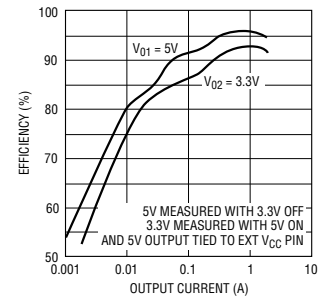


Multiple Output Main DC/DC Converters

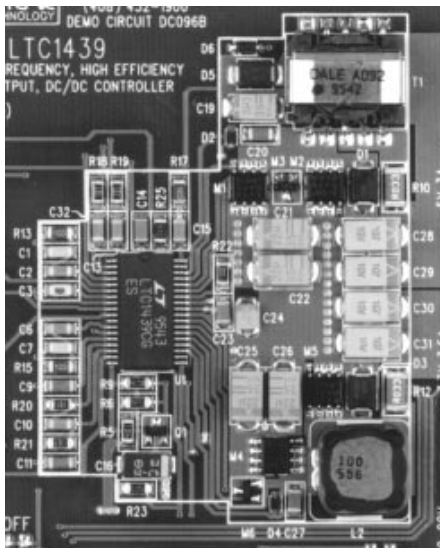
LTC1438/LTC1439: Dual, Low Noise, Synchronous Step-Down DC/DC Converters

- Maintains Constant Frequency at Low Output Currents
- Dual N-Channel MOSFET Synchronous Drive
- Programmable Fixed Frequency (PLL Lockable)
- Wide V_{IN} Range: 3.5V to 36V Operation
- Very Low Dropout Operation: 99% Duty Cycle
- Low Dropout, 0.5A Linear Regulator for VPP Generation or Low Noise Audio Supply
- Built-in Power-On Reset Timer
- Programmable Soft Start
- Low-Battery Detector
- Remote Output Voltage Sense
- Pin Selectable Output Voltage
- Logic Controlled Micropower Shutdown: $I_Q < 25\mu A$
- Available in 28- and 36-Lead SSOP Packages
- Up to Four Outputs Possible Including 2.9V at 1A

Efficiency vs Output Current

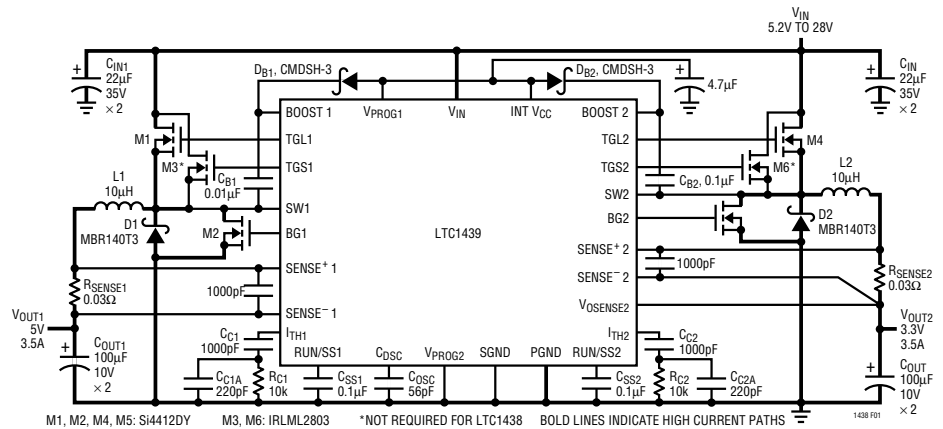


5V/3A, 3.3V/5A, 12V/120mA Evaluation Board



Actual Size

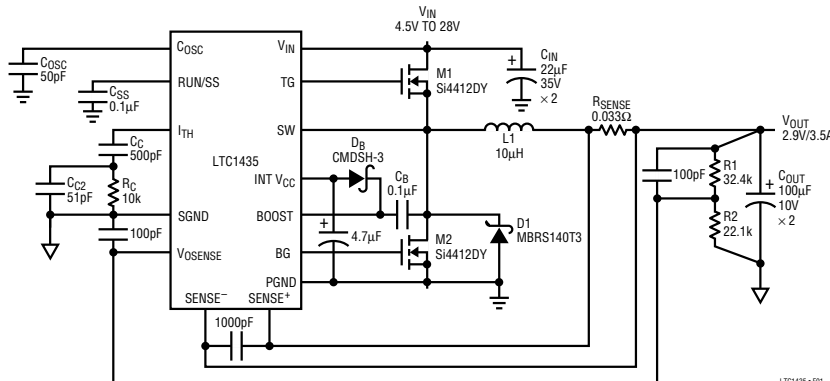
High Efficiency Dual 5V/3V Step-Down Converter



