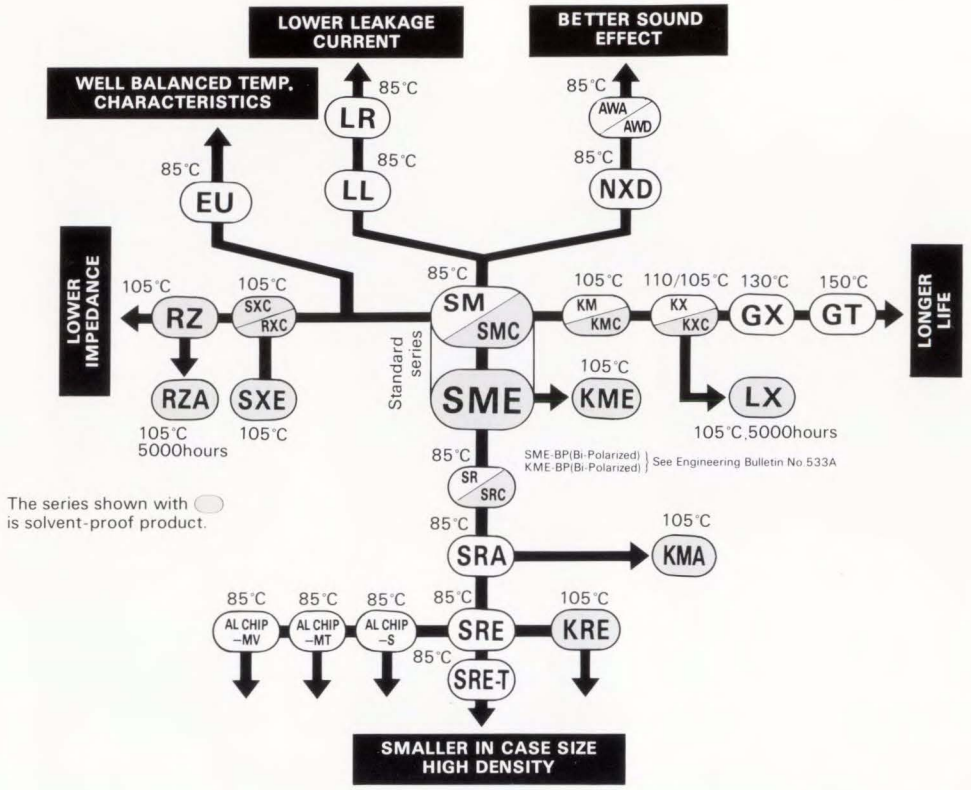
cat. **U60B**

UNITED CHEMI-CON

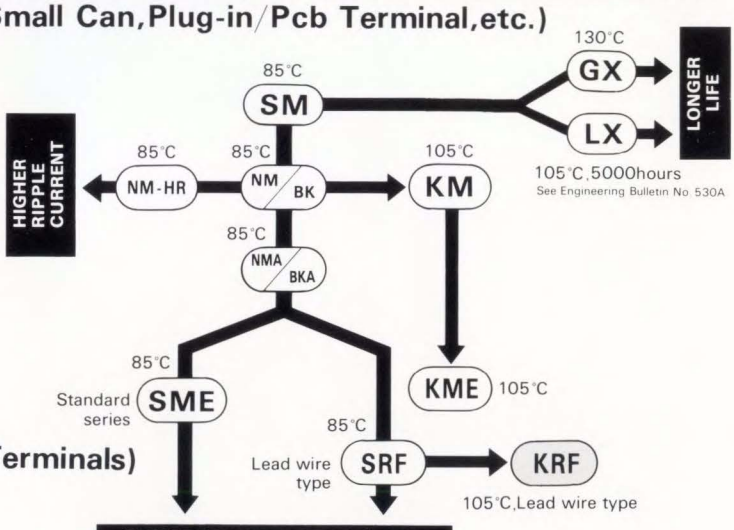
UNITED CHEMI-CON

- Aluminum Electrolytic Capacitors
- Tantalum Foil Electrolytic Capacitors
- OP/MP Capacitors
- Electret Condenser Microphone Units
- Precision Mechanical Parts
- Tone Arms
- Custom Thick Film Hybrid Circuits

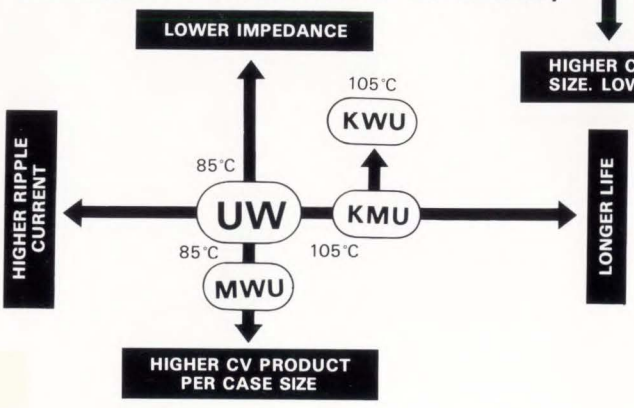
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS
(Radial and Axial Lead Types)



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS
(Small Can, Plug-in/Pcb Terminal, etc.)



(Computer Grade, Screw Terminals)



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Aluminum Electrolytic Capacitors

	Series	Features	General	Miniaturization	Long life	Low Impedance	Solvent-proof	Terminal type	Rated voltage range (VDC)	Capacitance range (μF)	
Miniature	SRE-T	Super Miniature, φ2x5.5ℓmm		O				Axial	4~50	0.47~4.7	11
	AL CHIP-S	Chip type		O				–	6.3~50	0.1~22	12
	AL CHIP-MT	Chip type		O				–	4~50	0.47~4.7	12
	AL CHIP-MV	Vertical type Chip		O				–	4~50	0.1~100	12
	FLS, FLK	Flat type		O	O	O		–	10~250	390~33,000	13
	SME	General, Miniature	O	O			O	Axial, Radial	6.3~250	0.47~22,000	15
	KME	General, Miniature (105°C)	O	O	O		O	Axial, Radial	6.3~250	0.47~22,000	15
	SM SMC	General	O				SMC O	Axial, Radial	6.3~450	0.47~10,000	18
	KM KMC	General (105°C)	O		O		KMC O	Axial, Radial	6.3~250	0.47~10,000	18
	SM-BP (D)	Bi-Polar, General	O					Axial, Radial	6.3~100	0.47~2,200	22
	SM-BP (P)	Bi-Polar, Crossover network	O					Axial, Radial	6.3~100	0.47~2,200	22
	BP (S)	Bi-Polar, Horizontal Deflection						Radial	25	2.2~10	23
	SRE	Miniature, Height 5mm		O				Radial	4~50	0.1~100	24
	KRE	Miniature, Height 5mm (105°)		O	O		O	Radial	4~50	0.1~100	24
	SRA	Miniature, Height 7mm		O				Radial	4~63	0.1~220	25
	KMA	Miniature, Height 7mm (105°)		O	O		O	Radial	4~63	0.1~220	25
	SR	Short length		O				Radial	6.3~50	0.1~3,300	27
	SRC	Short length		O			O	Radial	6.3~50	0.1~3,300	27
	LL	Low leakage						Radial	6.3~100	0.1~4,700	28
	LR	Low leakage, Epoxy end seal						Radial	6.3~50	0.1~100	28
	SXE	Low impedance, Miniature (105°C)		O	O	O	O	Radial	6.3~100	1.5~15,000	31
	SXC	Low impedance (105°C)			O	O	O	Radial	6.3~63	1~2,200	34
	RX, RXC	Low impedance (105°C)				O	O	Radial	10~100	2.2~1,000	36
	RZ	Low ESR (105°C)			O	O	O	Radial, 3 lead	7.5~250	15~16,500	38
	RZA	Low ESR, 5000 hrs life (105°C)			O	O	O	Radial, 3 lead	6.3~250	56~33,000	38
	LX	Long life, 5000 hrs life (105°C)			O		O	Radial	10~250	0.47~2,200	43
	GX	High reliability (130°C)			O			Axial, Radial	10~63	0.47~1,000	43
Large Sized	SM-VP	3 terminal, large CV value	O					3 lead radial	10~100	470~22,000	46
	KRF	Miniature, large CV (105°C)		O	O		O	Radial	10~250	68~39,000	47
	NMA	General		O				PCB terminal	10~400	82~15,000	50
	BKA	General, Low Profile		O				PCB terminal	10~400	82~15,000	50
	SME	General, Miniature	O	O				PCB terminal	10~400	82~22,000	50
	KME	General, Miniature	O	O	O			PCB terminal	10~400	39~47,000	54
	KM	General (105°C)						PCB terminal	10~400	47~33,000	54
	NM-HR	Miniature, High ripple		O				PCB terminal	160~250	100~1,000	54
	GX-VH	High reliability (130°C)		O	O			Radial	10~250	56~18,000	61
	UW	General	O					Screw	10~450	80~390,000	63
	MWU	Miniature		O				Screw	6~450	75~1,600,000	63
	KMU	High reliability (105°C)		O	O			Screw	10~400	220~390,000	63
	KWU	Low impedance (105°C)			O	O		Screw	10~100	1,000~100,000	63

RECOMMENDED SERIES FOR NEW DESIGNS

Series such as SL, SX, SXA, RX (not shown in this catalog) and RXC, NMA, BKA (shown in this catalog) are still being produced, however these series are being switched rapidly to the new type capacitors accordingly to the needs of the latest electronics market.
Today, Nippon Chemi-Con is producing many kinds of new series with better performance and higher reliability at drastically miniaturized case sizes with our advanced technologies.
Nippon Chemi-Con recommends customers to use the new series capacitors. By switching to Nippon Chemi-Con's new series, the sets will be able to further obtain an excellent performance.
The new series recommended for replacements are mostly as follows:

Series not shown in this catalog;

Series	Terminal type	Rated voltage range (V_{DC})	Capacitance range (μF)	New series to switch (Page)
SL	Axial Radial	6.3 to 100	0.47 to 10,000	SME (13)
SH	Radial	6.3 to 63	0.1 to 100	KMA (21)
SX	Radial	6.3 to 63	0.1 to 2,200	SXE (25)
SXA	Radial	6.3 to 63	22 to 2,200	SXE (25)
KX/KXC	Axial Radial	10 to 100 (to 400—KX)	0.47 to 2,200 0.47 to 3,300	KME (13)
RX	Radial	10 to 100	2.2 to 1,000	SXE (25)
BK	PCB terminal	16 to 400	47 to 22,000	SME-PCB terminal (44)
NM	PCB terminal	10 to 400	47 to 22,000	SME-PCB terminal (44)
SM (VP)	Radial 3 lead	10 to 100	470 to 22,000	KRF (41) KME-PCB terminal (48)
SM-Plug-in	PCB terminal	6.3 to 450	22 to 100,000	SME-PCB terminal (44)
SW	Screw, Bolt	6.3 to 350	120 to 470,000	KME-LG (57)

Note: PCB terminal means Plug-in terminal.

Series shown in this catalog;

New

SM/SMC ⇒ SME (up to 250wv)
KM/KMC ⇒ KME
SM-VP ⇒ KRF, SME (VB, PCB terminal)
SXC ⇒ SXE
RXC ⇒ SXE
RZ ⇒ RZA, SXE
NMA ⇒ SME-PCB terminal
BKA ⇒ SME-PCB terminal

KM
PCB terminal ⇒ KME-PCB terminal
NM-HR ⇒ KME-PCB terminal

HOW TO ORDER NIPPON CHEMI-CON CAPACITORS

When you place an order for ▭ Aluminum Electrolytic Capacitors and Tantalum Foil Electrolytic Capacitors, Please observe following Catalog Part Number indications which describe how to designate our product.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Series	Rated Voltage	Terminal Type	Capacitance	Capacitance Tolerance	Case Size	Lead Configuration	Options

Example

KM 50 VB 221 M 12X20 LL E

- E — Epoxy End Seal with Mylar Sleeve
- LL — LL/Catalog Standard
- 12X20 — 12.5 x 20
- M — ±20%
- 221 — 220 μF
- VB — VB/Radial lead type
- 50 — 50VDC
- KM — KM Series

(1) Series
Series name is shown.

(2) Rated Voltage
Rated voltage is shown in volts.

(3) Terminal Type
- VB: Radial lead type
- T: Axial lead type
- VP: 3 lead radial type
- LA: Lug terminal type
- VN: Snap-in type PCB terminal type
- VR: PCB terminal type
- LI: PCB terminal type
- VH: 2 lead radial type for RZ, RZA and GX-VH series
- VG: 3 lead radial type for RZ and RZA series
- LG: Screw-insert terminal type

(4) Capacitance
Expressed in micro farads (μF). The first two digits (or three) combined with the number of zeroes indicated by the third (or fourth) digit equals the capacitance for 100 μF or more. R indicates decimal point for less than 100 μF. (e.g., R22 = .22μF; 2R2 = 2.2μF; 22R = 22μF; 221 = 220μF; 222 = 2,200μF)

(5) Capacitance Tolerance
Symbol (K), (M) and (Q) show special capacitance tolerances which are listed as follows.

(K) = ±10%	(T) = −10 ~ +50%
(M) = ±20%	(U) = −10 ~ +75%
(Q) = −10 ~ +30%	(W) = −10 ~ +100%

For tolerance other than these and specified capacitance tolerances, in this catalog, please specify the value on the order sheet.

(6) Case Size
Capacitor dimensions (Diameter x Length, D x L) are given in millimeters (mm). Decimals are dropped for the case size code. Actual case dimensions without sleeve are given in the Case Size tables for each series. Refer to the Diagram of Dimensions for case sizes with sleeve.

(7) Lead Configuration or Taping Code
For VB/Radial Lead Wire Terminal and T/Axial Lead Wire Terminal Type capacitors, forming processes in "Service Data-Lead Cut/Forming Types" on page 7 are available at your request. Please specify as indicated, referring to following signs.

- CC = Cut Lead Wire
- FC = Forming Cut Lead Wire
- MC = Snap-in Cut Lead Wire
- FM = Snap-in Forming Cut Lead Wire
- LL = Standard
- TP = Tape and Reel for Axial Leads
- FT = Tape and Ammo Pack Box for Radial Leads
- MT = Tape and Reel Pack Box for Radial Leads (Negative Leading)
- PT = Tape and Reel Pack Box for Radial Leads (Positive Leading)

For details, see page 7. For Taping Code, see page 8 and 9.

(8) Options
- E: Epoxy End Seal with Polyester Sleeve
- V: Epoxy End Seal with PVC Sleeve
- H: Stand off

When using aluminum electrolytic capacitors, pay strict attention to the following:

1. **Electrolytic capacitors for DC application require polarization.**
   Confirm the polarity. If used in reversed polarity, the circuit life may be shortened or the capacitor may be damaged. For use on circuits whose polarity is occasionally reversed, or whose polarity is unknown, use bi-polarized capacitors (page 18). Also, note that the electrolytic capacitor cannot be used for AC application.
2. **Do not apply a voltage exceeding the capacitor's voltage rating.**
   If a voltage exceeding the capacitor's voltage rating is applied, the capacitor may be damaged as leakage current increases. When using the capacitor with AC voltage superimposed on DC voltage, care must be exercised that the peak value of AC voltage does not exceed the rated voltage.
3. **Do not allow excessive ripple current to pass.**
   Use the electrolytic capacitor at current values within the permissible ripple range. If the ripple current exceeds the specified value, request capacitors for high ripple current applications.
4. **Ascertain the operating temperature range.**
   Use the electrolytic capacitors according to the specified operating temperature range. Usage at room temperature will ensure longer life.
5. **The electrolytic capacitor is not suitable for circuits in which charge and discharge are frequently repeated.**
   If used in circuits in which charge and discharge are frequently repeated, the capacitance value may drop, or the capacitor may be damaged. Please consult our engineering department for assistance in these applications.
6. **Apply voltage treatment to the electrolytic capacitor which has been allowed to stand for a long time.**
   If the electrolytic capacitor is allowed to stand for a long time, its withstand voltage is liable to drop, resulting in increased leakage current. If the rated voltage is applied to such a product, a large leakage current occurs and this generates internal heat, which damaged the capacitor. If the electrolytic capacitor is allowed to stand for a long time, therefore, use it after giving voltage treatment (Note 1). (However, no voltage treatment is required if the electrolytic capacitor is allowed to stand for less than 2 or 3 years at normal temperature.)
7. **Cleaning circuit boards after soldering.**
   Some solvents have adverse effects on capacitors, please refer to page 10.
8. **Do not place a soldering iron on the body of the capacitor.**
   The electrolytic capacitor is covered with a vinyl sleeve. If the soldering iron comes in contact with the electrolytic capacitor body during wiring, damage to the vinyl sleeve and/or case may result in defective insulation, or improper protection of the capacitor element.
9. **Be careful of temperature and time when soldering.**
   When soldering a printed circuit board with various components, care must be taken that the soldering temperature is not too high and that the dipping time is not too long. Otherwise, there will be adverse effects on the electrical characteristics and insulation sleeve of electrolytic capacitors. In the case of small-sized electrolytic capacitors, nothing abnormal will occur if dipping is performed at less than 260°C for less than 10 seconds.
10. **Do not apply excessive force to the lead wires or terminals.**
    If excessive force is applied to the lead wires and terminals, they may be broken or their connections with the internal elements may be affected. (For strength of terminals, refer to JIS C5102, C5141 and C5142.)
11. **Care should be used in selecting a storage area.**
    If electrolytic capacitors are exposed to high temperatures caused by such things as direct sunlight, the life of the capacitor may be adversely affected. Storage in a high humidity atmosphere may affect the solderability of lead wires and terminals.
12. **Surge voltage**
    The surge voltage rating is the maximum DC over-voltage to which the capacitor may be subjected for short periods not exceeding approximately 30 seconds at infrequent intervals of not more than five minutes. According to JIS C5141, the test shall be conducted 1000 cycles at room temperature for the capacitors of characteristic W of JIS C5141 or at the maximum operating temperature for the capacitors of characteristics B and C of JIS C5141 with voltage applied through a series resistance of 1000 ohms without discharge. The electrical characteristics of the capacitor after the test are specified in JIS C5141. Unless otherwise specified, the rated surge voltages are as follows:

Rated Voltage (V)	6.3	10	16	25	35	50	63	80	100	160	200	250	315	350	400	450	500
Rated Surge Voltage (V)	8	13	20	32	44	63	79	100	125	200	250	300	365	400	450	500	550

13. **Capacitor case sizes and other product standards specified in this catalog may be changed or modified without notice for improvement of quality.**

Note 1 **Voltage treatment** . . . Voltage treatment shall be performed by increasing voltage up to the capacitor's voltage rating gradually while lowering the leakage current. In this case, the impressed voltage shall be in the range where the leakage current of the electrolytic capacitor is less than specified value. Meanwhile, the voltage treatment time amy be effectively shortened if the ambient temperature is increased (within the operating temperature range).

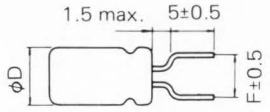
Note 2 **For methods of testing,** refer to JIS C5102, JIS C5141 and JIS C5142.

LEAD CUT AND LEAD FORMING

These lead configulations are available at your request.

Case Length = 5 mm (SRE, KRE series)

Lead configuration: **FC**



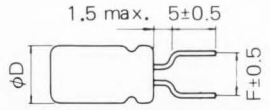
Unit (mm)

φD	3	3.5	4	5	6.3
F	2.5	2.5	5	5	5
	(3.5)	(3.5)	(3.5)	(3.5)	(3.5)

( ) shows dimension of sub-standard FC type.

Case Length = 7 mm (SRA, KMA series)

Lead configuration: **FC**



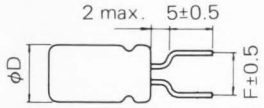
Unit (mm)

φD	4	5	6.3	7
F	5 (3.5)	5	5	5

( ) shows dimension of sub-standard FC type.

Case Length ≧ 11 mm

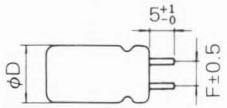
Lead configuration: **FC**
(φD = φ5, 6.3, 8)



Unit (mm)

φD	φ5~12.5	φ16~18
F	5	7.5

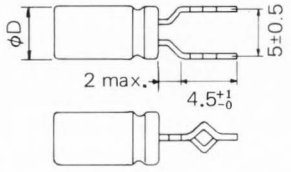
Lead configuration: **CC.**
(φD = φ10, 12.5 16, 18)



Snap in

φD = φ5 to φ8

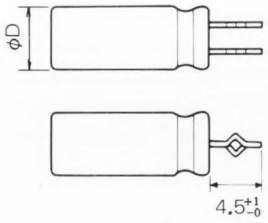
Snap-in Forming Cut: **FM**



Unit (mm)

φD = φ10 to φ18

Snap-in Cut: **MC**

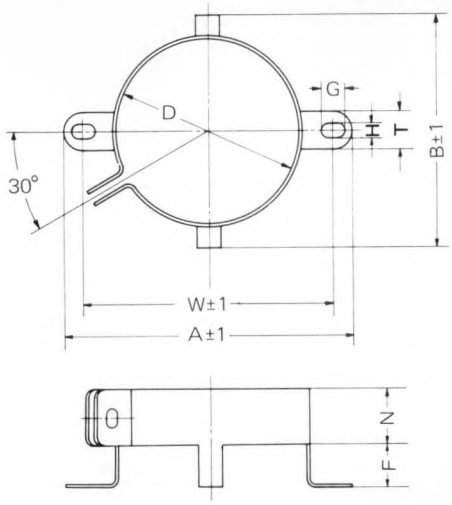


Unit (mm)

MOUNTING CLAMPS

For screw terminal type capacitors, type B and C are available at your request.

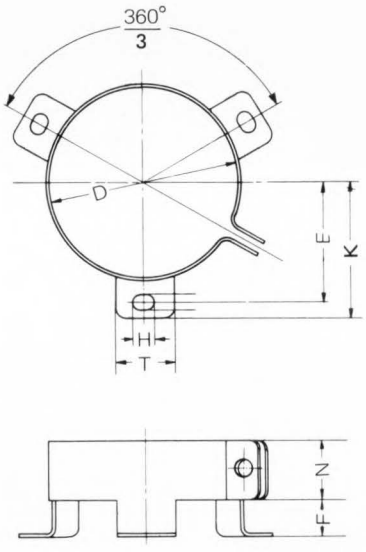
Type B



Unit (mm)

Capacitor's Case dia.	A	B	D	G	H	T	W	N	F
35	58	44	35.6	6	3.5	10	48	12	8
50	78	64	50.6	6	4.5	11	68	15	3.5
63.5	90	76	63.8	6	4.5	12	80	17	8
76	104.5	90	76.8	6	4.5	12	93.5	19	9

Type C



Unit (mm)

Capacitor's case dia.	E	K	D	F	N	H	T
50	32.5	37.0	50.3	5	15	8	14
63.5	38.1	43.5	63.8	8	17	8	14
76	44.5	50.0	76.8	9	19	8	14
89	50.8	56.5	90	9	21	8	16

TAPING SPECIFICATIONS

These specifications describe the lead taping packaging for electrolytic capacitor with axial lead and radial lead for automatic insertion systems. (Applicable specification; EIAJ-RC1008A)

AXIAL LEAD

1. Taping

1-1. The case diameters enabled to tape are ϕ5 to ϕ10 mm.
1-2. To identify the orientation, the cathode tape shall be blue and the anode tape shall be white.
1-3. A minimum 305 mm leader tape shall be provided before the first and after the last capacitor on reel.
1-4. Taping dimensions are indicated in Figure 1.

2. Reeling

2-1. Taped capacitors shall be wound on a packing reel shown on Figure 2.
2-2. 75 Kg weight Kraft paper shall be wound between layers of capacitors for capacitor protection.
2-3. After winding up the taped capacitors on the reel, the single side corrugated cardboard shall be wound over the taped capacitors on the reel (one wrap).
2-4. Finished reel shall be packaged in the packaging box shown on Figure 3.

3. Quantity of packaging

Dia. of capacitor (mm)	Quantity (pcs.)
5	1,500
6.3	1,000
8	1,000
10	500

Note) Above quantities are principle.
Some difference may be provided.

4. How to order

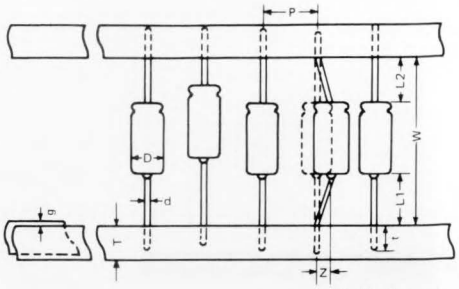
Please specify taping code (See below).
In case of special, please specify."Inside distance between tapes" and "Lead space."

Taping code	Inside distance between tapes	Lead space	Diameter of capacitor
TA22	52	10	5, 6.3, 8
TA32	63	10	5, 6.3, 8
TA42	73	10	5, 6.3, 8
TA23	52	15	10
TA33	63	15	10
TA43	73	15	10
TA53	93	15	10

Following EIA Standard RS-296-D are available upon request.

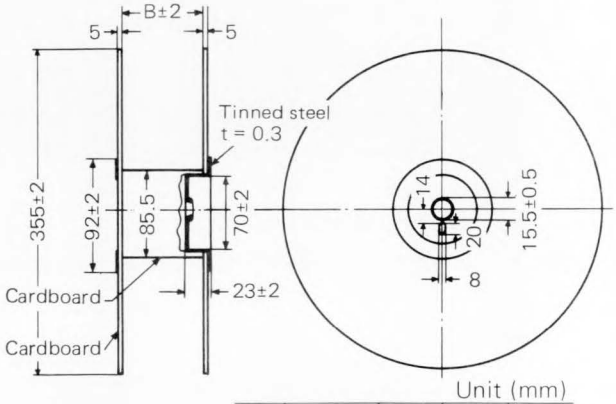
COMPONENT BODY DIAMETER	COMPONENT PITCH "A" (SEE NOTE 18)	INSIDE TAPE SPACING "B" ±1.5 mm (0.059")		
	±0.5 mm or (0.020")	I	II	III
0 mm (0") to 5 mm (0.197")	5 mm or (0.200")	52.4 mm (2.062")	63.5 mm (2.500")	73 mm (2.874")
5.01 mm (0.197") to 10 mm (0.394")	10 mm or (0.400")			
10.01 mm (0.394") to 15 mm (0.591")	15 mm or (0.600")			

Figure 1 Taping



Unit (mm)

Symbol	Dimension
D	5, 6.3, 8, 10
d	0.6, 0.8
P	10, 15 (±0.5)
W	$52^{+1.5}_{-1.0}$, $63^{+1.5}_{-1.0}$, 73±1.5, 93±1.5
g	0.8 max.
$L_1 - L_2$	1.5 max.(W=52~73), 2max.(W=93)
Z	1.2 max.
t	3.2 min. (Lead ends shall not extend beyond the tape.)
T	6.0±1.0

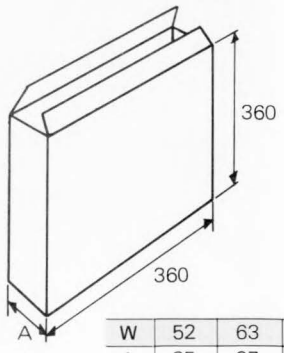


Unit (mm)

W	52	63	73	93
B	70	82	92	112

W: Inside distance between tapes
B: Inside distance between flanges

Figure 3 Packaging box



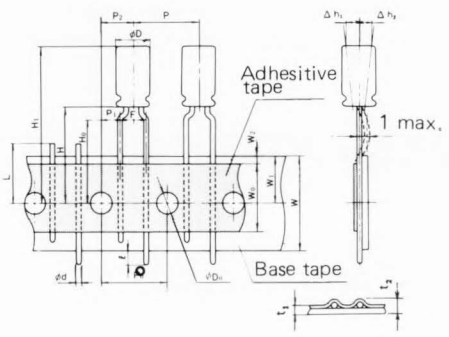
Unit (mm)

W	52	63	73	93
A	85	97	107	127

W: Inside distance between tapes
A: Width of packaging box

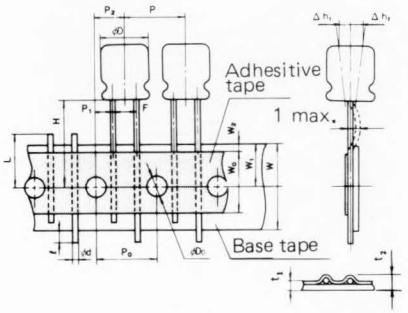
RADIAL LEAD

φD=3~8

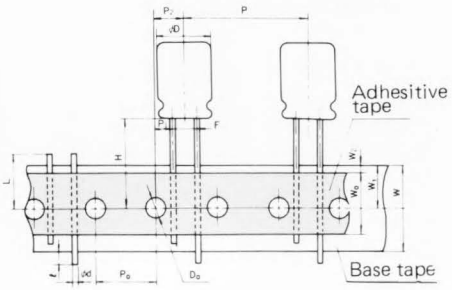


Series	SRE, KRE Series		SRA, KMA Series	Others		Tolerance	Remarks
φD	3, 3.5	4, 5, 6.3	4, 5, 6.3, 7	5	6.3, 8		
φd	0.4	0.45	0.45	0.5	0.6	±0.05	
P	12.7					±1.0	
P_0	12.7					±0.2	(Cumulative pitch error; 1 mm/20 pitches)
P_1	5.1(F=2.5), 4.6(F=3.5), 3.85(F=5)					±0.7	To be measured at bottom of clinch
P_2	6.35					±1.0	
F	2.5(3.5)	5(3.5)	5(3.5)	5		+0.8 −0.2	The dimension shown with ( ) is available at request.
Δh_1	0					±2.0	
W	18.0					±0.5	
W_0	12.5 min.					–	
W_1	9.0					+0.75 −0.5	
W_2	1.5 max.					–	
H	17.5			18.5	18.5(φ6.3) 20.0(φ8)	±0.75	H+A≦H_1 Applicable to Ammo pack box
H_0	16.0					±0.5	
H_1	32.25 max.					–	Applicable to Reel pack box
ℓ	1.0 max.					–	
$φD_0$	4.0					±0.3	
t	0.7					±0.2	
L	11.0 max.					–	

φD=10



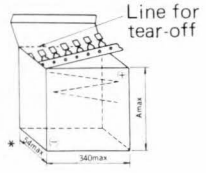
φD=12.5



Symbol	Nominal value		Tolerance	Remarks
φD	10	12.5	–	
φd	0.6		±0.05	
P	12.7	25.4	±1.0	
P_0	12.7		±0.3	(Cumulative pitch error; 1 mm/20 pitches)
P_1	3.85		±0.7	
P_2	6.35		±1.3	
F	5.0		+0.8 −0.2	
Δh_1	0		±2.0	
W	18.0		±0.5	
W_0	12.5 min.		–	
W_1	9.0		±0.5	
W_2	1.5 max.		–	Not to protrude over base tape
H	18.5		±0.75	
ℓ	1.0 max.		–	
$φD_0$	4.0		±0.3	
t	0.7		±0.2	
L	11.0 max.		–	

PACKAGING

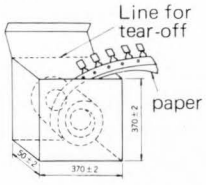
Ammo pack box



Case dia.	Quantity (pcs.)	A
φ3	3,000	205
φ3.5	3,000	205
φ4	2,000	305
φ5	2,000	265
φ6.3	2,000	305
φ7	1,000	265
φ8	1,000	265
φ10	800	305
φ12.5	500	305

* 65 mm for capacitors of length 20 mm and above.

Reel pack box



Case dia.	Quantity (pcs.)
φ3	2,000
φ3.5	2,000
φ4	1,800
φ5	1,500
φ6.3	1,000
φ7	1,000
φ8	800
φ10	600

Note) The component shall be oriented on the tape as such that the positive lead is leading or the negative lead is leading by customer's request.

HOW TO ORDER

Please specify package type (See below)

FT – Ammo pack box
PT – Reel pack box with plus lead leading
MT – Reel pack box with minus lead leading

(See page 5)

CLEANING CONDITIONS

Aluminum electrolytic capacitors that have been exposed to halogenated hydrocarbon cleaning and defluxing solvents are susceptible to attack by these solvents. This exposure can result in solvent penetration into the capacitors, leading to internal corrosion and potential failure. Therefore, for ordinary capacitors, the cleaning materials of alcohol system had to be used. However, the following Nippon Chemi-Con's series capacitors can withstand cleaning by some halogenated solvents shown;

Possible cleaning conditions

Series name	Freon TE®/TES®	1, 1, 1-Trichloroethane
SME (VB, T)	5 minutes	See below
SMC (VB, T)	5 minutes	See below
SRC (VB)	5 minutes	See below
KME (VB, T)	5 minutes	See below
KMC (VB, T)	5 minutes	See below
KMA (VB)	5 minutes	See below
KRE (VB)	2 minutes	–
SXE (VB)	5 minutes	See below

Series name	Freon TE®/TES®	1, 1, 1-Trichloroethane
SXC (VB)	5 minutes	See below
RXC (VB)	5 minutes	5 minutes, See below
RZ (VH, VG)	5 minutes	5 minutes, See below
RZA (VH, VG)	5 minutes	See below
LX (VB)	5 minutes	See below
SME-BP (VB)	5 mintues	See below
KME-BP(VB)	5 minutes	See below
KRF (VB)	3 minutes	–

Note: Freon TMS® is also acceptable as well as TE® or TES®

- **Freon TE®, TES® or TMS®**
  Cleaning method; One of immersion, ultrasonic or vapor cleaning
  Maximum cleaning time; See above table.

- **1, 1, 1-Trichloroethane**
  Cleaning method; immersion cleaning at the normal temperature
  Maximum cleaning time; 5 minutes
  For the above series except RXC and RZ, PVC sleeve is swollen with this solvent and then may shrink by heat at drying process.

– Caution –

- When the lead space of the capacitor is different from the hole space of the PC board to be mounted, use the lead forming type capacitor to prevent stress on seal.
- Consult for flux to be used and other cleaning conditions.
  (Freon TE, TES and TMS are registered trademarks of Dupont, Inc.)

Influence of cleaning solvent for aluminum electrolytic capacitor

Aluminum electrolytic capacitors are easily affected by halogen ions, particularly by chloride ions. Excessive amounts of halogen ions, if happened to enter the inside of the capacitors, will give corrosion accidents – rapid capacitance drop and vent open. The extent of corrosion accidents varies with kinds of electrolytes and seal-materials.
Therefore, the prevention of halogen ion contamination is the most important check point for quality control in our production lines. At present, halogenated hydrocarbon-contained organic solvents such as Trichloroethylene, 1, 1, 1-Trichloroethane, and Freon are used to remove flux from circuit boards. However, if general types of aluminum electroytic capacitors, whose seal constructions are not solvent-proof, are cleaned with such solvents, the solvents may gradually penetrate the seal portion and erode the inside of the capacitors.
The mechanism of corrosion of aluminum electrolytic capacitors by halogen ions can be explained as follows:
Halides (RX) are absorbed and diffused into the seal portion. The halides then enter the inside of the capacitors and contact with the electrolyte of the capacitors, whereby halogen ions are made free by a hydrolysis with water in the electrolyte:

$$RX + H_2O \rightarrow ROH + H^+ + X^-$$

The halogen ions (X^-) react with the dielectric substance (Al_2O_3) of aluminum electrolytic capacitors:

$$Al_2O_3 + 6H^+ + 6X^- \rightarrow 2AlX_3 + 3H_2O$$

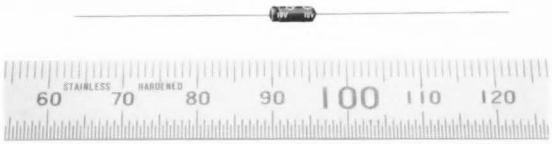
AlX_3 is then dissociated with water:

$$AlX_3 + 3H_2O \rightarrow Al(OH)_3 + 3H^+ + 3X^-$$

SRE-T SERIES

- **World's smallest. φ2 x 5.5 ℓmm, Axial lead type.**
- **Operating Temperature Range, -25°C to +85°C**

TENTATIVE



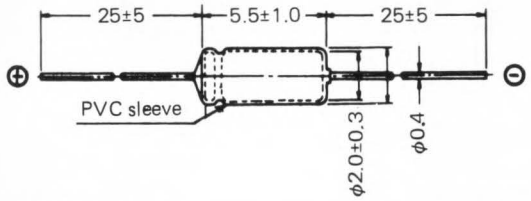
- Compete in CV product per case size with dip tantalums.
- Most suitable for miniature and low profile equipment.
- Taping is available at requests.
- Application: VTR, Cameras and other portable equipment.

CHARACTERISTICS

ITEM	CHARACTERISTIC
Operating temperature range	-25 ~ +85°C
Rated voltage range	4 ~ 50 V_{DC}
Capacitance tolerance	±20% (M) (at 20°C, 120 Hz)
Leakage current (μA)	3μA max. (after 3 minutes) (at 20°C)
Dissipation factor	Rated WV (V): 4 / 6.3 / 10 / 16 / 25 / 50 Dissipation factor: 0.50 / 0.35 / 0.30 / 0.25 / 0.22 / 0.20 (at 20°C, 120 Hz)
Temperature characteristics	The impedance ratio at -25°C and 20°C (120 Hz); Rated WV (V): 4 / 6.3 / 10 / 16 / 25 / 50 Ratio: 7 / 4 / 3 / 2 / 2 / 2
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 1,000 hours at 85°C Capacitance change ≦ ±25% of the initial value Dissipation factor ≦ 200% of the initial specified value Leakage current ≦ the initial specified value
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. Capacitance change ≦ ±25% of the initial value Dissipation factor ≦ 200% of the initial specified value Leakage current ≦ 200% of the initial specified value
Others	Satisfies characteristic W of JIS C 5141

DIMENSIONS

T/Axial lead Unit (mm)



MAXIMUM ESR

At 20°C, 120Hz

V / μF	4	6.3	10	16	25	50
0.1						3317
0.15						2212
0.22						1508
0.33						1005
0.47						705.8
1.0					364.9	
1.5				276.5		
2.2			226.3			
3.3		175.9				
4.7	176.5					

STANDARD RATINGS

V / μF	4	6.3	10	16	25	50
0.1	→	→	→	→	→	■
0.15	→	→	→	→	→	■
0.22	→	→	→	→	→	■
0.33	→	→	→	→	→	■
0.47	→	→	→	→	→	■
1.0	→	→	→	→	■	
1.5	→	→	→	■		
2.2	→	→	■			
3.3	→	■				
4.7	■					

Note) → Use next higher voltage value.
■ shows standard product.

Specifications subject to change without notice.

AL CHIP-S, -MV, -MT SERIES

- **Chip Type Capacitors for Reflow soldering**
- **First and Smallest Chip Type Capacitors in the world**

TENTATIVE

- AL CHIP-S
  With improved heat resistance characteristic, reflow soldering by hot plate is now possible up to 260°C for 10 seconds or 230°C for 25 seconds. Previous design allowed only up to 230°C, 10 seconds.
- AL CHIP-MV
  Miniature electrolytic capacitor with terminals for surface mounting. Wide capacitance range.
- AL CHIP-MT
  Smallest aluminum electrolytic chip type capacitor in the world. Heat resistance ability is even higher than AL CHIP-S.
- Please consult for taping.
- For Catalog Numbering System, see page 5.

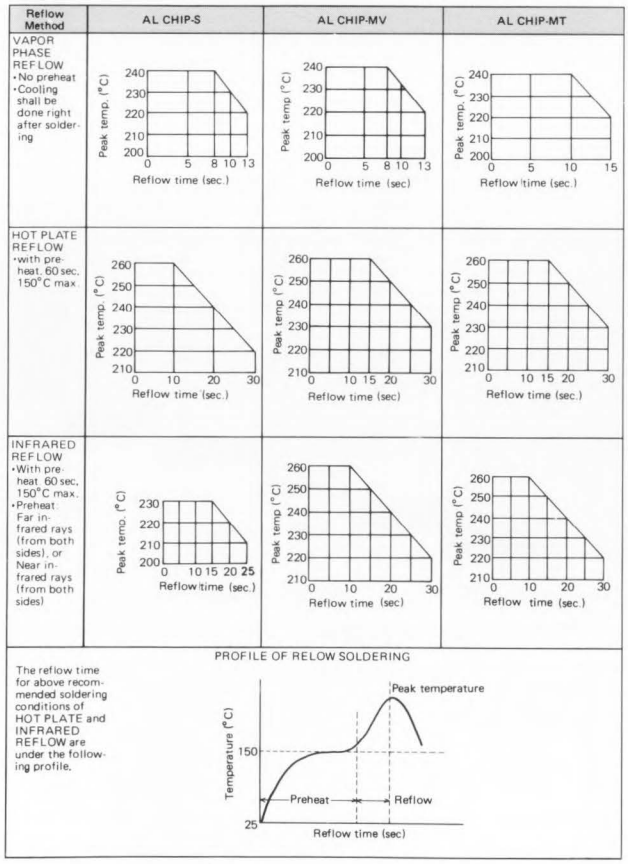
CHARACTERISTICS

Item	AL CHIP-S	AL CHIP-MV	AL CHIP-MT
Operating temperature range	-40 ~ +85°C		-25 ~ +85°C
Capacitance tolerance	±20%		at 20°C, 120 Hz
Leakage current	3 μA max. (After 2 minutes, 20°C)		3 μA max. (After 3 minutes, 20°C)
Dissipation factor			
Load life	85°C 1,000 hours		
Others	Satisfies characteristic W of JIS C5141		

Rated voltage (V)		4	6.3	10	16	25	35	50
Dissipation factor	AL CHIP-S	–	0.24	0.20	0.16	0.14	0.12	0.10
	AL CHIP-MV	0.38	0.24	0.20	0.16	0.14	0.12	0.10
	AL CHIP-MT	0.50	0.35	0.30	0.25	0.22	–	0.20

RECOMMENDED SOLDERING CONDITIONS

The following are recommended conditions when capacitors are to be soldered on a glass epoxy circuit board (90 x 50 x 0.8, with resist) by cream solder. The temperature is those of the solder at the terminals.



CASE SIZES

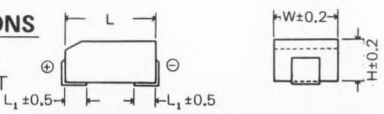
V / μF	4	6.3	10	16	25	35	50
0.1							A φ4 MT
0.15							φ4 MT
0.22							A φ4 MT
0.33							A φ4 MT
0.47							A φ4 MT
0.68							φ4
1					MT		A φ4
1.5				MT			φ4
2.2			MT			A	B φ4
3.3		MT			A	B	B φ4
4.7	MT		A	A	B	B φ4	(φ5)
6.8					φ4	(φ5)	φ6.3
10		A	B	φ4 B	(φ5)	(φ5)	φ6.3
15			φ4	(φ5)	φ6.3	φ6.3	
22		B φ4	(φ5)	(φ5)	φ6.3	φ6.3	
33	φ4	(φ5)	(φ5)	φ6.3	φ6.3		
47	(φ5)	(φ5)	φ6.3	φ6.3			
68	φ6.3	φ6.3	φ6.3				
100	φ6.3	φ6.3					

Note:
A: Size code A, AL CHIP-S
B: Size code B, AL CHIP-S
MT: AL CHIP-MT
φ4, φ5 and φ6.3: AL CHIP-MV

DIMENSIONS

Unit (mm)

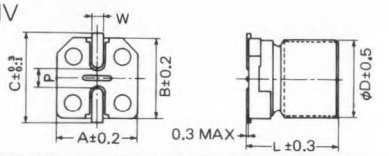
AL CHIP-S
AL CHIP-MT



Size Code		L	W	H	L_1
AL CHIP-S	A	6.4±0.2	4.6	2.5	1.5
	B	7.4±0.2	5.2	4.5	1.5
AL CHIP-MT		7.3±0.3	2.5	2.5	1.0

*Note: Dimension of AL CHIP-MT includes terminal.

