EVL2328-TL-00A

High-Efficiency, 28V, 2A, 430kHZ Synchronous Step-Down Converter In SOT583 Package

DESCRIPTION

The EVL2328 Evaluation Board is designed to demonstrate the capabilities of MPS' MP2328.

The MP2328 is a fully-integrated high-frequency, synchronous rectified, step-down, switch-mode converter with internal power MOSFETs. It offers a very compact solution to achieve a 2A continuous output current over a wide input range, with excellent load and line regulation. The MP2328 has synchronous-mode operation for high efficiency over wide output current-load range.

Constant On-Time control operation provides very fast transient response and easy loop design as well as very tight output regulation.

Full protection features include SCP, OCP, UVP and thermal shutdown.

The MP2328 requires a minimal number of readily-available, standard, external components and is available in a space-saving SOT583 package.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	6.5 - 28	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	0 - 2	A

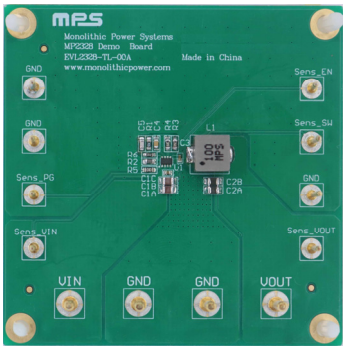
FEATURES

- Wide 4.5V-to-28V Operating Input Range
- 115mΩ/55mΩ Low-$R_{DS(ON)}$ Internal Power MOSFETs
- 160μA Quiescent Current
- >92% Efficiency for 24V to 5V/2A Condition
- Power Save Mode at Light Load
- Fast Load Transient Response
- 430kHz Switching Frequency
- Ton Extension for Improve Dropout
- Programmable Soft-Start Time
- Power Good Indication
- Hiccup Mode OCP/OVP Protection
- Thermal Shutdown Protection
- Includes an MPS-optimized Power Inductor

APPLICATIONS

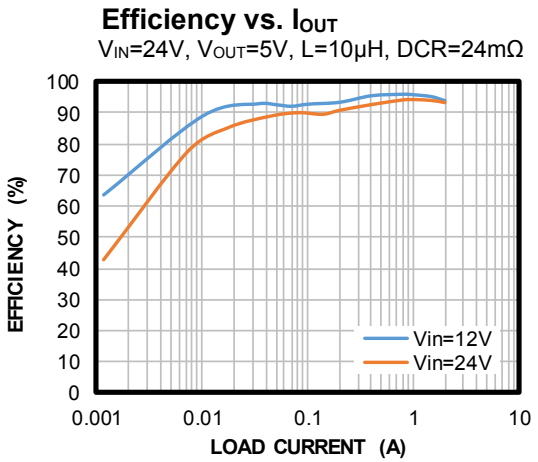
- Game Consoles
- Digital Set-Top Boxes
- Flat-Panel Television and Monitors
- General Purposes Power Supply

EVL2328-TL-00A EVALUATION BOARD



(L × W × H) 6.35cm x 6.35cm x 0.75cm

Board Number	MPS IC Number
EVL2328-TL-00A	MP2328GTL



QUICK START GUIDE

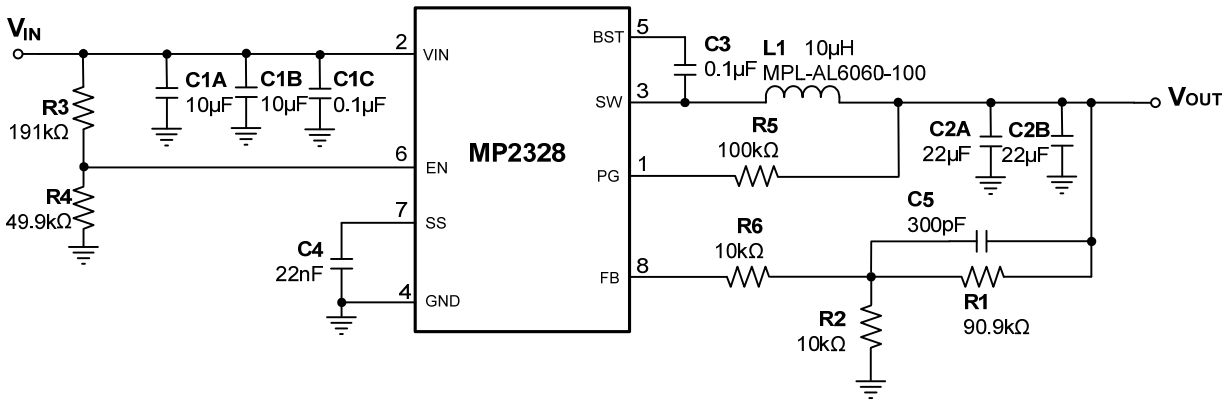
The output voltage of this board is set to 5V. The board layout accommodates most commonly used components. Following blew steps to quick start EVL2328-TL-00A.

