



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 0.6 μ A 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
- 65 μ A Operating Quiescent Current
- Light-Load Mode
- >90% Efficiency
- Dedicated Internal Compensation
- Wide 5V to 36V Operating Input Range
- 400m Ω /200m Ω 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

All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance. "MPS" and "The Future of Analog IC Technology" are Registered Trademarks of Monolithic Power Systems, Inc.

EV2457-T-00A EVALUATION BOARD

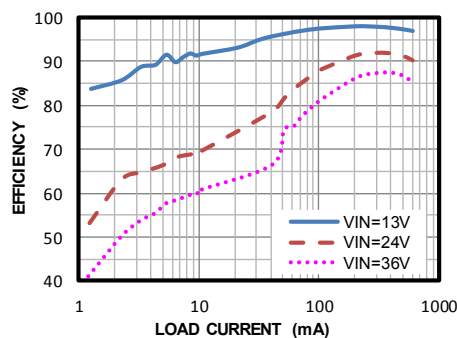


(L x W) 63.5mm x 63.5mm

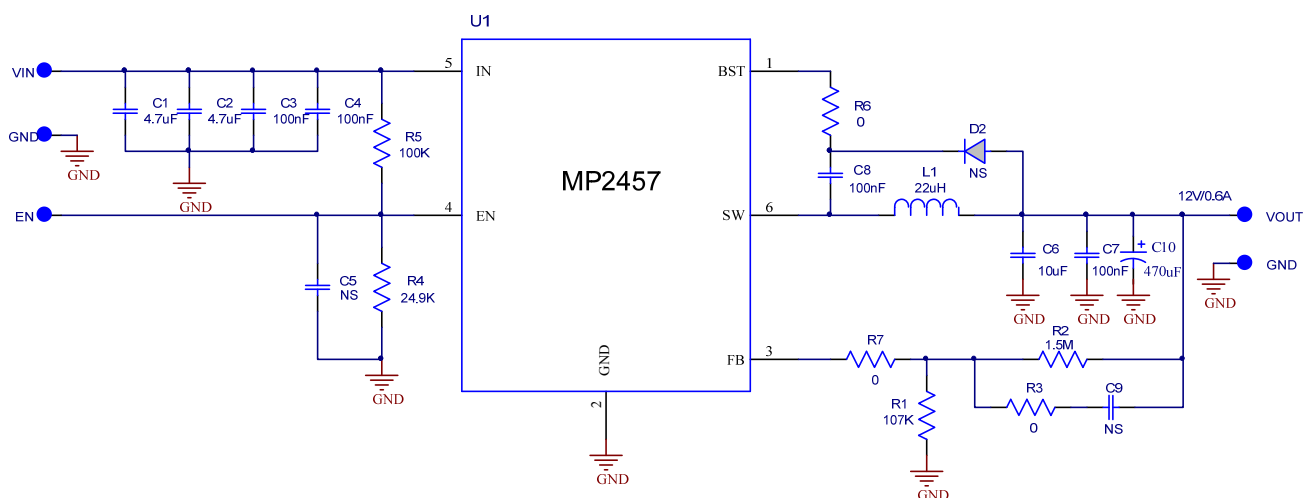
Board Number	MPS IC Number
EV2457-T-00A	MP2457GJ

Efficiency vs. Load Current

$V_{OUT}=12V$



EVALUATION BOARD SCHEMATIC



EV2457-T-00A BILL OF MATERIALS

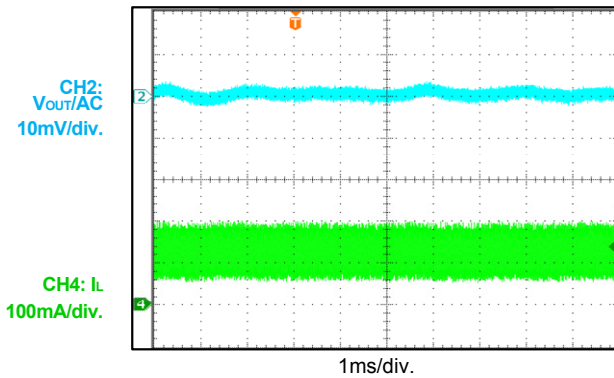
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
2	C1,C2	4.7 μ F	Ceramic Cap., 50V, X5R	1210	muRata	GRM32ER71H475KA88L
2	C3,C4	0.1 μ F	Ceramic Cap., 50V, X7R	0603	muRata	GRM188R71H104KA93D
0	C5,C9	NS				
1	C6	10 μ F	Ceramic Cap, X7R, 25V	1210	muRata	GRM32DR71E106KA12L
2	C7,C8	0.1 μ F	Ceramic Cap, X7R, 25V	0603	muRata	GRM188R71E104KA01D
1	C10	470 μ F	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	0 Ω	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	22 μ H	Inductor, DCR=69m Ω , Is=2.6A	SMD	Würth	74404084220
1	U1	MP2457GJ	Synchronous Step-Down Converter	TSOT23-6	MPS	MP2457GJ

