

System Side Single-Cell Fuel Gauge Evaluation Board

General Description

The Evaluation Board demonstrates the RT9426AWSC to provide fuel gauging for single-cell battery packs. The RT9426AWSC reports *StateOfCharge*, *StateOfHealth*, *FullChargeCapacity*, *TimeToEmpty* and *CycleCount*. The RT9426AWSC also provides complete battery status monitor with interrupt alarm function. It could alert to host processor actively when condition of battery over/undervoltage, under SOC, SOC change, battery presence status change and over-temperature in charge/discharge.

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Performance Specification Summary

Summary of the RT9426AWSC Evaluation Board performance specification is provided in Table 1. The ambient temperature is 25°C.

Table 1. RT9426AWSC Evaluation Board Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Operation Voltage	VBAT - VSS	2.5	--	5.5	V
Active Current	Active mode, VDD = 3.8V, BD_PRES_EN = 0 and not including external temp. measurement current.	--	14	20	μA
Sleep Current	Sleep mode, VDD = 3.8V, BD_PRES_EN = 0 and not including external temp. measurement current.	--	5	7	μA
Shutdown Current	VBAT = 3.8V	--	--	1	μA
Voltage Measurement Range		2.5	--	VBAT	V
Voltage Measurement Error	VBATS = 4V, VBATG = 0V	-7.5	--	7.5	mV
Current Measurement Range	VCSP - VCSN	-125	--	125	mV
Current Measurement Gain Error	VCSP - VCSN = 20mV	-1	--	1	%
Current Measurement Offset Error	VCSP - VCSN = 0V (Note1)	-10	±5	10	μV
Temperature Measurement Error	T _A = 25°C (Note 2)	-3	--	3	°C
Internal Temperature Measurement Range		-40	--	85	°C
Internal Temperature Measurement Error	T _A = 25°C	--	±3	--	°C

Note 1. Typical result is long time average.

Note 2. The thermistor is use 10k NTC and beta 3435k, default is SEMITEC 103KT1608T.

Power-up Procedure

Suggestion Required Equipments

- RT9426AWSC Evaluation Board
- DC power supply capable of 6V and 5A
- 1-Series (1sXp) Li-Ion/Li-Polymer Battery Cell
- Electronic load capable of 5A
- I²C communication Host

Proper measurement equipment setup and follow the procedure below.

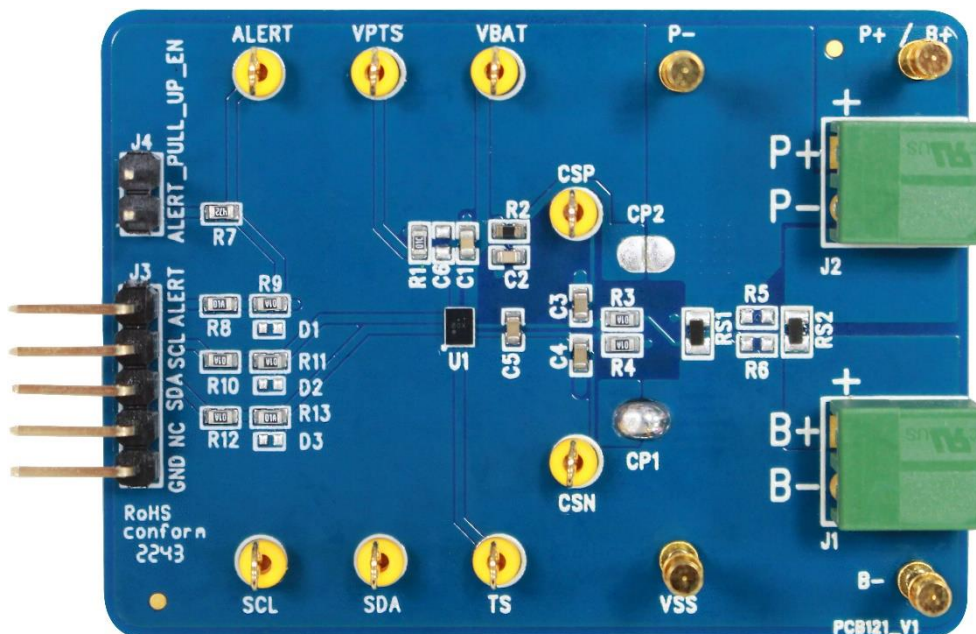
The Evaluation Board is fully assembled and tested. Follow the steps below to verify board operation.

