3A 220KHz 40V Buck LED Constant Current Driver XL3001

Features

- Wide 8V to 40V Input Voltage Range
- Output Current Sense Voltage is 0.21V
- Maximum Duty Cycle 100%
- Minimum Drop Out 0.3V
- Fixed 220KHz Switching Frequency
- 3A Constant Output Current Capability
- Internal Optimize Power MOSFET
- High efficiency
- Excellent line and load regulation
- Built in thermal shutdown function
- Built in current limit function
- Built in output short protection function
- Available in SOP8-EP package

Applications

- Buck constant current driver
- Monitor LED Backlighting
- General purpose LED lighting

General Description

The XL3001 is a 220 KHz fixed frequency PWM buck (step-down) LED constant current driver, capable of driving a 3A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 100%. An over current protection function is built inside. When short protection function happens, the operation frequency will be reduced from 220KHz to 60KHz. An internal compensation block is built in to minimize external component count.

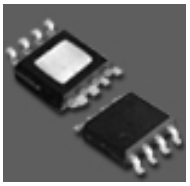
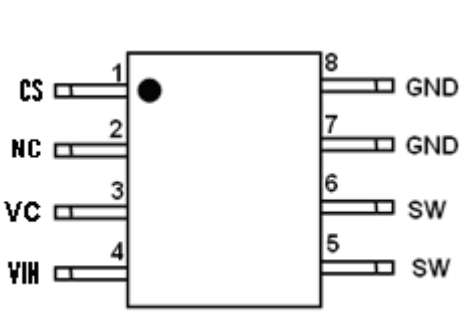


Figure1. Package Type of XL3001

Pin Configurations



The back exposed PAD is SW.

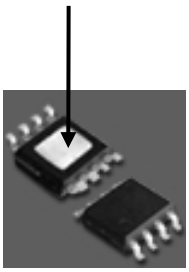


Figure2. Pin Configuration of XL3001 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	CS	Output constant current sense Pin (CS). The CS reference voltage is 0.21V.
2	NC	Not connected.
3	VC	Internal Voltage Regulator Bypass Capacity. In typical system application, The VC pin connect a 1uf capacity to VIN.
4	VIN	Supply Voltage Input Pin. XL3001 operates from a 8V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
5,6	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. (Note: **Connected the back exposed PAD to SW**.)
7,8	GND	Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL3001.

