

3A Single Cell Switching Battery Charger Evaluation Board

General Description

The RT9471D is a highly-integrated 3A switch mode battery charge management and system power path management device for single cell Li-Ion and Li-polymer battery. The low impedance power path optimizes switch-mode operation efficiency, reduces battery charging time and extends battery life during discharging phase. The I²C serial interface with charging and system settings makes the device a truly flexible solution.

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Performance Sepcification Summary

Summary of the RT9471D Evaluation Board performance specifiiaiton is provided in Table 1. The ambient temperature is 25°C.

Table 1. RT9471D Evaluation Board Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range, VBUS		3.9	--	13.5	V
Maximum Input Current, IBUS		0	--	3.2	A
Maximum Input Current, IBUS	VBUS ≥ 12V	--	--	2	A
Maximum Output Current, ISYS		--	--	3.2	A
Maximum Battery Voltage, VBAT		--	--	4.7	V
Maximum Charge Current, IBAT		--	--	3.15	A
Maximum Discharge Current, IBAT		--	--	6	A

Power-up Procedure

Suggestion Required Equipments

- RT9471D Evaluation Board
- DC power supply x 2, one for VBAT, one for VBUS
- Electronic load
- Oscilloscope

Quick Start Procedures

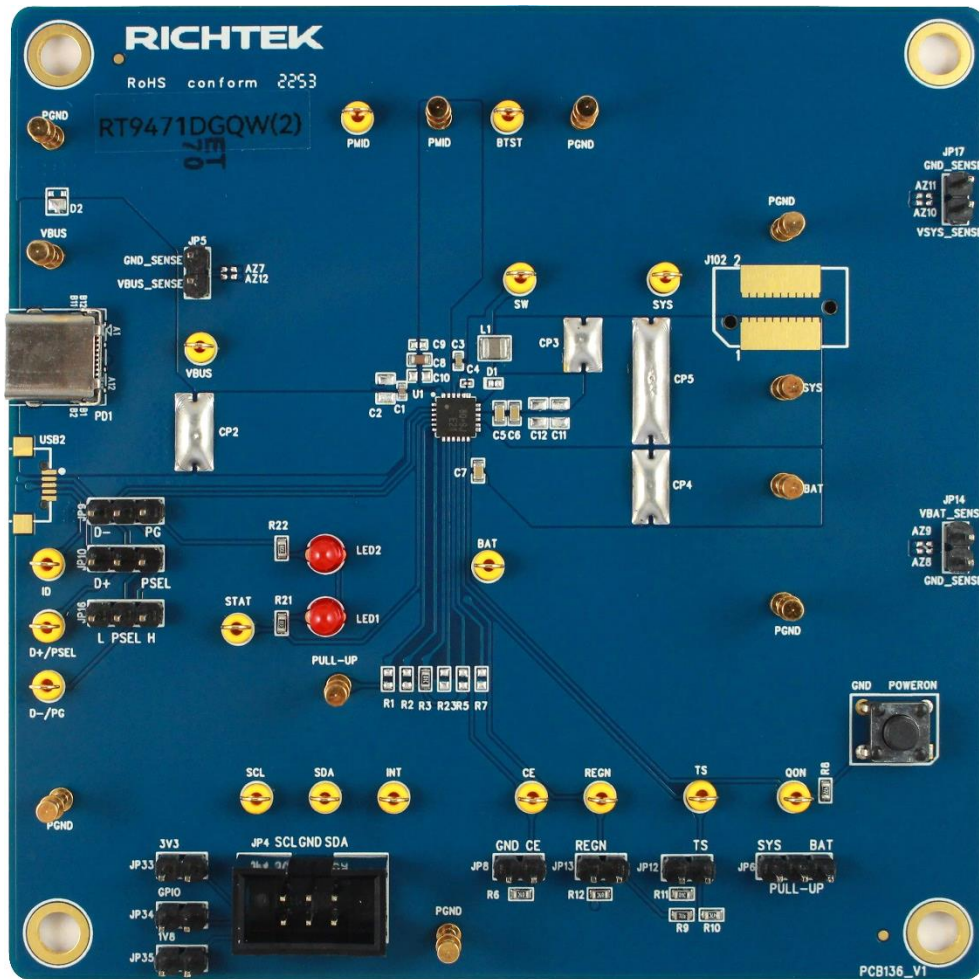
The Evaluation Board is fully assembled and tested. Follow the steps below to verify board operation. Do not turn on supplies until all connections are made.

