EV2348-TL-00A

High-Efficiency, 650kHz, 4A, 24V, Step-Down Converter Evaluation Board

DESCRIPTION

The EV2348-TL-00A evaluation board is designed to demonstrate the capabilities of the MP2348, a fully integrated, high-frequency, synchronous, rectified, step-down switch-mode converter with internal power MOSFETs. It offers a very compact solution to achieve 4A of continuous output current across a wide input supply range, with excellent load and line regulation. The MP2348 has synchronous mode operation for higher efficiency across the output current load range.

Constant-on-time (COT) control provides very fast transient response, easy loop design, and very tight output regulation.

Full protection features include short-circuit protection (SCP), over-current protection (OCP), under-voltage protection (UVP), and thermal shutdown.

The MP2348 requires a minimal number of readily available, standard external components, and is available in a space-saving SOT583 (1.6mmx2.1mm) package.

ELECTRICAL SPECIFICATIONS (1)

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	19	V
Output voltage	V_{OUT}	3.3	V
Output current	I_{OUT}	4	A

Note:

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

FEATURES

- Wide 4.2V to 24V Operating Input Range
- 75mΩ/40mΩ Low $R_{DS(ON)}$ Internal Power MOSFETs
- 200μA Low I_Q
- High-Efficiency Synchronous Mode Operation
- Forced PWM, Auto-PFM/PWM and Selectable Ultrasonic Mode
- Fast Load Transient Response
- 650kHz Switching Frequency
- Programmable Soft-Start Time
- Over-Current Protection (OCP) and Hiccup Mode
- Pre-Biased Start-Up
- Thermal Shutdown
- Available in a SOT583 (1.6mmx2.1mm) Package

APPLICATIONS

- Game Consoles
- Digital Set-Top Boxes
- Flat-Panel Television and Monitors
- General Purposes

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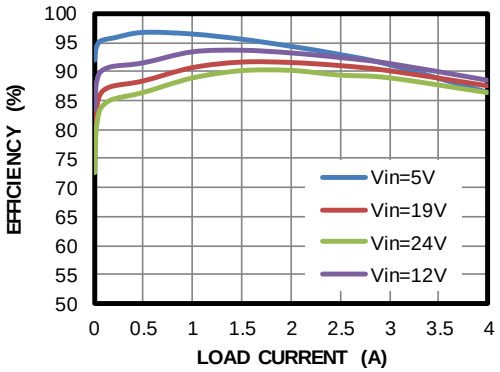
EV2348-TL-00A EVALUATION BOARD

(LxWxH) 63.7mmx48.4mmx6.4mm

Board Number	MPS IC Number
EV2348-TL-00A	MP2348GTL

Efficiency

PFM without USM, V_{OUT} = 3.3V,
L = 3.3µH, DCR = 9mΩ



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QUICK START GUIDE

1. Preset the power supply to 19V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load terminals 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 1.3V to turn the regulator on; drive EN below 1V to turn the regulator off.

