EVL2460-J-00A

45V, 0.6A, 1.7MHz, Synchronous, Step-Down Converter Evaluation Board

DESCRIPTION

The EVL2460-J-00A evaluation board is designed to demonstrate the capabilities of MPS's MP2460, a high-frequency, step-down switching regulator with integrated high-side and low-side power MOSFETs. The MP2460 can provide up to 0.6A of output current with current mode control for fast loop response.

The wide 4.5V to 45V input range accommodates a variety of step-down applications, and the 1μA shutdown mode quiescent current allows the device to be used in battery-powered applications. The MP2460 uses high duty cycle and low-dropout mode for low input voltage conditions.

The MP2460 has built-in protection features, such as cycle-by-cycle current limiting, hiccup mode, short-circuit protection, and thermal shutdown. It is available in a cost-effective TSOT23-6 package.

ELECTRICAL SPECIFICATIONS (1)

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	12.5 to 45	V
Output voltage	V_{OUT}	12	V
Output current	I_{OUT}	0.6	A

Notes:

1) For different input/output voltage specifications with different output capacitors/inductors, the application circuit parameters may require changes.

FEATURES

- Meets 0.1% Output Voltage Ripple
- Low-Dropout Mode
- Wide 4.5V to 45V Operating Input Range
- 50V Absolute Maximum Rating
- 2% to 98% Large Range Duty Cycle
- Light-Load Mode
- >90% Efficiency
- Dedicated Internal Compensation
- Stable with Ceramic/Electrolytic Output Capacitors
- 420mΩ/220mΩ Internal Power MOSFETs
- 1.7MHz Fixed Switching Frequency
- Internal Soft Start (SS)
- Precision Current Limit without Current-Sensing Resistor
- Short-Circuit Protection with Hiccup Mode
- Output Adjustable from 0.8V to 98% of V_{IN}
- Over-Temperature Protection
- Available in a TSOT23-6 Package
- MPL Optimized Performance with MPS Inductor

APPLICATIONS

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

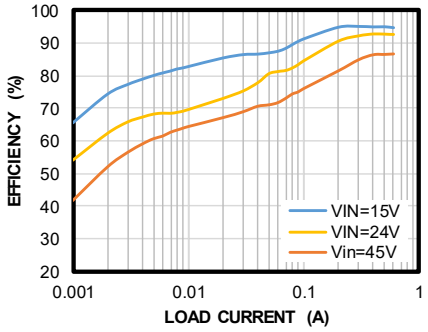
EVL2460-J-00A EVALUATION BOARD

LxW (50.8mmx50.8mm)

Board Number	MPS IC Number	MPS Inductor
EVL2460-J-00A	MP2460GJ	MPL-SE6040-220

Efficiency vs. Load Current

V_{OUT} = 12V



QUICK START GUIDE

1. Preset the power supply (V_{IN}) between 12.5V and 45V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. Turn the power supply on after making the connections. The board should automatically start up.
6. To use the enable function, apply a digital input to the EN pin. Drive EN above 2V to turn the regulator on; drive EN below 1V to turn it off.

