Sameer Dash

ISL91117II7-EVZ, ISL91117IIA-EVZ Evaluation Boards

Description

The ISL91117 is a highly-integrated boost switching regulator for battery powered applications. The device provides a power supply solution for products using dual-cell or three-cell alkaline, NiCd or NiMH, or one-cell Li-ion or Li-polymer battery The ISL91117II7-EVZ and ISL91117IIA-EVZ platforms allow quick evaluation of the high performance features of the ISL91117 high current boost regulator series.

Specifications

The boards are designed to operate at the following operating conditions:

- Input voltage rating from 1.8V to 4.8V
- Resistor programmable output voltage on the ISL91117IIA-EVZ
- Fixed 5V output voltage on the ISL91117II7-EVZ
- True disconnect input to output when disabled
- Up to 1.5A output current (PVIN = 3.3V, V_{OUT} = 5V)
- 2.5MHz switching frequency
- Operating temperature range: -40°C to +85°C

Key Board Features

- Small, compact design
- Jumper selectable EN (enabled/disabled)
- Jumper selectable MODE (auto-PFM/forced-PWM)
- Connectors, test points, and jumpers for easy probing

References

ISL91117 Data Sheet.

Ordering Information

PART NUMBER	DESCRIPTION
ISL91117II7-EVZ	Evaluation Board for ISL91117II7Z
ISL91117IIA-EVZ	Evaluation Board for ISL91117IIAZ

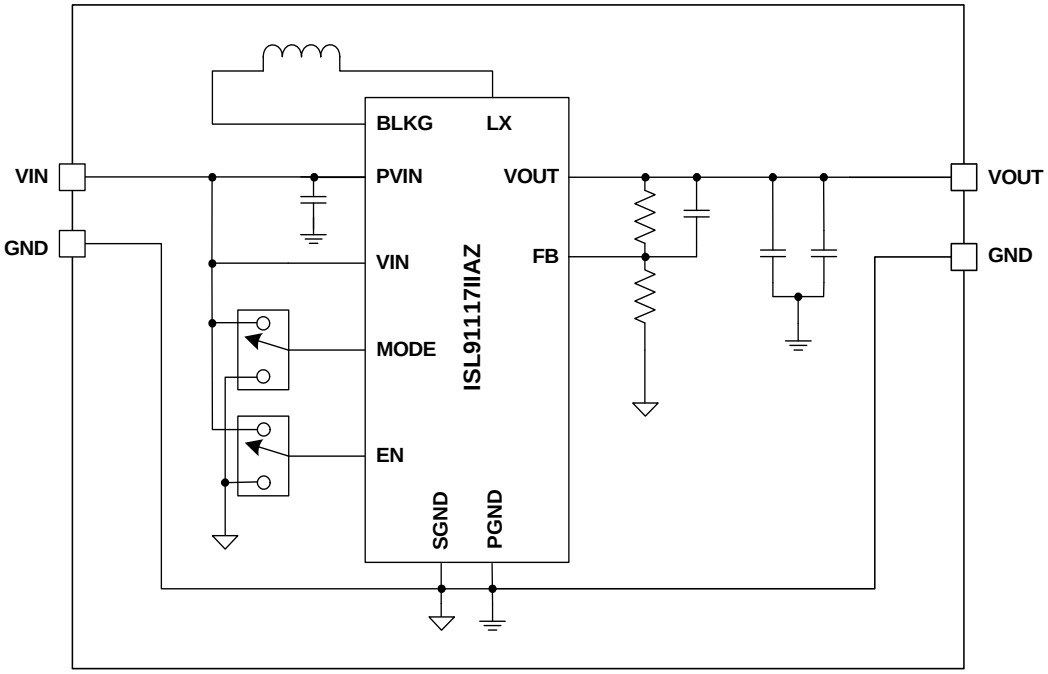

FIGURE 1. ISL91117IIA-EVZ BLOCK DIAGRAM

Functional description

The ISL91117II7-EVZ and ISL91117IIA-EVZ evaluation boards provide simple platforms to demonstrate the feature of the ISL91117 high current boost regulator. The ISL91117II7-EVZ is for the fixed 5V output IC ISL91117II7Z and the ISL91117IIA-EVZ is for the adjustable output IC ISL91117IIAZ. The evaluation boards have been functionally optimized for best performance of the ISL91117 IC series. The input power and load connections are provided through multi-pin connectors for high current operations.

