

High-Side Measurement Current-Shunt Monitor Evaluation Board

General Description

This document provides information on the function and use of the RTQ6050 evaluation board (EVB), as well as instructions for operating and modifying the board and circuit to meet individual requirements. Additionally, it includes details on the schematic diagram, bill of materials, and evaluation board layout.

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Performance Specification Summary

Summary of the RTQ6050GF Evaluation Board performance specification is provided in Table 1. The ambient temperature is 25°C.

Table 1. RTQ6050GF Evaluation Board Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Default Input Voltage	Default = 12V	2	--	80	V
Supply Voltage	Default = 12V	2.9	--	18	V
Sensing Current		--	0.5	--	A
Output Voltage		--	5	--	V
Gain		--	20	--	V/V
Gain Error		--	--	±2	%
Offset Voltage, RTI		--	±0.5	±2.5	mV
Quiescent Current	V _{OUT} = 2V, T _A = -40°C to 125°C	--	--	1200	μA

Power-up & Measurement Procedure

Suggestion Required Equipments

- RTQ6050GF Evaluation Board
- DC Power Supply (Chroma, 62006P-100-25)
- Electronic load capable of 6A
- Function Generator
- DC Meter
- Oscilloscope

Quick Start Procedures

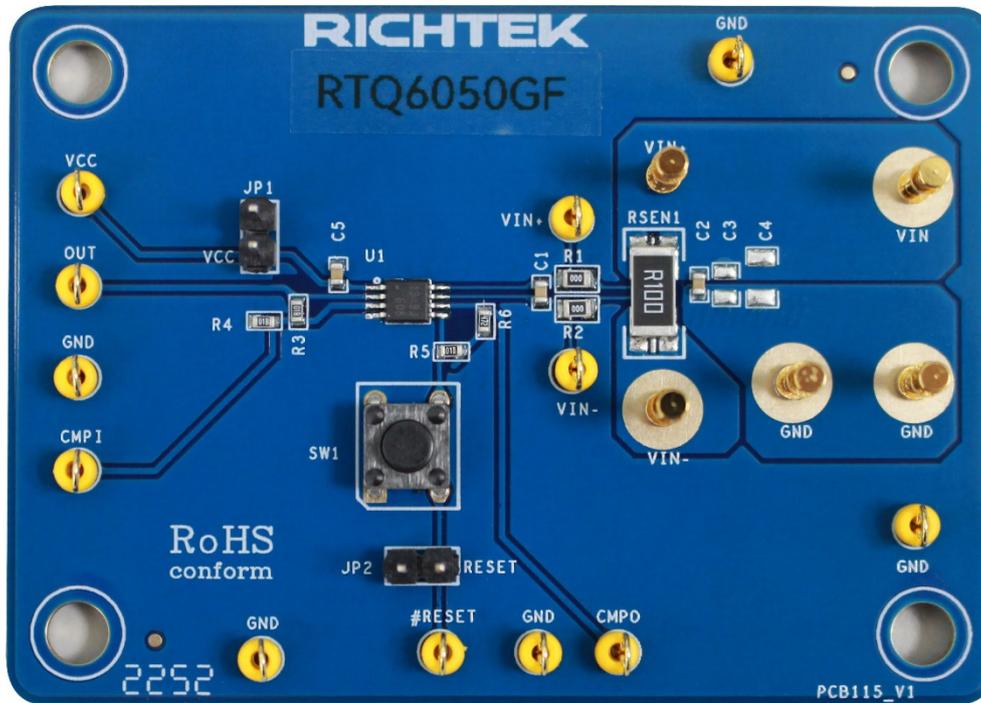
1. Apply VCC = 12V input power supply (2.9V < VCC < 18V) to VCC and GND terminals.
2. Apply VIN+ = 12V input power supply (2V < VIN+ < 80V) to VIN+ and GND terminals.
3. The default sense resistance is 100mΩ.
4. Connect an external load to VIN- and GND terminals, and keep loading current = 0.5A.
5. Measure the sense voltage (approximately 50mV) between VIN+ and VIN-.
6. Measure the output voltage (approximately 1V) between VOUT and GND.

