3A 150KHz 40V Buck DC/DC Converter With Constant Current Loop XL4201

Features

- Wide 8V to 40V Input Voltage Range
- Output Adjustable from 1.25V to 37V
- Minimum Drop Out 0.3V
- Fixed 150KHz Switching Frequency
- Maximum 3A Switching Current
- Internal Optimize Power MOSFET
- Excellent line and load regulation
- With output constant current loop
- Built in thermal shutdown function
- Built in current limit function
- Built in input over voltage protection
- Recommend output power less than 13W
- SOP8-EP (Exposed PAD) package

Applications

- Car Charger
- Battery Charger
- LCD Monitor and LCD TV
- Portable instrument power supply
- Telecom / Networking Equipment
- Buck constant current driver
- Monitor LED Backlighting
- General purpose LED lighting

General Description

The XL4201 is a 150KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 2.5A 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 enable function, an over current protection function is built inside. An internal compensation block is built in to minimize external component count.

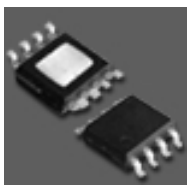


Figure1. Package Type of XL4201

Pin Configurations

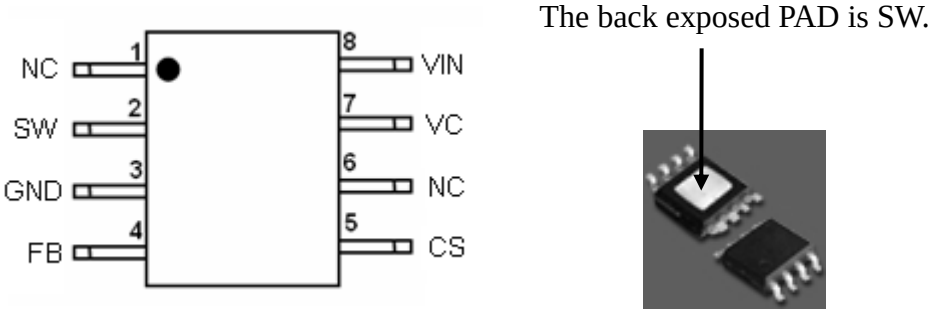


Figure2. Pin Configuration of XL4201 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1, 6	NC	Not connected.
2	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**.)
3	GND	Ground Pin.
4	FB	Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.25V.
5	CS	Output Current Sense Pin; (Iload=0.11V/Rcs)
7	VC	Internal Voltage Regulator Bypass Capacity. In typical system application, The VC pin connect a 1uF capacity to VIN.
8	VIN	Supply Voltage Input Pin. XL4201 operates from a 8V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.

Function Block

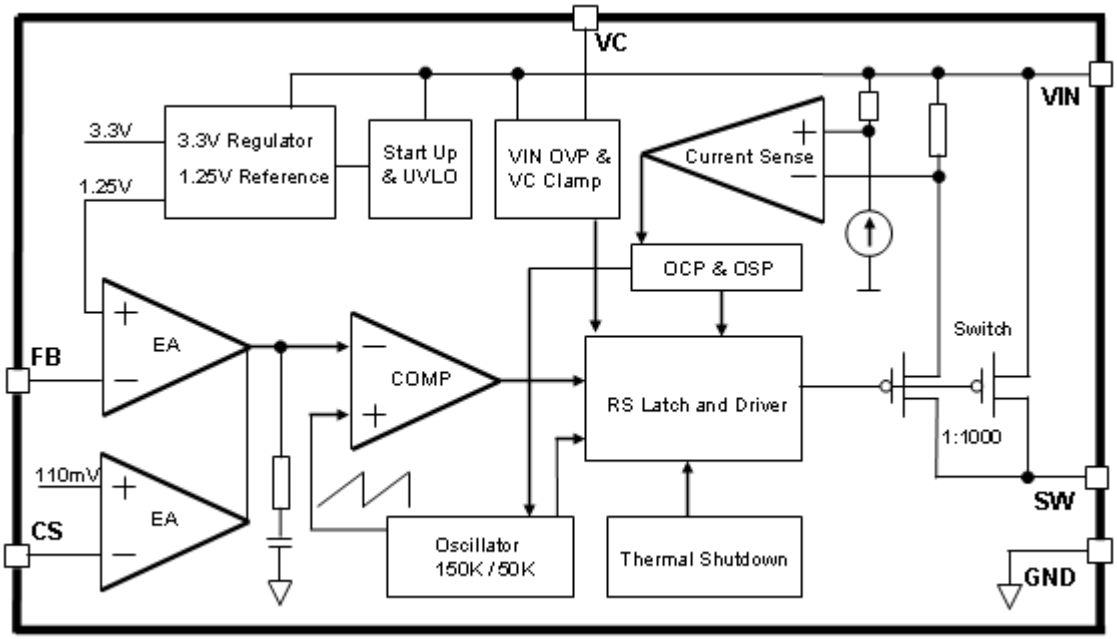


Figure3. Function Block Diagram of XL4201

Typical Application Circuit (Car Charger)

