



White LED Step-Up Converter

● Features

- Inherently Matched LED Current
- High Efficiency: 84% Typical
- Drives Up to Four LEDs from a 4V Supply
- Drives Up to Seven LEDs from a 6V Supply
- 36V Rugged Bipolar Switch
- Fast 1.2MHz Switching Frequency
- Uses Tiny 1mm Tall Inductors
- Requires Only 0.22mF Output Capacitor
- Low Profile SOT23-6 Packaging

● Applications

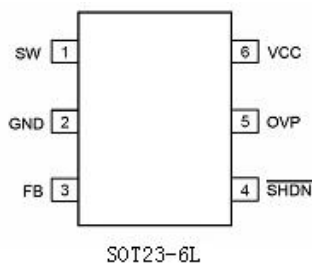
- Cellular Phones
- PDAs, Handheld Computers
- Digital Cameras
- MP3 Players
- GPS Receivers

● General Description

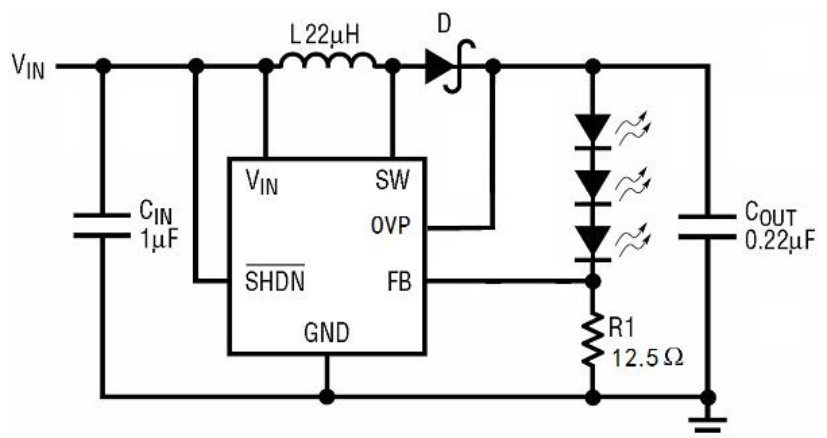
The FS1725B is a step-up DC/DC converter specifically designed to drive white LEDs with a constant current. The device can drive two, three or four LEDs in series from a Li-Ion cell. Series connection of the LEDs provides identical LED currents resulting in uniform brightness and eliminating the need for ballast resistors. The FS1725B switches at 1.2MHz, allowing the use of tiny external components. The output capacitor can be as small as 0.22uF, saving space and cost versus alternative solutions. A low 250mV feedback voltage minimizes power loss in the current setting resistor for better efficiency.

The FS1725B is available in low profile SOT23-6 packages.

● Pin Configurations



● Typical Application Circuit

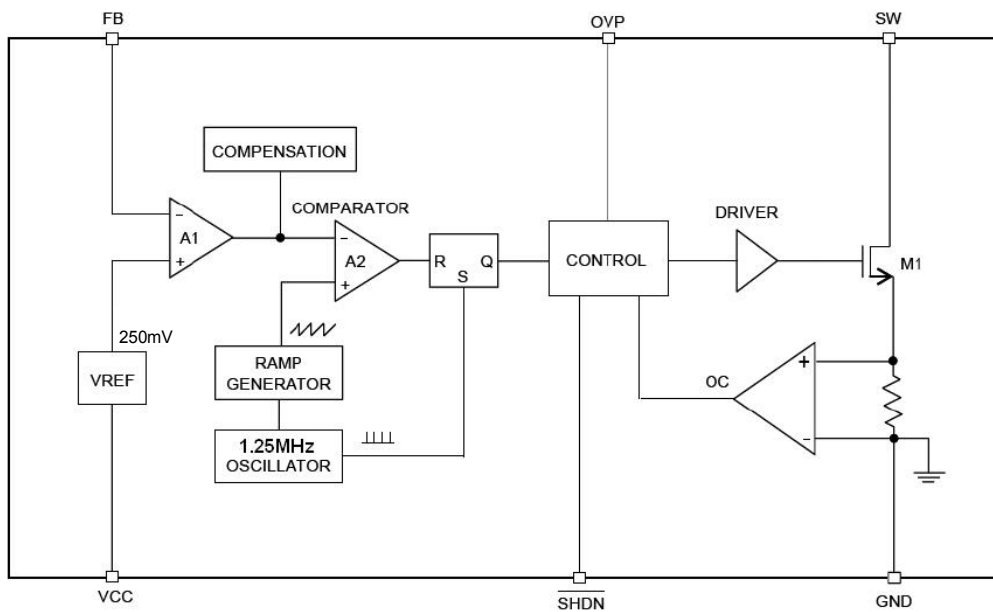




● Pin Description

| Pin No. | Pin Name | Pin Function |
|---------|----------|--|
| 1 | SW | Switch Pin. Connect inductor/diode here. Minimize trace area at this pin to reduce EMI. |
| 2 | GND | Ground Pin. Connect directly to local ground plane. |
| 3 | FB | Feedback Pin. Reference voltage is 250mV. Connect cathode of lowest LED and resistor here. Calculate resistor value according to the formula: $R_{FB} = 250mV/I_{LED}$ |
| 4 | SHDN | Shutdown Pin. Connect to 1.8V or higher to enable device; 0.4V or less to disable device. |
| 5 | OVP | Over Voltage Protection Sense Pin. |
| 6 | VIN | Input Supply Pin. Must be locally bypassed. |