High Current Single Output DC/DC Converters

LTC1435/LTC1436/LTC1436-PLL/LTC1437: High Efficiency Low Noise Synchronous Step-Down Switching Regulators

High Efficiency 2.9V/3.5A Step-Down Converter



- Maintains Constant Frequency at Low Output Currents
- Dual N-Channel MOSFET Synchronous Drive
- Programmable Fixed Frequency (PLL Lockable)
- Wide V_{IN} Range: 3.5V to 36V Operation
- Very Low Dropout Operation: 99% Duty Cycle
- Low Dropout 0.5A Linear Regulator for VPP Generation or Lower Noise Audio Supply (Except LTC1435)
- Built-In Power-On Reset Timer
- Programmable Soft Start
- Low-Battery Detector
- Remote Output Voltage Sense
- Pin Selectable Output Voltage
- Logic Controlled Micropower Shutdown: $I_Q < 25\mu A$
- Available in 24- and 28-Lead QSOP/SSOP Packages
- 16-Pin SO Package (LTC1435)

Choose the Right DC/DC Converter for Your Portable

CHARACTERISTICS	LTC1435	LTC1436	LTC1436-PLL	LTC1437	LTC1438 LTC1438-ADJ	LTC1438X	LTC1439	LTC1538-AUX	LTC1539
Number of Controllers	Single	Single	Single	Single	Dual	Dual	Dual	Dual	Dual
Constant Frequency	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auxiliary Linear Reg Controller	—	✓	✓	✓	—	—	✓	✓	✓
Power-On Reset	—	✓	✓	✓	✓	—	✓	—	✓
Secondary Feedback Control	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low-Battery Comparator	—	✓	—	✓	✓	✓	✓	✓	✓
Synchronization	—	—	✓	✓	—	—	✓	—	✓
Maximum Input Voltage	36V	36V	36V	36V	36V	36V	36V	36V	36V
Industrial Temperature	✓	✓	✓	—	✓	—	✓	✓	✓
5V Keep Alive in SHDN	—	—	—	—	—	—	—	✓	✓
Quiescent Current	260µA	260µA	260µA	260µA	320µA	320µA	320µA	320µA	320µA
Efficiency	> 90%	> 90%	> 90%	> 90%	> 90%	> 90%	> 90%	> 90%	> 90%
Packaging	16-SSOP 16-SO	24-SSOP	24-SSOP	28-SSOP	28-SSOP	28-SSOP	36-SSOP	28-SSOP	36-SSOP

Battery Charging

LT1510/LT1511/LT1512/LT1513: Constant-Voltage/Constant-Current Battery Chargers

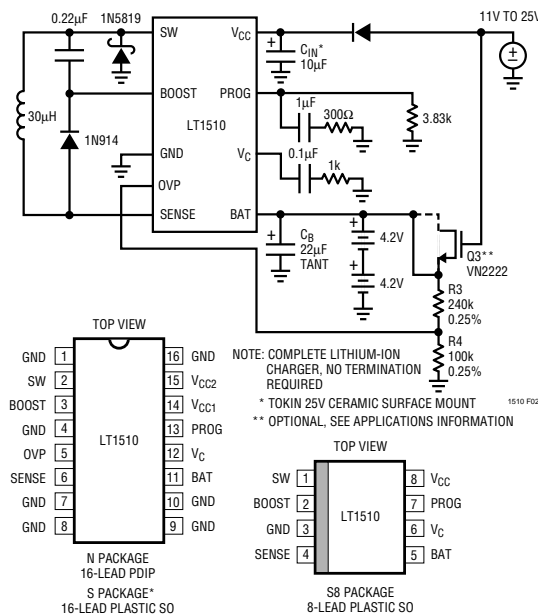
- Charge Li-Ion, NiCd, NiMH: Only One Resistor Required to Program Charging Current
- Surface Mount Packages
- LT1510:
 - 1.5A Step-Down Topology
 - 0.5% Voltage Accuracy
 - 5% Full-Charging Current Accuracy with Internal Sense Resistor
 - 8-Lead and 16-Lead Narrow SO Packages
 - (+) or (–) Terminal Battery Current Sensing
- LT1511:
 - 3A Step-Down Topology
 - AC Adaptor Current Limit Maximizes Available Power
 - Otherwise Similar to LT1510

