EVM3816C-PE-01A

5.5V, 1A, Step-Down Power Module Evaluation Board

DESCRIPTION

The EVM3816C-PE-01A is an evaluation board designed to demonstrate the capabilities of the MPM3816C, a fully integrated, synchronous, rectified, step-down, DC/DC power module with up to 1A of continuous current.

The output voltage (V_{OUT}) can be regulated as low as 0.4V. Only feedback (FB) resistors, input capacitors, and output capacitors are required to complete the design.

The MPM3816C adopts a constant-on-time (COT) control scheme to provide fast transient response and easy loop stabilization. Fault protections include cycle-by-cycle current limiting and thermal shutdown.

It is recommended to read the MPM3816C datasheet prior to making any changes to the EVM3816C-PE-01A.

PERFORMANCE SUMMARY (1)

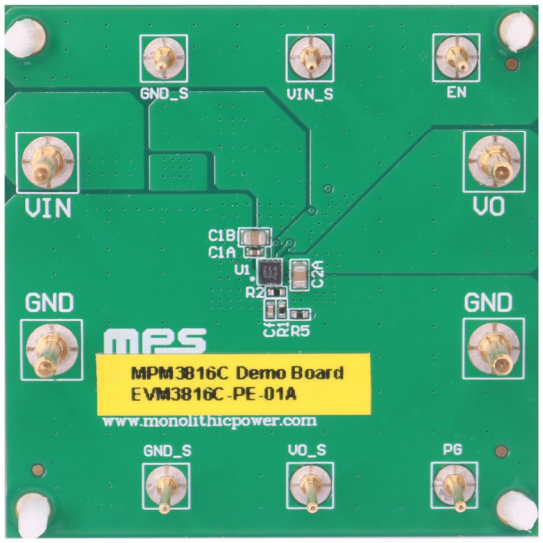
Specifications are at T_A = 25°C, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range		2.7V to 5.5V
Output voltage (V_{OUT})	Default configuration	1.2V
Maximum output current (I_{OUT})	V_{IN} = 2.7V to 5.5V	1A
Typical efficiency	V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 1A, f_{SW} = 2.4MHz	89.5%
Peak efficiency	V_{IN} = 3.3V, V_{OUT} = 1.8V, I_{OUT} = 1A, f_{SW} = 2.4MHz	92.9%
Switching frequency (f_{SW})	Default configuration	2.4MHz

Note:

1) For different V_{IN} and V_{OUT} specifications with different output capacitors, the application circuit parameters may require changes.

EVALUATION BOARD



LxWxH (5cmx5cmx1.6cm)

Board Number	MPS IC Number
EVM3816C-PE-01A	MPM3816CGPE

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QUICK START GUIDE

The EVM3816C-PE-01A evaluation board is easy to set up and use to evaluate the performance of the MPM3816C. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply (V_{IN}) to be between 2.7V and 5.5V, then turn off the power supply. (2)
2. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
3. Connect the load terminals to: (3)
   a. Positive (+): VO
   b. Negative (-): GND
4. After making the connections, turn on the power supply. The board should start up automatically.
5. Check for the proper output voltage (V_{OUT}) between the VO_S and GND_S terminals.
6. Once the proper V_{OUT} is established, adjust the load within the operating range, then measure the efficiency, V_{OUT} ripple, and other parameters. (4)

Notes:

2) Ensure that V_{IN} does not exceed 5.5V.
3) There is no initial load by default.
4) When measuring the V_{OUT} ripple or V_{IN} ripple, do not use the oscilloscope probe's long ground lead.

