



## L5030

## LINEAR INTEGRATED CIRCUIT

### BOOST-UP VOLTAGE CONVERTER FOR LED DRIVER

#### DESCRIPTION

The **L5030** is a high efficiency boost converter operating in current loop, based on a PFM mode to drive LEDs. The current mode regulation allows the uniform brightness of LEDs. The wide application of **L5030** makes it suitable for many types of battery applications such as Li-ions, Alkaline, or Sealed Lead Acid battery. The combination of few external components and small package size keeps the converter board area to a minimum in space-restricted applications.

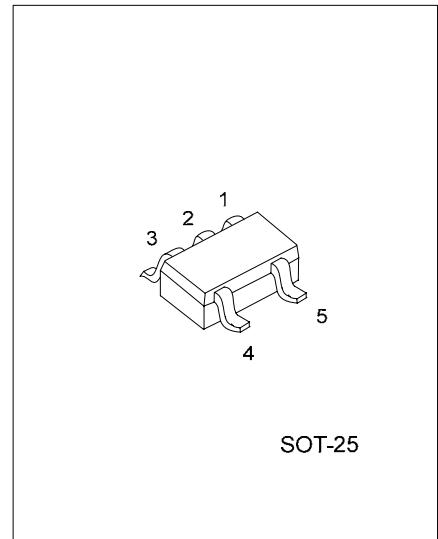
#### FEATURES

- \* Inductor based converter brings up to 92% efficiency
- \* +0.8V to +8.0V input voltage range
- \* 0.92V guaranteed start up input voltage
- \* Boost up control using PFM
- \* Constant output current regulation

#### ORDERING INFORMATION

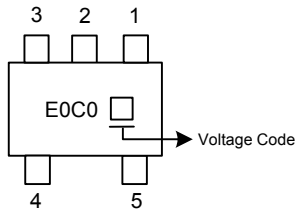
| Ordering Number |                   | Package | Packing   |
|-----------------|-------------------|---------|-----------|
| Normal          | Lead Free Plating |         |           |
| L5030-AF5-R     | L5030L-AF5-R      | SOT-25  | Tape Reel |

|   |  |
|---|--|
| <p>L5030L-AF5-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Plating</p> | <p>(1) R: Tape Reel</p> <p>(2) AF5: SOT-25</p> <p>(3) L: Lead Free Plating, Blank: Pb/Sn</p> |
|---|--|



\*Pb-free plating product number: L5030L

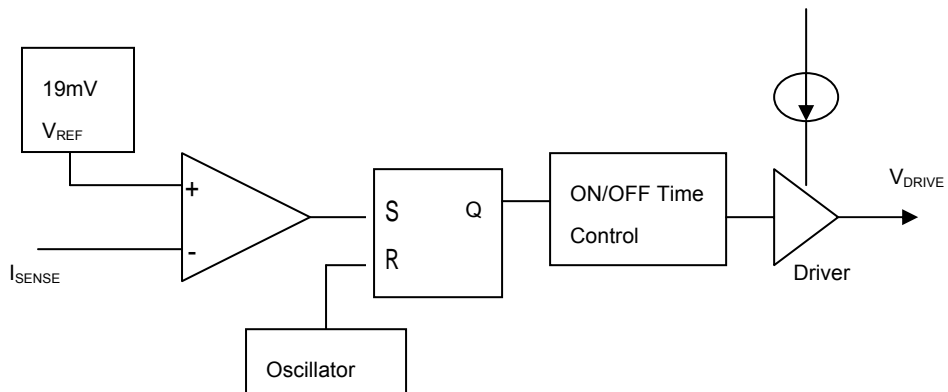
### MARKING



### PIN DESCRIPTIONS

| PIN NO. | SYMBOL             | I/O | DESCRIPTION   |
|---------|--------------------|-----|---|
| 1       | V <sub>CC</sub>    |     | Supply voltage  |
| 2       | GND                |     | Ground  |
| 3       | NC                 |     | No connection   |
| 4       | I <sub>SENSE</sub> | I   | Current sense input   |
| 5       | V <sub>DRIVE</sub> | O   | Output drive for external switching transistor. Connected to the base of external switching transistor. |

## ■ BLOCK DIAGRAM



### ■ DEVICE DESCRIPTION

The UTC L5030 is designed to supply a constant current to the external load, the circuit be powered a battery supply. An external transistor is required for LED application. The UTC L5030 guarantees the start up voltage as low as 0.92V and remains operation down to 0.8V.

