

2A, 5.5V, Low I_Q ACOT Synchronous Step-Down Converter

Purpose

The RT5795A is an Advanced Constant-On-Time (ACOT) synchronous step-down converter with the input voltage range from 2.5V to 5.5V and provides 2A output current. This document explains the function and use of the RT5795A evaluation board (EVB), and provides information to enable operation, modification of the evaluation board and circuit to suit individual requirements.

Table of Contents

Purpose.....	1
Introduction	2
Key Performance Summary Table	2
Bench Test Setup Conditions.....	3
Schematic, Bill of Materials & Board Layout.....	5
More Information.....	7
Important Notice for Richtek Evaluation Board.....	7

Introduction

General Product Information

The RT5795A is a full featured 5.5V, 2A, Advanced Constant-On-Time (ACOT) synchronous step-down converter with two integrated MOSFETs. The advanced COT operation allows transient responses to be optimized over a wide range of loads, and output capacitors to efficiently reduce external component count. The RT5795A provides up to 2.7MHz switching frequency to minimize the size of output inductor and capacitors.

Product Feature

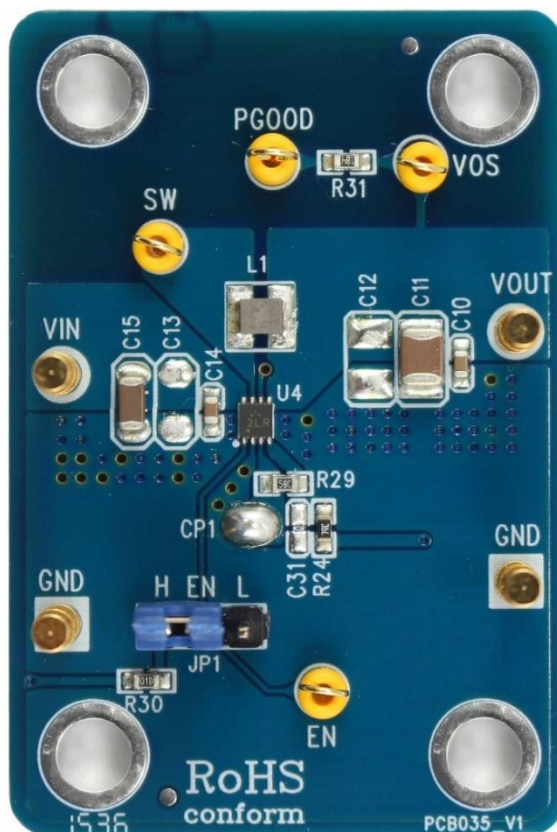
- 2.5V to 5.5V Input Voltage Range
- Advanced COT Control loop design
- Fast Transient Response
- Internal 100m Ω and 80m Ω Synchronous Rectifier
- Highly Accurate V_{OUT} Regulation Over Load/Line Range
- Robust Loop Stability with Low-ESR C_{OUT}

Key Performance Summary Table

Key Features	Evaluation Board Number : PCB035_V1
Default Input Voltage	3.3V
Max Output Current	2A
Default Output Voltage	1.2V
Default Marking & Package Type	RT5795AGQW, WDFN-8SL 2x2
Operation Frequency	Fixed 2.7MHz

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

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)
VIN	Input voltage	Power input supply voltage, 2.5V to 5.5V.
EN	Enable test point	Enable control input. Pull high to enable.
PGOOD	Power Ground	The exposed pad must be soldered to a large PCB and connected to GND for maximum thermal dissipation.
AGND	Analog Ground	Should be electrically connected to GND close to the device.
PGND	Power Ground	The exposed pad must be soldered to a large PCB and connected to PGND for maximum power dissipation.
VOS	No internal connection	Output voltage sense pin for the Internal Control Loop. Must be connected to output.
FB	Feedback test point	Feedback voltage input.
LX	Switch node test point	Switch node. The source of the internal high-side power MOSFET, and drain of the internal low-side (synchronous) rectifier MOSFET.

Power-up & Measurement Procedure

1. Apply a 12V nominal input power supply ($2.5V < V_{IN} < 5.5V$) to the VIN and GND terminals.
2. Set the jumper at JP1 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.

