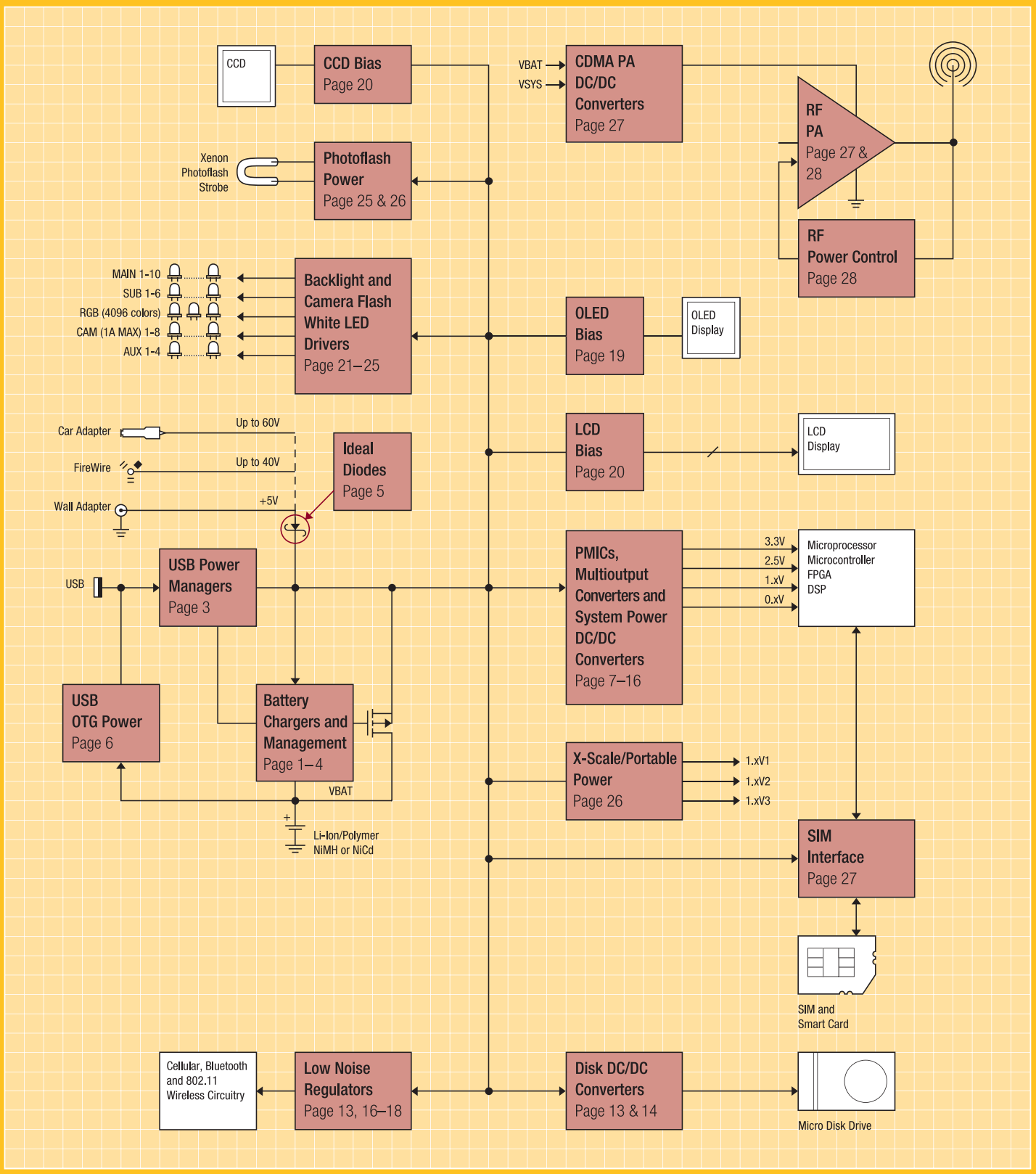
VOL 3

Power Management for Portable Products

High Performance Analog ICs

LINEAR TECHNOLOGY

Power Management for Portable Products



Today's handheld products require extremely small and low profile power management solutions. Consumers expect long battery life, so maximum efficiency is essential. Sensitive wireless receivers in close proximity to switching regulators pose potential interference issues.

Linear Technology's high performance analog ICs provide efficient system solutions for battery charging and management, USB support, system power regulation, display drivers, LED drivers, SIM and Smart Card interface, photoflash power and RF PA power supply and control.

This selection guide features recommended Linear Technology solutions for a wide range of portable electronics functions.

For information on our latest products, visit our website at **www.linear.com**

Linear Battery Chargers

LTC®4095: USB Li-Ion/Polymer Battery Charger in 2mm × 2mm DFN

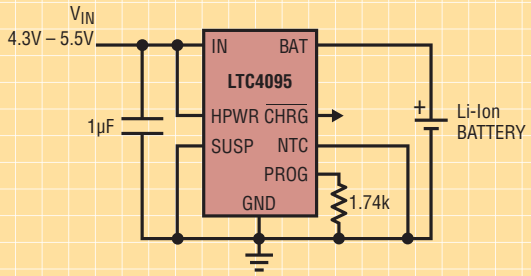
LTC4075HVX: High Voltage Dual Input Li-Ion/Polymer Battery Charger

We manufacture a comprehensive line of high performance battery chargers for any rechargeable battery chemistry, including Lithium-Ion, Lithium-Polymer, Lead Acid and Nickel-Based. Our linear battery charger ICs are completely autonomous in operation and offer many standard features for battery safety and management, including on-chip battery pre-conditioning, status signaling, thermal regulation and NTC thermistor interface.

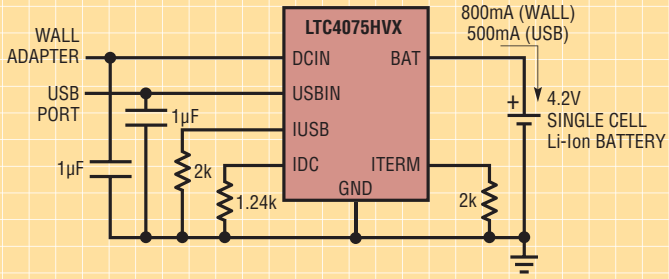
LTC4095: Actual Size, Complete Solution

LTC4075HVX: Actual Size, Complete Solution

500mA Single-Cell Li-Ion Charger



Dual Input Battery Charger for Single-Cell Li-Ion



For a more detailed review of Linear Technology's extensive portfolio of battery chargers, see the Battery Charger Solutions Brochure.

Linear Battery Chargers

Part No.	Maximum Charge Current (A)	Input Voltage (V)	Number of Cells (Series)	Cell Type	Pass Element	Charge Termination	Package
Linear Battery Chargers							
LTC4054L	0.15	4.25 to 6.5	1	Li	Internal	C/10	ThinSOT™
LTC1734L	0.18	4.55 to **8**	1	Li	External	Microcontroller	ThinSOT
LTC4065L/X	0.25	3.75 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-6
LTC4080/X*	0.5	3.75 to 5.5	1	Li	Internal	Timer + C/10	3x3 DFN-10, MSOP-10
LTC4056*	0.7	4.5 to 6.5	1	Li	External	Onboard Timer	ThinSOT
LTC1734	0.7	4.55 to **8**	1	Li	External	Microcontroller	ThinSOT
LTC4065*	0.75	3.75 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-6
LTC4065-4.4*	0.75	3.75 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-6
LTC4065A*	0.75	3.75 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-6
LTC4069*	0.75	3.75 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-6
LTC4069-4.4*	0.75	3.75 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-6
LTC4054*	0.8	4.25 to 6.5	1	Li	Internal	C/10	ThinSOT
LTC4054X*	0.8	4.25 to 6.5	1	Li	Internal	C/10	ThinSOT
LTC4057*	0.8	4.25 to 6.5	1	Li	Internal	Microcontroller	ThinSOT
LTC4059*	0.9	3.75 to **8**	1	Li	Internal	Microcontroller	2x2 DFN-6
LTC4059A*	0.9	3.75 to **8**	1	Li	Internal	Microcontroller	2x2 DFN-6
LTC4058*	0.95	4.25 to 6.5	1	Li	Internal	C/10	3x3 DFN-8
LTC4058X*	0.95	4.25 to 6.5	1	Li	Internal	C/10	3x3 DFN-8
LTC4068*	0.95	4.25 to 6.5	1	Li	Internal	C/x	3x3 DFN-8
LTC4068X*	0.95	4.25 to 6.5	1	Li	Internal	C/x	3x3 DFN-8
LTC4075* LTC4075X*	0.95	4.3 to **8**	1	Li	Internal	C/x	3x3 DFN-10
LTC4075HVX*	0.95	4.3 to 5.5**	1	Li	Internal	C/x	3x3 DFN-10
LTC4078* LTC4078X*	0.95	4.3 to 5.5**	1	Li	Internal	C/x	3x3 DFN-10
LTC4076*	0.95	4.3 to **8**	1	Li	Internal	C/x	3x3 DFN-10
LTC4077*	0.95	4.3 to **8**	1	Li	Internal	C/10	3x3 DFN-10
LTC3550-1*	0.95	4.3 to **8**	1	Li	Internal	C/x	3x5 DFN-16
LTC3550*	0.95	4.3 to **8**	1	Li	Internal	C/x	3x5 DFN-16
LTC3552-1*	0.95	4.25 to **8**	1	Li	Internal	C/x	3x5 DFN-16
LTC3552*	0.95	4.25 to **8**	1	Li	Internal	C/x	3x5 DFN-16
LTC4095*	0.95	4.3 to 5.5	1	Li	Internal	Timer + C/10	2x2 DFN-8
LTC4064*	1	4.25 to 6.5	1	Li	Internal	Timer + C/10	MSOP-10
LTC4061*	1	4.5 to **8**	1	Li	Internal	Timer + C/x	3x3 DFN-10
LTC4061-4.4*	1	4.5 to **8**	1	Li	Internal	Timer + C/x	3x3 DFN-10
LTC4062*	1	4.3 to **8**	1	Li	Internal	Timer + C/x	3x3 DFN-10
LTC4063*	1	4.3 to **8**	1	Li	Internal	Timer + C/x	3x3 DFN-10
LTC4096*	1.2	4.25 to 5.5	1	Li	Internal	C/x	3x3 DFN-12
LTC4096X*	1.2	4.25 to 5.5	1	Li	Internal	C/x	3x3 DFN-12
LTC4097*	1.2	4.25 to 5.5	1	Li	Internal	C/x	2x3 DFN-12
LTC4053*	1.25	4.25 to 6.5	1	Li	Internal	Timer + C/10	MSOP-10, 3x3 DFN-10
LTC4052	1.3	4.5 to **10**	1	Li	Internal	Timer + C/10	MSOP-10
LTC1733	1.5	4.5 to 6.5	1	Li	Internal	Timer + C/10	MSOP-10E
LTC4060	2	4.5 to **10**	1 to 4	Ni	External	Delta V, t, T	3x5 DFN-16, TSSOP-16

* USB 2.0 Compatible
** 22V Abs. Max.

For a more detailed review of Linear Technology's extensive portfolio of battery chargers, see the Battery Charger Solutions Brochure.

USB Power Managers: Battery Chargers with PowerPath™ Control

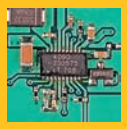
LTC4088: High Efficiency Battery Charger/USB Power Manager

LTC4090: USB Power Manager with 2A High Voltage Bat-Track™ Buck Regulator

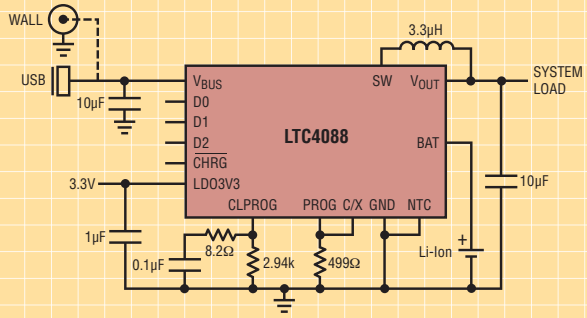
Our PowerPath products allow the load to be powered from both V_{IN} and the battery, allowing for shorter charging times, “instant-on” operation (even with a dead or missing battery) and more flexibility for the portable device designer. Other key features include standalone operation and thermal regulation.

LTC4088: Actual Size Complete Solution

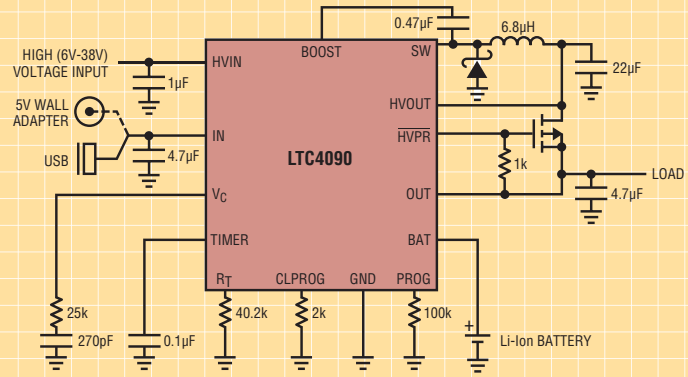
LTC4090: Actual Size Complete Solution



High Efficiency Battery Charger/USB Power Manager



USB Power Manager with 2A High Voltage Bat-Track Buck Regulator



VOUT (TYP)	AVAILABLE INPUT
VBAT + 0.3V	HV INPUT
5V	USB ONLY
VBAT	BAT ONLY

Part No.	Max. Charge Current Wall (A)	Max. Charge Current USB (mA)	Power Manager Topology	Input Voltage (V)	Number of Cells (Series)	Standby Current (µA)	IBAT Drain Current (µA)	Charge Termination	$R_{DS(ON)}$ Ideal Diode	Package
USB Power Managers: Li-Ion/Polymer Linear Battery Chargers with PowerPath Control										
LTC4055	1	500	Linear	4.3 to 5.5	1	50	2.5	Timer + C/10	200mΩ	4x4 QFN-16
LTC4089*	1.2	500	Linear	4.35 to 5.5 USB, 6-36V, 40V max wall	1	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4089-5	1.2	500	Linear	4.35 to 5.5 USB, 6-36V, 40V max wall	1	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4089-1*†	1.2	500	Linear	4.35 to 5.5 USB, 6-36V, 40V max wall	1	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4090*	1.2	500	Linear	4.35 to 5.5 USB, 6-38V, 60V max wall	1	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4067	1.25	500	Linear	4.35 to 5.5	1	52	2.5	Timer	200mΩ <50mΩ (opt.)	3x4 DFN-14
LTC4066 LTC4066-1†	1.5	500	Linear	4.3 to 5.5	1	50	2.5	Timer + C/10	50mΩ	4x4 QFN-24
LTC4085 LTC4085-1†	1.5	500	Linear	4.35 to 5.5	1	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x4 DFN-14
LTC4088* LTC4088-1* LTC4088-2*	1.5	700	Switching	4.25 to 5.5	1	25	1	Timer + C/x	180mΩ <50mΩ (opt.)	3x4 DFN-14

* Bat-Track adaptive output control

† 4.1V cell voltage

For a more detailed review of Linear Technology's extensive portfolio of battery chargers, see the Battery Charger Solutions Brochure.

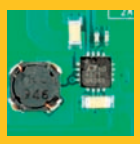
Switchmode and Smart Battery Chargers

LTC4001: Standalone 2A Monolithic Synchronous Li-Ion Battery Charger

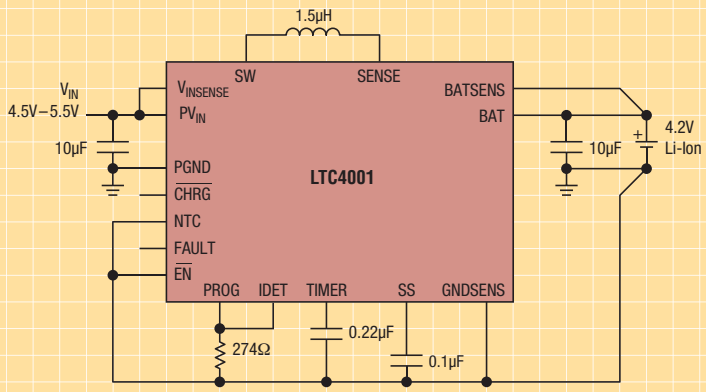
LTC4011: High Efficiency 4A Standalone Switchmode Nickel Battery Charger

Switchmode battery chargers utilize small, space-saving inductors and synchronous rectification for efficient, high current charging and reduced thermal management issues.