Comparator Input, R3, and R4

The RTQ6050 devices incorporate an open-drain comparator. This comparator typically has 1.3μs (typical) response time. The output of the comparator latches and is reset through the #RESET pin. The negative terminal is connected to a 0.6V internal reference, and the positive comparator input is connected to the CMPI pin of the device. Adjust R3 and R4 (show in EVB schematic) to set the comparator trip point for the intended application, where $CMPI = (OUT \times R4) / (R3 + R4) = 0.6V$.

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.

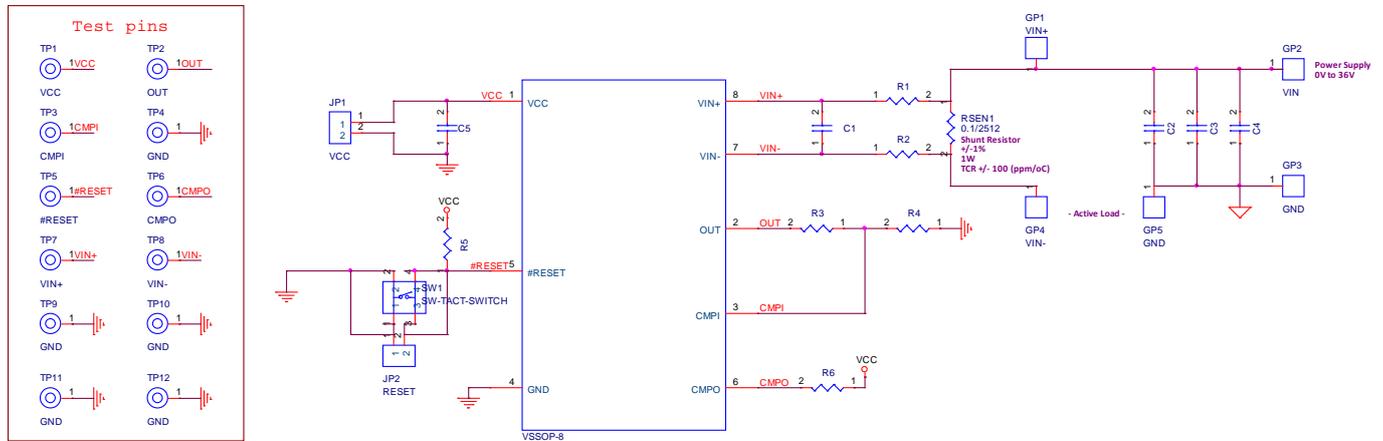
Test point	Function
VCC	Power input test point.
OUT	Output Voltage test point.
CMPI	Comparator input test point.
GND	Ground.
#RESET	Reset input pin.
CMPO	Open-drain comparator output.
VIN-	Negative current-sensing input.
VIN+	Positive current-sensing input.
JP1	VCC to ground test point.
JP2	RESET jumper. Connect RESET to ground or pull high to VCC.
SW1	RESET control switch. Connect RESET to ground or pull high to VCC.

Bill of Materials

Reference	Count	Part Number	Value	Description	Package	Manufacturer
C1, C2, C5	3	GRM188R71H104KA93D	0.1 μ F/25V/X7R/0603	Capacitor, Ceramic	0603	MURATA
R1, R2	2	RTT05000JTP	0/0805	Resistor	0805	RALEC
R3, R4	2	RTT031001FTP	1k/0603	Resistor	0603	RALEC
R5	1	WR06X1003FTL	100k/0603	Resistor	0603	WALSIN
R6	1	RTT034701FTP	4.7k/0603	Resistor	0603	RALEC
RSEN1	1	RTT25R100FTE	0.1	Resistor	2512	RALEC
U1	1	RTQ6052GF	RTQ6052GF	CSOP	MSOP-8	RICHTEK

Typical Applications

EVB Schematic Diagram

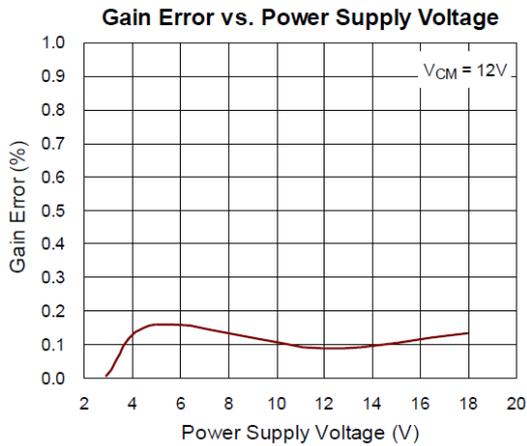


Note:

