EVM3812C-PH-01A

5.5V, 1A, Ultra-Small Package Step-Down Module with CCM Evaluation Board

DESCRIPTION

The EVM3812C-PH-01A evaluation board is designed to demonstrate the capabilities of the MPM3812C, a fully integrated, high-efficiency, synchronous, step-down power module with up to 1A of output current (I_{OUT}).

The MPM3812C adopts internally compensated constant-on-time (COT) control to provide fast transient response and easy loop stabilization. The switching frequency (f_{SW}) is fixed at 2.4MHz. Refer to the MPM3812C datasheet for more detailed information.

It is recommended to read the datasheet for the MPM3812C prior to making any changes to the EVM3812C-PH-01A.

PERFORMANCE SUMMARY (1)

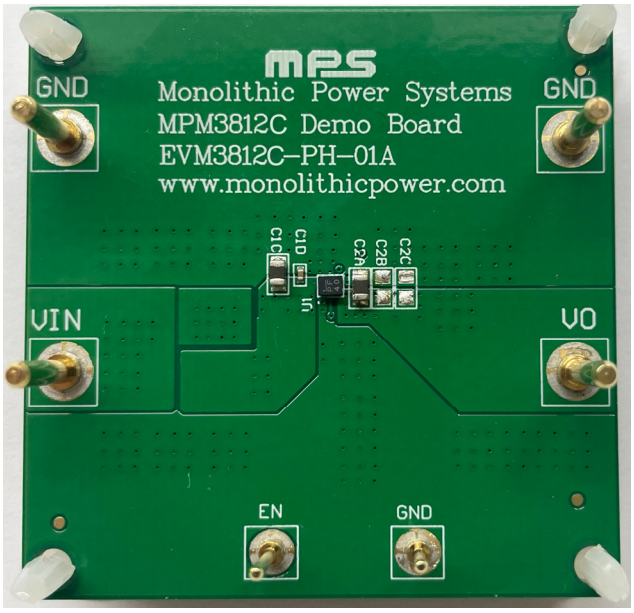
Specifications are at T_A = 25°C, unless otherwise noted.

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 1A	1.2V
Maximum output current (I_{OUT})	V_{IN} = 2.3V to 5.5V, V_{OUT} = 1.2V	1A
Full load efficiency	V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 1A, f_{SW} = 2.4MHz	77.94%
Peak efficiency	V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 0.5A, f_{SW} = 2.4MHz	83.93%
Default switching frequency (f_{SW})		2.4MHz

Note:

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

EVALUATION BOARD



(LxWxH) 5cmx5cmx1.5cm

Board Number	MPS IC Number
EVM3812C-PH-01A	MPM3812CGPH

QUICK START GUIDE

The EVM3812C-PH-01A evaluation board is easy to set up to evaluate the performance of the MPM3812C. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply (V_{IN}) 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. Set the initial load to 0A.
4. Connect the load terminals to:
   a. Positive (+): VO
   b. Negative (-): GND
5. After making the connections, turn on the power supply. The board should start up automatically.
6. Check for the proper output voltage (V_{OUT}) from the VO to GND turrets.
7. Once the proper V_{OUT} is established, adjust the load within the operating range, then measure the efficiency, output voltage ripple, and other parameters. (3)
8. After completing all tests, adjust the load to 0A, then turn off the input power supply.

Notes:

