

DC/DC CONTROLLER

Selection Guide



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ADI provides complete power solutions with a full lineup of power management products. This brochure shows an overview of our high performance DC/DC switching regulator controllers for applications including industrial, datacom, telecom, automotive, computing infrastructure, and consumer electronics. We make power design easier with our LTpowerCAD® and LTspice® simulation programs and our industry-leading field application engineering support. A broad selection of demonstration boards are available which includes layout and bill of material files, application notes and comprehensive technical documentation.

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LTpowerCAD

LTpowerCAD is an easy-to-use power supply design tool with a user-friendly graphical user interface and power design features. It supports many power products by Linear Technology, now part of Analog Devices Inc. Currently, most products in the LTpowerCAD tool are for nonisolated switching mode power supplies. The LTpowerCAD tool helps power supply designers select a solution for given supply specifications, design power stage components, estimate supply efficiency and power loss, and optimize supply loop stability


and load transient performances. Once a circuit design is completed, it can be easily exported to the LTspice simulation platform. Within the LTpowerCAD program, there is also a LTpowerPlanner® architecture tool for system-level power management design and optimization.

The LTpowerCAD program is free download at <http://www.analog.com/LTpowerCAD> website and runs on Microsoft Windows 7 or 10 based PC.


LTpowerCAD Power Supply Design Tool



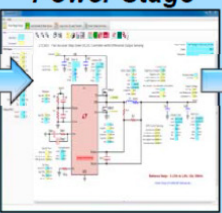
Find & Design Power Solutions (in 5 Simple Steps!)



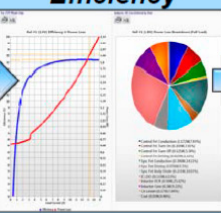
1. Find Solutions



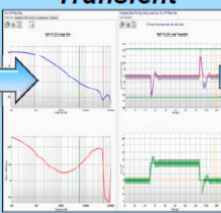
2. Design Power Stage




3. Optimize Efficiency




4. Loop & Load Transient

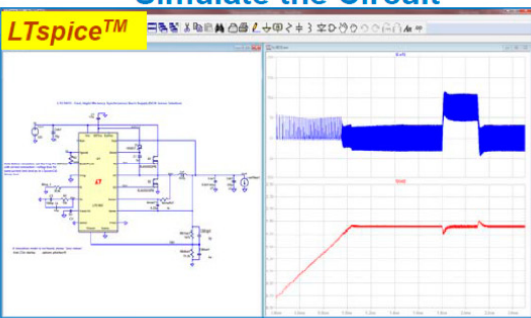


5. Summary, BOM, Size





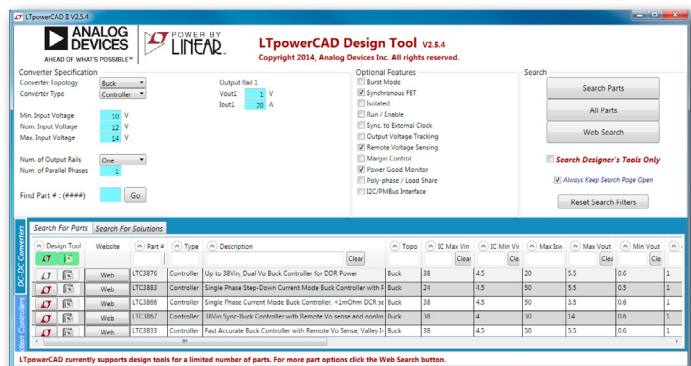
Simulate the Circuit



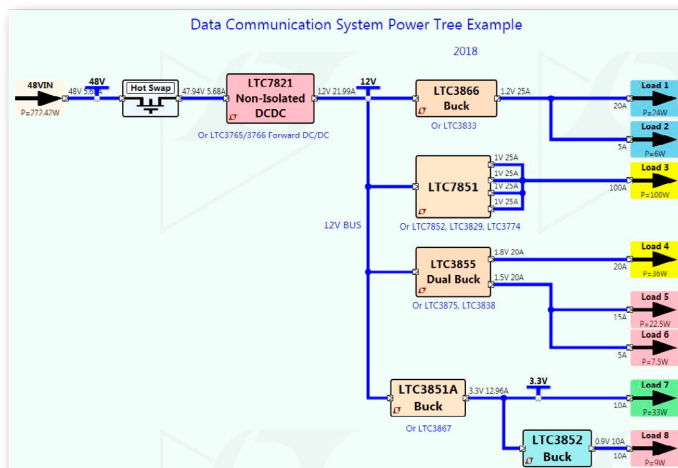
LTpowerCAD:

- ▶ **Powerful and Easy-to-Use**
- ▶ **Developed by Power Experts**
- ▶ **Bench Verified Models**
- ▶ **Free Download:**
www.analog.com/LTpowerCAD

Searching a Part in LTpowerCAD



LTpowerPlanner Power Tree Example



LTspice

LTspice® is a high performance SPICE simulation software, schematic capture and waveform viewer with enhancements and models for easing the simulation of analog circuits. Included in the download of LTspice are macromodels for a majority of Analog Devices' switching regulators, amplifiers, as well as a library of devices for general circuit simulation.

Benefits of Using LTspice

Our enhancements to SPICE have made simulating switching regulators extremely fast compared to normal SPICE simulators, allowing the user to view waveforms for most switching regulators in just a few minutes.

Features

- ▶ **Free Download**
- ▶ Stable SPICE Circuit Simulation
 - Unlimited Nodes/Nets
 - Schematic/Symbol Editor
 - Waveform Viewer
 - Library of Passive Devices
- ▶ Fast Simulation of Switching Mode Power Supplies (SMPS)
 - Steady State Detection
 - Turn On Transient
 - Step Response
 - Efficiency/Power Computations
- ▶ Advanced Analysis and Simulation Options

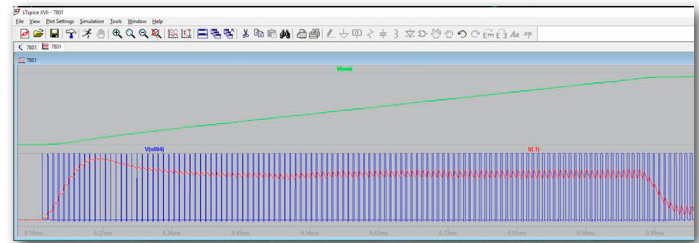
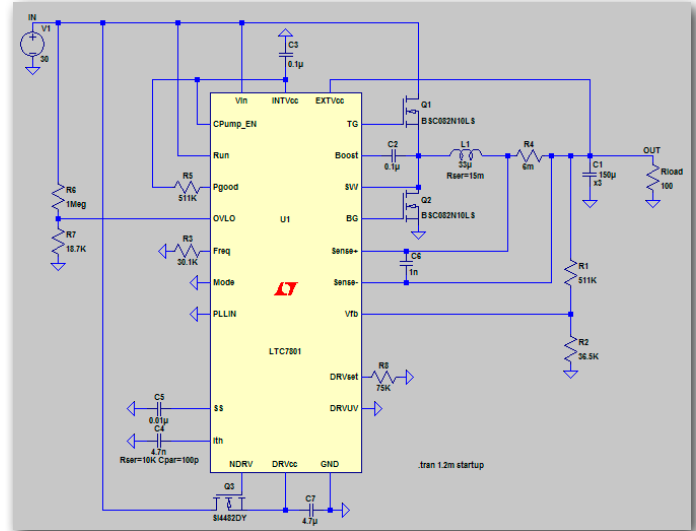
Download LTspice

Download our LTspice simulation software for the following operating systems:

[Download for Windows 7, 8, and 10](#)

[Download for Mac OS X 10.7+](#)

[Download for Windows XP \(End of Support\)](#)



LTspice Demo Circuits

- ▶ LTspice provides macromodels for most of Analog Devices' switching regulators, linear regulators, amplifiers, as well as a library of devices for general circuit simulation.
- ▶ Selected Analog Devices devices also have demonstration circuits available for free download. These demo circuits are designed to ensure proper performance and have been reviewed by Analog Devices' factory applications group.
- ▶ Over 1100 macromodels of ADI products
- ▶ 500+ SMPS

Single Output Buck

ADI's single output buck step-down DC/DC controllers provide up to 98% efficient step-down conversion. Output voltages are from 0.6 V with currents up to 60 amps. Features include synchronous or nonsynchronous operation, onboard MOSFET drivers, low quiescent current, tracking, tight reference voltage accuracy, optional sense resistor, current mode or voltage mode control and selectable or synchronizable operating frequency. ADI offers several hundred buck controllers. The ones listed below are recommended for new designs.

For a complete list visit www.analog.com.

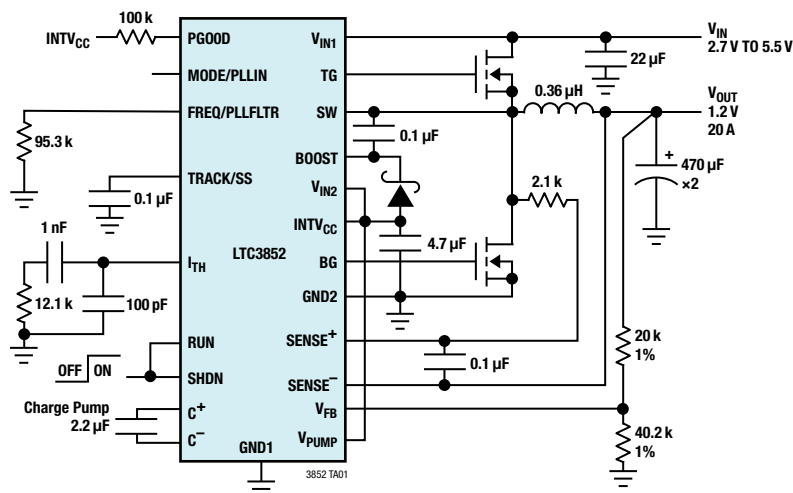
V_{IN} Up to 22 V, Down to 2.2 V

LTC3852

Features

- ▶ Charge Pump Input Range: 2.7 V to 5.5 V
- ▶ Controller Input Range: 4 V to 38 V
- ▶ Integrated Charge Pump Provides 5 V Gate Drive to Logic Level MOSFETs
- ▶ R_{SENSE} or DCR Current Sensing
- ▶ $\pm 1.25\%$ Output Voltage Accuracy Over Temperature

Low Input Voltage Synchronous Step-Down Regulator



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Operating Frequency ²	I_Q (SUPPLY)	Package	Synchronous Rectification	No R_{SENSE}	Tracking	Synchronizable	Sublogic Level MOSFETs	Power Good Signal	Programmable Soft-Start	Current (I) or Voltage (V) Mode Control	
LTC3852	2.7 to 5.5	0.8 to 0.90 V_{IN}	25	250 kHz to 750 kHz	7 mA	3x5 QFN-20	✓	✓	✓	✓	✓	✓	✓	I	
LT3740	2.2 to 22	0.8 to 0.77 V_{IN}	20	300 kHz	2.5 mA	DFN-16	✓	✓			✓			I	
LTC3830/ LTC3830-1	3 to 8	1.26 to 0.91 V_{IN}	20	100 kHz to 500 kHz	700 µA	S8, SO-16, SSOP-16	✓	✓		✓			✓	V	
LTC3832/ LTC3832-1	3 to 8	0.6 to 0.91 V_{IN}	20	100 kHz to 500 kHz	700 µA	SO-8, SSOP-16	✓	✓		✓			✓	V	
Automotive—Low Quiescent Current															
LTC3822-1	2.75 to 4.5	0.6 to 0.99 V_{IN}	20	300 kHz/550 kHz/750 kHz	105 µA	DFN-12, SSOP-16	✓	✓	✓	✓	✓		✓	I	
LTC3822	2.75 to 4.5	0.6 to 0.99 V_{IN}	20	300 kHz/550 kHz/750 kHz	360 µA	DFN-10, MSOP-10	✓	✓			✓			I	
LTC3772/ LTC3772B	2.75 to 9.8	0.8 to V_{IN}	5	550 kHz	40 µA	DFN-8, ThinSOT		✓			✓			I	
LTC3801/ LTC3801B	2.4 to 9.8	0.8 to V_{IN}	5	550 kHz	16 µA	ThinSOT™					✓			I	
LTC3808	2.75 to 9.8	0.6 to V_{IN}	5	250 kHz to 750 kHz	105 µA	DFN-14, SSOP-16	✓	✓	✓	✓	✓			I	
LTC3809/ LTC3809-1	2.75 to 9.8	0.6 to V_{IN}	5	250 kHz to 750 kHz	105 µA	DFN-10, MSOP-10E	✓	✓	✓	✓	✓			I	

¹ The maximum output current depends on the choice of external components.

² The operating frequency can be selected within the range indicated.

Single Output Buck

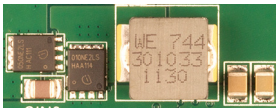
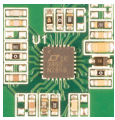
 V_{IN} Up to 38 V

LTC3866A

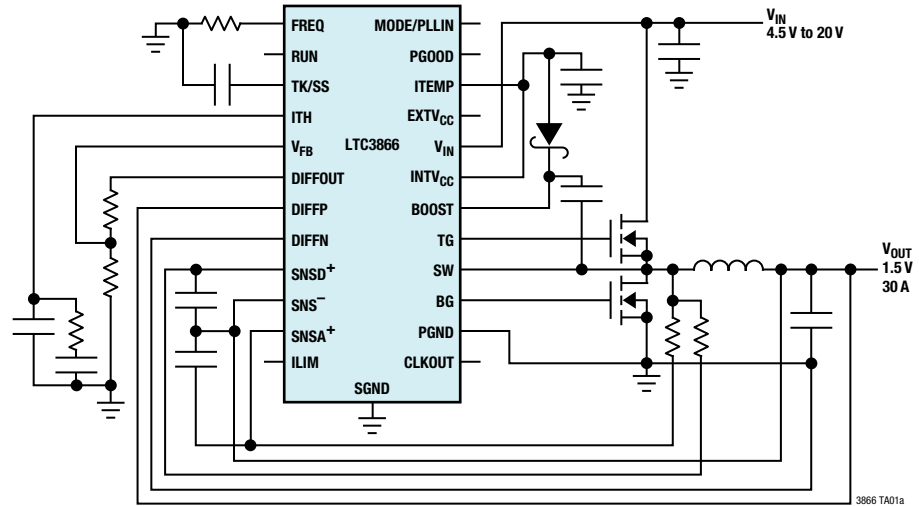
Features

- ▶ Sub-Milliohm DCR Current Sensing
- ▶ High Efficiency: Up to 95 %
- ▶ Selectable Current Sensing Limit
- ▶ Peak Current Mode Control
- ▶ Programmable DCR Temperature Compensation
- ▶ Remote V_{OUT} Sensing
- ▶ $\pm 0.5\%$ 0.6 V Output Voltage Accuracy
- ▶ Programmable Fixed Frequency 250 kHz to 770 kHz

Demonstration Board



High Efficiency, 1.5 V/30 A Step-Down Converter with Very Low DCR Sensing



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Operating Frequency ²	I_Q (SUPPLY)	Package	Synchronous Rectification	Remote V_o Sensing	Sub Millie OHM DCR	Tracking	Synchronizable	Power Good Signal	Current (I) or Voltage (V) Mode Control
Fixed Frequency													
LTC3866	4.5 to 38	0.6 V to 3.5 V	40	250 kHz to 770 kHz	3.2 mA	4x4 QFN-20/TSSOP-24	✓	✓	✓	✓	✓	✓	I
LTC3867	4 to 38	0.6 V to 14 V	30	200 kHz to 1.2 MHz	3.5 mA	4x4 QFN-24	✓	✓		✓	✓	✓	I
LTC3854	4.5 to 38	0.8 to 5.5	25	400 kHz	2 mA	3x3 DFN/MSOP-12	✓			✓			I
LTC3851A/ LTC3851-1	4 to 38	0.8 to 5.5	25	250 kHz to 750 kHz	1 mA	QFN-16/SSOP-16	✓			✓	✓		I
LTC3775	4.5 to 38	0.6 to 0.8 V_{IN}	25	250 kHz to 1 MHz	3.5 mA	3x3 QFN-12/MSOP-16E	✓			✓	✓		V
Constant On-Time (Fast Transient)													
LTC3833	4.5 to 38	0.6 to 5.5	30	200 kHz to 2 MHz	2 mA	3x4 QFN-20/TSSOP-20	✓	✓		✓	✓	✓	I
LTC3770	4 to 32	0.6 to 0.8 V_{IN}	25	Constant On-Time	1.3 mA	5x5 QFN-32/SSOP-28	✓	✓		✓	✓	✓	I
LTC3878	4 to 38	0.8 to 0.9 V_{IN}	25	Constant On-Time	1.5 mA	SSOP-16	✓						I
LTC3879	4 to 38	0.6 to 0.9 V_{IN}	25	Constant On-Time	1.5 mA	3x3 QFN-12/MSOP-16E	✓			✓		✓	I
Automotive—Low Quiescent Current													
LTC7803	4.5 to 40	0.8 to 36	25	100 kHz to 3 MHz	8 μ A	3x3 QFN-16/MSOP-16E	✓						Releasing in 2019
LTC3807	4 to 38	0.8 to 24	25	75 kHz to 900 kHz	50 μ A	3x4 QFN-20/TSSOP-20	✓			✓	✓	✓	I
LTC3835/ LTC3835-1	4 to 36	0.8 to 10	25	140 kHz to 650 kHz	80 μ A	FE20, 4x5 QFN, GN, 3x5 QFN	✓			✓	✓	✓	I
LTC3834/ LTC3834-1	4 to 36	0.8 to 10	25	140 kHz to 650 kHz	30 μ A	FE20, 4x5 QFN, GN, 3x5 QFN	✓			✓	✓	✓	I

¹ The maximum output current depends on the choice of external components.² The operating frequency can be selected within the range indicated.

