ISL9220IRTZEVAL1Z (1-cell), ISL9220AIRTZEVAL1Z (2-cell)
Evaluation Board

Evaluation Board Features

- Operating Input Voltage Range:
  - 4.5V to 14V for ISL9220IRTZEVAL1Z
  - 9.0V to 14V for ISL9220AIRTZEVAL1Z
- Up to 2A Charge Current
- Two Status Outputs
- 1.2MHz Switching Frequency
- Connector, Test Point and Jumper

Required Equipment

- Power Supply (PS1 & PS2) Capable of Supplying up to 18V and 3A
- Electronic Load (E-Load) (20V/5A), Voltmeter, Oscilloscope

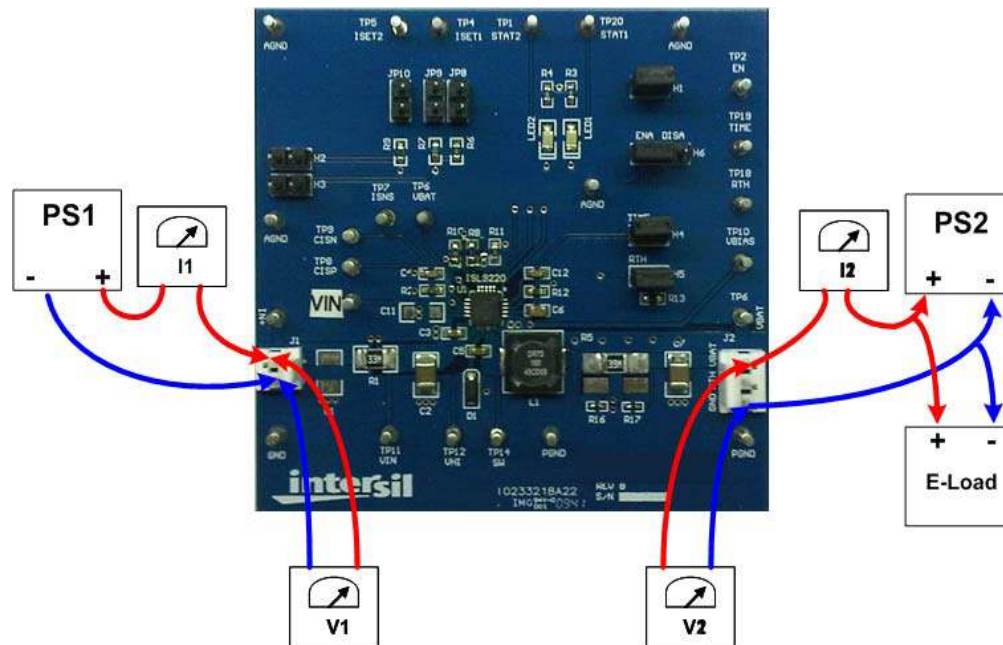FIGURE 1. QUICK SETUP DIAGRAM

Quick Setup Guide

1. Insert shunts on left two pins of H6, H5 for normal operation and H4 to disable timeout if needed.

2. Connect power supply (PS1) in series with a current meter (I1) to connector IN+.

3. Connect power supply (PS2) in series with a current meter (I2) to VBAT pin of J2.

4. Connect electronic load (E-load) setting at 2.2A to VBAT pin and ground.

5. Connect a voltage meter (V2) on TP6 to measure voltage on VBAT.

6. Place a scope probe on the connector of TP14 to monitor switching waveform.

7. Set input supply PS1 voltage between 4.5V to 14V for 1-cell charge and 9V to 14V for 2-cell charge.

8. Set PS2 so that V2 measures 3.6V on VBAT for 1-cell and 7V for 2-cell.

9. Turn on PS1. LED2 will turn on red indicating power good.

10. Turn on PS2 and E-load. LED1 will turn on green indicating charging in progress.

11. Without shunts on JP8 and JP9, current meter I2 will measure 500mA ±10% charge current.

12. Insert a shunt on JP8. The resistance on the ISET1 pin becomes 33.3kΩ and I2 will measure 1.5A±10% charge current.

13. Insert shunt on JP9. The resistance on the ISET1 pin becomes 25kΩ and I1 will measure 2A±10% charge current.

14. Lower the voltage on PS2 until V2 measures 2.5V for 1-cell and 5V for 2-cell. The charger will become trickle mode. I2 will measure around 70mA trickle charge current.