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

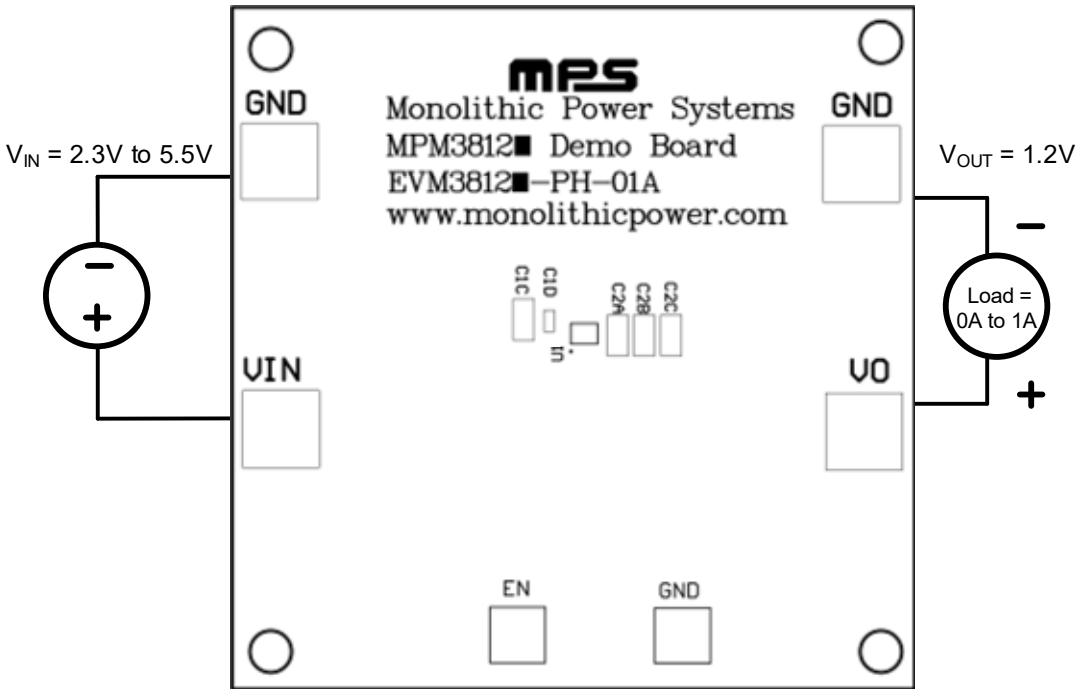


Figure 1: Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

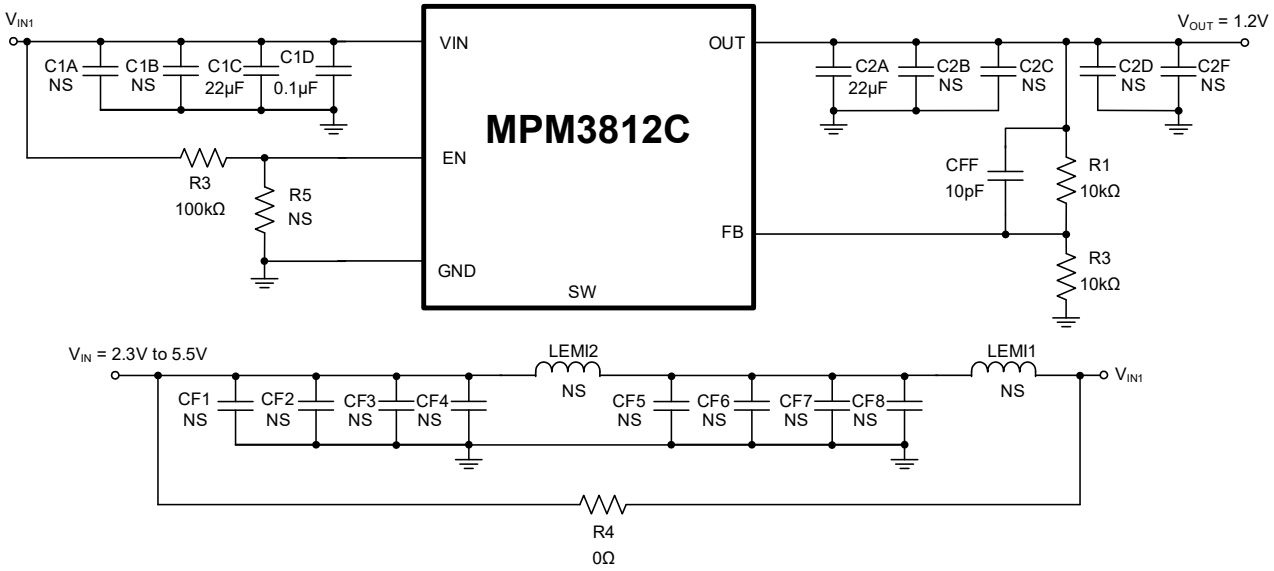


Figure 2: Evaluation Board Schematic

EVM3812C-PH-01A BILL OF MATERIALS

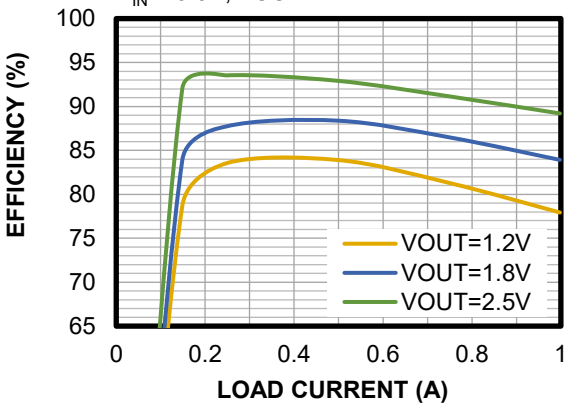
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1D	0.1µF	Ceramic capacitor, 10V, X7R	0402	Wurth	885012205018
2	C1C, C2A	22µF	Ceramic capacitor, 10V, X7R	0805	TDK	C2012X7S1A226M
1	CFF	10pF	Ceramic capacitor, 25V, NP0	0402	Wurth	885012005040