- 1) Insert battery to battery connector between B+ and B-
- 2) For discharge, connect electronic load from P+ to P-, adjust the discharge current according to battery spec.
- 3) For charge, connect DC power supply from P+ to P-, adjust the CV/CC according to battery spec.
- 4) Get the information like *StateOfCharge*, *StateOfHealth*, *FullChargeCapacity*, *TimeToEmpty*, *CycleCount*, *Voltage*, *Current* and *Temperature* by I²C interface.

Note: Contact with RICHTEK for detailed battery characterizing to get custom parameter for high accuracy *StateOfCharge* (SOC) report.

Detailed Description of Hardware

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	Function
VBAT	Power supply input and battery voltage sensing input for WL-CSP package.
VPTS	Power reference output pin for temperature measurement
VSS	Device ground
CSP	Battery current sensing positive input. Connect a 10mΩ sense resistor with kelvin connection where is near B-side.
CSN	Battery current sensing negative input. Connect a 10mΩ sense resistor with kelvin connection where is near PACK- side.
TS	Temperature measurement input.
SDA	Serial data input. Slave I ² C serial communications data line for communication with system. Open-drain I/O.
SCL	Serial clock input. Slave I ² C serial communications clock line for communication with system. Open-drain I/O.

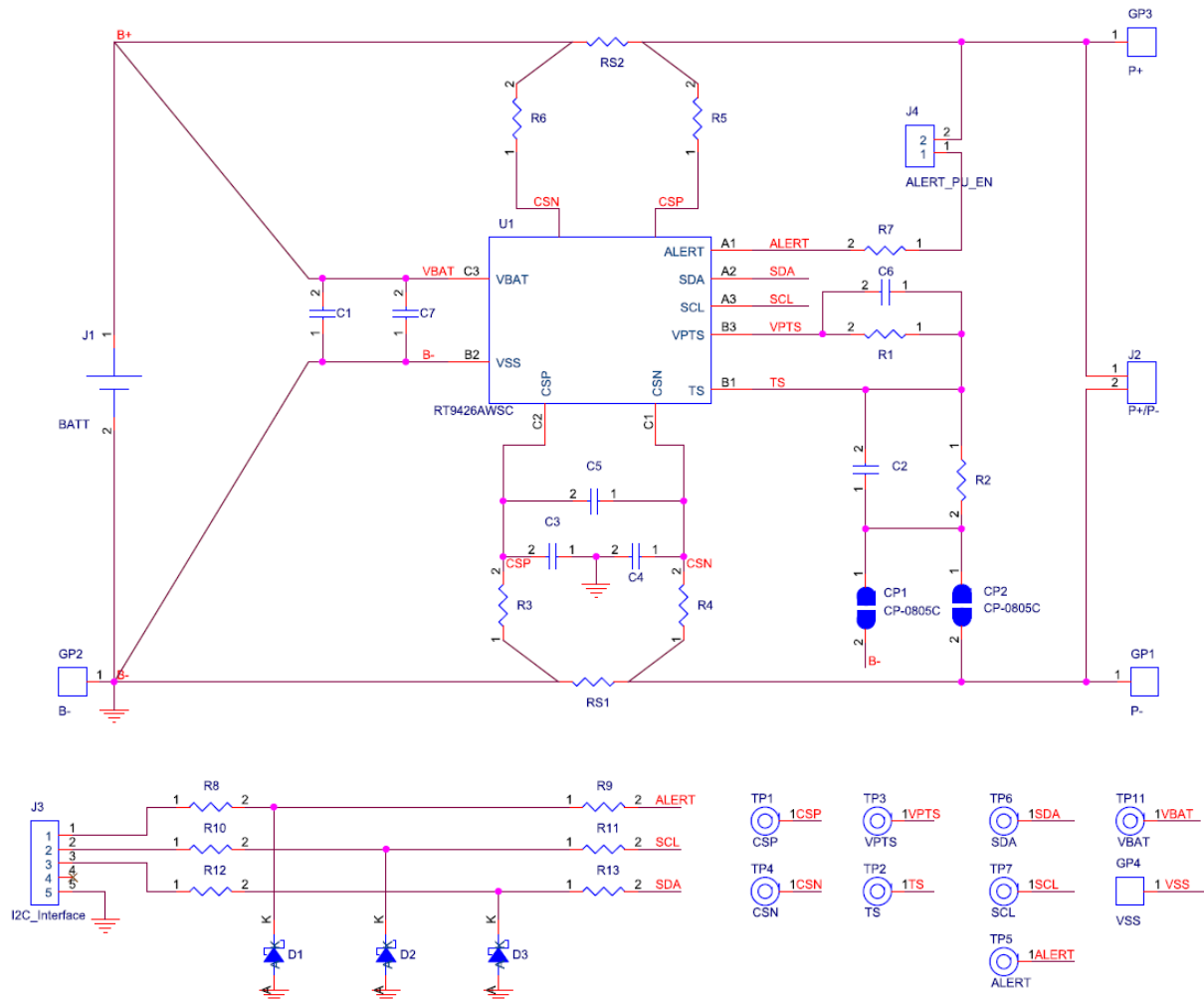
Test Point/ Pin Name	Function
ALERT	Alert open-drain indicator output.
J1	Battery Connector.
J2	Load/Charger Connector.
J3	I ² C communication interface.
J4	Alert pull-high enable.