AL CHIP-MV



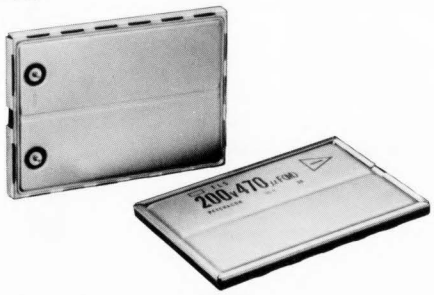
	D	L	A	B	C	W	P
φ4	4	5.7	4.3	4.3	5.0	0.5~0.8	1.0
(φ5)	(5)	(6.0)	(5.3)	(5.3)	(6.0)	(0.5~0.8)	(1.4)
φ6.3	6.3	6.3	6.6	6.6	7.3	0.5~0.8	1.9

Specifications subject to change without notice.

FLS/FLK SERIES

- FLS series; 85°C
  FLK series; 105°C
- Flat type (7.0 mm thick)

TENTATIVE



CHARACTERISTICS

Series	FLS		FLK	
Rated working voltage	10 – 100V	160 – 250V	10 – 100V	160 – 250V
Operating temp. range	-40 – +85°C	-25 – +85°C	-25 – +105°C	
Capacitance tolerance	±20% at 20°C, 120Hz			
Leakage current	I = 0.02CV or 3mA, whichever is smaller Where I; Max. leakage current (μA) (at 20°C, after 5 min.) C; Nominal capacitance (μF) V; Rated working voltage (V)			
Dissipation factor	at 20°C, 120Hz			

Rated voltage (V)		10	16	25	35	60	63–250
DF	FLS	0.50	0.40	0.30	0.25	0.20	0.15
	FLK	0.50	0.50	0.35	0.25	0.20	0.15

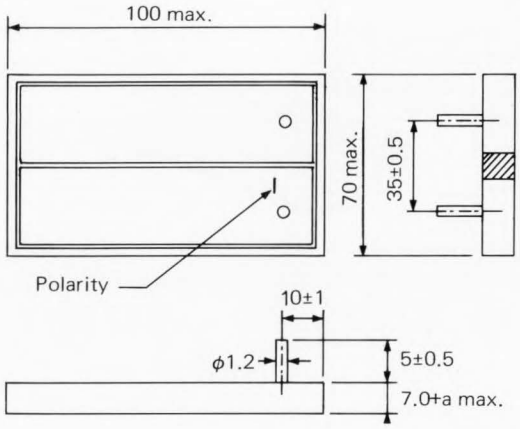
Temperature characteristics: Impedance ratio at 120Hz;

Rated voltage (V)		10	16	25	35	50	63–100	160–250
Z(-25°C)/Z(20°C)	FLS	4	4	4	4	4	4	4
	FLK	6	5	4	3	3	2	4
Z(-40°C)/Z(20°C)	FLS	12	12	12	12	12	12	–

Insulation resistance	10 Megaohm minimum at 500Vdc (between case and terminal)
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 hours at max. operating temperature. Capacitance change ≦±20% of the initial value Dissipation factor FLS; ≦ 150% of the initial specified value FLK; ≦ 200% of the initial specified value Leakage current ≦ The initial specified value
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at max. operating temperature for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≦ ±15% of the initial value Dissipation factor ≦ 150% of the initial specified value Leakage current FLS; ≦ The initial specified value FLK; ≦ 5 times the initial specified value
Others	Other specifications shall comply with JIS C5141, characteristic W.

Specifications subject to change without notice.

DIMENSIONS



RATED VOLTAGE RANGE	a
~ 100WV	0.5
160WV ~	0.8

(mm)

STANDARD RATINGS

FLS SERIES

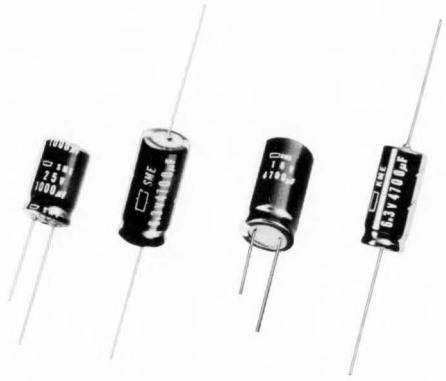
RATED VOLTAGE (V)	SURGE VOLTAGE (V)	CAPACITANCE (μF)	RIPPLE CURRENT (A rms/85°C, 120Hz)
10	13	33000	5.22
16	20	22000	4.60
25	32	15000	4.44
35	44	10000	4.25
50	63	6800	3.89
63	79	3300	2.95
80	100	2200	2.40
100	125	1500	2.08
160	200	820	1.62
200	250	560	1.42
250	300	470	1.20

FLK SERIES

RATED VOLTAGE (V)	SURGE VOLTAGE (V)	CAPACITANCE (μF)	RIPPLE CURRENT (A rms/105°C, 120Hz)
10	13	22000	3.99
16	20	18000	3.61
25	32	12000	3.52
35	44	8200	3.44
50	63	4700	3.36
63	79	2700	2.66
80	100	1800	2.17
100	125	1200	1.77
160	200	680	1.40
200	250	470	1.16
250	300	390	1.06

SME, KME SERIES

- **Miniaturized Standard Series. SME Series for 85°C, KME Series for 105°C Maximum Operating Temperature**
- **Solvent proof type**



- Case sizes of SME and KME are the same which are miniaturized from SM and KM series.
- SME series; 85°C, 2,000 hours assured.
  KME series; 105°C, 1,000 hours assured.
- For cleaning conditions, see page 10.
- For detail specification, refer to latest issue of Engineering Bulletin No. 511.
- SME series of case dia. 22 mm have been produced. Please refer to latest issue of Engineering Bulletin No. 528.

CHARACTERISTICS

<table>
<tr><th>Item \ Series</th><th colspan="5">SME</th><th colspan="5">KME</th></tr>
<tr><td>Rated working voltage</td><td colspan="5">6.3 ~ 250 V</td><td colspan="5">6.3 ~ 250 V</td></tr>
<tr><td>Operating temperature range</td><td colspan="5">−40 ~ +85°C</td><td colspan="5">−55~+105°C(for 6.3~100V), −40~+105°C(for 160~250V)</td></tr>
<tr><td>Capacitance tolerance</td><td colspan="10">±20% (at 20°C, 120 Hz)</td></tr>
<tr><td>Leakage current</td><td colspan="10">
<table>
<tr><td>Rated voltage</td><td colspan="2">≦ 100 V</td><td colspan="4">> 100 V</td></tr>
<tr><td rowspan="2">Time</td><td rowspan="2">1 minute</td><td rowspan="2">2 minutes</td><td colspan="2">1 minute</td><td colspan="2">5 minutes</td></tr>
<tr><td>CV≦1000</td><td>CV>1000</td><td>CV≦1000</td><td>CV>1000</td></tr>
<tr><td>Leakage current</td><td>0.03CV or 4μA whichever is larger</td><td>0.01 CV or 3μA, whichever is larger</td><td>0.1CV+40</td><td>0.04CV+100</td><td>0.03CV+15</td><td>0.02CV+25</td></tr>
</table>
(at 20°C)
</td></tr>
<tr><td>Dissipation factor</td><td colspan="10">
<table>
<tr><td>Rated voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160 ~ 250</td></tr>
<tr><td>Dissipation factor</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.08</td><td>0.2</td></tr>
</table>
Note: Above DF specifications shall be 0.02 added every 1,000 μF for capacitor exceeding 1,000 μF.
(at 20°C, 120 Hz)
</td></tr>
<tr><td>Load life</td><td colspan="10">The following specification shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 85°C, 2,000 hours for SME and 105°C, 1,000 hours for KME.
<table>
<tr><td colspan="3">Rated voltage (V)</td><td>6.3 ~ 16</td><td>25 ~ 100</td><td>160 ~ 250</td></tr>
<tr><td rowspan="3">Capacitance change</td><td rowspan="2">SME</td><td rowspan="2">case dia.</td><td>≦6.3</td><td>±20%</td><td>±20%</td><td rowspan="2">±20%</td></tr>
<tr><td>>6.3</td><td>±20%</td><td>±15%</td></tr>
<tr><td>KME</td><td colspan="3">±20%</td></tr>
<tr><td>Dissipation factor</td><td>SME</td><td colspan="2">Less than 150% of the initial specified value.</td><td>Less than 200% of the initial specified value</td></tr>
<tr><td>KME</td><td colspan="3">Less than 200% of the initial specified value.</td></tr>
<tr><td colspan="2">Leakage current</td><td colspan="3">Less than the initial specified value.</td></tr>
</table>
</td></tr>
<tr><td>Others</td><td colspan="10">Satisfies characteristic W of JIS C5141</td></tr>
</table>

VB/Radial lead

CASE SIZES

SME, KME

φDxL(mm)

μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.1						5x11					
0.22						5x11					
0.33						5x11					
0.47						5x11		5x11	6.3x11	6.3x11	6.3x11
1						5x11		5x11	6.3x11	6.3x11	6.3x11
2.2						5x11		5x11	6.3x11	6.3x11	8x11.5
3.3						5x11		5x11	8x11.5	8x11.5	10x12.5
4.7				5x11	5x11	5x11	5x11	5x11	8x11.5	10x12.5	10x12.5
10			5x11	5x11	5x11	5x11	5x11	6.3x11	10x16	10x16	10x20
22		5x11	5x11	5x11	5x11	5x11	6.3x11	8x11.5	10x20	10x20	12.5x25
33	5x11	5x11	5x11	5x11	5x11	6.3x11	6.3x11	10x12.5	12.5x20	12.5x25	12.5x25
47	5x11	5x11	5x11	5x11	6.3x11	6.3x11	8x11.5	10x16	12.5x25	12.5x25	16x25
100	5x11	5x11	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	12.5x20	16x25	16x31.5	18x35.5
220	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	16x25	18x35.5		
330	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	16x25			
470	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	12.5x25	16x31.5			
1,000	10x12.5	10x16	10x20	12.5x20	12.5x25	16x25	16x31.5				
2,200	12.5x20	12.5x20	12.5x25	16x25	16x31.5	18x35.5					
3,300	12.5x20	12.5x25	16x25	16x31.5	18x35.5						
4,700	16x25	16x25	16x31.5	18x35.5							
6,800	16x25	16x31.5	18x35.5								
10,000	16x31.5	18x35.5									
15,000	18x35.5										

MAXIMUM RIPPLE CURRENT (mA rms)

SME Series — At 85°C, 120 Hz

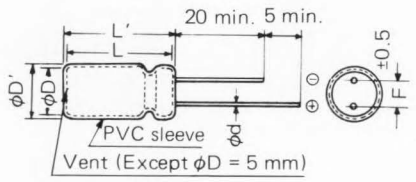
μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						11		12	9.5	9.5	9.5
1						17		18	14	14	14
2.2						25		27	21	21	24
3.3						31		33	28	28	34
4.7				31	34	37	40	42	35	35	41
10			44	47	49	54	58	69	66	66	71
22		59	64	69	73	81	98	120	110	110	130
33	66	72	78	83	91	110	120	170	140	160	160
47	81	86	93	100	120	140	170	230	180	180	210
100	120	130	160	170	210	230	280	400	300	330	340
220	200	210	270	280	370	440	490	710	510		
330	240	300	330	410	490	580	680	860			
470	330	350	450	540	640	760	880	1100			
1,000	570	660	790	950	1100	1340	1530				
2,200	1070	1110	1340	1570	1810	2090					
3,300	1260	1410	1720	1950	2220						
4,700	1740	1800	2100	2360							
6,800	1900	2180	2500								
10,000	2280	2500									
15,000	2670										

KME Series — At 105°C, 120 Hz

μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						8.3		8.8	6.7	6.7	6.7
1						12		13	9.9	9.9	9.9
2.2						18		19	15	15	17
3.3						22		23	20	20	24
4.7				22	24	26	28	30	25	29	29
10			31	33	35	38	41	49	47	47	50
22		42	45	49	52	57	69	84	75	75	90
33	47	51	55	59	64	80	85	120	100	110	110
47	57	61	66	71	87	96	120	160	130	130	145
100	82	89	110	120	150	160	200	280	210	230	240
220	140	150	190	200	260	310	350	500	360		
330	170	210	230	290	350	410	480	610			
470	230	250	320	380	450	540	620	780			
1,000	400	470	560	670	780	950	1080				
2,200	760	790	950	1110	1280	1480					
3,300	890	1000	1220	1380	1570						
4,700	1230	1270	1490	1670							
6,800	1340	1540	1770								
10,000	1610	1770									
15,000	1890										

DIMENSIONS

VB/Radial lead — Unit (mm)



φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.6	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
L'	L+1.5					L+2.0	
φD'	φD+0.5						

MAXIMUM ESR (EQUIVALENT SERIES RESISTANCE)

(Ohms)

SME, KME Series — At 20°C, 120 Hz

μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						352.9		282.3	705.8	705.8	705.8
1						165.9		132.7	331.7	331.7	331.7
2.2						75.40		60.32	150.8	150.8	150.8
3.3						50.26		40.21	100.5	100.5	100.5
4.7				49.41	42.35	35.29	31.76	28.23	70.58	70.58	70.58
10			26.54	23.22	19.90	16.59	14.93	13.27	33.17	33.17	33.17
22		14.33	12.06	10.56	9.05	7.54	6.79	6.03	15.08	15.08	15.08
33	11.06	9.55	8.04	7.04	6.03	5.03	4.52	4.02	10.05	10.05	10.05
47	7.76	6.71	5.65	4.94	4.23	3.53	3.18	2.82	7.06	7.06	7.06
100	3.65	3.15	2.65	2.32	1.99	1.66	1.49	1.33	3.32	3.32	3.32
220	1.66	1.43	1.21	1.06	0.99	0.75	0.68	0.60	1.51		
330	1.11	0.96	0.80	0.70	0.60	0.50	0.45	0.40			
470	0.78	0.67	0.56	0.49	0.42	0.35	0.32	0.28			
1,000	0.36	0.32	0.27	0.23	0.20	0.17	0.15				
2,200	0.18	0.16	0.14	0.12	0.11	0.090					
3,300	0.13	0.12	0.10	0.090	0.080						
4,700	0.099	0.088	0.078	0.071							
6,800	0.078	0.071	0.063								
10,000	0.066	0.061									
15,000	0.055										

T/Axial lead

CASE SIZES

SME, KME

μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						5x12.5		5x12.5	6.3x12.5		6.3x12.5
1						5x12.5		5x12.5	6.3x12.5	6.3x12.5	6.3x16
2.2						5x12.5	5x12.5	5x12.5	6.3x16	6.3x16	8x16
3.3						5x12.5	5x12.5	6.3x12.5	8x16	8x16	8x18
4.7				5x12.5	5x12.5	5x12.5	5x12.5	6.3x12.5	8x16	8x16	10x20
10				5x12.5	5x12.5	5x12.5	6.3x12.5	6.3x16	10x20	10x20	10x25
22		5x12.5	5x12.5	5x12.5	6.3x12.5	6.3x16	6.3x16	8x16	10x25	12.5x25	12.5x25
33		5x12.5	5x12.5	6.3x12.5	6.3x16	6.3x16	6.3x16	8x20	12.5x25	12.5x30	12.5x30
47		5x12.5	6.3x12.5	6.3x16	6.3x16	6.3x16	8x16	8x20	12.5x30	12.5x30	16x25
100	6.3x12.5	6.3x16	6.3x16	6.3x16	8x16	8x16	8x20	10x25	16x30	16x40	16x40
220	6.3x16	6.3x16	8x16	8x16	8x20	10x20	10x25	12.5x30	22x40	22x40	
330	8x16	8x16	8x16	8x20	10x20	10x25	12.5x25	16x25			
470	8x16	8x16	8x20	10x20	10x25	12.5x25	12.5x30	16x40			
1,000	10x20	10x20	10x25	12.5x25	12.5x30	16x25	16x30	22x40			
2,200	12.5x25	12.5x25	12.5x30	16x25	16x30	18x40	22x40				
3,300	12.5x25	12.5x30	16x25	16x30	16x40	22x40	22x50				
4,700	12.5x30	16x25	16x30	18x40	22x40	22x50					
6,800	16x30	16x30	16x40	22x40	22x50						
10,000	16x40	18x40	22x40	22x50							
15,000	18x40	22x40	22x50								
22,000	22x40	22x50									

MAXIMUM RIPPLE CURRENT (mA rms)

SME Series — At 85°C, 120 Hz

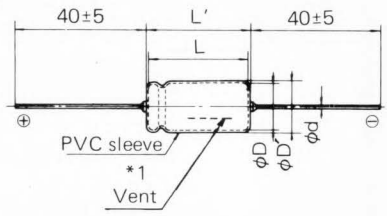
μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						12		14	10		10
1						17		21	14	14	16
2.2						26	29	31	24	24	27
3.3						32	36	45	33	33	35
4.7				32	35	38	43	54	39	39	48
10				47	51	56	73	87	71	71	77
22		59	66	70	89	100	120	140	110	120	120
33		72	81	100	120	130	140	190	150	160	160
47		86	110	130	140	150	190	230	200	200	200
100	130	160	180	190	230	250	310	410	320	340	340
220	220	240	300	320	380	470	570	730	540	540	
330	300	330	370	390	520	630	780	920			
470	360	390	480	580	680	830	1000	1250			
1,000	650	710	860	1020	1190	1340	1610	1960			
2,200	1110	1210	1440	1570	1810	2120	2440				
3,300	1310	1530	1720	1960	2190	2520	2870				
4,700	1640	1800	2110	2400	2660	2970					
6,800	2040	2170	2470	2770	3040						
10,000	2410	2610	2910	3160							
15,000	2710	2970	3270								
22,000	3050	3320									

KME Series — At 105°C, 120 Hz

μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						8		9	7		7
1						12		14	9	9	11
2.2						18	20	21	16	16	19
3.3						22	25	31	23	23	24
4.7				22	24	26	30	38	27	27	33
10				33	36	39	51	61	50	50	54
22		41	46	49	62	70	84	98	77	84	84
33		50	57	70	84	91	98	130	100	110	110
47		60	77	91	98	100	130	160	140	140	140
100	91	110	120	130	160	170	210	280	220	240	240
220	150	160	210	220	260	330	400	510	380	380	
330	230	230	260	300	360	440	550	650			
470	250	270	330	410	480	580	700	880			
1,000	450	500	600	720	840	940	1130	1380			
2,200	780	850	1010	1110	1270	1490	1720				
3,300	920	1080	1210	1380	1540	1780	2020				
4,700	1150	1270	1490	1690	1880	2100					
6,800	1440	1530	1740	1950	2140						
10,000	1700	1840	2050	2230							
15,000	1910	2100	2310								
22,000	2150	2340									

DIMENSIONS

T/Axial lead



Note) *1 This vent is applied only to the capacitors of φD=10~22 mm.

φD	5	6.3	8	10	12.5	16	18	22
φd	0.6					0.8		
L'	L +1.5					L +2.0		
φD'	φD+0.5							

MAXIMUM ESR (EQUIVALENT SERIES RESISTANCE)

(Ohms)

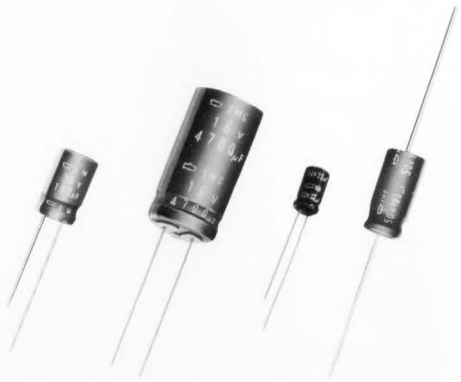
SME, KME Series — At 20°C, 120 Hz

μF \ V	6.3	10	16	25	35	50	63	100	160	200	250
0.47						352.9		282.3	705.8		705.8
1						165.9		132.7	331.7	331.7	331.7
2.2						75.40	67.86	60.32	150.8	150.8	150.8
3.3						50.26	45.24	40.21	100.5	100.5	100.5
4.7				49.41	42.35	35.29	31.76	28.23	70.58	70.58	70.58
10				23.22	19.90	16.59	14.93	13.27	33.17	33.17	33.17
22		14.33	12.06	10.56	9.05	7.54	6.79	6.03	15.08	15.08	15.08
33		9.55	8.04	7.04	6.03	5.03	4.52	4.02	10.05	10.05	10.05
47		6.71	5.65	4.94	4.23	3.53	3.18	2.82	7.06	7.06	7.06
100	3.65	3.15	2.65	2.32	1.99	1.66	1.49	1.33	3.32	3.32	3.32
220	1.66	1.43	1.21	1.06	0.99	0.75	0.68	0.60	1.51	1.51	
330	1.11	0.96	0.80	0.70	0.60	0.50	0.45	0.40			
470	0.78	0.67	0.56	0.49	0.42	0.35	0.32	0.28			
1,000	0.36	0.32	0.27	0.23	0.20	0.17	0.15	0.13			
2,200	0.18	0.16	0.14	0.12	0.11	0.090	0.083				
3,300	0.13	0.12	0.10	0.090	0.080	0.070	0.065				
4,700	0.099	0.088	0.078	0.071	0.064	0.056					
6,800	0.078	0.071	0.063	0.058	0.054						
10,000	0.066	0.061	0.056	0.053							
15,000	0.055	0.052	0.049								
22,000	0.048	0.046									

SM, SMC SERIES
KM, KMC SERIES

- **85°C, Standard series. SMC series are solvent proof**
- **105°C, Standard series. KMC series are solvent proof**

- For detail specification, refer to latest issue of Engineering Bulletin No. 511.
- For cleaning conditions of SMC and KMC series, see page 10.



CHARACTERISTICS

Item \ Series	SM, SMC	SM	KM, KMC	
Rated Working voltage	6.3 ~ 100 V	160 ~ 450 V	6.3 ~ 100 V	160 ~ 250 V
Operating temperature range	-40 ~ +85°C	-25 ~ +85°C	-55 ~ +105°C	-40 ~ +105°C
Capacitance tolerance	±20% (at 20°C, 120 Hz)			

Leakage current

Rated voltage	≦ 100 V		> 100 V			
Time	1 minute	2 minutes	1 minute		5 minutes	
			CV ≦ 1000	CV > 1000	CV ≦ 1000	CV > 1000
SM, SMC	0.03 CV or 4 μA, whichever is larger	0.01 CV or 3 μA, whichever is larger	0.1CV+40	0.04CV+100	0.03CV+15	0.02CV+25
KM, KMC	—	0.002 CV or 2 μA, whichever is larger				

(at 20°C)

Dissipation factor

Rated voltage (V_{DC})		6.3	10	16	25	35	50	63	80	100	160	200	250	315	350~450
Dissipation factor	SM, SMC	0.24	0.20	0.16	0.14	0.12	0.10	0.08		0.07	0.2 (SM)				0.24 (SM)
	KM, KMC	0.22	0.19	0.16	0.14	0.12	0.10	0.08		0.07	0.15	0.12	0.10	—	

Note: Above DF specifications shall be 0.02 added every 1,000 μF for capacitor exceeding 1,000 μF.

(at 20°C 120 Hz)

Load life

The following specification shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 hours (2,000 hours for KMC of φ10 or more) at maximum operating temperature.

Rated voltage				6.3~16 V	25~100 V	160 V~
Capacitance change	SM	Case Dia.	≦ 6.3	±20%		
	SMC		> 6.3	±20%	±15%	±20%
	KM, KMC			±25%	±20%	
Dissipation factor	SM, SMC			Less than 150% of the initial specified value.		
	KM, KMC			Less than 200% of the initial specified value.		
Leakage current				Less than initial specified value.		

Others

Satisfies characteristic W of JIS C5141.

Specifications subject to change without notice.

CASE SIZES

VB/Radial lead

Series	SM, SMC, KM, KMC ▭ ····· Applicable only to SM, SMC Series									SM, KM, KMC			SM	
V / μF	6.3	10	16	25	35	50	63	80	100	160	200	250	350	450
0.47						5x11			5x11	6.3x11			10x16	
1						5x11			5x11	6.3x11		10x16	10x16	10x16
2.2						5x11	5x11		5x11	8x11.5		10x16	10x16	10x20
3.3						5x11	5x11		5x11	10x16	10x16	10x16	10x20	12.5x20
4.7				5x11	5x11	5x11	5x11		6.3x11	10x16	10x16	10x16	10x20	12.5x25
10			5x11	5x11	5x11	5x11	6.3x11		8x11.5	10x16	10x20	12.5x20	12.5x25	16x25
22		5x11	5x11	5x11	6.3x11	6.3x11	8x11.5	10x12.5	10x12.5	12.5x20	12.5x20	12.5x25	16x25	
33	5x11	5x11	5x11	6.3x11	6.3x11	8x11.5	8x11.5	10x16	10x16	12.5x25	16x25	16x25	16x35.5	
47	5x11	5x11	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	16x25	16x25	16x31.5		
100	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	12.5x20	16x35.5	18x40			
220	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	12.5x20	12.5x25	16x25					
330	10x12.5	10x12.5	10x16	10x20	12.5x20	12.5x20	12.5x25	16x31.5	16x31.5					
470	10x12.5	10x16	10x20	12.5x20	12.5x25	16x25	16x25	16x35.5	18x35.5					
1,000	10x20	12.5x20	12.5x25	16x25	16x25	16x31.5	18x35.5							
2,200	12.5x25	16x25	16x25	16x35.5	18x35.5									
3,300	16x25	16x31.5	16x35.5	18x40										
4,700	16x31.5	16x35.5	18x35.5											
6,800	16x35.5	18x40												
10,000	18x40													

Unit (mm)

T/Axial lead

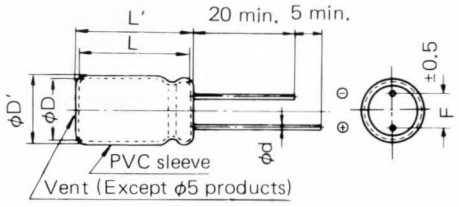
Series	SM, SMC, KM, KMC ▭ ····· Applicable only to SM, SMC Series									SM, KM, KMC			SM			
V / μF	6.3	10	16	25	35	50	63	80	100	160	200	250	315	350	400	450
0.47				5x12.5		5x12.5			5x12.5	6.3x16		6.3x16		6.3x18	8x18	8x18
1				5x12.5		5x12.5	5x12.5	5x12.5	5x12.5	6.3x16	6.3x16	6.3x16		8x16	8x18	8x18
2.2				5x12.5		5x12.5	5x12.5	5x12.5	5x12.5	6.3x16	8x16	8x18		8x18	10x20	10x20
3.3				5x12.5		5x12.5	5x12.5	5x12.5	6.3x12.5	8x16	8x18	8x18		10x20	10x25	10x25
4.7				5x12.5	5x12.5	5x12.5	5x12.5	6.3x12.5	6.3x12.5	8x16	8x18	10x20		10x25	10x30	12.5x25
10			5x12.5	5x12.5	5x12.5	5x12.5	6.3x12.5	6.3x16	8x16	10x20	10x20	10x25	12.5x25	12.5x25	12.5x35	12.5x40
22		5x12.5	5x12.5	★2	6.3x12.5	6.3x16	6.3x18	8x18	10x20	12.5x20	12.5x25	12.5x30	12.5x35	12.5x40	16x35	16x40
33	5x12.5	5x12.5	5x12.5	6.3x12.5	6.3x16	6.3x18	8x16	10x20	10x25	12.5x25	12.5x40	12.5x40	16x30	16x30	18x40	22x40
47	5x12.5	5x12.5	6.3x12.5	6.3x16	8x16	8x16	8x18	10x25	10x25	12.5x40	12.5x40	16x30	16x40	18x40	22x40	22x50
100	6.3x12.5	6.3x16	6.3x18	8x16	8x18	10x20	10x25	10x30	12.5x25	16x35	16x40	18x40	22x50			
220	6.3x16	8x16	8x18	10x20	10x25	10x30	12.5x25	★5	12.5x40	22x40	22x50					
330	8x16	8x18	10x20	10x25	10x30	12.5x25	12.5x30	★6	16x35							
470	10x20	10x20	10x25	12.5x20	12.5x30	12.5x30	12.5x40	16x40	18x40							
1,000	10x25	10x30	12.5x25	12.5x30	12.5x40	16x35	★3	22x40	22x50							
2,200	12.5x25	12.5x30	★1	16x40	18x40	22x40	★4	25.4x60								
3,300	12.5x35	12.5x40	16x40	18x40	22x40	22x50	25.4x50									
4,700	16x30	16x35	18x40	22x50	25.4x50	25.4x60										
10,000	22x40	22x40	22x50	25.4x60												

	SM, SMC	KM, KMC
★1	12.5x40	16x30
★2	5x12.5	6.3x12.5
★3	16x40	18x40
★4	22x50	25.4x50
★5	12.5x30	16x30
★6	12.5x40	16x35

Unit (mm)

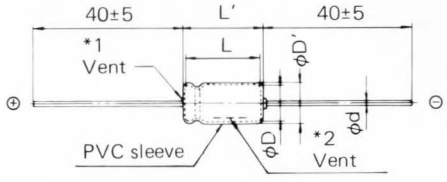
DIMENSIONS

VB/Radial lead — Unit (mm)



φD	φ5	φ6.3	φ8	φ10	φ12.5	φ16	φ18
φd	0.5	0.6	0.6	0.6	0.6	0.8	0.8
F	2	2.5	3.5	5	5	7.5	7.5
L'	L + 1.5					L + 2.0	
φD'	φD + 0.5					φD + 0.5	

T/Axial lead — Unit (mm)



Note) *1 This vent is applied only to SM of φD=12.5 mm and more.

*2 This vent is applied only to SM of φD=6.3~10 mm and KM, KMC, SMC of φD=6.3~25.4 mm.

φD	φ5	φ6.3	φ8	φ10	φ12.5	φ16	φ18	φ22	φ25.4
φd	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8
L'	L + 1.5					L + 2.0			
φD'	φD + 0.5					φD + 0.5			

SM, SMC Series

Maximum Ripple Current (mA RMS)
VB/Radial Lead

At 85°C, 120 Hz

Series	SM, SMC									SM				
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250V	350V	450V
0.47						6			10	6.7			9.2	
1						13			18	9.8		14	13	13
2.2						23	27		31	16		21	19	21
3.3						29	35		41	26	26	26	24	29
4.7				22	26	35	44		52	31	31	31	31	38
10			31	40	44	51	70		88	46	50	55	51	61
22		51	55	69	76	80	110	130	145	82	82	90	91	
33	44	68	73	90	100	105	140	180	190	110	122	122	122	
47	54	84	94	110	135	140	180	195	235	145	145	156		
100	90	140	160	170	230	250	300	330	390	234	248			
220	155	240	285	320	400	450	520	565	720					
330	222	320	385	450	520	600	700	825	980					
470	265	410	480	580	760	800	920	1020	1300					
1000	460	640	780	920	1050	1350	1550							
2200	787	946	1120	1300	1359									
3300	1027	1189	1347	1560										
4700	1270	1410	1585											
6800	1674	1959												
10000	2037													

Maximum Ripple Current (mA RMS)
T/Axial Lead

At 85°C, 120 Hz

Series	SM, SMC									SM						
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250v	315V	350V	400V	450V
0.47				7		9			10	8.8		8.8		10	10	10
1				11		13	14	14	15	12	16	16		14	15	15
2.2				16		19	21	21	23	19	22	24		21	23	25
3.3				20		24	26	26	32	29	29	32		28	31	32
4.7				24	26	28	32	36	38	35	35	38		37	40	41
10			33	35	38	41	52	58	70	56	60	62	67	60	68	72
22		43	48	52	63	77	91	102	126	100	100	109	110	102	109	110
33	48	53	59	72	86	99	119	145	168	133	140	140	146	132	140	140
47	58	63	80	95	116	127	148	187	200	167	167	170	170	170	170	180
100	95	116	137	156	177	225	273	292	323	260	260	260	270			
220	157	194	227	282	331	388	449	476	559	380	440					
330	217	249	324	376	434	491	583	641	732							
470	315	346	419	458	568	622	765	828	944							
1000	500	585	676	767	911	1066	1208	1440	1700							
2200	787	907	1103	1267	1444	1744	2110	2479								
3300	1038	1170	1388	1560	1850	2184	2554									
4700	1254	1434	1684	2181	2489	2865										
10000	2277	2435	2904	3563												

Maximum Equivalent Series Resistance (ohm)
VB/Radial Lead

At 20°C, 120 Hz

Series	SM, SMC									SM				
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250V	350V	450V
0.47						352.73			246.92	705.46			846.55	
1						165.79			116.05	331.57		331.57	397.88	397.88
2.2						75.36	60.29		52.75	150.72		150.72	180.86	180.86
3.3						50.24	40.19		35.17	100.48	100.48	100.48	120.57	120.57
4.7				49.39	42.33	35.28	28.22		24.70	70.55	70.55	70.55	84.66	84.66
10			26.53	23.21	19.90	16.58	13.27		11.61	33.16	33.16	33.16	39.79	39.79
22		15.08	12.06	10.55	9.05	7.54	6.03	6.03	5.28	15.08	15.08	15.08	18.09	
33	12.06	10.05	8.04	7.04	6.03	5.03	4.02	4.02	3.52	10.05	10.05	10.05	12.06	
47	8.47	7.06	5.65	4.94	4.24	3.53	2.83	2.83	2.47	7.06	7.06	7.06		
100	3.98	3.32	2.66	2.33	1.99	1.66	1.33	1.33	1.17	3.32	3.32			
220	1.81	1.51	1.21	1.06	0.91	0.76	0.61	0.61	0.53					
330	1.21	1.01	0.81	0.71	0.61	0.51	0.41	0.41	0.36					
470	0.85	0.71	0.57	0.50	0.43	0.36	0.29	0.29	0.25					
1000	0.40	0.34	0.27	0.24	0.20	0.17	0.14							
2200	0.20	0.17	0.14	0.13	0.11									
3300	0.15	0.13	0.11	0.091										
4700	0.11	0.092	0.078											
6800	0.083	0.073												
10000	0.070													

Maximum Equivalent Series Resistance (ohm)
T/Axial Lead

At 20°C, 120 Hz

Series	SM, SMC									SM						
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250v	315V	350V	400V	450V
0.47				493.83		352.73			246.92	705.46		705.46		846.55	846.55	846.55
1				232.10		165.79	132.63	132.63	116.05	331.57	331.57	331.57		397.88	397.88	397.88
2.2				105.50		75.36	60.29	60.29	52.75	150.72	150.72	150.72		180.86	180.86	180.86
3.3				70.34		50.24	40.19	40.19	35.17	100.48	100.48	100.48		120.57	120.57	120.57
4.7				49.39	42.33	35.28	28.22	28.22	24.70	70.55	70.55	70.55		84.66	84.66	84.66
10			26.53	23.21	19.90	16.58	13.27	13.27	11.61	33.16	33.16	33.16	33.16	39.79	39.79	39.79
22		15.08	12.06	10.55	9.05	7.54	6.03	6.03	5.28	15.08	15.08	15.08	15.08	18.09	18.09	18.09
33	12.06	10.05	8.04	7.04	6.03	5.03	4.02	4.02	3.52	10.05	10.05	10.05	10.05	12.06	12.06	12.06
47	8.47	7.06	5.65	4.94	4.24	3.53	2.83	2.83	2.47	7.06	7.06	7.06	7.06	8.47	8.47	8.47
100	3.98	3.32	2.66	2.33	1.99	1.66	1.33	1.33	1.17	3.32	3.32	3.32	3.32			
220	1.81	1.51	1.21	1.06	0.91	0.76	0.61	0.61	0.53	1.51	1.51					
330	1.21	1.01	0.81	0.71	0.61	0.51	0.41	0.41	0.36							
470	0.85	0.71	0.57	0.50	0.43	0.36	0.29	0.29	0.25							
1000	0.40	0.34	0.27	0.24	0.20	0.17	0.14	0.14	0.12							
2200	0.20	0.17	0.14	0.13	0.11	0.091	0.076	0.076								
3300	0.15	0.13	0.11	0.091	0.081	0.071	0.061									
4700	0.11	0.092	0.078	0.071	0.064	0.057										
10000	0.070	0.063	0.057	0.054												

KM, KMC Series

Maximum Ripple Current (mA RMS)

VB/Radial Lead

At 105°C, 120 Hz

Series	KM, KMC											
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250V
0.47						6			10	7		
1						12			15	11		20
2.2						18			22	19		30
3.3						22			27	30	34	37
4.7						27	30	34	36	36	41	45
10						39	50	57	61	53	65	79
22				49	60	65	85	99	106	95	107	127
33			56	68	73	93	104	133	142	127	157	172
47		60	76	81	101	111	145	158	184	168	188	221
100	90	99	128	137	172	207	252	280	298	270	320	
220	155	170	222	260	305	371	414	449	530			
330	222	243	297	346	415	454	550	651	699			
470	265	317	386	458	535	649	725	804	888			
1000	460	560	676	800	864	1014	1212					
2200	787	946	1046	1230	1359							
3300	1027	1189	1582	1620								
4700	1270	1410	1881									
10000	2037											

Maximum Ripple Current (mA RMS)

T/Axial Lead

At 105°C, 120 Hz

Series	KM, KMC											
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250V
0.47						6			10	8		11
1						13	14		15	12	15	17
2.2						19	21		23	18	23	27
3.3						24	26	26	32	25	31	34
4.7				24	26	28	32	36	38	30	37	48
10				35	38	41	52	58	70	58	65	79
22		44	48	55	63	77	91	102	126	95	116	138
33		54	59	72	86	99	119	145	168	127	157	172
47		64	80	95	116	127	148	187	200	168	188	221
100		118	137	156	177	225	273	292	323	270	311	351
220		198	227	282	331	388	449	536	559	446	525	
330	225	255	324	376	434	491	583	672	732			
470	329	354	419	458	568	622	765	828	944			
1000	516	609	676	767	911	1066	1241	1440	1700			
2200	859	1004	1131	1267	1444	1744	1721	2479				
3300	1164	1289	1388	1560	1850	2184	2554					
4700	1495	1646	1684	2181	2489	2865						
10000	2483	2672	2904	3563								

Maximum Equivalent Series Resistance (ohm)

VB/Radial Lead

At 20°C, 120 Hz

Series	KM, KMC											
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250V
0.47						352.8			247.0	529.1		
1						165.8			116.1	248.7		165.8
2.2						75.4			52.8	113.1		75.4
3.3						50.3			35.2	75.4	60.3	50.3
4.7						35.3	28.3	28.3	24.7	53.0	42.4	35.3
10						16.6	13.3	13.3	11.7	24.9	19.9	16.6
22				10.6	9.1	7.6	6.1	6.1	5.3	11.4	9.1	7.6
33			8.1	7.1	6.1	5.1	4.1	4.1	3.6	7.6	6.1	5.1
47		6.8	5.7	5.0	4.3	3.6	2.9	2.9	2.5	5.3	4.3	3.6
100	3.7	3.2	2.7	2.4	2.0	1.7	1.4	1.4	1.2	2.5	2.0	
220	1.7	1.5	1.3	1.1	0.91	0.76	0.61	0.61	0.53			
330	1.2	0.96	0.81	0.71	0.61	0.51	0.41	0.41	0.36			
470	0.78	0.68	0.57	0.50	0.43	0.36	0.29	0.29	0.25			
1000	0.40	0.35	0.30	0.27	0.24	0.20	0.17					
2200	0.20	0.18	0.16	0.14	0.13							
3300	0.14	0.13	0.12	0.11								
4700	0.11	0.096	0.085									
10000	0.070											

Maximum Equivalent Series Resistance (ohm)

T/Axial Lead

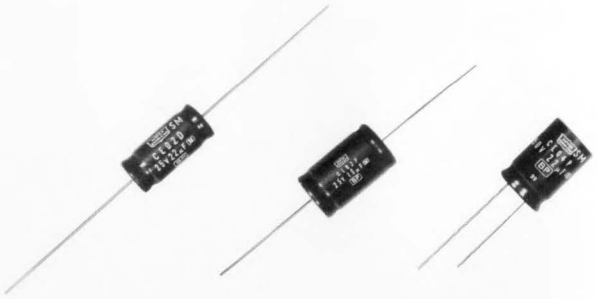
At 20°C, 120 Hz

Series	KM, KMC											
μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160V	200V	250V
0.47						352.8			247.0	529.1		352.8
1						165.8	132.7		116.1	248.7	199.0	165.8
2.2						75.4	60.3		52.8	113.1	90.5	75.4
3.3						50.3	40.2	40.2	35.2	75.4	60.3	50.3
4.7				49.4	42.4	35.3	28.3	28.3	24.7	53.0	42.4	35.3
10				23.3	19.9	16.6	13.3	13.3	11.7	24.9	19.9	16.6
22		14.4	12.1	10.6	9.1	7.6	6.1	6.1	5.3	11.4	9.1	7.6
33		9.6	8.1	7.1	6.1	5.1	4.1	4.1	3.6	7.6	6.1	5.1
47		6.8	5.7	5.0	4.3	3.6	2.9	2.9	2.5	5.3	4.3	3.6
100		3.2	2.7	2.4	2.0	1.7	1.4	1.4	1.2	2.5	2.0	1.7
220		1.5	1.3	1.1	0.91	0.76	0.61	0.61	0.53	1.2	0.91	
330	1.2	0.96	0.81	0.71	0.61	0.51	0.41	0.41	0.36			
470	0.78	0.68	0.57	0.50	0.43	0.36	0.29	0.29	0.25			
1000	0.40	0.35	0.30	0.27	0.24	0.20	0.17	0.17	0.15			
2200	0.20	0.18	0.16	0.14	0.13	0.11	0.091	0.091				
3300	0.14	0.13	0.12	0.11	0.091	0.081	0.071					
4700	0.011	0.096	0.085	0.078	0.071	0.064						
10000	0.070	0.065	0.060	0.057								

SM-BP (D) SERIES
-BP (P) SERIES

- **Bi-polar type capacitors**
- **SM-BP(D) for Reversing Polarity Circuits**
- **SM-BP(P) for Speaker Crossover Networks**

- SM-BP(D) series capacitors are suitable for use in circuits whose polarity is sometimes reversed or unknown.
- SM-BP(P) series capacitors are designed for use in speaker networks of Hi-Fi sound audio systems and have excellent frequency characteristics.
- These capacitors can not withstand an AC application which exceeds the specified maximum permissible ripple current rating. (see engineering bulletin)



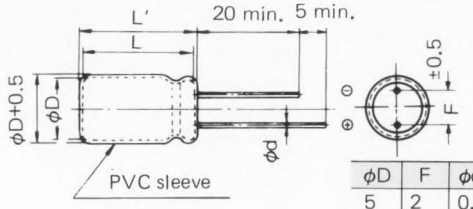
- For detail specifications, refer to latest issue of Engineering Bulletin No. 527.

