

ISL91127IRN-EVZ, ISL91127IRA-EVZ

Evaluation Board User Guide

UG080
Rev 2.00
October 28, 2016

Description

The [ISL91127IR](#) is a high-current buck-boost switching regulator for systems using new battery chemistries. It uses Intersil's proprietary buck-boost algorithm to maintain voltage regulation, while providing excellent efficiency and very low output voltage ripple when the input voltage is close to the output voltage. The ISL91127IRN-EVZ and ISL91127IRA-EVZ platforms allow quick evaluation of the high performance features of the ISL91127IR buck-boost regulator series.

Specifications

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

- Input voltage rating from 1.8V to 5.5V
- Resistor programmable output voltage on the ISL91127IRA-EVZ
- Fixed 3.3V output voltage on the ISL91127IRN-EVZ
- Up to 2A output current (PVIN = 2.5V, VOUT = 3.3V)
- 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

- [ISL91127IR](#) datasheet

Ordering Information

PART NUMBER	DESCRIPTION
ISL91127IRN-EVZ	Evaluation Board for ISL91127IRN
ISL91127IRA-EVZ	Evaluation Board for ISL91127IRA

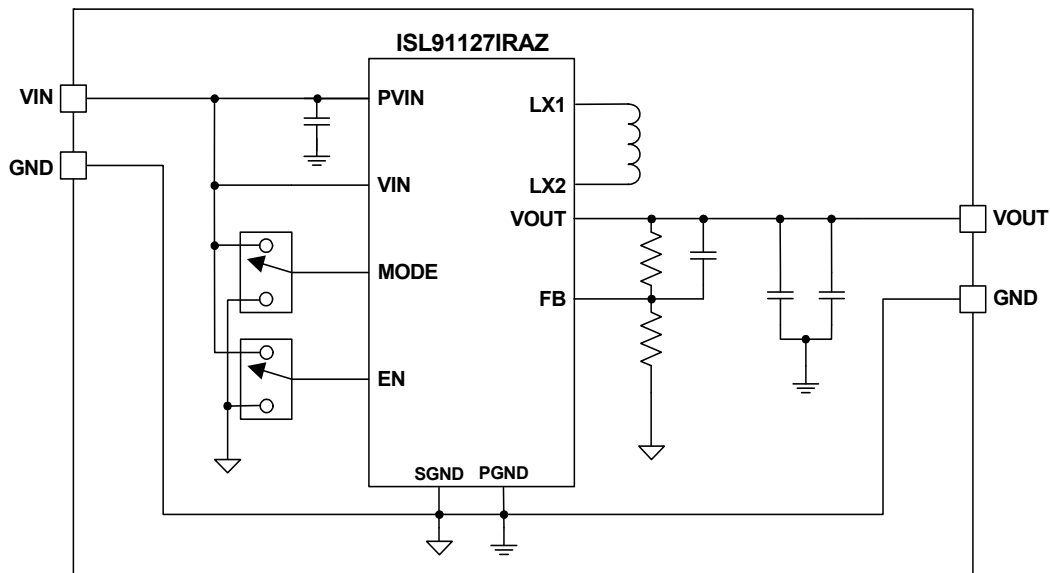


FIGURE 1. ISL91127IRA-EVZ BLOCK DIAGRAM

Functional Description

The ISL91127IRN-EVZ and ISL91127IRA-EVZ provide simple platforms to demonstrate the features of the ISL91127IR buck-boost regulator. The ISL91127IRN-EVZ is for the fixed 3.3V output IC ISL91127IRNZ. The ISL91127IRA-EVZ is for the adjustable output IC ISL91127IRAZ. The evaluation boards have been functionally optimized for best performance of the ISL91127IR IC series. The input power and load connections are provided through multi-pin connectors for high current operation.

