

RTKA808015DE0000BU

The RTKA808015DE0000BU evaluation board is a 5A synchronous buck regulator with an input range of 2.7V to 5.5V. The board evaluates the performance of the [RAA808015A](#) high-efficiency low BOM count Sync Buck Regulator with 5A output current.

The RAA808015 is offered in a QFN 2x2.5 package with 0.8mm maximum height. The converter occupies 1.516cm² area.

Specifications

This board is optimized for the following operating conditions:

- Input voltage: 2.7V ~ 5.5V_{DC}
- Output voltage: 1.2V_{DC}
- Output current: 5A max
- Output power: 6W
- Efficiency: >82% at 100% load $V_{IN} = 5V$
- High switching frequency: 1.8MHz
- Load regulation: +0.5% at 25°C
- Operating temperature: -40°C to 85°C
- Board dimension: 76.2mm x 63.5mm

Key Features

- 2.7V to 5.5V operating input range
- Continuous output current up to 5A
- 20mΩ and 16mΩ internal power MOSFET switches
- Output adjustable from 0.6V
- 100% duty cycle in dropout
- High switching frequency (1.8MHz)
- Fixed Soft Start time
- Cycle-by-cycle overcurrent protection
- OCP and SCP with Hiccup mode
- Input Undervoltage Lockout (UVLO)
- Over-temperature protection
- EN for power sequencing

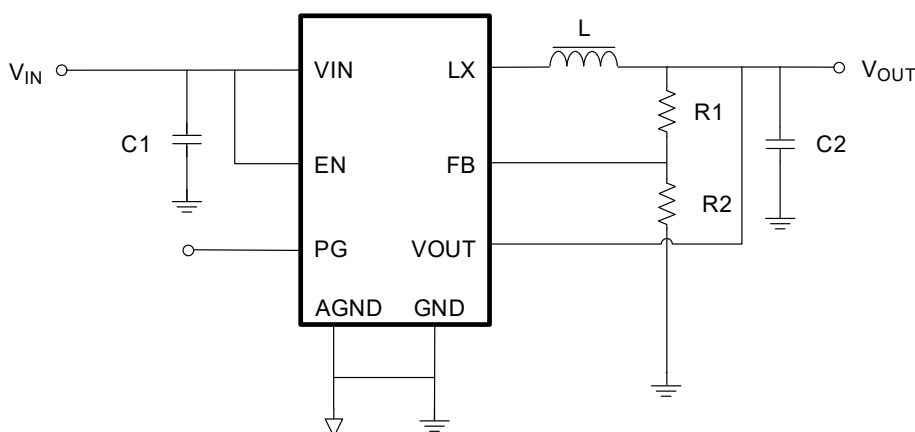


Figure 1. RTKA808015DE0000BU Block Diagram

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1. Functional Description

1.1 Recommended Equipment

The following materials are recommended to perform testing:

- 0V to 6V power supply with at least 20A source current capability
- Electronic loads capable of sinking current up to 15A
- Digital multimeters (DMMs)
- 100MHz quad-trace oscilloscope
- Signal generator

1.2 Quick Start Guide

1. Ensure that the circuit is correctly connected to the supply and loads before applying any power.
2. Connect the bias supply to VIN, the plus terminal to VIN (P4) and the negative return to GND (P5).
3. Turn on the power supply (Recommend $V_{INmax} = <5.5V$).
4. Verify the output voltage is 1.2V for V_{OUT} .

1.2.1 Evaluating the Other Output Voltage

The RTKA808015DE0000BU output is preset to 1.2V; however, output voltages can be adjusted from 0.6V to 3.3V. The output voltage programming resistor, R_2 , depends on the required output voltage of the regulator and the value of the feedback resistor R_1 , as shown in [Equation 1](#).

$$(EQ. 1) \quad R_2 = R_1 \left(\frac{0.6}{V_{OUT} - 0.6} \right)$$

[Table 1](#) shows the component selection that should be used for the respective V_{OUTs} .