CHARACTERISTICS

Item \ Series	SM-BP(D)	SM-BP(P)
Operating temperature range	-40 ~ +85°C	
Rated voltage range	6.3 ~ 100 V•DC	25 ~ 63 V•DC
Capacitance tolerance	±20% (at 120 Hz, 20°C)	±20% (M) [±10% (K) is available at request] (at 1 kHz, 20°C)
Leakage current (in both directions)	After 1 minute: 0.06CV (μA) or 10 μA, whichever is gerater After 5 minutes: 0.03CV (μA) or 3 μA, whichever is greater (at 20°C)	
Dissipation factor	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 Dissipation factor: 0.24 / 0.20 / 0.16 / 0.16 / 0.14 / 0.12 / 0.10 / 0.10 / 0.09 For the capacitors exceeding 1,000 μF, the specification of DF is increased by 0.02 (at 120 Hz, 20°C)	Rated voltage (V): 25 / 50 / 63 Dissipation factor: 0.12 / 0.10 / 0.09 0.20 at 10 kHz (Applicable to the capacitances of 10 μF or less) (at 1 kHz, 20°C)
Temperature characteristics	Impedance ratio at 120 Hz; Rated voltage (V): 6.3 / 10 / 16 / 25 / 35~100 Z(-25°C)/Z(20°C): 4 / 3 / 2 / 2 / 2 Z(-40°C)/Z(20°C): 10 / 8 / 6 / 4 / 3	
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after rated DC voltage applied for 1,000 hours at 85°C. During this test the rated DC voltage shall be reversed on the capacitor every 250 hours. Capacitance change ≦ ±20% of the initial value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value	Capacitance change ≦ ±15% of the initial value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value
Others	Satisfies characteristic W of JIS C 5141	Satisfies EIAJ RC-3803

DIMENSIONS

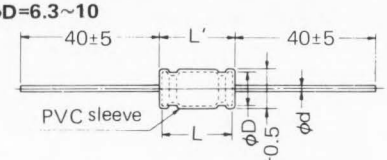
VB/Radial lead — Unit (mm)



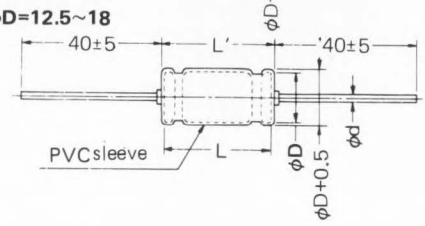
φD	F	φd	L'
5	2	0.5	L+1.5
6.3	2.5	0.6	L+1.5
8	3.5	0.6	L+1.5
10	5	0.6	L+1.5
12.5	5	0.6	L+1.5
16	7.5	0.8	L+2.0

T/Axial lead — Unit (mm)

φD=6.3~10



φD=12.5~18



φD	φd	L'
6.3	0.6	L+1.5
8	0.6	L+1.5
10	0.6	L+1.5
12.5	0.6	L+1.5
16	0.8	L+2.0
18	0.8	L+2.0

Specifications subject to change without notice.

CASE SIZES

SM-BP(D) SERIES

VB/Radial lead — φDxL (mm)

μF \ V	6.3	10	16	25	35	50	63	80	100
0.47						5x11			5x11
1						5x11			5x11
2.2						5x11		5x11	6.3x11
3.3						6.3x11	6.3x11	6.3x11	8x11.5
4.7					5x11	6.3x11	6.3x11	6.3x11	8x11.5
10			5x11	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16
22		5x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20
33	5x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	12.5x20
47	6.3x11	6.3x11	8x11.5	10x12.5	10x16	10x20	12.5x20	12.5x20	12.5x25
100	8x11.5	8x11.5	10x16	10x20	12.5x20	12.5x20	16x25	16x25	16x31.5
220	10x12.5	10x16	10x20	12.5x20	16x25	16x25	16x31.5		
330	10x16	10x20	12.5x20	16x25	16x25	16x35.5			
470	10x20	12.5x20	12.5x25	16x25	16x31.5				
1,000	12.5x25	16x25	16x31.5						
2,000	16x31.5	16x35.5							

T/Axial lead — φDxL (mm)

μF \ V	6.3	10	16	25	35	50	63	80	100
0.47						6.3x16			6.3x16
1						6.3x16			6.3x16
2.2						6.3x16		6.3x16	8x16
3.3						6.3x16	6.3x16	8x16	8x16
4.7					6.3x16	8x16	8x16	8x16	8x16
10					6.3x16	8x18	8x18	8x18	10x22
22			6.3x16	8x16	8x18	10x22	10x22	10x22	10x27
33		6.3x16	8x16	8x18	10x22	10x27	10x27	10x27	12.5x30
47	6.3x16	8x16	8x16	10x22	10x27	12.5x30	12.5x30	12.5x30	16x30
100	8x16	8x18	10x22	10x27	12.5x30	16x30	16x40	16x40	16x40
220	10x22	10x27	10x27	12.5x30	16x30	16x40	18x40		
330	10x27	10x27	12.5x30	16x30	16x40	18x40			
470	12.5x30	12.5x30	16x30	16x40	18x40				
1,000	16x30	16x30	16x40						
2,200	16x40	18x40							

SM-BP(P) SERIES

VB/Radial lead — φDxL (mm)

μF \ V	25	50	63
1			10x12.5
1.5			10x12.5
2.2			10x12.5
3.3			10x12.5
4.7		10x12.5	10x16
6.8	10x12.5	10x16	10x20
10	10x16	10x16	12.5x20
15	10x16	10x20	12.5x20
22	10x20	10x20	12.5x25
33	10x20	12.5x20	16x25
47	10x20	12.5x20	16x25
68	12.5x20	12.5x25	16x31.5
100	12.5x25	16x25	16x35.5

T/Axial lead — φDxL (mm)

μF \ V	25	50	63
1			8x18
1.5			8x18
2.2			8x18
3.3			8x18
4.7		8x18	10x22
6.8	8x18	10x22	10x27
10	10x22	10x22	10x27
15	10x22	10x27	10x27
22	10x27	10x27	12.5x30
33	10x27	12.5x30	12.5x40
47	10x27	12.5x30	12.5x40
68	12.5x30	12.5x40	16x40
100	12.5x40	16x40	18x40

BP (S) SERIES

• Bi-polarixed capacitors for horizontal deflection circuits of TV sets.

- Low cost compared with film capacitors.
- Items with higher permissible ripple ratings are available upon requests.

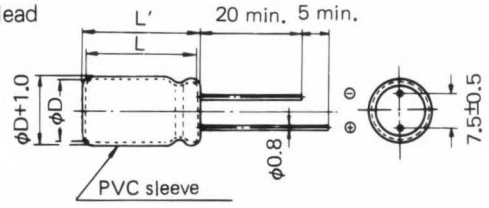
CHARACTERISTICS AND CASE SIZES

Part Number	25VB-2R2BP(S)	25VB-4R7BP(S)	25VB-6R8BP(S)	25VB-10BP(S)
Operating temperature range	-25 ~ +70°C			
Rated voltage	25 V DC			
Nominal capacitance at 120 Hz, 20°C	2.2 μF	4.7 μF	6.8 μF	10 μF
Case sizes φDxL	16x25.5 mm	16x35.5 mm	16x35.5 mm	16x35.5 mm
Max. ripple current at 15.75 kHz	6 Ap-p	7.5 Ap-p	8 Ap-p	10 Ap-p
Capacitance tolerance	±20% (at 20°C, 120 Hz)			
Leakage current	100 μA (After 5 minutes) in both directions. (at 20°C)			
Dissipation factor	0.05 max. (at 20°C, 120 Hz)			
Temperature characteristics	Capacitance change shall be within ±10% of the value at 20°C over operating temperature range.			
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after DC 12 V and specified ripple current applied for 1,000 hours at 70°C Capacitance change ≦ ±15% of the initial value Dissipation factor ≦ 200% of the initial specified value Leakage current ≦ The initial specified value			

DIMENSIONS

Unit (mm)

VB/Radial lead



SRE, KRE SERIES

- **Nominal case sizes, φ3x5ℓ to φ6.3x5ℓmm.**
- **Operating temperature range, SRE series: -40°C to +85°C KRE series: -55°C to +105°C**

- KRE series are high reliable, solvent proof type. For cleaning conditions, see page 10.
- Designed for space-saving and high density insertion.
- 4WV products are standarized for recent battery power source devices.
- Low price compared to tantalum capacitors.
- For detail specifications, refer to latest issue of Engineering Bulletin No.524.
- Application; VTR, camera, car audio, mini-audio sets, OA related equipment and other industrial and commercial applications.

CHARACTERISTICS

Item \ Series	SRE	KRE
Operating temperature range	-40 ~ +85°C	-55 ~ +105°C
Capacitance tolerance	±20% (at 20°C, 120 Hz)	
Leakage current	0.01CV (μA) or 3 μA, whichever is greater. (After 2 minutes) (at 20°C)	
Dissipation factor	See table below	
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 hours at maximum operating temperature. Capacitance change ≦ ±20% of the initial value (±25% for KRE with φ3 and φ3.5 mm) Dissipation factor ≦ 200% of the initial specified value. Leakage current ≦ The initial specified value.	
Others	Satisfies characteristic W of JIC C5141.	

Rated Voltage (V)	4	6.3	10	16	25	35	50
SRE	0.35	0.24	0.20	0.16	0.14	0.12	0.10
KRE	0.30	*0.27	*0.23	*0.19	*0.15	*0.13	*0.11

*For φ3x5ℓ KRE, 0.02 shall be added to the above value. (at 20°C, 120 Hz)

CASE SEZES

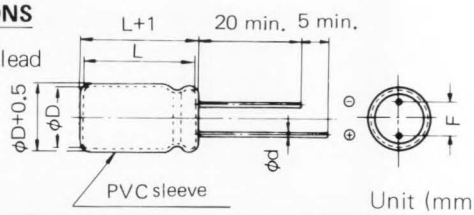
φDxL (mm)

μF \ V	4	6.3	10	16	25	35	50
0.1							3x5
0.15							3x5
0.22							3x5
0.33							3x5
0.47							3x5
0.68							3x5
1							3x5
1.5							3x5
2.2						3x5	3.5x5
3.3					3x5	3.5x5	4x5
4.7				3x5	3.5x5	4x5	5x5
6.8			3x5	3.5x5	4x5	5x5	6.3x5
10		3x5	3.5x5	3.5x5	5x5	5x5	6.3x5
15	3.5x5	3.5x5	4x5	5x5	6.3x5	6.3x5	
22	4x5	4x5	5x5	5x5	6.3x5	6.3x5	
33	*	5x5	5x5	6.3x5	6.3x5		
47	5x5	5x5	6.3x5	6.3x5			
68	6.3x5	6.3x5	6.3x5				
100	6.3x5	6.3x5					

*SRE: 4x5
KRE: 5x5

DIMENSIONS

VB/Radial lead



Unit (mm)

φD	3	3.5	4	5	6.3
φd	0.4	0.4	0.45	0.45	0.45
F	1.0±0.3	1±0.3	1.5±0.5	2.0±0.5	2.5±0.5

For lead forming type and taping specifications, refer to page 7 and 9.

SRE, KRE Series

Maximum Ripple Current (mA RMS) 85°C, 120Hz

μF	4V	6.3V	10V	16V	25V	35V	50V
0.10							1.3 (1.3)
0.15							2.0 (2.0)
0.22							2.9 (2.6)
0.33							3.5 (3.2)
0.47							4.2 (3.8)
0.68							5.1 (4.6)
1.0							6.2 (5.6)
1.5							7.5 (6.9)
2.2						8.3 (7.7)	10 (10)
3.3					9.5 (8.8)	11 (11)	14 (14)
4.7				10 (9.4)	12 (12)	15 (15)	19 (19)
6.8			11 (11)	14 (13)	16 (16)	20 (20)	24 (24)
10		12 (12)	15 (14)	17 (16)	23 (23)	25 (25)	29 (29)
15	14 (15)	17 (16)	20 (20)	26 (25)	30 (30)	33 (33)	
22	19 (21)	23 (21)	29 (27)	32 (30)	37 (37)	40 (40)	
33	23 (29)	32 (30)	35 (34)	42 (40)	45 (45)		
47	32 (35)	38 (36)	45 (43)	50 (48)			
68	41 (45)	50 (46)	54 (52)				
100	50 (55)	60 (56)					

* ( ) is of KRE, at 105°C, 120Hz

Specifications subject to change without notice.

SRA, KMA SERIES

- **Nominal Case Size, φ4x7ℓ to φ7x7ℓ mm**
- **Operating Temperature Range, SRA series; -40°C to +85°C KMA series; -55°C to +105°C**

- KMA series are solvent-proof type. (See page 10, for cleaning conditions)
- Designed for space-saving and high density insertion.
- 4WV products are standardized for recent battery power source devices.
- Low price compared with tantalums.
- For detail specifications, refer to latest issue of Engineering Bulletin No. 524.
- Applications; VTR, camera, car audio equipment, etc.

CHARACTERISTICS

Item \ Series	SRA	KMA
Operating temperature range	-40 ~ +85°C	-55 ~ +105°C
Capacitance tolerance	±20% (M) (at 20°C, 120 Hz)	
Leakage current	0.01CV (μA) or 3 μA, whichever is greater (after 2 minutes) (at 20°C)	
Dissipation factor		
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 hours at maximum operating temperature. Capacitance change ≦ ±20% of the initial value (±25% for KMA of 6.3 V ~ 16 V) Dissipation factor ≦ 200% of the initial specified value Leakage current ≦ The initial specified value	
Others	Satisfies Characteristic W of JIS C5141	

Rated voltage	4	6.3	10	16	25	35	50	63
SRA	0.35	0.24	0.20	0.16	0.14	0.12	0.10	0.08
KMA	0.33	0.22	0.19	0.16	0.14	0.12	0.10	0.08

(at 20°C, 120 Hz)

CASE SIZES

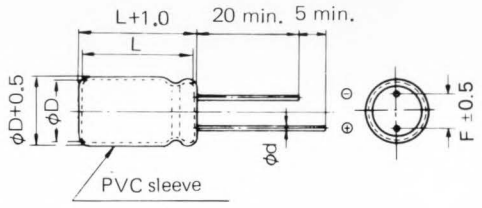
φDxL (mm)

μF \ V	4	6.3	10	16	25	35	50	63
0.1							4x7	4x7
0.15							4x7	4x7
0.22							4x7	4x7
0.33							4x7	4x7
0.47							4x7	4x7
0.68							4x7	4x7
1							4x7	4x7
1.5							4x7	4x7
2.2							4x7	4x7
3.3						4x7	4x7	5x7
4.7					4x7	4x7	5x7	6.3x7
6.8				4x7	5x7	5x7	6.3x7	
10				4x7	5x7	5x7	6.3x7	7x7
15			4x7	5x7	6.3x7	6.3x7		
22		4x7	5x7	5x7	6.3x7	6.3x7	7x7	
33	4x7	5x7	5x7	6.3x7	6.3x7	7x7		
47	4x7	5x7	6.3x7	6.3x7	7x7			
68		6.3x7	6.3x7					
100	5x7	6.3x7	6.3x7	7x7				
220	7x7	7x7						

DIMENSIONS

VB/Radial lead

Unit (mm)



φD	4	5	6.3	7
φd	0.45			
φF	1.5	2.0	2.5	

For lead forming type and taping specifications, refer to page 7 and 9.

SRA, KMA Series

SRA: 85°C, 120 Hz
KMA: 105°C, 120 Hz

Maximum Ripple Current (mA RMS)

μF	4V	6.3V	10V	16V	25V	35V	50V	63V
0.1							1.0	1.3
0.15							1.5	1.9
0.22							2.3	2.9
0.33							3.5	4.4
0.47							5.0	7.9
0.68							7.1	9.2
1.0							10	11
1.5							12	13
2.2							15	17
3.3						17	18	21
4.7					19	20	23	26
6.8				20	23	24	28	
10				25	28	30	34	
15			28	31	35	37		
22		31	35	39	43	47		
33	26	39	43	49	53			
47	34	47	53	59				
68		57	63					
100	61	71						
220	95							

KMA Series

Maximum Equivalent Series Resistance (ohm) 20°C, 120 Hz

μF	4V	6.3V	10V	16V	25V	35V	50V	63V
0.1							1658	1326
0.15							1105	884
0.22							754	603
0.33							502	402
0.47							353	282
0.68							244	195
1.0							166	133
1.5							111	88.4
2.2							75.4	60.3
3.3						60.3	50.0	40.2
4.7					49.4	42.3	35.0	28.2
6.8				39.0	34.1	29.2	24.4	
10				26.5	23.2	19.9	16.6	
15			21.0	17.7	15.5	13.3		
22		16.6	14.3	12.1	10.5	9.04		
33	16.6	11.1	9.55	8.04	7.03			
47	11.6	7.76	6.70	5.64				
68		5.36	4.63					
100	5.47	3.65						
220	2.49							

SRA Series

Maximum Equivalent Series Resistance (ohm) 20°C, 120 Hz

μF	4V	6.3V	10V	16V	25V	35V	50V	63V
0.1							1658	1326
0.15							1105	884
0.22							754	603
0.33							502	402
0.47							353	282
0.68							244	195
1.0							166	133
1.5							111	88.4
2.2							75.4	60.3
3.3						60.3	50.0	40.2
4.7					49.4	42.3	35.0	28.2
6.8				39.0	34.1	29.2	24.4	
10				26.5	23.2	19.9	16.6	
15			22.1	17.7	15.5	13.3		
22		18.1	15.1	12.1	10.5	9.04		
33	17.6	12.1	10.1	8.04	7.03			
47	12.4	8.47	7.06	5.64				
68		5.85	4.88					
100	5.81	3.98						
220	2.64							

SR, SRC SERIES

· Low Profile Case Sizes, φ5 x 9ℓ to φ18 x 15ℓ (mm)
Operating Temerature Range, -40°C to +85°C

- SRC series are solvent proof type. (See page 10, for cleaning conditions)
- Can vent for case diameters, φ10 mm and greater.
- For detail specifications, refer to latest issue of Engineering Bulletin No. 524.
- Applications: Car audio, Cassete tape recorder and other portable equipments.

CHARACTERISTICS

Item \ Series	SR, SRC
Operating temperature range	-40 ~ +85°C
Capacitance tolerance	±20% (at 20°C, 120 Hz)
Leakage current	0.01 CV or 3 μA, whichever is greater (after 2 minutes) (at 20°C)
Dissipation factor	Rated voltage: 6.3 / 10 / 16 / 25 / 35 / 50 Dissipation factor: 0.24 / 0.2 / 0.16 / 0.14 / 0.12 / 0.10 (at 20°C, 120 Hz) Note: Above DF specifications shall be 0.03 added every 1,000 μF for capacitors exceeding 1,000 μF.
Load life	The following specification shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 1,000 hours at 85°C. Capacitance change ≦ ±20% of the initial value Dissipation factor SR; ≦ 200% of the initial specified value SRC; ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value
Others	Satisfies characteristic W of JIS C5141

CASE SIZES

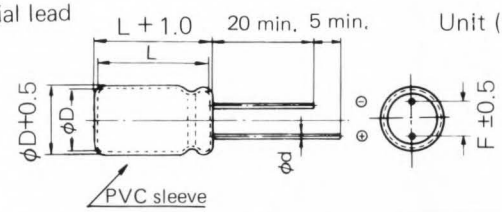
φDxL (mm)

μF \ V	6.3	10	16	25	35	50
0.1						5x9
0.22						5x9
0.33						5x9
0.47						5x9
1						5x9
2.2						5x9
3.3						5x9
4.7					5x9	5x9
10			5x9	5x9	5x9	5x9
22		5x9	5x9	5x9	6.3x9	6.3x9
33	5x9	5x9	5x9	6.3x9	6.3x9	8x9
47	5x9	5x9	6.3x9	6.3x9	8x9	8x9
100	6.3x9	6.3x9	8x9	8x9	10x9	10x12.5
220	8x9	8x9	10x9	10x12.5	(12.5x12.5) 10x15	12.5x15
330	10x9	10x9	10x12.5	(12.5x12.5) 10x15	12.5x15	(12.5x20) 16x15
470	10x9	10x12.5	(12.5x12.5) 10x15	12.5x15	(12.5x20) 16x15	(18x15) 16x20
1,000	12.5x12.5	12.5x15	(12.5x20) 16x15	(18x15) 16x20		
2,200	(12.5x20) 16x15	16x15	(18x15) 16x20			
3,300	(18x15) 16x20					

Case size in ( ) is available at request.

DIMENSIONS

VB/Radial lead



φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.6	0.6	0.6	0.6	0.8	0.8
F	2	2.5	3.5	5	5	7.5	7.5

SR, SRC Series

Maximum Ripple Current (mA RMS)*

VB/Radial Lead 85°C, 120Hz

μF	6.3V	10V	16V	25V	35V	50V
0.1						1.3
0.22						2.9
0.33						4.4
0.47						6.2
1.0						12
2.2						18
3.3						22
4.7					24	26
10			30	32	35	38
22		40	45	48	56	61
33	45	49	55	64	69	85
47	53	58	71	76	92	101
100	84	93	117	125	154	188
220	141	155	198	236	280	340
330	198	217	270	318	381	473
470	236	288	355	421	515	595
1000	434	513	651	733		
2200	743	805	934			
3300	910					

* These values are for standard case sizes only.

Maximum Equivalent Series Resistance (ohm)*

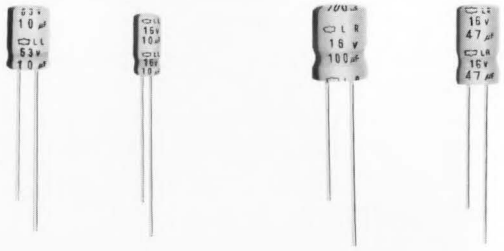
VB/Radial Lead 20°C, 120 Hz

μF	6.3V	10V	16V	25V	35V	50V
0.1						1659.0
0.22						754.0
0.33						502.7
0.47						353.0
1.0						165.9
2.2						75.4
3.3						50.3
4.7					42.4	35.3
10			26.6	23.3	19.9	16.6
22		15.1	12.1	10.6	9.05	7.54
33	12.1	10.1	8.05	7.04	6.04	5.03
47	8.47	7.06	5.65	4.94	4.24	3.53
100	3.98	3.32	2.66	2.33	1.99	1.66
220	1.81	1.51	1.21	1.06	0.91	0.76
330	1.21	1.01	0.81	0.71	0.61	0.51
470	0.85	0.71	0.57	0.50	0.43	0.36
1000	0.40	0.34	0.27	0.24		
2200	0.21	0.18	0.15			
3300	0.15					

*These values are for standard case sizes only.

LL, LR SERIES

- **Low leakage current**
  LL series; 0.002 CV or 0.2 μA (one minute value)
  LR series, 0.002 CV or 0.2 μA (30 seconds value)
- For LR series, the lead wires are fixed at their roots with epoxy resin to prevent mechanical stress to internal element.
- Excellent shelf performance.
- For detail specifications, refer to latest issue of Engineering Bulletin No.132.



CHARACTERISTICS

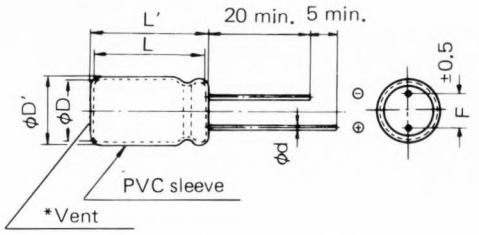
Item \ Series	LL	LR
Operating temperature range	−40 ~ +85°C	
Capacitance tolerance	−20 ~ +20% (M) [−10~+10% (K) is available at requests] (at 120Hz, 20°C)	
Dissipation factor (Tan δ)	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 Dissipation factor: 0.24 / 0.20 / 0.16 / 0.14 / 0.12 / 0.10 / 0.10 / 0.08 / 0.07 For capacitors whose capacitance exceeds 1,000μF, the value of DF should be increased by 0.02 for every 1,000μF. (at 120Hz, 20°C)	
Leakage current	Rated DC working voltage shall be applied to the capacitor in series with a protective resistor of 1,000 ohms. The leakage current shall not exceed the following values after 60 seconds (LL series) and 30 seconds (LR series) at 20°C. ○ Polarized capacitor : I = 0.002CV or 0.2μA, whichever is greater. ○ Bi-polarized capacitor : I = 0.006CV or 0.6μA whichever is greater. where I: Leakage current (μA), C: Nominal capacitance (μF), V: Rated voltage (V)	
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 hours at 85°C. Capacitance change ≦ ±15% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value. For bi-polarized capacitors, the rated DC working voltage should be applied so as to reverse polarity in every 250 hours.	
Shelf life	Accelerated test The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≦ ±15% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value. Storage test After exposing the capacitors at room temperature for 6 months without voltage applied, capacitance and DF shall meet the initial specified value and leakage current shall not exceed 150% of the initial specified value (for LL) and initial specified value (for LR, 1 minute value) without pre-conditioning.	
Others	Satisfies characteristic W of JIS C 5141.	

Specifications subject to change without notice.

DIMENSIONS

VB/Radial lead

Unit (mm)



φD	5	6.3	8	10	12.5	16	18
F	2	2.5	3.5	5	5	7.5	7.5
φd	0.5	0.6	0.6	0.6	0.6	0.8	0.8
L'	(LL series) L+1.5max (LR series) L+1.0max.					L+2.0max.	
φD'	φD + 0.5 max.					φD+0.5max.	

* LL series of case dia. φ5—φ8mm and LR series have no vents.

CASE SIZES

Polarized

φDxL (mm)

V / Series / μF	6.3		10		16		25		35	50		63	80	100
	LL	LR	LL	LR	LL	LR	LL	LR	LL	LL	LR	LL	LL	LL
0.1										5x11	5x14			5x11
0.15										5x11				5x11
0.22										5x11	5x14			5x11
0.33										5x11	5x14			5x11
0.47										5x11	5x14			5x11
0.68										5x11				5x11
1										5x11	5x14			5x11
1.5										5x11				5x11
2.2										5x11	5x14		5x11	6.3x11
3.3								5x14		5x11	6.3x14		6.3x11	8x11.5
4.7							5x11	5x14	5x11	6.3x11	6.3x14		6.3x11	8x11.5
6.8							5x11		5x11	6.3x11		6.3x11	8x11.5	10x12.5
10					5x11	5x14	6.3x11	6.3x14	6.3x11	8x11.5	8x14	8x11.5	10x12.5	10x16
15					5x11		6.3x11		8x11.5	8x11.5		10x12.5	10x16	10x20
22			5x11	5x14	6.3x11	6.3x14	8x11.5	8x14	8x11.5	10x12.5	10x15	10x16	10x16	10x20
33		5x14	6.3x11	6.3x14	6.3x11	6.3x14	8x11.5	8x14	10x12.5	10x16		10x16	10x20	12.5x20
47		6.3x14	6.3x11	6.3x14	8x11.5	8x14	10x12.5	10x15	10x12.5	10x16		10x20	10x20	12.5x25
68			6.3x11		8x11.5		10x12.5		10x16	10x20		10x20	12.5x20	12.5x25
100		8x14	8x11.5	8x14	10x12.5	10x15	10x16		10x20	12.5x20		12.5x25	12.5x25	16x25
150			10x12.5		10x16		10x20		12.5x20	12.5x25		12.5x25	16x25	16x31.5
220	10x12.5		10x16		10x20		12.5x20		12.5x25	16x25		16x31.5	16x31.5	18x35.5
330	10x16		10x20		12.5x20		12.5x25		16x25	16x31.5		16x35.5	16x35.5	18x40
470	10x20		12.5x20		12.5x20		16x25		16x25	16x35.5		18x35.5	18x35.5	
680	12.5x20		12.5x20		12.5x25		16x31.5		16x31.5	16x35.5		18x35.5		
1,000	12.5x25		12.5x25		16x25		16x35.5		18x35.5	18x40				
1,500	12.5x25		16x25		16x31.5		16x35.5		18x40					
2,200	16x25		16x31.5		18x35.5		18x40							
3,300	16x35.5		16x35.5		18x40									
4,700	18x35.5		18x40											

Bi-polarized

φDxL (mm)

V / Series / μF	6.3		10		16		25		35	50		63	80	100
	LL	LR	LL	LR	LL	LR	LL	LR	LL	LL	LR	LL	LL	LL
0.1										5x11	5x14			5x11
0.15										5x11				5x11
0.22										5x11	5x14			5x11
0.33										5x11	5x14			5x11
0.47										5x11	5x14			5x11
0.68										5x11				5x11
1										5x11	5x14		5x11	6.3x11
1.5										5x11		5x11	6.3x11	6.3x11
2.2							5x11	5x14	5x11	6.3x11	6.3x14	6.3x11	8x11.5	8x11.5
3.3						5x14	5x11	6.3x14	6.3x11	6.3x11	8x14	8x11.5	8x11.5	10x12.5
4.7						5x14	5x11	6.3x14	6.3x11	8x11.5	8x14	8x11.5	10x12.5	10x16
6.8					5x11		6.3x11		8x11.5	8x11.5		10x12.5	10x16	10x16
10			5x11	5x14	6.3x11	6.3x14	6.3x11	8x14	8x11.5	10x12.5	10x15	10x16	10x20	10x20
15			5x11		6.3x11		8x11.5		10x12.5	10x16		10x20	10x20	10x20
22	5x11		6.3x11	6.3x14	8x11.5	8x14	10x12.5	8x14	10x16	10x20		10x20	12.5x20	12.5x20
33	6.3x11	6.3x14	6.3x11	8x14	8x11.5	8x14	10x16	10x15	10x20	10x20		12.5x20	12.5x20	12.5x25
47	6.3x11	6.3x14	8x11.5	8x14	10x12.5	10x15	10x20		10x20	12.5x20		12.5x20	12.5x25	16x25
68	8x11.5		10x12.5		10x16		10x20		12.5x20	12.5x20		12.5x25	16x25	16x25
100	8x11.5	8x14	10x16		10x20		12.5x20		12.5x20	12.5x25		16x25	16x25	16x31.5

LL Series (Polarized)

Maximum Ripple Current (mA RMS)
VB/Radial Lead

85°C, 120 Hz

μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V
0.1						1.0			2.2
0.15						1.6			3.3
0.22						2.4			4.8
0.33						3.6			7.2
0.47						5.1			10
0.68						7.4			12
1.0						11			14
1.5						15			17
2.2						18		20	24
3.3						22		28	34
4.7				22	24	30		33	41
6.8				27	29	36	36	46	58
10			30	37	40	50	50	66	78
15			37	45	56	62	73	90	104
22		40	51	63	68	88	97	109	126
33		56	63	77	98	119	119	144	171
47		67	86	109	118	142	154	172	222
68		81	104	131	156	186	186	230	267
100		113	149	175	205	250	271	303	356
150		163	201	233	279	332	332	411	473
220	180	218	264	313	368	446	480	536	612
330	244	289	359	417	498	588	601	672	762
470	315	383	428	551	595	718	749	837	
680	421	461	515	713	770	863	901		
1000	554	607	751	885	997	1110			
1500	679	823	991	1084	1241				
2200	910	1073	1281	1391					
3300	1228	1345	1594						
4700	1529	1702							

Maximum Equivalent Series Resistance (ohm)
VB/Radial Lead

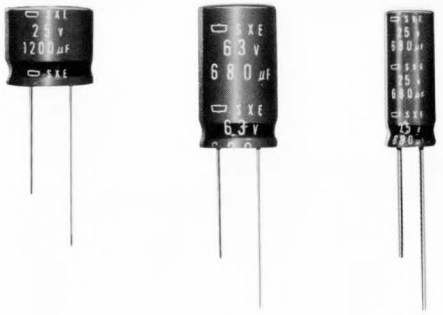
20°C, 120 Hz

μF	6.3V	10V	16V	25V	35V	50V	63V	80V	100V
0.1						1659			1161
0.15						1106			774
0.22						754			528
0.33						503			352
0.47						353			247
0.68						244			171
1.0						166			116
1.5						111			77.4
2.2						75.4		60.3	52.8
3.3						50.4		40.2	35.2
4.7				49.4	42.3	35.3		28.2	24.7
6.8				34.1	29.3	24.4	24.4	19.5	17.1
10			26.5	23.2	20.0	16.6	16.6	13.3	11.6
15			17.7	15.5	13.3	11.1	11.1	8.85	7.74
22		15.1	12.1	10.6	9.05	7.54	7.54	6.03	5.28
33		10.1	8.04	7.04	6.03	5.03	5.03	4.02	3.52
47		7.06	5.65	4.94	4.23	3.53	3.53	2.82	2.47
68		4.88	3.90	3.41	2.93	2.44	2.44	1.95	1.71
100		3.32	2.65	2.32	2.00	1.66	1.66	1.33	1.16
150		2.21	1.77	1.55	1.33	1.11	1.11	0.88	0.77
220	1.81	1.51	1.21	1.06	0.90	0.75	0.75	0.60	0.53
330	1.21	1.01	0.80	0.70	0.60	0.50	0.50	0.40	0.35
470	0.85	0.71	0.56	0.49	0.42	0.35	0.35	0.28	
680	0.59	0.49	0.39	0.34	0.29	0.24	0.24		
1000	0.40	0.33	0.27	0.23	0.20	0.17			
1500	0.27	0.22	0.18	0.15	0.13				
2200	0.20	0.17	0.14	0.12					
3300	0.14	0.12	0.10						
4700	0.11	0.092							

SXE SERIES

- **Miniaturized, low impedance capacitors**
- **Operating temperature range, −55°C to 105°C.**
- **Solvent proof type**

- SXE series are designed with low impedance and ESR at high frequencies with miniaturized case sizes. These are suitable for application in recent high reliability, miniaturized switching power supplies.
- For cleaning conditions, see page 10.
- For detail specifications, refer to latest issue of Engineering Bulletin No.514.
- Applications: DC-DC converter, switching power supply units.



CHARACTERISTICS

Item	Characteristics
Operating temperature range	−55 ~ +105°C
Capacitance tolerance	±20% (M) (at 20°C, 120 Hz)
Leakage current	I=0.03 CV (after 1 minute) I=0.01 CV (after 2 minutes) (at 20°C)
Dissipation factor	See table below
Low temperature characteristics	• Capacitance value at −55°C shall not be less than −30% of the 20°C value for the capacitors of the rated voltage 6.3 V, and −20% of the 20°C value for the capacitors of 10 to 100 V. • Impedance value at −55°C shall not exceed 3 times the 20°C value.
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 hours (for capacitors of case dia. 8 mm or less) or 2,000 hours (for case dia. 10 mm or more) at 105°C Capacitance change ≦ ±20% of the initial value Dissipation factor ≦ 200% of the initial specified value Leakage current ≦ The initial specified value
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 1,000 hours without voltage applied. Capacitance change ≦ ±20% of the initial value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value
Others	Satisfies characteristic W of JIS C 5141.

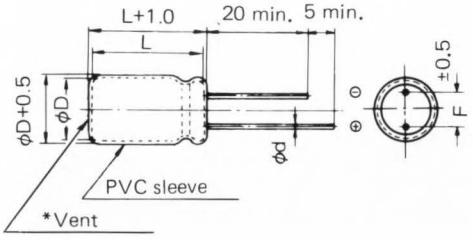
Rated voltage (V)	6.3	10	16	25	35	50	63	80	100
Dissipation factor	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.08	0.07

Note) Above DF specifications shall be 0.02 added every 1,000 μF for capacitor exceeding 1,000 μF. (at 20°C, 120 Hz)

DIMENSIONS

VB/Radial lead

Unit (mm)



* (Not applicable to D = φ4 ~ φ6.3 mm of SXE series)

φD	4	5	6.3	8	10	12.5	16	18
φd	0.45	*(0.45) 0.5	*(0.45) 0.6	0.6	0.6	0.6	0.8	0.8
F	1.5	2	2.5	3.5	5	5	7.5	7.5

Note)* Lead diameter (φd) for the capacitors of case sizes φDxL=5x7 and 6.3x7 mm shall be 0.45 mm.

RIPPLE CURRENT MULTIPLIERS

Temperature Multiplying Factor

Ambient temp.	Multiplying factor
45°C	2.40
65°C	2.17
85°C	1.75
105°C	1.00

Frequency Multiplying Factor

Frequency	Multiplying factor				
	~4.7μF	5.6~ 33μF	39~ 330μF	390~ 1000μF	1200μF & up
50 Hz	0.30	0.40	0.60	0.65	0.80
120 Hz	0.40	0.50	0.70	0.80	0.90
300 Hz	0.50	0.60	0.80	0.90	0.95
1 kHz	0.70	0.80	0.90	0.98	0.98
10 kHz	0.80	0.90	0.95	1.00	1.00
100 kHz	1.00	1.00	1.00	1.00	1.00

CATALOG NUMBERING SYSTEM

SXE 16 VB 331 M 8 x 15 LL

- LL — Standard lead
- 8 x 15 — Case size (diax length)
- M — Capacitance tolerance (M = ±20%)
- 331 — Nominal capacitance
  331 = 330 μF
  (cf. 3R3 = 3.3, 33R = 33, 332 = 3300 μF)
- VB — Terminal type VB
- 16 — Rated working voltage
- SXE — Series name

STANDARD RATINGS

V / Item / Case size φD x L (mm)	6.3					10					16				
	Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)		Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)		Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)	
		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)
4x7	27	5.5	14.3	47	24	22	5.4	14.0	42	21	15	5.3	13.8	39	20
4x11.5	68	2.2	5.7	105	74	47	2.2	5.6	107	75	33	2.1	5.5	111	56
5x7	56	3.4	8.8	97	68	39	3.3	8.6	95	67	27	3.3	8.6	98	49
5x11.5	120	1.3	3.4	121	85	82	1.3	3.4	121	85	56	1.3	3.4	118	83
5x15	150	0.92	2.4	133	93	120	0.91	2.4	126	88	82	0.89	2.3	125	88
6.3x7	120	1.4	3.6	106	74	82	1.4	3.6	79	55	56	1.4	3.6	88	62
6.3x11.5	220	0.61	1.6	148	104	180	0.59	1.5	145	102	120	0.58	1.5	115	81
6.3x15	330	0.40	1.0	163	114	270	0.39	1.0	153	107	180	0.38	0.99	125	88
8x12	390	0.34	0.88	287	230	330	0.33	0.86	292	204	220	0.33	0.86	295	207
8x15	560	0.24	0.62	363	290	470	0.24	0.62	367	294	330	0.23	0.60	370	259
8x20	820	0.19	0.49	471	377	560	0.18	0.47	475	380	470	0.18	0.47	480	384
10x12.5	470	0.28	0.73	361	289	390	0.27	0.70	365	292	270	0.27	0.70	368	258
10x15	680	0.22	0.57	432	346	560	0.22	0.57	436	349	390	0.21	0.55	440	352
10x20	1,200	0.14	0.36	591	532	820	0.14	0.36	597	478	680	0.14	0.36	602	482
10x25	1,500	0.12	0.31	689	620	1,200	0.12	0.31	696	626	820	0.12	0.31	702	562
10x30	2,200	0.095	0.25	829	746	1,500	0.093	0.24	836	752	1,000	0.091	0.24	844	675
12.5x15	1,200	0.12	0.31	674	607	1,000	0.12	0.31	680	544	680	0.12	0.31	687	550
12.5x20	2,200	0.089	0.23	821	739	1,800	0.087	0.23	828	745	1,200	0.086	0.22	836	752
12.5x25	2,700	0.075	0.20	968	871	2,200	0.073	0.19	977	879	1,500	0.072	0.19	986	887
12.5x30	3,900	0.065	0.17	1,110	999	2,700	0.064	0.17	1,120	1,010	2,200	0.063	0.16	1,130	1,020
12.5x35	4,700	0.053	0.14	1,290	1,160	3,300	0.052	0.14	1,300	1,169	2,700	0.051	0.13	1,310	1,180
12.5x40	5,600	0.046	0.12	1,370	1,230	3,900	0.045	0.12	1,390	1,250	3,300	0.045	0.12	1,400	1,260
16x15	2,200	0.10	0.26	940	840	1,500	0.10	0.26	947	852	1,200	0.099	0.26	956	860
16x20	3,900	0.076	0.20	1,190	1,070	3,300	0.075	0.20	1,200	1,080	2,200	0.073	0.19	1,210	1,090
16x25	5,600	0.066	0.17	1,400	1,260	3,900	0.065	0.17	1,410	1,270	2,700	0.064	0.17	1,430	1,290
16x30	6,800	0.055	0.14	1,620	1,460	4,700	0.054	0.14	1,630	1,470	3,900	0.053	0.14	1,650	1,480
16x35	8,200	0.047	0.12	1,850	1,660	6,800	0.046	0.12	1,870	1,680	4,700	0.046	0.12	1,880	1,690
16x40	10,000	0.039	0.10	2,120	1,910	8,200	0.038	0.099	2,140	1,920	5,600	0.037	0.096	2,160	1,940
18x15	3,300	0.081	0.21	1,110	999	2,200	0.080	0.21	1,120	1,010	1,500	0.078	0.20	1,130	1,020
18x20	5,600	0.063	0.16	1,400	1,260	3,900	0.062	0.16	1,410	1,269	3,300	0.060	0.16	1,420	1,280
18x25	6,800	0.054	0.14	1,610	1,450	4,700	0.053	0.14	1,630	1,470	3,900	0.052	0.14	1,640	1,470
18x30	10,000	0.047	0.12	1,830	1,650	6,800	0.046	0.12	1,850	1,660	4,700	0.046	0.12	1,860	1,670
18x35	12,000	0.042	0.11	2,030	1,830	8,200	0.041	0.11	2,050	1,840	6,800	0.040	0.10	2,070	1,860
18x40	15,000	0.037	0.096	2,280	2,050	10,000	0.037	0.096	2,300	2,070	8,200	0.036	0.094	2,320	2,090

Case size φDxL(mm) \ V	25					35					50				
Item	Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)		Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)		Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)	
		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)
4x7	10	5.3	13.7	47	24	6.8	5.2	13.4	43	22	4.7	5.0	13.0	48	19
4x11.5	22	2.1	5.5	100	50	15	2.1	5.4	89	45	10	2.0	5.2	86	43
5x7	22	3.3	8.6	89	45	12	3.2	8.3	69	35	8.2	3.1	8.1	68	34
5x11.5	39	1.3	3.3	103	72	27	1.2	3.1	100	50	18	1.2	3.1	96	48
5x15	56	0.88	2.3	116	81	39	0.87	2.3	120	84	27	0.84	2.2	103	52
6.3x7	39	1.4	3.6	79	55	27	1.3	3.4	74	37	18	1.3	3.4	74	37
6.3x11.5	82	0.58	1.5	112	78	56	0.57	1.5	108	76	39	0.55	1.4	105	74
6.3x15	120	0.38	0.99	121	85	82	0.37	0.96	119	83	56	0.36	0.94	116	81
8x12	150	0.33	0.86	296	207	100	0.32	0.83	298	209	68	0.31	0.81	303	212
8x15	220	0.23	0.60	372	260	150	0.23	0.60	375	263	82	0.22	0.57	381	267
8x20	270	0.18	0.47	482	337	220	0.18	0.47	487	341	120	0.17	0.44	494	346
10x12.5	180	0.26	0.68	370	259	120	0.26	0.68	373	261	82	0.25	0.65	379	265
10x15	270	0.21	0.55	442	309	180	0.21	0.55	446	312	100	0.20	0.52	453	317
10x20	470	0.14	0.36	605	484	330	0.13	0.34	611	428	180	0.13	0.34	620	434
10x25	560	0.12	0.31	706	565	390	0.11	0.29	712	570	220	0.11	0.29	723	506
10x30	680	0.090	0.23	848	678	470	0.089	0.23	856	685	330	0.086	0.22	869	608
12.5x15	470	0.12	0.31	690	552	330	0.11	0.29	697	488	180	0.11	0.29	707	495
12.5x20	820	0.085	0.22	840	672	560	0.083	0.22	848	678	330	0.081	0.22	861	603
12.5x25	1,000	0.071	0.18	991	793	680	0.070	0.18	1,000	800	470	0.068	0.19	1,010	808
12.5x30	1,500	0.062	0.16	1,130	1,020	1,000	0.061	0.16	1,150	920	560	0.059	0.16	1,160	928
12.5x35	1,800	0,050	0.13	1,320	1,190	1,200	0.049	0.13	1,330	1,197	680	0.048	0.14	1,350	1,080
12.5x40	2,200	0.044	0.11	1,410	1,270	1,500	0.043	0.11	1,420	1,280	820	0.042	0.12	1,440	1,150
16x15	820	0.098	0.25	960	768	560	0.096	0.25	970	776	330	0.093	0.20	984	689
16x20	1,500	0.072	0.19	1,220	1,100	1,000	0.071	0.18	1,230	984	680	0.069	0.15	1,250	1,000
16x25	1,800	0.063	0.16	1,430	1,290	1,200	0.062	0.16	1,450	1,300	820	0.060	0.13	1,470	1,170
16x30	2,700	0.053	0.14	1,650	1,480	1,800	0.052	0.14	1,670	1,500	1,000	0.050	0.13	1,700	1,360
16x35	3,300	0.045	0.12	1,890	1,700	2,200	0.044	0.11	1,910	1,720	1,200	0.043	0.11	1,940	1,740
16x40	3,900	0.037	0.096	2,170	1,950	2,700	0.036	0.094	2,190	1,970	1,500	0.035	0.091	2,220	2,000
18x15	1,200	0.078	0.20	1,140	1,020	820	0.076	0.20	1,150	920	470	0.074	0.19	1,170	936
18x20	2,200	0.060	0.16	1,430	1,290	1,500	0.059	0.15	1,440	1,300	820	0.057	0.15	1,460	1,170
18x25	2,700	0.051	0.13	1,650	1,480	1,800	0.050	0.13	1,670	1,500	1,000	0.049	0.13	1,690	1,350
18x30	3,300	0.045	0.12	1,870	1,680	2,200	0.044	0.11	1,890	1,700	1,500	0.043	0.11	1,920	1,730
18x35	3,900	0.040	0.10	2,080	1,870	2,700	0.039	0.10	2,100	1,890	1,800	0.038	0.099	2,130	1,920
18x40	4,700	0.036	0.094	2,330	2,100	3,300	0.035	0.091	2,360	2,120	2,200	0.034	0.088	2,390	2,150

Case size φDxL(mm) \ V	63					80					100				
Item	Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)		Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)		Capacitance (μF)	Impedance (Ω)		Ripple current (mA rms)	
		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)		(20°C/100KHz)	(-10°C/100KHz)	(105°C/100KHz)	(105°C/120Hz)
4x7	3.3	11.2	30.2	38	15	2.2	11.0	29.7	31	12	1.5	10.8	29.2	24	9.6
4x11.5	6.8	4.3	11.6	65	32	4.7	4.2	11.3	60	24	3.3	4.1	11.1	51	20
5x7	5.6	5.1	13.8	54	27	3.9	5.0	13.5	50	20	2.7	4.9	13.2	42	17
5x11.5	12	2.0	5.4	80	40	8.2	1.9	5.2	68	34	5.6	1.9	5.1	54	27
5x15	18	1.4	3.8	90	45	12	1.4	3.7	80	40	8.2	1.3	3.6	69	35
6.3x7	12	3.0	8.1	72	36	8.2	2.9	7.8	77	39	5.6	2.8	7.6	63	32
6.3x11.5	27	1.2	3.2	99	50	18	1.1	3.0	87	44	12	1.1	3.0	73	37
6.3x15	39	0.66	1.8	102	71	27	0.64	1.7	94	47	18	0.62	1.7	80	40
8x12	47	0.56	1.5	240	168	33	0.54	1.5	258	129	22	0.53	1.4	260	130
8x15	68	0.36	0.97	313	219	47	0.36	0.97	319	223	33	0.35	0.95	340	170
8x20	82	0.22	0.57	455	319	56	0.28	0.74	406	284	39	0.27	0.73	409	286
10x12.5	56	0.50	1.4	299	209	39	0.49	1.3	293	205	27	0.48	1.3	306	153
10x15	68	0.35	0.95	369	258	56	0.34	0.90	377	264	33	0.33	0.89	400	200
10x20	120	0.27	0.74	451	316	82	0.26	0.71	459	321	56	0.26	0.70	463	324
10x25	150	0.20	0.53	584	409	100	0.19	0.51	595	417	68	0.19	0.50	599	419
10x30	180	0.16	0.42	679	475	150	0.15	0.41	693	485	100	0.15	0.40	698	489
12.5x15	150	0.25	0.67	497	348	100	0.24	0.64	506	354	68	0.23	0.63	511	358
12.5x20	220	0.16	0.42	653	457	150	0.15	0.41	665	466	100	0.15	0.40	671	470
12.5x25	270	0.14	0.38	791	554	180	0.14	0.37	799	559	120	0.13	0.36	807	565
12.5x30	390	0.11	0.29	877	702	270	0.10	0.28	933	653	180	0.10	0.27	937	656
12.5x35	470	0.091	0.25	983	786	330	0.088	0.24	1,030	721	220	0.087	0.23	1,040	728
12.5x40	560	0.080	0.22	1,060	848	390	0.076	0.21	1,090	872	270	0.074	0.20	1,160	812
16x15	220	0.15	0.41	655	458	180	0.14	0.38	661	463	120	0.14	0.38	668	468
16x20	390	0.12	0.32	810	648	270	0.11	0.31	858	601	180	0.11	0.30	865	606
16x25	470	0.091	0.25	994	795	330	0.088	0.24	1,060	742	220	0.086	0.23	1,080	756
16x30	680	0.065	0.18	1,260	1,010	470	0.063	0.17	1,280	1,020	330	0.062	0.17	1,360	952
16x35	820	0.056	0.15	1,430	1,140	560	0.054	0.15	1,440	1,150	390	0.053	0.14	1,460	1,170
16x40	1,000	0.049	0.13	1,610	1,290	680	0.048	0.13	1,650	1,320	470	0.047	0.13	1,600	1,280
18x15	330	0.13	0.35	800	560	220	0.13	0.34	816	571	150	0.12	0.33	822	575
18x20	560	0.091	0.25	975	780	390	0.088	0.24	984	787	270	0.086	0.23	1,010	707
18x25	680	0.078	0.21	1,160	928	470	0.075	0.20	1,180	944	330	0.074	0.20	1,250	875
18x30	820	0.065	0.18	1,330	1,060	680	0.063	0.17	1,350	1,080	390	0.062	0.17	1,360	1,090
18x35	1,000	0.061	0.16	1,560	1,250	820	0.060	0.16	1,580	1,260	560	0.059	0.16	1,600	1,280
18x40	1,200	0.046	0.12	1,740	1,560	1,000	0.044	0.12	1,750	1,400	680	0.043	0.12	1,770	1,410

SXC SERIES

- **Low impedance**
- **Operating temperature range, −55°C to 105°C**
- **Solvent proof type**

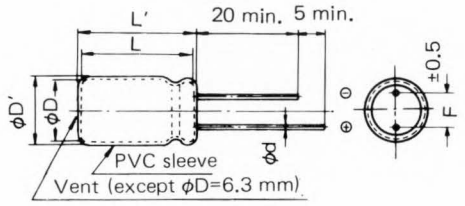
- For cleaning conditions, see page 10.
- For detail specifications, refer to latest issue of Engineering Bulletin No.514.

