LINEAR TECHNOLOGY

LT1271/LT1269

4A High Efficiency Switching Regulators

FEATURES

- Wide Input Voltage Range 3.5V to 30V
- Low Quiescent Current: 7mA
- Internal 4A Switch
- Very Few External Parts Required
- Self Protected Against Overloads
- Shutdown Mode Draws Only 100µA Supply Current
- Flyback Regulated Mode Has Fully Floating Outputs
- Comes in Standard 5-Pin Package
- Can Be Externally Synchronized (See LT1072 Data Sheet)

APPLICATIONS

- Boost Converter
- High Efficiency Buck Converter
- PC Power Supply with Multiple Outputs
- Battery Up-Converter
- Negative-to-Positive Converter

USER NOTE:

This data sheet is only intended to provide specifications, graphs, and a general functional description of the LT1271/LT1269. Application circuits are included to show the capability of the LT1271/LT1269. A complete design manual (AN-19) should be obtained to assist in developing new designs. This manual contains a comprehensive discussion of both the LT1070 and the external components used with it, as well as complete formulas for calculating the values of these components. The manual can also be used for the LT1271/LT1269 by factoring in the higher switch current rating and higher operating frequency.

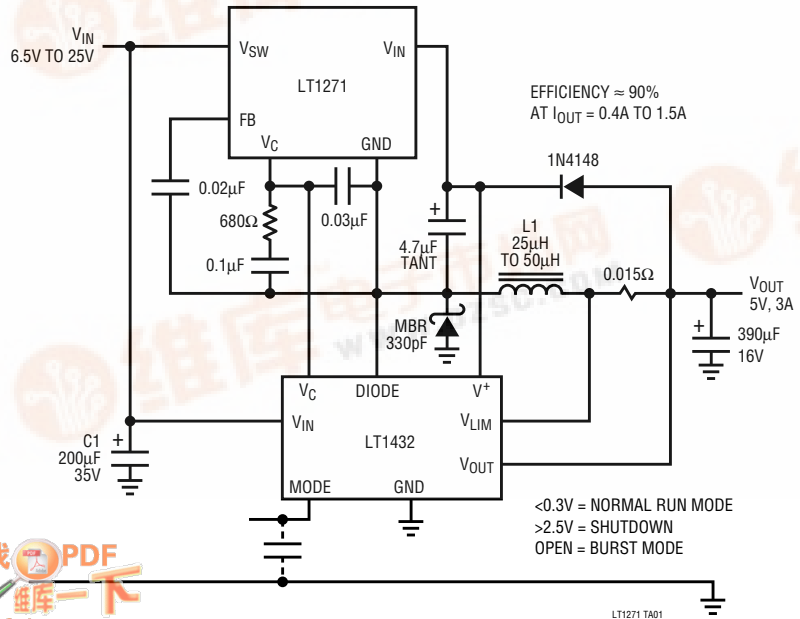
DESCRIPTION

The LT1271 and LT1269 are monolithic high power switching regulators. Identical to the popular LT1070, except for switching frequency (LT1271 = 60kHz, LT1269 = 100kHz) and slightly lower switch current, they can be operated in all standard switching configurations including buck, boost, flyback, and inverting. A high current, high efficiency switch is included on the die along with all oscillator, control, and protection circuitry. Integration of all functions allows the LT1271/LT1269 to be built in a standard TO-220 power package. This makes them extremely easy to use and provides “bust proof” operation similar to that obtained with 3-pin linear regulators.

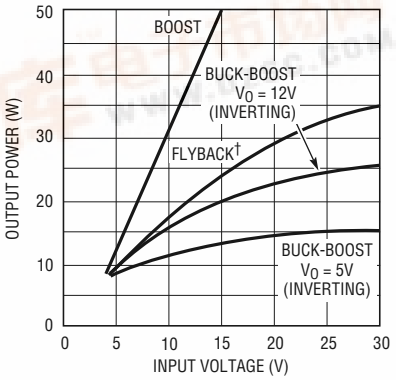
The LT1271/LT1269 operate with supply voltages from 3.5V to 30V, and draw only 7mA quiescent current. By utilizing current mode switching techniques, they provides excellent AC and DC load and line regulation.

