SCT2250 Evaluation Board User's Guide

FEATURES

- Wide 4.5V-18V Input Voltage Range
- 0.6V-7V Output Voltage Range
- 5A Continuous Output Current
- Integrated 42mΩ/17mΩ Rdson of HS/LS Power MOSFETs
- Fixed 1ms Soft-start Time
- Selectable 400KHz, 800KHz and 1.2MHz Switching Frequencies
- Selectable PFM and USM Operation Modes
- Cycle-by-Cycle Current Limiting
- Output Over-Voltage Protection
- Over-Temperature Protection
- Available in a QFN 12-leads 2mmx3mm Package

APPLICATIONS

- High End DTV
- Set-top Box, XDSL Modem, Personal Video Recorders
- Server, Cloud-Computing, Storage
- Telecom & Networking, Small-cell Base Stations, Point-of-Load (POL)
- IPCs, Factory Automation

DESCRIPTION

The SCT2250 is a high efficiency synchronous step-down DC-DC converter with 4.5V-18V input voltage range and adjustable output voltage down to 0.6V. It offers a small saving 2mmx3mm QFN package that supplies continuous 5A output current. The device fully integrates high-side and low-side power MOSFETs with 42mΩ/17mΩ on-resistance to minimize the conduction loss.

The SCT2280 adopts a Constant On-Time (COT) control to provide fast transient response and easy loop stabilization. The switching clock frequency can be selected from 400KHz, 800KHz and 1.2MHz for optimization of the filter size and output voltage ripple.

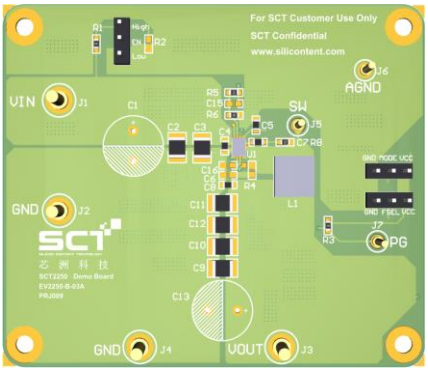
The SCT2250 has the MODE pin to select Pulse Frequency Modulation (PFM) operation mode to achieve the light load power save, or Ultrasonic Mode (USM) to keep the switching frequency above audible frequency areas during light-load or no-load conditions.
The converter requires a minimum number of external components and is available in a QFN- 12 (2mmx3mm) package.

Board Number	IC Number
EV2250-B-04A	SCT2250

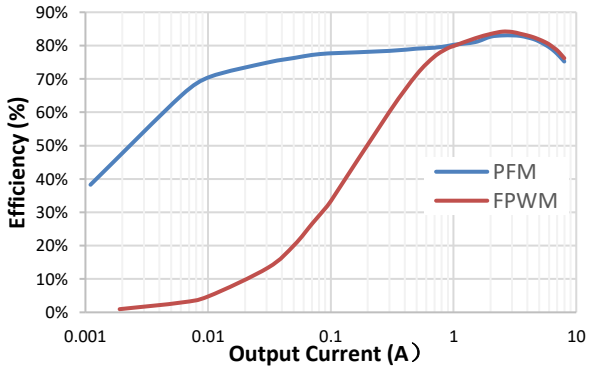
PERFORMANCE SUMMARY

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

Parameter	Condition	Value
Input Voltage	DC up to V	4.5V-18V
Output Voltage		1V ± 1%
Output Current	Continuous DC current	5A
Frequency	Default	800KHz



EV2250-B-04A Evaluation Board Top View



Vin=12V, Vout=1V, fsw=800kHz

QUICK START PROCESURE

Evaluation board EV2250-B-04A is easy to set up to evaluate the performance of the SCT2250. 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 V_{in} through a 100KΩ resistor to enable IC. Install OFF shunt to disable IC.
   - JP2: Frequency select jumper. Install shunt to connect FSEL with VCC to set frequency at 1.2MHz, float jumper to set frequency at 800KHz, install shunt to connect FSEL with GND to set frequency at 400KHz.
   - JP3: Mode select jumper. Install shunt to connect MODE with VCC to set mode as FCCM, float jumper to set mode as USM, install shunt to connect MODE with GND to set mode as PFM.
2. With power off, connect the input power supply to J1 and J2 terminals. Make sure that the input voltage does not exceed 18V, and supports sufficient current limit. Turn on the power at the input.
3. Check the output voltage at J3 and J4 terminals. The output voltage should be 1V 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.
   Users can place C1 if input wire is long and C13 for better load transient performance