The basic structure of UTC L5030 is a step-up DC/DC converter. It offers a Pulse Frequency Modulation (PFM) operation, which controls the constant OFF time (1.7 $\mu$ s typically) for external transistor at the 200KHz maximum frequency.

The external switching transistor is ON and kept on until the voltage across the current-sense resistor which is connected in series with the emitter of the switching transistor exceeds the  $I_{SENSE}$  input threshold (19mV). The transistor is shut OFF and the energy stored in inductor is discharged when  $I_{SENSE}$  input threshold exceeds 19mV. Once the discharge cycle is completed, the external transistor is ON again. This charging and discharging sequence will repeat and trigger the external transistor regardless the inductor current value.

■ ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)

| PARAMETER             | SYMBOL           | RATINGS                     | UNIT |
|-----------------------|------------------|-----------------------------|------|
| Supply Voltage        | V <sub>CC</sub>  | -0.3 ~ 10                   | V    |
| Input Voltage         |                  | -0.3 ~ V <sub>CC</sub> +0.3 | V    |
| Power Dissipation     | P <sub>D</sub>   | 450                         | mW   |
| Operating Temperature | T <sub>OPR</sub> | -40 ~ +85                   | °C   |
| Storage Temperature   | T <sub>STG</sub> | -55 ~ +125                  | °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.

■ ELECTRICAL CHARACTERISTICS (V<sub>CC</sub>=1.5V)

| PARAMETER   | SYMBOL                | TEST CONDITIONS  | MIN                  | TYP | MAX             | UNITS |
|---|-----------------------|--|----------------------|-----|-----------------|-------|
| <b>DC PARAMETERS</b> (Ta=25°C, unless otherwise specified.)               |                       |  |                      |     |                 |       |
| Recommended Supply Voltage  | V <sub>CC</sub>       |  | 0.8                  |     | 8               | V     |
| Minimum Startup Voltage   | V <sub>SU(MIN)</sub>  | I <sub>DRIVE</sub> =-600μA, V <sub>DRIVE</sub> =0.7V   |                      | 0.8 | 0.92            | V     |
| Drive Voltage   | High                  | V <sub>ISENSE</sub> = 0V, I <sub>VDRIVE</sub> = -0.5mA | V <sub>CC</sub> -0.3 |     | V <sub>CC</sub> | V     |
|   | Low                   | V <sub>ISENSE</sub> = 50mV, I <sub>VDRIVE</sub> = 5mA  | 0                    |     | 0.2             | V     |
| I <sub>SENSE</sub> Threshold Voltage                                      | V <sub>ISENSE</sub>   |  | 14                   | 19  | 24              | mV    |
| Efficiency(Note 1)  | η                     |  |                      | 88  | 92              | %     |
| Quiescent Current(Note 2)   | I <sub>Q</sub>        |  |                      | 0.2 |                 | mA    |
| V <sub>DRIVE</sub> Output Current   | I <sub>VDRIVE</sub>   | V <sub>DRIVE</sub> = 0.7V, V <sub>ISENSE</sub> = 0V    | 1.5                  |     | 3.6             | mA    |
| Supply Current(Note 3)  | I <sub>CC</sub>       | V <sub>DRIVE</sub> = 0.7V, V <sub>ISENSE</sub> = 0V    | 2                    |     | 4               | mA    |
| I <sub>SENSE</sub> Voltage Temp Co.(Note 2)                               | T <sub>CVISENSE</sub> |  |                      | 0.4 |                 | %/°C  |
| I <sub>SENSE</sub> Input Current  | I <sub>ISENSE</sub>   | V <sub>ISENSE</sub> = 0V                               | 0                    | -30 | -65             | μA    |
| <b>AC PARAMETERS</b> (Note 2) (Ta = 0 ~ 70°C, unless otherwise specified) |                       |  |                      |     |                 |       |
| Discharge Pulse Width   | T <sub>DRV</sub>      |  | 1.2                  | 1.7 | 3.2             | μs    |
| PFM Operating Frequency (Note 4)  | F <sub>OSC</sub>      |  |                      |     | 200             | kHz   |