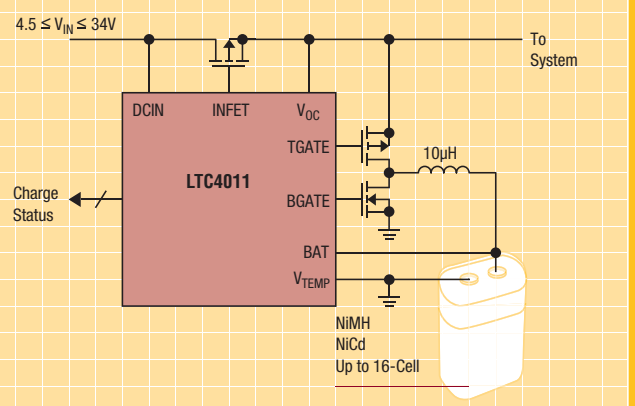
LTC4001: Actual Size Complete Solution



2A Synchronous Li-Ion Battery Charger



Autonomous NiMH/NiCd Battery Charger



Part No.	Cell Type	Battery Cells (series)	Max Charge Current (A)	Input Voltage (V)	Onboard Charge Termination	Standalone	Integrated Power FETS	Thermistor Interface	Package
Synchronous Step-Down Battery Chargers									
LTC4001 LTC4001-1†	Li-Ion	1	2	4.0–5.5	Timer	⚡	⚡	⚡	3x3 QFN-16
LTC4002	Li-Ion	1–2	4	4.7–24	Timer	⚡	–	⚡	3x3 DFN-10, SO-8
LTC4010	NiMH NiCd	1–16	4	4.5–34	-dV, dT/dt, T, t	⚡	–	⚡	TSSOP-16
LTC4011	NiMH NiCd	1–16	4	4.5–34	-dV, dT/dt, T, t	⚡	–	⚡	TSSOP-20
LTC4006	Li-Ion	2–4	4	6–28	Timer + C/10	⚡	–	⚡	SSOP-16
LTC4007	Li-Ion	3–4	4	6–28	Timer + C/10	⚡	–	⚡	SSOP-24
LTC4008	Li-Ion, NiMH, NiCd, Sealed Lead Acid	4–18 Ni & SLA 2–6 Li-Ion	4	6–28	External, µC	–	–	⚡	SSOP-28

Part No.	V_{BAT} Range (V)	Standalone	Max Charge Current (A)	Serial Bus Type	Single or Dual Battery Pack	Float Voltage Accuracy	Safety Limits (V&I)	AC Present Output	Package
Multichemistry Smart SMBus/SPI Switchmode Battery Charger Controllers									
LTC4100	7-26 (≥2-cell Li-Ion)	⚡	4	SMBus 1.1	Single	0.8%	⚡	⚡	SSOP-24
LTC4101	3.5-26 (1-cell Li-Ion)	⚡	4	SMBus 1.1	Single	0.8%	⚡	⚡	SSOP-24
LTC1760	5-28	⚡	4	SMBus 1.1	Dual	0.2%	⚡	⚡	TSSOP-48
LTC1960	6-28	–	8	SPI*	Dual	0.8%	–	–	SSOP-36

† 4.1V cell voltage

* Serial Peripheral Interface (SPI)

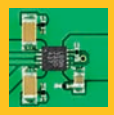
For a more detailed review of Linear Technology's extensive portfolio of battery chargers, see the Battery Charger Solutions Brochure.

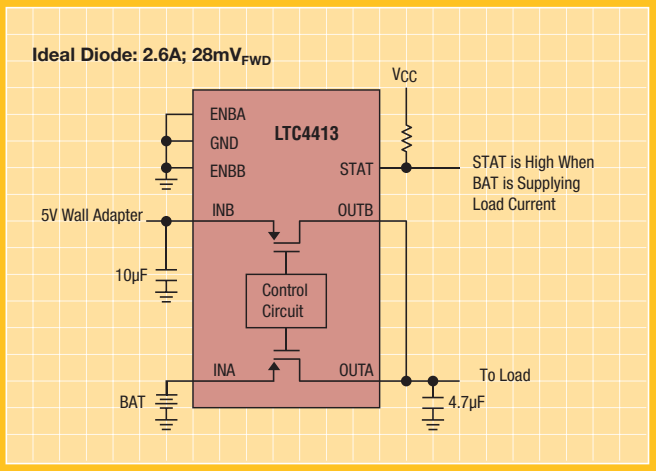
Ideal Diodes/PowerPath Controllers

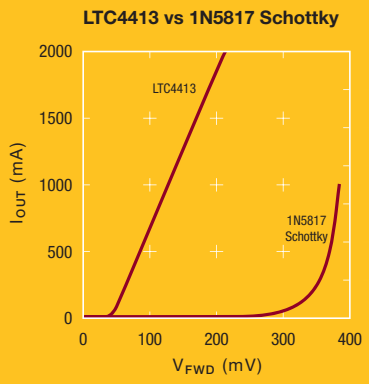
LTC4413: Dual 2.6A, 2.5V to 5.5V Ideal Diodes in 3mm × 3mm DFN

Our ideal diode devices provide a low loss, near "ideal" diode function. They feature much lower forward voltage drop and reverse leakage current than conventional Schottky diodes. This reduces power loss and eases thermal management while extending battery run time.

LTC4413: Actual Size Complete Solution





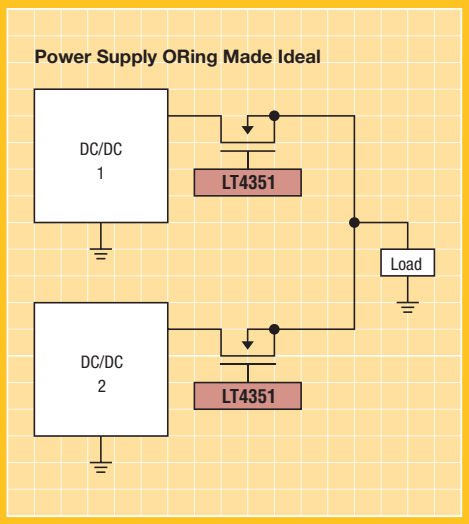


Part No.	Ideal Diode	MOSFET	Integrated MOSFET	Max Current (A)	Input Voltage (V)	Forward Voltage	Forward ON Resistance	Reverse Leakage Current	Supply Current	Package
P-Channel PowerPath Controllers and Ideal Diode Devices										
LTC4411	Single	P-Channel	⚡	1	2.6–5.5	28mV	140mΩ	1µA	35µA	ThinSOT
LTC4412	Single	P-Channel	–	2†	2.5–28	20mV	Controller	3µA	13µA	ThinSOT
LTC4412HV	Single	P-Channel	–	2†	2.5–36	20mV	Controller	3µA	13µA	ThinSOT
LTC4413/-1††	Dual	P-Channel	⚡	2.6	2.5–5.5	28mV	100mΩ	1µA	20µA	3x3 DFN-10
LTC4413-2††	Dual	P-Channel	⚡	2.6	2.5–5.5, 13V OVP†††	28mV	100mΩ	1µA	20µA	3x3 DFN-10
LTC4414	Single	P-Channel	–	≤ 5-75†	3–36	22mV	Controller	3µA	33µA	MSOP-8
LTC4416/-1	Dual	P-Channel	–	≤ 5-75†	4–36	22mV	Controller	3µA	70µA	MSOP-10

† Depends on MOSFET selection
†† High speed version
††† Overvoltage protection

Part No.	Ideal Diode	External MOSFET	Max Current (A)	Input Voltage (V)	Package
N-Channel PowerPath Controllers and Ideal Diode Devices					
LTC4350	Single	N-Channel	≥ 5*	1.5–12	SSOP-16
LT®4351	Single	N-Channel	≥ 5*	1.2–18	MSOP-10
LTC4357	Single	N-Channel	≥ 5*	9–80	2x3 DFN-6, MSOP-8
LTC1473	Dual	N-Channel	≥ 5*	4.75–30	SSOP-16
LTC1473L	Dual	N-Channel	≥ 5*	2.8–9	SSOP-16
LTC2952**	Dual	N-Channel	≥ 5*	2.7–28	TSSOP-20 4x4 QFN-20
LTC4354	Dual	N-Channel	≥ 5*	-12 to -80	2x3 DFN-8, SOIC-8
LTC4355	Dual	N-Channel	≥ 5*	9–80	3x4 DFN-14, SOIC-16
LTC1479	Triple	N-Channel	≥ 5*	6–28	SSOP-36

* Depends on MOSFET selection
** Pushbutton PowerPath Controller with Supervisor

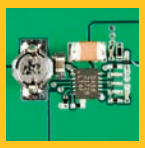


USB and USB On-the-Go Power

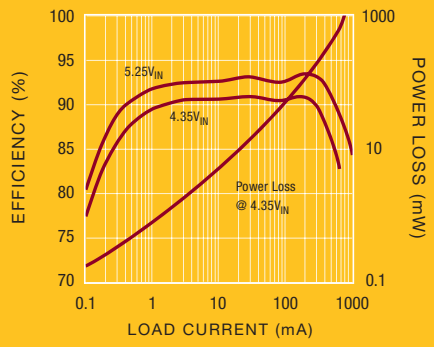
LTC3458: 1.4A, 1.5MHz Synchronous Step-Up DC/DC Converter with Output Disconnect

Our high efficiency boost and buck-boost DC/DC converters convert battery voltages to 5V USB V_{BUS} for host-to-peripheral or peripheral-to-peripheral connections. Most solutions include synchronous rectification for maximum run time and Burst Mode® capability for high light load efficiency.

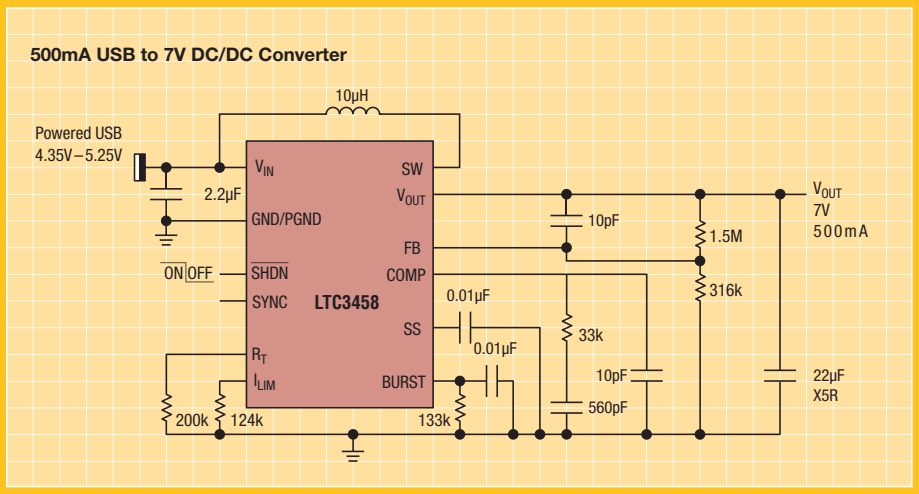
LTC3458: Actual Size Complete Solution



Efficiency and Power Loss vs Load Current



500mA USB to 7V DC/DC Converter

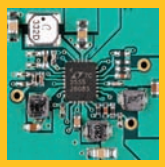


Part No.	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	Frequency	I_Q (µA)	Package
USB and USB On-the-Go Power						
LTC3440	2.5–5.5	2.5–5.5	0.6	300kHz to 2MHz	25	MSOP-10
LTC3426	1.6–4.3	2.25–5.5	0.8	1.2MHz	600	ThinSOT
LTC3441	2.4–5.5	2.4–5.25	1.2	1MHz	25	3x4 DFN-12
LTC3442	2.4–5.5	2.4–5.25	1.2	300kHz to 2MHz	35	3x4 DFN-12
LTC3443	2.4–5.5	2.4–5.25	1.2	600kHz	28	3x4 DFN-12
LTC3458/L	1.5–6	V_{IN}–7.5/6	1.4/1.7	400kHz to 1.5MHz	15	3x4 DFN-12

PMICs – Switchmode PowerPath Manager Topology

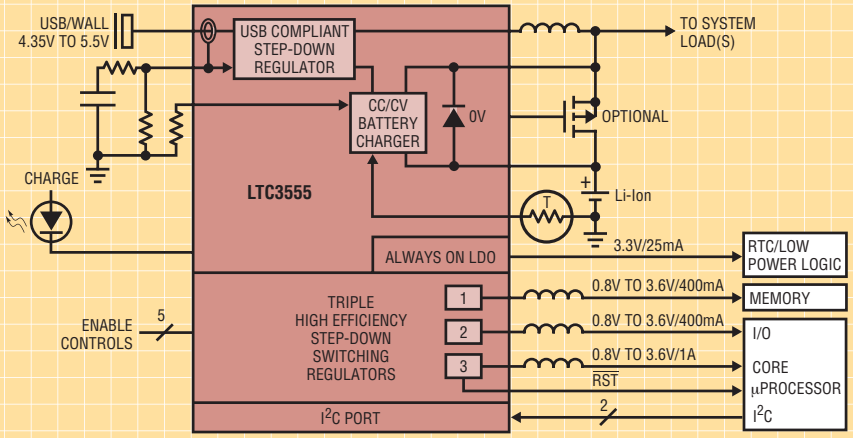
LTC3555: High Efficiency Switchmode USB Power Manager + Battery Charger + Triple Step-Down DC/DC + LDO

Power management integrated circuits (PMICs) address battery charging and provide multiple system rails in portable products. Switchmode power management enables higher charge currents from both wall adapter and USB-based power sources.

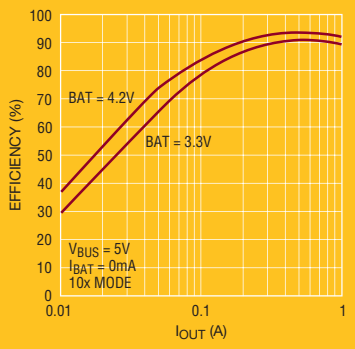


LTC3555: Actual Size Complete Solution

High Efficiency USB Power Manager + Triple Buck + LDO



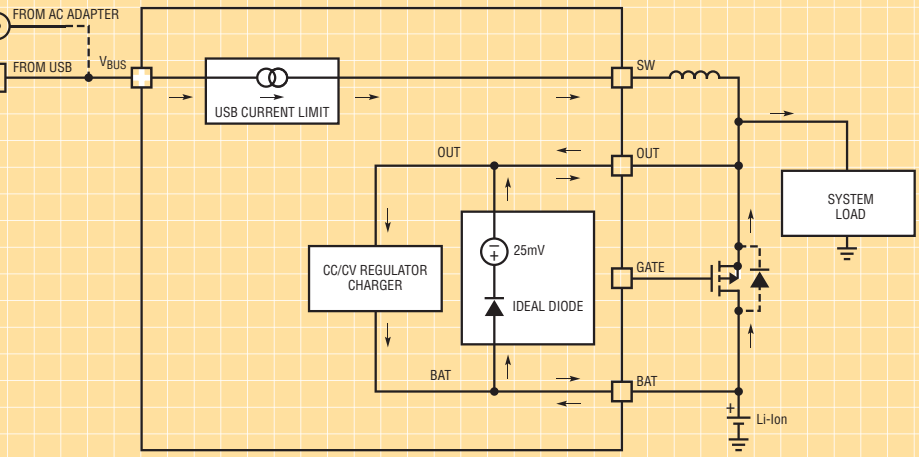
Switching Regulator Efficiency to System Load (P_{OUT}/P_{BUS})



Part No.	Number of Regulators	Buck(s)	Buck-Boost	LDO(s)	Li-Ion/ Polymer Charger	Max Charge Current	Ideal Diode	V_{IN} (V)	Interface	Package
Switchmode PowerPath Management Integrated Circuits (PMICs)										
LTC3566*	2	–	1A	3.3V/25mA	Linear	1.5A	Int + Ext (Opt.)	4.25 to 5.5	Simple	4x4 QFN-24
LTC3567*	2	–	1A	3.3V/25mA	Linear	1.5A	Int + Ext (Opt.)	4.25 to 5.5	I^2C	4x4 QFN-24
LTC3555	4	1A, 400mA x 2	–	3.3V/25mA	Linear	1.5A	Int + Ext (Opt.)	4.3 to 5.5	I^2C	4x5 QFN-28
LTC3556*	4	400mA x 2	1A	3.3V/25mA	Linear	1.5A	Int + Ext (Opt.)	4.25 to 5.5	I^2C	4x5 QFN-28

* Future product. Contact LTC for availability.