15. Insert a shunt on JP10. I2 will measure around 140mA trickle charge current. For Steps 11 to 15, you should see 1.2MHz switching waveform on the scope.

16. Lower the voltage on PS2 until V2 measures less than 2.5V for 1-cell and less than 5V for 2-cell. The charger will charge in LDO mode current. I2 will measure around 50mA LDO current. The charge stops switching in this mode.

17. Slowly increase the voltage on PS2; the charge current into the PS2 reduces. As current continues to reduce and reaches around 100mA, the end-of-charge event happens and the charger stops charging. At this point, V2 should measure 4.2V, ±1% for 1-cell and 8.4V, ±1% for 2-cell. STAT1 toggles high, and LED2 turns off. Remove the shunt from JP10, the end-of-charge current changes to 50mA.

18. Charging efficiency can be calculated by $(V_O*I_O)/(V_{IN}*I_{IN})*100$. The voltage and current can be read from V1, I1, V2 and I2.
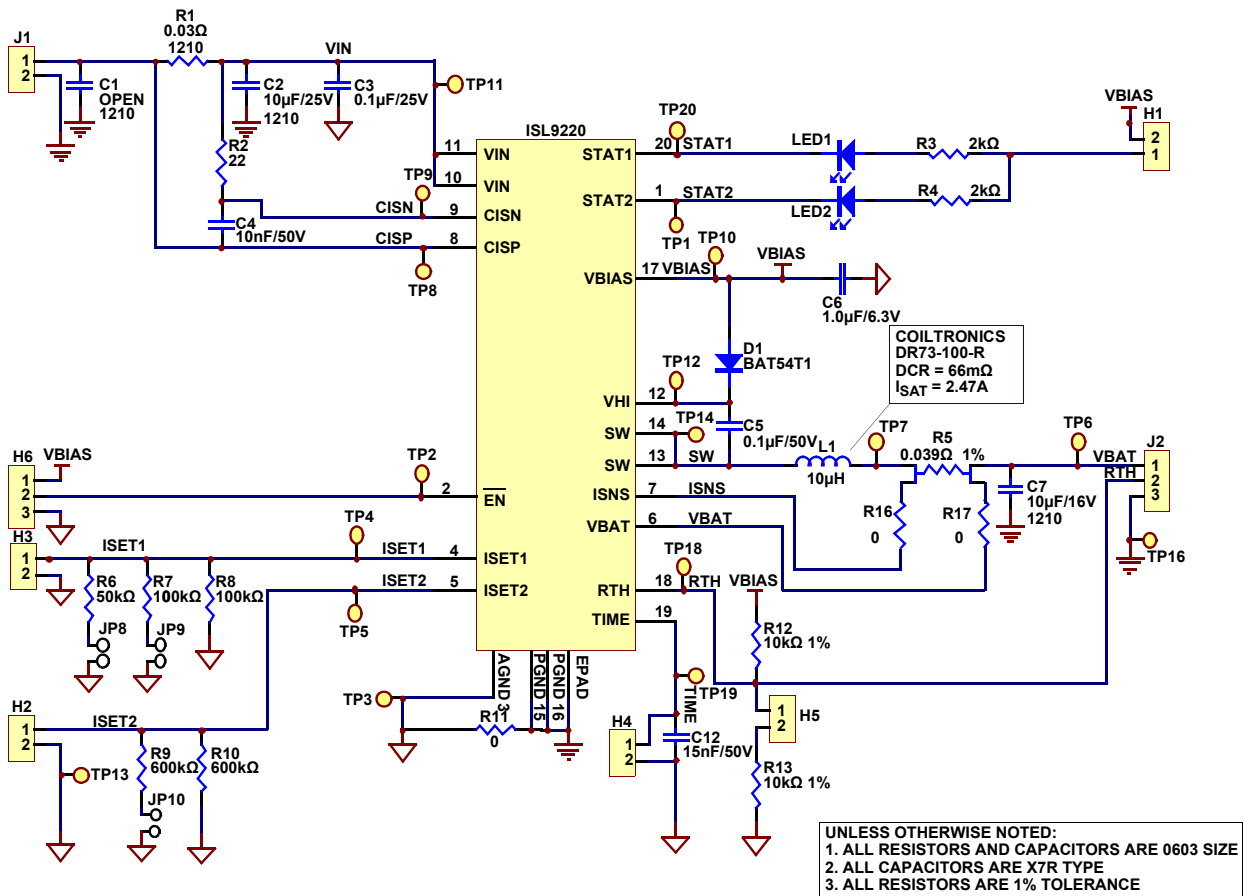

