



EVM4730-PQ-00A

2.8V to 22V V_{IN} , Max 1A, 4-Switch Integrated Buck-Boost Module Evaluation Board

DESCRIPTION

The EVM4730-PQ-00A is an evaluation board designed to demonstrate the capabilities of the MPM4730, a 2.8V to 22V input voltage (V_{IN}) range, synchronous, four-switch integrated buck-boost module, with regulated output voltage (V_{OUT}) and high efficiency.

The MPM4730 provides automatic pulse-frequency modulation (PFM)/pulse-width modulation (PWM) mode or forced PWM mode.

The device also provides selectable switching frequency (f_{SW}) and configurable soft start (SS). Full protection features include over-current protection (OCP), over-voltage protection (OVP), under-voltage protection (UVP), and thermal shutdown.

It is recommended to read the MPM4730 datasheet prior to making any changes to the EVM4730-PQ-00A.

PERFORMANCE SUMMARY ⁽¹⁾

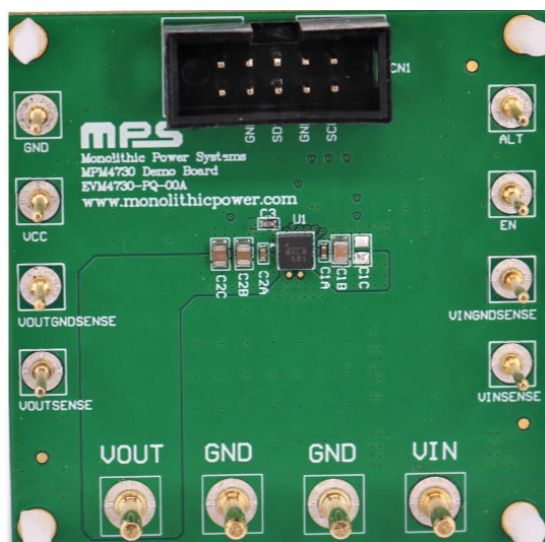
Specifications are at $T_A = 25^\circ\text{C}$, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range	Default configuration	2.8V to 22V
Output voltage (V_{OUT})	Default configuration	15V
Maximum output current (I_{OUT})	$V_{IN} = 2.8\text{V to } 22\text{V}$	1A
Typical efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 15\text{V}$, $I_{OUT} = 1\text{A}$, $f_{SW} = 500\text{kHz}$	95.7%
Peak efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 15\text{V}$, $I_{OUT} = 0.4\text{A}$, $f_{SW} = 500\text{kHz}$	96.4%
Switching frequency (f_{SW})	Default configuration	500kHz

Note:

1) For different V_{IN} and V_{OUT} specifications with different output capacitors, a change in the application circuit's parameters may be required.

EVALUATION BOARD



LxWxH (5.1cmx5.1cmx1.6mm)

Board Number	MPS IC Number
EVM4730-PQ-00A	MPM4730GPQ

QUICK START GUIDE

The EVM4730-PQ-00A evaluation board is designed to evaluate the performance of the MPM4730. Refer to Figure 1 and follow the steps below to quickly set up the board:

1. Preset the power source (V_{IN}) between 2.8V and 22V. ⁽²⁾
2. Turn off the power source off.
3. Connect the power source terminals to:
 - a. Positive (+): V_{IN}
 - b. Negative (-): GND
4. Connect the load terminals to: ⁽³⁾
 - a. Positive (+): V_{OUT}
 - 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 $V_{OUTSENSE}$ and $V_{OUTGNDSENSE}$ turrets.
7. Once the proper V_{OUT} is established, adjust the load within the operating range, and measure the efficiency, V_{OUT} ripple, and other parameters. Do not use the long ground lead on the oscilloscope probe when measuring the V_{OUT} ripple and V_{IN} ripple.

Notes:

- 2) Ensure that the V_{IN} does not exceed 22V.
- 3) The initial load should be set to 0A.