The ISL91117IIA-EVZ evaluation board is shown in Figures 4 and 5. The board's enable function is controlled by the on-board jumper header J3. Similarly the Mode function is controlled by the on-board jumper header J4.

The schematic of the ISL91117IIA-EVZ evaluation board is shown in Figure 6. The schematic for the ISL91117II7-EVZ is shown in Figure 7. The PCB layout images for all layers are shown in Figures 8 through 11. The bill of materials of the ISL91117IIA-EVZ is shown in Table 2. The bill of materials of the ISL91117II7-EVZ is shown in Table 3.

Operating Range

The V_{IN} range of the boards is 1.8V to 4.8V. The V_{OUT} range for the ISL91117IIA-EVZ is V_{IN}+0.2V to 5V. The I_{OUT} range of the boards is 0 to 1.5A. The operating ambient temperature range is -40°C to +85°C.

Quick Start Guide

For the ISL91117IIA-EVZ board, the default output voltage is set at 5V. Should other output voltages are desired, resistor R1 can be changed to set to a desired voltage as shown in Table 1 (use a resistor with 1% accuracy).

Refer to the following Quick Setup Guide to configure and power up the board for proper operation. During the power on process, the expected waveforms are shown in Figures 2 and 3.

Quick Setup Guide

1. Install jumper on J3, shorting EN to VIN.
2. Install jumper on J4, shorting MODE to VIN.
3. Connect power supply to J1, with voltage setting between 1.8V and 4.8V.
4. Connect electronic load to J2.
5. Place scope probes on the V_{OUT} test point, and other test points of interest.
6. Turn on the power supply.
7. Monitor the output voltage start-up sequence on the scope. The waveforms will look similar to that shown in Figure 2.
8. Turn on the electronic load.
9. Measure the output voltage with the voltmeter. The voltage should regulate within datasheet spec limits.
10. To determine efficiency, measure input and output voltages at the Kelvin sense test points (S+ and S-), which are part of J1 and J2 headers. The bench power supply can be connected to the PVIN and GND headers on J1. The electronic load can be connected to the VOUT and GND headers on J2. Measure the input and output currents. Calculate efficiency based on these measurements.
11. To test external sync, remove the jumper at J4, then apply an external clock between 2.75MHz and 3.25MHz on the MODE input (the center pin of header J4).
12. Set the electronic load to constant current dynamic mode with 10mA to 1A pulse, t_{ON}= 500µs. Check the load transient response as shown in Figure 3.

