



HX3244

High-efficiency Boost Constant-current LED Driver

Features

- Wide output voltage range: 2V to 24V
- Programmable LED Drive Current : 10mA~1.2A
- Typical 5% output current accuracy
- High efficiency (up to 88%)
- Adjustable Constant LED Current
- SOT-23-6L package

Applications

- Low voltage halogen replacement LEDs
- LED back-up lighting
- Low voltage industrial lighting
- LED traffic warning lights
- Constant Current Source
- SELV lighting
- RGB High Brightness LED lighting
- LCD TV backlighting

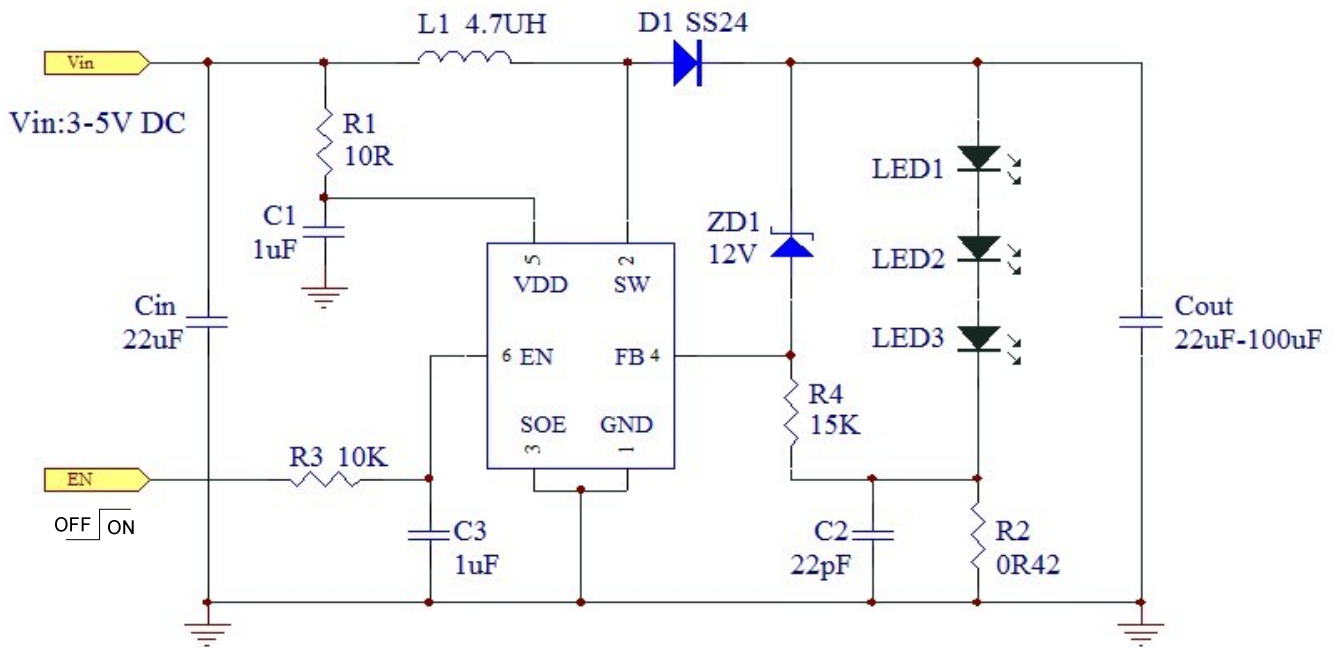
Description

The HX3244 is a high-efficiency boost constant-current LED driver, designed for driving single or multiple series connected LED efficiently. The device operates from an output between 2V and 24V and provides an externally adjustable output current of up to 1.2A. Depending upon the supply voltage and external components, the HX3244 can provide Max 5 watts of LED

The HX3244 includes the power switch which operating frequency up to 600KHz. The HX3244 is available in SOT-23-6L packages.

