

# LTC Battery-Powered DC/DC Conversion Solutions

The following tables form a shortform component selection guide for a collection of commonly used battery-powered DC/DC conversion applications. No design is required since inductor, capacitor and resistor values are completely specified. Choose the appropriate LTC DC/DC converter for your application from the following tables. The LT1073, LT1107, LT1108, LT1110, LT1111, LT1173, LTC1174, LT1303, and LT1304 all have low-battery detection capability.

## Step-Up From One Cell (1V)

V <sub>OUT</sub> (V)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	R (Ω)	FIG	COMMENTS
3.3	80	LT1307	70	10	10	–	***	Smallest Solution
5	40	LT1073-5	95	82	100	0	1	Lowest I <sub>Q</sub>
	40	LT1110-5	350	27	33	0	1	Best For Surface Mount
	40	LT1307	70	20	10	–	***	Smallest Solution
12	15	LT1073-12	95	82	100	0	1	Lowest I <sub>Q</sub>
	15	LT1110-12	350	27	33	0	1	Best For Surface Mount

Adjustable versions also available for V<sub>OUT</sub> up to 50V \*\*\*See data sheet

## Step-Up From Two Cells (2V)

V <sub>OUT</sub> (V)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	R (Ω)	FIG	COMMENTS
3.3	400	LT1300**	120	10	100	–	2	Selectable 3.3V/5V Out
5	90	LT1173-5	110	47	100	47	1	Lowest I <sub>Q</sub>
		LT1111-5	300	18	33	47	1	Surface Mount
	150	LT1107-5	300	33	33	47	1	Surface Mount
	150	LT1108-5	110	100	100	47	1	Lowest I <sub>Q</sub>
	220	LT1300**	120	10	100	–	2	Selectable 3.3V/5V Out
12	600	LT1301**	120	10	100	–	2	Selectable 5V/12V Out
		LT1302	200	10	100	–	*	Highest Power Output
	20	LT1173-12	110	47	47	47	1	Lowest I <sub>Q</sub>
	20	LT1111-12	300	18	22	47	1	Surface Mount
	40	LT1107-12	300	27	33	47	1	Surface Mount
	40	LT1108-12	110	82	100	47	1	Lowest I <sub>Q</sub>
	50	LT1301**	120	10	100	–	2	Selectable 5V/12V Out
120	LT1302	200	3.3	66	–	*	Highest Power Output	
		LT1305	120	10	100	–	2	High Power Output

\*See LT1302 data sheet \*\*For low-battery detection use LT1303 or LT1304

## Step-Up From 5V To 12V

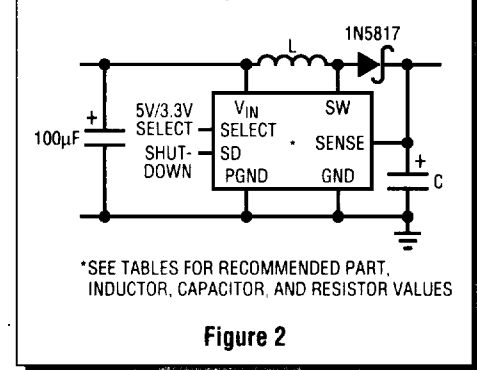
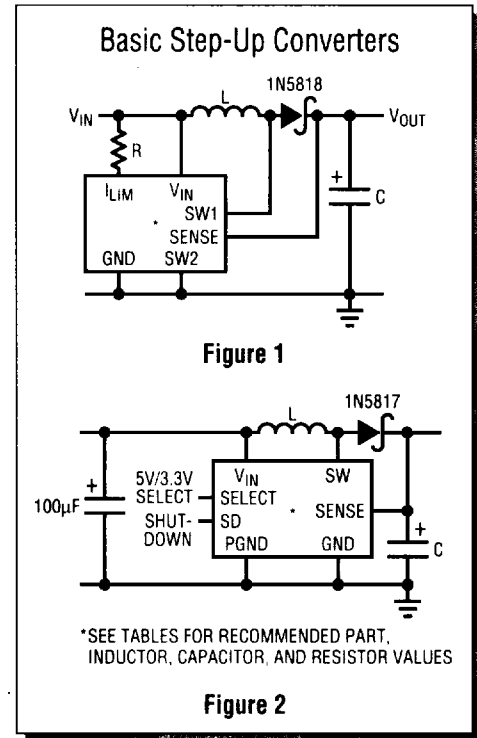
V <sub>OUT</sub> (V)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	R (Ω)	FIG	COMMENTS
12	90	LT1173-12	110	120	100	0	1	Lowest I <sub>Q</sub>
		LT1111-12	300	47	33	0	1	Surface Mount
	175	LT1107-12	300	60	32	0	1	Surface Mount
	175	LT1108-12	110	180	100	0	1	Lowest I <sub>Q</sub>
	200	LT1301**	120	33	47	–	2	True Shutdown
250	LT1373	1000	22	47	–	***	Fixed Frequency	

