SCT2650 Evaluation Board User's Guide

FEATURES

- Wide Input Range: 4.5V-60V
- Up to 5A Continuous Output Current
- 0.8V ±1% Feedback Reference Voltage
- Integrated 80mΩ High-Side
- Ultra-Low Quiescent Current: 175uA
- Pulse Skipping Mode (PSM) in light load
- 130ns Minimum On-time
- 2ms Internal Soft-start Time
- Adjustable Frequency 100KHz to 1.2MHz
- External Clock Synchronization
- Precision Enable Threshold for Programmable Input Voltage Under-Voltage Lock Out Protection (UVLO) Threshold and Hysteresis
- Derivable Inverting Voltage Regulator
- Over-voltage and Over-Temperature Protection
- Available in an ESOP-8 Package

APPLICATIONS

- Industrial Distributed Power Supplies
- Battery Pack Powered System - Cordless Power Tools, Cordless Home Appliance, Drone etc.
- Cigarette Lighter Adapters, USB Chargers
- USB Type-C Power Delivery
- Optical Communication and Networking System
- Automotive System

DESCRIPTION

The EV2650-B-02A Evaluation Board is designed to demonstrate the capabilities of SCT2650, high efficiency non-synchronous step-down DCDC converter supporting up to 5A continuous output current from an input source from 4.5V to 60V.

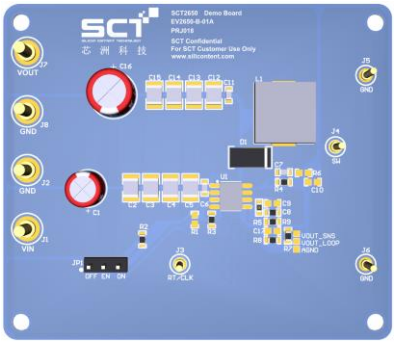
The SCT2650 features programmable switching frequency from 100 kHz to 1.2 MHz with an external resistor, which provides the flexibility to optimize either efficiency or external component size. The converter supports external clock synchronization with a frequency band from 100kHz to 1.2MHz. The device offers fixed 2ms soft start to prevent inrush current during the startup of output voltage ramping. The SCT2650 features external loop compensation to provide the flexibility to optimize either loop stability or loop response.

This user's guide describes the characteristics, operation and the use of the EV2650-B-02A Evaluation Module including EVM specifications, recommended test setup, test result, schematic diagram, bill of materials, and the board layout.

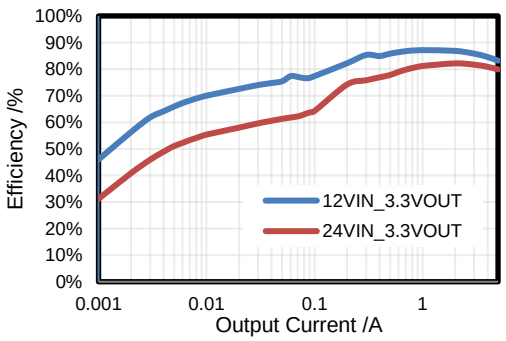
Board Number	IC Number
EV2650-B-02A	SCT2650

PERFORMANCE SUMMARY

Parameter	Condition	Value
Input Voltage	DC up to 60V	4.5V-60V
Output Voltage	Iout=0A~5A	3.3V ± 1%
Output Current	Continuous DC current	5A



EV2650-B-02A Evaluation Board Top View



SCT2650 Efficiency, Freq.=500KHz

QUICK START PROCESURE

Evaluation board EV2650-B-02A is easy to set up to evaluate the performance of SCT2650 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 60V, 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.

