EV2457-T-00A

36V,0.6A,2MHz, Synchronous, Step-Down Converter Evaluation Board

DESCRIPTION

The EV2457-T-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MP2457, a high-frequency, step-down, switching regulator with integrated high-side and low-side power MOSFETs designed specifically for power meter applications. The MP2457 can provide up to 0.6A of output current efficiently with current-mode control for fast loop response.

The wide 5V to 36V input range accommodates a variety of power meter step-down applications, and the 0.6μA shutdown mode quiescent current allows the device to be used in battery-powered applications. The MP2457 uses high duty cycle and low dropout mode for low power meter input voltage conditions.

Frequency fold-back prevents short circuit and inductor current runaway during start-up. Thermal shutdown provides reliable and fault-tolerant operation. The MP2457 is available in a cost-effective TSOT23-6 package.

ELECTRICAL SPECIFICATION (1)

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	24	V
Output Voltage	V_{OUT}	12	V
Output Current	I_{OUT}	0.6	A

NOTES:

1) For different Input/output voltage specs and different output capacitor/inductor may need change the application circuit parameters.

FEATURES

- Optimized for Power Meter Applications
- Low Dropout Mode
- 65μA Operating Quiescent Current
- Light-Load Mode
- >90% Efficiency
- Dedicated Internal Compensation
- Wide 5V to 36V Operating Input Range
- 400mΩ/200mΩ Internal Power MOSFETs
- 2MHz Fixed Switching Frequency
- Internal Soft Start (SS)
- Precision Current Limit without Current Sensing Resistor
- Guaranteed Industrial Temperature Range Limits
- Available in a TSOT23-6 Package

APPLICATIONS

- High Voltage Power Conversion
- Industrial Power Systems
- Battery Powered Systems
- Power Meters

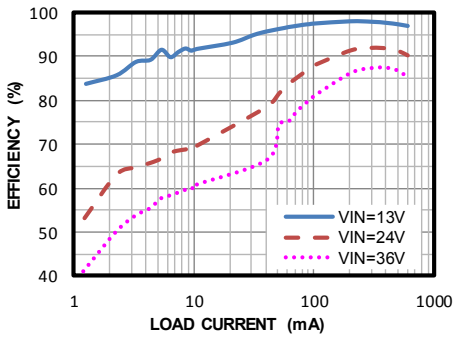
EV2457-T-00A EVALUATION BOARD

(L x W) 63.5mm x 63.5mm

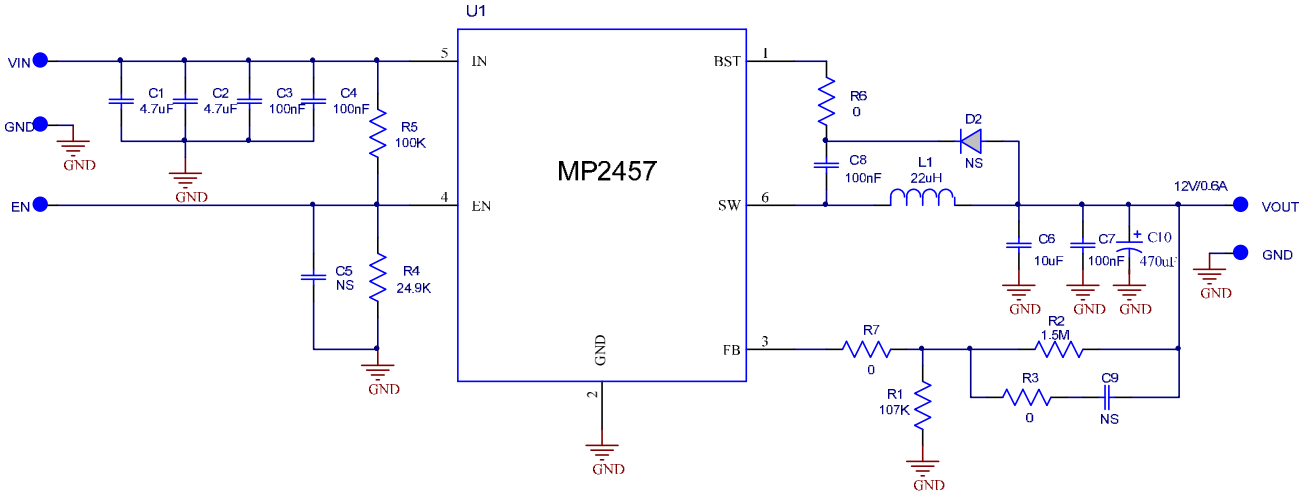
Board Number	MPS IC Number
EV2457-T-00A	MP2457GJ

