverse recovery time versus dI_F/dt

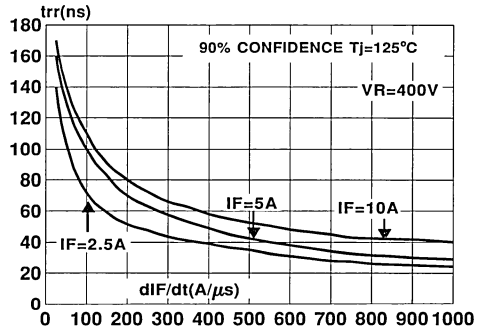


Fig 12 : Softness factor (tb/ta) versus dI_F/dt

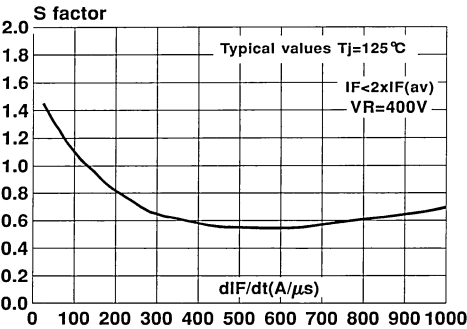


Fig 13 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

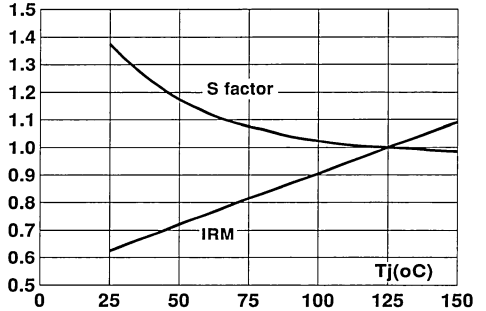


Fig 14 : Transient peak forward voltage versus dI_F/dt

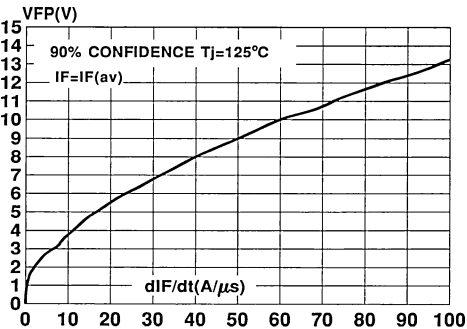


Fig 15 : Forward recovery time versus dI_F/dt

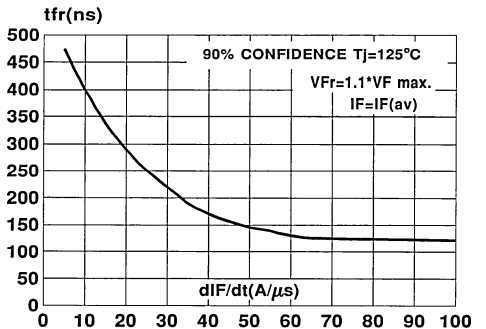


Fig 16 : Relative variation of thermal transient impedance junction to case versus pulse duration (TO220AC)

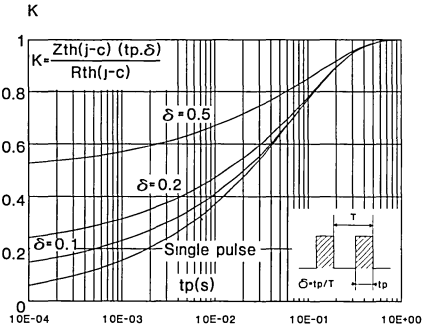
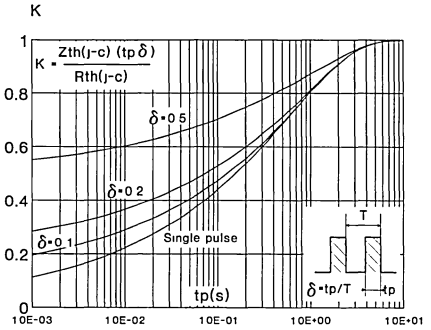


Fig 17 : Relative variation of thermal transient impedance junction to case versus pulse duration (I6SOWATT220AC)



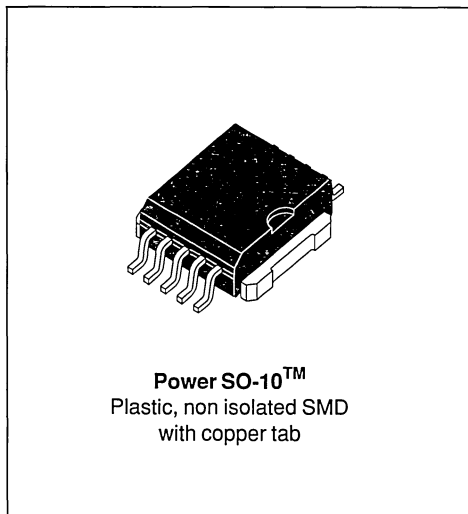
ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	5A
V_{RRM}	600V
t_{rr} (typ)	20ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST AND SOFT RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.
- HIGH DISSIPATION MINIATURE PACKAGE.
- SURFACE MOUNT TECHNOLOGY COMPATIBLE.



DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in motor control freewheel applications and in booster diode applications in Power Factor Control circuitries.

Packaged in a very high performance surface mount package PSO-10, this 600V device is particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	17	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s, f = 5kHz$)	65	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		3.5	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_F(AV) = 5\text{A}$ $\delta = 0.5$ $T_c = 118^{\circ}\text{C}$	9	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 115^{\circ}\text{C}$	10	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 5\text{A}$	$T_j = 25^{\circ}\text{C}$		1.75	V
			$T_j = 125^{\circ}\text{C}$		1.5	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$		100	μA
			$T_j = 125^{\circ}\text{C}$		2	mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS
TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $dI_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		20	50	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 5\text{A}$ $dI_F/dt = -40\text{A}/\mu\text{s}$ $dI_F/dt = -500\text{A}/\mu\text{s}$		11	3	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 5\text{A}$ $dI_F/dt = -500\text{A}/\mu\text{s}$		0.55		/

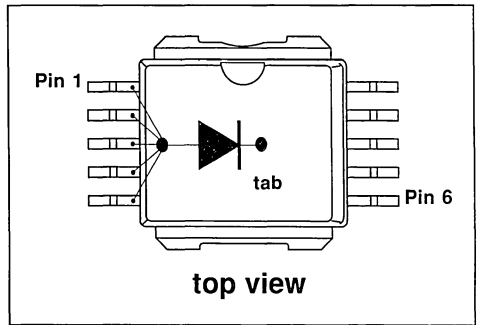
TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 5\text{A}$ $dI_F/dt = 40\text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 5\text{A}$ $dI_F/dt = 40\text{A}/\mu\text{s}$			10	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below:

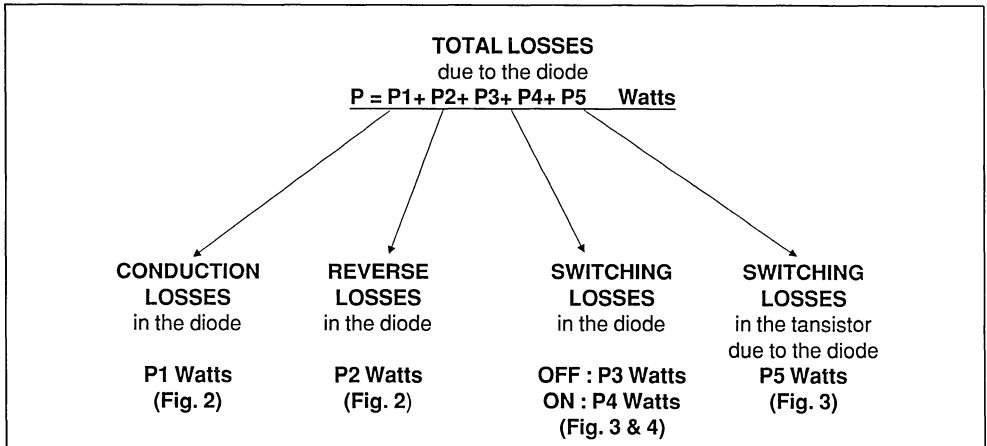
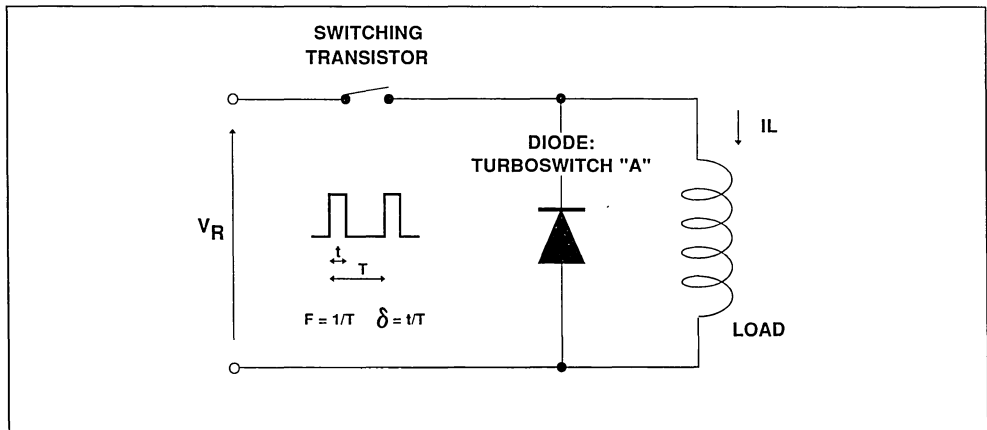
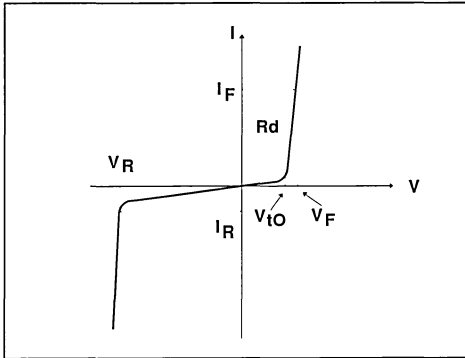


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{i0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{i0} = 1.15 V$$

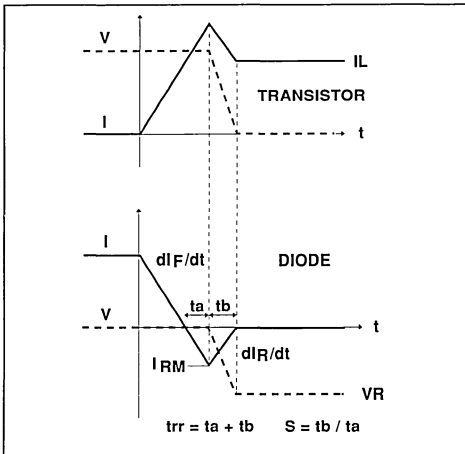
$$R_d = 0.070 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt}$$

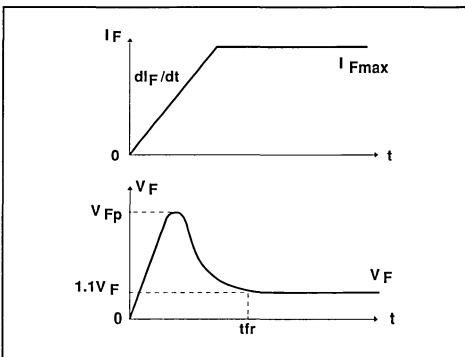
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 5 : Conduction losses versus average current

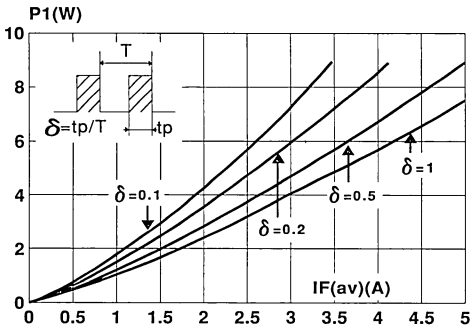


Fig 6 : Switching OFF losses versus dIF/dt

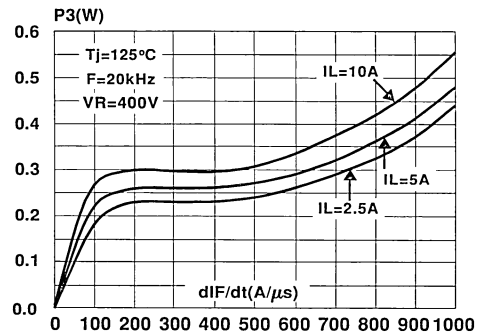


Fig 7 : Switching ON losses versus dIF/dt

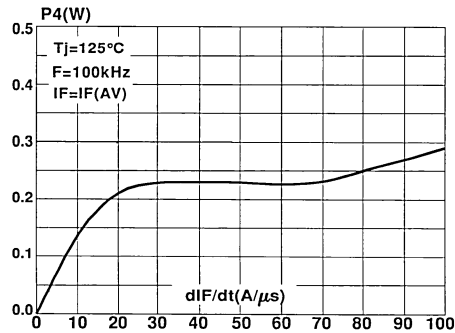


Fig 8 : Switching losses in transistor due to the diode

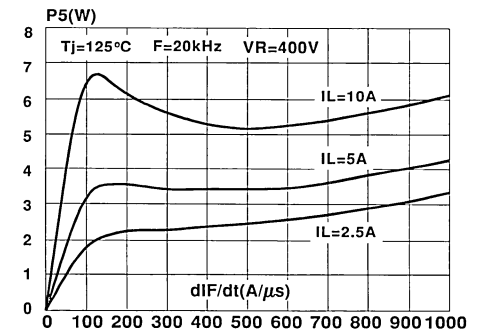


Fig 9 : Forward voltage drop versus forward current

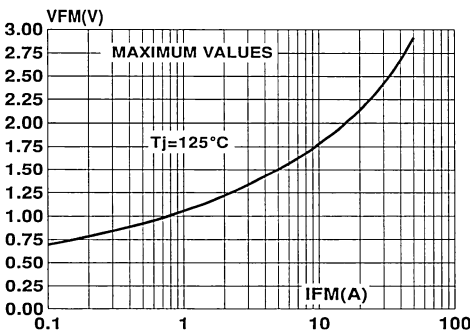


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

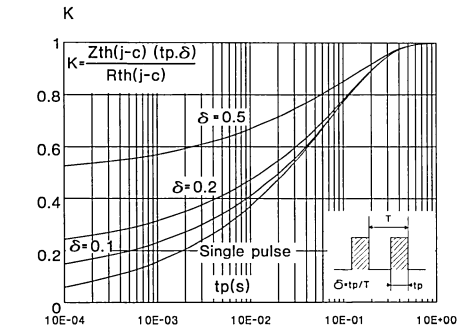


Fig 11 : Peak reverse recovery current versus dI_F/dt

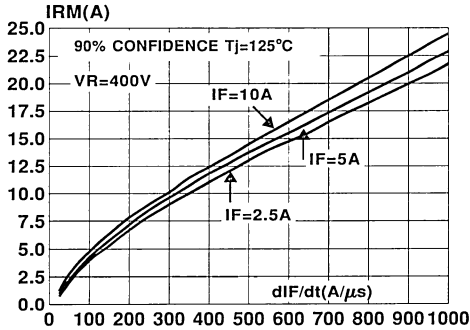


Fig 12 : Reverse recovery time versus dI_F/dt

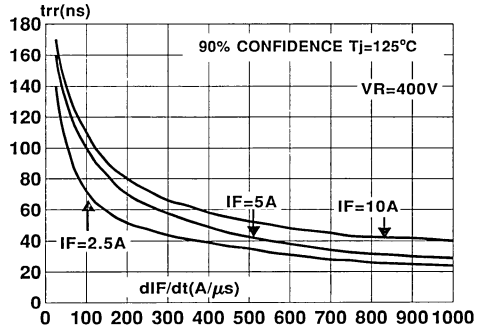


Fig 13 : Softness factor (tb/ta) versus dI_F/dt

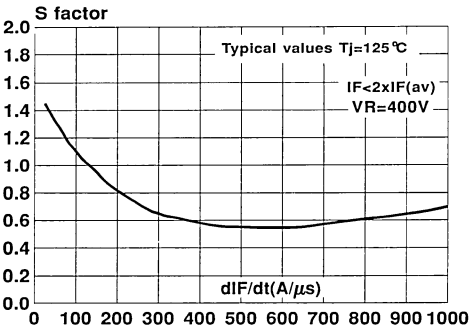


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

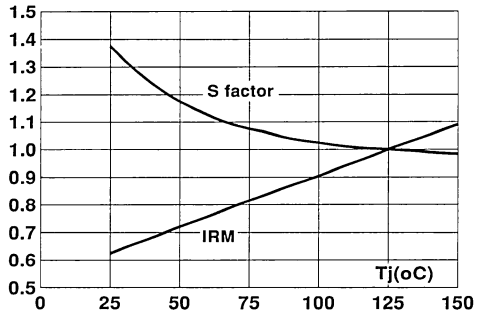


Fig 15 : Transient peak forward voltage versus dI_F/dt

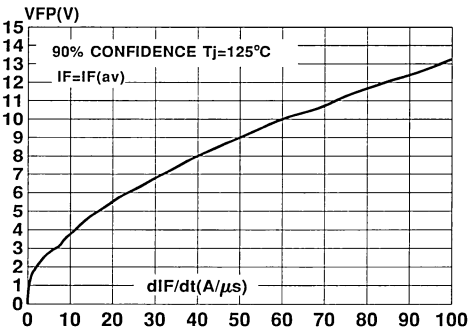
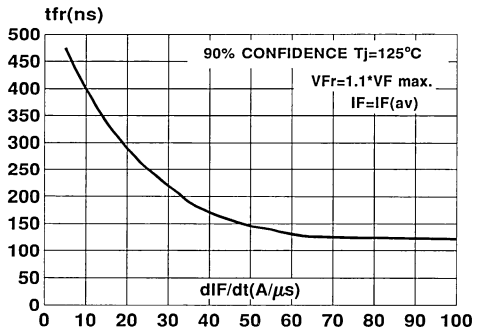


Fig 16 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ "B". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	5A
V_{RRM}	600V
t_{rr} (typ)	45ns
V_F (max)	1.3V

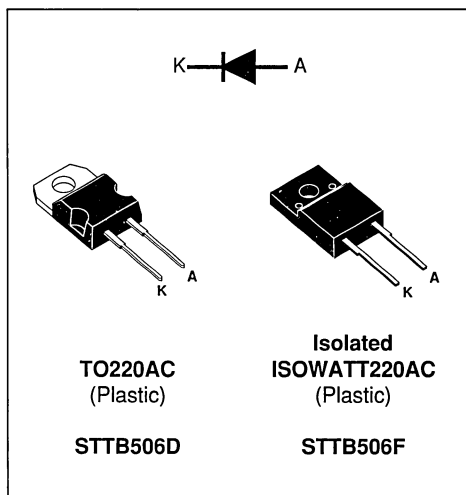
FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in TO220AC and in isolated ISOWATT220AC, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	175	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTB506D STTB506F	3.5 6.0	°C/W
P_1	Conduction power dissipation (see fig. 5)	$I_{F(AV)} = 5A$ $\delta = 0.5$ STTB506D $T_c = 122^\circ C$ STTB506F $T_c = 102^\circ C$	8	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTB506D $T_c = 115^\circ C$ STTB506F $T_c = 90^\circ C$	10	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 5A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			1.4 1.3	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			100 0.75	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1 A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		45	95	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 5A$ $di_F/dt = -40 A/\mu s$ $di_F/dt = -500 A/\mu s$		20	7.5	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 5A$ $di_F/dt = -500 A/\mu s$		1		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 5 A$, $di_F/dt = 40 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{FP}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 5A$, $di_F/dt = 40 A/\mu s$ $I_F = 25A$, $di_F/dt = 500 A/\mu s$		10	8	V

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

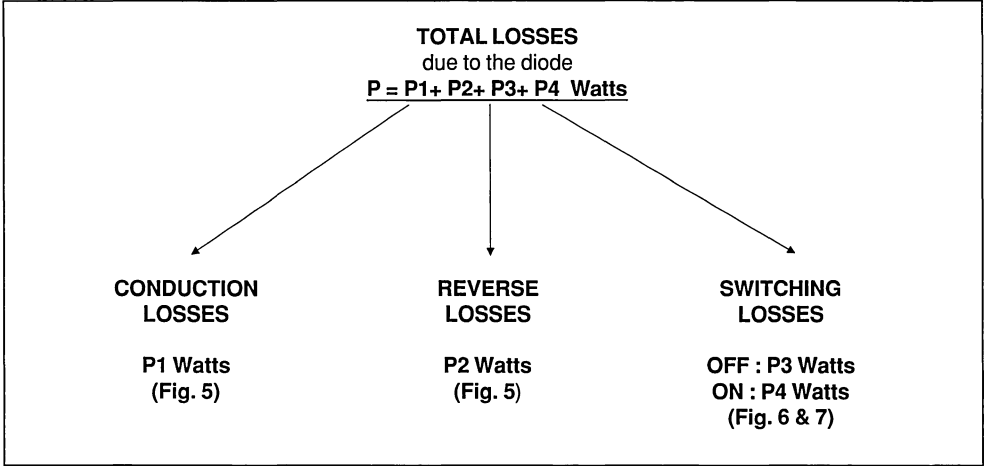


Fig. 1 : SNUBBER DIODE.

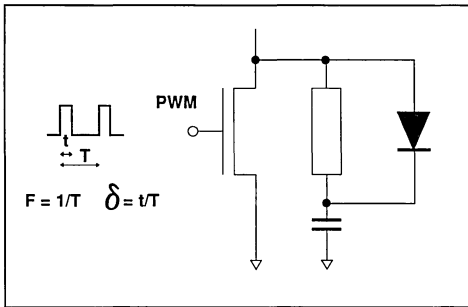


Fig. 2 : CLAMPING DIODE.

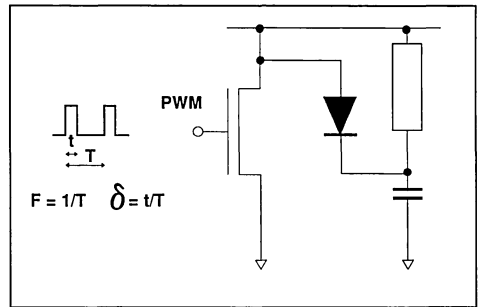


Fig. 3 : DEMAGNETIZING DIODE.

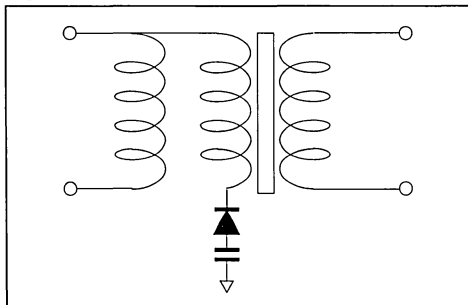
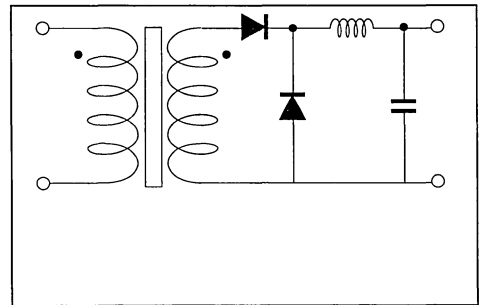
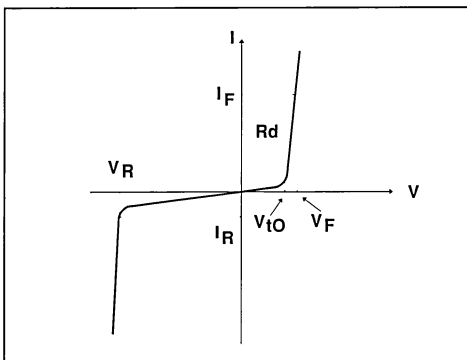


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

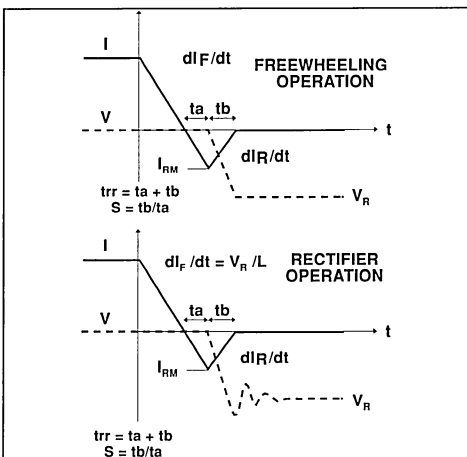
$$R_d = 0.060 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

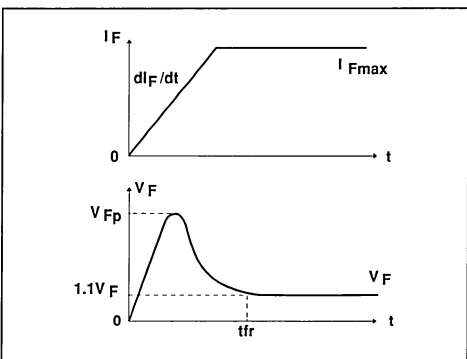
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 8 : Conduction losses versus average current

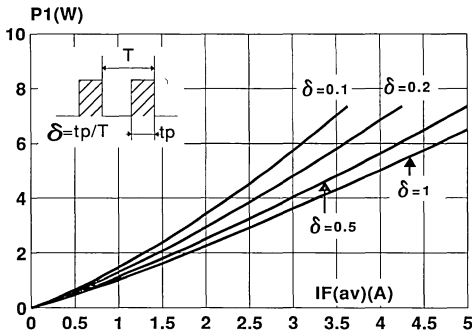


Fig 9 : Switching OFF losses versus diF/dt

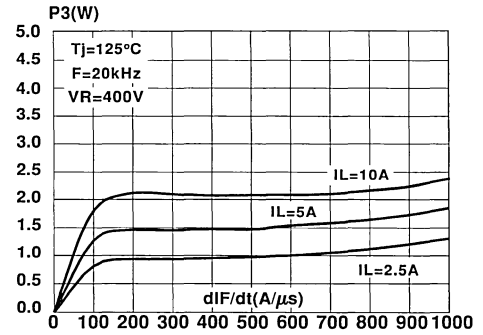


Fig 10 : Switching ON losses versus diF/dt

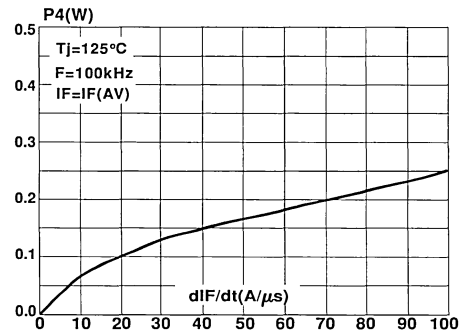


Fig 11 : Forward voltage drop versus forward current

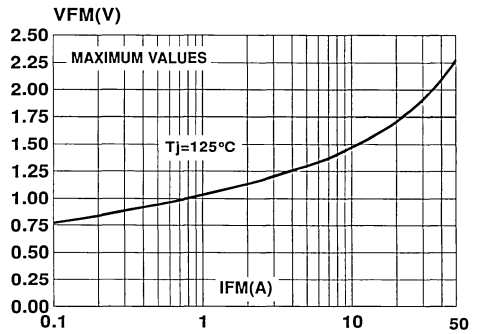


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration (TO220AC)

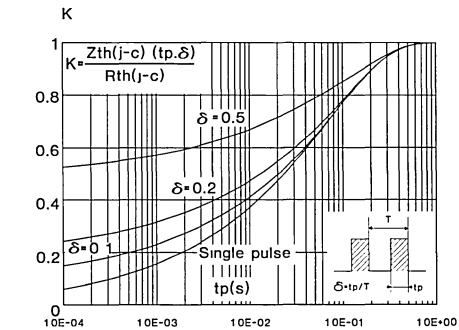


Fig 13 : Relative variation of thermal transient impedance junction to case versus pulse duration (ISOWATT220AC)

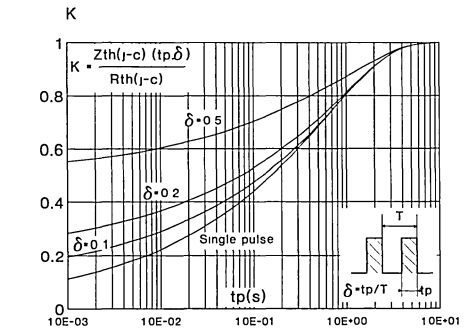


Fig 14 : Peak reverse recovery current versus dI_F/dt

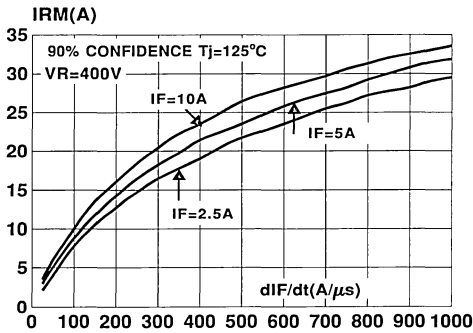


Fig 15 : Reverse recovery time versus dI_F/dt

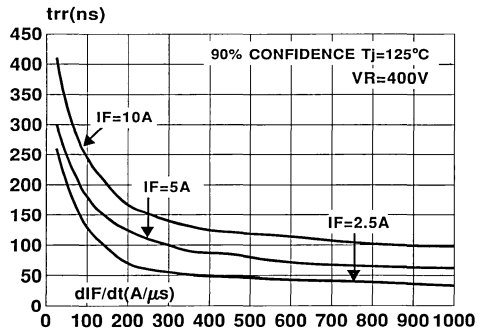


Fig 16 : Softness factor (tb/ta) versus dI_F/dt

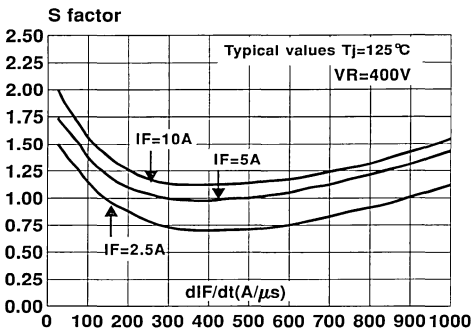


Fig 17 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

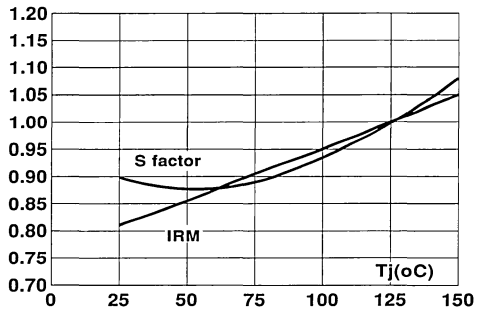


Fig 18 : Transient peak forward voltage versus dI_F/dt

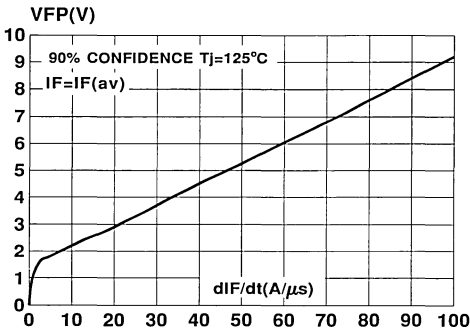
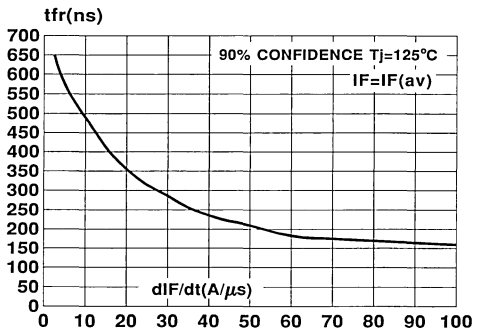


Fig 19 : Forward recovery time versus dI_F/dt



ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

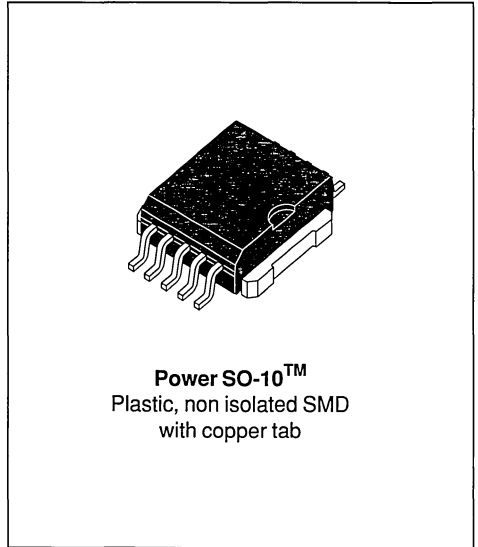
$I_{F(AV)}$	5A
V_{RRM}	600V
t_{rr} (typ)	45ns
V_F (max)	1.3V

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, VERY SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.
- HIGH FREQUENCY OPERATIONS
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in PSO-10, this 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	17	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	175	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		3.5	°C/W
P_1	Conduction power dissipation (see fig. 5)	$I_F(AV) = 5A$ $\delta = 0.5$ $T_c = 122^\circ C$	8	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 115^\circ C$	10	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 5A$			1.4	V
		$T_j = 25^\circ C$				
					1.3	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$		100	μA
			$T_j = 125^\circ C$		0.75	mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $dI_F/dt = -50A/\mu s$ $V_R = 30V$		45	95	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 5A$ $dI_F/dt = -40 A/\mu s$ $dI_F/dt = -500 A/\mu s$		20	7.5	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 5A$ $dI_F/dt = -500 A/\mu s$		1.0		/

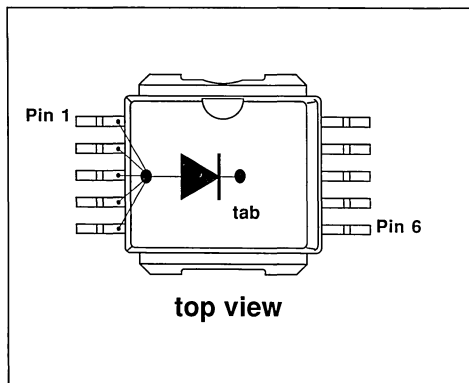
TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 5 A$, $dI_F/dt = 40 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 5A$, $dI_F/dt = 40 A/\mu s$			8	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

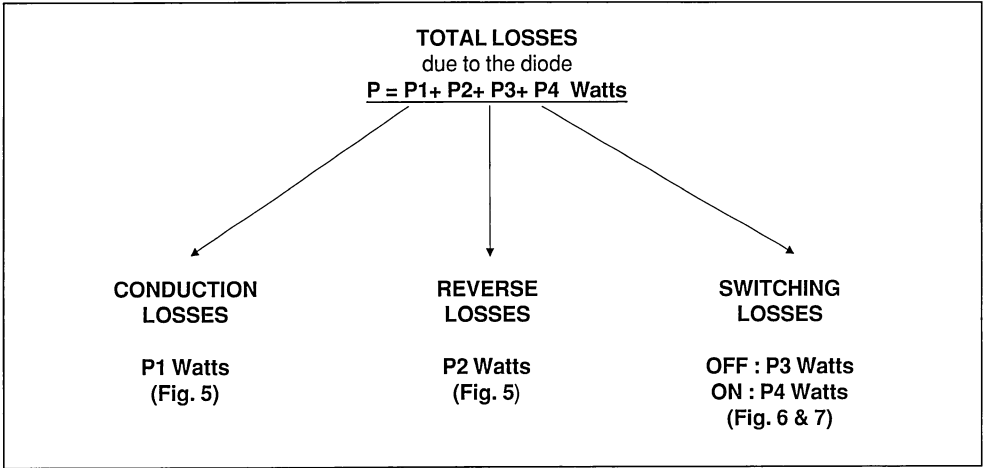


Fig. 1 : SNUBBER DIODE.

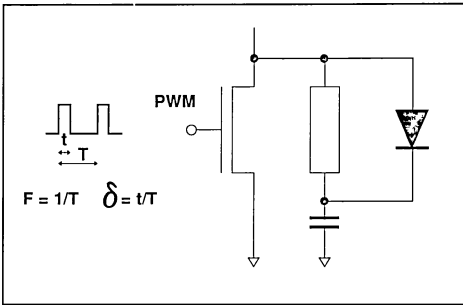


Fig. 2 : CLAMPING DIODE.

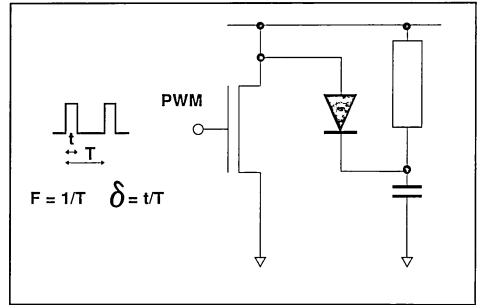


Fig. 3 : DEMAGNETIZING DIODE.

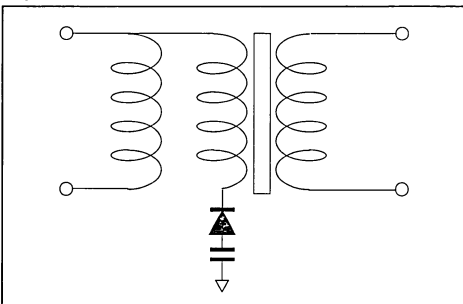
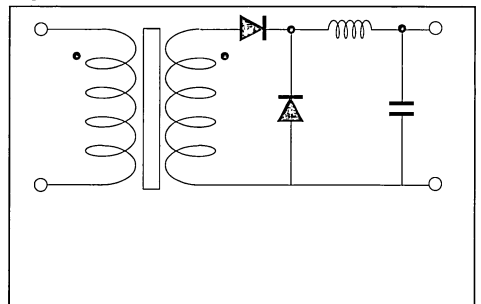
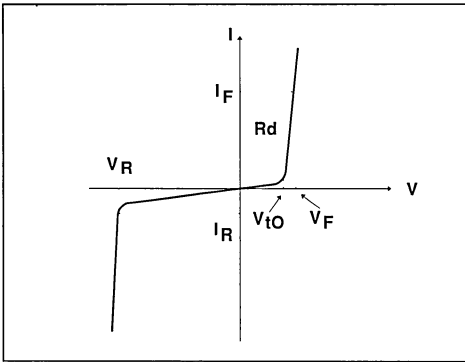


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

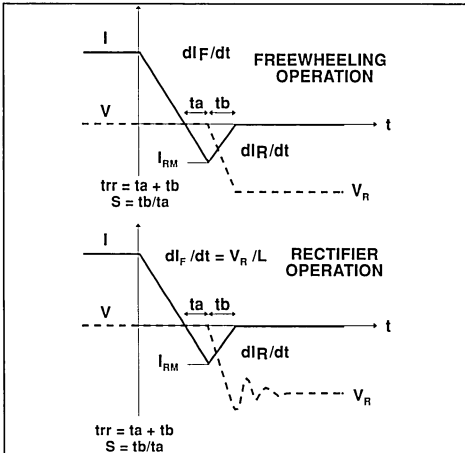
$$R_d = 0.060 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

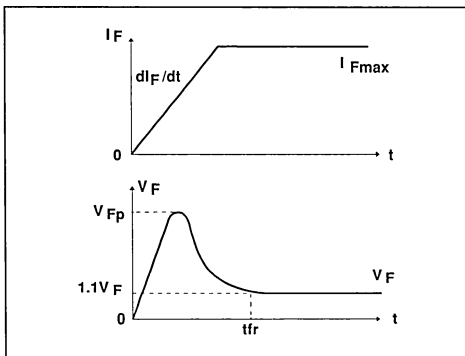
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 8 : Conduction losses versus average current

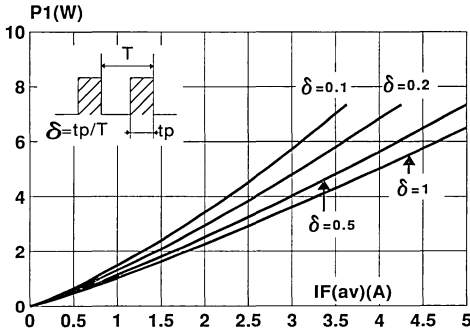


Fig 9 : Switching OFF losses versus dI/dt

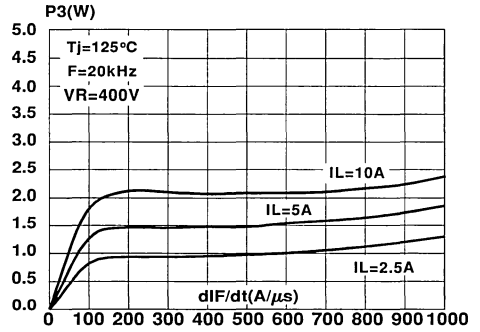


Fig 10 : Switching ON losses versus dI/dt

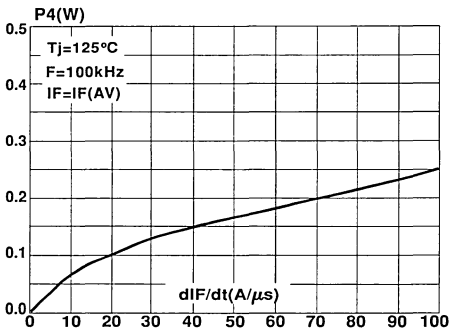


Fig 11 : Forward voltage drop versus forward current

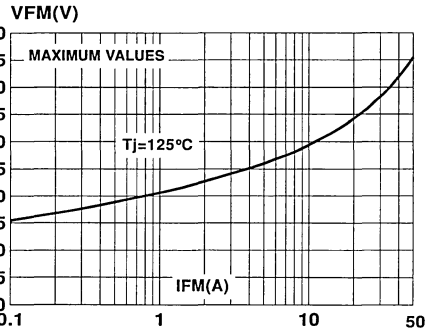


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

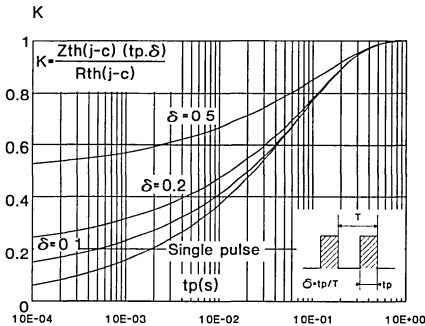


Fig 13 : Peak reverse recovery current versus diF/dt

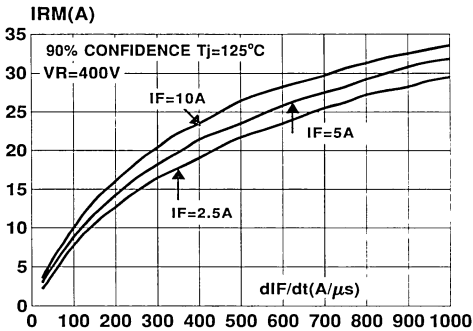


Fig 14 : Reverse recovery time versus diF/dt

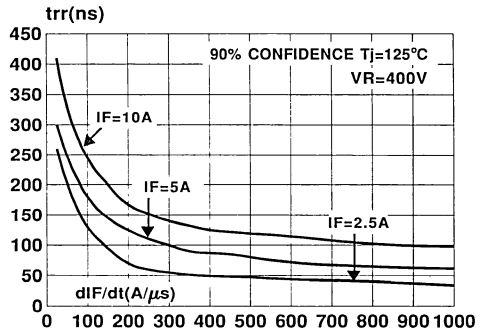


Fig 15 : Softness factor (tb/ta) versus diF/dt

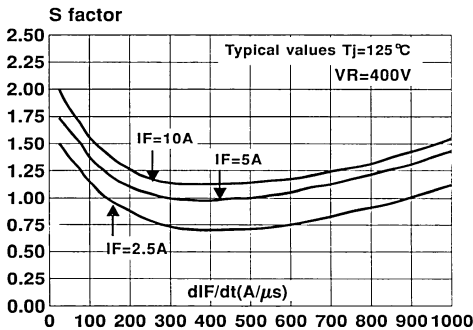


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

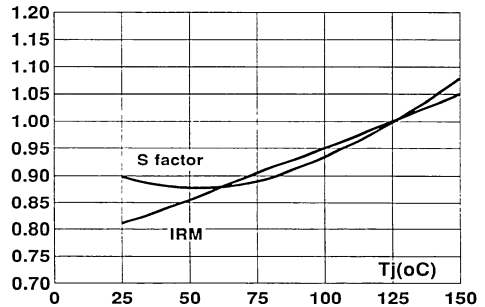


Fig 17 : Transient peak forward voltage versus diF/dt

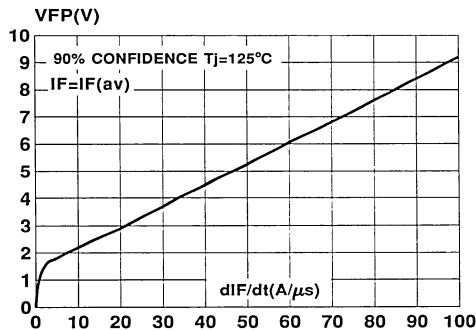
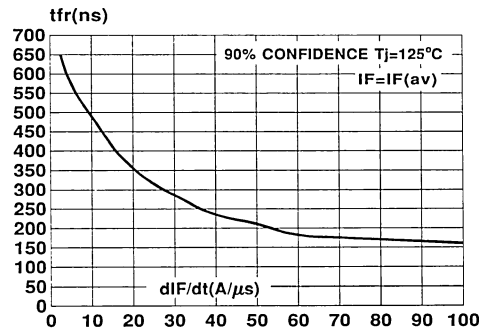


Fig 18 : Forward recovery time versus diF/dt



TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	5A
V_{RRM}	1200V
t_{rr} (typ)	45ns
V_F (max)	2.0V

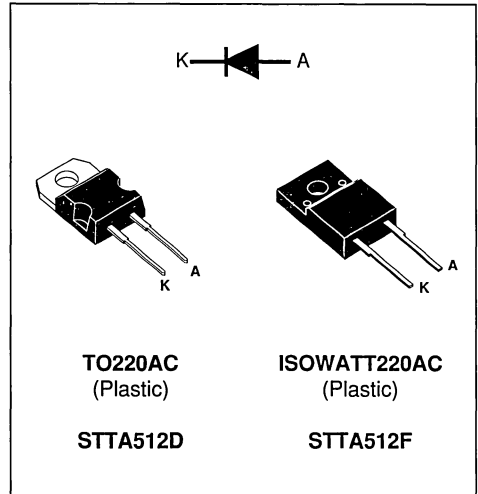
FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in TO220AC and in ISOWATT220AC, these 1200V devices are particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	75	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA512D STTA512F	4.0 5.5	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 6)	$I_{F(AV)} = 5\text{A}$ $\delta = 0.5$ STTA512D $T_c = 102^{\circ}\text{C}$ STTA512F $T_c = 84^{\circ}\text{C}$	12	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA512D $T_c = 98^{\circ}\text{C}$ STTA512F $T_c = 78^{\circ}\text{C}$	13	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 5\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			2.2 2.0	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 2.0	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		45	95	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 600\text{V}$ $I_F = 5\text{A}$ $di_F/dt = -40 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		20	7.5	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 600\text{V}$ $I_F = 5\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 5 \text{A}$, $di_F/dt = 40 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			900	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 5\text{A}$, $di_F/dt = 40 \text{A}/\mu\text{s}$ $I_F = 40\text{A}$, $di_F/dt = 500 \text{A}/\mu\text{s}$			35 50	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below :

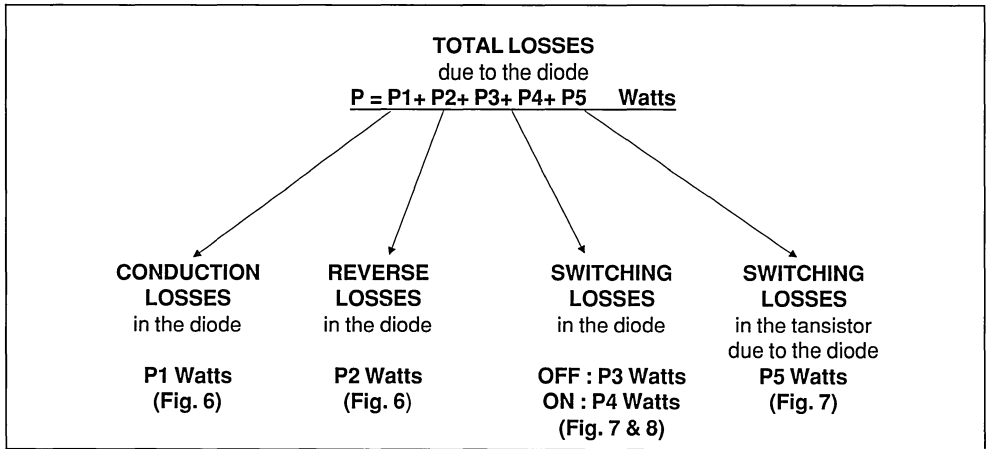


Fig. 1 : "FREEWHEEL" MODE.

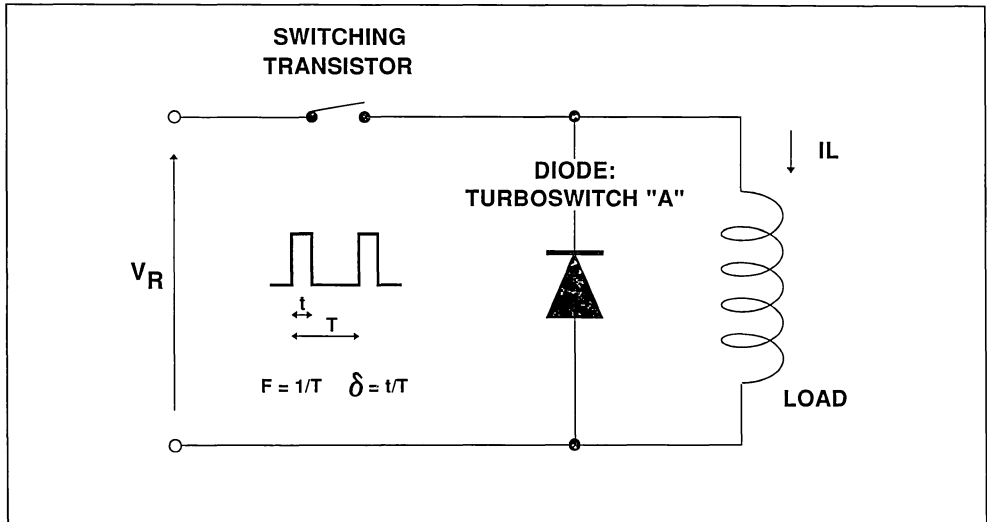


Fig. 2 : SNUBBER DIODE.

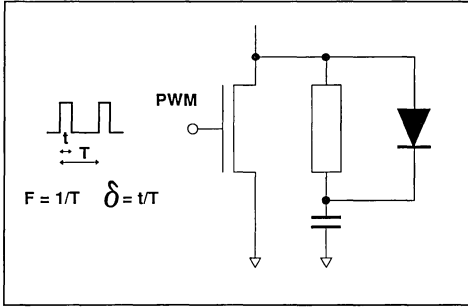


Fig. 3 : CLAMPING DIODE.

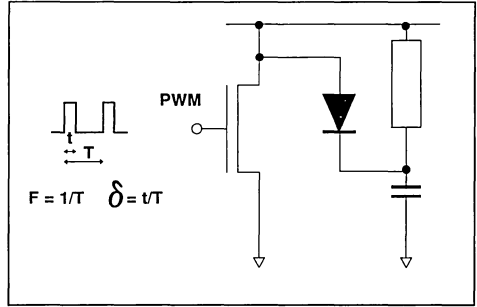


Fig. 4 : DEMAGNETIZING DIODE.

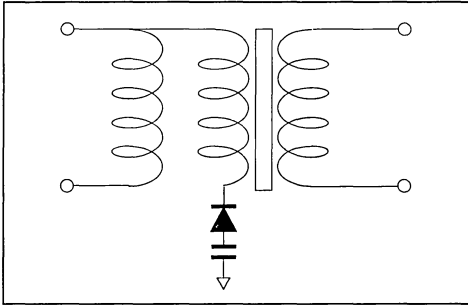
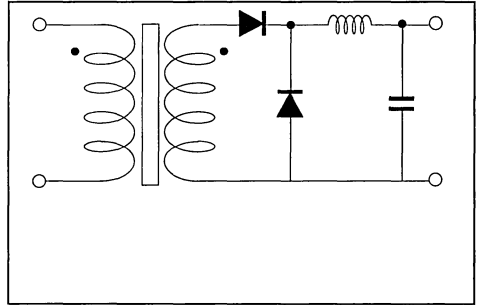
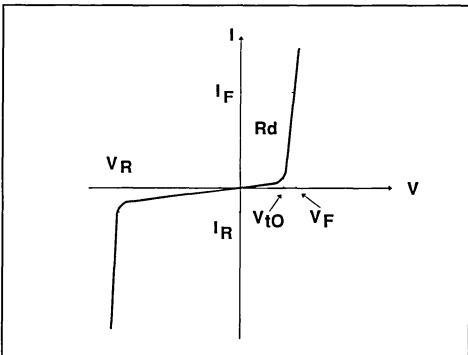


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.57 \text{ V}$$

$$R_d = 0.086 \text{ Ohm}$$

(Max values at 125°C, suitable for $I_{peak} < 3 \cdot I_{F(av)}$)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS

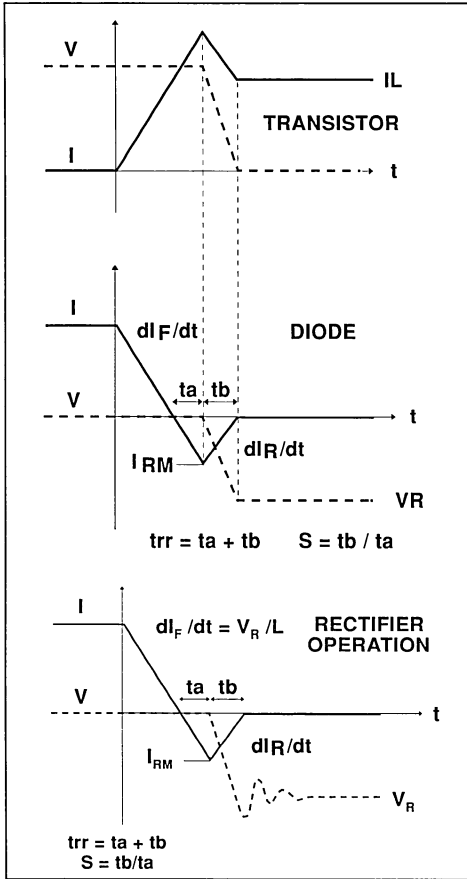
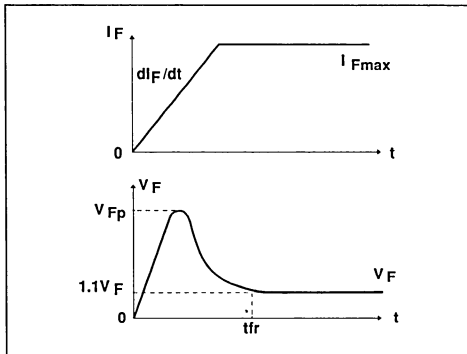


Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3,P3' and P5 are suitable for power MOSFET and IGBT

Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

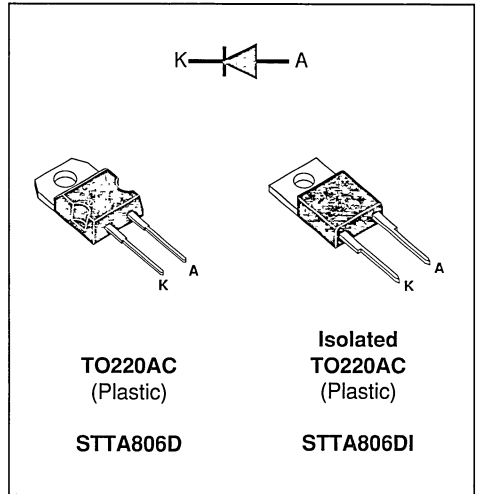
$I_{F(AV)}$	8A
V_{RRM}	600V
t_{rr} (typ)	25ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- ▣ SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ▣ ULTRA-FAST RECOVERY.
- ▣ VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- ▣ HIGH FREQUENCY OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient



in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuits. Packaged in TO220AC and in isolated TO220AC, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	120	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA806D STTA806DI	2.2 3.3	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_{F(AV)} = 8\text{A}$ $\delta = 0.5$ STTA806D $T_C = 118^{\circ}\text{C}$ STTA806DI $T_C = 102^{\circ}\text{C}$	14.5	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA806D $T_C = 115^{\circ}\text{C}$ STTA806DI $T_C = 97^{\circ}\text{C}$	16	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 8\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			1.75 1.5	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 4	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		25	52	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 8\text{A}$ $di_F/dt = -64 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		14	5.5	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 8\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		0.47		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 8 \text{A}$, $di_F/dt = 64 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 8\text{A}$, $di_F/dt = 64 \text{A}/\mu\text{s}$			10	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application. The way of calculating the power losses is given below:

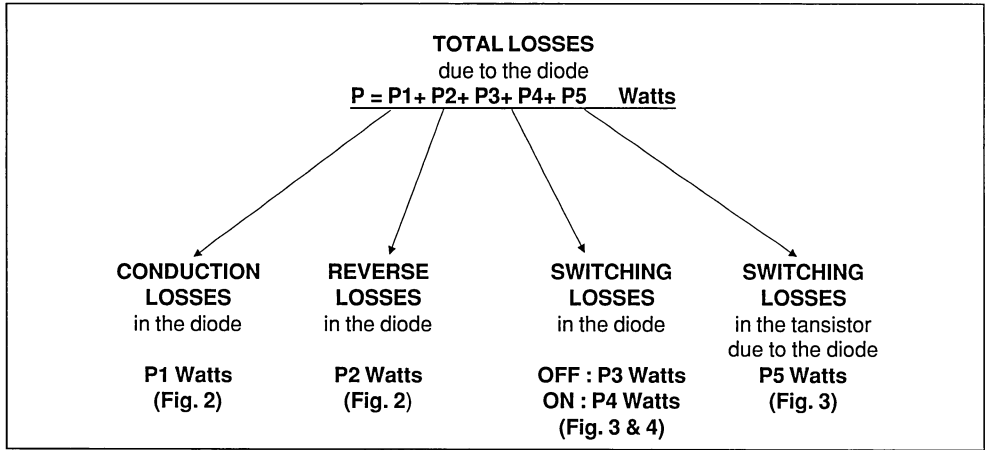
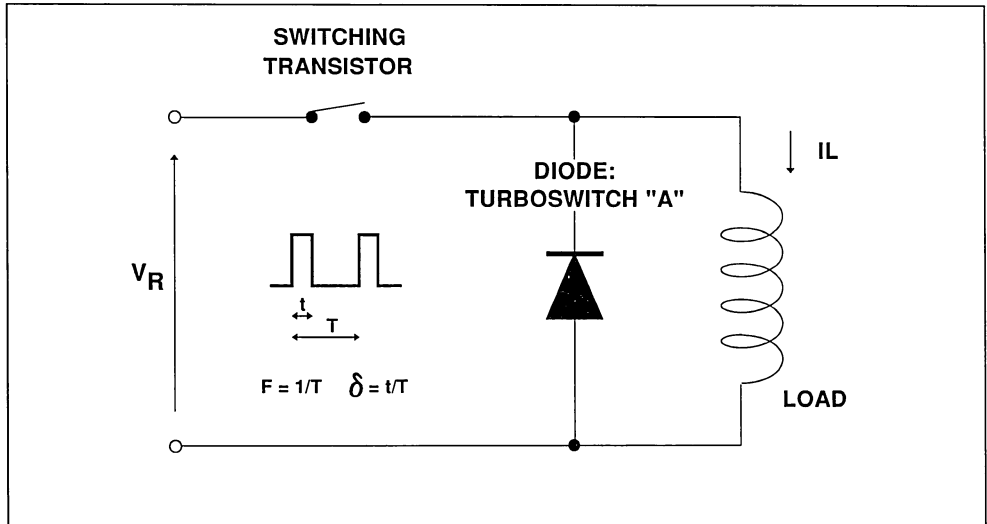
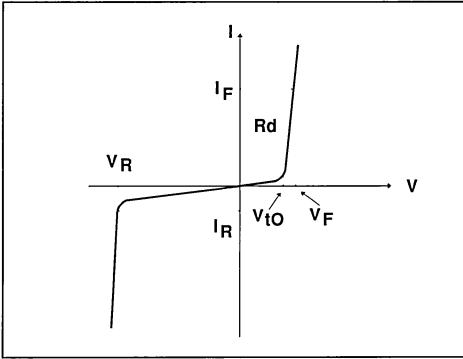


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 V$$

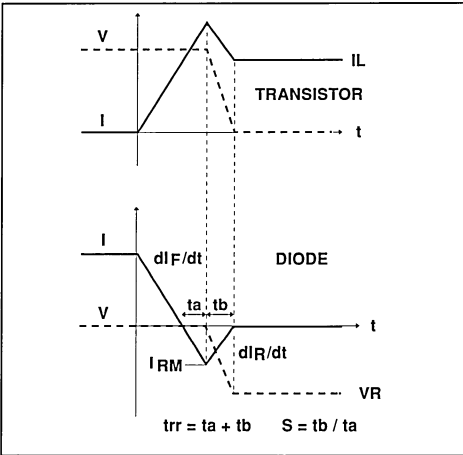
$$R_d = 0.043 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt}$$

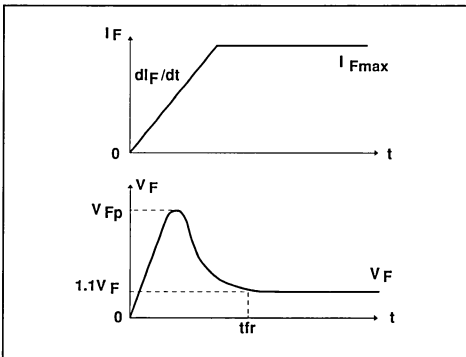
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{rr} \cdot F$$

Fig 5 : Conduction losses versus average current

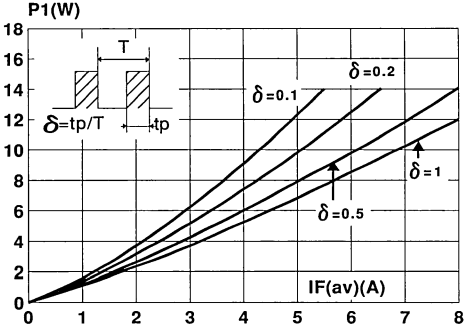


Fig 6 : Switching OFF losses versus dIF/dt

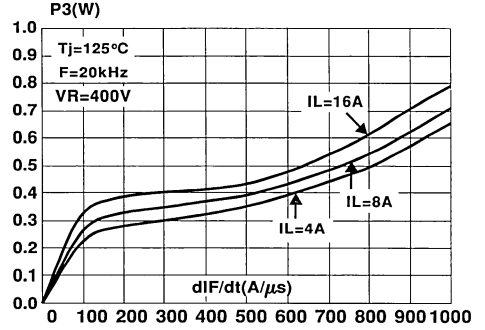


Fig 7 : Switching ON losses versus dIF/dt

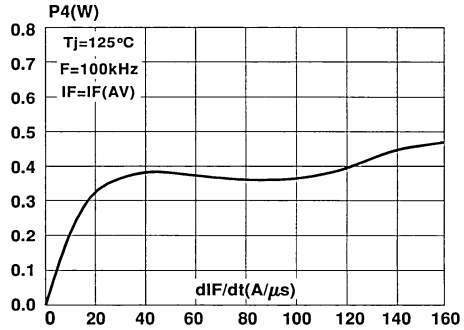


Fig 8 : Switching losses in transistor due to the diode

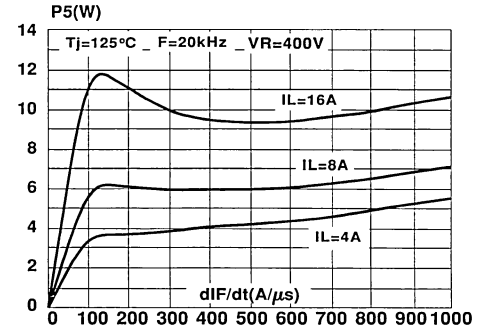


Fig 9 : Forward voltage drop versus forward current

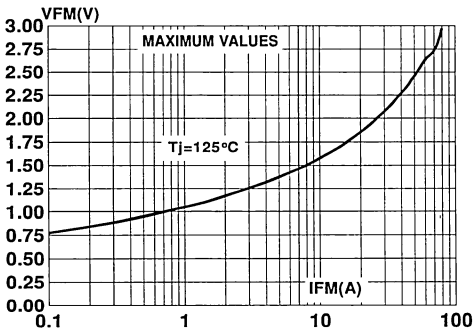


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

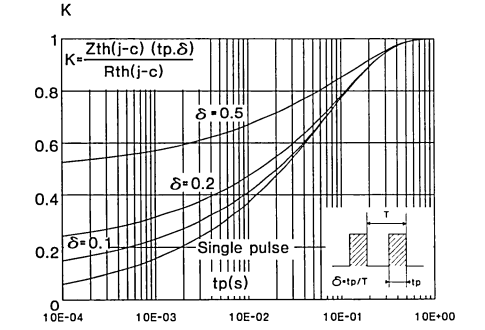


Fig 11 : Peak reverse recovery current versus dI/dt

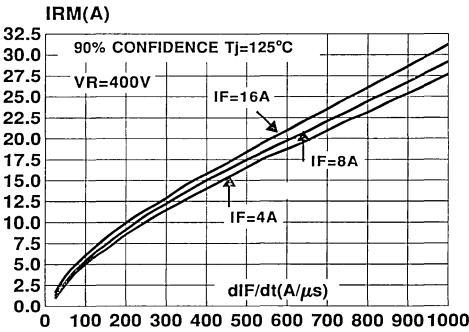


Fig 12 : Reverse recovery time versus dI/dt

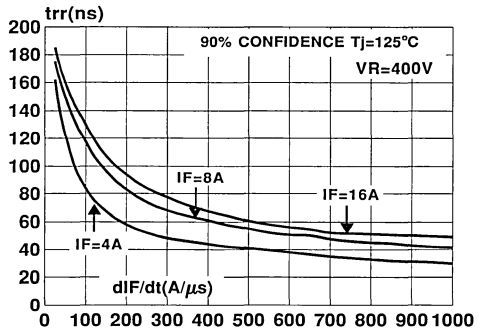


Fig 13 : Softness factor (tb/ta) versus dI/dt

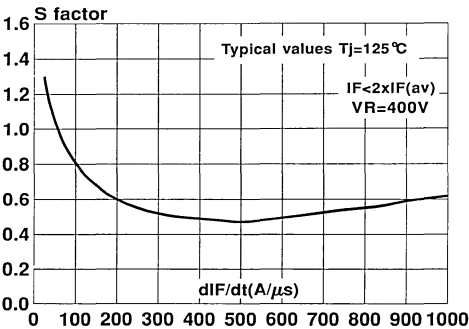


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

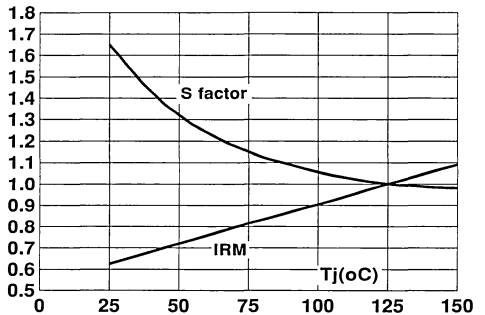


Fig 15 : Transient peak forward voltage versus dI/dt

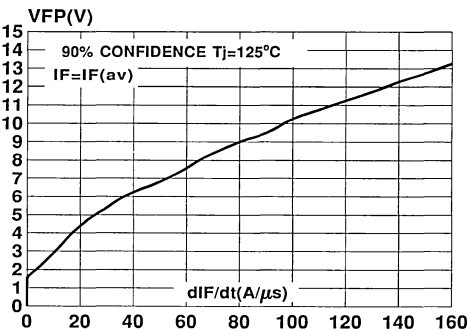
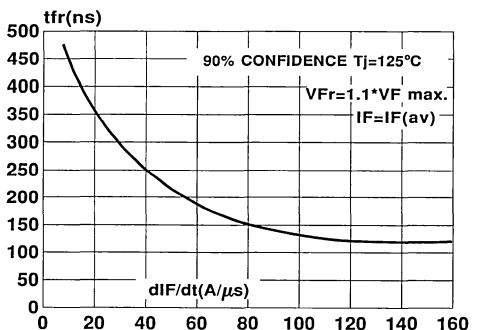


Fig 16 : Forward recovery time versus dI/dt



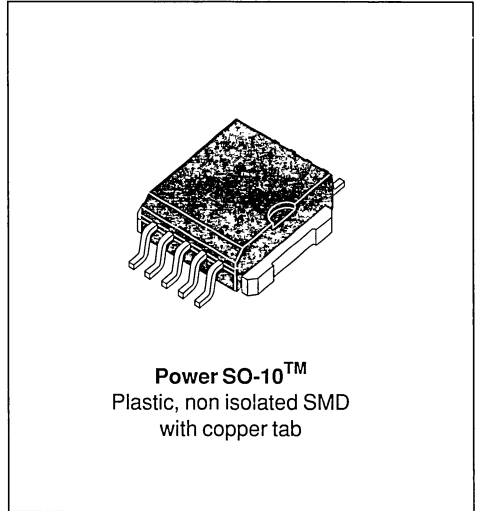
ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	8A
V_{RRM}	600V
t_{rr} (typ)	25ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST AND SOFT RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.
- HIGH DISSIPATION MINIATURE PACKAGE.
- SURFACE MOUNT TECHNOLOGY COMPATIBLE.



DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in motor control freewheel applications and in booster diode applications in Power Factor Control circuitries.

Packaged in a very high performance surface mount package PSO-10, this 600V device is particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	27	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s, f = 5 kHz$)	100	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		2.2	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_F(AV) = 8\text{A}$ $\delta = 0.5$ $T_c = 118^{\circ}\text{C}$	14.5	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 115^{\circ}\text{C}$	16	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 8\text{A}$	$T_j = 25^{\circ}\text{C}$		1.75	V
			$T_j = 125^{\circ}\text{C}$		1.5	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$		100	μA
			$T_j = 125^{\circ}\text{C}$		4	mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle $< 2\%$

** $t_p = 5 \text{ms}$, duty cycle $< 2\%$

DYNAMIC ELECTRICAL CHARACTERISTICS
TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $dI_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		25	52	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 8\text{A}$ $dI_F/dt = -64\text{A}/\mu\text{s}$ $dI_F/dt = -500\text{A}/\mu\text{s}$		14	5.5	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 8\text{A}$ $dI_F/dt = -500\text{A}/\mu\text{s}$		0.47		/

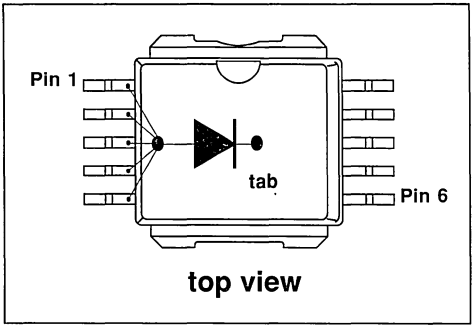
TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 8\text{A}$ $dI_F/dt = 64\text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 8\text{A}$ $dI_F/dt = 64\text{A}/\mu\text{s}$			10	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab

**APPLICATION DATA**

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below:

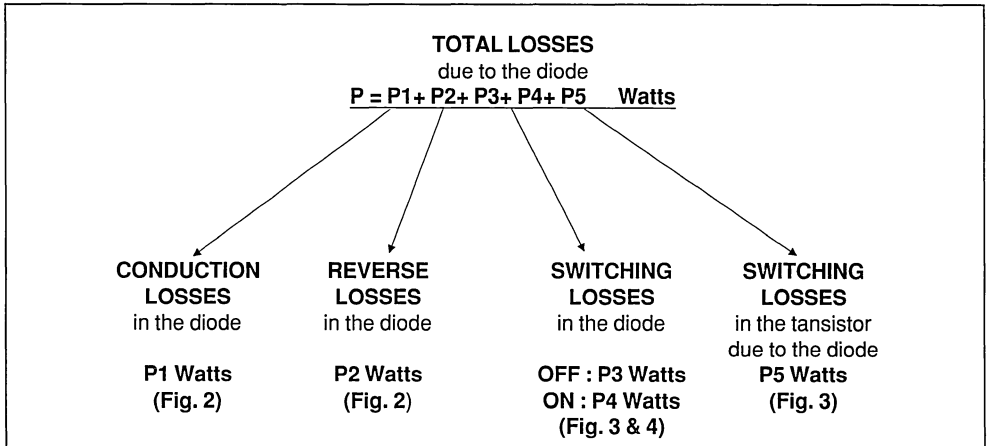
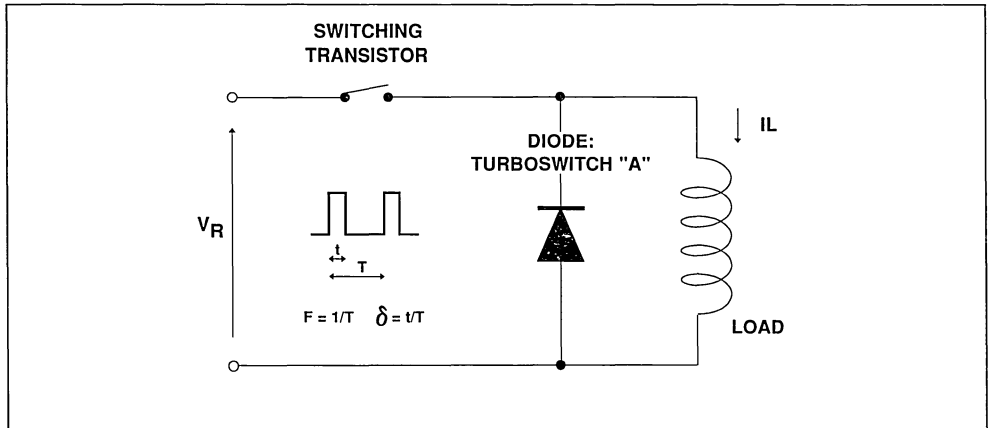
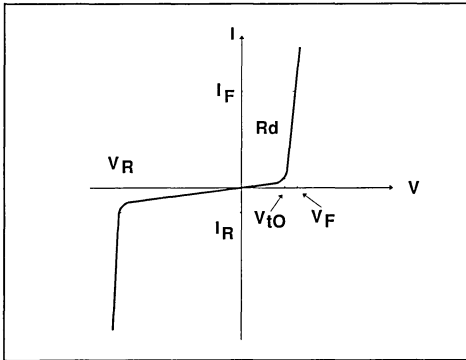


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 \text{ V}$$

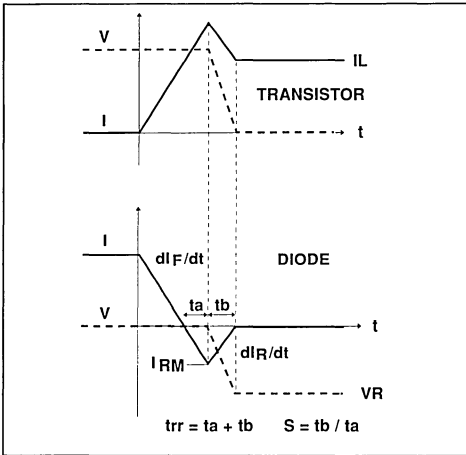
$$R_d = 0.043 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

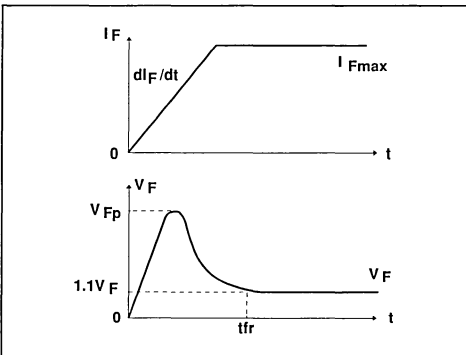
$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 5 : Conduction losses versus average current

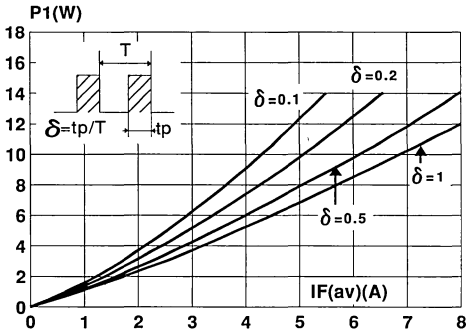


Fig 6 : Switching OFF losses versus dIF/dt

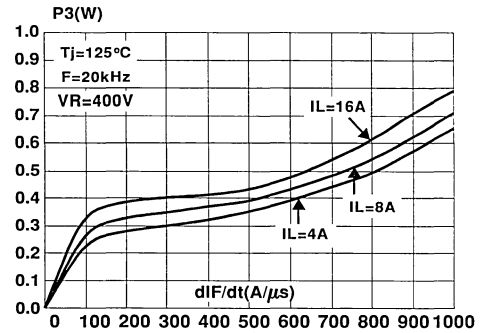


Fig 7 : Switching ON losses versus dIF/dt

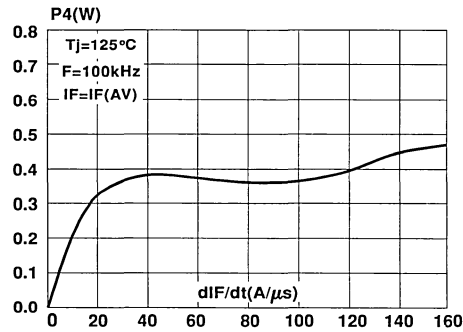


Fig 8 : Switching losses in transistor due to the diode

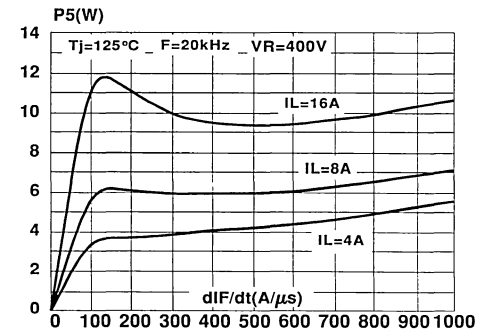


Fig 9 : Forward voltage drop versus forward current

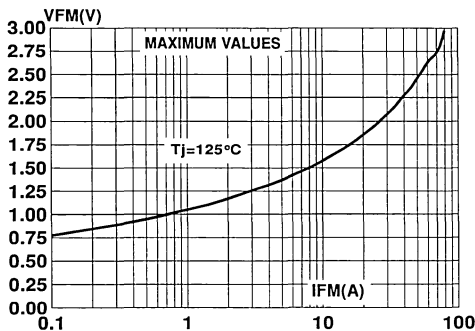


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

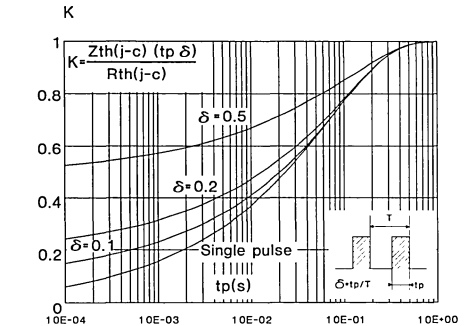


Fig 11 : Peak reverse recovery current versus dI_F/dt

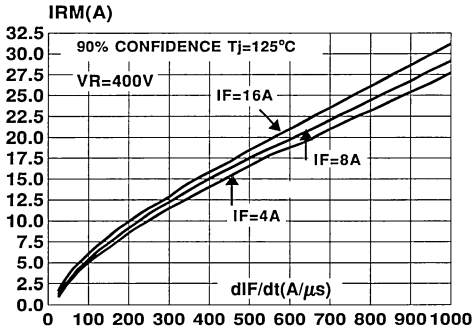


Fig 12 : Reverse recovery time versus dI_F/dt

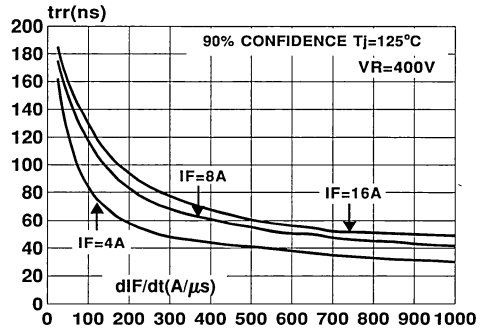


Fig 13 : Softness factor (tb/ta) versus dI_F/dt

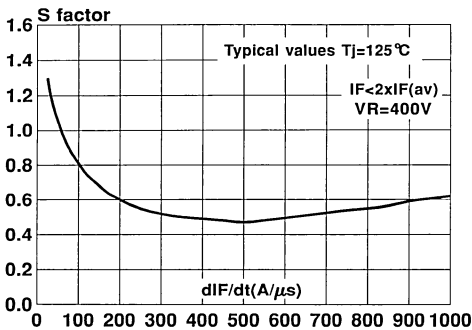


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

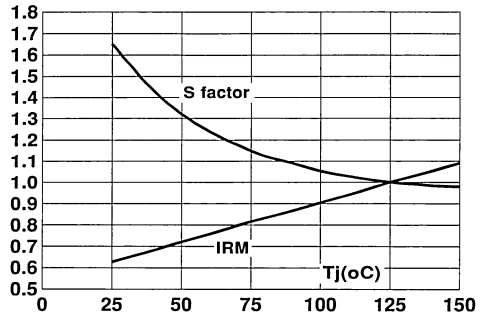


Fig 15 : Transient peak forward voltage versus dI_F/dt

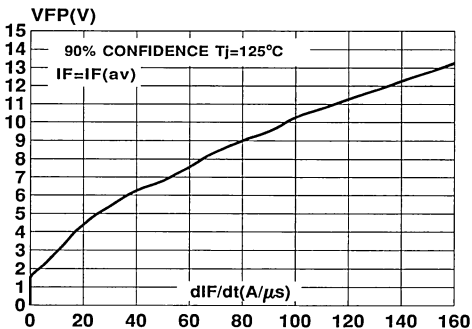
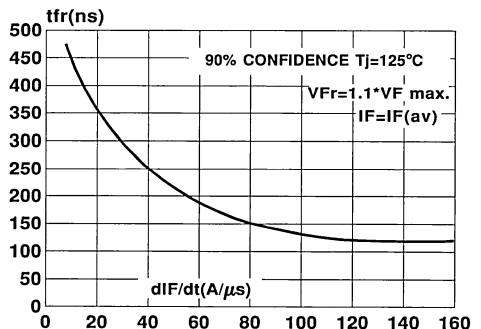


Fig 16 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ “B”. ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	8A
V_{RRM}	600V
t_{rr} (typ)	50ns
V_F (max)	1.3V

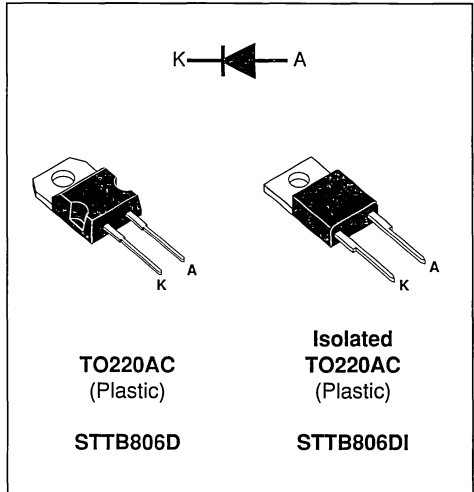
PRELIMINARY DATA

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in TO220AC and in isolated TO220AC, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	280	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTB806D STTB806DI	2.2 3.3	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 5)	$I_{F(AV)} = 8\text{ A}$ $\delta = 0.5$ STTB806D $T_C = 122^{\circ}\text{C}$ STTB806DI $T_C = 108^{\circ}\text{C}$	12.5	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTB806D $T_C = 115^{\circ}\text{C}$ STTB806DI $T_C = 97^{\circ}\text{C}$	16	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 8\text{ A}$	$T_J = 25^{\circ}\text{C}$ $T_J = 125^{\circ}\text{C}$			1.4 1.3	V V
I_R	Reverse leakage current	$V_R = 0.8 \times V_{RRM}$	$T_J = 25^{\circ}\text{C}$ $T_J = 125^{\circ}\text{C}$			100 1.5	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_J = 25^{\circ}\text{C}$ $I_F = 0.5 \text{ A}$ $I_R = 1 \text{ A}$ $I_{rr} = 0.25\text{ A}$ $I_F = 1 \text{ A}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$		50	100	ns
I_{RM}	Maximum reverse recovery current	$T_J = 125^{\circ}\text{C}$ $V_R = 400\text{ V}$ $I_F = 8\text{ A}$ $di_F/dt = -64 \text{ A}/\mu\text{s}$ $di_F/dt = -500 \text{ A}/\mu\text{s}$		25	12	A
S factor	Softness factor	$T_J = 125^{\circ}\text{C}$ $V_R = 400\text{ V}$ $I_F = 8\text{ A}$ $di_F/dt = -500 \text{ A}/\mu\text{s}$		0.8		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_J = 25^{\circ}\text{C}$ $I_F = 8 \text{ A}$, $di_F/dt = 64 \text{ A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_J = 25^{\circ}\text{C}$ $I_F = 8\text{ A}$, $di_F/dt = 64 \text{ A}/\mu\text{s}$ $I_F = 40\text{ A}$, $di_F/dt = 500 \text{ A}/\mu\text{s}$		10	8	V

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

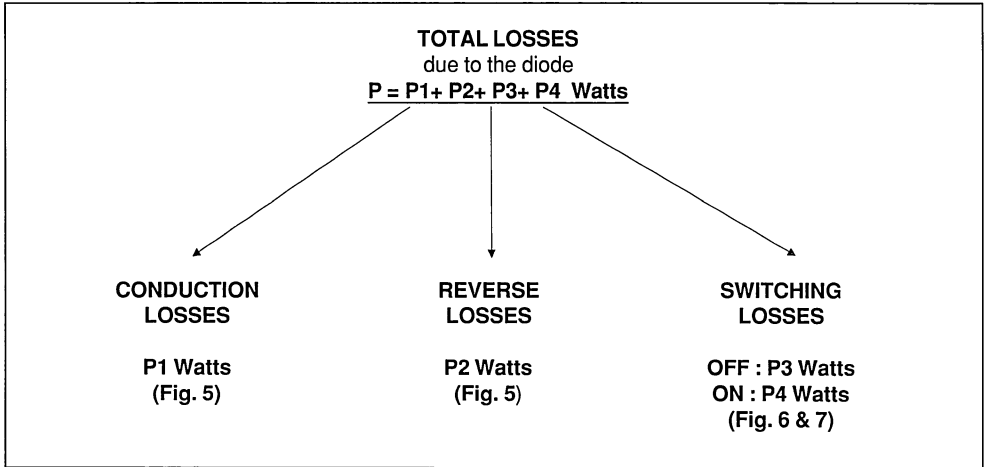


Fig. 1 : SNUBBER DIODE.

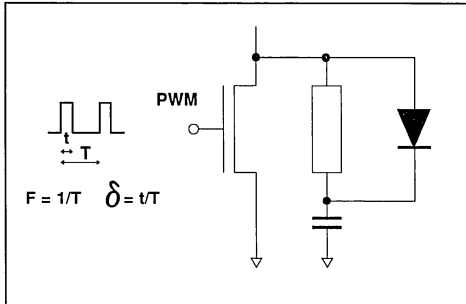


Fig. 2 : CLAMPING DIODE.

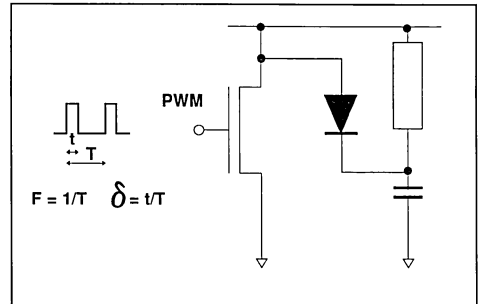


Fig. 3 : DEMAGNETIZING DIODE.

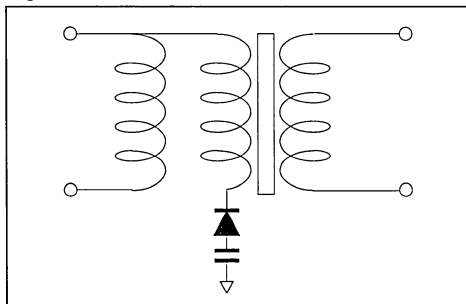
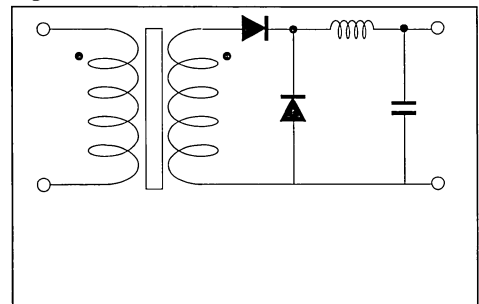
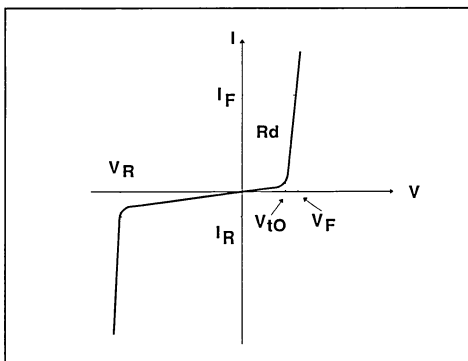


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

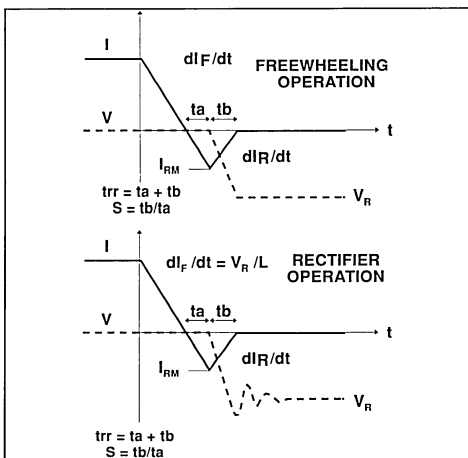
$$R_d = 0.037 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times di_F/dt}$$

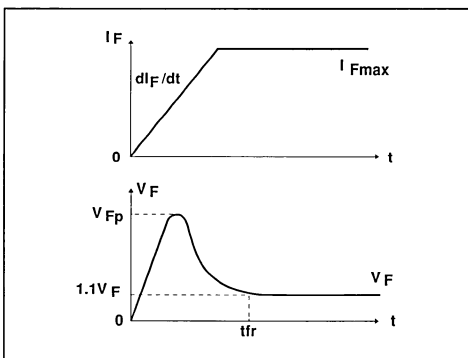
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times di_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 8 : Conduction losses versus average current

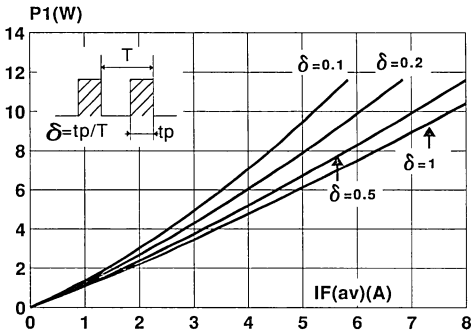


Fig 9 : Switching OFF losses versus dIF/dt

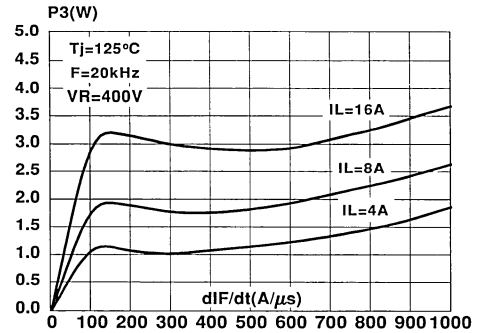


Fig 10 : Switching ON losses versus dIF/dt

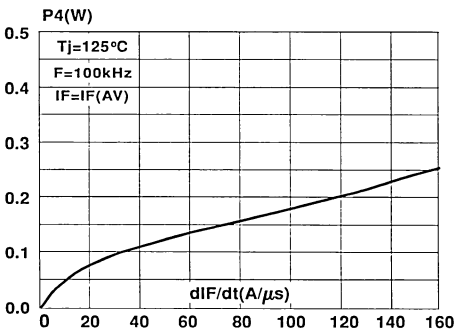


Fig 11 : Forward voltage drop versus forward current

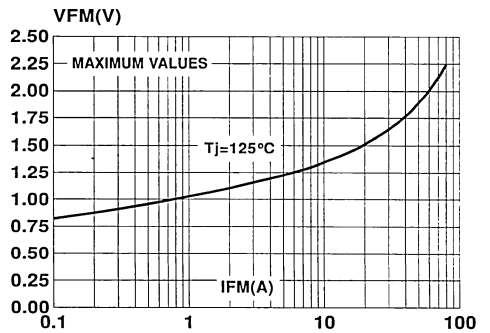


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

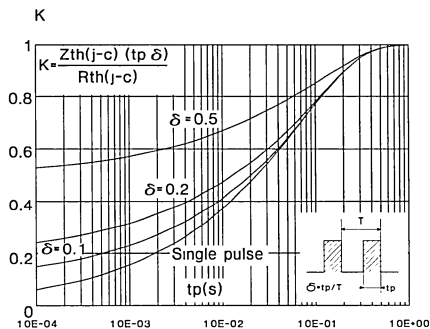


Fig 13 : Peak reverse recovery current versus di_F/dt

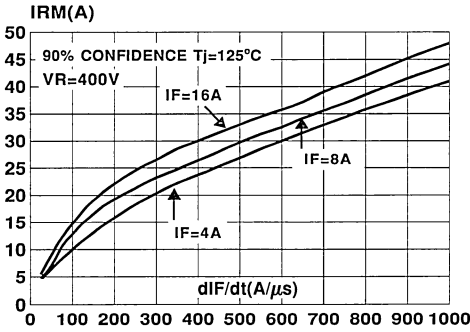


Fig 15 : Softness factor (tb/ta) versus di_F/dt

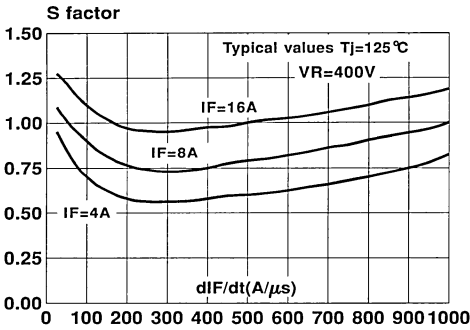


Fig 17 : Transient peak forward voltage versus di_F/dt

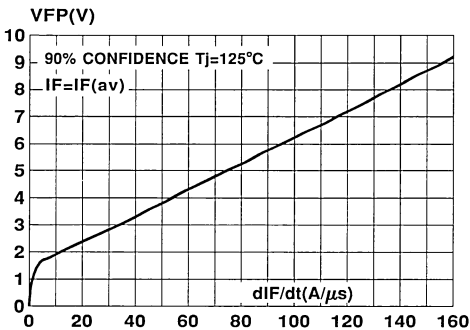


Fig 14 : Reverse recovery time versus di_F/dt

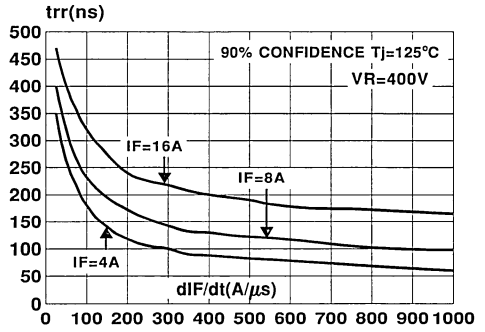


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

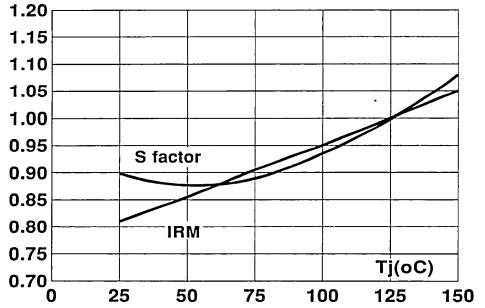
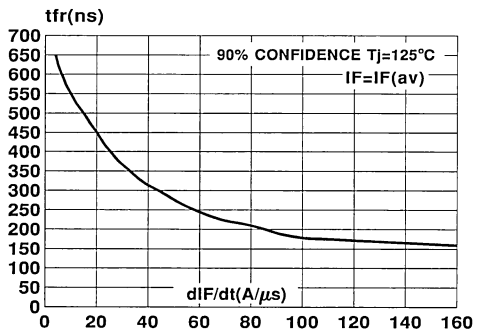


Fig 18 : Forward recovery time versus di_F/dt



ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

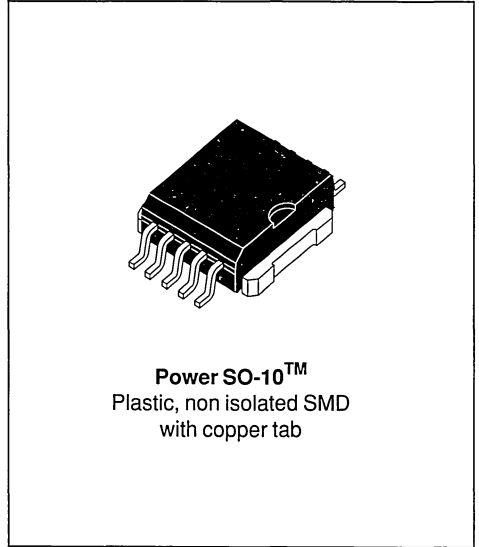
$I_{F(AV)}$	8A
V_{RRM}	600V
t_{rr} (typ)	50ns
V_F (max)	1.3V

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, VERY SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.
- HIGH FREQUENCY OPERATIONS
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in PSO-10, this 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	27	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	230	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		2.2	$^{\circ}C/W$
P_1	Conduction power dissipation (see fig. 5)	$I_F(AV) = 8A$ $\delta = 0.5$ $T_c = 122^{\circ}C$	12.5	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 115^{\circ}C$	16	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 8A$	$T_j = 25^{\circ}C$		1.4	V
			$T_j = 125^{\circ}C$		1.3	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}C$		100	μA
			$T_j = 125^{\circ}C$		1.5	mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $dI_F/dt = -50A/\mu s$ $V_R = 30V$		50	100	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}C$ $V_R = 400V$ $I_F = 8A$ $dI_F/dt = -64 A/\mu s$ $dI_F/dt = -500 A/\mu s$		25	12	A
S factor	Softness factor	$T_j = 125^{\circ}C$ $V_R = 400V$ $I_F = 8A$ $dI_F/dt = -500 A/\mu s$		0.8		/

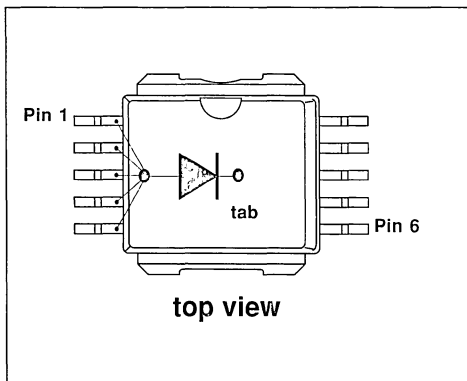
TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}C$ $I_F = 8A$, $dI_F/dt = 64 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}C$ $I_F = 8A$, $dI_F/dt = 64 A/\mu s$			8	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

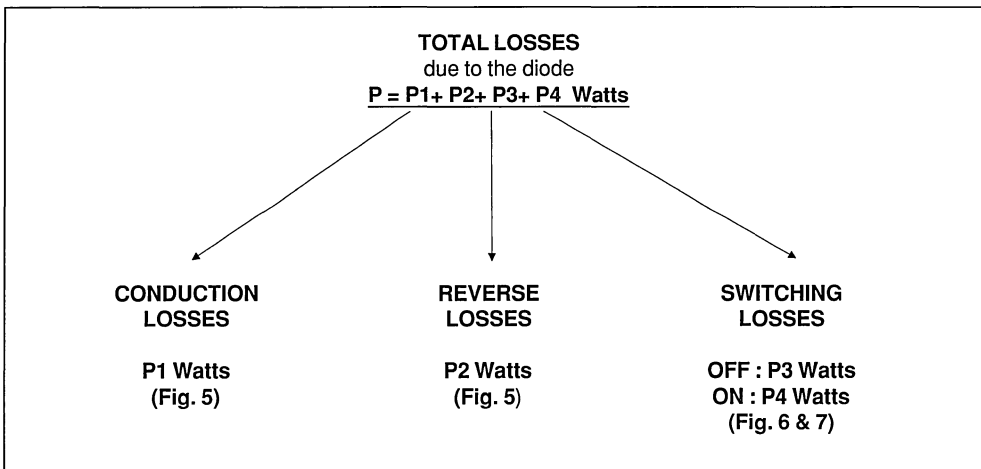


Fig. 1 : SNUBBER DIODE.

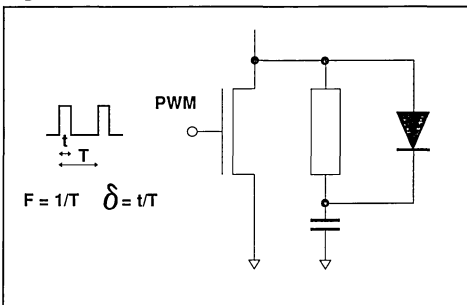


Fig. 2 : CLAMPING DIODE.

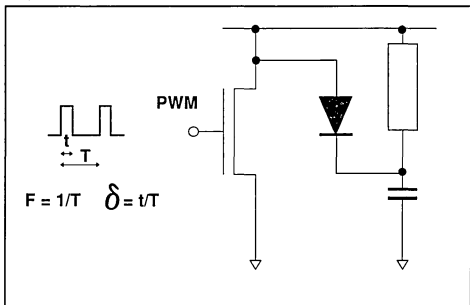


Fig. 3 : DEMAGNETIZING DIODE.

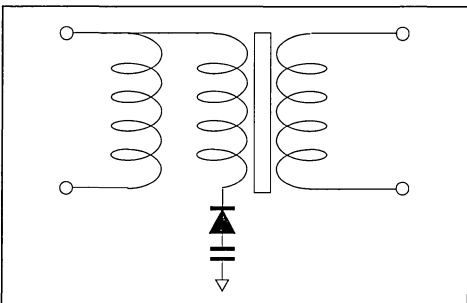
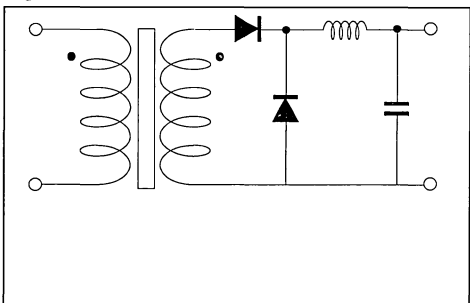
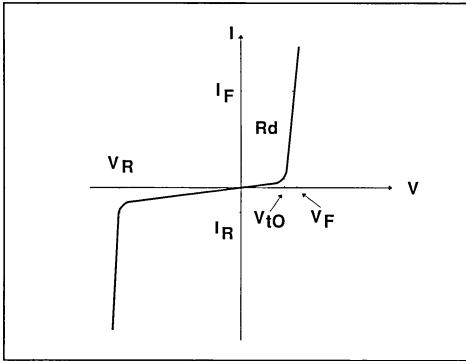


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{I0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{I0} = 1.00 \text{ V}$$

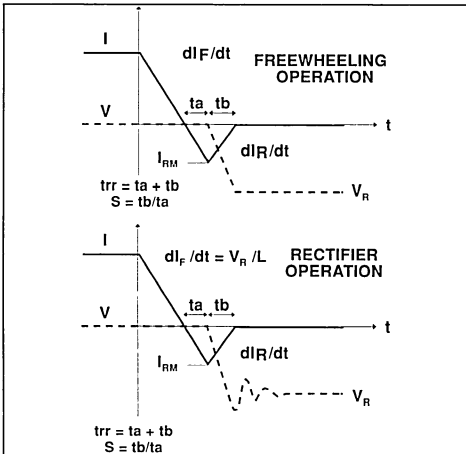
$$R_d = 0.037 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

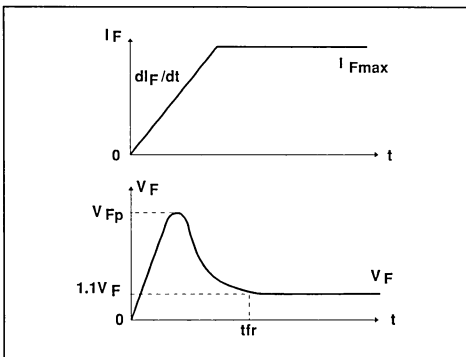
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr}$$

Fig 8 : Conduction losses versus average current

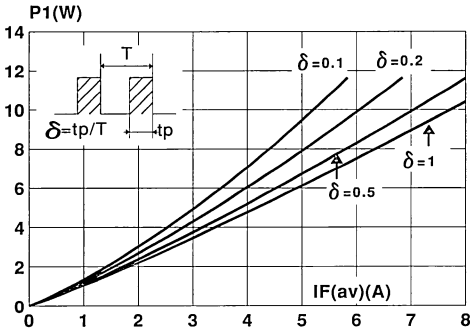


Fig 9 : Switching OFF losses versus dI/dt

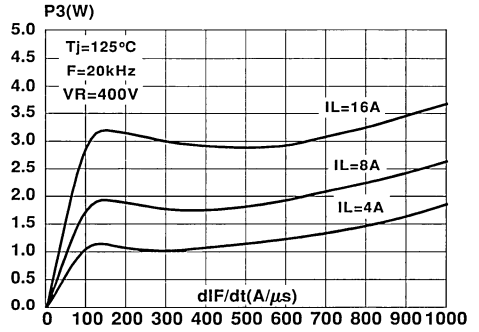


Fig 10 : Switching ON losses versus dI/dt

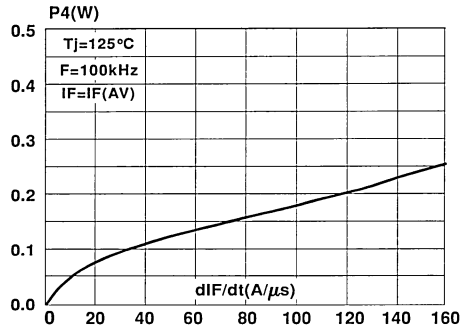


Fig 11 : Forward voltage drop versus forward current

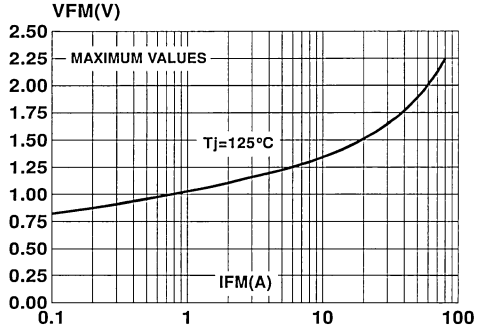


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

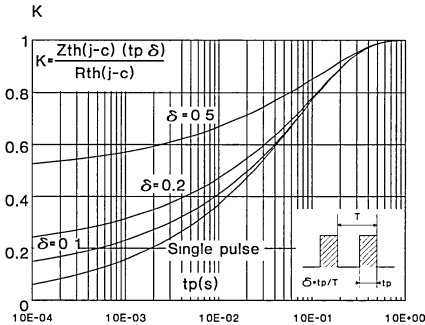


Fig 13 : Peak reverse recovery current versus dI_F/dt

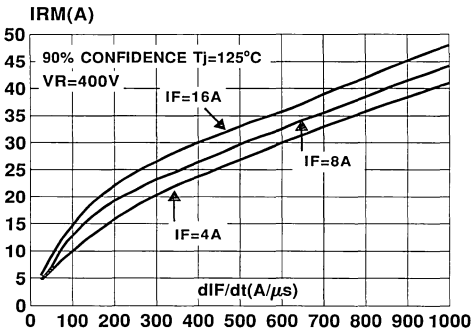


Fig 14 : Reverse recovery time versus dI_F/dt

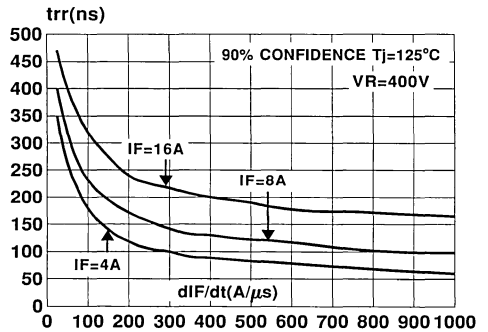


Fig 15 : Softness factor (tb/ta) versus dI_F/dt

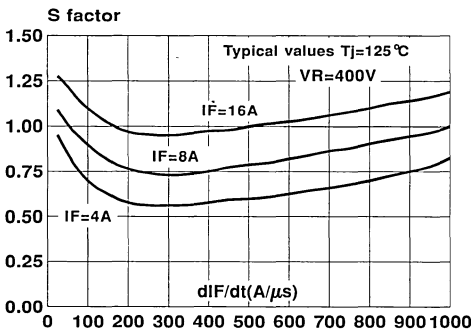


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

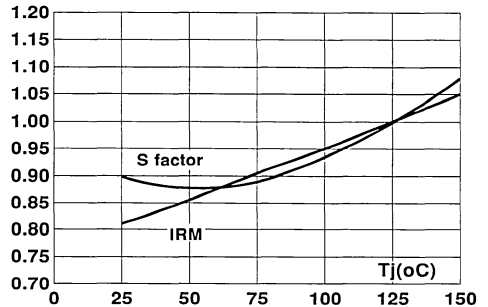


Fig 17 : Transient peak forward voltage versus dI_F/dt

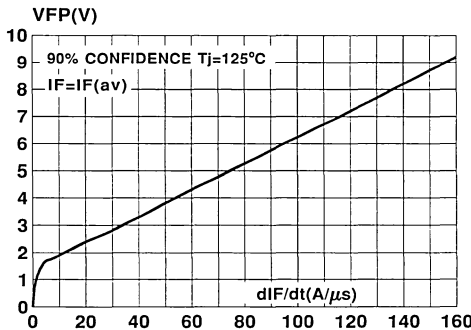
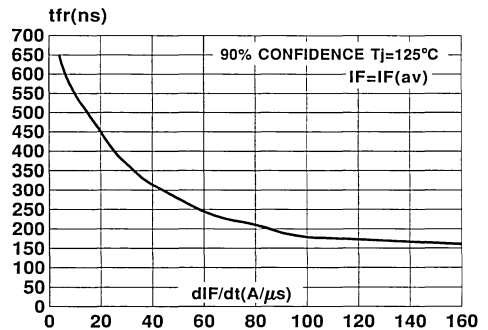
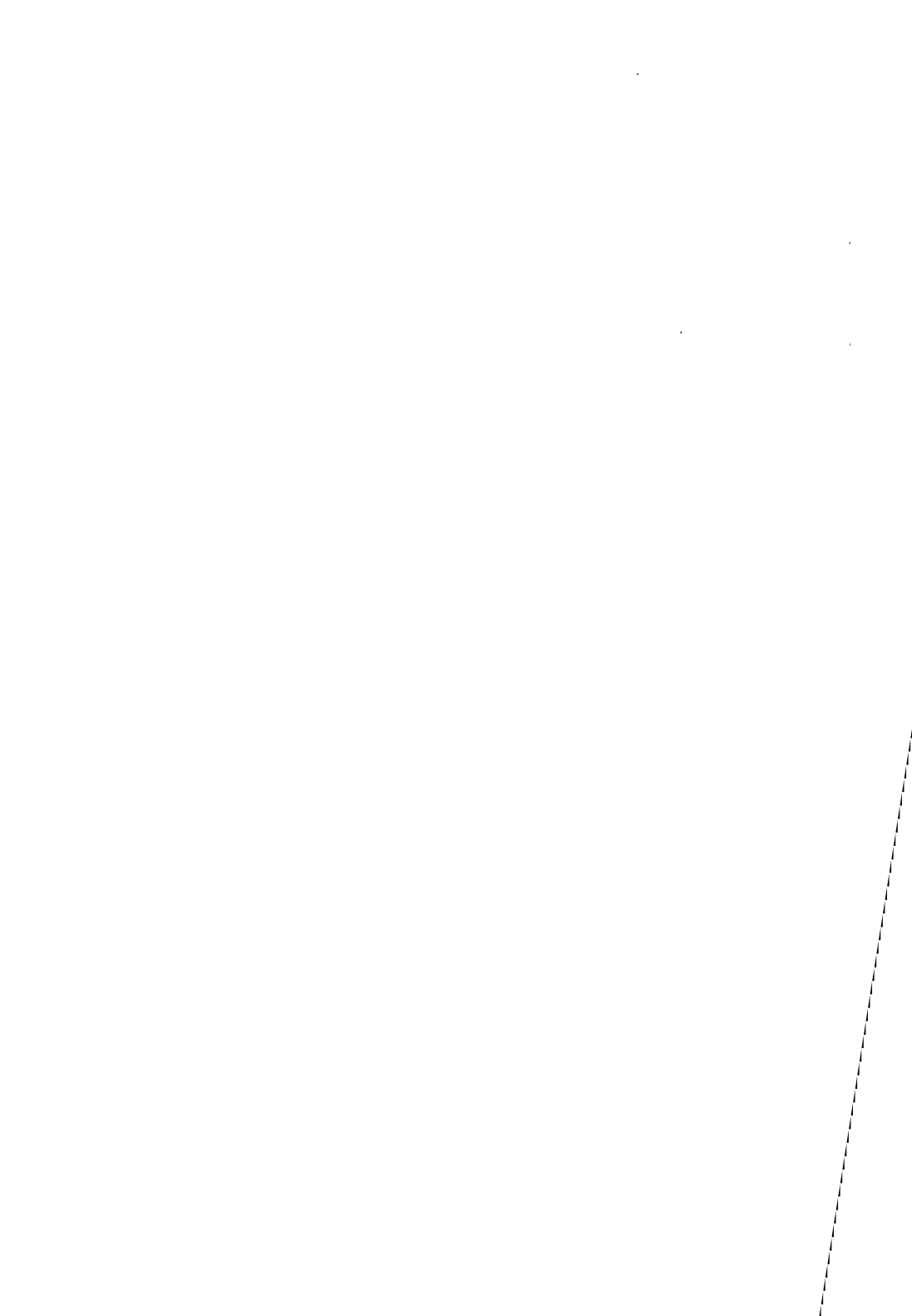


Fig 18 : Forward recovery time versus dI_F/dt





TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	8A
V_{RRM}	1200V
t_{rr} (typ)	50ns
V_F (max)	2.0V

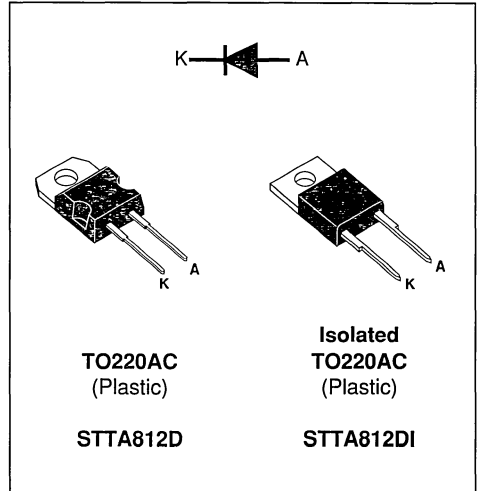
FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in TO220AC and in isolated TO220AC, these 1200V devices are particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	120	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA812D	2.3	°C/W
		STTA812DI	3.3	
P_1	Conduction power dissipation (see fig. 6)	$I_{F(AV)} = 8A$ $\delta = 0.5$ STTA812D $T_c = 105^\circ C$ STTA812DI $T_c = 85^\circ C$	19.5	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA812D $T_c = 100^\circ C$ STTA812DI $T_c = 79^\circ C$	21.5	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 8A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			2.2 2.0	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			100 4	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1 A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		50	100	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 8A$ $di_F/dt = -64 A/\mu s$ $di_F/dt = -500 A/\mu s$		25	12	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 8A$ $di_F/dt = -500 A/\mu s$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 8 A$, $di_F/dt = 64 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			900	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 8A$, $di_F/dt = 64 A/\mu s$ $I_F = 40A$, $di_F/dt = 500 A/\mu s$			35 45	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below

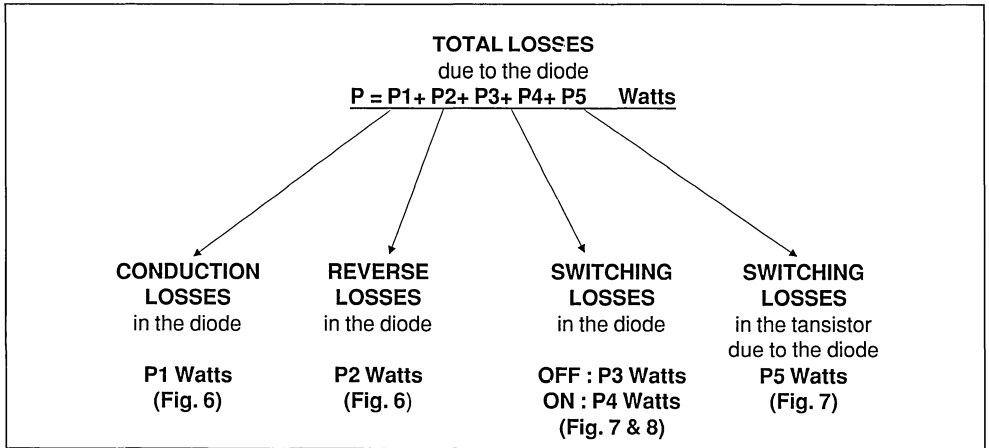


Fig. 1 : "FREEWHEEL" MODE.

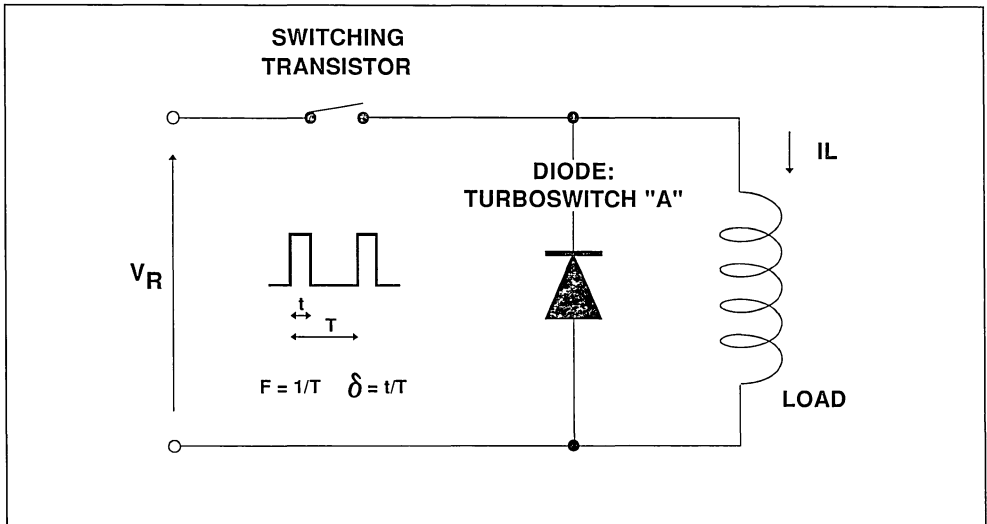


Fig. 2 : SNUBBER DIODE.

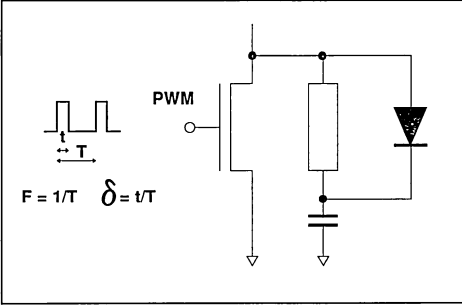


Fig. 3 : CLAMPING DIODE.

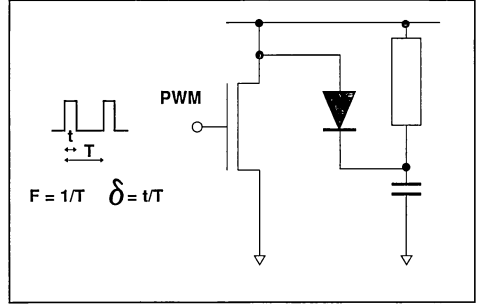


Fig. 4 : DEMAGNETIZING DIODE.

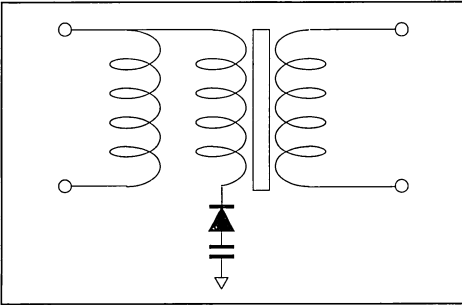
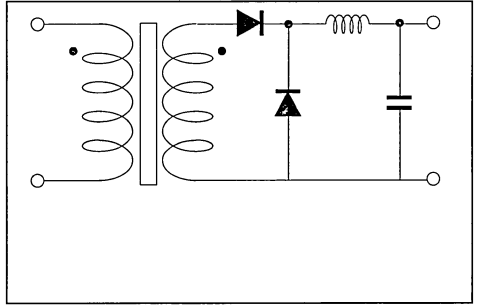
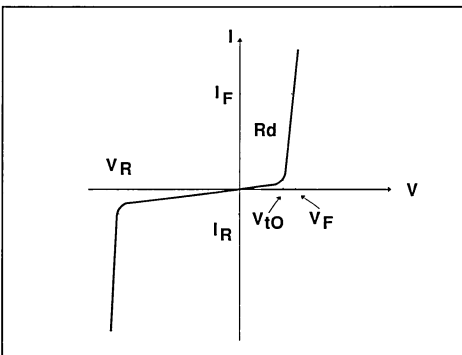


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.57 \text{ V}$$

$$R_d = 0.054 \text{ Ohm}$$

(Max values at 125°C, suitable for $I_{peak} < 3 \cdot I_F(av)$)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS

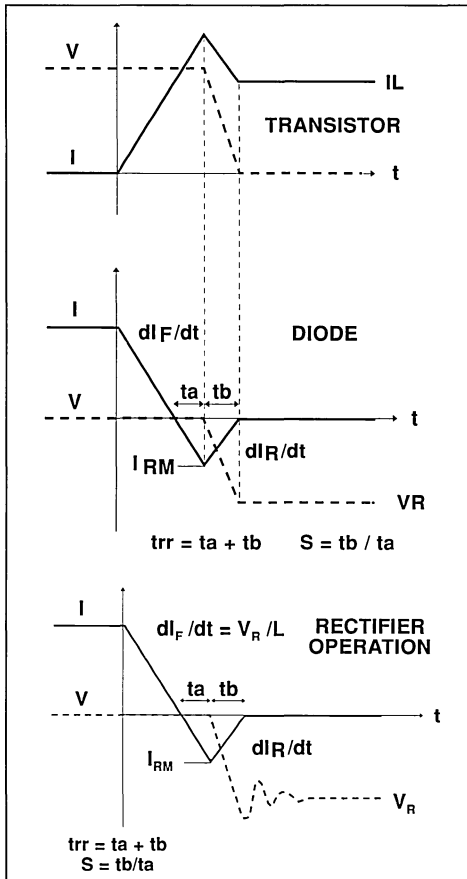
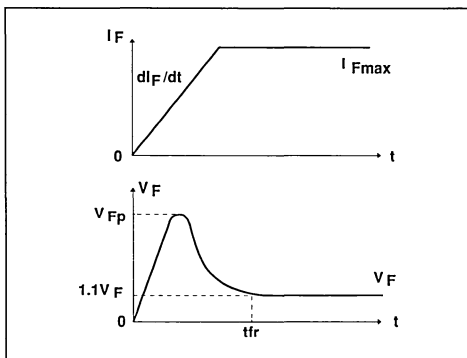


Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3, P3' and P5 are suitable for power MOSFET and IGBT

Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

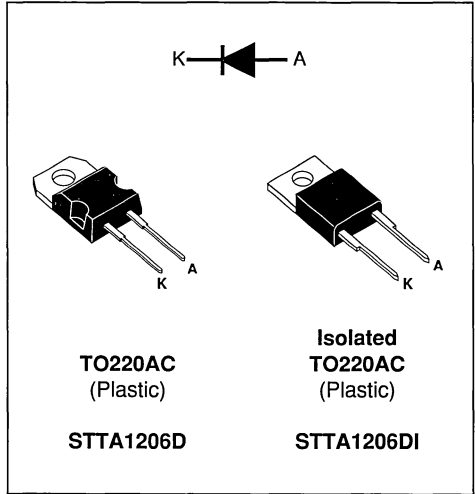
TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	12A
V_{RRM}	600V
t_{rr} (typ)	28ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.



DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries.

Packaged in TO220AC and in isolated TO220AC, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
V_{RSM}	Non repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	RMS forward current	STTA1206D STTA1206DI	30 20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s, f = 5 kHz$)	STTA1206D STTA1206DI	140 120	A
T_j	Max operating junction temperature		-65 to 150	°C
T_{stg}	Storage temperature		-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA1206D STTA1206DI	1.9 3.0	°C/W
P_1	Conduction power dissipation (see fig. 2)	$I_{F(AV)} = 12A$ $\delta = 0.5$ STTA1206D $T_c = 108^\circ C$ STTA1206DI $T_c = 84^\circ C$	22	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA1206D $T_c = 104^\circ C$ STTA1206DI $T_c = 78^\circ C$	24	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 12A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			1.75 1.5	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			100 5	μA mA

Test pulses widths * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		28	55	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 12A$ $di_F/dt = -96 A/\mu s$ $di_F/dt = -500 A/\mu s$		16	7.5	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 12A$ $di_F/dt = -500 A/\mu s$		0.45		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 12 A$, $di_F/dt = 96 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 12A$, $di_F/dt = 96 A/\mu s$			10	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below:

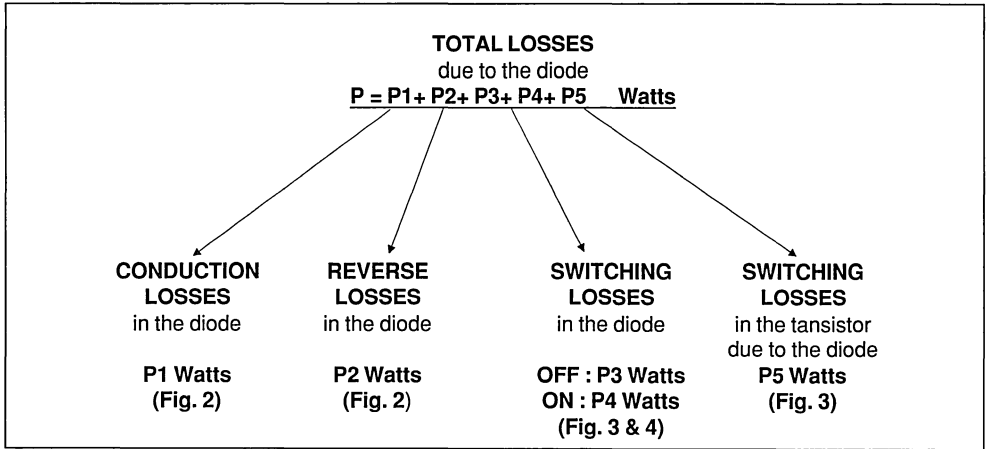
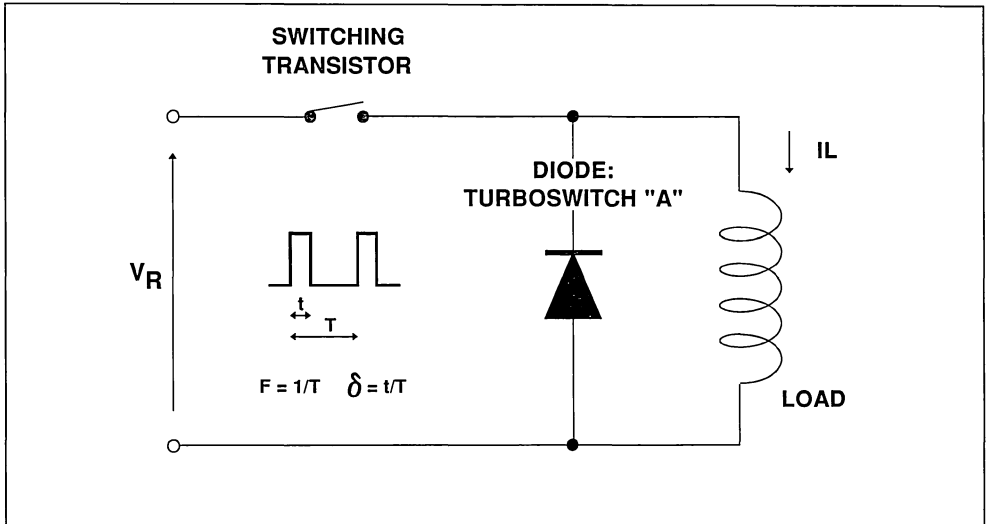
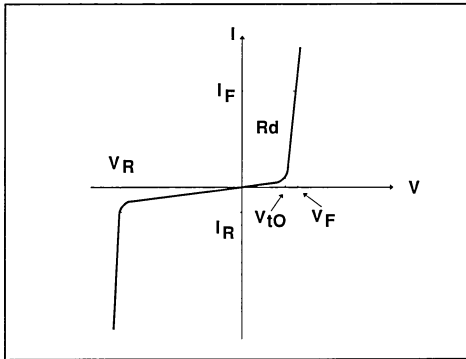


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 \text{ V}$$

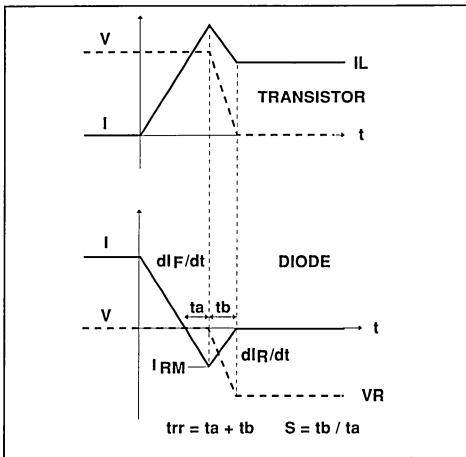
$$R_d = 0.029 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt}$$

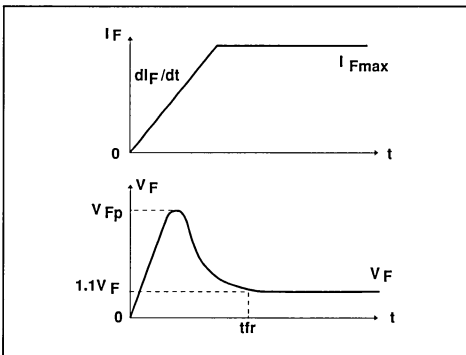
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 5 : Conduction losses versus average current

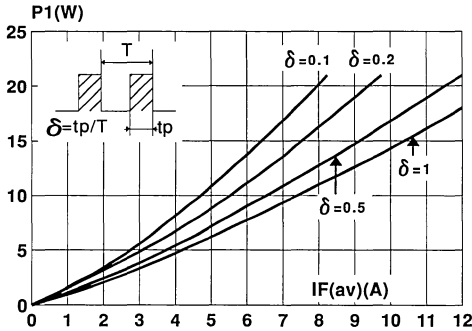


Fig 6 : Switching OFF losses versus dI/dt

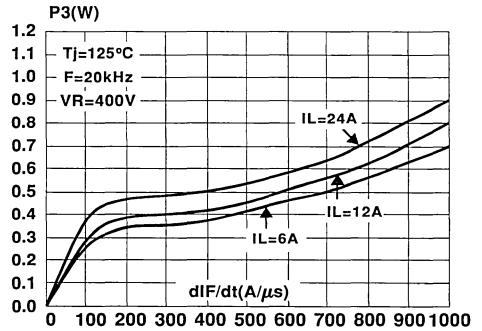


Fig 7 : Switching ON losses versus dI/dt

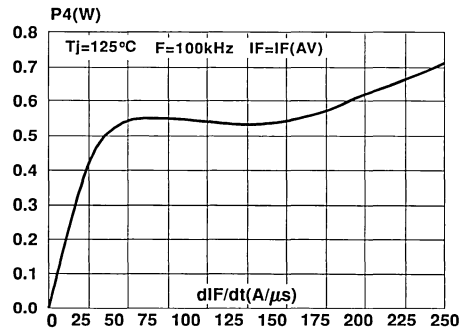


Fig 8 : Switching losses in transistor due to the diode

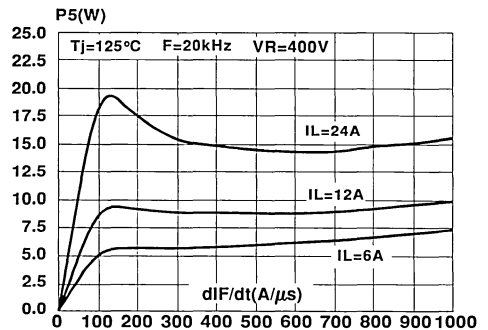


Fig 9 : Forward voltage drop versus forward current

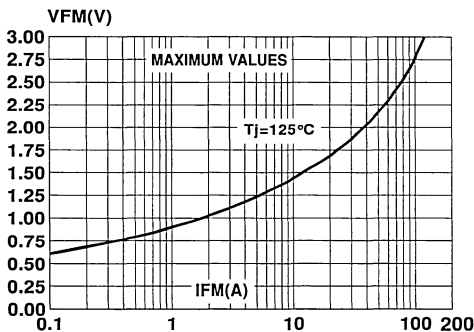


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

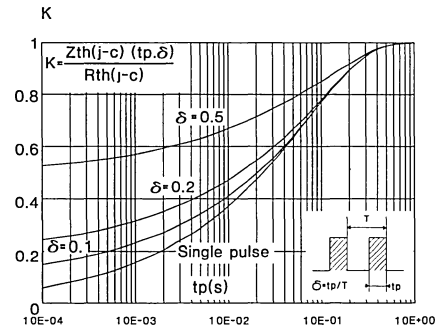


Fig 11 : Peak reverse recovery current versus dI/dt

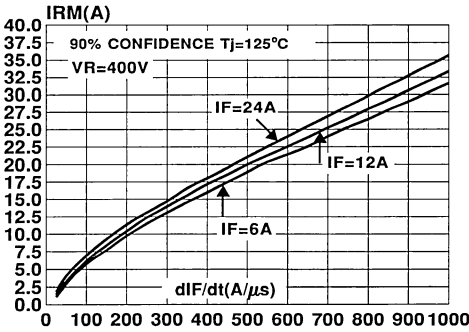


Fig 12 : Reverse recovery time versus dI/dt

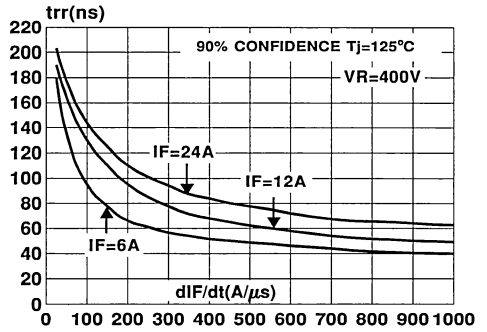


Fig 13 : Softness factor (tb/ta) versus dI/dt

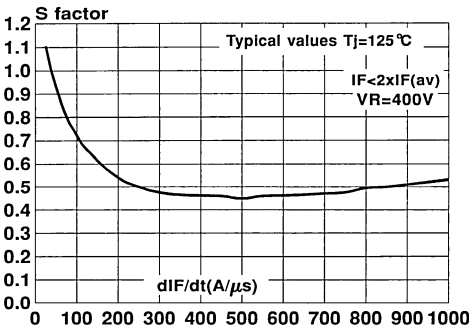


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

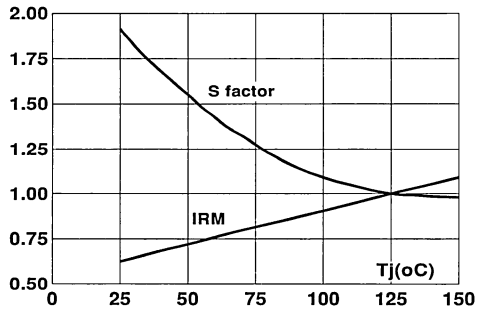


Fig 15 : Transient peak forward voltage versus dI/dt

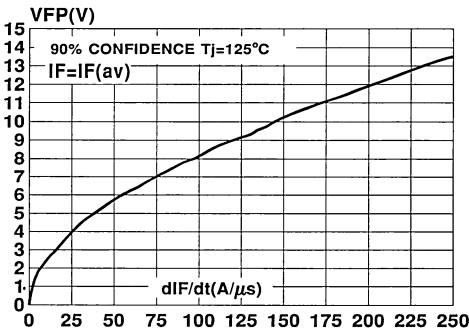
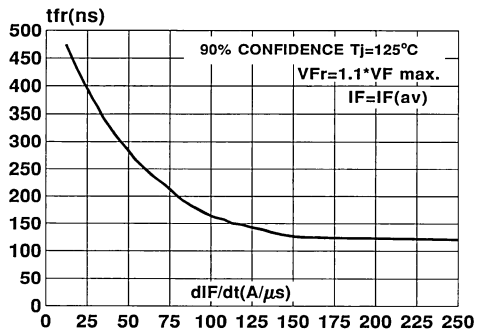


Fig 16 : Forward recovery time versus dI/dt



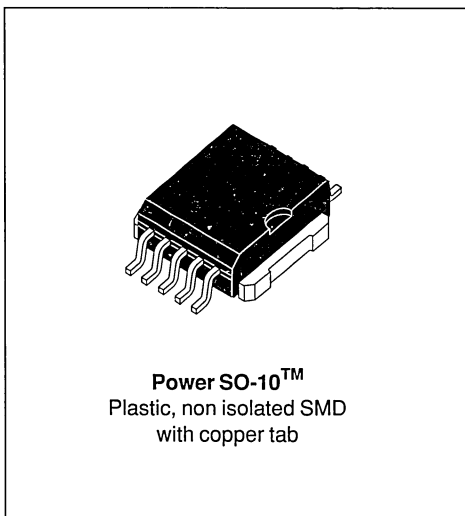
ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	12A
V_{RRM}	600V
t_{rr} (typ)	28ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST AND SOFT RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.
- HIGH DISSIPATION MINIATURE PACKAGE.
- SURFACE MOUNT TECHNOLOGY COMPATIBLE.



DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in motor control freewheel applications and in booster diode applications in Power Factor Control circuitries.

Packaged in a very high performance surface mount package PSO-10, this 600V device is particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	27	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	100	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		1.9	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_F(AV) = 12\text{A}$ $\delta = 0.5$ $T_c = 108^{\circ}\text{C}$	22	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 104^{\circ}\text{C}$	24	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 12\text{A}$	$T_j = 25^{\circ}\text{C}$		1.75	V
			$T_j = 125^{\circ}\text{C}$		1.5	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$		100	μA
			$T_j = 125^{\circ}\text{C}$		5	mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS
TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $dI_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		28	55	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 12\text{A}$ $dI_F/dt = -96 \text{A}/\mu\text{s}$ $dI_F/dt = -500 \text{A}/\mu\text{s}$		16	7.5	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 12\text{A}$ $dI_F/dt = -500 \text{A}/\mu\text{s}$		0.45		/

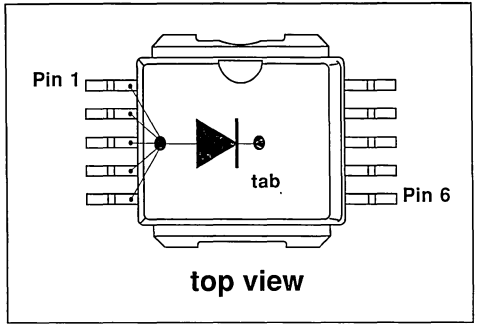
TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 12\text{A}$ $dI_F/dt = 96 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 12\text{A}$ $dI_F/dt = 96 \text{A}/\mu\text{s}$			10	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application. The way of calculating the power losses is given below:

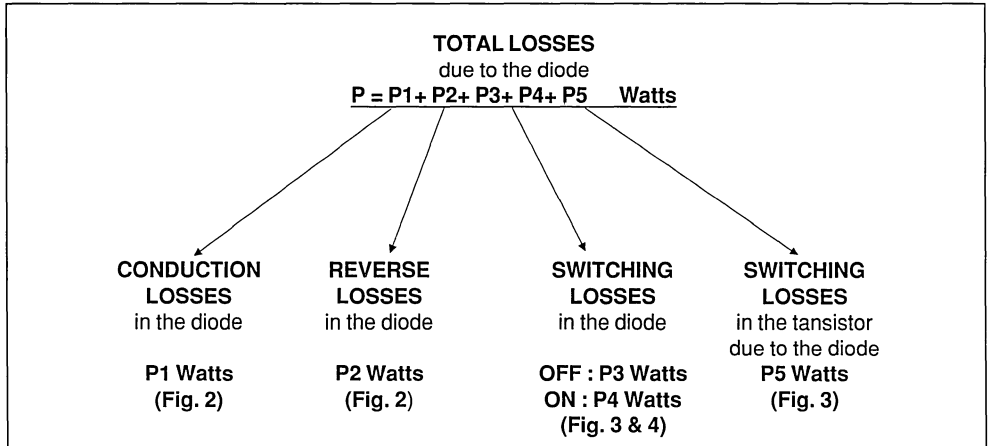
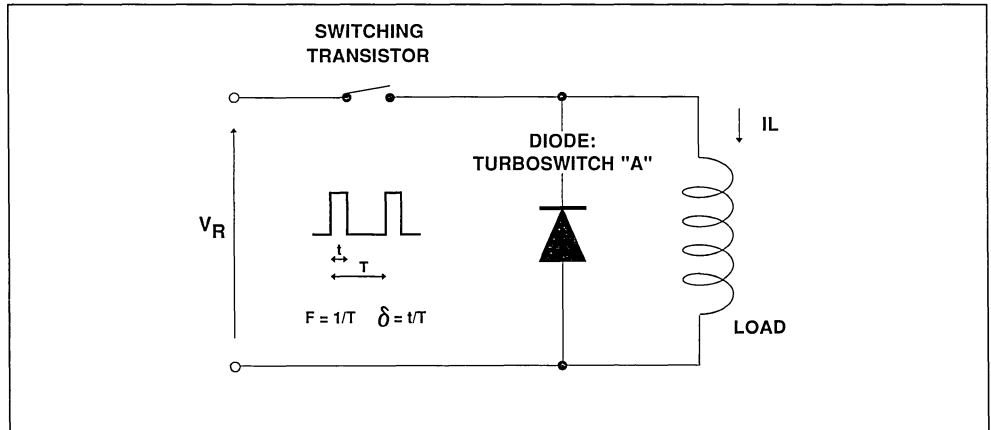
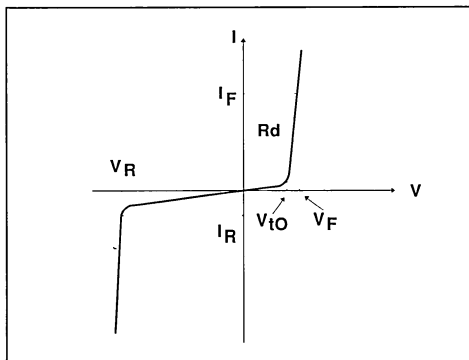


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 \text{ V}$$

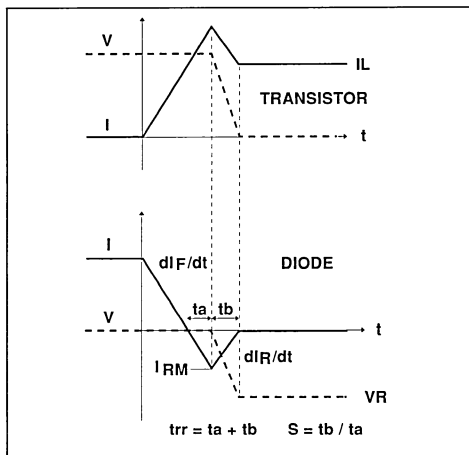
$$R_d = 0.029 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt}$$

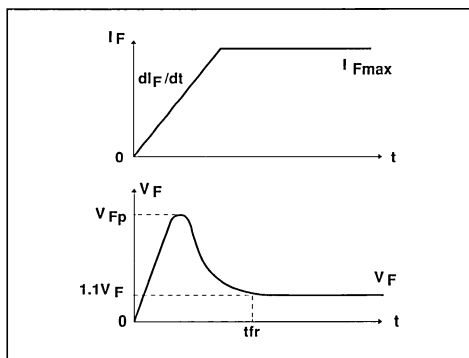
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 5 : Conduction losses versus average current

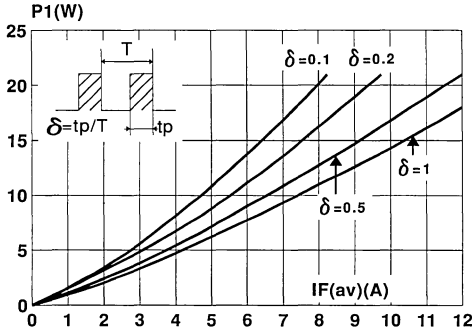


Fig 6 : Switching OFF losses versus dIF/dt

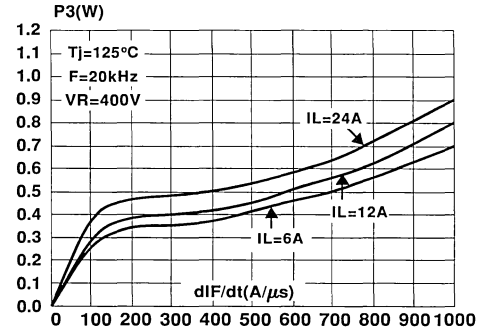


Fig 7 : Switching ON losses versus dIF/dt

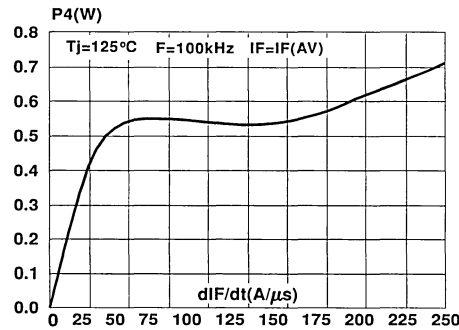


Fig 8 : Switching losses in transistor due to the diode

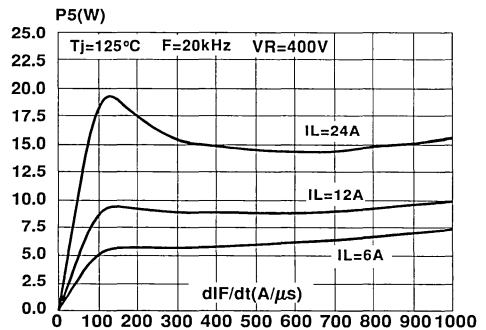


Fig 9 : Forward voltage drop versus forward current

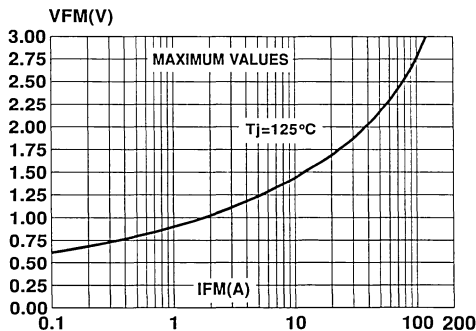


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

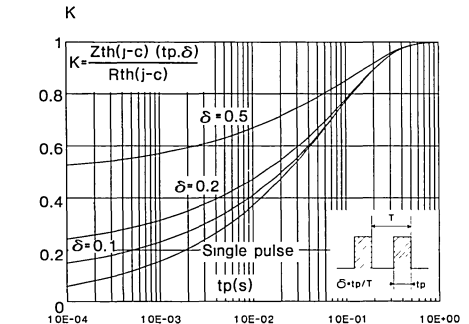


Fig 11 : Peak reverse recovery current versus di/dt

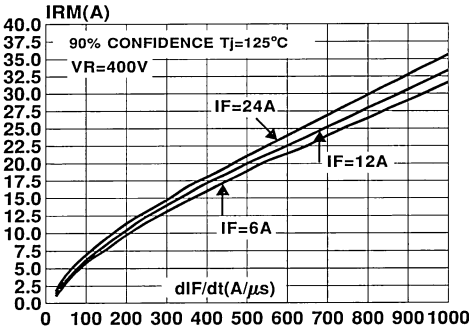


Fig 12 : Reverse recovery time versus di/dt

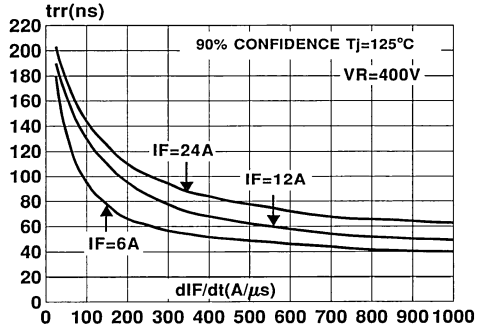


Fig 13 : Softness factor (t_b/t_a) versus di/dt

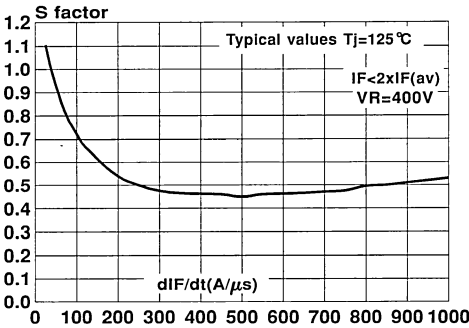


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

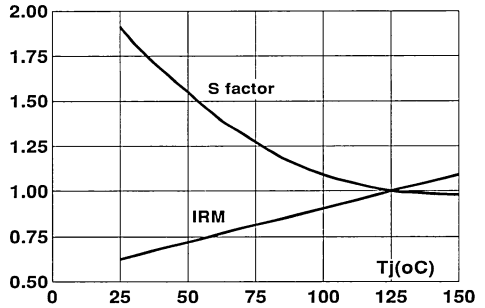


Fig 15 : Transient peak forward voltage versus di/dt

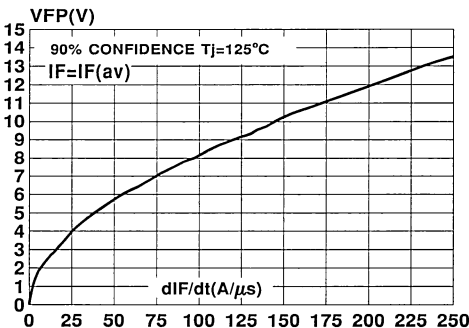
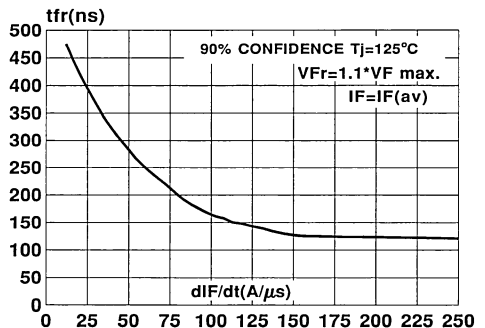


Fig 16 : Forward recovery time versus di/dt



TURBOSWITCH™ "B". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

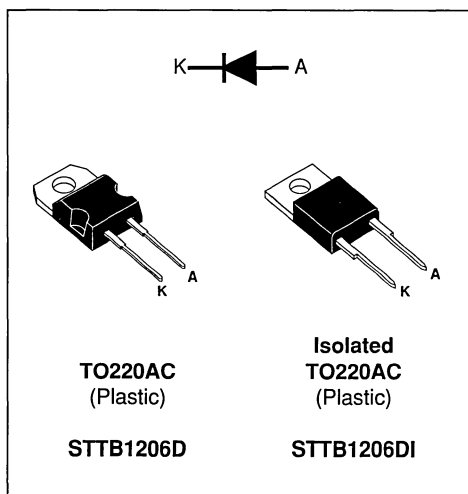
$I_{F(AV)}$	12A
V_{RRM}	600V
t_{rr} (typ)	50ns
V_F (max)	1.3V

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in TO220AC and in isolated TO220AC, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
V_{RSM}	Non repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	RMS forward current	STTB1206D STTB1206DI	30 20	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s, f = 1 kHz$)	STTB1206D STTB1206DI	420 280	A
T_j	Max operating junction temperature		-65 to 150	°C
T_{stg}	Storage temperature		-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

STTB1206D(I)

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTB1206D STTB1206DI	1.9 3.0	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 5)	$I_{F(AV)} = 12\text{A}$ $\delta = 0.5$ STTB1206D $T_c = 114^{\circ}\text{C}$ STTB1206DI $T_c = 93^{\circ}\text{C}$	19	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTB1206D $T_c = 104^{\circ}\text{C}$ STTB1206DI $T_c = 78^{\circ}\text{C}$	24	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 12\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			1.4 1.3	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 2	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $dI_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		50	100	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 12\text{A}$ $dI_F/dt = -96 \text{A}/\mu\text{s}$ $dI_F/dt = -500 \text{A}/\mu\text{s}$		30	18	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 12\text{A}$ $dI_F/dt = -500 \text{A}/\mu\text{s}$		0.9		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 12 \text{A}$, $dI_F/dt = 96 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 12\text{A}$, $dI_F/dt = 96 \text{A}/\mu\text{s}$ $I_F = 60\text{A}$, $dI_F/dt = 500 \text{A}/\mu\text{s}$		10	8	V

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

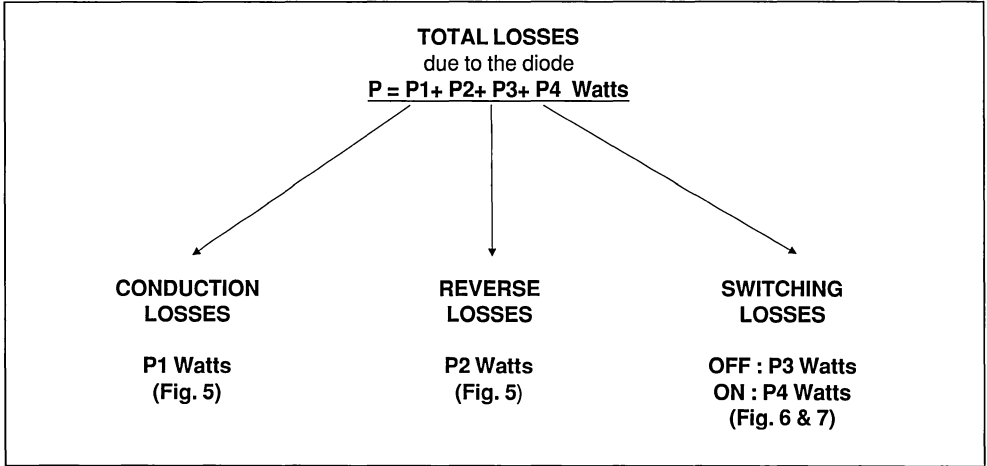


Fig. 1 : SNUBBER DIODE.

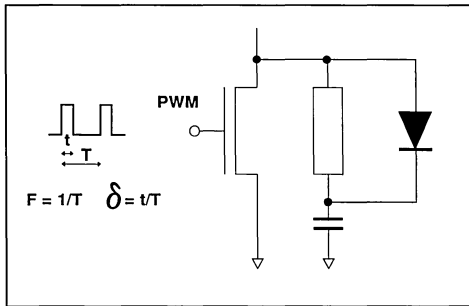


Fig. 2 : CLAMPING DIODE.

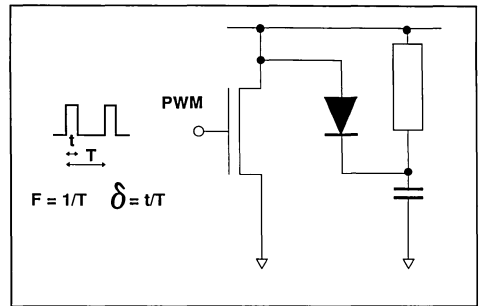


Fig. 3 : DEMAGNETIZING DIODE.

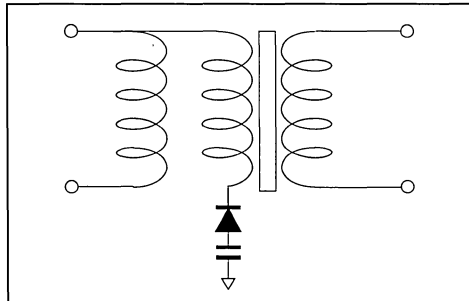
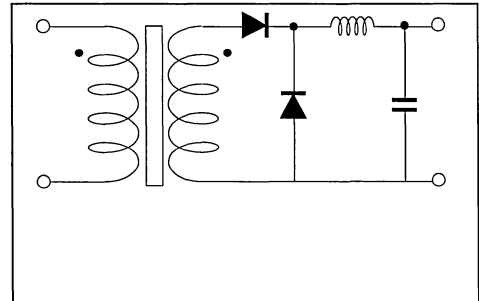
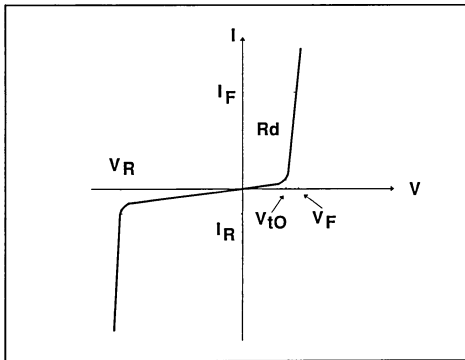


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

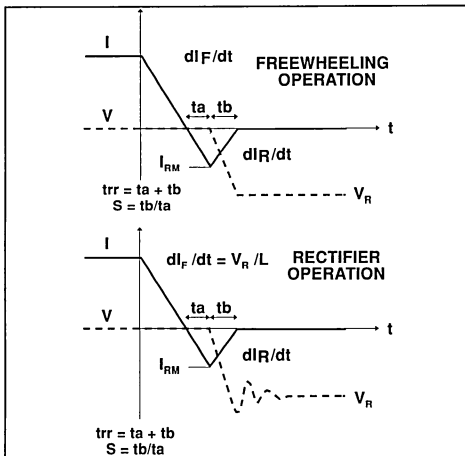
$$R_d = 0.025 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times df/dt}$$

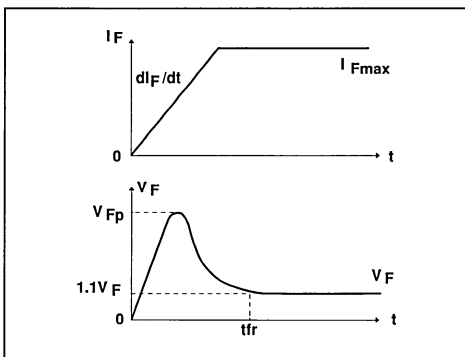
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times df/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 8 : Conduction losses versus average current

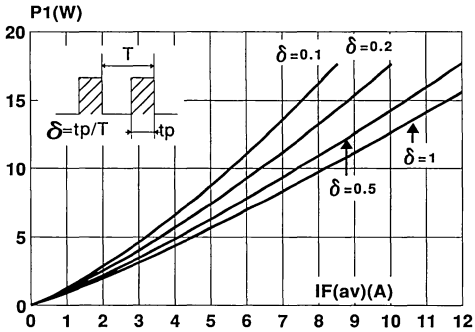


Fig 9 : Switching OFF losses versus dIF/dt

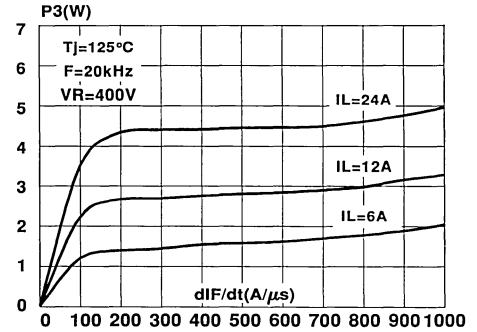


Fig 10 : Switching ON losses versus dIF/dt

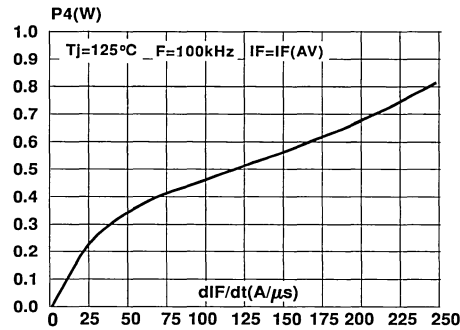


Fig 11 : Forward voltage drop versus forward current

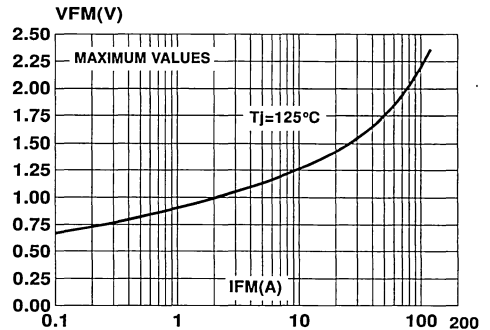


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

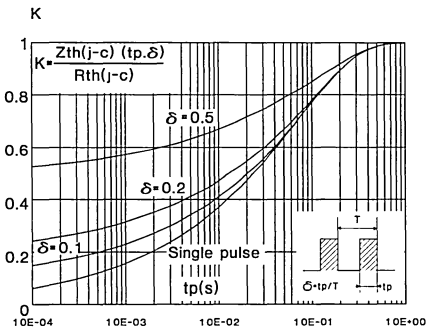


Fig 13 : Peak reverse recovery current versus dI_F/dt

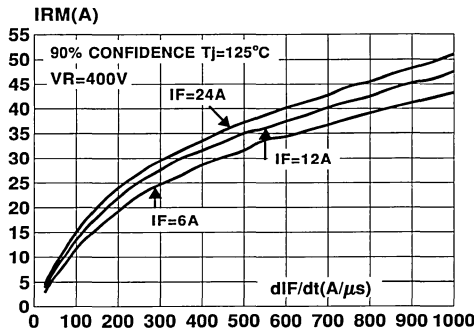


Fig 14 : Reverse recovery time versus dI_F/dt

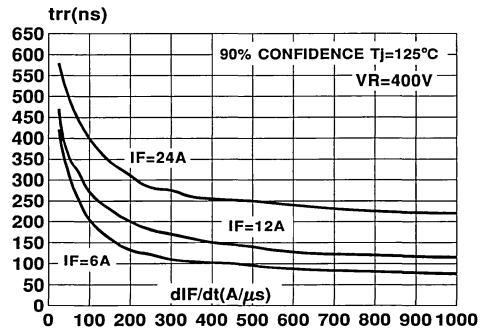


Fig 15 : Softness factor (tb/ta) versus dI_F/dt

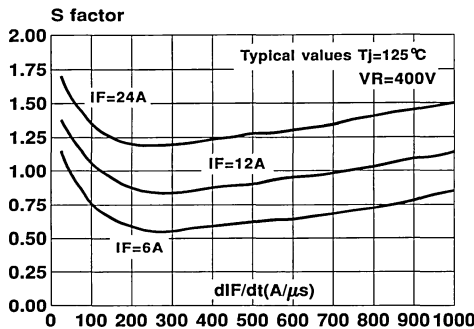


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_J=125^\circ\text{C}$)

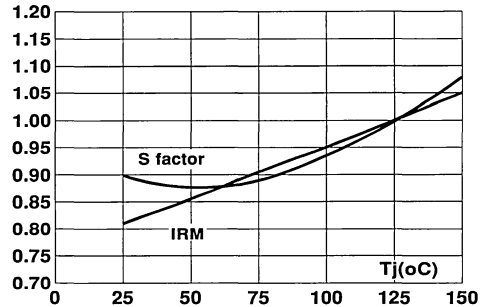


Fig 17 : Transient peak forward voltage versus dI_F/dt

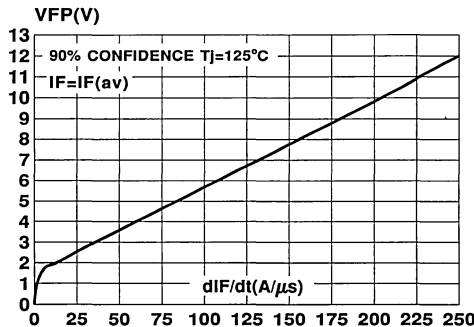
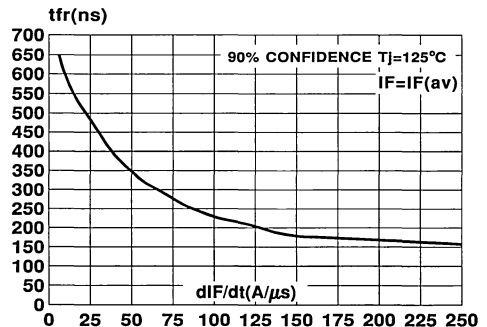


Fig 18 : Forward recovery time versus dI_F/dt



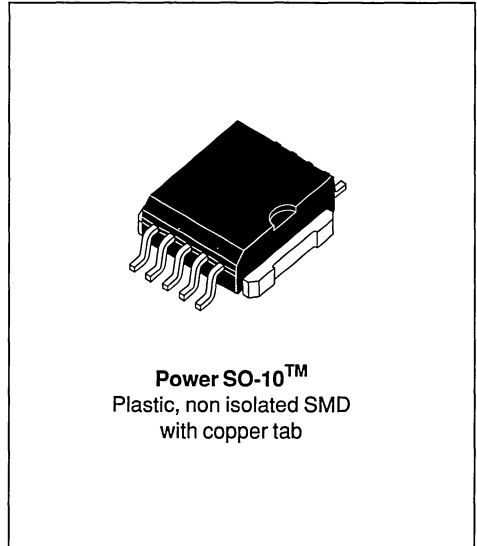
PowerSO-10™ TURBOSWITCH™ “B” ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

I_{F(AV)}	12A
V_{RRM}	600V
t_{rr} (typ)	50ns
V_F (max)	1.3V

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, VERY SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.
- HIGH FREQUENCY OPERATIONS
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE


DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit

of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in PSO-10, this 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{RRM}	Repetitive peak reverse voltage	600	V
V _{RSM}	Non repetitive peak reverse voltage	600	V
I _{F(RMS)}	RMS forward current (All pins connected)	27	A
I _{FRM}	Repetitive peak forward current (t _p = 5 μs, f = 1kHz)	320	A
T _j	Max operating junction temperature	- 65 to + 150	°C
T _{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		1.9	°C/W
P_1	Conduction power dissipation (see fig. 5)	$I_F(AV) = 12A$ $\delta = 0.5$ $T_c = 114^\circ C$	19	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 104^\circ C$	24	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 12A$ $T_j = 25^\circ C$			1.4	V
					1.3	
I_R **	Reverse leakage current	$V_R = 0.8 \times V_{RRM}$ $T_j = 25^\circ C$			100	μA
					2.0	mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, duty cycle < 2%

**DYNAMIC ELECTRICAL CHARACTERISTICS
TURN-OFF SWITCHING (see Fig.6)**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $dI_F/dt = -50A/\mu s$ $V_R = 30V$		50	100	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 12A$ $dI_F/dt = -96 A/\mu s$ $dI_F/dt = -500 A/\mu s$		30	18	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 12A$ $dI_F/dt = -500 A/\mu s$		0.9		/

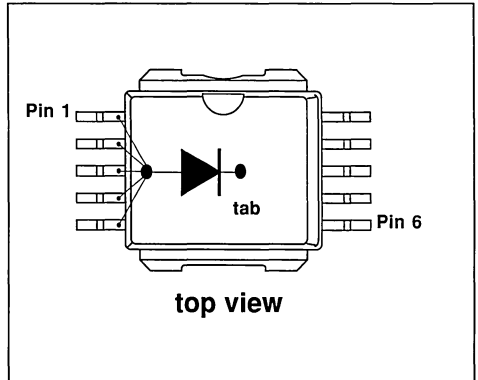
TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 12A$, $dI_F/dt = 96 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 12A$, $dI_F/dt = 96 A/\mu s$			8	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig. 1 to fig. 4), the way of calculating the power losses is given below :

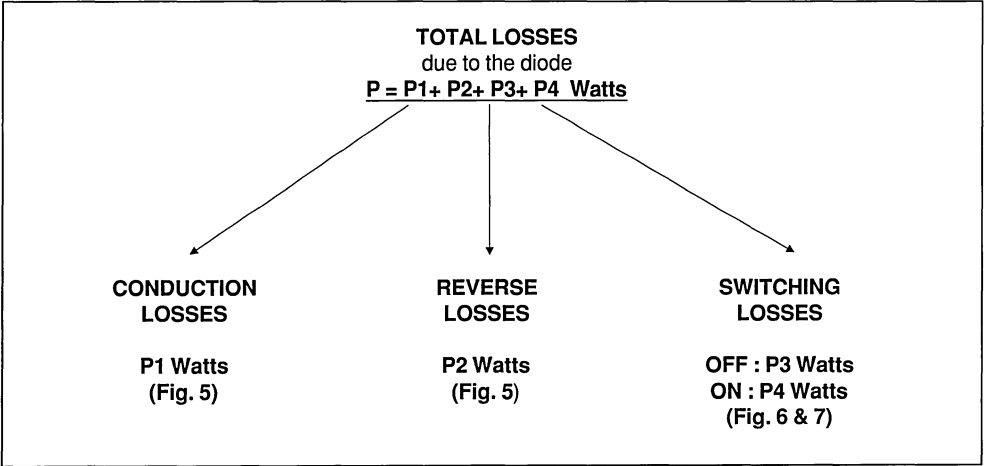


Fig. 1 : SNUBBER DIODE.

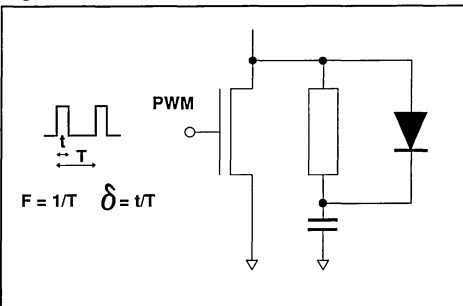


Fig. 2 : CLAMPING DIODE.

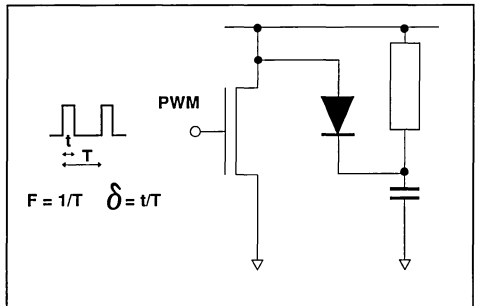


Fig. 3 : DEMAGNETIZING DIODE.

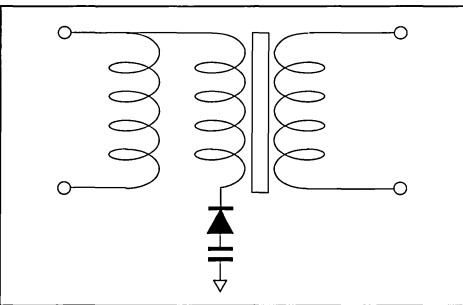
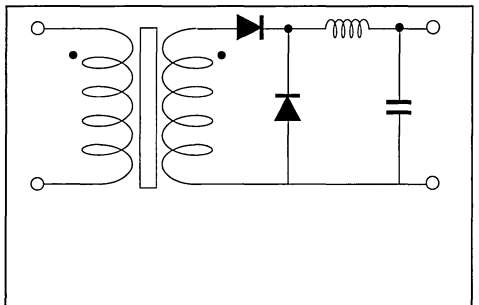
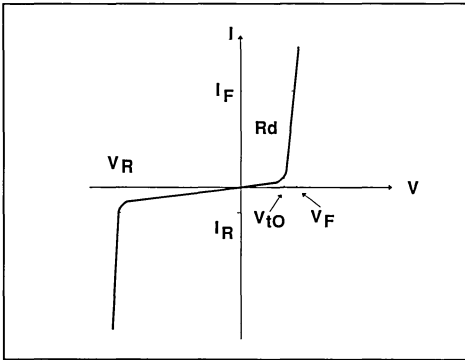


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

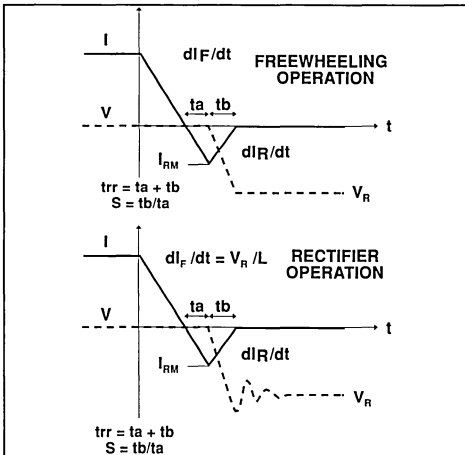
$$R_d = 0.025 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

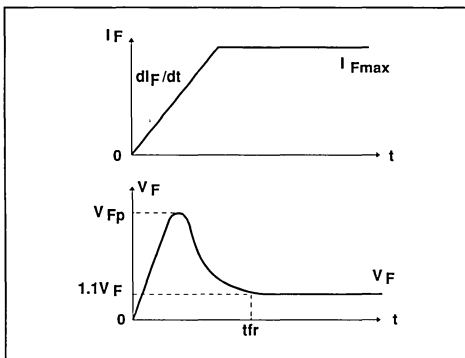
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 8 : Conduction losses versus average current

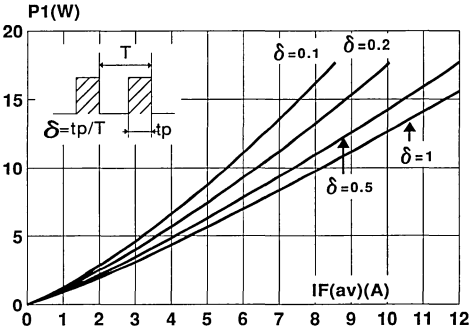


Fig 9 : Switching OFF losses versus dI/dt

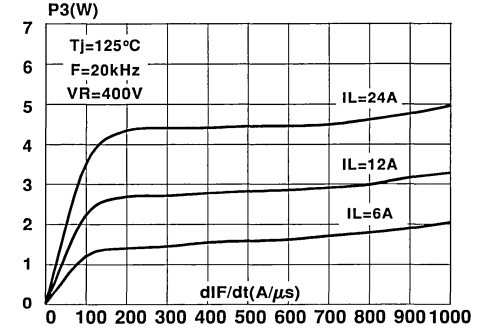


Fig 10 : Switching ON losses versus dI/dt

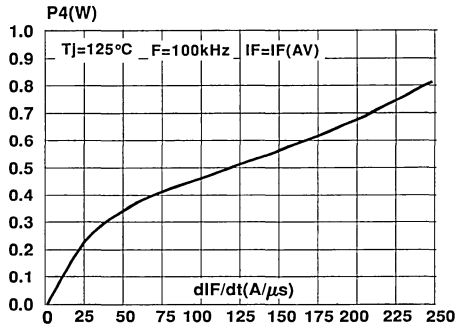


Fig 11 : Forward voltage drop versus forward current

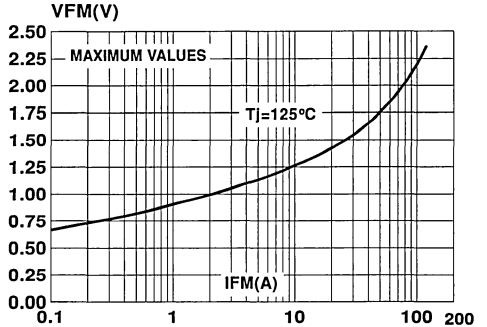


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

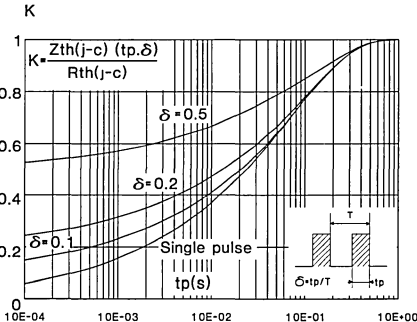


Fig 13 : Peak reverse recovery current versus dI_F/dt

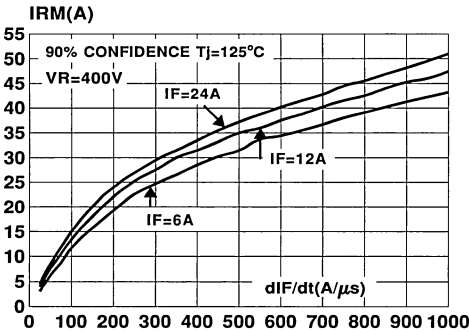


Fig 14 : Reverse recovery time versus dI_F/dt

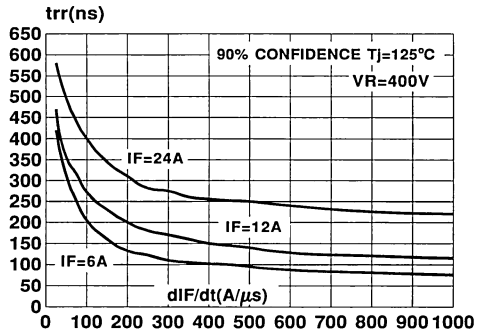


Fig 15 : Softness factor (tb/ta) versus dI_F/dt

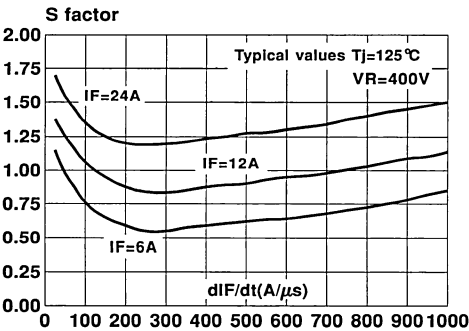


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

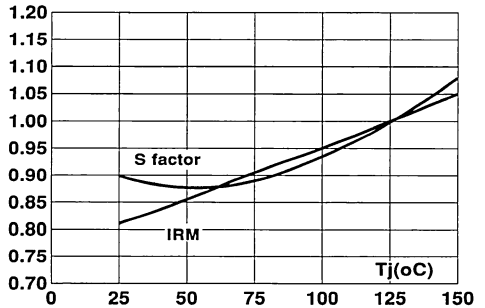


Fig 17 : Transient peak forward voltage versus dI_F/dt

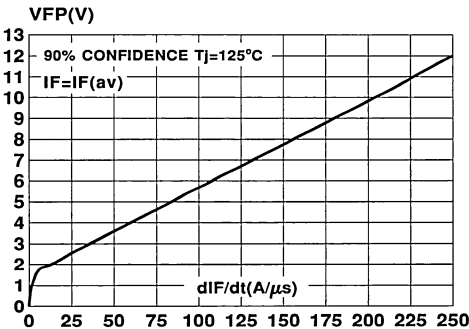
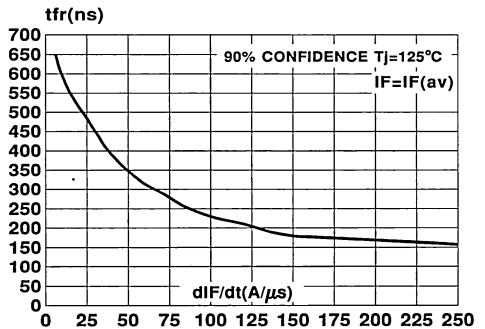


Fig 18 : Forward recovery time versus dI_F/dt





TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCT CHARACTERISTICS

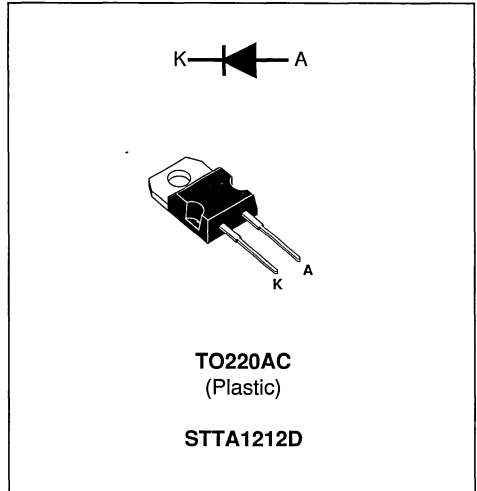
$I_{F(AV)}$	12A
V_{RRM}	1200V
t_{rr} (typ)	ns
V_F (max)	V

FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in TO220AC, this 1200V device is particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	30	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s, f = 5kHz$)	180	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		1.9	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 6)	$I_{F(AV)} = 12\text{A}$ $\delta = 0.5$ $T_c = 95^{\circ}\text{C}$	29.2	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 89^{\circ}\text{C}$	32.1	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 12\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			2.2 2.0	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 5.0	μA mA

Test pulses widths : *tp = 380 μs , duty cycle < 2%

**tp = 5 ms, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		50	100	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 600\text{V}$ $I_F = 12\text{A}$ $di_F/dt = -96\text{A}/\mu\text{s}$ $di_F/dt = -500\text{A}/\mu\text{s}$		30	18	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 600\text{V}$ $I_F = 12\text{A}$ $di_F/dt = -500\text{A}/\mu\text{s}$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 12\text{A}$, $di_F/dt = 96\text{A}/\mu\text{s}$ measured at, $1.1 \times V_{FM}$			TBD	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 12\text{A}$, $di_F/dt = 96\text{A}/\mu\text{s}$ $I_F = 40\text{A}$, $di_F/dt = 500\text{A}/\mu\text{s}$			TBD TBD	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below :

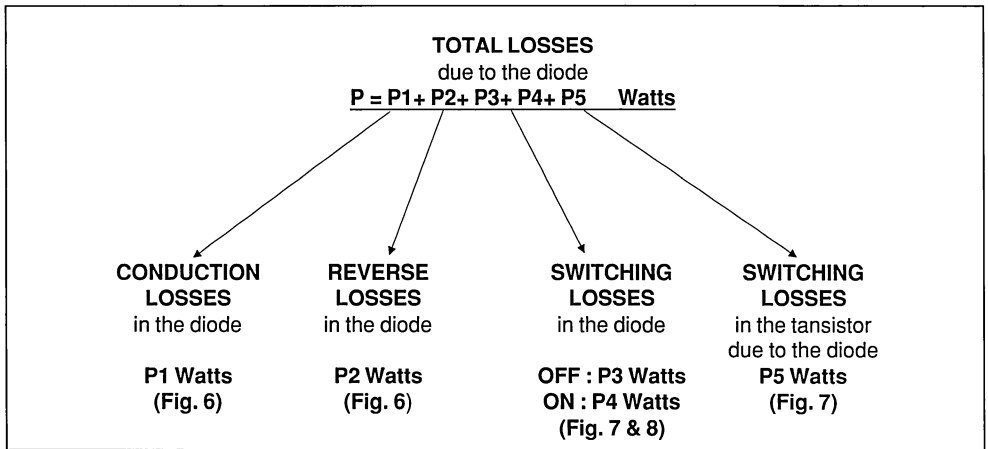


Fig. 1 : "FREEWHEEL" MODE.