EVALUATION BOARD SCHEMATIC

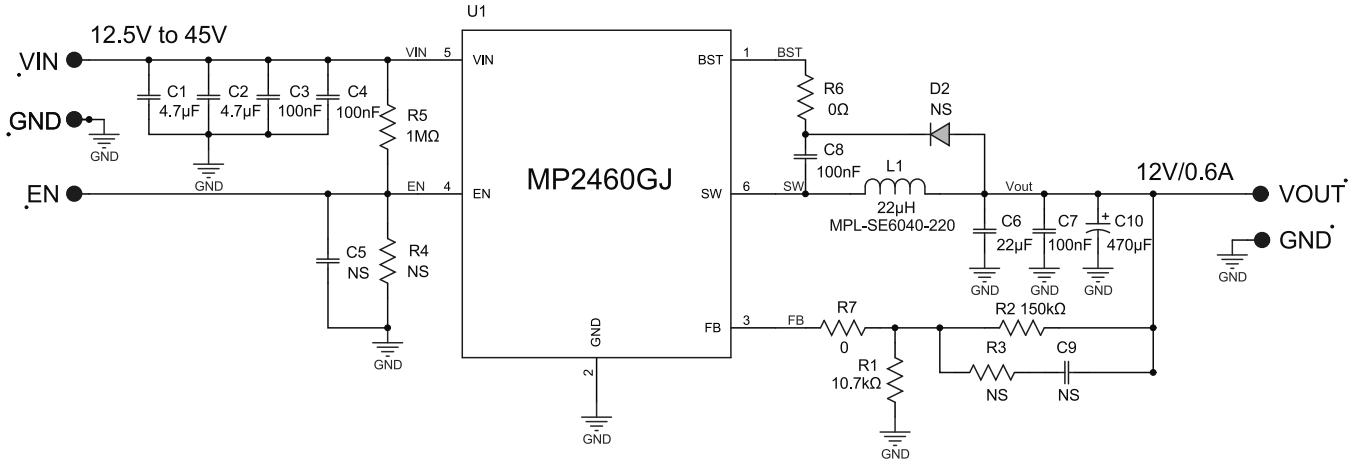


Figure 1: Evaluation Board Schematic

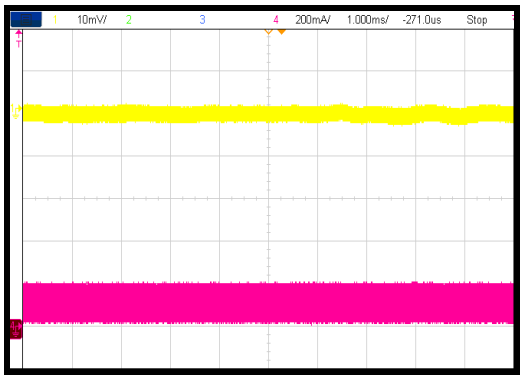
EVL2460-J-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	L1	22µH	Inductor, DCR = 97mΩ, I_{SAT} = 2.35A	SMD	MPS	MPL-SE6040-220
2	C1,C2	4.7µF	Ceramic capacitor, 100V, X7S	1210	Murata	GRM32DC72A475KE01L
4	C3, C4, C7, C8	0.1µF	Ceramic capacitor, 100V, X7R	0603	Murata	GRM188R72A104KA35D
1	C6	22µF	Ceramic capacitor, 25V, X7R	1210	Murata	GRM32ER71E226KE15L
1	C10	470µF	Electrolytic capacitor, 25V	DIP	Jianghai	CD284
1	R1	10.7kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-0710K7L
1	R2	150kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-07150KL
2	R6,R7	0Ω	Thick film resistor, 5%	0603	Yageo	RC0603FR-070RL
1	R5	1MΩ	Thick film resistor, 5%	0603	Yageo	RC0603JR-071ML
0	D2	NS				
0	R3, R4	NS				
0	C5, C9	NS				
1	U1	MP2460	Synchronous step-down converter	TSOT23-6	MPS	MP2460GJ

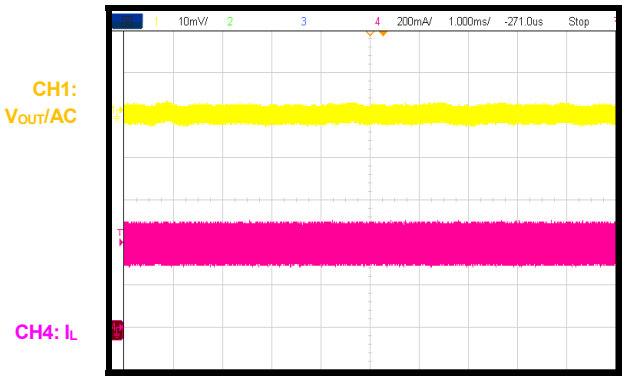
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 24V, V_{OUT} = 12V, C6 = 22µF, C10 = 470µF, L1 = 22µH, T_A = 25°C, unless otherwise noted.

