IS31LT3177/IS32LT3177 10-TO-200mA CONSTANT-CURRENT LED DRIVER

DESCRIPTION

The IS31LT3177 and IS32LT3177 are adjustable linear current devices with excellent temperature stability. A single resistor is all that is required to set the operating current from 10mA to 200mA. The devices can operate from an input voltage from 5.0V to 40V with a minimal voltage headroom of 1.0V (Typ.) at 150mA. Designed with a low dropout voltage; the device can drive LED strings close to the supply voltage without switch capacitors or inductors.

The EN Pin of the IS31LT3177/IS32LT3177 can be tied to V_{BAT} or PSM (Power Supply Modulation) signal for high side dimming.

As a current sink it is ideal for LED lighting applications or current limiter for power supplies.

The device is provided in a lead (Pb) free, SOT23-6 and SOP-8-EP packages.

FEATURES

- Low-side current sink
  - Adjustable from 10mA to 150mA (SOT23-6)/200mA (SOP-8-EP) with external resistor selection
- Wide input voltage range from
  - 5V to 40V
  with a low dropout of typical 1.0V at 150mA
- ±5% current accuracy over -40°C ~ +125°C
- Protection features:
  -0.6%/K current roll off at high temp over 145°C for thermal protection
- Up to 0.77W (SOT23-6)/2.32W (SOP-8-EP) power dissipation in a small package
- RoHS compliant (Pb-free) package
- AEC-Q100 qualification in progress (IS32LT3177)

QUICK START

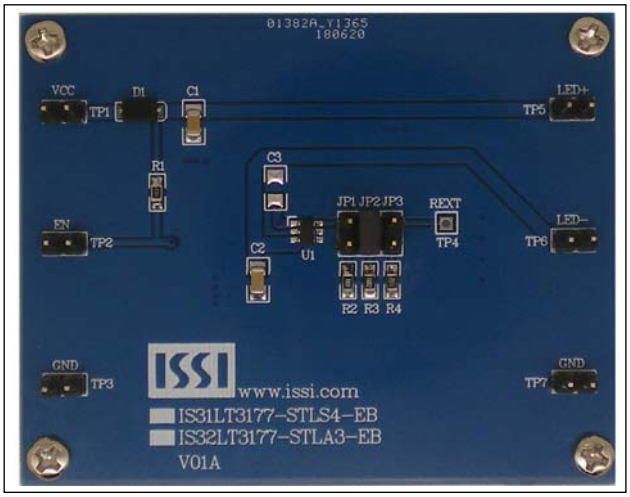


Figure 1: Photo of IS31LT3177-STLS4 /IS32LT3177-STLA3 Evaluation Board

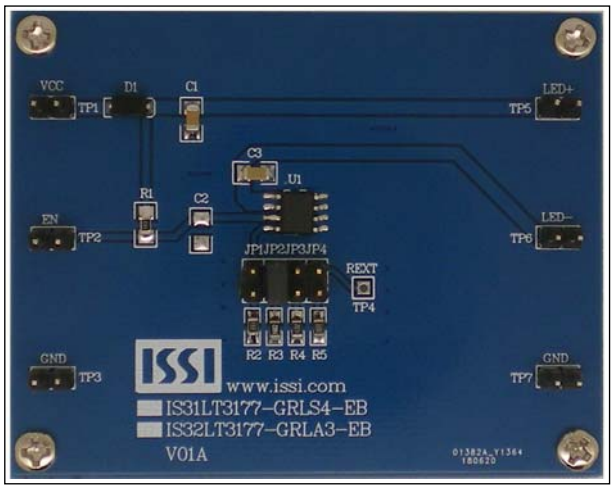


Figure 2: Photo of IS31LT3177-GRLS4 /IS32LT3177-GRLA3 Evaluation Board

RECOMMENDED EQUIPMENT

- 5V~40V, 1A DC variable power supply
- HBLEDs

ABSOLUTE MAXIMUM RATINGS

- ≤ 40V input voltage

Caution: Do not exceed the conditions listed above, otherwise the board will be damaged.