1. Preset Power Supply to 6.5V ≤ VIN ≤ 28V.
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.
6. The MP2328 is enabled on the evaluation board once VIN is applied.
7. The output voltage VOUT can be changed by varying R1 and R2. Calculate the new value using the formula:

$$V_{OUT} = V_{FB} \times (1 + \frac{R1}{R2})$$

   Where VFB = 0.5V.
8. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.3V to turn on EVL2328-TL-00A or less than 1V to turn it off. The EN voltage must not exceed 6V max to avoid damaging the internal circuit.

EVALUATION BOARD SCHEMATIC



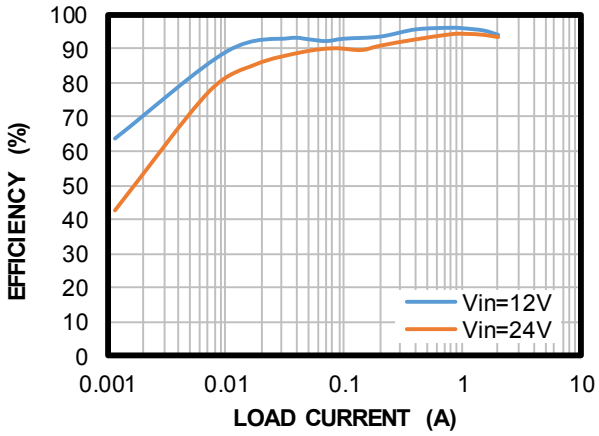
EVL2328-TL-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	L1	10μH	Inductor, RDC=24mΩ, Isat=6.6A	SMD	MPS	MPL-AL6060-100
2	C1A,C1B	10μF	Ceramic Cap, 50V, X5R	0805	Murata	GRM21BR61H106KE43L
2	C1C,C3	100nF	Ceramic Cap, 50V, X7R	0402	Murata	GRM155R71H104ME14D
2	C2A,C2B	22μF	Ceramic Cap, 10V, X7S	0805	TDK	C2012X7S1A226MT000E
1	C4	22nF	Ceramic Cap, 25V, X7R	0603	Murata	GRM188R71E223JA01D
1	C5	300pF	Ceramic Cap, 50V, COG	0603	Murata	GRM1885C1H301JA01D
1	R1	90.9K	Film Res, 1%	0603	YAGEO	RC0603FR-0790K9L
1	R2	10K	Film Res, 1%	0603	YAGEO	RC0603FR-0710KL
1	R3	191K	Film Res, 1%	0603	YAGEO	RC0603FR-07191KL
1	R4	49K9	Film Res, 1%	0603	YAGEO	RC0603FR-0749K9L
1	R5	100K	Film Res, 1%	0603	YAGEO	RC0603FR-07100KL
1	R6	10K	Film Res, 1%	0603	YAGEO	RC0603FR-0710KL
1	U1	MP2328	28V/2A Buck	SOT583	MPS	MP2328GTL

