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ISL9110IRTNEVAL1Z, ISL9110IRT7EVAL1Z, ISL9110IRTAEVAL1Z Evaluation Board User Guide

Evaluation Board Features

- ISL9110IRTAZ high efficiency buck-boost regulator with adjustable output voltage
- Input voltage rating from 1.8V to 5.5V
- Resistor programmable output voltage, set to 3.3V
- 1200mA output current at $V_{IN} \geq 3V$ and $V_{OUT} = 3.3V$
- 2.5MHz switching frequency
- Jumper selectable EN (enabled/disabled)
- Jumper selectable MODE (auto-PFM/forced-PWM)
- LED indicators for PG and BAT status outputs
- Connectors, test points and jumpers for easy evaluation

Required Equipment

- Power supply capable of delivering up to 5.5V and 3A
- Electronic load
- Multimeter to measure voltages and currents
- Oscilloscope

Test Points, Connectors and Jumpers

TABLE 1. DESCRIPTION OF TEST POINTS

TEST POINT(S)	DESCRIPTION
TP1	VOUT Kelvin connection for efficiency measurements
TP2	LX1 (Input side of power inductor)
TP3	PGND (Power ground)
TP4	LX2 (Output side of power inductor)
TP5	PVIN Kelvin connection for efficiency measurements
TP6	VIN (supply input for internal reference)
TP7	PG (Open drain status output)
TP8	$\overline{BAT}$ (Open drain status output)
TP9	EN (Enable input, drive high to enable device)
TP10	MODE/SYNC (Mode input, drive low for forced PWM, or apply external clock between 2.75MHz and 3.25MHz for external sync)
TP11, TP13, TP14	GND (Ground)
TP12	FB (Voltage feedback input, connected to resistive divider network that sets VOUT)

TABLE 2. DESCRIPTION OF CONNECTORS

CONNECTOR	DESCRIPTION
J1	Header for connecting input power
J2	Header for connecting external load

TABLE 3. DESCRIPTION OF JUMPERS

JUMPER	DESCRIPTION
J3	Jumper to select EN input logic state. Set EN = VIN to enable device, or set EN = GND to disable device.
J4	Jumper to select MODE input logic state. Set MODE = VIN to enable auto-PFM mode, or set MODE = GND to select forced PWM mode. To use external sync feature, remove this jumper and apply an external clock between 2.75MHz and 3.25MHz on the MODE test point (TP10) or center pin on the J4 header.
J5	Jumper to enable PG LED. Remove this jumper when measuring quiescent current.
J6	Jumper to enable $\overline{BAT}$ LED. Remove this jumper when measuring quiescent current.

Quick Setup Guide

1. Install jumpers on J5 and J6 to enable the status LEDs.
2. Install jumper on J3, shorting EN to VIN.
3. Install jumper on J4, shorting MODE to VIN.
4. Connect power supply to J1, with voltage setting between 1.8V and 5.5V.
5. Connect electronic load to J2.
6. Place scope probes on VOUT test point, and other test points of interest.
7. Turn on the power supply.
8. Monitor the output voltage start-up sequence on the scope. The waveforms will look similar to those shown in Figure 1 and Figure 2.
9. Turn on the electronic load.
10. Measure the output voltage with the voltmeter. The voltage should regulate within data sheet spec limits (FN7649).
11. To determine efficiency, first remove jumpers J5 and J6 to eliminate LED currents. Then measure input and output voltages at the Kelvin test points TP5 and TP1, and measure the input and output currents. Calculate efficiency based on these measurements.
12. To test external sync, remove the jumper at J4, then apply an external clock between 2.75MHz and 3.25MHz on the MODE input (test point TP10, or the center pin of header J4).