CHARACTERISTICS

Item	Characteristic
Operating temperature range	−55 ~ +105°C
Capacitance tolerance	±20% (at 20°C, 120 Hz)
Leakage current	After 1 minute: 0.03 CV (μA) After 2 minutes: 0.01 CV (μA) (at 20°C)
Dissipation factor	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 Dissipation factor: 0.20 / 0.15 / 0.10 / 0.08 / 0.07 / 0.06 / 0.05 For capacitors exceeding 1,000 μF, the specification of dissipation factor is increased by 0.02 for every addition of 1,000 μF. (at 20°C, 120 Hz)
Surge voltage	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 Surge voltage (V): 8 / 13 / 20 / 32 / 44 / 63 / 79
Temperature characteristics	At −55°C and 120 Hz, the following specifications shall be satisfied: Rated voltage (V): 6.3 / 10~63 Capacitance change from 20°C value: ±25% / ±15% Z(−55°C)/Z(20°C): 3 / 2 Impedance value at −10°C and 100 KHz; Refer to table on next page.
Permissible ripple current	Refer to table on next page. When the ambient temperature and frequency are different from 105°C and 10 KHz respectively, the ripple current shall not exceed the value multiplied by the factor given in the following tables: Temperature (°C): ~+70 / +85 / +105 Compensating coefficient: 2.83 / 2.2 / 1 Frequency (Hz): 50 / 120 / 300 / 1K / 10K~ 6.3~16V: 0.54 / 0.70 / 0.85 / 0.95 / 1 25, 35V: 0.43 / 0.57 / 0.73 / 0.88 / 1 50, 63V: 0.39 / 0.55 / 0.71 / 0.86 / 1
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours at 105°C. (φ6.3 and φ8 products are for 1,000 hours.) Capacitance change ≦ ±20% of the initial value Dissipation factor ≦ 200% of the initial specified value Leakage current ≦ The initial specified value
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 1,000 hours without voltage applied. Capacitance change ≦ ±20% of the initial specified value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value
Others	Satisfies characteristic C of JIS C 5141.

DIMENSIONS

VB/Radial lead



Unit (mm)

φD	φ6.3	φ8	φ10	φ12.5	φ16	φ18
φd	0.6	0.6	0.6	0.6	0.8	0.8
F	2.5	3.5	5	5	7.5	7.5
L'	L + 1.5				L + 2.0	
φD'	φD+0.5					

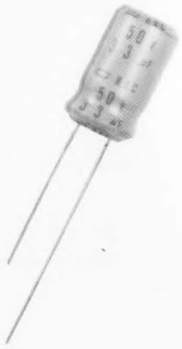
STANDARD RATINGS

Rated voltage (VDC)	Capacitance (μF)	Case size φD x L (mm)	Max. Impedance (Ω)				Max. ripple current (Arms)
			at 20°C, 10 kHz	at 20°C, 100 kHz	at 20°C, 1 MHz	at −10°C, 100 kHz	at 105°C 10 kHz
6.3	220	10x12.5	0.48	0.45	–	1.13	0.25
	330	10x16	0.35	0.27	–	0.68	0.36
	470	10x20	0.26	0.23	–	0.58	0.49
	1,000	12.5x25	0.15	0.14	–	0.35	0.81
	2,200	16x25	0.07	0.07	–	0.18	1.09
10	100	8x11.5	–	0.77	0.70	2.04	0.19
	220	10x16	0.45	0.38	–	0.95	0.35
	330	10x20	0.21	0.18	–	0.45	0.46
	470	12.5x20	0.15	0.12	–	0.30	0.61
	1,000	12.5x25	0.09	0.09	–	0.23	0.90
	2,200	16x31.5	0.05	0.05	–	0.13	1.52
16	47	8x11.5	–	0.87	0.76	2.19	0.15
	100	10x12.5	0.54	0.45	–	1.13	0.24
	220	10x16	0.29	0.26	–	0.65	0.40
	330	10x20	0.21	0.18	–	0.45	0.52
	470	12.5x20	0.12	0.11	–	0.28	0.70
	1,000	16x25	0.09	0.09	–	0.22	1.15
	2,200	18x35.5	0.05	0.05	–	0.13	1.78
25	33	8x11.5	–	0.92	0.81	2.61	0.18
	47	10x12.5	0.70	0.42	–	1.05	0.20
	100	10x16	0.36	0.27	–	0.67	0.31
	220	12.5x20	0.15	0.11	–	0.27	0.54
	330	12.5x25	0.12	0.10	–	0.25	0.70
	470	16x25	0.08	0.06	–	0.15	0.96
	1,000	16x31.5	0.06	0.06	–	0.15	1.32
35	22	8x11.5	–	0.98	0.85	2.55	0.15
	33	10x12.5	0.90	0.53	–	1.32	0.18
	47	10x12.5	0.80	0.53	–	1.33	0.21
	100	10x20	0.35	0.23	–	0.57	0.37
	220	12.5x25	0.15	0.09	–	0.23	0.65
	330	16x25	0.09	0.05	–	0.13	0.84
	470	16x25	0.08	0.05	–	0.13	1.09
50	1	6.3x11	–	3.25	1.50	5.40	0.03
	2.2	6.3x11	–	2.35	1.50	3.90	0.05
	3.3	6.3x11	–	2.35	1.50	3.90	0.06
	4.7	6.3x11	–	2.25	1.50	3.50	0.07
	10	8x11.5	–	0.80	0.66	2.00	0.12
	22	10x16	1.35	0.60	–	1.50	0.20
	33	10x16	0.90	0.50	–	1.25	0.22
	47	10x16	0.80	0.50	–	1.25	0.26
	100	12.5x20	0.30	0.10	–	0.25	0.45
	220	16x25	0.14	0.08	–	0.20	0.82
	330	16x31.5	0.09	0.05	–	0.13	1.03
	470	16x35.5	0.06	0.05	–	0.13	1.35
63	22	10x16	1.35	0.60	–	1.50	0.20
	33	10x16	0.83	0.60	–	0.82	0.24
	47	10x20	0.75	0.30	–	0.40	0.31
	100	12.5x25	0.27	0.14	–	0.35	0.54
	220	16x31.5	0.14	0.08	–	0.20	1.08
	330	16x35.5	0.09	0.05	–	0.13	1.27

RX, RXC SERIES

- **Low impedance**
- **Operating temperature range, −55°C to 105°C**

- For cleaning conditions, see page 10. (Applicable only to RXC Series)
- For detail specifications, refer to latest issue of Engineering Bulletin No.514.



CHARACTERISTICS

Item	Characteristic
Operating temperature range	−55 ~ 105°C
Capacitance tolerance	−10 ~ +100% (at 120 Hz, 20°C)
Equivalent series resistance (ESR)	When measured at a temperature of 20°C and a frequency of 120 Hz and 1 KHz, ESR value shall not exceed the specified values given in the tables on next page.
Impedance	When measured at a temperature of 20°C and frequency of 100 KHz, impedance value shall not exceed the specified values given in the tables on next page.
Leakage current	0.002 CV (μA) or 2 μA, whichever is greater. (After 5 minutes) (at 20°C)
Low temperature characteristics	Capacitance at −55°C shall not be less than 70% of the initial 20°C measured value and the ratio of impedance at 120 Hz shall not exceed the following value.

Rated voltage (V)	10	16	25	35	50	63	100
Z(−55°C)/Z(20°C)	4	3	2	2	2	2	2

Surge voltage	Rated voltage (V)	10	16	25	35	50	63	100
	Surge voltage (V)	13	20	32	44	63	79	125

Load life

The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours at 105°C.

Capacitance change	≦	±15% of the initial value
ESR at 120 Hz and 1 KHz	≦	150% of the initial specified value
Leakage current	≦	The initial specified value

Shelf life

The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 500 hours without voltage applied.

Capacitance change	≦	±10% of the initial value
ESR at 120 Hz and 1 KHz	≦	115% of the initial specified value
Leakage current	≦	200% of the initial specified value

Permissible ripple current	Refer to tables on next page. When the ambient temperature and frequency are different from 85°C and 100 KHz respectively, the ripple current shall not exceed the value multiplied by the factor given in Fig. 1 and Fig. 2 (next page).
Others	Satisfies characteristic C of JIS C 5141.

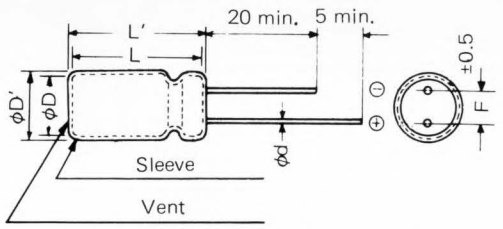
STANDARD RATINGS

Rated voltage (VDC)	Capacitance (μF)	Nominal Case Size φD x L (mm)	ESR (Ω) at 20°C		Impedance (Ω) at 20°C and 100 KHz	Max. Ripple Current (A RMS) at 85°C and 100 KHz
			120 Hz	1 KHz		
10	47	8x11.5	3.5	1.9	0.90	0.26
	100	10x16.5	1.8	1.0	0.70	0.33
	220	10x20.5	1.0	0.58	0.38	0.48
	330	12.5x20.5	0.48	0.28	0.25	0.73
	470	12.5x24.5	0.24	0.16	0.12	1.42
	1000	12.5x42.5	0.12	0.076	0.06	2.87
16	33	8x11.5	4.0	2.0	0.90	0.19
	47	10x12.5	2.8	1.4	0.90	0.26
	100	10x16.5	1.5	0.8	0.50	0.45
	220	12.5x20.5	0.61	0.35	0.30	0.71
	330	12.5x24.5	0.28	0.17	0.12	1.31
	680	12.5x42.5	0.14	0.09	0.06	2.44
25	22	8x11.5	5.0	2.0	0.90	0.15
	33	10x12.5	2.8	1.7	0.90	0.24
	68	10x16.5	1.5	0.85	0.50	0.40
	100	10x20.5	1.2	0.60	0.40	0.47
	220	12.5x24.5	0.40	0.27	0.16	1.02
	470	12.5x42.5	0.16	0.10	0.06	1.90
35	10	8x11.5	7.0	2.0	1.2	0.13
	22	10x12.5	2.5	1.5	1.2	0.26
	47	10x16.5	2.2	1.0	0.70	0.31
	68	10x20.5	1.3	0.80	0.50	0.45
	100	12.5x24.5	0.80	0.40	0.30	1.00
	330	12.5x42.5	0.26	0.20	0.12	1.55
50	10	8x11.5	10.0	4.5	2.1	0.10
	33	10x16.5	2.3	1.8	1.0	0.26
	47	10x20.5	2.0	1.0	0.70	0.34
	100	12.5x24.5	0.76	0.42	0.26	0.69
	220	12.5x42.5	0.40	0.25	0.15	1.28
63	6.8	8x11.5	18.0	8.0	5.0	0.075
	10	10x12.5	10.0	5.0	2.9	0.10
	22	10x16.5	4.0	2.8	1.7	0.19
	33	10x20.5	3.5	2.0	1.5	0.24
	68	12.5x24.5	1.2	0.60	0.50	0.55
	100	12.5x42.5	0.60	0.30	0.20	1.18
100	2.2	8x11.5	70.0	30	15	0.075
	3.3	10x12.5	48.3	20	10	0.081
	6.8	10x16.5	20.0	4.5	2.4	0.12
	10	10x20.5	13.3	3.0	1.7	0.17
	22	12.5x24.5	2.0	0.80	0.50	0.60
	47	12.5x42.5	0.88	0.35	0.20	1.10

DIMENSIONS

VB/Radial lead

Unit (mm)



φD	φD'	L'	F	φd
8	φD+0.5	L+2.0	3.5	0.6
10	φD+1.0	L+2.0	5.0	0.6
12.5	φD+1.0	L+2.0	5.0	0.6

RIPPLE CURRENT MULTIPLIERS

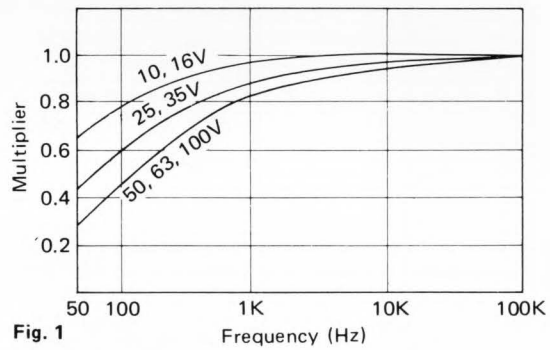


Fig. 1

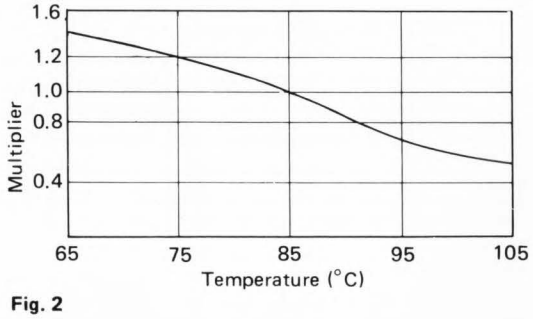
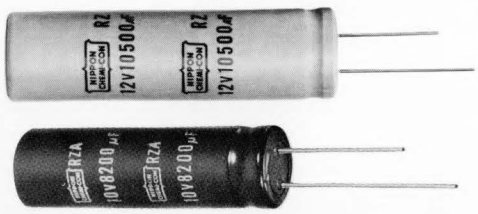


Fig. 2

RZ, RZA SERIES

- **Low impedance, high ripple current specified**
- **Large capacitance**
- **Maximum operating temperature, 105°C**



- RZA series capacitors are designed for use in switching power supplies and offer high performance, low impedance, low ESR, high ripple current and much longer life of 5,000 hours at 105°C
- RZA capacitors are series which are improved from RZ series on various characteristics. They are designed for use in switching power supplies and offer high performance, low impedance, low ESR, high ripple current and much longer life of 5,000 hours at 105°C.
- For cleaning conditions, see page 10.
- Two types (VH and VG) lead configuration are available.
- For detail specifications, refer to latest issue of Engineering Bulletin No.514.
- Applications: Input and output filtering circuits of switching power supply and other high frequency equipment.

CHARACTERISTICS

Item	RZ		RZA (*TENTATIVE*)	
Working voltage range	7.5~100V	150~250V	6.3~100V	160~250V
Operating temperature range	−55~105°C	−25~105°C	−55~105°C	−25~105°C
Capacitance tolerance	−10~+75% at 20°C, 120Hz		−10~75% at 20°C, 120Hz	±20% at 20°C, 120Hz
Leakage current	7.5~40WV; $I=0.5\sqrt{CV}$ 50~100WV; $I=\sqrt{CV}$	I=0.02CV+10	$I=2\sqrt{CV}$	I=0.02CV or 3mA, whichever is smaller.

Where I: Maximum leakage current (μA) at 20°C (after 5 minutes)
C: Nominal capacitance (μF)
V: Rated working voltage (V)

ESR: Maximum ESR at 20°C and 120Hz and 10KHz is given in the table of STANDARD RATING.

Temperature characteristics (at 120Hz)

Item	Series name	Working voltage 6.3~12WV	16~100WV	150~250WV	160~250WV
		RZ/RZA		RZ	RZA
At −55°C	Impedance ratio at −55°C/20°C	6 max.	3 max.	———	
	Capacitance change at −55°C/20°C	±35%	±20%	———	
	Leakage current	Less than the initial specified value.		———	
ESR	ESR	≦20 times the initial specified value.	≦10 times the initial specified value.	———	
At −25°C max.	Impedance ratio at −25°C/20°C	———		4 max.	
	Capacitance change at −25°C/20°C	———		±30%	
	Leakage current	———		Less than the initial specified value.	
	ESR	———		≦10 times the initial specified value.	
At 105°C	Impedance ratio at 105°C/20°C	1 max.			
	Capacitance change at 105°C/20°C	±15%		±15%	±20%
	Leakage current	≦5 times the initial specified value.		≦5 times the initial specified value.	≦10 times the initial specified value.
	ESR	Less than the initial specified value.			

Impedance: Maximum impedance at 20°C, 100KHz is given in the table of STANDARD RATING.

Maximum ripple current: Maximum ripple current at the following temperature and frequency is shown in the table of STANDARD RATING.
RZ: 85°C 120Hz
RZA (63~100WV): 85°C 20KHz
(160~250WV): 85°C 120Hz
Where the capacitors are operated at conditions other than the above conditions, the maximum ripple current must be multiplied by the factor shown on page 12.

Load life: The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours (for RZ series) or 5,000 hours (for RZA series) at 105°C.

Capacitance change (7.5~100WV)	≦ ±15% of the initial value.		
Capacitance change (150~250WV)	≦ ±20% of the initial value.	Capacitance change	≦ ±20% of the initial value.
ESR	≦ 200% of the initial specified value.	ESR	≦ 300% of the initial specified value.
Impedance	≦ 200% of the initial specified value.	Impedance	≦ 200% of the initial specified value.
Leakage current	≦ The initial specified value.	Leakage current	≦ The initial specified value.

Shelf life: The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 500 hours (for RZ series) or 1,000 hours (for RZA series) without voltage applied.

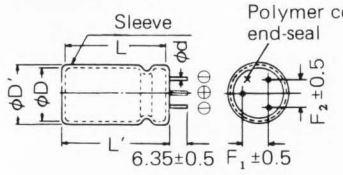
Capacitance change	≦ ±15% of the initial value.	Capacitance change	≦ ±20% of the initial value.
ESR/impedance	≦ 150% of the initial specified value.	ESR/impedance	≦ 200% of the initial specified value.
Leakage current	≦ 5 times the initial specified value.	Leakage current	≦ 5 times the initial specified value.

Others: Satisfies characteristic C of JIS C 5141.

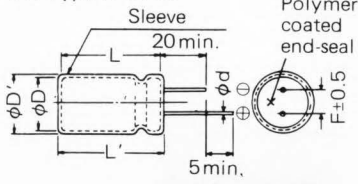
Specifications subject to change without notice.

DIMENSIONS

VG Type (3 leads)



VH Type (2 leads)



φD	19	22	25.4
φD'	φD+0.8	φD+0.8	φD+0.8
L'	L+2.0	L+2.0	L+2.0
F	7.5	7.5	10.0
F_1	7.5	10.0	10.0
F_2	5.0	7.5	7.5
φd	1.0	1.0	1.0

RZ SERIES

7.5V (10sv)

Capacitance (μF)	Case size φDxL(mm)	ESR(ohm)at20°C 120Hz	ESR(ohm)at20°C 10KHz	Impedance(ohm) 100KHz, 20°C	Ripple current(A rms) 85°C, 120Hz
1,800	19x31	0.125	0.062	0.062	1.9
2,200	19x41	0.067	0.038	0.041	2.8
2,800	19x41	0.090	0.045	0.046	2.4
3,300	19x51	0.045	0.026	0.031	3.7
3,900	19x51	0.058	0.029	0.030	3.5
5,200	19x64	0.046	0.023	0.025	4.3
5,600	19x64	0.040	0.021	0.022	4.4
6,800	19x81	0.033	0.018	0.020	5.4
2,700	22x31	0.080	0.047	0.047	2.4
4,100	22x41	0.063	0.034	0.035	2.9
5,600	22x51	0.043	0.023	0.024	4.2
5,900	22x51	0.042	0.023	0.024	4.1
6,800	22x64	0.025	0.016	0.022	5.7
8,200	22x64	0.029	0.016	0.018	5.5
10,000	22x81	0.024	0.013	0.015	6.6
3,500	25.4x31	0.058	0.027	0.032	3.2
4,700	25.4x41	0.037	0.024	0.028	4.1
5,600	25.4x41	0.047	0.026	0.028	3.9
8,200	25.4x51	0.032	0.018	0.020	5.3
10,000	25.4x64	0.020	0.013	0.021	7.3
11,000	25.4x64	0.025	0.015	0.018	5.3
13,500	25.4x81	0.021	0.013	0.016	6.3
16,500	25.4x91	0.018	0.012	0.015	7.4

12V (18sv)

Capacitance(μF)	Case size φDxL(mm)	ESR(ohm)at20°C 120Hz	ESR(ohm)at20°C 10KHz	Impedance(ohm) 100KHz, 20°C	Ripple current(A rms) 85°C, 120Hz
1,200	19x31	0.144	0.058	0.058	1.8
1,800	19x41	0.096	0.039	0.039	2.4
2,500	19x51	0.070	0.031	0.032	3.5
3,300	19x64	0.052	0.023	0.025	4.3
3,600	19x64	0.042	0.020	0.022	4.3
4,100	19x81	0.042	0.019	0.021	5.4
4,700	19x81	0.037	0.015	0.017	5.4
1,500	22x31	0.119	0.053	0.053	2.1
2,600	22x41	0.058	0.026	0.028	3.2
2,700	22x41	0.066	0.029	0.030	3.1
3,900	22x51	0.038	0.020	0.025	4.6
4,700	22x64	0.032	0.017	0.023	5.5
5,100	22x64	0.036	0.017	0.019	5.1
6,300	22x81	0.029	0.014	0.017	6.1
2,200	25.4x31	0.084	0.043	0.044	2.7
3,700	25.4x41	0.055	0.029	0.031	3.1
4,700	25.4x51	0.036	0.020	0.022	4.8
5,300	25.4x51	0.036	0.020	0.022	4.3
5,600	25.4x51	0.027	0.014	0.019	5.7
6,800	25.4x64	0.027	0.014	0.017	6.0
7,200	25.4x64	0.028	0.015	0.018	5.3
8,200	25.4x81	0.023	0.013	0.016	6.6
8,800	25.4x81	0.023	0.013	0.016	6.3
10,500	25.4x91	0.020	0.012	0.015	7.4
11,000	25.4x91	0.020	0.012	0.015	8.6

16V (20sv)

Capacitance(μF)	Case size φDxL(mm)	ESR(ohm)at20°C 120Hz	ESR(ohm)at20°C 10KHz	Impedance(ohm) 100KHz, 20°C	Ripple current(A rms) 85°C, 120Hz
1,000	19x31	0.146	0.064	0.064	1.8
1,500	19x41	0.097	0.042	0.042	2.4
2,200	19x51	0.066	0.029	0.030	3.4
2,700	19x64	0.047	0.022	0.027	4.4
2,800	19x64	0.055	0.023	0.025	4.3
3,200	19x64	0.042	0.019	0.021	4.3
3,400	19x81	0.044	0.019	0.021	5.4
3,900	19x81	0.037	0.016	0.018	5.4
1,200	22x31	0.132	0.060	0.060	2.0
2,200	22x41	0.072	0.033	0.034	3.0
3,900	22x51	0.050	0.023	0.024	4.0
4,300	22x64	0.038	0.017	0.019	5.1
5,300	22x81	0.031	0.014	0.017	6.1
5,600	22x81	0.028	0.013	0.015	6.1
1,800	25.4x31	0.087	0.044	0.045	2.6
3,100	25.4x41	0.057	0.029	0.031	3.0
3,300	25.4x41	0.052	0.024	0.026	3.7
4,500	25.4x51	0.039	0.020	0.022	4.2
4,700	25.4x51	0.037	0.017	0.019	4.8
6,000	25.4x64	0.029	0.015	0.018	5.3
6,800	25.4x64	0.025	0.013	0.016	6.3
7,400	25.4x81	0.024	0.013	0.016	6.3
8,200	25.4x81	0.024	0.013	0.016	7.3
10,000	25.4x91	0.017	0.012	0.015	8.2

25V (35sv)

Capacitance(μF)	Case size φDxL(mm)	ESR(ohm)at20°C 120Hz	ESR(ohm)at20°C 10KHz	Impedance (ohm) 100KHz, 20°C	Ripple current(A rms) 85°C, 120Hz
680	19x31	0.156	0.059	0.059	1.7
1,000	19x41	0.106	0.040	0.040	2.3
1,200	19x51	0.073	0.030	0.033	3.4
1,300	19x51	0.085	0.032	0.033	2.9
1,500	19x51	0.071	0.027	0.028	3.0
2,200	19x64	0.048	0.019	0.020	4.0
2,700	19x81	0.039	0.016	0.020	4.9
1,000	22x31	0.111	0.046	0.046	2.1
1,500	22x41	0.074	0.031	0.032	2.9
2,200	22x51	0.051	0.021	0.022	3.8
2,800	22x64	0.043	0.018	0.020	4.7
3,300	22x81	0.035	0.015	0.018	5.1
3,900	22x81	0.029	0.013	0.015	6.0
1,200	25.4x31	0.097	0.044	0.045	2.4
1,800	25.4x41	0.054	0.028	0.029	4.0
1,900	25.4x41	0.065	0.030	0.031	2.6
2,200	25.4x41	0.053	0.024	0.025	3.6
2,700	25.4x51	0.044	0.020	0.022	3.6
2,800	25.4x51	0.042	0.019	0.021	4.7
3,900	25.4x64	0.030	0.015	0.018	5.7
4,600	25.4x81	0.027	0.013	0.016	5.5
4,900	25.4x81	0.026	0.013	0.016	5.6
5,900	25.4x91	0.023	0.012	0.015	6.5

40V (55sv)

Capacitance(μF)	Case size φDxL(mm)	ESR(ohm)at20°C 120Hz	ESR(ohm)at20°C 10KHz	Impedance(ohm) 100KHz, 20°C	Ripple current(A rms) 85°C, 120Hz
390	19x31	0.170	0.061	0.061	1.6
560	19x41	0.118	0.043	0.043	2.1
850	19x51	0.071	0.035	0.033	3.0
1,200	19x64	0.055	0.025	0.027	3.7
1,500	19x81	0.044	0.024	0.023	4.6
560	22x31	0.118	0.048	0.048	2.1
820	22x41	0.081	0.033	0.034	2.8
1,200	22x51	0.055	0.023	0.024	3.7
1,800	22x64	0.037	0.016	0.018	4.9
2,200	22x81	0.030	0.013	0.015	5.9
820	25.4x31	0.097	0.039	0.040	2.4
1,200	25.4x41	0.066	0.027	0.028	3.3
1,800	25.4x51	0.044	0.018	0.019	4.4
2,200	25.4x64	0.066	0.016	0.016	5.2
2,800	25.4x81	0.031	0.013	0.016	5.6
3,300	25.4x91	0.024	0.010	0.015	7.3

50V (75sv)

Capacitance(μF)	Case size φDxL(mm)	ESR(ohm)at20°C 120Hz	ESR(ohm)at20°C 10KHz	Impedance(ohm) 100KHz, 20°C	Ripple current(A rms) 85°C, 120Hz
330	19x31	0.281	0.145	0.145	1.2
560	19x41	0.166	0.085	0.085	1.8
820	19x51	0.113	0.058	0.058	1.3
1,200	19x64	0.077	0.041	0.040	3.0
1,500	19x81	0.062	0.033	0.032	3.8
470	22x31	0.206	0.112	0.112	1.6
820	22x41	0.118	0.064	0.064	2.3
1,200	22x51	0.081	0.044	0.044	3.0
1,500	22x64	0.065	0.035	0.035	3.7
2,200	22x81	0.044	0.024	0.025	4.8
680	25.4x31	0.146	0.084	0.084	1.9
1,200	25.4x41	0.083	0.048	0.048	2.9
1,500	25.4x51	0.086	0.038	0.038	3.5
2,200	25.4x64	0.046	0.026	0.027	4.6
2,700	25.4x81	0.037	0.021	0.022	5.6
3,300	25.4x91	0.030	0.017	0.018	6.4

RZ series

75V (100sv)					
Capacitance (μF)	Case size φDxL (mm)	ESR (Ω) at 20°C 120Hz	ESR (Ω) at 20°C 10KHz	Impedance (Ω) 100KHz, 20°C	Ripple current (A rms) 85°C, 120Hz
150	19x31	0.424	0.102	0.102	1.0
270	19x41	0.236	0.071	0.071	1.5
390	19x51	0.163	0.049	0.049	2.0
560	19x64	0.113	0.036	0.036	2.6
680	19x81	0.094	0.030	0.030	3.1
270	22x31	0.246	0.083	0.083	1.4
390	22x41	0.170	0.057	0.057	1.9
560	22x51	0.118	0.040	0.040	2.5
820	22x64	0.081	0.030	0.030	3.3
1,000	22x81	0.066	0.025	0.026	4.0
340	25.4x31	0.176	0.086	0.084	1.8
560	25.4x41	0.126	0.045	0.045	2.3
820	25.4x51	0.086	0.033	0.033	3.1
1,200	25.4x64	0.059	0.025	0.025	4.0
1,500	25.4x81	0.047	0.020	0.021	4.9
1,700	25.4x91	0.041	0.017	0.018	5.5

100V (150sv)					
Capacitance (μF)	Case size φDxL (mm)	ESR (Ω) at 20°C 120Hz	ESR (Ω) at 20°C 10KHz	Impedance (Ω) 100KHz, 20°C	Ripple current (A rms) 85°C, 120Hz
82	19x31	0.647	0.213	0.213	0.8
130	19x41	0.440	0.142	0.142	0.9
190	19x51	0.295	0.105	0.105	1.4
260	19x64	0.220	0.078	0.078	1.8
320	19x81	0.180	0.064	0.064	2.1
390	19x81	0.136	0.045	0.045	2.6
120	22x31	0.453	0.159	0.159	1.0
220	22x41	0.247	0.087	0.087	1.6
290	22x51	0.195	0.071	0.071	1.8
400	22x64	0.145	0.053	0.053	2.3
560	22x81	0.097	0.034	0.034	3.2
190	25.4x31	0.316	0.155	0.150	1.3
290	25.4x41	0.210	0.071	0.071	1.5
410	25.4x51	0.140	0.053	0.053	2.0
550	25.4x64	0.105	0.040	0.040	2.7
680	25.4x81	0.082	0.030	0.030	3.7
820	25.4x91	0.068	0.025	0.025	4.2

150V (200sv)					
Capacitance (μF)	Case size φDxL (mm)	ESR (Ω) at 20°C 120Hz	ESR (Ω) at 20°C 10KHz	Impedance (Ω) 100KHz, 20°C	Ripple current (A rms) 85°C, 120Hz
27	19x31	3.240	0.848	0.882	0.36
33	19x31	2.700	0.750	0.690	0.40
39	19x31	2.160	0.570	0.553	0.44
47	19x41	1.830	0.448	0.465	0.51
56	19x41	1.570	0.418	0.406	0.56
68	19x41	1.210	0.318	0.308	0.63
82	22x41	1.050	0.278	0.207	0.71
100	25.4x41	0.849	0.226	0.221	0.83
120	25.4x41	0.693	0.185	0.180	0.92
150	25.4x51	0.562	0.151	0.147	1.07
180	25.4x51	0.457	0.122	0.120	1.18
220	25.4x64	0.378	0.102	0.101	1.36
270	25.4x64	0.312	0.086	0.085	1.50
330	25.4x81	0.251	0.070	0.069	1.80

200V (250sv)					
Capacitance (μF)	Case size φDxL (mm)	ESR (Ω) at 20°C 120Hz	ESR (Ω) at 20°C 10KHz	Impedance (Ω) 100KHz, 20°C	Ripple current (A rms) 85°C, 120Hz
18	19x31	4.490	0.924	0.886	0.31
22	19x31	3.720	0.760	0.740	0.34
27	19x31	2.920	0.606	0.581	0.38
33	19x41	2.500	0.540	0.500	0.44
39	19x41	2.020	0.418	0.400	0.49
47	19x41	1.550	0.322	0.309	0.56
56	22x41	1.350	0.282	0.270	0.63
68	25.4x41	1.130	0.238	0.229	0.72
82	25.4x41	0.934	0.196	0.189	0.79
100	25.4x41	0.775	0.163	0.157	0.87
120	25.4x51	0.647	0.138	0.134	0.99
150	25.4x64	0.501	0.107	0.104	1.18
180	25.4x64	0.430	0.093	0.090	1.28
220	25.4x91	0.346	0.075	0.074	1.59

250V (300sv)					
Capacitance (μF)	Case size φDxL (mm)	ESR (Ω) at 20°C 120Hz	ESR (Ω) at 20°C 10KHz	Impedance (Ω) 100KHz, 20°C	Ripple current (A rms) 85°C, 120Hz
15	19x31	5.470	0.936	0.887	0.28
18	19x31	4.700	0.760	0.750	0.30
22	19x31	3.750	0.645	0.611	0.34
27	19x41	2.870	0.492	0.467	0.41
33	19x41	2.460	0.429	0.408	0.44
39	22x41	2.030	0.350	0.332	0.51
47	22x41	1.620	0.280	0.266	0.57
56	25.4x41	1.410	0.244	0.232	0.64
68	25.4x41	1.140	0.198	0.189	0.71
82	25.4x41	0.940	0.165	0.158	0.78
100	25.4x51	0.795	0.141	0.141	0.89
120	25.4x64	0.632	0.112	0.108	1.05
150	25.4x64	0.524	0.094	0.090	1.15
180	25.4x91	0.437	0.078	0.076	1.42

RZA series

STANDARD RATINGS

WV (VDC)		6.3 (8sv)					10 (13sv)				
Case size φDxL (mm)	Case code	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)
19x31	19A	3,300	0.068	0.037	0.037	3.7	2,200	0.079	0.037	0.037	3.7
19x41	19B	5,600	0.045	0.025	0.026	4.8	3,900	0.045	0.025	0.026	4.8
19x51	19C	6,800	0.033	0.018	0.019	5.8	5,600	0.033	0.018	0.019	5.8
19x64	19D	10,000	0.022	0.015	0.018	6.8	8,200	0.022	0.015	0.018	6.8
19x81	19E	15,000	0.019	0.014	0.014	7.6	10,000	0.019	0.014	0.014	7.6
22x31	22A	4,700	0.045	0.030	0.030	4.2	3,300	0.054	0.030	0.030	4.2
22x41	22B	6,800	0.038	0.024	0.024	5.0	5,600	0.027	0.024	0.023	5.0
22x51	22C	10,000	0.024	0.015	0.015	6.7	8,200	0.018	0.015	0.015	6.7
22x64	22D	15,000	0.016	0.010	0.011	8.6	10,000	0.015	0.010	0.013	8.6
22x81	22E	22,000	0.011	0.009	0.010	11.4	15,000	0.012	0.009	0.010	11.4
25.4x31	25A	6,800	0.030	0.016	0.018	6.0	4,700	0.039	0.022	0.024	5.0
25.4x41	25B	10,000	0.017	0.013	0.015	7.3	6,800	0.030	0.018	0.019	6.0
25.4x51	25C	15,000	0.017	0.011	0.013	8.0	10,000	0.017	0.012	0.013	8.0
25.4x64	25D	22,000	0.011	0.009	0.011	9.6	15,000	0.012	0.010	0.012	9.6
25.4x81	25E	27,000	0.011	0.009	0.010	11.0	18,000	0.011	0.009	0.010	11.0
25.4x91	25F	33,000	0.009	0.008	0.010	12.4	22,000	0.010	0.008	0.010	12.4

NIPPON CHEMI-CON

RZA series

WV (VDC)		16				(20sv)	25				(32sv)
Case size φD×L(mm)	Case code	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)
19x31	19A	1,500	0.097	0.043	0.043	3.2	820	0.129	0.049	0.049	3.0
19x41	19B	2,200	0.066	0.029	0.029	4.1	1,200	0.088	0.033	0.033	3.9
19x51	19C	3,300	0.044	0.019	0.021	5.3	1,800	0.049	0.020	0.022	5.2
19x64	19D	4,700	0.028	0.013	0.019	6.8	2,700	0.039	0.015	0.019	6.4
19x81	19E	6,800	0.026	0.013	0.015	7.3	3,900	0.032	0.013	0.015	7.3
22x31	22A	2,200	0.072	0.033	0.033	3.8	1,000	0.111	0.046	0.046	3.2
22x41	22B	3,300	0.048	0.022	0.023	4.9	1,800	0.062	0.026	0.027	4.5
22x51	22C	4,700	0.031	0.016	0.020	6.1	2,700	0.042	0.017	0.020	5.9
22x64	22D	6,800	0.024	0.011	0.012	7.8	3,900	0.024	0.011	0.013	7.8
22x81	22E	10,000	0.016	0.007	0.009	10.5	4,700	0.024	0.011	0.013	8.4
25.4x31	25A	2,700	0.058	0.029	0.030	4.2	1,500	0.078	0.035	0.036	3.8
25.4x41	25B	4,700	0.038	0.019	0.020	5.5	2,700	0.046	0.021	0.022	5.2
25.4x51	25C	6,800	0.026	0.013	0.015	7.0	3,900	0.030	0.014	0.015	6.7
25.4x64	25D	10,000	0.017	0.009	0.011	9.1	4,700	0.025	0.011	0.013	8.2
25.4x81	25E	12,000	0.015	0.008	0.010	10.3	6,800	0.018	0.009	0.011	9.7
25.4x91	25F	15,000	0.010	0.007	0.009	11.5	8,200	0.010	0.007	0.009	11.5

WV (VDC)		35				(44sv)	50				(63sv)
Case size φD×L(mm)	Case code	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)
19x31	19A	560	0.130	0.049	0.049	3.0	390	0.237	0.057	0.057	2.8
19x41	19B	1,000	0.088	0.033	0.033	3.9	560	0.166	0.040	0.040	3.5
19x51	19C	1,500	0.049	0.020	0.022	5.2	820	0.113	0.027	0.027	4.5
19x64	19D	1,800	0.039	0.015	0.019	6.4	1,200	0.077	0.019	0.020	5.6
19x81	19E	2,700	0.032	0.013	0.015	7.3	1,500	0.062	0.015	0.017	6.8
22x31	22A	820	0.111	0.046	0.046	3.2	560	0.173	0.094	0.094	2.2
22x41	22B	1,500	0.062	0.026	0.027	4.5	820	0.118	0.064	0.064	2.9
22x51	22C	1,800	0.042	0.017	0.020	5.9	1,200	0.081	0.044	0.044	3.6
22x64	22D	2,700	0.026	0.011	0.013	7.8	1,800	0.054	0.029	0.029	4.8
22x81	22E	3,900	0.025	0.011	0.013	8.4	2,200	0.044	0.024	0.025	5.7
25.4x31	25A	1,200	0.078	0.035	0.036	3.8	680	0.146	0.084	0.084	2.4
25.4x41	25B	1,800	0.046	0.021	0.022	5.2	1,200	0.083	0.048	0.048	3.5
25.4x51	25C	2,700	0.030	0.014	0.015	6.7	1,500	0.066	0.038	0.038	4.1
25.4x64	25D	3,900	0.025	0.011	0.013	8.2	2,200	0.045	0.026	0.027	5.3
25.4x81	25E	4,700	0.018	0.009	0.011	9.7	3,300	0.030	0.017	0.018	7.0
25.4x91	25F	5,600	0.014	0.008	0.009	10.7	3,900	0.025	0.014	0.015	8.1