Efficiency vs. Load Current

V_{OUT}=12V



EVALUATION BOARD SCHEMATIC



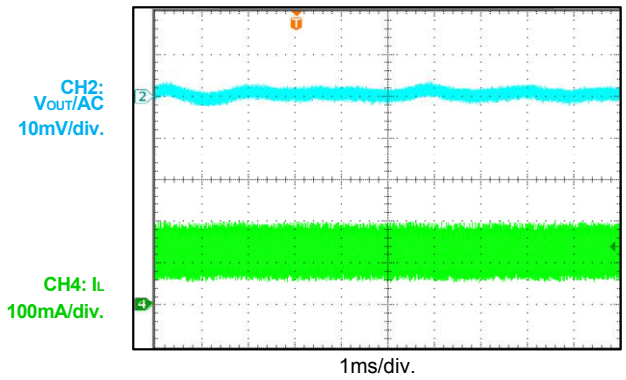
EV2457-T-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
2	C1,C2	4.7μF	Ceramic Cap., 50V, X5R	1210	muRata	GRM32ER71H475KA88L
2	C3,C4	0.1μF	Ceramic Cap., 50V, X7R	0603	muRata	GRM188R71H104KA93D
0	C5,C9	NS				
1	C6	10μF	Ceramic Cap, X7R, 25V	1210	muRata	GRM32DR71E106KA12L
2	C7,C8	0.1μF	Ceramic Cap, X7R, 25V	0603	muRata	GRM188R71E104KA01D
1	C10	470μF	Electrolytic capacitor,25V	DIP	Jianghai	CD284
1	R1	107K	Thick Film Res., 1%	0603	Yageo	RC0603FR-07107KL
1	R2	1.5M	Thick Film Res., 1%	0603	Yageo	RC0603FR-071M5L
3	R3, R6, R7	0Ω	Thick Film Res., 1%	0603	Yageo	RC0603FR-070RL
1	R4	24.9K	Thick Film Res., 1%	0603	Yageo	RC0603FR-0724K9L
1	R5	100K	Thick Film Res., 1%	0603	Yageo	RC0603FR-07100KL
0	D2	NS				
1	L1	22μH	Inductor, DCR=69mΩ,Is=2.6A	SMD	Wurth	74404084220
1	U1	MP2457GJ	Synchronous Step-Down Converter	TSOT23-6	MPS	MP2457GJ

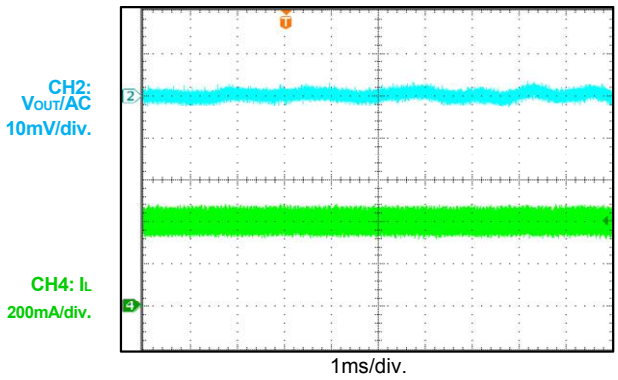
EVB TEST RESULTS

V_{IN} =24V, V_{OUT} =12V, L = 22µH, T_A = +25°C, unless otherwise noted.

