

2A 150kHz 40V Buck/Buck-Boost LED Constant Current Driver**XL6002****Features**

- Wide 4.5V to 40V Input Voltage Range
- 0.155V CS adjustable LED drive current
- Minimum Drop Out 1.5V
- Fixed 150kHz Switching Frequency
- 2A Constant Output Current Capability
- Internal Optimize Power Transistor
- Excellent line and load regulation
- PWM pin with dimming function
- Built in thermal shutdown function
- Built in current limit function
- **Built in output over voltage protection**
- TO252-5L package

General Description

The XL6002 is a 150KHz fixed frequency PWM buck / buck_boost LED driver, capable of driving a 2A 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 PWM dimming function, an over current protection function is built inside. An internal compensation block is built in to minimize external component count.

Applications

- LED Lighting
- LED Constant Current Driver



Figure1. Package Type of XL6002

2A 150kHz 40V Buck/Buck-Boost LED Constant Current Driver	XL6002
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Pin Configurations

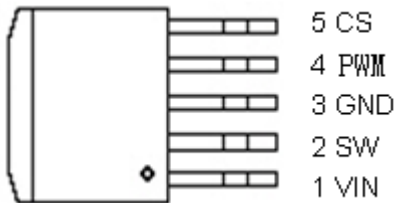


Figure2. Pin Configuration of XL6002 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	VIN	Supply Voltage Input Pin. XL6002 operates from a 4.5V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
2	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output.
3	GND	Ground Pin.(Note: Connected the back exposed PAD to Pin3.)
4	PWM	PWM dimming Pin (PWM). The PWM dimming threshold voltage is 1.4V. (“LOW” is ON, “HIGH” is OFF;)
5	CS	Output Current Sense Pin; (Iload=0.155V/Rcs)

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XL6002

Function Block

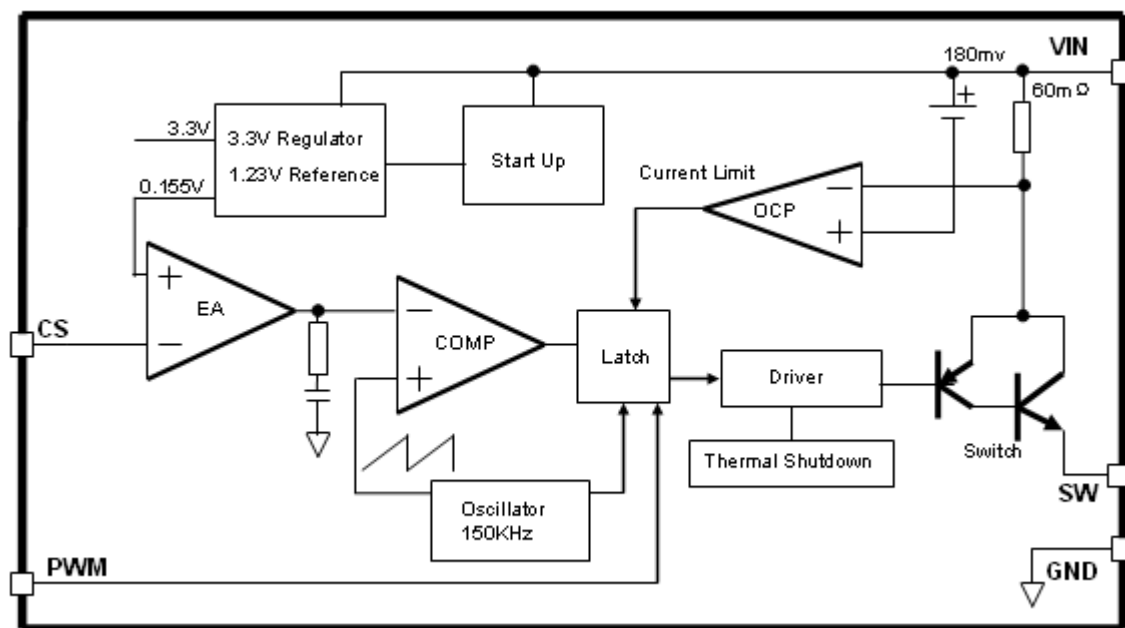


Figure3. Function Block Diagram of XL6002

Typical Application Circuit (Buck Topology LED Lighting)

