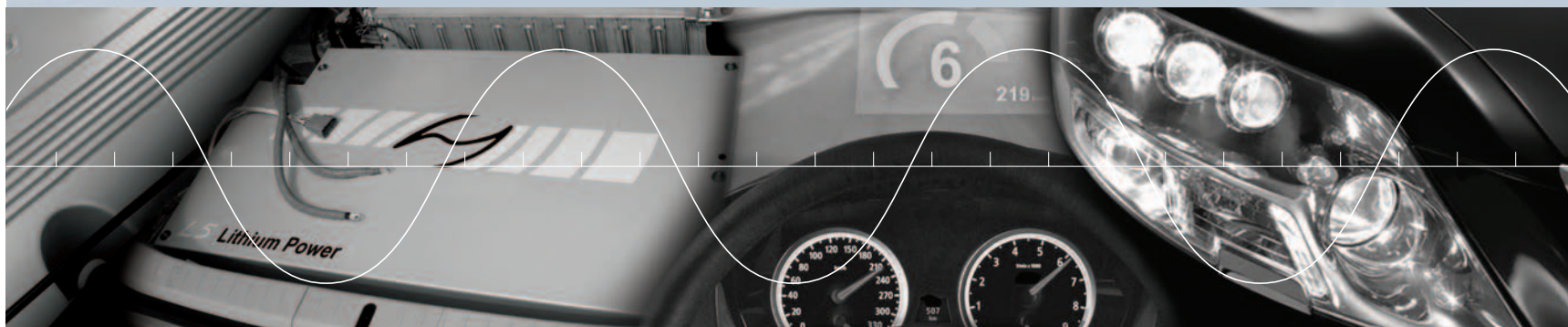


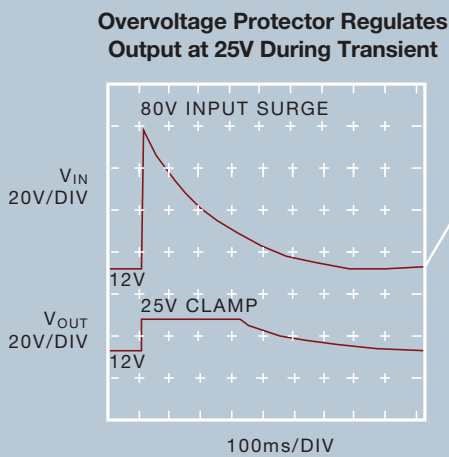
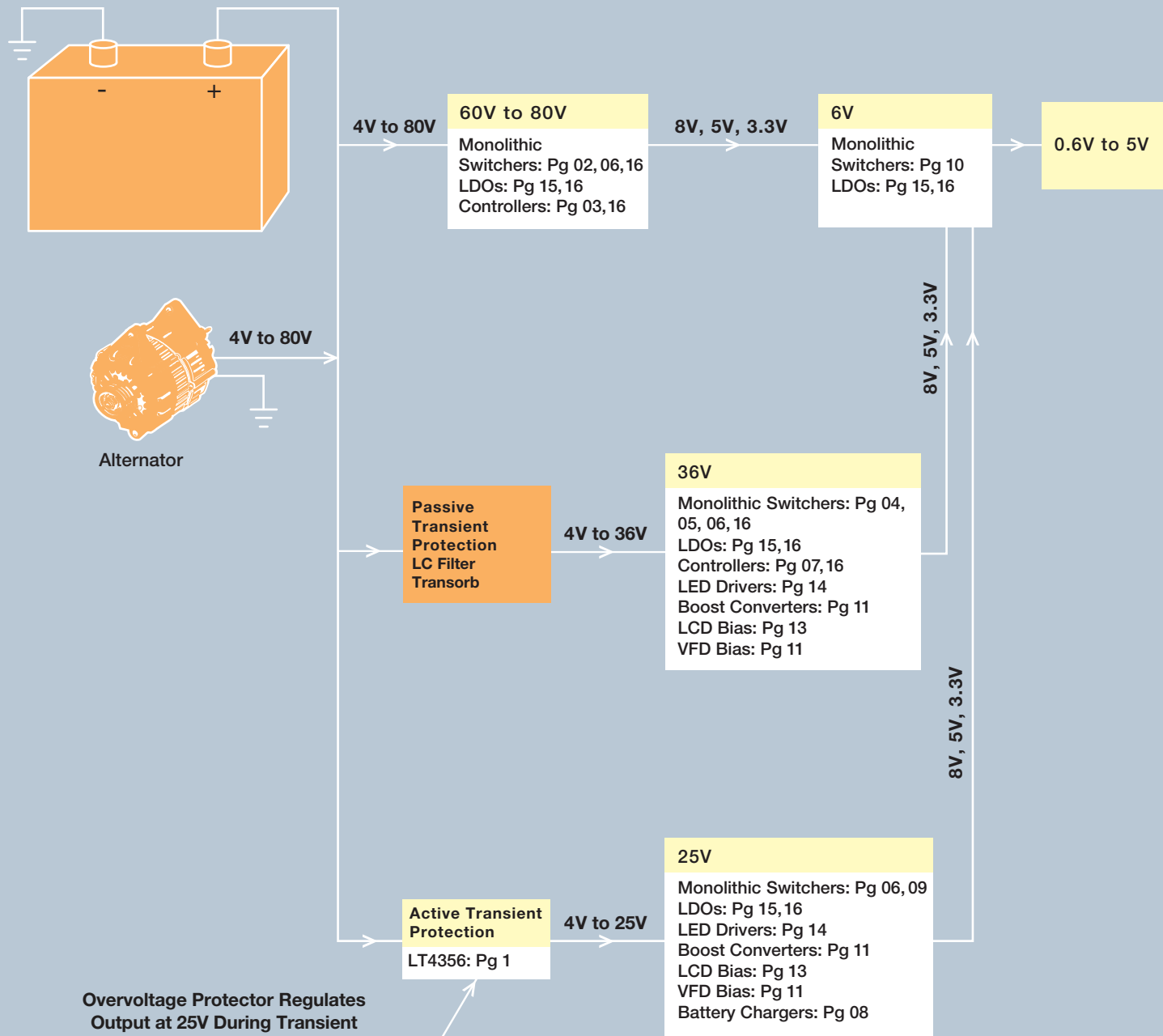
VOL 2

Automotive Electronics Solutions

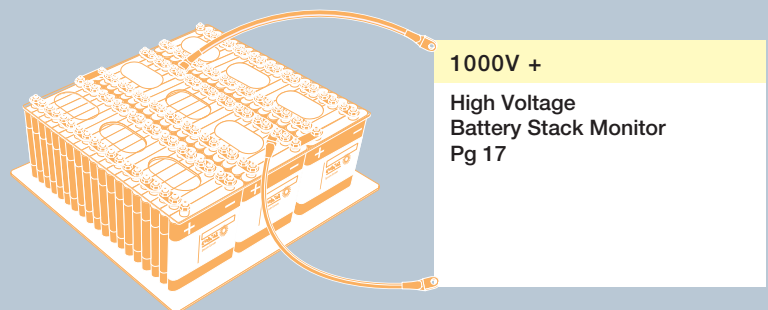
High Performance Analog ICs



Typical Automotive Power Architecture

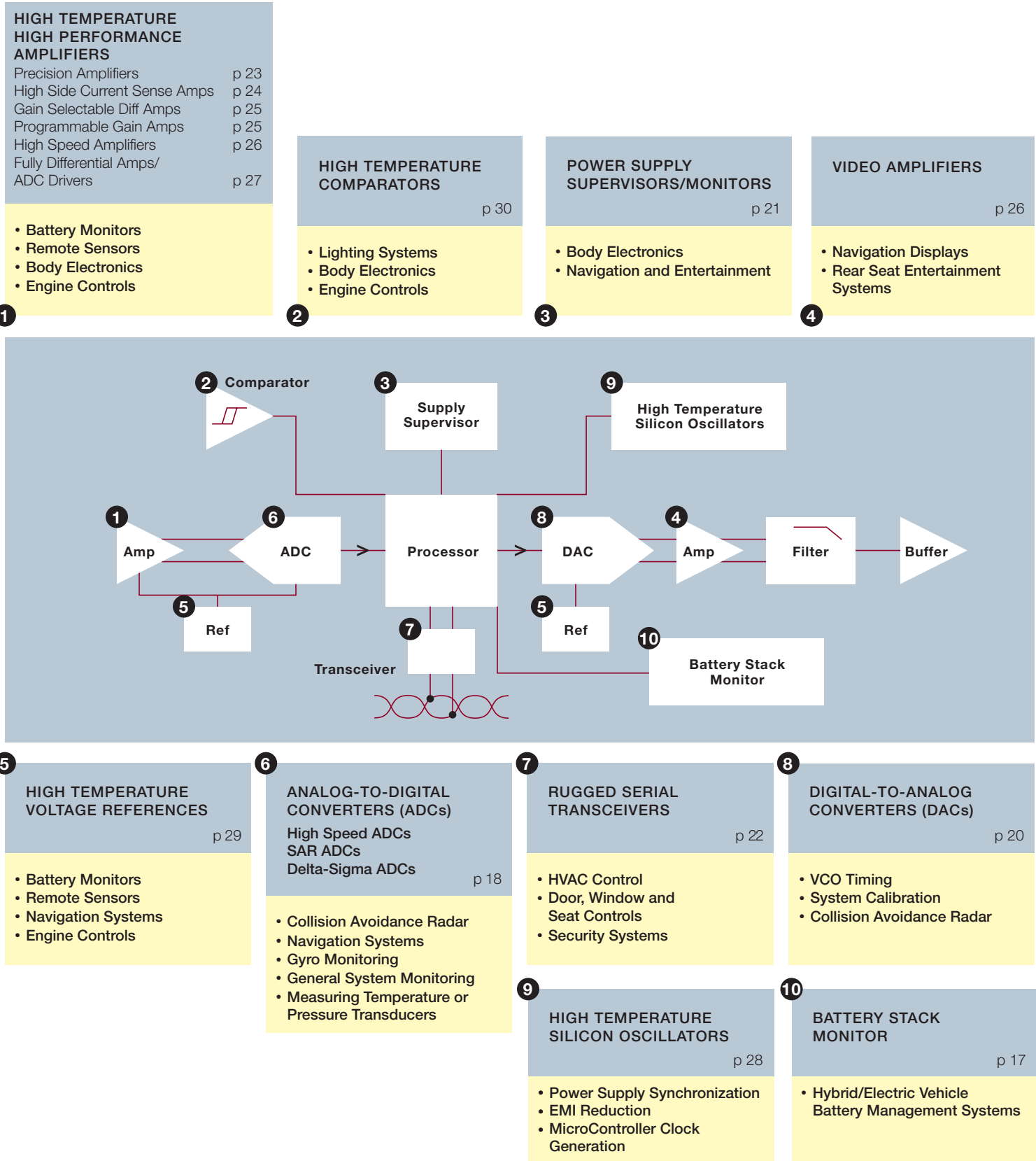


Hybrid/Electric Vehicle Power



Automotive Signal Chain Products

Linear Technology's signal chain ICs are designed, manufactured and tested to thrive in harsh under-hood environments. Automotive-grade data converters, amplifiers, monitors, voltage references, filters and oscillators offer outstanding performance, high reliability, ruggedness, and are fully specified over a wide temperature range. For example, Linear Technology's Over-The-Top™ high precision amplifiers can operate with inputs that exceed the supply rails, and ensure guaranteed -40°C to 125°C specifications, low quiescent current, reverse supply protection and reliable small footprint packages.



Today's automotive environment demands high input voltage capability, wide operating temperature ranges and efficient thermal management. Consumer expectations and extended warranties demand years of trouble-free operation, so rugged dependable power conversion and management, signal conditioning and data conversion solutions are essential. Linear Technology's high-performance analog ICs provide efficient, compact and dependable solutions for use in all kinds of automotive systems.

This selection guide features recommended Linear Technology solutions for a wide range of functions commonly used in today's automobiles, including telematics and infotainment systems, body electronics and engine management, safety systems and GPS/navigation systems. For information on our latest product releases for the continuously evolving automotive market, visit our web site at www.linear.com.

Linear Technology Quality Certifications and Awards

1993

ISO9001 Certification

1998

Ford Q1 Preferred Quality

1998

QS9000 Certification

2001

ISO14001 Certification

2003

TS16949: 2002 Certification

ISO9001: 2000 Certification

Delphi Commendation Award

2004

Harmon/Becker Automotive Systems
A-Supplier Award, Best Supplier Rating,
0ppm failure rate, 0 complaints

2005

Northrop Grumman

Gold Supplier Award

Rockwell Collins Top Preferred Supplier

2007

Cisco Excellence in Quality (#1) Award

Fluke Outstanding Supplier Award

Quality Assurance and Reliability

Linear Technology is a supplier to major OEM and Tier 1 automotive customers worldwide. Our commitment to the automotive industry is underscored by our dedication to quality, reliability and customer service.

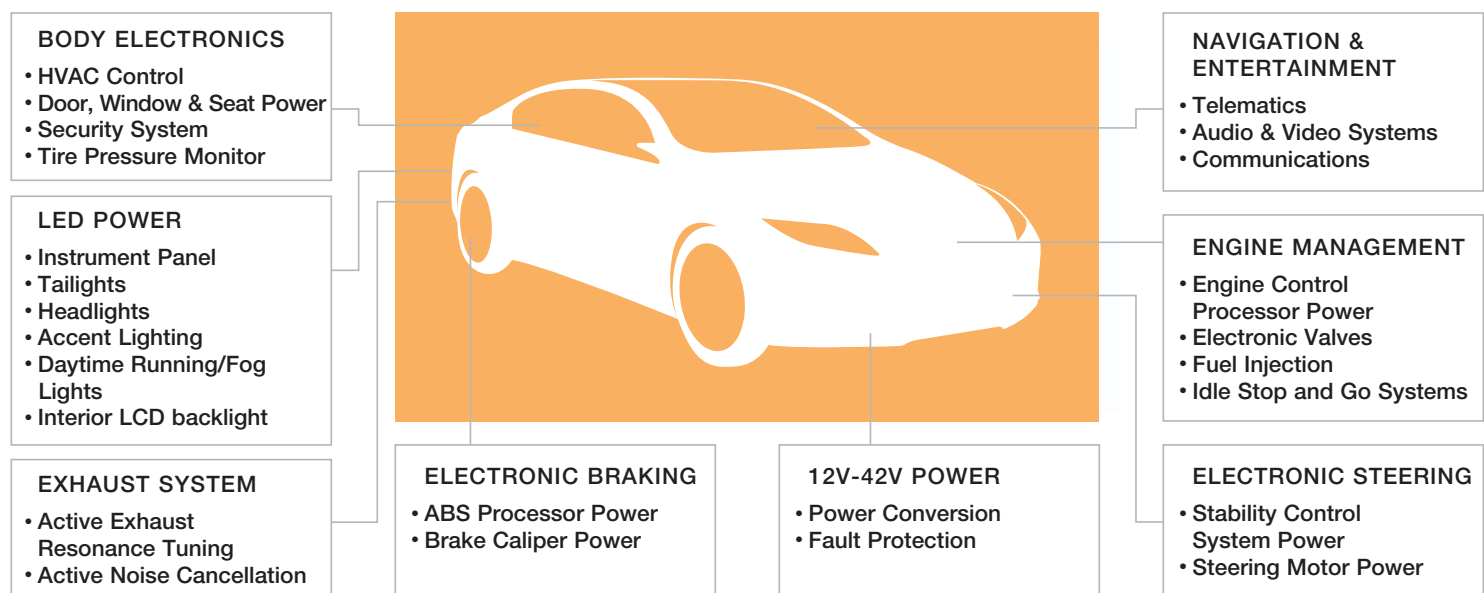
- We were among the first semiconductor companies to become certified to the TS16949-2002 standard, a distinction we have maintained since 2003.
- We qualify our automotive products according to the Automotive Electronics Council's AEC - Q100 standard.
- We have a demonstrated quality level below 2 defects per million units shipped.
- We offer best in class product reliability at 0.1FITs.

The cornerstone of Linear Technology's Quality, Reliability & Service Program is to achieve 100% customer satisfaction by producing the most technically advanced product with the best quality, on-time delivery, and service. Management is fully committed to this goal, but to achieve this goal requires the involvement and dedication of every employee.

Linear Technology's quality standard is error-free products and error-free performance. This standard commits all Linear Technology employees to a philosophy of continuous improvement and to a Quality, Reliability and Service policy that takes precedence over all other considerations and leaves no room for error or failures. Our goal is zero defects.

Please visit www.linear.com/designtools/quality/ for more information.

Automotive Electronics

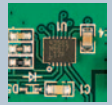


LT4356 Surge Stopper: Overvoltage Protection Regulator and Inrush Current Limiter

The LT4356 Surge Stopper eliminates the need for bulky filtering components (capacitors, inductors, TVS diodes, fuses) by isolating low voltage circuitry from damaging spikes and surges found in automotive, avionic and industrial systems. The LT4356 offers complete front-end protection, guards against overloads and short circuits and withstands input voltage reversal with a simple IC/MOSFET solution. An important distinction from existing products is that it protects against DC overvoltage and overcurrent, which ordinary surge suppressors cannot do.

Under normal conditions, the LT4356 drives the MOSFET fully on, so that input power passes through directly to the load with very little loss. If the input voltage rises above a set threshold, the LT4356 regulates the output at a safe level. The regulating action eliminates the need to use high-voltage-rated components downstream. Instead, less costly components may be used, while the LT4356 blocks high voltages from reaching them.

The LT4356 provides the ability to ride out transients for continued system operation. If the fault persists, an adjustable timer sets the time limit to ensure the MOSFET stays within its operating limits before the load is disconnected and the system is shut down. The timer capacitor is charged with a current proportional to the voltage drop, V_{DS} . For an overcurrent fault, the timer charging current is This unique feature takes better advantage of the Safe Operating Area (SOA) of the MOSFET than would a fixed timer interval, allowing the user to size the MOSFET accordingly.

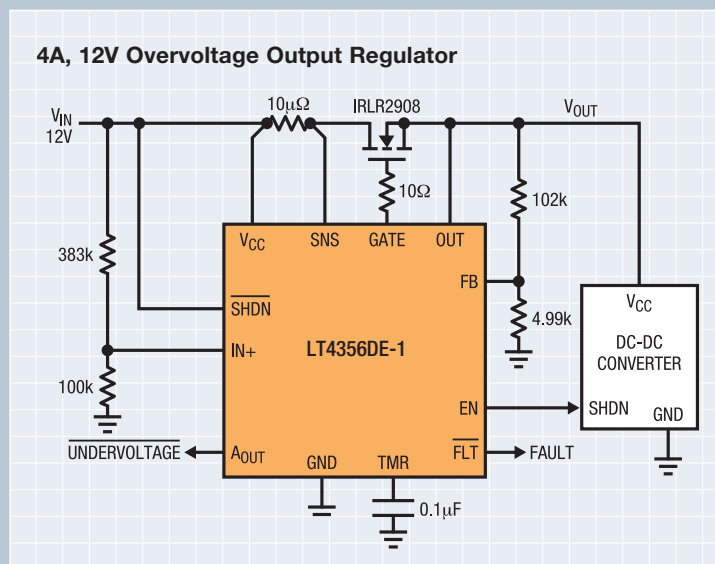


LT4356: Actual Size

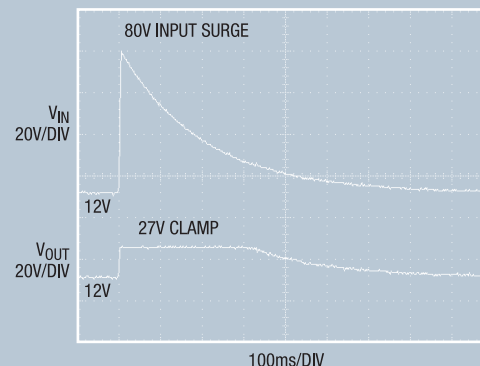
LT4356: Overvoltage Protection Regulator and Inrush Limiter

Features:

- Stops High Voltage Surges
- Adjustable Output Clamp Voltage
- Overcurrent Protection
- Wide Operation Range: 4V to 80V
- Reverse Input Protection to -60V
- Low 7 μ A Shutdown Current
- Adjustable Fault Timer
- Inrush Current Limiting
- Controls N-Channel MOSFET
- Shutdown Pin Withstands -60V to 100V
- Fault Output Indication
- Spare Amplifier for Level Detection Comparator or Linear Regulator Controller
- H-Grade Operation to 125°C
- Available in (4mm \times 3mm) 12-Pin DFN or 10-Pin MSOP Packages
- Also Offered in 16-Pin SOIC for Intrinsic Safety Applications



Overvoltage Protector Regulates Output at 27V During Transient



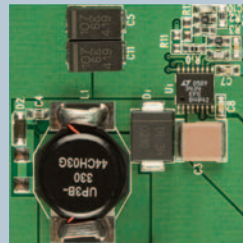
60V_{IN}, High Efficiency Monolithic Step-Down DC/DC Converters

Many automotive systems are required to operate in always-on mode, even when the ignition is turned off. For these applications, Linear Technology offers a broad line of step-down DC/DC converters that operate with less than 100μA of quiescent current, minimizing battery drain when the car is not running. Additionally, these devices can withstand transient input voltages from 60V to 80V found in load dump conditions while maintaining output voltage regulation. Similarly, they can operate from input voltages less than 4V, allowing them to regulate through the cold-crank scenario as well. Efficiencies as high as 90% can be maintained, minimizing thermal issues, and switching frequencies as high as 500kHz minimize solution footprints while keeping switching noise out of critical frequency bands.