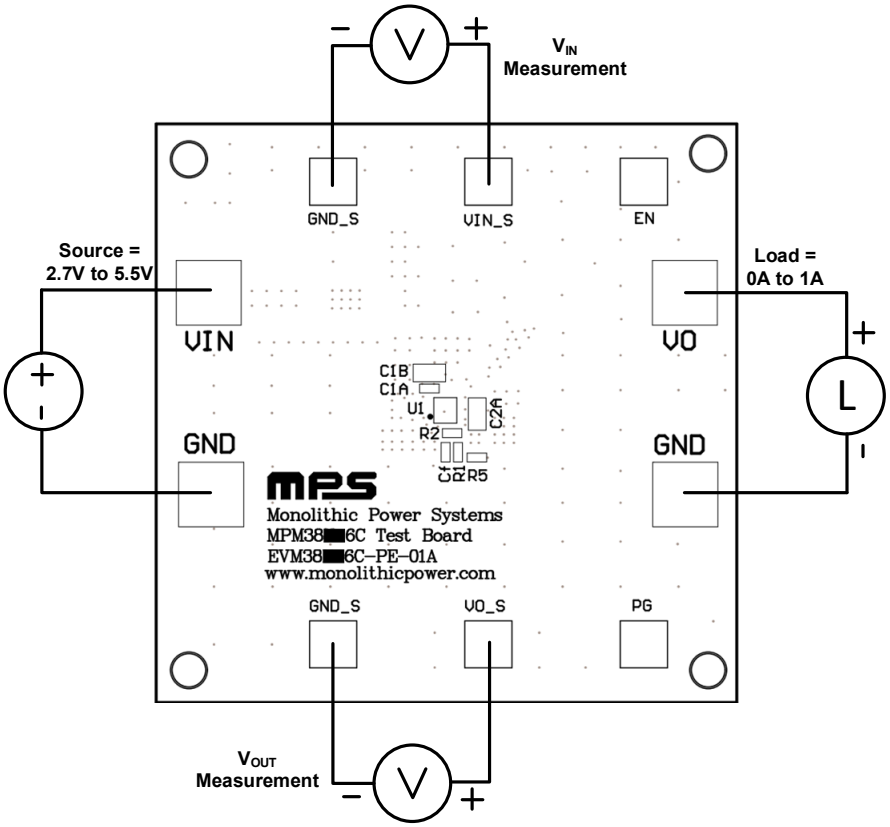

Figure 1: Proper Measurement Equipment Set-Up

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EVALUATION BOARD SCHEMATIC

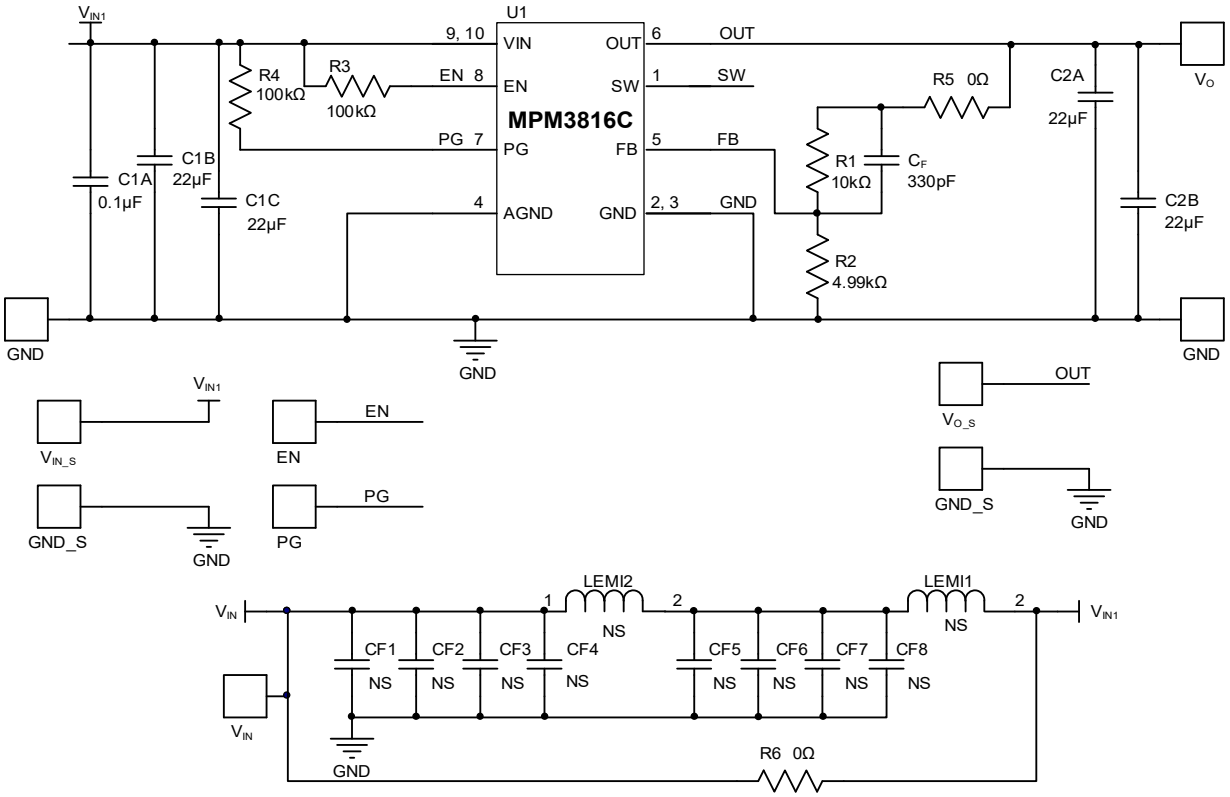

Figure 2: Evaluation Board Schematic

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EVM3816C-PE-01A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1A	0.1µF	Ceramic capacitor, 16V, X7R	0402	TDK	C1005X7R1C104K
4	C1B, C1C, C2A, C2B	22µF	Capacitor, 25V, X5R	0805	Murata	GRM21BR61E226ME44L
1	C_F	330pF	Capacitor, 50V, X7R	0402	Wurth	885012205058
1	R1	10kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-0710KL
1	R2	4.99kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-074K99L
