High Performance DC/DC Controllers
We provide complete power solutions with a full lineup of power management products. This brochure provides an overview of our high performance DC/DC switching regulator controllers for applications including datacom, telecom, industrial, automotive, medical, avionics and control systems. We make power design easier with our industry-leading field application engineering support; a broad selection of demonstration boards with schematics, layout files and parts lists; SwitcherCAD® software for simulation, application notes and comprehensive technical documentation.

Contents

**Topologies**

DC/DC Converter Topologies.................................................................................................................................1

**Step-Down (Buck) DC/DC Controllers**

Single Output Buck DC/DC Controllers $V_{IN}$ up to 24V ......................................................................................2

Single Output Buck DC/DC Controllers $V_{IN}$ up to 38V ......................................................................................3

Single Output Buck DC/DC Controllers $V_{IN}$ up to 60V/100V...........................................................................4

PolyPhase® Single Output DC/DC Controllers .................................................................................................5

PolyPhase Multiple Output DC/DC Controllers ...............................................................................................6

**Step-Up (Boost), Buck-Boost, Sepic, Inverter and Flyback Controllers**

Boost DC/DC Controllers ....................................................................................................................................7

Synchronous Buck-Boost DC/DC Controllers ........................................................................................................8

SEPIC DC/DC Controllers .....................................................................................................................................9

Inverter DC/DC Controllers ..................................................................................................................................10

Flyback Controllers ..............................................................................................................................................11

**Micropower, Multiple Topologies, DDR/QDR, Monitor, Margining and MOSFET Drivers**

Micropower DC/DC Controllers ..........................................................................................................................12

Multiple Topology DC/DC Controllers ..................................................................................................................13

DDR/QDR Memory Termination DC/DC Controllers ............................................................................................14

Digital Power System Management ....................................................................................................................15

High Speed MOSFET Drivers..............................................................................................................................16
**DC/DC Converter Topologies**

**Step-Down (Buck) Converter**

\[ V_{\text{OUT}} < V_{\text{IN}} \]

**SEPIC Converter**

\[ V_{\text{IN}} \text{ Above, Below or Equal to } V_{\text{OUT}} \]

**Synchronous Step-Up (Boost) Converter**

More Efficient than a Standard Boost

**Flyback Converter**

Isolated and Non-Isolated; High \( V_{\text{OUT}}/V_{\text{IN}} \) Ratios; Simple

**Synchronous Buck-Boost Converter**

\[ V_{\text{IN}} \text{ Above, Below or Equal to } V_{\text{OUT}}^\dagger, \text{ More Efficient than a SEPIC} \]

**Step-Up (Boost) Converter**

\[ V_{\text{OUT}} > V_{\text{IN}} \]

**Inverter**

Converts Positive Input Voltage to Negative Output Voltage

**Digital Power Synchronous Buck Converter**

Digital Control, Telemetry and Fault Logging
Single Output Buck DC/DC Controllers

Linear Technology’s single output buck step-down DC/DC controllers provide up to 96 percent efficient step-down conversion. Output voltages are as low as 0.6V 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 and/or synchronizable operating frequency. Linear offers several hundred buck controllers. Only a select few are listed below. For a complete list visit [www.linear.com/LTC3852](http://www.linear.com/LTC3852) or contact your local sales office.

V<sub>IN</sub> up to 24V

**LTC3852 Features**

- Charge Pump Input Range: 2.7V to 5.5V
- Integrated Charge Pump Provides 5V Gate Drive to Logic Level MOSFETs
- \( R_{\text{SENSE}} \) or DCR Current Sensing
- ±1.25% Output Voltage Accuracy Over Temperature
- Phase-Lockable Fixed Frequency: 250kHz to 750kHz

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**LTC3852 Low Voltage Synchronous Step-Down Schematic**

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**LTC3852 Features**

- Charge Pump Input Range: 2.7V to 5.5V
- Integrated Charge Pump Provides 5V Gate Drive to Logic Level MOSFETs
- \( R_{\text{SENSE}} \) or DCR Current Sensing
- ±1.25% Output Voltage Accuracy Over Temperature
- Phase-Lockable Fixed Frequency: 250kHz to 750kHz

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**Notes**

(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 DC/DC Controllers

\[ V_{\text{IN}} \text{ up to 38V} \]

**LTC3866 Features**
- Sub Milliohm DCR Current Sensing
- Advanced Current Mode Control For Ultralow Jitter
- High Efficiency: Up to 95%
- Selectable Current Sensing Limit
- Programmable DCR Temperature Compensation
- \( \pm 0.5\% \) 0.6V Output Voltage Accuracy
- Programmable Fixed Frequency 250kHz to 770kHz
- High Speed Differential Remote Sense Amplifier

**LTC3866 Sub-Milliohm Synchronous Step-Down Schematic**

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**Notes**
(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 DC/DC Controllers

**V\(_{\text{IN}}\) up to 60V/100V**

#### LTC3891 Features

- Wide **V\(_{\text{IN}}\)** Range: 4V to 60V (65V Abs Max)
- Low Operating IQ: 50μA
- Wide Output Voltage Range: 0.8V ≤ V\(_{\text{OUT}}\) ≤ 24V
- R\(_{\text{SENSE}}\) or DCR Current Sensing

