EVM4710-PA-00B

6V, 1A, 2MHz, Synchronous Buck-Boost Power Module Evaluation Board

DESCRIPTION

The EVM4710-PA-00B evaluation board is designed to demonstrate the capabilities of the MPM4710, a high-efficiency, buck-boost power module with an integrated inductor.

The fixed 2MHz switching frequency enables the use of small external components, and the internal compensation and soft start minimize the external component count. The MPM4710 uses current-mode control with a fixed pulse-width modulation (PWM) frequency for optimal stability and transient response.

It is recommended to read the MPM4710 datasheet prior to making any changes to the EVM4710-PA-00B.

PERFORMANCE SUMMARY [1]

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

Parameters	Conditions	Value
Input voltage (V_{IN}) range	Start-up through V_{IN}	1.8V to 5.5V
	Steady state	1.2V to 5.5V
Output voltage (V_{OUT})	Default configuration	V_{OUT} = 3.3V
Maximum output current (I_{OUT})	V_{IN} = 2.5V to 5.5V	1A
Typical efficiency	V_{IN} = 3.3V, V_{OUT} = 3.3V, I_{OUT} = 1A	91.4%
Peak efficiency	V_{IN} = 3.3V, V_{OUT} = 3.3V, I_{OUT} = 0.5A	93.2%
Switching frequency	V_{IN} = 5V	2MHz

Note:

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

EVALUATION BOARD
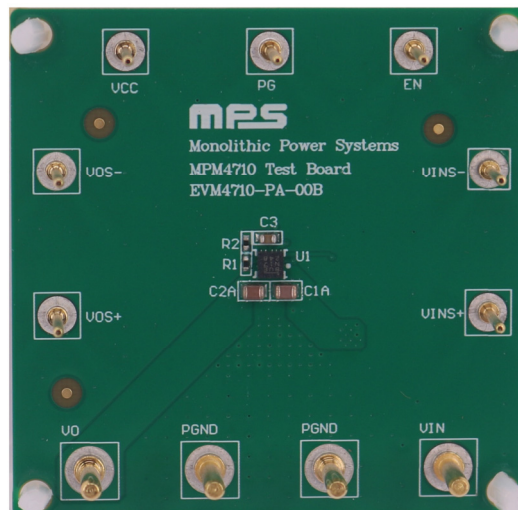
LxWxH (50mmx50mmx1.6mm)

| Board Number	MPS IC Number
EVM4710-PA-00B	MPM4710GPA

QUICK START GUIDE

The EVM4710-PA-00B evaluation board is easy to set up and use to evaluate the performance of the MPM4710. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply (V_{IN}) between 1.8V and 5.5V, then turn off the power supply. [2]

2. Connect the power supply terminals to:

   a. Positive (+): VIN

   b. Negative (-): PGND

3. Connect the load terminals to: [3]

   a. Positive (+): VO

   b. Negative (-): PGND

4. After making the connections, turn on the power supply. The board should automatically start up.

5. Check for the proper output voltage (V_{OUT}) between VOS+ and VOS-.

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. [4]

Notes:

