

ISL9204EVAL1

Evaluation Board Application Manual

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Description

The ISL9204EVAL1 is an evaluation tool for the ISL9204 single-cell Li-ion battery charger. The evaluation tool provides a complete evaluation platform addressing all datasheet specifications and functionalities. The jumpers on the board facilitate the programming of the charge current, different charging conditions, and can be used to make other necessary connections, such as current measurement.

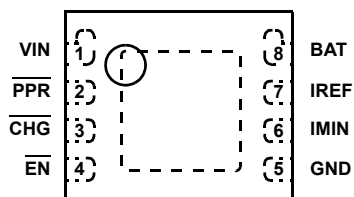
The ISL9204 is a fully integrated single-cell Li-ion battery charger that accepts input voltages ranging from 4.5V up to 28V. Since the cradle input is rated for 28V maximum input voltage, the components associated with the input circuit on the evaluation board are good for a 28V supply.

The components assembled in the center square constitute a complete charger, indicating the space saving advantage of the typical ISL9204 installation in space-limited applications.

Ordering Information

| PART # | DESCRIPTION |
|--------------|------------------------------|
| ISL9204EVAL1 | Evaluation Board for ISL9204 |

Pinout



Features

- A Complete Evaluation Platform for the ISL9204 Charger
- The Center Square Suggesting the Space Saving Advantage of the Typical Components Assembly
- Accepts Input Voltage up to 28V
- Flexible Power Connectors Each with a Hook and a Solder Pad Providing Variety to Users
- Convenient Jumpers for Programming the Charge Current, Charge Mode, and for Current Measurement
- 3.5 x 2.5 Square Inches Board Size Handy for Evaluation
- Six Thermal Vias in the Thermal Pad Similar to Customers' Thermally Enhanced Environment
- On-Board LEDs for Input $\overline{\text{PPR}}$ and $\overline{\text{CHG}}$ State Indication

What is Needed

The following instruments will be needed to perform testing:

- Power Supplies:
 - 1) PS1: DC 30V/5A
 - 2) PS2: DC 20V/5A
- DC Electronic Load: 20V/5A
- Multimeters
- Function Generator
- Oscilloscope
- Cables and Wires

Quick Setup Guide (Refer to Figure 1)**DO NOT APPLY POWER UNTIL STEP 5**

- Step 1: Connect a 5V supply PS1 to VIN with the current limit set at 1.2A
- Step 2: Connect a 3.7V supply PS2 to VBAT with the current limit set at 1.2A
- Step 3: Connect the DC electronic load of 1.0A to BAT

- Step 4: Verify that jumper shunts JP5 and JP7 are not inserted
- Step 5: Turn on Power Supplies and DC electronic load
- Step 6: The green LED should be on, indicating normal charging operation
- Step 7: The current meter I2 in series with PS2 should read about 70mA as the charging current
- Step 8: Insert a jumper shunt on JP5 and the current meter I2 should read about 140mA
- Step 9: Insert a jumper shunt on both JP5 and JP7 and the current meter I2 should read about 210mA