#### LTC3891 High Voltage Synchronous Step-Down Schematic

<table>
<thead>
<tr>
<th>Part Number</th>
<th><strong>V(_{\text{IN}})</strong> Range (V)</th>
<th><strong>V(_{\text{OUT}})</strong> Range (V)</th>
<th>I(_{\text{OUT}})(^{(1)}) Max (A)</th>
<th>Operating Frequency(^{(2)})</th>
<th>I(_{\text{Q}}) (supply)</th>
<th>Package</th>
<th>Synchronous Rectification</th>
<th>No R(_{\text{SENSE}})</th>
<th>Tracking</th>
<th>Synchronized</th>
<th>Shutoff</th>
<th>Power Good Signal</th>
<th>Adjustable Turn-on Voltage</th>
<th>Current Control</th>
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<tbody>
<tr>
<td>LTC3812-5</td>
<td>4.2 to 60</td>
<td>0.8 to 0.93 V(_{\text{IN}})</td>
<td>20</td>
<td>100kHz to 1MHz</td>
<td>3mA</td>
<td>TSSOP-16E</td>
<td>√</td>
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<td>LTC3810-5</td>
<td>4.2 to 60</td>
<td>0.8 to 0.93 V(_{\text{IN}})</td>
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<td>100kHz to 1MHz</td>
<td>3mA</td>
<td>QFN-32</td>
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<td>0.8 to 0.93 V(_{\text{IN}})</td>
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<td>1.7mA</td>
<td>SSOP-16, TSSOP-28</td>
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<td>0.8 to 0.93 V(_{\text{IN}})</td>
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<td>0.8 to 0.93 V(_{\text{IN}})</td>
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<td>100kHz to 600kHz</td>
<td>1.7mA</td>
<td>SSOP-16, TSSOP-28</td>
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#### Low Quiescent Current

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<th><strong>V(_{\text{OUT}})</strong> Range (V)</th>
<th>I(_{\text{OUT}})(^{(1)}) Max (A)</th>
<th>Operating Frequency(^{(2)})</th>
<th>I(_{\text{Q}}) (supply)</th>
<th>Package</th>
<th>Synchronous Rectification</th>
<th>No R(_{\text{SENSE}})</th>
<th>Tracking</th>
<th>Synchronized</th>
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<th>Power Good Signal</th>
<th>Adjustable Turn-on Voltage</th>
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<td>LTC3864</td>
<td>3.5 to 60</td>
<td>0.8 to V(_{\text{IN}})</td>
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<td>50kHz to 850kHz</td>
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<td>4 to 60</td>
<td>1.23 to 36</td>
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<td>TSSOP-16E</td>
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<td>50kHz to 90kHz</td>
<td>50μA</td>
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<td>1.23 to 36</td>
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<td>100kHz to 500kHz</td>
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<td>1.23 to 36</td>
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<td>200kHz</td>
<td>80μA</td>
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<td>1.25 to 60</td>
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<td>50kHz to 1MHz</td>
<td>220μA</td>
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#### Additional feature

All parts have programmable soft-start

#### Notes

(1) The maximum output current depends on the choice of external components
(2) The operating frequency can be selected within the range indicated
PolyPhase Single Output DC/DC Controllers

PolyPhase operation clocks multiple DC/DC converter channels out-of-phase. This significantly reduces the input and output ripple currents, resulting in higher efficiency and lower EMI, as well as enabling smaller input and output filtering components.

### LTC3829 Features
- Nonlinear Control for Fast Transient Response
- ±0.75%, 0.6V Reference Accuracy
- PWM, Stage Shedding™ or Burst Mode® Operation
- High Efficiency: Up to 95%
- \( R_{\text{SENSE}} \) or DCR Current Sensing
- Programmable DCR Temperature Compensation
- Phase-Lockable Fixed Frequency: 250kHz to 770kHz
- True Remote Sense Differential Amplifier

### Additional features
- All parts have differential V\text{os} sensing, shut-down (run) pin, clock input, programmable soft-start and a power good signal
- All parts are peak current mode controllers
- Multiple parts can be paralleled for higher current applications

### Notes
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. The maximum 240A can only be developed by paralleling multiple phases
PolyPhase Multiple Output DC/DC Controllers

Linear’s PolyPhase multiple output DC/DC controllers provide up to three high current outputs with up to 95 percent efficiency. Features include multiphase operation, onboard MOSFET drivers, synchronous or nonsynchronous rectification, low quiescent current, tracking, tight VREF accuracy and choice of current sense element. Other options include selectable, synchronizable switching frequency or constant on-time, tracking, along with DrMOS and power block compatibility.

LTC3855 Features

- Dual, 180° Phased Controllers Reduce Required Input Capacitance and Power Supply Induced Noise
- High Efficiency: Up to 95%
- RSENSE or DCR Current Sensing
- Programmable DCR Temperature Compensation
- ±0.75% 0.6V Output Voltage Accuracy
- Phase-Lockable Fixed Frequency 250kHz to 770kHz
- True Remote Sensing Differential Amplifier

LTC3855 Dual Output 2-Phase Synchronous Step-Down Schematic

Part| V IN Range (V) | V OUT Range (V) | I OUT MAX (A) | I Q SUPPLY | Operating Frequency (MHz) | Package | Number of Outputs | Maximum # of Phases | Remote Sense | Tracking | Sync | DCR Temp Compensation | DrMOS/Power Block Compatible | DCRR Temp Compensation |
---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
LTC3855 | 4.5 to 38 | 0.6 to 3.3 (12.5) | 3.5mA | 25/25 | 25kHz to 770kHz | 6x6 QFN-40, TSSOP-38 | 2 | 12 | ✓ | ✓ | ✓ | ✓ |
LTC3838 | 4.5 to 38 | 0.6 to 5.5 | 3mA | 25kHz to 2MHz | 5x7 QFN-38, TSSOP-38 | 2 | 12 | ✓ | ✓ | ✓ | ✓ |
LTC3861 | 3 to 24 | 0.6 to 5 | 30mA | 25kHz to 2.25MHz | 5x6 QFN-36 | 2 | 12 | ✓ | ✓ | ✓ | ✓ |
LTC3869 | 4 to 38 | 0.6 to 12.5 | 3mA | 25kHz to 780kHz | 4x5 QFN-28, SSOP-28 | 2 | 2 | ✓ | ✓ | ✓ | ✓ |
LTC3853 | 4.5 to 24 | 0.8 to 13.5 | 4.1mA | 25kHz to 750kHz | 6x6 QFN-40 | 3 | 12 | ✓ | ✓ | ✓ | ✓ |
LTC3850 | 4.5 to 28 | 0.8 to 5.5 | 850µA | 25kHz to 780kHz | QFN-28, SSOP-28 | 2 | 2 | ✓ | ✓ | ✓ | ✓ |
LTC3736/-1 | 2.75 to 9.8 | 0.6 to V IN | 5/5 | 475µA | 300kHz to 750kHz | QFN-24, SSOP-24 | 2 | 2 | ✓ | ✓ | ✓ | ✓ |
LT3742 | 3.5 to 30 | 0.8 to 30 | 5mA | 50kHz | QFN-24 | 2 | 2 | ✓ | ✓ | ✓ | ✓ |
LTC3736/-2 | 2.75 to 9.8 | 0.6 to V IN | 8/8 | 300µA | 300kHz to 750kHz | QFN-24, SSOP-24 | 2 | 2 | ✓ | ✓ | ✓ | ✓ |
LTC3836 | 2.75 to 4.5 | 0.6 to 0.97V IN | 10/10 | 450µA | 250kHz to 850kHz | SSOP-28, QFN-28 | 2 | 2 | ✓ | ✓ | ✓ | ✓ |
LTC3859A | 4.5 to 38 | 0.8 to 24 (Buck), Up to 60 (Boost) | 55µA | 50kHz to 900kHz | 5x7 QFN-38, TSSOP-38 | 3 | 3 | ✓ | ✓ | ✓ | ✓ |
LTC3890/-1/-2 | 4 to 60 | 0.8 to 24 | 20/20 | 50µA | 50kHz to 900kHz | 5x5 QFN-32 | 2 | 12 | ✓ | ✓ | ✓ | ✓ |