Note 1. The application dependent, please see reference designs.

2. These parameters are guaranteed by design.

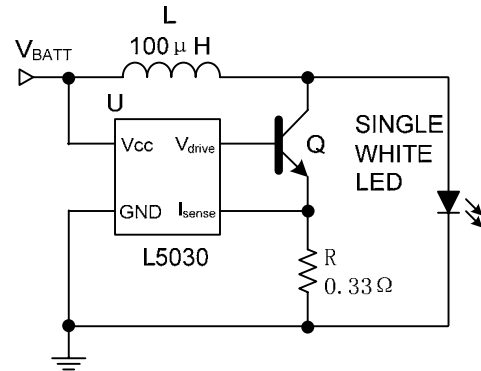
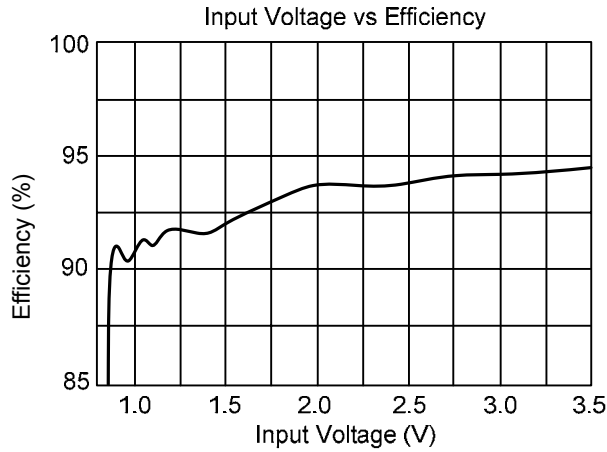
3. See typical characteristics. The total supply current = I<sub>Q</sub> + I<sub>VDRIVE</sub>,

4. See applications section. Operating frequency is application circuit dependent.

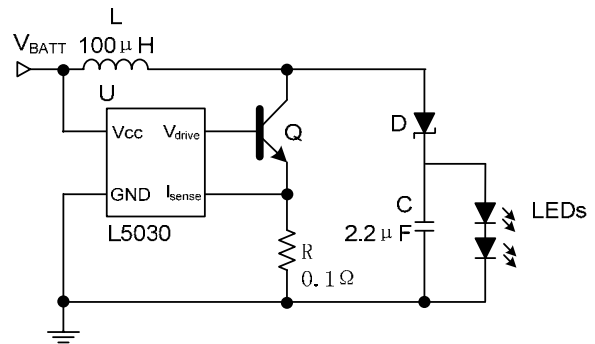
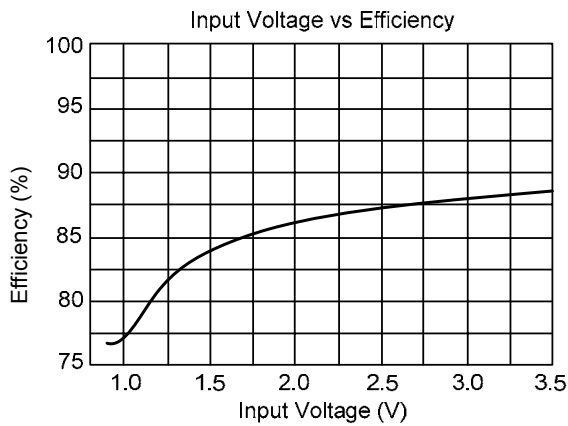
## ■ TYPICAL APPLICATION CIRCUITS

The UTC L5030 provides portable and multiple LEDs applications.

