

RT2805A Step-Down Converter Evaluation Board

Purpose

The RT2805A is a current mode asynchronous step-down converter that achieves excellent load and line regulation. This document explains the function and use of the RT2805A evaluation board (EVB) and provides information to enable operation and modification of the evaluation board and circuit to suit individual requirements.

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Introduction

General Product Description

The RT2805A is a current mode asynchronous step-down converter that achieves excellent load and line regulation. Over a wide input voltage range from 5.5V to 36V and supports output current up to 5A. The Current mode operation provides fast transient response and eases loop stabilization. An adjustable soft-start reduces the stress on the input source at start up. In shutdown mode, the regulator draws only 25 μ A of supply current. The RT2805A requires a minimum number of readily available external components, providing a compact solution. The RT2805A provides protection functions including input under voltage lockout, cycle-by-cycle current limit, short circuit protection and thermal shutdown protection. The RT2805A is available in the SOP-8 (Exposed Pad) package.

Product Features

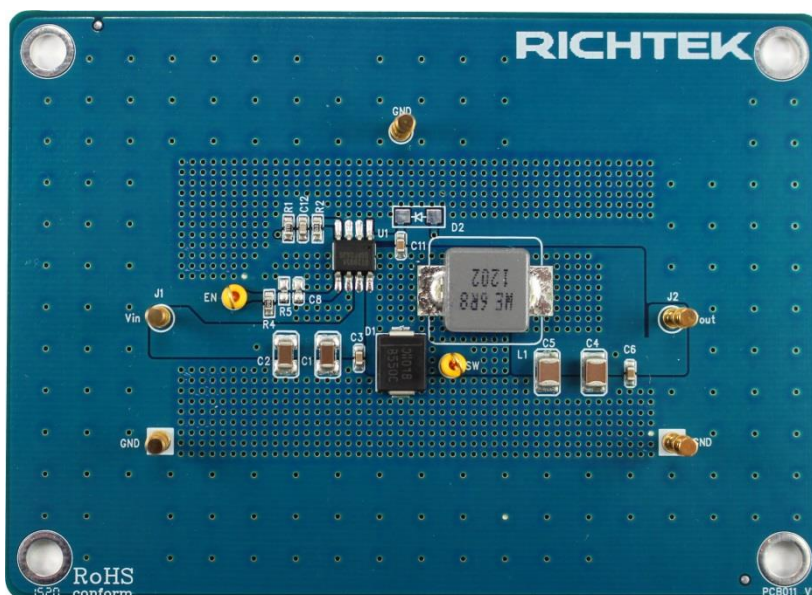
- **5A Output Current**
- **Wide Operating Input Range 5.5V to 36V**
- **Adjustable Output Voltage from 1.222V to 26V**
- **High Efficiency up to 90%**
- **Internal Compensation Minimizes External Parts Count**
- **Internal Soft-Start**
- **110m Ω Internal Power MOSFET Switch**
- **25 μ A Shutdown Mode**
- **Fixed 500kHz Frequency**
- **Thermal Shutdown**
- **Cycle-by-Cycle Current Limit**
- **Available In an SOP-8 (Exposed Pad) Package**
- **RoHS Compliant and Halogen Free**

Application

- **Distributive Power Systems**
- **Battery Charger**
- **DSL Modems**
- **Pre-regulator for Linear Regulators**

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 | Input voltage range = 5.5V to 36V |
| VOUT | Output voltage | Output voltage = 2.4V |
| SW | Switch Node | |
| EN | Chip Enable Operation | The EN pin is externally pulled to High by adding a 100kΩ resistor (R4) from the VIN pin in this EVB setting. For another enable operation, the converter is turned on when the EN pin is higher than 1.4V and turned off when the EN pin is lower than 0.4V. |
| GND | Ground | Ground |

Power-up & Measurement Procedure

1. Connect input power ($5.5V < V_{IN} < 36V$) and input ground to VIN and GND pins respectively.
2. Connect positive end and negative end of load to VOUT and GND of output pins respectively.
3. The output voltage of (V_{OUT}) can be set by R1 and R2.