Typical Start-up Waveforms

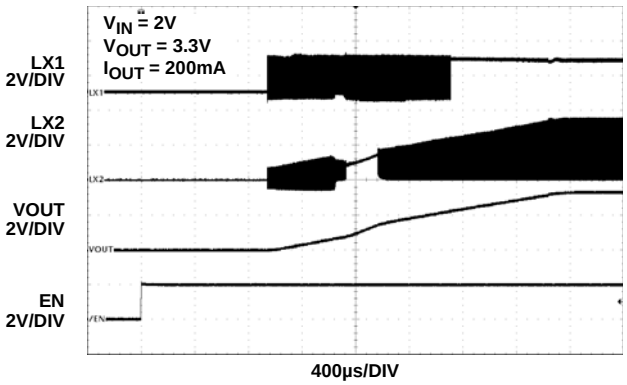

FIGURE 1. ISL9110 START-UP WITH V_{IN} = 2V AND V_{OUT} = 3.3V

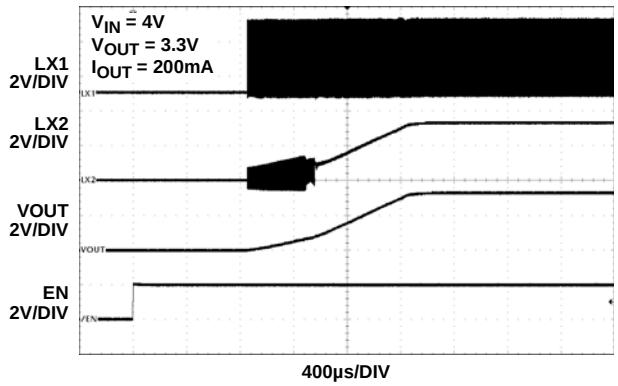

FIGURE 2. ISL9110 START-UP WITH V_{IN} = 4V AND V_{OUT} = 3.3V

Output Voltage Programming

To change the output voltage, resistor R2 should be removed and replaced with a resistor value corresponding to the desired output voltage, as shown in Table 4. A precision resistor with 1% tolerance should be used.