PROCEDURE

The IS31LT3177/IS32LT3177 evaluation board are fully assembled and tested. Follow the steps listed below to verify board operation.

Caution: Do not turn on the power supply until all connections are completed.

1) Connect the ground terminal of the power supply to the GND (TP3) and the positive terminal to the VCC (TP1). Connect the Anode of an external LED string to LED+ (TP5) and its Cathode to LED- (TP6).
2) The evaluation board (IS31LT3177-STLS4/ IS32LT3177-STLA3-EB) supports three current levels, selected byJP1, JP2, JP3 see the table below. The test point REXT can be used to add an external resistor. The final resistance can be measured with an ohm meter across REXT and GND (TP7) pins. For jumpers (JP1~JP3) Closed=1 and Open=0.

JP1	JP2	JP3	R_{EXT} (kΩ)
1	0	0	33
0	1	0	16
0	0	1	11

3) The evaluation board (IS31LT3177-GRLS4/ IS32LT3177-GRLA3-EB) supports four current levels, selected by JP1, JP2, JP3, JP4 see table on the right. The test point REXT can be used to add an external resistor. The final resistance can be measured with an ohm meter across REXT and GND (TP7) pins. For jumpers (JP1~JP4) Closed=1 and Open=0.

JP1	JP2	JP3	JP4	R_{EXT} (kΩ)
1	0	0	0	33
0	1	0	0	16
0	0	1	0	11
0	0	0	1	8.2

4) The 0Ω resistor R1 is installed to connect the EN pin directly to VCC.

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31LT3177-STLS4-EB	-40°C ~ +125°C (Industrial)	SOT23-6, Lead-free
IS31LT3177-GRLS4-EB	-40°C ~ +125°C (Industrial)	SOP-8-EP, Lead-free
IS32LT3177-STLA3-EB	-40°C ~ +125°C (Automotive)	SOT-23-6, Lead-free
IS32LT3177-GRLA3-EB	-40°C ~ +125°C (Automotive)	SOP-8-EP, Lead-free

Table 1: Ordering Information

For pricing, delivery, and ordering information, please contact Lumissil's analog marketing team at analog@Lumissil.com or (408) 969-6600

EVALUATION BOARD OPERATION

IS31LT3177/IS32LT3177 evaluation board drives one string of HBLEDs.

OUTPUT CURRENT SETING

IS31LT3177/IS32LT3177 provides an easy constant current source solution for LED lighting applications. It uses an external resistor to adjust the LED current from 10mA to 150mA (SOT23-6)/200mA (SOP-8-EP). The LED current can be determined by the external resistor R_{ISET} as Equation (1):

$$R_{ISET} = \frac{V_{ISET} \times 1600}{I_{SET}} \qquad (1)$$

10.6kΩ≤R_{ISET}≤160kΩ for SOT23-6 package, and 8kΩ≤R_{ISET}≤160kΩ for SOP-8-EP package.

Where R_{ISET} is in Ω, I_{SET} is desired LED current in Amp and V_{ISET}= 1.0V (Typ.)

R_{ISET} must be a 1% accuracy resistor with good temperature characteristics in order to ensure stable output current. The device limits the maximum output current to I_{OUT_LIMIT} to protect itself from an output overcurrent condition caused by a low value. Do not leave ISET pin floating.

THERMAL PROTECTION

The IS31LT3177/IS32LT3177 implements thermal roll off protection to reduce the LED current when the package's thermal dissipation is exceeded and prevent "thermal runaway". The thermal roll off begins from 145°C, and linearly decreases following the junction temp to 85% of the set current value at T_{SD} (170°C). In the event that the junction temperature exceeds 170°C, the device will go into shutdown mode. At this point, the IC begins to cool off and will resume operation once the junction temperature goes below 140°C.