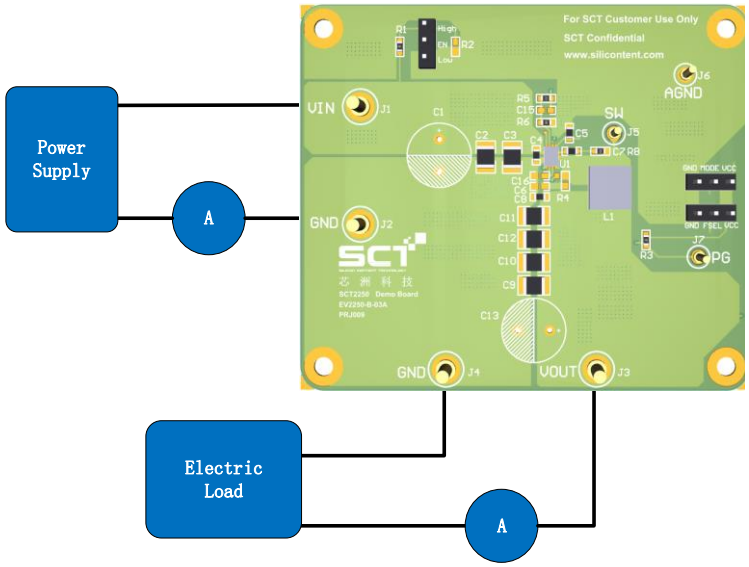


Figure 1. Proper Supply, Load and Measurement Equipment Setup

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

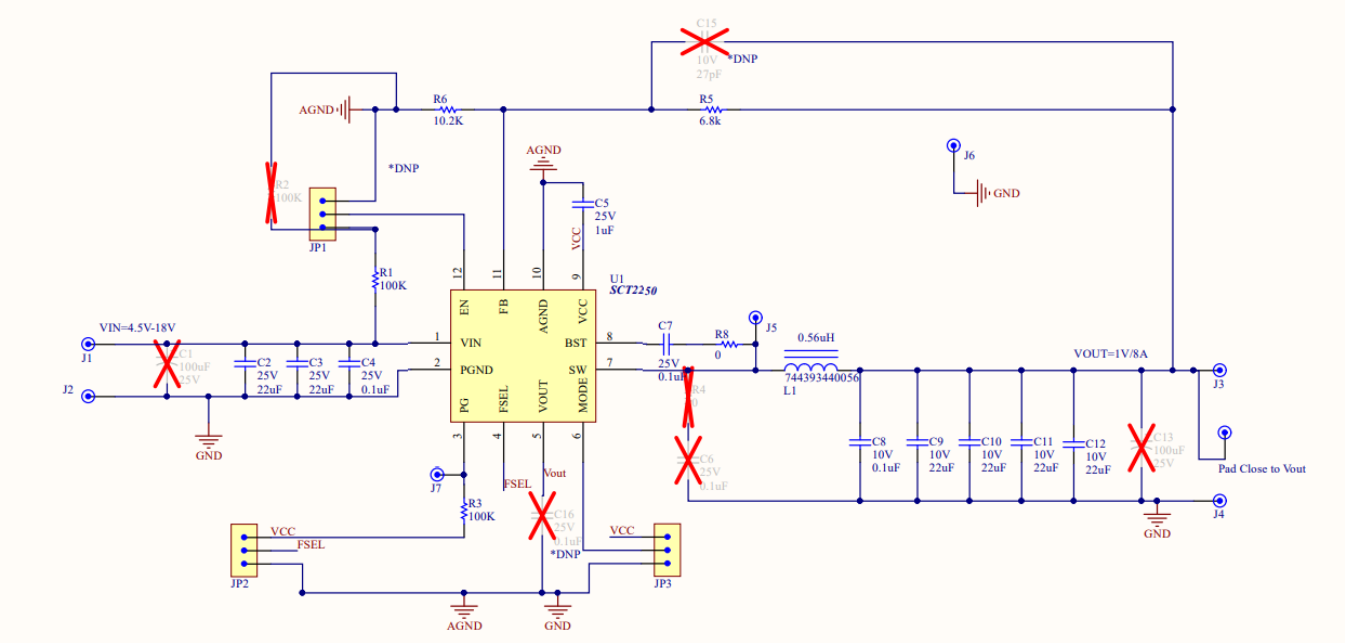


Figure 3. Evaluation Board Schematic

BILL OF MATERIALS

Table 2. Bills of Materials

Manufacture	Comment	Designator	Description	Quantity
PANASONIC	Not Install	C1 C13,	100uF, 35V, 10mm*12.5mm (DxL),F=5mm	0
Wurth Electronik	885 012 109 014	C2, C3,	22uf, 25V, 1210	2
Wurth Electronik	885 012 206 071	C4, C7	0.1uF, 25V, 0603	2
Wurth Electronik	885 012 206 020	C8	0.1uF, 10V, 0603	1
Wurth Electronik	885 012 106 022	C5	1uF, 25V, 0603	1
Wurth Electronik	Not Install	C6	0.1uF, 10V, 0603	0
Wurth Electronik	885 012 109 010	C9, C10, C11, C12	22uf, 16V, 1210	4
YAGEO	Not Install	C15	27pF,50V,0603	0
Wurth Electronik	Not Install	C16	0.1uF, 10V, 0603	0
	Terminal 2.1	J1, J2, J3, J4	terminal	4
	Terminal 1.1	J5, J6, J7	terminal	3
Wurth Electronik	613 003 111 21	JP1, JP2, JP3	Header, 100mil, 3x1, Tin plated, TH	3
Wurth Electronik	744 393 440 056	L1	Inductor, Shielded, 0.56uH, 16A, 3.19mohms, SMT	1
YAGEO	RC0603TR-071100K	R1, R3	100K 1% 0603	2
YAGEO	Not Install	R2	100K 1% 0603	0
YAGEO	Not Install	R4	10ohm 1% 0603	0
YAGEO	RC0603FR-076K8L	R5	6.8k 1% 0603	1
YAGEO	RC0603FR-0710K2L	R6	10.2k 1% 0603	1
YAGEO	RC0603FR-070RL	R8	0 1% 0603	1
SCT	SCT2250	U1	SCT2280	1