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EVALUATION BOARD SCHEMATIC

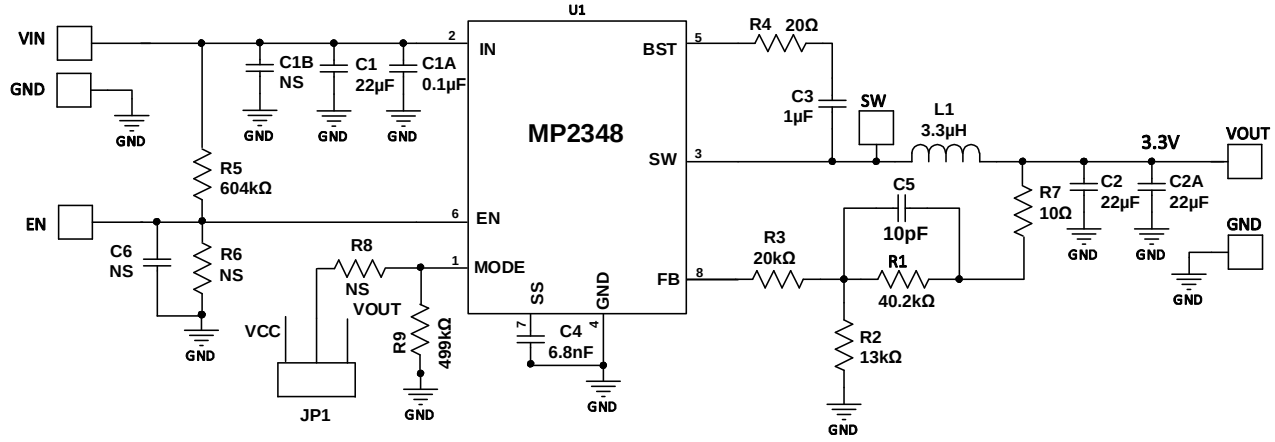

Figure 1: Evaluation Board Schematic

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EV2348-TL-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	C1	22µF	25V ceramic capacitor, X5R	0805	Murata	GRM21BR61E226ME44L
1	C1A	0.1µF	25V ceramic capacitor, X7R	0603	Murata	GRM188R71E104KA01D
2	C2, C2A	22µF	16V ceramic capacitor, X5R	0805	Murata	GRM21BR61C226ME44L
1	C3	1µF	16V ceramic capacitor, X7R	0603	Murata	GRM188R71C105KA12D
1	C4	6.8nF	50V ceramic capacitor, X7R	0603	Murata	GRM188R71H682KA01D
1	C5	10pF	50V ceramic capacitor, COG	0603	Murata	GRM1885C1H100JA01D
0	C1B, C6	NS				
1	R1	40.2kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-0740K2L
1	R2	13kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-0713KL
1	R3	20kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-0720KL
1	R4	20Ω	Thick film resistor, 1%	0603	Yageo	RC0603FR-0720RL
1	R5	604kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-07604KL
0	R6	NS				
1	R7	10Ω	Thick film resistor, 1%	0603	Yageo	RC0603JR-0710RL
1	R8	NS				
1	R9	499kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-07499KL
1	L1	3.3µH	Inductor, DCR = 9mΩ, I_{SAT} = 9A	SMD	Wurth	744314330
1	U1	MP2348	Synchronous step-down converter	SOT583	MPS	MP2348GTL
1	JP1		Jumper	SIP-3	Any	

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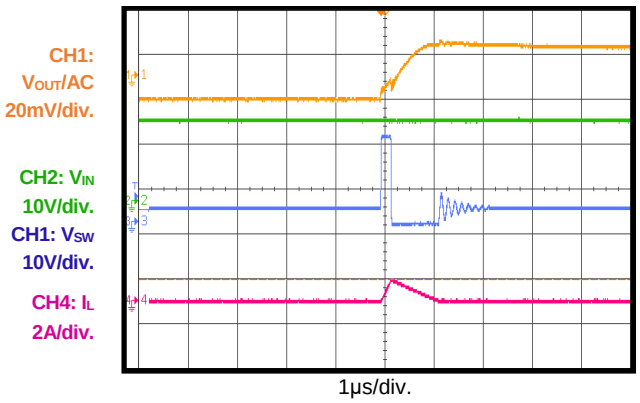
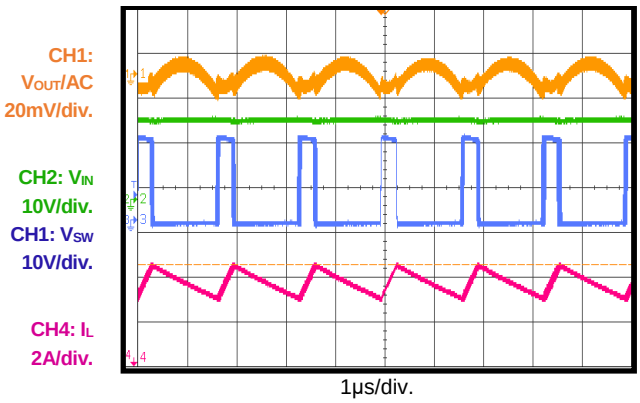
EVB TEST RESULTS

V_{IN} = 19V, V_{OUT} = 3.3V, L = 3.3µH, T_A = 25°C, unless otherwise noted.

