

## FEATURES

- Wide Input Voltage Range: 3.5V to 30V
- Low Quiescent Current: 7mA
- Internal 8A Switch (10A for LT1270A)
- Very Few External Parts Required
- Self-Protected Against Overloads
- Shutdown Mode Draws Only 100 $\mu$ A Supply Current
- Flyback-Regulated Mode Has Fully Floating Outputs
- Can be Externally Synchronized  
(See LT1072 Data Sheet)
- Comes in Standard 5-Pin TO-220 Package

## APPLICATIONS

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

### USER NOTE:

This data sheet is only intended to provide specifications, graphs and a general functional description of the LT1270A/LT1270. Application circuits are included to show the capability of the LT1270A/LT1270. A complete design manual (AN-19) should be obtained to assist in developing new designs. AN-19 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. AN-19 can also be used for the LT1270A/LT1270 by factoring in the higher switch current rating and higher operating frequency.

A comprehensive CAD program called SwitcherCad is also available. Contact the local sales office in your area or the factory direct.

## DESCRIPTION

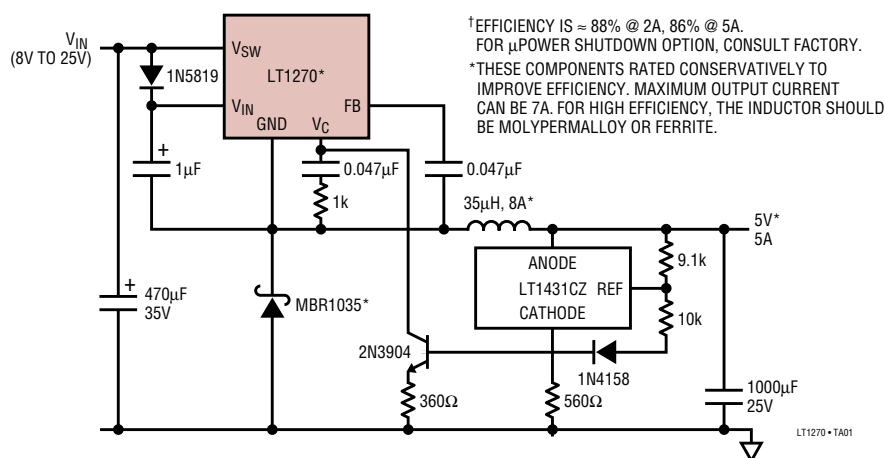
The LT1270A/LT1270 are monolithic high power switching regulators. Identical to the popular LT1070, except for switching frequency (60kHz) and higher switch current, they can be operated in all standard switching configurations including buck, boost, flyback, and inverting. A high current, high efficiency switch is included on the die along with all oscillator, control, and protection circuitry. Integration of all functions allows the LT1270A/LT1270 to be built in a standard TO-220 power package. This makes it extremely easy to use and provides "bust proof" operation similar to that obtained with 3-pin linear regulators.

The LT1270A/LT1270 operate with supply voltages from 3.5V to 30V, and draw only 7mA quiescent current. By utilizing current-mode switching techniques, they provide excellent AC and DC load and line regulation.

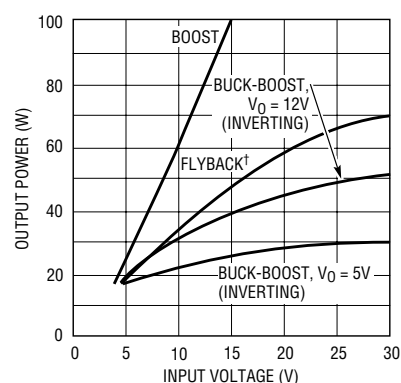
The LT1270A/LT1270 use adaptive anti-sat switch drive to allow very wide ranging load currents with no loss in efficiency. An externally activated shutdown mode reduces total supply current to 100 $\mu$ A typical for standby operation.