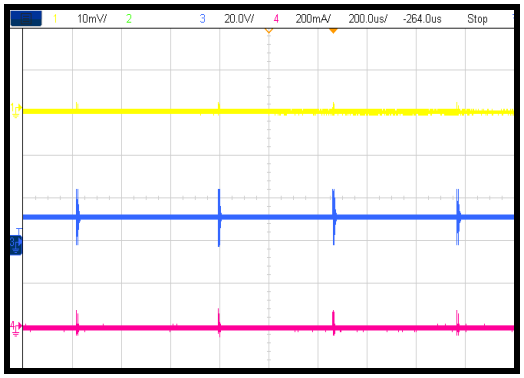
Output Voltage Ripple
I_{OUT} = 0.125A



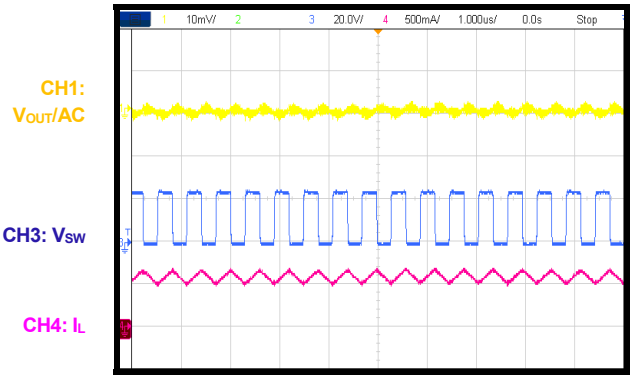
Output Voltage Ripple
I_{OUT} = 0.4A



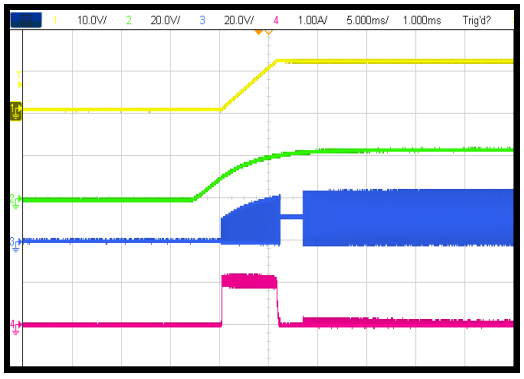
Steady State
I_{OUT} = 0A



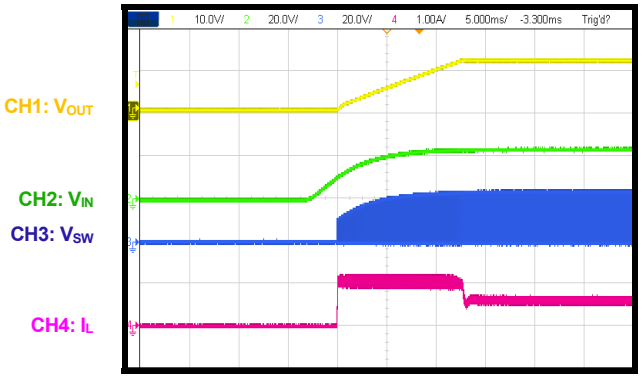
Steady State
I_{OUT} = 0.6A



Start-Up through VIN
I_{OUT} = 0A



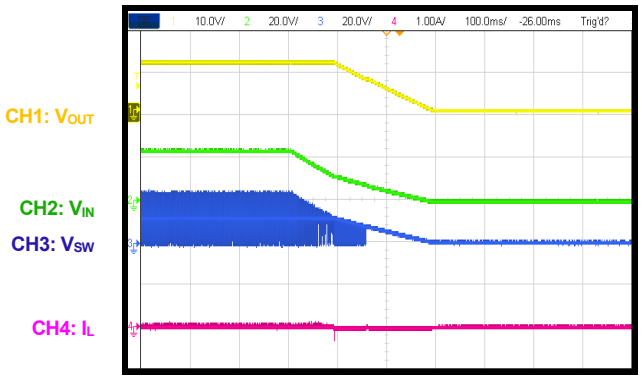
Start-Up through VIN
I_{OUT} = 0.6A



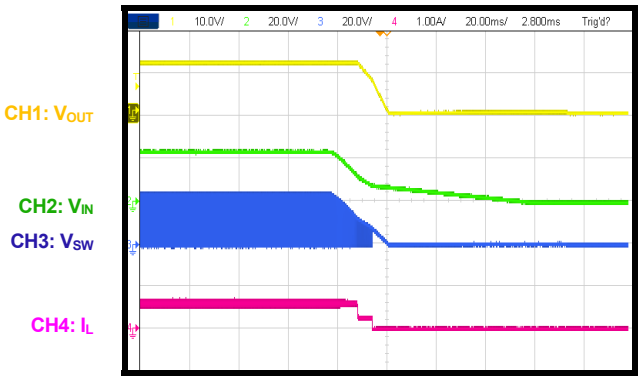
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 24V, V_{OUT} = 12V, C6 = 22µF, C10 = 470µF, L1 = 22µH, T_A = 25°C, unless otherwise noted.