LT3434: High Voltage 3A, 200kHz Step-Down Switching Regulator with 100μA Quiescent Current

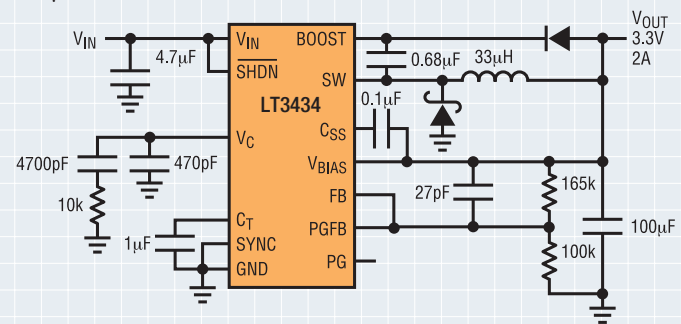
Features:

- Wide Input Range: 3.3V to 60V
- 3A Peak Switch Current
- Burst Mode® Operation: 100μA Quiescent Current**
- Low Shutdown Current: $I_o < 1\mu A$
- PowerGood Flag with Programmable Threshold
- Load Dump Protection to 60V
- 200kHz Switching Frequency
- Saturating Switch Design: 0.1Ω
- Peak Switch Current Maintained Over Full Duty Cycle Range
- 1.25V Feedback Reference Voltage
- Easily Synchronizable
- Soft-Start Capability
- Small 16-Pin Thermally Enhanced TSSOP Package

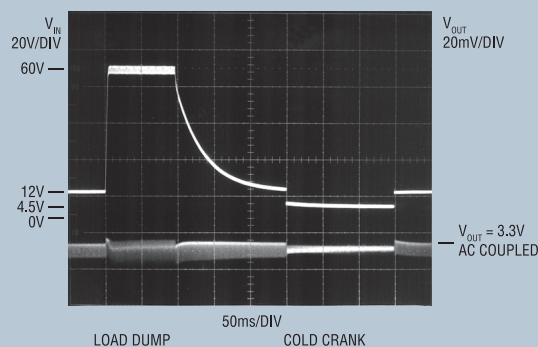


LT3434: Actual Size

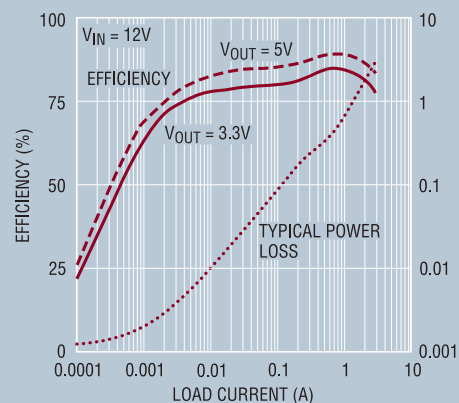
14V to 3.3V Step-Down Converter with 100μA No Load Quiescent Current



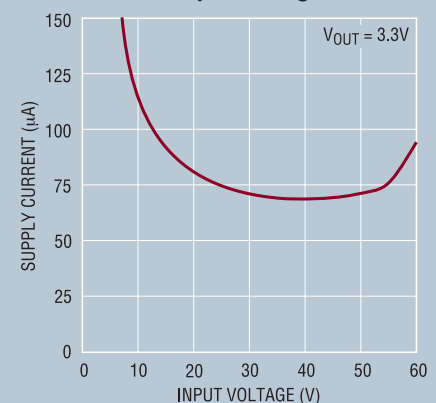
LT3434 Load Dump and Cold Crank



Efficiency and Power Loss vs Load Current



Supply Current vs Input Voltage



60V_{IN}, Low Quiescent Current ($\leq 100\mu A$) Monolithic Step-Down DC/DC Converters

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)	Frequency (kHz)	Ext Sync Range (kHz)	I _Q (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LT3437	Step-Down Regulator	3.3 to 80	1.25	0.40	200	240 to 700	100	1	140	3x3 DFN-10, TSSOP-16E
LT3433	Buck-Boost Regulator	4 to 60	3.3	0.40	200	n/a	100	10	125	TSSOP-16E
LT1976/-1	Step-Down Regulator	3.3 to 60	1.2	1.25	200/100	230 to 600	100	1	140	TSSOP-16E
LT1977	Step-Down Regulator	3.3 to 60	1.2	1.25	500	575 to 700	100	1	140	TSSOP-16E
LT3434	Step-Down Regulator	3.3 to 60	1.2	2.50	200	230 to 500	100	1	125	TSSOP-16E
LT3435	Step-Down Regulator	3.3 to 60	1.2	2.50	500	575 to 700	100	1	125	TSSOP-16E

60V_{IN} Monolithic Switching Regulators

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)	Frequency (kHz)	Ext Sync Range (kHz)	I _Q (mA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LT1676	Step-Down Regulator	7.4 to 60	1.24	0.44	100	130 to 250	3.2	30	125	N8/SO-8
LT1956/-5	Step-Down Regulator	5.5 to 60	1.2	1.2	500	580 to 700	2.5	25	125	TSSOP-16/E
LT1766/-5	Step-Down Regulator	5.5 to 60	1.2	1.2	200	228 to 700	2.5	25	140	TSSOP-16/E
LT3431	Step-Down Regulator	5.5 to 60	1.2	2.5	500	580 to 700	2.5	30	125	TSSOP-16E
LT3430/-1	Step-Down Regulator	5.5 to 60	1.2	2.5	200/100	228 to 700	2.5	30	125	TSSOP-16E
LT3992*	Dual Step-Down Regulator	3.0 to 60, 80 max	0.8	2 × 3.0	250 to 2.5MHz	250 to 2.5MHz	3.5	1	150	TSSOP-28E, 5×5 QFN-28

* Future Product

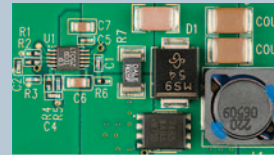
60V_{IN} Low Quiescent Current DC/DC Controllers

Many automotive systems are required to operate in always-on mode, even when the ignition is turned off. For these applications, Linear Technology offers a broad line of step-down DC/DC controllers that operate with less than 120μA of quiescent current, minimizing battery drain when the car is not running. These devices can withstand transient input voltages from 60V to 100V found during load dump conditions while maintaining output voltage regulation. Similarly, they can operate from input voltages as low as 4V, allowing them to regulate during cold-crank conditions. Efficiencies as high as 97% can be achieved, minimizing thermal issues, and switching frequencies as high as 1MHz minimize solution footprints while keeping switching noise out of critical frequency bands.

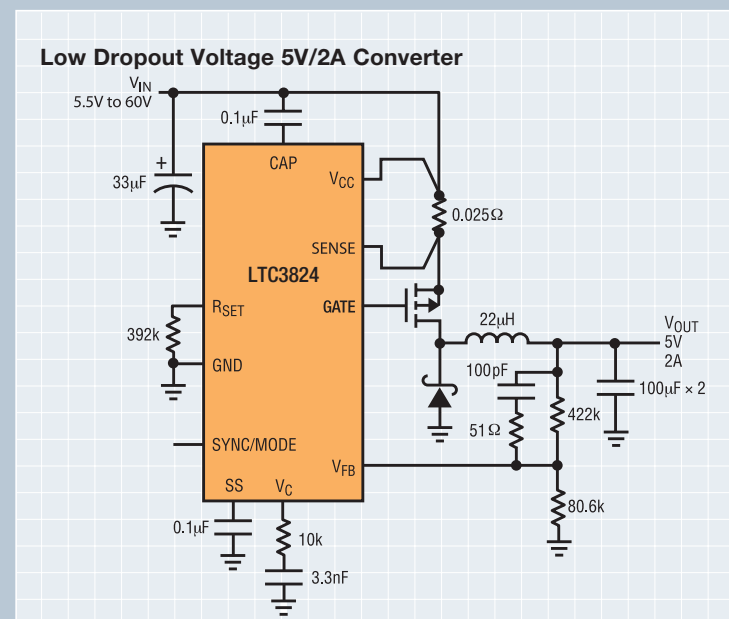
LTC3824: 60V Step-Down Controller with 40μA Quiescent Current

Features:

- Wide Input Voltage range: 4V to 60V
- Very Low Dropout Operation: 100% Duty Cycle
- Powerful On-Board 2A Gate Driver
- Programmable Operating Frequency: 200kHz to 600kHz
- Synchronizable to an external Clock
- Selectable High Efficient Burst Mode Operation
- Programmable Soft-Start
- Adjustable Current Limit
- Output Adjustable Down to 0.8V
- Small MSOP-10E Thermally Enhanced Package



LTC3824: Actual Size



60V_{IN} Low Quiescent Current (<120μA) DC/DC Controllers

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)*	Frequency (kHz)	Ext Sync Range (kHz)	I _O (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LTC3824	Step-Down	4 to 60	0.8	5	200 to 600	230 to 600	40	25	125	MSOP-10E
LT3724	Step-Down/Step-Up	4 to 60	1.23	5	200	n/a	100	10	125	TSSOP-16E
LT3844	Step-Down/Step-Up	4 to 60	1.23	5	100 to 600	100 to 600	120	10	125	TSSOP-16E
LT3800	Synchronous Step-Down	4 to 60	1.23	20	200	n/a	100	10	125	TSSOP-16E
LT3845	Synchronous Step-Down	4 to 60	1.23	20	100 to 600	100 to 600	120	10	125	TSSOP-16E

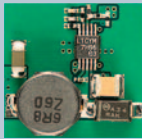
60V_{IN}/100V_{IN} Input DC/DC Controllers

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)*	Frequency (kHz)	Ext Sync Range (kHz)	I _O (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LTC3803/-3	Flyback	9.2 to 75*	0.8	5	200/300	n/a	240	40	150	ThinSOT™
LTC3803-5	Flyback	5 to 75*	0.8	5	200	n/a	240	40	150	ThinSOT
LTC3805	Flyback	8.8 to 75*	0.8	5	70 to 700	70 to 700	360	40	125	3x3 DFN-10/MSOP-10
LTC3805-5	Flyback	4.7 to 75*	0.8	5	70 to 700	70 to 700	360	40	125	3x3 DFN-10/MSOP-10
LTC3814-5	Synchronous Step-Up	4.5 to 50	7	10	Constant off-time	n/a	3mA	240	125	TSSOP-16E
LTC3813	Synchronous Step-Up	7 to 90	8	10	Constant off-time	100 to 1MHz	3mA	240	125	SSOP-28
LTC3703-5	Synchronous Step-Down	4.1 to 60	4.1	10	100 to 600	100 to 600	1.7mA	25	125	SSOP-16, TSSOP-28
LTC3703	Synchronous Step-Down/Step-Up	9.3 to 100	9.3	10	100 to 600	100 to 600	1.7mA	50	150	SSOP-16, TSSOP-28
LTC3812-5	Synchronous Step-Down	4.2 to 60	4.2	20	Constant on-time	n/a	3mA	230	125	TSSOP-16E
LTC3810-5	Synchronous Step-Down	4.2 to 60	4.2	20	Constant on-time	100 to 1MHz	3mA	240	125	5x5 QFN-32
LTC3810	Synchronous Step-Down	6.2 to 100	6.2	20	Constant on-time	100 to 1MHz	3mA	240	125	SSOP-28

* Dependent on External Components

36V_{IN}, Low Quiescent Current (<75μA) Monolithic Switching Regulators

Linear Technology offers a broad line of step-down DC/DC converters that operate with less than 75μA of quiescent current, minimizing battery drain when the car is not running. These devices can withstand transient input voltages from 36V to 60V found in load dump conditions while maintaining output voltage regulation. Similarly, they can operate from input voltages less than 4V, allowing them to regulate through the cold-crank scenario as well. Efficiencies as high as 90% can be maintained, minimizing thermal issues while switching frequencies as high as 2.8MHz minimize solution footprints, keeping switching noise out of critical frequency bands, such as AM radio.



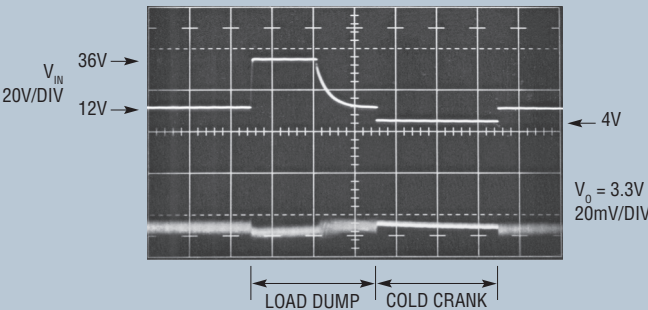
LT3680: Actual Size

LT3680: 36V, 3.5A Step-Down DC/DC Converter with Burst Mode Operation

Features:

- Wide Input Voltage Range: 3.6V to 36V
- 3.5A Maximum Output Current
- Low Ripple (<15mV_{P-P}) Burst Mode® Operation:
- I_Q = 75μA at 12V_{IN} to 3.3V_{OUT}
- Adjustable Switching Frequency: 200kHz to 2.4MHz
- Low Shutdown Current: I_Q < 1μA
- Integrated Boost Diode
- Synchronizable Between 250kHz to 2MHz
- PowerGood Flag
- Saturating Switch Design: 95m On-Resistance
- 0.790V Feedback Reference Voltage
- Output Voltage: 0.79V to 30V
- Thermal Protection
- Soft-Start Capability
- Small 10-Pin Thermally Enhanced MSOP and 3mm x 3mm DFN Packages

LT3680 with 36V Load Dump Transient and 4V Cold Crank Scenario

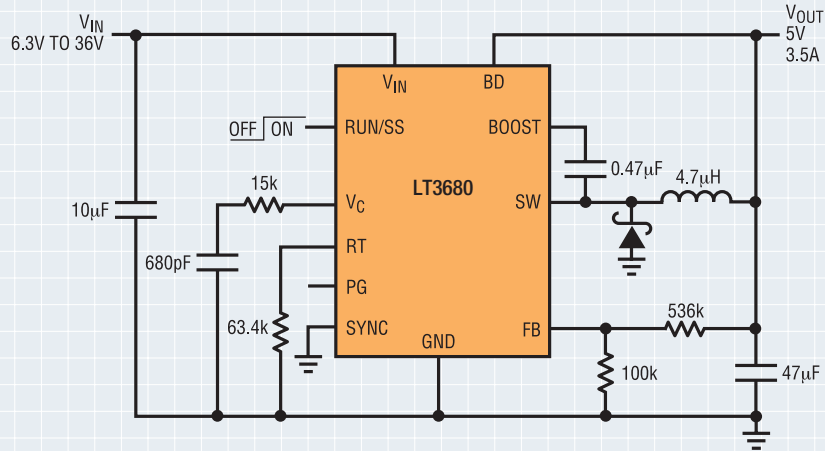


36V_{IN}, Low Quiescent Current Monolithic Switching Regulators

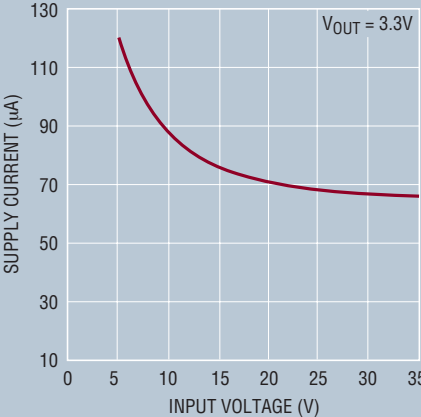
Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)	Frequency (kHz)	Ext Sync Range (kHz)	I _Q (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LT3470	Step-Down Regulator	4 to 40	1.25	0.33	hyst.	n/a	26	1	150	ThinSOT
LT1934/-1	Step-Down Regulator	3.3 to 34	1.25	0.4	COT*	n/a	12	1	125	2x3 DFN-6,ThinSOT
LT3689	Step-Down Regulator with POR, Watchdog Timer	3.6 to 36, 60 _{MAX}	0.80	0.80	350 to 2.2MHz	350 to 2.2MHz	75	1	150	3x3 QFN-16
LT3480	Step-Down Regulator	3.6 to 38, 60 _{MAX}	0.79	2.00	200 to 2.4MHz	250 to 2MHz	70	1	125	3x3 DFN-10, MSOP-10E
LT3682	Step-Down Regulator	3.6 to 36, 60 _{MAX}	1.0	1.0	250 to 2.2MHz	300 to 2.2MHz	75	1	125	3x4 DFN-14
LT3481	Step-Down Regulator	3.6 to 34, 36 _{MAX}	1.26	2.00	300 to 2.8MHz	n/a	50	1	150	3x3 DFN-10, MSOP-10E
LT3681	Step-Down Regulator	3.6 to 34, 36 _{MAX}	1.26	2.00	300 to 2.8MHz	n/a	50	1	125	3x4 DFN-14
LT3680	Step-Down Regulator	3.6 to 36	0.79	3.50	200 to 2.4MHz	250 to 2MHz	75	1	125	3x3 DFN-10, MSOP-10E
LT3972	Step-Down Regulator	3.3 to 33, 62 _{MAX}	0.79	3.80	200 to 2.4MHz	250 to 2MHz	75	1	125	3x3 DFN-10, MSOP-10E

* Constant Off Time

5V Step-Down Converter



No Load Supply Current



36V_{IN} Monolithic Switching Regulators

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)	Frequency (kHz)	Ext Sync Range (kHz)	I _O (mA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LT3502/A	Step-Down Regulator	3.4 to 40	0.7	0.33	1.1/2.2MHz	n/a	1.5	1	125	2x2 DFN-8
LT1933	Step-Down Regulator	3.6 to 36	0.75	0.6	500	n/a	1.6	1	150	ThinSOT, 2x3 DFN-6
LT1776	Step-Down Regulator	7.4 to 40	1.25	0.7	200	250 to 400	3.2	30	125	SO-8
LT3493/A	Step-Down Regulator	3.6 to 36	0.78	1.20	750	n/a	1.9	2	125	2x3 DFN-6
LT3505	Step-Down Regulator	3.6 to 36	0.78	1.20	300 to 2.8MHz	n/a	1.9	2	125	3x3 DFN-8, MSOP-8E
LT3663	Step-Down Regulator with Output Current Limit	7.5 to 36, 60 _{MAX}	0.8	1.2	1.5MHz	n/a	2.5	1	125	2x3 DFN-8
LT1936	Step-Down Regulator	3.6 to 36	1.20	1.40	500	n/a	1.9	1	150	MSOP-8E
LT3508	Dual Step-Down Regulator	3.7 to 36	0.80	2x1.40	250 to 2.5MHz	250 to 2.5MHz	4.6	1	150	4x4 QFN-24, TSSOP-16E
LT3685	Step-Down Regulator	3.6 to 38, 60 _{MAX}	0.79	2.00	200 to 2.4MHz	250 to 2MHz	0.8	1	125	3x3 DFN-10, MSOP-10E
LT3684	Step-Down Regulator	3.6 to 34, 36 _{MAX}	1.26	2.00	300 to 2.8MHz	n/a	0.8	1	125	3x3 DFN-10, MSOP-10E
LT1912	Step-Down Regulator	3.6 to 36	0.79	2.00	250 to 500kHz	n/a	0.8	1	125	3x3 DFN-10, MSOP-10E
LT3500	Step-Down Regulator + LDO Controller	3.6 to 40	0.80	2.00	250 to 2.2MHz	250 to 2.2MHz	2.5	12	150	3x3 DFN-12, MSOP-10E
LT3693	Step-Down Regulator	3.6 to 36	0.79	3.50	200 to 2.4MHz	250 to 2MHz	1.3	1	125	3x3 DFN-10, MSOP-10E
LT3507	Triple Step-Down Regulator + LDO Controller	4 to 40	0.8	2.4, 1.5, 1.5	250 to 2.5MHz	250 to 2.5MHz	2.0	1	150	5x7 QFN-38
LT3692*	Dual Step-Down Regulator	3.0 to 40, 60 _{MAX}	0.8	2x3.0	250 to 2.5MHz	250 to 2.5MHz	3.5	1	150	5x5 QFN-28, TSSOP-28E