Additional Features: All parts have peak or valley current mode control and a shut-down (run) pin.

Single Output Buck

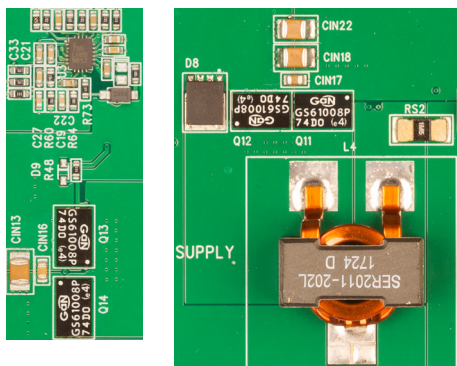
V_{IN} Up to 60 V

LTC7800

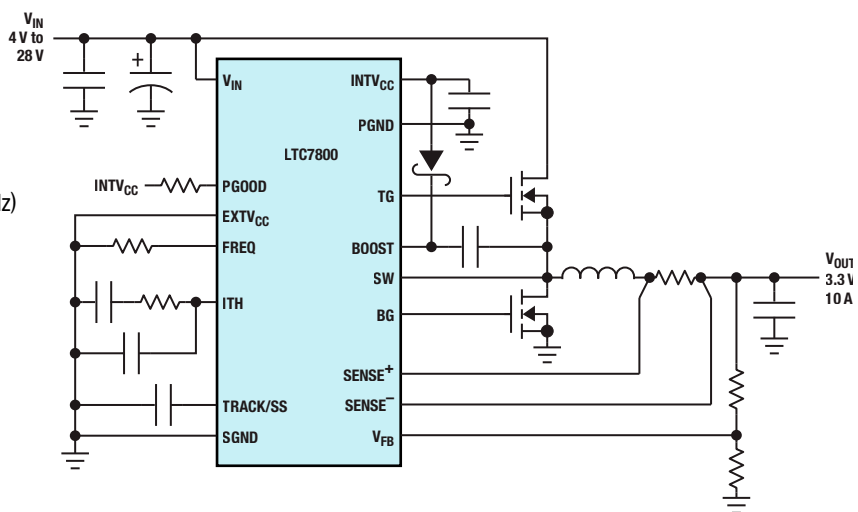
Features

- ▶ Wide V_{IN} Range: 4 V to 60 V (65 V Abs Max)
- ▶ Low Operating I_Q : 50 μ A
- ▶ Wide Output Voltage Range: $0.8\text{ V} \leq V_{OUT} \leq 24\text{ V}$
- ▶ R_{SENSE} or DCR Current Sensing
- ▶ Phase-Lockable Frequency (320 kHz to 2.25 MHz)
- ▶ Programmable Fixed Frequency (320 kHz to 2.25 MHz)
- ▶ Selectable Continuous, Pulse-Skipping or Low Ripple
- ▶ Burst Mode® Operation at Light Load

Demonstration Board with Gan FETs



High Efficiency 2.1MHz Step-Down Converter



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Operating Frequency ²	I_Q (SUPPLY)	Package	Synchronous Rectification	No R_{SENSE}	Tracking	Synchronizable	Shut-Down	Power Good Signal	Adjustable Turn-On Voltage	Current (I) or Voltage (V) Mode Control	
LTC3703-5	4.1 to 60	0.8 to $0.93 V_{IN}$	10	100 kHz to 600 kHz	1.7 mA	SSOP-16, TSSOP-28	✓	✓		✓	✓			V	
LTC3812-5	4.2 to 60	0.8 to $0.93 V_{IN}$	20	100 kHz to 1 MHz	3 mA	TSSOP-16E	✓	✓		✓	✓	✓		I	
LTC3810-5	4.2 to 60	0.8 to $0.93 V_{IN}$	20	100 kHz to 1 MHz	3 mA	QFN-32	✓	✓	✓	✓	✓	✓	✓	I	
LTC3810	6.2 to 100	0.8 to $0.93 V_{IN}$	20	100 kHz to 1 MHz	3 mA	SSOP-28	✓	✓	✓	✓	✓	✓	✓	I	
LTC3703	9.3 to 100	0.8 to $0.93 V_{IN}$	10	100 kHz to 600 kHz	1.7 mA	SSOP-16, TSSOP-28	✓	✓		✓	✓			V	
Automotive—Low Quiescent Current															
LTC7800	4 to 60	0.8 to 24	25	320 kHz to 2.25 MHz	50 μ A	3x4 QFN-20	✓	✓		✓	✓	✓		I	
LTC3891	4 to 60	0.8 to 24	20	50 kHz to 900 kHz	50 μ A	3x4 QFN-20, TSSOP-20E	✓	✓		✓	✓	✓		I	
LT3845A	4 to 60	1.23 to 36	20	100 kHz to 500 kHz	120 μ A	TSSOP-16E	✓			✓	✓		✓	I	
LTC3864	3.5 to 60	0.8 to V_{IN}	5	50 kHz to 850 kHz	40 μ A	3x4 QFN-12, MSOP-12E			✓	✓	✓	✓	✓	I	
LTC3824	4 to 60	0.8 to V_{IN}	5	200 kHz to 600 kHz	40 μ A	MSOP-10				✓				I	
LT3844	4 to 60	1.23 to 36	5	100 kHz to 500 kHz	120 μ A	TSSOP-16E				✓	✓		✓	I	
LT3800	4 to 60	1.23 to 36	20	200 kHz	80 μ A	TSSOP-16E	✓				✓		✓	I	
LT3840	2.5 to 60	1.25 to 60	20	50 kHz to 1 MHz	75 μ A	TSSOP-28, 4x6 QFN-38									
LTC3372	4.5 to 60	0.8 to 5	15	166 kHz to 500 kHz/ 1 MHz to 3 MHz	15 μ A	7x7 QFN-48	60 V Controller with 4 Monolithic Bucks								

¹ The maximum output current depends on the choice of external components.

² The operating frequency can be selected within the range indicated.

Additional Features: All parts have programmable soft-start.

Single Output Buck

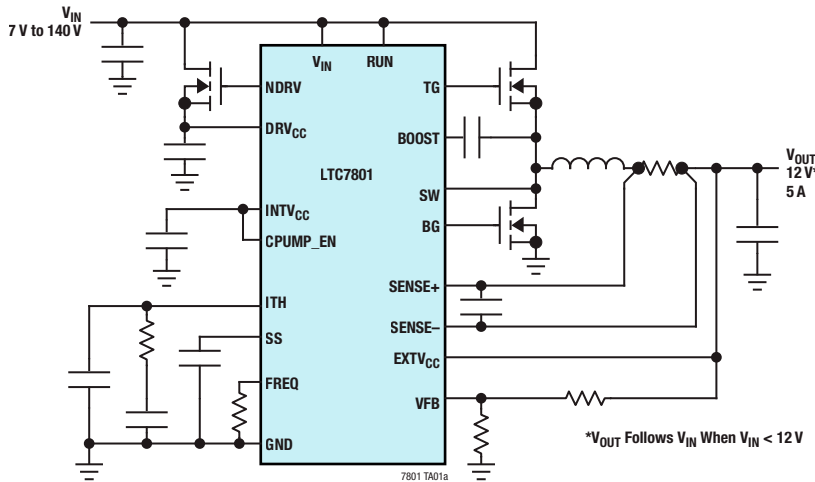
V_{IN} Up to 150 V

LTC7801

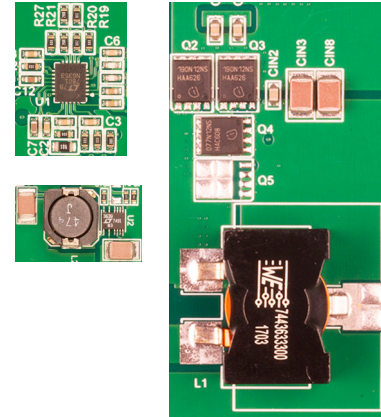
Features

- ▶ Wide V_{IN} Range: 4 V to 140 V (150 V Abs Max)
- ▶ Wide Output Voltage Range: 0.8 V to 60 V
- ▶ Adjustable Gate Drive Level: 5 V to 10 V (OPTI-DRIVE)
- ▶ Low Operating I_Q : 40 μ A (Shutdown = 10 μ A)

High Voltage Synchronous Step-Down Regulator



Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Operating Frequency ²	I_Q (SUPPLY)	Package	Synchronous Rectification	No R_{SENSE}	Tracking	Synchronizable	Shut-Down	Power Good Signal	Adjustable Turn-On Voltage	Current (I) or Voltage (V) Mode Control	
LTC3810	6.2 to 100	0.8 to 0.93 V_{IN}	20	100 kHz to 1 MHz	3 mA	SSOP-28	✓	✓	✓	✓	✓	✓	✓	I	
LTC3703	9.3 to 100	0.8 to 0.93 V_{IN}	10	100 kHz to 600 kHz	1.7 mA	SSOP-16, TSSOP-28	✓	✓		✓	✓			V	
Automotive—Low Quiescent Current															
LTC7801	4.5 to 140	0.8 V to 60 V	20	50 kHz to 900 kHz	40 μ A	TSSOP-38 4x5 QFN-24	✓	✓	✓	✓	✓	✓	✓	I	
LTC3895	4.5 to 140	0.8 V to 60 V	20	50 kHz to 900 kHz	40 μ A	TSSOP-38 (31)	✓	✓	✓	✓	✓	✓	✓	I	
LTC3894	4.5 to 150	0.8 V to 60 V	5	50 kHz to 850 kHz	27 μ A	TSSOP-20 (16)		✓	✓	✓	✓	✓	✓	I	

¹ The maximum output current depends on the choice of external components.

² The operating frequency can be selected within the range indicated.

Additional Features: All parts have programmable soft-start.

Hybrid and Switched Capacitor DC/DC

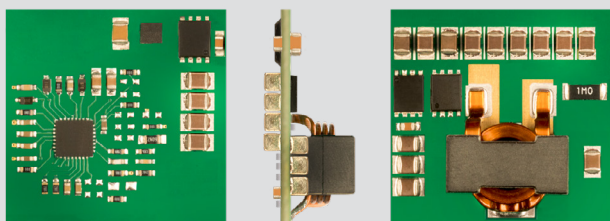
A hybrid step-down controller combines a switched capacitor circuit with a synchronous step-down controller, enabling up to a 50 % reduction in DC/DC converter solution size compared to traditional step-down solutions. This improvement is enabled by a 3X higher switching frequency without compromising efficiency. Alternatively, when operating at the same frequency, an LTC7821 based solution can provide up to a 3 % higher efficiency. Other benefits include low EMI and reduced MOSFET stress due to a soft-switched front end. The LTC7821 is ideal for nonisolated intermediate bus applications in power distribution, datacom and telecom as well as emerging 48 V automotive systems.

LTC7821: Hybrid Step-Down Synchronous Controller

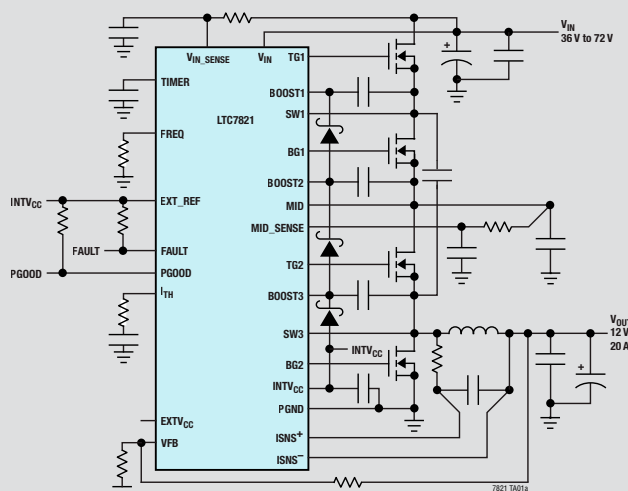
Features

- ▶ Wide V_{IN} Range: 10 V to 72 V (80 V Abs Max)
- ▶ Soft Switching for $3 \times f_{SW}$, 1/3 of Inductor Size
- ▶ Phase-Lockable Fixed Frequency 200 kHz to 1.5 MHz
- ▶ $\pm 1\%$ Regulated Output Voltage Accuracy
- ▶ R_{SENSE} or DCR Current Sensing
- ▶ Programmable CCM, DCM, or Burst Mode Operation
- ▶ CLKOUT Pin for Multiphase Operation

Demonstration Board (300W)



Hybrid Step-Down Synchronous Regulator

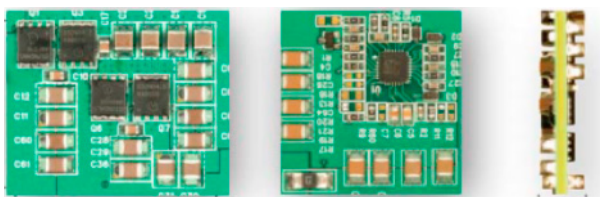


LTC7820: Fixed Ratio High Power Inductorless (Charge Pump) Controller

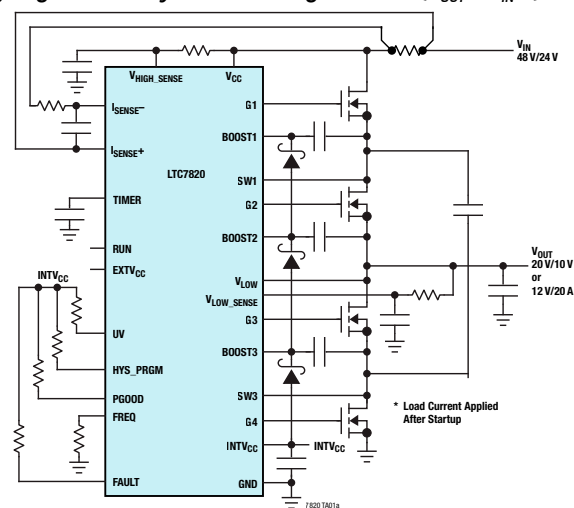
Features

- ▶ Low Profile, High Power Density, Capable of 500 W+
- ▶ Soft Switching: 99 % Peak Efficiency and Low EMI
- ▶ V_{IN} Max for Voltage Divider (2:1): 72 V
- ▶ V_{IN} Max for Voltage Doubler (1:2)/Inverter (1:1): 36 V
- ▶ Non-Regulated Output
- ▶ Soft Start-Up into Steady State Operation

Demonstration Board (240W)



Very High Efficiency 240 W Voltage Divider ($V_{OUT} = V_{IN}/2$)



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Operating Frequency ²	I_O (SUPPLY)	Package	Output Voltage Regulation	No R_{SENSE}	Synchronizable	Shutdown	Power Good Signal	Adjustable Turn-On Voltage
LTC7820 ³	6 to 72	Note 3	15	100 kHz to 1 MHz	1.5 mA	4x5 QFN-28		✓	✓	✓	✓	✓
LTC7821	10 to 72	0.9 to 33.5	25	200 kHz to 1.5 MHz	0.5 mA	5x5 QFN-28	✓	✓	✓	✓	✓	✓

¹ The maximum output current depends on the choice of external components.
² The operating frequency can be selected within the range indicated.
³ 2:1 for voltage divider, 1:2 for voltage doubler, 1:1 for inverter.