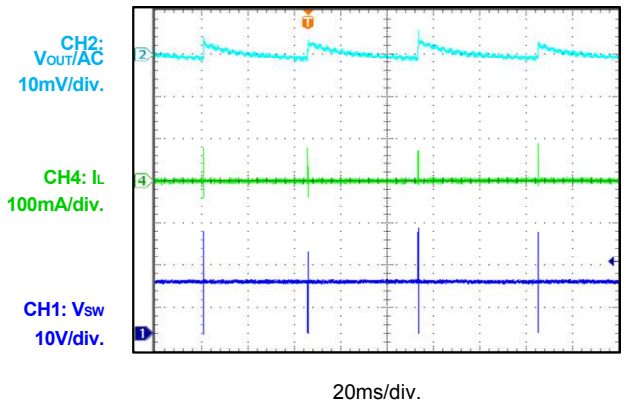
Output Voltage Ripple
I_{OUT} = 0.125A



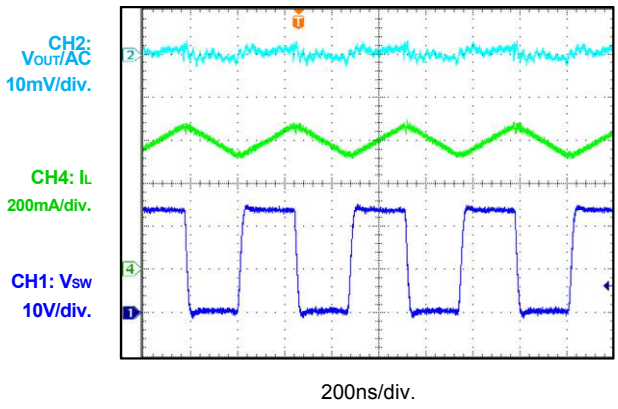
Output Voltage Ripple
I_{OUT} = 0.4A



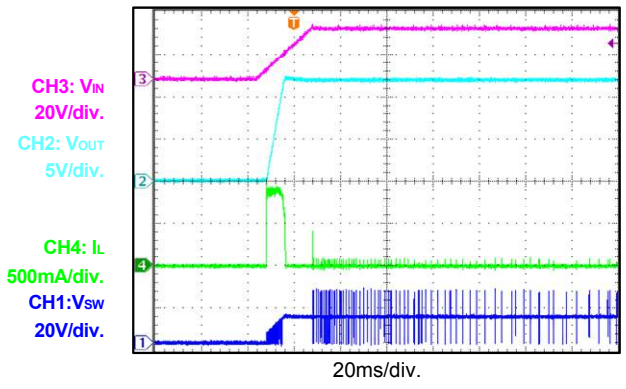
Steady State
I_{OUT} = 0A



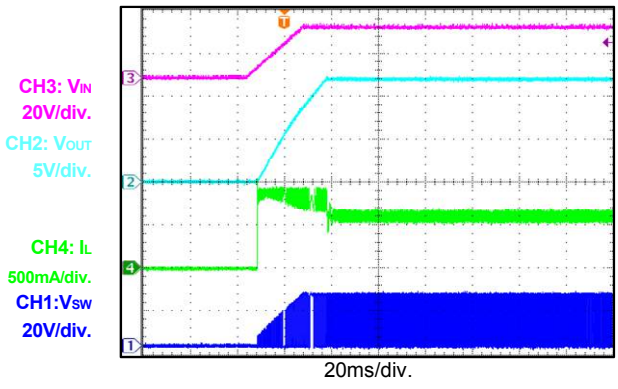
Steady State
I_{OUT} = 0.6A



Start-Up through V_{IN}
I_{OUT} = 0A



Start-Up through V_{IN}
I_{OUT} = 0.6A

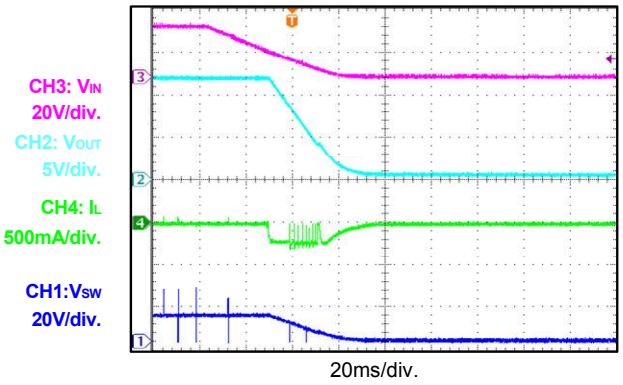


EVB TEST RESULTS *(continued)*