A patented adaptive anti-sat switch drive allows very wide ranging load currents with no loss in efficiency. An externally activated shutdown mode reduces total supply current to 100µA typical for standby operation.

High Efficiency 5V Regulator with Burst Mode



Maximum Output Power



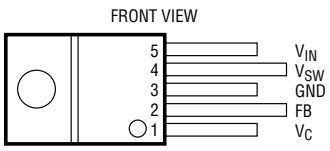
BUCK MODE OUTPUT POWER ≈ (3.5A)(VOUT)
† TRANSFORMER TURNS RATIO MUST BE OPTIMUM TO ACHIEVE FULL POWER.

LT1271 TA02

ABSOLUTE MAXIMUM RATINGS

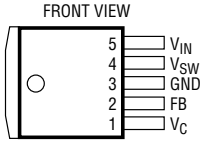
Supply Voltage 30V
Switch Output Voltage 60V
Feedback Pin Voltage (Transient, 1ms) ..... ±15V
Operating Junction Temperature Range
(Oper.) ..... 0°C to +100°C
(Short Ckt.) ..... 0°C to +125°C
Storage Temperature Range ..... – 65°C to +150°C
Lead Temperature (Soldering, 10 sec.) ..... 300°C

PACKAGE/ORDER INFORMATION



T PACKAGE
5-LEAD TO-220

$T_{J\,MAX}$ = 100°C, θ_{JC} = 4°C/W, θ_{JA} = 50°C/W



Q PACKAGE
5-LEAD DD

$T_{J\,MAX}$ = 100°C, θ_{JC} = 4°C/W
θ_{JA} = 30°C/W*

ORDER PART NUMBER	
LT1271CT LT1269CT	LT1271CQ LT1269CQ

*With device soldered to 1/2 square inch of 1oz copper over backside or internal layer ground plane.

ELECTRICAL CHARACTERISTICS

V_{IN} = 15V, V_C = 0.5V, V_{FB} = V_{REF}, switch pin open, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{REF}	Reference Voltage	Measured at Feedback Pin		1.224	1.244	1.264	V
		V_C = 0.8V	●	1.214	1.244	1.274	V
I_B	Feedback Input Current	V_{FB} = V_{REF}			350	750	nA
			●			1100	nA
gm	Error Amplifier Transconductance	ΔI_C = ±25µA		3000	4400	6000	µmho
			●	2400		7000	µmho
	Error Amplifier Source or Sink Current	V_C = 1.5V		150	200	350	µA
			●	120		400	µA
	Error Amplifier Clamp Voltage	Hi Clamp, V_{FB} = 1V		1.8		2.3	V
		Lo Clamp, V_{FB} = 1.5V		0.25	0.38	0.52	V
	Reference Voltage Line Regulation	3V ≤ V_{IN} ≤ V_{MAX}, V_C = 0.8V	●			0.03	%/V
A_V	Error Amplifier Voltage Gain	0.9V ≤ V_C ≤ 1.4V		500	800		V/V
	Minimum Input Voltage (Note 3)		●		2.8	3.0	V
I_Q	Supply Current	3V ≤ V_{IN} ≤ V_{MAX}, V_C = 0.6V			7	10	mA
	Control Pin Threshold	Duty Cycle = 0		0.7	0.9	1.08	V
			●	0.5		1.25	V
	Normal/Flyback Threshold on Feedback Pin			0.4	0.45	0.54	V
V_{FB}	Flyback Reference Voltage	I_{FB} = 50µA		15	16.3	17.6	V
			●	14		18	V
V_{FB}	Change in Flyback Reference Voltage	0.05 ≤ I_{FB} ≤ 1mA		4.5	6.8	8.5	V
	Flyback Reference Voltage Line Regulation	I_{FB} = 50µA 3V ≤ V_{IN} ≤ V_{MAX}			0.01	0.03	%/V
	Flyback Amplifier Transconductance (gm)	ΔI_C = ±10µA		150	300	650	µmho
	Flyback Amplifier Source and Sink Current	V_C = 0.6V Source	●	15	32	70	µA
		I_{FB} = 50µA Sink	●	25	40	70	µA