Multiphase Single Output Buck

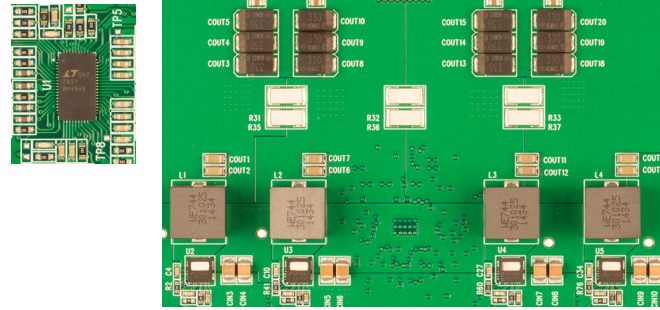
The multiphase, single output step-down controllers from ADI can be implemented with external power MOSFETs, DrMOS, or power blocks. Multiphase operation clocks multiple DC/DC converter sections out-of-phase. This significantly reduces the input and output ripple currents, resulting in higher efficiency, lower EMI and smaller input and output filtering components.

LTC7851

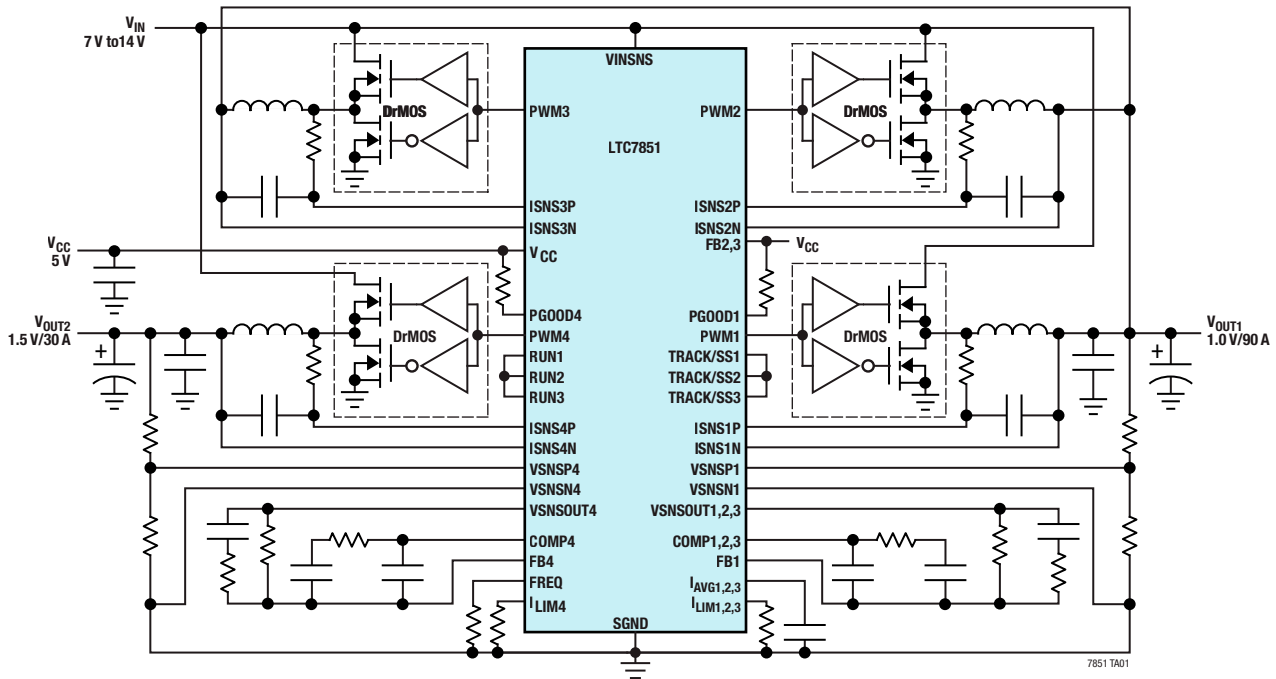
Features

- ▶ Operates with Power Blocks, DrMOS or External Gate Drivers and MOSFETs
- ▶ Voltage Mode Control with Accurate Current Sharing
- ▶ $\pm 0.75\%$ 0.6 V Voltage Reference
- ▶ Quad Differential Output Voltage Sense Amplifiers
- ▶ Multiphase Capability
- ▶ Phase-Lockable Fixed Frequency 250 kHz to 2.25 MHz
- ▶ Lossless Current Sensing Using Inductor DCR or Precision Current Sensing with Sense Resistor or DrMOS with Integrated Current Sensing

Demonstration Board



Four-Phase Synchronous Step-Down Regulator



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Number of Phases	Operating Frequency ²	Comments	Package
LTC3856	4.5 to 38	0.6 to 5.5	50 to 300	2 to 12	250 kHz to 770 kHz	Fixed Frequency	5x5 QFN-32, TSSOP-38
LTC3839	4.5 to 38	0.6 to 5.5	40 to 240	2 to 12	250 kHz to 2 MHz	Constant On-Time	5x5 QFN-32
LTC3829	4.5 to 38	0.6 to 5	75 to 150	3 to 6	250 kHz to 770 kHz	Fixed Frequency	5x6 QFN-36
LTC3861	3 to 24	0.6 to 4.5	60 to 360	2 to 12	Up to 2.25 MHz	DrMOS in the Power Stage	5x6 QFN-36
LTC3774	4.5 to 38	0.6 to 3.5	60 to 360	2 to 12	250 kHz to 1.2 MHz	DrMOS in the Power Stage/ Sub-Milliohm DCR Sensing	5x6 QFN-36
LTC7851	3 to Note 3	0.6 to 5	120 to 360	4 to 12	250 kHz to 2.2 MHz	DrMOS in the Power Stage	5x6 QFN-36
LTC7852	Releasing in 2019			6 to 12			

¹ The maximum output current depends on the choice of external components and number of phases.

² The operating frequency can be selected within the range indicated.

Additional Features: • All parts have differential V_O sensing, shut-down (run) pin, clock input, programmable soft-start and a power good signal.

• All parts are peak current mode controllers except for the LTC7851 and LTC7852 which are voltage mode control.

• Multiple parts can be paralleled for its higher current applications.

Multiple Output Buck

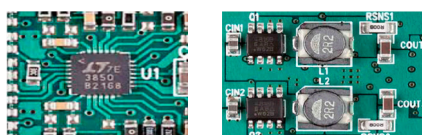
ADI's multiple output DC/DC controllers provide up to three high current outputs with up to 98 % efficiency. Features include out-of-phase operation, onboard MOSFET drivers, synchronous or nonsynchronous rectification, low quiescent current, tracking, tight V_{REF} accuracy and choice of current sense resistor. Other options include selectable, synchronizable switching frequency or constant on-time, tracking, spread spectrum and extra an LDO output voltage.

LTC3850

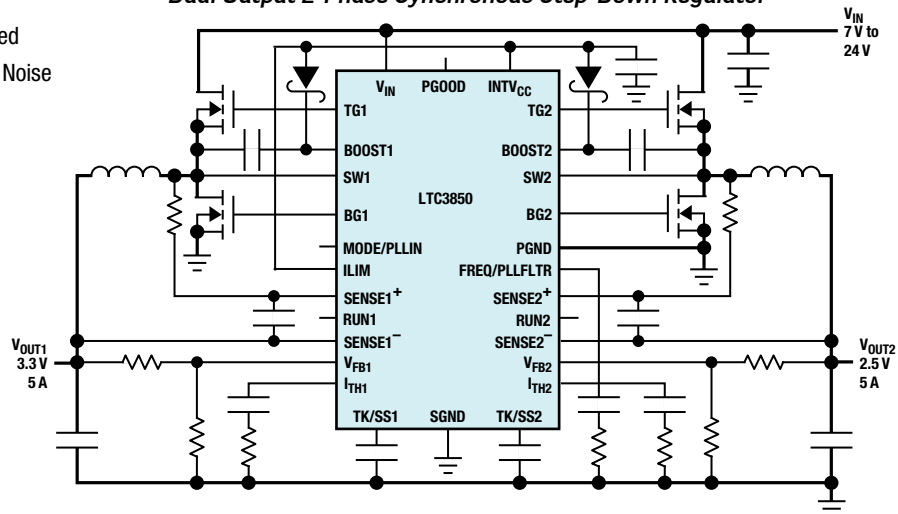
Features

- ▶ Dual, 180° Phased Controllers Reduce Required
- ▶ Input Capacitance and Power Supply Induced Noise
- ▶ High Efficiency: Up to 95 %
- ▶ R_{SENSE} or DCR Current Sensing

Demonstration Board



Dual Output 2-Phase Synchronous Step-Down Regulator



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT1} Max (A)	Operating Frequency ²	I_Q (SUPPLY)	Package	Number of Outputs	Maximum # of Phases	Remote Sense	Tracking	Synchronizable	EXTV _{CC}	Current (I) or Voltage (V) Mode Control	DrMOS/Power Block Compatible	Sub Milli Ohm DCR Sensing	Preset Output Voltages	Adjustable Gate Drive
LTC3850/-1/-2	4.5 to 30	0.8 to 5.5	25/25	250 kHz to 780 kHz	850 μ A	QFN-28, SSOP-28	2	2	✓	✓	✓	✓	I				
LTC3838/-1/-2	4.5 to 38	0.6 to 5.5	25/25	200 kHz to 2 MHz	3 mA	QFN-38, TSSOP-38	2	12	✓	✓	✓	✓	I				
LTC3855	4.5 to 38	0.6 to 3.3 (12)	25/25	250 kHz to 770 kHz	3.5 mA	QFN-38, TSSOP-38	2	12	✓	✓	✓	✓	I				
LTC3869/-2	4 to 38	0.6 to 12.5	25/25	250 kHz to 780 kHz	3 mA	QFN-28, SSOP-28	2	2	✓	✓	✓	✓	I				
LTC3853	4.5 to 24	0.8 to 13.5	25/25/25	250 kHz to 750 kHz	4.1 mA	QFN-40	3	12	✓	✓	✓	✓	I				
LTC3774	4.5 to 38	0.6 to 3.5	40/40	200 kHz to 1.2 MHz	9 mA	QFN-36	2	12	✓	✓	✓	✓	I	✓	✓		
LTC3861/-1	3 to 24	0.6 to 4.5	40/40	Up to 2.25 MHz	30 mA	QFN-36	2	12	✓	✓	✓	✓	V	✓	✓		
LTC3865	4.5 to 38	0.6 to 5	25/25	250 kHz to 770 kHz	3 mA	QFN-32, TSSOP-38	2	2	✓	✓	✓	✓	I				✓
LTC3875	4.5 to 38	0.6 to 5	40/40	250 kHz to 720 kHz	7 mA	QFN-40	2	12	✓	✓	✓	✓	I		✓		
LTC7851	3 to 27	0.6 to 5	30/30/30/30	250 kHz to 2.25 MHz	60 mA	5x9 QFN-58	4	12	✓	✓	✓	✓	V	✓	✓		
LTC7852	4.5 to Note (3)	0.5 to 2	120/120	200 kHz to 1.2 MHz	15 mA	4x5 QFN/ 5x6 GQFN	2	6	✓		✓		I	✓	✓	✓	
Low I_Q																	
LTC3890/-1/-2/-3	4 to 60	0.8 to 24	25/25	50 kHz to 900 kHz	50 μ A	QFN-32	2	12	✓	✓	✓	✓	I				
LTC3892/-1/-2	4 to 60	0.8 to 0.99 V_{IN}	25/25	75 kHz to 850 kHz	29 μ A	QFN-32/TSSOP-28	2	12	✓	✓	✓	✓	I				✓
LTC3858/-1/-2	4 to 38	0.8 to 24	25/25	50 kHz to 900 kHz	170 μ A	QFN-32	2	12	✓	✓	✓	✓	I				
LTC3857/-1	4 to 38	0.8 to 24	25/25	50 kHz to 900 kHz	50 μ A	QFN-32/SSOP-28	2	12	✓	✓	✓	✓	I				
LTC3868/-1	4 to 24	0.8 to 14	25/25	50 kHz to 900 kHz	170 μ A	QFN-32	2	2	✓	✓	✓	✓	I				
LTC7810	4.5 to 140	1 to 60	25/25	50 kHz to 750 kHz	16 μ A	7x7 eLQFP	2	2	✓	✓	✓	✓	I				
Slaves																	
LTC3870/-1	4.5 to 60	0.5 to 14	25/25	100 kHz to 1 MHz	1.1 mA	QFN-28	2	12	✓	✓	✓	✓	I				
LTC3874/-1	4.5 to 38	0.5 to 5.5	25/25	250 kHz to 1 MHz	4.6 mA	QFN-28	2	12	✓	✓	✓	✓	I				✓

¹ The maximum output current depends on the choice of external components.

² The operating frequency can be selected within the range indicated.

Additional Features: All parts have a shut-down (run) pin and a power good signal.

All parts are synchronous controllers.

All parts have programmable soft-start.

All parts have R_{SEN} or DCR current sense.

Boost

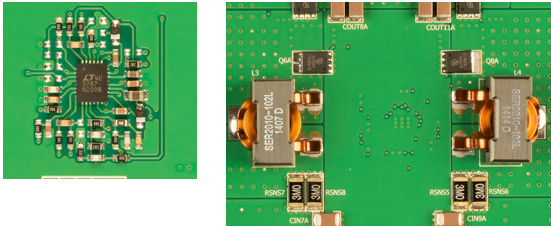
ADI offers both synchronous and nonsynchronous boost controllers. Features include optional sense resistor, onboard LDO, multiphase operation, high power gate driver, programmable fixed switching frequency and low quiescent current. Efficiencies up to 97 % can be achieved with synchronous rectification.