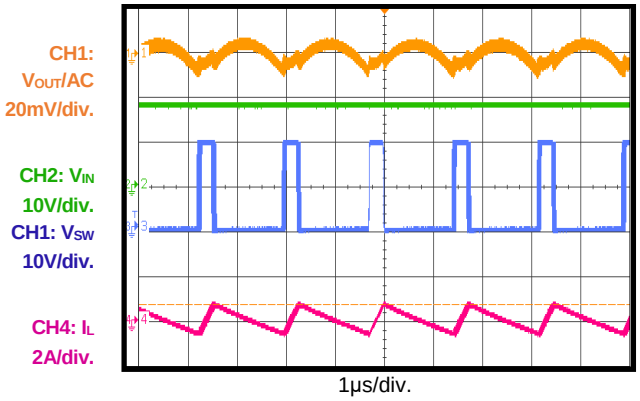
Input/Output Ripple
I_{OUT} = 0A, PFM



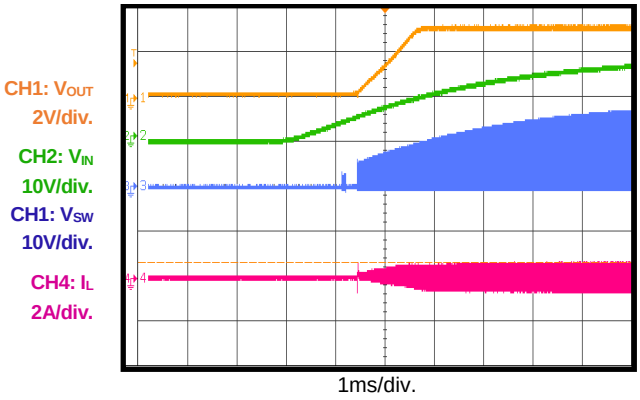
Input/Output Ripple
I_{OUT} = 4A



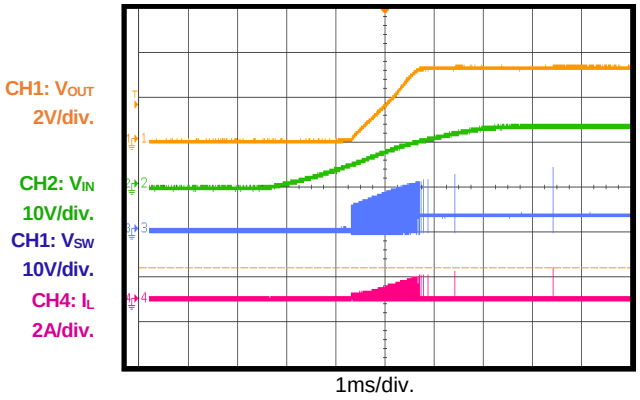
Input/Output Ripple
I_{OUT} = 0A, PWM



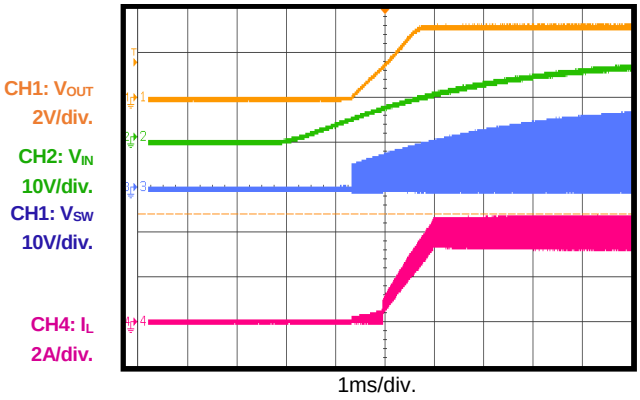
Start-Up through VIN
I_{OUT} = 0A, PWM



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



Start-Up through VIN
I_{OUT} = 4A



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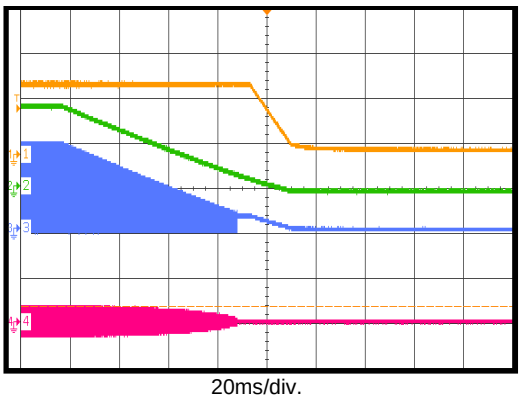
EVB TEST RESULTS *(continued)*