* Future Product

LT3500: 36V, 2A Step-Down DC/DC Converter with LDO Controller

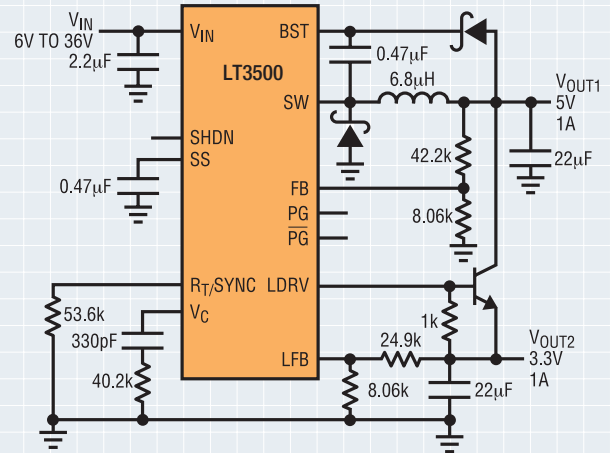
Features:

- Wide Input Range: 3V to 36V Operating, 40V Maximum
- Short-Circuit Protected over Full Input Range
- 2A Output Current Capability
- Adjustable/Synchronizable Fixed Frequency Operation from 250kHz to 2.2MHz
- Soft-Start/Tracking Capability
- Output Adjustable down to 0.8V
- Adjustable Linear Regulator/Driver with 13mA Output Capability
- PowerGood Comparator with Complimentary Outputs
- Low Shutdown Current: 12μA
- Thermally Enhanced 3mm × 3mm DFN or MSOP-10E, Package

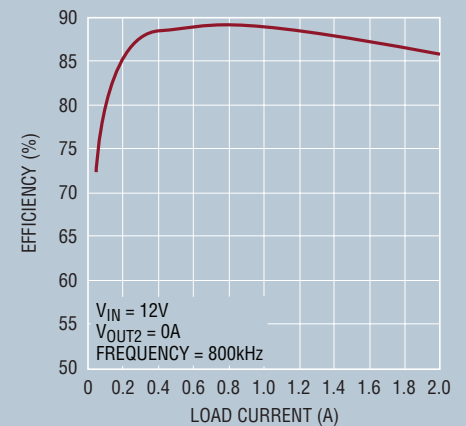


LT3500: Actual Size

36V_{IN} Dual Output Step-Down Converter

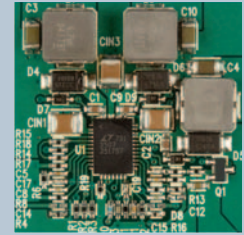


Switching Converter Efficiency



25V_{IN} to 60V_{IN} Multioutput Step-Down DC/DC Converters

Automotive electronic systems demand an increasing number of voltage rails while reducing the available space for power conversion. In order to accommodate these needs, Linear Technology offers a growing family of multioutput step-down DC/DC converters. These DC/DC converters offer dual and triple outputs in a very compact solution footprint. Maximum input voltages range from 25V to 40V, enabling operation in load dump environments as well as applications protected from transients. These devices regulate through cold crank conditions with input voltages less than 4V. Efficiencies as high as 90% can be maintained, minimizing thermal issues, and switching frequencies as high as 2.5MHz minimize solution footprints while keeping switching noise out of critical frequency bands, such as AM radio.

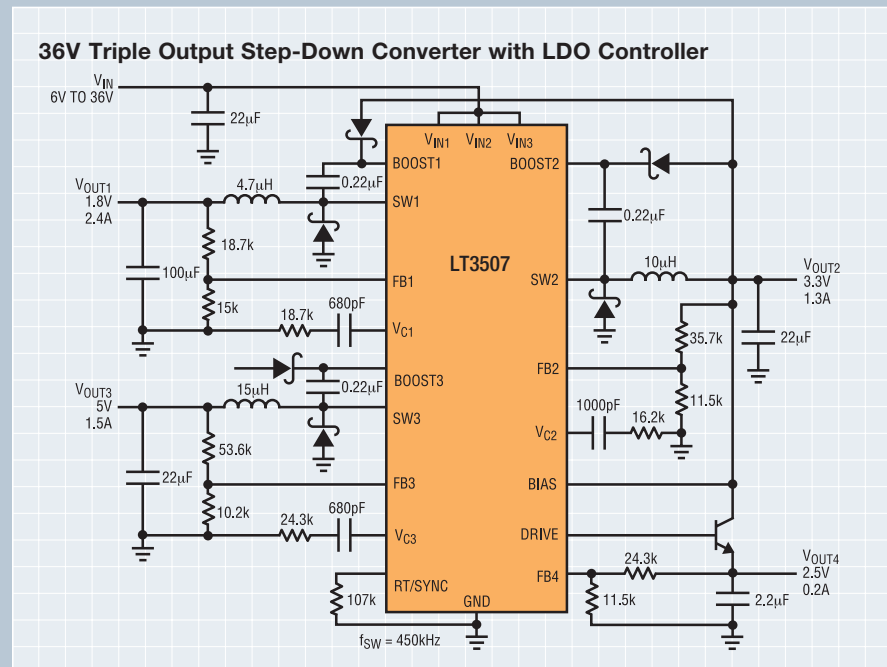


LT3507: Actual Size

LT3507: Triple 2.4A/1.5A/1.5A, 2.5MHz Step-Down DC/DC Converter

Features:

- Wide Input Range: 4V to 40V
- One 2.4A and Two 1.5A Output Switching Regulators with Internal Power Switches
- Low Dropout Linear Regulator with External Transistor
- Antiphase Switching Reduces Ripple
- Independent Run, Tracking/Soft-Start and PowerGood Indicators Ease Supply Sequencing
- Uses Small Inductors and Ceramic Capacitors
- Adjustable 250kHz to 2.5MHz Switching Frequency, Synchronizable over the Full Range
- User-Programmable Over- and Undervoltage Lock Outs
- Thermally Enhanced 5mm × 7mm 38-Lead QFN Package



Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)	Frequency	Ext Sync Range	I _Q (mA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LT3509	Dual Step-Down Regulator	3.7 to 36	0.80	2x0.70	250kHz to 2.5MHz	250kHz to 2.5MHz	4.6	1	150	3x4 DFN-14
LT3508	Dual Step-Down Regulator	3.7 to 36	0.80	2x1.40	250kHz to 2.5MHz	250kHz to 2.5MHz	4.6	1	150	4x4 QFN-24 TSSOP-16E
LT3506/A	Dual Step-Down Regulator	3.6 to 25	0.80	2x1.60	750kHz/1.1MHz	n/a	3.8	30	125	4x5 DFN-16 TSSOP-16E
LT1939	Step-Down Regulator + LDO Controller	3.6 to 25	0.80	2.00	250kHz to 2.2MHz	250kHz to 2.2MHz	2.5	1	125	3x3 DFN-12
LT3500	Step-Down Regulator + LDO Controller	3.6 to 40	0.80	2.00	250kHz to 2.2MHz	250kHz to 2.2MHz	2.5	12	150	3x3 DFN-12, MSOP-10E
LT3510	Dual Step-Down Regulator	3.3 to 25	0.80	2x2.0	250kHz to 1.5MHz	250kHz to 1.5MHz	3.5	10	125	TSSOP-20E
LT3507	Triple Step-Down Regulator + LDO Controller	4 to 40	0.80	2.4, 1.5, 1.5	250kHz to 2.5MHz	250kHz to 2.5MHz	2	1	150	5x7 QFN-38
LT3501	Dual Step-Down Regulator	3.3 to 25	0.80	2x3.0	250kHz to 1.5MHz	250kHz to 1.5MHz	3.5	10	125	TSSOP-20E
LT3692*	Dual Step-Down Regulator	3 to 40 60 Transient	0.80	2x3.0	250kHz to 2.5MHz	250kHz to 2.5MHz	3.5	<1	150	5x5 QFN-28 TSSOP-28E
LT3992*	Dual Step-Down Regulator	3 to 60 80 Transient	0.80	2x3.0	250kHz to 2.5MHz	250kHz to 2.5MHz	3.5	<1	150	5x5 QFN-28 TSSOP-28E

* Future Product

36V_{IN} Low Quiescent Current Synchronous DC/DC Controllers

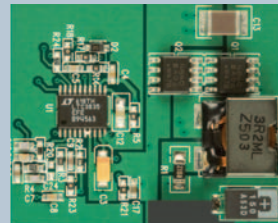
Linear Technology offers a broad line of step-down DC/DC controllers that operate with less than 100μA of quiescent current, minimizing battery drain when the car is not running. These devices can withstand transient input voltages up to 36V found during load dump conditions while maintaining output voltage regulation. Similarly, they can operate from input voltages as low as 4V, allowing them to regulate through the cold-crank scenario as well. Efficiencies as high as 95% can be maintained, minimizing thermal issues while switching frequencies as high as 1.5MHz minimize solution footprints and keep switching noise out of critical frequency bands.

LTC3834: 36V Low Quiescent Current Step-Down Controller

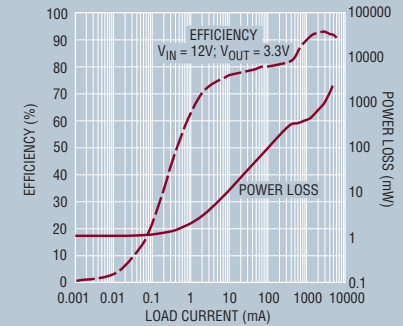
Features:

- Wide V_{OUT} Range: 0.8V to 10V
- Low Quiescent Current: 30μA
- ±1% V_{REF} Accuracy over Temp
- Wide V_{IN} Range: 4V to 36V
- Phase-Lockable Fixed Frequency: 140kHz to 650kHz
- Dual N-Channel MOSFET Synchronous Drive
- Very Low Dropout Operation: 99% Duty Cycle
- Programmable Soft-Start or Tracking
- Output Current Foldback Limiting
- PowerGood Output Voltage Monitor
- Clock Output for PolyPhase® Applications
- Output Overvoltage Protection
- Low Shutdown I_O: 4μA
- Internal LDO Powers Gate Drive from V_{IN} or V_{OUT}
- Selectable Continuous, Pulse-Skipping or Burst Mode Operation
- 3mm x 5mm DFN-16, SSOP-16, 4mm x 5mm QFN-20 and TSSOP-20 Packages

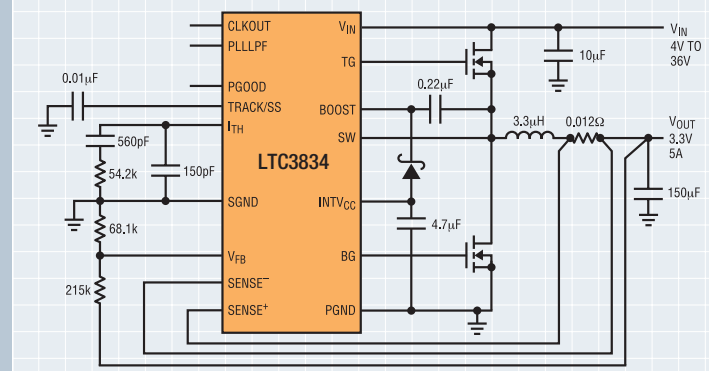
LTC3834:
Actual Size



Efficiency and Power Loss vs Load Current



High Efficiency Synchronous Step-Down Converter



36V_{IN} Low Quiescent Current (≤100μA) Synchronous DC/DC Controllers

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)*	Frequency (kHz)	Ext Sync Range (kHz)	I _O (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LTC3834/-1	Synchronous Step-Down	4 to 36	0.8	20	140 to 650	140 to 650	30	14	125	3X5 DFN-16, SSOP-16, 4x5 QFN-20, TSSOP-20
LTC3835/-1	Synchronous Step-Down	4 to 36	0.8	20	140 to 650	140 to 650	80	10	125	3X5 DFN-16, SSOP-16, 4x5 QFN-20, TSSOP-20
LTC3826/-1	Dual Synchronous Step-Down	4 to 36	0.8	20/20	140 to 650	140 to 650	30	4	125	5X5 QFN-32/SSOP-28
LTC3827/-1	Dual Synchronous Step-Down	4 to 36	0.8	20/20	140 to 650	140 to 650	80	8	125	5X5 QFN-32/SSOP-28

36V/40V Input DC/DC Controllers

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)*	Frequency (kHz)	Ext Sync Range (kHz)	I _O (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LTC1624	Step-Down	3.5 to 36	1.19	5	200	n/a	550	16	125	SO-8
LTC3780	Synchronous Buck-Boost	4 to 36	0.8	12	200 to 400	200 to 400	1.5mA	55	125	5x5 QFN-32, SSOP-24
LTC1625	Step-Down	3.7 to 36	1.19	10	150	225	550	15	125	SSOP-16
LTC1871/-1	Step-Up, Flyback and SEPIC	2.5 to 36	3.3	10	50 to 1MHz	65 to 1.3MHz	250	10	150	MSOP-10
LTC1735/-1	Synchronous Step-Down	3.5 to 36	0.8	20	200 to 600	200 to 500	450	15	125	SSOP-16, TSSOP-20
LTC1775	Synchronous Step-Down	3.7 to 36	1.19	20	150	150 to 225	500	15	125	SSOP-16
LTC1778/-1	Synchronous Step-Down	4 to 36	0.8	20	Constant On-Time	n/a	900	15	150	SSOP-16
LTC3713	Synchronous Step-Down	1.5 to 36	0.8	20	200 to 1.5MHz	n/a	900	15	125	SSOP-24
LTC3778	Synchronous Step-Down	4 to 36	0.6	20	Constant On-Time	n/a	900	15	125	TSSOP-20
LTC3851/-1	Synchronous Step-Down	4 to 38	0.8	20	250 to 750	250 to 750	1mA	15	125	3x3 QFN-16, SSOP-16, MSOP-16
LTC3850 /-1/-2	Dual Synchronous Step-Down	4 to 30	0.8	20/20	250 to 780	250 to 780	850	30	125	4x4 QFN-28, 4X5 QFN-28, SSOP-28
LTC3727	Dual Synchronous Step-Down	4.5 to 36	0.8	20/20	250 to 550	250 to 550	670	20	125	SSOP-28
LT3782A	2-Phase Step-Up	4 to 40	7	30	150 to 500	180 to 715	11mA	40	125	SSOP-28
LTC3731	3-Phase Synchronous Controller	4 to 36	0.6	60	250 to 600	250 to 600	2.3mA	50	140	5x5 QFN-32, SSOP-36
LTC3862/-1	Multiphase Step-up	4 to 36	7	60	75 to 500	50 to 650	1.8mA	30	150	5x5 QFN-24, TSSOP-24, SSOP-36

* Dependent on External Components

High Voltage Power Managers and Battery Chargers

Automotive power sources have drawbacks such as line voltage transients and surges from the alternator. As a result, a battery charger IC needs to be well protected to handle these harsh conditions. To remedy these problems, rugged PowerPath™ charging system topologies in Linear's PowerPath system managers and battery chargers provide numerous advantages, including the ability to autonomously and seamlessly manage multiple input power sources to preferentially power the system load and charge the battery.



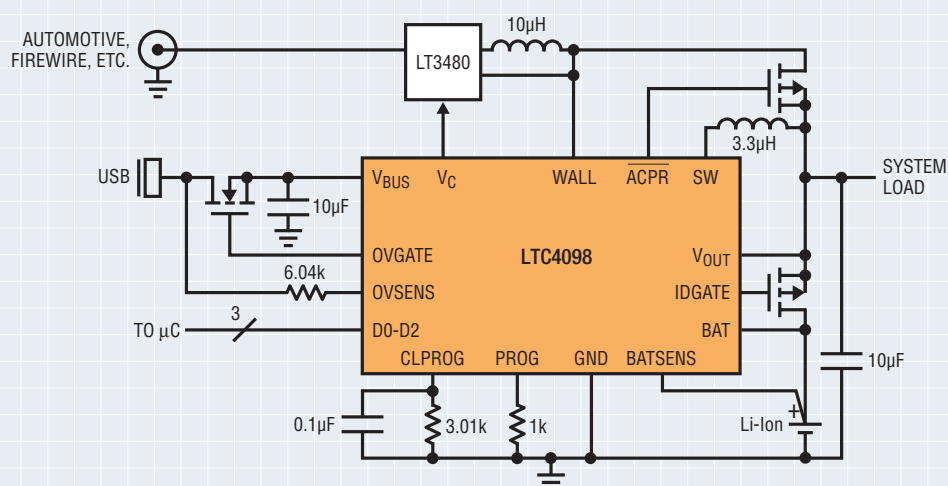
LTC4098: Actual Size

LTC4098: USB-Compatible Switching Power Manager/Li-Ion Charger with Overvoltage Protection

Features:

- Switching Regulator with Bat-Track™ Adaptive Output Control Makes Optimal Use of Limited Power Available from USB Port to Charge Battery and Power Application
- Input Overvoltage Protection
- 180mΩ Internal Ideal Diode Plus External Ideal Diode Controller Seamlessly Provide Low Loss PowerPath When Input Power is Limited or Unavailable
- Full-Featured Li-Ion/Polymer Battery Charger
- 1.5A Maximum Charge Current with Thermal Limiting
- Ultra-Thin (0.55mm) 20-Lead 3mm × 4mm QFN

High Efficiency USB/Automotive Battery Charger with Overvoltage Protection



High Voltage Power Managers and Battery Chargers

Part Number	Max Charge Current Adapter (A)	Number of Battery Cells (Series)	Max Charge Current USB (mA)	Power Manager Topology	Input Voltage (V)	Standby Current (µA)	I _{BAT} Drain Current (µA)	Charge Termination	R _{ds(on)} Ideal Diode	Package
LTC4089*	1.2	1	500	Linear	4.35 to 5.5 USB, 6 to 36, 40 max adapter	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4089-5	1.2	1	500	Linear	4.35 to 5.5 USB, 6 to 36, 40 max adapter	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4089-1*†	1.2	1	500	Linear	4.35 to 5.5 USB, 6 to 36, 40 max adapter	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4090	1.2	1	500	Linear	4.35 to 5.5 USB, 6 to 38, 60 max adapter	50	2.5	Timer + C/10	215mΩ <50mΩ (opt.)	3x6 DFN-22
LTC4098*	1.5	1	700	Switching	4.35 to 5.5 USB, 6 to 38 and 60 transient adapter, 66 OVP	25	3.7	Timer + C/10	180mΩ <50mΩ (opt.)	3x4 UTQFN-20
LTC4099*	1.5	1	700	Switching, I ² C Interface	4.35 to 5.5 USB, 6 to 38 and 60 transient adapter, 66 OVP	25	3.7	Timer + C/10	180mΩ <50mΩ (opt.)	3x4 UTQFN-20
LT3650*-4.2/8.4 LT3650*-4.1†/8.2†	2	1 to 2	n/a	n/a	4.75 to 32/9V to 32, 40 abs max	85	15	Timer + C/10	n/a	3x3 DFN-12

*Bat-Track Adaptive Output Control

† 4.1V Cell Voltage

* Future product. Contact LTC for availability.