LTC3787

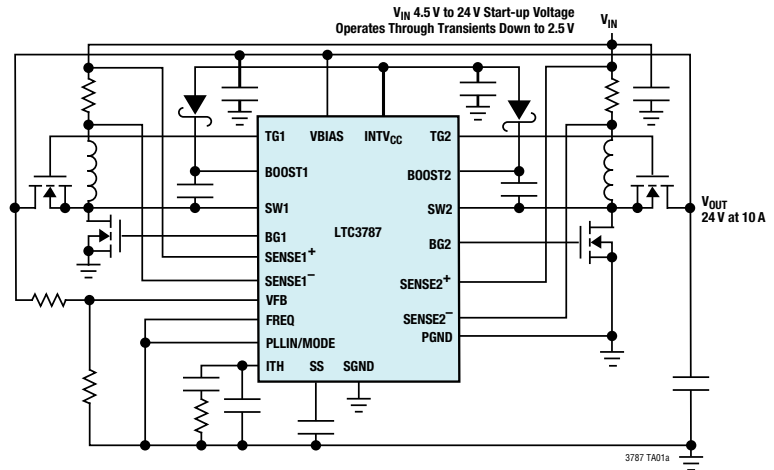
Features

- ▶ 2-Phase Operation Reduces Required Input and Output Capacitance and Power Supply Induced Noise
- ▶ Synchronous Operation for Highest Efficiency and Reduced Heat Dissipation
- ▶ Wide V_{IN} Range: 4.5 V to 38 V (40 V Abs Max) and Operates Down to 2.5 V After Start-Up
- ▶ Output Voltage Up to 60 V
- ▶ $\pm 1\%$ 1.200 V Reference Voltage
- ▶ R_{SENSE} or Inductor DCR Current Sensing
- ▶ 100 % Duty Cycle Capability for Synchronous MOSFET
- ▶ Low Quiescent Current: 135 μ A
- ▶ Phase-Lockable Frequency (75 kHz to 850 kHz)

Demonstration Board



12 V to 24 V/10 A 2-Phase Synchronous Boost Converter



Part Number	V_{IN} Range (V)	V_{OUT}^1 Range (V)	I_{OUT}^1 Max (A)	I_O (SUPPLY)	Operating Frequency ²	Package
Automotive—Low Quiescent Current						
Single Phase/Single Output Synchronous Boost						
LTC7804	4.5 to 40	Up to 60	10	15 μ A	100 kHz to 3 MHz	Releasing in 2019
LTC3786	4.5 to 38	Up to 60	10	55 μ A	50 kHz to 900 kHz	3x3 QFN-16, MSOP-16E
LTC3769	4.5 to 60	Up to 60	10	28 μ A	50 kHz to 900 kHz	4x4 QFN-24, TSSOP-20
Multiphase Synchronous Boost						
LTC3787	4.5 to 38	Up to 60	10 (120)	135 μ A	50 kHz to 900 kHz	4x5 QFN-28, T/SSOP-28
LTC3788/LTC3788-1	4.5 to 38	Up to 60	10/10 Dual V_{OUT}	125 μ A	50 kHz to 900 kHz	5x5 QFN-32, SSOP-28
LTC3784	4.5 to 60	Up to 60	20	28 μ A	50 kHz to 900 kHz	4x5 QFN-28, SSOP-28
LTC3897/LTC3897-1	4.5 to 65	Up to 60	20	555 μ A	100 kHz to 1 MHz	5x7 QFN-38, TSSOP-38
LTC7841	2-Phase PSM	Releasing in 2019				Releasing in 2019
Single Output Multiphase Nonsynchronous Boost						
LTC3862/LTC3862-1/LTC3862-2	4 to 36	5 and Higher	5 (60)	1.8 mA	75 kHz to 500 kHz	5x5 QFN-24, SSOP-24
Dual Output Multiphase Nonsynchronous Boost						
LTC7840	5.5 to 60	6 V and Higher	3/3	3 mA	50 kHz to 450 kHz	4x5 QFN-28, SSOP-28
Single Output Nonsynchronous Boost						
LTC1872/LTC1872B	2.5 to 9.8	3.3 and Higher	3	270 μ A	550 kHz	SOT-23
LTC3872/LTC3872-1	2.75 to 9.8	Up to 60 w/o R_{SENSE} and Higher w/ R_{SENSE}	3	250 μ A	550 kHz	SOT-23, 2x3 DFN-8
LT3757A	2.9 to 40	3.3 and Higher	3	1.6 mA	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10
LT3758A	5.5 to 100	6 and Higher	3	1.75 mA	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10
LT3759	1.6 to 42	2.2 and Higher	3	350 μ A	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10
LTC1871/LTC1871X/LTC1871-1	2.5 to 36	3.3 and Higher	3	250 μ A	50 kHz to 1 MHz	MSOP-10
LTC1871-7	6 to 36	7 and Higher	3	280 μ A	50 kHz to 1 MHz	MSOP-10

¹ The maximum voltage and current depend on the choice of external components.

² The operating frequency can be selected within the range indicated.

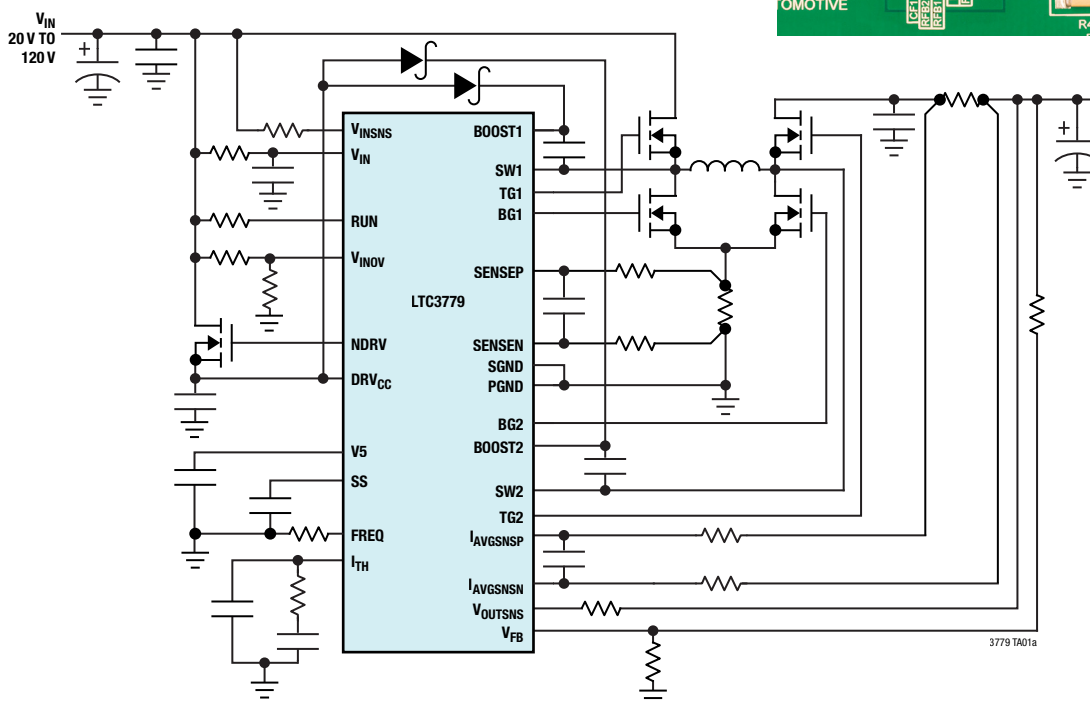
Buck-Boost

High performance 4-switch synchronous buck-boost controllers operate from an input voltage that can be above, below or equal to the output voltage. These buck-boost controllers utilize a single inductor and can deliver efficiencies up to 98%. The buck+boost utilize two inductors.

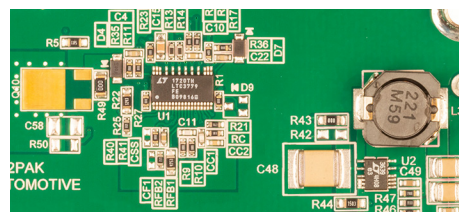
LTC3779

Features

- ▶ 4-Switch Current Mode Single Inductor Architecture
Allows V_{IN} Above, Below or Equal to V_{OUT}
- ▶ Wide V_{IN} Range: 4.5 V to 150 V
- ▶ Wide Output Voltage Range: $1.2 V \leq V_{OUT} \leq 150 V$
- ▶ Synchronous Rectification: Up to 99% Efficiency



Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	Operating Frequency ²	Package	Synchronizable	Current (I) or Voltage (V) Mode Control	Synchronous Rectification	Spread Spectrum	IC Bias Voltage Generator	Maximum Power Point Tracking
Buck-Boost (Single Inductor)											
LTC3785	2.7 to 10	2.7 to 10	10	100 kHz to 1 MHz	QFN-24		V	✓			
LT8711	4.5 to 42	0.8 to Note 3	3	100 kHz to 750 kHz	3x4 QFN-20, TSSOP-20						
LTC3780	4 to 36	0.8 to 30	10	200 kHz to 400 kHz	5x5 QFN-32, SSOP-24	✓	I	✓			
LTC3789	4 to 38	0.8 to 38	10	200 kHz to 600 kHz	4x5 QFN-28, SSOP-28	✓	I	✓			
LT8705A	2.8 to 80	1.3 to 80	10	100 kHz to 400 kHz	5x7 QFN-38, TSSOP-38	✓	I	✓			
LT8390A	4 to 60	1 to 60	10	600 kHz to 2 MHz	4x5 QFN-28, TSSOP-28	✓	I	✓	✓		
LT8390	4 to 60	1 to 60	10	150 kHz to 600 kHz	4x5 QFN-28, TSSOP-28	✓	I	✓	✓		
LTC3777	4.5 to 150	1.2 to 150	10	50 kHz to 600 kHz	7x7 eLQFP	✓	I	✓		✓	
LTC3779	4.5 to 150	1.2 to 150	10	50 kHz to 600 kHz	TSSOP-38 (31)	✓	I	✓			
LT8490	6 to 80	1.3 to 80	10	100 kHz to 400 kHz	7x11 QFN-64	✓	I	✓			✓
LT8210	Releasing in 2019										
Boost+Buck (2 Inductors, Fast Transient, Low EMI and Low I_D)											
LTC7812	4.5 to 38	0.8 to 24/60	10	75 kHz to 850 kHz	5x5 QFN-32	✓	I	✓			
LTC7813	4.5 to 60	0.8 to 60	10	75 kHz to 850 kHz	5x5 QFN-32	✓	I	✓			

¹ The maximum output current depends on the choice of external components.

² The operating frequency can be selected within the range indicated.

³ The maximum output voltage depends on the choice of external components.

Buck/Buck/Boost—Ideal for Automotive Start-Stop Systems

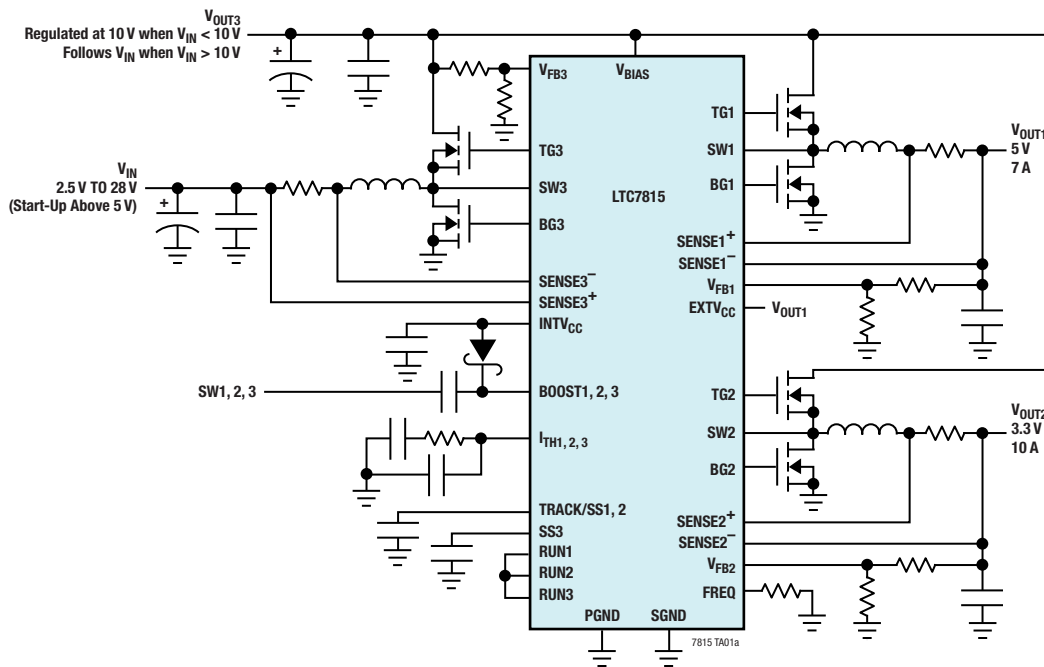
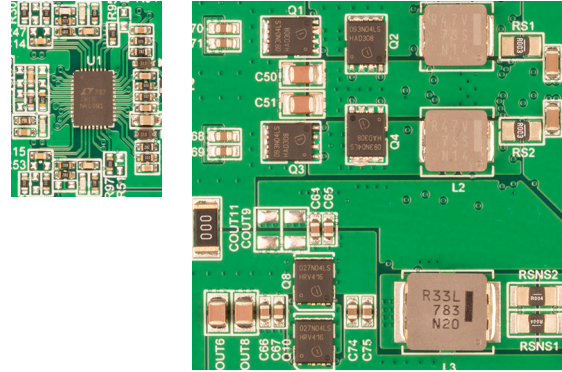
An automotive cold crank condition can cause the battery voltage to drop to as low as 4 V in an automobile or a heavy equipment vehicle. If a 5 V or higher output voltage is required for any onboard electronic circuit, a step-down only converter from the nominal 12 V or 24 V battery will not be able to maintain regulation when the battery droops. The LTC3899 solves this problem by providing a synchronous boost front end converter and two follow-on bucks. The LTC3899 can also be used as a general purpose triple output DC/DC controller with one boost phase and two buck phases.

LTC7815

Features

- ▶ Dual Buck Plus Single Boost Synchronous Controllers
- ▶ Wide Bias Input Voltage Range: 4.5 V to 38 V
- ▶ Outputs Remain in Regulation Through Cold Crank Down to a 2.5 V Input Supply Voltage
- ▶ Buck Output Voltage Range: $0.8 \text{ V} \leq V_{\text{OUT}} \leq 24 \text{ V}$
- ▶ Boost Output Voltage Up to 60 V
- ▶ Low Operating I_0 : 28 μA (One Channel On)
- ▶ R_{SENSE} or DCR Current Sensing
- ▶ 100 % Duty Cycle for Boost Synchronous MOSFET Even in Burst Mode Operation
- ▶ Phase-Lockable Frequency (320 kHz to 2.25 MHz)

Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT} Range Boost (V)	V_{OUT} Range Buck (V)	I_{OUT}^1 Max (A) with 12 Phases	I_0 (SUPPLY)	Operating Frequency ²	Comments
LTC7815	4.5 to 38	Up to 60 V	0.8 to 24	Bucks—Up to 15 A Boost—Up to 15 A	29 μA	320 kHz to 2.25 MHz	Targeted at 12 V Automotive
LTC3899	4.5 to 60	Up to 60 V	0.8 to 60	Bucks—Up to 15 A Boost—Up to 15 A	29 μA	50 kHz to 900 kHz	Ideal for Truck 24 V Double Battery
LTC3859/LTC3859A/ LTC3859AL	4.5 to 38	Up to 60 V	0.8 to 24	Bucks—Up to 15 A Boost—Up to 15 A	29 μA	50 kHz to 900 kHz	Targeted at 12 V Automotive Spread Spectrum on 3859AL-2
LTC7816	Releasing in 2019						Pin Compatible with LTC3859AL
LTC7817	Releasing in 2019			Bucks—Up to 15 A Boost—Up to 15 A	10 μA	Up to 3 MHz	
LTC7818	Releasing in 2019			Bucks—Up to 15 A Boost—Up to 15 A	10 μA	Up to 3 MHz	Spread Spectrum
LTC7819	Releasing in 2019						

¹ The maximum output current depends on the choice of external components and number of phases.

² The operating frequency can be selected within the range indicated.