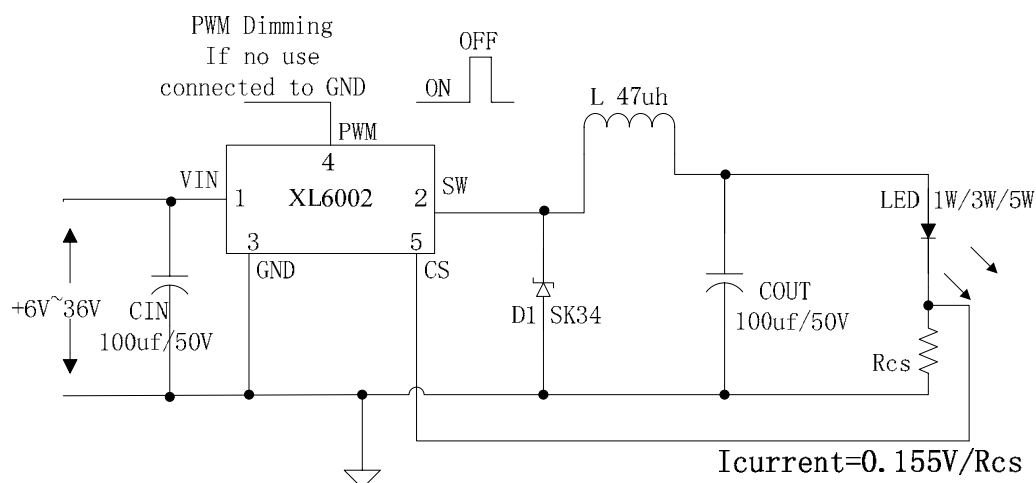


Figure4. XL6002 Typical Application Circuit (LED Lighting)

2A 150kHz 40V Buck/Buck-Boost LED Constant Current Driver

XL6002

Ordering Information

Package	Temperature Range	Part Number	Marking ID	Packing Type
		Lead Free	Lead Free	
		XL6002E1	XL6002E1	Tube
		XL6002TRE1	XL6002E1	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	V _{IN}	-0.3 to 45	V
PWM Pin Voltage	V _{PWM}	-0.3 to V _{IN}	V
SW Pin Voltage	V _{SW}	-0.3 to V _{IN}	V
Power Dissipation	P _D	Internally limited	mW
Thermal Resistance (Junction to Ambient, No Heatsink, Free Air)	R _{JA}	50	°C/W
Operating Junction Temperature	T _J	-40 to 125	°C
Storage Temperature	T _{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T _{LEAD}	260	°C
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.

2A 150kHz 40V Buck/Buck-Boost LED Constant Current Driver**XL6002****Electrical Characteristics (DC Parameters)**

$V_{in} = 12V$, $GND=0V$, V_{in} & GND parallel connect a 220uf/50V capacitor; $I_{out}=500mA$, $T_a = 25^\circ C$; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	V_{in}		4.5		40	V
Quiescent Supply Current	I_q	$V_{CS} = V_{in}$		2	5	mA
Oscillator Frequency	F_{osc}		127	150	172	Khz
Switch Current Limit	I_L	$V_{CS} = 0$		3		A
PWM Pin Threshold	V_{PWM}	High (Regulator OFF) Low (Regulator ON)		1.4 0.8		V
Output Saturation Voltage	V_{CE}	$V_{FB}=0V$ $I_{SW}=2A$		1.1	1.4	V
Constant current sense Voltage	V_{CS}		0.132	0.155	0.178	V



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Schottky Diode Selection Table

Current	Surface Mount	Through Hole	VR (The same as system maximum input voltage)				
			20V	30V	40V	50V	60V
1A			1N5817	1N5818	1N5819		
3A			1N5820	1N5821	1N5822		
			MBR320	MBR330	MBR340	MBR350	MBR360
			SK32	SK33	SK34	SK35	SK36
				30WQ03	30WQ04	30WQ05	
				31DQ03	31DQ04	31DQ05	
			SR302	SR303	SR304	SR305	SR306

