SCT9336 Evaluation Board User's Guide

FEATURES

- EMI Reduction with Switching Node Ringing-free
- 400kHz Switching Frequency with 6% Frequency Spread Spectrum
- 3.8V-28V Wide Input Voltage Range
- Adjustable Output Voltage
- Up to 3A Continuous Output Load Current
- Fully Integrated 85mΩ (R_{dson}) High Side MOSFET and 48mΩ (R_{dson}) Low Side MOSFET
- 1uA Shut-down Current
- 20uA Ultra Low Quiescent Current
- Peak Current Mode Control with Integrated Loop Compensation
- PSM Mode in Light Load Condition
- 4ms Soft Start Time
- Output Over Voltage Protection
- Thermal Shutdown Protection at 160°C
- Available in SOP-8 Package

APPLICATIONS

- White Goods, Home Appliance
- Surveillance
- Audio, WiFi Speaker
- Printer, Charging Station
- DTV, STB, Monitor/LCD Display

DESCRIPTION

The EV9336-B-01A Evaluation Board is designed to demonstrate the capabilities of SCT9336, what are 3A, EMI friendly synchronous buck converters with up to 28V wide input voltage range. The SCT9336, features an ultra-low quiescent operating current of 20uA. The SCT9336 is available in a low-profile ESOP-8 package.

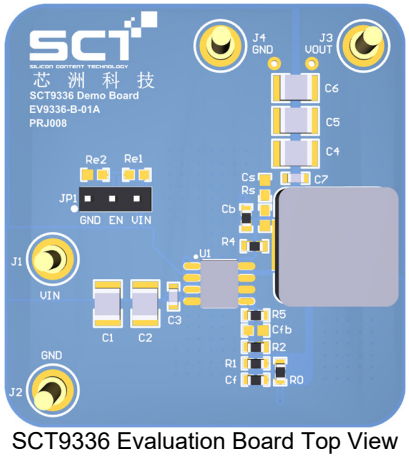
This user's guide describes the characteristics, operation and the use of the EV9336-B-01A Evaluation Module including EVM specifications, recommended test setup, test result, schematic diagram, bill of materials, and the board layout.

Board Number	IC Number
EV9336-B-01A	SCT9336

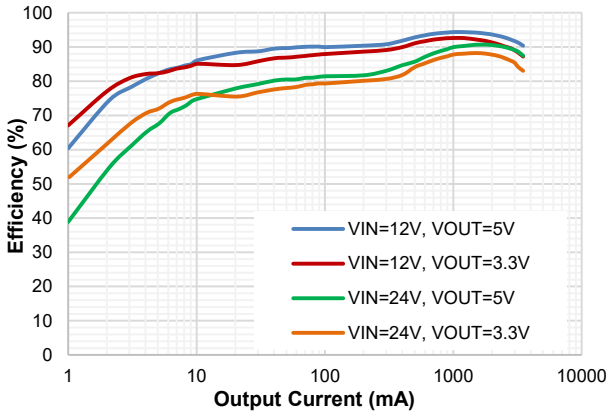
PERFORMANCE SUMMARY

Table 1. Performance — Specifications are at TA = 25°C

Parameter	Condition	Value
Input Voltage	DC up to 28V	3.8V-28V
Output Voltage	PFM	5V ± 1%
Output Current	Continuous DC current	3A
Frequency	Default	400KHz



SCT9336 Evaluation Board Top View



SCT9336 Efficiency

QUICK START PROCESURE

Evaluation board EV9336-B-01A is easy to set up to evaluate the performance of the SCT9336. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions:
   - J1, J2: Input terminal. Connect the power supply to the input of converter.
   - J3, J4: Output terminal. Connect the load to the output of converter.
   - JP1: Enable Jumper. Install ON shunt to connect EN pin to Vin through a 100KΩ resistor to enable IC.
2. Install OFF shunt to disable IC. With power off, connect the input power supply to J1 V_{IN} connector and J2 GND connector. Turn on the power at the input. Make sure that the input voltage does not exceed 28V, and supports sufficient current limit.
3. Check the output voltage at J3 and J4. The output voltage should be 5V typical. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, output voltage ripple, efficiency and other parameters.
4. To use the enable function, apply a digital input to the EN pin of JP1.