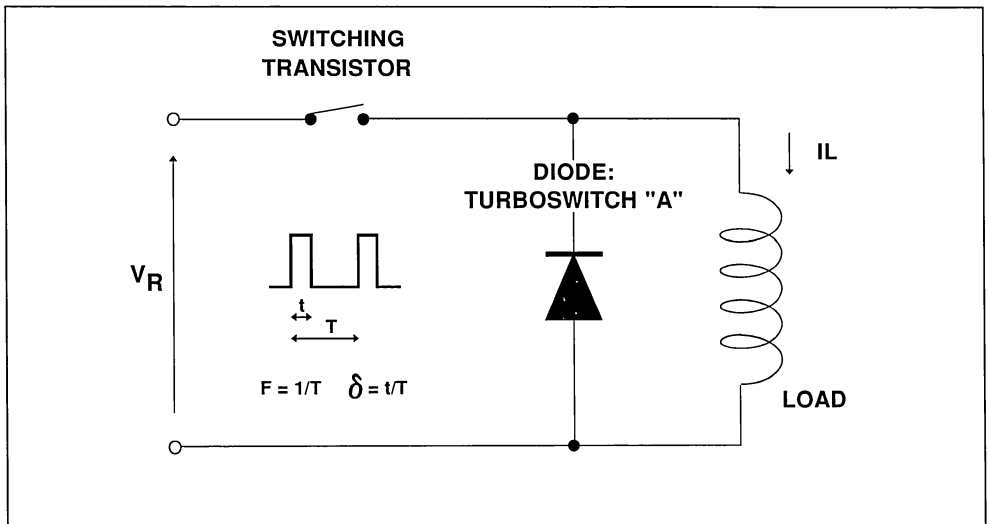


Fig. 2 : SNUBBER DIODE.

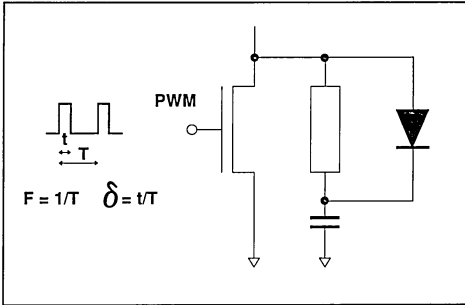


Fig. 3 : CLAMPING DIODE.

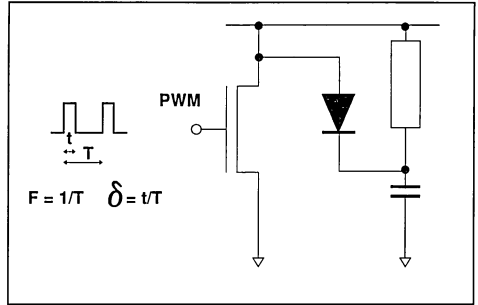


Fig. 4 : DEMAGNETIZING DIODE.

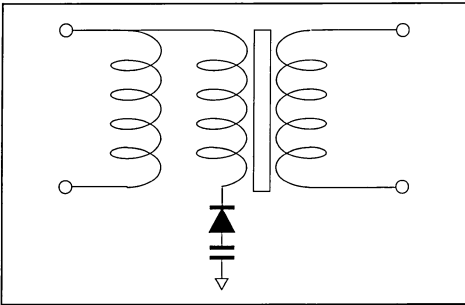
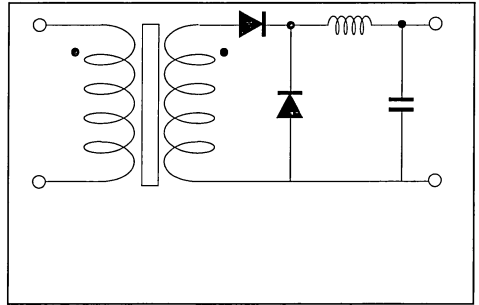
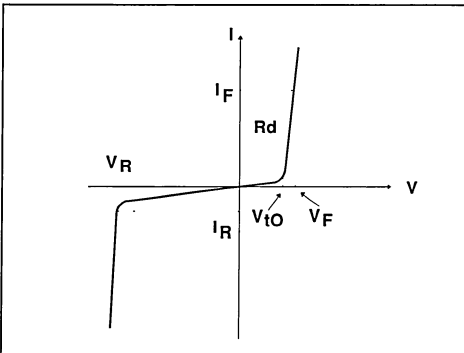


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.57 \text{ V}$$

$$R_d = 0.036 \text{ Ohm}$$

(Max values at 125°C, suitable for $I_{peak} < 3 \cdot I_{F(av)}$)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS

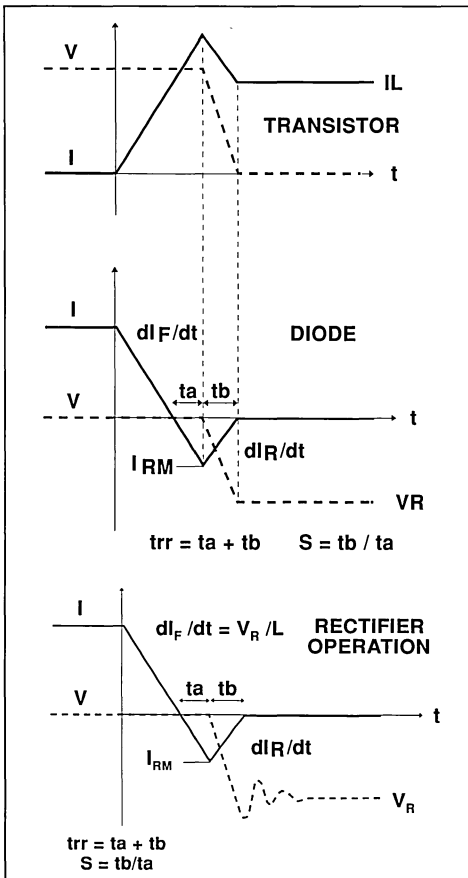
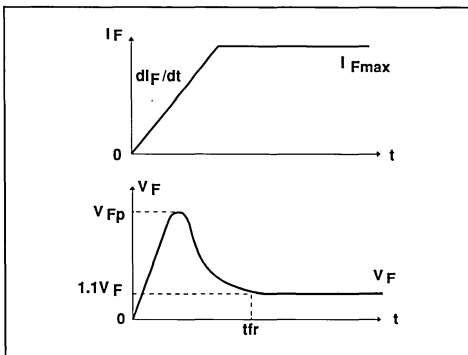


Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3,P3' and P5 are suitable for power MOSFET and IGBT

Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	15A
V_{RRM}	1200V
t_{rr} (typ)	55ns
V_F (max)	1.9V

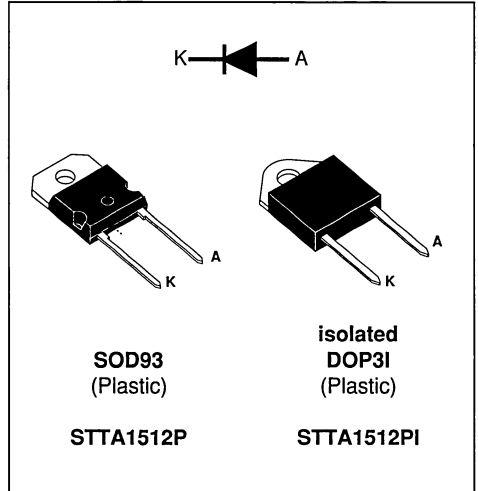
FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in SOD93 and in DOP31, these 1200V devices are particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	300	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA1512P STTA1512PI	1.6 2.1	°C/W
P_1	Conduction power dissipation (see fig. 6)	$I_{F(AV)} = 15A$ $\delta = 0.5$ STTA1512P $T_c = 95^\circ C$ STTA1512PI $T_c = 78^\circ C$	34	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA1512P $T_c = 89^\circ C$ STTA1512PI $T_c = 70^\circ C$	38	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 15A$ $T_j = 25^\circ C$ $T_j = 125^\circ C$			2.1 1.9	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$ $T_j = 25^\circ C$ $T_j = 125^\circ C$			100 6.0	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		55	105	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 15A$ $di_F/dt = -120 A/\mu s$ $di_F/dt = -500 A/\mu s$		TBD	TBD	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 15A$ $di_F/dt = -500 A/\mu s$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 15 A$, $di_F/dt = 120 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 15A$, $di_F/dt = 120 A/\mu s$ $I_F = 40A$, $di_F/dt = 500 A/\mu s$			TBD TBD	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below :

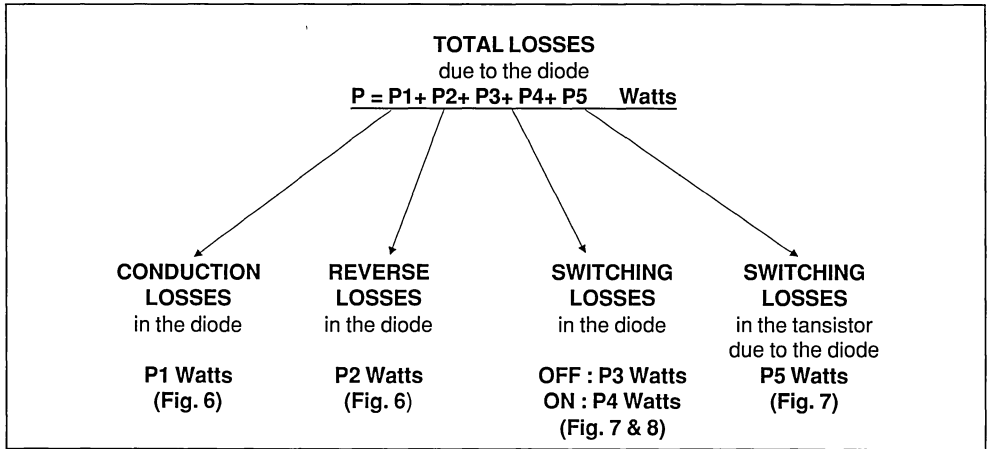


Fig. 1 : "FREEWHEEL" MODE.

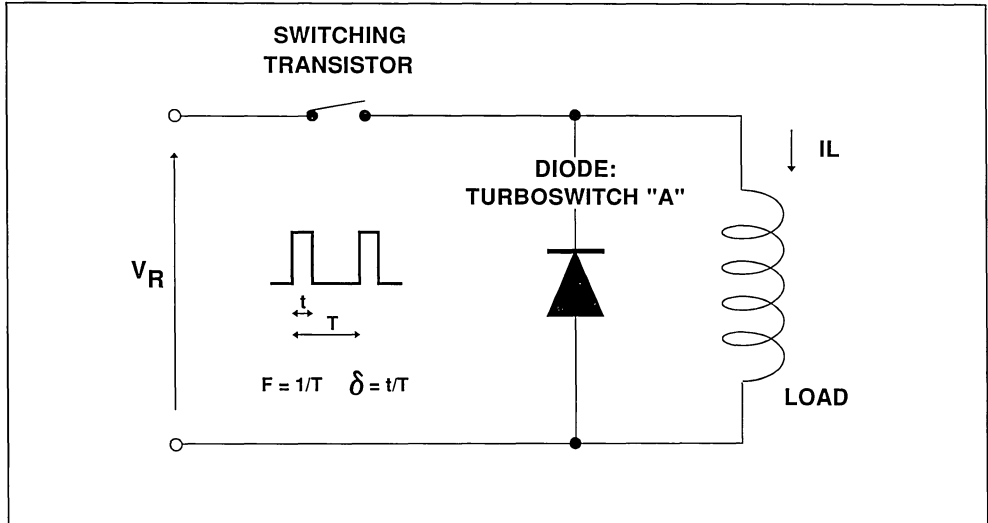


Fig. 2 : SNUBBER DIODE.

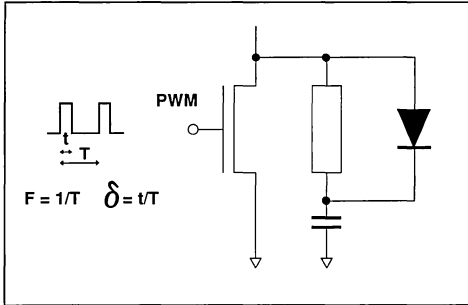


Fig. 3 : CLAMPING DIODE.

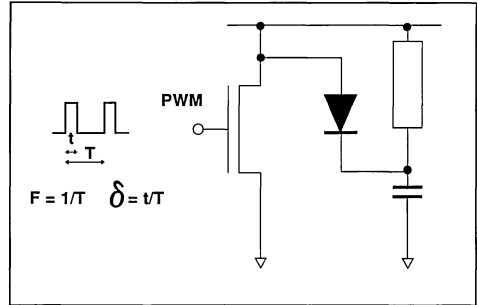


Fig. 4 : DEMAGNETIZING DIODE.

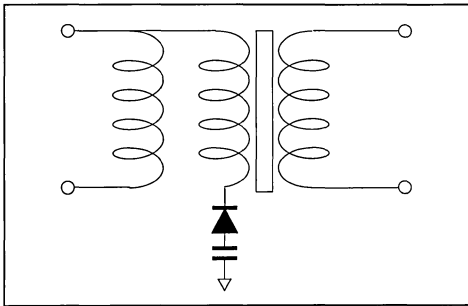
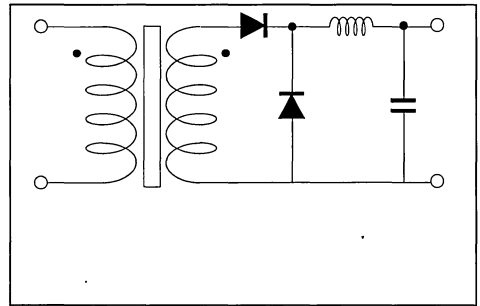
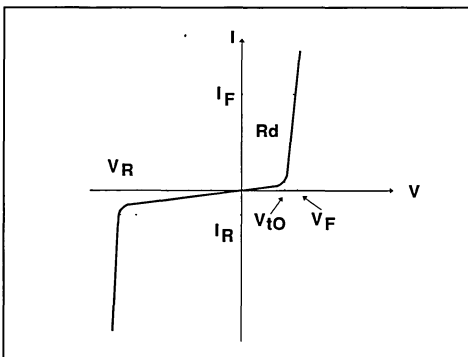


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_{F(AV)} + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.48 \text{ V}$$

$$R_d = 0.027 \text{ Ohm}$$

(Max values at 125°C, suitable for $I_{peak} < 3 \cdot I_{F(av)}$)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS

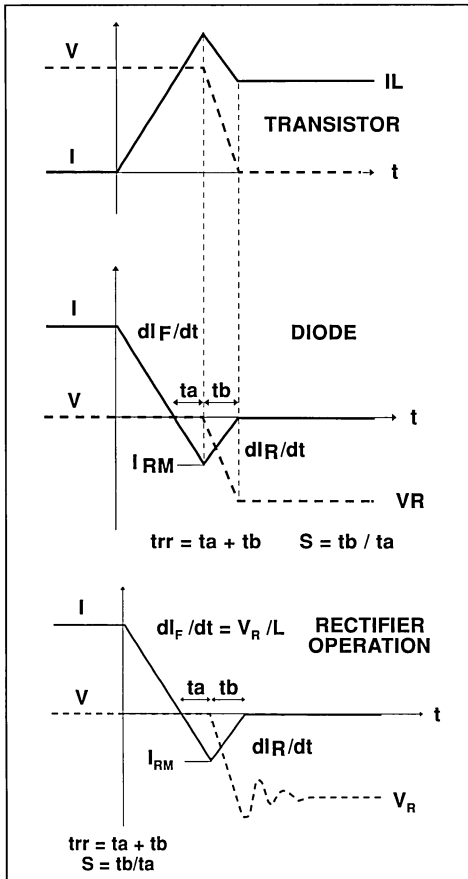
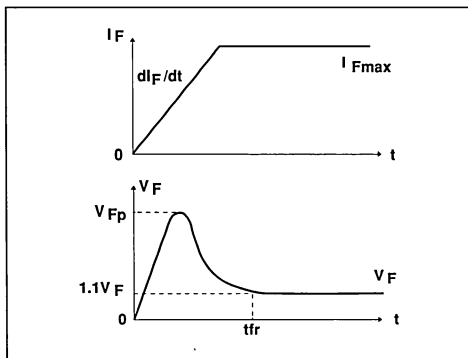


Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3,P3' and P5 are suitable for power MOSFET and IGBT

Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

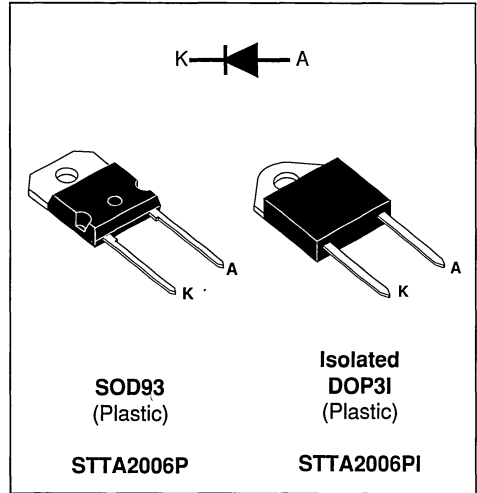
TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	20A
V_{RRM}	600V
t_{rr} (typ)	30ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.



DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries.

Packaged in SOD93 and in isolated DOP3I, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current (tp = 5 μ s, f = 5kHz)	270	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA2006P STTA2006PI	1.5 2.1	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_{F(AV)} = 20\text{A}$ $\delta = 0.5$ STTA2006P $T_c = 96^{\circ}\text{C}$ STTA2006PI $T_c = 74^{\circ}\text{C}$	36	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA2006P $T_c = 90^{\circ}\text{C}$ STTA2006PI $T_c = 66^{\circ}\text{C}$	40	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 20\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			1.75 1.5	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 6	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		30	60	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $di_F/dt = -160 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		17.5	12.5	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		0.42		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$, $di_F/dt = 160 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			600	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$, $di_F/dt = 160 \text{A}/\mu\text{s}$			12	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below:

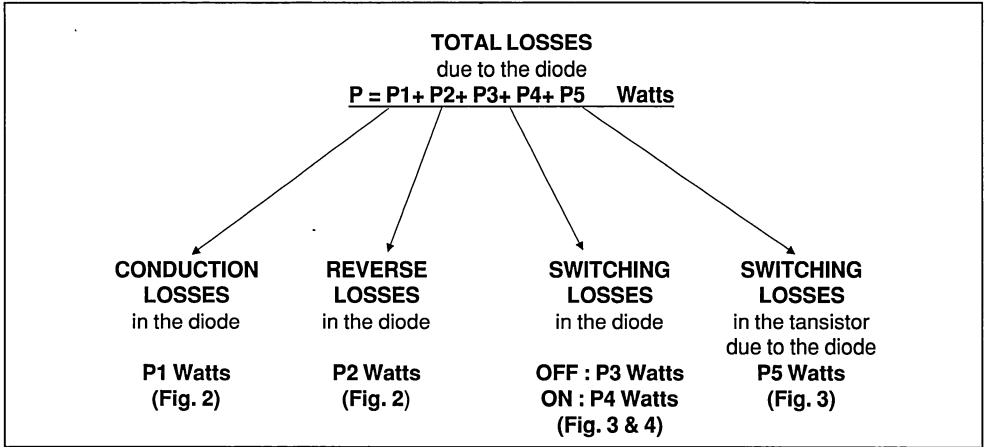
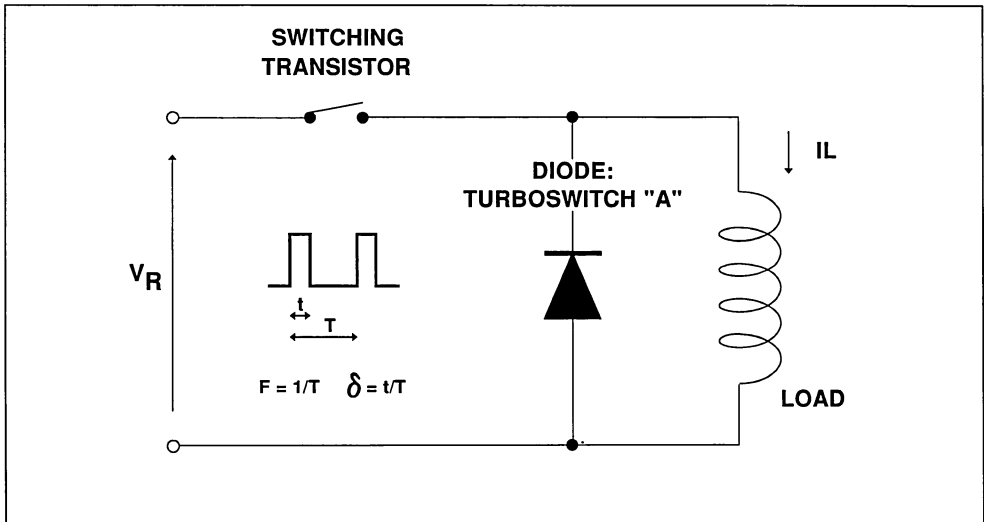
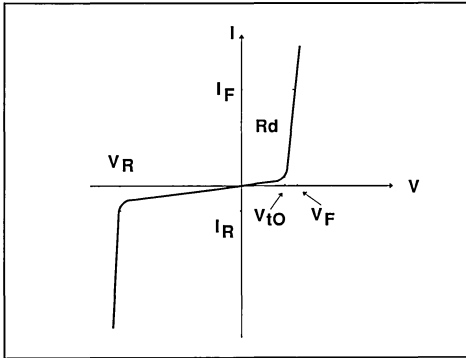


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 V$$

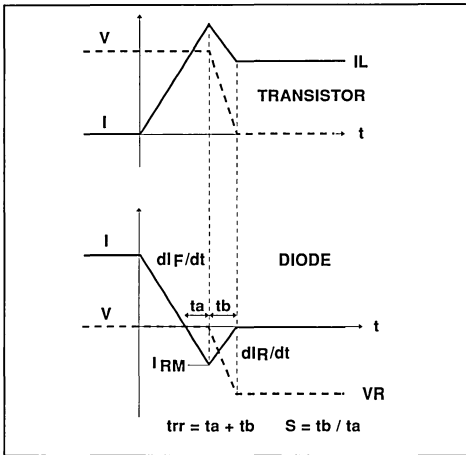
$$R_d = 0.017 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times df/dt}$$

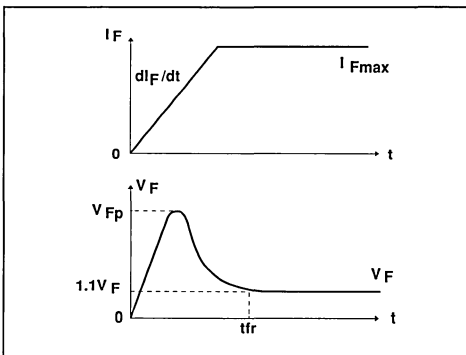
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times df/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times df/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 5 : Conduction losses versus average current

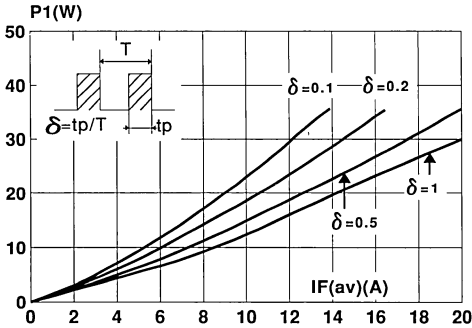


Fig 6 : Switching OFF losses versus dIF/dt

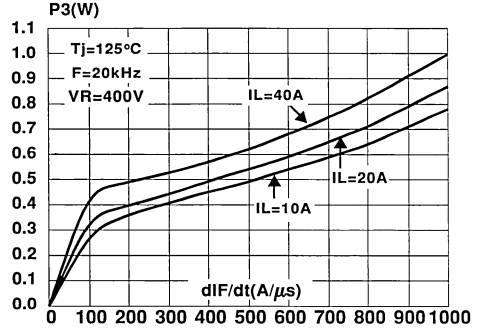


Fig 7 : Switching ON losses versus dIF/dt

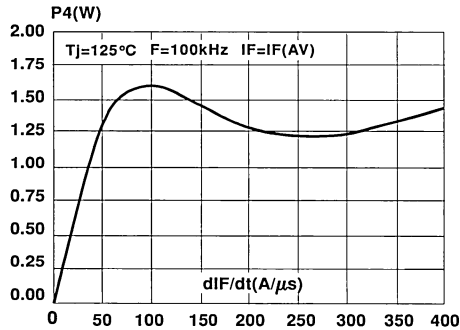


Fig 8 : Switching losses in transistor due to the diode

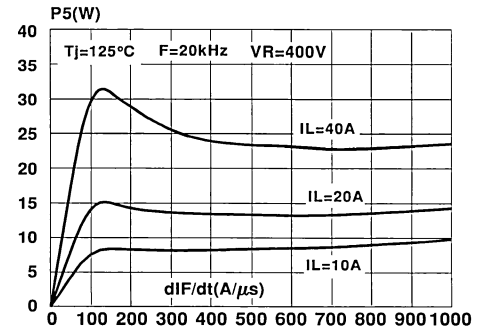


Fig 9 : Forward voltage drop versus forward current

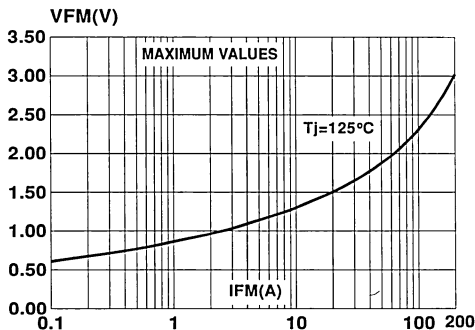


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

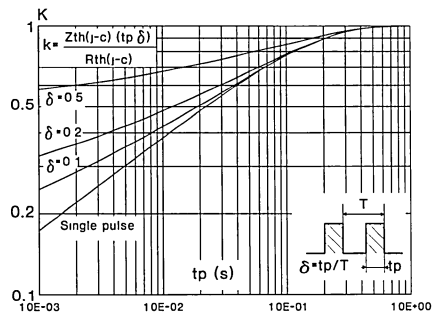


Fig 11 : Peak reverse recovery current versus diF/dt

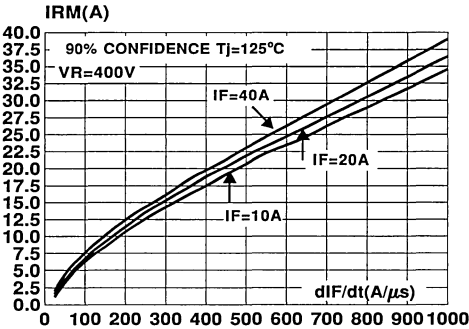


Fig 12 : Reverse recovery time versus diF/dt

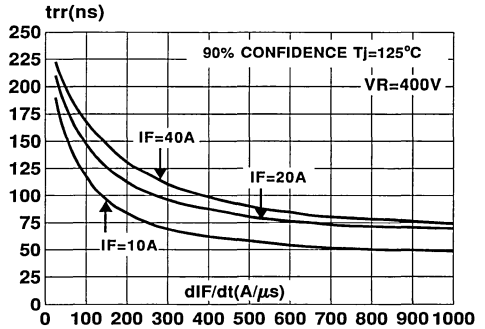


Fig 13 : Softness factor (tb/ta) versus diF/dt

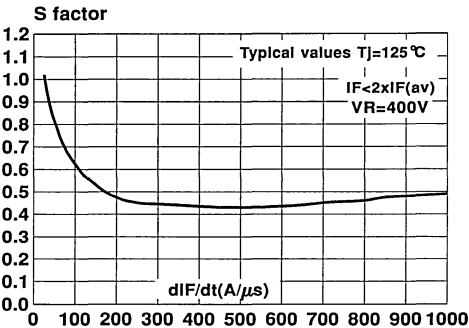


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_J=125^\circ\text{C}$)

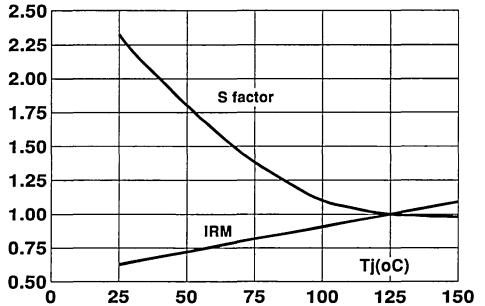


Fig 15 : Transient peak forward voltage versus diF/dt

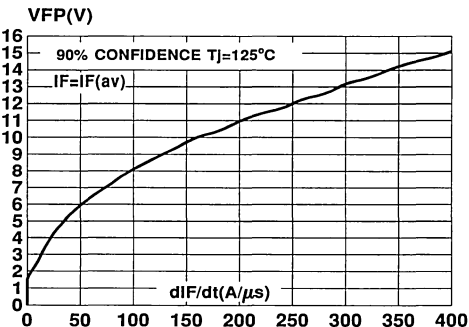
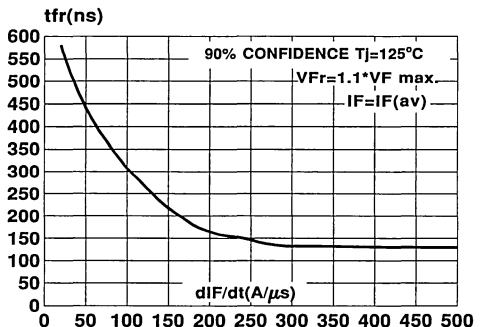


Fig 16 : Forward recovery time versus diF/dt



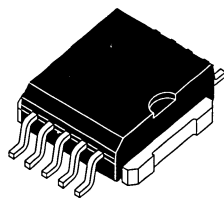
ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	20A
V_{RRM}	600V
t_{rr} (typ)	30ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST AND SOFT RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.
- HIGH DISSIPATION MINIATURE PACKAGE.
- SURFACE MOUNT TECHNOLOGY COMPATIBLE.



Power SO-10™
 Plastic, non isolated SMD
 with copper tab

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in motor control freewheel applications and in booster diode applications in Power Factor Control circuitries.

Packaged in a very high performance surface mount package PSO-10, this 600V device is particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_F(RMS)$	RMS forward current (All pins connected)	44	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5 kHz$)	180	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

TM : PowerSO-10 and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		1.5	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 2)	$I_F(AV) = 20\text{A}$ $\delta = 0.5$ $T_c = 96^{\circ}\text{C}$	36	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 90^{\circ}\text{C}$	40	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 20\text{A}$ $T_j = 25^{\circ}\text{C}$			1.75	V
		$T_j = 125^{\circ}\text{C}$			1.5	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$			100	μA
		$T_j = 125^{\circ}\text{C}$			6	mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		30	60	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $di_F/dt = -160 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		17.5	12.5	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		0.42		/

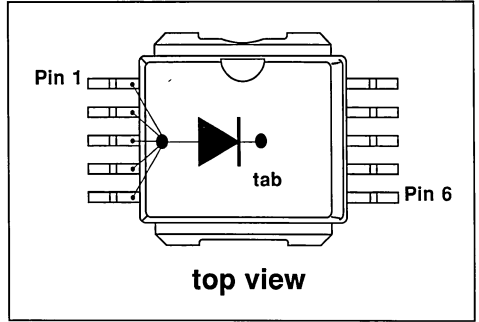
TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$ $di_F/dt = 160 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			600	ns
V_{FP}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$ $di_F/dt = 160 \text{A}/\mu\text{s}$			12	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application. The way of calculating the power losses is given below:

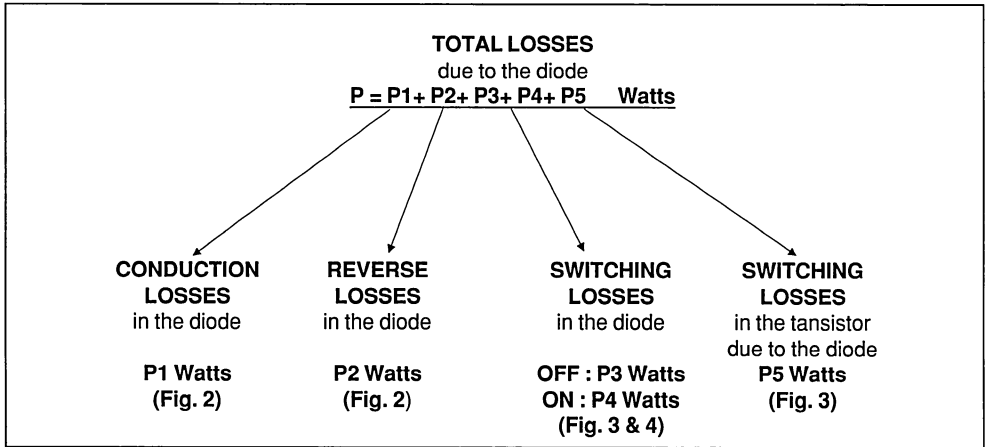
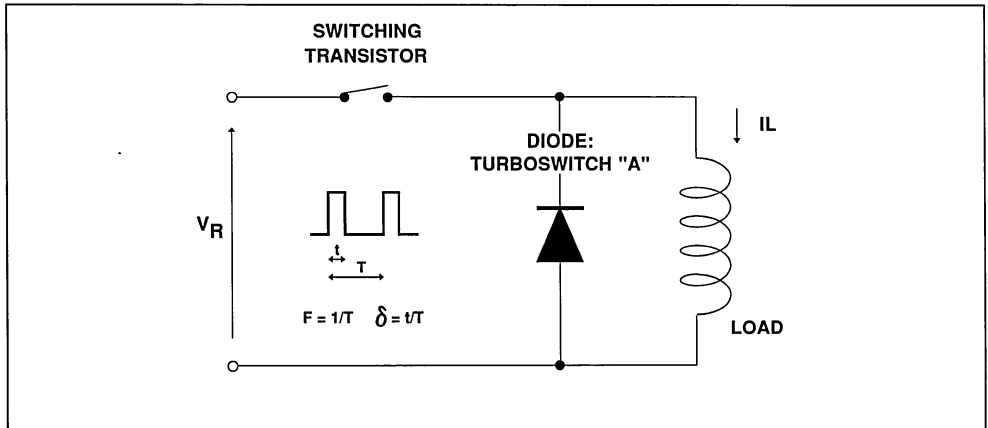
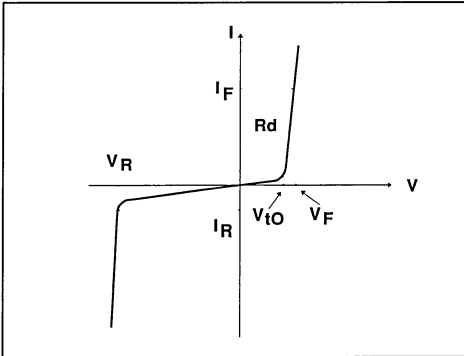


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 \text{ V}$$

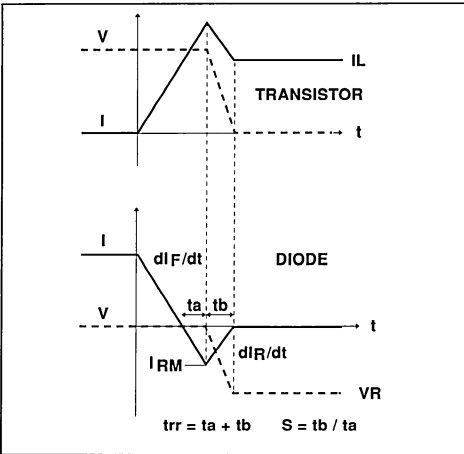
$$R_d = 0.017 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt}$$

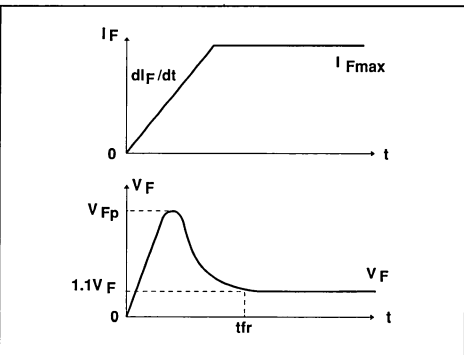
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 5 : Conduction losses versus average current

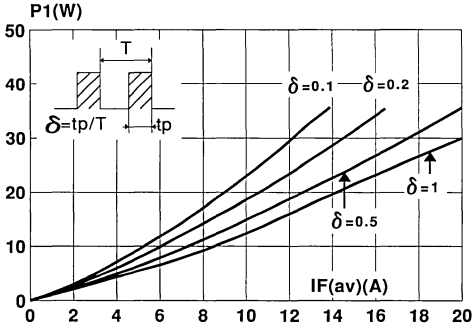


Fig 6 : Switching OFF losses versus dIF/dt

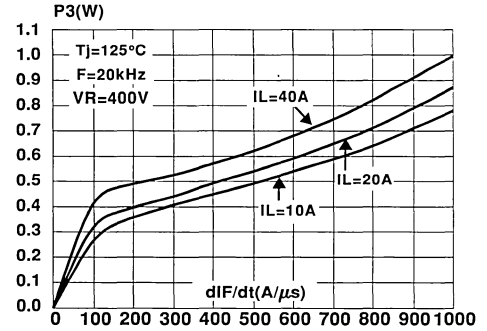


Fig 7 : Switching ON losses versus dIF/dt

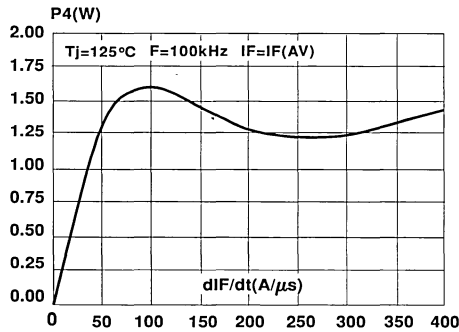


Fig 8 : Switching losses in transistor due to the diode

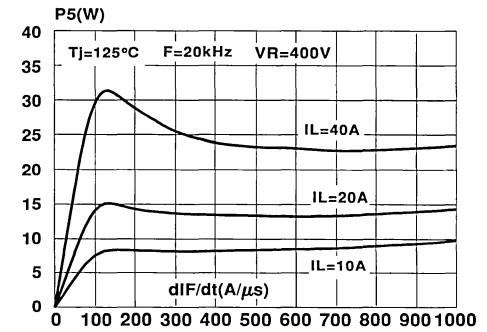


Fig 9 : Forward voltage drop versus forward current

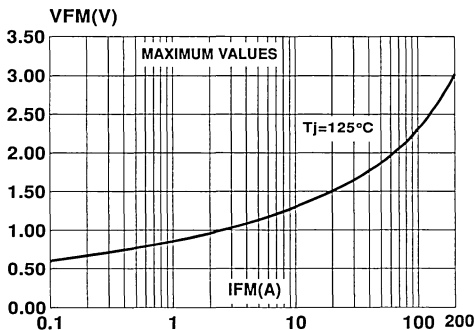


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

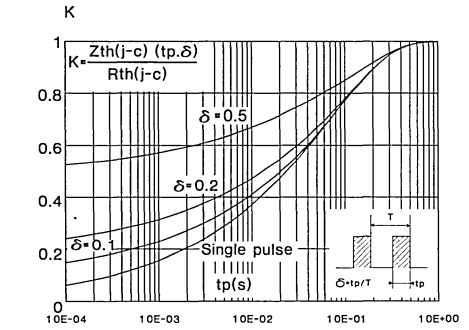


Fig 11 : Peak reverse recovery current versus dI_F/dt

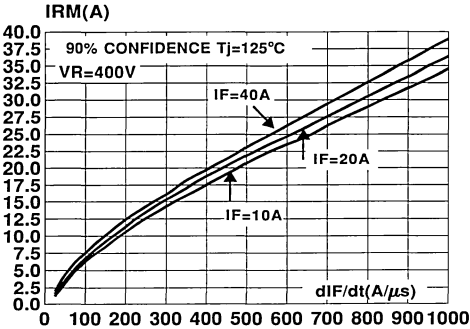


Fig 13 : Softness factor (tb/ta) versus dI_F/dt

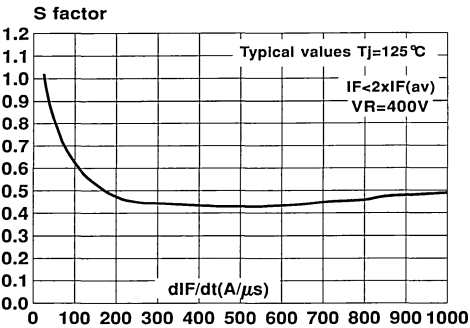


Fig 15 : Transient peak forward voltage versus dI_F/dt

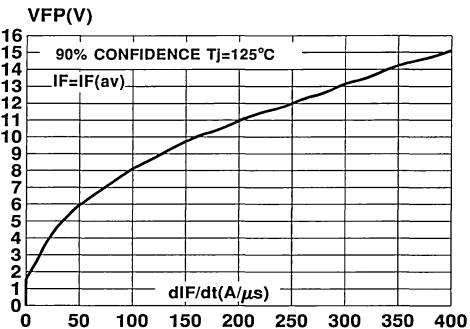


Fig 12 : Reverse recovery time versus dI_F/dt

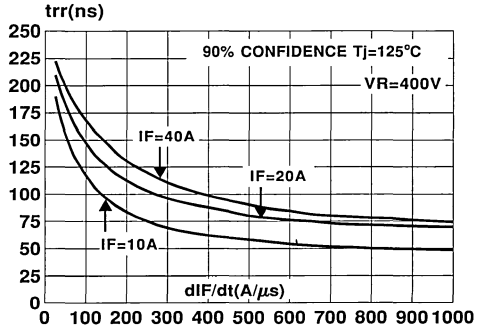


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

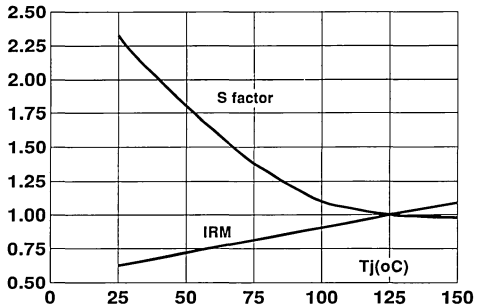
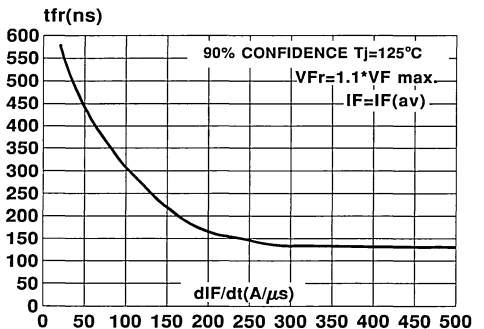


Fig 16 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ “B”. ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

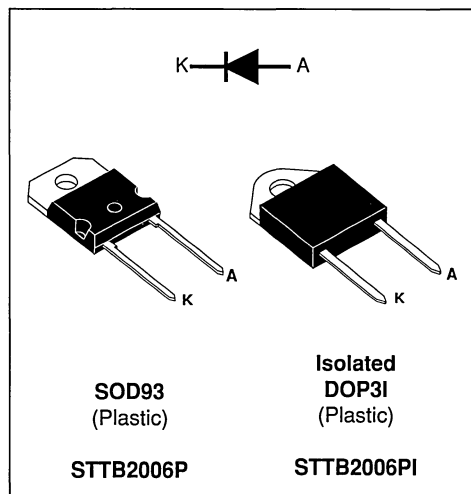
$I_{F(AV)}$	20A
V_{RRM}	600V
t_{rr} (typ)	55ns
V_F (max)	1.3V

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in SOD93 and in isolated DOP3I, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1kHz$)	680	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTB2006P STTB2006PI	1.3 2.1	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 5)	$I_{F(AV)} = 20\text{A}$ $\delta = 0.5$ STTB2006P $T_c = 108^{\circ}\text{C}$ STTB2006PI $T_c = 82^{\circ}\text{C}$	32	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTB2006P $T_c = 98^{\circ}\text{C}$ STTB2006PI $T_c = 66^{\circ}\text{C}$	40	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 20\text{A}$ $T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			1.4 1.3	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$ $T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			100 3.0	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1\text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		55	105	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $di_F/dt = -160 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		33	30	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		1.1		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 20 \text{A}$, $di_F/dt = 160 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$, $di_F/dt = 160 \text{A}/\mu\text{s}$ $I_F = 100\text{A}$, $di_F/dt = 500 \text{A}/\mu\text{s}$		10	8	V

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

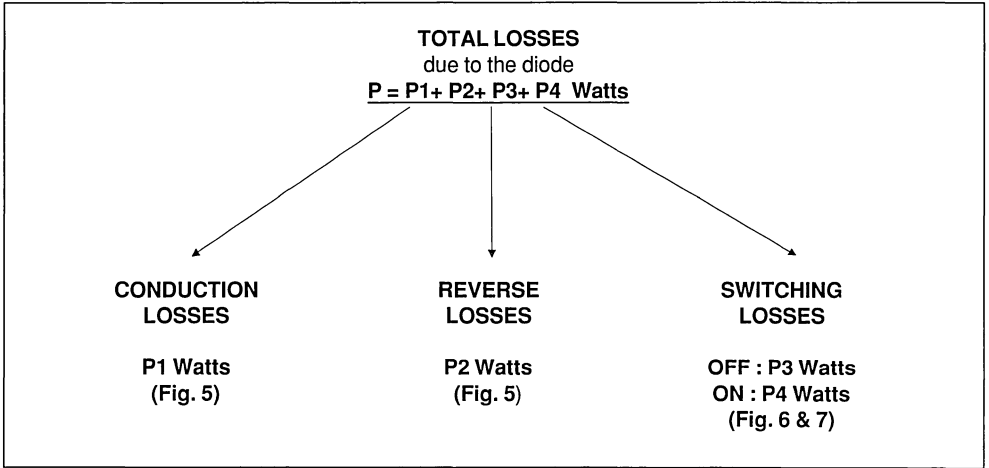


Fig. 1 : SNUBBER DIODE.

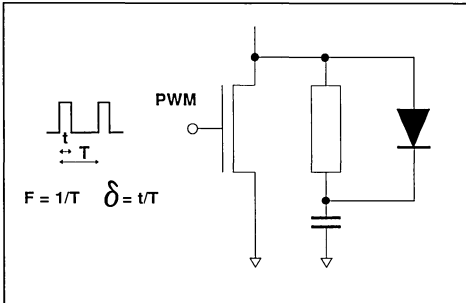


Fig. 2 : CLAMPING DIODE.

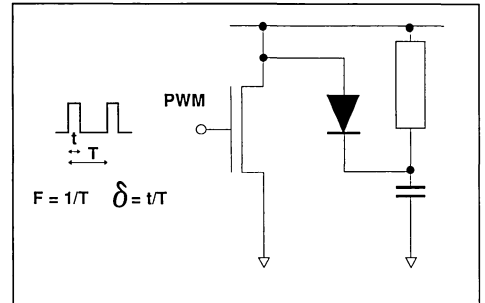


Fig. 3 : DEMAGNETIZING DIODE.

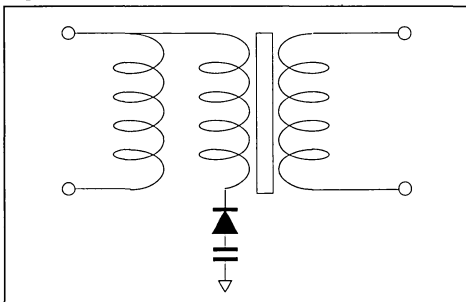
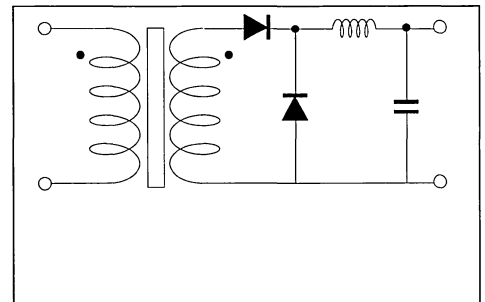
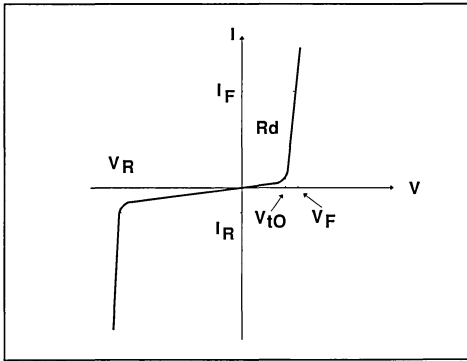


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

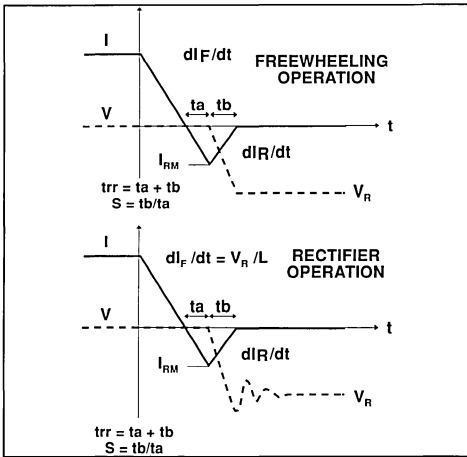
$$R_d = 0.015 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times df/dt}$$

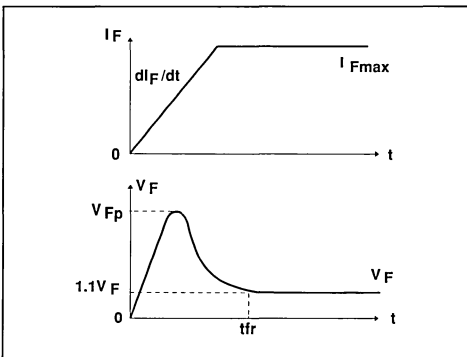
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times df/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 8 : Conduction losses versus average current

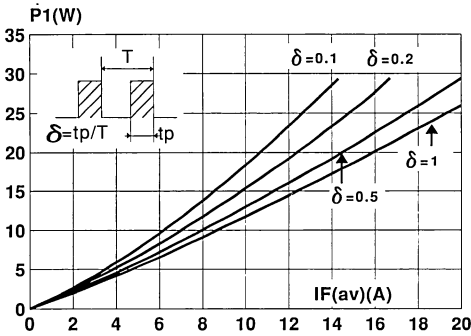


Fig 9 : Switching OFF losses versus dI/dt

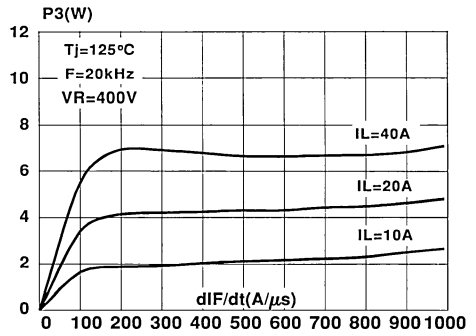


Fig 10 : Switching ON losses versus dI/dt

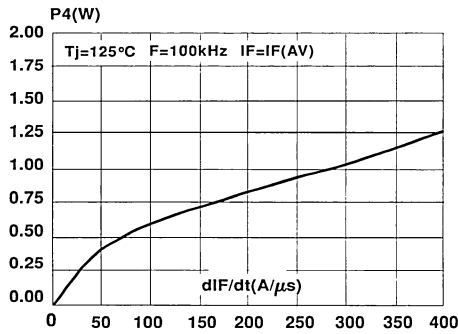


Fig 11 : Forward voltage drop versus forward current

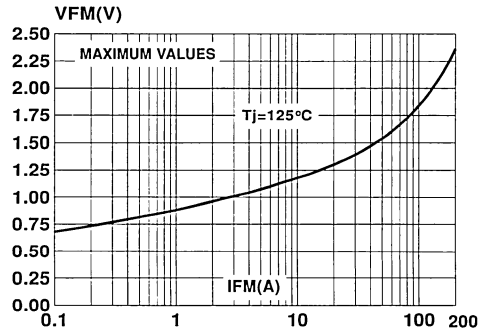


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

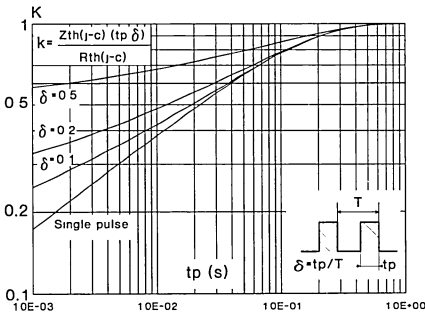


Fig 13 : Peak reverse recovery current versus dI_F/dt

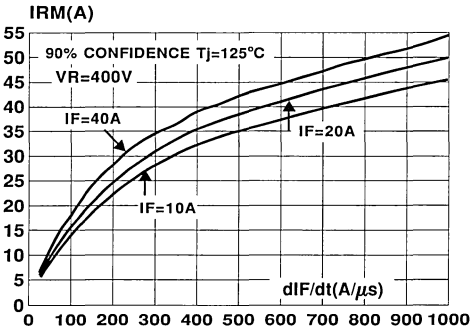


Fig 14 : Reverse recovery time versus dI_F/dt

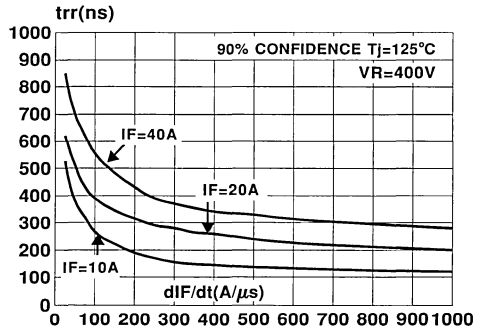


Fig 15 : Softness factor (tb/ta) versus dI_F/dt

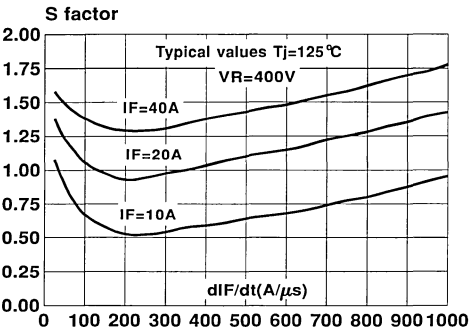


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

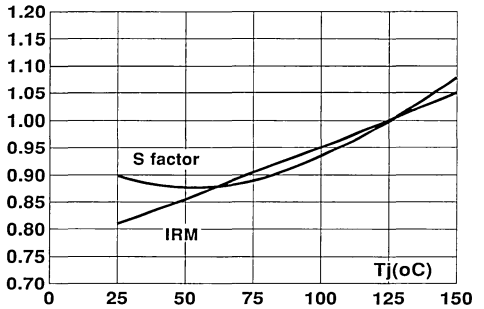


Fig 17 : Transient peak forward voltage versus dI_F/dt

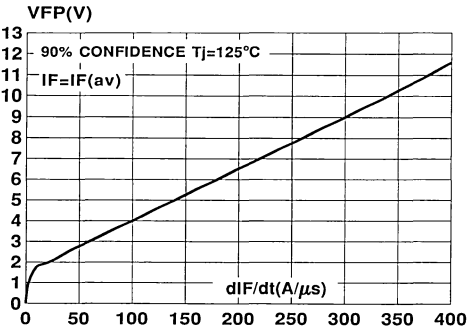
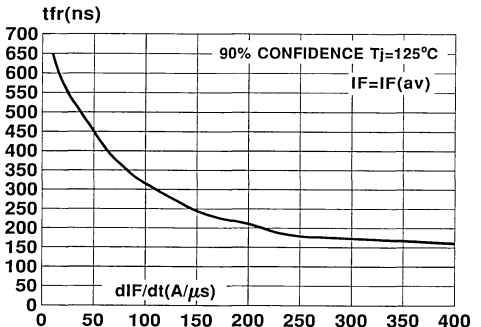


Fig 18 : Forward recovery time versus dI_F/dt



ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	20A
V_{RRM}	600V
t_{rr} (typ)	55ns
V_F (max)	1.3V

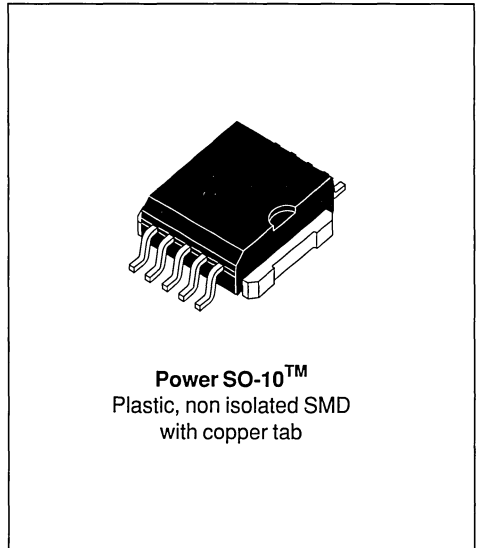
FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, VERY SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.
- HIGH FREQUENCY OPERATIONS
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in PSO-10, this 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	44	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	600	A
T_j	Max operating junction temperature	- 65 to + 150	°C
T_{stg}	Storage temperature	- 65 to + 150	°C

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		1.3	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 5)	$I_{F(AV)} = 20\text{A}$ $\delta = 0.5$ $T_c = 108^{\circ}\text{C}$	32	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 98^{\circ}\text{C}$	40	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 20\text{A}$				
		$T_j = 25^{\circ}\text{C}$			1.4	V
		$T_j = 125^{\circ}\text{C}$			1.3	
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$				
		$T_j = 25^{\circ}\text{C}$			100	μA
		$T_j = 125^{\circ}\text{C}$			3.0	mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $dI_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		55	105	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 20\text{A}$ $dI_F/dt = -160 \text{A}/\mu\text{s}$ $dI_F/dt = -500 \text{A}/\mu\text{s}$		33	30	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 12\text{A}$ $dI_F/dt = -500 \text{A}/\mu\text{s}$		1.1		/

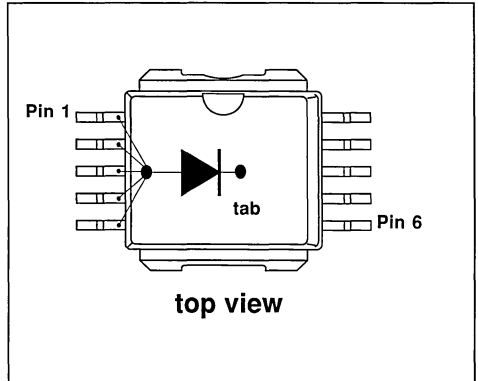
TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$, $dI_F/dt = 160 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			500	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}$, $dI_F/dt = 160 \text{A}/\mu\text{s}$			8	V

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab



APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

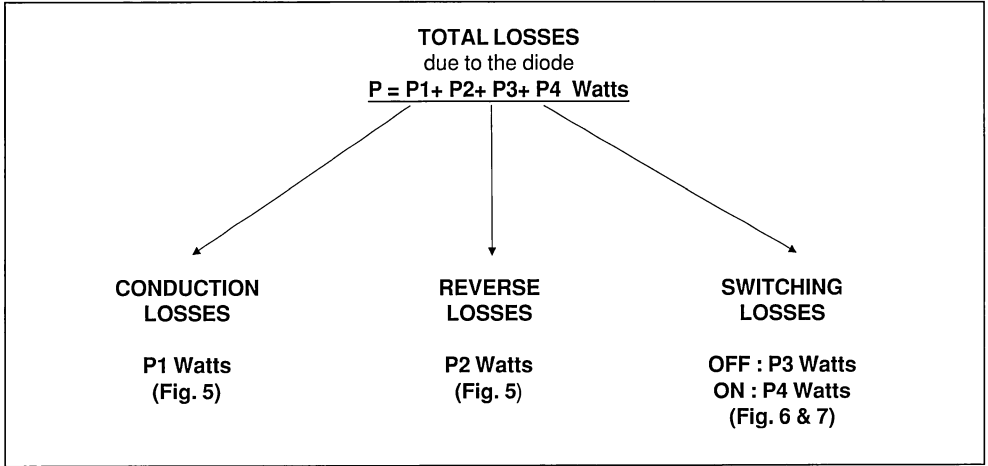


Fig. 1 : SNUBBER DIODE.

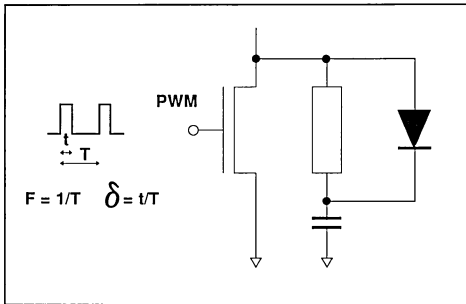


Fig. 2 : CLAMPING DIODE.

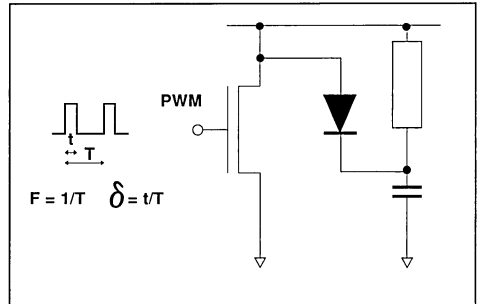


Fig. 3 : DEMAGNETIZING DIODE.

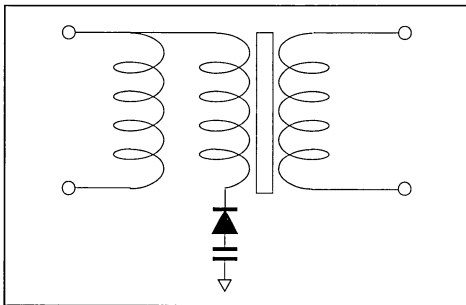
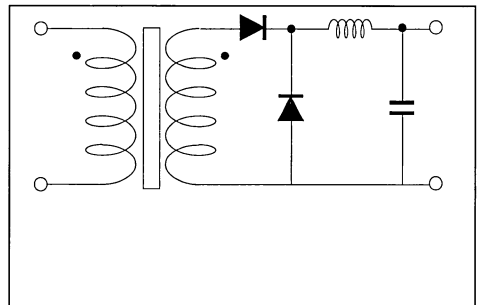
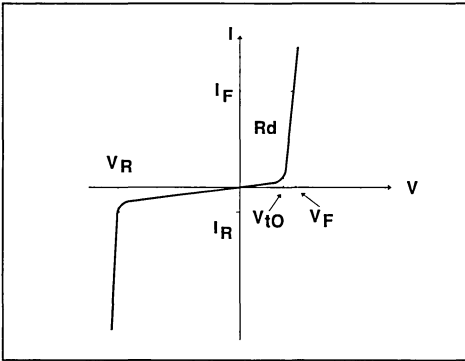


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

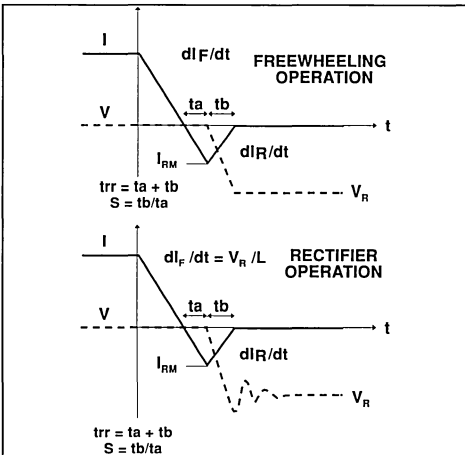
$$R_d = 0.015 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

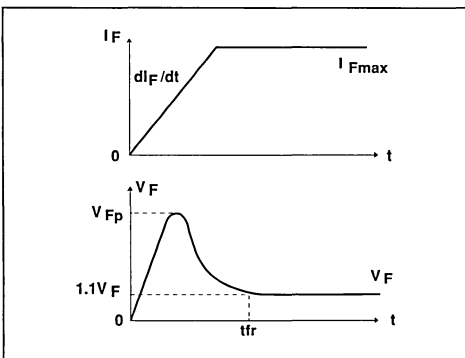
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

Fig 8 : Conduction losses versus average current

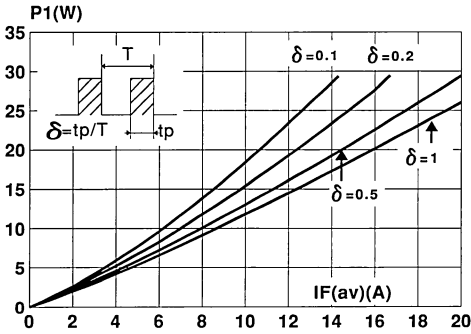


Fig 9 : Switching OFF losses versus dI/dt

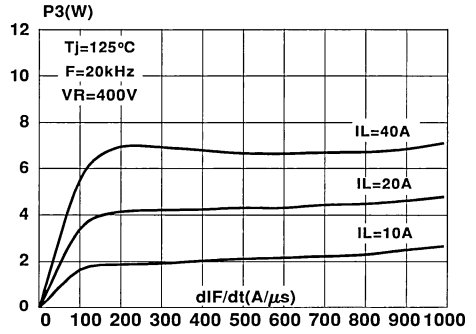


Fig 10 : Switching ON losses versus dI/dt

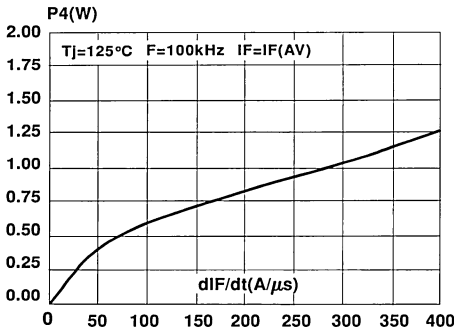


Fig 11 : Forward voltage drop versus forward current

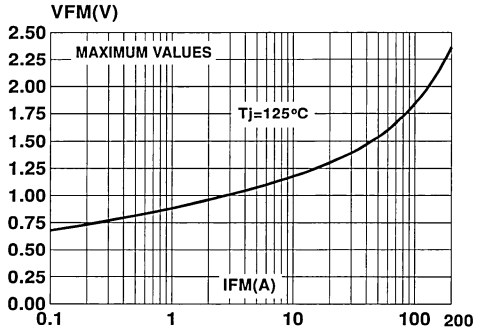


Fig 12 : Relative variation of thermal transient impedance junction to case versus pulse duration

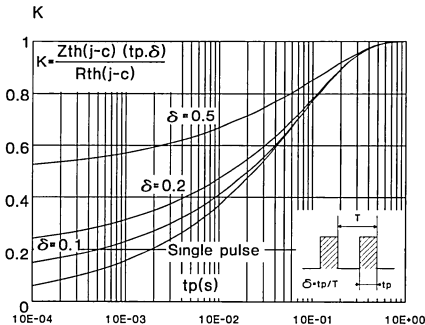


Fig 13 : Peak reverse recovery current versus dI_F/dt

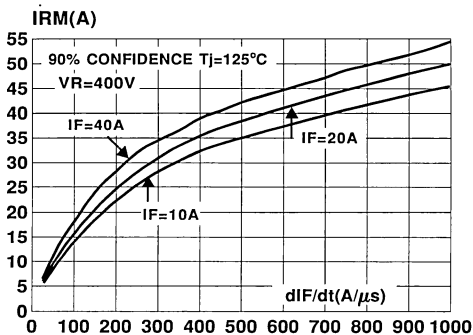


Fig 14 : Reverse recovery time versus dI_F/dt

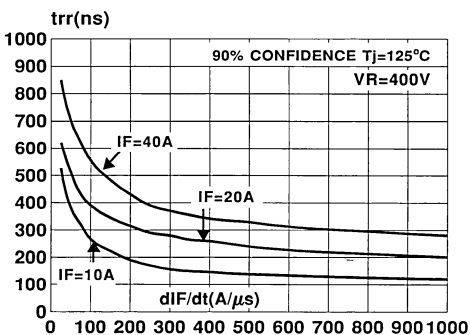


Fig 15 : Softness factor (tb/ta) versus dI_F/dt

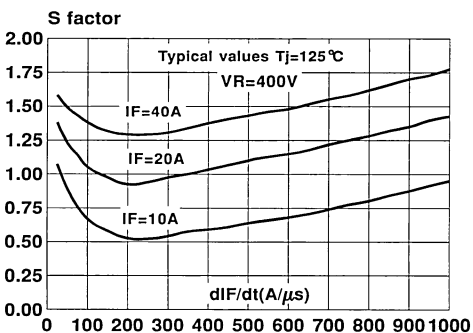


Fig 16 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

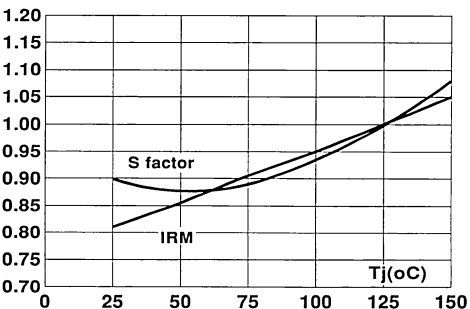


Fig 17 : Transient peak forward voltage versus dI_F/dt

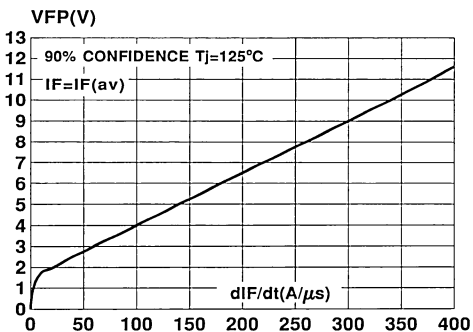
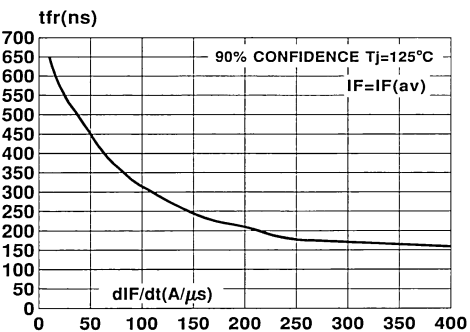


Fig 18 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	25A
V_{RRM}	1200V
t_{rr} (typ)	60ns
V_F (max)	1.9V

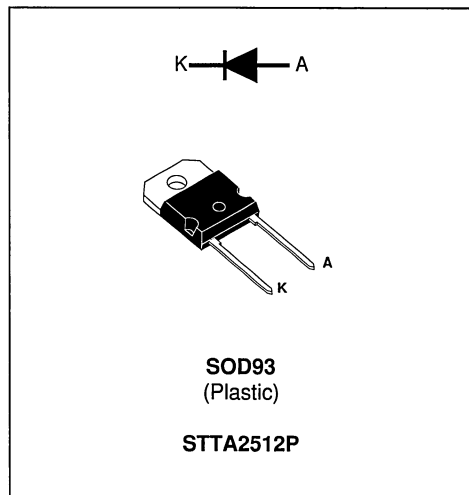
FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in SOD93, this 1200V device is particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5 kHz$)	300	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance		1.2	$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 6)	$I_{F(AV)} = 25\text{A}$ $\delta = 0.5$ $T_c = 82^{\circ}\text{C}$	57	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_c = 75^{\circ}\text{C}$	62.5	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 25\text{A}$ $T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			2.1 1.9	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$ $T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			150 8.0	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%

** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		60	110	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 600\text{V}$ $I_F = 25\text{A}$ $di_F/dt = -200 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		TBD	TBD	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 600\text{V}$ $I_F = 25\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 25 \text{A}$, $di_F/dt = 200 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{Fp}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 25\text{A}$, $di_F/dt = 200 \text{A}/\mu\text{s}$ $I_F = 40\text{A}$, $di_F/dt = 500 \text{A}/\mu\text{s}$			TBD TBD	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below :

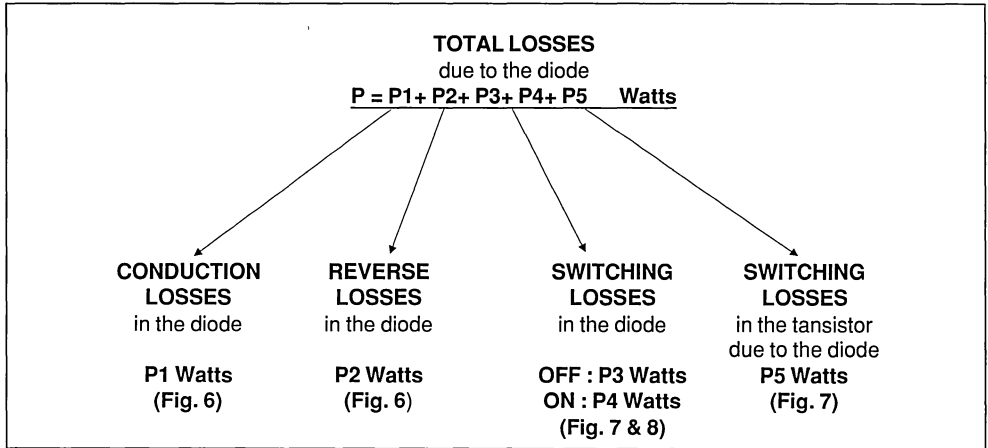


Fig. 1 : "FREEWHEEL" MODE.

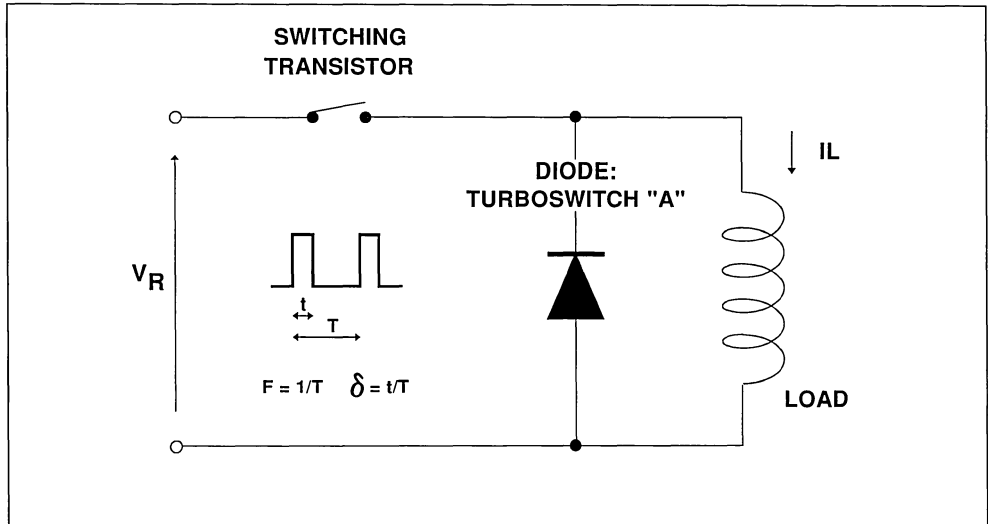


Fig. 2 : SNUBBER DIODE.

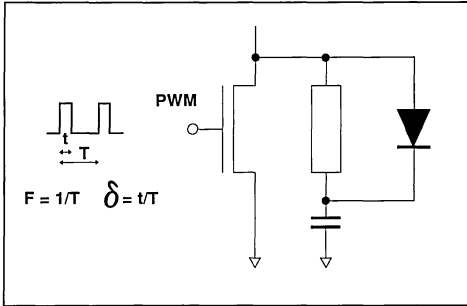


Fig. 3 : CLAMPING DIODE.

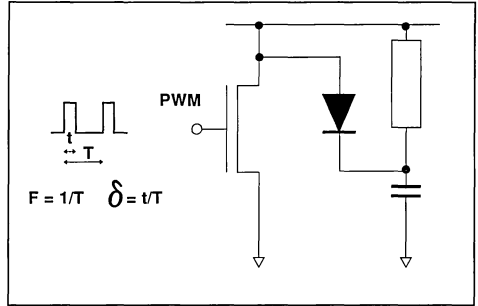


Fig. 4 : DEMAGNETIZING DIODE.

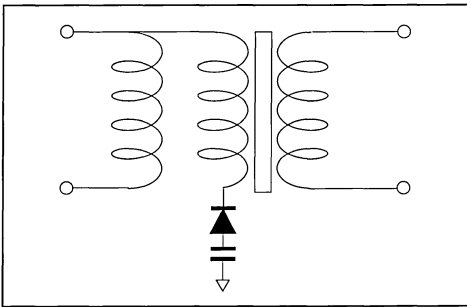
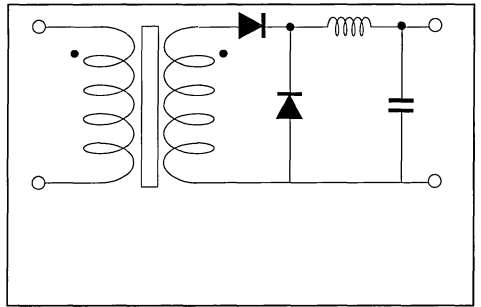
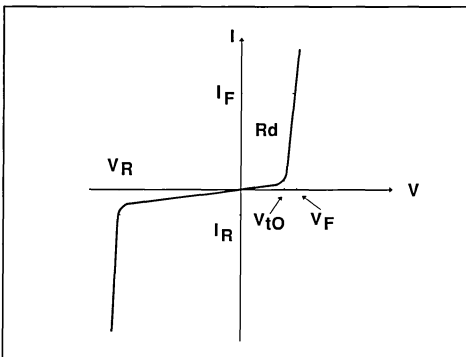


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{10} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{10} = 1.52 \text{ V}$$

$$R_d = 0.015 \text{ Ohm}$$

(Max values at 125°C, suitable for I_{peak} < 3.I_{F(av)})

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS

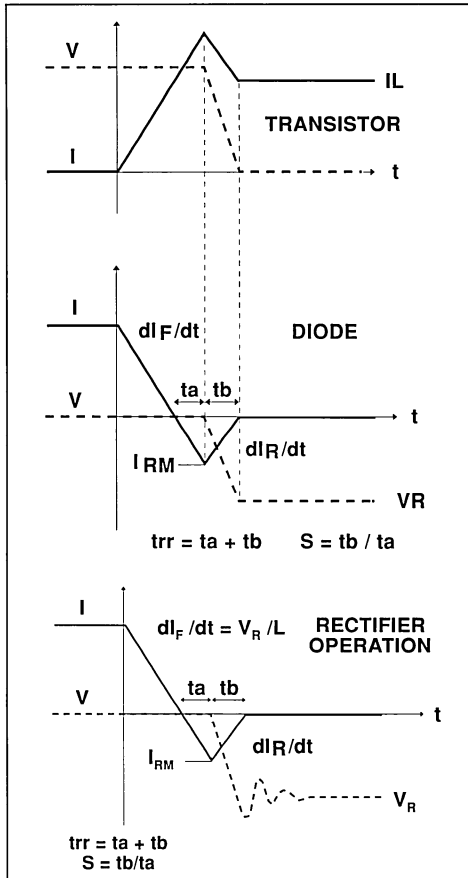
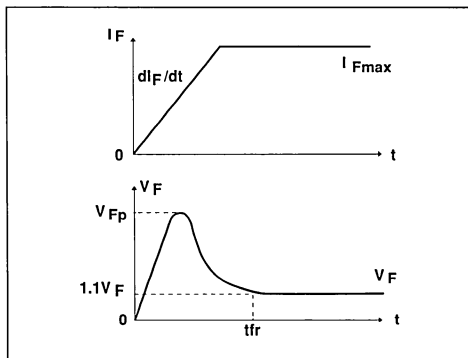


Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3, P3' and P5 are suitable for power MOSFET and IGBT

Turn-on losses :
 $P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

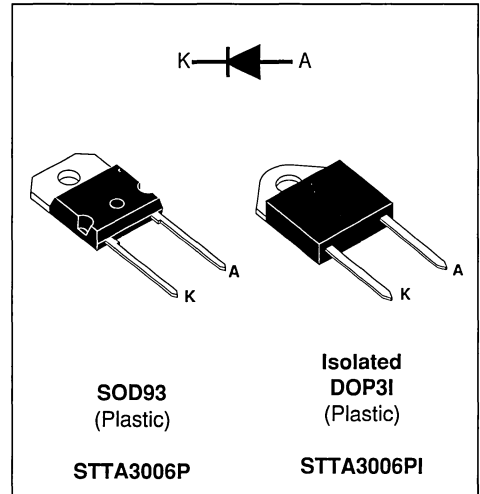
$I_{F(AV)}$	30A
V_{RRM}	600V
t_{rr} (typ)	35ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient



in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries. Packaged in SOD93 and in isolated DOP31, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5 kHz$)	300	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTA3006P STTA3006PI	1.2 1.8	°C/W
P_1	Conduction power dissipation (see fig. 2)	$I_{F(AV)} = 30A$ $\delta = 0.5$ STTA 3006P $T_c = 85^\circ C$ STTA3006PI $T_c = 52^\circ C$	54	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTA 3006P $T_c = 78^\circ C$ STTA3006PI $T_c = 42^\circ C$	60	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 30A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			1.75 1.5	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			150 8	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		35	65	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 30A$ $di_F/dt = -240 A/\mu s$ $di_F/dt = -500 A/\mu s$		20	19	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 30A$ $di_F/dt = -500 A/\mu s$		0.40		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 30A$, $di_F/dt = 240 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			600	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 30A$, $di_F/dt = 240 A/\mu s$			12	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application. The way of calculating the power losses is given below:

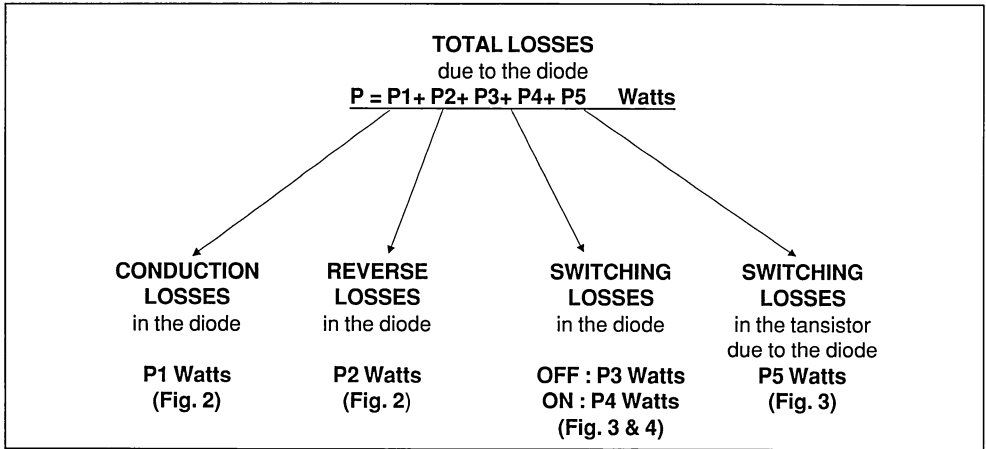
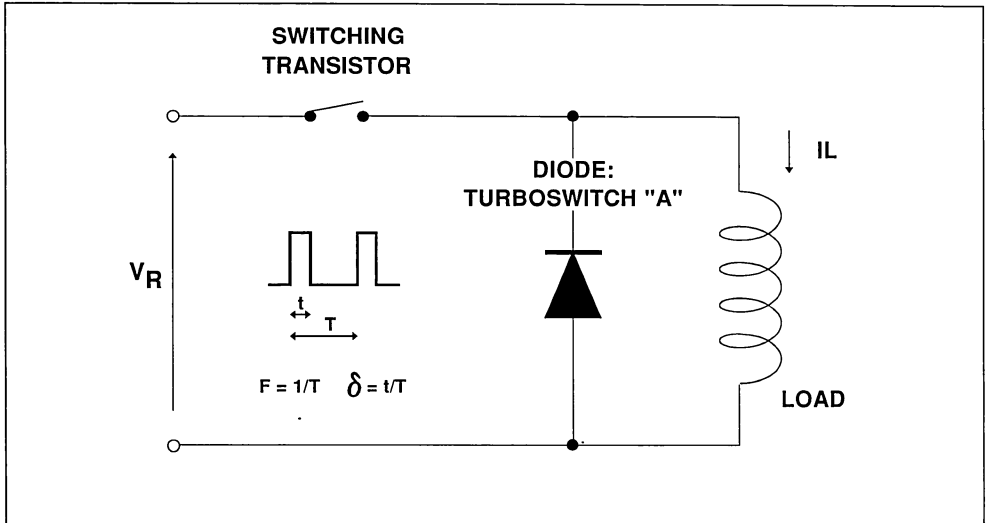
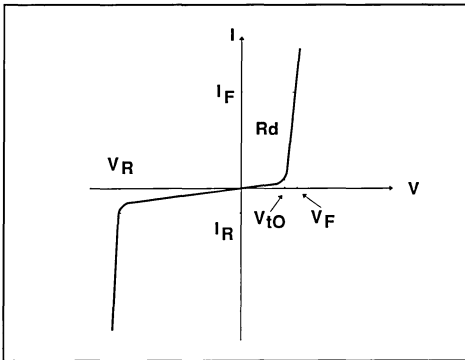


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_{F(AV)} + R_d \cdot I_{F(RMS)}^2$$

with

$$V_{t0} = 1.15 \text{ V}$$

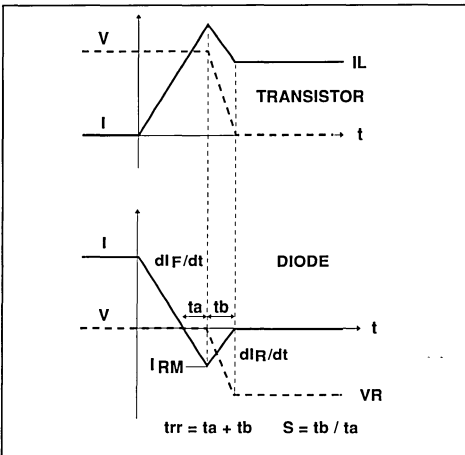
$$R_d = 0.011 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

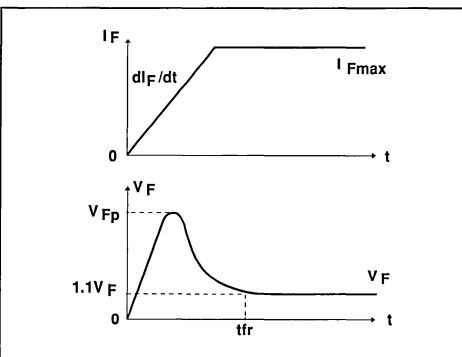
$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 5 : Conduction losses versus average current

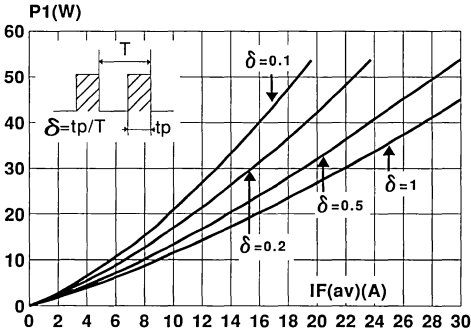


Fig 6 : Switching OFF losses versus dI/dt

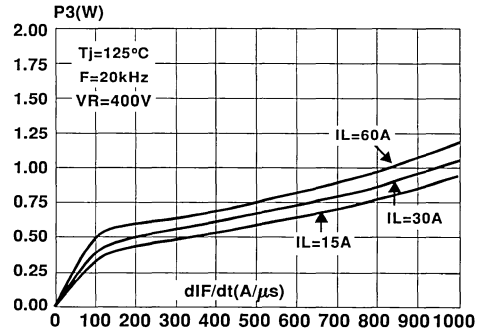


Fig 7 : Switching ON losses versus dI/dt

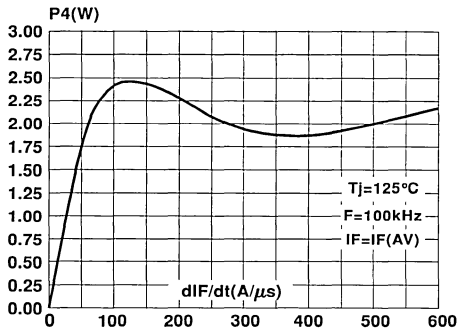


Fig 8 : Switching losses in transistor due to the diode

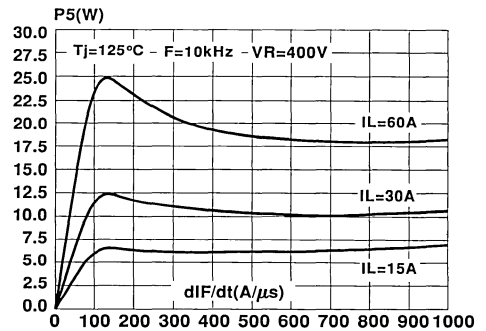


Fig 9 : Forward voltage drop versus forward current

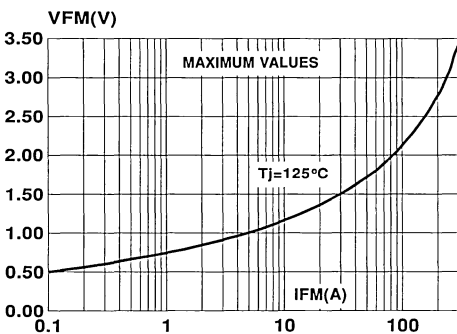


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

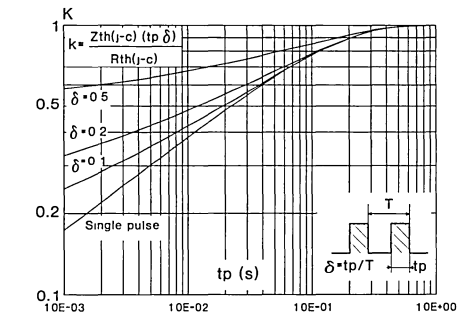


Fig 11 : Peak reverse recovery current versus dI_F/dt

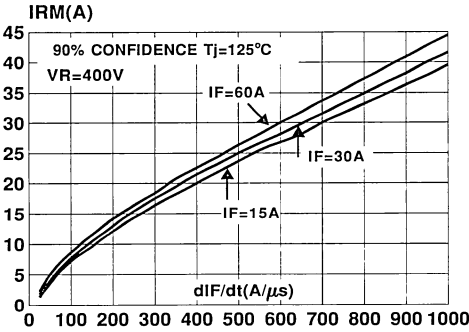


Fig 12 : Reverse recovery time versus dI_F/dt

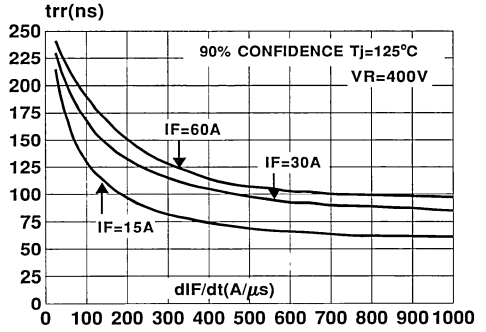


Fig 13 : Softness factor (tb/ta) versus dI_F/dt

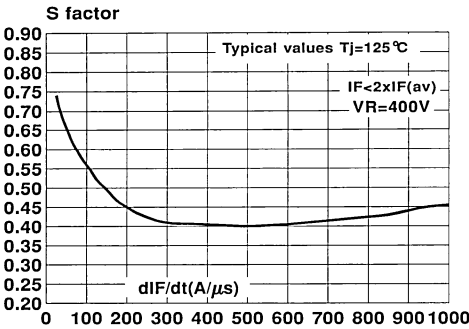


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_J=125^\circ\text{C}$)

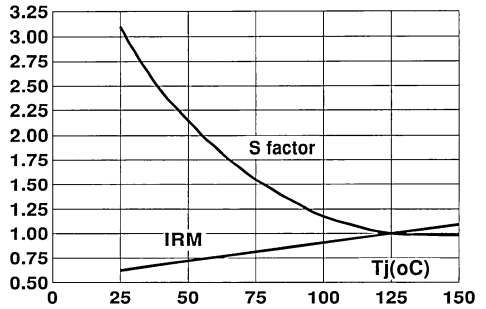


Fig 15 : Transient peak forward voltage versus dI_F/dt

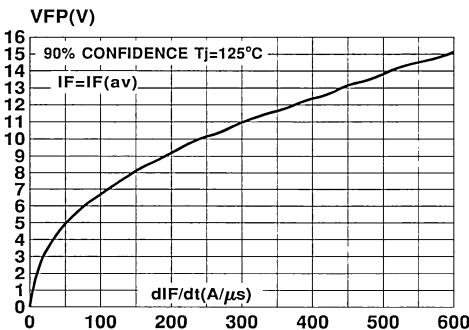
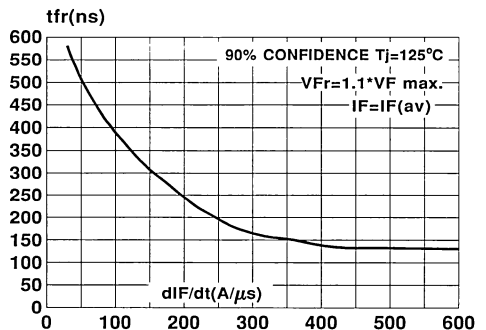


Fig 16 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ "B". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_F(AV)$	30A
V_{RRM}	600V
t_{rr} (typ)	60ns
V_F (max)	1.3V

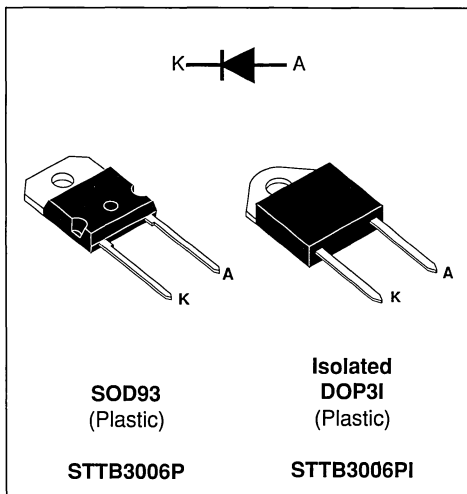
FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in SOD93 and in isolated DOP3I, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	700	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	STTB3006P STTB3006PI		$^{\circ}\text{C}/\text{W}$
P_1	Conduction power dissipation (see fig. 5)	$I_{F(AV)} = 30\text{A}$ $\delta = 0.5$ STTB3006P $T_c = 85^{\circ}\text{C}$ STTB3006PI $T_c = 45^{\circ}\text{C}$		W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	STTB 3006P $T_c = ^{\circ}\text{C}$ STTB3006PI $T_c = ^{\circ}\text{C}$		W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 30\text{A}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			1.4 1.3	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^{\circ}\text{C}$ $T_j = 125^{\circ}\text{C}$			150 5.0	μA mA

Test pulses widths : * $t_p = 380 \mu\text{s}$, duty cycle < 2%** $t_p = 5 \text{ms}$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 0.5 \text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$ $I_F = 1 \text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$ $V_R = 30\text{V}$		60	110	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 30\text{A}$ $di_F/dt = -240 \text{A}/\mu\text{s}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		TBD	TBD	A
S factor	Softness factor	$T_j = 125^{\circ}\text{C}$ $V_R = 400\text{V}$ $I_F = 30\text{A}$ $di_F/dt = -500 \text{A}/\mu\text{s}$		TBD		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$ $I_F = 30 \text{A}$, $di_F/dt = 240 \text{A}/\mu\text{s}$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{FP}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$ $I_F = 30\text{A}$, $di_F/dt = 240 \text{A}/\mu\text{s}$ $I_F = 150\text{A}$, $di_F/dt = 500 \text{A}/\mu\text{s}$		TBD	TBD	V

TBD : To Be Defined

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagne-

tization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

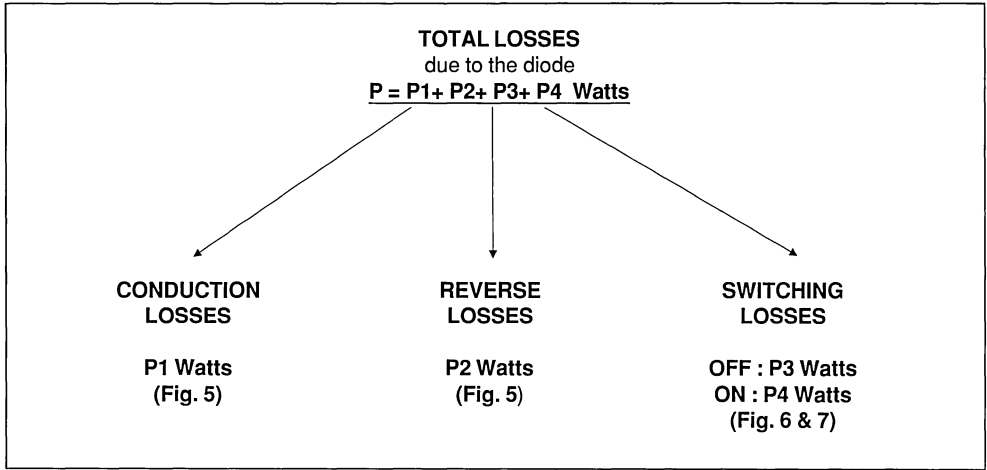


Fig. 1 : SNUBBER DIODE.

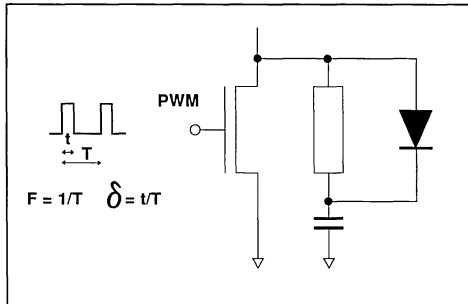


Fig. 2 : CLAMPING DIODE.

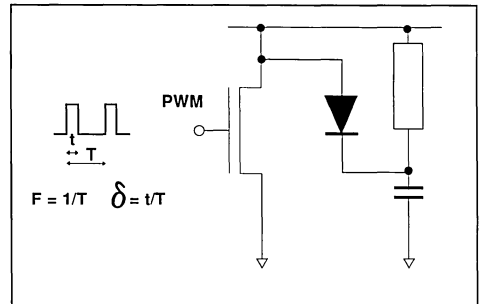


Fig. 3 : DEMAGNETIZING DIODE.

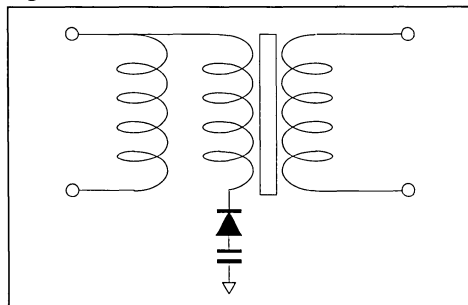
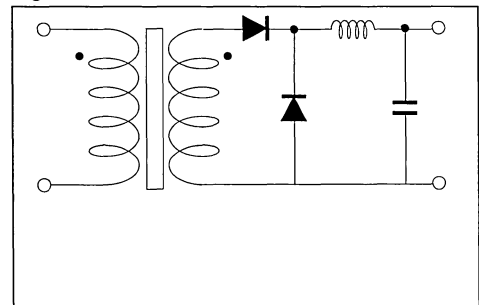
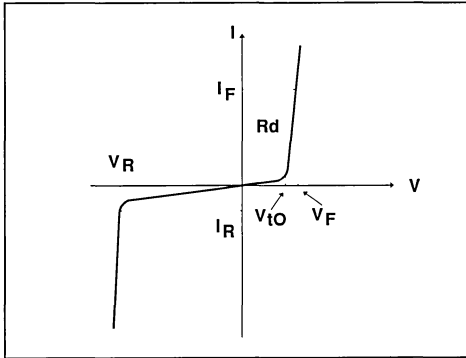


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

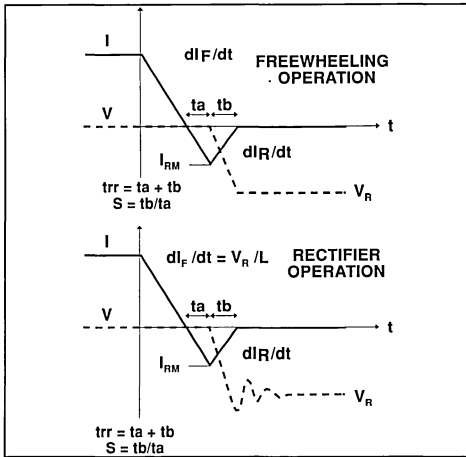
$$R_d = 0.010 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

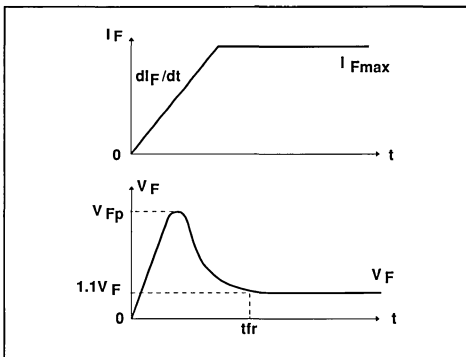
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

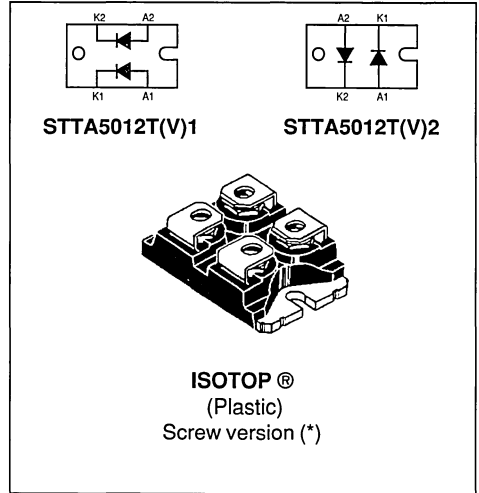
$I_{F(AV)}$	25A
V_{RRM}	1200V
t_{rr} (typ)	65ns
V_F (max)	1.85V

FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in ISOTOP®, this 1200V device is particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	300	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

(*) : Tin plated Fast-on version is also available (Without V suffix)

TM : ISOTOP and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	Per diode	1.4	°C/W
		Total	0.75	
		Coupling	0.1	
P_1	Conduction power dissipation (see fig. 6)	$I_F(AV) = 25A$ $\delta = 0.5$ Per diode $T_c = 70^\circ C$	57	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	Per diode $T_c = 62^\circ C$	62.5	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 25A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			2.1 1.9	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			150 8	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		60	110	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 25A$ $di_F/dt = -200 A/\mu s$ $di_F/dt = -500 A/\mu s$		TBD	TBD	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 25A$ $di_F/dt = -500 A/\mu s$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 25 A$, $di_F/dt = 200 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 25A$, $di_F/dt = 200 A/\mu s$ $I_F = 40A$, $di_F/dt = 500 A/\mu s$			TBD TBD	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below :

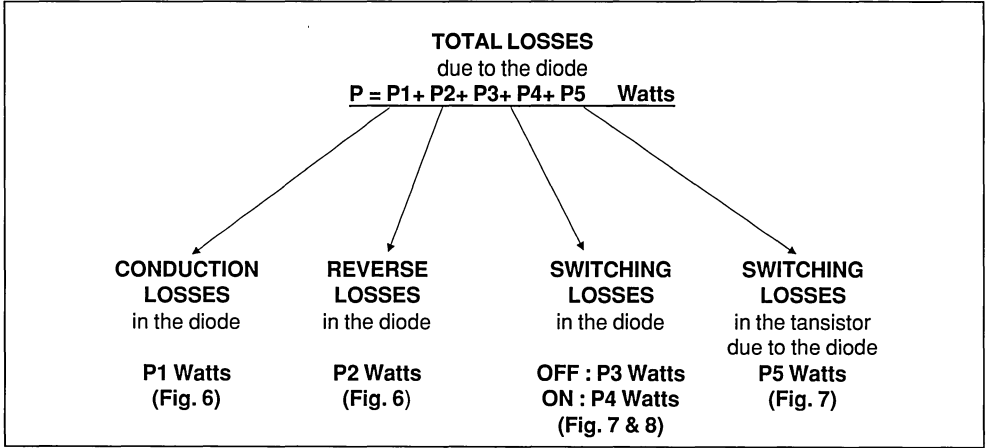


Fig. 1 : "FREEWHEEL" MODE.

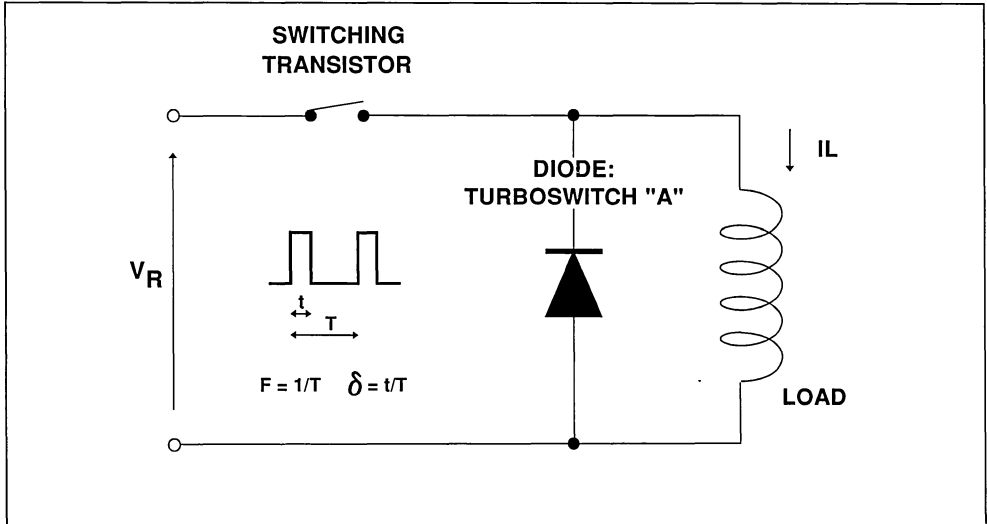


Fig. 2 : SNUBBER DIODE.

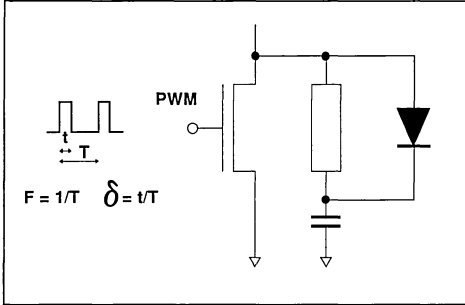


Fig. 3 : CLAMPING DIODE.

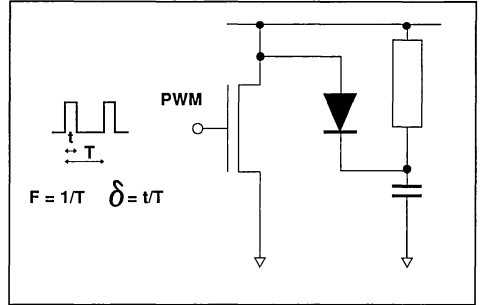


Fig. 4 : DEMAGNETIZING DIODE.

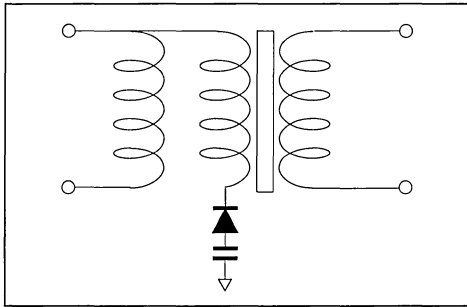
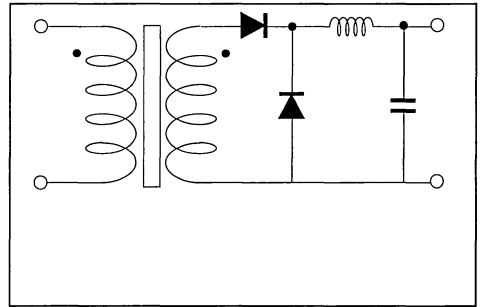
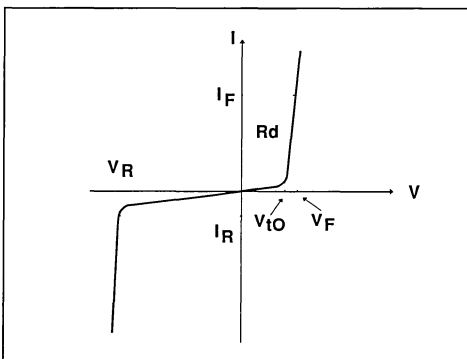


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.52 \text{ V}$$

$$R_d = 0.015 \text{ Ohm}$$

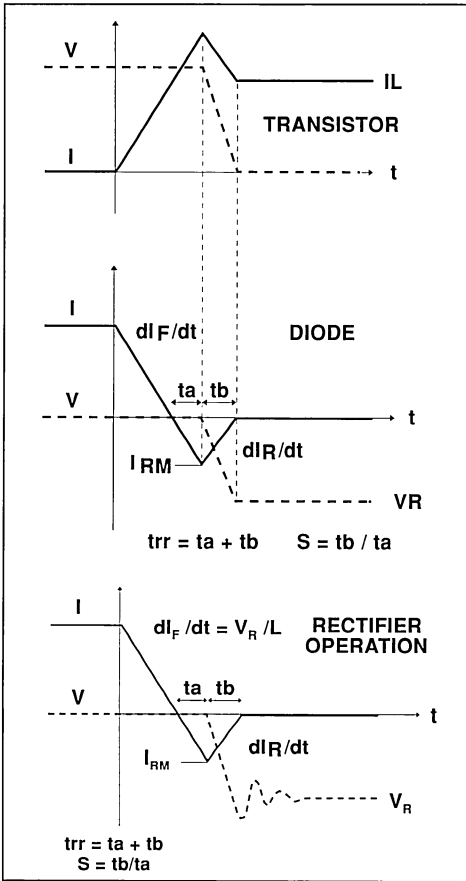
(Max values at 125°C, suitable for $I_{peak} < 3 \cdot I_{F(av)}$)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

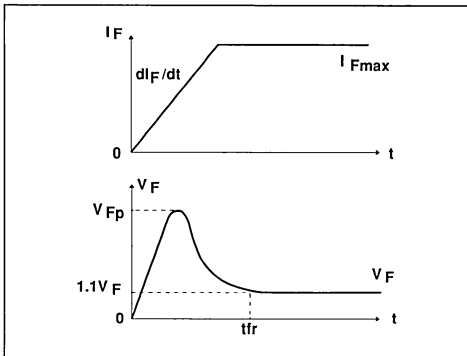
$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3,P3' and P5 are suitable for power MOSFET and IGBT

Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
 $P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

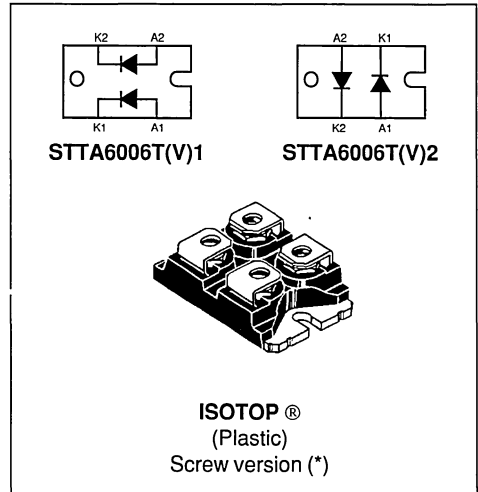
$I_{F(AV)}$	2*30A
V_{RRM}	600V
t_{rr} (typ)	35ns
V_F (max)	1.5V

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode
- ULTRA-FAST RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient



in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries. Packaged in ISOTOP, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage.	600	V
V_{RSM}	Non repetitive peak reverse voltage.	600	V
$I_{F(RMS)}$	RMS forward current.	50	A
I_{FRM}	Repetitive peak forward current (tp = 5 μ s, f = 5kHz)	300	A
T_j	Max operating junction temperature.	-65 to 150	°C
T_{stg}	Storage temperature.	-65 to 150	°C

(*): Tin plated Fast-on version is also available (without V suffix).

TM - ISOTOP and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	Per diode	1.4	°C/W
		Total	0.75	
		Coupling	0.1	
P_1	Conduction power dissipation (see fig. 2)	Per diode $I_{F(AV)} = 30A$ $\delta = 0.5$ $T_c = 74^\circ C$	54	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	Per diode $T_c = 66^\circ C$	60	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 30A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			1.75 1.5	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			150 8	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1 A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		35	65	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 30A$ $di_F/dt = -240 A/\mu s$ $di_F/dt = -500 A/\mu s$		20	19	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 30A$ $di_F/dt = -500 A/\mu s$		0.40		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 30A$, $di_F/dt = 240 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			600	ns
V_{FP}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 30A$, $di_F/dt = 240 A/\mu s$			12	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below:

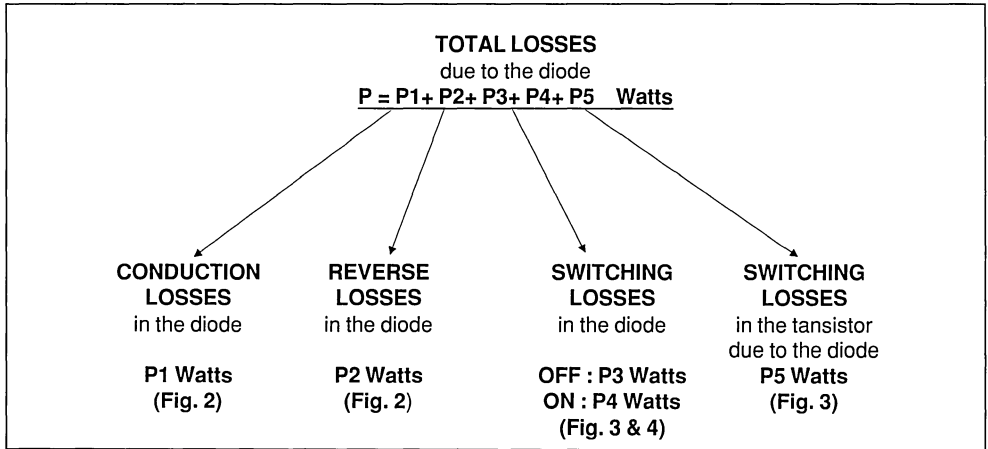
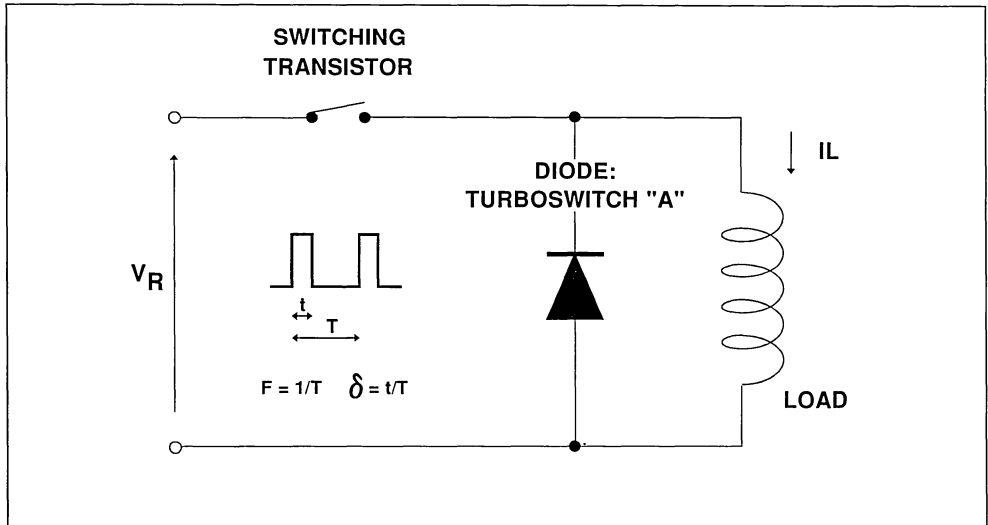
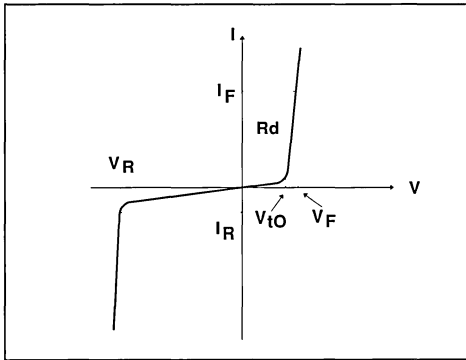


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 \text{ V}$$

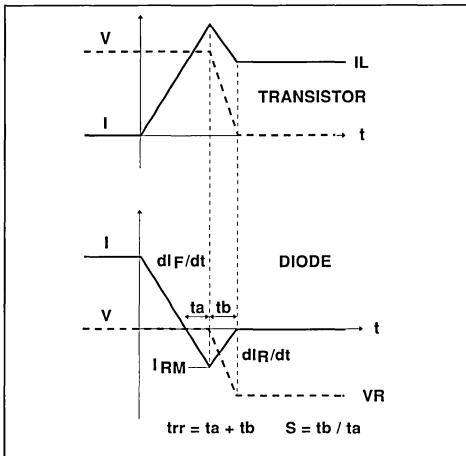
$$R_d = 0.011 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt}$$

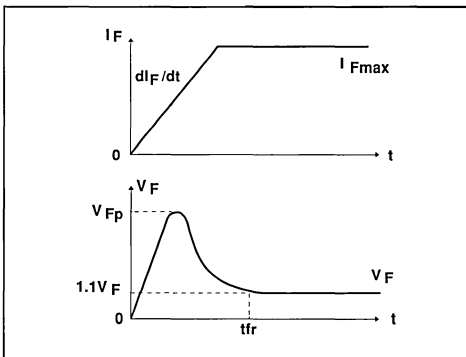
$$+ \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 5 : Conduction losses versus average current

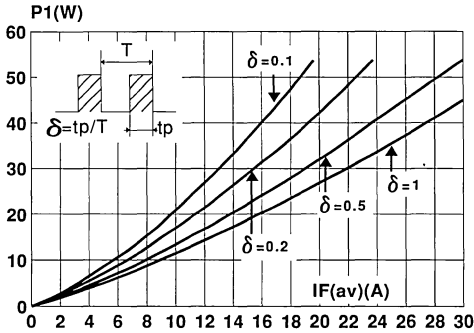


Fig 6 : Switching OFF losses versus dIF/dt

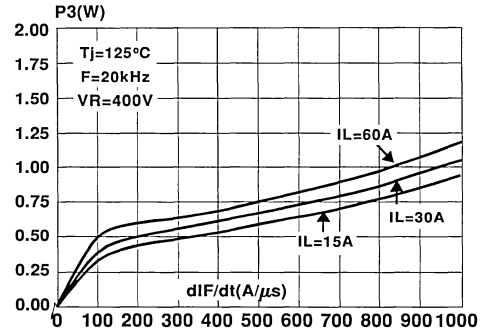


Fig 7 : Switching ON losses versus dIF/dt

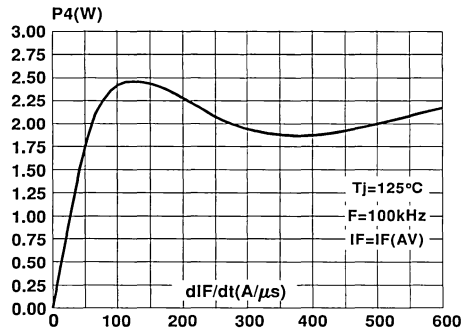


Fig 8 : Switching losses in transistor due to the diode

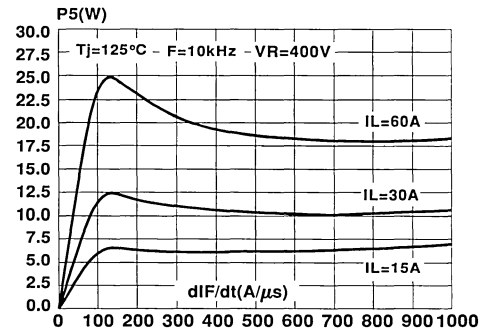


Fig 9 : Forward voltage drop versus forward current

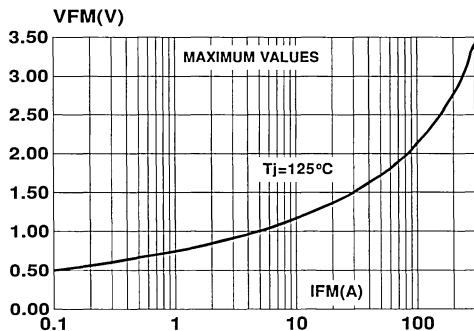


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

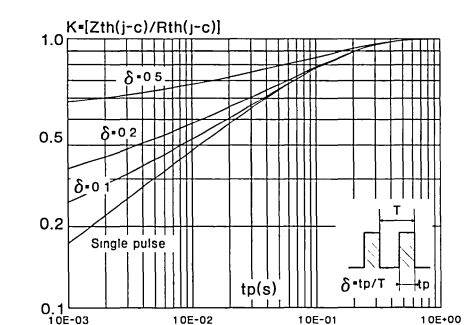


Fig 11 : Peak reverse recovery current versus dI_F/dt

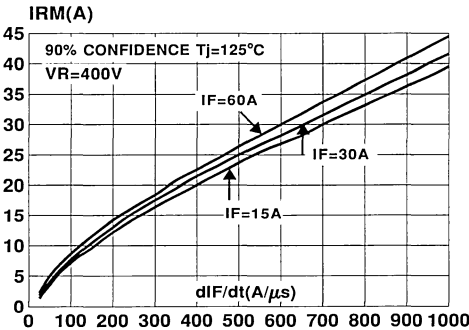


Fig 12 : Reverse recovery time versus dI_F/dt

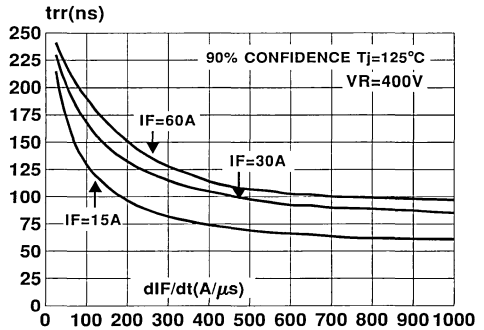


Fig 13 : Softness factor (tb/ta) versus dI_F/dt

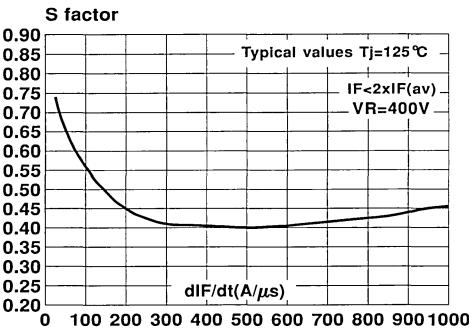


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

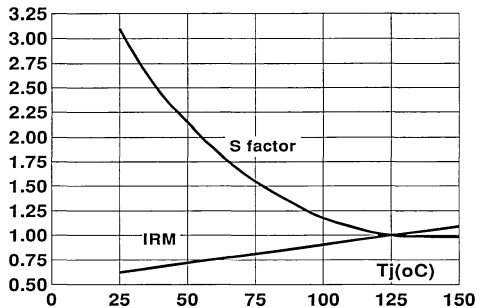


Fig 15 : Transient peak forward voltage versus dI_F/dt

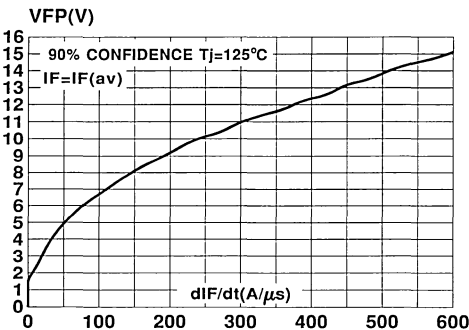
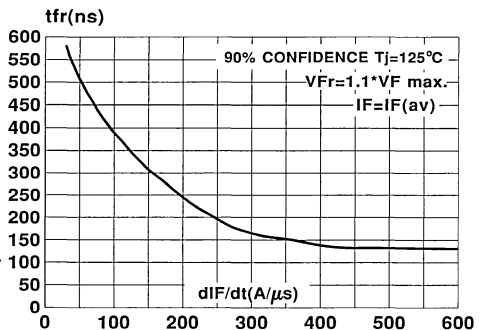


Fig 16 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ “B”. ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

$I_F(AV)$	2*30A
V_{RRM}	600V
t_{rr} (typ)	60ns
V_F (max)	1.3V

FEATURES AND BENEFITS

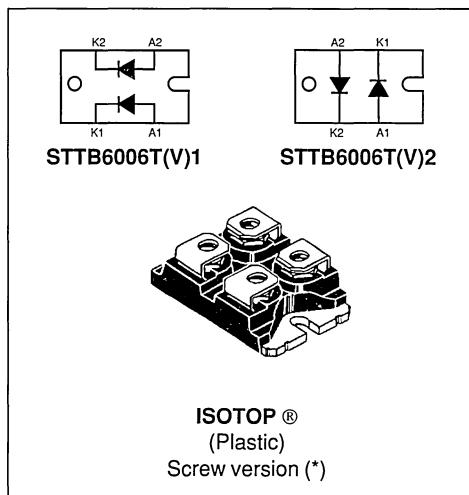
- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes.

They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes.

Packaged in ISOTOP these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	50	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 kHz$)	700	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

(*) : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	Per diode		°C/W
		Total		
		Coupling		
P_1	Conduction power dissipation (see fig. 5)	Per diode $I_{F(AV)} = 30A$ $\delta = 0.5$ $T_c = 74^\circ C$		W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	Per diode $T_c = 66^\circ C$		W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward voltage drop	$I_F = 30A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			1.4 1.3	V V
I_R **	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			150 5	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		60	110	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 30A$ $di_F/dt = -240 A/\mu s$ $di_F/dt = -500 A/\mu s$		TBD	TBD	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 30A$ $di_F/dt = -240 A/\mu s$ $di_F/dt = -500 A/\mu s$		TBD TBD		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 30 A$, $di_F/dt = 240 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 30A$, $di_F/dt = 240 A/\mu s$ $I_F = 150A$, $di_F/dt = 500 A/\mu s$		TBD	TBD	V

TBD : To Be Defined

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping,

demagnetization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

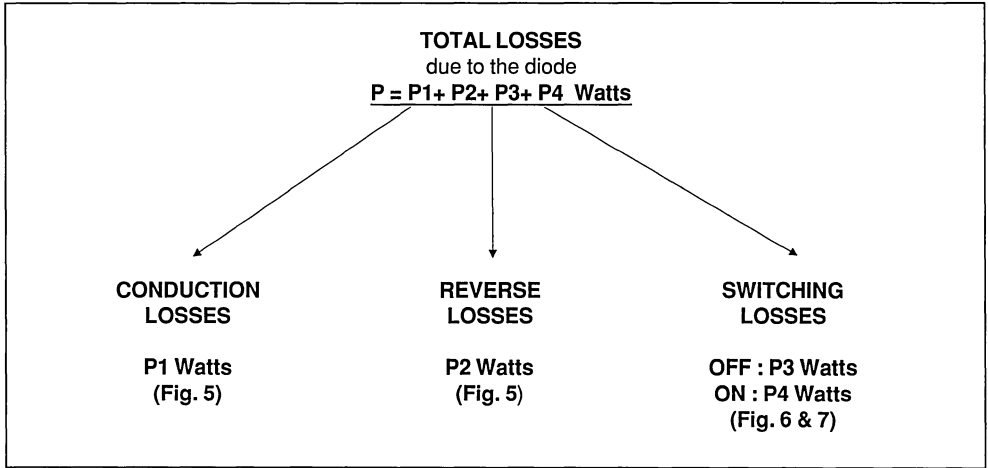


Fig. 1 : SNUBBER DIODE.

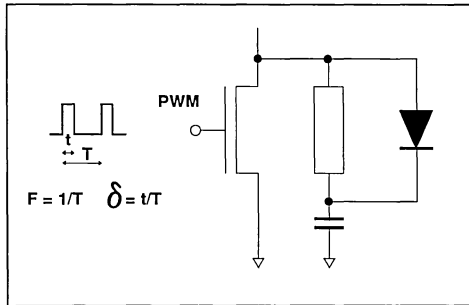


Fig. 2 : CLAMPING DIODE.

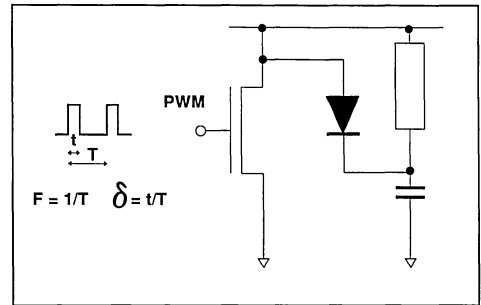


Fig. 3 : DEMAGNETIZING DIODE.

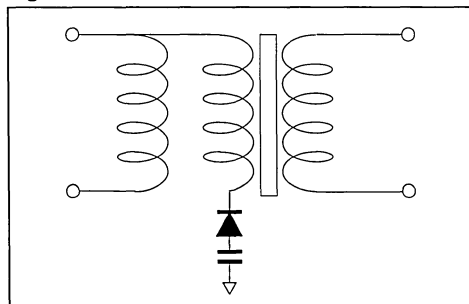
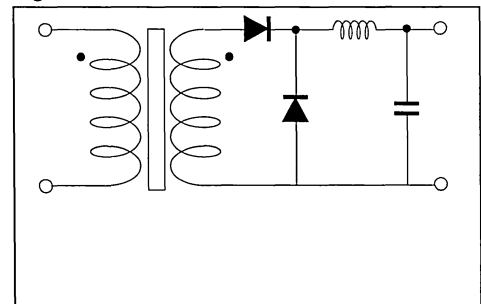
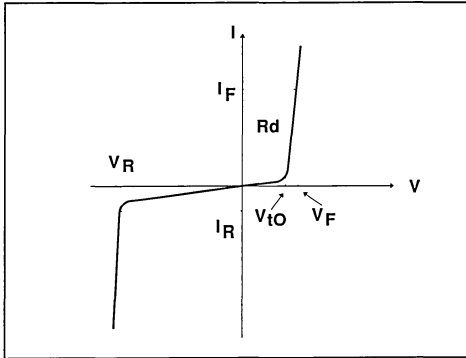


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{I0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{I0} = 1.00 \text{ V}$$

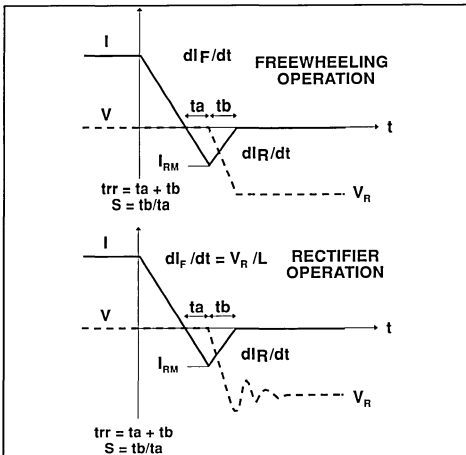
$$R_d = 0.010 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

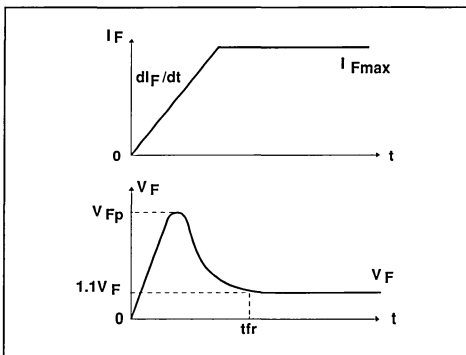
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

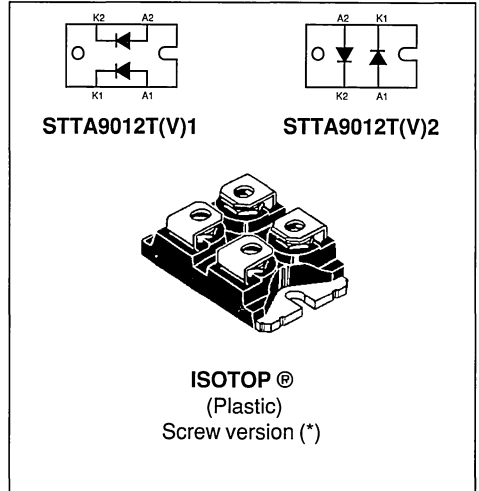
$I_F(AV)$	45A
V_{RRM}	1200V
t_{rr} (typ)	65ns
V_F (max)	1.85V

FEATURES AND BENEFITS

- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V. TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "Freewheel



Mode" operations.

They are particularly suitable in Motor Control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes, and also at the secondary of SMPS as high voltage rectifier diodes.

Packaged in ISOTOP®, this 1200V device is particularly intended for use on 3 phase 400V industrial mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
V_{RSM}	Non repetitive peak reverse voltage	1200	V
$I_F(RMS)$	RMS forward current	150	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 5kHz$)	900	A
T_j	Max operating junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

(*) : Tin plated Fast-on version is also available (Without V suffix).

TM : ISOTOP and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	Per diode	0.85	°C/W
		Total	0.48	
		Coupling	0.1	
P_1	Conduction power dissipation (see fig. 6)	$I_{F(AV)} = 45A$ $\delta = 0.5$ Per diode $T_c = 70^\circ C$	94	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	Per diode $T_c = 62^\circ C$	104	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.6)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 45A$	$T_j = 25^\circ C$			2.05	V
			$T_j = 125^\circ C$			1.85	V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$			200	μA
			$T_j = 125^\circ C$			12	mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1 A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		65	115	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 45A$ $di_F/dt = -360 A/\mu s$ $di_F/dt = -500 A/\mu s$		TBD	TBD	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 600V$ $I_F = 45A$ $di_F/dt = -500 A/\mu s$		1.2		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 45 A$, $di_F/dt = 360 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{FP}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 45A$, $di_F/dt = 360 A/\mu s$ $I_F = 40A$, $di_F/dt = 500 A/\mu s$			TBD TBD	V

APPLICATION DATA

The 1200V TURBOSWITCH series has been designed to provide the lowest overall power losses in all high frequency or high pulsed current operations. In such applications (Fig 1 to 5), the way of calculating the power losses is given below :

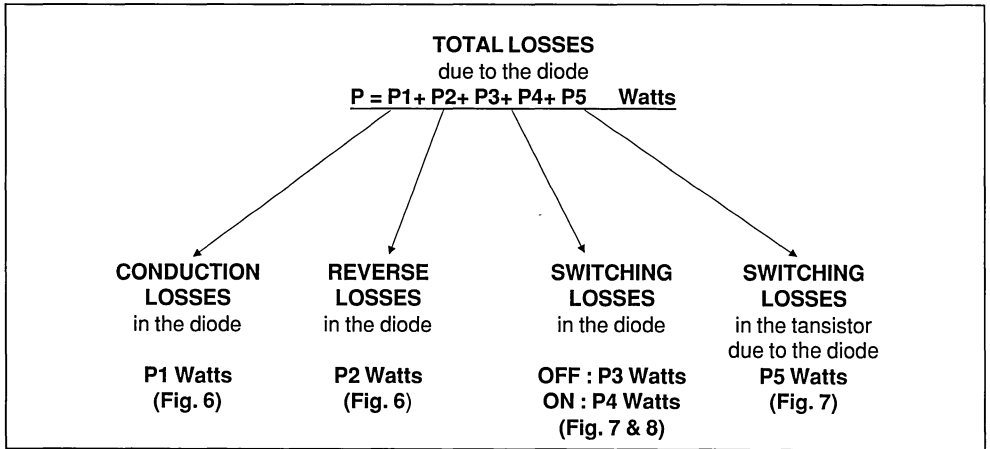


Fig. 1 : "FREEWHEEL" MODE.

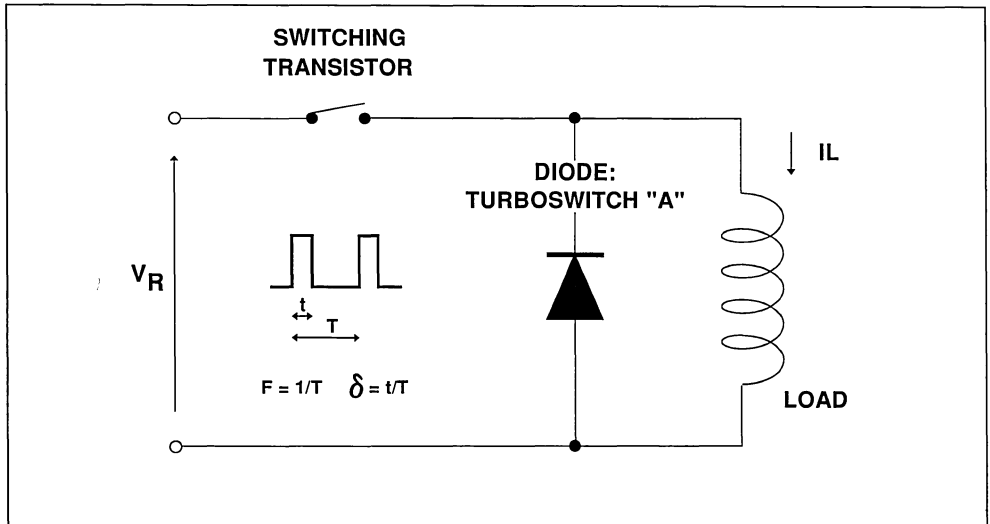


Fig. 2 : SNUBBER DIODE.

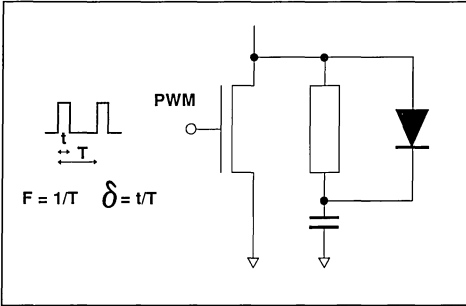


Fig. 3 : CLAMPING DIODE.

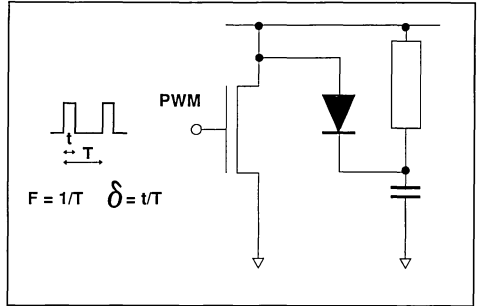


Fig. 4 : DEMAGNETIZING DIODE.

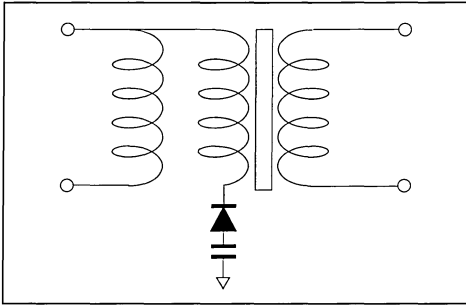
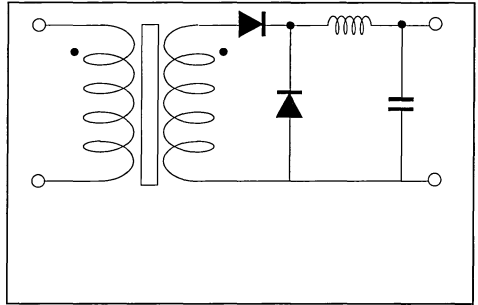
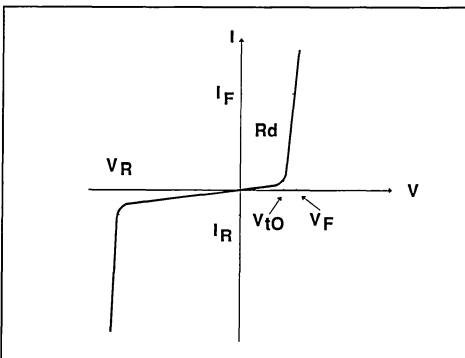


Fig. 5 : RECTIFIER DIODE.



STATIC & DYNAMIC CHARACTERISTICS . POWER LOSSES .

Fig. 6 : STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.57 \text{ V}$$

$$R_d = 0.006 \text{ Ohm}$$

(Max values at 125°C, suitable for Ipeak < 3.IF(av))

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-OFF CHARACTERISTICS

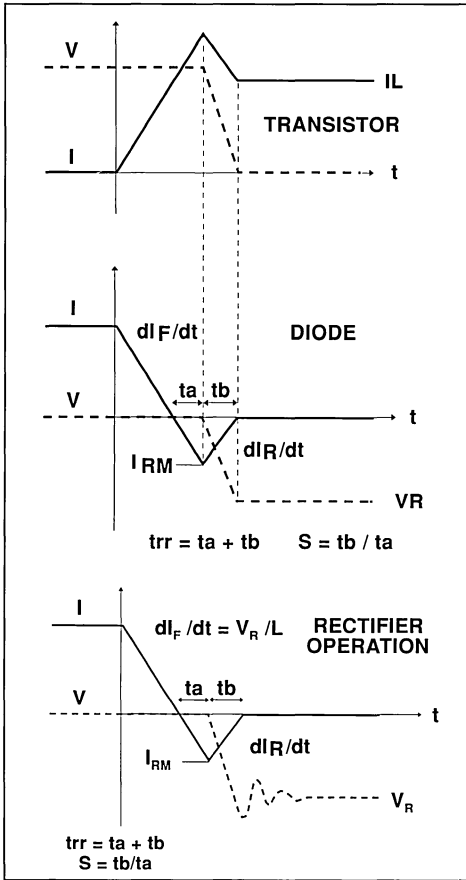
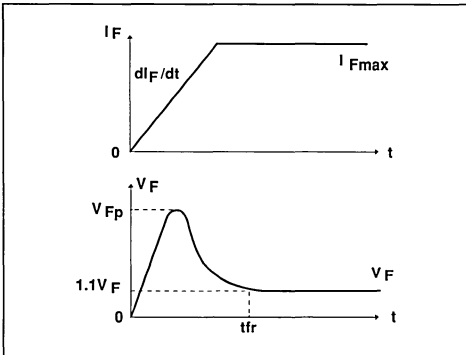


Fig. 8: TURN-ON CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

Turn-off losses :
(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

$P3, P3'$ and $P5$ are suitable for power MOSFET and IGBT

Turn-on losses :
 $P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$

TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	2*60A
V_{RRM}	600V
t_{rr} (typ)	45ns
V_F (max)	1.5V

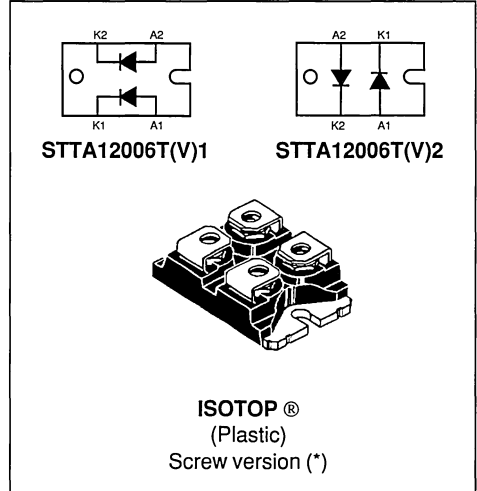
FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: Freewheel or Booster Diode.
- ULTRA-FAST RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR.
- HIGH FREQUENCY OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, A family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient



in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuits.

Packaged in ISOTOP, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	Per diode 150	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s, f = 5 kHz$)	Per diode 450	A
T_j	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

(*) : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	Per diode	085	°C/W
		Total	0.47	
		Coupling	0.1	
P_1	Conduction power dissipation (see fig. 2)	Per diode $I_{F(AV)} = 60A$ $\delta = 0.5$ $T_c = 58^\circ C$	108	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	Per diode $T_c = 48^\circ C$	120	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 60A$ $T_j = 25^\circ C$ $T_j = 125^\circ C$			1.75 1.5	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$ $T_j = 25^\circ C$ $T_j = 125^\circ C$			200 12	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1 A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		45	80	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 60A$ $di_F/dt = -480 A/\mu s$ $di_F/dt = -500 A/\mu s$		24	38	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 60A$ $di_F/dt = -500 A/\mu s$		0.37		/

TURN-ON SWITCHING (see Fig.4)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 60 A$, $di_F/dt = 480 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			700	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 60A$, $di_F/dt = 480 A/\mu s$			14	V

APPLICATION DATA

The TURBOSWITCH "A" is especially designed to provide the lowest overall power losses in any "FREEWHEEL Mode" application (Fig.1) considering both the diode and the companion

transistor, thus optimizing the overall performance in the end application.
The way of calculating the power losses is given below:

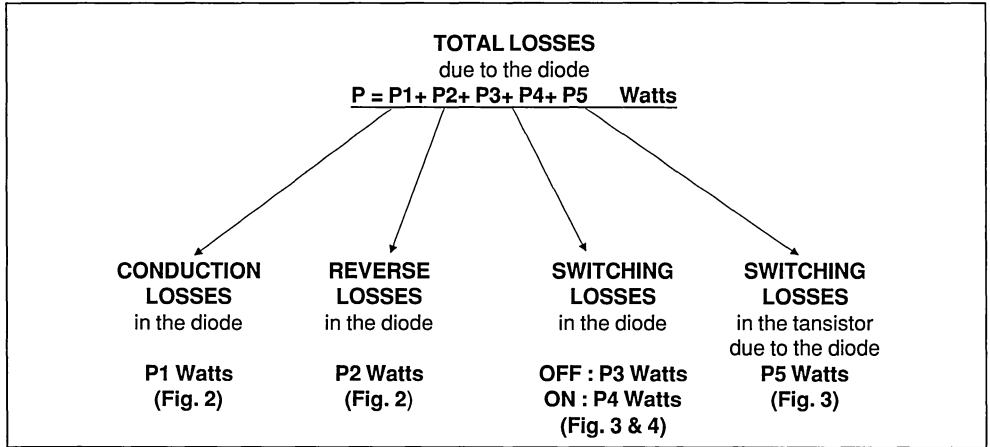
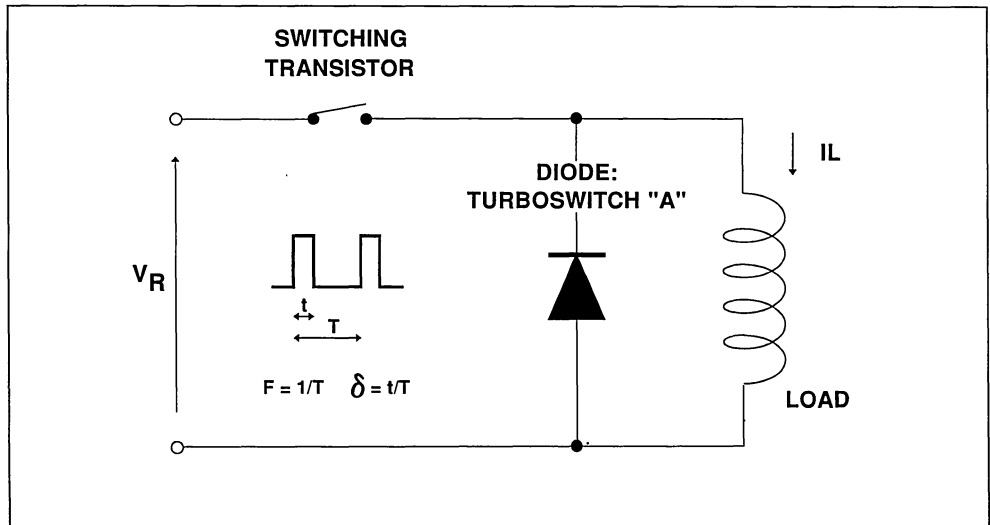
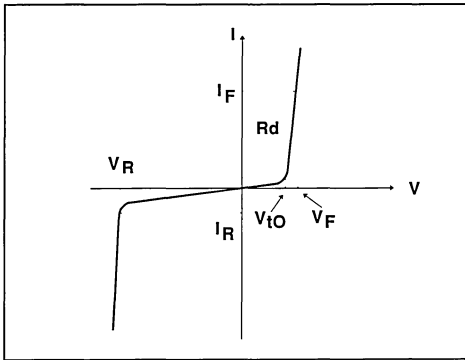


Fig. 1 : "FREEWHEEL" MODE.



APPLICATION DATA (Cont'd)

Fig. 2: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.15 \text{ V}$$

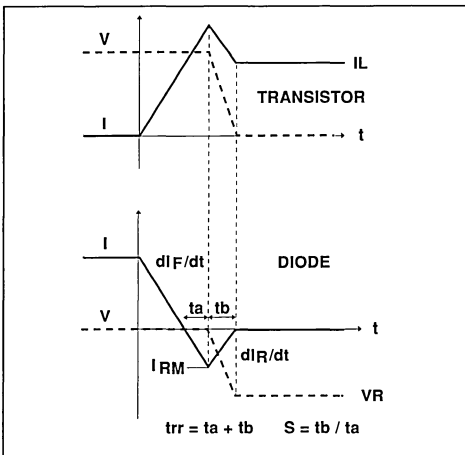
$$R_d = 0.0055 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 3: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

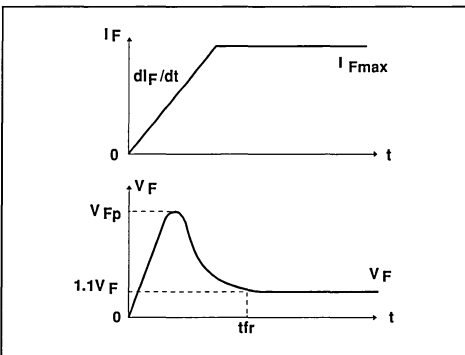
$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode) :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT

Fig. 4: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{fr} \cdot F$$

Fig 5 : Conduction losses versus average current

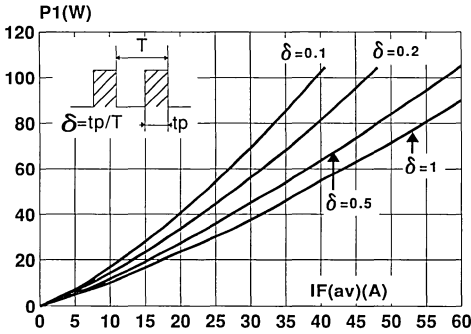


Fig 6 : Switching OFF losses versus dI/dt

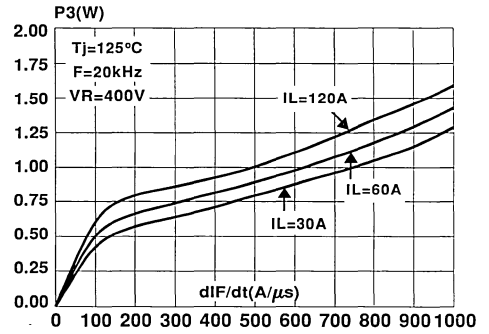


Fig 7 : Switching ON losses versus dI/dt

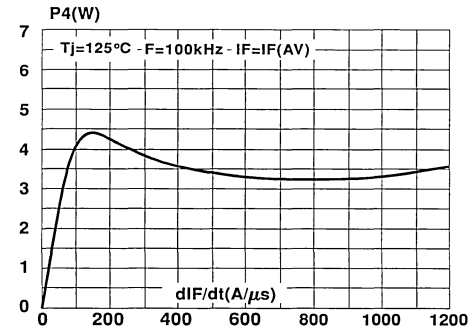


Fig 8 : Switching losses in transistor due to the diode

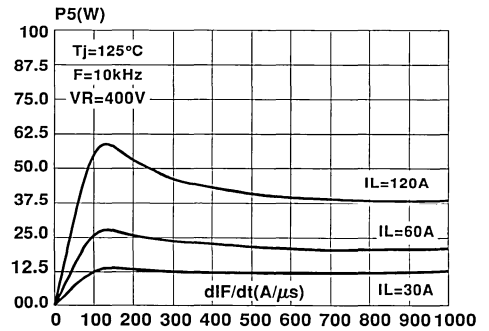


Fig 9 : Forward voltage drop versus forward current

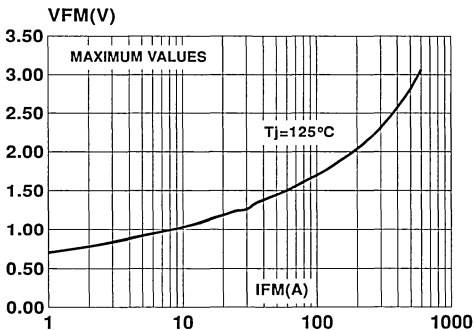


Fig 10 : Relative variation of thermal transient impedance junction to case versus pulse duration

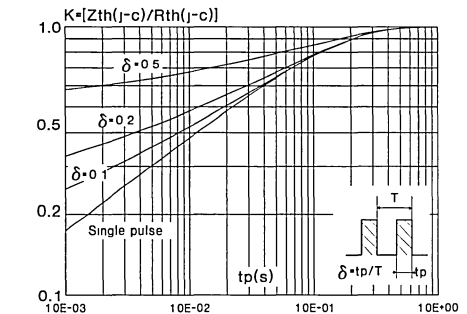


Fig 11 : Peak reverse recovery current versus dI_F/dt

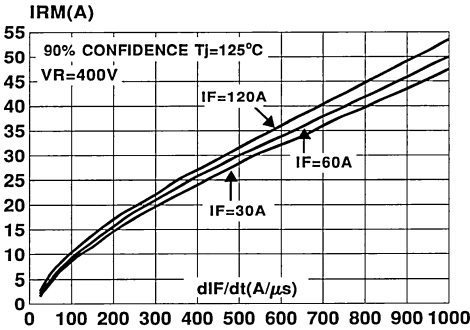


Fig 13 : Softness factor (tb/ta) versus dI_F/dt

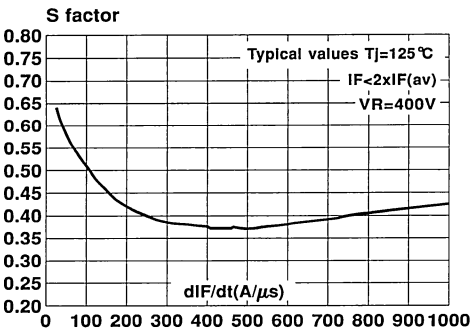


Fig 15 : Transient peak forward voltage versus dI_F/dt

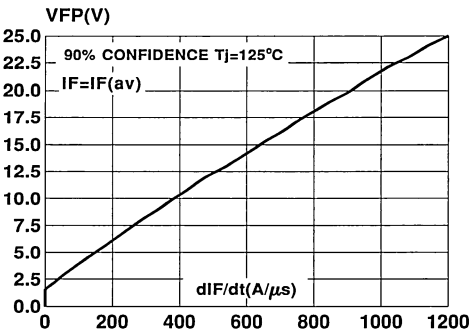


Fig 12 : Reverse recovery time versus dI_F/dt

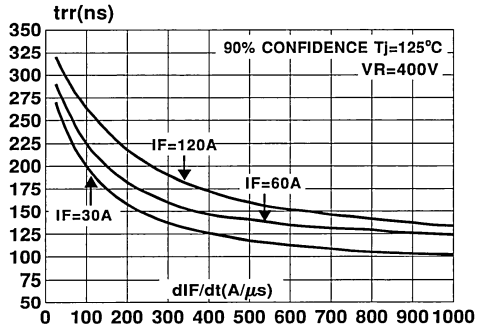


Fig 14 : Relative variation of dynamic parameters versus junction temperature (Reference $T_j=125^\circ\text{C}$)

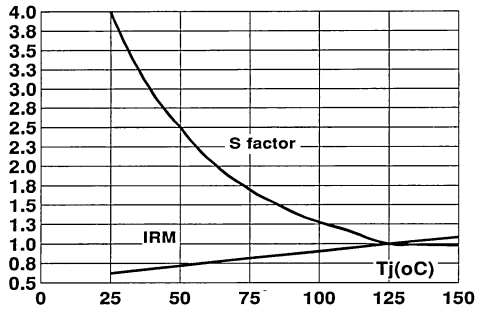
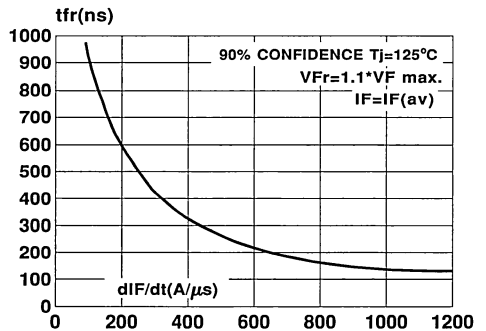


Fig 16 : Forward recovery time versus dI_F/dt



TURBOSWITCH™ “B”. ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	2*60A
V_{RRM}	600V
t_{rr} (typ)	65ns
V_F (max)	1.3V

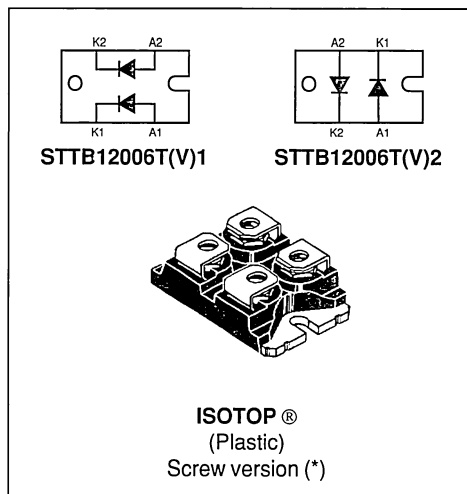
FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS: Snubbing or clamping, demagnetization and rectification.
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY.
- VERY LOW OVERALL POWER LOSSES AND PARTICULARLY LOW FORWARD VOLTAGE.
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS.

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH, B family, drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. They are particularly suitable in the primary circuit



of an SMPS as snubber, clamping or demagnetizing diodes, and also in most power converters as high performance rectifier diodes. Packaged in ISOTOP, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
V_{RSM}	Non repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	150	A
I_{FRM}	Repetitive peak forward current ($t_p = 5 \mu s$, $f = 1 \text{ kHz}$)	2100	A
T_J	Max operating junction temperature	-65 to 150	°C
T_{stg}	Storage temperature	-65 to 150	°C

(*) : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP and TURBOSWITCH are trademarks of SGS-THOMSON Microelectronics.

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	Per diode	085	°C/W
		Total	0.47	
		Coupling	0.1	
P_1	Conduction power dissipation (see fig. 5)	Per diode $I_{F(AV)} = 60A$ $\delta = 0.5$ $T_C = 58^\circ C$	108	W
P_{max}	Total power dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	Per diode $T_C = 48^\circ C$	120	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig.5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F	Forward voltage drop	$I_F = 60A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			1.4 1.3	V V
I_R	Reverse leakage current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$			200 9	μA mA

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%** $t_p = 5 ms$, duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig.6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		65	115	ns
I_{RM}	Maximum reverse recovery current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 60A$ $di_F/dt = -480 A/\mu s$			TBD	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 60A$ $di_F/dt = -500 A/\mu s$		TBD		/

TURN-ON SWITCHING (see Fig.7)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ C$ $I_F = 60 A$, $di_F/dt = 480 A/\mu s$ measured at, $1.1 \times V_{Fmax}$			TBD	ns
V_{Fp}	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 60A$, $di_F/dt = 480 A/\mu s$			TBD	V

TBD : To Be Defined

APPLICATION DATA

The TURBOSWITCH "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping,

demagnetization and rectification. In such applications (fig.1 to fig.4), the way of calculating the power losses is given below :

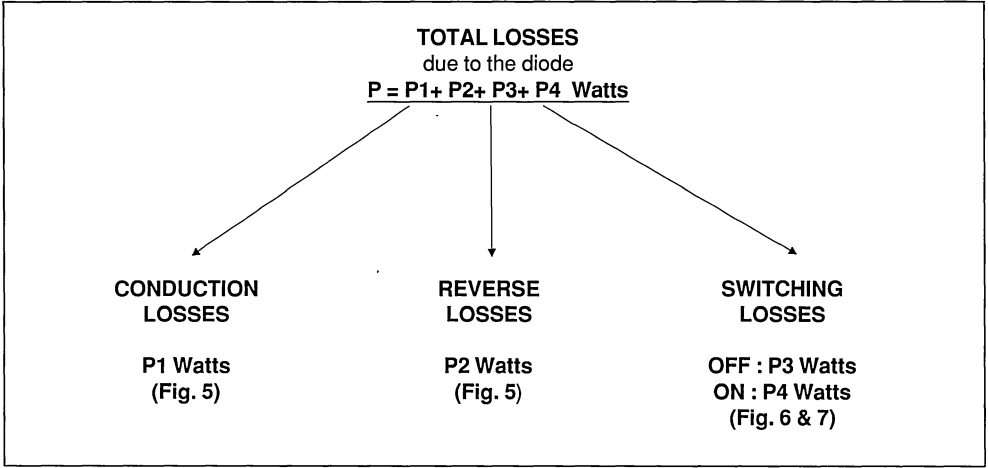


Fig. 1 : SNUBBER DIODE.

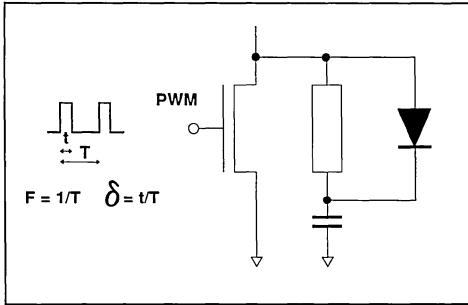


Fig. 2 : CLAMPING DIODE.

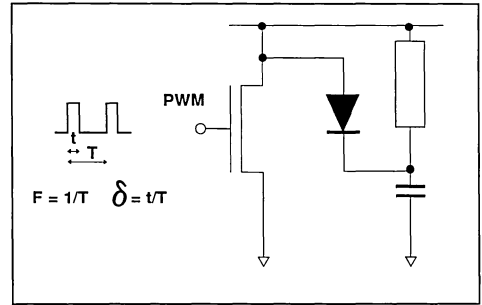


Fig. 3 : DEMAGNETIZING DIODE.

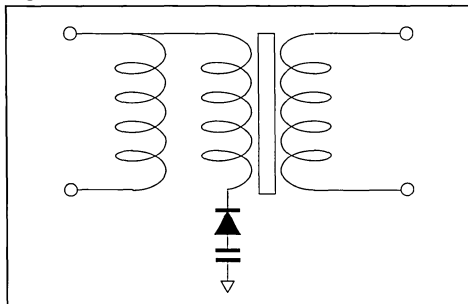
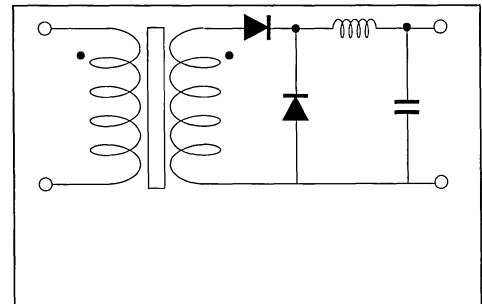
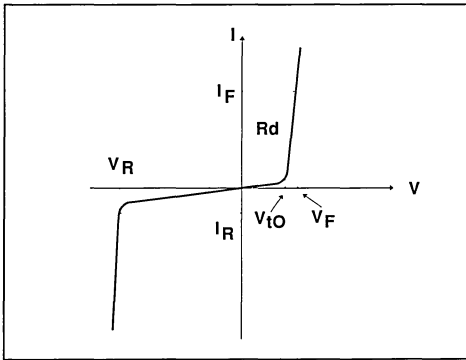


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$$P1 = V_{t0} \cdot I_F(AV) + R_d \cdot I_F^2(RMS)$$

with

$$V_{t0} = 1.00 \text{ V}$$

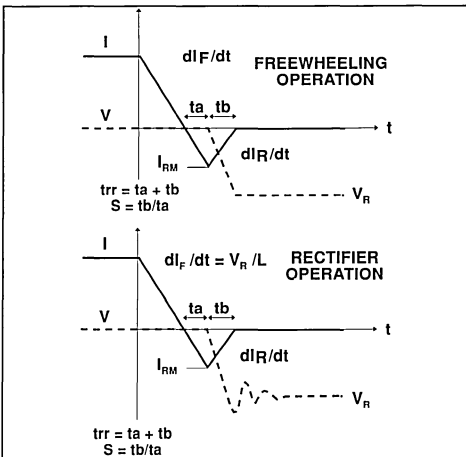
$$R_d = 0.005 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \cdot I_R \cdot (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-off losses :

$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt}$$

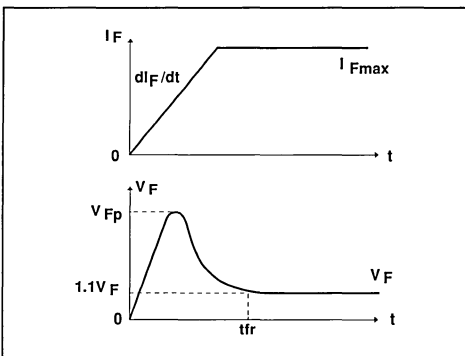
Turn-off losses :

(with non negligible serial inductance)

$$P3' = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI/dt} + \frac{L \times I_{RM}^2 \times F}{2}$$

P3 and P3' are suitable for power MOSFET and IGBT

Fig. 7: TURN-ON CHARACTERISTICS



Turn-on losses :

$$P4 = 0.4 (V_{FP} - V_F) \cdot I_{Fmax} \cdot t_{tr} \cdot F$$

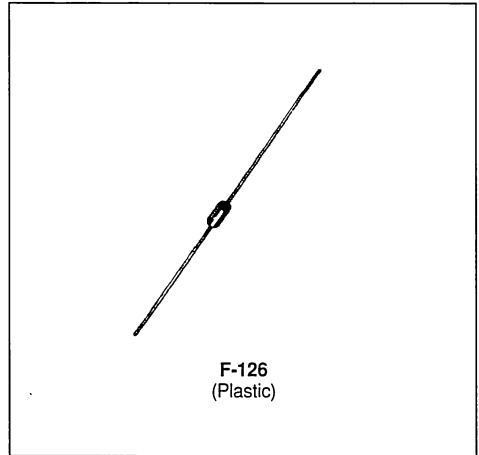
FAST RECOVERY RECTIFIER DIODES

FAST RECOVERY RECTIFIER

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTORS CIRCUITS
- RECTIFIER IN S.M.P.S.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	30	A
$I_{F(AV)}$	Average Forward Current *	$T_a = 70^\circ C$ $\delta = 0.5$	1	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	30	A
P	Power Dissipation *	$T_a = 70^\circ C$	1.33	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 01-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient *	60	$^\circ C/W$

* On infinite heatsink with 10mm lead length.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
	$T_j = 100^\circ\text{C}$				0.5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$			1.5	V
	$T_j = 100^\circ\text{C}$				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		55	ns
	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		25	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$	$I_F = 1\text{A}$		35	ns
I_{RM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$L_p \leq 0.05\mu\text{A}$	See figure 12			1.5	A

To evaluate the conduction losses use the following equations :

$$V_F = 1.05 + 0.145 I_F$$

$$P = 1.05 \times I_F(AV) + 0.145 I_F^2(RMS)$$

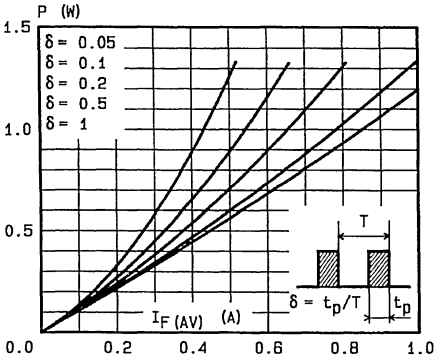


Fig.1 - Maximum average power dissipation versus average forward current.

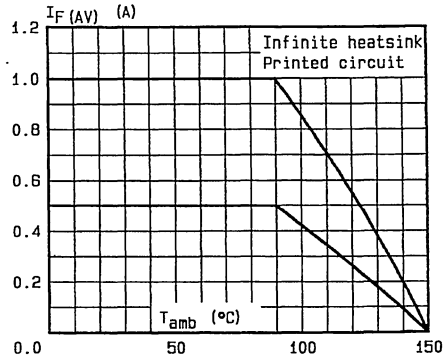


Fig.2 - Average forward current versus ambient temperature.

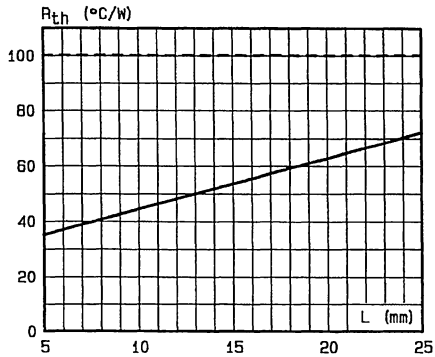


Fig.3 - Thermal resistance versus lead length.

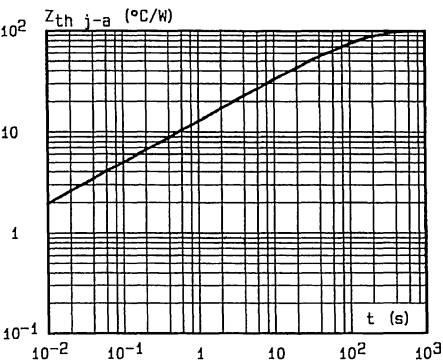
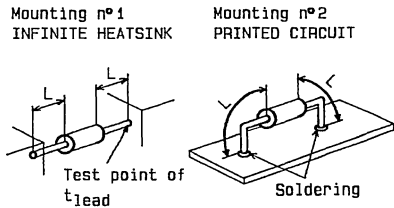


Fig.4 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

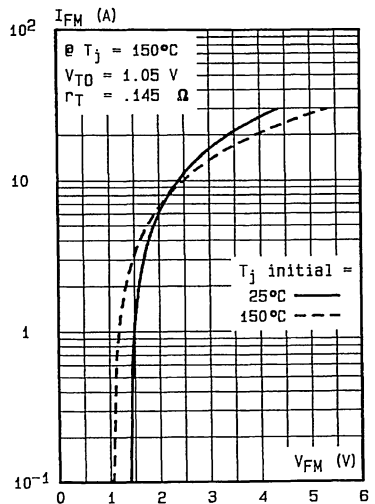


Fig.5 - Peak forward current versus peak forward voltage drop (maximum values).

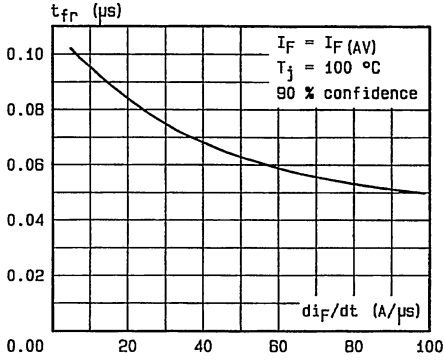


Fig.7 - Recovery time versus di_F/dt .

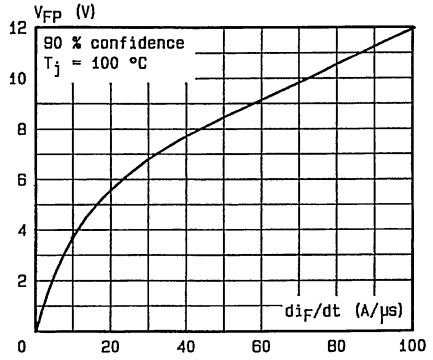


Fig.8 - Peak forward voltage versus di_F/dt .

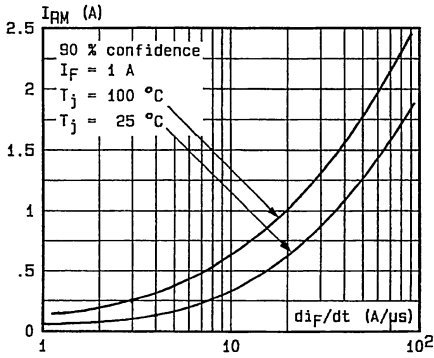


Fig.9 - Peak reverse current versus di_F/dt .

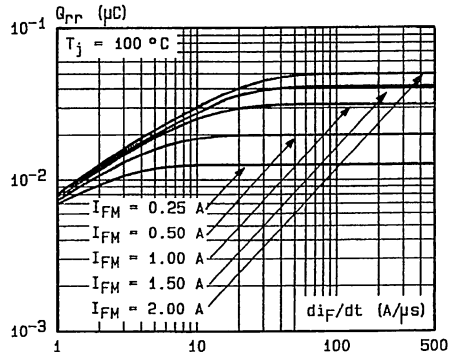


Fig.10 - Recovered charge versus di_F/dt (typical values).

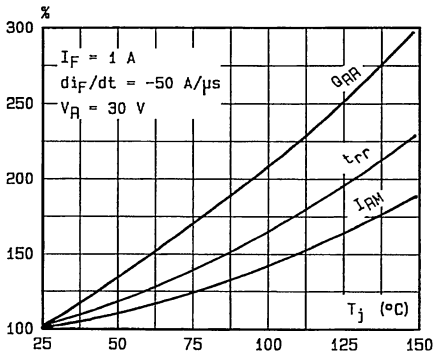


Fig.11 - Dynamic parameters versus junction temperature.

