

## WHITE LED STEP-UP CONVERTER

### DESCRIPTION

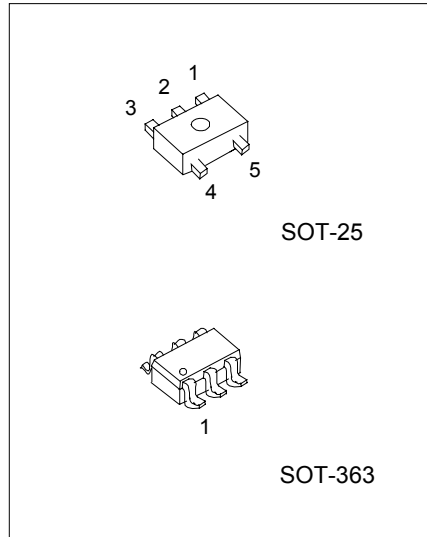
The UTC L1937 is a step-up DC/DC converter specifically designed to drive white LEDs with a constant current. The device can drive two, three or four LEDs in series from a Li-Ion cell. Series connection of the LEDs provides identical LED currents resulting in uniform brightness and eliminating the need for ballast resistors. The UTC LT1937 switches at 1.2MHz, allowing the use of tiny external components. The output capacitor can be as small as 0.22  $\mu$ F, saving space and cost versus alternative solutions. A low 95mV feedback voltage minimizes power loss in the current setting resistor for better efficiency.

### 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  $\mu$ F Output Capacitor

### APPLICATIONS

- \* Marking code: LTGG
- \* Cellular Phones
- \* PDAs, Handheld Computers
- \* Digital Cameras
- \* MP3 Players
- \* GPS Receivers



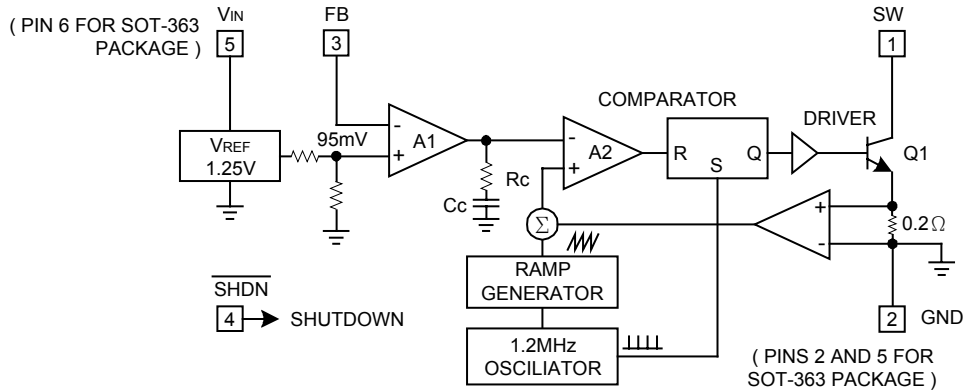
### PIN FUNCTION

PIN NO. (SOT-25)	PIN NO. (SOT-363)	PIN NAME	SYMBOL	FUNCTION
1		Switch	SW	Connect inductor/diode here. Minimize trace area at this pin to reduce EMI.
2		Ground	GND	Connect directly to local ground plane.
3		Feedback	FB	Reference voltage is 95mV. Connect cathode of lowest LED and resistor here. Calculate resistor value according to the formula: $R_{FB} = 95mV/I_{LED}$
4		Shutdown	$\overline{SHDN}$	Connect to 1.5V or higher to enable device; 0.4V or less to disable device.
5	6	Input Supply	$V_{IN}$	Input Supply Pin. Must be locally bypassed.
	5	Ground	GND	Connect to Pin 2 and to local ground plane