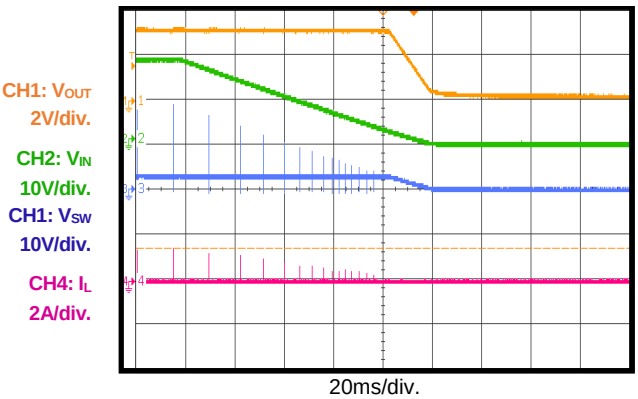
V_{IN} = 19V, V_{OUT} = 3.3V, L = 3.3µH, T_A = 25°C, unless otherwise noted.

Shutdown through VIN
I_{OUT} = 0A, PWM



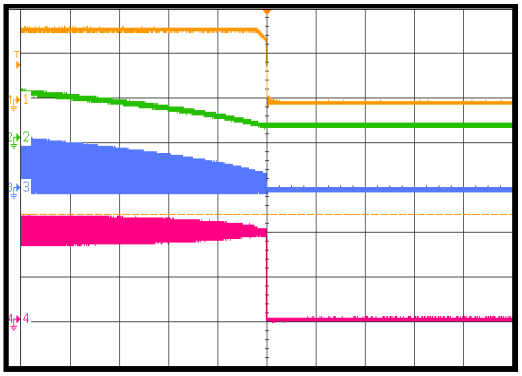
20ms/div.

Shutdown through VIN
I_{OUT} = 0A, PFM



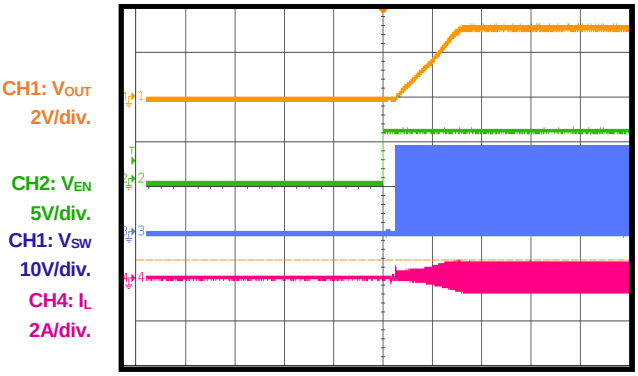
20ms/div.

Shutdown through VIN
I_{OUT} = 4A



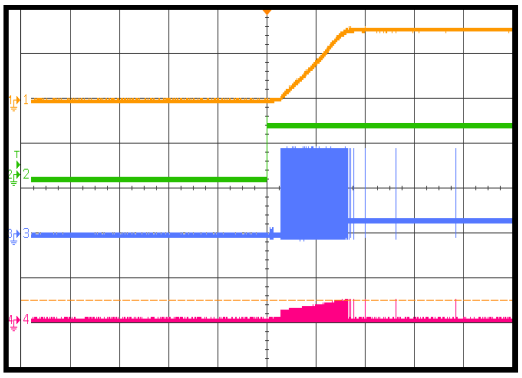
1ms/div.

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



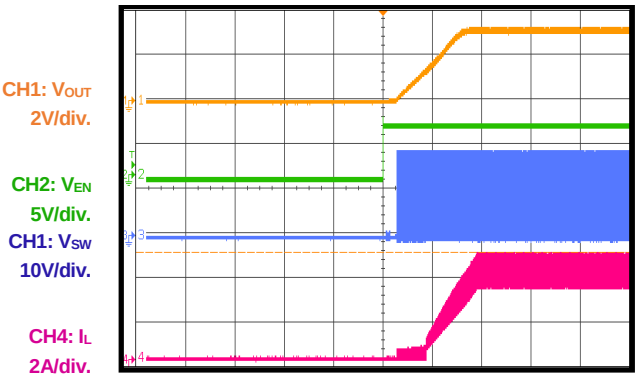
1ms/div.

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



1ms/div.

Start-Up through EN
I_{OUT} = 4A



1ms/div.