2	R3, R4	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R5	0Ω	Film resistor, 1%	0402	Yageo	RC0402FR-070RL
1	R6	0Ω	Film resistor, 1%	2512	Yageo	RC2512FK-070RL
6	VIN_S, GND_S, EN, PG, VO_S, GND_S	1mm	Φ1.0 copper pin	DIP	Custom (5)	
4	VIN, GND, GND, VO	2mm	φ2.0 copper pin	DIP	Custom (5)	
1	U1	MPM3816C	5.5V, 1A, step-down power module	ECLGA-10 (2mmx 2.2mmx 1.2mm)	MPS	MPM3816C

Note:

5) Contact an MPS FAE for more information regarding custom pins.

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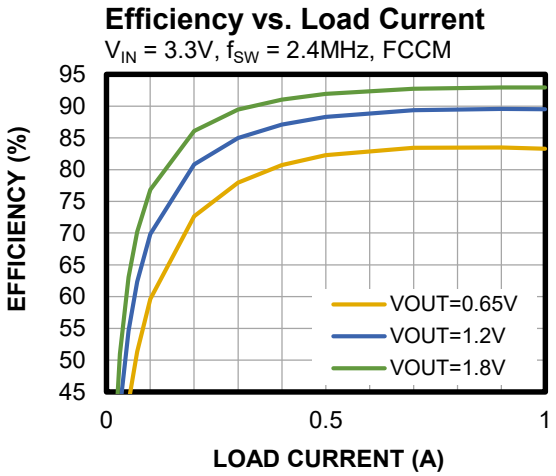
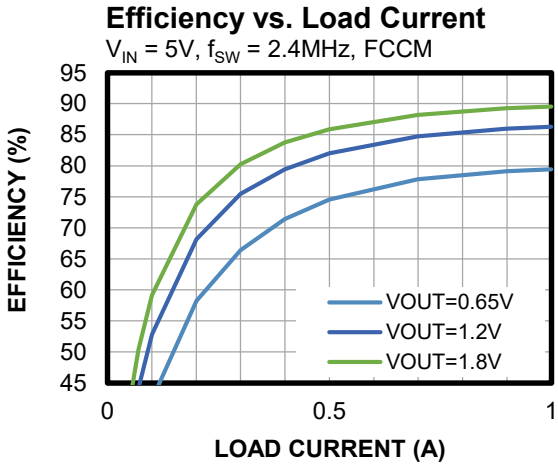
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, V_{OUT} = 1.2V, C_{OUT} = 2 x 22µF, unless otherwise noted.