TABLE 4. OUTPUT VOLTAGE PROGRAMMING

DESIRED OUTPUT VOLTAGE (V)	R2 RESISTOR VALUE (kΩ)
2.0	665
2.5	470
3.0	365
3.3	324
3.4	309
4.0	249
4.5	215
5.0	191

Evaluation Board Schematics

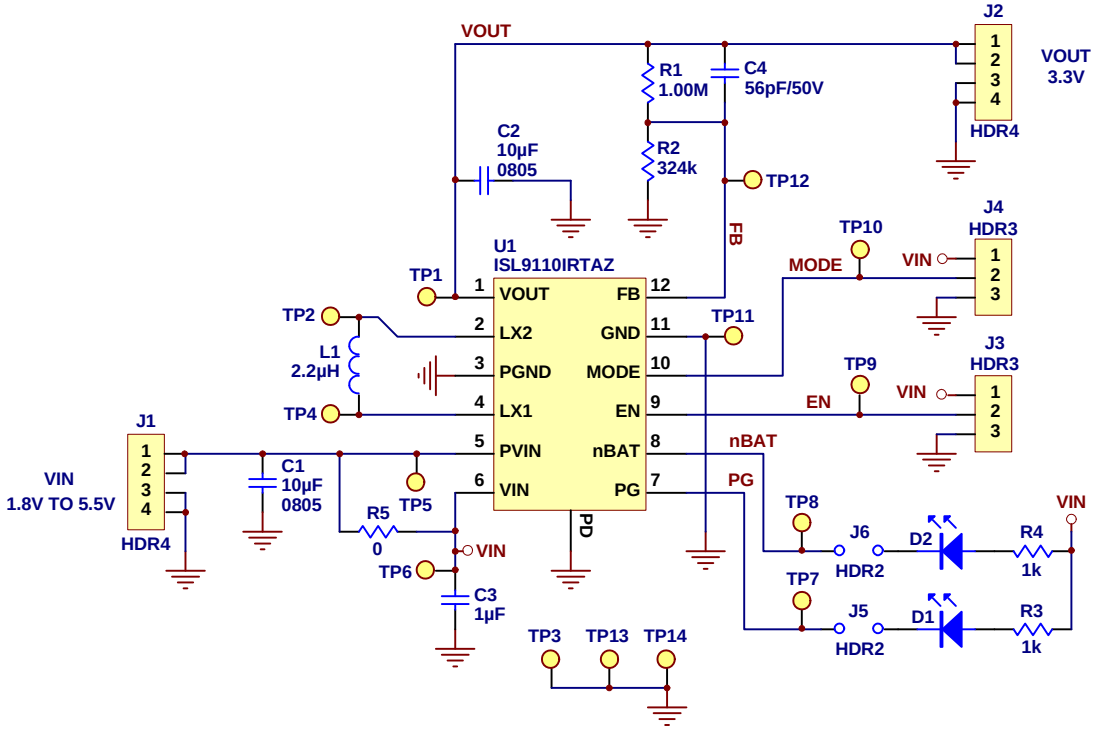

FIGURE 3. ISL9110IRTAEVAL1Z EVALUATION BOARD SCHEMATIC

TABLE 5. ISL9110IRTAEVAL1Z EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATORS	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	U1	ISL9110IRTAZ	L12.3x3C TQFN	Intersil ISL9110 Buck-Boost Regulator with Adjustable Output Voltage	INTERSIL
2	1	L1	2.2µH	5x5x1.4	NRS5020T2R2	TAIYO YUDEN
3	2	C1, C2	10µF/10V/X5R	0805	LMK212BJ106KG	TAIYO YUDEN
4	1	C3	1µF/10V/X5R	0603	LMK107BJ105KK	TAIYO YUDEN
5	1	C4	56pF/50V	0603	Capacitor, Generic	ANY
6	1	R1	1MΩ, 1%	0603	Resistor, Generic	ANY
7	1	R2	324kΩ, 1%	0603	Resistor, Generic	ANY
8	2	R3, R4	1kΩ	0603	Resistor, Generic	ANY
9	1	R5	0Ω	0603	Resistor, Generic	ANY
10	2	D1, D2	LED, RED	1.6x0.8	LED, RED, SMD	ANY
11	2	J1, J2	HDR-4	HDR-4	Vert. Pin Header, 4-Pin, 0.1” Spacing, Generic	ANY
12	2	J3, J4	HDR-3	HDR-3	Vert. Pin Header, 3-Pin, 0.1” Spacing, Generic	ANY
13	2	J5, J6	HDR-2	HDR-2	Vert. Pin Header, 2-Pin, 0.1” Spacing, Generic	ANY
14	14	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14	TEST POINT	TEST POINT	Test Point, Thru-Hole, White, Mouser 534-5002	KEYSTONE

Evaluation Board Schematics (continued)