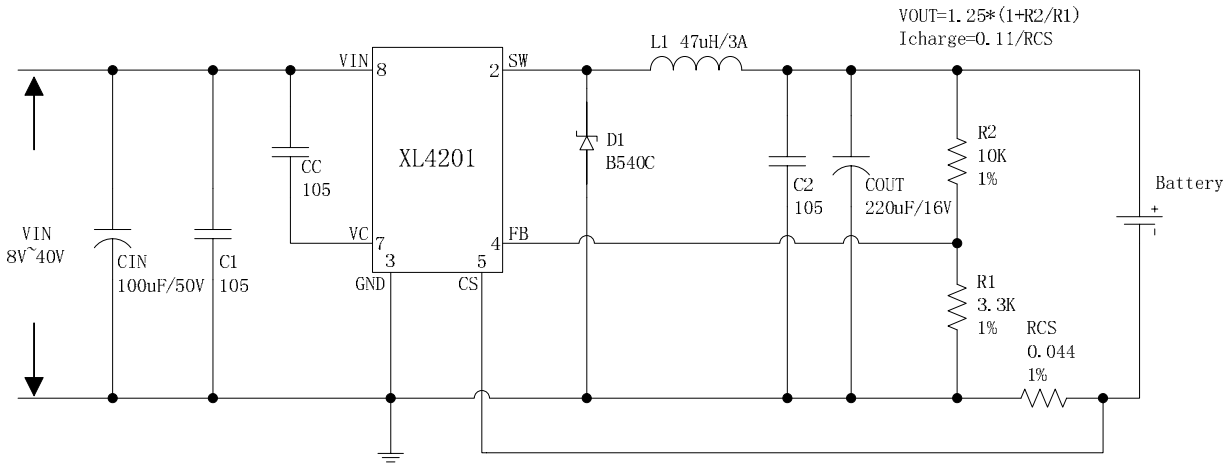


Figure4. XL4201 Typical Application Circuit (Li Battery Charger)

Typical System Circuit(Buck LED Constant Current Driver)

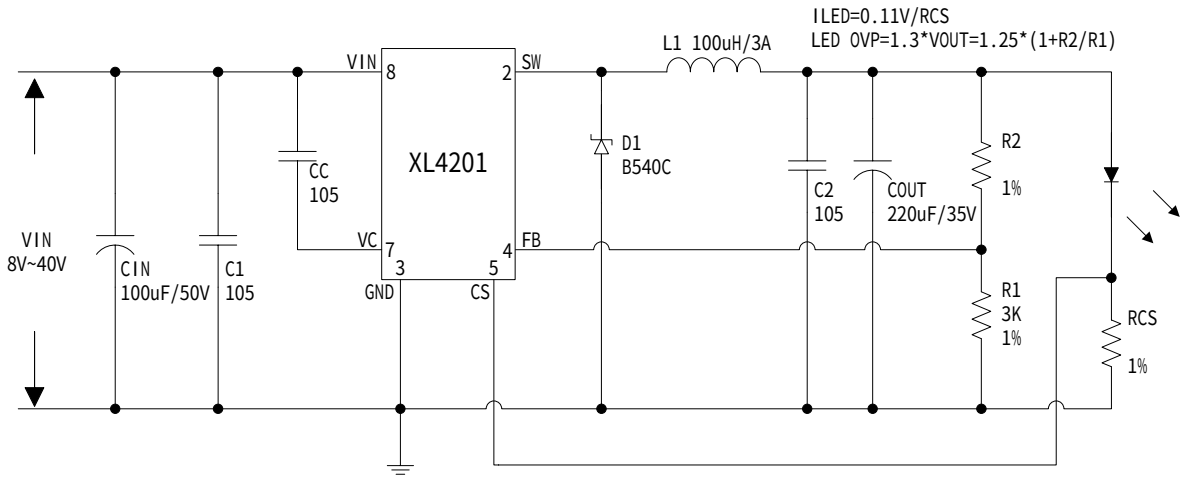


Figure5. XL4201 Typical Application Circuit(LED Constant Current Driver)

Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL4201E1	XL4201E1	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
FB Pin Voltage	V_{FB}	-0.3 to Vin	V
SW Pin Voltage	V_{SW}	-0.3 to Vin	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (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.