PRINTED CIRCUIT BOARD LAYOUT

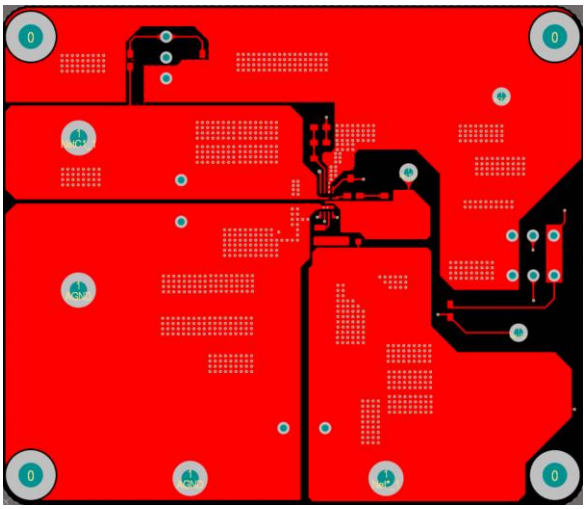


Figure 4. Top Layer

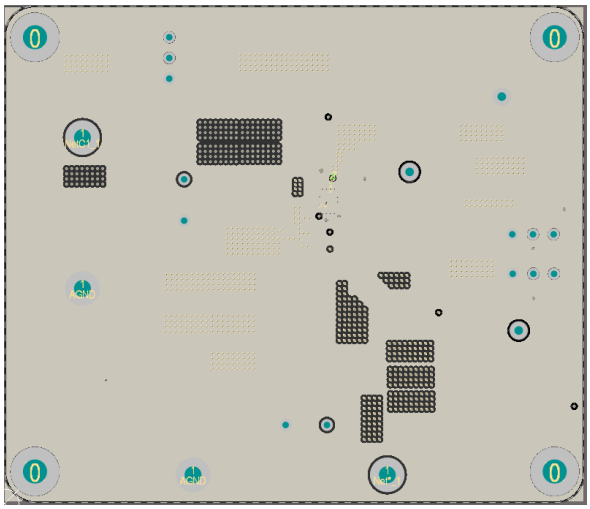


Figure 5. Inner Layer1

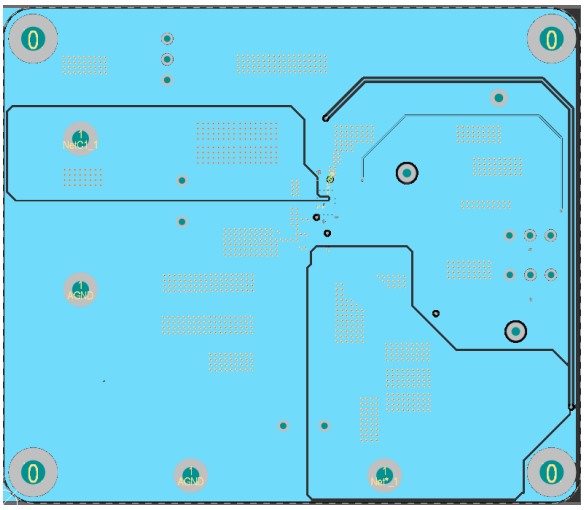


Figure 6. Inner Layer2

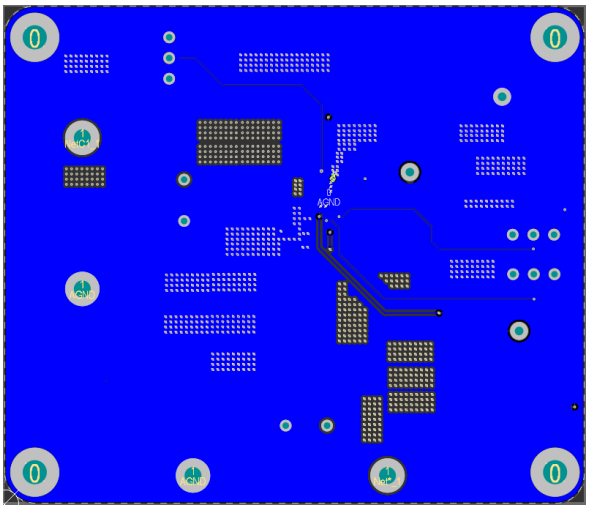


Figure 7. Bottom Layer

EVB TEST RESULTS