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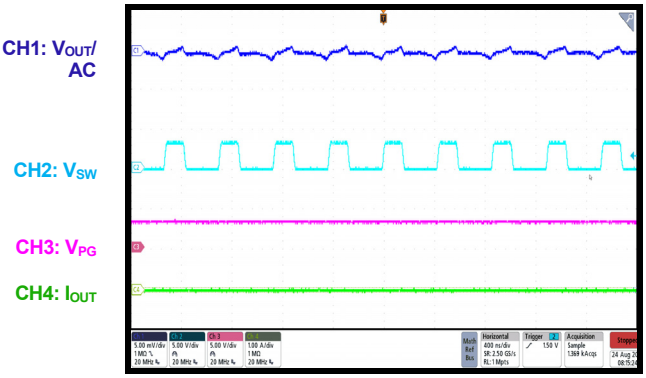
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, V_{OUT} = 1.2V, C_{OUT} = 2 x 22µF, unless otherwise noted.

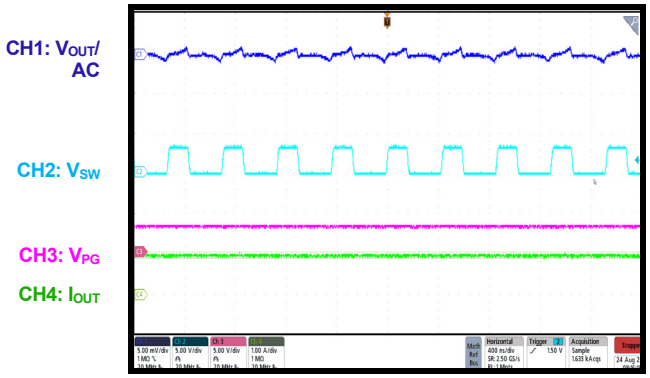
Steady State

V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 0A



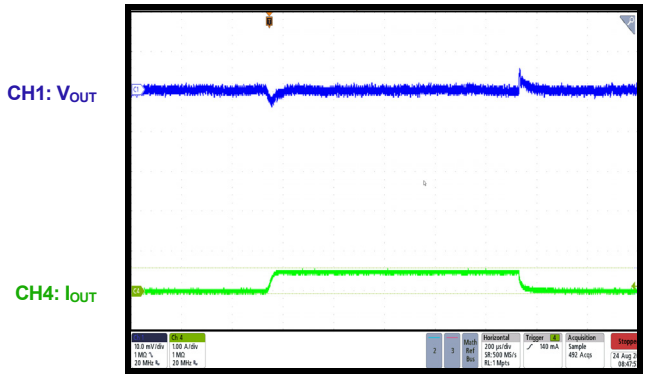
Steady State

V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 1A



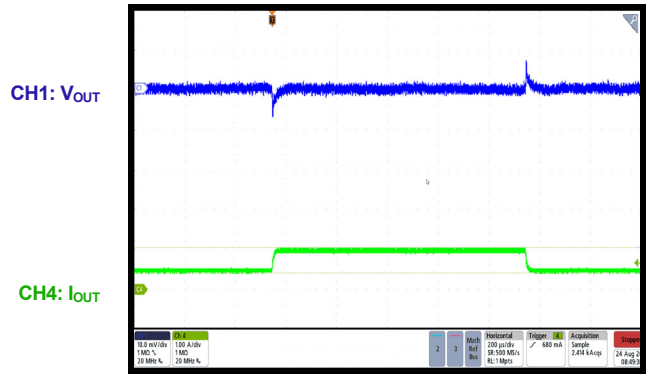
Load Transient

V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 0A to 0.5A, 0.8A/µs e-load



Load Transient

V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 0.5A to 1A, 0.8A/µs e-load