Function Block

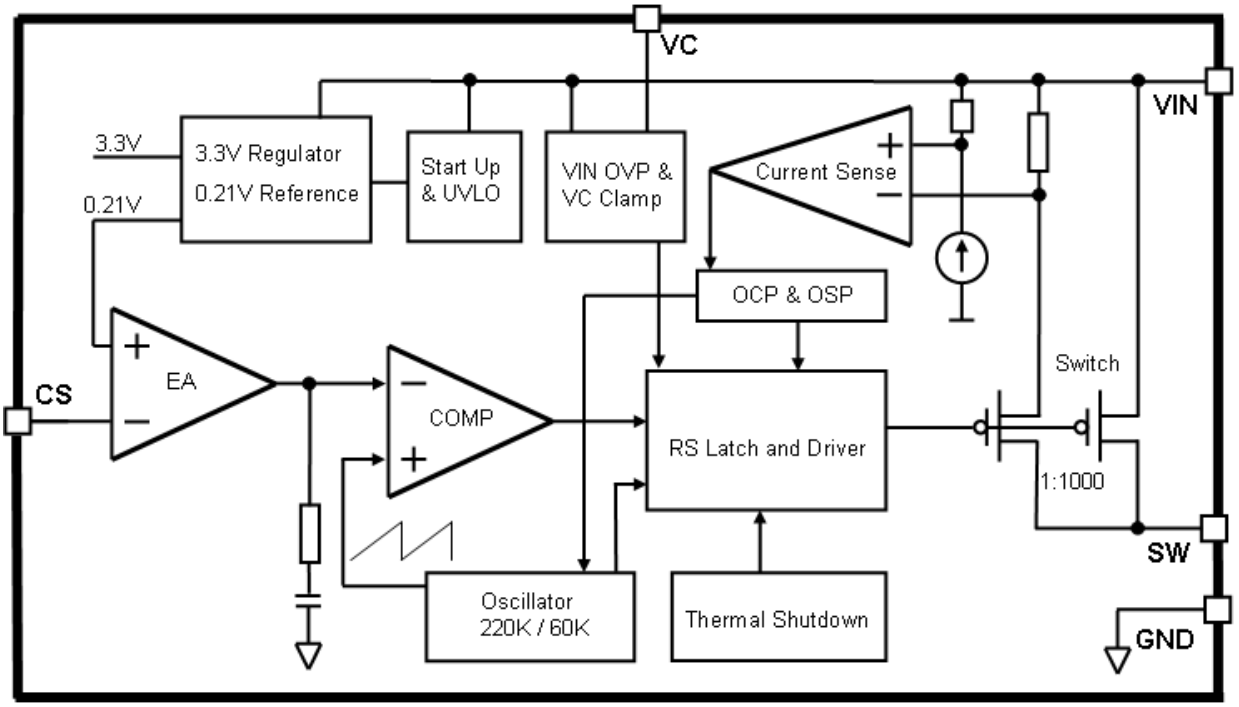


Figure3. Function Block Diagram of XL3001

Typical Application Circuit

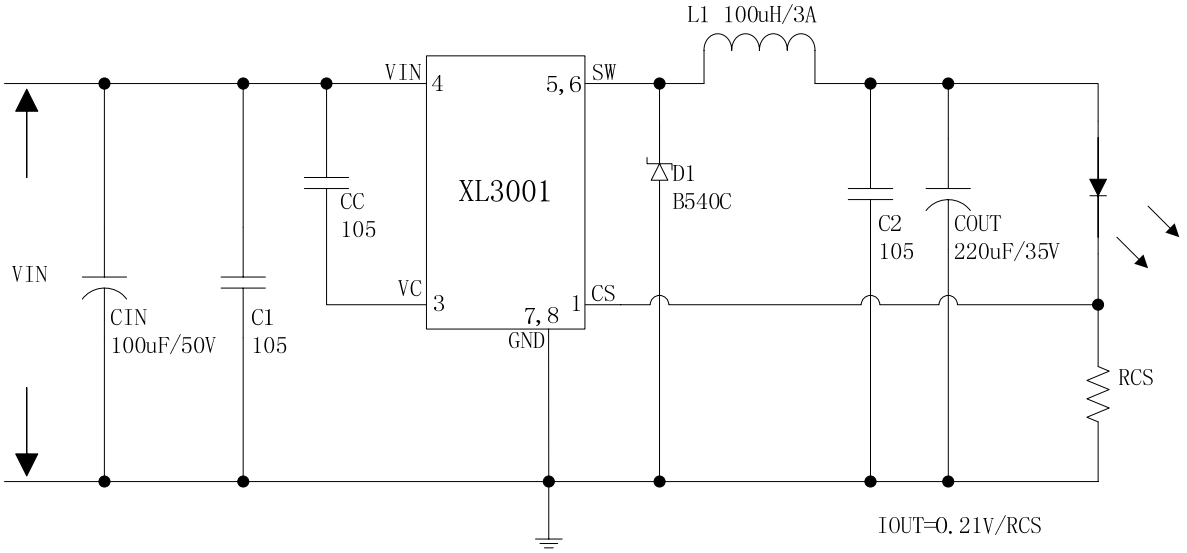


Figure4. XL3001 Typical Application Circuit

Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL3001E1	XL3001E1	SOP8-EP	2500 Units on Tape & Reel

XLSEMI Pb-free products, as designated with "E1" suffix in the par number, are RoHS compliant.

Absolute Maximum Ratings（Note1）

Parameter	Symbol	Value	Unit
Input Voltage	Vin	-0.3 to 45	V
CS Pin Voltage	V_{CS}	-0.3 to Vin	V
Output Switch Pin Voltage	V_{Output}	-0.3 to Vin	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (SOP8-EP) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	60	ºC/W
Maximum Junction Temperature	T_J	-40 to 150	ºC
Operating Junction Temperature	T_J	-40 to 125	ºC
Storage Temperature	T_{STG}	-65 to 150	ºC
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	ºC
ESD (HBM)		>2000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

XL3001 Electrical Characteristics

T_a = 25℃;unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
System parameters test circuit figure4						
VCS	Current Sense Voltage	Vin = 8V to 40V, Vout=6.4V Iload=0.1A to 2A	203.7	210	216.3	mV
ŋ	Efficiency	Vin=12V ,Vout=10V Iout=0.3A	-	95	-	%
ŋ	Efficiency	Vin=24V ,Vout=16V Iout=0.6A	-	96	-	%
ŋ	Efficiency	Vin=36V ,Vout=19V Iout=0.6A	-	95	-	%

Electrical Characteristics (DC Parameters)

Vin = 12V, GND=0V, Vin & GND parallel connect a 100uf/50V capacitor; Iout=500mA, T_a = 25℃; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	Vin		8		40	V
VIN UVLO	Vin_uvlo			5		V
VIN OVP	Vin_ovp			45		V
Quiescent Supply Current	I_q	V_{CS}=Vin		2.1	5	mA
Oscillator Frequency	Fosc		176	220	264	KHz
Output Short Frequency	Fosp		48	60	72	KHz
Switch Current Limit	I_L	V_{CS}=0		3.5		A
Max. Duty Cycle	D_{MAX}	V_{CS}=0V		100		%
Output Power PMOS	Rdson	V_{CS}=0V, Vin=12V, I_{SW}=3A		75	100	mohm

Typical System Application (Recommend output voltage safe work range)