Switching PowerPath System



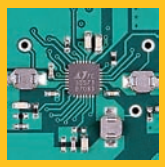
ADVANTAGES

- System power available as soon as input supply available (even with dead or missing battery)
- Most efficient use of available 2.5W USB power
- Best thermal performance of any USB power manager
- USB charge current not limited to 500mA (limited to ~ 2.3W)

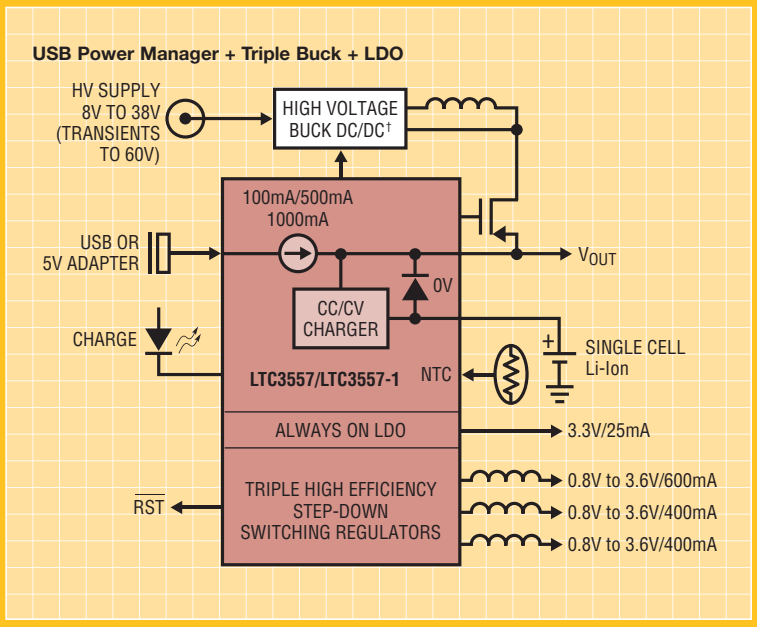
PMICs – Linear PowerPath Manager Topology

LTC3557/-1: Linear USB Power Manager with Li-Ion/Polymer Charger, Three Step-Down Regulators + LDO

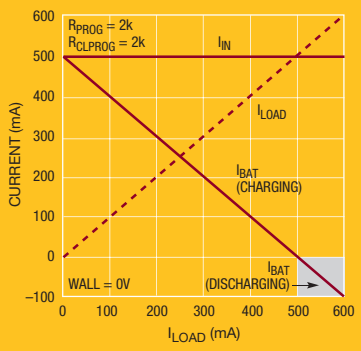
LTC3557: Actual Size
Complete Solution



Power management integrated circuits (PMICs) address battery charging and multiple system rails in handheld portable products. Linear power management allows seamless transitions and manages power flow between input sources such as a wall adapter, USB port and Lithium battery to the system load.



Input and Battery Current vs Load Current



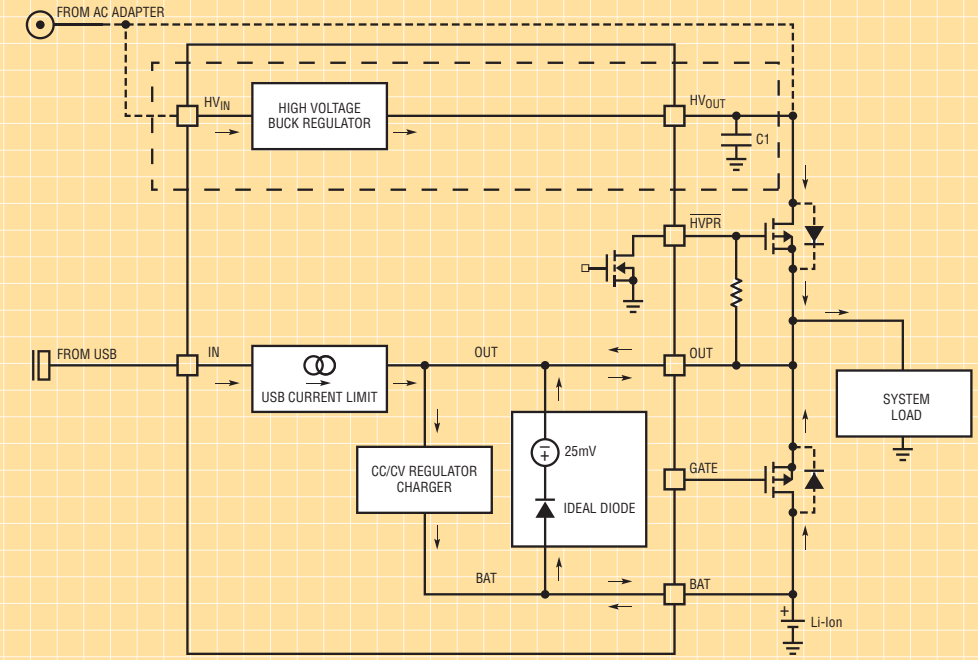
Part No.	Number of Regulators	Buck(s)	LDO(s)	Li-Ion/ Polymer Charger	Max Charge Current	PowerPath Topology	Ideal Diode	V_{IN} (V)	Interface	Package
Linear PowerPath Management Integrated Circuits (PMICs)										
LTC3456	3*	150mA, 200mA	–	–	–	–	–	1.8 to 5.5	–	4x4 QFN-24
LTC3455	3	400mA, 600mA**	Controller	Linear	500mA	Linear	–	2.7 to 5.5	–	4x4 QFN-24
LTC3557 LTC3557-1***	4	600mA, 400mA x 2	3.3V/25mA	Linear	1.5A	Linear	Int + Ext (Opt)	2.7 to 5.5 38 max†	–	4x4 QFN-28

† See table below for compatible high voltage buck regulators
* Includes 50mA Hot Swap™ controller
** May be increased to 1A with additional components
*** 4.1V battery float voltage

Part No.	Input Voltage, Max (V)	Efficiency V_{IN}=12V, V_{OUT}=5V I_{OUT}=1A	I_{SW} (A)/ I_{OUT} (A)	Switching Frequency	Reference Voltage (V)	Inductor Size (µH)	Output Capacitor	I_Q	I_{SD} (µA)	Package
High Voltage Buck Regulators (compatible with LTC3557/-1)										
LT3505	3.6-36, 40	87%	1.75/1.2	300k-3MHz	0.78	6.8	10µF-cer	2mA	<2µA	3x3 DFN-8
LT3480	3.6-38, 60	90%	3/2	200k-2MHz	0.79	4.7	22µF-cer	70µA	<1µA	3x3 DFN-10, MSOP-10E
LT3481	3.6-34, 36	90%	3.2/2	300k-2.8MHz	1.26	4.7	22µF-cer	50µA	<1µA	3x3 DFN-10, MSOP-10E

PMICs – Linear PowerPath Manager Topology

Linear PowerPath System



ADVANTAGES

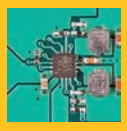
- System power available as soon as input supply available (even with dead or missing battery)
- More efficient use of 2.5W USB power than charger fed topology
- Easily accommodates different charge rates from USB to wall adapter
- HV buck adaptive output control enables efficient charging from an HV supply

PMICs – Linear Battery Charger (Charger-Fed) Topology

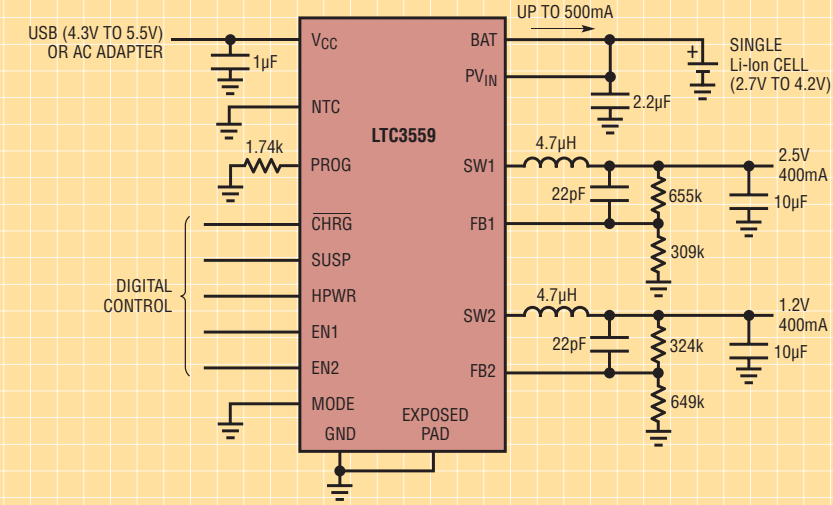
LTC3559: Linear USB Battery Charger with Dual Buck Regulators

Power management integrated circuits (PMICs) address battery charging and provide multiple system rails in portable products. A high level of integration is offered in a small footprint, with small total solution size and ease-of-use.

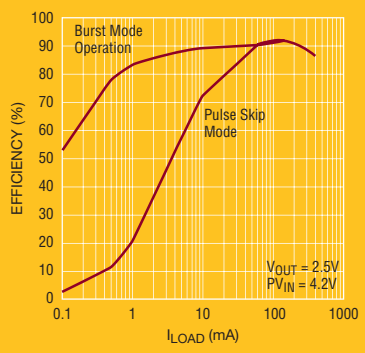
LTC3559: Actual Size Complete Solution



USB Charger Plus Dual Buck Regulators



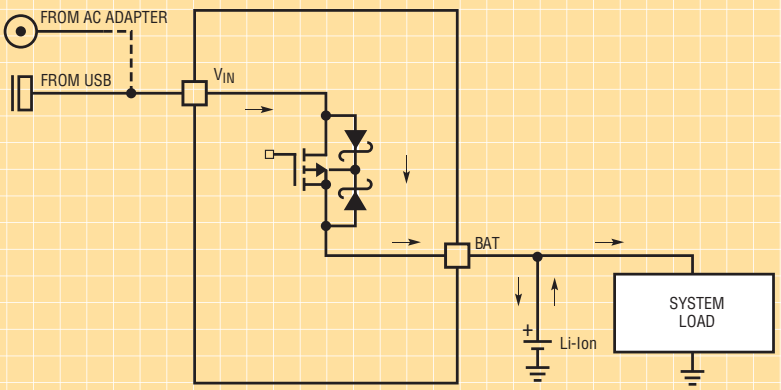
Buck Regulators Efficiency vs I_{LOAD}



PMICs – Linear Battery Charger (Charger-Fed) Topology

Part No.	Number of Regulators	Regulator Input Voltage (V)	Buck(s)	LDO(s)	Li-Ion/ Polymer Charger	Max Charge Current (mA)	PowerPath Topology	Package
Power Management Integrated Circuits (PMICs), Charger-Fed Topology								
LTC4080	1	2.7–4.5	300mA	–	Linear	500	–	3x3 DFN-10
LTC4081	1	2.7–4.5	300mA	–	Linear	500	–	3x3 DFN-10
LTC3550/-1	1	2.5–5.5	600mA	–	Linear	950	–	3x5 DFN-16
LTC3559	2	3.0–4.2	400mA x 2	–	Linear	950	–	3x3 QFN-16
LTC3552/-1	2	2.5–5.5	400mA / 800mA	–	Linear	950	–	3x5 DFN-16

Battery/Charger-Fed System



ADVANTAGES

- Small, low component count
- Simple and inexpensive
- No additional loss when running from battery

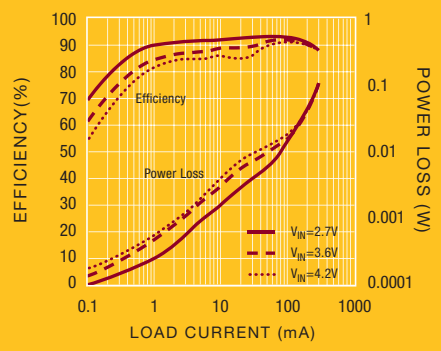
System Power – Synchronous Step-Down Regulators

LTC3410: 2.25MHz, 300mA Synchronous Step-Down Regulator in SC70

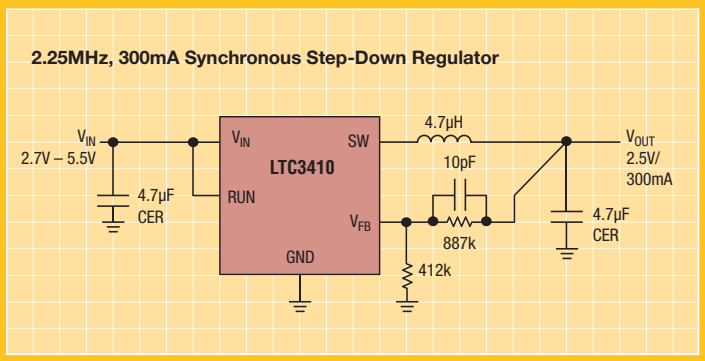
We offer a broad line of high performance buck (step-down) switching regulators with integrated synchronous switches for maximum battery run time.

LTC3410: Actual Size Complete Solution

Efficiency and Power Loss vs Load Current



2.25MHz, 300mA Synchronous Step-Down Regulator



System Power – Synchronous Step-Down Regulators

Part No.	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	Frequency	Efficiency	I_Q (µA)	Package
Synchronous Step-Down Regulators							
LTC3549	1.6–5.5	0.6–5.5	0.25	2.25MHz	95%	50	2x3 DFN-6
LTC3405A	2.5–5.5	0.8–5.5, 1.375, 1.5, 1.8	0.30	1.5MHz	96%	20	ThinSOT
LTC3410/B	2.5–5.5	0.8–5.5, 1.2, 1.5, 1.65, 1.8, 1.875	0.30	2.25MHz	96%	26	SC70
LTC3542	2.5–5.5	0.6–5.5	0.50	2.25MHz	95%	26	2x2 DFN-6, ThinSOT-6
LTC3409	1.6–5.5	0.62–5.5	0.60	1.5/2.25MHz	92%	60	3x3 DFN-8
LTC3404	2.5–6.0	0.8–5.5	0.60	1.4MHz	95%	10	MSOP-8
LTC3406A/B	2.5–5.5	0.6–5.5, 1.2, 1.5, 1.8	0.60	1.5MHz	95%	20	ThinSOT
LTC3406AB-2	2.5–5.5	0.6–5.5	0.60	2.25MHz	95%	350	ThinSOT
LTC3448*	2.5–5.5	0.6–5.5	0.60	1.5/2.25MHz	95%	32	3x3 DFN-8, MS8E
LTC3560	2.5–5.5	0.6–5.5	1.00	400kHz to 4MHz	95%	16	ThinSOT
LTC3561	2.6–5.5	0.8–5.5	1.20	2.25MHz	95%	240	3x3 DFN-8
LTC3564	2.5–5.5	0.6–5.5	1.25	400kHz to 4MHz	95%	20	ThinSOT
LTC3565	2.5–5.5	0.8–5.5	1.25	400kHz to 4MHz	95%	60	3x3 DFN-10, MSOP-10
LTC3411A	2.5–5.5	0.8–5.5	1.25	400kHz to 4MHz	95%	60	3x3 DFN-10, MSOP-10
LTC3412A	2.5–5.5	0.8–5.5	3.00	300kHz to 4MHz	95%	60	4x4 QFN-16, TSSOP-16
LTC3414	2.25–5.5	0.8–5.5	4.00	300kHz to 4MHz	95%	64	TSSOP-20

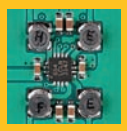
*LDO Mode

System Power – Multioutput Regulators

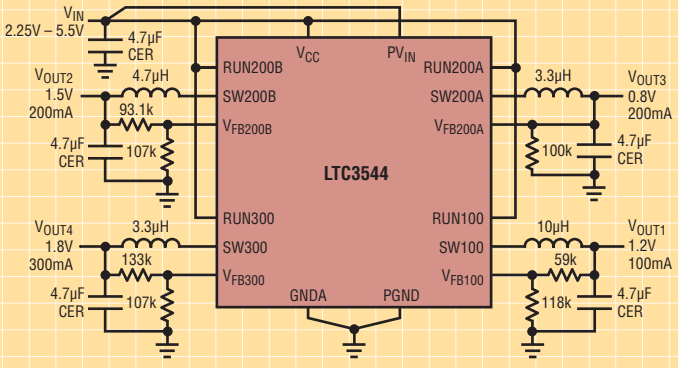
LTC3544/B: Quad 300mA/2x200mA/100mA, 2.25MHz Synchronous Step-Down DC/DC Converter in 3mm x 3mm QFN

We manufacture a broad line of high performance multiple-output buck (step-down) switching regulators with both synchronous and non-synchronous switches. High performance LDOs are added in some IC configurations.