XL4201 Electrical Characteristics

T_a = 25℃;unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
System parameters test circuit figure4						
VFB	Feedback Voltage	Vin = 8V to 40V, Vout=5V Iload=0.2A to 2A	1.231	1.25	1.269	V
Efficiency	ŋ	Vin=12V ,Vout=5V Iout=2.4A	-	89	-	%

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
VIN operation voltage	Vin		8		40	V
VIN UVLO	Vuvlo			5		V
VIN OVP	Vovp			45		V
Quiescent Supply Current	I_q	V				

cal System Application (Car Charger)

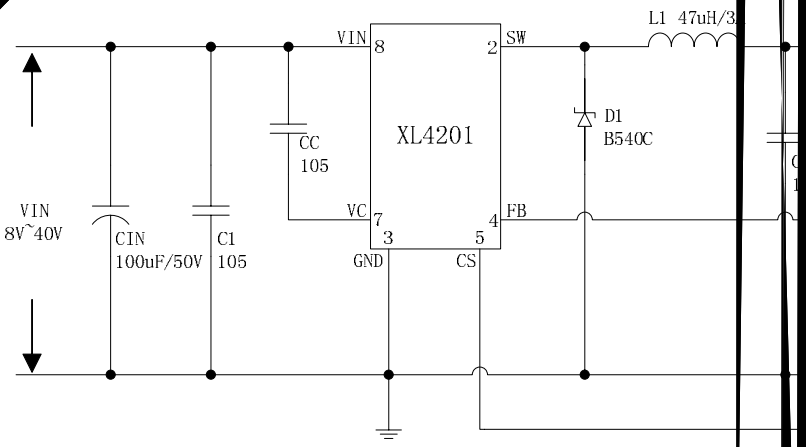
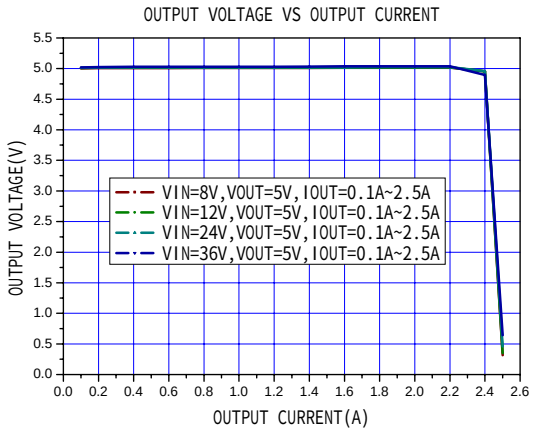
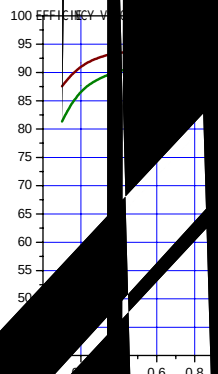


Figure6. XL4201 System Parameters Test Circuit (VIN=8V





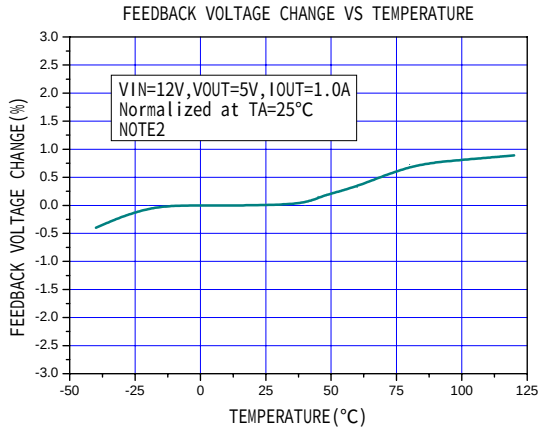


Figure11. Feedback voltage change Curve

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

Typical System Circuit(VIN=8V~36V,IOUT=330mA)