2	R1, R2	10kΩ	Film resistor, 1%	0402	Yageo	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	MPM3812C	5.5V, 1A, step-down power module	ECLGA-6 (1.5mmx 2mm)	MPS	MPM3812CGPH

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.

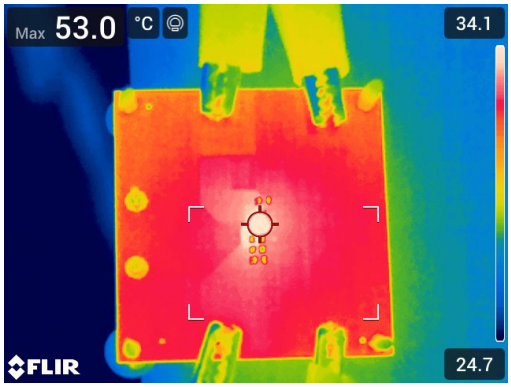
Efficiency vs. Load Current

V_{IN} = 3.3V, FCCM



Thermal Performance

T_A = 28°C, I_{OUT} = 1A, no forced airflow, T_{CASE} = 53°C

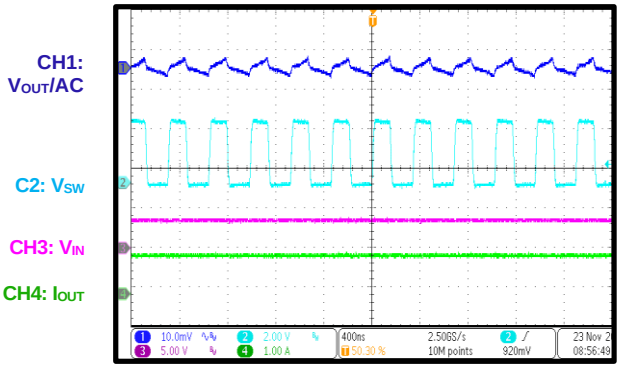


EVB TEST RESULTS *(continued)*

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.