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

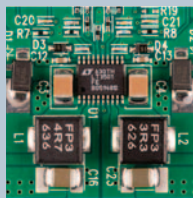
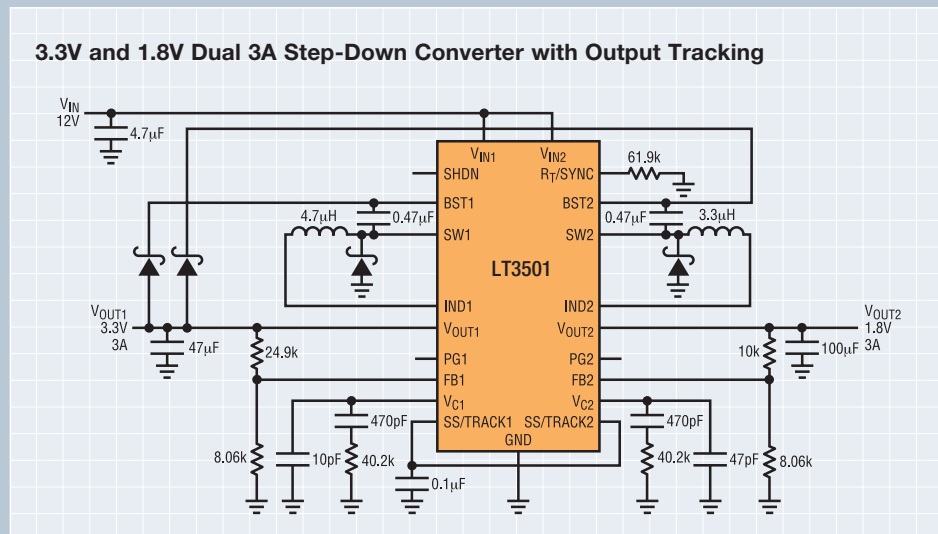
25V Monolithic Switching Regulators

Some automotive systems are protected from transient input voltages and only require maximum input voltages as high as 25V. However, they must regulate through cold crank conditions with input voltages less than 4V. Linear Technology offers a broad line of step-down DC/DC converters that maintain regulation with these wide input voltage variations. Efficiencies as high as 90% can be maintained, minimizing thermal issues, and switching frequencies as high as 2.8MHz minimize solution footprints while keeping switching noise out of critical frequency bands, such as AM radio.

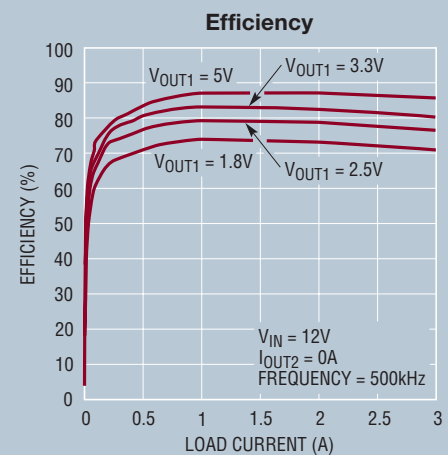
LT3501: Dual 3A, 1.5MHz Step-Down DC/DC Converter

Features:

- Two Switching Regulators with 3A Output Capability
- Independent Supply to Each Regulator
- Adjustable/Synchronizable Fixed Frequency Operation from 250kHz to 1.5MHz
- Antiphase Switching
- Outputs Can Be Paralleled
- Independent, Sequential, Ratiometric or Absolute Tracking Between Outputs
- Independent Soft-Start and PowerGood Pins
- Enhanced Short-Circuit Protection
- Low Dropout: 95% Maximum Duty Cycle
- Low Shutdown Current: <10 μ A
- 20-Lead TSSOP Package with Exposed Leadframe



LT3501: Actual Size



Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)}	I _{OUT} (A)	Frequency	Ext Sync Range	I _Q (mA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LT1616	Step-Down Regulator	3.6 to 25	1.25	0.5	1.4MHz	n/a	1.9	1	125	ThinSOT
LT3503	Step-Down Regulator	3.6 to 20	0.78	1.00	2.2MHz	n/a	1.9	1	125	2x3 DFN-6
LT1767	Step-Down Regulator	3.0 to 25	1.20	1.20	1.25MHz	1.5MHz to 2MHz	1	2	125	MSOP-8E
LT1939	Step-Down Regulator + LDO Controller	3.6 to 25	0.80	2.00	250kHz to 2.2MHz	250kHz to 2.2MHz	2.5	1	125	3x3 DFN-12
LT1938	Step-Down Regulator	3.6 to 25	1.26	2.20	300kHz to 2.8MHz	n/a	1.2	1	125	3x3 DFN-10
LT1765	Step-Down Regulator	3.0 to 25	1.20	2.40	1.25MHz	1.6MHz to 2MHz	1	15	125	TSSOP-16E
LT1940	Dual Step-Down Regulator	3.0 to 25	1.25	2x1.40	1.1MHz	n/a	3.8	30	125	TSSOP-16E
LT1941	Dual Step-Down + Boost	3.5 to 25	0.63	2.5+1.5	1.1MHz	n/a	2	50	125	TSSOP-28E
LT3506/A	Dual Step-Down Regulator	3.6 to 25	0.80	2x1.60	750kHz/1.1MHz	n/a	3.8	30	125	4x5 DFN-16, TSSOP-16E
LT1913	Step-Down Regulator	3.6 to 25	0.79	3.50	200kHz to 2.4MHz	250kHz to 2MHz	1.3	1	125	3x3 DFN-10, MSOP-10E
LT3510	Dual Step-Down Regulator	3.3 to 25	0.80	2x2.0	250kHz to 1.5MHz	250kHz to 1.5MHz	3.5	10	125	TSSOP-20E
LT3501	Dual Step-Down Regulator	3.3 to 25	0.80	2x3.0	250kHz to 1.5MHz	250kHz to 1.5MHz	3.5	10	125	TSSOP-20E

Low Voltage (<6V_{IN}) Point-of-Load Synchronous Step-Down Switching Regulators

Many automotive systems use secondary DC/DC converters to step-down 5V or 3.3V rails delivered from primary rails. Generally, these applications require the high (up to 95%) efficiency that synchronous DC/DC converters offer. Since many of these systems must operate in an always on mode when the ignition is turned off, low quiescent current is essential. For these applications, Linear Technology offers a broad line of synchronous step-down DC/DC converters that operate with as little as 16μA quiescent current, minimizing battery drain when the car is not running. Efficiencies as high as 95% can be maintained, minimizing thermal issues, and switching frequencies as high as 2.25MHz minimize solution footprints while keeping switching noise out of critical frequency bands, such as AM radio.

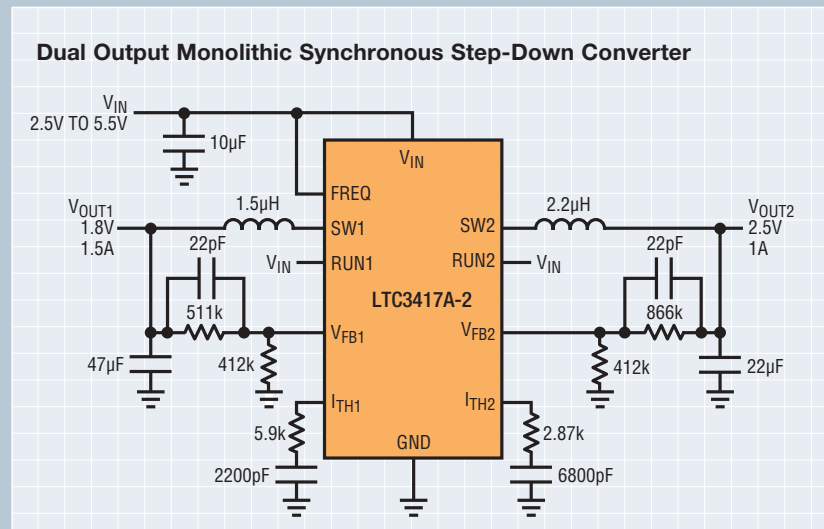


LTC3417A-2: Actual Size

LTC3417A-2: Dual Synchronous, 1.5A and 1A, 4MHz Step-Down DC/DC Converters

Features:

- High Efficiency: Up to 95%
- 1.5A/1A Output Currents
- Synchronizable to External Clock
- Programmable Frequency Operation: 1.5MHz or Adjustable From 0.6MHz to 4MHz
- Low Ripple (<35mV_{P-P}) Burst Mode Operation
- I_Q: 125μA in Sleep
- Short-Circuit Protected
- VIN: 2.25V to 5.5V
- Current Mode Operation for Excellent Line and Load Transient Response
- Ultralow Shutdown Current: I_Q < 1μA
- PowerGood Output
- Available in Small Thermally Enhanced (5mm × 3mm) DFN and 20-Lead TSSOP Packages



Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MIN)} (V)	I _{OUT} (A)	Frequency (MHz)	Ext Sync Range (MHz)	I _Q (μA)	I _{SD} (μA)	Max Junc Temp (°C)	Package
LTC3410/B	Synchronous	2.5 to 5.5	0.8	0.3	2.25	n/a	26	1	125	SC70
LTC3542	Synchronous	2.5 to 5.5	0.6	0.5	2.25	1 to 3	26	1	125	2x2 DFN-6, ThinSOT
LTC3547/B	Dual Synch	2.5 to 5.5	0.6	0.3/0.3	2.25	n/a	40	1	125	2x3 DFN-8
LTC3406A/AB	Synchronous	2.5 to 5.5	0.6	0.6	1.5	n/a	20	1	125	ThinSOT
LTC3406AB-2	Synchronous	2.5 to 5.5	0.6	0.6	2.25	n/a	200	1	125	ThinSOT
LTC3448	Synchronous	2.5 to 5.5	0.6	0.6	2.25	1.4 to 4	32	1	125	MSOP-8E, DFN-8
LTC3543	Synchronous	2.5 to 5.5	0.6	0.6	2.25	1 to 3	45	1	125	2x3 DFN-6
LTC3544/B	Quad Synch	2.25 to 5.5	0.8	0.3/0.2/0.2/0.1	2.25	n/a	80	1	125	3x3 QFN-16
LTC3560	Synchronous	2.5 to 5.5	0.6	0.8	2.25	1 to 3	16	1	125	ThinSOT
LTC3561A	Synchronous	2.6 to 5.5	0.8	1	850kHz to 4MHz	n/a	240	1	125	3x3 DFN-10
LTC3446	Synchronous + LDOs	2.7 to 5.5	0.4	1.0/0.3/0.3	2.25	n/a	140	1	125	4x3 DFN-14
LTC3407A	Dual Synch	2.5 to 5.5	0.6	0.6/0.6	1.5	1.5	40	1	125	MSOP-10, 3x3 DFN-10
LTC3409	Dual Synch	1.6 to 5.5	0.6	0.6/0.6	1.7/2.6	1 to 3	65	1	125	3x3 DFN-8
LTC3419	Dual Synch	2.5 to 5.5	0.6	0.6/0.6	2.25	n/a	55	1	125	MSOP-10, 3x3 DFN-10
LTC3548	Dual Synch	2.5 to 5.5	0.6	0.8/ 0.4	2.25	2.25	40	1	125	MSOP-10, 3x3 DFN-10
LTC3411A	Synchronous	2.5 to 5.5	0.8	1.25	300kHz to 4MHz	400kHz to 4MHz	40	1	125	3x3 DFN-10, MSOP-10
LTC3407A-2	Synchronous	2.5 to 5.5	0.6	0.8/ 0.8	2.25	2.25	40	1	125	MSOP-10, 3x3 DFN-10
LTC3568	Synchronous	2.5 to 5.5	0.8	1.8	850kHz to 4MHz	400kHz to 4MHz	60	1	125	3x3 DFN-10
LTC3417A-2	Dual Synch	2.25 to 5.5	0.8	1.5/1.0	2.25	2.25	125	1	125	TSSOP-20E, 3x5 DFN-20
LTC3546	Dual Synch	2.25 to 5.5	0.6	2/2 or 3/1	2.25	750kHz to 4MHz	125	1	125	4x5 QFN-28
LTC3545	Triple Synch	2.25 to 5.5	0.6	0.8/0.8/0.8	2.25	1 to 3	58	1	125	3x3 QFN-16
LTC3412A	Synchronous	2.25 to 5.5	0.8	3.0	300kHz to 4MHz	300kHz to 4MHz	64	1	125	TSSOP-16E, QFN
LTC3414	Synchronous	2.25 to 5.5	0.8	4	300kHz to 4MHz	300kHz to 4MHz	64	1	125	TSSOP-20E
LTC3415	Synchronous	2.5 to 5.5	0.6	7.0	2.25	750kHz to 2.25MHz	450	1	125	5x7 QFN-38
LTC3416	Synchronous	2.25 to 5.5	0.8	4	300kHz to 4MHz	n/a	300	1	125	TSSOP-20E
LTC3418	Synchronous	2.25 to 5.5	0.8	8.0	300kHz to 4MHz	300kHz to 4MHz	300	1	125	5x7 QFN-38

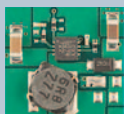
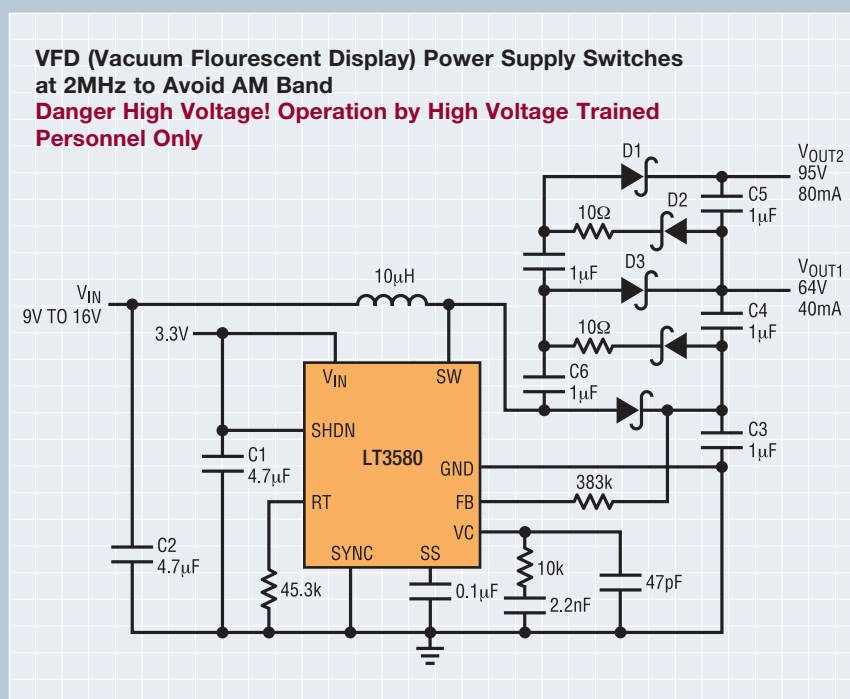
Monolithic Step-Up DC/DC Converters

Some automotive systems use secondary DC/DC converters to step-up 3.3V to 12V rails delivered from primary rails to outputs up to 40V. Common applications include Vacuum Fluorescent Display power and TFT LCD biasing. High efficiency and compact solution footprints are of primary importance. Linear Technology's family of boost converters offers high efficiency, low noise and very compact solutions for these applications. Whether an application requires 94% efficiency and a 3MHz switching frequency or a 40V output from a very compact footprint. Linear Technology has a solution.

LT3580: Boost/Inverting DC/DC Converter with 2A Switch, Soft-Start, and Synchronization

Features:

- 2A Internal Power Switch
- Adjustable Switching Frequency
- Single Feedback Resistor Sets V_{OUT}
- Synchronizable to External Clock
- High Gain SHDN Pin Accepts Slowly Varying Input Signals
- Wide Input Voltage Range: 2.5V to 32V
- Low VCESAT Switch: 300mV at 1.5A (Typical)
- Integrated Soft-Start Function
- Easily Configurable as a Boost or Inverting Converter
- User Configurable Undervoltage Lockout (UVLO)
- Tiny 8-Lead 3mm × 3mm DFN and 8-Lead MSOP Packages



LT3580: Actual Size

High Voltage Boost Outputs to 42V

Part Number	Device Architecture	V_{IN} Range (V)	$V_{OUT(MAX)}$ (V)	I_{SW} (A)	Frequency (MHz)	I_Q (mA)	I_{SD} (µA)	Max Junc Temp (°C)	Package
LT3464	Boost	2.3 to 10	34	0.085	COT	25µA	1	125	ThinSOT
LT3494/A	Boost	2.3 to 16	38	0.18/0.35	LNAPC	65µA	1	125	2×3 DFN-6, ThinSOT
LT3461/A	Boost	2.5 to 16	38	0.30	1.3/3	2.8	1	125	ThinSOT
LT1615/-1	Boost	1.2 to 15	36	0.30	COT	20µA	1	125	ThinSOT
LT3460	Boost	2.5 to 16	36	0.32	1.3	2.0	1	125	SC70, ThinSOT
LT1945	Boost/Inverter	1 to 15	36	0.35	COT	20µA	1	125	MSOP-10
LT1613	Boost	1 to 10	36	0.55	1.4	3.0	1	125	ThinSOT
LT3495/B/B-1	Boost	2.3 to 16	40	0.65/0.35	LNAPC	60µA	1	125	2×3 DFN-10
LT1930/A	Boost	2.6 to 16	36	1.00	1.2/2.2	4.2/5.5	1	125	ThinSOT
LT3467/A	Boost	2.4 to 16	40	1.10	1.3/2.2	1.0	1	125	ThinSOT, 2×3 DFN
LT1946/A	Boost	2.45 to 16	35	1.50	2.7	3.6	1	125	MSOP-8E
LT1618	Boost	1.6 to 18	36	1.50	1.4	1.8	1	125	MSOP-10
LT1961	Boost	3 to 25	34	1.50	1.25	0.9	6	125	MSOP-8E
LT3580	Boost	2.5 to 32	42	2.00	200kHz to 2.5MHz	1.0	1	125	3×3 DFN-8, MSOP-8
LT1935	Boost	2.3 to 16	40	2.00	1.2	3.0	1	125	ThinSOT
LT3489	Boost	2.6 to 16	40	2.50	2	2.0	1	125	MSOP-8E
LT3479	Boost	2.5 to 24	40	3.00	300kHz to 3.5MHz	6.5	1	125	3×3 DFN-14, TSSOP-16E
LT3477	Boost	2.5 to 25	42	3.00	200kHz to 3.5MHz	5.0	1	125	TSSOP-20E, 4×4 QFN-20
LT3436	Boost	3 to 25	34	3.00	800kHz	0.9	1	125	TSSOP-16E

Low Voltage Boost Outputs to 10V

Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT(MAX)} (V)	I _{SW} (A)	Frequency (MHz)	I _Q (μA)	I _{SD} (μA)	Max Ambient Temp (°C)	Package
LTC3459	Synch Boost	1.5 to 5.5	10	0.75	COT	10	1	85	ThinSOT
LTC3526/B	Synch Boost	0.85 to 5	5.25	0.50	1.0	9	1	85	2×2 DFN-6
LTC3528/B	Synch Boost	0.7 to 5.5	5.25	1.00	1	12	1	85	2×3 DFN-8
LTC3527	Synch Boost	0.7 to 5.5	5.25	0.8 and 0.40	1.2/2.2	12	1	85	3×3 QFN-16
LTC3458	Synch Boost	1.5 to 6	7.5	1.40	400kHz to 1.5MHz	15	1	85	3×4 DFN-12
LTC3422	Synch Boost	1.0 to 4.5	5.25	1.50	100kHz to 3MHz	25	1	85	3×3 DFN-10
LTC3426	Boost	1.6 to 5.25	5	2.00	1.2	600	1	85	ThinSOT
LTC3421	Synch Boost	0.5 to 5	5.25	3.00	3	12	1	85	4×4 QFN-24
LTC3425	Synch Boost	0.5 to 4.5	5.25	5.00	8	12	1	85	5×5 QFN-32

LCD and OLED Biasing — Boost and Inverting Monolithic DC/DC Converters

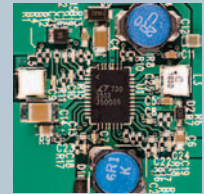
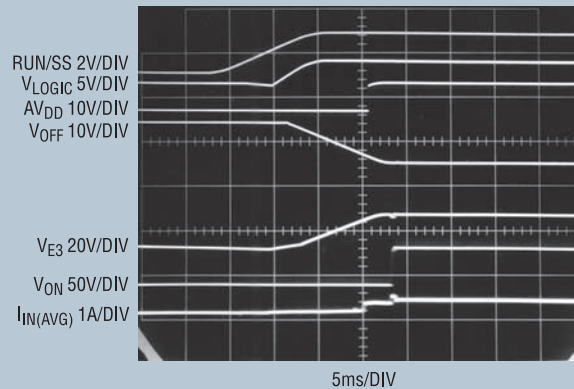
As more and more LCD and OLED panels proliferate in cars for everything from infotainment systems to rear-seat DVD systems, the demand for automotive LCD and OLED biasing power continues to grow. Input for these applications is usually a regulated 3.3V or 5V rail. Biasing voltage as high as +30V can be required for these displays. High efficiency and compact solution footprints are of primary importance due to space limitations. Linear Technology's family of boost and inverting converters offer high efficiency, low noise and very compact solutions.