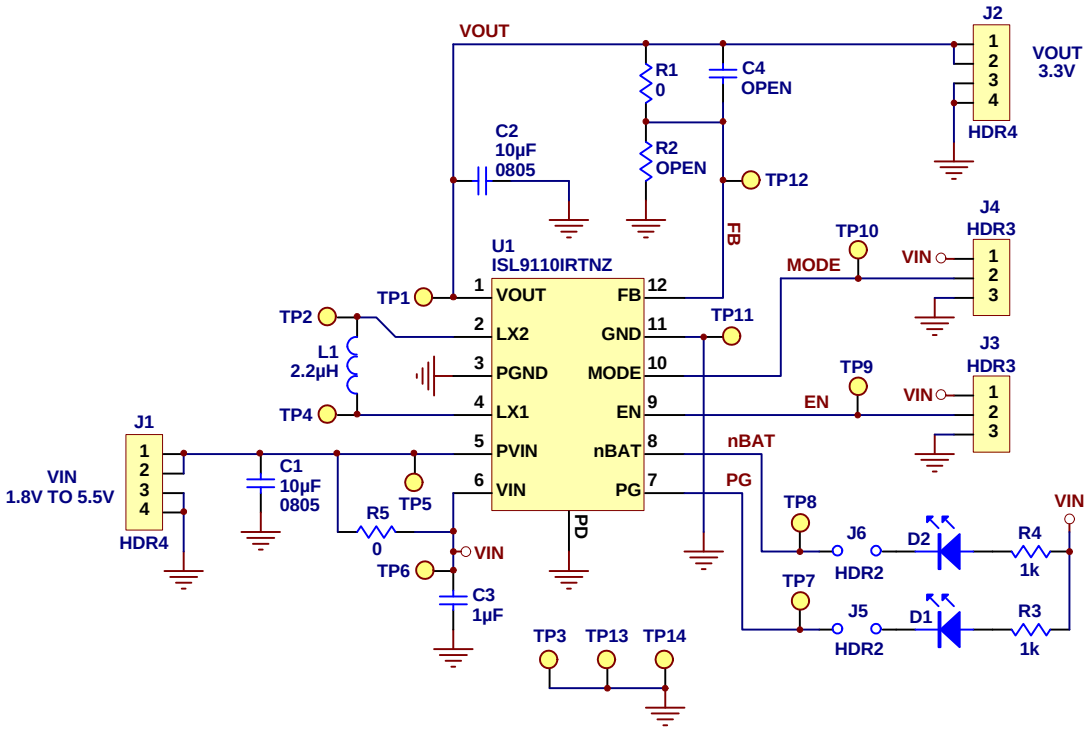

FIGURE 4. ISL9110IRTNEVAL1Z EVALUATION BOARD SCHEMATIC

TABLE 6. ISL9110IRTNEVAL1Z EVALUATION BOARD BILL OF MATERIALS

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3	2	C1, C2	10µF/10V/X5R	0805	LMK212BJ106KG	TAIYO YUDEN
4	1	C3	1µF/10V/X5R	0603	LMK107BJ105KK	TAIYO YUDEN
5	1	C4	OPEN	0603	Not installed	
6	1	R1	0Ω	0603	Resistor, Generic	ANY
7	1	R2	OPEN	0603	Not installed	
8	2	R3, R4	1kΩ	0603	Resistor, Generic	ANY
9	1	R5	0Ω	0603	Resistor, Generic	ANY
10	2	D1, D2	LED, RED	1.6x0.8	LED, RED, SMD	ANY
11	2	J1, J2	HDR-4	HDR-4	Vert. Pin Header, 4-Pin, 0.1” Spacing, Generic	ANY
12	2	J3, J4	HDR-3	HDR-3	Vert. Pin Header, 3-Pin, 0.1” Spacing, Generic	ANY
13	2	J5, J6	HDR-2	HDR-2	Vert. Pin Header, 2-Pin, 0.1” Spacing, Generic	ANY
14	16	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14	TEST POINT	TEST POINT	Test Point, Thru-Hole, White, Mouser 534-5002	KEYSTONE

Evaluation Board Schematics (continued)

