



## L5100

## LINEAR INTEGRATED CIRCUIT

### WHITE LED STEP-UP CONVERTER

#### DESCRIPTION

The UTC **L5100** is a STEP-UP DC/DC Converter and designed for driving white LEDs with a constant current. It can drive several LEDs in series by a Li-Ion cell. UTC **L5100** switches at a high frequency 1.2MHz, so it can allow the use of tiny external components. The output capacitor can be as small as 0.22 $\mu$ F; saving space and cost compare with alternative other solutions. The low 95mV feedback voltage minimizes power loss in the current setting resistor can have better efficiency.

#### FEATURES

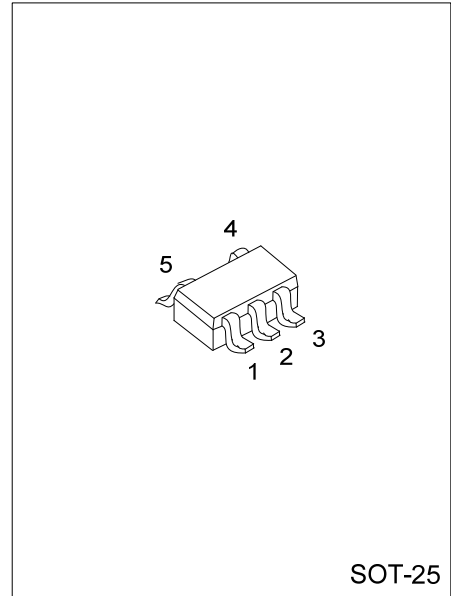
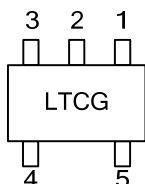
- \* Inherently Matched LED Current
- \* High Efficiency: 83% Typical
- \* Drives Up to Four LEDs from a 3.2V Supply
- \* Drives Up to Six LEDs from a 5V Supply
- \* 36V Rugged Bipolar Switch
- \* 1.2MHz Switching Frequency
- \* Uses Tiny 1mm Tall Inductors
- \* Output Capacitor can be Small to only 0.22 $\mu$ F

#### ORDERING INFORMATION

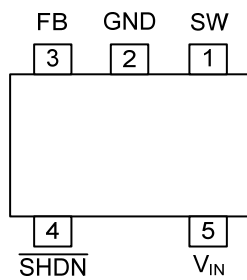
| Ordering Number | Package | Packing   |
|-----------------|---------|-----------|
| L5100G-AF5-R    | SOT-25  | Tape Reel |

|              |                 |                     |
|--------------|-----------------|---------------------|
| L5100G-AF5-R | (1)Packing Type | (1) R: Tape Reel    |
|              | (2)Package Type | (2) AF5: SOT-25     |
|              | (3)Halogen Free | (3) G: Halogen Free |