Proper measurement equipment setup and follow the procedure below.

1. Set power source equal 3.8V/5A then connect to BAT and GND of EVB.
2. Use E-Load connect to power source and enable CC loading from power source.
3. The AP connect to SCL, SDA and GND of EVB
4. Check I²C can work normally by connecting to slave address (0x53).
5. Set VBUS = 5V/3A and connect to VBUS and GND of EVB.
6. Check have charging current to VBAT.
7. Check 0x0F[3:0] shows '0100' (Fast-charge)
8. Start the test by changing register setting which you want.

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
VBUS	Input voltage.
SYS	System voltage.
BAT	Battery voltage.
SW	Switching node.
REGN	Internal LDO.

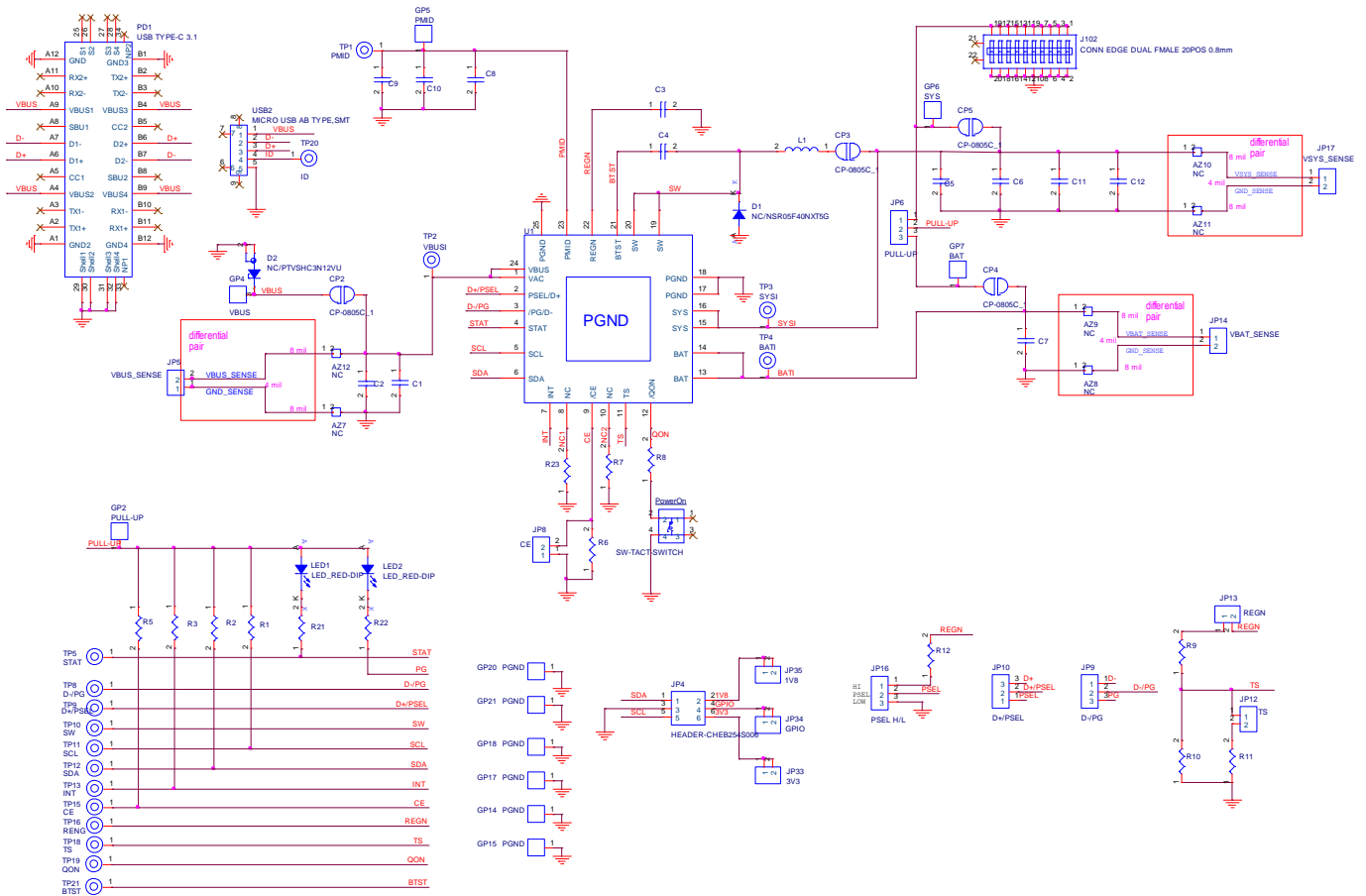
Test Point/ Pin Name	Function
PMID	PMID from VBUS.
BTST	Boost strap pin.
INT	Interrupt pin.
SDA	I ² C SDA.
SCL	I ² C SCL.
/QON	Power key.
VAC	Input sense.
/CE	Charger enable or disable.
D+	Positive of USB data line.
D-	Negative of USB data line.
TS	Temperature sense voltage.

