SCT2452C Evaluation Board User's Guide

FEATURES

- Wide Input Range: 4.5V-42V
- Up to 5A Continuous Output Current
- 0.8V ±1% Feedback Reference Voltage
- Integrated 80mΩ High-Side MOSFET
- Low Quiescent Current: 100uA
- Pulse Skipping Mode (PSM) in light load
- 130ns Minimum On-time
- Programmable Soft-start Time
- Adjustable Frequency 100KHz to 2.2MHz
- External Clock Synchronization
- Precision Enable Threshold for Programmable Input Voltage Under-Voltage Lock Out Protection (UVLO) Threshold and Hysteresis
- Low Dropout Mode Operation
- Derivable Inverting Voltage Regulator
- Over-voltage and Over-Temperature Protection
- Available in an ESOP-8 Package

APPLICATIONS

- 12-V, 24-V, 48-V Industry and Telecom Power System
- Industrial Automation and Motor Control
- Vehicle Accessories

DESCRIPTION

The SCT2452C is 5A buck converter with wide input voltage, ranging from 4.5V to 42V, which integrates an 80mΩ high-side MOSFET. The SCT2452C, adopting the peak current mode control, supports the Pulse Skipping Modulation (PSM) which assists the converter on achieving high efficiency at light load or standby condition.

The SCT2452C features programmable switching frequency from 100kHz to 2.2MHz with an external resistor, which provides the flexibility to optimize either efficiency or external component size. The converter supports external clock synchronization with a frequency band from 100kHz to 2.2MHz. The SCT2452C allows power conversion from high input voltage to low output voltage with a minimum 130ns on time of high-side MOSFET.

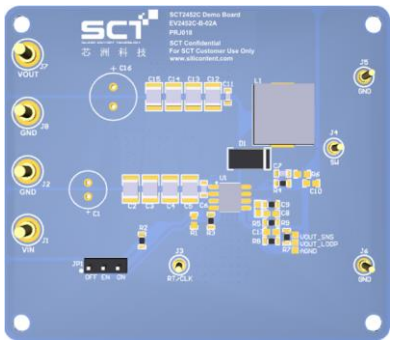
The device offers adjustable soft start to prevent inrush current during the startup of output voltage ramping. The SCT2452C features internal loop compensation to simplify the loop compensation design.

The SCT2452C provides cycle-by-cycle current limit, thermal shutdown protection, output over-voltage protection and input voltage under-voltage protection. The device is available in an 8-pin ESOP-8 package.

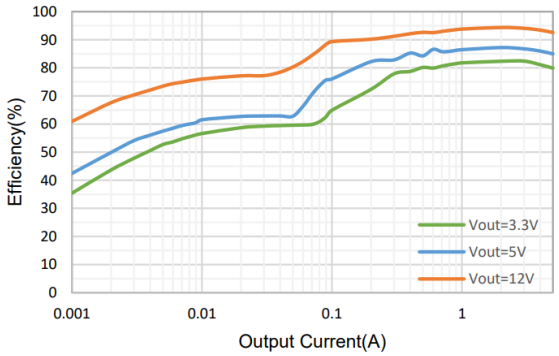
Board Number	IC Number
EV2452C-B-02A	SCT2452C

PERFORMANCE SUMMARY

Parameter	Condition	Value
Input Voltage	DC up to 42V	4.5V-42V
Output Voltage	Iout=0A~5A	3.3V ± 1%
Output Current	Continuous DC current	5A



EV2452C-B-02A Evaluation Board Top View



SCT2452C Efficiency, Vin=24V, Freq.=500KHz

QUICK START PROCESURE

Evaluation board EV2452C-B-02A is easy to set up to evaluate the performance of SCT2452C synchronous step-down DCDC converter. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions:
   - J1, J2: Connect the power supply to the input of converter.
   - J7, J8: Connect the load to the output of converter.
   - JP1: Enable. Enable Jumper. Install ON shunt to connect EN pin to V_{in} through a 100KΩ resistor to enable IC. Install OFF shunt to disable IC.
2. With power off, connect the input power supply to J1 V_{IN} connector and J2 GND connector. Make sure that the input voltage does not exceed 42V, and supports sufficient current limit. Turn on the power at the input.
3. Check the output voltage at J7 and J8. The output voltage should be 3.3V 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.
5. Users can place C1 if input wire is long and C16 for better load transient performance.