## TYPICAL APPLICATION

### High Efficiency<sup>†</sup> Buck Converter



### Maximum Output Power\*



\*MULTIPLY BY 1.2 FOR LT1270A.  
BUCK MODE OUTPUT POWER  $\approx (7.5A)(V_{OUT})$

† TRANSFORMER TURNS RATIO MUST BE OPTIMUM TO ACHIEVE FULL POWER

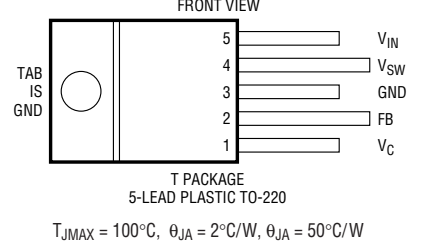
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## ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage .....	30V
Switch Output Voltage .....	60V
Feedback Pin Voltage (Transient, 1ms) .....	±15V
Operating Junction Temperature Range	
LT1270AC/LT1270C (Oper.) .....	0°C to 125°C
LT1270AC/LT1270C (Short-Ckt) .....	0°C to 140°C
Storage Temperature Range .....	–65°C to 150°C
Lead Temperature (Soldering, 10 sec) .....	300°C

## PACKAGE/ORDER INFORMATION

	ORDER PART NUMBER
	LT1270CT LT1270ACT

Consult LTC Marketing for parts specified with wider operating temperature ranges.

## ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are at  $T_A = 25^\circ\text{C}$ .  $V_{IN} = 15\text{V}$ ,  $V_C = 0.5\text{V}$ ,  $V_{FB} = V_{REF}$ , switch pin open, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$V_{REF}$	Reference Voltage	Measured at Feedback Pin $V_C = 0.8\text{V}$	1.224 1.214	1.244 1.244	1.264 1.274	V V
$I_B$	Feedback Input Current	$V_{FB} = V_{REF}$		350	750 1100	nA nA
$g_m$	Error Amplifier Transconductance	$\Delta I_C = \pm 25\mu\text{A}$	3000 2400	4400	6000 7000	$\mu\text{mho}$ $\mu\text{mho}$
	Error Amplifier Source of Sink Current	$V_C = 1.5\text{V}$	150 120	200	350 400	$\mu\text{A}$ $\mu\text{A}$
	Error Amplifier Clamp Voltage	Hi Clamp, $V_{FB} = 1\text{V}$ Lo Clamp, $V_{FB} = 1.5\text{V}$	1.80 0.25	0.38	2.30 0.52	V V
	Reference Voltage Line Regulation	$3\text{V} \leq V_{IN} \leq V_{MAX}$ , $V_C = 0.8\text{V}$			0.03	%/V
$A_V$	Error Amplifier Voltage Gain	$0.9\text{V} \leq V_C \leq 1.4\text{V}$	500	800		V/V
	Minimum Input Voltage			2.8	3.0	V
$I_Q$	Supply Current	$3\text{V} \leq V_{IN} \leq V_{MAX}$ , $V_C = 0.6\text{V}$		7	10	mA
	Control Pin Threshold	Duty Cycle = 0	0.70 0.50	0.90	1.08 1.25	V V
	Normal/Flyback Threshold on Feedback Pin		0.40	0.45	0.54	V
$V_{FB}$	Flyback Reference Voltage	$I_{FB} = 50\mu\text{A}$	15.0 14.0	16.3	17.6 18.0	V V
$V_{FB}$	Change in Flyback Reference Voltage	$0.05 \leq I_{FB} \leq 1\text{mA}$	4.5	6.8	8.5	V
	Flyback Reference Voltage Line Regulation	$I_{FB} = 50\mu\text{A}$ $3\text{V} \leq V_{IN} \leq V_{MAX}$		0.01	0.03	%/V
	Flyback Amplifier Transconductance ( $g_m$ )	$\Delta I_C = \pm 10\mu\text{A}$	150	300	650	$\mu\text{mho}$
	Flyback Amplifier Source and Sink Current	$V_C = 0.6\text{V}$ Source $I_{FB} = 50\mu\text{A}$ Sink	15 25	32 40	70 70	$\mu\text{A}$ $\mu\text{A}$
$B_V$	Output Switch Breakdown Voltage	$3\text{V} \leq V_{IN} \leq V_{MAX}$ $I_{SW} = 1.5\text{mA}$	60	75		V
$V_{SAT}$	Output Switch ON Resistance (Note 2, 4)	$T_J \leq 100^\circ\text{C}$ $T_J \leq 125^\circ\text{C}$		0.12	0.18 0.22	$\Omega$ $\Omega$
	Control Voltage to Switch Current Transconductance			12		A/V
$LIM$	Switch Current Limit (LT1270) (Note 4)	Duty Cycle = 50%, $T_J \leq 100^\circ\text{C}$ Duty Cycle = 80%, $T_J \leq 100^\circ\text{C}$	8 6		16 14	A A