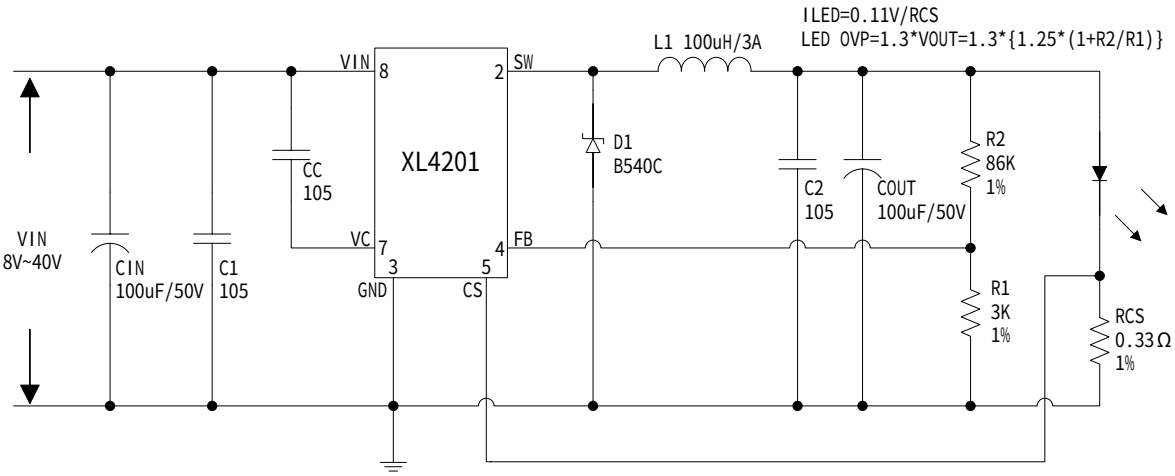


Figure16. XL4201 System Parameters Test Circuit (VIN=8V~40V,IOUT=330mA)

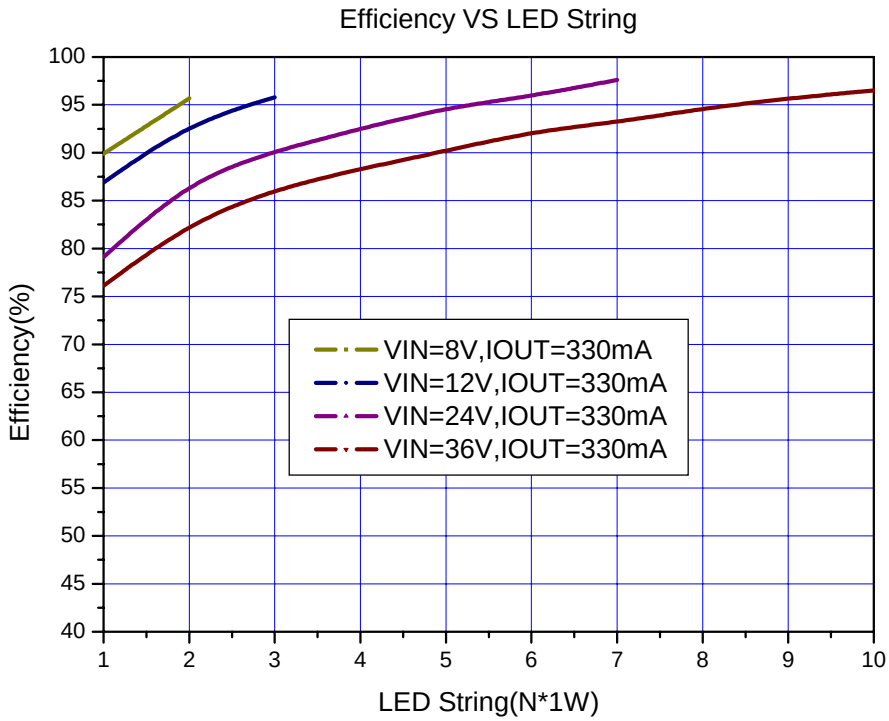
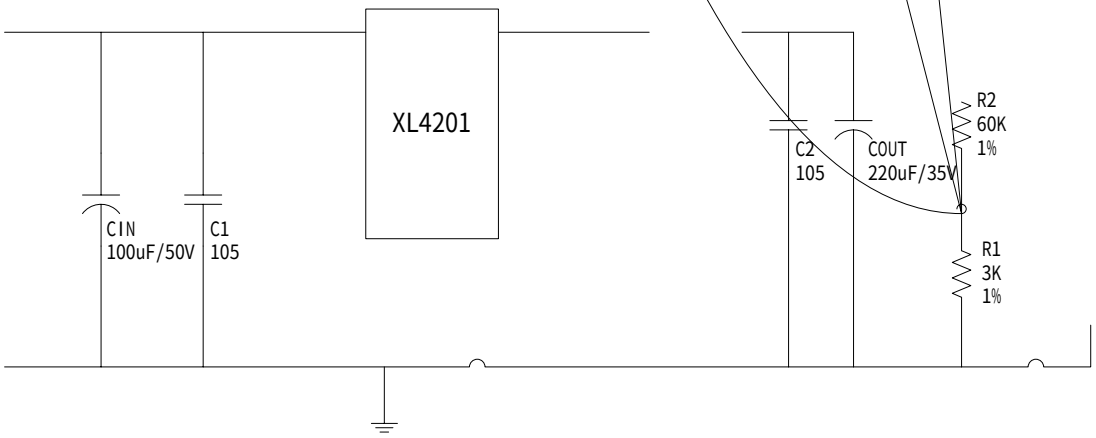