\*\*For low-battery detection use LT1303 or LT1304 \*\*\* See data sheet

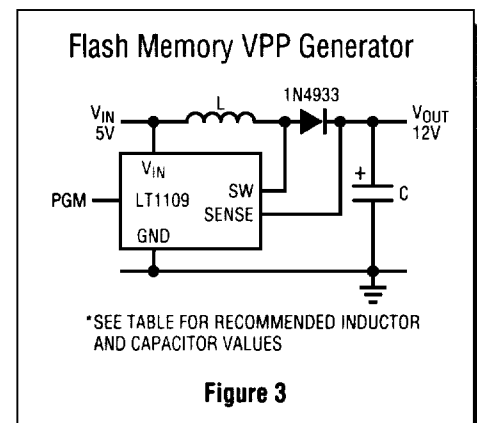
## Flash Memory VPP (12V) Generation

V <sub>IN</sub> (V)	V <sub>OUT</sub> (V)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	FIG	COMMENTS
5	12	60	LT1109-12	320	33	22	3	Small, SMT
		120	LT1109A-12	320	27	47	3	Small, SMT
		200	LT1301**	120	27	47	2	True Shutdown
		80	LT1309	650	10	1	***	For PCMCIA Type II
2 Cells	12	60	LT1109A-12	320	10	22	1	All Surface Mount
		80	LT1301**	120	10	47	2	True Shutdown

\*\*For low-battery detection use LT1303 or LT1304 \*\*\*See LT1309 data sheet



\*SEE TABLES FOR RECOMMENDED PART, INDUCTOR, CAPACITOR, AND RESISTOR VALUES



\*SEE TABLE FOR RECOMMENDED INDUCTOR AND CAPACITOR VALUES

Selection Guides

# LTC Battery-Powered DC/DC Conversion Solutions

## Step-Down Conversion to 3.3V

V <sub>IN</sub> (V)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	I <sub>PGM</sub>	Fig	COMMENTS
4.5 to 12.5	200	LTC1174-3.3	450	50	2 × 33	To GND	5	Low Dropout, Surface Mount
	425		450	50	2 × 33	To V <sub>IN</sub>	5	
4.5 to 12.5	200	LTC1574-3.3	450	50	2 × 33	To GND	5	Low Dropout, SMT No External Diode
	425		450	50	2 × 33	To V <sub>IN</sub>	5	
5 to 16	2A	LTC1148-3.3	160	-	-	-	-	See Ultrahigh Efficiency Regs – Pg 4
12 to 60	2A	LTC1149-3.3	600	-	-	-	-	See Ultrahigh Efficiency Regs – Pg 4