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# ELECTRICAL CHARACTERISTICS

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SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$I_{LIM}$	Switch Current Limit (LT1270A) (Note 4)	Duty Cycle = 50%, $T_J \leq 100^\circ\text{C}$ Duty Cycle = 80%, $T_J \leq 100^\circ\text{C}$	● 10.0 ● 7.5		16.0 14.0	A A
$\frac{\Delta I_{IN}}{\Delta I_{SW}}$	Supply Current Increase During Switch-ON Time			25	40	mA/A
f	Switching Frequency		50 ● 50	60	70 70	kHz kHz
DC <sub>MAX</sub>	Maximum Switch Duty Cycle		80	92	95	%
	Flyback Sense Delay Time			1.5		$\mu\text{s}$
	Shutdown Mode Supply Current	$3\text{V} \leq V_{IN} \leq V_{MAX}$ , $V_C = 0.05\text{V}$		100	400	$\mu\text{A}$
	Shutdown Mode Threshold Voltage	$3\text{V} \leq V_{IN} \leq V_{MAX}$	100 ● 50	150	250 300	mV mV

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

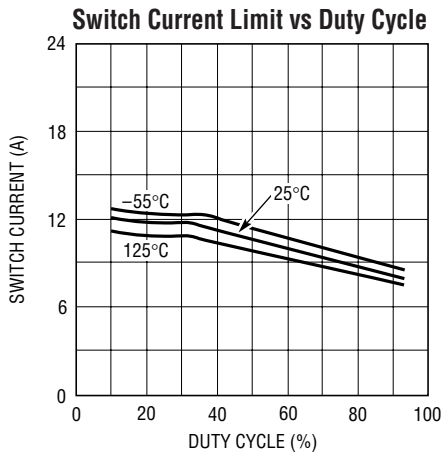
**Note 2:** Measured with  $V_C$  in Hi Clamp,  $V_{FB} = 0.8\text{V}$ .

**Note 3:** For duty cycles (DC) between 50% and 80%, minimum guaranteed

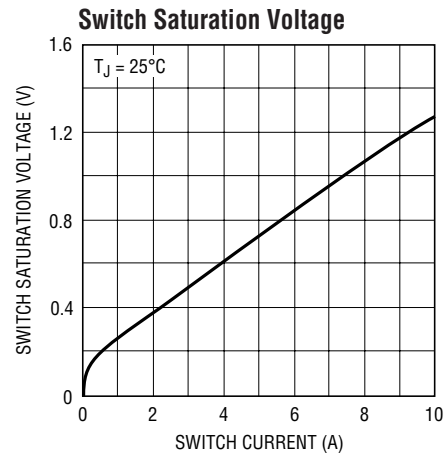
switch current is given by  $I_{LIM} = 6.67 (1.7 - \text{DC})$  for the LT1270 and  $I_{LIM} = 8.33 (1.7 - \text{DC})$  for the LT1270A.

**Note 4:** Minimum current limit is reduced by 0.5A at  $125^\circ\text{C}$ .  $100^\circ\text{C}$  test limits are guaranteed by correlation to  $125^\circ\text{C}$  tests.

## TYPICAL PERFORMANCE CHARACTERISTICS



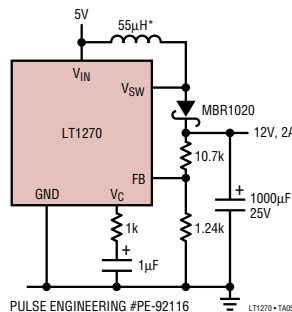
LT1270 • TA03



LT1270 • TA04

## TYPICAL APPLICATIONS

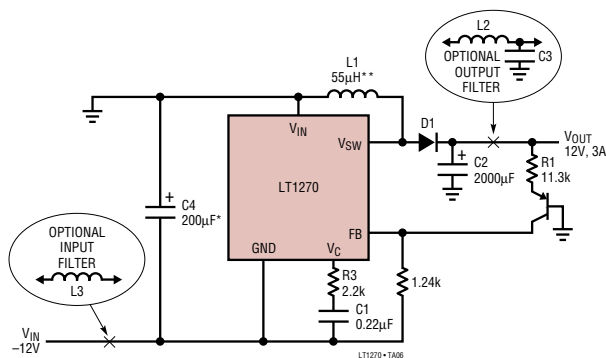
### Boost Converter (5V to 12V)