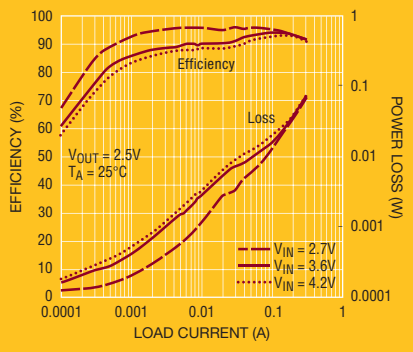
LTC3544: Actual Size Complete Solution



High Efficiency Quad Buck Converter



Efficiency and Power Loss vs Load Current



System Power – Multioutput Regulators

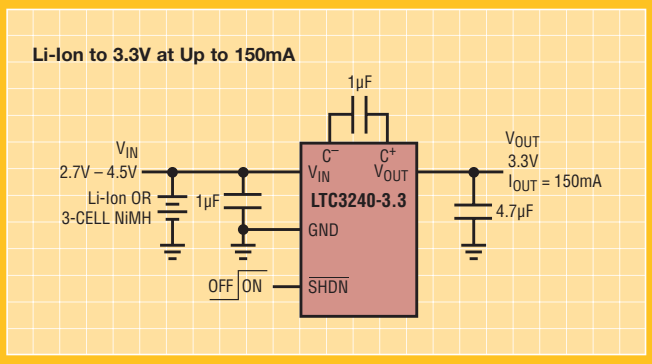
Part No.	Topology	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	Frequency	I_Q (µA)	Package
Multioutput Regulators							
LTC3522	Synchronous Buck-Boost and Step-Down	2.4–5.5	2.2-5.25, 0.6V to 5.25	400mA Buck-Boost and 200mA Buck	1MHz	25	3x3 QFN-10
LTC3672B-1/-2	Synchronous Step-Down with LDOs	2.9–5.5	1.2/1.8/2.8 Fixed	400mA Switcher and Dual 150mA LDO(2)s	2.25MHz	260	2x2 DFN-8
LTC3541/-1/ -2/-3	Synchronous Step-Down with VLDO	2.7–5.5	0.8–5.5	1A Switcher and 300mA VLDO(1)	2.25MHz	85	3x3 DFN-10
LTC3547/B*	Dual Synchronous Step-Down	2.5–5.5	0.6–5.5	0.3/0.3	2.25MHz	40	2x3 DFN-8
LTC3544/B*	Quad Synchronous Step-Down	2.25–5.5	0.8–5.5	0.30/0.20 x 2/0.10	2.25MHz	70/825	3x3 QFN-16
LTC3523/-2	Synchronous Step-Down, Step-Up	1.8–5.5	0.62–5.5 1.8–5.5	400mA-Step-Down 600mA (I_{SW})-Step-Up	1.2/2.3MHz	60	3x3 QFN-16
LTC3446	Synchronous Step with Dual VLDOs	2.7–5.5	0.6–5.5	1-Switcher Dual 300mA VLDOs(1)	2.25MHz	140	3x4 DFN-14
LTC3548/-1/-2	Dual Synchronous Step-Down	2.5–5.5	0.6–5.5	0.8/0.4	2.25MHz	40	MSOP-10E, 3x3 DFN-10
LTC3419/-1	Dual Synchronous Step-Down	2.5–5.5	0.6–5.5/ 1.575 & 1.8	0.6/0.6	2.25MHz	40/500	MSOP-10, 3x3 DFN-8
LTC3407/A	Dual Synchronous Step-Down	2.5–5.5	0.6–5.5	0.6/0.6	1.5MHz	40	MSOP-10E, 3x3 DFN-10
LTC3407-2	Dual Synchronous Step-Down	2.5–5.5	0.6–5.5	0.8/0.8	2.25MHz	40	MSOP-10E, 3x3 DFN-10
LTC3520	Synchronous Buck-Boost, Buck	2.2–5.5	2.2–5.25, 0.8V–5.25	1A Buck-Boost and 600mA Buck	100kHz -2.0MHz	55	4x4 QFN-24
LTC3417	Dual Synchronous Step-Down	2.25–5.5	0.8–5.5	1.4/0.8	600kHz -4.0MHz	125	TSSOP-20E, 3x5 DFN-20
LTC3417A/-1	Dual Synchronous Step-Down	2.25–5.5	0.8–5.5	1.5/1.0	600kHz -4.0MHz	125	TSSOP-20E, 3x5 DFN-20
LTC3562	I^2C Quad Synchronous Step-Down	2.7–5.5	0.425–5.5	2x 0.60/2x 0.40	2.25MHz	100	3x3 QFN-20
LTC3545/-1	Triple Synchronous Step-Down	2.25–5.5	0.6–5.5	0.8/0.8/0.8	2.25MHz	58	3x3 QFN-16
LT1940	Dual Step-Down	3.6–25	1.25–0.9V_{IN}	1.4/1.4	1.1MHz	3.8mA	TSSOP-16E
LT1940L	Dual Step-Down	3.6–7	1.25–0.9V_{IN}	1.4/1.4	1.1MHz	3.8mA	TSSOP-16E
LT3510	Dual Step-Down	3.3–26	0.8–0.9V_{IN}	2.0/2.0	250kHz -1.5MHz	3.7mA	TSSOP-20E
LT3501	Dual Step-Down	3.3–26	0.8–0.9V_{IN}	3.0/3.0	250kHz -1.5MHz	3.7mA	TSSOP-20E

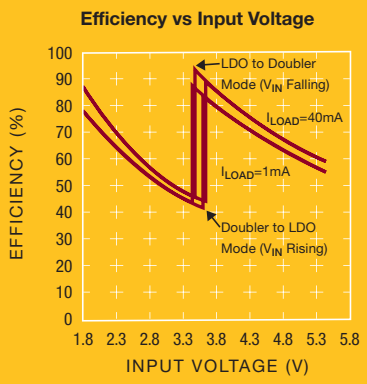
* Burst Mode defeat option for lower noise
(1) VLDOs can run off switcher output
(2) One LDO can run off switcher output, the other from input

System Power – Charge Pump DC/DC Converters – Buck & Buck-Boost

LTC3240: Low Quiescent Current 150mA Buck-Boost Charge Pump

Our family of charge pump regulators features the widest selection of simple and compact inductorless DC/DC converter designs. These converters can be used to step-down or step-up/down an input voltage. By eliminating the inductor, these switched capacitor converters provide small solution footprints and a simple design. Furthermore, by incorporating Spread Spectrum technology on-chip, both input and output noise are significantly reduced.





LTC3240: Actual Size Complete Solution

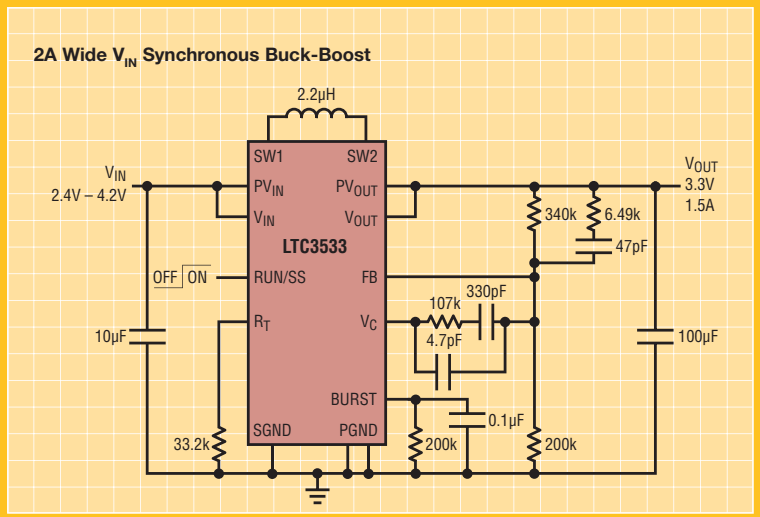
Part No.	V_{IN} (V)	V_{OUT} (V)	Max I_{OUT} (mA)	Frequency	I_Q (I_{SUPPLY})	I_{SD}	Package
Regulated Charge Pump Converters (Step-Down)							
LTC1503-1.8	2.4–6	1.8	100	600kHz	25µA	5µA	MSOP-8, SO-8
LTC1503-2	2.4–6	2	100	600kHz	25µA	5µA	MSOP-8, SO-8
LTC1911-1.5/1.8	2.7–5.5	1.5/1.8	250	1.5MHz	180µA	10µA	MSOP-8
LTC3250-1.2/1.5	3.1–5.5	1.2/1.5	250	1.5MHz	35µA	<1µA	ThinSOT
LTC3252*	2.7–5.5	0.9–1.6	2 x 250	1MHz–1.6MHz	60µA	<1µA	3x4 DFN-12
LTC3251-1.2/1.5*	2.7–5.5	0.9–1.6, 1.2/1.5	500	1MHz–1.6MHz	9µA	<1µA	MSOP-10
Regulated Charge Pump Converters (Buck-Boost)							
LTC3240-2.5	1.8–5.5	2.5	150	1.2MHz	65µA	1µA	2x2 DFN-6
LTC3240-3.3	1.8–5.5	3.3	150	1.2MHz	65µA	1µA	2x2 DFN-6

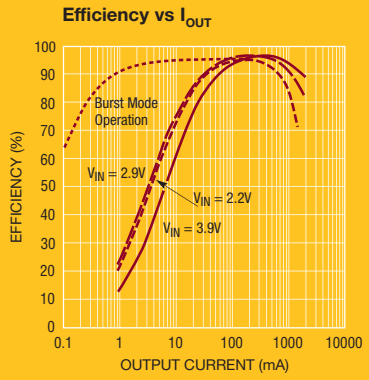
*Spread Spectrum Technology

System Power – Buck-Boost DC/DC Converters

LTC3533: 2A Buck-Boost Synchronous DC/DC Converter

We offer the industry's broadest line of buck-boost synchronous DC/DC converters. With their unique four MOSFET switch configuration, they can seamlessly transition from step-down mode, through 100% dropout operation and then to step-up mode to allow a fixed output voltage even when the input voltage fluctuates above or below the output.





LTC3533: Actual Size Complete Solution

System Power – Buck-Boost DC/DC Converters

Part No.	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	Frequency	I_Q (µA)	Package
Buck-Boost DC/DC Converters						
LTC3531/-3/-3.3	1.8–5.5	2.0–5.0/3.0/3.3	0.2	Burst Mode	16	3x3 DFN-8,ThinSOT
LTC3444	2.7–5.5	2.0–5.0	0.4	1.5MHz	700	3x3 DFN-8
LTC3522	2.4–5.5	2.2–5.25, 0.6–5.25	0.4/0.20	1MHz	25	3x3 QFN-10
LTC3532	2.4–5.5	2.4–5.25	0.5	300kHz to 2MHz	35	3x3 DFN-10, MSOP-10
LTC3530	1.8–5.5	1.8–5.25	0.6	300kHz to 2MHz	40	3x3 DFN-10, MSOP-10
LTC3440	2.5–5.5	2.5–5.5	0.6	300kHz to 2MHz	25	MSOP-10
LTC3538	2.4–5.5	1.5–5.25	0.8	1MHz	35	2x3 DFN-8
LTC3520	2.2–5.5	0.8–5.25	1.0/0.6	2MHz	55	4x4 QFN-24
LTC3441	2.4–5.5	2.4–5.25	1.2	1MHz	25	3x4 DFN-12
LTC3442	2.4–5.5	2.4–5.25	1.2	300kHz to 2MHz	35	3x4 DFN-12
LTC3443	2.4–5.5	2.4–5.25	1.2	600kHz	28	3x4 DFN-12
LTC3533	1.8–5.5	1.8–5.25	2	300kHz to 2MHz	40	3x4 DFN-14
LTC3785	2.7–10	2.7–10	10*	100kHz to 1MHz	86	4x4 QFN-24

*Depends on MOSFET selection

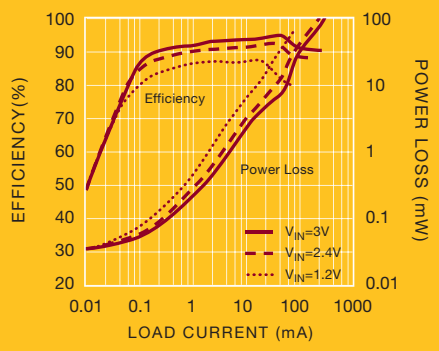
System Power – Low Noise, High Efficiency Step-Up DC/DC Converters

LTC3525 – 400mA Micropower Synchronous Step-Up DC/DC Converter with Output Disconnect

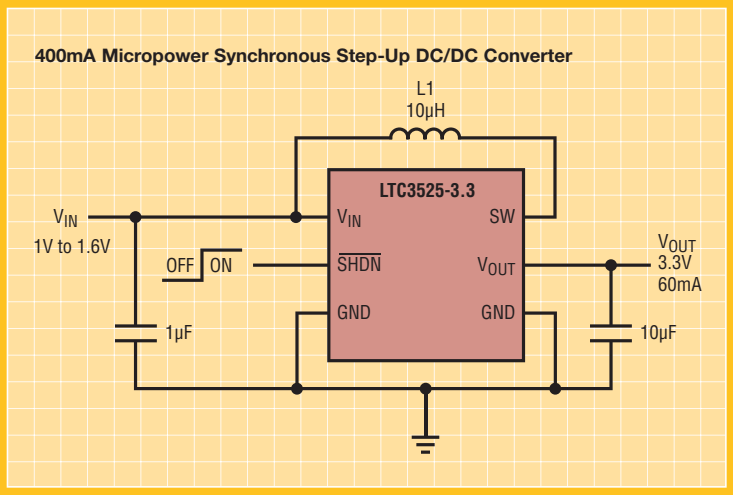
We manufacture a broad line of high performance boost (step-up) switching regulators with both synchronous and non-synchronous switches.

LTC3525: Actual Size Complete Solution

Efficiency and Power Loss vs Load Current



400mA Micropower Synchronous Step-Up DC/DC Converter



System Power – Low Noise, High Efficiency Step-Up DC/DC Converters

Part No.	VIN (V)	VOUT (MAX) (V)	ISW (A)*	Frequency	IQ (µA)	Output Disconnect	Package
Low Noise, High Efficiency Step-Up DC/DC Converters							
LTC3459	1.5–5.5	10	0.075	Constant Off-Time	10	Yes	ThinSOT
LT3464	2.3–10	34	0.085	Constant Off-Time	25	Yes	ThinSOT
LT3460	2.5–16	36	0.3	1.3MHz	2mA	–	SC70, ThinSOT
LT1615/-1	1–15	34	0.3/0.075	Constant Off-Time	20	–	ThinSOT
LT3494/A	2.3–16	40	0.180/0.35	LNAPC **	65	Yes	2x3 DFN-8
LTC3525/3/3.3/5	1–4.5	3, 3.3, 5	0.4	APC ***	6	Yes	SC70
LTC3525L-3	0.85–4.5	3	0.4	APC ***	6	Yes	SC70
LTC3427	1.8–5	5.25	0.5	1.2MHz	350	Yes	2x2 DFN-6
LTC3426/L	0.85–5	5.25	0.5	1MHz	9	Yes	2x2 DFN-6
LT1613	0.9–10	34	0.55	1.4MHz	3mA	–	ThinSOT
LTC3400/B	0.5–5	5	0.6	1.2MHz	19/300	–	ThinSOT
LTC3429/B	0.5–4.4	5	0.6	500kHz	20	Yes	ThinSOT
LTC3499/B	1.8–5	6	0.75	1.2MHz	20	Yes	3x3 DFN-8, MSOP-8
LTC3527/-1	0.7–5.25	5.25	0.80/0.40	1.2/2.2MHz	12µA	Yes	3x3 QFN-16
LTC3528/B	0.7–5.25	5.25	1	1MHz	12	Yes	2x3 DFN-8
LTC3401	0.5–5	5	1.0	300kHz - 3MHz	38	–	MSOP-10
LTC3423	0.5–5	5.5	1.0	3MHz	38	–	MSOP-10
LT3467/A	2.4–16	40	1.1	1.3/2.1MHz	1mA	–	ThinSOT
LTC3458/L	1.5–6	7.5/6	1.4	1.5MHz	15	Yes	3x4 DFN-12
LTC3422	0.85–4.5	5.25	1.5	300kHz - 3MHz	25	Yes	3x3 DFN-10
LTC3529	1.8–5.15	5.5	1.5	1.5MHz	350	Yes	2x3 DFN-8
LTC3402	0.5–5	5	2.0	300kHz - 3MHz	38	–	MSOP-10
LTC3426	1.6–4.2	5.5	2.0	1.2MHz	600	–	ThinSOT
LT1935	2.3–16	40	2.0	1.2MHz	3mA	–	ThinSOT
LTC3424	0.5–5	5.5	2.0	300kHz - 3MHz	38	–	MSOP-10
LTC3421	0.5–4.5	5.25	3.0	300kHz - 3MHz	12	Yes	4x4 QFN-24
LTC3428	1.6–4.5	5.25	4.0	2MHz	1.3mA	–	3x3 DFN-10
LTC3425	0.5–4.5	5.25	5.0	8MHz	16	Yes	5x5 QFN-32

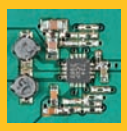
* I_{OUT} ~ 0.65 I_{SW} x (V_{IN} / V_{OUT}). Estimate may vary depending on external component values.
** Low Noise Adaptive Power Control (LNAPC)
*** Adaptive Power Control (APC)

System Power – Multioutput Boost Regulators

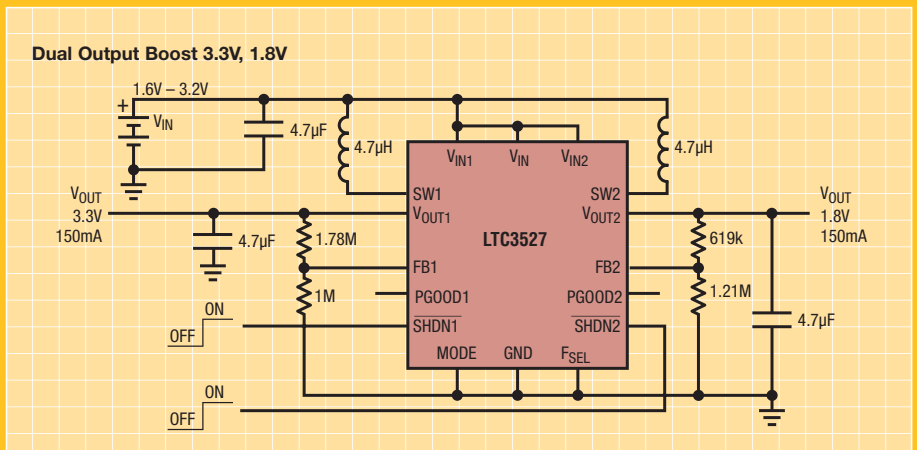
LTC3527/-1: Dual Micropower Synchronous Boost DC/DC Converter in 3mm x 3mm QFN

We offer a broad line of high performance multiple-output boost (step-up) switching regulators for a wide array of applications including display bias and general-purpose applications.