Typical Application Circuit

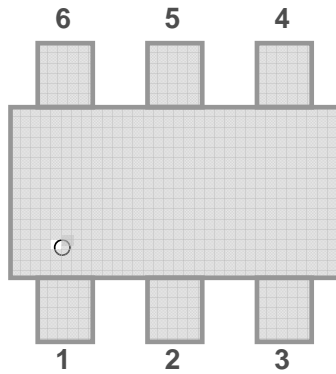
Drive four to seven 3W' LED



Absolute Maximum Ratings

- Supply Voltage.....-0.3V to 6.5V
- SW Pin Voltage -0.3 to 24V
- Other I/O Pin Voltages-0.3V to (VDD + 0.3V)
- SW Pin Current3A
- Operating Junction Temperature..... 125°C
- Storage Temperature Range -65°C ~ +150°C
- Lead Temperature (Soldering 10 sec) 265°C

Pin Assignment



PIN NUMBER SOT-23-6L	PIN NAME	FUNCTION
1	GND	Ground
2	SW	Switch Output
3	SOE	Current Setting
4	FB	Feedback
5	VDD	Input
6	EN	ON/OFF Control (High Enable)

Pin Function

GND (Pin1): Signal and Power Ground.

SW (Pin 2): Drain of power switch. Connected to the inductor, drive the LED.

SOE (Pin3): According to the resistors which connect SOE Pin and GND Pin to set the current of internal MOSFET. Generally, set a 0 Ω resistor.

FB (Pin 4): The feedback voltage is 0.125V, the current can be adjusted by setting the resistor which is connected between VFB and GND. Formula: $I_{LED} = 0.125V/R_2$.

VDD (Pin 5): Power input. Input voltage range: 3-5V

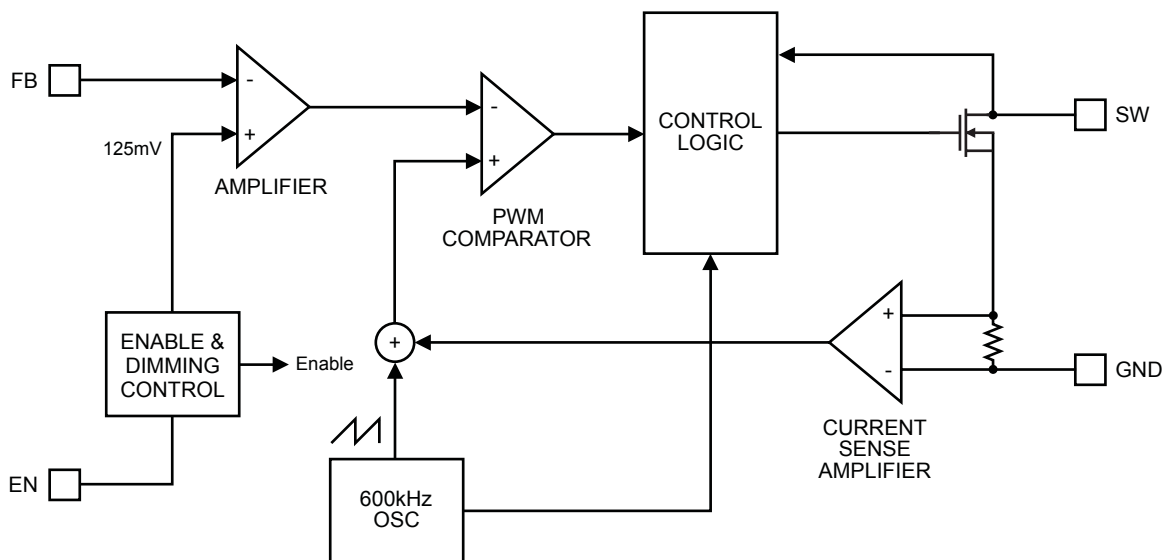
EN (Pin 6): En Control Input. Forcing this pin above 1.5V enables the part. Forcing this pin below 0.4V shuts down the device. In shutdown, all functions are disabled drawing <1uA supply current. Do not leave EN floating.