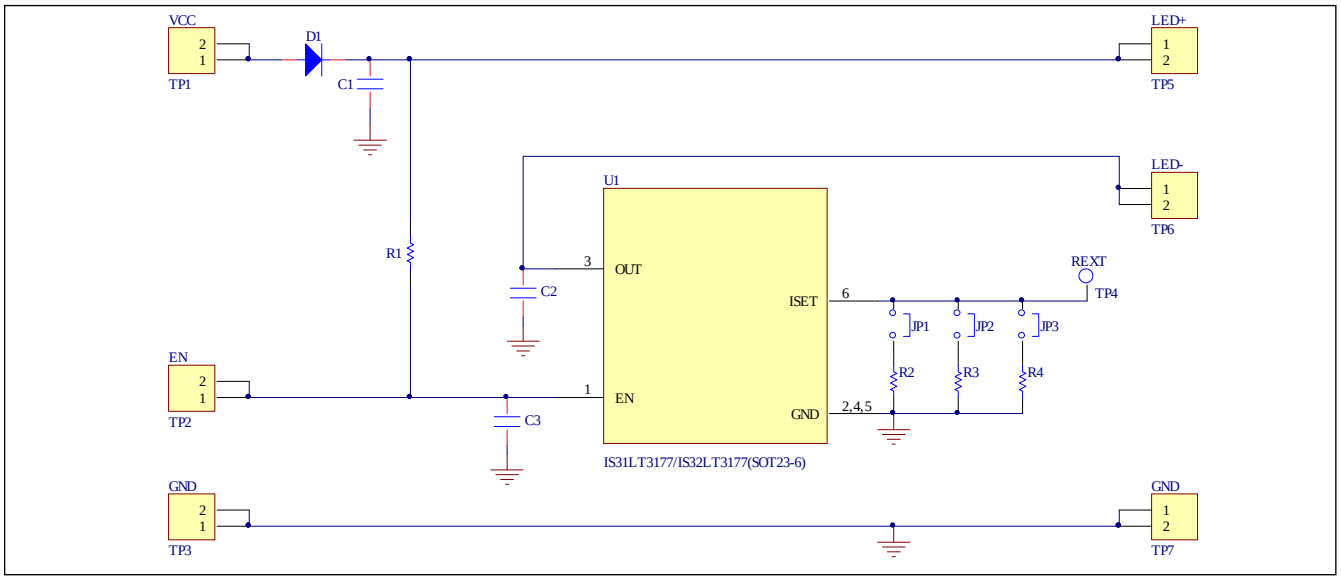


Figure 3: IS31LT3177/IS32LT3177 (SOT23-6) Application Schematic

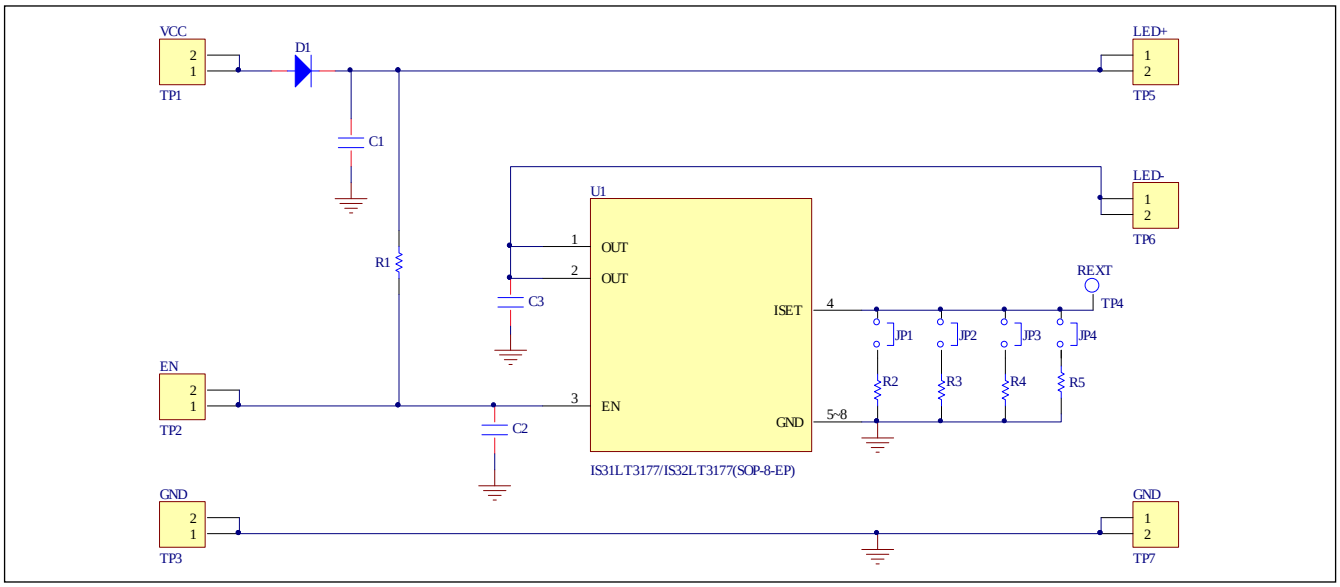


Figure 4: IS31LT3177/IS32LT3177 (SOP-8-EP) Application Schematic

BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U1	LED Driver	1	Lumissil	IS31LT3177-STLS4-TR IS32LT3177-STLA3-TR
Resistor	R1	RES,0R,1/8W,±5%,SMD	1	YAGEO	RC0805JR-070RL
Resistor	R2	RES,33K,1/8W,±1%,SMD	1	YAGEO	RC0805FR-0733KL
Resistor	R3	RES,16K,1/8W,±1%,SMD	1	YAGEO	RC0805FR-0716KL
Resistor	R4	RES,11K,1/8W,±1%,SMD	1	YAGEO	RL0805JR-0711KL
Capacitor	C1	CAP, 0.1μF,50V,±10%,SMD	1	YAGEO	CC1206KPX7R9BB104
Capacitor	C2	CAP, 1nF,50V,±10%,SMD	1	YAGEO	CC1206KPX7R9BB102
Diode	D1	1N4007,1A,1000V,SMA	1	Diodes	M7
Capacitor	C3	NC	1		
Jumper	JP1~JP3	Jumper	3		
