

## 2A, 18V, 500kHz, ACOT™ Step-Down Converter

### *Purpose*

The RT6212A is a synchronous step-down converter with the input voltage range from 4.5V to 18V and provides 2A output current. This document explains the function and use of the RT6212A 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 RT6212A is a high-efficiency, monolithic synchronous step-down DC/DC converter that can deliver up to 2A output current from a 4.5V to 18V input supply. The RT6212A adopts ACOT architecture to allow the transient response to be improved and keep in constant frequency. Cycle-by-cycle current limit provides protection against shorted outputs and soft-start eliminates input current surge during start-up. Fault conditions also include output under voltage protection, output over current protection, and thermal shutdown.

### Product Feature

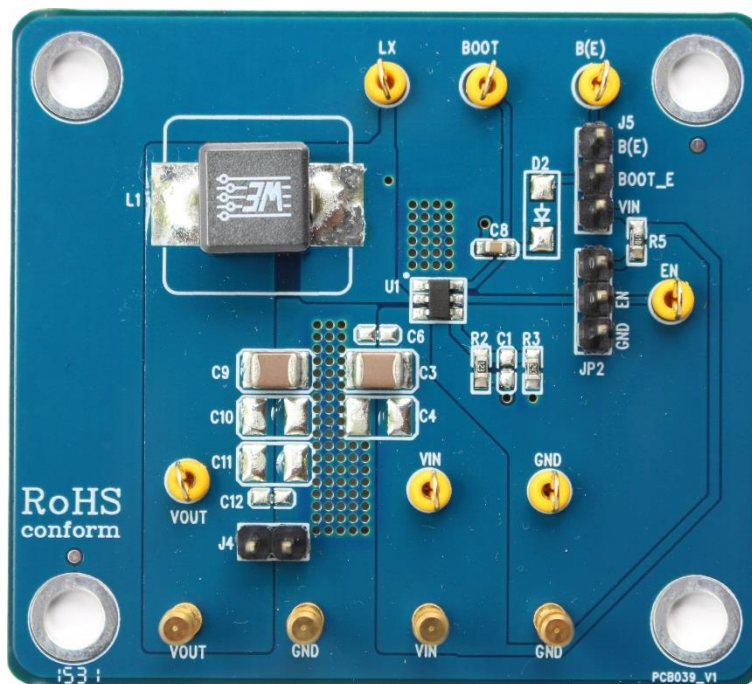
- Integrated 163mΩ/86mΩ MOSFETs
- 4.5V to 18V Supply Voltage Range
- 500kHz Switching Frequency
- ACOT Control
- 0.8V±1.5% Voltage Reference
- Internal Start-Up into Pre-biased Outputs
- Compact Package : TSOT-23-6 Pin
- Over-Current Protection and Hiccup

### Key Performance Summary Table

Key Features	Evaluation Board Number : PCB039_V1
Default Input Voltage	12V
Max Output Current	2A
Default Output Voltage	1.2V
Default Marking & Package Type	RT6212AHGJ6F, TSOT-23-6 (FC)
Operation Frequency	Fixed 500kHz

## Bench Test Setup Conditions

### Headers Description and Placement



Please carefully inspect the EVB IC and external components, comparing them to the following Bill of Materials, to ensure that all components are installed and undamaged. If any components are missing or damaged during transportation, please contact the distributor or send e-mail to [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	Signal	Comment (expected waveforms or voltage levels on test points)
<b>VIN</b>	Input voltage	Power input.
<b>EN</b>	Enable test point	Floating this pin or connecting this pin to GND can disable the device and connecting this pin to logic high can enable the device.
<b>GND</b>	Ground	System Ground. Provides the ground return path for the control circuitry and low-side power MOSFET.
<b>BOOT</b>	Bootstrap supply test point	Bootstrap Supply for High-Side Gate Driver. Connect a 0.1 $\mu$ F or greater capacitor from LX to BOOT to power the high-side switch.
<b>FB</b>	Feedback Voltage Input.	This pin is used to set the desired output voltage via an external resistive divider. The feedback voltage is 0.8V typically.
<b>LX</b>	Switch node test point	LX is the switching node that supplies power to the output and connect the output LC filter from LX to the output load.

### ***Power-up & Measurement Procedure***

1. Apply a 12V nominal input power supply ( $4.5V < V_{IN} < 18V$ ) to the VIN and GND terminals.
2. Set the jumper at JP2 to connect terminals 2 and 3, connecting EN to enable operation.
3. Verify the output voltage (approximately 1.2V) between VOUT and GND.
4. Connect an external load up to 2A to the VOUT and GND terminals and verify the output voltage and current.