#### MARKING



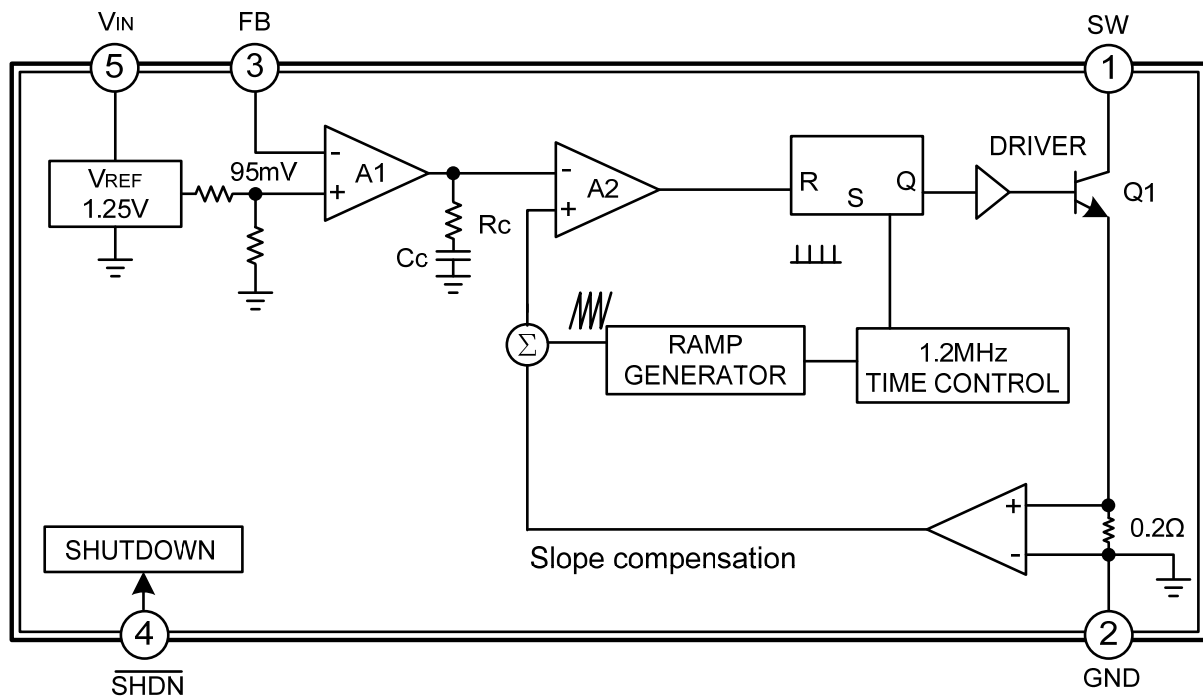
## ■ PIN CONFIGURATION



## ■ PIN DESCRIPTION

| PIN NO. | PIN NAME        | DESCRIPTION  |
|---------|-----------------|--|
| 1       | SW              | Switch. Connect inductor/diode here. Minimize trace area at this pin to reduce EMI.  |
| 2       | GND             | Ground. Connect directly to local ground plane.  |
| 3       | FB              | Feedback. 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       | SHDN            | Shutdown. Connect to 1.5V or higher to enable device; 0.4V or less to disable device.  |
| 5       | V <sub>IN</sub> | Input Supply Pin. Must be locally bypassed.  |

## ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER                      | SYMBOL     | RATINGS  | UNIT |
|--------------------------------|------------|----------|------|
| Input Voltage                  | $V_{IN}$   | 12       | V    |
| Switch Voltage                 | $V_{SW}$   | 36       | V    |
| Feedback Voltage               | $V_{FB}$   | 12       | V    |
| Shutdown Voltage               | $V_{SHDN}$ | 12       | V    |
| Junction Temperature           | $T_J$      | +125     | °C   |
| Operating Junction Temperature | $T_J$      | -40~+85  | °C   |
| Storage Temperature Range      | $T_{STG}$  | -65~+150 | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

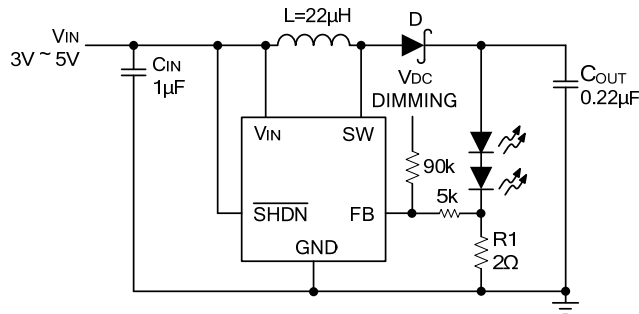
## ■ THERMAL DATA

| PARAMETER                         | SYMBOL        | RATINGS | UNIT |
|-----------------------------------|---------------|---------|------|
| Junction to Ambient (in free air) | $\theta_{JA}$ | 256     | °C/W |