WV (VDC)		63				(79sv)	80				(100sv)
Case size φD×L(mm)	Case code	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)
19x31	19A	220	0.289	0.070	0.070	2.5	150	0.424	0.102	0.102	2.1
19x41	19B	390	0.163	0.049	0.049	3.2	220	0.289	0.087	0.087	2.4
19x51	19C	560	0.114	0.040	0.040	3.7	330	0.193	0.057	0.057	3.1
19x64	19D	820	0.077	0.030	0.030	4.5	470	0.135	0.043	0.043	3.7
19x81	19E	1,000	0.064	0.025	0.026	5.3	680	0.114	0.037	0.037	4.3
22x31	22A	330	0.201	0.094	0.094	2.2	220	0.302	0.102	0.102	2.1
22x41	22B	560	0.118	0.064	0.064	2.9	330	0.201	0.067	0.067	2.8
22x51	22C	820	0.081	0.044	0.044	3.6	470	0.141	0.048	0.048	3.5
22x64	22D	1,200	0.055	0.029	0.029	4.8	680	0.098	0.036	0.036	4.3
22x81	22E	1,500	0.044	0.024	0.025	5.7	820	0.080	0.030	0.032	5.0
25.4x31	25A	470	0.146	0.084	0.084	2.4	270	0.222	0.108	0.106	2.1
25.4x41	25B	680	0.104	0.048	0.048	3.5	470	0.150	0.054	0.054	3.2
25.4x51	25C	1,000	0.071	0.038	0.038	4.1	680	0.104	0.040	0.040	4.0
25.4x64	25D	1,500	0.047	0.026	0.027	5.3	820	0.086	0.037	0.037	4.4
25.4x81	25E	1,800	0.039	0.017	0.018	7.0	1,200	0.059	0.025	0.026	5.8
25.4x91	25F	2,200	0.032	0.014	0.015	8.1	1,500	0.046	0.019	0.020	7.0

WV (VDC)		100				(125sv)
Case size φD×L(mm)	Case code	Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/20KHz)
19x31	19A	120	0.530	0.175	0.175	1.6
19x41	19B	220	0.312	0.101	0.101	2.2
19x51	19C	270	0.250	0.089	0.089	2.4
19x64	19D	390	0.176	0.063	0.063	3.1
19x81	19E	560	0.136	0.045	0.045	3.9
22x31	22A	180	0.302	0.106	0.106	2.1
22x41	22B	270	0.201	0.071	0.071	2.7
22x51	22C	390	0.145	0.053	0.053	3.3
22x64	22D	560	0.104	0.038	0.038	4.2
22x81	22E	820	0.080	0.030	0.032	5.0
25.4x31	25A	220	0.273	0.108	0.106	2.1
25.4x41	25B	390	0.156	0.054	0.054	3.2
25.4x51	25C	560	0.104	0.040	0.040	4.0
25.4x64	25D	820	0.086	0.037	0.037	4.4
25.4x81	25E	1,000	0.059	0.025	0.026	5.8
25.4x91	25F	1,200	0.046	0.019	0.020	7.0

RZA series

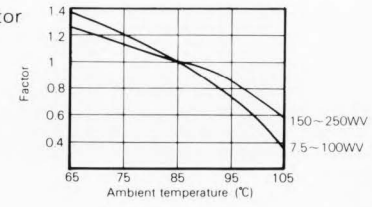
WV (V_{DC}) / Case size φDxL(mm)	Case code	160 (200sv) Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/120Hz)	180 (225sv) Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/120Hz)
19x31	19A	82	1.230	0.220	0.200	0.60	82	1.230	0.220	0.200	0.60
19x41	19B	150	0.670	0.120	0.110	0.86	120	0.830	0.150	0.140	0.78
19x51	19C	180	0.560	0.100	0.090	0.99	180	0.560	0.100	0.090	0.99
19x64	19D	270	0.380	0.068	0.063	1.20	220	0.450	0.081	0.073	1.10
19x81	19E	390	0.300	0.055	0.055	1.50	330	0.300	0.055	0.055	1.50
22x31	22A	120	0.884	0.150	0.150	0.74	100	1.060	0.190	0.190	0.67
22x41	22B	180	0.589	0.105	0.105	0.95	180	0.589	0.105	0.105	0.95
22x51	22C	270	0.393	0.070	0.070	1.20	270	0.393	0.070	0.070	1.20
22x64	22D	390	0.272	0.049	0.049	1.40	350	0.322	0.058	0.058	1.40
22x81	22E	560	0.189	0.034	0.034	2.00	470	0.226	0.041	0.041	1.80
25.4x31	25A	180	0.589	0.108	0.106	0.93	150	0.707	0.126	0.126	0.85
25.4x41	25B	270	0.393	0.070	0.070	1.20	220	0.482	0.087	0.087	1.10
25.4x51	25C	390	0.272	0.049	0.049	1.50	330	0.322	0.058	0.058	1.40
25.4x64	25D	560	0.189	0.037	0.037	1.90	470	0.226	0.041	0.041	1.80
25.4x81	25E	680	0.156	0.029	0.029	2.30	560	0.189	0.035	0.035	2.10
25.4x91	25F	820	0.129	0.024	0.024	2.60	680	0.156	0.029	0.029	2.40

WV (V_{DC}) / Case size φDxL(mm)	Case code	200 (250sv) Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/120Hz)	250 (300sv) Capacitance (μF)	ESR (Ω) (20°C/120Hz)	ESR (Ω) (20°C/10KHz)	Impedance (Ω) (20°C/100KHz)	Ripple current (Arms:85°C/120Hz)
19x31	19A	68	1.460	0.250	0.230	0.55	56	1.710	0.390	0.390	0.51
19x41	19B	120	0.830	0.140	0.140	0.78	82	1.160	0.270	0.270	0.66
19x51	19C	150	0.670	0.110	0.099	0.90	120	0.800	0.180	0.180	0.82
19x64	19D	220	0.450	0.081	0.073	1.10	180	0.530	0.130	0.120	1.00
19x81	19E	270	0.370	0.063	0.063	1.30	220	0.430	0.100	0.100	1.20
22x31	22A	100	1.060	0.190	0.182	0.67	68	1.560	0.356	0.356	0.55
22x41	22B	150	0.707	0.119	0.119	0.87	120	0.884	0.206	0.206	0.78
22x51	22C	220	0.482	0.079	0.079	1.10	180	0.589	0.133	0.133	1.00
22x64	22D	330	0.322	0.058	0.058	1.40	220	0.482	0.118	0.118	1.10
22x81	22E	390	0.272	0.046	0.046	1.60	330	0.322	0.075	0.075	1.50
25.4x31	25A	120	0.884	0.151	0.151	0.76	100	1.060	0.242	0.242	0.69
25.4x41	25B	220	0.482	0.087	0.087	1.10	150	0.707	0.165	0.165	0.91
25.4x51	25C	330	0.322	0.058	0.058	1.40	220	0.482	0.108	0.108	1.10
25.4x64	25D	470	0.226	0.041	0.041	1.80	330	0.322	0.079	0.079	1.50
25.4x81	25E	560	0.189	0.035	0.035	2.10	470	0.226	0.053	0.053	1.90
25.4x91	25F	680	0.156	0.029	0.029	2.40	560	0.189	0.044	0.044	2.20

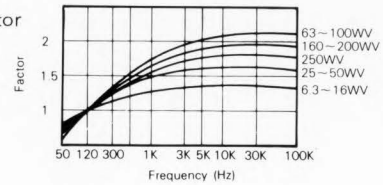
RIPPLE CURRENT MULTIPLIERS

RZ series

Temperature Multiplying Factor

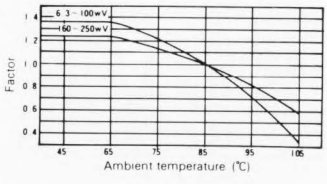


Frequency Multiplying Factor



RZA series

Temperature Multiplying Factor



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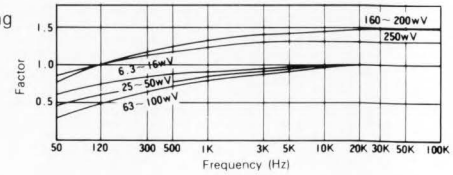


LX, GX SERIES

- **Much long life, about 13 to 15 years at 60°C**
- **Operating temperature range,**
  LX series; −40°C to +105°C
  GX series; −40°C to +130°C

- LX series have guaranteed operating life of 5,000 hours at 105°C and specified maximum impedance at 100KHz. Case sizes of LX are smaller than those of GX.
- LX series are solvent proof type. (see page 10 for cleaning conditions.)
- GX series have guaranteed operating life of 1,000 hours at 130°C and also have the widest operating temperature range, −40°C to 130°C.
- For detail specifications, refer to latest issue of Engineering Bulletin No.526.
- Applications: High reliability equipment, filtering circuit of switching power supply, and industrial control equipment.

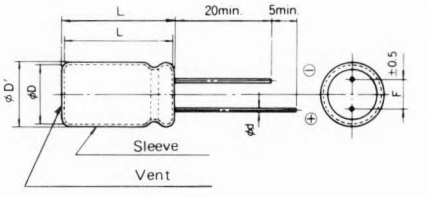
CHARACTERISTICS

Item \ Series	LX (Radial lead)	GX (Radial, Axial lead)
Rated voltage range	10 ~ 250 VDC	10 ~ 63 VDC
Operating temperature range	−40 ~ +105°C	−40 ~ +130°C
Capacitance tolerance	±20% (M) (at 20°C, 120Hz)	−10 ~ +50% (at 20°C, 120Hz)
Leakage current	After 2 minutes 100WV or less; I = 0.01CV + 2μA 160 ~ 250WV; I = 0.04CV + 100μA where I ; Maximum leakage current (μA) at 20°C C; Nominal capacitance (μF) V; Rated working voltage (V)	After 5 minutes I = 0.002CV or 2μA whichever larger
Dissipation factor	At 20°C, 120Hz Rated voltage (V): 10 / 25 / 35~100 / 160~250 Dissipation factor: 0.19 / 0.14 / 0.12 / 0.15 Note: Above DF specification shall be 0.02 added every 1,000μF for capacitor exceeding 1,000μF.	At 20°C, 120Hz Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63 Dissipation factor: 0.20 / 0.17 / 0.17 / 0.12 / 0.10 / 0.10
Low temperature characteristics	Capacitance change (at 120Hz): $\Delta C_{-10°C}/C_{20°C} \leqq \pm 10\%$ (~50WV) $\leqq \pm 20\%$ (100WV~) Impedance value at −10°C, 100kHz is given in the table.	Capacitance change (at 120Hz): $\Delta C_{-25°C}/C_{20°C} \leqq \pm 30\%$
Impedance at 100kHz	Maximum impedance at 20°C, 100kHz is given in the table.	—
Maximum rippie current	Maximum rms ripple current at 105°C, 10kHz is given in the table.	Maximum rms ripple current at 130°C, 120Hz is given in the table.
Load life	The following specifications shall be satisfied when the capacitors are restored at 20°C after the rated working voltage applied for 5,000 hours at 105°C. Capacitance change ≦ ±30% of the initial value. Dissipation factor ≦ 250% of the initial specified value. Leakage current ≦ The initial specified value.	The following specifications shall be satisfied when the capacitors are restored at 20°C after the rated working voltage applied for 1,000 hours at 130°C. Capacitance change ≦ ±15% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value.
Shelf life	The following specifications shall be satisfied when the capacitors are restored at 20°C after exposing them at 105°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value.	The following specifications shall be satisfied when the capacitors are restored at 20°C after exposing them at 130°C for 1,000 hours without voltage applied. Capacitance change ≦ ±15% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ 5 times the initial specified value.
Others	Satisfies characteristic W of JIS C 5141.	Satisfies characteristic C of JIS C 5141.

STANDARD RATINGS (VB/Radial lead)

Rated voltage (V)	Capacitance (μF)	LX				GX	
		Case size φDxL (mm)	Max. ripple current (mA rms: 105°C/10KHz)	Impedance (Ω max.) (20°C/100KHz)	Impedance (Ω max.) (-10°C/100KHz)	Case size φDxL (mm)	Max. ripple current (mA rms: Max. operating temp./120Hz)
10	47	8x14	230	0.85	2.55	8x11.5	92
	100	8x14	240	0.83	2.49	10x16.5	145
	220	10x20	540	0.28	0.84	12.5x20.5	330
	330	10x20	550	0.25	0.75	12.5x20.5	410
	470	12.5x20	660	0.21	0.63	12.5x24.5	525
	1,000	12.5x25	860	0.15	0.45	16x31.5	960
	2,200	16x31.5	1,400	0.08	0.24		
16	33					8x11.5	91
	47					10x12.5	110
	100					10x20.5	206
	220					12.5x20.5	400
	330					12.5x24.5	525
	470					16x25.5	720
25	22	8x14	180	1.33	3.99	8x11.5	70
	33	8x14	190	1.25	3.75	10x12.5	100
	47	8x14	260	1.10	3.30	10x16.5	130
	100	10x20	420	0.42	1.26	10x20.5	250
	220	12.5x20	670	0.20	0.60	12.5x24.5	470
	330	12.5x25	900	0.13	0.39	16x25.5	631
	470	16x25	1,220	0.09	0.27	16x31.5	810
	1,000	16x31.5	1,400	0.08	0.24		
35	22	8x14	190	1.58	4.74	10x12.5	82
	33	8x14	200	1.33	3.99	10x16.5	108
	47	8x14	280	1.03	3.09	10x16.5	158
	100	10x20	510	0.32	0.96	12.5x20.5	262
	220	12.5x25	900	0.15	0.45	16x25.5	540
	330	16x25	1,040	0.13	0.39	16x31.5	718
	470	16x25	1,300	0.09	0.27	16x35.5	900
50	10	8x14	200	1.23	3.69	8x11.5	48
	22	8x14	200	1.21	3.63	10x16.5	88
	33	10x20	290	0.87	2.61	10x16.5	122
	47	10x20	320	0.72	2.16	10x20.5	164
	100	12.5x20	670	0.22	0.66	12.5x20.5	277
	220	16x25	1,220	0.09	0.27	16x31.5	587
	330	16x31.5	1,520	0.07	0.21		
63	0.47					8x11.5	12
	1					8x11.5	18
	2.2					8x11.5	26
	3.3					8x11.5	30
	4.7					8x11.5	38
	10					10x12.5	55
	22					10x16.5	88
	33					10x20.5	132
	47					12.5x20.5	172
	100					12.5x24.5	295
	220					16x31.5	587
100	0.47	8x14	30	35.0	105.0		
	1	8x14	50	18.0	54.0		
	2.2	8x14	60	9.62	28.8		
	3.3	8x14	70	8.57	25.7		
	4.7	8x14	80	6.43	19.3		
	10	10x20	230	2.99	8.97		
	22	12.5x20	250	1.47	4.41		
	33	12.5x25	330	1.00	3.00		
	47	16x25	440	0.69	2.07		
160	10	12.5x20	130	3.5	10.0		
	22	16x25	250	1.8	4.8		
	33	16x25	320	1.7	4.5		
	47	16x31.5	400	1.1	2.9		
	68	18x35.5	510	0.9	1.9		
200	1	10x16	30	18.0	70.0		
	2.2	10x16	40	16.0	65.0		
	3.3	10x16	50	9.2	32.0		
	4.7	10x20	80	4.7	14.0		
	10	12.5x20	140	2.6	7.6		
	22	16x25	250	1.9	5.0		
	33	16x31.5	330	1.2	3.0		
	47	18x35.5	430	1.0	2.5		
	68	18x40	520	0.7	1.8		
250	1	10x16	30	20.0	80.0		
	2.2	10x16	40	18.0	70.0		
	3.3	10x20	60	9.0	27.0		
	4.7	12.5x20	90	5.0	15.0		
	10	12.5x25	150	2.5	7.0		
	22	16x31.5	260	1.8	4.8		
	33	16x35.5	340	1.0	2.8		
	47	18x40	440	0.8	2.0		

VB/Radial lead Unit (mm)



φD		8	10	12.5	16	18
φd	LX	0.6			0.8	
	GX	0.6			0.65	0.8
F		3.5	5.0	5.0	7.5	7.5
φD'	LX	φD+0.5max.				
	GX	φD +0.5 max.	φD+1.0max.			
L'	LX	L+1.5max.			L+2.0max.	
	GX	L+2.0max.				

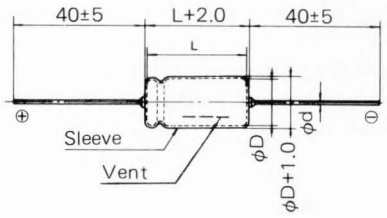
STANDARD RATEGS (T/Axial lead)

Rated voltage (V)	Capacitance (μF)	GX series	
		Case size φDxL (mm)	Max. ripple current (mA rms: Max. operating temp./120Hz)
10	22	6.3x13	53
	33	6.3x16	72
	47	6.3x18	89
	100	8x18	160
	220	10x25	310
	330	12.5x25	444
	470	12.5x30	570
	1,000	16x30	940
16	22	6.3x16	70
	33	6.3x18	88
	47	8x16	124
	100	10x20	227
	220	10x30	430
	330	12.5x30	570
	470	12.5x40	730
	1,000	16x40	1,100
25	10	6.3x13	47
	22	8x16	80
	33	8x18	111
	47	10x20	143
	100	10x25	273
	220	12.5x30	508
	330	12.5x40	660
	470	16x30	840
35	10	6.3x16	50
	22	8x18	90
	33	10x20	114
	47	10x20	170
	100	12.5x25	280
	220	12.5x40	528
	330	16x30	705
	470	16x40	945
50	4.7	6.3x13	29
	10	8x16	51
	22	10x20	93
	33	10x25	156
	47	10x30	211
	100	12.5x25	300
	220	16x30	534
	330	16x40	720
63	0.47	6.3x13	10
	1	6.3x13	15
	2.2	6.3x13	23
	3.3	6.3x13	28
	4.7	6.3x18	34
	10	8x18	54
	22	10x20	93
	33	10x25	156
	47	12.5x25	218
	100	12.5x30	319
	220	16x40	575

T/Axial Lead

Unit (mm)

φD	φd
6.3~12.5	0.6
16	0.8



LX SERIES RIPPLE CURRENT MULTIPLIERS

Maximum rms ripple current at 105°C, 10 kHz is given in the table.

Temperature multiplying factor;

Where capacitors are operated at a temperature other than 105°C, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor;

If capacitors are used to filter circuits at a frequency other than 10 kHz, the rated 10 kHz rms ripple current shown must be multiplied by the factor shown in the table.

Ambient temp.	Multiplying factor
70°C or less	2.17
85°C	1.73
105°C	1.00

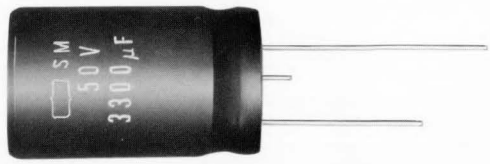
Frequency	Multiplying factor		
	0.47~3.3μF	4.7~33μF	47μF & up
50 Hz	0.3	0.4	0.6
120 Hz	0.4	0.5	0.7
300 Hz	0.5	0.6	0.8
1 kHz	0.7	0.8	0.9
10 kHz ~	1.0	1.0	1.0

Note: The rms ripple current has to be reduced when long life performance is required in actual use.

SM-VP SERIES

• VP type (3 lead wires) of SM series

- Three lead wire type. One is auxiliary lead wire for mechanical support.
- Free from polarity insertion error.
- For detail specifications, refer to latest issue of Engineering Bulletin No.528.



CHARACTERISTICS

Item \ Series	SM-VP
Operating temperature range	−40 ~ +85°C
Capacitance tolerance	±20% (M) (at 20°C, 120Hz)
Leakage current	0.02CV (μA) or 3,000μA, whichever is smaller. (After 5 minutes) (at 20°C)
Dissipation factor	Refer to the table. (at 20°C, 120Hz)
Ripple current (A RMS)	Refer to the table. (at 85°C, 120Hz)
Temperature characteristics	Impedance ratio at 120Hz

Rated voltage (V)	10	16	25	35	50	63	80	100
Z(-25°C)/Z(20°C)	3	3	3	3	3	3	3	3
Z(-40°C)/Z(20°C)	12	12	10	6	4	4	4	4

Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied at 85°C for 1,000 hours. Capacitance change ≦ ±20% of the initial value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied. Capacitance change ≦ ±20% of the initial specified value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value
Others	Satisfies characteristic W of JIS C 5141.

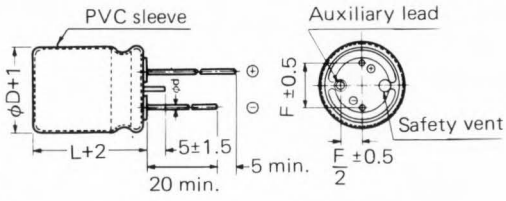
STANDARD RATINGS

Working voltage (V)	Capacitance (μF)	Case size φD x L (mm)	DF (ESR/Ω) at 20°C 120Hz	Max. ripple current (A rms) at 85°C,120Hz
10	4,700	22x30	0.50 (0.18)	1.0
	6,800	22x30	0.50 (0.12)	1.3
	10,000	22x40	0.70 (0.12)	1.6
	15,000	25.4x50	0.85 (0.094)	2.0
	22,000	30x50	0.85 (0.064)	2.8
16	3,300	22x30	0.35 (0.18)	1.0
	4,700	22x30	0.35 (0.12)	1.3
	6,800	22x40	0.50 (0.12)	1.6
	10,000	25.4x40	0.60 (0.10)	2.0
	15,000	30x50	0.75 (0.083)	2.7
25	3,300	22x30	0.35 (0.18)	1.1
	4,700	22x40	0.35 (0.12)	1.3
	6,800	25.4x40	0.45 (0.11)	1.7
	10,000	25.4x50	0.45 (0.075)	2.1
	15,000	30x50	0.60 (0.066)	2.7
35	2,200	22x30	0.20 (0.15)	1.0
	3,300	22x40	0.30 (0.15)	1.3
	4,700	25.4x40	0.30 (0.11)	1.6
	6,800	25.4x50	0.30 (0.073)	2.0
	10,000	30x50	0.40 (0.066)	2.6
50	2,200	22x40	0.20 (0.15)	1.1
	3,300	25.4x40	0.25 (0.13)	1.4
	4,700	25.4x50	0.25 (0.088)	1.7
	6,800	30x50	0.30 (0.061)	2.2
63	1,000	22x30	0.20 (0.33)	0.7
	2,200	25.4x40	0.20 (0.15)	1.2
	3,300	25.4x50	0.25 (0.13)	1.4
	4,700	30x50	0.25 (0.088)	1.8
80	1,000	22x40	0.15 (0.25)	0.8
	2,200	25.4x50	0.20 (0.15)	1.3
	3,300	30x50	0.20 (0.10)	1.7
100	470	22x30	0.15 (0.53)	0.6
	1,000	25.4x40	0.15 (0.25)	0.9
	2,200	30x50	0.15 (0.11)	1.4

DIMENSIONS

VP/3 leads

Unit (mm)



φD	22	25.4	30
F	10.0	12.5	15.0
φd	1.0	1.0	1.2

(Note) Use auxiliary terminal independent from all other circuits.

KRF SERIES

- **Radial lead type, Large capacitance φ22x20ℓ to φ30x50ℓmm.**
- **Operating temperature range, −40 (25)°C to +105°C**
- **Solvent proof type**

- Impedance at 20KHz or 100KHz is specified.
- Low profile case sizes of φ22x20ℓ, φ25.4x20ℓ and φ30x20ℓ mm are included in the standard products.
- For cleaning conditions, see page 10.
- For detail specifications, refer to latest issue of Engineering Bulletin No.529.
- Applications: Consumer and industrial. Compact and light-weight equipment and input/output filtering circuit of switching power supply.

CHARACTERISTICS

Item \ Series	KRF	
Rated voltage range	10 ~ 100VDC	160 ~ 250VDC
Operating temperature range	−40 ~ +105°C	−25 ~ +105°C
Capacitance tolerance	±20% (at 20°C, 120Hz)	
Leakage current	I = 0.02CV or 3mA, whichever is smaller (after 5 minutes) Where I : Maximum leakage current (μA) at 20°C C: Nominal capacitance (μF) V: Rated working voltage (V)	
Dissipation factor	(at 20°C, 120Hz)	

Rated voltage (V)	10	16	25	35	50	63	80~250
Dissipation factor	0.60	0.50	0.40	0.35	0.25	0.20	0.15

Low temperature characteristics	1) Capacitance change at the minimum operating temperature shall not be less than 70% of the 20°C value. 2) Impedance ratio at 120Hz shall not exceed the values given in the below table.

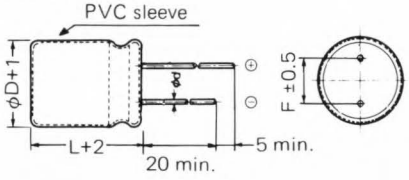
Rated voltage (V)	10	16	25	35	50	63	80	100	160~250
Z at -25°C/Z at +20°C	4	4	3	3	2	2	2	2	4
Z at -40°C/Z at +20°C	15	15	10	8	6	6	5	5	–

Equivalent series inductance	Equivalent series inductance at 20°C, 1MHz shall not exceed 50nH.
Impedance	Impedance at 20°C and 20KHz or 100KHz shall not exceed the values given in the table.
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 1,000 hours at 105°C. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 200% of the initial specified value. Leakage current ≦ The initial specified value.
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current (10~100WV) ≦ 200% of the initial specified value. (160~250WV) ≦ 500% of the initial specified value.
Others	Other specifications shall comply with JIS C 5141, characteristic W.

DIMENSIONS

Unit (mm)

VB/Radial lead



φD	φd	F
22	1.0	10
25.4	1.0	12.5
30	1.2	15

Specifications subject to change without notice.

KRF series

Rated voltage (V)	Case size φDxL(mm)	Cap. (μF)	Max. ripple current (Arms) 85°C120Hz	Max. ripple current (Arms) 105°C120Hz	Impedance (mΩ/20°C, 20KHz)
10	22x20	4,700	1.54	0.88	230
	22x25	6,800	1.99	1.14	150
	22x30	10,000	2.62	1.50	120
	22x35	12,000	3.02	1.73	95
	22x40	15,000	3.50	2.00	80
	22x50	18,000	4.13	2.36	60
	25.4x20	6,800	1.97	1.13	170
	25.4x25	10,000	2.57	1.47	110
	25.4x30	12,000	3.02	1.73	85
	25.4x35	18,000	3.88	2.22	70
	25.4x40	22,000	4.56	2.61	60
	25.4x50	27,000	5.39	3.08	45
	30x20	10,000	2.62	1.50	120
	30x25	15,000	3.44	1.97	80
	30x30	18,000	4.00	2.29	60
	30x35	22,000	4.69	2.68	50
	30x40	27,000	5.39	3.08	40
	30x50	39,000	7.07	4.04	30
16	22x20	3,900	1.59	0.91	230
	22x25	5,600	2.04	1.17	150
	22x30	6,800	2.41	1.38	120
	22x35	10,000	3.09	1.77	95
	22x40	12,000	3.50	2.00	80
	22x50	15,000	4.21	2.41	60
	25.4x20	4,700	1.85	1.06	170
	25.4x25	8,200	2.60	1.49	110
	25.4x30	10,000	3.09	1.77	85
	25.4x35	12,000	3.55	2.03	70
	25.4x40	15,000	4.21	2.41	60
	25.4x50	22,000	5.44	3.11	45
	30x20	6,800	2.41	1.38	120
	30x25	10,000	3.15	1.80	80
	30x30	15,000	4.09	2.34	60
	30x35	18,000	4.74	2.71	50
	30x40	22,000	5.44	3.11	40
	30x50	27,000	6.58	3.76	30
25	22x20	2,700	1.57	0.90	230
	22x25	3,900	2.03	1.16	150
	22x30	4,700	2.32	1.33	120
	22x35	5,600	2.67	1.53	95
	22x40	6,800	3.04	1.74	80
	22x50	10,000	4.49	2.57	60
	25.4x20	3,300	1.78	1.02	170
	25.4x25	4,700	2.27	1.30	110
	25.4x30	6,800	2.94	1.68	85
	25.4x35	8,200	3.39	1.94	70
	25.4x40	10,000	3.97	2.27	60
	25.4x50	12,000	4.63	2.65	45
	30x20	4,700	2.32	1.33	120
	30x25	6,800	2.99	1.71	80
	30x30	10,000	3.86	2.21	60
	30x35	12,000	4.46	2.55	50
	30x40	15,000	5.18	2.96	40
	30x50	18,000	6.21	3.55	30
35	22x20	1,800	1.33	0.76	230
	22x25	2,700	1.76	1.01	150
	22x30	3,300	2.10	1.20	120
	22x35	3,900	2.45	1.40	95
	22x40	4,700	2.76	1.58	80
	22x50	6,800	3.58	2.05	60
	25.4x20	2,200	1.61	0.92	170
	25.4x25	3,300	2.08	1.19	110
	25.4x30	4,700	2.67	1.53	85
	25.4x35	5,600	3.08	1.76	70
	25.4x40	6,800	3.58	2.05	60
	25.4x50	8,200	4.20	2.40	45
	30x20	3,300	2.13	1.22	120
	30x25	4,700	2.73	1.56	80
	30x30	6,800	3.48	1.99	60
	30x35	8,200	4.04	2.31	50
	30x40	10,000	4.63	2.65	40
	30x50	12,000	5.54	3.17	30

Rated voltage (V)	Case size φDxL(mm)	Cap. (μF)	Max. ripple current (Arms) 85°C 120Hz	Max. ripple current (Arms) 105°C120Hz	Impedance (mΩ/20°C, 20KHz)
50	22x20	1,000	1.12	0.64	230
	22x25	1,500	1.48	0.85	150
	22x30	1,800	1.76	1.01	120
	22x35	2,700	2.27	1.30	95
	22x40	3,300	2.59	1.48	80
	22x50	3,900	3.02	1.73	60
	25.4x20	1,200	1.33	0.76	170
	25.4x25	2,200	1.90	1.09	110
	25.4x30	2,700	2.27	1.30	85
	25.4x35	3,300	2.64	1.51	70
	25.4x40	3,900	3.02	1.73	60
	25.4x50	5,600	3.88	2.22	45
	30x20	1,800	1.76	1.01	120
	30x25	2,700	2.31	1.32	80
	30x30	3,900	2.95	1.69	60
	30x35	4,700	3.41	1.95	50
	30x40	5,600	3.88	2.22	40
	30x50	8,200	5.12	2.93	30
63	22x20	560	0.91	0.52	230
	22x25	820	1.17	0.67	150
	22x30	1,200	1.55	0.89	120
	22x35	1,500	1.83	1.05	95
	22x40	1,800	2.06	1.18	80
	22x50	2,200	2.46	1.41	60
	25.4x20	820	1.17	0.67	170
	25.4x25	1,200	1.52	0.87	110
	25.4x30	1,500	1.83	1.05	85
	25.4x35	1,800	2.10	1.20	70
	25.4x40	2,200	2.46	1.41	60
	25.4x50	3,300	3.22	1.84	45
	30x20	1,200	1.38	0.79	120
	30x25	1,800	2.03	1.16	80
	30x30	2,200	2.39	1.37	60
	30x35	2,700	2.80	1.60	50
	30x40	3,300	3.22	1.84	40
	30x50	4,700	4.18	2.39	30
80	22x20	390	0.78	0.45	230
	22x25	560	1.01	0.58	150
	22x30	820	1.33	0.76	120
	22x35	1,000	1.55	0.89	95
	22x40	1,200	1.78	1.02	80
	22x50	1,800	2.32	1.33	60
	25.4x20	560	1.01	0.58	170
	25.4x25	820	1.31	0.75	110
	25.4x30	1,000	1.55	0.89	85
	25.4x35	1,500	1.99	1.14	70
	25.4x40	1,800	2.32	1.33	60
	25.4x50	2,200	2.74	1.57	45
	30x20	820	1.33	0.76	120
	30x25	1,200	1.73	0.99	80
	30x30	1,500	2.06	1.18	60
	30x35	1,800	2.38	1.36	50
	30x40	2,200	2.73	1.56	40
	30x50	3,300	3.65	2.09	30
100	22x20	270	0.68	0.39	230
	22x25	390	0.89	0.51	150
	22x30	560	1.15	0.66	120
	22x35	680	1.34	0.77	95
	22x40	820	1.52	0.87	80
	22x50	1,200	1.99	1.14	60
	25.4x20	390	0.89	0.51	170
	25.4x25	560	1.13	0.65	110
	25.4x30	680	1.34	0.77	85
	25.4x35	820	1.55	0.89	70
	25.4x40	1,200	1.99	1.14	60
	25.4x50	1,500	2.36	1.35	45
	30x20	560	1.15	0.66	120
	30x25	820	1.50	0.86	80
	30x30	1,000	1.76	1.01	60
	30x35	1,200	2.04	1.17	50
	30x40	1,500	2.36	1.35	40
	30x50	2,200	3.13	1.79	30

KRF series

Rated voltage (V)	Case size φDxL(mm)	Cap. (μF)	Max. ripple current (Arms) 85°C120Hz	Max. ripple current (Arms) 105°C120Hz	Impedance (mΩ/20°C100KHz)
160	22x20	120	0.57	0.33	1,200
	22x25	180	0.77	0.44	800
	22x30	270	1.01	0.58	700
	22x35	330	1.19	0.68	560
	22x40	390	1.33	0.76	500
	22x50	560	1.71	0.98	390
	25.4x20	150	0.70	0.40	940
	25.4x25	270	0.99	0.57	660
	25.4x30	390	1.29	0.74	520
	25.4x35	470	1.48	0.85	440
	25.4x40	560	1.71	0.98	380
	25.4x50	820	2.22	1.27	300
	30x20	220	0.91	0.52	700
	30x25	390	1.31	0.75	500
	30x30	560	1.68	0.96	400
	30x35	680	1.94	1.11	320
	30x40	820	2.22	1.27	290
	30x50	1,000	2.67	1.53	220
180	22x20	100	0.52	0.30	1,200
	22x25	180	0.77	0.44	800
	22x30	220	0.91	0.52	700
	22x35	270	1.06	0.61	560
	22x40	390	1.33	0.76	500
	22x50	470	1.57	0.90	390
	25.4x20	120	0.63	0.36	940
	25.4x25	220	0.89	0.51	660
	25.4x30	330	1.19	0.68	520
	25.4x35	390	1.34	0.77	440
	25.4x40	470	1.57	0.90	380
	25.4x50	680	2.03	1.16	300
	30x20	180	0.82	0.47	700
	30x25	330	1.20	0.69	500
	30x30	470	1.54	0.88	400
	30x35	560	1.76	1.01	320
	30x40	680	2.03	1.16	290
	30x50	1,000	2.67	1.53	220

Rated voltage (V)	Case size φDxL(mm)	Cap. (μF)	Max. ripple current (Arms) 85°C 120Hz	Max. ripple current (Arms) 105°C120Hz	Impedance (mΩ/20°C,100KHz)
200	22x20	82	0.47	0.27	1,200
	22x25	150	0.70	0.40	800
	22x30	220	0.91	0.52	700
	22x35	270	1.06	0.61	560
	22x40	330	1.22	0.70	500
	22x50	390	1.43	0.82	390
	25.4x20	120	0.63	0.36	940
	25.4x25	220	0.89	0.51	660
	25.4x30	270	1.06	0.61	520
	25.4x35	390	1.34	0.77	440
	25.4x40	470	1.57	0.90	380
	25.4x50	560	1.83	1.05	300
	30x20	180	0.82	0.47	700
	30x25	270	1.08	0.62	500
	30x30	390	1.54	0.88	400
	30x35	470	1.61	0.92	320
	30x40	560	1.83	1.05	290
	30x50	820	2.43	1.39	220
250	22x20	68	0.43	0.25	1,200
	22x25	100	0.56	0.32	800
	22x30	150	0.75	0.43	700
	22x35	180	0.87	0.50	560
	22x40	220	0.99	0.57	500
	22x50	330	1.31	0.75	390
	25.4x20	82	0.50	0.29	940
	25.4x25	150	0.73	0.42	660
	25.4x30	220	0.96	0.55	520
	25.4x35	270	1.12	0.64	440
	25.4x40	330	1.31	0.75	380
	25.4x50	390	1.52	0.87	300
	30x20	120	0.68	0.39	700
	30x25	220	0.98	0.56	500
	30x30	270	1.15	0.66	400
	30x35	390	1.47	0.84	320
	30x40	470	1.68	0.96	290
	30x50	560	2.01	1.15	220

RIPPLE CURRENT MULTIPLIERS

1) Maximum rms ripple currents at 120Hz, 85°C and 105°C are given in the table.
2) Temperature multiplying factor;
   Where capacitors are operated at temperature other than 105°C, the maximum ripple current must be multiplied by the figure shown in the below table.

Ambient temp.	Multiplying factor
45°C & under	2.40
65°C	2.17
85°C	1.75
105°C	1.00

3) Frequency multiplying factor;
   If capacitors are used to filter circuits at a frequency other than 120Hz, the rated 120Hz rms ripple current shown must be multiplied by the factor shown in the below table.

Frequency	Multiplying factor 10~50V	63~100V	160~250V
50Hz	0.95	0.92	0.81
120Hz	1.00	1.00	1.00
300Hz	1.03	1.07	1.17
1kHz	1.05	1.13	1.32
10kHz	1.08	1.19	1.45
50kHz	1.08	1.20	1.50

(Note) The rms ripple current has to be reduced when long life performance is required in actual use.

NMA, BKA SERIES

- **Large capacitance, 85°C product.**

SME SERIES

- **Miniaturized standard 85°C product**
- **High ripple current**

- NMA and BKA series capacitors have reduced case sizes compared with ordinary PC board mounting types.
- SME series have further reduced case sizes and high maximum ripple current specifications which are approximately 1.4 times the values of NMA, BKA series.
- For detail specifications, refer to latest issue of Engineering Bulletin No.528.
- Applications: Audio, video and other filtering applications.

CHARACTERISTICS

Item \ Series	NMA/BKA	SME
Operating temperature range	10~200V: −40~+85°C 250~400V: −25~+85°C	10~100V: −40~+85°C 160~400V: −25~+85°C
Capacitance tolerance (at 20°C, 120Hz)	±20%(M)	±20%(M)
Leakage current	10~100V: I = 0.02CV or 3mA, whichever is smaller. 160~250V: I = 0.03CV 315~400V: I = 0.06CV + 200 or 5mA, whichever is smaller. Where I : Maximum leakage current (μA) at 20°C (after 5 minutes) C: Nominal capacitance (μF) V: Rated working voltage (V)	
Dissipation factor	Dissipation factor at 20°C, 120Hz shall not exceed the values given in the table of STANDARD RATING.	
Low temperature characteristics (Impedance ratio at 120Hz)	See table below	See table below
Maximum ripple current	Maximum rms ripple current at 85°C, 120Hz is given in the table of STANDARD RATING.	
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 1,000 hours at 85°C. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value.	
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value.	
Others	Satisfies characteristic W of JIS C 5141.	

Z ratio \ W.V.	10~200	250	315	350 400
Z(-25°C)/Z(20°C)	3	6	12	16
Z(-40°C)/Z(20°C)	12	–	–	–

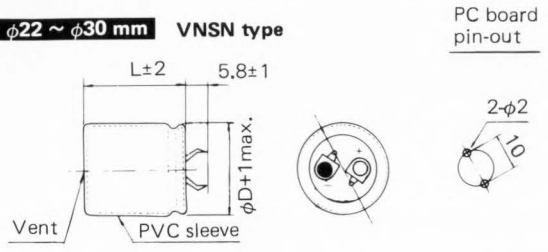
Z ratio \ W.V.	10~100	160~400
Z(-25°C)/Z(20°C)	4	4
Z(-40°C)/Z(20°C)	15	–

Specifications subject to change without notice.

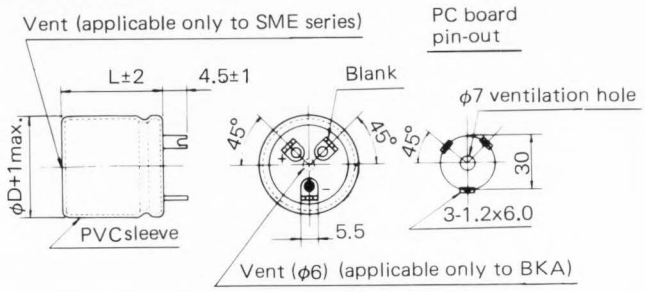
DIMENSIONS

Unit (mm)

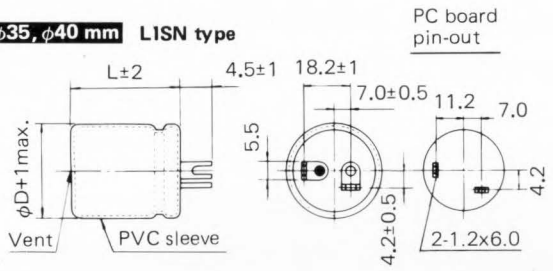
D = φ22 ~ φ30 mm **VNSN type**



D = φ50, φ63.5 mm **LISN type**



D = φ35, φ40 mm **LISN type**



Please make a ventilation hole on PC board for venting.
Blank terminal may not connect electrically but use for mechanical support only.