Bill of Materials

Reference	Count	Part Number	Description	Package	Vendor
C1	1	GRM155R61E105KA12	1 μ F/25V/X5R/0402	0402	Murata
C3	1	GRM155R60J475ME47	4.7 μ F/6.3V/X5R/0402	0402	Murata
C4	1	GRM033R61C473KE84	47nF/16V/X5R/0201	0201	Murata
C5, C6, C7	2	GRM185R60J106ME15	10 μ F/6.3V/X5R/0603	0603	Murata
C10	1	GRM188R61E106MA73	10 μ F/25V/X5R/0603	0603	Murata
J102	1	HSEC8-110-01-S-DV-A-TR	CONN EDGE DUAL FEMALE 20POS 0.8mm	12.6x7.98mm	SAMTEC
L1	1	CIGT252010EH1R0MNE	1 μ H	L-2-5x2-0	Samsung
LED1, LED2	2	LNL-302RD000A1	LED_RED-DIP	LED-3-85MMDIP	LighTop
PD1	1	121U-3CST-09CR	USB TYPE-C 3.1	9.87x9.75mm	JEM
POWER ON	1	HTS6601H	SW-TACT-SWITCH	TACT-BTN	High-Tronics
R3, R6, R11, R12	4	WR06X1002FTL	10k/0603	0603	WALSIN
R8	1	WR06X4701FTL	4.7k/0603	0603	WALSIN
R9	1	WR06X5231FTL	5.23k/0603	0603	WALSIN
R10	1	WR06X3012FTL	30.1k/0603	0603	WALSIN
R21, R22	2	WR06X2001FTL	2k/0603	0603	WALSIN
U1	1	RT9471DGQW(2)	RT9471DGQW(2)	WQFN-24L 4x4	RichTek
USB2	1	UMMBF-051MGCB2- CF1066	MICRO USB AB TYPE, SMT	7.4x5.63mm	Cherng Weei