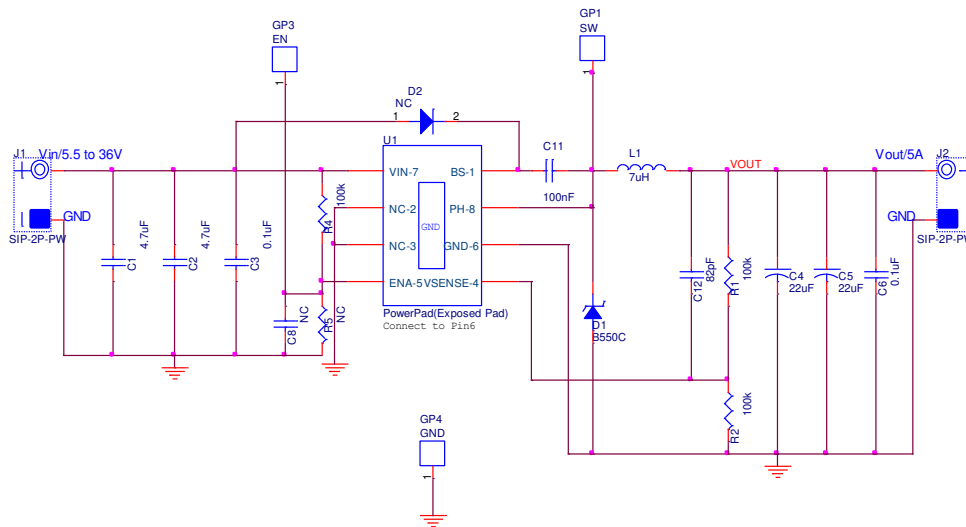
$$V_{OUT} = V_{REF} * (1 + R1 / R2)$$

where $V_{REF} = 1.222V$ (typ.)

Specification

| Parameter | Symbol | Min | Typ. | Max | Units |
|----------------------|------------------|-----|------|-----|-------|
| Input Voltage Range | V _{IN} | 5.5 | | 36 | V |
| Output Voltage | V _{OUT} | | 2.4 | | V |
| Oscillator Frequency | f _{OSC} | 400 | 500 | 600 | kHz |
| Output Current | I _{OUT} | | | 5 | A |
| Current Limit | I _{LIM} | 6 | 7.5 | 9 | A |