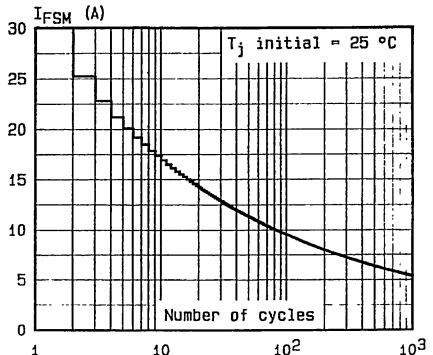


Fig.12 - Non repetitive surge peak current versus number of cycles

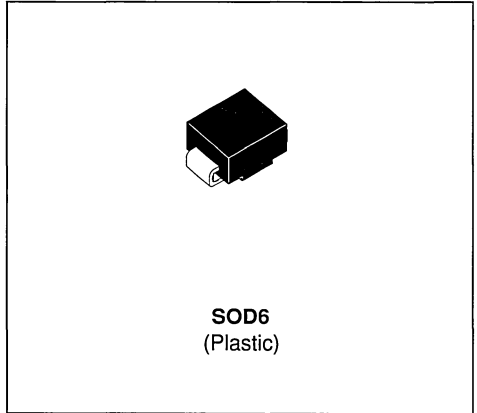
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- SURFACE MOUNT DEVICE

DESCRIPTION

Single high voltage rectifier ranging from 200V to 400 V suited for Switch Mode Power Supplies and other power converters.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS forward current		10	A
$I_{F(AV)}$	Average forward current	$T_I = 110^\circ\text{C}$ $\delta = 0.5$	1	A
I_{FSM}	Non repetitive surge peak forward current	$t_p = 10\text{ms}$ sinusoidal	30	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$

Symbol	Parameter	SMBYT01-			Unit
		200	300	400	
V_{RRM}	Repetitive peak reverse voltage	200	300	400	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	25	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F *	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$			1.5	V
	$T_j = 100^\circ\text{C}$				1.4	
I_R **	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
	$T_j = 100^\circ\text{C}$				0.5	mA

 Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

 ** $t_p = 5\ \text{ms}$, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$			25	ns
		$I_F = 1\text{A}$ $dI_F/dt = -15\text{A}/\mu\text{s}$ $V_R = 30\text{V}$			60	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$V_{CC} = 200\text{V}$ $T_j = 100^\circ\text{C}$	$I_F = 1\text{A}$ $L_p \leq 0.05\ \mu\text{H}$ $dI_F/dt = -50\text{A}/\mu\text{s}$		35	50	ns
I_{RM}				1.5	2	A

To evaluate the conduction losses use the following equation :

$$P = 1.1 \times I_{F(AV)} + 0.25 \times I_F^2_{(RMS)}$$

Voltage (V)	200	300	400
Marking	B2	B3	B4

Laser marking

Logo indicates cathode

Fig.1 : Low frequency power losses versus average current.

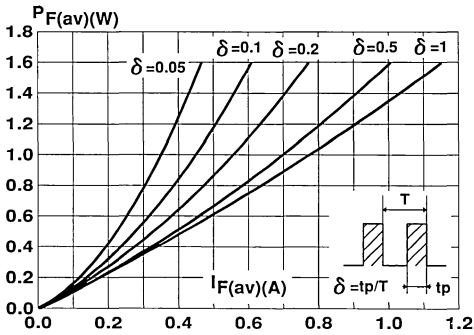


Fig.2 : Peak current versus form factor.

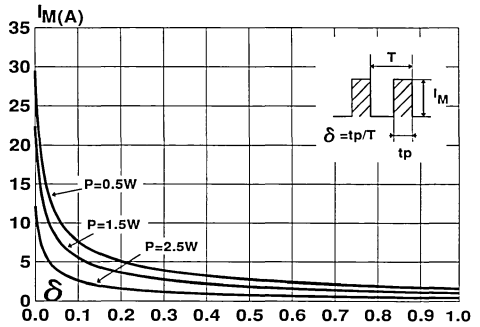


Fig.3 : Non repetitive surge peak forward current versus overload duration.

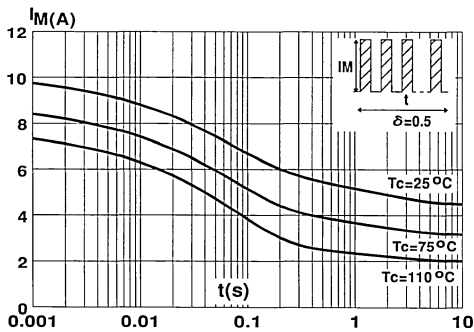


Fig.4 : Relative variation of thermal impedance junction to lead versus pulse duration.

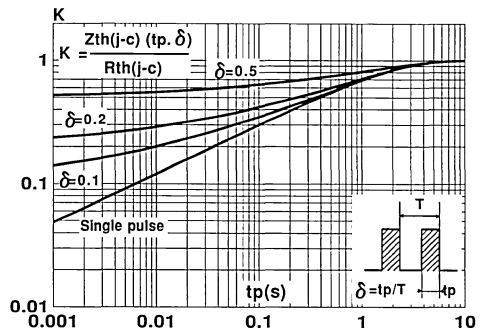


Fig.5 : Voltage drop versus forward current. (Maximum values)

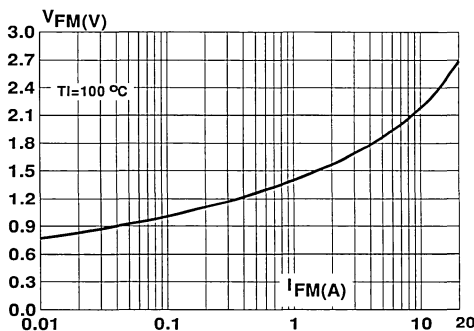


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

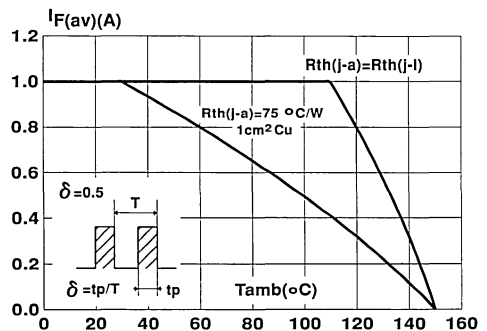


Fig.7 : Recovery time versus di_F/dt .

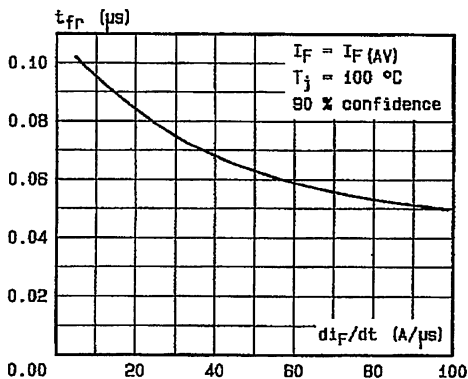


Fig.9 : Peak reverse current versus di_F/dt .

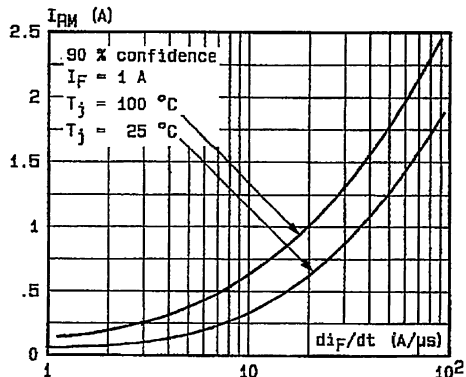


Fig.11 : Dynamic parameters versus junction temperature.

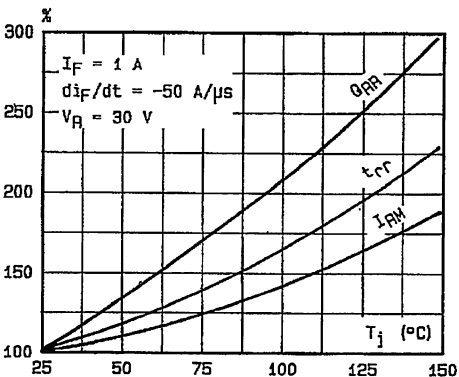


Fig.8 : Peak forward voltage versus di_F/dt .

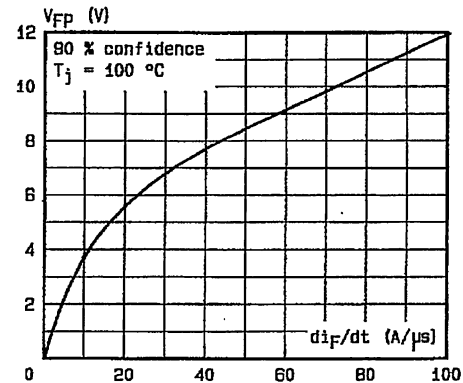


Fig.10 : Recovery charge versus di_F/dt . (typical values)

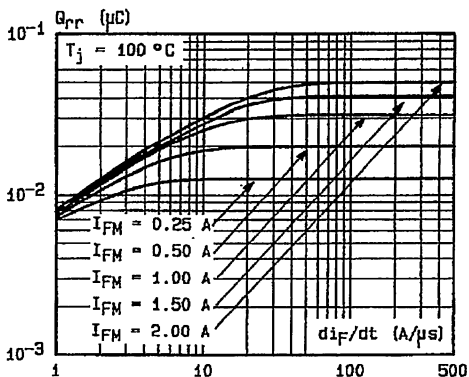
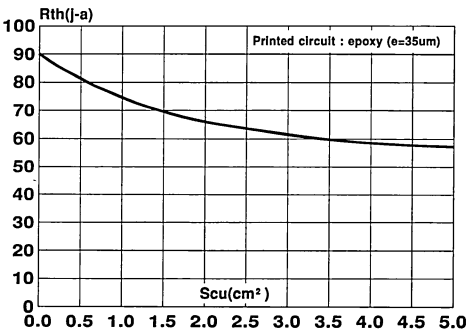


Fig.12 : Thermal resistance junction to ambient versus copper surface under each lead.



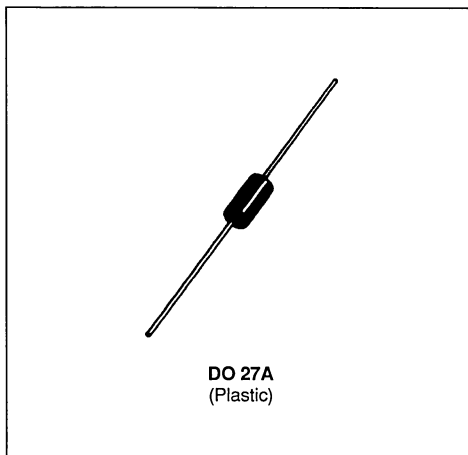
FAST RECOVERY RECTIFIER DIODES

FAST RECOVERY RECTIFIER

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIERS IN S.M.P.S.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	60	A
$I_{F(AV)}$	Average Forward Current *	$T_a = 65^\circ C$ $\delta = 0.5$	3	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	60	A
P	Power Dissipation *	$T_a = 65^\circ C$	4.2	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 03-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	20	$^\circ C/W$

* On infinite heatsink with 10mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			20	μA
	$T_j = 100^\circ\text{C}$				0.5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 3\text{A}$			1.5	V
	$T_j = 100^\circ\text{C}$				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		55	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		25	

TURN -OFF SWITCHING CHARACTERISTICS - Without Series Inductance

Symbol	Test Conditions		Min.	Typ.	Max.	Unit	
t_{IRM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$	$I_F = 3\text{A}$	35	50	ns
I_{RM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$L_P \leq 0.05\mu\text{H}$			1.5	2	A

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.050 I_F$$

$$P = 1.1 \times I_F (AV) + 0.050 I_F^2 (RMS)$$

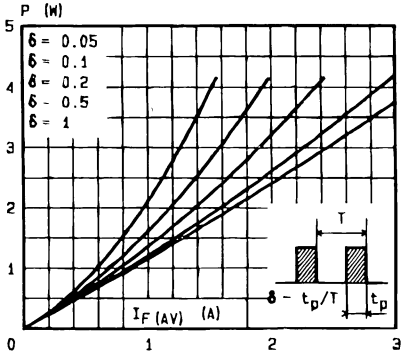


Fig. 1 - Maximum average power dissipation versus average forward current.

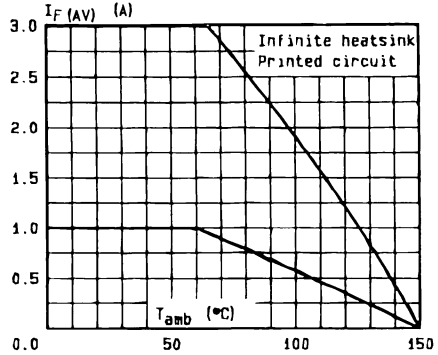


Fig. 2 - Average forward current versus ambient temperature.

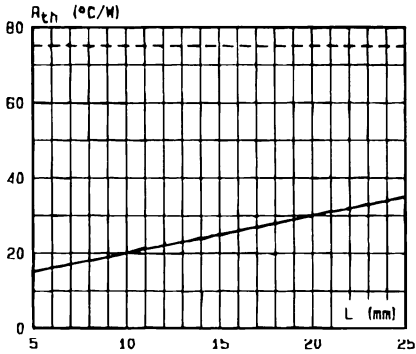


Fig. 3 - Thermal resistance versus lead length.

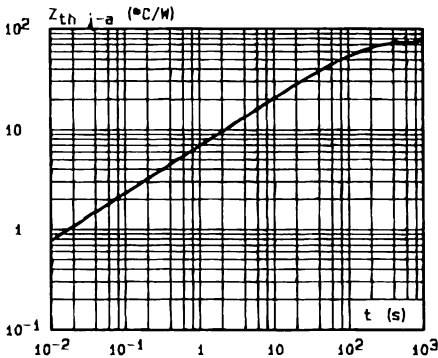


Fig. 4 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

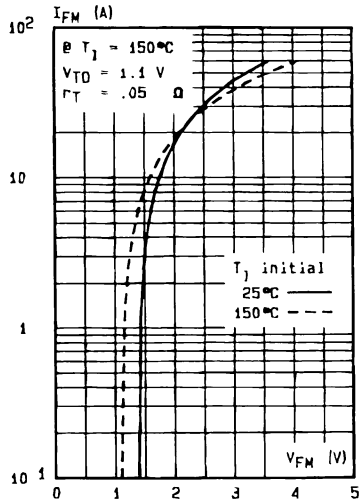
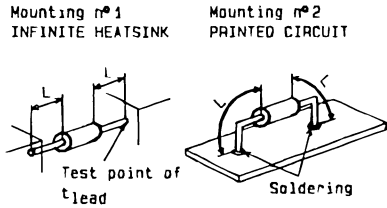


Fig. 5 - Peak forward current versus peak forward voltage drop (maximum values).

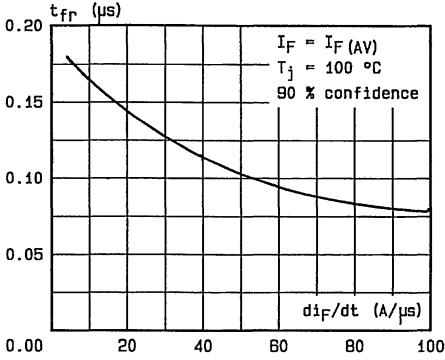


Fig.7 - Recovery time versus di_F/dt .

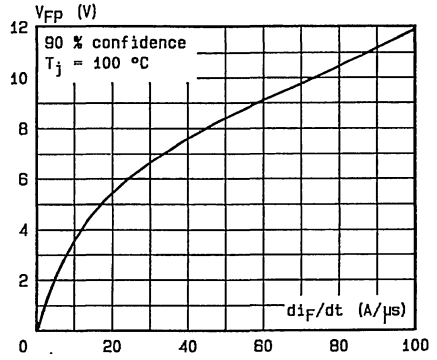


Fig.8 - Peak forward voltage versus di_F/dt .

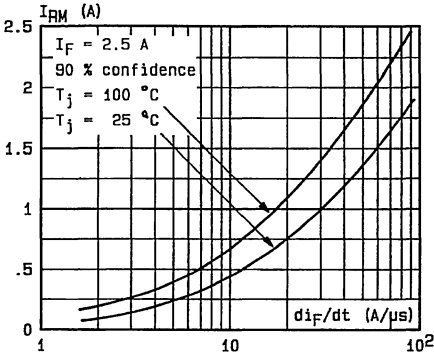


Fig.9 - Peak reverse current versus di_F/dt .

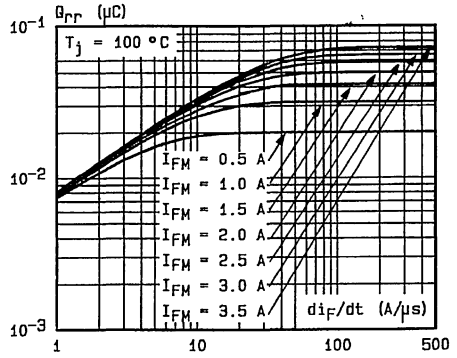


Fig.10 - Recovered charge versus di_F/dt (typical values).

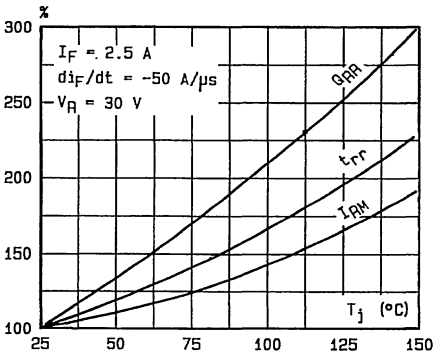


Fig.11 - Dynamic parameters versus junction temperature.

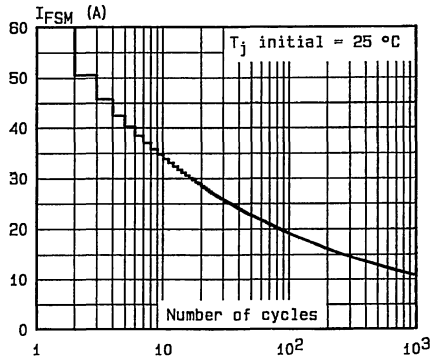


Fig.12 - Non repetitive surge peak current versus number of cycles

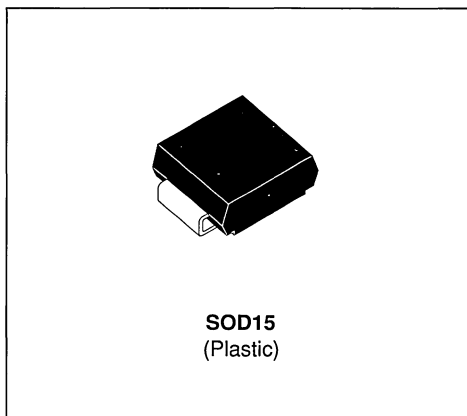
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- SURFACE MOUNT DEVICE

DESCRIPTION

Single high voltage rectifier ranging from 200V to 400 V suited for Switch Mode Power Supplies and other power converters.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS forward current		10	A
$I_{F(AV)}$	Average forward current	$T_I=55^{\circ}\text{C}$ $\delta = 0.5$	3	A
I_{FSM}	Non repetitive surge peak forward current	$t_p=10\text{ms}$ sinusoidal	60	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$

Symbol	Parameter	SMBYT03-			Unit
		200	300	400	
V_{RRM}	Repetitive peak reverse voltage	200	300	400	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	20	$^{\circ}\text{C/W}$

**ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS**

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 3 A			1.5	V
	T _j = 100°C				1.4	
I _R **	T _j = 25°C	V _R = V _{RRM}			20	μA
	T _j = 100°C				0.5	mA

Pulse test : * tp = 380 μs, duty cycle < 2 %

** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			25	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			60	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	V _{CC} = 200V	I _F = 3A L _p ≤ 0.05μH		35	50	ns
I _{RM}	T _j = 100°C	dI _F /dt = -50A/μs		1.5	2	A

To evaluate the conduction losses use the following equation :

$$P = 1.1 \times I_{F(AV)} + 0.08 \times I_{F(RMS)}^2$$

Voltage (V)	200	300	400
Marking	C2	C3	C4

Laser marking

Logo indicates cathode

Fig.1 : Low frequency power losses versus average current.

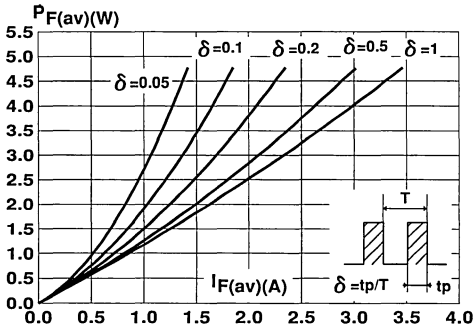


Fig.2 : Peak current versus form factor.

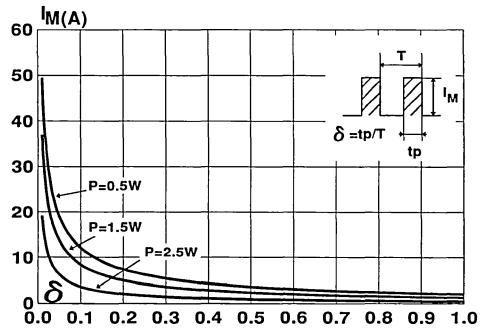


Fig.3 : Non repetitive surge peak forward current versus overload duration.

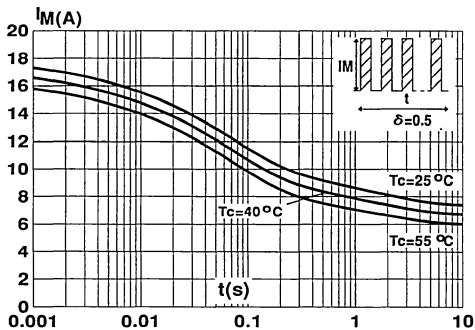


Fig.4 : Relative variation of thermal impedance junction to lead versus pulse duration.

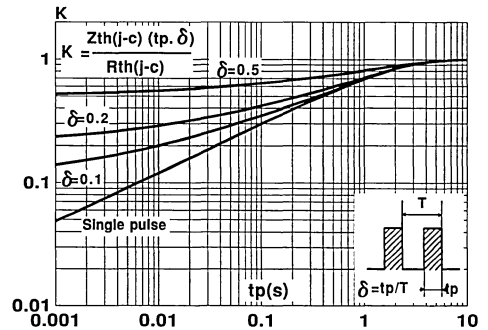


Fig.5 : Voltage drop versus forward current. (Maximum values)

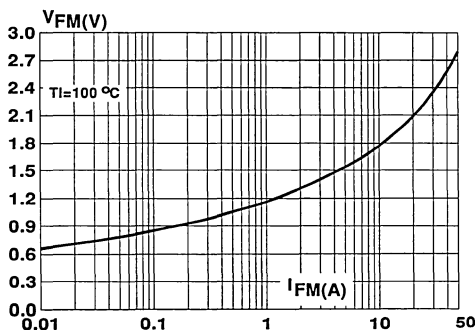


Fig.6 : Average current versus ambient temperature. (duty cycle : 0.5)

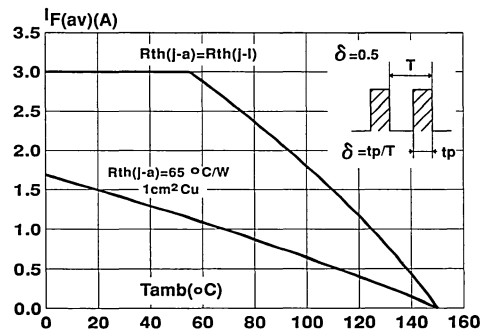


Fig.7 : Recovery time versus di_F/dt .

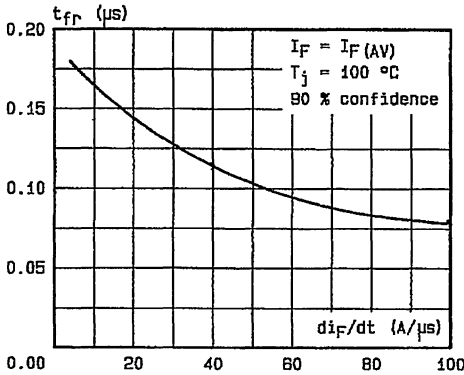


Fig.9 : Peak reverse current versus di_F/dt .

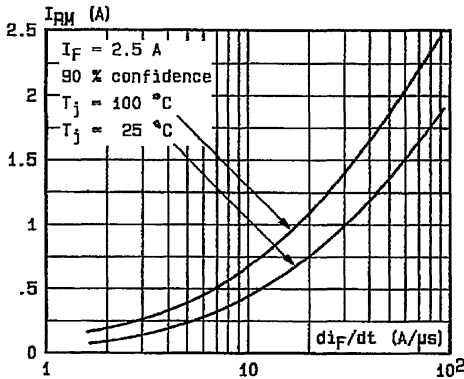


Fig.11 : Dynamic parameters versus junction temperature.

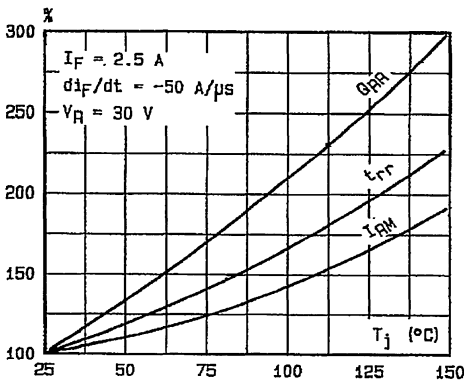


Fig.8 : Peak forward voltage versus di_F/dt .

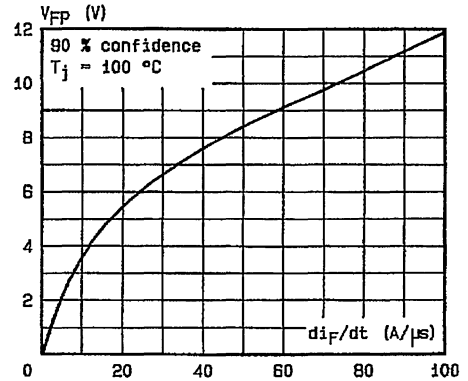


Fig.10 : Recovery charge versus di_F/dt . (typical values)

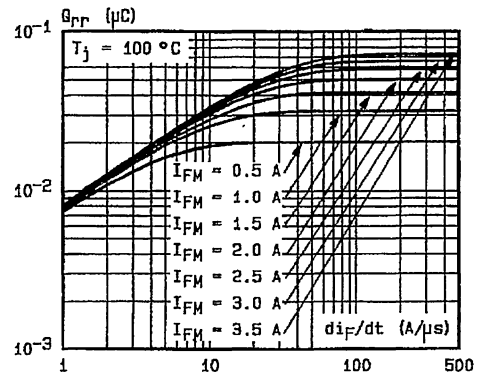
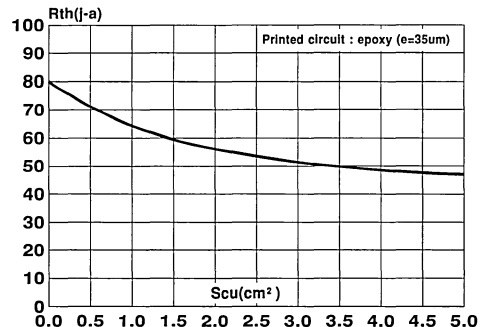


Fig.12 : Thermal resistance junction to ambient versus copper surface under each lead.



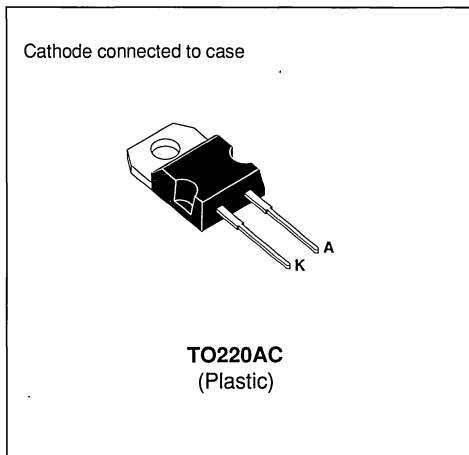
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p < 10\mu s$	130	A
$I_{F(RMS)}$	RMS Forward Current		16	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 120^\circ C$ $\delta = 0.5$	8	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ sinusoidal	100	A
P	Power Dissipation	$T_{case} = 100^\circ C$	20	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 08P-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _j = 25°C	V _R = V _{R_{RRM}}			15	μA
	T _j = 100°C				2.5	mA
V _F	T _j = 25°C	I _F = 8A			1.5	V
	T _j = 100°C				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _j = 25°C	I _F = 1A	di _F /dt = - 15A/μs	V _R = 30V		75	ns
t _{rr}		I _F = 0.5A	I _R = 1A	I _{rr} = 0.25A		35	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 32A/μs	V _{CC} = 200V I _F = 8A L _p ≤ 0.05μH T _j = 100°C See Figure 11			75	ns
	di _F /dt = - 64A/μs			50		
I _{RM}	di _F /dt = - 32A/μs				2.2	A
	di _F /dt = - 64A/μs			2.8		

TURN -OFF OVERVOLTAGE COEFFICIENT - (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _j = 100°C	V _{CC} = 120V	I _F = I _{F(AV)} See note		3.3		
	di _F /dt = - 8A/μs	L _p = 9μH	See figure 12				

Note : Applicable to BYT 08 P-400 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.024 I_F \quad P = 1.1 \times I_{F(AV)} + 0.024 I_F^2_{(RMS)}$$

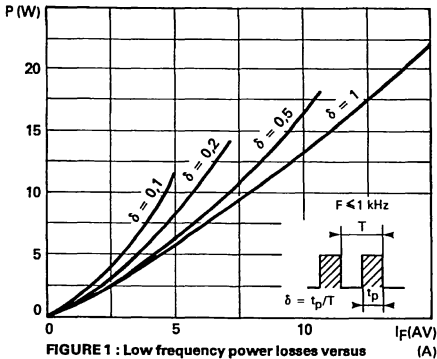


FIGURE 1 : Low frequency power losses versus average current.

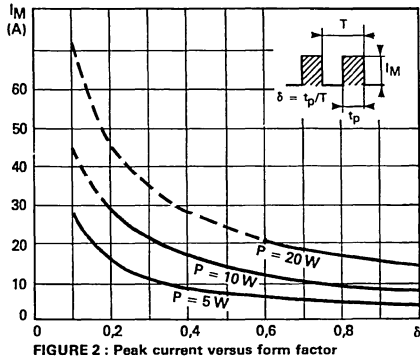


FIGURE 2 : Peak current versus form factor

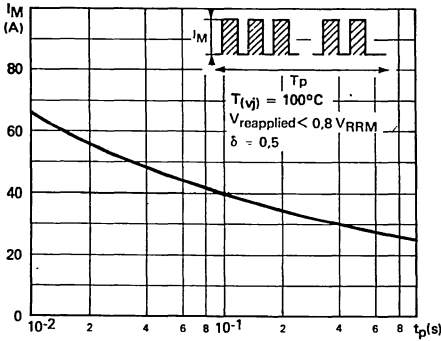


FIGURE 3 : Non repetitive peak surge current versus overload duration.

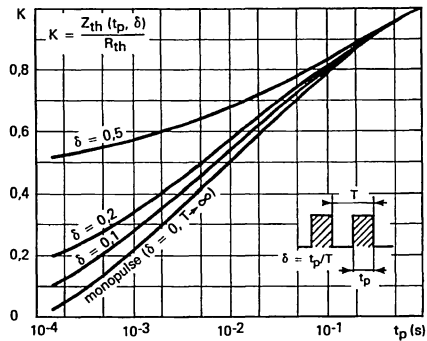


FIGURE 4 : Thermal impedance versus pulse width.

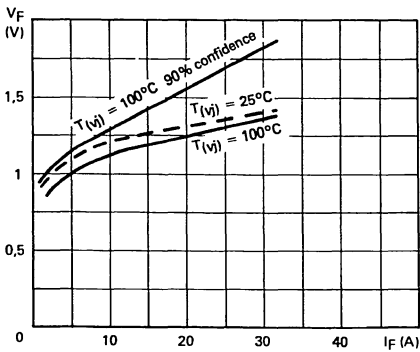


FIGURE 5 : Voltage drop versus forward current.

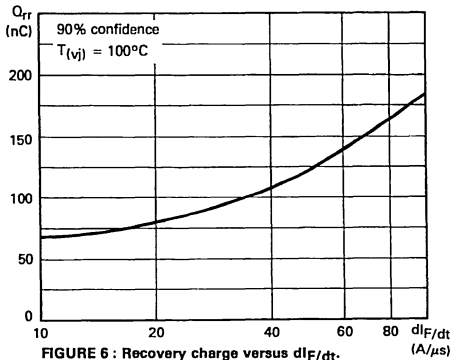


FIGURE 6 : Recovery charge versus di/dt.

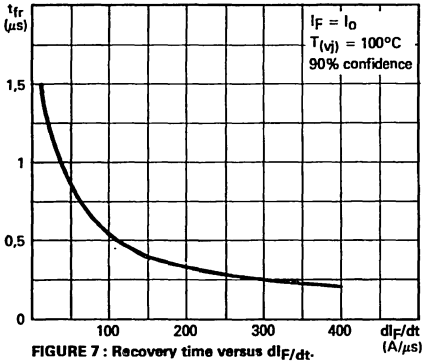


FIGURE 7 : Recovery time versus dI_F/dt .

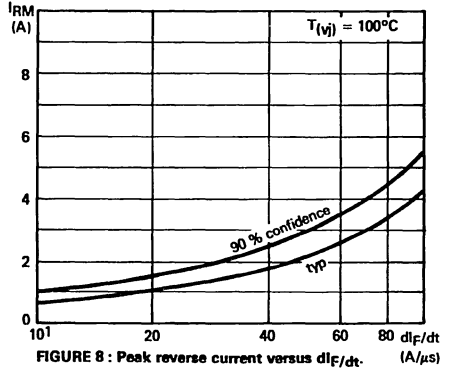


FIGURE 8 : Peak reverse current versus dI_F/dt .

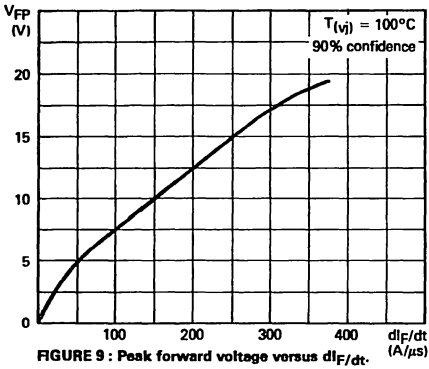


FIGURE 9 : Peak forward voltage versus dI_F/dt .

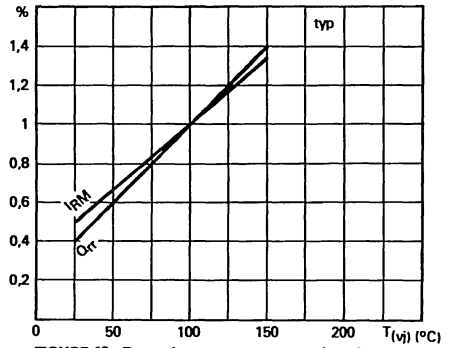


FIGURE 10 : Dynamic parameters versus junction temperature.

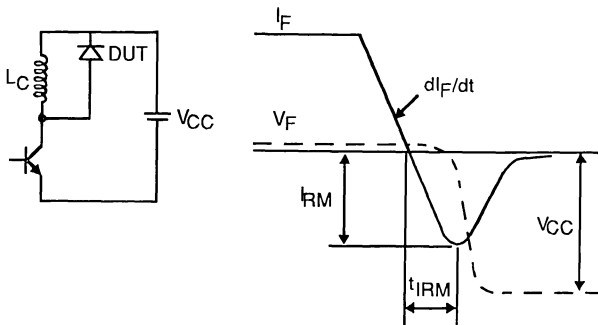


Figure 11 : Turn-off switching characteristics (without series inductance).

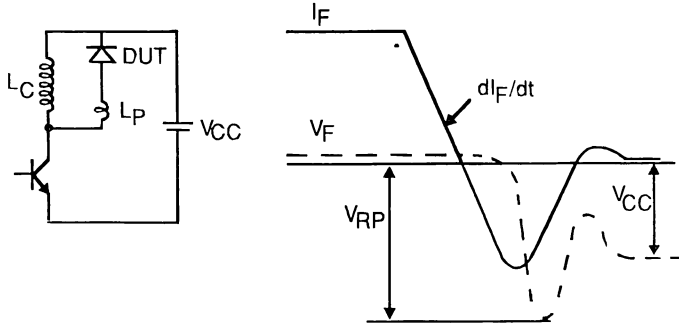
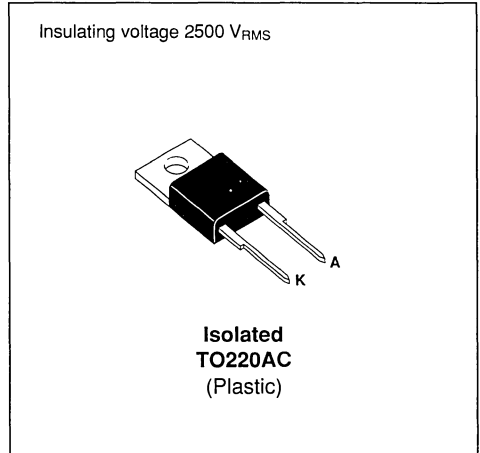


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 7pF



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	130	A
$I_{F(RMS)}$	RMS Forward Current		16	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 105^\circ C$ $\delta = 0.5$	8	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	100	A
P	Power Dissipation	$T_{case} = 80^\circ C$	20	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 08PI-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	3.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			15	μA
	T _J = 100°C				2.5	mA
V _F	T _J = 25°C	I _F = 8A			1.5	V
	T _J = 100°C				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A	di _F /dt = - 15A/μs	V _R = 30V		75	ns
		I _F = 0.5A	I _R = 1A	I _{rr} = 0.25A		35	

TURN -OFF SWITCHING CHARACTERISTICS ((Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 32A/μs	V _{CC} = 200V I _F = 8A L _p ≤ 0.05μH T _J = 100°C See Figure 11			75	ns
	di _F /dt = - 64A/μs			50		
I _{RM}	di _F /dt = - 32A/μs				2.2	A
	di _F /dt = - 64A/μs			2.8		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _J = 100°C	V _{CC} = 120V	I _F = I _{F(AV)} See note		3.3		
	di _F /dt = - 8A/μs	L _p = 9μH	See Figure 12				

Note : Applicable to BYT 08 PI-400 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.024 I_F \quad P = 1.1 \times I_{F(AV)} + 0.024 I_F^2_{(RMS)}$$

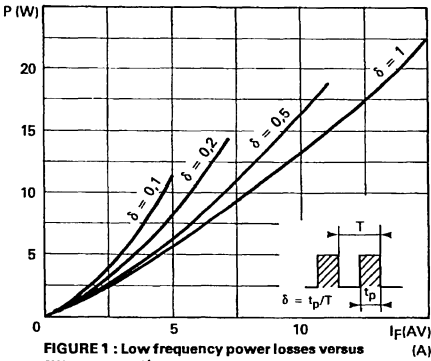


FIGURE 1 : Low frequency power losses versus average current.

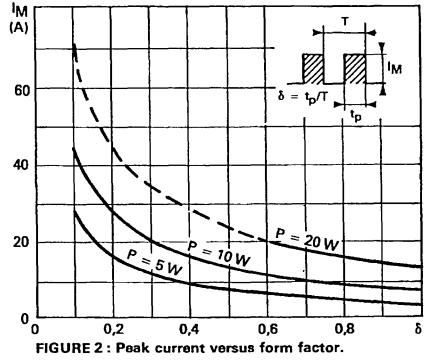


FIGURE 2 : Peak current versus form factor.

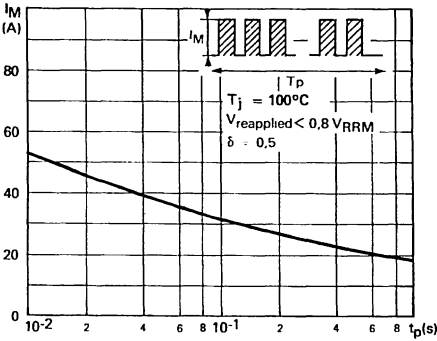


FIGURE 3 : Non repetitive peak surge current versus overload duration.

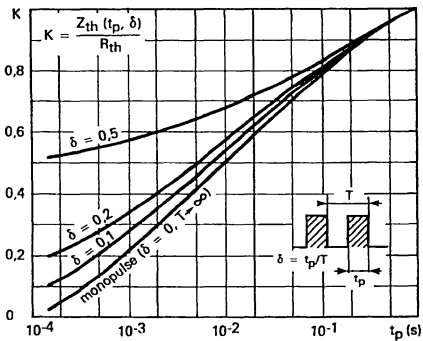


FIGURE 4 : Thermal impedance versus pulse width.

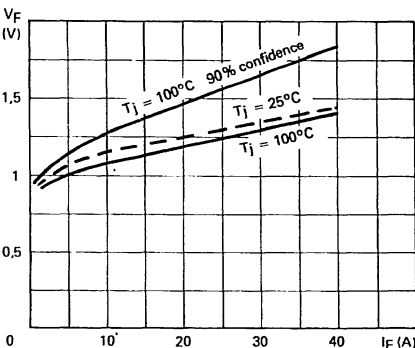


FIGURE 5 : Voltage drop versus forward current.

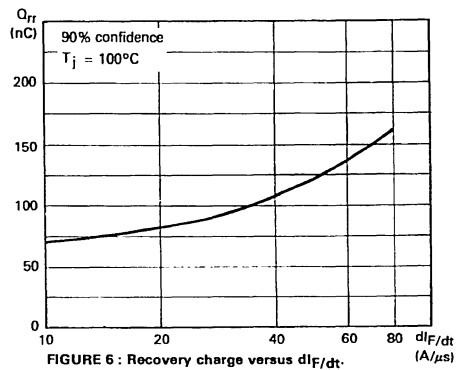


FIGURE 6 : Recovery charge versus di/dt .

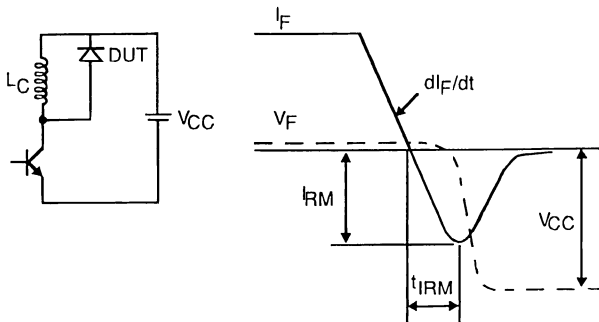
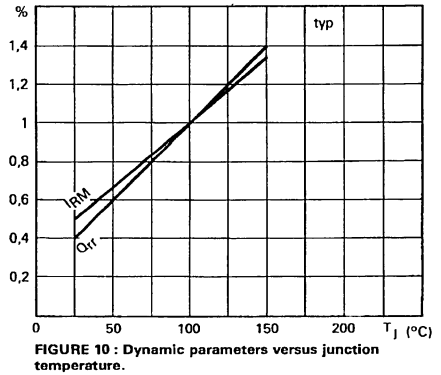
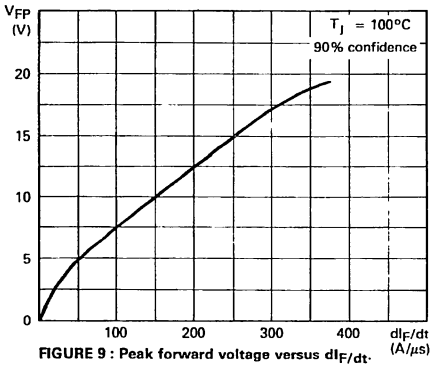
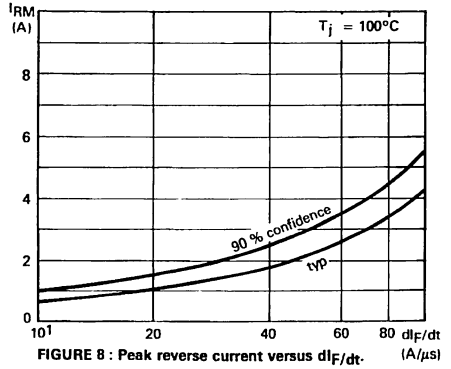
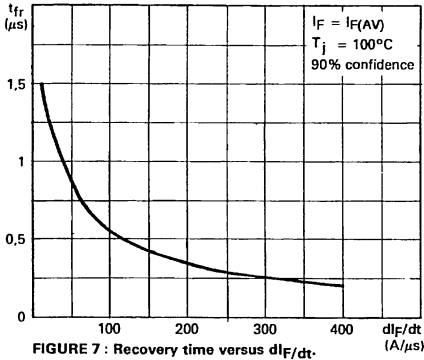


Figure 11 : Turn-off switching characteristics (without series inductance).

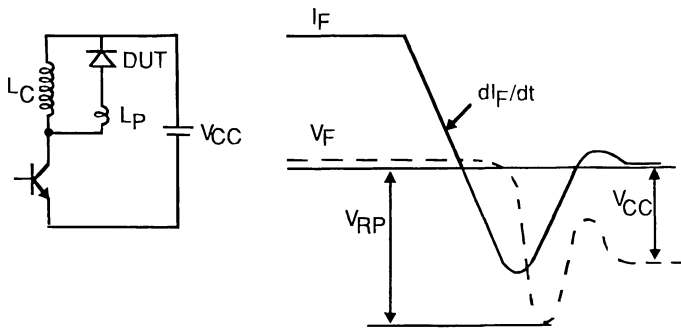
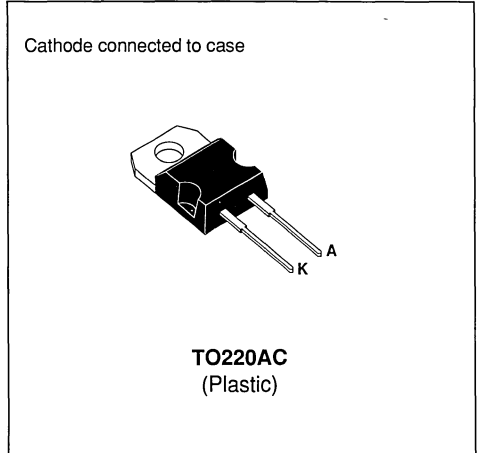


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p < 10\mu s$	100	A
$I_{F(RMS)}$	RMS Forward Current		16	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 115^\circ C$ $\delta = 0.5$	8	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ sinusoidal	50	A
P	Power Dissipation	$T_{case} = 115^\circ C$	17	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 08P-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			35	μA
	T _J = 100°C				2	mA
V _F	T _J = 25°C	I _F = 8A			1.9	V
	T _J = 100°C				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A di _F /dt = - 15A/μs V _R = 30V			120	ns
		I _F = 0.5A I _R = 1A I _{rr} = 0.25A			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 32A/μs	V _{CC} = 200V I _F = 8A L _p ≤ 0.05μH T _J = 100°C See Figure 1			160	ns
	di _F /dt = - 64A/μs			100		
I _{RM}	di _F /dt = - 32A/μs				4	A
	di _F /dt = - 64A/μs			5		

TURN -OFF OVERVOLTAGE COEFFICIENT - With Series Inductance

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C di _F /dt = - 8A/μs	V _{CC} = 150V I _F = I _{F(AV)} L _p = 12μH See figure 2			4	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.04 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.04 I_F^2 (RMS)$$

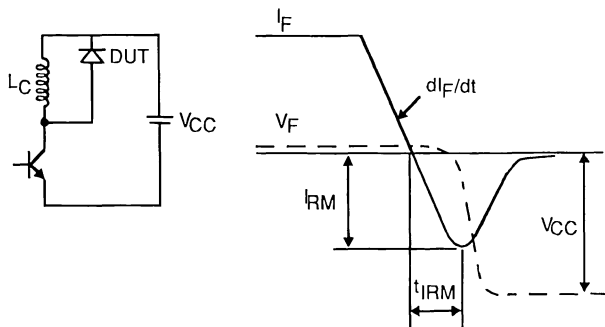


Figure 1 : Turn-off switching characteristics (without series inductance).

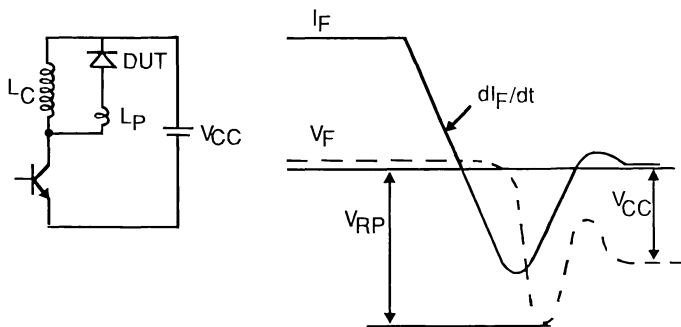
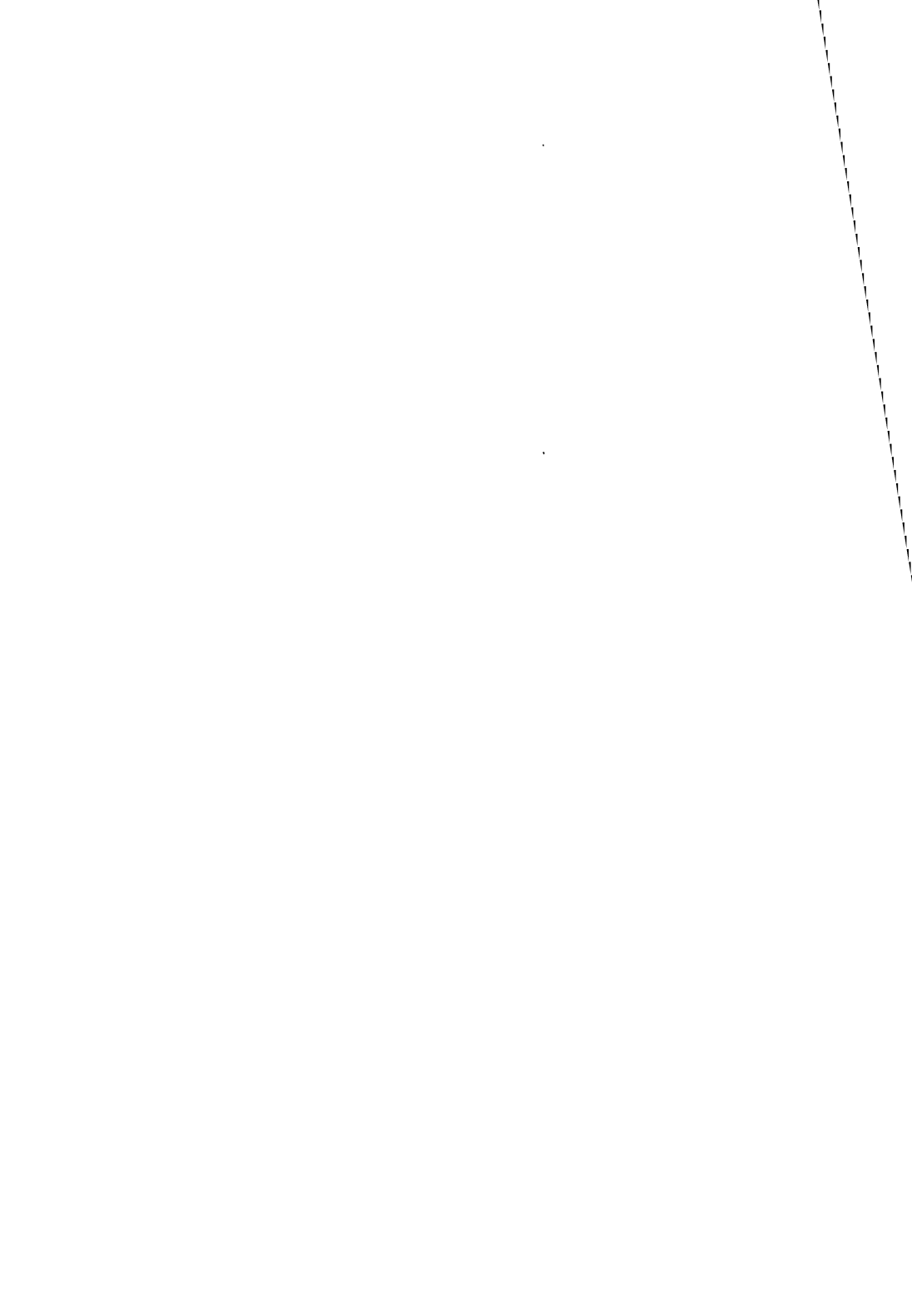


Figure 2 : Turn-off switching characteristics (with series inductance).

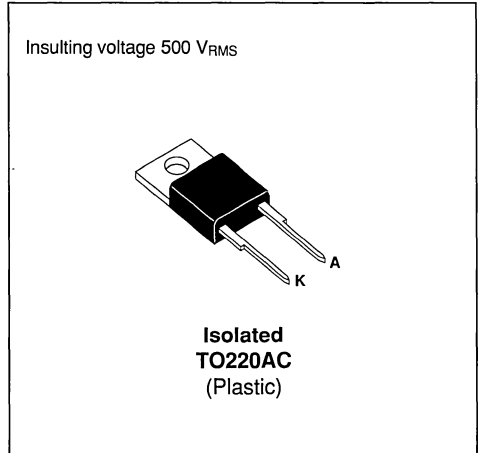


FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSES RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 7pF

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I _{FRM}	Repetitive Peak Forward Current	t _p ≤ 10μs	100	A
I _{F(RMS)}	RMS Forward Current		16	A
I _{F(AV)}	Average Forward Current	T _{case} = 80°C δ = 0.5	8	A
I _{FSM}	Surge non Repetitive Forward Current	t _p = 10ms Sinusoidal	50	A
P	Power Dissipation	T _{case} = 80°C	17	W
T _{stg} T _J	Storage and Junction Temperature Range		- 40 to + 150	°C

Symbol	Parameter	BYT 08PI-		Unit
		600	800	
V _{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V _{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{th(j-c)}	Junction-case	4	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			35	μA
	$T_J = 100^\circ\text{C}$				2	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 8\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$ $di_F/dt = -15\text{A}/\mu\text{s}$ $V_R = 30\text{V}$			120	ns
		$I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -32\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 8\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 1			160	ns
	$di_F/dt = -64\text{A}/\mu\text{s}$			100		
I_{RM}	$di_F/dt = -32\text{A}/\mu\text{s}$				4	A
	$di_F/dt = -64\text{A}/\mu\text{s}$			5		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$ $di_F/dt = -8\text{A}/\mu\text{s}$	$V_{CC} = 150\text{V}$ $I_F = I_{F(AV)}$ $L_p = 12\mu\text{H}$ See Figure 2			4	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.04 I_F$$

$$P = 1.47 \times I_{F(AV)} + 0.04 I_F^2_{(RMS)}$$

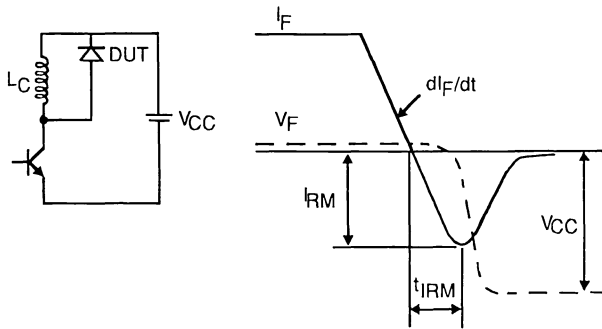


Figure 1 : Turn-off switching characteristics (without series inductance).

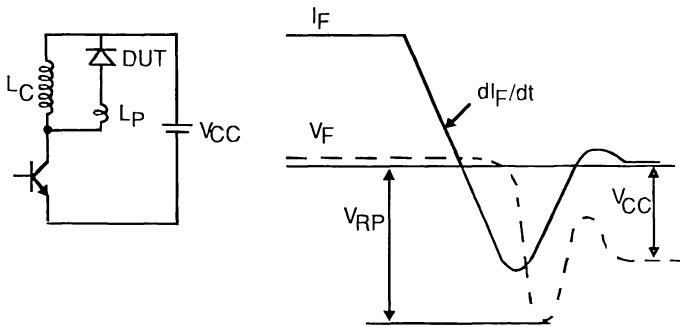


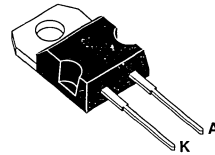
Figure 2 : Turn-off switching characteristics (with series inductance).



FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

Cathode connected to case



TO220AC
(Plastic)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1000	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	A
$I_{F(RMS)}$	RMS Forward Current	16	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 115^\circ C$ $\delta = 0.5$	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoïdal	A
P	Power Dissipation	$T_{case} = 115^\circ C$	W
T_{stg} T_J	Storage and Junction Temperature Range	- 40 to + 150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (J-C)}$	Junction-case	2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			35	μA
	$T_J = 100^\circ\text{C}$				2	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 8\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		155	ns
t_{rr}		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		65	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{RM}	$di_F/dt = -32\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 8\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 1			200	ns
	$di_F/dt = -64\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -32\text{A}/\mu\text{s}$				5.5	A
	$di_F/dt = -64\text{A}/\mu\text{s}$			6		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$	$I_F = I_{F(AV)}$			4.5	
	$di_F/dt = -8\text{A}/\mu\text{s}$	$L_p = 12\mu\text{H}$	See Figure 2				

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.041 I_F \quad P = 1.47 \times I_{F(AV)} + 0.041 I_F^2 (RMS)$$

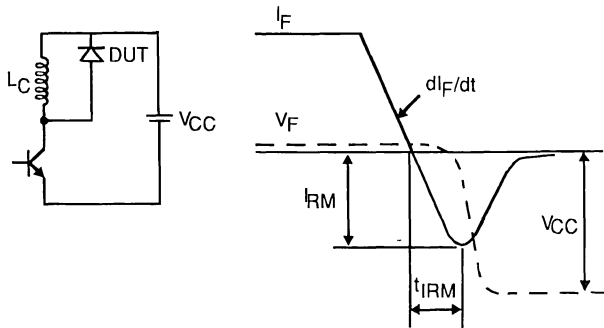


Figure 1 : Turn-off switching characteristics (without series inductance).

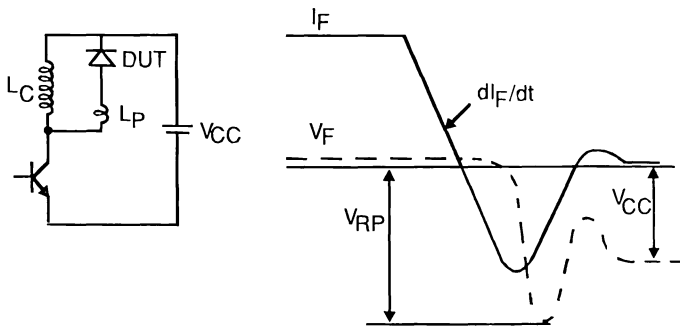
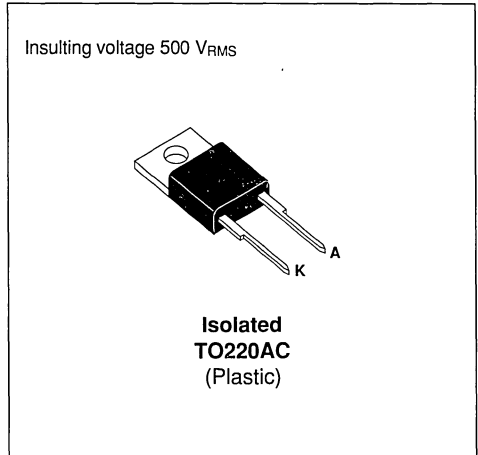


Figure 2 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSES RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 7pF



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	1000	V
V _{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I _{FRM}	Repetitive Peak Forward Current	t _p ≤ 10μs	A
I _{F(RMS)}	RMS Forward Current	16	A
I _{F(AV)}	Average Forward Current	T _{case} = 80°C δ = 0.5	A
I _{FSM}	Surge non Repetitive Forward Current	t _p = 10ms Sinusoidal	A
P	Power Dissipation	T _{case} = 80°C	W
T _{stg} T _J	Storage and Junction Temperature Range	- 40 to + 150	°C

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{th (j-c)}	Junction-case	4	°C/W

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			35	μA
	$T_J = 100^\circ\text{C}$				2	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 8\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		155	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$		$I_{rr} = 0.25\text{A}$		

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -32\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 8\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 1			200	ns
	$di_F/dt = -64\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -32\text{A}/\mu\text{s}$				5.5	A
	$di_F/dt = -64\text{A}/\mu\text{s}$			6		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$ $di_F/dt = -8\text{A}/\mu\text{s}$ $L_p = 12\mu\text{H}$ See Figure 2			4.5	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.04 I_F$$

$$P = 1.47 \times I_{F(AV)} + 0.04 I_F^2(\text{RMS})$$

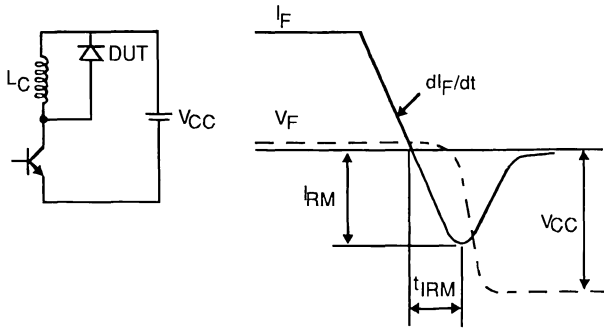


Figure 1 : Turn-off switching characteristics (without series inductance).

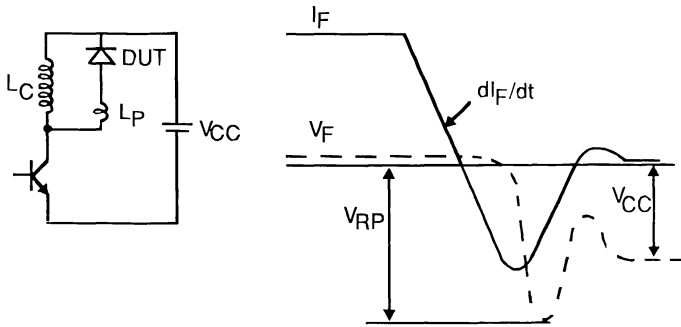


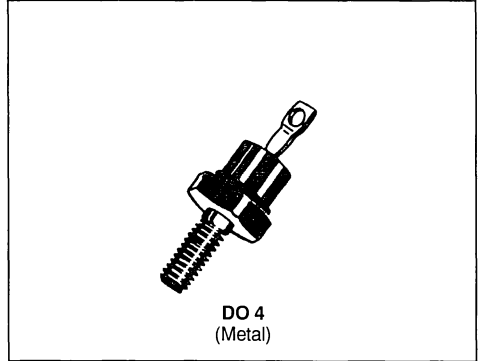
Figure 2 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS :

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	200	A
$I_{F(RMS)}$	RMS Forward Current		25	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 100^\circ C$ $\delta = 0.5$	12	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ sinusoidal	200	A
P	Power Dissipation	$T_{case} = 100^\circ C$	20	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 12-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	μA
	$T_J = 100^\circ\text{C}$				2.5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 12\text{A}$			1.5	V
	$T_J = 100^\circ\text{C}$				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$ $di_F/dt = -15\text{A}/\mu\text{s}$ $V_R = 30\text{V}$			100	ns
		$I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 12\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 11			75	ns
	$di_F/dt = -100\text{A}/\mu\text{s}$				50	
I_{RM}	$di_F/dt = -50\text{A}/\mu\text{s}$				3.8	A
	$di_F/dt = -100\text{A}/\mu\text{s}$			4.3		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$ $di_F/dt = -12\text{A}/\mu\text{s}$	$V_{CC} = 120\text{V}$ $I_F = I_{F(AV)}$ See note $L_p = 7\mu\text{H}$ See Figure 12		3.3		

Note : Applicable to BYT12-400 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.022 I_F \qquad P = 1.1 \times I_{F(AV)} + 0.022 I_F^2 \text{(RMS)}$$

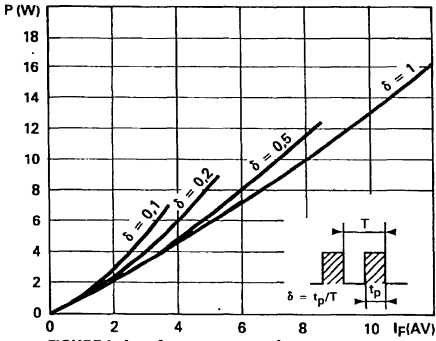


FIGURE 1 : Low frequency power losses versus average current.

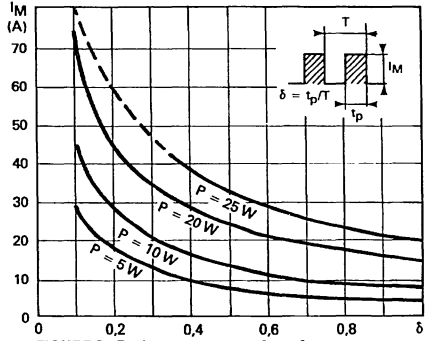


FIGURE 2 : Peak current versus form factor.

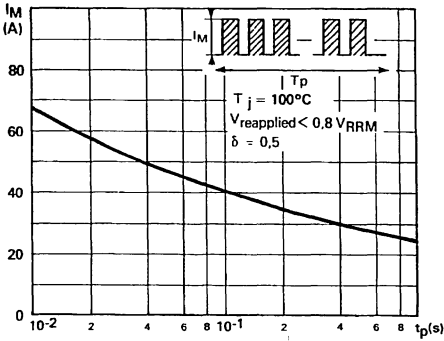


FIGURE 3 : Non repetitive peak surge current versus overload duration.

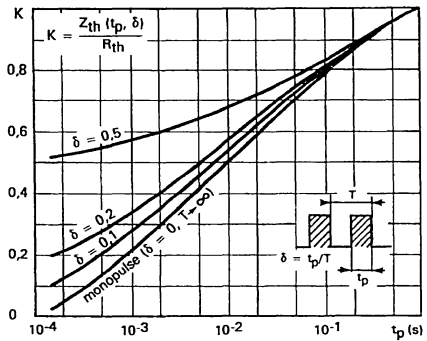


FIGURE 4 : Thermal impedance versus pulse width.

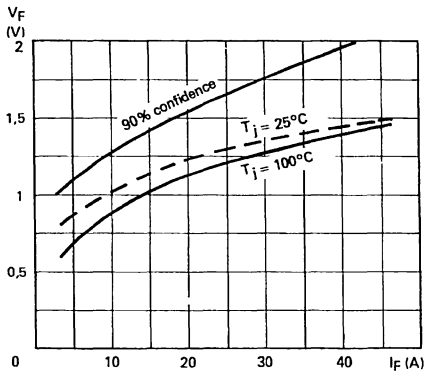


FIGURE 5 : Voltage drop versus forward current.

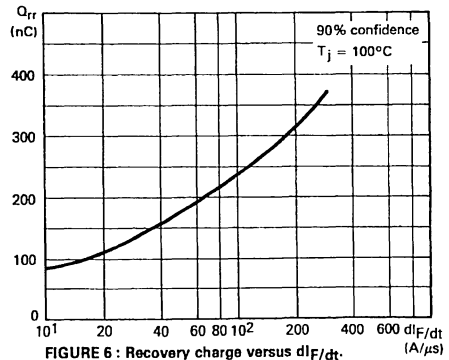


FIGURE 6 : Recovery charge versus dI_F/dt .

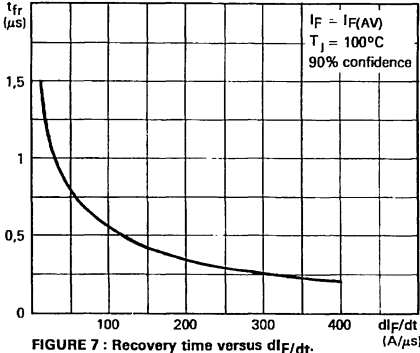


FIGURE 7 : Recovery time versus dI_F/dt .

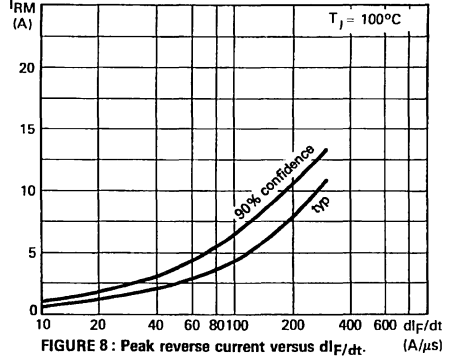


FIGURE 8 : Peak reverse current versus dI_F/dt .

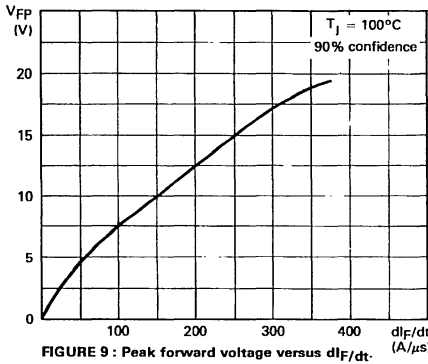


FIGURE 9 : Peak forward voltage versus dI_F/dt .

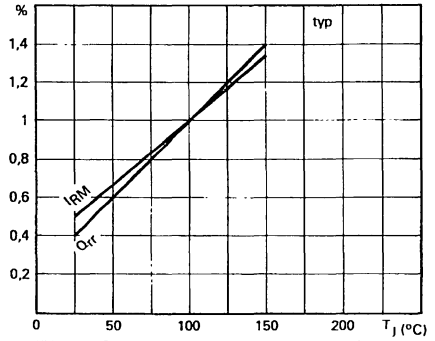


FIGURE 10 : Dynamic parameters versus junction temperature.

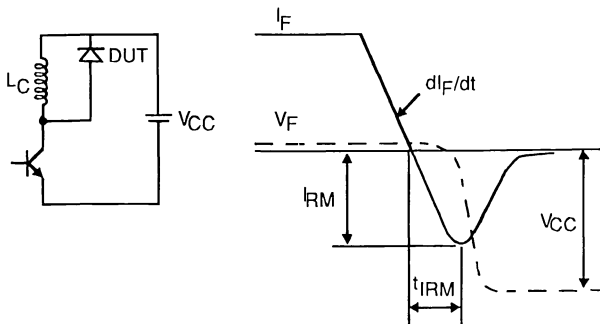


Figure 11 : Turn-off switching characteristics (without series inductance).

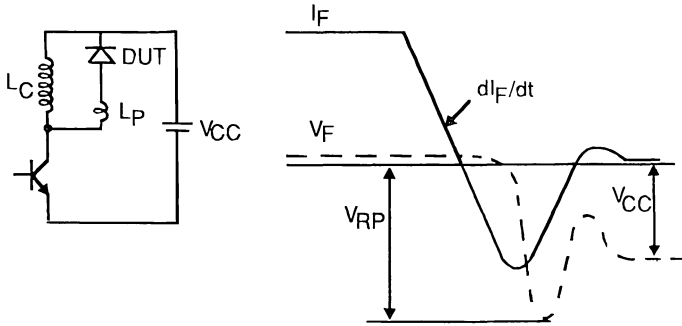
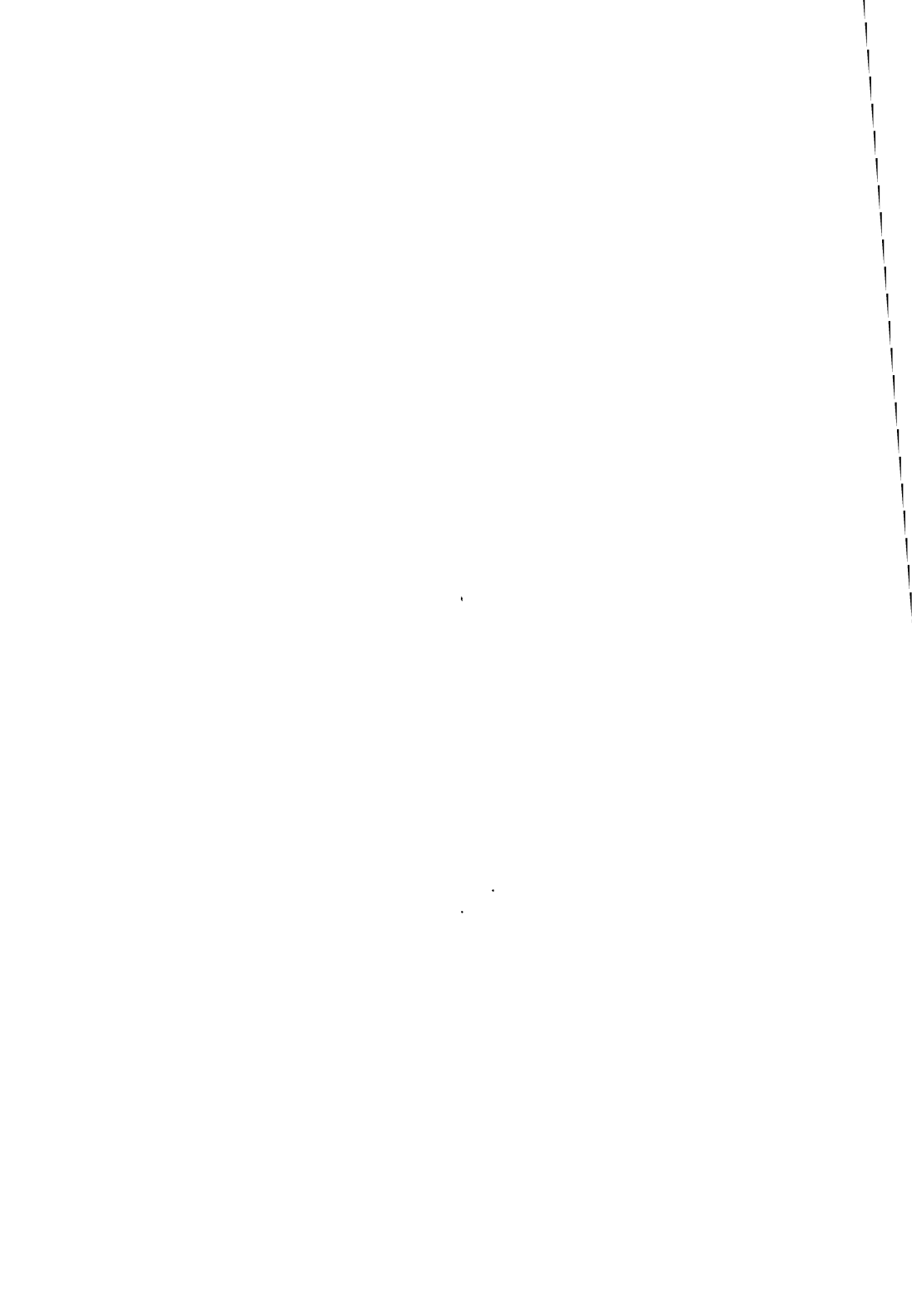
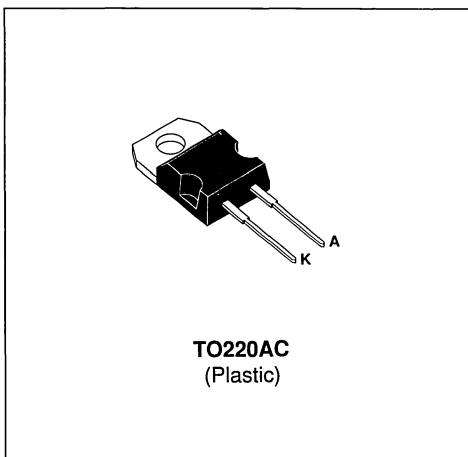


Figure 12 : Turn-off switching characteristics (with series inductance).



FAST RECOVERY RECTIFIER DIODES

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	150	A
$I_{F(RMS)}$	RMS Forward Current		25	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 100^\circ C$ $\delta = 0.5$	12	A
I_{FSM}	Surge non Repetitive Forward Current		75	A
P	Power Dissipation	$T_{case} = 100^\circ C$	25	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 12 P-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			50	μA
	T _J = 100°C				2.5	mA
V _F	T _J = 25°C	I _F = 12A			1.9	V
	T _J = 100°C				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A di _F /dt = - 15A/μs V _R = 30V			120	ns
		I _F = 0.5A I _R = 1A I _{rr} = 0.25A			50	

TURN - OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Parameter		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 50 A/μs	V _{CC} = 200V I _F = 12A L _p ≤ 0.05 μH T _J = 100°C See figure 11			160	ns
	di _F /dt = - 100 A/μs			100		
I _{IRM}	di _F /dt = - 50 A/μs				6	A
	di _F /dt = - 100 A/μs			7.5		

TURN - OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _J = 100°C di _F /dt = - 12A/μs	V _{CC} = 150V I _F = I _{F(AV)} L _p = 4μH See Figure 12			4	

Note : Applicable to BYT 12 P-800 only.

To evaluate the conduction losses use the following equation :

$$V_F = 1.47 + 0.026 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.026 I_{F(RMS)}^2$$

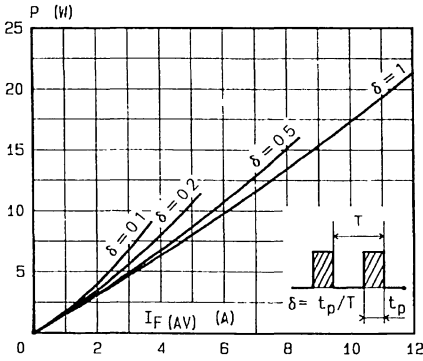


FIGURE 1 : Low frequency power losses versus average current.

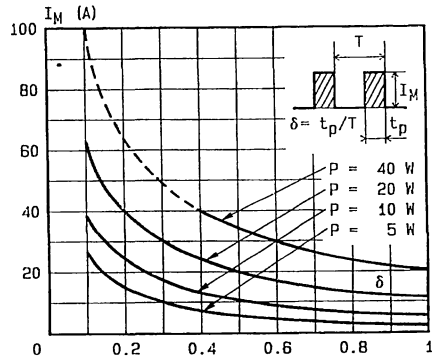


FIGURE 2 : Peak current versus form factor.

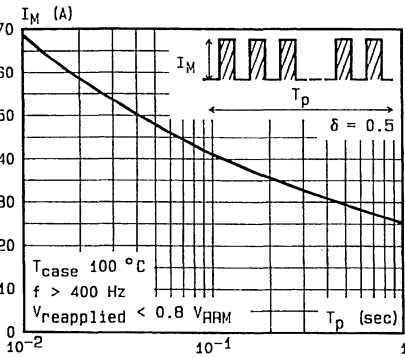


FIGURE 3 : Non repetitive peak surge current versus overload duration.

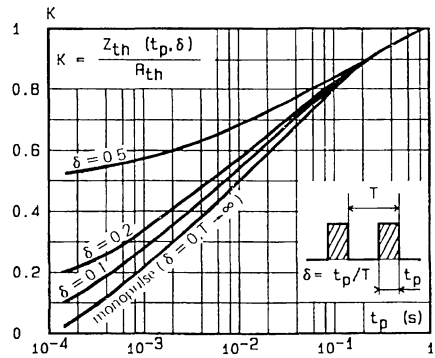


FIGURE 4 : Thermal impedance versus pulse width.

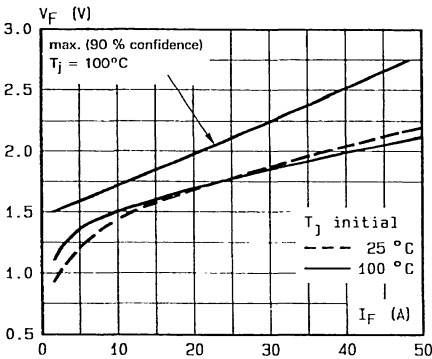


FIGURE 5 : Voltage drop versus forward current.

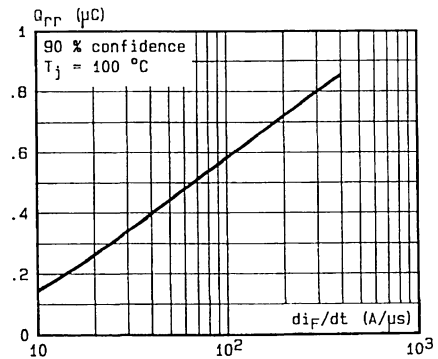


FIGURE 6 : Recovery charge versus di_f/dt .

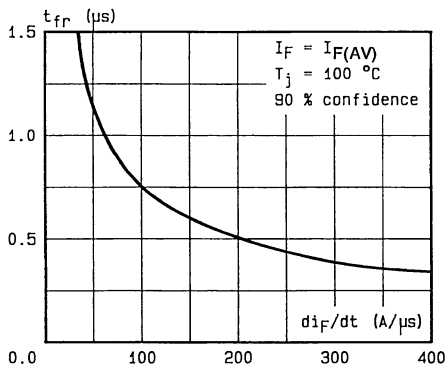


FIGURE 7 : Recovery time versus di_F/dt .

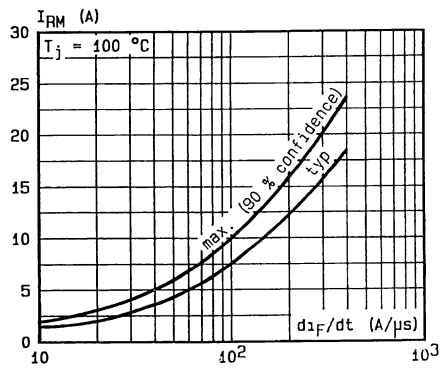


FIGURE 8 : Peak reverse current versus di_F/dt .

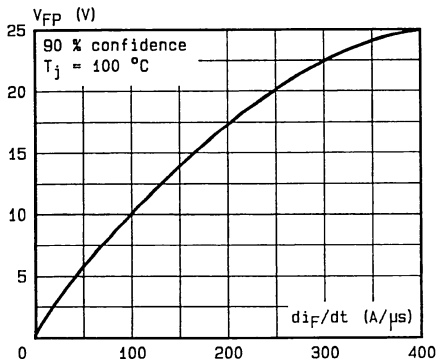


FIGURE 8 : Peak forward voltage versus di_F/dt .

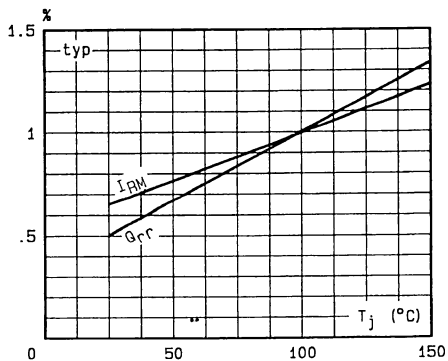


FIGURE 10 : Dynamic parameters versus junction temperature.

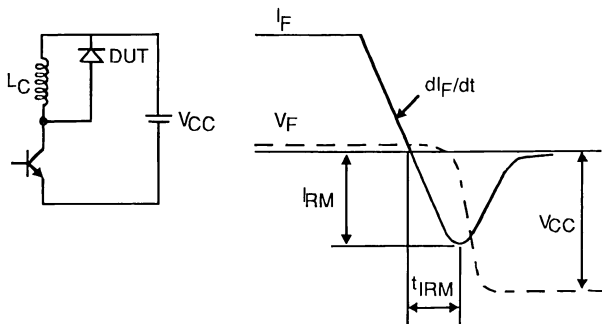


Figure 11 : Turn-off switching characteristics (without series inductance).

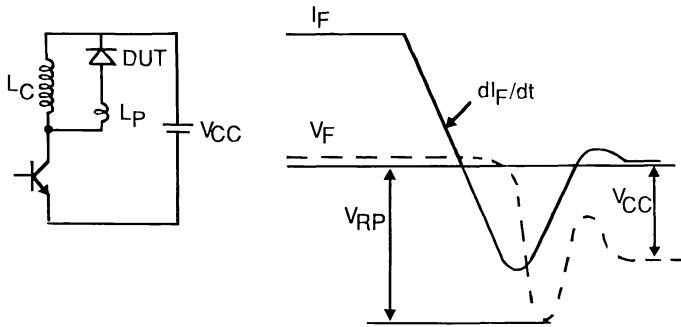


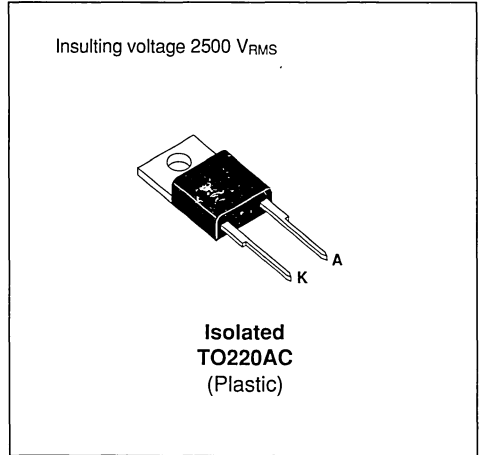
Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSES RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 7pF

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit	
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	150	A
$I_{F(RMS)}$	RMS Forward Current		25	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 50^\circ C$ $\delta = 0.5$	12	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	75	A
P	Power Dissipation	$T_{case} = 50^\circ C$	25	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to + 150	°C

Symbol	Parameter	BYT 12PI-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	4	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			50	μA
	T _J = 100°C				2.5	mA
V _F	T _J = 25°C	I _F = 12A			1.9	V
	T _J = 100°C				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A	di _F /dt = - 15A/μs	V _R = 30V		120	ns
		I _F = 0.5A	I _R = 1A	I _{rr} = 0.25A		50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 50A/μs	V _{CC} = 200V I _F = 12A L _p ≤ 0.05μH T _J = 100°C See Figure 11			160	ns
	di _F /dt = - 100A/μs			100		
I _{RM}	di _F /dt = - 50A/μs				6	A
	di _F /dt = - 100A/μs			7.5		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C	V _{CC} = 150V	I _F = I _{F(AV)}			4	
	di _F /dt = - 12A/μs	L _p = 4μH	See Figure 12				

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.026 I_F \quad P = 1.47 \times I_{F(AV)} + 0.026 I_F^2 (RMS)$$

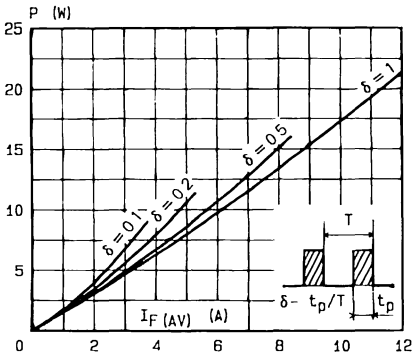


FIGURE 1 : Low frequency power losses versus average current.

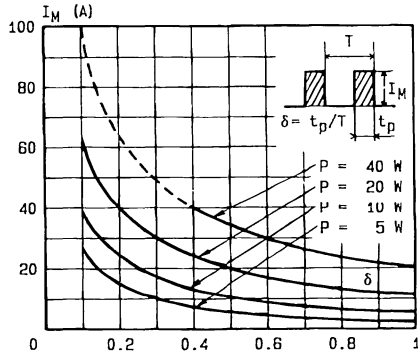


FIGURE 2 : Peak current versus form factor.

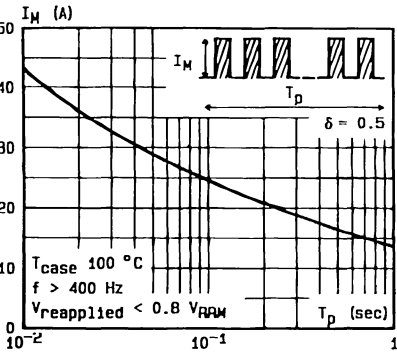


FIGURE 3 : Non repetitive peak surge current versus overload duration.

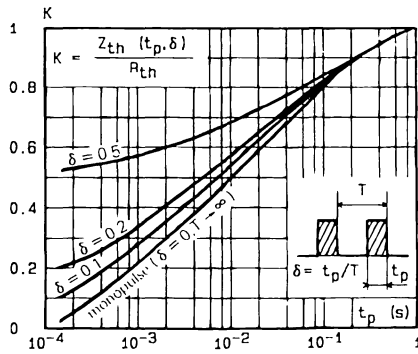


FIGURE 4 : Thermal impedance versus pulse width.

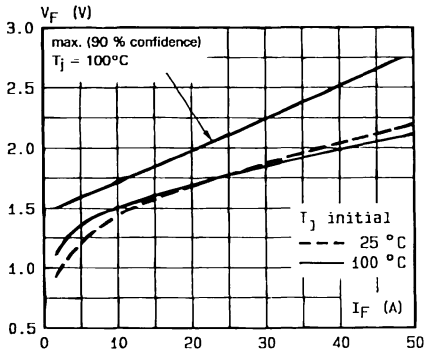


FIGURE 5 : Voltage drop versus forward current.

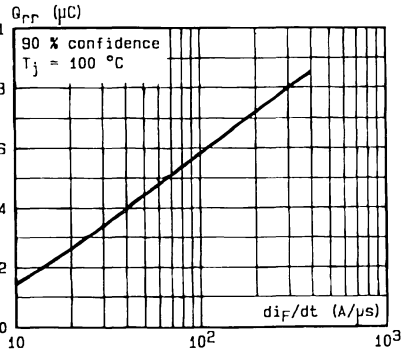


FIGURE 8 : Recovery charge versus di_F/dt .

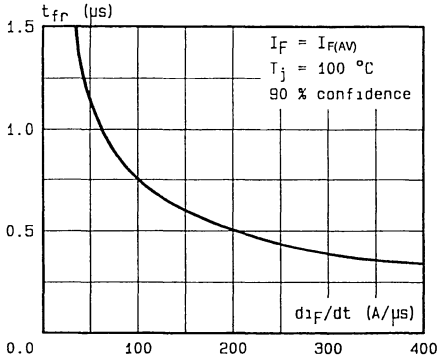


FIGURE 7 : Recovery time versus di_F/dt .

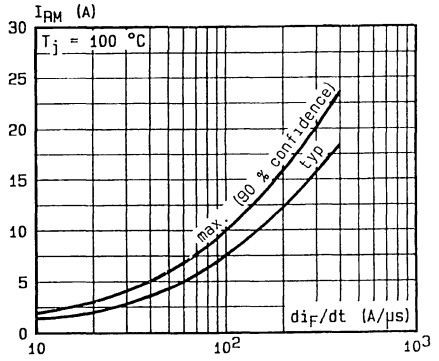


FIGURE 8 : Peak reverse current versus di_F/dt .

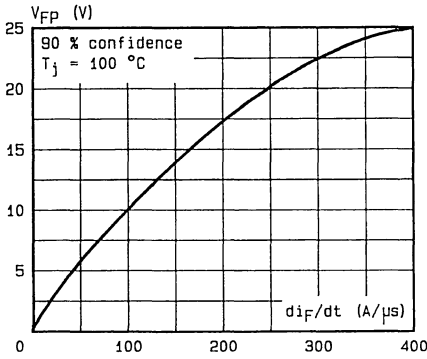


FIGURE 9 : Peak forward voltage versus di_F/dt .

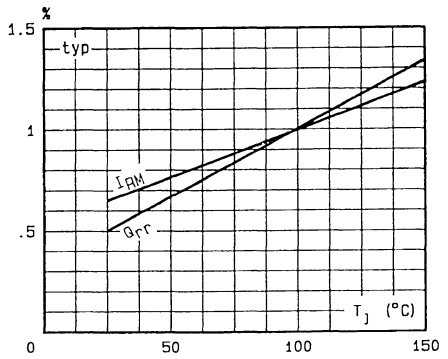


FIGURE 10 : Dynamic parameters versus junction temperature.

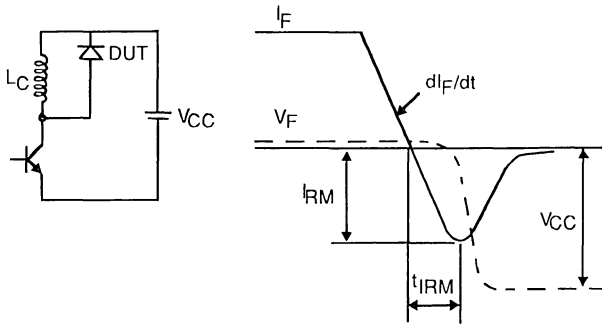


Figure 11 : Turn-off switching characteristics (without series inductance).

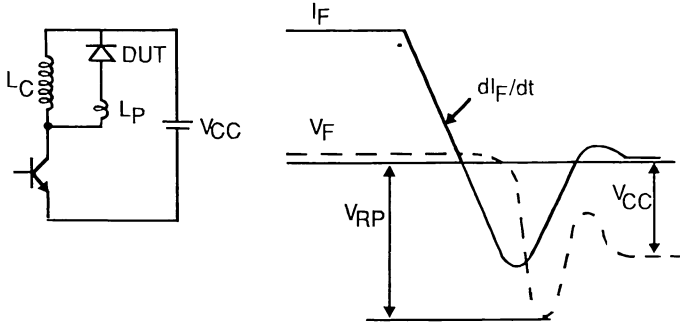


Figure 12 : Turn-off switching characteristics (with series inductance).

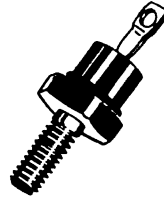
FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

Cathode connected to case



DO 4
(Metal)

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	200	A
$I_{F(RMS)}$	RMS Forward Current		25	A
$I_{F(AV)}$	Average forward current	$T_c = 100^\circ C$ $\delta = 0.5$	12	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ sinusoidal	75	A
P	Power Dissipation	$T_c = 100^\circ C$	20	W
Tstg Tj	Storage and junction temperature range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 12-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			50	μA
	T _J = 100°C				2.5	mA
V _F	T _J = 25°C	I _F = 12A			1.9	V
	T _J = 100°C				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25 °C	I _F = 1 A	di _F /dt = - 15 A/μs	V _R = 30 V		120	ns
		I _F = 0.5 A	I _R = 1 A		I _{rr} = 0.25 A		

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 50A/μs	V _{CC} = 200V I _F = 12A L _p ≤ 0.05μH T _J = 100°C See Figure 11			160	ns
	di _F /dt = - 100A/μs			100		
I _{RM}	di _F /dt = - 50A/μs				6	A
	di _F /dt = - 100A/μs			7.5		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C di _F /dt = - 12A/μs	V _{CC} = 200V I _F = I _{F(AV)} See note L _p = 12μH See Figure 12			4	

Note : Applicable to BYT 12-800 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.026 I_F \quad P = 1.47 \times I_{F(AV)} + 0.026 I_F^2 (RMS)$$

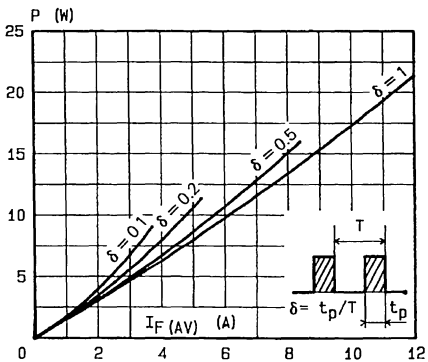


FIGURE 1 : Low frequency power losses versus average current.

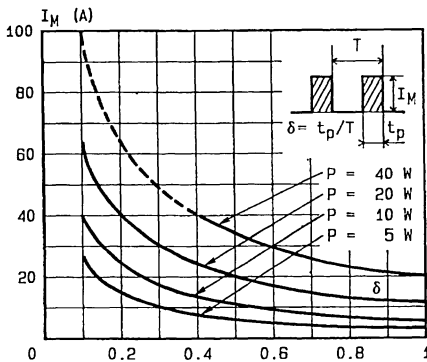


FIGURE 2 : Peak current versus form factor.

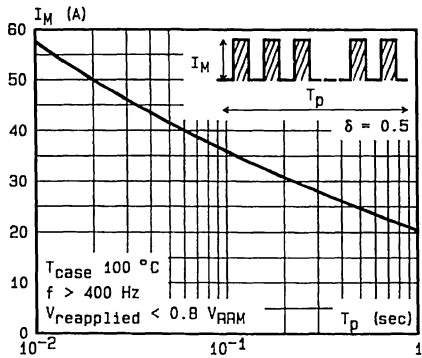


FIGURE 3 : Non repetitive peak surge current versus overload duration.

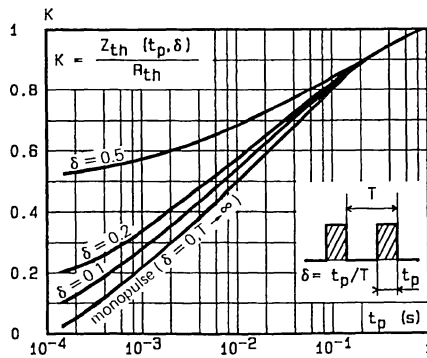


FIGURE 4 : Thermal impedance versus pulse width.

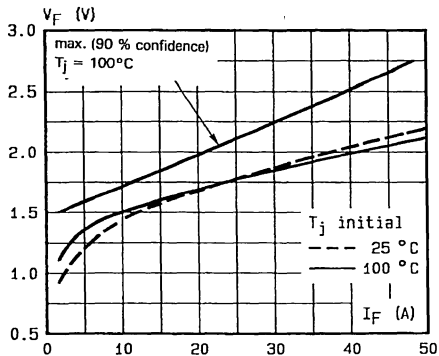


FIGURE 5 : Voltage drop versus forward current.

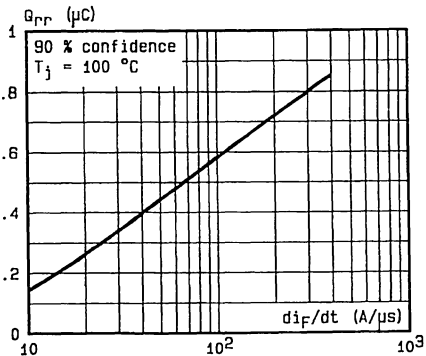


FIGURE 6 : Recovery charge versus di_F/dt .

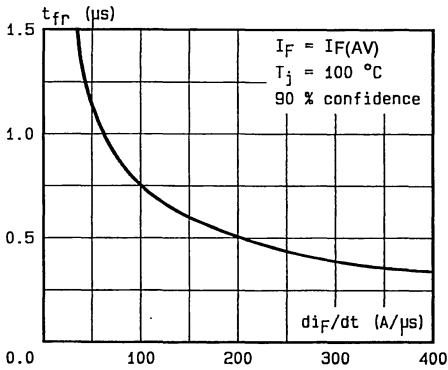


FIGURE 7 : Recovery time versus di_F/dt .

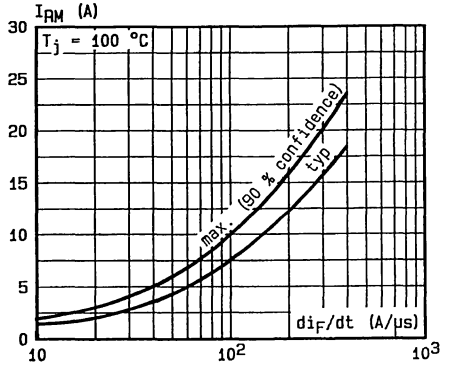


FIGURE 8 : Peak reverse current versus di_F/dt .

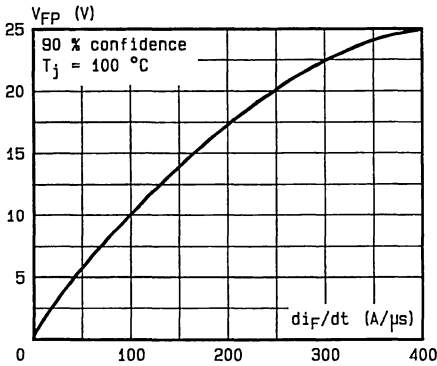


FIGURE 9 : Peak forward voltage versus di_F/dt .

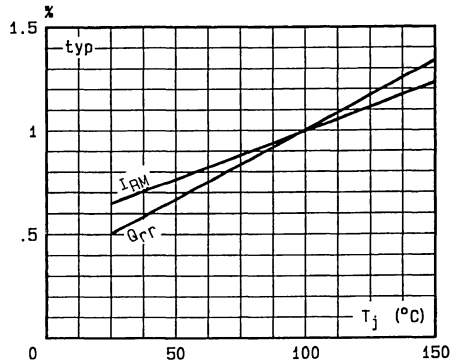


FIGURE 10 : Dynamic parameters versus junction temperature.

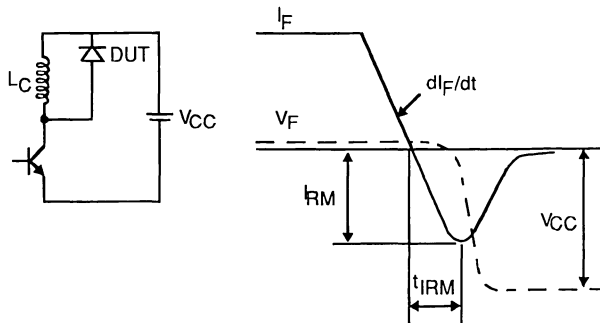


Figure 11 : Turn-off switching characteristics (without series inductance).

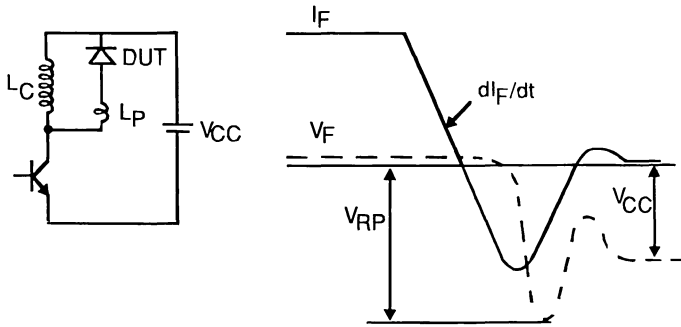


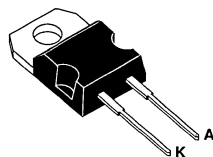
Figure 12 : Turn-off switching characteristics (with series inductance).



FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

Cathode connected to case


TO220AC
 (Plastic)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1000	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$ 150	A
$I_{F(RMS)}$	RMS Forward Current	25	A
$I_{F(AV)}$	Average Forward Current	$T_{case}=100^\circ C$ $\delta = 0.5$ 12	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal 75	A
P	Power Dissipation	$T_{case}=100^\circ C$ 25	W
T_{stg} T_j	Storage and Junction Temperature Range	- 40 to + 150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_j = 100^\circ\text{C}$				2.5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 12\text{A}$			1.9	V
	$T_j = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		155	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		65	

TURN-OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $L_p \leq 0.05\mu\text{H}$ See Figure 11			200	ns
	$di_F/dt = -100\text{A}/\mu\text{s}$					
I_{RM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$I_F = 12\text{A}$ $T_j = 100^\circ\text{C}$			7.8	A
	$di_F/dt = -100\text{A}/\mu\text{s}$					

TURN-OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$	$I_F = I_{F(AV)}$			4.5	
	$di_F/dt = -12\text{A}/\mu\text{s}$	$L_p = 12\mu\text{H}$	See Figure 12				

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.026 I_F$$

$$P = 1.47 \times I_{F(AV)} + 0.026 I_{F(RMS)}^2$$

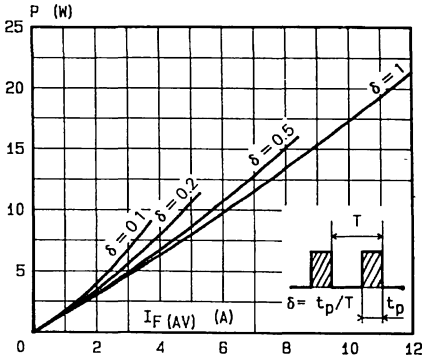


FIGURE 1 : Low frequency power losses versus average current.

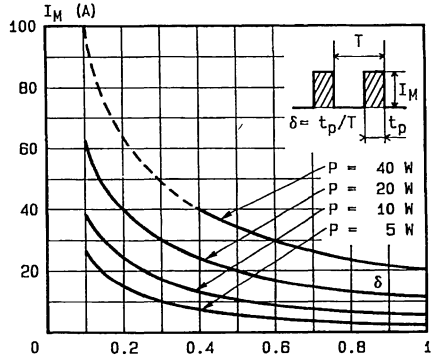


FIGURE 2 : Peak current versus form factor.

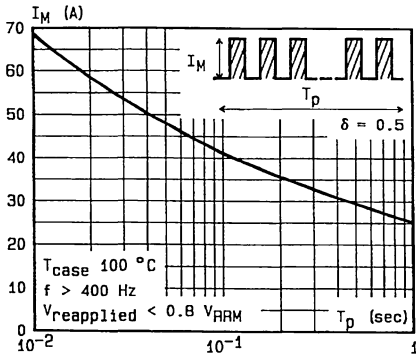


FIGURE 3 : Non repetitive peak surge current versus overload duration.

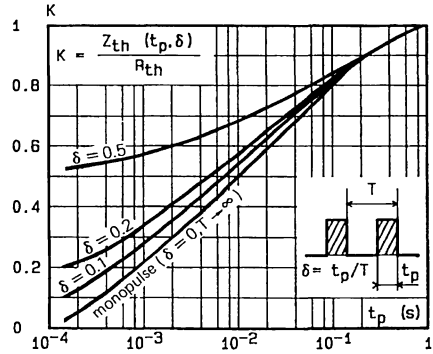


FIGURE 4 : Thermal impedance versus pulse width.

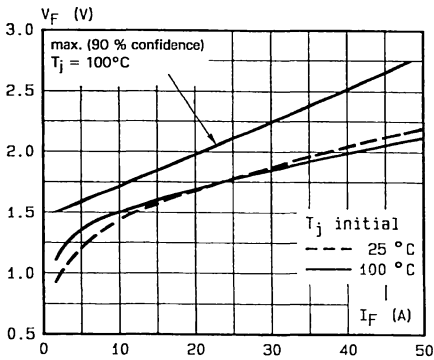


FIGURE 5 : Voltage drop versus forward current.

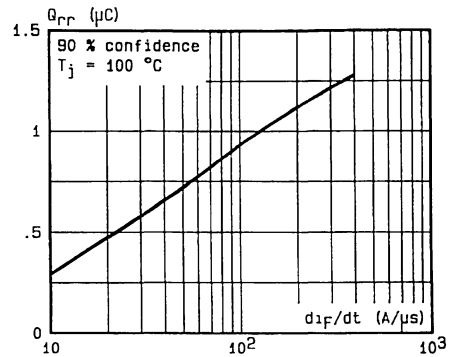


FIGURE 6 : Recovery charge versus di/dt .

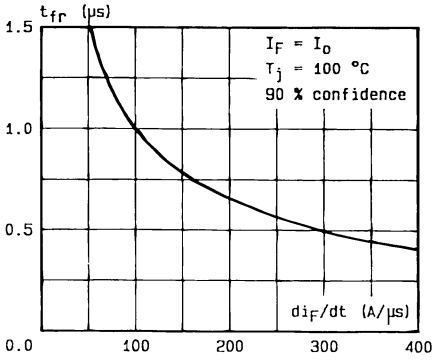


FIGURE 7 : Recovery time versus di_F/dt .

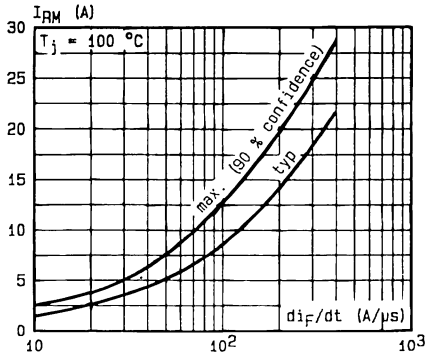


FIGURE 8 : Peak reverse current versus di_F/dt .

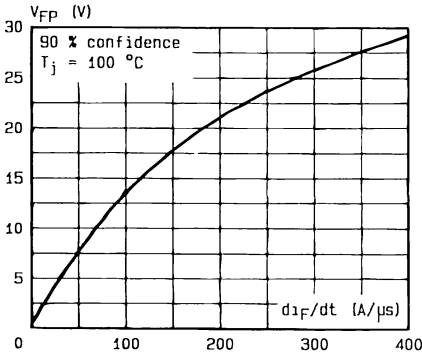


FIGURE 8 : Peak forward voltage versus di_F/dt .

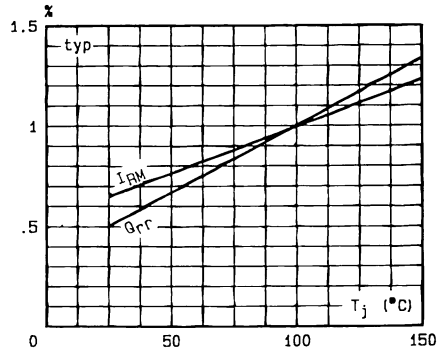


FIGURE 10 : Dynamic parameters versus junction temperature.

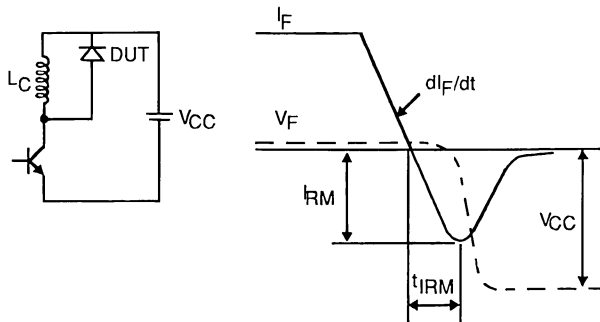


Figure 11 : Turn-off switching characteristics (without series inductance).

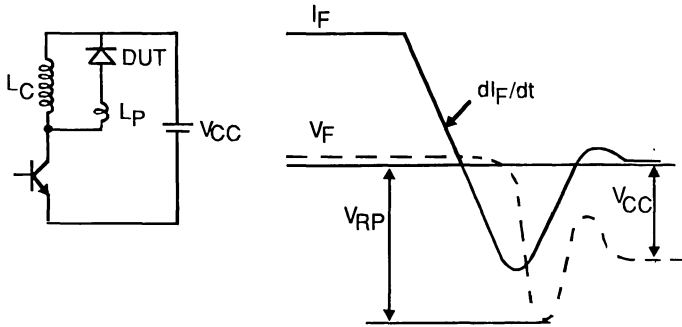
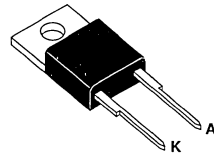


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 7pF

 Insulating voltage 2500 V_{RMS}

**Isolated
TO220AC**
 (Plastic)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage		1000	V
V _{RSM}	Non Repetitive Peak Reverse Voltage		1000	V
I _{FRM}	Repetitive Peak Forward Current	t _p ≤ 10μs	150	A
I _{F(RMS)}	RMS Forward Current		25	A
I _{F(AV)}	Average Forward Current	T _{case} = 50°C δ = 0.5	12	A
I _{FSM}	Surge Non Repetitive Forward Current	t _p = 10ms Sinusoidal	75	A
P	Power Dissipation	T _{case} = 50°C	25	W
T _{stg} T _J	Storage and Junction Temperature Range		- 40 to + 150	°C

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{th (j-c)}	Junction-case	4	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_j = 100^\circ\text{C}$				2.5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 12\text{A}$			1.9	V
	$T_j = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		155	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		65	

TURN-OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 12\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_j = 100^\circ\text{C}$ See Figure 11			200	ns
	$di_F/dt = -100\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -50\text{A}/\mu\text{s}$				7.8	A
	$di_F/dt = -100\text{A}/\mu\text{s}$			9		

TURN-OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$ $di_F/dt = -12\text{A}/\mu\text{s}$ $L_p = 12\mu\text{H}$ See Figure 12			4.5	

To evaluate the conduction losses use the following equation :

$$V_F = 1.47 + 0.026 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.026 I_F^2(\text{RMS})$$

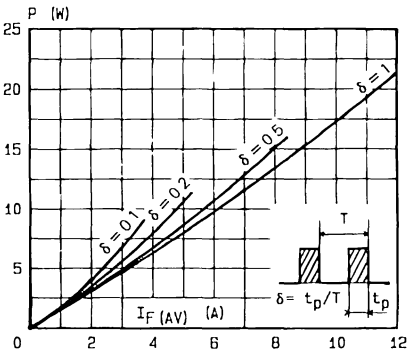


FIGURE 1 : Low frequency power losses versus average current.

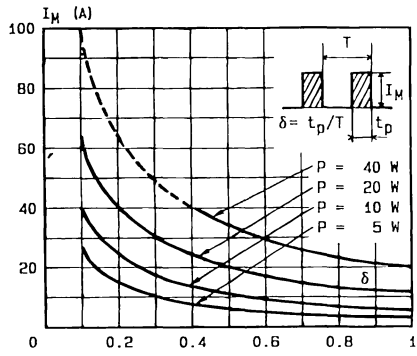


FIGURE 2 : Peak current versus form factor.

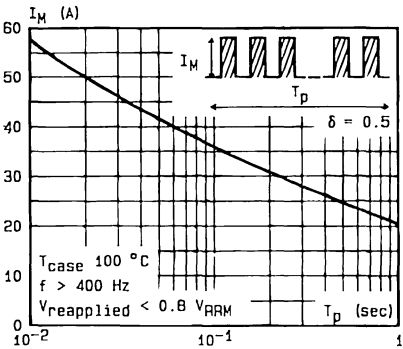


FIGURE 3 : Non repetitive peak surge current versus overload duration.

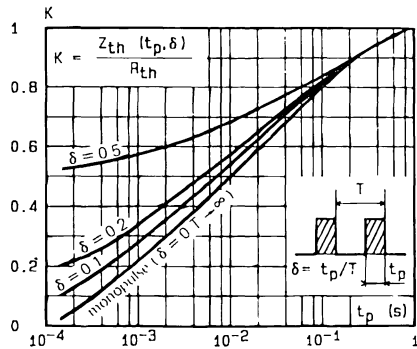


FIGURE 4 : Thermal impedance versus pulse width.

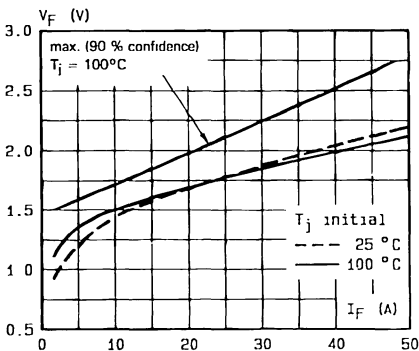


FIGURE 5 : Voltage drop versus forward current.

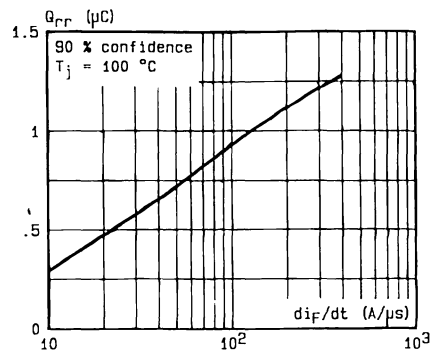


FIGURE 8 : Recovery charge versus di_F/dt.

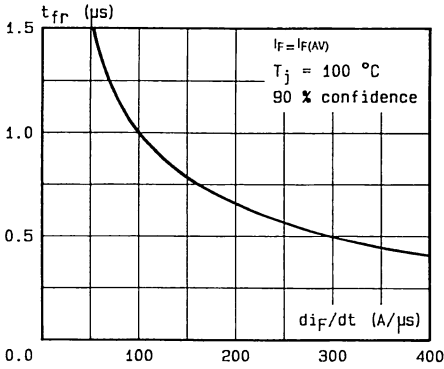


FIGURE 7 : Recovery time versus di_F/dt .

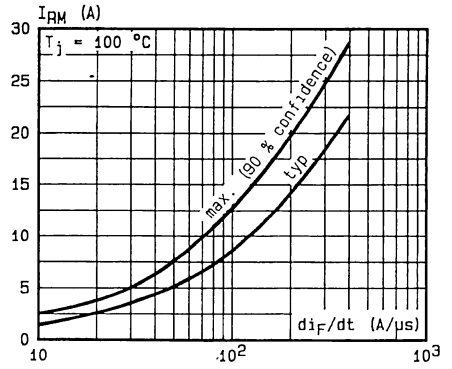


FIGURE 8 : Peak reverse current versus di_F/dt .

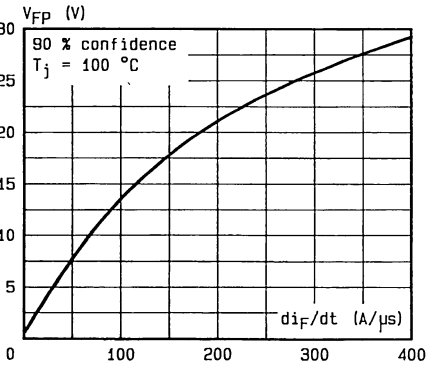


FIGURE 9 : Peak forward voltage versus di_F/dt .

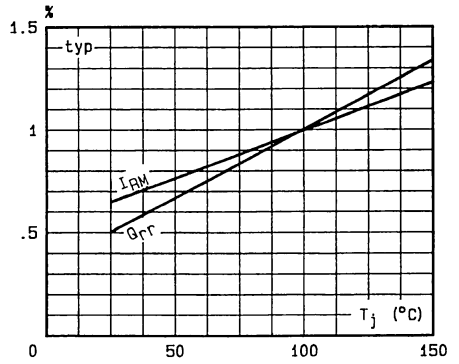


FIGURE 10 : Dynamic parameters versus junction temperature.

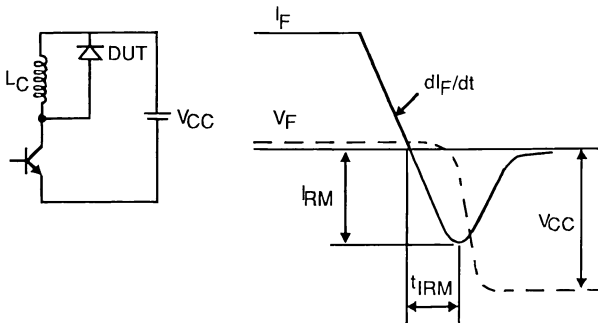


Figure 11 : Turn-off switching characteristics (without series inductance).

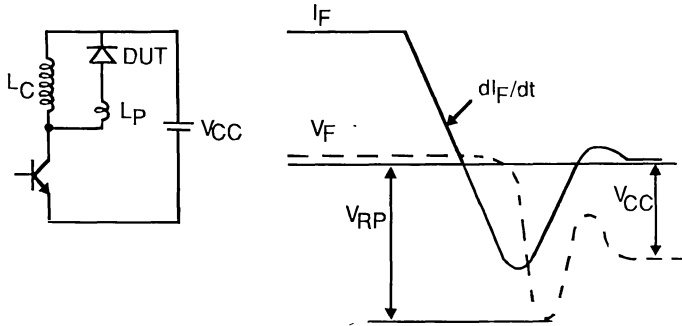


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

Cathode connected to case


DO 4
 (Metal)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		1000	V
V_{RSM}	Non Repetitive Peak Reverse Voltage		1000	V
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	150	A
$I_{F(RMS)}$	RMS Forward Current		25	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 85^\circ C$ $\delta = 0.5$	12	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	75	A
P	Power Dissipation	$T_{case} = 85^\circ C$	26	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	2.5	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
	$T_J = 100^\circ\text{C}$				2.5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 12\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		155	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		65	

TURN-OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -50\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 12\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 11			200	ns
	$di_F/dt = -100\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -50\text{A}/\mu\text{s}$				7.8	A
	$di_F/dt = -100\text{A}/\mu\text{s}$			9		

TURN-OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$	$I_F = I_{F(AV)}$			4.5	
	$di_F/dt = -12\text{A}/\mu\text{s}$	$L_p = 12\mu\text{H}$	See Figure 12				

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.026 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.026 I_F^2(\text{RMS})$$

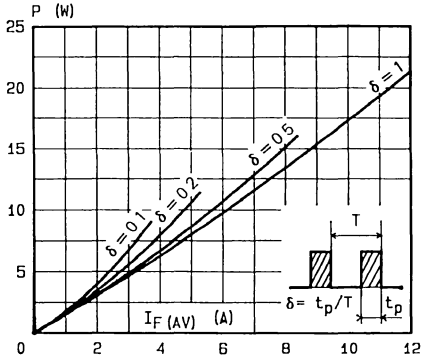


FIGURE 1: Low frequency power losses versus average current.

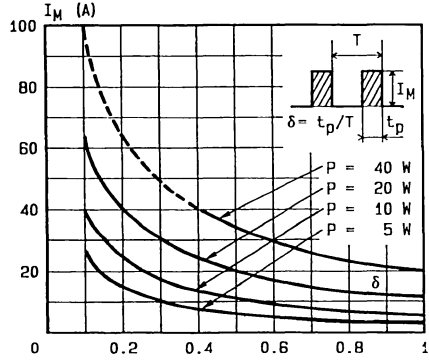


FIGURE 2: Peak current versus form factor.

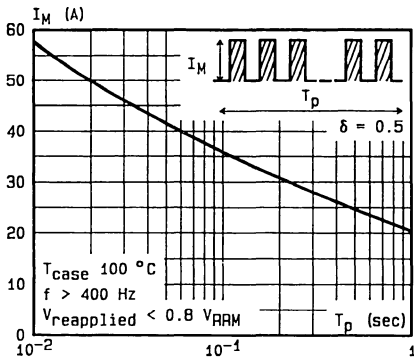


FIGURE 3: Non repetitive peak surge current versus overload duration.

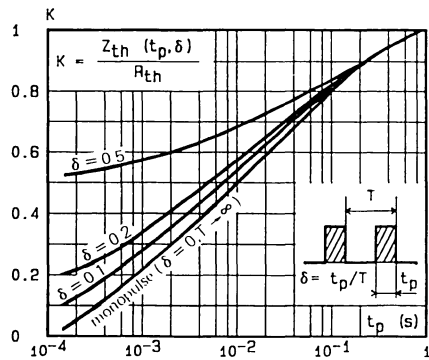


FIGURE 4: Thermal impedance versus pulse width.

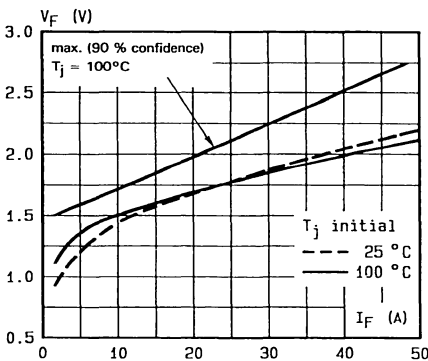


FIGURE 5: Voltage drop versus forward current.

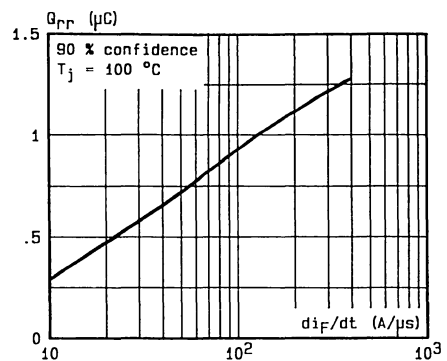


FIGURE 6: Recovery charge versus di/dt.

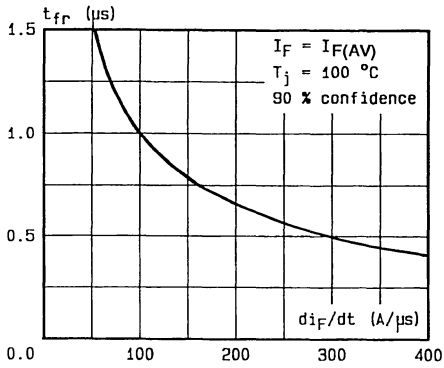


FIGURE 7 : Recovery time versus di_F/dt .

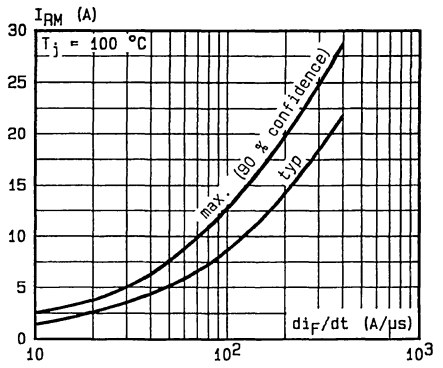


FIGURE 8 : Peak reverse current versus di_F/dt .

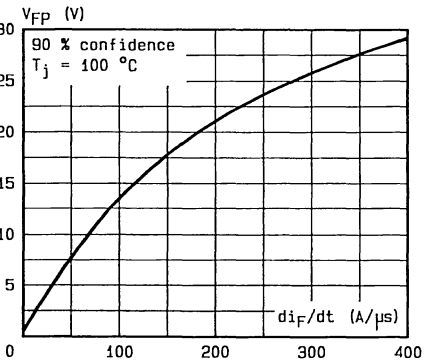


FIGURE 9 : Peak forward voltage versus di_F/dt .

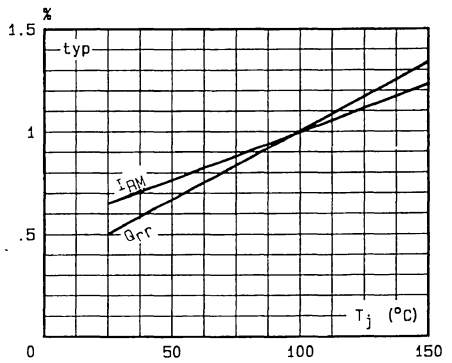


FIGURE 10 : Dynamic parameters versus junction temperature.

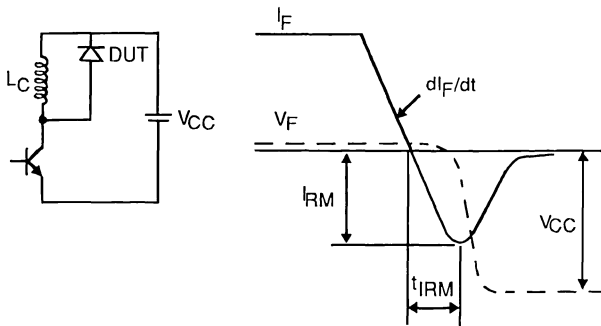


Figure 11 : Turn-off switching characteristics (without series inductance).

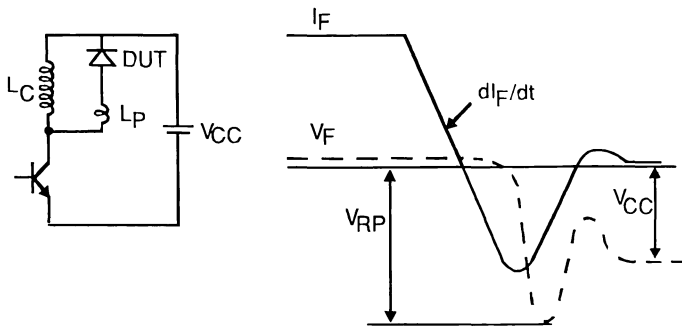
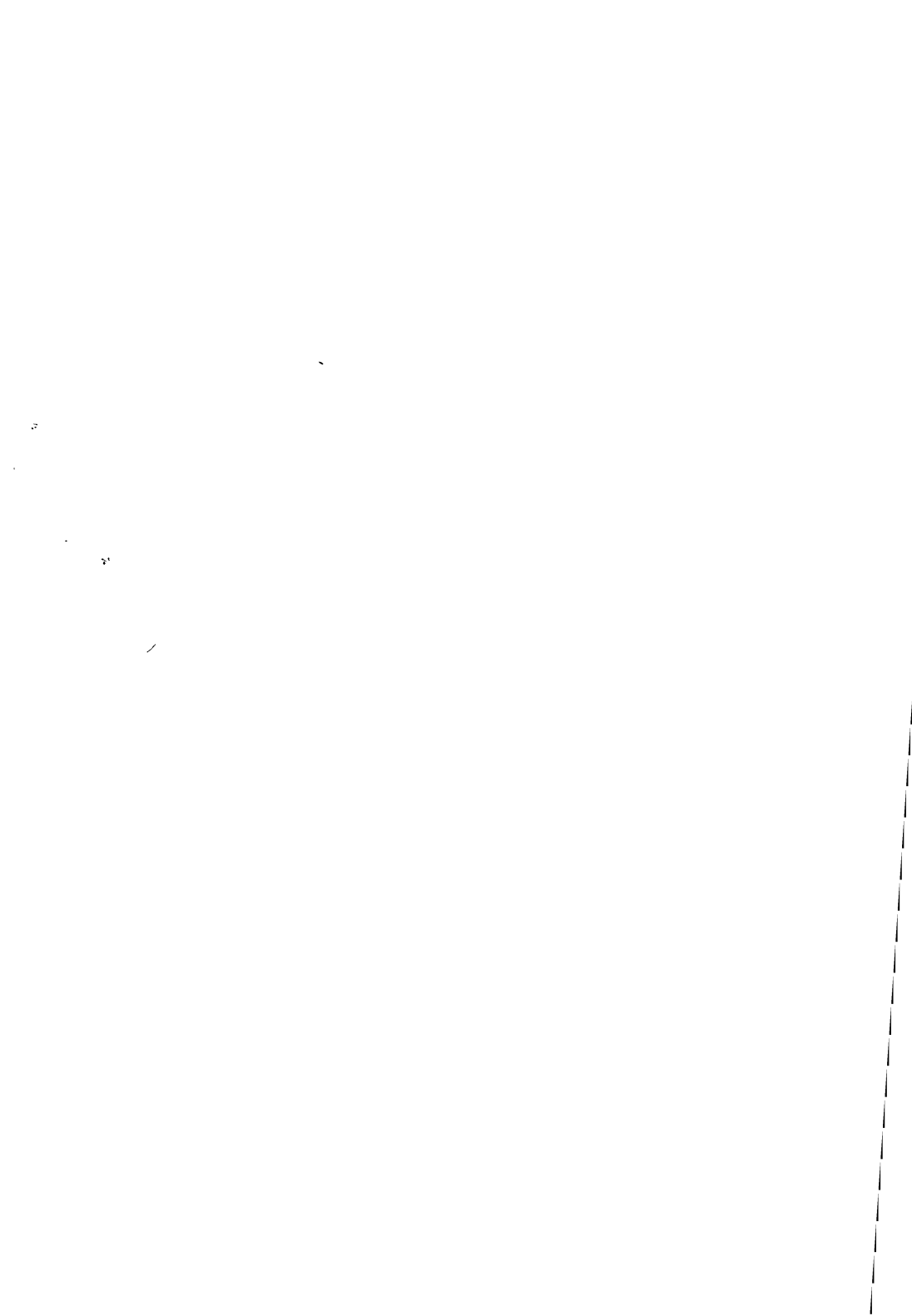


Figure 12 : Turn-off switching characteristics (with series inductance).

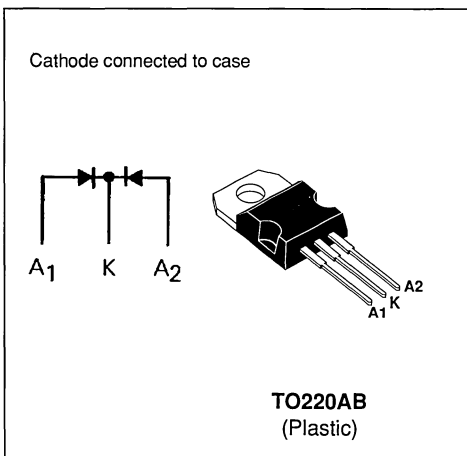
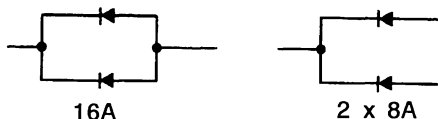


FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS :

- The BYT 16 P can be used :


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	130	A
$I_{F(RMS)}$	RMS Forward Current		30	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 100^\circ C$ $\delta = 0.5$	16	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	100	A
P	Power Dissipation	$T_{case} = 100^\circ C$	25	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 16P-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions		Value	Unit
$R_{th(j-c)}$	Junction-case	per leg total	3.75 2	$^\circ C/W$
$R_{th(c)}$	Coupling		0.25	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	μA
	$T_j = 100^\circ\text{C}$				2.5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 8\text{A}$			1.5	V
	$T_j = 100^\circ\text{C}$				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		75	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		35	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -32\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 8\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_j = 100^\circ\text{C}$ See Figure 11			75	ns
	$di_F/dt = -64\text{A}/\mu\text{s}$			50		
I_{RM}	$di_F/dt = -32\text{A}/\mu\text{s}$				2.2	A
	$di_F/dt = -64\text{A}/\mu\text{s}$			2.8		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 120\text{V}$	$I_F = I_{F(AV)}$ See note		3.3		
	$di_F/dt = -8\text{A}/\mu\text{s}$	$L_p = 9\mu\text{H}$	See Figure 12				

Note : Applicable to BYT 16P-400 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.024I_F$$

$$P = 1.1 \times I_{F(AV)} + 0.024I_{F(RMS)}^2 \text{ (1 leg)}$$

$$P = 1.1 \times I_{F(AV)} + 0.012I_{F(RMS)}^2 \text{ (2 legs)}$$

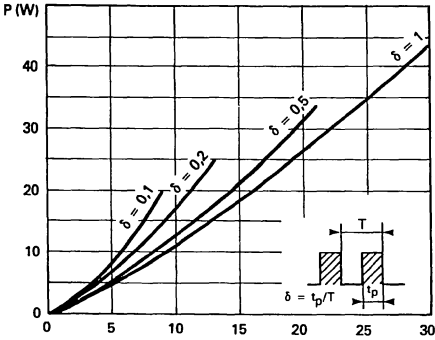


FIGURE 1 : Low frequency power losses versus average current. (A)

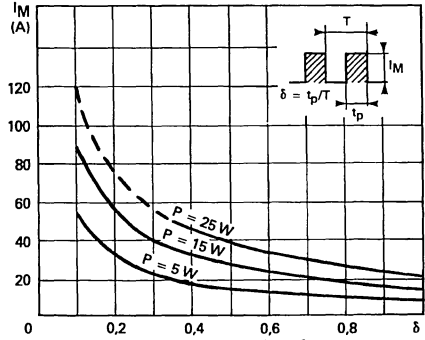


FIGURE 2 : Peak current versus form factor.

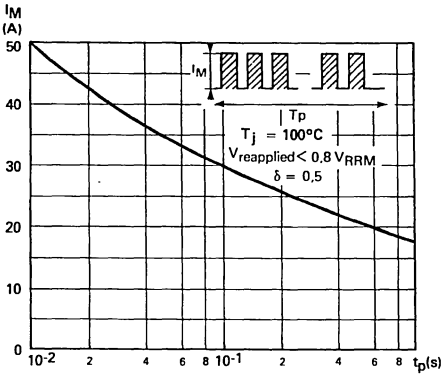


FIGURE 3 : Non repetitive peak surge current versus overload duration.

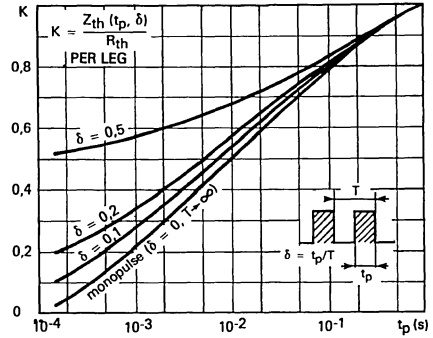


FIGURE 4 : Thermal impedance versus pulse width.

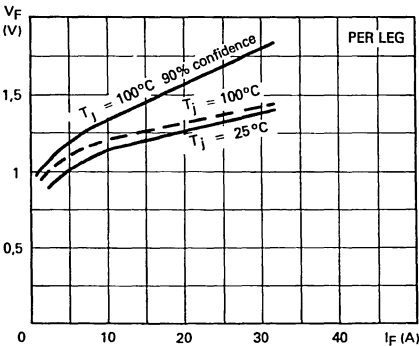


FIGURE 5 : Voltage drop versus forward current.

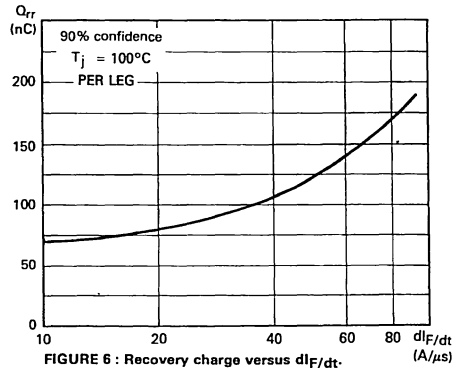


FIGURE 6 : Recovery charge versus dI_F/dt .

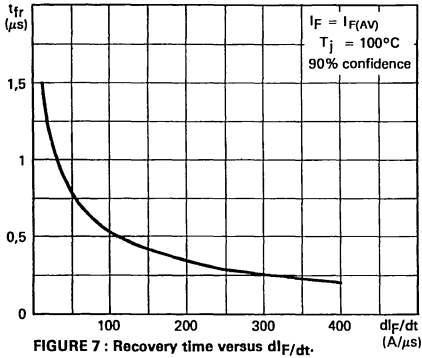


FIGURE 7 : Recovery time versus dI_F/dt .

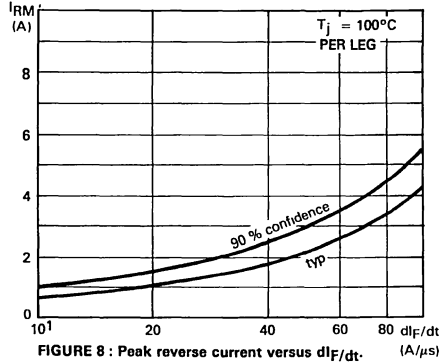


FIGURE 8 : Peak reverse current versus dI_F/dt .

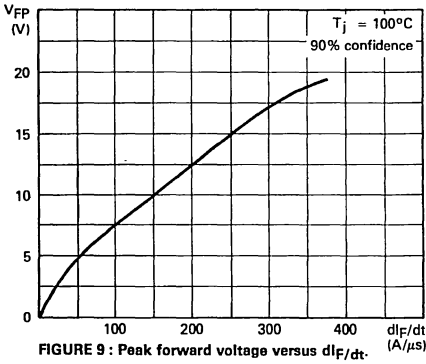


FIGURE 9 : Peak forward voltage versus dI_F/dt .

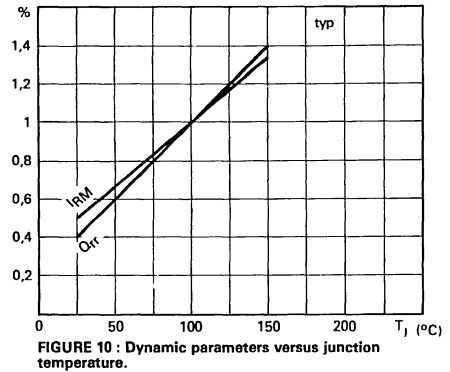


FIGURE 10 : Dynamic parameters versus junction temperature.

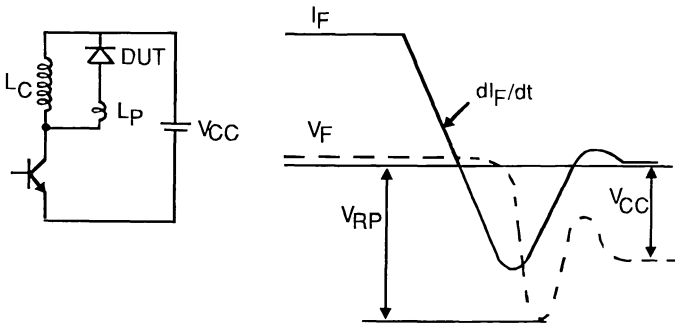


Figure 11 : Turn-off switching characteristics (without series inductance).

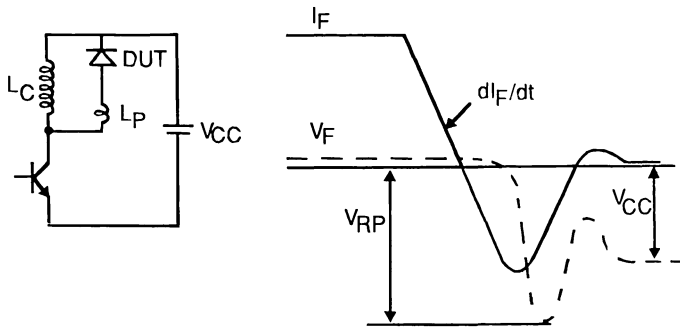


Figure 12 : Turn-off switching characteristics (with series inductance).

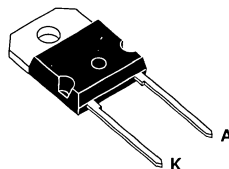
FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

Cathode connected to case



SOD93
(Plastic)

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	500	A
$I_{F(RMS)}$	RMS Forward Current		50	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 100^\circ C$ $\delta = 0.5$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	350	A
P	Power Dissipation		50	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 30P-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	1	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			35	μA
	T _J = 100°C				6	mA
V _F	T _J = 25°C	I _F = 30A			1.5	V
	T _J = 100°C				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A	di _F /dt = - 15A/μs	V _R = 30V		100	ns
		I _F = 0.5A	I _R = 1A	I _{rr} = 0.25A		50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 120A/μs	V _{CC} = 200V I _F = 30A L _p < 0.05μH T _J = 100°C See Figure 11			75	ns
	di _F /dt = - 240A/μs			50		
I _{RM}	di _F /dt = - 120A/μs				9	A
	di _F /dt = - 240A/μs			12		

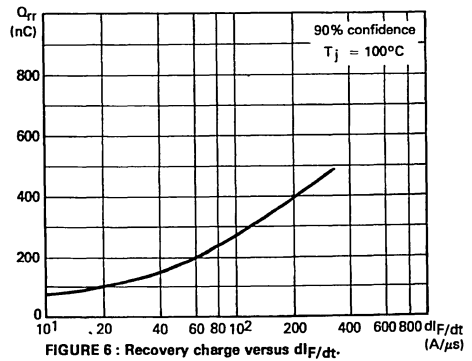
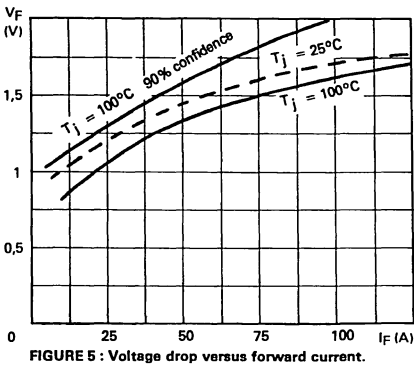
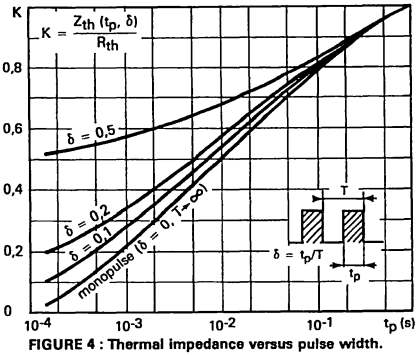
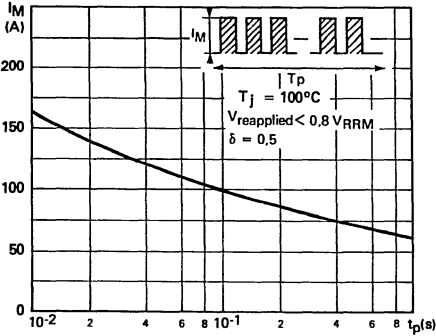
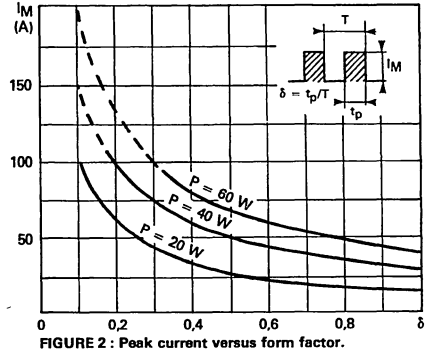
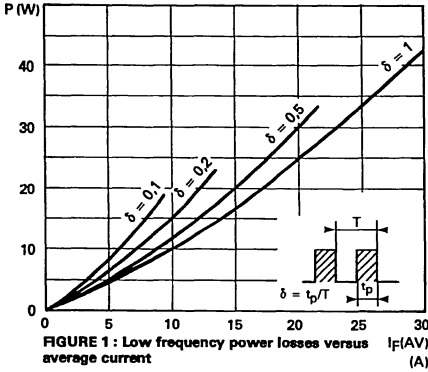
TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C	V _{CC} = 60V	I _F = I _{F(AV)}		3.3		
	di _F /dt = - 30A/μs	L _p = 1μH	See Figure 12				

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.0095I_F$$

$$P = 1.1 \times I_{F(AV)} = 0.0095I_{F(RMS)}^2$$



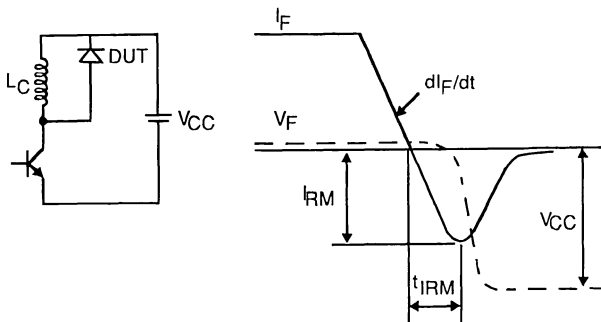
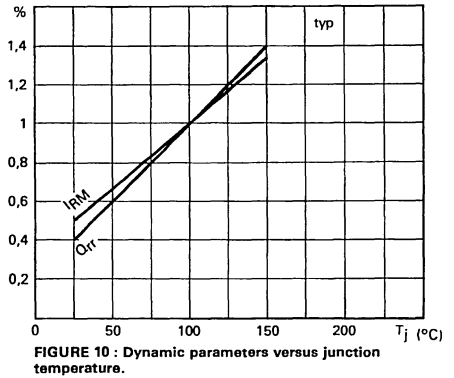
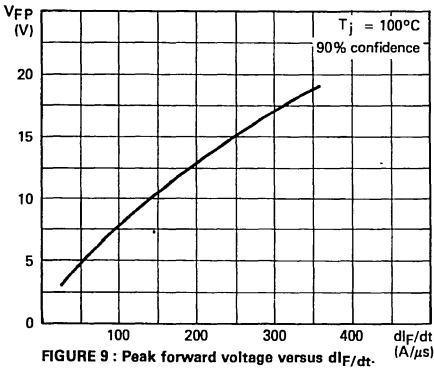
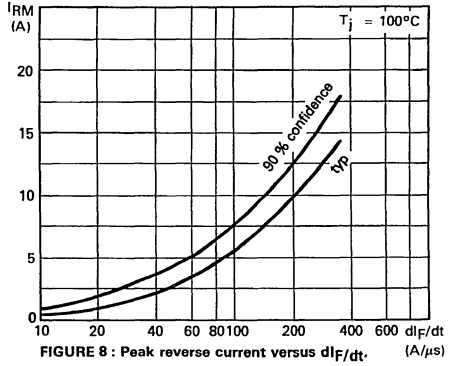
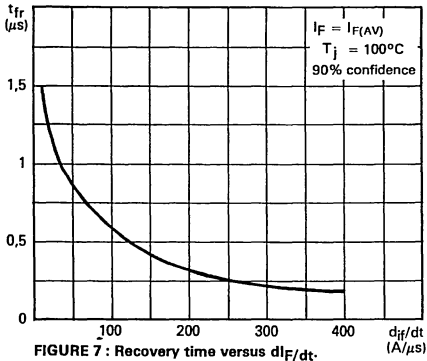


Figure 11 : Turn-off switching characteristics (without series inductance).

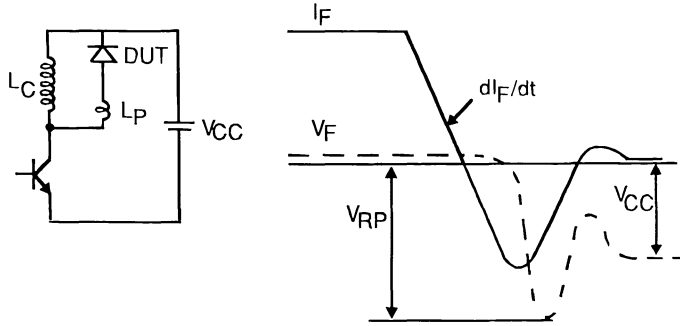


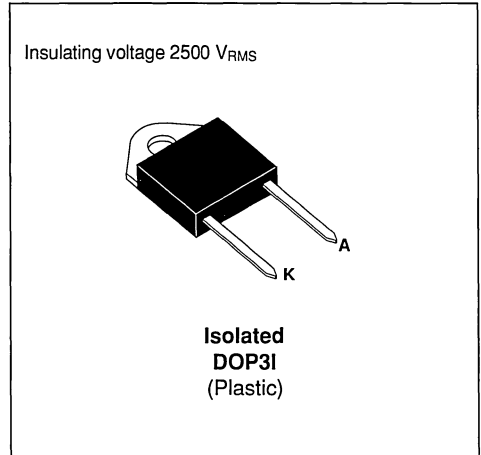
Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 15pF

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit	
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	500	A
$I_{F(RMS)}$	RMS Forward Current		50	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 60^\circ C$ $\delta = 0.5$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	350	A
P	Power Dissipation	$T_{case} = 60^\circ C$	50	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to + 150	°C

Symbol	Parameter	BYT 30PI-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	1.8	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			35	μA
	T _J = 100°C				6	mA
V _F	T _J = 25°C	I _F = 30A			1.5	V
	T _J = 100°C				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A di _F /dt = - 15A/μs V _R = 30V			100	ns
		I _F = 0.5A I _R = 1A , I _{rr} = 0.25A			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 120A/μs	V _{CC} = 200V I _F = 30A L _p ≤ 0.05μH T _J = 100°C See Figure 11			75	ns
	di _F /dt = - 240A/μs			50		
I _{RM}	di _F /dt = - 120A/μs				9	A
	di _F /dt = - 240A/μs			12		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C di _F /dt = - 30A/μs	V _{CC} = 60V I _F = I _{F(AV)} See note L _p = 1μH See Figure 12		3.3		

Note : Applicable to BYT 30 PI-400 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.0095 I_F \qquad P = 1.1 \times I_{F(AV)} + 0.0095 I_F^2 (RMS)$$

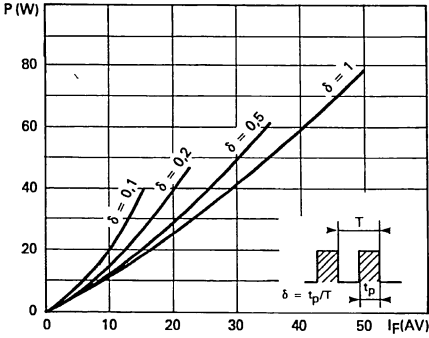


FIGURE 1 : Low frequency power losses versus average current.

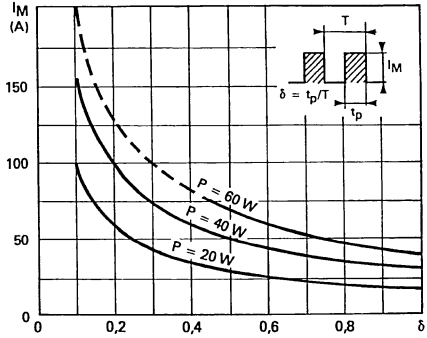


FIGURE 2 : Peak current versus form factor.

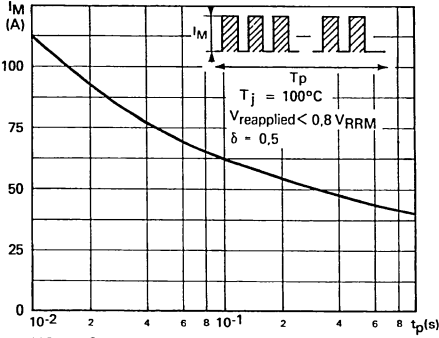


FIGURE 3 : Non repetitive peak surge current versus overload duration.

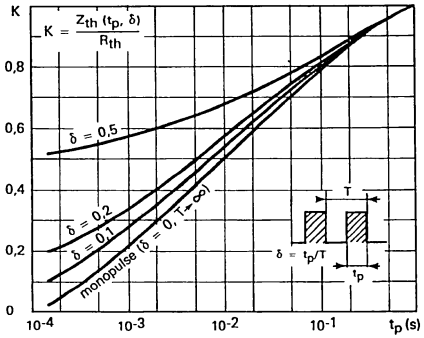


FIGURE 4 : Thermal impedance versus pulse width.

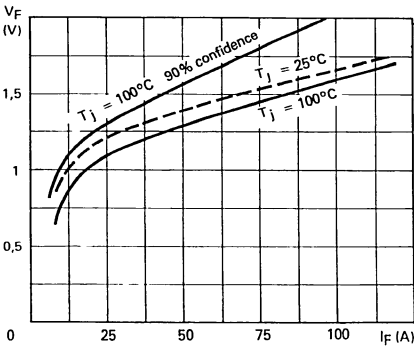


FIGURE 5 : Voltage drop versus forward current.

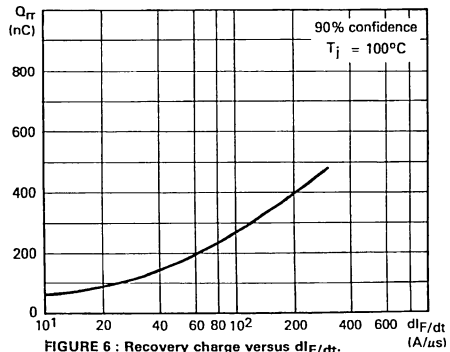


FIGURE 6 : Recovery charge versus dI_F/dt .

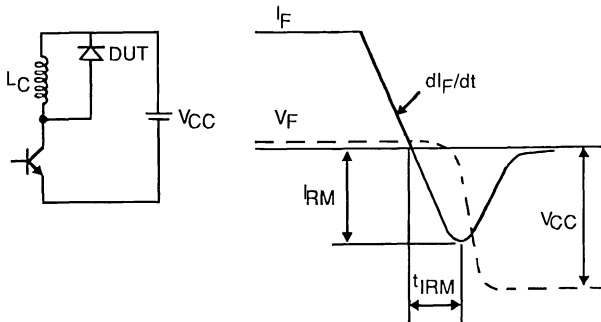
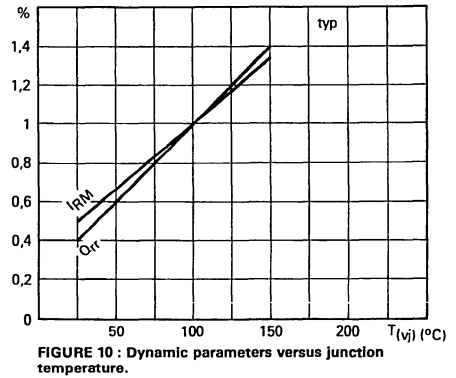
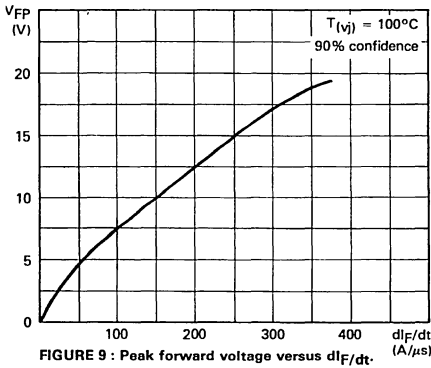
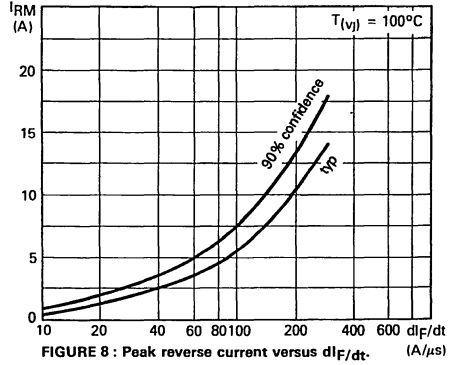
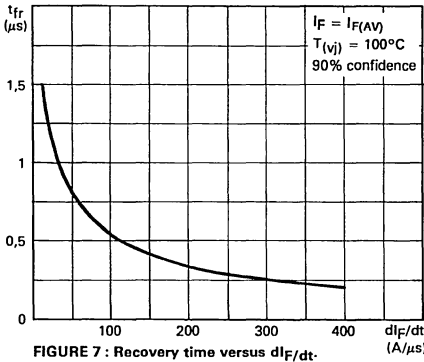


Figure 11 : Turn-off switching characteristics (without series inductance).

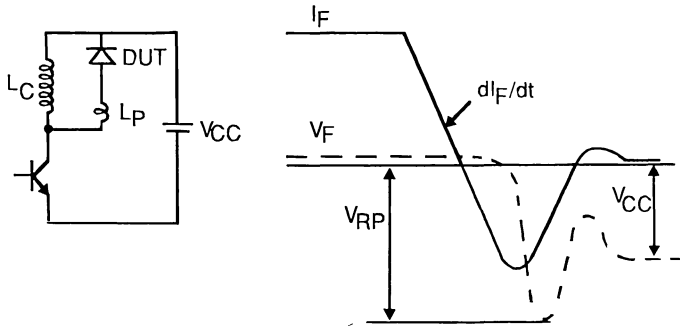


Figure 12 : Turn-off switching characteristics (with series inductance).

HIGH EFFICIENCY FAST RECOVERY DIODES

MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	30 A
V_{RRM}	400 V
t_{rr}	50 ns
V_F	1.4 V

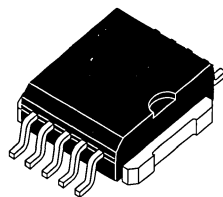
FEATURES AND BENEFITS

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Single rectifier suited for freewheeling in converters and motor control circuits.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
Plastic, non isolated SMD
with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	400	V
$I_{F(RMS)}$	RMS forward current (All pins connected)	44	A
$I_{F(AV)}$	Average forward current	$T_c=100^{\circ}C$ $\delta = 0.5$	A
I_{FSM}	Surge non repetitive forward current (All pins connected)	$t_p=10ms$ sinusoidal	A
I_{FRM}	Repetitive peak forward current	$t_p = 5\mu s$ $f = 5 kHz$	A
T_{stg} T_j	Storage and junction temperature range	- 40 to + 150	$^{\circ}C$

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case thermal resistance	1.0	°C/W

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RRM}	T _j = 25°C			35	μA
			T _j = 100°C			6	mA
V _F **	Forward voltage drop	I _F = 30 A	T _j = 100°C			1.4	V
		I _F = 30 A	T _j = 25°C			1.5	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 1.1 \times I_{F(AV)} + 0.0095 I_F^2 (RMS)$$

RECOVERY CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	Reverse recovery time	T _j = 25°C	I _F = 0.5A			50	ns
		I _{rr} = 0.25 A	I _R = 1A				
		T _j = 25°C	I _F = 1A			100	
		dI _F /dt = -15A/μs	V _R = 30V				

TURN-OFF SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	Maximum reverse recovery time	T _j = 100°C	dI _F /dt = -120A/μs			75	ns
		I _F = 30 A	dI _F /dt = -240A/μs		50		
I _{RM}	Maximum reverse recovery current	V _{CC} = 200 V	dI _F /dt = -120A/μs			9	ns
		L _p < 0.05 μH	dI _F /dt = -240A/μs		12		
C factor	Turn-off overvoltage coefficient	T _j = 100°C	I _F = I _{F(AV)}		3.3		/
		V _{CC} = 60 V	L _p = 1 μH				
		dI _F /dt = -30A/μs					

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5

Cathode = connected to base tab

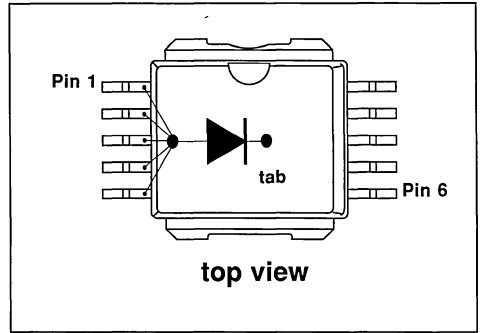


Fig.1 : Average forward power dissipation versus average forward current.

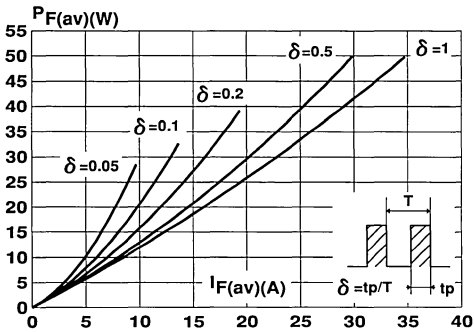


Fig.3 : Forward voltage drop versus forward current (maximum values).

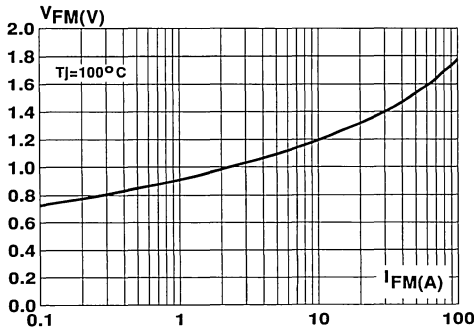


Fig.2 : Peak current versus form factor.

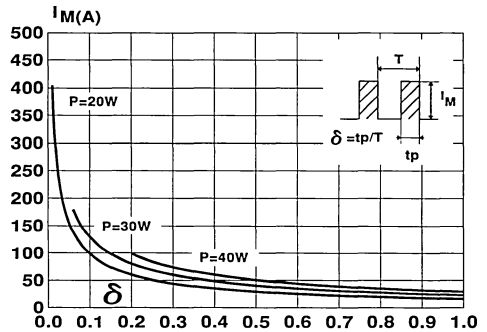


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

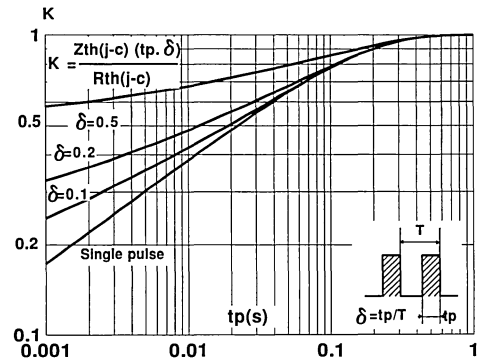


Fig.5 : Non repetitive surge peak forward current versus overload duration.

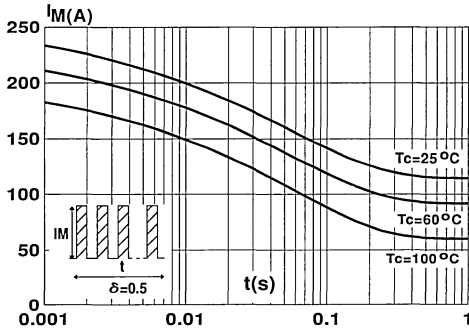


Fig.7 : Recovery charge versus $di_F/dt..$

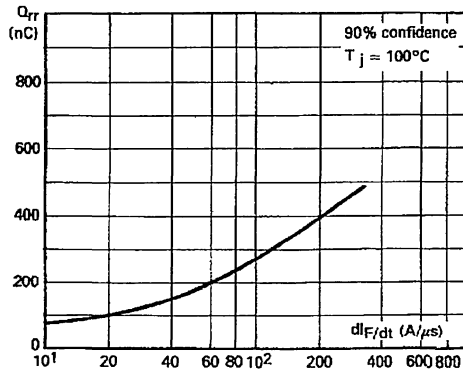


Fig.9 : Peak reverse current versus $di_F/dt..$

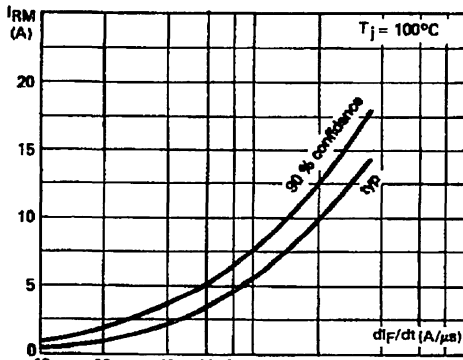


Fig.6 : Average current versus ambient temperature. (duty cycle)

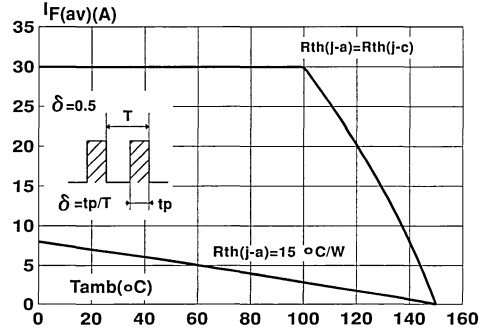


Fig.8 : Recovery times versus $di_F/dt..$

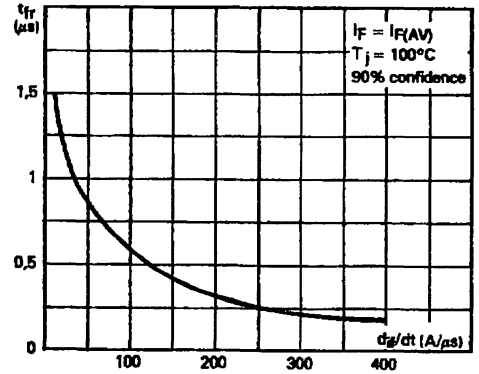


Fig.10 : Peak forward voltage versus $di_F/dt..$

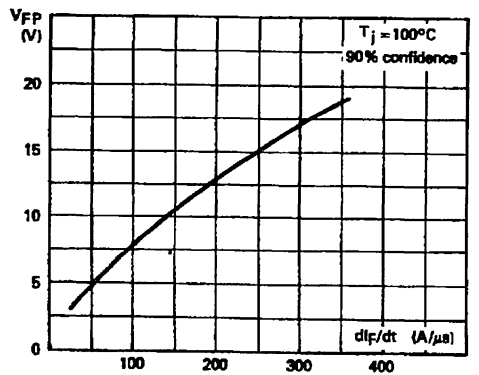
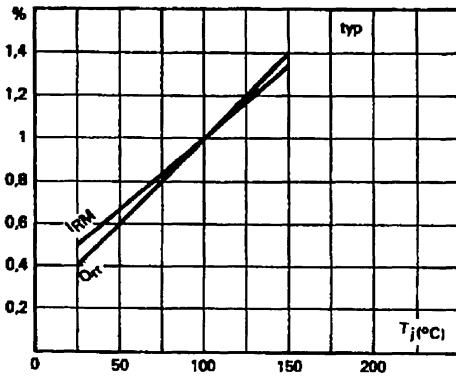
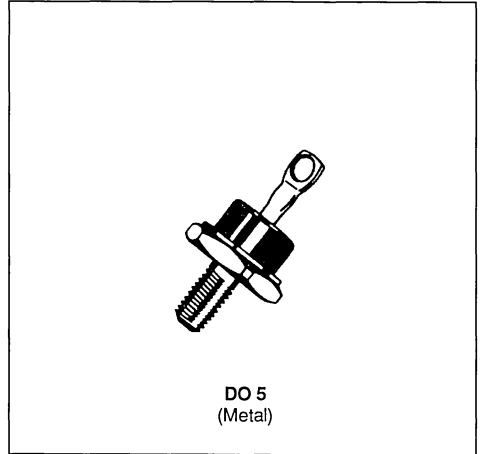


Fig.11: Dynamic parameters versus junction temperature.



FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	500	A
$I_{F(RMS)}$	RMS Forward Current		50	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 90^\circ C$ $\delta = 0.5$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ sinusoidal	500	A
P	Power Dissipation	$T_{case} = 90^\circ C$	50	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 30-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1.2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{R_{RM}}			35	μA
	T _J = 100°C				6	mA
V _F	T _J = 25°C	I _F = 30A			1.5	V
	T _J = 100°C				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A di _F /dt = - 15A/μs V _R = 30V			100	ns
		I _F = 0.5A I _R = 1A t _{rr} = 0.25A			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 120A/μs	V _{CC} = 200V I _F = 30A L _p ≤ 0.05μH T _J = 100°C See Figure 11			75	ns
	di _F /dt = - 240A/μs			50		
I _{RM}	di _F /dt = - 120A/μs				9	A
	di _F /dt = - 240A/μs			12		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C di _F /dt = - 30A/μs	V _{CC} = 60V I _F = I _{F(AV)} L _p = 1μH See Figure 12		3.3		

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.0095 I_F \qquad P = 1.1 \times I_{F(AV)} + 0.0095 I_F^2 (RMS)$$

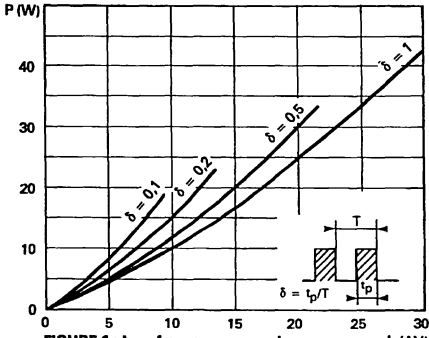


FIGURE 1 : Low frequency power losses versus average current (A)

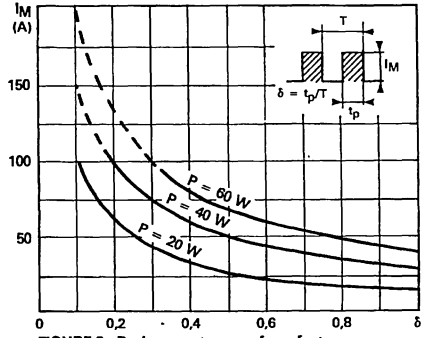


FIGURE 2 : Peak current versus form factor.

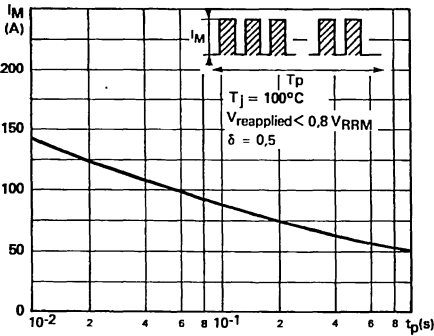


FIGURE 3 : Non repetitive peak surge current versus overload duration.

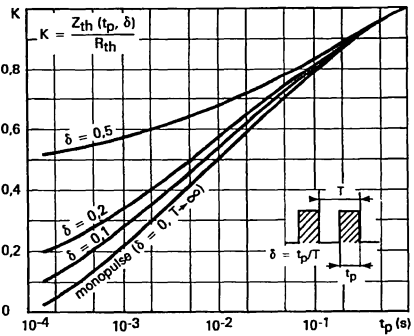


FIGURE 4 : Thermal impedance versus pulse width.

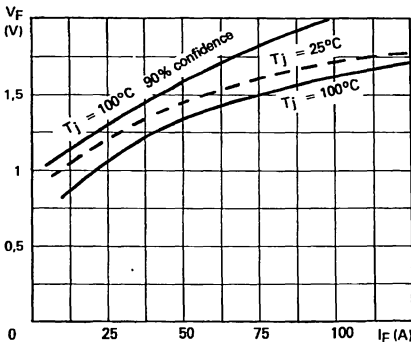


FIGURE 5 : Voltage drop versus forward current.

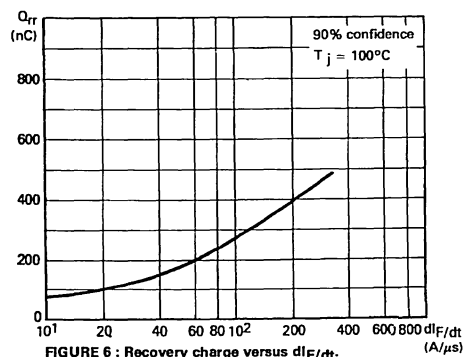


FIGURE 6 : Recovery charge versus di/dt .

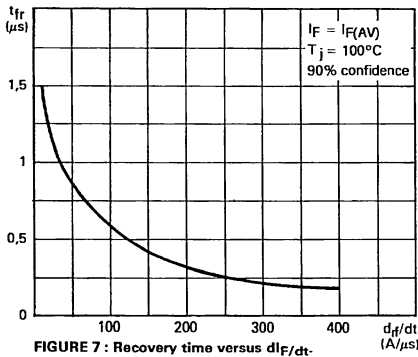


FIGURE 7 : Recovery time versus dI_F/dt .

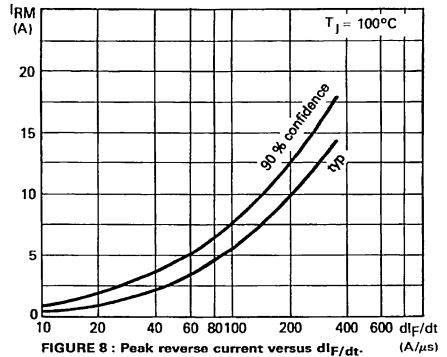


FIGURE 8 : Peak reverse current versus dI_F/dt .

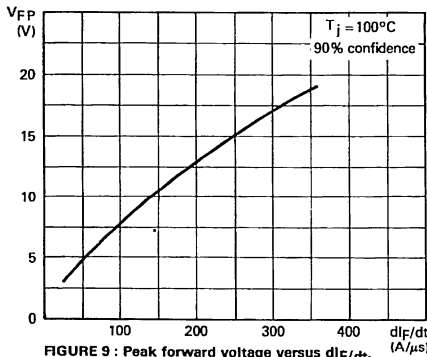


FIGURE 9 : Peak forward voltage versus dI_F/dt .

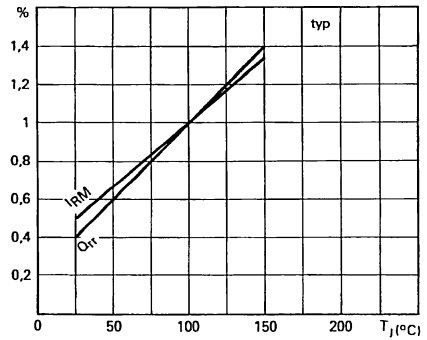


FIGURE 10 : Dynamic parameters versus junction temperature.

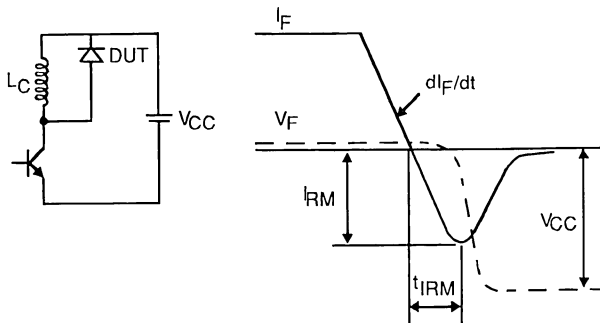


Figure 11 : Turn-off switching characteristics (without series inductance).

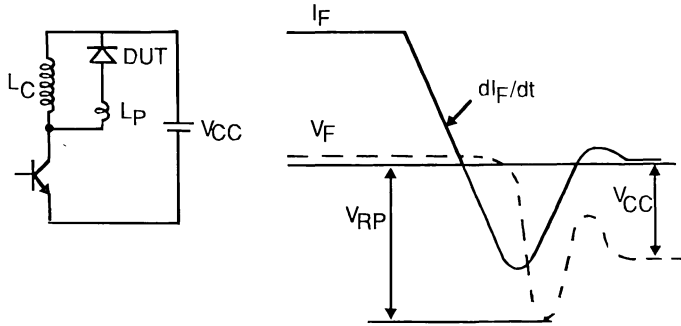
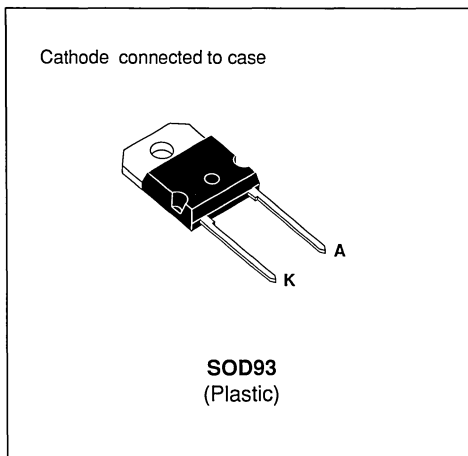


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING


SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	375	A
$I_{F(RMS)}$	RMS Forward Current		70	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 85^\circ C$ $\delta = 0.5$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	200	A
P	Power Dissipation	$T_{case} = 85^\circ C$	65	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 30P-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			100	μA
	T _J = 100°C				5	mA
V _F	T _J = 25°C	I _F = 30A			1.9	V
	T _J = 100°C				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A di _F /dt = - 15A/μs V _R = 30V			130	ns
		I _F = 0.5A I _R =1A I _{rr} = 0.25A			55	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 120A/μs	V _{CC} = 200V I _F = 30A L _p ≤ 0.05μH T _J = 100°C See Figure 11			160	ns
	di _F /dt = - 240A/μs			100		
I _{RM}	di _F /dt = - 120A/μs				15	A
	di _F /dt = - 240A/μs				19	

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _J = 100°C di _F /dt = - 30A/μs	V _{CC} = 200V I _F = I _{F(AV)} L _p = 5μH See Figure 12			4	

Note : Applicable to BYT 30 P-800 only.

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.01 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.01 I_F^2 (RMS)$$

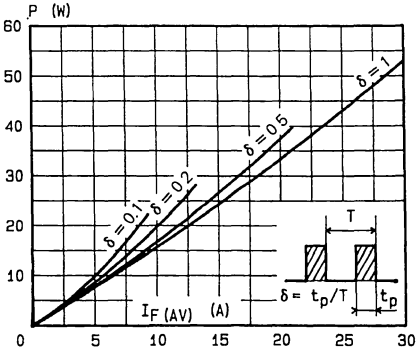


FIGURE 1 : Low frequency power losses versus average current.

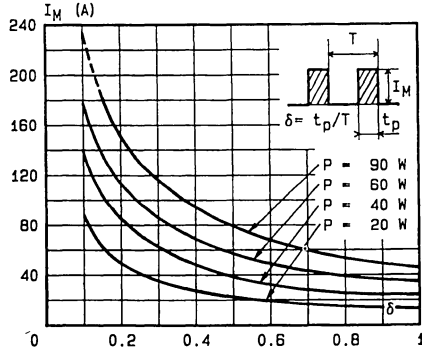


FIGURE 2 : Peak current versus form factor.

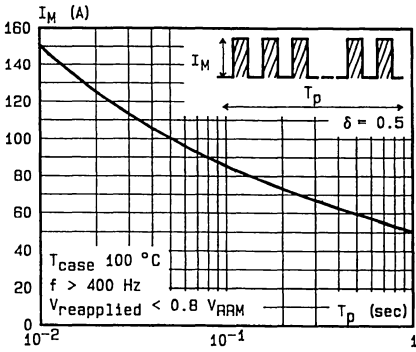


FIGURE 3 : Non repetitive peak surge current versus overload duration.

