EVM3809-PH-01A

5.5V, 0.6A, Ultra-Small Package Step-Down Module Evaluation Board

DESCRIPTION

The EVM3809-PH-01A evaluation board is designed to demonstrate the capabilities of the MPM3809, a fully integrated, high-efficiency, synchronous, step-down power module. The device provides up to 0.6A of output current (I_{OUT}).

The MPM3809 features internally compensated constant-on-time (COT) control to provide fast transient response and ease loop stabilization. The switching frequency is fixed at 2.4MHz when entering continuous conduction mode (CCM). Refer to the MPM3809 datasheet for more detailed information.

It is recommended to read the datasheet for the MPM3809 prior to making any changes to the EVM3809-PH-01A.

PERFORMANCE SUMMARY (1)

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

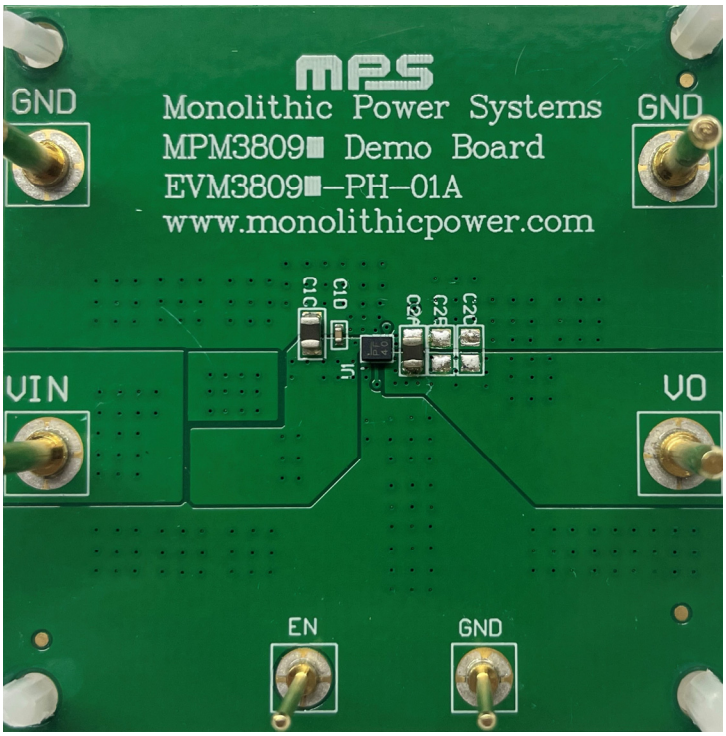
Parameters	Conditions	Value
Input voltage (V_{IN}) range		2.3V to 5.5V
Output voltage (V_{OUT})	V_{IN} = 2.3V to 5.5V, I_{OUT} = 0A to 0.6A	1.2V
Maximum output current (I_{OUT})	V_{IN} = 2.3V to 5.5V, V_{OUT} = 1.2V	0.6A
Peak efficiency	V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 0.4A, f_{SW} = 2.4MHz	84.39%
Full load efficiency	V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 0.6A, f_{SW} = 2.4MHz	82.95%
Switching frequency (f_{SW})		2.4MHz

Note:

1) For input and output voltage specifications with different output capacitors (C_{OUT}), the application circuit parameters may require changes.

MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

EVALUATION BOARD



LxWxH (5cmx5cmx1.5cm)

Board Number	MPS IC Number
EVM3809-PH-01A	MPM3809

MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

QUICK START GUIDE

The EVM3809-PH-01A evaluation board is easy to set up to evaluate the performance of the MPM3809. 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 2.3V 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:
   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 to GND terminals.
6. Once the proper V_{OUT} is established, adjust the load within the operating range, then measure the efficiency, output ripple voltage, and other parameters.
7. After completing all tests, adjust the load to 0A and turn off the input power supply. (3)

Notes:

2) Ensure that V_{IN} does not exceed 5.5V.
3) When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe.