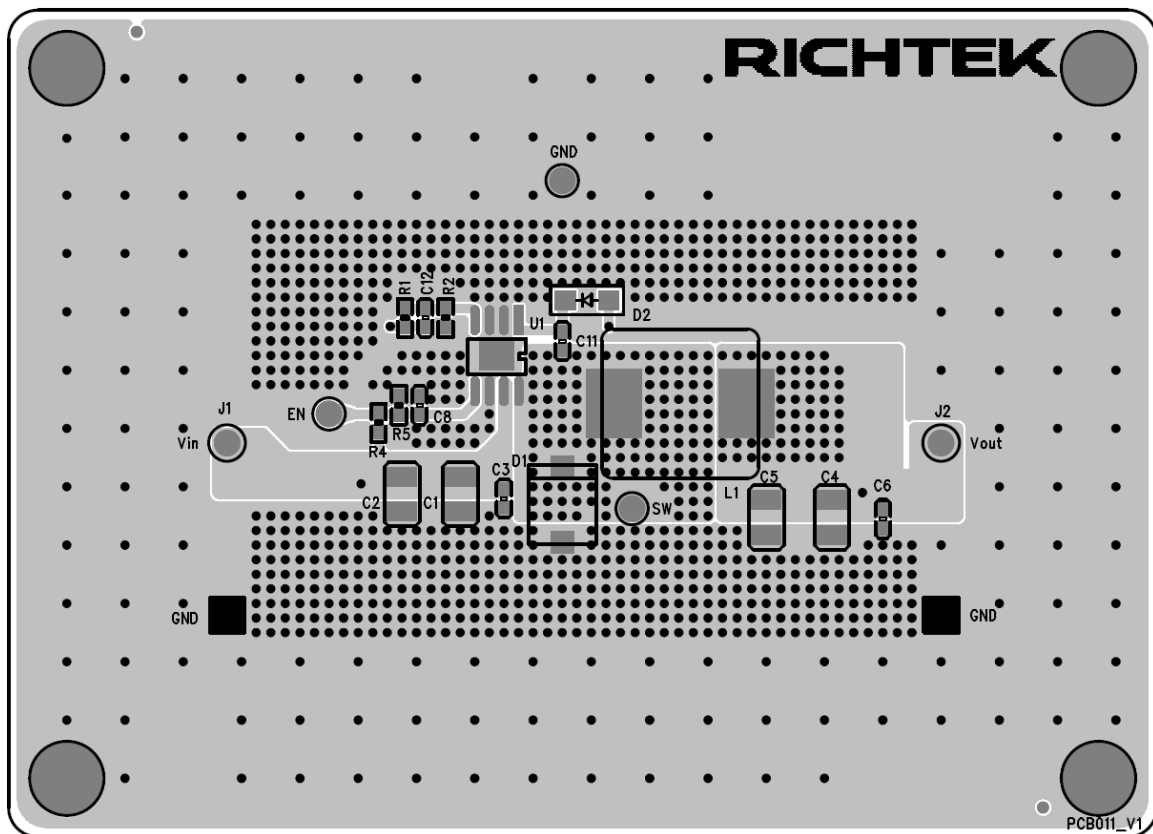
Schematic



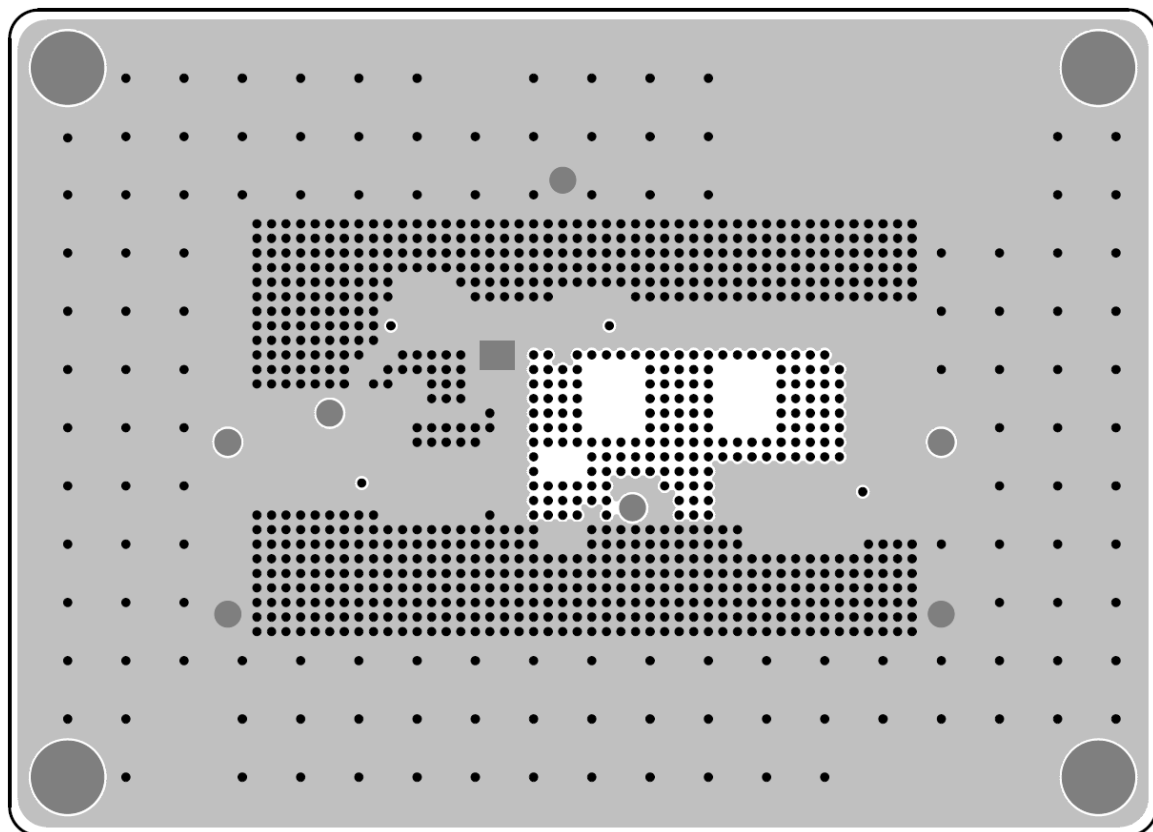
BOM

| Reference | Q'ty | P/N | Description | Package | Manufacture |
|-------------|------|---------------------|----------------------------------|-----------------|-------------|
| U1 | 1 | RT2805AGSP | Step-down converter | SOP-8 | RICHTEK |
| C1, C2 | 2 | GRM32ER71H475K | 4.7µF/50V/X7R | C-1210 | MURATA |
| C3, C6, C11 | 3 | C1608X7R1H104K080AA | 0.1µF/±10%/50V/X7R | C-0603 | TDK |
| C4, C5 | 2 | GRM32ER61C226KE20 | 22µF/±10%/16V/X5R | C-1210 | MURATA |
| C12 | 1 | | 82pF | C-0603 | |
| L1 | 1 | 74437368068 | 6.8µH, 6A, ±20%, DCR = 23.3mΩ | 10 x 10 x 3.8mm | WE-LHMI |
| D1 | 1 | B550C | 50V/5A | | DIODES |
| R1, R2, R4 | 3 | | 100k | R-0402 | |
| C8, R5 | 2 | | NC | | |

