6A Smart Load Switch Battery Charger

Purpose

The RT9750 is a 6A smart load switch battery charger, which integrates an internal load switch with charge pump control and 3-path constant current/constant voltage regulation, a 5-way hardware protection, and a 8-Channel 12-bit analog-to-digital converter. This document explains the function and use of the RT9750 evaluation board (EVB), and provides information to enable operation, modification of the evaluation board and circuit to suit individual requirements.

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Introduction

General Product Information

The RT9750 is a 6A smart load switch battery charger, which integrates an internal load switch with charge pump control and 3-path constant current/constant voltage regulation, a 5-way hardware protection, and a 8-Channel 12-bit analog-to-digital converter. The RT9750 provides the accurate analog-to-digital converter for voltage/current measurement by I^2C serial interface to report the battery charging parameters and 3-way software protection and flags.

Product Feature

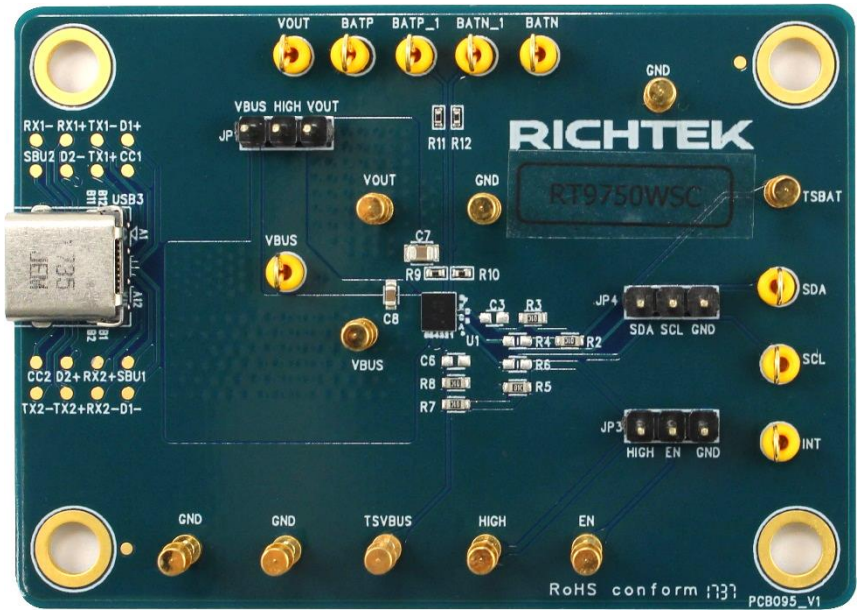
- **Internal Load Switch with Charge Pump Control**
  - **Dual NFETs in a Back to Back Configuration**
  - **Internal Charge Pump Control**
- **3-Path CC/CV Regulation**
  - **Input Current Regulation (ICR)**
  - **Output Voltage Regulation (OVR)**
  - **Battery Voltage Regulation (BVR)**
- **5-Way Hardware Protection**
  - **VBUS Over-Voltage Protection (VBUS_OVP)**
  - **Drop-Out Over-Voltage Protection (VDR_OVP)**
  - **Reverse Over-Current Protection (RE_OCP)**
  - **Junction Over-Temperature Protection (TJ_OTP)**
  - **Input Over-Current Protection (IOC_OCP)**
- **8-Channel 12-bit ADC**
  - **High Accuracy of 12-bit Resolution**
  - **8-Channel for Voltage/Current Measurement**
  - **High Speed Data Rate for 8/16 Times Average per Channel**
- **3-Way Software Protection**
  - **Drop-Out Over-Voltage Protection Alarm (VDR_ALM)**
  - **TS of the VBUS Over-Temperature Protection (TBUS_OTP)**
  - **TS of the BAT Over-Temperature Protection (TBAT_OTP)**

Key Performance Summary Table

Key Features	Evaluation Board Number : PCB095_V1
Input Voltage	3V to 6V
Output Voltage	3V to 6V
Maximum Output Current	6A
Marking & Package Type	RT9750WSC, WL-CSP-42B 2.75x3.05

Bench Test Setup Conditions

Headers Description and Placement



Carefully inspect all the components used in the EVB according to the following Bill of Materials table, and then make sure all the components are undamaged and correctly installed. If there is any missing or damaged component, which may occur during transportation, please contact our distributors or e-mail us at evb_service@richtek.com.