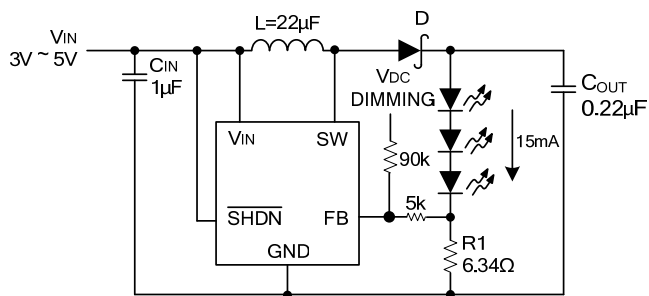
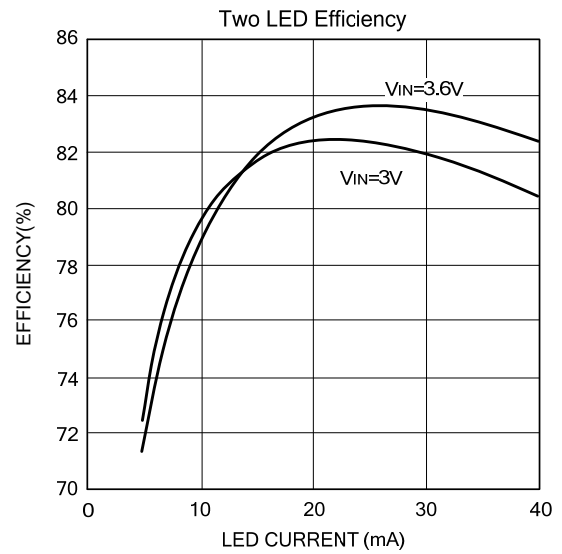
■ ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ ,  $V_{IN}=3\text{V}$ ,  $V_{SHDN}=3\text{V}$ , unless otherwise specified.)

| PARAMETER                 | SYMBOL          | TEST CONDITIONS                        | MIN | TYP  | MAX | UNIT          |
|---------------------------|-----------------|--|-----|------|-----|---------------|
| Operating Voltage         | $V_{IN}$        |  | 2.5 |      | 12  | V             |
| Feedback Voltage          | $V_{FB}$        | $I_{SW}=100\text{mA}$ , Duty Cycle=66% | 87  | 95   | 104 | mV            |
| Shutdown Voltage ON       | $V_{ON}$        |  | 1.5 |      |     | V             |
| Shutdown Voltage OFF      | $V_{OFF}$       |  |     |      | 0.3 | V             |
| Switch $V_{CESAT}$        | $V_{CESAT(SW)}$ | $I_{SW}=250\text{mA}$                  |     | 360  |     | mV            |
| Switch Current Limit      | $I_{SW}$        |  |     | 320  |     | mA            |
| Supply current            | $I_{CC}$        | $\overline{SHDN}=0\text{V}$            |     | 1.8  | 2.5 | mA            |
|                           |                 |  |     | 0.1  | 1.0 | $\mu\text{A}$ |
| Switch Leakage Current    | $I_{SW(OFF)}$   | $V_{SW}=5\text{V}$                     |     | 0.01 | 5   | $\mu\text{A}$ |
| Shutdown Pin Bias Current | $I_{SHDN}$      |  |     | 60   |     | $\mu\text{A}$ |
| Feedback Pin Bias Current | $I_{FB}$        |  | 10  | 45   | 100 | nA            |
| Switching Frequency       | $f_{OSC}$       |  | 0.8 | 1.2  | 1.6 | MHz           |
| Maximum Duty Cycle        | DC              |  | 85  | 90   |     | %             |