Electrical Characteristics

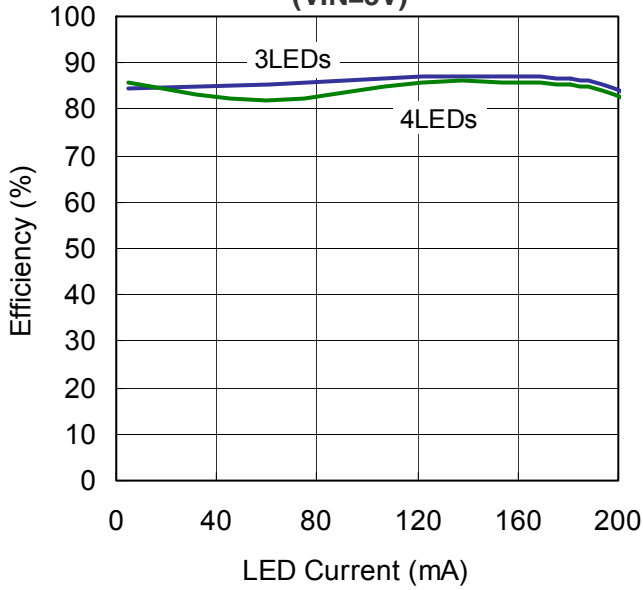
(R2=0.33 , TA = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Operating Input Voltage	V _{in}		2		6	V
VDD Pin Voltage	V _{DD}		3		5.5	V
Maximum Duty Cycle	D _{max}	V _{dd} =2.5V 3ELED		80		%
Operating Quiescent Current Into Vin	I _Q	I _{out} =0mA		200		μA
Enable						
En Input Bias Current	I _{EN}			1		μA
En Shut Down Voltage	V _{EN}				0.4	V
Enable Voltage	V _{EN}		1.5			V
Feedback						
Fb Voltage	V _{fb}	V _{in} =3.6V	110	125	140	mV
		V _{in} =4.8V	130		170	mV
Fb Input Bias Current	I _{bias}			0.1	1	μA
Output Switch						
SW ON-Resistance	R _{ON}	V _{in} =3.6V		0.26		Ω
SW Current Limit	I _{limit}				3	A
Oscillator						
Switching Frequency	f _{sw}			600		kHz
Maximum Switch Voltage	V _{sw}	V _{in} =2-5V		24		V