● Functional Block Diagram



● Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|--------------------------------|------------|-------------|------|
| IN Voltage | V_{IN} | 8 | V |
| SW/OVP Voltage | V_{OUT} | 36 | V |
| FB Voltage | V_{FB} | 10 | V |
| SHDN Voltage | V_{SHDN} | 10 | V |
| Operating Junction Temperature | T_{opr} | -40 to +85 | °C |
| Storage Temperature Range | T_{stg} | -65 to +150 | °C |

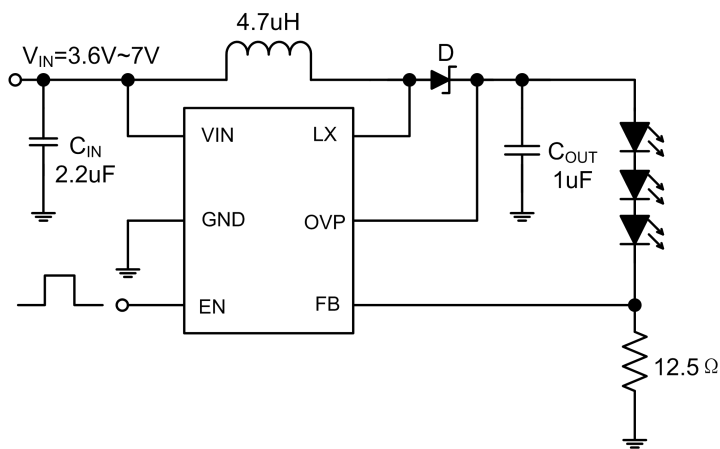


● **Electrical Characteristics**

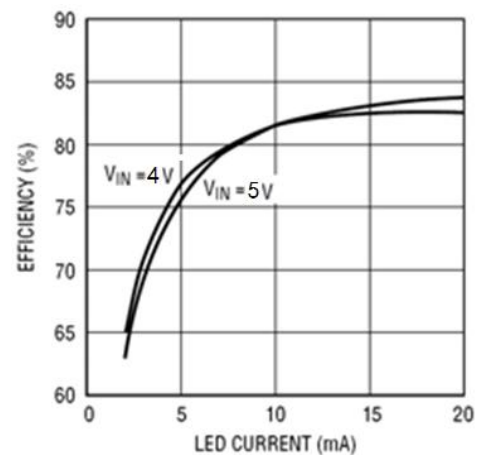
($V_{IN} = V_{OUT} + 0.5V$, $V_{EN} = V_{IN}$, $C_{OUT} = 1\mu F$, $T_J = 25^\circ C$ unless otherwise specified)

| Parameter | Parameter | Min | Typ | Max | Units |
|-----------------------------------|-------------------------------------|-----|------|-----|-------|
| Operating Voltage | | 2.5 | | 6.5 | V |
| Feedback Voltage | $I_{SW} = 100mA$, Duty Cycle = 66% | 235 | 250 | 265 | mV |
| Over Voltage Protection Threshold | | | 29 | | V |
| FB Pin Bias Current | | 10 | 45 | 100 | nA |
| Supply Current | | | 1.9 | 2.5 | mA |
| | SHDN = 0V | | 0.1 | 1.0 | mA |
| Switching Frequency | | 0.8 | 1.2 | 1.6 | MHz |
| Maximum Duty Cycle | | | 85 | 90 | % |
| Switch Current Limit | | | 340 | | mA |
| Switch VCESAT | $I_{SW} = 250mA$ | | 30 | | mV |
| Switch Leakage Current | $V_{SW} = 5V$ | | 0.01 | 5 | mA |
| SHDN Voltage High | | 1.8 | | | V |
| SHDN Voltage Low | | | | 0.4 | V |
| SHDN Pin Bias Current | | | 65 | | uA |

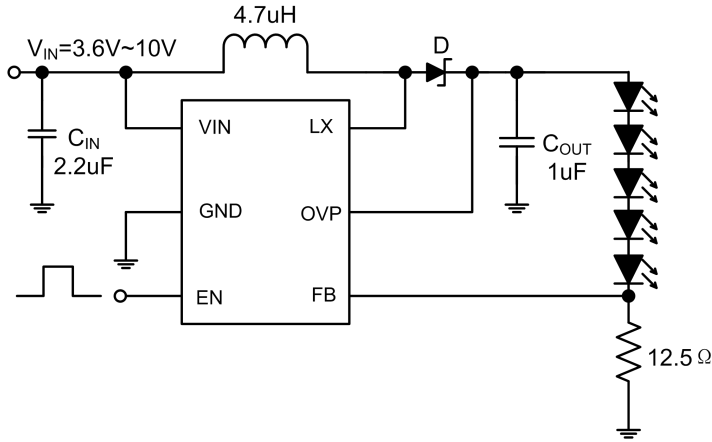
● **Typical Performance Characteristics**