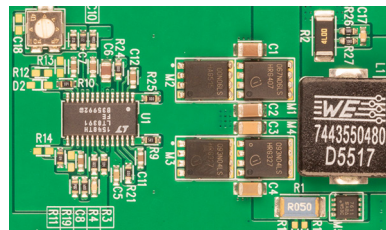
LED Controllers

LT8391

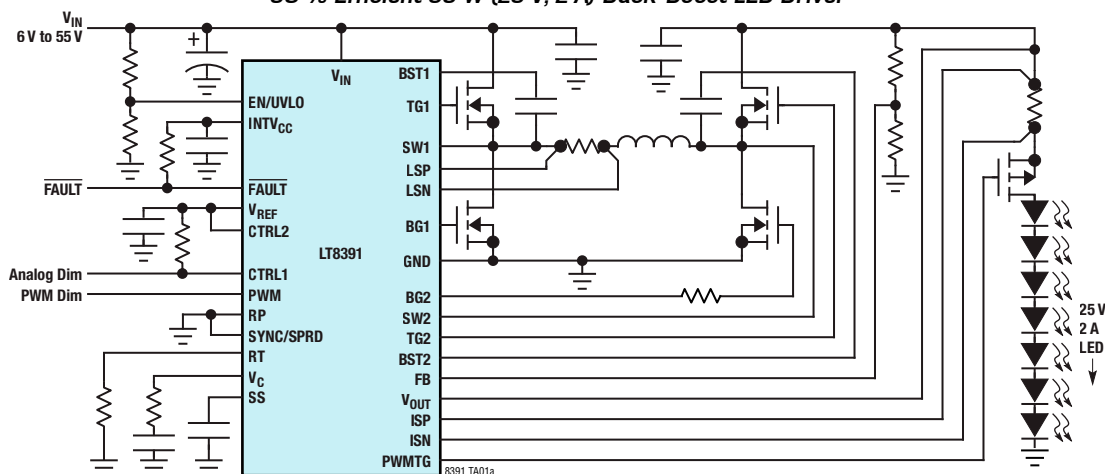
Features

- ▶ 4-Switch Single Inductor Architecture Allows V_{IN} Above, Below or Equal to V_{OUT}
- ▶ Synchronous Switching: Up to 98 % Efficiency
- ▶ Proprietary Peak-Buck Peak-Boost Current Mode
- ▶ Wide V_{IN} Range: 4 V to 60 V
- ▶ Wide V_{OUT} Range: 0 V to 60 V (51 V LED)
- ▶ $\pm 3\%$ LED Current Accuracy
- ▶ 2000:1 External and 128:1 Internal PWM Dimming

Demonstration Board



98 % Efficient 50 W (25 V, 2 A) Buck-Boost LED Driver



Part Number	Topology	Dimming Type	Number of LED Strings	LED Configuration	Input Voltage Range (V)	Max Output Voltage (V)	Frequency (MHz)	Oversoltage Protection	Max Junction Temp (°C)	Package
<i>Single LED String</i>										
LT3762	Synchronous Boost or SEPIC	250:1 INT PWM 3000:1 PWM 20:1 Analog	1	Series	2.5 to 42	60	100 kHz to 1 MHz	Yes	150	TSSOP-28E 4x5 QFN-28
LT3755	Buck, Boost, Buck/Boost	3000:1 PWM 20:1 Analog	1	Series	4.5 to 40	75	100 kHz to 1 MHz	Yes	150	3x3 QFN-16, MSOP-16E
LT8391A	Synchronous Buck-Boost	128:1 Int PWM 2000:1 PWM 20:1 Analog	1	Series	4 to 60	60	600 kHz to 2 MHz	Yes	150	TSSOP-28E 4x5 QFN-28
LT8391	Synchronous Buck-Boost	128:1 Int PWM 2000:1 PWM 20:1 Analog	1	Series	4 to 60	60	150 kHz to 650 kHz	Yes	150	TSSOP-28E 4x5 QFN-28
LT3761/ LT3761A	Buck, Boost, Buck/Boost LED Driver w/PWM	3000:1 PWM 20:1 Analog	1	Series	4.5 to 60	80	100 kHz to 1 MHz	Yes	150	MSOP-16E
LT3763	Buck	3000:1 PWM	1	Series	6 to 60	55	200 kHz to 1 MHz	Yes	150	TSSOP-28E
LT3756	Buck, Boost, Buck/Boost	3000:1 PWM 20:1 Analog	1	Series	6 to 100	100	100 kHz to 1 MHz	Yes	150	3x3 QFN-16, MSOP-16E
LT3795	Buck, Boost, Buck/Boost	3000:1 PWM 20:1 Analog	1	Series	6 to 100	100	100 kHz to 1 MHz	Yes	150	TSSOP-28E
LT3796	Buck, Boost, Buck/Boost	3000:1 PWM 20:1 Analog	1	Series	6 to 100	100	100 kHz to 1 MHz	Yes	150	TSSOP-28E
<i>Multiple LED Strings</i>										
LT3797	Triple Buck, Boost, Buck/Boost	3000:1 PWM 20:1 Analog	3	Series	2.5 to 40, 60 Max	100	100 kHz to 1 MHz	Yes	125	7x8 QFN-52
LT3760	String Boost	3000:1 PWM 25:1 Analog	8	Eight Parallel 100mA Strings	6 to 40	45	100 kHz to 1 MHz	Yes	125	TSSOP-28E
LT3754	String Boost	INT PWM, 3000:1 PWM 20:1 Analog	16	Sixteen Parallel 50mA Strings	6 to 40	45	100 kHz to 1 MHz	Yes	125	5x5 QFN-28

¹ The maximum output current depends on the choice of external components.

Bidirectional

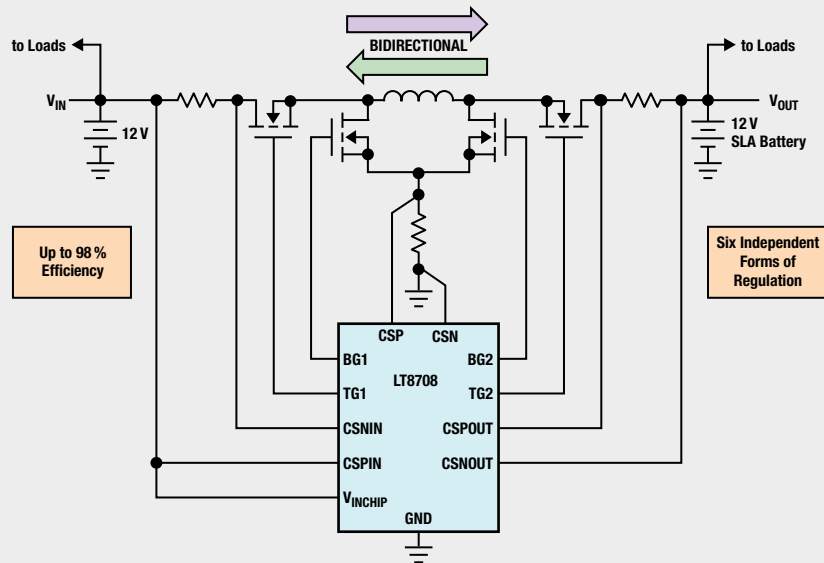
These bidirectional controllers bring a new level of performance and simplicity to automotive dual battery systems. Using the same external components for buck and boost modes significantly reduces complexity and solution size. Up to 97 % efficiency can be achieved, and the maximum current delivered in either direction is controlled. Multiphase operation supports high power applications.

LT8708 (4-Switch Buck/Boost)

Features

- ▶ Allows V_{IN} Above, Below, or Equal to V_{OUT}
- ▶ Six Independent Forms of Regulation
 - V_{IN} Current (Forward and Reverse)
 - V_{OUT} Current (Forward and Reverse)
 - V_{IN} and V_{OUT} Voltage
- ▶ Battery Voltages Can Be the Same

3-Phase Synchronous Step-Down Regulator



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A) with 12 Phases	Number of Phases	I_O (SUPPLY)	Operating Frequency ²	Package	Topology
LT8708/ LT8708-1	2.8 to 80	1.3 to 80	Up to 180 A	(1) 12	3.9 mA	100 kHz to 400 kHz	5x8 QFN-40	Buck-Boost
LTC3871/ LTC3871-1/ LTC3871-2	V_{IN} High – Up to 100 V V_{IN} Low – Up to 30 V	V_{IN} High – Up to 100 V V_{IN} Low – Up to 30 V	V_{IN} High – Up to 45 A V_{IN} Low – Up to 180 A	(2) 12	8 mA	60 kHz to 460 kHz	7x7 LQFP-48	Buck or Boost
LT8228 ³	V_{IN} High – Up to 100 V V_{IN} Low – Up to 100 V	V_{IN} High – Up to 100 V V_{IN} Low – Up to 100 V	V_{IN} High – Up to 45 A V_{IN} Low – Up to 180 A	(1) 12	8 mA	80 kHz to 600 kHz	TSSOP-38	Buck or Boost

¹ The maximum output current depends on the choice of external components and number of phases.

² The operating frequency can be selected within the range indicated.

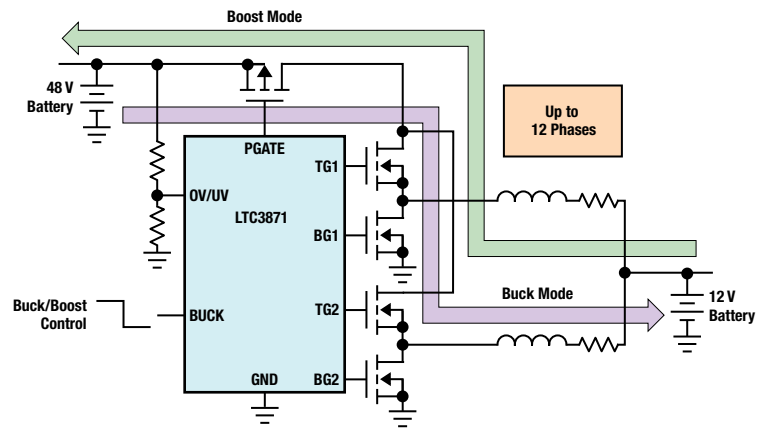
³ Releasing in 2019.

Bidirectional (Buck or Boost)

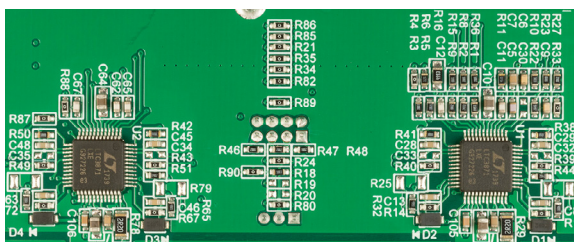
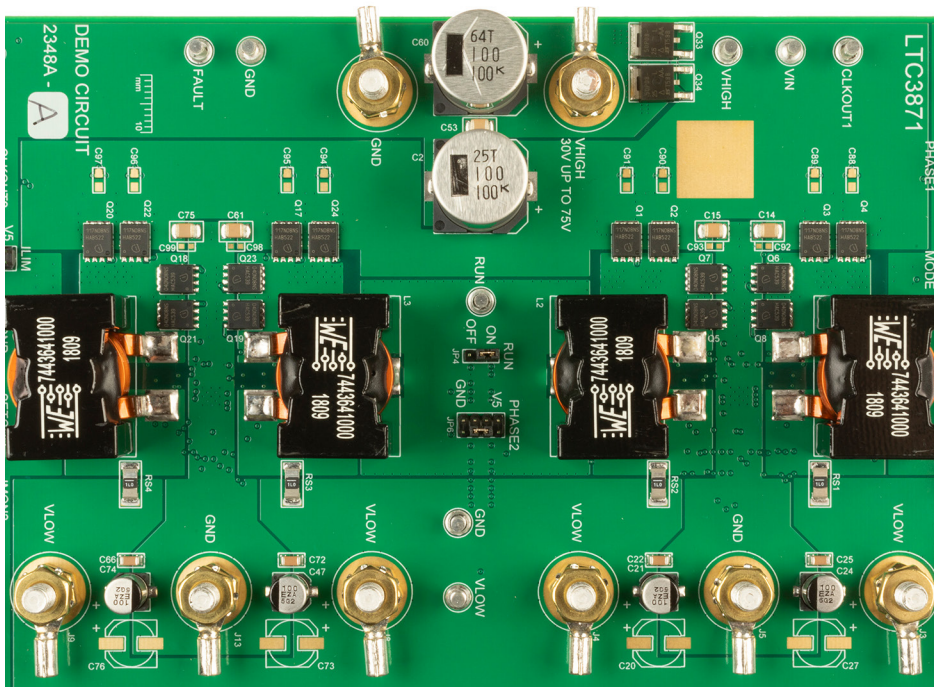
LTC3871 (Buck or Boost)

Features

- ▶ Unique Architecture Allows Dynamic Regulation of Input Voltage, Output Voltage or Current
- ▶ V_{HIGH} Voltages Up to 100 V
- ▶ V_{LOW} Voltages Up to 30 V
- ▶ Synchronous Rectification: Up to 97 % Efficiency
- ▶ Ideal for 48V/12V Battery Systems



Demonstration Board—4 Phases



SEPIC

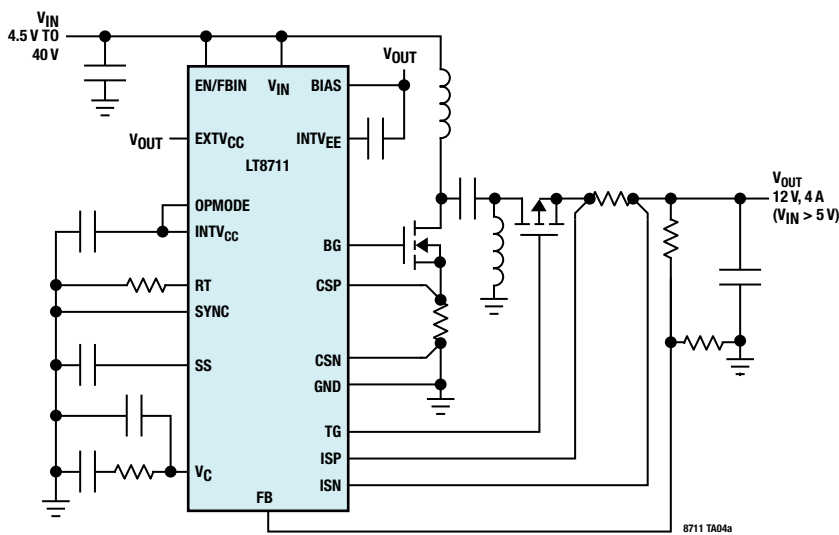
SEPIC converters operate from an input voltage that is above, below or equal to the output voltage. The SEPIC provides a simpler solution as compared to synchronous buck-boost controllers, but has a lower efficiency, power density and maximum output current. All of ADI's boost controllers can be designed into a SEPIC converter.