Test Points

The EVB is provided with the test points and pin names listed in the table below.

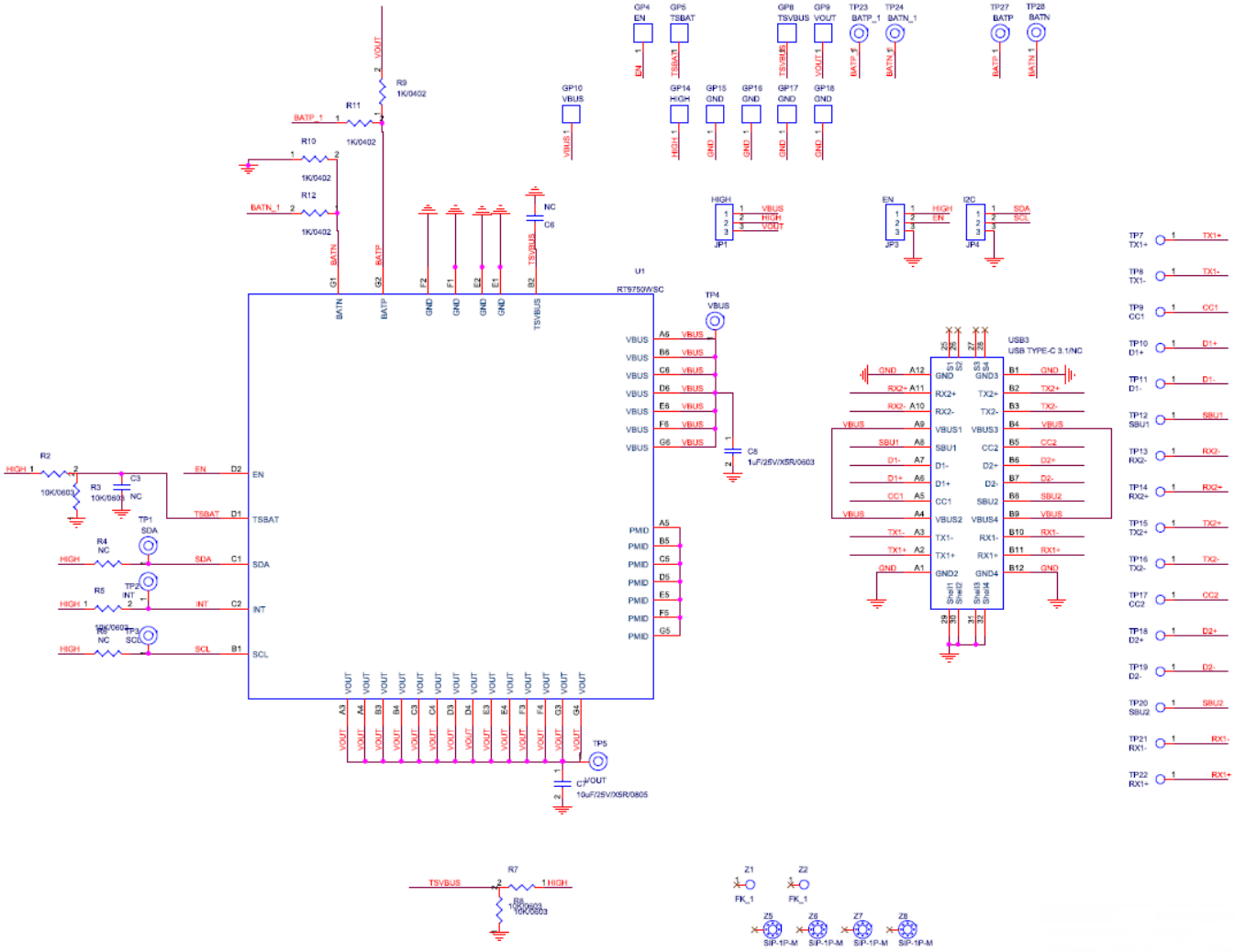
Test point/ Pin name	Signal	Comment (expected waveforms or voltage levels on test points)
VBUS	Input voltage	DC input power supply.
VOUT	Output voltage	Battery connection point to positive terminal of the battery pack.
GND	Ground	Ground.
TSVBUS	VBUS temperature qualification voltage input	VBUS temperature qualification voltage input. Require an external resistor divider and a voltage reference.
TSBAT	VBAT temperature qualification voltage input	Battery temperature qualification voltage input. Require an external resistor divider and a voltage reference.
EN	Enable pin	Device enable control pin. Pull low to disable device. I^2C not available when disabled.
INT	Intterrupt	Open drain interrupt output. connect to pull-up voltage via 10kΩ pull-up resistor. Normally high, the INT pin sends an active low.
SDA	SDA	I^2C interface data. Connect to pull-up voltage via 10kΩ pull-up resistor.
SCL	SCL	I^2C interface clock. Connect to pull-up voltage via 10kΩ pull-up resistor.