Vin=12V, Vout=1V, 5A loading, unless otherwise noted

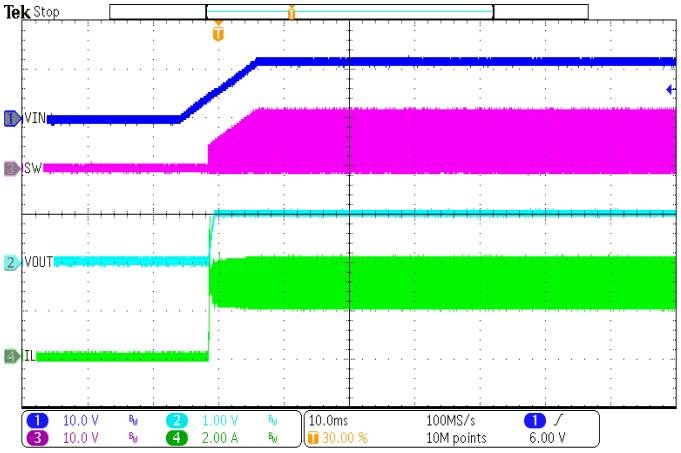


Figure 8. Power Up

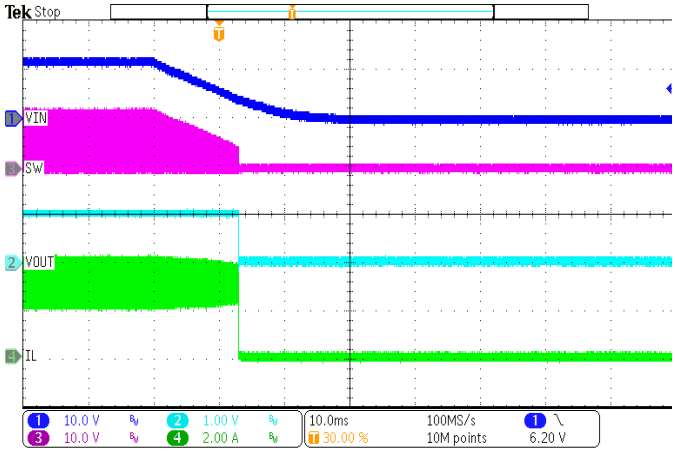


Figure 9. Power Down

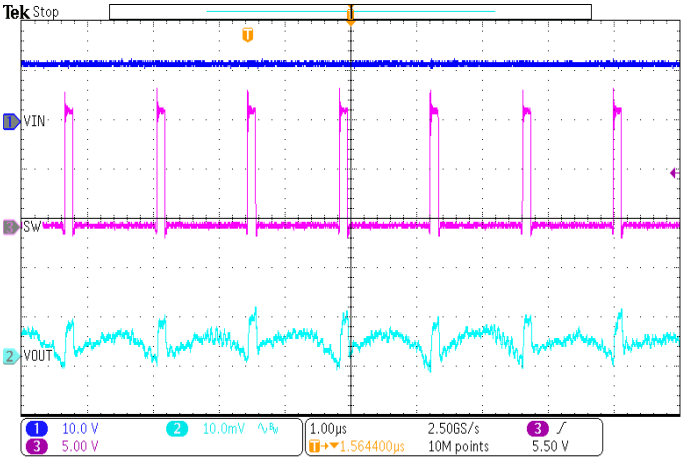


Figure 10. Switching Waveforms and Output Ripple Iout=0.1A

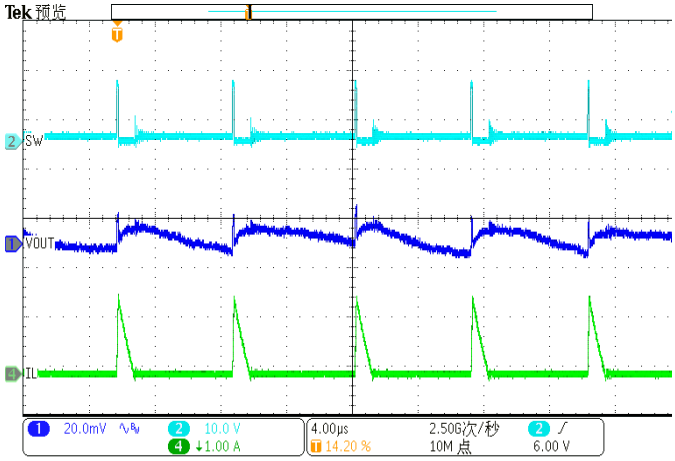