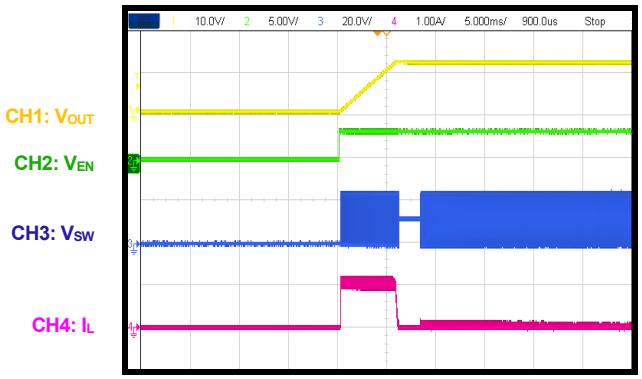
Shutdown through VIN
I_{OUT} = 0A



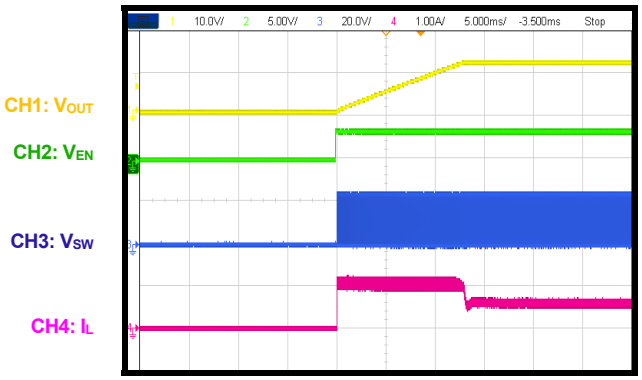
Shutdown through VIN
I_{OUT} = 0.6A



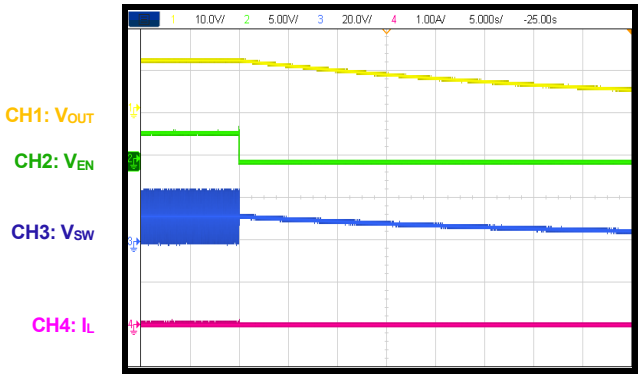
Start-Up through EN
I_{OUT} = 0A



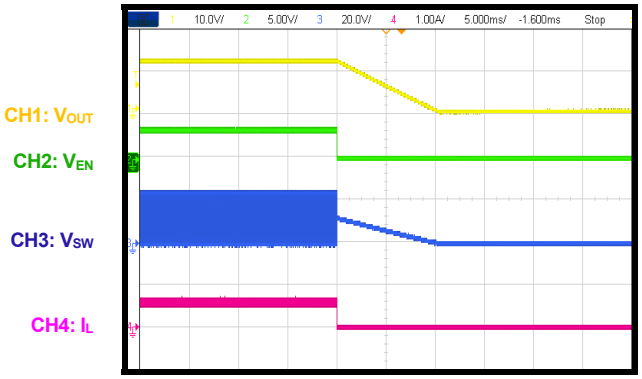
Start-Up through EN
I_{OUT} = 0.6A



Shutdown through EN
I_{OUT} = 0A



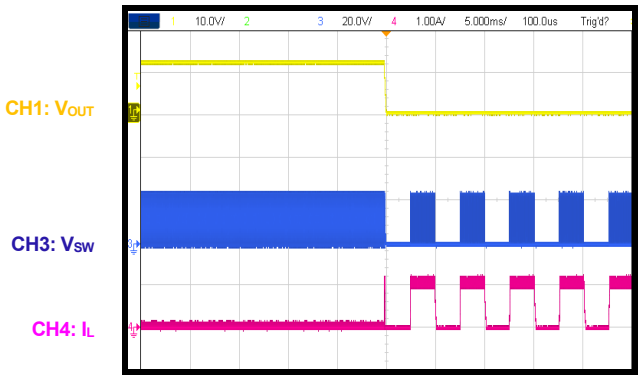
Shutdown through EN
I_{OUT} = 0.6A