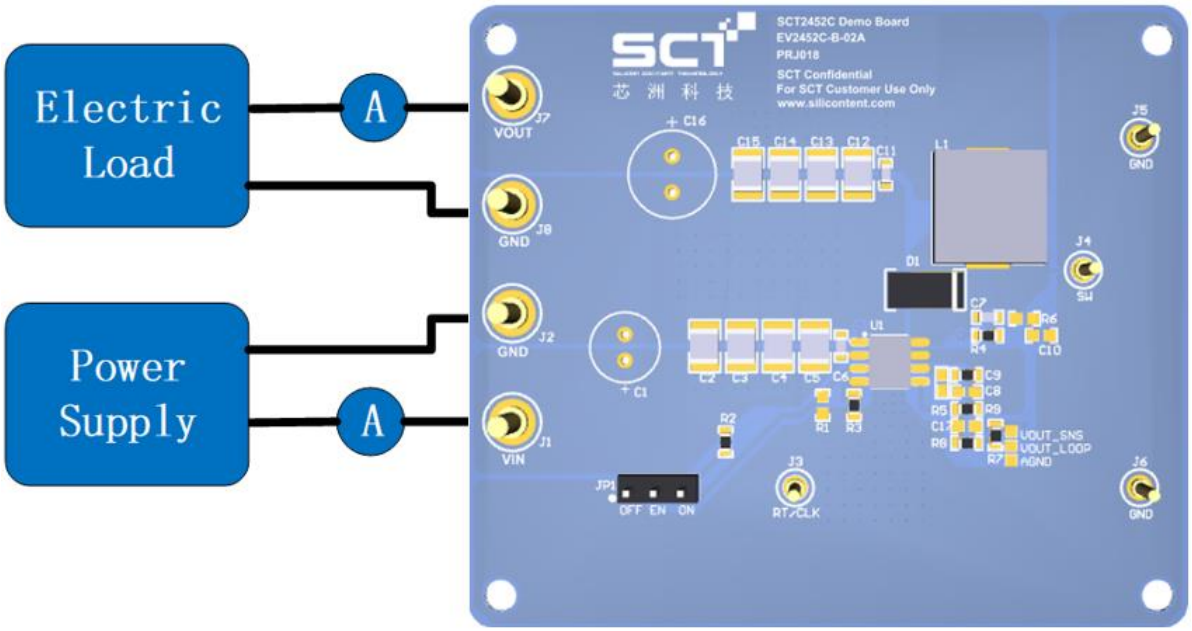


Figure 1. Power Supply, Load and Measurement Equipment Setup

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

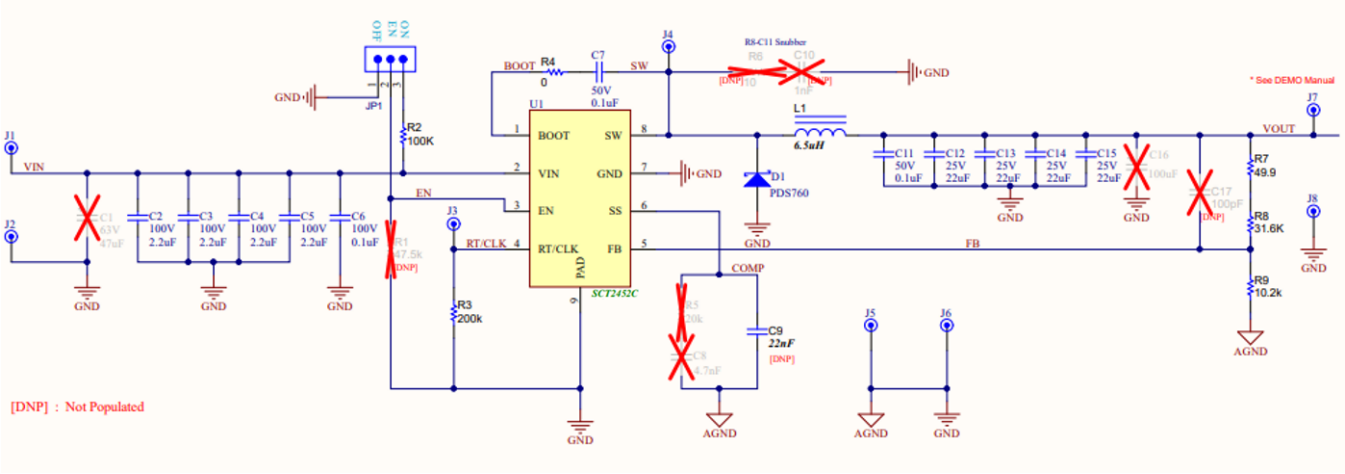


Figure 3. SCT2452C EVM Schematic

BILL OF MATERIALS

Table 1. SCT2452C EVM Bills of Materials

Footprint	PartNumber	Manufacture	Designator	Description	Quantity
1210	885 382 209 002	Wurth Electronix	C2, C3, C4, C5	CAP, CERM, 2.2u, 100 V, +/- 10%, X7R, 1210	4
1210	885 012 109 011	Wurth Electronix	C12, C13, C14, C15	CAP, CERM, 47 uF, 16 V, +/- 10%, X5R, 1210	4
0603	885 012 206 095	Wurth Electronix	C11	CAP, CERM, 0.1 u, 50V, +/- 10%, X7R, 0603	1
0603	885 012 206 120	Wurth Electronix	C6	CAP, CERM, 0.1 u, 100 V, +/- 10%, X7R, 0603	1
0603	885 012 206 095	Wurth Electronix	C7	CAP, CERM, 0.1 u, 50 V, +/- 10%, X7R, 0603	1