2) Ensure that V_{IN} does not exceed 5.5V.
3) There is no initial load by default.
4) When measuring the output voltage ripple or input voltage ripple, do not use the oscilloscope probe's long ground lead.
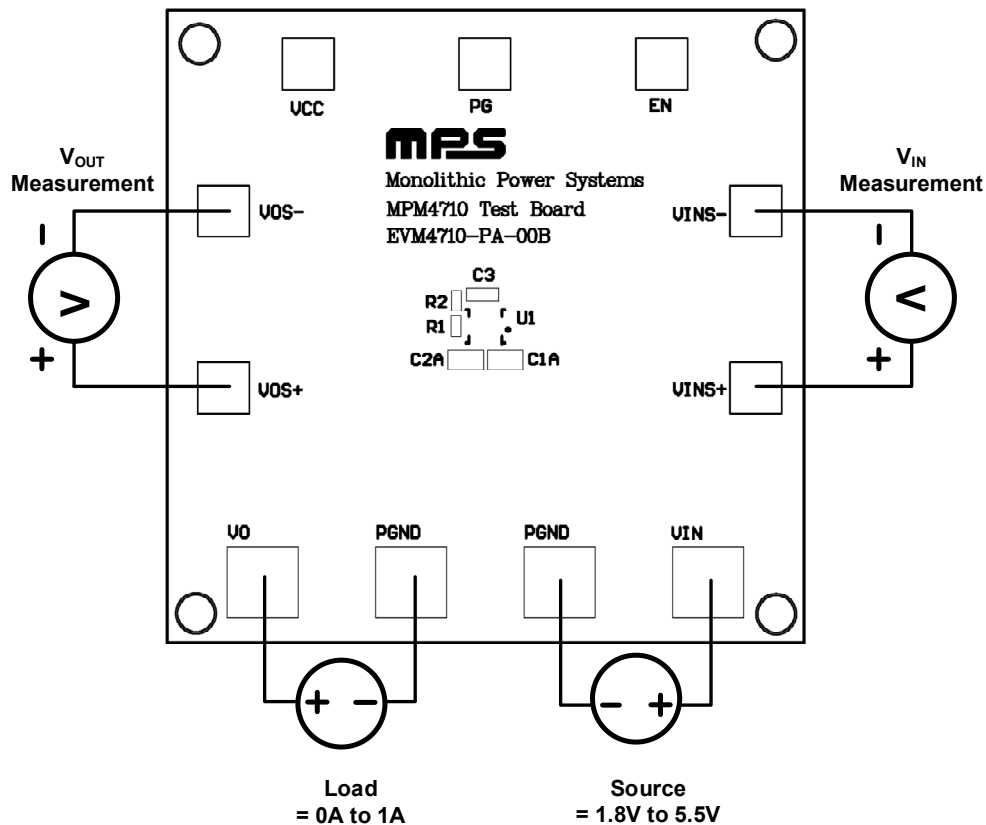
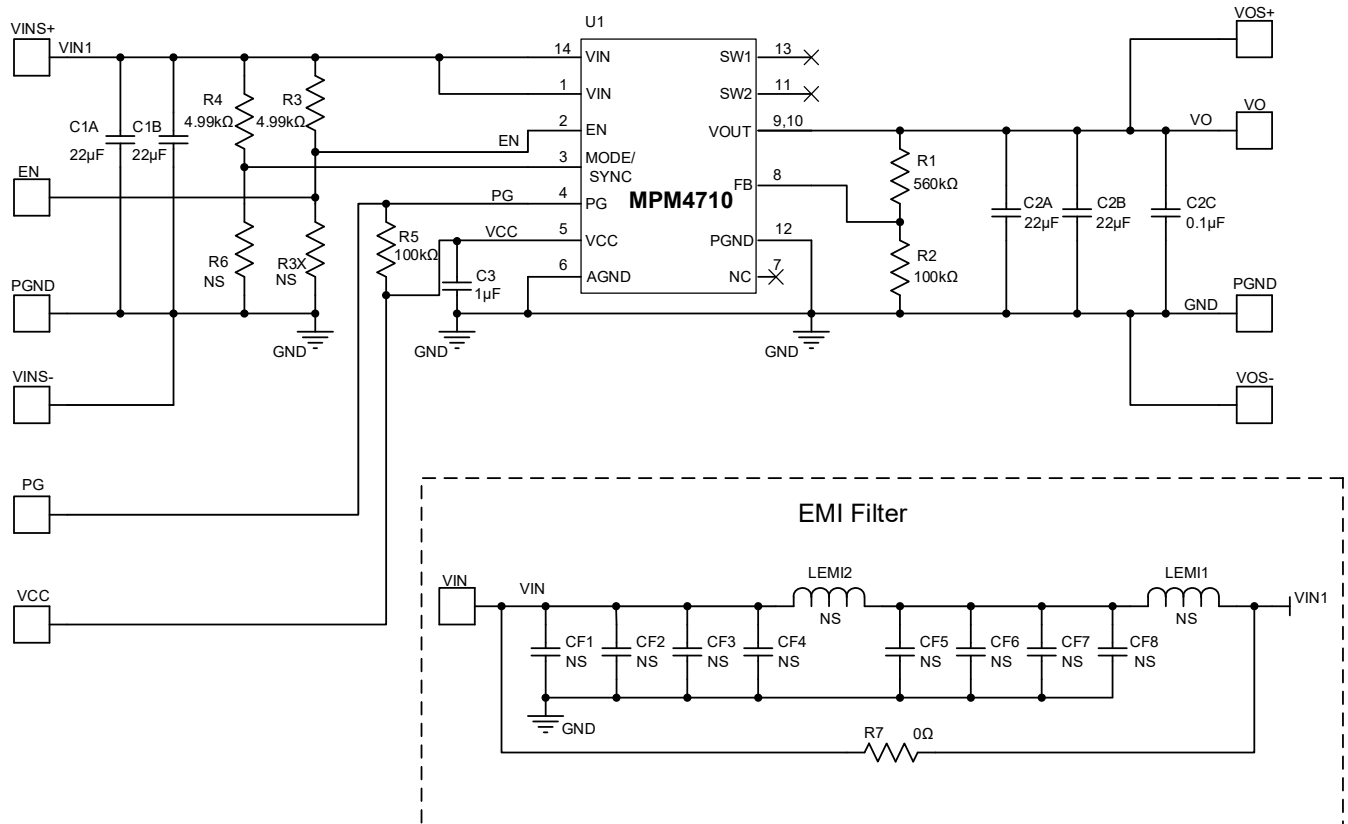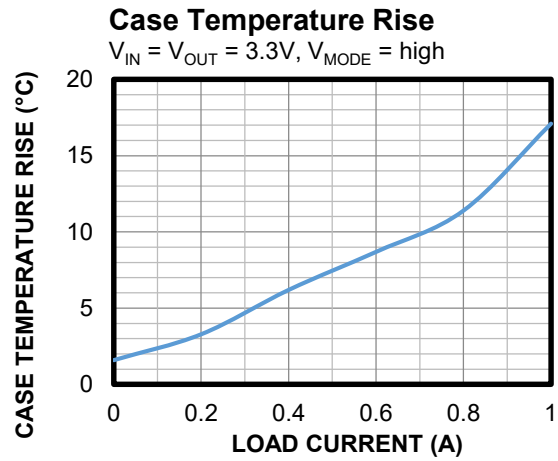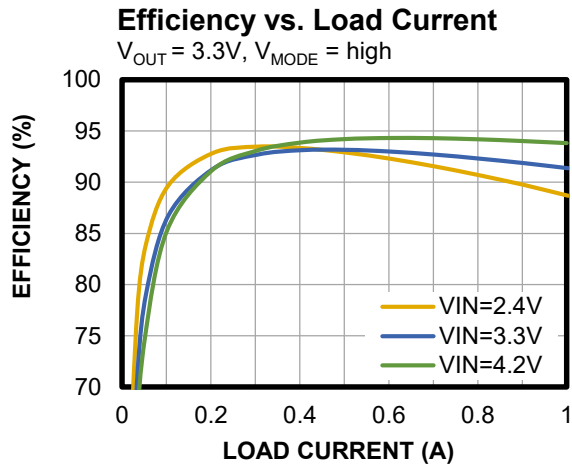**Figure 1: Proper Measurement Equipment Set-Up**