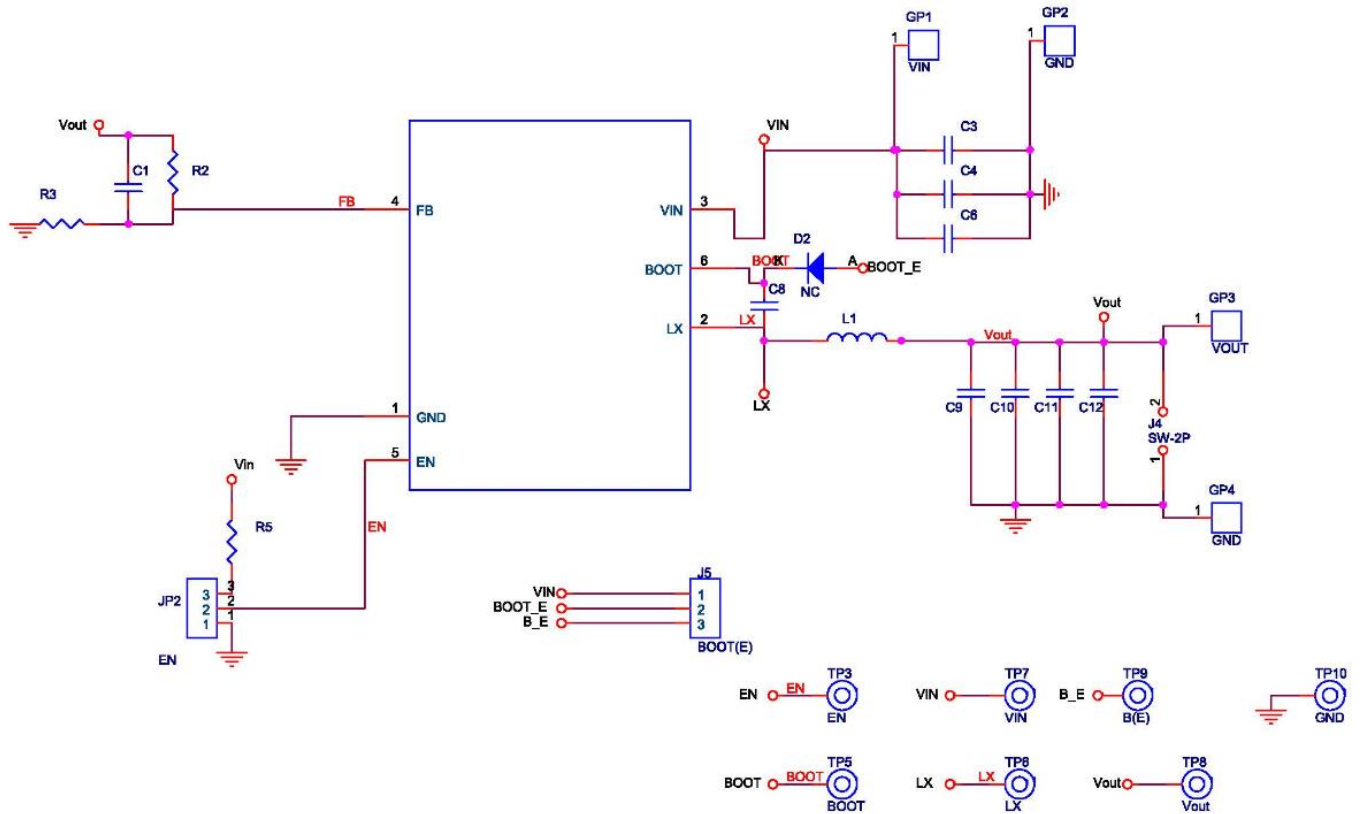
### ***Output Voltage Setting***

Set the output voltage with the resistive divider (R2, R3) between VOUT and GND with the midpoint connected to FB. The output is set by the following formula :