The ISL91127IRA-EVZ and ISL91127IRN-EVZ evaluation boards are 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 ISL91127IRA-EVZ evaluation board is shown in [Figure 6](#) and the schematic of the ISL91127IRN-EVZ is shown in [Figure 7](#). The PCB layout images for all layers are shown in [Figures 8](#) and [9](#). The bill of materials of ISL91127IRA-EVZ is shown in [Table 2](#) and the bill of materials of ISL91127IRN-EVZ is shown in [Table 3](#).

Operating Range

The V_{IN} range of the boards is 1.8V to 5.5V. The V_{OUT} range for the ISL91127IRA-EVZ is 2V to 5V. The I_{OUT} range of the boards is 0A to 2A. The operating ambient temperature range is -40°C to $+85^{\circ}\text{C}$.

Quick Start Guide

For the ISL91127IRA-EVZ board, the default output voltage is set at 3.3V. If other output voltages are desired, resistor R_2 can be 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-up process, the expected waveforms are shown in [Figures 2](#) and [3](#).

Quick Setup Guide

1. Install jumper on J3, shorting EN to V_{IN} .
2. Install jumper on J4, shorting MODE to V_{IN} .
3. Connect power supply to J2, with voltage setting between 1.8V and 5.5V.
4. Connect electronic load to J1.
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 [Figures 2](#) and [3](#).
8. Turn on the electronic load.
9. Measure the output voltage with the voltmeter. The voltage should regulate within datasheet specification limits.

10. To determine efficiency, measure input and output voltages at J1 and J2 headers. The bench power supply can be connected to the P_{VIN} and GND headers on J2. The electronic load can be connected to the V_{OUT} and GND headers on J1. Measure the input and output currents. Calculate efficiency based on these measurements.

TABLE 1. OUTPUT VOLTAGE PROGRAMMING FOR ISL91127IRA-EVZ

DESIRED OUTPUT VOLTAGE (V)	R_2 RESISTOR VALUE (k Ω)
2.0	124
2.5	88.7
3.0	68.1
3.3	60.4
3.4	57.6
4.0	46.4
4.5	40.2
5.0	35.7
5.1	34.8