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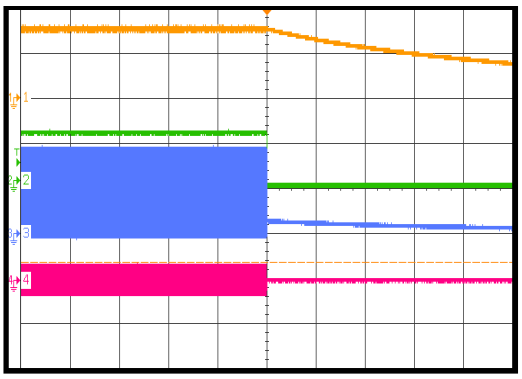
EVB TEST RESULTS *(continued)*

V_{IN} = 19V, V_{OUT} = 3.3V, L = 3.3µH, T_A = 25°C, unless otherwise noted.

Shutdown through EN

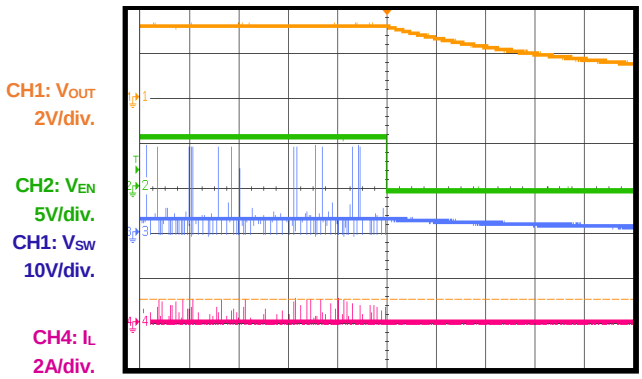
I_{OUT} = 0A, PWM



200ms/div.

Shutdown through EN

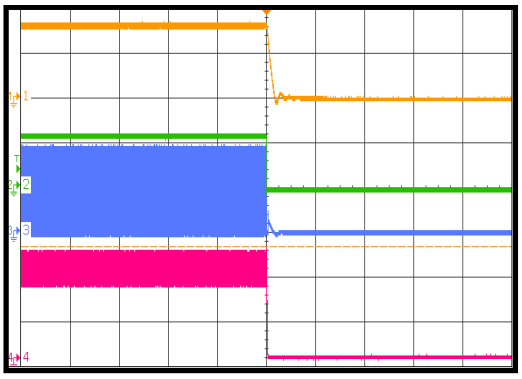
I_{OUT} = 0A, PFM



200ms/div.

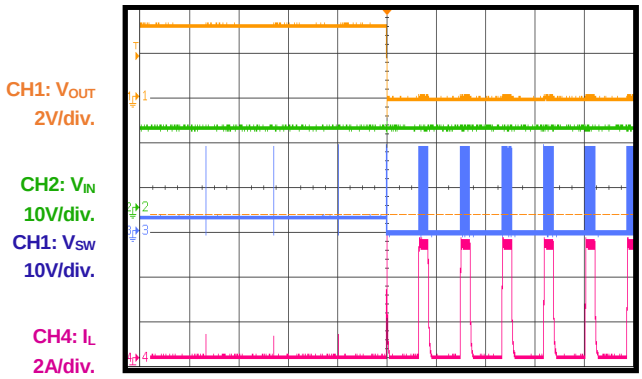
Shutdown through EN

I_{OUT} = 4A



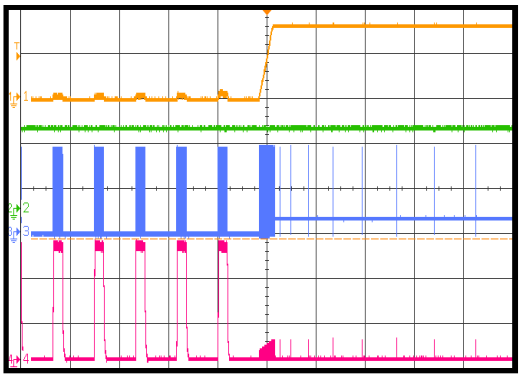
200µs/div.

Short-Circuit Entry



5ms/div.