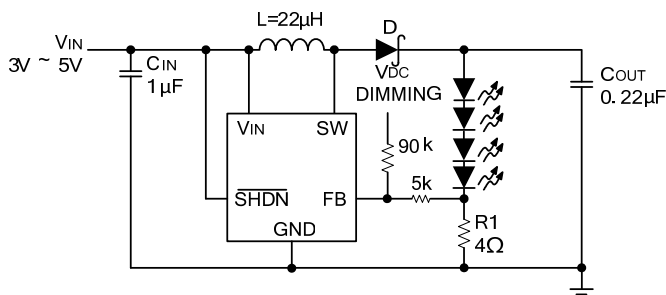
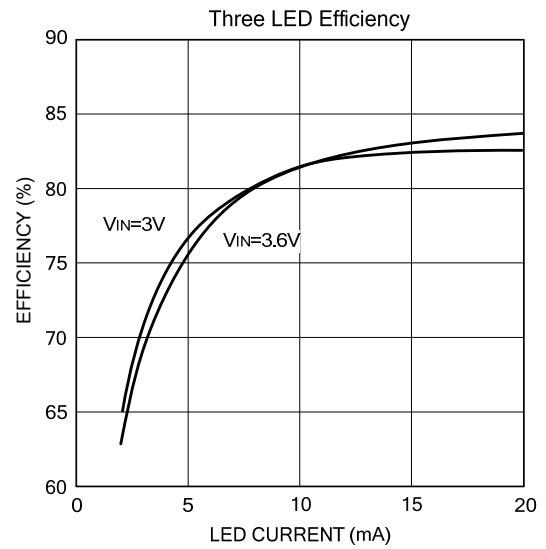
### ■ TYPICAL APPLICATION CIRCUITS



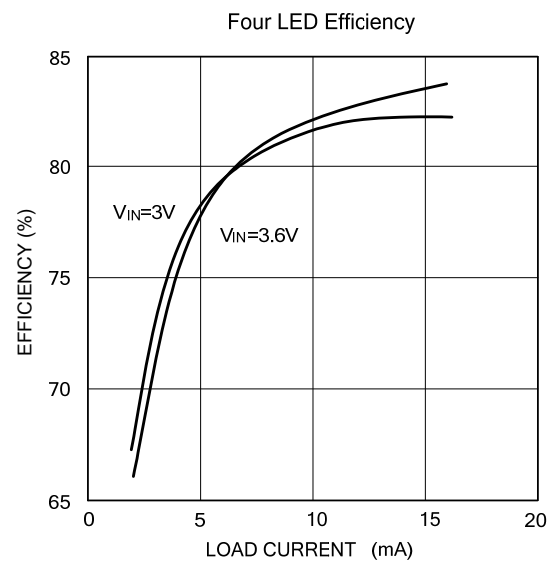
Li-Ion to Two White LEDs



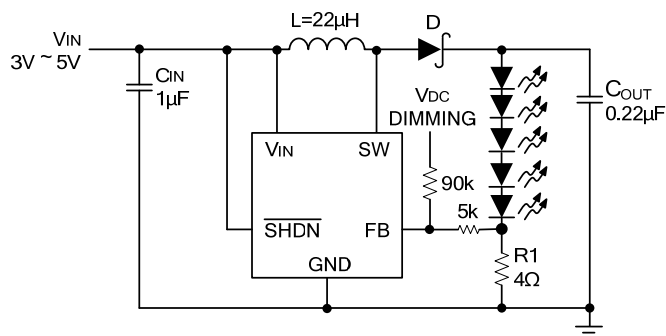
Li-Ion to Three White LEDs



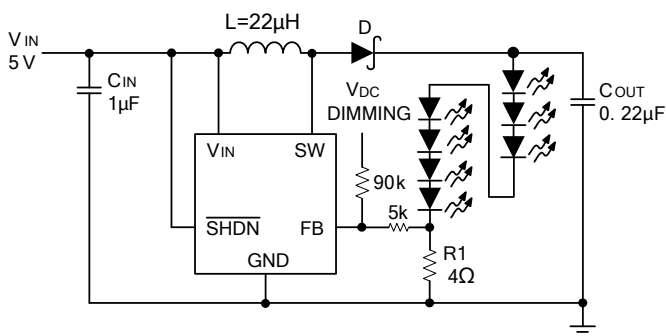
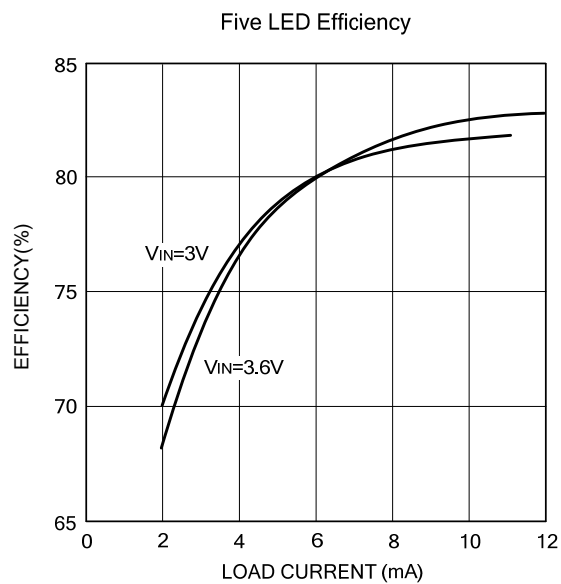
Li-Ion to Four White LEDs