- LT1512/LT1513:
 - SEPIC Topology
 - V_{IN} Can Be Higher or Lower than Battery
 - 500kHz, 1.5A Switch (LT1512) 3A Switch (LT1513)
 - Charges Any Number of Cells Up to 20V

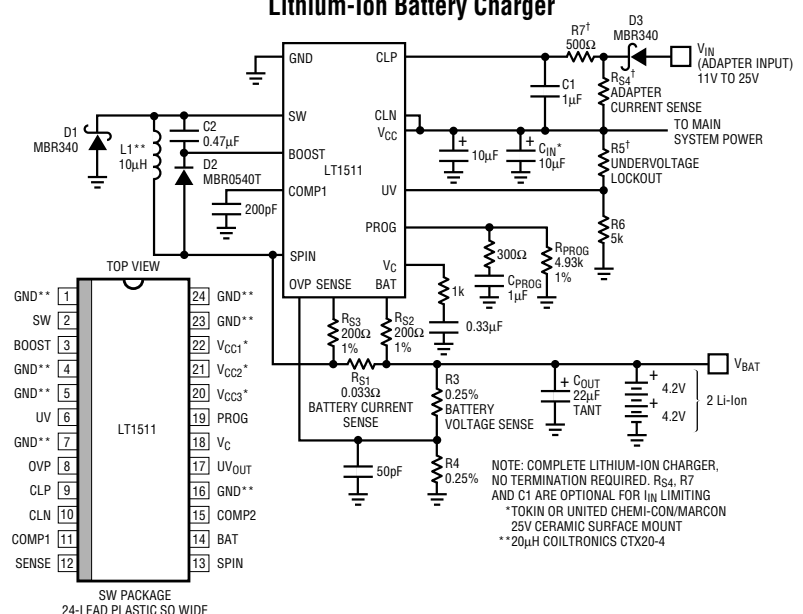
Battery Charger Selection Guide

Characteristics	LT1510CS8	LT1510	LT1511	LT1512	LT1513
Maximum Charging Current	1.2A	1.5A	3A	1A	2A
Charges Li-Ion Cells	✓	✓	✓	✓	✓
Charges NiCd and NiMH Cells	✓	✓	✓	✓	✓
Step-Up	—	—	—	✓	✓
Step-Down	✓	✓	✓	✓	✓
V_{BAT} Maximum	20V	20V	20V	20V	20V
Up to 24V Wall Adapter	✓	✓	✓	✓	✓
Packages	8-Lead SO	16-Lead SO	24-Lead SO, 16-Lead PDIP	8-Lead SO 8-Lead PDIP	7-Lead DD

Charging Lithium-Ion Batteries (Efficiency at 1.3A > 87%)