STANDARD RATINGS

SME, NMA, BKA series

Working voltage (V)	Surge voltage (V)	Capacitance (μF)	SME			NMA			BKA		
			Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz	Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz	Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz
10	13	6,800							25.4x25	0.25 (0.061)	1.60
		8,200	22x30	0.35 (0.071)	2.43	22x30	0.35 (0.071)	1.71			
			25.4x25	0.35 (0.071)	2.42				25.4x25	0.35 (0.071)	1.71
		10,000	22x30	0.40 (0.066)	2.50	22x35	0.40 (0.067)	1.81			
			25.4x25	0.40 (0.066)	2.49				30x25	0.40 (0.066)	1.85
		12,000	22x30	0.40 (0.055)	2.74	22x35	0.40 (0.055)	1.99			
			30x25	0.40 (0.055)	2.86				30x25	0.40 (0.055)	2.02
		15,000	22x35	0.40 (0.044)	3.14	22x40	0.40 (0.044)	2.28			
			30x25	0.40 (0.044)	3.20				30x30	0.40 (0.044)	2.32
		18,000	22x40	0.40 (0.037)	3.40						
			30x30	0.40 (0.037)	3.47						
		22,000	22x45	0.40 (0.030)	3.85						
			30x30	0.40 (0.030)	3.84						
16	20	4,700	25.4x25	**0.25 (0.088)**	2.18				25.4x25	0.25 (0.088)	1.54
		6,800	22x30	**0.25 (0.061)**	2.39	22x30	0.25 (0.061)	1.68			
			25.4x25	**0.25 (0.061)**	2.38				30x25	0.25 (0.061)	1.70
		8,200	22x35	0.35 (0.071)	2.43	22x35	0.35 (0.071)	1.76			
			30x25	0.35 (0.071)	2.54				30x25	0.35 (0.071)	1.80
		10,000	22x35	0.40 (0.066)	2.57	22x40	0.40 (0.066)	1.87			
			30x25	0.40 (0.066)	2.61				30x30	0.40 (0.066)	1.90
		12,000	22x40	0.40 (0.055)	2.88	22x45	0.40 (0.055)	2.09			
			30x30	0.40 (0.055)	2.94				35x25	0.40 (0.055)	2.13
		15,000	22x45	0.40 (0.044)	3.30	25.4x45	0.40 (0.044)	2.44			
			35x25	0.40 (0.044)	3.36				35x30	0.40 (0.044)	2.47
		18,000	22x50	0.40 (0.037)	3.58						
			35x30	0.40 (0.037)	3.60						
		22,000	25.4x45	0.40 (0.030)	4.02						
			35x30	0.40 (0.030)	3.98						
25	32	3,300	25.4x25	**0.25 (0.126)**	1.83				25.4x25	0.25 (0.13)	1.29
		4,700	22x30	**0.25 (0.088)**	1.55	22x30	0.25 (0.088)	1.55			
			25.4x25	**0.25 (0.088)**	2.18				30x25	0.25 (0.088)	1.62
		6,800	22x35	**0.25 (0.061)**	2.45	22x40	0.25 (0.061)	1.71			
			30x25	**0.25 (0.061)**	2.50				30x30	0.25 (0.061)	1.83
		8,200	22x40	0.35 (0.071)	2.25	22x45	0.35 (0.071)	1.85			
			30x30	0.35 (0.071)	2.60				35x25	0.35 (0.071)	1.88
		10,000	22x45	0.35 (0.058)	2.89	22x50	0.35 (0.058)	2.10			
			30x30	0.35 (0.058)	2.87				35x30	0.35 (0.058)	2.16
		12,000	22x50	0.35 (0.048)	3.25	25.4x50	0.35 (0.048)	2.39			
			35x30	0.35 (0.048)	3.35				35x35	0.35 (0.048)	2.43
		15,000	25.4x45	0.35 (0.039)	3.69	25.4x50	0.35 (0.039)	2.67			
			35x30	0.35 (0.039)	3.74				35x35	0.35 (0.039)	2.71
		18,000	30x40	0.35 (0.032)	3.74						
			35x35	0.35 (0.032)	3.92						
		22,000	30x50	0.35 (0.026)	4.38						
			40x35	0.35 (0.026)	4.62						

SME, NMA, BKA series

Working voltage (V)	Surge voltage (V)	Capacitance (μF)	SME			NMA			BKA		
			Case size φDxL (mm)	EF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz	Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz	Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz
35	44	2,200	25.4x25	0.20 (0.15)	1.67				25.4x25	0.20 (0.15)	1.19
		3,300	22x30	0.20 (0.10)	2.06	22x30	0.20 (0.15)	1.46			
			25.4x25	0.20 (0.10)	2.05				30x25	0.20 (0.10)	1.52
		4,700	22x35	0.25 (0.088)	2.24	22x40	0.25 (0.088)	1.63			
			30x25	0.25 (0.088)	2.28				30x30	0.25 (0.088)	1.66
		6,800	22x40	0.25 (0.061)	2.52	22x50	0.25 (0.061)	1.81			
			30x30	0.25 (0.061)	2.57				35x30	0.25 (0.061)	1.88
		8,200	22x50	0.35 (0.071)	2.69	25.4x45	0.35 (0.071)	1.93			
			35x30	0.35 (0.071)	2.76				35x30	0.35 (0.071)	1.96
		10,000	25.4x45	0.35 (0.058)	3.01	25.4x50	0.35 (0.058)	2.18			
			35x30	0.35 (0.058)	3.05				35x35	0.35 (0.058)	2.21
		12,000	25.4x50	0.35 (0.048)	3.37	30x45	0.35 (0.048)	2.49			
			35x35	0.35 (0.048)	3.42				35x35	0.35 (0.048)	2.43
		15,000	30x45	0.35 (0.039)	3.93	30x50	0.35 (0.039)	2.85			
			40x35	0.35 (0.039)	4.08				40x40	0.35 (0.039)	2.98
		18,000	40x40	0.35 (0.032)	4.30						
		22,000	40x40	0.35 (0.026)	4.76						
50	63	1,000	25.4x25	0.20 (0.33)	1.13				25.4x25	0.30 (0.33)	0.80
		2,200	22x30	0.20 (0.15)	1.68	22x30	0.20 (0.15)	1.19			
			25.4x25	0.20 (0.15)	1.67				30x25	0.20 (0.15)	1.24
		3,300	22x35	0.20 (0.10)	2.11	22x40	0.20 (0.10)	1.54			
			30x25	0.20 (0.10)	2.15				30x30	0.20 (0.10)	1.56
		4,700	22x40	0.25 (0.088)	2.30	22x50	0.25 (0.088)	1.72			
			35x25	0.25 (0.088)	2.39				35x30	0.25 (0.088)	1.77
		6,800	25.4x45	0.25 (0.061)	2.69	25.4x50	0.25 (0.061)	1.96			
			35x35	0.25 (0.061)	2.73				35x35	0.25 (0.061)	2.04
		8,200	30x45	0.35 (0.071)	2.90	30x50	0.35 (0.071)	2.11			
			35x35	0.35 (0.071)	2.83				40x35	0.35 (0.071)	2.14
		10,000	30x50	0.35 (0.058)	3.28	30x50	0.35 (0.058)	2.33			
			40x35	0.35 (0.058)	3.33				40x40	0.35 (0.058)	2.43
		12,000	40x40	0.35 (0.048)	3.76				40x40	0.35 (0.048)	2.67
		15,000	50x40	0.35 (0.039)	4.71				50x40	0.35 (0.039)	3.33
		18,000	50x40	0.35 (0.032)	4.82						
		22,000	50x40	0.35 (0.026)	5.32						
63	79	1,000	22x30	0.15 (0.25)	1.32	22x30	0.15 (0.25)	0.94			
			25.4x25	0.15 (0.25)	1.31				25.4x25	0.15 (0.25)	0.93
		2,200	22x35	0.15 (0.11)	2.10	22x40	0.15 (0.11)	1.46			
			30x25	0.15 (0.11)	2.05				30x30	0.15 (0.11)	1.49
		3,300	22x45	0.15 (0.075)	2.58	22x50	0.15 (0.075)	1.88			
			35x25	0.15 (0.075)	2.63				35x30	0.15 (0.075)	1.94
		4,700	25.4x45	0.20 (0.071)	2.76	25.4x50	0.20 (0.071)	2.00			
			35x30	0.20 (0.071)	2.80				35x35	0.20 (0.071)	2.03
		6,800	30x45	0.20 (0.049)	3.45	30x50	0.20 (0.049)	2.57			
			40x35	0.20 (0.049)	3.68				40x40	0.20 (0.049)	2.52
		8,200	40x40	0.25 (0.051)	3.70				40x40	0.25 (0.051)	2.62
		10,000	40x40	0.25 (0.041)	4.09				50x40	0.25 (0.041)	3.24
		12,000	50x40	0.25 (0.035)	5.01				50x40	0.25 (0.035)	3.55
		15,000	50x40	0.30 (0.033)	5.60				50x50	0.25 (0.028)	4.14
		18,000	50x50	0.30 (0.028)	5.83						
		22,000	50x50	0.30 (0.023)	6.44						
80	100	1,000	22x30	0.15 (0.25)	1.32	22x30	0.15 (0.25)	0.94			
			25.4x25	0.15 (0.25)	1.31				25.4x25	0.15 (0.25)	0.93
		2,200	22x40	0.15 (0.11)	2.06	22x50	0.15 (0.11)	1.54			
			35x25	0.15 (0.11)	2.14				35x30	0.15 (0.11)	1.58
		3,300	25.4x45	0.15 (0.075)	2.70	25.4x50	0.15 (0.075)	1.95			
			35x30	0.15 (0.075)	2.73				35x35	0.15 (0.075)	1.98
		4,700	30x45	0.20 (0.071)	2.94	30x50	0.20 (0.053)	2.13			
			40x35	0.20 (0.071)	3.06				40x40	0.20 (0.071)	2.23
		6,800	40x40	0.20 (0.049)	3.79				50x40	0.20 (0.049)	2.74
		8,200	50x40	0.25 (0.051)	4.14				50x40	0.25 (0.051)	2.93
		10,000	50x40	0.25 (0.041)	4.57				50x50	0.25 (0.041)	3.38
		12,000	50x50	0.25 (0.035)	5.23						
		15,000	50x50	0.25 (0.028)	5.85						
100	125	1,000	22x35	0.15 (0.25)	1.35	22x40	0.15 (0.25)	0.98			
			30x25	0.15 (0.25)	1.38				30x30	0.15 (0.25)	1.00
		2,200	25.4x45	0.15 (0.11)	2.20	25.4x50	0.15 (0.11)	1.59			
			35x30	0.15 (0.11)	2.23				35x35	0.15 (0.11)	1.62
		3,300	30x45	0.15 (0.075)	2.87	30x50	0.15 (0.075)	2.08			
			40x35	0.15 (0.075)	2.98				40x40	0.15 (0.075)	2.18
		4,700	40x40	0.15 (0.053)	3.67				50x40	0.15 (0.053)	2.91
		6,800	50x40	0.15 (0.037)	4.24				50x50	0.15 (0.037)	3.28
		8,200	50x50	0.20 (0.040)	4.86				50x50	0.20 (0.040)	3.44
		10,000	50x50	0.20 (0.033)	5.36						

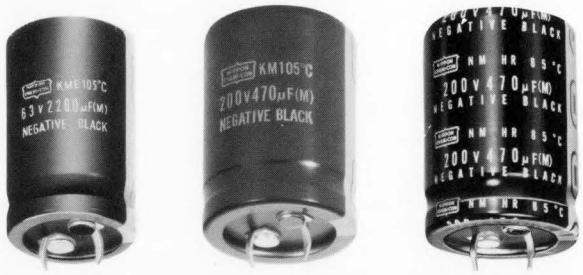
SME, NMA, BKA series

Working voltage (V)	Surge voltage (V)	Capacitance (μF)	SME			NMA			BKA		
			Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz	Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz	Case size φDxL (mm)	DF (ESR/Ω) at 20°C,120Hz	Max. ripple current (A rms) at 85°C,120Hz
160	200	330	22x30	0.15 (0.75)	0.75	22x30	0.15 (0.75)	0.54			
			25.4x25	0.15 (0.75)	0.75				25.4x25	0.15 (0.75)	0.54
		470	22x35	0.15 (0.53)	0.93	22x45	0.15 (0.53)	0.69			
			30x25	0.15 (0.53)	0.94				30x30	0.15 (0.53)	0.69
		680	22x50	0.15 (0.37)	1.20	25.4x40	0.15 (0.37)	0.85			
			35x25	0.15 (0.37)	1.19				35x25	0.15 (0.37)	0.85
		820	25.4x45	0.15 (0.30)	1.34	25.4x45	0.15 (0.30)	0.95			
			35x30	0.15 (0.30)	1.31				35x30	0.15 (0.30)	0.97
		1,000	25.4x50	0.15 (0.25)	1.51	30x40	0.15 (0.25)	1.08			
			35x35	0.15 (0.25)	1.54				35x35	0.15 (0.25)	1.09
180	225	220	22x30	0.15 (1.13)	0.62	22x30	0.15 (1.13)	0.44			
			25.4x25	0.15 (1.13)	0.61				25.4x25	0.15 (1.13)	0.44
		330	22x35	0.15 (0.75)	0.77	22x35	0.15 (0.75)	0.55			
			30x25	0.15 (0.75)	0.79				30x25	0.15 (0.75)	0.56
		470	22x40	0.15 (0.53)	0.95	22x45	0.15 (0.53)	0.69			
			30x30	0.15 (0.53)	0.97				30x30	0.15 (0.53)	0.69
		680	25.4x45	0.15 (0.37)	1.22	25.4x50	0.15 (0.37)	0.89			
			35x30	0.15 (0.37)	1.24				35x30	0.15 (0.37)	0.88
		820	25.4x50	0.15 (0.30)	1.37	30x45	0.15 (0.30)	1.01			
			35x30	0.15 (0.30)	1.36				35x35	0.15 (0.30)	0.99
		1,000	30x45	0.15 (0.25)	1.58	30x50	0.15 (0.25)	1.15			
			35x35	0.15 (0.25)	1.54						
200	250	220	22x30	0.15 (1.13)	0.62	22x30	0.15 (1.13)	0.44			
			25.4x25	0.15 (1.13)	0.61				25.4x25	0.15 (1.13)	0.44
		330	22x35	0.15 (0.75)	0.77	22x40	0.15 (0.75)	0.57			
			30x25	0.15 (0.75)	0.79				30x30	0.15 (0.75)	0.58
		470	22x45	0.15 (0.53)	0.97	22x50	0.15 (0.53)	0.71			
			30x30	0.15 (0.53)	0.97				30x30	0.15 (0.53)	0.69
		680	25.4x45	0.15 (0.37)	1.22	25.4x50	0.15 (0.37)	0.89			
			35x30	0.15 (0.37)	1.24				35x35	0.15 (0.37)	0.88
		820	30x45	0.15 (0.30)	1.43	30x45	0.15 (0.30)	1.01			
			35x35	0.15 (0.30)	1.39				35x35	0.15 (0.30)	0.99
250	300	220	22x35	0.15 (1.13)	0.63	22x35	0.15 (1.13)	0.45			
			30x25	0.15 (1.13)	0.64				30x30	0.15 (1.13)	0.47
		330	22x45	0.15 (0.75)	0.81	22x50	0.15 (0.75)	0.59			
			33x30	0.15 (0.75)	0.81				30x30	0.15 (0.75)	0.58
		470	25.4x45	0.15 (0.53)	1.01	25.4x50	0.15 (0.53)	0.73			
			35x30	0.15 (0.53)	1.03				35x30	0.15 (0.53)	0.73
		680	30x45	0.15 (0.37)	1.30	30x50	0.15 (0.37)	0.94			
			35x35	0.15 (0.37)	1.27						
315	365	100	22x30	0.23 (3.82)	0.33	22x30	0.23 (3.82)	0.23			
			25.4x25	0.23 (3.82)	0.33				25.4x25	0.23 (3.82)	0.23
		220	22x45	0.23 (1.73)	0.53	22x50	0.23 (1.73)	0.38			
			30x30	0.23 (1.73)	0.53				35x30	0.23 (1.73)	0.39
		330	25.4x50	0.23 (1.16)	0.69	30x40	0.23 (1.16)	0.49			
			35x35	0.23 (1.16)	0.69				35x35	0.23 (1.16)	0.49
		470	30x50	0.23 (0.82)	0.88						
350	400	82	22x30	0.20 (4.05)	0.32	22x30	0.20 (4.05)	0.22			
			25.4x25	0.20 (4.05)	0.32				25.4x25	0.20 (4.05)	0.22
		100	22x30	0.23 (3.82)	0.33	22x35	0.23 (3.82)	0.24			
			30x25	0.23 (3.82)	0.34				30x25	0.23 (3.82)	0.24
		220	22x50	0.23 (1.73)	0.54	25.4x45	0.23 (1.73)	0.39			
			35x30	0.23 (1.73)	0.56				35x30	0.23 (1.73)	0.39
		330	30x45	0.23 (1.16)	0.72						
			35x35	0.23 (1.16)	0.70						
400	450	82	22x30	0.20 (4.05)	0.32	22x35	0.20 (4.05)	0.23			
			30x25	0.20 (4.05)	0.33				30x25	0.20 (4.05)	0.24
		100	22x40	0.23 (3.82)	0.35	22x40	0.23 (3.82)	0.24			
			30x25	0.23 (3.82)	0.34				30x25	0.23 (3.82)	0.24
		220	30x40	0.23 (1.73)	0.57	30x40	0.23 (1.73)	0.40			
			35x35	0.23 (1.73)	0.57				35x35	0.23 (1.73)	0.40

KME, KM, NM-HR SERIES

- **High reliability**
- **High ripple current**
- **Operating temperature range,**
  KME, KM series;
  -40(-25)°C to +105°C
  NM-HR series;
  -25°C to +85°C

- 85°C NM-HR series were developed for input filters of switching power supplies which require high ripple current characteristics.
- KME, KM series have reduced case sizes of NM-HR series and are designed to withstand 105°C maximum operating temperature.
- KME series have further reduced case sizes compared to KM series.
- For detail specifications, refer to latest issue of Engineering Bulletin No.529.
- Applications: NM-HR series — Input filter of switching power supply, etc.
  KME, KM series — Input and output filters of switching power supply, etc.



CHARACTERISTICS

Item \ Series	KME		KM		NM-HR
Rated voltage range	10~100VDC	160~400VDC	10~100VDC	160~400VDC	160~250VDC
Operating temperature range	−40~+105°C	−25~+105°C	−40~+105°C	−25~+105°C	−25~+85°C
Capacitance tolerance	±20% (M) (at 20°C, 120Hz)				
Leakage current	I = 0.02CV or 3mA, whichever is smaller, after 5 minutes. Where I : Maximum leakage current (μA) at 20°C C: Nominal capacitance (μF) V: Rated working voltage (V)				
Dissipation factor	Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63 to 400 Dissipation factor: 0.50 / 0.40 / 0.30 / 0.25 / 0.20 / 0.15 (at 20°C, 120Hz)				0.10 max. at 20°C, 120Hz
Low temperature characteristics	The capacitance at 120Hz, minimum operating temperature shall not be less than 70% of the 20°C value (Applicable only to KME). Impedance ratio at 120Hz between the −25°C or −40°C value and the 20°C value shall not exceed the values given below.				
	Rated voltage (V): 10, 16 / 25 / 35 / 50, 63 / 80, 100 / 160~400 Z(−25°C)/Z(20°C): 4 / 3 / 3 / 2 / 2 / 4 Z(−40°C)/Z(20°C): 15 / 10 / 8 / 6 / 5 / –				Z(−25°C)/Z(20°C) ≦ 2
ESL	50nH max. (at 20°C, 1MHz)				
Impedance	10 to 100WV: Impedance value at 20°C, 20KHz shall not exceed the values given in the table. 160 to 400WV: Impedance value at 20°C, 100KHz shall not exceed the values given in the table.				
Load life	The following specificatios shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 1,000 hours at 105°C. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 200% of the initial specified value. Leakage current ≦ The initial specified value.				The capacitors shall be subjected to DC voltage with the rated ripple current applied at 85°C for 1,000 hours or for 2,000 hours. The rated ripple current values for their respective life times are shown in the table. In the load life test, the sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitor. After the test, the following specifications shall be satisfied when the capacitors are restored to 20°C. Capacitance change ≦ ±20% of the initial value. Dissipation factor ≦ 200% of the initial specified value. Leakage current ≦ The initial specified value.
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at max. operating temperature for 500 hours without voltage applied. The rated working voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.				
	Capacitance change ≦ ±15% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current (10 to 100WV) ≦ 200% of the initial specified value. (160 to 400WV) ≦ 500% of the initial specified value.		Capacitance change (10 to 100WV) ≦ ±20% of the inital value. (160 to 400WV) ≦ ±15% of the initial value. Dissipation factor ≦ 150% of the initial specified value. Leakage current ≦ The initial specified value.		Capacitance change ≦ ±20% of the inital value. Dissipation factor ≦ 200% of the initial specified value. Leakage current ≦ The initial specified value.
Others	Satisfies characteristic W of JIS C 5141.				Satisfies characteristic B of JIS C 5141.

Specifications subject to change without notice.

RIPPLE CURRENT MULTIPLIERS

Temperature multiplying factor

KM, KME series

Temperature (°C)	45	65	85	105
Factor	2.40	2.17	1.75	1

NM-HR series

Temperature (°C)	45	65	85
Factor	1.37	1.24	1

Frequency multiplying factor

KM series

Frequency (Hz)	50	120	300	1K	10K	50K
10, 16WV	0.96	1	1.03	1.05	1.08	1.08
25, 35WV	0.95	1	1.04	1.07	1.10	1.11
50~100WV	0.92	1	1.07	1.13	1.19	1.20
160~200WV	0.75	1	1.17	1.32	1.45	–
250, 315WV	0.83	1	1.12	1.22	1.30	–
350WV	0.81	1	1.16	1.30	1.41	–
400WV	0.77	1	1.23	1.44	1.60	–

KME series

Frequency (Hz)	50	120	300	1K	10K	50K
10~50WV	0.95	1	1.03	1.05	1.08	1.08
63~100WV	0.92	1	1.07	1.13	1.19	1.20
160~250WV	0.81	1	1.17	1.32	1.45	1.50
315~400WV	0.77	1	1.16	1.30	1.41	1.43

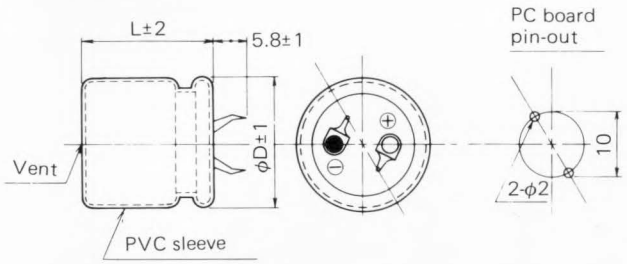
NM-HR series

Frequency (Hz)	50	120	400	1K	10K	50K
160~200WV	0.76	1	1.22	1.32	1.45	1.50
250WV	0.83	1	1.15	1.22	1.30	1.33

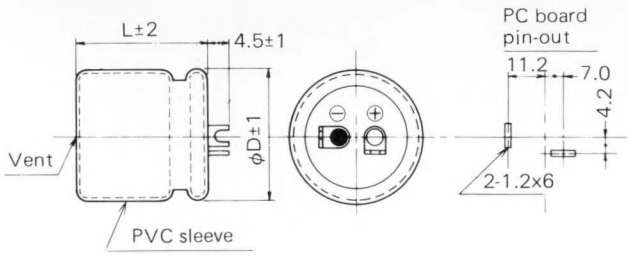
Note) When long life performance is required in actual use, the rms ripple current has to be reduced.

DIMENSIONS

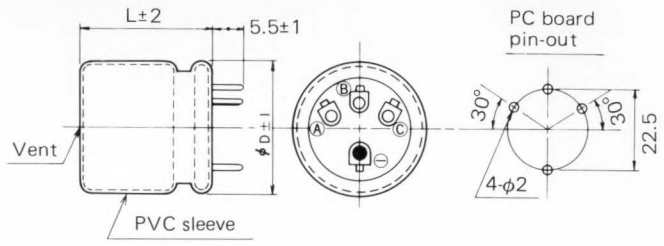
φD = φ30mm or less (Type: VNSN) Unit (mm)



φD = φ35mm (Type: LISN)



φD = φ35mm (Type: VRSN)



B : Positive terminal

A, C : Terminals not connected electrically but used for mechanical support only.

KME, KM, NM-HR series

Rated voltage (V)	Case size φDxL(mm)	KME series			KM series			NM-HR series			Impedance (mΩ/20°C,20KHz)			Maximum ESR (Ω/20°C, 120Hz)		
		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms/85°C,120Hz)		KME	KM	NM-HR	KME	KM	NM-HR
			85°C 120Hz	105°C 120Hz		85°C 120Hz	105°C 120Hz		1000hrs	2000hrs						
10	22x25	6,800	2.25	1.29	4,700	1.87	1.07				150	105		0.122	0.176	
	22x30	10,000	2.97	1.70	6,800	2.38	1.36				120	75		0.083	0.122	
	22x35	12,000	3.43	1.96							95			0.069		
	22x40	15,000	3.97	2.27	10,000	3.20	1.83				80	60		0.055	0.083	
	22x50	18,000	4.67	2.67							60			0.046		
	25.4x25	8,200	2.64	1.51	6,800	2.38	1.36				110	75		0.101	0.122	
	25.4x30	12,000	3.43	1.96							85			0.069		
	25.4x35	15,000	4.04	2.31							70			0.055		
	25.4x40	18,000	4.67	2.67	15,000	4.17	2.38				60	45		0.046	0.055	
	25.4x50	27,000	6.10	3.49	22,000	5.53	3.16				45	38		0.031	0.038	
	30x25	12,000	3.50	2.00	10,000	3.19	1.82				80	60		0.069	0.083	
	30x30	18,000	4.55	2.60							60			0.046		
	30x35	22,000	5.32	3.04							50			0.038		
	30x40	27,000	6.10	3.49							40			0.031		
	30x50	39,000	8.01	4.58							30			0.021		
	35x25	15,000	4.09	2.34							70			0.055		
	35x30	22,000	5.44	3.11	15,000	4.44	2.54				50	45		0.038	0.055	
	35x35	27,000	6.31	3.61	22,000	5.65	3.23				40	38		0.031	0.038	
	35x40	39,000	8.01	4.58							30			0.021		
	35x50	47,000	9.04	5.17	33,000	7.72	4.41				25	23		0.018	0.025	
16	22x25	4,700	2.10	1.20	3,300	1.75	1.00				150	105		0.141	0.201	
	22x30	6,800	2.74	1.57	4,700	2.22	1.27				120	75		0.098	0.141	
	22x35	8,200	3.18	1.82	6,800	2.82	1.61				95	68		0.081	0.098	
	22x40	10,000	3.62	2.07							80			0.066		
	22x50	15,000	4.77	2.73							60			0.044		
	25.4x25	6,800	2.69	1.54	4,700	2.22	1.27				110	75		0.098	0.141	
	25.4x30	10,000	3.51	2.01							85			0.066		
	25.4x35	12,000	4.04	2.31							70			0.055		
	25.4x40	15,000	4.77	2.73	10,000	3.81	2.18				60	45		0.044	0.066	
	25.4x50	18,000	5.58	3.19	15,000	5.10	2.92				45	38		0.037	0.044	
	30x25	10,000	3.57	2.04	6,800	2.94	1.68				80	68		0.066	0.098	
	30x30	12,000	4.16	2.38	10,000	3.76	2.15				60	45		0.055	0.066	
	30x35	18,000	5.37	3.07							50			0.037		
	30x40	22,000	6.17	3.53							40			0.030		
	30x50	27,000	7.47	4.27	22,000	7.05	4.03				30	23		0.025	0.030	
	35x25	12,000	4.09	2.34							70			0.055		
	35x30	18,000	5.51	3.15	15,000	4.99	2.85				50	38		0.037	0.044	
	35x35	22,000	6.40	3.66							40			0.030		
	35x40	27,000	7.47	4.27	22,000	6.53	3.73				30	23		0.025	0.030	
	35x50	39,000	9.24	5.28							25			0.017		
25	22x25	3,300	2.03	1.16	2,200	1.65	0.94				150	105		0.151	0.226	
	22x30	4,700	2.64	1.51	3,300	2.15	1.23				120	75		0.106	0.151	
	22x35	5,600	3.02	1.73							95			0.089		
	22x40	6,800	3.44	1.97	4,700	2.84	1.62				80	60		0.073	0.106	
	22x50	10,000	4.51	2.58							60			0.050		
	25.4x25	4,700	2.59	1.48	3,300	2.15	1.23				110	75		0.106	0.151	
	25.4x30	5,600	3.02	1.73							85			0.089		
	25.4x35	8,200	3.85	2.20							70			0.061		
	25.4x40	10,000	4.51	2.58	6,800	3.62	2.07				60	45		0.050	0.073	
	25.4x50	12,000	5.25	3.00	10,000	4.81	2.75				45	38		0.041	0.050	
	30x25	6,800	3.39	1.94	4,700	2.82	1.61				80	60		0.073	0.106	
	30x30	8,200	3.97	2.27	6,800	3.59	2.05				60	45		0.061	0.073	
	30x35	12,000	5.05	2.89							50			0.041		
	30x40	15,000	5.88	3.36							40			0.033		
	30x50	18,000	7.03	4.02	15,000	6.72	3.84				30	23		0.028	0.033	
	35x25	8,200	3.90	2.23							70			0.061		
	35x30	12,000	5.19	2.97	10,000	4.69	2.68				50	38		0.041	0.050	
	35x35	15,000	6.09	3.48							40			0.033		
	35x40	18,000	7.03	4.02	15,000	6.21	3.55				30	23		0.028	0.033	
	35x50	27,000	8.87	5.07							25			0.018		

KME, KM NM-HR series

Rated voltage (V)	Case size φDxL(mm)	KME series			KM series			NM-HR series			Impedance (mΩ/20°C,20KHz)			Maximum ESR (Ω/20°C, 120Hz)		
		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms/85°C,120Hz)		KME	KM	NM-HR	KME	KM	NM-HR
			85°C 120Hz	105°C 120Hz		85°C 120Hz	105°C 120Hz		1000hrs	2000hrs						
35	22x25	2,200	1.82	1.04	1,500	1.49	0.85				150	105		0.188	0.276	
	22x30	2,700	2.18	1.25	2,200	1.92	1.10				120	75		0.154	0.188	
	22x35	3,900	2.76	1.58							95			0.106		
	22x40	4,700	3.15	1.80	3,300	2.61	1.49				80	60		0.088	0.126	
	22x50	6,800	4.06	2.32							60			0.061		
	25.4x25	3,300	2.38	1.36	2,200	1.92	1.10				110	75		0.126	0.188	
	25.4x30	3,900	2.76	1.58							85			0.106		
	25.4x35	5,600	3.48	1.99							70			0.074		
	25.4x40	6,800	4.06	2.32	4,700	3.31	1.89				60	45		0.061	0.088	
	25.4x50	8,200	4.76	2.72	6,800	4.34	2.48				45	38		0.051	0.061	
	30x25	4,700	3.09	1.77	3,300	2.59	1.48				80	60		0.088	0.126	
	30x30	5,600	3.58	2.05	4,700	3.25	1.86				60	45		0.074	0.088	
	30x35	8,200	4.58	2.62							50			0.051		
	30x40	10,000	5.25	3.00							40			0.041		
	30x50	12,000	6.28	3.59	10,000	6.00	3.43				30	23		0.035	0.041	
	35x25	5,600	3.53	2.02							70			0.074		
	35x30	8,200	4.70	2.69	6,800	4.24	2.42				50	38		0.051	0.061	
	35x35	10,000	5.44	3.11							40			0.041		
	35x40	12,000	6.28	3.59	10,000	5.57	3.18				30	23		0.035	0.041	
	35x50	18,000	7.92	4.53	15,000	7.45	4.26				25	18		0.023	0.028	
50	22x25	1,200	1.50	0.86	1,000	1.36	0.78				150	110		0.276	0.332	
	22x30	1,800	1.99	1.14	1,500	1.77	1.01				120	80		0.184	0.221	
	22x35	2,200	2.32	1.33							95			0.151		
	22x40	2,700	2.66	1.52	2,200	2.38	1.36				80	65		0.123	0.151	
	22x50	3,900	3.44	1.97							60			0.085		
	25.4x25	1,800	1.96	1.12	1,500	1.77	1.01				110	80		0.184	0.221	
	25.4x30	2,700	2.57	1.47							85			0.123		
	25.4x35	3,300	2.99	1.71							70			0.101		
	25.4x40	3,900	3.44	1.97	3,300	3.08	1.76				60	50		0.085	0.101	
	25.4x50	5,600	4.39	2.51	4,700	4.04	2.31				45	40		0.059	0.071	
	30x25	2,700	2.62	1.50	2,200	2.36	1.35				80	65		0.123	0.151	
	30x30	3,300	3.08	1.76	3,300	3.05	1.74				60	50		0.101	0.101	
	30x35	4,700	3.88	2.22							50			0.071		
	30x40	5,600	4.39	2.51							40			0.059		
	30x50	6,800	5.53	3.16	6,800	5.53	3.16				30	25		0.049	0.049	
	35x25	3,300	3.02	1.73							70			0.101		
	35x30	4,700	3.97	2.27	4,700	3.94	2.25				50	40		0.071	0.071	
	35x35	5,600	4.55	2.60							40			0.059		
	35x40	6,800	5.28	3.02	6,800	5.13	2.93				30	25		0.049	0.049	
	35x50	10,000	6.61	3.78							25			0.033		
63	22x25	820	1.34	0.77	680	1.21	0.69				150	125		0.303	0.366	
	22x30	1,200	1.76	1.01	1,000	1.56	0.89				120	90		0.207	0.249	
	22x35	1,500	2.08	1.19							95			0.166		
	22x40	1,800	2.34	1.34	1,500	2.12	1.21				80	70		0.138	0.166	
	22x50	2,200	2.80	1.60							60			0.113		
	25.4x25	1,200	1.73	0.99	1,000	1.56	0.89				110	90		0.207	0.249	
	25.4x30	1,500	2.08	1.19							85			0.166		
	25.4x35	1,800	2.38	1.36							70			0.138		
	25.4x40	2,200	2.80	1.60	2,200	2.73	1.56				60	55		0.113	0.113	
	25.4x50	3,300	3.64	2.08	3,300	3.64	2.08				45	45		0.075	0.075	
	30x25	1,500	2.10	1.20	1,500	2.10	1.20				80	70		0.166	0.166	
	30x30	2,200	2.71	1.55	2,200	2.69	1.54				60	55		0.113	0.113	
	30x35	2,700	3.18	1.82							50			0.092		
	30x40	3,300	3.64	2.08							40			0.075		
	30x50	4,700	4.97	2.84	4,700	4.97	2.84				30	30		0.053	0.053	
	35x25	2,200	2.67	1.53							70			0.113		
	35x30	2,700	3.25	1.86							50			0.092		
	35x35	3,900	4.09	2.34	3,300	3.73	2.13				40	45		0.064	0.075	
	35x40	4,700	4.76	2.72	4,700	4.60	2.63				30	30		0.053	0.053	
	35x50	6,800	5.88	3.36							25			0.037		

KME, KM, NM-HR series

Rated voltage (V)	Case size φDxL(mm)	KME series			KM series			NM-HR series			Impedance (mΩ/20°C,20KHz)			Maximum ESR (Ω/20°C, 120Hz)		
		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms/85°C,120Hz)		KME	KM	NM-HR	KME	KM	NM-HR
			85°C 120Hz	105°C 120Hz		85°C 120Hz	105°C 120Hz		1000hrs	2000hrs						
80	22x25	560	1.15	0.66	470	1.05	0.60				150	150		0.444	0.529	
	22x30	820	1.52	0.87	680	1.35	0.77				120	105		0.303	0.366	
	22x35	1,000	1.76	1.01							95			0.249		
	22x40	1,200	2.01	1.15	1,000	1.80	1.03				80	75		0.207	0.249	
	22x50	1,800	2.64	1.51							60			0.138		
	25.4x25	820	1.48	0.85	680	1.35	0.77				110	105		0.303	0.366	
	25.4x30	1,000	1.76	1.01							85			0.249		
	25.4x35	1,500	2.27	1.30							70			0.166		
	25.4x40	1,800	2.64	1.51	1,500	2.36	1.35				60	60		0.138	0.166	
	25.4x50	2,200	3.11	1.78	2,200	3.12	1.78				45	45		0.113	0.113	
	30x25	1,200	1.97	1.13	1,000	1.80	1.03				80	75		0.207	0.249	
	30x30	1,500	2.34	1.34							60			0.166		
	30x35	1,800	2.71	1.55							50			0.138		
	30x40	2,200	3.11	1.78							40			0.113		
	30x50	3,300	4.14	2.37							30			0.075		
	35x25	1,500	2.31	1.32							70			0.166		
	35x30	2,200	3.06	1.75	1,500	2.50	1.43				50	60		0.113	0.166	
	35x35	2,700	3.57	2.04	2,200	3.19	1.82				40	45		0.092	0.113	
	35x40	3,300	4.14	2.37							30			0.075		
	35x50	4,700	5.11	2.92	3,300	4.36	2.49				25	30		0.053	0.075	
100	22x25	290	1.01	0.58	330	0.93	0.53				150	180		0.638	0.754	
	22x30	560	1.31	0.75	470	1.17	0.67				120	135		0.444	0.529	
	22x35	680	1.52	0.87							95			0.366		
	22x40	820	1.75	1.00	680	1.56	0.89				80	90		0.303	0.366	
	20x50	1,200	2.27	1.30							60			0.207		
	25.4x25	560	1.29	0.74	470	1.17	0.67				110	135		0.444	0.529	
	25.4x30	680	1.52	0.87							85			0.366		
	25.4x35	1,000	1.94	1.11							70			0.249		
	25.4x40	1,200	2.25	1.29	1,000	2.01	1.15				60	60		0.207	0.249	
	25.4x50	1,500	2.69	1.54							45			0.166		
	30x25	820	1.71	0.98	680	1.56	0.89				80	90		0.303	0.366	
	30x30	1,000	2.01	1.15							60			0.249		
	30x35	1,200	2.32	1.33							50			0.207		
	30x40	1,500	2.69	1.54							40			0.166		
	30x50	2,200	3.55	2.03	1,500	2.91	1.66				30	45		0.113	0.166	
	35x25	1,000	1.97	1.13							70			0.249		
	35x30	1,200	2.38	1.36	1,000	2.15	1.23				50	60		0.207	0.249	
	35x35	1,800	3.04	1.74	1,500	2.76	1.58				40	45		0.138	0.166	
	35x40	2,200	3.55	2.03							30			0.113		
	35x50	2,700	4.06	2.32	2,200	3.73	2.13				25	30		0.092	0.113	

Rated voltage (V)	Case size φDxL(mm)	KME series			KM series			NM-HR series			Impedance (mΩ/20°C,100KHz)			Maximum ESR (Ω/20°C, 120Hz)		
		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms/85°C,120Hz)		KME	KM	NM-HR	KME	KM	NM-HR
			85°C 120Hz	105°C 120Hz		85°C 120Hz	105°C 120Hz		1000hrs	2000hrs						
160	22x25	180	0.96	0.55							800			1.38		
	22x30	270	1.29	0.74							700			0.922		
	22x35	330	1.50	0.86							560			0.754		
	22x40	390	1.69	0.97							500			0.638		
	22x50	560	2.18	1.25							390			0.444		
	25.4x25	270	1.26	0.72	220	0.91	0.52	180	1.35	0.95	660	290	250	0.922	1.13	0.922
	25.4x30	390	1.62	0.93	270	1.07	0.61	220	1.57	1.11	520	240	200	0.638	0.922	0.754
	25.4x35	470	1.89	1.08	390	1.34	0.77	330	2.02	1.42	440	170	130	0.529	0.638	0.503
	25.4x40	560	2.18	1.25	470	1.55	0.88	390	2.31	1.63	380	150	100	0.444	0.529	0.425
	25.4x50	820	2.81	1.61	680	2.02	1.15	470	2.74	1.93	300	100	90	0.303	0.366	0.353
	30x25	390	1.66	0.95	270	1.09	0.62	220	1.61	1.13	500	240	200	0.638	0.922	0.754
	30x30	560	2.11	1.21	390	1.38	0.79	330	2.08	1.47	400	170	130	0.444	0.638	0.503
	30x35	680	2.46	1.41	560	1.74	0.99	470	2.61	1.84	320	120	90	0.366	0.444	0.353
	30x40	820	2.81	1.61	680	2.02	1.15	560	2.98	2.10	290	100	80	0.303	0.366	0.296
	30x50	1,000	3.39	1.94	820	2.38	1.35	680	3.54	2.50	220	80	70	0.249	0.303	0.244
	35x25	470	1.90	1.09							420			0.529		
	35x30	680	2.53	1.45	560	1.79	1.02	470	2.67	1.88	320	120	90	0.366	0.444	0.353
	35x35	820	2.90	1.66	820	2.26	1.29	680	3.37	2.38	260	80	70	0.303	0.303	0.244
	35x40	1,000	3.39	1.94	1,000	2.67	1.52	820	3.94	2.78	220	70	60	0.249	0.249	0.202
	35x50	1,500	4.28	2.45	1,200	3.08	1.75	1,000	4.59	3.24	170	65	55	0.166	0.207	0.166

KME, KM, NM-HR series

Rated voltage (V)	Case size φDxL(mm)	KME series			KM series			NM-HR series			Impedance (mΩ/20°C,100KHz)			Maximum ESR (Ω/20°C, 120Hz)		
		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms/85°C,120Hz)		KME	KM	NM-HR	KME	KM	NM-HR
			85°C 120Hz	105°C 120Hz		85°C 120Hz	105°C 120Hz		1000hrs	2000hrs						
180	22x25	180	0.96	0.55							800			1.38		
	22x30	220	1.15	0.66							700			1.13		
	22x35	270	1.36	0.78							560			0.922		
	22x40	390	1.69	0.97							500			0.638		
	22x50	470	1.99	1.14							390			0.529		
	25.4x25	220	1.13	0.65	180	0.88	0.50	180	1.35	0.95	660	300	220	1.13	1.38	0.922
	25.4x30	330	1.50	0.86	270	1.14	0.65	220	1.57	1.11	520	210	180	0.754	0.922	0.754
	25.4x35	390	1.71	0.98	330	1.32	0.75	270	1.88	1.32	440	170	140	0.638	0.754	0.614
	25.4x40	470	1.99	1.14	390	1.51	0.86	330	2.12	1.49	380	150	115	0.529	0.638	0.503
	25.4x50	680	2.55	1.46	560	1.96	1.11	470	2.74	1.93	300	105	85	0.366	0.444	0.353
	30x25	330	1.52	0.87	270	1.17	0.66	220	1.61	1.13	500	210	180	0.754	0.922	0.754
	30x30	470	1.94	1.11	390	1.48	0.84	330	2.08	1.47	400	150	115	0.529	0.638	0.503
	30x35	560	2.24	1.28	470	1.71	0.97	390	2.38	1.68	320	125	95	0.444	0.529	0.425
	30x40	680	2.55	1.46	560	1.96	1.11	470	2.73	1.93	290	105	85	0.366	0.444	0.353
	30x50	1,000	3.39	1.94	820	2.55	1.45	680	3.54	2.50	220	70	65	0.249	0.303	0.244
	35x25	390	1.75	1.00							420			0.638		
	35x30	560	2.29	1.31	560	1.91	1.09	470	2.67	1.88	320	105	85	0.444	0.444	0.353
	35x35	820	2.90	1.66	680	2.20	1.26	560	3.06	2.16	260	85	75	0.303	0.366	0.296
	35x40	1,000	3.39	1.94	820	2.59	1.47	680	3.59	2.53	220	70	65	0.249	0.303	0.244
	35x50	1,200	3.83	2.19	1,200	3.29	1.87	1,000	4.59	3.24	170	60	50	0.207	0.207	0.166
200	22x25	150	0.89	0.51							800			1.66		
	22x30	220	1.15	0.66							700			1.13		
	22x35	270	1.36	0.78							560			0.922		
	22x40	330	1.55	0.89							500			0.754		
	22x50	470	1.99	1.14							390			0.529		
	25.4x25	220	1.13	0.65	180	0.90	0.51	150	1.23	0.86	660	270	250	1.13	1.38	1.11
	25.4x30	270	1.36	0.78	220	1.05	0.60	180	1.42	1.00	520	220	200	0.922	1.13	0.922
	25.4x35	390	1.71	0.98	270	1.22	0.70	220	1.65	1.16	440	180	160	0.638	0.922	0.754
	25.4x40	470	1.99	1.14	390	1.54	0.88	270	1.92	1.35	380	130	130	0.529	0.638	0.614
	25.4x50	560	2.32	1.33	470	1.83	1.04	390	2.50	1.76	300	110	90	0.444	0.529	0.425
	30x25	270	1.38	0.79	220	1.08	0.61	220	1.61	1.13	500	220	160	0.922	1.13	0.754
	30x30	390	1.76	1.01	330	1.39	0.79	270	1.88	1.32	400	150	130	0.638	0.754	0.614
	30x35	560	2.24	1.28	390	1.59	0.91	330	2.19	1.54	320	130	100	0.444	0.638	0.503
	30x40	680	2.55	1.46	470	1.83	1.04	470	2.73	1.93	290	110	80	0.366	0.529	0.353
	30x50	820	3.06	1.75	680	2.37	1.35	560	3.21	2.26	220	70	70	0.303	0.366	0.296
	35x25	390	1.75	1.00							420			0.638		
	35x30	560	2.29	1.31	470	1.79	1.02	390	2.44	1.72	320	110	90	0.444	0.529	0.425
	35x35	680	2.64	1.51	560	2.05	1.17	560	3.06	2.16	260	90	70	0.366	0.444	0.296
	35x40	820	3.06	1.75	680	2.40	1.37	680	3.59	2.53	220	70	60	0.303	0.366	0.244
	35x50	1,200	3.83	2.19	1,000	3.07	1.75	820	4.15	2.93	170	60	55	0.207	0.249	0.202
250	22x25	100	0.71	0.41							800			2.49		
	22x30	150	0.96	0.55							700			1.66		
	22x35	180	1.10	0.63							560			1.38		
	22x40	220	1.26	0.72							500			1.13		
	22x50	330	1.68	0.96							390			0.754		
	25.4x25	150	0.94	0.54	120	0.72	0.41	100	1.00	0.70	660	600	430	1.66	2.07	1.66
	25.4x30	220	1.22	0.70	180	0.93	0.53	150	1.30	0.91	520	380	350	1.13	1.38	1.11
	25.4x35	270	1.41	0.81	220	1.08	0.61	180	1.49	1.05	440	310	300	0.922	1.13	0.922
	25.4x40	330	1.68	0.96	270	1.26	0.72	220	1.74	1.23	380	250	260	0.754	0.922	0.754
	25.4x50	470	2.13	1.22	390	1.63	0.93	330	2.29	1.61	300	170	160	0.529	0.638	0.614
	30x25	220	1.24	0.71	180	0.95	0.54	150	1.33	0.94	500	380	350	1.13	1.38	1.11
	30x30	270	1.47	0.84	220	1.11	0.63	220	1.70	1.20	400	310	260	0.922	1.13	0.754
	30x35	390	1.87	1.07	330	1.43	0.81	270	1.98	1.40	320	200	210	0.638	0.754	0.614
	30x40	470	2.13	1.22	390	1.63	0.93	330	2.29	1.61	290	170	160	0.529	0.638	0.503
	30x50	560	2.53	1.45	560	2.10	1.20	470	2.94	2.07	220	120	100	0.444	0.444	0.353
	35x25	270	1.45	0.83							420			0.922		
	35x30	390	1.90	1.09	390	1.59	0.91	330	2.24	1.58	320	170	160	0.638	0.638	0.503
	35x35	470	2.20	1.26	470	1.83	1.04	390	2.56	1.81	260	140	120	0.529	0.529	0.425
	35x40	560	2.53	1.45	560	2.13	1.22	470	2.98	2.10	220	120	100	0.444	0.444	0.353
	35x50	820	3.16	1.81	820	2.71	1.55	680	3.78	2.67	170	90	80	0.303	0.303	0.244