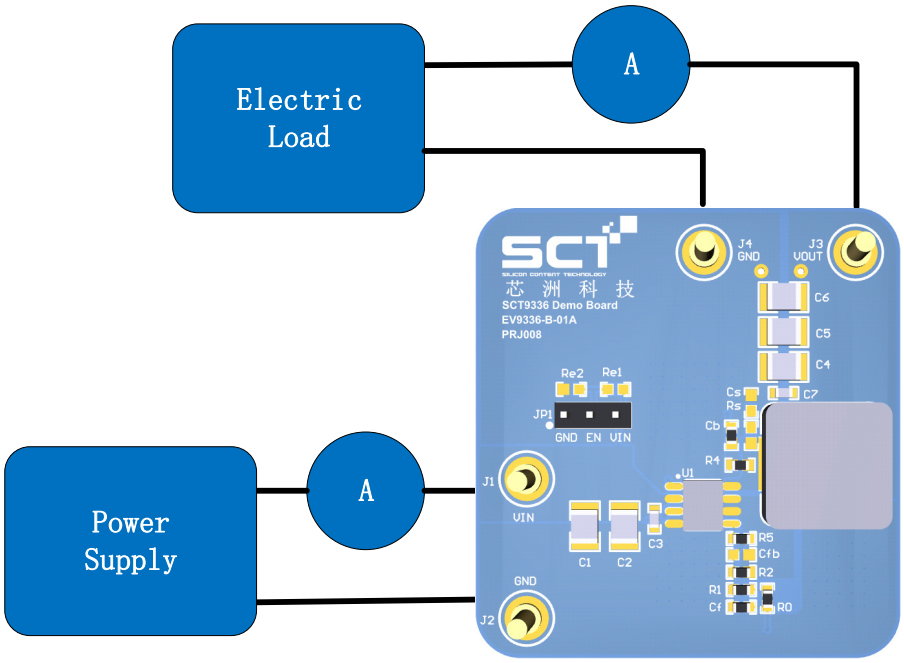


Figure 1. Proper Supply, Load and Measurement Equipment Setup

NOTE: When measuring the voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across relevant capacitor of VIN or VOUT. See Figure 2 for proper scope probe technique.

Figure 2. Measuring Voltage Ripple Across Terminals or Directly Across Ceramic Capacitor

