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180KHz 60V 4A Switching Current Boost LED Constant Current Driver	XL6005
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## Features

- Wide 3.6V to 32V Input Voltage Range
- 0.22V FB adjustable LED drive current
- Directly drive 11 Series 1W LED at  $V_{IN} \geq 12V$
- Fixed 180KHz Switching Frequency
- Max. 4A Switching Current Capability
- Up to 94% efficiency
- Excellent line and load regulation
- EN PIN TTL shutdown capability & With PWM Dimming Function
- Internal Optimize Power MOSFET
- Built in Soft-Start Function
- Built in Frequency Compensation
- Built in Thermal Shutdown Function
- Built in Current Limit Function
- Available in TO252-5L package

## Applications

- LED Lighting
- Boost constant current driver
- Monitor LED Backlighting
- 7' to 15' LCD Panels

## General Description

The XL6005 regulator is fixed frequency PWM Boost (step-up) LED constant current driver, capable of driving Series 1W/3W/5W LED units with excellent line and load regulation. The regulator is simple to use because it includes internal frequency compensation and a fixed-frequency oscillator so that it requires a minimum number of external components to work.

The XL6005 could directly drive 11 Series 1W LED units at  $V_{IN} \geq 12V$ .

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 90%. An enable function, an over current protection function is built inside. An internal compensation block is built in to minimize external component count.

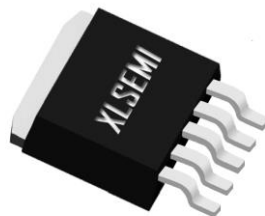


Figure1. Package Type of XL6005

## Pin Configurations

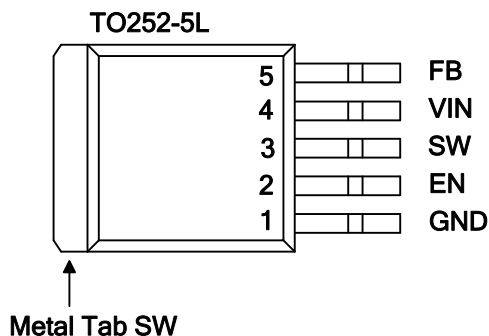


Figure2. Pin Configuration of XL6005 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	GND	Ground Pin.
2	EN	Enable Pin. Drive EN pin low to turn off the device, drive it high to turn it on. Floating is default high.
3	SW	Power Switch Output Pin (SW).
4	VIN	Supply Voltage Input Pin. XL6005 operates from a 3.6V to 32V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
5	FB	Feedback Pin (FB). The feedback threshold voltage is 0.22V.