# UTCL1937

# LINEAR INTEGRATED CIRCUIT

## BLOCK DIAGRAM



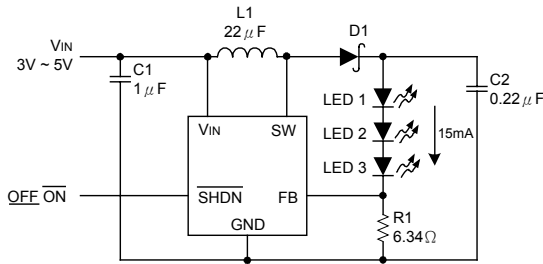
## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	10	V
SW Voltage	$V_{SW}$	36	V
FB Voltage	$V_{FB}$	10	V
SHDN Voltage	$V_{SHDN}$	10	V
Operating Temperature	$T_{opr}$	-40 ~ +85	°C
Storage Temperature	$T_{stg}$	-65 ~ +150	°C
Maximum Junction Temperature	$T_j$	125	°C
Lead Temperature (Soldering, 10 sec)	$T_{Lead}$	300	°C

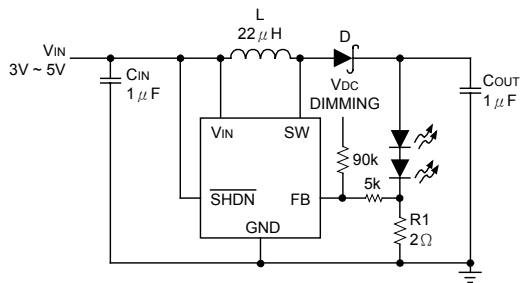
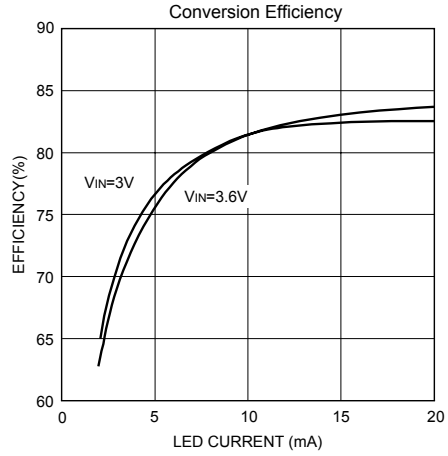
## ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ , $V_{IN}=3\text{V}$ , $V_{SHDN}=3\text{V}$ , unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	$V_{IN}$				10	V
Feedback Voltage	$V_{FB}$	$I_{sw}=100\text{mA}$ , Duty Cycle=66%	86	95	104	mV
FB Pin Bias Current	$I_{FB}$		10	45	100	nA
Supply Current	$I_{cc}$	$\overline{SHDN}=0\text{V}$		1.9 0.1	2.5 1.0	mA $\mu\text{A}$
Switching Frequency	$f_{osc}$		0.8	1.2	1.6	MHz
Maximum Duty Cycle	DC		85	90		%
Switch Current Limit	$I_{sw}$			320		mA
Switch $V_{CESAT}$	$V_{CESAT(SW)}$	$I_{sw}=250\text{mA}$		350		mV
Switch Leakage Current	$I_{sw(OFF)}$	$V_{SW}=5\text{V}$		0.01	5	$\mu\text{A}$
SHDN Voltage High	$V_{IH}$		1.5			V
SHDN Voltage Low	$V_{IL}$				0.4	V
SHDN Pin Bias Current	$I_{SHDN}$			65		$\mu\text{A}$