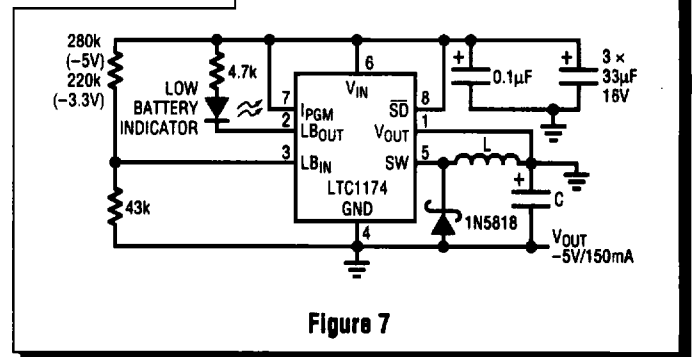
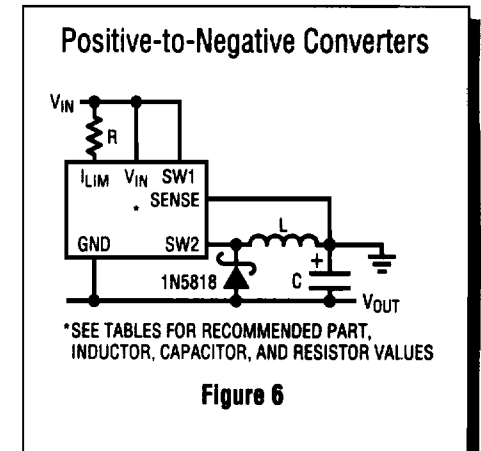
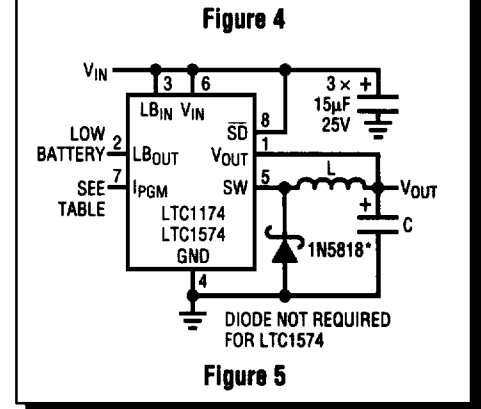
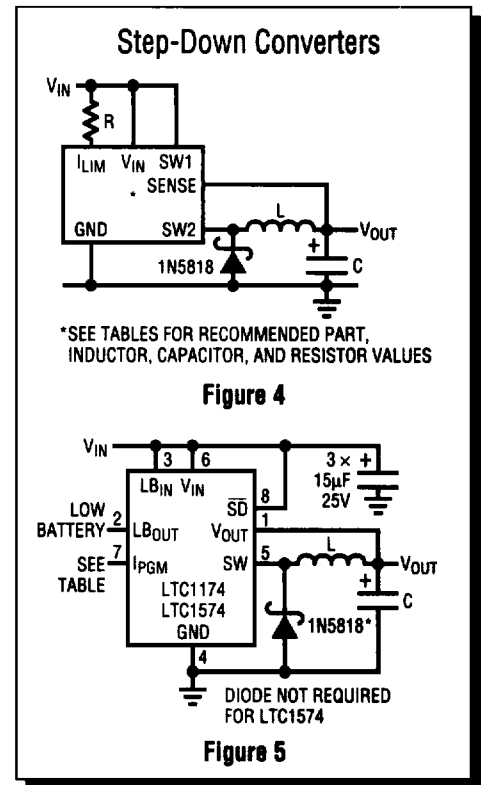
## Step-Down Conversion to 5V

V <sub>IN</sub> (Max)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	R/ I <sub>PGM</sub>	Fig	COMMENTS
5.5 to 12	200	LTC1174-5	450	100	2 × 33	To GND	5	Low Dropout, Surface Mount
	400		450	100	2 × 33	To V <sub>IN</sub>	5	
5.5 to 16	200	LTC1574-5	450	100	2 × 33	To GND	5	Low Dropout, SMT No External Diode
	400		450	100	2 × 33	To V <sub>IN</sub>	5	
12 to 20	300	LT1107-5	300	60	100	100	4	Surface Mount Lowest I <sub>Q</sub>
	300	LT1108-5	110	180	330	100	4	
20 to 30	300	LT1173-5	110	470	470	100	4	Lowest I <sub>Q</sub> Surface Mount
	300	LT1111-5	300	180	220	100	4	
6 to 16	2A+	LTC1147/8-5	160	-	-	-	-	See Ultrahigh Efficiency Regs – Pg 4
12 to 60	2A+	LTC1149-5	600	-	-	-	-	See Ultrahigh Efficiency Regs – Pg 4

Adjustable output voltages up to 6.2V can be obtained with the adjustable versions of LT1173, LT1111, LT1107, LT1108, or LT1110.

## Positive-to-Negative Voltage Conversion

V <sub>IN</sub> (V)	V <sub>OUT</sub> (V)	I <sub>OUT</sub> (mA)	DEVICE	I <sub>Q</sub> (μA)	L (μH)	C (μF)	R (Ω)	Fig	COMMENTS
5	-5	75	LT1108-5	110	100	100	100	6	Lowest I <sub>Q</sub> Surface Mount
			LT1107-5	300	33	33	100	6	Surface Mount
		150	LTC1174-5	450	50	2 × 33	-	7	Surface Mount
12	-5	250	LT1173-5	110	470	220	100	6	Lowest I <sub>Q</sub> Surface Mount
		250	LT1111-5	300	180	82	100	6	Surface Mount
4	-5	110	LTC1574-5	450	50	100	-	7	SMT, No Ext. Schottky Diode Required
8									
12.5									