Table 1. External Component Selection

V_{OUT} (V)	L_1 (μH)	C_{OUT} (μF)	R_1 (k Ω)	R_2 (k Ω)
0.6	0.47	2 x 22	0	300*
1	0.47	2 x 22	200	300
1.2	0.47	2 x 22	200	200
1.8	0.47	2 x 22	200	100
2.5	0.47	2 x 22	200	63.2
3.3	0.47	2 x 22	200	44.2

2. Board Design

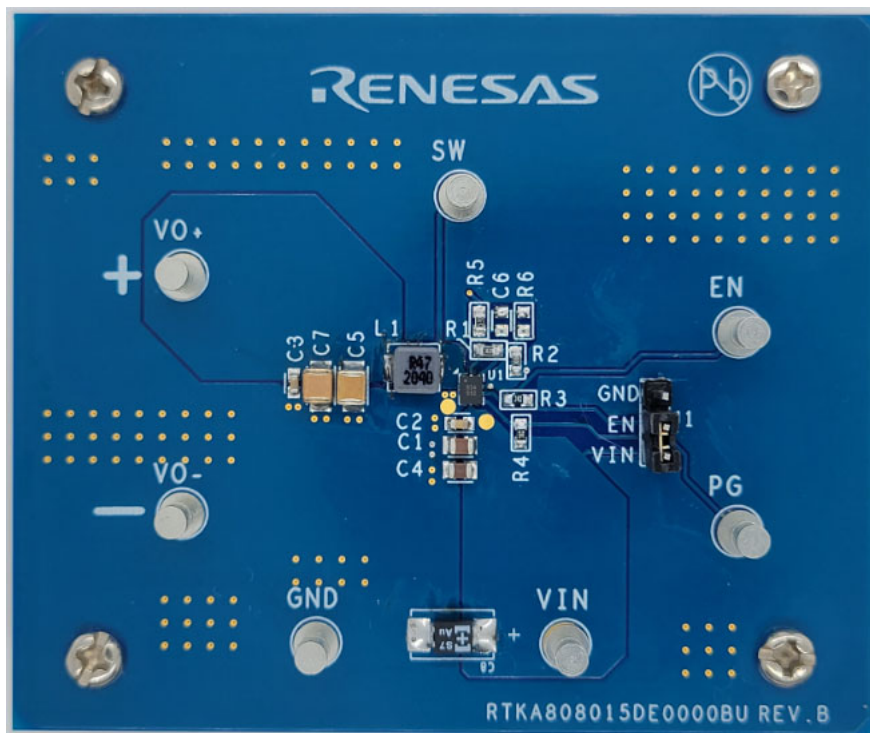


Figure 2. RTKA808015DE0000BU Evaluation Board (Top)

2.1 PCB Layout Guidelines

The following are PCB guidelines to consider when laying out the board.

- Place the input ceramic capacitors between the VIN and GND pins. Place them as close to the pins as possible.
- A 0.1 μ F decoupling input ceramic capacitor is recommended. Place it as close to the VIN pin as possible.
- The GND pin and AGND pin should be tied directly to the power pad under the IC.
- Keep the switching node (PHASE) plane away from the feedback network. Place the resistor divider close to the IC.