Test Terminal	TP1~TP7	Test terminal	7		

Bill of materials, refer to Figure 3 above.

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U1	LED Driver	1	Lumissil	IS31LT3177-GRLS4-TR IS32LT3177-GRLA3-TR
Resistor	R1	RES,0R,1/8W,±5%,SMD	1	YAGEO	RC0805JR-070RL
Resistor	R2	RES,33K,1/8W,±1%,SMD	1	YAGEO	RC0805FR-0733KL
Resistor	R3	RES,16K,1/8W,±1%,SMD	1	YAGEO	RC0805FR-0716KL
Resistor	R4	RES,11K,1/8W,±1%,SMD	1	YAGEO	RL0805FR-0711KL
Resistor	R5	RES,8.2K,1/8W,±1%,SMD	1	YAGEO	RL0805FR-078K2L
Capacitor	C1	CAP, 0.1μF,50V,±10%,SMD	1	YAGEO	CC1206KPX7R9BB104
Capacitor	C3	CAP, 1nF,50V,±10%,SMD	1	YAGEO	CC1206KPX7R9BB102
Diode	D1	1N4007,1A,1000V,SMA	1	Diodes	M7
Capacitor	C2	NC	1		
Jumper	JP1~JP4	Jumper	4		
Test Terminal	TP1~TP7	Test terminal	7		

Bill of materials, refer to Figure 4 above.