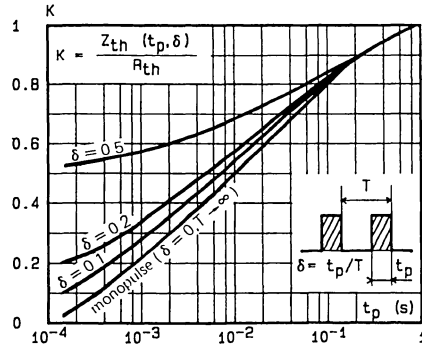


FIGURE 4 : Thermal impedance versus pulse width.

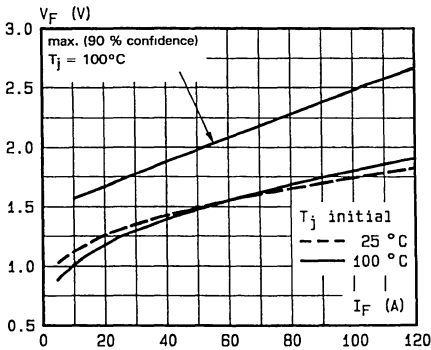


FIGURE 5 : Voltage drop versus forward current.

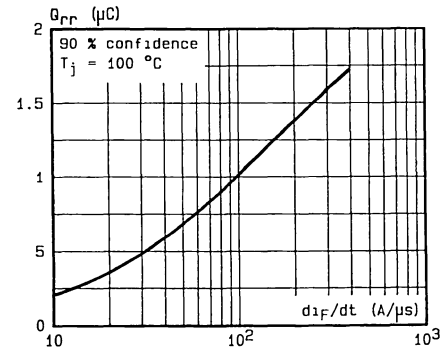


FIGURE 8 : Recovery charge versus di_F/dt .

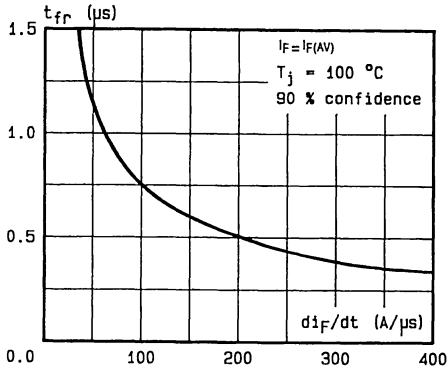


FIGURE 7 : Recovery time versus di_F/dt .

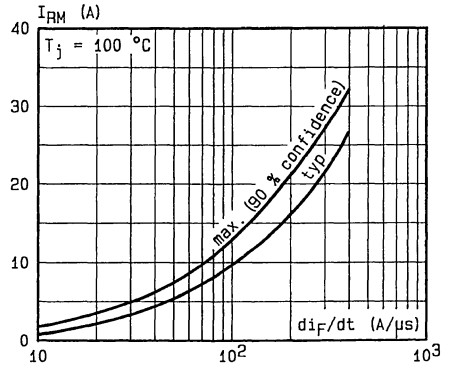


FIGURE 8 : Peak reverse current versus di_F/dt .

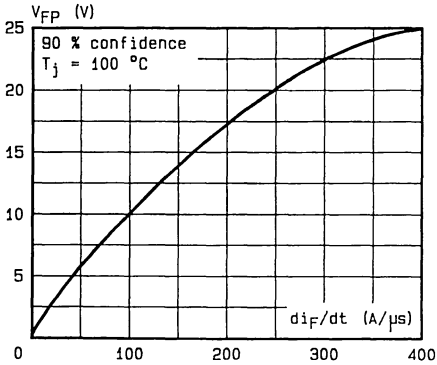


FIGURE 8 : Peak forward voltage versus di_F/dt .

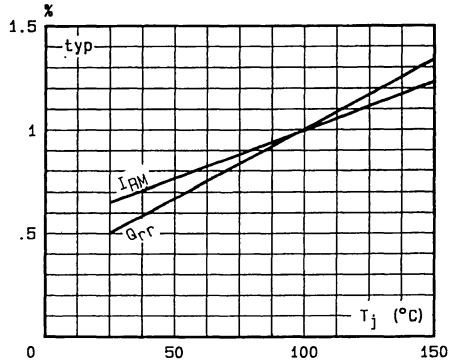


FIGURE 10 : Dynamic parameters versus junction temperature.

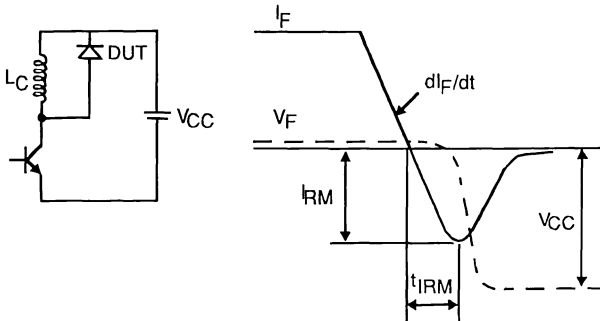


Figure 11 : Turn-off switching (without series inductance).

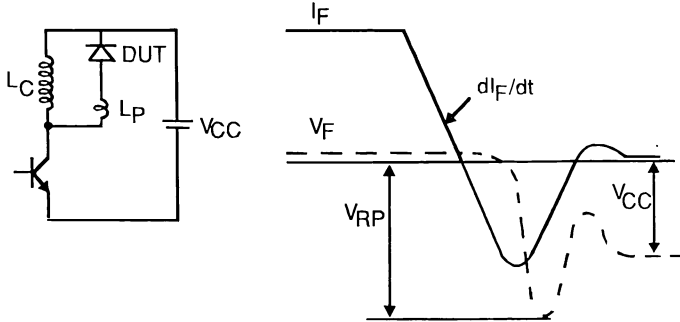
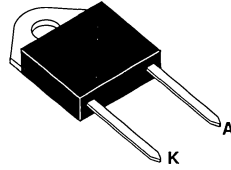


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 15pF

Insulating voltage 2500 V_{RMS}



**Isolated
DOP31
(Plastic)**

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I _{FRM}	Repetitive Peak Forward Current	t _p ≤ 10μs	375	A
I _{F(RMS)}	RMS Forward Current		70	A
I _{F(AV)}	Average Forward Current	T _{case} = 50°C δ = 0.5	30	A
I _{FSM}	Surge non Repetitive Forward Current	t _p = 10ms Sinusoidal	200	A
P	Power Dissipation	T _{case} = 50°C	62	W
T _{stg} T _J	Storage and Junction Temperature Range		- 40 to + 150	°C

Symbol	Parameter	BYT 30PI-		Unit
		600	800	
V _{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V _{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{th (j-c)}	Junction-case	1.6	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_j = 100^\circ\text{C}$				5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.9	V
	$T_j = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		130	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		55	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -120\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 30\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_j = 100^\circ\text{C}$ See Figure 11			160	ns
	$di_F/dt = -240\text{A}/\mu\text{s}$			100		
I_{RM}	$di_F/dt = -120\text{A}/\mu\text{s}$				15	A
	$di_F/dt = -240\text{A}/\mu\text{s}$			19		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 150\text{V}$ $I_F = I_{F(AV)}$ $di_F/dt = -30\text{A}/\mu\text{s}$ $L_p = 4\mu\text{H}$ See Figure 12			4	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.010 I_F \quad P = 1.47 \times I_{F(AV)} + 0.010 I_F^2 (R_{MS})$$

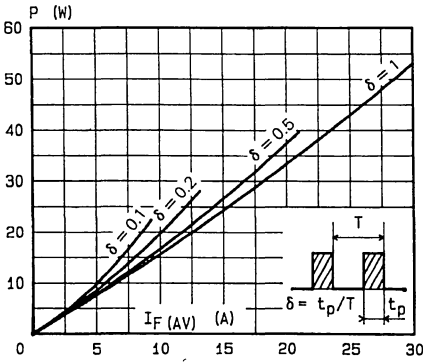


FIGURE 1 : Low frequency power losses versus average current.

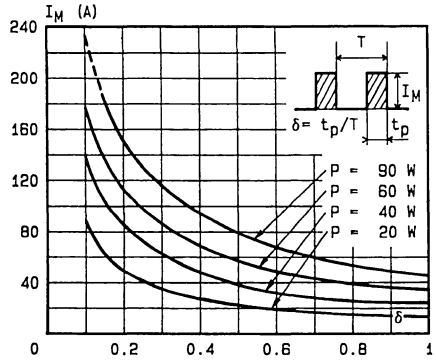


FIGURE 2 : Peak current versus form factor.

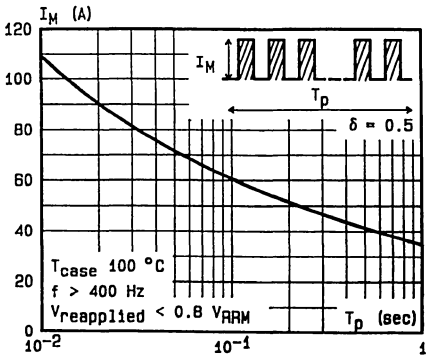


FIGURE 3 : Non repetitive peak surge current versus overload duration.

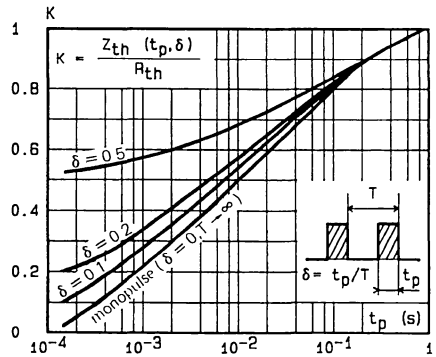


FIGURE 4 : Thermal impedance versus pulse width.

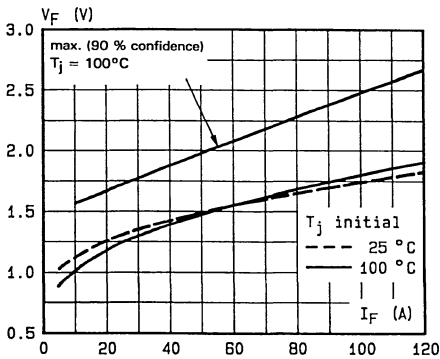


FIGURE 5 : Voltage drop versus forward current.

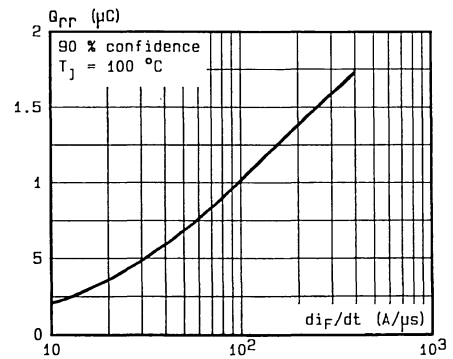


FIGURE 8 : Recovery charge versus di_F/dt .

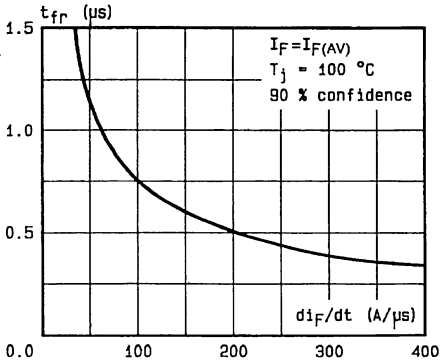


FIGURE 7 : Recovery time versus di_F/dt .

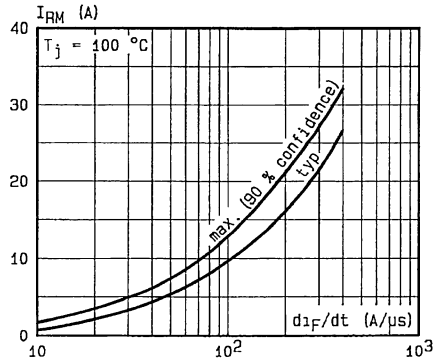


FIGURE 8 : Peak reverse current versus di_F/dt .

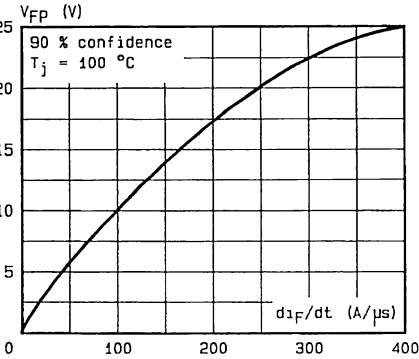


FIGURE 9 : Peak forward voltage versus di_F/dt .

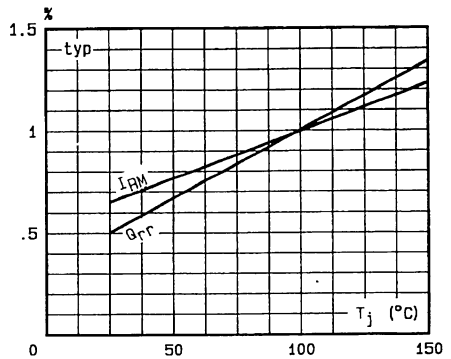


FIGURE 10 : Dynamic parameters versus junction temperature.

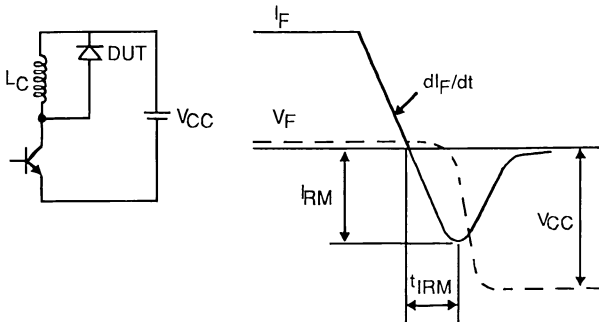


Figure 11 : Turn-off switching characteristics (without series inductance).

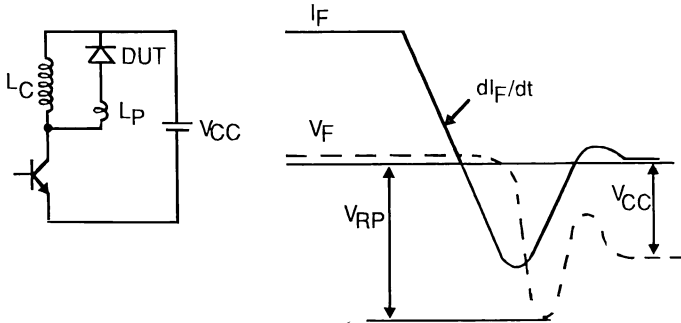


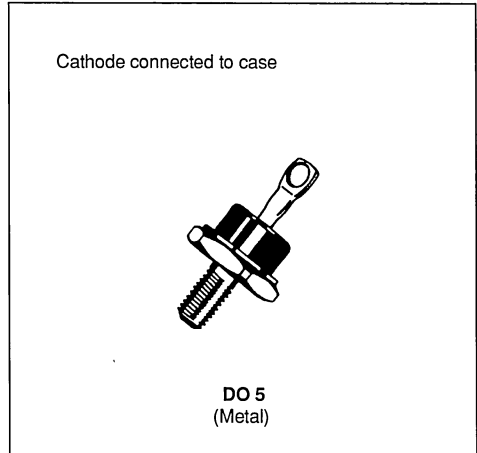
Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	375	A
$I_{F(RMS)}$	RMS Forward Current		70	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 75^\circ C$ $\delta = 0.5$	30	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	200	A
P	Power Dissipation	$T_{case} = 75^\circ C$	62	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 30-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1.2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_J = 100^\circ\text{C}$				5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		130	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		55	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -120\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 30\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See figure 11			160	ns
	$di_F/dt = -240\text{A}/\mu\text{s}$			100		
I_{RM}	$di_F/dt = -120\text{A}/\mu\text{s}$				15	A
	$di_F/dt = -240\text{A}/\mu\text{s}$			19		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$	$V_{CC} = 150\text{V}$ $I_F = I_{F(AV)}$ $di_F/dt = -30\text{A}/\mu\text{s}$ $L_p = 4\mu\text{H}$ See figure 12			4	

To evaluate the conduction losses use the following equation :

$$V_F = 1.47 + 0.010 I_F \quad P = 1.47 \times I_{F(AV)} + 0.010 I_F^2_{(RMS)}$$

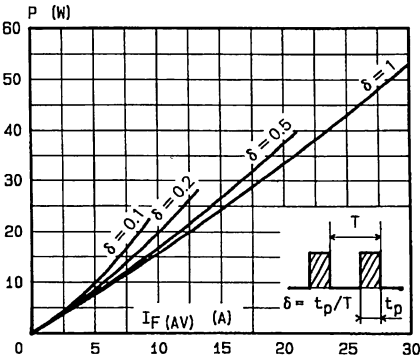


FIGURE 1 : Low frequency power losses versus average current.

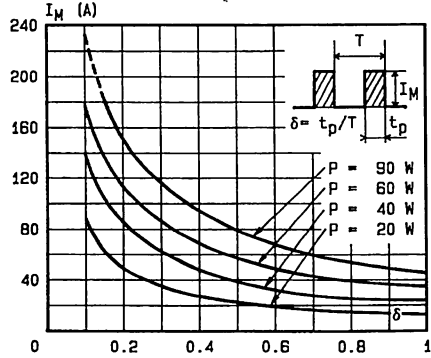


FIGURE 2 : Peak current versus form factor.

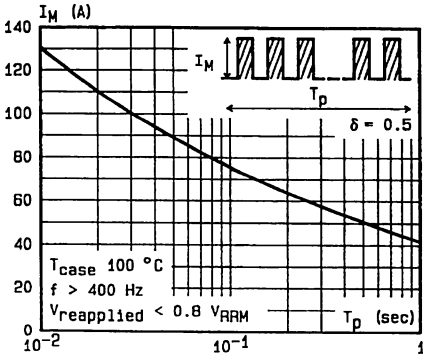


FIGURE 3 : Non repetitive peak surge current versus overloaded duration.

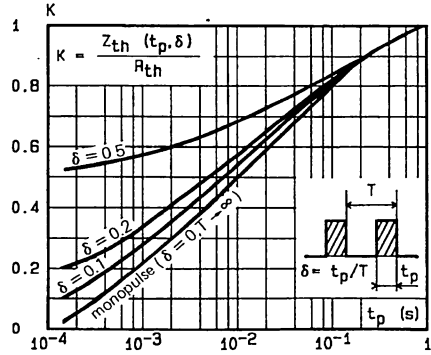


FIGURE 4 : Thermal impedance versus pulse width.

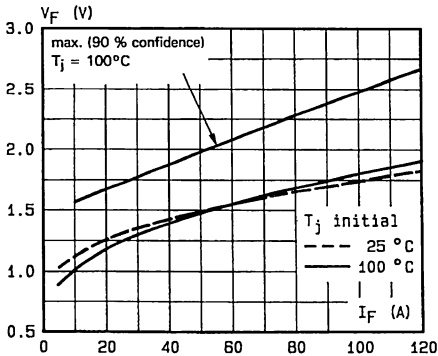


FIGURE 5 : Voltage drop versus forward current.

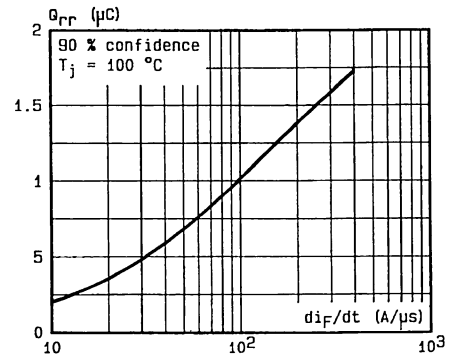


FIGURE 6 : Recovery charge versus di_F/dt .

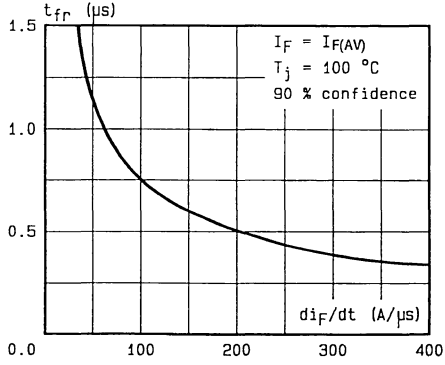


FIGURE 7 : Recovery time versus di_F/dt .

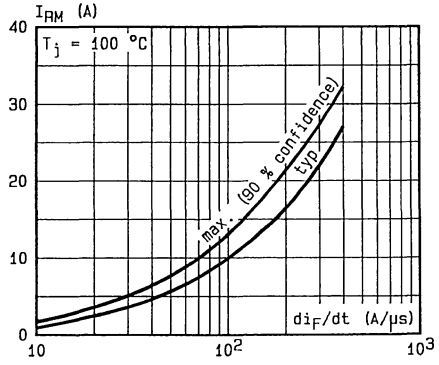


FIGURE 8 : Peak reverse current versus di_F/dt .

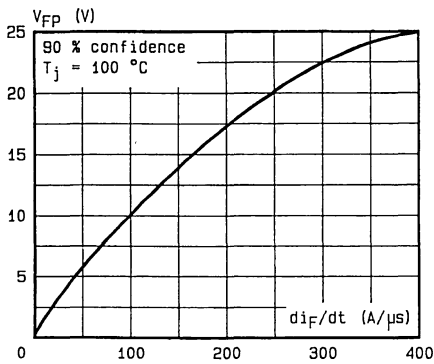


FIGURE 8 : Peak forward voltage versus di_F/dt .

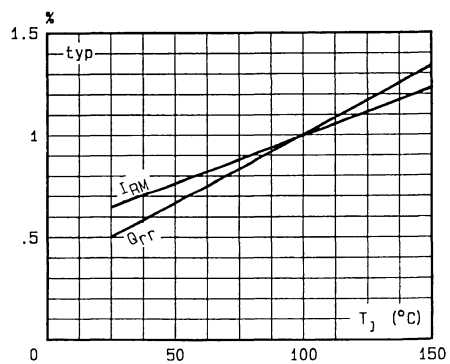


FIGURE 10 : Dynamic parameters versus junction temperature.

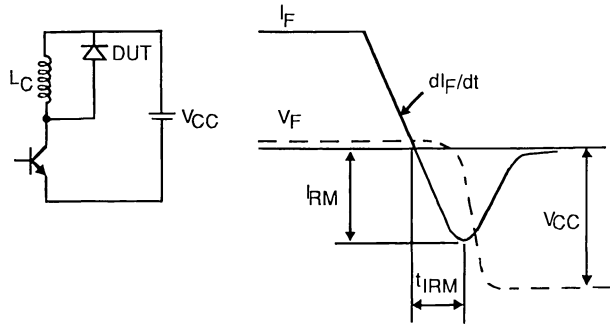


Figure 11 : Turn-off switching characteristics (without series inductance)

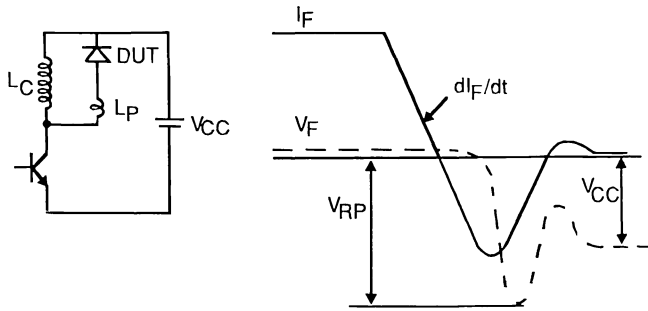
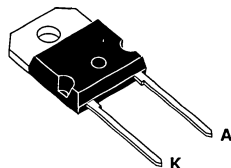


Figure 12 : Turn-off switching characteristics (with series inductance)

FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

Cathode connected to case


SOD93
 (Plastic)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1000	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$ 375	A
$I_{F(RMS)}$	RMS Forward Current	70	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 85^\circ C$ $\delta = 0.5$ 30	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal 200	A
P	Power Dissipation	$T_{case} = 85^\circ C$ 65	W
T_{stg} T_J	Storage and Junction Temperature Range	- 40 to + 150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_j = 100^\circ\text{C}$				5	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.9	V
	$T_j = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		165	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		70	

TURN-OFF SWITCHING CHARACTERISTICS (without series inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -120\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 30\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_j = 100^\circ\text{C}$ See Figure 11			200	ns
	$di_F/dt = -240\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -120\text{A}/\mu\text{s}$				19.5	A
	$di_F/dt = -240\text{A}/\mu\text{s}$			22		

TURN-OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_j = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$ $L_p = 5\mu\text{H}$ See figure 12			4.5	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.010 I_F \quad P = 1.47 \times I_{F(AV)} + 0.010 I_F^2(\text{RMS})$$

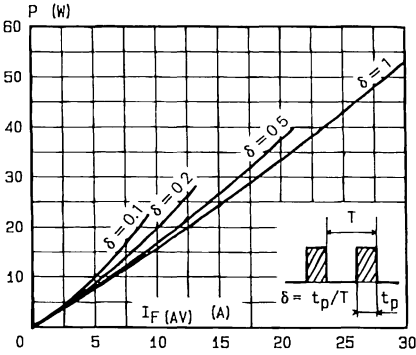


FIGURE 1 : Low frequency power losses versus average current.

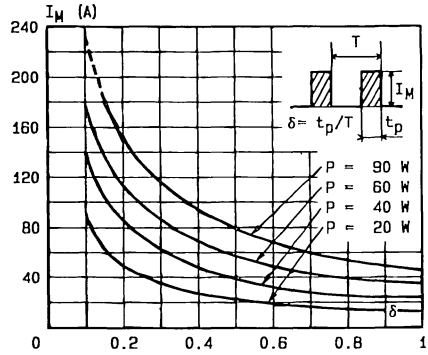


FIGURE 2 : Peak current versus form factor.

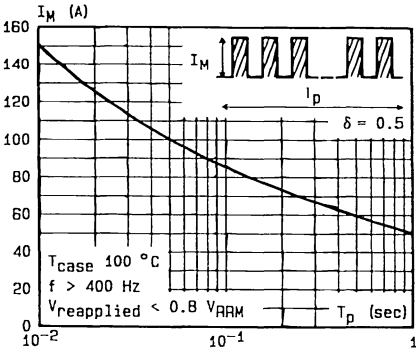


FIGURE 3 : Non repetitive peak surge current versus overload duration.

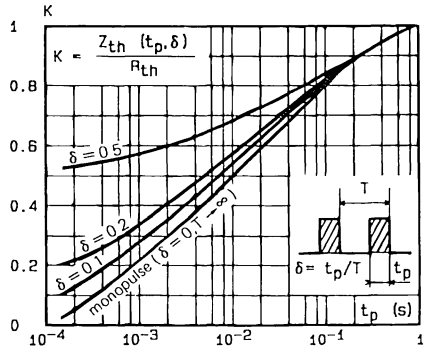


FIGURE 4 : Thermal impedance versus pulse width.

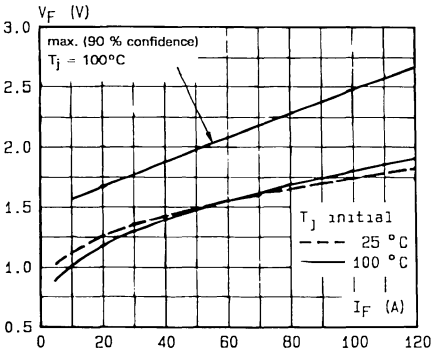


FIGURE 5 : Voltage drop versus forward current.

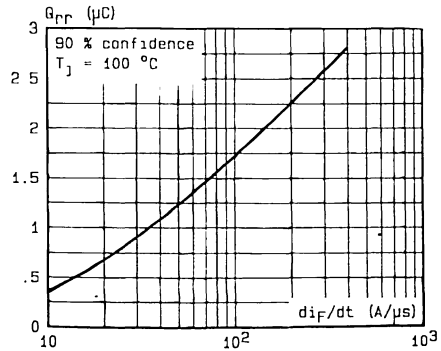


FIGURE 8 : Recovery charge versus di_f/dt .

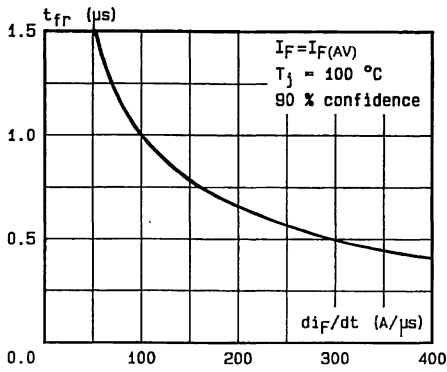


FIGURE 7 : Recovery time versus di_F/dt .

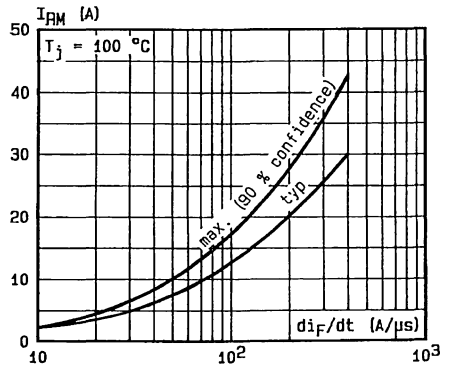


FIGURE 8 : Peak reverse current versus di_F/dt .

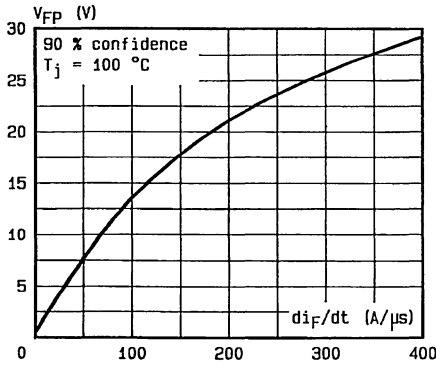


FIGURE 9 : Peak forward voltage versus di_F/dt .

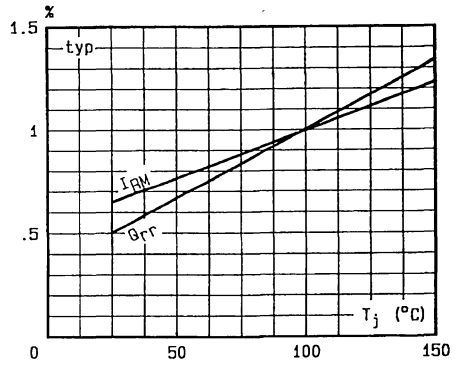


FIGURE 10 : Dynamic parameters versus junction temperature.

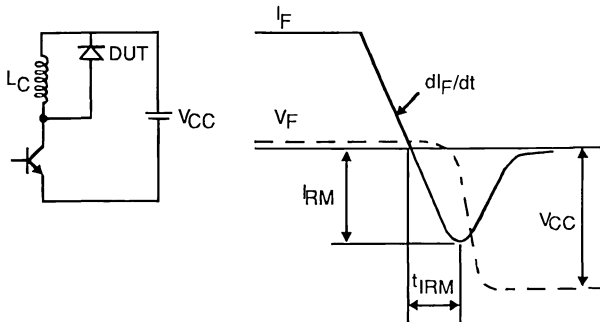


Figure 11 : Turn-off switching characteristics (without series inductance).

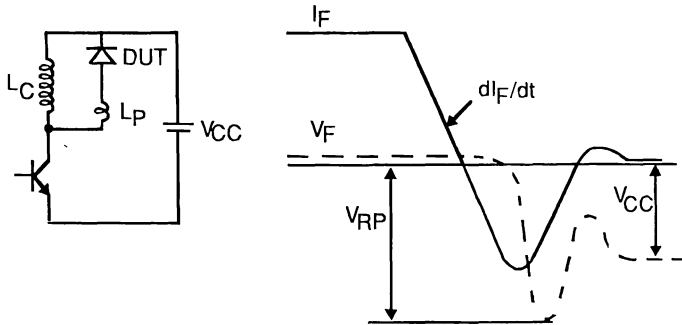
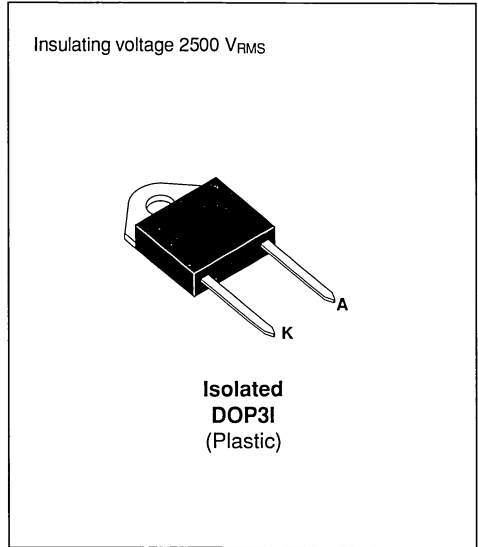


Figure 12 : Turn-off switching characteristics (with series inductance).



FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED : Capacitance 15pF



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	1000	V
V _{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I _{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	A
I _{F(RMS)}	RMS Forward Current	70	A
I _{F(AV)}	Average Forward Current	T _{case} = 50°C $\delta = 0.5$	A
I _{FSM}	Surge Non Repetitive Forward Current	t _p = 10ms Sinusoidal	A
P	Power Dissipation	T _{case} = 50°C	W
T _{stg} T _j	Storage and Junction Temperature Range	- 40 to + 150	°C

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{th (j-c)}	Junction-case	1.6	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_J = 100^\circ\text{C}$				5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$ $di_F/dt = -15\text{A}/\mu\text{s}$ $V_R = 30\text{V}$			165	ns
		$I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$			70	

TURN-OFF SWITCHING CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -120\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 30\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 11			200	ns
	$di_F/dt = -240\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -120\text{A}/\mu\text{s}$				19.5	A
	$di_F/dt = -240\text{A}/\mu\text{s}$			22		

TURN-OFF OVERVOLTAGE COEFFICIENT

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$ $di_F/dt = -30\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$ $L_p = 5\mu\text{H}$ See Figure 12			4.5	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.010 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.010 I_{F(RMS)}^2$$

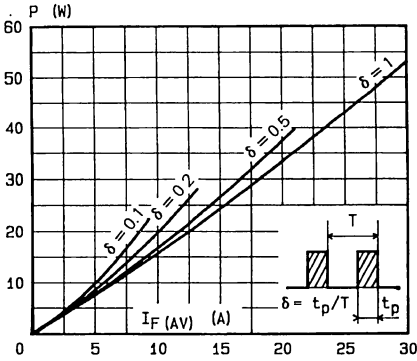


FIGURE 1 : Low frequency power losses versus average current.

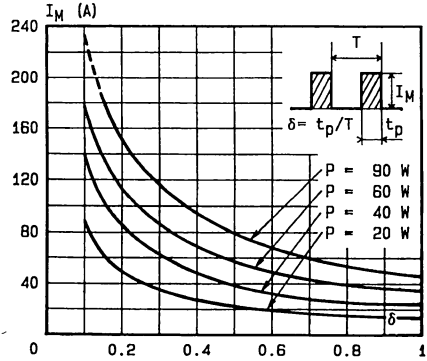


FIGURE 2 : Peak current versus form factor.

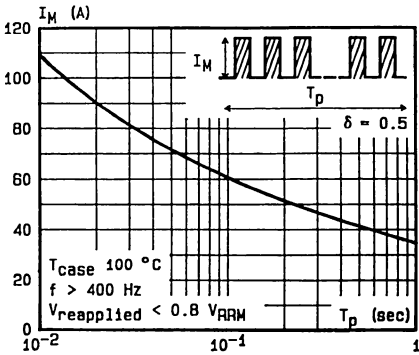


FIGURE 3 : Non repetitive peak surge current versus overload duration.

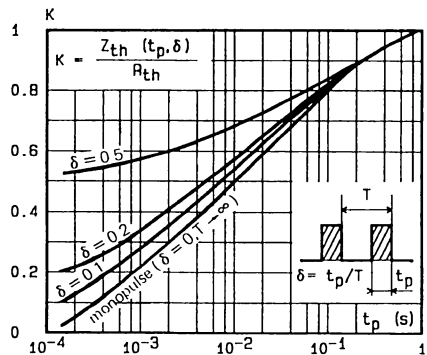


FIGURE 4 : Thermal impedance versus pulse width.

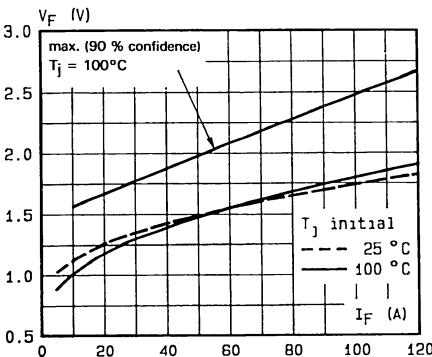


FIGURE 5 : Voltage drop versus forward current.

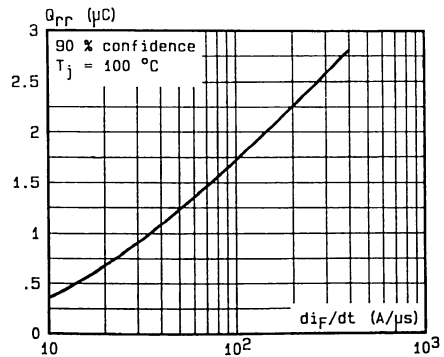


FIGURE 8 : Recovery charge versus di_f/dt .

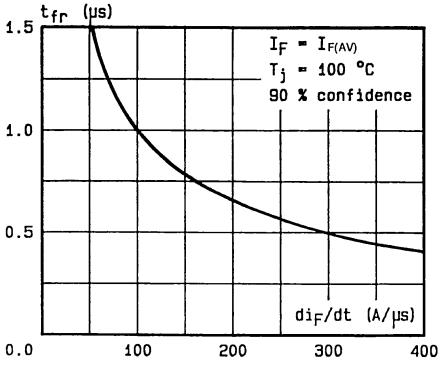


FIGURE 7 : Recovery time versus di_F/dt .

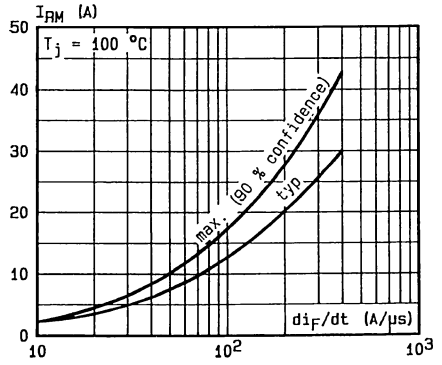


FIGURE 8 : Peak reverse current versus di_F/dt .

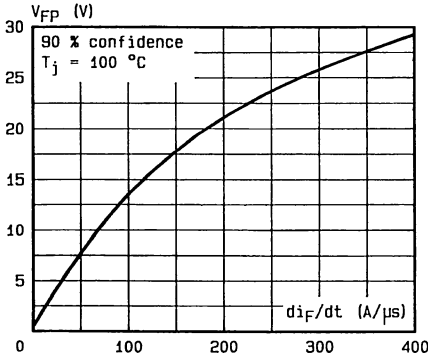


FIGURE 9 : Peak forward voltage versus di_F/dt .

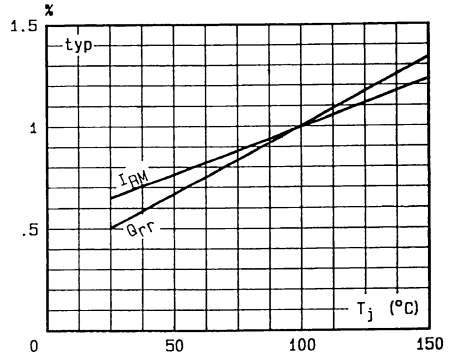


FIGURE 10 : Dynamic parameters versus junction temperature.

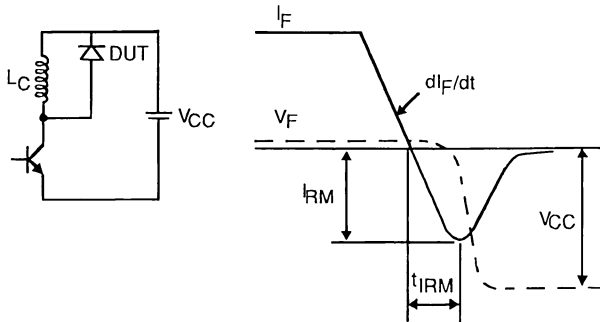


Figure 11 : Turn-off switching characteristics (without series inductance).

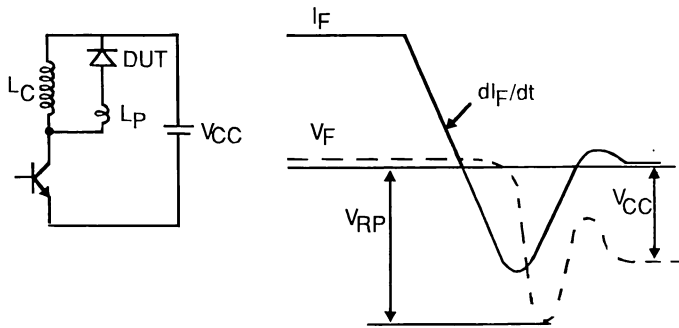


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODE

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

Cathode connected to case


 DO 5
 (Metal)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1000	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	A
$I_{F(RMS)}$	RMS Forward Current	70	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 75^\circ C$ $\delta = 0.5$	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	A
P	Power Dissipation	$T_{case} = 75^\circ C$	W
T_{stg} T_J	Storage and Junction Temperature Range	- 40 to + 150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	1.2	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_J = 100^\circ\text{C}$				5	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt = -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		165	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		70	

TURN-OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -120\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 30\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See figure 11			200	ns
	$di_F/dt = -240\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -120\text{A}/\mu\text{s}$				19.5	A
	$di_F/dt = -240\text{A}/\mu\text{s}$			22		

TURN-OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$	$V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$ $di_F/dt = -30\text{A}/\mu\text{s}$ $L_p = 5\mu\text{H}$ See figure 12			4.5	

To evaluate the conduction losses use the following equation :

$$V_F = 1.47 + 0.010 I_F \quad P = 1.47 \times I_{F(AV)} + 0.010 I_F^2 \text{ (RMS)}$$

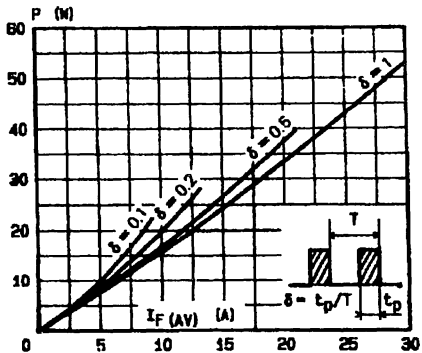


FIGURE 1 : Low frequency power losses versus average current.

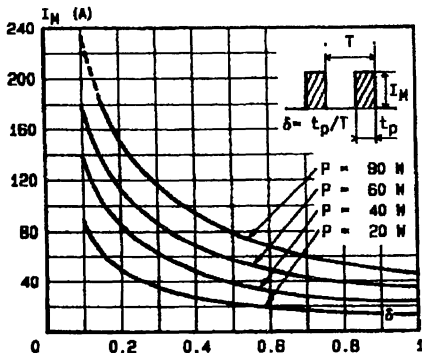


FIGURE 2 : Peak current versus form factor.

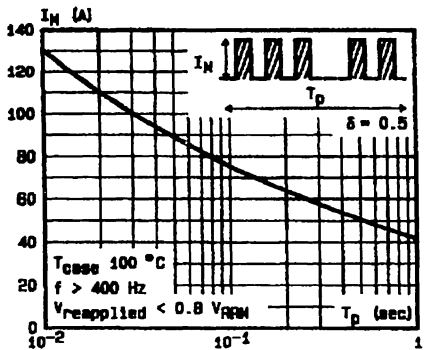


FIGURE 3 : Non repetitive peak surge current versus overload duration.

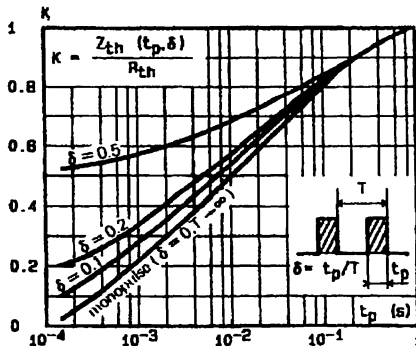


FIGURE 4 : Thermal impedance versus pulse width.

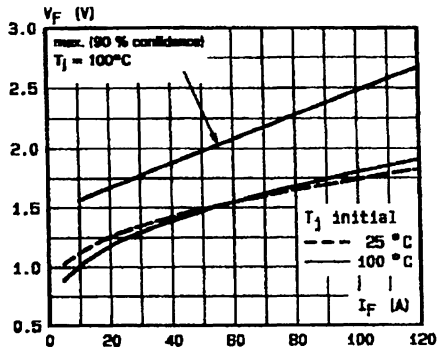


FIGURE 5 : Voltage drop versus forward current.

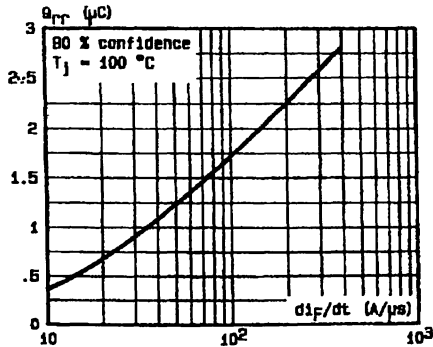


FIGURE 6 : Recovery charge versus di_F/dt .

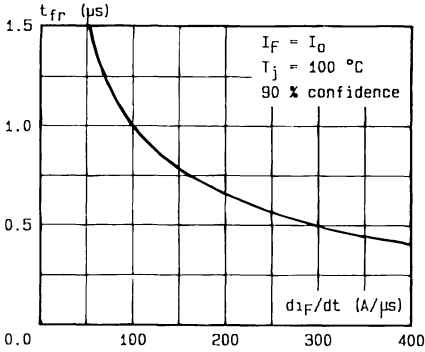


FIGURE 7 : Recovery time versus di_F/dt .

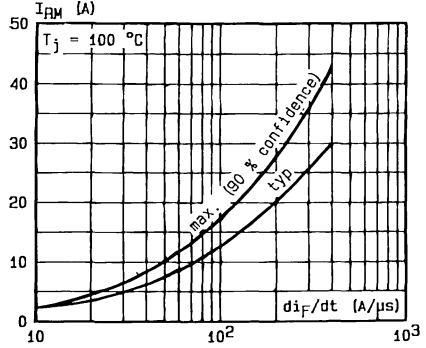


FIGURE 8 : Peak reverse current versus di_F/dt .

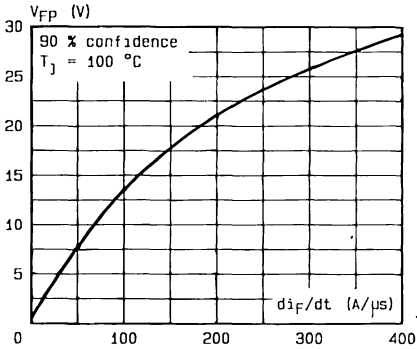


FIGURE 9 : Peak forward voltage versus di_F/dt .

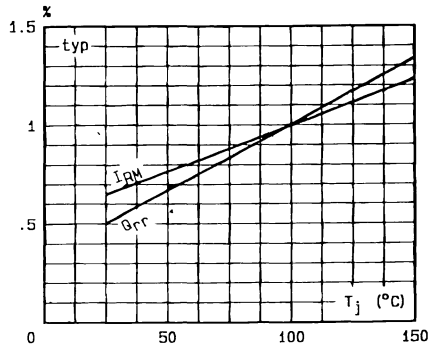


FIGURE 10 : Dynamic parameters versus junction temperature.

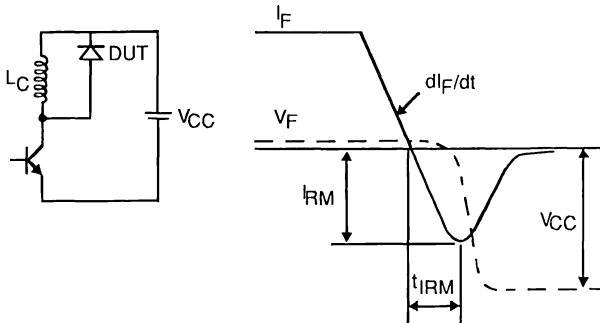


Figure 11 : Turn-off switching characteristics (without series inductance).

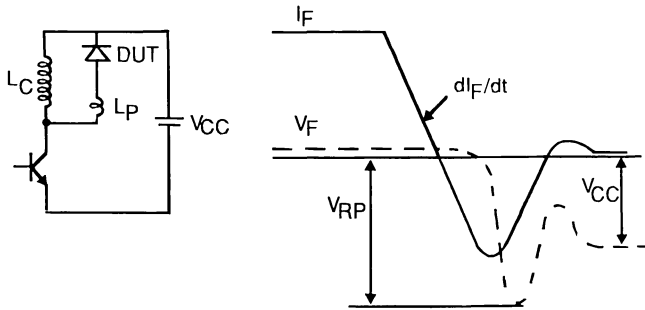
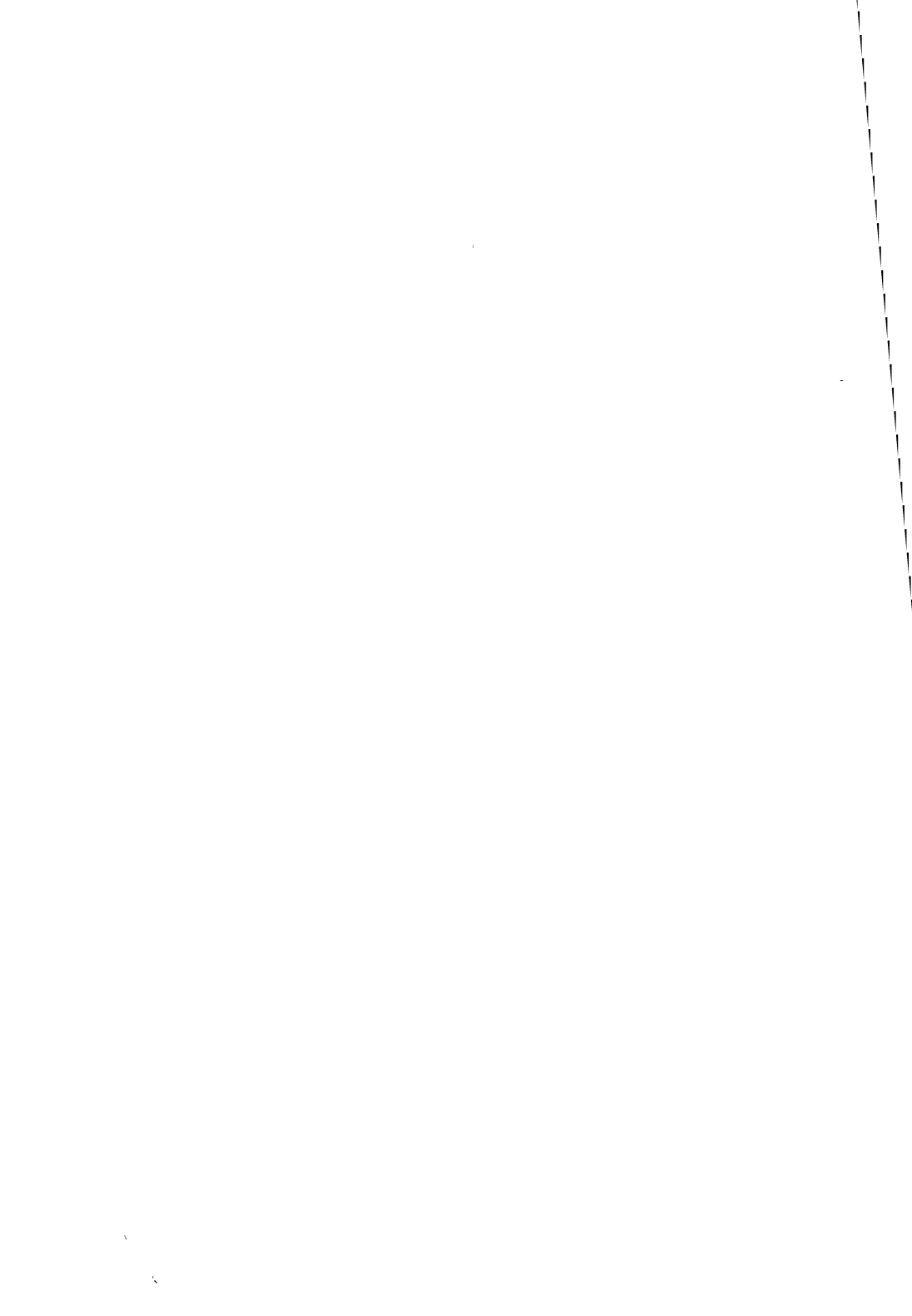


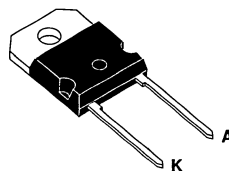
Figure 12 : Turn-off switching characteristics (with series inductance).



FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

Cathode connected to case


SOD93
 (Plastic)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	800	A
$I_{F(RMS)}$	RMS Forward Current		100	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 70^\circ C$ $\delta = 0.5$	60	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	550	A
P	Power Dissipation	$T_{case} = 70^\circ C$	100	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 60P-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	0.8	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			60	μA
	$T_J = 100^\circ\text{C}$				10	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 60\text{A}$			1.5	V
	$T_J = 100^\circ\text{C}$				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$ $di_F/dt = -15\text{A}/\mu\text{s}$ $V_R = 30\text{V}$			100	ns
		$I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -240\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 60\text{A}$ $L_p < 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See Figure 11			75	ns
	$di_F/dt = -480\text{A}/\mu\text{s}$			50		
I_{RM}	$di_F/dt = -240\text{A}/\mu\text{s}$				18	A
	$di_F/dt = -480\text{A}/\mu\text{s}$			24		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_J = 100^\circ\text{C}$ $di_F/dt = -60\text{A}/\mu\text{s}$	$V_{CC} = 120\text{V}$ $I_F = I_{F(AV)}$ See note $L_p = 1.3\mu\text{H}$ See Figure 12		3.3		

Note : Applicable to BYT 60P 400 V only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.0045 I_F \quad P = 1.1 \times I_{F(AV)} + 0.0045 I_F^2_{(RMS)}$$

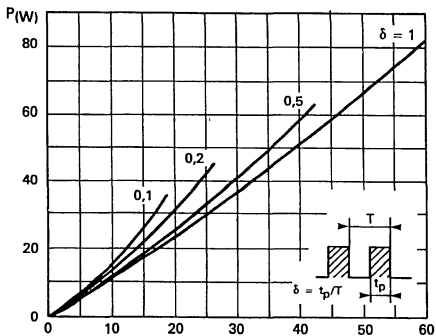


FIGURE 1 : Low frequency power losses versus average current

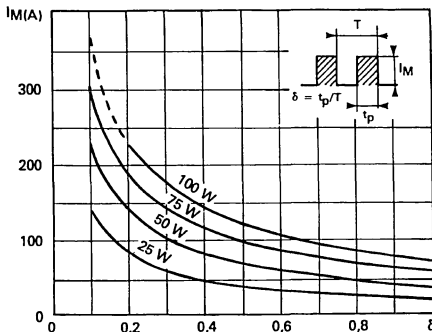


FIGURE 2 : Peak current versus form factor.

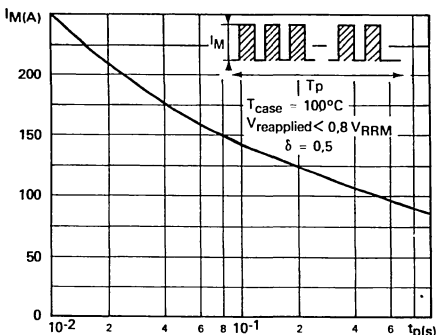


FIGURE 3 : Non repetitive peak surge current versus overload duration.

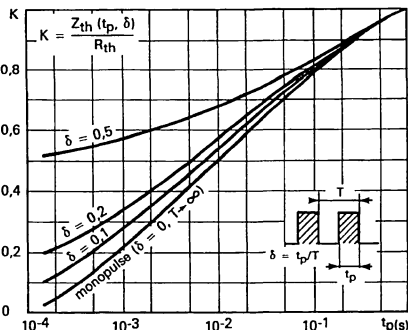


FIGURE 4 : Thermal impedance versus pulse width.

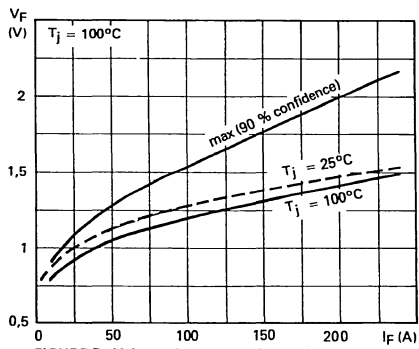


FIGURE 5 : Voltage drop versus forward current.

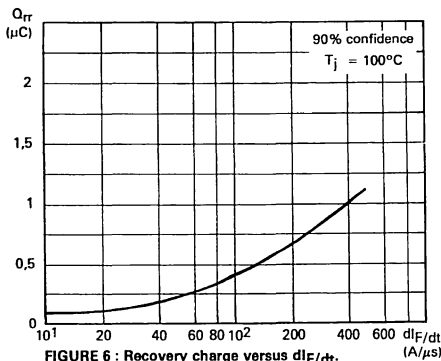


FIGURE 6 : Recovery charge versus di/dt .

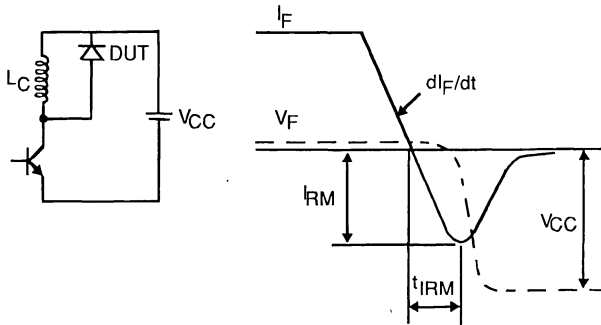
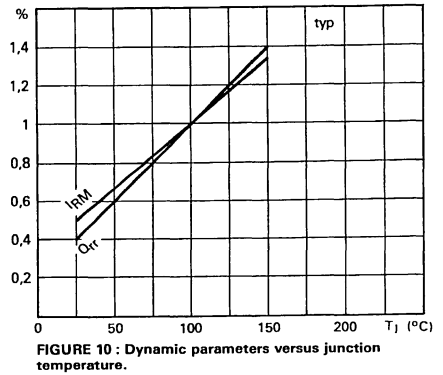
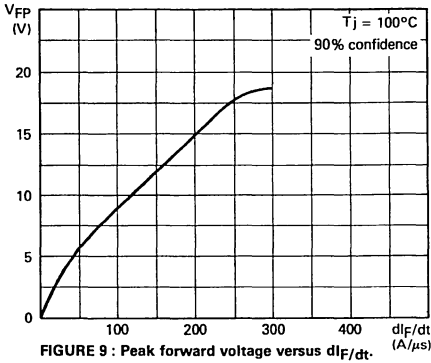
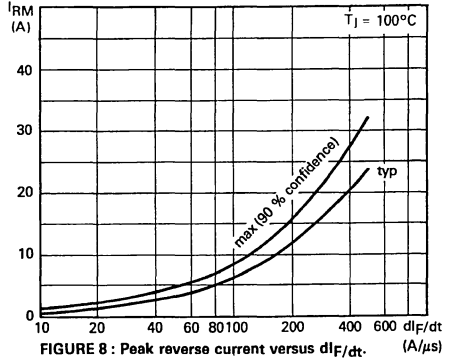
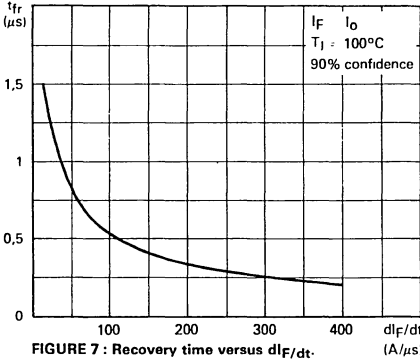


Figure 11 : Turn-off switching characteristics (without series inductance).

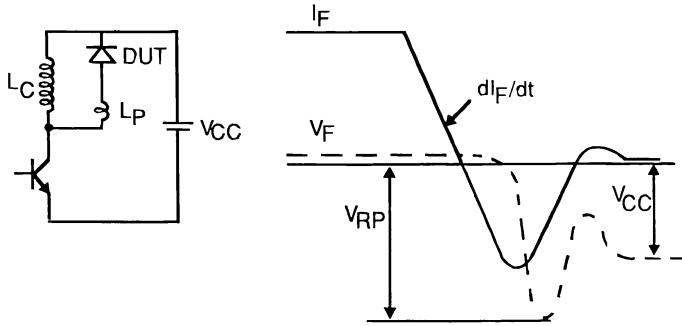
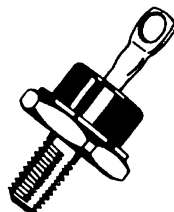


Figure 12 : Turn-off switching characteristics (with series inductance).

FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

(Metric thread)



DO 5
(Metal)

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	800	A
$I_{F(RMS)}$	RMS Forward Current		100	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 80^\circ C$ $\delta = 0.5$	60	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ sinusoidal	800	A
P	Power Dissipation	$T_{case} = 80^\circ C$	100	W
T_{stg} T_j	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 60-			Unit
		200	300	400	
V_{RRM}	Repetitive Peak Reverse Voltage	200	300	400	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	220	330	440	V

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-c)}$	Junction-case	0.7	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R	T _J = 25°C	V _R = V _{RRM}			60	μA
	T _J = 100°C				10	mA
V _F	T _J = 25°C	I _F = 60A			1.5	V
	T _J = 100°C				1.4	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr}	T _J = 25°C	I _F = 1A di _F /dt = - 15A/μs V _R = 30V			100	ns
		I _F = 0.5A I _R = 1A I _{rr} = 0.25A			50	

TURN -OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	di _F /dt = - 240A/μs	V _{CC} = 200V I _F = 60A L _p ≤ 0.05μH T _J = 100°C See Figure 11			75	ns
	di _F /dt = - 480A/μs			50		
I _{RM}	di _F /dt = - 240A/μs				18	A
	di _F /dt = - 480A/μs			24		

TURN -OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _J = 100 °C di _F /dt = - 60 A/μs	V _{CC} = 120 V I _F = I _{F(AV)} See note L _p = 1.3 μH See Figure 12		3		

Note : Applicable to BYT 60-400 only

To evaluate the conduction losses use the following equations :

$$V_F = 1.1 + 0.0045 I_F \qquad P = 1.1 \times I_{F(AV)} + 0.0045 I_F^2 (RMS)$$

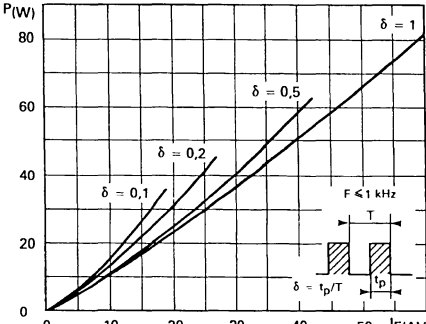


FIGURE 1 : Low frequency power losses versus average current.

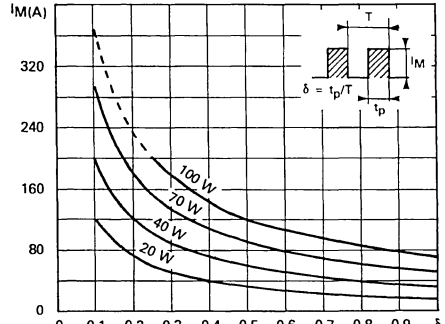


FIGURE 2 : Peak current versus form factor.

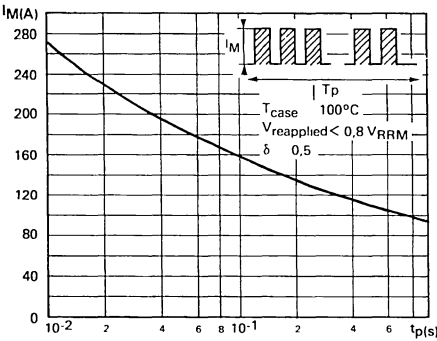


FIGURE 3 : Non repetitive peak surge current versus overload duration.

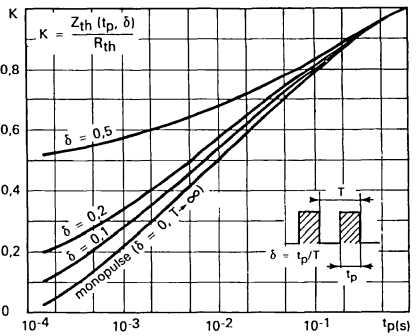


FIGURE 4 : Thermal impedance versus pulse width.

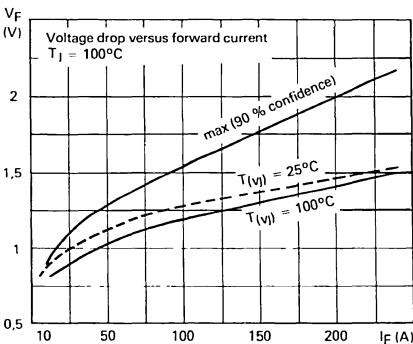


FIGURE 5 : Voltage drop versus forward current.

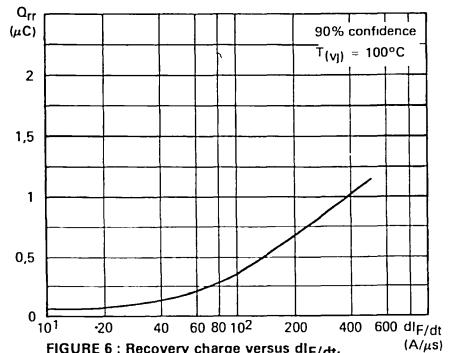


FIGURE 6 : Recovery charge versus dI_F/dt .

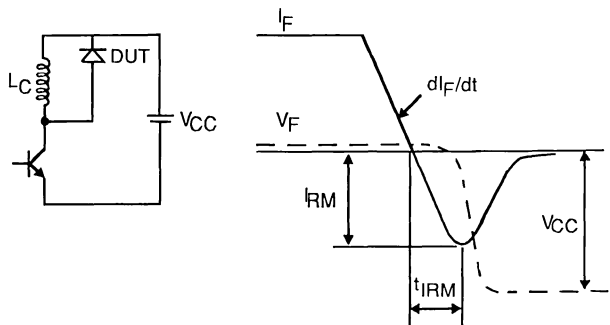
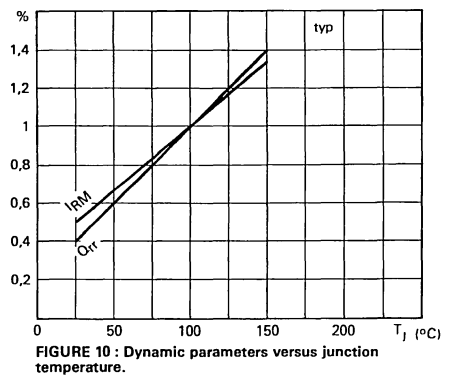
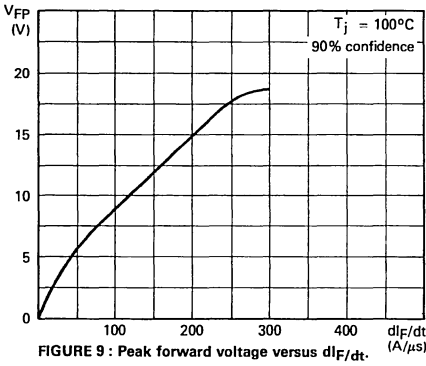
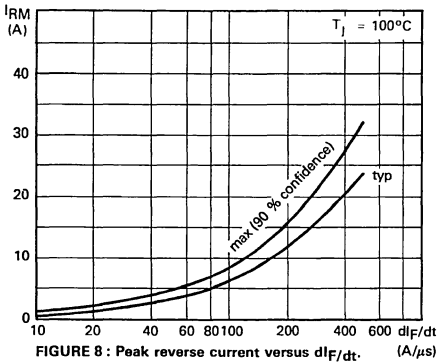
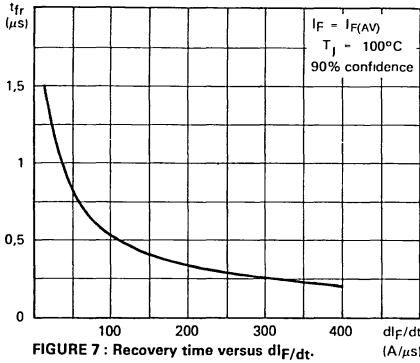


Figure 11 : Turn-off switching characteristics (without series inductance).

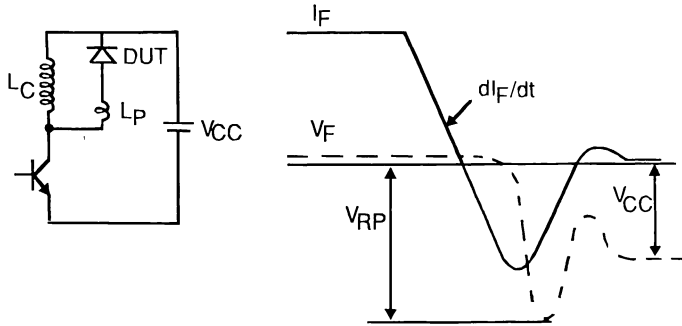
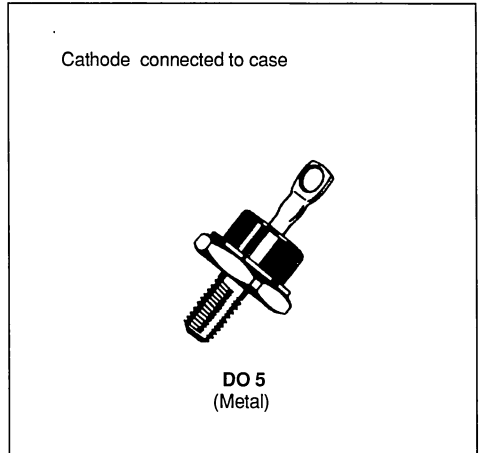


Figure 12 : Turn-off switching characteristics (with series inductance).



FAST RECOVERY RECTIFIER DIODES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING



SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	750	A
$I_{F(RMS)}$	RMS Forward Current		140	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 50^\circ C$ $\delta = 0.5$	60	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	400	A
P	Power Dissipation	$T_{case} = 50^\circ C$	125	W
T_{stg} T_J	Storage and Junction Temperature Range		- 40 to + 150	$^\circ C$

Symbol	Parameter	BYT 60-		Unit
		600	800	
V_{RRM}	Repetitive Peak Reverse Voltage	600	800	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	640	850	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	0.8	$^\circ C/W$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_J = 100^\circ\text{C}$				6	mA
V_F	$T_J = 25^\circ\text{C}$	$I_F = 60\text{A}$			1.9	V
	$T_J = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$ $di_F/dt = - 15\text{A}/\mu\text{s}$ $V_R = 30\text{V}$			135	ns
		$I_F = 0.5\text{A}$ $I_R = 1\text{A}$ $I_{rr} = 0.25\text{A}$			65	

TURN -OFF SWITCHING CHARACTERISTICS - Without Series Inductance

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = - 240\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 60\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_J = 100^\circ\text{C}$ See fig. 2			160	ns
	$di_F/dt = - 480\text{A}/\mu\text{s}$			100		
I_{RM}	$di_F/dt = - 240\text{A}/\mu\text{s}$				30	A
	$di_F/dt = - 480\text{A}/\mu\text{s}$			38		

TURN -OFF OVERVOLTAGE COEFFICIENT - With Series Inductance

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RM}}{V_{CC}}$	$T_J = 100^\circ\text{C}$ $di_F/dt = - 60\text{A}/\mu\text{s}$	$V_{CC} = 150\text{V}$ $I_F = I_{F(AV)}$ $L_p = 2\mu\text{H}$ See fig. 3		3.3	4	

To evaluate the conduction losses use the following equations :

$$V_F = 1.47 + 0.005 I_F \qquad P = 1.47 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$$

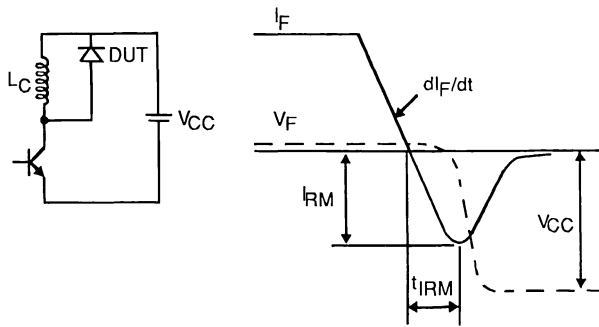


Figure 1 : Turn-off switching characteristics (without series inductance).

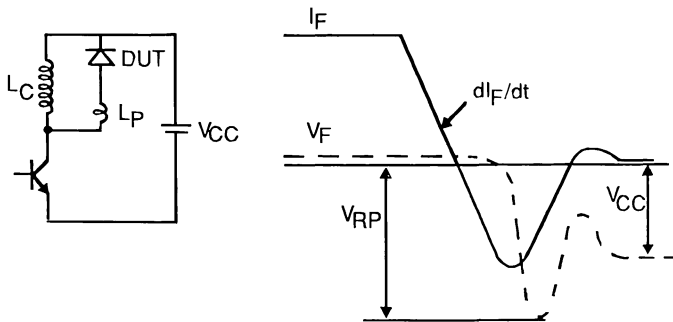


Figure 2 : Turn-off switching characteristics (with series inductance).

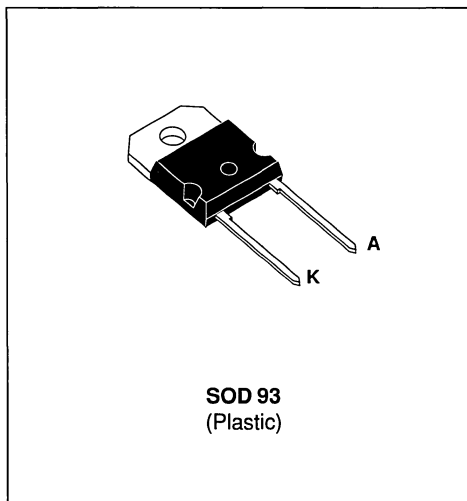
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

DESCRIPTION

Single high voltage rectifier suited for Switch Mode Power Supplies and other power converters.



ABSOLUTE MAXIMUM RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1000	V
I_{FRM}	Repetitive peak forward current	$t_p \leq 10\mu s$ 750	A
$I_{F(RMS)}$	RMS forward current	85	A
$I_{F(AV)}$	Average forward current	$T_c = 50^\circ C$ $\delta = 0.5$ 60	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10ms$ sinusoidal 400	A
T_{stg} T_J	Storage and junction temperature range	- 65 to + 150 - 65 to + 150	$^\circ C$ $^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case	0.8	°C/W

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 60 A			1.9	V
	T _j = 100°C				1.8	
I _R **	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 100°C				6	mA

Pulse test : * tp = 380 μs, duty cycle < 2 %

** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			70	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			170	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	dI _F /dt = -240A/μs	V _{CC} = 200V I _F = 60A L _p ≤ 0.05μH T _j = 100°C see fig. 1			200	ns
	dI _F /dt = -480A/μs			120		
I _{RM}	dI _F /dt = -240A/μs				40	A
	dI _F /dt = -480A/μs			44		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _j = 100°C V _{CC} = 200V dI _F /dt = -60A/μs	I _F = I _{F(AV)} L _p = 2μH see fig12		3.3	4.5	/

To evaluate the conduction losses use the following equation :

$$P = 1.47 \times I_{F(AV)} + 0.005 \times I_F^2(RMS)$$

Fig.1 : Low frequency power losses versus average current.

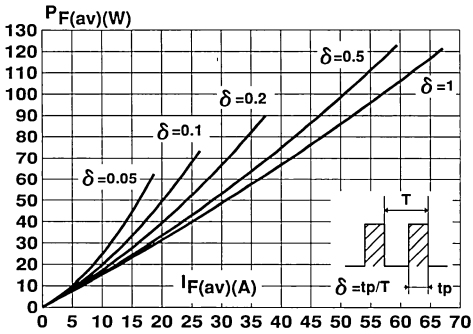


Fig.2 : Peak current versus form factor.

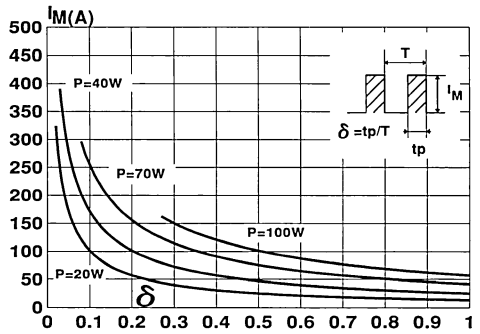


Fig.3 : Non repetitive peak surge current versus overload duration.

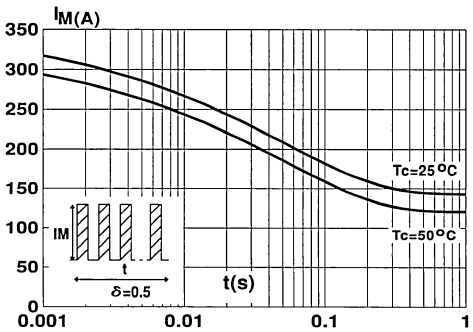


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

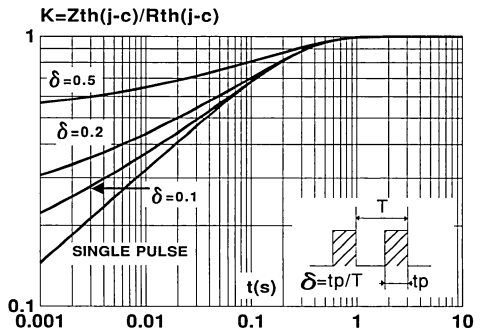


Fig.5 : Voltage drop versus forward current.

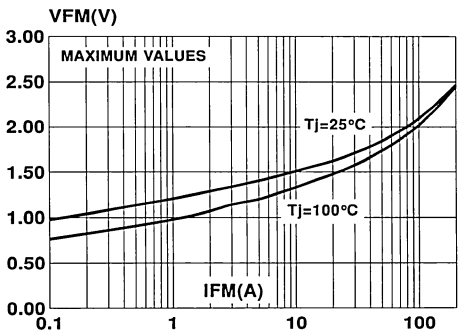


Fig.6 : Recovery charge versus diF/dt.

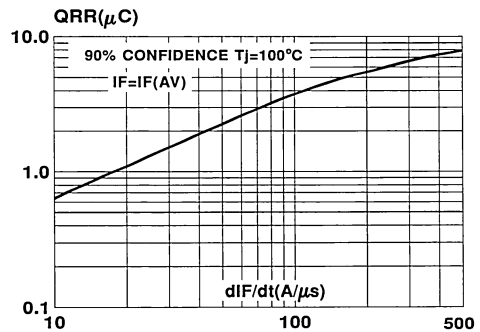


Fig.7 : Recovery time versus dI_F/dt .

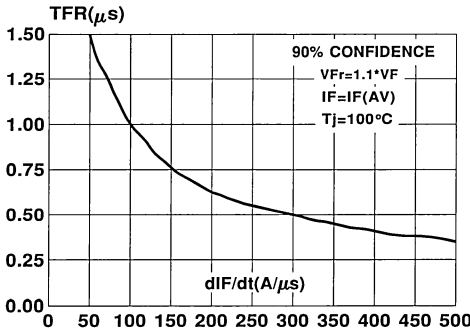


Fig.8 : Peak reverse current versus dI_F/dt .

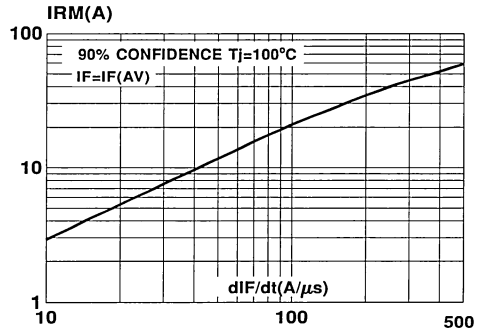


Fig.9 : Peak forward voltage versus dI_F/dt .

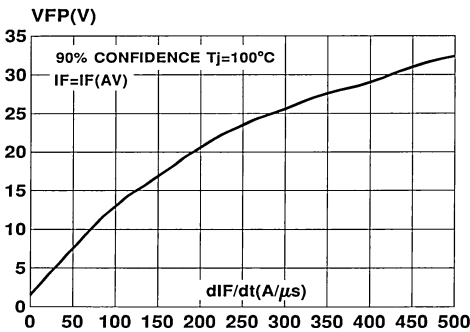


Fig.10 : Dynamic parameters versus junction temperature.

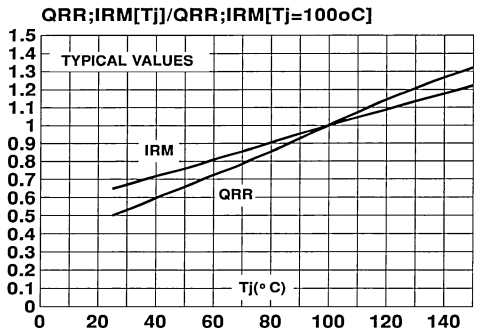


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

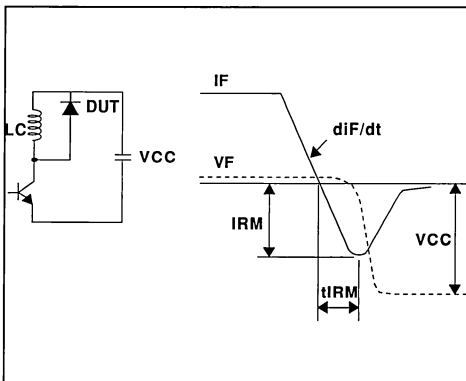
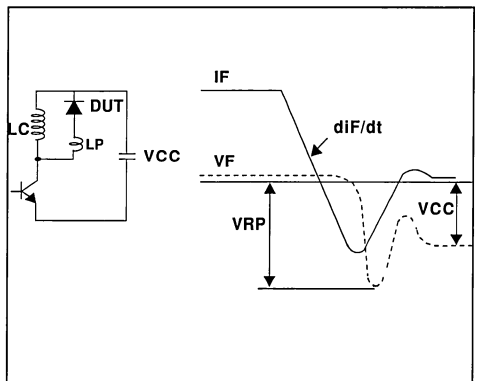


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



FAST RECOVERY RECTIFIER DIODE
FEATURES

- VERY HIGH REVERSE VOLTAGE CAPABILITY
- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING

SUITABLE APPLICATIONS

- FREE WHEELING DIODE IN CONVERTERS AND MOTOR CONTROL CIRCUITS
- RECTIFIER IN S.M.P.S.

Cathode connected to case


DO 5
 (Metal)

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1000	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	1000	V
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 10\mu s$	A
$I_{F(RMS)}$	RMS Forward Current	140	A
$I_{F(AV)}$	Average Forward Current	$T_{case} = 50^\circ C$ $\delta = 0.5$	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10ms$ Sinusoidal	A
P	Power Dissipation	$T_{case} = 50^\circ C$	W
T_{stg} T_J	Storage and Junction Temperature Range	- 40 to + 150	$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-case	0.8	$^\circ C/W$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_j = 100^\circ\text{C}$				6	mA
V_F	$T_j = 25^\circ\text{C}$	$I_F = 60\text{A}$			1.9	V
	$T_j = 100^\circ\text{C}$				1.8	

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t_{rr}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$	$di_F/dt \approx -15\text{A}/\mu\text{s}$	$V_R = 30\text{V}$		170	ns
		$I_F = 0.5\text{A}$	$I_R = 1\text{A}$	$I_{rr} = 0.25\text{A}$		70	

TURN-OFF SWITCHING CHARACTERISTICS (Without Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t_{IRM}	$di_F/dt = -240\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = 60\text{A}$ $L_p \leq 0.05\mu\text{H}$ $T_j = 100^\circ\text{C}$ See figure 1			200	ns
	$di_F/dt = -480\text{A}/\mu\text{s}$			120		
I_{RM}	$di_F/dt = -240\text{A}/\mu\text{s}$				40	A
	$di_F/dt = -480\text{A}/\mu\text{s}$			44		

TURN-OFF OVERVOLTAGE COEFFICIENT (With Series Inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	$T_j = 100^\circ\text{C}$ $di_F/dt = -60\text{A}/\mu\text{s}$	$V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$ $L_p = 2.5\mu\text{H}$ See figure 2		3.3	4.5	

To evaluate the conduction losses use the following equation :

$$V_F = 1.47 + 0.005 I_F \quad P = 1.47 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$$

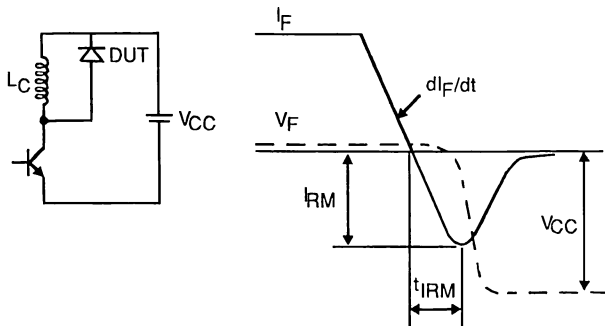


Figure 1 : Turn-off switching characteristics (without series inductance).

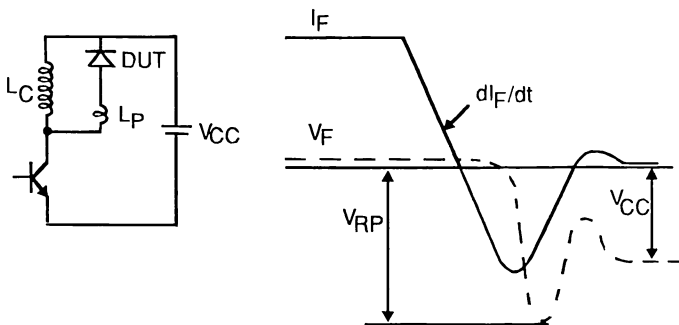


Figure 2 : Turn-off switching characteristics (without series inductance).

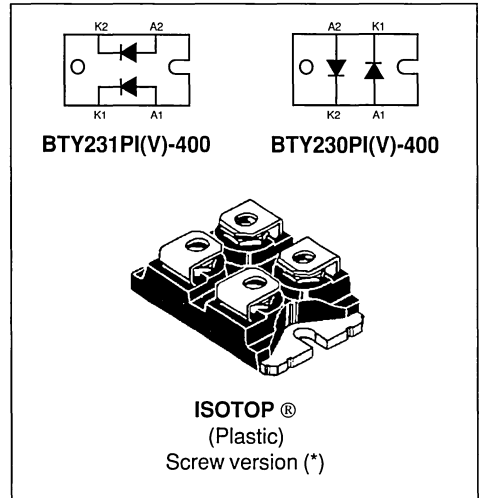
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual high voltage rectifiers ranging from 200V to 400V suited for Switch Mode Power Supplies and other power converters.
 The devices are packaged in ISOTOP.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{FRM}	Repetitive peak forward current	tp ≤ 10μs	500	A
I _{F(RMS)}	RMS forward current	Per diode	50	A
I _{F(AV)}	Average forward current	T _c =75°C δ = 0.5 Per diode	30	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal Per diode	350	A
T _{stg} T _J	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

Symbol	Parameter	BYT230PI(V)- / BYT231PI(V)-			Unit
		200	300	400	
V _{RRM}	Repetitive peak reverse voltage	200	300	400	V

* : Tin plated Fast-on version is also available (without V suffix).
 TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	1.5	°C/W
		Total	0.8	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_{j}(\text{diode } 1) = P(\text{diode}) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 30 A			1.5	V
	T _j = 100°C				1.4	
I _R **	T _j = 25°C	V _R = V _{RRM}			35	µA
	T _j = 100°C				6	mA

Pulse test : * tp = 380 µs, duty cycle < 2 %
 ** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			50	ns
		I _F = 1A dI _F /dt = -15A/µs V _R = 30V			100	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	dI _F /dt = -120A/µs	V _{CC} = 200V I _F = 30A L _p ≤ 0.05µH T _j = 100°C see fig. 11			75	ns
	dI _F /dt = -240A/µs			50		
I _{IRM}	dI _F /dt = -120A/µs				9	A
	dI _F /dt = -240A/µs			12		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _j = 100°C V _{CC} = 60V I _F = I _{F(AV)} dI _F /dt = -30A/µs L _p = 1µH	see note see fig.12		3.3		/

Note : Applicable to BYT230PI(V)-400 / BYT231PI(V)-400 only
 To evaluate the conduction losses use the following equation :
 $P = 1.1 \times I_{F(AV)} + 0.0095 \times I_F^2(\text{RMS})$

Fig.1 : Low frequency power losses versus average current.

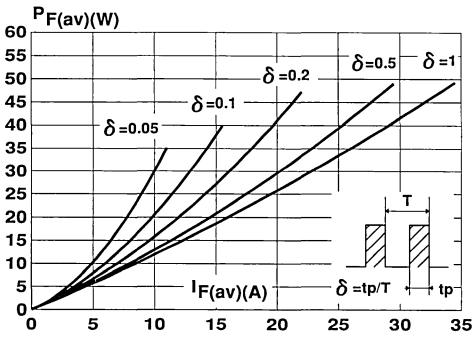


Fig.2 : Peak current versus form factor.

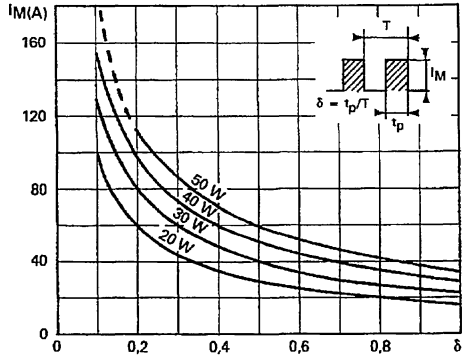


Fig.3 : Non repetitive peak surge current versus overload duration.

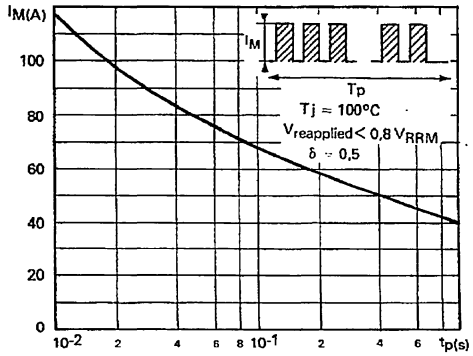


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

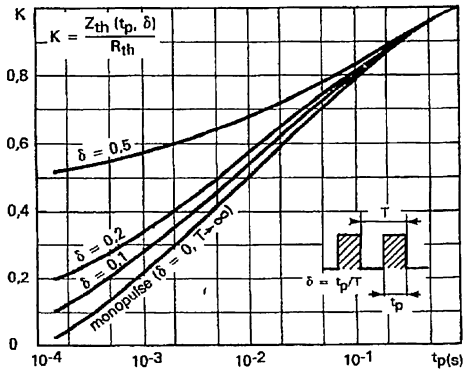


Fig.5 : Voltage drop versus forward current.

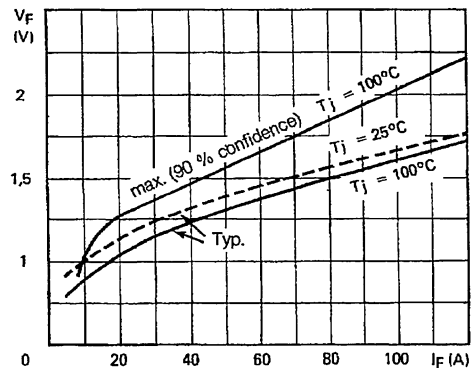


Fig.6 : Recovery charge versus diF/dt.

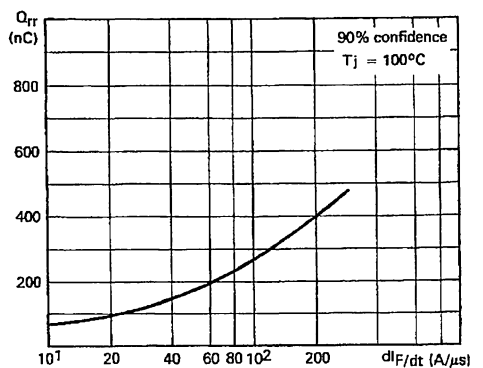


Fig.7 : Recovery time versus di_F/dt .

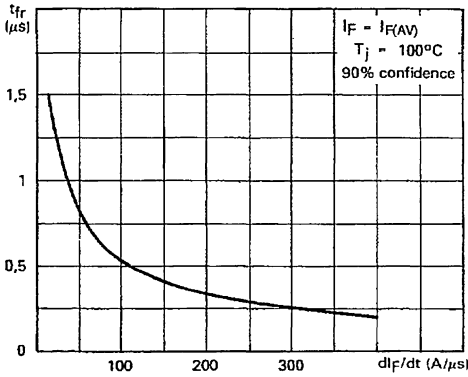


Fig.9 : Peak forward voltage versus di_F/dt .

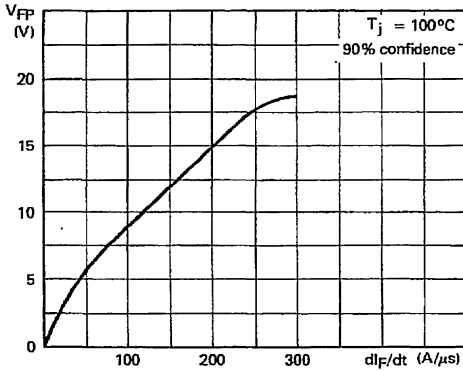


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

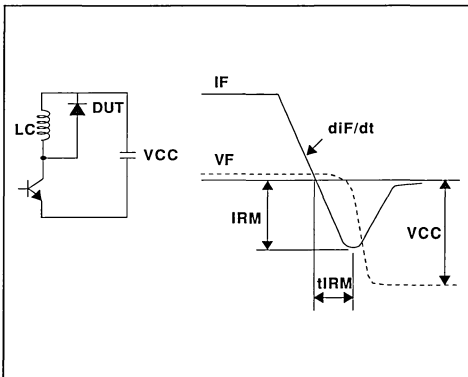


Fig.8 : Peak reverse current versus di_F/dt .

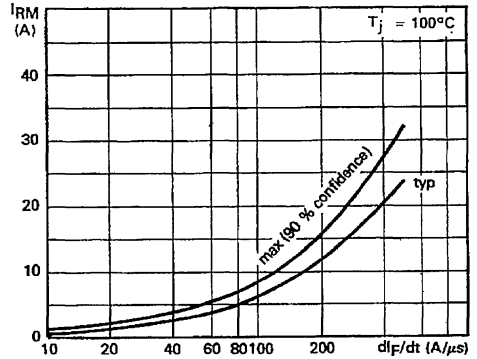


Fig.10 : Dynamic parameters versus junction temperature.

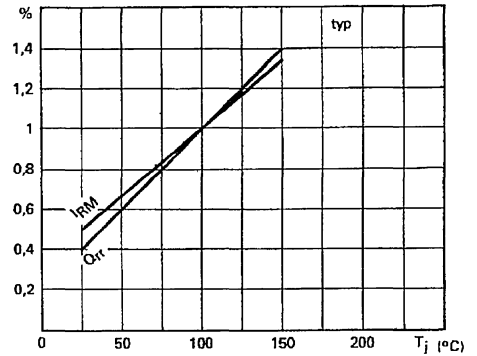
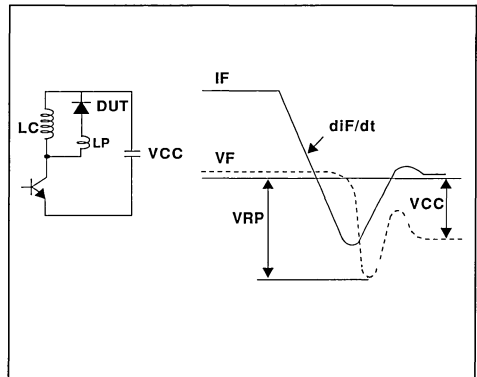


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



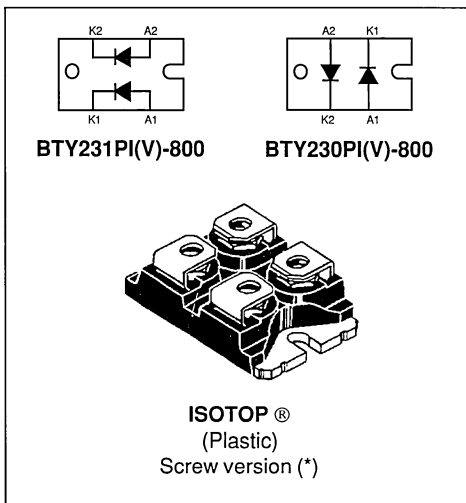
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual high voltage rectifiers ranging from 600V to 800V suited for Switch Mode Power Supplies and other power converters.
 The devices are packaged in ISOTOP.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{FRM}	Repetitive peak forward current	tp ≤ 10μs	375	A
I _{F(RMS)}	RMS forward current	Per diode	70	A
I _{F(AV)}	Average forward current	T _c =55°C δ = 0.5	30	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal	200	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

Symbol	Parameter	BYT230PI(V)- / BYT231PI(V)-		Unit
		600	800	
V _{RRM}	Repetitive peak reverse voltage	600	800	V

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	1.5	°C/W
		Total	0.8	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_J(\text{diode } 1) = P(\text{diode}) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _J = 25°C	I _F = 30 A			1.9	V
	T _J = 100°C				1.8	
I _R **	T _J = 25°C	V _R = V _{RRM}			100	μA
	T _J = 100°C				5	

Pulse test : * tp = 380 μs, duty cycle < 2 %

** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _J = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			55	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			130	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	dI _F /dt = -120A/μs	V _{CC} = 200V I _F = 30A L _p ≤ 0.05μH T _J = 100°C see fig. 11			160	ns
	dI _F /dt = -240A/μs			100		
I _{RM}	dI _F /dt = -120A/μs				15	A
	dI _F /dt = -240A/μs			19		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _J = 100°C V _{CC} = 150V dI _F /dt = -30A/μs	I _F = I _{F(AV)} L _p = 4μH see fig. 12			4	/

To evaluate the conduction losses use the following equation :

$$P = 1.47 \times I_{F(AV)} + 0.010 \times I_{F(RMS)}^2$$

Fig.1 : Low frequency power losses versus average current.

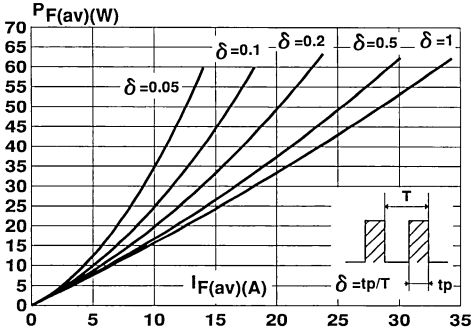


Fig.2 : Peak current versus form factor.

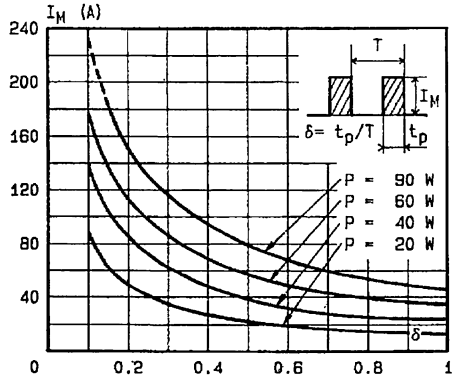


Fig.3 : Non repetitive peak surge current versus overload duration.

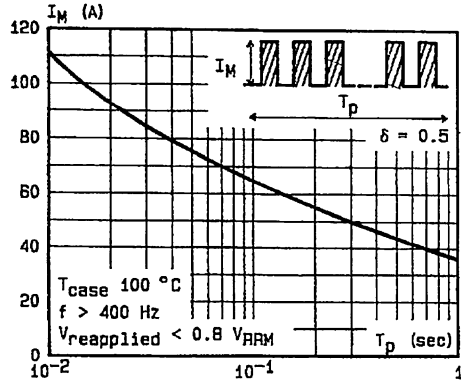


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

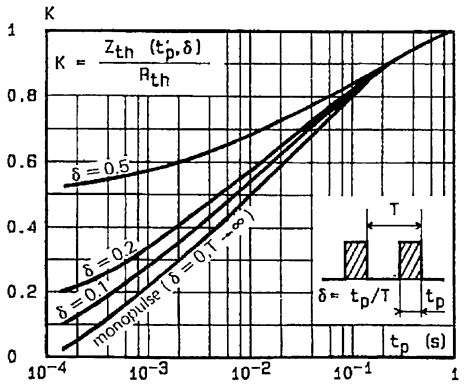


Fig.5 : Voltage drop versus forward current.

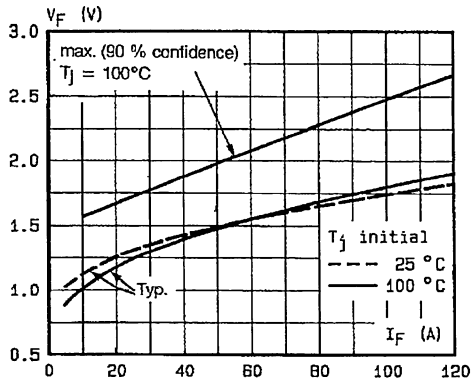


Fig.6 : Recovery charge versus diF/dt.

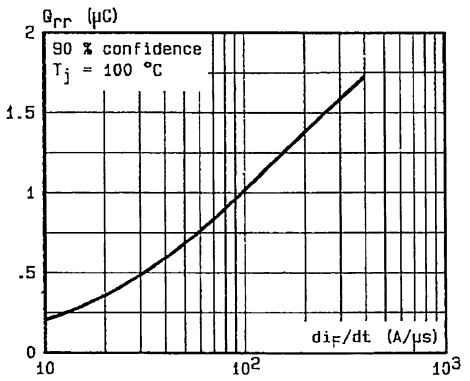


Fig.7 : Recovery time versus di_F/dt .

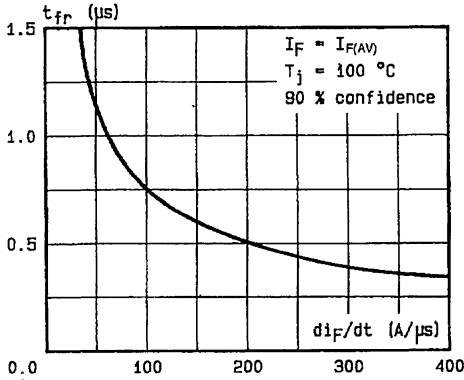


Fig.9 : Peak forward voltage versus di_F/dt .

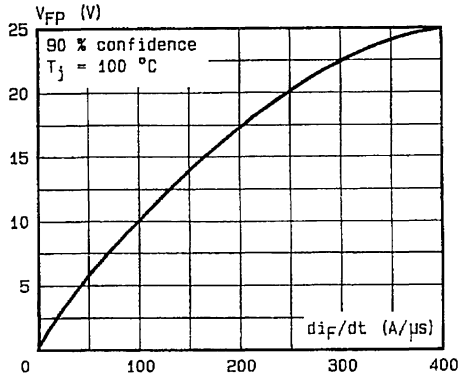


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

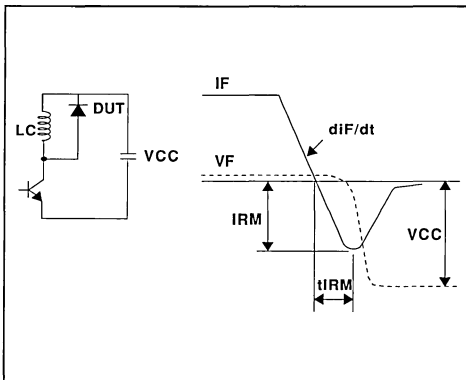


Fig.8 : Peak reverse current versus di_F/dt .

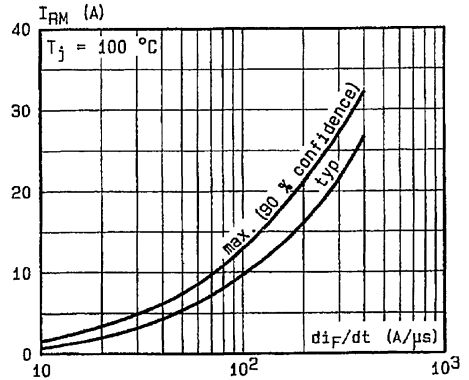


Fig.10 : Dynamic parameters versus junction temperature.

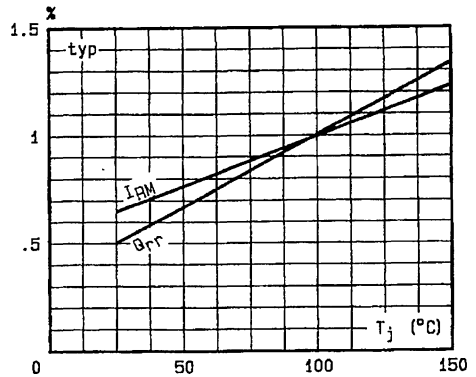
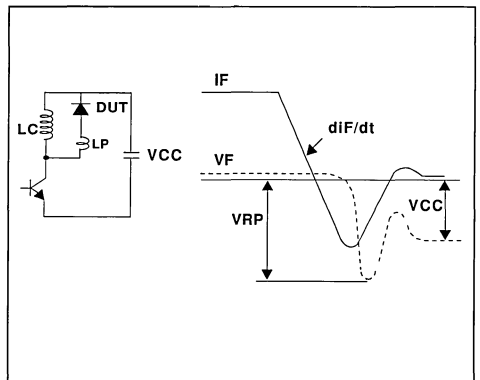


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



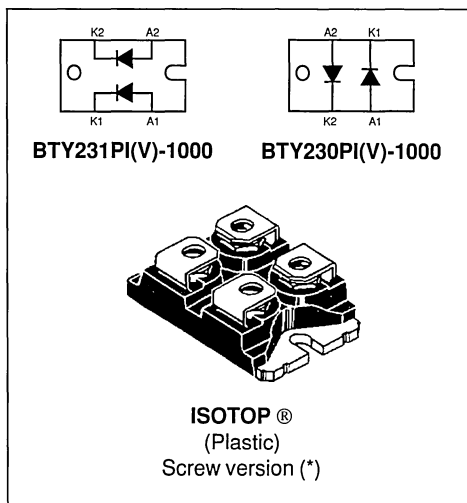
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual high voltage rectifiers suited for Switch Mode Power Supplies and other power converters. The devices are packaged in ISOTOP.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive peak reverse voltage		1000	V	
I_{FRM}	Repetitive peak forward current	$t_p \leq 10\mu s$	375	A	
$I_{F(RMS)}$	RMS forward current		Per diode	70	A
$I_{F(AV)}$	Average forward current	$T_C=55^\circ C$ $\delta = 0.5$	Per diode	30	A
I_{FSM}	Surge non repetitive forward current	$t_p=10ms$ sinusoidal	Per diode	200	A
T_{stg} T_J	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^\circ C$ $^\circ C$	

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	1.5	°C/W
		Total	0.8	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode}) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 30 A			1.9	V
	T _j = 100°C				1.8	
I _R **	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 100°C				5	mA

Pulse test : * tp = 380 μs, duty cycle < 2 %

** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			70	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			165	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	dI _F /dt = -120A/μs	V _{CC} = 200V I _F = 30A L _p ≤ 0.05μH T _j = 100°C see fig. 11			200	ns
	dI _F /dt = -240A/μs			120		
I _{IRM}	dI _F /dt = -120A/μs				19.5	A
	dI _F /dt = -240A/μs			22		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _j = 100°C V _{CC} = 200V dI _F /dt = -30A/μs L _p = 5μH	I _F = I _{F(AV)} see fig. 12			4.5	/

To evaluate the conduction losses use the following equation :

$$P = 1.47 \times I_{F(AV)} + 0.010 \times I_{F(RMS)}^2$$

Fig.1 : Low frequency power losses versus average current.

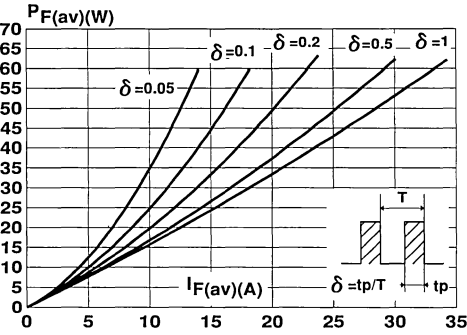


Fig.2 : Peak current versus form factor.

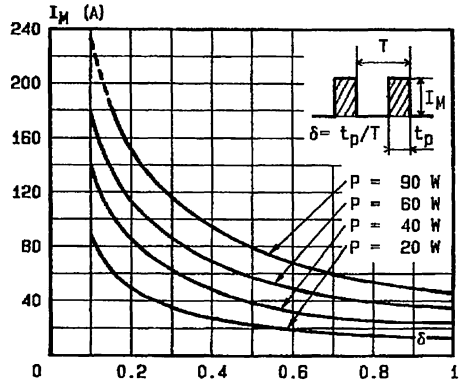


Fig.3 : Non repetitive peak surge current versus overload duration.

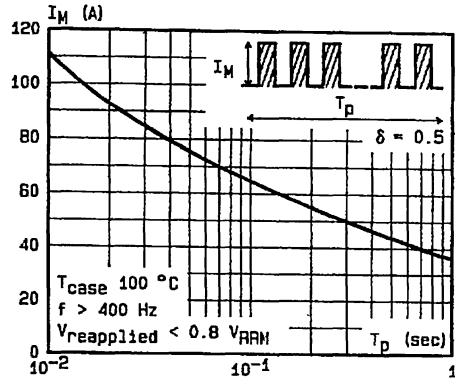


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

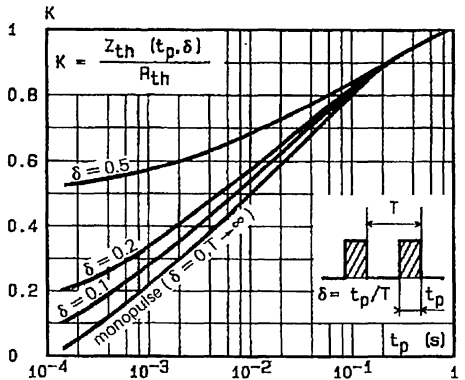


Fig.5 : Voltage drop versus forward current.

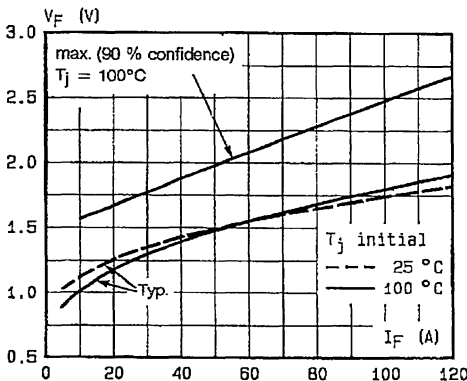


Fig.6 : Recovery charge versus diF/dt.

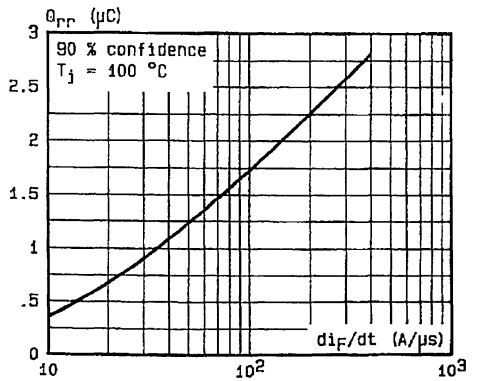


Fig.7 : Recovery time versus di_F/dt .

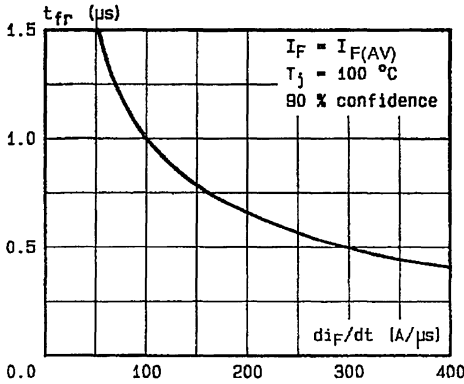


Fig.9 : Peak forward voltage versus di_F/dt .

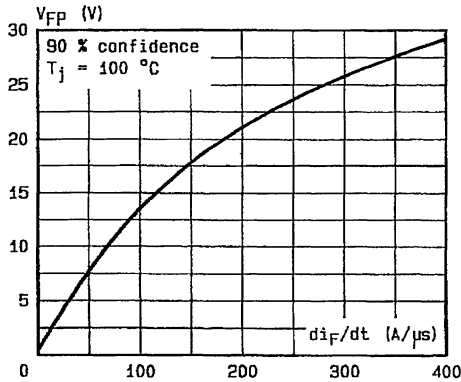


Fig.8 : Peak reverse current versus di_F/dt .

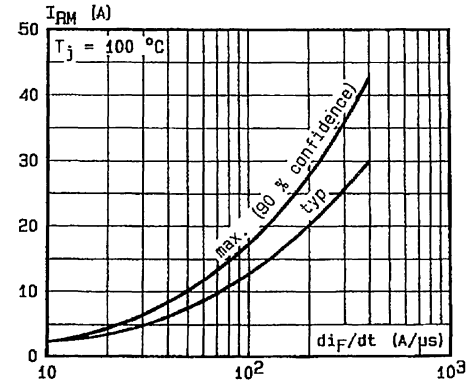


Fig.10 : Dynamic parameters versus junction temperature.

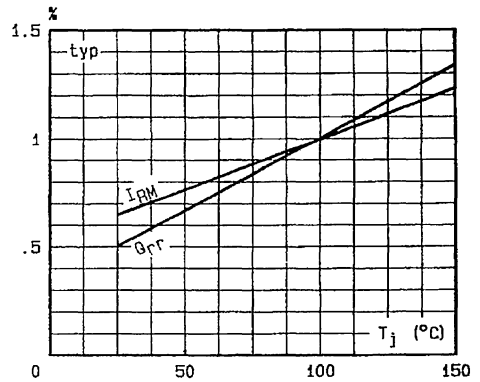


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

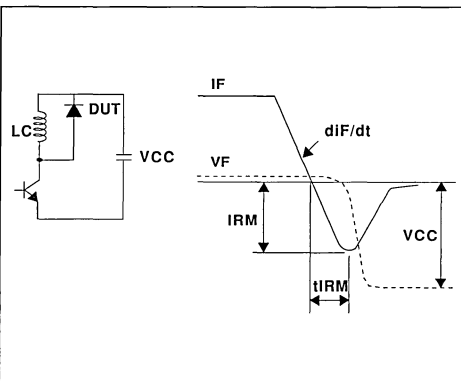
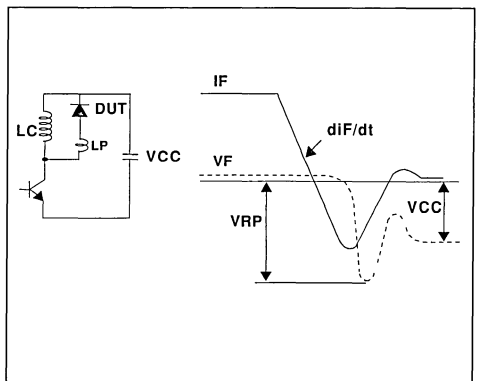


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



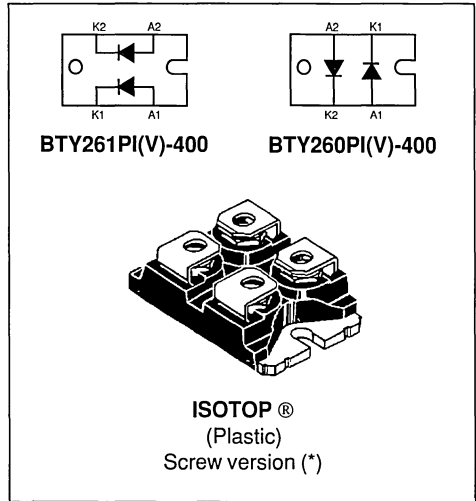
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual high voltage rectifiers ranging from 400V to 200V suited for Switch Mode Power Supplies and other power converters.
 The devices are packaged in ISOTOP.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{FRM}	Repetitive peak forward current	tp ≤ 10μs	800	A
I _{F(RMS)}	RMS forward current	Per diode	140	A
I _{F(AV)}	Average forward current	T _c =80°C δ = 0.5 Per diode	60	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal Per diode	600	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

Symbol	Parameter	BYT261PI(V)-/BYT260PI(V)-			Unit
		200	300	400	
V _{RRM}	Repetitive peak reverse voltage	200	300	400	V

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.7	°C/W
		Total	0.4	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode 1}) = P(\text{diode}) \times R_{th}(\text{Per diode}) + P(\text{diode 2}) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 60 A			1.5	V
	T _j = 100°C				1.4	
I _R **	T _j = 25°C	V _R = V _{RRM}			60	μA
	T _j = 100°C				6	mA

Pulse test : * tp = 380 μs, duty cycle < 2 %

** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			50	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			100	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{RM}	dI _F /dt = -240A/μs	V _{CC} = 200V I _F = 60A L _p ≤ 0.05μH T _j = 100°C see fig. 11			75	ns
	dI _F /dt = -480A/μs			50		
I _{RM}	dI _F /dt = -240A/μs				18	A
	dI _F /dt = -480A/μs			24		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _j = 100°C V _{CC} = 120V I _F = I _{F(AV)} dI _F /dt = -60A/μs L _p = 0.8μH	see note see fig.12		3.3	4	/

Note : Applicable to BYT261PI(V)-400 only

To evaluate the conduction losses use the following equation :

$$P = 1.1 \times I_{F(AV)} + 0.0045 \times I_F^2(\text{RMS})$$

Fig.1 : Low frequency power losses versus average current.

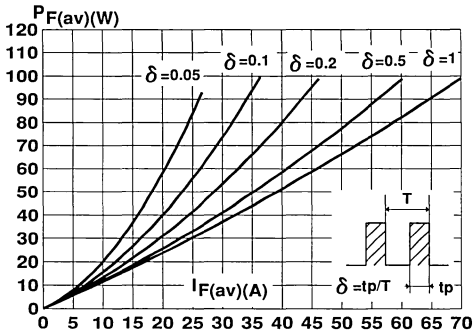


Fig.2 : Peak current versus form factor.

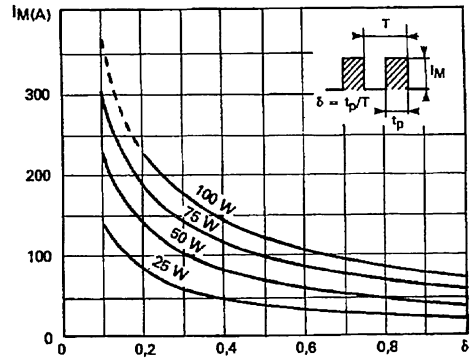


Fig.3 : Non repetitive peak surge current versus overload duration.

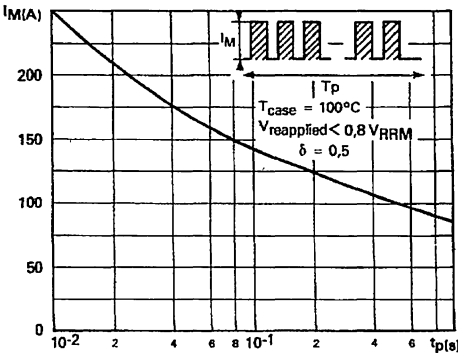


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

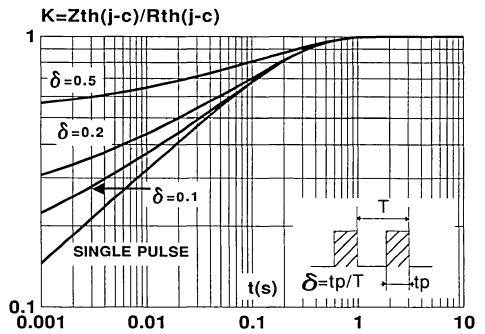


Fig.5 : Voltage drop versus forward current.

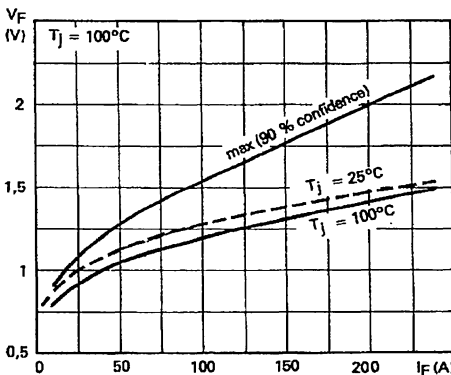


Fig.6 : Recovery charge versus di_F/dt.

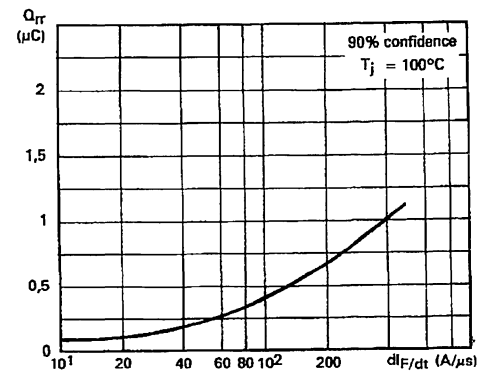


Fig.7 : Recovery time versus dI_F/dt .

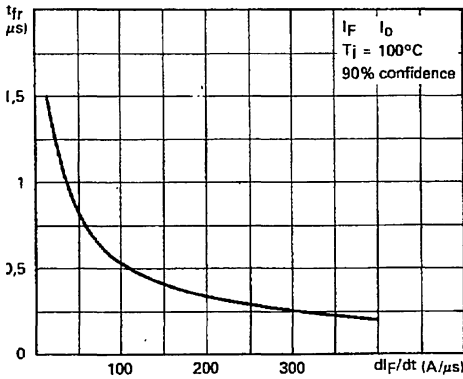


Fig.9 : Peak forward voltage versus dI_F/dt .

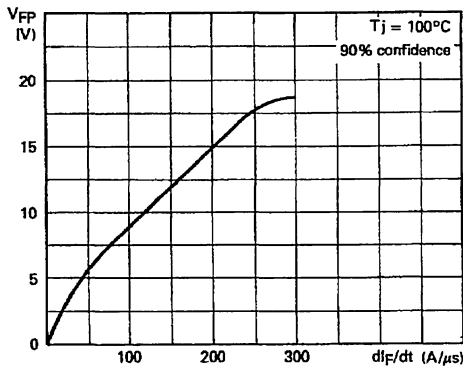


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

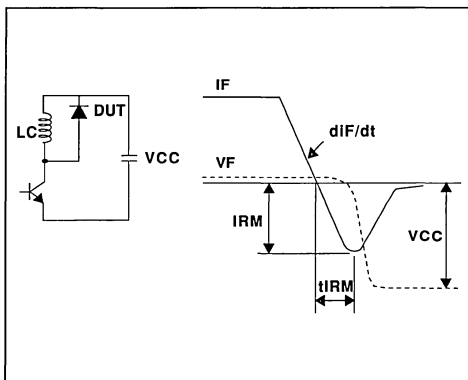


Fig.8 : Peak reverse current versus dI_F/dt .

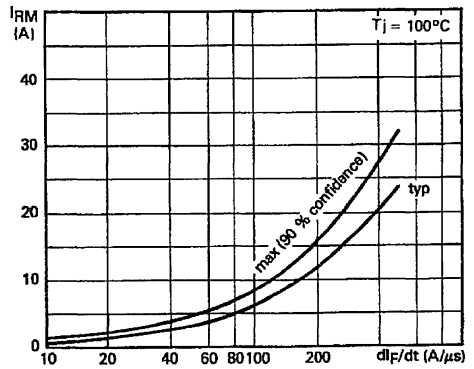


Fig.10 : Dynamic parameters versus junction temperature.

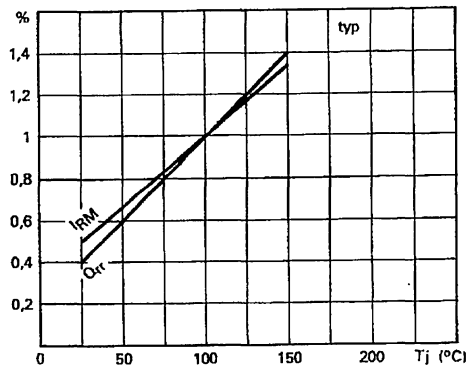
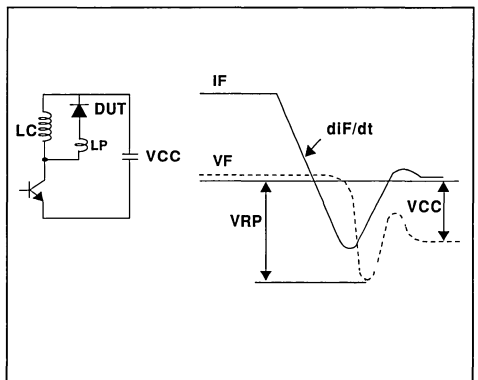


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



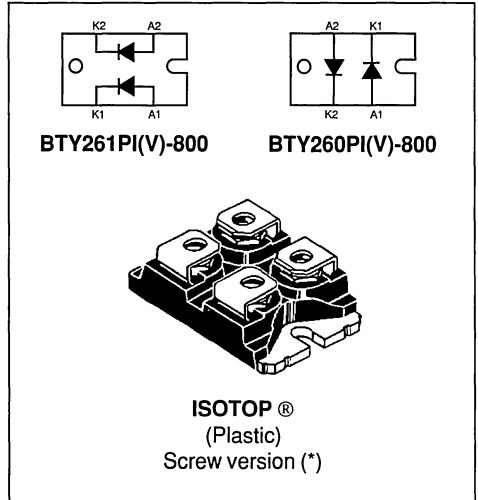
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual high voltage rectifiers ranging from 600V to 800V suited for Switch Mode Power Supplies and other power converters.
 The devices are packaged in ISOTOP.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
I _{FRM}	Repetitive peak forward current	tp ≤ 10μs	750	A
I _{F(RMS)}	RMS forward current	Per diode	140	A
I _{F(AV)}	Average forward current	T _c =60°C δ = 0.5 Per diode	60	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal Per diode	400	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

Symbol	Parameter	BYT260PI(V)- / BYT261PI(V)-		Unit
		600	800	
V _{RRM}	Repetitive peak reverse voltage	600	800	V

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.7	°C/W
		Total	0.4	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 60 A			1.9	V
	T _j = 100°C				1.8	
I _R **	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 100°C				6	mA

Pulse test : * tp = 380 μs, duty cycle < 2 %
 ** tp = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			65	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			135	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	dI _F /dt = -240A/μs	V _{CC} = 200V I _F = 60A L _p ≤ 0.05μH T _j = 100°C see fig. 11			160	ns
	dI _F /dt = -480A/μs			100		
I _{RM}	dI _F /dt = -240A/μs				30	A
	dI _F /dt = -480A/μs			38		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$C = \frac{V_{RP}}{V_{CC}}$	T _j = 100°C V _{CC} = 150V dI _F /dt = -60A/μs L _p = 2μH	I _F = I _{F(AV)} see fig. 12		3.3	4	/

To evaluate the conduction losses use the following equation :
 $P = 1.47 \times I_{F(AV)} + 0.005 \times I_F^2(\text{RMS})$

Fig.1 : Low frequency power losses versus average current.

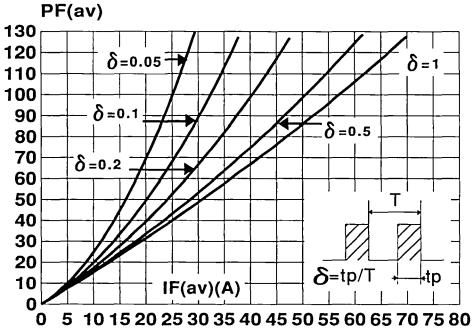


Fig.2 : Peak current versus form factor.

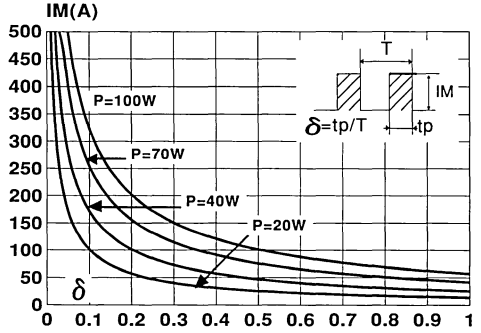


Fig.3 : Non repetitive peak surge current versus overload duration.

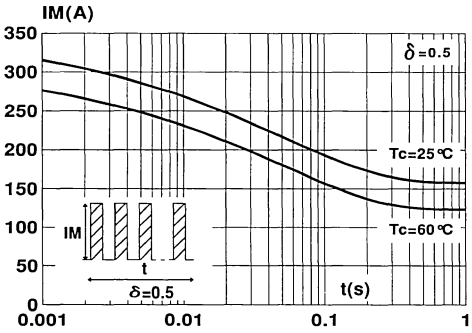


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

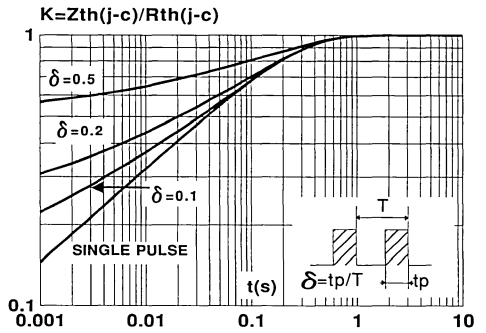


Fig.5 : Voltage drop versus forward current.

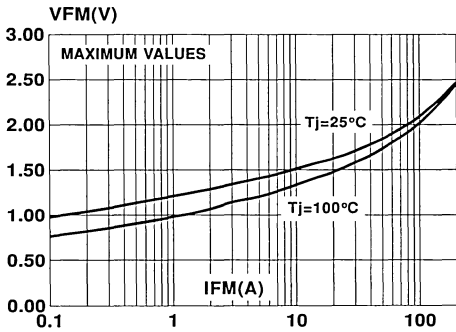


Fig.6 : Recovery charge versus diF/dt.

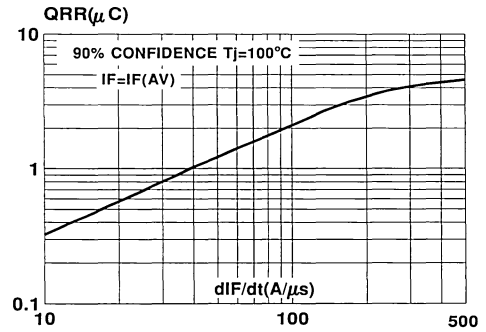


Fig.7 : Recovery time versus diF/dt .

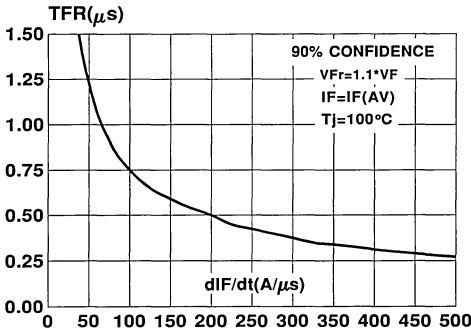


Fig.8 : Peak reverse current versus diF/dt .

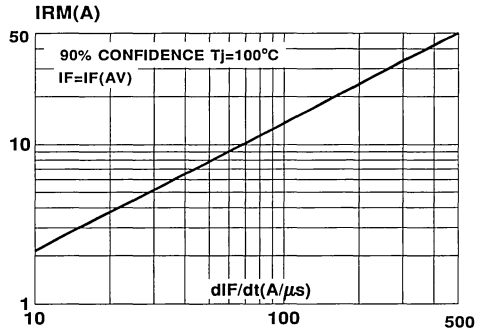


Fig.9 : Peak forward voltage versus diF/dt .

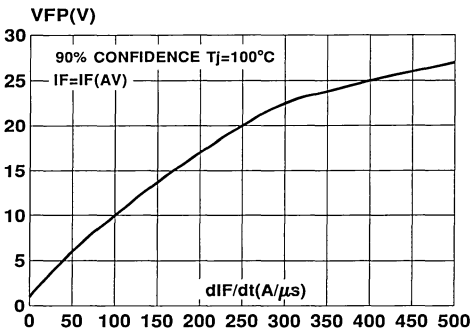


Fig.10 : Dynamic parameters versus junction temperature.

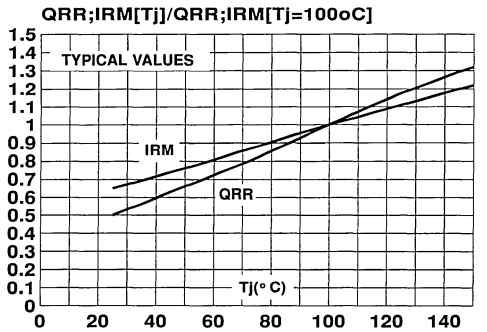


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

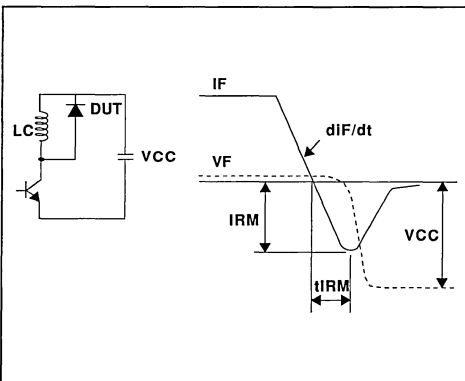
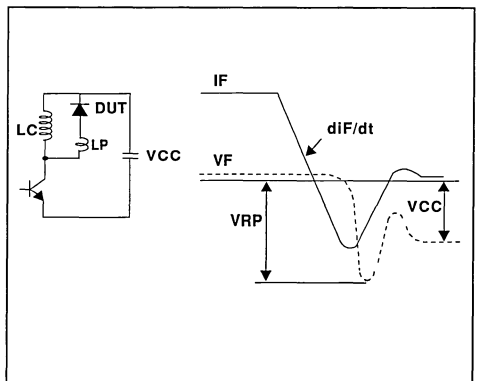


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



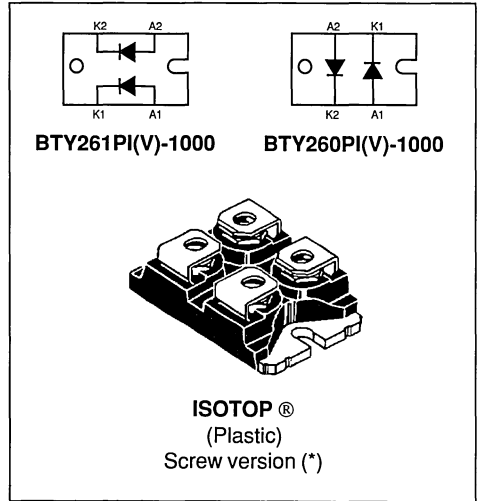
FAST RECOVERY RECTIFIER DIODES

FEATURES

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V_{RMS}
 Capacitance = 45 pF

DESCRIPTION

Dual high voltage rectifiers suited for Switch Mode Power Supplies and other power converters. The devices are packaged in ISOTOP.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
V _{RRM}	Repetitive peak reverse voltage		1000	V	
I _{FRM}	Repetitive peak forward current	tp ≤ 10μs	750	A	
I _{F(RMS)}	RMS forward current		Per diode	140	A
I _{F(AV)}	Average forward current	T _c = 60°C δ = 0.5	Per diode	60	A
I _{FSM}	Surge non repetitive forward current	tp = 10ms sinusoidal	Per diode	400	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C	

* : Tin plated Fast-on version is also available (without V suffix).
 TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.7	°C/W
		Total	0.4	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _F *	T _j = 25°C	I _F = 60 A			1.9	V
	T _j = 100°C				1.8	
I _R **	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 100°C				6	mA

Pulse test : * t_p = 380 μs, duty cycle < 2 %

** t_p = 5 ms, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr	T _j = 25°C	I _F = 0.5A I _{rr} = 0.25A I _R = 1A			70	ns
		I _F = 1A dI _F /dt = -15A/μs V _R = 30V			170	

TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{IRM}	dI _F /dt = -240A/μs	V _{CC} = 200V I _F = 60A L _p ≤ 0.05μH T _j = 100°C see fig. 11			200	ns
	dI _F /dt = -480A/μs			120		
I _{RM}	dI _F /dt = -240A/μs				40	A
	dI _F /dt = -480A/μs			44		

TURN-OFF OVERVOLTAGE COEFFICIENT (With serie inductance)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C = $\frac{V_{RP}}{V_{CC}}$	T _j = 100°C V _{CC} = 200V dI _F /dt = -60A/μs	I _F = I _{F(AV)} see fig.12		3.3	4.5	/

To evaluate the conduction losses use the following equation :

$$P = 1.47 \times I_{F(AV)} + 0.005 \times I_{F(RMS)}^2$$

Fig.1 : Low frequency power losses versus average current.

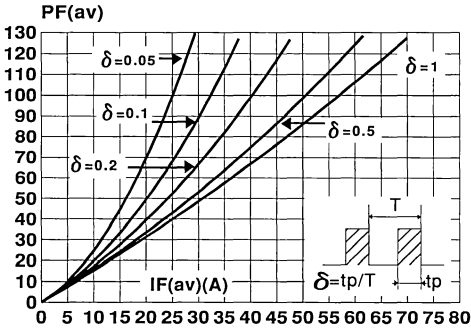


Fig.2 : Peak current versus form factor.

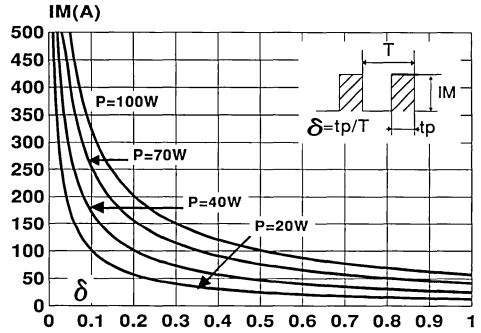


Fig.3 : Non repetitive peak surge current versus overload duration.

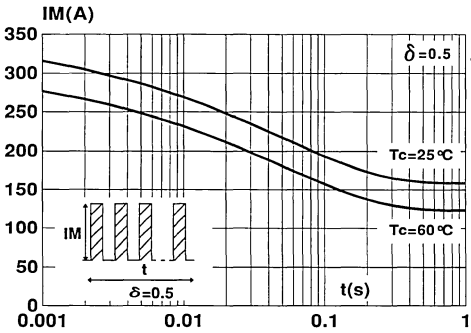


Fig.4 : Relative variation of thermal impedance junction to case versus pulse duration.

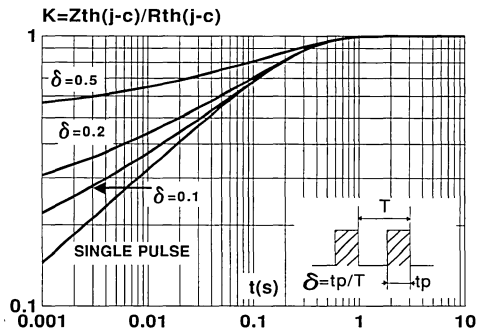


Fig.5 : Voltage drop versus forward current.

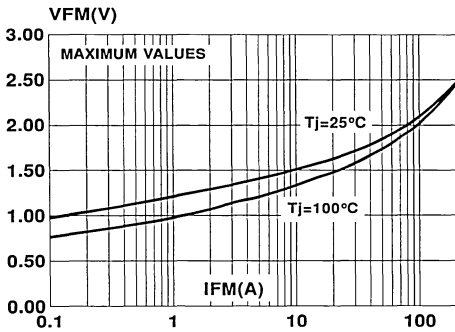


Fig.6 : Recovery charge versus diF/dt.

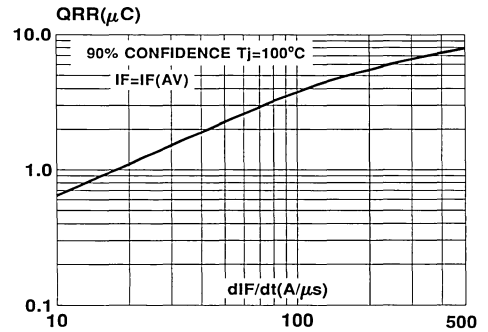


Fig.7 : Recovery time versus di_F/dt .

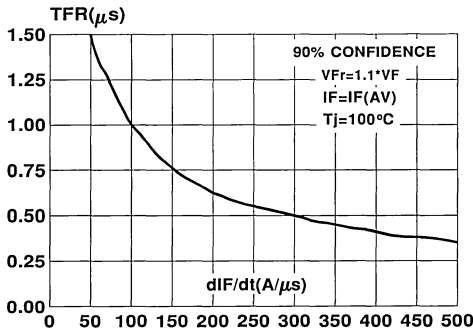


Fig.9 : Peak forward voltage versus di_F/dt .

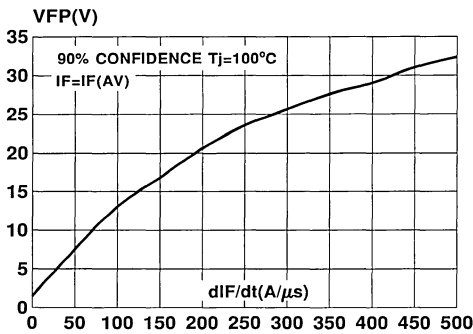


Fig.11 : TURN-OFF SWITCHING CHARACTERISTICS (Without serie inductance)

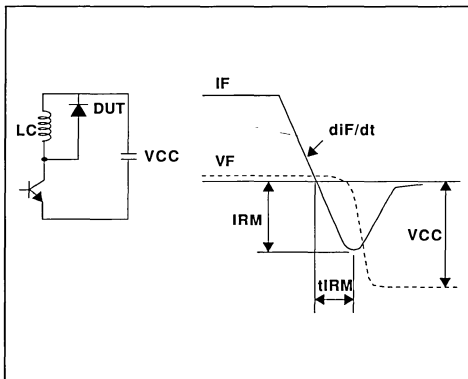


Fig.8 : Peak reverse current versus di_F/dt .

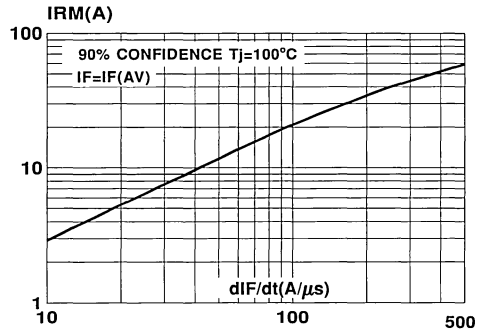


Fig.10 : Dynamic parameters versus junction temperature.

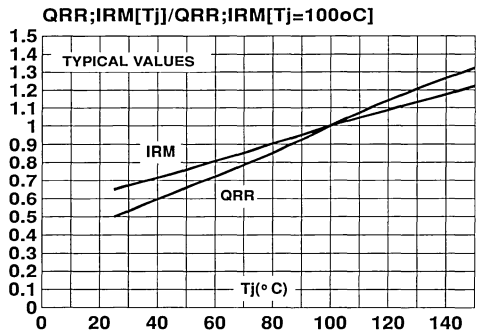
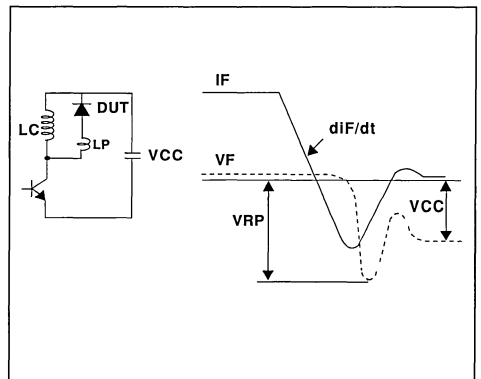


Fig.12 : TURN-OFF SWITCHING CHARACTERISTICS (With serie inductance)



VIDEO DEFLECTION DIODES

**(CRT HORIZONTAL DEFLECTION)
 MODULATION DIODE**
MAIN PRODUCT CHARACTERISTICS

I _F peak	3A
V _{RRM}	400V
trr	22ns
V _F	1.35V

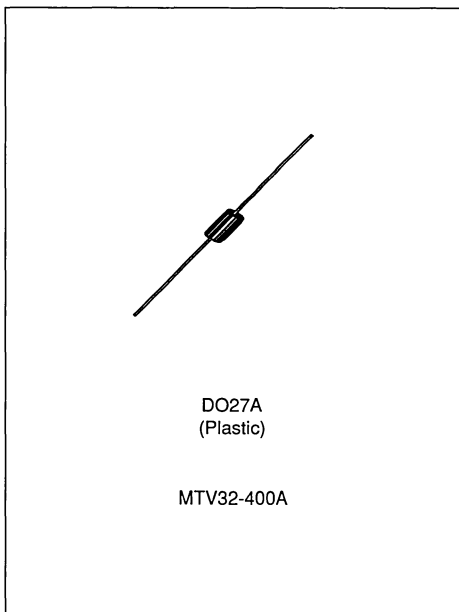
FEATURES

- PRODUCT SPECIFIC TO HORIZONTAL DEFLECTION
- HIGH REVERSE VOLTAGE
- LOW SWITCHING LOSSES DUE TO SMALL RECOVERY CHARGES

DESCRIPTION

High voltage diode especially designed for horizontal deflection stage in standard and high resolution displays for TV's and monitors.

This device is packaged in DO27A and is intended for use as a MODULATION diode in deflection circuitry with east-west correction.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V _{RRM}	Repetitive peak reverse voltage		400	V
V _{RWM}	Reverse working voltage		400	V
I _F peak	Peak forward current (1)	T _{amb} =130°C (2)	3	A
I _{FRM}	Repetitive peak forward current	tp ≤ 10μs	60	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal	60	A
T _{stg} T _j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	°C °C

(1) $\delta = 0.5$ and triangular waveform

(2) on infinite heatsink with 10mm lead length

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-a)	Junction to ambient (*)	20	°C/W

(*) on infinite heatsink with 10mm lead length

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RWM}	T _j = 25°C		20	μA
			T _j = 100°C		0.5	mA
V _F **	Forward voltage drop	I _F = 3 A	T _j = 25°C		1.45	V
			T _j = 100°C		1.35	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
trr	Reverse recovery time	I _F = 0.5 A I _{rr} = 0.25 A I _R = 1 A T _j = 25°C			22	ns

TURN ON SWITCHING

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{FR}	Forward recovery time	I _F = 3 A dI _F /dt = 100 A/μs Measured at 1.1 x V _F T _j = 25°C			0.1	μs
V _{FP}	Peak forward voltage				17	V

To evaluate the conduction losses, in case of triangular current, use the following equation :

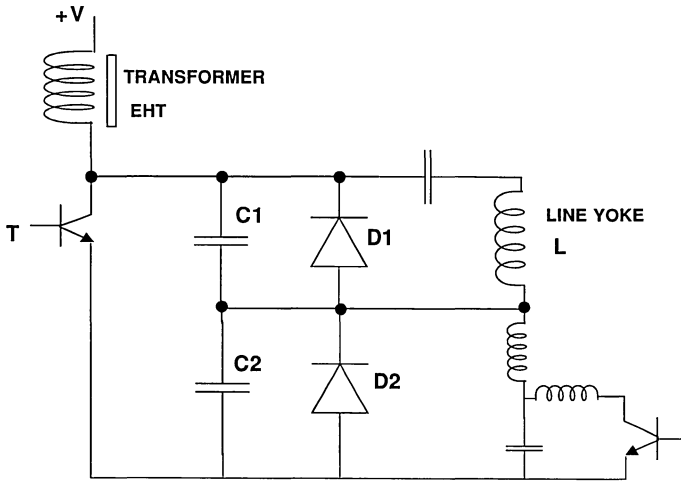
$$P = \frac{1.17 \times I_P \times \delta}{2} + \frac{0.06 \times I_P^2 \times \delta}{3}$$

δ : duty cycle

I_P : Peak current

for I_P = 3A and δ = 0.5, P = 0.97 W

BASIC E-W DIODE MODULATOR CIRCUIT



D1=DTV32-1000A D2=MTV32-400A



(CRT HORIZONTAL DEFLECTION)
HIGH VOLTAGE DAMPER & MODULATION DIODES

MAIN PRODUCTS CHARACTERISTICS

	MTV32	DTV32
I _{F peak}	3A	3A
V _{RRM}	600V	1000V
t _{rr}	50ns	70ns
V _F	1.6V	1.6V

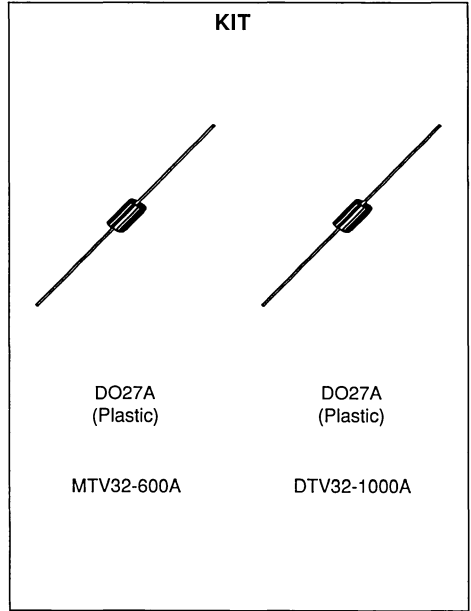
FEATURES

- PRODUCTS SPECIFIC TO HORIZONTAL DEFLECTION
- HIGH REVERSE VOLTAGE
- LOW SWITCHING LOSSES DUE TO SMALL RECOVERY CHARGES
- FULL KIT IN AXIAL PACKAGE

DESCRIPTION

High voltage diodes especially designed for horizontal deflection stage in standard and high resolution displays for TV's and monitors.

The kit includes both the DAMPER diode and the MODULATION diode. These devices are packaged in DO27A and are intended for use as a low cost kit solution in deflection circuitry with east-west correction.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value		Unit
			MTV32	DTV32	
V _{RRM}	Repetitive peak reverse voltage		600	1000	V
V _{RWM}	Reverse working voltage		600	1000	V
I _{F peak}	Peak forward current (1)	T _{amb} =120°C (2)	3	3	A
I _{FRM}	Repetitive peak forward current	t _p ≤ 10μs	100	50	A
I _{FSM}	Surge non repetitive forward current	t _p =10ms sinusoidal	150	150	A
T _{stg} T _J	Storage and junction temperature range		- 40 to + 150		°C
			- 40 to + 150		°C

(1) δ = 0.5 and triangular waveform

(2) on infinite heatsink with 10mm lead length

THERMAL AND ELECTRICAL CHARACTERISTICS OF THE DTV32-1000A (DAMPER diode)

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-a)	Junction to ambient (*)	25	°C/W

(*) on infinite heatsink with 10mm lead length

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RWM}	T _j = 25°C		20	μA
			T _j = 125°C		2	mA
V _F **	Forward voltage drop	I _F = 3 A	T _j = 25°C		2.0	V
			T _j = 125°C		1.6	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{rr}	Reverse recovery time	I _F = 0.5 A I _{rr} = 0.25 A I _R = 1 A T _j = 25°C			72	ns

TURN ON SWITCHING

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{FR}	Forward recovery time	I _F = 3 A dI _F /dt = 100 A/μs Measured at 1.1 x V _F T _j = 25°C			0.5	μs
V _{FP}	Peak forward voltage				35	V

To evaluate the conduction losses, in case of triangular current, use the following equation :

$$P = \frac{1.33 \times I_P \times \delta}{2} + \frac{0.09 \times I_P^2 \times \delta}{3}$$

δ : duty cycle

I_P : Peak current

for I_P = 3A and δ = 0.5, P = 1.13 W

THERMAL AND ELECTRICAL CHARACTERISTICS OF THE MTV32-600A (MODULATION diode)

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-a)	Junction to ambient (*)	25	°C/W

(*) on infinite heatsink with 10mm lead length

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RWM}	T _j = 25°C			10	μA
			T _j = 125°C			1	mA
V _F **	Forward voltage drop	I _F = 3 A	T _j = 25°C			2.0	V
			T _j = 125°C			1.6	

Pulse test : * tp = 5 ms, duty cycle < 2 %

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
trr	Reverse recovery time	I _F = 0.5 A I _{Rr} = 0.25 A I _R = 1 A T _j = 25°C			55	ns

TURN ON SWITCHING

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{FR}	Forward recovery time	I _F = 3 A dI _F /dt = 100 A/μs Measured at 1.1 x V _F T _j = 25°C			0.5	μs
V _{FP}	Peak forward voltage				20	V

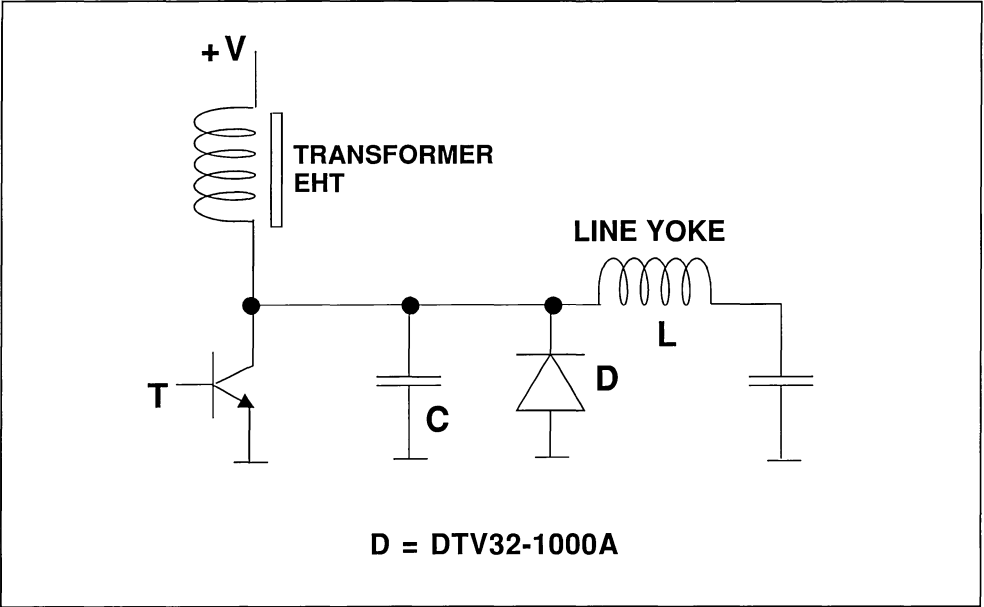
To evaluate the conduction losses, in case of triangular current, use the following equation :

$$P = \frac{1.33 \times I_P \times \delta}{2} + \frac{0.09 \times I_P^2 \times \delta}{3}$$

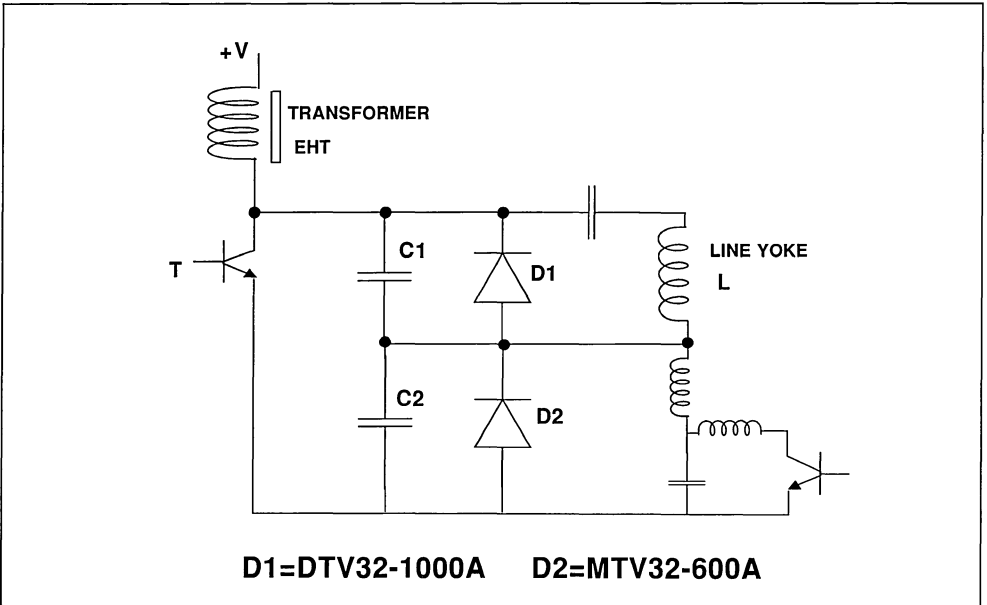
δ : duty cycle

I_P : Peak currentfor I_P = 3A and δ = 0.5, P = 1.13 W

BASIC HORIZONTAL DEFLECTION CIRCUIT



BASIC E-W DIODE MODULATOR CIRCUIT



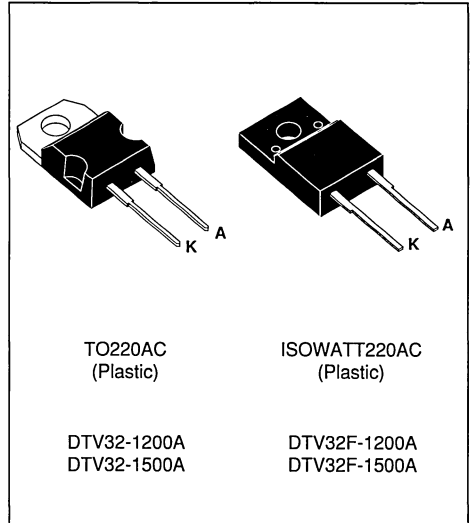
(CRT HORIZONTAL DEFLECTION)
 HIGH VOLTAGE DAMPER DIODE

FEATURES

- HIGH BREAKDOWN VOLTAGE CAPABILITY
- LOW AND MEDIUM FREQUENCY OPERATION
- SPECIFIED TURN ON SWITCHING CHARACTERISTICS
- TYPICAL TOTAL LOSSES : 2 W
($I_{Fpeak} = 6\text{ A}$, $F = 32\text{ kHz}$)
- SUITABLE WITH **BUH** TRANSISTORS SERIES
- INSULATED VERSION (ISOWATT220AC) :
Insulating voltage = 2000 V DC
Capacitance = 12 pF

DESCRIPTION

High voltage diode especially designed for horizontal deflection stage in standard and high resolution displays for TV's and monitors. This device is packaged in TO220AC or ISO-WATT220AC.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
$I_F(\text{RMS})$	RMS forward current		15	A
$I_F(\text{AV})$	Average forward current $\delta = 0.5$	TO220AC $T_c = 130^\circ\text{C}$	6	A
		ISOWATT220AC $T_c = 115^\circ\text{C}$	6	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$

Symbol	Parameter	DTV32(F)-		Unit
		1200A	1500A	
V_{RRM}	Repetitive peak reverse voltage	1200	1500	V
V_{RWM}	Reverse working voltage	1000	1350	V

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	TO220AC	2	°C/W
		ISOWATT220AC	4	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RWM}			100	μA
	T _j = 100°C				1	mA
V _F **	T _j = 25°C	I _F = 6 A			1.3	V
	T _j = 100°C	I _F = 6 A			1.2	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
trr (1)	T _j = 25°C	I _F = 1 A V _R = 30 V	dI _F /dt = -15 A/μs		450	600	ns
trr (2)	T _j = 25°C	I _F = 1 A V _R = 30 V	dI _F /dt = -50 A/μs		300		ns
trr	T _j = 25°C	I _F = 100mA	I _R = 100mA		250		ns

TURN ON SWITCHING CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
t _{FR} (2)	T _j = 100°C	I _F = 6 A	dI _F /dt = 80 A/μs		0.5		μs
V _{FP} (2)		V _{FR} = 2 V			30		V

(1) Test following Jedec Standard

(2) Test representative of the application

To evaluate the conduction losses use the following equations :

$$V_F = 1.0 + 0.025 I_F$$

$$P = 1.0 \times I_{F(AV)} + 0.025 \times I_F^2_{(RMS)}$$

Fig.1 : Average forward power dissipation versus average forward current.

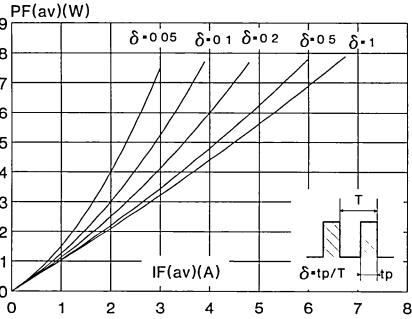


Fig.2 : Peak current versus form factor.

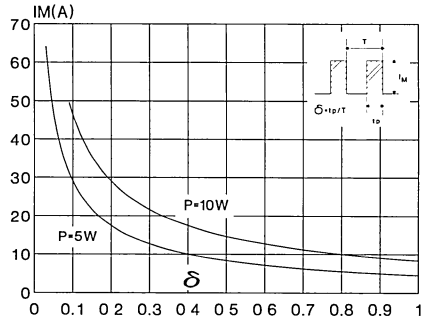


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

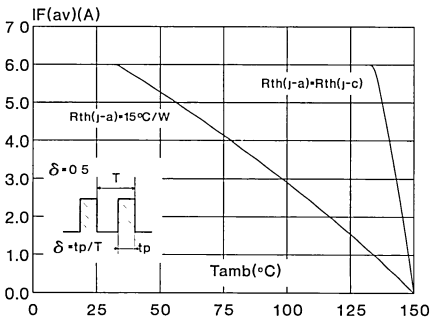


Fig.4 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

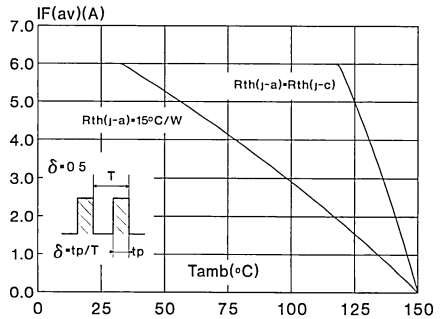


Fig.5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

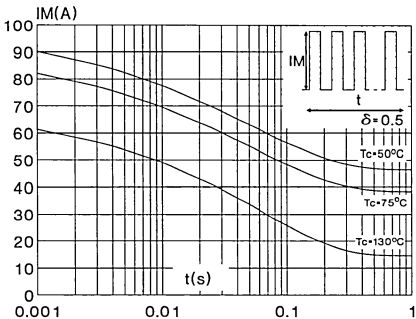


Fig.6 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

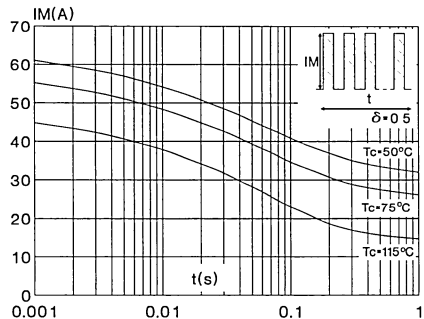


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

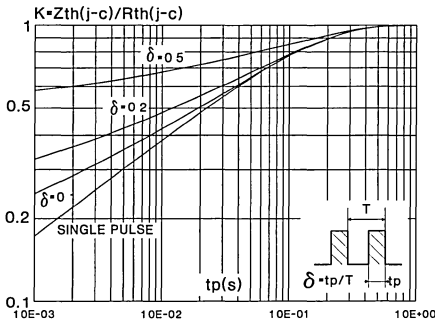


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

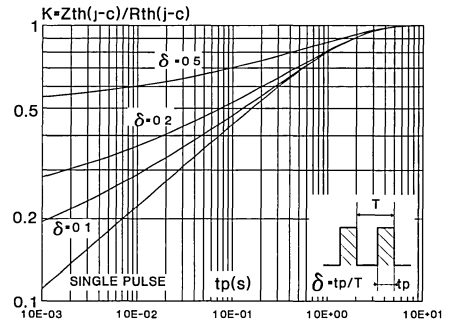


Fig.9 : Forward voltage drop versus forward current. (Maximum values)

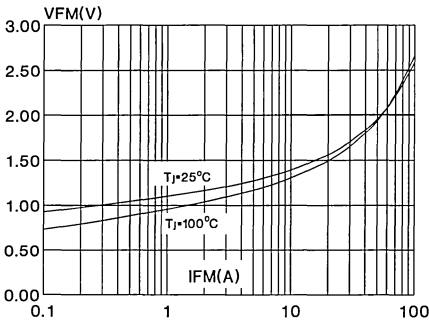


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

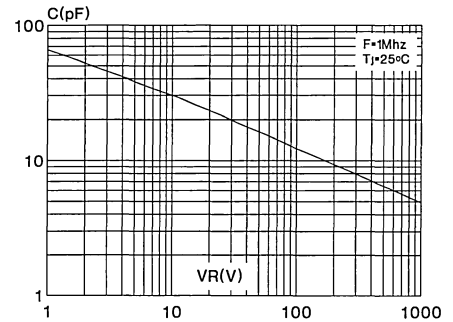


Fig.11 : Recovery charge versus dI_F/dt .

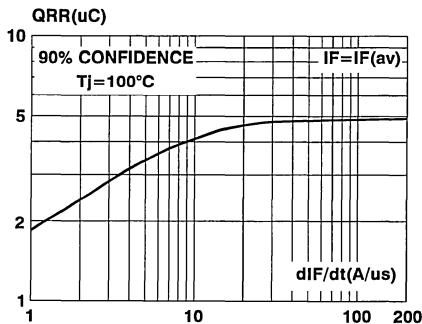


Fig.12 : Peak reverse current versus dI_F/dt .

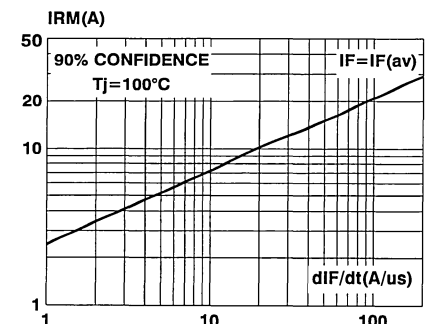


Fig.13 : Dynamic parameters versus junction temperature.

Fig.14 : Peak forward voltage versus dI_F/dt .

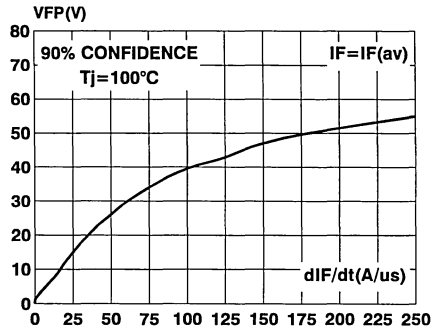
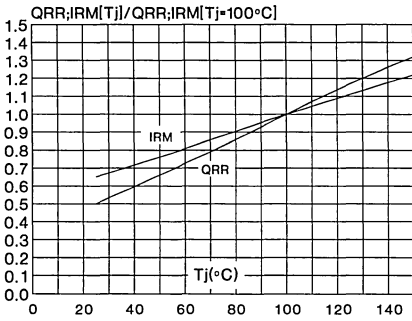
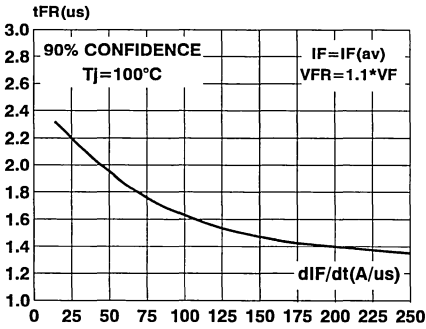
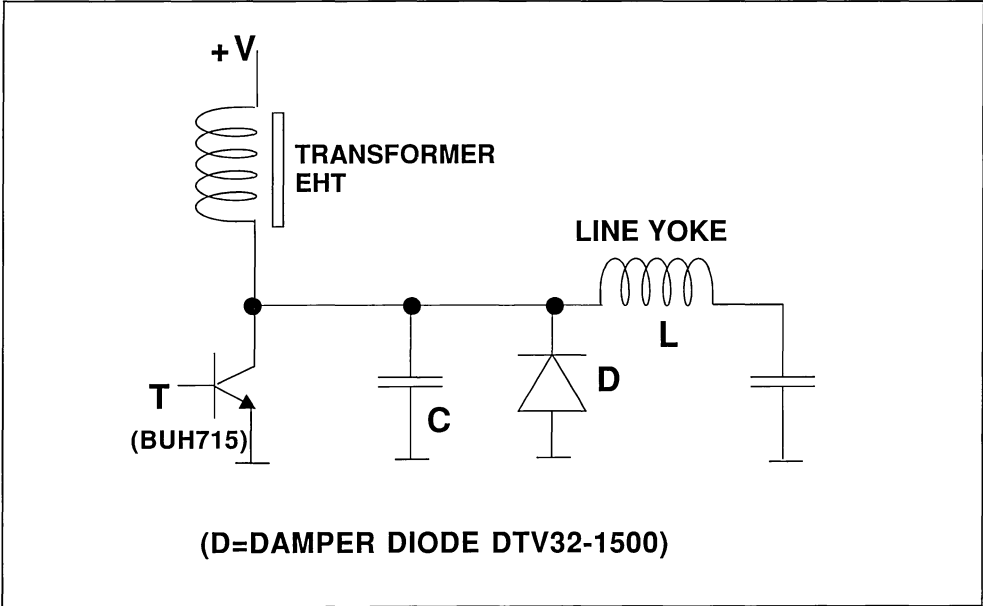


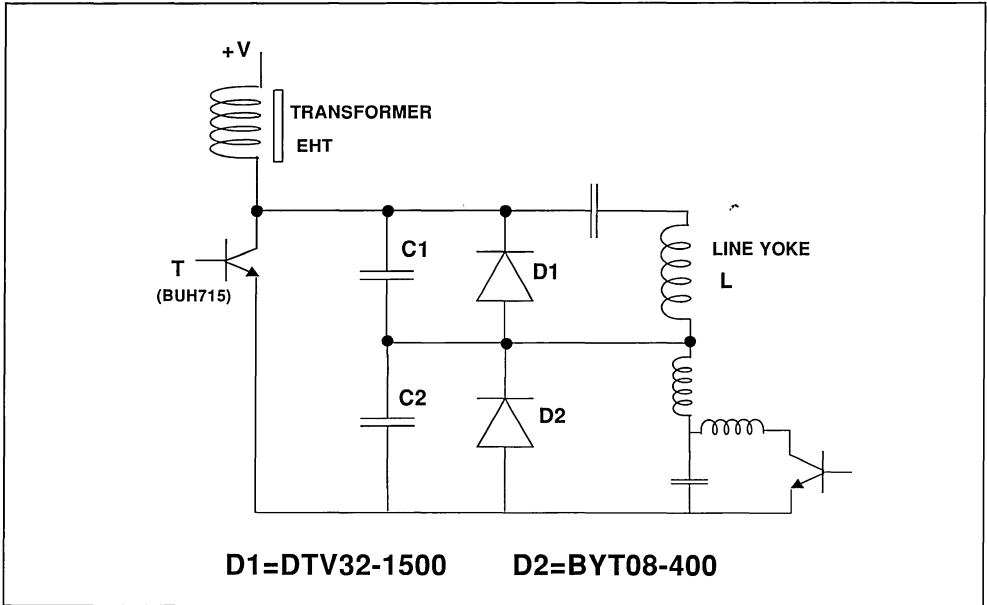
Fig.15 : Recovery time versus dI_F/dt .



BASIC HORIZONTAL DEFLECTION CIRCUIT



BASIC E-W DIODE MODULATOR CIRCUIT

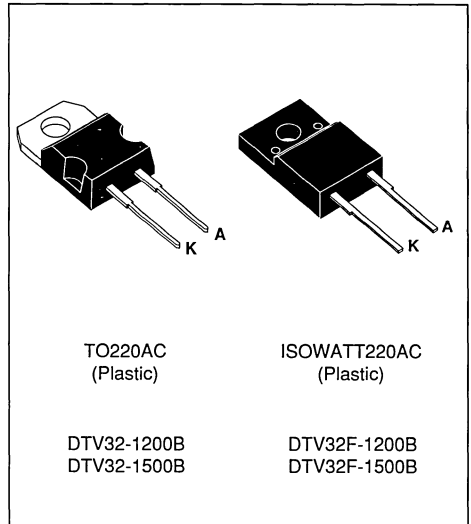


(CRT HORIZONTAL DEFLECTION)
HIGH VOLTAGE DAMPER DIODE
FEATURES

- HIGH BREAKDOWN VOLTAGE CAPABILITY
- HIGH FREQUENCY OPERATION
- SPECIFIED TURN ON SWITCHING CHARACTERISTICS
- TYPICAL TOTAL LOSSES : 3.5W
($I_{Fpeak} = 6\text{ A}$, $F = 64\text{ kHz}$)
- SUITABLE WITH **BUH** TRANSISTORS SERIES
- INSULATED VERSION (ISOWATT220AC) :
Insulating voltage = 2000 V DC
Capacitance = 12 pF

DESCRIPTION

High voltage diode especially designed for horizontal deflection stage in standard and high resolution displays for TV's and monitors. This device is packaged in TO220AC or ISOWATT220AC.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
$I_F(\text{RMS})$	RMS forward current		15	A	
$I_F(\text{AV})$	Average forward current $\delta = 0.5$	TO220AC	$T_C = 130^\circ\text{C}$	6	A
		ISOWATT220AC	$T_C = 110^\circ\text{C}$		
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	100	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$	

Symbol	Parameter	DTV32(F)-		Unit
		1200B	1500B	
V_{RRM}	Repetitive peak reverse voltage	1200	1500	V
V_{RWM}	Reverse working voltage	1000	1350	V

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	TO220AC	2	°C/W
		ISOWATT220AC	4	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RWM}			200	μA
	T _j = 100°C				1	mA
V _F **	T _j = 25°C	I _F = 6 A			1.5	V
	T _j = 100°C	I _F = 6 A			1.4	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{rr} (1)	T _j = 25°C	I _F = 1 A V _R = 30 V			175	ns
t _{rr} (1)	T _j = 25°C		dI _F /dt = -15 A/μs		250	
t _{rr}	T _j = 25°C	I _F = 100mA	I _R = 100mA		140	ns

TURN ON SWITCHING CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{FR} (2)	T _j = 100°C	I _F = 6 A		0.6		μs
V _{FP} (2)		V _{FR} = 2 V		39		V

(1) Test following Jedec Standard

(2) Test representative of the application

To evaluate the conduction losses use the following equations :

$$V_F = 1.2 + 0.034 I_F$$

$$P = 1.2 \times I_{F(AV)} + 0.034 \times I_F^2 (RMS)$$

Fig.1 : Average forward power dissipation versus average forward current.

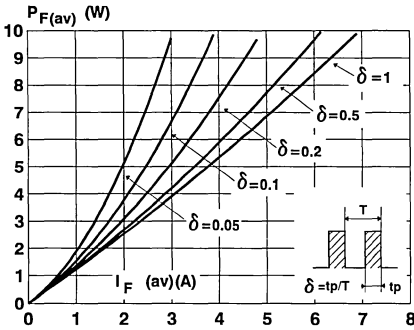


Fig.2 : Peak current versus form factor.

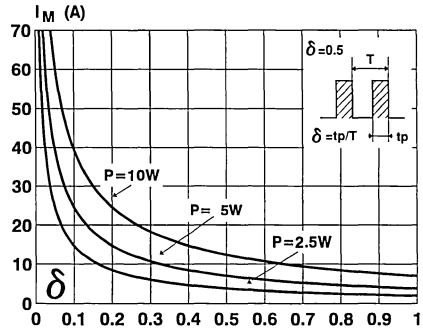


Fig.3 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

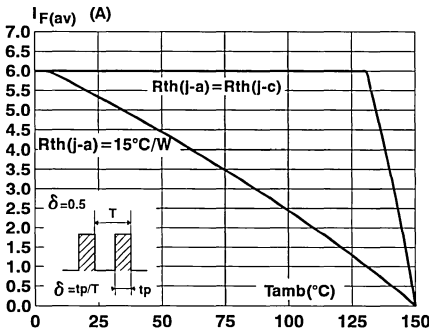


Fig.4 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

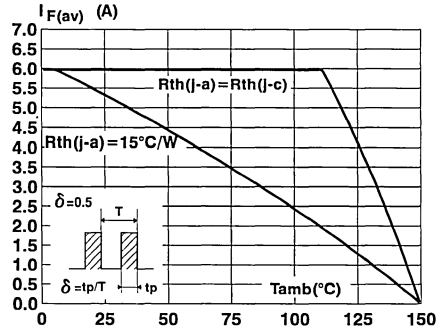


Fig.5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

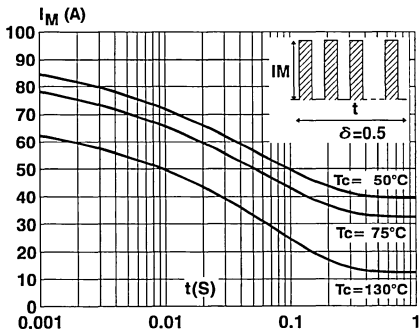


Fig.6 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

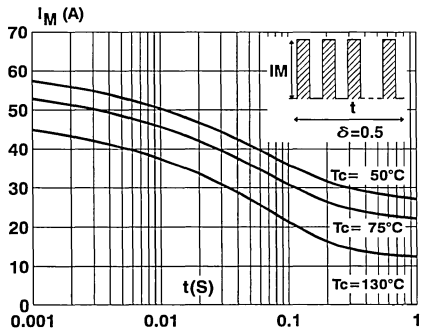


Fig.7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

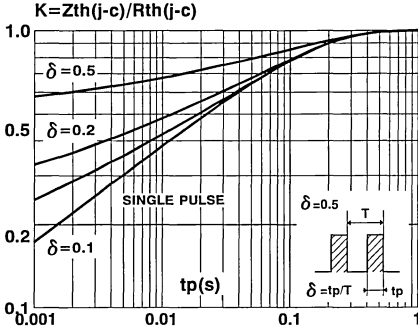


Fig.8 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

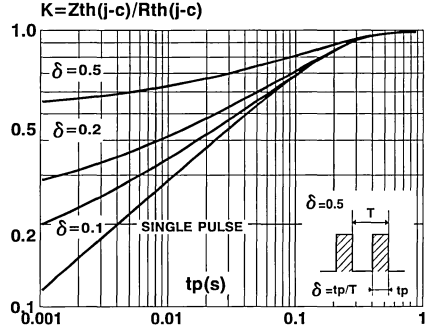


Fig.9 : Forward voltage drop versus forward current. (Maximum values)

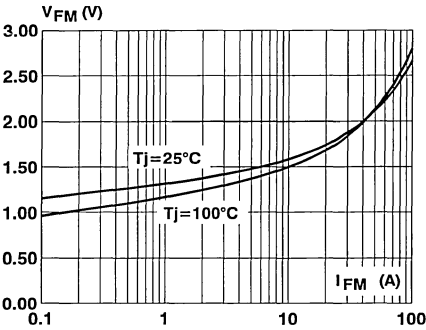


Fig.10 : Junction capacitance versus reverse voltage applied. (Typical values)

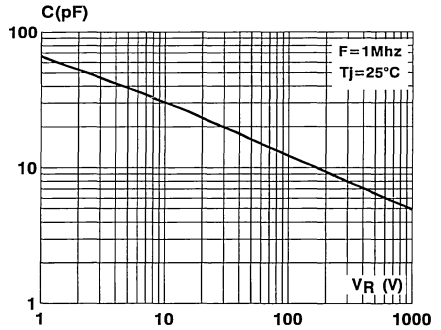


Fig.11 : Recovery charge versus di/dt.