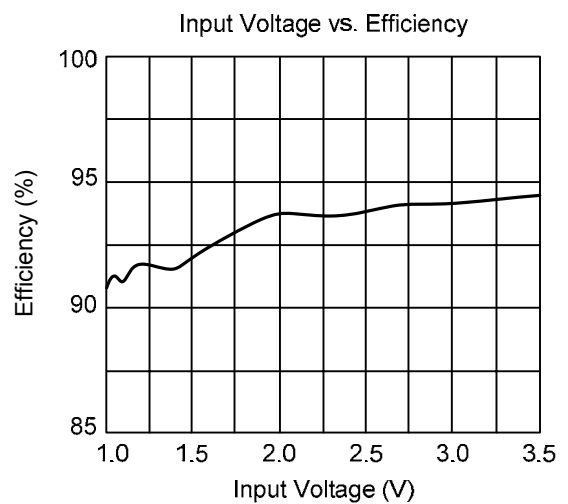
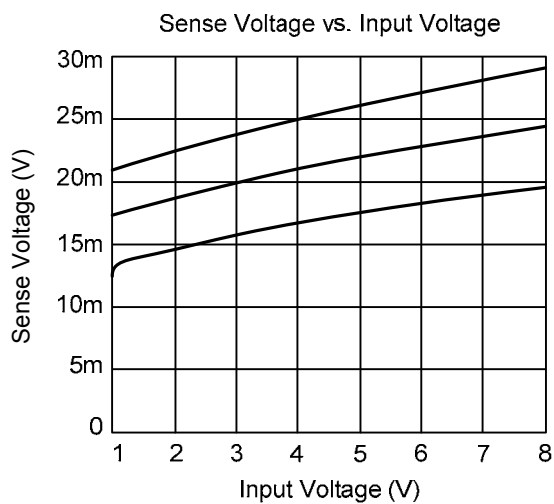
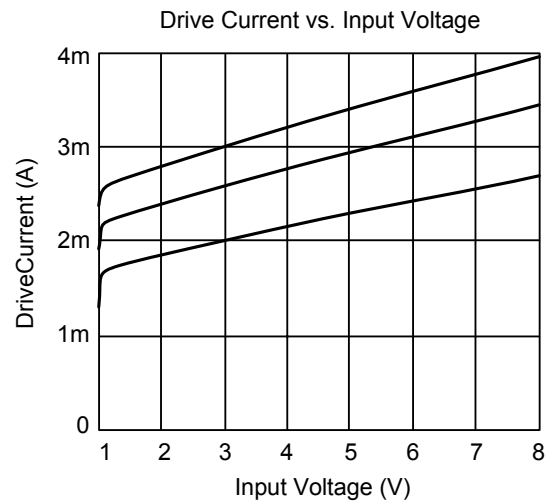
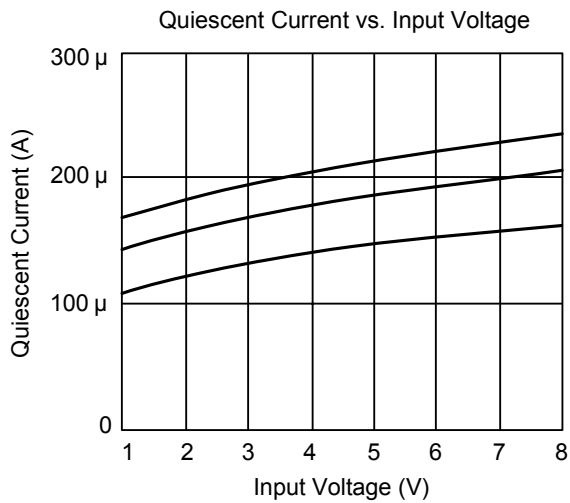
### Solution for portable application



### Solution for multiple LEDs application



## TYPICAL CHARACTERISTICS



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