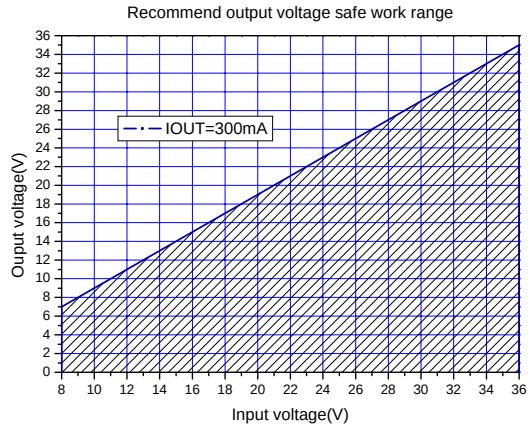


Figure5.Max output voltage(IOUT=300mA)

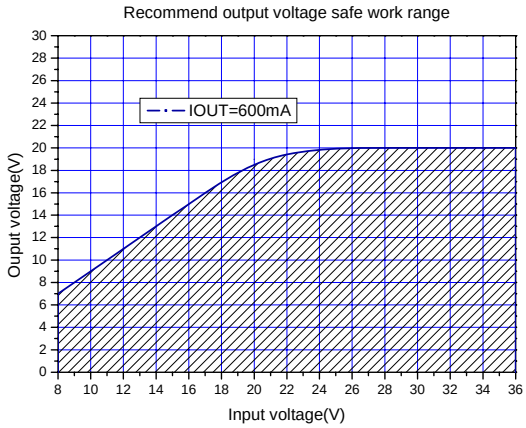


Figure6.Max output voltage(IOUT=600mA)

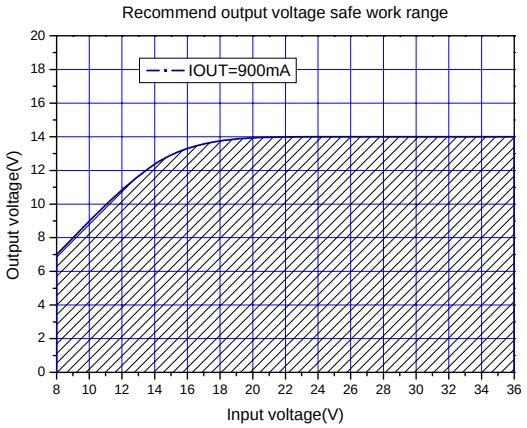


Figure7.Max output voltage(IOUT=900mA)

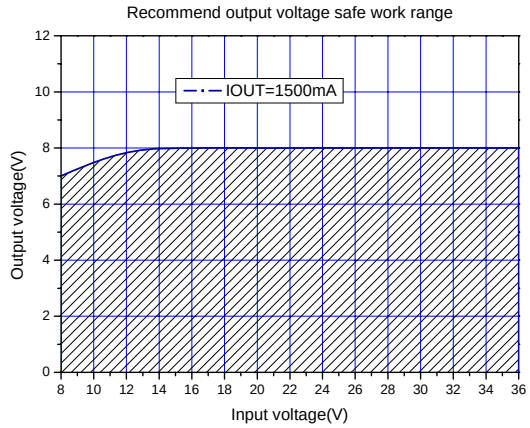


Figure8.Max output voltage(IOUT=1500mA)

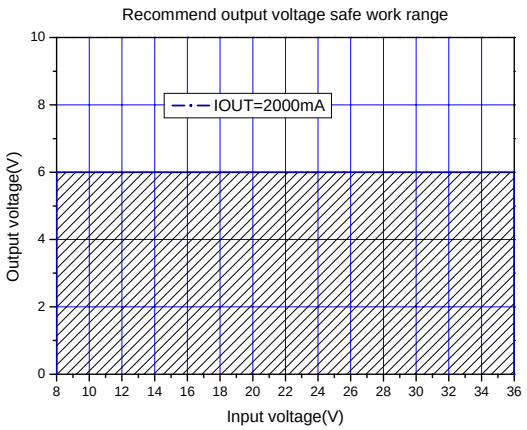


Figure9.Max output voltage(IOUT=2000mA)