SCHEMATIC DIAGRAM

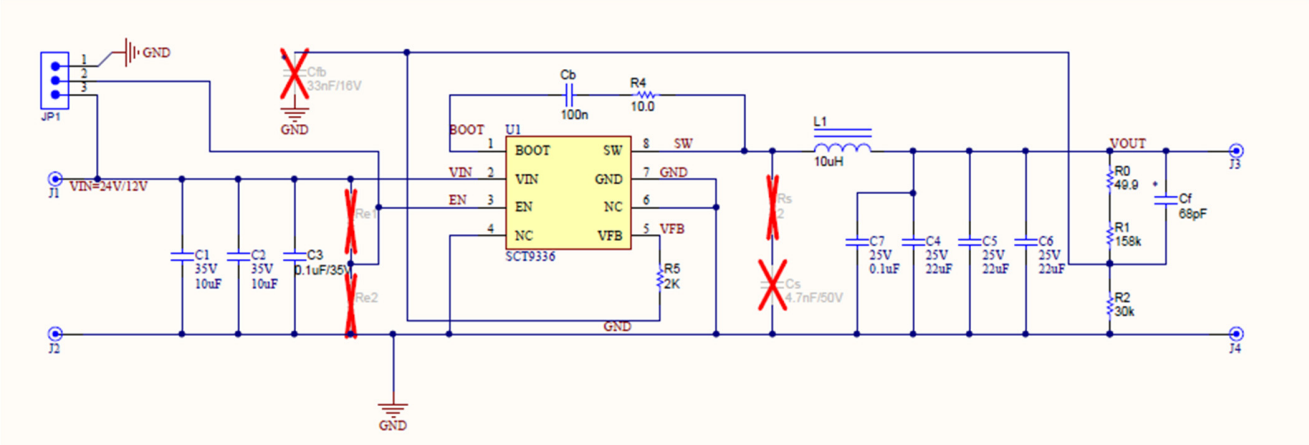


Figure 3. Evaluation Board Schematic

BILL OF MATERIALS

Table 2. Bills of Materials

Manufacture	Comment	Designator	Description	Quantity
Silicon Content Technology	SCT9336	U1	SCT9336, 3.8V-28V Vin, 3A, Low Quiescent Current Synchronous Step-down Converter	1
			ESOP-8	
Wurth Elektronik	613 003 111 21	JP1	'Header, 100mil, 3x1, Tin plated, TH	1
QJJCJ	Terminal_2.1	J1, J2, J3, J4	Terminal	4
Murata	GRM32ER7YA106KA12L	C1, C2	CAP, CERM, 10 uF, 35 V, +/- 10%, X7R, 1210	2
Wurth Elektronik	885 012 206 095	C3, Cb	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, 0603	2
Wurth Elektronik	885 012 109 010	C4, C5, C6	CAP, CERM, 22 uF, 16V, +/-10%, X7R, 1210	3
YAGEO	CC0603KRX7R8BB104	C7	CAP, CERM, 0.1 uF, 25 V, +/- 10%, X7R, 0603	1
Wurth Elektronik	885 012 206 056	Cf	CAP, CERM, 68 pF, 50 V, +/- 10%, X7R, 0603	1
Murata Electronics	Not Install	Cfb	CAP, CERM, 33 pF, 16 V, +/- 10%, X7R, 0603	0
Wurth Elektronik	Not Install	Cs	CAP, CERM, 1000 pF, 50 V, +/- 10%, X7R, 0603	0
Wurth Elektronik	744 770 9100	L1	Inductor, WE-XHMI, 10 uH, 7.1 A, 26.5 mohm, SMD	1
Vishay	CRCW060349R9FKEA	R0	RES, 49.9, 1%, 0.1 W, 0603	1
Vishay	RC0603FR-07158KL	R1	RES, 158 k, 1%, 0.1 W, 0603	1
Yageo	RC0603FR-0730K	R2	RES, 30 k, 1%, 0.1 W, 0603	1
Samsung Electro-Mechanics	RC1608F202CS	R5	RES, 2 k, 1%, 0.1W, 0603	1
Yageo	AC0603FR-0710RL	R4	RES, 10, 1%, 0.1W, 0603	1
Yageo	Not Install	Re1	RES, 487 k, 1%, 0.1 W, 0603	0
Yageo	Not Install	Re2	RES, 121 k, 1%, 0.1 W, 0603	0
Vishay	Not Install	Rs	RES, 10.0, 1%, 0.1 W, 0603	0