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### Function Block

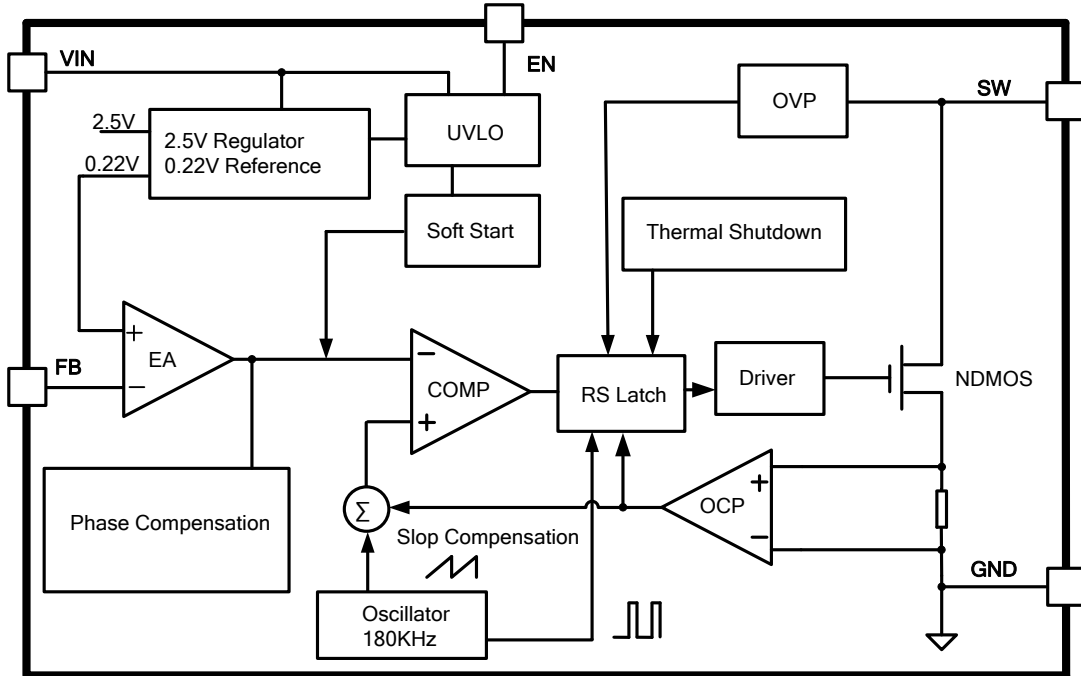


Figure3. Function Block Diagram of XL6005

### Typical Application Circuit

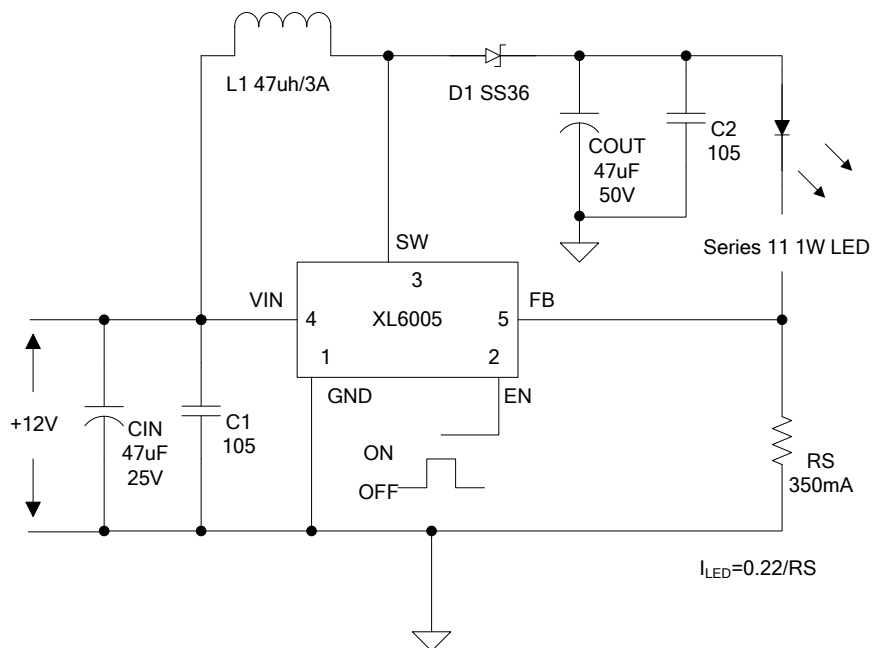


Figure4. XL6005 Typical Application Circuit

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## Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL6005E1	XL6005E1	TO252-5L	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	$V_{in}$	-0.3 to 36	V
Feedback Pin Voltage	$V_{FB}$	-0.3 to $V_{in}$	V
EN Pin Voltage	$V_{EN}$	-0.3 to $V_{in}$	V
Output Switch Pin Voltage	$V_{SW}$	-0.3 to 60	V
Power Dissipation	$P_D$	Internally limited	mW
Thermal Resistance (TO252-5L) (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.