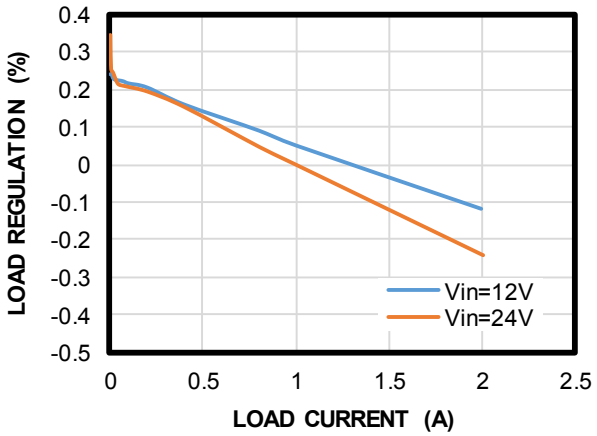
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board.
V_{IN} = 24V, V_{OUT} = 5V, L = 10μH, T_A = 25°C, unless otherwise noted.

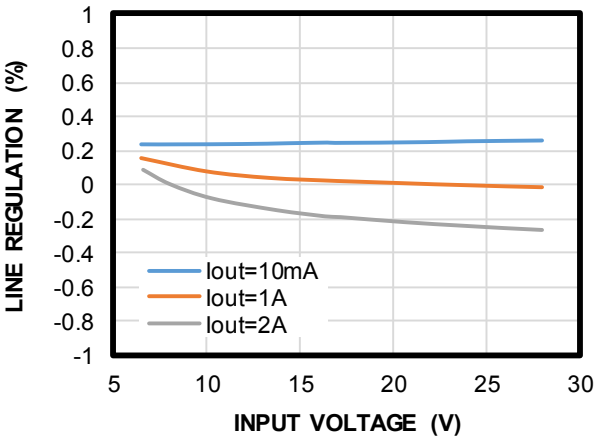
Efficiency vs. I_{OUT}



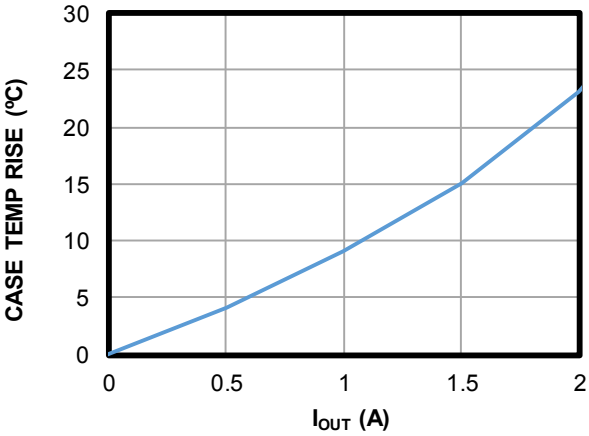
Load Regulation



Line Regulation



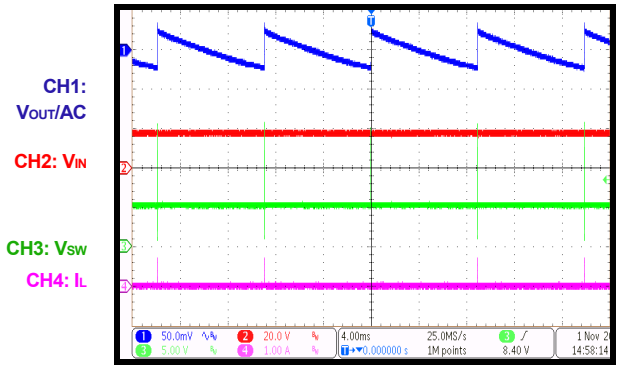
Case Temperature Rise vs. I_{OUT}



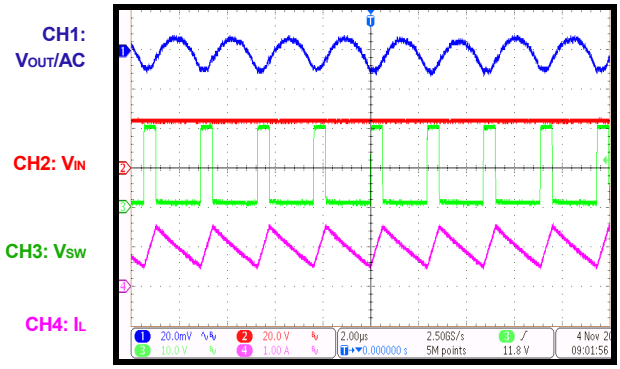
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board.
V_{IN} = 24V, V_{OUT} = 5V, L = 10µH, T_A = 25°C, unless otherwise noted.