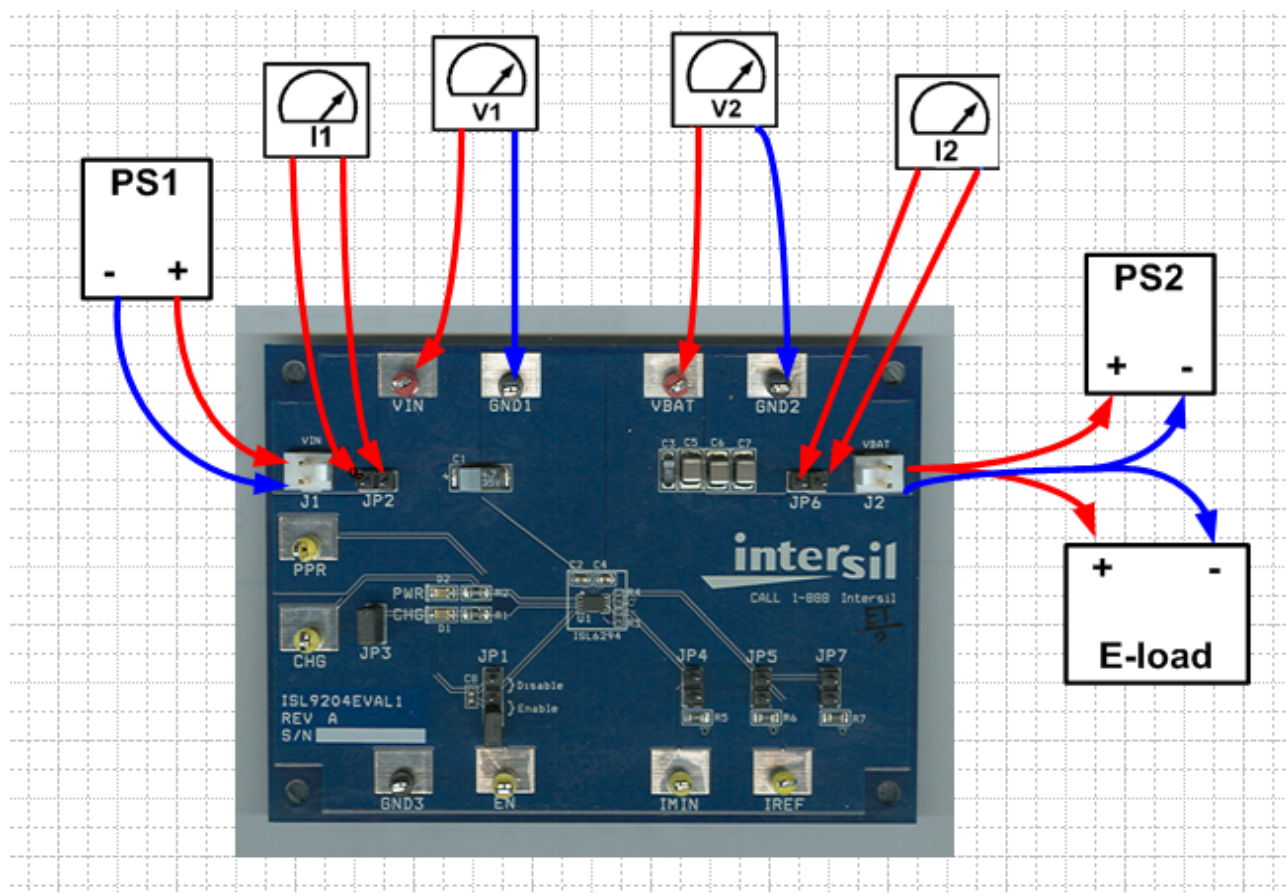


FIGURE 1. CONNECTION OF INSTRUMENTS

Detailed Description

The ISL9204EVAL1 is a complete evaluation platform addressing all datasheet specifications and functionalities.

The jumpers on the board facilitate the programming of the charge current, different charging conditions, and can be used to make other necessary connections, such as current measurement.

Jumpers

JP1 - Connects the $\overline{\text{EN}}$ pin to a pull-up voltage or GND. The pull-up voltage is either the BAT voltage (when a shunt is installed on JP3) an external 3.3V power source (when the shunt on JP3 is removed and a +3.3V supply is connected to the upper pin of JP3). If there is no shunt installed on JP1, the $\overline{\text{EN}}$ pin is internally pulled down to logic LOW, which enables the charger. If a shunt is installed across the two jumper pins labeled as "Enable", the $\overline{\text{EN}}$ pin is driven to logic LOW, the charger is enabled, same as floating. If the shunt is installed across the two jumper pins labeled as "Disable" and the pull-up voltage is above 2V, the $\overline{\text{EN}}$ pin is driven to logic HIGH, which disables the charger.

JP2 - A shunt installed on JP2 connects the input source from connector J1 to the circuit if input current measurement is not needed. The shunt can be replaced by a current meter if input current measurement is needed.