Additional features

(A) All parts have a shut-down (run) pin and a power good signal
(B) All parts are synchronous controllers, except the LT3742
(C) All parts have programmable soft-start except the LTC3736

Notes

(1) The maximum output current depends on the choice of external components
(2) The operating frequency can be selected within the range indicated
Boost DC/DC Controllers

Linear Technology offers both synchronous and nonsynchronous boost controllers. Features include optional sense resistor, onboard LDO, 2-phase operation, high power gate drivers, programmable fixed switching frequency and low quiescent current. Efficiencies up to 97 percent can be achieved with synchronous operation.

**LT3757 Features**
- Wide Input Voltage Range: 2.9V to 40V
- Positive or Negative Output Voltage Programming with a Single Feedback Pin

**LT3757 Boost Schematic**

**LT3786 Features**
- Synchronous Operation For Highest Efficiency and Reduced Heat Dissipation
- Wide \( V_{IN} \) Range: 4.5V to 38V (40V Abs Max) and Operates Down to 2.5V After Start-Up
- Output Voltages Up to 60V
- Low Quiescent Current: 55\( \mu \)A

**LT3786 High Power Synchronous Boost Schematic**

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### Part Number | \( V_{IN} \) Range (V) | \( V_{OUT} \) Range (V) | \( I_{MAX} \) MAX (A) | Operating Frequency(3) | Package | Description
--- | --- | --- | --- | --- | --- | ---
LTC3786 | 4.5 to 38 | Up to 60 | 10 | 50kHz to 900kHz | 3x3 QFN-16, MSOP-16E | Synchronous Rectification
LTC3757 | 2.9 to 40 | 3.3 and Higher | 5 | 100kHz to 1MHz | 3x3 DFN-10, MSOP-10 | Simple Design
LTC3758 | 5.5 to 100 | 6 and Higher | 5 | 100kHz to 1MHz | 3x3 DFN-10, MSOP-10 | Simple Design
LTC3759 | 1.6 to 42 | 2.2 and Higher | 5 | 100kHz to 1MHz | 3x3 DFN-10, MSOP-10 | Simple Design
LTC1871/-1 | 2.5 to 36 | 3.3 and Higher | 5 | 50kHz to 1MHz | MSOP-10 | No \( R_{SENSE} \), Burst Mode Operation
LTC1871-7 | 6 to 36 | 7 and Higher | 5 | 50kHz to 1MHz | MSOP-10 | No \( R_{SENSE} \), Burst Mode Operation
LTC3872 | 2.75 to 9.8 | Up to 60V w/o \( R_{SENSE} \) & Higher w/ \( R_{SENSE} \) | 5 | 550kHz | SOT-23, 2x DFN-8 | No \( R_{SENSE} \), Pulse-Skipping at Light Load
LTC1872 | 2.5 to 9.8 | 3.3 and Higher | 5 | 550kHz | ThinSOT | Burst Mode Operation
LTC1700 | 0.9 to 5 | 1.5 to 6 | 5 | 400kHz to 750kHz | MSOP-10 | Synchronous Rectification
LTC3813 | 7 to 9.9\( V_{OUT} \) | 8 to 100 | 10 | 100kHz to 1MHz | SSOP-28 | No \( R_{SENSE} \), Synchronous Rectification

**Dual Channel (Multiphase)**

LTC3786/-1/-2 | 4 to 36 | 5 and Higher | 5(60) | 75kHz to 500kHz | 5x5 QFN-24, SSOP-24 | Single Output, up to 12 Phases, Selectable Gate Drive Voltage
LTC3787 | 4.5 to 38 | Up to 60 | 10(120) | 50kHz to 900kHz | 4x5 QFN-28, TSSOP-28 | Single Output, up to 12 Phases, Synchronous Rectification
LTC3788 | 4.5 to 38 | Up to 60 | 10/10 | 50kHz to 900kHz | 5x5 QFN-32, SSOP-28 | Dual Output, up to 12 Phases, Synchronous Rectification
LTC3782A | 6 to 40 | 7 and Higher | 10/10 | 150kHz to 500kHz | SSOP-28 | 2-Phase Operation

**Notes:**
1. The maximum voltage and current depend on the choice of external components
2. The frequency can be selected within the range indicated
# Synchronous Buck-Boost DC/DC Controllers

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

## LT8705 Features
- Single inductor allows $V_{IN}$ above, below or equal to the regulated $V_{OUT}$
- Input voltage range $2.8V$ (need $EXTV_{CC} > 6.4V$) to $80V$
- Programmable input or output current
- Wide $V_{IN}$ range: $4V$ to $38V$
- 1% output voltage accuracy: $0.8V < V_{OUT} < 38V$
- Synchronous rectification: up to 98% efficiency