KME, KM, NM-HR series

Rated voltage (V)	Case size φDxL(mm)	KME series			KM series			NM-HR series			Impedance (mΩ/20°C,100KHz)			Maximum ESR (Ω/20°C, 120Hz)		
		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms)		Capacitance (μF)	Maximum ripple current (A rms/85°C,120Hz)		KME	KM	NM-HR	KME	KM	NM-HR
			85°C 120Hz	105°C 120Hz		85°C 120Hz	105°C 120Hz		1,000 hrs	2,000 hrs						
315	22x25	56	0.54	0.31							800			4.44		
	22x30	82	0.70	0.40							700			3.03		
	22x35	120	0.91	0.52							560			2.07		
	22x40	150	1.05	0.60							500			1.66		
	22x50	180	1.22	0.70							390			1.38		
	25.4x25	82	0.70	0.40	82	0.70	0.40				660	700		3.03	3.03	
	25.4x30	120	0.91	0.52	100	0.81	0.46				520	550		2.07	2.49	
	25.4x35	150	1.06	0.61	150	1.07	0.61				440	400		1.66	1.66	
	25.4x40	180	1.22	0.70	180	1.19	0.68				380	330		1.38	1.38	
	25.4x50	270	1.61	0.92	220	1.44	0.82				300	280		0.922	1.13	
	30x25	120	0.91	0.52	100	0.82	0.47				500	550		2.07	2.49	
	30x30	180	1.19	0.68	150	0.93	0.53				400	400		1.38	1.66	
	30x35	220	1.40	0.80	180	1.23	0.70				320	330		1.13	1.38	
	30x40	270	1.61	0.92	220	1.44	0.82				290	280		0.922	1.13	
	30x50	390	2.11	1.21	330	1.87	1.07				220	220		0.638	0.754	
	35x25	180	1.17	0.67							420			1.38		
	35x30	220	1.43	0.82	220	1.44	0.82				320	280		1.13	1.13	
	35x35	330	1.83	1.05	270	1.59	0.91				260	250		0.754	0.922	
	35x40	390	2.11	1.21	330	1.87	1.07				220	220		0.638	0.754	
	35x50	470	2.39	1.37	470	2.40	1.37				170	160		0.529	0.529	
350	22x25	56	0.54	0.31							800			4.44		
	22x30	82	0.70	0.40							700			3.03		
	22x35	100	0.82	0.47							560			2.49		
	22x40	120	0.92	0.53							500			2.07		
	22x50	180	1.22	0.70							390			1.38		
	25.4x25	68	0.63	0.36	68	0.63	0.36				660	750		3.66	3.66	
	25.4x30	100	0.82	0.47	82	0.74	0.42				520	600		2.49	3.03	
	25.4x35	120	0.94	0.54	120	0.95	0.54				440	450		2.07	2.07	
	25.4x40	180	1.22	0.70	150	1.09	0.62				380	380		1.38	1.66	
	25.4x50	220	1.45	0.83	180	1.28	0.73				300	320		1.13	1.38	
	30x25	100	0.84	0.48	82	0.75	0.43				500	600		2.49	3.03	
	30x30	150	1.08	0.62	120	0.84	0.48				400	450		1.66	2.07	
	30x35	180	1.26	0.72	180	1.23	0.70				320	320		1.38	1.38	
	30x40	220	1.45	0.83	220	1.44	0.82				290	270		1.13	1.13	
	30x50	330	1.94	1.11	270	1.70	0.97				220	230		0.754	0.922	
	35x25	150	1.08	0.62							420			1.66		
	35x30	220	1.43	0.82	180	1.28	0.73				320	320		1.13	1.38	
	35x35	270	1.66	0.95	220	1.49	0.85				260	270		0.922	1.13	
	35x40	330	1.94	1.11	270	1.70	0.97				220	230		0.754	0.922	
	35x50	470	2.39	1.37	390	2.19	1.25				170	180		0.529	0.638	
400	22x25	39	0.45	0.26							800			6.38		
	22x30	56	0.57	0.33							700			4.44		
	22x35	68	0.68	0.39							560			3.66		
	22x40	82	0.77	0.44							500			3.03		
	22x50	120	0.99	0.57							390			2.07		
	25.4x25	56	0.57	0.33	47	0.53	0.30				660	780		4.44	5.29	
	25.4x30	68	0.68	0.39	68	0.67	0.38				520	620		3.66	3.66	
	25.4x35	100	0.85	0.49	100	0.86	0.49				440	450		2.49	2.49	
	25.4x40	120	0.99	0.57	120	0.98	0.56				380	350		2.07	2.07	
	25.4x50	150	1.19	0.68	150	1.17	0.67				300	300		1.66	1.66	
	30x25	82	0.75	0.43	68	0.68	0.39				500	600		3.03	3.66	
	30x30	100	0.89	0.51	100	0.75	0.43				400	450		2.49	2.49	
	30x35	150	1.15	0.66	120	1.00	0.57				320	300		1.66	2.07	
	30x40	180	1.31	0.75	150	1.17	0.67				290	250		1.38	1.66	
	30x50	220	1.57	0.90	220	1.52	0.89				220	220		1.13	1.13	
	35x25	100	0.87	0.50							420			2.49		
	35x30	150	1.19	0.68	150	1.17	0.67				320	320		1.66	1.66	
	35x35	180	1.36	0.78	180	1.33	0.76				260	270		1.38	1.38	
	35x40	220	1.59	0.91	220	1.52	0.87				220	220		1.13	1.13	
	35x50	330	1.99	1.14	330	2.01	1.15				170	170		0.754	0.754	

GX SERIES (VH TYPE)

- **VH type of GX series**
- **Operating temperature range, −40 (−25)°C to +130°C**

- Wide and high operating temperature range.
- High ripple current.
- Case sizes, φ22x30ℓ to φ35x50ℓmm.
- For detail specifications, refer to latest issue of Engineering Bulletin No.529.
- Applications: High reliability equipment, power supply filtering applications and industrial control equipment.

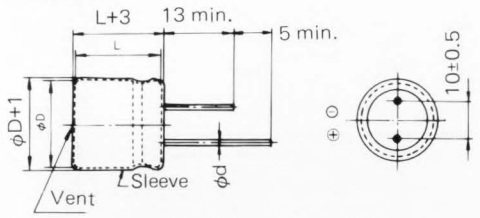
CHARACTERISTICS

Item \ Series	GX
Operating temperature range	10 ~ 100VDC: −40 ~ +130°C　　160 ~ 250VDC: −25 ~ +130°C
Capacitance tolerance	±20% (M)　(at 20°C, 120Hz)
Leakage current	I = 0.02CV or 3mA, whichever is smaller, after 5 minutes.　(at 20°C)
Dissipation factor	(at 20°C, 120Hz)
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated working voltage applied for 1,000 hours at 130°C. Capacitance change ≦ ±20% of the initial value Dissipation factor ≦ 150% of the initial specified value Leakage current ≦ The initial specified value
Others	Satisfies characteristic C of JIS C 5141.

Rated voltage (V)	10	16	25	35	50	63	80	100	160	180	200	250
Dissipation factor	0.50	0.40	0.30	0.25	0.20	0.20	0.17	0.17	0.17	0.17	0.15	0.15

DIMENSIONS

Unit (mm)



φD	φd
22	1.2
25.4 and 30	1.6

STANDARD RATINGS

Rated voltage (V DC)	Case size φDxL(mm)	Capacitance (μF)	Ripple current (A rms) at 130°C, 120Hz	Impedance at 20°C, 20KHz (mΩ)
10	22x30	3,300	0.99	110
	22x35	3,900	1.12	95
	22x40	5,600	1.39	80
	22x50	6,800	1.67	60
	25.4x30	4,700	1.23	90
	25.4x35	5,600	1.43	80
	25.4x40	6,800	1.67	60
	25.4x50	10,000	2.18	50
	30x30	6,800	1.62	60
	30x35	8,200	1.88	55
	30x40	10,000	2.18	50
	30x50	15,000	2.84	40
	35x30	8,200	1.92	55
	35x35	12,000	2.44	45
	35x40	15,000	2.84	40
	35x50	18,000	3.29	30
16	22x30	2,700	0.98	110
	22x35	3,900	1.22	90
	22x40	4,700	1.37	80
	22x50	6,800	1.80	55
	25.4x30	3,900	1.22	90
	25.4x35	4,700	1.42	80
	25.4x40	6,800	1.80	55
	25.4x50	8,200	2.03	45
	30x30	5,600	1.59	70
	30x35	6,800	1.85	55
	30x40	8,200	2.13	45
	30x50	12,000	2.75	35
	35x30	8,200	2.08	45
	35x35	10,000	2.40	40
	35x40	12,000	2.75	35
	35x50	18,000	3.56	28

Rated voltage (V DC)	Case size φDXL(mm)	Capacitance (μF)	Ripple current (A rms) at 130°C, 120Hz	Impedance at 20°C, 20KHz (mΩ)
25	22x30	1,800	0.87	110
	22x35	2,700	1.11	95
	22x40	3,300	1.26	80
	22x50	4,700	1.64	60
	25.4x30	2,700	1.11	95
	25.4x35	3,900	1.41	70
	25.4x40	4,700	1.64	60
	25.4x50	5,600	1.93	50
	30x30	3,900	1.46	70
	30x35	5,600	1.93	50
	30x40	6,800	2.12	45
	30x50	8,200	2.49	35
	35x30	5,600	1.88	50
	35x35	6,800	2.17	45
	35x40	8,200	2.49	35
	35x50	12,000	3.18	30
35	22x30	1,500	0.89	120
	22x35	1,800	1.01	100
	22x40	2,200	1.15	85
	22x50	3,300	1.54	65
	25.4x30	1,800	1.01	100
	25.4x35	2,700	1.32	75
	25.4x40	3,300	1.54	65
	25.4x50	3,900	1.80	55
	30x30	2,700	1.35	75
	30x35	3,300	1.58	65
	30x40	4,700	1.97	45
	30x50	5,600	2.30	35
	35x30	3,900	1.76	55
	35x35	4,700	2.02	45
	35x40	5,600	2.30	35
	35x50	8,200	2.94	28

Specifications subject to change without notice.

STANDARD RATINGS

Rated voltage (V DC)	Case size φDxL(mm)	Capacitance (μF)	Ripp e current (A rms) at 130°C, 120Hz	Impedance at 20°C, 20KHz (mΩ)
50	22x30	680	0.71	130
	22x35	1,000	0.90	110
	22x40	1,200	1.02	90
	22x50	1,800	1.36	70
	25.4x30	1,000	0.90	110
	25.4x35	1,200	1.07	90
	25.4x40	1,800	1.36	70
	25.4x50	2,200	1.58	55
	30x30	1,500	1.21	85
	30x35	1,800	1.39	70
	30x40	2,200	1.61	55
	30x50	3,300	2.11	40
	35x30	1,800	1.42	70
	35x35	2,700	1.83	50
	35x40	3,300	2.11	40
	35x50	4,700	2.66	33
63	22x30	470	0.65	140
	22x35	680	0.80	120
	22x40	820	0.91	100
	22x50	1,200	1.20	80
	25.4x30	680	0.80	120
	25.4x35	1,000	1.04	90
	25.4x40	1,200	1.20	80
	25.4x50	1,500	1.44	60
	30x30	1,000	1.06	90
	30x35	1,200	1.22	80
	30x40	1,500	1.44	60
	30x50	2,200	1.86	40
	35x30	1,200	1.26	80
	35x35	1,800	1.62	50
	35x40	2,200	1.86	40
	35x50	3,300	2.41	35
80	22x30	330	0.56	160
	22x35	470	0.70	135
	22x40	560	0.78	110
	22x50	820	1.03	85
	25.4x30	470	0.70	135
	25.4x35	560	0.80	110
	25.4x40	820	1.03	85
	25.4x50	1,000	1.23	65
	30x30	680	0.92	95
	30x35	820	1.05	85
	30x40	1,000	1.23	65
	30x50	1,500	1.61	45
	35x30	820	1.09	85
	35x35	1,200	1.38	55
	35x40	1,500	1.61	45
	35x50	2,200	2.05	40
100	22x30	180	0.43	200
	22x35	270	0.56	160
	22x40	330	0.64	130
	22x50	470	0.82	80
	25.4x30	270	0.56	160
	25.4x35	330	0.65	130
	25.4x40	470	0.82	90
	25.4x50	560	0.96	70
	30x30	390	0.73	110
	30x35	470	0.84	90
	30x40	560	0.96	70
	30x50	820	1.24	50
	35x30	560	0.93	80
	35x35	680	1.08	70
	35x40	820	1.24	60
	35x50	1,200	1.59	40

Rated voltage (V DC)	Case size φDxL(mm)	Capacitance (μF)	Ripple current (A rms) at 130°C, 120Hz	Impedance at 20°C, 100KHz (mΩ)
160	22x30	120	0.35	950
	22x35	150	0.41	750
	22x40	220	0.52	450
	22x50	270	0.63	360
	25.4x30	180	0.45	650
	25.4x35	220	0.53	450
	25.4x40	270	0.63	360
	25.4x50	390	0.80	240
	30x30	220	0.54	450
	30x35	330	0.71	300
	30x40	390	0.80	240
	30x50	560	1.03	170
	35x30	330	0.72	300
	35x35	470	0.90	210
	35x40	560	1.03	170
	35x50	820	1.31	130
180	22x30	100	0.34	970
	22x35	150	0.44	700
	22x40	180	0.49	500
	22x50	220	0.59	400
	25.4x30	150	0.44	700
	25.4x35	180	0.51	500
	25.4x40	220	0.59	400
	25.4x50	330	0.79	250
	30x30	220	0.57	400
	30x35	270	0.67	320
	30x40	330	0.79	250
	30x50	470	1.00	180
	35x30	270	0.69	320
	35x35	390	0.87	220
	35x40	470	1.00	180
	35x50	680	1.26	140
200	22x30	100	0.35	900
	22x35	120	0.39	720
	22x40	150	0.45	520
	22x50	220	0.59	350
	25.4x30	120	0.39	720
	25.4x35	180	0.51	450
	25.4x40	220	0.59	350
	25.4x50	270	0.70	260
	30x30	180	0.52	450
	30x35	220	0.61	350
	30x40	270	0.70	300
	30x50	390	0.90	190
	35x30	270	0.69	300
	35x35	330	0.80	230
	35x40	390	0.90	190
	35x50	560	1.14	140
250	22x30	56	0.27	1,000
	22x35	82	0.34	800
	22x40	100	0.39	600
	22x50	120	0.47	400
	25.4x30	82	0.34	800
	25.4x35	100	0.40	600
	25.4x40	120	0.47	500
	25.4x50	180	0.61	300
	30x30	120	0.45	500
	30x35	150	0.53	400
	30x40	180	0.61	300
	30x50	270	0.80	220
	35x30	150	0.54	400
	35x35	220	0.69	260
	35x40	270	0.80	220
	35x50	390	1.02	160

COMPUTER GRADE

Responding to the recent general thrust of advanced electronic technology, NIPPON CHEMI-CON has provided various computer grade capacitors featuring high temperature operation, reliability, capacitance and ripple current as well as long life and low impedance in smaller case sizes for power-supply filter applications.

Various case sizes are available for these series, and they will make you possible to design your set more unique with originality.

Besides listed in this book, following new series are available upon request.

RW . . . . . High Ripple
KME . . . . . Smaller than KMU
LX . . . . . Long Life (105°C, 5000 hours)

Please ask us information for details

CHARACTERISTICS

Item \ Series	MWU		UW		KMU		KWU
Rated voltage range	6 to 100V	150 to 450 V	10 to 100 V	200 to 450 V	10 to 100 V	160 to 400 V	10 to 100 V
Operating temperature range	−40 to +85°C	−25 to +85°C	−40 to +85°C	−25 to +85°C	−40 to +105°C	−25 to +105°C	−40 to +105°C
Storage temperature range	−55 to +85°C		−55 to +85°C		−55 to +105°C		−55 to +105°C
Capacitance range	75 to 1,600,000 μF		80 to 390,000 μF		220 to 390,000 μF		1,000 to 100,000 μF
Capacitance tolerance	−10 to +75%(U)	−10 to +50%(T)	−10 to +75%(U)	−10 to +50%(T)	−10 to +50% (T)		−10 to +50% (T)
Leakage current	At 20°C, where C = Nominal capacitance (μF) and V = Rated voltage (V) 0.02 CV (μA) or 5mA, whichever is smaller, after 5 minutes						
Surge voltage	See the Standard Ratings table. Test conditions: connect the capacitor in series with a current limiting resistor of 1,000 ohms and apply rated surge voltage for a period of 30 ±5 seconds followed by 4 −½ ±0.5 minute rest periods with no voltage applied. This test shall be repeated for 1,000 cycles. Capacitance change: not less than 80% of the initial measured value. ESR: not to exceed 200% of the initial specified value. Leakage current: not to exceed the initial specified value. Appearance: no notable change to be found.						
Low temperature characteristics	———		———		10 to 100V: Capacitance at −40°C shall not be less than 60% of the value at +20°C. 160 to 400V: Capacitance at −25°C shall not be less than 70% of the value at +20°C		Capacitance at −40°C shall not be less than 60% of the value at +20°C. Impedance (Z) ratio at 20KHz: Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 Z −10°C / Z 20°C: 8 / 8 / 6 / 6 / 6 / 6 / 6 / 6
Equivalent series inductance (ESL)							At 1MHz, 30nH
Vibration	Capacitor shall be subjected to the vibration of 10 to 55Hz, total amplitude 1.5mm. The rate of frequency vibration shall vary from 10 to 55Hz, returning to 10Hz in about 1 minute and repeat process. The cycle shall be conducted for 2 hours in each of 3 mutually perpendicular planes. During the final 30 minutes of testing, capacitance values measured several times shall remain stable. There will be no mechanical damage. Appearance: no notable change to be found.						
Load life	The following specifications shall be satistified when the capacitors are restored to 20°C after rated voltage applied for 1,000 hours at 85°C, or for 4,000 hours at 65°C. Capacitance change: less than ±15% of the initial measured value. ESR: not to exceed 150% of the initial specified value. Leakage current: not to exceed the initial specified value. Appearance: no notable change to be found.				———		The following specifications shall be satisified when the capacitors are restored to 20°C after rated voltage applied for 2000 hours at 105°C. Capacitance change: less than ±20% of the initial measured value. ESR: not to exceed 200% of the initial specified value. Leakage current: not to exceed the initial specified value. Appearance: no notable change to be found.
Load life with ripple current	———		———		The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage with maximum ripple current are applied for 2,000 hours at 85°C or 105°C. Capacitance change: less than ±20% of the initial measured value. ESR: not to exceed 200% of the initial measured value. Leakage current: not to exceed the initial specified value. Appearance: no notable change to be found.		———
Shelf life	The following specifications shall be satisified when capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. Capacitance change: less than ±15% of the initial measured value. ESR: not to exceed 150% of the initial specified value. Leakage current: not to exceed the initial specified value.				The following specifications shall be satisified when capacitors are restored to 20°C after exposing them at 105°C for 500 hours without voltage applied. Capacitance change: less than ±15% of the initial measured value. ESR: not to exceed 150% of the initial specified value. Leakage current: not to exceed the initial specified value.		
Others	Satisfies characteristic B, class Y, of JIS C5141						

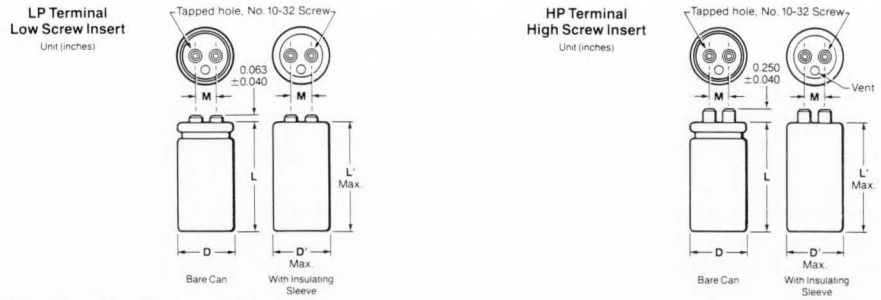
Specifications subject to change without notice.

Case Size of Standard Voltage Ratings

Case Code*	Case Size for Bare Can				Case Size with Insulating Sleeve				M	
	D		L		D'		L'		mm	inches
	mm	inches	mm	inches	mm	inches	mm	inches	±0.50	±0.02
35X41	35.0	1.38	41	1.61	36.9	1.45	43.5	1.71	12.7	0.500
35X55	35.0	1.38	55	2.17	36.9	1.45	57.5	2.26	12.7	0.500
35X67	35.0	1.38	67	2.64	36.9	1.45	69.5	2.74	12.7	0.500
35X80	35.0	1.38	80	3.15	36.9	1.45	82.5	3.25	12.7	0.500
35X92	35.0	1.38	92	3.62	36.9	1.45	94.5	3.72	12.7	0.500
35X105	35.0	1.38	105	4.13	36.9	1.45	107.5	4.23	12.7	0.500
35X117	35.0	1.38	117	4.61	36.9	1.45	119.5	4.70	12.7	0.500
35X130	35.0	1.38	130	5.12	36.9	1.45	132.5	5.22	12.7	0.500
35X143	35.0	1.38	143	5.63	36.9	1.45	145.5	5.73	12.7	0.500
50X55	50.8	2.00	55	2.17	51.9	2.04	57.5	2.26	21.8	0.860
50X67	50.8	2.00	67	2.64	51.9	2.04	69.5	2.74	21.8	0.860
50X80	50.8	2.00	80	3.15	51.9	2.04	82.5	3.25	21.8	0.860
50X92	50.8	2.00	92	3.62	51.9	2.04	94.5	3.72	21.8	0.860
50X105	50.8	2.00	105	4.13	51.9	2.04	107.5	4.23	21.8	0.860
50X117	50.8	2.00	117	4.61	51.9	2.04	119.5	4.70	21.8	0.860
50X130	50.8	2.00	130	5.12	51.9	2.04	132.5	5.22	21.8	0.860
50X143	50.8	2.00	143	5.63	51.9	2.04	145.5	5.73	21.8	0.860
63X80	63.5	2.50	80	3.15	64.9	2.56	82.5	3.25	28.2	1.11
63X92	63.5	2.50	92	3.62	64.9	2.56	94.5	3.72	28.2	1.11
63X105	63.5	2.50	105	4.13	64.9	2.56	107.5	4.23	28.2	1.11
63X117	63.5	2.50	117	4.61	64.9	2.56	119.5	4.70	28.2	1.11
63X130	63.5	2.50	130	5.12	64.9	2.56	132.5	5.22	28.2	1.11
63X143	63.5	2.50	143	5.63	64.9	2.56	145.5	5.73	28.2	1.11
76X80	76.2	3.00	80	3.15	77.9	3.07	82.5	3.25	31.4	1.24
76X92	76.2	3.00	92	3.62	77.9	3.07	94.5	3.72	31.4	1.24
76X105	76.2	3.00	105	4.13	77.9	3.07	107.5	4.23	31.4	1.24
76X117	76.2	3.00	117	4.61	77.9	3.07	119.5	4.70	31.4	1.24
76X130	76.2	3.00	130	5.12	77.9	3.07	132.5	5.22	31.4	1.24
76X143	76.2	3.00	143	5.63	77.9	3.07	145.5	5.73	31.4	1.24
76X219	76.2	3.00	219	8.62	77.9	3.07	221.5	8.72	31.4	1.24

* The case code does not indicate actual size.

Diagram of Dimensions



Part Numbering System

When ordering, always specify complete catalog number.

MWU 6 LG 884 U 76X105 LP

- Terminal Length: LP = Low Screw Insert; HP = High Screw Insert (See Diagram of Dimensions)
- Case Code: See Case Size Table
- Capacitance Tolerance: U = −10% to +75%; T = −10% to +50%
- Capacitance Value: The first two digits combined with the number of zeroes indicated by the third digit equals the capacitance for 100μF or more. R indicates decimal point for less than 100μF. (e.g. 1R0 = 1.0μF; 10R = 10μF; 104 = 100,000μF)
- Lead Configuration: LG = Screw Terminals
- Rated Voltage: Expressed in Volts (e.g. 6 = 6WVDC).
- Series Name

RIPPLE CURRENT MULTIPLIERS

Maximum rms ripple current is given in the table of STANDARD RATING.
Where the capacitors are operated at temperature and frequency other than the figures shown in the table of STANDARD RATINGS, the rated rms ripple current shown must be multiplied by the factor shown in the below table.

MWU Series

Where capacitors are operated at a temperature other than +65°C, the maximum ripple current (A rms) may be multiplied by the factor given below.

Temperature	+20°C	+50°C	+65°C	+75°C	+85°C
Multiplying Factor	1.2	1.2	1.0	0.7	0.5

If capacitors are used at a frequency other than 120Hz, the rated 120Hz ripple current may be multipled by the factor given below.

Frequency	50Hz	120Hz	300Hz	1KHz	10KHz	50KHz
Multiplying Factor	0.80	1.00	1.15	1.30	1.40	1.50

UW Series

Where capacitors are operated at a temperature other than +65°C, the maximum ripple current (A rms) may be multiplied by the factor given below.

Temperature	+20°C	+50°C	+65°C	+75°C	+85°C
Multiplying Factor	1.4	1.3	1.0	0.7	0.5

If capacitors are used at a frequency other than 120Hz, the rated 120Hz ripple current may be multipled by the factor given below.

Frequency	50Hz	120Hz	300Hz	1KHz	10KHz	50KHz
Multiplying Factor	0.80	1.00	1.15	1.30	1.40	1.50

KMU Series

Where capacitors are operated at a temperature other than +105°C, the maximum ripple current may be multiplied by the factor given below.

Temperature	+45°C	+65°C	+85°C	+105°C
Multiplying Factor	2.40	2.17	1.74	1.00

If capacitors are used at a frequency other than 120Hz, the rated 120Hz ripple current may be multipled by the factor given below.

Rated voltage (V)	Diameter mm (in.)	Frequency (Hz)					
		50Hz	120Hz	300Hz	1kHz	10kHz	50kHz
10 ~ 50WV	35.0 (1.38) ~ 76.2 (3.00)	0.95	1.00	1.03	1.05	1.09	1.12
63 ~ 80WV	50.8 (2.00) ~ 76.2 (3.00)	0.95	1.00	1.03	1.05	1.09	1.12
100WV	63.5 (2.50) ~ 76.2 (3.00)	0.95	1.00	1.03	1.05	1.09	1.12
63 ~ 80WV	35.0 (1.38)	0.90	1.00	1.06	1.10	1.18	1.22
100WV	50.8 (2.00)	0.90	1.00	1.06	1.10	1.18	1.22
100WV	35.0 (1.38)	0.82	1.00	1.12	1.22	1.30	1.33
160 ~ 250WV	76.2 (3.00)	0.82	1.00	1.12	1.22	1.30	1.33
160 ~ 250WV	50.8 (2.00) ~ 63.5 (2.50)	0.81	1.00	1.14	1.26	1.36	1.41
160 ~ 250WV	35.0 (1.38)	0.80	1.00	1.14	1.34	1.46	1.52
315 ~ 400WV	35.0 (1.38) ~ 76.2 (3.00)	0.80	1.00	1.19	1.34	1.46	1.52

KWU Series

Where capacitors are operated at a temperature other than +85°C, the maximum ripple current may be multiplied by the factor given below.

Temperature	+45°C	+65°C	+85°C	+105°C
Multiplying Factor	1.37	1.24	1.00	0.57

If capacitors are used at a frequency other than 20KHz, the rated 20KHz ripple current may be multiplied by the factor given below.

Rated voltage (V)	Diameter mm (in.)	Frequency (Hz)				
		50Hz	120Hz	1kHz	20kHz	50kHz
10 ~ 16WV	35.0 (1.38) 50.8 (2.00)	0.75	0.84	0.96	1.00	1.01
25 ~ 50WV	35.0 (1.38)	0.68	0.81	0.95	1.00	1.01
25 ~ 63WV	50.8 (2.00)	0.68	0.81	0.95	1.00	1.01
63 ~ 100WV	35.0 (1.38)	0.56	0.75	0.94	1.00	1.01

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
		35,000	35x41				0.30				2.5					
		63,000	35x55				0.17				3.7					
		79,000	35x67				0.13				4.4					
		110,000	35x80				0.088				5.7					
		120,000	35x92				0.064				7.1					
		120,000	50x55				0.10				5.5					
		150,000	35x105				0.048				8.6					
		160,000	50x67				0.077				6.8					
		170,000	35x117				0.044				9.2					
		220,000	50x80				0.056				8.4					
		270,000	50x92				0.042				10.5					
		330,000	50x105				0.034				12.0					
6	8	370,000	50x117				0.030				13.4					
		370,000	63x80				0.040				11.5					
		380,000	50x130				0.030				14.5					
		410,000	50x143				0.028				15.7					
		450,000	63x92				0.027				14.6					
		550,000	63x105				0.026				16.1					
		580,000	76x80				0.030				14.8					
		620,000	63x117				0.024				17.6					
		670,000	63x130				0.024				18.3					
		720,000	76x92				0.023				17.6					
		880,000	76x105				0.021				20.3					
		990,000	76x117				0.019				21.3					
		1,000,000	76x130				0.019				22.3					
		1,600,000	76x219				0.010				39.9					
		9,000		35x55				0.22				2.6				
		10,000				35x55				0.029					10.2	0.010
		18,000		35x80				0.12				4.3				
		22,000			35x80	35x80			0.025	0.013			7.0	4.0	14.0	0.008
		25,000	35x41				0.32				2.5					
		27,000		35x105	35x80			0.072	0.020			5.8	7.8	4.5		
		33,000			35x80	35x80			0.017	0.0089			8.5	4.9	17.1	0.007
		39,000			35x80				0.014				9.4	5.4		
		41,000		35x143				0.050				8.0				
		46,000	35x55				0.18				3.6					
		47,000			35x105	35x105			0.012	0.0063			10.9	6.3	19.9	0.006
		56,000			35x117				0.011				12.3	7.1		
		58,000	35x67	50x105			0.14	0.052			4.3	8.7				
		68,000			50x80				0.011				12.7	7.3		
		81,000	35x80				0.096				5.5					
		82,000			50x80				0.0088				13.7	7.9		
		88,000		50x143				0.034				12.1				
		91,000	50x55				0.10				5.5					
		92,000	35x92				0.064				7.1					
		100,000		63x105	50x105	50x117		0.034	0.0084	0.0044		12.2	15.3	8.8	28.9	0.005
		110,000	35x105				0.050				8.4					
		120,000	50x67		50x117		0.078		0.0070		6.7		17.6	10.1		
10	13	130,000	35x117				0.044				9.2					
		150,000		63x143	63x105			0.025	0.0064			16.2	19.2	11.0		
		160,000	50x80				0.059				8.3					
		180,000			63x105				0.0053				21.1	12.1		
		190,000	50x92				0.042				10.5					
		220,000			63x117				0.0055				22.0	12.6		
		230,000		76x143				0.020				19.8				
		240,000	50x105				0.034				12.0					
		270,000	50x117		76x105		0.030		0.0053		13.4		22.5	12.9		
		270,000	63x80				0.040				11.5					
		300,000	50x143				0.028				15.7					
		330,000	63x92		76x117		0.027		0.0043		14.6		26.3	15.1		
		390,000		76x219	76x143			0.012	0.0043			30.7	28.1	16.1		
		400,000	63x105				0.026				16.1					
		420,000	76x80				0.030				14.8					
		460,000	63x117				0.024				17.6					
		490,000	63x130				0.024				18.3					
		520,000	76x92				0.023				17.6					
		640,000	76x105				0.021				20.3					
		720,000	76x117				0.019				21.3					
		770,000	76x130				0.019				22.3					
		1,100,000	76x219				0.010				39.9					
15	18	7,500		35x55				0.22				2.6				
(16 for	(20 for	10,000				35x55				0.029					10.2	0.012
KMU	KMU	15,000		35x80	35x55			0.12	0.036			4.3	4.9	2.8		
and	and	18,000	35x41		35x80		0.34		0.030		2.4		6.3	3.6		
KWU)	KWU)	22,000		35x105	35x80	35x80		0.072	0.025	0.013		5.8	7.0	4.0	14.0	0.008

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
15 (16 for KMU and KWU)	18 (20 for KMU and KWU)	27,000			35x80				0.020				7.8	4.5		
		33,000	35x55		35x105	35x105	0.28		0.018	0.0089	3.5		8.8	5.1	18.6	0.008
		34,000		35x143				0.052				8.0				
		39,000			35x105				0.016				9.5	5.5		
		41,000	35x67				0.14				4.2					
		47,000			35x117	50x80			0.013	0.0063			11.3	6.5	23.6	0.006
		50,000		50x105				0.054				8.6				
		56,000			50x105				0.013				12.3	7.1		
		58,000	35x80				0.096				5.5					
		65,000	50x55				0.10				5.5					
		66,000	35x92				0.064				7.1					
		68,000			50x105				0.011				13.5	7.8		
		75,000		50x143				0.036				12.0				
		82,000	35x105		50x117		0.053		0.011		8.2		14.6	8.4		
		83,000		63x105				0.034				12.1				
		87,000	50x67				0.078				6.7					
		93,000	35x117				0.046				9.2					
		100,000			50x117				0.0084				16.0	9.2		
		110,000	50x80				0.061				8.3					
		120,000		63x143	63x105			0.030	0.0084			14.9	17.2	9.9		
		120,000		76x105				0.029				14.9				
		140,000	50x92				0.043				10.3					
		150,000			63x105				0.0064				19.1	11.0		
		170,000	50x105				0.035				12.0					
		180,000		76x143	63x117			0.022	0.0053			19.4	22.3	12.8		
		190,000	50x117				0.033				13.4					
		190,000	63x80				0.043				11.2					
		200,000	50x130				0.032				14.0					
		210,000	50x143				0.029				15.7					
		220,000			76x117				0.0055				23.7	13.6		
		230,000	63x92				0.027				14.6					
		270,000			76x143				0.0045				27.5	15.8		
		290,000	63x105				0.026				16.1					
		300,000	76x80	76x219			0.030	0.013			14.8	29.3				
		330,000	63x117				0.024				17.6					
		350,000	63x130				0.024				18.3					
		370,000	76x92				0.023				17.6					
		460,000	76x105				0.022				19.4					
		520,000	76x117				0.020				21.3					
		550,000	76x130				0.019				22.3					
		840,000	76x219				0.010				39.9					
25	32	4,500		35x55				0.24				2.5				
		9,000		35x80				0.12				4.0				
		10,000			35x55	35x80			0.042	0.025			4.6	2.7	12.9	0.010
		11,000	35x41				0.38				2.2					
		12,000			35x80				0.035				5.9	3.4		
		13,000		35x105				0.090				4.3				
		15,000			35x80				0.028				6.6	3.8		
		18,000			35x80				0.024				7.3	4.2		
		20,000		35x143				0.058				7.7				
		22,000	35x55		35x105	35x105	0.19		0.019	0.011	3.4		8.6	5.0	15.2	0.008
		27,000			35x117				0.018				9.5	5.5		
		28,000	35x67				0.14				4.2					
		30,000		50x105				0.054				8.4				
		33,000			35x117	50x80			0.015	0.0076			10.6	6.1	21.7	0.006
		39,000	35x80		50x80		0.096		0.013		5.5		11.6	6.7		
		43,000	50x55				0.10				5.5					
		44,000	35x92				0.064				7.1					
		45,000		50x143				0.036				11.7				
		47,000			50x105				0.011				13.9	8.0		
		50,000		63x105				0.036				12.1				
		55,000	35x105				0.054				8.1					
		56,000			50x117				0.0086				16.0	9.2		
		58,000	50x67				0.078				6.7					
		62,000	35x117				0.048				9.0					
		68,000			63x105				0.0088				16.4	9.4		
		75,000		63x143				0.028				15.4				
		75,000		76x105				0.029				15.0				
		77,000	50x80				0.054				8.3					
		82,000			63x105				0.0073				17.9	10.3		
		95,000	50x92				0.043				10.3					
		100,000			63x117				0.0072				19.3	11.1		
		110,000	50x105	76x143			0.037	0.022			12.0	19.3				
		120,000			63x117				0.0060				21.1	12.1		
		130,000	50x117				0.034				13.0					

NIPPON CHEMI-CON

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
25	32	130,000	63x80				0.043				11.0					
		140,000	50x143				0.029				15.7					
		150,000	63x92		76x117		0.029		0.0060		14.6		22.8	13.1		
		180,000			76x143				0.0050				26.3	15.1		
		190,000	63x105	76x219			0.026	0.013			16.1	29.3				
		200,000	76x80				0.030				14.8					
		220,000	63x117				0.024				17.6					
		230,000	63x130				0.024				18.3					
		250,000	76x92				0.023				17.6					
		310,000	76x105				0.022				19.4					
		340,000	76x117				0.021				21.3					
		370,000	76x130				0.021				22.3					
		560,000	76x219				0.010				39.9					
30	37	4,000		35x55				0.24				2.3				
		8,000		35x80				0.13				3.9				
		9,500	35x41				0.36				2.2					
		12,000		35x105				0.080				5.5				
		17,000	35x55				0.20				3.3					
		18,000		35x143				0.057				7.5				
		21,000	35x67				0.15				4.1					
		26,000		50x105				0.056				8.3				
		30,000	35x80				0.10				5.3					
		33,000	50x55				0.12				5.1					
		34,000	35x92				0.064				7.1					
		39,000		50x143				0.038				11.6				
		42,000	35x105				0.058				7.8					
		44,000	50x67	63x105			0.088	0.036			6.3	11.7				
		48,000	35x117				0.050				8.8					
		59,000	50x80				0.066				7.9					
		66,000		63x143				0.030				15.8				
		66,000		76x105				0.031				14.9				
		73,000	50x92				0.045				10.3					
		89,000	50x105				0.038				11.7					
		97,000		76x143				0.022				19.2				
		99,000	63x80				0.043				11.0					
		100,000	50x117				0.034				13.0					
		110,000	50x143				0.030				15.2					
		120,000	63x92				0.029				14.6					
		150,000	63x105				0.027				15.5					
		150,000	76x80				0.030				14.4					
		160,000	63x117	76x219			0.027	0.013			16.3	29.3				
		180,000	63x130				0.026				17.7					
		190,000	76x92				0.025				17.6					
		230,000	76x105				0.022				19.4					
		260,000	76x117				0.021				21.3					
		280,000	76x130				0.021				22.3					
		430,000	76x219				0.010				39.9					
35	44	4,700				35x55				0.047					8.4	0.016
		6,800			35x55				0.053				4.0	2.3		
		8,200			35x80				0.044				5.2	3.0		
		10,000			35x80	35x80			0.036	0.022			5.7	3.3	12.9	0.010
		12,000			35x80				0.030				6.3	3.6		
		15,000			35x105				0.024				7.5	4.3		
		18,000			35x105				0.020				8.3	4.8		
		22,000			35x117	50x80			0.019	0.010			9.2	5.3	19.4	0.007
		27,000			50x80				0.018				9.7	5.6		
		33,000			50x107				0.015				11.6	6.7		
		39,000			50x117				0.013				13.4	7.7		
		47,000			63x105				0.012				14.2	8.2		
		56,000			63x105				0.0096				15.6	9.0		
		68,000			63x105				0.0079				17.2	9.9		
		82,000			63x117				0.0073				19.1	11.0		
		100,000			76x117				0.0072				20.7	11.9		
		120,000			76x143				0.0060				23.9	13.7		
50	40	2,900		35x55				0.25				2.5				
		5,800		35x80				0.13				3.9				
		7,000	35x41				0.36				2.2					
		8,700		35x105				0.086				5.4				
		12,000	35x55				0.21				3.3					
		13,000		35x143				0.058				7.4				
		16,000	35x67				0.15				4.1					
		20,000		50x105				0.058				8.2				
		22,000	35x80				0.10				5.3					
		25,000	35x92				0.070				6.8					
		25,000	50x55				0.12				5.1					

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
40	50	30,000		50x143				0.038				11.5				
		31,000	35x105				0.058				7.8					
		33,000	50x67				0.096				6.0					
		34,000		63x105				0.038				11.5				
		35,000	35x117				0.051				8.6					
		45,000	50x80				0.069				7.8					
		51,000		63x143				0.032				15.5				
		51,000		76x105				0.032				14.7				
		55,000	50x92				0.046				10.0					
		67,000	50x105				0.040				11.4					
		76,000	50x117				0.036				12.6					
		76,000	63x80	76x143			0.043	0.024			11.0	18.9				
		78,000	50x130				0.035				13.2					
		85,000	50x143				0.030				15.2					
		93,000	63x92				0.030				14.1					
		110,000	63x105				0.027				15.5					
		120,000	63x117				0.027				16.3					
		120,000	76x80	76x219			0.030	0.014			14.4	28.3				
		130,000	63x130				0.026				17.7					
		140,000	76x92				0.026				16.9					
		180,000	76x105				0.024				18.6					
		200,000	76x117				0.022				20.3					
		210,000	76x130				0.021				22.3					
		330,000	76x219				0.011				36.4					
50	63	2,400		35x55				0.26				2.3				
		3,300			35x55	35x55			0.073	0.058			3.5	2.0	8.4	0.015
		3,900			35x55				0.062				3.8	2.2		
		4,700			35x80	35x80			0.064	0.041			4.3	2.5	12.1	0.010
		4,800		35x80				0.13				3.9				
		5,400	35x41				0.39				2.2					
		5,600			35x80				0.054				4.7	2.7		
		6,800			35x80				0.044				5.2	3.0		
		7,200		35x105				0.087				5.3				
		8,200			35x80				0.037				5.7	3.3		
		9,700	35x35				0.22				3.2					
		10,000			35x105	35x105			0.030	0.019			6.8	3.9	15.2	0.008
		11,000		35x143				0.061				7.4				
		12,000	35x67		35x105		0.16		0.025		4.0		7.5	4.3		
		15,000			35x117				0.024				8.3	4.8		
		16,000		50x105				0.062				7.9				
		17,000	35x80				0.10				5.3					
		18,000			50x80				0.024				8.6	5.0		
		19,000	35x92				0.069				6.8					
		19,000	50x55				0.12				4.9					
		22,000			50x105				0.019				10.2	5.9		
		24,000	35x105	50x143			0.064	0.040			7.4	11.1				
		26,000	50x67				0.096				6.0					
		27,000	35x117	63x105	50x117		0.054	0.040	0.016		8.5	11.3	12.0	6.9		
		33,000			63x105				0.015				12.8	7.4		
		34,000	50x80				0.072				7.6					
		39,000			63x105				0.013				13.9	8.0		
		40,000		63x143				0.030				15.4				
		41,000		76x105				0.031				14.6				
		42,000	50x92				0.052				9.6					
		47,000			63x117				0.010				16.2	9.3		
		52,000	50x105				0.042				11.1					
		56,000			63x117				0.0085				17.7	10.2		
		58,000	50x117				0.038				12.3					
		58,000	63x80				0.043				11.0					
		60,000	50x130				0.037				13.2					
		61,000		76x143				0.024				18.6				
		66,000	50x143				0.032				14.7					
		68,000			76x117				0.0079				19.7	11.3		
		71,000	63x92				0.032				13.7					
		82,000			76x143				0.0066				22.8	13.1		
		88,000	63x105				0.027				15.5					
		93,000	76x80				0.030				14.4					
		99,000	63x117				0.027				16.3					
		100,000	63x130	76x219			0.026	0.014			17.7	28.3				
		110,000	63x143				0.026				18.4					
		110,000	76x92				0.026				16.9					
		140,000	76x105				0.024				18.6					
		150,000	76x117				0.022				20.3					
		160,000	76x130				0.022				21.3					
		250,000	76x219				0.011				36.4					