TABLE 1. OUTPUT VOLTAGE PROGRAMMING For ISL91117IIA-EVZ

DESIRED OUTPUT VOLTAGE (V)	R1 RESISTOR VALUES (kΩ)
2.0	90.9
2.5	127
3.0	165
3.3	187
3.6	210
4.0	243
4.5	280
5.0	316

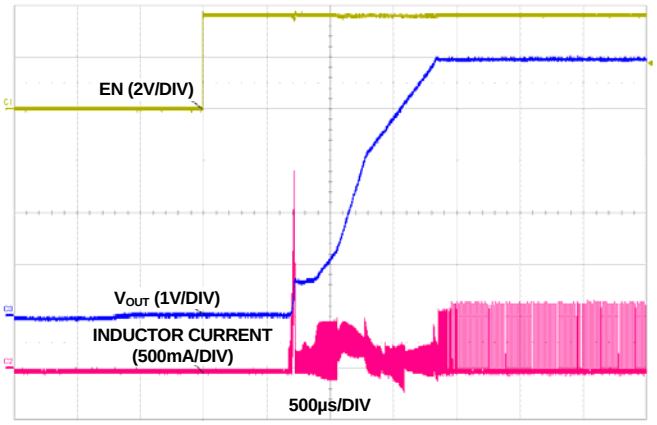

FIGURE 2. ISL91117 START-UP WITH V_{IN} = 3.6V and V_{OUT} = 5V

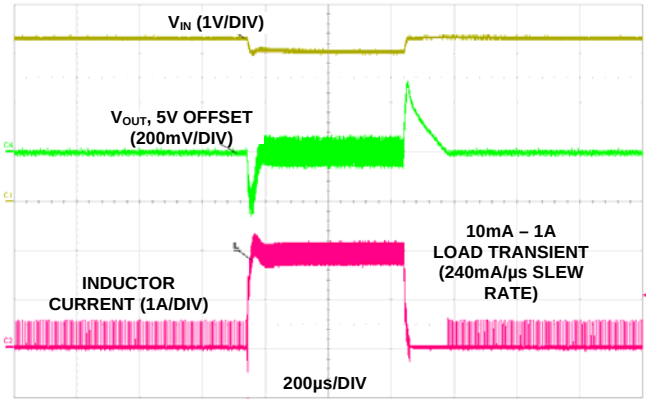

FIGURE 3. ISL91117 LOAD TRANSIENT AT V_{IN} = 3V AND V_{OUT} = 5V

ISL91117IIA-EVZ Evaluation Board

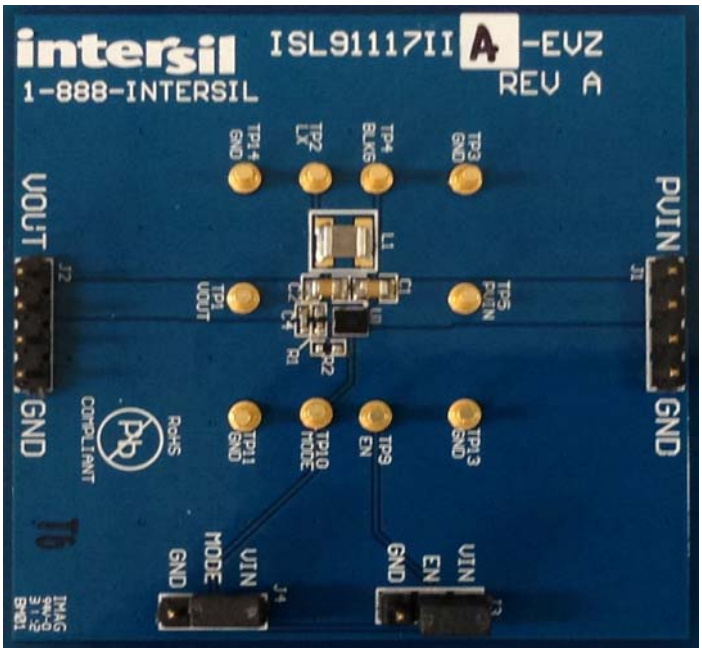

FIGURE 4. TOP VIEW

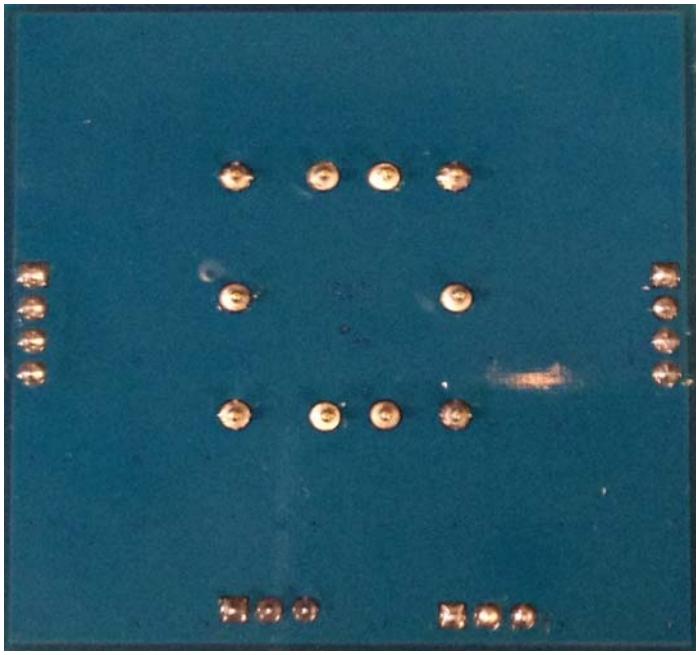

FIGURE 5. BOTTOM VIEW

ISL91117IIA-EVZ Evaluation Board Schematic

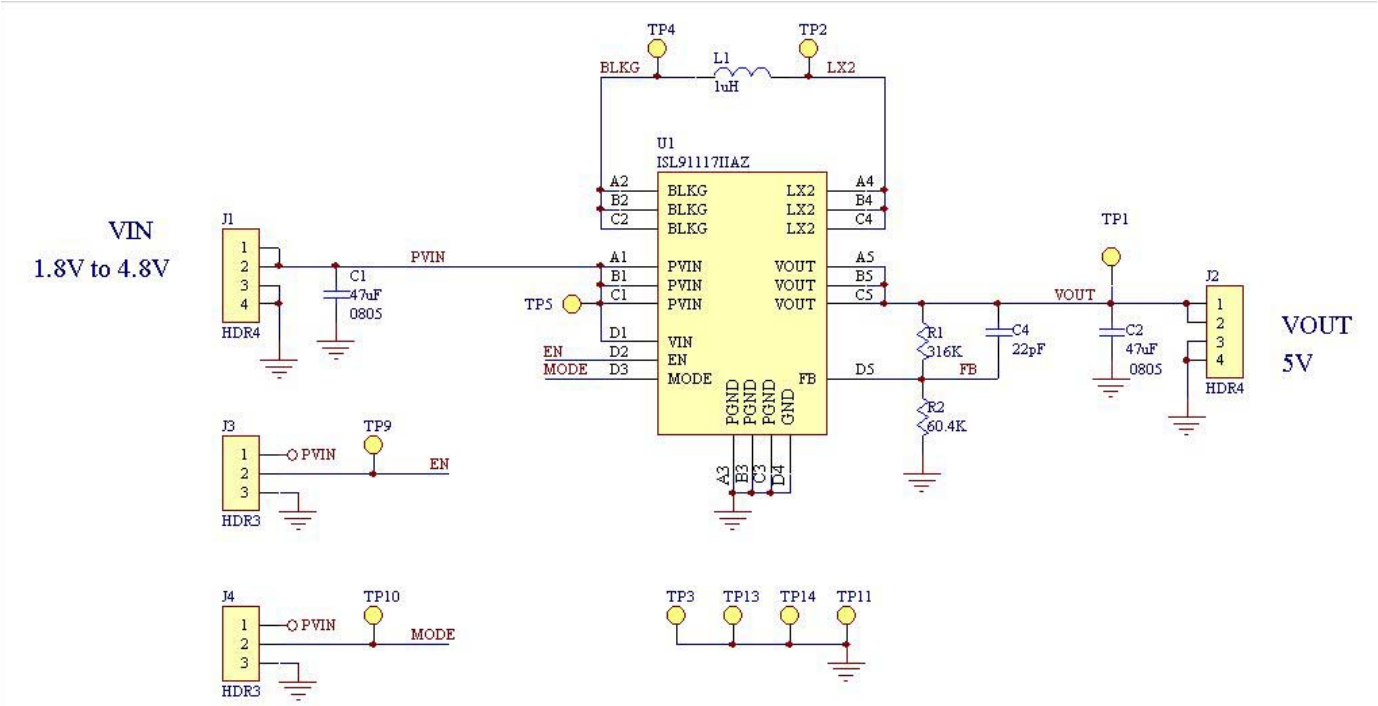

FIGURE 6. ISL91117IIA-EVZ EVALUATION BOARD SCHEMATIC

TABLE 2. ISL91117IIA-EVZ EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATORS	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	U1	ISL91117IIAZ	W4x5.20; WLCSP	Intersil ISL91117 Boost Regulator with Adjustable Output Voltage	INTERSIL
2	1	L1	1µH	3.2mmx2.5mm	Power Inductor DFE322512C, 4.6A, 34mΩ	TOKO
3	2	C1, C2	47µF/6.3V/ X5R	0805	Capacitor, GRM21BR60J476ME15L	MURATA
4	1	C4	22pF	0402	Capacitor, Generic	ANY
5	1	R1	316kΩ, 1%	0402	Resistor, Generic	ANY
6	1	R2	60.4kΩ, 1%	0402	Resistor, Generic	ANY
7	2	J3, J4	HDR-3	HDR-3	Vert. Pin Header, 3-Pin, 0.1” Spacing, Generic	ANY
11	2	J1, J2	HDR-4	HDR-4	Vert. Pin Header, 4-Pin, 0.1” Spacing, Generic	ANY
12	9	TP1, TP2, TP4, TP5, TP9, TP10, TP11, TP13, TP14	TEST POINT	TEST POINT	Test Point, Thru-Hole, 3156-1-00-15-00-00-08-0	MILL-MAX PINS