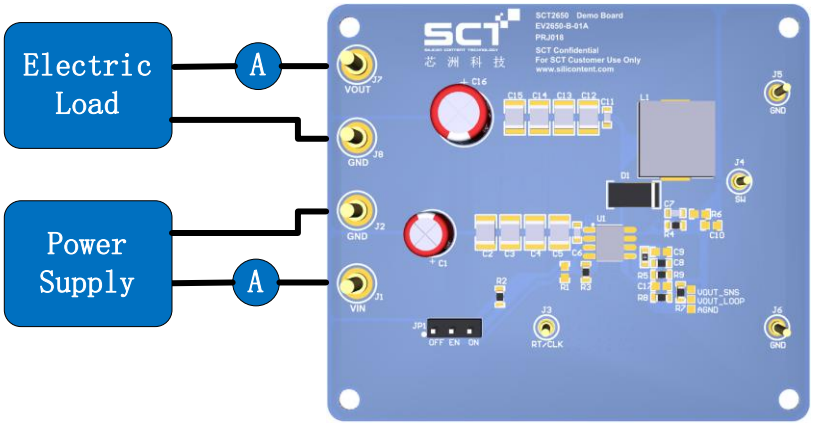


Figure 1. Power Supply, Load and Measurement Equipment Setup

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

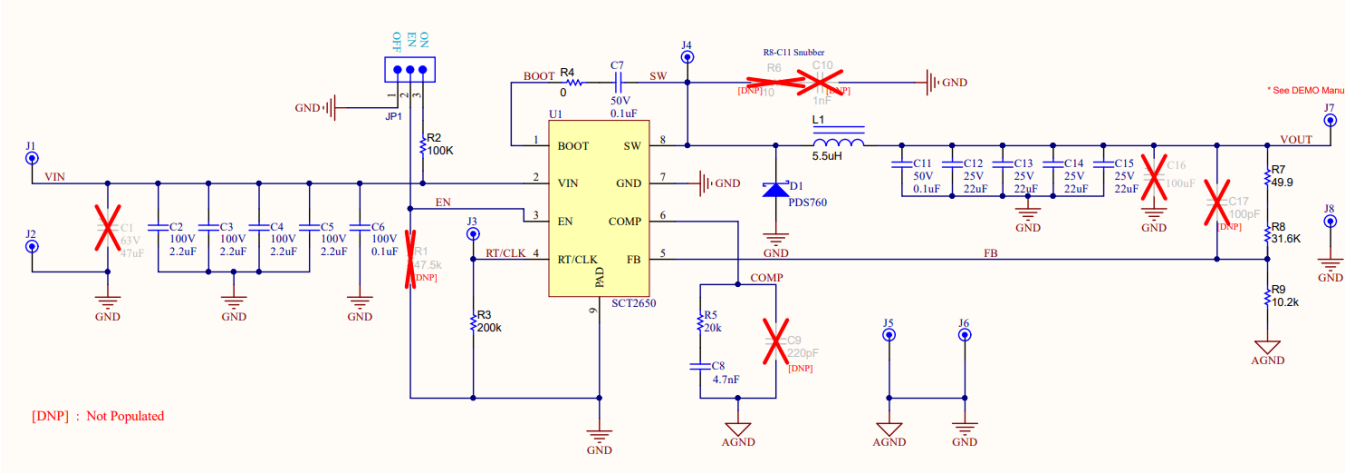


Figure 3. SCT2650 EVM Schematic

BILL OF MATERIALS

Table 1. SCT2650 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	885 012 206 069	Wurth Electronix	C8	CAP, CERM, 4.7nF, 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
R0603	RC0603FR-0720KL	Vishay	R5	RES, 20k, 1%, 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	SCT2650	SCT2650	U1	4.5V-60V 输入，5A， DCDC 转换器	1