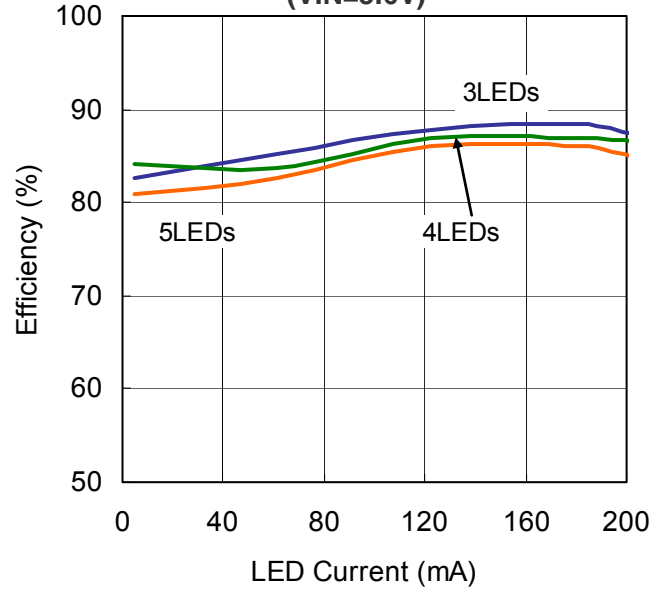
Functional Block Diagram



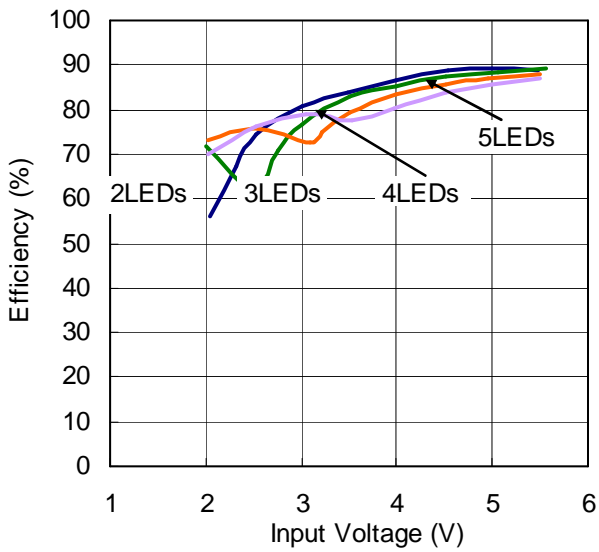
**Efficiency vs. LED Current
(VIN=3V)**



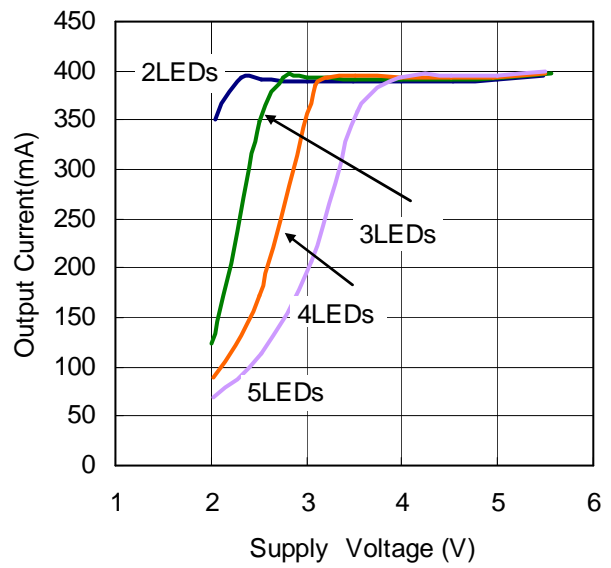
**Efficiency vs. LED Current
(VIN=3.6V)**

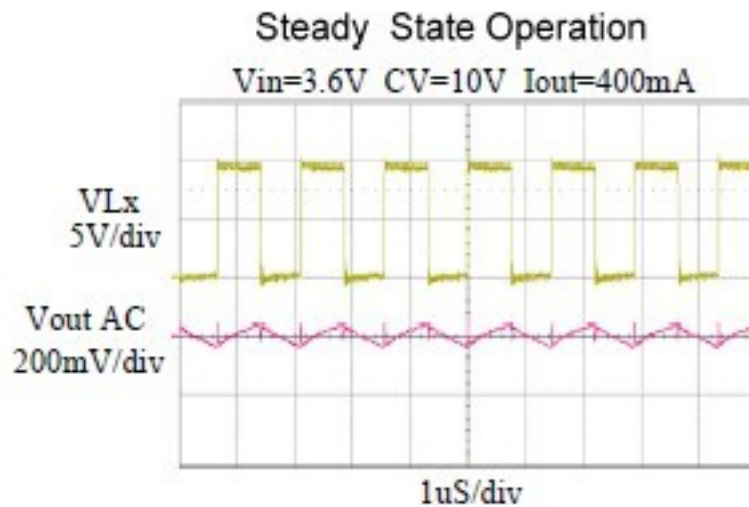


**Efficiency vs. Supply Voltage
(R=0.33ohm)**



**Output Current vs. Supply Voltage
(R=0.33ohm)**





Applications Information

LED Current Control

The Hx3244 regulates the LED current by setting the current sense resistor (RSET) connecting to feedback and ground. The internal feedback reference voltage is 0.125V. The LED current can be set from following equation easily:

$$R_{SET} = 0.125V / I_{LED}$$

In order to have an accurate LED current, precision resistors are preferred (1% is recommended). The table for RSET selection is shown below.