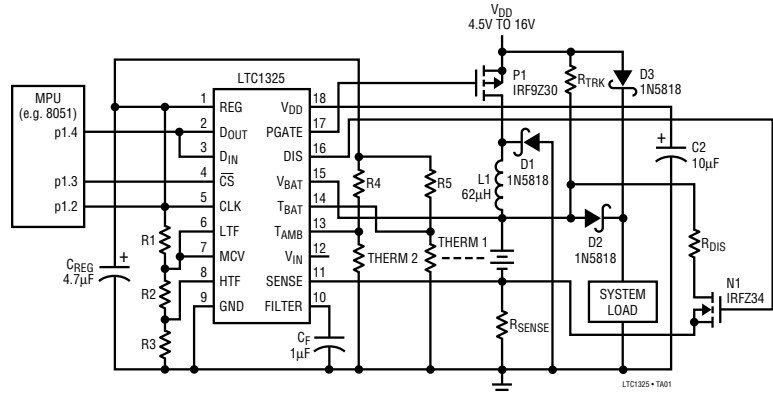
Lithium-Ion Battery Charger



LTC1325: Microprocessor-Controlled Battery Charger and Management IC

- Fast Charge Nickel-Cadmium, Nickel-Metal-Hydrate or Lead Acid Batteries under μP Control
- Accurate Gas Gauge Function
- Flexible Current Regulation:
 - Programmable 111kHz PWM Current Regulator with Built-In PFET Driver
 - PFET Current Gating for Use with External Current Regulator or Current Limited Transformer
- Discharge Mode
- Measures Battery Voltage, Battery Temperature and Ambient Temperature with Internal 10-Bit ADC
- Battery Voltage, Temperature and Charge Time Fault Protection
- Built-In Voltage Regulator and Programmable Battery Attenuator
- Easy to Use 3- or 4-Wire Serial μP Interface
- Wide Supply Range: $V_{\text{DD}} = 4.5\text{V}$ to 16V
- Digital Input Pins Are High Impedance in Shutdown Mode

Battery Charger for Up to 8 NiCd or NiMH Cells



Battery Backup

LT1304: Micropower Boost DC/DC Converter

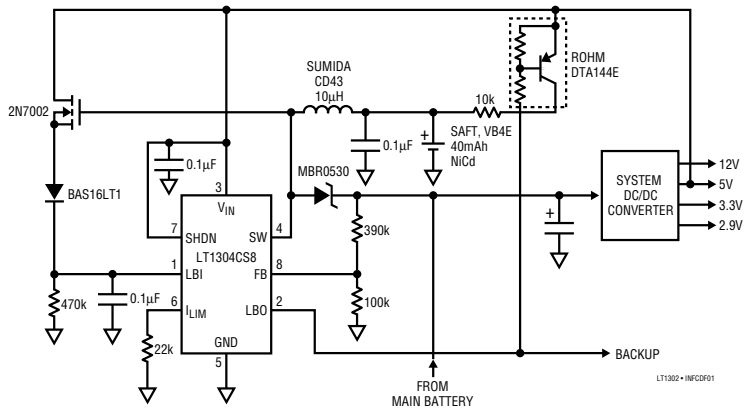
Application Circuit:

- Uses Single NiCd or NiMH Coin Cell
- Supports Notebook in Suspend During Battery Replacement
- Automatic Trickle Charge
- Backup Signal Available to Keyboard Controller
- Automatic Shutdown when Backup Battery Dead

LT1304:

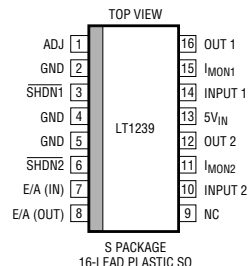
- 10 μA Quiescent Current in Shutdown
- Low-Battery Detector Active in Shutdown
- Low Switch V_{CESAT} : 370mV at 1A Typical
- 120 μA Quiescent Current in Active Mode
- Switching Frequency Up to 300kHz
- Programmable Peak Current with One Resistor
- 8-Lead SO Package