## Simplified Wide Voltage Range Synchronous Buck-Boost Schematic

![Simplified Wide Voltage Range Synchronous Buck-Boost Schematic](image)

## LT8705

- **Part Number**: LT8705
- **50% Size Demo Board**: (DC1791A)
- **Actual Size Demo Board**: (DC1523A)

## LTC3789 Features
- Single inductor architecture allows $V_{IN}$ above, below or equal to the regulated $V_{OUT}$
- Programmable input or output current
- Wide $V_{IN}$ range: $4V$ to $38V$
- 1% output voltage accuracy: $0.8V < V_{OUT} < 38V$
- Synchronous rectification: up to 98% efficiency
- Current mode control

## Simplified Synchronous Buck-Boost Schematic

![Simplified Synchronous Buck-Boost Schematic](image)

## Table

<table>
<thead>
<tr>
<th>Part Number</th>
<th>$V_{IN}$ Range (V)</th>
<th>$V_{OUT}$ Range (V)</th>
<th>$I_{OUT}^{(1)}$ MAX (A)</th>
<th>Operating Frequency$^{(2)}$</th>
<th>Package</th>
<th>No Range</th>
<th>Synchronous</th>
<th>Current (0) or Voltage (1) Mode Control</th>
<th>Input/Output Current Monitor</th>
<th>Battery Charging Capability</th>
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<td>2.7 to 10</td>
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<td>100kHz to 1MHz</td>
<td>QFN-24</td>
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**Notes**

1. The maximum voltage and current depend on the choice of external components
2. The frequency can be selected within the range indicated
SEPIC DC/DC Controllers

SEPIC converters operate from an input voltage that is above, below or equal to the output voltage and provides output short-circuit protection. 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 Linear’s boost controllers can be designed into a SEPIC converter. Only a select list of parts is shown below. For a complete list visit www.linear.com/LT3759 or contact your local sales office.

LT3759 Features

- Wide VIN Range: 1.6V to 42V
- Positive or Negative Output Voltage Programming with a Single Feedback Pin
- PGOOD Output Voltage Status Report

LT3759 SEPIC Schematic

<table>
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<tr>
<th>Part Number</th>
<th>VIN Range (V)</th>
<th>VOUT MAX (V)</th>
<th>Output Current(1) (A)</th>
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<td>36</td>
<td>3</td>
<td>100kHz to 1MHz</td>
<td></td>
<td>1.6mA</td>
<td>&lt;1µA</td>
<td>3x3 DFN-10/MSOP-10</td>
</tr>
<tr>
<td>LT3758</td>
<td>5.5 to 100</td>
<td>75</td>
<td>3</td>
<td>100kHz to 1MHz</td>
<td></td>
<td>1.75mA</td>
<td>&lt;1µA</td>
<td>3x3 DFN-10/MSOP-10</td>
</tr>
<tr>
<td>LT3759</td>
<td>1.6 to 42</td>
<td>33</td>
<td>3</td>
<td>100kHz to 1MHz</td>
<td></td>
<td>350µA</td>
<td>&lt;1µA</td>
<td>3x3 DFN-10/MSOP-10</td>
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<td>LTC1871-1</td>
<td>2.5 to 36</td>
<td>30</td>
<td>3</td>
<td>50kHz to 1MHz</td>
<td>√</td>
<td>250µA</td>
<td>&lt;20µA</td>
<td>MSOP-10</td>
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<td>LTC1871-7</td>
<td>6 to 36</td>
<td>30</td>
<td>3</td>
<td>50kHz to 1MHz</td>
<td>√</td>
<td>250µA</td>
<td>&lt;20µA</td>
<td>MSOP-10</td>
</tr>
<tr>
<td>LTC3805/5</td>
<td>4.7 to 75(3)</td>
<td>52</td>
<td>3</td>
<td>70kHz to 700kHz</td>
<td>√</td>
<td>360µA</td>
<td>&lt;20µA</td>
<td>3x3 DFN-10/MSOP-10</td>
</tr>
<tr>
<td>LT3844</td>
<td>4 to 60</td>
<td>36</td>
<td>3</td>
<td>100kHz to 60kHz</td>
<td></td>
<td>120µA</td>
<td>&lt;15µA</td>
<td>TSSOP-16E</td>
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<td>LT3724</td>
<td>7.4 to 60</td>
<td>36</td>
<td>3</td>
<td>200kHz</td>
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<td>80µA</td>
<td>&lt;15µA</td>
<td>TSSOP-16</td>
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<tr>
<td>LT1950</td>
<td>3 to 75(3)</td>
<td>52</td>
<td>3</td>
<td>100kHz to 500kHz</td>
<td></td>
<td>2.3mA</td>
<td>&lt;20µA</td>
<td>SSOP-16</td>
</tr>
</tbody>
</table>

Notes
(1) The maximum voltage and current depend on the choice of external components
(2) The frequency can be selected within the range indicated
Inverter DC/DC Controllers

Inverting 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.

LT3757 Features
• Wide Input Voltage Range: 2.9V to 40V
• Positive or Negative Output Voltage
  Programming with a Single Feedback Pin