PRINTED CIRCUIT BOARD LAYOUT

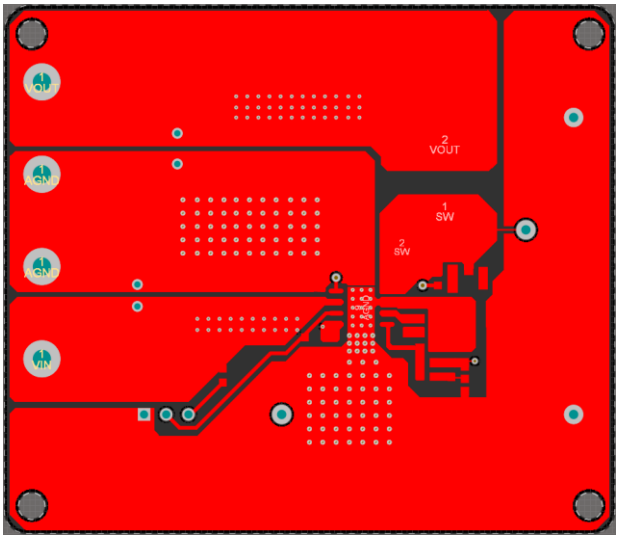


Figure 4. Top Layer

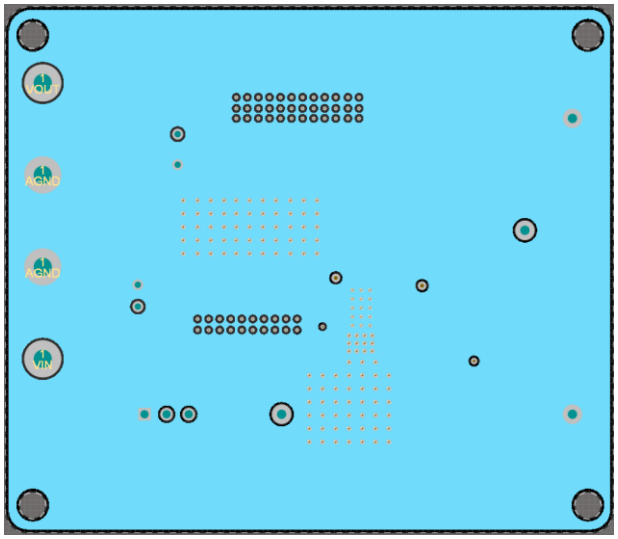


Figure 5. Internal 1 Layer

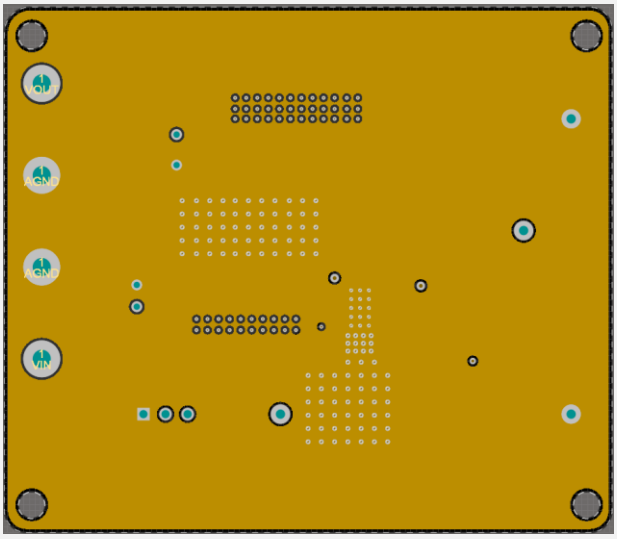


Figure 6. Internal 2 Layer

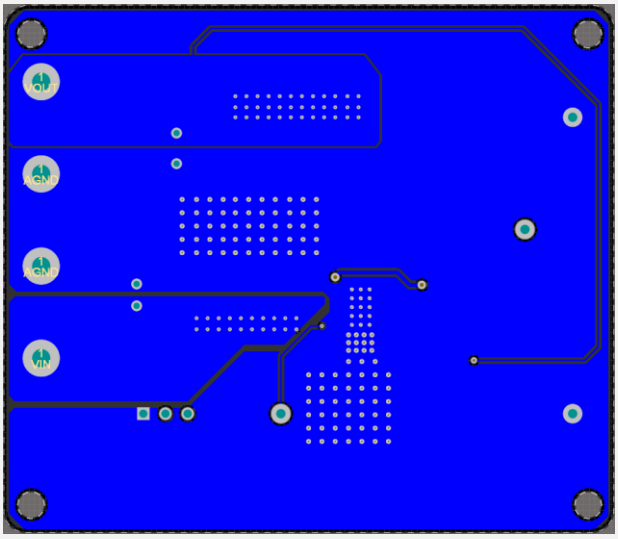


Figure 7. Bottom Layer

EVB TEST RESULTS

Vin=12V, Vout=3.3V, unless otherwise noted

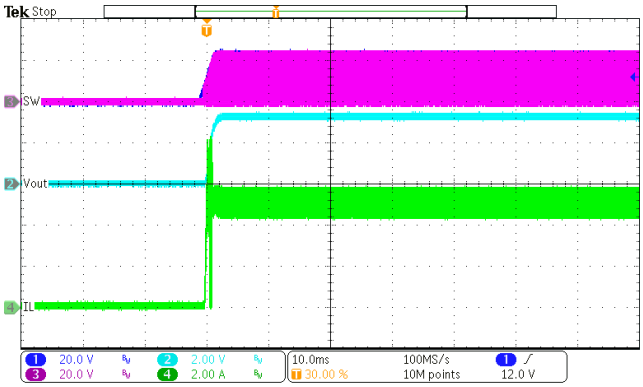


Figure 8. Power up

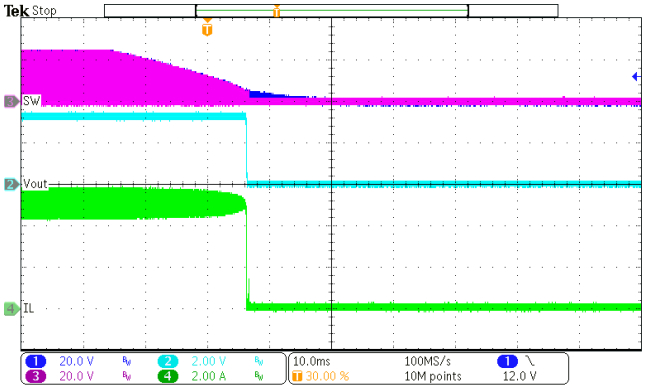


Figure 9. Power down

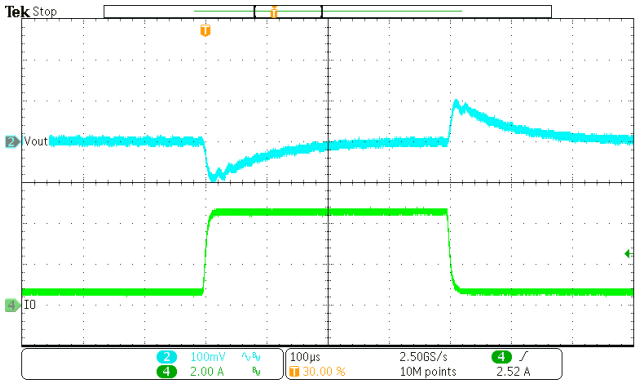


