

White LED Step-Up Converter in SC70 and ThinSOT

FEATURES

- Inherently Matched LED Current
- High Efficiency: 84% Typical
- Drives Up to Four LEDs from a 3.2V Supply
- Drives Up to Six LEDs from a 5V Supply
- 36V Rugged Bipolar Switch
- Fast 1.2MHz Switching Frequency
- Uses Tiny 1mm Tall Inductors
- Requires Only 0.22 μ F Output Capacitor
- Low Profile SC70 and ThinSOT™ Packaging

APPLICATIONS

- Cellular Phones
- PDAs, Handheld Computers
- Digital Cameras
- MP3 Players
- GPS Receivers

DESCRIPTION

The LT®1937 is a step-up DC/DC converter specifically designed to drive white LEDs with a constant current. The device can drive two, three or four LEDs in series from a Li-Ion cell. Series connection of the LEDs provides identical LED currents resulting in uniform brightness and eliminating the need for ballast resistors. The LT1937 switches at 1.2MHz, allowing the use of tiny external components. The output capacitor can be as small as 0.22 μ F, saving space and cost versus alternative solutions. A low 95mV feedback voltage minimizes power loss in the current setting resistor for better efficiency.

The LT1937 is available in low profile SC70 and ThinSOT packages.

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ThinSOT is a trademark of Linear Technology Corporation.

TYPICAL APPLICATION

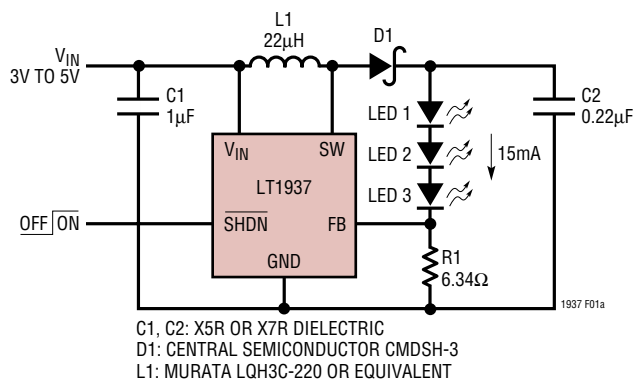
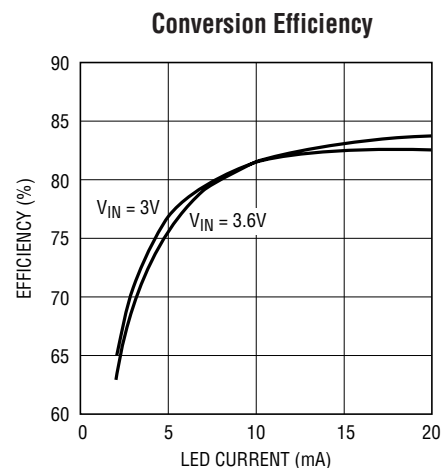


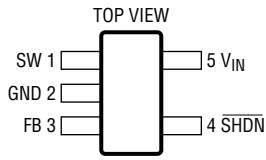
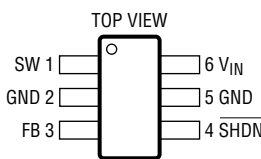
Figure 1. Li-Ion Powered Driver for Three White LEDs



ABSOLUTE MAXIMUM RATINGS (Note 1)

Input Voltage (V_{IN})	10V	Extended Commercial
SW Voltage	36V	Operating Temperature Range (Note 2) ... -40°C to 85°C
FB Voltage	10V	Maximum Junction Temperature 125°C
SHDN Voltage	10V	Storage Temperature Range -65°C to 150°C
		Lead Temperature (Soldering, 10 sec) 300°C

PACKAGE/ORDER INFORMATION

 <p>S5 PACKAGE 5-LEAD PLASTIC TSOT-23</p> <p>$T_{JMAX} = 125^{\circ}\text{C}$, $\theta_{JA} = 256^{\circ}\text{C/W}$ IN FREE AIR $\theta_{JA} = 120^{\circ}\text{C}$ ON BOARD OVER GROUND PLANE</p>	ORDER PART NUMBER	 <p>SC6 PACKAGE 6-LEAD PLASTIC SC70</p> <p>$T_{JMAX} = 125^{\circ}\text{C}$, $\theta_{JA} = 256^{\circ}\text{C/W}$ IN FREE AIR $\theta_{JA} = 150^{\circ}\text{C}$ ON BOARD OVER GROUND PLANE</p>	ORDER PART NUMBER
	LT1937ES5		LT1937ESC6
	S5 PART MARKING		SC6 PART MARKING
	LTYN		LAAB