LT3757 Inverter Schematic

<table>
<thead>
<tr>
<th>Part Number</th>
<th>( V_{IN} ) Range (V)</th>
<th>( V_{OUT}^{(1)} ) MAX (V)</th>
<th>( I_{OUT}^{(1)} ) MAX (A)</th>
<th>Operating Frequency(2)</th>
<th>( I_0 ) (SUPPLY)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT3757</td>
<td>2.9 to 40</td>
<td>-1.23 and Lower</td>
<td>5</td>
<td>100kHz to 1MHz</td>
<td>1.6mA</td>
<td>3x DFN-10, MSOP-10</td>
</tr>
<tr>
<td>LT3758</td>
<td>5.5 to 100</td>
<td>-1.23 and Lower</td>
<td>5</td>
<td>100kHz to 1MHz</td>
<td>1.75mA</td>
<td>3x DFN-10, MSOP-10</td>
</tr>
<tr>
<td>LT3759</td>
<td>1.6 to 42</td>
<td>-1.23 and Lower</td>
<td>5</td>
<td>100kHz to 1MHz</td>
<td>350µA</td>
<td>3x DFN-10, MSOP-10</td>
</tr>
<tr>
<td>LT3724</td>
<td>2.5 to 36</td>
<td>-1.23 and Lower</td>
<td>5</td>
<td>50kHz to 1MHz</td>
<td>550µA</td>
<td>MSOP-10</td>
</tr>
<tr>
<td>LT3724</td>
<td>4 to 60</td>
<td>-1.23 and Lower</td>
<td>10</td>
<td>200kHz</td>
<td>100µA</td>
<td>TSSOP-16E</td>
</tr>
<tr>
<td>LT3800</td>
<td>4 to 60</td>
<td>-1.23 and Lower</td>
<td>10</td>
<td>200kHz</td>
<td>80µA</td>
<td>TSSOP-16E</td>
</tr>
<tr>
<td>LT3844</td>
<td>4 to 60</td>
<td>-1.23 and Lower</td>
<td>10</td>
<td>100kHz to 600kHz</td>
<td>120µA</td>
<td>TSSOP-16E</td>
</tr>
<tr>
<td>LT1952/-1</td>
<td>8 to 75(^{(3)})</td>
<td>-2.5V and Lower</td>
<td>10</td>
<td>100kHz to 500kHz</td>
<td>5.2mA</td>
<td>SSOP-16</td>
</tr>
</tbody>
</table>

Notes
(1) The maximum voltage and current depend on the choice of external components
(2) The frequency can be selected within the range indicated
### Flyback Controllers

A flyback converter stores energy in a transformer during the on-time of the power switch and then delivers that energy to the output during the off-time. It is most commonly used when isolation is required from input to output, but can also be used in nonisolated applications. The output power of a flyback may vary from one watt to about 100 watts. A flyback design can operate over wide input voltage, typically up to a 4:1 input range. Its simple design makes it popular for lower power applications.

#### LT3748 Features
- 5V to 100V Input Voltage Range
- 1.9A Average Gate Drive Source and Sink Current
- Boundary Mode Operation
- No Transformer Third Winding or Opto-Isolator Required for Regulation
- Primary-Side Winding Feedback Load Regulation

#### LT3748 Flyback Schematic

![LT3748 Schematic Diagram](image)

### Table of Specifications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>( V_{IN} ) Range (V)</th>
<th>( V_{OUT} )(1) Min (V)</th>
<th>Output Current(1) (A)</th>
<th>Synchronous Operation</th>
<th>Operating Frequency(2)</th>
<th>( I_{Q} ) (SUPPLY)</th>
<th>Package</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>LT3748</td>
<td>5 to 100</td>
<td>1.23</td>
<td>5</td>
<td>Variable</td>
<td>50kHz to 250kHz</td>
<td>1.3mA</td>
<td>MSOP-16 (12)</td>
<td>No Opto</td>
</tr>
<tr>
<td>LT3798</td>
<td>90 to 305VAC(1)</td>
<td>1.23</td>
<td>5</td>
<td>Variable</td>
<td>200kHz or 300kHz</td>
<td>70µA</td>
<td>MSOP-16E</td>
<td>Off-Line, Active PFC/No Opto</td>
</tr>
<tr>
<td>LT3799</td>
<td>90 to 305VAC(1)</td>
<td>1.23</td>
<td>5</td>
<td>Variable</td>
<td>200kHz</td>
<td>70µA</td>
<td>MSOP-16E</td>
<td>Off-Line, LED Driver w/ Active PFC</td>
</tr>
<tr>
<td>LTC3803-3</td>
<td>9.2 to 75(1)</td>
<td>0.8</td>
<td>5</td>
<td>200kHz</td>
<td>360µA</td>
<td>DFN-10, MSOP-10</td>
<td>Synchronizable, Adj Current Limit</td>
<td></td>
</tr>
<tr>
<td>LTC3803-5</td>
<td>5.7 to 75(1)</td>
<td>0.8</td>
<td>5</td>
<td>200kHz</td>
<td>360µA</td>
<td>DFN-10, MSOP-10</td>
<td>Synchronizable, Adj Current Limit</td>
<td></td>
</tr>
<tr>
<td>LTC3805</td>
<td>8.8 to 75(1)</td>
<td>0.8</td>
<td>5</td>
<td>70kHz to 700kHz</td>
<td>360µA</td>
<td>DFN-10, MSOP-10</td>
<td>Synchronizable, Adj Current Limit</td>
<td></td>
</tr>
<tr>
<td>LTC3805-5</td>
<td>4.5 to 75(1)</td>
<td>0.8</td>
<td>5</td>
<td>70kHz to 700kHz</td>
<td>360µA</td>
<td>DFN-10, MSOP-10</td>
<td>Synchronizable, Adj Current Limit</td>
<td></td>
</tr>
<tr>
<td>LTC3873</td>
<td>8.8 to 75(1)</td>
<td>1.2</td>
<td>5</td>
<td>200kHz</td>
<td>360µA</td>
<td>8-Lead SOT, 2x3 DFN-8</td>
<td>Adjustable Current Limit</td>
<td></td>
</tr>
<tr>
<td>LTC3873-5</td>
<td>4 to 75(1)</td>
<td>1.2</td>
<td>5</td>
<td>200kHz</td>
<td>360µA</td>
<td>8-Lead SOT, 2x3 DFN-8</td>
<td>Adjustable Current Limit</td>
<td></td>
</tr>
<tr>
<td>LT1725</td>
<td>16 to 75(1)</td>
<td>1.25</td>
<td>250kHz</td>
<td>250µA</td>
<td>SO-16, SSOP-16</td>
<td>No Opto</td>
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<td></td>
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<tr>
<td>LT1725</td>
<td>4.5 to 75(1)</td>
<td>1.23</td>
<td>5</td>
<td>50kHz to 250kHz</td>
<td>10mA</td>
<td>SO-16, SSOP-16</td>
<td>No Opto</td>
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<td>LT3827</td>
<td>4.5 to 75(1)</td>
<td>1.23</td>
<td>12</td>
<td>√</td>
<td>50kHz to 250kHz</td>
<td>6.4mA</td>
<td>TSSOP-16</td>
<td>Higher Output Current</td>
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<tr>
<td>LT3825</td>
<td>16 to 75(1)</td>
<td>1.23</td>
<td>12</td>
<td>√</td>
<td>50kHz to 250kHz</td>
<td>400µA</td>
<td>TSSOP-16</td>
<td>Higher Output Current</td>
</tr>
</tbody>
</table>