2.4 Board Layout

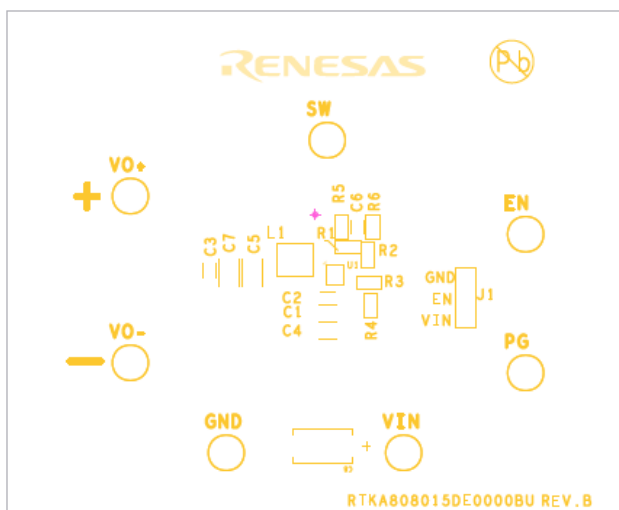


Figure 4. Silkscreen - Top Layer

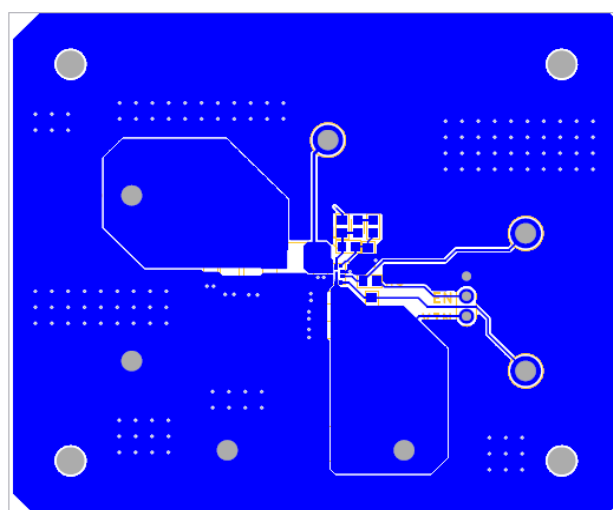


Figure 5. Top Layer

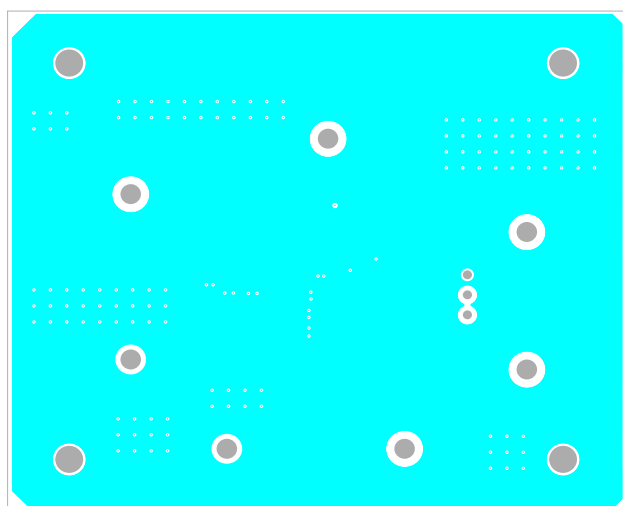


Figure 6. Layer 2

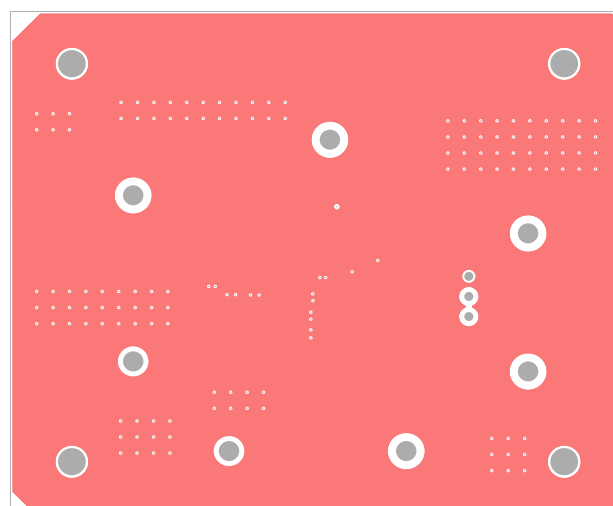


Figure 7. Layer 3

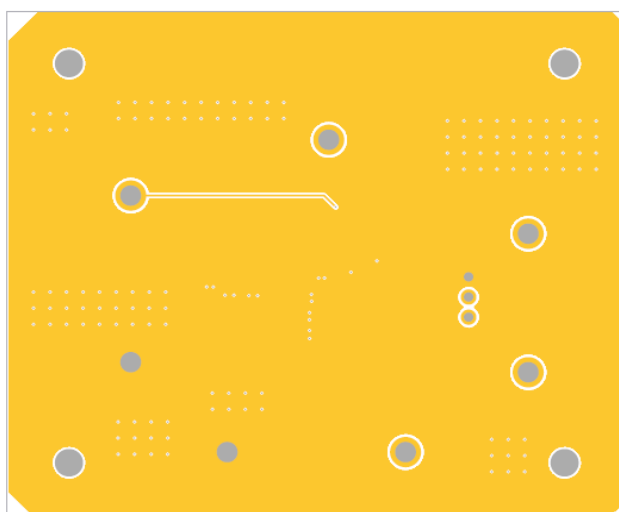


Figure 8. Bottom Layer

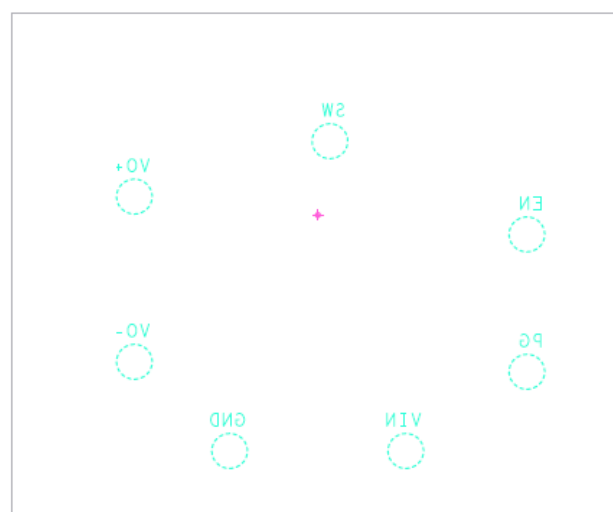