Figure 11. Switching Waveforms and Output Ripple in PFM Iout=600mA

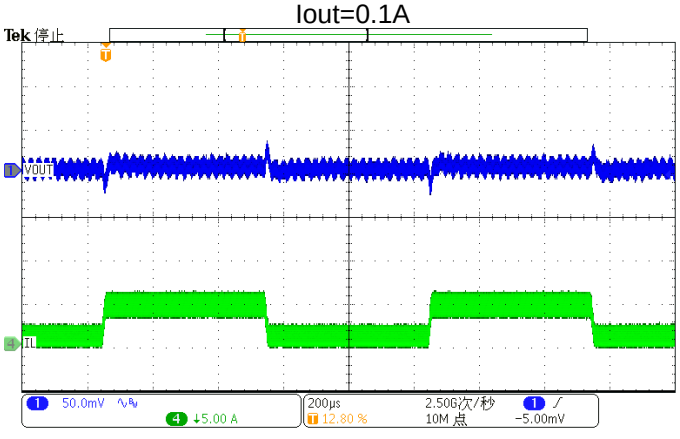


Figure 12. Load Transient (0.2A-7.8A, SR=250mA/us)

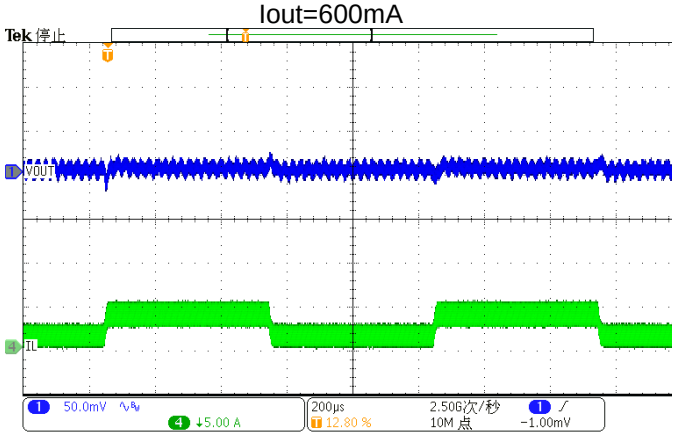


Figure 13. Load Transient (0.2A-0.4A, SR=250mA/us)

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