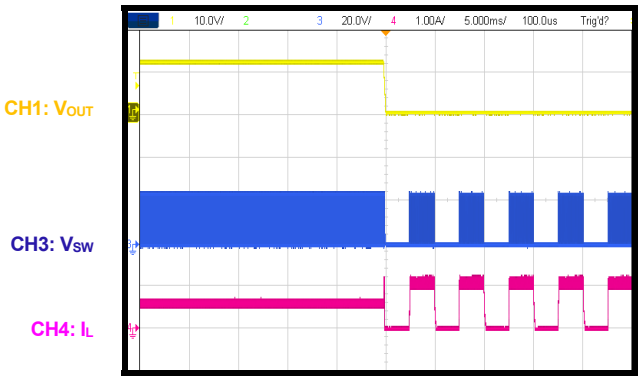
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 24V, V_{OUT} = 12V, C6 = 22µF, C10 = 470µF, L1 = 22µH, T_A = 25°C, unless otherwise noted.

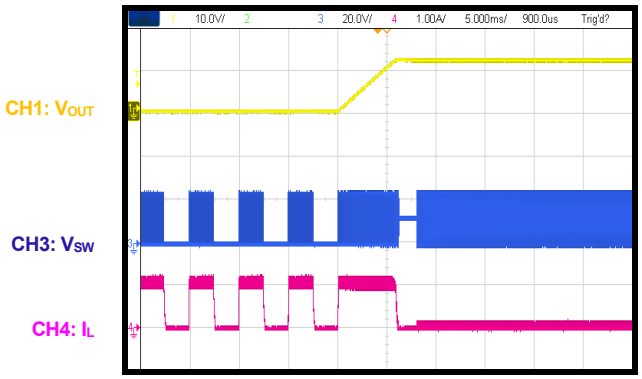
Short-Circuit Protection Entry
I_{OUT} = 0A



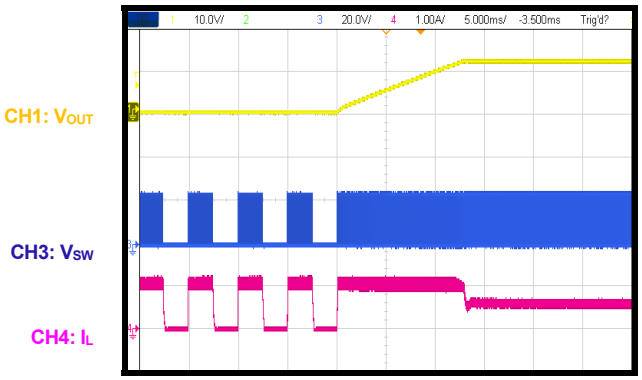
Short-Circuit Protection Entry
I_{OUT} = 0.6A



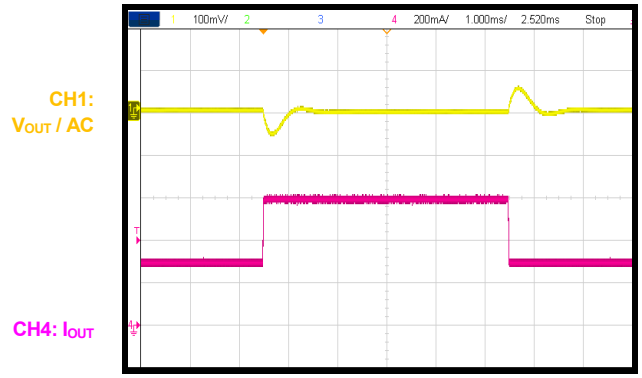
Short-Circuit Protection Recovery
I_{OUT} = 0A