Bill of Materials

Reference	Count	Part Number	Value	Description	Package	Manufacturer
U1	1	RT9426AWSC	RT9426AWSC	Single-Cell Fuel Gauge	WL-CSP-9B 2.29x1.74 (BSC)	RICHTEK
C1	1	0603X105K250CT	1 μ F	Capacitor, Ceramic, 25V, X5R	0603	WALSIN
C2	1	0603B103K500CT	10nF	Capacitor, Ceramic, 50V, X7R	0603	WALSIN
C3, C4, C5	3	0603B104K250CT	0.1 μ F	Capacitor, Ceramic, 25V, X7R	0603	WALSIN
C6, C7	2			NC		
R1	1	WR06X1002FTL	10k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R2	1	103KT1608T	10k	NTC Resistor, Chip, 3435K, 1%	0603	SEMITEC
R3, R4, R8, R9, R10, R11, R12, R13	8	WR06X1000FTL	100	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R7	1	RTT034701FTP	4.7k	Resistor, Chip, 1/10W, 1%	SMB	RALEC
R5, R6	2			NC		
RS1, RS2	2	RLM-0816-3F-R010-FNH	0.01	Current Sense Resistor, 1W, 1%	0603	Cyntec
D1, D2, D3	3			NC		

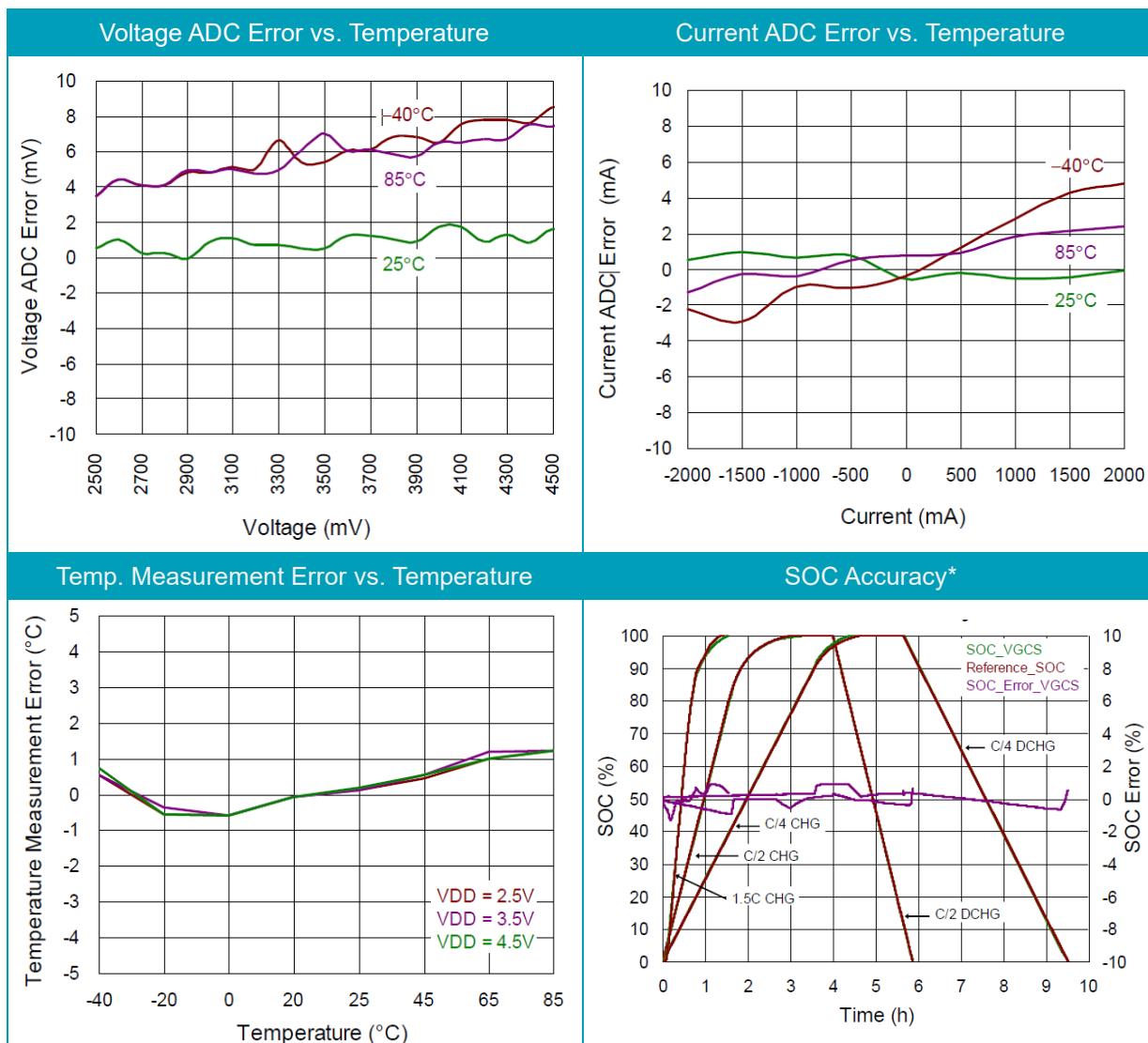
Typical Applications

EVB Schematic Diagram



- RT9426AWSC can support high/low-side current sensing, EVB is default low side sense setup.
 - Mount RS1/R3/R4 for Low-Side Sensing.
 - Mount RS2/R5/R6 for High-Side Sensing.

Measurement Result



*: Sample accuracy with custom parameter into the IC.

Evaluation Board Layout

Figure 1 and Figure 2 are RT9426AWSC Evaluation Board layout. This board size is 55mm x 40mm and is constructed on two-layer PCB with 1 oz. Cu.