FIGURE 2. ISL9220, ISL9220A EVALUATION BOARD SCHEMATIC
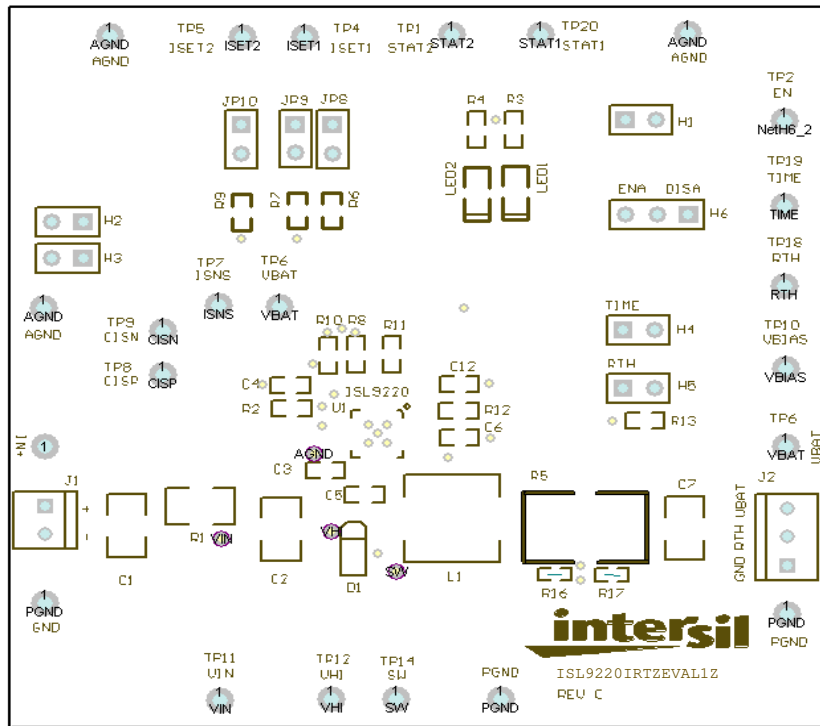
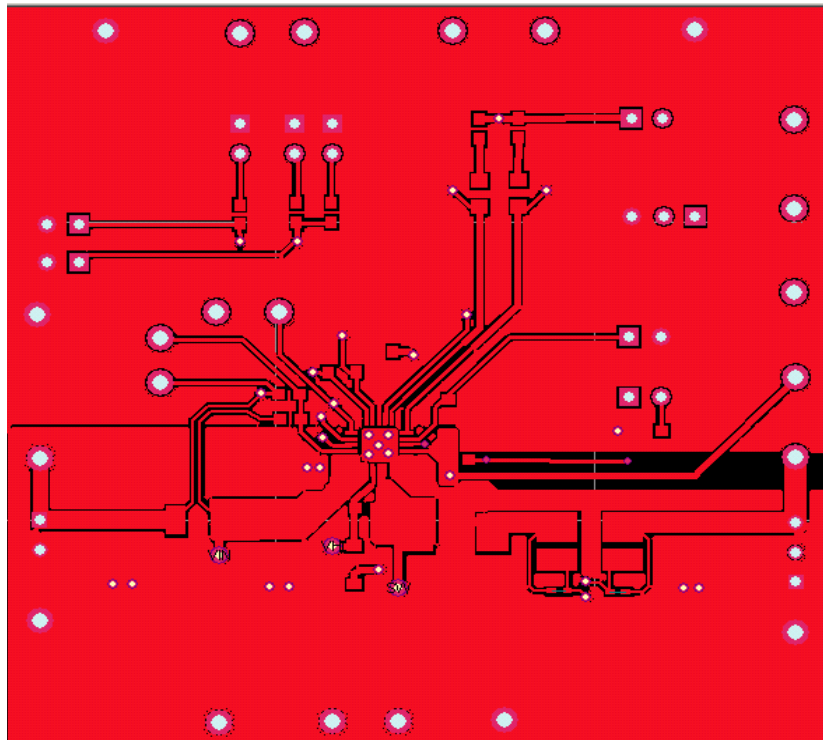# Evaluation Board Layout