PRINTED CIRCUIT BOARD LAYOUT

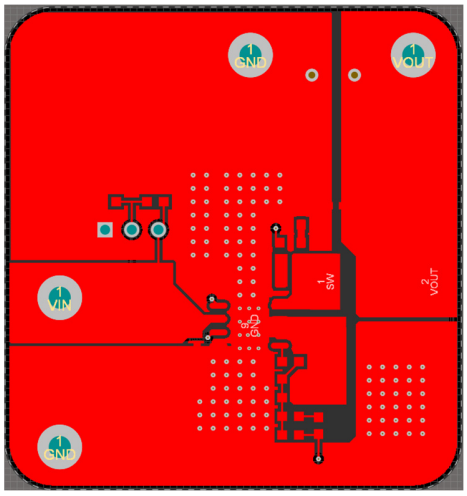


Figure 4.Top Layer

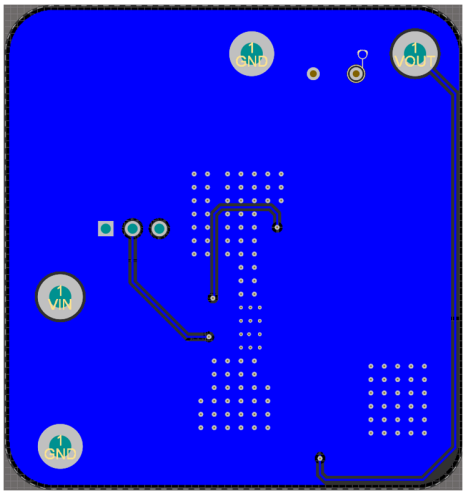


Figure 5.Bottom Layer

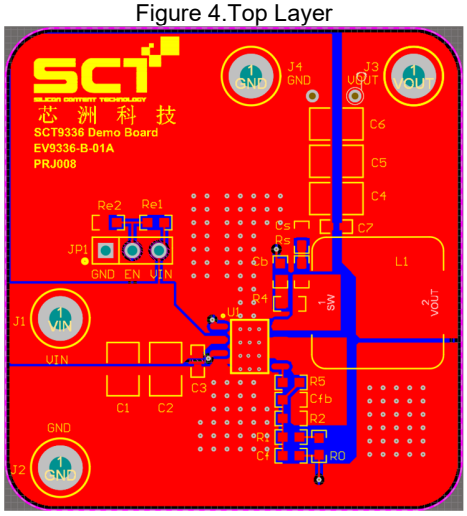


Figure 6. Composite View

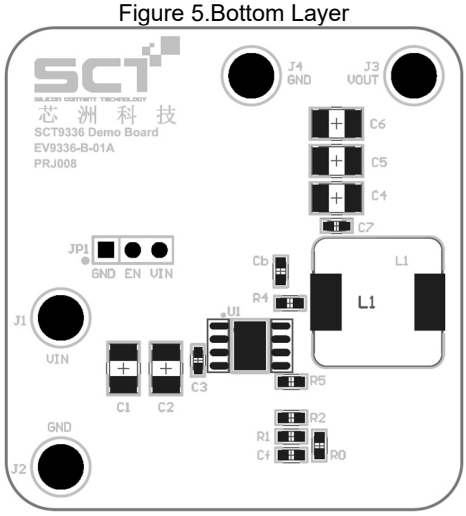


Figure 7. Assemble Drawing

EVB TEST RESULTS

Vin=24V, Vout=5V, 2A loading, unless otherwise noted

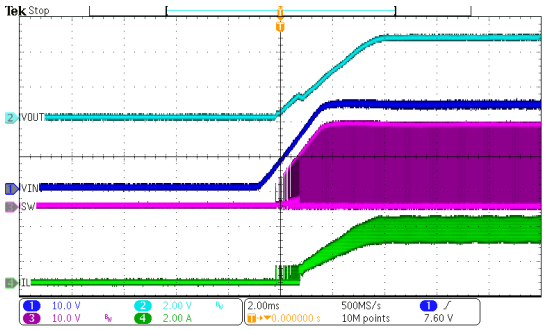


Figure 8. Power Up

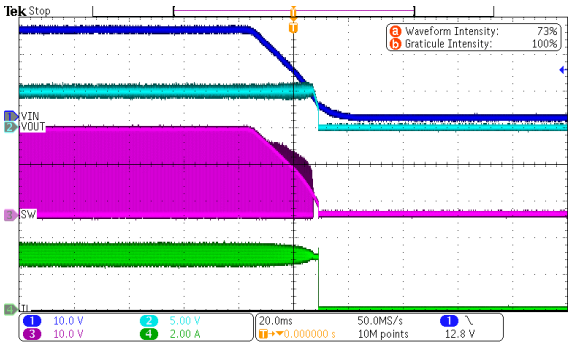


Figure 9. Power Down

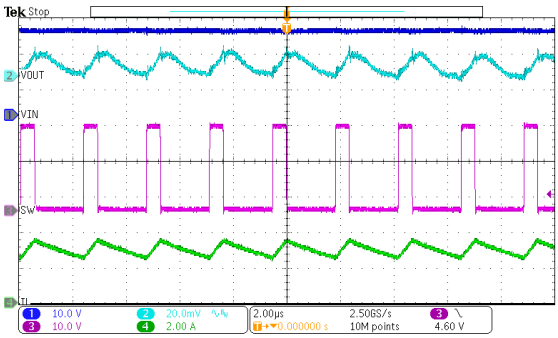


Figure 10. SW node waveform and Output Ripple
VIN=24V, IOUT=3A

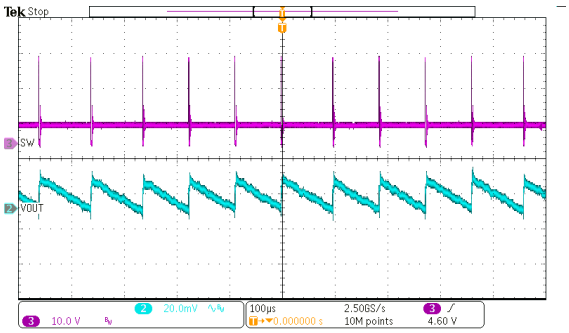


Figure 11.SW node waveform and Output Ripple
VIN=24V, IOUT=10mA

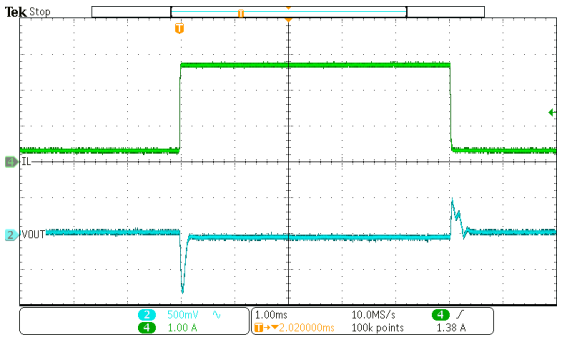


Figure 12.Load Transient
VOUT=5V, IOUT=0.3A to 2.7A, SR=250mA/us

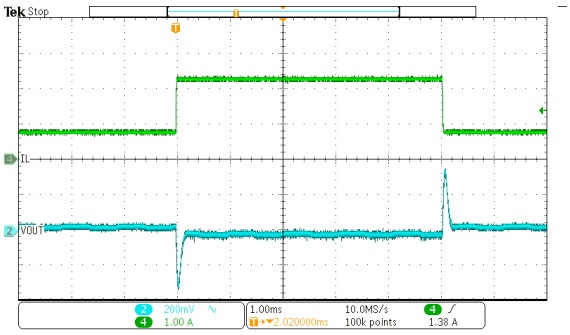


Figure 13.Load Transient
VOUT=5V, IOUT=0.75A to 2.25A, SR=250mA/us

OPTIONAL MODIFICATION

Output Voltage

The output voltage is set by an external resistor divider R1 and R2 in typical application schematic. The value of R2 can be calculated by equation 1. A minimum current of typical 20uA flowing through feedback resistor divider gives good accuracy and noise covering.

$$R_1 = \frac{(V_{OUT} - V_{REF}) \times R_2}{V_{REF}} \quad (1)$$

where:

- V_{REF} is the feedback reference voltage, typical 0.8V

Table 3. Feedback Resistor R_1 R_2Value for Output Voltage
(Room Temperature)

Vout	L1	COUT	R1	R2	R0	R5	Cf
3.3V	6.5uH	3*22uF	93.5k	30k	49.9	2k	68p
5V	10uH	3*22uF	158k	30k	49.9	2k	100p
12V	22uH	3*22uF	422k	30k	49.9	2k	330p

*Wurth Elektronik Inductor XHMI series size 6060 is considerable for application

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