

# RT5753AH, 6V<sub>IN</sub>, 3A, Synchronous Step-Down Converter Evaluation Board

## ***General Description***

The Evaluation Board demonstrates that the RT5753AH is designed for a 1.2V/3A output from a 2.5V to 6V input at a 1.2MHz switching frequency. This user's guide includes setup instructions for the hardware, a printed circuit board (PCB) layout for the EVB, a schematic diagram, a bill of materials, and test results for the EVB.

## **Table of Contents**

General Description .....	1
Performance Specification Summary .....	2
Power-up Procedure .....	2
Detailed Description of Hardware .....	3
Bill of Materials.....	4
Typical Applications .....	5
Evaluation Board Layout.....	8
More Information.....	10
Important Notice for Richtek Evaluation Board.....	10

## Performance Specification Summary

A summary of the RT5753AH Evaluation Board performance specification is provided in Table 1. The ambient temperature is 25°C.

Table 1. RT5753AH Evaluation Board Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range		2.5	--	6	V
Output Current		0	--	3	A
Default Output Voltage		--	1.2	--	V
Operation Frequency		--	1.2	--	MHz
Output Ripple Voltage	I <sub>OUT</sub> = 1.5A	--	5	--	mVp-p
Line Regulation	I <sub>OUT</sub> = 1.5A, V <sub>IN</sub> = 2.5V to 6V	--	±1	--	%
Load Regulation	V <sub>IN</sub> = 3.6V, I <sub>OUT</sub> = 0A to 3A	--	±1	--	%
Load Transient Response	I <sub>OUT</sub> = 1.5A to 3A	--	±5	--	%
Peak Efficiency	V <sub>IN</sub> = 3.6V, V <sub>OUT</sub> = 1.2V	--	89.2	--	%

## Power-up Procedure

### Suggestion Required Equipments

- RT5753AH Evaluation Board
- DC power supply capable of at least 6V and 3A
- Electronic load capable of 5A
- Function Generator
- Oscilloscope

### Quick Start Procedures

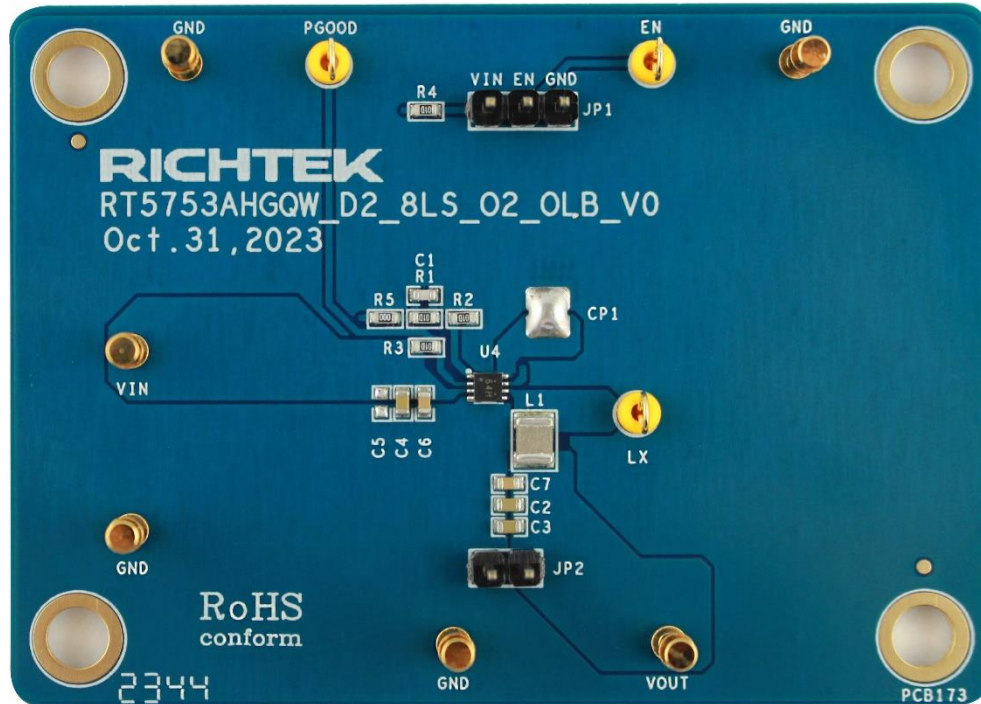
The Evaluation Board is fully assembled and tested. Follow the steps below to verify board operation. Do not turn on supplies until all connections are made. When measuring the output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the output voltage ripple by touching the probe tip and ground ring directly across the last output capacitor.