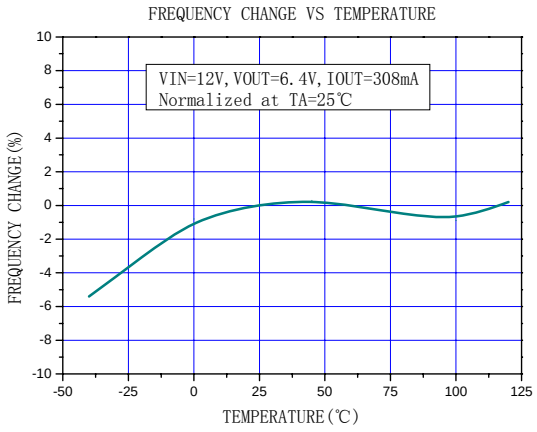


Figure10. Frequency change Curve

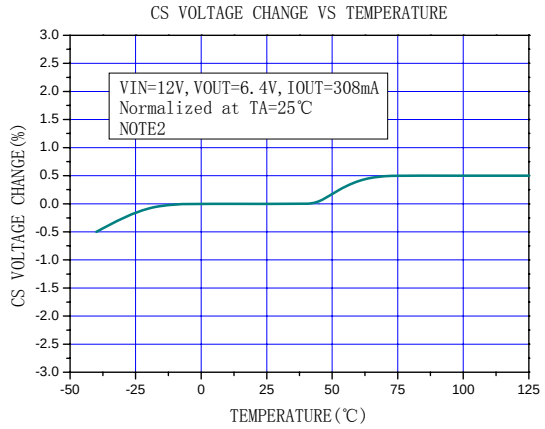


Figure11. CS Voltage change Curve

Note2: Internal temperature compensation circuitry is providd to compensation the PCB and external line loss in system application. When the junction temperature or the output power rise , the CS voltage will be compensated. This function is provided to compensation the PCB and external line loss in system application.

Typical System Application (VIN=8V~40V, IOUT=308mA)

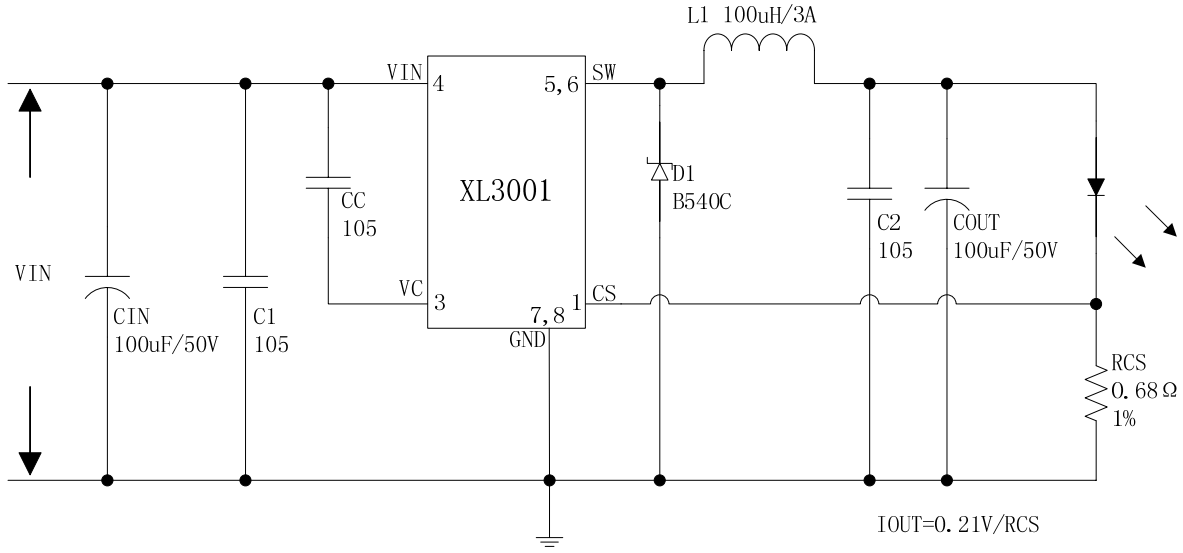


Figure12. XL3001 System Parameters Test Circuit (VIN=8V~40V, IOUT=308mA)