**Notes**

1. The maximum voltage and current depend on the choice of external components
2. The frequency can be selected within the range indicated
Micropower DC/DC Controllers

Micropower controllers have a very low quiescent current that creates an extremely low power consuming DC/DC converter during no-load or light-load conditions. The parts listed below utilize Burst Mode operation and/or pulse-skipping to reduce light-load power consumption, preserving battery life during standby or idle mode.

LTC3835 Features
- Wide Output Voltage Range: 0.8V ≤ V_{OUT} ≤ 10V
- Low Operating Quiescent Current: 80μA
- OPTI-LOOP® Compensation Minimizes C_{OUT}
- 1% Output Voltage Accuracy
- Wide VIN Range: 4V to 36V Operation
- Phase-Lockable Fixed Frequency 140kHz to 650kHz

<table>
<thead>
<tr>
<th>Part Number</th>
<th>V_{IN} Range (V)</th>
<th>V_{OUT} Range (V)</th>
<th>I_{OUT MAX}^{(1)} (A)</th>
<th>Synchronous Operation</th>
<th>Operating Frequency^{(2)}</th>
<th>No Renewable</th>
<th>I_{sup}(µA) (SUPPLY)</th>
<th>Package</th>
<th>Topology</th>
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<tr>
<td>Single Outputs</td>
<td></td>
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<tr>
<td>LTC3864</td>
<td>3.5 to 60</td>
<td>0.8 to V_{IN}</td>
<td>5</td>
<td>50kHz to 850kHz</td>
<td>40</td>
<td>3x4 DFN-12, MSOP-12E</td>
<td>Buck</td>
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<td>LTC3891</td>
<td>4 to 60</td>
<td>0.8 to 24</td>
<td>20</td>
<td>50 kHz to 900 kHz</td>
<td>50</td>
<td>3 x 4 QFN-20, TSSOP 20</td>
<td>Buck</td>
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<tr>
<td>LTC3834/1</td>
<td>4 to 36</td>
<td>0.8 to 10V</td>
<td>20</td>
<td>140kHz to 650kHz</td>
<td>30</td>
<td>FE20, 4x5 QFN GTN16/3x5 QFN</td>
<td>Buck</td>
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<td>LTC3835/-1</td>
<td>4 to 36</td>
<td>0.8 to 10V</td>
<td>20</td>
<td>140kHz to 650kHz</td>
<td>80</td>
<td>FE20, 4x5 QFN GTN16/3x5 QFN</td>
<td>Buck</td>
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<td>LTC3845A</td>
<td>4 to 60</td>
<td>1.23 to 36</td>
<td>20</td>
<td>100kHz to 600kHz</td>
<td>120</td>
<td>TSSOP-16</td>
<td>Buck</td>
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<td>LT3801</td>
<td>2.5 to 9.8</td>
<td>0.8 to V_{IN}</td>
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<td>550kHz</td>
<td>16</td>
<td>ThinSOT</td>
<td>Buck</td>
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<td>LTC3772</td>
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<td>0.8 to V_{IN}</td>
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<td>550kHz</td>
<td>40</td>
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<td>1.23 to 36</td>
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<td>200kHz</td>
<td>80</td>
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<td>Buck, Inverter</td>
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<td>LT3800</td>
<td>4 to 60</td>
<td>1.23 to 36</td>
<td>20</td>
<td>200kHz</td>
<td>80</td>
<td>TSSOP-16</td>
<td>Buck, Inverter</td>
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<tr>
<td>LT3844</td>
<td>4 to 60</td>
<td>1.23 to 36</td>
<td>5</td>
<td>100kHz to 600kHz</td>
<td>120</td>
<td>TSSOP-16</td>
<td>Buck, Boost, SEPI, Inverter</td>
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<td>LTC3872</td>
<td>2.75 to 9.8</td>
<td>Up to 60V w/o Renewable &amp; Higher w/ Renewable</td>
<td>5</td>
<td>550kHz</td>
<td>250</td>
<td>ThinSOT, DFN-8</td>
<td>Boost</td>
<td></td>
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</tr>
<tr>
<td>LTC1871-1</td>
<td>6 to 36</td>
<td>1.23 and Higher</td>
<td>5</td>
<td>50kHz to 1MHz</td>
<td>250</td>
<td>MSOP-10</td>
<td>Boost, Flyback &amp; SEPI</td>
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<tr>
<td>LTC1871/-1</td>
<td>2.5 to 36</td>
<td>1.23 and Higher</td>
<td>5</td>
<td>50kHz to 1MHz</td>
<td>250</td>
<td>MSOP-10</td>
<td>Boost, Flyback &amp; SEPI</td>
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<tr>
<td>LT3739</td>
<td>1.6 to 42</td>
<td>1.23 and Higher</td>
<td>5</td>
<td>50kHz to 1MHz</td>
<td>350</td>
<td>3x3 DFN-10, MSOP-10</td>
<td>Boost, SEPI, Inverter</td>
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<td>Dual/Triple Outputs</td>
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<tr>
<td>LTC3890/-1/-2</td>
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<td>0.8 to 24</td>
<td>20/20</td>
<td>50 kHz to 900kHz</td>
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<td>5x5 QFN-32</td>
<td>Dual Buck</td>
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<tr>
<td>LTC3857</td>
<td>4 to 38</td>
<td>0.8 to 24</td>
<td>25/25</td>
<td>50kHz to 900kHz</td>
<td>50</td>
<td>5x5 QFN-32, SSOP-28</td>
<td>Dual Buck</td>
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</tr>
<tr>
<td>LTC3858</td>
<td>4 to 38</td>
<td>0.8 to 24</td>
<td>25/25</td>
<td>50kHz to 900kHz</td>
<td>170</td>
<td>5x5 QFN-32, 4x5 QFN-28, SSOP-28</td>
<td>Dual Buck</td>
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<tr>
<td>LTC3859AL</td>
<td>4.5 to 38</td>
<td>0.8 to 24/60</td>
<td>25/25/10</td>
<td>50kHz to 900kHz</td>
<td>27</td>
<td>5x7 QFN-38, TSSOP-38</td>
<td>Buck/Buck/Boost</td>
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<td></td>
</tr>
<tr>
<td>LTC3856/-1</td>
<td>4 to 36</td>
<td>0.8 to 10</td>
<td>20/20</td>
<td>140kHz to 650kHz</td>
<td>30</td>
<td>5x5 QFN-32/SSOP-28</td>
<td>Dual Buck</td>
<td></td>
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</tr>
</tbody>
</table>