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### XL6005 Electrical Characteristics

$T_a = 25^\circ\text{C}$ ; unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>System parameters test circuit figure4</b>						
VFB	Feedback Voltage	$V_{in} = 5\text{V to } 12\text{V}, V_{out}=24\text{V}$ $I_{load}=100\text{mA}$	209	220	231	mV
$\eta$	Efficiency	$V_{in}=12\text{V}, V_{out}=24\text{V}$ $I_{out}=1\text{A}$	-	92	-	%

### Electrical Characteristics (DC Parameters)

$V_{in} = 12\text{V}$ ,  $GND=0\text{V}$ ,  $V_{in}$  &  $GND$  parallel connect a  $100\mu\text{f}/50\text{V}$  capacitor;  $I_{out}=100\text{mA}$ ,  $T_a = 25^\circ\text{C}$ ; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	$V_{in}$		3.6		32	V
Shutdown Supply Current	$I_s$	$V_{EN}=0\text{V}$		70	100	$\mu\text{A}$
Quiescent Supply Current	$I_q$	$V_{EN}=2\text{V}$ , $V_{FB}=V_{in}$		2.5	5	mA
Oscillator Frequency	Fosc		144	180	216	Khz
Switch Current Limit	$I_L$	$V_{FB}=0\text{V}$		4		A
Output Power NMOS	Rdson	$V_{in}=12\text{V}$ , $I_{SW}=4\text{A}$		110	120	mohm
EN Pin Threshold	$V_{EN}$	High (Regulator ON) Low (Regulator OFF)		1.4 0.8		V
EN Pin Input Leakage Current	$I_H$	$V_{EN}=2\text{V}$ (ON)		3	10	$\mu\text{A}$
	$I_L$	$V_{EN}=0\text{V}$ (OFF)		3	10	$\mu\text{A}$
Max. Duty Cycle	$D_{MAX}$	$V_{FB}=0\text{V}$		90		%

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Typical System Application for VIN=12V to driver 11 x 1W series LED units

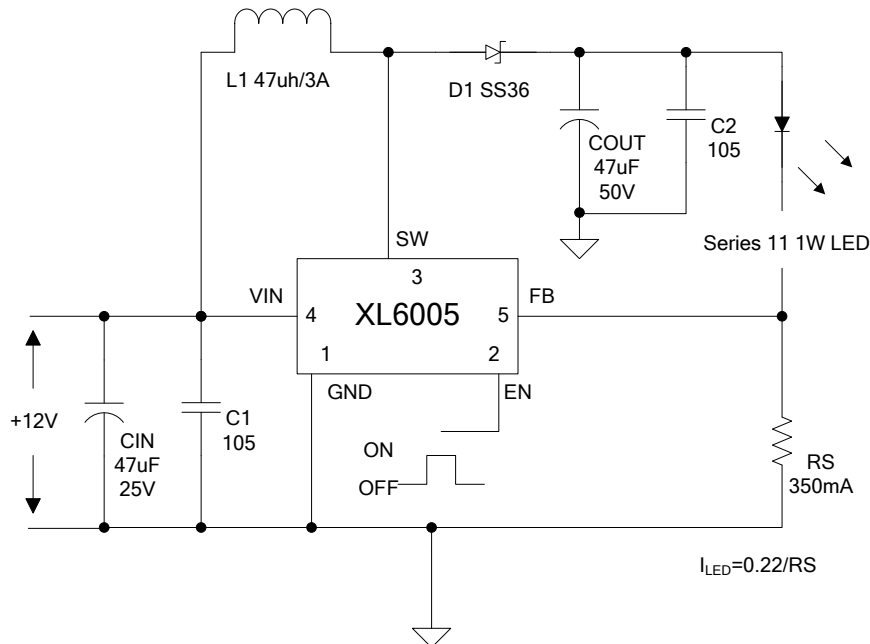


Figure5. XL6005 System Parameters Test Circuit (12V ~11 x 1W LED)