LT3513: Quad Power Converter for TFT Displays

Features:

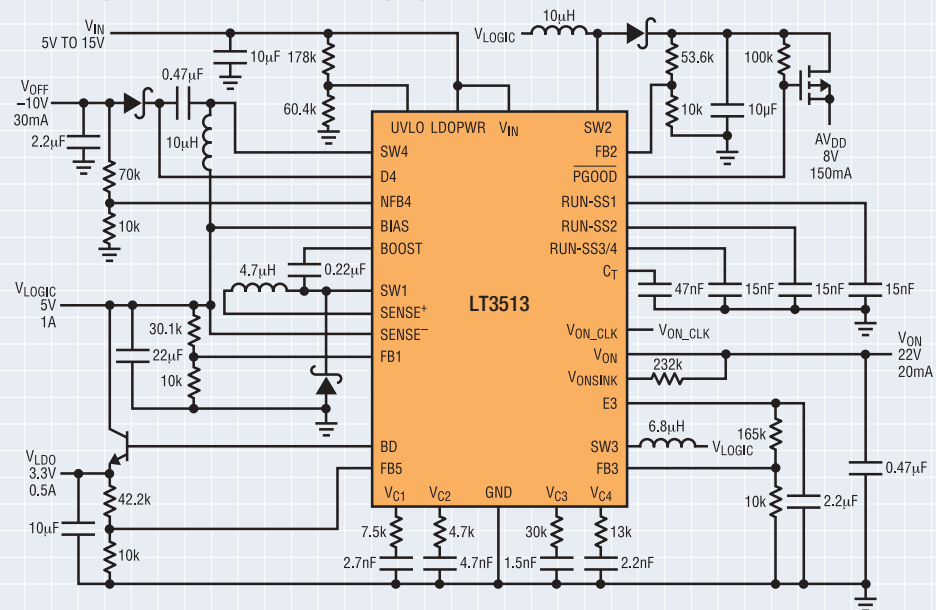
- Four Integrated Switches: 3A Buck, 2.5A Boost, 0.35A Boost, 0.35A Inverter (Guaranteed Minimum Current Limit)
- External NPN LDO Driver
- Fixed Frequency, Low Noise Outputs
- Inductor Current Sense for Buck
- Soft-Start for All Outputs
- Externally Programmable V_{ON} Delay
- Three Integrated Schottky Diodes
- PowerGood Pin for AV_{DD} Output Disconnect
- 4.5V to 30V Input Voltage Range
- PanelProtect™ Circuitry Disables V_{ON} Upon Fault
- Thermally Enhanced 38-Lead 5mm × 7mm QFN Package

Start-Up Waveforms



LT3513: Actual Size

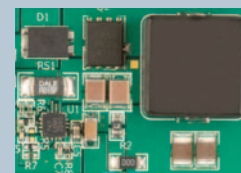
Quad Output Converter for TFT Displays



Part Number	Device Architecture	V_{IN} Range (V)	$V_{OUT(MAX)}$ (V)	I_{SW} (A)	Frequency (MHz)	I_O (mA)	I_{SD} (μ A)	Max Junc Temp ($^{\circ}$ C)	Package
LT3494/A	Boost	2.3 to 16	40	0.18/0.35	LNAPC	65 μ A	1	125	2×3 DFN-6, ThinSOT
LT3495/-1	Boost	2.3 to 16	40	0.65/0.35	LNAPC	60 μ A	1	125	2×3 DFN-10
LT1945	Dual-Boost/Inverter	1.2 to 15	\pm 34	0.35/0.35	COT	20 μ A	1	125	MSOP-10
LT3463/A	Dual-Boost/Inverter	2.4 to 15	\pm 40	0.25/0.40	COT	20 μ A	1	125	ThinSOT
LT3472	Dual-Boost/Inverter	2.2 to 16	\pm 34	0.25/0.30	1.1	2.8	1	125	3×3 DFN-10
LT3487	Dual-Boost/Inverter	2.3 to 16	\pm 28	0.75/0.90	2	3.7	5.3	125	3×3 DFN-10
LT3471	Dual-Boost/Inverter	2.4 to 16	\pm 40	1.3/1.3	1.2	2.5	1	125	3×3 DFN-10
LT3513	Quad-Buck, Boost, Boost/Inverter + LDO Controller	4.5 to 30	\pm 40	3.0/2.5/0.35/0.35	1.8	10	1	125	5×7 QFN-38

High Efficiency LED Drivers

LEDs are quickly replacing incandescent lighting in automotive applications. LED applications for headlamps, taillights, interior lighting and a wide variety of display backlighting are becoming commonplace. The long life, high efficiency and very compact solution footprint of LEDs are quickly making them the preferred lighting solution. Linear Technology's family of LED drivers is optimized for the very demanding automotive environment. This family of LED drivers offers high dimming ratios, high efficiency, plus highly integrated and compact LED power solutions, whether the input is derived directly from the battery voltage or from a secondary power rail.

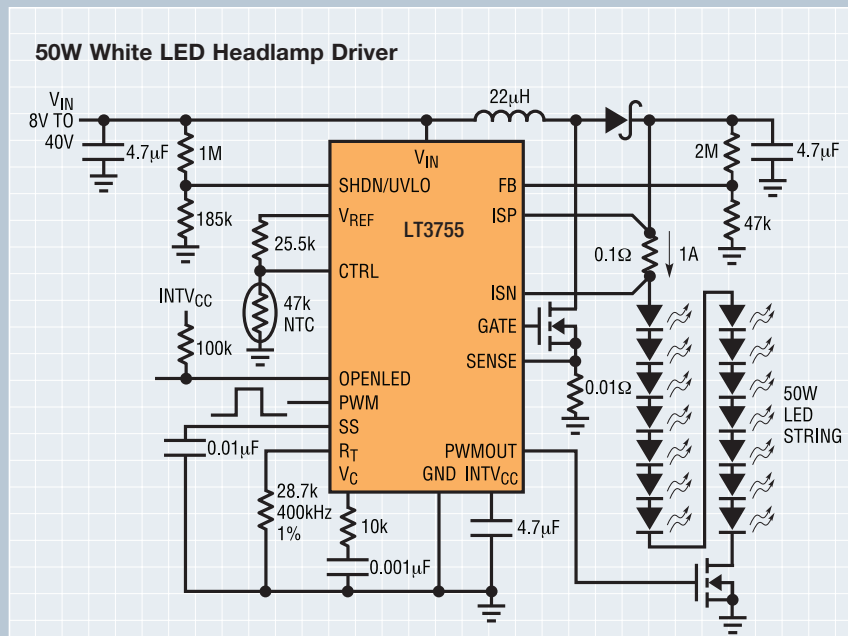


LT3755: Actual Size

LT3755: High Current LED Controller

Features:

- 3000:1 True Color PWM™ Dimming Ratio
- 100mV High Side Current Sense with 75V Common Mode Range
- Wide Input Voltage Range: 4V to 40V
- Constant-Current and Constant-Voltage Regulation
- Drives LEDs in Boost, Buck, Buck-Boost or Flyback Modes
- Adjustable Frequency: 100kHz to 1MHz
- Programmable Undervoltage Lockout with Hysteresis
- Open LED Status Pin and Protection
- LED Overvoltage Protection
- PWM Disconnect Switch Driver
- CTRL Pin Provides 10:1 Analog Dimming
- Low Shutdown Current: <1μA
- Soft-Start
- Thermally Enhanced 16-Lead QFN (3mm × 3mm) Package

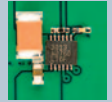


LED Drivers

Part Number	Topology	Dimming Type	Max # of LEDs × I _{LED} from 12V _{IN}	LED Configuration	Input Voltage Range (V)	Max. Output Voltage (V)	I _{SW} (A)*	Frequency	Overvoltage Protection	Max Junc Temp (°C)	Package
LT3590	Buck Mode	200:1 PWM	10×50mA	Series	4.5 to 55	n/a	0.08	850kHz	Yes	125	2×2 DFN-6, SC70
LT3466	Boost Mode	DC/PWM	2×10×20mA	Dual Parallel Strings	2.7 to 24	39	2×0.320	200kHz to 2MHz	Yes	125	3×3 DFN-10
LT3517	Buck, Boost, Buck/Boost LED Driver	5,000:1 PWM	4×300mA	Series	3 to 30 (40 _{MAX})	45	1.3	250kHz to 2.5MHz	Yes	125	4×4 QFN-16
LT3474/-1	Buck Mode LED Driver	400:1 PWM	2×1A	Series	4 to 36	9/34	1.6	200kHz to 2MHz	Yes	125	TSSOP-16E
LT3496	Buck, Boost, Buck/Boost LED Driver	3,000:1 PWM	3×10×100mA	Triple Parallel Strings	3 to 30 (40 _{MAX})	45	3×0.75	330kHz to 2.1MHz	Yes	125	4×4 QFN-28
LT3598	6-Channel Boost LED Driver	3000:1 PWM 10:1 Analog	6×10×30mA	Six Parallel Strings	3 to 30 (36 _{MAX})	44	1.5	200kHz to 2.5MHz	Yes	125	4×4 QFN-24
LT3599	4-Channel 100mA Boost LED Driver	3000:1 PWM 10:1 Analog	4×10×100mA	Four Parallel Strings	3 to 30 (40 _{MAX})	44	2	200kHz to 2.5MHz	Yes	125	5×5 QFN-32, TSSOP-28E
LT3518	Buck, Boost, Buck/Boost LED Driver	5,000:1 PWM	8×300mA	Series	3 to 30 (40 _{MAX})	45	2.3	250kHz to 2.5MHz	Yes	125	4×4 QFN-16
LT3486	Dual Boost Mode LED Driver	1000:1 PWM	2×7×350mA	Dual Parallel Strings	2.7 to 24	35	2×1.3	200kHz to 2.5MHz	Yes	125	3×5 DFN-16
LT3477	Buck, Boost, Buck/Boost LED Driver	DC/PWM	6×1A	Series	2.5 to 25	40	3	200kHz to 3.5MHz	Yes	125	4×4 QFN-20, TSSOP-20
LT3475/-1	Dual Buck Mode LED Driver	3,000:1 PWM	4×1.5A	Dual Parallel Strings	4 to 36 (40 _{MAX})	9/34	2×2.3	200kHz to 2MHz	Yes	125	TSSOP-20E
LT3478/-1	Buck, Boost, Buck/Boost LED Driver	3000:1 PWM	6×1A	Series	2.8 to 36 (40 _{MAX})	40	4.5	200kHz to 2.25MHz	Yes	125	TSSOP-16E
LT3476	Buck, Boost, Buck/Boost Quad LED Driver	1000:1 PWM	4×8×350mA	4 × Multiple Series String	2.8 to 16	36	4×1.5	200kHz to 2MHz	Yes	125	5×7 QFN-38
LTC3783	Buck, Boost, Buck/Boost LED Driver	3000:1 PWM 10:1 Analog	10×1A	Series	3 to 36	36	Ext FET	20kHz to 1MHz	Yes	125	4×5 DFN-16, TSSOP-16
LT3755/-1	Buck, Boost, Buck/Boost LED Driver	3000:1 PWM 10:1 Analog	14×1A	Series	4.5 to 40	75	Ext FET	100kHz to 1MHz	Yes	150	MSOP-16E
LT3756/-1	Buck, Boost, Buck/Boost LED Driver	3000:1 PWM 10:1 Analog	14×1A	Series	6 to 100	100	Ext FET	100kHz to 1MHz	Yes	150	MSOP-16E

Low Noise LDOs

Many automotive systems have noise-sensitive circuits or ICs that require a very low noise supply rail. For these applications, Linear Technology offers a broad line of LDOs with output noise less than $20\mu\text{V}_{\text{RMS}}$. Low quiescent currents of less than $30\mu\text{A}$ are ideal for always-on systems, which minimizes battery drain when the car is not running. These devices can withstand transient input voltages from 60V to 80V found in load dump conditions while maintaining output voltage regulation. Linear Technology's LDOs offer the lowest noise, quiescent current and drop-out voltage available. All of these devices are packaged in a very compact and thermally efficient footprint, offering the highest reliability for automotive applications.



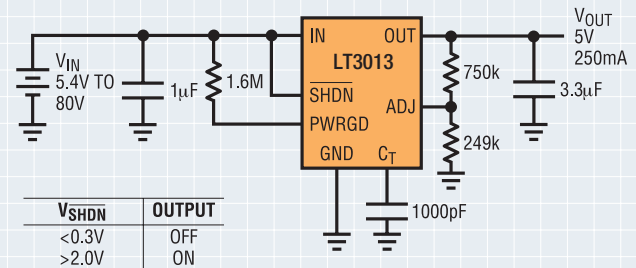
LT3013: Actual Size

LT3013/H: 250/200mA, 4V to 80V Low Dropout Micropower LDO with PowerGood

Features:

- Wide Input Voltage Range: 4V to 80V
- Low Quiescent Current: $65\mu\text{A}$
- Low Dropout Voltage: 400mV
- H-Grade: $+140^{\circ}\text{C}$ Operation, 200mA I_{OUT}
- Adjustable Output from 1.24V to 60V
- $1\mu\text{A}$ Quiescent Current in Shutdown
- Stable with $3.3\mu\text{F}$ Output Capacitor
- Stable with Aluminum, Tantalum or Ceramic Capacitors
- PowerGood Flag Indicates Output Regulation
- Reverse-Battery Protection

5V Supply with Shutdown



Low Noise LDOs: Positive Regulators

Part Number	Device Architecture	V_{IN} Range (V)	$V_{\text{OUT(MIN)}}$ (V)	I_{OUT} (A)	Dropout Voltage (V)	Noise (μV_{RMS})	I_{Q} (μA)	I_{SD} (μA)	Output Voltage (V)	Max Junc Temp ($^{\circ}\text{C}$)	Package
LT3010/-5/H	Single	1.5 to 80	1.275	50mA	0.30	100	30	1	Adj (1.275 to 60), 5	140	ThinSOT
LT3011	Single	3.0 to 80	1.24	50mA	0.30	100	46	1	Adj (1.24 to 60)	150	3x3 DFN-10, MSOP-12E
LT1761	Single	1.8 to 20	1.22	100mA	0.30	20	20	1	Adj, 1.5, 1.8, 2, 2.5, 2.8, 3, 3.3, 5	125	ThinSOT
LT3023	Dual	1.8 to 20	1.22	2x100mA	0.30	20	40	1	Adj (1.22 to 20)	125	3x3 DFN-10, MSOP-10E
LT3027	Dual	1.8 to 20	1.22	2x100mA	0.30	20	40	1	Adj (1.22 to 20)	125	3x3 DFN-10, MSOP-10E
LT1762	Single	1.8 to 20	1.22	150mA	0.30	20	25	1	Adj, 2.5, 3, 3.3, 5	125	MSOP-8
LTC1844	Single	1.6 to 6.5	1.25	150mA	0.11	30	40	1	Adj, 1.5, 1.8, 2.5, 2.8, 3.3	125	ThinSOT
LT3012	Single	4 to 80	1.24	250mA	0.40	100	40	1	Adj (1.24 to 60)	125	3x4 DFN-12, TSSOP-16E
LT3013	Single	4 to 80	1.24	250mA	0.40	100	65	1	Adj (1.24 to 60)	125	3x4 DFN-12, TSSOP-16E
LT3012H	Single	4 to 80	1.24	200mA	0.40	100	40	1	Adj (1.24 to 60)	140	TSSOP-16E
LT3013H	Single	4 to 80	1.24	200mA	0.40	100	65	1	Adj (1.24 to 60)	140	TSSOP-16E
LT1962	Single	1.8 to 20	1.22	300mA	0.27	20	30	1	Adj, 1.5, 1.8, 2.5, 3, 3.3, 5	125	MSOP-8
LT1763	Single	1.8 to 20	1.22	500mA	0.30	20	30	1	Adj, 1.5, 1.8, 2.5, 3, 3.3, 5	125	SO-8
LT3085	Single	1.2 to 36 ($40V_{\text{MAX}}$)	0	0.5	0.275	33	500	1	Adj (0 to 36)**	125	2x3 DFN-6, MSOP-8E
LT3024	Dual	1.8 to 20	1.22	100/500mA	0.30	20	60	1	Adj (1.22 to 20)	125	3x4 DFN-12, TSSOP-16E
LT3028	Dual	1.8 to 20	1.22	100/500mA	0.30	20	60	1	Adj (1.22 to 20)	125	3x5 DFN-16, TSSOP-16E
LT1965	Single	1.8 to 20	1.20	1.1	0.29	40	500	1	Adj (1.20 to 20)	125	3x3 DFN-8, MSOP-8E, TO-220-5, DDPak-5
LT3080/-1	Single	1.2 to 36 ($40V_{\text{MAX}}$)	0	1.1	0.3*	40	1mA	1	Adj (0 to 36)**	125	3x3 DFN-8, MSOP-8E, TO-220-5, SOT-223
LT1963/A	Single	2.1 to 20	1.21	1.5	0.34	40	1mA	1	Adj, 1.5, 1.8, 2.5, 3.3	125	DDPak-5, TO-220-5, SOT-223, SO-8
LT1764/A	Single	2.7 to 20	1.21	3	0.34	40	1mA	1	Adj, 1.8, 2.5, 3.3	125	DDPak-5, TO-220-5

* in two supply operation

** single resistor V_{OUT} set

Low Noise LDOs: Negative Regulators

Part Number	Device Architecture	V_{IN} Range (V)	$V_{\text{OUT(MIN)}}$ (V)	I_{OUT} (A)	Dropout Voltage (V)	Noise (μV_{RMS})	I_{Q} (μA)	I_{SD} (μA)	Output Voltage (V)	Highest Temp Grade ($^{\circ}\text{C}$)	Package
LT1964	Single	-1.9 to -20	-1.21	200mA	0.34	30	30	3	Adj, -5	125	ThinSOT
LT1175	Single	-4.3 to -20	-3.8	500mA	0.50	150	45	10	Adj, -5	125	DD, SOT-223, SO-8, PDIP8
LT1185	Single	-4.3 to -35	-2.40	3A	0.80	40	2.5mA	1	Adj	125	TO-220-5

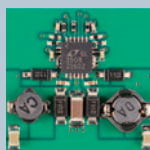
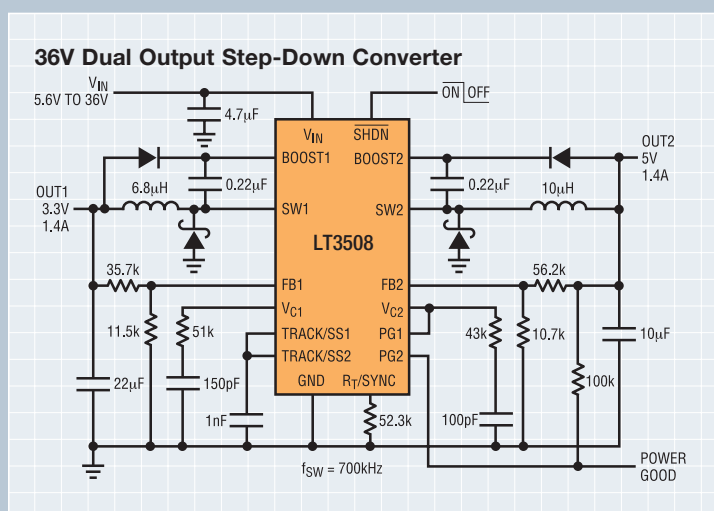
H-Grade (140°C to 150°C Maximum Junction Temperature) Power Products

The automotive environment is one of the most physically demanding for power ICs. ICs that operate in the engine compartment, or close to it, are exposed to temperatures in excess of 100°C. In order to accommodate these applications, Linear Technology offers a wide array of power ICs that can operate with junction temperatures as high as 150°C. Device topologies include LDOs, switching regulators and controllers. These devices are designed, tested and guaranteed to operate with junction temperatures as high as 150°C.