0603	885 012 206 067	Wurth Electronix	C9	CAP, CERM, 22nF, 25 V, +/- 10%, X7R, 0603	1
PDS760	PDS760	Diodes	D1	Schottky Diode,60V, 7A	1
Terminal_2.1	Terminal_2.1	Terminal	J1, J2, J7, J8	Power Terminal	4
Terminal_1.1	Terminal_1.1	Terminal	J3, J4, J5, J6	Test Point	4
CONN_PEC03SAAN	'613 003 111 21	Wurth Electronix	JP1	Header, 100mil, 3x1, Tin plated, TH	1
WE-HCI_1050	744325550	Wurth Electronix	L1	Inductor, Shielded Drum Core, 5.5u, 8.4 A, 0.0125 ohm, SMD	1
0603	RC0603JR-07100KL	Vishay	R2	RES, 100 k, 1%, 0.1 W, 0603	1
0603	RC0603FR-07200KL	Vishay	R3	RES, 200k, 1%, 0.1 W, 0603	1
0603	CRCW06030000Z0EA	Vishay	R4	RES, 0, 5%, 0.1 W, 0603	1
0603	CRCW060349R9FKEA	Vishay	R7	RES, 49.9 1%, 0.1 W, 0603	1
0603	CR0603-FX-3162ELF	Vishay	R8	RES, 31.6K 1%, 0.1 W, 0603	1
0603	CRCW060310K2FKEA	Vishay	R9	RES, 10.2k, 1%, 0.1 W, 0603	1
SOP8	SCT2452C	SCT2452C	U1	4.5V-42V 输入，5A， DCDC 转换器	1

