# 0.8A/40V Input 800kHz Buck LED Driver

## ■ General Description

LN5019 is a current mode monolithic buck switching regulator. Operating with an input range of 4.5V~40V, the LN5019 delivers 800mA of continuous output current with two integrated N-Channel MOSFETs. The internal synchronous power switches provide high efficiency without the use of an external Schottky diode. At light loads, the regulator operates in low frequency to maintain high efficiency and low output ripple. Current mode control provides tight load transient response and cycle-by-cycle current limit.

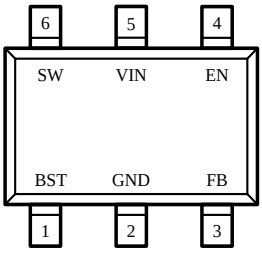
The LN5019 guarantees robustness with short-circuit protection, thermal protection, current run-away protection,

## ■ Ordering Information

**LN5019P**

| Designator | Symbol | Description |
|---|---|---|
| | A | Feedback Voltage 0.2V |
| | M | Package Type :SOT-23-6L |
| | R | Embossed Tape : Standard Feed |
| | L | Embossed Tape : Reverse Feed |

## ■ Pin Configuration



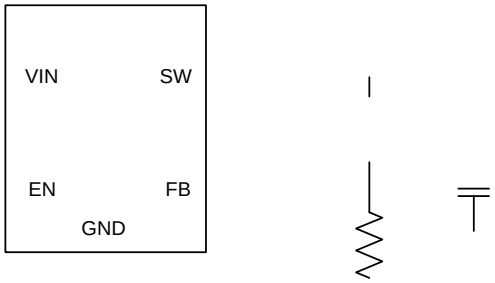

SOT-23-6L
(TOP VIEW)

## ■ Pin Assignment SOT

| Pin Number | Pin Name | Function |
|---|---|---|
| SOT-23-6L | | |

## ■ Dimming Control

Dimming control can be realized by using a DC voltage through the FB pin for LN5019 as below




Calculate ILED using the following equations

(1)

where VD is DC voltage

When the analog dimming voltage VD>>0.2V, the minimum value of ILED is approximately 0, calculated by

$$0.2=(VD-0.2)*R1/R2 \quad (2)$$

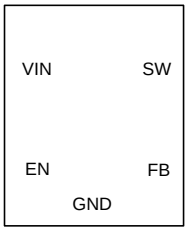
When the analog dimming voltage VD=0V, ILED reaches the maximum, calculated by

$$ILEDmax=1/RSET \times (0.2 + 0.2*R1/R2) \quad (3)$$

For example, RSET=0.22ohm, VD=1.8V, ILED=1A, then R2/R1=8. Considering the current capability of IO and other system factors, take R1=10K, then R2=80K

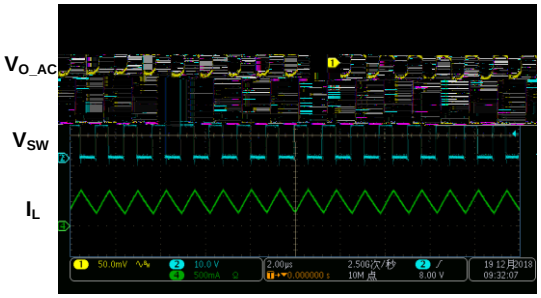
Using PWM dimming signal we can get the DC voltage VD.

The low-pass filter composed of RS and CS converts the digital signal PWM into an analog signal VD.



**Medium Load Operation**

Vin=12V Vout=5.0V Lout=400mA




**Startup through Enable**

Vin=12V Vout=5.0V Lout=800mA Resistive load




**Shutdown through Enable**

Vin=12V Vout=5.0V Lout=800mA Resistive load




**Load Transient**

Load 300mA ->800mA ->300mA



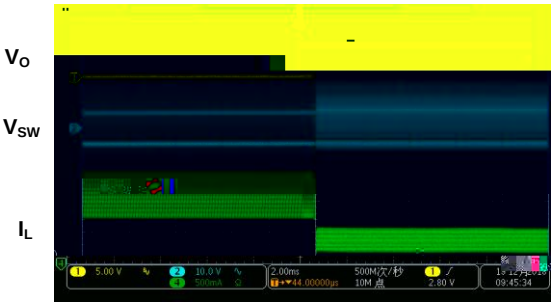

**Short Circuit Protection**

Vin=12V Vout=5.0V Lout=800mA - Short




**Short Circuit Protection**

Vin=12V Vout=5.0V Lout= Short - 800mA



## ■ Functional Description

## ■ Application Information

**Setting the Output Current**

The external resistor $R_{SET}$ is used to set the output current (see Typical Application on page 1). $R_{SET}$ is then given by:

**Inductor Selection**

A

recommended for most applications. For highest efficiency, the inductor DC resi . For most designs, the inductance value can be derived from the following equation.

Where is the inductor ripple current.

Choose to be approximately 30% of the maximum load current.

Under light load conditions below 100mA, larger inductance is recommended for improved efficiency.

