



## L3012

## LINEAR INTEGRATED CIRCUIT

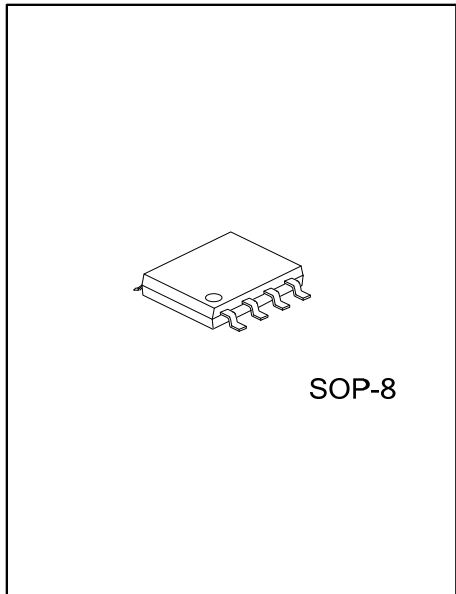
### 1A HIGH POWER LED DRIVER WITH 4.5~40V INPUT

#### DESCRIPTION

The UTC **L3012** is a step-down PWM control LED driver with a built-in power Switch. It achieves 1A continuous output current in 4.5~40V input voltage range. It has high efficiency up to more than 96%, with the excellent current accuracy within  $\pm 1\%$ .

#### FEATURES

- \* 4.5~40V input voltage range
- \* Maximum 1A output current
- \* 0.15Ω built-in power MOSFET
- \* 280kHz fixed frequency
- \* Excellent constant current accuracy  $\pm 1\%$
- \* Thermal shutdown
- \* Cycle-by-cycle over current protection
- \* PWM dimming function

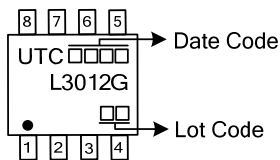


#### ORDERING INFORMATION

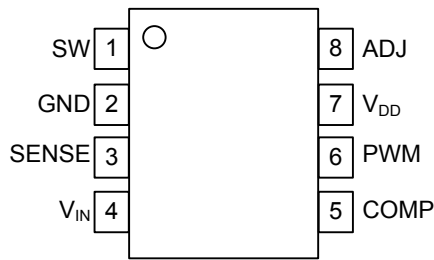
Ordering Number	Package	Packing
L3012G-S08-R	SOP-8	Tape Reel

<p>L3012G-S08-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) S08: SOP-8</li> <li>(3) G: Halogen Free and Lead Free</li> </ul>
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#### MARKING



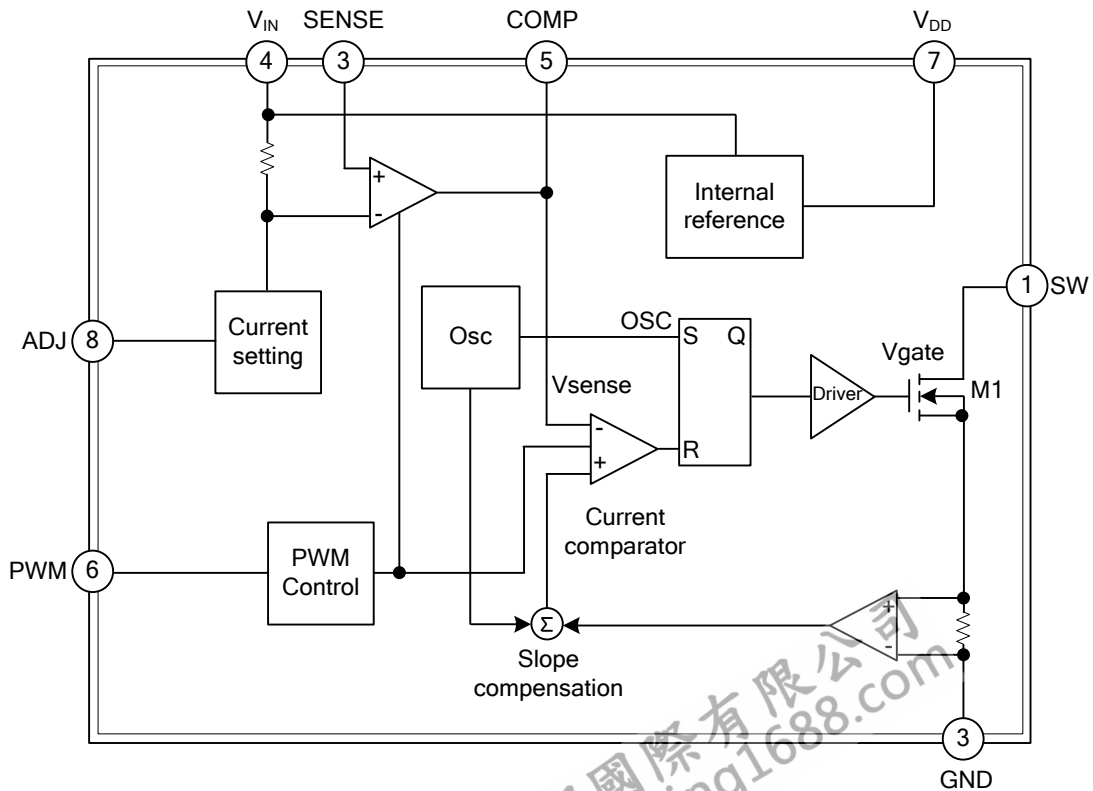
## PIN CONFIGURATION



## PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	SW	Power Switch output.
2	GND	Ground.
3	SENSE	Current sense pin.
4	V <sub>IN</sub>	Input supply voltage.
5	COMP	Compensation pin, connects to external capacitor.
6	PWM	PWM dimming pin.
7	V <sub>DD</sub>	5V LDO output
8	ADJ	Thermal compensation pin or linear dimming pin.

## BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{IN}$	40	V
Switch Voltage	$V_{SW}$	$-1\sim V_{IN}+1$	V
Comp Voltage	$V_{COMP}$	$-0.3\sim 6$	V
SENSE Voltage	$V_{SENSE}$	$-0.3\sim V_{IN}$	V
Input Voltage	$V_{IN}$	4.5~40	V
Junction Temperature	$T_J$	150	$^{\circ}\text{C}$
Operating Temperature	$T_{OPR}$	$-40\sim +125$	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	$-65\sim +150$	$^{\circ}\text{C}$

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 ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified,  $V_{IN}=12\text{V}$ ,  $I_{OUT}=700\text{mA}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{IN}$		6		36	V
Operating Current	$I_{IN}$	$V_{CC}=4/40\text{V}$ (Switch Off)		2.2	5	mA
Upper Switch Leakage	$I_L$	$V_{SW}=40\text{V}$		0	5	$\mu\text{A}$
Current Limit	$I_{LIM}$	$V_{IN}=\text{SENSE}=12\text{V}$	1.7	2	3	A
Maximum Duty Cycle	$D_{MAX}$	3LED, $V_{IN}=9\text{V}$		94	96	%
Oscillator Frequency	$f_{OSC}$		250	280	350	kHz
COMP Clamp Voltage	$V_{COMP}$	Open without load		2.6		V
Switch Transistor on Resistance	$R_{ON}$	1LED, $I_{OUT}=1\text{A}$		0.15	0.5	$\Omega$
Sampling Voltage Threshold	$V_{IN}-V_{SENSE}$	Drop voltage between $V_{IN}$ and SENSE		100		mV
Thermal Shutdown Threshold	TSD			160		$^{\circ}\text{C}$
Thermal Shutdown Hysteresis	TSD-hys			30		$^{\circ}\text{C}$

### FUNCTION DESCRIPTION

The UTC **L3012** is a current mode and fixed frequency (280kHz) LED driver.

#### 1. Output current setting

The output current is determined by the sampling resistor ( $R_s$ ) and setting voltage ( $V_{IN}-V_{SENSE}$  a built-in fixed 100mV).

$$I_{OUT} = \frac{V_{IN} - V_{SENSE}}{R_s} = 100mV/R_s$$

#### 2. Current limiting

UTC **L3012** has internal current limiting function, and the voltage on COMP is clamped at about 2V, the output current of the power MOSFET is limited at about 2A by current comparator.

#### 3. Diode Selection

UTC **L3012** driver LED need a Schottky diode. If output current is 700mA or smaller then SS14W (1N5819) is ok.

The average current through the diode is  $I_D$ :

$$I_D = (1-D) \cdot I_{LED}$$

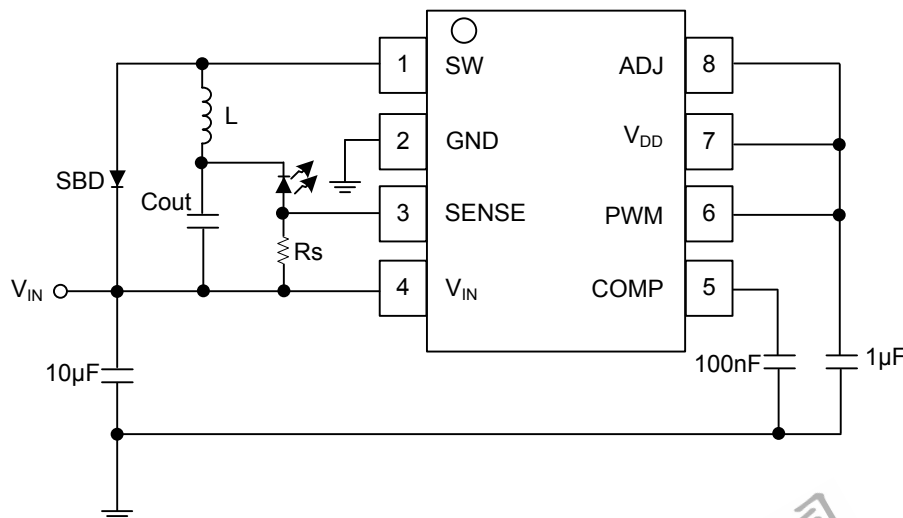
$I_{LED}$  is the current of LED

#### 4. PWM dimming

UTC **L3012** has internal PWM dimming function. When PWM voltage is connects to high level, the chip is working normally, when PWM voltage is open or connects to low level, the COMP pin voltage will keep normal state, so can improve the startup speed of the chip. Adjust the output current by control the duty of external PWM signal.

The minimum setup time of UTC **L3012** PWM dimming is less than 20 $\mu$ S, and the maximum PWM dimming ratio is up to 500:1. When high dimming ratio is needed, the dimming frequency is recommended 500Hz below, or else the dimming frequency can be up to 2KHz. When PWM pin is low, output is shutdown.

### TYPICAL APPLICATION CIRCUIT



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