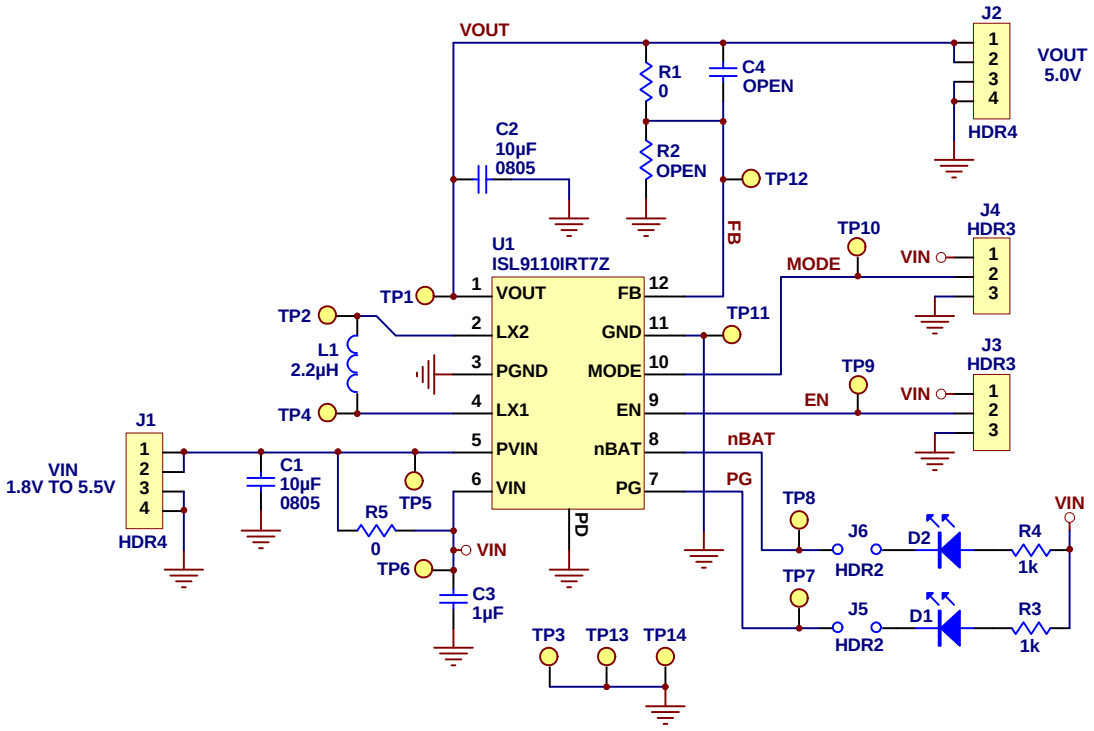

FIGURE 5. ISL9110IRT7EVAL1Z EVALUATION BOARD SCHEMATIC

TABLE 7. ISL9110IRT7EVAL1Z EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATORS	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	U1	ISL9110IRTAZ	L12.3x3C TQFN	Intersil ISL9110 Buck-Boost Regulator with Adjustable Output Voltage	INTERSIL
2	1	L1	2.2µH	5x5x1.4	NRS5020T2R2	TAIYO YUDEN
3	2	C1, C2	10µF/10V/X5R	0805	LMK212BJ106KG	TAIYO YUDEN
4	1	C3	1µF/10V/X5R	0603	LMK107BJ105KK	TAIYO YUDEN
5	1	C4	OPEN	0603	Not installed	
6	1	R1	0Ω	0603	Resistor, Generic	ANY
7	1	R2	OPEN	0603	Not installed	
8	2	R3, R4	1kΩ	0603	Resistor, Generic	ANY
9	1	R5	0Ω	0603	Resistor, Generic	ANY
10	2	D1, D2	LED, RED	1.6x0.8	LED, RED, SMD	ANY
11	2	J1, J2	HDR-4	HDR-4	Vert. Pin Header, 4-Pin, 0.1” Spacing, Generic	ANY
12	2	J3, J4	HDR-3	HDR-3	Vert. Pin Header, 3-Pin, 0.1” Spacing, Generic	ANY
13	2	J5, J6	HDR-2	HDR-2	Vert. Pin Header, 2-Pin, 0.1” Spacing, Generic	ANY
14	16	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14	TEST POINT	TEST POINT	Test Point, Thru-Hole, White, Mouser 534-5002	KEYSTONE