EVB TEST RESULTS

$V_{IN} = 24V$, $V_{OUT} = 12V$, $L = 22\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

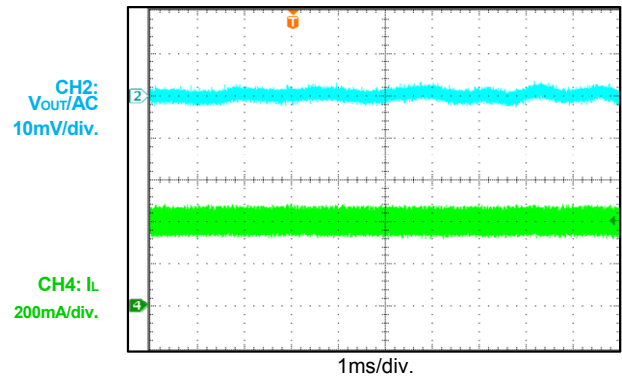
Output Voltage Ripple

$I_{OUT} = 0.125A$



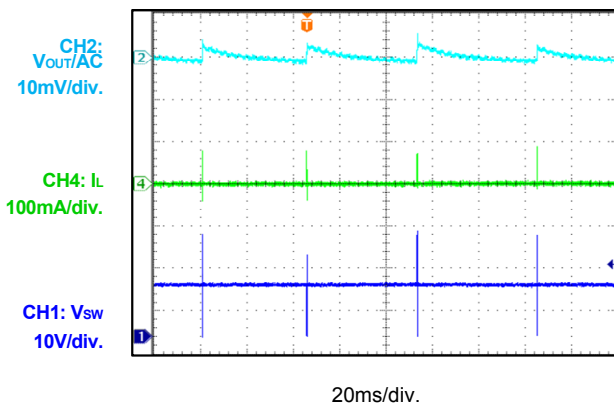
Output Voltage Ripple

$I_{OUT} = 0.4A$



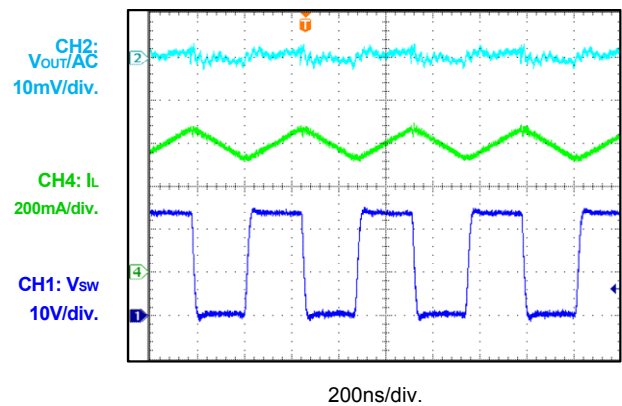
Steady State

$I_{OUT} = 0A$



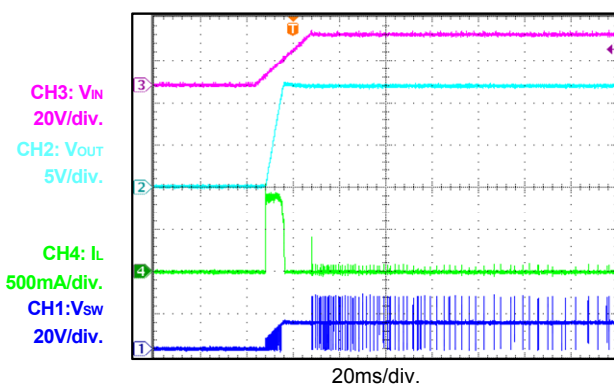
Steady State

$I_{OUT} = 0.6A$



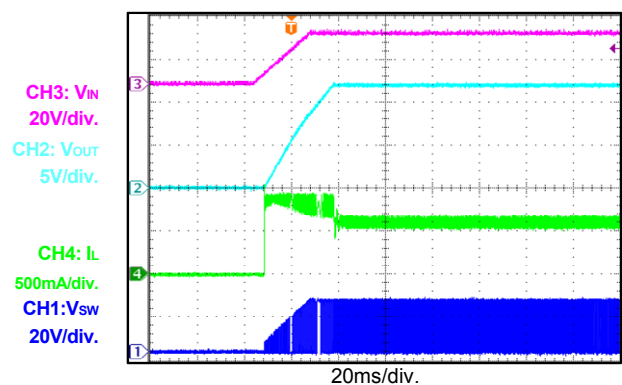
Start-Up through V_{IN}

$I_{OUT} = 0A$



Start-Up through V_{IN}

$I_{OUT} = 0.6A$

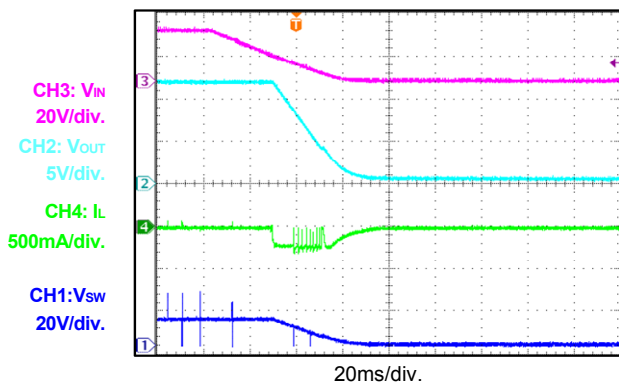


EVB TEST RESULTS (continued)

$V_{IN} = 24V$, $V_{OUT} = 12V$, $L = 22\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