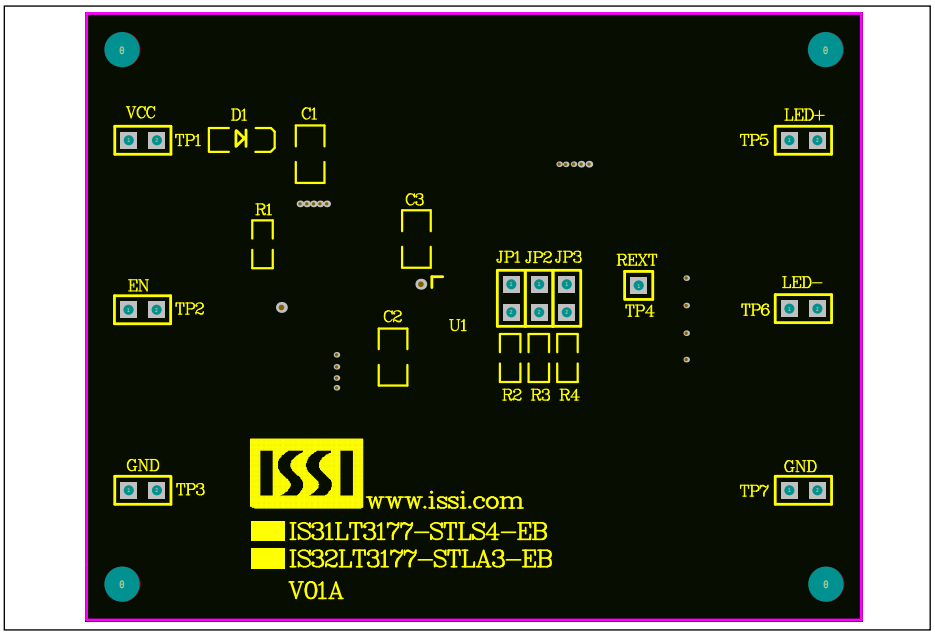


Figure 5: Board Component Placement Guide - Top Layer (SOT23-6)

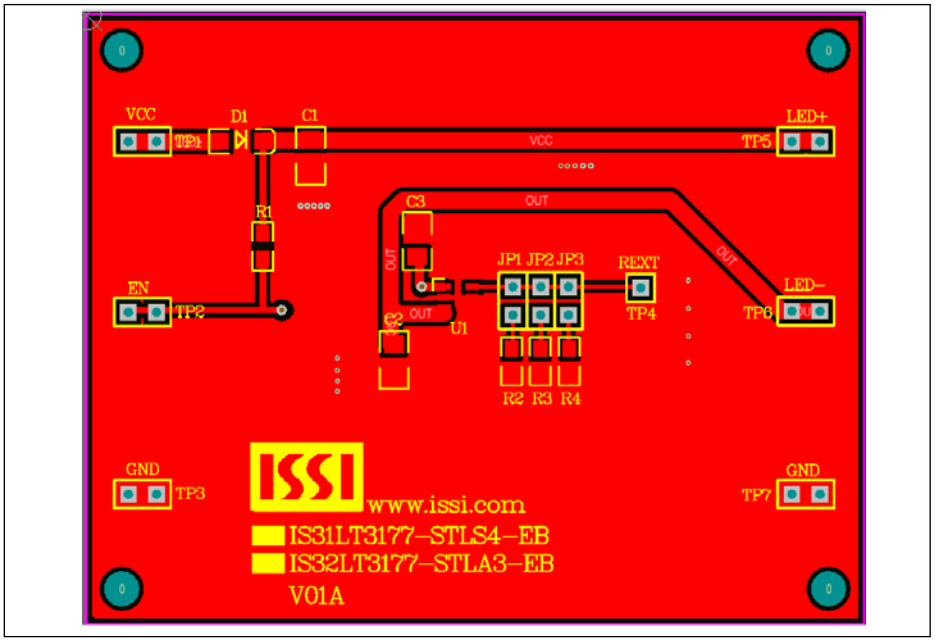


Figure 6: Board PCB Layout - Top Layer (SOT23-6)