### Proper measurement equipment setup and follow the procedure below.

- 1) With power off, connect the input power supply to VIN and GND pins.
- 2) With power off, connect the electronic load between the VOUT and nearest GND pins.
- 3) Turn on the power supply at the input. Make sure that the input voltage does not exceeds 6V on the Evaluation Board.
- 4) Check for the proper output voltage using a voltmeter.
- 5) Once the proper output voltage is established, adjust the load within the operating ranges and observe the output voltage regulation, ripple voltage, efficiency and other performance.

## 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](mailto:evb_service@richtek.com).

### Test Points

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

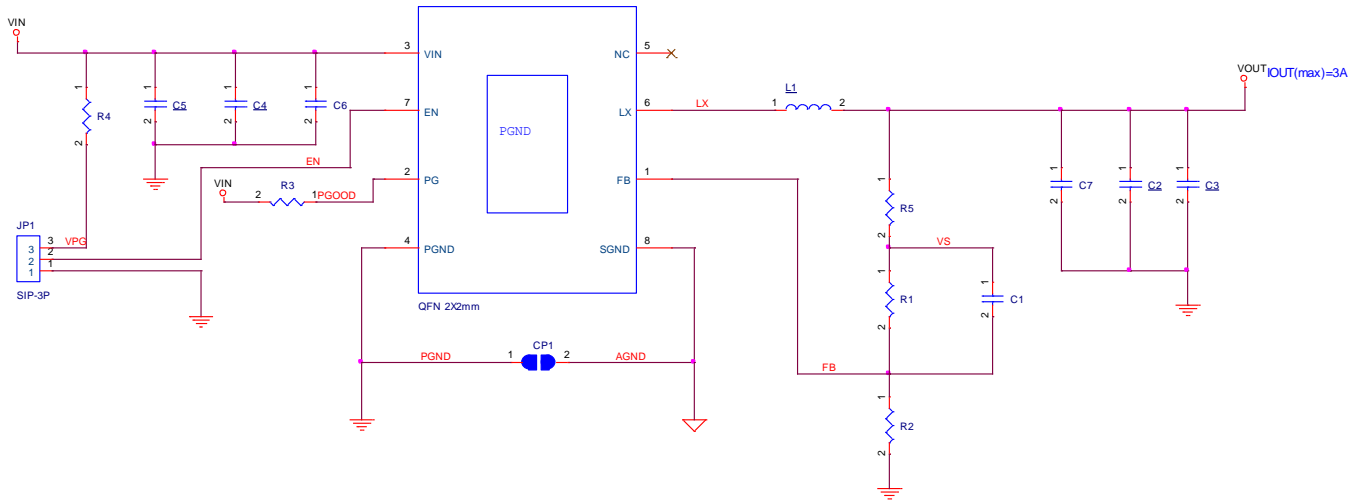
Test Point/ Pin Name	Function
<b>VIN</b>	Input voltage.
<b>VOUT</b>	Output voltage.
<b>GND</b>	Ground.
<b>EN</b>	Enable test point.
<b>JP1</b>	EN jumper. Connect EN to the ground to disable and EN to VIN to enable.
<b>LX</b>	Switch node test point.
<b>JP2</b>	Measure the VOUT waveform and output regulation.
<b>PGOOD</b>	Power-good indication test point.