Notes
(1) The maximum output current depends on the choice of external components
(2) The frequency can be selected within the range indicated
Multiple Topology DC/DC Controllers

Linear offers DC/DC controllers that can be used in multiple converter topologies including buck, boost, flyback, forward, inverter and SEPIC. Features include a wide input voltage range, low quiescent current, single and dual outputs, selectable operating frequency, optional sense resistor and onboard MOSFET gate driver.

LT3758 Features

- Wide Input Voltage Range: 5.5V to 100V
- Positive or Negative Output Voltage Programming with a Single Feedback Pin

LT3758 High Voltage SEPIC Schematic
### DDR/QDR Memory Termination DC/DC Controllers

DDR (Double Data Rate)/QDR (Quad Data Rate) termination applications require that $V_{OUT}$ ($V_{TT}$) is always 1/2 of $V_{REF}$ (which is usually $V_{OUT}$ or $V_{DDQ}$). Features include dual and single outputs, onboard MOSFET drivers, synchronous rectification, low quiescent current, tracking, tight $V_{REF}$ accuracy, current mode or voltage mode control, spread spectrum, and no need for a current sense resistor.

#### LTC3876 Features
- Complete DDR Power Solution with VTT Reference
- Wide $V_{IN}$ Range: 4.5V to 38V, VDDQ: 1V to 2.5V
- ±0.67% VDDQ Output Voltage Accuracy
- VDDQ and VTT Termination Controllers
- ±1.2% ±50mA Linear VTTR Reference Output
- Controlled On-Time, Valley Current Mode Control
- Frequency Programmable from 200kHz to 2MHz
- Synchronizable to External Clock
- $t_{ON(MIN)} = 30$ns, $t_{OFF(MIN)} = 90$ns

#### LTC3876 DDR Triple Output Synchronous Step-Down Schematic

![LTC3876 DDR Triple Output Synchronous Step-Down Schematic](image)

### Additional Features

- Part Number: LTC3876
- $V_{IN}$ Range: 4.5 to 38V
- VDDQ Range: 1.25 to 2.5V
- VTT Range: 0.5 to 1.25V
- Operating Frequency: 200kHz to 2MHz
- Package: 5x7 QFN-38, TSSOP-38

#### Notes

1. All parts have synchronous rectification and use the MOSFET $R_{DS(ON)}$ for current sense.
2. The maximum output current depends on the choice of external components.
Digital Power System Management

Digital power system management provides the capability to autonomously control and supervise dozens of voltages, as well as to provide accurate information about the power system using LTpowerPlay™ software. These controllers have onboard data acquisition system, nonvolatile memory and a PMBus interface for real-time reporting and control of point-of-load (POL) applications. Power management monitoring and control parameters include current, voltage, operating frequency and temperature. Power supply sequencing, margining and supervisory levels are easily programmed via the PMBus interface and provide POL fault detection reporting.

LTC3880 Features
- PMBus/PC 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 and Frequency Synchronization (250kHz to 1MHz)
- ±0.5% Output Voltage Accuracy over Temperature
- Integrated 16-Bit ADC
- Internal EEPROM and Fault Logging
- Integrated Powerful N-Channel MOSFET Gate Drivers
- LTpowerPlay Configuration and Development Tool

LTC3880 Digital Control/Telemetry Synchronous Step-Down Schematic

LTC3880 Actual Size Demo Board (DC1590B-B)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Number of Outputs</th>
<th>( V_{IN} ) Range (V)</th>
<th>I/O</th>
<th>ADC</th>
<th>DAC</th>
<th>Control/Monitoring Functions</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTC3883</td>
<td>Step-Down Regulator with PC-based PMBus Compliant Serial Interfact</td>
<td>1</td>
<td>4.5 to 24</td>
<td>PMBus/SMBus/FC</td>
<td>16-bit</td>
<td>12-bit</td>
<td>( V_{IN}, V_{OUT}, I_{OUT} ) Temperatures and Faults</td>
<td>QFN-32</td>
</tr>
<tr>
<td>LTC3880</td>
<td>Step-Down Regulator with PC-based PMBus Compliant Serial Interfact</td>
<td>2</td>
<td>4.5 to 24</td>
<td>PMBus/SMBus/FC</td>
<td>16-bit</td>
<td>12-bit</td>
<td>( V_{IN}, V_{OUT}, I_{OUT} ) Temperatures and Faults</td>
<td>QFN-40</td>
</tr>
<tr>
<td>LTC2978</td>
<td>Octal, Digital Power-Supply Monitor, Supervisor, Sequencer, and Margin Controller</td>
<td>8</td>
<td>3.3 to 15</td>
<td>PMBus/SMBus/FC</td>
<td>16-bit</td>
<td>10-bit</td>
<td>( V_{IN}, V_{OUT}, I_{OUT} ) Temperatures and Faults</td>
<td>QFN-64</td>
</tr>
<tr>
<td>LTC2974</td>
<td>Quad, Digital Power-Supply Monitor, Supervisor, Sequencer, and Margin Controller</td>
<td>4</td>
<td>3.3 to 15</td>
<td>PMBus/SMBus/FC</td>
<td>16-bit</td>
<td>10-bit</td>
<td>( V_{IN}, V_{OUT}, I_{OUT} ) Temperatures and Faults</td>
<td>QFN-64</td>
</tr>
<tr>
<td>LTC2970(1)</td>
<td>Dual Power Supply Monitor and Margining Controller with SMBus Compatible PC Interface</td>
<td>1</td>
<td>5 to 15</td>
<td>SMBus/PC</td>
<td>14-bit</td>
<td>8-bit</td>
<td>( V_{IN}, V_{OUT}, I_{OUT} ) Temperatures and Faults</td>
<td>QFN-24</td>
</tr>
</tbody>
</table>