Typical Application Circuit (Buck Drive one 1W/3W/5W LED unit)

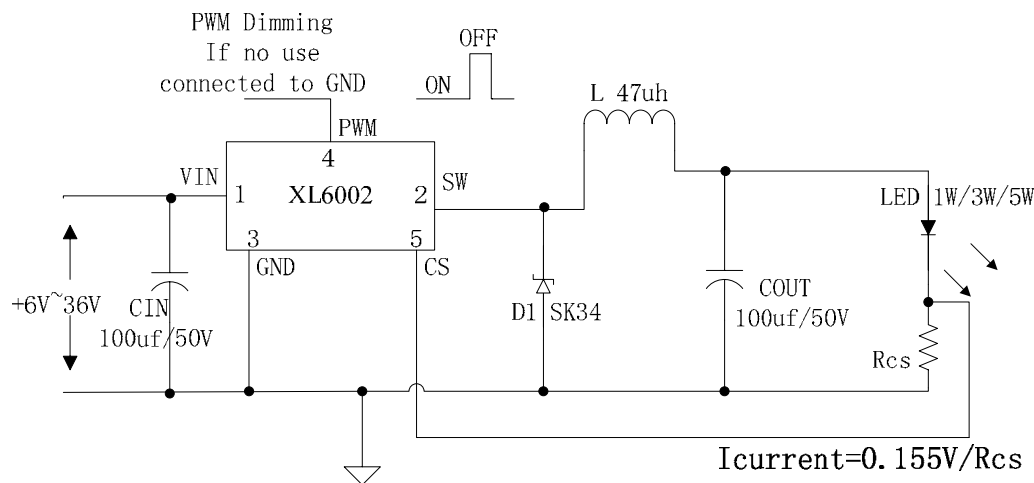


Figure5. XL6002 Typical Application Circuit (LED Lighting)

Typical Application Circuit (Buck Drive 3 series 1W/3W/5W LED units)

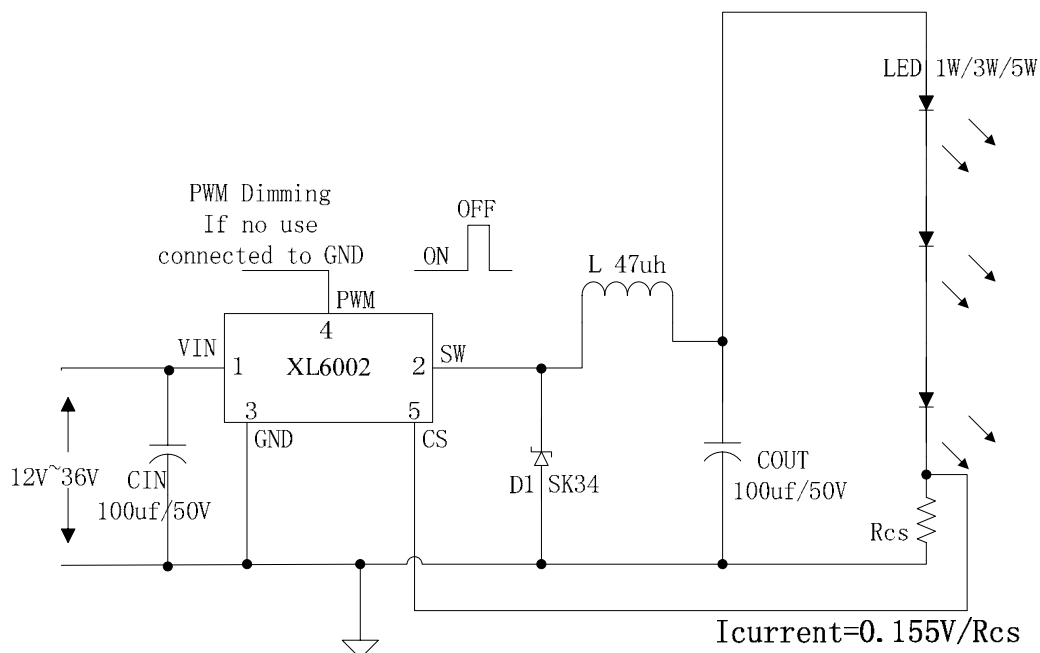


Figure6. XL6002 Typical Application Circuit (LED Lighting)