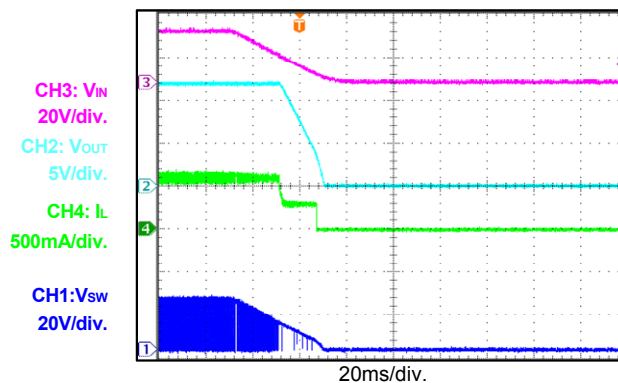
Shutdown through V_{IN}

$I_{OUT} = 0A$



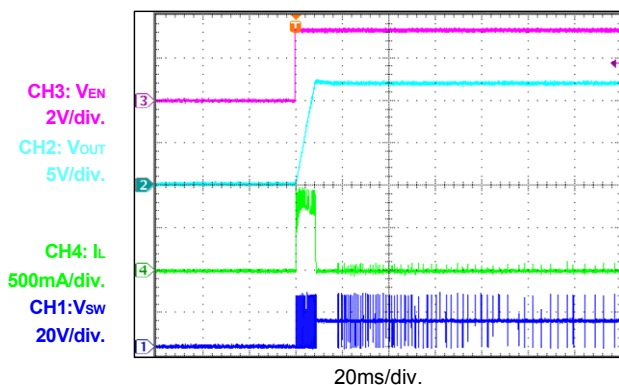
Shutdown through V_{IN}

$I_{OUT} = 0.6A$



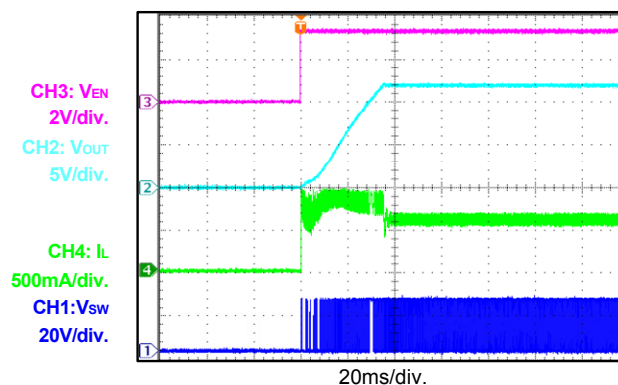
Start-Up through EN

$I_{OUT} = 0A$



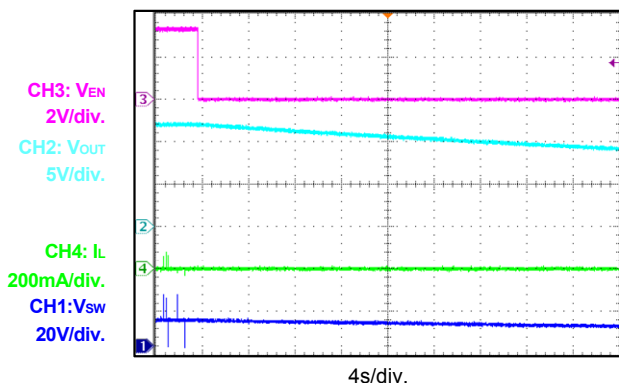
Start-Up through EN

$I_{OUT} = 0.6A$



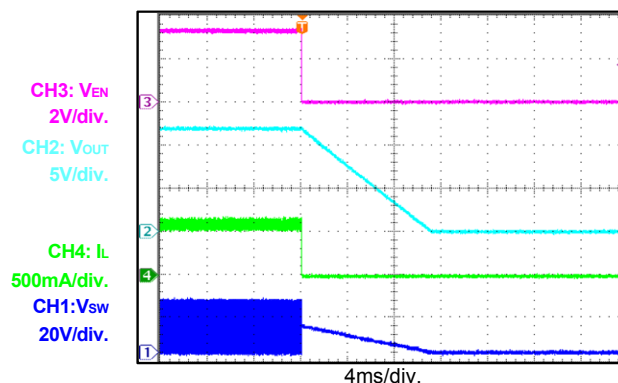
Shutdown through EN

$I_{OUT} = 0A$



Shutdown through EN

$I_{OUT} = 0.6A$

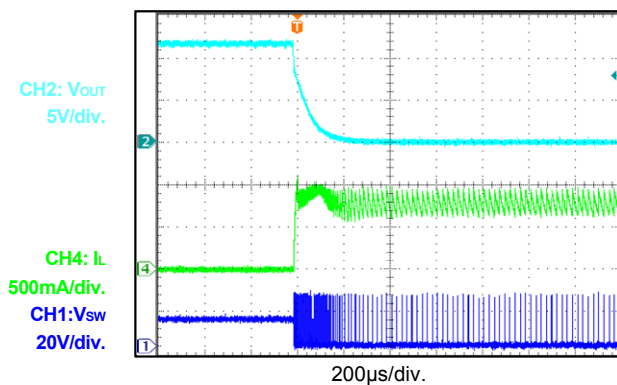


EVB TEST RESULTS (continued)

$V_{IN} = 24V$, $V_{OUT} = 12V$, $L = 22\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