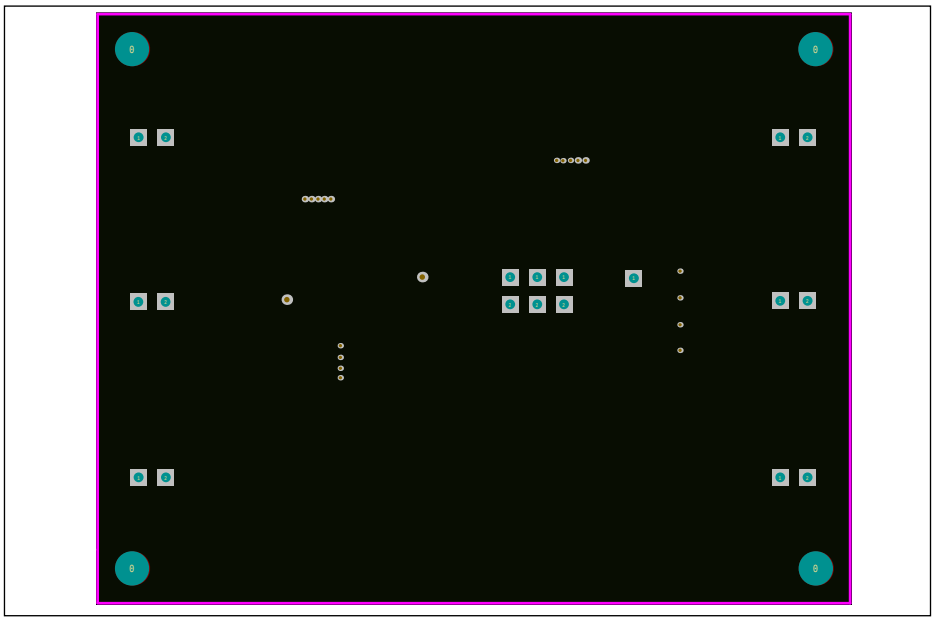


Figure 7: Board Component Placement Guide - Bottom Layer (SOT23-6)

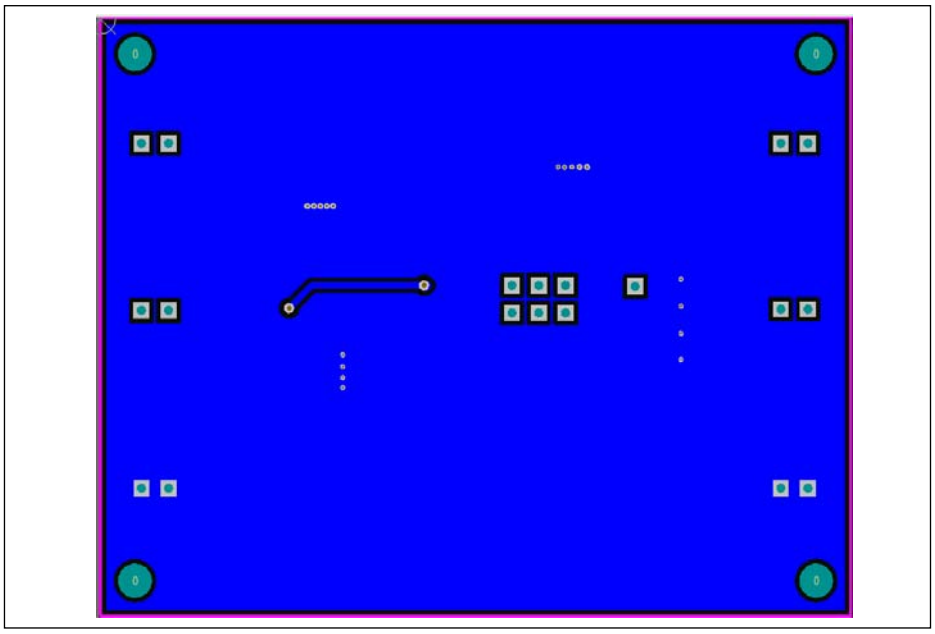


Figure 8: Board PCB Layout - Bottom Layer (SOT23-6)