ISL91117II7-EVZ Evaluation Board Schematic

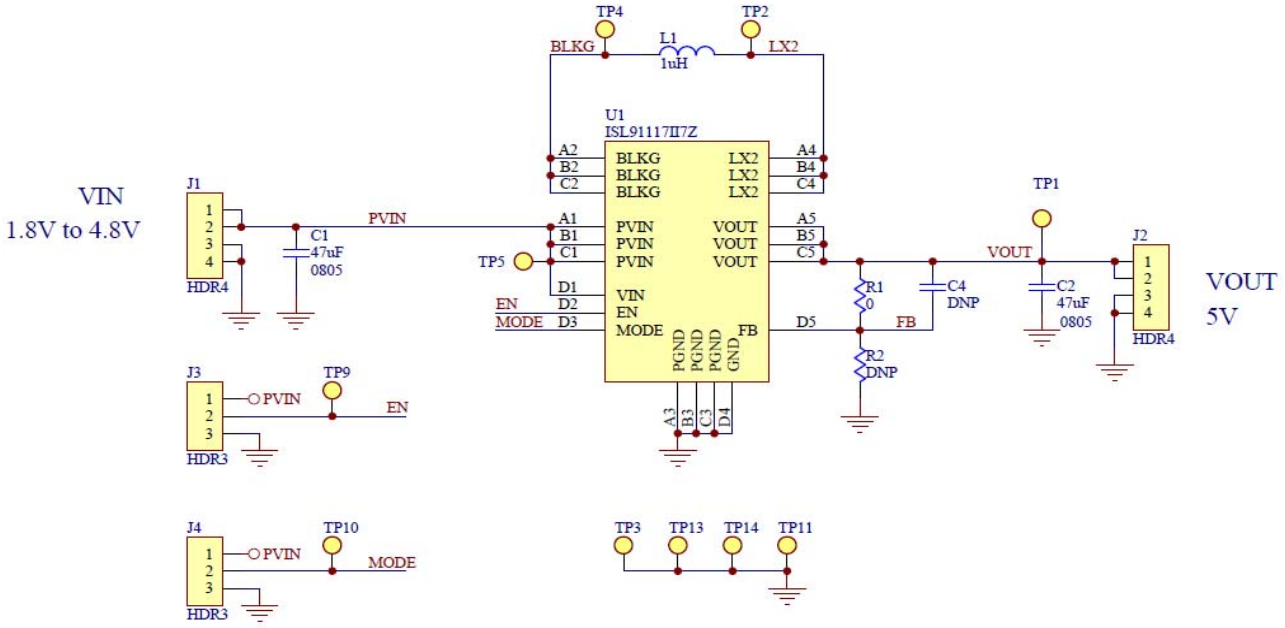

FIGURE 7. ISL91117II7-EVZ EVALUATION BOARD SCHEMATIC

TABLE 3. ISL91117II7-EVZ EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATORS	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	U1	ISL91117II7Z	W4x5.20 WLCSP	Intersil ISL91117 Boost Regulator with Fixed 5V Output	INTERSIL
2	1	L1	1µH	3.2mmx2.5mm	Power Inductor DFE322512C, 4.6A, 34mΩ	TOKO
3	2	C1, C2	47µF/6.3V/X5R	0805	Capacitor, GRM21BR60J476ME15L	MURATA
4	1	C4	OPEN	0402	Not installed	ANY