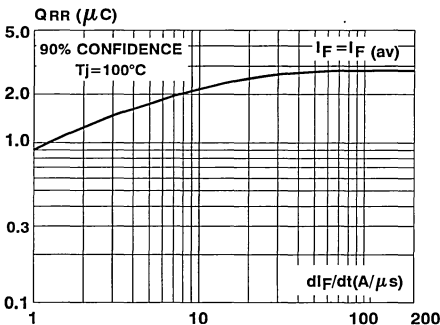


Fig.12 : Peak reverse current versus di/dt.

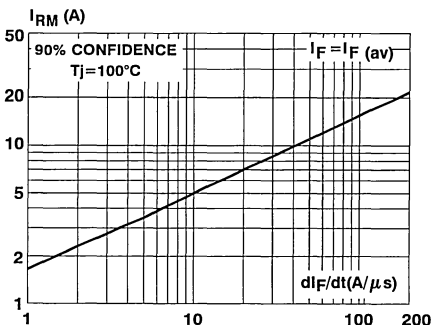


Fig.13 : Dynamic parameters versus junction temperature.

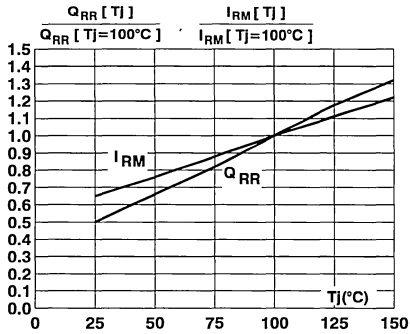


Fig.14 : Peak forward voltage versus di_F/dt .

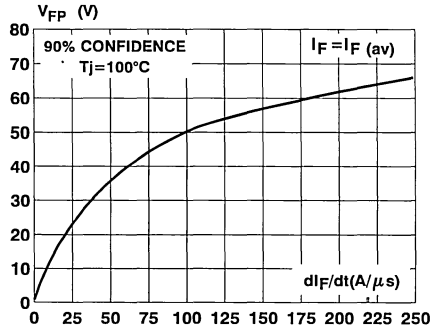
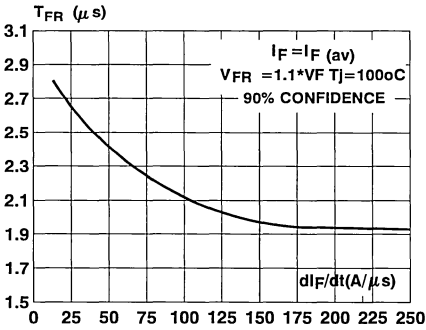
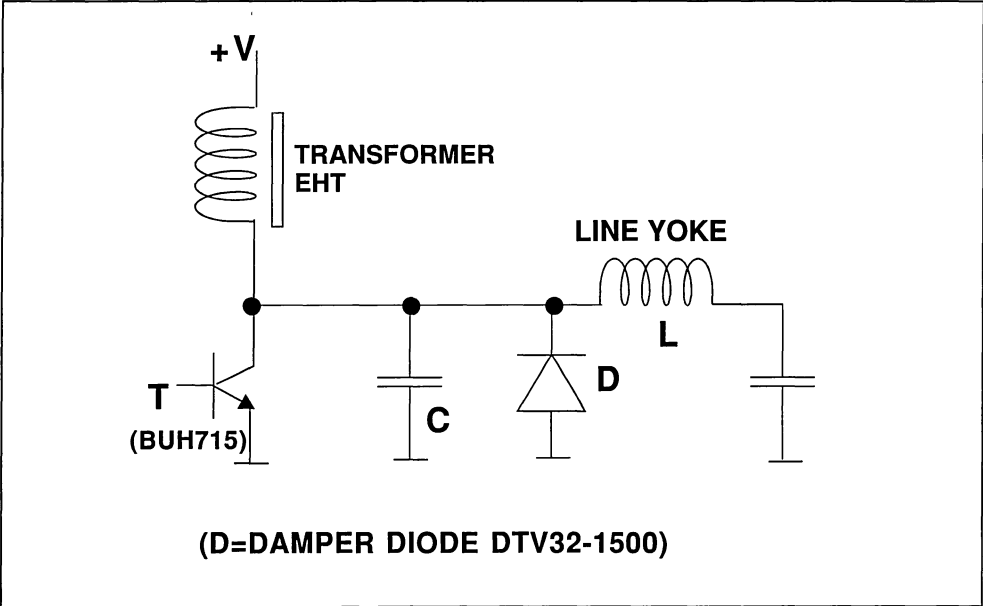


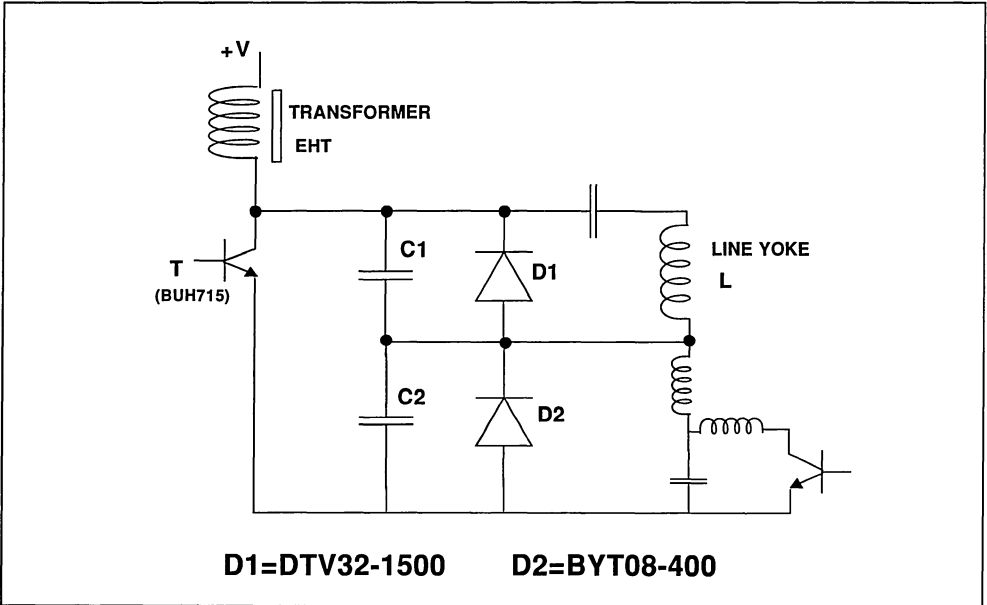
Fig.15 : Recovery time versus di_F/dt .



BASIC HORIZONTAL DEFLECTION CIRCUIT



BASIC E-W DIODE MODULATOR CIRCUIT



**(CRT HORIZONTAL DEFLECTION)
 HIGH VOLTAGE DAMPER DIODE**

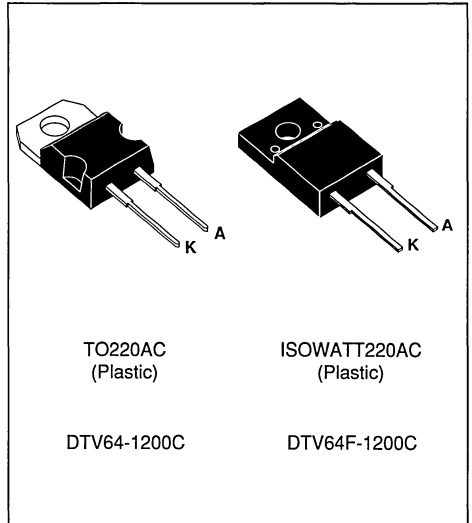
TENTATIVE DATASHEET

FEATURES

- HIGH BREAKDOWN VOLTAGE CAPABILITY
- MEDIUM & HIGH FREQUENCY OPERATION
- SPECIFIED TURN ON SWITCHING CHARACTERISTICS
- TYPICAL TOTAL LOSSES : 3 W
($I_{Fpeak} = 6\text{ A}$, $F = 64\text{ kHz}$)
- SUITABLE WITH **BUH** TRANSISTORS SERIES
- INSULATED VERSION (ISOWATT220AC) :
 Insulating voltage = 2000 V DC
 Capacitance = 12 pF

DESCRIPTION

High voltage diode especially designed for horizontal deflection stage in standard and high resolution displays for TV's and monitors.
 This device is packaged in TO220AC or ISOWATT220AC.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive peak reverse voltage		1200	V	
V_{RWM}	Repetitive working voltage		1200	V	
$I_{F(RMS)}$	RMS forward current		20	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO220AC	$T_c = 120^\circ\text{C}$	6	A
		ISOWATT220AC	$T_c = 90^\circ\text{C}$	6	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	100	A
T_{stg} T_j	Storage and junction temperature range		- 40 to + 150 - 40 to + 150	$^\circ\text{C}$ $^\circ\text{C}$	

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	TO220AC	2.2	°C/W
		ISOWATT220AC	5.0	

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RWM}			200	μA
	T _j = 100°C				2.0	mA
V _F **	T _j = 25°C	I _F = 6 A			2.0	V
	T _j = 100°C	I _F = 6 A			1.8	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

RECOVERY CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
trr (1)	T _j = 25°C	I _F = 1 A V _R = 30 V	dI _F /dt = -50 A/μs		100	ns
trr (1)	T _j = 100°C			dI _F /dt = -15 A/μs		
trr	T _j = 25°C	I _F = 100mA	I _R = 100mA		70	ns

TURN ON SWITCHING CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
t _{FR} (2)	T _j = 100°C	I _F = 6 A	dI _F /dt = 80 A/μs		0.5	μs
V _{FP} (2)				V _{FR} = 1.1 x V _F		27

(1) Test following Jedec Standard

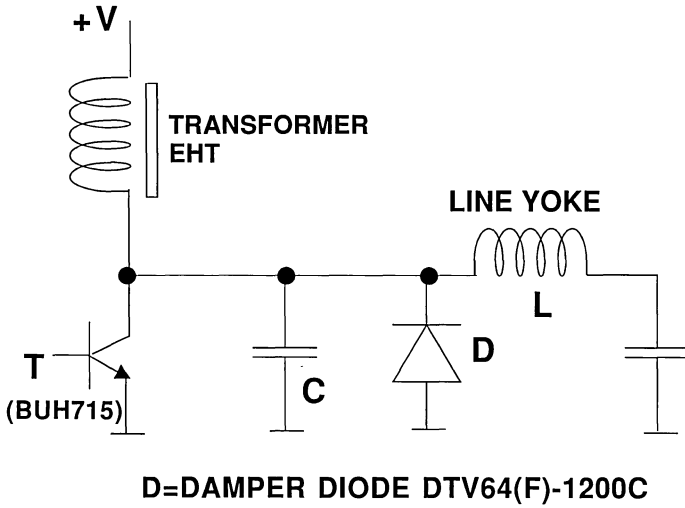
(2) Test representative of the application

To evaluate the conduction losses use the following equations :

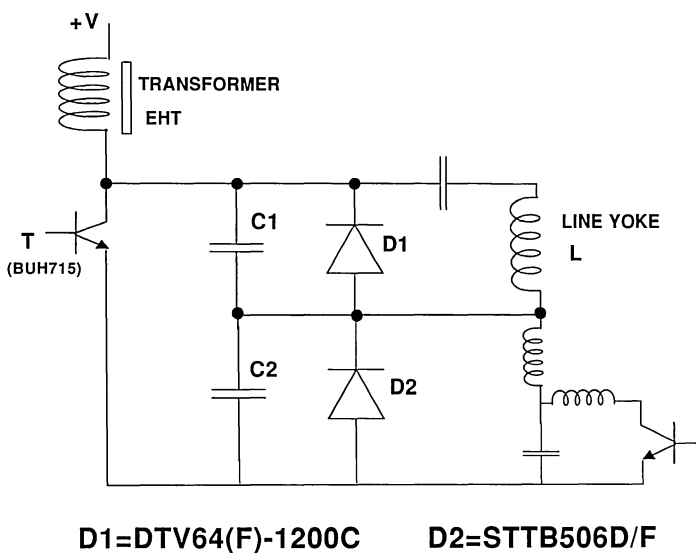
$$V_F = 1.5 + 0.050 I_F$$

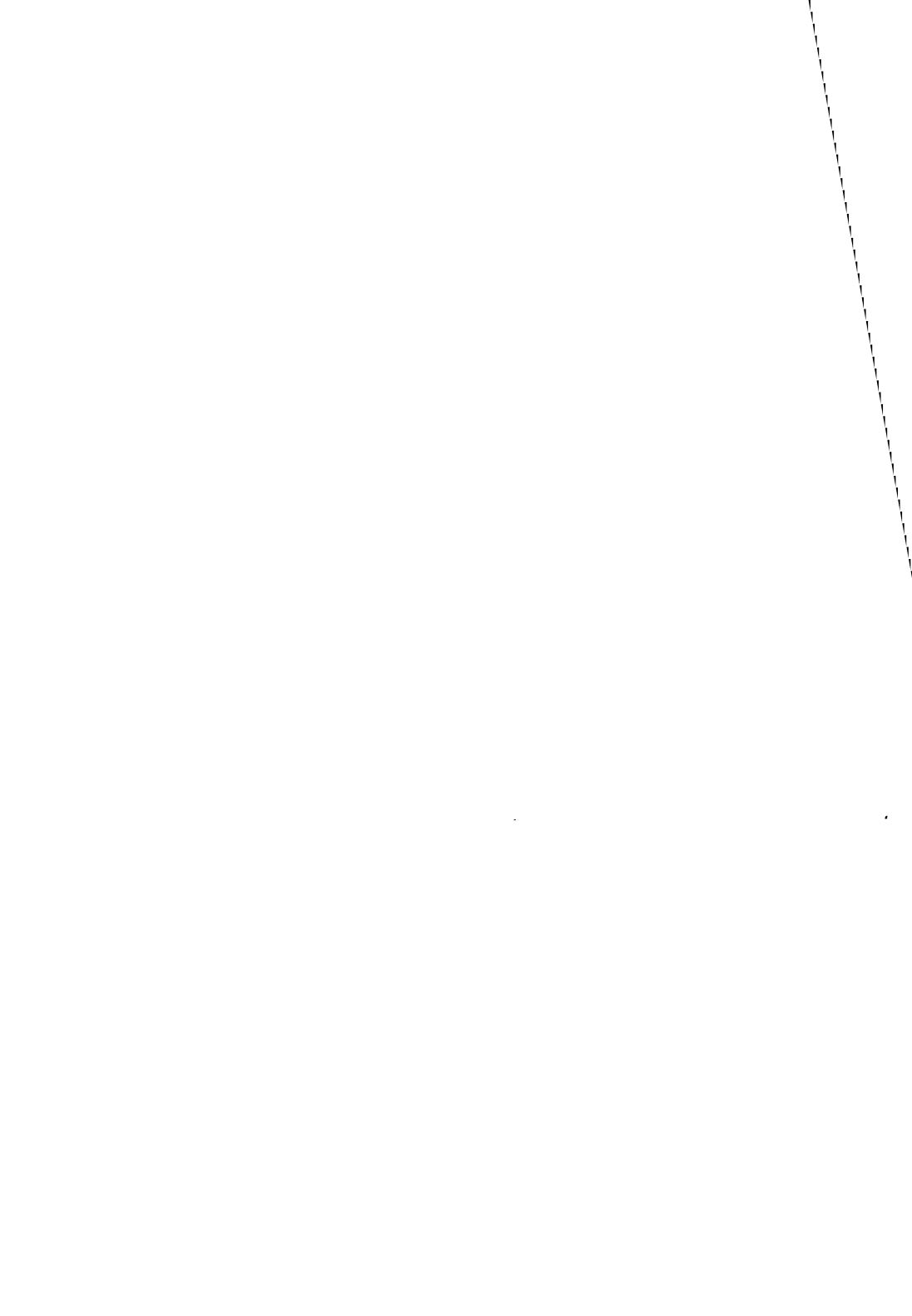
$$P = 1.5 \times I_{F(AV)} + 0.050 \times I_F^2 (RMS)$$

BASIC HORIZONTAL DEFLECTION CIRCUIT



BASIC E-W DIODE MODULATOR CIRCUIT





POWER SCHOTTKY DIODES



SCHOTTKY RECTIFIER

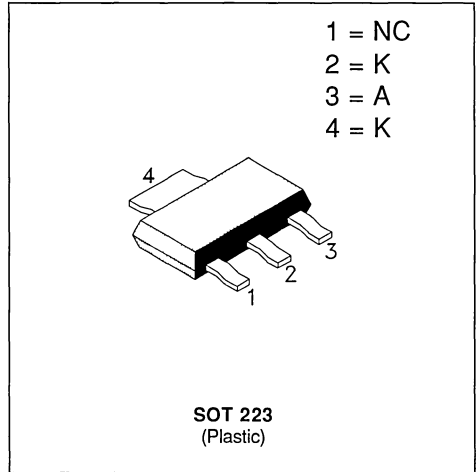
PRELIMINARY DATA

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- SURFACE MOUNTED DEVICE

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in SOT 223, this device is intended for surface mounting and use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
$I_{F(RMS)}$	RMS Forward Current	1.4	A
$I_{F(AV)}$	Average Forward Current	$T_L = 135^\circ\text{C}$ $\delta = 0.5$	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10 \text{ ms}$ Sinusoidal	A
I_{RRM}	Peak Repetitive Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	A
T_{stg} T_j	Storage and Junction Temperature Range	- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage	1000	V/ μs

Symbol	Parameter	STPS			Unit
		120E	130E	140E	
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{TH(j-t)}$	Junction to Tab for D.C	Total	$^\circ\text{C/W}$
$R_{TH(j-a)}$	Junction to Ambient with 5cm^2 Copper Surface Under Tab	20 55	

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R **	T _j = 25°C	V _R = V _{RRM}			500	μA
	T _j = 100°C				10	mA
V _F *	T _j = 125°C	I _F = 2 A			0.72	V
	T _j = 125°C	I _F = 1 A			0.55	
	T _j = 25°C	I _F = 2 A			0.81	

Pulse test : * t_p = 380 μs, duty cycle < 2 %
 ** t_p = 5 ms, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.38 \times I_{F(AV)} + 0.17 I_F^2 (RMS)$$

Voltage (V)	20	30	40
Marking	S12	S13	S14

SCHOTTKY RECTIFIER

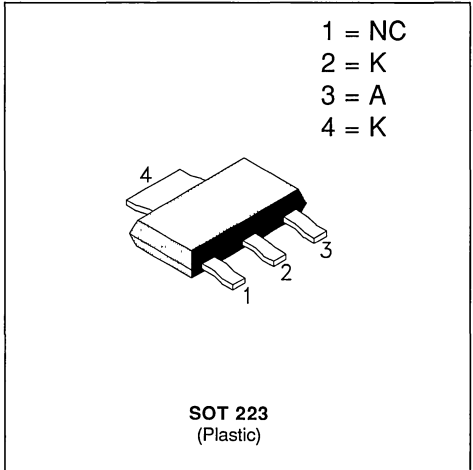
PRELIMINARY DATA

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- SURFACE MOUNTED DEVICE

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in SOT 223, this device is intended for surface mounting and use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	60	V
$I_{F(RMS)}$	RMS Forward Current	1.4	A
$I_{F(AV)}$	Average Forward Current	1	A
I_{FSM}	Surge Non Repetitive Forward Current	$T_L = 130^\circ\text{C}$ $\delta = 0.5$	A
I_{RRM}	Peak Repetitive Reverse Current	$t_p = 10 \text{ ms}$ Sinusoidal	A
T_{stg} T_J	Storage and Junction Temperature Range	$t_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage	- 65 to + 150 - 65 to + 150	V/ μs

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{TH(j-t)}$	Junction to Tab for D.C	Total	$^\circ\text{C/W}$
$R_{TH(j-a)}$	Junction to Ambient with 5cm^2 Copper Surface Under Tab	20 55	

ELECTRICAL CHARACTERISTICS**STATIC CHARACTERISTICS**

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^{**}	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			500	μA
	$T_j = 100^\circ\text{C}$				8	mA
V_F^*	$T_j = 125^\circ\text{C}$	$I_F = 2\text{ A}$			0.82	V
	$T_j = 125^\circ\text{C}$	$I_F = 1\text{ A}$			0.65	
	$T_j = 25^\circ\text{C}$	$I_F = 2\text{ A}$			0.91	

Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

** $t_p = 5\ \text{ms}$, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.48 \times I_{F(AV)} + 0.17 I_{F(RMS)}^2$$

Voltage (V)	60
Marking	S16

SCHOTTKY RECTIFIER

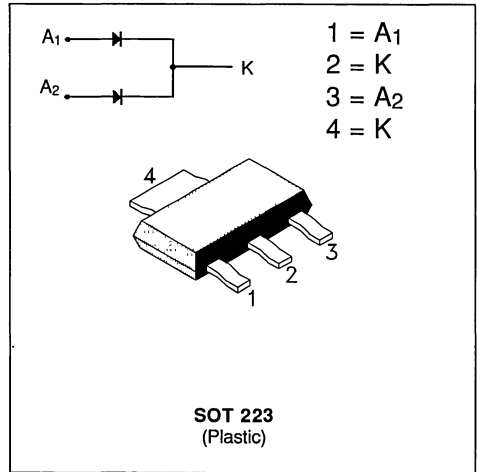
PRELIMINARY DATA

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- SURFACE MOUNTED DEVICE

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in SOT 223, this device is intended for surface mounting and use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS Forward Current		Per diode 1.4	A
$I_{F(AV)}$	Average Forward Current	$T_L = 135^\circ\text{C}$ $\delta = 0.5$	Per diode 1 Per device 2	A
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10 \text{ ms}$ Sinusoidal	Per diode 10	A
I_{RRM}	Peak Repetitive Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	Per diode 1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

Symbol	Parameter	STPS			Unit
		220CE	230CE	240CE	
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
$R_{TH(j-t)}$	Junction to Tab for D.C		12	$^\circ\text{C/W}$
$R_{TH(j-a)}$	Junction to Ambient with 5cm^2 Copper Surface Under Tab		20	
			55	
$R_{TH(c)}$	Coupling		5	$^\circ\text{C/W}$

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_J(\text{diode } 1) = P(\text{diode } 1) \times R_{TH}(\text{Per diode}) + P(\text{diode } 2) \times R_{TH(c)}$$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS (Per diode)

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^{**}	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			500	μA
	$T_j = 100^\circ\text{C}$				10	mA
V_F^*	$T_j = 125^\circ\text{C}$	$I_F = 2\text{ A}$			0.72	V
	$T_j = 125^\circ\text{C}$	$I_F = 1\text{ A}$			0.55	
	$T_j = 25^\circ\text{C}$	$I_F = 2\text{ A}$			0.81	

Pulse test : * $t_p = 380\ \mu\text{s}$, duty cycle < 2 %

** $t_p = 5\ \text{ms}$, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.38 \times I_{F(AV)} + 0.17 I_{F(RMS)}^2$$

Voltage (V)	20	30	40
Marking	T22	T23	T24

SCHOTTKY RECTIFIER

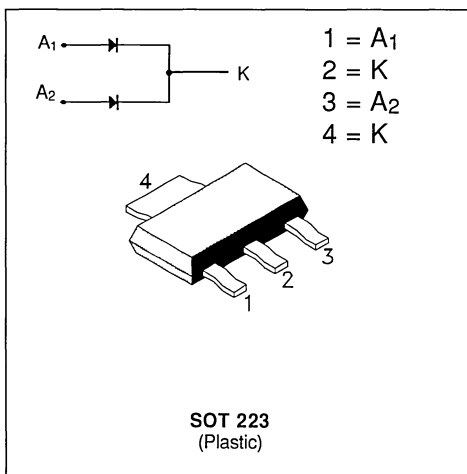
PRELIMINARY DATA

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- SURFACE MOUNTED DEVICE

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in SOT 223, this device is intended for surface mounting and use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage		60	V
I _{F(RMS)}	RMS Forward Current		Per diode 1.4	A
I _{F(AV)}	Average Forward Current	T _L = 130°C δ = 0.5	Per diode Per device 1 2	A
I _{FSM}	Surge Non Repetitive Forward Current	tp = 10 ms Sinusoidal	Per diode 10	A
I _{RRM}	Peak Repetitive Reverse Current	tp = 2 μs F = 1KHz	Per diode 1	A
T _{stg} T _J	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	°C
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/μs

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{TH(j-t)}	Junction to Tab for D.C	Total Per diode	12	°C/W
R _{TH(j-a)}	Junction to Ambient with 5cm ² Copper Surface Under Tab		20 55	
R _{TH(c)}	Coupling		5	°C/W

When the diodes 1 and 2 are used simultaneously ;
 $\Delta T_{j(\text{diode } 1)} = P(\text{diode } 1) \times R_{TH(\text{Per diode})} + P(\text{diode } 2) \times R_{TH(c)}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS (Per diode)

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^{**}	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			500	μA
	$T_j = 100^\circ\text{C}$				8	mA
V_F^*	$T_j = 125^\circ\text{C}$	$I_F = 2 \text{ A}$			0.82	V
	$T_j = 125^\circ\text{C}$	$I_F = 1 \text{ A}$			0.65	
	$T_j = 25^\circ\text{C}$	$I_F = 2 \text{ A}$			0.91	

Pulse test : * $t_p = 380 \mu\text{s}$, duty cycle < 2 %

** $t_p = 5 \text{ ms}$, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.48 \times I_{F(AV)} + 0.17 I_{F(RMS)}^2$$

Voltage (V)	60
Marking	T26

POWER SCHOTTKY RECTIFIER

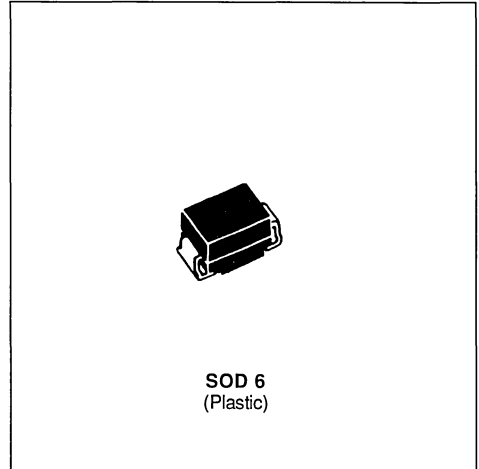
- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- SURFACE MOUNTED DEVICE

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in SOD 6*, this device is intended for surface mounting and use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

(*) in accordance with DO214AA standard.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
$I_{F(RMS)}$	RMS Forward Current	10	A
$I_{F(AV)}$	Average Forward Current	$T_L = 105^\circ\text{C}$ $\delta = 0.5$	A
I_{FSM}	Surge Non Repetitive Forward Current	$T_p = 10 \text{ ms}$ Sinusoidal	A
I_{RRM}	Peak Repetitive Reverse Current	$T_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	A
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage	1000	V/ μs

Symbol	Parameter	STPS			Unit
		320U	330U	340U	
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{TH(j-l)}$	Junction-leads	20	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R **	T _J = 25°C	V _R = V _{RRM}			100	μA
	T _J = 125°C				10	mA
V _F *	T _J = 125°C	I _F = 6 A			0.72	V
	T _J = 125°C	I _F = 3 A			0.57	
	T _J = 25°C	I _F = 6 A			0.84	

Pulse test : * t_p = 380 μs, duty cycle < 2 %
 ** t_p = 5 ms, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.42 \times I_{F(AV)} + 0.050 I_{F(RMS)}^2$$

Figure 1 : Average forward power dissipation versus average forward current.

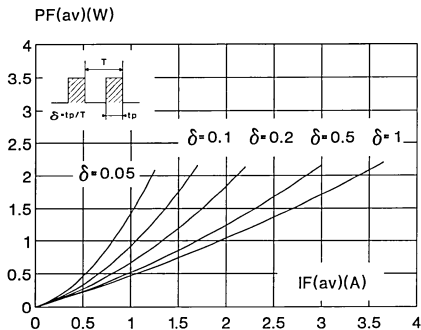


Figure 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

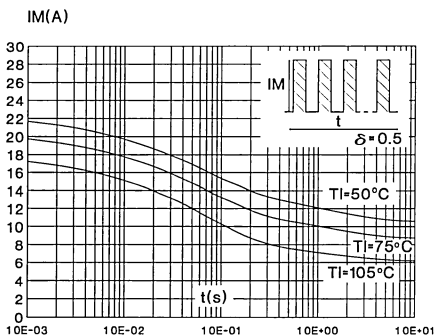


Figure 2 : Average current versus ambient temperature. (duty cycle : 0.5)

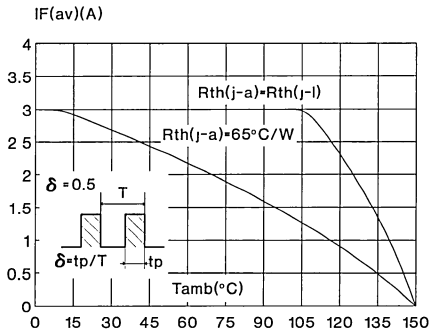


Figure 4 : Relative variation of thermal transient impedance junction to lead versus pulse duration.

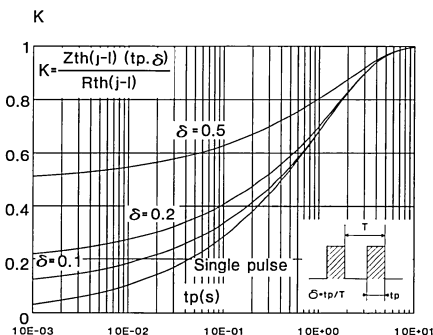


Figure 5 : Reverse leakage current versus reverse voltage applied.
(Typical values)

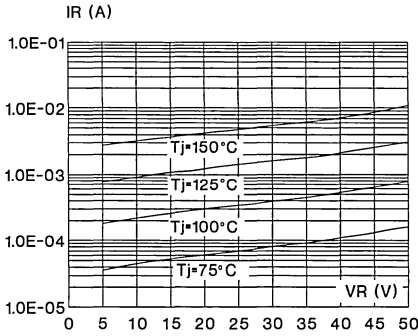


Figure 6 : Junction capacitance versus reverse voltage applied.
(Typical values)

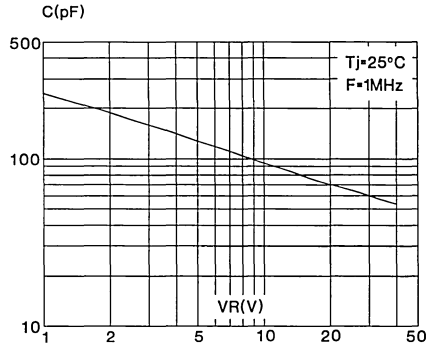
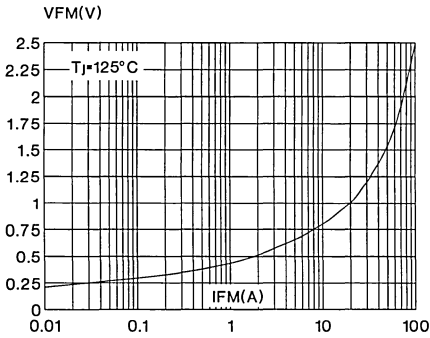


Figure 7 : Forward voltage drop versus forward current.
(Maximum values)



Voltage (V)	20	30	40
Marking	U32	U33	U34

Laser marking
Logo indicates cathode

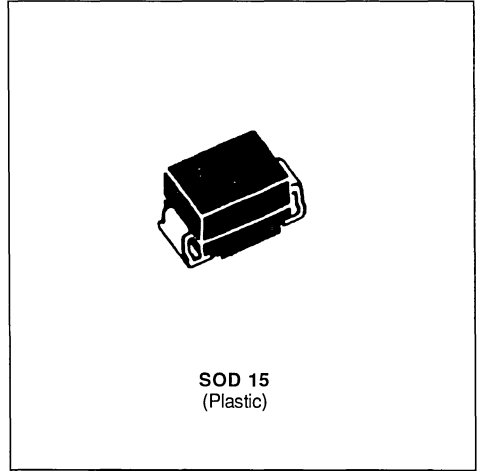
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- SURFACE MOUNTED DEVICE

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in SOD 15, this device is intended for surface mounting and use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS Forward Current		10	A
$I_{F(AV)}$	Average Forward Current	$T_L = 105^\circ\text{C}$ $\delta = 0.5$	3	A
I_{FSM}	Surge Non Repetitive Forward Current	$T_p = 10 \text{ ms}$ Sinusoidal	75	A
I_{RRM}	Peak Repetitive Reverse Current	$T_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	$\text{V}/\mu\text{s}$

Symbol	Parameter	STPS			Unit
		320S	330S	340S	
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{TH(j-l)}$	Junction-leads	20	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_j = 125^\circ\text{C}$				10	mA
V_F^{**}	$T_j = 125^\circ\text{C}$	$I_F = 6\text{ A}$			0.72	V
	$T_j = 125^\circ\text{C}$	$I_F = 3\text{ A}$			0.57	
	$T_j = 25^\circ\text{C}$	$I_F = 6\text{ A}$			0.84	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\text{ }\mu\text{s}$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.050 I_F^2 (RMS)$

Figure 1 : Average forward power dissipation versus average forward current.

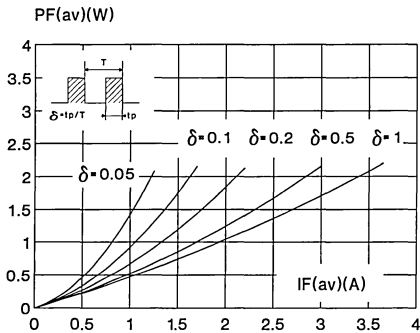


Figure 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

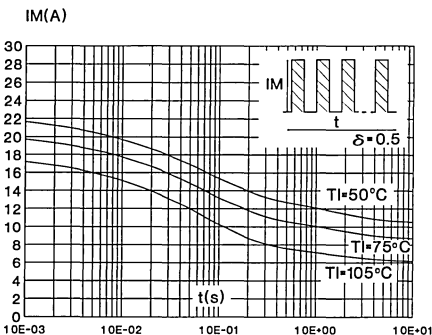


Figure 2 : Average current versus ambient temperature. (duty cycle : 0.5)

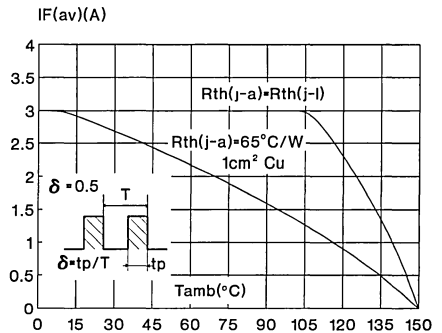


Figure 4 : Relative variation of thermal transient impedance junction to lead versus pulse duration.

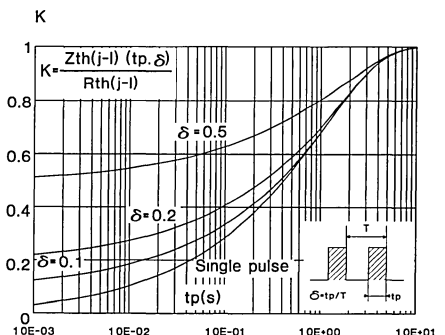


Figure 5 : Reverse leakage current versus reverse voltage applied.
(Typical values)

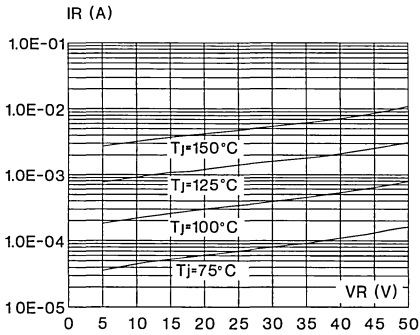


Figure 6 : Junction capacitance versus reverse voltage applied.
(Typical values)

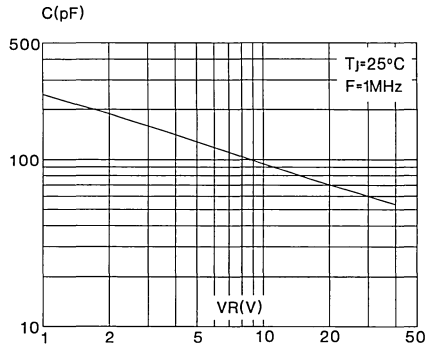
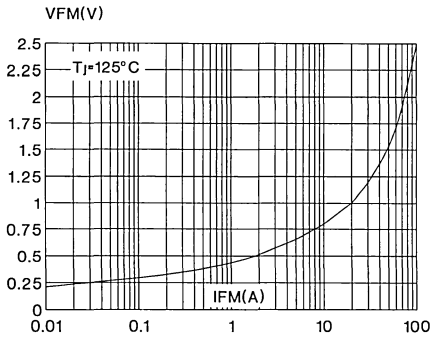


Figure 7 : Forward voltage drop versus forward current.
(Maximum values)



Voltage (V)	20	30	40
Marking	S32	S33	S34

Laser marking
Logo indicates cathode

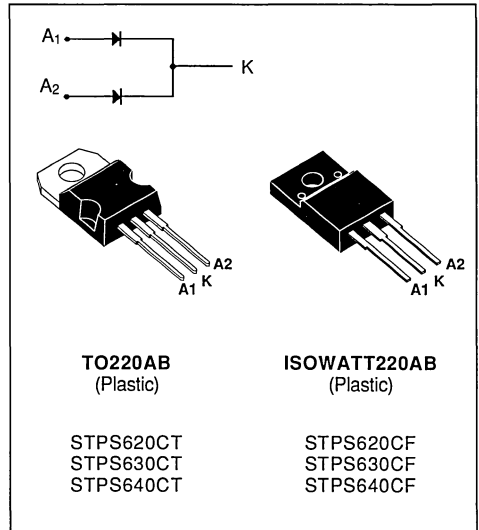
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB and ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit	
$I_{F(RMS)}$	RMS Forward Current			Per diode	10	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AB	$T_c = 135^\circ\text{C}$	Per diode	3	A
		ISOWATT220AB	$T_c = 130^\circ\text{C}$	Per device	6	
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10$ ms Sinusoidal	Per diode	75	A
I_{RRM}	Peak Repetitive Reverse Current		$T_p = 2$ μs $F = 1\text{KHz}$	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$	
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	V/ μs	

Symbol	Parameter	STPS			Unit
		620CT 620CF	630CT 630CF	640CT 640CF	
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
$R_{TH(j-c)}$	Junction-case	TO220AB	Per diode total	5.5 3.0
		ISOWATT220AB	Per diode total	7.5 5.2
$R_{TH(c)}$	Coupling	TO220AB		0.5
		ISOWATT220AB		3

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_J(\text{diode } 1) = P(\text{diode } 1) \times R_{TH}(\text{Per diode}) + P(\text{diode } 2) \times R_{TH(c)}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS PER DIODE

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
	$T_j = 125^\circ\text{C}$				10	mA
V_F^{**}	$T_j = 125^\circ\text{C}$	$I_F = 6 \text{ A}$			0.72	V
	$T_j = 125^\circ\text{C}$	$I_F = 3 \text{ A}$			0.57	
	$T_j = 25^\circ\text{C}$	$I_F = 6 \text{ A}$			0.84	

Pulse test : * $t_p = 5 \text{ ms}$, duty cycle < 2 %
 ** $t_p = 380 \mu\text{s}$, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.050 I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

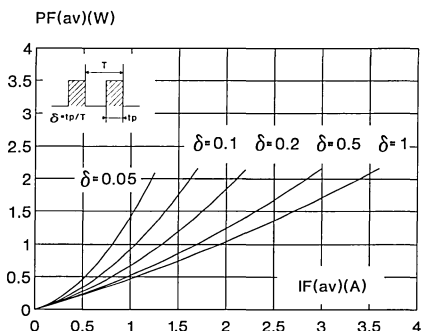


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (TO220AB)

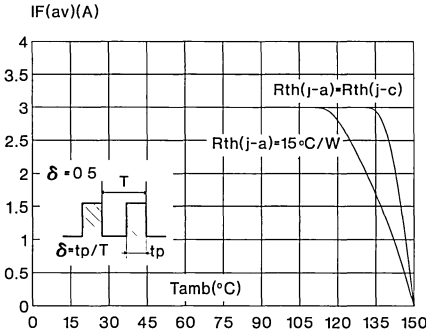


Fig. 3 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (ISOWATT220AB)

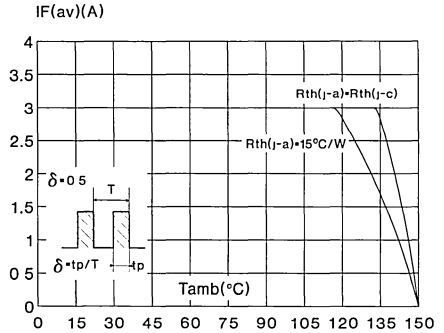


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (TO220AB)

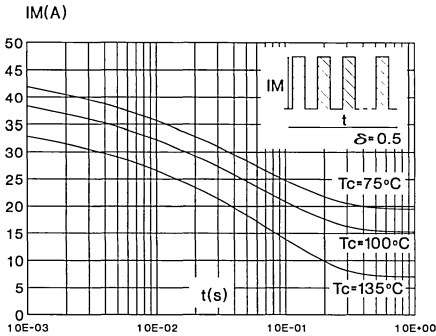


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (ISOWATT220AB)

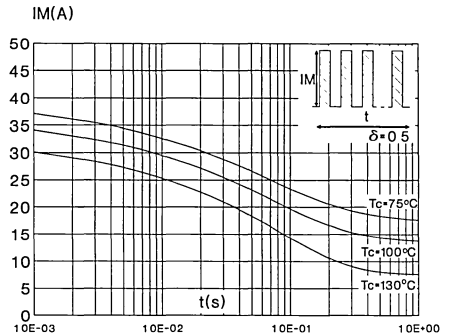


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AB)

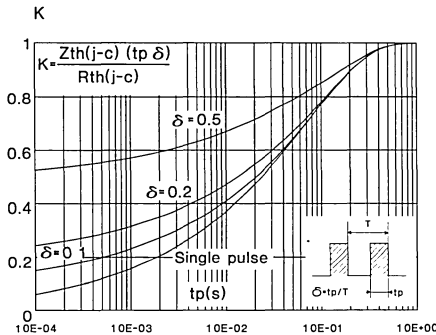


Fig. 7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AB)

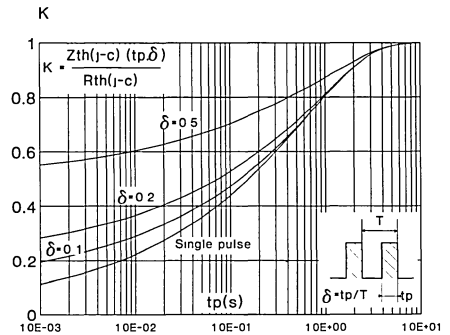


Fig. 8 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

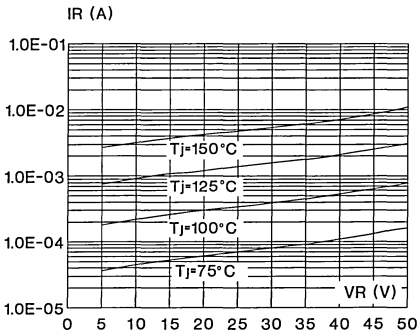


Fig. 9 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

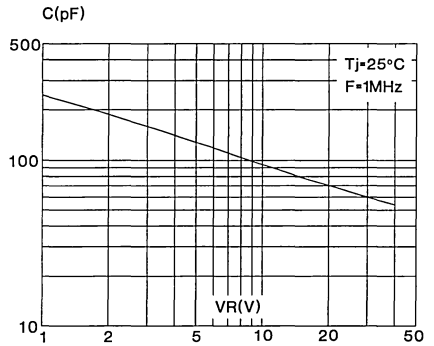
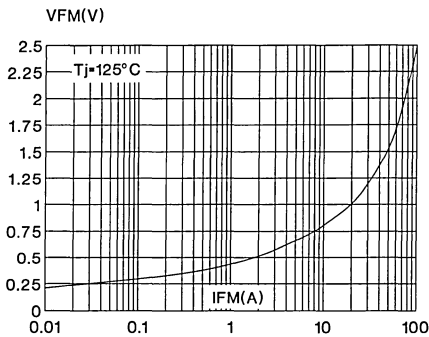


Fig. 10 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 3 A
V_{RRM}	45 V
V_F	0.57 V

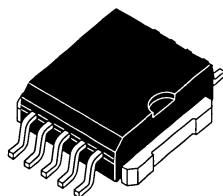
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


Power SO-10™

Plastic, non isolated SMD
with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage			40	V
$I_{F(RMS)}$	RMS Forward Current	All pins connected	Per diode	11	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	$T_c = 135^\circ\text{C}$	Per diode	3	A
			Per device	6	
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10 \text{ ms}$ Sinusoidal All pins connected	Per diode	75	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1 \text{ KHz}$	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	V/ μs

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

STPS640CM

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
$R_{TH(j-c)}$	Junction to Case Thermal Resistance	Per diode total	5.5 3.0	$^{\circ}C/W$
$R_{TH(c)}$	Coupling Thermal Resistance		0.5	$^{\circ}C/W$

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage Current	$T_j = 25^{\circ}C$	$V_R = V_{RRM}$			100	μA
		$T_j = 125^{\circ}C$				10	mA
V_F^{**}	Forward Voltage drop	$T_j = 125^{\circ}C$	$I_F = 6 A$			0.72	V
		$T_j = 125^{\circ}C$	$I_F = 3 A$			0.57	
		$T_j = 25^{\circ}C$	$I_F = 6 A$			0.84	

Pulse test : * $t_p = 5 \text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380 \mu\text{s}$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.050 I_{F(RMS)}^2$

PIN OUT configuration in PowerSO-10 :

- Anode 1 = pin 1 to 5
- Anode 2 = pin 6 to 10
- Cathodes = connected to base tab

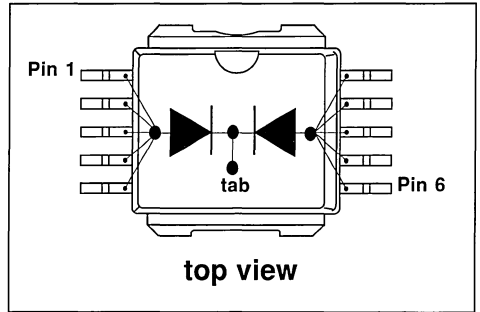


Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

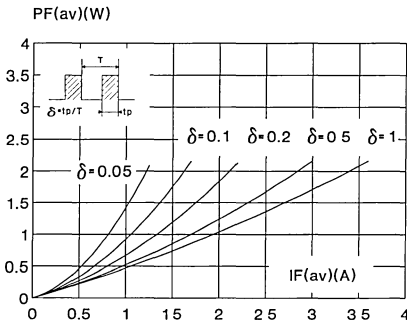


Fig. 2 : Average current versus ambient temperature.

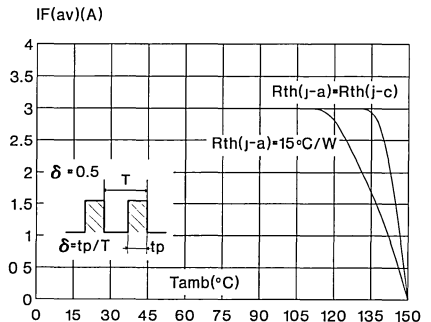


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

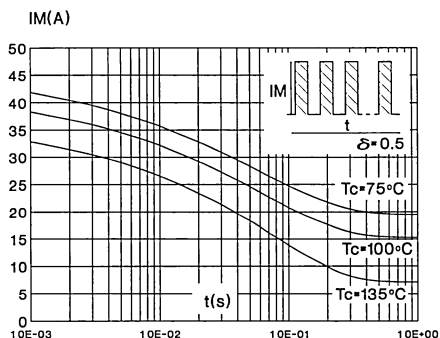


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

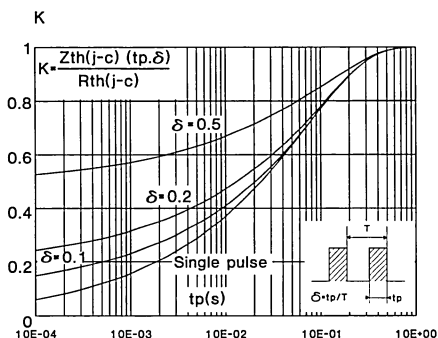


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

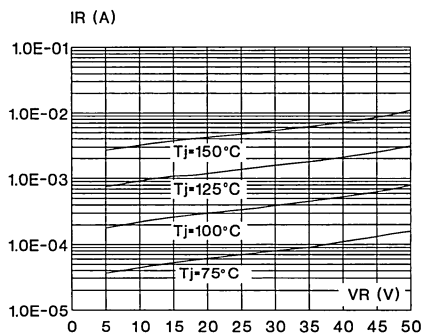


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

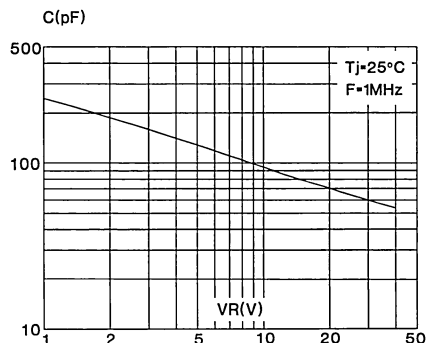
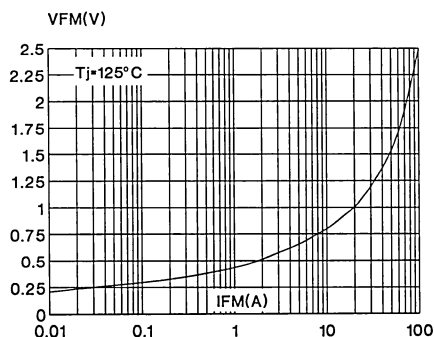
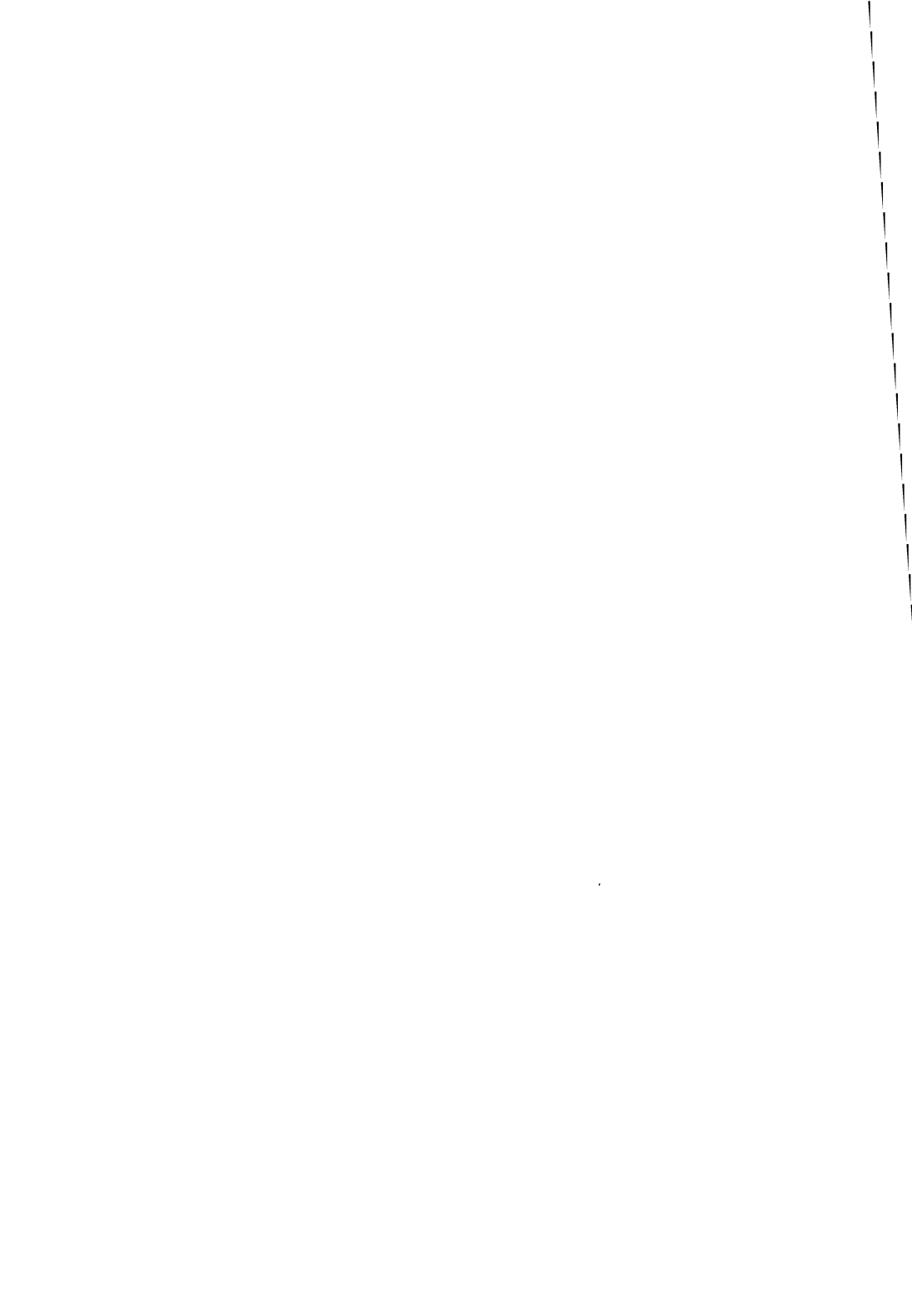


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)





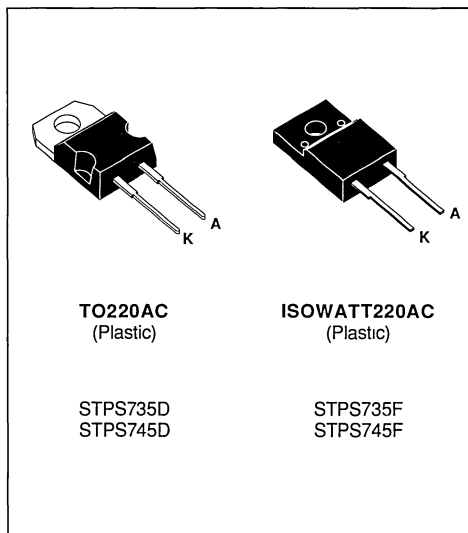
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS Forward Current		20	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AC	7.5	A
		ISOWATT220AC		
I_{FSM}	Surge Non Repetitive Forward Current		150	A
I_{RRM}	Peak Repetitive Reverse Current		1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

Symbol	Parameter	STPS		Unit
		735D 735F	745D 745F	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{TH(j-c)}	Junction-case	TO220AC	3.0
		ISOWATT220AC	5.5

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions	Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C			100	μA
	T _j = 125°C			15	mA
V _F **	T _j = 125°C			0.72	V
	T _j = 125°C			0.57	
	T _j = 25°C			0.84	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.42 \times I_{F(av)} + 0.020 I_F^2(RMS)$$

Fig. 1 : Average forward power dissipation versus average forward current.

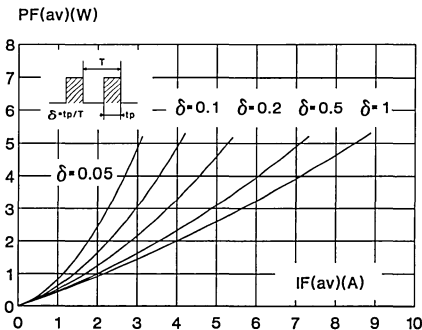


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

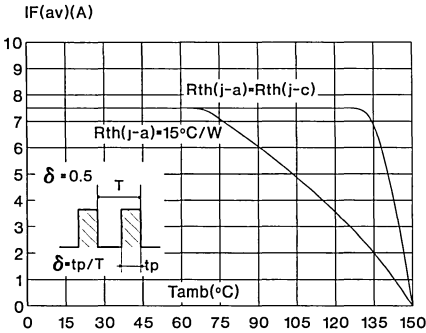


Fig. 3 : Average current versus ambient temperature. (duty cycle : 0.5) (TISOWAT220AC)

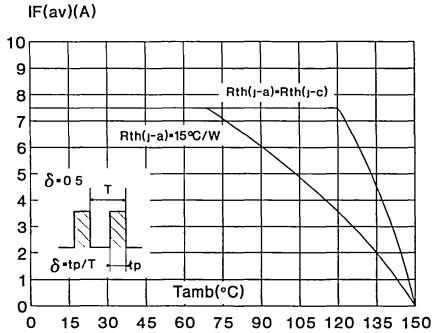


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

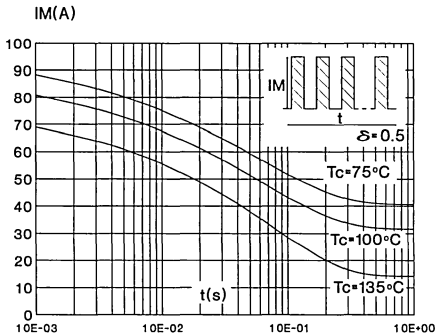


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

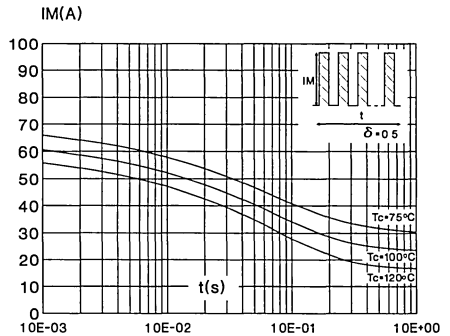


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

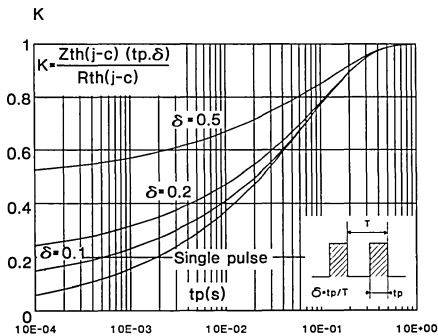


Fig. 7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

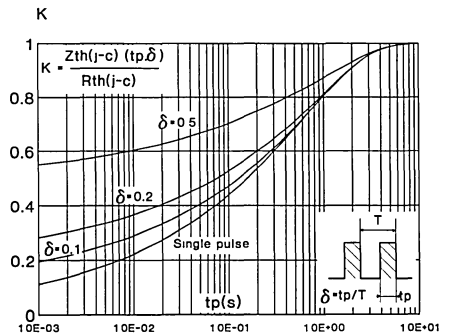


Fig. 8 : Reverse leakage current versus reverse voltage applied. (Typical values)

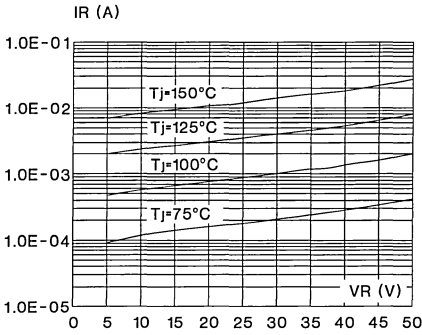


Fig. 9 : Junction capacitance versus reverse voltage applied. (Typical values)

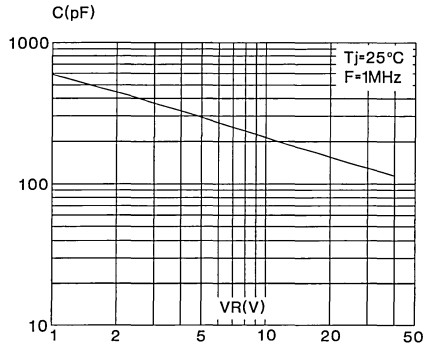
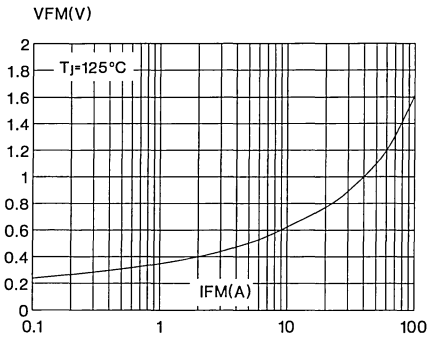


Fig. 10 : Forward voltage drop versus forward current. (Maximum values)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	7.5 A
V_{RRM}	45 V
V_F	0.57 V

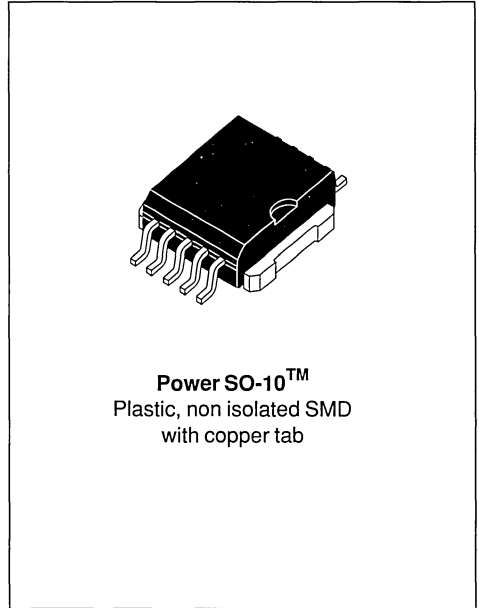
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		45	V
$I_{F(RMS)}$	RMS Forward Current (All pins connected)		17	A
$I_{F(AV)}$	Average Forward Current	$T_c = 135^\circ\text{C}$ $\delta = 0.5$	7.5	A
I_{FSM}	Surge Non Repetitive Forward Current (All pins connected)	$t_p = 10 \text{ ms}$ Sinusoidal	150	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics

THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{TH(j-c)}$	Junction to Case Thermal Resistance	3.0	°C/W

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions	Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage Current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$		100	μA
		$T_j = 125^\circ\text{C}$			15	mA
V_F^{**}	Forward Voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 15\text{ A}$		0.72	V
		$T_j = 125^\circ\text{C}$	$I_F = 7.5\text{ A}$		0.57	
		$T_j = 25^\circ\text{C}$	$I_F = 15\text{ A}$		0.84	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_F(\text{AV}) + 0.020 I_F^2(\text{RMS})$

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5
 Cathode = connected to base tab

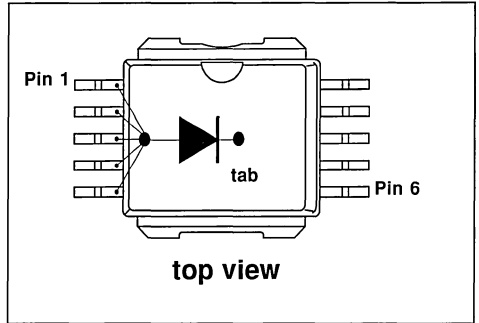


Fig. 1 : Average forward power dissipation versus average forward current.

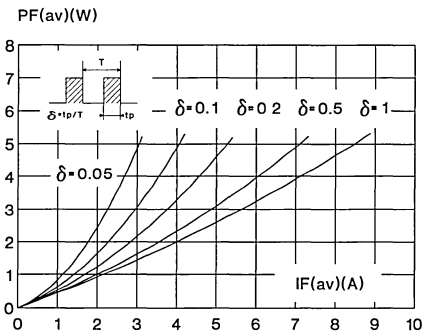


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5)

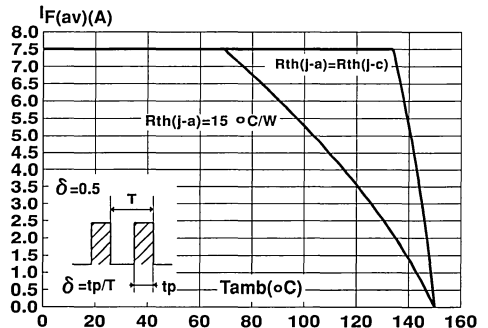


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

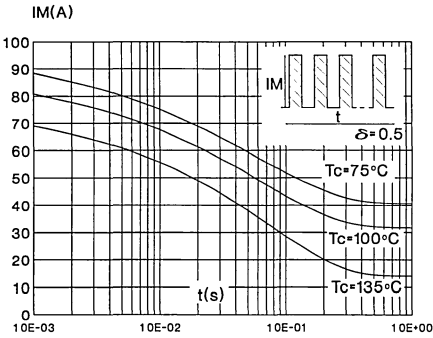


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

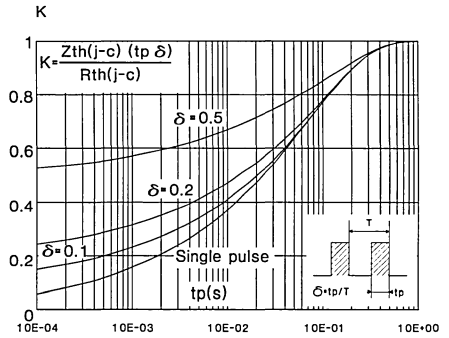


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values)

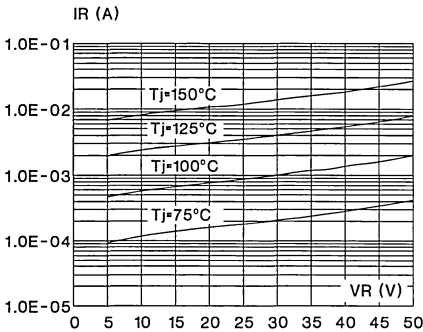


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values)

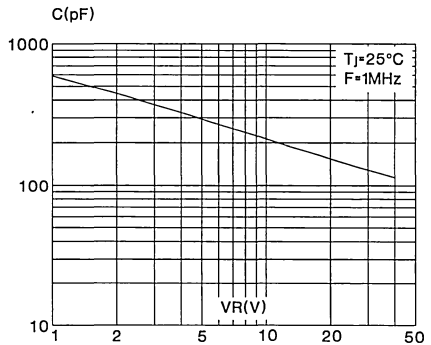
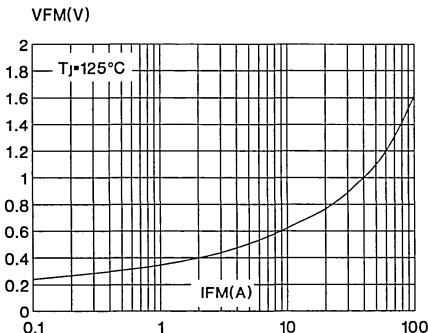


Fig. 7 : Forward voltage drop versus forward current. (Maximum values)



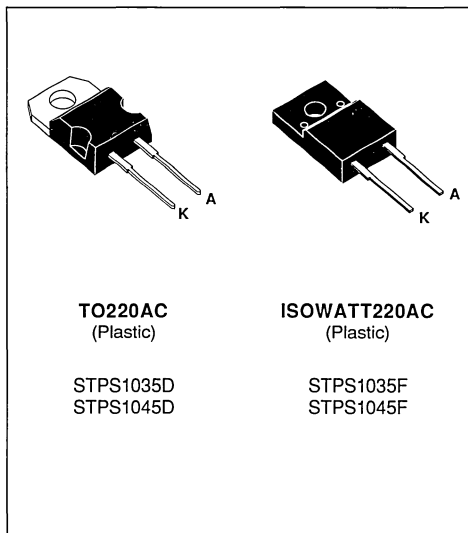
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit	
$I_{F(RMS)}$	RMS Forward Current		30	A	
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AC	10	A	
		ISOWATT220AC			$T_c = 120^\circ\text{C}$
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10 \text{ ms}$ Sinusoidal	180	A
I_{RRM}	Peak Repetitive Reverse Current		$T_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150		$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000		V/ μs

Symbol	Parameter	STPS		Unit
		1035D 1035F	1045D 1045F	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{TH(j-c)}	Junction-case	TO220AC	2.2
		ISOWATT220AC	4.5

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 125°C				15	mA
V _F **	T _j = 125°C	I _F = 20 A			0.72	V
	T _j = 125°C	I _F = 10 A			0.57	
	T _j = 25°C	I _F = 20 A			0.84	

Pulse test : * t_p = 5 ms, duty cycle < 2 %
 ** t_p = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current.

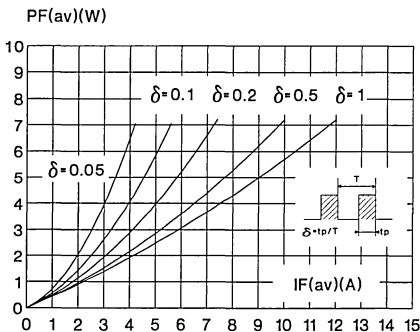


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (TO220AC)

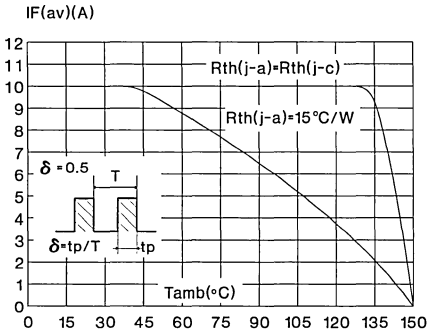


Fig. 3 : Average current versus ambient temperature. (duty cycle : 0.5) (ISOWATT220AC)

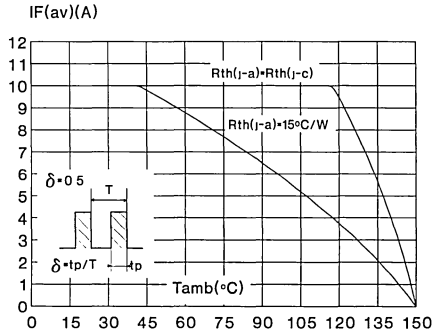


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (TO220AC)

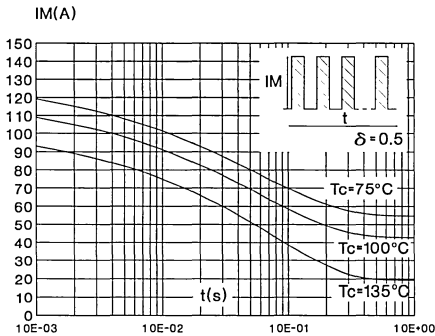


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (ISOWATT220AC)

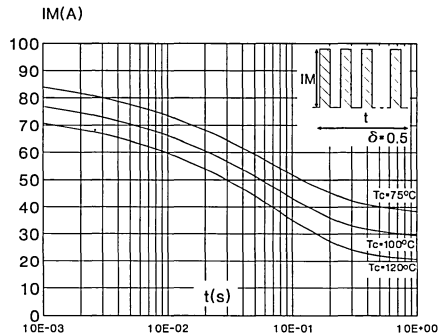


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AC)

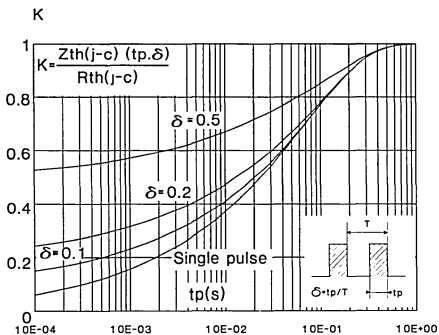


Fig. 7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AC)

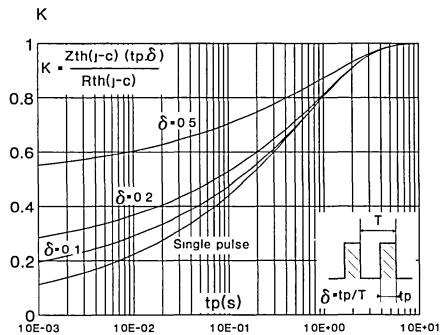


Fig. 8 : Reverse leakage current versus reverse voltage applied. (Typical values)

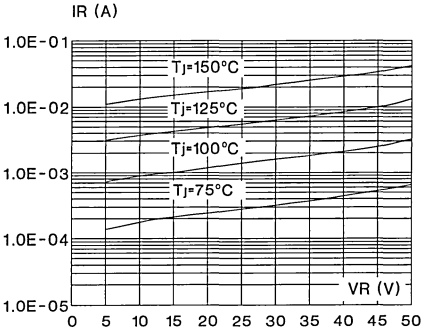


Fig. 9 : Junction capacitance versus reverse voltage applied. (Typical values)

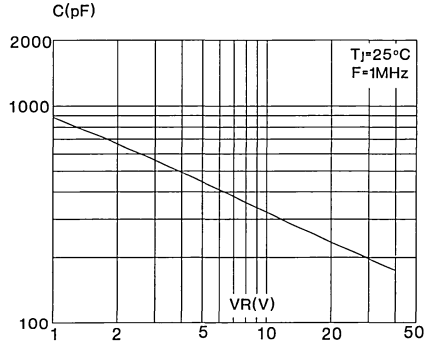
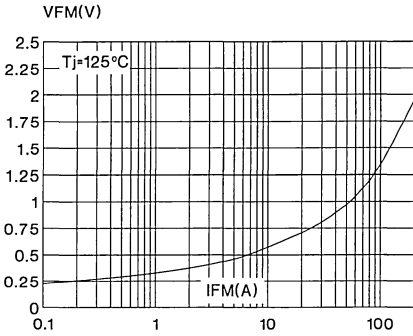


Fig. 10 : Forward voltage drop versus forward current. (Maximum values)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	10 A
V_{RRM}	45 V
V_F	0.57 V

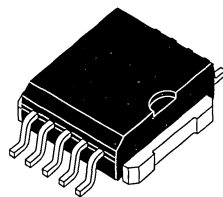
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
 Plastic, non isolated SMD
 with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		45	V
$I_{F(RMS)}$	RMS Forward Current (All pins connected)		27	A
$I_{F(AV)}$	Average Forward Current	$T_c = 135^\circ\text{C}$ $\delta = 0.5$	10	A
I_{FSM}	Surge Non Repetitive Forward Current (All pins connected)	$t_p = 10 \text{ ms}$ Sinusoidal	180	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{TH(j-c)}$	Junction to Case Thermal Resistance	2.2	°C/W

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions	Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage Current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$		100	μA
		$T_j = 125^\circ\text{C}$			15	mA
V_F^{**}	Forward Voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 20\text{ A}$		0.72	V
		$T_j = 125^\circ\text{C}$	$I_F = 10\text{ A}$		0.57	
		$T_j = 25^\circ\text{C}$	$I_F = 20\text{ A}$		0.84	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}$

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5
 Cathode = connected to base tab

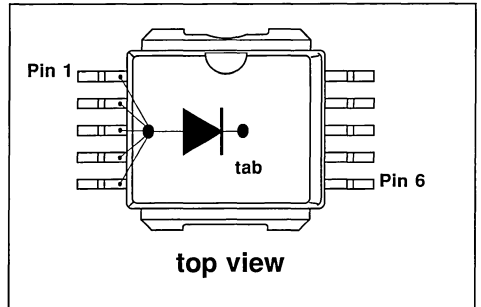


Fig. 1 : Average forward power dissipation versus average forward current.

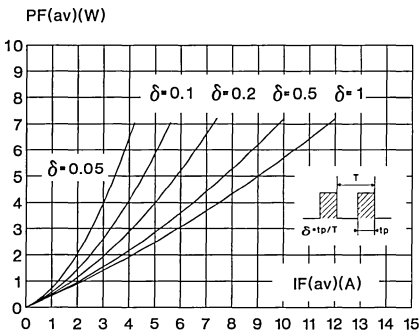


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5)

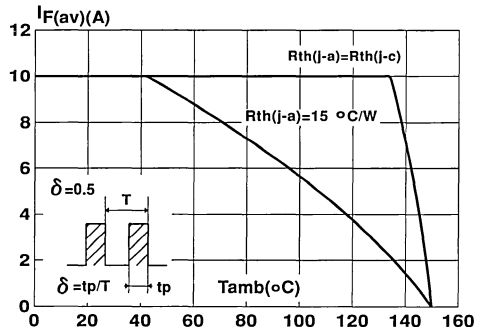


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

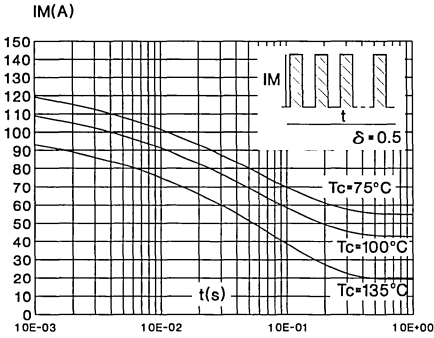


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

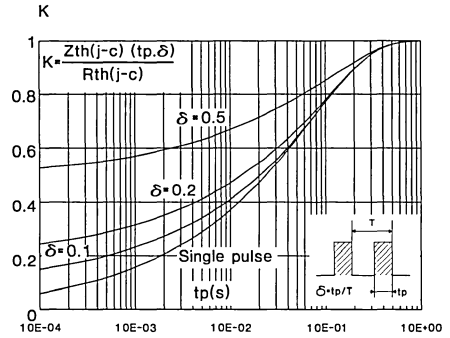


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values)

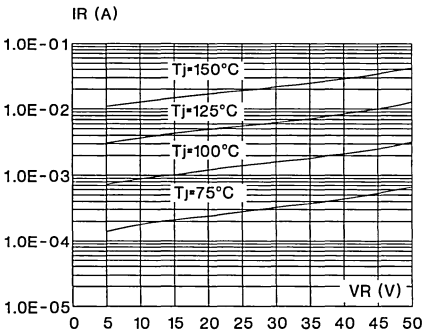


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values)

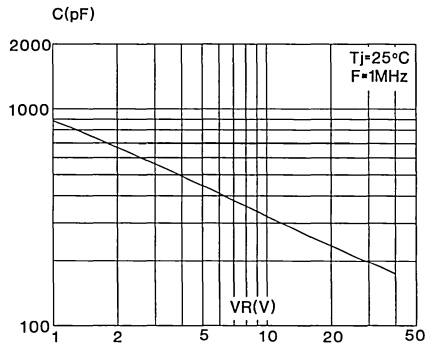
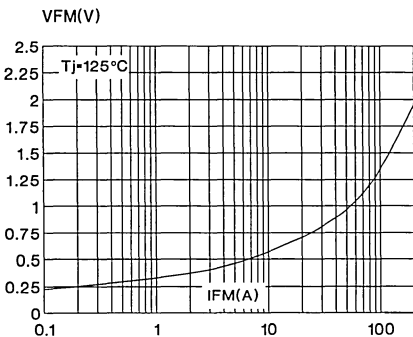


Fig. 7 : Forward voltage drop versus forward current. (Maximum values)



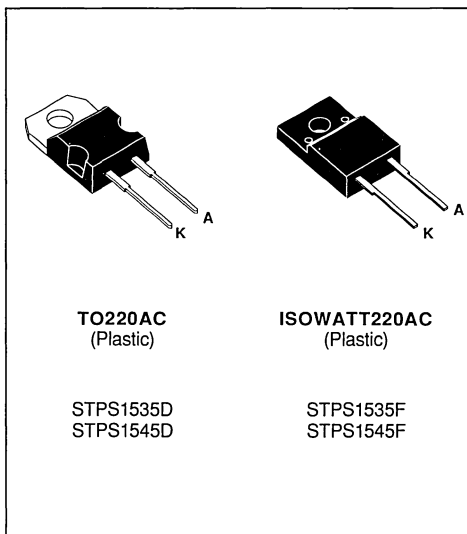
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Single chip schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in TO220AC and ISOWATT220AC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS Forward Current		30	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AC	15	A
		ISOWATT220AC		
I_{FSM}	Surge Non Repetitive Forward Current	$T_p = 10$ ms Sinusoidal	220	A
I_{RRM}	Peak Repetitive Reverse Current	$T_p = 2$ μs $F = 1\text{KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

Symbol	Parameter	STPS		Unit
		1535D 1535F	1545D 1545F	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{TH(j-c)}$	Junction-case	TO220AC	1.6
		ISOWATT220AC	4.0

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ C$	$V_R = V_{RRM}$			200	μA
	$T_j = 125^\circ C$				40	mA
V_F^{**}	$T_j = 125^\circ C$	$I_F = 30 A$			0.72	V
	$T_j = 125^\circ C$	$I_F = 15 A$			0.57	
	$T_j = 25^\circ C$	$I_F = 30 A$			0.84	

Pulse test : * $t_p = 5 \text{ ms}$, duty cycle < 2 %
 ** $t_p = 380 \mu s$, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current.

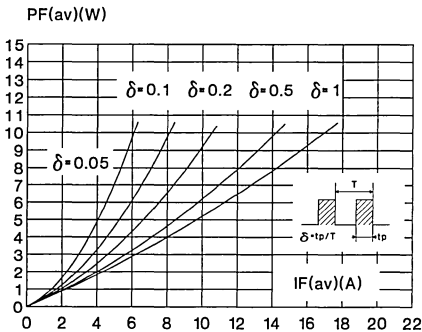


Fig. 2 : Average current versus ambient temperature.
uty cycle : 0.5) (TO220AC)

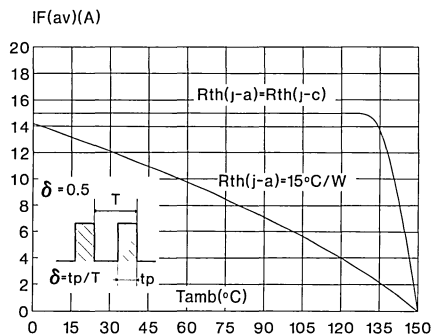


Fig. 3 : Average current versus ambient temperature.
(duty cycle : 0.5) (ISOWATT220AC)

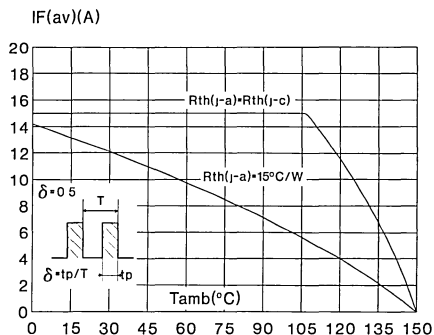


Fig. 4 : Non repetitive surge peak forward current versus
overload duration.
(Maximum values) (TO220AC)

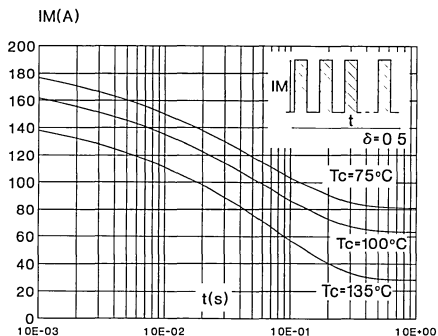


Fig. 5 : Non repetitive surge peak forward current versus
overload duration.
(Maximum values) (ISOWATT220AC)

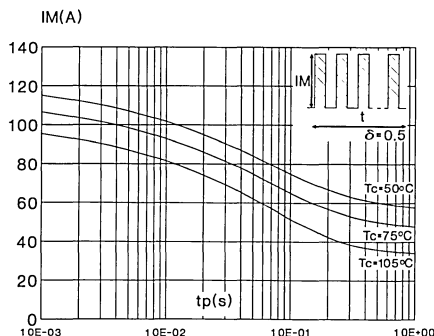


Fig. 6 : Relative variation of thermal transient impedance
junction to case versus pulse duration.
(TO220AC)

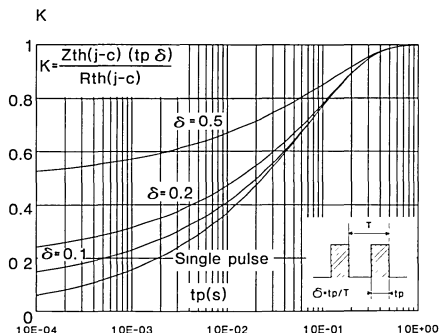


Fig. 7 : Relative variation of thermal transient impedance
junction to case versus pulse duration.
(ISOWATT220AC)

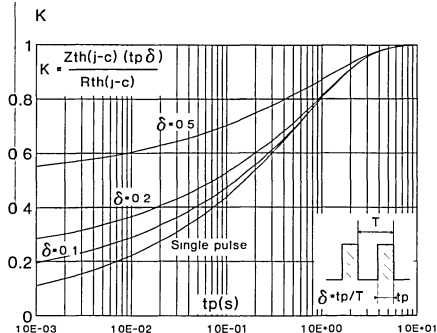


Fig. 8 : Reverse leakage current versus reverse voltage applied. (Typical values)

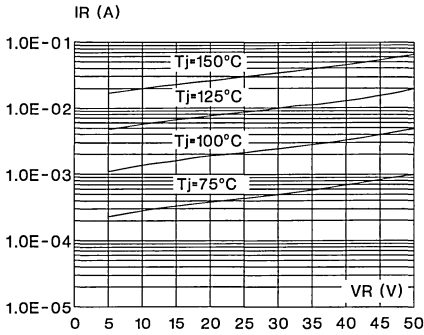


Fig. 9 : Junction capacitance versus reverse voltage applied. (Typical values)

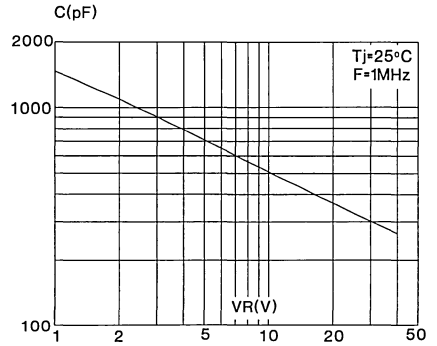
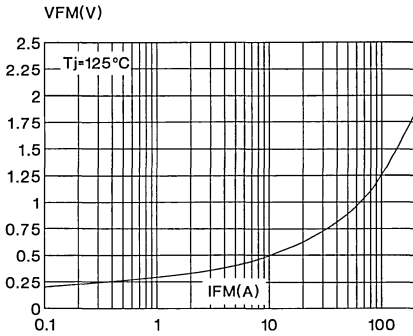


Fig. 10 : Forward voltage drop versus forward current. (Maximum values)



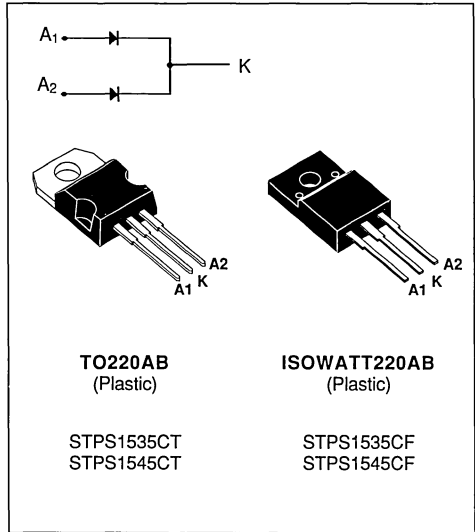
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB and ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit	
$I_{F(RMS)}$	RMS Forward Current		Per diode	20 A	
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AB	$T_c = 135^\circ\text{C}$	Per diode	7.5 A
		ISOWATT220AB	$T_c = 120^\circ\text{C}$	Per device	15
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10$ ms Sinusoidal	Per diode	150 A
I_{RRM}	Peak Repetitive Reverse Current		$T_p = 2$ μs $F = 1$ KHz	Per diode	1 A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs	

Symbol	Parameter	STPS		Unit
		1535CT 1535CF	1545CT 1545CF	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{TH(j-c)}	Junction-case	TO220AB	Per diode total 3.0 1.7	°C/W
		ISOWATT220AB	Per diode total 5.5 4.2	
R _{TH(c)}	Coupling	TO220AB	0.35	°C/W
		ISOWATT220AB	2.9	

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_{j(\text{diode } 1)} = P(\text{diode } 1) \times R_{TH(\text{Per diode})} + P(\text{diode } 2) \times R_{TH(c)}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS PER DIODE

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 125°C				15	mA
V _F **	T _j = 125°C	I _F = 15 A			0.72	V
	T _j = 125°C	I _F = 7.5 A			0.57	
	T _j = 25°C	I _F = 15 A			0.84	

Pulse test : * t_p = 5 ms, duty cycle < 2 %
 ** t_p = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.020 I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

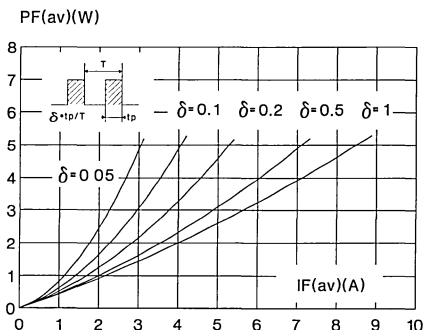


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (TO220AB)

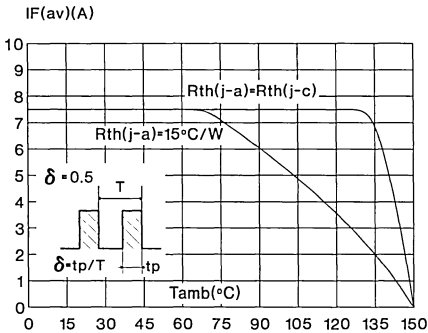


Fig. 3 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (ISOWATT220AB)

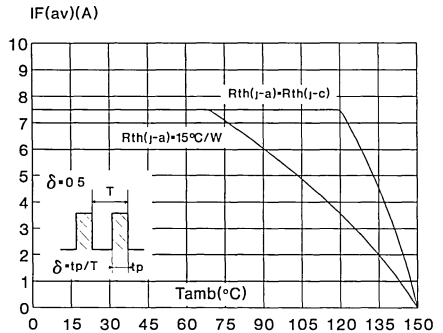


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (TO220AB)

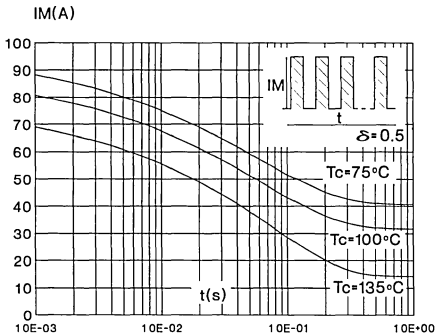


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (ISOWATT220AB)

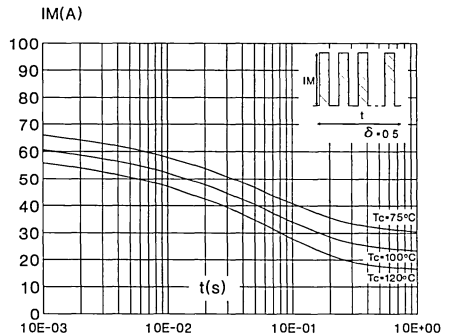


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AB)

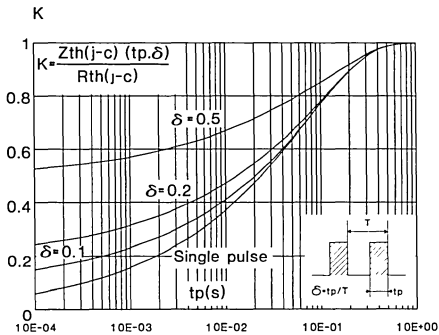


Fig. 7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AB)

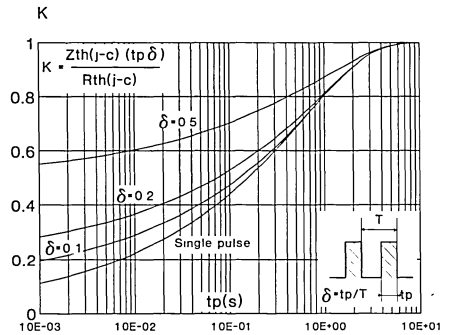


Fig. 8 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

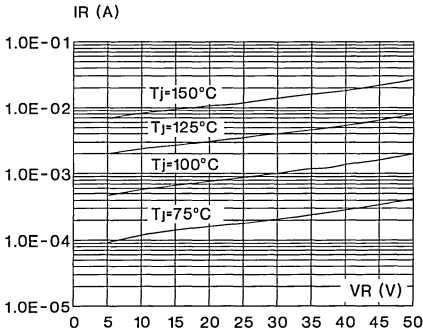


Fig. 9 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

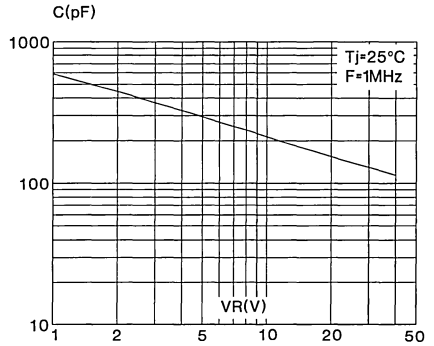
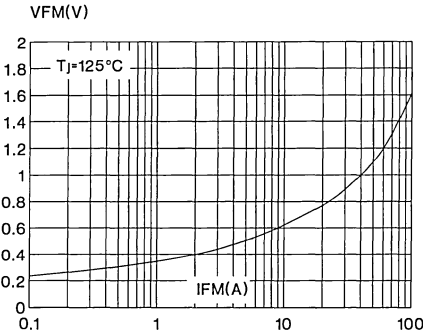


Fig. 10 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 7.5 A
V_{RRM}	45 V
V_F	0.57 V

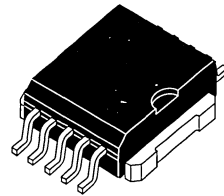
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
 Plastic, non isolated SMD
 with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage			45	V
$I_{F(RMS)}$	RMS Forward Current	All pins connected	Per diode	17	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	$T_c = 130^\circ\text{C}$	Per diode	7.5	A
			Per device	15	
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10 \text{ ms}$ Sinusoidal All pins connected	Per diode	150	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1 \text{ KHz}$	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	$\text{V}/\mu\text{s}$

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
$R_{TH(j-c)}$	Junction to Case Thermal Resistance	Per diode total	3.5 2.2	°C/W
$R_{TH(c)}$	Coupling Thermal Resistance		0.7	°C/W

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage Current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	μA
		$T_j = 125^\circ\text{C}$				15	mA
V_F^{**}	Forward Voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 15\text{ A}$			0.72	V
		$T_j = 125^\circ\text{C}$	$I_F = 7.5\text{ A}$			0.57	
		$T_j = 25^\circ\text{C}$	$I_F = 15\text{ A}$			0.84	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle < 2%
 ** $t_p = 380\text{ }\mu\text{s}$, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(av)} + 0.020 I_{F^2(RMS)}$

PIN OUT configuration in PowerSO-10 :

- Anode 1 = pin 1 to 5
- Anode 2 = pin 6 to 10
- Cathodes = connected to base tab

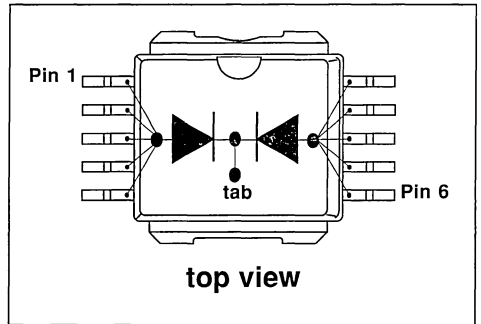


Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

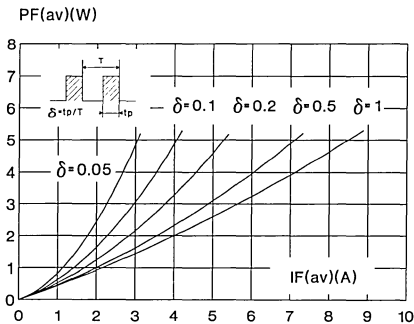


Fig. 2 : Average current versus ambient temperature.

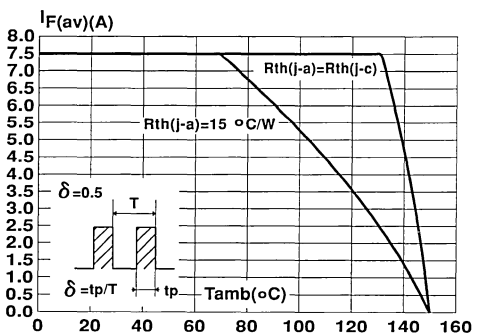


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

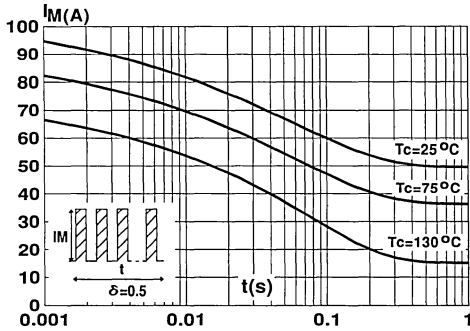


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

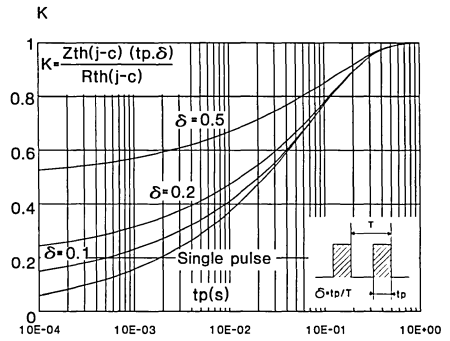


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

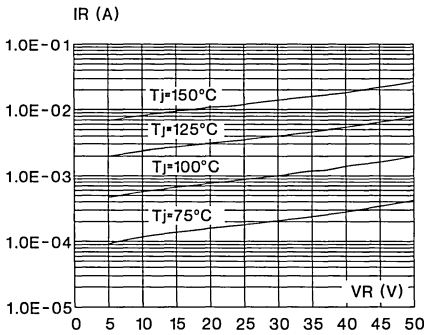


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

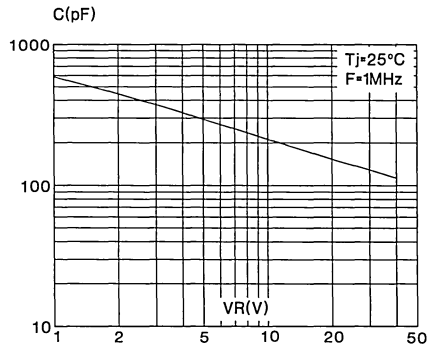
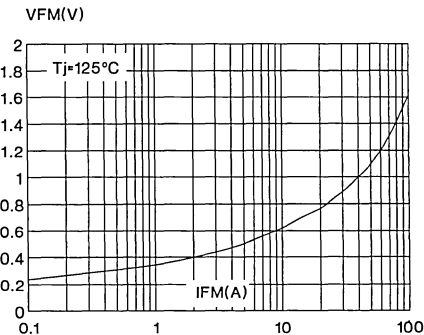


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



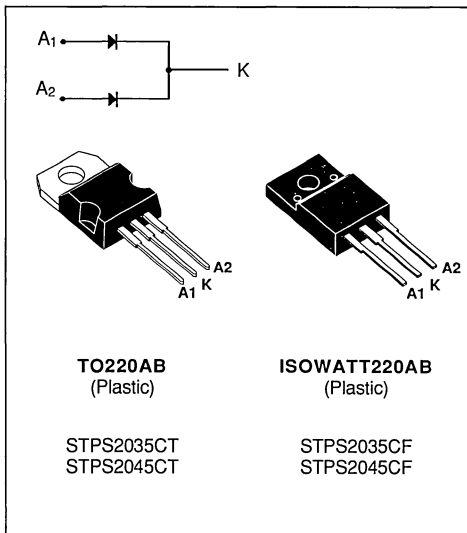
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB and ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit	
$I_{F(RMS)}$	RMS Forward Current		Per diode	30	A	
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	TO220AB	$T_c = 135^\circ\text{C}$	Per diode	10	A
		ISOWATT220AB	$T_c = 120^\circ\text{C}$	Per device	20	
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10$ ms Sinusoidal	Per diode	180	A
I_{RRM}	Peak Repetitive Reverse Current		$T_p = 2$ μs $F = 1$ KHz	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$	
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	V/ μs	

Symbol	Parameter	STPS		Unit
		2035CT 2035CF	2045CT 2045CF	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{TH(j-c)}	Junction-case	TO220AB	Per diode total 2.2 1.3	°C/W
		ISOWATT220AB	Per diode total 4.5 3.5	
R _{TH(c)}	Coupling	TO220AB	0.3	°C/W
		ISOWATT220AB	2.5	

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_{j(\text{diode } 1)} = P(\text{diode } 1) \times R_{TH(\text{Per diode})} + P(\text{diode } 2) \times R_{TH(c)}$$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS PER DIODE

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			100	μA
	T _j = 125°C				15	mA
V _F **	T _j = 125°C	I _F = 20 A			0.72	V
	T _j = 125°C	I _F = 10 A			0.57	
	T _j = 25°C	I _F = 20 A			0.84	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.42 \times I_{F(AV)} + 0.015 I_F^2(\text{RMS})$$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

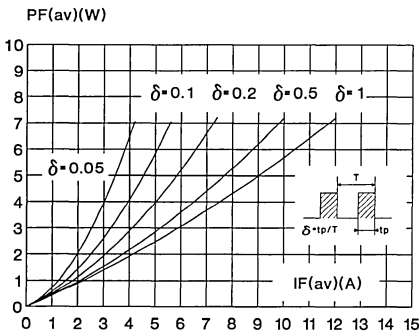


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (TO220AB)

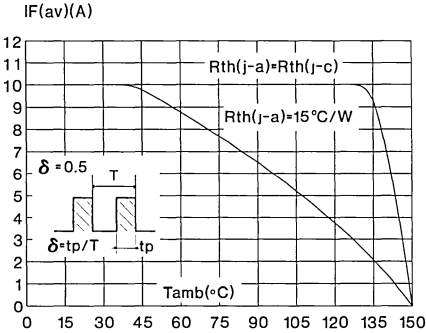


Fig. 3 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (ISOWATT220AB)

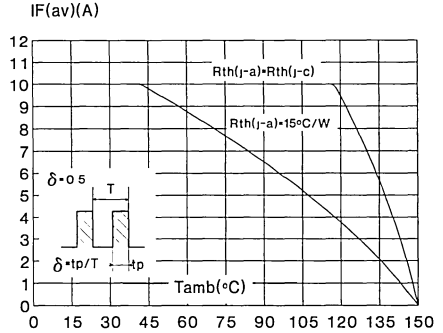


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (TO220AB)

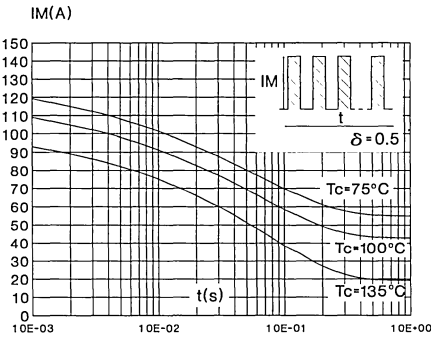


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (ISOWATT220AB)

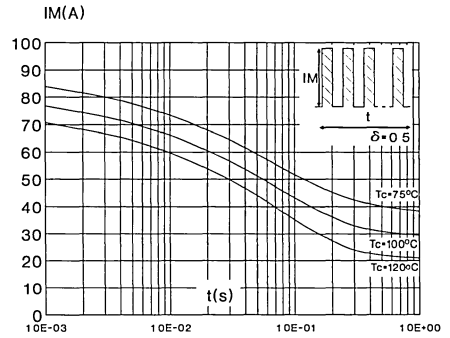


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration. (TO220AB)

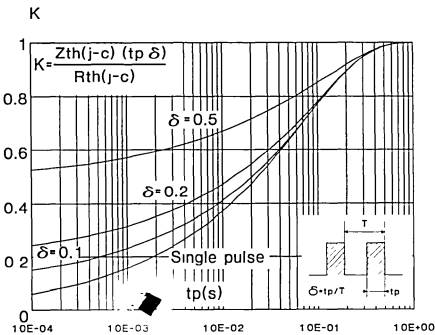


Fig. 7 : Relative variation of thermal transient impedance junction to case versus pulse duration. (ISOWATT220AB)

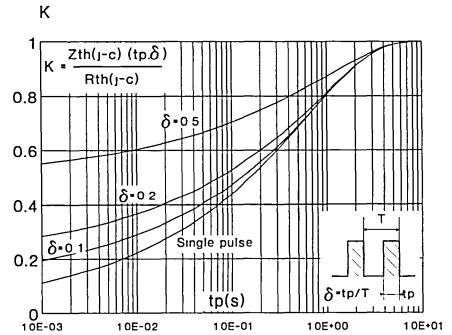


Fig. 8 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

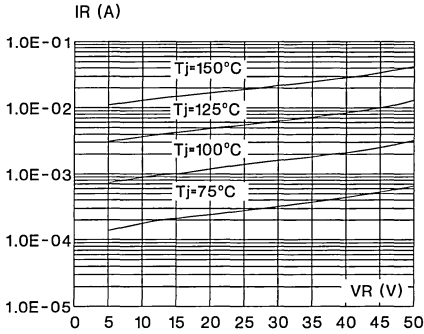


Fig. 9 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

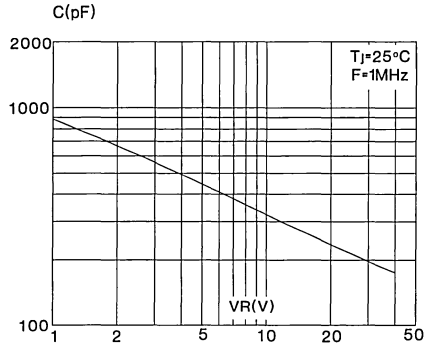
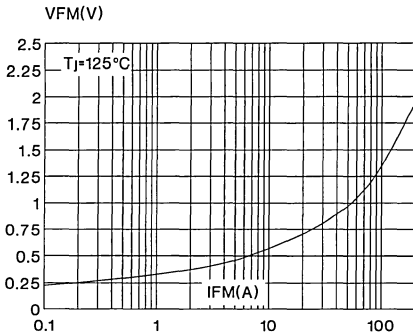


Fig. 10 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 10 A
V_{RRM}	45 V
V_F	0.57 V

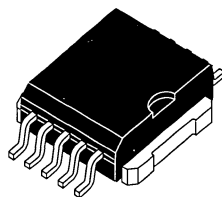
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



Power SO-10™
 Plastic, non isolated SMD
 with copper tab

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive Peak Reverse Voltage		45	V	
$I_{F(RMS)}$	RMS Forward Current	All pins connected	Per diode	27	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	$T_c = 135^\circ\text{C}$	Per diode	10	A
			Per device	20	
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10$ ms Sinusoidal All pins connected	Per diode	180	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2$ μs $F = 1$ KHz	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150	$^\circ\text{C}$	
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs	

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
R _{TH(j-c)}	Junction to Case Thermal Resistance	Per diode	2.2	°C/W
		total	1.3	
R _{TH(c)}	Coupling Thermal Resistance		0.3	°C/W

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage Current	T _j = 25°C	V _R = V _{RRM}			100	μA
		T _j = 125°C				15	mA
V _F **	Forward Voltage drop	T _j = 125°C	I _F = 20 A			0.72	V
		T _j = 125°C	I _F = 10 A			0.57	
		T _j = 25°C	I _F = 20 A			0.84	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.42 \times I_{F(AV)} + 0.015 I_{F(RMS)}^2$$

PIN OUT configuration in PowerSO-10 :

- Anode 1 = pin 1 to 5
- Anode 2 = pin 6 to 10
- Cathodes = connected to base tab

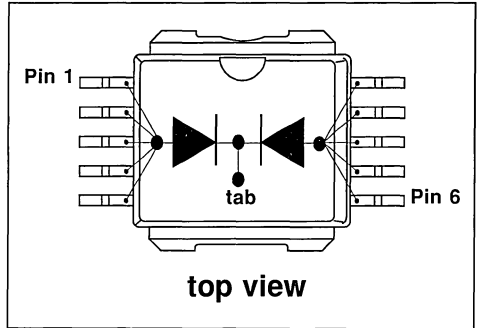


Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

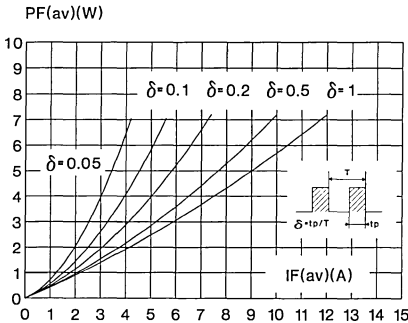


Fig. 2 : Average current versus ambient temperature.

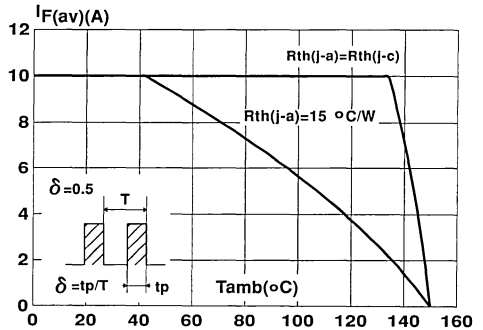


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

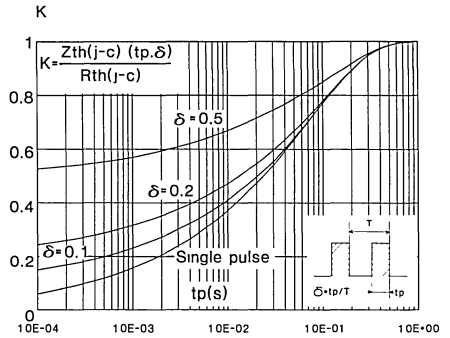
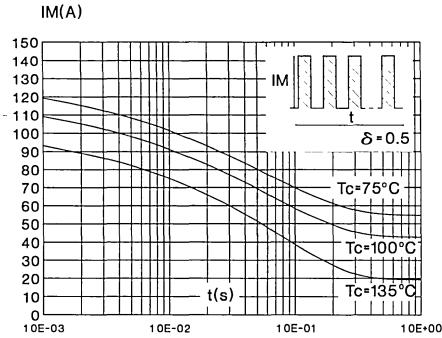


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

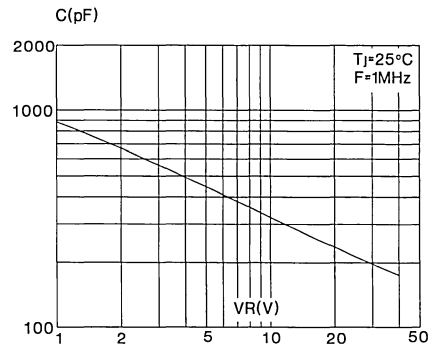
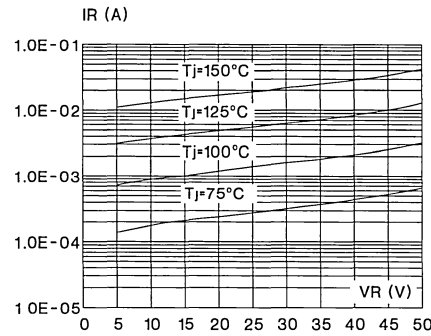
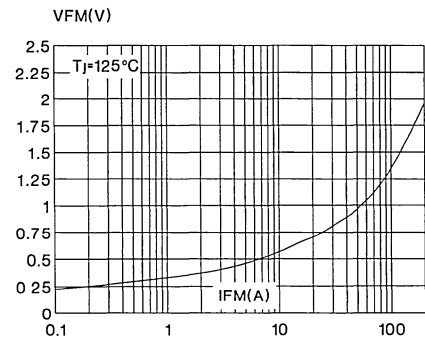


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



HIGH VOLTAGE POWER SCHOTTKY RECTIFIER

MAIN PRODUCT CHARACTERISTICS

$I_F(AV)$	2 x 10A
V_{RRM}	100V
V_F (typ)	0.60V

PRELIMINARY DATASHEET

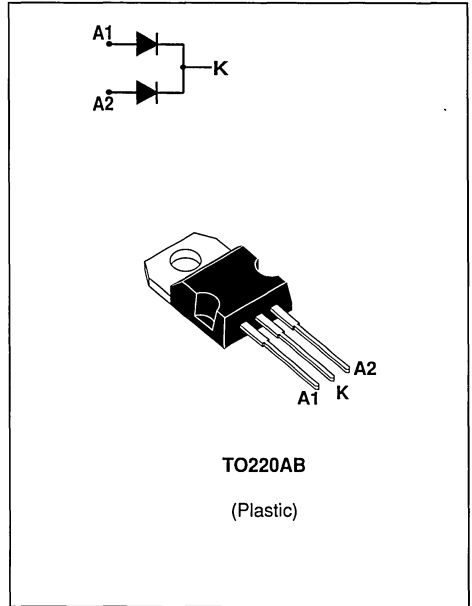
FEATURES AND BENEFITS

- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW CAPACITANCE
- HIGH REVERSE AVALANCHE SURGE CAPABILITY

DESCRIPTION

High voltage dual Schottky rectifier suited for switchmode power supplies and other power converters.

Packaged in TO220AC, this device is intended for use in medium voltage operation, and particularly, in high frequency circuitries where low switching losses and low noise are required.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		100	V
$I_F(RMS)$	RMS forward current		Per diode 30	A
$I_F(AV)$	Average forward current	$T_c=110^\circ C$ $V_R = 60V$ $\delta = 0.5$	Per diode 10 Per device 20	A A
I_{FSM}	Surge non repetitive forward current	$t_p=10ms$ sinusoidal	Per diode 200	A
I_{RRM}	Repetitive peak reverse current	$t_p=2\mu s$ $F=1KHz$	Per diode 1	A
I_{RSM}	Non repetitive peak reverse current	$t_p=100\mu s$	Per diode 1	A
T_{stg}	Junction temperature range		- 65 to + 150	$^\circ C$
T_j	Max. Junction temperature		125	$^\circ C$
dV/dt	Critical rate of rise of reverse voltage		1000	V/ μs

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	1.6	°C/W
		Total	0.9	
Rth (c)	Coupling		0.15	°C/W

When the diodes 1 and 2 are used simultaneously :
 $T_J - T_c(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage current	$V_R = V_{RRM}$	$T_J = 25^\circ\text{C}$			150	μA
			$T_J = 125^\circ\text{C}$			100	mA
V_F^{**}	Forward voltage drop	$I_F = 20\text{ A}$	$T_J = 125^\circ\text{C}$			0.85	V
		$I_F = 10\text{ A}$	$T_J = 125^\circ\text{C}$		0.60	0.70	
		$I_F = 20\text{ A}$	$T_J = 25^\circ\text{C}$			0.95	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle < 2 %
 ** $t_p = 380\text{ }\mu\text{s}$, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.55 \times I_F(\text{AV}) + 0.015 \times I_F^2(\text{RMS})$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

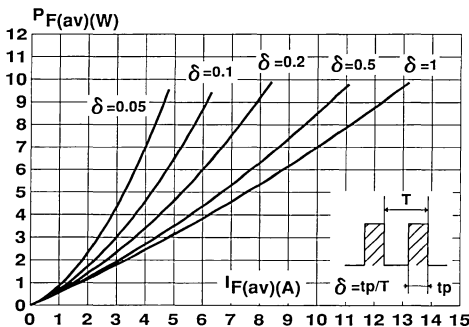


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode)

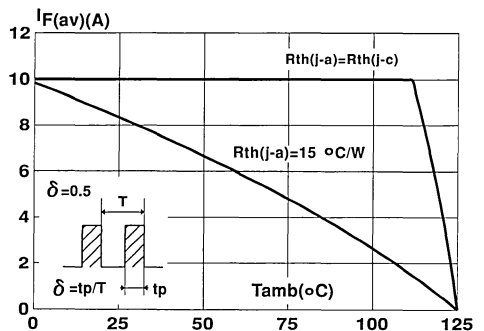


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

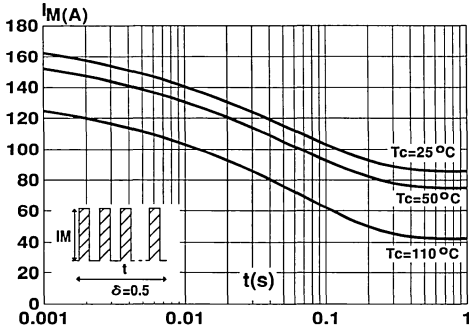


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

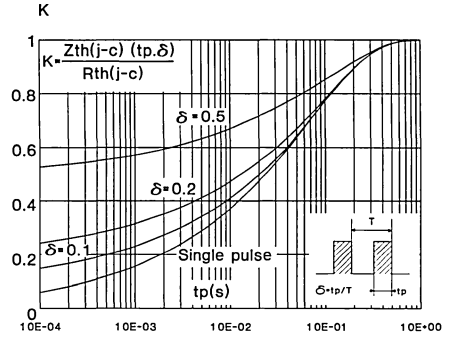


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

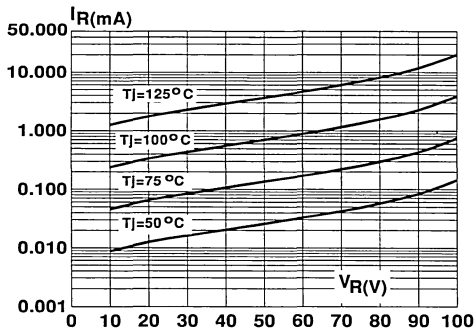


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

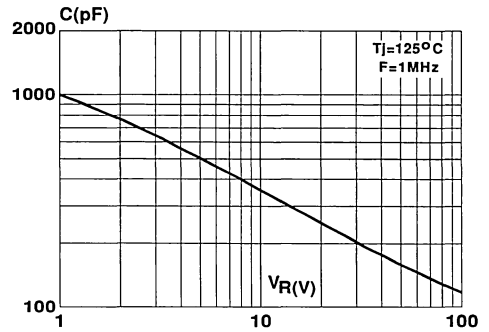
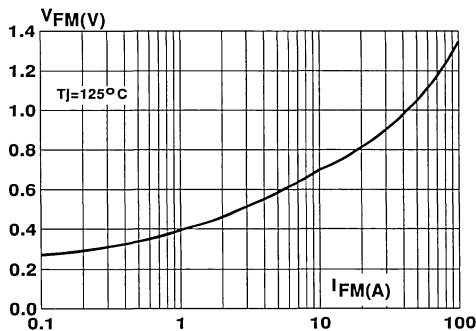


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	30 A
V_{RRM}	45 V
V_F	0.63 V

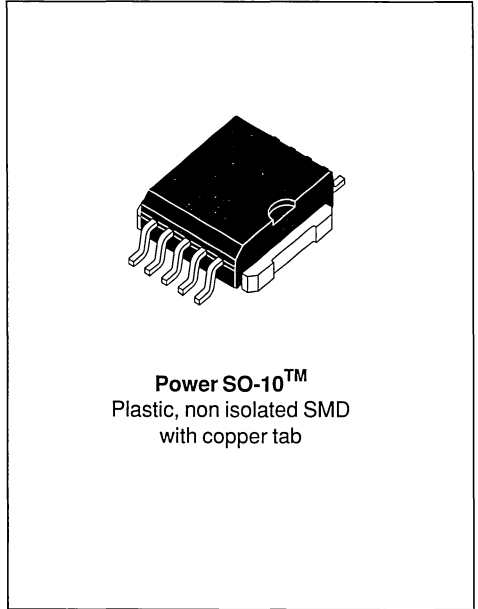
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		45	V
$I_{F(RMS)}$	RMS Forward Current (All pins connected)		44	A
$I_{F(AV)}$	Average Forward Current	$T_c = 125^\circ\text{C}$ $\delta = 0.5$	30	A
I_{FSM}	Surge Non Repetitive Forward Current (All pins connected)	$t_p = 10 \text{ ms}$ Sinusoidal	200	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1 \text{ KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{TH(j-c)}$	Junction to Case Thermal Resistance	1.0	$^{\circ}C/W$

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions	Min.	Typ.	Max.	Unit	
I_R^*	Reverse leakage Current	$T_j = 25^{\circ}C$	$V_R = V_{RRM}$		500	μA	
		$T_j = 125^{\circ}C$				80	mA
V_F^{**}	Forward Voltage drop	$T_j = 125^{\circ}C$	$I_F = 60 A$		0.78	V	
		$T_j = 125^{\circ}C$	$I_F = 30 A$				0.63
		$T_j = 25^{\circ}C$	$I_F = 60 A$				0.84

Pulse test : * $t_p = 5 ms$, duty cycle $< 2\%$
 ** $t_p = 380 \mu s$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.48 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$

PIN OUT configuration in PowerSO-10 :

Anode = pin 1 to 5
 Cathode = connected to base tab

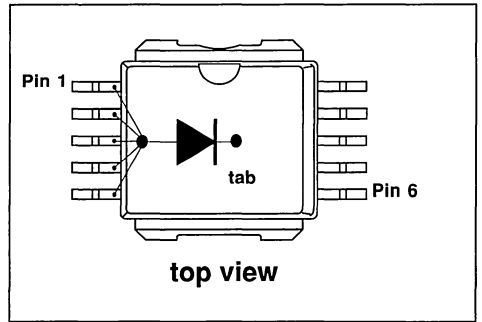


Fig. 1 : Average forward power dissipation versus average forward current.

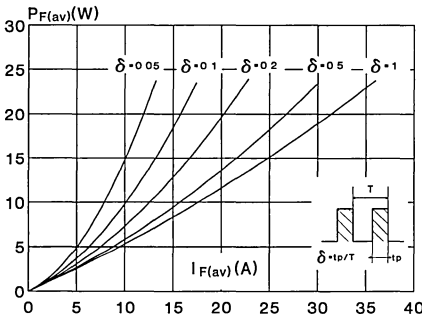


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5)

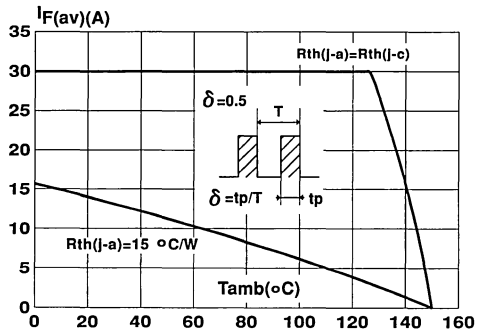


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values)

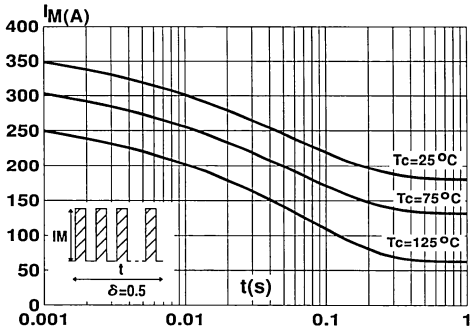


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

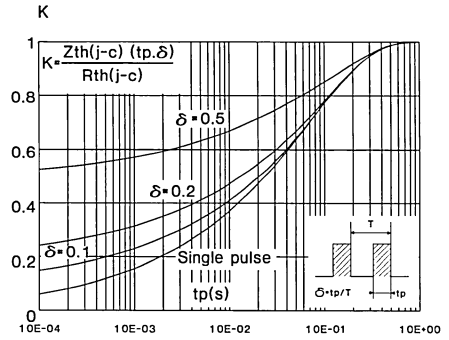


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values)

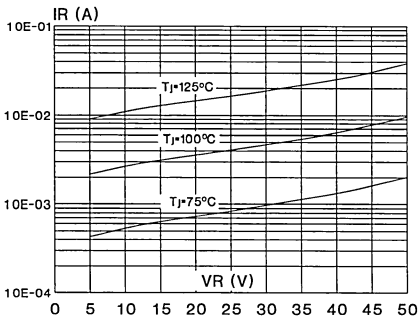


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values)

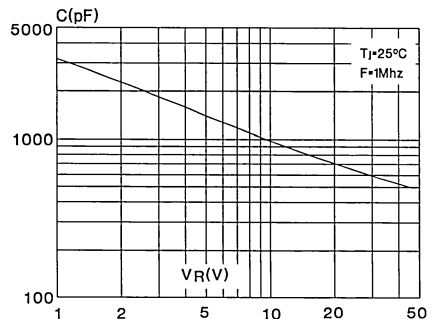
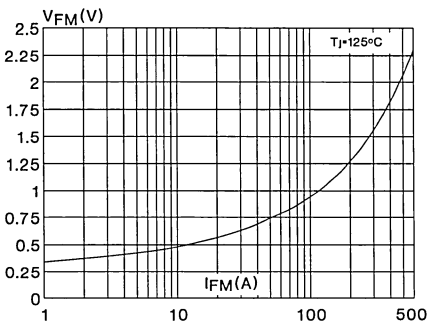
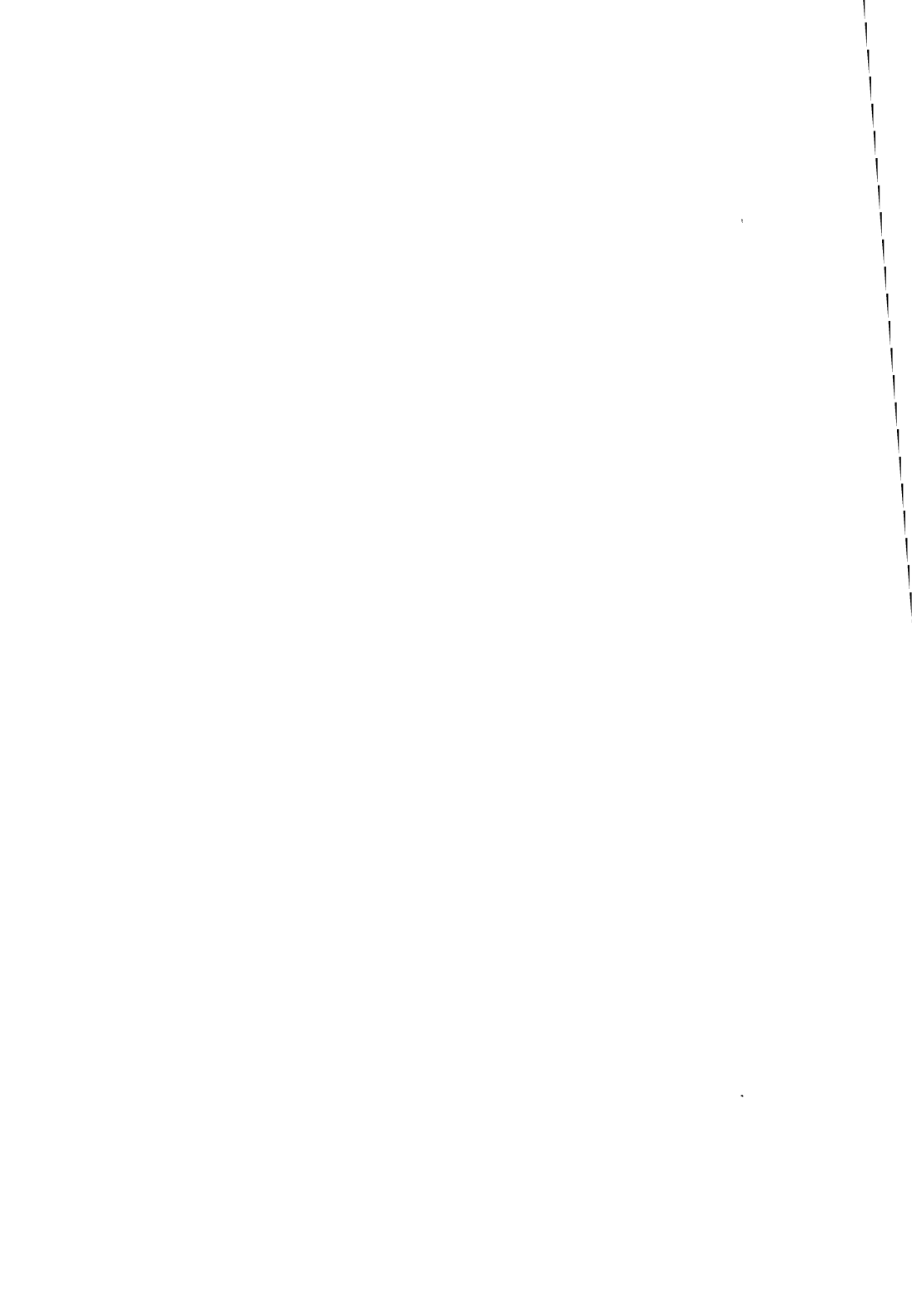


Fig. 7 : Forward voltage drop versus forward current. (Maximum values)





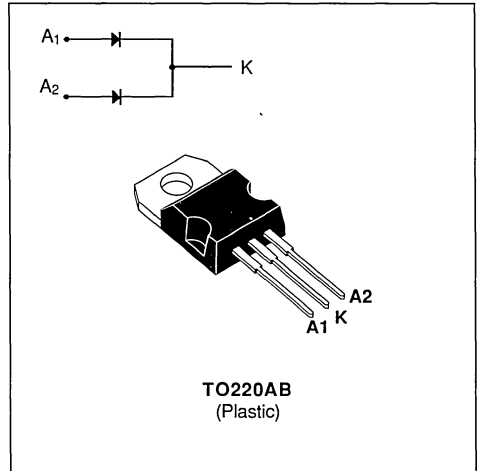
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2000V DC
 Capacitance = 12pF

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in TO220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{F(RMS)}$	RMS Forward Current		Per diode 30	A
$I_{F(AV)}$	Average Forward Current	$T_c = 135^\circ\text{C}$ $\delta = 0.5$	Per diode 15 Per device 30	A
I_{FSM}	Surge Non Repetitive Forward Current	$T_p = 10$ ms Sinusoidal	Per diode 220	A
I_{RRM}	Peak Repetitive Reverse Current	$T_p = 2$ μs $F = 1\text{KHz}$	Per diode 1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

Symbol	Parameter	STPS		Unit
		3035CT	3045CT	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
$R_{TH(j-c)}$	Junction-case	Per diode total	1.60 0.85	$^\circ\text{C/W}$
$R_{TH(c)}$	Coupling		0.10	$^\circ\text{C/W}$

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{TH}(\text{Per diode}) + P(\text{diode } 2) \times R_{TH(c)}$$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS PER DIODE

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R **	T _j = 25°C	V _R = V _{RRM}			200	μA
	T _j = 125°C				40	mA
V _F *	T _j = 125°C	I _F = 30 A			0.72	V
	T _j = 125°C	I _F = 15 A			0.57	
	T _j = 25°C	I _F = 30 A			0.84	

Pulse test : * tp = 380 μs, duty cycle < 2 %
 ** tp = 5 ms, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

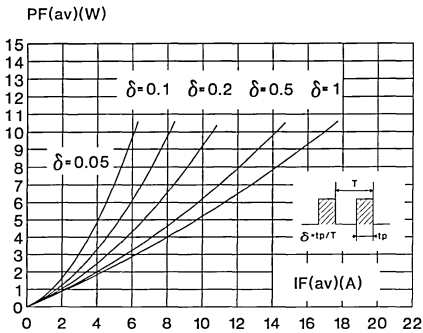


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode)

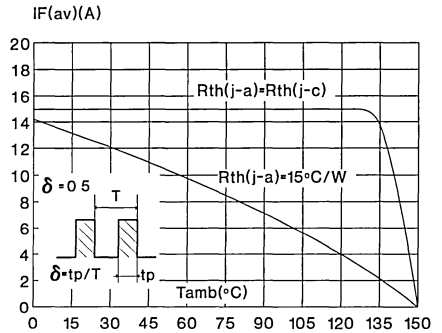


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

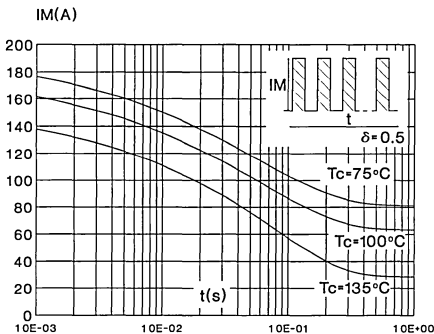


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

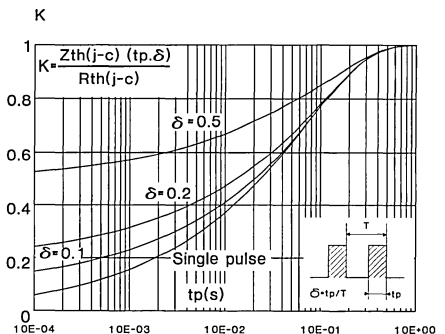


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

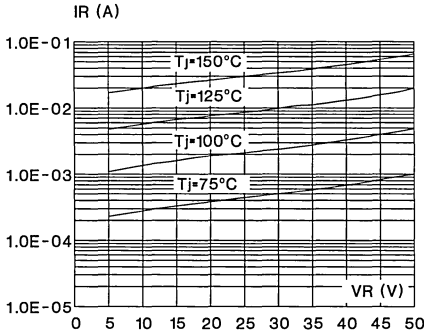


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

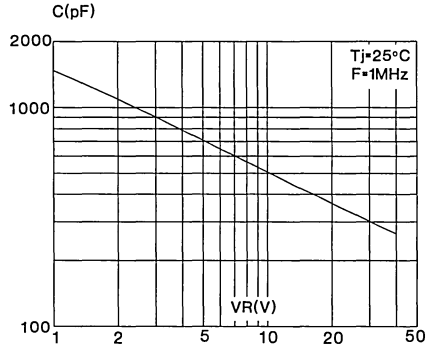
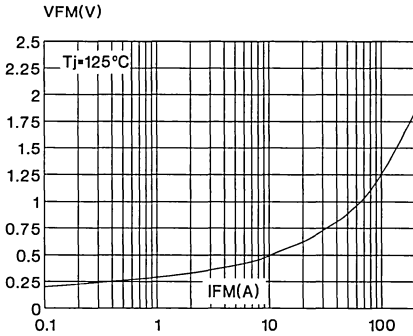


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



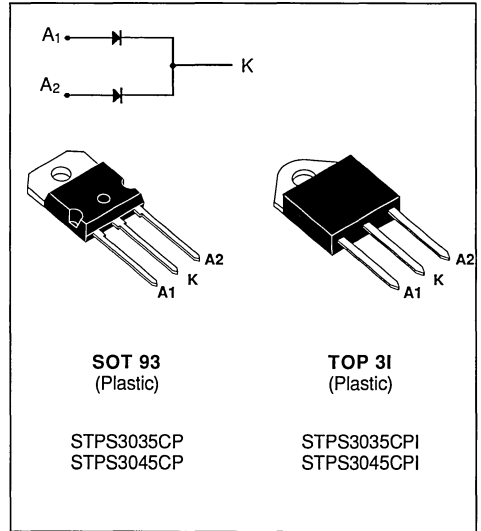
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2500V_{RMS}
 Capacitance = 12pF

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in SOT 93 and TOP 3I, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit	
$I_{F(RMS)}$	RMS Forward Current			30	A	
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	SOT 93	$T_c = 135^\circ\text{C}$	Per diode	15	A
		TOP 3I	$T_c = 125^\circ\text{C}$	Per device	30	
I_{FSM}	Surge Non Repetitive Forward Current			220	A	
I_{RRM}	Peak Repetitive Reverse Current			1	A	
T_{stg} T_J	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$	
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	V/ μs	

Symbol	Parameter	STPS		Unit
		3035CP 3035CPI	3045CP 3045CPI	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit	
R _{TH(j-c)}	Junction-case	SOT 93	Per diode total	1.5 0.8	°C/W
		TOP 3I	Per diode total	2.2 1.6	
R _{TH(c)}	Coupling	SOT 93		0.1	°C/W
		TOP 3I		1.0	

When the diodes 1 and 2 are used simultaneously :
 $\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{TH}(\text{Per diode}) + P(\text{diode } 2) \times R_{TH(c)}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS PER DIODE

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			200	μA
	T _j = 125°C				40	mA
V _F **	T _j = 125°C	I _F = 30 A			0.72	V
	T _j = 125°C	I _F = 15 A			0.57	
	T _j = 25°C	I _F = 30 A			0.84	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

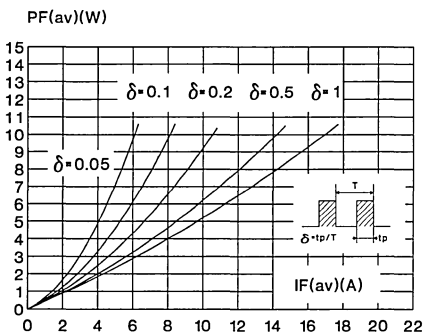


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (SOT 93)

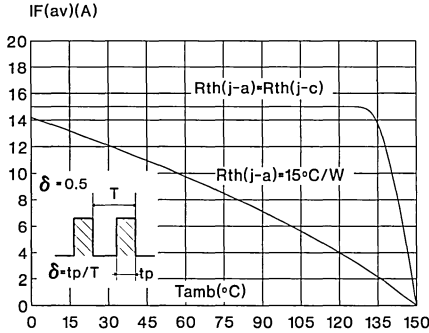


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (TOP 31)

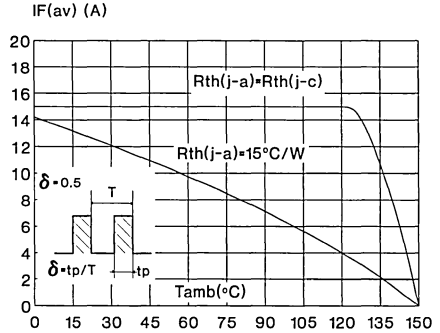


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (SOT 93)

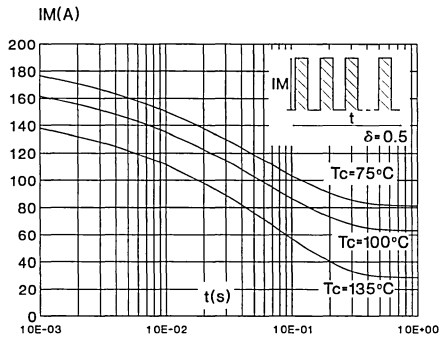


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (TOP 31)

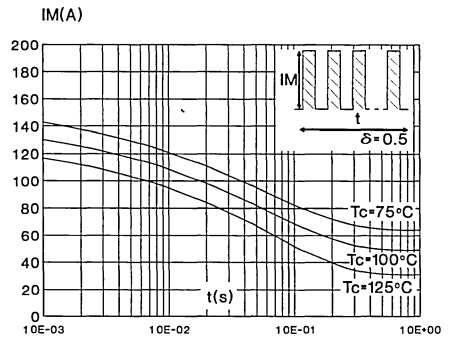


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration.

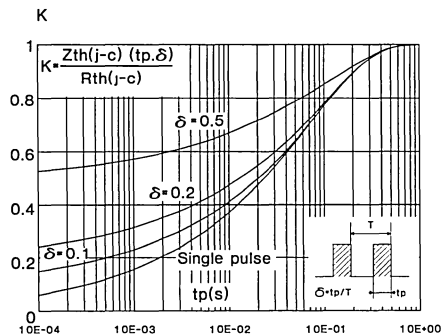


Fig. 7 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

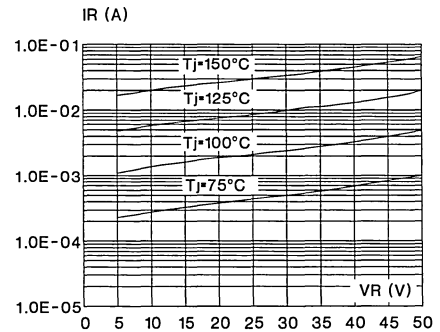


Fig. 8 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

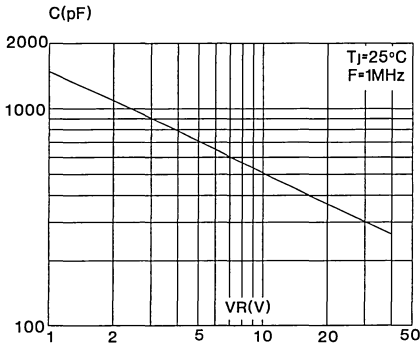
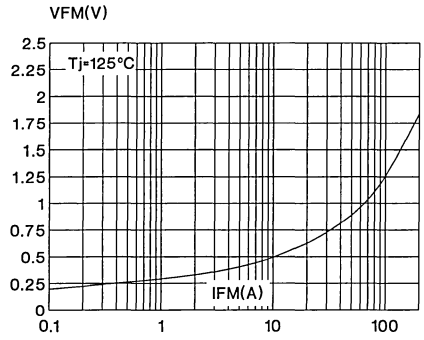


Fig. 9 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER
MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 15 A
V_{RRM}	45 V
V_F	0.57 V

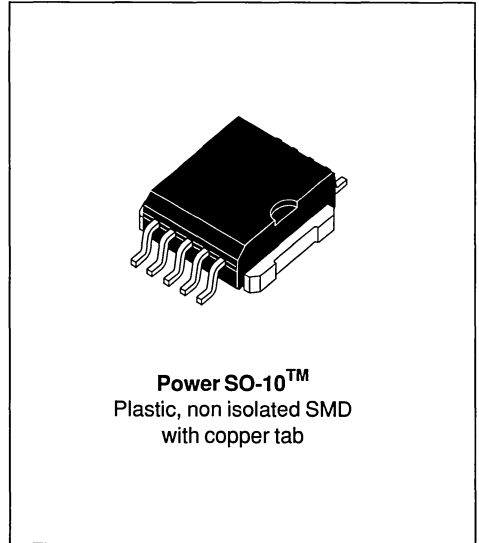
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- HIGH DISSIPATION MINIATURE PACKAGE
- SURFACE MOUNT TECHNOLOGY COMPATIBLE

DESCRIPTION

Dual schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in a high performance surface mount package PSO-10, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage			45	V
$I_{F(RMS)}$	RMS Forward Current	All pins connected	Per diode	27	A
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	$T_c = 135^\circ\text{C}$	Per diode	15	A
			Per device	30	
I_{FSM}	Surge Non Repetitive Forward Current	$t_p = 10 \text{ ms}$ Sinusoidal All pins connected	Per diode	220	A
I_{RRM}	Repetitive Peak Reverse Current	$t_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	V/ μs

TM : PowerSO-10 is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
$R_{TH(j-c)}$	Junction to Case Thermal Resistance	Per diode total	1.6 0.85	°C/W
$R_{TH(c)}$	Coupling Thermal Resistance		0.1	°C/W

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Tests Conditions	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage Current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			200	μA
		$T_j = 125^\circ\text{C}$				40	mA
V_F^{**}	Forward Voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 30\text{ A}$			0.72	V
		$T_j = 125^\circ\text{C}$	$I_F = 15\text{ A}$			0.57	
		$T_j = 25^\circ\text{C}$	$I_F = 30\text{ A}$			0.84	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.010 I_F^2 (RMS)$

PIN OUT configuration in PowerSO-10 :

- Anode 1 = pin 1 to 5
- Anode 2 = pin 6 to 10
- Cathodes = connected to base tab

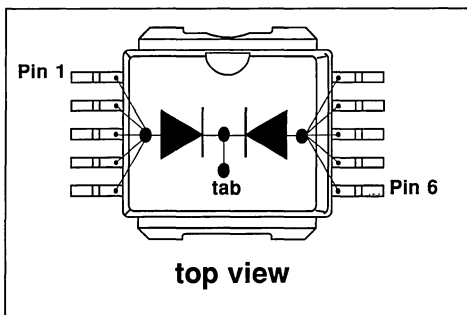


Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

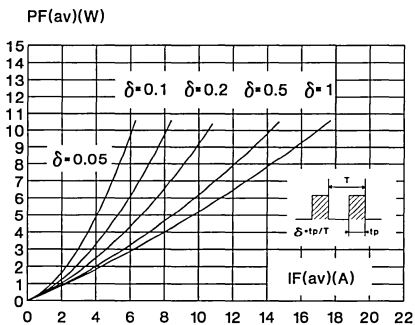


Fig. 2 : Average current versus ambient temperature.

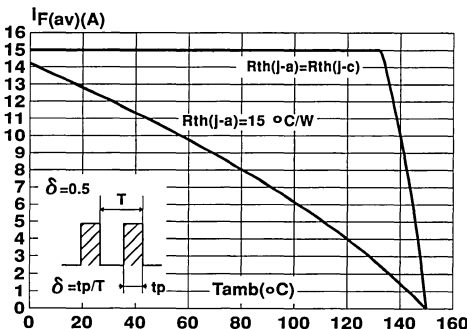


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

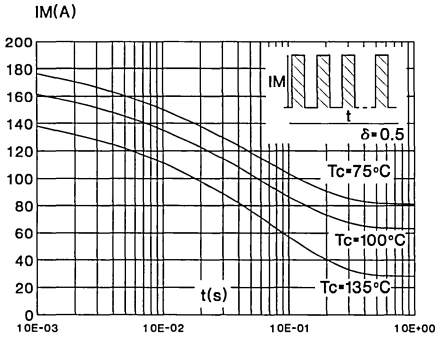


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

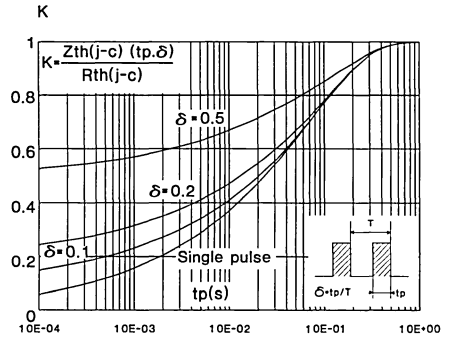


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

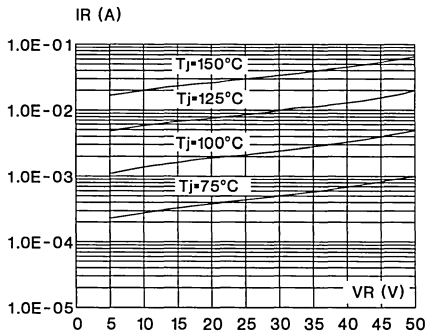


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

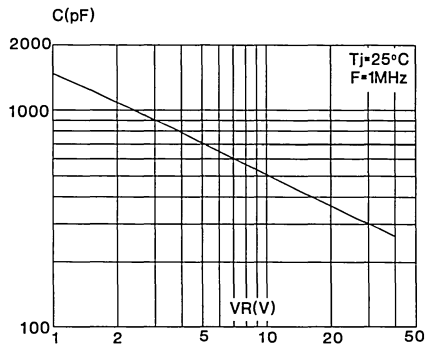
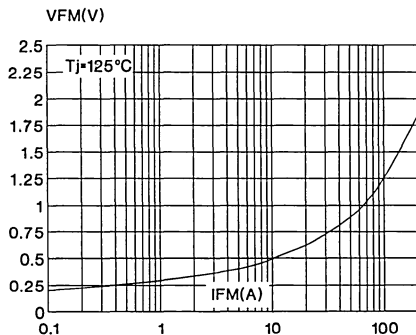


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER
MAJOR PRODUCTS CHARACTERISTICS

$I_{F(av)}$	2 * 20 A
V_{RRM}	45 V
V_F	0.63 V

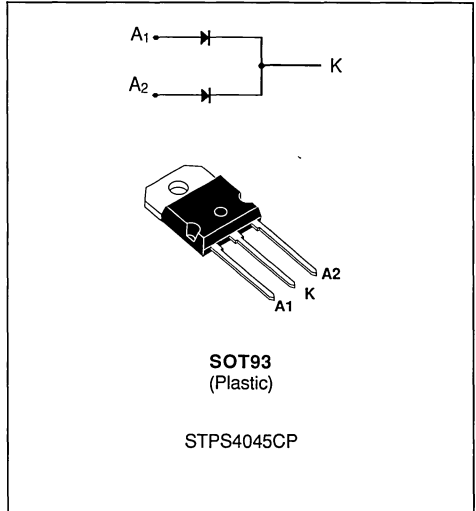
FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH AVALANCHE CAPABILITY
- NON ISOLATED VERSION

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in SOT93, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		45	V
$I_{F(RMS)}$	RMS Forward Current	Per diode	35	A
$I_{F(AV)}$	Average Forward Current	$T_c = 125^\circ\text{C}$	20	A
		$\delta = 0.5$	40	
I_{FSM}	Surge Non Repetitive Forward Current	$T_p = 10 \text{ ms}$ Sinusoidal	220	A
I_{RRM}	Peak Repetitive Reverse Current	$T_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	1	A
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to + 150 - 65 to + 150	$^\circ\text{C}$
dV/dt	Critical Rate of Rise of Reverse Voltage		1000	V/ μs

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
$R_{TH(j-c)}$	Junction-case	Per diode	1.5	$^\circ\text{C/W}$
		total	0.8	
$R_{TH(c)}$	Coupling		0.1	$^\circ\text{C/W}$

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_{j(\text{diode } 1)} = P(\text{diode } 1) \times R_{TH(\text{Per diode})} + P(\text{diode } 2) \times R_{TH(c)}$$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS PER DIODE

Symbol	Parameter	Tests Conditions		Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			200	μA
		$T_j = 125^\circ\text{C}$				40	mA
V_F^{**}	Forward voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 15\text{ A}$			0.57	V
		$T_j = 125^\circ\text{C}$	$I_F = 20\text{ A}$			0.63	
		$T_j = 125^\circ\text{C}$	$I_F = 30\text{ A}$			0.72	
		$T_j = 125^\circ\text{C}$	$I_F = 40\text{ A}$			0.83	
		$T_j = 25^\circ\text{C}$	$I_F = 30\text{ A}$			0.84	

Pulse test : * $t_p = 5\text{ ms}$, duty cycle $< 2\%$
 ** $t_p = 380\ \mu\text{s}$, duty cycle $< 2\%$

To evaluate the conduction losses use the following equation :
 $P = 0.42 \times I_{F(AV)} + 0.01 I_F^2(RMS)$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

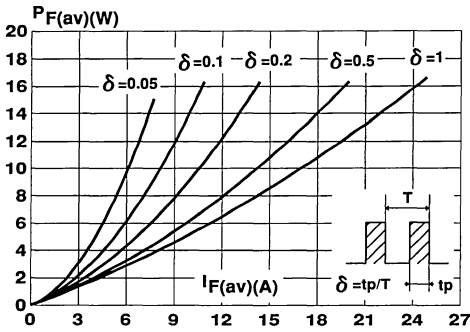


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

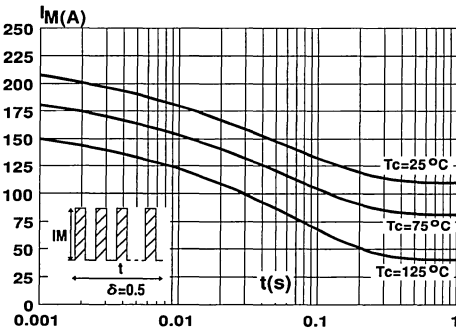


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode)

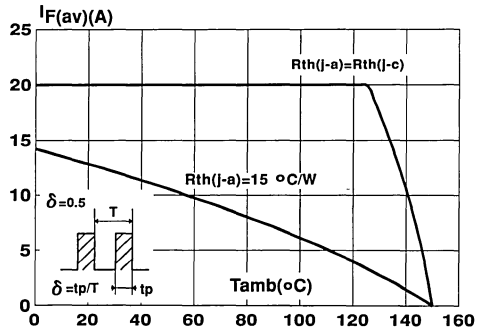


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

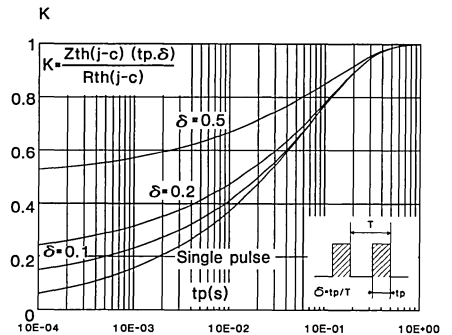


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

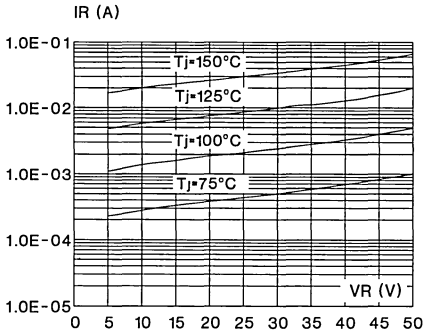


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

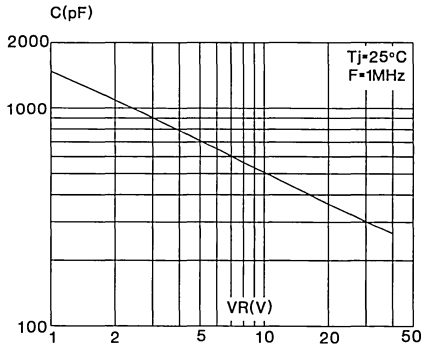
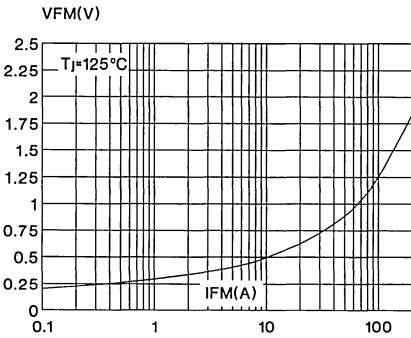


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



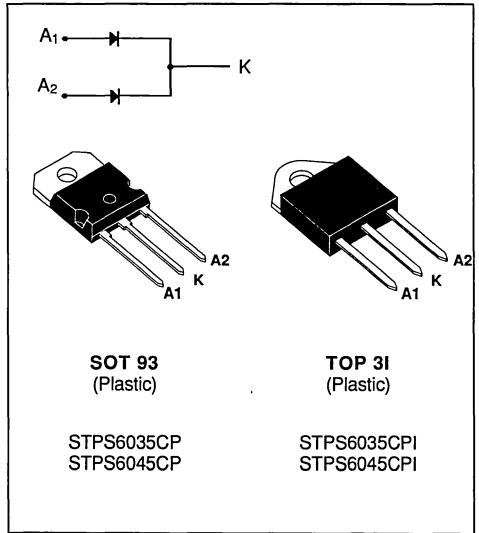
POWER SCHOTTKY RECTIFIER

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- HIGH AVALANCHE CAPABILITY
- LOW THERMAL RESISTANCE
- INSULATED PACKAGE :
 Insulating voltage = 2500V_{RMS}
 Capacitance = 12pF

DESCRIPTION

Dual center tap schottky rectifier suited for switch-mode power supply and high frequency DC to DC converters.

Packaged in SOT 93 and TOP 3I, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit		
$I_{F(RMS)}$	RMS Forward Current		Per diode	60	A	
$I_{F(AV)}$	Average Forward Current $\delta = 0.5$	SOT 93	$T_c = 125^\circ\text{C}$	Per diode	30	A
		TOP 3I	$T_c = 105^\circ\text{C}$	Per device	60	
I_{FSM}	Surge Non Repetitive Forward Current		$T_p = 10$ ms Sinusoidal	Per diode	400	A
I_{RRM}	Peak Repetitive Reverse Current		$T_p = 2 \mu\text{s}$ $F = 1\text{KHz}$	Per diode	1	A
T_{stg} T_j	Storage and Junction Temperature Range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$	
dV/dt	Critical Rate of Rise of Reverse Voltage			1000	V/ μs	

Symbol	Parameter	STPS		Unit
		6035CP 6035CPI	6045CP 6045CPI	
V_{RRM}	Repetitive Peak Reverse Voltage	35	45	V

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
R _{TH(j-c)}	Junction-case	SOT 93	Per diode total 0.95 0.55	°C/W
		TOP 3I	Per diode total 1.8 1.1	
R _{TH(c)}	Coupling	SOT 93		°C/W
		TOP 3I		

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_{J(\text{diode } 1)} = P(\text{diode } 1) \times R_{TH(\text{Per diode})} + P(\text{diode } 2) \times R_{TH(c)}$$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS PER DIODE

Symbol	Tests Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			500	μA
	T _j = 125°C				80	mA
V _F **	T _j = 125°C	I _F = 60 A			0.78	V
	T _j = 125°C	I _F = 30 A			0.63	
	T _j = 25°C	I _F = 60 A			0.84	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2%

To evaluate the conduction losses use the following equation :

$$P = 0.48 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

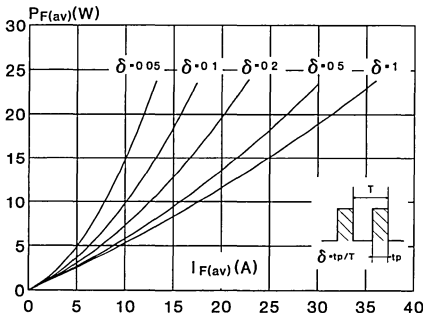


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (SOT 93)

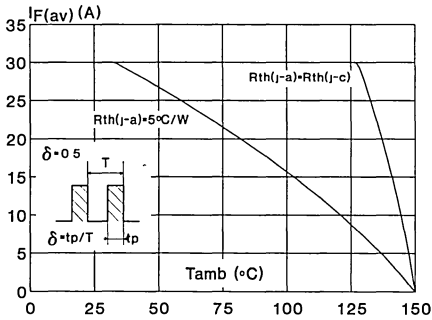


Fig. 3 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode) (TOP 31)

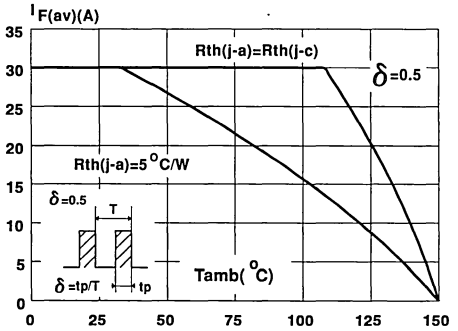


Fig. 4 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (SOT 93)

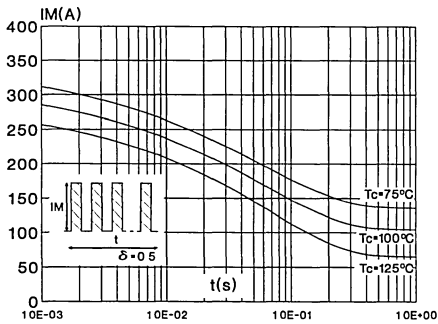


Fig. 5 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode) (TOP 31)

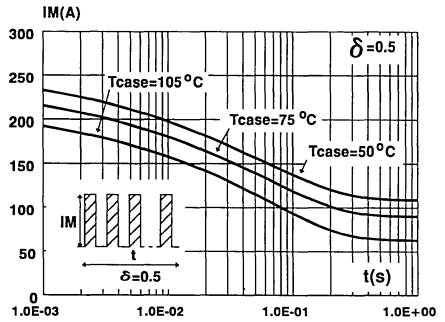


Fig. 6 : Relative variation of thermal transient impedance junction to case versus pulse duration.

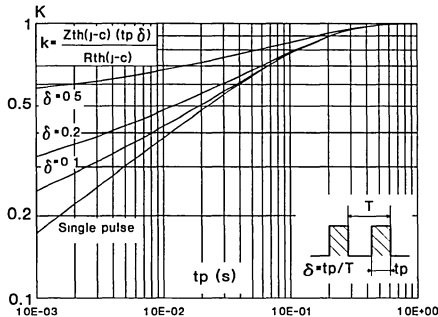


Fig. 7 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

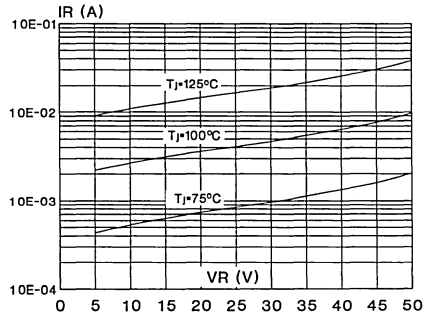


Fig. 8 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

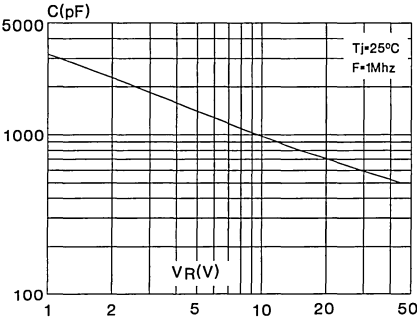
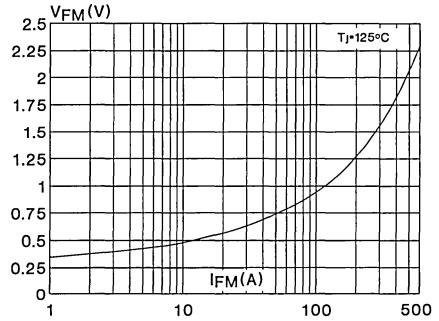


Fig. 9 : Forward voltage drop versus forward current. (Maximum values)



HIGH VOLTAGE POWER SCHOTTKY RECTIFIER

MAIN PRODUCT CHARACTERISTICS

$I_F(AV)$	2 x 40A
V_{RRM}	100V
V_F (typ)	0.63V

FEATURES AND BENEFITS

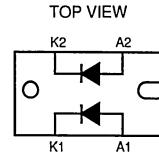
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW CAPACITANCE
- HIGH REVERSE AVALANCHE SURGE CAPABILITY
- LOW INDUCTANCE PACKAGE

DESCRIPTION

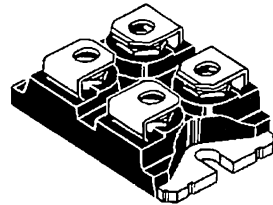
High voltage dual Schottky rectifier suited for switchmode power supplies and other power converters.

Packaged in ISOTOP™, this device is intended for use in medium voltage operation, and particularly, in high frequency circuitries where low switching losses and low noise are required.

PRELIMINARY DATASHEET



STPS80100TV



Screw version

ISOTOP™
(Plastic)

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		100	V
$I_F(RMS)$	RMS forward current		125	A
$I_F(AV)$	Average forward current	$T_c=90^\circ C$ $V_R = 60V$ $\delta = 0.5$	40	A
I_{FSM}	Surge non repetitive forward current	$t_p=10ms$ sinusoidal	700	A
I_{RRM}	Repetitive Peak reverse current	$t_p=2\mu s$ $F=1KHz$	2	A
I_{RSM}	Non repetitive peak reverse current	$t_p=100\mu s$	2	A
T_{stg}	Junction temperature range		- 65 to + 150	°C
T_j	Max. Junction temperature		125	°C
dV/dt	Critical rate of rise of reverse voltage		1000	V/ μs

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.9	°C/W
		Total	0.5	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :
 $T_j - T_c(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(j-c)(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	Reverse leakage current	V _R = V _{RRM}	T _j = 25°C			400	μA
			T _j = 100°C			70	mA
V _F **	Forward voltage drop	I _F = 80 A	T _j = 100°C			0.90	V
		I _F = 40 A	T _j = 100°C		0.63	0.80	
		I _F = 80 A	T _j = 25°C			0.99	

Pulse test : * tp = 5 ms, duty cycle < 2 %
 ** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :
 $P = 0.7 \times I_{F(AV)} + 0.0025 \times I_{F(RMS)}^2$

Fig. 1 : Average forward power dissipation versus average forward current. (Per diode)

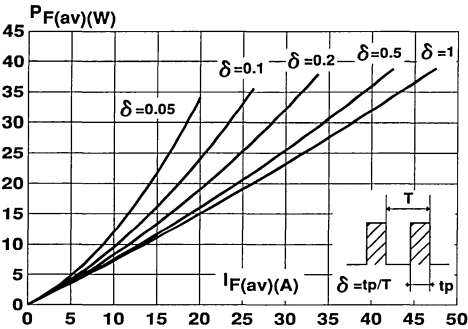


Fig. 2 : Average current versus ambient temperature. (duty cycle : 0.5) (Per diode)

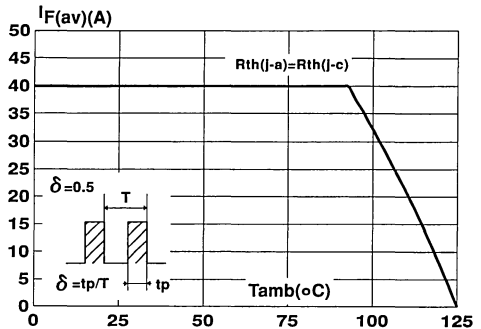


Fig. 3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

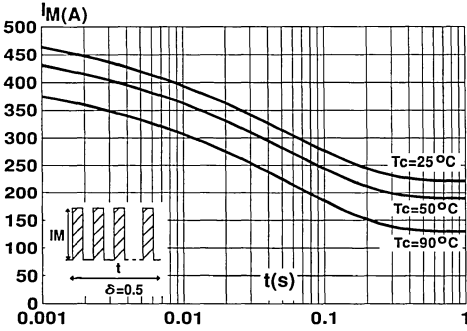


Fig. 4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

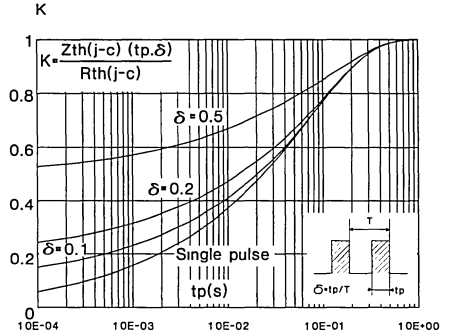


Fig. 5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

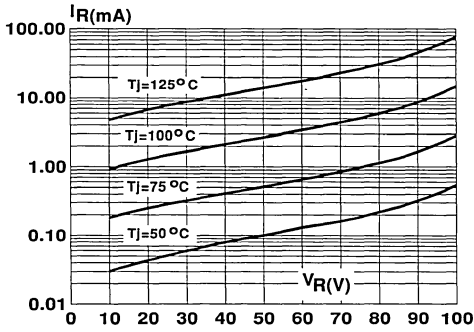


Fig. 6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

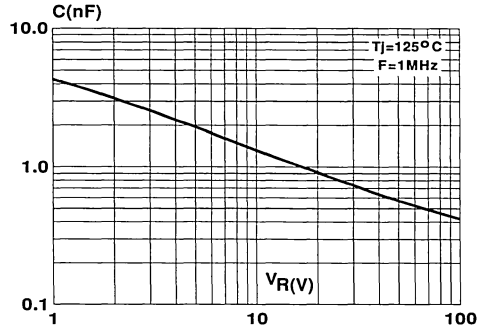
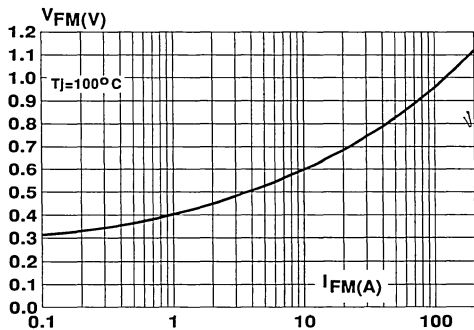


Fig. 7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



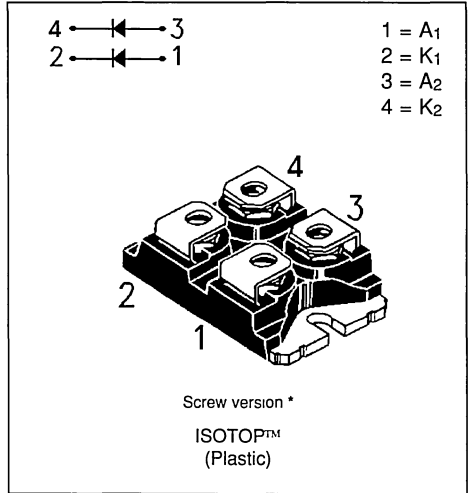
POWER SCHOTTKY RECTIFIER
FEATURES

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- INSULATED PACKAGE :
Insulating voltage = 2500 V_(RMS)

DESCRIPTION

Dual power schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in ISOTOP™, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I _{F(RMS)}	RMS forward current		125	A
I _{F(AV)}	Average forward current	T _C =100°C	60	A
		δ = 0.5	120	A
I _{FSM}	Surge non repetitive forward current	tp=10ms sinusoidal	700	A
I _{RRM}	Peak repetitive reverse current	tp=2μs F=1KHz	2	A
T _{stg} T _j	Storage and junction temperature range		- 65 to + 150 - 65 to + 150	°C °C
dV/dt	Critical rate of rise of reverse voltage		1000	V/μs

Symbol	Parameter	STPS		Unit
		12035TV	12045TV	
V _{RRM}	Repetitive peak reverse voltage	35	45	V

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	1.0	°C/W
		Total	0.55	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			1	mA
	T _j = 125°C				150	
V _F **	T _j = 125°C	I _F = 120 A			0.87	V
	T _j = 125°C	I _F = 60 A			0.67	
	T _j = 25°C	I _F = 120 A			0.91	

Pulse test : * t_p = 5 ms, duty cycle < 2 %

** t_p = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.47 \times I_{F(AV)} + 0.00333 \times I_{F(RMS)}^2$$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

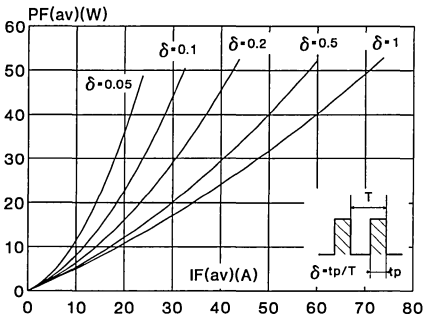


Fig.2 : Average current versus case temperature. (duty cycle : 0.5) (Per diode)

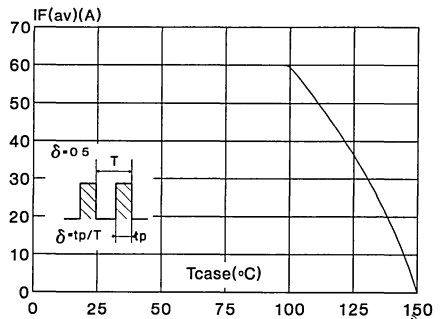


Fig.3 : Non repetitive surge peak forward current overload duration. (Maximum values) (Per diode)

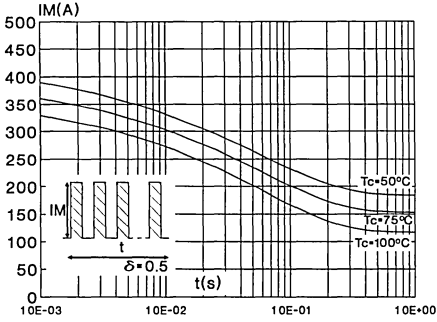


Fig.4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

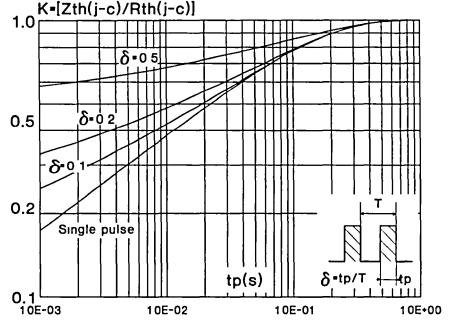


Fig.5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

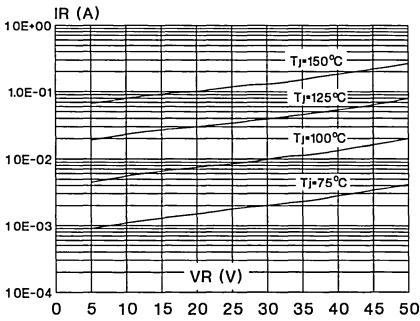


Fig.6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

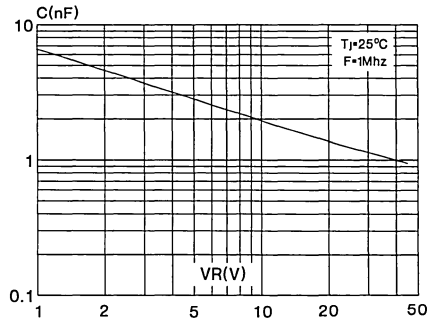
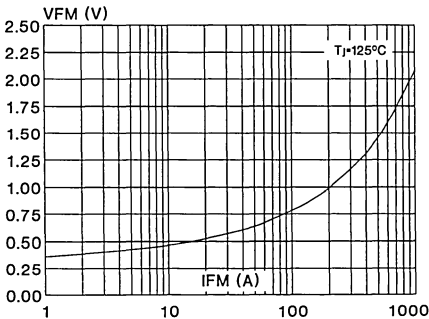


Fig.7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER

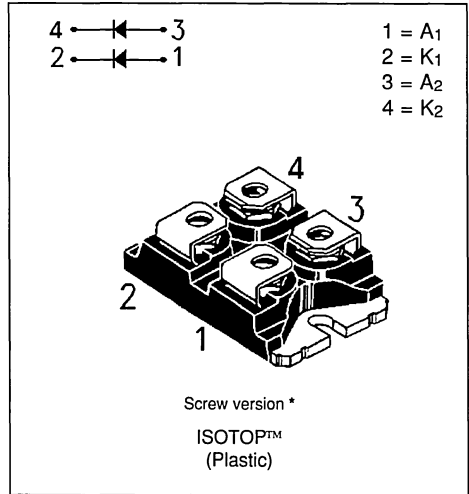
FEATURES

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V(RMS)

DESCRIPTION

Dual power schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in ISOTOP™, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_F(RMS)$	RMS forward current		125	A
$I_F(AV)$	Average forward current	$T_c=85^\circ C$	80	A
		$\delta = 0.5$	160	A
I_{FSM}	Surge non repetitive forward current	$t_p=10ms$ sinusoidal	900	A
I_{RRM}	Peak repetitive reverse current	$t_p=2\mu s$ $F=1KHz$	2	A
T_{stg} T_j	Storage and junction temperature range		- 65 to + 150 - 65 to + 150	$^\circ C$ $^\circ C$
dV/dt	Critical rate of rise of reverse voltage		1000	V/ μs

Symbol	Parameter	STPS		Unit
		16035TV	16045TV	
V_{RRM}	Repetitive peak reverse voltage	35	45	V

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.9	°C/W
		Total	0.5	
Rth (c)	Coupling		0.1	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			1	mA
	T _j = 125°C				150	
V _F **	T _j = 125°C	I _F = 160 A			0.90	V
	T _j = 125°C	I _F = 80 A			0.69	
	T _j = 25°C	I _F = 160 A			0.95	

Pulse test : * t_p = 5 ms, duty cycle < 2 %

** t_p = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.48 \times I_{F(AV)} + 0.00262 \times I_{F(RMS)}^2$$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

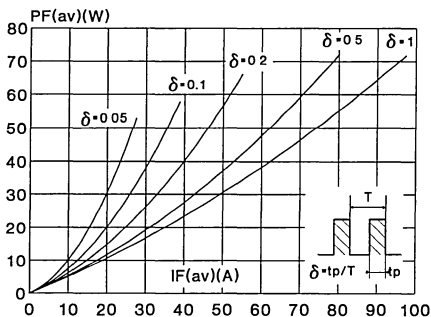


Fig.2 : Average current versus case temperature. (duty cycle : 0.5) (Per diode)

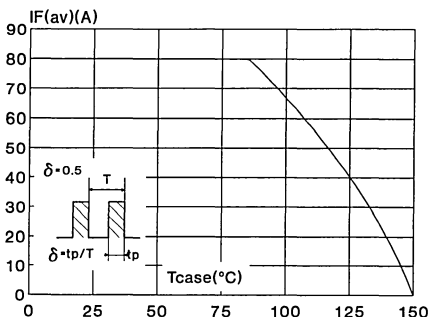


Fig.3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

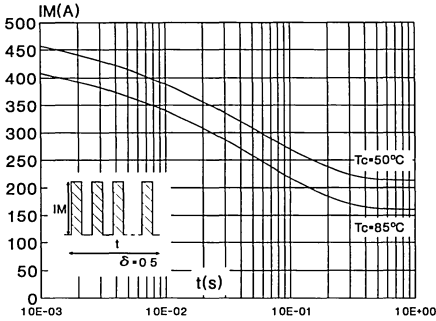


Fig.4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

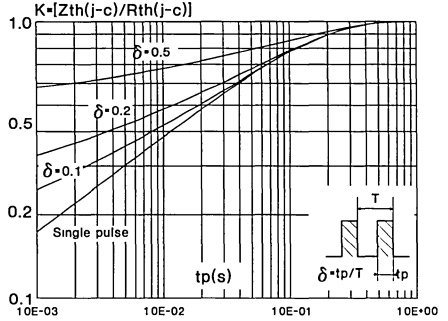


Fig.5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

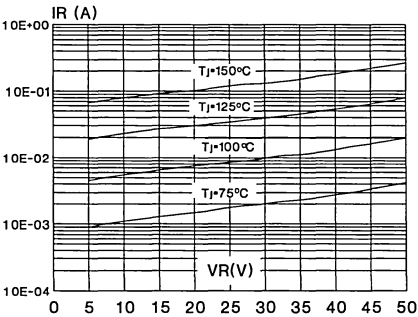


Fig.6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

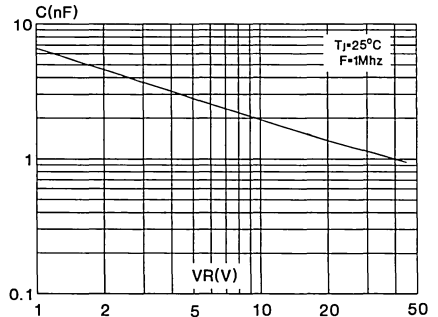
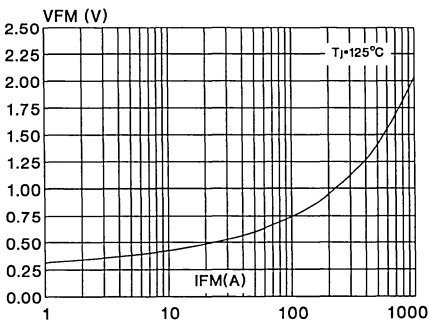


Fig.7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



POWER SCHOTTKY RECTIFIER

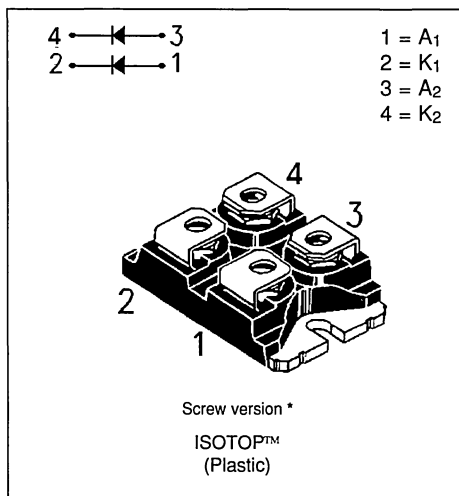
FEATURES

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- EXTREMELY FAST SWITCHING
- INSULATED PACKAGE :
 Insulating voltage = 2500 V(RMS)

DESCRIPTION

Dual power schottky rectifier suited for switchmode power supply and high frequency DC to DC converters.