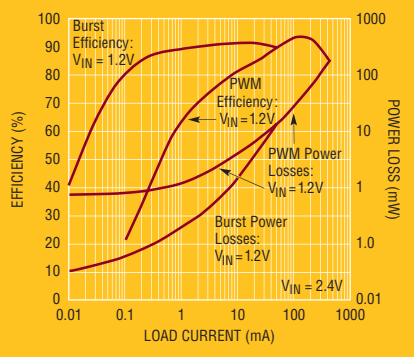
LTC3527: Actual Size Complete Solution



Dual Output Boost 3.3V, 1.8V



1-Cell to 3V Boost Efficiency and Power Loss at 1.2MHz



System Power – Multioutput Boost Regulators

Part No.	Switch Configuration	V_{IN} (V)	V_{OUT} (MAX) (V)	I_{SW} (A)*	Frequency	I_Q	Output Disconnect	Package
Multioutput Boost Regulators								
LTC3450	Triple Output	1.4–4.6	+5, ±15	0.09	550kHz	75µA	Yes	3x3 DFN-16
LT1944-1	Internal, Dual	1.2–15	34	0.1/0.18	Constant Off-Time	20µA	–	MSOP-10
LT3463	Internal, Dual	2.4–15	±40	0.25/0.25	Constant Off-Time	20µA	–	3x3 DFN-10
LTC3537	Internal + LDO	0.7–5	5.25	0.60/0.10	2.2MHz	30µA	Yes	3x3 QFN-16
LT3463A	Internal, Dual	2.4–15	±40	0.25/0.40	Constant Off-Time	40µA	–	3x3 DFN-10
LT1945	Internal, Dual	1.2–15	±34	0.25/0.25	Constant Off-Time	20µA	–	MSOP-10
LT1944	Internal, Dual	1.2–15	34	0.35/0.35	Constant Off-Time	20µA	–	MSOP-10
LT3472/A	Internal, Dual	2.2–16	±40	0.35/0.40	1.2MHz	2.8mA	–	3x3 DFN-10
LTC3527/-1	Internal, Sync Dual	0.7–5.25	5.25	0.80/0.40	1.2/2.2MHz	12µA	Yes	3x3 QFN-16
LT3487	Internal, Dual	2.3–16	±30	0.75/0.90	2MHz	3.7mA	–	3x3 DFN-10
LT1947	Internal, Dual	2.6–8	34	1.10	3MHz	9.5mA	–	MSOP-10/E
LT3471	Internal, Dual	2.4–16	±40	1.3/1.3	1.2MHz	2.5mA	–	3x3 DFN-10

*I_{OUT} ~ 0.65 I_{SW} x (V_{IN} / V_{OUT}). Estimate may vary depending on external component values.

System Power – Charge Pump DC/DC Converters – Step-Up or Inverting

LTC3221: Micropower, Regulated Charge Pump in 2mm x 2mm DFN

LTC3203: 500mA Low Noise Dual Mode Charge Pump

LTC3204/B: Low Noise, Miniature 2mm x 2mm DFN Regulated Charge Pump Doubler

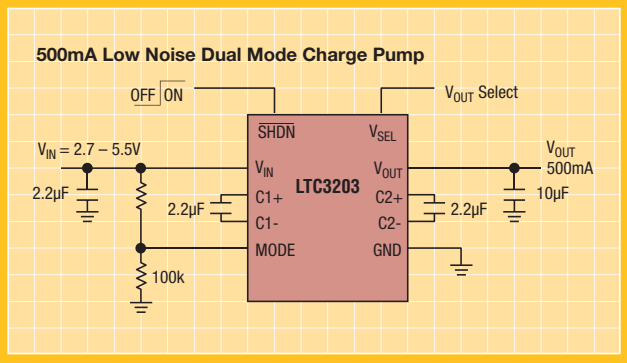
Our family of charge pumps includes the widest selection of simple and compact inductorless DC/DC converter designs. These step-up converters offer low ripple and can be used to boost or invert an input voltage. By eliminating the inductor, these switched capacitor converters provide small solution footprint and a simple design.

LTC3221: Actual Size Complete Solution

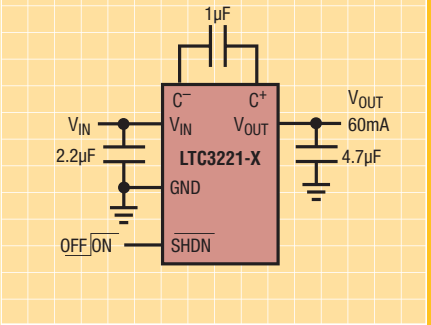
LTC3203: Actual Size Complete Solution

LTC3204/B: Actual Size Complete Solution

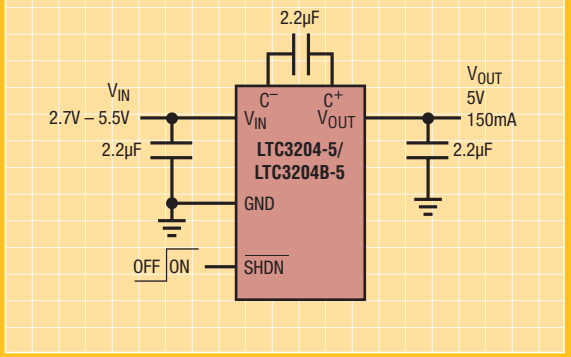
500mA Low Noise Dual Mode Charge Pump



Micropower 2mm x 2mm Pump



Low Noise, Miniature 2mm x 2mm DFN Regulated Charge Pump Doubler



System Power – Charge Pump DC/DC Converters – Step-Up or Inverting

Part No.	V_{IN} Range (V)	V_{OUT} (V)	Max I_{OUT} (mA)	Frequency	I_Q	I_{SD} (µA)	Package
Regulated Charge Pump Converters (Step-Up or Inverting)							
LTC1502-3.3	0.9–1.8	3.3	10	500kHz	40µA	5	MSOP-8, SO-8
LTC1517-3.3	2.2–4.4	3.3	15	700kHz	6µA	–	ThinSOT
LTC1517-5	2.7–5	5	20	800kHz	6µA	–	ThinSOT
LTC1522	2.7–5	5	20	700kHz	6µA	–	MSOP-8, SO-8
LTC1556	2.7–10	5	20	650kHz	60µA	<1	SSOP-20
LTC1262	5	12	30	300kHz	500µA	<1	SO-8, PDIP-8
LTC1928-5	2.7–4.4	5	30	550kHz	190µA	4	ThinSOT
LTC1754-3.3	2–4	3.3	40	600kHz	13µA	<1	ThinSOT
LTC3204-3.3	1.8–4.5	3.3	50	1.2MHz	48µA	<1	2x2 DFN-6
LTC3204B-3.3	1.8–4.5	3.3	50	1.2MHz	1.25mA	<1	2x2 DFN-6
LTC1754-5	2.7–5.5	5	50	600kHz	13µA	<1	ThinSOT
LTC1514	2.7–10	3 or 5	50	650kHz	60µA	10	SO-8
LTC1515	2.7–10	3.3 or 5	50	650kHz	60µA	<1	SO-8
LTC1516	2–5	5	50	600kHz	12µA	<1	SO-8
LTC1682	1.8–4.4	3.3, 5, Adj	50	550kHz	150µA	<1	MSOP-8, SO-8
LTC1263	5	12	60	300kHz	300µA	<1	SO-8
LTC3221	1.8–4.4	Adjustable	60	600kHz	8µA	<1	2x2 DFN-6
LTC3221-3.3	1.8–4.4	3.3	60	600kHz	8µA	<1	2x2 DFN-6
LTC3221-5	2.7–5.5	5	60	600kHz	8µA	<1	2x2 DFN-6
LTC1751-3.3	2–4.4	3.3	80	800kHz	20µA	2	MSOP-8
LTC1751	2–5.5	Adjustable	100	PFM	20µA	2	MSOP-8
LTC1751-5	2.7–5.5	5	100	PFM	20µA	2	MSOP-8
LTC1983-3	3–5.5	-3	100	900kHz	25µA	<1	ThinSOT
LTC1983-5	2.3–5.5	-5	100	900kHz	25µA	<1	ThinSOT
LTC3200	2.7–4.5	Adjustable	100	2MHz	3.5mA	<1	MSOP-8
LTC3200-5	2.7–4.5	5	100	2MHz	3.5mA	<1	ThinSOT
LTC3201	2.7–4.5	Adjustable	100	1.8MHz	4mA	<1	MSOP-10
LTC3202	2.7–4.5	Adjustable	125	1.5MHz	2.5mA	<1	3x3 DFN-10, MSOP-10
LTC3204-5	2.7–5.5	5	150	1.2MHz	60µA	<1	2x2 DFN-6
LTC3204B-5	2.7–5.5	5	150	1.2MHz	3.6mA	<1	2x2 DFN-6
LTC3203B	2.7–5.5	Adjustable	500	1MHz	7mA	<1	3x3 DFN-10
LTC3203-1	2.7–5.5	4.5, 5	500	1MHz	120µA	<1	3x3 DFN-10
LTC3203B-1	2.7–5.5	4.5, 5	500	1MHz	7mA	<1	3x3 DFN-10

Low Noise, Very Low Dropout Linear Regulators

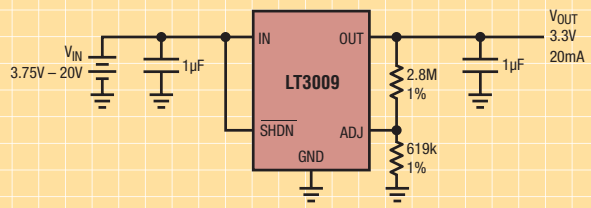
LT3009: 3µA I_Q, 20mA Low Dropout Linear Regulator

LTC3035: 300mA VLDO™ Linear Regulator with Charge Pump Bias Generator

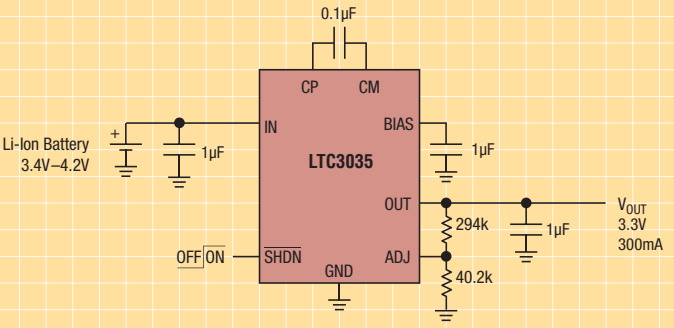
LT3009: Actual Size Complete Solution

Linear Technology's low dropout regulator products offer industry-leading low noise performance, stability with small, low ESR ceramic capacitors, very low dropout, low quiescent and shutdown currents and flexible wide input and sub-1V output voltages. In addition, they are offered in thermally and space-efficient packages to power a wide variety of portable products.

3.3V, 20mA Supply with Shutdown



3.3V, 300mA Supply from Li-Ion Battery



Part No.	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (mA)	Dropout Voltage (@I_{OUT}) (mV)	I_Q (µA)	I_{SD} (µA)	Output Voltage (V)	Package
Positive Linear Regulators								
LT3009	1.6–20	0.6–20	20	280	3	<1	Adj.	SC-70-8, 2x2 DFN-6
LT1761	1.8–20	1.22–20	100	300	20	<1	Adj., 1.5, 1.8, 2, 2.5, 2.8, 3, 3.3, 5	ThinSOT
LT3020	0.95–10	0.2–10	150	155	120	<1	Adj., 1.2, 1.5, 1.8	3x3 DFN-8
LT3023	1.8–20	1.22–20	2 x 100	300	40	<1	Adj.	3x3 DFN-10, MSOP-10
LT3027	1.8–20	1.22–20	2 x 100	300	40	<1	Adj.	3x3 DFN-10, MSOP-10
LT3024	1.8–20	1.22–20	100/500	300	60	<1	Adj.	3x4 DFN-12, TSSOP-16
LT3028	1.8–20	1.22–20	100/500	300	60	<1	Adj	3x5 DFN-16, TSSOP-16
LT1762	1.8–20	1.22–20	150	300	25	<1	Adj., 2.5, 3, 3.3, 5	MSOP-8
LTC1844	1.6–6.5	1.25–20	150	90	40	<1	Adj., 1.5, 1.8, 2.5, 2.8, 3.3	ThinSOT
LT1962	1.8–20	1.22–20	300	270	30	<1	Adj., 1.5, 1.8, 2.5, 3, 3.3, 5	MSOP-8
LTC3025	0.9–5.5	0.4–3.6	300	50	54	<1	Adj.	2x2 DFN-6
LTC3035	1.7–5.5	0.4–3.6	300	45	100	<1	Adj.	2x3 DFN-8
LTC3025-1	0.9–5.5	0.4–3.6	500	75	54	<1	Adj.	2x2 DFN-6
LT3021	0.9–10	0.2–10	500	160	120	<3	Adj., 1.2, 1.5, 1.8	5x5 DFN-10
LT1763	1.8–20	1.22–20	500	300	30	<1	Adj., 1.5, 1.8, 2.5, 3, 3.3, 5	SO-8
Negative Linear Regulators								
LT1964	(-1.9) to (-20)	(-1.22) to (-20)	200	-340	30	<1	Adj., -5	ThinSOT

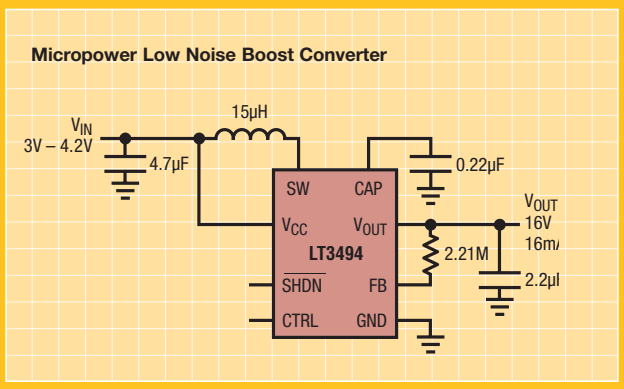
Organic LED (OLED) Power

LT3494/A: Dual 1.3A, 1.2MHz Boost/Inverter with Integrated Schottkys in 3mm x 3mm DFN

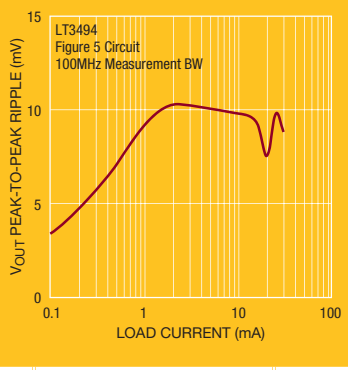
We deliver highly integrated solutions for OLED bias applications. Key features include output disconnect, soft-start and integrated Schottky diodes. Their small circuit size and high efficiency make them ideal solutions for space-conscious portable device applications such as cellular phones and media players.