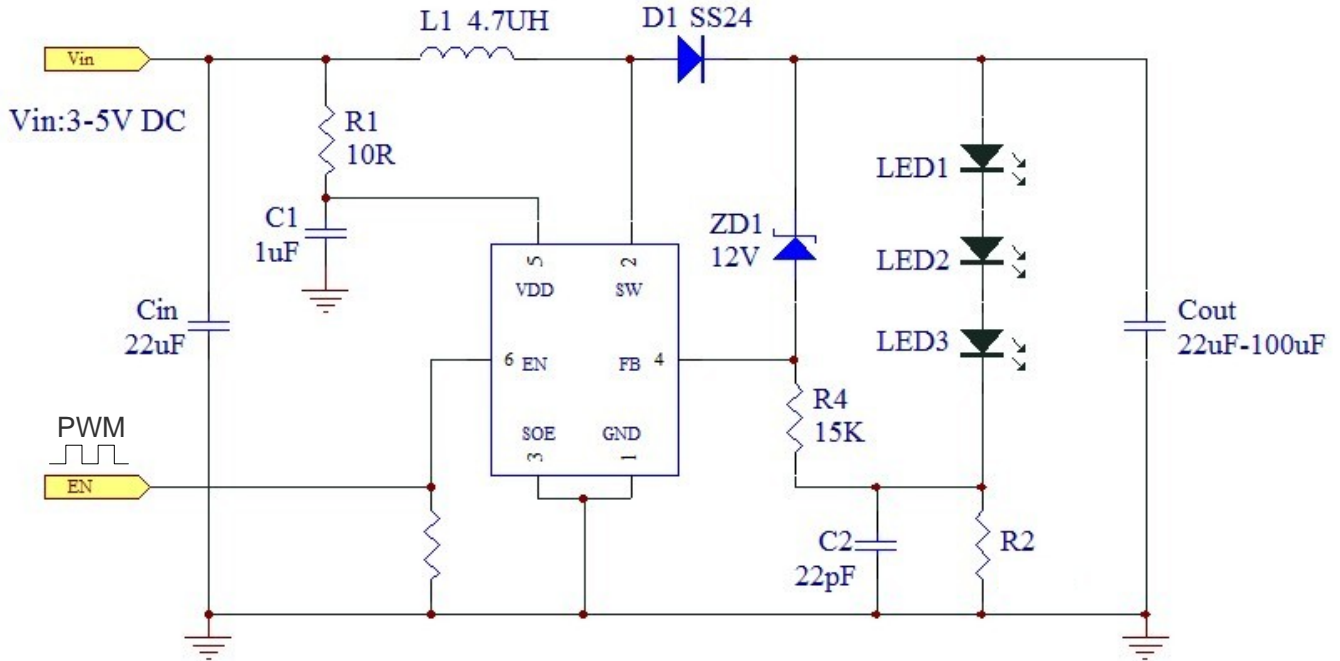
Inductor Selection

The recommended value of inductor for 2 to 5 WLEDs applications are 4.7 to 22 μ H. Small size and better efficiency are the major concerns for portable device, such as Hx3244 used for mobile phone. The inductor should have low core loss at 600KHz and low DCR for better efficiency. To avoid inductor saturation current rating should be considered.