JP3 - Selects the power source for logic pull-up and the LEDs supply. If a shunt is installed, the BAT voltage is selected as the power source. If the shunt is removed, an external power supply of +3.3V can be connected from the upper pin to GND to provide the pull-up and LEDs supply. This purpose is to exclude the extra current through the charger when characterizing small currents such as EOC and quiescent currents.

JP4 - Parallels an additional 274k resistor to the IMIN pin, such that the End-of-Charge Current will be increased to 30mA (R_{IMIN} is 274k and the EOC current is 15mA without the shunt).

JP5 - Parallels an additional 59k resistor to the IREF pin, such that the Cradle charge current will be increased by 70mA (R_{IREF} is 59k and the charge current is 70mA if the shunts on both JP5 and JP7 are removed).

JP6 - A shunt installed on JP6 connects the BAT pin to the output connector J2 if output current measurement is not needed. The shunt can be replaced by a current meter if output current measurement is needed.

JP7 - Parallels an additional 59k resistor to the IREF pin, such that the Cradle charge current will be increased by another 70mA.

TABLE 1. JUMPER SETTINGS

| JUMPER | POSITION | FUNCTION |
|--------|-------------------------------|----------------------------------|
| JP1 | $\overline{\text{EN}}$ = HIGH | Charger disabled |
| | $\overline{\text{EN}}$ = GND | Charger enabled |
| | Shunt not installed | Charger enabled |
| JP2 | Shunt installed | Connect input source to VIN |
| JP3 | Shunt installed | Select BAT as the pull-up source |
| JP4 | Shunt installed | Set EOC current to 30mA |
| JP5 | Shunt installed | Add 70mA to charging current |
| JP6 | Shunt installed | Connects BAT to J2 |
| JP7 | Shunt installed | Add 70mA to charging current |