Note If the output voltage is less than 2.5V, it is recommended to use a larger inductance and add a small capacitance 10nF parallel to R1.

**Input Capacitor Selection**

The input capacitor reduces the surge current drawn from the input and switching noise from the device. The input capacitor impedance at the switching frequency should be less than input source impedance to prevent high frequency switching current passing to the input. A low ESR input capacitor sized for maximum RMS current must be used. Ceramic capacitors with X5R or X7R dielectrics are highly recommended because of their low ESR and small temperature coefficients. A 22µF ceramic capacitor for most applications is sufficient. Include a capacitor with a value of 0.1 µF for high-frequency filtering and place it as close as possible to the device pins.

**Output Capacitor Selection**

The output capacitor ($C_{OUT}$) is required to maintain the DC output voltage, and the capacitance value determines the output ripple voltage. The output voltage ripple can be calculated by:

Where L is the inductor value and $R_{ESR}$ is the equivalent series resistance (ESR) value of the output capacitor.

The output capacitor can be low ESR electrolytic, tantalum or ceramic, which lower ESR capacitors get lower output ripple voltage.

The characteristics of the output capacitor also affect the stability of the regulation system, and a 10uF ceramic capacitor is recommended in typical application.The LN5019 can be optimized for a wide range of capacitance and ESR values.

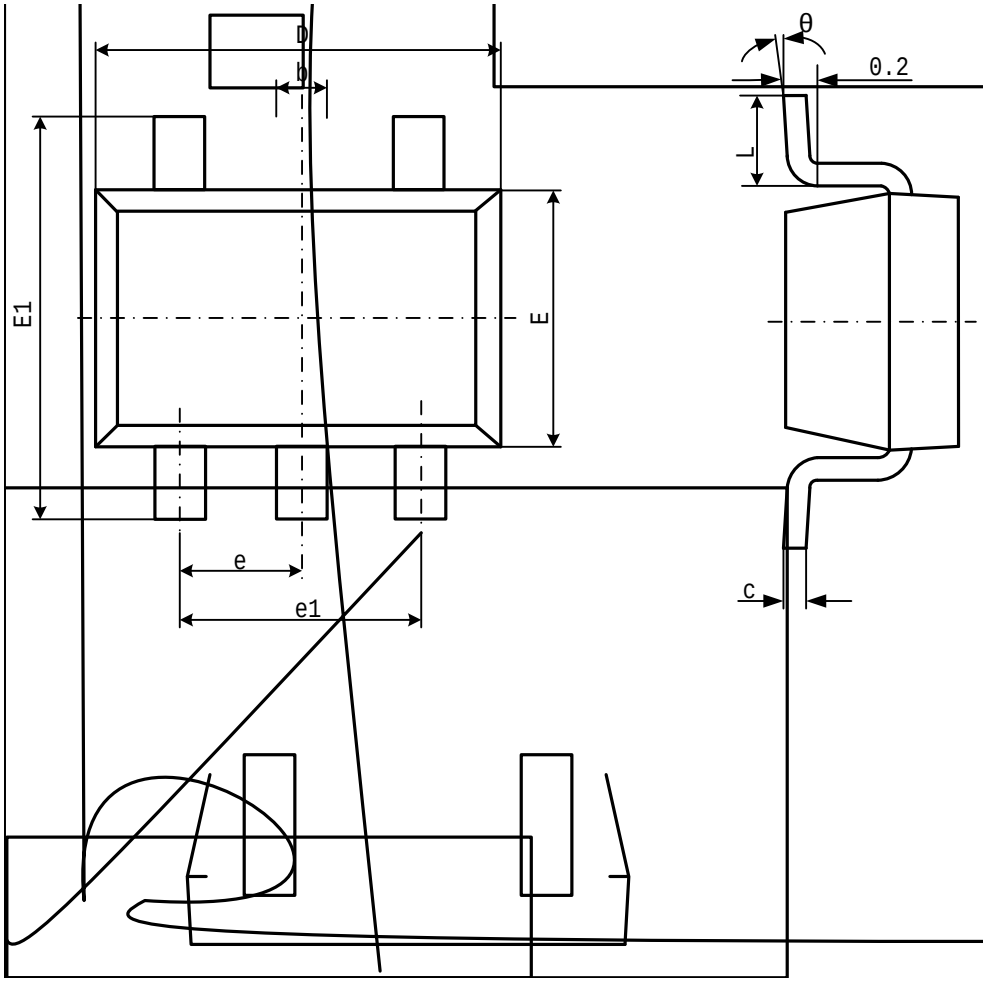
## ■ Application Information

For minimum noise problem and best operating performance, the PCB is preferred to following the guidelines as reference.

1. Place the input decoupling capacitor as close to LN5019 (VIN pin and GND) as possible to eliminate noise at the input pin. The loop area formed by input capacitor and GND must be minimized.
2. Put the feedback trace as far away from the inductor and noisy power traces as possible.
3. The ground plane on the PCB should be as large as possible for better heat dissipation.

## ■ Package Information

**SOT-23-6L**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| | 0 ° | 8 ° | 0 ° | 8 ° |