EVALUATION BOARD SCHEMATIC

Figure 2: Evaluation Board Schematic

EVM4710-PA-00B BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
4	C1A, C1B, C2A, C2B	22µF	Ceramic capacitor, 10V, X7T	0805	Murata	GRM21BD71A226ME44L
1	C2C	0.1µF	Ceramic capacitor, 16V, X7R, 100nF	0402	Murata	GRM155R71C104KA88D
1	C3	1µF	Ceramic capacitor, 10V, X7R, 1µF	0603	Wurth	885012206026
1	R1	560kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-07560KL
2	R3, R4	4.99kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-074K99L
2	R2, R5	100kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-07100KL
1	R7	0Ω	Film resistor, 1%	2512	Yageo	RC2512FK-070RL
0	R3X, R6	NS				
7	VCC, PG, EN, VINS, VOS, GNDS, GNDS	φ1.0	φ1.0 copper pin	DIP	Custom	
4	VIN, GND, GND, VO	φ2.0	φ2.0 copper pin	DIP	Custom	
1	U1	MPM4710	6V, 1A, 2MHz, synchronous buck-boost power module	ECLGA-14 (2.5mmx 2.5mmx 1.2mm)	MPS	MPM4710GPA

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, V_{OUT} = 3.3V, PWM mode, T_A = 25°C, unless otherwise noted.

Efficiency vs. Load Current
V_{OUT} = 3.3V, V_{MODE} = high

Case Temperature Rise
V_{IN} = V_{OUT} = 3.3V, V_{MODE} = high

EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, V_{OUT} = 3.3V, PWM mode, T_A = 25°C, unless otherwise noted.

Steady State
I_{OUT} = 0.2A, V_{MODE} = high

CH1: V_{OUT}/AC

CH2: V_{SW1}

CH3: V_{SW2}

CH4: I_{OUT}

Steady State
I_{OUT} = 1A, V_{MODE} = high

CH1: V_{OUT}/AC

CH2: V_{SW1}

CH3: V_{SW2}

CH4: I_{OUT}

Start-Up
I_{OUT} = 1A, V_{MODE} = high

CH1: V_{OUT}

CH2: V_{SW1}

CH3: V_{SW2}

R2: V_{PG}

CH4: I_{OUT}
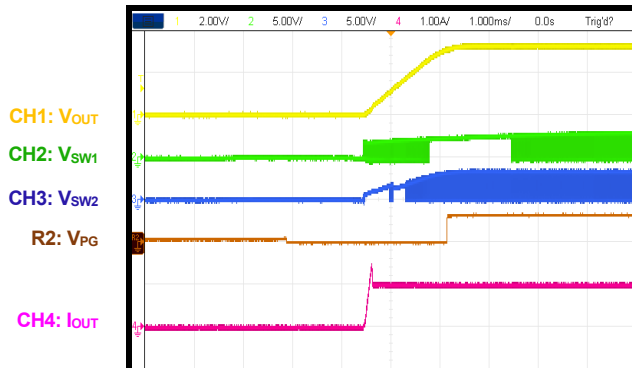
Shutdown
I_{OUT} = 1A, V_{MODE} = high

CH1: V_{OUT}

CH2: V_{SW1}

CH3: V_{SW2}

R2: V_{PG}

CH4: I_{OUT}
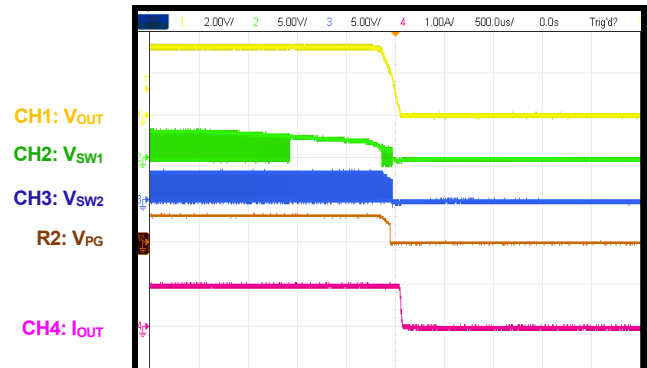
Start-Up through EN
I_{OUT} = 1A, V_{MODE} = high