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PCB LAYOUT

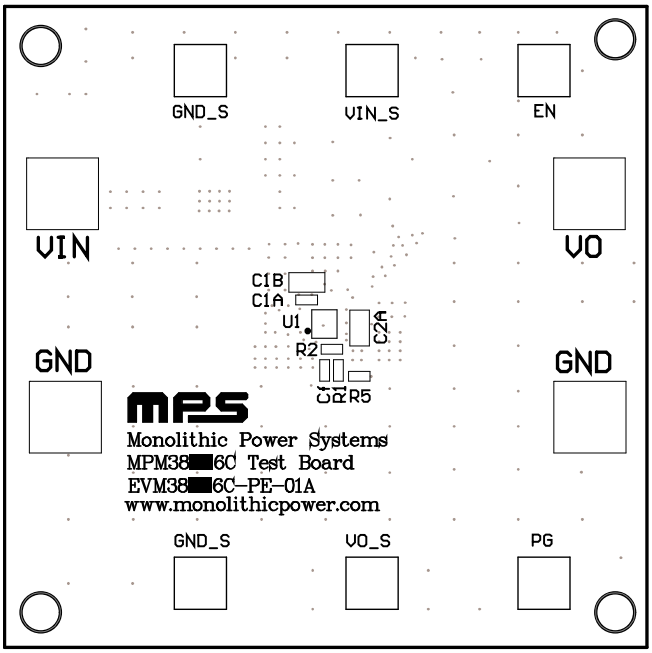

Figure 3: Top Silk

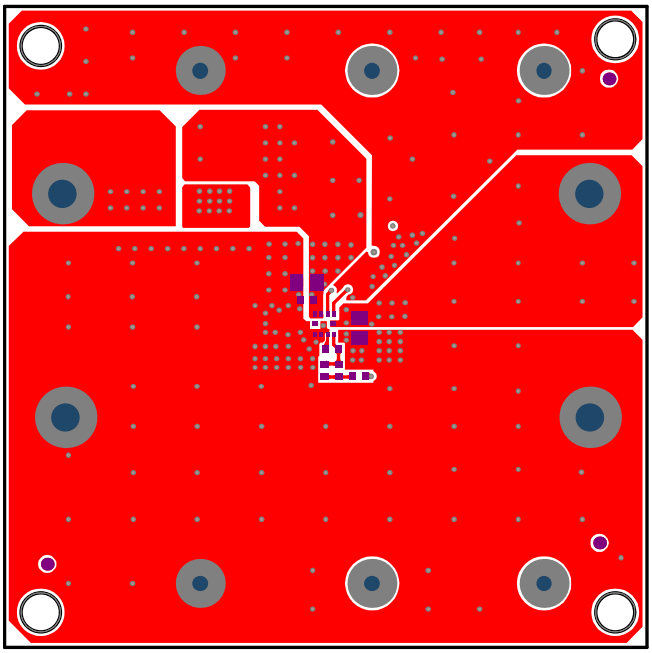

Figure 4: Top Layer

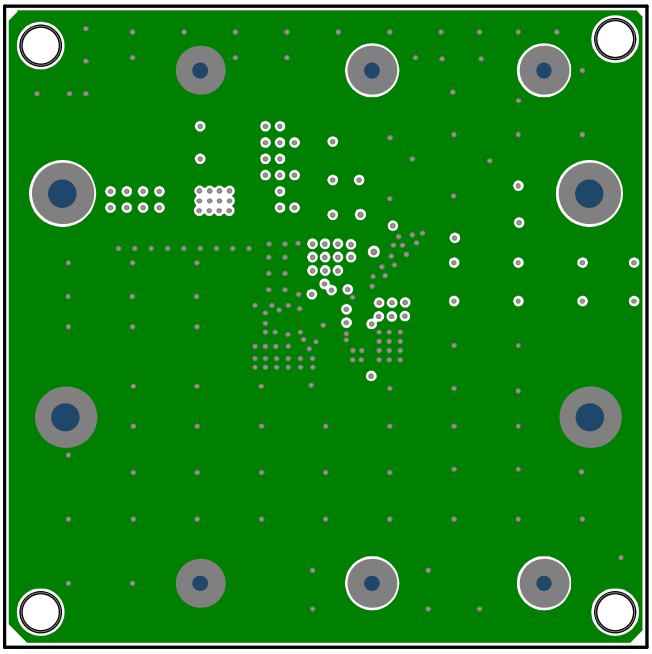

Figure 5: Mid-Layer 1

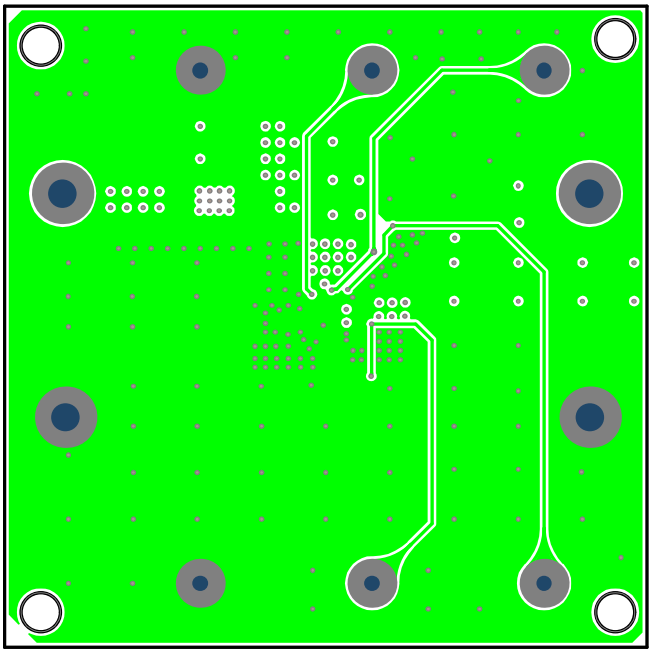

Figure 6: Mid-Layer 2