Figure 10.Load Transient (0.5A-4.5A, 1.6A/us)

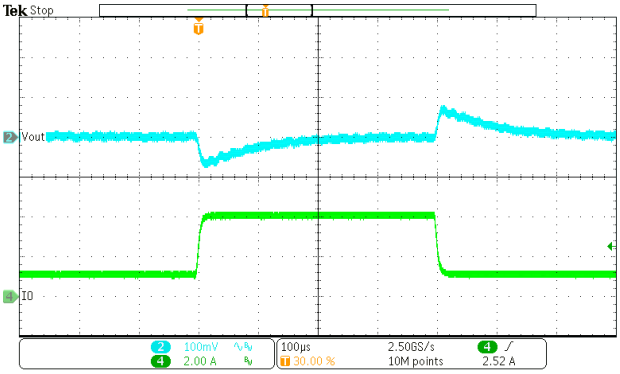


Figure 11. Load Transient (1A-4A, 1.6A/us)

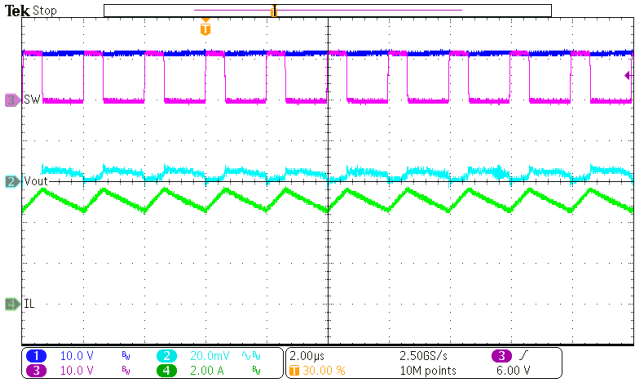


Figure 12. SW and Vout Ripple

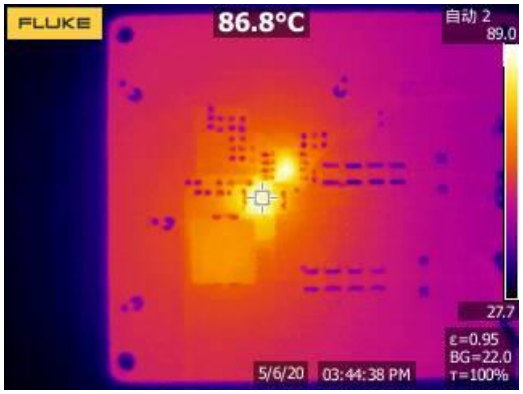


Figure 13. Thermal, 12VIN, 3.3Vout,5A

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Silicon Content Technology Co., Ltd.
#1 Floor 2 Building 15, Yard 33 Dijin Road, Haidian District, Beijing 100095
(86 10) 64779806 FAX: (86 10) 64779806 www.silicontent.com