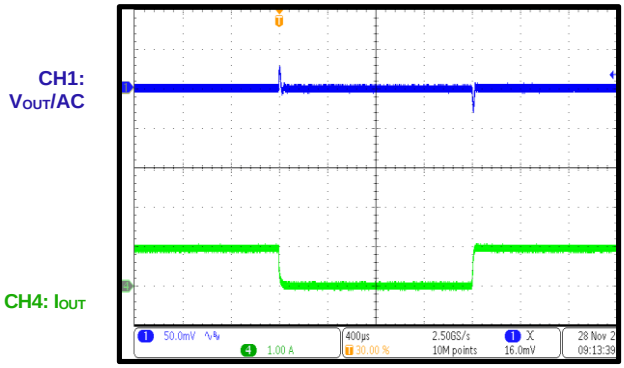
Steady State

I_{OUT} = 1A



Load Transient Ripple

I_{OUT} = 0A to 1A, slew rate = 0.8A/µs



PCB LAYOUT

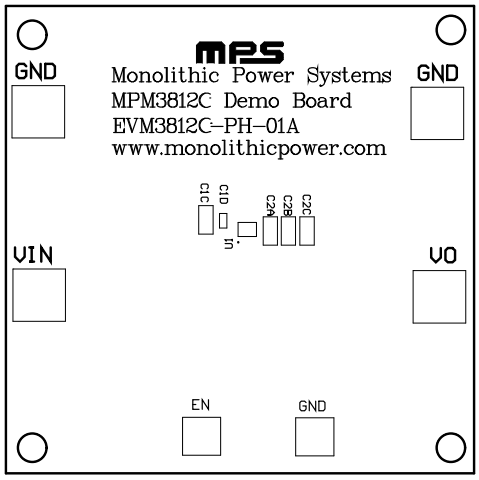


Figure 3: Top Silk

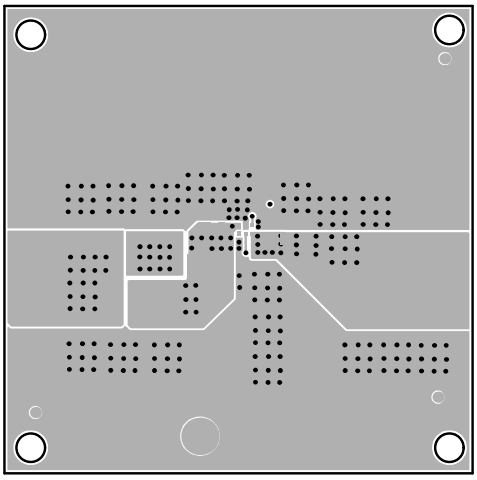


Figure 4: Top Layer

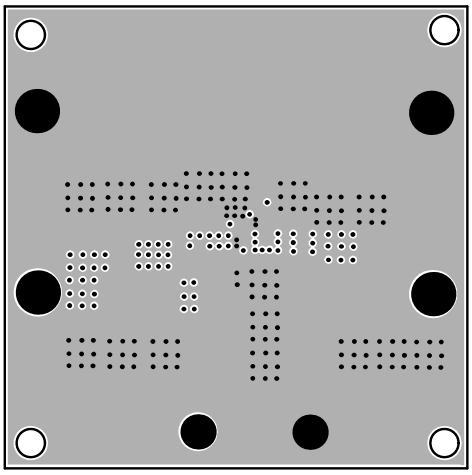


Figure 5: Mid-Layer 1

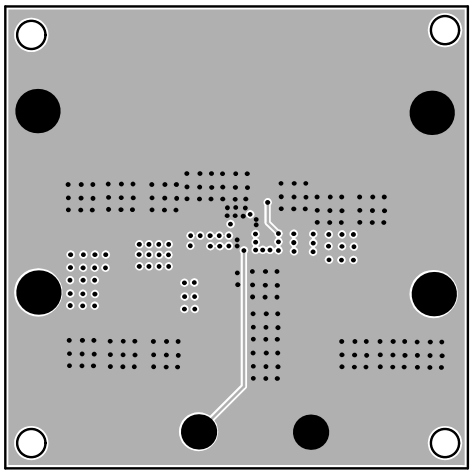


Figure 6: Mid-Layer 2

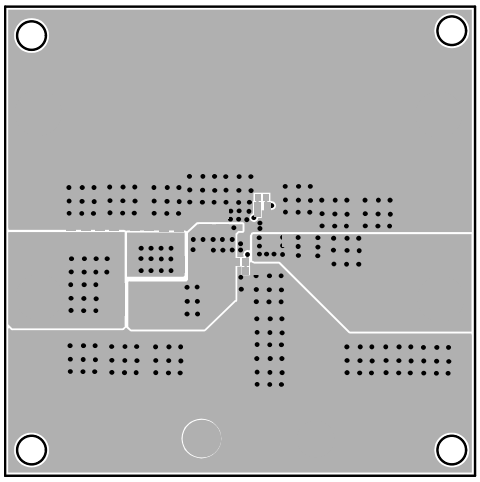


Figure 7: Bottom Layer

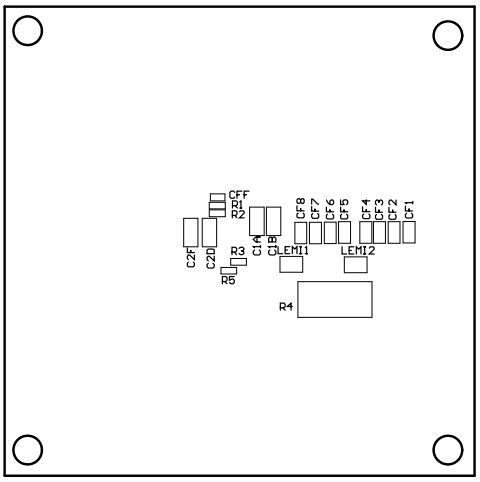


Figure 8: Bottom Silk

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	6/18/2024	Initial Release	-