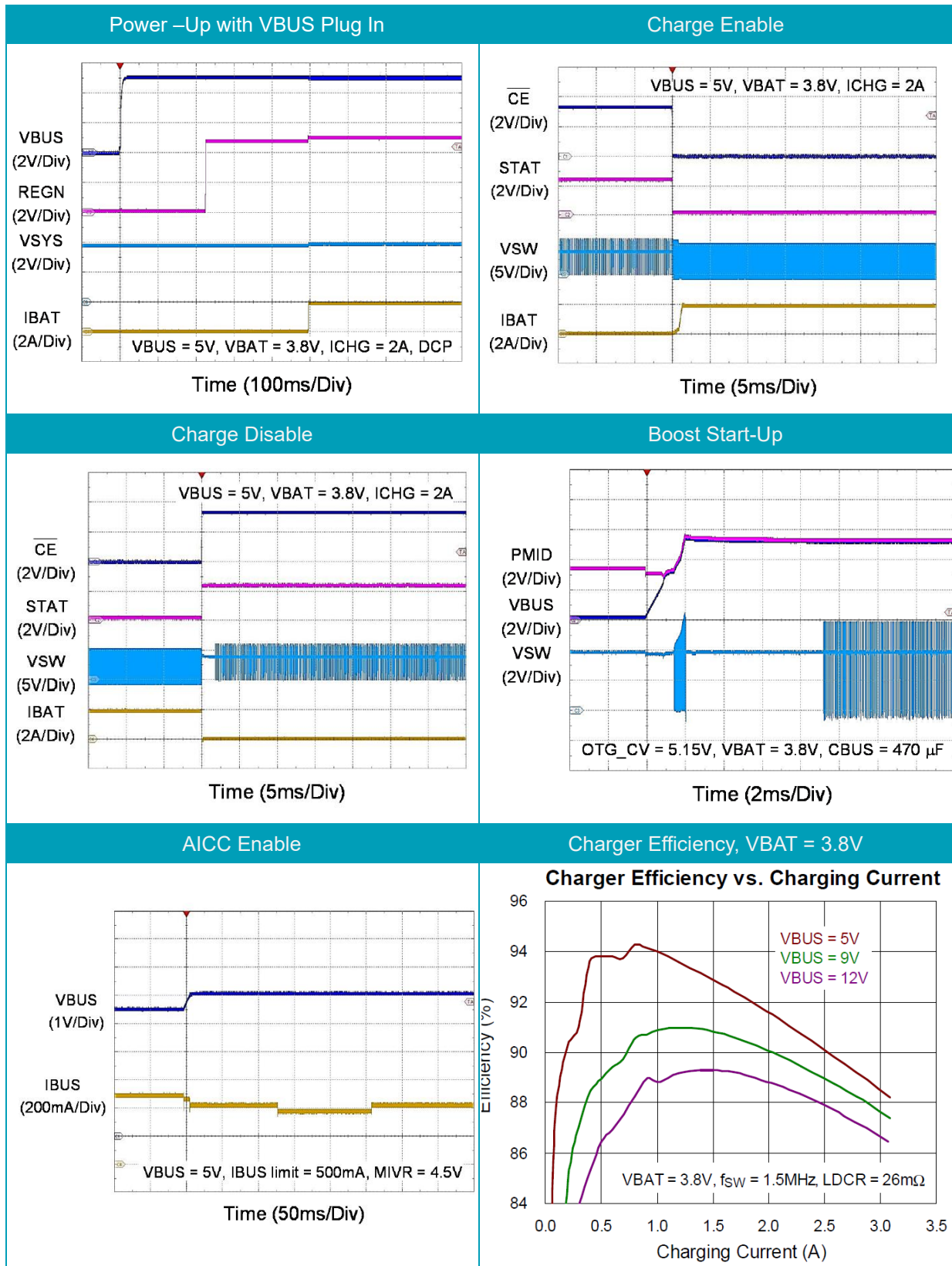
Typical Applications

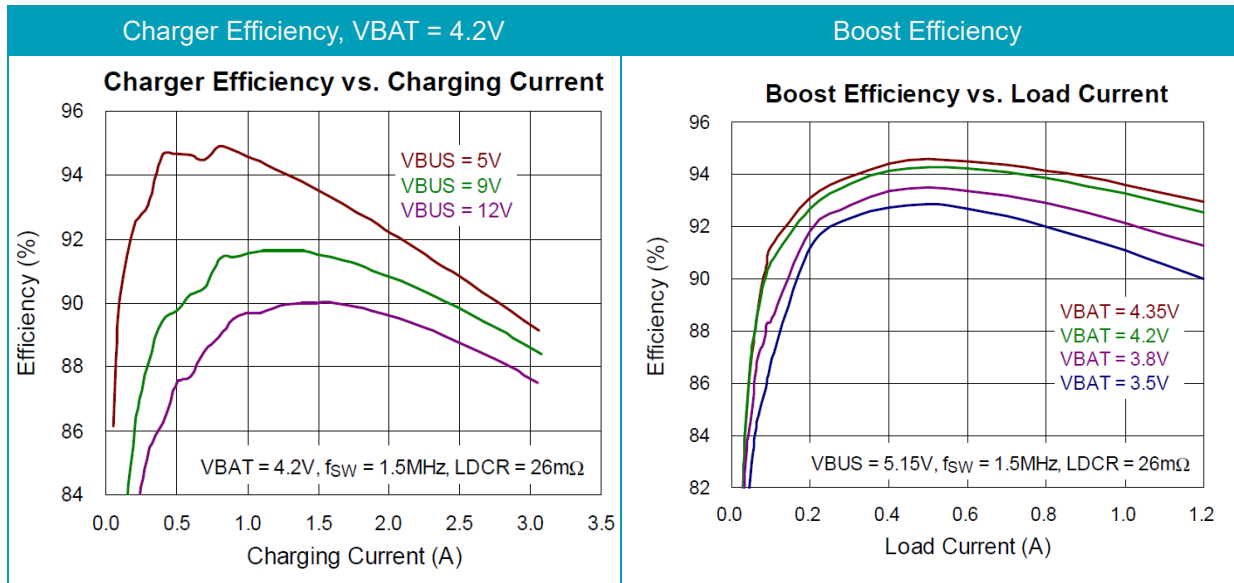
EVB Schematic Diagram



1. The capacitance values of the input and output capacitors will influence the input and output voltage ripple and stability.
2. MLCC capacitors have degrading capacitance at DC bias voltage, and especially smaller size MLCC capacitors will have much lower capacitance.

Measure Result





Evaluation Board Layout

Figure 1 to Figure 4 are RT9471D Evaluation Board layout.