CH1: V_{OUT}

CH2: V_{SW1}

CH3: V_{SW2}

R2: V_{EN}

CH4: I_{OUT}
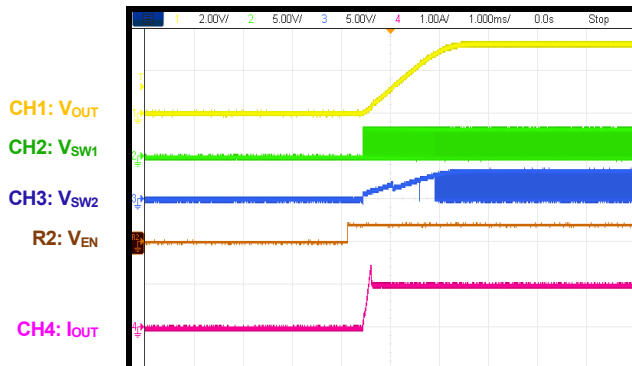
Shutdown through EN
I_{OUT} = 1A, V_{MODE} = high

CH1: V_{OUT}

CH2: V_{SW1}

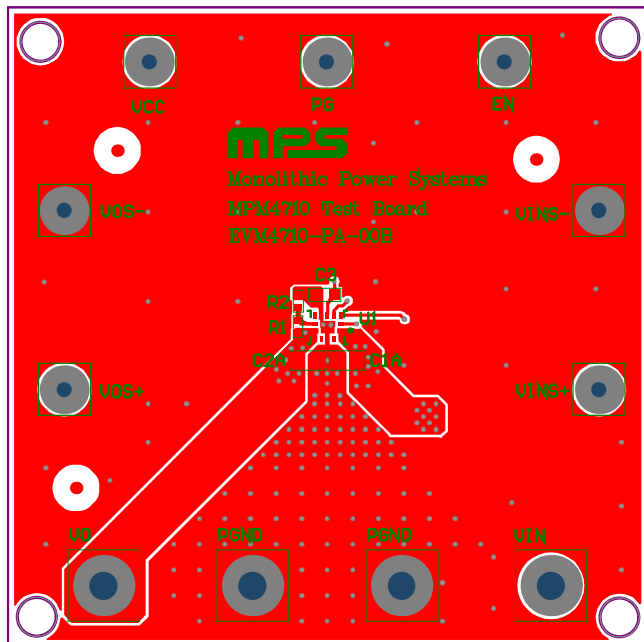CH3: V_{SW2}

R2: V_{EN}

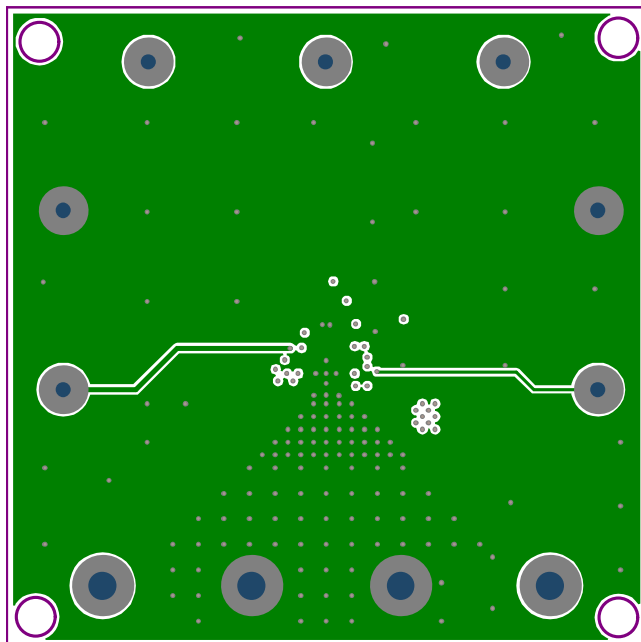CH4: I_{OUT}
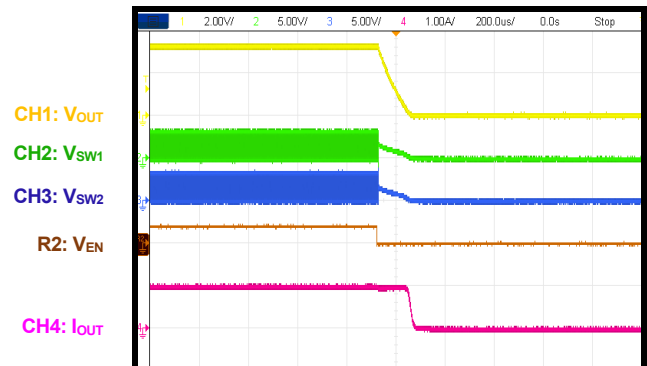
PCB LAYOUT