LT3494: Actual Size Complete Solution

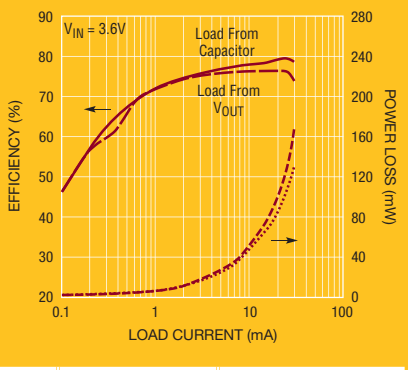
Micropower Low Noise Boost Converter



Output Voltage Ripple vs Load Current



Efficiency and Power Loss vs Load Current



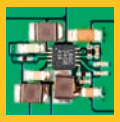
Part No.	V_{IN} (V)	$V_{OUT(MAX)}$ (V)	I_{SW} (A)*	Frequency	I_Q (µA)	Output Disconnect	Package
Organic LED (OLED) Power							
LTC3459	1.5–5.5	10	0.075	Constant Off-Time	10	Yes	ThinSOT
LT3464	2.3–10	34	0.085	Constant Off-Time	25	Yes	ThinSOT
LT3494/A	2.3–16	40	0.180/0.35	LNAPC**	65	Yes	2x3 DFN-8
LT3463	2.4–15	±40	0.25/0.25	Constant Off-Time	20	–	3x3 DFN-10
LT3463A	2.4–15	±40	0.25/0.40	Constant Off-Time	20	–	3x3 DFN-10
LT3498	2.5–12	27	0.25/0.40	2.1MHz/LNAPC**	1.65mA	Yes	2x3 DFN-12
LT3472	2.2–16	±34	0.35	1.2MHz	2.8mA	–	3x3 DFN-10
LT3473/A	2.2–16	34	1.20	1.2MHz	150	Yes	3x3 DFN-8
LT3471	2.4–16	±40	2 x 1.30	1.2MHz	2.5mA	–	3x3 DFN-10
LT1613	0.9–10	34	0.55	1.4MHz	3mA	–	ThinSOT
LT3467/A	2.4–16	40	1.1	1.3/2.1MHz	1mA	–	ThinSOT
LTC3458/L	1.5–6	7.5/6	1.4	1.5MHz	15	Yes	3x4 DFN-12
LT3487	2.3–16	±30	0.75/0.90	2MHz	3.7mA	Yes	3x3 DFN-10

* $I_{OUT} \sim 0.65\ I_{SW} \times (V_{IN} / V_{OUT})$. Estimate may vary depending on external component values.
** Low Noise Adaptive Power Control (LNAPC)

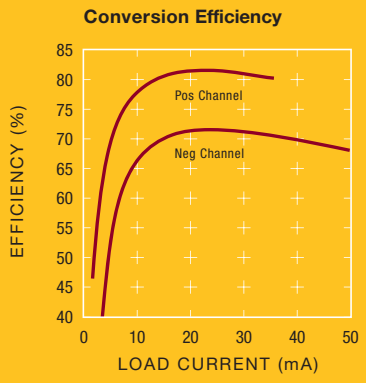
LCD and CCD Bias Power

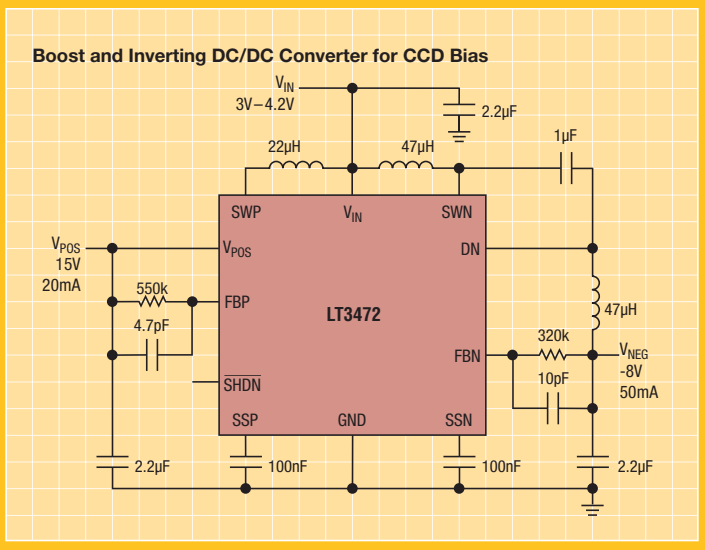
LT3472: Boost and Inverting DC/DC Converter for CCD Bias in 3mm x 3mm DFN

LCD and CCD Bias ICs deliver highly compact and efficient power supply solutions for small LCD displays and CCD imagers. Key features include wide input voltage range, built-in inrush current limiting, output disconnect and power saving controls to simplify the task of implementing power-friendly LCD displays.



LT3472: Actual Size Complete Solution





Part No.	V_{IN} (V)	$V_{OUT(MAX)}$ (V)	I_{SW} (A)	Frequency	I_Q (µA)	Output Disconnect	Package
LCD and CCD Bias Power							
LT3464	2.3–10	34	0.085	Constant Off-Time	25	Yes	ThinSOT
LTC3450	1.5–4.6	(+5), ±15	0.09	550kHz	75		3x3 QFN-16
LT1945	1.2–15	±34	0.25	Constant Off-Time	20	–	MSOP-10
LT3463/A	2.4–15	±40	0.25 x 2/0.25/0.4	Constant Off-Time	40	–	3x3 DFN-10
LT3461/A	2.5–16	38	0.30	1.3MHz/ 3MHz	2.8mA	–	ThinSOT
LT3462/A	2.5–16	-40	0.30	1.2MHz/2.7MHz	2.9mA	–	ThinSOT
LT3466-1	2.7–24	40	0.32 x 2	1.0MHz	5mA	–	3x3 DFN-10, TSSOP-16E
LT3498	2.5–12	27	0.25/0.40	2MHz/LNAPC*	1.65mA	Yes	2x3 DFN-12
LT3472	2.2–16	±34	0.35 x 2	1.2MHz	2.8mA	–	3x3 DFN-10
LT1617/-1	1.2–15	-34	0.35/0.10	Constant Off-Time	20	–	ThinSOT
LT1942	2.6–16	44	0.55/0.15/0.5/0.5	1MHz	7mA	Yes	4x4 QFN-24
LT3487	2.3–16	±30	.75/.9	2MHz	3.7mA	Yes	3x3 DFN-10
LT1930/A	2.6–16	34	1.0	1.2MHz/ 2.2MHz	4.2mA	–	ThinSOT
LT1931/A	2.6–16	-34	1.0	1.2MHz/ 2.2MHz	4.2mA	–	ThinSOT
LT3467	2.4–16	40	1.10	1.3MHz	1mA	–	ThinSOT
LT3473/A	2.2–16	34	1.20	1.2MHz	150	Yes	3x3 DFN-8
LT1946/A	2.4–16	36	1.50	1.2MHz/2.7MHz	3.2mA	–	MSOP-8
LT3471	2.4–16	±40	2 x 1.30	1.2MHz	2.5mA	–	3x3 DFN-10
LT3479	2.5–24	40	3.00	200kMz to 3.5MHz	5mA	–	4x3 DFN, TSSOP

* Low Noise Adaptive Power Control (LNAPC)

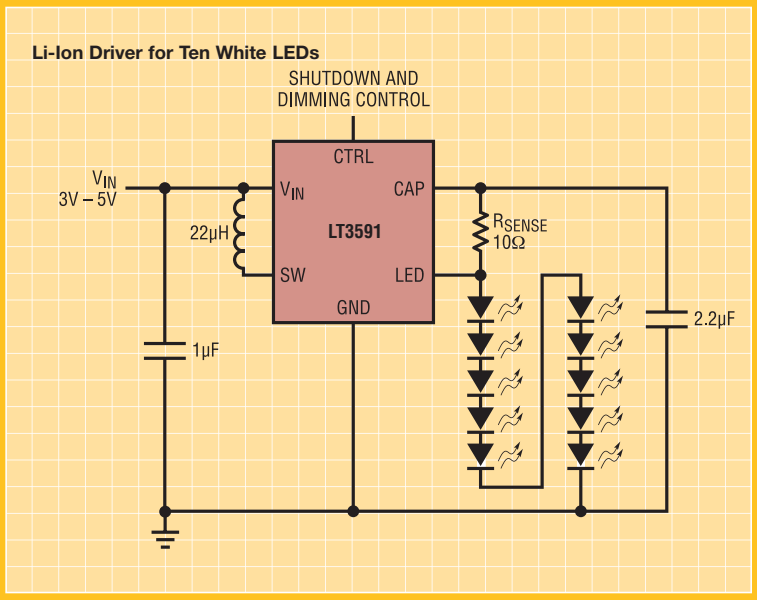
Inductor-Based LED Drivers (Up to 25mA)

LT3591: White LED Driver with Integrated Schottky and 80:1 PWM Dimming in 2mm x 3mm DFN

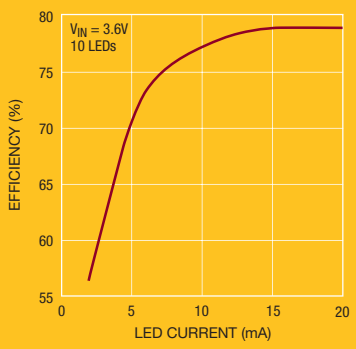
Low current inductor-based switching LED drivers ensure light-intensity matching across LEDs. Key features include the purest white LED color dimming control, low standby mode quiescent current, selectable current level, guaranteed LED brightness matching and extremely small circuit size, making them well suited for cellular phone and other portable backlight applications.

LT3591: Actual Size Complete Solution

Li-Ion Driver for Ten White LEDs



Conversion Efficiency



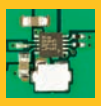
Part No.	V_{IN} (V)	$V_{OUT(MAX)}$ (V)	I_{SW} (A)	Dimming Control	Frequency (MHz)	I_Q (mA)	I_{SD} (µA)	Package
Inductor-Based LED Drivers (Up to 25mA)								
LT3491	2.5–12	27	260	300:1 PWM	2.3	2.6	<1	SC70
LT1932	1.0–10	34	400	PWM	1.2	1.2	<1	ThinSOT
LT1937	2.5–10	34	400	PWM	1.2	1.9	<1	ThinSOT, SC70
LT3465/A	2.7–16	30	400	PWM	1.2/2.2	2	<1	ThinSOT
LT3591	2.5–12	42	500	80:1 PWM	1	4	<1	2x3 DFN-8
LT1942	2.6–16	44	550	PWM	1	7	<1	4x4 QFN-24
LT1618	1.6–18	34	1.5A	PWM	1.4	1.8	<1	MSOP-10
LT3466	2.7–24	40	2 x 320	PWM	1	5.2	<1	3x3 DFN-10
LT3466-1	2.7–24	40	2 x 320	PWM	1	5.2	<1	3x3 DFN-10
LT3497	2.5–10	32	2 x 300	250:1 PWM	2.3	6	<1	2x3 DFN-10
LTC3452	2.7–5.5	5.5	1.1A	PWM, Analog	1	0.6	<1	4x4 QFN-20
LT3498	2.5–12	32	0.25/0.40	PWM, Analog	2.1/LNAPC*	1.65	<1	2x3 DFN-12

*Low Noise Adaptive Power Control (LNAPC)

High Current (100mA to 2A) LED Drivers for PhotoFlash/Torch Lighting

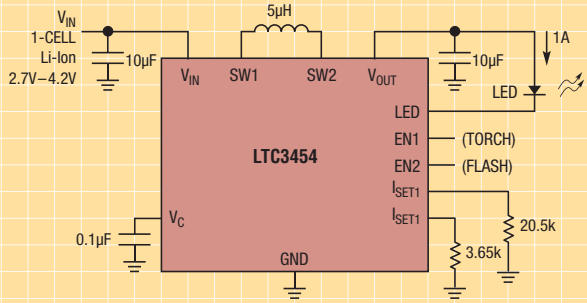
LTC3454: 1A Synchronous Buck-Boost High Current LED Driver

High current inductor-based switching LED drivers feature various topologies such as buck-boost or boost and provide tiny, efficient high power LED camera flash and video light solutions for DSC and cell-phone applications.

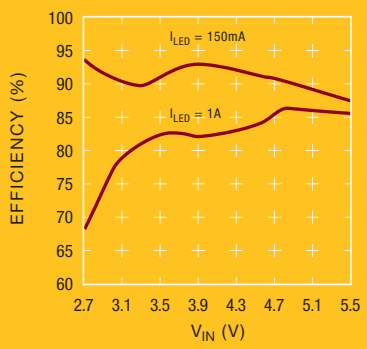


LTC3454: Actual Size Complete Solution

1A Synchronous Buck-Boost High Current LED Driver



LED Power Efficiency vs V_{IN}



Part No.	V_{IN} (V)	$V_{OUT(MAX)}$ (V)*	Max. LED Current (A)	Dimming Control	Frequency (MHz)	I_Q (mA)	I_{SD} (µA)	Package
High Current (100mA to 2A) LED Drivers for PhotoFlash/Torch Lighting								
LTC3454	2.7–5.5	5	1	PWM, Analog	1	0.8	<1	3x3 DFN
LTC3453	2.7–5.5	5	0.5	PWM, Analog	1	2.5	<6	4x4 QFN-16
LT1618	1.6–18	34	0.5	PWM, Analog	1.4	1.8	<1	MSOP-10
LT3486	2.5–24	36	0.5	1000:1 PWM	200kHz to 2MHz	9	<1	3x5 DFN-16, TSSOP-16E
LTC3452	2.7–5.5	5.5	0.4	PWM, Analog	1	0.6	<1	4x4 QFN-20
LTC3490	1.0–3.2	4	1	PWM, Analog	1.3	1	<50	3x3 DFN-8, SO-8
LT3477	2.5–25	42	2	PWM, Analog	200kHz to 3.5MHz	5	<1	4x4 QFN-20, TSSOP-20E
LT3479	2.5–24	40	2	PWM, Analog	200KHz to 3.5MHz	6.5	<1	3x4 DFN-14, TSSOP-16

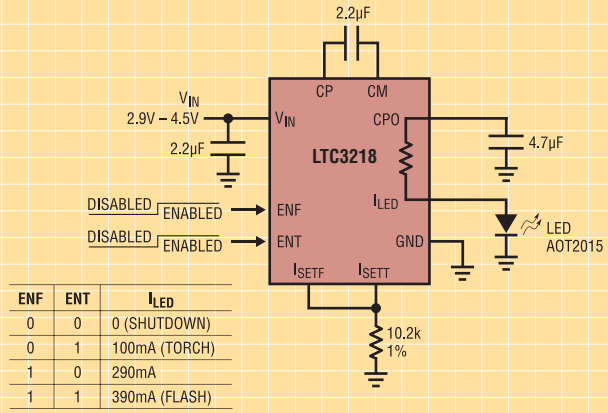
*Output voltage and current depends on the choice of LED

Low Noise, Inductorless White LED Drivers

LTC3218: 400mA Single-Wire Camera LED Charge Pump

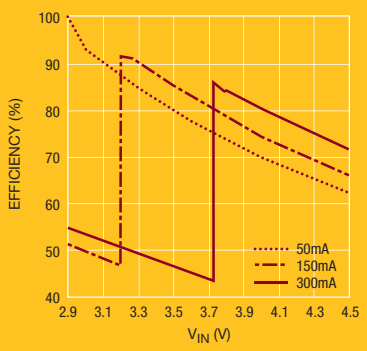
Our family of inductorless charge-pump-based LED driver products features a range of performance options, the smallest footprint and highest efficiency. The ICs efficiently drive low, medium and high current white LEDs for a wide range of camera flash applications.