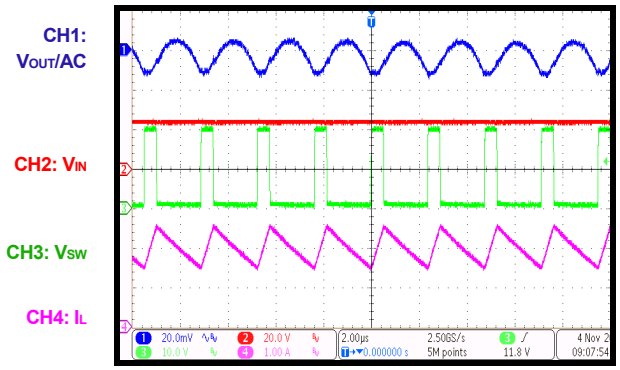
Steady State
I_{OUT}=0A



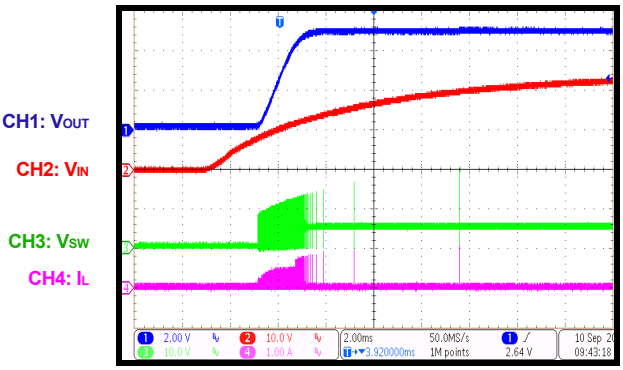
Steady State
I_{OUT}=1A



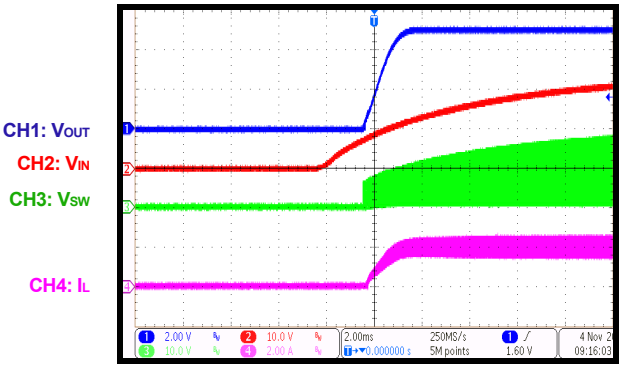
Steady State
I_{OUT}=2A



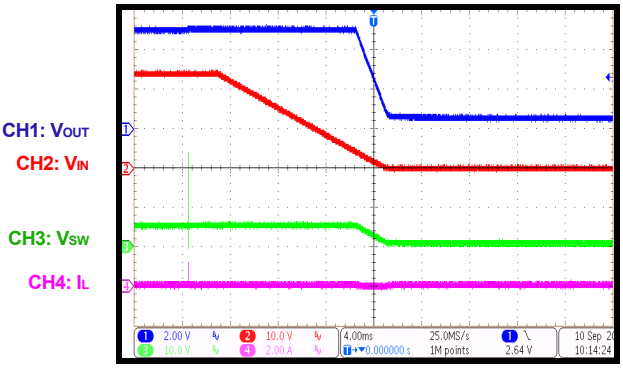
Input Power Start-Up
I_{OUT}=0A



Input Power Start-Up
I_{OUT}=2A



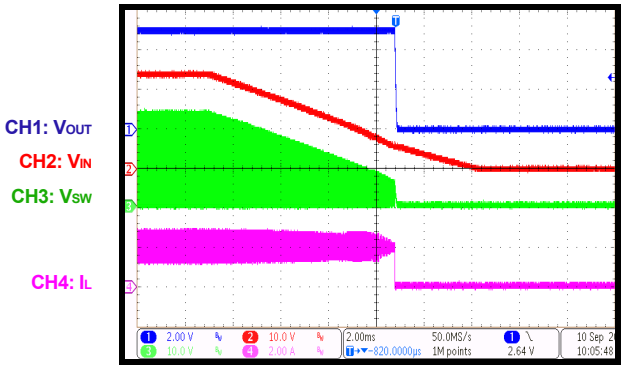
Input Power Shutdown
I_{OUT}=0A



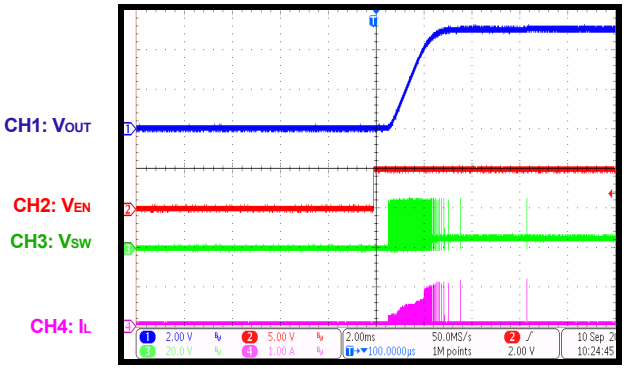
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board.
V_{IN} = 24V, V_{OUT} = 5V, L = 10μH, T_A = 25°C, unless otherwise noted.