Typical Application Circuit (Buck Drive 3 series 1W/3W/5W LED units with LED open protection function)

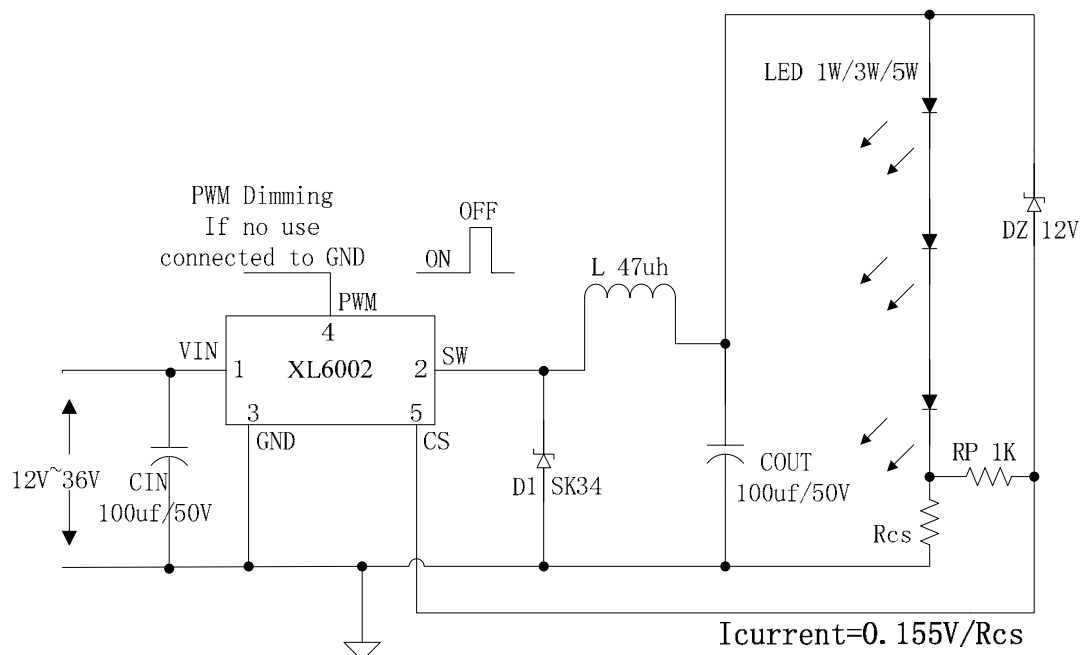


Figure7. XL6002 Typical Application Circuit (with LED open protection function)