5	1	R1	0Ω	0402	Resistor, Generic	ANY
6	1	R2	OPEN	0402	Not installed	ANY
7	2	J3, J4	HDR-3	HDR-3	Vert. Pin Header, 3-Pin, 0.1” Spacing, Generic	ANY
11	2	J1, J2	HDR-4	HDR-4	Vert. Pin Header, 4-Pin, 0.1” Spacing, Generic	ANY
12	9	TP1, TP2, TP4, TP5, TP9, TP10, TP11, TP13, TP14	TEST POINT	TEST POINT	Test Point, Thru-Hole, 3156-1-00-15-00-00-08-0	MILL-MAX PINS

PCB Layout

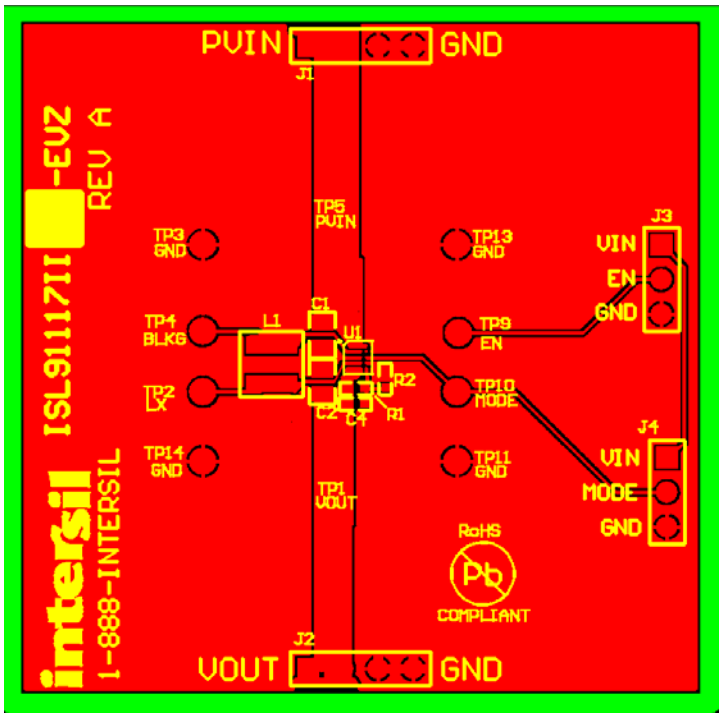

FIGURE 8. TOP LAYER

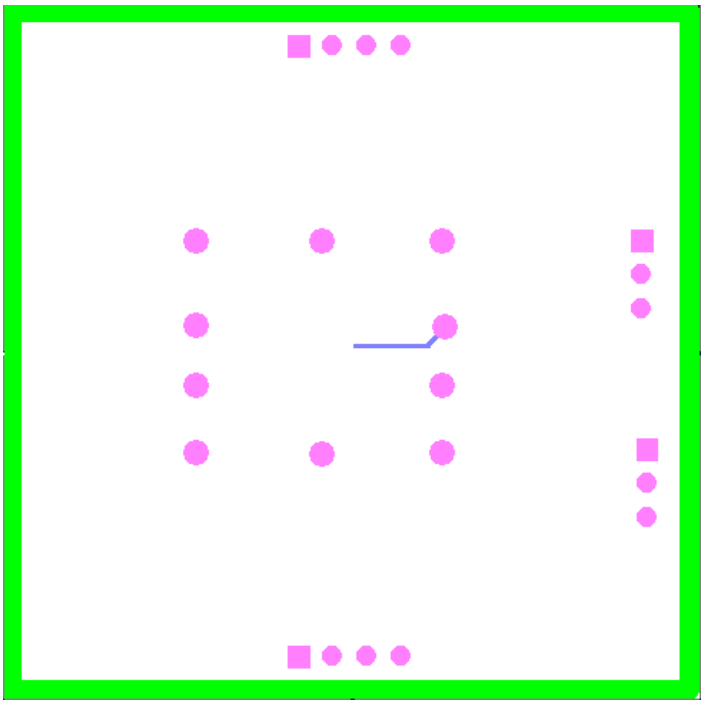

FIGURE 9. INNER LAYER 1

PCB Layout (Continued)