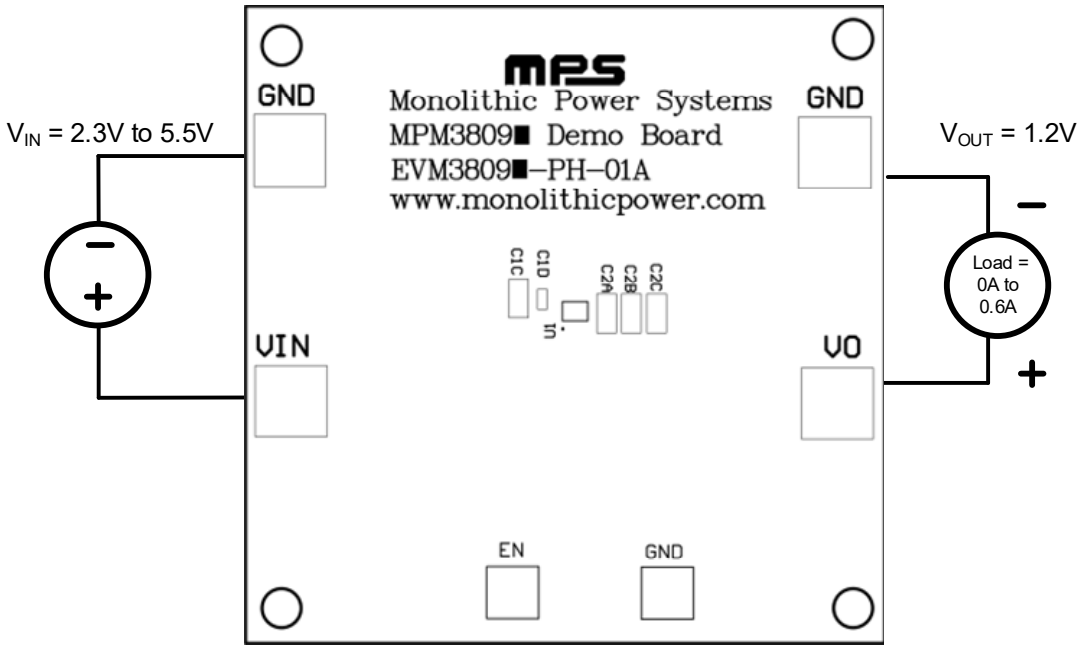


Figure 1: Measurement Equipment Set-Up

MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

EVALUATION BOARD SCHEMATIC

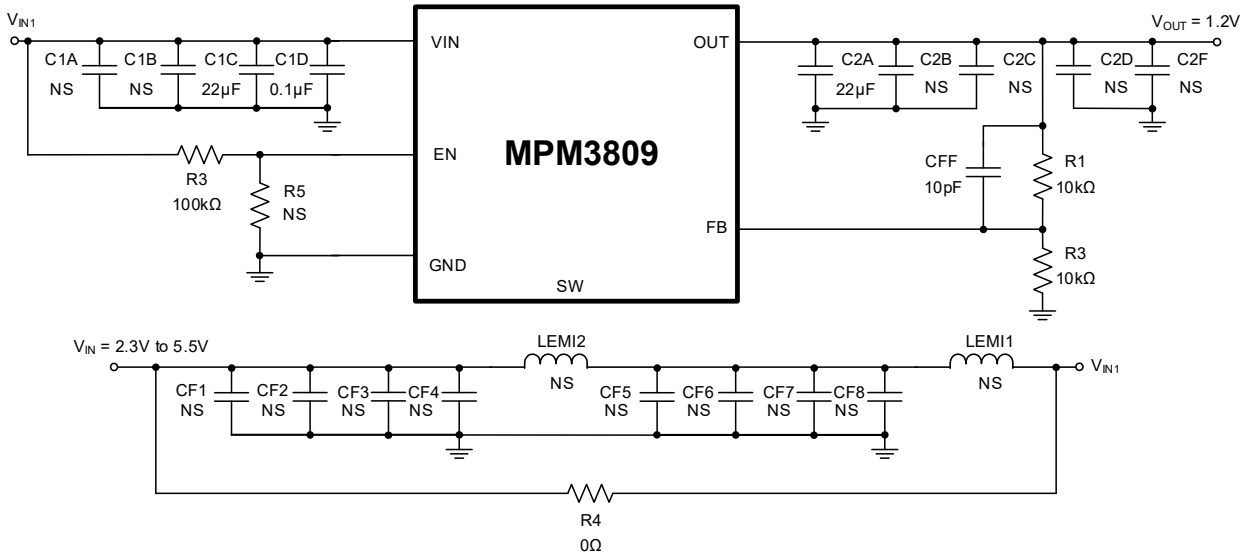


Figure 2: Evaluation Board Schematic

MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

EVM3809-PH-01A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1D	0.1µF	Ceramic capacitor, 10V, X7R	0402	Wurth	885012205018
2	C1C, C2A	22µF	Ceramic capacitor, 10V, X7R	0805	TDK	C2012X7S1A226M
1	CFF	10pF	Ceramic capacitor, 25V, NP0	0402	Wurth	885012005040
2	R1, R2	10kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-0710KL
1	R3	100kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-07100KL
1	R4	0Ω	Film resistor, 1%	2512	Yageo	RC2512FK-070RL
1	R5	NS				
0	LEMI1, LEMI2	NS				
0	C1A, C1B, C2B, C2C, C2D, C2F	NS				
0	CF1, CF2, CF3, CF4, CF5, CF6, CF7, CF8	NS				
1	U1	MPM3809	0.6A, 5.5V, synchronous, step-down power module	ECLGA-6 (1.5mmx 2mm)	MPS	MPM3809