400mA 1-Wire Camera LED Driver



ENF	ENT	I_{LED}
0	0	0 (SHUTDOWN)
0	1	100mA (TORCH)
1	0	290mA
1	1	390mA (FLASH)

Efficiency vs V_{IN}



LTC3218: Actual Size Complete Solution

Low Noise, Inductorless White LED Drivers

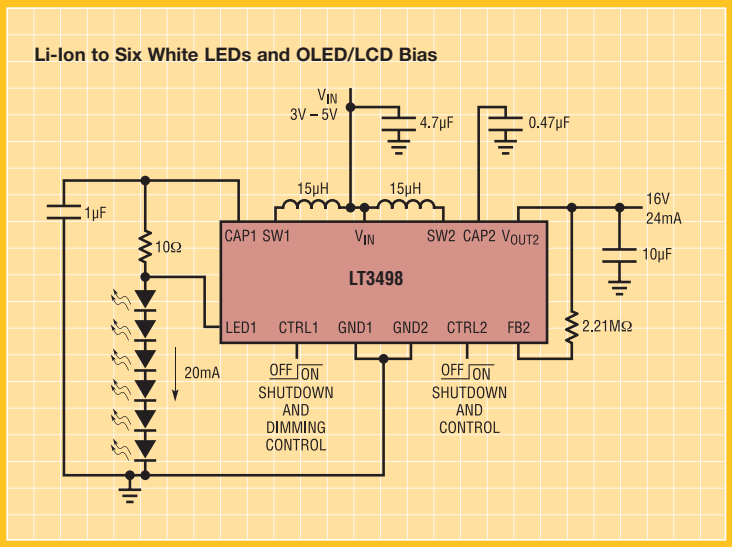
Part No.	V_{IN} (V)	Conversion Ratio	Max. Total LED Current (mA)	Max. No. of White LEDs	Dimming Control	Operating Efficiency (%)	Frequency (MHz)	I_Q (mA)	I_{SD} (µA)	Package
Low Noise, Inductorless White LED Drivers										
LTC3200-5	2.7–4.5	1x/2x	100	6	PWM	>70	2	8	<1	ThinSOT
LTC3200	2.7–4.5	1x/2x	100	6	PWM	>70	2	8	<1	MSOP-10
LTC3201	2.7–4.5	1x/2x	100	6	DAC	>70	1.7	6.5	<1	MSOP-10
LTC3202	2.7–4.5	1x/1.5x	125	8	DAC	>70	1.5	5	<1	3x3 DFN, MSOP-10
LTC3218	2.9–4.5	1x/2x	400	1*	Resistor/PWM	92	1	0.98	<1	2x3 DFN-10
LTC3214	2.9–4.4	1x/1.5x/2x	500	1*	Resistor/PWM	85	0.9	0.98	<2.5	3x3 DFN-10
LTC3217	2.9–4.5	1x/1.5x/2x	600	4*	Resistor/PWM	86	0.9	0.4	<4	3x3 QFN-16
LTC3215	2.9–4.4	1x/1.5x/2x	700	1*	Resistor/PWM	90	0.9	0.3	<2.5	3x3 DFN-10
LTC3216	2.9–4.4	1x/1.5x/2x	1000	1*	Resistor/PWM	90	0.9	0.3	<2.5	3x4 DFN-12

* Single high current LED

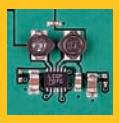
Multidisplay Switching Regulator-Based LED Drivers

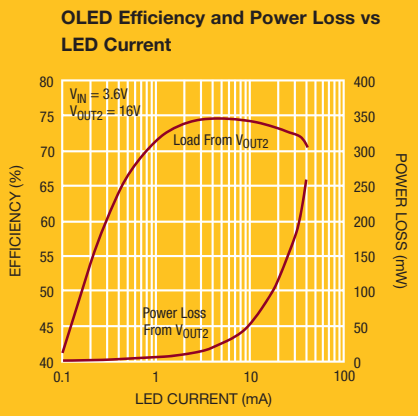
LT3498: 20mA LED Driver and OLED Driver with Integrated Schottky in 2mm x 3mm DFN

Multidisplay inductor-based white LED drivers are capable of driving up to 20 white LEDs from a single cell Li-Ion input. Key features include high-voltage internal power switches, internal Schottky diodes, adjustable switching frequency, DC dimming control, open LED protection and optimized internal compensation. They are ideal solutions for multipanel LCD backlight applications or space constrained portable applications such as cellular phones, media players and digital cameras.



LT3498: Actual Size Complete Solution





Part No.	V_{IN} (V)	Internal Switches	$I_{(SW)}$ (A)	Number of Displays	Max. No. of White LEDs	Dimming Control	Frequency (MHz)	I_{SD} (µA)	Package
Multidisplay Switching Regulator-Based LED Drivers									
LT3466	2.7–24	Dual	2 x 0.32	2	2 x 10	PWM, Analog	1.0	<1	3x3 DFN-10, TSSOP-16E
LT3466-1	2.7–24	Dual	2 x 0.32	2	2 x 10	PWM, Analog	1.0	<1	3x3 DFN-10, TSSOP-16E
LTC3452	2.7–5.5	Single	1.1	2	6	PWM, Analog	1.0	<1	4x4 QFN-20
LT3486	2.5–24	Dual	2 x 1.3	2	2 x 8	PWM, Analog	0.2 to 2	<1	4x3 DFN-16, TSSOP-16E
LT3498	2.5–12	Dual	0.25 + 0.40	2	6 + OLED	PWM, Analog	2.3/LNAPC*	<1	2x3 DFN-12
LT3497	2.5–10	Dual	2 x 0.30	2	2 x 6	250:1 True Color	2.3	<1	2x3 DFN-10

* Low Noise Adaptive Power Control (LNAPC)

Multidisplay Inductorless LED Drivers

LTC3207: 600mA Universal Multioutput LED/CAM Driver

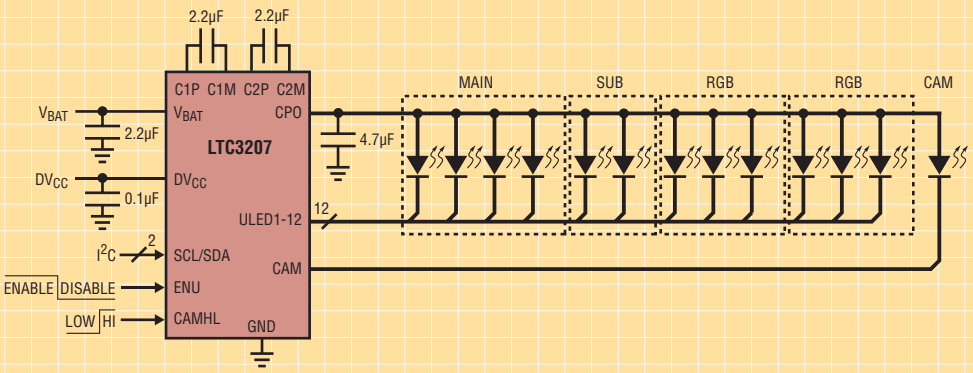
LTC3208: 1A High Efficiency 5-Display LED/CAM Driver

Our family of inductorless, multidisplay charge pump-based LED drivers features the highest level of integration, smallest footprint and highest efficiency. Individual display driver outputs eliminate the need for ballast resistors. These ICs optimize flexibility for designers of portable products, ranging from fully featured, multidisplay cellular phones to high current/high resolution camera flash modules.

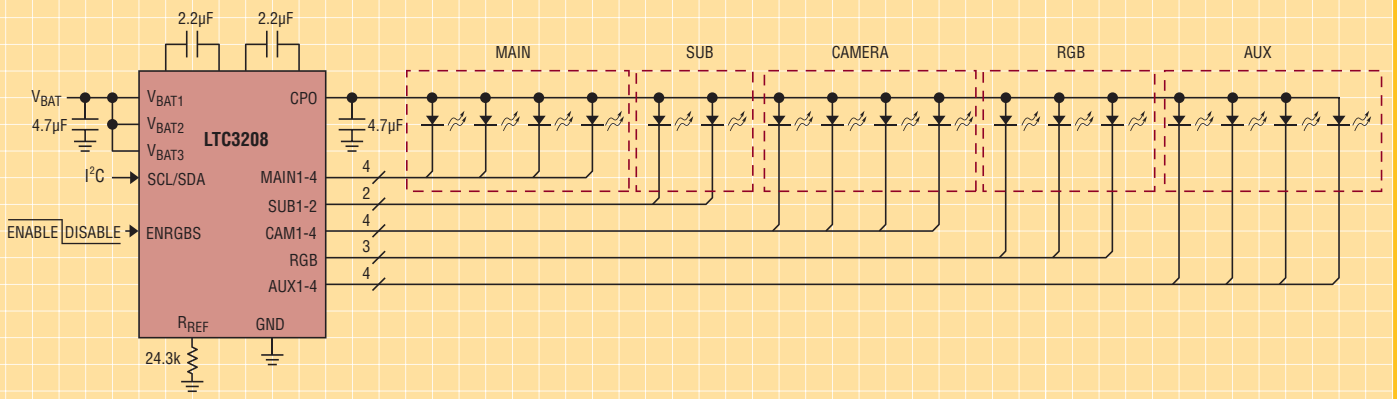
LTC3207: Actual Size Complete Solution

LTC3208: Actual Size Complete Solution

4-LED MAIN, 2-LED SUB, Dual RGB and Camera Light



High Current, High-Efficiency 5-Display LED Driver



Multidisplay Inductorless LED Drivers

Part No.	V_{IN} (V)	Conversion Ratio	Max Total LED Current (mA)	Number of Displays	Display Types	Max. No. of White LEDs	Dimming Control	Operating Efficiency (%)	Frequency	I_Q (µA)	I_{SD} (µA)	Package
Multidisplay Inductorless LED Drivers												
LTC3230	2.7–5.5	1x/1.5x/2x	125	2	Main, SUB + 2 LDOs	4 + 1	1-wire	91	800kHz	400	<3	3x3 QFN-20
LTC3205	2.8–4.5	1x/1.5x	250	3	Main, SUB, RGB	5+3+3	I²C	90	1MHz	70	<1	4x4 QFN-24
LTC3219***	2.9–5.5	1x/1.5x/2x	250	3	Main, SUB, RGB	4+2+3	I²C	93	850kHz	400	<2	3x3 QFN-20
LTC3206	2.8–4.5	1x/1.5x	400	3	Main, SUB, RGB	4+2+3	SPI*	90	1MHz	180	<1	4x4 QFN-24
LTC3210/-1	2.9–4.5	1x/1.5x/2x	500	2	Main, CAM	4+1**	1-wire	93	800kHz	400	<3	3x3 QFN-16
LTC3209-1	2.9–4.5	1x/1.5x/2x	600	3	Main, CAM, Aux	6 + 1** + 1	I²C	94	850kHz	400	<3	4x4 QFN-20
LTC3209-2	2.9–4.5	1x/1.5x/2x	600	3	Main, CAM, Aux	5 + 2** + 1	I²C	94	850kHz	400	<3	4x4 QFN-20
LTC3207*** LTC3207-1***	2.9–5.5	1x/1.5x/2x	600	4	Main, Sub, CAM, RGB	4 + 2 + 1** + 6	I²C	90	850kHz	400	<2	4x4 QFN-24
LTC3208	2.9–4.5	1x/1.5x/2x	1000	5	Main, SUB, CAM, RGB, Aux	4 + 2 + 4 + 3 + 4	I²C	90	850kHz	250	<1	5x5 QFN-32

* Serial Peripheral Interface (SPI)
** High current LED ≥200-400mA
*** Universal LED configuration for high flexibility

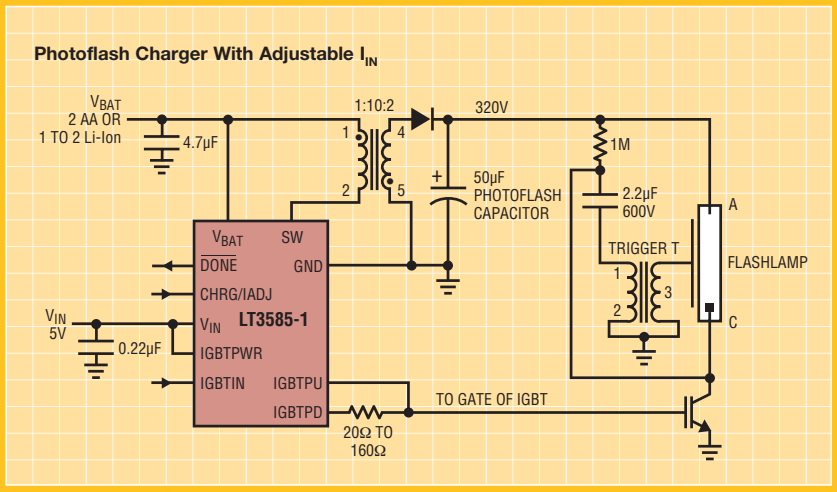
Xenon Photoflash Chargers

LT3585: Photoflash Capacitor Chargers with Adjustable Input Current and Integrated IGBT Drive

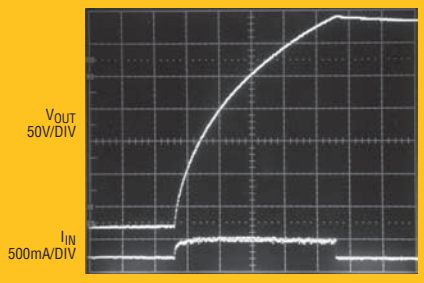
LT3585: Actual Size Complete Solution

Our growing portfolio of photoflash chargers provides effective and low profile solutions to power a Xenon flashlamp. These monolithic chargers have current ratings from 225mA to 2A, can operate from input voltages as low as 1.8V and are available in DFN, MSOP or ThinSOT packages. They require very tiny transformers, charging a 220µF capacitor to 320V from 5V in as little as 3.7 seconds.

Photoflash Charger With Adjustable I_{IN}



LT3585-1 Charging Waveform
Normal Input Current Mode



Xenon Photoflash Chargers

Part No.	V_{IN} (V)	Output Current (A)	Efficiency	I_Q (mA)	I_{SD} (µA)	Package
Xenon Photoflash Chargers						
LT3585-0/-1/-2/-3	1.5–16	0.55/0.25/0.4/0.8	>75%	5	<1	2x3 DFN
LT3484-0/-2/-1	1.8–16	1.4/1.0/0.7	>75%	5	<1	2x3 DFN
LT3485-0/-1/-2/-3	1.8–16	1.4/1.0/0.7/2	>75%	5	<1	3x3 DFN
LT3420/-1	1.8–16	1.4/1.0	>75%	300µA	<1	MSOP-10
LT3468/-1/-2	2.5–16	1.4/0.7/1.0	>80%	5	<1	ThinSOT
LT3750	3–24	Ext FET*	>75%	1.6	<1	MSOP-10

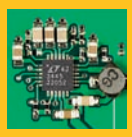
* Depends on MOSFET selection

X-Scale/Portable Processor Power

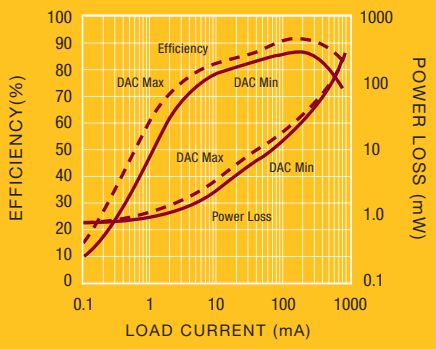
LTC3445: I²C Controllable Buck Regulator with Two LDOs

We offer a growing line of compact, high efficiency X-Scale and other portable microprocessor power supplies. Key features include high output current up to 1A, high efficiency monolithic synchronous buck regulators, LDO regulators and I²C interfaces. Input voltage ranges are all Li-Ion compatible.