Packaged in ISOTOP™, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value	Unit
I_F (RMS)	RMS forward current		Per diode	170	A
I_F (AV)	Average forward current	$T_c=105^\circ\text{C}$ $\delta = 0.5$	Per diode Per device	120 240	A A
I_{FSM}	Surge non repetitive forward current	$t_p=10\text{ms}$ sinusoidal	Per diode	1500	A
I_{RRM}	Peak repetitive reverse current	$t_p=2\mu\text{s}$ $F=1\text{KHz}$	Per diode	2	A
T_{stg} T_j	Storage and junction temperature range			- 65 to + 150 - 65 to + 150	$^\circ\text{C}$ $^\circ\text{C}$
dV/dt	Critical rate of rise of reverse voltage			1000	V/ μs

Symbol	Parameter	STPS		Unit
		24035TV	24045TV	
V_{RRM}	Repetitive peak reverse voltage	35	45	V

* : Tin plated Fast-on version is also available (without V suffix).

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics.

STPS24035T(V) / STPS24045T(V)

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
Rth (j-c)	Junction to case	Per diode	0.45	°C/W
		Total	0.28	
Rth (c)	Coupling		0.10	°C/W

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode}) \times R_{th}(\text{Per diode}) + P(\text{diode } 2) \times R_{th}(c)$$

ELECTRICAL CHARACTERISTICS (Per diode)

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I _R *	T _j = 25°C	V _R = V _{RRM}			2	mA
	T _j = 125°C				300	mA
V _F **	T _j = 125°C	I _F = 240 A			0.87	V
	T _j = 125°C	I _F = 120 A			0.67	
	T _j = 25°C	I _F = 240 A			0.91	

Pulse test : * tp = 5 ms, duty cycle < 2 %

** tp = 380 μs, duty cycle < 2 %

To evaluate the conduction losses use the following equation :

$$P = 0.47 \times I_F(\text{AV}) + 0.00167 \times I_F^2(\text{RMS})$$

Fig.1 : Average forward power dissipation versus average forward current. (Per diode)

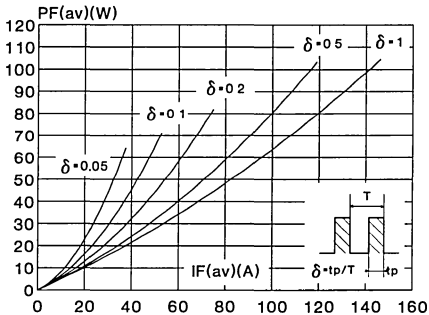


Fig.2 : Average current versus case temperature. (duty cycle : 0.5) (Per diode)

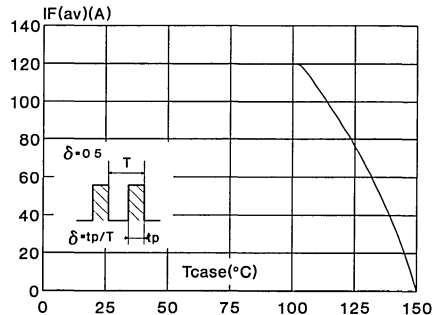


Fig.3 : Non repetitive surge peak forward current versus overload duration. (Maximum values) (Per diode)

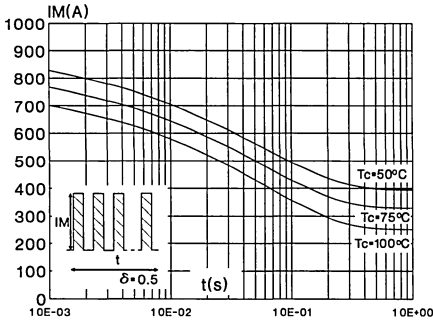


Fig.4 : Relative variation of thermal transient impedance junction to case versus pulse duration.

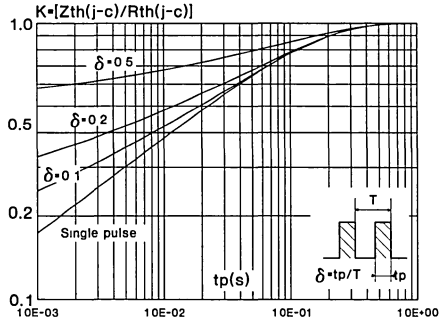


Fig.5 : Reverse leakage current versus reverse voltage applied. (Typical values) (Per diode)

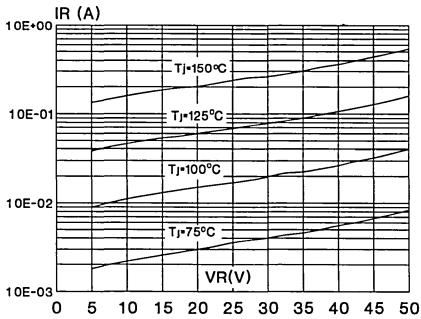


Fig.6 : Junction capacitance versus reverse voltage applied. (Typical values) (Per diode)

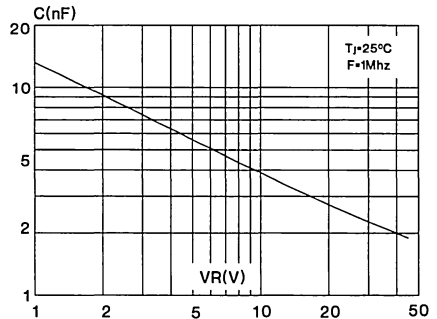
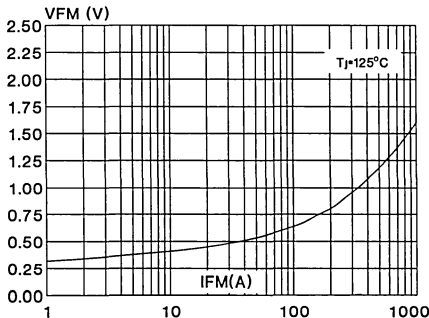


Fig.7 : Forward voltage drop versus forward current. (Maximum values) (Per diode)



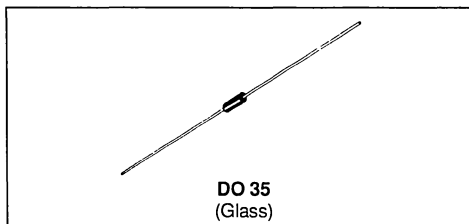
SIGNAL SCHOTTKY DIODES

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode featuring high break-down, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.

Matched batches are available on request.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		70	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	15	mA
P_{tot}	Power Dissipation*	$T_a = 25^\circ\text{C}$	430	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	70			V
V_F^{**}	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 15\text{mA}$			1	
I_R^{**}	$T_{amb} = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.2	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* On infinite heatsink with 4mm lead length

** Pulse test : $t_b \leq 300\mu\text{s}$ $\delta < 2\%$

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification.

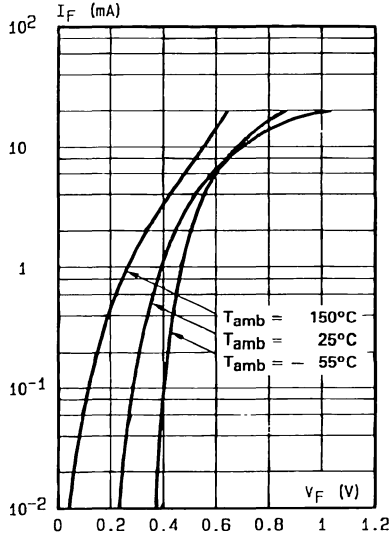


Fig.1 - Forward current versus forward voltage at low level (typical values).

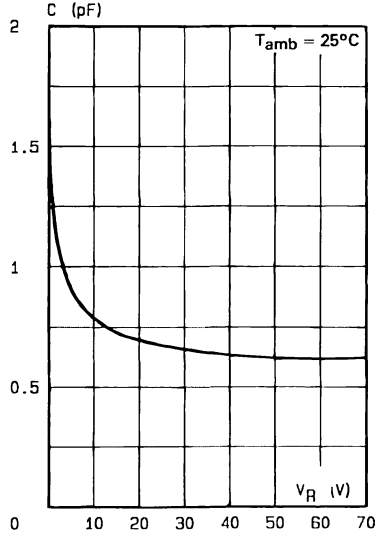


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

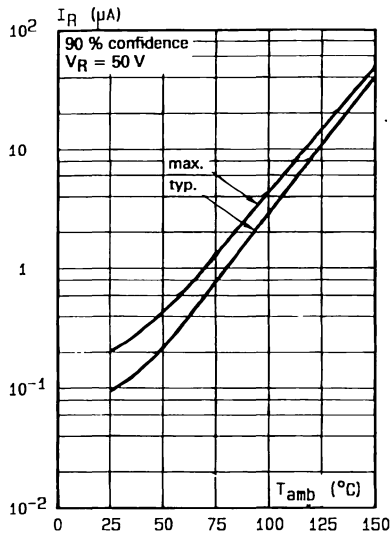


Fig.3 - Reverse current versus ambient temperature.

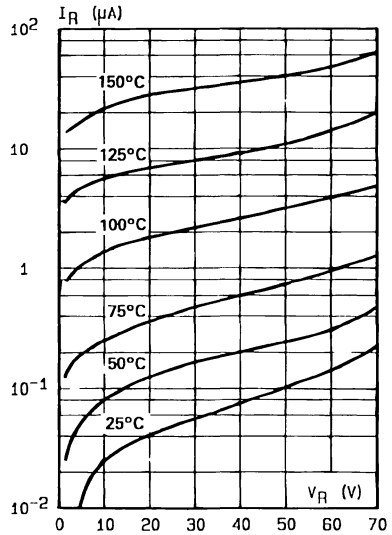
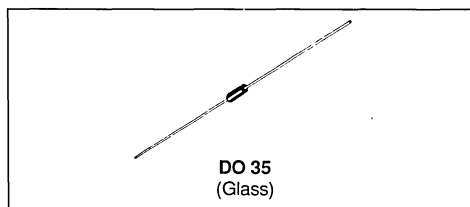


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode featuring high breakdown voltage, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		20	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	35	mA
P_{tot}	Power Dissipation*	$T_a = 25^\circ\text{C}$	430	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4 mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	20			V
V_F^{**}	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 35\text{mA}$			1	
I_R^{**}	$T_{amb} = 25^\circ\text{C}$	$V_R = 15\text{V}$			0.1	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			1.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* On infinite heatsink with 4mm lead length

** Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

Matched batches available on request Test conditions (forward voltage and/or capacitance) according to customer specification.

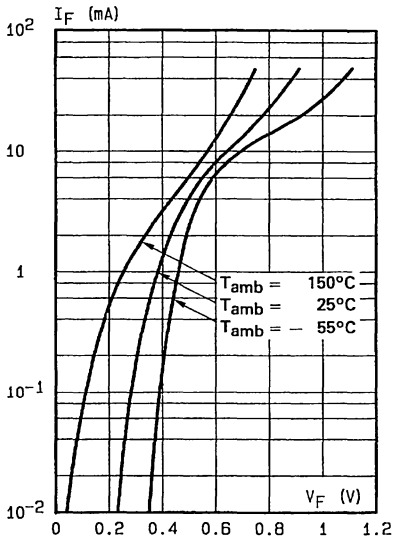


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

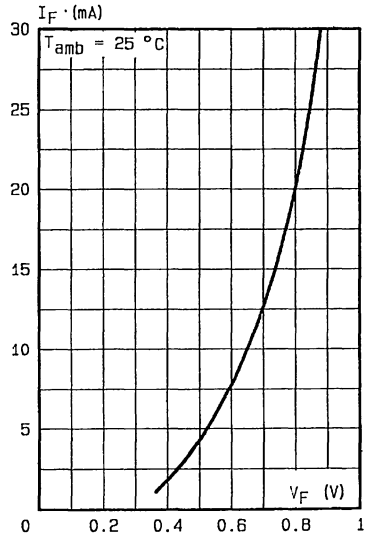


Fig.2 - Forward current versus forward voltage (typical values).

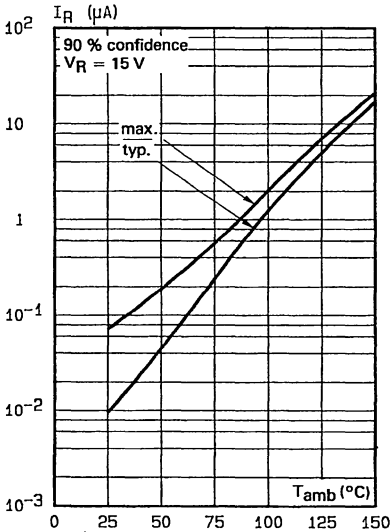


Fig.3 - Reverse current versus ambient temperature.

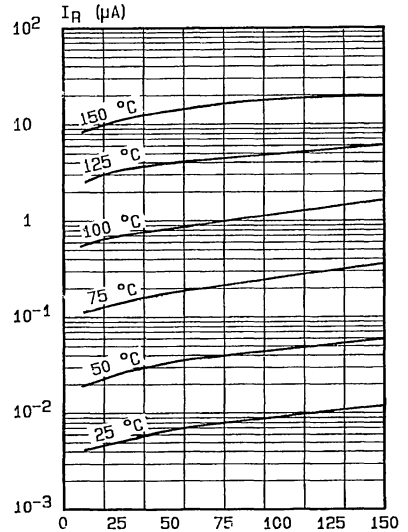


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

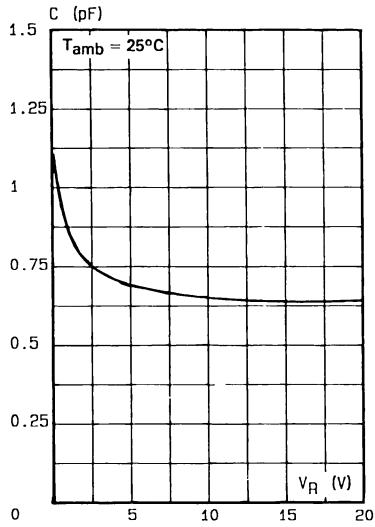


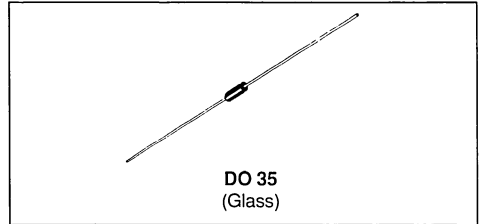
Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode featuring high break-down, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	60	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$ 15	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 1\text{s}$ 50	mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 200	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	60			V
V_F^{**}	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 15\text{mA}$			1	
I_R^{**}	$T_{amb} = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.2	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			2.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* On infinite heatsink with 4mm lead length

** Pulse test · $t_p \leq 300\mu\text{s}$ · $\delta < 2\%$

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification

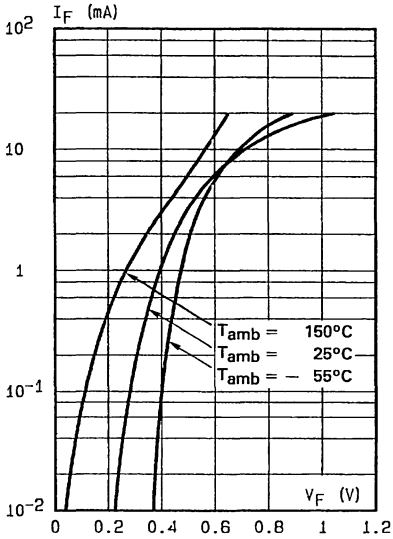


Fig.1 - Forward current versus forward voltage (typical values).

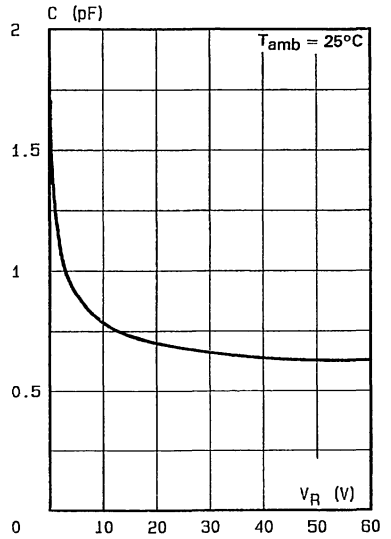


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

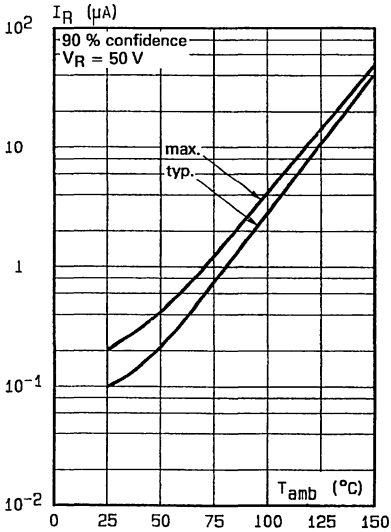


Fig.3 - Reverse current versus ambient temperature.

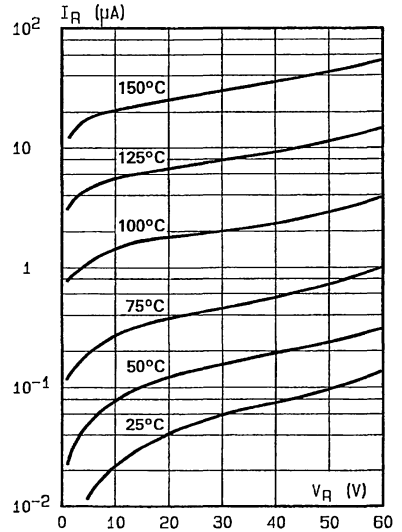


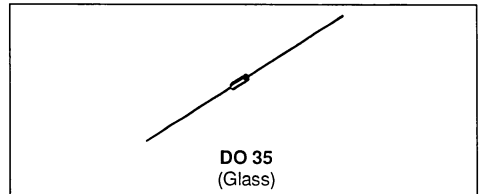
Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODES

DESCRIPTION

Metal to silicon junction diodes featuring high breakdown, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range. Matched batches are available on request, (BAR 11 only).



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		BAR 10	BAR 11	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		20	15	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	35	20	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 1\text{s}$	100		mA
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200		$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230		$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	BAR 10	20			V
	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	BAR 11	15			
V_F^{**}	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$				0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 35\text{mA}$	BAR 10			1	
	$T_{amb} = 25^\circ\text{C}$	$I_F = 20\text{mA}$	BAR 11			1	
I_R^{**}	$T_{amb} = 25^\circ\text{C}$	$V_R = 15\text{V}$	BAR 10			0.1	μA
	$T_{amb} = 25^\circ\text{C}$	$V_R = 8\text{V}$	BAR 11			0.1	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			1.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* On infinite heatsink with 4mm lead length

** Pulse test $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

Matched batches available on request Test conditions (forward voltage and/or capacitance) according to customer specification

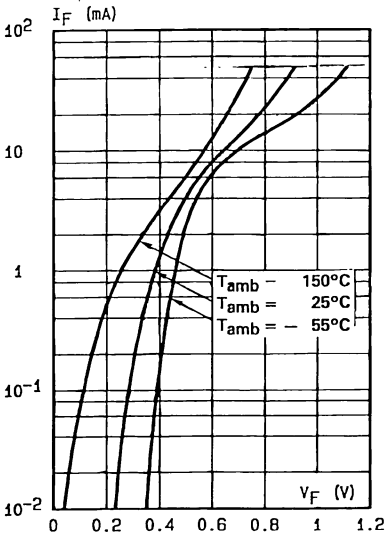


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

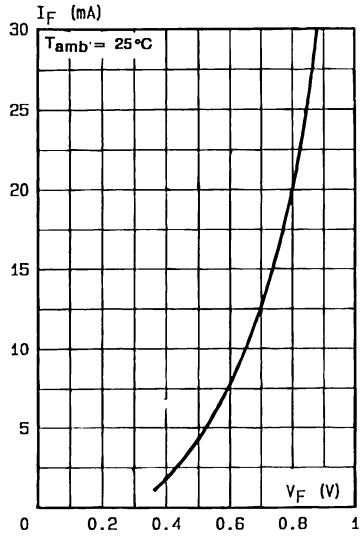


Fig.2 - Forward current versus forward voltage (typical values).

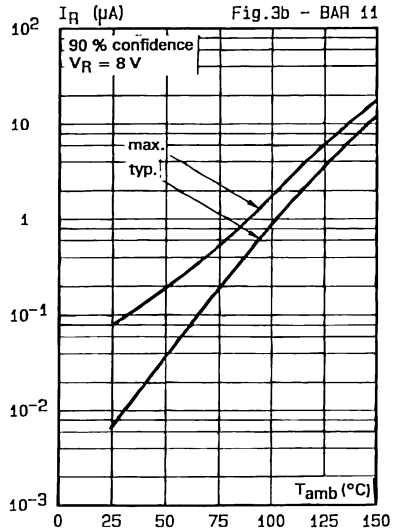
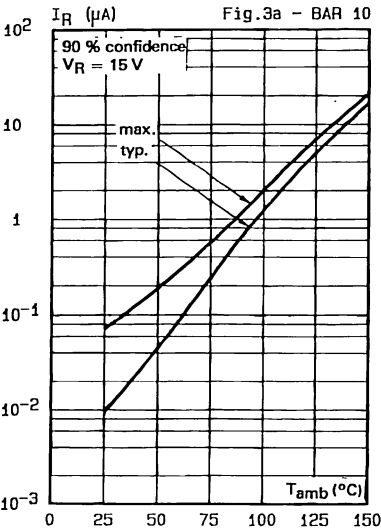


Fig.3a/3b - Reverse current versus ambient temperature.

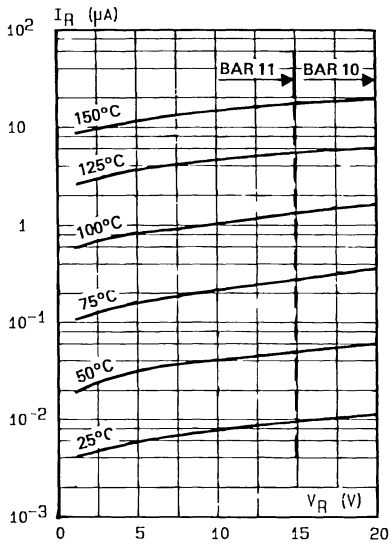


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

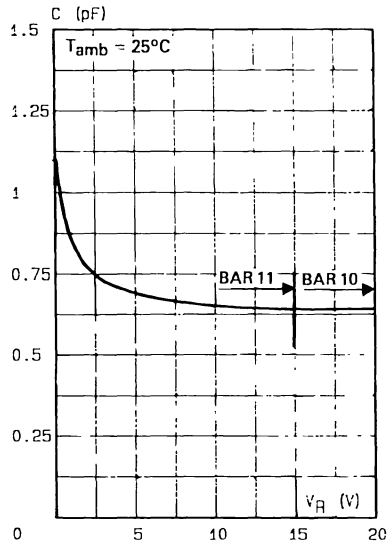
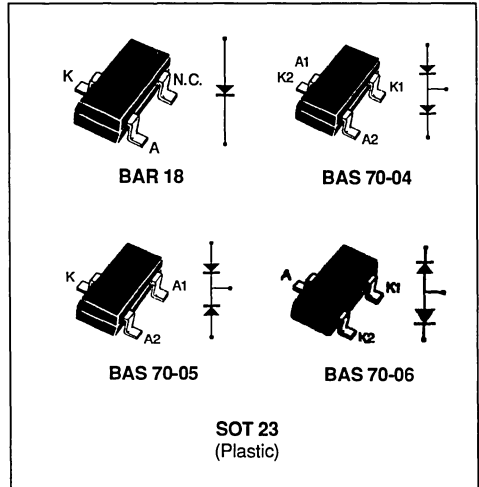


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODES

DESCRIPTION

Low turn-on and high breakdown voltage diodes intended for ultrafast switching and UHF detectors in hybrid micro circuits.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	70	V
P_{tot}	Power Dissipation* $T_{amb} = 25^{\circ}C$	200	mW
T_{stg} T_J	Storage and Junction Temperature Range	- 55 to 150 150	$^{\circ}C$ $^{\circ}C$

THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	625	$^{\circ}C/W$
$R_{th(j-SR)}$	Junction-substrate	400	$^{\circ}C/W$

* Mounted on ceramic substrate : 7 x 5 x 0.5mm.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^{\circ}C$	$I_R = 10\mu A$		70			V
V_F	$T_{amb} = 25^{\circ}C$	$I_F = 1mA$				410	mV
I_R	$T_{amb} = 25^{\circ}C$	$V_R = 50V$				200	nA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^{\circ}C$	$V_R = 0$	$f = 1MHz$			2	pF
τ^*	$T_{amb} = 25^{\circ}C$	$I_F = 5mA$	Krakauer Method			100	ps

* Effective carrier life time.

Type	BAR 18	BAS 70-04	BAS 70-05	BAS 70-06
Marking	D76	D96	D97	D98

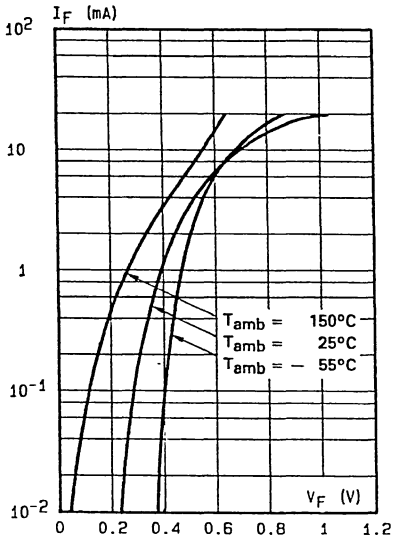


Fig.1 - Forward current versus forward voltage at low level (typical values).

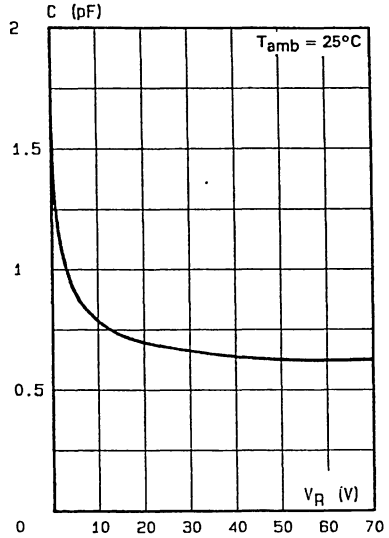


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

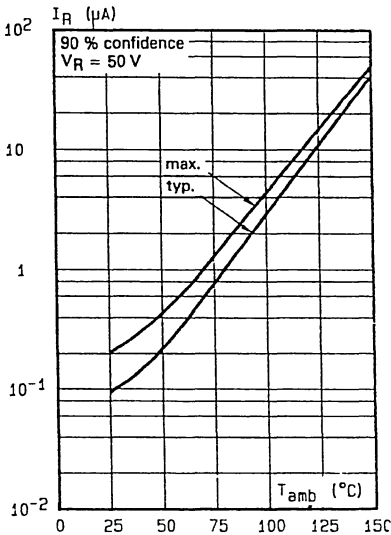


Fig.3 - Reverse current versus ambient temperature.

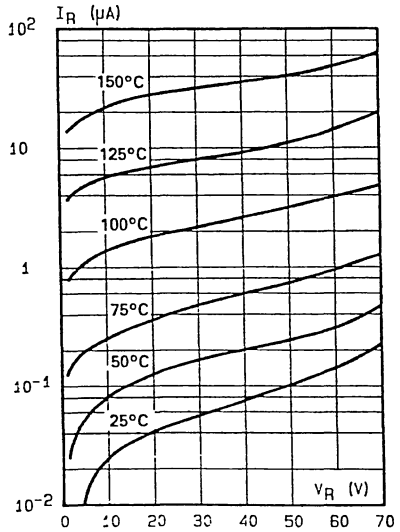
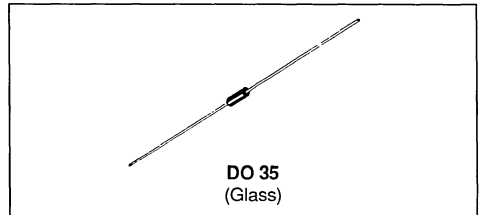


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		4	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	30	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 1\text{s}$	60	mA
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at4mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	4			V
$V_F(1)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 10\text{mA}$			0.6	V
$I_R(1)$	$T_{amb} = 25^\circ\text{C}$	$V_R = 3\text{V}$			0.25	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 1\text{V}$	$f = 1\text{MHz}$			1	pF
F (2)	$T_{amb} = 25^\circ\text{C}$	$f = 1\text{GHz}$			6		dB

* On infinite heatsink with 4mm lead length

(1) Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

(2) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure 1.5dB.

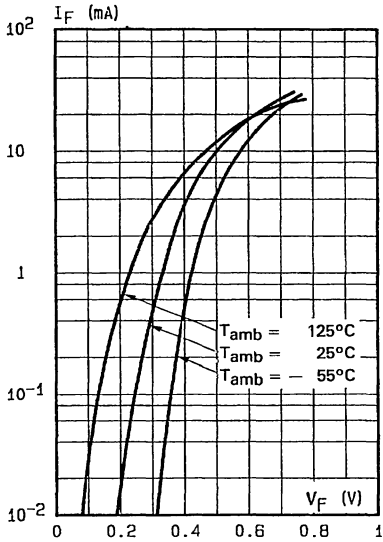


Fig.1 - Forward current versus forward voltage (typical values).

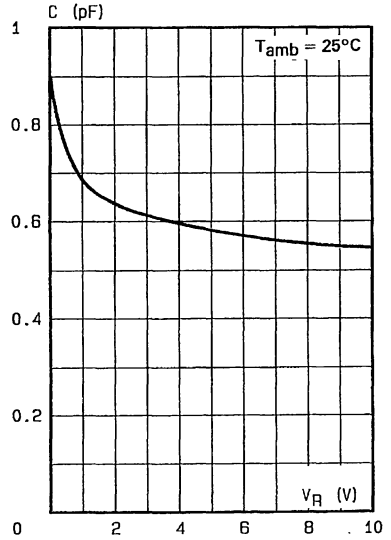


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

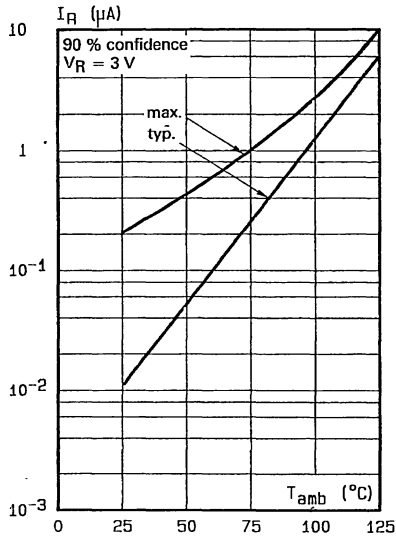


Fig.3 - Reverse current versus ambient temperature.

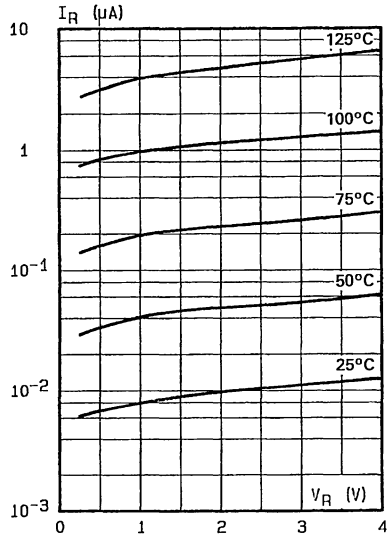


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

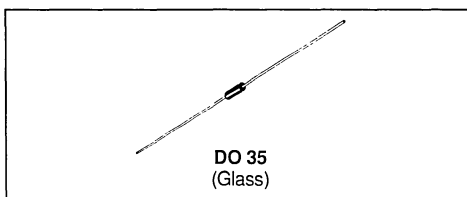
SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode featuring high breakdown, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.

Matched batches are available on request.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	70	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$ 15	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 1\text{s}$ 50	mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 200	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	70			V
V_F^{**}	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 15\text{mA}$			1	
I_R^{**}	$T_{amb} = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.2	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* On infinite heatsink with 4mm lead length

** Pulse test : $t_b \leq 300\mu\text{s}$ $\delta < 2\%$.

Matched batches available on request Test conditions (forward voltage and/or capacitance) according to customer specification

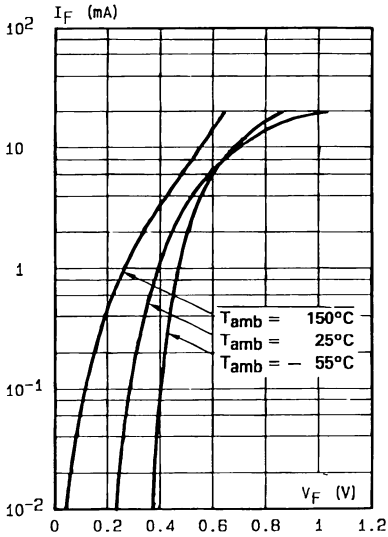


Fig.1 Forward current versus forward voltage at low level (typical values).

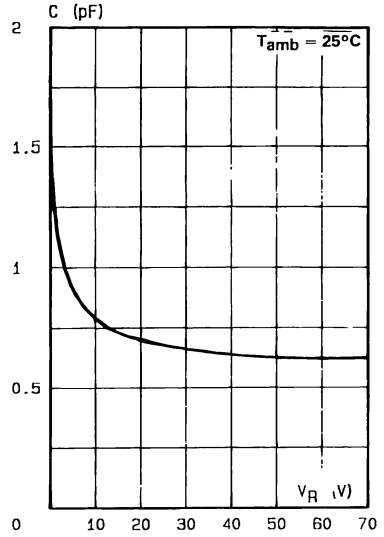


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

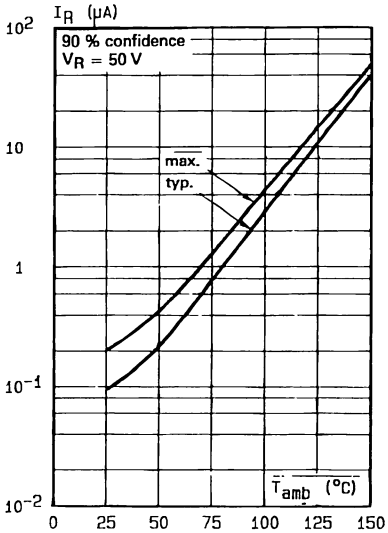


Fig.3 - Reverse current versus ambient temperature.

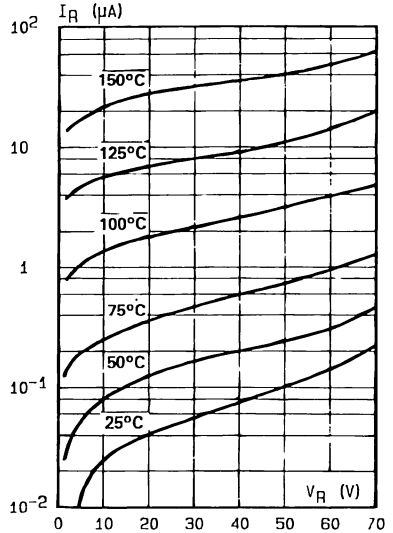
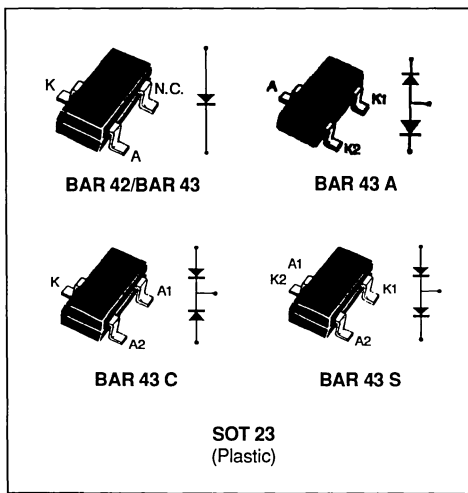


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODES


DESCRIPTION

General purpose, metal to silicon diodes featuring very low turn-on voltage and fast switching.

ABSOLUTE RATINGS (limiting values) ($T_{amb} = 25^{\circ}\text{C}$) (see note 1)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	30	V
I_F	Forward Current	100	mA
I_{FRM}	Repetitive Peak Forward Current	350	mA
I_{FSM}	Surge non Repetitive Forward Current	750	mA
P_{tot}	Power Dissipation* (see note 2)	160	mW
T_{stg} T_J	Storage and Junction Temperature Range	- 55 to 150 125	$^{\circ}\text{C}$ $^{\circ}\text{C}$

THERMAL RESISTANCES (see note 3)

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	625	$^{\circ}\text{C}/\text{W}$
$R_{th(j-SR)}$	Junction-substrate	400	$^{\circ}\text{C}/\text{W}$

* Mounted on ceramic substrate : $7 \times 5 \times 0.5\text{mm}$

Notes : 1 For double diodes maximum ratings apply to each diode, provided that rated P_{tot} is not exceeded.

2 For double diodes, P_{tot} is the total power dissipation of the two diodes

3 For double diodes, R_{th} refer to the total power dissipation in the two diodes and is given independently of the power distribution in the two diodes

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^{\circ}\text{C}$	$I_R = 100\mu\text{A}$		30			V
V_F	$T_{amb} = 25^{\circ}\text{C}$	BAR 42	$I_F = 10\text{mA}$		0.35	0.4	V
			$I_F = 50\text{mA}$		0.5	0.65	
		BAR 43	$I_F = 2\text{mA}$	0.26		0.33	
			$I_F = 15\text{mA}$			0.45	
All	$I_F = 100\text{mA}$			1			
I_R	$T_{amb} = 25^{\circ}\text{C}$	$V_R = 25\text{V}$				500	nA
	$T_{amb} = 100^{\circ}\text{C}$					100	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^{\circ}\text{C}$	$V_R = 1\text{V}$	$f = 1\text{MHz}$		7		pF
t_{rr}	$T_{amb} = 25^{\circ}\text{C}$ $I_{rr} = 1\text{mA}$	$I_F = 10\text{mA}$ $R_L = 100\Omega$	$I_R = 10\text{mA}$			5	ns
η^*	$T_{amb} = 25^{\circ}\text{C}$ $F = 45\text{MHz}$	$R_L = 15\text{k}\Omega$ $V_I = 2\text{V}$	$C_L = 300\text{pF}$ for BAR 43	80			%

* Detection efficiency

Type	BAR 42	BAR 43	BAR 43A	BAR 43C	BAR 43 S
Marking	D94	D95	DB1	DB2	DA5

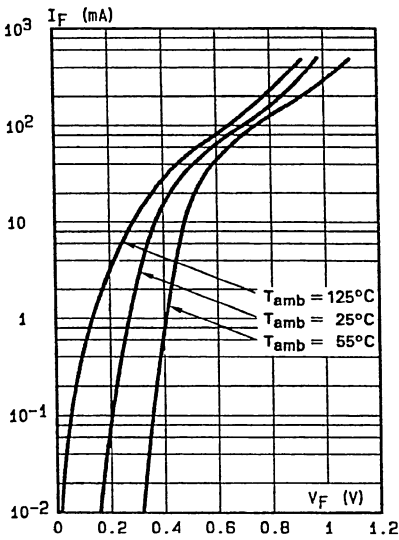


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

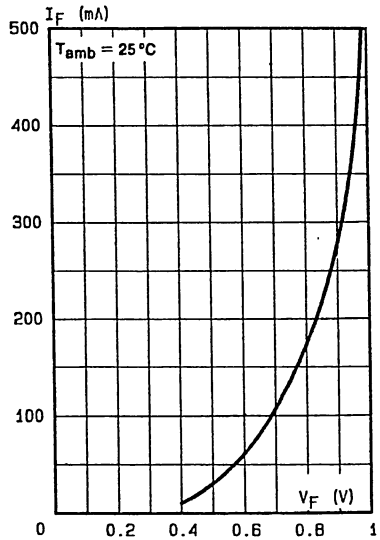


Fig.2 - Forward current versus forward voltage (typical values).

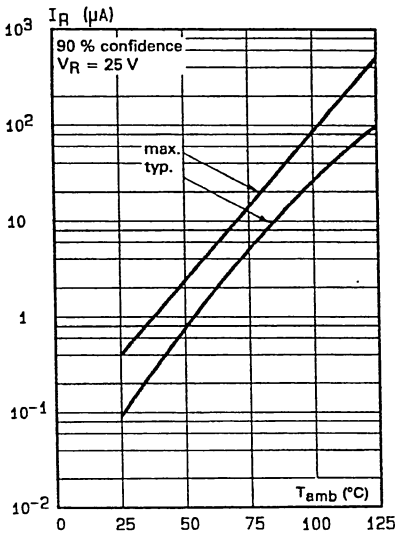


Fig.3 - Reverse current versus junction temperature.

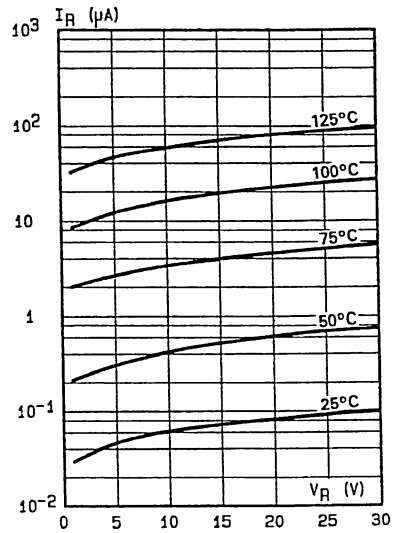


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

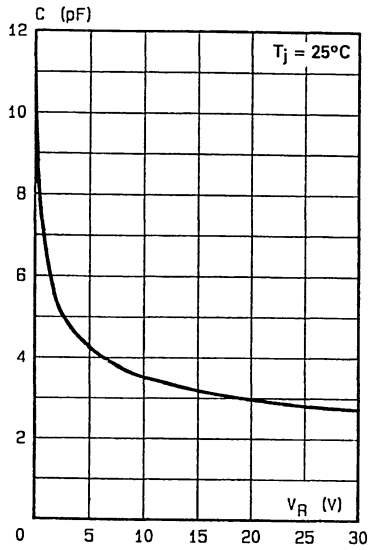
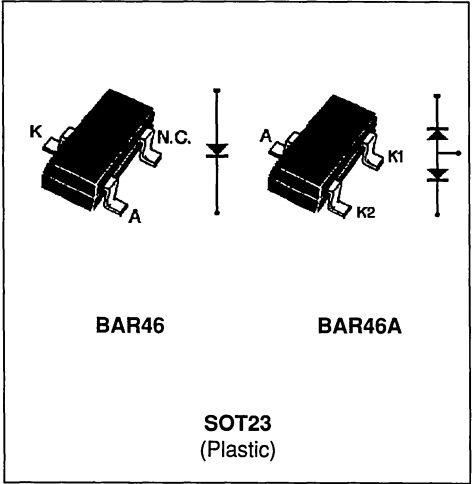


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODES



DESCRIPTION

High voltage Schottky rectifier suited for SLIC protection during the card insertion operation.

ABSOLUTE RATINGS(limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		100	V
P_{tot}	Power Dissipation *	$T_{amb}=25^{\circ}C$	200	mW
T_{stg} T_j	Storage and Junction Temperature Range		- 55 to + 150 150	$^{\circ}C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient *	625	$^{\circ}C/W$
$R_{th(j-SR)}$	Junction-Substrate	400	$^{\circ}C/W$

* Mounted on ceramic substrate : 7 x 5 x 0.5mm

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test conditions		Min.	Typ.	Max.	Unit
V _{BR}	T _j = 25 °C	I _R = 100 μA	100			V
V _F *	T _j = 25 °C	I _F = 0.1 mA			0.25	V
	T _j = 25 °C	I _F = 10 mA			0.45	
	T _j = 25 °C	I _F = 250 mA			1	
I _R *	T _j = 25 °C	V _R = 1.5 V			0.5	μA
	T _j = 60 °C				5	
	T _j = 25 °C	V _R = 10 V			0.8	
	T _j = 60 °C				7.5	
	T _j = 25 °C	V _R = 50 V			2	
	T _j = 60 °C				15	
	T _j = 25 °C	V _R = 75 V			5	
	T _j = 60 °C				20	

* Pulse test : t_p ≤ 300μs δ < 2%

DYNAMIC CHARACTERISTICS

Symbol	Test conditions		Min.	Typ.	Max.	Unit
C	T _j = 25 °C	V _R = 0 V		10		pF
	T _j = 25 °C	V _R = 1 V		6		

Type	BAR46	BAR46A
Marking	S46	A46

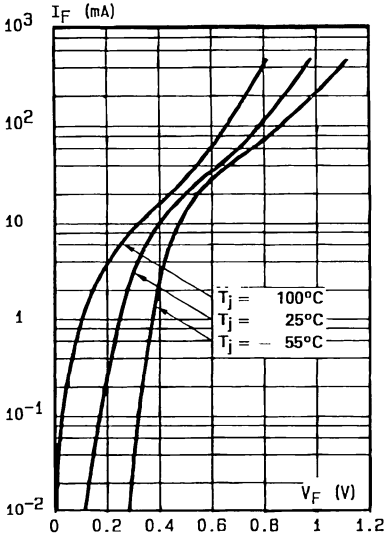


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

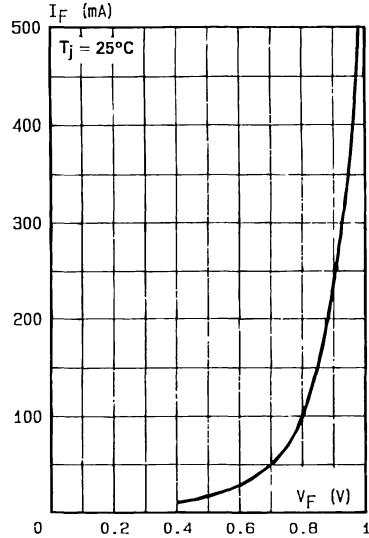


Fig.2 - Forward current versus forward voltage (typical values).

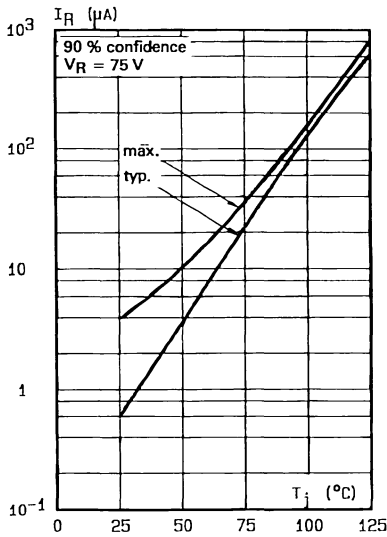


Fig.3 - Reverse current versus junction temperature (typical values).

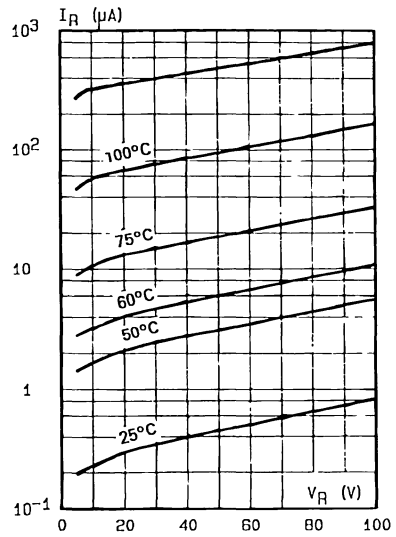


Fig.4 - Reverse current versus continuous reverse voltage

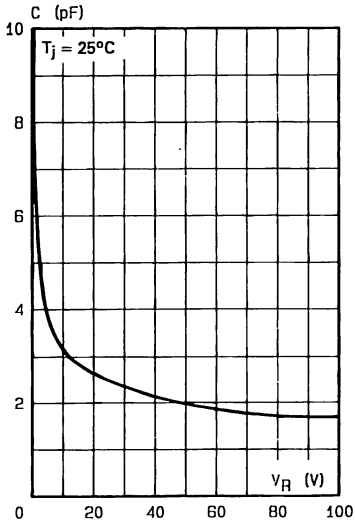


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values) .

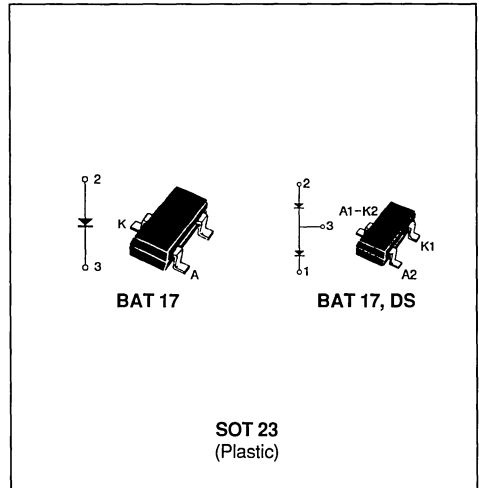


SMALL SIGNAL SCHOTTKY DIODES

DESCRIPTION

BAT 17 is a metal to silicon junction diode featuring low turn-on voltage, low capacitance and ultrafast switching. Single or double series connected diodes are available. Two double diodes can be connected in bridge or ring configuration.

These devices are suited for single or double balanced UHF mixers, sampling circuits, modulators, phase detectors.



ABSOLUTE RATINGS (limiting values) ($T_{amb} = 25^{\circ}\text{C}$)

Symbol	Parameter	Value	Unit
V_R	Continuous Reverse Voltage	4	V
I_F	Continuous Forward Current	30	mA
T_{stg}	Storage and Junction Temperature Range	- 65 to 100	$^{\circ}\text{C}$
T_J		100	$^{\circ}\text{C}$

THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	625	$^{\circ}\text{C}/\text{W}$
$R_{th(j-SR)}$	Junction-substrate	400	$^{\circ}\text{C}/\text{W}$

* Mounted on ceramic substrate : $7 \times 5 \times 0.5\text{mm}$.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^{\circ}C$	$I_R = 10\mu A$		4			V
V_F	$T_{amb} = 25^{\circ}C$	$I_F = 10mA$				0.6	V
I_R	$T_{amb} = 25^{\circ}C$	$V_R = 3V$				0.25	μA
	$T_{amb} = 60^{\circ}C$					1.25	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^{\circ}C$	$V_R = 0$	$f = 1MHz$			1	pF
F	$T_{amb} = 25^{\circ}C$	$F = 1GHz$	See note			7	dB
r	$T_{amb} = 25^{\circ}C$	$I_F = 5mA$	$F = 1KHz$			15	Ω

Note : NOISE FIGURE TEST

- Diode is inserted in a tuned stripline circuit
- Local oscillator frequency : 1GHz
- Local oscillator power : 1mW
- Intermediary frequency amplifier, tuned on 30MHz, has a noise figure : 1.5dB.

Marking : A3 for BAT 17
 D85 for BAT 17DS

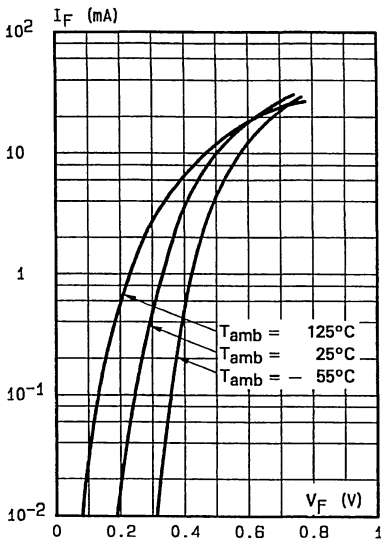


Fig.1 - Forward current versus forward voltage (typical values).

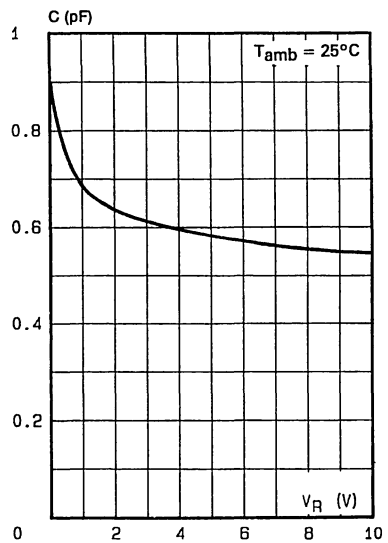


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

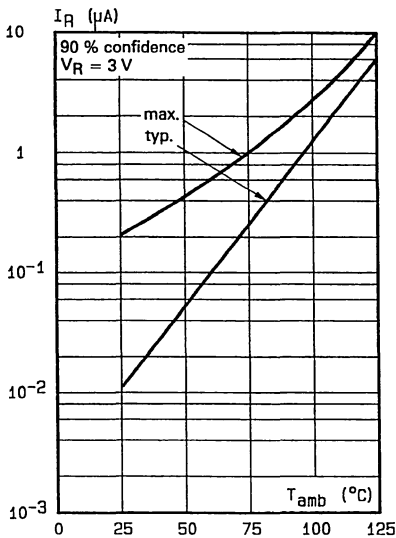


Fig.3 - Reverse current versus ambient temperature.

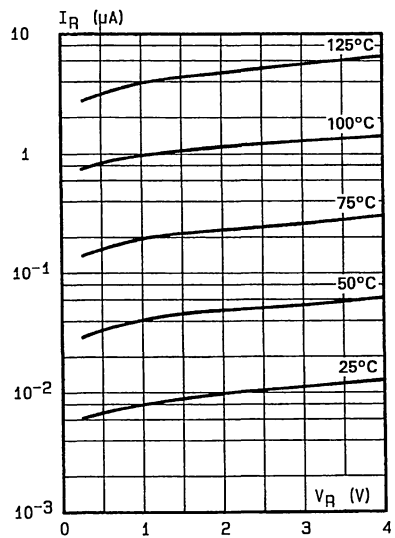
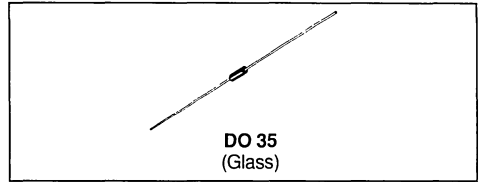


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.

Matched batches are available on request.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	10	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	30 mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 1\text{ s}$	60 mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	125	$^\circ\text{C}$
		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	10			V
$V_F(1)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.4	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 20\text{mA}$			1	
$I_R(1)$	$T_{amb} = 25^\circ\text{C}$	$V_R = 5\text{V}$			0.1	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{GHz}$			1.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 20\text{mA}$	Krakauer Method			100	ps
F (2)	$T_{amb} = 25^\circ\text{C}$	$f = 1\text{GHz}$			6		dB

* On infinite heatsink with 4mm lead length

(1) Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

(2) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure 1.5dB.

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification.

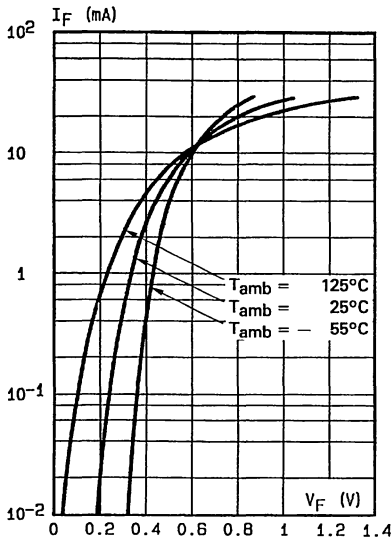


Fig.1 - Forward current versus forward voltage at low level (typical values).

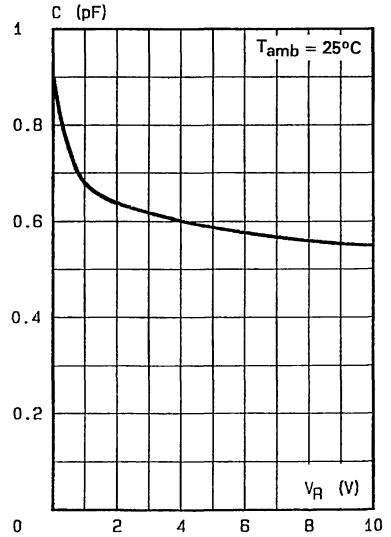


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

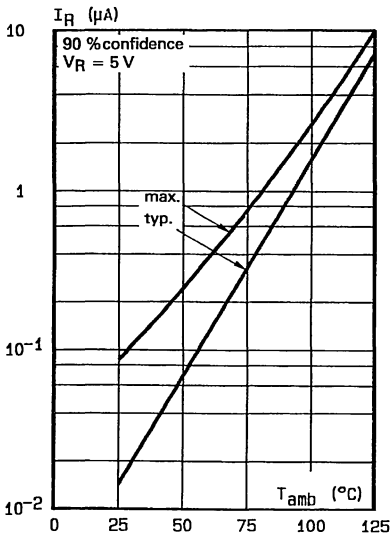


Fig.3 - Reverse current versus ambient temperature.

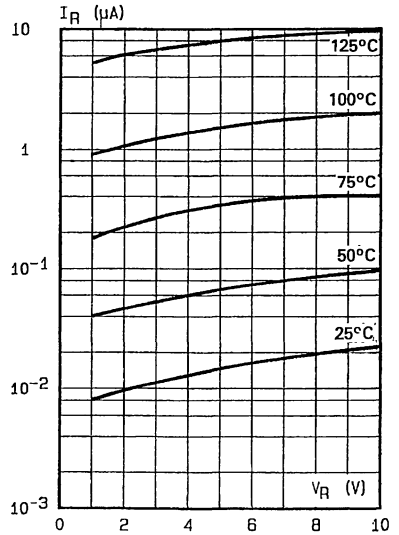
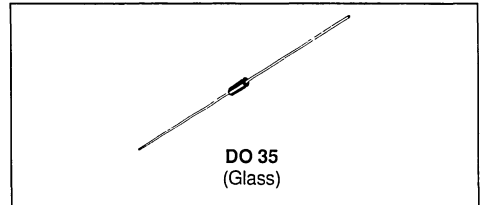


Fig.4 - Reverse current versus reverse continuous voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	5	V
I_F	Forward Continuous Current* $T_a = 25^\circ\text{C}$	30	mA
I_{FSM}	Surge non Repetitive Forward Current* $t_p \leq 1\text{s}$	60	mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering 10s at 4mm from Case	230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 100\mu\text{A}$	5			V
$V_F(1)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 10\text{mA}$			0.55	V
$I_R(1)$	$T_{amb} = 25^\circ\text{C}$	$V_R = 1\text{V}$			0.05	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$ $f = 1\text{MHz}$			1	pF
$Q_S(2)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 10\text{mA}$			3	pC
F(3)	$T_{amb} = 25^\circ\text{C}$	$f = 1\text{GHz}$		6	7	dB

* On infinite heatsink with 4mm lead length

(1) Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

(2) Measured on B-line Electronics QS-3 stored charge meter.

(3) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure, 1 5dB.

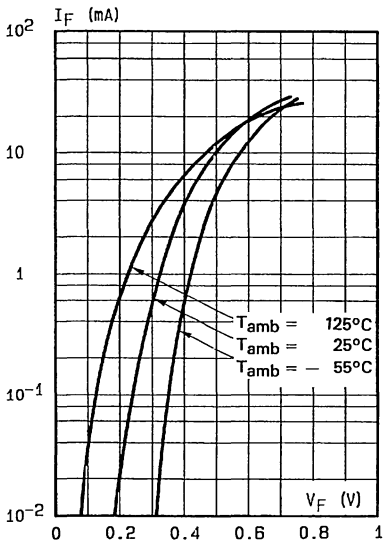


Fig.1 - Forward current versus forward voltage (typical values).

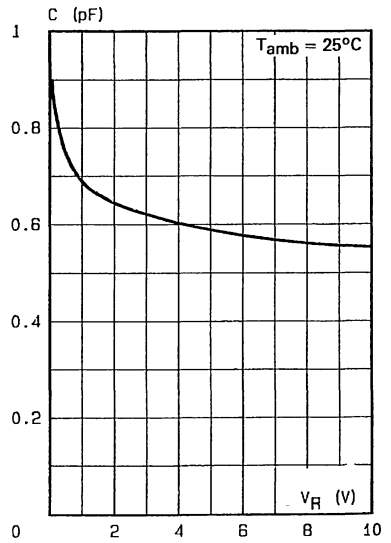


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

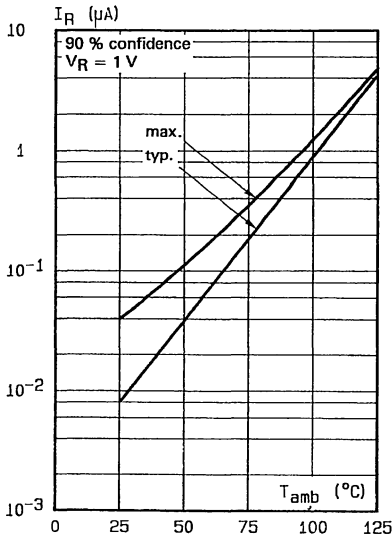


Fig.3 - Reverse current versus ambient temperature.

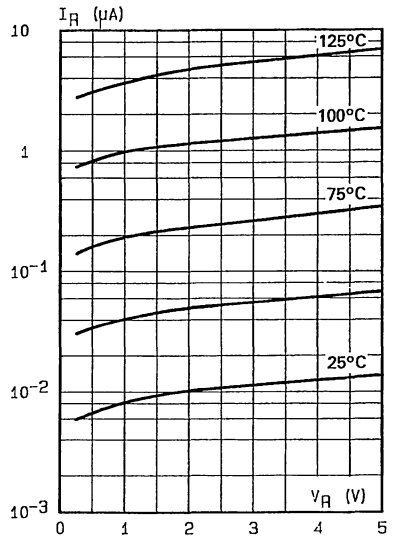
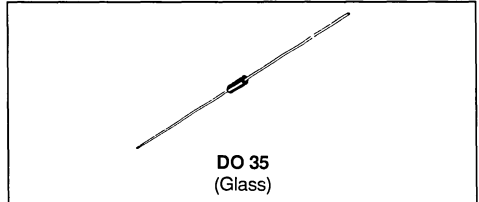


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

General purpose metal to silicon diode featuring very low turn-on voltage and fast switching.

This device has integrated protection against excessive voltage such as electrostatic discharges.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		100	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	100	mA
I_{FRM}	Repetitive Peak Forward Current*	$t_p \leq 1\text{s}$ $\delta \leq 0.5$	350	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p = 10\text{ms}$	750	mA
P_{tot}	Power Dissipation*	$T_a = 95^\circ\text{C}$	100	mW
T_{stg}	Storage and Junction Temperature Range		- 65 to 150	$^\circ\text{C}$
T_J			- 65 to 125	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	300	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_J = 25^\circ\text{C}$	$I_R = 100\mu\text{A}$	100			V
V_F^{**}	$T_J = 25^\circ\text{C}$	$I_F = 1\text{mA}$		0.4	0.45	V
	$T_J = 25^\circ\text{C}$	$I_F = 200\text{mA}$			1	
I_R^{**}	$T_J = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.1	μA
	$T_J = 100^\circ\text{C}$				20	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 1\text{V}$	$f = 1\text{MHz}$		2		pF

* On infinite heatsink with 4mm lead length

** Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

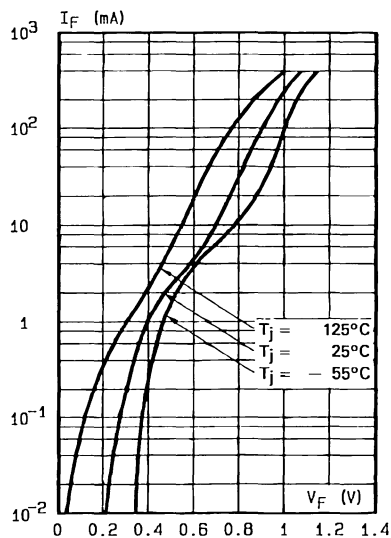


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

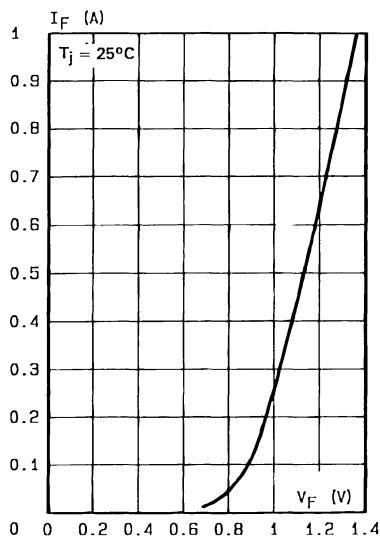


Fig.2 Forward current versus forward voltage (typical values).

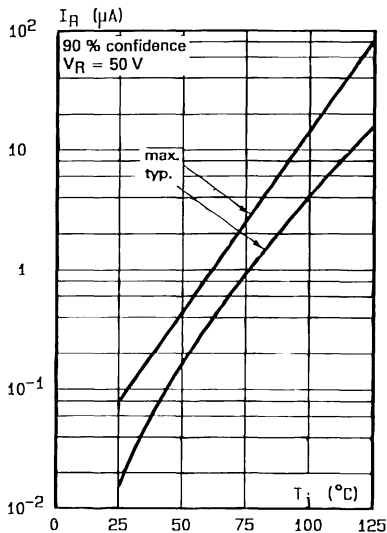


Fig.3 - Reverse current versus junction temperature.

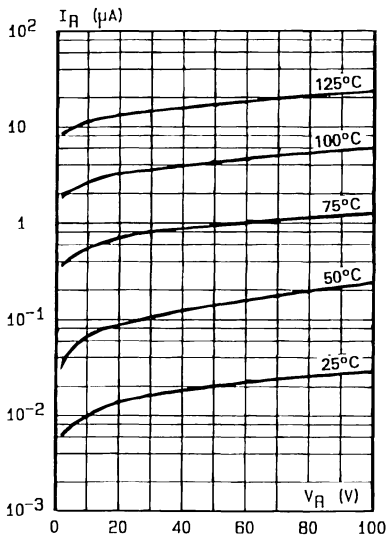


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

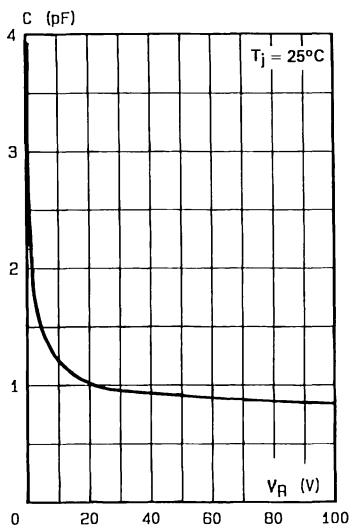


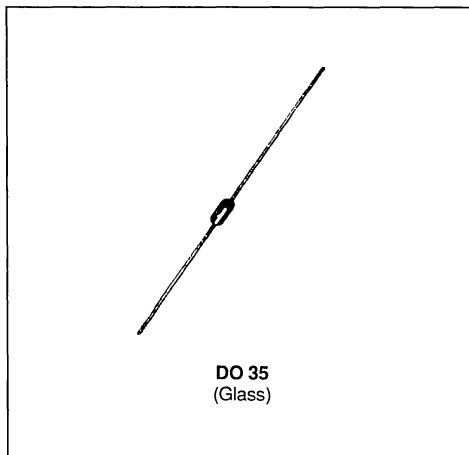
Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values) .

SMALL SIGNAL SCHOTTKY DIODES

DESCRIPTION

General purpose metal to silicon diodes featuring very low turn-on voltage and fast switching.

These devices have integrated protection against excessive voltage such as electrostatic discharges.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		30	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	200	mA
I_{FRM}	Repetitive Peak Forward Current*	$t_p \leq 1\text{s}$ $\delta \leq 0.5$	500	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p = 10\text{ms}$	4	A
P_{tot}	Power Dissipation*	$T_a = 65^\circ\text{C}$	200	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	300	$^\circ\text{C}/\text{W}$

* On infinite heatsink with 4mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _(BR)	T _J = 25°C	I _R = 100μA	30			V
V _F *	T _J = 25°C	I _F = 200mA	All Types		1	V
	T _J = 25°C	I _F = 10mA	BAT 42		0.4	
	T _J = 25°C	I _F = 50mA			0.65	
	T _J = 25°C	I _F = 2mA	BAT 43		0.33	
	T _J = 25°C	I _F = 15mA			0.45	
I _R *	T _J = 25°C	V _R = 25V			0.5	μA
	T _J = 100°C				100	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	T _J = 25°C	V _R = 1V f = 1MHz		7		pF
t _{rr}	T _J = 25°C	I _F = 10mA I _R = 10mA i _{rr} = 1mA R _L = 100Ω			5	ns
η	T _J = 25°C	R _L = 15KΩ C _L = 300pF f = 45MHz V _i = 2V	80			%

* Pulse test : t_p ≤ 300μs δ < 2%.

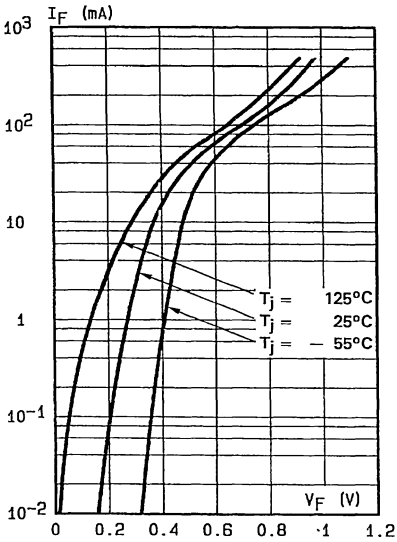


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

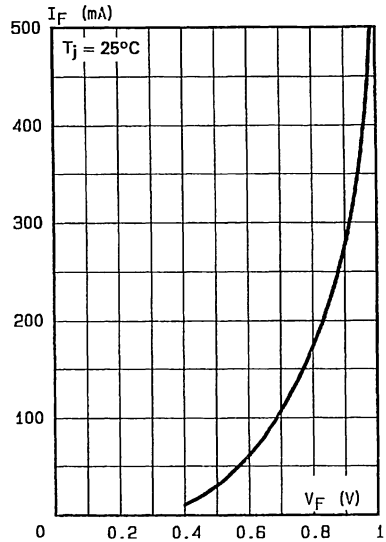


Fig.2 - Forward current versus forward voltage (typical values).

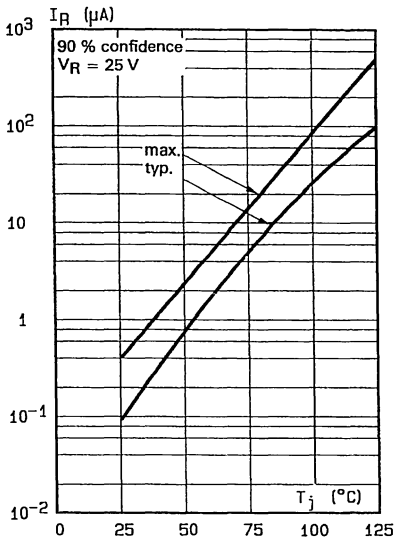


Fig.3 - Reverse current versus junction temperature.

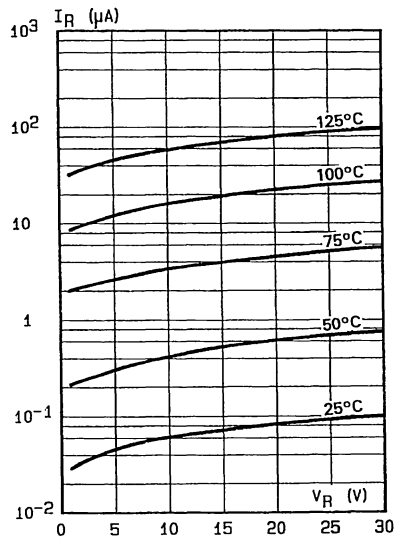


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

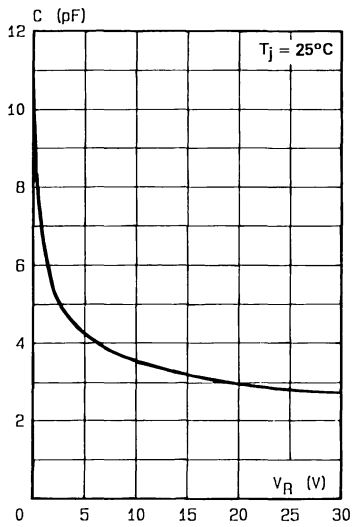
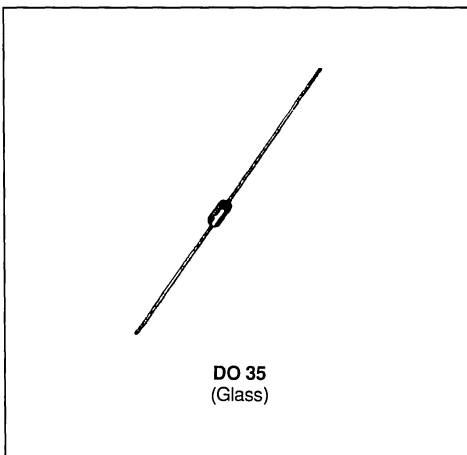


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values) .

SMALL SIGNAL SCHOTTKY DIODE


DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		15	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	30	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 1\text{s}$	60	mA
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to 150	$^\circ\text{C}$
			125	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	400	$^\circ\text{C/W}$

* On infinite heatsink with 4mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^{\circ}C$	$I_R = 10\mu A$	15			V
$V_F (1)$	$T_{amb} = 25^{\circ}C$	$I_F = 1mA$			0.38	V
	$T_{amb} = 25^{\circ}C$	$I_F = 10mA$			0.5	
	$T_{amb} = 25^{\circ}C$	$I_F = 30mA$			1	
$I_R (1)$	$T_{amb} = 25^{\circ}C$	$V_R = 6V$			0.1	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^{\circ}C$	$V_R = 1V$	$f = 1MHz$			1.1	pF
τ	$T_{amb} = 25^{\circ}C$	$I_F = 20mA$	Krakauer Method			100	ps
F (2)	$T_{amb} = 25^{\circ}C$	$f = 1GHz$			6	7	dB

(1) Pulse test : $t_p \leq 300\mu s$ $\delta < 2\%$

(2) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure 1.5dB

Matched batches available on request Test conditions (forward voltage and/or capacitance) according to customer specification.

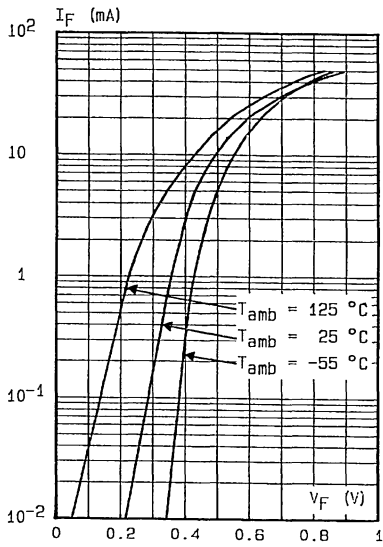


Fig.1 - Forward current versus forward voltage (typical values).

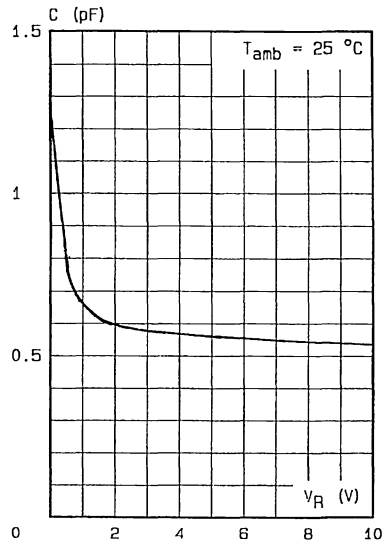


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

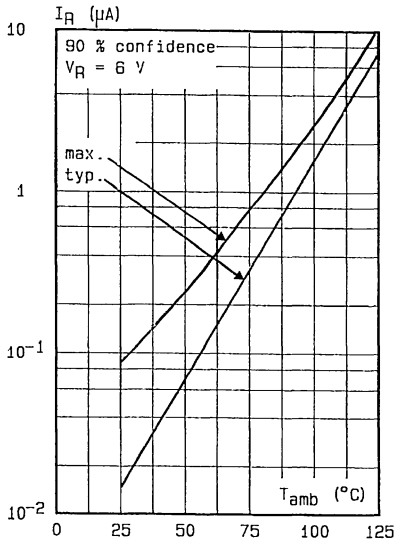


Fig.3 - Reverse current versus ambient temperature.

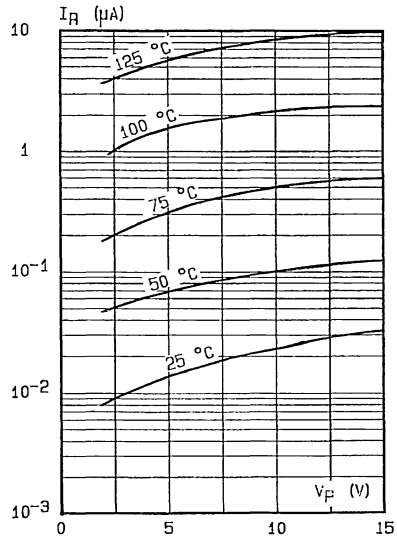
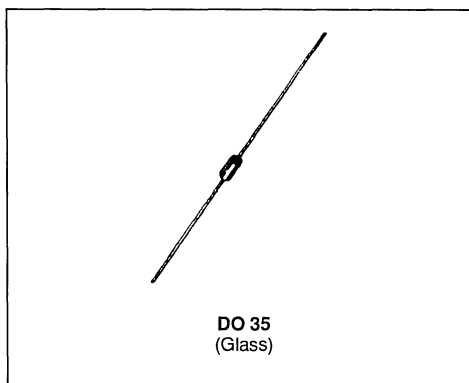


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

General purpose, metal to silicon diode featuring high breakdown voltage low turn-on voltage.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		100	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$	150	mA
I_{FRM}	Repetitive Peak Forward Current*	$t_p \leq 1\text{s}$ $\delta \leq 0.5$	350	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p = 10\text{ms}$	750	mA
P_{tot}	Power Dissipation*	$T_a = 80^\circ\text{C}$	150	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case		230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-a)}$	Junction-ambient*	300	$^\circ\text{C/W}$

* On infinite heatsink with 4mm lead length.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_J = 25^\circ\text{C}$	$I_R = 100\mu\text{A}$	100			V
V_F^*	$T_J = 25^\circ\text{C}$	$I_F = 0.1\text{mA}$			0.25	V
	$T_J = 25^\circ\text{C}$	$I_F = 10\text{mA}$			0.45	
	$T_J = 25^\circ\text{C}$	$I_F = 250\text{mA}$			1	
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = 1.5\text{V}$			0.5	μA
	$T_J = 60^\circ\text{C}$				5	
	$T_J = 25^\circ\text{C}$	$V_R = 10\text{V}$			0.8	
	$T_J = 60^\circ\text{C}$				7.5	
	$T_J = 25^\circ\text{C}$	$V_R = 50\text{V}$			2	
	$T_J = 60^\circ\text{C}$				15	
	$T_J = 25^\circ\text{C}$	$V_R = 75\text{V}$			5	
	$T_J = 60^\circ\text{C}$				20	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 0\text{V}$		10		pF
	$T_J = 25^\circ\text{C}$	$V_R = 1\text{V}$		6		

* Pulse test : $t_b \leq 300\mu\text{s}$ $\delta < 2\%$

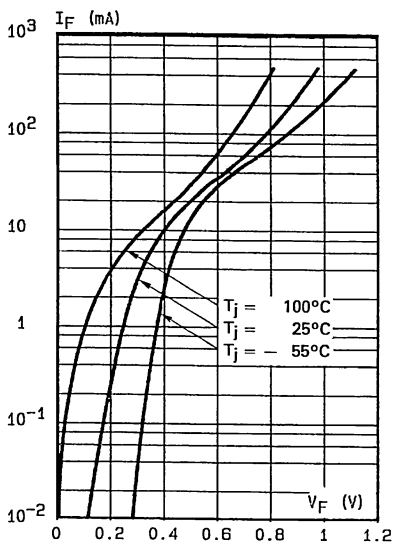


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

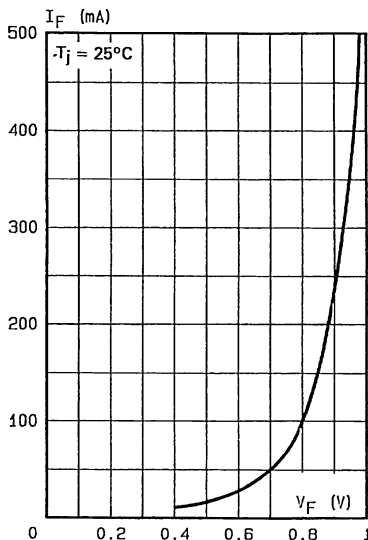


Fig.2 - Forward current versus forward voltage (typical values).

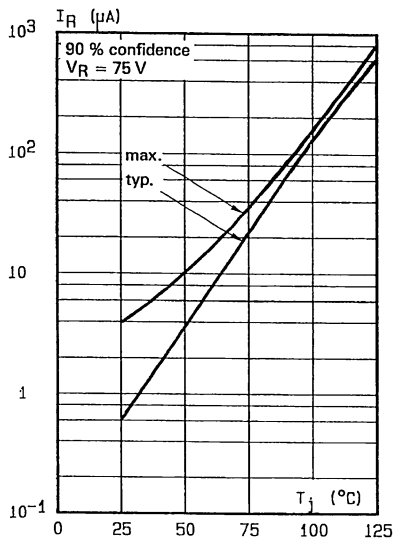


Fig.3 - Reverse current versus junction temperature (typical values).

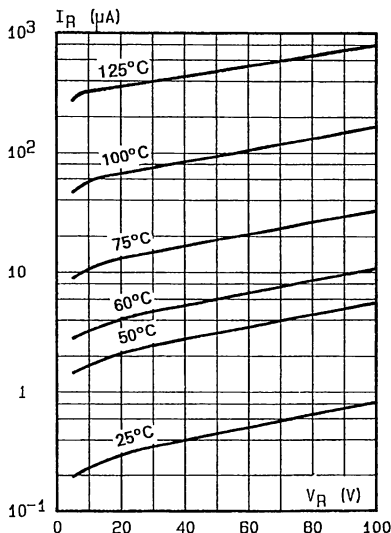


Fig.4 - Reverse current versus continuous reverse voltage

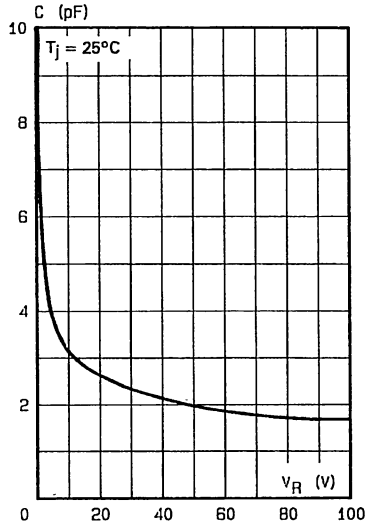
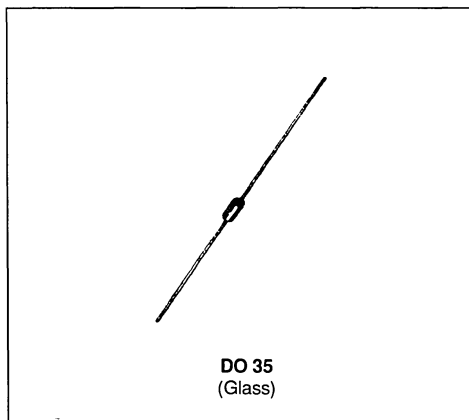


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values) .

SMALL SIGNAL SCHOTTKY DIODES


DESCRIPTION

General purpose metal to silicon diodes featuring very low turn-on voltage and fast switching.

These devices have integrated protection against excessive voltage such as electrostatic discharges.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	BAT 47	BAT 48	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	20	40	V
I_F	Forward Continuous Current*	$T_a = 25^\circ\text{C}$ 350		mA
I_{FRM}	Repetitive Peak Forward Current*	$t_p \leq 1\text{s}$ $\delta \leq 0.5$ 1		A
I_{FSM}	Surge non Repetitive Forward Current*	$t_p = 10\text{ms}$ 7.5		A
		$t_p = 1\text{s}$ 1.5		
P_{tot}	Power Dissipation*	$T_a = 25^\circ\text{C}$ 330		mW
T_{stg} T_j	Storage and Junction Temperature Range	- 65 to 150		$^\circ\text{C}$
		- 65 to 125		$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230		$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	300	$^\circ\text{C/W}$

* On infinite heatsink with 4mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V _(BR)	I _R = 10μA	BAT 47	20			V
	I _R = 25μA	BAT 48	40			
V _F *	T _J = 25°C I _F = 0.1mA	All Types			0.25	V
	T _J = 25°C I _F = 1mA				0.3	
	T _J = 25°C I _F = 10mA				0.4	
	T _J = 25°C I _F = 30mA	BAT 47			0.5	
	T _J = 25°C I _F = 150mA				0.8	
	T _J = 25°C I _F = 300mA				1	
	T _J = 25°C I _F = 50mA	BAT 48			0.5	
	T _J = 25°C I _F = 200mA				0.75	
T _J = 25°C I _F = 500mA				0.9		
I _R *	T _J = 25°C	V _R = 1.5V	All Types		1	μA
	T _J = 60°C				10	
	T _J = 25°C	V _R = 10V	BAT 47		4	
	T _J = 60°C				20	
	T _J = 25°C	V _R = 20V			10	
	T _J = 60°C				30	
	T _J = 25°C	V _R = 10V	BAT 48		2	
	T _J = 60°C				15	
	T _J = 25°C	V _R = 20V			5	
	T _J = 60°C				25	
	T _J = 25°C	V _R = 40V			25	
	T _J = 60°C				50	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	T _J = 25°C V _R = 0V	f = 1MHz		20		pF
	T _J = 25°C V _R = 1V			12		
t _{rr}	T _J = 25°C I _F = 10mA	V _R = 1V	i _{rr} = 1mA	R _L = 100Ω	10	ns

* Pulse test t_p ≤ 300μs δ < 2%

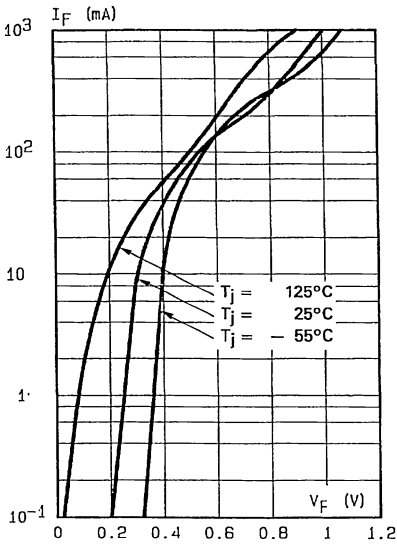


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

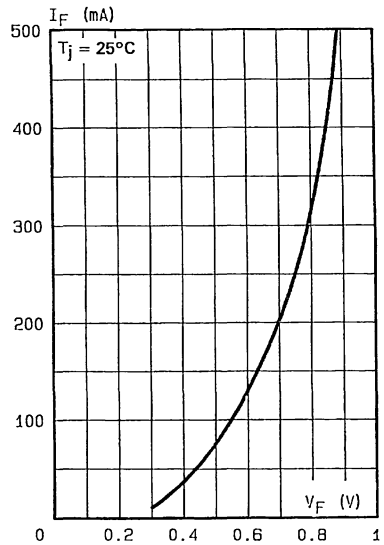


Fig.2 - Forward current versus forward voltage (typical values).

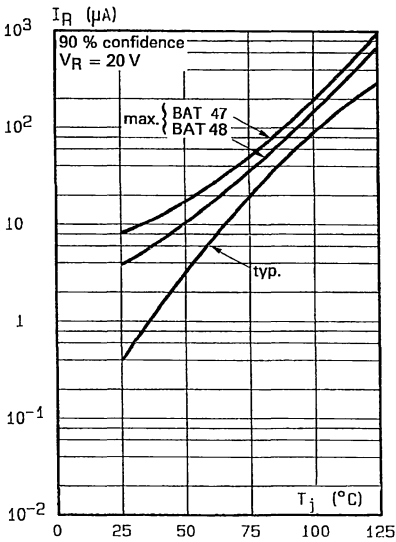


Fig.3 - Reverse current versus junction temperature.

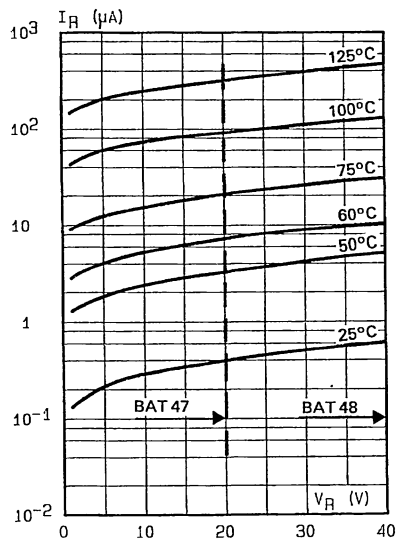


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

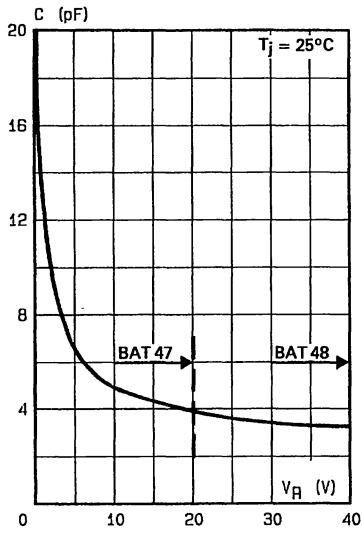
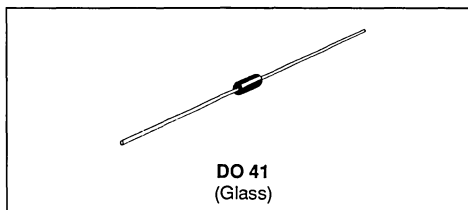


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

General purpose metal to silicon diode featuring very low turn-on voltage and fast switching.

This device has integrated protection against excessive voltage such as electrostatic discharges.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	80	V
I_F	Forward Continuous Current*	$T_a = 70^\circ\text{C}$ 500	mA
I_{FRM}	Repetitive Peak Forward Current*	$t_p = 1\text{s}$ $\delta \leq 0.5$ 3	A
I_{FSM}	Surge non Repetitive Forward Current*	$t_p \leq 10\text{ms}$ 10	A
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	110	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
I_R^{**}	$T_J = 25^\circ\text{C}$ $V_R = 80\text{V}$			200	μA
V_F^{**}	$T_J = 25^\circ\text{C}$ $I_F = 10\text{mA}$			0.32	V
	$T_J = 25^\circ\text{C}$ $I_F = 100\text{mA}$			0.42	
	$T_J = 25^\circ\text{C}$ $I_F = 1\text{A}$			1	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$ f = 1MHz	$V_R = 0\text{V}$		120	pF
		$V_R = 5\text{V}$		35	

* On infinite heatsink with 4mm lead length

** Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

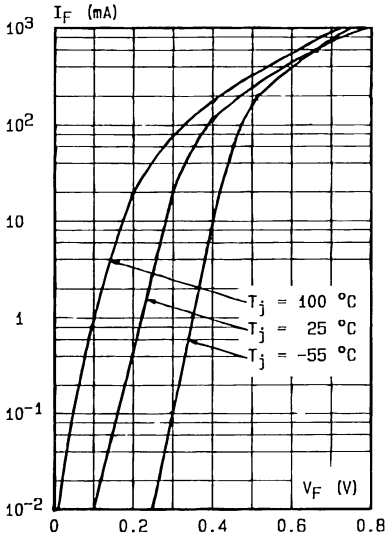


Fig.1 - Forward current versus forward voltage at low level (typical values).

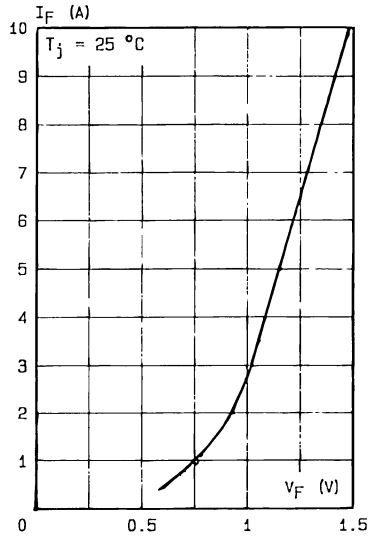


Fig.2 - Forward current versus forward voltage at high level (typical values).

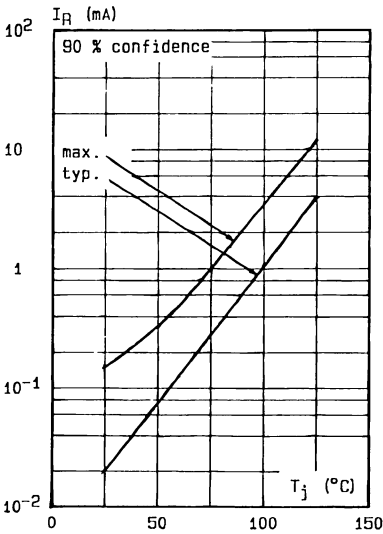


Fig.3 - Reverse current versus junction temperature.

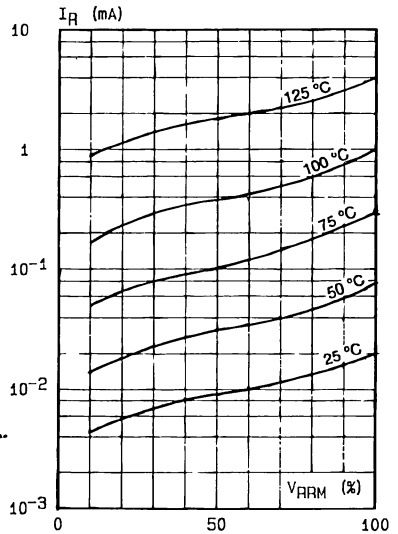


Fig.4 - Reverse current versus V_{RRM} in per cent.

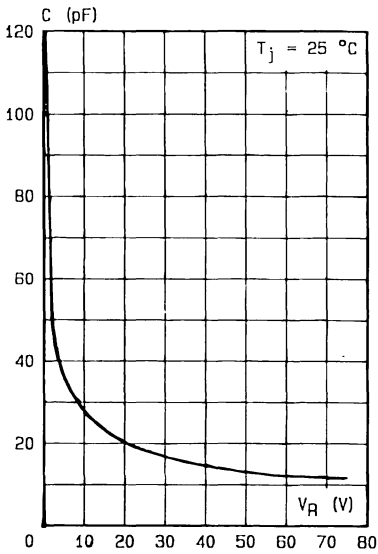


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

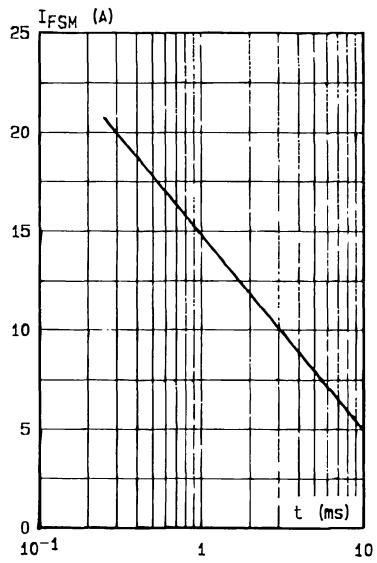


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms.

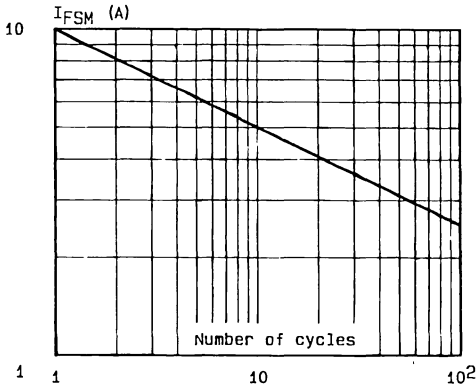
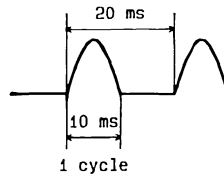
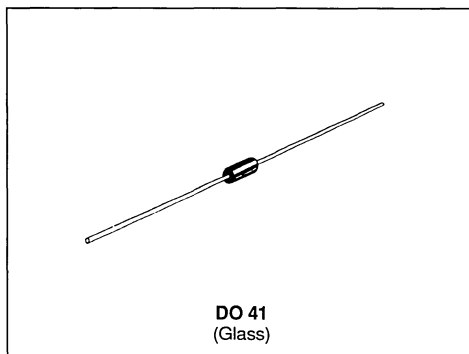


Fig.7 - Surge non repetitive forward current versus number of cycles.



SMALL SIGNAL SCHOTTKY DIODES
DESCRIPTION

Metal to silicon rectifier diodes in glass case featuring very low forward voltage drop and fast recovery time, intended for low voltage switching mode power supply, polarity protection and high frequency circuits.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
$I_{F(AV)}$	Average Forward Current*	$T_{amb} = 60^{\circ}\text{C}$ 1	A
I_{FSM}	Surge non Repetitive Forward Current	$T_{amb} = 25^{\circ}\text{C}$ $t_p = 10\text{ms}$ Sinusoidal Pulse	A
		$T_{amb} = 25^{\circ}\text{C}$ $t_p = 300\mu\text{s}$ Rectangular Pulse	
T_{stg} T_j	Storage and Junction Temperature Range	- 65 to 150 - 65 to 125	$^{\circ}\text{C}$ $^{\circ}\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230	$^{\circ}\text{C}$

Symbol	Parameter	BYV 10-20	BYV 10-30	BYV 10-40	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	110	$^{\circ}\text{C/W}$

* On infinite heatsink with 4mm lead length.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			0.5	mA
	$T_J = 100^\circ\text{C}$				10	
V_F^*	$I_F = 1\text{A}$	$T_J = 25^\circ\text{C}$			0.55	V
	$I_F = 3\text{A}$				0.85	

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 0$		220		pF

Forward current flow in a schottky rectifier is due to majority carrier conduction. So reverse recovery is not affected by stored charge as in conventional PN junction diodes.

Nevertheless, when the device switches from forward biased condition to reverse blocking state, current is required to charge the depletion capacitance of the diode.

This current depends only of diode capacitance and external circuit impedance. Satisfactory circuit behaviour analysis may be performed assuming that schottky rectifier consists of an ideal diode in parallel with a variable capacitance equal to the junction capacitance (see fig. 5 page 4/4).

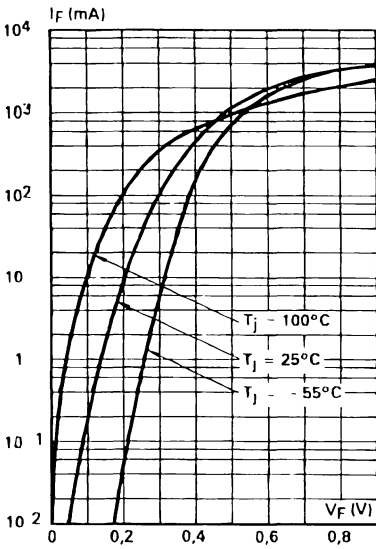


Fig.1 Forward current versus forward voltage at low level (typical values)

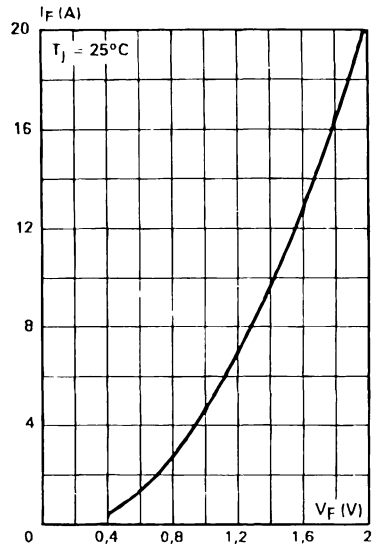


Fig.2 Forward current versus forward voltage at high level (typical values)

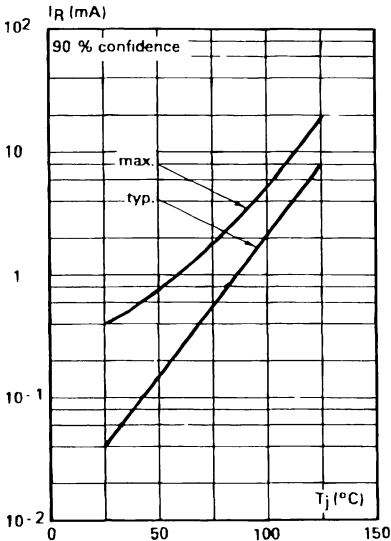


Fig.3 Reverse current versus junction temperature

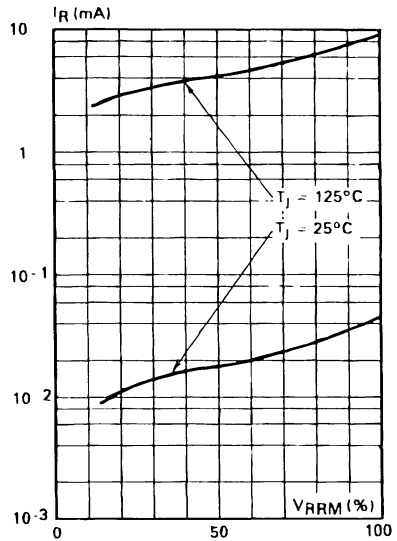


Fig.4 Reverse current versus V_{RRM} in per cent

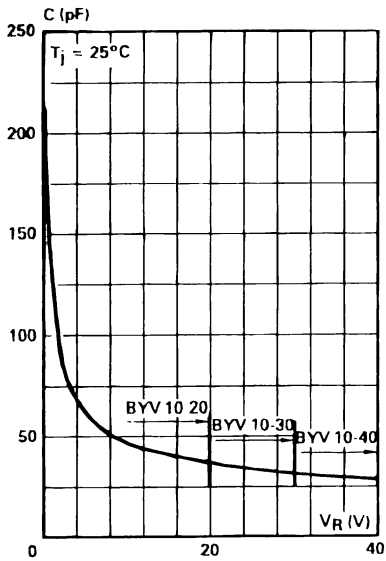


Fig. 5 - Capacitance C versus reverse applied voltage V_R (typical values)

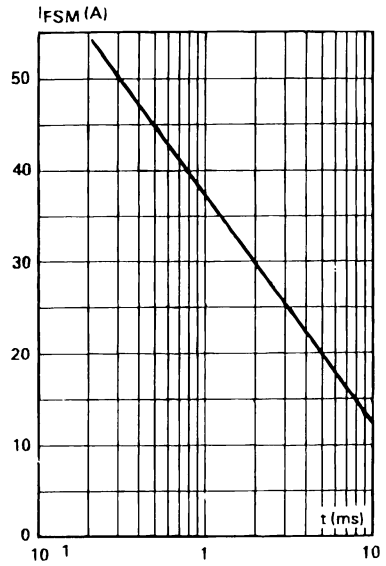


Fig. 6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms

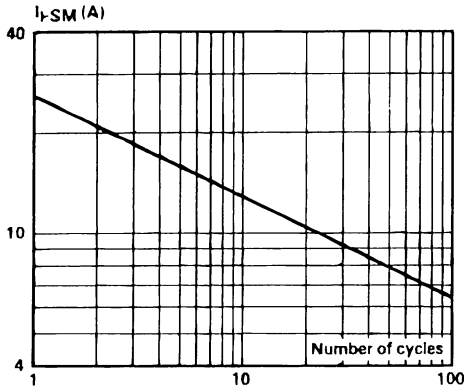
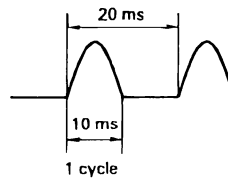


Fig. 7 - Surge non repetitive forward current versus number of cycles.

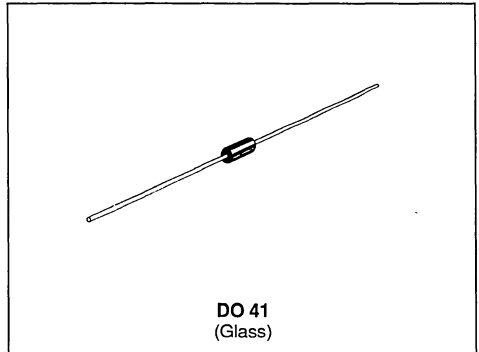




SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon rectifier diode in glass case featuring very low forward voltage drop and fast recovery time, intended for low voltage switching mode power supply, polarity protection and high frequency circuits.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	20	V
$I_{F(AV)}$	Average Forward Current*	1	A
I_{FSM}	Surge non Repetitive Forward Current	$T_{amb} = 25^{\circ}C$ $t_p = 10ms$ Sinusoidal Pulse	A
		$T_{amb} = 25^{\circ}C$ $t_p = 300\mu s$ Rectangular Pulse	
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 - 65 to 125	$^{\circ}C$ $^{\circ}C$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230	$^{\circ}C$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	110	$^{\circ}C/W$

* On infinite heatsink with 4mm lead length

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			0.3	mA
	$T_J = 100^\circ\text{C}$				10	
V_F^*	$I_F = 1\text{A}$	$T_J = 25^\circ\text{C}$			0.45	V
	$I_F = 3\text{A}$				0.75	

* Pulse test $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 0$		330		pF

Forward current flow in a schottky rectifier is due to majority carrier conduction. So reverse recovery is not affected by stored charge as in conventional PN junction diodes.

Nevertheless, when the device switches from forward biased condition to reverse blocking state, current is required to charge the depletion capacitance of the diode.

This current depends only of diode capacitance and external circuit impedance. Satisfactory circuit behaviour analysis may be performed assuming that schottky rectifier consists of an ideal diode in parallel with a variable capacitance equal to the junction capacitance (see fig. 5 page 4/4).

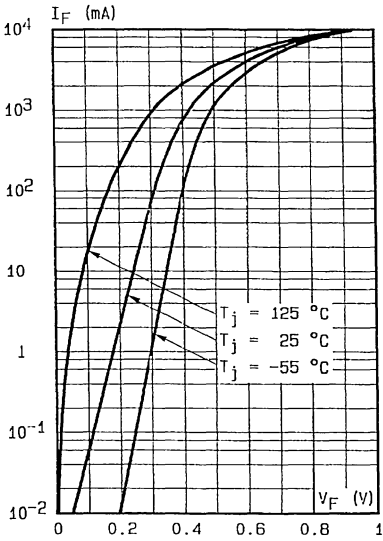


Fig.1 - Forward current versus forward voltage at low level (typical values) .

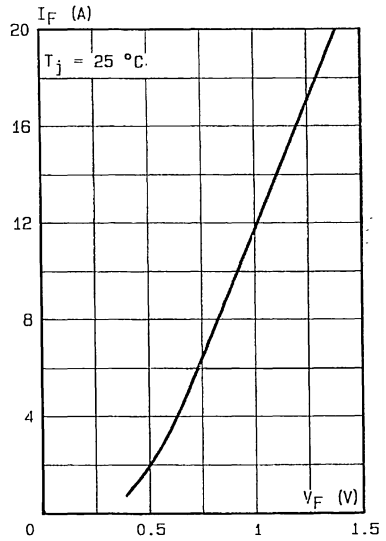


Fig.2 - Forward current versus forward voltage at high level (typical values) .

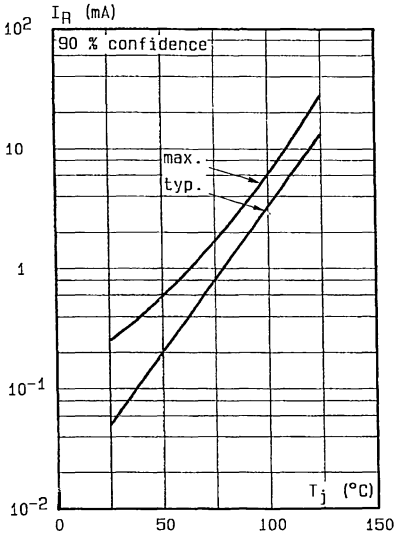


Fig.3 - Reverse current versus junction temperature.

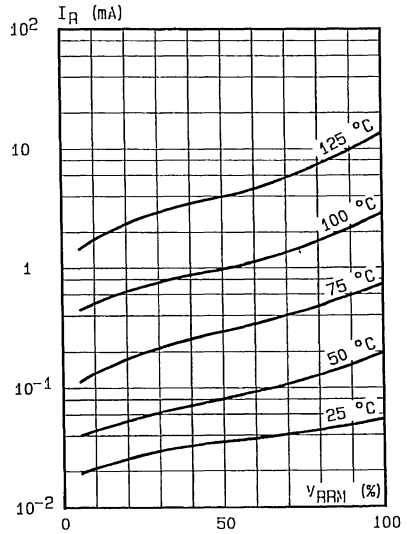


Fig.4 - Reverse current versus V_{ARM} in per cent.

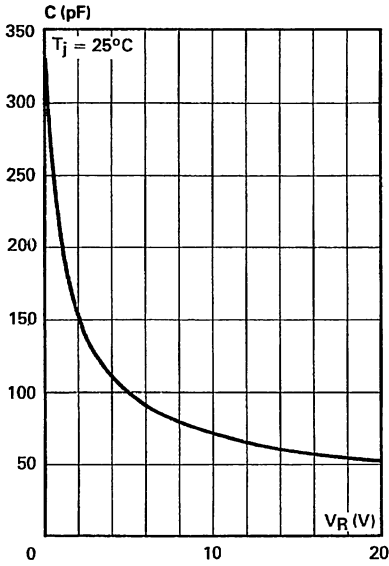


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values)

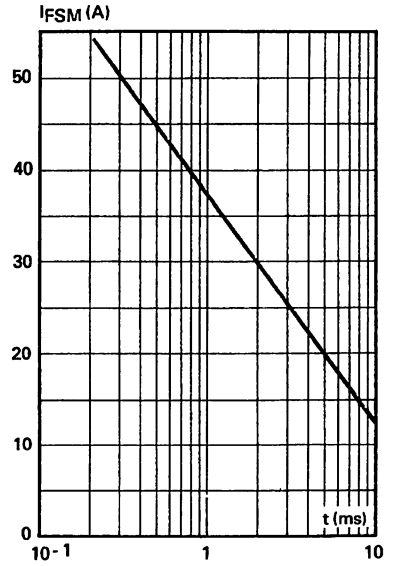


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms.

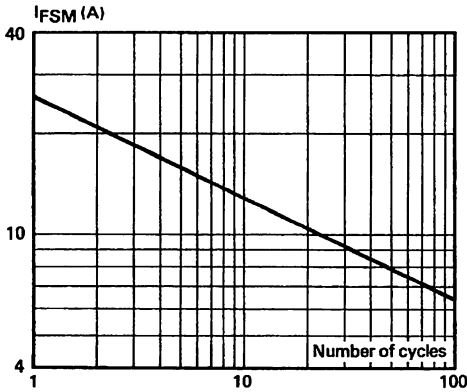
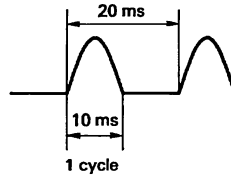
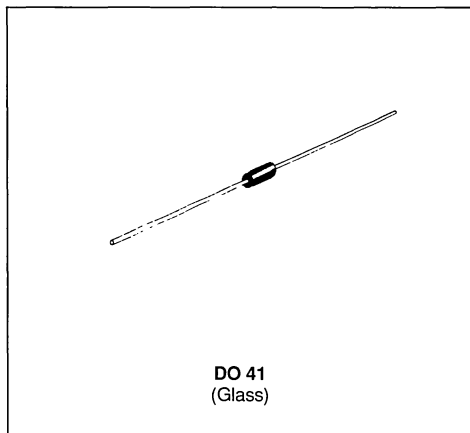


Fig.7 - Surge non repetitive forward current versus number of cycles.



SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon rectifier diode in glass case featuring very low forward voltage drop and fast recovery time, intended for low voltage switching mode power supply, polarity protection and high frequency circuits.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	60	V
$I_{F(AV)}$	Average Forward Current*	$T_{amb} = 25^{\circ}\text{C}$ 1	A
I_{FSM}	Surge non Repetitive Forward Current	$T_{amb} = 25^{\circ}\text{C}$ $t_p = 10\text{ms}$ Sinusoidal Pulse	A
		$T_{amb} = 25^{\circ}\text{C}$ $t_p = 300\mu\text{s}$ Rectangular Pulse	
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150	$^{\circ}\text{C}$
		- 65 to 125	$^{\circ}\text{C}$
T_L	Maximum Lead Temperature for Soldering during 10s at 4mm from Case	230	$^{\circ}\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	110	$^{\circ}\text{C}/\text{W}$

* On infinite heatsink with 4mm lead length.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			0.5	mA
	$T_j = 100^\circ\text{C}$				10	
V_F^*	$I_F = 1\text{A}$	$T_j = 25^\circ\text{C}$			0.7	V
	$I_F = 3\text{A}$				1	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_j = 25^\circ\text{C}$	$V_R = 0$		150		pF
	$T_j = 25^\circ\text{C}$	$V_R = 5\text{V}$		40		

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

Forward current flow in a schottky rectifier is due to majority carrier conduction. So reverse recovery is not affected by stored charge as in conventional PN junction diodes.

Nevertheless, when the device switches from forward biased condition to reverse blocking state, current is required to charge the depletion capacitance of the diode.

This current depends only of diode capacitance and external circuit impedance. Satisfactory circuit behaviour analysis may be performed assuming that schottky rectifier consists of an ideal diode in parallel with a variable capacitance equal to the junction capacitance (see fig. 5 page 4/4).

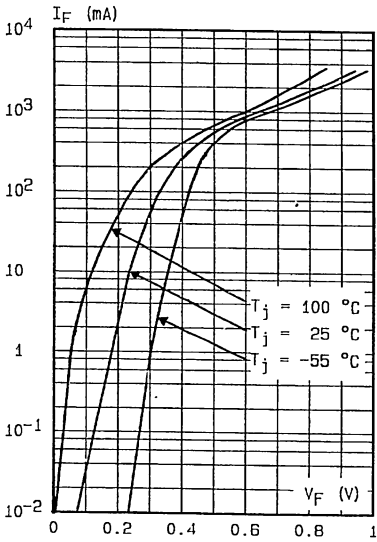


Fig.1 - Forward current versus forward voltage at low level (typical values).

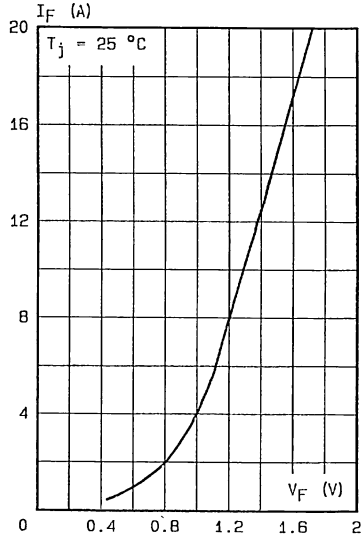


Fig.2 - Forward current versus forward voltage at high level (typical values).

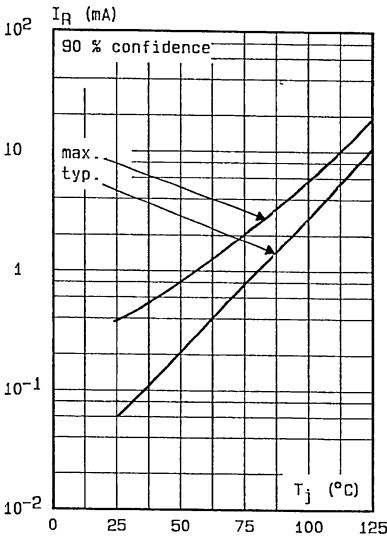


Fig.3 - Reverse current versus junction temperature.

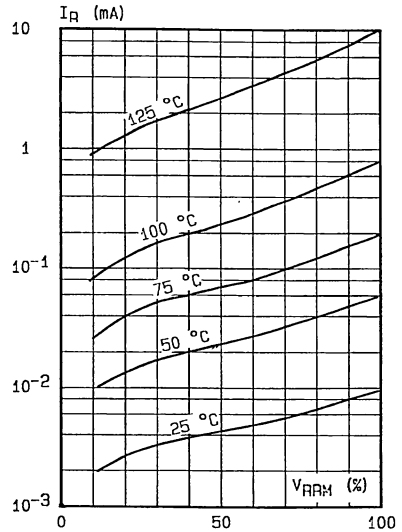


Fig.4 - Reverse current versus V_{RRM} in per cent.

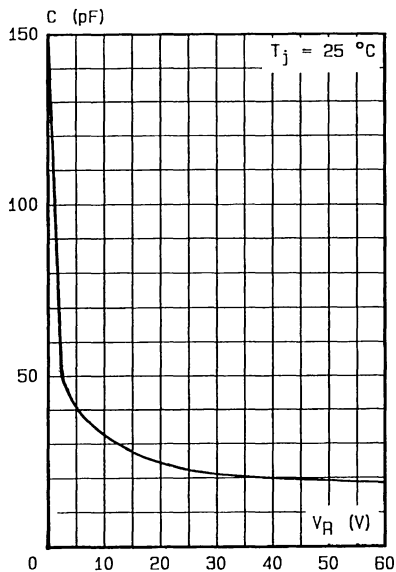


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

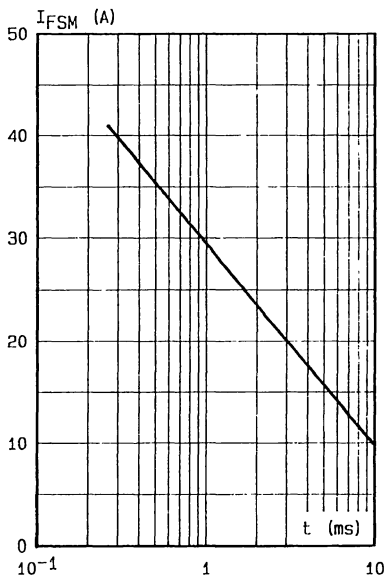


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms.

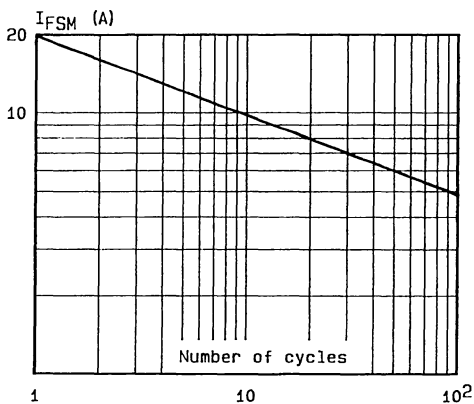
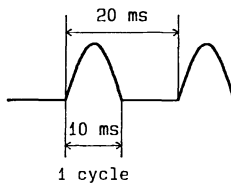


Fig.7 - Surge non repetitive forward current versus number of cycles.

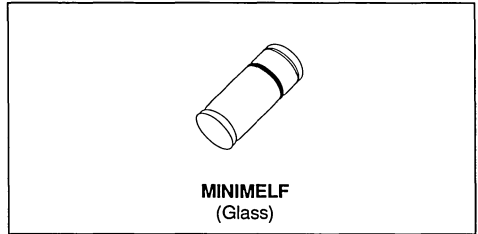




SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode featuring high break-down, low turn-on voltage and ultrafast switching. Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range. Matched batches are available on request.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		70	V
I_F	Forward Continuous Current	$T_J = 25^\circ\text{C}$	15	mA
P_{tot}	Power Dissipation	$T_J = 25^\circ\text{C}$	430	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	70			V
V_F^*	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 15\text{mA}$			1	
I_R^*	$T_{amb} = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.2	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$
Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification.

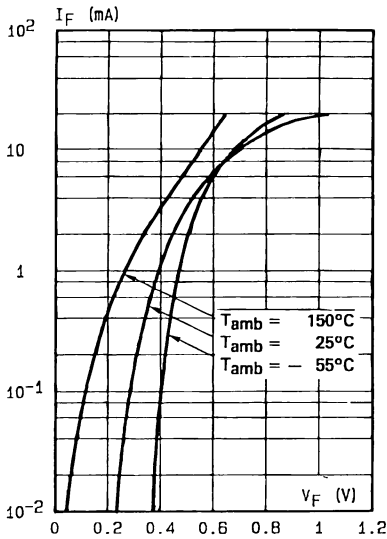


Fig.1 Forward current versus forward voltage at low level (typical values).

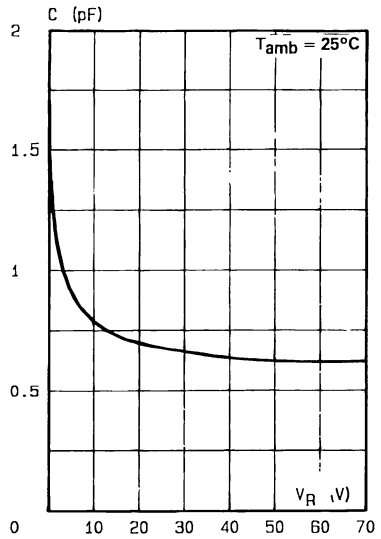


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

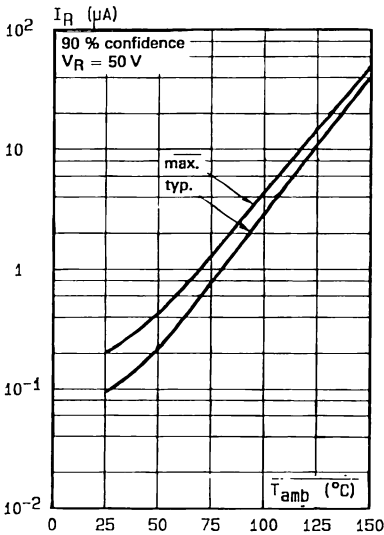


Fig.3 - Reverse current versus ambient temperature.

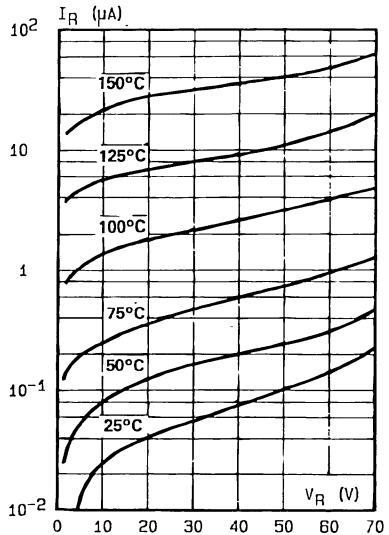


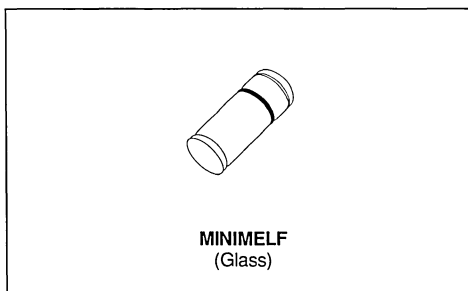
Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode featuring high breakdown voltage, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		20	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$	35	mA
P_{tot}	Power Dissipation	$T_I = 25^\circ\text{C}$	430	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	20			V
V_F^*	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 35\text{mA}$			1	
I_R^*	$T_{amb} = 25^\circ\text{C}$	$V_R = 15\text{V}$			0.1	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			1.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification.

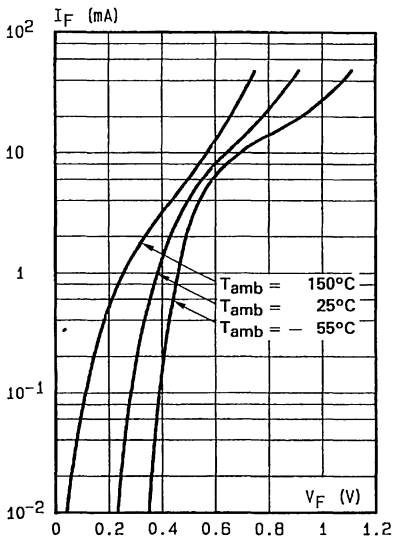


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

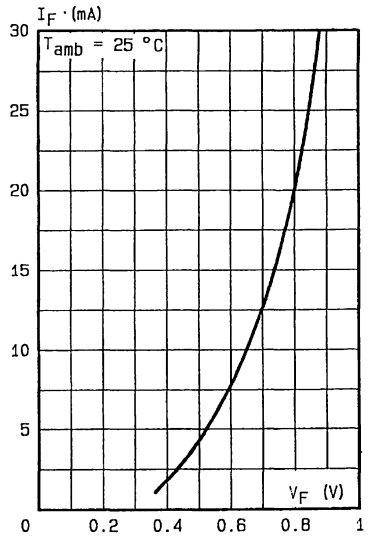


Fig.2 - Forward current versus forward voltage (typical values).

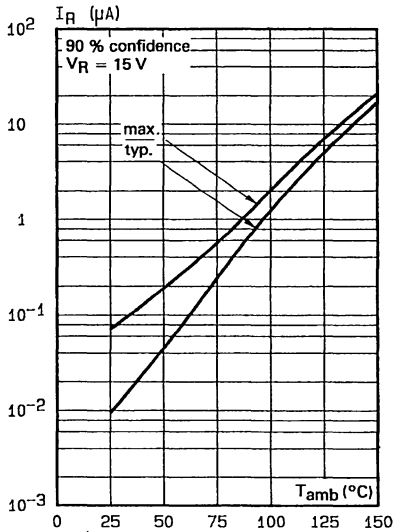


Fig.3 - Reverse current versus ambient temperature.

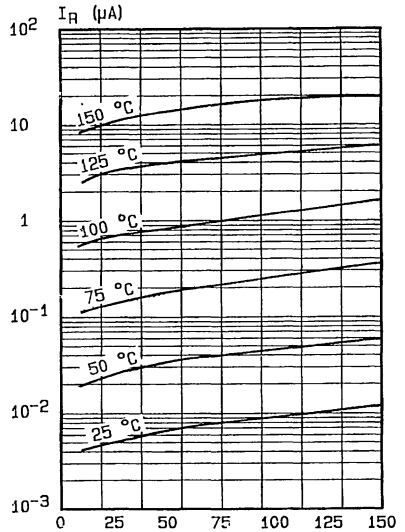


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

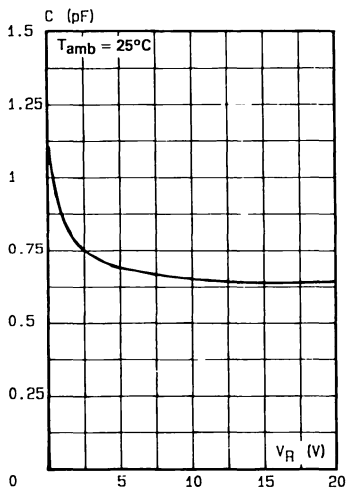
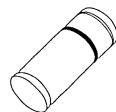


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode featuring high break-down, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.



MINIMELF
(Glass)

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	60	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$	15 mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$	50 mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 200	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th (j-l)}$	Junction-leads	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	60			V
V_F^*	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 15\text{mA}$			1	
I_R^*	$T_{amb} = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.2	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			2.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* Pulse test $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

Matched batches available on request Test conditions (forward voltage and/or capacitance) according to customer specification

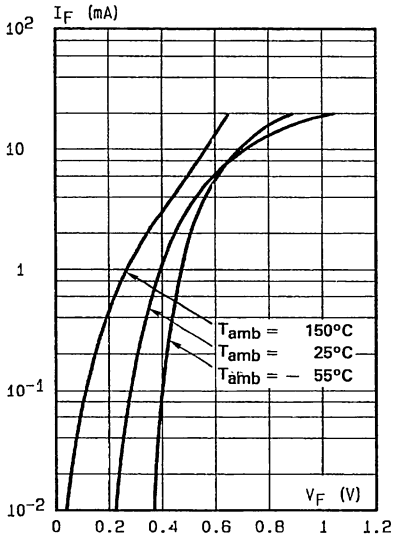


Fig.1 - Forward current versus forward voltage (typical values).

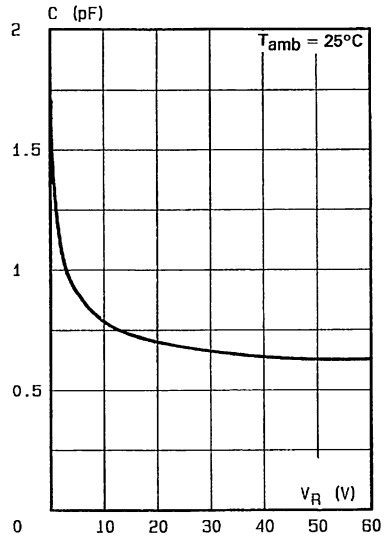


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

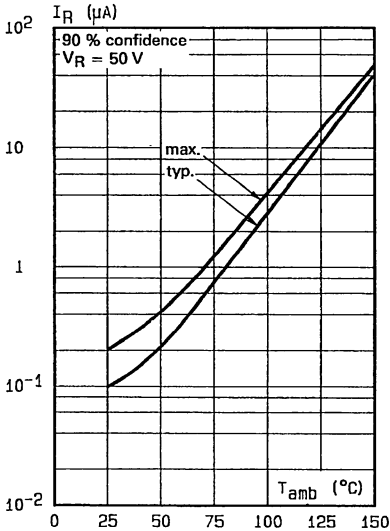


Fig.3 - Reverse current versus ambient temperature.

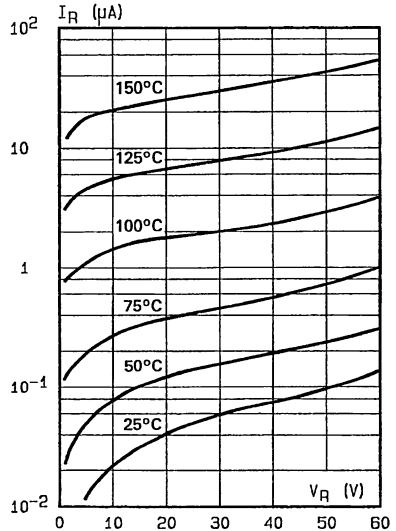
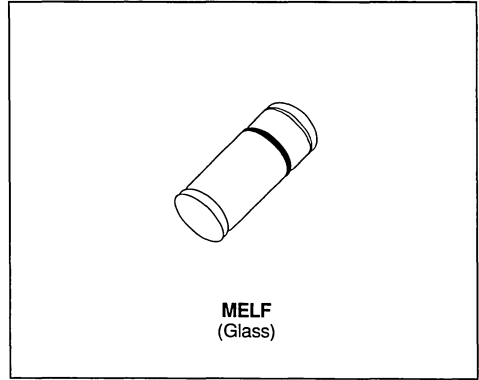


Fig.4 - Reverse current versus reverse continuous voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon rectifier diodes in glass case featuring very low forward voltage drop and fast recovery time, intended for low voltage switching mode power supply, polarity protection and high frequency circuits.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
$I_{F(AV)}$	Average Forward Current	$T_J = 60^\circ\text{C}$ 1	A
I_{FSM}	Surge non Repetitive Forward Current	$T_J = 25^\circ\text{C}$ $t_p = 10\text{ms}$ Sinusoidal Pulse	A
		$T_J = 25^\circ\text{C}$ $t_p = 300\mu\text{s}$ Rectangular Pulse	
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$

Symbol	Parameter	BYV 10-20	BYV 10-30	BYV 10-40	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	20	30	40	V

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	110	$^\circ\text{C/W}$

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			0.5	mA
	$T_J = 100^\circ\text{C}$				10	
V_F^*	$I_F = 1\text{A}$	$T_J = 25^\circ\text{C}$			0.55	V
	$I_F = 3\text{A}$				0.85	

** Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 0$		220		pF

Forward current flow in a schottky rectifier is due to majority carrier conduction. So reverse recovery is not affected by stored charge as in conventional PN junction diodes. Nevertheless, when the device switches from forward biased condition to reverse blocking state, current is required to charge the depletion capacitance of the diode.

This current depends only of diode capacitance and external circuit impedance. Satisfactory circuit behaviour analysis may be performed assuming that schottky rectifier consists of an ideal diode in parallel with a variable capacitance equal to the junction capacitance (see fig. 5 page 4/4).

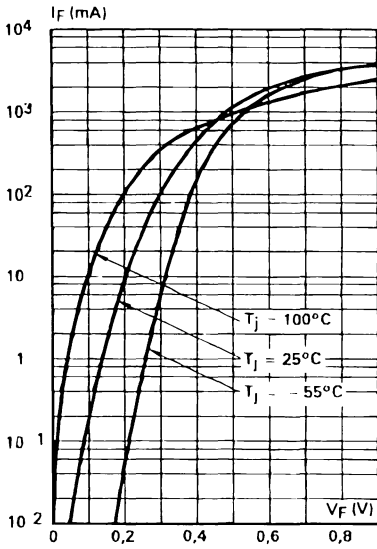


Fig.1 Forward current versus forward voltage at low level (typical values)

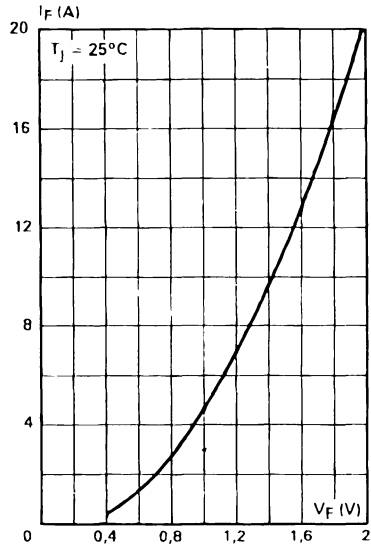


Fig.2 Forward current versus forward voltage at high level (typical values)

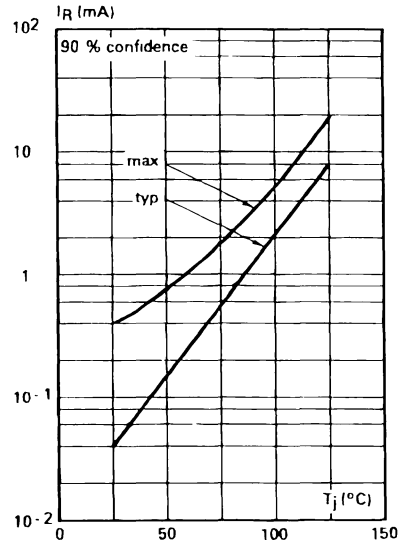


Fig 3 - Reverse current versus junction temperature.

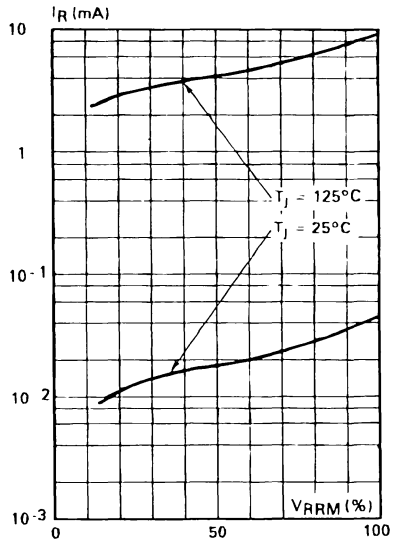


Fig.4 Reverse current versus V_{RRM} in per cent

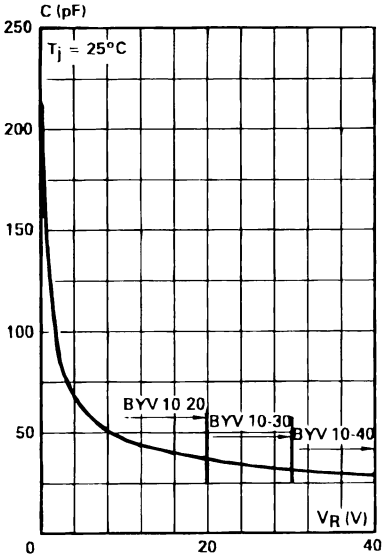


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values)

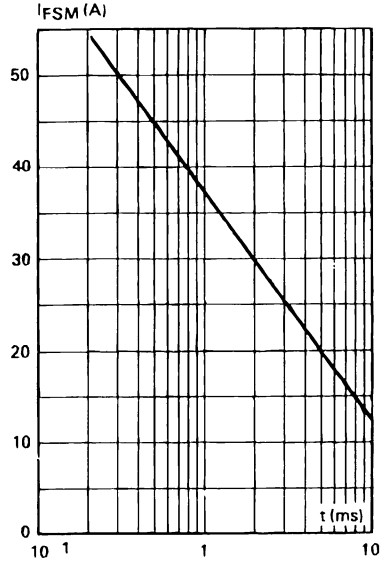


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms

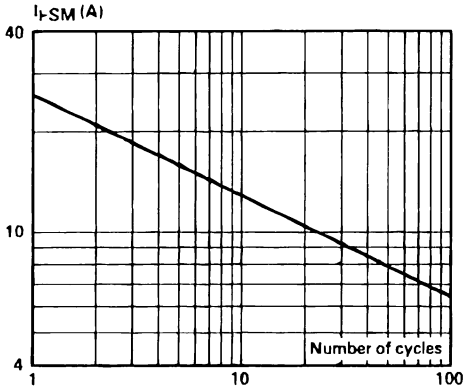
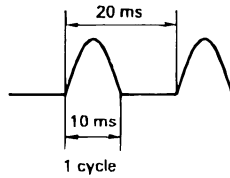


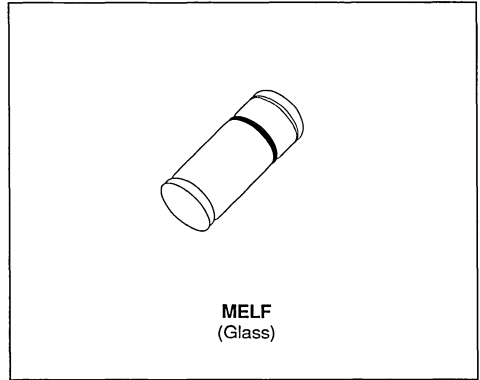
Fig.7 Surge non repetitive forward current versus number of cycles.



SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon rectifier diode in glass case featuring very low forward voltage drop and fast recovery time, intended for low voltage switching mode power supply, polarity protection and high frequency circuits.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		20	V
$I_{F(AV)}$	Average Forward Current	$T_1 = 60^\circ\text{C}$	1	A
I_{FSM}	Surge non Repetitive Forward Current	$T_1 = 25^\circ\text{C}$ $t_p = 10\text{ms}$	25 Sinusoidal Pulse	A
		$T_1 = 25^\circ\text{C}$ $t_p = 300\mu\text{s}$	50 Rectangular Pulse	
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	110	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			0.3	mA
	$T_J = 100^\circ\text{C}$				10	
V_F^*	$I_F = 1\text{A}$	$T_J = 25^\circ\text{C}$			0.45	V
	$I_F = 3\text{A}$				0.75	

* Pulse test . $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 0$		330		pF

Forward current flow in a schottky rectifier is due to majority carrier conduction. So reverse recovery is not affected by stored charge as in conventional PN junction diodes.

Nevertheless, when the device switches from forward biased condition to reverse blocking state, current is required to charge the depletion capacitance of the diode.

This current depends only of diode capacitance and external circuit impedance. Satisfactory circuit behaviour analysis may be performed assuming that schottky rectifier consists of an ideal diode in parallel with a variable capacitance equal to the junction capacitance (see fig. 5 page 4/4).

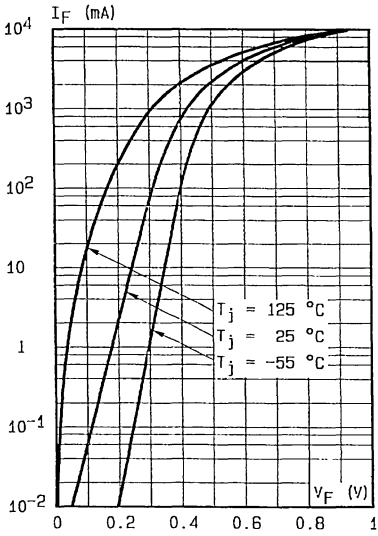


Fig.1 - Forward current versus forward voltage at low level (typical values).

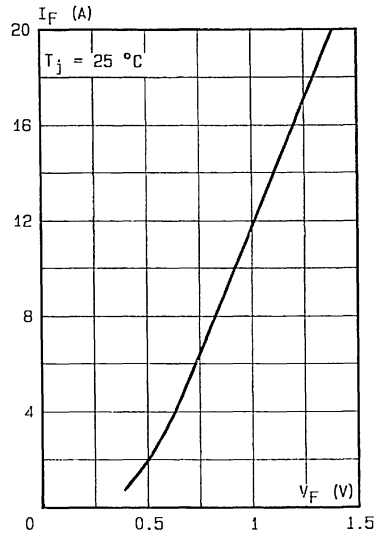


Fig.2 - Forward current versus forward voltage at high level (typical values).

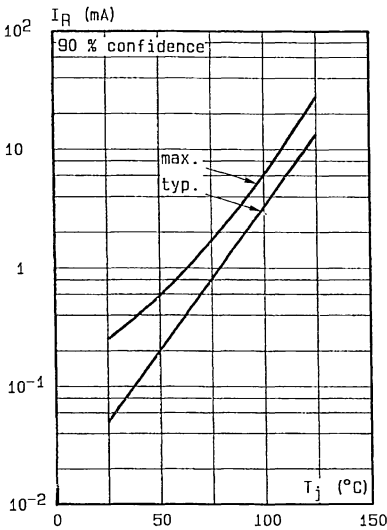


Fig.3 - Reverse current versus junction temperature.

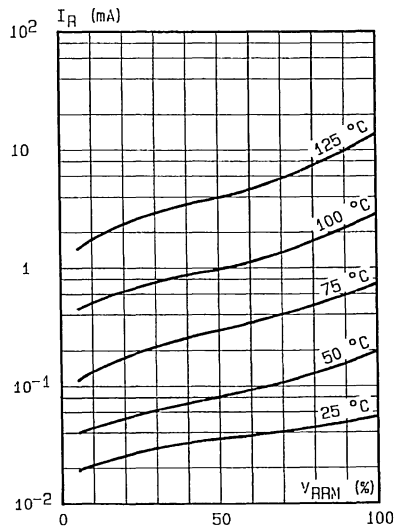


Fig.4 - Reverse current versus V_{RRM} in per cent.

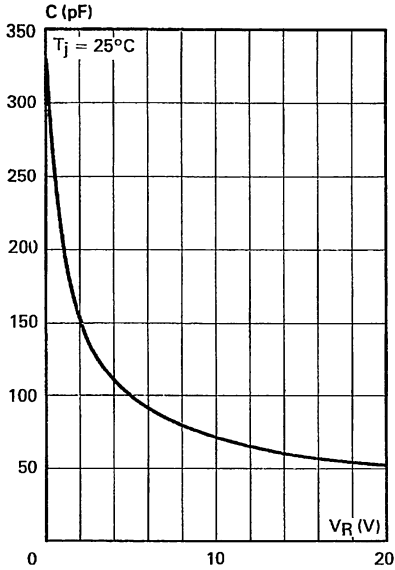


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values)

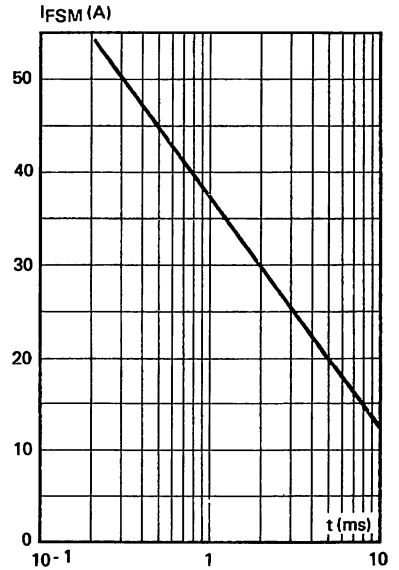


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms.

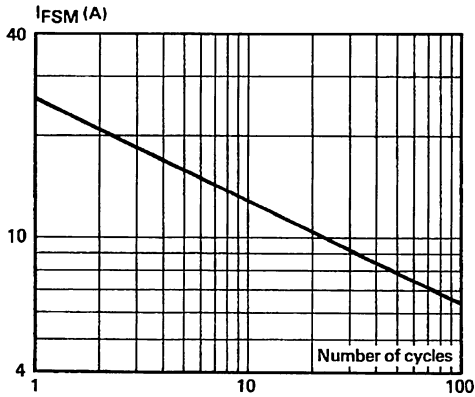
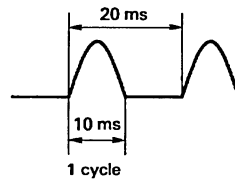


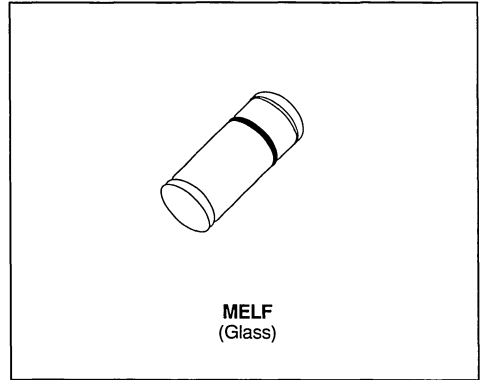
Fig.7 - Surge non repetitive forward current versus number of cycles.



SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon rectifier diode in glass case featuring very low forward voltage drop and fast recovery time, intended for low voltage switching mode power supply, polarity protection and high frequency circuits.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		60	V
$I_{F(AV)}$	Average Forward Current	$T_j = 25^\circ\text{C}$	1	A
I_{FSM}	Surge non Repetitive Forward Current	$T_j = 25^\circ\text{C}$ $t_p = 10\text{ms}$	20 Sinusoidal Pulse	A
		$T_j = 25^\circ\text{C}$ $t_p = 300\mu\text{s}$	40 Rectangular Pulse	
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	110	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = V_{RRM}$			0.5	mA
	$T_J = 100^\circ\text{C}$				10	
V_F^*	$I_F = 1\text{A}$	$T_J = 25^\circ\text{C}$			0.7	V
	$I_F = 3\text{A}$				1	

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 0$		150		pF
	$T_J = 25^\circ\text{C}$	$V_R = 5\text{V}$		40		

Forward current flow in a schottky rectifier is due to majority carrier conduction. So reverse recovery is not affected by stored charge as in conventional PN junction diodes.

Nevertheless, when the device switches from forward biased condition to reverse blocking state, current is required to charge the depletion capacitance of the diode.

This current depends only of diode capacitance and external circuit impedance. Satisfactory circuit behaviour analysis may be performed assuming that schottky rectifier consists of an ideal diode in parallel with a variable capacitance equal to the junction capacitance (see fig. 5 page 4/4).

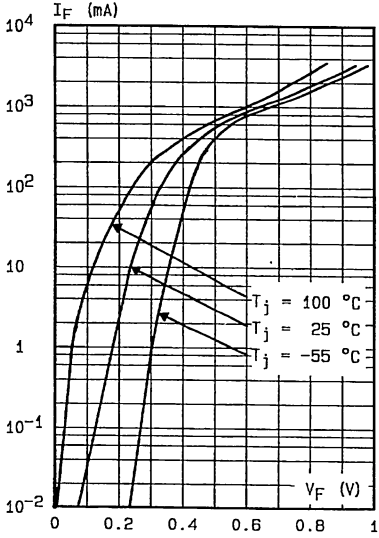


Fig.1 - Forward current versus forward voltage at low level (typical values).

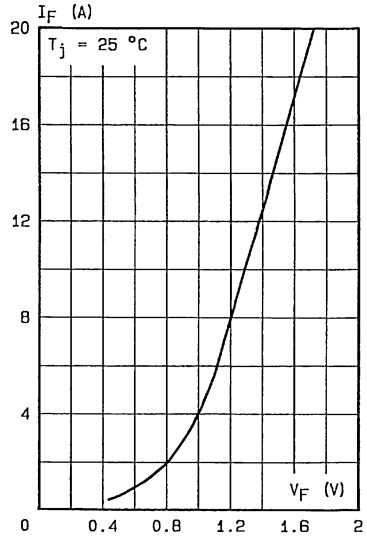


Fig.2 - Forward current versus forward voltage at high level (typical values).

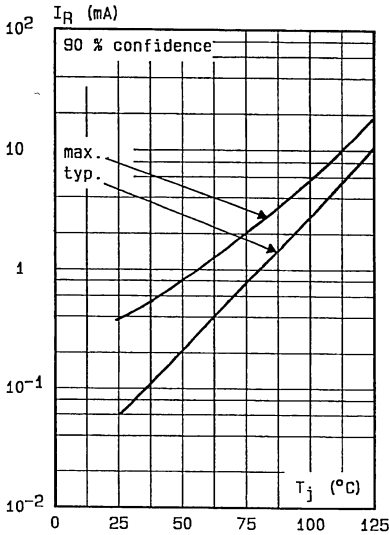


Fig.3 - Reverse current versus junction temperature.

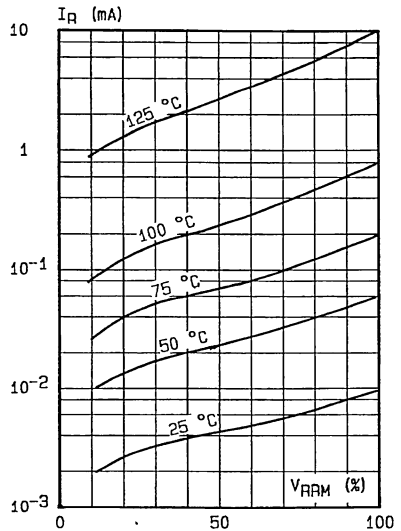


Fig.4 - Reverse current versus V_{RRM} in per cent.

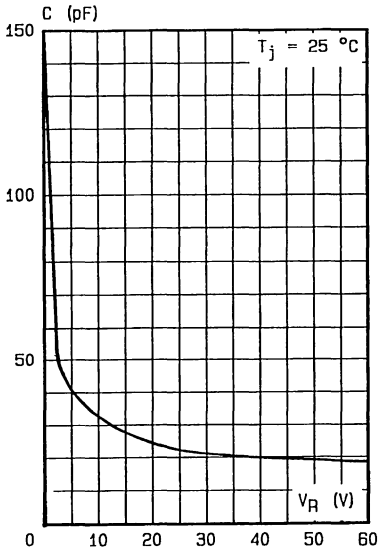


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

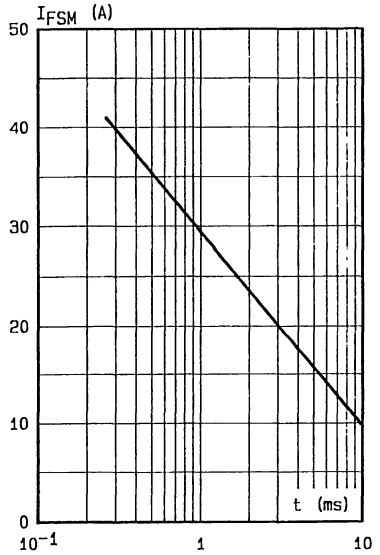


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms.

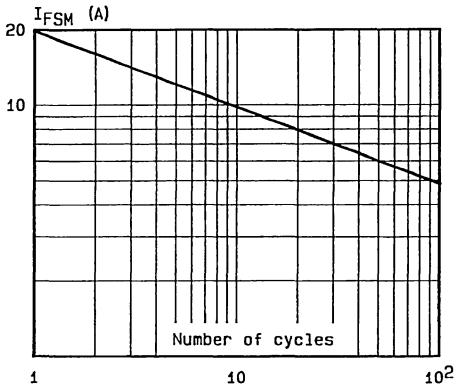
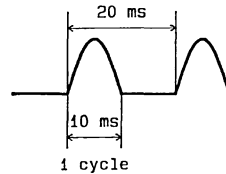


Fig.7 - Surge non repetitive forward current versus number of cycles.



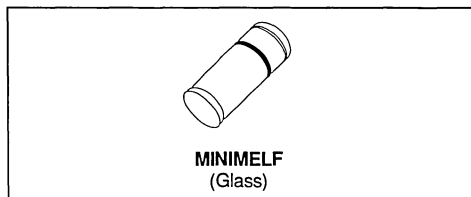
SMALL SIGNAL SCHOTTKY DIODES

DESCRIPTION

Metal to silicon junction diodes featuring high breakdown, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.

Matched batches are available on request, (TMMBAR11 only).



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		TMMBAR 10	TMMBAR 11	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		20	15	V
I_F	Forward Continuous Current	$T_J = 25^\circ\text{C}$	35	20	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$	100		mA
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200		$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260		$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	TMMBAR 10	20			V
	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	TMMBAR 11	15			
V_F^*	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$				0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 35\text{mA}$	TMMBAR 10			1	
	$T_{amb} = 25^\circ\text{C}$	$I_F = 20\text{mA}$	TMMBAR 11			1	
I_R^*	$T_{amb} = 25^\circ\text{C}$	$V_R = 15\text{V}$	TMMBAR 10			0.1	μA
	$T_{amb} = 25^\circ\text{C}$	$V_R = 8\text{V}$	TMMBAR 11			0.1	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			1.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification.

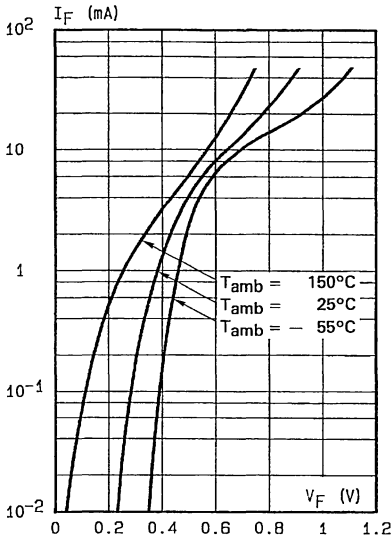


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

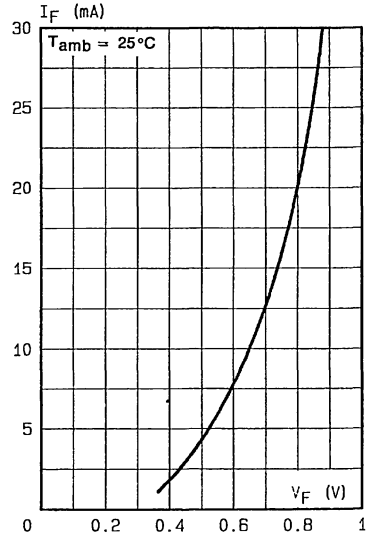


Fig.2 - Forward current versus forward voltage (typical values).

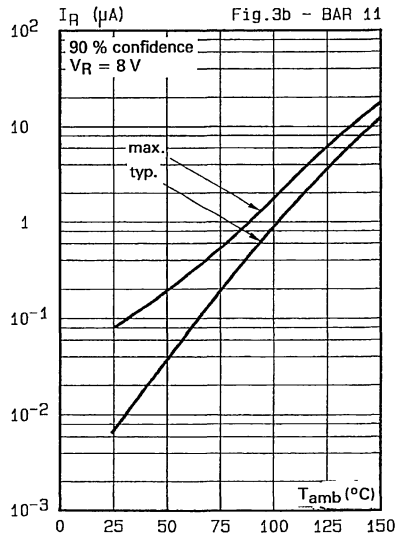
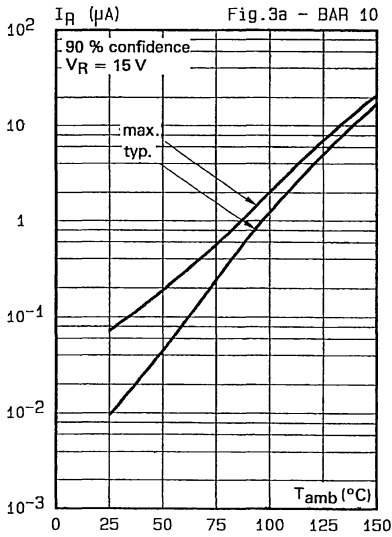


Fig.3a/3b - Reverse current versus ambient temperature.

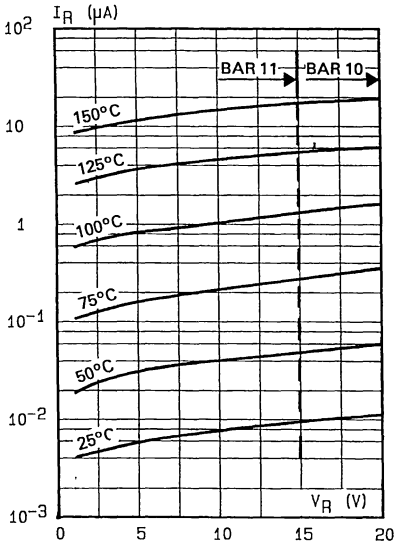


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

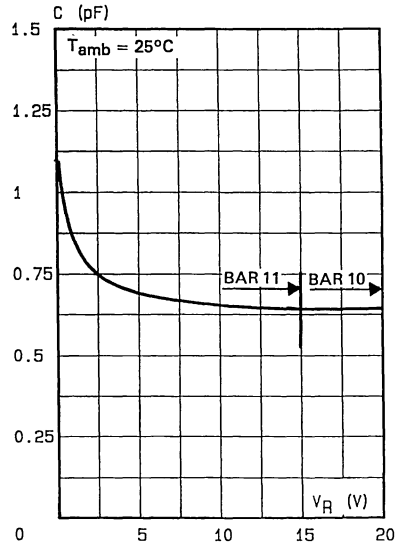
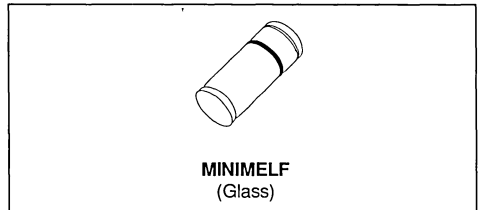


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	4	V
I_F	Forward Continuous Current	$T_J = 25^\circ\text{C}$ 30	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$ 60	mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	4			V
$V_F(1)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 10\text{mA}$			0.6	V
$I_R(1)$	$T_{amb} = 25^\circ\text{C}$	$V_R = 3\text{V}$			0.25	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 1\text{V}$	$f = 1\text{MHz}$			1	pF
F(2)	$T_{amb} = 25^\circ\text{C}$	$f = 1\text{GHz}$			6		dB

(1) Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

(2) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure 1.5dB.

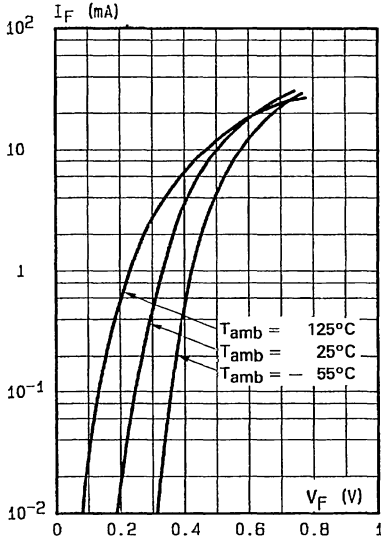


Fig.1 - Forward current versus forward voltage (typical values).

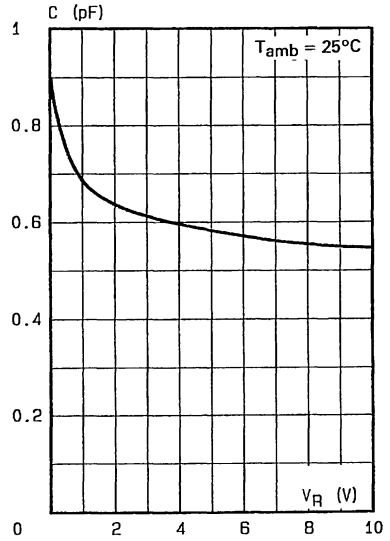


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

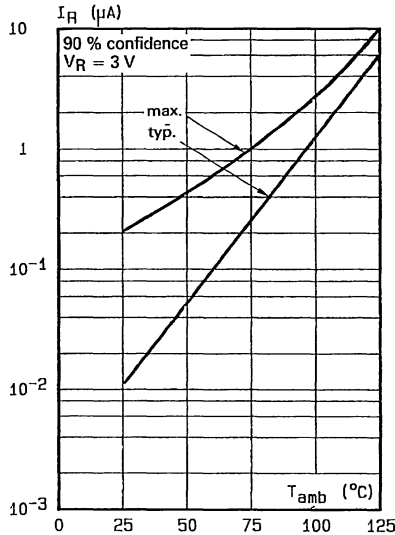


Fig.3 - Reverse current versus ambient temperature.

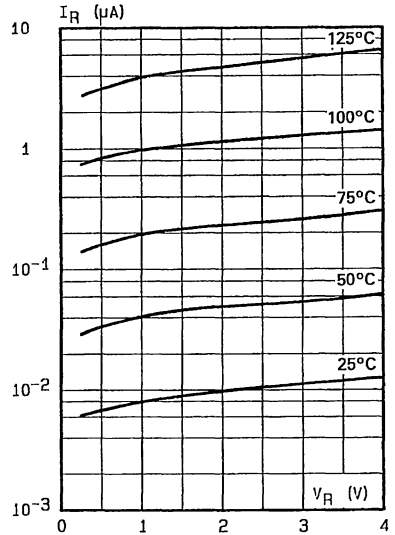


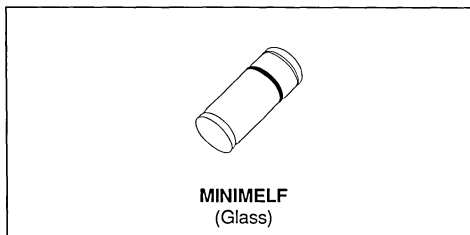
Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

Metal to silicon junction diode featuring high breakdown, low turn-on voltage and ultrafast switching.

Primarily intended for high level UHF/VHF detection and pulse application with broad dynamic range.

Matched batches are available on request.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		70	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$	15	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$	50	mA
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 200	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	70			V
V_F^*	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.41	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 15\text{mA}$			1	
I_R^*	$T_{amb} = 25^\circ\text{C}$	$V_R = 50\text{V}$			0.2	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 5\text{mA}$	Krakauer Method			100	ps

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification

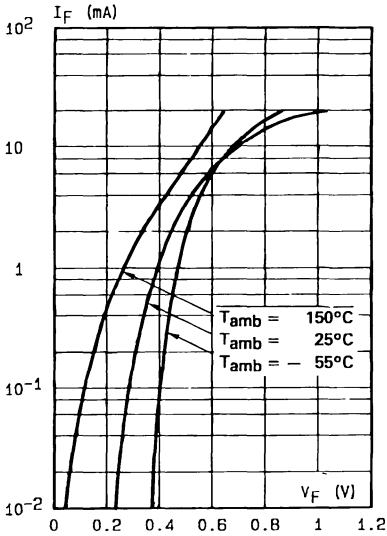


Fig.1 Forward current versus forward voltage at low level (typical values).

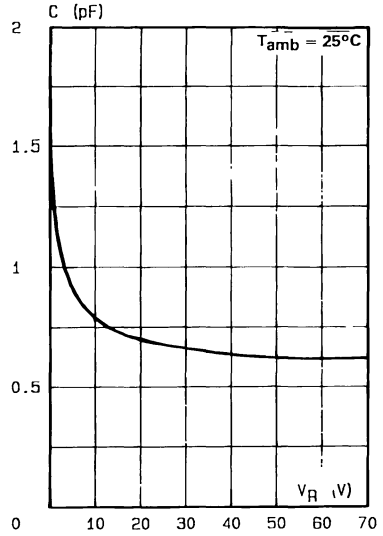


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

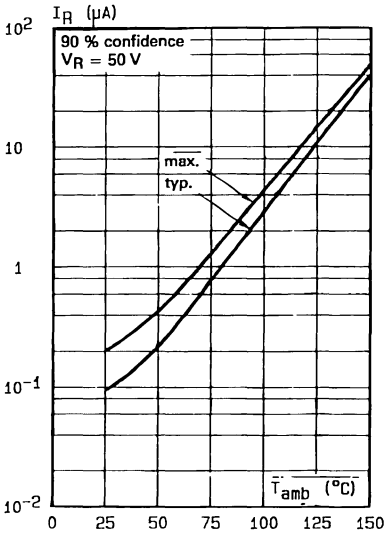


Fig.3 - Reverse current versus ambient temperature.

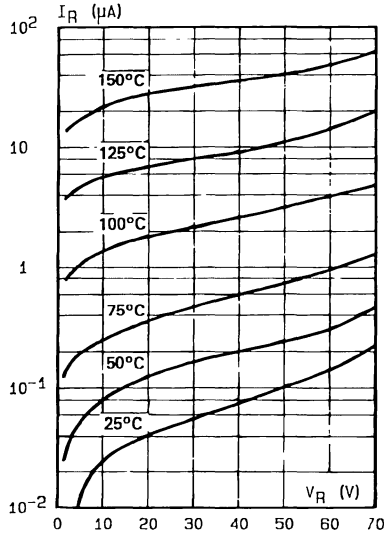


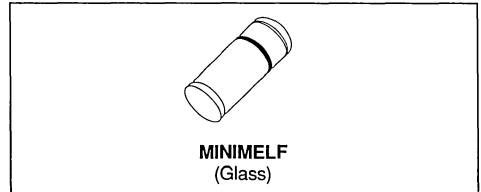
Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.

Matched batches are available on request.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	10	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$ 30	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$ 60	mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 10\mu\text{A}$	10			V
$V_F(1)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 1\text{mA}$			0.4	V
	$T_{amb} = 25^\circ\text{C}$	$I_F = 20\text{mA}$			1	
$I_R(1)$	$T_{amb} = 25^\circ\text{C}$	$V_R = 5\text{V}$			0.1	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{GHz}$			1.2	pF
τ	$T_{amb} = 25^\circ\text{C}$	$I_F = 20\text{mA}$	Krakauer Method			100	ps
F(2)	$T_{amb} = 25^\circ\text{C}$	$f = 1\text{GHz}$			6		dB

(1) Pulse test . $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

(2) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure 1.5dB

Matched batches available on request Test conditions (forward voltage and/or capacitance) according to customer specification.

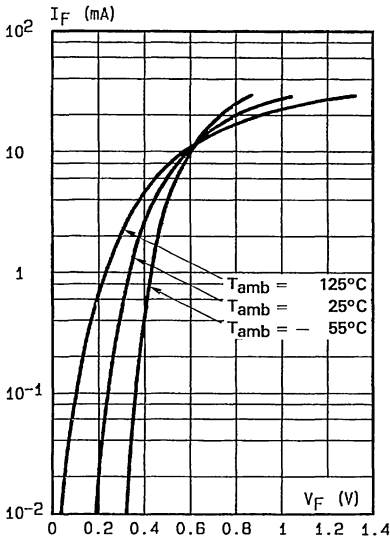


Fig.1 - Forward current versus forward voltage at low level (typical values).

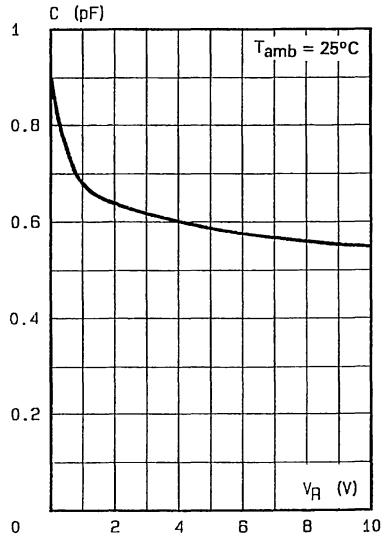


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

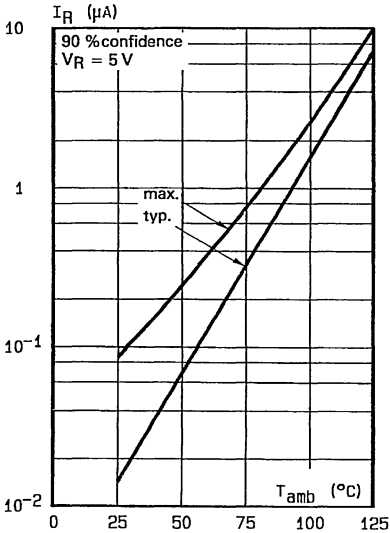


Fig.3 - Reverse current versus ambient temperature.

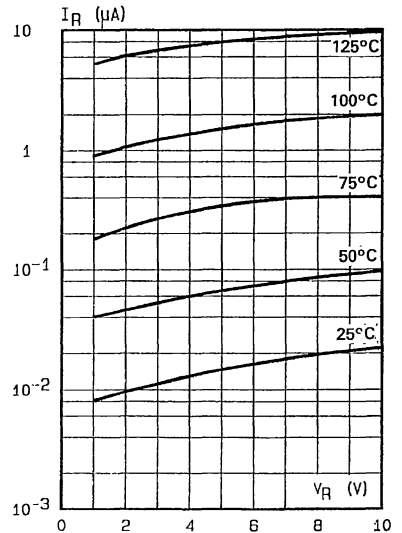
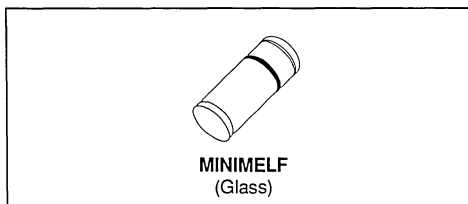


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	5	V
I_F	Forward Continuous Current	$T_1 = 25^\circ\text{C}$ 30	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$ 60	mA
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^\circ\text{C}$	$I_R = 100\mu\text{A}$	5			V
$V_F(1)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 10\text{mA}$			0.55	V
$I_R(1)$	$T_{amb} = 25^\circ\text{C}$	$V_R = 1\text{V}$			0.05	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^\circ\text{C}$	$V_R = 0\text{V}$	$f = 1\text{MHz}$			1	pF
$Q_S(2)$	$T_{amb} = 25^\circ\text{C}$	$I_F = 10\text{mA}$				3	pC
F(3)	$T_{amb} = 25^\circ\text{C}$	$f = 1\text{GHz}$			6	7	dB

(1) Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

(2) Measured on B-line Electronics QS-3 stored charge meter

(3) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW

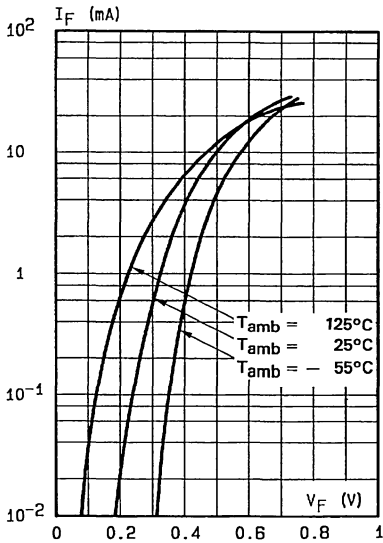


Fig.1 - Forward current versus forward voltage (typical values).

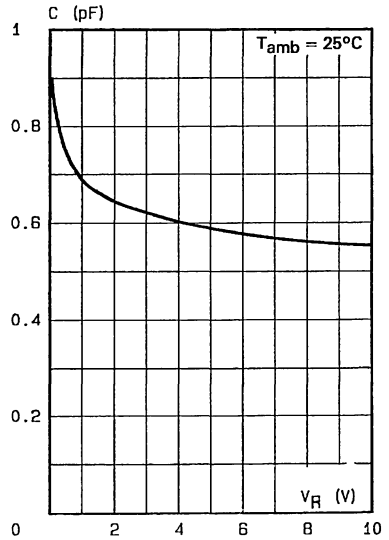


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

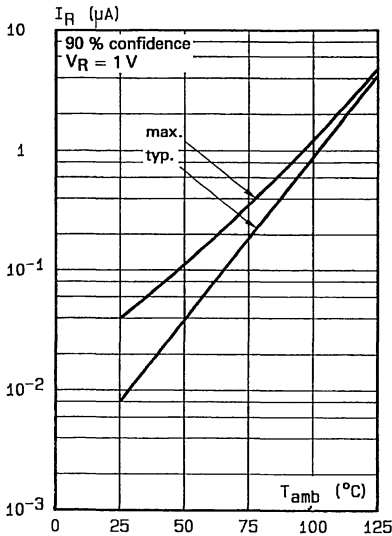


Fig.3 - Reverse current versus ambient temperature.

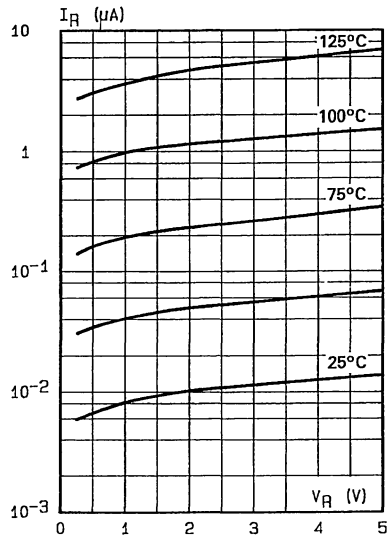
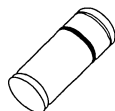


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

General purpose metal to silicon diode featuring very low turn-on voltage and fast switching.

This device has integrated protection against excessive voltage such as electrostatic discharges.



MINIMELF
(Glass)

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit	
V_{RRM}	Repetitive Peak Reverse Voltage	100	V	
I_F	Forward Continuous Current	$T_J = 25^\circ\text{C}$	100	mA
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 1\text{s}$ $\delta \leq 0.5$	350	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$	750	mA
P_{tot}	Power Dissipation	$T_J = 95^\circ\text{C}$	100	mW
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$	

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	300	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_J = 25^\circ\text{C}$ $I_R = 100\mu\text{A}$	100			V
V_F^*	$T_J = 25^\circ\text{C}$ $I_F = 1\text{mA}$		0.4	0.45	V
	$T_J = 25^\circ\text{C}$ $I_F = 200\text{mA}$			1	V
I_R^*	$T_J = 25^\circ\text{C}$			0.1	μA
	$T_J = 100^\circ\text{C}$			20	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$ $V_R = 1\text{V}$ $f = 1\text{MHz}$		2		pF

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

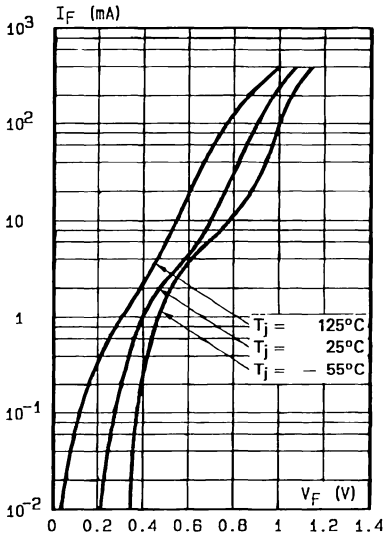


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

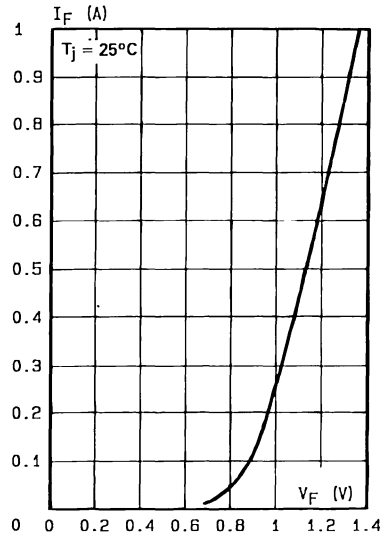


Fig.2 Forward current versus forward voltage (typical values).

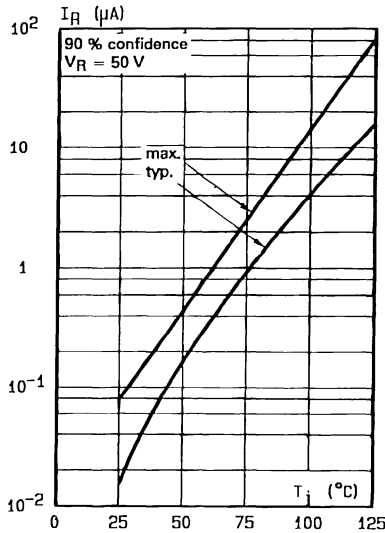


Fig.3 - Reverse current versus junction temperature.