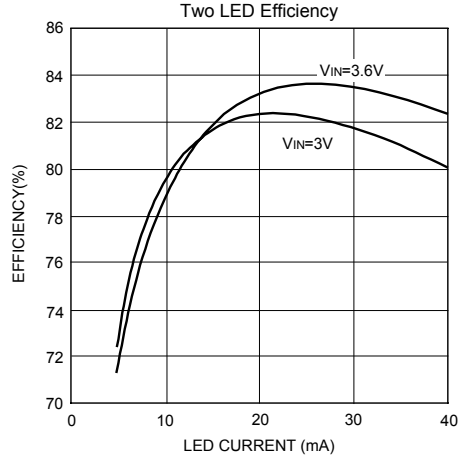
TYPICAL APPLICATIONS

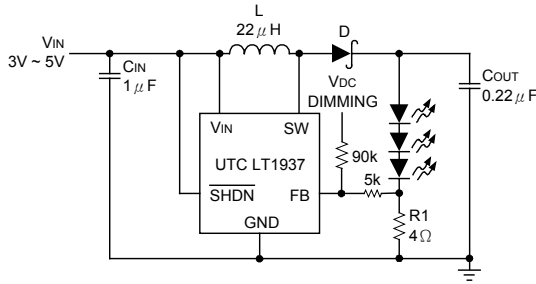


Li-Ion Powered Driver for Three White LEDs

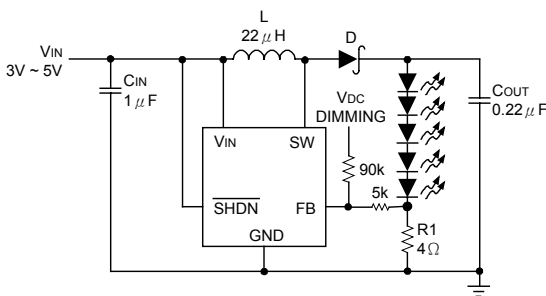
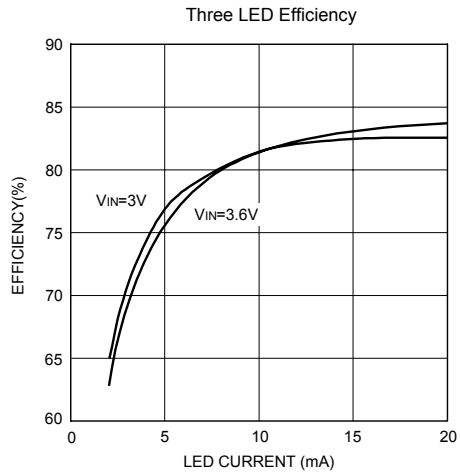


Li-Ion to Two White LEDs

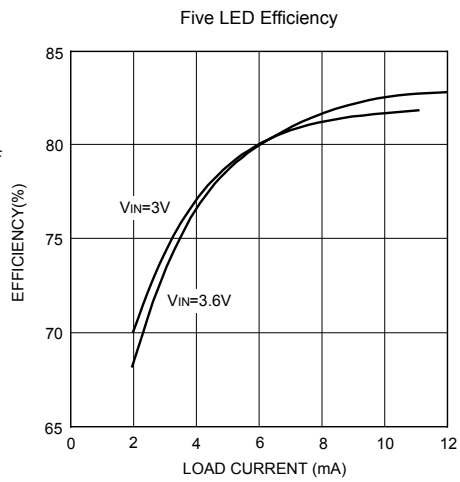


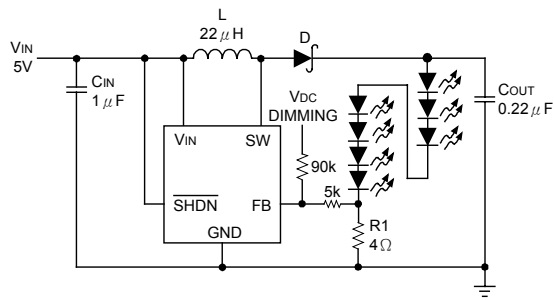


Li-Ion to Three White LEDs

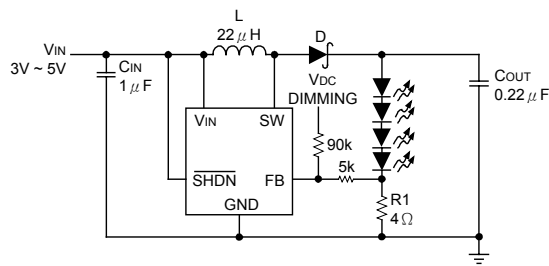
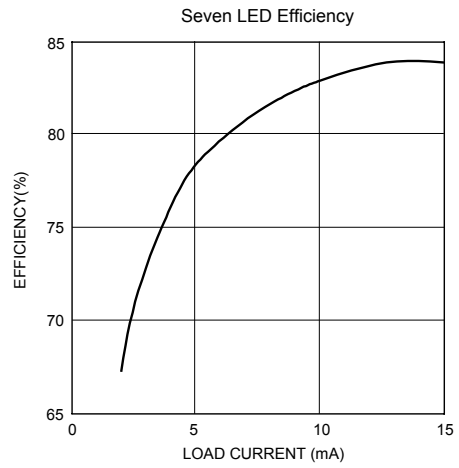