Typical System Application for VIN>=12V to driver 6 x 3W series LED units

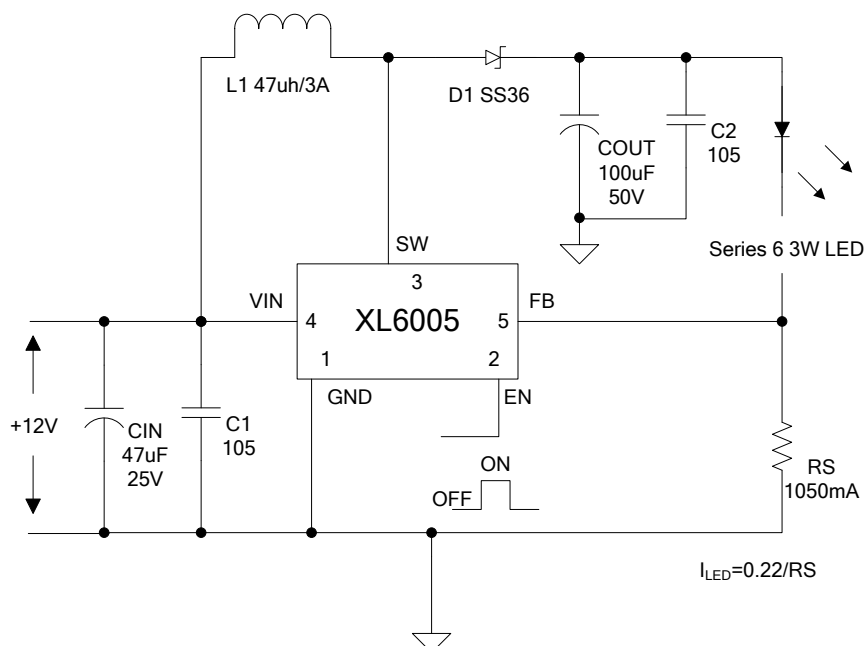


Figure6. XL6005 System Parameters Test Circuit (12V ~ 6 x 3W LED)

Typical System Application for  $V_{IN} \geq 24V$  to driver 10 x 3W series LED units

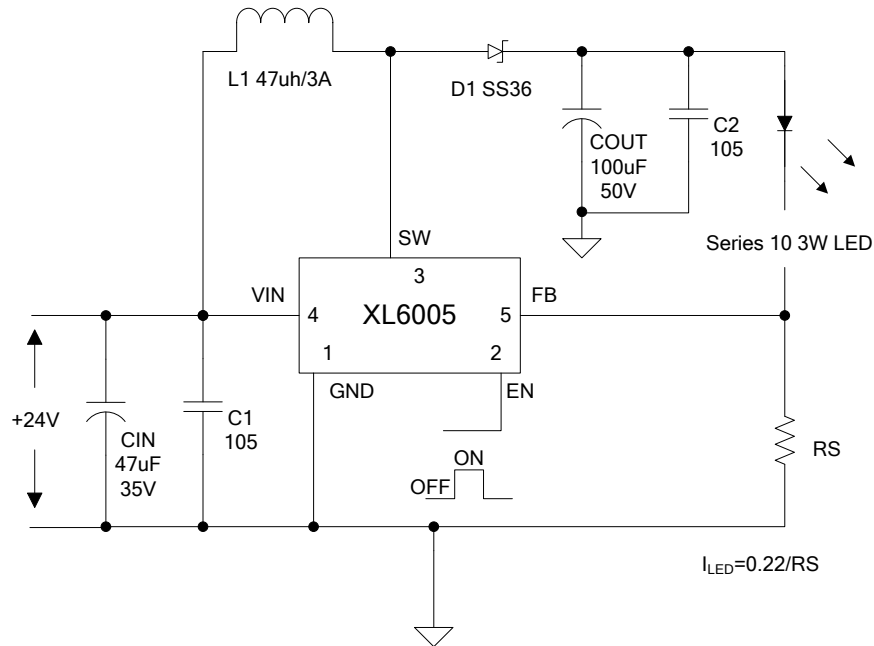


Figure7. XL6005 System Parameters Test Circuit (24V ~ 10 x 3W LED)