Board Layout Information

Schematic of PCB Board

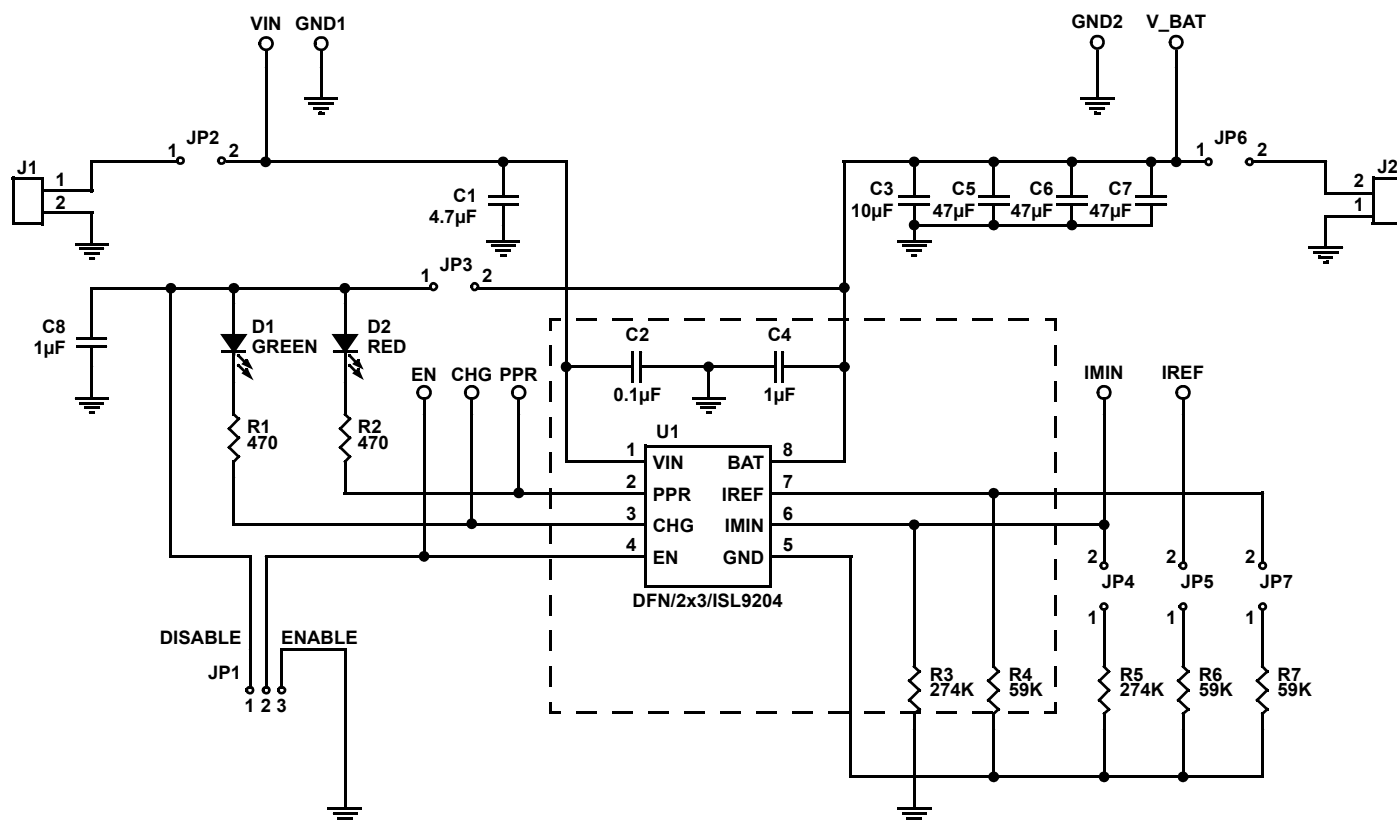
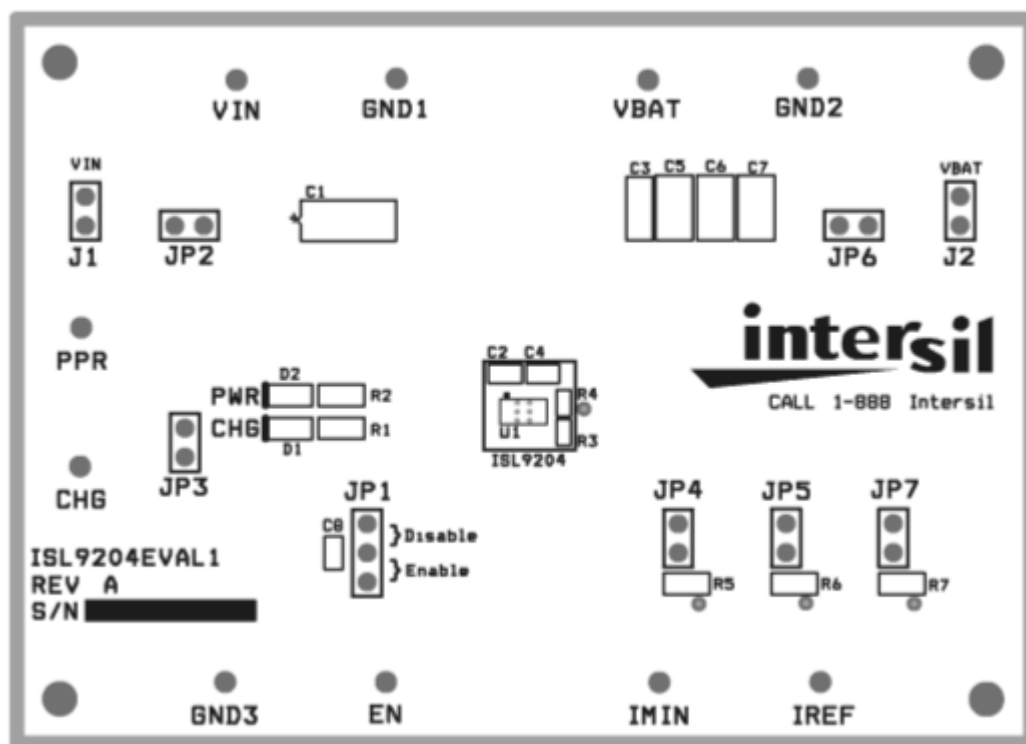