Figure 9. Silkscreen Bottom Layer

3. Typical Performance Graphs

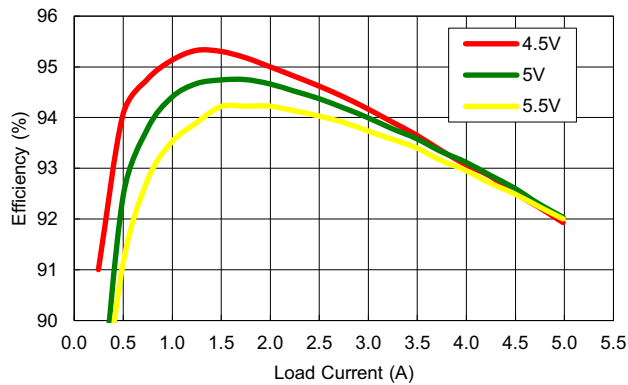


Figure 10. Efficiency vs Load, $V_{OUT} = 3.3V$, 25°C

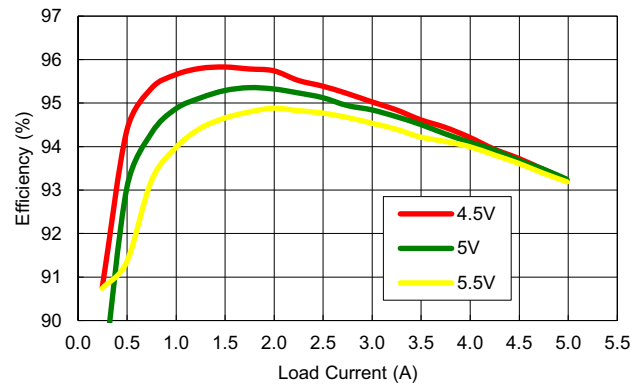


Figure 11. Efficiency vs Load, $V_{OUT} = 3.3V$, -40°C

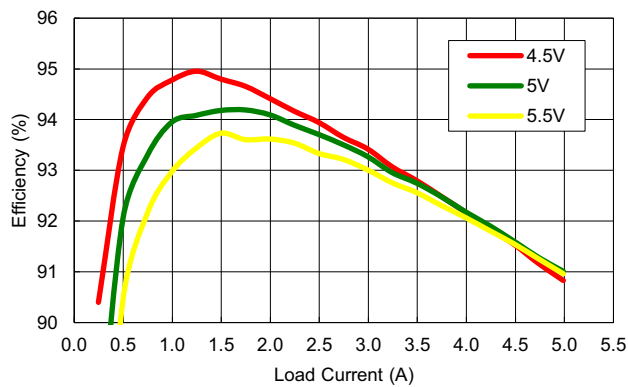


Figure 12. Efficiency vs Load, $V_{OUT} = 3.3V$, 85°C