LT8711

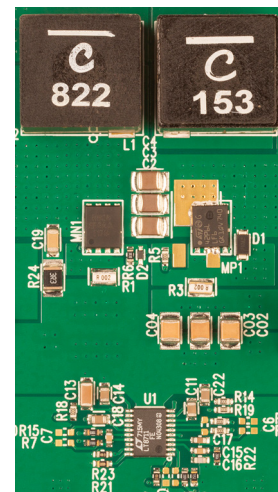
Features

- ▶ Easily Configurable as a Synchronous Buck, Boost, SEPIC, ZETA or Nonsynchronous Buck-Boost Converter
- ▶ Wide Input Range: 4.5 V to 42 V (V_{IN} Can Operate to 0 V, when $EXTV_{CC} > 4.5$ V)
- ▶ Automatic Low Noise Burst Mode® Operation
- ▶ Low I_o in Burst Mode Operation (15 μ A Operating)
- ▶ Input Voltage Regulation for High Impedance Source

Synchronous SEPIC



Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT}^1 Max (V)	Output Current ¹ (A)	I_o (SUPPLY)	Operating Frequency ²	No R_{SENSE}	Synchronous Rectification	Package
LT8711	4.5 to 42	42	10	15 μ A	100 kHz to 750 kHz		✓	TSSOP-20/3x3 QFN-20
LT3757A	2.9 to 40	36	3	1.6 mA	100 kHz to 1 MHz			3x3 DFN-10, MSOP-10E
LT3758A	5.5 to 100	75	3	1.75 mA	100 kHz to 1 MHz			3x3 DFN-10, MSOP-10E
LT3759	1.6 to 42	36	3	350 μ A	100 kHz to 1 MHz			MSOP-12E
LTC1871/ LTC1871-1	2.5 to 36	30	3	550 μ A	50 kHz to 1 MHz	✓		MSOP-10
LTC1871-7	6 to 36	30	3	550 μ A	50 kHz to 1 MHz	✓		MSOP-10
LTC3805/ LTC3805-5	3 to 75(1)	52	3	360 μ A	70 kHz to 700 kHz			MSOP-10/3x3 DFN-10
LT3844	4 to 60	36	3	120 μ A	100 kHz to 600 kHz			TSSOP-16E
LT3724	7.4 to 60	36	3	80 μ A	200 kHz			TSSOP-16

¹ The maximum voltage and current depend on the choice of external components.

² The operating frequency can be selected within the range indicated.

Inverter (Positive to Negative)

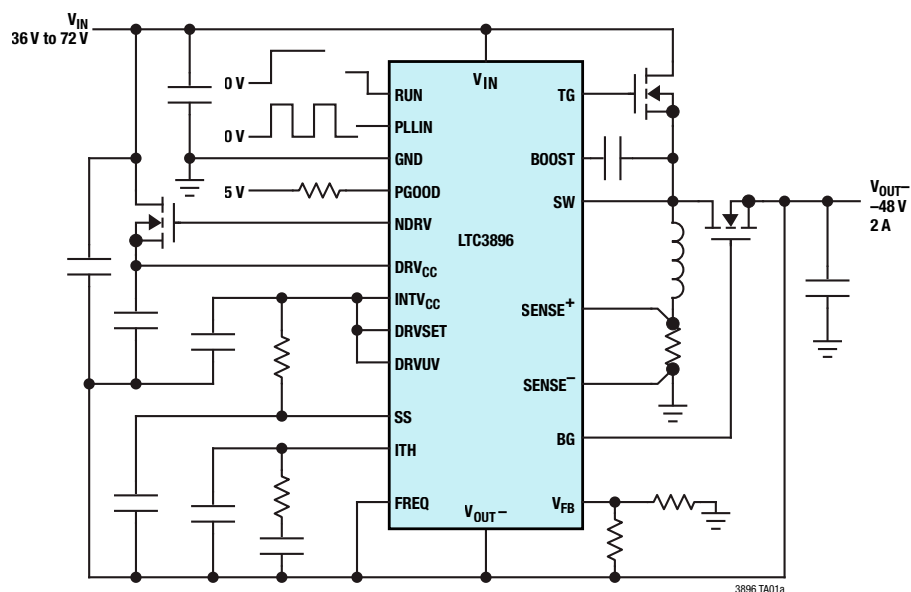
Inverter DC/DC controllers convert a positive input voltage to a negative output. Features include optional sense resistor, current mode control, integrated MOSFET driver, undervoltage lockout, selectable operating frequency, low quiescent current and wide input voltage range.

LTC3896

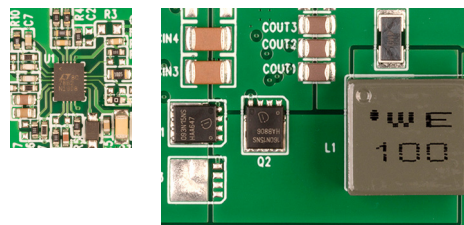
Features

- ▶ Wide $V_{IN} + |V_{OUT}|$ Range: 4 V to 140 V (150 V Abs Max)
- ▶ Wide Output Voltage Range: -60 V to -0.8 V
- ▶ Ground-Referenced Control/Interface Pins
- ▶ Adjustable Gate Drive Level 5 V to 10 V (OPTI-DRIVE)

High Efficiency 36 V–72 V to -48 V/2 A Inverting Regulator



Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT}^1 Max (V)	I_{OUT}^1 Max (A)	I_O (SUPPLY)	Operating Frequency ²	Package
LTC3896	4 to 140	-0.80 to -60	10	2.5 mA	50 kHz to 900 kHz	TSSOP-38 (31)
LTC3863	3.5 to 60	-0.40 to -150	3	50 μ A	50 kHz to 850 kHz	MSOP-12/3x4 DFN-12
LT8711	4.5 to 42	-1.23 and Lower	10	15 μ A	100 kHz to 750 kHz	TSSOP-20/3x3 QFN-20
LT8714	4.5 to 80	-1.23 and Lower	10	4 mA	Up to 750 kHz	TSSOP-20
LT3757A	2.9 to 40	-1.23 and Lower	3	1.6 mA	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10E
LT3758A	5.5 to 100	-1.23 and Lower	3	1.75 mA	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10E
LT3759	1.6 to 42	-1.23 and Lower	3	350 μ A	100 kHz to 1 MHz	MSOP-12E
LTC3704	2.5 to 36	-1.23 and Lower	10	550 μ A	50 kHz to 1 MHz	MSOP-10
LT3724	4 to 60	-1.23 and Lower	10	100 μ A	200 kHz	TSSOP-16E
LT3800	4 to 60	-1.23 and Lower	10	80 μ A	200 kHz	TSSOP-16E
LT3844	4 to 60	-1.23 and Lower	10	120 μ A	100 kHz to 600 kHz	TSSOP-16E

¹ The maximum voltage and current depend on the choice of external components.

² The operating frequency can be selected within the range indicated.

Switching Surge Stoppers

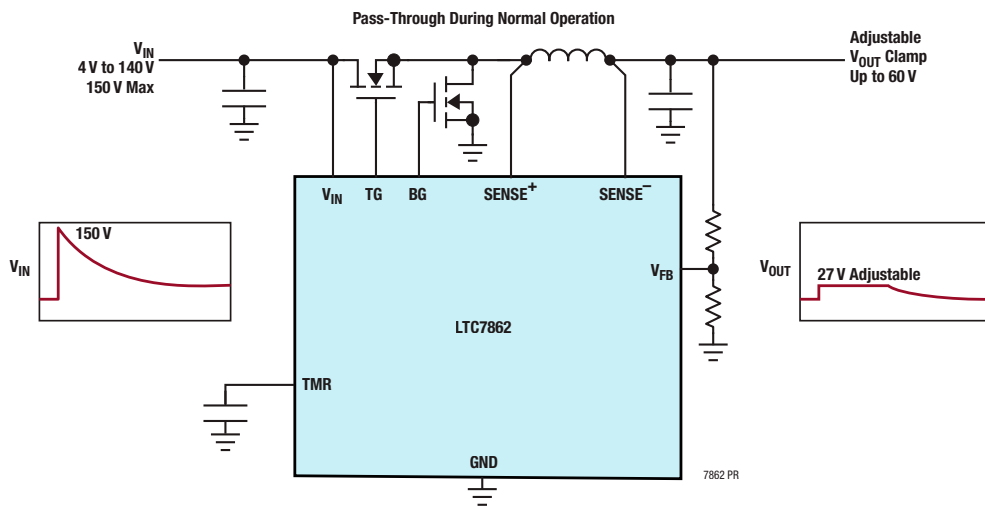
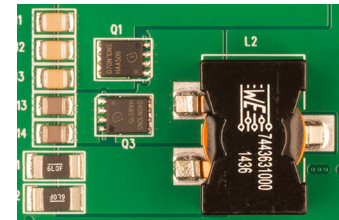
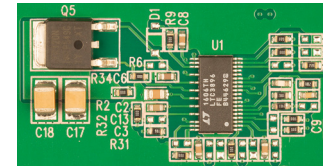
These high efficiency switching surge stoppers provide overvoltage and overcurrent protection. During normal operation the input voltage is passed through to the output with minimal conduction loss. When an input overvoltage condition occurs, they start switching as a high efficiency step-down DC/DC converter, regulating the output voltage and protecting critical downstream components by limiting the output voltage and current ideal for for automotive and industrial applications. The LTC7862 drives a N-channel synchronous power MOSFET stage, whereas, the LTC7860 drives a nonsynchronous power stage. The LTC7860 and LTC7862 build on popular linear surge stoppers by offering higher efficiency switching protection to increase output current capability and reduce power loss during transients and faults.

LTC7862

Features

- ▶ V_{OUT} Clamp Stops High Voltage Input Surges
- ▶ 100 % Duty Cycle Pass-Through Mode During Normal Operation
- ▶ Switches During Overvoltage or Overcurrent Transients and Faults and During Start-Up
- ▶ High Efficiency Switching Enables Long Duration Surge Protection and High Output Currents
- ▶ Wide V_{IN} Range: 4 V to 140 V (150 V Abs Max)
- ▶ Adjustable Output Voltage Clamp Up to 60 V

Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT} ¹ Clamp Voltage (V)	Output Current ¹ (A)	Synchronous Operation	I_o (SUPPLY)	Operating Frequency ²	Package
LTC7862	4 to 140	Up to 60	25	Yes	1.2 mA	50 kHz to 900 kHz	4x5 QFN-20/TSSOP-20
LTC7860	3.5 to 60, 200 V + pk	0.8 to V_{IN}	10	No	0.77 mA	50 kHz to 850 kHz	MSOP-16

¹ The maximum voltage and current depend on the choice of external components.

² The operating frequency can be selected within the range indicated.

Isolated Forward, Half-Bridge, Full-Bridge, and Push-Pull

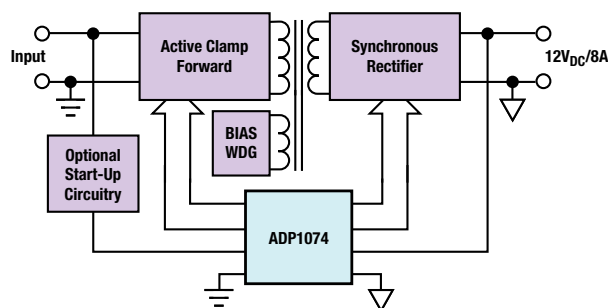
These types of controllers are well suited for isolated and nonisolated application at power levels from 100 W to several kilowatts. The ADP1074 is a current mode, fixed frequency, active clamp, synchronous forward controller designed for isolated DC to DC power supplies. Analog Devices proprietary *i*Couplers[®] are integrated in the ADP1074 to eliminate the bulky signal transformers and opto-couplers that transmit signals over the isolation boundary. Integrating the *i*Couplers reduces system design complexity, cost, and component count and improves overall system reliability. With the integrated isolators and metal-oxide semiconductor field effect transistor (MOSFET) drivers on both the primary and the secondary side, the ADP1074 offers a compact system level design and yields a higher efficiency than a nonsynchronous forward converter at heavy loads.

ADP1074

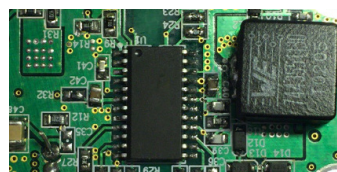
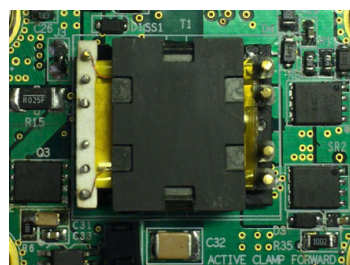
Features

- ▶ Current mode controller for active clamp forward topology
- ▶ Integrated 5 kV rated dielectric isolation voltage with Analog Devices, Inc., patented *i*Coupler technology
- ▶ Wide voltage supply range
 - Primary V_{IN} : up to 60 V
 - Secondary V_{DD2} : up to 36 V

Typical Circuit Diagram



Demonstration Board



Part Number	V_{IN} ³ Range (V)	V_{OUT} ¹ Min (V)	I_{OUT} ¹ Max (A)	Synchronous Operation	Operating Frequency ²	Package	Topology
ADP1074	Up to 60	1.1 to 52	50	√	50 kHz to 600 kHz	SSOP-24	Forward
LT8310	6 to 100	1.2 to 52	10		100 kHz to 500 kHz	TSSOP-20	Forward
LT3752/ LT3752-1	6.5 to Note 1	1.2 to 52	50	√	100 kHz to 500 kHz	TSSOP-38	Forward
LT3753	8.5 to 100	1.2 to 52	50	√	100 kHz to 500 kHz	TSSOP-38	Forward
LTC3765/ LTC3766	5 to 75	1.2 to 52	50	√	100 kHz to 500 kHz	QFN-28 or SSOP-28/MSOP-10	Forward
LTC3721-1	Note 1	1.2 to 52	25	√	Up to 1 MHz	SSOP-16/4x4 QFN-16	Push-Pull
LTC3722-1/ LTC3722-2	Note 1	1.2 to 52	75	√	Up to 1 MHz	SSOP-16	Full Bridge (ZVS)
LTC3723-2	Note 1	1.2 to 52	75	√	Up to 1 MHz	SSOP-16	Push-Pull

¹ The maximum voltage and current depend on the choice of external components.

² The operating frequency can be selected within the range indicated.

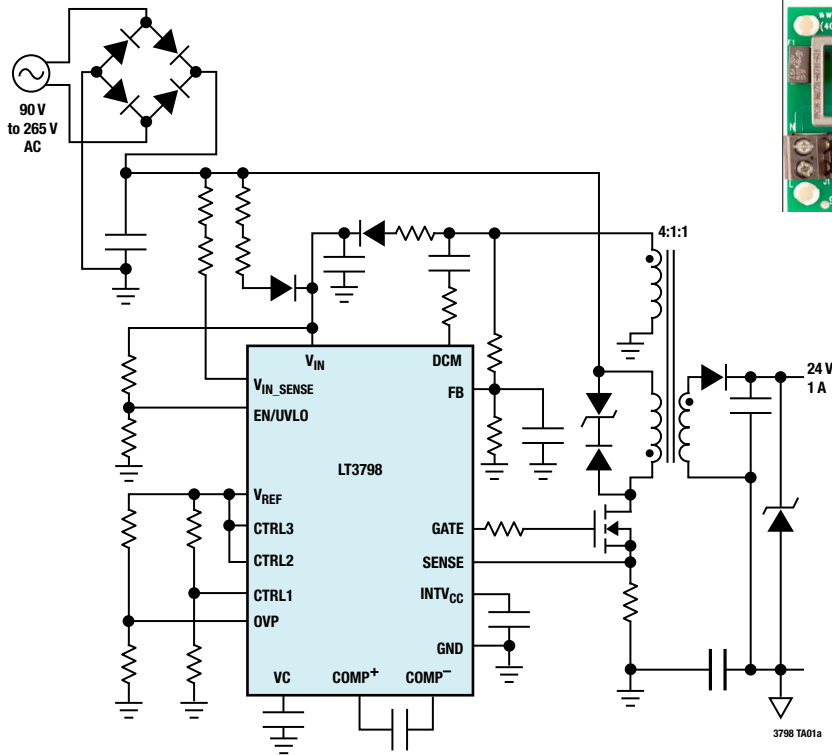
³ For higher input voltages, consult the factory.

Flyback

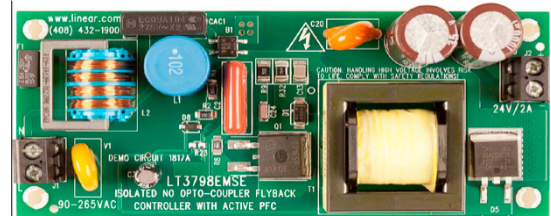
Synchronous and nonsynchronous flyback controllers can be used for isolated and nonisolated DC/DC converters. This family of current mode controllers can either regulate the output voltage directly, through the *i*Coupler, opto-coupler or integrated primary-side transformer winding.