V_{IN} =24V, V_{OUT} =12V, L = 22µH, T_A = +25°C, unless otherwise noted.

Shutdown through V_{IN}

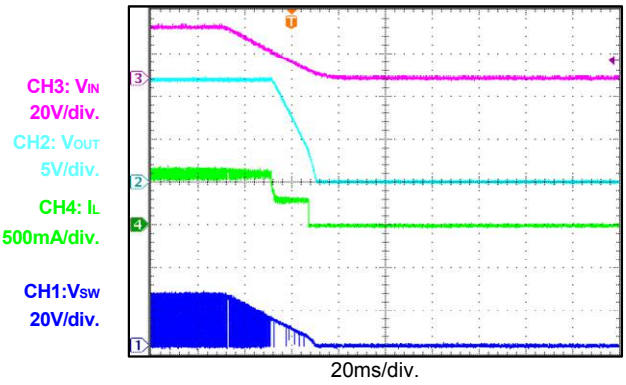
I_{OUT} = 0A



20ms/div.

Shutdown through V_{IN}

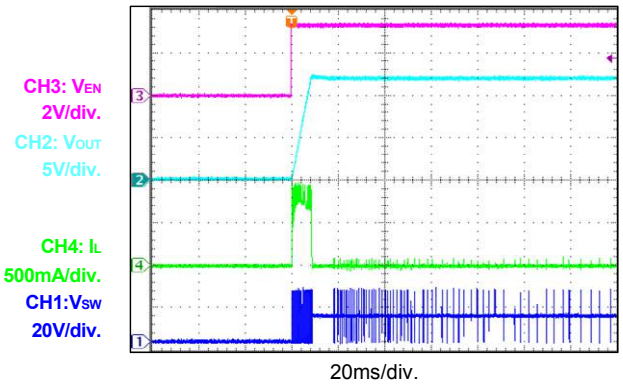
I_{OUT} = 0.6A



20ms/div.

Start-Up through EN

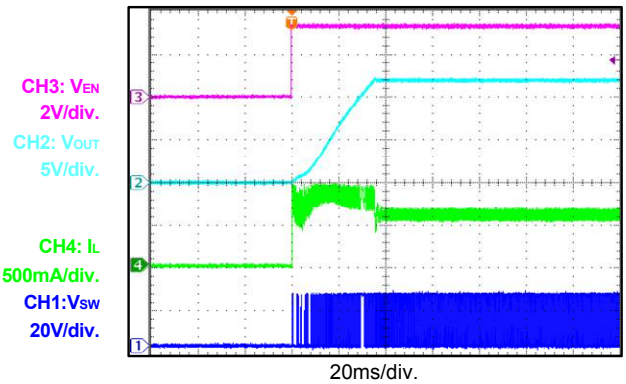
I_{OUT} = 0A



20ms/div.

Start-Up through EN

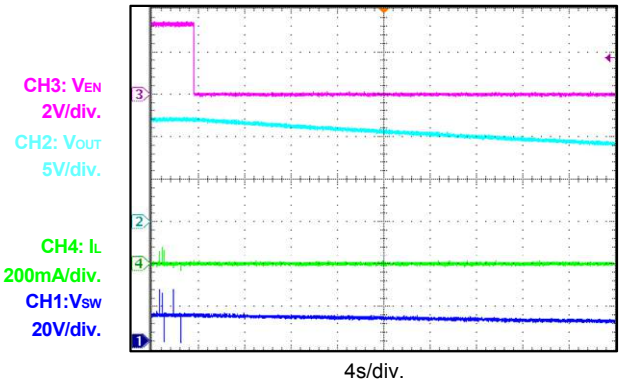
I_{OUT} = 0.6A



20ms/div.