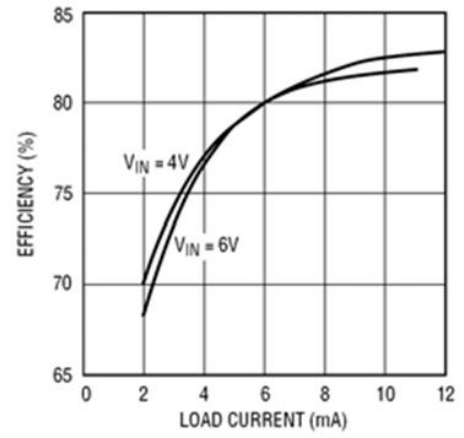
Li-Ion to Three White LEDs



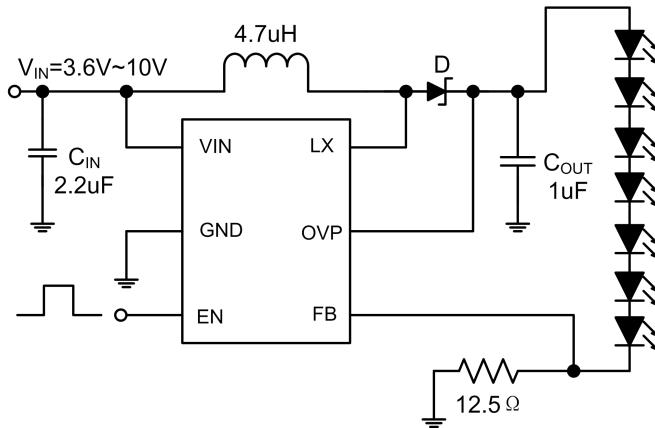
Three LED Efficiency



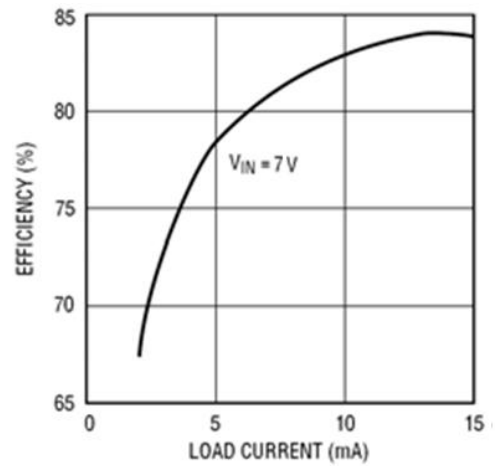
Li-Ion to Five White LEDs



Five LED Efficiency

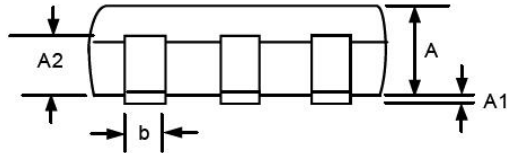
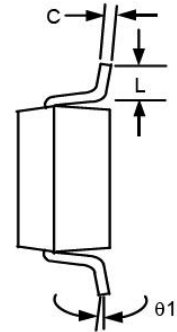
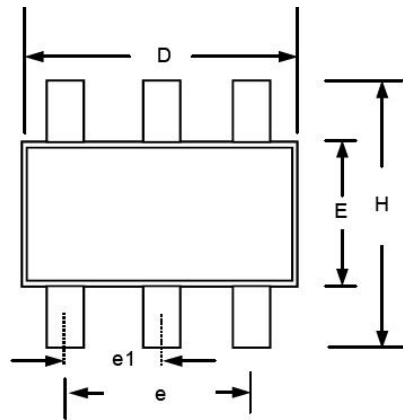


5V to Seven White LEDs



Seven LED Efficiency

- Package Information



| Symbol | Dimension mm | | | Dimension in inch | | |
|------------|--------------|------|------|-------------------|-------|-------|
| | Min | Nom | Max | Min | Nom | Max |
| A | 1.00 | 1.10 | 1.30 | 0.039 | 0.043 | 0.051 |
| A1 | 0.00 | | 0.10 | 0.000 | | 0.004 |
| A2 | 0.70 | 0.80 | 0.90 | 0.028 | 0.031 | 0.035 |
| b | 0.35 | 0.40 | 0.50 | 0.014 | 0.016 | 0.020 |
| C | 0.10 | 0.15 | 0.25 | 0.004 | 0.006 | 0.010 |
| D | 2.70 | 2.90 | 3.10 | 0.106 | 0.114 | 0.122 |
| E | 1.40 | 1.60 | 1.80 | 0.055 | 0.063 | 0.071 |
| e | 1.90(TYP) | | | 0.075(TYP) | | |
| H | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |
| L | 0.37 | | | 0.015 | | |
| $\theta 1$ | 1° | 5° | 9° | 1° | 5° | 9° |