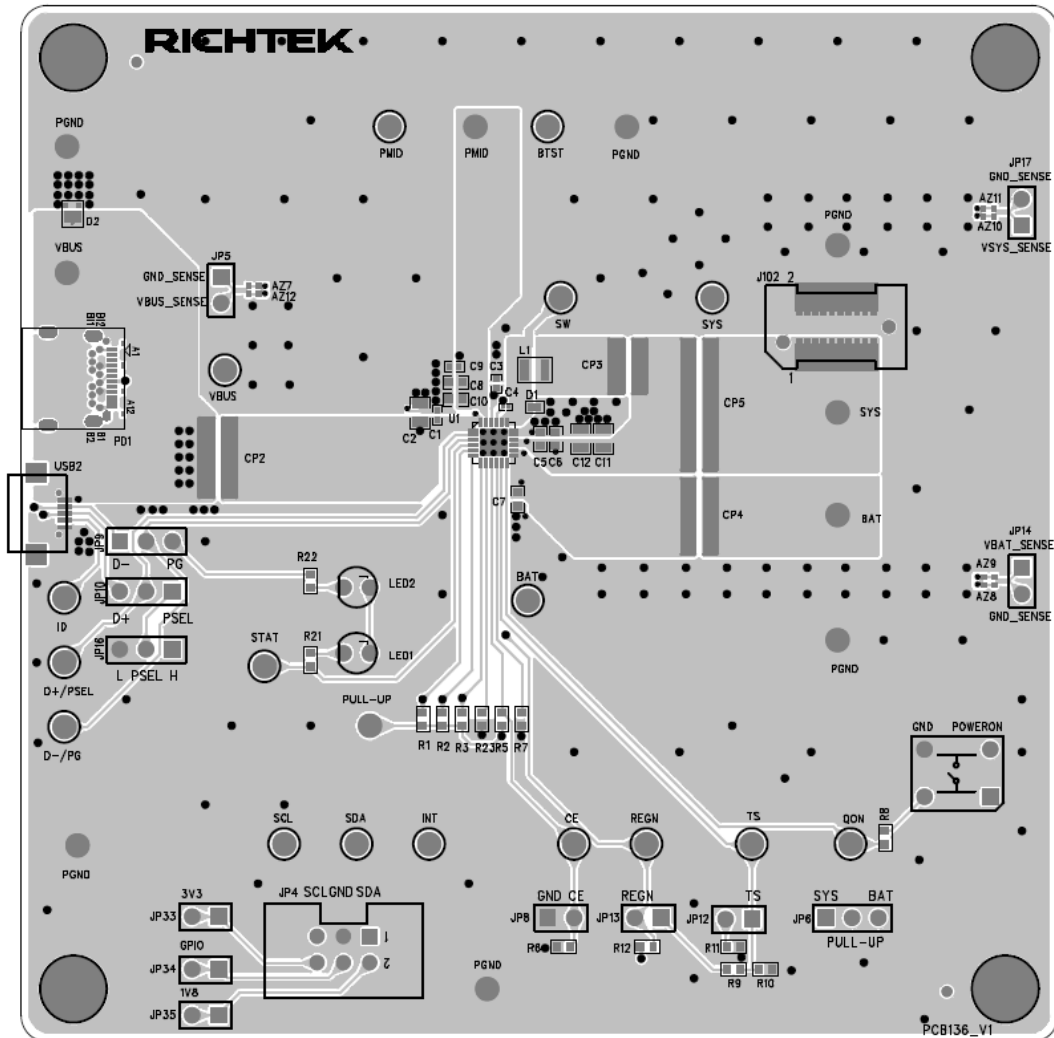


Figure 1. Top View (1st layer)