FIGURE 3. SILKSCREEN TOP

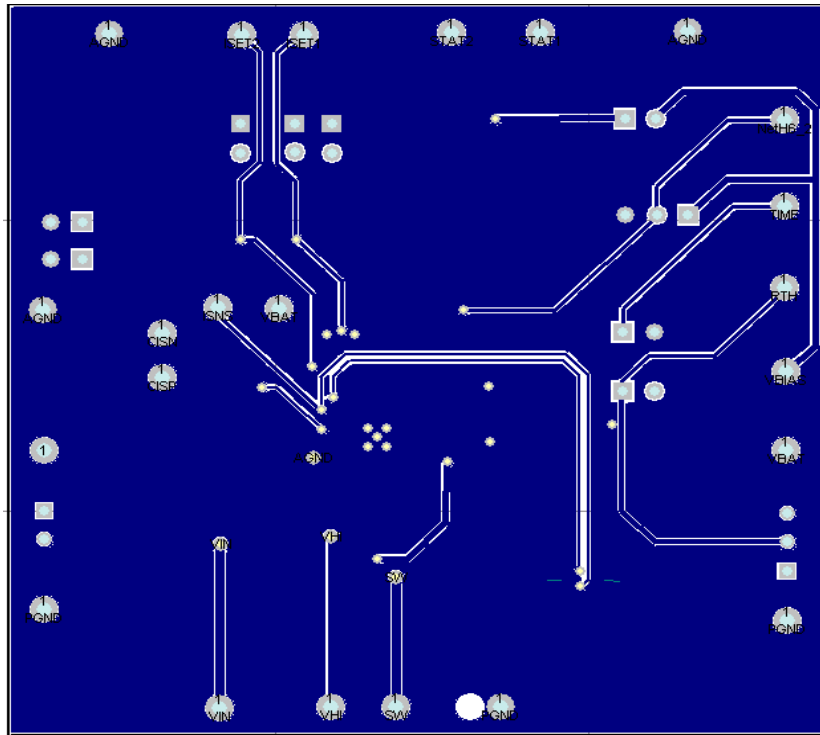**FIGURE 4. TOP LAYER**

Evaluation Board Layout (Continued)

FIGURE 5. BOTTOM LAYER (AGND)