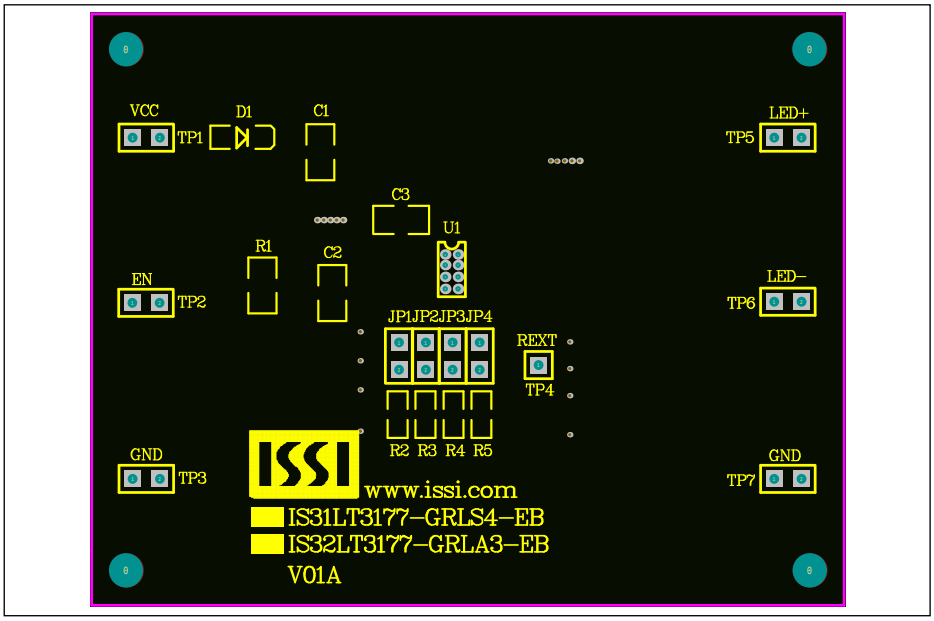


Figure 9: Board Component Placement Guide - Top Layer (SOP-8-EP)

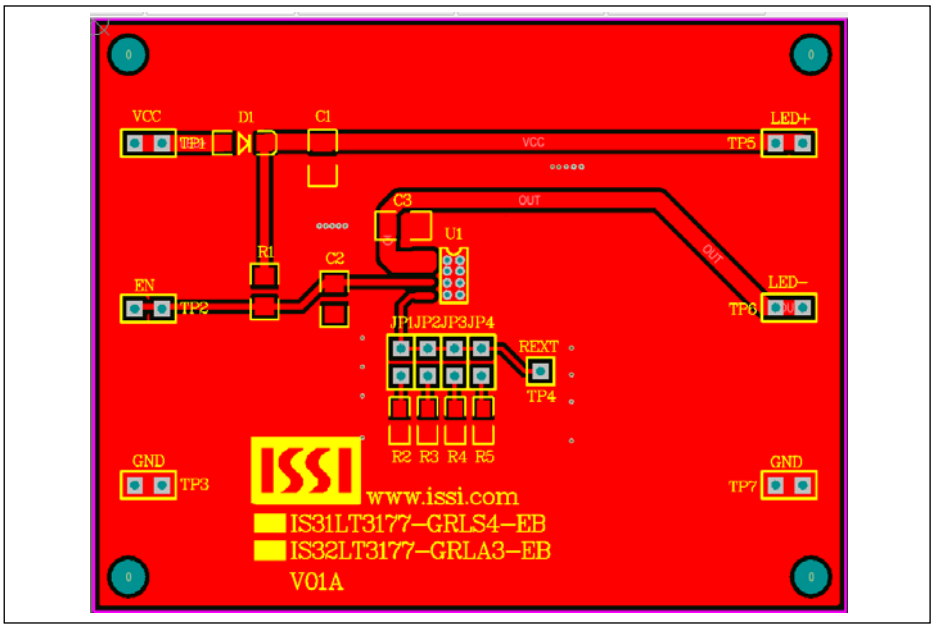


Figure 10: Board PCB Layout - Top Layer (SOP-8-EP)