Figure 3: Top Layer

Figure 4: Mid-Layer 1
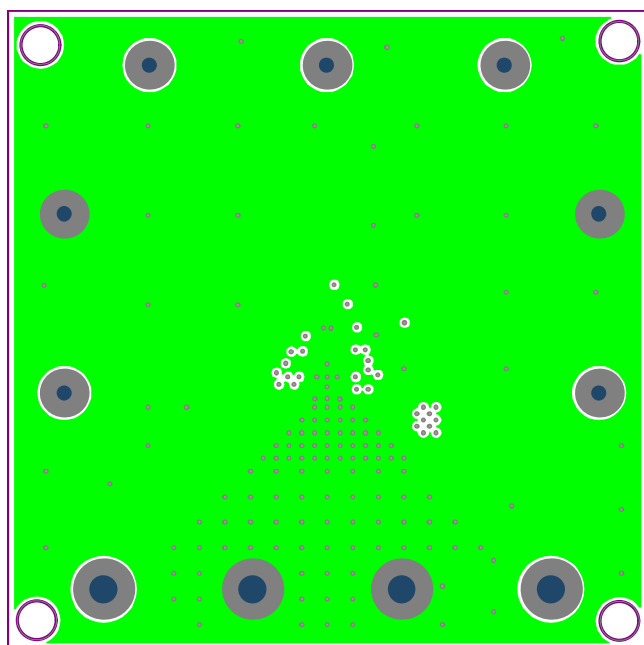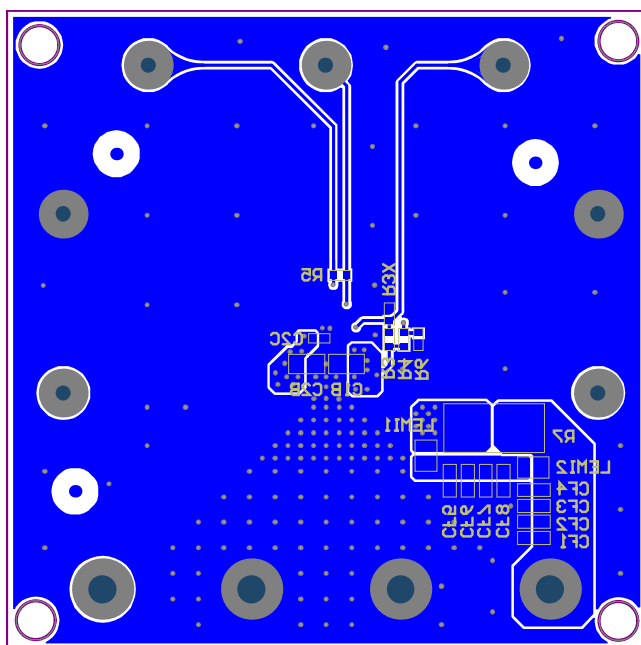

Figure 5: Mid-Layer 2

Figure 6: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	10/19/2021	Initial Release	-