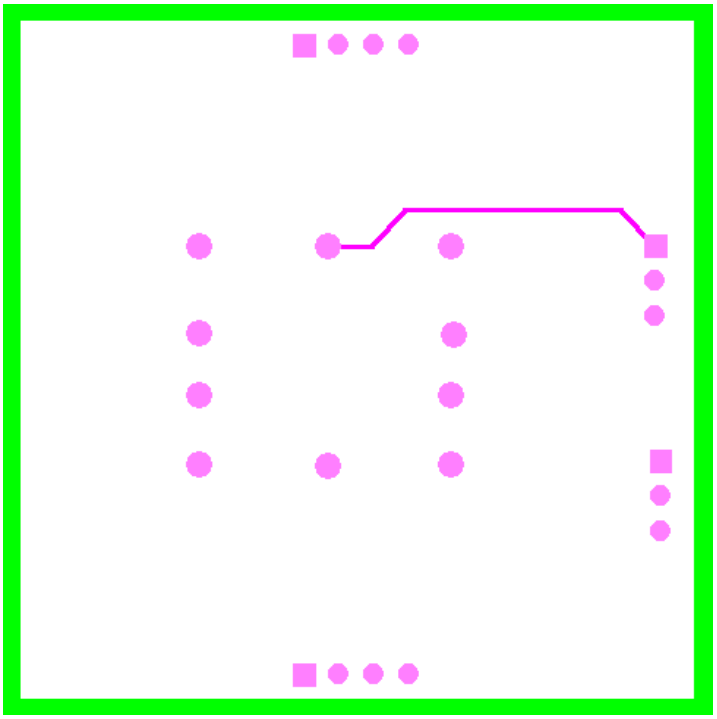

FIGURE 10. INNER LAYER 2

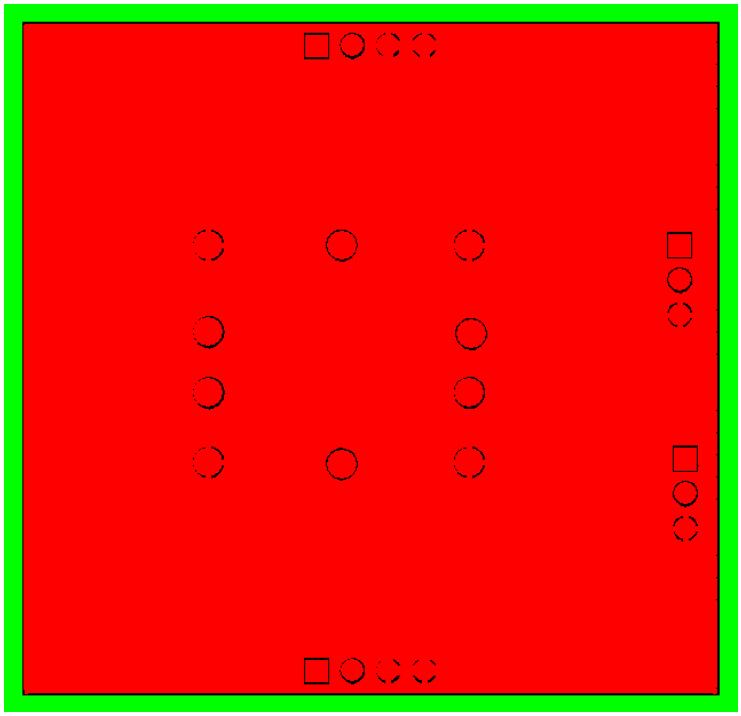

FIGURE 11. BOTTOM LAYER