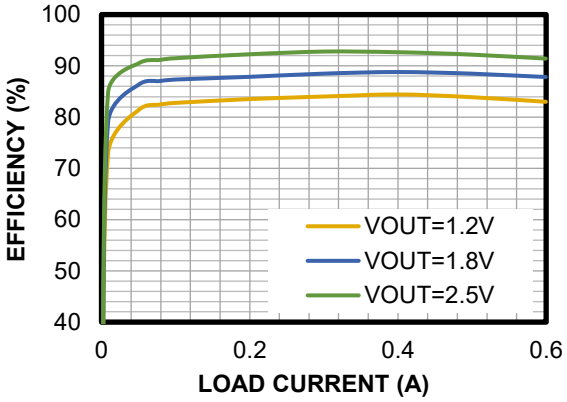
MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, V_{OUT} = 1.2V, f_{SW} = 2400kHz, T_A = 25°C, unless otherwise noted.

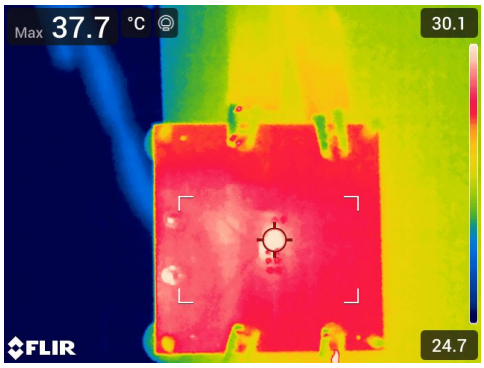
Efficiency vs. Load Current

V_{IN} = 3.3V, AAM mode



Thermal Performance (T_A = 28°C)

I_{OUT} = 0.6A, no forced airflow, T_{CASE} = 37.7°C



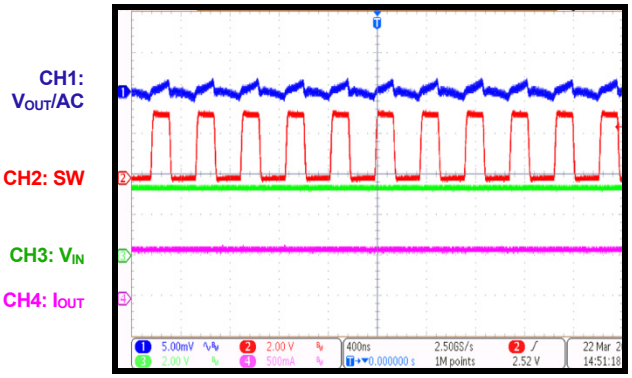
MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, V_{OUT} = 1.2V, f_{SW} = 2400kHz, T_A = 25°C, unless otherwise noted.