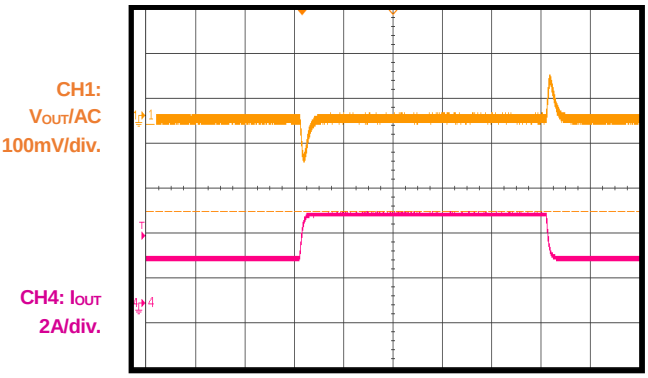
Short-Circuit Recovery



5ms/div.

Load Transient

I_{OUT} = 2A to 4A



100µs/div.

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PCB LAYOUT

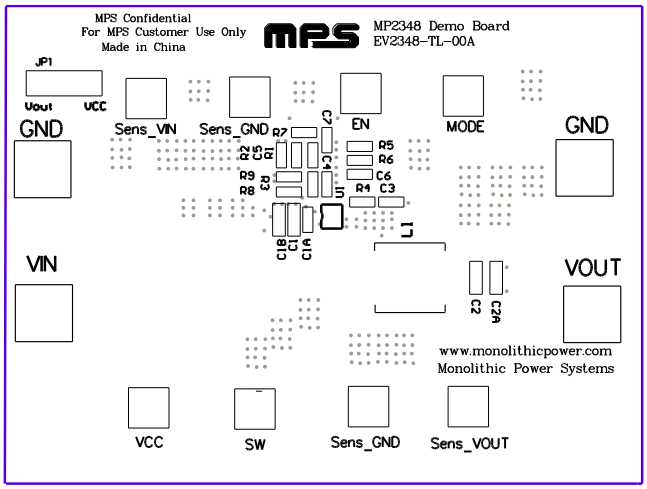

Figure 2: Top Silk Layer

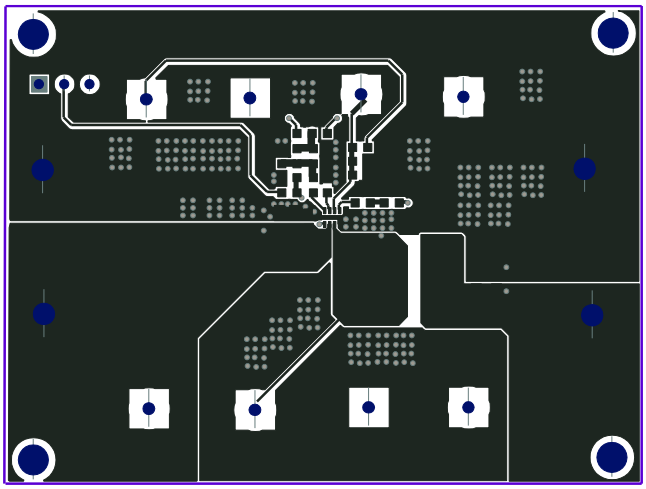

Figure 3: Top Layer

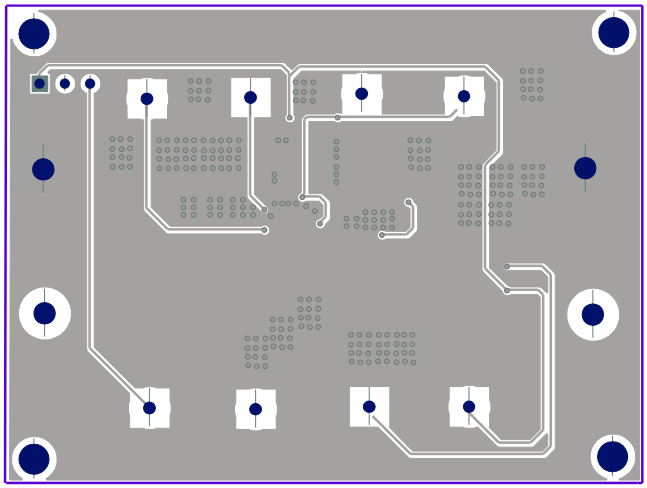

Figure 4: Bottom Layer

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Revision History

Revision #	Revision Date	Description	Pages Updated
1.0	10/15/2020	Initial Release	-

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