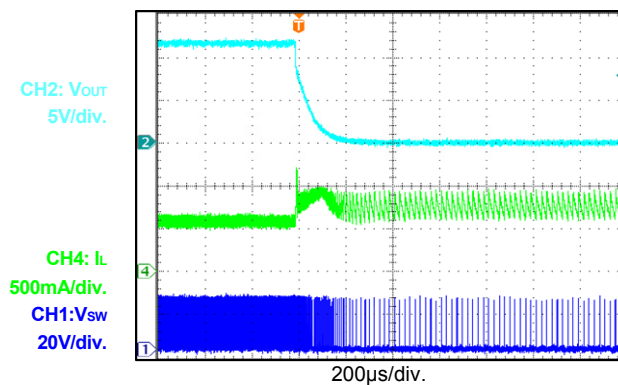
SCP Entry

$I_{OUT} = 0A$ to Short Circuit

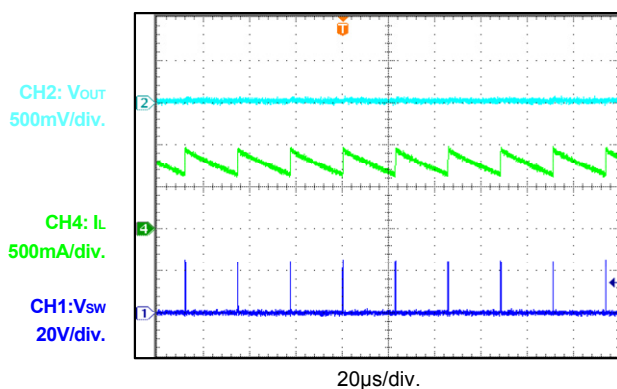


SCP Entry

$I_{OUT} = 0.6A$ to Short Circuit

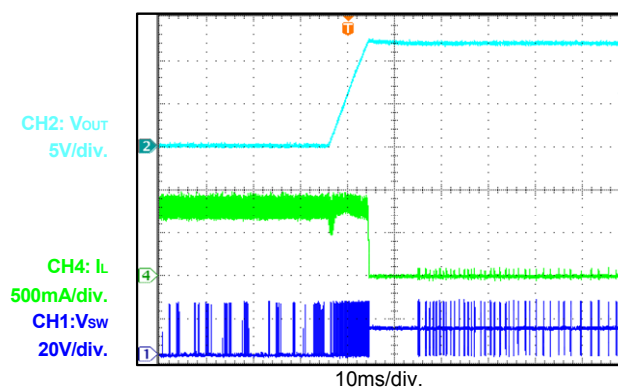


SCP Steady State



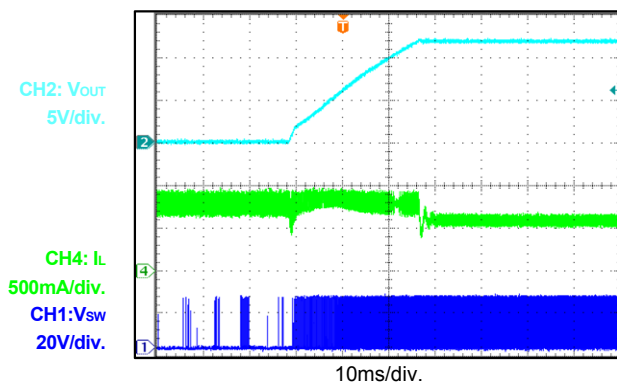
SCP Recovery

Short Circuit to $I_{OUT} = 0A$