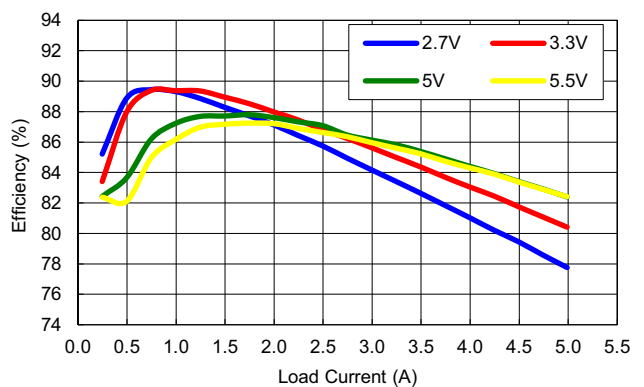


Figure 13. Efficiency vs Load, $V_{OUT} = 1.2V$, 25°C

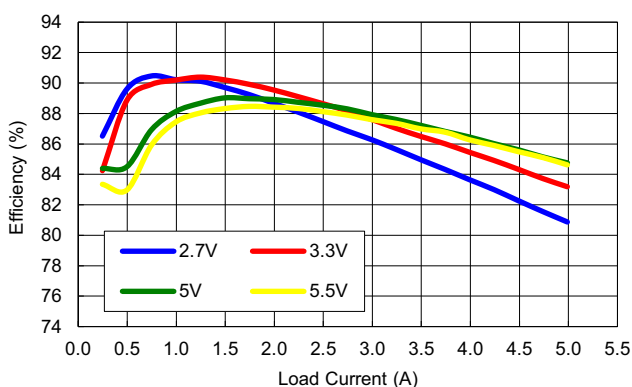


Figure 14. Efficiency vs Load, $V_{OUT} = 1.2V$, -40°C

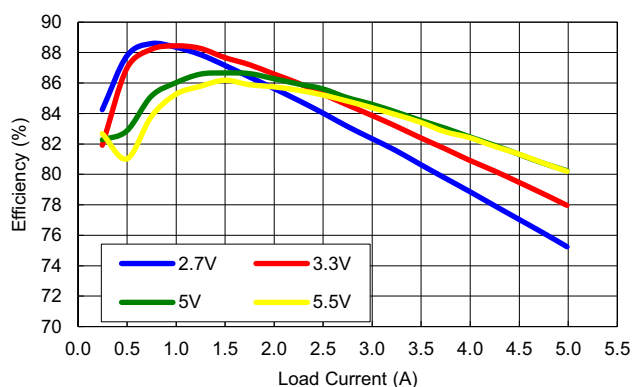


Figure 15. Efficiency vs Load, $V_{OUT} = 1.2V$, 85°C

$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $T_A = +25^\circ C$.