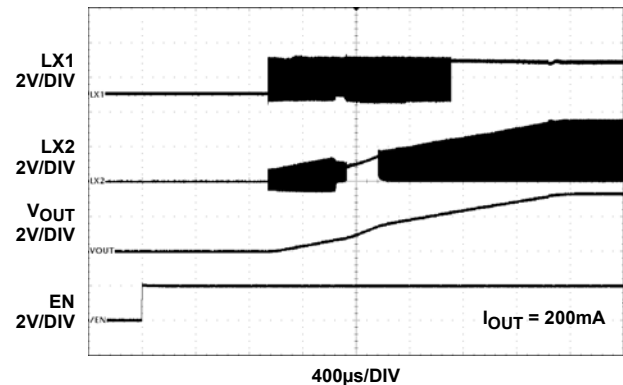


FIGURE 2. ISL91127IR START-UP WITH $V_{IN} = 2\text{V}$ AND $V_{OUT} = 3.3\text{V}$

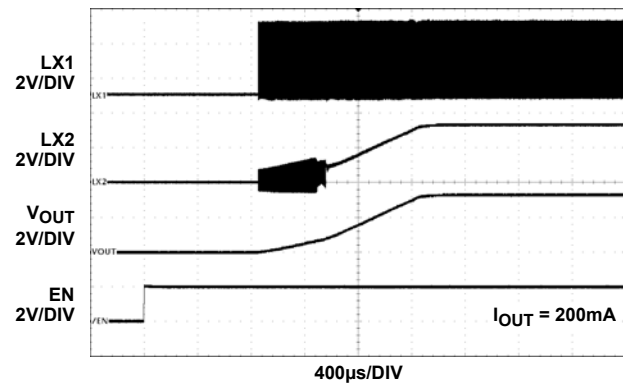


FIGURE 3. ISL91127IR START-UP WITH $V_{IN} = 4\text{V}$ AND $V_{OUT} = 3.3\text{V}$

Evaluation Board Images



FIGURE 4. ISL91127IRA-EVZ TOP VIEW

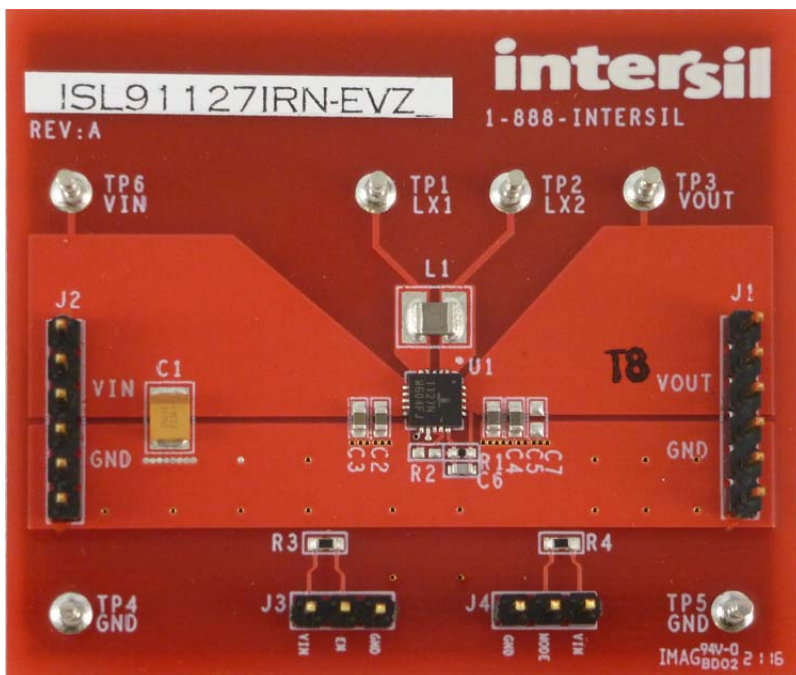


FIGURE 5. ISL91127IRN-EVZ TOP VIEW

TABLE 2. ISL91127IRA-EVZ EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATORS	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	U1	ISL91127IRAZ	4mmx4mm QFN	Intersil ISL91127IR Buck-Boost Regulator with Adjustable Output Voltage	INTERSIL
2	1	L1	1 μ H	3.2mmx2.5mmx1.2mm	Power Inductor Toko DFE322512C series, 4.6A (typ), 34m Ω (typ)	TOKO
3	1	C1	150 μ F	7343	Capacitor, Tantalum	ANY
4	2	C2, C3	10 μ F/16V/X5R	0603	Capacitor, Generic	ANY
5	2	C4, C5	22 μ F/10V/X5R	0603	Capacitor, Generic	ANY
6	1	C6	22pF	0402	Capacitor, 56pF 50V 5% NPO 0402	ANY
7	1	C7	DNP	0402		ANY
8	1	R1	187k Ω , 1%	0402	Resistor, Generic	ANY
9	1	R2	60.4k Ω , 1%	0402	Resistor, Generic	ANY
10	2	R3, R4	1M Ω , 5%	0603	Resistor, Generic	ANY
11	2	J1, J2	HDR-6	HDR-6	Vert. Pin Header, 6-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	6	TP1 to TP6	Power Post		Connectors	ANY