Shutdown through EN

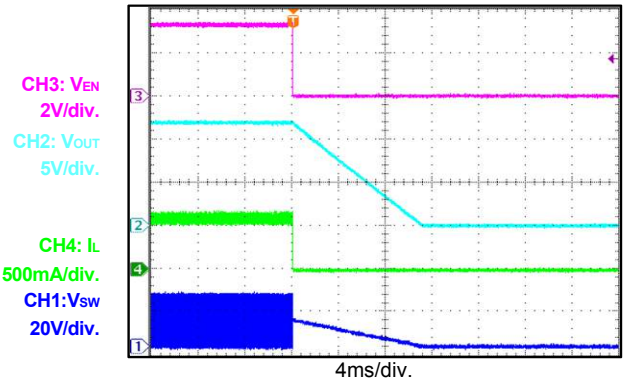
I_{OUT} = 0A



4s/div.

Shutdown through EN

I_{OUT} = 0.6A



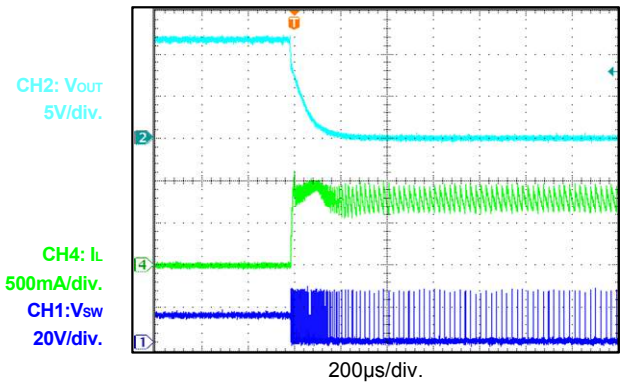
4ms/div.

EVB TEST RESULTS *(continued)*

V_{IN} =24V, V_{OUT} =12V, L = 22µH, T_A = +25°C, unless otherwise noted.

SCP Entry

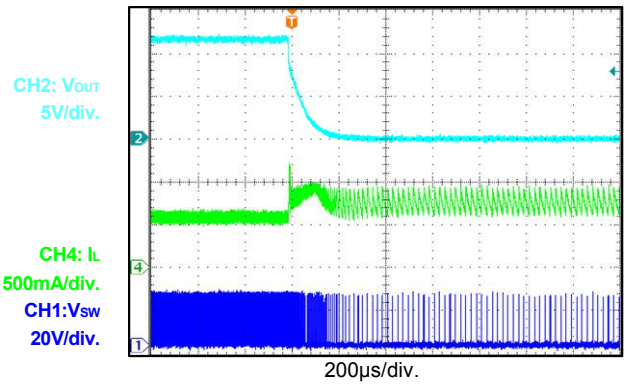
I_{OUT} = 0A to Short Circuit



200µs/div.

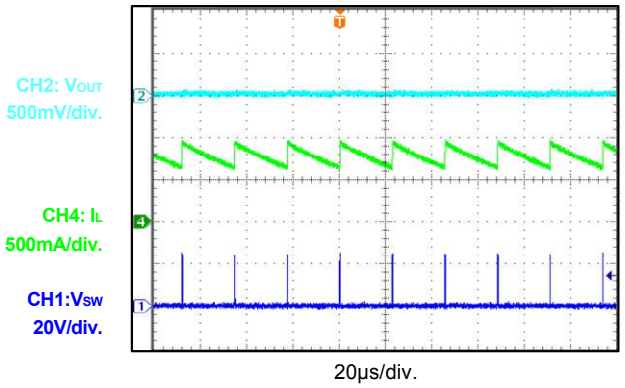
SCP Entry

I_{OUT} = 0.6A to Short Circuit



200µs/div.