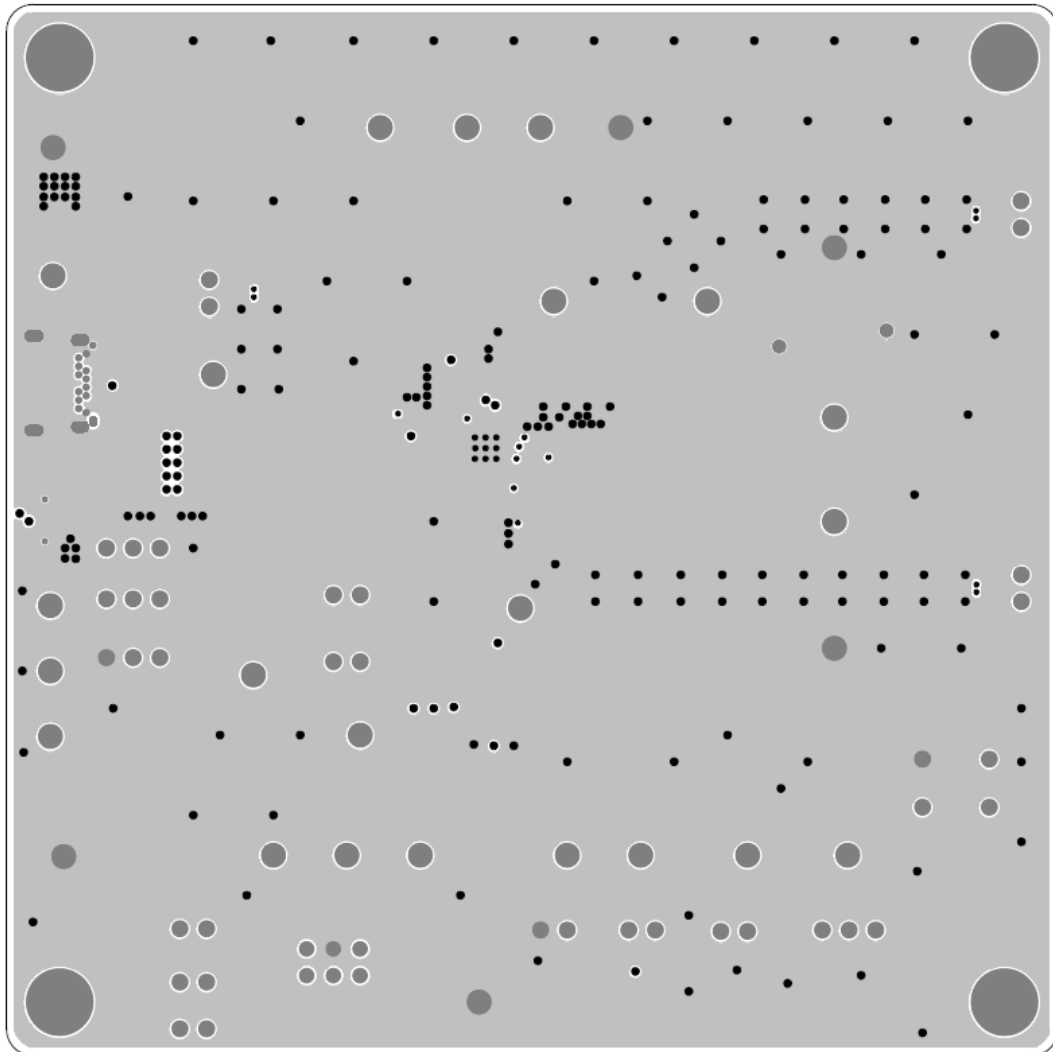


Figure 2. PCB Layout—Inner Side (2nd Layer)