Evaluation Board Layout

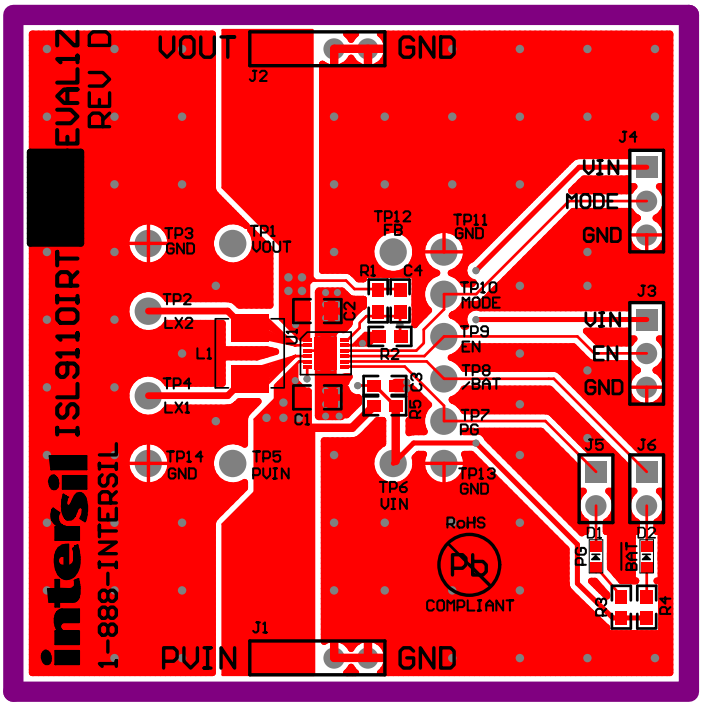

FIGURE 6. ISL9110 EVALUATION BOARD SILKSCREEN TOP

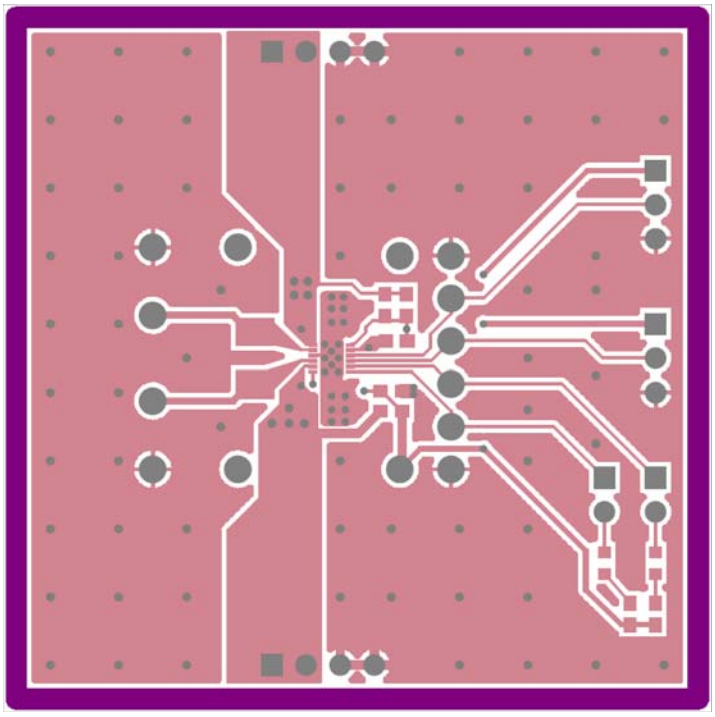

FIGURE 7. ISL9110 EVALUATION BOARD TOP COPPER

Evaluation Board Layout (Continued)

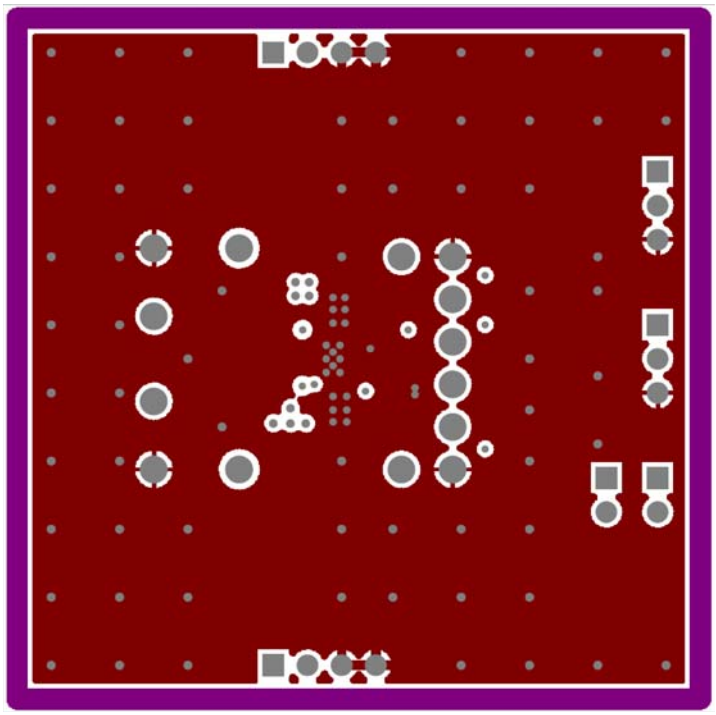

FIGURE 8. ISL9110 EVALUATION BOARD MID LAYER 1 (GND)