FIGURE 2. SCHEMATIC

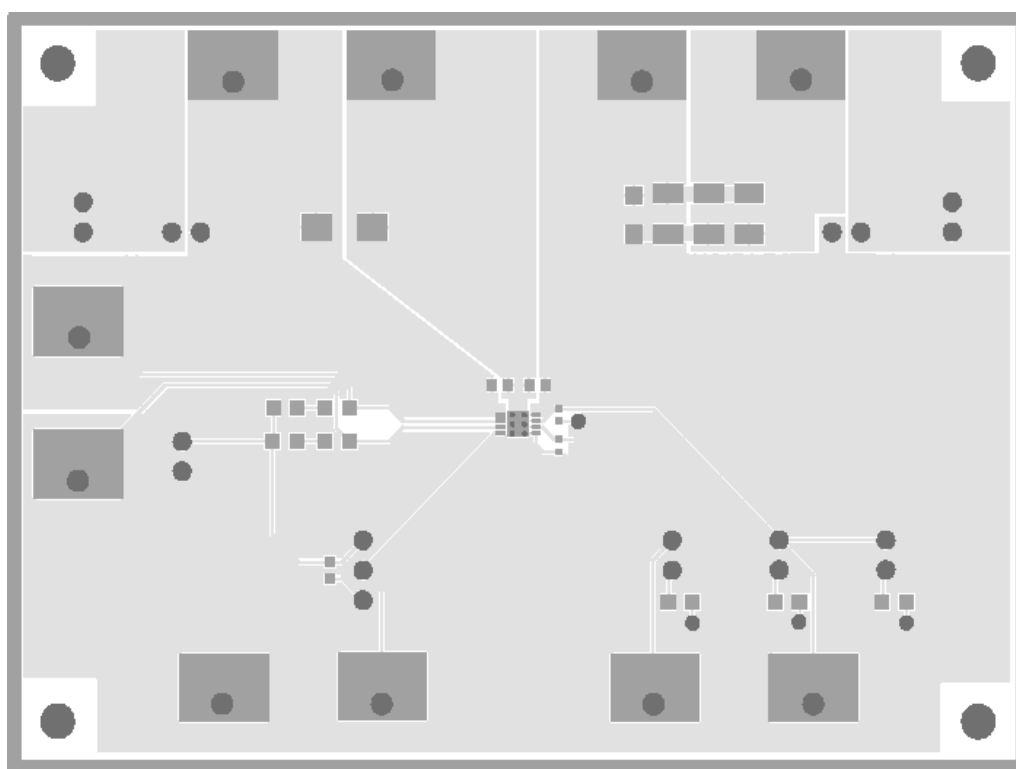
TABLE 2. ISL9204EVAL1 BILL OF MATERIALS (BOM)

| ITEM | QTY | REFERENCE | PART DESCRIPTION | PCB FOOTPRINT | PART NUMBER | VENDOR |
|------|-----|--------------------------|----------------------------------|---------------|------------------|------------|
| 1 | 1 | U1 | ISL9204 Charger | 2x3 DFN | ISL9204 | Intersil |
| 2 | 2 | R1, R2 | 470 Ω , 5%, 1/8W Resistor | 0805 | ERJ-6GEYJ471V | Panasonic |
| 3 | 1 | R3 | 274k, 1%, 1/16W Resistor | 0402 | ERJ-2RKF2743X | Panasonic |
| 4 | 1 | R4 | 59k, 1%, 1/16W Resistor | 0402 | ERJ-2RKF5902X | Panasonic |
| 5 | 1 | R5 | 274k, 1%, 1/8W Resistor | 0805 | ERJ-6ENF2743V | Panasonic |
| 6 | 1 | R6 | 59k, 1% 1/8W Resistor | 0805 | ERJ-6ENF5902V | Panasonic |
| 8 | 1 | C1 | 4.7 μ F, 35V, Tantalum | | ECS-T1VC475R | Panasonic |
| 9 | 1 | C2 | 0.1 μ F, 50V, X7R Ceramic | 0603 | C1608X7R1H104K | TDK |
| 10 | 1 | C3 | 10 μ F, 6.3V, Tantalum | 0603 | ECS-T0JY106R | Panasonic |
| 11 | 2 | C4, C8 | 1.0 μ F, 6.3V, X5R Ceramic | 0603 | ECJ-1VB0J105K | Panasonic |
| 12 | 3 | C5, C6, C7 | 47 μ F, 6.3V, X5R Ceramic | 1210 | ECJ-4YB0J476M | Panasonic |
| 13 | 2 | J1, J2 | 2.54mm Center Header, 2 CKT | | 22-11-2022 | Molex |
| 14 | 3 | VIN, VBAT | Test point, Red | | 5010 | Keystone |
| 15 | 5 | EN, CHG, PPR, IREF, IMIN | Test point, Yellow | | 5014 | Keystone |
| 16 | 3 | GND1, GND2, GND3 | Test point, Black | | 5011 | Keystone |
| 17 | 5 | JP2, JP3, JP4, JP5, JP6 | 2.54mm header, 2ckt | | 22-28-4020 | Molex |
| 18 | 2 | JP1 | 2.54mm header, 3ckt | | 22-28-4030 | Molex |
| 19 | 1 | D1 | Green LED | 0805 | SML-LXT0805GW-TR | Lumex Opto |
| 20 | 1 | D2 | Red LED | 0805 | SML-LXT0805IW-TR | Lumer Opto |