**Bill of Materials**

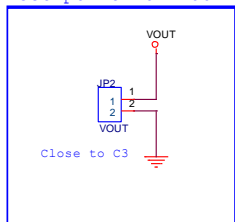
Reference	Count	Part Number	Value	Description	Package	Manufacturer
U1	1	RT5753AHGQW	RT5753AH	Step-Down Converter	WDFN-10SL 3x3	RICHTEK
C2, C3, C4	3	GRM188R60J226MEA0	22 $\mu$ F	Capacitor, Ceramic, 6.3V, X5R	0603	MURATA
C1	1	0603N220J500CT	22pF	Capacitor, Ceramic, 50V, X7R	0603	WALSIN
C6, C7	2	0603B104K500CT	0.1 $\mu$ F	Capacitor, Ceramic, 16V, X7R	0603	WALSIN
L1	1	DFE322512F-1R0M	1 $\mu$ H	Inductor, Isat = 4.8A, 32m $\Omega$	3.2x 2.5x1.2mm	MURATA
R1, R2, R3, R4	4	WR06X1003FTL	100k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R5	1	WR06X000 PTL	0	Resistor, Chip, 1/10W, 5%	0603	WALSIN

**Typical Applications**

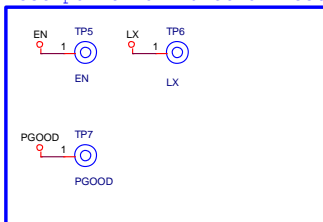
**EVB Schematic Diagram**



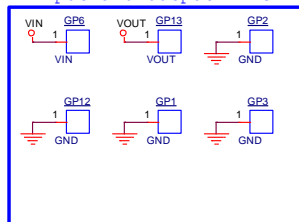
Test point for VOUT



Test point for Function Test

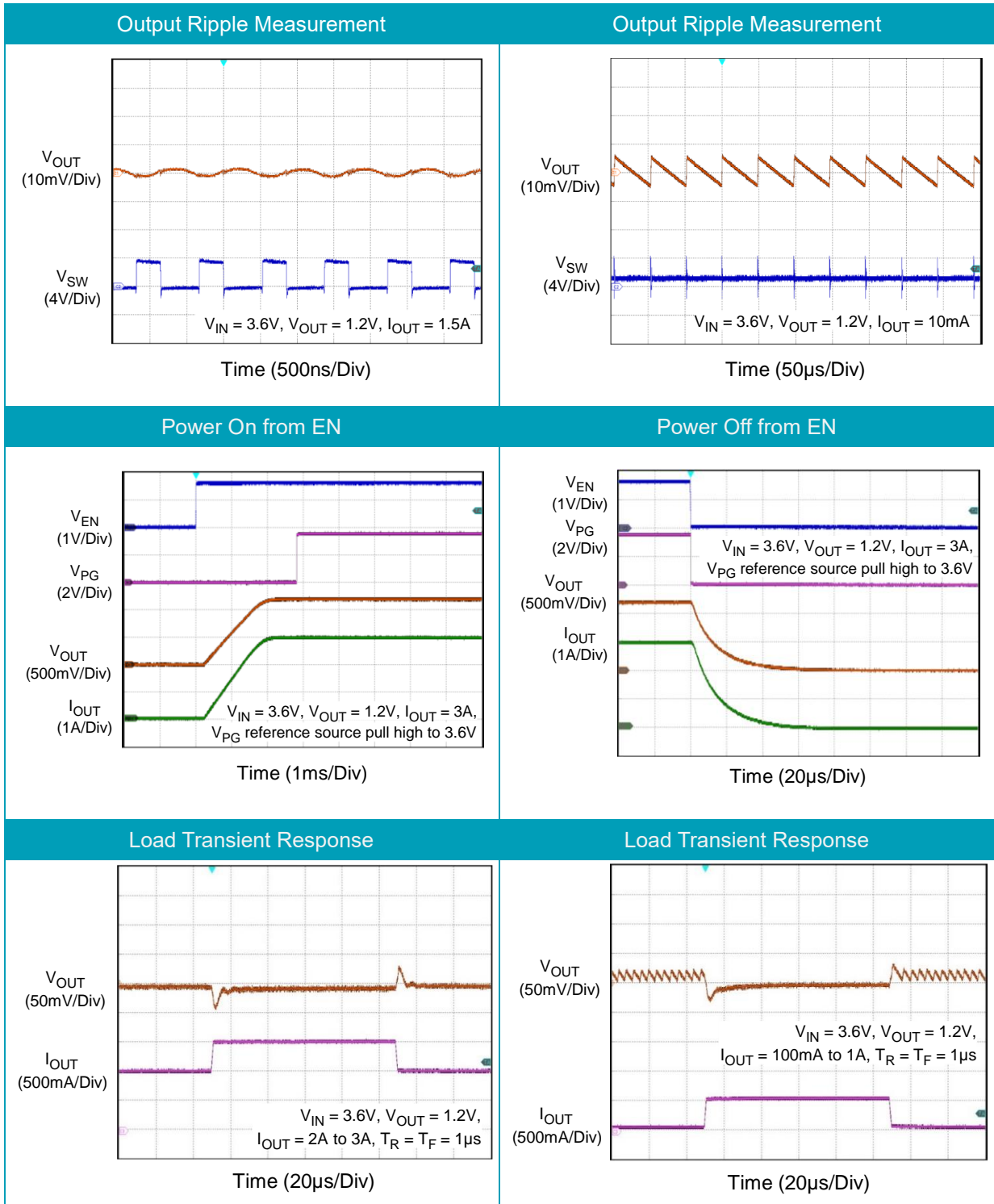


Input and Output Pins

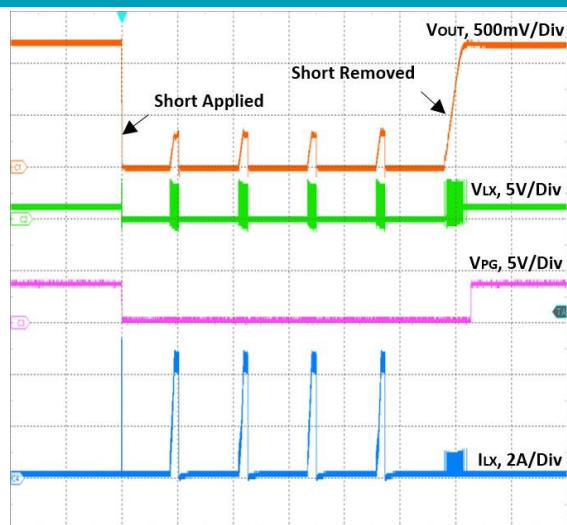


1. The capacitance values of the input and output capacitors will influence the input and output voltage ripple.
2. MLCC capacitors have degrading capacitance at DC bias voltage, and especially smaller size MLCC capacitors will have much lower capacitance.

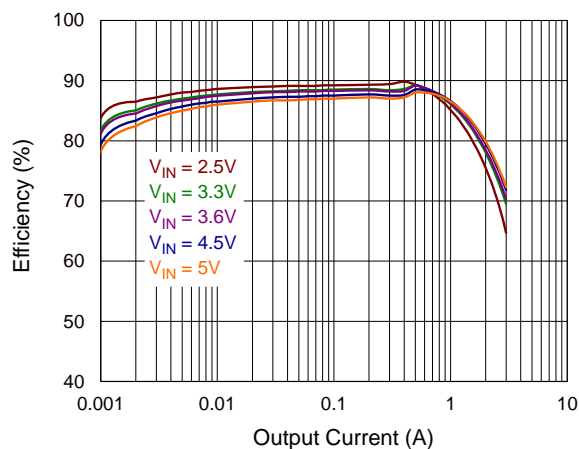
**Measure Result**



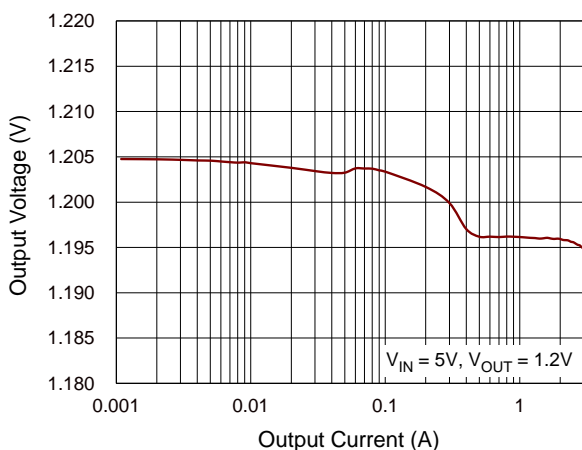
Short Circuit Response – Short and Recovery