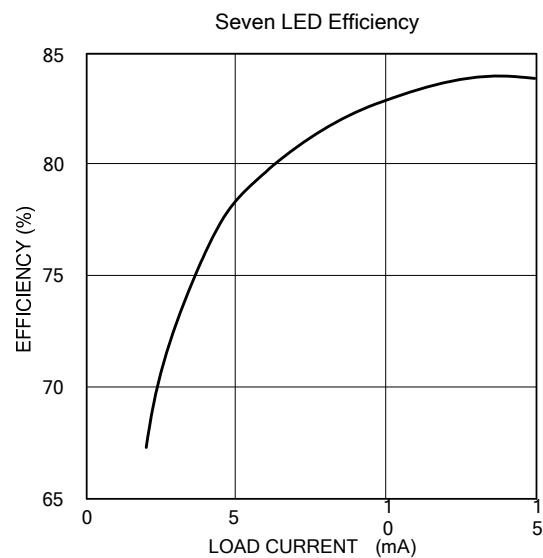
### ■ TYPICAL APPLICATION CIRCUITS (Cont.)



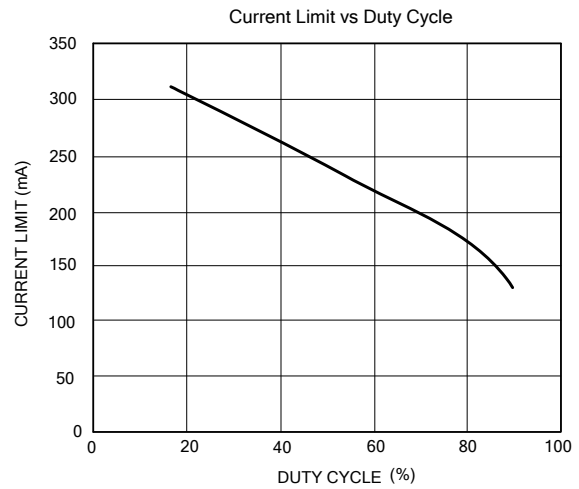
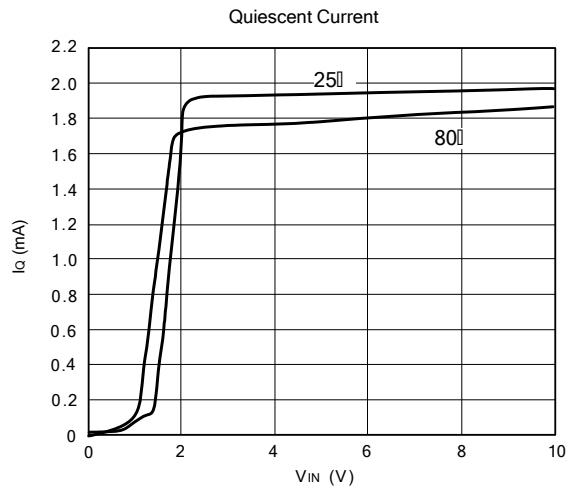
Li-Ion to Five White LEDs



5V to Seven White LEDs



### ■ TYPICAL CHARACTERISTICS



\* UTC L5100 is guaranteed the operating temperature range of 0°C ~ 75°C.

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