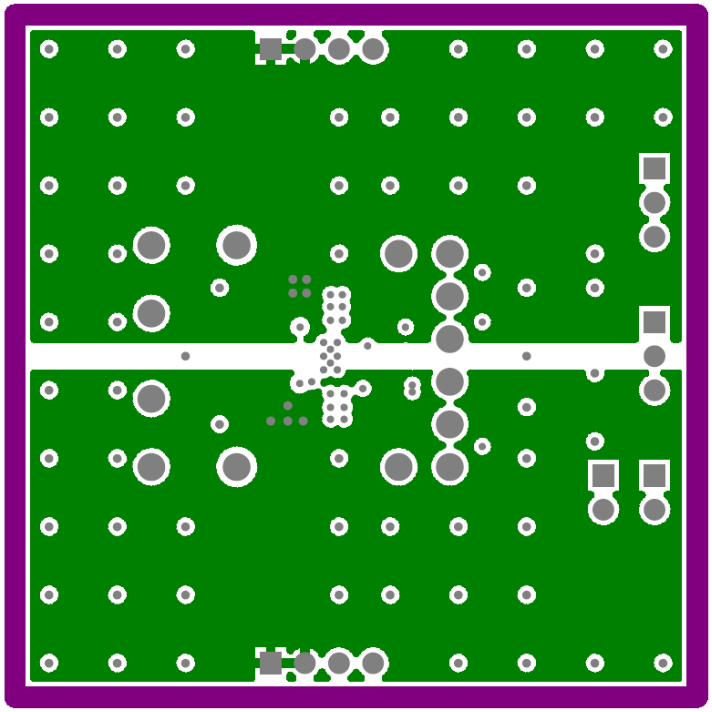

FIGURE 9. ISL9110 EVALUATION BOARD MID LAYER 2 (VIN AND VOUT)

Evaluation Board Layout (Continued)

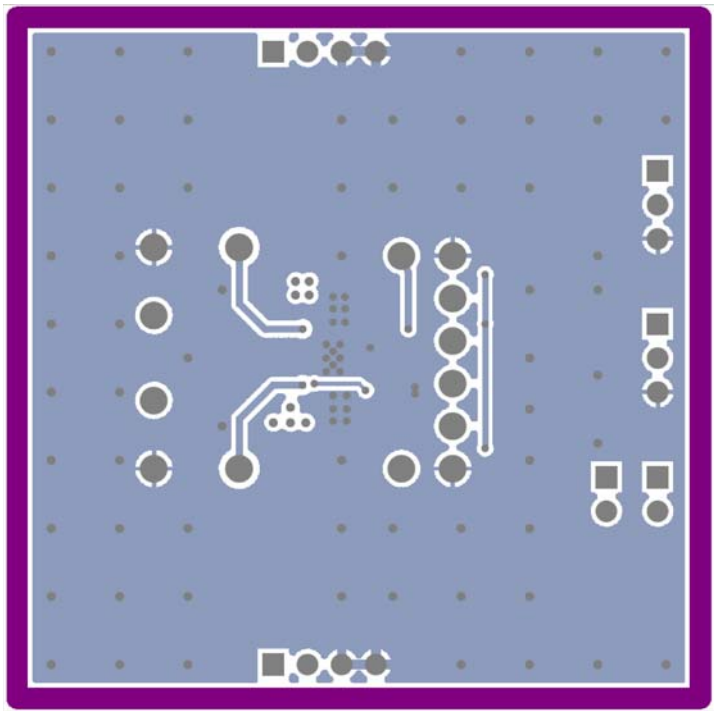

FIGURE 10. ISL9110 EVALUATION BOARD BOTTOM LAYER (GND)