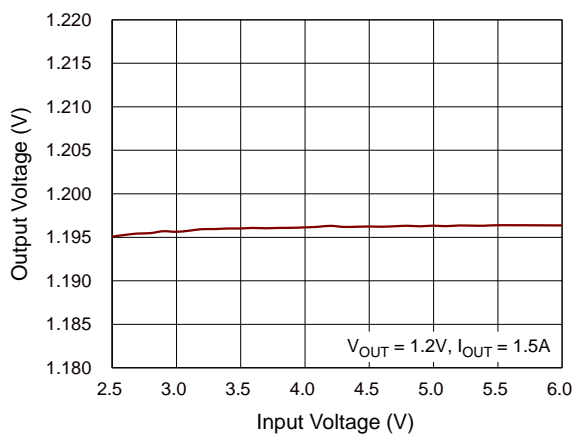
Efficiency vs. Output Current



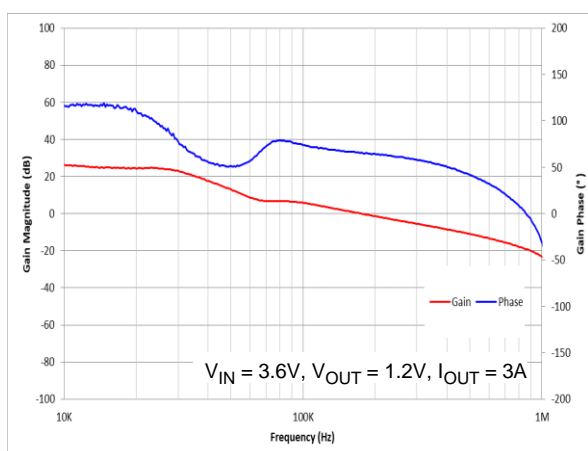
Output Voltage vs. Output Current



Output Voltage vs. Input Voltage

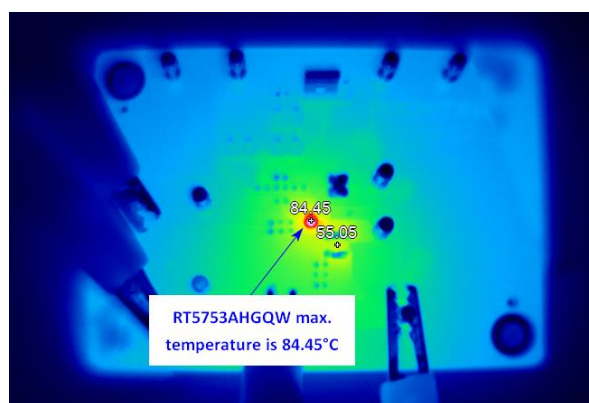


Loop Response



Thermal Image at

$V_{IN} = 3.6V, V_{OUT} = 1.2V, I_{OUT} = 3A$



Note: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the output voltage ripple by touching the probe tip directly across the output capacitor.

**Evaluation Board Layout**

Figure 1 to Figure 4 are RT5753AH Evaluation Board layout. This board size is 70mm x 50mm and is constructed on four-layer PCB, outer layers with 2 oz. Cu and inner layers with 1 oz. Cu.