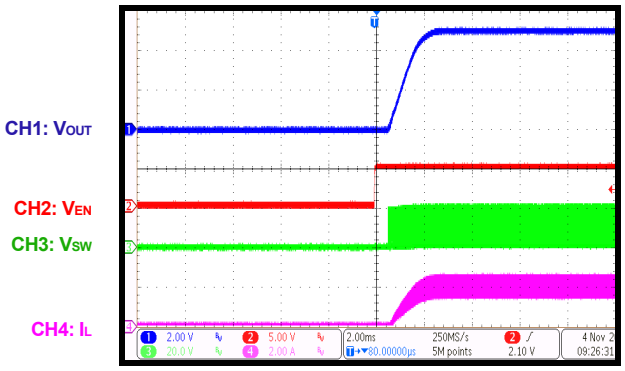
Input Power Shutdown
I_{OUT}=2A



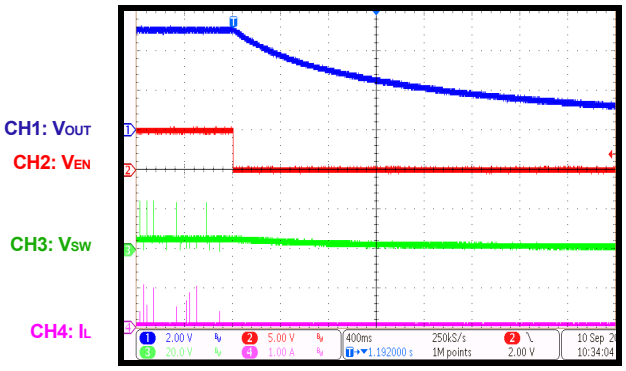
Start-Up through Enable
I_{OUT}=0A



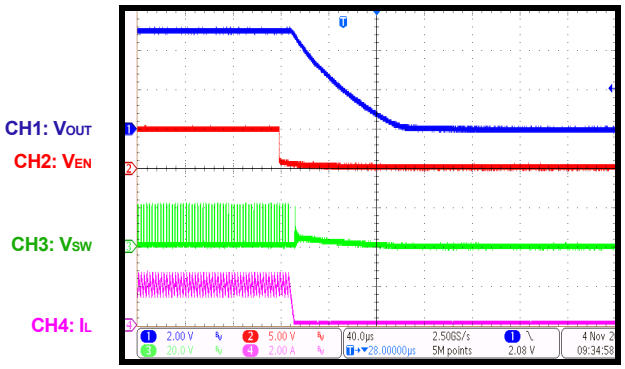
Start-Up through Enable
I_{OUT}=2A



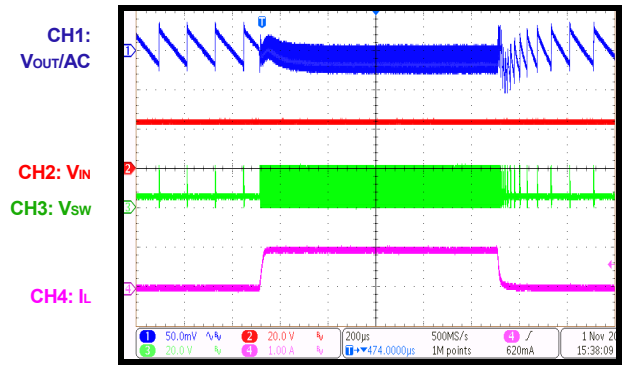
Shutdown through Enable
I_{OUT}=0A



Shutdown through Enable
I_{OUT}=2A



Load Transient
I_{OUT}=0-1A



EVB TEST RESULTS *(continued)*

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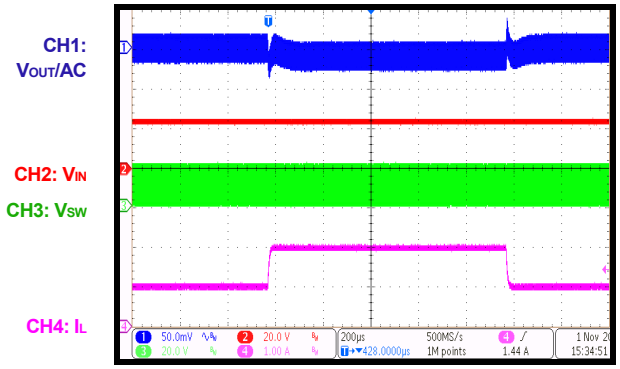
V_{IN} = 24V, V_{OUT} = 5V, L = 10µH, T_A = 25°C, unless otherwise noted.