$$V_{OUT} = 0.8 \times \left(1 + \frac{R2}{R3}\right)$$

**Schematic, Bill of Materials & Board Layout**

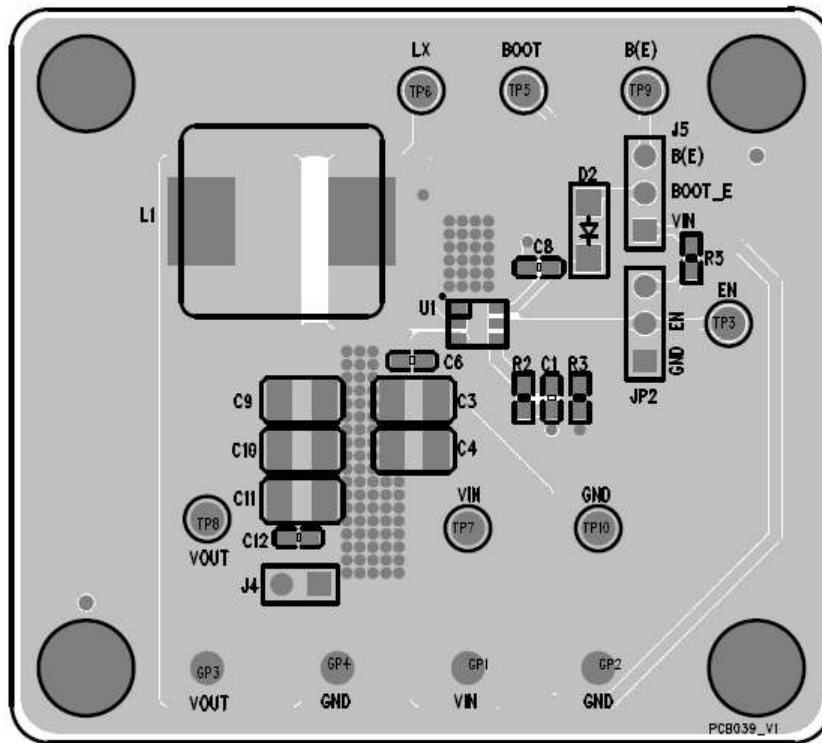
**EVB Schematic Diagram**



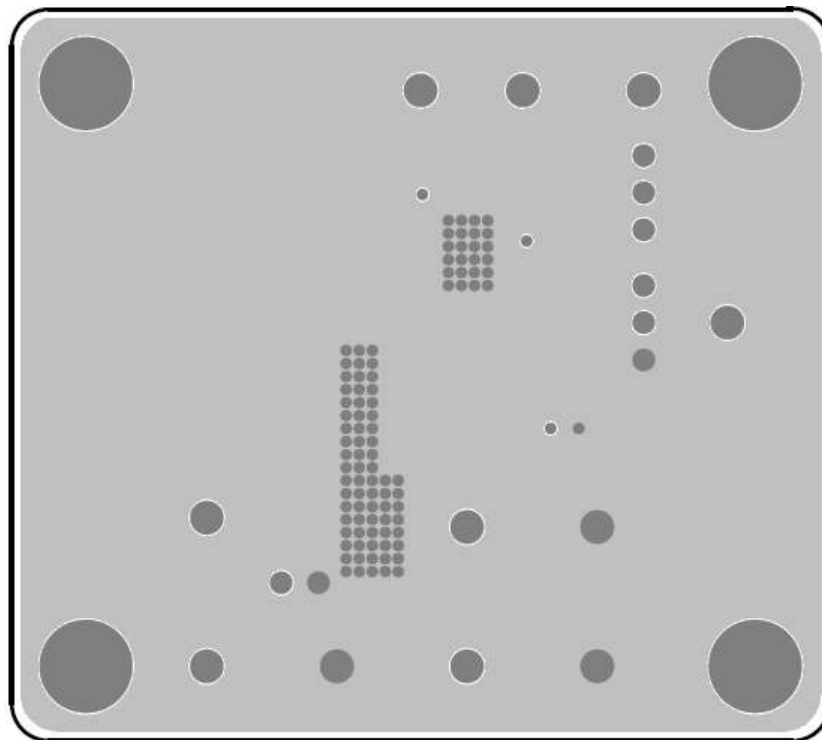
**Bill of Materials**

Reference	Qty	Part Number	Description	Package	Manufacture
U1	1	RT6212AHGJ6F	DC/DC Converter	TSOT-23-6 (FC)	RICHTEK
C3, C9	2	C3225X5R1E226MT	22 $\mu$ F/25V/X7R	C-1210	TDK
C8	1	C1608X7R1H104K080AA	0.1 $\mu$ F/ $\pm$ 10%/50V/X7R	C-0603	TDK
C1, C4, C6, C10, C11, C12, D2	7		N/A		
R2	1		12k $\Omega$	R-0603	
R3	1		24k $\Omega$	R-0603	
R5	1		100k $\Omega$	R-0603	
L1	1	7443340220	2.2 $\mu$ H/12.5A	8.4 x 7.9 x 7.2 mm	WE