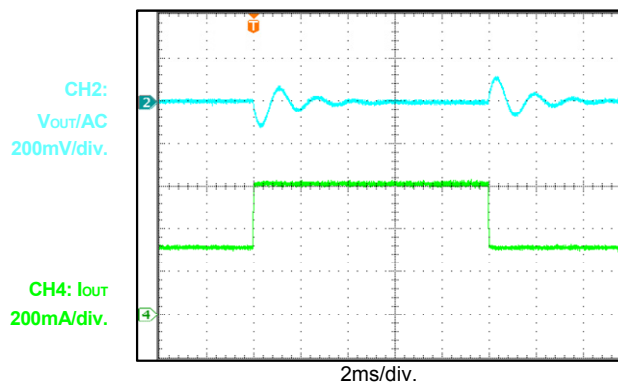
SCP Recovery

Short Circuit to $I_{OUT} = 0.6A$



Load Transient

$I_{OUT} = 0.3A \leftrightarrow 0.6A$, $1.6A/\mu s$

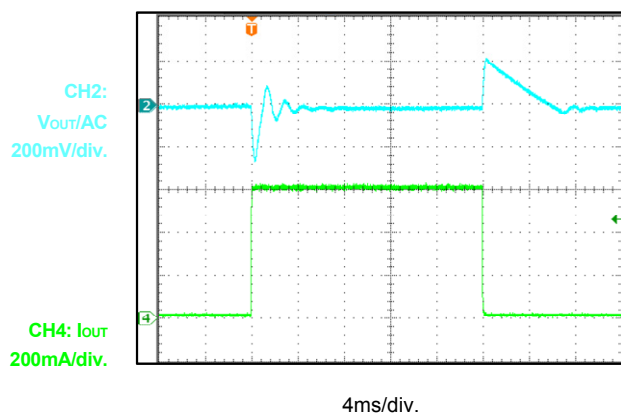


EVB TEST RESULTS (continued)

$V_{IN} = 24V$, $V_{OUT} = 12V$, $L = 22\mu H$, $T_A = +25^{\circ}C$, unless otherwise noted.