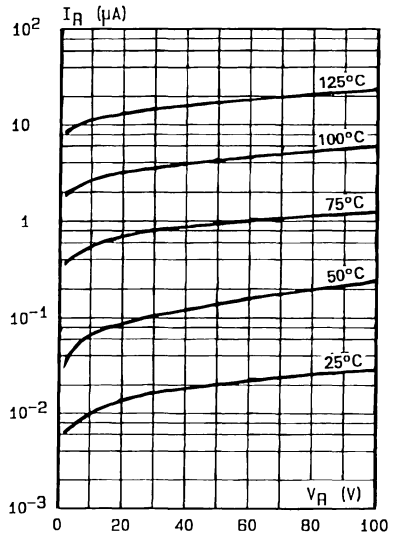


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

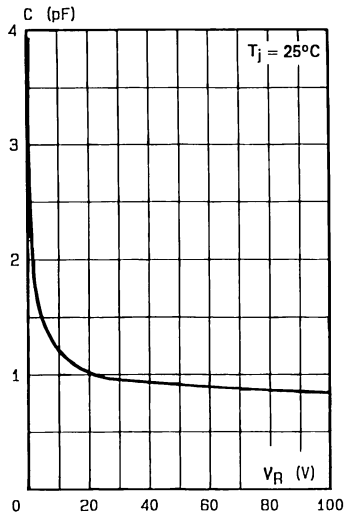


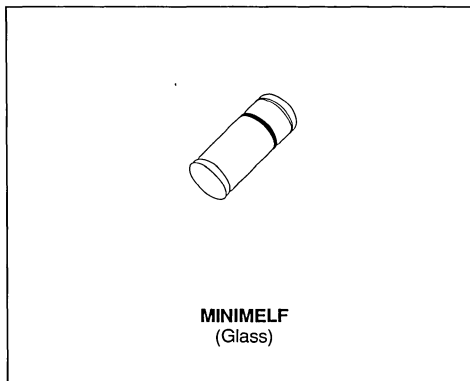
Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODES

DESCRIPTION

General purpose metal to silicon diodes featuring very low turn-on voltage fast switching.

These devices have integrated protection against excessive voltage such as electrostatic discharges.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		30	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$	200	mA
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 1\text{s}$ $\delta \leq 0.5$	500	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$	4	A
P_{tot}	Power Dissipation	$T_I = 65^\circ\text{C}$	200	mW
T_{stg}	Storage and Junction Temperature Range		- 65 to 150	$^\circ\text{C}$
T_J			- 65 to 125	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	300	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit	
$V_{(BR)}$	$T_J = 25^\circ\text{C}$	$I_R = 100\mu\text{A}$	30			V	
V_F^*	$T_J = 25^\circ\text{C}$	$I_F = 200\text{mA}$	All Types		1	V	
	$T_J = 25^\circ\text{C}$	$I_F = 10\text{mA}$	BAT 42		0.4		
	$T_J = 25^\circ\text{C}$	$I_F = 50\text{mA}$			0.65		
	$T_J = 25^\circ\text{C}$	$I_F = 2\text{mA}$	BAT 43		0.26		0.33
	$T_J = 25^\circ\text{C}$	$I_F = 15\text{mA}$			0.45		
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = 25\text{V}$			0.5	μA	
	$T_J = 100^\circ\text{C}$				100		

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions				Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$V_R = 1\text{V}$	$f = 1\text{MHz}$			7		pF
t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 10\text{mA}$	$I_R = 10\text{mA}$	$i_{rr} = 1\text{mA}$	$R_L = 100\Omega$		5	ns
η	$T_J = 25^\circ\text{C}$	$R_L = 15\text{K}\Omega$	$C_L = 300\text{pF}$	$f = 45\text{MHz}$	$V_i = 2\text{V}$	80		%

* Pulse test . $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

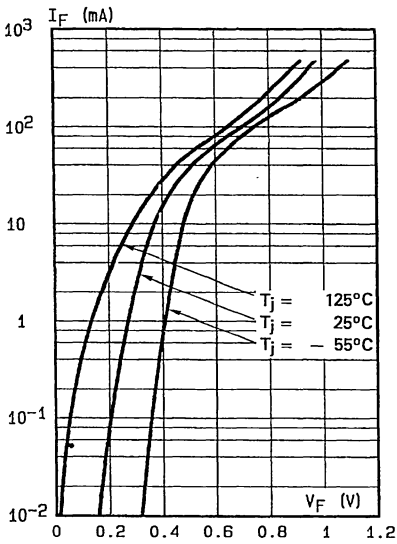


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

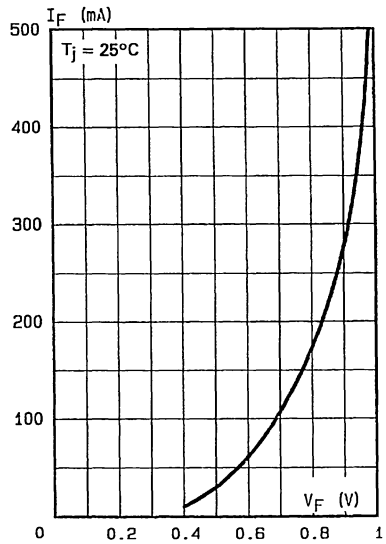


Fig.2 - Forward current versus forward voltage (typical values).

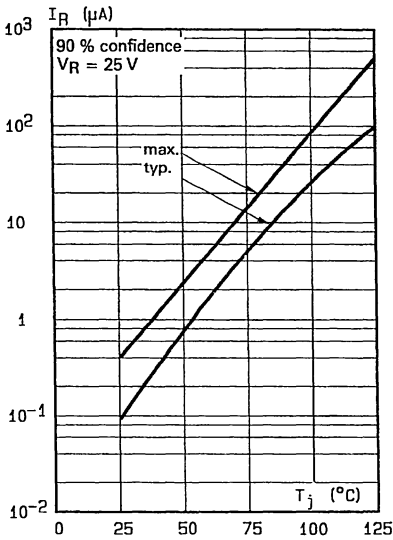


Fig.3 - Reverse current versus junction temperature.

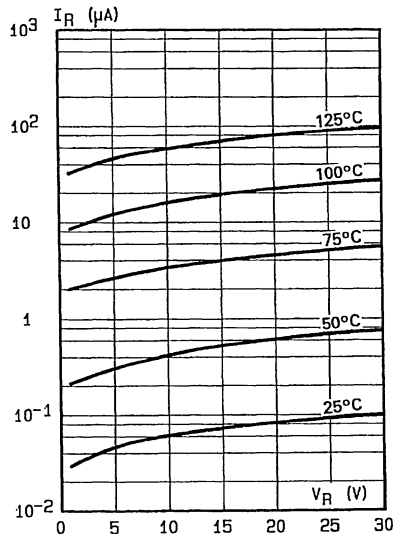


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

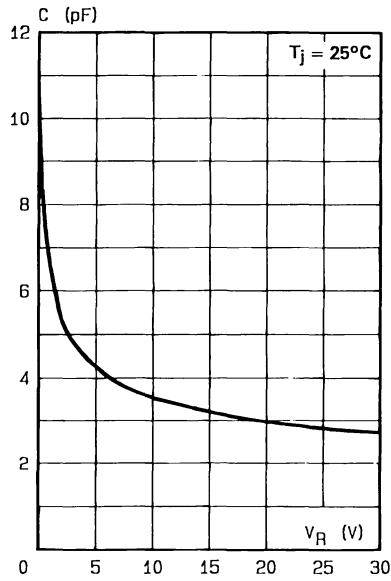
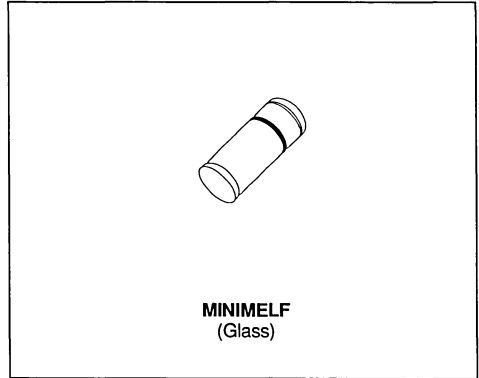


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODE


DESCRIPTION

Metal to silicon junction diode primarily intended for UHF mixers and ultrafast switching applications.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		15	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$	30	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p \leq 1\text{s}$	60	mA
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to 150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	400	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_{amb} = 25^{\circ}C$	$I_R = 10\mu A$	15			V
$V_F (1)$	$T_{amb} = 25^{\circ}C$	$I_F = 1mA$			0.38	V
	$T_{amb} = 25^{\circ}C$	$I_F = 10mA$			0.5	
	$T_{amb} = 25^{\circ}C$	$I_F = 30mA$			1	
$I_R (1)$	$T_{amb} = 25^{\circ}C$	$V_R = 6V$			0.1	μA

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	$T_{amb} = 25^{\circ}C$	$V_R = 1V$	$f = 1MHz$			1.1	pF
τ	$T_{amb} = 25^{\circ}C$	$I_F = 20mA$	Krakauer Method			100	ps
F (2)	$T_{amb} = 25^{\circ}C$	$f = 1GHz$			6	7	dB

(1) Pulse test : $t_p \leq 300\mu s$ $\delta < 2\%$.

(2) Noise figure test :

- diode is inserted in a tuned stripline circuit
- local oscillator frequency 1GHz
- local oscillator power 1mW
- intermediate frequency amplifier, tuned on 30MHz, has a noise figure 1.5dB

Matched batches available on request. Test conditions (forward voltage and/or capacitance) according to customer specification.

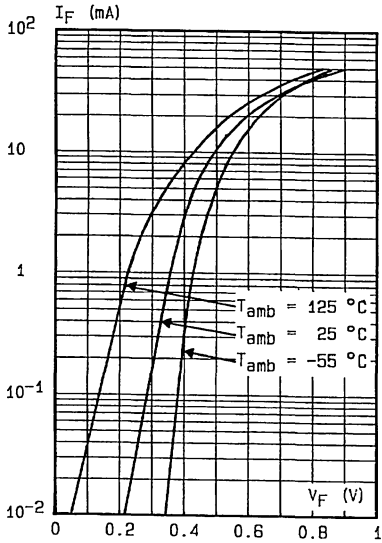


Fig.1 - Forward current versus forward voltage (typical values).

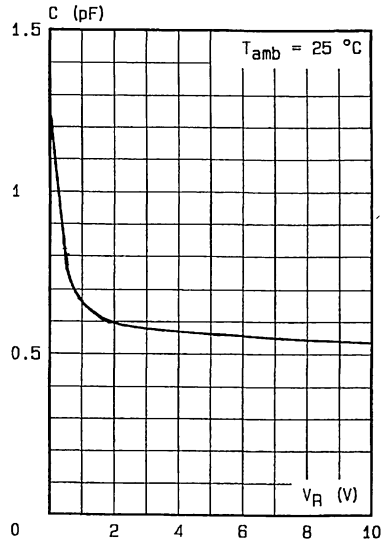


Fig.2 - Capacitance C versus reverse applied voltage V_R (typical values).

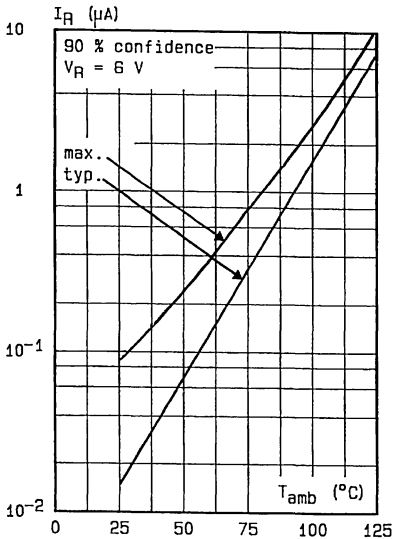


Fig.3 - Reverse current versus ambient temperature.

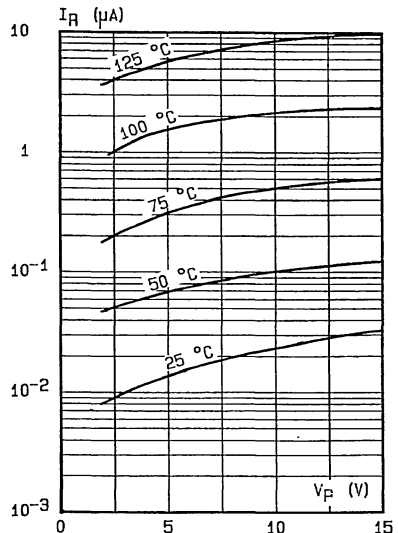
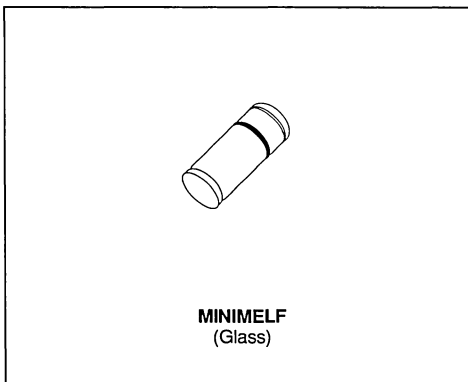


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

SMALL SIGNAL SCHOTTKY DIODE

DESCRIPTION

General purpose, metal to silicon diode featuring high breakdown voltage low turn-on voltage.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	100	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$ 150	mA
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 1\text{s}$ $\delta \leq 0.5$ 350	mA
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$ 750	mA
P_{tot}	Power Dissipation	$T_I = 80^\circ\text{C}$ 150	mW
T_{stg} T_J	Storage and Junction Temperature Range	- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s	260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	300	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)}$	$T_J = 25^{\circ}\text{C}$	$I_R = 100\mu\text{A}$	100			V
V_F^*	$T_J = 25^{\circ}\text{C}$	$I_F = 0.1\text{mA}$			0.25	V
	$T_J = 25^{\circ}\text{C}$	$I_F = 10\text{mA}$			0.45	
	$T_J = 25^{\circ}\text{C}$	$I_F = 250\text{mA}$			1	
I_R^*	$T_J = 25^{\circ}\text{C}$	$V_R = 1.5\text{V}$			0.5	μA
	$T_J = 60^{\circ}\text{C}$				5	
	$T_J = 25^{\circ}\text{C}$	$V_R = 10\text{V}$			0.8	
	$T_J = 60^{\circ}\text{C}$				7.5	
	$T_J = 25^{\circ}\text{C}$	$V_R = 50\text{V}$			2	
	$T_J = 60^{\circ}\text{C}$				15	
	$T_J = 25^{\circ}\text{C}$	$V_R = 75\text{V}$			5	
	$T_J = 60^{\circ}\text{C}$				20	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^{\circ}\text{C}$	$V_R = 0\text{V}$		10		pF
	$T_J = 25^{\circ}\text{C}$	$V_R = 1\text{V}$		6		

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$

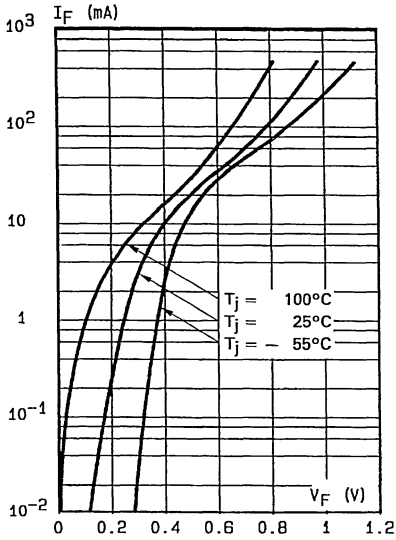


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

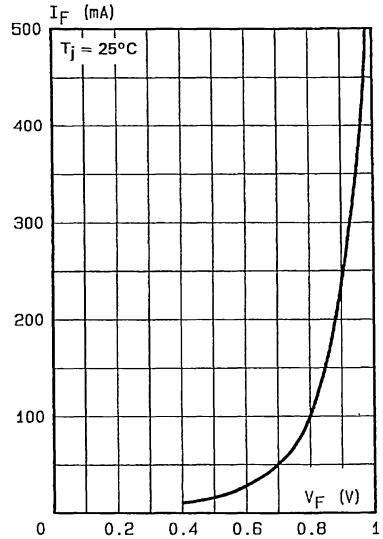


Fig.2 - Forward current versus forward voltage (typical values).

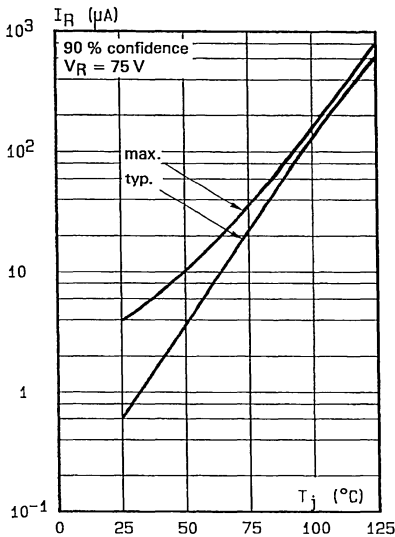


Fig.3 - Reverse current versus junction temperature (typical values).

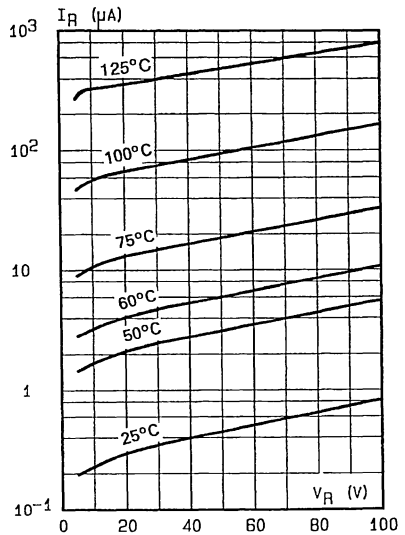


Fig.4 - Reverse current versus continuous reverse voltage

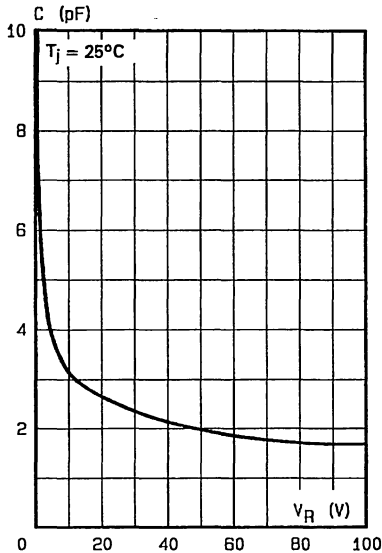
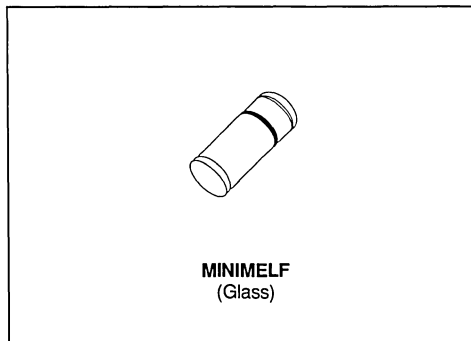


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODES


DESCRIPTION

General purpose metal to silicon diodes featuring very low turn-on voltage and fast switching.

These devices have integrated protection against excessive voltage such as electrostatic discharges.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		TMMBAT47	TMMBAT48	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		20	40	V
I_F	Forward Continuous Current	$T_I = 25^\circ\text{C}$	350		mA
I_{FRM}	Repetitive Peak Forward Current	$t_p \leq 1\text{s}$ $\delta \leq 0.5$	1		A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$	7.5		A
		$t_p = 1\text{s}$	1.5		
P_{tot}	Power Dissipation	$T_I = 25^\circ\text{C}$	330		mW
T_{stg}	Storage and Junction Temperature Range		- 65 to 150		$^\circ\text{C}$
T_J			- 65 to 125		$^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15s		260		$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	300	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
V _(BR)	T _j = 25°C	I _R = 10μA	TMMBAT47	20			V
	T _j = 25°C	I _R = 25μA	TMMBAT48	40			
V _F *	T _j = 25°C	I _F = 0.1mA	All Types			0.25	V
	T _j = 25°C	I _F = 1mA				0.3	
	T _j = 25°C	I _F = 10mA				0.4	
	T _j = 25°C	I _F = 30mA	TMMBAT47			0.5	
	T _j = 25°C	I _F = 150mA				0.8	
	T _j = 25°C	I _F = 300mA			1		
	T _j = 25°C	I _F = 50mA	TMMBAT48			0.5	
	T _j = 25°C	I _F = 200mA				0.75	
	T _j = 25°C	I _F = 500mA				0.9	
I _R *	T _j = 25°C	V _R = 1.5V	All Types			1	μA
	T _j = 60°C					10	
	T _j = 25°C	V _R = 10V	TMMBAT47			4	
	T _j = 60°C					20	
	T _j = 25°C	V _R = 20V			10		
	T _j = 60°C				30		
	T _j = 25°C	V _R = 10V	TMMBAT48			2	
	T _j = 60°C					15	
	T _j = 25°C	V _R = 20V			5		
	T _j = 60°C				25		
	T _j = 25°C	V _R = 40V			25		
	T _j = 60°C				50		

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
C	T _j = 25°C	V _R = 0V	f = 1MHz		20		pF
	T _j = 25°C	V _R = 1V			12		
t _{rr}	T _j = 25°C	I _F = 10mA	V _R = 1V	i _{rr} = 1mA	R _L = 100Ω	10	ns

* Pulse test : t_p ≤ 300μs δ < 2%

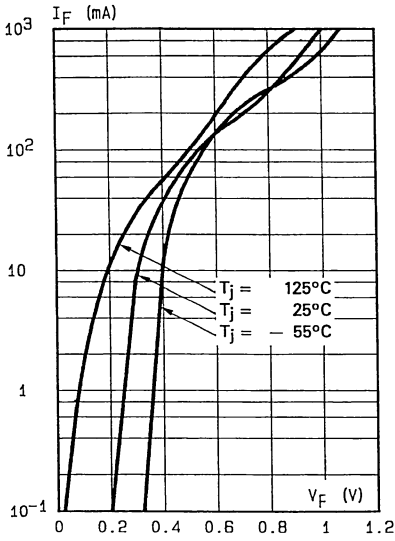


Fig.1 - Forward current versus forward voltage at different temperatures (typical values).

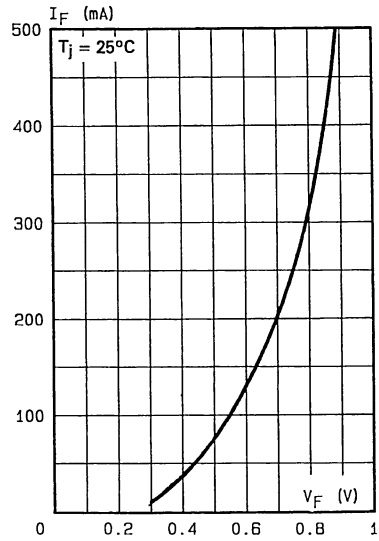


Fig.2 - Forward current versus forward voltage (typical values).

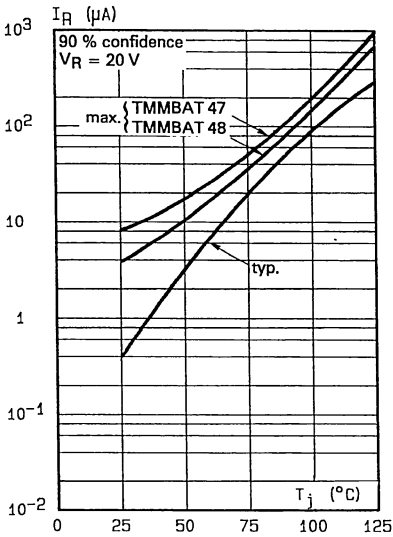


Fig.3 - Reverse current versus junction temperature.

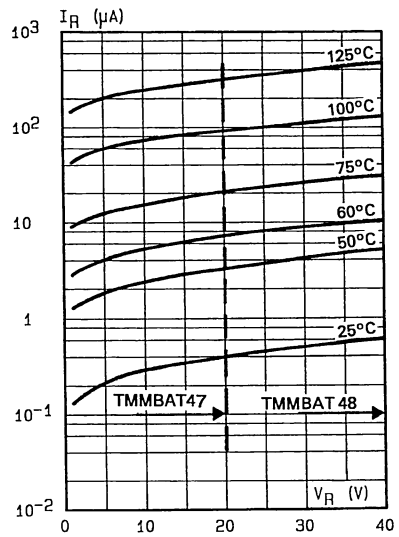


Fig.4 - Reverse current versus continuous reverse voltage (typical values).

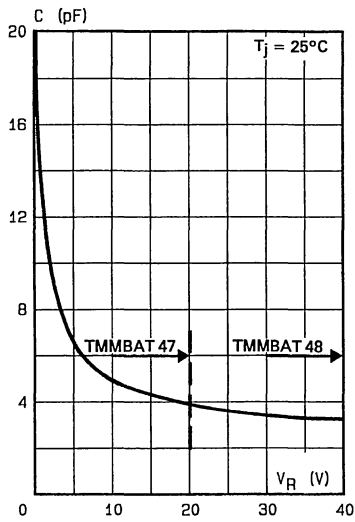
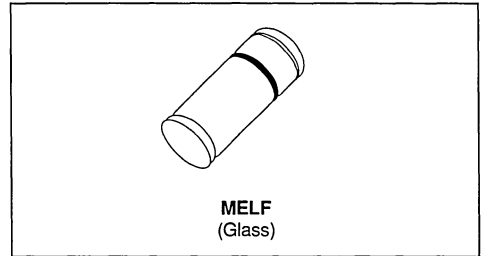


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

SMALL SIGNAL SCHOTTKY DIODE
DESCRIPTION

General purpose metal to silicon diode featuring very low turn-on voltage and fast switching.

This device has integrated protection against excessive voltage such as electrostatic discharges.


ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		80	V
I_F	Forward Continuous Current	$T_J = 70^\circ\text{C}$	500	mA
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{s}$ $\delta \leq 0.5$	3	A
I_{FSM}	Surge non Repetitive Forward Current	$t_p = 10\text{ms}$	10	A
T_{stg} T_J	Storage and Junction Temperature Range		- 65 to 150 - 65 to 125	$^\circ\text{C}$ $^\circ\text{C}$
T_L	Maximum Temperature for Soldering during 15 s		260	$^\circ\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads	110	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS
STATIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	$T_J = 25^\circ\text{C}$	$V_R = 80\text{V}$			200	μA
V_F^*	$T_J = 25^\circ\text{C}$	$I_F = 10\text{mA}$			0.32	V
	$T_J = 25^\circ\text{C}$	$I_F = 100\text{mA}$			0.42	
	$T_J = 25^\circ\text{C}$	$I_F = 1\text{A}$			1	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
C	$T_J = 25^\circ\text{C}$	$f = 1\text{MHz}$	$V_R = 0\text{V}$	120		pF
			$V_R = 5\text{V}$	35		

* Pulse test : $t_p \leq 300\mu\text{s}$ $\delta < 2\%$.

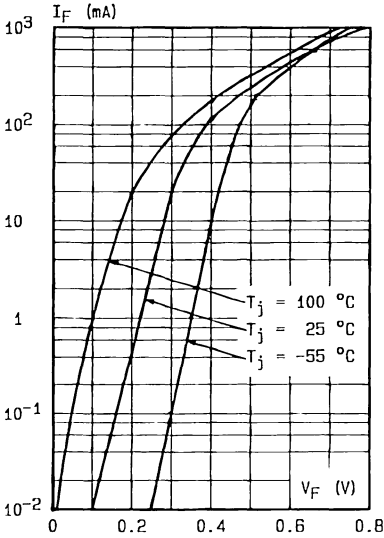


Fig.1 - Forward current versus forward voltage at low level (typical values).

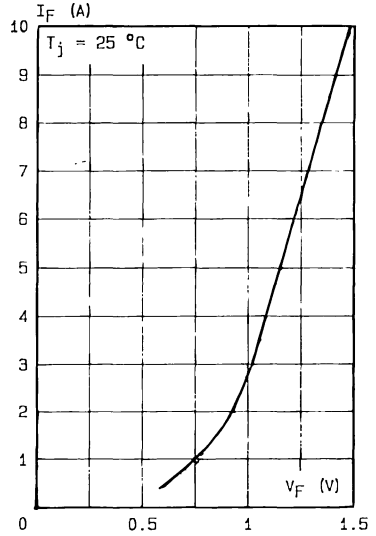


Fig.2 - Forward current versus forward voltage at high level (typical values).

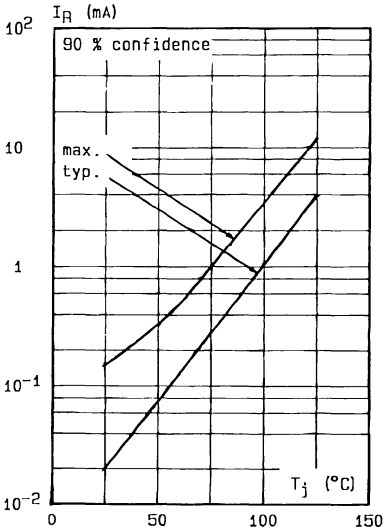


Fig.3 - Reverse current versus junction temperature.

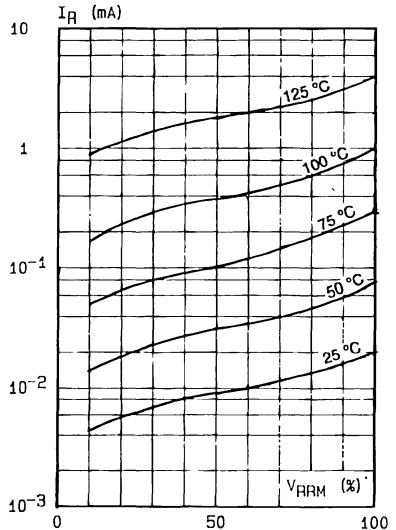


Fig.4 - Reverse current versus V_{ARM} in per cent.

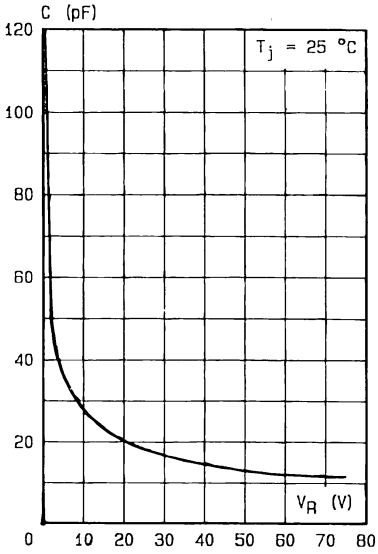


Fig.5 - Capacitance C versus reverse applied voltage V_R (typical values).

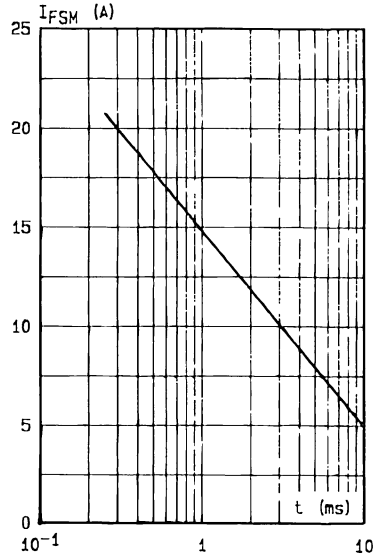


Fig.6 - Surge non repetitive forward current for a rectangular pulse with $t \leq 10$ ms.

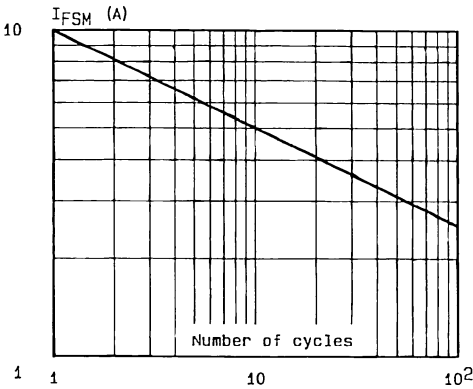
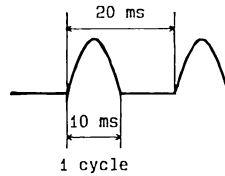
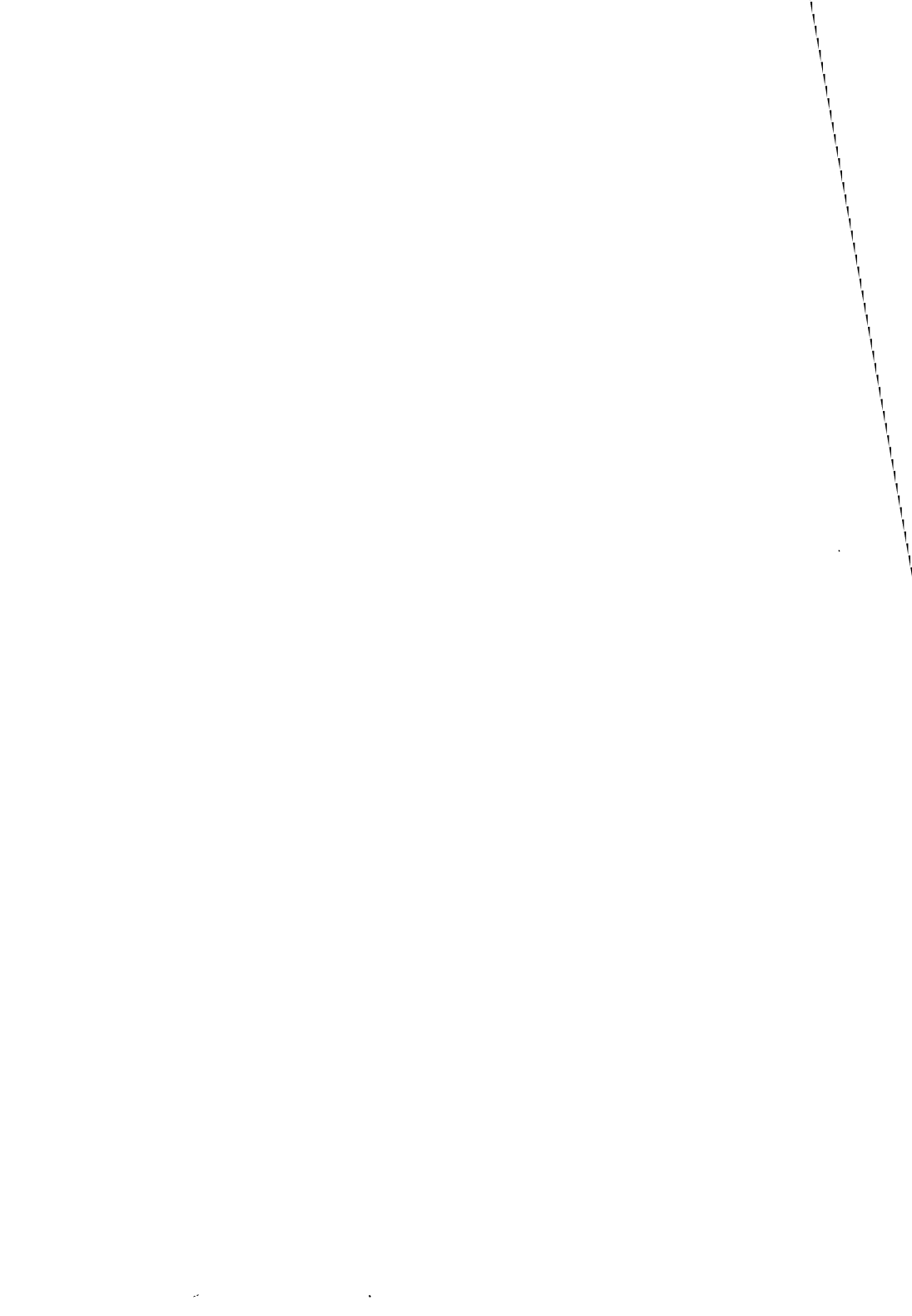


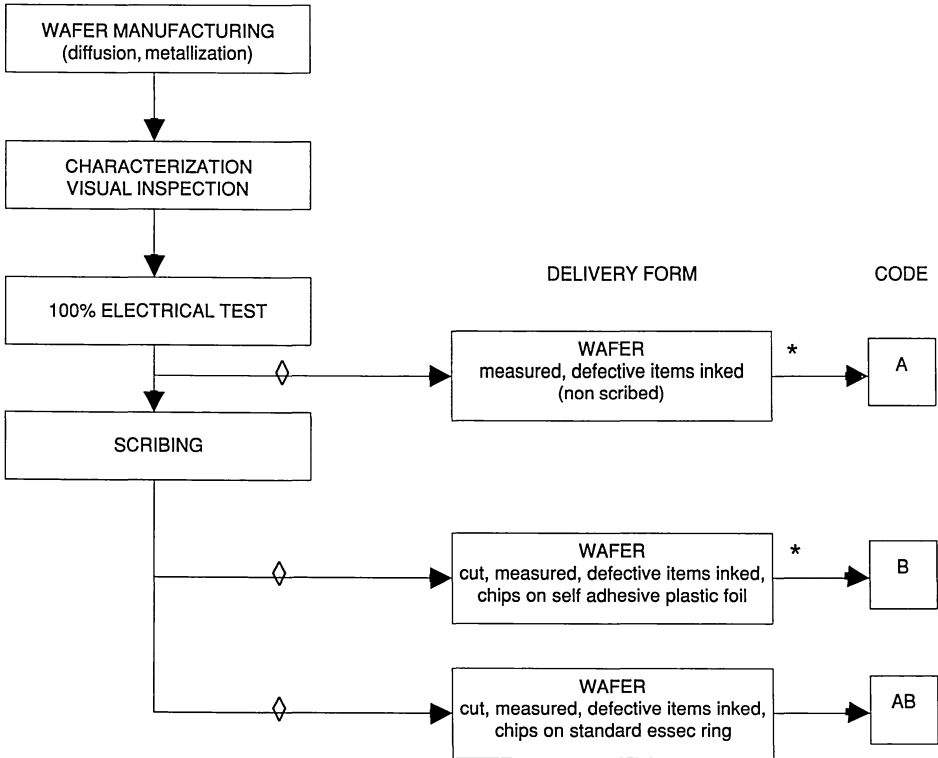
Fig.7 - Surge non repetitive forward current versus number of cycles.



DICE



POWER SCHOTTKY AND RECTIFIERS



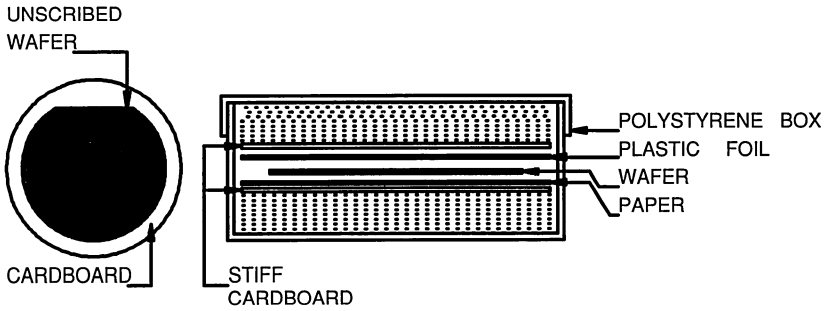
◇ QA INSPECTION

* PREFERRED DELIVERY FORM

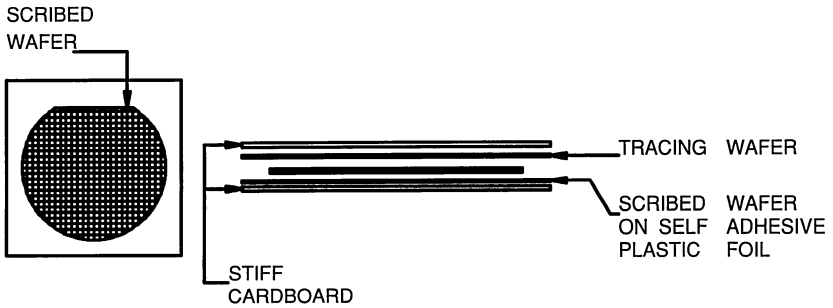
The chips are 100% tested or guaranteed with minimum yield.
 The final quality control is done through sampling for all the batches.
 The MIL STD 105D Standard defines the way of sampling.
 AQL/Sampling guaranteed on 01/01/90 :

SUBGROUP	SAMPLING LEVEL	AQL	PARAMETERS
VISUAL (Mechanical dim. + General appearance)	II	0.65	QA019005
STATIC PARAMETERS AT 25°C (V _F / I _R)	II	0.65	V _F / I _R

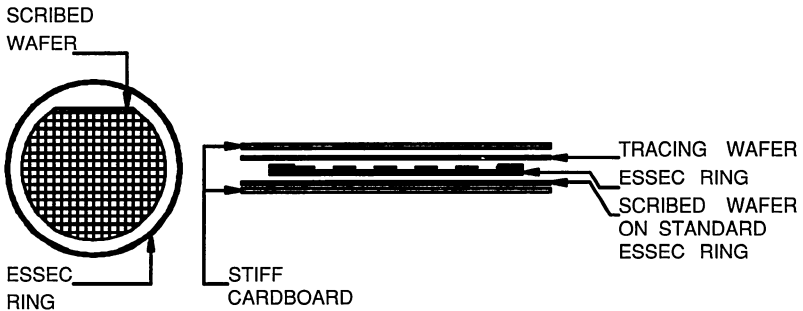
WAFER (A code)



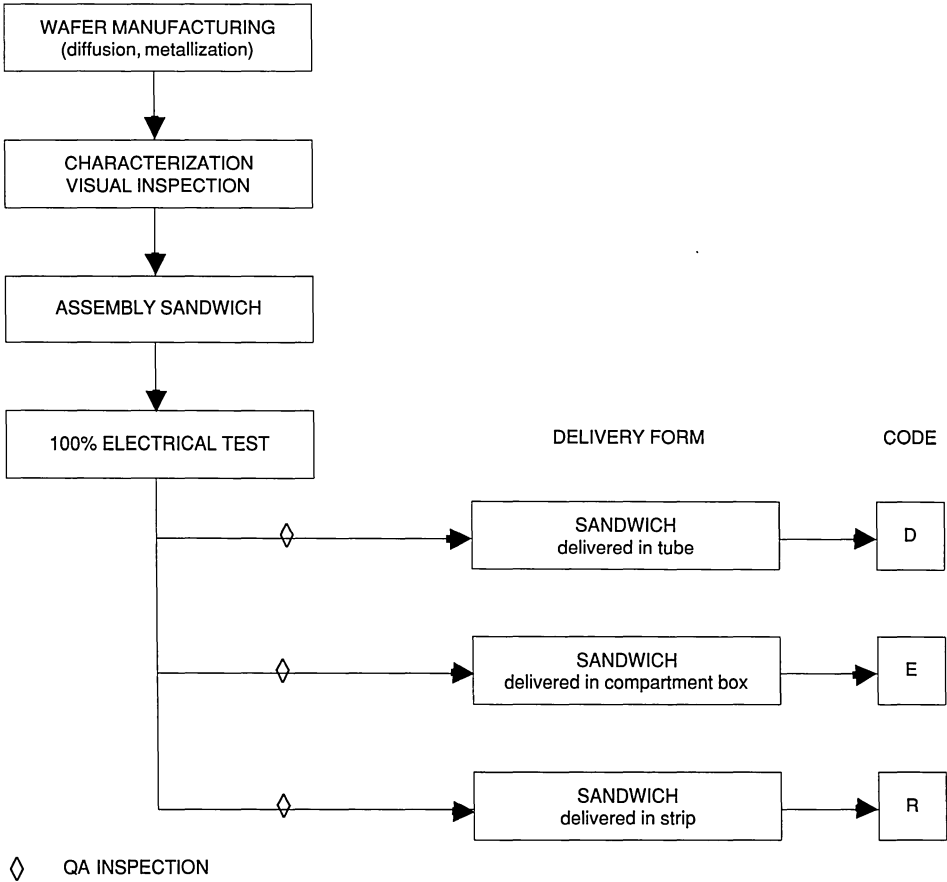
SAWED WAFER (B code)



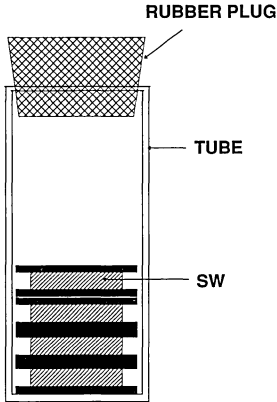
SAWED WAFER (AB code)



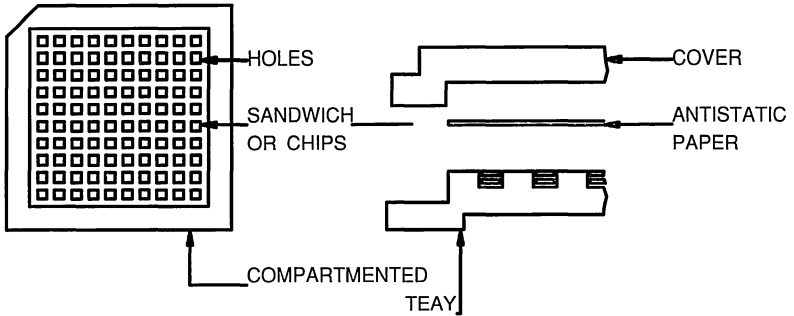
SANDWICH : RECTIFIERS $\leq 3A$



SANDWICH IN TUBE (D code)

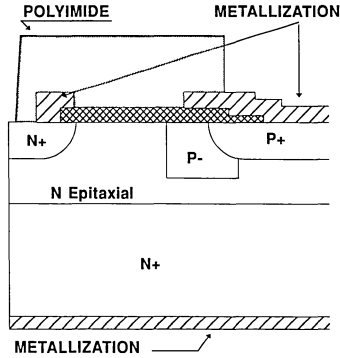


SANDWICH OR CHIPS IN COMPARTMENT BOX (V,E code)



	A	B	AB	D	V	E
RECTIFIERS $\leq 3A$	X	X	X	X	X	X
POWER RECTIFIERS	X	X	X			
POWER SCHOTTKY	X	X	X			

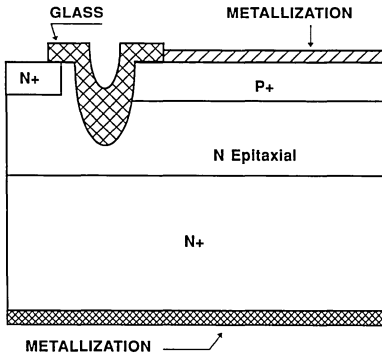
HIGH VOLTAGE PLANAR TECHNOLOGY



JBY239...

J1N...

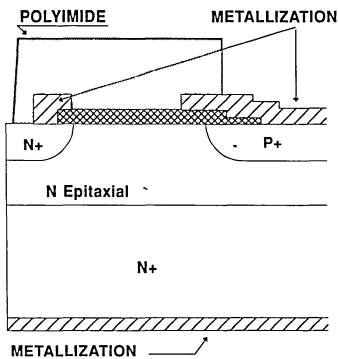
MESA TECHNOLOGY



JBYT...

JR2A...

LOW VOLTAGE PLANAR TECHNOLOGY



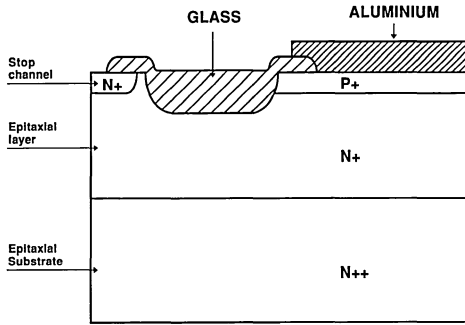
JBYT...

JBYW...

JBY...

RECTIFIERS

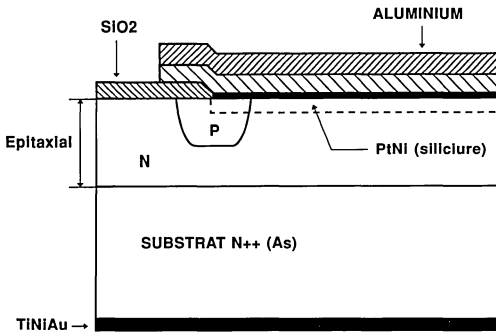
HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY



JTA...

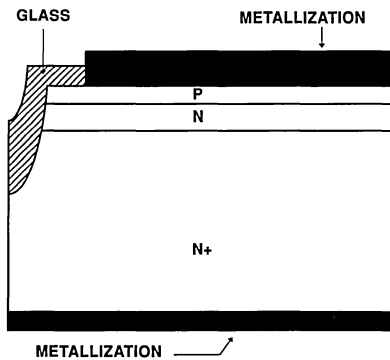
JTB...

SCHOTTKY BARRIER TECHNOLOGY



JTPS...

MESA TECHNOLOGY



JSBYW...

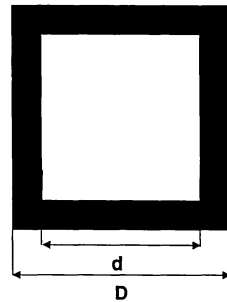
JBYT...

HIGH VOLTAGE STANDARD PLANAR TECHNOLOGY

TYPE	I _{F(AV)} (A)	V _{RRM} (V)	I _{FSM} (A) <small>tp=10ms</small>	V _F @ I _F <small>T_j=25°C</small>		I _R @ V _{RRM} <small>T_j=25°C</small> max (μA)	DICE			
				max (V)	(A)		Thick. (μm)	Dim.		Metal.
								D (mm)	d (mm)	
JBY239-40 JBY239-60 JBY239-80	10	400 600 800	140	1.45	30	5	400	2.8	2.06 1.70 1.70	10* & 2
JBYW88-40 JBYW88-60 JBYW88-80	12	400 600 800	230	1.25	35	5	400	3.3	2.56 2.28 2.28	2* & 10
J1N1188-40 J1N3768-60 J1N3768-80	40	400 600 800	700	1.5	110	20	400	5.3	4.28	2* & 10

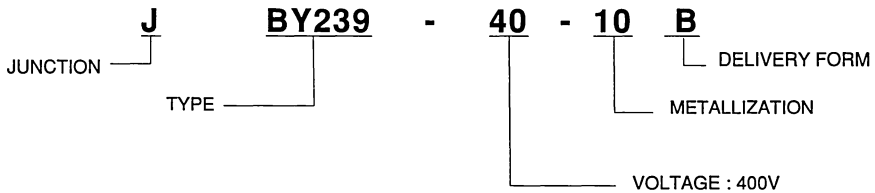
* Preferred

TECHNO.	PLANAR HIGH VOLTAGE STANDARD	
PACKAGING	A	B
	x	x
DICE	MAX QTY PER WAFER	
2.8x2.8	895	
3.3x3.3	635	
5.3x5.3	235	
MIN QTY	Preferred : 2 WAFERS Not Preferred : 10 WAFERS	



White area : anode
Square die

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
2	Al / Ni / Au	Ti / Ni / Au
10	Al	Ti / Ni / Au

RECTIFIERS

HIGH VOLTAGE FAST MESA TECHNOLOGY

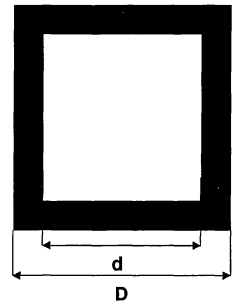
trr conditions ($I_F=1A$, $V_R=30V$, $di/dt=-15 A/\mu s$)

TYPE	$I_{F(AV)}$ (A)	V_{RRM} (V)	I_{FSM} (A) tp=10ms	$V_F @ I_F$ Tj=25°C		$I_R @ V_{RRM}$ Tj=25°C max (μA)	trr (ns)	DICE			
				max (V)	(A)			Thick. (μm)	Dim.		Metal.
									D (mm)	d (mm)	
JBYT71-20 JBYT71-40 JBYT71-60 JBYT71-80	6	200 400 600 800	90	1.4	6	20	300	400	2.5	1.6	10* & 2
JBY233-20 JBY233-40 JBY233-60	8	200 400 600	100	1.5	8	20	150	400	2.8	1.9	10* & 2
JESM765-20 JESM765-40 JESM765-60 JESM765-80	10	200 400 600 800	120	1.4	10	20	300	400	2.8	1.9	10* & 2
JBYX62-20 JBYX62-40 JBYX62-60	12	200 400 600	150	1.4	12	25	200	400	3.3	2.2	2* & 10
JBYX64-20 JBYX64-40 JBYX64-60	30	200 400 600	300	1.4	30	50	200	400	4.8	3.7	2* & 10
JESM244-20 JESM244-40 JESM244-60	60	200 400 600	800	1.5	60	100	200	400	6.3	5.2	2* & 10

* Preferred

TECHNO.	MESA	
PACKAGING	A	B
	x	x
DICE	MAX QTY PER WAFER	
2.5 x 2.5	1034	
2.8 x 2.8	816	
3.3 x 3.3	635	
4.8 x 4.8	290	
6.3 x 6.3	160	
MIN QTY	Preferred : 2 WAFERS Not Preferred : 10 WAFERS	

White area : anode
Square die



EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
2	Al / Ni / Au	Ti / Ni / Au
10	Al	Ti / Ni / Au

LOW VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

trr=35ns conditions (IF=1A, VR=30V, dIF/dt=-50 A/μs)

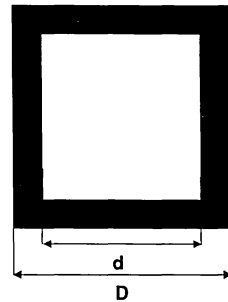
TYPE	IF(AV) (A)	VRRM (V)	IFSM tp=10ms (A)	VF @ IF		IR @ VRRM Tj=25°C max (μA)	DICE			
				Tj=100°C			Thick. (μm)	Dim.		Metal.
				max (V)	(A)			D (mm)	d (mm)	
JBYW100-10 JBYW100-15 JBYW100-20	1.5	100 150 200	70	0.85	1.5	10	400	1.6	0.85	10
JBYW98-10 JBYW98-15 JBYW98-20	3	100 150 200	70	0.85	3	10	400	2.0	1.25	10

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

trr=55ns conditions (IF=1A, VR=30V, dIF/dt=-15 A/μs)

TYPE	IF(AV) (A)	VRRM (V)	IFSM tp=10ms (A)	VF @ IF		IR @ VRRM Tj=25°C max (μA)	DICE			
				Tj=100°C			Thick. (μm)	Dim.		Metal.
				max (V)	(A)			D (mm)	d (mm)	
JBYT01-20 JBYT01-30 JBYT01-40	1	200 300 400	30	1.4	1	20	400	1.4	0.65	10
JBYT03-20 JBYT03-30 JBYT03-40	3	200 300 400	50	1.5	3	20	400	2.0	1.25	10

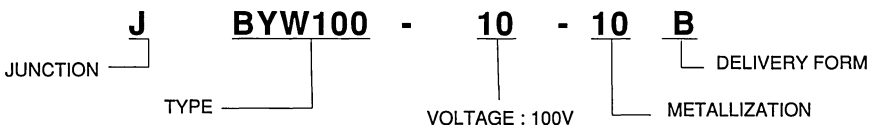
TECHNO.	PLANAR		
PACKAGING	A	AB	B
	x (p)	x	x (p)
DICE	MAX QTY PER WAFER		
1.4 x 1.4	3419		
1.6 x 1.6	2587		
2.0 x 2.0	1644		
MIN QTY	2 WAFERS		



White area : anode
Square die

(p) : Preferred

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
10	Al	Ti / Ni / Au

RECTIFIERS

LOW VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

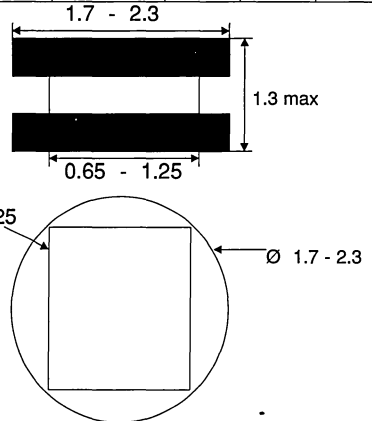
trr=35ns conditions ($I_F=1A$, $V_R=30V$, $dI_F/dt=-50 A/\mu s$)

TYPE	$I_{F(AV)}$ (A)	V_{RRM} (V)	I_{FSM} tp=10ms (A)	$V_F @ I_F$ T _J =100°C		I_R @ V_{RRM} T _J =25°C max (μA)	DICE		
				max (V)	(A)		Thick. (mm)	\varnothing (mm)	Metal.
JSBYW100-10 JSBYW100-15 JSBYW100-20	1.5	100 150 200	70	0.85	1.5	10	1.3 max	1.7	8
JSBYW98-10 JSBYW98-15 JSBYW98-20	3	100 150 200	70	0.85	3	10	1.3 max	2.3	8

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

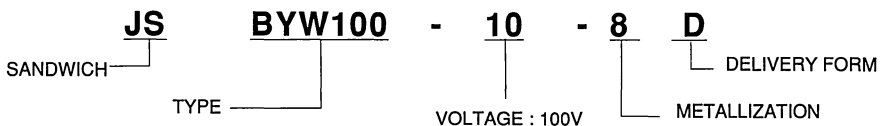
trr=55ns conditions ($I_F=1A$, $V_R=30V$, $dI_F/dt=-15 A/\mu s$)

TYPE	$I_{F(AV)}$ (A)	V_{RRM} (V)	I_{FSM} tp=10ms (A)	$V_F @ I_F$ T _J =100°C		I_R @ V_{RRM} T _J =25°C max (μA)	DICE		
				max (V)	(A)		Thick. (mm)	\varnothing (mm)	Metal.
JSBYT01-20 JSBYT01-30 JSBYT01-40	1	200 300 400	30	1.4	1	20	1.3 max	1.7	8
JSBYT03-20 JSBYT03-30 JSBYT03-40	3	200 300 400	50	1.5	3	20	1.3 max	2.3	8



DIE Information Technology Dimension	MESA GLASS
PACKAGING E = Chip carrier D = Tube	50 45
MIN QTY	500pcs

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
8	Ag	Ag

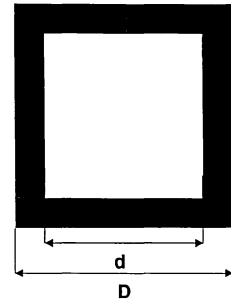
LOW VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

trr conditions (IF=1A, VR=30V, dIF/dt=-50 A/μs)

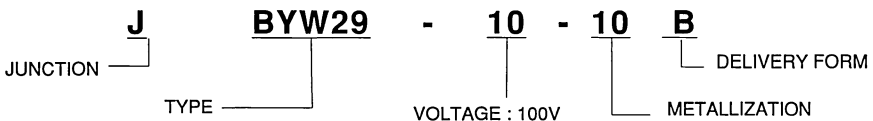
TYPE	IF(AV) (A)	VRRM (V)	IFSM tp=10ms (A)	VF @ IF		IR @ VRRM Tj=25°C max (μA)	trr (ns)	DICE			
				max (V)	(A)			Thick. (μm)	Dim.		Metal.
									D (mm)	d (mm)	
JBYW29-10 JBYW29-15 JBYW29-20	5	100 150 200	80	0.85	5	10	35	400	2.2	1.82	10* & 2
JBYW80-10 JBYW80-15 JBYW80-20	7	100 150 200	100	0.85	7	10	35	400	2.4	2.02	10* & 2
JBYW81-10 JBYW81-15 JBYW81-20	12	100 150 200	200	0.85	12	15	35	400	3.3	2.56	10* & 2
JBYW77-10 JBYW77-15 JBYW77-20	20	100 150 200	500	0.85	20	25	50	400	4.3	3.56	10* & 2
JBYW92-10 JBYW92-15 JBYW92-20	35	100 150 200	500	0.92	35	50	50	400	4.3	3.56	2* & 10
JBYW78-10 JBYW78-15 JBYW78-20	50	100 150 200	1000	0.85	50	50	60	400	6.3	5.56	10* & 2

* Preferred

TECHNO.	LOW VOLTAGE PLANAR	
PACKAGING	A	B
	x	x
DICE	MAX QTY PER WAFER	
2.2 x 2.2	1318	
2.4 x 2.4	1104	
3.3 x 3.3	583	
4.3 x 4.3	336	
6.3 x 6.3	144	
MIN QTY	Preferred : 2 WAFERS Not Preferred : 10 WAFERS	



EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
2	Al / Ni / Au	Ti / Ni / Au
10	Al	Ti / Ni / Au

RECTIFIERS

LOW VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

$t_{rr}=35\text{ns}$ conditions ($I_F=1\text{A}$, $V_R=30\text{V}$, $dI_F/dt=-50\text{ A}/\mu\text{s}$) 2 x 8A

TYPE	$I_F(\text{AV})$ (A)	V_{RRM} (V)	I_{FSM} (A) <small>$t_p=10\text{ms}$</small>	$V_F @ I_F$ <small>$T_j=100^\circ\text{C}$</small>		$I_R @ V_{RRM}$ <small>$T_j=25^\circ\text{C}$</small> max (μA)	DICE			
				max (V)	(A)		Thick. (μm)	Dim.		Metal.
								D1xD2 (mm)	d1xd2 (mm)	
JBYW51-10 JBYW51-15 JBYW51-20	8	100 150 200	100	0.89	8	15	400	2.8x4.0	2.42x1.67	10* & 2

* Preferred

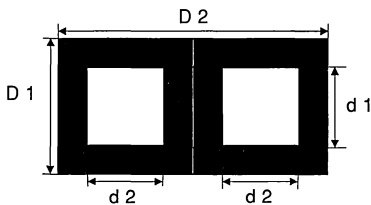
HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

$t_{rr}=75\text{ns}$ conditions ($I_F=1\text{A}$, $V_R=30\text{V}$, $dI_F/dt=-15\text{ A}/\mu\text{s}$)

TYPE	$I_F(\text{AV})$ (A)	V_{RRM} (V)	I_{FSM} (A) <small>$t_p=10\text{ms}$</small>	$V_F @ I_F$ <small>$T_j=100^\circ\text{C}$</small>		$I_R @ V_{RRM}$ <small>$T_j=25^\circ\text{C}$</small> max (μA)	DICE			
				max (V)	(A)		Thick. (μm)	Dim.		Metal.
								D1xD2 (mm)	d1xd2 (mm)	
JBYT16-20 JBYT16-30 JBYT16-40	8	200 300 400	100	1.4	8	15	400	3.2x4.8	1.73x1.23	10* & 2

* Preferred

TECHNO.	LOW VOLTAGE PLANAR	
PACKAGING	A	B
	x	x
DICE	MAX QTY PER WAFER	
2.8x4.0	558	
4.8x3.2	406	
MIN QTY	Preferred : 2 WAFERS Not Preferred : 10 WAFERS	



White area : anode

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
2	Al / Ni / Au	Ti / Ni / Au
10	Al	Ti / Ni / Au

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

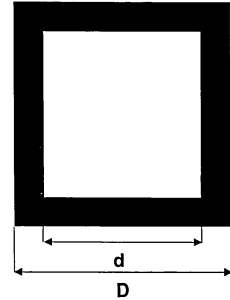
trr conditions (IF=1A, VR=30V, dIF/dt=-15 A/μs)

TYPE	IF(AV) (A)	VRRM (V)	IFSM tp=10ms (A)	VF @ IF		IR @ VRRM Tj=25°C max (μA)	trr (ns)	DICE			
				Tj=25°C				Thick. (μm)	Dim.		Metal.
				max (V)	(A)				D (mm)	d (mm)	
JBYT08-20 JBYT08-30 JBYT08-40	8	200 300 400	100	1.5	8	15	75	400	2.8	2.06	10* & 2
JBYT12-20 JBYT12-30 JBYT12-40	12	200 300 400	200	1.5	12	15	100	400	3.3	2.56	10* & 2
JBYT30-20 JBYT30-30 JBYT30-40	30	200 300 400	350	1.5	30	35	100	400	4.3	3.56	10* & 2
JBYT60-20 JBYT60-30 JBYT60-40	60	200 300 400	550	1.5	60	60	100	400	6.3	5.56	10* & 2

* Preferred

TECHNO.	LOW VOLTAGE PLANAR	
PACKAGING	A	B
	x	x
DICE	MAX QTY PER WAFER	
2.8 x 2.8	823	
3.3 x 3.3	583	
4.3 x 4.3	336	
6.3 x 6.3	144	
MIN QTY	Preferred : 2 WAFERS Not Preferred : 10 WAFERS	

White area : anode
Square die



EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
2	Al / Ni / Au	Ti / Ni / Au
10	Al	Ti / Ni / Au

RECTIFIERS

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

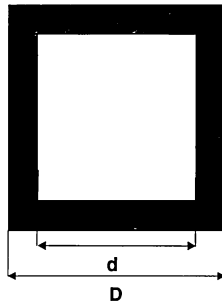
trr conditions ($I_F=1A$, $V_R=30V$, $dI_F/dt=-15 A/\mu s$)

TYPE	$I_{F(AV)}$ (A)	V_{RRM} (V)	I_{FSM} (A) tp=10ms	$V_F @ I_F$ Tj=25°C		$I_R @ V_{RRM}$ Tj=25°C max (μA)	trr (ns)	DICE			
				max (V)	(A)			Thick. (μm)	Dim.		Metal.
									D (mm)	d (mm)	
JBYT12-100	12	1000	75	1.9	12	50	155	280	2.8	1.96	10* & 2
JBYT30-100	30	1000	200	1.9	30	100	165	280	4.0	3.16	10* & 2
JBYT60-100	60	1000	400	1.9	60	100	170	280	5.3	4.46	10* & 2

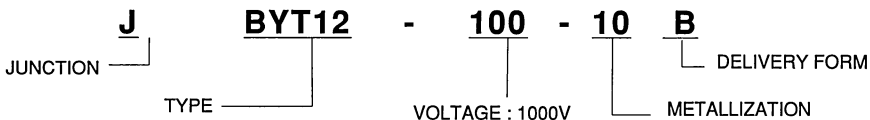
* Preferred

TECHNO.	HIGH VOLTAGE ULTRA FAST PLANAR	
PACKAGING	A	B
	x	x
DICE	MIN QTY PER WAFER	
2.8x2.8	816	
4.0 x 4.0	390	
5.3 x 5.3	217	
MIN QTY	Preferred : 2 WAFERS Not Preferred : 10 WAFERS	

White area : anode
Square die



EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
2	Al / Ni / Au	Ti / Ni / Au
10	Al	Ti / Ni / Au

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

TURBOSWITCH "A"

$V_{RRM} = 600V$ $t_{rr} (1) 45ns$

TYPE	I _{F(AV)} (A)	V _F @ I _F T _J =125°C		I _R (4)T _J =125°C	t _{rr} (2)T _J =25°C	I _{RM} (3)T _J =125°C	DICE			
		max (V)	(A)	max (mA)	max (ns)	max (A)	Thick. (μm)	Dim.		Metal.
								D (mm)	d (mm)	
JTA106	1	TBD	TBD	TBD	TBD	TBD	280	1.6	0.7	10
JTA206	2	TBD	TBD	TBD	TBD	TBD	280	1.9	1.0	
JTA506	5	1.5	5	2	50	3.0	280	2.2	1.3	
JTA806	8	1.5	8	4	52	5.5	280	2.8	1.9	
JTA1206	12	1.5	12	5	55	7.5	280	3.1	2.2	
JTA2006	20	1.5	20	6	60	12.5	280	3.7	2.8	
JTA3006	30	1.5	30	8	65	19.0	280	4.4	3.5	
JTA6006	60	1.5	60	12	80	38.0	280	5.9	5.0	

(1) I_F = 0.5A, I_P = 1A, I_{RR} = 0.25A

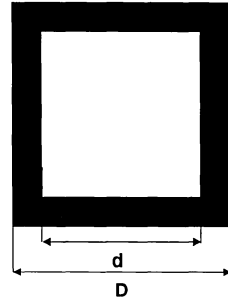
(2) I_F = 1A, di_F/dt = -50 A/μs, V_R = 30 V

(3) di_F/dt = 8 times I_{F(AV)} A/μs, V_R = 400 V

(4) I_R @ 80 % of V_{RRM}

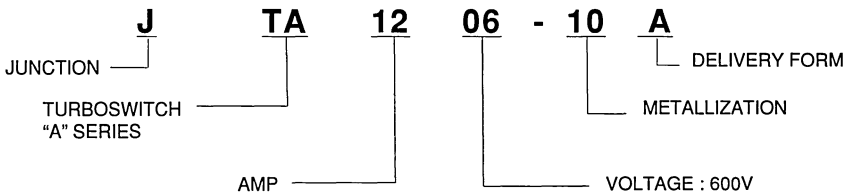
TBD = To Be Defined

TECHNO.	HIGH VOLTAGE PLANAR		
PACKAGING	A	AB	B
	x	x	x
DICE	MAX QTY PER WAFER		
1.6 x 1.6	2650		
1.9 x 1.9	1802		
2.2 x 2.2	1344		
2.8 x 2.8	816		
3.1 x 3.1	657		
3.7 x 3.7	460		
4.4 x 4.4	308		
5.9 x 5.9	175		
MIN QTY	2 WAFERS		



White area : anode
Square die

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
10	Al	Ti / Ni / Au

RECTIFIERS

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

TURBOSWITCH "B"

$V_{RRM} = 600V$ $t_{rr} (1) 65ns$

TYPE	$I_{F(AV)}$ (A)	$V_F @ I_F$ $T_j=125^\circ C$ max (V) (A)		I_R (4) $T_j=125^\circ C$ max (mA)	t_{rr} (2) $T_j=25^\circ C$ max (ns)	I_{RM} (3) $T_j=125^\circ C$ max (A)	DICE			
		Thick. (μm)	Dim.		Metal.					
			D (mm)	d (mm)						
JTB106	1	TBD	TBD	TBD	TBD	TBD	280	1.6	0.7	10
JTB206	2	TBD	TBD	TBD	TBD	TBD	280	1.9	1.0	
JTB506	5	1.3	5	0.75	95	7.5	280	2.2	1.3	
JTB806	8	1.3	8	1.5	100	12	280	2.8	1.9	
JTB1206	12	1.3	12	2	100	18	280	3.1	2.2	
JTB2006	20	1.3	20	3	105	30	280	3.7	2.8	
JTB3006	30	1.3	30	5	110	45	280	4.4	3.5	
JTB6006	60	1.3	60	9	115	90	280	5.9	5.0	

(1) $I_F = 0.5A$, $I_P = 1A$, $I_{RR} = 0.25A$

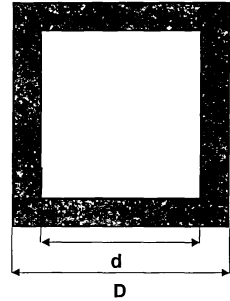
(2) $I_F = 1A$, $di_F/dt = -50 A/\mu s$, $V_R = 30 V$

(3) $di_F/dt = 8$ times $I_{F(AV)} A/\mu s$, $V_R = 400 V$

(4) $I_R @ 80\%$ of V_{RRM}

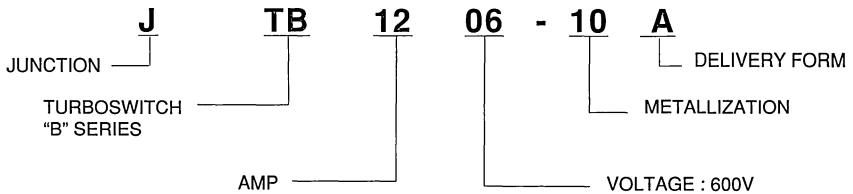
TBD = To Be Defined

TECHNO.	HIGH VOLTAGE PLANAR		
	A	AB	B
PACKAGING	x	x	x
DICE	MAX QTY PER WAFER		
1.6 x 1.6	2650		
1.9 x 1.9	1802		
2.2 x 2.2	1344		
2.8 x 2.8	816		
3.1 x 3.1	657		
3.7 x 3.7	460		
4.4 x 4.4	308		
5.9 x 5.9	175		
MIN QTY	2 WAFERS		



White area : anode
Square die

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
10	Al	Ti / Ni / Au

HIGH VOLTAGE ULTRA FAST PLANAR TECHNOLOGY

TURBOSWITCH "A"

$V_{RRM} = 1200V$ $t_{rr} (1) 65ns$

TYPE	$I_{F(AV)}$ (A)	$V_F @ I_F$ $T_j=125^\circ C$ max (V) (A)		I_R (4)	t_{rr} (2)	I_{RM} (3)	DICE			
				$T_j=125^\circ C$ max (mA)	$T_j=25^\circ C$ max (ns)	$T_j=125^\circ C$ max (A)	Thick. (μm)	Dim.		Metal.
								D (mm)	d (mm)	
JTA112	1	TBD	TBD	TBD	TBD	TBD	280	1.6	0.7	10
JTA212	2	TBD	TBD	TBD	TBD	TBD	280	1.9	1.0	
JTA512	5	2	5	2	95	7.5	280	2.2	1.3	
JTA812	8	2	8	4	100	12	280	2.8	1.9	
JTA1212	12	2	12	5	100	18	280	3.1	2.2	
JTA1512	15	1.9	15	6	105	TBD	280	3.7	2.8	
JTA2512	25	1.9	25	8	110	TBD	280	4.4	3.5	
JTA4512	45	1.85	45	12	115	TBD	280	5.9	5.0	

(1) $I_F = 0.5A$, $I_P = 1A$, $I_{RR} = 0.25A$

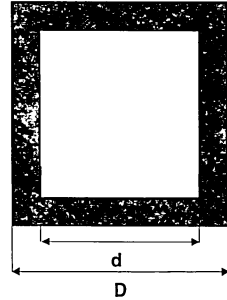
(2) $I_F = 1A$, $di_F/dt = -50 A/\mu s$, $V_R = 30 V$

(3) $di_F/dt = 8$ times $I_{F(AV)} A/\mu s$, $V_R = 400 V$

(4) $I_R @ 80\%$ of V_{RRM}

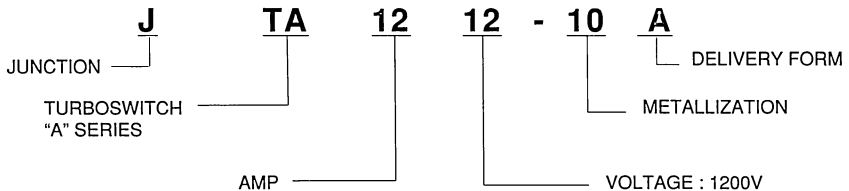
TBD = To Be Defined

TECHNO.	HIGH VOLTAGE PLANAR		
PACKAGING	A	AB	B
		x	x
DICE	MAX QTY PER WAFER		
1.6 x 1.6	2650		
1.9 x 1.9	1802		
2.2 x 2.2	1344		
2.8 x 2.8	816		
3.1 x 3.1	657		
3.7 x 3.7	460		
4.4 x 4.4	308		
5.9 x 5.9	175		
MIN QTY	2 WAFERS		



White area : anode
Square die

EXAMPLE :



AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
10	Al	Ti / Ni / Au

RECTIFIERS

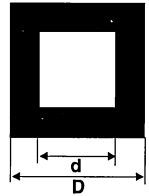
POWER SCHOTTKY

TYPE	I _{F(AV)} (A)	V _{RRM} (V)	I _{FSM} tp=10ms (A)	V _F @ I _F T _j =125°C		I _R @ V _{RRM} T _j =25°C max (μA)	DICE			WIRE BY DIE (μm)	
				max (V)	(A)		Thick. (μm)	Dim.			Metal.
								D (mm)	d (mm)		
JTPS320 JTPS330 JTPS340	3	20 30 40	75	0.57	3	100	280	1.4	1.1	10	250
JTPS620 JTPS630 JTPS640	2x3	20 30 40	75	0.57	3	100	280	1.4	1.1	10	2x250
JTPS735 JTPS745	7.5	35 45	150	0.57	7.5	100	280	2	1.7	10	380
JTPS1535C JTPS1545C	2x7.5	35 45	150	0.57	7.5	100	280	2	1.7	10	2x380
JTPS1035 JTPS1045	10	35 45	150	0.57	10	100	280	2.4	2.1	10	500
JTPS2035C JTPS2045C	2x10	35 45	150	0.57	10	100	280	2.4	2.1	10	2x500

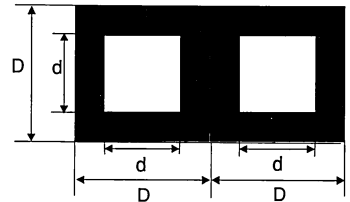
TECHNO.	SCHOTTKY		
	A	AB	B
PACKAGING	x	x	x
DICE	MAX QTY PER WAFER		
1.4 x 1.4	3404		
1.4 x 2.8	1670		
2.0 x 2.0	1634		
2.0 x 4.0	794		
2.4 x 2.4	1132		
2.4 x 4.8	547		
MIN QTY	2 WAFERS		

SINGLE CHIP :

White area : anode
Square die



DUAL CHIP :



White area : anode

EXAMPLE :

J **TPS** **10** - **35** - **10** **B**
 JUNCTION TYPE AMP VOLTAGE : 35V METALLIZATION DELIVERY FORM

AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
10	Al	Ti / Ni / Au

POWER SCHOTTKY

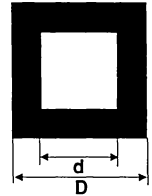
TYPE	IF(AV) (A)	VRRM (V)	IFSM tp=10ms (A)	VF @ IF		IR @ VRRM Tj=25°C max (μA)	DICE			WIRE BY DIE (μm)	
				Tj=125°C			Thick. (μm)	Dim.			Metal.
				max (V)	(A)	D (mm)		d (mm)			
JTPS1535 JTPS1545	15	35 45	150	0.57	15	200	280	2.9	2.6	10	500
JTPS3035C JTPS3045C	2x15	35 45	150	0.57	15	200	280	(1)	(1)	10	2x500
JTPS3035 JTPS3045	30	35 45	400	0.63	30	500	280	3.8	3.4	10	2x500
JTPS6035C JTPS6045C	2x30	35 45	400	0.63	30	500	280	3.8	3.4	10	4x500
JTPS6035 JTPS6045	60	35 45	700	0.67	60	1mA	280	5.3	4.9	10	5x500
JTPS8035 JTPS8045	80	35 45	900	0.69	80	1mA	280	5.3	4.9	10	5x500
JTPS10100	10	100	200	0.70	10	150	280	2.9	2.6	10	500
JTPS40100	40	100	700	0.83	40	400	280	5.3	4.9	10	5x500

(1) : Special layout : consult us.

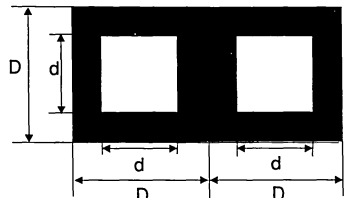
TECHNO.	SCHOTTKY		
PACKAGING	A	AB	B
		x	x
DICE	MAX QTY PER WAFER		
2.9 x 2.9	759		
4.4 x 3.9	362		
3.8 x 3.8	432		
3.8 x 7.6	208		
5.3 x 5.3	216		
MIN QTY	2 WAFERS		

SINGLE CHIP :

White area : anode
Square die



DUAL CHIP :



White area : anode

EXAMPLE : **J** **TPS** **30** - **35** - **10** **B**

JUNCTION TYPE AMP VOLTAGE : 35V DELIVERY FORM METALLIZATION

AVAILABLE METALLIZATION		
Ref.	FRONT SIDE	BACK SIDE
10	Al	Ti / Ni / Au

APPLICATION NOTES

SERIES OPERATION OF FAST RECTIFIERS

B. Rivet

The use of several rectifiers connected in series is necessary to obtain voltage ratings beyond the capabilities of single diodes and also when some special requirement, such as very low switching losses, requires the implementation of several low voltage ultra fast diodes.

Rectifiers connected in series tend to unequally share the voltage across the string in blocking conditions because of the variations in reverse characteristics : leakage currents and turn-off switching parameters.

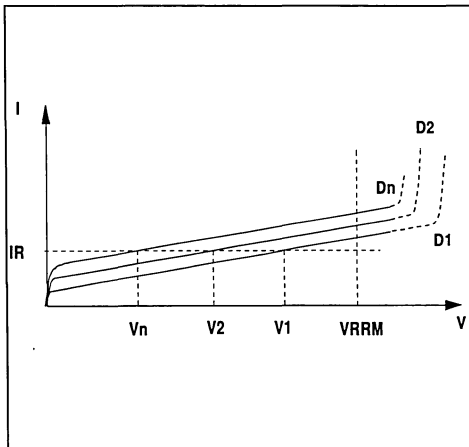
To ensure that each diode operates within its voltage rating, it is generally necessary to add a voltage sharing network.

This paper gives the rules of calculation of this auxiliary network and shows how this circuit could be optimized : reduction of power dissipation and cost.

I - STEADY STATE VOLTAGE SHARING :

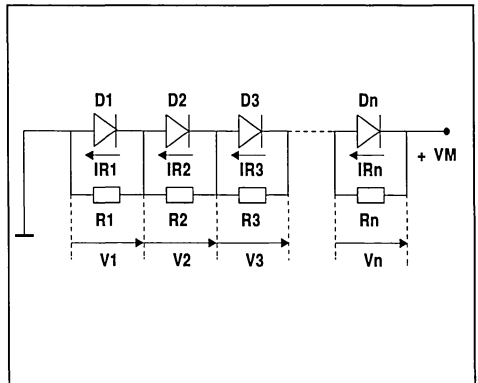
The difference in blocking characteristics results in unequal steady state voltage (fig.1).

Figure 1 : Dispersion of diodes reverse characteristics. The reverse current through the string D1, D2, ..., Dn is I_R and the voltages across the diodes are respectively V_1, V_2, \dots, V_n .



In order to equalize the voltage, a resistor is connected across each diode (Fig.2).

Figure 2 : Use of shunt resistors for steady state voltage sharing.



1) Calculation of sharing resistors :

The calculation of these resistances is based on the worst case situation.

The maximum imbalance in blocking voltage when n diodes are connected in series occurs when $(n-1)$ diodes have the maximum leakage current and one diode D_1 has the lowest possible leakage current.

In this case D_1 will support the highest voltage V_1 , and this tendency is aggravated by the assumption that the corresponding resistor R_1 is at the upper limit of its tolerance (a), while all the others are at the lowest limit so,

$$R_1 = R(1+a)$$

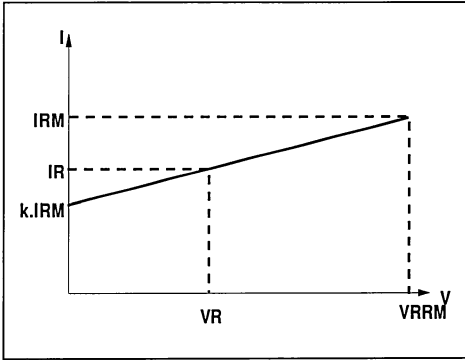
$$R_2 = R_3 = \dots R_n = R$$

In order to calculate the current in the string we approximate the reverse characteristic with a straight line. We define the slope by the coefficient k according to fig.3.

Figure 3 : Reverse characteristic model of a fast rectifier.

$$I_R + I_{RM}(T) \cdot \left[k + \frac{V_R(1-k)}{V_{RRM}} \right]$$

With $k = 0.8$



The leakage current I_{RM} of diodes D2 ... Dn under the blocking voltage $V_2 ... V_n$ is :

$$I_{R2} = I_{R3} = \dots I_{Rn} = I_{RM} \left[k + \frac{V_n(1-k)}{V_{RRM}} \right]$$

where I_{RM} is the maximum leakage current at V_{RRM} (maximum voltage specified for this diode) and at the operating junction temperature. For D1 the maximum reverse current at V_{RRM} is :

$$I_{RM} - \Delta I_R$$

In these conditions the leakage current of diode D1 is :

$$I_{R1} = (I_{RM} - \Delta I_R) \left(k + \frac{V_1(1-k)}{V_{RRM}} \right)$$

Taking into account all these parameters, the voltage V_1 across the diode D1 is given by the relation :

$$V_1 = \frac{V_M(1+a)(V_{RRM} + (1-k)I_{RM}R) + k(n-1)(1+a)\Delta I_R R V_{RRM}}{R I_{RM} n(1-k)(1+a) + V_{RRM}(n+a) - R \Delta I_R (1-k)(1+a)(n-1)} \quad (1)$$

The resistance R must be chosen to limit the voltage V_1 under the maximum value V_{RRM} specified for this rectifier. Thus :

$$R < \frac{V_{RRM}(V_{RRM}(n+a) - V_M(1+a))}{\Delta I_R V_{RRM}(1+a)(n-1) - I_{RM}(1-k)(1+a)(nV_{RRM} - V_M)} \quad (2)$$

For today's fast rectifiers we can use $k=0.8$.

2) I_{RM} evaluation

I_{RM} is the maximum leakage current at the maximum reverse voltage V_{RRM} . This current depends on the junction temperature (Fig.4).

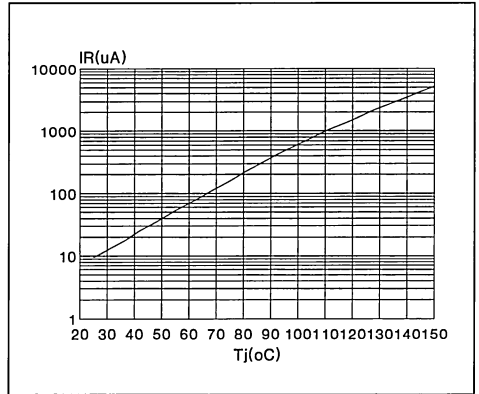
Generally, the manufacturer specifies a maximum value I_{RM} at V_{RRM} at $T_j=100^\circ\text{C}$, in the data sheet.

When we know the operating junction temperature (T_j), it is possible to calculate I_{RM} by using the following relation :

$$I_{RM}(T_j) = I_{RM}(100^\circ\text{C}) \exp[-0.054(100-T_j)]$$

Figure 4 : Reverse leakage current versus junction temperature.

Example :
BYT 261-1000 (typical value)



3) ΔI_R estimation

In fact ΔI_R is the sum of ΔI_{R1} and ΔI_{R2}

- ΔI_{R1} is due to the leakage current dispersion of the rectifiers in the same conditions of voltage and temperature.

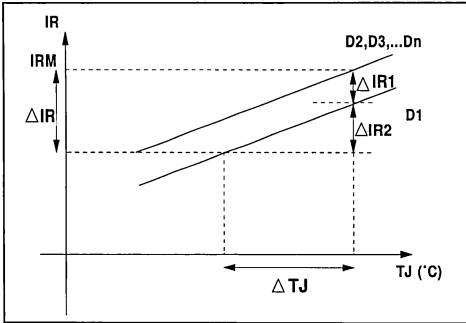
For the fast rectifiers available today on the market the dispersion of the reverse current at $V_R = V_{RRM}$ and $T_j = 100^\circ\text{C}$ is about :

$$\Delta I_{R1} = 0.6 I_{RM}$$

This dispersion varies from one batch to another.

- ΔI_{R2} is due to the difference between the junction temperatures of each device (ΔT_j).

Figure 5 : The variation ΔI_R is the dispersion of I_R at max operation junction temperature (ΔI_{R1}) plus the variation due to T_J (ΔI_{R2})



The junction temperature is given by the thermal resistance junction to ambient R_{th} (j-a) and the power dissipation due to the conduction losses (PC) and the switching losses (PS).

PC is linked to the forward voltage (V_F) and PS is linked to the reverse recovery charge (Q_{RR}). So the variation of the junction temperature is :

$$\Delta T_J = \Delta R_{th} (PC + PS) + R_{th} \left(\frac{\Delta V_F}{V_F} PC + \frac{\Delta Q_{RR}}{Q_{RR}} PS \right)$$

where ΔV_F is the dispersion of the forward voltage and Q_{RR} the dispersion of the reverse recovery charge.

For series operation, it is recommended to use pieces coming from the same lot, so the dispersion on the parameters V_F , Q_{RR} and R_{th} is minimized;

In most cases the evaluation of ΔT_J is difficult but, from experience, it is generally lower than 10°C .

We propose to take a safety margin and to use :

$$\Delta I_R = 0.85 I_{RM}$$

4) Simplified formula

The relation (2) is often used by using the following approximations

$k = 1$: supposing the reverse current I_{RM} constant, whatever the blocking voltage across the diode.

$a = 0$: Neglecting the effect of the tolerance of resistors. thus :

$$R < \frac{n V_{RRM} - V_M}{(n-1) \Delta I_R}$$

As for the ΔI_R the worst case is taken into account.

$\Delta I_R = I_R$ with $I_R = I_{RM}$ max at T_J max specified (100°C)

$$R < \frac{n V_{RRM} - V_M}{(n-1) I_R}$$

This formula is "pessimistic" and induces a low resistance and then a high power dissipation.

5) Example

- Given

Maximum blocking voltage : $V_M = 2500\text{V}$

Part number used : BYT12PI-1000

Power dissipation per diode : $P = 7\text{W}$

Case temperature : $T_{case} = 52^\circ\text{C}$

- Rectifier specification :

$V_{RRM} = 1000\text{V}$

I_R (Max at $T_J=100^\circ\text{C}$) = 2.5mA

R_{th} j-c = 4°C/W

- Problem :

Calculation of sharing resistors for 3 diodes in series.

- Solutions :

a) Simplified method :

$$R < \frac{n V_{RRM} - V_M}{(n-1) I_R}$$

With

$n = 3$

$V_{RRM} = 1000\text{V}$

$V_M = 2500\text{V}$

$I_R = 2.5\text{mA}$

Thus

$R_{min} = 100 \text{ k}\Omega$

Power dissipation per resistor : 3.45 W ! (with duty cycle $\delta = .5$)

b) Calculation with relation (2) :

$$R < \frac{V_{RRM} (V_{RRM} (n+a) - V_M (1+a))}{\Delta I_R V_{RRM} (1+a) (n-1) - I_{RM} (1-k) (1+a) (n V_{RRM} - V_M)}$$

General data for fast rectifiers :

$\Delta I_R = 0.85 I_{RM}$

$k = 0.8$

Intermediate calculations :

$T_J = P \cdot R_{th} \text{ j-c} + T_{case} = 80^\circ\text{C}$

APPLICATION NOTE

$$\begin{aligned} I_{RM} &= I_{RM}(80^{\circ}\text{C}) \\ &= I_{RM}(100^{\circ}\text{C}) \exp[-0.0054(100-80)] \\ &= 0.85\text{mA} \end{aligned}$$

$$\Delta I_{RM} = 0.72\text{mA}$$

Assuming we use resistors with 5% of tolerance, then $a = .10$

Let : $R_{min} = 220 \text{ k}\Omega$

Power dissipation per resistor = 1.58W (with $\delta = .5$)

6) Question : is it possible to remove the sharing resistors ?

With the relation (1) we can find the value of V_1 when the value of R tends to be infinite. Then we calculate the condition to have

$$V_1 < V_{RRM}$$

Solving we find

$$\frac{\Delta I_R}{I_{RM}} < \frac{(1-k)(n V_{RRM} - V_M)}{V_{RRM}(n-1)}$$

In the previous example this condition should be

$$\frac{\Delta I_R}{I_{RM}} = 5\%$$

It is obvious that this condition is generally very difficult to meet without hard selection.

II - TRANSIENT VOLTAGE SHARING

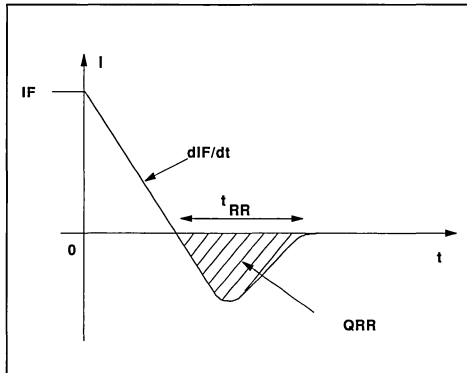
1) The problem

When a diode is switched from the forward conduction to the reverse blocking state, a reverse current flows through the device during the reverse recovery time t_{rr} .

After this delay all the charges (minority carriers) stored in the junction are eliminated and the diode turns off. The time integral of the reverse recovery current is called reverse recovery charge (Q_{RR}).

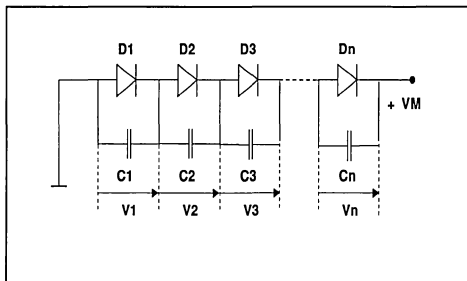
Fig.6 defines the reverse recovery parameters. When a string of n diodes in series switches off, the diode which has the lowest recovery charge turns off first and supports an important proportion of the total voltage V_M . Its maximum reverse voltage V_{RRM} could be reached or exceeded.

Figure 6 : Reverse recovery current waveform.



Voltage sharing during the reverse recovery phase is achieved by using a shunt capacitor string connected across the diodes (Fig.7).

Figure 7 : Use of shunt capacitors for transient voltage sharing.



2) Calculation of sharing capacitors

The calculation of capacitance C is also based on the worst case situation.

We assume that $(n-1)$ diodes $D_2, D_3 \dots D_n$ with a reverse recovery charge $Q_{RR} + \Delta Q_{RR}$, and one diode D_1 with lowest value Q_{RR} .

We suppose also that the corresponding capacitor C_1 is at the lowest limit of tolerance (a) while the others are at the upper limit

$$\begin{aligned} \text{so : } C_1 &= C \\ C_2 = C_3 = \dots = C_n &= C(1+a) \end{aligned}$$

When all the stored charges of diode D_1 have been evacuated, the charge remaining in the other diodes is ΔQ_{RR} .

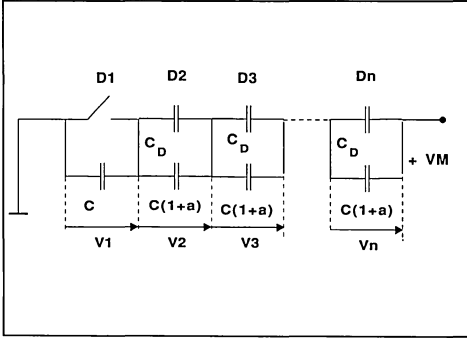
At this time the voltage across D_1 is V_1 and the voltage across the other diodes of the string is :

$$V_2 = V_3 = \dots V_n = \frac{V_M - V_1}{(n-1)}$$

So these diodes can be assimilated to a capacitor

$$C_D = \frac{\Delta Q_{RR}}{V_n} = \frac{\Delta Q_{RR} (n-1)}{V_M - V_1}$$

Figure 8 : Equivalent diagram when D1 switches off. Diodes D2, D3, ..., Dn are equivalent to a capacitor $C_D = \Delta Q_{RR}(n-1) / (V_M - V_1)$



In these conditions the voltage across D1 is :

$$V_1 = \frac{\Delta Q_{RR} (n-1) + C V_M (1+a)}{C (n+a)}$$

In order to limit the voltage across D1 under the specified value V_{RRM} we calculate C by solving thus :

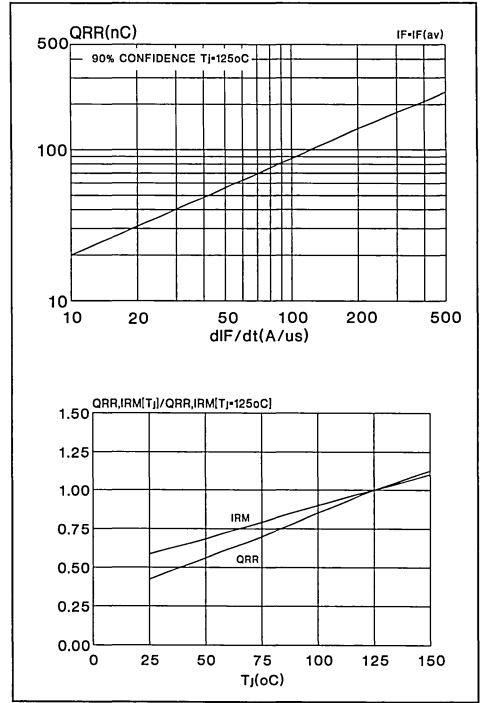
$$C > \frac{(n-1)\Delta Q_{RR}}{(n+a)V_{RRM} - V_M(1+a)}$$

3) QRR and ΔQ_{RR} consideration

For a given diode the reverse recovery charge QRR is a function of the circuit commutation conditions such as the magnitude of this forward current (IF), the rate of decay of this current (dIF/dt) and the junction temperature.

Typical values of QRR are given in the data sheet of each part number (Fig.9).

Figure 9 : Example of reverse recovery charge specification. (case of BYW 51)



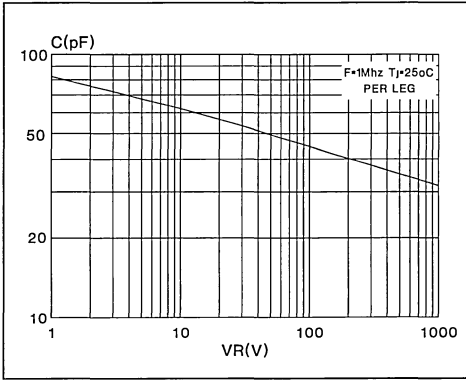
For fast rectifiers coming from the same lot the dispersion of this parameter is low and we can use, with a good safety margin :

$$\Delta Q_{RR} = .30 Q_{RR}$$

4) Is it possible to remove the equalizing capacitor ?

In the blocking state, diodes have a junction capacitance. For a given diode this capacitance decreases with an increase in the applied reverse voltage according to Fig.10.

Figure 10 : Junction capacitance C_J versus reverse voltage (example : BYT261PIV-1000)

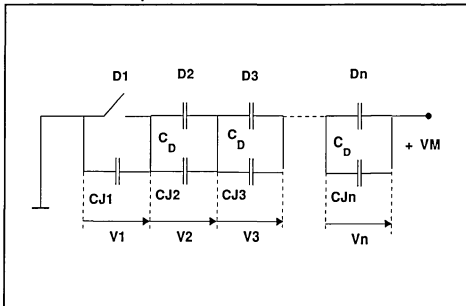


When D1 has evacuated all its stored charge, it is equivalent to a capacitor C_{J1} and the other diodes D2, D3 ... Dn are equivalent to a capacitor which is the sum of the junction capacitance $C_{J2}, C_{J3} \dots C_{Jn}$ and the capacitance

$$C_D = \frac{\Delta Q_{RR} (n-1)}{V_M - V_1}$$

Fig.11 shows the equivalent circuit

Figure 11 : Equivalent diagram when D1 switches off in case of low Q_{RR} : The junction capacitances $C_{J1}, C_{J2}; \dots C_{Jn}$, play the role of sharing capacitors.



In the worst case C_{J1} is the junction capacitor of D1 at the maximum voltage V_{RRM}
Putting

$$C_{J1} = C_J \text{ at } V_{RRM}$$

$$C_{J2} = C_{J3} \dots C_{Jn} = C_J \text{ at } \frac{V_M - V_{RRM}}{n-1}$$

We have

$$V_1 = \frac{\Delta Q_{RR} (n-1) + V_M C_{Jn}}{C_{J1} (n+1) + C_{Jn}}$$

Auxiliary capacitors are not necessary if

$$V_1 < V_{RRM}$$

$$\text{or } \Delta Q_{RR} < \frac{V_{RRM} [C_{J1} (n-1) + C_{Jn}] - V_M C_{Jn}}{n-1}$$

Generally, the value of the junction capacitance at the operating voltage is very close to the value at V_{RRM} (C_{J1}) so we can write

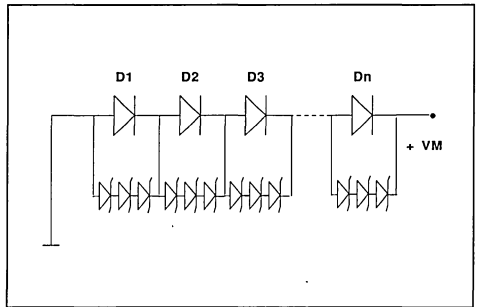
$$\Delta Q_{RR} < \frac{C_{J1} (n V_{RRM} - V_M)}{n-1}$$

This condition can be met by using very fast rectifiers in applications where the dI/dt is low (like in some resonant converters or flyback converters) and consequently low Q_{RR} .

III - EQUALIZATION BY TRANSIL DIODES

TRANSIL diodes are avalanche diodes designed for operation in breakdown characteristic and they are used as clamping devices in a wide field of applications. To limit the voltage across the rectifiers of a string below the maximum value, TRANSIL diodes can be used according to diagram Fig.12.

Figure 12 : Voltage sharing by TRANSIL diodes.



TRANSIL operates as a voltage limiter at steady state, during the switching phase, and also in case of external voltage transients.

1) Steady state

In the blocking condition, the TRANSILs connected across the diode D1 (which has the lowest reverse current) operate in the breakdown

characteristic. The current through these TRANSILS is I_R and the power dissipation is :

$$V_{BR} \cdot \Delta I_R \cdot \delta \quad (\delta = \text{duty cycle})$$

Where V_{BR} is the maximum breakdown voltage of TRANSILS. In general this extra power dissipation is lower than in the case of sharing by resistors and TRANSILS in axial packages can be used.

2) Switching phase

When the fastest diodes of the string switches off, the TRANSILS across it operate in breakdown characteristic, and the reverse recovery current of the other diodes flows through these TRANSILS. The charge remaining in the string at this moment is :

$$(n-1) \Delta Q_{RR}$$

and we can estimate the maximum energy in the TRANSILS with

$$E < 1/2(n-1) \cdot \Delta Q_{RR} \cdot V_{BR}$$

This relation does not take into account the losses due to the capacitive current through the string.

3) Example

GIVEN :

Use of a 3-BYT12PI-1000 for $V_M = 2500V$

Operating conditions :

$$T_j = 100^\circ C$$

$$di/dt = 20A/\mu s$$

$$F = 25 \text{ kHz}$$

$$\delta = .5$$

RECTIFIER SPECIFICATION :

$$V_{RRM} = 1000V$$

$$I_{RM} \text{ at } V_{RRM} = 2.5mA \text{ at } T_j = 100^\circ C$$

$$Q_{RR} = .5\mu C \text{ (in operating conditions)}$$

PROBLEM :

3 TRANSIL diodes are connected in series across each rectifier. What is the suitable part number ?

DESIGN STEPS :

- V_{BR} calculation :

$$V_{BR} \text{ min} > \frac{2500}{3 \times 3} = 277V$$

$$V_{BR} \text{ max} < \frac{1000}{3} = 333V$$

- Power dissipation in steady state :

$$P1 < I_R \cdot V_{BR} \text{ max} \cdot \delta$$

$$\begin{aligned} \text{with } I_R &= .85 \times 2.5 \approx 2mA \\ V_{BRmax} &= 330V \\ P1 &< 330mW \end{aligned}$$

- Power dissipation in switching phase :

$$\begin{aligned} P2 &= E \cdot F < 1/2 (n-1) Q_{RR} \cdot V_{BRmax} \cdot F \\ \text{with } \Delta Q_{RR} &= .5 \times .3 = .15\mu C \\ F &= 25 \text{ kHz and } n = 3 \\ \text{then } P2 &< 1.2W \end{aligned}$$

- Max total power dissipation $P1 + P2$ 1.530 W

Solution : 1.5 KE series can be used (1.5KE300CP)

CONCLUSION

When using several fast rectifiers in series it is necessary to make sure that no diode will be subjected to continuous or transient voltages in excess of their ratings.

In most cases, this is achieved by using sharing networks across each diode. It is important to optimize this circuit in order to reduce power consumption and to save space.

Parallel resistors can be optimized by using the model of the fast recovery diodes reverse characteristic proposed in this paper. Then, thanks to a good knowledge of the reverse current and its variation in the operating conditions (possibly by measurement and selection), it is possible to implement a resistor with a value as high as possible.

Parallel capacitors also have to be reduced as much as possible with the knowledge the switching characteristics of the string in the actual conditions. The reverse recovery charge (Q_{RR}) is not always accessible with the datasheet and a measurement is often necessary.

In certain applications using ultra fast diodes of the same lot, where the Q_{RR} , and therefore the ΔQ_{RR} are very low, the sharing capacitor can be reduced to zero.

In systems where there is a risk of external overvoltages or where there are transient states not well known, TRANSIL diodes are a solution to the sharing voltage problem insofar as the total power dissipation of the TRANSIL string remains compatible with the existing packages for these devices.

References :

1. B.M. BIRD and K.G. KING : "An introduction to Power Electronics"
2. J.M. PETER - SGS-THOMSON Microelectronics : "Analysis and optimisation of high frequency Power rectification"

SURFACE MOUNT DEVICE SOD6/SOD15 PACKAGING AND SOLDERING METHOD

P. Rault

PACKAGING :

These devices are delivered in standard embossed 12 & 16 mm tapes and reels (E.I.A. 481A standards).

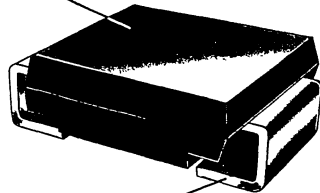
This packaging minimizes handling and is fully compatible with state-of-the-art assembly technology for hybrid circuits and printed circuit boards.

The diodes are pre-orientated and the tape can be used directly on automatic pick and place equipment.

Picking up is easy thanks to the rectangular parallelepiped shape. In particular, a vacuum chuck is very efficient due to the flatness of the upper side of the components, thus avoiding air leakage.

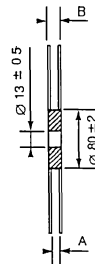
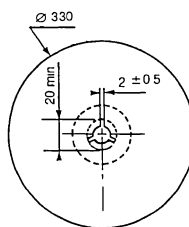
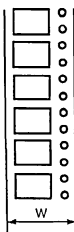
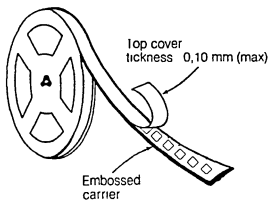
- Lead frame: copper alloy.
- Top connection: copper alloy.
- Die attach: Soft solder alloy.
- Encapsulation: high performance epoxy compound UL-94.
- Lead coating: Sn-Pb plating (10% Pb typical).
- Lead bending: suitable with surface mounting techniques (wave or re-flow)

Epoxy encapsulation compound



Terminal

Case	Quantity per reel	Film width	Reel dimensions	
			A	B
SOD 6	2500	12	12.4 ± 2	18.4 ± 2
SOD 15	2500	16	16.4 ± 2	22.4 ± 2



Note : Polarized devices have cathode lead oriented towards the perforated side of the film

SOLDERING METHODS :

SOD 6 & SOD 15 devices are suitable for mounting on various substrates (thick or thin films) and printed circuit boards.

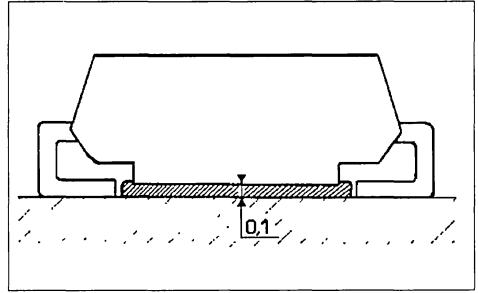
They are compatible with current soldering techniques.

1) WAVE SOLDERING :

This method is employed when surface mount components are used with conventional through-hole components on the same board. The through-hole mounting components are inserted from the top, and the SMD are attached to the under-side, using a suitable adhesive.

The lower part of the package allows a controlled thickness of the glue and ensures efficient adhesion.

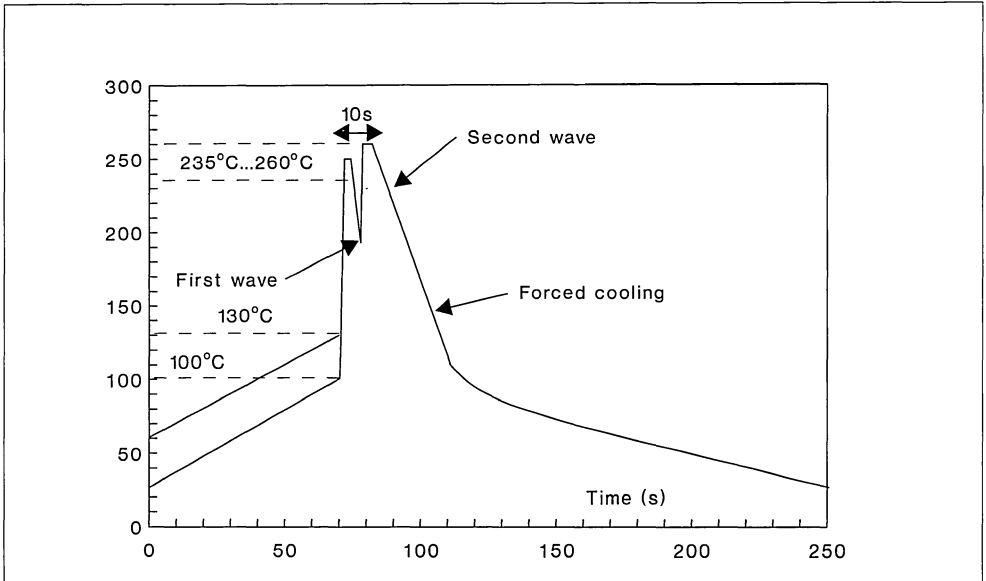
The height (2.6 mm) provides a very low "screen effect".



Recommendations :

- The assembly should be pre-heated to about 100°C to minimize the thermal shock.
- The maximum solder temperature is 260°C and the exposure time should not exceed 10 seconds.
- A dual wave process gives the best results.

Figure 1: Temperature -Time-Profile Double-Wave Soldering (Lead temperature)



Note : According to CECC Standard Method SMD 50301188 - Oct 89

2) REFLOW SOLDERING :

The epoxy resin specially designed for the molding of these components is suitable for all reflow soldering techniques used today :

- vapour phase
- infrared tunnel
- pulse-heat
- etc...

According to these methods, components are first positioned on the substrate and kept in place thanks to the adhesive properties of the solder paste applied to the soldering areas (footprints).

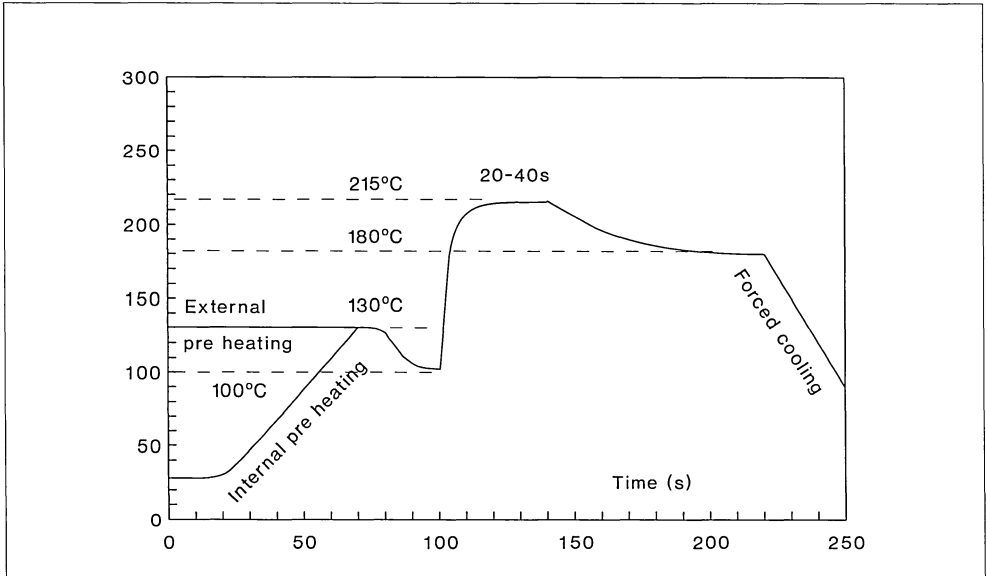
The wide surfaces of contact of SOD 6 & SOD 15 packages ensure a good stability of the assembly before reflowing process.

Recommendations :

The soldering temperature changes according to the method used. Pre-heating up to 100°C is required. The temperature during reflow should be limited in order to keep the plastic body of the device below 260°C. At this temperature, exposure time should be less than 10 seconds.

The vapour phase reflow soldering method provides the best control of the temperature and gives the most uniform results.

Figure 2 : In Line System with Preheating - Temp.-Time-Profile Vapour-Phase-Soldering (Lead Temperature)



Note : According to CECC Standard Method SMD 50301188 - Oct 89

3) PROTOTYPES :

In the laboratory, for low volume, reflow soldering using heat-plate can be implemented. The immersion method is also a possibility.

When the complete circuit board is immersed in a solder bath, the temperature should not exceed 260°C and the soldering cycle should not exceed 10 seconds. A forced cooling is then recommended.

PARALLEL OPERATION OF POWER RECTIFIERS

B. Rivet

INTRODUCTION

In parallel operation of several diodes, the current is not split into equal parts because of differences between forward characteristics.

The current through the rectifier having the lowest voltage drop will be higher than the current through the other diodes.

On the other hand the temperature coefficient of the forward voltage is negative and therefore this unbalanced situation at switching ON can become worse up to a stable equilibrium state.

The designer has to be sure that at this final state the diodes operate below the maximum specified limits.

The aim of this study is to calculate the acceptable difference between forward voltage drops of diodes to be paralleled in a given application.

I - QUALITATIVE ANALYSIS AND LIMITATIONS

Let's assume that we have two diodes D1 and D2 connected in parallel.

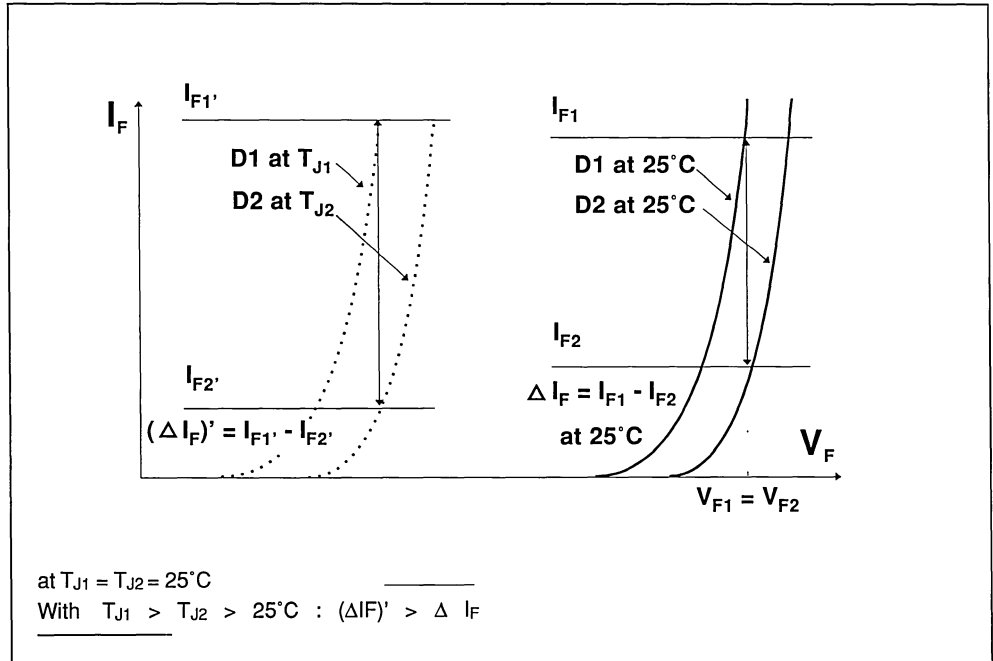
The forward characteristics of the two diodes at $T_{J1} = T_{J2} = 25^\circ\text{C}$ are shown in fig.1.

The total current $I_T = I_{F1} + I_{F2}$ is not split into equal parts.

The thermal dissipation makes the difference $\Delta I_F = I_{F1} - I_{F2}$ increase.

Indeed, the current through D1 is higher than through D2 so $T_{J1} > T_{J2}$, and because the forward voltage has a negative temperature coefficient, the difference ΔI_F increases.

Fig.1 : Forward characteristics of two diodes D1 and D2 in parallel



APPLICATION NOTE

For a safe and reliable operation it is absolutely necessary to remain within the maximum ratings of the devices :

- 1) T_{J1} lower than the maximum junction temperature
- 2) Current through D1 compatible with the specified maximum RMS current.

II - SIMPLIFIED FORWARD CHARACTERISTIC MODEL

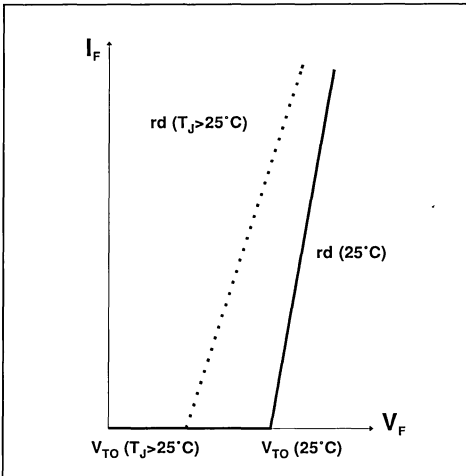
The forward characteristic of a diode may be as-similated to a straight line whose equation is :

$$V_F = V_{TO} + r_d \times I_F \quad (\text{fig.:2})$$

V_{TO} and r_d act as a function of the temperature.

V_{TO} has a negative temperature coefficient ($\alpha_{V_{TO}}$) and r_d has a positive temperature coefficient (α_{r_d}).

Fig.2 : Forward characteristics model of rectifier versus temperature

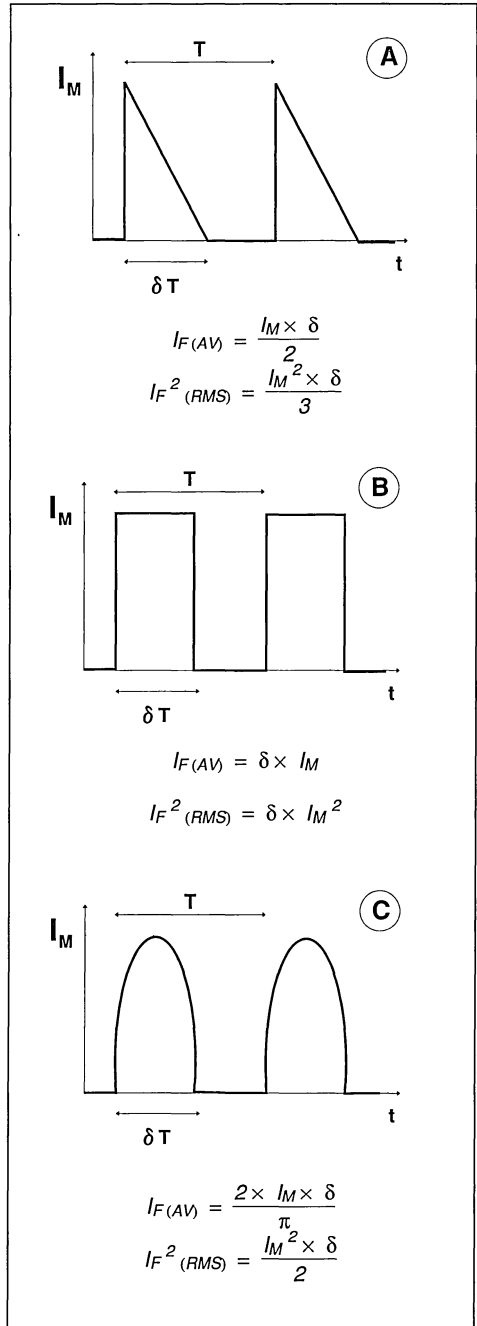


This model allows to easily calculate the operating point (V_F , I_F) of each diode and to evaluate the power losses due to the conduction.

$$P_{cond} = V_{TO} \times I_{F(AV)} + r_d \times I_{F(RMS)}^2 \quad (1)$$

In practice the waveforms of current can be assimilated to simple forms (rectangular, triangular, sinusoidal), so $I_{F(AV)}$ and $I_{F(RMS)}$ can be expressed with the peak current (I_M) and the duty cycle (δ) (Figure 3)

Fig.3 : Average and RMS values for different currents wave forms

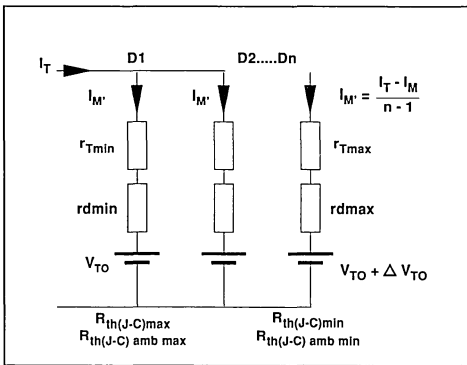


III - OPERATING WITH SEVERAL DIODES IN PARALLEL

Taking into consideration the dispersion of both the diodes parameters as well as the circuit parameters, we can calculate the maximum difference between V_F (measured at 25°C and at the nominal current specified for the device $I_F = I_{F(AV)}$) in order to be sure than no diode will operate out of its specification.

The calculation is based on the worst case situation (Figure 4) : we suppose that D1 has the lowest V_{TO} and r_d and the highest $R_{th(j-c)}$ and T_{CASE} . This diode supports the highest current I_M and operates at the highest junction temperature.

Fig.4 : Worst configuration of several diodes in parallel



As a first step, we have to determine the maximum acceptable peak current (I_M) through D1 in these conditions.

III.1. Thermal limitation : I_{M1}

The maximum total power dissipation in the diode is given by :

$$P_T = \frac{T_{Jmax} - T_{CASE(max)}}{R_{th(j-c)max} + R_{th(c)}}$$

The total power dissipation is

$$P_T = P_{COND} + P_{COM}$$

P_{COND} : conduction losses $P_{COND} = \rho P_T$

P_{COM} : commutation losses $P_{COM} = (1 - \rho) P_T$

For SCHOTTKY diodes, the commutation losses are negligible ($\rho = 1$)

(*) Case of double diodes.

$R_{th(c)}$: Coupling thermal resistance

We can write P_{COND} versus I_M for rectangular waveform :
(For the other waveforms see the annex).

$$P_{COND} = V_{TO}(100^\circ C) \delta \cdot I_M + r_d(100^\circ C) \delta \cdot I_M^2$$

So

$$I_{M1} = \frac{-V_{TO} \cdot \delta + [(V_{TO} \cdot \delta)^2 + 4 \cdot P_{COND} \cdot r_d \cdot \delta]^{+1/2}}{2 \cdot r_d \cdot \delta} \quad (2)$$

III.2. RMS current limitation : I_{M2}

If $I_{F(RMS)}$ is the maximum RMS current specified in the data sheet, the limit in the case of a rectangular waveform will be :

$$I_{M2} = \frac{I_{F(RMS)}}{\sqrt{\delta}}$$

It is obvious that we will take the minimum value of I_{M1} and I_{M2}

III.3. Calculation of ΔV_F

* THE DIODES PARAMETERS ARE :

∞_{TO}	Temperature coefficient of V_{TO}
∞_{rd}	Temperature coefficient of r_d
V_{TO}	Threshold voltage at $T_J = 25^\circ C$
r_d	Dynamical resistance at $T_J = 25^\circ C$ and its dispersion (r_{dmin} , r_{dmax})
$R_{th(j-c)}$	Junction to case thermal resistance and its dispersion $R_{th(j-c)min}$, $R_{th(j-c)max}$.
T_{Jmax}	max operating junction temperature

* THE "APPLICATION" PARAMETERS ARE :

I_T	Peak current through the diodes and its waveform.
δ	Duty cycle
n	Number of diodes
T_C	Case temperature and the dispersion T_{Cmin} (coldest case) and T_{Cmax} (hottest case)
r_{Tmax} r_{Tmin}	Min and max values of the resistances of wires and various connections.

By solving electrical and thermal equations corresponding to the circuit of the fig.5 in the case of rectangular waveform , we find :

$$\Delta V_F < \frac{\Delta V_{F1} + \Delta V_{F2} + \Delta V_{F3} - \Delta V_{F4}}{\Delta}$$

With

$$\Delta V_{F1} = (r_T \min + rd \min) I_M - (r_T \max + rd \max) I_M'$$

$$\Delta V_{F2} = R_{th(j-c) \max} (\alpha_{TO} + \alpha \cdot rd \cdot I_M) \cdot P1$$

$$\Delta V_{F3} = (\alpha_{TO} + \alpha \cdot rd \cdot I_M) \cdot (T_{C \max} - T_{C \min})$$

$$\Delta V_{F4} = R_{th(j-c) \min} \cdot (\alpha_{TO} + \alpha \cdot rd \cdot I_M') \cdot P2$$

$$\Delta = 1 + R_{th(j-c) \min} [\alpha_{TO} + rd \cdot I_M'] \delta \cdot I_M'$$

$$P1 = \frac{V_{TO} \delta I_M + rd \min \delta I_M'^2}{\rho}$$

$$P2 = \frac{V_{TO} \cdot I_M' + rd \max \cdot I_M'^2}{\rho}$$

$$I_M' = \frac{I_T - I_M}{n - 1}$$

III.4. Information about of diodes parameters

α_{TO} and α_{rd} are given for some part numbers in the following table :

	BYV255 -xxx	BYT60P -xxx	BYW51 -xxx
$\alpha_{TO} \left(\frac{V}{^\circ C} \right)$	-1.6 10 ⁻³	-1.6 10 ⁻³	-1.6 10 ⁻³
$\alpha_{rd} \left(\frac{\Omega}{^\circ C} \right)$	+2 10 ⁻⁶	+3 10 ⁻⁶	+16 10 ⁻⁶

* Datasheet gives $V_{TO \max}$ (100°C) and $rd \max$ (100°C)

with these values we can determine $V_{TO}(25^\circ C)$ and $rd \max$ (25°C) :

$$V_{TO} (25^\circ C) = V_{TO \max} (100^\circ C) - \alpha_{TO} \times 75$$

$$rd \max (25^\circ C) = rd \max (100^\circ C) - \alpha_{rd} \times 75$$

* $rd \min$ and $R_{th(j-c) \min}$ can be calculated by :

$$rd \min = k \cdot rd \max \quad \text{with } k = 0.75$$

$$R_{th(j-c) \min} = k \cdot R_{th(j-c) \max} \quad \text{with } k = 0.75$$

* We recommande to take $T_{J \max} = 110^\circ C$ to increase the safety margin for parallel operation.

IV - EXAMPLES OF APPLICATION

IV.1. Example of rectifiers in discret package

In this example we look for the maximum peak current I_T versus V_F that can flow in three BYV255 ($n = 6$) connected in parallel.

The current is rectangular and we consider 3 different duty cycles ($\delta = 0.3$ $\delta = 0.5$ $\delta = 0.7$).

As a good estimation, the conduction losses can be considered to be 95 % of the total losses ($\delta = 0.95$)

Application data is

$$T_{C \max} = 80^\circ C$$

$$T_{C \min} = 78^\circ C$$

$$\rho = 0.95$$

$$r_T \max = 0.5 \text{ m } \Omega$$

$$r_T \min = 0.4 \text{ m } \Omega$$

Diodes data is

From data sheet of BYV255 we get :

$$R_{th(j-c) \max} = 0.4^\circ C/W$$

$$R_{th(c)} = 0.1^\circ C/W$$

$$V_{TO \max} = 0.7 \text{ V (at } 100^\circ C)$$

$$rd \max = 1.35 \text{m Ohms (at } 100^\circ C)$$

$$I_{F(RMS)} = 150 \text{ A}$$

From the recommandations of § 3.4 we can calculate :

$$R_{th(j-c) \min} = 0.3^\circ C/W$$

$$V_{TO} \text{ at } 25^\circ C = 0.82 \text{ V}$$

$$rd \max \text{ at } 25^\circ C = 1.20 \text{m } \Omega$$

$$rd \min \text{ at } 25^\circ C = 0.9 \text{m } \Omega$$

Calculations :

a) I_{M1}

In this example we have to take into account $R_{th(c)}$ because there are two diodes in the package. Thus :

$$P_{COND} = \frac{\rho (T_{J \max} - T_{C \max})}{R_{th(j-c)} + R_{th(c)}}$$

$$P_{COND} = 57 \text{ W}$$

The following table gives I_{M1} value for $\delta = 0.3 - 0.5 - 0.7$ (according to the relation (2) of page 3)

δ	$I_{M1} [\text{A}]$
0.3	196
0.5	130
0.7	97

b) I_{M2}

$$I_{M2} = \frac{I_{F(RMS)}}{\sqrt{\delta}}$$

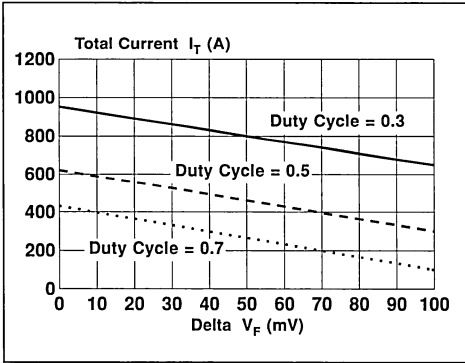
The following table gives the I_{M2} limits for $\delta = 0.3 - 0.5 - 0.7$

δ	I_{M2} [A]
0.3	274
0.5	212
0.7	179

c) Results

These two tables show that the I_M current is imposed by thermal considerations ($I_{M1} < I_{M2}$).

Using formulas (5) - (6) - (7) - (8) we can draw the **Fig.5** : Peak current I_T versus ΔV_F for different duty cycles with 3 BY255 in parallel



curve Fig.5 I_T versus ΔV_F for different duty cycles.

IV.2 Example of double rectifiers

In this example we consider a BYW51. The two diodes in the same package are connected in parallel. The current is rectangular with $\delta = 0.5$. The commutation losses are negligible ($\rho = 1$)

Application data is :

- $\rho = 1$
- $r_{T \min} = 0.5 \text{ m}\Omega$
- $r_{T \max} = 0.5 \text{ m}\Omega$

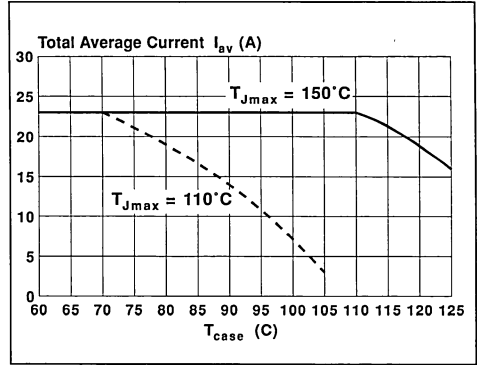
Diode data :

From data sheet of BYW51 we get

- $R_{th(j-c)} = 2.5\text{C/W}$
- $R_{th(c)} = 0.1\text{C/W}$
- $V_{TO \max} = 0.66 \text{ V (at 100C)}$
- $rd \max = 14 \text{ m}\Omega \text{ (at 100C)}$

Fig.6 shows the total average current versus T_C . The flat part of the curves corresponds to the $I_{F(RMS)}$ limitation and the other part corresponds to the thermal limitation. The calculation is done with $\Delta V_F = 30 \text{ mV}$.

Fig.6 : I_{AV} versus T_C for BYW51 double rectifier in parallel operation ($\delta = 0.5$)

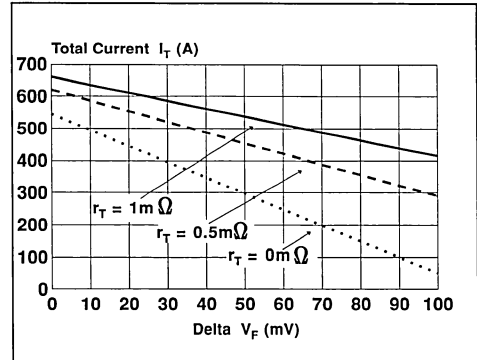


V - INFLUENCE OF THE WIRING RESISTANCE : r_T

When all diodes are connected through the same wiring resistance, the total current is better split into the circuitry.

Fig.7 shows the good influence of the wiring resistance when all diodes are connected through the same r_T (Same conditions as BYV255 example, with $\delta = 0.5$)

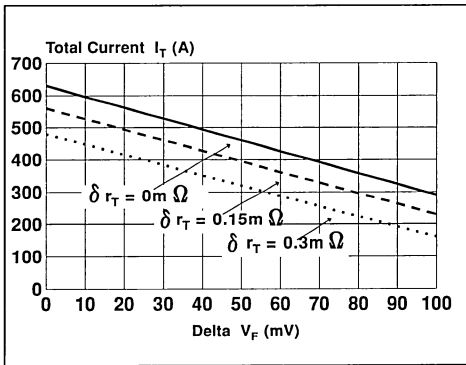
Fig.7 : I_T versus ΔV_F for different resistances of connections. (Case of 3 BYV255 with $\delta = 0.5$)



If diodes are connected through very different wiring resistance, the current imbalance can be important.

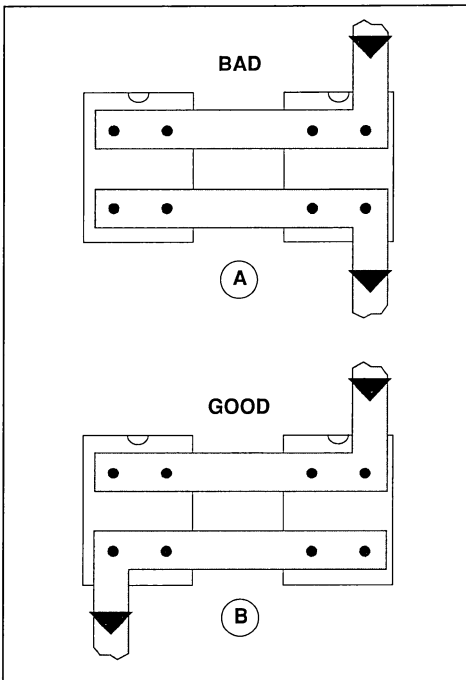
Fig.8 shows r_T influence for different values of r_T tolerance.

Fig.8 : I_T versus ΔV_F for different wiring resistance dispersion.
(Case of 3 BYV255 with $\delta = 0.5$)



Particular care must be taken to connect several diodes in parallel. The assembly must be as symmetrical as possible in order to reduce variation of r_T from one rectifier to another (see Fig.9). In the same way it is necessary to mount the packages on a single and efficient heat sink in order to reduce the variation of the case temperatures.

Fig.9 : Assembly of 2 ISOTOP packages :
(B) configuration provides a better balance of stray resistances



VI - COMMENTS ABOUT ΔV_F IN MANUFACTURING

VI.1 Double rectifiers (*) (2 diodes in the same package) :

These devices house 2 silicon dice coming from the same wafer and the dispersion is low :

90% of the production offers a ΔV_F lower than 30 mV.

VI.2 Rectifiers in separate packages : (or discrete)

In this case the dispersion is more important and when a ΔV_F lower than 100 mV is needed in the application, a screening is necessary.

VII - CONCLUSION

Ultra fast rectifiers and power schottky diodes can be easily connected in parallel to provide a reliable high current device if a few simple rules are applied.

This paper shows how we can calculate, for a given application, the maximum value of the forward voltage drop variation (ΔV_F) which guarantees that each diode will operate always below its maximum ratings.

This calculation takes into account the dispersion of the diode parameters (given by the manufacturer) and the electrical and thermal characteristics of the circuit.

Thus, it is possible to know if a special selection in term of V_F is needed or if the number of diodes connected in parallel is large enough to allow the use of standard parts without risk of overcurrent for one of the rectifiers.

(*) BYT261 - BYV255 - BYW51, ... etc

ANNEX

A - TRIANGULAR WAVEFORM

$$I_{M1} = \frac{-V_{TO} \left(\frac{\delta}{3} \right) + \left[\left(V_{TO} \cdot \frac{\delta}{2} \right)^2 + 4 \cdot P_{COND} \cdot rd \cdot \frac{\delta}{3} \right]^{1/2}}{\left(2/3 \right) \cdot rd \cdot \delta}$$

$$I_{M2} = \frac{I_{F(RMS)} \sqrt{3}}{\delta}$$

$$\Delta V_F < \frac{\Delta V_{F1} + \Delta V_{F2} + \Delta V_{F3} - \Delta V_{F4}}{\Delta}$$

With

$$\Delta V_{F1} = (r_T \min + rd \min) \cdot I_M - (r_T \max + rd \max) \cdot I_M'$$

$$\Delta V_{F2} = R_{th(j-c) \max} (\alpha_{TO} + \alpha_{rd} \cdot I_M) \cdot P1$$

$$\Delta V_{F3} = (\alpha_{TO} + \alpha_{rd} \cdot I_M) \cdot (T_C \max - T_C \min)$$

$$\Delta V_{F4} = R_{th(j-c) \min} (\alpha_{TO} + \alpha_{rd} \cdot I_M') \cdot P2$$

$$\Delta = 1 + R_{th(j-c) \min} [\alpha_{TO} + rd \cdot I_M'] (\delta/2) \cdot I_M'$$

$$P1 = \frac{V_{TO} (\delta/2) \cdot I_M + rd \min (\delta/3) \cdot I_M^2}{\rho}$$

$$P2 = \frac{V_{TO} (\delta/2) \cdot I_M' + rd \max (\delta/3) \cdot I_M'^2}{\rho}$$

$$I_M' = \frac{I_T - I_M}{n - 1}$$

B - SINUSOIDAL WAVEFORM

$$I_{M1} = \frac{-2 V_{TO} \left(\frac{\delta}{\pi} \right) + \left[\left(2 V_{TO} \cdot \frac{\delta}{\pi} \right)^2 + 2 \cdot P_{COND} \cdot \delta \cdot rd \right]^{1/2}}{rd \cdot \delta}$$

$$I_{M2} = I_{F(RMS)} \cdot (\sqrt{2}/\delta)$$

$$\Delta V_F < \frac{\Delta V_{F1} + \Delta V_{F2} + \Delta V_{F3} - \Delta V_{F4}}{\Delta}$$

With

$$\Delta V_{F1} = (r_T \min + rd \min) \cdot I_M - (r_T \max + rd \max) \cdot I_M'$$

$$\Delta V_{F2} = R_{th(j-c) \max} (\alpha_{TO} + \alpha_{rd} \cdot I_M) \cdot P1$$

$$\Delta V_{F3} = (\alpha_{TO} + \alpha_{rd} \cdot I_M) \cdot (T_C \max - T_C \min)$$

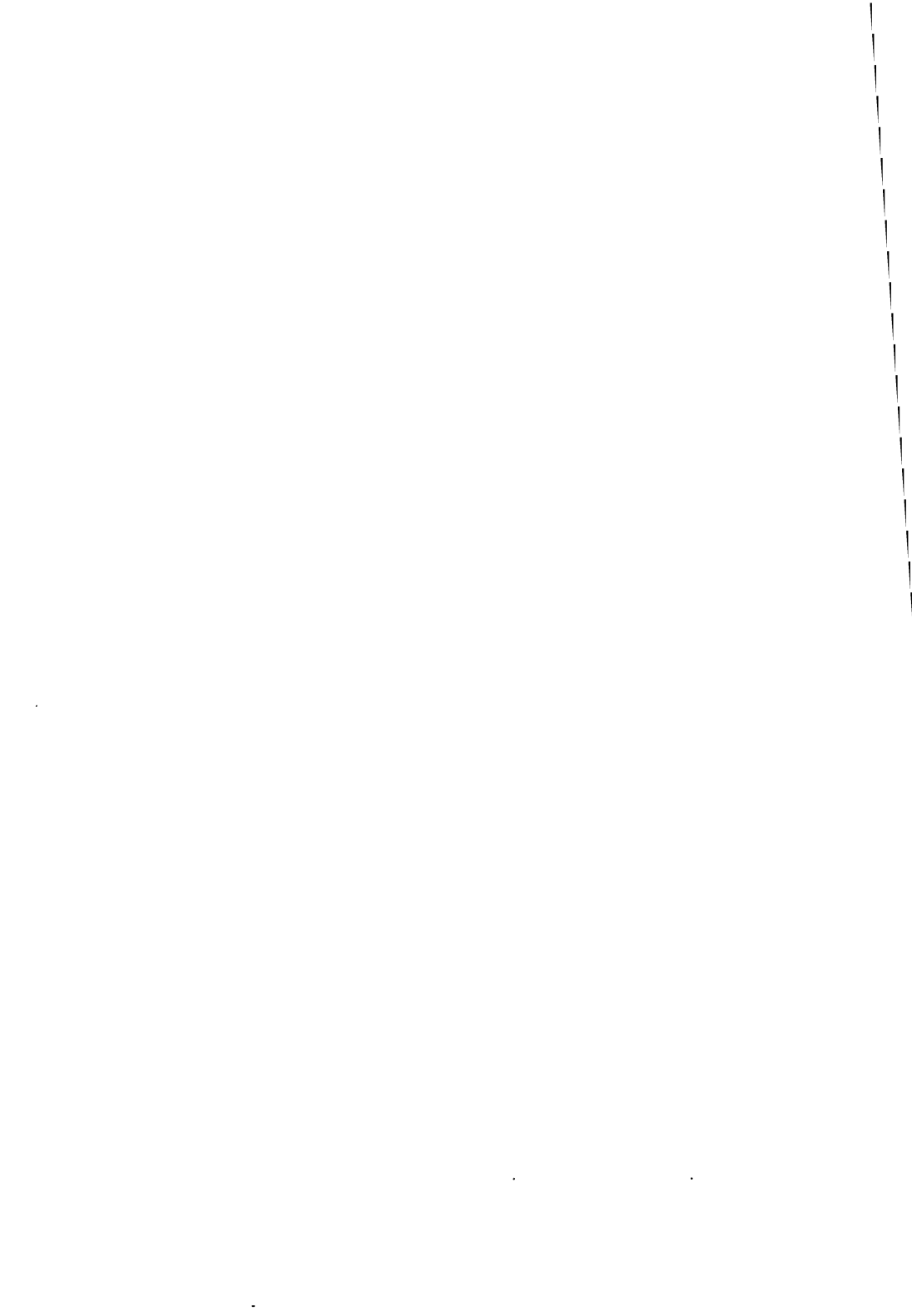
$$\Delta V_{F4} = R_{th(j-c) \min} (\alpha_{TO} + \alpha_{rd} \cdot I_M') \cdot P2$$

$$\Delta = 1 + R_{th(j-c) \min} [\alpha_{TO} + rd \cdot I_M'] (\delta/\pi) \cdot I_M'$$

$$P1 = \frac{2 V_{TO} (\delta/\pi) \cdot I_M + rd \min (\delta/3) \cdot I_M^2}{\rho}$$

$$P2 = \frac{2 V_{TO} (\delta/\pi) \cdot I_M' + rd \max (\delta/3) \cdot I_M'^2}{\rho}$$

$$I_M' = \frac{I_T - I_M}{n - 1}$$



**TV AND MONITORS :
 CHOICE OF DIODE FOR A HORIZONTAL DEFLECTION**

B. Rivet

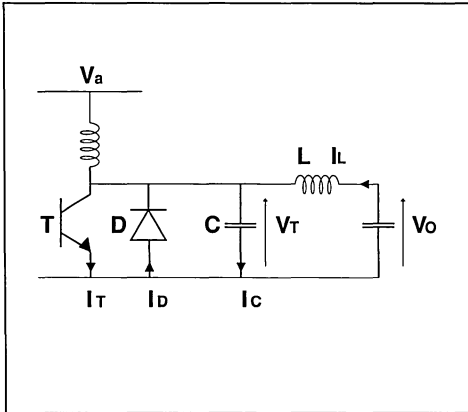
I - INTRODUCTION

The purpose of this note is to review the operation of the basic horizontal deflection circuit, to do an analysis of the different losses in the damper diode, and to suggest criteria for choosing between the DTV32-1500A and DTV32-1500B for a given application.

II - BEHAVIOUR OF THE BASIC HORIZONTAL DEFLECTION CIRCUIT

The basic horizontal deflection circuit is shown in Fig.1

Fig.1 : Basic horizontal deflection circuit



The current and voltage waveforms in the circuit are shown in Fig.2

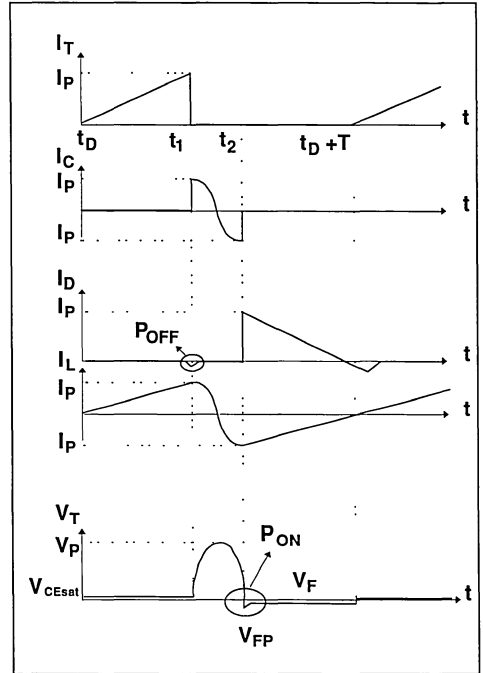
At $t = t_0$ the transistor starts to turn ON. The current in the line yoke and in the transistor is given by

$$I_T(t) = I_L(t) = \frac{V_0 \cdot t}{L}$$

The voltage V_T across the diode is equal to the V_{CEsat} of the transistor. The damper diode is blocked.

At $t = t_1$ the transistor starts to turn OFF, the circuit becomes resonant ($V_0 \cdot L \cdot C$). The current in the line decreases from I_p to $-I_p$ and an overvoltage (V_{FP}) appears across the diode.

Fig.2 : Waveforms in the basic horizontal deflection circuit



At $t = t_2$ the voltage V_T across the diode becomes negative and the damper diode conducts. The current in the diode and in the line Yoke is then :

$$I_D(t) = -I_L(t) = I_p - \frac{V_0 \cdot t}{L}$$

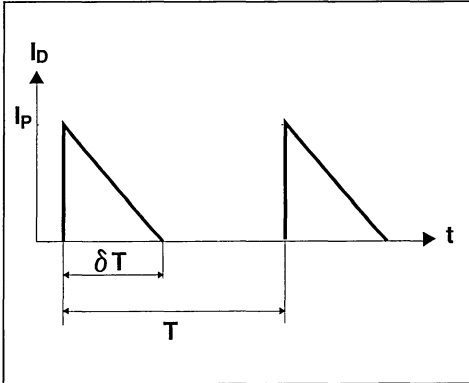
At $t = t_0 + T$ a new cycle starts

III - ANALYSIS OF THE POWER LOSSES IN THE DAMPER DIODE

a) Conduction losses : P_{COND}

The current in the damper diode is triangular Fig.3

Fig.3 : Current in the damper diode



The conduction losses are given by :

$$P_{COND} = V_{TO} \cdot I_{F(AV)} + rd I_F^2(RMS)$$

with

$$I_{F(AV)} = \frac{I_P \delta}{2}$$

and

$$I_{F(RMS)}^2 = \frac{I_P^2 \delta}{3}$$

Example : With a DTV32-1500 A

- $V_{TO} = 1 \text{ V}$
- $rd = 25 \text{ m}\Omega$
- and
- $I_P = 6 \text{ A}$
- $\delta = 0.45$

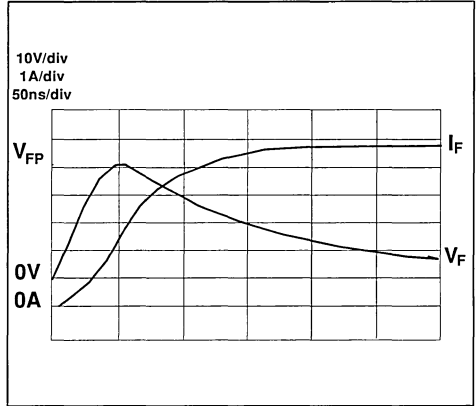
We find $P_{COND} = 1.5 \text{ W}$

b) Switch ON losses : P_{ON}

When the diode switches ON ($t=t_2$ Fig.2), the current in it increases from 0 to I_P with an high dI/dt ($80\text{A}/\mu\text{s}$). This current variation results in an overvoltage across the diode (V_{FP}) and switch ON losses.

Fig.4 shows the oscillogram of the current and the voltage across the damper diode when it is switched ON.

Fig.4 : Current and voltage in the damper diode at switch ON



P_{ON} is calculated with the oscillogram of Fig.4 and the following formula :

$$P_{ON} = \frac{1}{T} \int_0^{t_{fr}} V_F \cdot I_F dt$$

t_{fr} is the time during which the voltage across the diode increases from 0V to V_{FP} and then decreases from V_{FP} to $V_F = 2\text{V}$

Example : With a DTV32-1500B

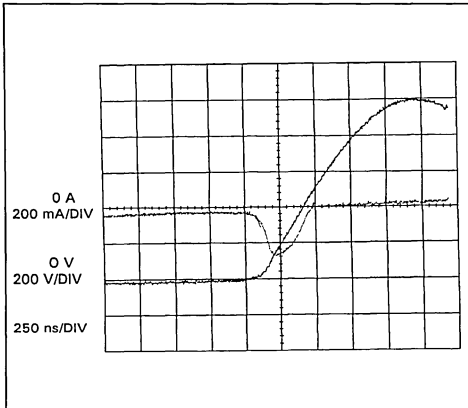
- and
- $T_j = 100^\circ\text{C}$
- $dI/dt = 80\text{A}/\mu\text{s}$
- $V_{FP} = 42\text{V}$
- $f = 32\text{kHz}$
- $I_P = 6\text{A}$

We find : $P_{ON} = 1 \text{ W}$

c) Switch OFF losses : P_{OFF}

When the switching frequency of the horizontal deflection circuit is low (40 kHz), P_{OFF} is negligible. The diode disposes of all its stored charge with a low voltage across it (V_{CEsat}). At high frequencies there is insufficient time to complete this discharge during the conduction time of the transistor. In this case, when the transistor switches off, a current appears in the diode (at $t=t_1$ Fig.2) and the voltage reaches a high value (600V) resulting in switch-OFF losses (Fig.5)

Fig.5 : Current and voltage in the damper diode at switch OFF ($f = 70\text{kHz}$)



Example : With a DTV32-1500A
and $P = 6\text{A}$
 $f = 70\text{kHz}$
 $T_j = 80^\circ\text{C}$
 $t_{rr} = 210\text{ns}$

($T_j = 25^\circ\text{C}$ $I_F = 1\text{A}$ $V_R = 30\text{V}$ $dI/dt = -50\text{A/s}$)
 P_{OFF} is estimated at $P_{OFF} = 0.9\text{W}$

This estimate has been made by measurements on the board whose circuit diagram is given in appendix A.

IV - CHOICE BETWEEN THE DTV32-1500A AND THE DTV32-1500B FOR A GIVEN APPLICATION

SGS THOMSON offers two high voltage damper diodes : the DTV32- 1500A and the DTV32-1500B. The principal characteristics of these two diodes are given in the following table :

: Principal characteristics of the DTV32-1500A and the DTV32-1500B

Parameters	DTV32-1500A	DTV32-1500B
V_{TO} max	1 V	1.2 V
r_d max	25 m Ω	34 m Ω
V_{FP} 80 A/ μs typ $V_{FR} = 2\text{V}$	30 V	39 V
t_{fr} typ	500 ns	600 ns
t_{rr} 25 $^\circ\text{C}$ $I_F = 1\text{A}$ $V_R = 30\text{V}$ -50 A/ μs typ	250 ns	130 ns

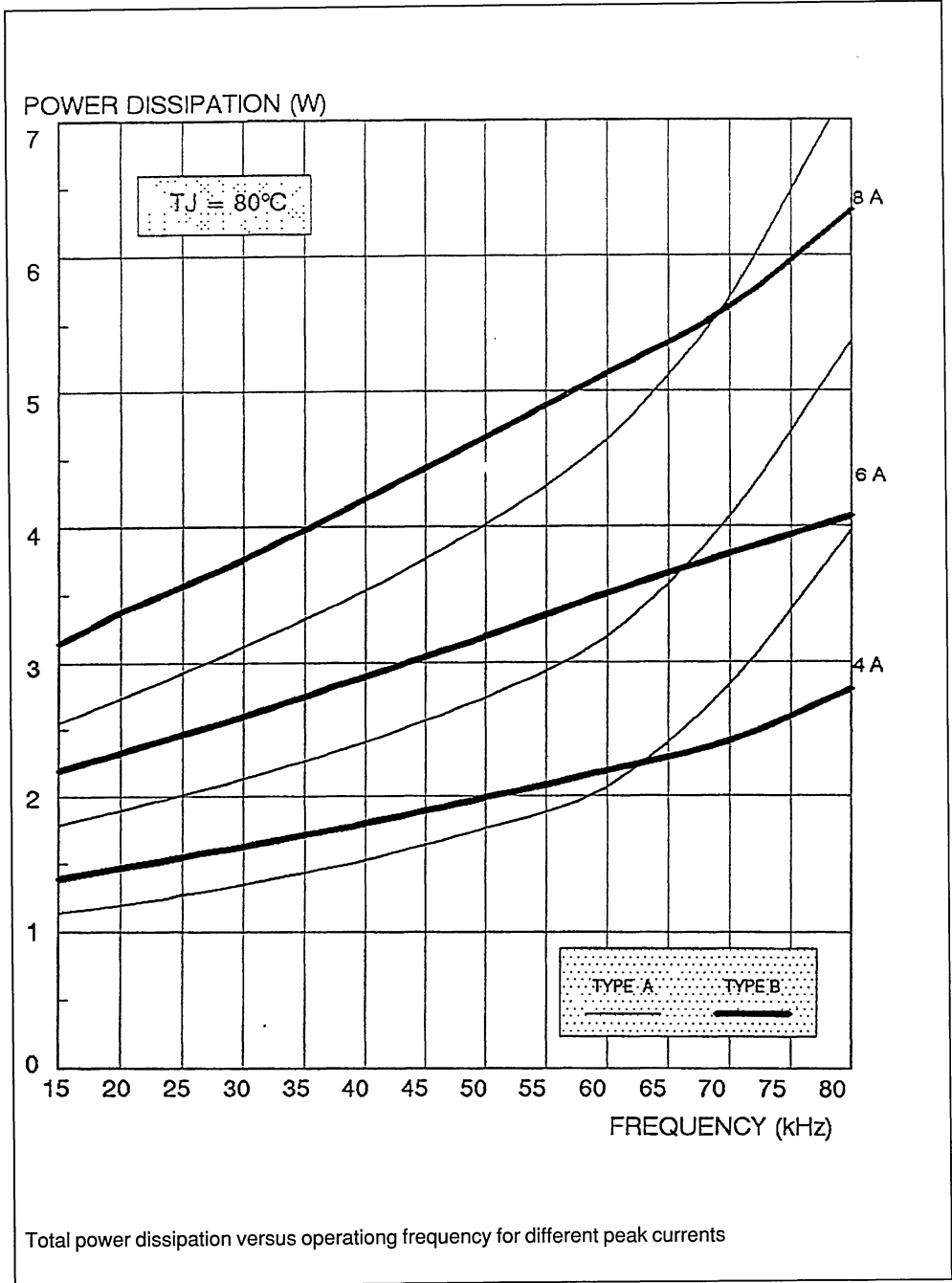
Figs:7 - 9 show the total loss ($P_T = P_{COND} + P_{ON} + P_{OFF}$) in the damper diodes A and B versus frequency, for different currents I_P and different junction temperatures.

These curves have the same forms for the different junction temperatures ($80^\circ\text{C} - 100^\circ\text{C} - 120^\circ\text{C}$)

For the lower frequencies ($< 55\text{kHz}$) total losses are greater in the DTV32-1500B. In this area conduction and switch ON losses are predominant. For the high frequencies ($> 65\text{kHz}$) total losses become greater in the DTV32-1500A (switch OFF losses are more significant in this diode). This difference in high- frequency losses between the two devices also increases with temperature.

APPLICATION NOTE

Fig.6 : Comparison type "A" and type "B" at $T_J = 80^\circ\text{C}$



Total power dissipation versus operating frequency for different peak currents

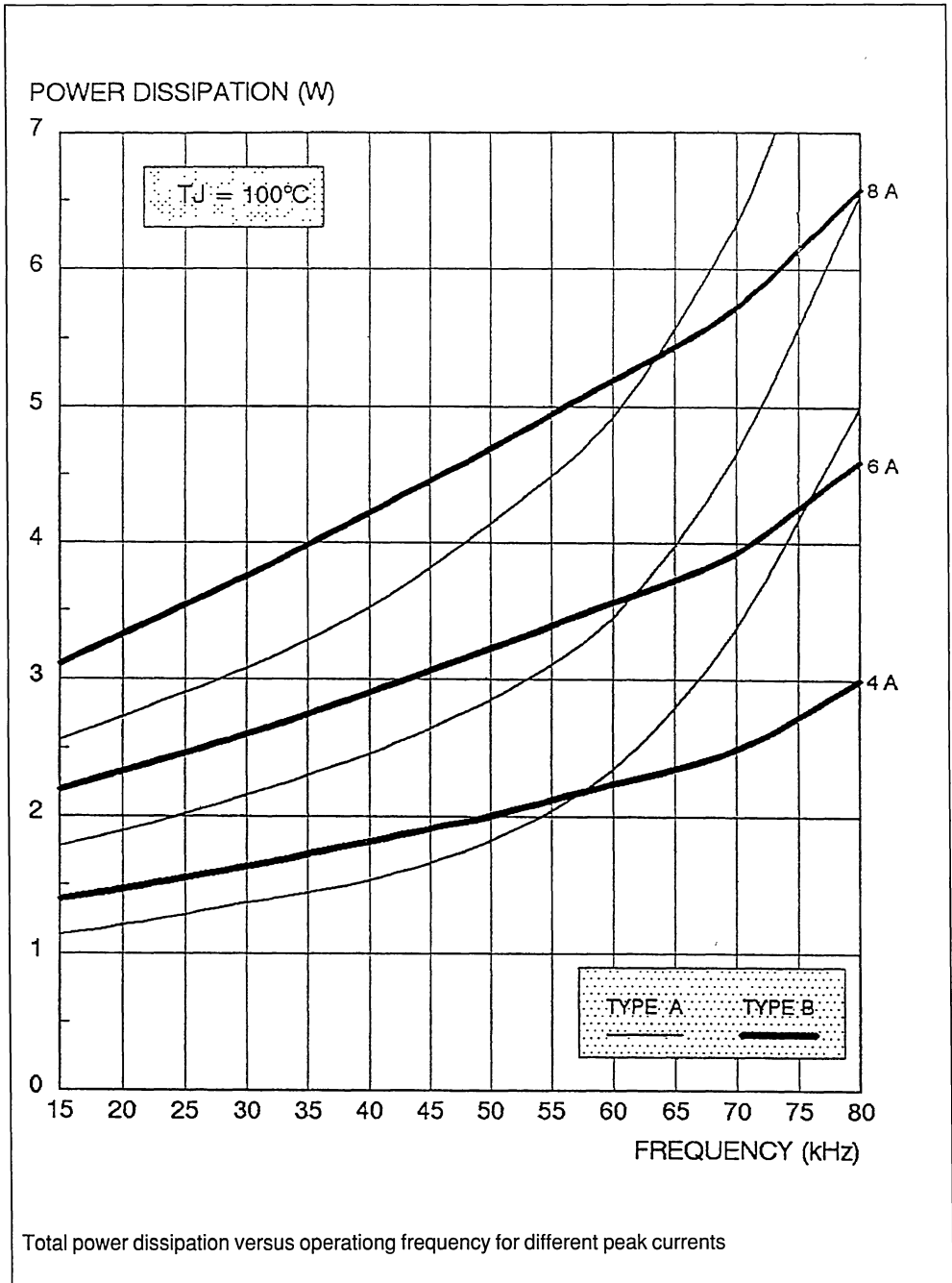
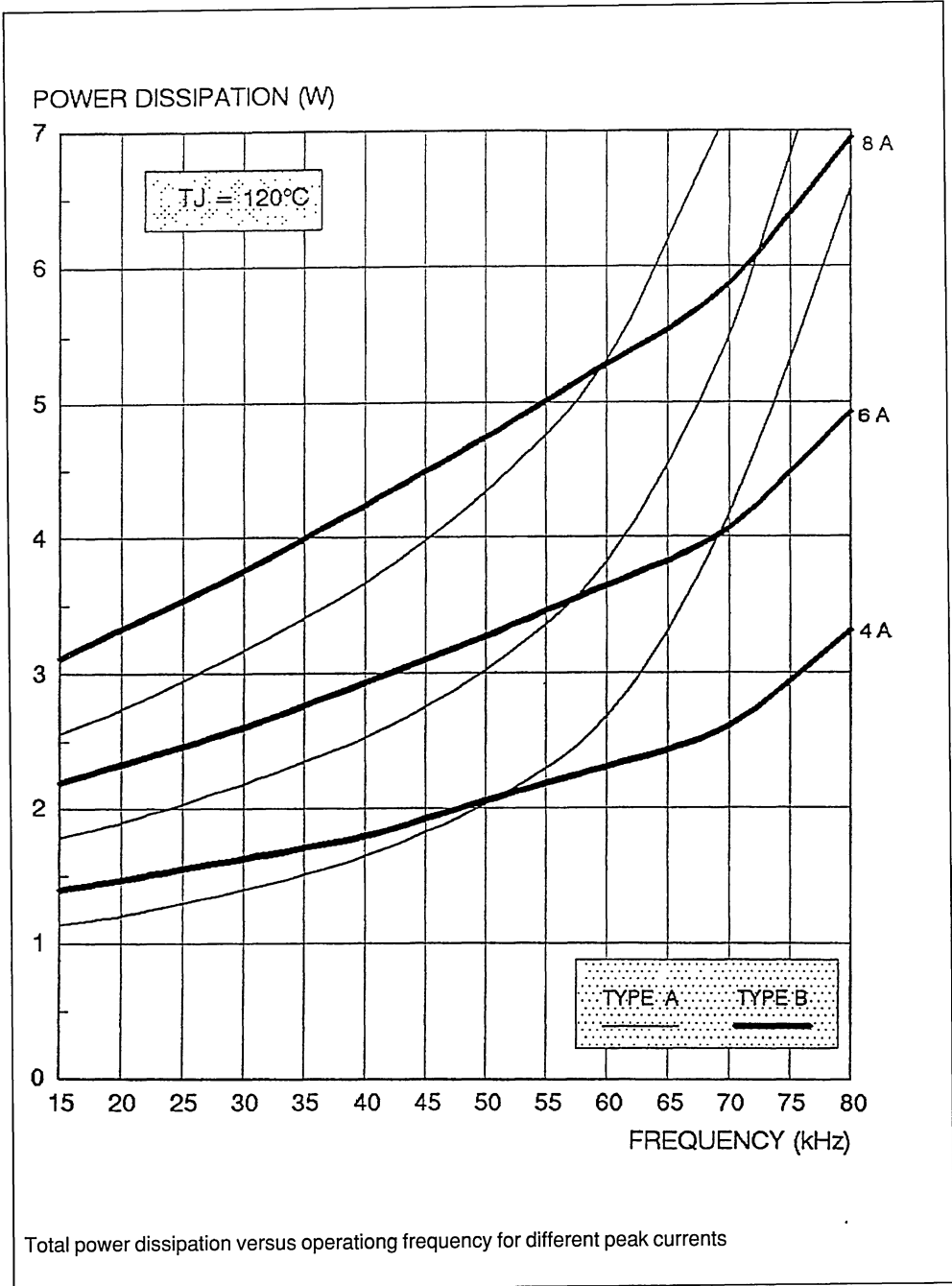
Fig.7 : Comparison type "A" and type "B" at $T_J = 100^\circ\text{C}$ 

Fig.8 : Comparison type "A" and type "B" at $T_J = 120^\circ\text{C}$

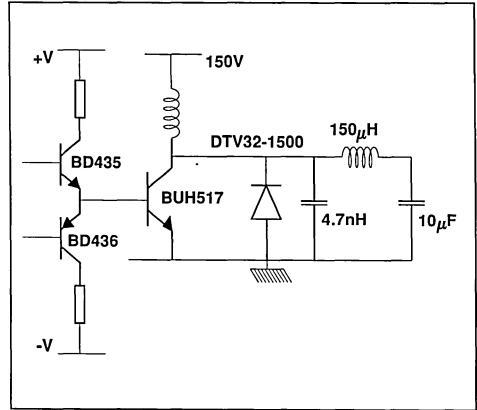


Total power dissipation versus operating frequency for different peak currents

V - CONCLUSION

SGS-THOMSON offers two Damper diodes to cover the need in horizontal deflection circuit for televisions and monitors. The operating frequency determines the choice of damper diode. For frequencies below 55 kHz the DTV32-1500A is preferable while above 65 kHz the DTV32-1500B is the better choice.

APPENDIX A



NEW HIGH VOLTAGE ULTRA-FAST DIODES : THE TURBOSWITCH™ A and B SERIES

B. Rivet

In today's power converter, the commutation speed of the transistor and the operating frequencies are higher and higher.

Fast diodes used for freewheel, snubber, and rectifier functions become one of the main causes of the power losses. In the range of 600V-1200V, SGS THOMSON has developed a new family of ultrafast diodes.

Taking into account these new constraints which are different from one application to another, SGS-THOMSON proposes two series : TURBOSWITCH "A" and TURBOSWITCH "B".

The specific characteristics of these two series offer to the designer a double choice, allowing him to use the best diode in this application.

I. INTRODUCTION

The choice of the optimum diode for a given application depends on the estimation of the power losses generated by the diode. This note explains how to calculate the different losses with information given in the datasheet and shows the difference between TURBOSWITCH "A" and TURBOSWITCH "B" and their respective advantages.

II. LOSSES CALCULATION

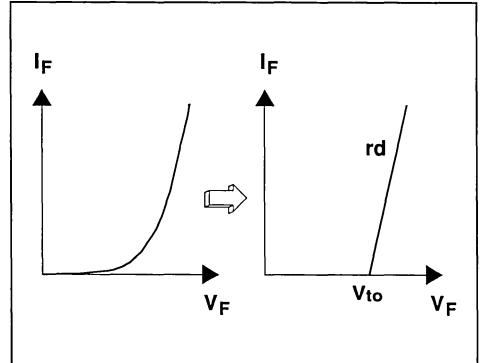
II.1 Conduction losses

Conduction losses are estimated with the classical formula :

$$P_{con} = V_{to} I_{F(AV)} + r_d I_{F(RMS)}^2$$

V_{to}	: Threshold voltage (Fig.1)
r_d	: Dynamical resistance (Fig.1)
$I_{F(AV)}$: Average current
$I_{F(RMS)}$: RMS current

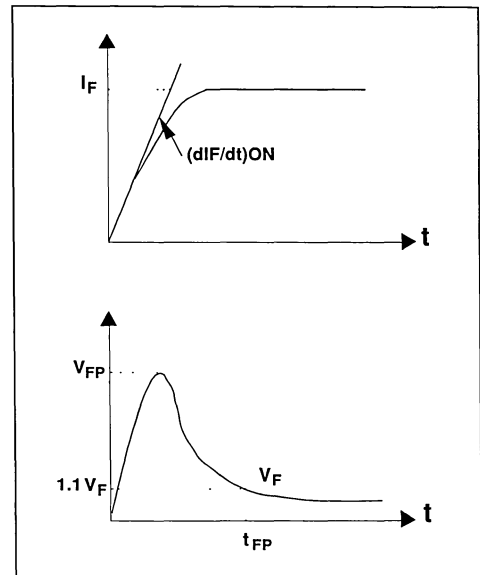
Fig.1 : Approximation of the forward characteristic



II.2. Turn on losses

When the diode turns ON, the voltage across the diode increases to V_{FP} (Peak forward voltage) before it decreases to $1.1 V_F$ at the time t_{FR} (Forward recovery time) (Fig.2).

Fig.2 : Turn ON waveforms



APPLICATION NOTE

Turn ON losses can be approximated by the following formula :

$$P_{on} = 0.4 (V_{FP} - V_F) \times t_{FR} \times I_F \times f$$

Where f is the operating frequency :

V_{FP} and t_{FR} depend on $(dI_F/dt)_{ON}$ and I_F . Curves in the datasheet giving V_{FP} and t_{FR} versus $(dI_F/dt)_{ON}$ allow the estimation of P_{on} for each application.

Example :

- $I_F = 8A$
- $(dI_F/dt)_{ON} = 64A/\mu s$
- $f = 100 kHz$

With an STTA806D (TURBOSWITCH A, 8 A / 600 V / TO220AC)

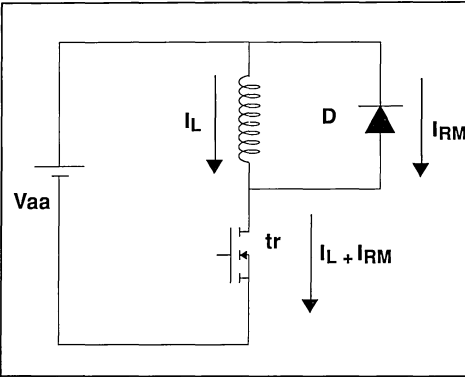
in these conditions

- $V_{FP(max)} = 10V$
- $t_{FR(max)} = 500ns$
- $P_{on} = 1.4 W$

II.3. Turn-on losses

Turn-off losses are studied in the case of a freewheel function where the switch is a MOS transistor (Fig.3).

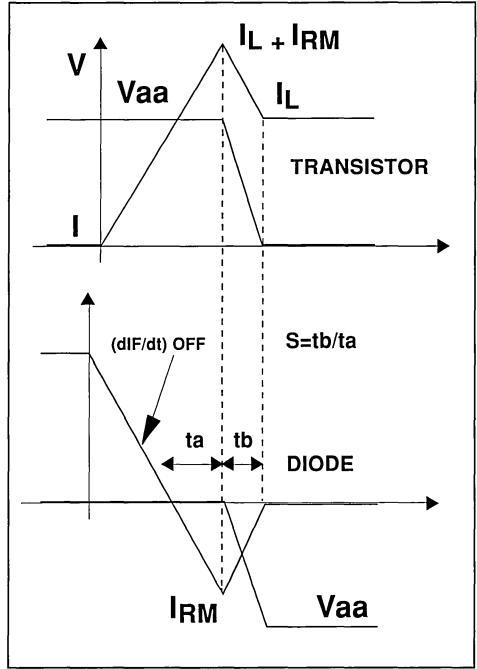
Fig.3 : Basic circuit with freewheel diode



- I_L = Load current
- I_{RM} = Maximum reverse recovery current of the freewheel diode D

The typical waveform of the current and the voltage when the transistor switches ON and the diode switches OFF is shown in Fig.4 in the case where the stray inductance is low ($< 50 nH$).

Fig.4 : Current and voltage waveforms of a freewheel diode at turn-OFF and the associated transistor at turn-ON



The turn-OFF losses in the diode can be calculated by :

$$P_{OFF} = \frac{V_{aa} \cdot I_{RM}^2 \cdot S \cdot f}{6 (dI/dt)_{OFF}}$$

II.4. Transistor losses due to the diode

When the diode switches OFF, the recovery current flows in the transistor which induces turn-ON losses in the transistor. The turn-ON losses in the transistor due to the diode can be estimated by :

$$P_{ON}(tr) = \frac{V_{aa} \cdot I_{RM}^2 (3+2S) f}{6 (dI/dt)_{OFF}} + \frac{V_{aa} \cdot I_{RM} \cdot I_L (S+2) f}{2 (dI/dt)_{OFF}}$$

Turn-ON losses in the transistor are generally much higher than turn-OFF losses in the diode.

These two formulas include I_{RM} and S parameters which characterize the turn ON behaviour. These parameters depend on the $(dI/dt)_{OFF}$.

In the datasheet, curves giving I_{RM} and S versus $(di_F/dt)_{OFF}$ allow to calculate these losses for a given application.

Example :

V_{aa} = 400V
 f = 30 kHz
 I_L = 12 A
 $(di_F/dt)_{OFF}$ = -500A/ μ s
 T_j = 125°C

with a STTA12060
 (TURBOSWITCH"A", 12 A / 600 V / TO220AC)

we find :

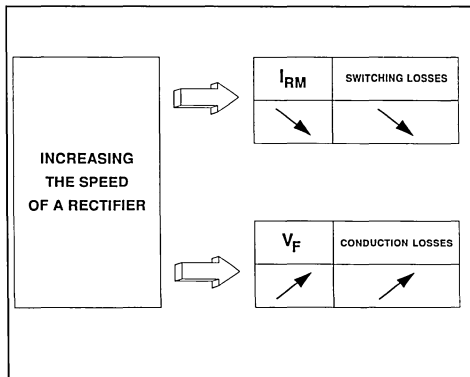
P_{off} = 0.43 W
 $P_{on(tr)}$ = 9.5 W

III. COMPARISON BETWEEN TURBOSWITCH "A" AND TURBOSWITCH "B"

III.1. Difference between characteristics

The design of a fast rectifier is known to be the result of a trade-off for a given reverse voltage, and the compromise can be explained in the fig.5.

Fig.5 : Compromise between I_{RM} and V_F for a given reverse voltage



For the diode of the family "A", the compromise V_F - I_{RM} has been chosen to reduce the total losses in both the diode and the companion transistor in a freewheel configuration.

On the other hand, the compromise of the family "B" has been chosen to minimize the conduction losses.

Table in Fig.6 summarizes the main characteristics of a STTA806D (TURBOSWITCH"A", 8 A / 600V / TO220AC) and a STTB806D (TURBOSWITCH"B", 8 A / 600V / TO220AC)

Fig.6 : Main characteristics of a STTA806D and a STTB806D

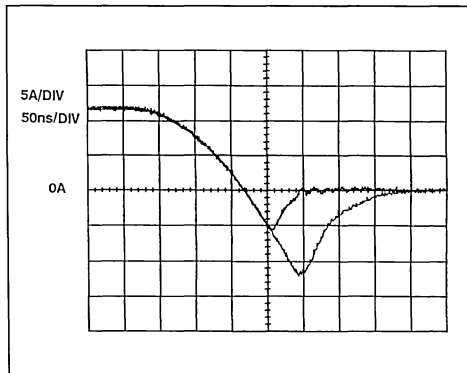
TYPE	$(di_F/dt)_{OFF}$ = 500 A/ μ s I_F = 8A T_j = 125°C		I_F = 8A T_j = 125°C	$(di_F/dt)_{ON}$ = 64 A/ μ s T_j = 25°C	
	I_{RM}	S	V_F	V_{FP}	t_{FR}
	typ	typ	max	max	max
STTA806D	14 A	0.45	1.5 V	10 V	500 ns
STTB806D	28 A	0.79	1.3 V	8 V	500 ns

Data in this table show that conduction losses and switch-ON losses will be lower in a TURBOSWITCH "B" while switch-OFF losses will be lower in a TURBOSWICH "A".

The oscillogram in Fig.7 shows the current in a STTA806D and in a STTB806D when the diodes switch-OFF in the following conditions :

V_R = 350V
 $(di_F/dt)_{OFF}$ = -300 A/ μ s
 T_j = 100°C
 I_F = 12 A

Fig.7 : Switch-OFF oscillogram of STTA806D and STTB806D



This oscillogram shows that the I_{RM} value is approximately two times lower with a STTA1206D, and that STTB1206D is a very soft diode.

III.2. Application examples

Example 1 : In this example, a comparison of the loss differences is done in a freewheel application where the current in the diode is rectangular. The main parameters are :

Peak current

I_M = 12 A
 V_{aa} = 400 V

Duty cycle: $\delta = 0.6$
 $(di_F/dt)_{ON} = 200 \text{ A}/\mu\text{s}$
 $(di_F/dt)_{OFF} = 500 \text{ A}/\mu\text{s}$
 $T_j = 125^\circ\text{C}$
 $f = 30 \text{ kHz}$

In these conditions the reverse recovery characteristics of the diodes are given in fig.7 :

The losses of the table fig.8 are calculated by

Fig.7 : Reverse recovery characteristics of STTA1206D and STTB1206D with the conditions of the example 1

TYPE	I_{RM}	S
STTA1206D	16 A	0.42
STTB1206D	30 A	0.90

using relations given in part 2.

In this type of application, the TURBOSWITCH "A"

Fig.8 : Comparison between STTB1206D and STTA1206D in a freewheel diode function

TYPE	Conduction losses	Switch ON losses	Switch OFF losses	Transistor losses	Total losses
STTA1206D	9 W	0.1 W	0.43 W	9.5 W	19 W
STTB1206D	7.8 W	0.07 W	3.2 W	29.8 W	40.9 W

is obviously the better choice.

Example 2 : In this example, the diode is used as a rectifier diode with the following conditions :

$I_F = 12 \text{ A}$
 $(di_F/dt)_{ON} = (di_F/dt)_{OFF} = 100 \text{ A}/\mu\text{s}$
 $V_{aa} = 350 \text{ V}$
 $T_j = 125^\circ\text{C}$
 $\delta = 0.8$
 $f = 20 \text{ kHz}$

The estimated losses are summarized in the table fig.9

Fig.9 : Comparison between STTA1206D and STTB1206D in a rectifier function

TYPE	Conduction losses	Switch ON losses	Switch OFF losses	Total losses
STTA1206D	14.4 W	negligible	0.2 W	14.6 W
STTB1206D	12.4 W	negligible	1 W	13.4 W

In this application, we have to take into account the leakage inductance and the fact that a very soft diode is required to limit the overvoltage. The total losses are 10% lower with the STTB1206D, therefore the TURBOSWITCH "B" is the best choice.

IV. CONCLUSION

This note shows how to calculate the different losses due to the diodes in basic power switching circuits. These calculations can be done by using the parameters given in the datasheet of the TURBOSWITCH "A" and the TURBOSWITCH "B".

In most of cases, it is easy to choose between the "A" type and the "B" type.

The "A" type is very efficient in freewheel diode applications with high frequencies ($f > 10 \text{ kHz}$). The "B" type is better when conduction losses are predominant like in the case of the power factor corrector circuit in discontinuous mode (low $(di_F/dt)_{OFF}$), or for applications where very high soft recovery behaviour is required (commutation with series inductances, for example).

**MODELLING PARALLEL OPERATION OF
POWER RECTIFIERS WITH PSPICE**

B. Rivet

I - INTRODUCTION

The behaviour of semiconductor components is always linked with the junction temperature.

This is the case, for example, in current-sharing between diodes connected in parallel. The current in each diode depends on the forward characteristic but also on the junction temperature.

This study describes thermal and electrical modelling of diodes connected in parallel. It allows the variation in current and junction temperature of each diode to be visualized between turn on and the equilibrium state.