Typical System Application for  $V_{IN} \geq 12V$  to driver 11 series x 40 parallel White LED Array

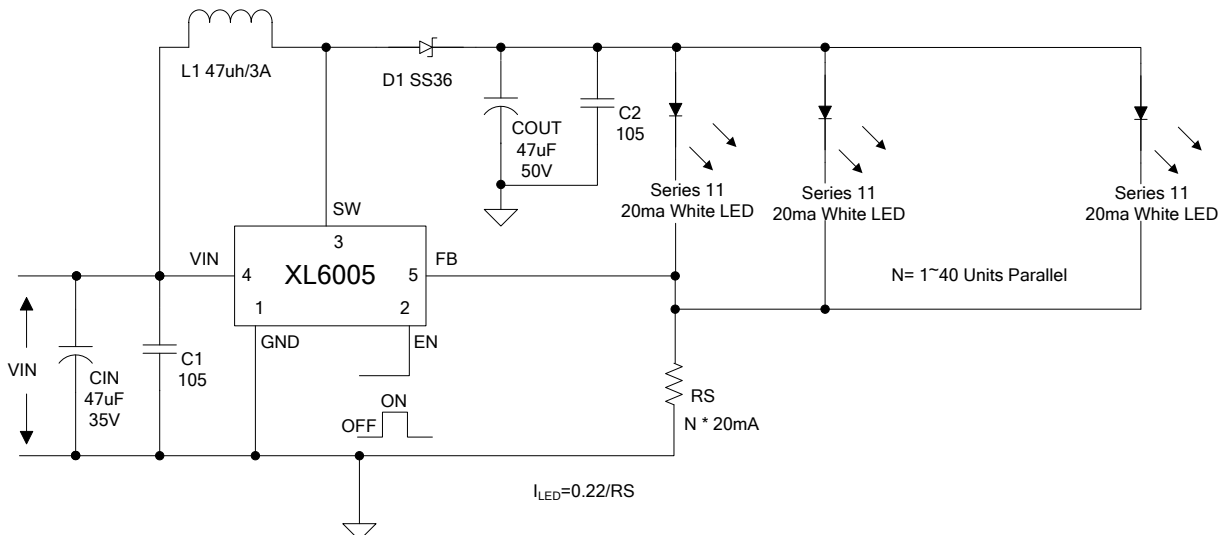


Figure8. XL6005 System Parameters Test Circuit ( $V_{IN} \geq 12V$  ~ 11 x 40 White LED)