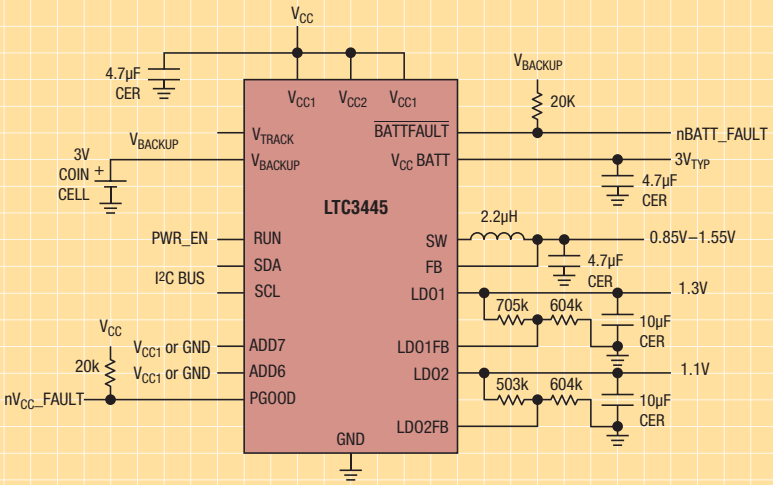
LTC3445: Actual Size Complete Solution



Efficiency and Power Loss vs Load Current, V_{CC1} = 3.6V



I²C Controllable Buck Regulator with Two LDOs



Part No.	Interface	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	Frequency	Efficiency	I_Q	I_{SD}	Package
X-Scale Processor Power									
LTC3447	I²C	2.5–5.5	0.69–2.06	0.6	1MHz	93%	33µA	<1µA	3x3 DFN-10
LTC3445	I²C	2.5–5.5	0.85–1.55	0.6	1.5MHz	93%	105µA	<1µA	4x4 QFN-24
LTC3446	–	2.7–5.5	0.80–5.5	1.00	2.25MHz	90%	100µA	<1µA	4x3 DFN-14
LTC3562	I²C	2.85–5.5	0.43–5.5	0.6x2 0.4x2	2.25MHz	95%	100µA	<1µA	3x3 QFN-20

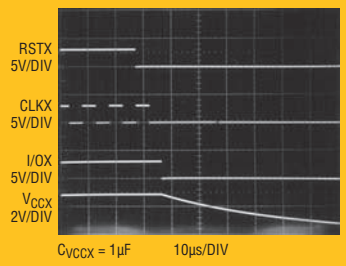
SIM & Smart Card Power

LTC4558 – Dual SIM/Smart Card Power Supply and Interface

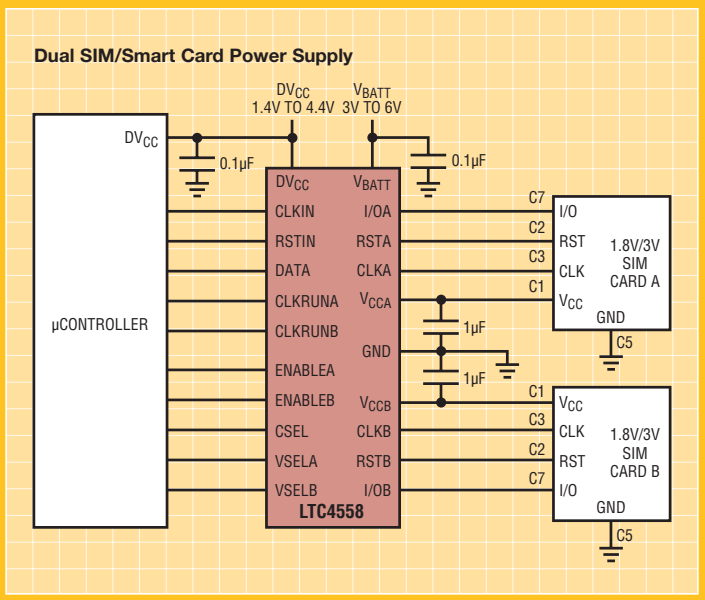
SIM and smart card interface ICs provide power conversion and signal-level shifting for subscriber identity modules (SIMs). In addition, they feature internal level translators that allow controllers operating with low voltage supplies to interface with lower voltage smart card readers. Battery run time is maximized with low operating and shutdown currents and board area is minimized with compact packaging.

LTC4558: Actual Size
Complete Solution

Deactivation Sequence



Dual SIM/Smart Card Power Supply



Part No.	V_{IN} (V)	SIM Voltage (V)	I_{OUT} (mA)	Controller V_{CC} Range (V)	I_Q (µA)	I_{SD} (µA)	Package
SIM and Smart Card Power							
LTC1755/6	2.7–6	3/5	65	2.0–5.5	60	<1	SSOP-16/-24
LTC1555L/1.8	2.5–6	1.8/3/5	50	1.45–4.4	32	<1	SSOP-16
LTC4555	3–6	1.8/3	50	1.2–4.4	20	<1	3x3 QFN-16
LTC4556	2.7–5.5	1.8/3/5	50	1.7–5.5	250	<1	4x4 QFN-24
LTC4557	2.7–5.5	1.8/3	50	1.2–5.5	65	<1	3x3 QFN-16
LTC4558	2.7–5.5	1.8/3	50	1.4–5.5	65	<1	3x3 QFN-20
LTC1955	2.7–4.5	1.8/3/5	50	1.7–5.5	250	<1	5x5 QFN-32
LTC1986	2.6–4.4	3/5	10	–	14	<1	ThinSOT

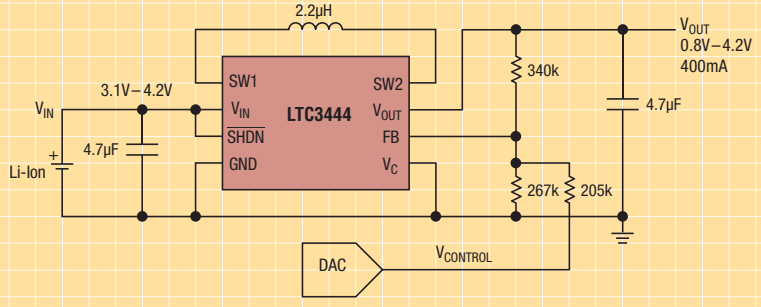
RF PA Power

LTC3444 – Micropower Synchronous Buck-Boost DC/DC Converter for HSDPA

We offer high slew rate, high efficiency PA power supplies. Key features include high output current up to 600mA and high efficiency monolithic synchronous topologies. Input voltage ranges are all Li-Ion compatible.

LTC3444: Actual Size
Complete Solution

Micropower Synchronous Buck-Boost DC/DC Converter



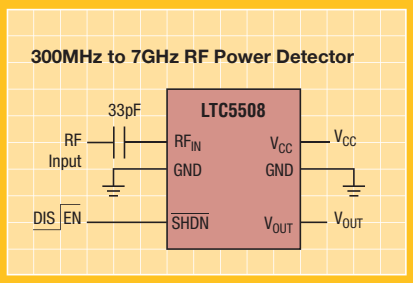
Part No.	Topology	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	Frequency	Efficiency	I_Q (µA)	I_{SD} (µA)	Package
RF PA Power									
LTC3444	Buck-Boost	2.7–5.5	0.5–V_{IN}	0.40	1.5MHz	95%	700	<1	3x3 DFN-8
LTC3403	Buck with Bypass Transistor	2.5–5.5	0.3–V_{IN}	0.60	1.5MHz	95%	20	<1	3x3 DFN-8
LTC3408	Buck with Bypass Transistor	2.5–5.5	0.3–V_{IN}	0.60	1.5MHz	95%	1.5mA	<1	3x3 DFN-8

RF Power Detectors/Demodulators

LTC5508: 300MHz to 7GHz RF Power Detector

Applications include:

- GSM/EDGE
- CDMA/CDMA2000
- W-CDMA/UMTS
- PHS/PCS
- WiMAX
- 802.11/15/16
- ISM Band Radios



Part No.	Detector Type	Frequency Range	Dynamic Range	Supply Voltage	Supply Current	Package
RF Power Detectors/Demodulators						
LT5537	Wide Dynamic Range Log	LF to 1GHz	90dB	2.7–5.25V	13.5mA	2x3 DFN-8
LTC5536	Detector w/ Comparator	600MHz to 7GHz	38dB	2.7–5.5V	2.1mA	ThinSOT
LTC5535	Schottky w/ 12MHz BW	600MHz to 7GHz	42dB	2.7–5.5V	2mA	ThinSOT
LT5534	Low Drift Log Detector	50MHz to 3GHz	60dB	2.7–5.25V	7mA	2x2 SC70
LTC5533	Dual Precision Schottky Peak Detector	300MHz to 11GHz	44dB	2.7–6V	450µA (Each Detector)	3x4 DFN-12
LTC5532	Precision Schottky Peak Detector	300MHz to 12GHz	42dB	2.7–6V	500µA	ThinSOT
LTC5531	Precision Schottky Peak w/Offset & S/D	300MHz to 7GHz	42dB	2.7–6V	500µA	ThinSOT
LTC5530	Precision Schottky Peak w/Gain Adj. & S/D	300MHz to 7GHz	42dB	2.7–6V	500µA	ThinSOT
LTC5508	Schottky Peak Detector	300MHz to 7GHz	44dB	2.7–6V	550µA	2x2 SC70
LTC5509	Schottky Peak Detector	300MHz to 3GHz	36dB	2.7–6V	580µA	2x2 SC70
LTC5507	Schottky Peak Detector	100kHz to 1GHz	48dB	2.7–6V	550µA	ThinSOT
LTC5505	Low-Cost Schottky Peak Detector	300MHz to 3GHz	44dB	2.7–6V	500µA	ThinSOT

RF PA Power Controllers

Part No.	Package	RF PA Compatible/Comments
RF PA Power Controllers		
LTC1757A	MSOP-8, MSOP-10	Legacy RF PA Such as RF3103
LTC1758	MSOP-8, MSOP-10	Slow Turn on RF PAs Such as PF08123, RF3160, CX77304, RF3160
LTC1957	MSOP-8, MSOP-10	Fast Turn on RF PAs Such as RF3108, PF0819B, RF2138/RF2140
LTC4400	ThinSOT	Fast Turn on RF PAs Such as RF3108, PF0819B, RF2138/RF2140
LTC4401	ThinSOT	Slow Turn on RF PAs Such as PF08123, RF3160, CX77304, RF3160
LTC4402/3	MSOP-8, MSOP-10	EDGE/TDMA (ANSI-136), AM Modulation

Sales Offices

NORTH AMERICA

GREATER BAY AREA

Bay Area
720 Sycamore Dr.
Milpitas, CA 95035
Tel: (408) 428-2050
Fax: (408) 432-6331

Sacramento
2260 Douglas Blvd., Ste. 280
Roseville, CA 95661
Tel: (916) 787-5210
Fax: (916) 787-0110

PACIFIC NORTHWEST

Denver
7007 Winchester Cir., Ste. 130
Boulder, CO 80301
Tel: (303) 926-0002
Fax: (303) 530-1477

Portland
5005 SW Meadows Rd., Ste. 410
Lake Oswego, OR 97035
Tel: (503) 520-9930
Fax: (503) 520-9929

Salt Lake City
Tel: (801) 731-8008

Seattle
2018 156th Ave. NE, Ste. 100
Bellevue, WA 98007
Tel: (425) 748-5010
Fax: (425) 748-5009

SOUTHWEST AREA

Los Angeles
21243 Ventura Blvd., Ste. 238
Woodland Hills, CA 91364
Tel: (818) 703-0835
Fax: (818) 703-0517

Orange County
15375 Barranca Pkwy., Ste. A-213
Irvine, CA 92618
Tel: (949) 453-4650
Fax: (949) 453-4765

San Diego
5090 Shoreham Place, Ste. 110
San Diego, CA 92122
Tel: (858) 638-7131
Fax: (858) 638-7231

CENTRAL AREA

Chicago
2040 E. Algonquin Rd., Ste. 512
Schaumburg, IL 60173
Tel: (847) 925-0860
Fax: (847) 925-0878

Cleveland
7550 Lucerne Dr., Ste. 106
Middleburg Heights, OH 44130
Tel: (440) 239-0817
Fax: (440) 239-1466

Columbus
Tel: (614) 488-4466

Detroit
39111 West Six Mile Road
Livonia, MI 48152
Tel: (734) 779-1657
Fax: (734) 779-1658

Indiana
Tel: (317) 581-9055

Kansas
Tel: (913) 829-8844

Minneapolis
7805 Telegraph Rd., Ste. 225
Bloomington, MN 55438
Tel: (952) 903-0605
Fax: (952) 903-0640

Wisconsin
Tel: (262) 859-1900
NORTHEAST AREA

Boston
15 Research Place
North Chelmsford, MA 01863
Tel: (978) 656-4750
Fax: (978) 656-4760

Connecticut
Tel: (860) 228-4104

Philadelphia
3220 Tillman Dr., Ste. 120
Bensalem, PA 19020
Tel: (215) 638-9667
Fax: (215) 638-9764

SOUTHEAST AREA

Atlanta
Tel: (770) 888-8137

Austin
8500 N. Mopac, Ste. 603
Austin, TX 78759
Tel: (512) 795-8000
Fax: (512) 795-0491

Dallas
17000 Dallas Pkwy., Ste. 200
Dallas, TX 75248
Tel: (972) 733-3071
Fax: (972) 380-5138

Fort Lauderdale
Tel: (954) 473-1212

Houston
1080 W. Sam Houston Pkwy., Ste. 225
Houston, TX 77043
Tel: (713) 463-5001
Fax: (713) 463-5009

Huntsville
Tel: (256) 881-9850

Orlando
Tel: (407) 688-7616

Raleigh
15100 Weston Pkwy., Ste. 202
Cary, NC 27513
Tel: (919) 677-0066
Fax: (919) 678-0041

Tampa
Tel: (813) 634-9434

ASIA

CHINA

Linear Technology Corp. Ltd.
Units 1503-04, Metroplaza Tower 2
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: +852 2428-0303
Fax: +852 2348-0885

Linear Technology Corp. Ltd.
Room 902, Evergo Tower
1325 Huaihai M. Road
Shanghai, 200031, PRC
Tel: +86 (21) 6375-9478
Fax: +86 (21) 5465-5918

Linear Technology Corp. Ltd.
Room 816, 8/F
China Electronics Plaza B
No. 3 Dan Ling Rd., Hai Dian District
Beijing, 100080, PRC
Tel: +86 (10) 6801-1080
Fax: +86 (10) 6805-4030

Linear Technology Corp. Ltd.
Room 2604, 26/F
Excellence Times Square Building
4068 YiTian Road, Futian District
Shenzhen, 518048, PRC
Tel: +86 755-8236-6088
Fax: +86 755-8236-6008

JAPAN

Linear Technology KK
8F Shuwa Kioicho Park Bldg.
3-6 Kioicho Chiyoda-ku
Tokyo, 102-0094, Japan
Tel: +81 (3) 5226-7291
Fax: +81 (3) 5226-0268

Linear Technology KK
6F Kearny Place Honmachi Bldg.
1-6-13 Awaza, Nishi-ku
Osaka-shi, 550-0011, Japan
Tel: +81 (6) 6533-5880
Fax: +81 (6) 6543-2588

Linear Technology KK
7F, Sakuradori Ohtsu KT Bldg.
3-20-22 Marunouchi, Naka-ku Nagoya-shi,
460-0002, Japan
Tel: +81 (52) 955-0056
Fax: +81 (52) 955-0058

KOREA

Linear Technology Korea Co., Ltd.
Yundang Building, #1002
Samsung-Dong 144-23
Kangnam-Ku, Seoul
135-090 Korea
Tel: +82 (2) 792-1617
Fax: +82 (2) 792-1619

SINGAPORE

Linear Technology Pte. Ltd.
507 Yishun Industrial Park A
Singapore 768734
Tel: +65 6753-2692
Fax: +65 6752-0108

TAIWAN

Linear Technology Corporation
8F-1, 77, Nanking E. Rd., Sec. 3
Taipei, Taiwan
Tel: +886 (2) 2505-2622
Fax: +886 (2) 2516-0702

EUROPE

FINLAND

Linear Technology AB
Teknobulevardi 3-5
P.O. Box 35
FIN-01531 Vantaa
Finland
Tel: +358 (0)9 2517 8200
Fax: +358 (0)9 2517 8201

FRANCE

Linear Technology S.A.R.L.
Parc Tertiaire Silic
2 Rue de la Couture, BP10217
94518 Rungis Cedex
France
Tel: +33 (1) 56 70 19 90
Fax: +33 (1) 56 70 19 94

GERMANY

Linear Technology GmbH
Osterfeldstrasse 84, Haus C
D-85737 Ismaning
Germany
Tel: +49 (89) 962455-0
Fax: +49 (89) 963147

Linear Technology GmbH
Haselburger Damm 4
D-59387 Ascheberg
Germany
Tel: +49 (2593) 9516-0
Fax: +49 (2593) 951679

Linear Technology GmbH
Jesinger Strasse 65
D-73230 Kirchheim/Teck
Germany
Tel: +49 (0)7021 80770
Fax: +49 (0)7021 807720

ITALY

Linear Technology Italy Srl
Orione 3, C.D. Colleoni
Via Colleoni, 17
I-20041 Agrate Brianza (MI)
Italy
Tel: +39 039 596 5080
Fax: +39 039 596 5090

SWEDEN

Linear Technology AB
Electrum 204
Isafjordsgatan 22
SE-164 40 Kista
Sweden
Tel: +46 (8) 623 16 00
Fax: +46 (8) 623 16 50

UNITED KINGDOM

Linear Technology (UK) Ltd.
3 The Listons, Liston Road
Marlow, Buckinghamshire SL7 1FD
United Kingdom
Tel: +44 (1628) 477066
Fax: +44 (1628) 478153

Linear Technology Corporation
1630 McCarthy Blvd.
Milpitas, CA 95035-7417
Tel: 1-800-4-LINEAR
(408) 432-1900
Fax: (408) 434-6441
www.linear.com

LW10087KR