LT3798

Off-Line Isolated Flyback with Active PFC



Demonstration Board



Part Number	V_{IN} Range (V)	V_{OUT}^1 Min (V)	Maximum Output Wattage ¹ (W)	Synchronous Operation	I_O (SUPPLY)	Operating Frequency ²	Package	Comments
LT8316	16 to 600 ¹	4.5	100		75 μ A	3.5kHz to 140kHz	TSSOP-20(16)	High V_{IN}
LT3798	90 to 275 VAC ¹	1.23	80		70 μ A	25 kHz to 300 kHz	MSOP-16 (12)	Active PFC
LT3799	90 to 275 VAC ¹	1.23	100+		70 μ A	25 kHz to 300 kHz	MSOP-16 (12)	LED Driver w/Active PFC
LT3748	5 to 100	1.23	80		300 μ A	Variable	MSOP-16 (12)	
LTC3803/ LTC3803-3	9.2 to 75 ¹	0.8	80		240 μ A	200 kHz or 300 kHz	ThinSOT	
LTC3803-5	5.7 to 75 ¹	0.8	80		240 μ A	200 kHz	ThinSOT	
LTC3805	8.8 to 75 ¹	0.8	80		360 μ A	70 kHz to 700 kHz	DFN-10, MSOP-10	
LTC3805-5	4.5 to 75 ¹	0.8	80		360 μ A	70 kHz to 700 kHz	DFN-10, MSOP-10	
LTC3873	8.8 to 75 ¹	1.2	80		360 μ A	200 kHz	ThinSOT, DFN-8	
LTC3873-5	4 to 75 ¹	1.2	80		360 μ A	200 kHz	ThinSOT, DFN-8	
LTC1871	2.5 to 75 ¹	1.23	80		250 μ A	50 kHz to 1 MHz	MSOP-10	
LT1725	16 to 75 ¹	1.25	80		250 μ A	50 kHz to 250 kHz	SO-16, SSOP-16	
LT1737	4.5 to 75 ¹	1.23	80		10 mA	50 kHz to 250 kHz	SO-16, SSOP-16	
LT3837	4.5 to 75 ¹	1.23	100	✓	6.4 mA	50 kHz to 250 kHz	TSSOP-16	
LT3825	16 to 75 ¹	1.23	100	✓	400 μ A	50 kHz to 250 kHz	TSSOP-16	
ADP1071-1	4.5 to 60 ¹	1.2	100+	✓	6 mA ¹	50 kHz to 600 kHz	SOIC-W	
ADP1071-2	4.5 to 60 ¹	1.2	100+	✓	6 mA ¹	50 kHz to 600 kHz	SOIC-W	

¹ The maximum voltage and current depend on the choice of external components

² The operating frequency can be selected within the range indicated.

Multiple Topology

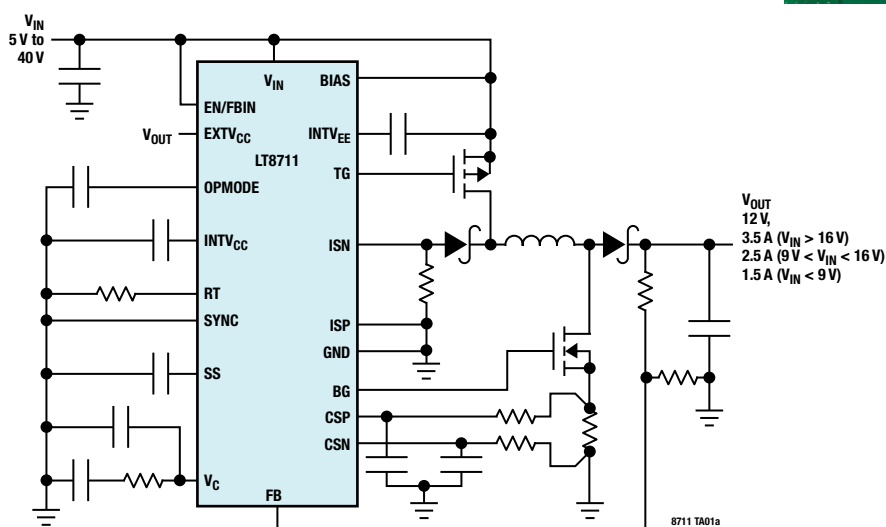
ADI offers DC/DC controllers that can be used in multiple converter topologies including buck, boost, SEPIC, flyback, forward, and inverting. Features include a wide input voltage range, low quiescent current, single and dual outputs, along with optional sense resistor.

LTC8711

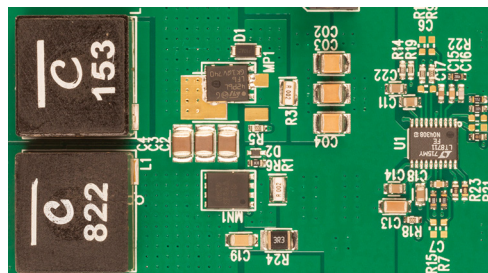
Features

- ▶ Easily Configurable as a Synchronous Buck, Boost, SEPIC, ZETA or Nonsynchronous Buck-Boost Converter
- ▶ Wide Input Range: 4.5 V to 42 V (V_{IN} Can Operate to 0 V, when $EXTV_{CC} > 4.5$ V)
- ▶ Automatic Low Noise Burst Mode[®] Operation
- ▶ Low I_Q in Burst Mode Operation (15 μ A Operating)
- ▶ Input Voltage Regulation for High Impedance Source

Nonsynchronous Buck-Boost



Demonstration Board



Part Number	V_{IN} Range (V)	V_{REF}^1 (V)	I_Q (SUPPLY)	Operating Frequency ²	Package	No R_{SENSE}	Buck	Boost	Flyback	Forward	Inverter	SEPIC	Zeta	Nonsynchronous Buck-Boost
LTC8711	4.5 to 42	0.8	15 μ A	100 kHz to 750 kHz	3x4 QFN-20, TSSOP-20		✓	✓				✓	✓	✓
LT3757A	2.9 to 40	1.6 or -0.8	1.6 mA	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10E			✓	✓		✓	✓		
LT3758A	5.5 to 100	1.6 or -0.8	1.75 mA	100 kHz to 1 MHz	3x3 DFN-10, MSOP-10E			✓	✓		✓	✓		
LT3759	1.6 to 42	1.6 or -0.8	350 μ A	100 kHz to 1 MHz	MSOP-12E			✓			✓	✓		
LTC1871-7	6 to 36	1.23	250 μ A	50 kHz to 1 MHz	MSOP-10	✓		✓	✓			✓		
LTC1871/ LTC1871-1	2.5 to 36	1.23	250 μ A	50 kHz to 1 MHz	MSOP-10	✓		✓	✓			✓		
LTC1624	3.5 to 36	1.19	550 μ A	200 kHz	SO-8		✓	✓			✓	✓		
LTC1625	3.7 to 36	1.19	500 μ A	150 kHz	SSOP-16	✓	✓				✓	✓		
LT3724	7.5 to 60	1.23	80 μ A	200 kHz	TSSOP-16		✓	✓			✓	✓		
LTC3703-5	4.1 to 60	0.8	1.7 mA	100 kHz to 600 kHz	SSOP-16, SSOP-28		✓	✓						
LT3844	4 to 60	1.23	120 μ A	100 kHz to 600 kHz	TSSOP-16E		✓	✓			✓	✓		
ADP1074	4.5 to 60 ¹	1.2	6 mA	50 kHz to 600 kHz	SOIC-24					✓				

¹ The maximum output voltage depends on the choice of external components.

² The operating frequency can be selected within the range indicated.

DDR/QDR Memory Termination

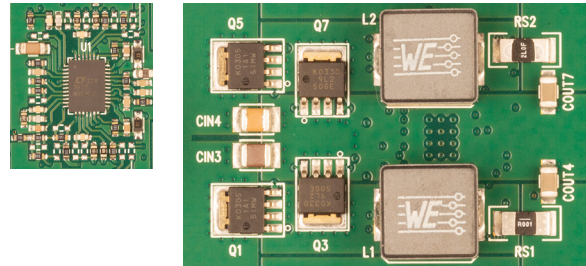
DDR (Double Data Rate)/QDR (Quad Data Rate) termination applications requires that V_{OUT2} (V_{TT}) is always half of V_{REF} (which is usually V_{OUT1} or V_{DDQ}). Features include dual and single outputs, onboard MOSFET drivers, synchronous rectification, low quiescent current, tracking, tight VREF accuracy, current mode or voltage mode control, spread spectrum and no need for a current sense resistor.

LTC3876

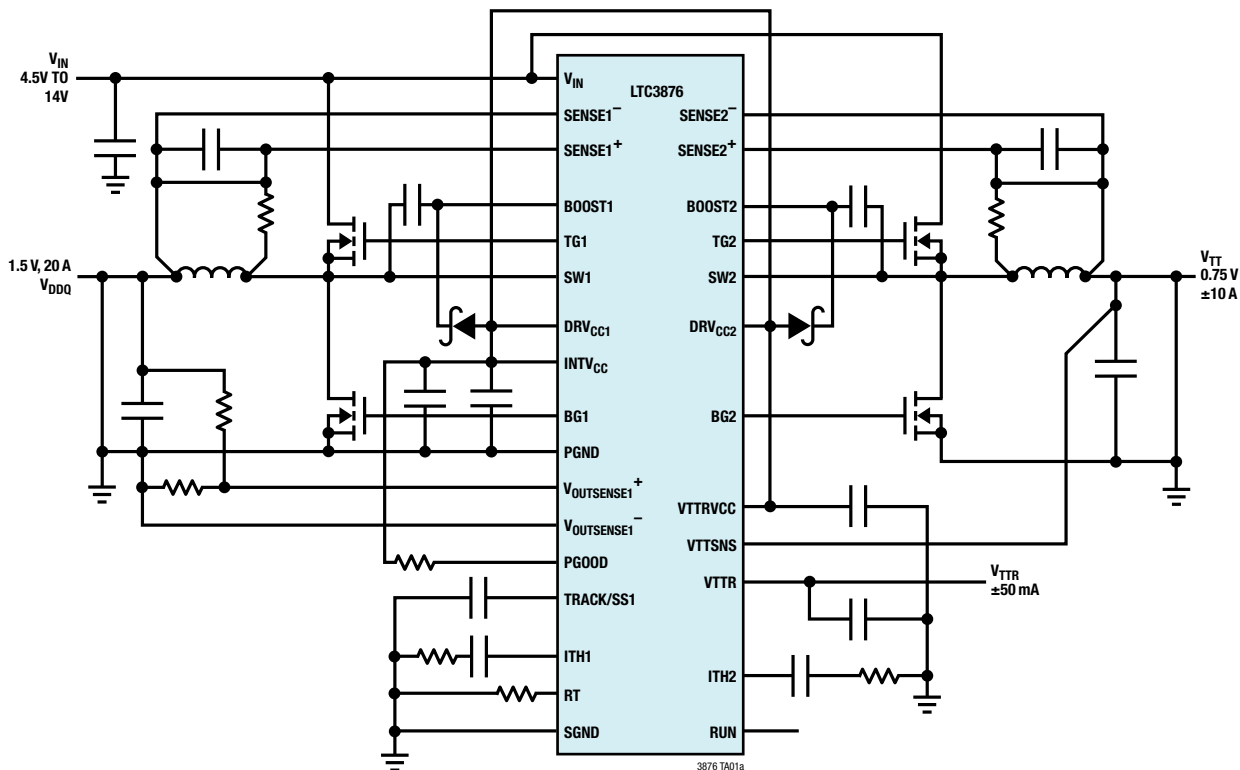
Features

- ▶ Complete DDR Power Solution with V_{TT} Reference
- ▶ Wide V_{IN} Range: 4.5 V to 38 V, V_{DDQ} : 1 V to 2.5 V
- ▶ $\pm 0.67\%$ V_{DDQ} Output Voltage Accuracy
- ▶ V_{DDQ} and V_{TT} Termination Controllers

Demonstration Board



DDR3, 1.5 V_{DDQ} /20 A, 0.75 V_{TT} /±10 A, 4.5 V to 14 V Input



Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT}^1 Max (A)	I_O (SUPPLY)	Operating Frequency ²	Package	Dual Output	Spread Spectrum	No R_{SENSE}	Tracking	Synchronizable	EXTV _{CC}	Current (I) or Voltage (V) Mode
LTC3876	4.5 to 38	1 to 2.5	25/25	5 mA	200 kHz to 2 MHz	QFN-38, TSSOP-38	✓		✓	✓	✓	✓	y
LTC3776	2.75 to 9.8	0.6 to V_{IN}	6/6	575 μ A	300 kHz to 750 kHz	QFN-24, SSOP-24	✓	✓	✓	✓	PLL		I
LTC3831	3 to 8	1.25 to 0.91 V_{IN}	15	14.7 mA	100 kHz to 500 kHz	SSOP-16			✓		✓		V
LTC3831-1	3 to 8	0.4 to 0.91 V_{IN}	15	20.7 mA	100 kHz to 500 kHz	SSOP-16			✓		✓		V
LTC3718	1.5 to 36	0.7 to $V_{REF}/2$	20	1 mA	200 kHz to 1.5 MHz	SSOP-24			✓				I
LTC3717/ LTC3717-1	4 to 36	0.7 to $V_{REF}/2$	20	1 mA	200 kHz to 1.5 MHz	SSOP-16			✓			✓	I

¹ The maximum output current depends on the choice of external components

² The operating frequency can be selected within the range indicated

Additional Features: All parts have synchronous rectification and use the MOSFET $R_{DS(ON)}$ for current sense.

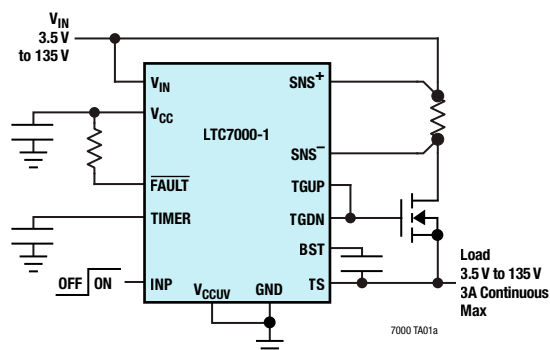
MOSFET Drivers

ADI offers several types of high speed MOSFET drivers with features that include low and high side driving, single or dual outputs, inverting or noninverting and some for high voltage application.