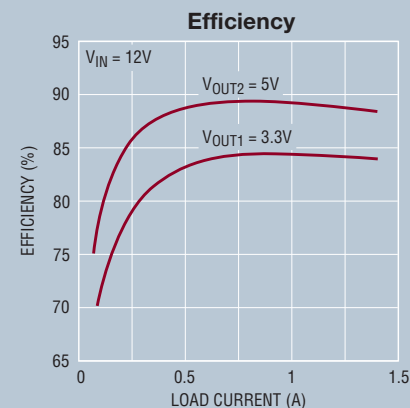
LT3508: 36V, 2.5MHz Dual 1.4A Step-Down DC/DC Converter

Features:

- Wide Input Voltage Range: 3.7V to 36V
- Two 1.4A Output Switching Regulators with Internal Power Switches
- Adjustable 250kHz to 2.5MHz Switching Frequency
- Synchronizable over the Full Frequency Range
- Antiphase Switching Reduces Ripple
- Uses Small Inductors and Ceramic Capacitors
- Accurate Programmable Undervoltage Lockout
- Independent Tracking, Soft-Start and PowerGood Circuits
- Output Adjustable Down to 800mV
- Small 4mm × 4mm 24-Pin QFN or 16-Pin Thermally Enhanced TSSOP Surface Mount Packages



LT3508: Actual Size



Part Number	Device Architecture	V _{IN} Range (V)	V _{OUT} Max/Min (V)	I _{OUT} (A)	Frequency (MHz)	Ext Sync Range (kHz)	I _O (mA)	I _{SD} (µA)	Max Junc Temp (°C)	Package
LT3010H/-5H	LDO	1.5 to 80	1.275	0.05	n/a	n/a	30µA	1	140	MSOP-8E
LT3011H	LDO	3.0 to 80	1.24	0.05	n/a	n/a	46µA	1	150	MSOP-12E
LT3012H	LDO	4 to 80	1.24	0.2	n/a	n/a	40µA	1	140	TSSOP-16E
LT3013H	LDO	4 to 80	1.24	0.2	n/a	n/a	65µA	1	140	TSSOP-16E
LT3470H	Switching Regulator	4 to 40	1.25	0.2	Hysteretic	n/a	26µA	1	150	2x3 DFN-8, ThinSOT
LT3437H	Switching Regulator	3.3 to 60	1.25	0.4	200kHz	240 to 700	100µA	1	140	TSSOP-16E
LT1933H	Switching Regulator	3.6 to 36	1.25	0.6	500kHz	n/a	1.2	2	150	ThinSOT, 2x3 DFN-6
LT1766H	Switching Regulator	5.5 to 60	1.2	1.2	200kHz	228 to 700	2.5	25	140	TSSOP-16E
LT1976H	Switching Regulator	3.3 to 60	1.2	1.2	200kHz	230 to 600	100µA	1	140	TSSOP-16E
LT1936H	Switching Regulator	3.6 to 36	1.2	1.4	500kHz	n/a	1.9	1	150	MSOP-8E
LT3509H	Dual Step-Down Regulator	3.7 to 36	2x0.70	0.80	250kHz to 2.5	250 to 2.5MHz	4.6	1	150	TBD
LT3500H	Step-Down Regulator + LDO Controller	3.6 to 40	2.00	0.80	250kHz to 2.5	250 to 2.5MHz	2.5	12	150	3x3 DFN-12
LT3481H	Switching Regulator	3.6 to 34, 36 _{MAX}	1.26	2	300kHz to 2.8	300 to 2.8MHz	50µA	1	150	3x3 DFN-10, MSOP-10E
LT3508H	Switching Regulator	3.7 to 36	0.8	1.4 x 2	250kHz to 2.5	250 to 2.5MHz	4.6	1	150	4x4 QFN-24, TSSOP-16E
LT3507H	Triple Step-Down Regulator	4 to 40	0.8	2.4, 1.5, 1.5	250kHz to 2.5	250 to 2.5MHz	2	1	150	5x7 QFN-38
LTC3803/-5/-3H	Flyback Controllers	4 to 75	0.8	Ext FETs	200kHz	n/a	240µA	1	150	ThinSOT-6
LTC1772H	Step-Down Controller	2.5 to 9.8	0.8	Ext FETs	550kHz	n/a	270µA	22	140	ThinSOT-6
LTC1871H	Step-Up, Flyback and SEPIC Controller	2.5 to 36	1.23	Ext FETs	50kHz to 1	65 to 1.3MHz	550µA	20	150	MSOP-10
LTC3703H	Synchronous Step-Down/Step-Up Controller	9.3 to 100	0.8	Ext FETs	100kHz to 600kHz	100 to 600	1.7	50	150	SSOP-16, TSSOP-28
LTC3731H	3-Phase Synchronous Controller	4 to 36	0.6	Ext FETs	250kHz to 600kHz	250 to 600	2.3	100	140	SSOP-36
LTC3862H/-1H	Multiphase Step-Up Controllers	4 to 36	7	Ext FETs	75kHz to 500kHz	50kHz to 650kHz	1.8	30	150	5x5 QFN-24, SSOP-24, TSSOP-24

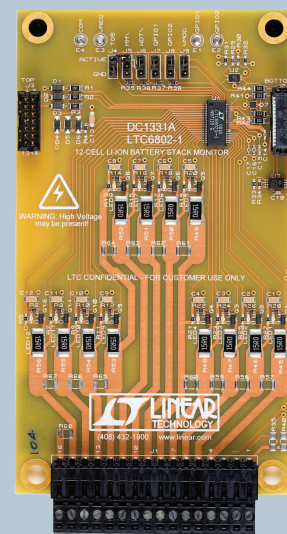
LTC6802 High Voltage Battery Stack Monitor for Hybrid/Electric Vehicles & Battery Backup Systems

The LTC6802 is a highly integrated battery monitoring IC capable of measuring up to 12 individual battery cells. Using a unique level shifting technique, multiple LTC6802s can be stacked in series without opto-couplers or isolators, allowing precision voltage monitoring of every cell in long strings of series connected batteries. Long battery strings enable high power, rechargeable battery applications, such as electric & hybrid electric vehicles, scooters, motorcycles, golf carts, wheelchairs, boats, forklifts, robotics, UPS systems and portable medical equipment.

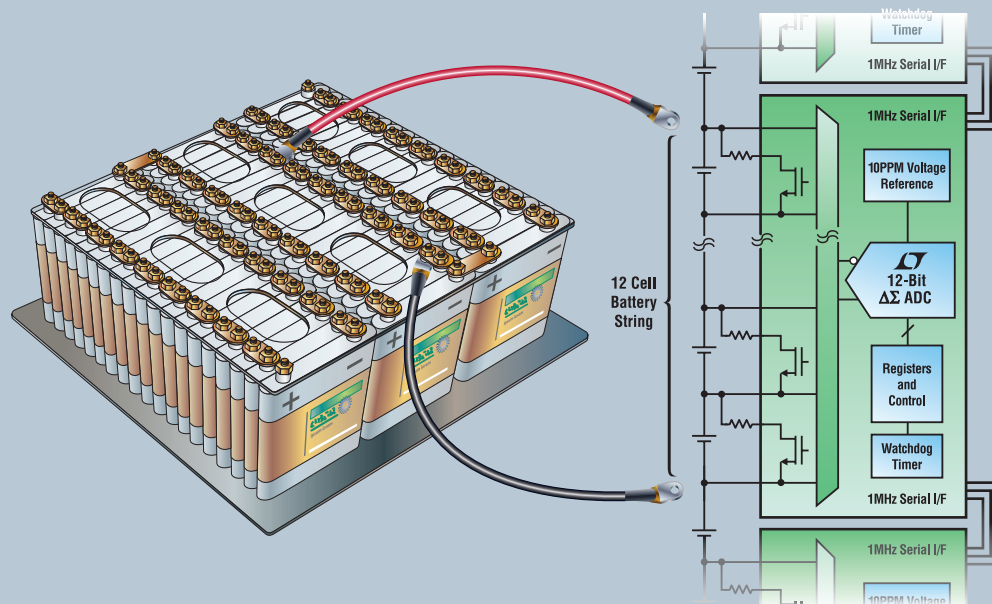
With superior energy density, Lithium-ion batteries are poised to be the power source of choice for these applications. However, designing a large, highly reliable and long lasting Li-Ion battery stack is a very complex problem. Li-Ion cells are sensitive to overcharging or over-discharging, requiring that each cell in a stack be carefully managed. The LTC6802 makes this possible with quick and accurate measurements of all cell voltages, even in the presence of stack voltages greater than 1000V+.

The maximum total measurement error is guaranteed to be less than 0.25% from -40°C to 85°C and every cell voltage in a battery stack can be measured within 13ms. Each cell is monitored for under voltage and over voltage conditions and an associated MOSFET switch is available to discharge over-charged cells. Each LTC6802 communicates via a 1MHz serial interface. Also included are temperature sensor inputs, GPIO lines and a precision voltage reference.

The LTC6802 was designed for the environmental and reliability challenges of automotive and industrial applications. It is fully specified for operation from -40°C to 85°C and offers diagnostics and fault detection. The LTC6802 is a small 8mm x 12mm surface mount device. The combined robustness, exceptional precision and tiny package directly address the critical requirements of emerging and advanced battery technologies.

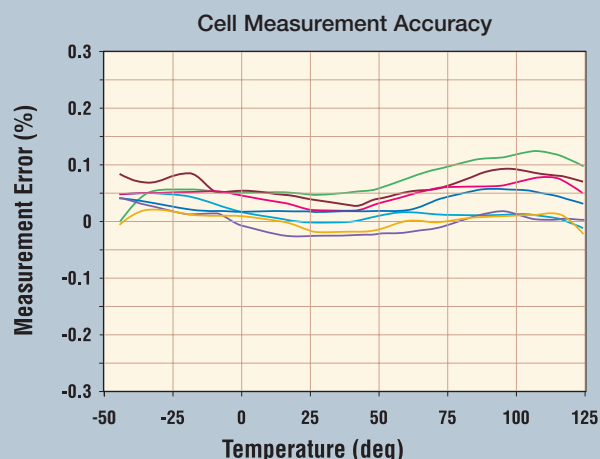


LTC6802 Demo Board



Features:

- 0.25% Maximum Total Measurement Error from -40°C to 85°C
- Stackable Architecture Enables 1000V+ Systems
- ADC with Inherent FIR Filtering
- 1MHz Serial Interface with Packet Error Checking
- Onboard FETs for Cell Discharge
- Temperature Sensor Inputs
- Diagnostics and Fault Detection
- AEC-Q100
- 44-lead SSOP Package
- Fully Specified for -40°C to 85°C



Typical devices show outstanding accuracy over extended temperature extremes.

Data Converter Products

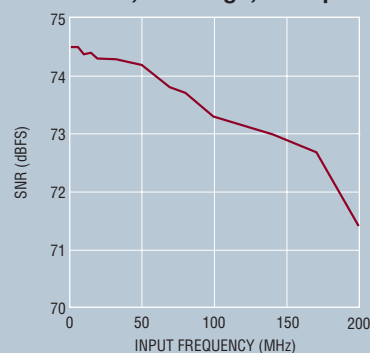
Linear's data converter products are well known for their high performance, low power and small solution size. Our ADC product line includes low speed, high precision converter products with up to 24-bit resolution, and the highest performance, high speed ADCs on the market today. Our DAC products offer precision DC performance specifications with ± 1 LSB INL and DNL, a choice of voltage or current output, serial or parallel interfaces.

High Speed Analog-to-Digital Converters

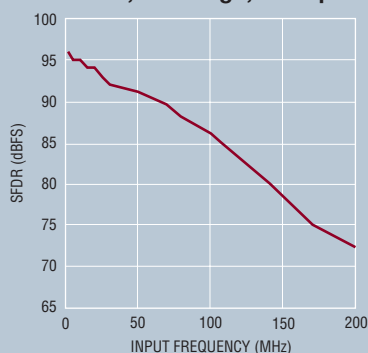
The LTC2246H is designed to satisfy the high temperature demands of automotive applications and is offered in a small leaded package for easier inspection of solder joints in manufacturing. All of our high speed ADC products integrate the bypass capacitance on chip, requiring only a small number of external components to ensure the smallest solution size for more compact, cost-effective designs.

Part Number	Resolution	Channels	Speed (Msps)	SNR (dB)	SFDR (dB)	Power (mW)	Maximum Ambient Temperature	Package
LTC2246H	14	1	25	74.3	90	75	125°C	7x7 LQFP-48
LTC2226H	12	1	25	71.3	90	75	125°C	7x7 LQFP-48

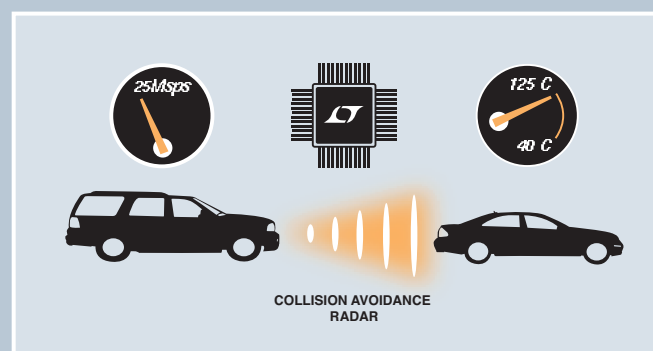
SNR vs Input Frequency, -1dB, 2V Range, 25Msps



SFDR vs Input Frequency, -1dB, 2V Range, 25Msps



Applications: Collision Avoidance Radar, Downhole Drilling, Spectral Analysis, Medical Equipment, Camera Front-End, Satellite



SAR Analog-to-Digital Converters

Linear offers the most complete family of 12-, 14- and 16-bit SAR ADCs rated for the -40°C to $+125^{\circ}\text{C}$ automotive temperature range. The LTC1403 ADCs and LTC186x ADCs offer the advantages of speed, low power, small package size and measure 1, 2 or 8 input channels. Our new LTC236x ADC family is a 12-bit resolution, pin- and software-compatible family, with optimized sampling performance and lowest power over the automotive temperature range. All of these SAR ADCs are ideal for navigation systems, gyrometer monitor and general system monitoring.

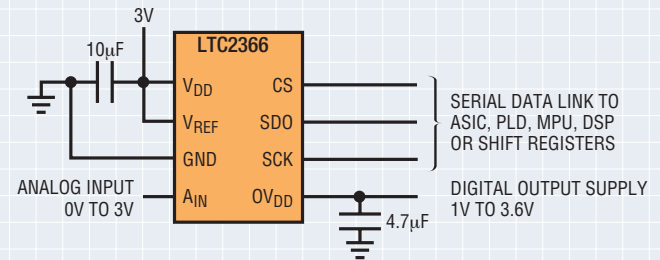
Part Number	Resolution	Channels	Sample Rate		Power @ Max Sample Rate		Maximum Ambient Temperature	Package
			5V Supply (ksps)	3V Supply (ksps)	5V Supply (mW)	3V Supply (mW)		
LTC1403AH	14	1	–	2.8Msps	–	14	125°C	MSOP-10
LTC1403H	12	1	–	2.8Msps	–	14	125°C	MSOP-10
LTC1864 (L)	16	1	250	(150)	4.25	(1.22)	125°C	MSOP-8
LTC1865 (L)	16	2	250	(150)	4.25	(1.22)	125°C	MSOP-10
LTC1867(L)	16	8	200	(175)	6	(2.25)	85°C	SSOP-16
LTC1860 (L)	12	1	250	(150)	4.25	(1.22)	125°C	MSOP-8
LTC1861 (L)	12	2	250	(150)	4.25	(1.22)	125°C	MSOP-10
LTC1863 (L)	12	8	200ksps	(175ksps)	6	(2.25)	85°C	SSOP-16

Tiny SAR Analog-to-Digital Converter Family

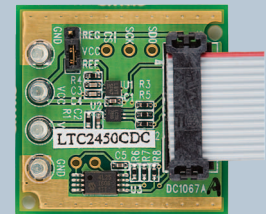
Part Number	Resolution	Channels	Sample Rate	Power @ Max Sample Rate	Maximum Ambient Temperature	Package
LTC2360	12	1	100ksps	1.5mW	125°C	TSOT23-6/8
LTC2361	12	1	250ksps	2.2mW	125°C	TSOT23-6/8
LTC2362	12	1	500ksps	3.3mW	125°C	TSOT23-6/8
LTC2365	12	1	1Msps	6mW	125°C	TSOT23-6/8
LTC2366	12	1	3Msps	7.8mW	125°C	TSOT23-6/8

LTC2366: 12-bit, 3Msps Tiny SAR ADC**Features:**

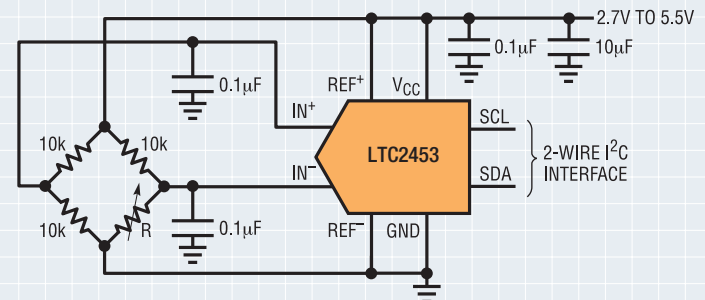
- Low Noise: 73dB SNR
- Low Power Dissipation: 7.8mW
- Single Supply 2.35V to 3.6V Operation
- No Data Latency
- Sleep Mode with 1nA Typical Supply Current
- Dedicated External REF Pin on 8-Lead TSOT
- Dedicated Output Supply Pin on 8-Lead TSOT
- SPI/MICROWIRE™ - Compatible Serial I/O
- Guaranteed Operation from -40°C to 125°C
- 6- and 8-Lead TSOT Plastic Packages

12-Bit, 3 Msps ADC in Thin SOT Package**Delta-Sigma Analog-to-Digital Converters**

Voted one of Electronic Design's ADCs of the Year in 2007, the LTC2450 family of ultra-tiny ADCs are ideal for measuring automotive signals such as temperature, pressure and viscosity. For higher precision applications, Linear offers the 24-bit Easy Drive™ ADCs that measure up to 8 differential or 16 single-ended analog inputs.

LTC2450 Demo Board: 2.8cm x 2.8cm**LTC2453: Easy-to-Use, Ultra-Tiny, Differential, 16-Bit Delta-Sigma ADC With I²C Interface****Features:**

- $\pm V_{CC}$ Differential Input Range
- 16-Bit Resolution (Including Sign), No Missing Codes
- 2LSB Offset Error
- 4LSB Full-Scale Error
- 60 Conversions Per Second
- Single Conversion Settling Time for Multiplexed Applications
- Single-Cycle Operation with Auto Shutdown
- 800µA Supply Current
- 0.2µA Sleep Current
- Internal Oscillator — No External Components Required
- 2-Wire I²C Interface
- Ultra-Tiny 8-Pin 3mm x 2mm DFN 2nd TSOT Packages

16-Bit Ultra-Tiny I²C ADC

Part Number	Resolution	Channels	RMS Noise (mV)	I/O	Total Unadjusted Error	Maximum Ambient Temperature	Packages
LTC2450	16-Bits	1	1.4	SPI	0.05% (max)	85°C	2x2 DFN-6
LTC2451	16-Bits	1	1.4	I²C	0.05% (max)	85°C	3x2 DFN-8, TSOT23-8
LTC2452	16-Bits	1	1.4	SPI	0.05% (max)	85°C	3x2 DFN-8, TSOT23-8
LTC2453	16-Bits	1	1.4	I²C	0.05% (max)	85°C	3x2 DFN-8, TSOT23-8
LTC2483	16-Bits	1	0.6	I²C	0.004% (max)	85°C	3x3 DFN-10
LTC2488	16-Bits	2/4	0.6	SPI	0.004% (max)	85°C	4x3 DFN-14
LTC2489	16-Bits	2/4	0.6	I²C	0.004% (max)	85°C	4x3 DFN-14
LTC2492	24-Bits	2/4	0.6	SPI	0.004% (max)	85°C	4x3 DFN-14
LTC2493	24-Bits	2/4	0.6	I²C	0.004% (max)	85°C	4x3 DFN-14
LTC2496	16-Bits	8/16	0.6	SPI	0.004% (max)	85°C	5x7 QFN-38
LTC2497	16-Bits	8/16	0.6	I²C	0.004% (max)	85°C	5x7 QFN-38
LTC2498	24-Bits	8/16	0.6	SPI	0.004% (max)	85°C	5x7 QFN-38
LTC2499	24-Bits	8/16	0.6	I²C	0.004% (max)	85°C	5x7 QFN-38

Digital-to-Analog Converters

Linear Technology's DACs work well in a wide variety of open-loop or closed-loop systems, adjusting gain, offset and many other signals. From 8-bit singles to 16-bit octals, serial or parallel I/O, Linear has a DAC to suit your application.