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PCB LAYOUT *(continued)*

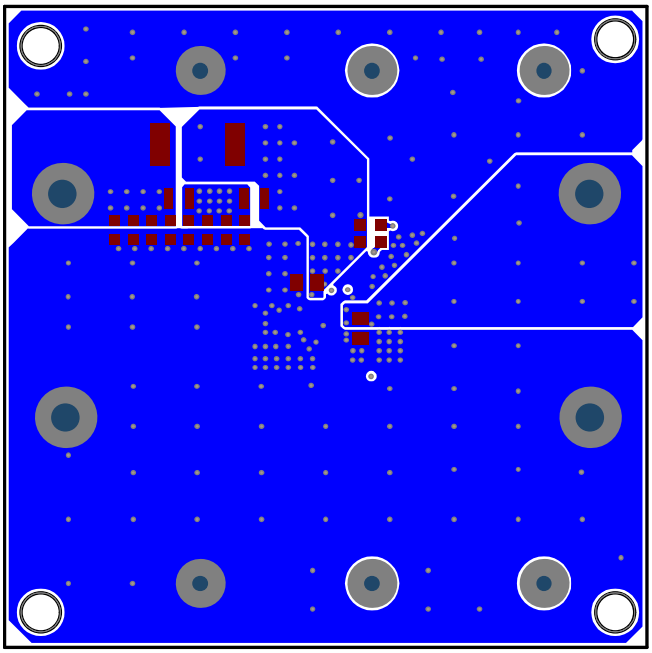

Figure 7: Bottom Layer

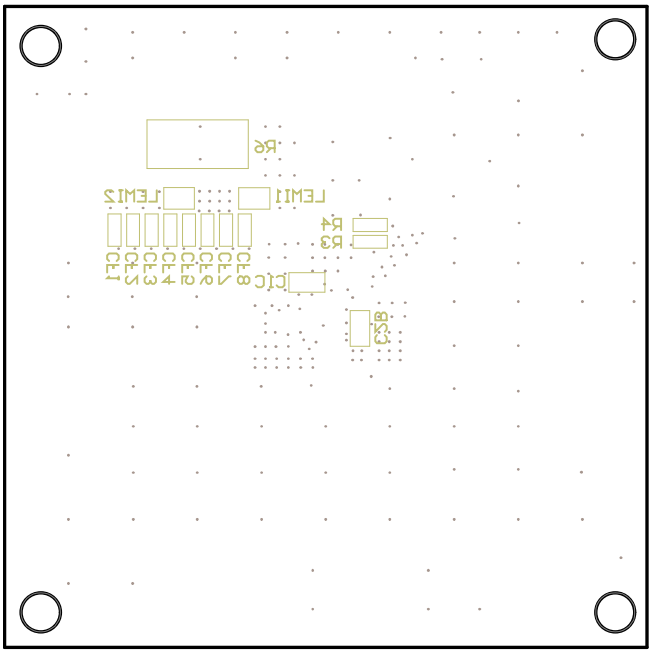

Figure 8: Bottom Silk

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	11/15/2024	Initial Release	-

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