Bridge Battery DC/DC Converter

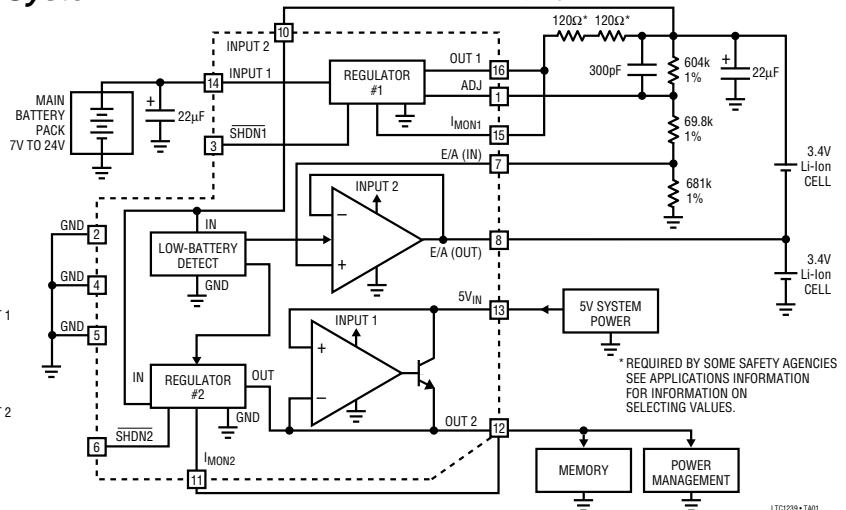


LT1239: Backup Battery Management System

- Micropower Operation ($I_{\text{Q}} = 20\mu\text{A}$)
- Adjustable Regulator for Battery Charging
- 4.85V Regulator for Battery Regulation
- Cell Voltage Equalization in 2-Cell Systems
- Low-Battery Detector Protects Li-Ion Cells
- Comparator for Automatic Power Switching
- Shutdown
- Output Current Sensing
- Current and Thermal Limiting
- Reverse Output Protection
- 16-Pin Narrow SO Package
- Operates on 7V to 30V Input



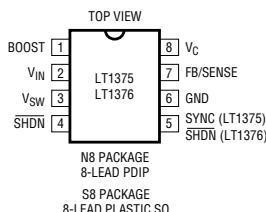
Lithium-Ion Backup System



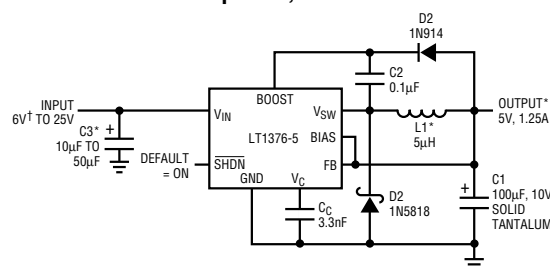
Low Noise DC Supply for Multimedia Audio Circuitry

LT1375/LT1376: 1.5A, 500kHz Step-Down Switching Regulators

- Constant 500kHz Switching Frequency
- Easily Synchronizable
- Uses All Surface Mount Components
- Inductor Size Reduced to 5 μ H
- Saturating Switch Design: 0.4 Ω
- Effective Supply Current: 2.5mA
- Shutdown Current: 20 μ A
- Cycle-by-Cycle Current Limiting



Simple 5V, 1.25A Buck Converter



* RIPPLE CURRENT $\geq I_{OUT}/2$
 ** INCREASE L1 TO 10 μ H FOR LOAD CURRENTS ABOVE 0.6A AND TO 20 μ H ABOVE 1A
 † FOR INPUT VOLTAGE BELOW 7.5V, SOME RESTRICTIONS MAY APPLY.
 SEE APPLICATIONS INFORMATION.

1375/76 TAD1

LCD Display Backlight and Contrast

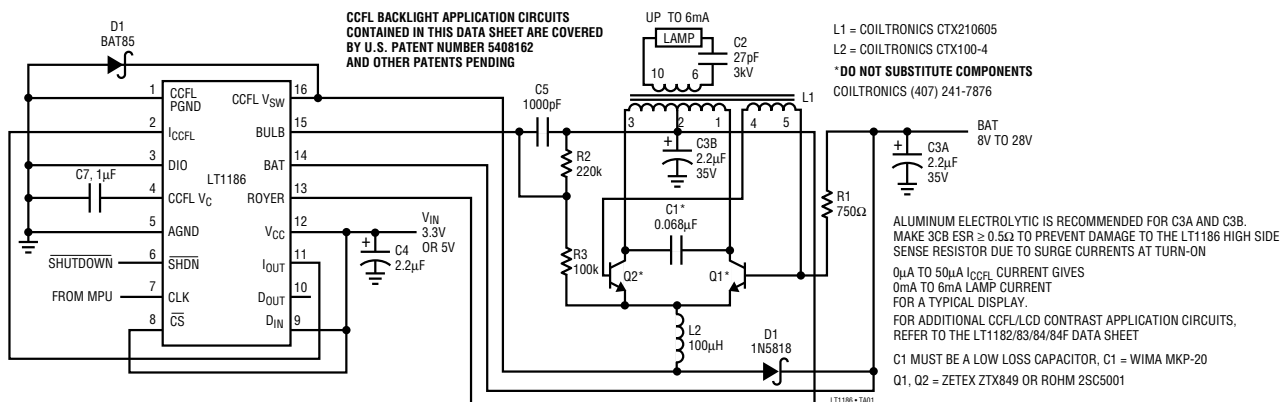
LT1186: CCFL Inverter with Digital Brightness Control