Li-Ion to Five White LEDs

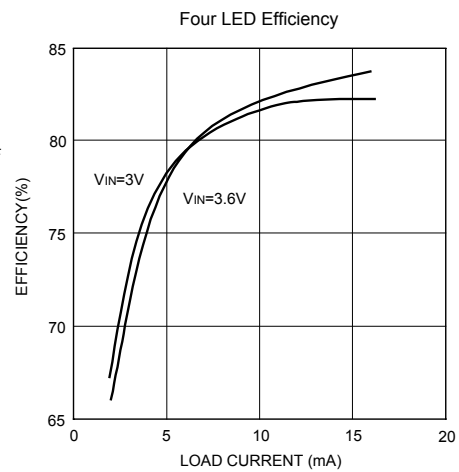




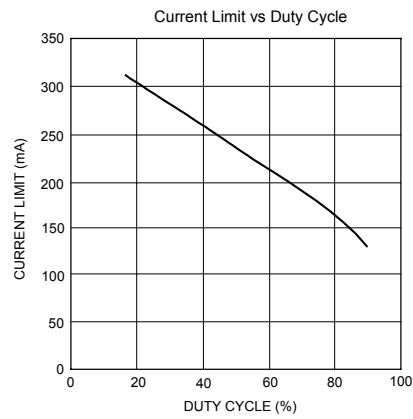
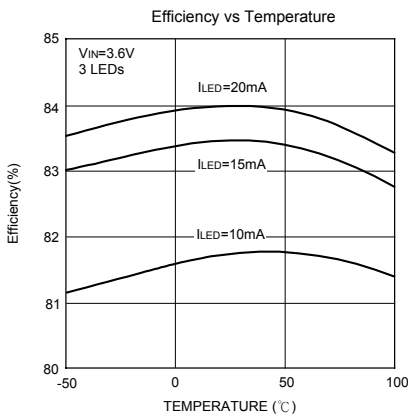
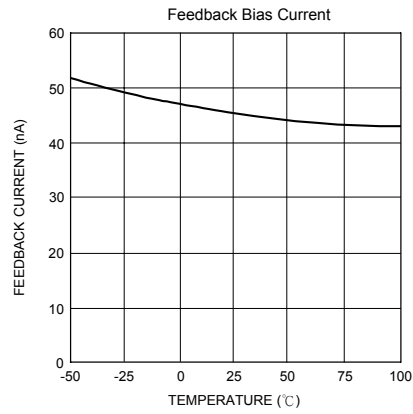
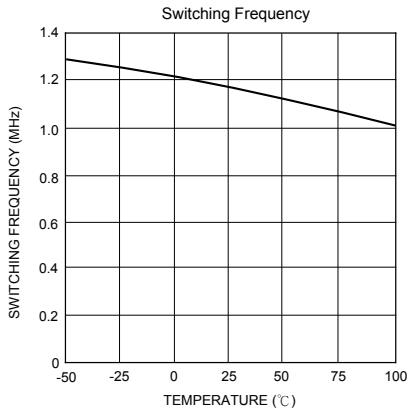
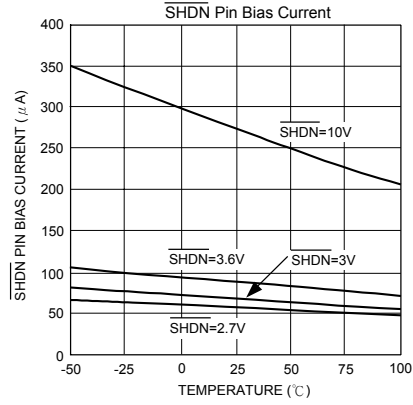
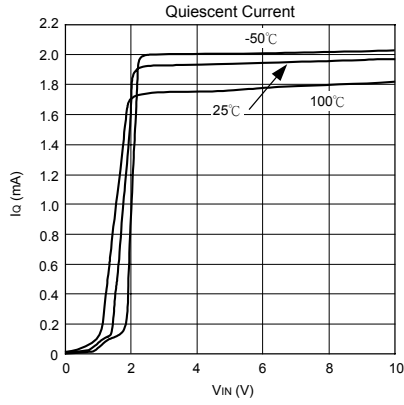
5V to Seven White LEDs



Li-Ion to Four White LEDs



TYPICAL PERFORMANCE CHARACTERISTICS



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