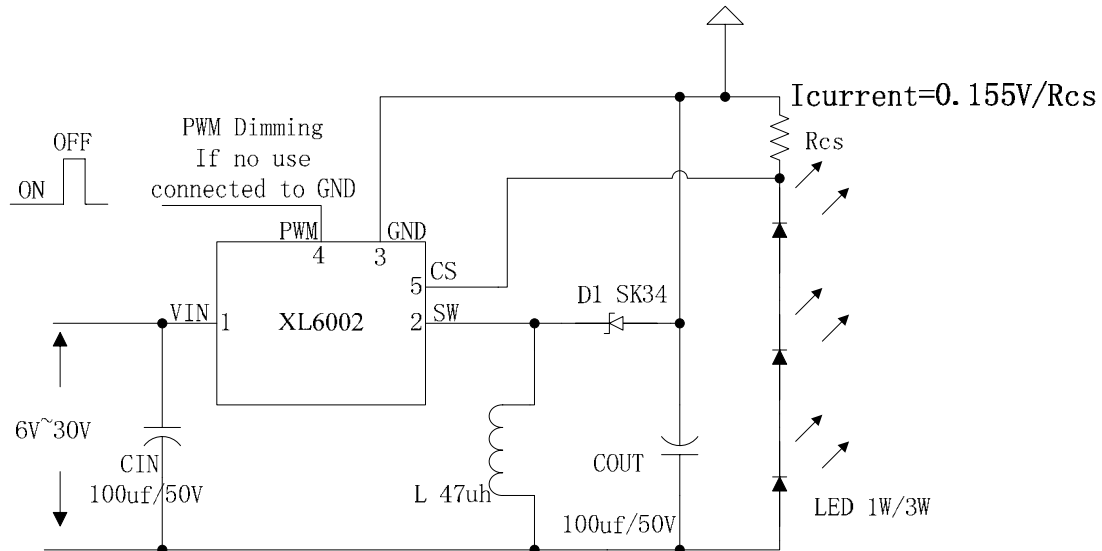
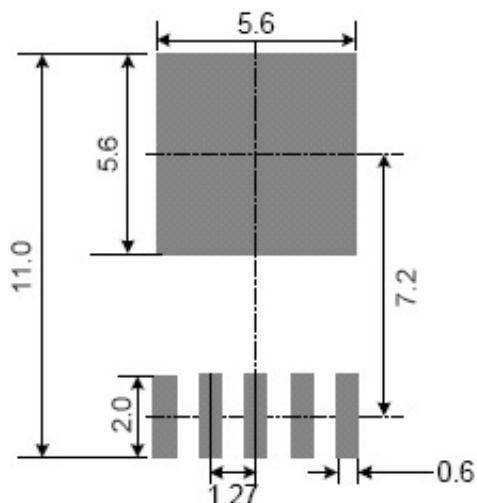
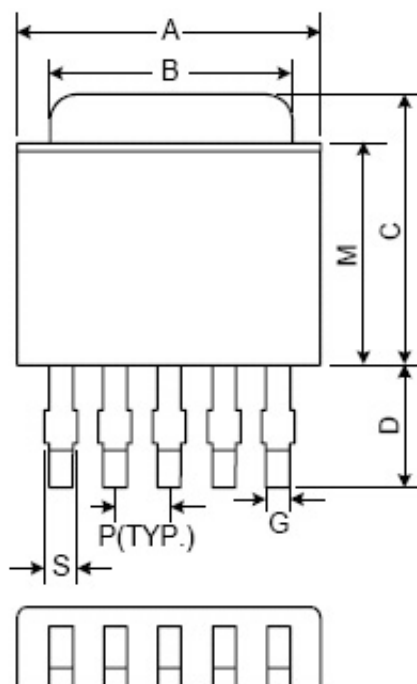
2A 150kHz 40V Buck/Buck-Boost LED Constant Current Driver**XL6002****Typical Application Circuit (Buck_Boost Drive 3 series 1W/3W LED units)**

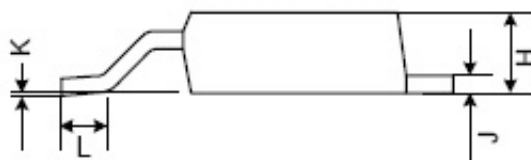
Figure8. XL6002 Typical Application Circuit (Buck-Boost LED Lighting)

Package Information

TO252-5L



Land Pattern Recommendation (Unit: mm)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	6.35	6.60	6.85	0.250	0.260	0.270
B	5.20	5.35	5.50	0.205	0.211	0.217
C	6.80	7.00	7.30	0.268	0.276	0.287
D	2.40	2.80	3.20	0.094	0.110	0.126
P	1.27 REF.			0.050 REF.		
S	0.50	0.65	0.80	0.020	0.026	0.031
G	0.40	0.50	0.63	0.016	0.020	0.025
H	2.20	2.30	2.40	0.087	0.091	0.094
J	0.45	0.52	0.58	0.018	0.020	0.023
K	0.00	0.08	0.15	0.000	0.003	0.006
L	0.90	1.20	1.63	0.035	0.047	0.064
M	5.40	5.80	6.20	0.213	0.228	0.244