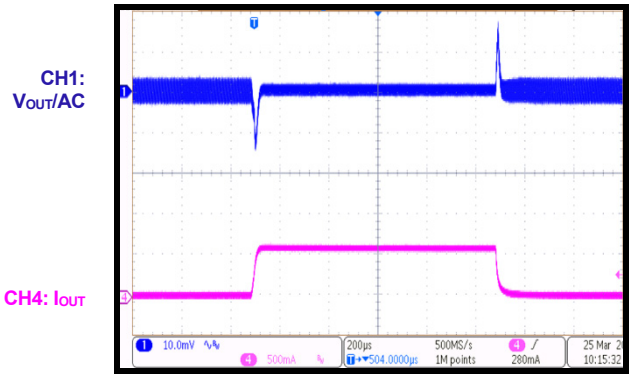
Steady State

I_{OUT} = 0.6A



Load Transient Ripple

I_{OUT} = 0A to 0.6A, slew rate = 0.8A/μs



MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

PCB LAYOUT

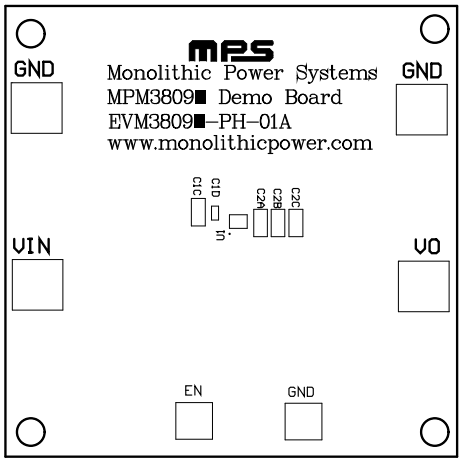


Figure 3: Top Silk

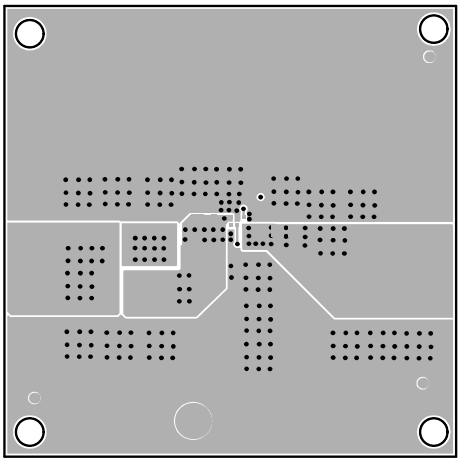


Figure 4: Top Layer

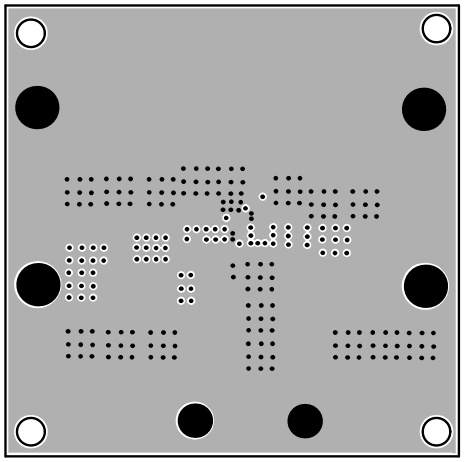


Figure 5: Mid-Layer 1

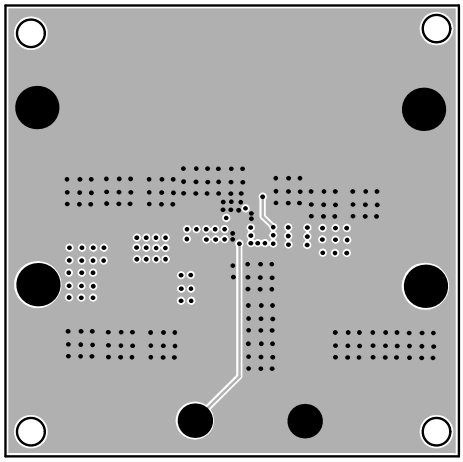


Figure 6: Mid-Layer 2

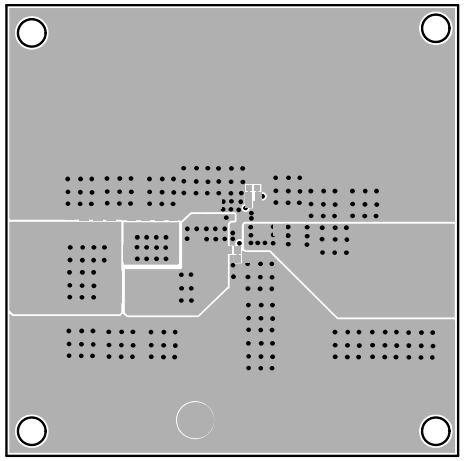


Figure 7: Bottom Layer

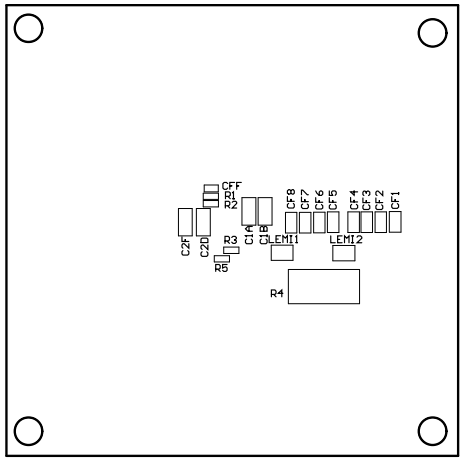


Figure 8: Bottom Silk

MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	11/12/2024	Initial Release	-

Notice: The information in this document is subject to change without notice. Please contact MPS for current specifications. Users should warrant and guarantee that third-party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS will not assume any legal responsibility for any said applications.

MPS Proprietary Information. Patent Protected. Unauthorized Photocopy and Duplication Prohibited.
© 2024 MPS. All Rights Reserved.