- Wide Battery Input Range: 4.5V to 30V
- Grounded Lamp or Floating Lamp Configurations
- Open Lamp Protection
- Precision 50 μ A Full-Scale DAC Programming Current
- Standard SPI Mode or Pulse Mode
- DAC Setting Is Retained in Shutdown

Choose the Right LCD Illumination Supply

Characteristics	LT1182	LT1183	LT1184	LT1184F	LT1186
Floating or Grounded Bulb	F or G	F or G	G	F	F or G
LCD Contrast Supply	✓	✓	✓	✓	✓
Dedicated CCFL IC	✓	✓	✓	✓	✓
LCD Reference Pinned Out	✓	✓	N/A	N/A	N/A
Digital Brightness Controller	✓	✓	✓	✓	✓

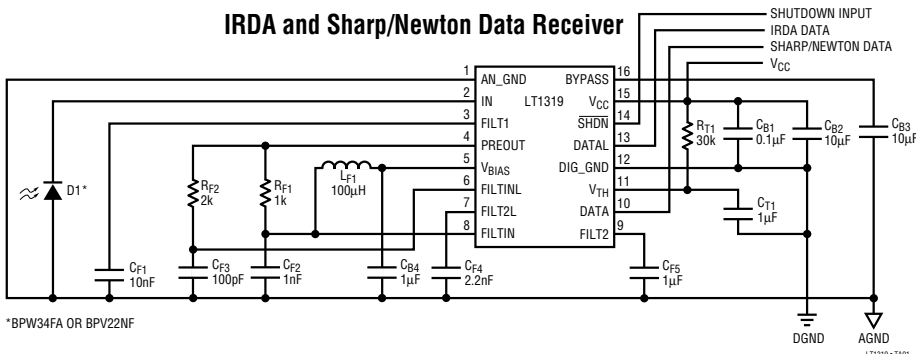
90% Efficient CCFL with Single Wire (Increment Only) Pulse Mode Control of Lamp Current



Infrared Data Receiver

LT1319: Multiple Modulation Standard IR Receiver

IRDA and Sharp/Newton Data Receiver



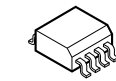
- Receives Multiple IR Modulation Methods: IRDA SIR, FIR, Sharp/Newton, Others
- Low Noise, High Speed Preamp: 2pA/ $\sqrt{\text{Hz}}$, 7MHz
- Low Frequency Ambient Rejection Loops
- Dual Gain Channels: 8MHz, 400V/V
- 25ns and 60ns Comparators
- 16-Lead SO Package
- 5V Single Supply Operation
- Supply Current: 14mA
- Shutdown Supply Current: 500 μ A
- External Comparator Threshold Setting

PC Card Host Power Interface

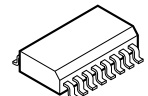
Linear Technology PCMCIA Product Family

DEVICE	DESCRIPTION	PACKAGE
LT1312	Single PCMCIA VPP Driver/Regulator	8-Pin SO
LT1313	Dual PCMCIA VPP Driver/Regulator	16-Pin SO*
LTC1314	Single PCMCIA Switch Matrix	14-Pin SO
LTC1315	Dual PCMCIA Switch Matrix	24-Pin SSOP
LTC1470	Protected V_{CC} 5V/3.3V Switch Matrix	8-Pin SO
LTC1471	Dual Protected V_{CC} 5V/3.3V Switch Matrix	16-Pin SO*
LTC1472	Protected V_{CC} and VPP Switch Matrix	16-Pin SO*

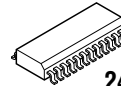
*Narrow Body



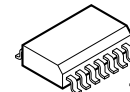
8-Lead SO



16-Lead SO
(Narrow Body)



24-Lead SSOP



14-Lead SO

(Packages Enlarged for Clarity)