ELECTRICAL CHARACTERISTICS

V_{IN} = 15V, V_C = 0.5V, V_{FB} = V_{REF}, switch pin open, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
BV	Output Switch Breakdown Voltage	$3V \le V_{IN} \le V_{MAX}$ I_{SW} = 1.5mA	● 	60	75		V
V_{SAT}	Output Switch (Note 1) "On" Resistance		●		0.2	0.33	Ω
	Control Voltage to Switch Current Transconductance				6.4		A/V
I_{LIM}	Switch Current Limit (Note 2)	Duty Cycle = 50% Duty Cycle = 80%	● ●	4 3.2		8 8	A A
$\frac{\Delta I_{IN}}{\Delta I_{SW}}$	Supply Current Increase During Switch On-Time				25	40	mA/A
f	Switching Frequency	LT1271 LT1269	● ●	50 85	60 100	70 115	kHz kHz
DC (max)	Maximum Switch Duty Cycle	LT1271 LT1269		85 80	92 90	95 95	% %
	Flyback Sense Delay Time				1.5		µs
	Shutdown Mode Supply Current	$3V \le V_{IN} \le V_{MAX}$, V_C = 0.05V			100	400	µA
	Shutdown Mode Threshold Voltage	$3V \le V_{IN} \le V_{MAX}$	 ●	100 50	150	250 300	mV mV

The ● denotes the specifications which apply over the full operating temperature range.

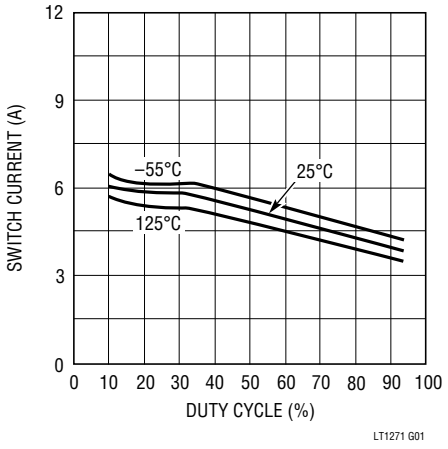
Note 1: Measured with V_C in hi clamp, V_{FB} = 0.8V.

Note 2: For duty cycles (DC) between 50% and 85%, minimum guaranteed switch current is given by I_{LIM} = 2.67 (2 – DC).

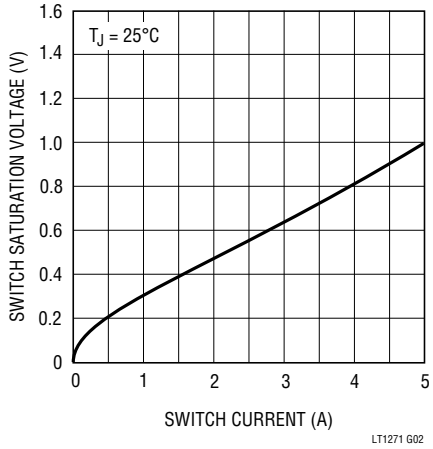
Note 3: Minimum input voltage.