Load Transient

$I_{OUT} = 10mA \leftrightarrow 0.6A$, $1.6A/\mu s$



PRINTED CIRCUIT BOARD LAYOUT

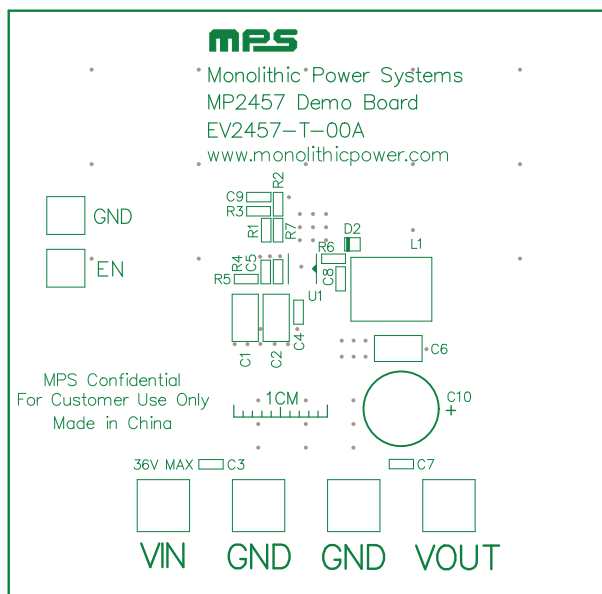


Figure 1: Top Silk Layer

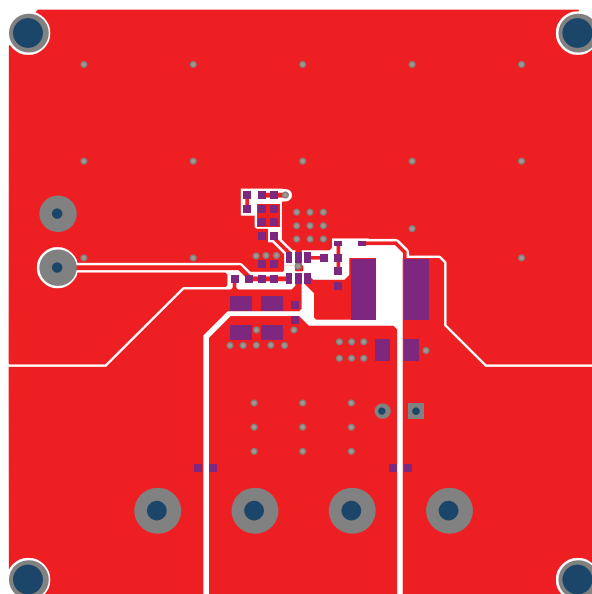


Figure 2: Top Layer

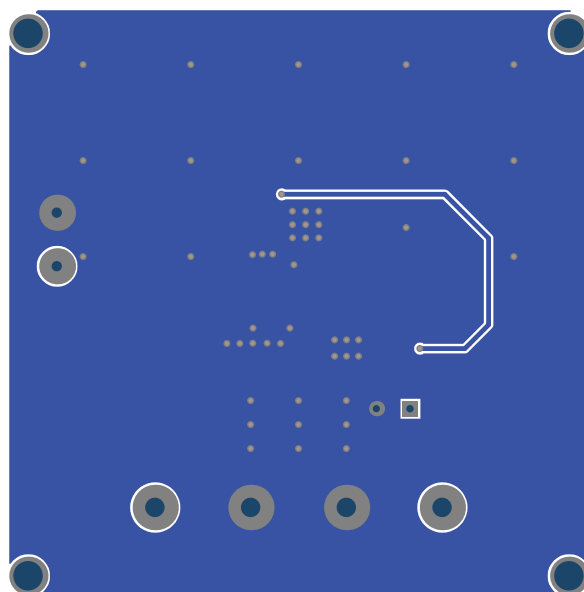


Figure 3: Bottom Layer

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.

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