Complete RS232 PC Serial Ports: 3 Drivers, 5 Receivers

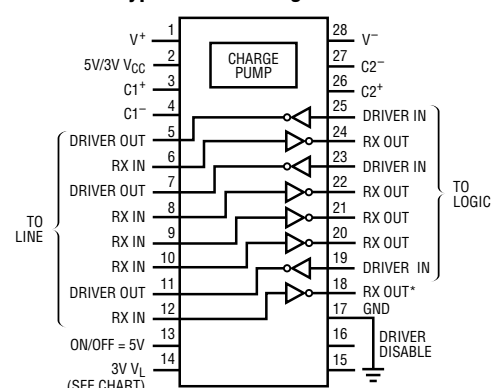
- ±15kVESD Protection (LT1137A)
- ±10kV ESD Protection (All Others)
- 3V Logic Compatible
- Receiver Keep-Alive in Shutdown
- SO and SSOP Packages
- Ultralow Power (LTC1337: 1.5mW)
- Flowthrough Architecture
- 0.1μF Capacitors
- Low Power Shutdown
- 120kBd Operation
- Capable of Mouse Driving
- 3.3V or 5V Powered

SUPPLY VOLTAGE	3V OR 5V LOGIC	TYP POWER DISS(mW)	Rx ACTIVE IN SHDN	I _Q IN SHDN (μA)	DRIVER DISABLE	10kV ESD	0.1μF CAPS	DEVICE TYPE
5	5	60	0	1	X	15kV	X	LT1137A
5	5	30	1	60	X	X	X*	LT1237
3	3	1.5	0	1	—	X	X	LTC1327
5 & 3	3	30	1	60	X	X	X*	LT1330
3	3	42	1	60	X	X	X	LT1331
5 & 3	3	34	1	60	X	X	X*	LT1331
3	3	1.5	1	70	—	X	X	LT1332**
5	5	1.5	0	1	—	X	X	LTC1337
5	5	60	1	60	X	X	X	LT1341
5 & 3	3	60	0	1	X	X	X	LT1342
5	5	1.5	5	80	—	X	X	LTC1347
3	3	1.5	0 or 5	0.2 or 10	—	X	X	LTC1348
5	5	1.5	2	35	—	X	X	LTC1349
3	3	1.5	2	35	—	X	X	LTC1350

*Requires one 1μF capacitor

** Works with switching power supply to generate full RS232 output levels from 3V supplies

Typical Pin Configuration†



* REMAINS ALIVE IN SHUTDOWN DEPENDING ON PART TYPE

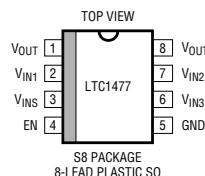
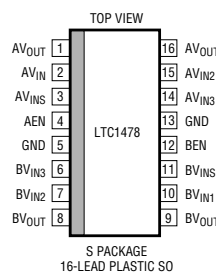
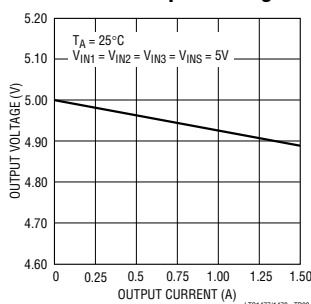
† EXCEPT LT1332 AND LTC1348

Protected Switches for Power Management

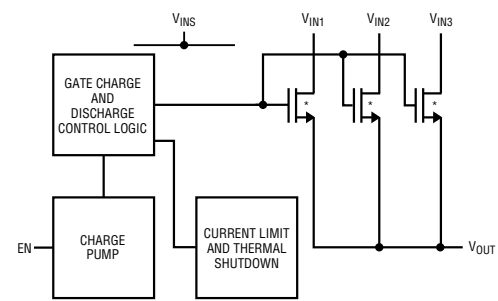
LTC1477/LTC1478: Single/Dual Protected High Side Switches

- Extremely Low $R_{DS(ON)}$ Switch: 0.07Ω
- No Parasitic Body Diode
- Built-In Short-Circuit Protection: 2A
- Built-In Thermal Overload Protection
- Operates from 2.7V to 5.5V
- Inrush Current Limited
- Ultralow Standby Current: 0.01μA
- Built-In Charge Pump
- Controlled Rise and Fall Times: $t_r = 1ms$
- Single Switch in 8-Pin SO Package
- Dual Switch in Narrow 16-Pin SO Package

Switch Output Voltage



LTC1477 Block Diagram



*NMOS SWITCHES WITH NO PARASITIC BODY DIODES

LTC1477/LTC1478 • T401