Ultra-Tiny 12-/10-/8-Bit DACs with Internal Reference in SC70 Package

The LTC2630 family of 12-bit, 10-bit and 8-bit digital-to-analog converters (DACs) are offered in tiny 2.1mm × 2mm SC70 packages — the smallest available DACs with an internal reference. The LTC2630 offers the choice of an internal 2.5V or 4.096V 10ppm/°C full-scale reference, providing nearly a 50% board space reduction over competing DACs with an internal reference. These single-voltage output DACs achieve 12-bit DC performance of $\pm 1\text{LSB}$ (max) integral nonlinearity error and are ideal for automotive voltage adjustment or setting the analog voltage to a VCO.

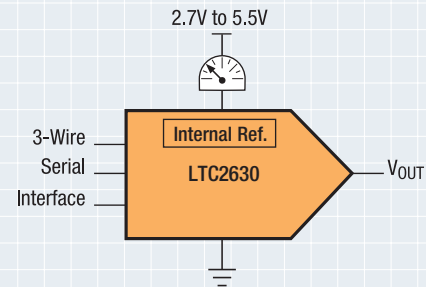
LTC2630 DAC Family

Features:

- Integrated Precision Reference:
 - 2.5V Full-Scale 10ppm/°C (LTC2630-L)
 - 4.096V Full-Scale 10ppm/°C (LTC2630-H)
- Maximum INL Error: 1LSB (LTC2630A-12)
- Guaranteed Operation from -40°C to 125°C
- Low Noise: $0.7\text{mV}_{\text{P-P}}$, 0.1Hz to 200kHz
- Guaranteed Monotonic over Temperature
- Selectable Internal Reference or Supply as Reference
- 2.7V to 5.5V Supply Range (LTC2630-L)
- Low Power Operation: $180\mu\text{A}$ at 3V
- Power Down to $1.8\mu\text{A}$ (Max)
- Power-On Reset to Zero or Midscale Options
- SPI Serial Interface
- Tiny 6-Lead (2.1mm×2mm) SC70 Package

Resolution	Single SPI with Internal Reference	Single with Internal Reference Bonded Out		Maximum Ambient Temperature
	SPI	I ² C	SPI	
12-Bit	LTC2630-12	LTC2631-12	LTC2640-12	125°C
10-Bit	LTC2630-10	LTC2631-10	LTC2640-10	125°C
8-Bit	LTC2630-8	LTC2631-8	LTC2640-8	125°C

12-/10-/8-Bit DACs



Micropower 16-/14-/12-Bit DAC Family

For system calibration of offset and gain, Linear Technology's LTC2600 family of data converters are ideal. The devices are available in different packages (singles, duals, quads and octals) and have 12- to 16-bit resolution.

LTC2600 DAC Family

Features:

- 2.7V to 5.5V Single Supply Operation
- Guaranteed Monotonic Over Temperature
- Rail-to-Rail Outputs Drive $\pm 15\text{mA}$
- Low Power: $250\mu\text{A}$ per DAC
- Ultralow Crosstalk Between DACs
- Small Packages: 3mm × 3mm 10-Pin DFN Single, MSOP-8 Dual, SSOP-16 Quad and Octal

Resolution	Single		Dual		Quad		Octal		Maximum Ambient Temperature
	SPI	I ² C	SPI	I ² C	SPI	I ² C	SPI	I ² C	
16-Bit	LTC2601	LTC2606	LTC2602	LTC2607	LTC2604	LTC2609	LTC2600	LTC2605	85°C
14-Bit	LTC2611	LTC2616	LTC2612	LTC2617	LTC2614	LTC2619	LTC2610	LTC2615	85°C
12-Bit	LTC2621	LTC2626	LTC2622	LTC2627	LTC2624	LTC2629	LTC2620	LTC2625	85°C

Rugged Serial Interface Transceivers

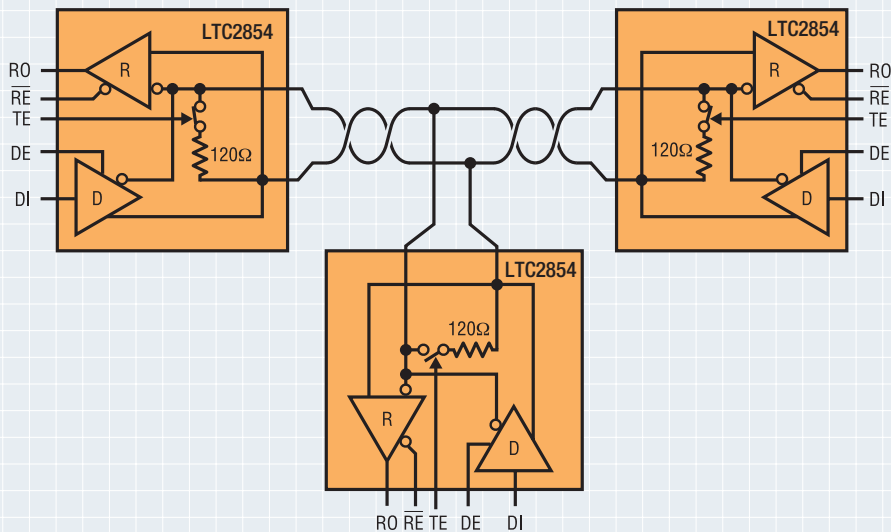
Linear offers a broad selection of RS485/RS422, RS232 and CAN interface transceivers for rugged environments. Our newest family of industry-standard, low power RS485 transceivers features an extended operating temperature of -40°C to 125°C that helps ensure reliable data transmission in harsh environmental conditions commonly posed by automotive applications. Select models feature slew rate limiting to lower EMI, while others include a receiving logic-selectable 120Ω termination. All devices are designed to operate in systems with 3.3V or 5V supplies, possess a maximum data rate of 20Mbps and maintain a high input impedance capable of supporting up to 256 nodes. In addition, enhanced ESD protection guarantees that no damage or latchup can occur up to $\pm 15\text{kV}$ HBM. These features, coupled with a wide operating window, make this product family suitable for an array of automotive transceiving and low power RS422/RS485 transceiver applications including level translation, backplane transceiving and low power RS422/RS485 transceiving.

Part Number	Standard	Bus Voltage Protection (V)	ESD Protection (kV)	Comments	Maximum Ambient Temperature
LT1785	RS485	± 60	± 15	Standard pinout, half-duplex	85°C
LT1796	CAN	± 60	± 15	Standard SO-8 pinout, 125kbaud	85°C

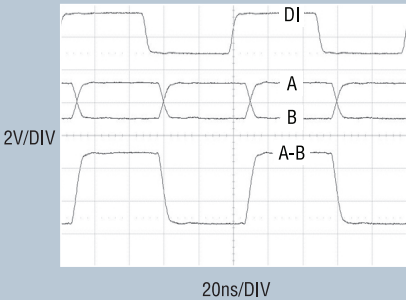
RS485/RS422 Transceivers

Part Number	Max Data Rate	Duplex	Supply Voltage (V)	ESD Protection (kV)	Shutdown	Maximum Ambient Temperature	Comments
LTC2850	20Mbps	Half	3.3	± 15	yes	125°C	High-Speed, Failsafe
LTC2851	20Mbps	Full	3.3	± 15		125°C	Failsafe, No RCVR/DRVR Enable Pins
LTC2852	20Mbps	Full	3.3	± 15	yes	125°C	High-Speed, Failsafe
LTC2854	20Mbps	Half	3.3	± 25	yes	125°C	Integrated Switchable Termination
LTC2855	20Mbps	Half	3.3	± 15	yes	125°C	Integrated Switchable Termination
LTC2856-1	20Mbps	Half	5	± 15	yes	125°C	Failsafe, Hot Swap™ Capable
LTC2856-2	250kbps	Half	5	± 15	yes	125°C	Slew Rate Limited, Failsafe, Hot Swap Capable
LTC2857-1	20Mbps	Full	5	± 15		125°C	Failsafe, Hot Swap Capable
LTC2857-2	250kbps	Full	5	± 15		125°C	Slew Rate Limited, Failsafe, Hot Swap Capable
LTC2858-1	20Mbps	Full	5	± 15	yes	125°C	Failsafe, Hot Swap Capable
LTC2858-2	250kbps	Full	5	± 15	yes	125°C	Slew Rate Limited, Failsafe, Hot Swap Capable
LTC2859	20Mbps/250kbps	Half	5	± 15	yes	85°C	Integrated Switchable Termination, Low EMI Mode
LTC2861	20Mbps/250kbps	Full	5	± 15	yes	85°C	Integrated Switchable Termination, Low EMI Mode

3.3V, 20Mbps RS485/RS422 Transceiver Application



LTC2854 at 20Mbps into 54Ω



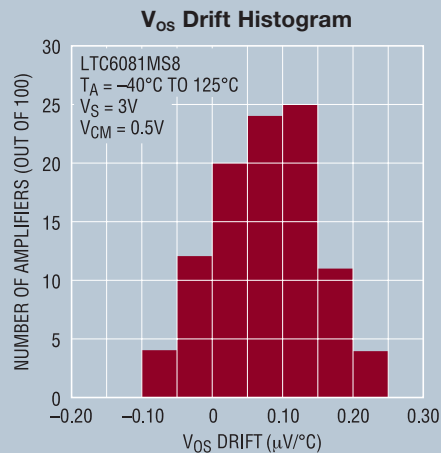
Precision Amplifiers

Linear Technology offers a wide range of precision amplifiers designed to take the heat of the rugged automotive environment. From micropower to high speed + precision, these parts are fully specified over the -40°C to 125°C temperature range. They offer industry-leading precision and ruggedness features such as Over-The-Top™ inputs and reverse-battery protection. The portfolio includes both operational amplifiers and more highly integrated parts such as programmable gain amps and difference amps with integrated precision resistors.

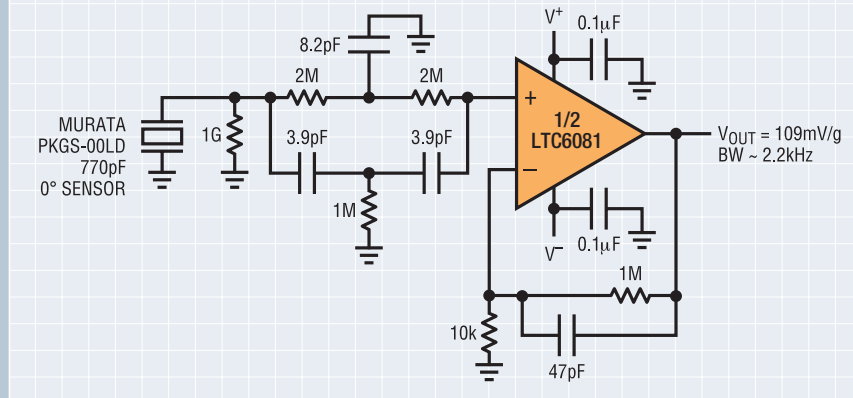
LTC6081: Precision Dual CMOS Rail-to-Rail Input/Output Amplifier

Features:

- Maximum Offset Voltage $90\mu\text{V}$ (-40°C to 125°C)
- Maximum Offset Voltage Drift: $\pm 0.8\mu\text{V}/^{\circ}\text{C}$ (-40°C to 125°C)
- Maximum Input Bias Current: 40pA ($T_A \leq 85^{\circ}\text{C}$)
- Gain Bandwidth Product: 3.6MHz
- 0.1Hz to 10Hz Noise: $1.3\mu\text{V}_{\text{P-P}}$
- Supply Current: $330\mu\text{A}$
- Rail-to-Rail Inputs and Outputs



Shock Sensor Amplifier (Accelerometer)



-40°C to 125°C Guaranteed Specifications

Part Number	Channels	Bandwidth (kHz)	V_{SUPPLY} (V)	I_{SUPPLY} (μA)	V_{OS} (μV)	Reverse Battery	Features
LT1490A/1A	2/4	60	2.5 to 44	95	2.5mV	yes	Rail-to-Rail, Over-The-Top
LT1494/5/6	1/2/4	2.7 typ	2.2 to 36	5	875	yes	Rail-to-Rail, Over-The-Top
LT1636	1	60	2.5 to 44	75	3mV	yes	Rail-to-Rail, Over-The-Top
LT1637/8/9	1/2/4	350	2.5 to 44	400	3mV	yes	Rail-to-Rail, Over-The-Top
LT1782	1	65	2.7 to 18	100	3mV	yes	Rail-to-Rail, Over-The-Top
LT1783	1	400	2.7 to 18	600	3mV	yes	Rail-to-Rail, Over-The-Top
LT1991	1	560 typ	2.4 to 40	180	285	no	Precision Gain-Selectable
LT6003/4/5	1/2/4	3 typ	1.6 to 16	2.5	1.5mV	no	Rail-to-Rail Micropower, Precision
LTC1050	1	2.5 typ	4.75 to 18	2.3mA	10	no	Zero-Drift
LTC2050/1/2HV	1/2/4	3000 typ	2.7 to 12	1.2mA	8	no	Zero-Drift
LTC2053	1	200 typ	2.7 to 11	1.1mA	17.45	no	Instrumentation Amp, Zero-Drift
LTC2054/5	1/2	500 typ	2.7 to 12	155	8	no	Zero-drift, Ultralow Power
LTC6078/9	2/4	320	2.7 to 6	80	95	no	Rail-to-Rail, 1pA Bias Current
LTC6081/2	2/4	1500	2.7 to 5.5	460	90	no	Rail-to-Rail, 1pA Bias Current
LTC6084/5	2/4	600	2.5 to 6	145	1.1mV	no	Rail-to-Rail, 1pA Bias Current
LTC6087/8	2/4	8000	2.7 to 5.5	1.4mA	1.1mV	no	Rail-to-Rail, 1pA Bias Current
LTC6240/1/2	1/2/4	12000	2.8 to 11	2.4mA	400	no	Rail-to-Rail Out, 1pA Bias Current
LTC6244	2	30000	2.8 to 10.5	7.4mA	400	no	Rail-to-Rail Out, 1pA Bias Current
LTC6800	1	200 typ	2.7 to 5.5	1.3mA	125	no	Instrumentation Amp, Zero-Drift
LTC6915	1	200 typ	2.7 to 11	1.3mA	20	no	Programmable Instrumentation Amp

High Side Current Sense Amplifiers

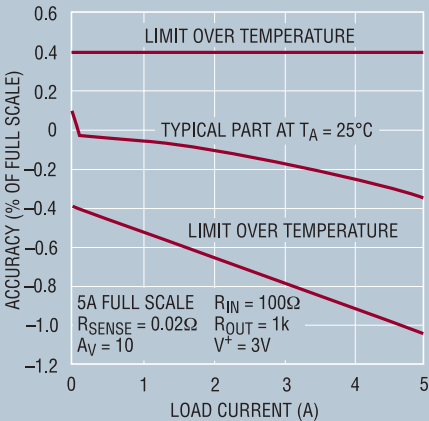
As the electronics content in automotive systems increases, so too does the need for accurate current measurements, whether for state-of-health analyses, fault protection or to provide feedback loop support. Linear Technology's high side current sense products simplify the challenge of accurately measuring currents in automotive applications. The LTC6102 utilizes a zero-drift architecture to achieve the highest levels of precision at up to 105V. This allows a smaller value sense resistor to be used, reducing power and heat loss in the shunt resistor. The LT6107 is specified for operation from -55°C to 150°C for the harshest environments.

LT6107: Wide Temperature Range High Side Current Sense Amplifier

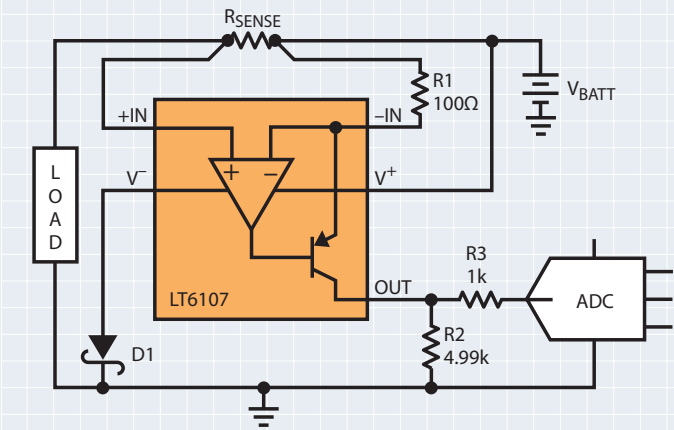
Features:

- Operating Temperature Range: -55°C to 150°C
- Gain Configurable with Two Resistors
- Low Offset Voltage: $250\mu\text{V}$ Maximum
- Output Current: 1mA Guaranteed
- Supply Range: 2.7V to 36V , 44V Absolute Maximum
- Low Profile (1mm) ThinSOT™ Package

Measurement Accuracy vs Load Current



Precision Current Sensing Up to 150°C



LT6107: Actual Size

-40°C to 125°C Guaranteed Specifications

Part Number	Current Direction	Common Mode Voltage (V)	Response Time typ (μs)	V_{OS} Max (μV)	V_{OS} Drift ($\mu\text{V}/^{\circ}\text{C}$)	I_{BIAS} Max (nA)	Gain	PSRR Min (dB)
LT1787	Bidirectional	2.5 to 65	10	400	0.5	$25\mu\text{A}$	8V/V	100
LT6100	Unidirectional	4.1 to 48	40	600	0.5	$10\mu\text{A}$	Pin-Set	100
LTC6101	Unidirectional	5 to 105	1	535	1	245	R-Set	115
LTC6102	Unidirectional	5 to 105	1	17.5	0.025	20	R-Set	125
LTC6103	Unidirectional	4 to 70	1	700	1.5	245	R-Set	106
LTC6104	Bidirectional	4 to 70	1	700	1.5	245	R-Set	112
LT6105	Unidirectional	-0.3 to 44	3.5	600	0.5	30	R-Set	94
LT6106	Unidirectional	2.7 to 44	3.5	350	1	65	R-Set	106
LT6107	Unidirectional	2.7 to 44	3.5	400	1	130	R-Set	106

Gain-Selectable Diff Amps and PGAs

Linear Technology's family of gain-selectable and gain-programmable amplifiers provides an excellent combination of integration, precision and flexibility. The LT1990 difference amplifier can accept input voltages up to $\pm 250\text{V}$. The LT1991 gain-selectable difference amplifier has a gain range of 1 to 13, with less than $50\mu\text{V}$ input voltage offset error at 25°C . Like the other parts shown in the table below, the LT6910/1/2 programmable gain amplifier family is specified over the entire -40°C to 125°C temperature range. These parts provide gain ranges of 0 to 7V/V , 0 to 64V/V and 0 to 100V/V . The LTC6915 provides further integration as a zero-drift instrumentation amplifier with 14 levels of programmable gain.