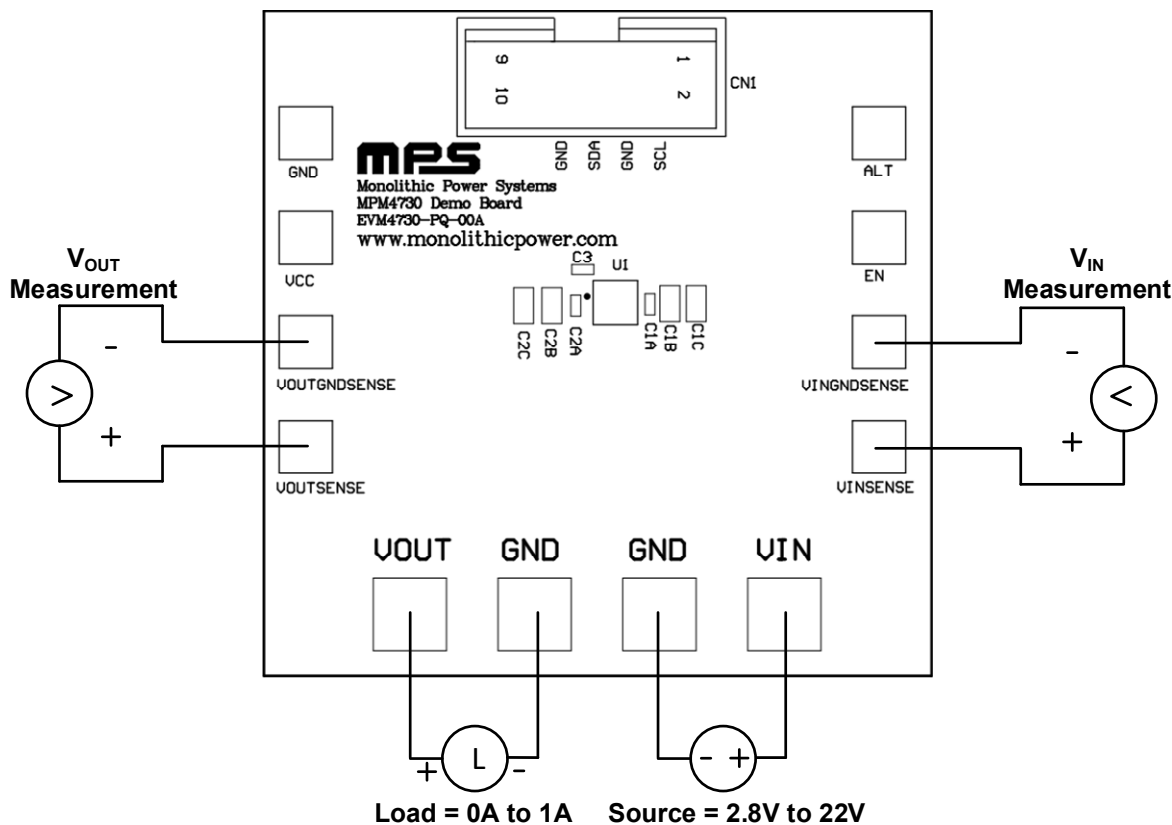


Figure 1: Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

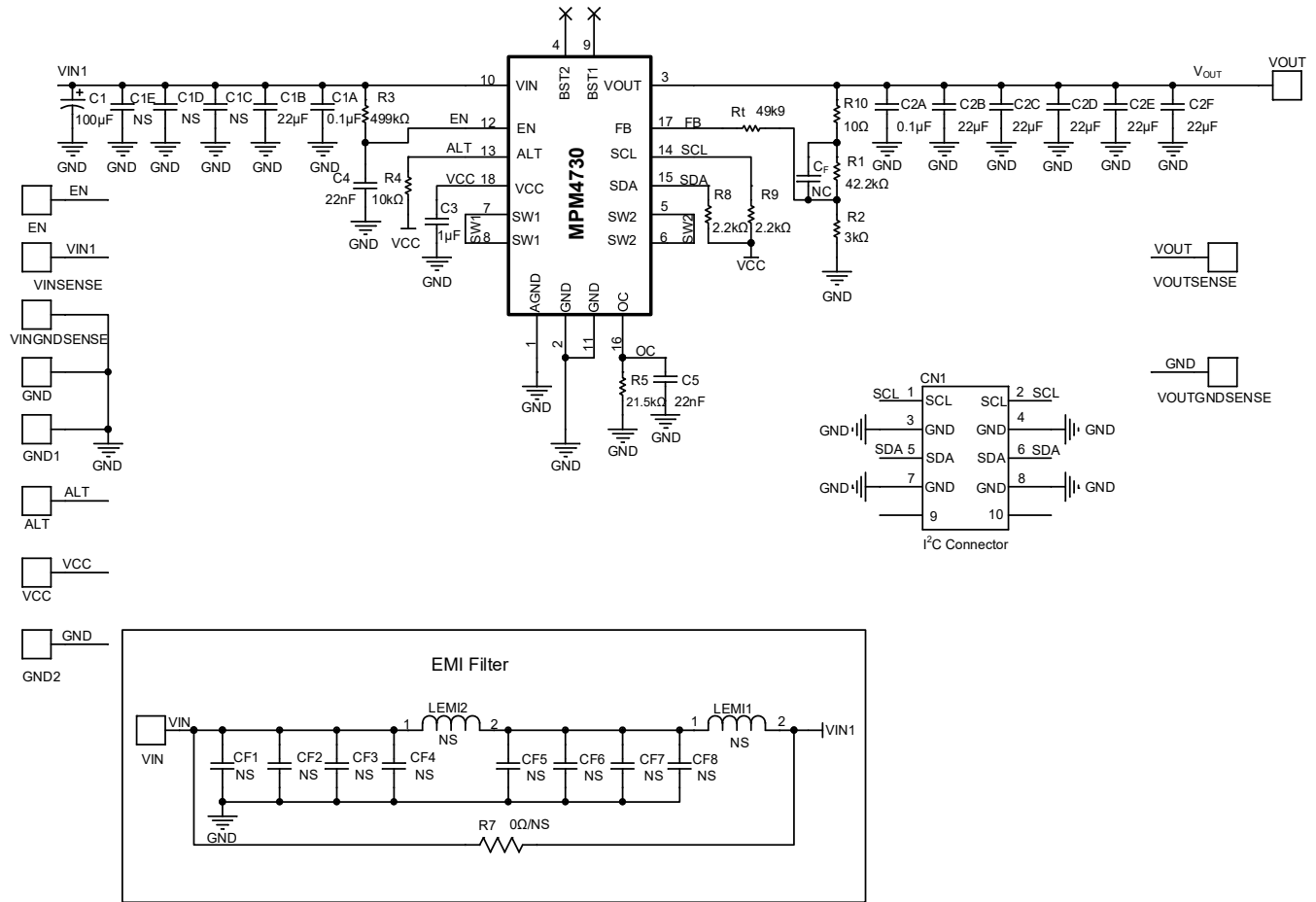