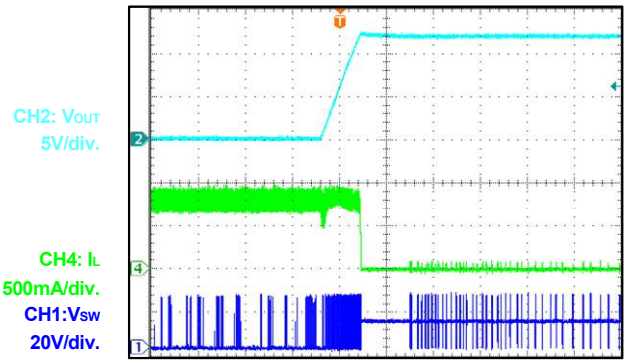
SCP Steady State



20µs/div.

SCP Recovery

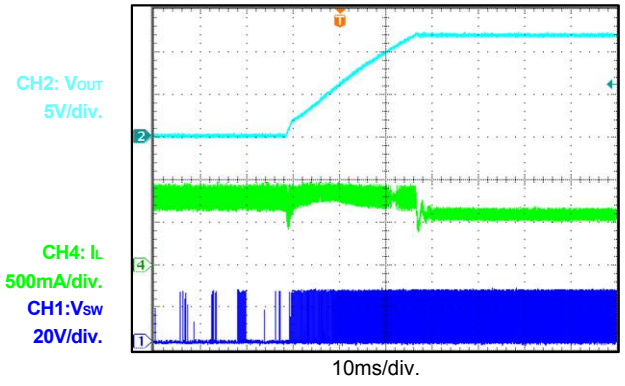
Short Circuit to I_{OUT} = 0A



10ms/div.

SCP Recovery

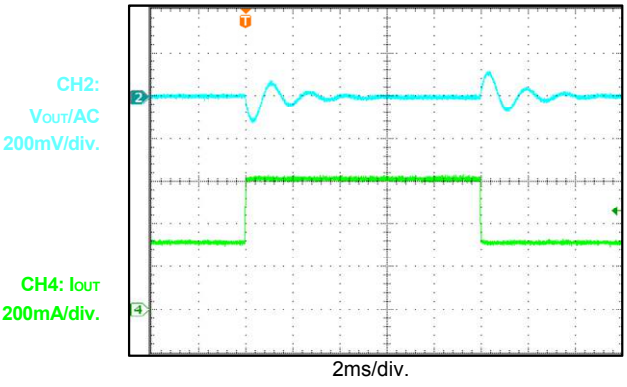
Short Circuit to I_{OUT} = 0.6A



10ms/div.

Load Transient

I_{OUT} = 0.3A <-> 0.6A, 1.6A/µs



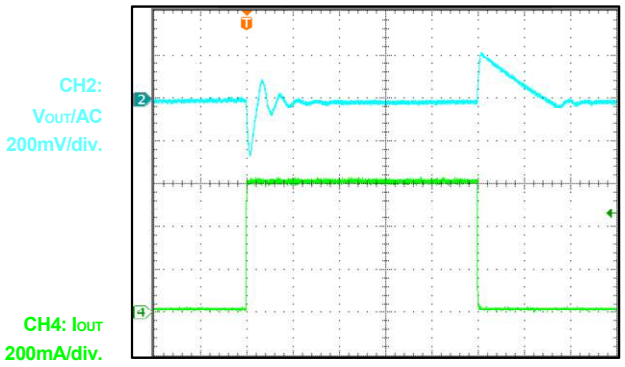
2ms/div.

EVB TEST RESULTS *(continued)*

V_{IN} =24V, V_{OUT} =12V, L = 22µH, T_A = +25°C, unless otherwise noted.

Load Transient

I_{OUT} = 10mA <-> 0.6A, 1.6A/µs



4ms/div.