Figure17. XL4201 System Efficiency Curve (VIN=8V~40V,IOUT=330mA)

Typical System Circuit(VIN=8V~40V,IOUT=660mA)



Typical System Circuit(VIN=8V~40V,IOUT=1000mA)

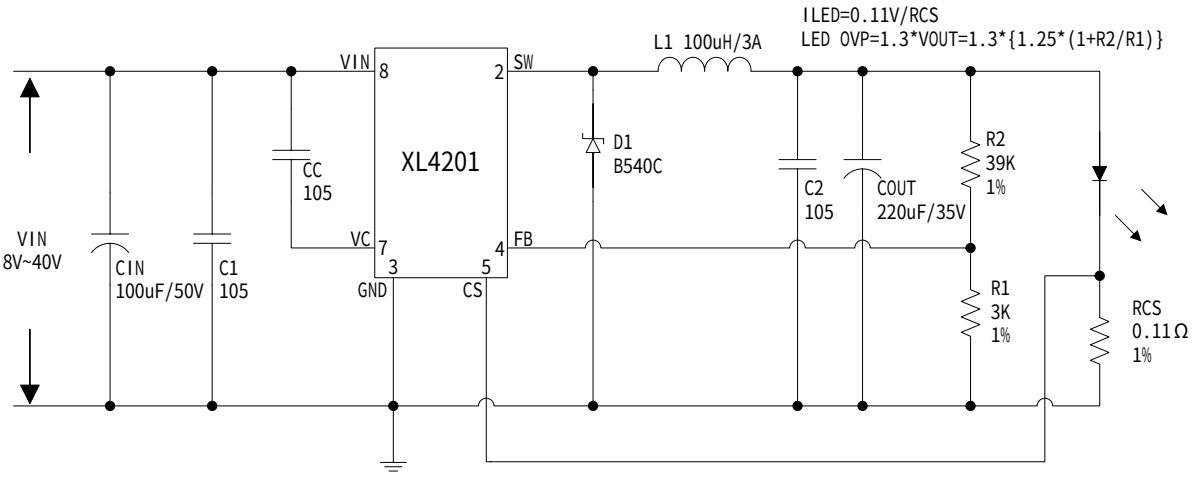


Figure20. XL4201 System Parameters Test Circuit (VIN=8V~40V,IOUT=1000mA)