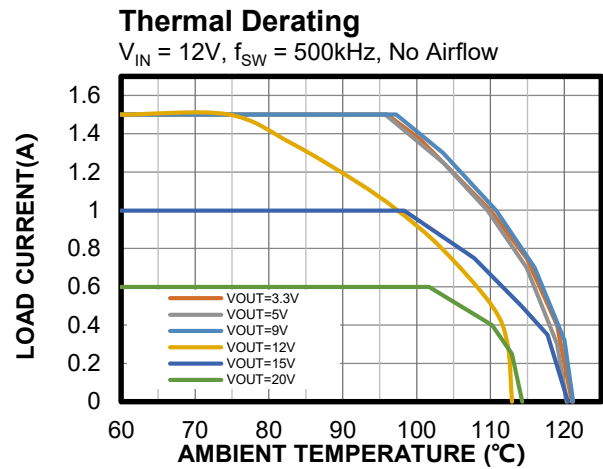
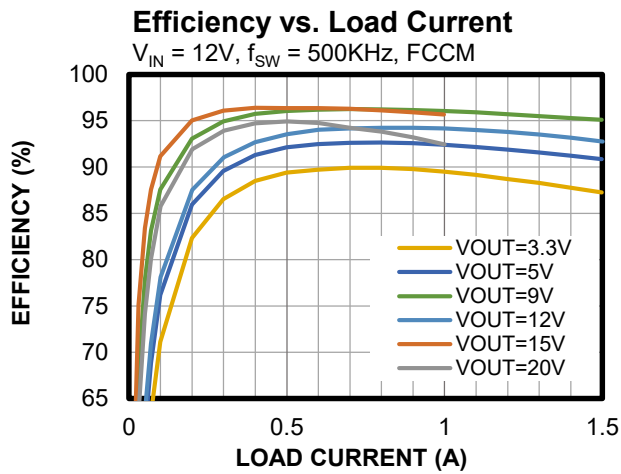
Figure 2: Evaluation Board Schematic