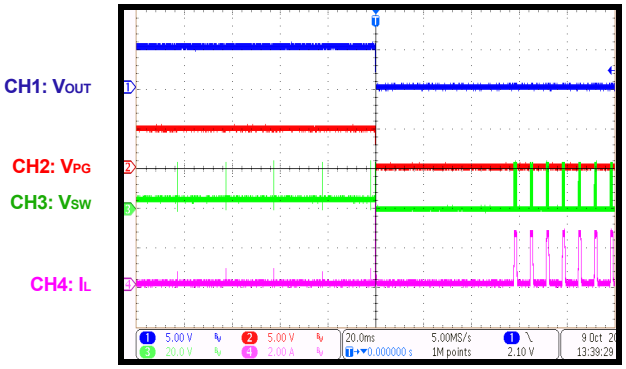
Load Transient

I_{OUT}=1-2A



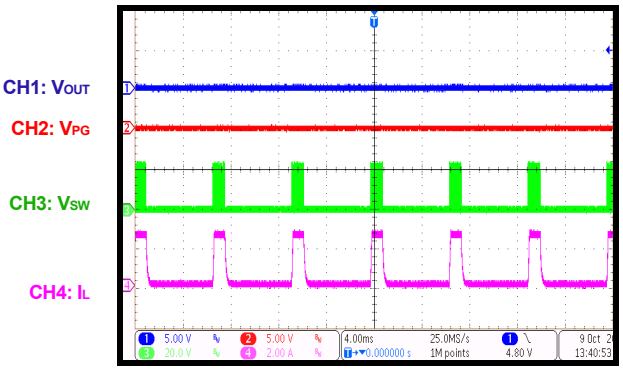
SCP

I_{OUT}=0A, Entry



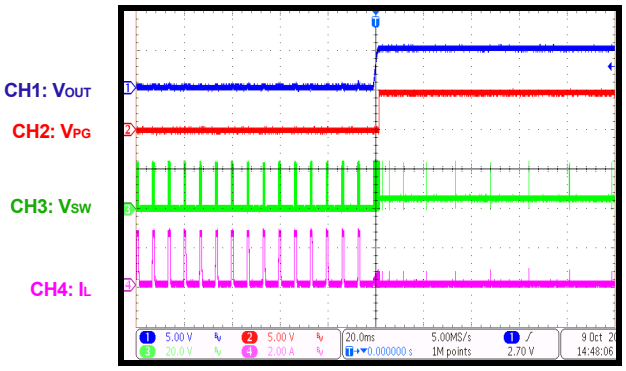
SCP

Steady State



SCP

I_{OUT}=0A, Recovery