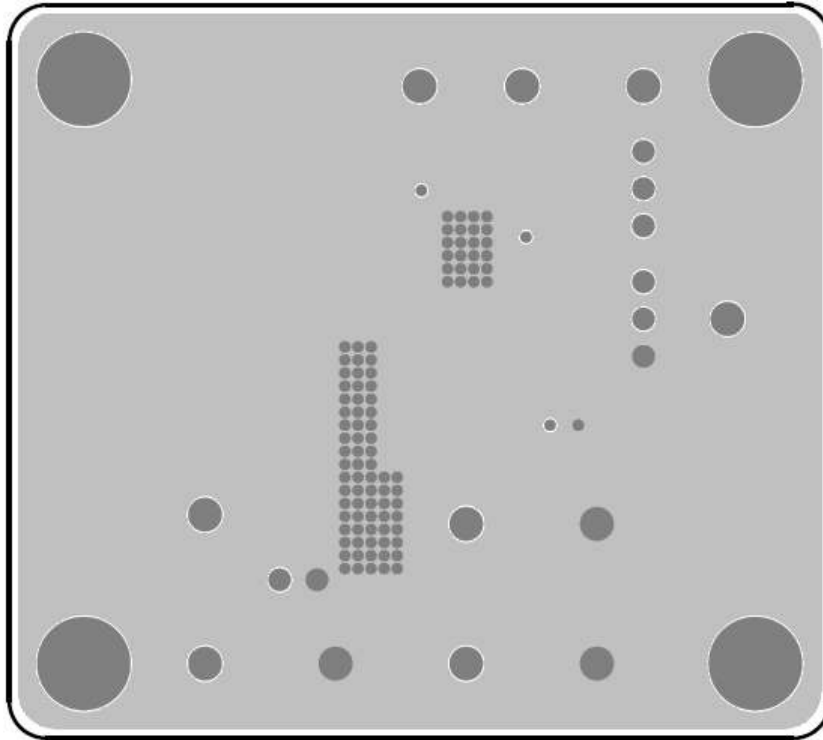
**PCB Layout**



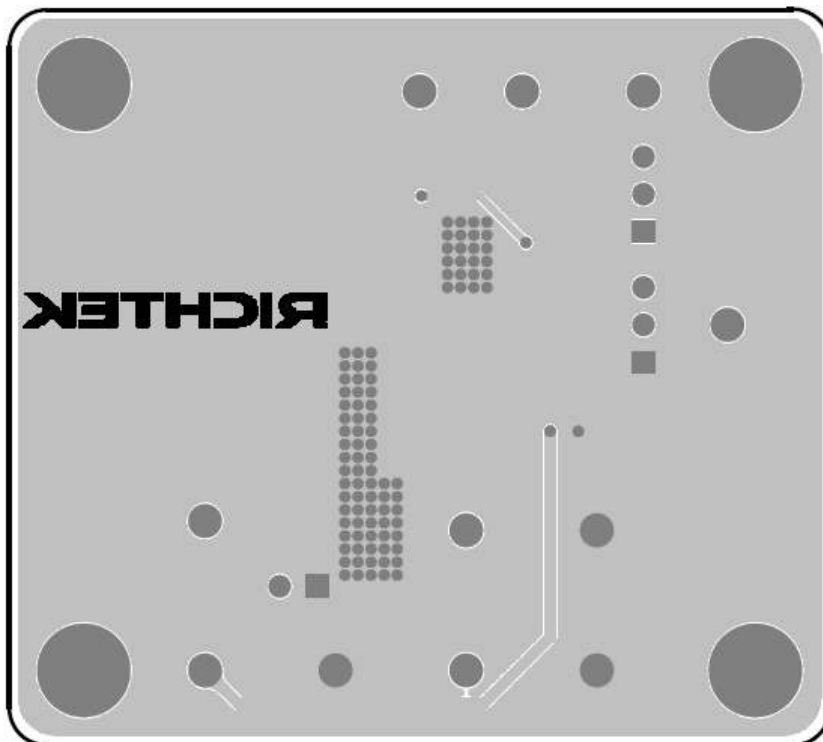
Top View (1<sup>st</sup> layer)



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



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



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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