EVM4730-PQ-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
6	C1B, C2B, C2C, C2D, C2E, C2F	22 μ F	Ceramic capacitor, 25V, X5R	0805	Murata	GRM21BR61E226 ME44L
2	C1A, C2A	0.1 μ F	Ceramic capacitor, 25V, X7R	0402	Murata	GRM188R71E104 KA01D
1	C3	1 μ F	Ceramic capacitor, 10V, X7R	0603	Würth	885012206026
1	C1	100 μ F	Electrolytic cap, 35V	SMD	Chemicon	EMZJ350ADA101 MF80G
2	C4, C5	22nF	Ceramic capacitor, 50V, X5R	0603	Murata	GRM188R71H223 KA01D
1	R3	499k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07499KL
1	R5	21.5k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0721K5L
2	R8, R9	2.2k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-072K2L
1	R10	10 Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0710RL
1	R1	42.2k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0742.2KL
1	R2	3k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-073KL
1	R4	10k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	Rt	49.9k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0749K9L
1	R7	0 Ω	Film resistor, 1%	2512	Yageo	RC2512FK-070RL
1	CN1	2.54mm	2-row, 5-pin I ² C connector	DIP	Würth	612010235121
8	GND, VINSENSE, VINGNDSSENSE, EN, ALT, VOUTGNDSENSE, VOUTSENSE, VCC	Φ 1	Φ 1.0 copper pin	DIP	Any	
4	VIN, VOUT, GND	Φ 2	Φ 2.0 copper pin	DIP	Any	
1	U1	MPM4730	2.8V to 22V buck-boost module	ECLGA-18 (3mmx3mm)	MPS	MPM4730GPQ

EVB TEST RESULTS

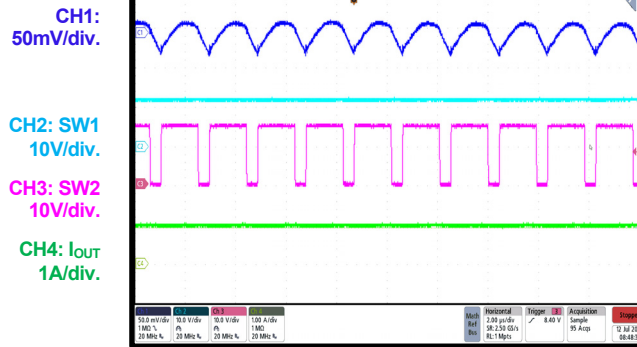
Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 15V$, $C_{OUT} = 5 \times 22\mu F$ ceramic capacitor, FCCM, $f_{SW} = 500kHz$, $T_A = 25^\circ C$, unless otherwise noted.



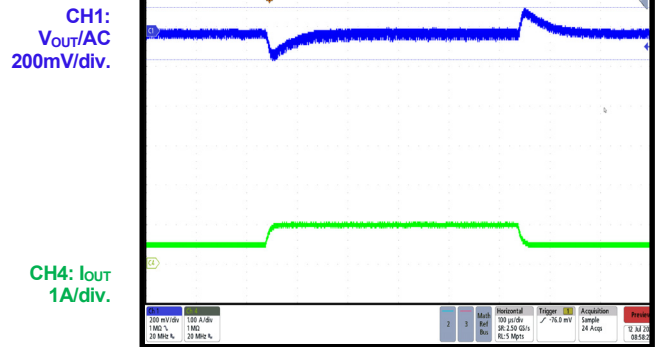
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 15V$, $C_{OUT} = 5 \times 22\mu F$ ceramic capacitor, FCCM, $f_{SW} = 500kHz$, $T_A = 25^\circ C$, unless otherwise noted.