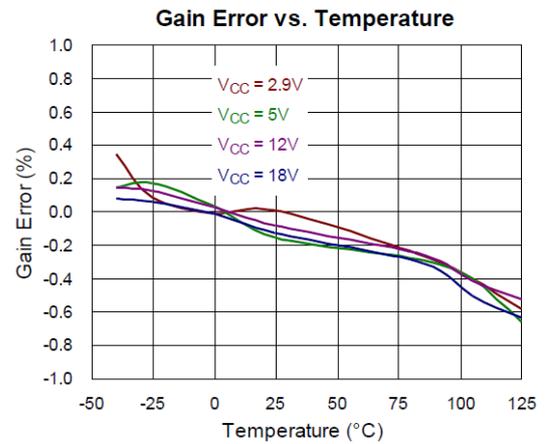
1. Do not hot-plug input voltage and supply voltage on the board. If hot-plugging is required, add ~100 μ F electrolytic capacitor at the input.
2. All the stated input and output capacitor values are the effective capacitances, including any de-rating effect, like a DC Bias. The stability of the converter may be impacted when using small size MLCC output capacitors, which may have much lower capacitance at the application DC output voltage than the rated value.

Measurement Results

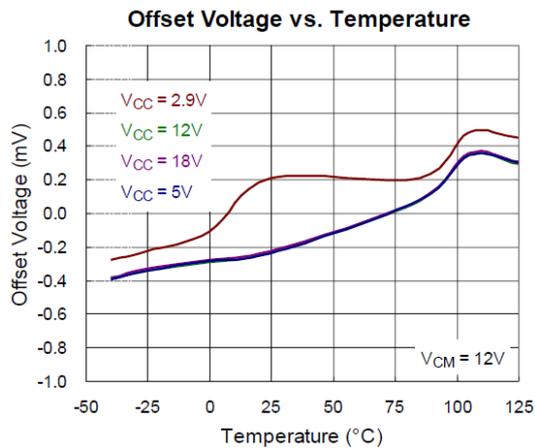
Gain Error with Power Supply (VS) Measurement



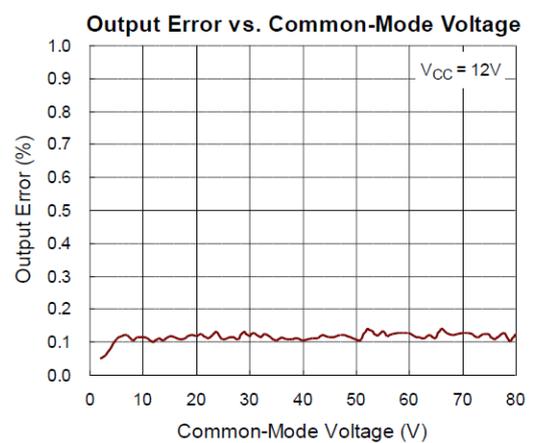
Gain Error with Temperature Measurement



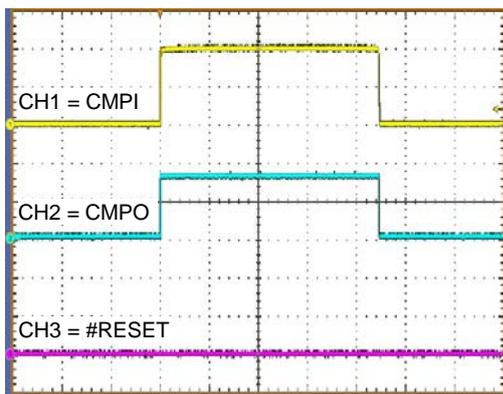
Offset Voltage with Temperature Measurement