## 180KHz 60V 4A Switching Current Boost LED Constant Current Driver XL6005

### Typical System Application for SEPIC Buck-Boost LED Driver

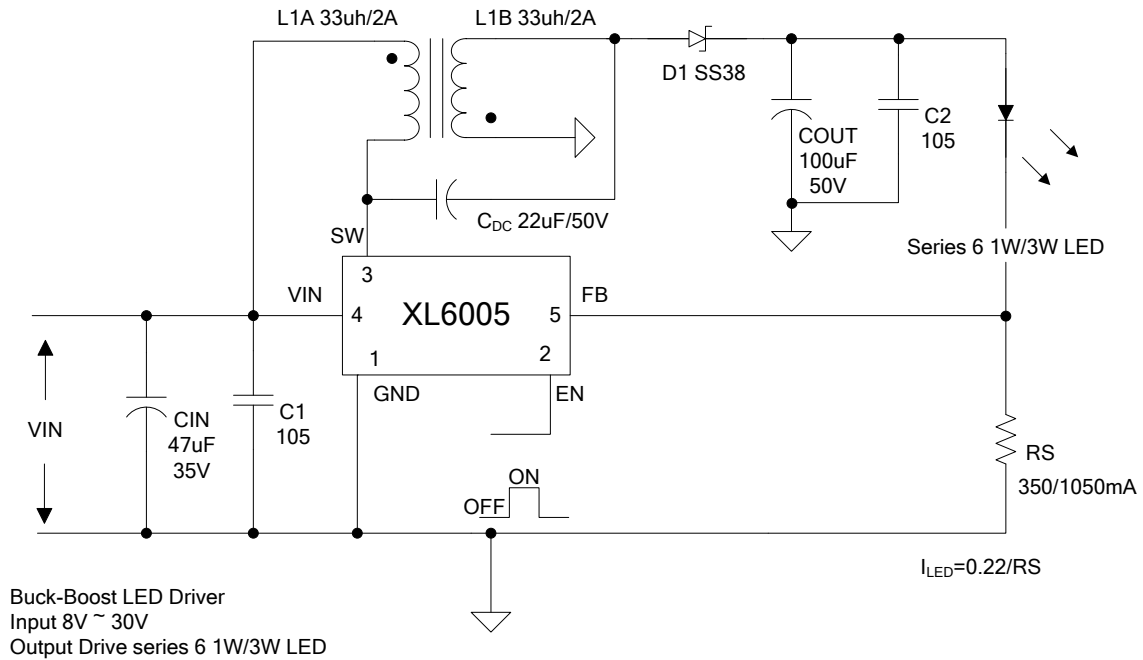


Figure9. XL6005 System Parameters Test Circuit (Buck-Boost LED Driver)

### Typical System Application for $V_{IN} \geq 12V$ to driver 8 x 2W series LED units With Dimming Function

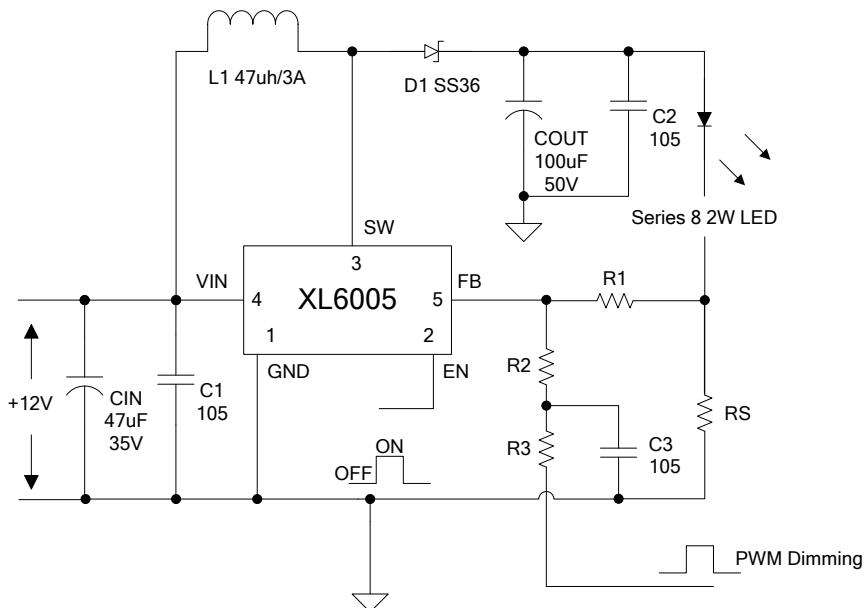


Figure10. XL6005 System Test Circuit (12V ~ 8 x 2W LED with Dimming Function)