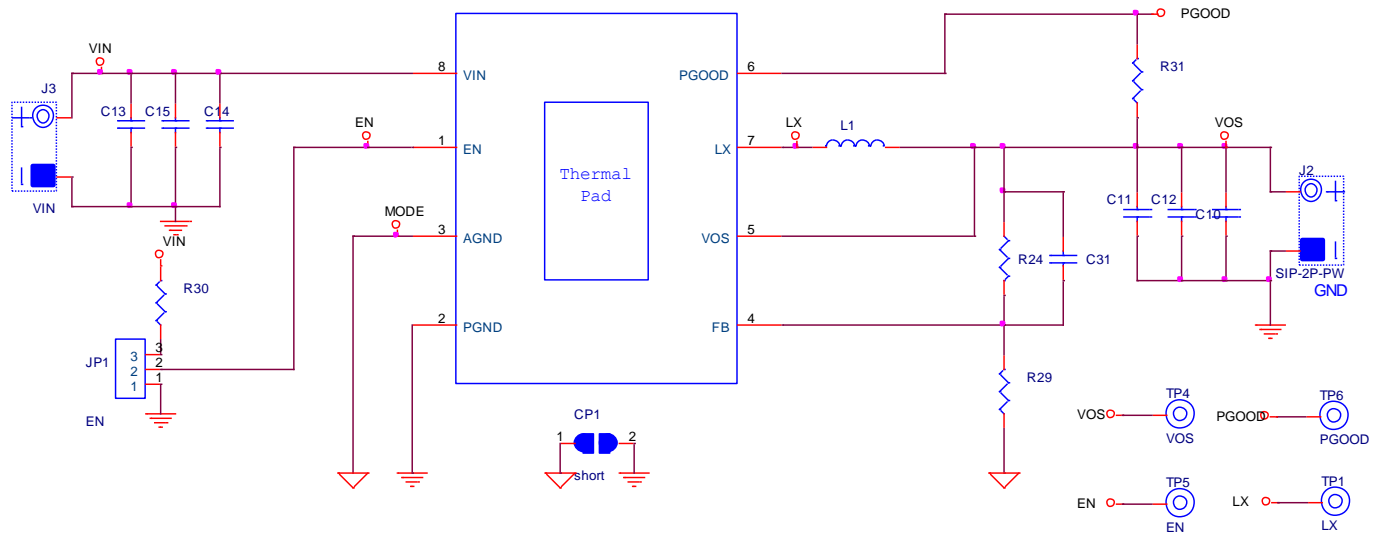
Output Voltage Setting

Set the output voltage with the resistive divider (R24, R29) between VOUT and GND with the midpoint connected to FB. The output is set by the following formula :

$$V_{OUT} = 0.8 \times \left(1 + \frac{R1}{R2}\right) V_{OUT} = 0.45 \times \left(1 + \frac{R24}{R29}\right)$$

Schematic, Bill of Materials & Board Layout

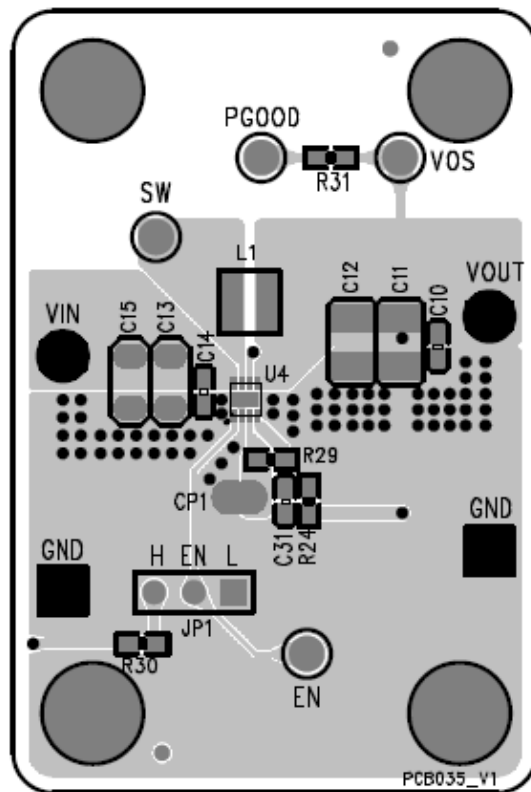
EVB Schematic Diagram



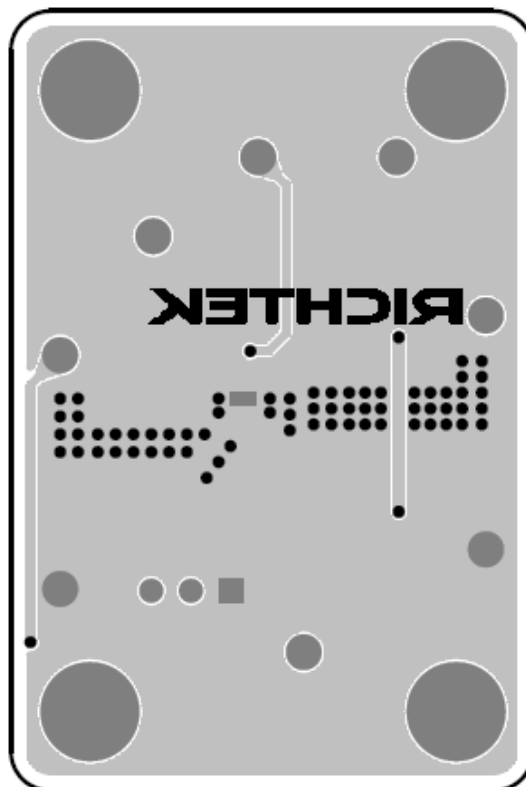
Bill of Materials

Reference	Qty	Part Number	Description	Package	Manufacture
U4	1	RT5795AGQW	DC/DC Converter	WDFN-8SL 2x2	RICHTEK
C12, C13, C31	3		NC		
C10, C14	2	C1608X7R1H104KT000N	0.1μF/±10%/50V/X7R	C-0603	TDK
C11	1	GRM31CR61A226KE19L	22μF/10V/X5R	C-1206	MURATA
C15	1	GRM31CR71E106KA12L	10μF/25V/X7R	C-1206	MURATA
L1	1	PIFE25201T-R47MS	0.47μH	2.5 x 2.0 mm	CYNTEC
R24	1		65.3kΩ	R-0603	
R29	1		39.2k	R-0603	
R30	1		100k	R-0603	
R31	1		180k	R-0603	

PCB Layout



Top View



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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