NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Revision 1.0: Release to Market.

Revision 1.2: Add application waveforms, update efficiency curve.

Revision 1.3: Update R1 and R2 calculation value in page 11.

S G P

SW	8	Regulator switching output. Connect SW to an external power inductor
Thermal Pad	9	Heat dissipation path of die. Electrically connection to GND pin. Must be connected to ground plane on PCB for proper operation and optimized thermal performance.

Over operating free-air temperature range unless otherwise noted

V_{IN}	Input voltage range	4.5	85	V
V_{OUT}	Output voltage range	0.8	24	V
T_J	Operating junction temperature			

V_{REF}	Reference voltage of FB		0.792	0.8	0.808	V
V_{EN_H}	Enable high threshold			1.21		V
V_{EN_L}	Enable low threshold			1.05		V
I_{EN_L}	Enable pin pull-up current	EN=1V		1		μA
I_{EN_H}	Enable pin pull-up current	EN=1.5V		4		uA

T

Figure 2. Efficiency vs Load Current (Vout=5V)

Figure 3. Efficiency vs Load Current (Vout=12V)

Figure 4. Load Regulation (Vout=12V)

Figure 5

The SCT2A10 is a 4.5V-85V input, 0.6A output, internal-compensated synchronous buck converter with built-in 750mΩ Rdson high-side and 500mΩ Rdson low-side power MOSFETs

$$3 = \frac{(\text{——}) -}{{}_1\,(1 - \text{——}) + {}_2} \qquad (1)$$

$$4 = \frac{{}_3 \times}{- \quad + \; {}_3({}_1 + {}_2)} \qquad (2)$$

Where

Vstart: Vin rise threshold to enable the device
Vstop: Vin fall threshold to disable the device
I_1=1uA
I_2=3uA
V_{ENR}=1.21V
V_{EMF}=1.05V

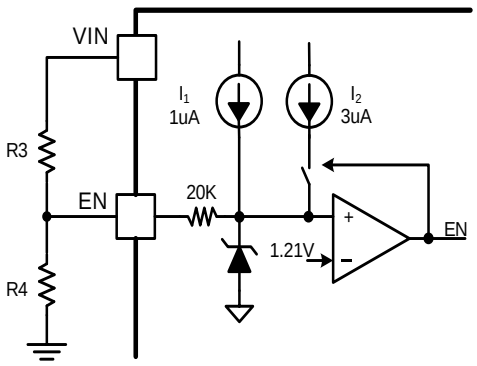


Figure 9. System UVLO by enable divide

The SCT2A10 regulates the internal reference voltage at 0.8V with ±1% tolerance over the operating temperature and voltage range. The output voltage is set by a resistor divider from the output node to the FB pin. It is recommended to use 1% tolerance or better resistors. Use Equation 3 to calculate resistance of resistor dividers. To improve efficiency at light loads, larger value resistors are recommended. However, if the values are too high, the regulator will be more susceptible to noise affecting output voltage accuracy.

$$\_ \quad = (\text{——} - 1) \quad \_ \qquad (3)$$

where

- R_{FB_TOP} is the resistor connecting the output to the FB pin.
- R_{FB_BOT} is the resistor connecting the FB pin to the ground.

The SCT2A10 integrates an internal soft-start circuit that ramps the reference voltage from zero volts to 0.8V reference voltage in 4ms. If the EN pin is pulled below 1.05V, switching stops and the internal soft-start resets. The soft-start also resets during shutdown due to thermal overloading.

The switching frequency of the SCT2A10 is set by placing a resistor between RT pin and the ground.

In resistor setting frequency mode, a resistor placed between RT pin to the ground sets the switching frequency over a wide range from 300KHz to 800KHz. RT pin is not allowed to be left floating or shorted to the ground. Use Equation 4 or the plot in Figure 10. to determine the resistance for a switching frequency needed.

$$(\quad) = \quad (\quad) \qquad (4)$$

Where,

fsw is switching clock frequency

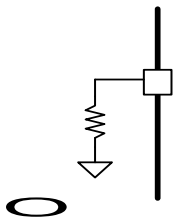


Figure 10. Setting Frequency

Input Voltage	48V Normal 24V to 85V
Output Voltage	12V
Maximum Output Current	600mA
Switching Frequency	500 KHz
Output voltage ripple (peak to peak)	50mV
Transient Response 60mA to 540mA load step	ΔVout = 400mV

The output voltage is set by an external resistor divider R5 and R6 in typical application schematic. Recommended R6 resistance is 10.2KΩ. Use equation 5 to calculate R5.

$$_5 = (\text{——} - 1) \quad _6 \qquad (5)$$

where:

- V_{REF}

- V_{OUT} is the output voltage
- V_{IN} is the input voltage

Since the inductor-current ripple increases with the input voltage, so the maximum input voltage in application is always used to calculate the minimum inductance required. Use Equation 9 to calculate the inductance value.

$$= \frac{\quad}{(\quad)} \quad (1 - \frac{\quad}{(\quad)})$$

The voltage rating of the input capacitor must be greater than the maximum input voltage. And the capacitor must also have a ripple current rating greater than the maximum input current ripple. The RMS current in the input capacitor

Vin=48V, Vout=12V, unless otherwise noted

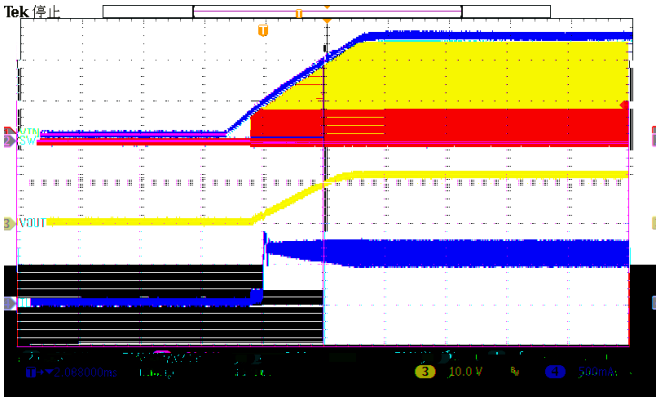


Figure 12. Power up

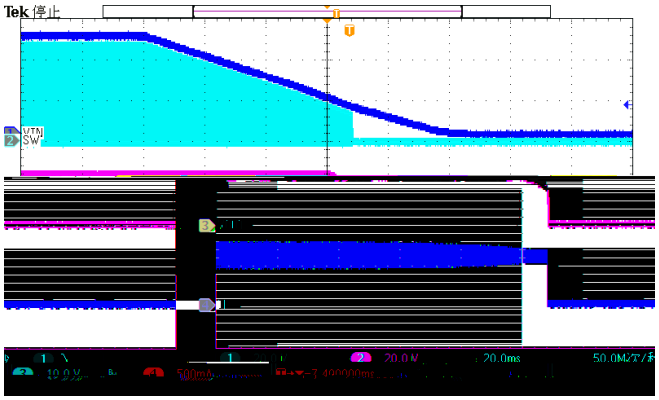


Figure 13. Power down

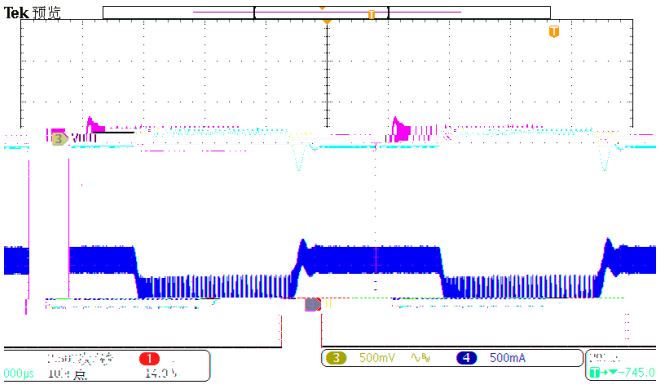


Figure 14.Load Transient (0.06A-0.54A, 0.25A/us)

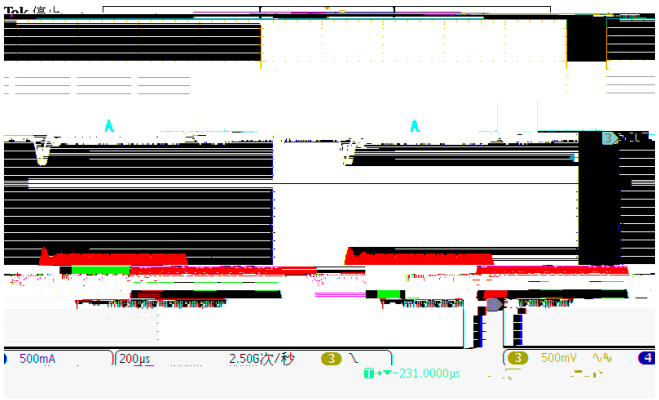


Figure 15. Load Transient (0.15A-0.45A, 0.25A/us)