PCB Layout

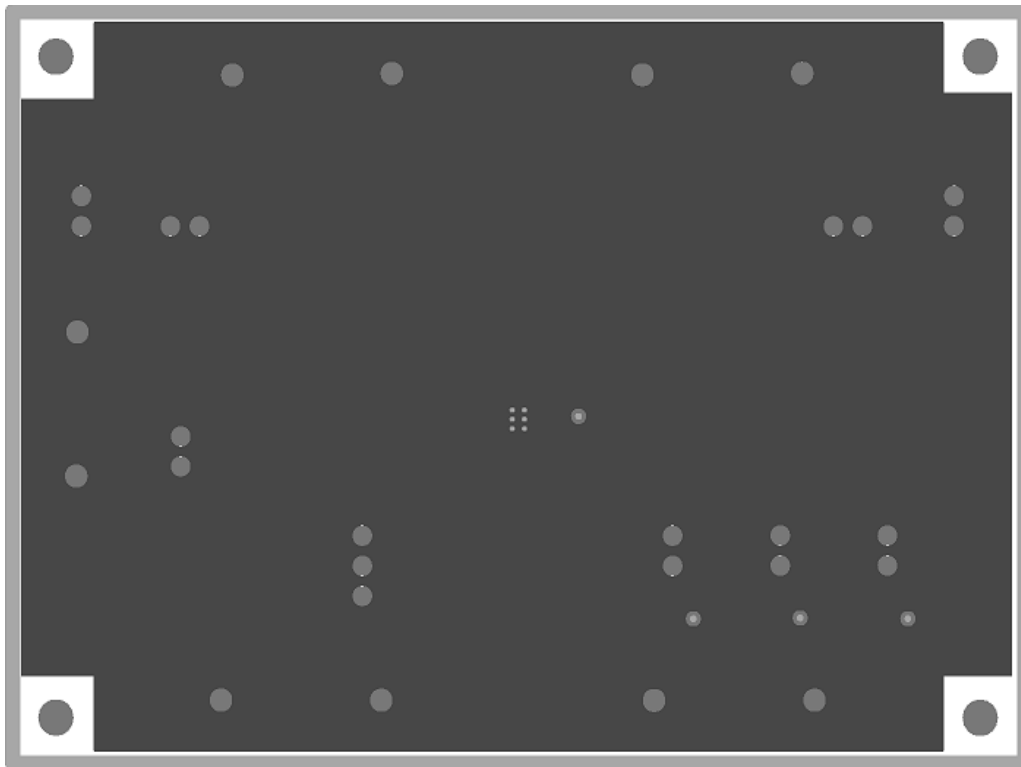


SILK LAYER



TOP LAYER

PCB Layout (Continued)



BOTTOM LAYER

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