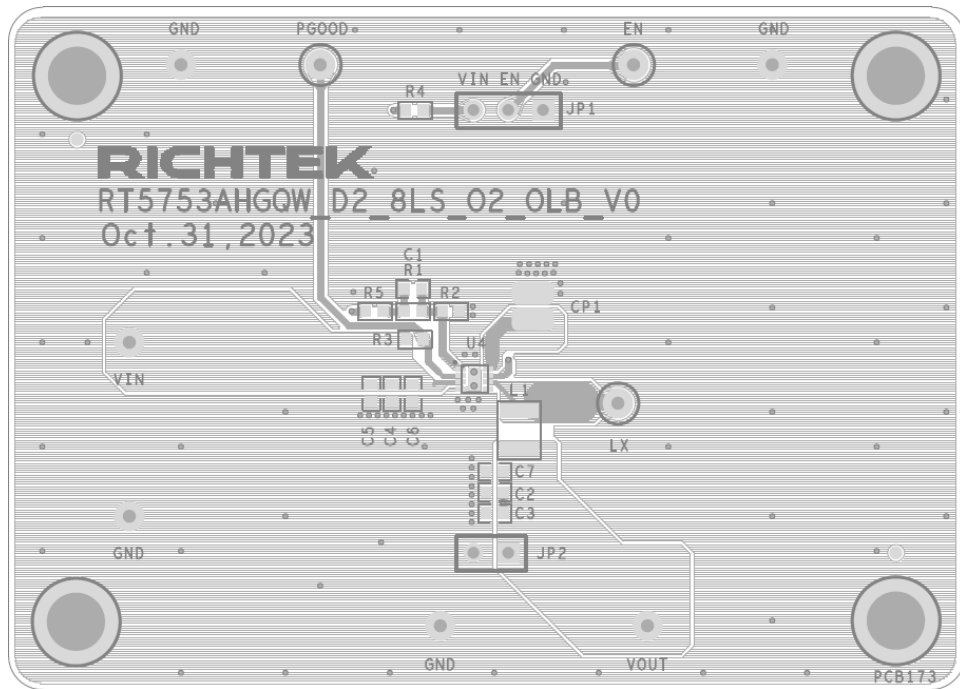


Figure 1. Top View (1<sup>st</sup> layer)

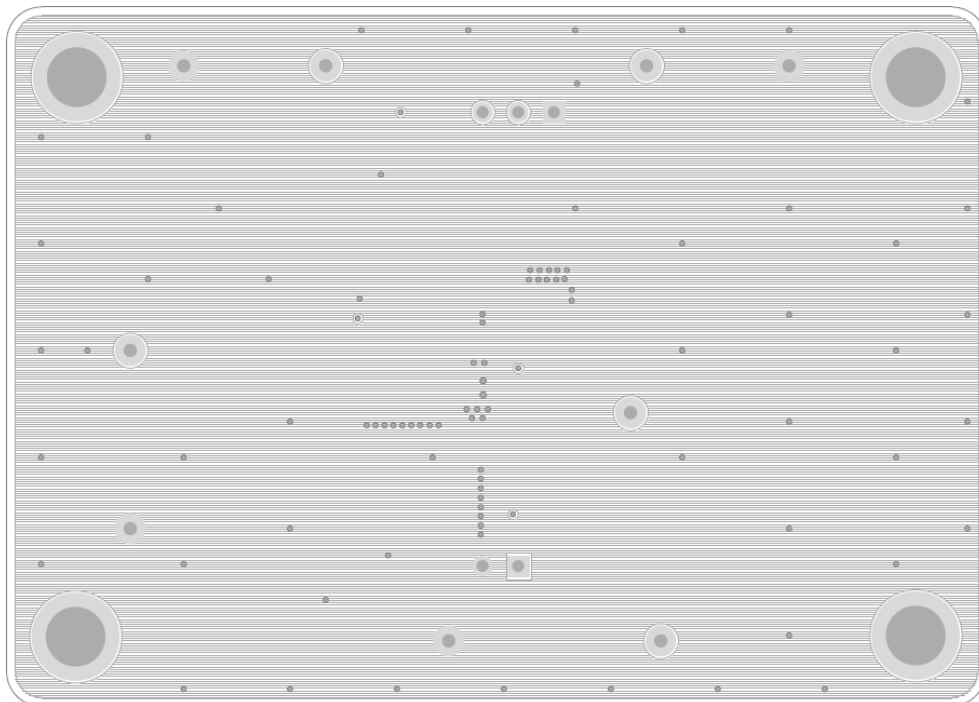


Figure 2. PCB Layout—Inner Side (2<sup>nd</sup> Layer)