PRINTED CIRCUIT BOARD LAYOUT

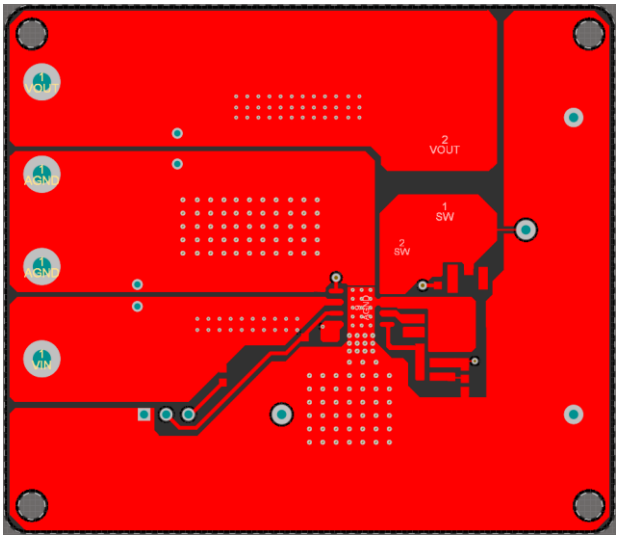


Figure 4. Top Layer

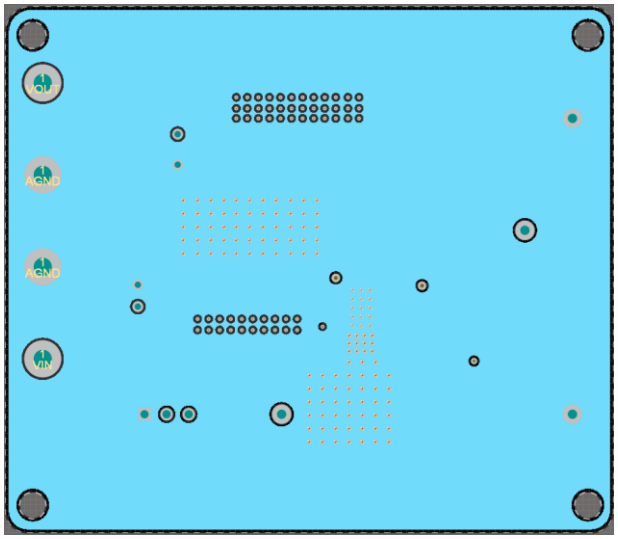


Figure 5. Internal 1 Layer

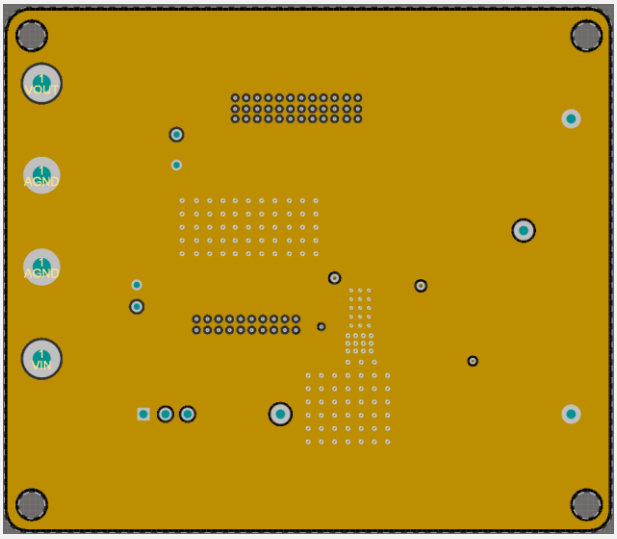


Figure 6. Internal 2 Layer

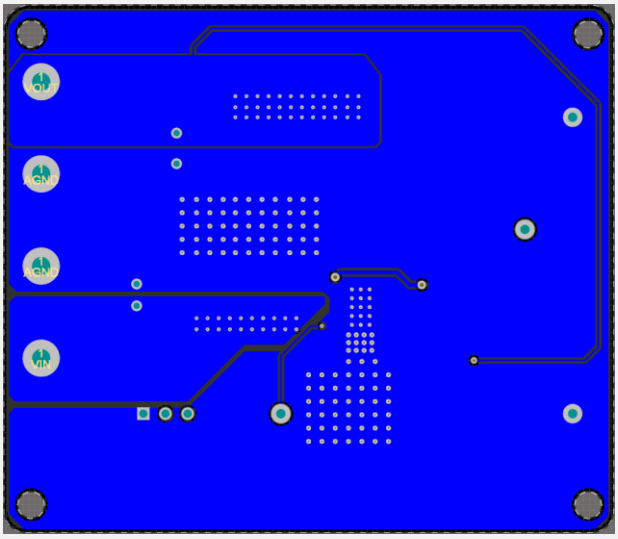


Figure 7. Bottom Layer

EVB TEST RESULTS

Vin=24V, Vout=3.3V, unless otherwise noted

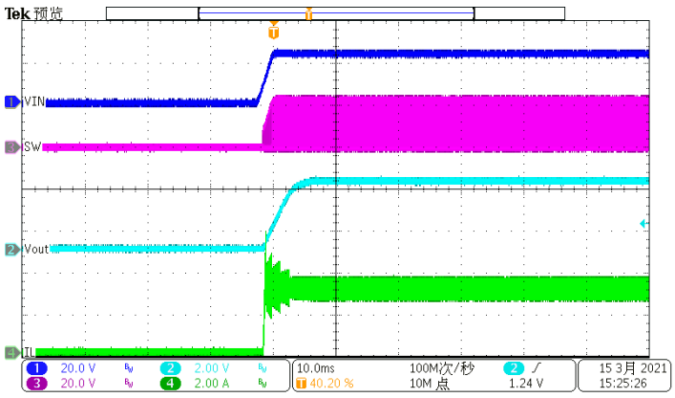


Figure 8. Power up (Iload=3A)