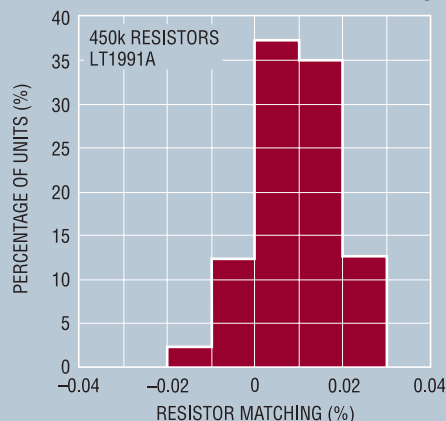
LT1991: Actual Size

LT1991: Precision $100\mu\text{A}$ Gain Selectable Amplifier

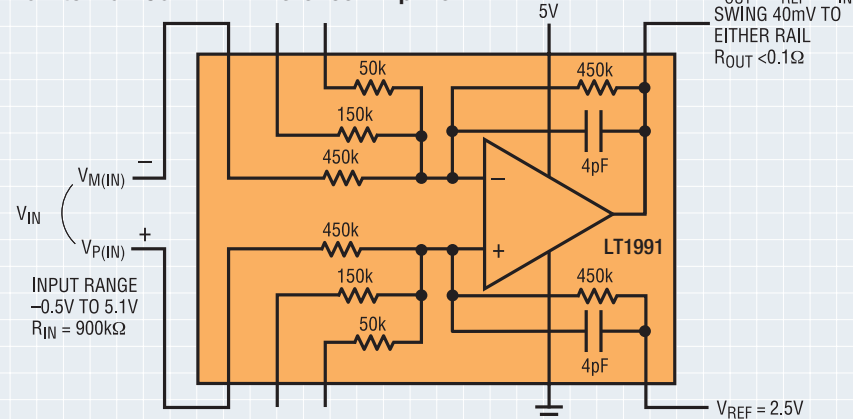
Features:

- Pin-Configurable:
 - Difference Amplifier Gain Range: 1 to 13
 - Noninverting Amplifier Gain Range: 0.07 to 14
 - Inverting Amplifier Gain Range: -0.08 to -13
- Gain Error: $<0.04\%$
- Rail-to-Rail Output

Distribution of Resistor Matching



Rail-to-Rail Gain = 1 Difference Amplifier



-40°C to 125°C Guaranteed Specifications

Part Number	Channels	Bandwidth typ	V_{SUPPLY} (V)	I_{SUPPLY}	V_{OS}	Gain Range	Features
LT1990	1	100kHz	2.4 to 36	$200\mu\text{A}$	5.2mV	1, 10	$\pm 250\text{V}$ Diff Amp
LT1991	1	560kHz	2.4 to 40	$180\mu\text{A}$	$285\mu\text{V}$	-13 to 14	Precision Gain-Selectable Diff Amp
LTC6910/1-x	1/2	13MHz	2.7 to 11	3mA	11mV	0 to 100	Single/Dual Programmable Gain Amplifier
LTC6912-x	2	33MHz	2.7 to 10.5	3mA	3.5mV	0 to 100	Dual PGA with Independent Channels
LTC6915	1	200kHz	2.7 to 11	$1.3\mu\text{A}$	$20\mu\text{V}$	0 to 4096	Zero-Drift Programmable Instrumentation Amp

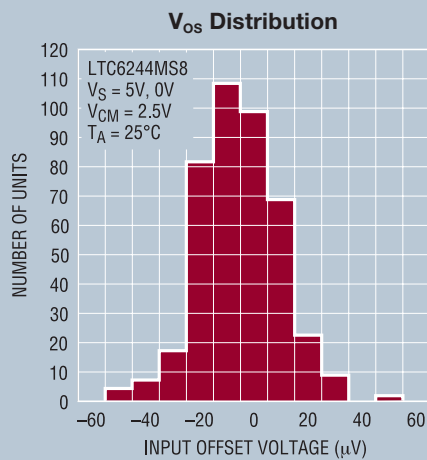
High Speed Amplifiers

Linear Technology offers a wide range of high speed amplifiers specified from -40°C to 125°C including low noise, low bias current amplifiers, current feedback amplifiers, fully differential amplifiers for driving lines or ADCs, and programmable gain amplifiers.

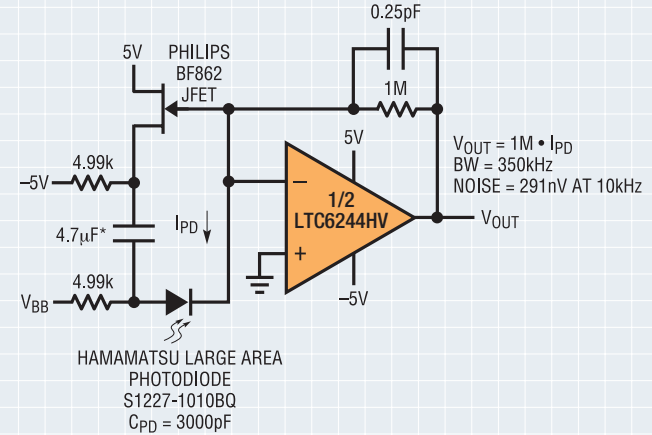
LTC6244HV: Dual 50MHz Low Noise Rail-to-Rail CMOS Op Amp

Features:

- Input Bias Current: 1pA (Typ at 25°C)
- Gain Bandwidth Product: 50MHz
- Slew Rate: $35\text{V}/\mu\text{s}$
- 2.8V to $\pm 5.25\text{V}$ Supply Operation
- Supply Range: 2.7V to 36V , 44V Absolute Maximum
- Rail-to-Rail Outputs



Very Low Noise Large Area Photodiode



* CAN BE MICROPHONIC, FILM, X7R, IF NEEDED.

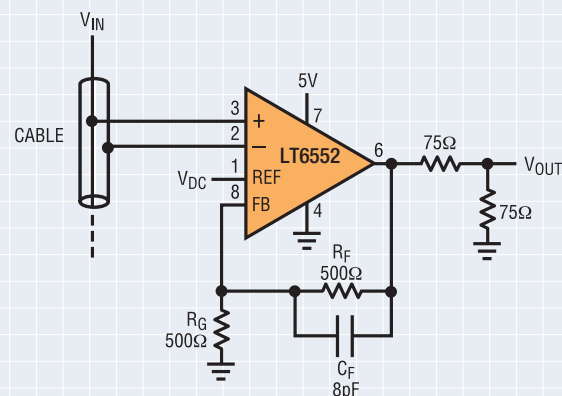
-40°C to 125°C Guaranteed Specifications

Part Number	Channels	Bandwidth (MHz) typ	Slew Rate ($\text{V}/\mu\text{s}$) typ	V_{SUPPLY} (V)	I_{SUPPLY} (mA)	V_{OS} (mV)	Features
LT1397	4	400	800	3 to 12	6.5	12	Current Feedback
LTC6087/8	2/4	14	7.2	2.7 to 5.5	1.35	1.1	Rail-to-Rail, Low Cost
LT6205	1	100	450	3 to 12	6.5	6	Rail-to-Rail Output
LTC6240/1/2	1/2/4	17	8	2.8 to 11	2.4	$400\mu\text{V}$	Rail-to-Rail Out, 1pA Bias Current
LTC6244	2	40	34	2.8 to 10.5	7.4	$400\mu\text{V}$	Rail-to-Rail Out, 1pA Bias Current
LTC6404	1	600	450	2.7 to 5.25	36.5	2	Fully Differential Input and Output
LTC6910/1-x	1/2	13	16	2.7 to 11	3	8	Programmable Gain Amplifier
LTC6912-x	2	33	16	2.7 to 10.5	3	3.5	Programmable Gain Amplifier

Video Amplifiers and Fully Differential Amplifiers

Part Number	Channels	Slew Rate (V/ μ s)	Bandwidth (MHz)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Features
LTC6553/4	3	2500	650	4.5 to 13.2	11	Fixed Gain of 2 or 1, –85dB Distortion
LT1818/9	1/2	2500	250	4 to 12.6	10	Low Noise, –85dB Distortion
LT1675/-1	1/3	1100	250	8 to 12.6	14	2:1 Multiplexer, Fixed Gain of 2
LT1398/9	2/3	800	300	4 to 15.5	6.5	0.1dB Gain Flatness to 150 MHz
LT1395/6/7	1/2/4	800	400	4 to 12.6	6.5	Current Feedback, 80mA Output
LT6550/1	3/4	600	90	3 to 12.6	11	Fixed Gain of 2, Operates on 3.3V
LT6552	1	600	75	3 to 12.6	17	Difference Amp, Rail-to-Rail Output
LT6205/6/7	1/2/4	450	100	2.7 to 12.6	5	Low Cost, Rail-to-Rail Output
LT6555/6	3	2100	650	4.5 to 12.6	12	2:1 Multiplexer, Fixed Gain of 2 or 1
LT6557/8	3	2200	500	3 to 7.5	25	Fixed Gain of 2 or 1, –85dB Distortion
LT6559	3	800	300	4 to 12.6	6	Fixed Gain of –1, 1, or 2
LTC1992-X	1	1.5	3.2	2.7 to 11	1.5	Fully Differential - 40°C to 125°C
LTC6404-1/-2/-4	1	700	900	2.7 to 5.25	35.5	Fully Differential - 40°C to 125°C

Cable Sense Amplifier for Loop Through Connections with DC Adjust

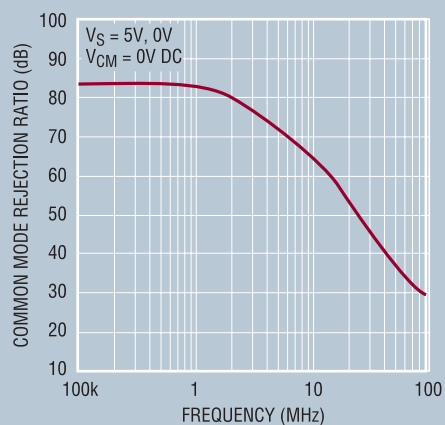


LT6552: Video Difference Amplifier

Features:

- Differential or Single-Ended Gain Block
- Wide Supply Range: 3V to 12.6V
- Rail-to-Rail Outputs
- Input Common Mode Range Includes Ground
- 600V/ μ s Slew Rate

Input Referred CMRR vs Frequency



LT6552: Actual Size

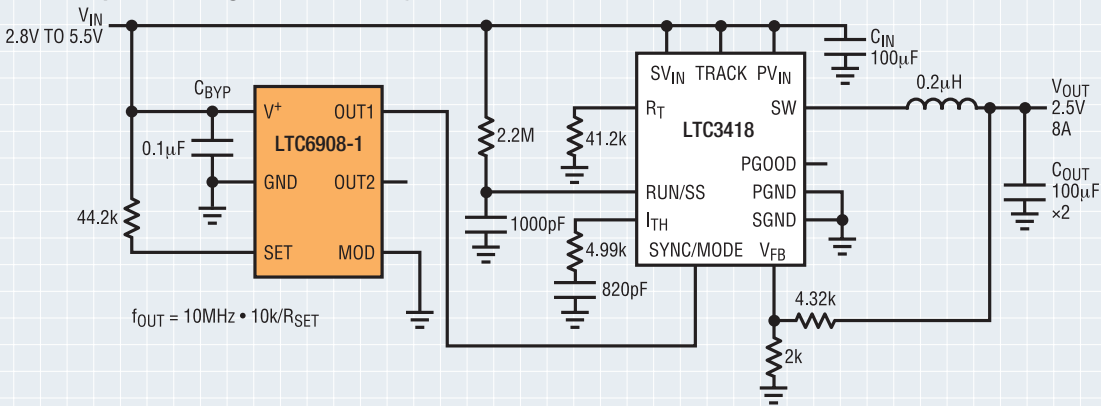
Silicon Oscillators

Silicon oscillators provide a clock signal without the need of an external timing element such as a crystal oscillator. As rugged solid-state devices, they offer excellent shock and vibration immunity. These parts are extremely flexible with frequency programmability via pin selection, a single resistor or serial port. With fast start-up time and low quiescent current, Linear Technology silicon oscillators can enable significant system power savings. In addition to general clock applications, these parts are used in switching regulator synchronization circuits. The LTC6908 provides an optional spread spectrum frequency modulation capability to decrease peak switcher EMI.

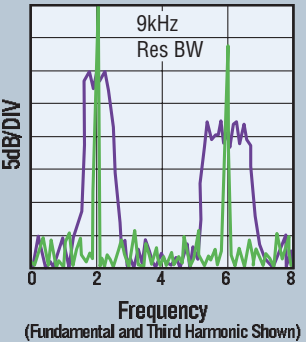


LTC6908: Actual Size

2.5V Step-Down Regulator Driven by LTC6908 at 2.25MHz



2MHz Switcher with and without SSFM



LTC6908: Silicon Oscillator with Spread Spectrum Frequency Modulation

Features:

- LTC6908-1: Complementary Outputs (0°/180°)
- LTC6908-2: Quadrature Outputs (0°/90°)
- One External Resistor Sets the Frequency
- Optional Spread Spectrum Frequency Modulation for Improved EMC Performance
- ±10% Frequency Spreading

–40°C to 125°C Specifications

Part Number	Frequency Output	Accuracy Max 25°C	Supply Current	Drift (ppm/°C)	Package	Features
LTC1799	1kHz to 33MHz	1.50%	1mA @ 3MHz	40	SOT-5	Wide Frequency Range, Resistor Set Oscillator
LTC6903	1kHz to 68MHz	1.10%	1.7mA @ 3MHz	10	MSOP-8	SPI Interface Programmable Oscillator
LTC6904	1kHz to 68MHz	1.10%	1.7mA @ 3MHz	10	MSOP-8	I ² C Interface Programmable Oscillator
LTC6905	17MHz to 170MHz	1.40%	7mA @ 170MHz	20	SOT-5	Resistor Programmable, 100µs Start-Up
LTC6905-80/96/100/133	20MHz to 133MHz	1%	10mA @ 133MHz	20	SOT-5	Fixed Frequency, 100µs Start-Up, 50ps Jitter
LTC6906	10kHz to 1MHz	0.50%	60µA @ 1MHz	50	SOT-6	Micro-Power Resistor Programmable Oscillator
LTC6907	40kHz to 4MHz	0.50%	275µA @ 4MHz	50	SOT-6	Micro-Power Resistor Programmable Oscillator
LTC6908	50kHz to 10MHz	1.50%	400µA @ 50kHz	40	SOT-6	Resistor Set Oscillator with Spread Spectrum Modulation
LTC6930-X	32.768kHz to 8.192MHz	0.09%	490µA @ 8MHz	1	DFN-8, MS-8	Pin Settable High Accuracy Micropower Oscillator

High Temperature Voltage References

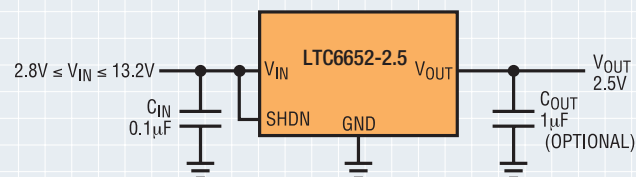
The following table features references that operate from -40°C to $+125^{\circ}\text{C}$. They provide a variety of performance features such as high precision over temperature, low noise, and small package size, which are important in automotive applications. Fixed voltages ranging from 1.25 to 5V are available. In addition, the LT6650 includes an integrated buffer, allowing the output reference voltage to be programmable by two resistors.

LTC6652-x: Precision Low Drift Low Noise Buffered Reference

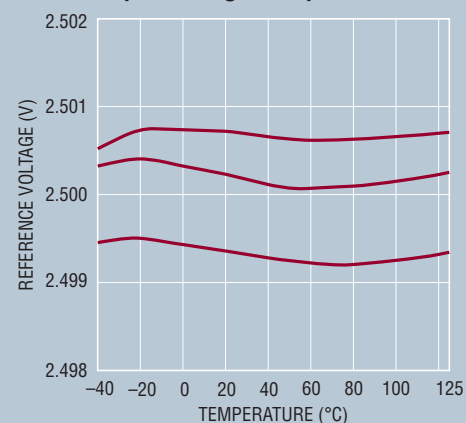
Features:

- Low Drift: 5ppm/ $^{\circ}\text{C}$ Max
- High Accuracy: $\pm 0.05\%$
- Low Noise: 2ppm_{p.p} (0.1Hz to 10Hz)
- Sinks and Sources $\pm 5\text{mA}$
- Low Dropout: 300mV

2.5V Precision Reference



Output Voltage Temperature Drift

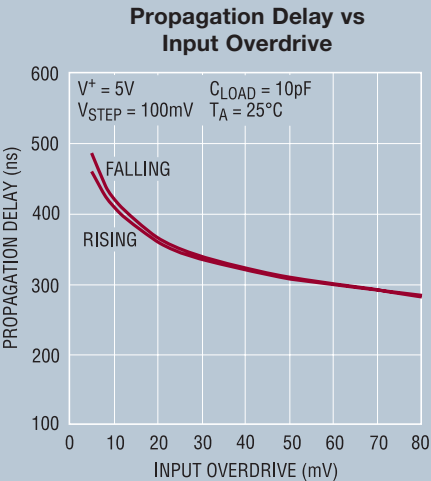
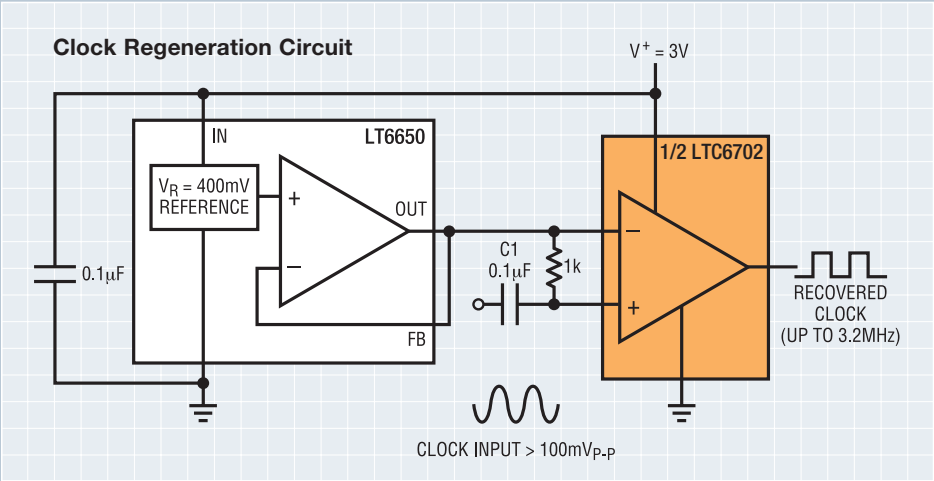


-40°C to 125°C Guaranteed Specifications

Part Number	Temperature Range	V_{OUT}	Initial Accuracy Max	Temp Coeff Max (ppm/ $^{\circ}\text{C}$)	I_{SUPPLY} (μA)	Package	V_{SUPPLY} Voltage
LTC6652	-40° to 125°C	1.25V, 2V, 2.5V, 3V, 3.3V, 4V, 5V	± 0.05	5	560	MSOP-8	$(V_{\text{OUT}} + 300\text{mV})$ to 13.2V
LT1461	-40° to 125°C	2.5V, 3V, 3.3V, 4.096V, 5V	± 0.15	20	70	SO-8	$(V_{\text{OUT}} + 0.3\text{V})$ to 30V
LT1460	-40° to 125°C	2.5V, 5V	± 0.2	50	165	SO-8	$(V_{\text{OUT}} + 0.9\text{V})$ to 30V
LT6650	-40° to 125°C	0.4V	± 0.5	30 Typ	14	SOT-23	$(V_{\text{OUT}} + 1\text{V})$ to 30V
LT1021	-55° to 125°C	5V, 10V	± 0.05	5	1500	TO-5	$(V_{\text{OUT}} + 1\text{V})$ to 40V
LT1031	-55° to 125°C	10V	± 0.05	5	2000	TO-39	11V to 40V
LTZ1000	-55° to 125°C	7.2V	± 4	0.05	1000	TO-5	Super Zener Device

High Temperature Voltage Comparators

Drawing only microamps of current, Linear Technology’s family of high temperature comparators is designed for the harsh automotive environment. Many devices feature Over-The-Top™ inputs capable of operating with inputs up to 18V (or 40V for the HV versions) independent of the supply voltage. The LTC6702 combines low power operation with excellent precision in a tiny 2mm × 2mm package.



LTC6702: Tiny Micropower Low Voltage Dual Comparator

Features:

- Low Supply Operation: 1.7V minimum
- Low Supply Current: 30µA/Comparator Maximum
- Propagation Delay: 500ns Maximum
- 3.2MHz Toggle Frequency
- SOT-23 and 2mm × 2mm DFN Packages

–40°C to 125°C Guaranteed Specifications

Part Number	Channels	Prop Delay (µS)	Reference (mV)	V _{SUPPLY} (V)	I _{SUPPLY} (µA)	Features
LT1716	1	9	No	2.7 to 44	70	Over-The-Top with 44V Inputs
LT6700	2	18	400	1.4 to 18	17	Over-The-Top, Open Collector Outputs
LT6700HV	2	18	400	1.4 to 18	17	Over-The-Top, Open Collector Outputs, 40V I/O
LT6703	1	18	400	1.4 to 18	17	Over-The-Top, Open Collector Outputs
LT6703HV	1	18	400	1.4 to 18	17	Over-The-Top, Open Collector Outputs, 40V I/O
LTC6702	2	500ns	No	1.7 to 5.5	40	2mm x 2mm DFN, SOT-23 Packages

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