Dimming control

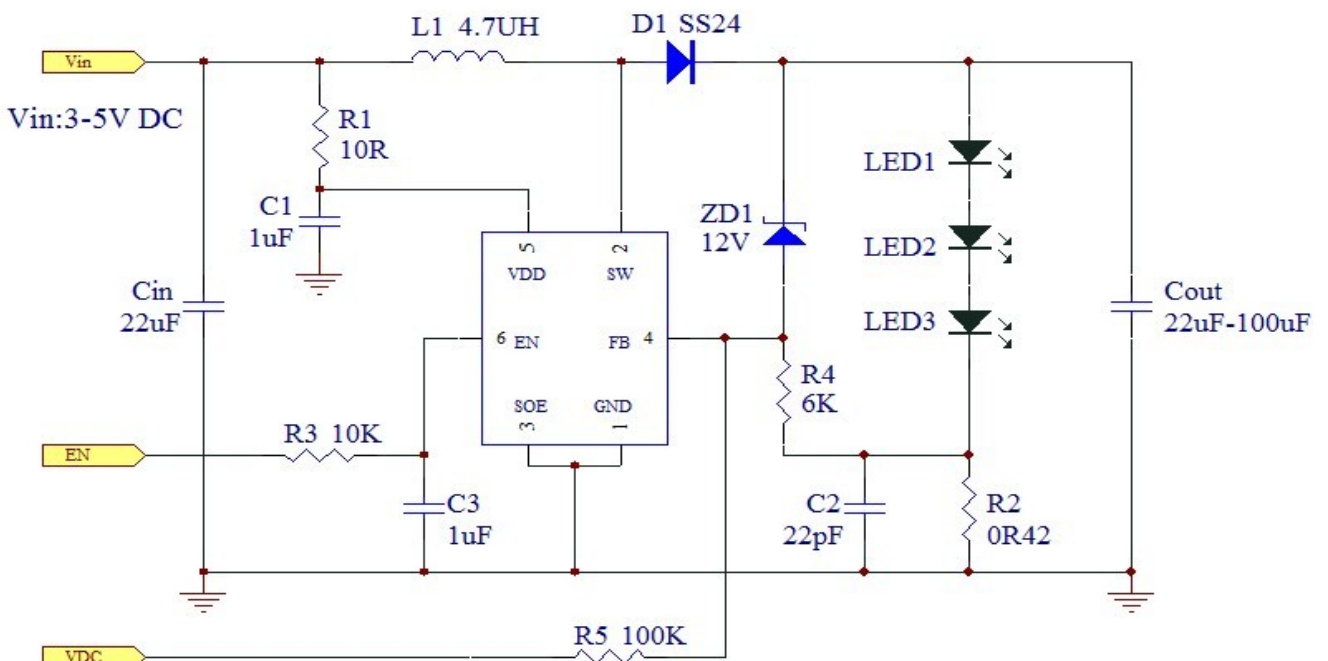
a. Using a PWM Signal to EN Pin

For controlling the LED brightness, the Hx3244 can perform the dimming control by applying a PWM signal to EN pin. The internal soft-start and wide range dimming frequency from 100Hz to 25KHz can insignificantly reduce audio noise when dimming. The average LED current is proportional to the PWM signal duty cycle. The magnitude of the PWM signal should be higher than the maximum enable voltage of EN pin, in order to let the dimming control perform correctly.