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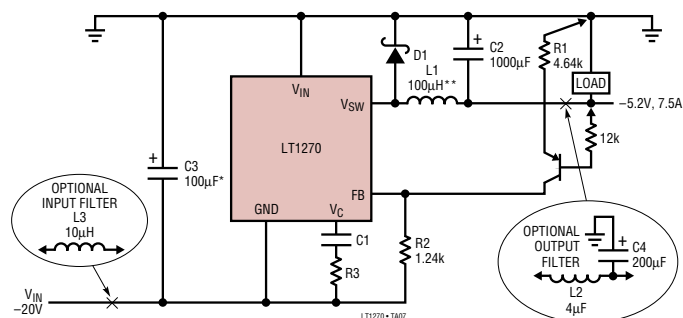
## TYPICAL APPLICATIONS

### Negative-to-Positive Buck-Boost Converter



\*REQUIRED IF INPUT LEADS  $\geq 2^\circ$   
 \*\*PULSE ENGINEERING #PE-92116

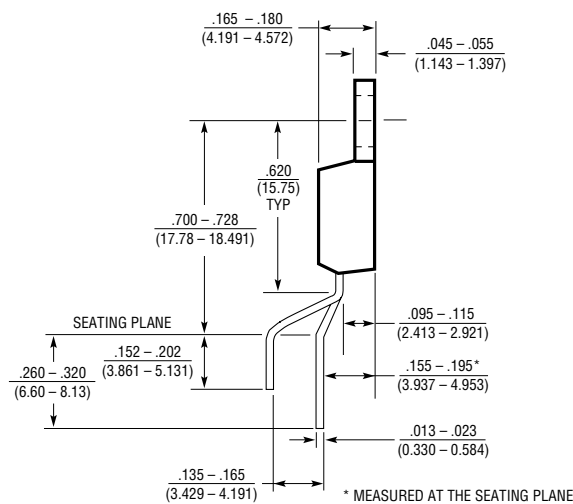
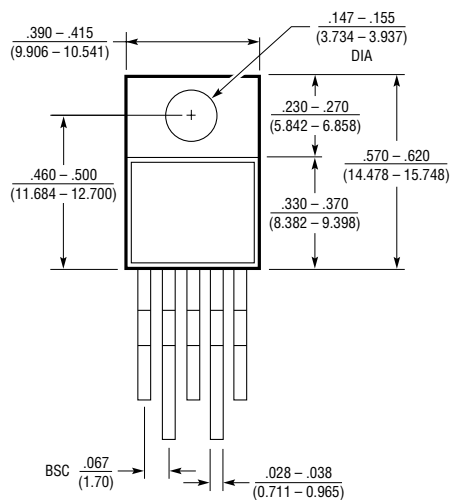
### Negative Buck Converter



\*REQUIRED IF INPUT LEADS  $\geq 2^\circ$   
 \*\*PULSE ENGINEERING #PE-92115

## PACKAGE DESCRIPTION

**T Package**  
**5-Lead Plastic TO-220 (Standard)**  
 (Reference LTC DWG # 05-08-1421)



## RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1074/HV	4.4A ( $I_{OUT}$ ), 100kHz, High Efficiency Step-Down DC/DC Converter	$V_{IN}$ : 7.3V to 45/64V, $V_{OUT}$ (min) = 2.21V, $I_Q$ = 8.5mA, $I_{SD}$ = 10µA, DD-5/7, TO220-5/7
LTC3414	4A ( $I_{OUT}$ ), 4MHz, Synchronous Step-Down DC/DC Converter	$V_{IN}$ : 2.3V to 5.5V, $V_{OUT}$ (min) = 0.8V, $I_Q$ = 64µA, $I_{SD}$ < 1µA, TSSOP20E
LT3430/LT3431	60V, 2.75A ( $I_{OUT}$ ), 200/500kHz, High Efficiency Step-Down DC/DC Converter	$V_{IN}$ : 5.5V to 60V, $V_{OUT}$ (min) = 1.2V, $I_Q$ = 2.5mA, $I_{SD}$ = 30µA, TSSOP16E

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