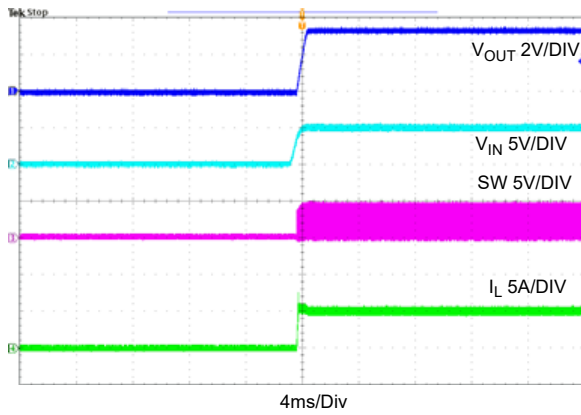


Figure 16. Startup at 5A

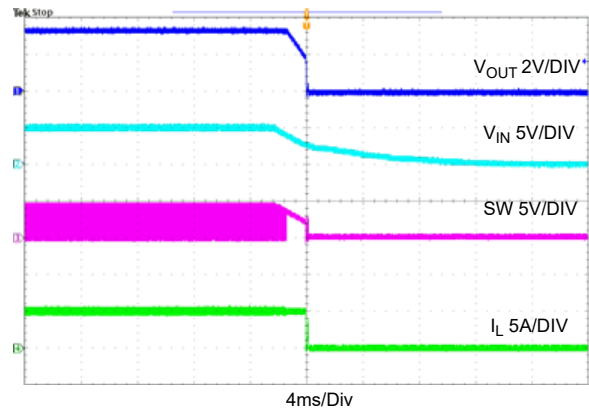


Figure 17. Shutdown at 5A

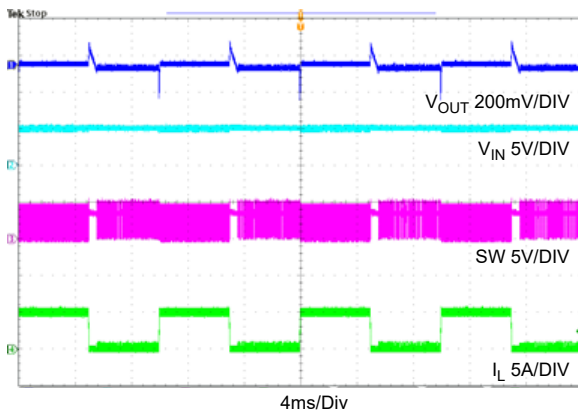


Figure 18. Load Transition, 0A→5A

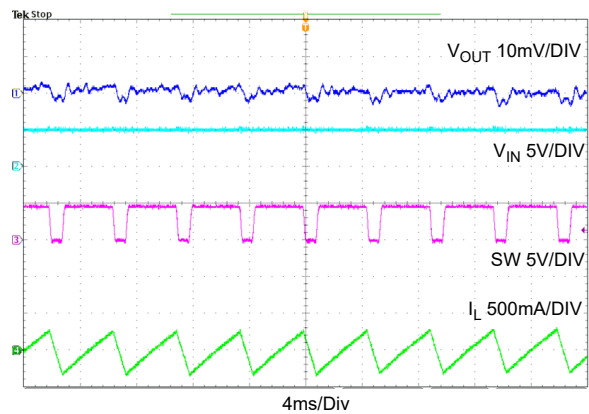


Figure 19. Steady State at 5A

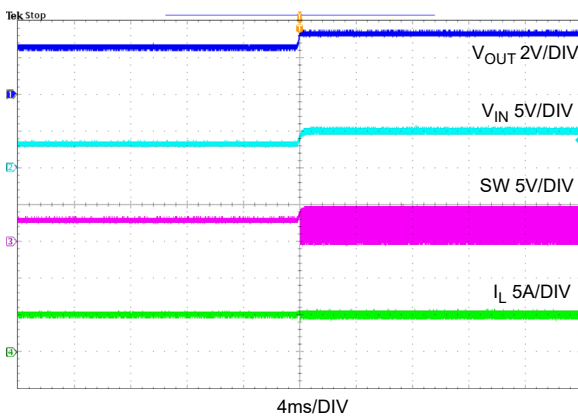


Figure 20. Line Transition at 5A, 3.3V→5V

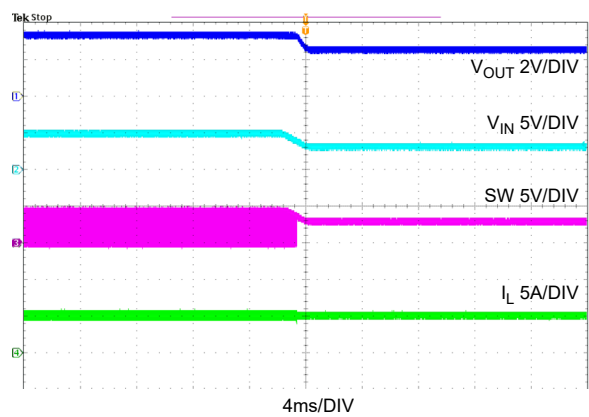


Figure 21. Line Transition at 5A, 5V→3.3V

4. Ordering Information

Part Number	Description
RTKA808015DE0000BU	2.7V~5.5V synchronous buck converter evaluation board

5. Revision History

Revision	Date	Description
1.01	Feb 27, 2023	Fixed broken hyperlink.
1.00	Jul 22, 2022	Initial release

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