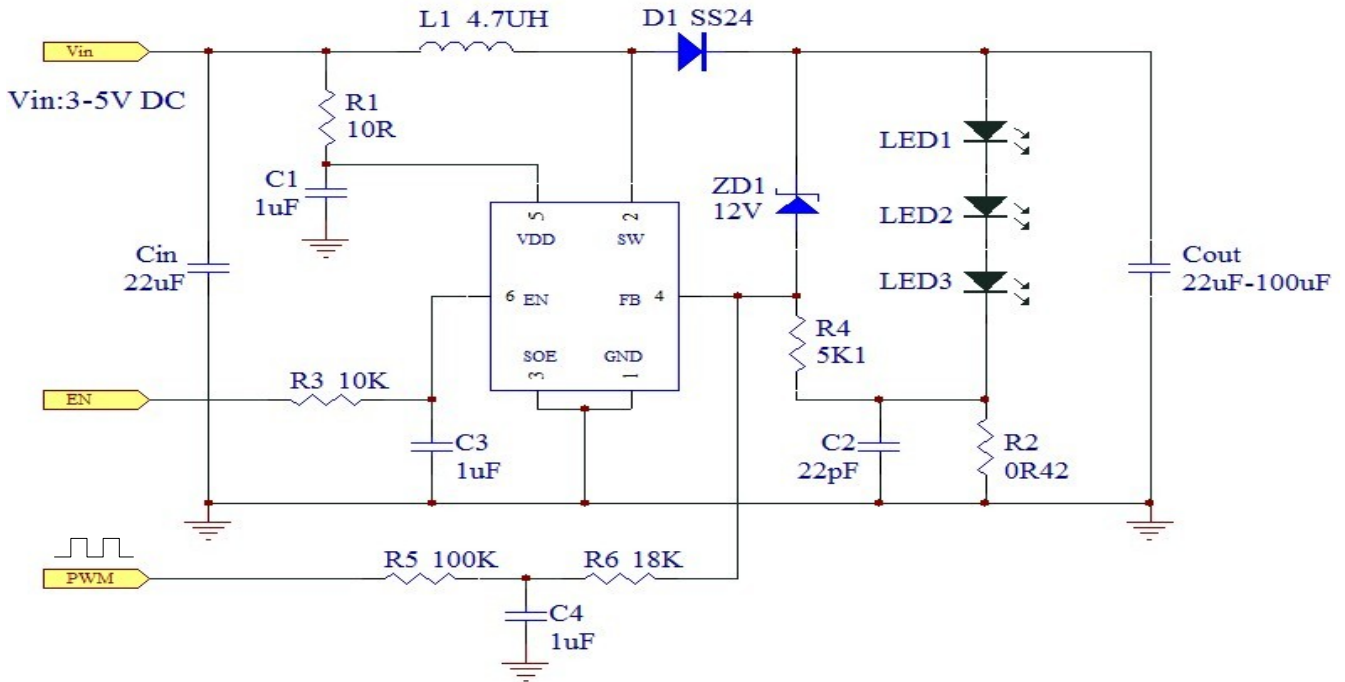
b. Using a DC Voltage

Using a variable DC voltage to adjust the brightness is a popular method in some applications. The dimming control using a DC voltage circuit is shown in Figure . According to the Superposition Theorem, as the DC voltage increases, the voltage contributed to VFB increases and the voltage drop on RSET decreases, i.e. the LED current decreases. For example, if the VDC range is from 0V to 2.8V, the selection of resistors in Figure sets dimming control of LED current from 300mA to 0mA.



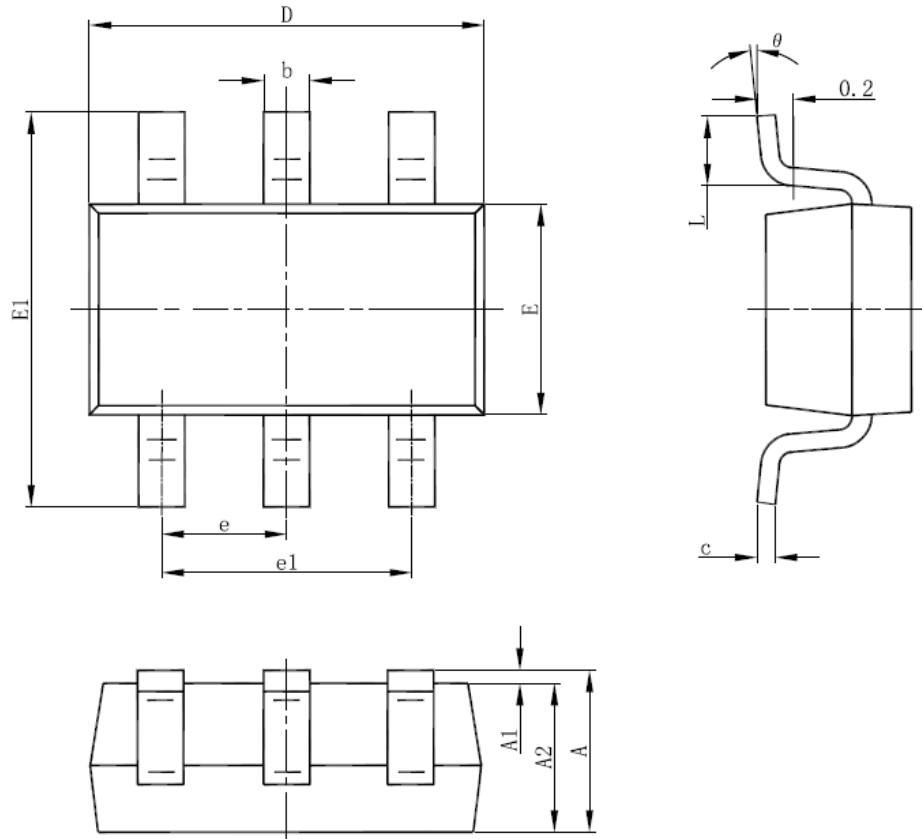
c. Using a Filtered PWM signal

Another common application is using a filtered PWM signal as an adjustable DC voltage for LED dimming control. A filtered PWM signal acts as the DC voltage to regulate the output current. The recommended application circuit is shown in the Figure . In this circuit, the output ripple depends on the frequency of PWM signal. For smaller output voltage ripple (<100mV), the recommended frequency of 3.3V PWM signal should be above 2kHz. To fix the frequency of PWM signal and change the duty cycle of PWM signal can get different output current. According to the application circuit of Figure , output current is from 300mA to 30mA by adjusting the PWM duty cycle from 10% to 80%.



Packaging Information

SOT-23-6L Package Outline Dimension



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
θ	0°	8°	0°	8°

Subject changes without notice.