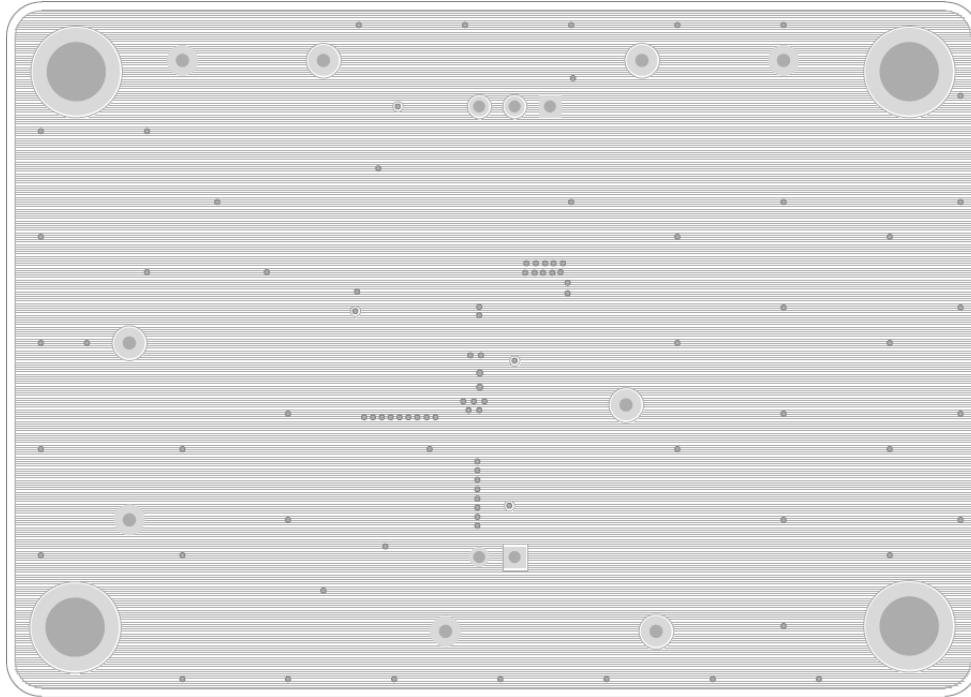


Figure 3. PCB Layout—Inner Side (3<sup>rd</sup> Layer)

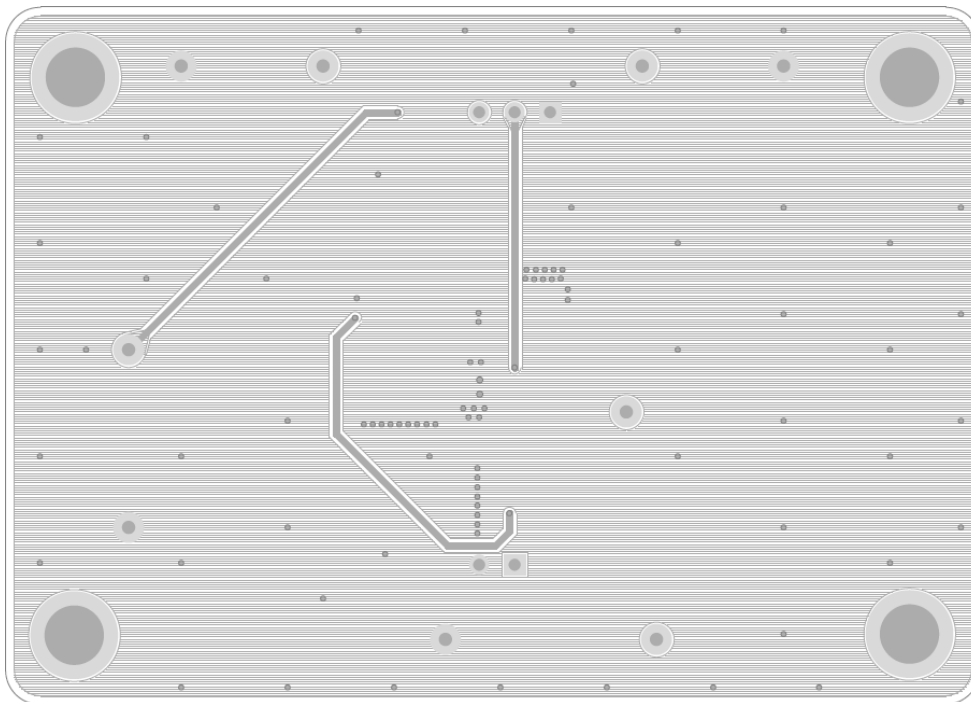


Figure 4. Bottom View (4<sup>th</sup> Layer)

### ***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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