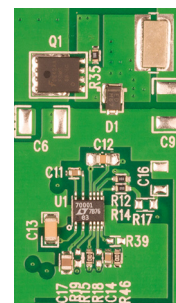
LTC7000-1

Features

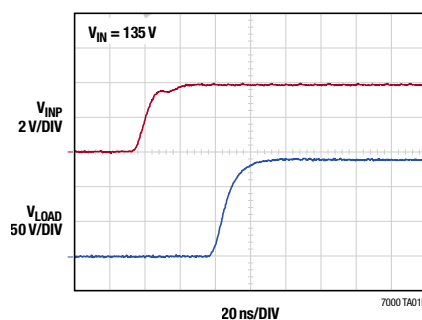
- ▶ V_{IN} Range: 3.5 V to 135 V (150 V Abs Max)
- ▶ Internal Charge Pump for 100 % Duty Cycle
- ▶ 1 Ω Pull-Down, 2.2 Ω Pull-Up
- ▶ Fast Turn-On and Turn-Off Times
- ▶ Short-Circuit Protected
- ▶ Adjustable Current Trip Threshold
- ▶ Current Monitor Output
- ▶ Automatic Restart Timer
- ▶ Open-Drain Fault Flag
- ▶ Adjustable Turn-On Slew Rate
- ▶ Gate Driver Supply from 3.5 V to 15 V
- ▶ CMOS Compatible Input
- ▶ MSOP-16 Packages with High Voltage Spacing



Demonstration Board



Turn-On Waveform



	LTC7000	LTC7000-1
Package	16-Lead MSOP MES16	16-Lead MSOP MES16(12)
High Voltage Pin Spacing	0.157 mm	0.657 mm
RUN/OVLO/I _{SET} /IMON Pins	Yes	No

Part Number	Maximum V_{IN} Voltage (V)	V_{CC} Input Range (V)	Sink/Source	I_O (SUPPLY)	Package	Single (S) or Dual (D)	Description
MOSFET Drivers							
LTC7000/LTC7000-1	3.5 to 135	3.5 to 15	1 Ω /2.2 Ω	60 μ A	MSOP-16	S	Protected High Side, High Voltage
LTC7001	3.5 to 135	3.5 to 15	1 Ω /2.2 Ω	27 μ A	MSOP-10	S	High Side, High Voltage
LTC7003	3.5 to 60	3.5 to 15	1 Ω /2.2 Ω	60 μ A	MSOP-16	S	Protected High Side, High Voltage
LTC7004	3.5 to 60	3.5 to 15	1 Ω /2.2 Ω	27 μ A	MSOP-10	S	High Side, High Voltage
LTC4441	24	5 to 24	6 A/6 A	250 μ A	MSOP-10, SO-8	S	Low Side
LTC4440	Up to 80, 100 pk	7.3 to 15	2.4 A/1.5 Ω	250 μ A	MSOP-10, SO-8	S	High Side, High Voltage
LTC4440-5	Up to 60, 80 pk	3.65 to 15	1.1 A/1.85 Ω	200 μ A	MSOP-8E, ThinSOT	S	High Side, High Voltage
LTC4442/LTC4442-1	38	6 to 9.5	2.4 A/5 A	730 μ A	DFN-8, MSOP-8	S	Synchronous Driver
LTC4444/LTC4444-5	100	7 to 15	2.5 A/2.5 A	350 μ A	MSOP-8	S	Synchronous Driver
LTC4446	Up to 114	7.2 to 13.5	0.55 Ω /2.2 Ω	350 μ A	MSOP-8	S	Synchronous Driver
LTC4449	Up to 38	4 to 6.5	1 Ω /2.2 Ω	730 μ A	2x3 DFN-8	S	Synchronous Driver
LTC1693-1	14	4.5 to 13.2	1.4 A/1.7 A	730 μ A	SO-8	D	Dual N-Channel Both Noninverting
LTC1693-2	14	4.5 to 13.2	1.4 A/1.7 A	730 μ A	SO-8	D	Dual N-Channel 1 Noninverting, 1 Inverting
LTC1693-3	14	4.5 to 13.2	1.4 A/1.7 A	730 μ A	MSOP-8	D	Single with Output Polarity Select
LTC1693-5	14	4.5 to 13.2	1.4 A/1.7 A	360 μ A	MSOP-8	D	Single P-Channel
DrMOS							
LTC7050		Releasing in 2019					
LTC7051		Releasing in 2019					

Digital Power System Management

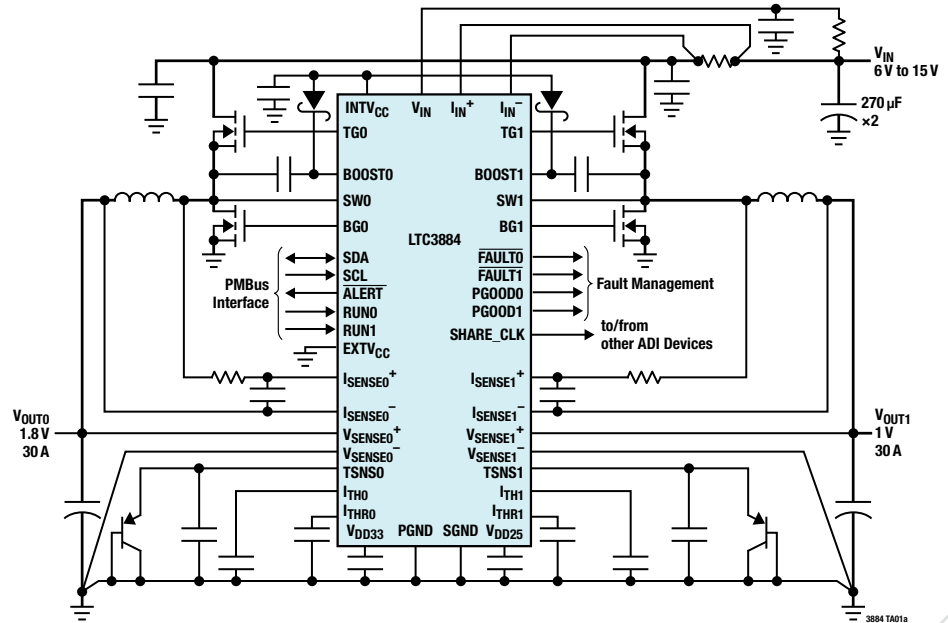
Digital power management is being adopted in the marketplace because of its ability to provide accurate information about the power system and its ability to autonomously control and supervise dozens of voltages with ease. These controllers have onboard nonvolatile memory and PMBus interface for real time reporting and controlling of point-of-load (POL) regulators. Power management monitoring and control include current, voltage, operating frequency and temperature. Power supply sequencing, margining, turn-on/off are easily programmed via the PMBus interface.

LT3884

Features

- ▶ PMBus/I²C Compliant Serial Interface
- ▶ Telemetry Read-Back Includes V_{IN} , I_{IN} , V_{OUT} , I_{OUT} , Temperature and Faults
- ▶ Programmable Voltage, Current Limit, Digital Soft-Start/Stop, Sequencing, Margining, OV/UV/OC
- ▶ Sub-Milliohm DCR Current Sensing
- ▶ Digitally Adjustable Loop Compensation Parameters

Digital Power Monitoring and Control Synchronous Step-Down Regulator



Part Number	V_{IN}^2 Range (V)	V_{OUT}^1 Range (V)	Output Current ¹ (A/Phase)	Number of Outputs/Phases	Current Mode or Voltage Mode	Package	Features
Step-Down							
LTC3880/LTC3880-1	4.5 to 24	0.5 to 4.0, ch0 0.5 to 5.4, ch1	35	2	Current	6 x 6 QFN-40	Recommend the LTC3887 for New Designs
LTC3882/LTC3882-1	3.0 to 38	0.5 to 5.3	35	2	Voltage	6 x 6 QFN-40	
LTC3883/LTC3883-1	4.5 to 24	0.5 to 5.4	30/35	1	Current	5 x 5 QFN-32	
LTC3884/LTC3884-1	4.5 to 38	0.5 to 5.4	30/35	2	Current	7 x 7 WFN-48	
LTC3886	4.5 to 60	0.5 to 13.2	30	2	Current	7 x 8 QFN-40	
LTC3887/LTC3887-1/ LTC3887-2	4.5 to 24	0.5 to 5.5	30/35/30	2	Current	6 x 6 QFN-40	
LTC3889	5.0 to 60	0.5 to 40, ch0 0.5 to 8, ch1		2	Current	7 x 8 QFN-52	
Phase Extenders							
LTC3870/LTC3870-1	4.5 to 60	0.5 to 14	30	2	Current	4x5 QFN-28	
LTC3874/LTC3874-1	4.5 to 38	Up to 5.5	40	2	Current	4x5 QFN-28	Sub Milliohm DCR Sensing
Forward							
ADP1051/ADP1052	Note 1	Note 1	Note 1	1 (typ), max 3	Voltage	LFCSP	Ideal for Isolated Forward Applications
ADP1055	Note 1	Note 1	Note 1	1 (typ), max 2	Current	LFCSP	Ideal for Isolated Forward Applications
Power Factor Correction							
ADP1047/ADP1048	85-265 V_{RMS}	385 V_{DC}	Note 1	1 for ADP1047, 2 for ADP1048	Average Current Mode	TSSOP	AC Power Factor Correction PFC, PMBus
Control Device							
LTC7106/LTC7106-1	2.5 to 5.5	NA	NA	NA	NA	2x3 DFN-10	A 7-Bit Current DAC with PMBus Interface

¹ The maximum voltage and current depend on the choice of external components

² For higher input voltages, consult the factory.

LTpowerPlay

LTpowerPlay® is a powerful, Windows-based development environment supporting Analog Devices' Digital Power System Management (PSM) products.

Installing LTpowerPlay

Step 1: Download and Install LTpowerPlay

[Download LTpowerPlay](#)

Step 2: Request an LTpowerPlay License

When LTpowerPlay launches the first time, it will prompt you to request a license

- ▶ Click 'Request a License Key...'
- ▶ Enter the Required Information
- ▶ Click 'Send License Request'

Note: Please ensure your email spam filter is configured to accept emails from 'licenseserver@ltpowerplay.com'

Step 3: Install your LTpowerPlay License File

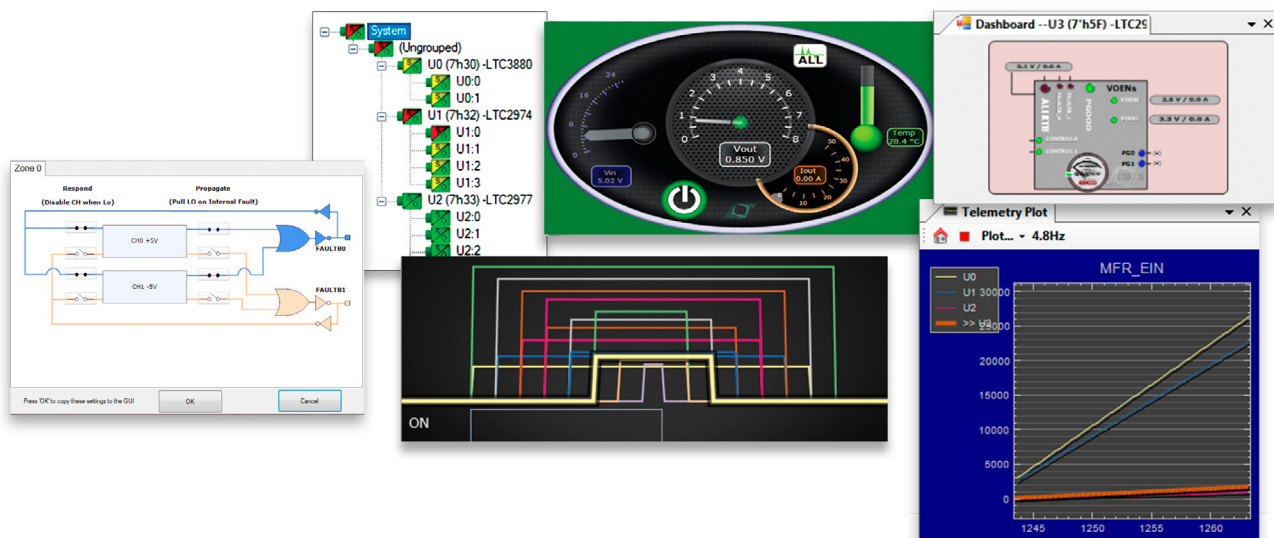
You will receive an email with your license file and instructions for installing it.

Power System Management

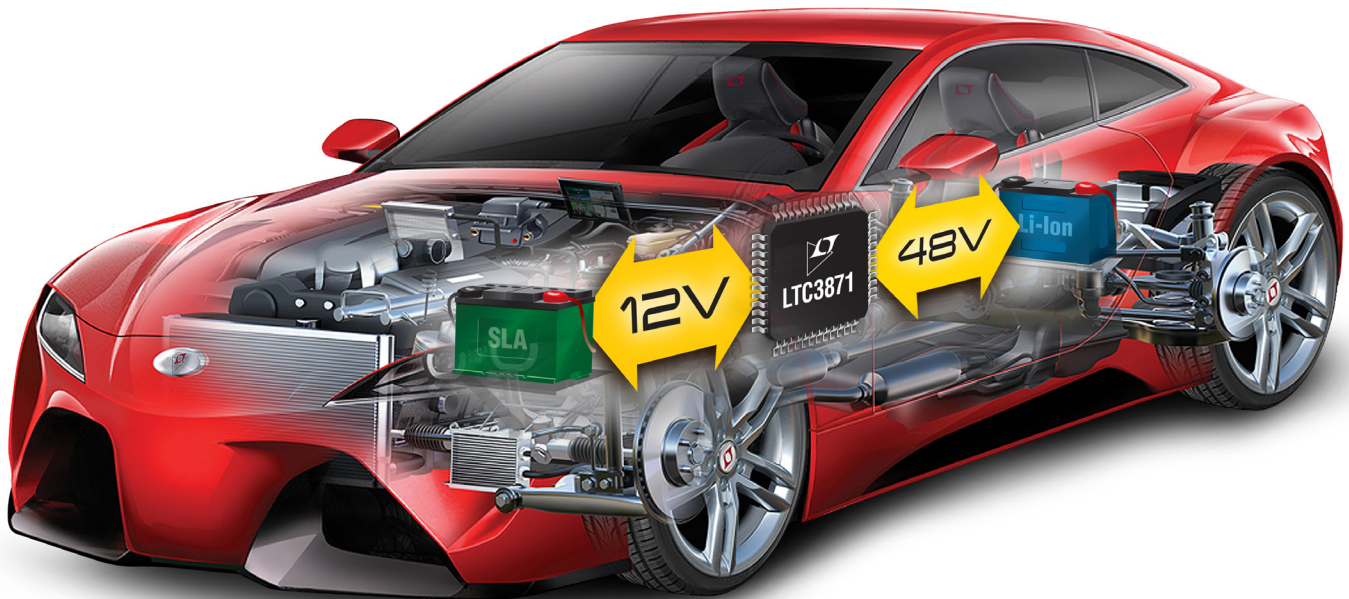
LTpowerPlay supports a variety of different tasks such as using it to evaluate Analog Devices' ICs by connecting to a demo board system, and in an offline mode (with no hardware present) to build a multichip configuration file that can be saved and reloaded at a later time. It also provides unprecedented diagnostic and debug features, and becomes a valuable diagnostic tool during board bring-up to program or tweak the power management scheme in a system or to diagnose power issues when bringing up rails.



LTpowerPlay Dashboard



Multi-kW Bidirectional Power Transfer



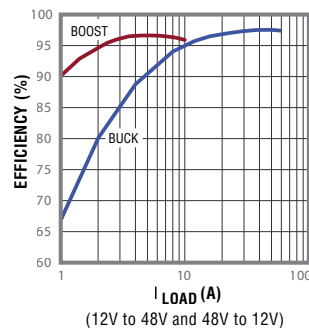
Single IC 48V/12V Dual Battery Power Controller

The LTC3871 bidirectional two-phase synchronous buck or boost controller brings a new level of performance and simplicity to 12V/48V automotive dual battery systems. Using the same external components for buck and boost modes significantly reduces complexity and solution size. Up to 97% efficiency can be achieved, and the maximum current delivered in either direction is controlled. Four control loops, two for current and two for voltage, along with overload protection in either direction provide a robust solution. 6kW to 8kW can be supplied in either mode with a 12-phase design.

Features

- Buck or Boost on Demand
- Regulation of V_{IN} , V_{OUT} or Current
- 48V Nominal Bus, Up to 100V
- 12V Nominal Bus, Up to 30V
- Up to 97% Efficiency
- Up to 12-Phase Operation
- AEC-Q100 Compliant
- Engineered for Diagnostic Coverage in ISO 26262 Systems

Efficiency Buck & Boost Modes



Info & Free Samples

www.analog.com/LTC3871

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