Output Error with Common-Mode Measurement



#RESET signal = Low, CMPO is dominated by CMPI and 0.6V



Evaluation Board Layout

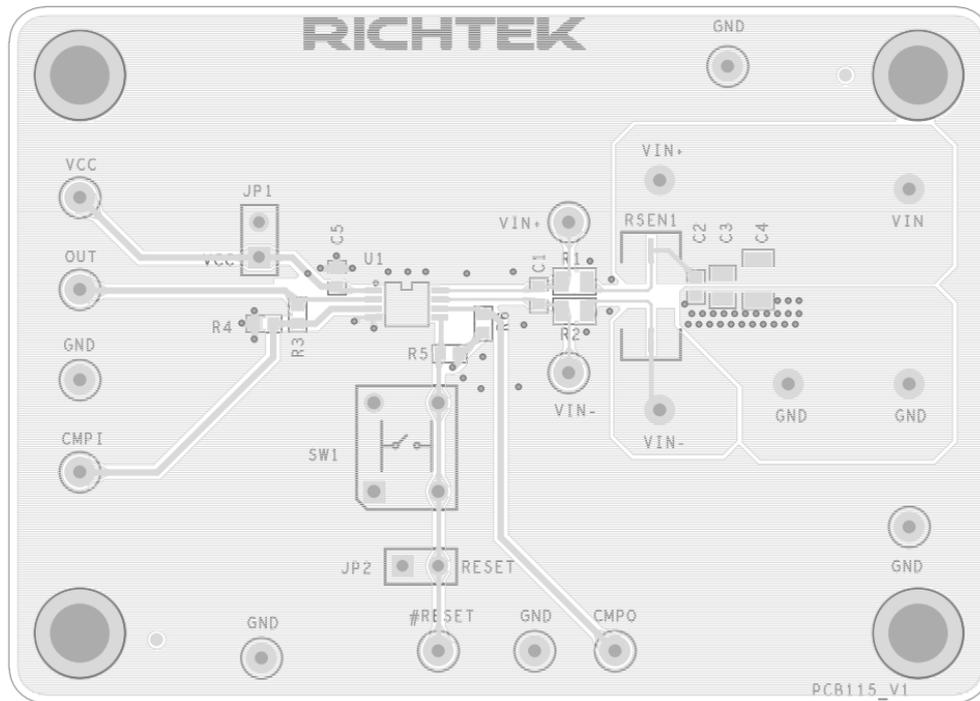


Figure 1. Top View

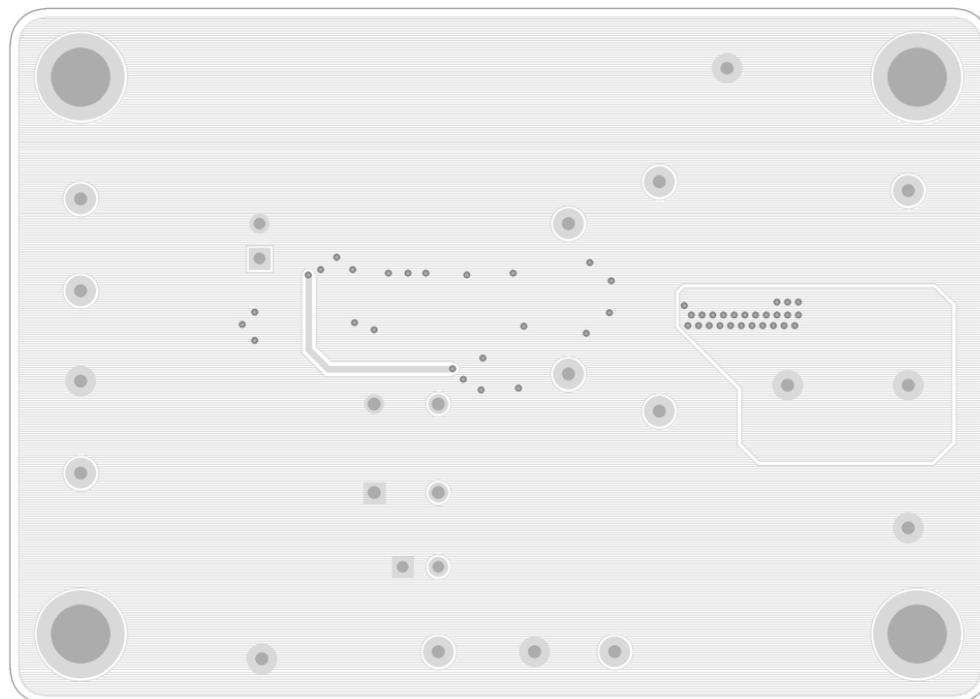


Figure 2. Bottom View

More Information

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

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

Important Notice for Richtek Evaluation Board

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