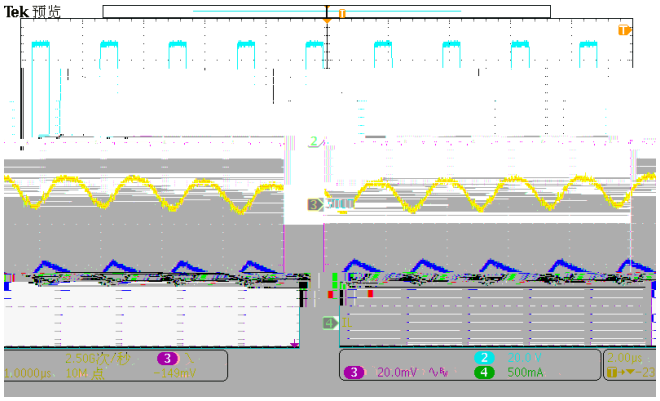


Figure 16. SW and Vout Ripple

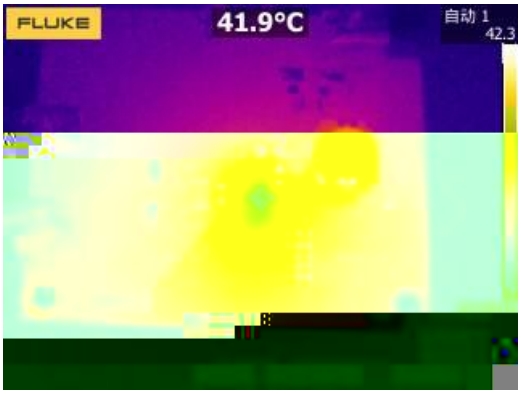
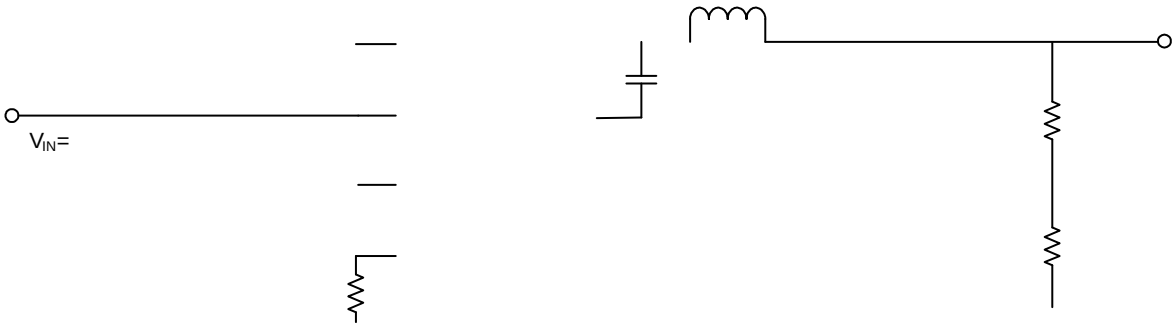
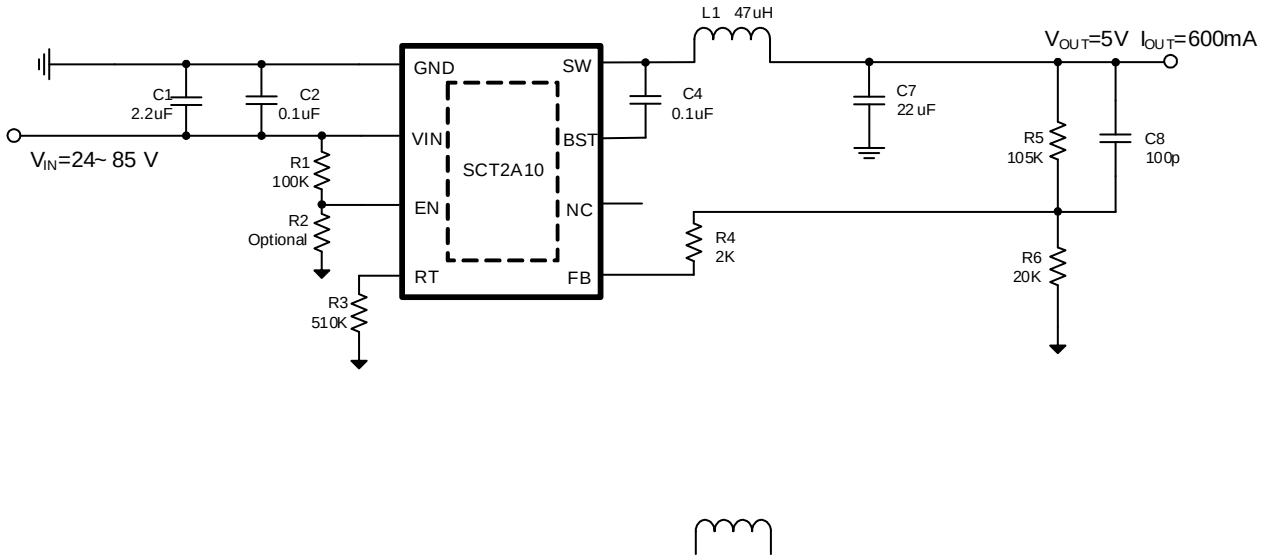