Power-up & Measurement Procedure

1. Connect input power (3V < V_{BUS} < 6V) and input ground to VIN and GND test pins respectively.
2. Connect positive end and negative terminals of VBAT to VOUT and GND test pins respectively.
3. There is a 3-pin header “High” for pull-up control. To use a jumper at “VBUS” option to tie pull up pin to input power VIN. Use a jumper at “VOUT” option to tie pull-up test pin to battery.
4. There is a 3-pin header “EN” for enable control. To use a jumper at “High” option to tie EN test pin to high level for enabling the device. Inversely, to use a jumper at “GND” option to tie EN test pin and ground GND for disabling the device.

Schematic, Bill of Materials & Board Layout

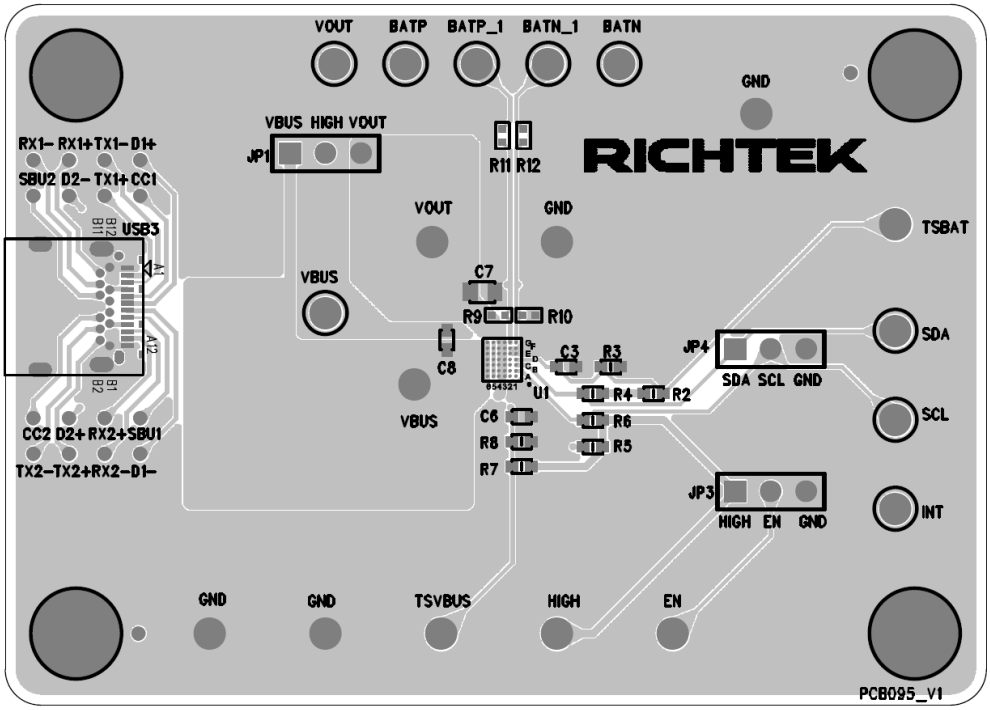
EVB Schematic Diagram



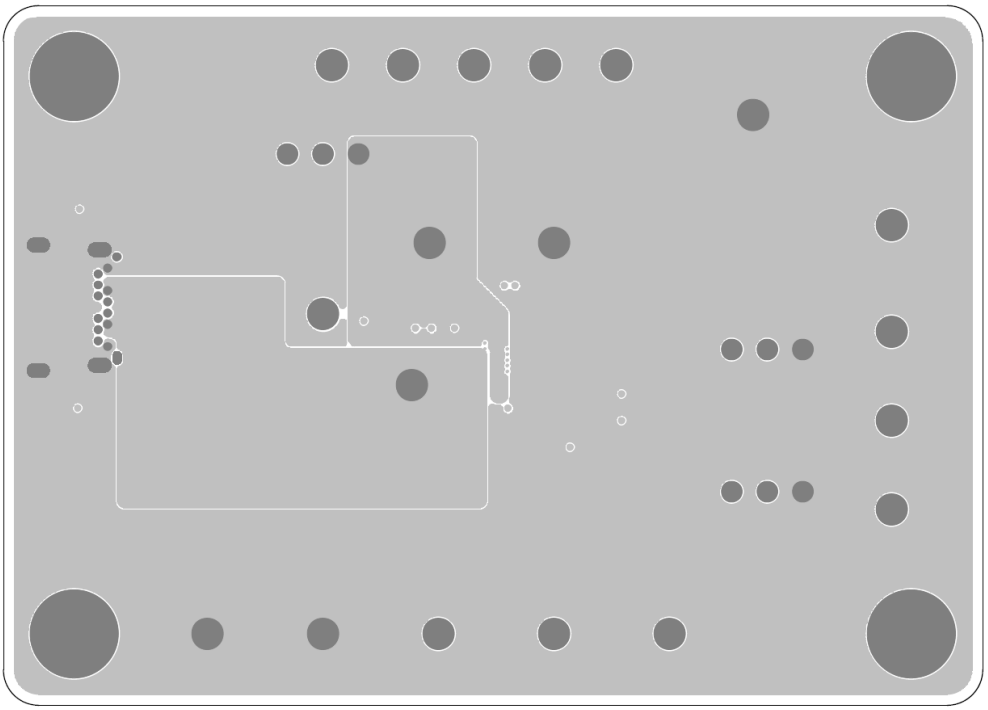
Bill of Materials

Reference	Qty	Part Number	Description	Package	Manufacturer
U1	1	RT9750WSC	Smart Load Switch	WL-CSP-42B 2.75x3.05	RICHTEK
C7	1	GRM21BR61E106KA73L	10µF/25V/X5R	C-0805	muRata
C8	1	C1608X5R1E105K080AC	1µF/25V/X5R	C-0603	TDK
R2, R3, R5, R7, R8	5	WR06X1002FTL	10k	R-0603	WALSIN
R9, R10, R11, R12	4	WR04X1001FTL	1k/1%	R-0402	WALSIN