TABLE 1. ISL9220, ISL9220A EVALUATION BOARD BILL OF MATERIALS

ITEM#	QTY	DESIGNATOR	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
1	1	R1	0.033Ω 1/3W 1%	1210	P33NACT-ND	DIGIKEY
2	1	R2	22	603	RMCF1/1622FRTE-ND	DIGIKEY
3	2	R3, R4	2kΩ	603	311-2.00KHRCT-ND	DIGIKEY
4	1	R6	49.9kΩ	603	CR0603-10W4532FT	VENKEL
5	2	R7, R8	100kΩ	603	CR0603-16W1003FT	VENKEL
6	2	R9, R10	600kΩ	603	CR0603-10W4993FT	VENKEL
7	1	R11	0	603	CR0603-16W000T	VENKEL
8	2	R12, R13	10kΩ	603	RHM10.0KHTR-ND	DIGIKEY
9	1	R5	0.039Ω 1/3W 1%	1210	P39NATR-ND	DIGIKEY
10	2	C2, C7	10µF/25V	1210	GRM32DR71E106KA12L	MURATA
11	2	C3, C5	0.1µF/25V	603	C1608X7R1H104K	TDK
12	1	C4	10nF/50V	603	C1608X7R1H103	TDK
13	1	C6	1.0µF/16V	0805	GRM21BR71C475KA73L	MURATA
14	1	C12	15nF/50V	603	GRM188R71H153KA73L	MURATA
15	1	D1	RED	0805	67-1552-1-ND	DIGIKEY
16	1	D2	GREEN	0805	67-1553-1-ND	DIGIKEY
17	1	L1	10µH	DR73-100-R	704-DR73-100-R	MOUSER

TABLE 1. ISL9220, ISL9220A EVALUATION BOARD BILL OF MATERIALS (Continued)

ITEM#	QTY	DESIGNATOR	PART TYPE	FOOTPRINT	DESCRIPTION	VENDORS
18	13	TP1, TP2, TP4, TP5, TP7, TP8, TP9, TP10, TP12, TP14, TP18, TP19, TP20	TEST POINT		2110-00-80-00-00-070	MILL-MAX
19	3	GND, AGND, PGND	TEST POINT		2110-00-80-00-00-070	MILL-MAX
20	3	IN+, TP6, TP11	TEST POINT		2110-00-80-00-00-070	MILL-MAX
21	6	JP4, JP5, JP7, JP8, JP9, JP10	CON2	JUMPER	538-22-28-4020	MOUSER
22	1	J1	CONN		A1921-ND	DIGIKEY
23	1	J2	CONN		A19470-ND	DIGIKEY
24	1	C1	OPEN	1210		
25	2	R16, R17	0 ohm	0402	RMCF0402ZT0R00	STACKPOLE
26	1	U1		4mmx4mm TQFN	ISL9220, ISL9220A	INTERSIL

TABLE 2. DESCRIPTION OF JUMPERS

JUMPER	DESCRIPTION
H1	The jumper installed to connect R3 and R4 to VBIAS pin as power supply to the LED1 and LED2
H2	The jumper installed to short ISET2 pin to ground
H3	The jumper to short ISET1 pin to ground
H4	If a shunt is inserted on H4, TIME pin is shorted to ground, and the TIMEOUT function will be disabled. If H4 is open, TIMEOUT function will be enabled and timeout can be set with capacitor at the pin
H5	If a shunt is installed on H5, VBIAS will be scaled down to 2.5V at the RTH pin by the resistive divider of R12 and R13 and the charger will operate in normal mode. If H5 is open, RTH pin will be pulled high, and the charger is in suspend mode
H6	It is a 3 pin jumper. If a shunt is inserted on the left two pins, the EN pin is connected to ground and the charger is enabled. If a shunt is inserted on the right two pins, the EN pin is connected to VBIAS and the charger is disabled
JP8	Parallels an additional 50kΩ resistor to ISET1 pin such that the charge current will be set at 1.5A with JP9 open
JP9	Parallels an additional 100kΩ resistor to ISET1 pin such that the charge current will be set at 1A with JP8 open. If both JP8 and JP9 are inserted, the charge current will be 2A. If both JP8 and JP9 are open, the charge current will be 500mA
JP10	Parallels an additional 600kΩ resistor to ISET2 pin to set a trickle charge current of 140mA

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