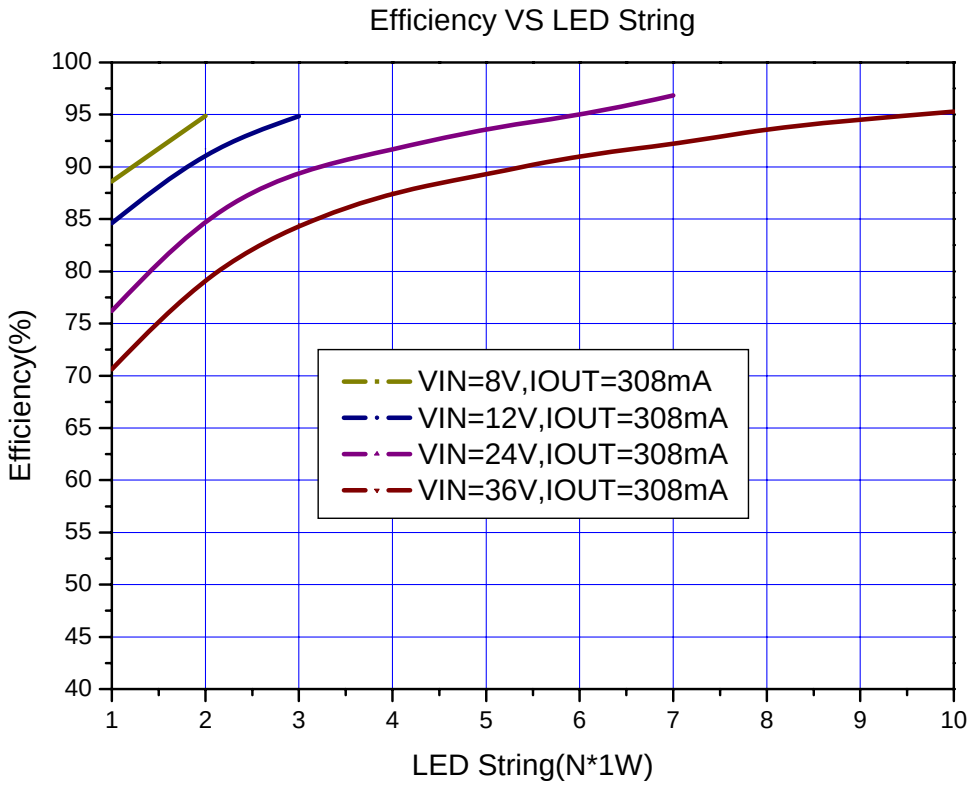


Figure13. XL3001 System Efficiency Curve

Typical System Application (VIN=8V~40V, IOUT=615mA)

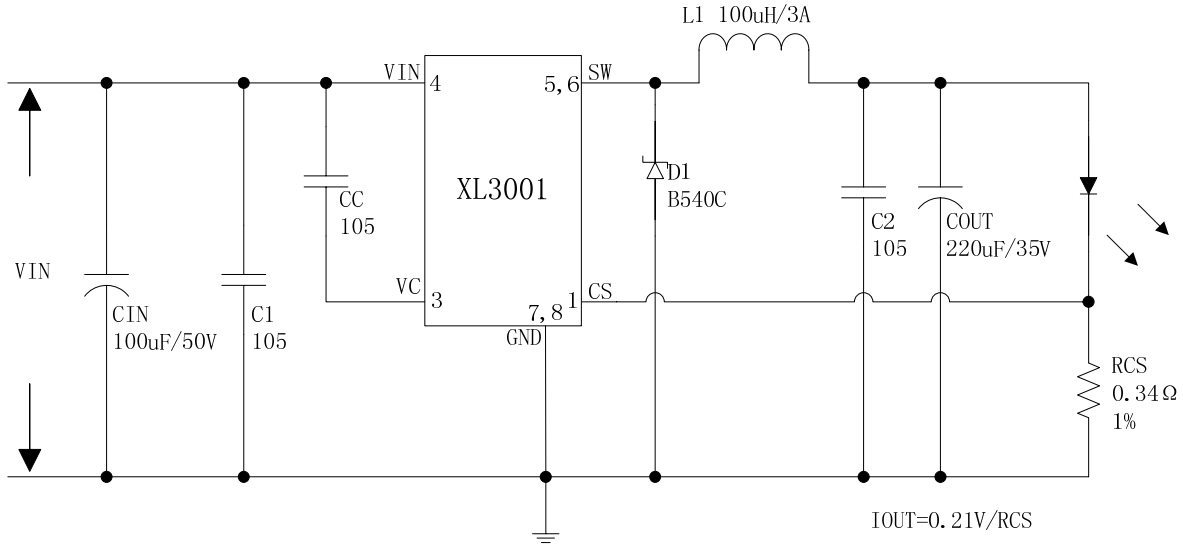


Figure14. XL3001 System Parameters Test Circuit (VIN=8V~40V, IOUT=615mA)