## 180KHz 60V 4A Switching Current Boost LED Constant Current Driver XL6005

### Typical System Application (LED Open Protection)

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

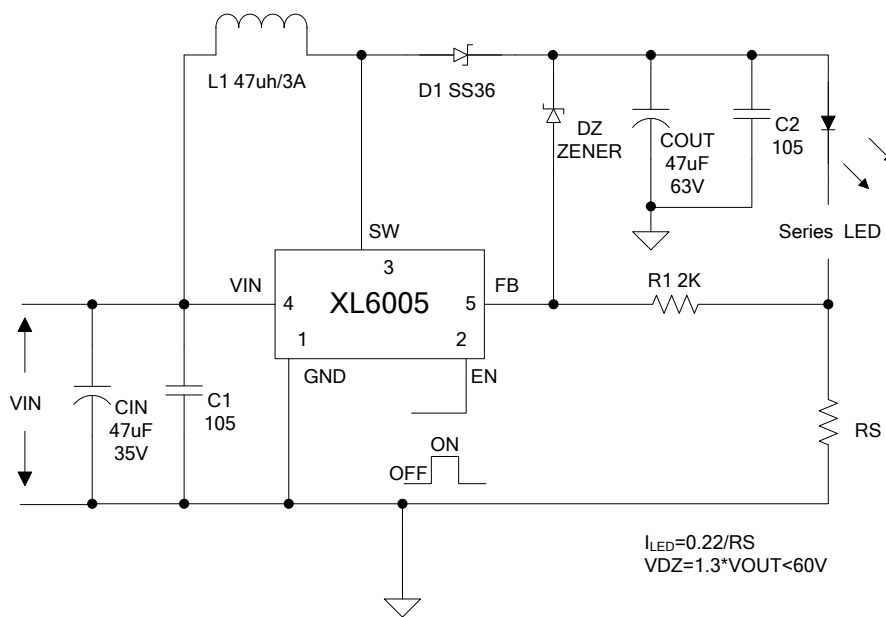
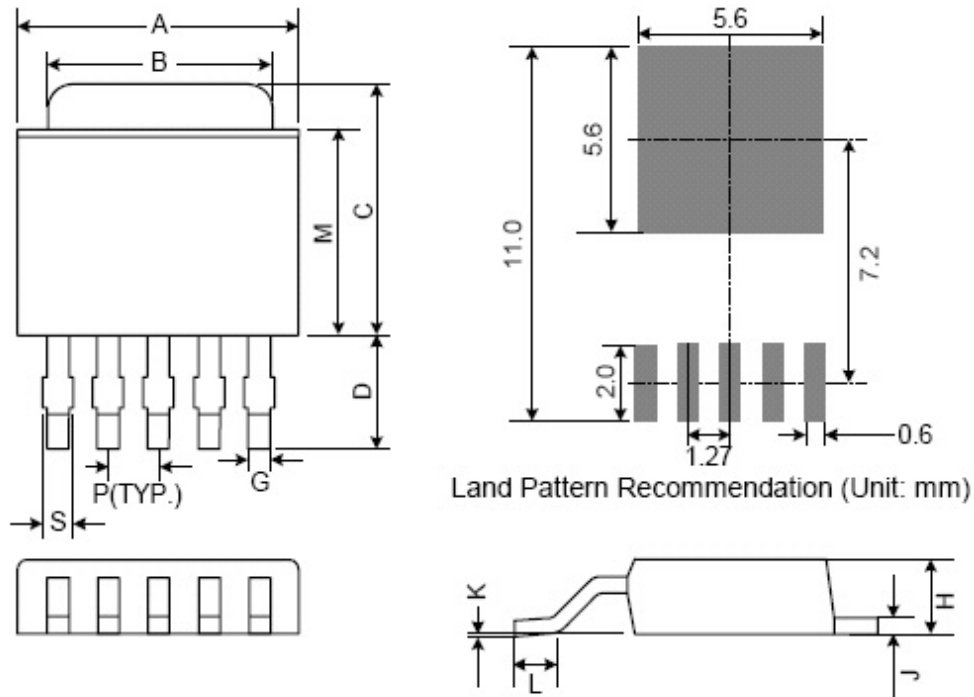


Figure11. XL6005 System Test Circuit (LED Open Protection)

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## Package Information

### TO252-5L Mechanical Dimensions



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

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