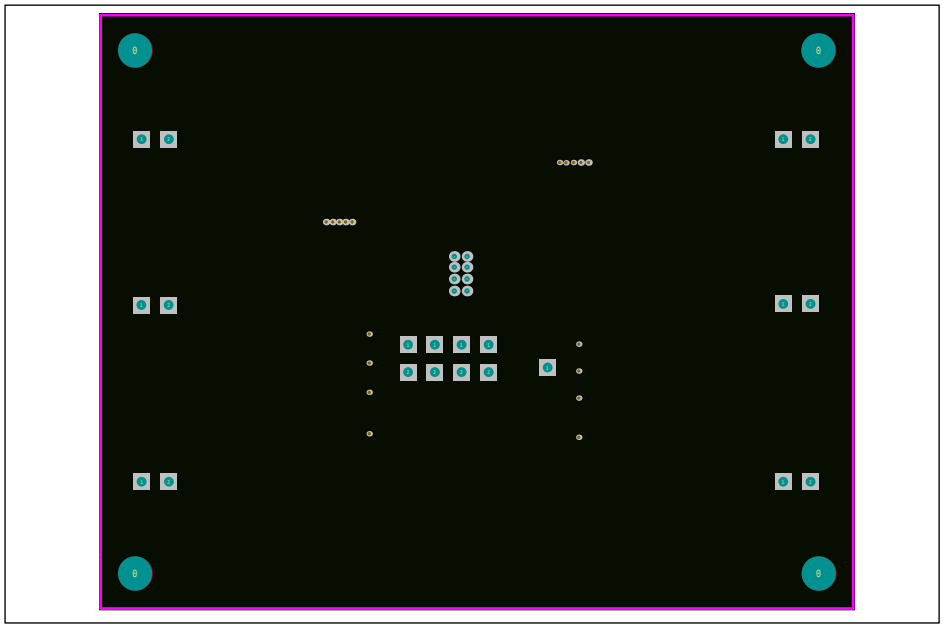


Figure 11: Board Component Placement Guide - Bottom Layer (SOP-8-EP)

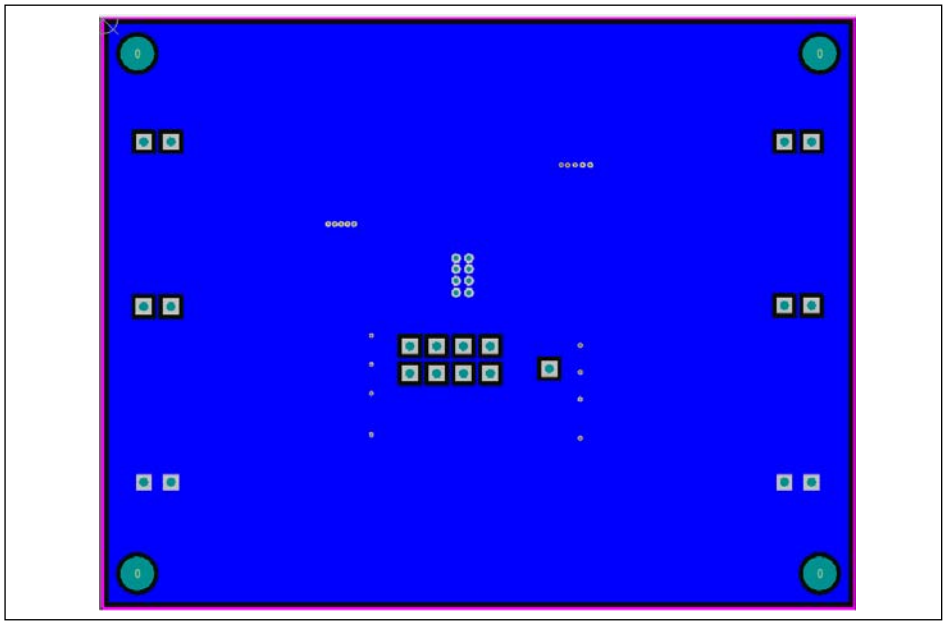


Figure 12: Board PCB Layout - Bottom Layer (SOP-8-EP)

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a.) the risk of injury or damage has been minimized;
b.) the user assume all such risks; and
c.) potential liability of Lumissil Microsystems is adequately protected under the circumstances

REVISION HISTORY

Revision	Detail Information	Date
A	Initial release	2018.08.20
B	Update BOM list	2018.10.23