# LTC Battery-Powered DC/DC Conversion Solutions

## Inductor and Capacitor Part Numbers/Manufacturers

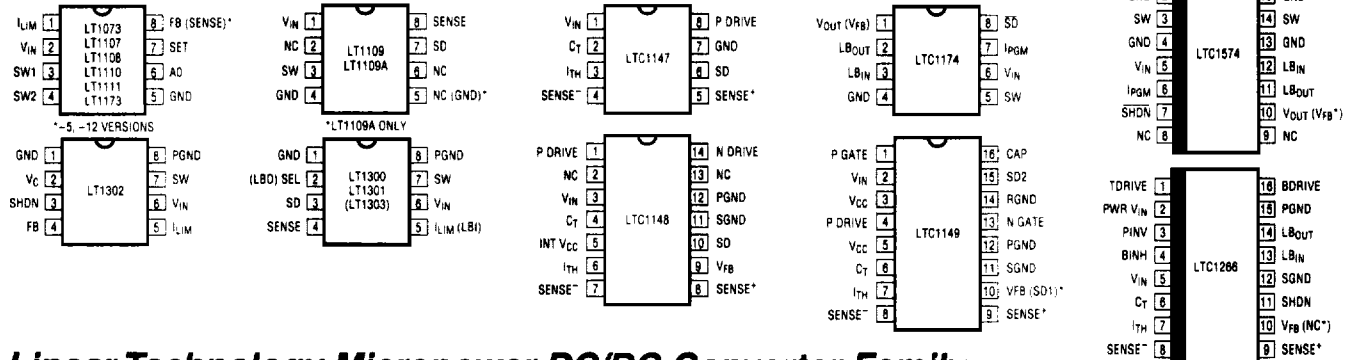
INDUCTOR VALUE (μH)	COILTRONICS'	COILCRAFT'	SUMIDA'
15	-	DT3316-153	CD54-150LC
18	CTX20-1	-	CD54-180LC
20	CTX20-1	-	-
22	CTX20-1	DT3316-223	CD54-220LC
27	-	-	CD54-270LC
33	-	DT3316-473	CD54-330LC
47	CTX50-1	DT3316-683	CD74-470LC
68	-	DT3316-104	CD74-680LC
82	CTX82-1	DT3316-154	CD74-820LC
100	CTX100-1	-	CD105-101MC
120	CTX100-1	-	CD105-121MC
180	CTX250-4	-	CDR125-181MC
220	CTX250-4	-	CDR125-221MC
470	-	-	CDR125-471MC

Inductor Manufacturers			
Gowanda Elect.	Gowanda, NY, USA	716-532-2234	FAX: 716-532-2702
Coiltronics Intl.	Boca Raton, FL, USA	407-241-7876	FAX: 407-241-9335
Sumida	Arlington Heights, IL, USA	708-956-0666	FAX: 708-956-0702
Coilcraft	Cary, IL, USA	800-322-2645	FAX: 708-639-1469

Capacitor Manufacturers			
<b>Best:</b> TPS Series	AVX	Myrtle Beach, SC, USA	803-946-0690
<b>Better:</b> OS-CON Series	Sanyo Video	San Diego, CA, USA	619-661-6322
<b>Good:</b> PL Series	Nichicon America	Schaumburg, IL, USA	708-843-7500