PRINTED CIRCUIT BOARD LAYOUT

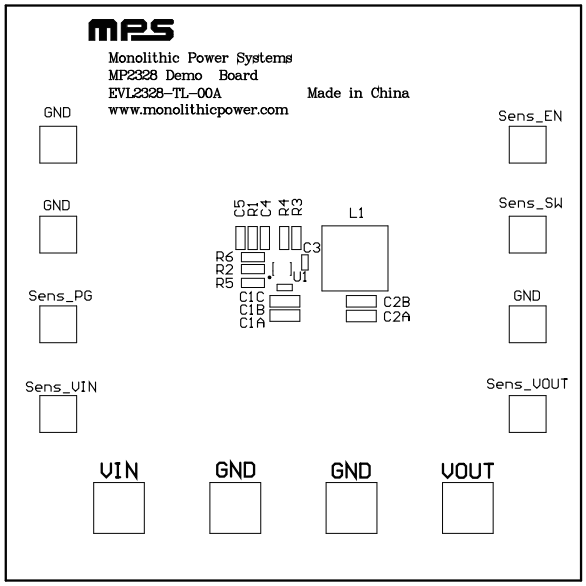


Figure 1: Top Silkscreen Layer

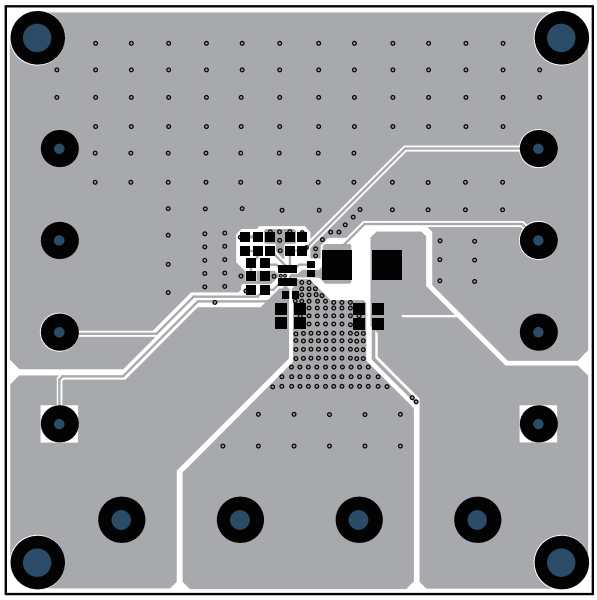


Figure 2: Top Layer

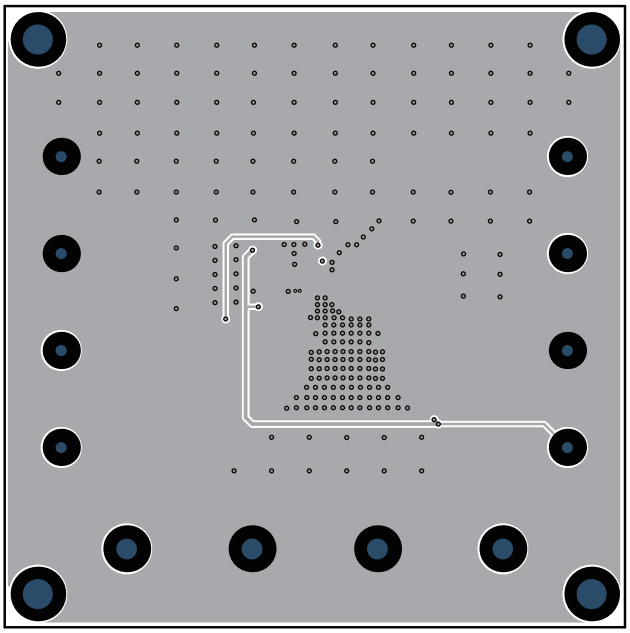


Figure 3: Bottom Layer