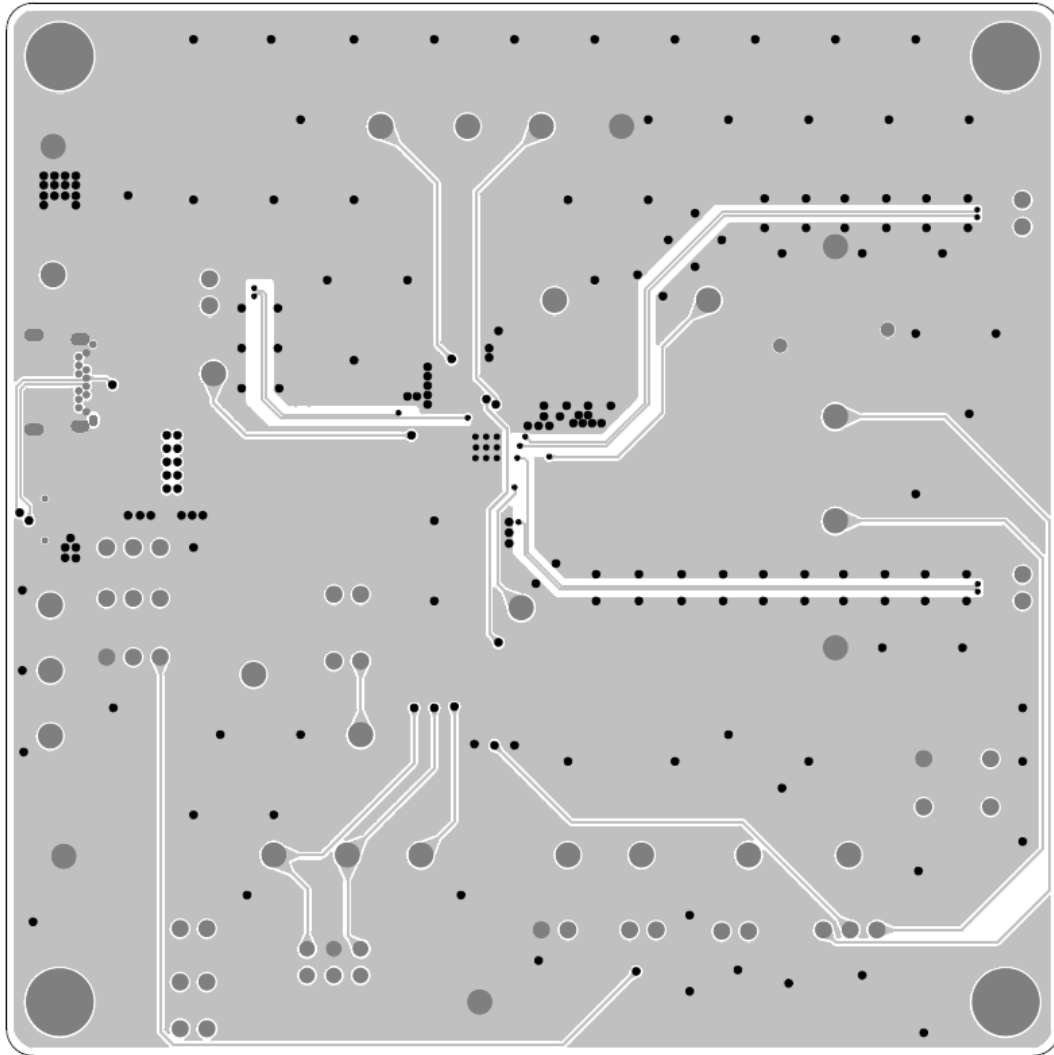


Figure 3. PCB Layout—Inner Side (3rd Layer)