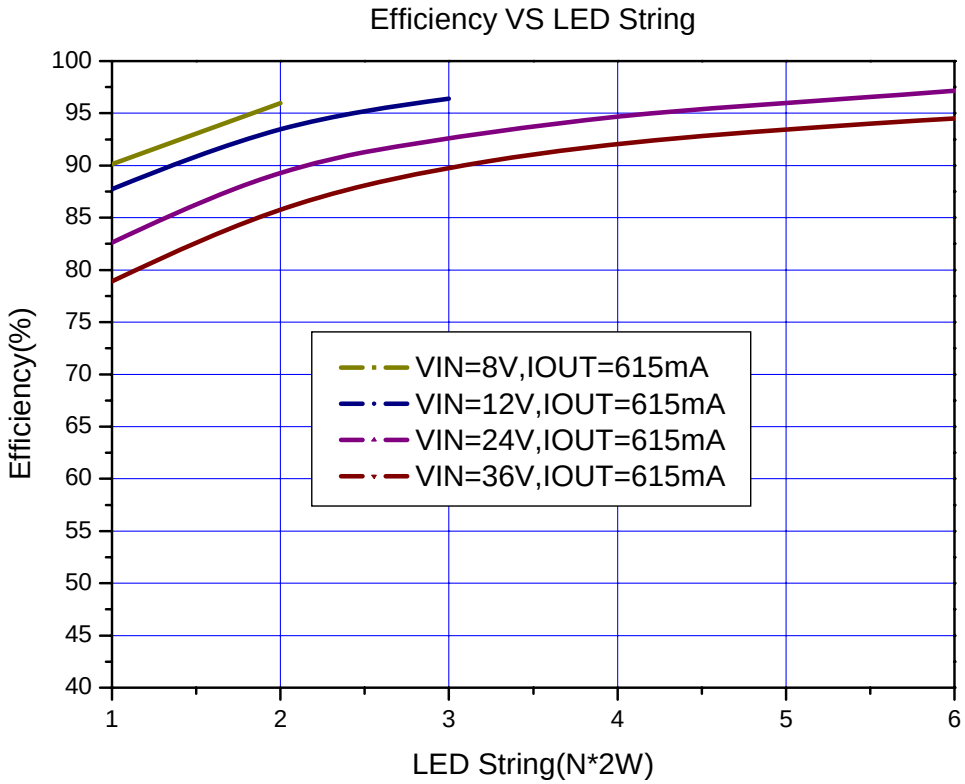


Figure15. XL3001 System Efficiency Curve

Typical System Application (VIN=8V~40V, IOUT=925mA)

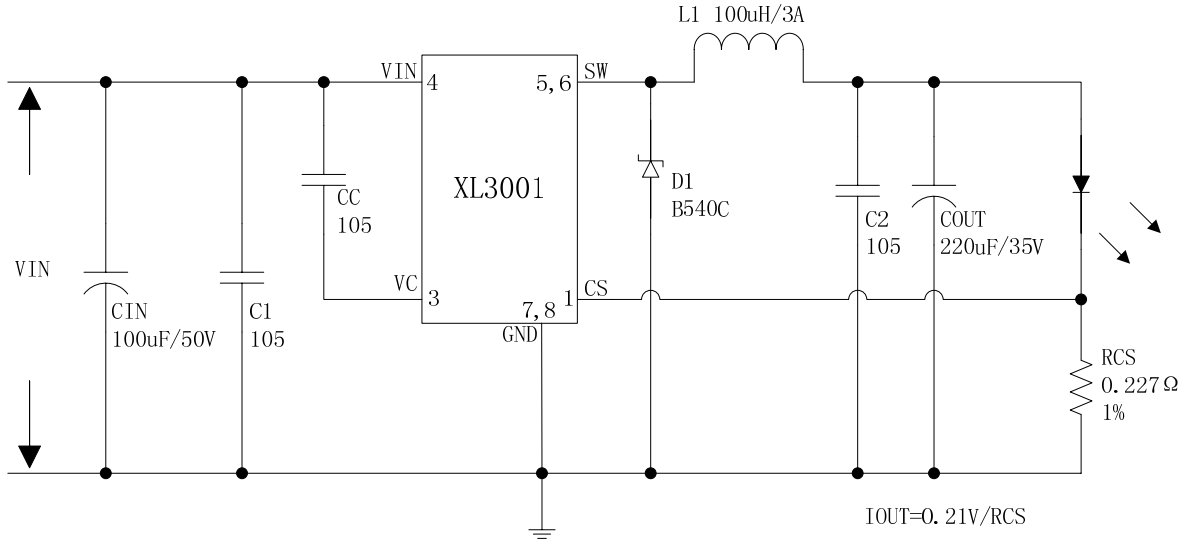


Figure16. XL3001 System Parameters Test Circuit (VIN=8V~40V, IOUT=925mA)