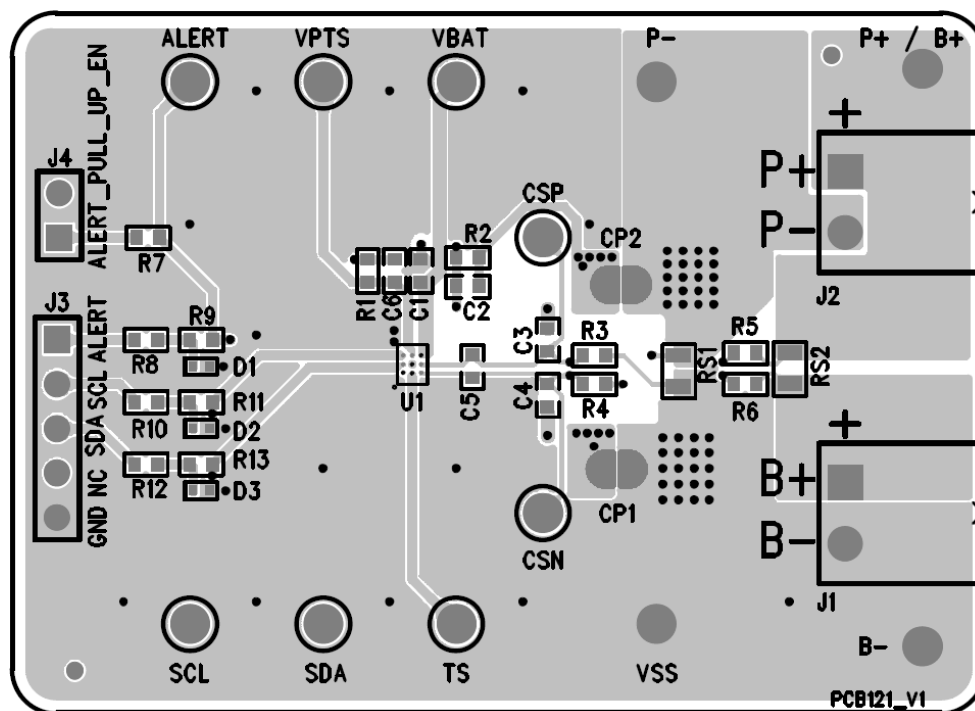


Figure 1. Top View

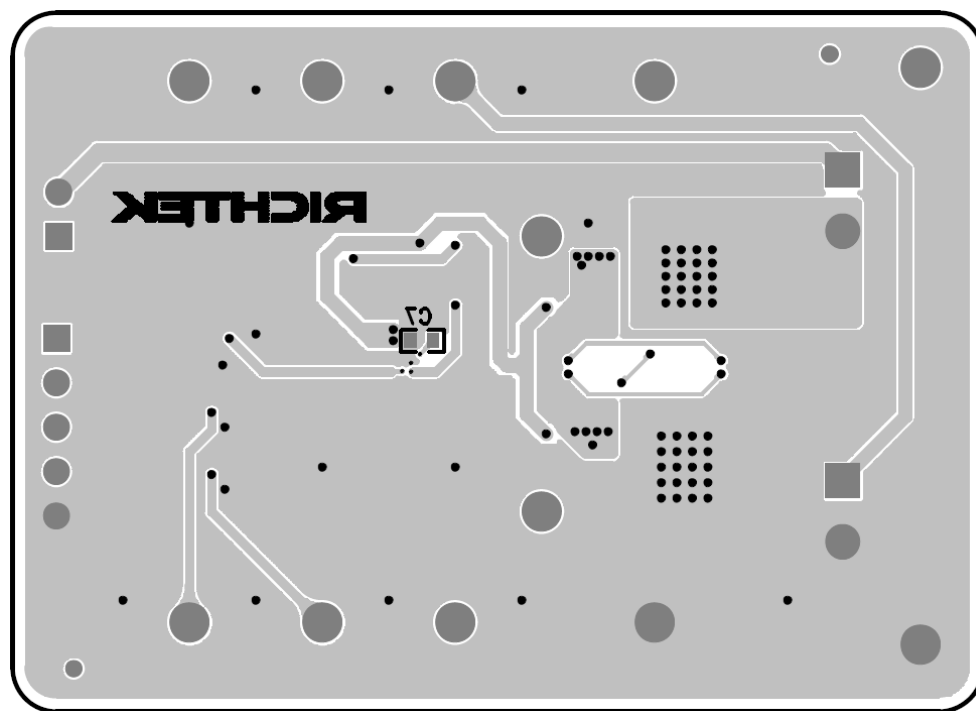


Figure 2. Bottom View

More Information

For more information, please find the related datasheet or application notes from Richtek website

<http://www.richtek.com>.

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