Short-Circuit Protection Recovery
I_{OUT} = 0.6A



Load Transient
I_{OUT} = 0.3A to 0.6A, 100mA/µs



PCB LAYOUT

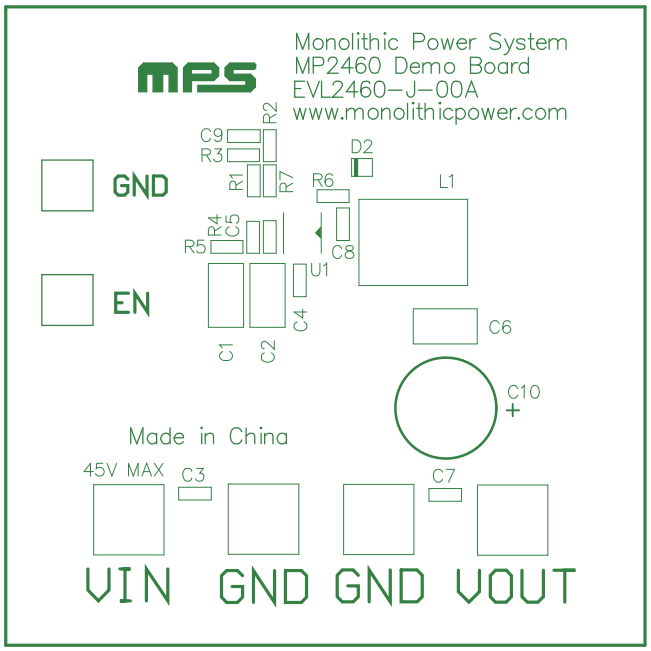


Figure 2: Top Silkscreen Layer

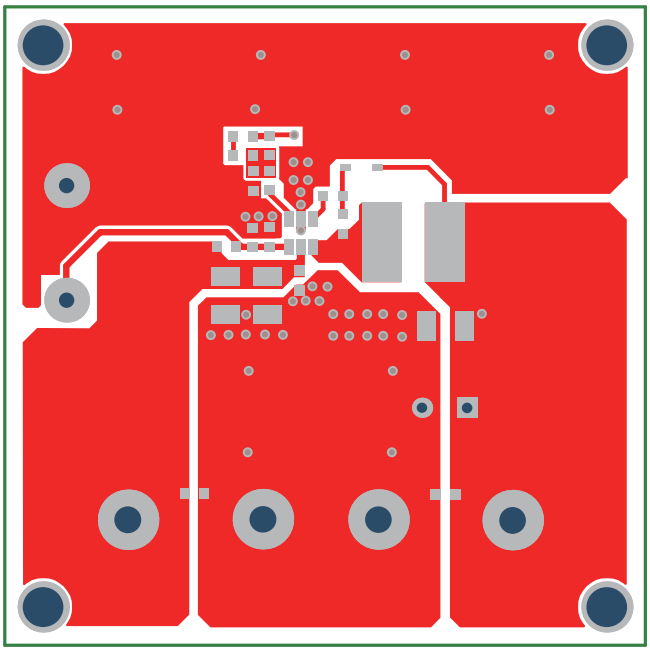


Figure 3: Top Layer

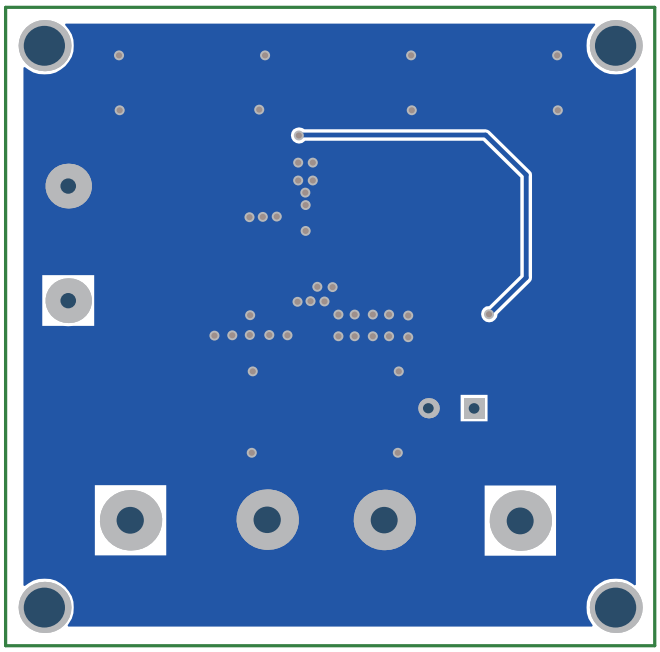


Figure 4: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	2/22/2021	Initial Release	-