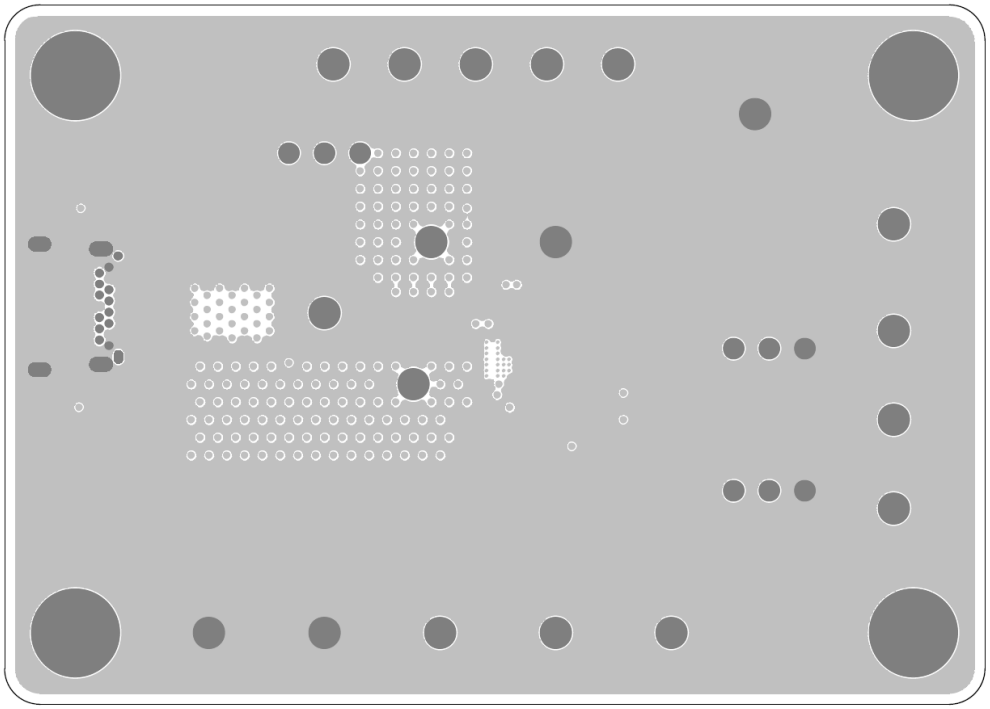
PCB Layout



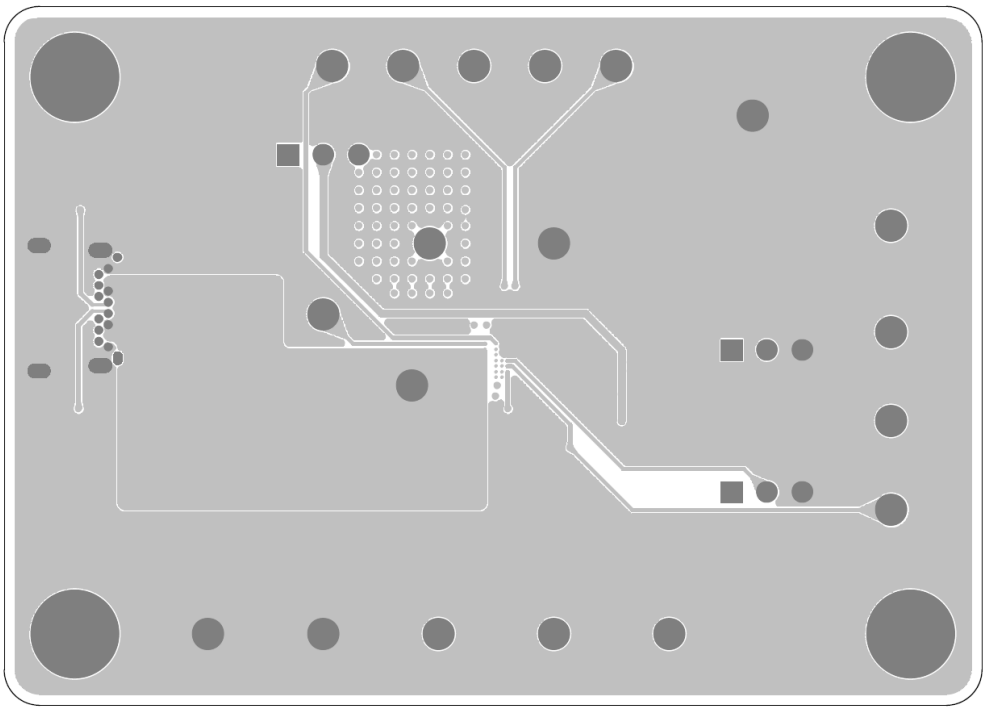
Top View (1st layer)



PCB Layout—Inner Side (2nd Layer)



PCB Layout—Inner Side (3rd Layer)



Bottom View (4th Layer)

More Information

For more information, please find the related datasheet or application notes from Richtek website http://www.richtek.com.

Important Notice for Richtek Evaluation Board