II - ELECTRICAL AND THERMAL MODELLING OF A DIODE

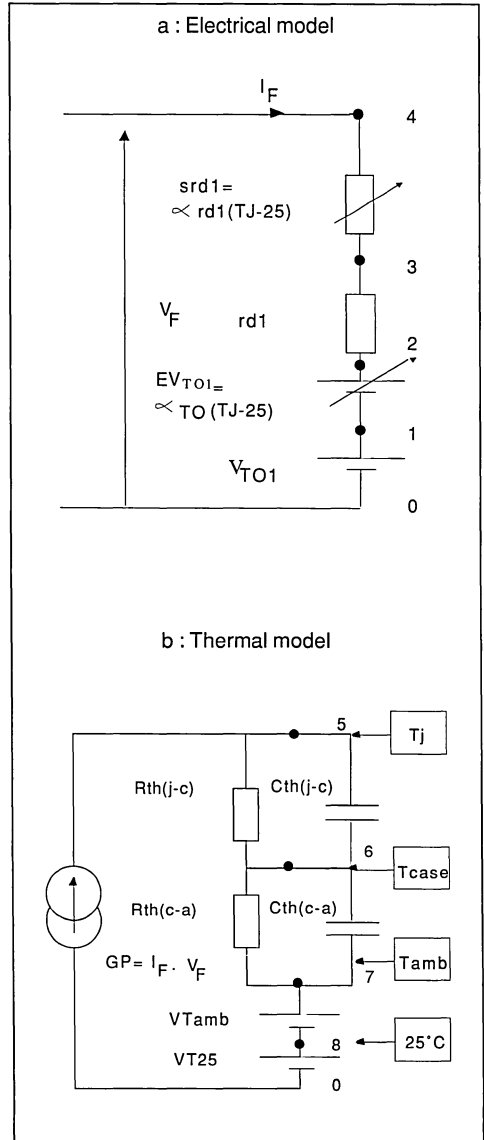
The forward characteristic of a diode is modelled by a threshold voltage V_{TO} in series with a dynamic resistance rd . These two parameters depend on the junction temperature of the diodes. V_{TO} has a negative temperature coefficient $\propto TO$ and rd have a positive temperature coefficient $\propto rd$.

One way to simulate the operation of such a device is to split the model into 2 different circuits : one "electrical" model and one "thermal" model.

The electrical and thermal models of a diode are shown in fig.1.

The thermal model is represented by electrical components.

Fig.1 : Electrical and thermal models of a diode



APPLICATION NOTE

THE ELECTRICAL PARAMETERS ARE :

- V_{T01} : Threshold voltage at $T_j = 25^\circ\text{C}$
 EV_{T01} : Threshold voltage versus junction temperature
 $EV_{T01} = \infty T_O (T_j - T_{\text{amb}})$
 $= \infty T_O (V(5) - V(8))$
 $rd1$: Dynamic resistance at $T_j = 25^\circ\text{C}$
 $srd1$: Dynamic resistance versus temperature
 $srd1 = \infty rd1 (T_j - T_{\text{amb}})$
 $= \infty rd1 (V(5) - V(8))$
 V_F : Instantaneous forward voltage across the diode
 I_F : Instantaneous forward current in the diode

THE THERMAL PARAMETERS ARE :

- GP : Generator current representing the instantaneous power dissipated in the diode.
 $GP = V_F \times I_F$
 $R_{th}(j-c)$: Resistor representing the junction to case thermal resistance
 $C_{th}(j-c)$: Capacitor representing the junction to case thermal capacitance
 $R_{th}(c-a)$: Resistor representing the case to ambient thermal capacitance
 $C_{th}(c-a)$: Capacitor representing the case to ambient thermal capacitance
 $V_{T_{\text{amb}}}$: Voltage generator representing the ambient temperature
 $V_{T_{\text{amb}}} = T_{\text{amb}} - 25^\circ\text{C}$
 V_{T25} : Voltage generator representing the 25°C temperature

III - MODELLING OF SEVERAL DIODES IN PARALLEL

See the application note : "Parallel operation of power rectifiers" (B.RIVET) for the qualitative analysis. In this note the acceptable difference between forward voltage drops (ΔV_F) is calculated so that the diodes can be safely connected in parallel.

The modelling will be based on the worst case situation. Suppose D1 has the lowest V_{T0} and rd and the highest $R_{th}(j-c)$ so that this diode supports the highest current. The diode D2 and D3 have the same characteristics (maximum V_{T0} and rd , minimum $R_{th}(j-c)$).

The electrical and thermal models are shown in Fig.2.

Fig.2a : Thermal model of 3 rectifiers in parallel

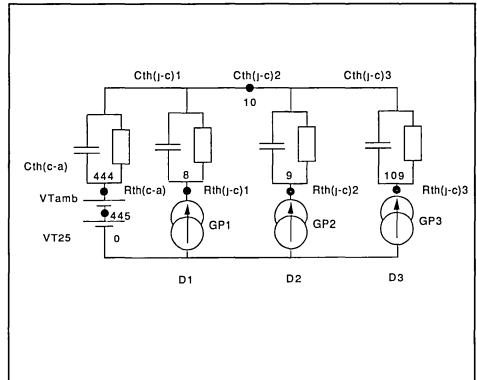
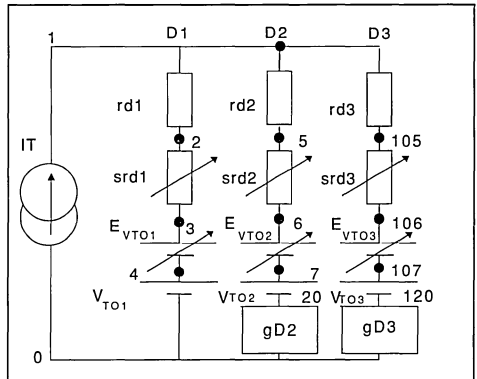


Fig.2b : Electrical model of 3 rectifiers in parallel



The modelling of several diodes in parallel will be treated with an example. Consider three BYV255 in parallel. The total current I_T is rectangular with a duty cycle equal to 0.5, a peak current of 300 A and a frequency of 100 Hz.

In this example the following values have been taken.

$$\begin{aligned}
 rd1 &= 1.2 \text{ m}\Omega \\
 rd2 &= rd3 = 0.9 \text{ m}\Omega \\
 V_{T01} &= 0.82 \text{ V} \\
 \infty T_O &= -1.6 \times 10^{-3} \text{ V}/^\circ\text{C} \\
 \infty rd &= 2.10^{-8} \Omega/^\circ\text{C} \\
 R_{th}(j-c)1 &= 0.4^\circ\text{C}/\text{W} \\
 R_{th}(j-c)2 &= R_{th}(j-c)3 = 0.3^\circ\text{C}/\text{W}
 \end{aligned}$$

This calculation is explained in the previously mentioned application note.

$C_{th}(j-c)1$, $C_{th}(j-c)2$, $C_{th}(j-c)3$, $C_{th}(j-c)$ are not very important parameters; they influence only the

transient behaviour of the circuit and not the equilibrium state.

In the example $C_{th}(j-c)1 = C_{th}(j-c)2 = C_{th}(j-c)3 = C_{th}(c-a) = 1 \text{ sW}^\circ\text{C}$ has been assumed.

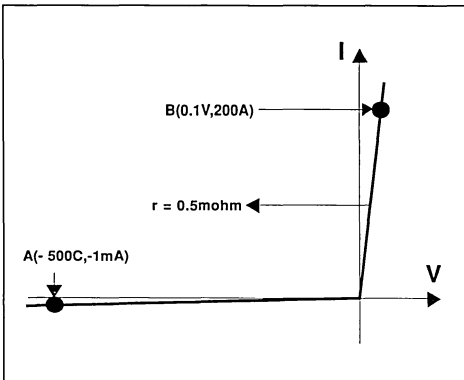
The simulation has been done with $\Delta V_F = 80 \text{ mV}$

Consider

$\Delta F \approx \Delta V_{T0}$ so $V_{T02} = V_{T03} = V_{T01} + \Delta V_F = 0.9 \text{V}$

In the electrical modelling of the diode D2 and D3, components gD2, gD3 have been added. Their characteristic is drawn in Fig.3

Fig.3 : Characteristic of gD2 and gD3



These auxiliary components are needed to avoid a current flow in the diodes when the current I_T is equal to zero. When the diodes conduct, these components are equivalent to the resistance of $0.5 \text{ m}\Omega$.

To take these resistances into account, make $rd2 = rd3 = 0.4 \text{ m}\Omega$

The PSPICE description of this circuit is given in the appendix.

Fig.4 and 5 show the results of the simulation.

These curves represent the variations of the current in D1 and D2 (fig.4) and the junction temperatures T_{j1} and T_{j2} (fig.5)

At $t = 0 \text{ s}$ $T_{j1} = T_{j2} = T_{amb} = 40^\circ\text{C}$: the current is higher in D1 than in D2 so T_{j1} will increase more quickly than T_{j2} and the difference between I_{F1} and I_{F2} will increase also.

When the equilibrium state is reached this difference becomes constant.

If the frequency and the thermal capacitor are high the simulation time needed to reach the equilibrium state is long. So to reduce this time the C_{th} values can be decreased (This change will affect only the transient behaviour).

IV - CONCLUSION

A very flexible analysis of operation of several rectifiers in parallel can be done easily by using simulation on PSPICE. Because of the importance of the thermal effect on the various parameters of each diode we have design 2 models operating simultaneously. The first circuit calculates the electrical parameters while the second monitors the junction temperature.

One example of calculation with 3 diodes in parallel has shown how the curves of the currents and the junction temperatures can be obtained.

This double model is very powerful. The designer can add other diodes, insert wiring resistance, change the current waveform and also the cooling characteristic of the design.

Fig.4 : Variation of the current in D1 (IRD1) and in D2 (IRD2) versus time

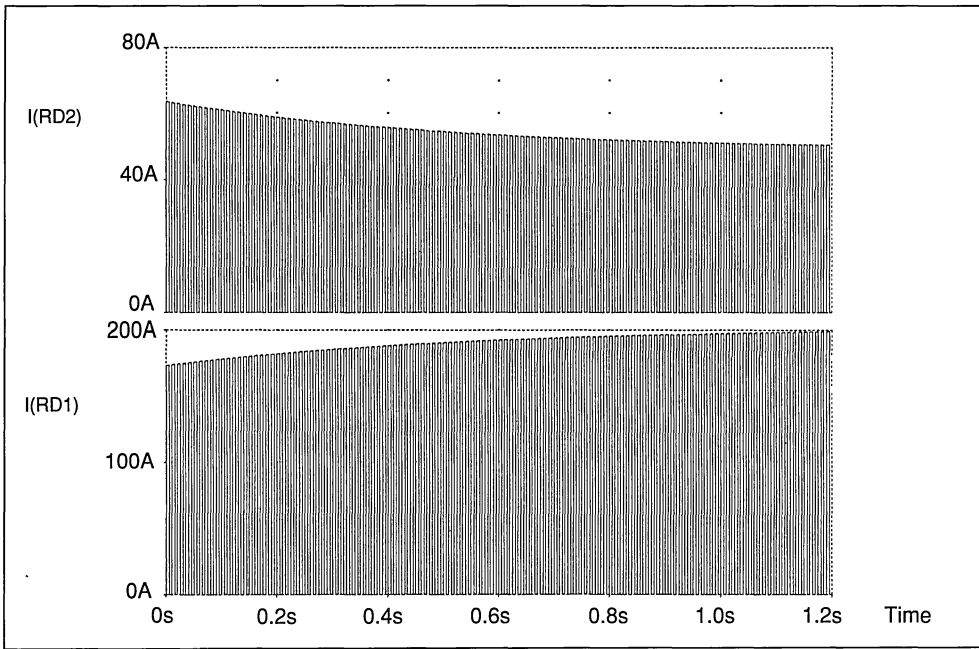
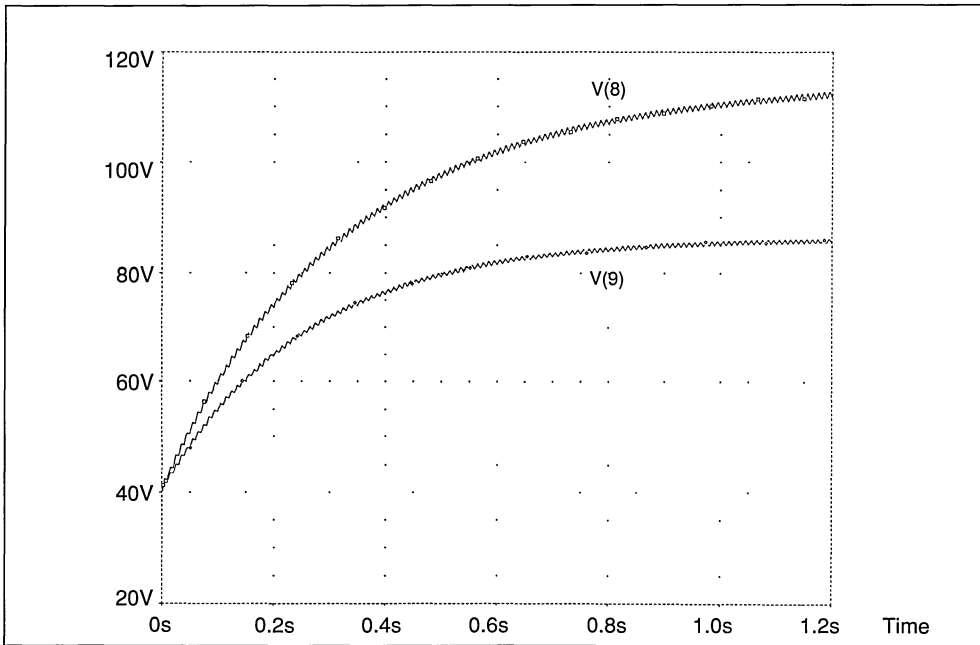


Fig.5 : Variation of the junction temperature of the diode D1 (V(8)) and D2 (V(9)) versus time



APPENDIX

DIODES-PARALLEL

```

I1 1 0 PULSE50 -300 0 0 0 5m 10m)
RD1 1 2 .9m
SRD1 2 3 8 445 SMOD
EVTO1 3 4 VALUE={-0.0016*V(8,445)}
VTO1 4 0 0.82
RD2 1 5 0.7m
SRD2 5 6 9 445 SMOD
EVTO2 6 7 VALUE={-0.0016*V(9,445)}
VTO2 7 20 0.9
GD2 20 0 TABLE {V(20)} =
+ (-500,-0.001) (0,0) (0.1,200)
RD3 1 105 0.7m
SRD3 105 106 109 445 SMOD
EVTO3 106 107 VALUE={-0.0016*V(109,445)}
VTO3 107 120 0.9
GR3 120 0 TABLE {V(120)} =
+ (-500,-0.001) (0,0) (0.1,200)
GP1 8 0 VALUE={-V(1,0)*V(1,2)*1111.11}
RTHJC1 8 10 .4
CTHJC1 8 10 1
GP2 9 0 VALUE={-V(1,0)*V(1,5)*1428.57}
RTHJC2 9 10 .3
CHTJC2 9 10 1
GP3 109 0 VALUE={-V(1,0)*V(1,105)*1428.57}
RTHJC3 109 10 .3
CTHJC3 109 10 1
RTHCA 10 444 .3
CTHCA 10 444 1
VTAMB 444 445 15
VT25 445 0 25
MODEL SMOD VSWITCH
(RON=0.0006 ROFF=0.00001 VON=250
VOFF=25)
tran 100.000u 1.2 0 0 ;*ipsp*
END

```


TURBOSWITCH™ IN A PFC BOOST CONVERTER

B. Rivet

1. INTRODUCTION

SGS-THOMSON offers two families of 600V ultrafast diodes (TURBOSWITCH™ "A" and "B") having different compromises between the forward characteristics and the reverse recovery characteristics.

This paper explains why TURBOSWITCH™ "B" is a suitable family for PFC boost converters working in discontinuous mode, and why the TURBOSWITCH™ "A" should be used for PFC's working in continuous mode.

In this kind of application, the main concern for the designer is to evaluate the power losses. For that, SGS-THOMSON proposes a very powerful tool. A program has been developed in order to calculate the losses in the diode and in the transistor in a PFC working in continuous mode at a constant frequency. This application note describes how the calculations are performed. This software determines clearly that there is an optimum MOSFET turn on di/dt to increase the efficiency of the design and reduce EMI.

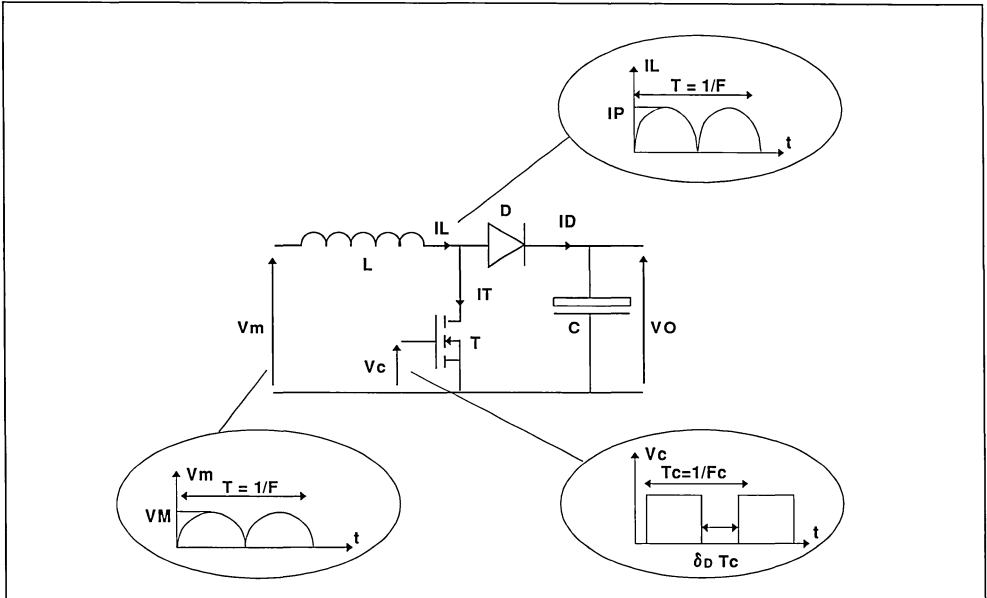
Fig.1 : Boost PFC converter notations

2. PARAMETERS DEFINITION

The basic circuit of the fig.1 shows the current, voltage and frequencies notations used in this paper.

List of the parameters :

V_m	:	mains voltage
V_M	:	peak value of the mains voltage
I_L	:	current in the coil
I_D	:	current in the diode
I_T	:	current in the transistor
I_P	:	peak current in the coil
δ_D	:	duty cycle of the diode
F_c	:	switching frequency
V_o	:	output voltage
F	:	mains frequency



3. TURBOSWITCH IN A PFC BOOST CONVERTER WORKING IN DISCONTINUOUS MODE

The discontinuous mode is used for power below 200-300W. In this mode, the current in the diode before reaching zero A decreases very slowly (less than 1A/μs). The slope is fixed by the coil and is equal to (Vm - Vo)/L. The low value of this slope generates low values of reverse recovery current (IRM) and therefore low switch-off losses. For this reason the forward voltage (VF) of the diode becomes the most important parameter. The best choice is to use a TURBOSWITCH"B" 1-2A/600V.

The major part of the losses is the conduction losses (Pcond). They can be calculated with a good approximation by :

$$P_{cond} = V_F (I_{F(AV)}) \times I_{F(AV)}$$

The average current in the diode is equal to the output power (POUT) divided by the output voltage Vo :

$$I_{F(AV)} = P_{OUT} / V_o$$

4. TURBOSWITCH IN PFC BOOST CONVERTER WORKING IN CONTINUOUS MODE

In continuous mode (output power higher than 200-300W) the current in the diode decreases very quickly. The (diF/dt)OFF of the diode is fixed by the MOS transistor control and is equal to a few hundred A/μs ((diF/dt)OFF of the diode is equal to the (diF/dt)ON of the transistor).

The reverse recovery current of the diode when the transistor switches on flows in the transistor and generates high turn-on losses in the transistor. For this reason the most important parameter of the diode is the IRM.

The TURBOSWITCH"A" family represents the optimum in term of VF/IRM compromise for this type of application and is recommended.

The calculations of the average current, RMS current and power losses in the diode and in the transistor are very complex. This is why SGS-THOMSON has developed a software which performs calculations and proposes the best TURBOSWITCH for the application. The boost converter is assumed to work in a continuous mode and at a constant frequency. This development tool, the PFC diskette, is available in a 5 1/4 inches format. The following paragraph explains how the calculations are performed.

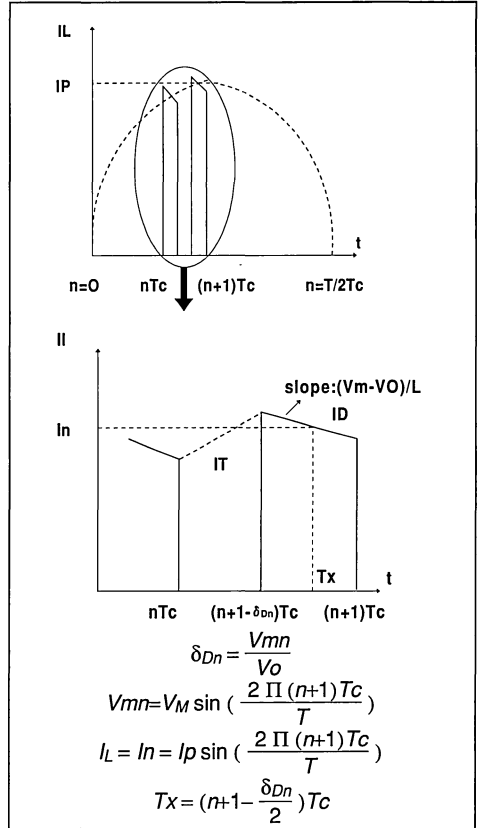
4.1. Results concerning the diode

4.1.1. Conduction losses

The current waveform in the diode is a succession of trapezoids. The duty cycle δDn and the amplitude of the latter are varying as a function of the input mains voltage.

The fig.2 shows the current in the diode between the time nTc and (n+1)Tc.

Fig.2 : Current in the diode between nTc and (n+1)Tc



Average current and RMS current in the diode

The program calculates the average and RMS current in the diode with the iterative formulae :

$$I_{D(AV)} = \frac{2}{T} \sum_{n=0}^{N-1} \left[\frac{A}{2} Tc^2 \delta_{Dn} (2n+2-\delta_n) + BTc\delta_{Dn} \right]$$

$$I_{D(RMS)} = \left[\frac{2}{T} \sum_{n=0}^{N-1} (Cn + Dn) \right]^{1/2}$$

with :

$$A = \frac{V_{mn} - V_o}{L}$$

$$N = \frac{T}{2Tc}$$

$$B = In - A \left(n+1 - \frac{\delta_{Dn}}{2} \right) Tc$$

$$Cn = \frac{A^2}{3} Tc^3 \delta_{Dn} [3(n(n+2) - \delta_{Dn}) + 1 - \delta_{Dn}] + \delta_{Dn}^2$$

$$Dn = AB Tc^2 \delta_{Dn} (2n + 2 - \delta_{Dn}) + B^2 Tc \delta_{Dn}$$

Conduction losses in the diode

The conduction losses in the diode are calculated with the maximum value of V_{TO} and Rd (respectively the threshold voltage and the dynamic resistance of the forward characteristic). It must be pointed out that these power losses correspond to a worst case situation.

$$P_{cond} = V_{TO} I_{D(AV)} + Rd I_{D(RMS)}^2$$

4.1.2. Turn-on losses in the diode

These losses are estimated with the formula

$$P_{ON} = 0.4 (V_{FP} - V_F) I_F \cdot t_{FR} \cdot F$$

V_{FP} : Peak forward voltage

t_{FR} : forward recovery time

This formula provides only an estimate, which is sufficient because turn ON losses are low with regard to conduction losses. The program interpolates data of the curve V_{FP} and t_{FR} versus $(di_F/dt)_{ON}$ of the diode (Fig 3). These data have been stored on the disk for each part number.

Fig.3 : V_{FP} versus di_F/dt .

(STTA806D)

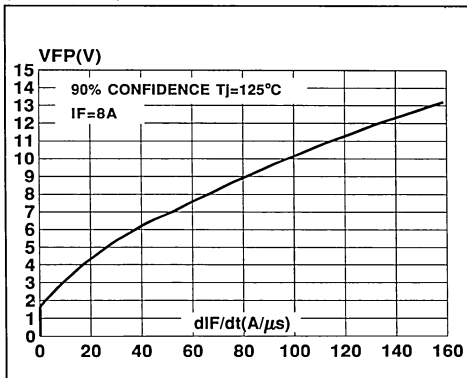
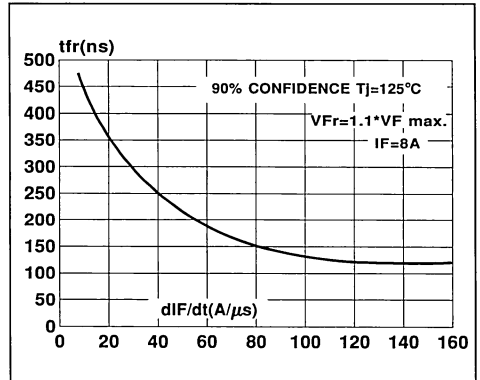


Fig.3 Bis : t_{FR} versus di_F/dt .

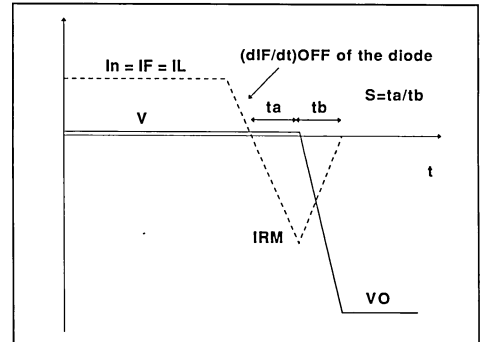
(STTA806D)



4.1.3. Turn-off losses in the diode

The fig.4 shows the theoretical waveform of the current and the voltage when the diode switches off.

Fig.4 : Current and voltage waveform during diodes switch OFF



In a PFC working in a continuous mode, the $(di_F/dt)_{OFF}$ of the diode is fixed. But current ($I_F = I_L$) acts as a function of the time, as do the softness factors and the current I_{RM} (Fig.5).

These data were also stored for each individual part number.

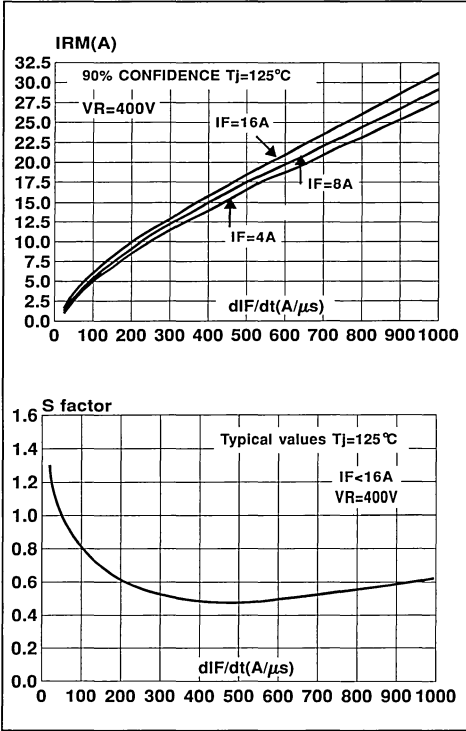
$$P_{OFF} = \frac{1}{T} \sum_{n=0}^{N-1} \frac{V_o I_{RMn}^2 S_n}{3 (di_F/dt)_{OFF}}$$

I_{RMn} and S_n are respectively the reverse current and softness factor corresponding to the $(di_F/dt)_{OFF}$ of the application and at the time nTc when

$$I_F = I_n = I_p \left(\sin \frac{2\pi(n+1)T_c}{T} \right)$$

These losses are calculated with data (S, I_{RM}) at 90% confidence.

Fig.5 : I_{RM} and S versus diF/dt.
(STTA806D)



4.1.4. Turn-on losses in the transistor due to the diode

When the transistor turns on the reverse recovery current flows in the transistor (Fig.6)

Turn-on losses in the transistor due to the diode are calculated with the same data as the turn-off losses in the diode.

The formula used is :

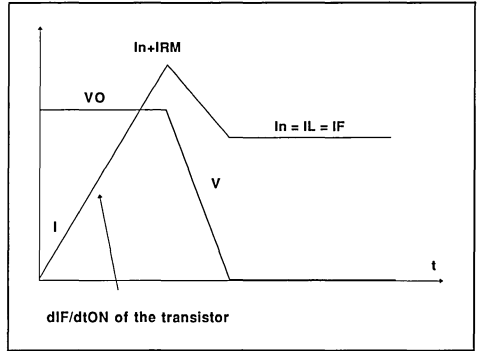
$$P_{ON} = 2 \frac{V_0}{T} \sum_{n=0}^{N-1} (Mn + Gn)$$

with :

$$Mn = \frac{I_{RMn}^2 (3 + 2 Sn)}{6 (di_F/dt)_{OFF}}$$

$$Gn = \frac{I_n I_{RMn} (2 + Sn)}{2 (di_F/dt)_{OFF}}$$

Fig.6 : Current and voltage waveform during transistor turn-on.

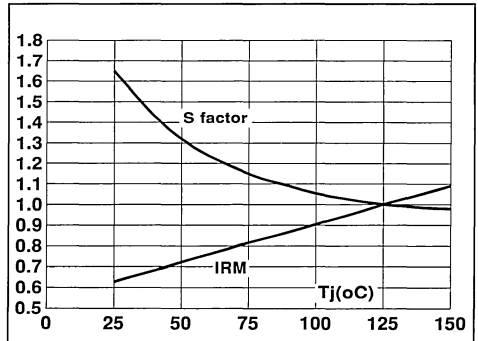


4.1.5. Junction temperature of the diode

S factor and IRM depend on the temperature (Fig.7). This program takes into account these variations to calculate the junction temperature. Two options are available :

Enter Tcase (case temperature) or, Enter Tamb (ambient temperature) and Rth (c-a) (case ambient thermal resistance).

Fig 7 : Relative variation of dynamic parameters versus junction temperature
(STTA806D)

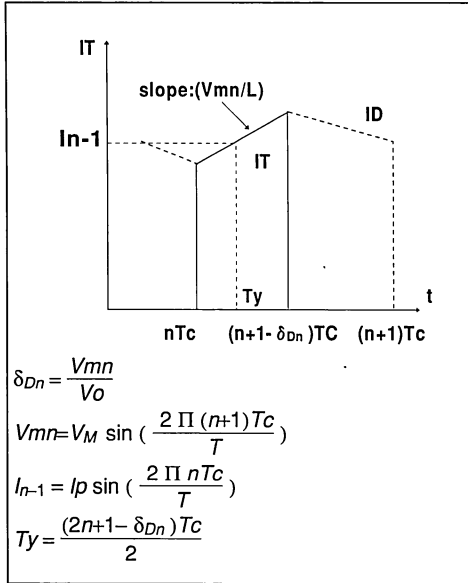


4.2. Results concerning the transistor

4.2.1. Conduction losses

The current waveform in the transistor is also a succession of N trapezoids and the duty cycle of the transistor, and the amplitude of which varies as a function of the input main voltage. Fig.8 shows the current in the transistor between the time nTc and (n+1)Tc.

Fig.8 : Current in the transistor between T_c and $(n+1)T_c$



The program calculates the average and RMS current in the transistor with the formulae.

$$I_{T(AV)} = \frac{2}{T} \sum_{n=0}^{N-1} \left[\frac{A((n+1-\delta_{Dn})^2 - n^2)T_c^2}{2} + Ln \right]$$

$$I_{T(RMS)} = \left[\frac{2}{T} \sum_{n=0}^{N-1} [In + Jn] \right]^{1/2}$$

with :

$$A = \frac{V_{mn}}{L}$$

$$B = I_{n-1} - A \left(\frac{2n+1-\delta_{Dn}}{2} \right) T_c$$

$$Ln = BT_c(1-\delta_{Dn})$$

$$In = \frac{A^2}{3} T_c^3 ((n+1-\delta_{Dn})^3 - n^3)$$

$$Jn = ABT_c^2 ((n+1-\delta_{Dn})^2 - n^2) + B^2 T_c (1-\delta_{Dn})$$

Conduction losses

We have :

$$P_{cond} = r_{dson} I_{T(RMS)}^2$$

r_{dson} : r_{dson} of the transistor

4.2.2. Total turn-on losses in the transistor

The principle of the calculation is the same as the calculation of turn-off losses in the diode.

The formula used is :

$$P_{ON}(T_R) = \frac{2V_o}{T} \sum_{n=0}^{N-1} [Kn / (di/dt)_{OFF}]$$

with :

$$Kn = \frac{(In + I_{RMn})^2}{2} + Sn \frac{I_{RMn}^2}{3} + Sn \frac{I_{RMn} In}{2}$$

5. EXAMPLE OF SIMULATION

Data entered in the software :

Diode : STTA2006P

$(di/dt)_{OFF}$ of the diode = 500A/ μ s

$(di/dt)_{ON}$ of the diode = 500A/ μ s

- F = 50Hz
- Fc = 50 000HZ
- V_M = 300V
- V_O = 400V
- L = 100 μ H
- I_p = 20A
- R_{dson} = 0.1 Ω
- T_{case} = 60°C

Results

Diode results

- I_{D(AV)} = 7.5A
- I_{D(RMS)} = 11.8A
- P_{ON} = 0.5W
- P_{OFF} = 1W
- P_{cond} = 11W
- T_j = 76°C
- P_{ON T_{R(D)}} = 18.6W

Transistor results

- I_{T(AV)} = 5.2A
- I_{T(RMS)} = 9.1A
- P_{ON(T_R)} = 22.6W
- P_{cond(T_R)} = 8.3W

6. OPTIMUM MOSFET TURN ON di/dt

P_{OFF} in the diode and $P_{ON}(TR)$ are the only losses depending on the $(di/dt)_{ON}$ of the transistor ((di/dt) of the diode).

The software allows you to draw the curve $P_{ON}(TR) + P_{OFF}(D)$ versus the $(di/dt)_{ON}$ of the the transistor ($(di/dt)_{OFF}$ of the diode).

Example :

The curve fig.9 shows the variation of $P_{OFF}(D) + P_{ON}(TR)$ versus the $(di/dt)_{OFF}$ of the diodes. We enter in the program the following data :

Diode : STTA2006P

- F = 50Hz
- F_C = 50kHz
- V_M = 300V
- V_O = 400V
- L = 100µH
- T_C = 80°C
- I_p = 12A

This curve shows that in order to optimize the efficiency, the designer has to fix the $(di/dt)_{ON}$ of the transistor at 500A/µs. When the switching time decreases in the area of $di/dt < 500A/µs$, $P_{OFF} + P_{ON}(TR)$ decreases. But for $di/dt > 500A/µs$, the increasing of I_{RM} takes over the influence of the switching time and $P_{OFF} + P_{ON}(TR)$ increases.

The reverse recovery of the diode produces EMI that increases with the di/dt . In this application the

best compromise to reduce the noise and have the best efficiency is to fix $di/dt \approx 350A/µs$ ($P_{OFF}(D) + P_{ON}(TR)$) at $350A/µs \approx (P_{OFF}(D) + P_{ON}(TR))$ at $500A/µs$.

Another way to reduce EMI produced by the diode is to overdimension the diode. Indeed the noise generated by the diode decreases as a function of the junction temperature.

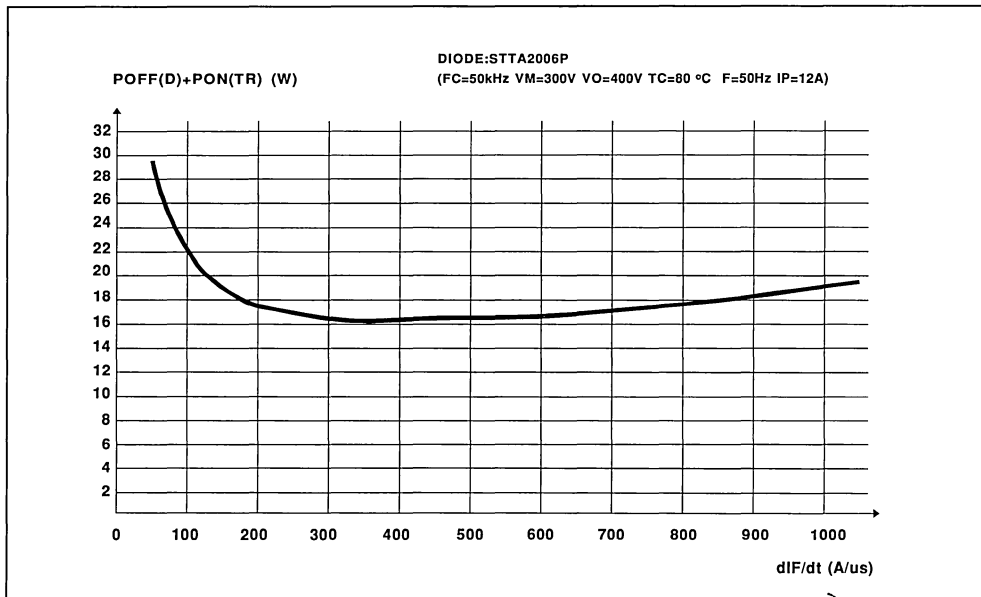
7. CONCLUSION

This paper explains why TURBOSWITCH"A" and TURBOSWITCH"B" are the right choices of diodes respectively for PFC working in continuous and discontinuous mode.

The software described in the application note is now available. It can help the designer to evaluate the influence of the different parameters (switching frequency, coil, $(di/dt)_{ON}$ of the transistor ...) on the power losses in the diode and in the transistor.

This program is especially interesting to determine the optimum $(di/dt)_{ON}$ of the transistor. This will increase the efficiency of the converter and decrease noise.

Fig.8 : OFF losses (D) + ON losses (TR) versus $(di/dt)_{ON}$ of the transistor .



THE CONDUCTION LOSSES IN A POWER RECTIFIER

B. Rivet

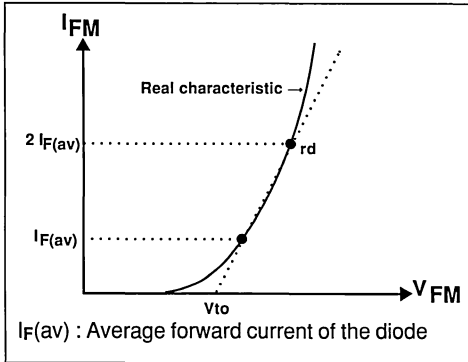
INTRODUCTION

In spite of the high operating frequency, the conduction losses remain the main cause of the junction's temperature increase in the majority of the applications. Therefore, it is important to accurately estimate these losses.

The purpose of this note is to give data to calculate the conduction losses in the diodes.

The forward characteristic of a diode is shown in fig.1

Fig.1 : Forward characteristics of a diodes



We can define two areas :

1) The peak current I_M is lower than 3 $I_{F(av)}$:

The forward characteristic of a diode may be assimilated to a straight line defined by V_{to} and r_d (Fig.1).

The forward voltage can be expressed by

$$V_{FM} = V_{to} + r_d I_{FM}$$

V_{to} and r_d are given in the datasheet for each part number. With this model the expression of the conduction losses is :

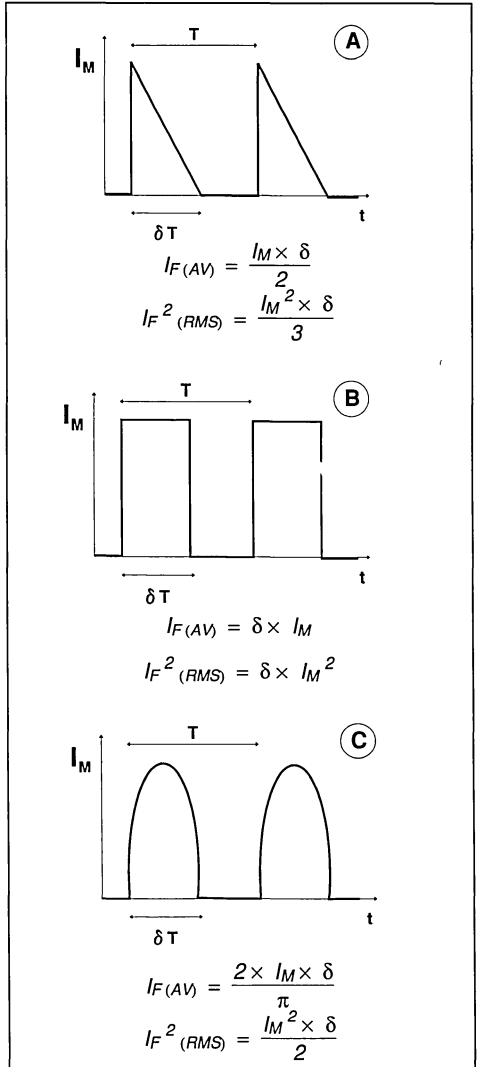
$$P_{cond} = V_{to} I_{F(av)} + r_d I_{F(RMS)}^2$$

$I_{F(av)}$: average forward current in the diode

$I_{F(RMS)}$: RMS forward current in the diode

Fig.2 shows the average and RMS values for different current wave forms.

Fig.2 : Average and RMS values for different currents wave forms.



Example :

With a STTA1206D : $V_{to} = 1.15V$ $r_d = 0.029 \text{ Ohm}$ and a rectangular current : $I_M = 20A$ $\delta = 0.5$ we find :

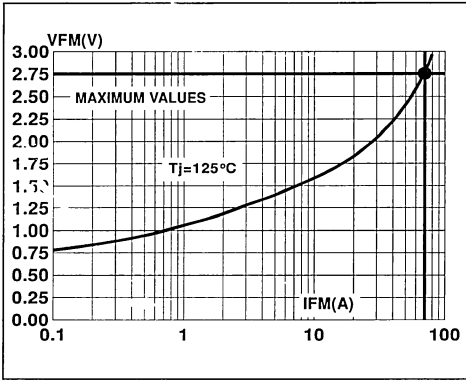
$$P_{cond} = 17.3W$$

2) The peak current I_M is higher than $3 I_{F(av)}$:

When the peak current I_M is higher than $3 I_{F(av)}$, the forward voltage and the conduction losses values calculated with V_{to} and r_d becomes very pessimistic (Fig.1).

A more accurate estimation of the conduction losses can be done with the curve V_{FM} , I_{FM} given in the datasheet (fig.3).

Fig.3 : Forward voltage drop versus forward current of a STTA806D.



In the case of a rectangular current conduction losses can be expressed by :

$$P_{cond} = V_{FM} (I_M) \times I_{F(av)}$$

Where $V_F (I_M)$ is the V_{FM} value when $I_{FM} = I_M$

Example :

With a rectangular current : $I_M = 70A$ $\delta = 0.1$ and a STTA806D $V_{FM}(70A) = 2.75V$ (Fig.3) $P_{cond} = V_{FM}(70A) \times \delta \times I_M$ we find :

$$P_{cond} = 19W$$





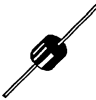







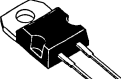
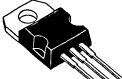
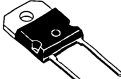
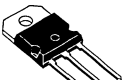
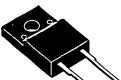
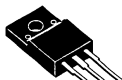
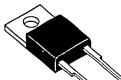
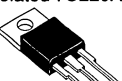
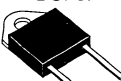
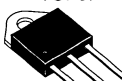




In these conditions, conduction losses calculated with V_{to} and r_d give : $P_{cond} = 29W$!

Conclusion

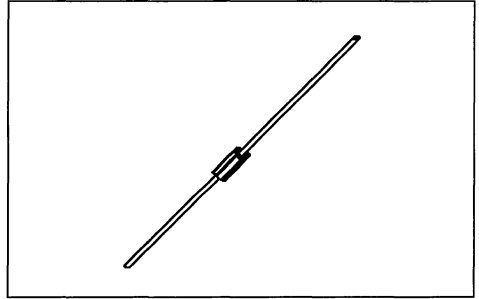
This short note provides the designer with the rules to properly estimate the conduction losses in a power diode. It also highlights the limitation of the traditional forward characteristic model $V_F = V_{to} + r_d I_F$, gives a value very pessimistic at high level current.

PACKAGE INFORMATION

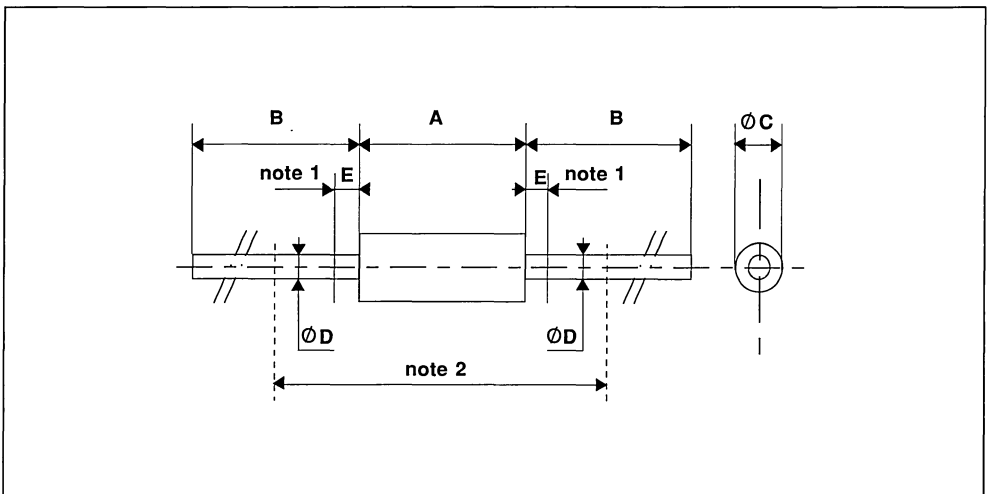
RECTIFIERS AND SCHOTTKY DIODES PACKAGES

	<p>DO35</p>  <p>P 2/27</p>	<p>DO41</p>  <p>P 3/27</p>	<p>F126</p>  <p>P 4/27</p>
<p>DO27A</p>  <p>P 5/27</p>	<p>AG</p>  <p>P 6/27</p>	<p>MINIMELF</p>  <p>P 7/27</p>	<p>MELF</p>  <p>P 8/27</p>
<p>SOT23</p>  <p>P 9/27</p>	<p>SOT223</p>  <p>P 10/27</p>	<p>SOD6</p>  <p>P 11/27</p>	<p>SOD15</p>  <p>P 12/27</p>
<p>PowerSO-10™</p>  <p>P 13/27</p>	<p>TO220AC</p>  <p>P 14/27</p>	<p>TO220AB</p>  <p>P 15/27</p>	<p>SOD93</p>  <p>P 16/27</p>
<p>SOT93</p>  <p>P 17/27</p>	<p>ISOWATT220AC</p>  <p>P 18/27</p>	<p>ISOWATT220AB</p>  <p>P 19/27</p>	<p>Isolated TO220AC</p>  <p>P 20/27</p>
<p>Isolated TO220AB</p>  <p>P 21/27</p>	<p>DOP3I</p>  <p>P 22/27</p>	<p>TOP3I</p>  <p>P 23/27</p>	<p>ISOTOP® screw version</p>  <p>P 24/27</p>
<p>ISOTOP® fast-on version</p>  <p>P 25/27</p>	<p>DO4</p>  <p>P 26/27</p>	<p>DO5</p>  <p>P 27/27</p>	

Weight = 0.15 g
 Marking : clear, ring at cathode end
 Cooling method : by convection and conduction



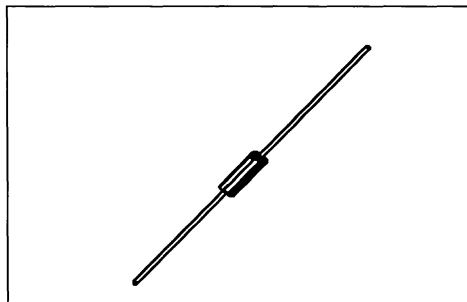
REF.	DIMENSIONS				NOTES
	Millimeters		Inches		
	Min.	Max.	Min.	Max.	
A	3.050	4.500	0.120	0.117	1 - The lead diameter $\varnothing D$ is not controlled over zone E 2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.59" (15 mm)
B	12.7		0.500		
$\varnothing C$	1.530	2.000	0.060	0.079	
$\varnothing D$	0.458	0.558	0.018	0.022	
E		1.27		0.050	



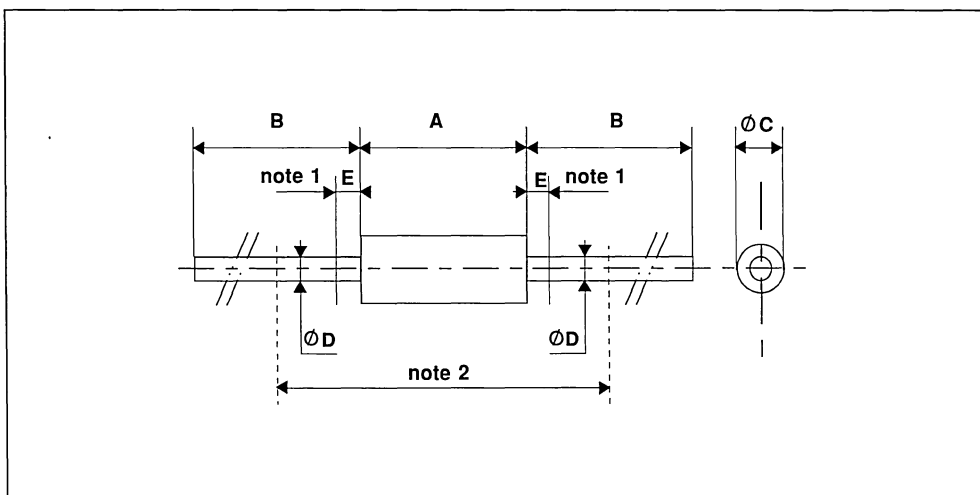
Weight = 0.34 g

Marking : clear, ring at cathode end

Cooling method : by convection and conduction

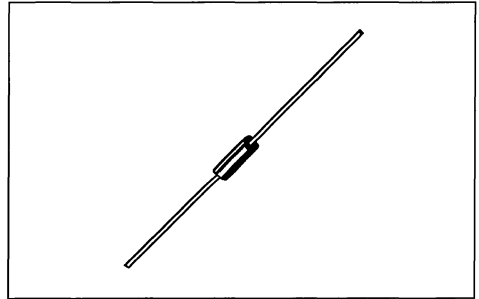


REF.	DIMENSIONS				NOTES
	Millimeters		Inches		
	Min.	Max.	Min.	Max.	
A	4.070	5.200	0.160	0.205	1 - The lead diameter $\varnothing D$ is not controlled over zone E 2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.59" (15 mm)
B	28		1.102		
$\varnothing C$	2.040	2.710	0.080	0.107	
$\varnothing D$	0.712	0.863	0.028	0.034	
E		1.27		0.050	

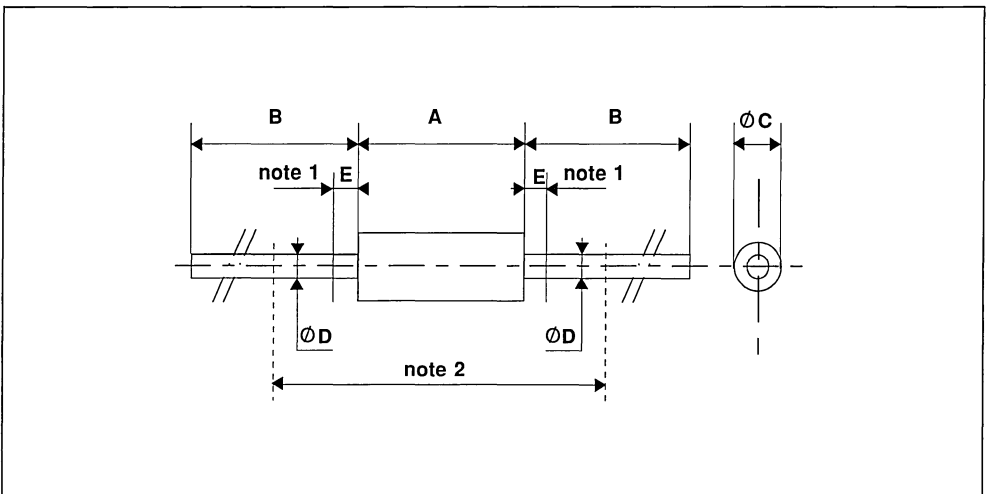


AXIAL

Weight = 0.4 g
 Marking : clear, ring at cathode end
 Cooling methode : by convection (method A)



REF.	DIMENSIONS				NOTES
	Millimeters		Inches		
	Min.	Max.	Min.	Max.	
A	6.05	6.35	0.238	0.250	1 - The lead diameter $\varnothing D$ is not controlled over zone E 2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.59" (15 mm)
B	26		1.024		
$\varnothing C$	2.95	3.05	0.116	0.120	
$\varnothing D$	0.76	0.86	0.029	0.034	
E		1.27		0.050	



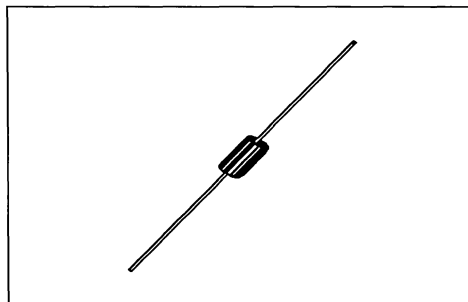
AXIAL

Weight = 1 g

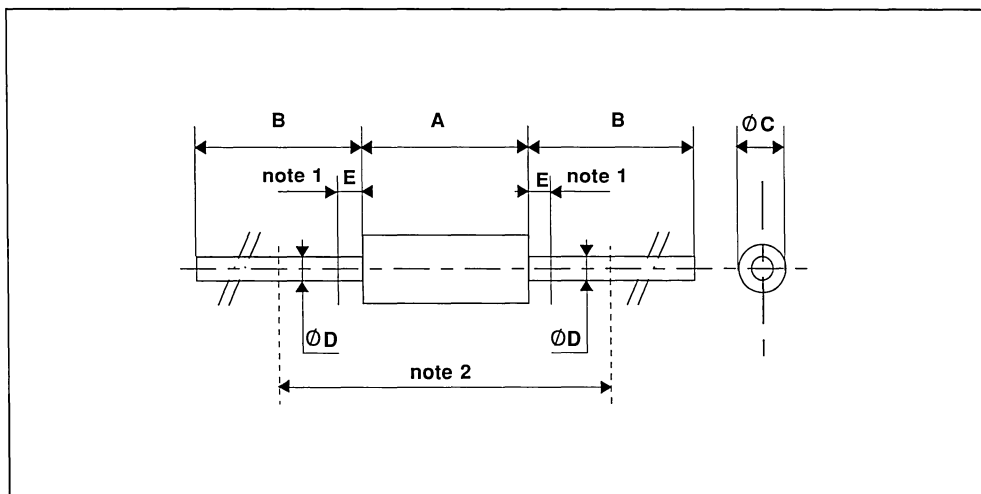
Marking : Type number

White band indicates cathode

Cooling method : by convection (method A)

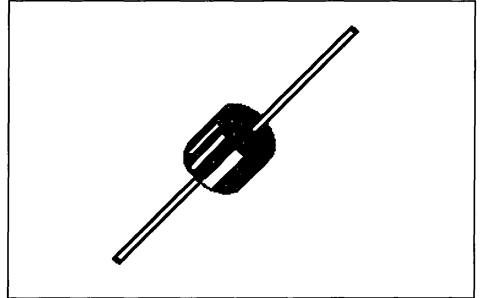


REF.	DIMENSIONS				NOTES
	Millimeters		Inches		
	Min.	Max.	Min.	Max.	
A		9.80		0.385	1 - The lead diameter $\varnothing D$ is not controlled over zone E 2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.59"(15 mm)
B	26		1.024		
$\varnothing C$		5.10		0.200	
$\varnothing D$		1.28		0.050	
E		1.25		0.049	

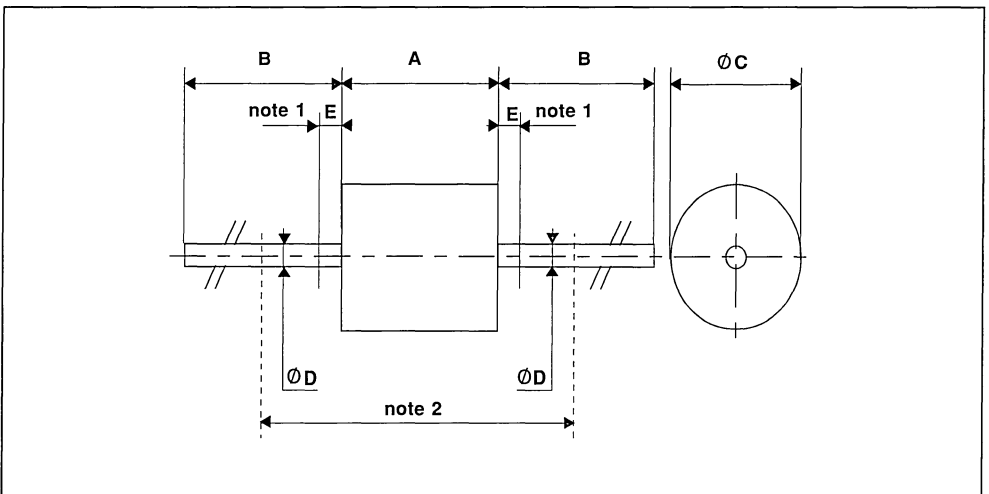


AXIAL

Weight = 1 g
 Marking : Type number
 White band indicates cathode
 Cooling method : by convection (method A)

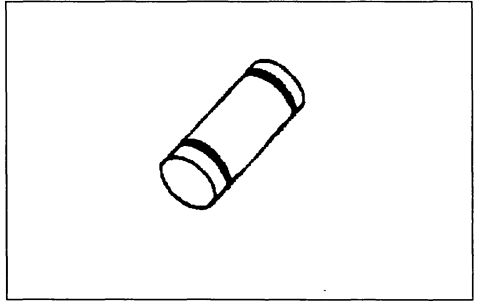


REF.	DIMENSIONS				NOTES
	Millimeters		Inches		
	Min.	Max.	Min.	Max.	
A		9		0.354	1- The lead diameter $\varnothing D$ is not controlled over zone E. 2- The minimum axial length within which the device may be placed bent at right angles is 0.79" (20 mm).
B	20		0.787		
$\varnothing C$		8		0.315	
$\varnothing D$	1.35	1.45	0.053	0.057	
E		1.27		0.050	



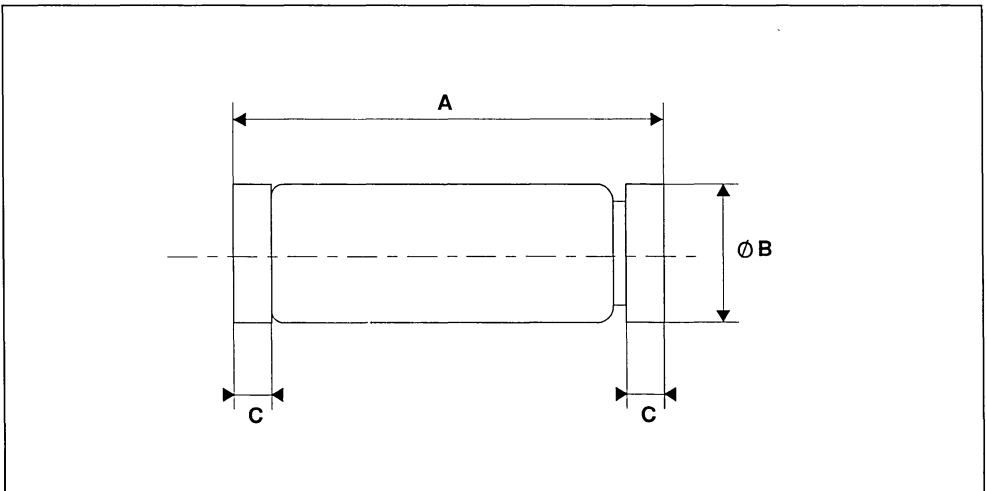
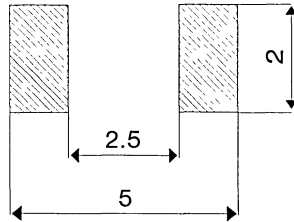
Weight = 0.15 g

Marking : clear, ring at cathode end



FOOT PRINT

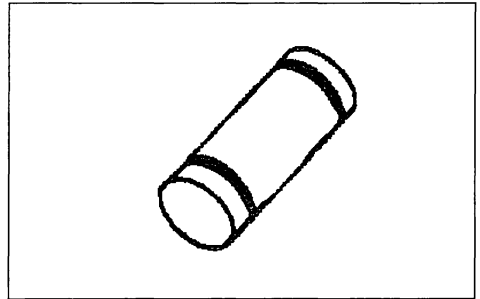
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.3	3.6	0.13	0.14
B	1.59	1.62	0.06	0.06
C	0.4	0.5	0.02	0.02



Weight = 0.55 g

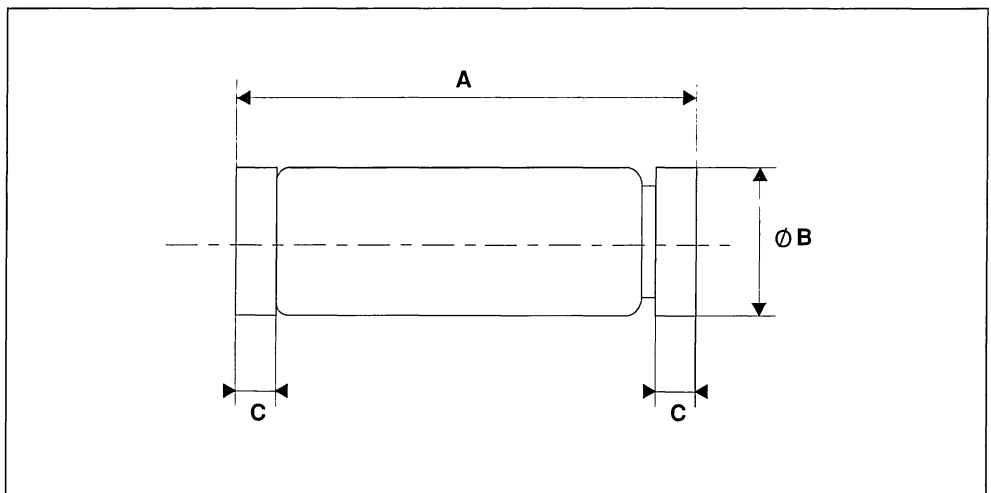
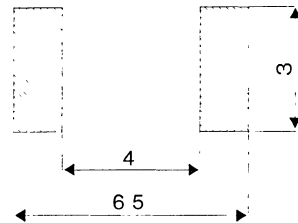
Marking : clear, ring at cathode end

Cooling method : by convection and conduction



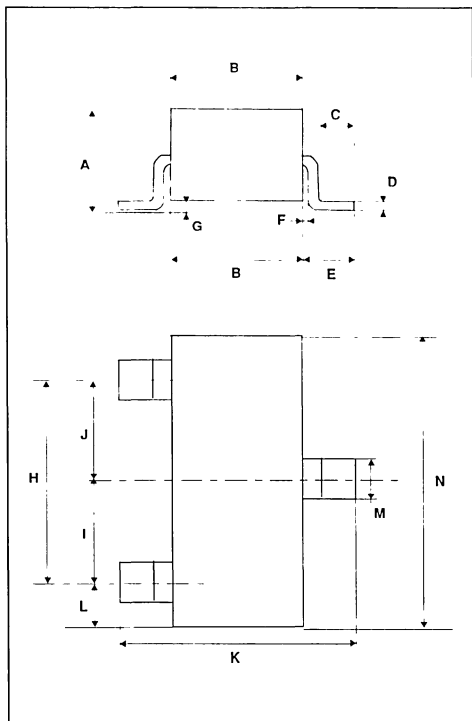
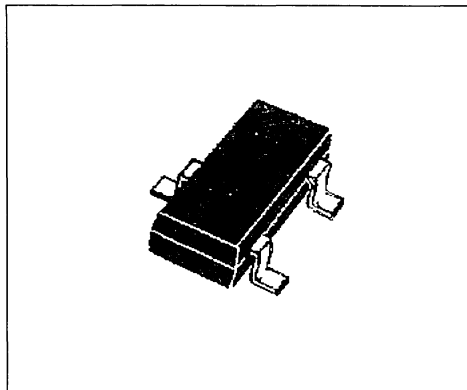
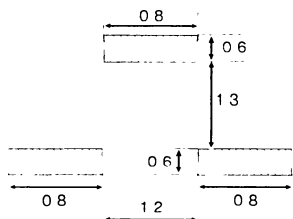
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min	Max
A	4.80	5.20	0.19	0.20
B	2.55	2.65	0.10	0.10
C	0.45	0.55	0.02	0.02

FOOT PRINT



Weight = 0.007 g

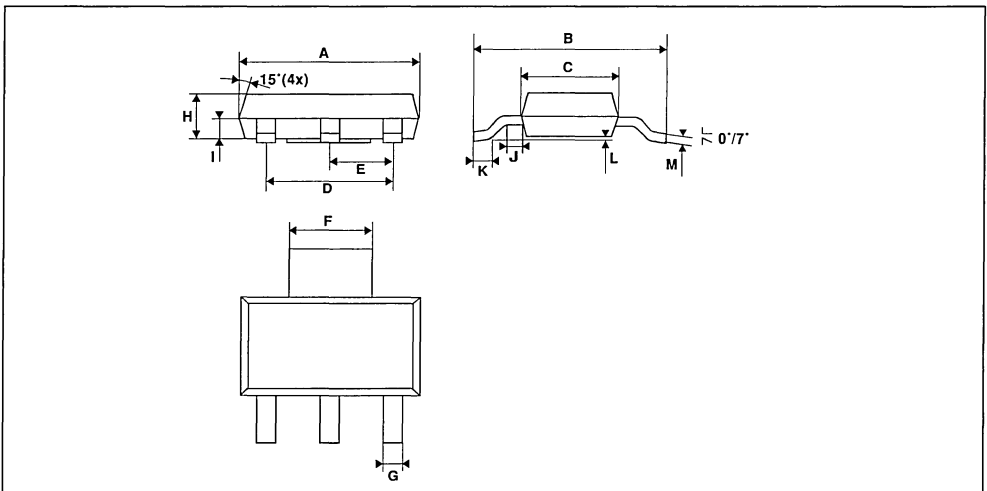
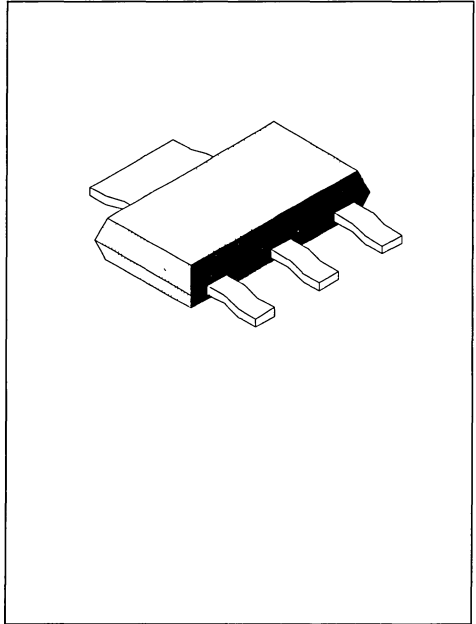
FOOT PRINT



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min	Max
A	0.93	1.04	0.0376	0.0410
B	1.20	1.40	0.0472	0.0551
C	0.15		0.0059	
D	0.085	0.115	0.0033	0.0045
E	0.45	0.60	0.0177	0.0236
F	0.08		0.00031	
G	0.013	0.10	0.00051	0.00039
H	1.90	2.05	0.0748	0.0807
I	0.95	1.05	0.0374	0.0413
J	0.95	1.05	0.0374	0.0413
K	2.10	2.50	0.0827	0.0984
L	0.45	0.60	0.0177	0.0236
M	0.37	0.46	0.0145	0.0181
N	2.80	3.00	0.110	0.118

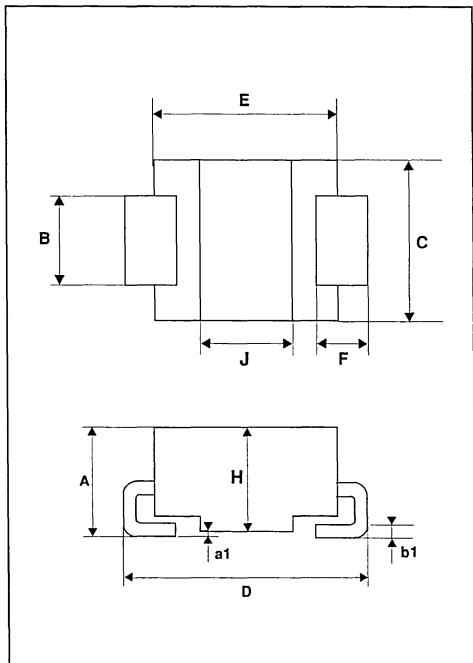
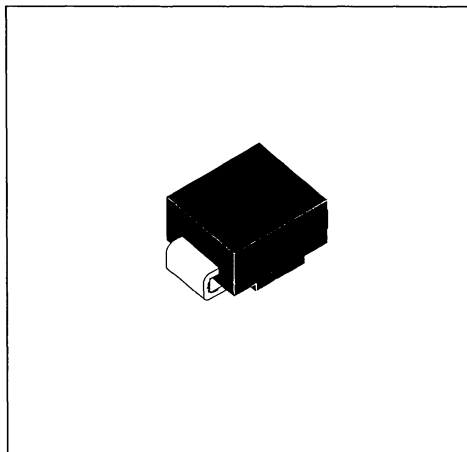
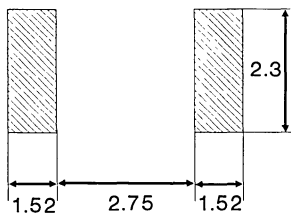
Weight = 0.11 g

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30	6.50	6.70	0.248	0.256	0.264
B	6.70	7.00	7.30	0.264	0.275	0.287
C	3.30	3.50	3.70	0.130	0.139	0.146
D		4.60			0.181	
E		2.30			0.090	
F	2.90	3.00	3.10	0.114	0.118	0.122
G	0.60	0.70	0.80	0.023	0.027	0.031
H	1.50	1.60	1.70	0.059	0.063	0.067
I	0.43	0.45	0.47	0.017	0.018	0.019
J	0.50	0.60	0.70	0.019	0.023	0.027
K	0.63	0.65	0.67	0.024	0.025	0.026
L		0.05			0.002	
M			0.32			0.012



Marking laser

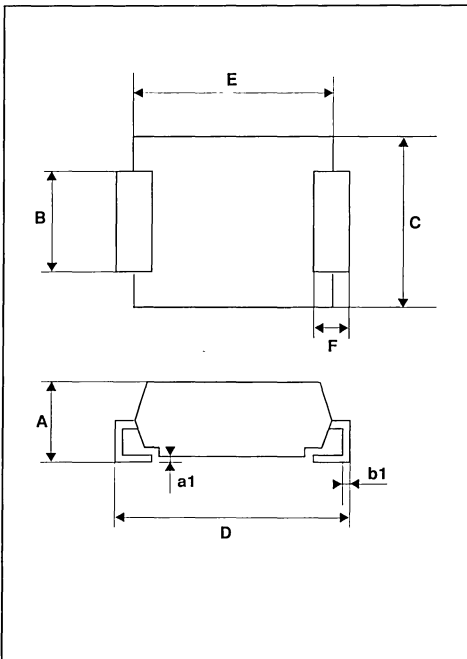
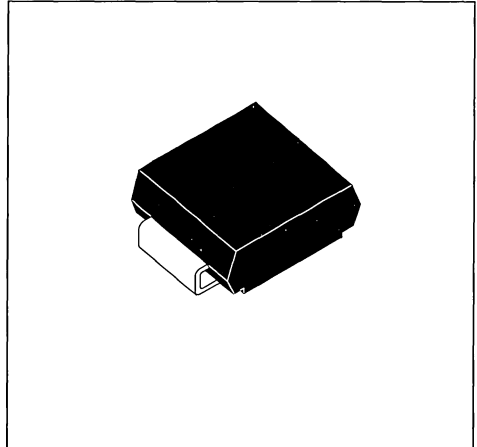
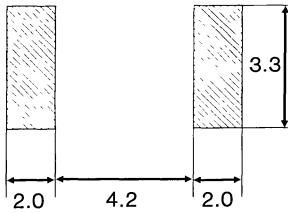
FOOT PRINT



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.44	2.62	0.096	0.103
a1	0.10	0.20	0.004	0.008
B	1.96	2.11	0.077	0.083
b1	0.25	0.35	0.010	0.014
C	3.65	3.93	0.143	0.155
D	5.39	5.59	0.212	0.220
E	4.15	4.30	0.163	0.170
F	1.00	1.27	0.039	0.050
H	2.33	2.41	0.092	0.095
J	2.05	2.13	0.080	0.084

Marking laser

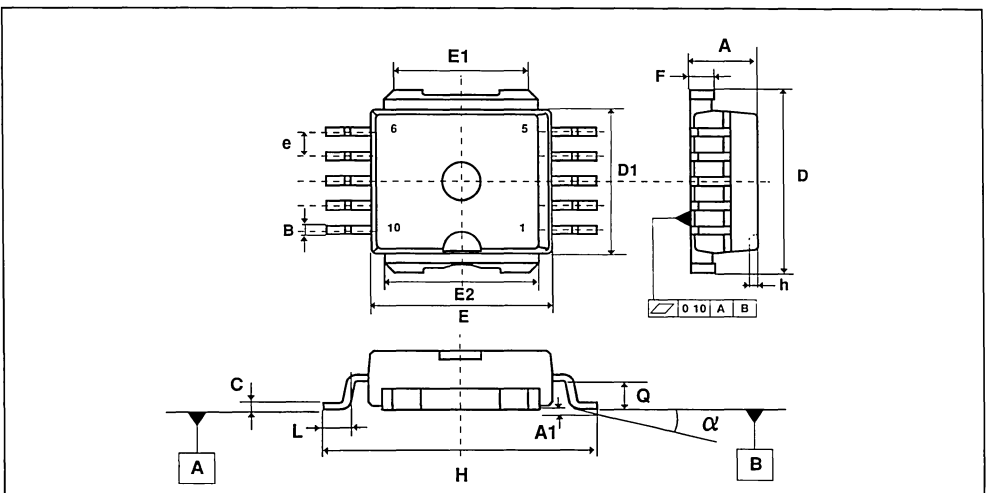
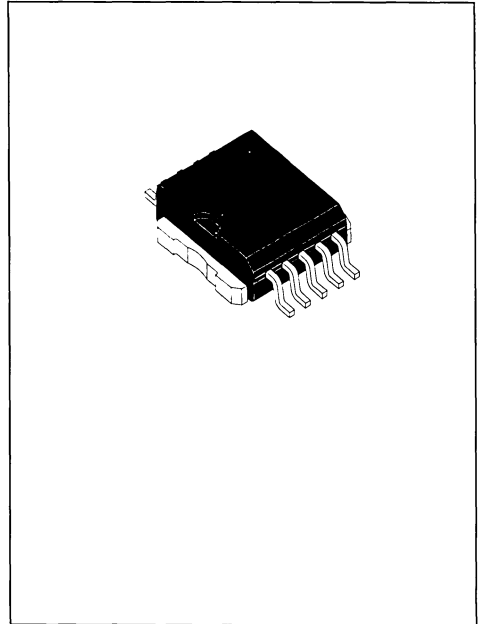
FOOT PRINT



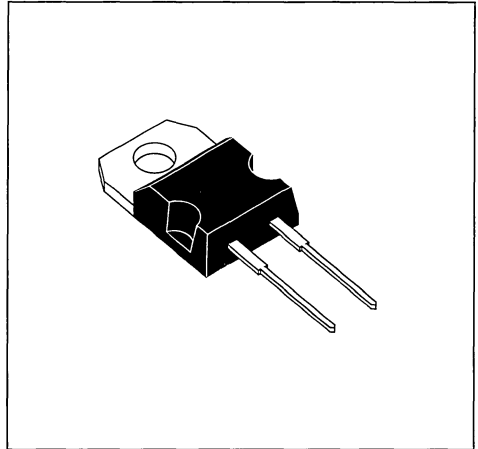
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.50	3.10	0.098	0.122
a1	0.05	0.20	0.002	0.008
B	2.90	3.10	0.114	0.122
b1	0.29	0.32	0.011	0.012
C	4.80	5.20	0.189	0.204
D	7.60	8.00	0.299	0.315
E	6.30	6.60	2.225	0.259
F	1.30	1.70	0.051	0.056

SMD

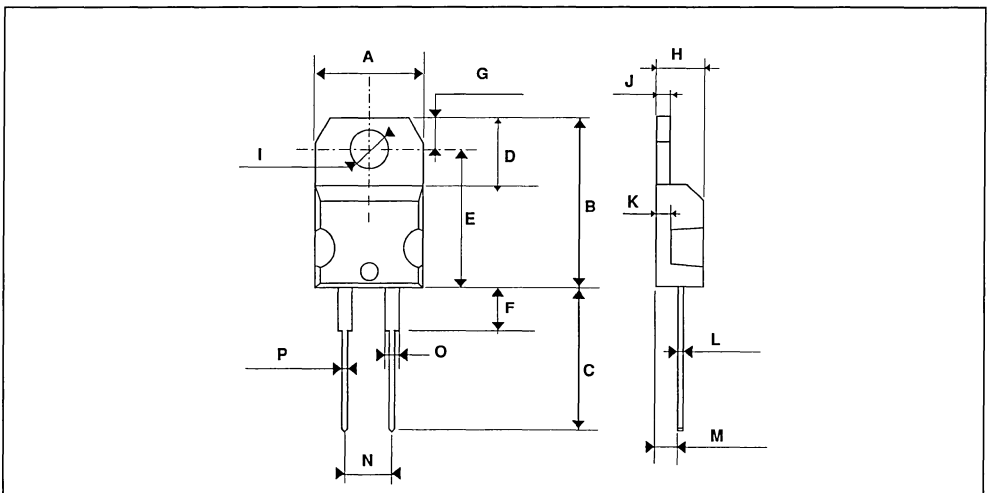
REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	3.35		3.65	0.132		0.144
A1			0.10			0.004
B	0.40		0.60	0.016		0.023
C	0.35		0.55	0.013		0.021
D	9.40		9.60	0.370		0.378
D1	7.40		7.60	0.290		0.300
E	9.30		9.50	0.366		0.374
E1		6.15			0.242	
E2	7.20		7.40	0.283		0.290
e		1.27			0.050	
F	1.25		1.35	0.049		0.053
H	13.80		14.40	0.425		0.567
h		0.50			0.002	
L	0.80		1.30	0.031		0.05
Q		1.70			0.067	
α	0°		8°			



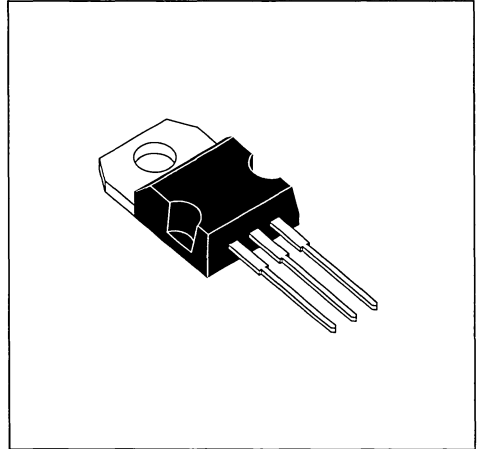
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	9.66	10.66	0.380	0.419
B	15.2	15.9	0.598	0.626
C	13	14	0.511	0.551
D	6.2	6.6	0.244	0.260
E	16.4 typ.		0.645 typ.	
F	3.5	4.2	0.137	0.165
G	2.65	2.95	0.104	0.116
H	4.4	4.6	0.173	0.181
I	3.75	3.85	0.147	0.151
J	1.23	1.32	0.048	0.051
K	1.27 typ.		0.050 typ.	
L	0.49	0.70	0.019	0.027
M	2.4	2.72	0.094	0.107
N	4.95	5.15	0.194	0.203
O	1.14	1.70	0.044	0.067
P	0.61	0.88	0.024	0.034



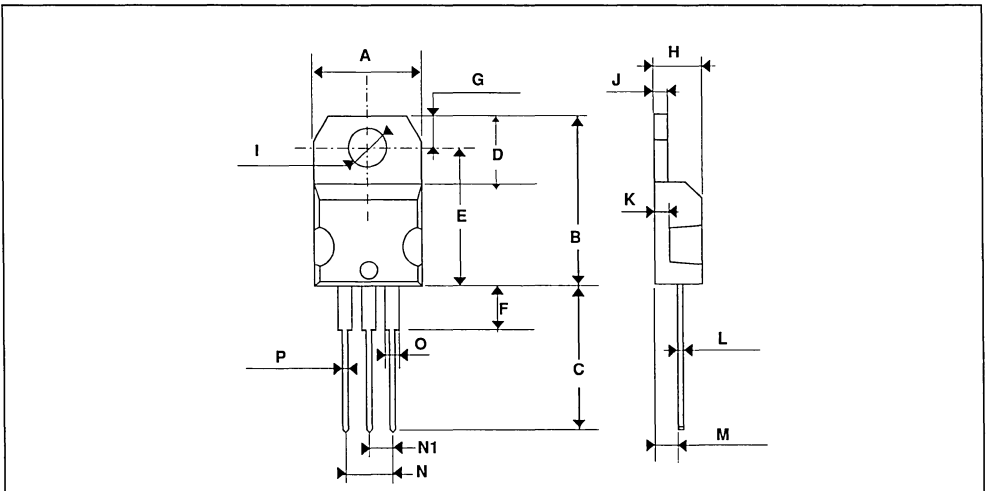
Weight = 1.9 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.55 m.N.
 Maximum torque value : 0.70 m.N.



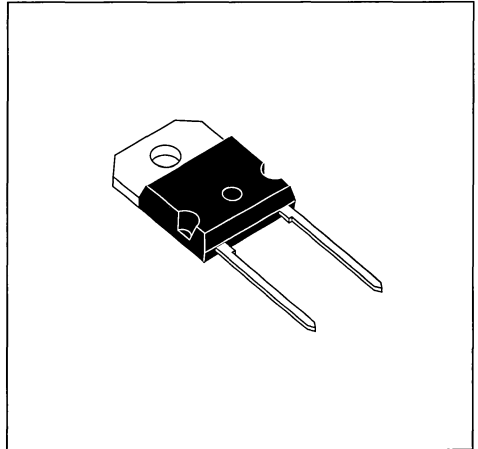
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	9.66	10.66	0.380	0.419
B	15.2	15.9	0.598	0.626
C	13	14	0.511	0.551
D	6.2	6.6	0.244	0.260
E	16.4 typ.		0.645 typ.	
F	3.5	4.2	0.137	0.165
G	2.65	2.95	0.104	0.116
H	4.4	4.6	0.173	0.181
I	3.75	3.85	0.147	0.151
J	1.23	1.32	0.048	0.051
K	1.27 typ.		0.050 typ.	
L	0.49	0.70	0.019	0.027
M	2.4	2.72	0.094	0.107
N	4.95	5.15	0.194	0.203
N1	2.40	2.70	0.094	0.106
O	1.14	1.70	0.044	0.067
P	0.61	0.88	0.024	0.034



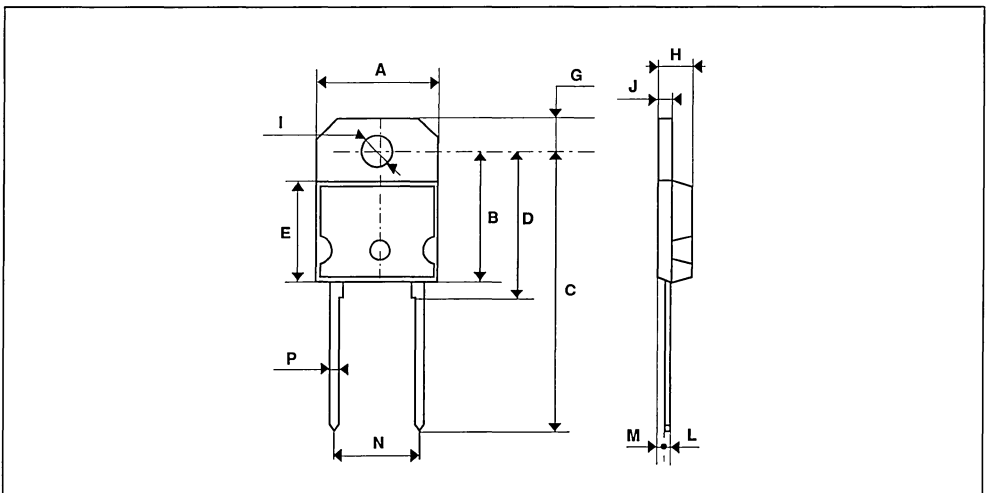
Weight = 2 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.55 m.N.
 Maximum torque value : 0.70 m.N.



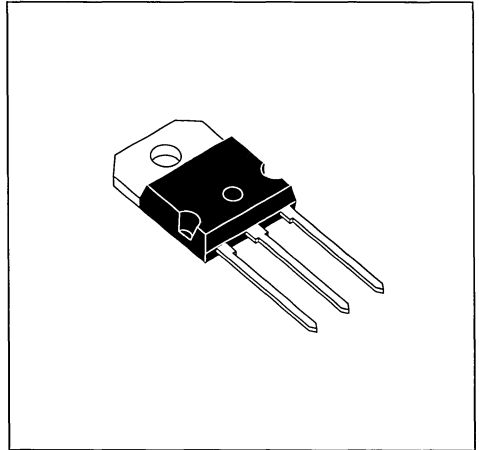
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	14.7	15.2	0.578	0.596
B		16.2		0.637
C	31 typ		1.220 typ	
D	18 typ		0.708 typ	
E		12.2		0.480
G	3.95	4.15	0.155	0.163
H	4.7	4.9	0.185	0.193
I	4	4.1	0.157	0.161
J	1.17	1.37	0.046	0.054
L	0.5	0.78	0.019	0.030
M	2.5 typ		0.098 typ	
N	10.8	11.1	0.425	0.437
P	1.1	1.3	0.043	0.051



Weight = 4 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.8 m.N.
 Maximum torque value : 1.0 m.N.



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	14.7	15.2	0.578	0.596
B		16.2		0.637
C	31 typ		1.220 typ	
D	18 typ		0.708 typ	
E		12.2		0.480
G	3.95	4.15	0.155	0.163
H	4.7	4.9	0.185	0.193
I	4	4.1	0.157	0.161
J	1.17	1.37	0.046	0.054
L	0.5	0.78	0.019	0.030
M	2.5 typ		0.098 typ	
N	10.8	11.1	0.425	0.437
P	1.1	1.3	0.043	0.051



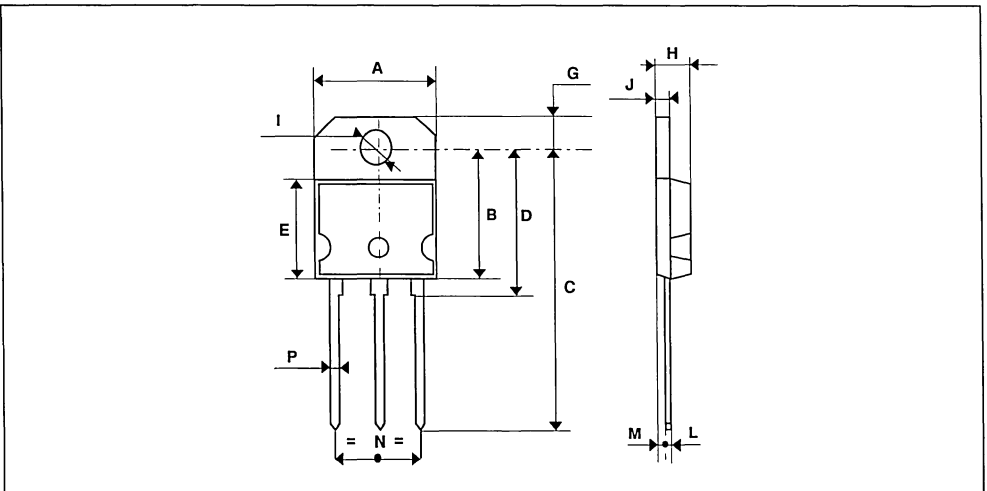
Weight = 4.1 g

Marking : Type number

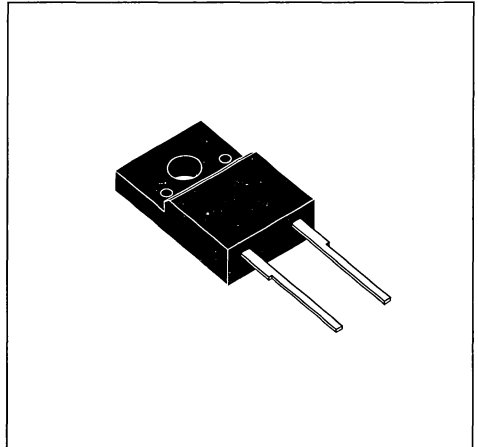
Cooling method : C

Recommended torque value : 0.8 m.N.

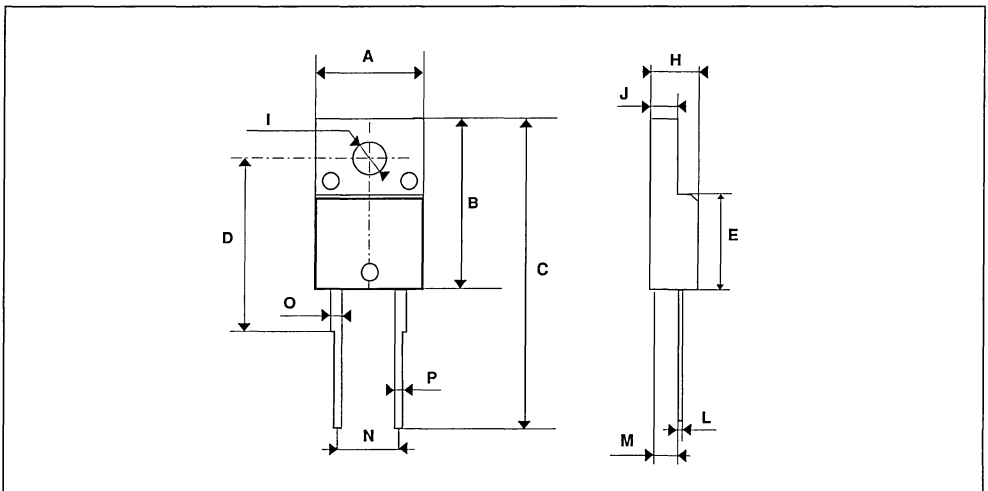
Maximum torque value : 1.0 m.N.



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	10	10.4	0.393	0.409
B	15.9	16.4	0.626	0.645
C	28.6	30.6	1.126	1.204
D	16 typ		0.630 typ	
E	9	9.3	0.354	0.366
H	4.4	4.6	0.173	0.181
I	3	3.2	0.118	0.126
J	2.5	2.7	0.098	0.106
L	0.4	0.7	0.015	0.027
M	2.4	2.75	0.094	0.108
N	4.95	5.2	0.195	0.204
O	1.15	1.7	0.045	0.067
P	0.75	1	0.030	0.039

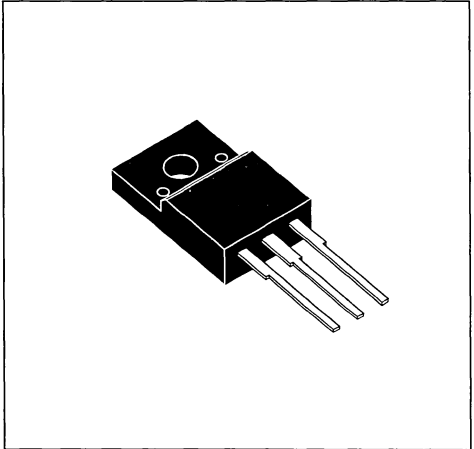


Weight = 2 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.55 m.N.
 Maximum torque value : 0.70 m.N.
 Electrical isolation : 2000V DC
 Capacitance : 12 pF

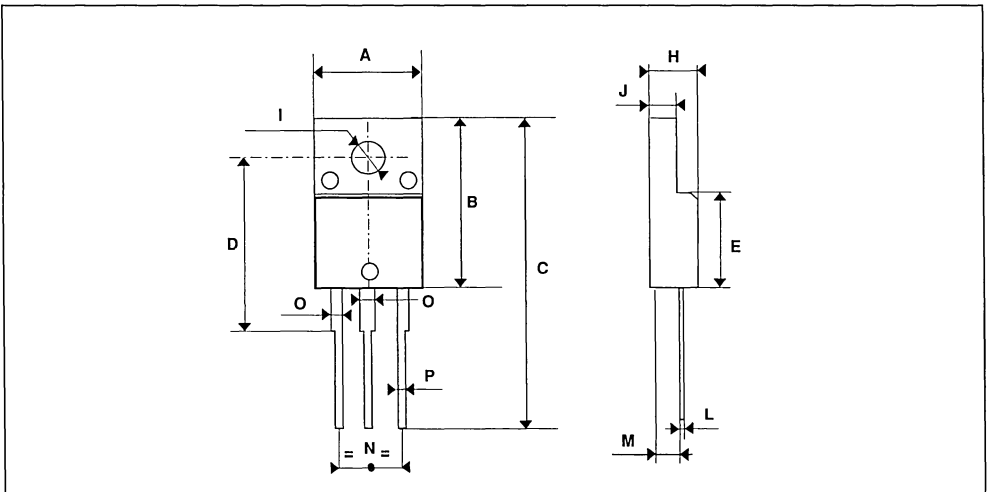


ISOLATED PLASTIC

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	10	10.4	0.393	0.409
B	15.9	16.4	0.626	0.645
C	28.6	30.6	1.126	1.204
D	16 typ		0.630 typ	
E	9	9.3	0.354	0.366
H	4.4	4.6	0.173	0.181
I	3	3.2	0.118	0.126
J	2.5	2.7	0.098	0.106
L	0.4	0.7	0.015	0.027
M	2.4	2.75	0.094	0.108
N	4.95	5.2	0.195	0.204
O	1.15	1.7	0.045	0.067
P	0.75	1	0.030	0.039

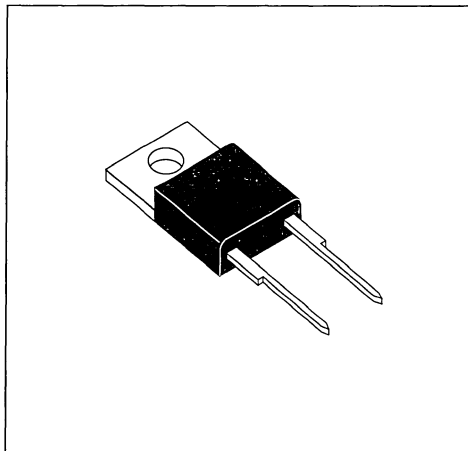


Weight = 2.1 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.55 m.N.
 Maximum torque value : 0.70 m.N.
 Electrical isolation : 2000V DC
 Capacitance : 12 pF

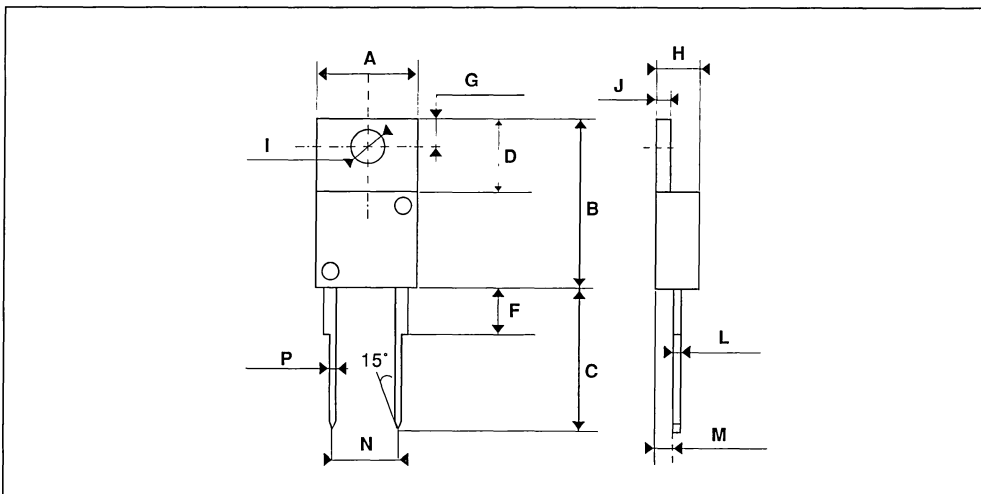


ISOLATED PLASTIC

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	10.20	10.45	0.401	0.411
B	14.23	15.87	0.560	0.625
C	12.70	14.70	0.500	0.579
D	5.85	6.85	0.230	0.270
F		4.50		0.178
G	2.54	3.00	0.100	0.119
H	4.48	4.82	0.176	0.190
I	3.55	4.00	0.139	0.158
J	1.15	1.39	0.045	0.055
L	0.35	0.65	0.013	0.026
M	2.10	2.70	0.082	0.107
N	4.58	5.58	0.18	0.22
P	0.64	0.96	0.025	0.038

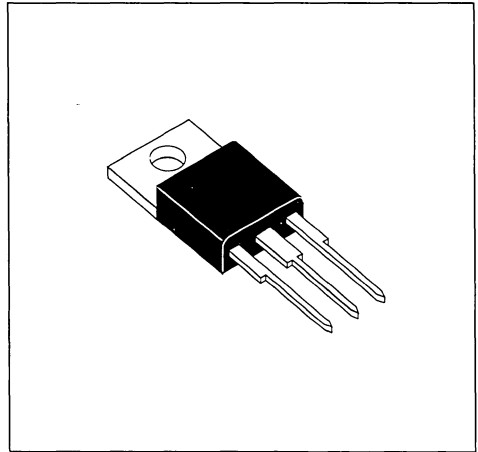


Weight = 2.2 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.8 m.N.
 Maximum torque value : 1.0 m.N.
 Electrical isolation : 2500V DC
 Capacitance : 7 pF

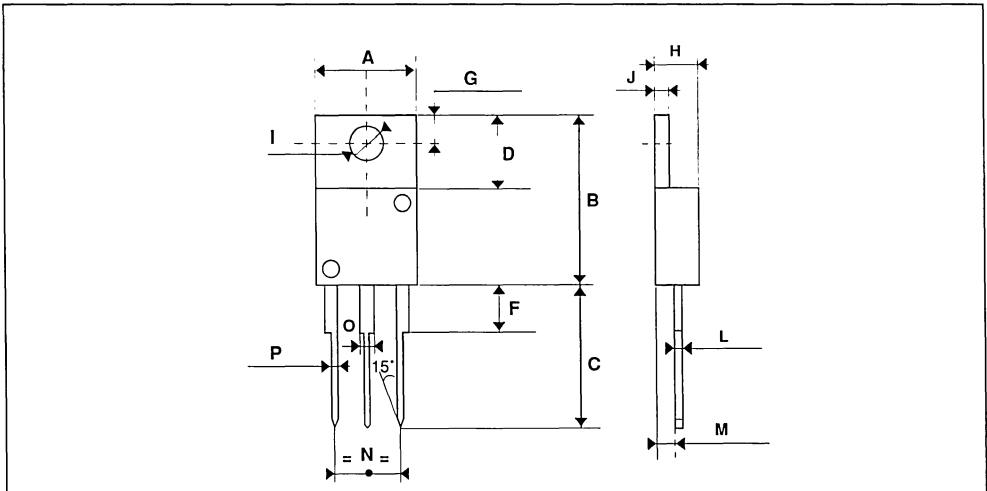


ISOLATED PLASTIC

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	10.20	10.45	0.401	0.411
B	14.23	15.87	0.560	0.625
C	12.70	14.70	0.500	0.579
D	5.85	6.85	0.230	0.270
F		4.50		0.178
G	2.54	3.00	0.100	0.119
H	4.48	4.82	0.176	0.190
I	3.55	4.00	0.139	0.158
J	1.15	1.39	0.045	0.055
L	0.35	0.65	0.013	0.026
M	2.10	2.70	0.082	0.107
N	4.58	5.58	0.18	0.22
O	0.80	1.20	0.031	0.048
P	0.64	0.96	0.025	0.038

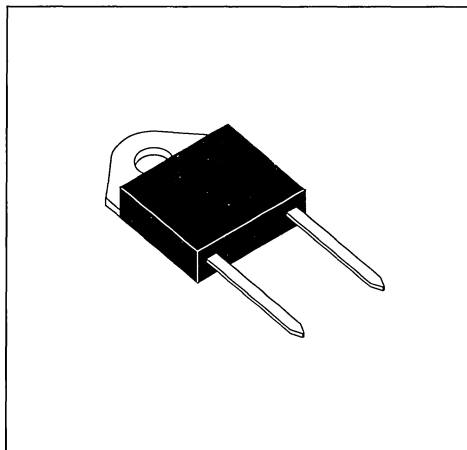


Weight = 2.3 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.8 m.N.
 Maximum torque value : 1.0 m.N.
 Electrical isolation : 2500V DC
 Capacitance : 7 pF

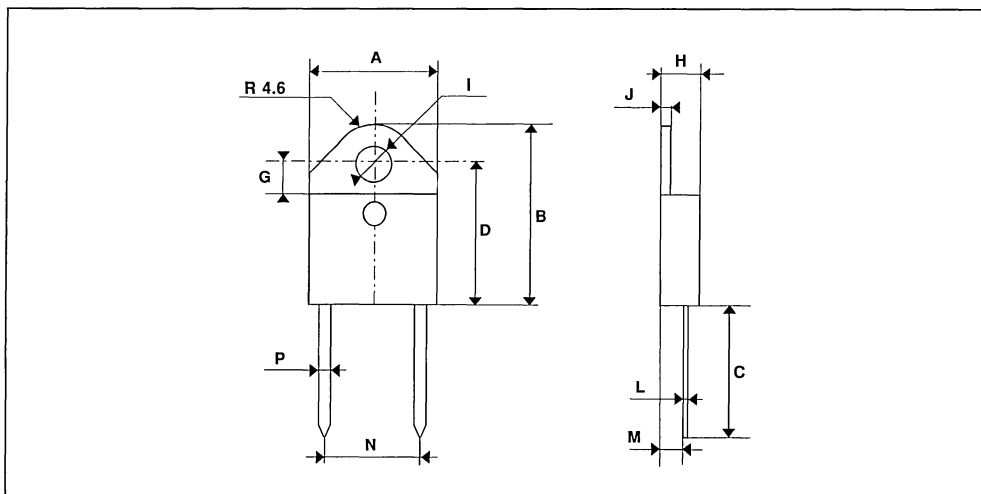


ISOLATED PLASTIC

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	15.10	15.50	0.594	0.611
B	20.70	21.10	0.814	0.831
C	14.30	15.60	0.561	0.615
D	16.10	16.50	0.632	0.650
G	3.40	-	0.133	-
H	4.40	4.60	0.173	0.182
I	4.08	4.17	0.161	0.164
J	1.45	1.55	0.057	0.062
L	0.50	0.70	0.019	0.028
M	2.70	2.90	0.106	0.115
N	10.80	11.30	0.42	0.45
P	1.20	1.40	0.047	0.056

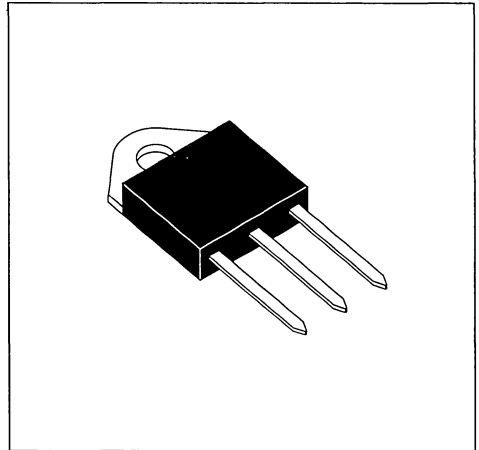


Weight = 4.6 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.8 m.N.
 Maximum torque value : 1.0 m.N.
 Electrical isolation : 2500V DC
 Capacitance : 12 pF

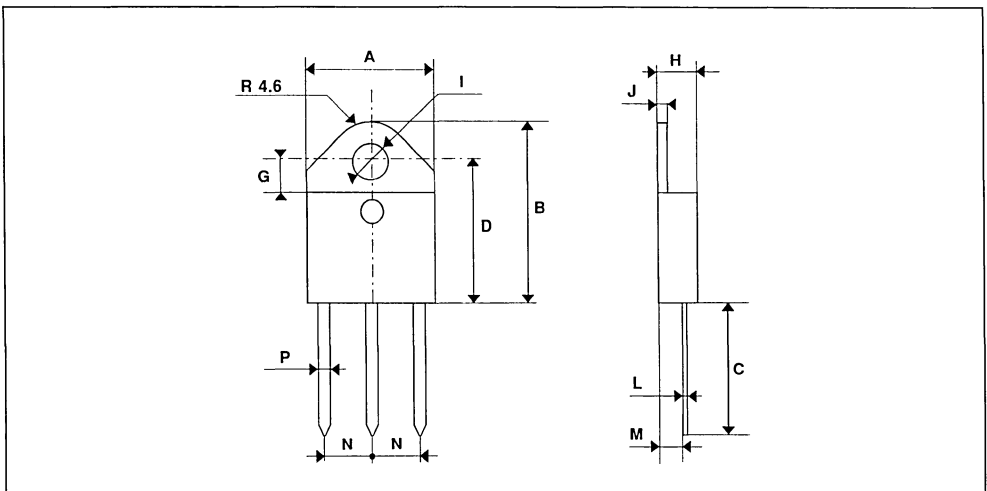


ISOLATED PLASTIC

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	15.10	15.50	0.594	0.611
B	20.70	21.10	0.814	0.831
C	14.30	15.60	0.561	0.615
D	16.10	16.50	0.632	0.650
G	3.40	-	0.133	-
H	4.40	4.60	0.173	0.182
I	4.08	4.17	0.161	0.164
J	1.45	1.55	0.057	0.062
L	0.50	0.70	0.019	0.028
M	2.70	2.90	0.106	0.115
N	5.40	5.65	0.212	0.223
P	1.20	1.40	0.047	0.056

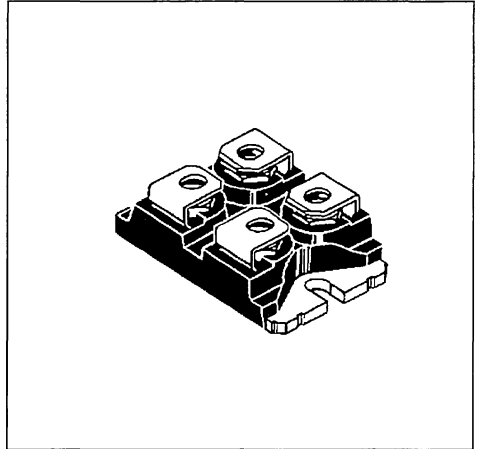


Weight = 4.7 g
 Marking : Type number
 Cooling method : C
 Recommended torque value : 0.8 m.N.
 Maximum torque value : 1.0 m.N.
 Electrical isolation : 2500V DC
 Capacitance : 12 pF

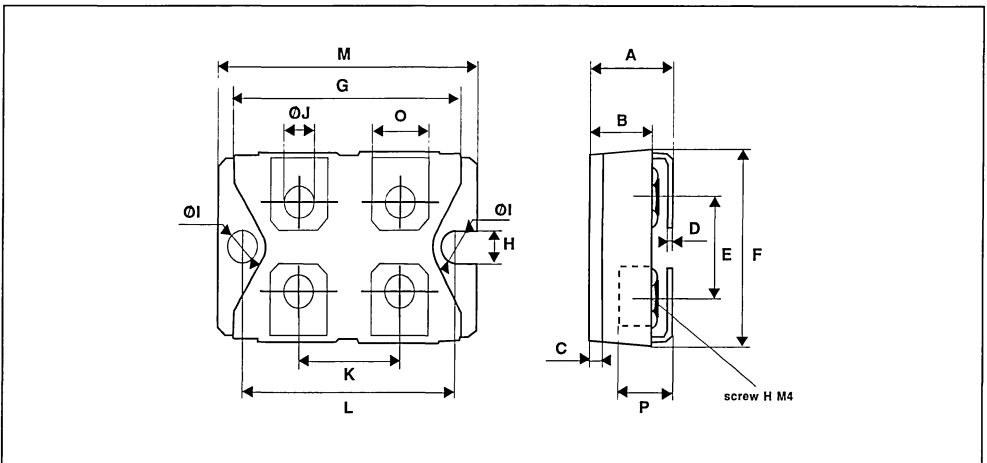


ISOLATED PLASTIC

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.465	0.480
B	8.90	9.10	0.350	0.358
C	1.95	2.05	0.077	0.081
D	0.75	0.85	0.029	0.034
E	12.60	12.80	0.496	0.504
F	25.10	25.50	0.988	1.004
G	31.50	31.70	1.240	1.248
H	4.00		0.157	
I	4.10	4.30	0.161	0.169
J	4.10	4.30	0.161	0.169
K	14.90	15.10	0.586	0.595
L	30.10	30.30	1.185	1.193
M	37.80	38.20	1.488	1.504
O	7.80	8.20	0.307	0.323
P	5.50		0.216	



Weight = 28 g (without screws)
 Marking : Type number
 Cooling method : C
 Electrical isolation : 2500V(RMS)
 Capacitance : < 45 pF
 Inductance : < 5 nH

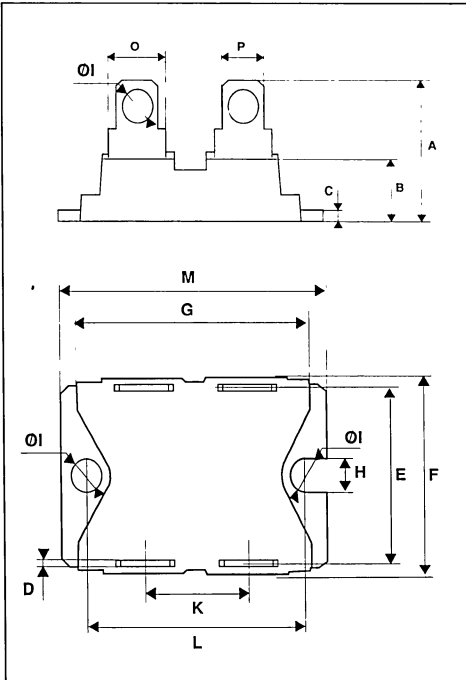
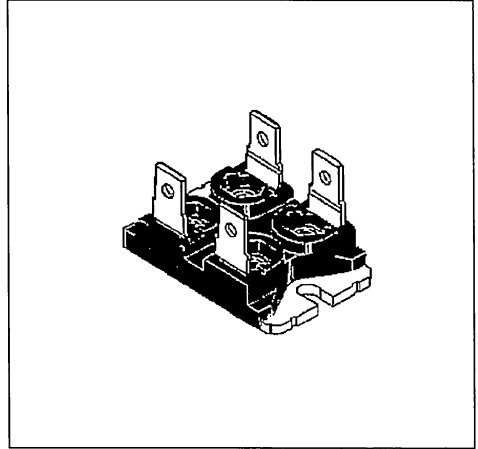


- Recommended torque value . 1.3 N.m (MAX 1.5 N.m) for the 6 x M4 screws. (2 x M4 screws recommended for mounting the package on the heatsink and the 4 screws given with the screw version).

- The screws supplied with the package are adapted for mounting on a board (or other types of terminals) with a thickness of 0.6 mm min and 2.2 mm max

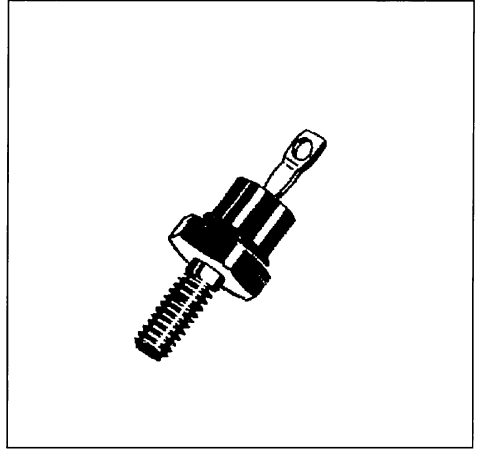
ISOLATED PLASTIC

Weight = 28 g (without screws)
 Marking : Type number
 Cooling method : C
 Electrical isolation : 2500V_(RMS)
 Capacitance : < 45 pF
 Inductance : < 5 nH



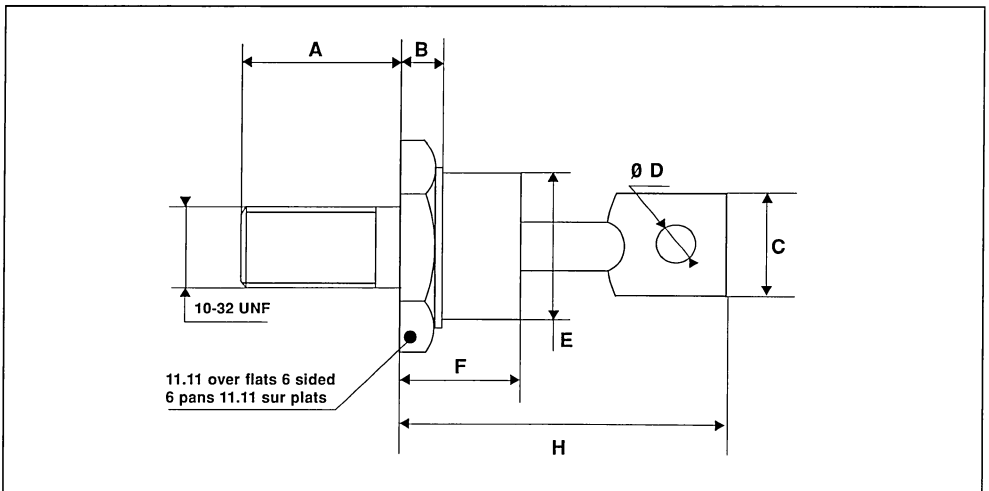
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	20.30	20.70	0.799	0.815
B	8.90	9.10	0.350	0.358
C	1.958	2.05	0.078	0.081
D	0.75	0.87	0.029	0.034
E	22.00	22.40	0.866	0.882
F	25.10	25.50	0.988	1.004
G	31.50	31.70	1.240	1.248
H	4.00		1.57	
I	4.10	4.30	0.161	0.169
J	2.50	2.60	0.098	1.103
K	14.90	15.10	0.580	0.595
L	30.10	30.30	1.185	1.193
M	37.80	38.20	1.488	1.504
N	4.10	4.30	0.161	0.169
O	7.80	8.20	0.307	0.323
P	6.20	6.40	0.244	0.252

METALLIC

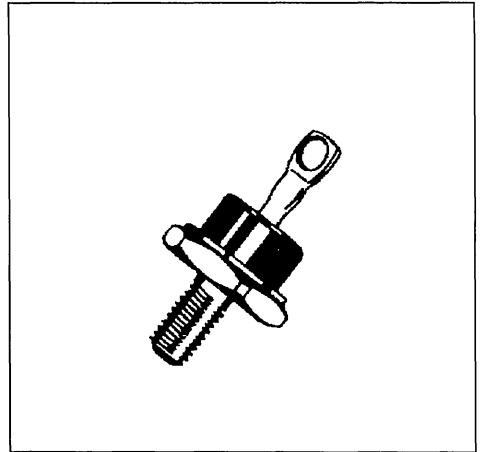


REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	10.72		11.50	0.422		0.453
B	2.00		4.40	0.079		0.0173
C			6.35			0.25
D	1.53			0.060		
E			10.76			0.424
F			10.28			0.405
H			20.32			0.800

Weight = 5.1g
 Marking : Cathode connected to case : type number
 Cooling method : by convection (method C)
 Anode connected to case : type number + suffix R
 (consult us for these reserve version datasheets)
 Recommended torque value : 1.8 m.N
 Maximum torque value : 2.2 m.N



METALLIC



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	10.72		12.70	0.422		0.500
B	2.93		5.08	0.115		0.200
C			9.52			0.375
D	3.56		4.44	0.140		0.175
E			16.94			0.667
F			12.70			0.500
H			25.40			1

Weight = 18.84g

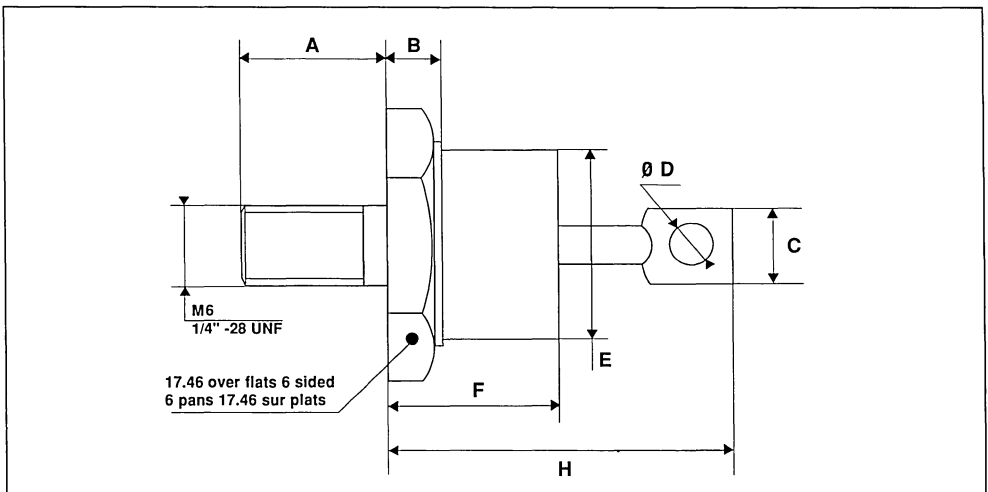
Marking : Cathode connected to case : type number

Cooling method : by convection (method C)

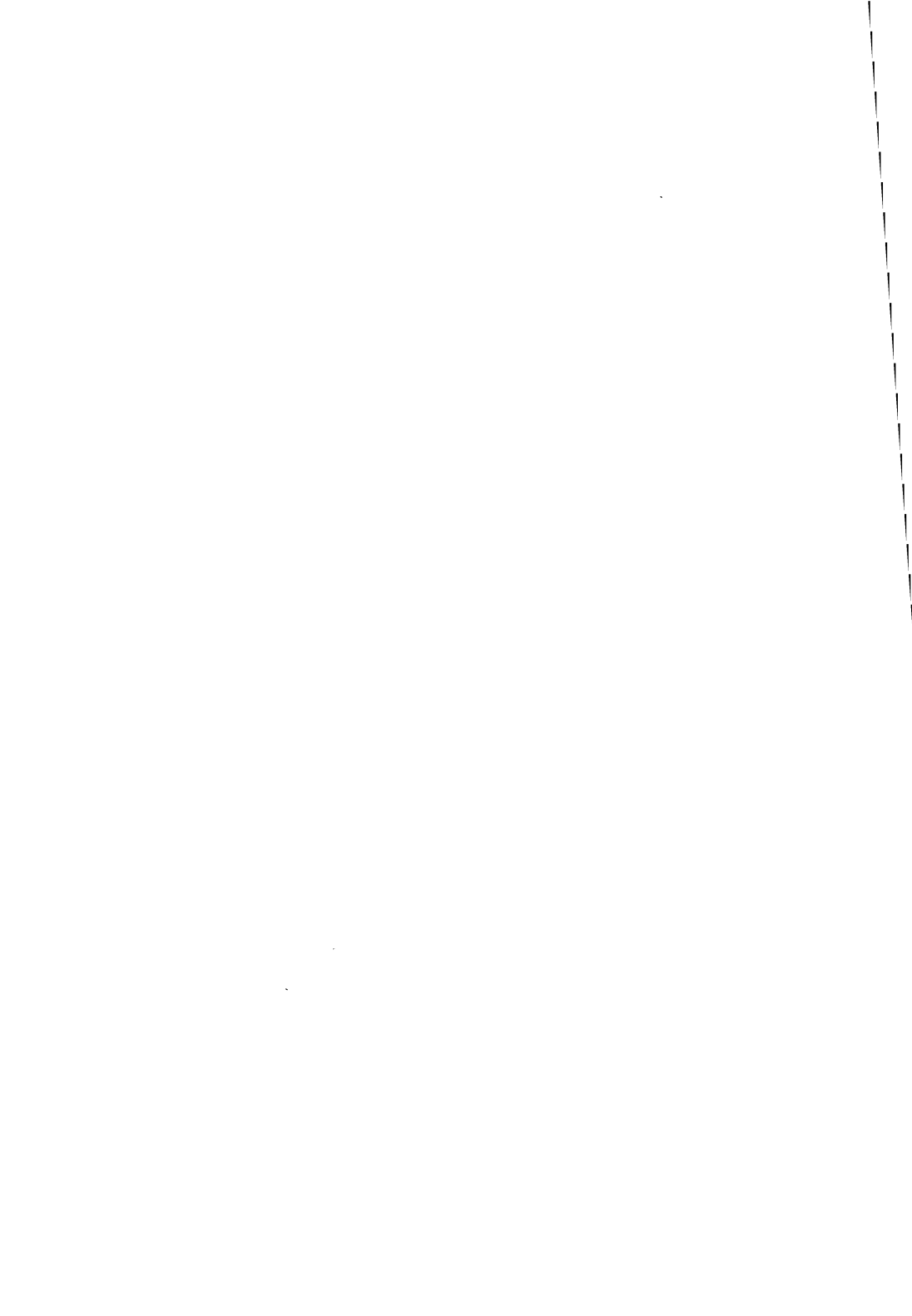
Anode connected to case : type number + suffix R
 (consult us for these reserve version datasheets)

Recommended torque value : 2.5 m.N

Maximum torque value : 3.1 m.N



PowerSO-10™



SOLDERING RECOMMENDATION

The soldering process causes considerable thermal stress to a semiconductor component. This has to be minimized to assure a reliable and extended lifetime of the device. The PowerSO-10 package can be exposed to a maximum temperature of 260°C for 10 seconds. However a proper soldering of the package could be done at 215°C for 3 seconds. Any solder temperature profile should be within these limits. As reflow techniques are most common in surface mounting, typical heating profiles are given in Figure 1, either for mounting on FR4 or on metal-backed boards. For each particular board, the appropriate heat profile has to be adjusted experimentally. The present proposal is just a starting point. In any case, the following precautions have to be considered :

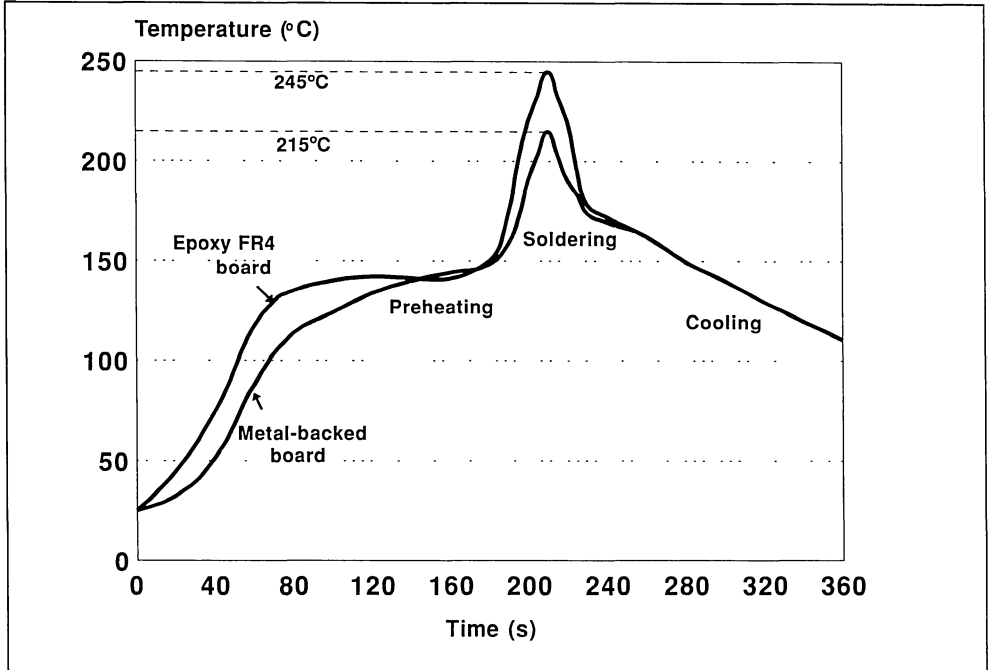
- always preheat the device
- peak temperature should be at least 30 °C higher than the melting point of the solder alloy chosen
- thermal capacity of the base substrate

Voids pose a difficult reliability problem for large surface mount devices. Such voids under the package result in poor thermal contact and the

high thermal resistance leads to component failures. The PowerSO-10 is designed from scratch to be solely a surface mount package, hence symmetry in the x- and y-axis gives the package excellent weight balance. Moreover, the PowerSO-10 offers the unique possibility to control easily the flatness and quality of the soldering process. Both the top and the bottom soldered edges of the package are accessible for visual inspection (soldering meniscus).

Coplanarity between the substrate and the package can be easily verified. The quality of the solder joints is very important for two reasons : (I) poor quality solder joints result directly in poor reliability and (II) solder thickness affects the thermal resistance significantly. Thus a tight control of this parameter results in thermally efficient and reliable solder joints.

Fig 1 : Typical reflow soldering heat profile



SUBSTRATES AND MOUNTING INFORMATION

The use of epoxy FR4 boards is quite common for surface mounting techniques, however, their poor thermal conduction compromises the otherwise outstanding thermal performance of the PowerSO-10. Some methods to overcome this limitation are discussed below.

One possibility to improve the thermal conduction is the use of large heat spreader areas at the copper layer of the PC board. This leads to a reduction of thermal resistance to 35 °C for 6 cm² of the board heatsink (see fig. 2).

Use of copper-filled through holes on conventional FR4 techniques will increase the metallization and decrease thermal resistance accordingly. Using a configuration with 16 holes under the spreader of the package with a pitch of 1.8 mm and a diameter of 0.7 mm, the thermal resistance (junction - heatsink) can be reduced to 12°C/W (see fig. 3). Beside the thermal advantage, this solution allows multi-layer boards to be used. However, a drawback of this traditional material prevent its use in very high power, high current circuits. For instance, it is not advisable to surface mount devices with currents greater than 10 A on FR4 boards. A Power Mosfet or Schottky diode in a surface mount power package can handle up to around 50 A if better substrates are used.

A new technology available today is IMS - an Insulated Metallic Substrate. This offers greatly enhanced thermal characteristics for surface mount components. IMS is a substrate consisting of three different layers, (I) the base material which is available as an aluminium or a copper plate, (II) a thermal conductive dielectrical layer and (III) a copper foil, which can be etched as a circuit layer. Using this material a thermal resistance of 8°C/W with 40 cm² of board floating in air is achievable (see fig. 4). If even higher power is to be dissipated an external heatsink could be applied which leads to an $R_{th(j-a)}$ of 3.5°C/W (see Fig. 5), assuming that R_{th} (heatsink-air) is equal to R_{th} (junction-heatsink). This is commonly applied in practice, leading to reasonable heatsink dimensions. Often power devices are defined by considering the maximum junction temperature of the device. In practice, however, this is far from being exploited. A summary of various power management capabilities is made in table 1 based on a reasonable delta T of 70°C junction to air.

Fig 2 : Mounting on epoxy FR4 head dissipation by extending the area of the copper layer

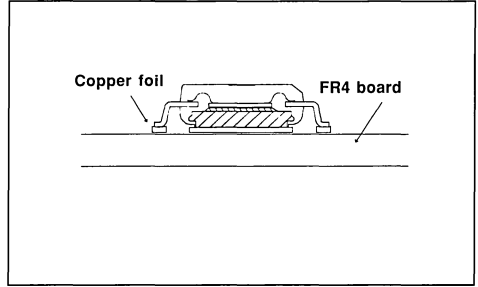


Fig 3 : Mounting on epoxy FR4 by using copper-filled through holes for heat transfer

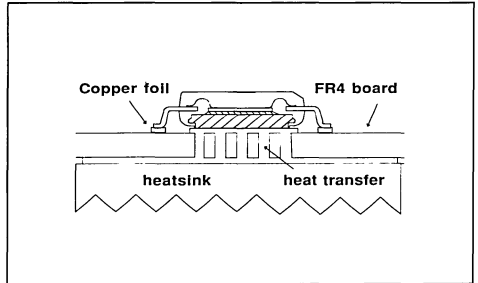


Fig 4 : Mounting on metal backed board

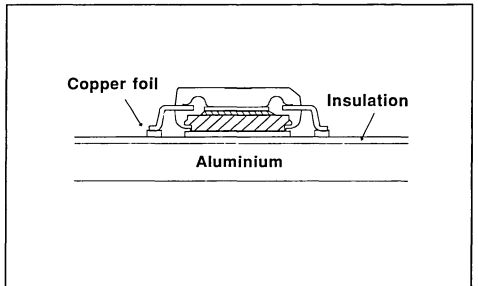
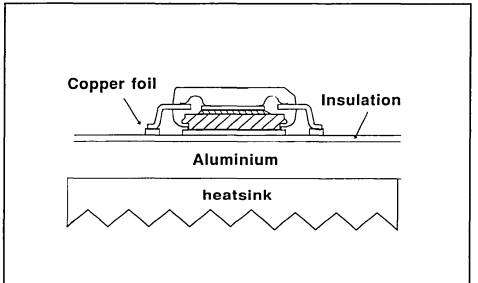


Fig 5 : Mounting on metal backed board with an external heatsink applied



SUBSTRATES AND MOUNTING INFORMATION

(cont'd)

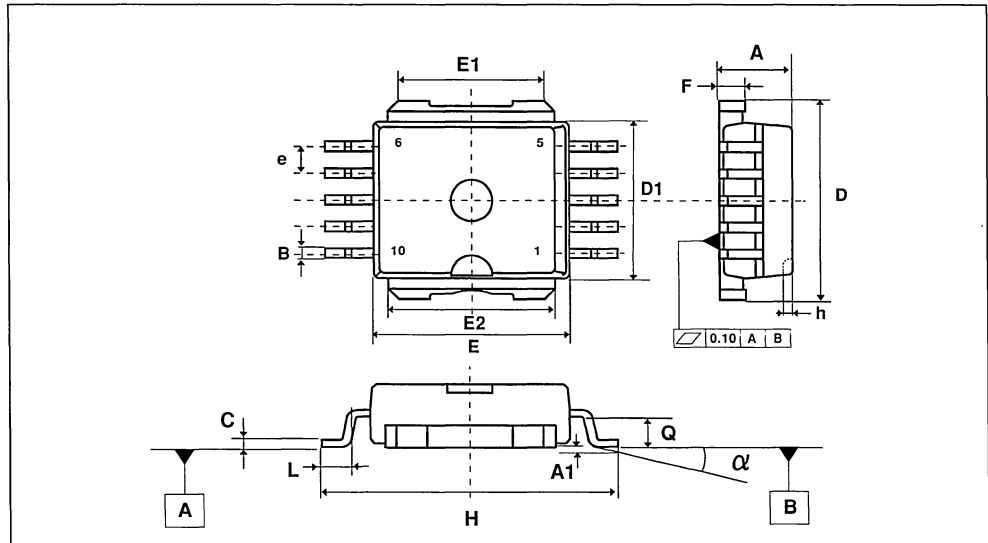
The PowerSO-10 concept also represents an attractive alternative to C.O.B. techniques. PowerSO-10 offers devices fully tested at low and high temperature. Mounting is simple - only

conventional SMT is required - enabling the users to get rid of bond wire problems and the problem to control the high temperature soft soldering as well. An optimized thermal management is guaranteed through PowerSO-10 as the power chips must in any case be mounted on heat spreaders before being mounted onto the substrate.

TABLE 1

PowerSo-10 package mounted on	R _{th} (j-a)	P Diss
1.FR4 using the recommended pad-layout	50 °C/W	1.5 W
2.FR4 with heatsink on board (6cm ²)	35 °C/W	2.0 W
3.FR4 with copper-filled through holes and external heatsink applied	12 °C/W	5.8 W
4. IMS floating in air (40 cm ²)	8 °C/W	8.8 W
5. IMS with external heatsink applied	3.5 °C/W	20 W

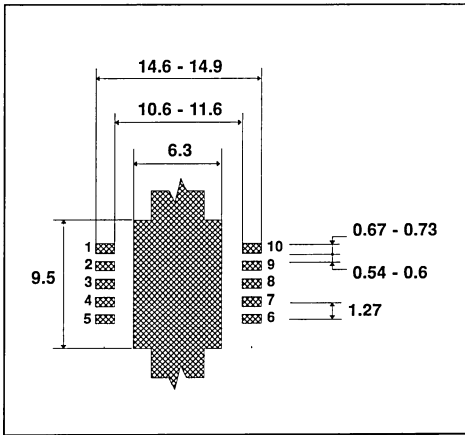
PACKAGE MECHANICAL DATA



DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.35		3.65	0.132		0.144
A1			0.10			0.004
B	0.40		0.60	0.016		0.023
C	0.35		0.55	0.013		0.021
D	9.40		9.60	0.370		0.378
D1	7.40		7.60	0.290		0.300
E	9.30		9.50	0.366		0.374
E1		6.15			0.242	

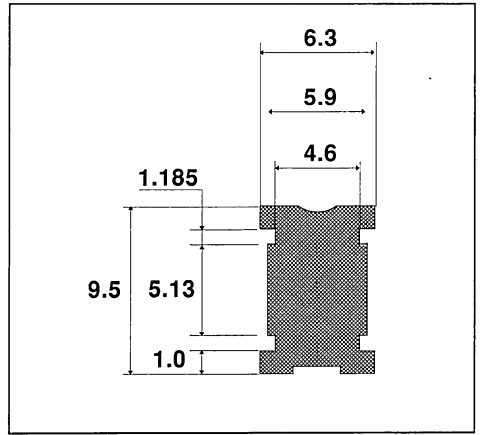
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
E2	7.20		7.40	0.283		0.290
e		1.27			0.05	
F	1.25		1.35	0.049		0.053
H	13.80		14.40	0.425		0.567
h		0.50			0.002	
L	0.80		1.30	0.031		0.050
Q		1.70			0.067	
alpha	0°		8°			

**FOOT PRINT
MOUNTING PAD LAYOUT
RECOMMENDED**



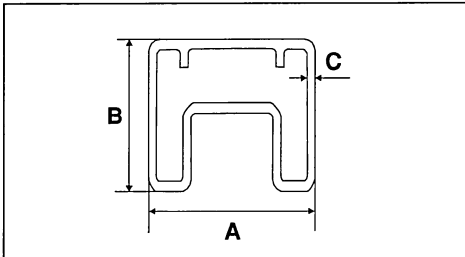
Dimensions in millimeters

HEADER SHAPE



Dimensions in millimeters

SHIPPING TUBE





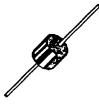






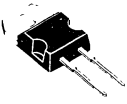
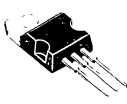
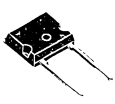
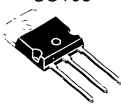
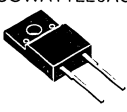
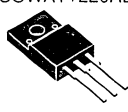
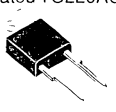
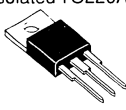
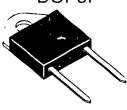
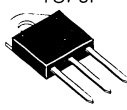
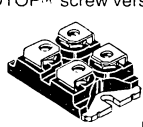





	DIMENSIONS (mm)
	TYP
A	18
B	12
C	0,8
Length tube	532
Quantity per tube	50

Surface mount film taping : contact sales office

PACKAGING INFORMATION

RECTIFIERS AND SCHOTTKY DIODES PACKAGING

For the following packages :	DO35  P 2 17 3 17	DO41  P 3 17	F126  P 4 17
	DO27A  P 5 17	AG  P 5 17	MINIMELF  P 6 17
SOT23  P 7 17	SOT223  P 8 17	SOD6  P 9 17	SOD15  P 9 17
PowerSO-10™  P 10 17	TO220AC  P 11 17	TO220AB  P 11 17	SOD93  P 12 17
SOT93  P 12 17	ISOWATT220AC  P 13 17	ISOWATT220AB  P 13 17	Isolated TO220AC  P 14 17
Isolated TO220AB  P 14 17	DOP3I  P 15 17	TOP3I  P 15 17	ISOTOP® screw version  P 16 17
ISOTOP® fast-on version  P 16 17	DO4  P 17 17	DO5  P 17 17	

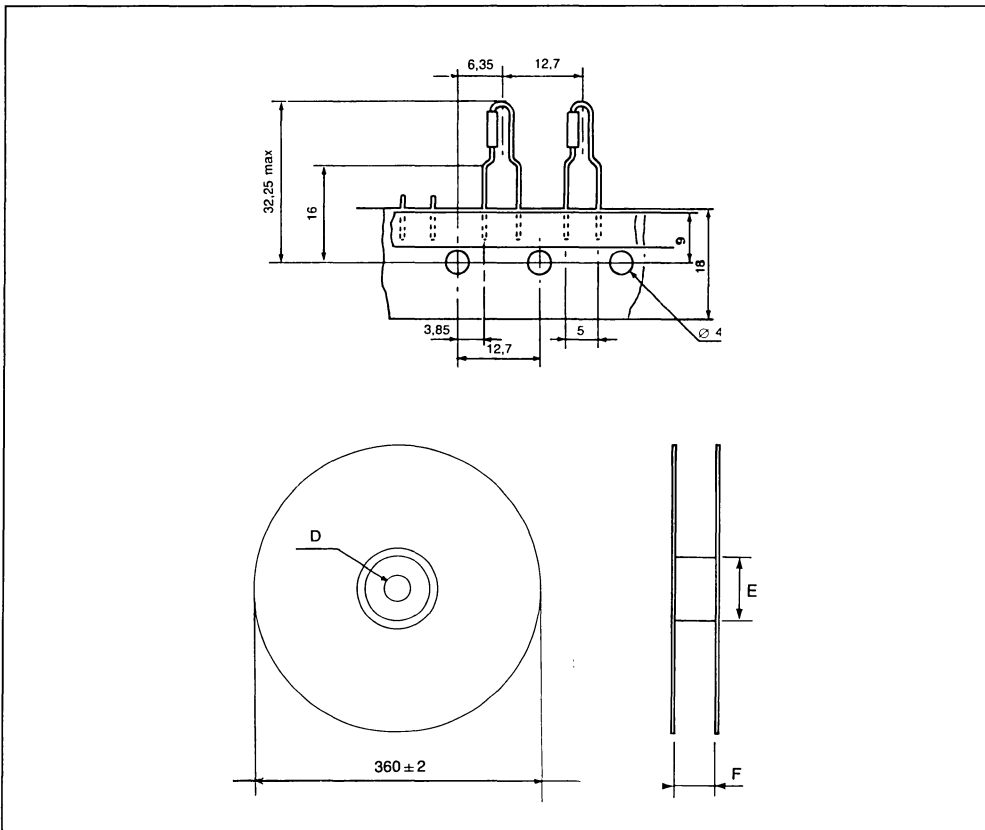
PACKAGING

AXIAL

RADIAL TAPING

Suffixes	Base Qty	Reel dimensions		
		D	E	F
ARX AZX	400 350	30	80	40

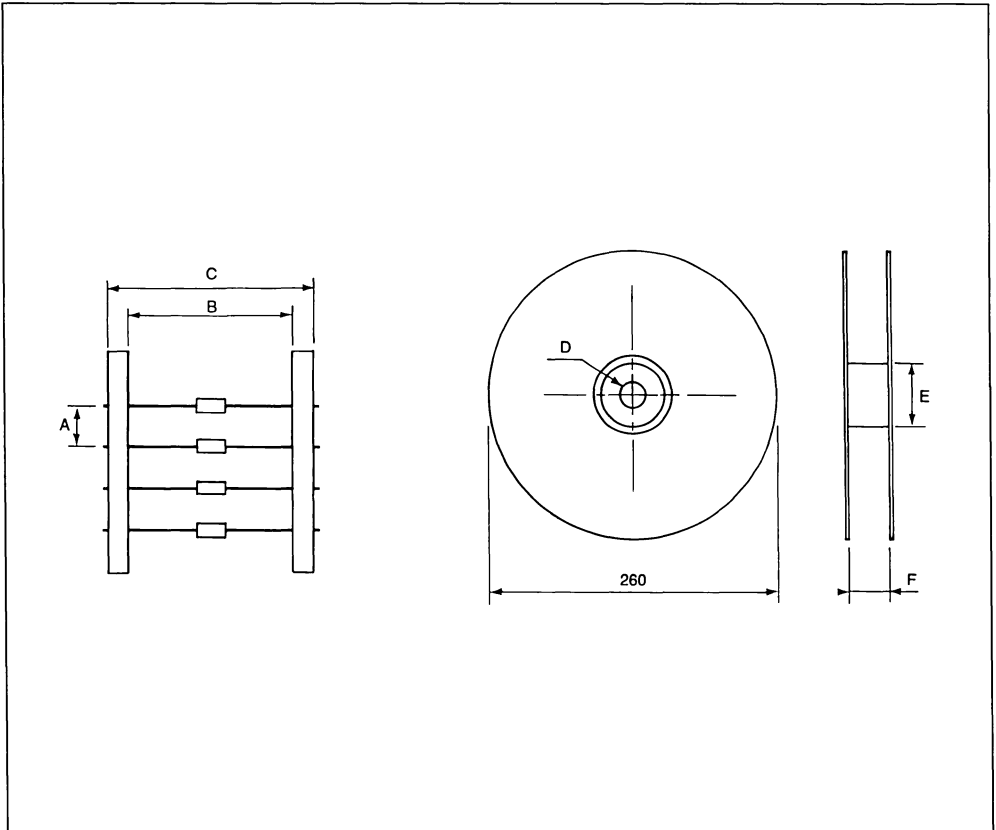
Note : Sizes are given in millimeters



PACKAGING
AXIAL
RADIAL TAPING

Case	Suffixes	Base Qty	Component spacing A	Tape spacing		Reel dimensions		
				B	C	D	E	F
DO35	-	5000	5 ± 0.5	53 ± 2	65 ± 2	20	40	70
DO35	B2	5000	5 ± 0.5	26 ± 2	65 ± 2	20	40	70
DO41	-	3000	5 ± 0.5	53 ± 2	65 ± 2	20	40	70

Note : Sizes are given in millimeters

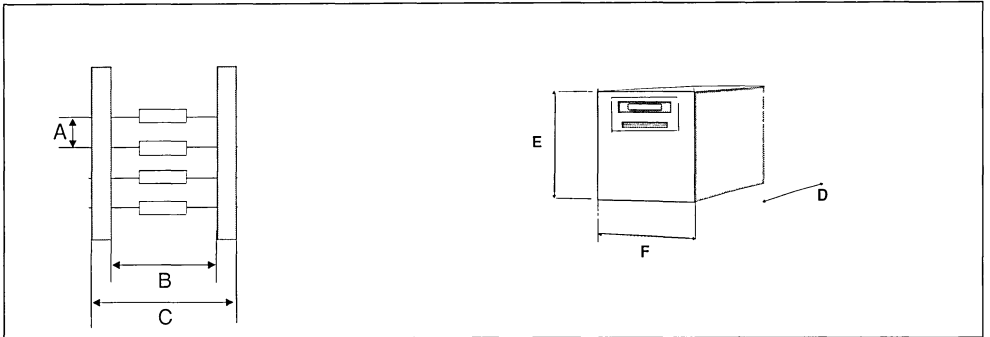


Note: All polarized components must be oriented in one direction
 The Cathode lead lape shall be red, and the anode tape shall be white.

PACKAGING
AXIAL
FAN FOLD BOX PACKAGING

Base Qty	Component spacing A	Tape spacing		Reel dimensions		
		B	C	D	E	F
6000	5 ± 0.5	58 ± 2	65 ± 2	255	85	82

All dimensions are in millimeters

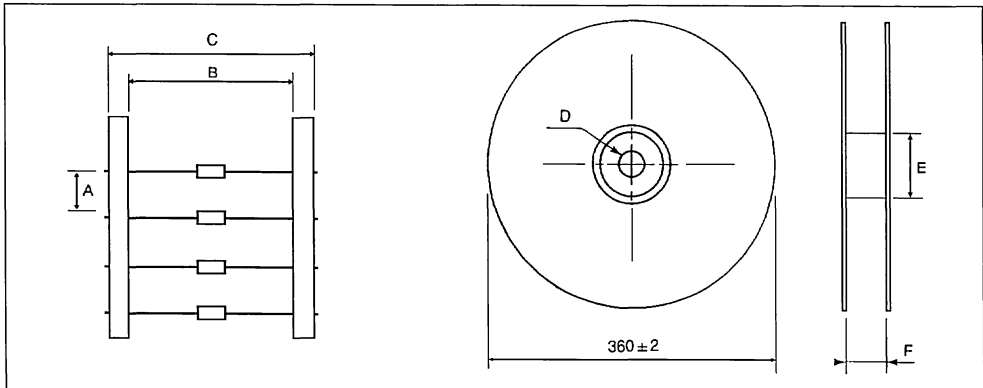


Note : All polarised components are oriented with their cathode tape coloured red and their anode tape white. Unpolarised components have both tapes coloured red.

PACKAGING
AXIAL
TAPE AND REEL PACKAGING

Case	Base Qty	Component spacing	Tape spacing		Reel dimensions		
		A	B	C	D	E	F
DO27A	1900	5 ± 0.5	53 ± 2	65 ± 2	31.5	86	75min
AG	1000	10 ± 0.5	43 ± 2	55 ± 2	31.5	86	75min

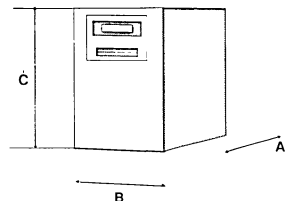
All dimensions are in millimeters



Note : All polarised components are oriented with their cathode tape coloured red and their anode tape white. Unpolarised components have both tapes coloured red.

MATCHBOX PACKAGING

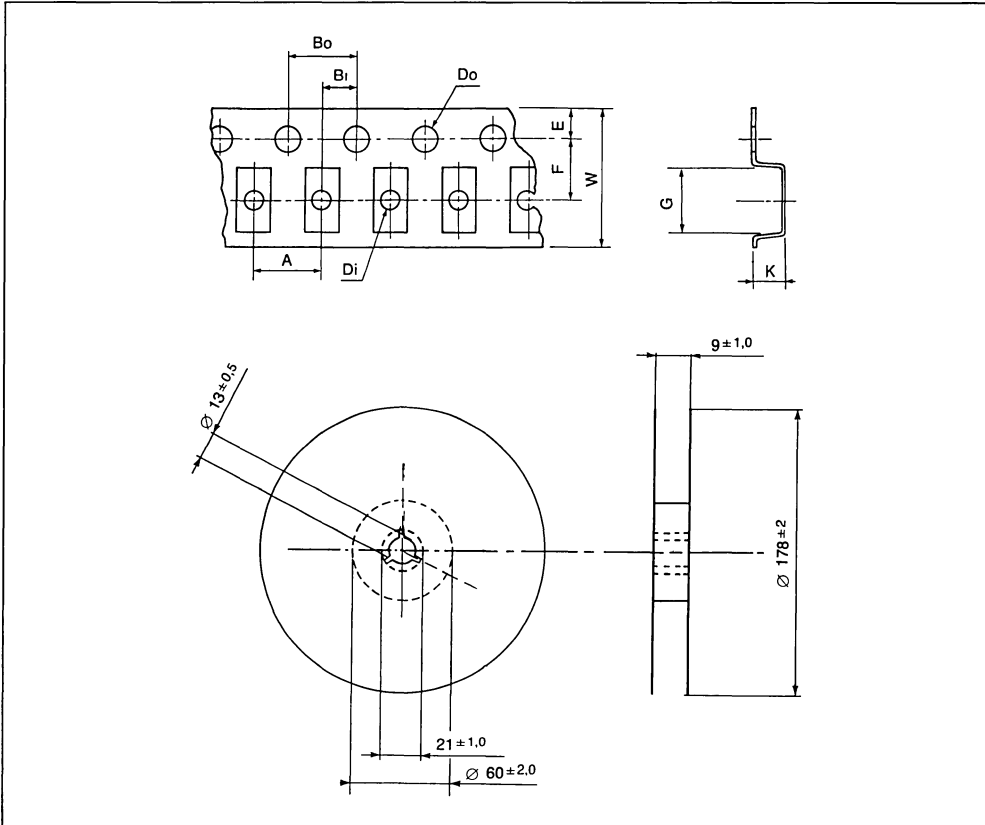
Case	Base Qty	box dimensions		
		A	B	C
DO27A	600	149	62	80
AG	100	149	62	80



PACKAGING
SMD
SURFACE MOUNT

Case	Base Qty	Component spacing A	Holes spacing		Holes diameter		Holes Position		Compartment dimension G	Compartment depth K	Tape width W
			Bo	Bi	Do	Di	E	F			
MINIMELF	2500	4 ± 0.1	4 ± 0.1	2 ± 0.1	1.5	1.0	1.75	3.5	3.8	2.05	8
MELF	1500	4 ± 0.1	4 ± 0.1	2 ± 0.1	1.5	1.5	1.75	3.5	5.3	2.90	12

All dimensions are in millimeters



All Polarised components have Cathode lead oriented towards the perforated side of the film.

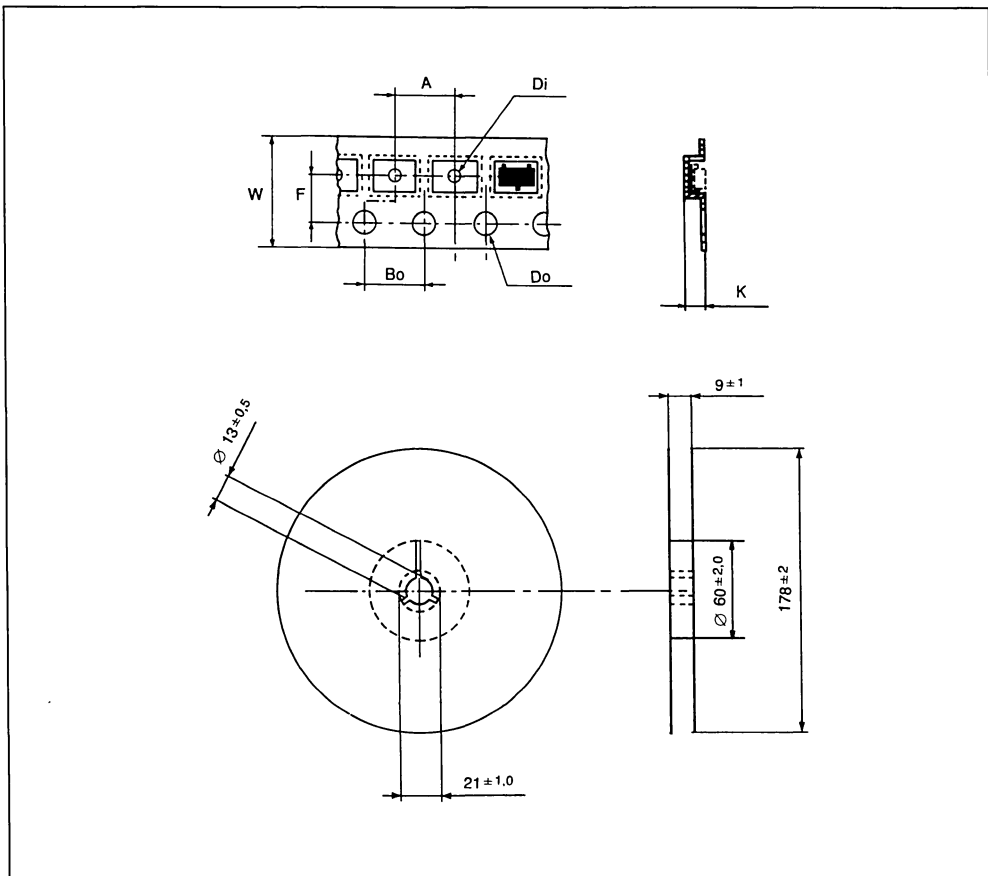
PACKAGING

SMD

SURFACE MOUNT

Base Qty	Component spacing A	Holes spacing Bo	Holes diameter		Holes Position F	Compartment depth K	Tape width W
			Do	Di			
3000	4 ± 0.1	4 ± 0.1	1.5	1.0	3.5	1.55	8

All dimensions are in millimeters

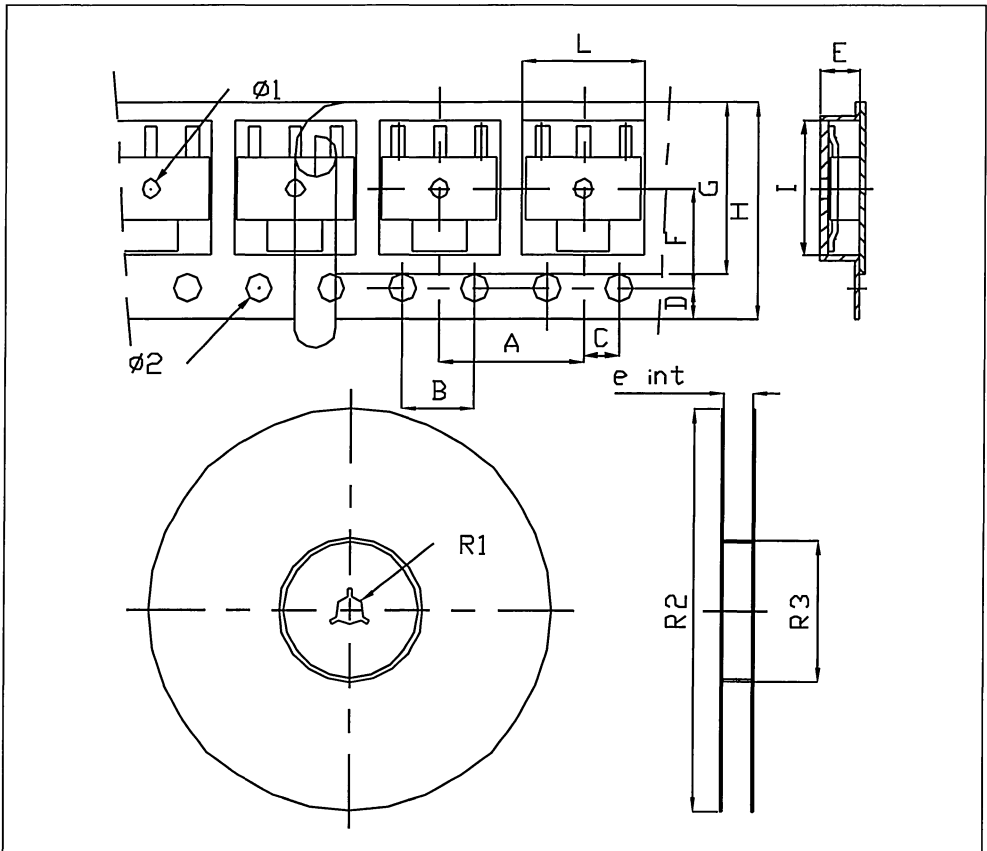


PACKAGING

SMD

SURFACE MOUNT

Base Qty	mm	Reel dimensions															
		A	B	C	D	E	e int	F	G	H	L	I	R1	R2	R3	Ø1	Ø2
1000	min	7.9	3.9	1.95	1.65	-	-	5.45	-	11.8	6.65	7.4				1.6	1.5
	typ	-	-	-	-	-	-	-	-	-	-	13	178	90	-	-	
	max	8.1	4.1	2.05	1.85	2.2	13	5.55	9.5	12.2	6.85	7.6				1.8	1.6



PACKAGING

SMD

TAPE AND REEL PACKAGING

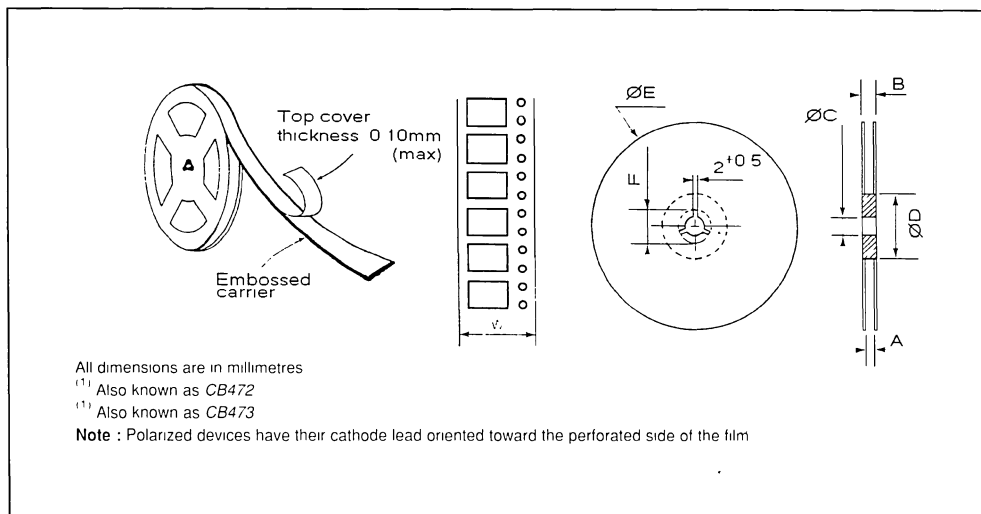
Case	Base Qty	Film width W	Reel dimensions					
			A	B	C	D	E	F
SOD6 ⁽¹⁾	2500	12 ± 0.2	12.4 ± 2	18.4max	13	60 ± 2	330	20.2
SOD15 ⁽²⁾	2500	16 ± 0.2	16.4 ± 2	22.4max	13	60 ± 2	330	20.2

All dimensions are in millimeters

(1) Also known as CB472

(2) Also known as CB473

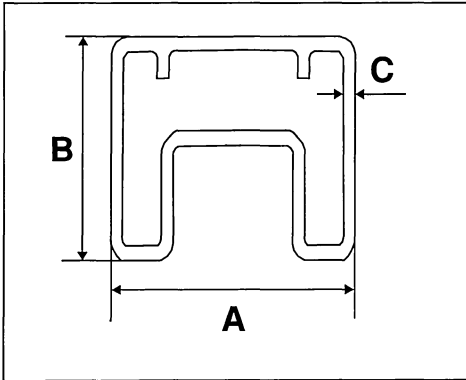
Note : Polarized devices have their cathode lead oriented towards the perforated side of the film



PACKAGING

SMD

SHIPPING TUPE



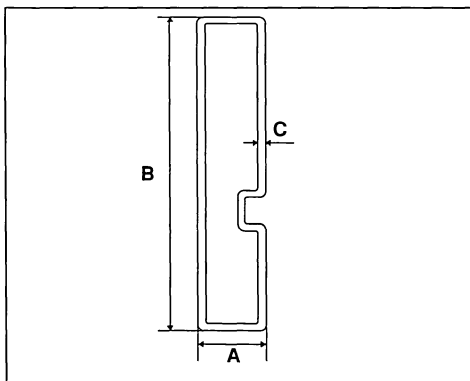
	Dimensions (mm)
	TYP
A	18
B	12
C	0.8
Tube length	532
Quantity per tube	50

Surface mount film taping : contact sales office

PACKAGING

PLASTIC

SHIPPING TUPE

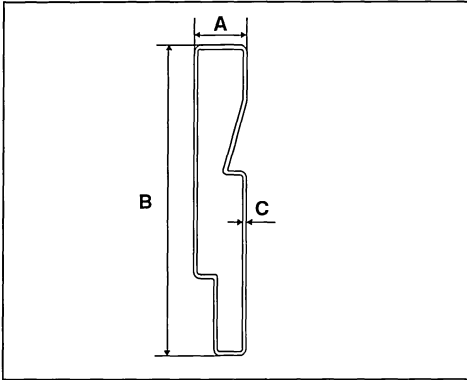


	Dimensions (mm)
	TYP
A	7
B	33
C	0.75
Tube length	532
Quantity per tube	50

PACKAGING

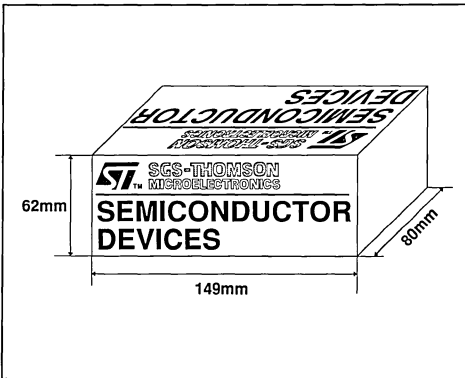
PLASTIC

SHIPPING TUPE



	Dimensions (mm)
	TYP
A	7.4
B	40.5
C	0.5
Tube length	532
Quantity per tube	30

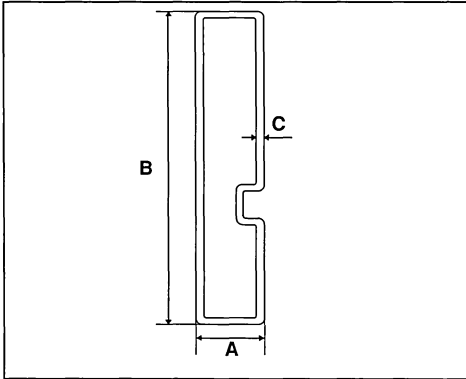
SHIPPING BOX



PACKAGING

ISOLATED PLASTIC

SHIPPING TUPE

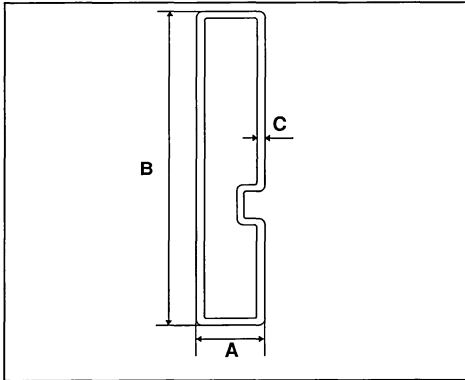


	Dimensions (mm)
	TYP
A	7
B	33
C	0.75
Tube length	532
Quantity per tube	50

PACKAGING

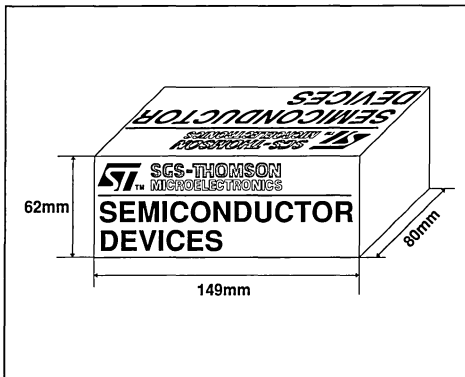
ISOLATED PLASTIC

SHIPPING TUPE



	Dimensions (mm)
	TYP
A	7
B	33
C	0.75
Tube length	532
Quantity per tube	50

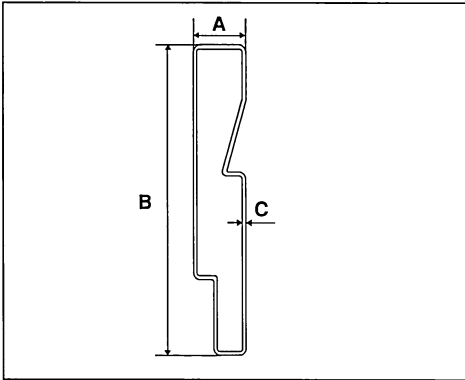
SHIPPING BOX



PACKAGING

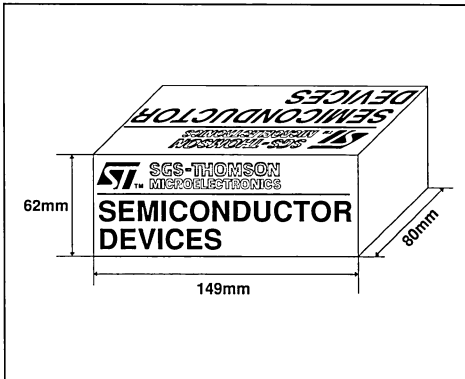
ISOLATED PLASTIC

SHIPPING TUPE



	Dimensions (mm)
	TYP
A	7.4
B	40.5
C	0.5
Tube length	532
Quantity per tube	30

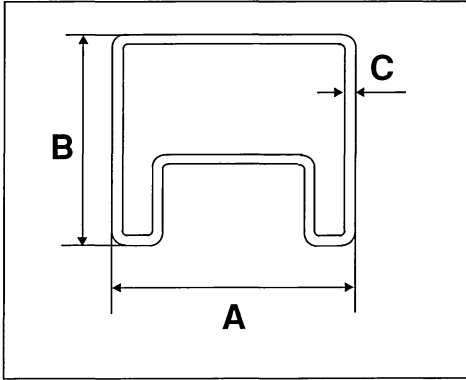
SHIPPING BOX



PACKAGING

ISOLATED PLASTIC

SHIPPING TUPE

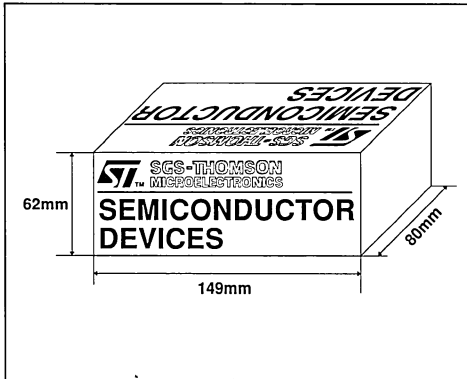


	Dimensions (mm)
	TYP
A	29
B	25
C	1.25
Tube length	532
Quantity per tube	10

PACKAGING

METALLIC

SHIPPING BOX



	Base Qty
DO4	100
DO5	50

QUALITY AND RELIABILITY

QUALITY AND RELIABILITY

1. INTRODUCTION :

Using its technological know-how in the field and its historical position of leader, SGS-THOMSON will extend its product portfolio through new technologies and packages. This strategy will closely associate product performance and high reliability.

All of our working methods meet these requirements and result from an awareness at all levels of the necessity to design and product quality. In particular, a training along these lines is systematically given to our personnel.

The effort to strengthen our quality culture has put a new emphasis on the application of S.P.C. (Statistical Process control) techniques. In addition to this, technical improvements are done regularly. All these actions have been taken as a result of our continuous drive for progress, a theme we rely on to remain the leader.

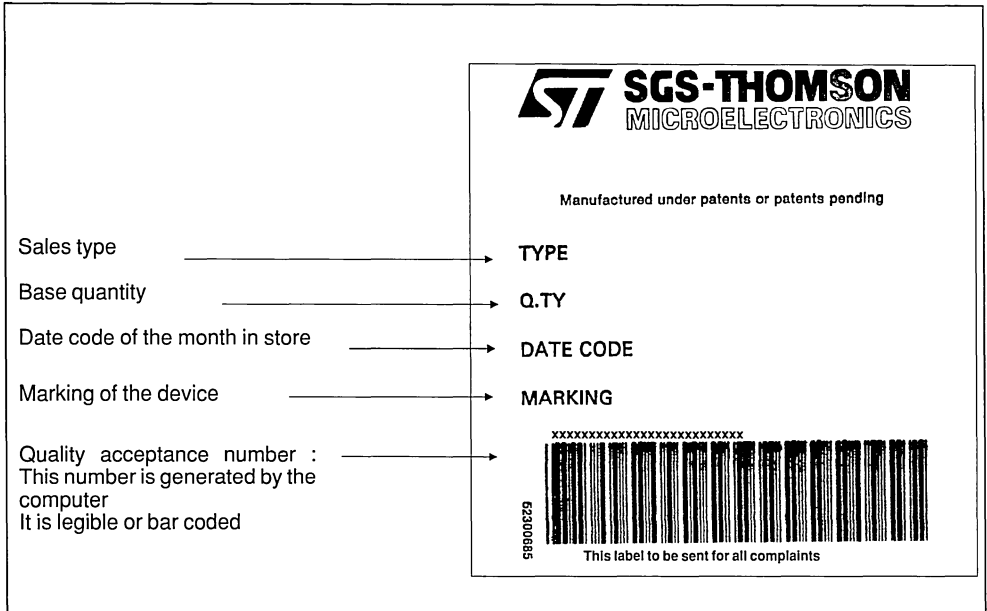
2. BAR CODE AND TRACEABILITY :

Bar Code

The bar code system applied to the shipments has the main following objectives :

- * To reduce shipment errors to zero defect by avoiding human errors.
- * To read, with a QA number key, the quantity shipped or remaining in the store. When the pieces have been shipped, the computer indicates to which customer they have been sent.

With the QA number (refer to drawing), full process traceability is provided : IN / OUT dates at diffusion, assembly, test as well as location. In addition shipment date and shipment number are provided.



The label is stuck on each boxe (qty per box = base qty).

3. QUALITY BY DESIGN :

3.1 QUALIFICATION OF A NEW PRODUCT :

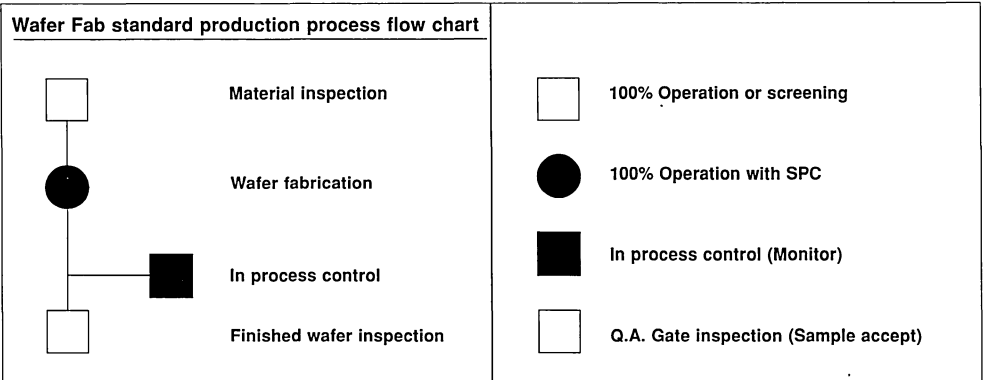
- * Requested for all new products.
- * Qualification plan according to internal specification.
- * Main documents requested are :
 - . Design rules manual
 - . Development report
 - . Characterization report on 3 manufacturing lots
 - . Reliability report on 3 manufacturing lots
 - . Product Specifications
- * Requested internal approvals are :
 - . Originator
 - . Product manager
 - . Division QA manager

3.2 QUALIFICATION FOR A CHANGE OF TECHNOLOGY :

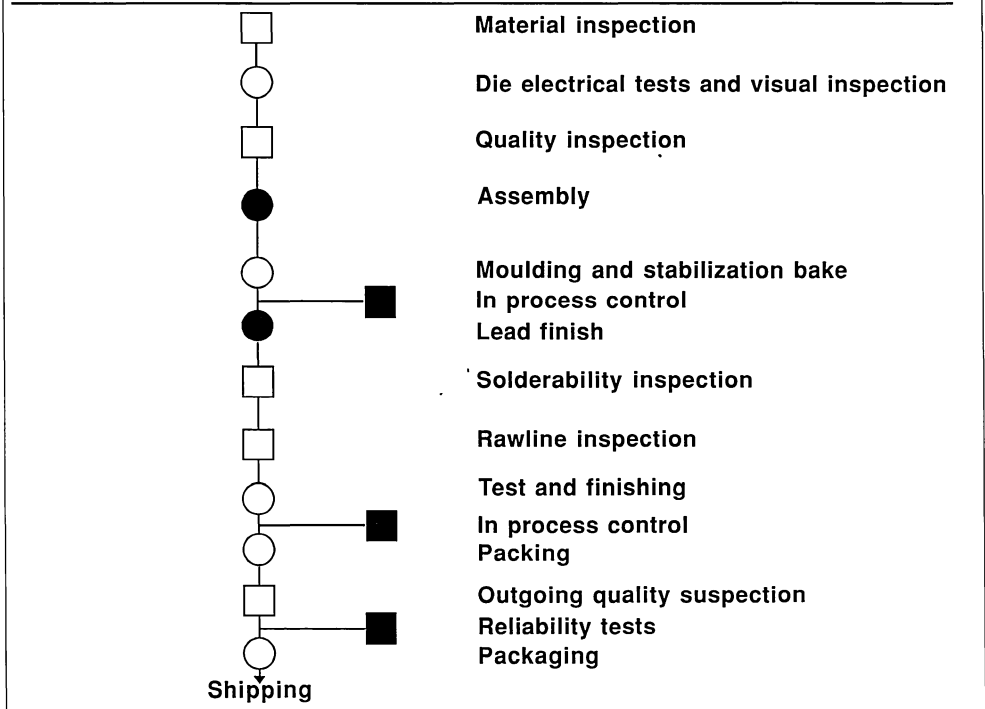
- * Requested for :
 - . All major new processes (either wafer fab and assembly).
 - . Critical change of process step.
 - . Change of manufacturing location.
- * Qualification plan according to internal specification.
- * Main documents requested are :
 - . Characterization report on 3 manufacturing lots.
 - . Reliability report on 3 manufacturing lots.
 - . Manufacturing specifications.
 - . Failure mode defect analysis or criticality analysis .
 - . Provisions for traceability.
- * Requested internal approvals are :
 - . Originator
 - . Product Manager
 - . Division QA Manager
- * Technology change notification to customers.

4 QUALITY ASSURANCE ORGANIZATION :

4.1 IN PROCESS CONTROL FLOW CHART :



Assembly standard production process Flow chart



4.2 OUTGOING QUALITY INSPECTION :

All product is submitted to the outgoing QC inspection.

All rejected lots should be 100% rescreened and resubmitted to the OQI.

Parameters	Minimum sample size	acceptance number
Visual and mechanical inspection	315	0
cumulative electrical and inoperative mechanical failures	315	0

4.3 RELIABILITY ASSURANCE :

**ABSTRACT OF SURE 6.
RELIABILITY ASSURANCE.**

The reliability approach : In a customer's finished product, semiconductor devices must work normally in a stable manner under the given operational conditions throughout the specified life of the product.

SGS-THOMSON, therefore, exercises meticulous care in the design and manufacturing stages and studies the various factors that affect the reliability of semiconductors such as operational and environmental conditions.

Reliability testing :

Reliability testing is an ongoing process adopted to identify and then improve reliability performance.

Accelerated tests are an important tool for evaluating long term reliability and stability of process and product parameters.

SGS-THOMSON performs rigorous tests throughout production to ensure that production devices have the properly designed reliability.

Two major actions are developed to monitor reliability performances :

- . Real time control (RTC tests)
- . Periodical reliability tests.

4.3.1 REAL TIME CONTROL (RTC TEST) :

This program requires the assembly plants to perform sampling of the manufacturing flow (after OQI acceptance) every week, on each technological family.

The tests are performed on assembly plants. Corrective actions have to be taken by the local Q and R department when the failures exceed the target, and in a second time, if failures are confirmed, information is sent to the Q and R division in order to receive instructions.

4.3.2 PERIODICAL RELIABILITY TEST :

On each technological family, for data acquisition and quality monitoring, SGS-THOMSON performs long term reliability tests by periodical sampling after OQI acceptance.

These tests are performed either on assembly location or on Q.A. Division.

4.3.2.1 TEST SELECTION GUIDELINES

Specific emphasis is put on electrical, thermomechanical and environmental tests which are intended to accelerate failure mechanisms in order to define the limits of the products when they are submitted to industrial conditions.

The tests performed are split into 2 main families called die- oriented tests and package-oriented tests.

The tests are selected according to the knowledge of the application conditions of the products, the failure mode effect analysis performed at design / development, and to the history of the manufacturing process.

An intermediate family (die and package-oriented tests) is also described.

The attached sheets provide the relevant information on applicable tests, international standards, failure point, failure process, acceleration factors, usual failure rate as well as acceptance numbers.

4.3.2.2 ABBREVIATIONS AND MEANINGS

Failure : Any device which does not comply to its specification

Failure point : Physical localization of failure

Failure process : Physical or chemical or other mechanism resulting in a failure.

F I T : Failure unit ; 1 fit = 1 failure in 10⁹ devices - Hours.

Failure rate : Also called "Lambda - λ" ; it is the incremental change in the number of failures per associated incremental change in time. Failure rate is expressed in fits.

Nota : MTBF (Mean Time Between Failure) = 1/λ.

Currently "λ" is provided in the useful life of device (constant λ ; exponential modelization of the population reliability :

$$R(t) = N(t) = e^{-\lambda t}$$

$$N(t_0)$$

Accelerating factor : The physical or chemical factor increasing the failure rate.

Confidence

level : A 60 % confidence level means there is 60 % possibility that the sample came from a population whose failure rate does not exceed the given failure rate.

Ea : Activation energy (eV : electron volt). Activation energy is introduced for example in the Arrhenius law - It is representative of the failure mechanism involved.
Ex : 1eV is used to modelize failure rate when surface charges are involved.

4.3.3.1 DIE ORIENTED TESTS

Test description	Failure point	Failure process	accelerating factors/ activ. energy	Usual samples size & acceptance number
High temperature storage (HST) MIL STD 750C -1032 1000Hrs - Ta=150°C	Metallization	Contact degradation Intermetallic growth	Temperature : 0.8eV Temperature : 0.8eV	45/0
High temperature reverse bias (HTRB) MIL STD 750C -1038 1000Hrs Ta = 110 /150°C	Passivation layers and silicon interfaces	Surface charges accumulation	Temp./elec field 1.0eV	45/0
Steady state life test (OLT) MIL STD 750C -1026	active area and mechanical interfaces	Charges accumulation / thermal runaway	Tj, J (current density)	45/0
Electrostatic discharges(ESD) MIL STD 750C -1020	silicon volume (active area)	Poor design and die process	Vpeak amplitude	22/0

4.3.3.2 DIE AND PACKAGE ORIENTED TESTS

Test description	Failure point	Failure process	accelerating factors/ activ. energy	Usual samples size & acceptance number
Intermittent life test MIL STD 750C -1037 thermal fatigue	Mechanical interfaces	Fatigue	Temperature variation Tj	22/0
Repetitives surges Ipp-100S and 1000S	Silicon volume and die attach	Silicon structure anomaly	Surges amplitude and duration	20/0

4.3.3.3 PACKAGE ORIENTED TESTS (main tests)

Test description	Failure point	Failure process	accelerating factors/ activ. energy	Usual samples size & acceptance number
Humidity bias 85°C 85% 1000H - Vr as specified in the applicable devices specif (THB *	Die periphery passivation bonds; metallization	Poor hermeticity contamination corrosion	Humidity / temperature / voltage Ea = 0.8eV	45/0
Autoclave test 121°C 2 ATM / 168Hrs 100% RH (PCT)	die periphery passivation	Poor hermeticity contamination	Temperature pressure	22/0
Thermal cycling (TCT) -55°C/ + 150°C 100cy 1000cy	Die volume structure interfaces	Silicon / package thermal expansion coefficient mismatch	Temperature extremes in cycling	77/0
solderability MIL STD 750C - 2026 1H steam aging 245°C - 5s	Lead surface	Plating or dipping process material	Aging humidity / temperature	22/0

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