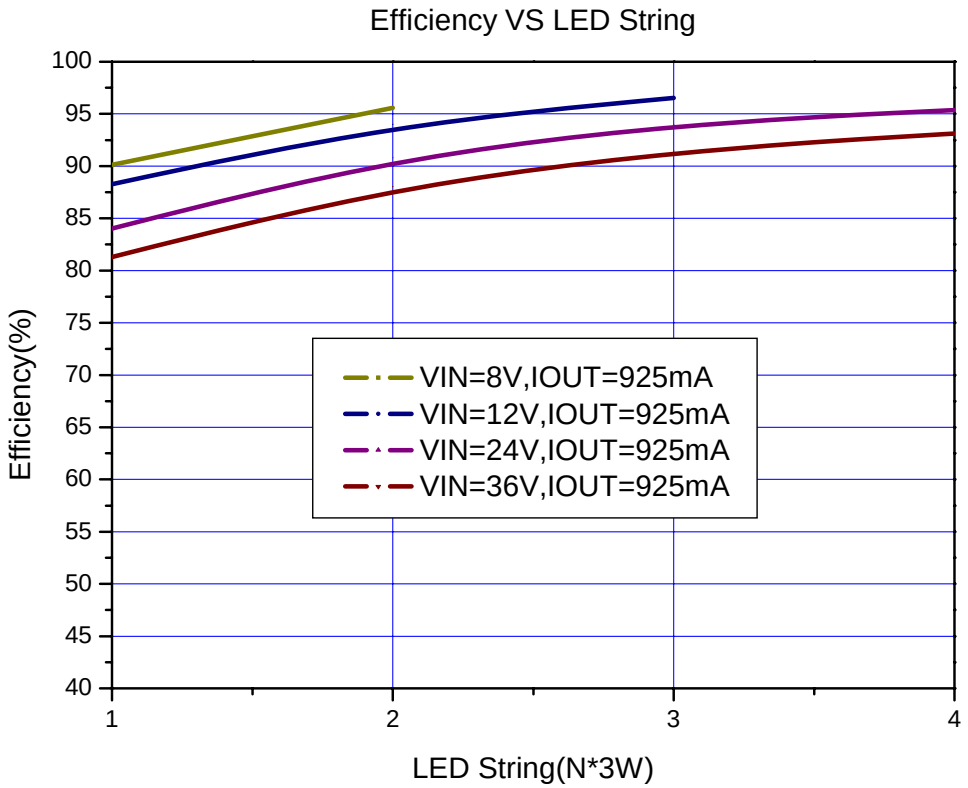


Figure17. XL3001 System Efficiency Curve

Typical System Application (PWM DIMMING)

PWM dimming function can be used in typical system application with external components. Changing the duty cycle of PWM signal can get different LED current. The PWM signal voltage is 3.3V or 5V.

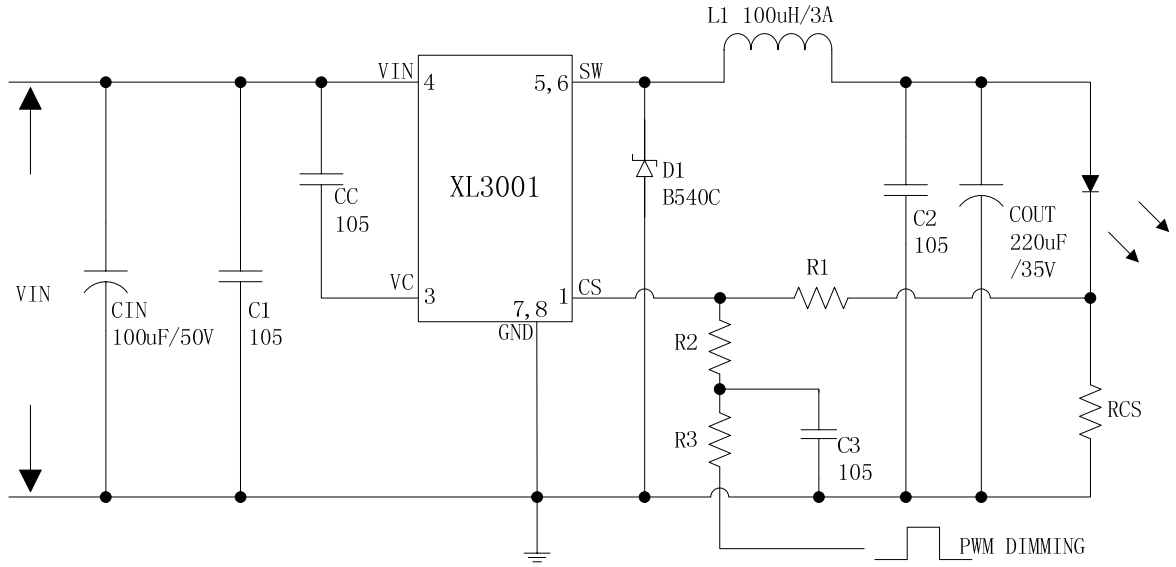


Figure18. XL3001 System Parameters Test Circuit (PWM DIMMING)

Typical System Application (LED OVP)

LED OVP function can be used in typical system application with external components. The output voltage can be limited in a suitable value by choose different zener diode when the output LED open. the zener diode voltage choosed by output led voltage's 1.3 times.