PRINTED CIRCUIT BOARD LAYOUT

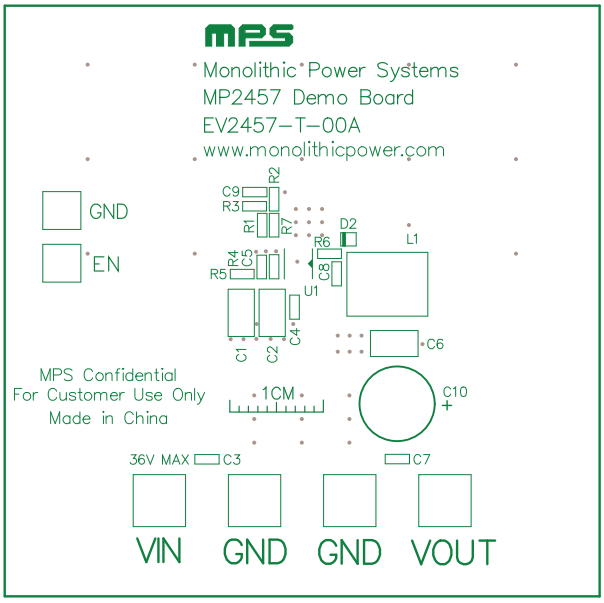


Figure 1: Top Silk Layer

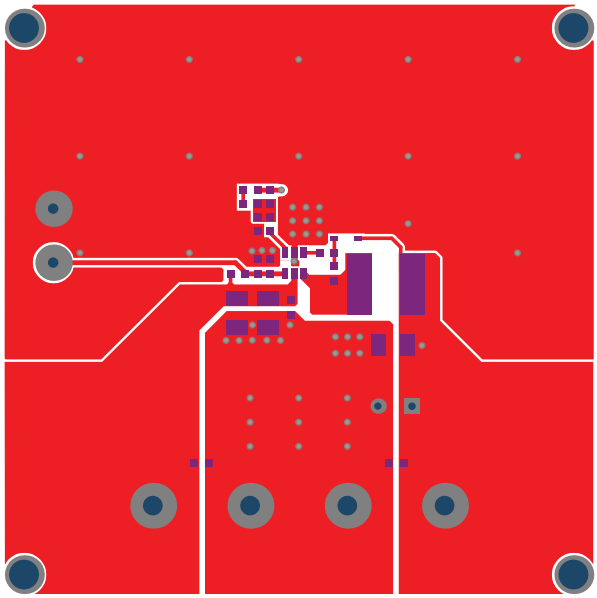


Figure 2: Top Layer

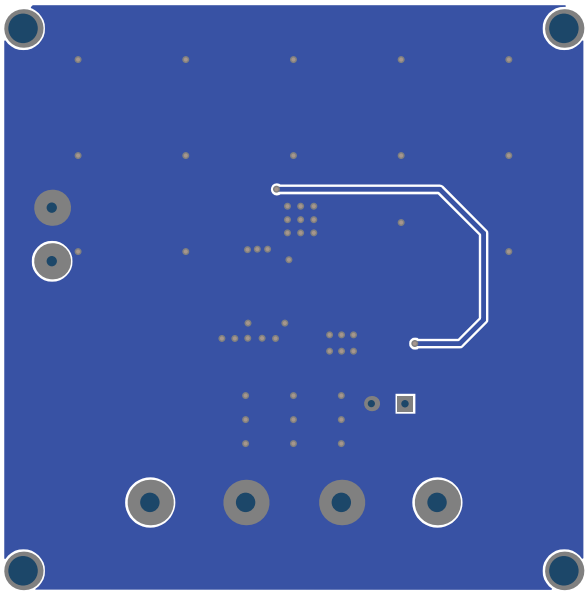


Figure 3: Bottom Layer

QUICK START GUIDE

1. Preset Power Supply to 24V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
    a. Positive (+): VIN
    b. Negative (–): GND
4. Connect Load to:
    a. Positive (+): VOUT
    b. Negative (–): GND
5. Turn Power Supply on after making connections. The board will automatically start up.
6. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 2V to turn on the regulator, or less than 1.3V to turn it off.