TABLE 3. ISL91127IRN-EVZ EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATORS	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	U1	ISL91127IRNZ	4mmx4mm QFN	Intersil ISL91127IR Buck-Boost Regulator with Fixed Output Voltage	INTERSIL
2	1	L1	1 μ H	3.2mmx2.5mmx1.2mm	Power Inductor Toko DFE322512C series, 4.6A (typ), 34m Ω (typ)	TOKO
3	1	C1	150 μ F	7343	Capacitor, Tantalum	ANY
4	2	C2, C3	10 μ F/16V/X5R	0603	Capacitor, Generic	ANY
5	2	C4, C5	22 μ F/10V/X5R	0603	Capacitor, Generic	ANY
6	1	C6	DNP	0402		ANY
7	1	C7	DNP	0402		ANY
8	1	R1	0 Ω	0402	Resistor, Generic	ANY
9	1	R2	DNP	0402		ANY
10	2	R3, R4	1M Ω , 5%	0603	Resistor, Generic	ANY
11	2	J1, J2	HDR-6	HDR-6	Vert. Pin Header, 6-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	6	TP1 to TP6	Power Post		Connectors	ANY

ISL91127IRA-EVZ, ISL91127IRN-EVZ Schematics

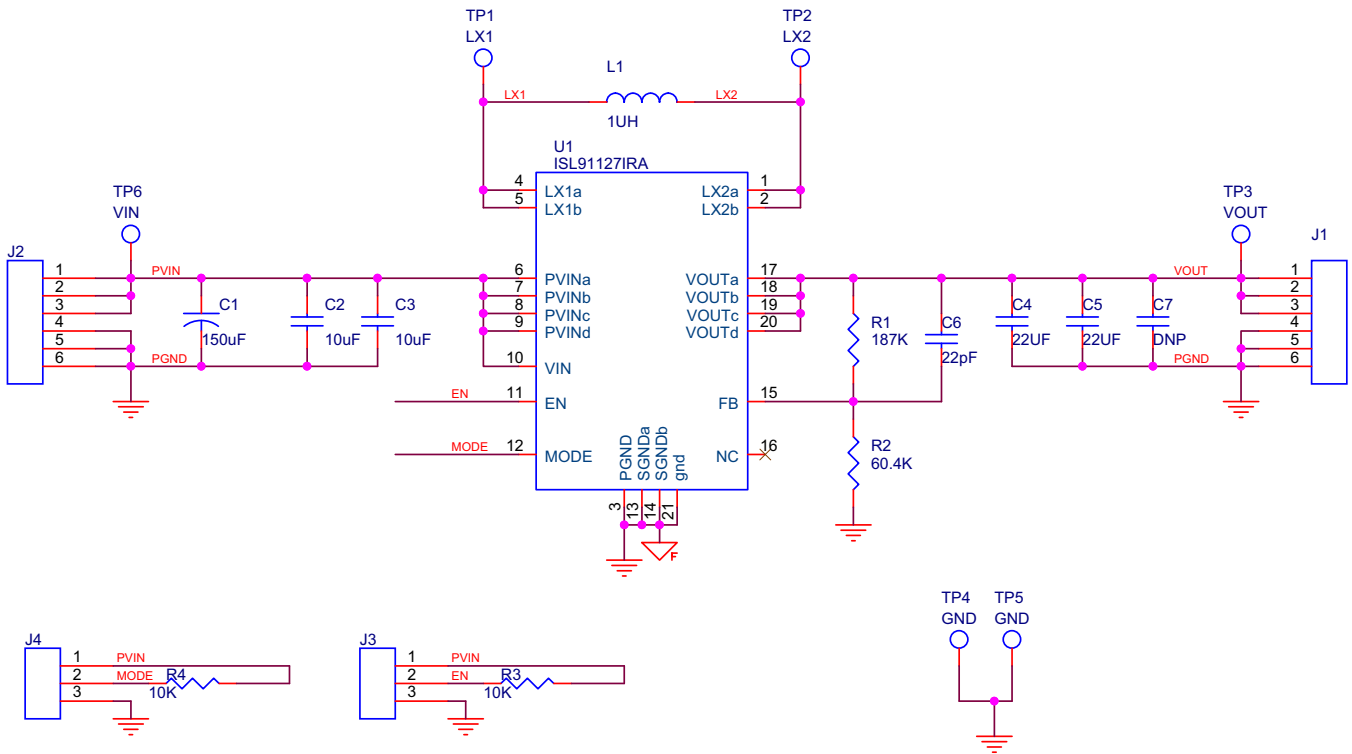


FIGURE 6. ISL91127IRA-EVZ EVALUATION BOARD SCHEMATIC

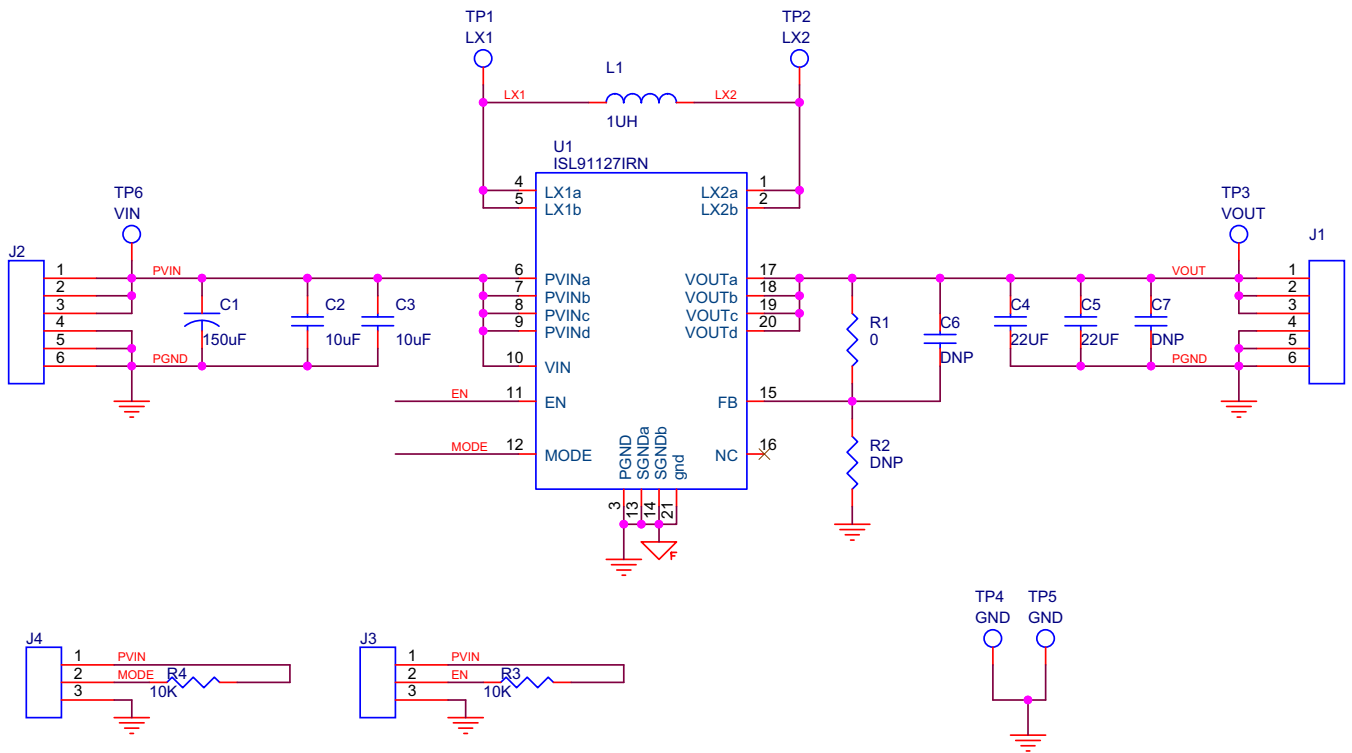


FIGURE 7. ISL91127IRN-EVZ EVALUATION BOARD SCHEMATIC

PCB Layout

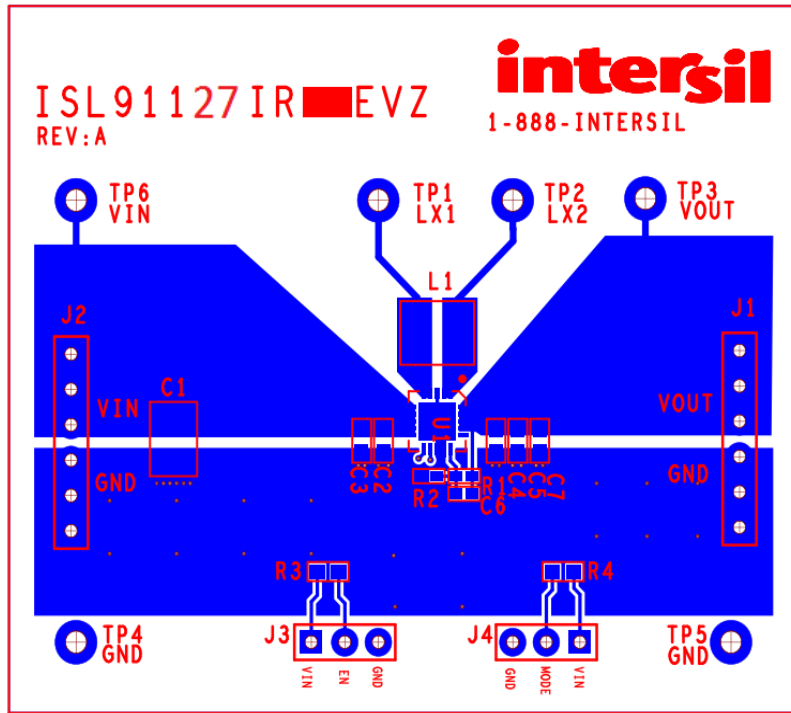


FIGURE 8. TOP LAYER

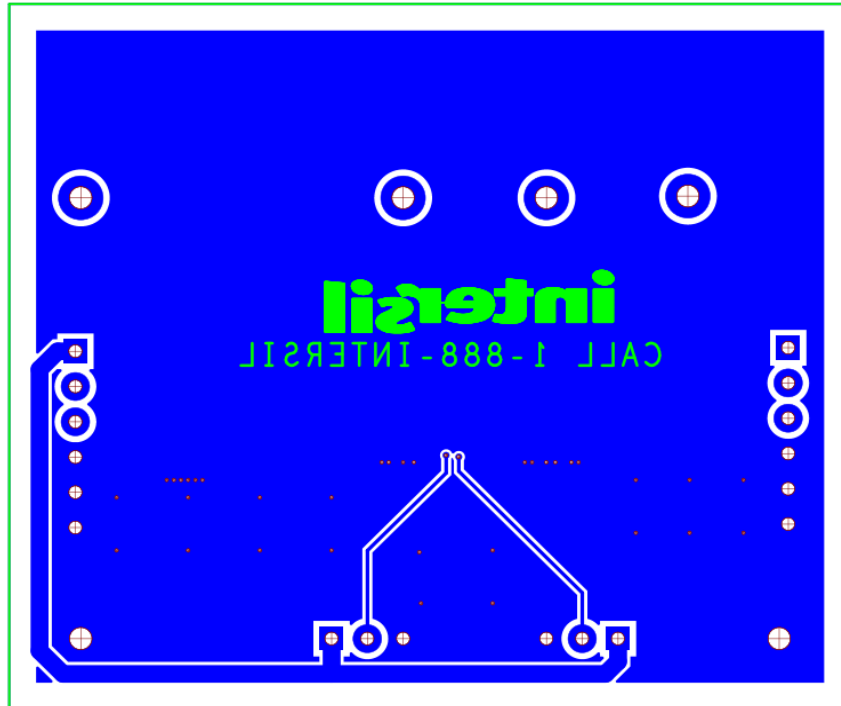


FIGURE 9. BOTTOM LAYER