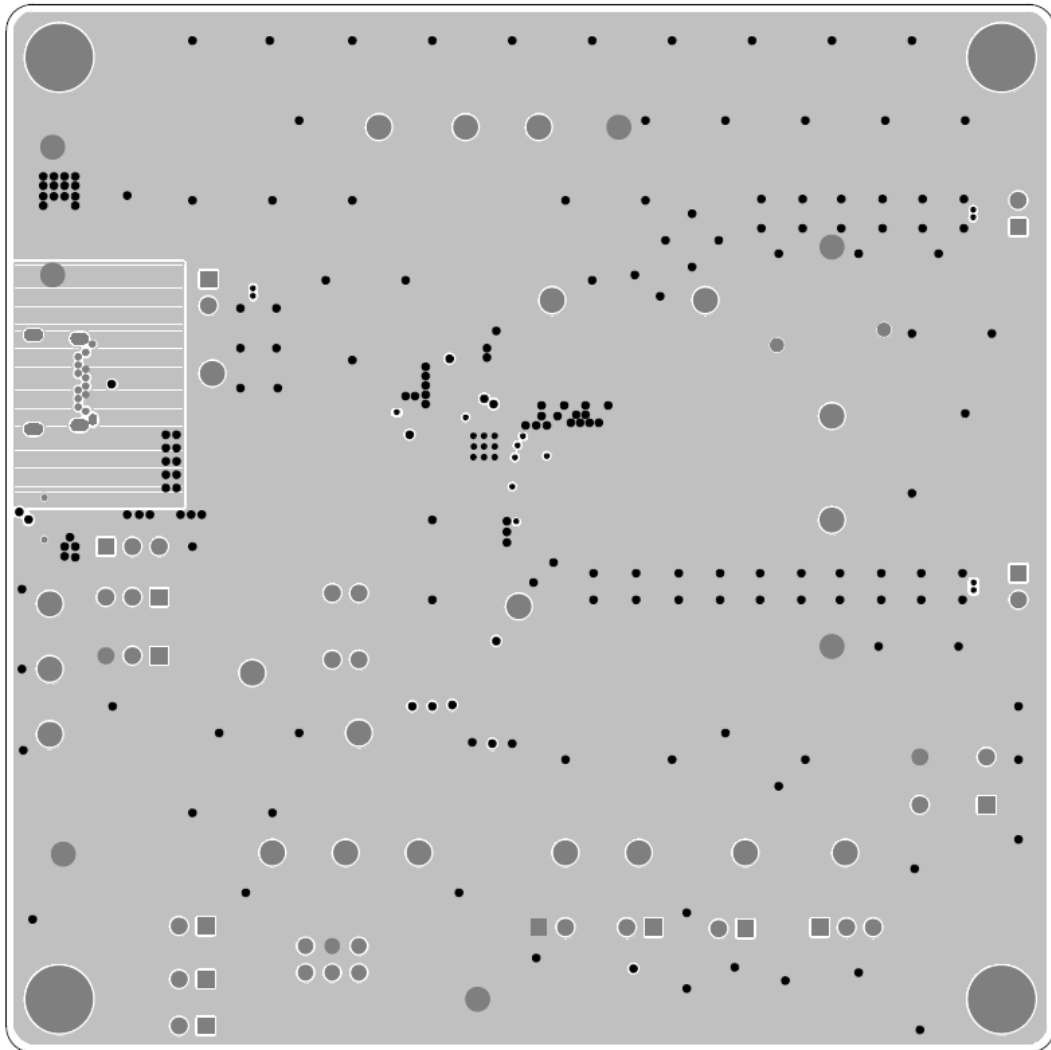


Figure 4. Bottom View (4th Layer)

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

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