TYPICAL PERFORMANCE CHARACTERISTICS

Switch Current Limit vs Duty Cycle

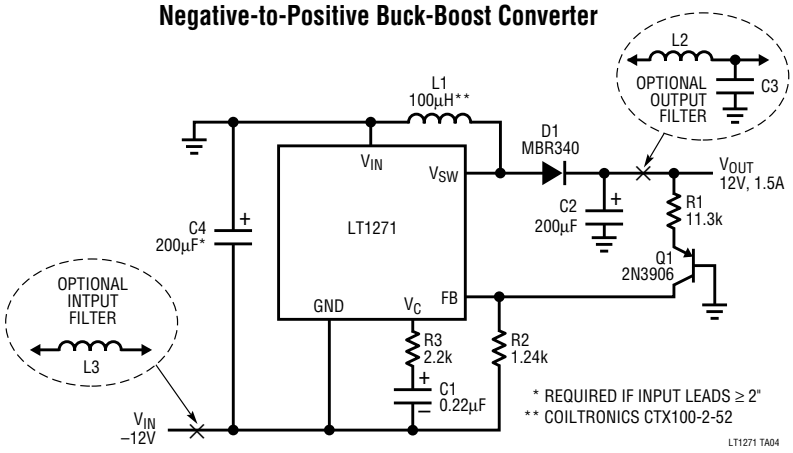


Switch Saturation Voltage

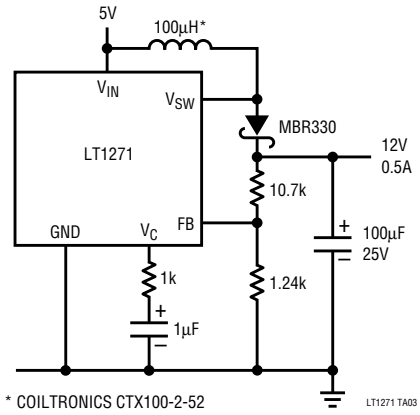


TYPICAL APPLICATIONS

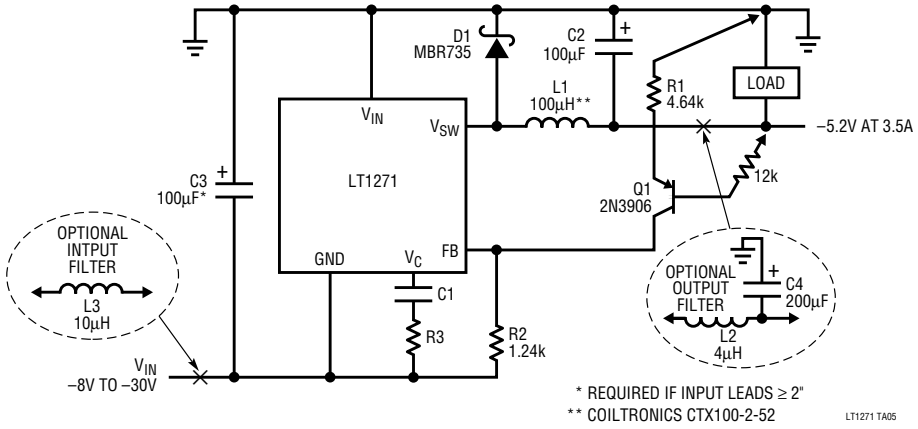
Negative-to-Positive Buck-Boost Converter



Boost Converter (5V to 12V)



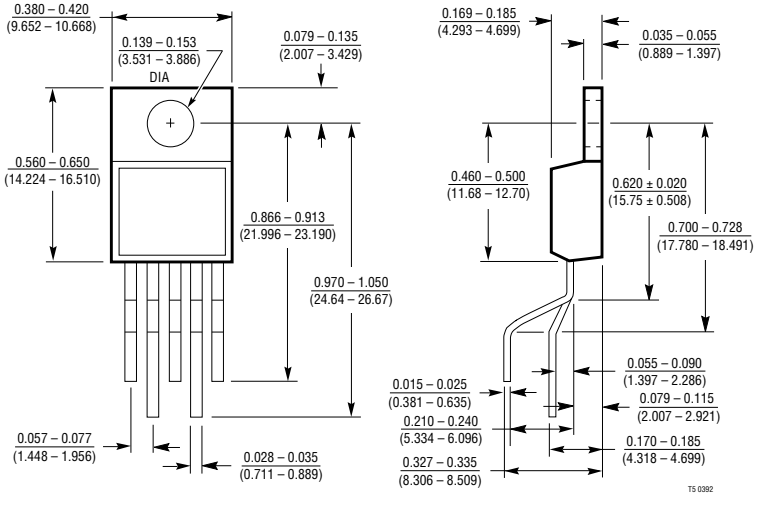
Negative Buck Converter



PACKAGE DESCRIPTION

Dimensions in inches (millimeters) unless otherwise noted.

T Package
5-Lead TO-220



Q Package
5-Lead DD