Figure 17. Thermal, 48VIN, 12Vout, 0.6A

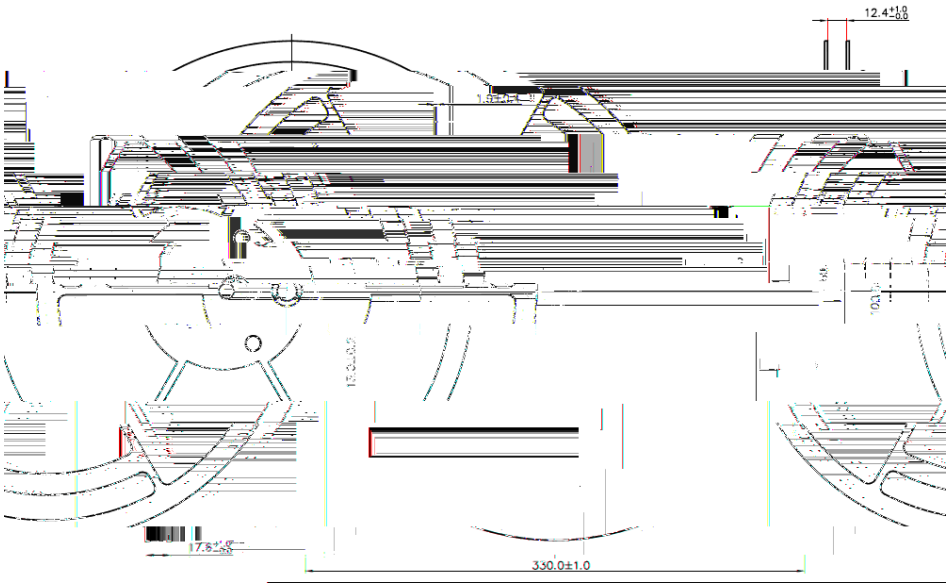

V_{IN}=

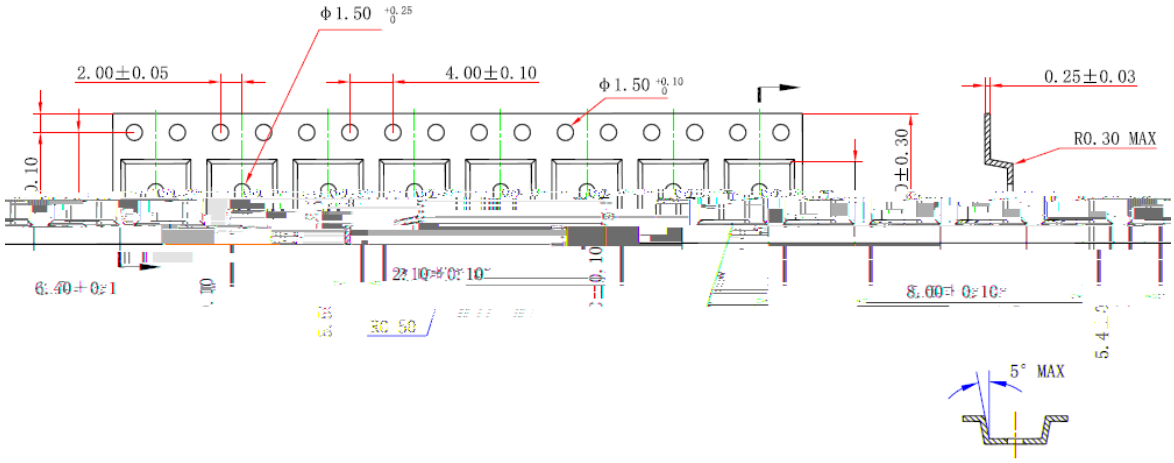

L1 47uH
V_{OUT}=5V I_{OUT}=600mA
C1
2.2uF
C2
0.1uF
V_{IN}=24~ 85 V
R1
100K
R2
Optional
R3
510K
GND
VIN
EN
RT
SW
BST
NC
FB
SCT2A10
C4
0.1uF
C7
22 uF
R4
2K
R5
105K
C8
100p
R6
20K

Proper PCB layout is a critical for SCT2A10's stable and efficient operation. The traces conducting fast switching currents or voltages are easy to interact with stray inductance and parasitic capacitance to generate noise and degrade performance. For better results, follow these guidelines as below:

ESOP8/PP(95x130) Package Outline Dimensions

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	1.300	1.700	0.051	0.067
A1	0.000	0.100	0.000	0.004
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
D1	3.050	3.250	0.120	0.128
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.160	2.360	0.085	0.093
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050





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