Note
(1) All parts have onboard nonvolatile memory except LTC2970
High Speed MOSFET Drivers

Linear Technology 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 a wide range of voltage applications.

LTC4444 Features
- Bootstrap Supply Voltage to 114V
- Wide $V_{CC}$ Voltage: 7.2V to 13.5V
- Adaptive Shoot-Through Protection
- 2.5A Peak TG Pull-Up Current
- 3A Peak BG Pull-Up Current
- 1.2Ω TG Driver Pull-Down
- 0.55Ω BG Driver Pull-Down
- 5ns TG Fall Time Driving 1nF Load
- 8ns TG Rise Time Driving 1nF Load
- 3ns BG Fall Time Driving 1nF Load
- 6ns BG Rise Time Driving 1nF Load

LTC4444 Low Quiescent Current Synchronous Step-Down Regulator

<table>
<thead>
<tr>
<th>Part Number</th>
<th>$V_{CC}$ Input Range (V)</th>
<th>Maximum $V_{IN}$ Voltage (V)</th>
<th>Maximum Output Current/Ohms Source/Sink</th>
<th>Rise/Fall Time (ns)</th>
<th>Prop Delay (ns)</th>
<th>$I_Q$ (µA) (SUPPLY)</th>
<th>Package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTC4442/-1</td>
<td>6 to 9.5</td>
<td>38</td>
<td>2.4A/5A</td>
<td>12/8/12/8(2)</td>
<td>20/12/20/12</td>
<td>730</td>
<td>MSOP-8E</td>
<td>Synchronous</td>
</tr>
<tr>
<td>LTC4444/-5</td>
<td>7.2/4.5 to 15</td>
<td>100</td>
<td>2.5A/2.5A</td>
<td>10/7/10/5(3)</td>
<td>30/30/18/15</td>
<td>350</td>
<td>MSOP-8E</td>
<td>Synchronous</td>
</tr>
<tr>
<td>LTC4446</td>
<td>7.2 to 13.5</td>
<td>100</td>
<td>2.5A/2.5A</td>
<td>8/5/6/3(3)</td>
<td>30/30/18/15</td>
<td>350</td>
<td>MSOP-8E</td>
<td>Synchronous</td>
</tr>
<tr>
<td>LTC4449</td>
<td>4 to 6.5</td>
<td>38</td>
<td>3.2A/2.4A</td>
<td>8/7/7/4(3)</td>
<td>14/13/13/11</td>
<td>300</td>
<td>2xS DFN-8</td>
<td>Synchronous</td>
</tr>
<tr>
<td>LTC4441</td>
<td>5 to 24</td>
<td>26</td>
<td>6A/6A</td>
<td>13/8(4)</td>
<td>30/36</td>
<td>250</td>
<td>MSOP-10, SO-8</td>
<td>Low-Side</td>
</tr>
<tr>
<td>LTC4440</td>
<td>7.3 to 15</td>
<td>80, 100pk</td>
<td>2.4A/1.5A</td>
<td>10/7(4)</td>
<td>30/28</td>
<td>250</td>
<td>MSOP-10, SO-8</td>
<td>High-Side, High Voltage</td>
</tr>
<tr>
<td>LTC4440-5</td>
<td>3.65 to 15</td>
<td>60, 80pk</td>
<td>1.1A/1.85Ω</td>
<td>10/7(4)</td>
<td>35/33</td>
<td>200</td>
<td>MSOP-8E, SOT-23</td>
<td>High-Side, High Voltage</td>
</tr>
<tr>
<td>LTC1693-1</td>
<td>4.5 to 13.2</td>
<td>14V</td>
<td>1.4A/1.7A</td>
<td>17/5/16/5(4)</td>
<td>38/32</td>
<td>730</td>
<td>SO-8</td>
<td>Dual N-Chnl both Noninverting</td>
</tr>
<tr>
<td>LTC1693-2</td>
<td>4.5 to 13.2</td>
<td>14V</td>
<td>1.4A/1.7A</td>
<td>17/5/16/5(4)</td>
<td>38/32</td>
<td>730</td>
<td>SO-8</td>
<td>Dual N-Chnl 1 Noninverting, 1 Inverting</td>
</tr>
<tr>
<td>LTC1693-3</td>
<td>4.5 to 13.2</td>
<td>14V</td>
<td>1.4A/1.7A</td>
<td>17/5/16/5(4)</td>
<td>38/32</td>
<td>730</td>
<td>MSOP-8</td>
<td>Single with Output pPolarity Select</td>
</tr>
<tr>
<td>LTC1693-5</td>
<td>4.5 to 13.2</td>
<td>14V</td>
<td>1.4A/1.7A</td>
<td>17/5/16/5(4)</td>
<td>38/32</td>
<td>360</td>
<td>MSOP-8</td>
<td>Single P-Chnl</td>
</tr>
</tbody>
</table>

Notes
(1) 1nF capacitive load
(2) 3nF capacitive load
(3) 4.7nF capacitive load