'Surface mount inductors

## Device Pinouts (DIP and SO Packages)



Selection Guides

## Linear Technology Micropower DC/DC Converter Family

DEVICE	V <sub>IN</sub> (MIN)	V <sub>IN</sub> (MAX)	I <sub>SW</sub> (A) (MAX)	STEP-UP	STEP-DOWN	I <sub>Q</sub> (μA)	S/D	LOW BATT DETECT	DROPOUT VOLTAGE (V)	3.3V OUT	5V OUT	12V OUT	ADJ	# OF PINS	SO PACK	APPLICATION EXAMPLE
LT1073	1	15	1	X	X	95		X			X	X	X	8	X	1 Cell to 5V, 40mA
LT1107	2	30	1	X	X	300		X			X	X	X	8	X	2 Cells to 5V, 150mA
LT1108	2	30	1	X	X	110		X			X	X	X	8	X	2 Cells to 5V, 150mA
LT1109	2	30	0.5	X		320					X	X	X	3, 8	X	5V to 12V VPP, 60mA (Flash Memory)
LT1109A	2	20	1	X		320					X	X	X	8	X	5V to 12V VPP, 120mA (Flash Memory)
LT1110	1	15	1	X	X	350		X			X	X	X	8	X	1 Cell to 5V, 40mA
LT1111	2	30	1	X	X	300		X			X	X	X	8	X	2 Cells to 5V, 90mA
LTC1142	6	16	Ext.		X	320	X		0	X	X			16	X	6-8 Cells to both 5V and 3.3V
LTC1142HV	6	20	Ext.		X	320	X		0	X	X			28	X	8-10 Cells NiCd to 5V and 3.3V or ADJ
LTC1143	6	16	Ext.		X	320	X		0	X	X			28	X	6-8 Cells to both 5V and 3.3V
LTC1144	6	16	Ext.		X	160	X		0	X	X			8	X	6-8 Cells NiCd to 5V or 3.3V or ADJ at 1A+
LTC1148	6	16	Ext.		X	160	X		0	X	X	X		14	X	6-8 Cells NiCd to 5V or 3.3V at 2A
LTC1148HV	6	20	Ext.		X	160	X		0	X	X	X		14	X	8-10 Cells NiCd to 5V or 3.3V at 2A
LTC1149	7	48	Ext.		X	600	X		2	X	X		X	16	X	≥8 Cells NiCd to 5V or 3.3V at 2A
LTC1159	5	40	Ext.		X	300	X		0	X	X	X	X	16	X	≥6 Cells NiCd to 5V or 3.3V at 2A
LT1173	2	30	1	X	X	110		X			X	X	X	8	X	2 Cells to 5V, 90mA
LTC1174	3.5	13.5	0.6		X	450	X	X	0.5	X	X		X	8	X	9V to 5V at up to 400mA5
LTC1265	3.5	13.5	1		X	160	X	X	0.5	X	X		X	14	X	9V to 5V at 800mA
LTC1266	3.5	20	Ext.		X	170	X	X	0	X	X		X	16	X	5V to 3.3V at 10A
LTC1267	4	40	Ext.		X	300	X		0	X	X		X	28	X	>8 Cells NiCad to 5V and 3.3V or ADJ
LT1300	2	6	1	X		120	X			X	X			8	X	2 Cells to 3.3V or 5V at 250mA
LT1301	2	6	1	X		120	X				X	X		8	X	2 Cells to 5V or 12V at 220mA or 50mA
LT1302	2	10	2	X		200	X					X	X	8	X	2 Cells to 5V at 600mA
LT1303	2	6	1	X		120	X	X			X		X	8	X	2 Cells to 5V at 220mA
LT1304	2	6	1	X		120	X	X		X	X		X	8	X	2 Cells to 5V at 220mA, LBD Active in Shutdown
LT1305	2	6	2	X		120	X	X					X	8	X	ideal for EL panel supply
LT1307	1.0	8	1	X		70	X	X					X	8	X	1 Cell to 3.3V or 5V with Low-Battery Detect
LT1309	3.3	5	0.5	X		500	X					X		8	X	3.3V or 5V to 12V VPP (PCMCIA)
LTC1574	4	16	0.6		X	450	X	X	X	X	X		X	16	X	9V to 5V at up to 400mA. No External Schottky Diode Needed

# LTC Battery-Powered DC/DC Conversion Solutions

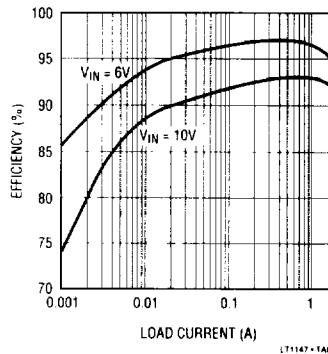
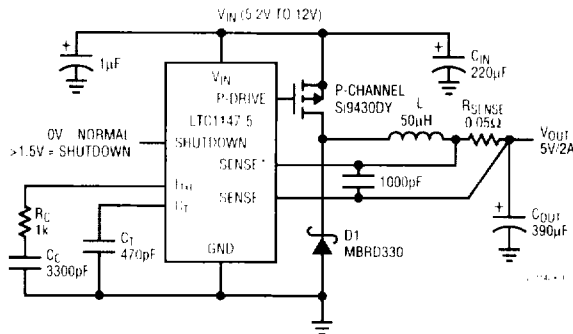
## ULTRA-HIGH EFFICIENCY REGULATORS WITH Burst Mode™ OPERATION

- Very High Efficiency: Over 95% Possible
- Current-Mode Operation for Excellent Line and Load Transient Response
- High Efficiency Maintained Over 3 Decades of Output Current
- Short-Circuit Protection
- Very Low Dropout Operation (100% Duty Cycle)
- Dual 3.3V and 5V Outputs (LTC1142 and LTC1143)

Burst Mode is a trademark of Linear Technology Corporation.