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
63	79	2,200			35x55	35x55			0.082	0.080			3.4	2.0	7.7	0.018
		2,700			35x55				0.066				3.8	2.2		
		3,300			35x80	35x80			0.073	0.054			4.1	2.4	10.8	0.012
		3,900			35x80				0.062				4.5	2.6		
		4,700			35x80	35x80			0.051	0.038			5.0	2.9	12.1	0.010
		5,600			35x80				0.043				5.4	3.1		
		6,800			35x105				0.036				6.4	3.7		
		8,200			35x105				0.030				7.1	4.1		
		10,000			35x117	50x80			0.028	0.018			7.7	4.4	17.7	0.007
		12,000			50x80				0.025				8.1	4.7		
		15,000			50x105				0.020				9.9	5.7		
		18,000			50x117				0.017				11.4	6.6		
		22,000			63x105				0.017				12.1	7.0		
		27,000			63x105				0.014				13.4	7.7		
		33,000			63x117				0.011				15.8	9.1		
		39,000			76x105				0.011				16.3	9.4		
		47,000			76x117				0.0089				19.0	10.9		
		56,000			76x143				0.0075				21.8	12.5		
75 (80 for KMU and KWU)	95 (100 for KMU and KWU)	1,400		35x55				0.30				2.2				
		1,800			35x55				0.099				3.4	2.0		
		2,200			35x55	35x80			0.081	0.067			3.7	2.2	0.90	0.014
		2,700			35x80				0.082				4.5	2.6		
		2,800		35x80				0.16				3.7				
		3,000	35x41				0.39				2.2					
		3,300			35x80	35x80			0.067	0.045			4.9	2.8	11.4	0.012
		3,900			35x80				0.057				5.4	3.1		
		4,200		35x105				0.10				4.9				
		4,600	35x55				0.24				3.1					
		4,700			35x80	35x105			0.047	0.031			5.9	3.4	14.0	0.008
		5,600			35x105				0.040				6.9	4.0		
		5,700	35x67				0.18				3.7					
		6,300		35x143				0.067				7.2				
		6,800			35x117				0.039				7.3	4.2		
		8,000	35x80				0.13				4.7					
		8,200			50x80					0.036			7.6	4.4		
		8,900	50x55				0.12				4.9					
		9,100	35x92				0.080				6.3					
		10,000		50x105	50x105			0.068	0.030			7.5	8.4	4.9		
		11,000	35x105				0.069				7.2					
		11,000	50x67				0.096				6.0					
		12,000	35x117		50x105		0.058		0.025		8.2		10.0	5.8		
		15,000	50x80	50x143	50x117		0.072	0.046	0.020		7.6	10.4	11.8	6.8		
		17,000		63x105				0.046				10.6				
		18,000			63x105				0.021				12.0	6.9		
		19,000	50x92				0.054				9.3					
		22,000			63x117				0.017				14.0	8.1		
		23,000	50x105				0.046				10.6					
		25,000		63x143				0.034				13.3				
		25,000		76x105				0.034				13.6				
		26,000	50x117				0.042				11.7					
		26,000	63x80				0.046				10.7					
		27,000	50x130		76x105		0.042		0.017		12.3		14.6	8.4		
		29,000	50x143				0.037				13.9					
		32,000	63x92				0.037				12.9					
		33,000			76x117				0.014				17.0	9.8		
		37,000		76x143				0.026				18.2				
		39,000			76x143				0.012				19.5	11.2		
		40,000	63x105				0.030				15.0					
		42,000	76x80				0.033				14.4					
		45,000	63x117				0.029				16.3					
		47,000	63x130		76x143		0.029		0.0095		17.0		21.4	12.3		
		51,000	76x92				0.027				16.3					
		52,000	63x143				0.027				17.8					
		60,000		76x219				0.016				26.9				
		63,000	76x105				0.026				17.8					
		71,000	76x117				0.024				19.4					
		76,000	76x130				0.024				20.4					
		110,000	76x219													
100	125	820			35x55				0.18				2.5	1.5		
		850		35x55				0.41				1.8				
		1,000			35x55	35x55			0.15	0.15			2.8	1.6	7.2	0.022
		1,200			35x55				0.13				3.1	1.8		
		1,500			35x55				0.099				3.4	2.0		
		1,700	35x41	35x80			0.60	0.21			1.8	3.1				
		1,800			35x80				0.082				4.5	2.6		

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
100	125	2,200			35x80	35x80			0.067	0.067			4.9	2.8	9.9	0.014
		2,600		35x105				0.14				4.3				
		2,700			35x80				0.055				5.5	3.2		
		3,100	35x55				0.33				2.7					
		3,300			35x105	35x105			0.045	0.045			6.5	3.7	12.4	0.011
		3,800		35x143				0.092				6.0				
		3,900	35x67		35x105		0.23		0.038		3.2		7.0	4.1		
		4,700			35x117				0.038				7.4	4.3		
		4,900	35x80				0.17				4.1					
		5,500	50x55				0.17				4.3					
		5,600	35x92		50x80		0.11		0.040		5.3		7.6	4.4		
		5,800		50x105				0.094				6.3				
		6,800			50x105				0.033				9.0	5.2		
		7,000	35x105				0.096				6.1					
		7,300	50x67				0.12				5.4					
		7,900	35x117				0.080				7.0					
		8,200			50x105				0.027				9.9	5.7		
		8,700		50x143				0.062				9.1				
		9,700	50x80				0.096				6.5					
		9,800		63x105				0.060				9.2				
		10,000			50x117				0.022				11.1	6.4		
		12,000	50x92		63x105		0.075		0.025		7.8		11.5	6.6		
		14,000	50x105				0.064				9.0					
		15,000		63x143	63x117			0.044	0.020			12.1	13.2	7.6		
		15,000		76x105				0.043				12.1				
		16,000	50x117				0.058				10.0					
		16,000	63x80				0.074				8.5					
		18,000	50x143		76x105		0.050		0.021		11.7		13.3	7.7		
		20,000	63x92				0.048				11.2					
		21,000		76x143				0.034				14.1				
		22,000			76x117				0.017				15.1	8.7		
		24,000	63x105				0.042				12.6					
		26,000	76x80				0.042				12.5					
		27,000			76x143				0.014				17.6	10.1		
		28,000	63x117				0.037				14.3					
		29,000	63x130				0.037				15.0					
		32,000	63x143				0.035				15.7					
		32,000	76x92				0.034				14.7					
		36,000		76x219				0.020				23.5				
		39,000	76x105				0.032				16.1					
		44,000	76x117				0.030				17.4					
		47,000	76x130				0.030				18.2					
		73,000	76x219				0.016				31.5					
150 (160 for KMU)	175 (200 for KMU)	470			35x55				0.38				1.7	1.0		
		560			35x55				0.32				1.9	1.1		
		660	35x41				0.81				1.6					
		680			35x80				0.26				2.4	1.4		
		820			35x80				0.22				2.7	1.6		
		1,000			35x80				0.18				3.0	1.7		
		1,100	35x55				0.49				2.2					
		1,200			35x80				0.15				3.3	1.9		
		1,400	35x67				0.37				2.8					
		1,500			35x80				0.12				3.6	2.1		
		1,800			35x117				0.099				4.6	2.7		
		2,000	35x80				0.25				3.6					
		2,200	35x92		35x117		0.16		0.081		4.7		5.1	2.9		
		2,200	50x55				0.29				3.4					
		2,700			50x80				0.082				5.3	3.0		
		2,800	35x105				0.14				5.4					
		3,000	50x67				0.21				4.3					
		3,200	35x117				0.13				5.9					
		3,300			50x105				0.067				6.3	3.6		
		3,900	50x80		50x117		0.16		0.057		5.3		7.2	4.1		
		4,700			50x117				0.047				7.9	4.6		
		4,800	50x92				0.11				6.9					
		5,600			63x105				0.040				9.0	5.2		
		6,000	50x105				0.099				7.7					
		6,500	63x80				0.086				8.3					
		6,700	50x117				0.086				8.7					
		6,800	50x130		63x117		0.083		0.033		9.2		10.5	6.1		
		7,400	50x143				0.074				10.2					
		8,000	63x92				0.070				9.8					
		8,200			76x105				0.033				10.7	6.2		
		9,900	63x105				0.059				11.4					
		10,000	76x80		76x117		0.056		0.027		11.5		12.3	7.1		

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
150 (160 for KMU)	175 (200 for (KMU)	11,000	63x117				0.052				12.7					
		12,000	76x92		76x143		0.047		0.023		13.3		14.1	8.2		
		15,000	76x105				0.047				14.0					
		17,000	76x117				0.044				15.0					
		19,000	76x130				0.041				16.6					
		22,000	76x219				0.018				31.5					
200	250	270			35x55				0.55				1.5	0.85		
		300		35x55				0.52				1.5				
		330			35x55				0.45				1.6	0.93		
		390			35x55				0.38				1.8	1.0		
		460	35x41				0.99				1.5					
		470			35x80				0.32				2.3	1.3		
		560			35x80				0.27				2.5	1.4		
		590		35x80				0.26				2.5				
		680			35x80				0.22				2.7	1.6		
		790	35x55				0.60				2.0					
		820			35x105				0.18				3.2	1.9		
		850		35x105				0.18				3.3				
		1,000	35x67		35x117		0.45		0.15		2.5		3.8	2.2		
		1,200		35x143	35x117			0.12	0.13			4.8	4.2	2.4		
		1,400	35x80	50x80			0.31	0.18			3.2	4.0				
		1,500	35x92		50x80		0.21		0.12		4.1		4.4	2.5		
		1,500	50x55				0.31				3.3					
		1,800			50x105				0.099				5.1	2.9		
		1,900	35x105				0.17				4.8					
		2,000		50x105				0.12				5.1				
		2,100	50x67				0.22				4.3					
		2,200	35x117		50x105		0.16		0.081		5.2		5.6	3.2		
		2,700	50x80		50x117		0.17		0.066		5.2		6.5	3.8		
		2,900		50x143				0.080				7.3				
		3,300			63x105				0.054				7.6	4.4		
		3,400	50x92	63x105			0.14	0.077			6.2	7.3				
		3,900			63x117				0.046				8.7	5.0		
		4,200	50x105				0.12				7.0					
		4,600	63x80				0.13				6.9					
		4,700	50x117		76x105		0.11		0.047		7.7		9.0	5.2		
		4,900		63x143				0.051				10.5				
		5,200	50x143				0.090				9.3					
		5,600	63x92		76x117		0.086		0.040		8.9		10.3	5.9		
		6,800			76x143				0.033				11.9	6.9		
		6,900	63x105				0.074				10.1					
		7,300	76x80				0.071				10.1					
		7,400		76x143				0.040				13.0				
		7,800	63x117				0.068				11.1					
		8,300	63x130				0.065				11.8					
		9,000	76x92				0.058				12.0					
		11,000	76x105				0.058				12.6					
		12,000	76x117	76x219			0.054	0.025			13.7	20.2				
		13,000	76x130				0.050				15.0					
		15,000	76x219				0.023				28.2					
250	300	220			35x55				0.67				1.2	0.72		
		250		35x55				0.64				1.5				
		270			35x55				0.55				1.4	0.8		
		330	35x41		35x80		1.10		0.45		1.4		1.8	1.0		
		390			35x80				0.38				2.0	1.1		
		470			35x80				0.32				2.1	1.2		
		500	35x55	35x80			0.72	0.31			1.8	2.2				
		560			35x105				0.27				2.5	1.5		
		630	35x67				0.53				2.3					
		680			35x105				0.22				2.8	1.6		
		740		35x105				0.20				3.1				
		820			35x117				0.18				3.3	1.9		
		890	35x80				0.35				3.0					
		1,000	35x92				0.23				4.0					
		1,000	50x55		50x80		0.40		0.18		2,9		3.4	2.0		
		1,100		35x143				0.14				4.3				
		1,200	35x105	50x80	50x80		0.20	0.21	0.15		4.5	3.5	3.6	2.1		
		1,300	50x67				0.31				3.5					
		1,400	35x117				0.18				4.9					
		1,500			50x105				0.12				4.4	2.5		
		1,700	50x80	50x105			0.23	0.14			4.5	4.7				
		1,800			50x105				0.099				4.8	2.8		
		2,100	50x92				0.15				5.8					
		2,200			50x117				0.081				5.6	3.3		
		2,500		50x143				0.10				6.7				

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (M) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
		2,600	50x105				0.14				6.6					
		2,700			63x117				0.066				6.9	4.0		
		2,900		63x105				0.088				6.9				
		3,000	50x117				0.12				7.4					
		3,000	63x80				0.14				6.4					
		3,300	50x143		63x117		0.11		0.054		8.5		7.6	4.4		
		3,700	63x92				0.099				8.2					
		3,900			76x117				0.057				8.2	4.8		
		4,200		63x143				0.058				9.8				
		4,500	63x105				0.083				9.5					
250	300	4,700	76x80		76x117		0.077		0.047		9.8		9.0	5.2		
		5,100	63x117				0.076				10.4					
		5,400	63x130				0.074				11.1					
		5,600			76x143				0.040				10.4	6.0		
		5,700	76x92				0.064				11.5					
		6,300		76x143				0.043				12.4				
		7,100	76x105				0.063				12.1					
		7,900	76x117				0.059				13.2					
		8,500	76x130				0.056				14.1					
		10,000		76x219				0.028				18.8				
		13,000	76x219				0.025				26.9					
		220	35x41		35x55		1.80		0.67		0.90		1.2	0.72		
		270			35x67				0.55				1.5	0.84		
		330			35x80				0.45				1.8	1.0		
		370	35x55				1.08				1.2					
		390			35x80				0.38				2.0	1.1		
		470	35x67		35x105		0.80		0.32		1.5		2.3	1.3		
		560			35x117				0.26				2.7	1.6		
		660	35x80				0.54				2.0					
		680			35x117				0.22				3.0	1.7		
		740	35x92				0.36				2.5					
		740	50x55				0.52				2.1					
		820			50x80				0.22				3.1	1.8		
		930	35x105				0.31				3.0					
		990	50x67				0.40				2.6					
		1,000	35x117		50x105		0.27		0.18		3.3		3.6	2.1		
		1,200			50x105				0.15				3.9	2.3		
		1,300	50x80				0.30				3.2					
300	350	1,500			50x117				0.12				4.6	2.7		
(315	(365	1,600	50x92				0.24				3.8					
for	for	1,800			50x117				0.099				5.1	2.9		
KMU)	KMU)	1,900	50x105				0.21				4.3					
		2,200	50x117				0.18				4.9					
		2,200	63x80		63x105		0.18		0.081		4.7		5.9	3.4		
		2,400	50x143				0.16				5.6					
		2,700	63x92		76x105		0.14		0.082		5.6		6.5	3.8		
		3,300	63x105		76x117		0.13		0.067		6.3		7.6	4.4		
		3,400	76x80				0.13				6.2					
		3,700	63x117				0.12				6.9					
		3,900			76x117				0.057				8.2	4.8		
		4,000	63x130				0.11				7.5					
		4,200	76x92				0.099				7.5					
		4,700			76x143				0.047				9.5	5.5		
		5,200	76x105				0.099				7.9					
		5,900	76x117				0.088				8.7					
		6,300	76x130				0.083				9.5					
		9,900	76x219				0.036				18.2					
		130		35x55				1.20				1.0				
		160	35x41				2.30				0.78					
		220			35x67				0.67				1.4	0.8		
		260		35x80				0.59				1.7				
		270			35x80				0.55				1.7	1.0		
		280	35x55				1.40				1.1					
		330			35x80				0.45				1.9	1.1		
		360	35x67				0.99				1.4					
		380		35x105				0.39				2.2				
350	400	390			35x80				0.38				2.1	1.2		
		470			35x105				0.32				2.4	1.4		
		500	35x80				0.65				1.8					
		560			35x117				0.27				2.9	1.7		
		570	35x92				0.44				2.3					
		570	50x55				0.79				1.7					
		580		35x143				0.26				3.3				
		610		50x80				0.38				2.5				
		680			50x80				0.26				3.0	1.8		

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
350	400	710	35x105				0.37				2.7					
		760	50x67				0.59				2.1					
		810	35x117				0.33				2.9					
		820			50x80				0.22				3.2	1.9		
		880		50x105				0.26				3.5				
		1,000	50x80		50x105		0.45		0.18		2.6		3.8	2.2		
		1,200	50x92		50x117		0.30		0.15		3.4		4.4	2.5		
		1,300		50x143				0.18				4.8				
		1,500	50x105	63x105	63x105		0.25	0.16	0.12		3.9	5.1	5.1	2.9		
		1,700	50x117				0.23				4.3					
		1,700	63x80				0.27				3.8					
		1,800			63x105				0.099				5.6	3.2		
		1,900	50x143				0.20				5.1					
		2,100	63x92				0.18				5.0					
		2,200		63x143	63x117			0.11	0.081			7.3	6.5	3.8		
		2,500	63x105				0.15				5.8					
		2,600	76x80				0.15				5.7					
		2,700			76x105				0.082				6.8	3.9		
		2,900	63x117				0.14				6.4					
		3,100	63x130				0.14				6.7					
		3,200	76x92				0.13				6.6					
		3,300		76x143	76x117			0.078	0.067			9.2	7.9	4.6		
		3,900			76x143				0.056				9.0	5.2		
		4,000	76x105				0.12				7.3					
		4,500	76x117				0.11				7.9					
		4,800	76x130				0.099				8.7					
		5,100		76x219				0.052				14.2				
		7,600	76x219				0.047				16.0					
400	450	120	35x41				3.40				0.65					
		200	35x55				2.10				0.90					
		220			35x80				0.67				1.6	0.9		
		250	35x67				1.50				1.1					
		270			35x80				0.55				1.7	1.0		
		330			35x105				0.45				2.0	1.2		
		360	35x80				0.99				1.4					
		390			35x105				0.38				2.2	1.3		
		400	35x92				0.65				1.9					
		400	50x55				1.30				1.3					
		470			50x80				0.38				2.4	1.4		
		510	35x105				0.59				2.1					
		540	50x67				0.90				1.7					
		560			50x80				0.32				2.6	1.5		
		570	35x117				0.51				2.4					
		680			50x105				0.26				3.1	1.8		
		710	50x80				0.69				2.1					
		820			50x105				0.22				3.4	2.0		
		870	50x92				0.52				2.5					
		1,000	50x105		63x105		0.40		0.18		3.1		4.1	2.4		
		1,200	50x117				0.35				3.5					
		1,200	63x80		63x105		0.41		0.15		3.0		4.5	2.6		
		1,300	50x143				0.31				4.1					
		1,500	63x92		63x117		0.28		0.12		3.9		5.4	3.1		
		1,800	63x105		76x105		0.23		0.13		4.5		5.5	3.2		
		1,900	76x80				0.24				4.5					
		2,000	63x117				0.22				5.1					
		2,200	63x130		76x117		0.21		0.10		5.3		6.4	3.7		
		2,200	63x143				0.19				5.8					
		2,300	76x92				0.20				5.3					
		2,700			76x143				0.082				7.5	4.3		
		2,800	76x105				0.17				6.1					
		3,200	76x117				0.15				6.7					
		3,400	76x130				0.15				7.0					
		5,400	76x219				0.077				12.5					
450	500	75	35x41				5.00				0.53					
		80		35x55				2.80				0.64				
		120	35x55				3.20				0.74					
		160	35x67	35x80			2.30	1.40			0.92	1.1				
		220	35x80				1.50				1.2					
		230		35x105				0.93				1.5				
		250	35x92				1.10				1.5					
		270	50x55				1.80				1.1					
		320	35x105				0.90				1.7					
		350		35x143				0.60				2.0				
		360	35x117				0.84				1.8					
		360	50x67				1.40				1.4					

STANDARD RATINGS

Note: Case Code does not indicate actual size. Refer to Case Size Table.

Rated Voltage (V)	Surge Voltage (V)	Capacitance (μF)	Case Code (See Note) (mm)				Maximum ESR (Ω) at 20°C 120Hz				Maximum Ripple Current					Maximum Impedance (Ω) at 20°C 20KHz
											(A rms) at 65°C 120Hz	(A rms) at 65°C 120Hz	(A rms) at 85°C 120Hz	(A rms) at 105°C 120Hz	(A rms) at 85°C 20KHz	
			MWU	UW	KMU	KWU	MWU	UW	KMU	KWU	MWU	UW	KMU	KMU	KWU	KWU
450	500	380		50x80				0.88				1.7				
		410	35x130				0.77				2.0					
		450	35x143				0.72				2.2					
		480	50x80				0.99				1.7					
		540		50x105				0.60				2.2				
		590	50x92				0.68				2.2					
		720	50x105				0.58				2.6					
		800		50x143				0.40				3.2				
		810	50x117				0.50				2.9					
		860	63x80				0.60				2.5					
		930		63x105				0.36				3.5				
		950	50x130				0.50				3.0					
		1,000	50x143				0.45				3.4					
		1,000	63x92				0.41				3.3					
		1,100	76x80				0.35				3.7					
		1,300	63x105	63x143			0.34	0.24			3.8	4.8				
		1,400	63x117				0.34				4.0					
		1,400	76x92				0.28				4.4					
		1,700	63x130				0.31				4.5					
		1,700	76x105				0.24				5.0					
		1,800	63x143				0.27				4.9					
		2,000	76x117	76x143			0.23	0.17			5.5	6.5				
		2,300	76x130				0.21				5.9					
		2,500	76x143				0.19				6.4					
		3,100		76x219				0.11				10.2				
		4,200	76x219				0.099				10.9					

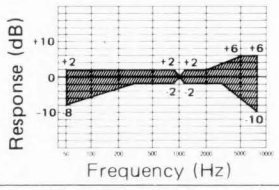
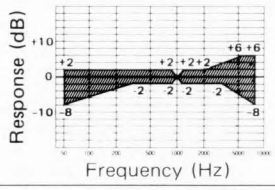
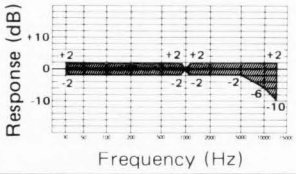
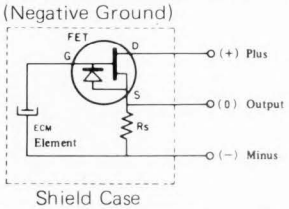
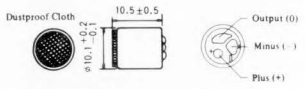
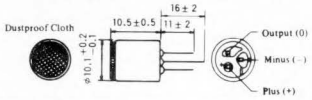
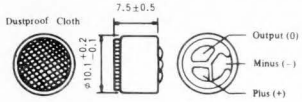
ELECTRET CONDENSER MICROPHONE UNITS

We are producing OMNI-DIRECTIONAL and UNI-DIRECTIONAL. Their sizes are so small that they are used as a built-in microphone for cassette tape recorders, transceiver, 8 mm movie camera recording part, TV camera, telephone equipment, and so forth. The newest type EBM-5, which has 5 mm in diameter, is available at request. Our electret condenser microphone units have the following characteristics.

- Since the vibrating diaphragm is extremely light, it can detect high-frequency sound waves with fidelity.
- The charged density in our unit is high so the unit has high sensitivity.
- The sound equipment can be designed at minimized size without degrading sensitivity.
- Out unit is light and solid so that it shows a good mechanical shock resistance.

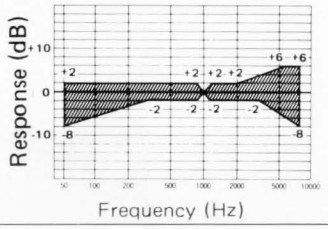
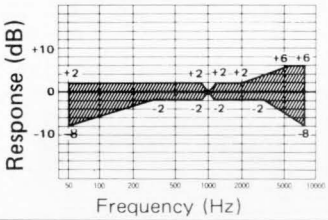
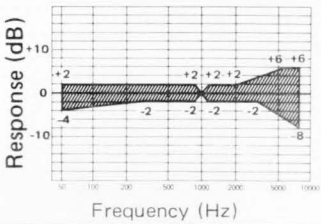
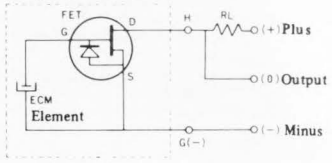
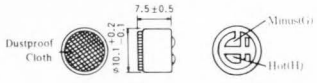
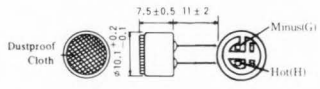
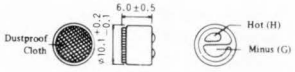
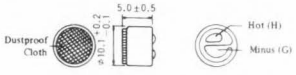
CHARACTERISTICS

OMNI-DIRECTIONAL

	ERM-10	EPM-10	EFM-10
Appearance			
Sensitivity	A: -70±3dB B: -65±3dB C: -60±3dB (0dB=1V/μ bar at open circuit voltage of 1 kHz)	A: -70±3dB B: -65±3dB C: -60±3dB (0dB=1V/μ br at open circuit voltage of 1kHz)	B: -65dB±3.0dB B1: -63dB±1.5dB B2: -66dB±1.5dB (0dB=1V/μ bar at open circuit voltage of 1kHz)
Output impedance	1kΩ max.		
Frequency characteristics			
Operating voltage range	1.5 ~ 10V (Standard operating voltage: 4.5V)		
Consumption of current	1.0mA max.		
Maximum sound pressure level	130dB max.		
Operating temperature range	-20 ~ +60°C		
Storage temperature range	-40 ~ +60°C		
Self-noise level	35dB SPL max. (Weighted A curve)		
S/N ratio	40dB min. (Weighted A Curve)		
Electrical circuit	(Negative Ground)  Shield Case		
Dimensions	1. P.C. board terminal type (P type) (Unit: mm)  2. Lead wire terminal type (L type) (Unit: mm) 	P.C. board terminal type (P type) (Unit: mm) 	
How to order	ERM-10 — P — A Style — Type — Sensitivity	EPM-10 — P — A Style — Type — Sensitivity	EFM-10 — P — B1 Style — Type — Sensitivity

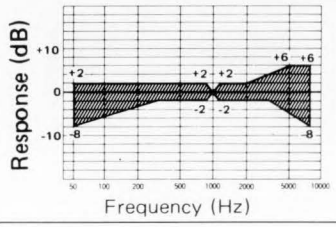
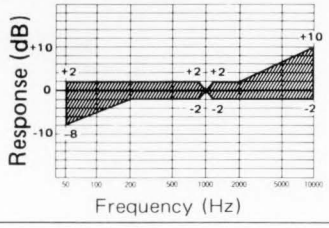
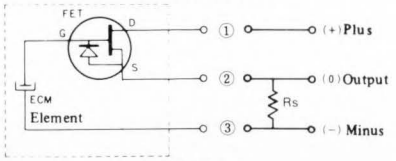
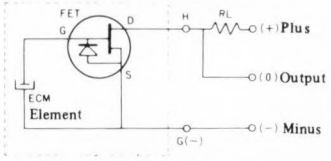
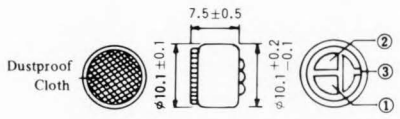
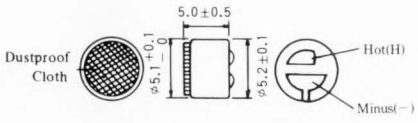
Specifications subject to change without notice.

OMNI-DIRECTIONAL

	EQM-10	ESM-10	EBM-10
Appearance			
Sensitivity	B: -65±4dB (0dB=1V/μ bar 1kHz RL= 1kΩ)	B: -65±4dB (0dB=1V/μ bar 1kHz RL=680Ω)	B: -65±3dB (0dB=1V/μ bar 1kHz RL=1kΩ)
Output impedance	1kΩ ±30% (RL=1kΩ)	600Ω ±30% (RL=680Ω)	1kΩ ±30% (RL=1kΩ)
Frequency characteristics	 Frequency (Hz)	 Frequency (Hz)	 Frequency (Hz)
Operating voltage range	1.5 ~ 10V (Standard operating voltage: 4.5V)		
Consumption of current	1.0mA max.		
Maximum sound pressure level	120dB max.		
Operating temperature range	-20 ~ +70°C		
Storage temperature range	-40 ~ +70°C		
Self-noise level	36dB SPL max. (Weighted A curve)		
S/N ratio	40dB min. (Weighted A curve)		
Electrical circuit	(Negative Ground)  Shield Case		
Dimensions	1. P.C. board terminal type (P type) (Unit: mm)  2. Lead wire terminal type (L type) 	P.C. board terminal type (P type) (Unit: mm) 	P.C. board terminal type (P type) (Unit: mm) 
How to order	EQM-10 / Style — P / Type — B / Sensitivity	ESM-10 / Style — P / Type — B / Sensitivity	EBM-10 / Style — P / Type — B / Sensitivity

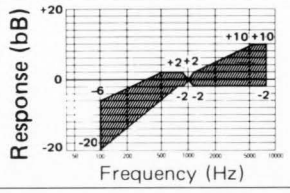
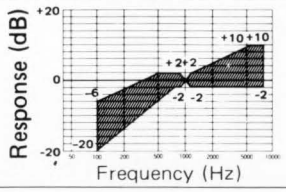
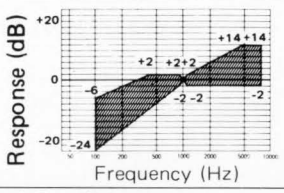
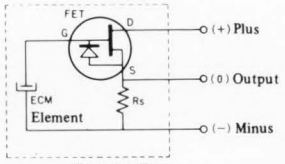
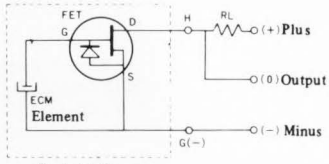
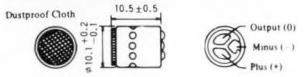
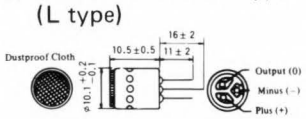
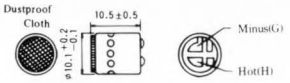
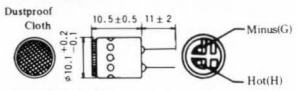
Specifications subject to change without notice.

OMNI-DIRECTIONAL

	EDM-10	EBM-5
Appearance		
Sensitivity	A: -70±3dB B: -65±4dB C: -60±3dB (0dB=1V/μ bar 1kHz RS=2.2kΩ)	A: -70±3dB B: -65±4dB C: -60±3dB (0dB=1V/μ bar 1kHz RL=2.2kΩ)
Output impedance	1kΩ max. (RS=2.2kΩ)	1.8kΩ ±30% (RL=2.2kΩ)
Frequency characteristics		
Operating voltage range	1.5 ~ 10V (Standard operating voltage: 4.5V)	1.5 ~ 8V (Standard operating voltage 3V)
Consumption of current	1.0mA max.	0.8mA max.
Maximum sound pressure level	130dB SPL max.	
Operating temperature range	-20 ~ +60°C	-20 ~ +70°C
Storage temperature range	-40 ~ +60°C	-40 ~ +70°C
Self-noise level	35dB SPL max. (Weighted A curve)	38dB SPL max. (Weighted A curve)
S/N ratio	40dB min (Weighted A curve)	36dB min. (Weighted A curve)
Electrical circuit	(Negative Ground)  Shield Case	(Negative Ground)  Shield Case
Dimensions	P.C. board terminal type (P type) (Unit: mm) 	P.C. board terminal type (P type) (Unit: mm) 
How to order	EDM-10 (Style) – P (Type) – B (Sensitivity)	EBM-5 (Style) – P (Type) – B (Sensitivity)

Specifications subject to change without notice.

UNI – DIRECTIONAL

	EUM-10	EVM-10	EVM-5
Appearance			
Sensitivity	A: -72±4dB (0dB= 1V/μ bar at open circuit voltage of 1kHz)	B: -65±4dB (0dB=1V/μ bar 1kHz RL=1.5kΩ)	A: -72±4dB (0dB=1V/μ bar 1kHz RL=3.3kΩ)
Output impedance	1kΩ max.	1kΩ ±30% (RL=1.5kΩ)	1.8kΩ ±30% (RL=3.3kΩ)
Frequency characteristics			
Operating voltage range	1.5 ~ 10V (Standard operating voltage: 4.5V)		1.5 ~ 8V (Standard operating voltage : 3V)
Consumption of current	1.0mA max.	1.0mA max.	0.8mA max.
Maximum sound pressure level	130dB max.	120dB max.	130dB max.
Operating temperature range	0 ~ +50°C		0 ~ +60°C
Storage temperature range	-40 ~ +50°C		-40 ~ +70°C
Self-noise level	45dB SPL max. (Weighted A Curve)	36dB SPL max. (Weighted A Curve)	45dB SPL max. (Weighted A Curve)
S/N ratio	29dB min. (Weighted curve)	40dB min. (Weighted A curve)	29dB min. (Weighted A curve)
Electrical circuit	(Negative Ground) 	(Negative Ground) 	
Dimensions	1. P.C. board terminal type (P type) (Unit: mm)  2. Lead wire terminal type (L type) 	1. P.C. board terminal type (P type) (Unit: mm)  2. Lead wire terminal type (L type) 	P.C. board terminal type (P type) (Unit: mm) 
How to order	EUM-10 / Style – P / Type – A / Sensitivity	EVM-10 / Style – P / Type – B / Sensitivity	EVM-5 / Style – P / Type – A / Sensitivity

♦ NOTES WHEN USING ELECTRET CONDENSER MICROPHONE UNITS

1. Water and solvent.
   Electried film has the property of distinguishing electric charges when it touches water and solvents.
2. Lead wire soldering on p.c. board (Non-Directional)
   If a lead wire hole is not covered with solder, a microphone may pick up mechanical or vibration noises from the back, its sensitivity may be deteriorated at low frequency.
3. Protection against static electricity.
   Please pay attention to the protection of static electricity, as a junction gate FET is mounted inside microphone units.

TANTALUM FOIL DRY ELECTROLYTIC CAPACITORS

TFJ: Plain Foil, Axial Lead Type
TFL: Plain Foil, Single Ended Type
TFR: Etched Foil, Axial Lead Type
TFS: Etched Foil, Single Ended Type

The tantalum foil electrolytic capacitor is provided with a chemically stable tantalum oxide film in its dielectric, uses a high-performance electrolyte which Nippon Chemi-Con has developed and features high efficiency, long life and high reliability. Because of its winding type, it is possible to manufacture a large-capacitance, bipolar capacitor, which has been difficult to attain by conventional solid tantalum capacitors.

The working voltage range is extended to 160V. To meet various requirements, the following tantalum foil capacitors are manufactured: plain foil TFJ, TFL types, and small-sized, low cost TFR, TFS types which use high-magnification etched foil. The tantalum foil capacitor for use at a temperature of 125°C is available upon request.

Meanwhile, these capacitors have withstood the quality test conducted by the Japan Defense Agency in accordance with MIL C3965C.

The operating temperature range: −55°C to +85°C

CASE SIZE OF STANDARD PRODUCTS

(TFJ: Plain Foil, Axial Lead)

μF \ V	3	6	10	15	25	35	50	70	100	150
0.33										E1
0.47									E1	E2
0.68								E1	E2	E3
1.0						E1	E1	E2	E3	E4
1.5					E1	E2	E2	E3	E4	E4
2.2				E1	E2	E2	E3	E4	E4	E5
3.3			E1	E2	E2	E3	E4	E4	E5	E6
4.7		E1	E2	E2	E3	E4	E4	E5	E6	E6
6.8	E1	E2	E3	E3	E4	E4	E5	E6	E6	E7
10	E2	E3	E4	E4	E5	E5	E6	E6	E7	E8
15	E3	E4	E4	E5	E6	E6	E6	E7	E8	E8
22	E4	E4	E5	E6	E6	E6	E7	E8	E8	E9
33	E4	E5	E6	E6	E7	E7	E8	E8	E9	
47	E5	E6	E6	E7	E8	E8	E8	E9		
68	E6	E6	E7	E8	E8	E8	E9			
100	E6	E7	E8	E8	E9					
150	E7	E8	E8	E9						
200	E8	E8	E9							
330	E8	E9								
470	E9	E9								

(TFL: Plain Foil, Radial Lead)

μF \ V	3	6	10	15	25	35	50	70	100	150
0.33										V2
0.47										V2
0.68									V2	V5
1.0								V2		V5
1.5							V2			V5
2.2						V2				V5
3.3					V2				V5	V6
4.7			V2	V2				V2	V6	
6.8		V2					V5	V6		
10	V2				V5	V5	V6			
15				V5		V6				
22			V5		V6					
33		V5		V6						
47	V5		V6							
68		V6								
100	V6									

(TFR: Etched Foil, Axial Lead)

μF \ V	16	25	31.5	50	63	100	160
1.0						E1	E2
2.2					E1	E2	E4
4.7				E1	E2	E3	E5
10		E1	E1	E2	E3	E4	E6
22	E1	E2	E2	E4	E4	E6	E8
47	E2	E4	E4	E5	E6	E7	
100	E4	E5	E6	E7	E7		
220	E6	E6	E7				
470	E7						

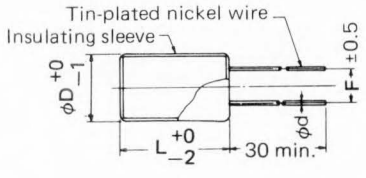
(TFS: Etched Foil, Radial Lead)

μF \ V	16	25	31.5	50	63	100	160
1.0							V2
2.2						V2	V5
4.7					V2	V5	V5
10				V2	V5	V5	
22		V2	V2	V5			
47	V2	V5					

DIMENSIONS WITH CASE CODE, TFL/TFS and TFJ/TFR

(TFL/TFS)

(Unit: mm)

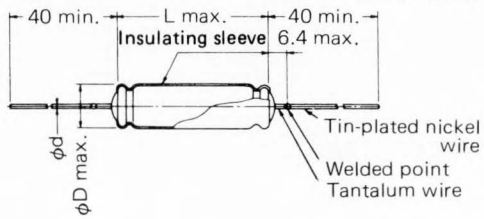


Unit (mm)

Case Code	External Dimensions		Lead Diameter	Lead Spacing
	D	L	φd	F
V2	6.5	13	0.6	2.5
V5	8.5	19	0.6	2.5
V6	10.5	23	0.6	4.0

(TFJ/TFR)

(Unit: mm)



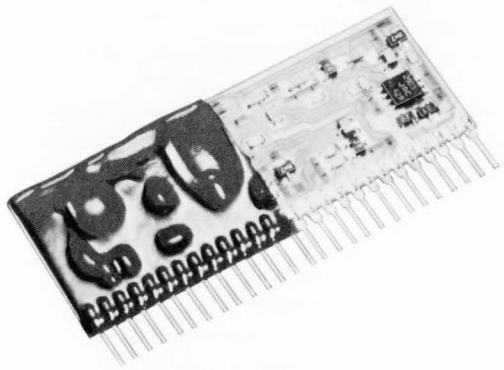
Unit (mm)

Case Code	Dimensions of Metal Case		Lead Diameter
	D	L	φd
E1	5.0	16	0.5
E2	5.0	20	0.5
E3	5.0	25	0.5
E4	7.5	20	0.6
E5	7.5	25	0.6
E6	7.5	37.5	0.6
E7	10.0	37.5	0.6
E8	10.0	56	0.6
E9	10.0	71	0.6

Specifications subject to change without notice.

CUSTOM THICK FILM HYBRID Circuit

Recent advances in electronics technology have made possible the construction of more compact and utilized pieces of equipment.
Especially of note in this miniaturizing process for integrated systems are custom designed Hybrid Circuits.
Nippon Chemi-Con has now entered the field of high reliability Hybrid Circuit assembly using noble metals and fine ceramic circuits. The Hybrid Circuit is the perfect solution for high capability, high density circuits in applications for office and factory automation or communication systems.



TYPICAL APPLICATIONS

- OA·FA equipment.
- Control circuits for Power Supply.
- Circuits for telecommunications.
- Automotive electronics.
- Consumer electronic equipment.
- Automatic control circuits.
- Circuits for measuring instruments.
- Circuits for medical equipment.

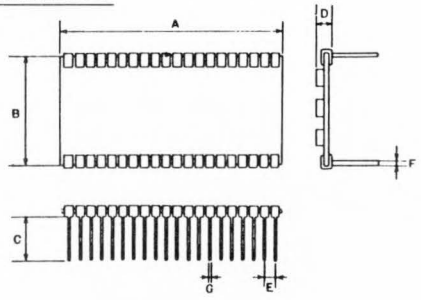
MOUNTED COMPONENTS TABLES

Item	Elements	Details and Standards	
Active Components	Transistors	Miniature mold type, Power miniature mold type, Bare chip type	
	Diodes	"	
	Bipolar IC	Flat package type, Bare chip type	
	MOS IC	"	
	Memory IC	"	
Passive Components	Thick film resistors	Resistance range	5 ~ 10MΩ
		Temperature coefficient	100 ~ 250 ppm/°C
		Tolerance	±1 ~ ±30%
	Ceramic capacitors	Capacitance range	1.0pF ~ 2.2μF
		Tolerance	±10%, ±20%, $^{+80}_{-20}$%
	Tantalum capacitors	Capacitance range	0.1μF ~ 100μF
		Tolerance	±20%
	Inductor	Inductance	1μH ~ 10mH
	Conductors	Materials	Ag-Pd paste, Au paste
	Circuit substrate	Type	Ceramic substrate, Printed circuit board, Ceramic substrate with heat-sink.

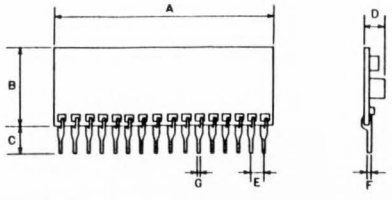
- Other kinds of mounting components are available upon request.
- Double-faced mounting and multilayer circuits boards are also available.

STANDARD PACKAGE SAMPLES

- Dual-in-line package



- Single-in-line package



Measure of package (Unit: mm)

A	12.5(MIN) ~ 76.2(MAX)
B	8(MIN) ~ 76.2(MAX)
C	5 ~ 14
D	Depends on mounted components.
E	1.27 ~ 2.54
F	0.25
G	0.50

- Order made packages are also available upon request.

TONE ARMS, PRECISION MECHANICAL PARTS AND UNITS

Nippon Chemi-Con has produced various types of precision mechanical parts by means of precision processing technology utilized by our manufacturing subsidiaries of audio tone-arms, and the latest precision processing machinery and measuring equipment.
At present, we have actually supplied tone-arms and their parts, precision mechanical parts for VTR and special connectors in accordance with customers requirements.

- Precision mechanical parts for VTR
- Tone-arms for audio record player
- Precision mechanical parts for audio record player
- Special connectors and their assembly units
- Disc pully for compact disc player
- Tape guide roller for VTR
- Precision die cast parts

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