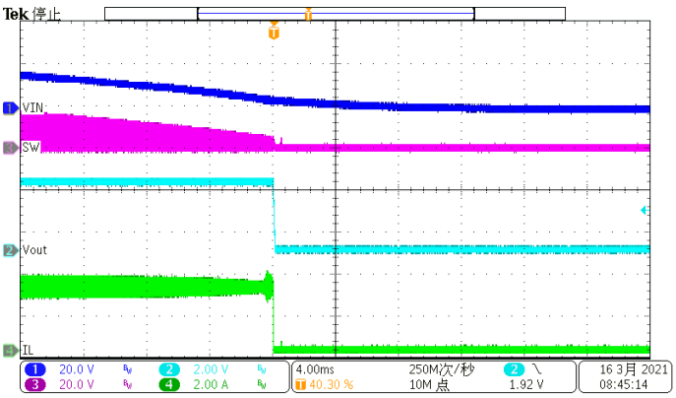


Figure 9. Power down (Iload=3A)

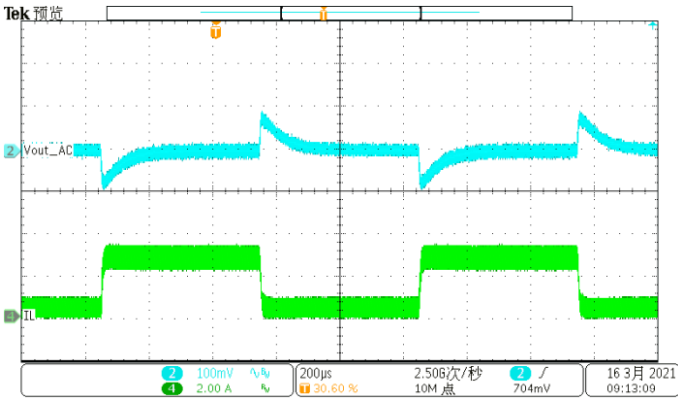


Figure 10.Load Transient (0.3A-2.7A, 1.6A/us)

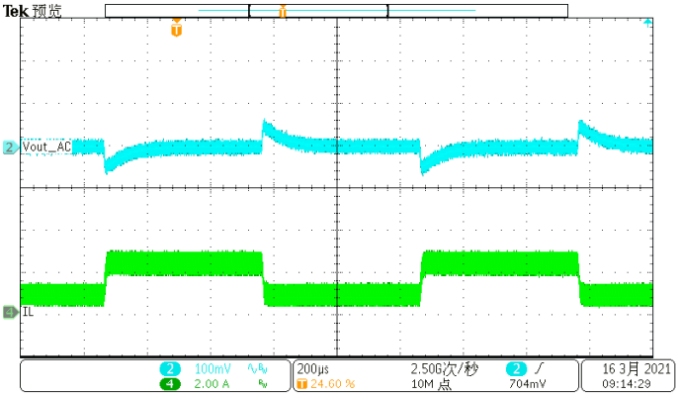


Figure 11. Load Transient (0.75A-2.25A, 1.6A/us)

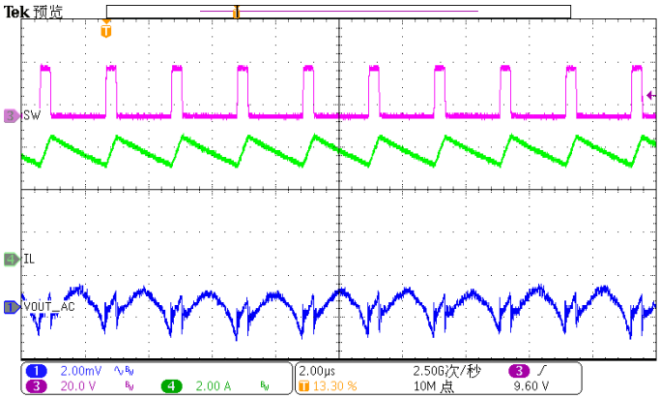


Figure 12. SW and Vout Ripple (Iload=5A)

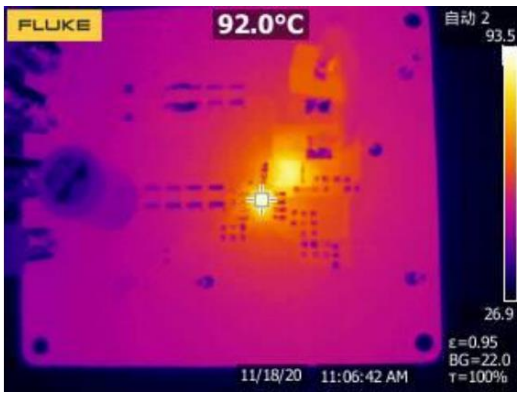


Figure 13. Thermal, 24VIN, 3.3Vout,5A

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