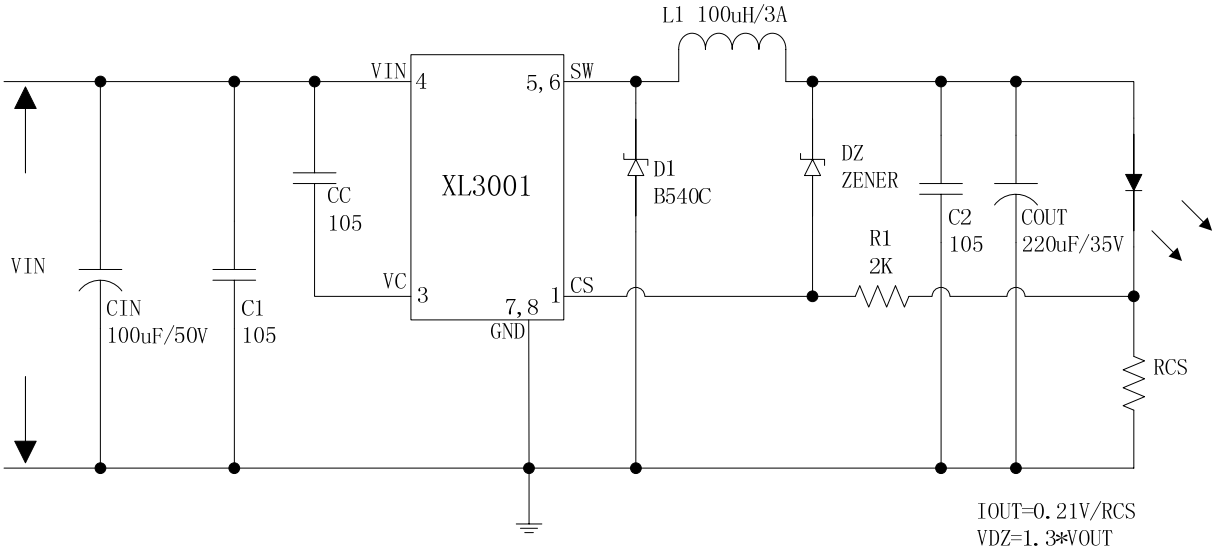
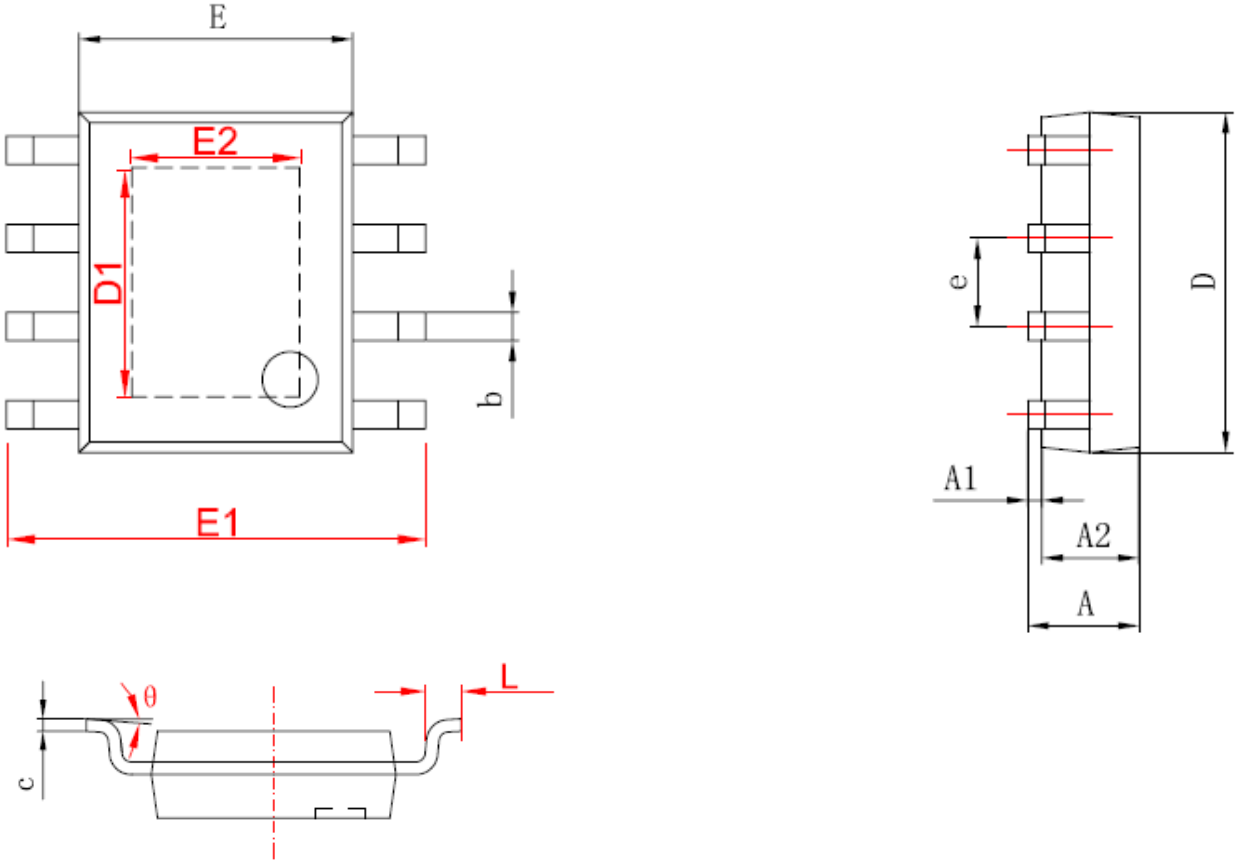


Figure19. XL3001 System Parameters Test Circuit (LED OVP)

Package Information (SOP8-EP)



字符	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Important Notice

XLSEMI reserve the right to make modifications, enhancements, improvements, corrections or other changes without notice at any time. XLSEMI does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. XLSEMI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using XLSEMI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards. XLSEMI warrants performance of its products to the specifications applicable at the time of sale, in accordance with the warranty in XLSEMI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent XLSEMI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

For the latest product information, go to www.xlsemi.com.

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.