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

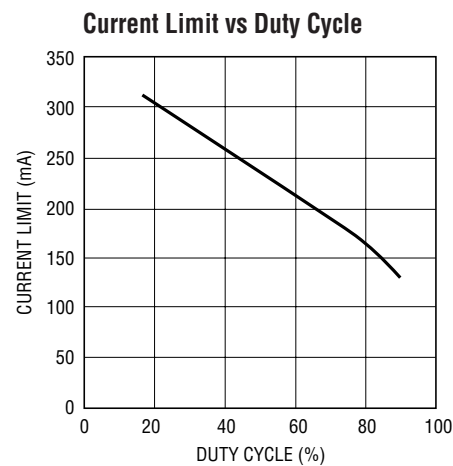
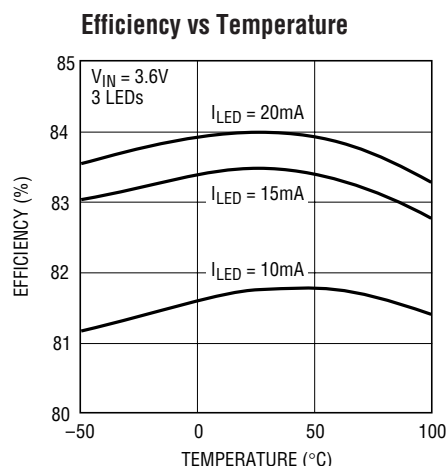
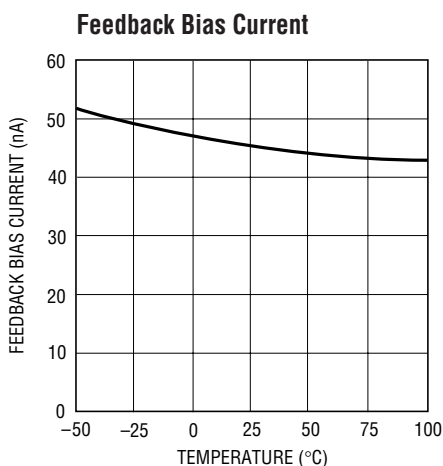
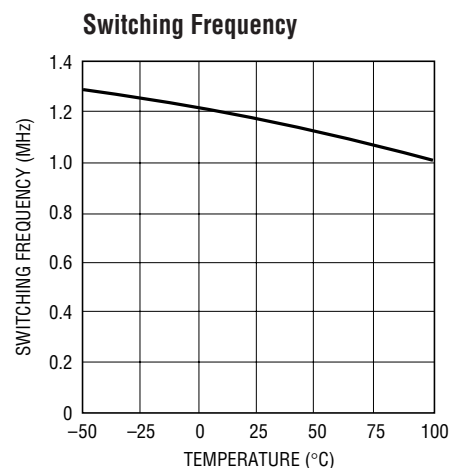
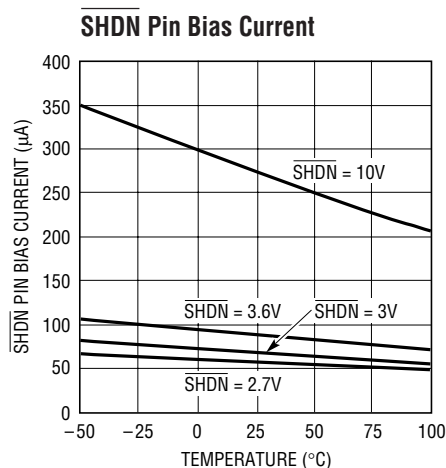
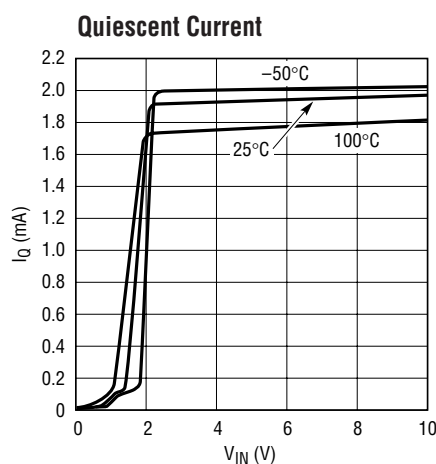
ELECTRICAL CHARACTERISTICS $T_A = 25^{\circ}\text{C}$, $V_{IN} = 3\text{V}$, $V_{SHDN} = 3\text{V}$, unless otherwise noted.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Minimum Operating Voltage		2.5			V
Maximum Operating Voltage				10	V
Feedback Voltage	$I_{SW} = 100\text{mA}$, Duty Cycle = 66%	86	95	104	mV
FB Pin Bias Current		10	45	100	nA
Supply Current	$\overline{\text{SHDN}} = 0\text{V}$		1.9 0.1	2.5 1.0	mA μA
Switching Frequency		0.8	1.2	1.6	MHz
Maximum Duty Cycle		85	90		%
Switch Current Limit			320		mA
Switch V_{CESAT}	$I_{SW} = 250\text{mA}$		350		mV
Switch Leakage Current	$V_{SW} = 5\text{V}$		0.01	5	μA
SHDN Voltage High		1.5			V
SHDN Voltage Low				0.4	V
SHDN Pin Bias Current			65		μA

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

Note 2: The LT1937E is guaranteed to meet specifications from 0°C to 70°C . Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with statistical process controls.

TYPICAL PERFORMANCE CHARACTERISTICS



PIN FUNCTIONS

SW (Pin 1): Switch Pin. Connect inductor/diode here. Minimize trace area at this pin to reduce EMI.

GND (Pin 2): Ground Pin. Connect directly to local ground plane.

FB (Pin 3): Feedback Pin. Reference voltage is 95mV. Connect cathode of lowest LED and resistor here. Calculate resistor value according to the formula:

$$R_{FB} = 95\text{mV}/I_{LED}$$

SHDN (Pin 4): Shutdown Pin. Connect to 1.5V or higher to enable device; 0.4V or less to disable device.

GND (Pin 5, SC70 Package): Ground Pin. Connect to Pin 2 and to local ground plane

V_{IN} (Pin 5/Pin 6 SC70 Package): Input Supply Pin. Must be locally bypassed.