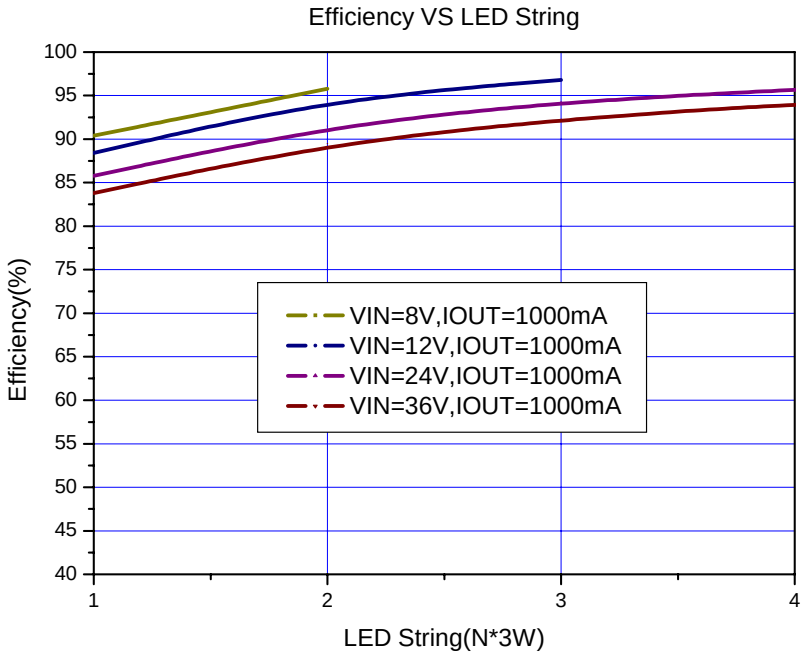
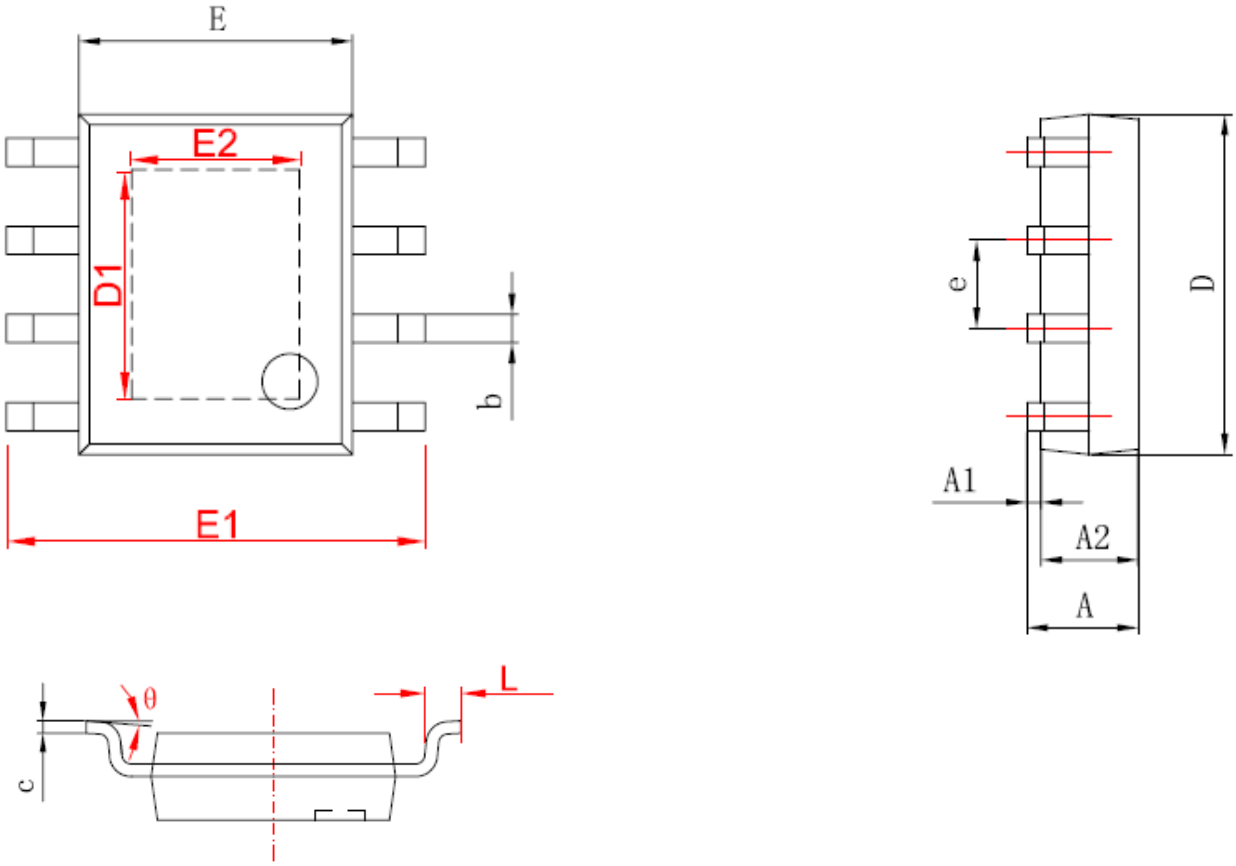


Figure21. XL4201 System Efficiency Curve (VIN=8V~40V,IOUT=1000mA)

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
[illegible]	[illegible]	3.800	[illegible]	0.150
[illegible]	E1	5.800	6.200	[illegible]
[illegible]	E2	2.313	2.513	0.091
	e	1.270 (BSC)		0.050 (BSC)
[illegible]	L	0.400	1.270	0.016
[illegible]	θ	0°	8°	0°

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