### LTC1147: Up to 95% Efficient Step-Down Regulator in 8-Pin SO

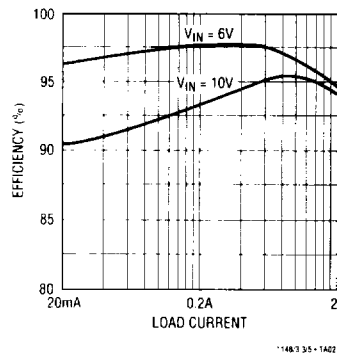
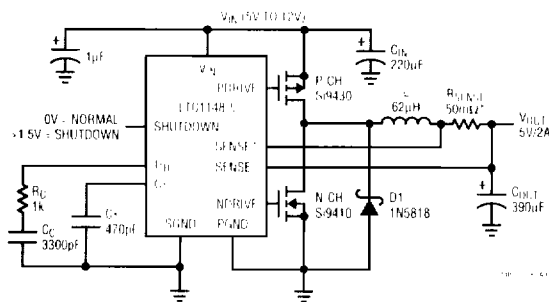
### LTC1143: Dual Output (3.3V/5V), Up to 95% Efficiency Step-Down Regulator in 16-Pin SO



- Low 160µA Standby Current at Light Loads
- Logic Controlled Micropower Shutdown ( $I_Q < 20\mu A$ )
- Wide  $V_{IN}$  Range: 4V to 16V
- Low Number of External Parts
- Output Can Be Externally Held High in Shutdown
- LTC1147 Available in 8-Pin Narrow SO Package
- LTC1147L for Low Dropout 3.3V Applications
- LTC1265 for 1.25A Internal PFET

### LTC1148: 95% Efficient 3.3V or 5V Battery-Powered Regulator (Synchronous Rectifier)

### LTC1142: Dual Output (3.3V/5V), 95% Efficient Regulator in SSOP Package

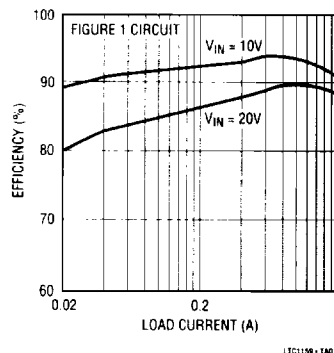
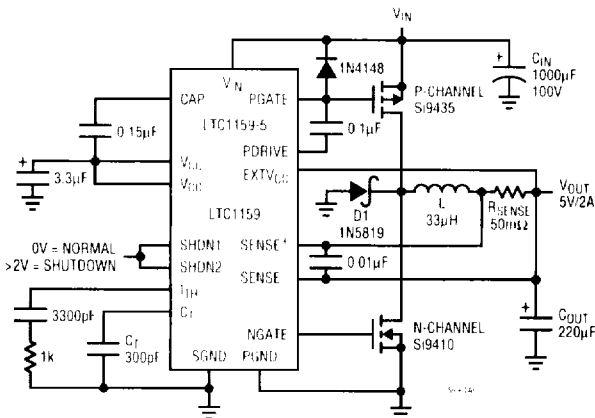


- 160µA Standby Current at Light Loads
- Micropower Shutdown:  $I_Q < 20\mu A$
- Wide  $V_{IN}$  Range: 4V to 18V
- Short-Circuit Protection
- Very Low Dropout Operation
- Adaptive Non-Overlap Gate Drives
- Output Can Be Externally Held High in Shutdown
- LTC1148 Available in 14-Pin Narrow SO Package
- LTC1148L for Low Dropout 3.3V Applications

For High Current 5V to 3.3V, See LTC1266 All N-Channel Solution

### LTC1159: Highest Efficiency for $V_{IN}$ Up to 40V, 3.3V or 5V Output (Synchronous Rectifier)

### LTC1267: Dual Output (3.3V/5V or Adjustable) in SSOP Package



- Wide  $V_{IN}$  Range: 4V to 40V
- Logic-Controlled Micropower Shutdown
- Adaptive Non-Overlap Gate Drives
- Available in 16-Lead Narrow SO Package
- 250µA Operating Current
- 20µA Shutdown Current