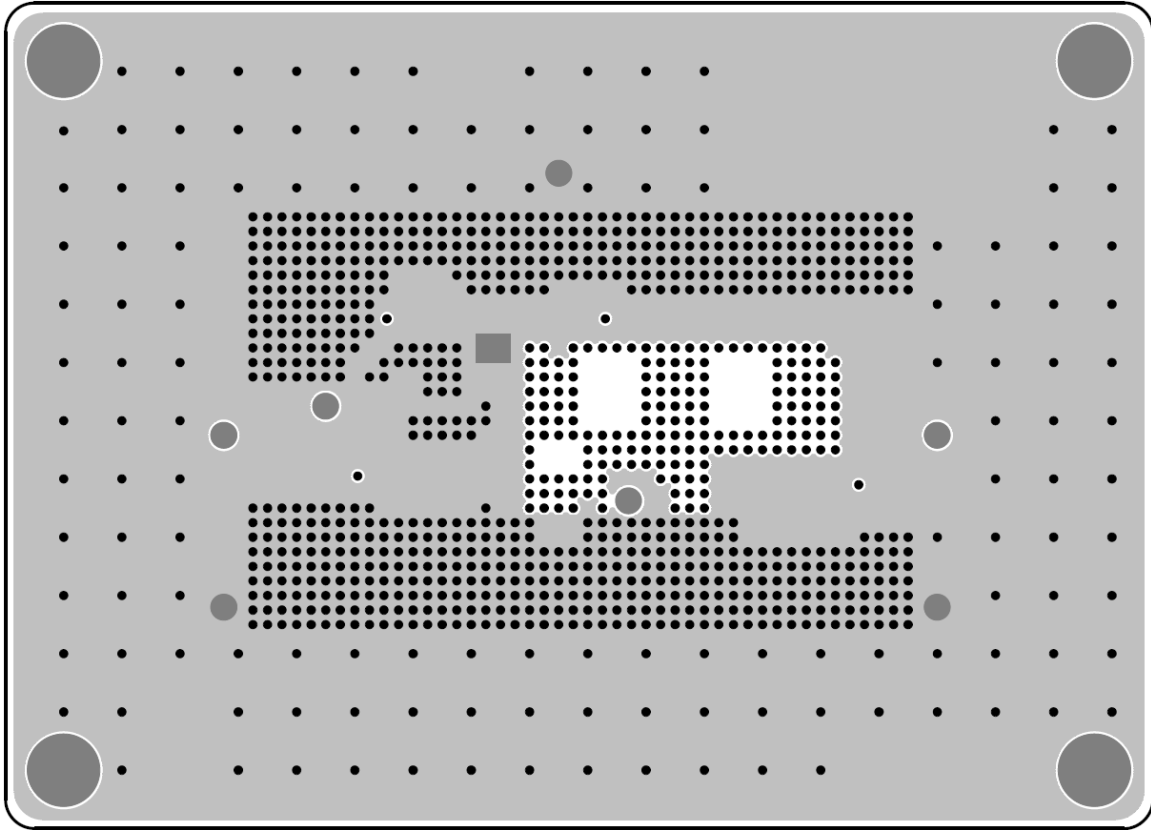
PCB Layout



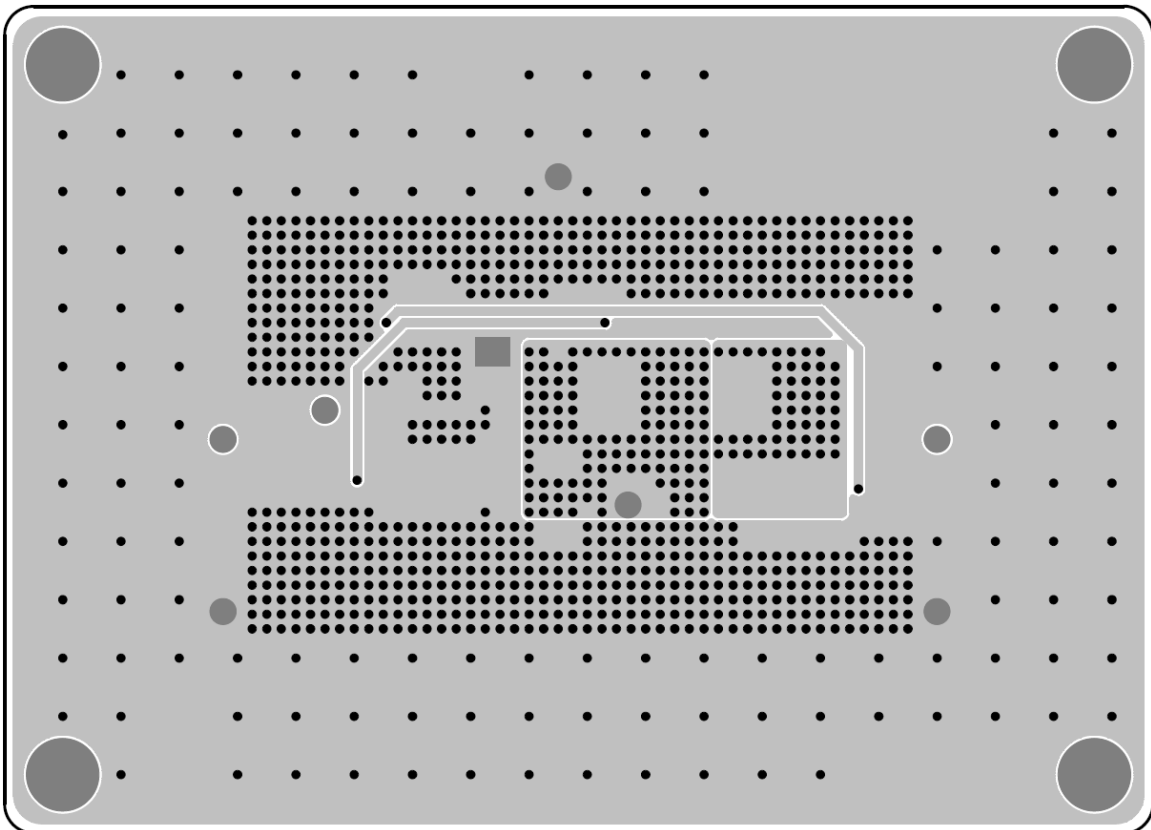
PCB Layout (1st layer)



PCB Layout (2nd layer)

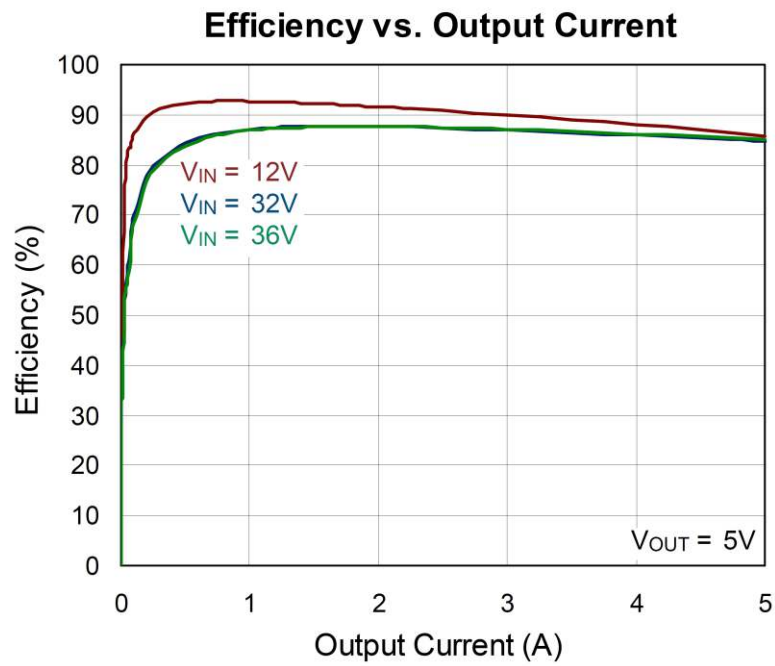


PCB Layout (3rd layer)



PCB Layout (4th layer)

Step-Down Converter Efficiency Test



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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