Steady State and Output Ripple

 $I_{OUT} = 1A$


Load Transient Output Ripple

 $I_{OUT} = 0.5A$ to $1A$, slew rate = $150mA/\mu s$ e-load


PCB LAYOUT

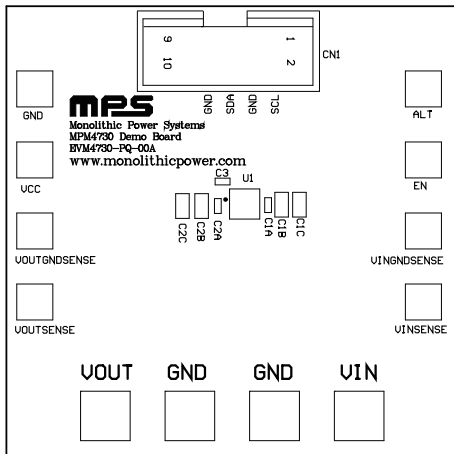


Figure 3: Top Silk

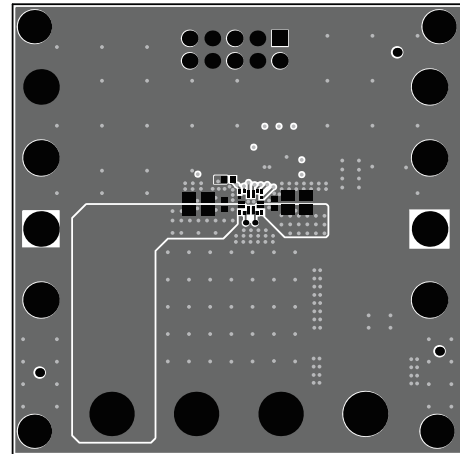


Figure 4: Top Layer

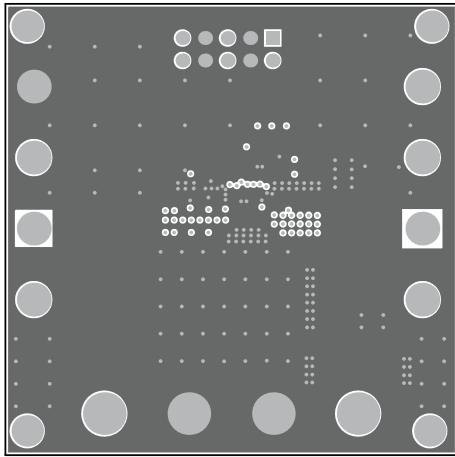


Figure 5: Mid-Layer 1

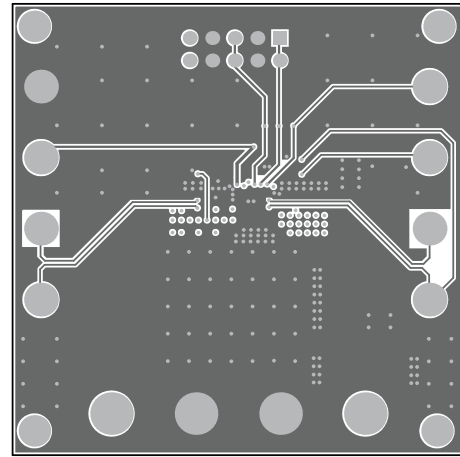


Figure 6: Mid-Layer 2

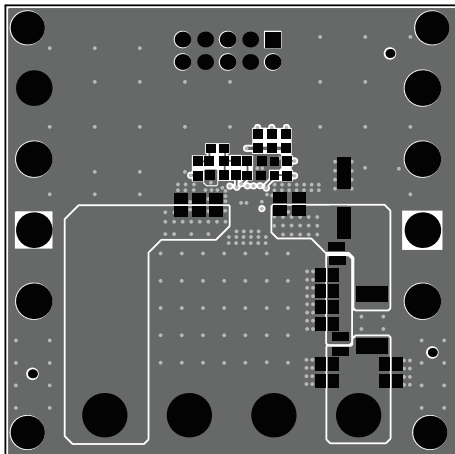


Figure 7: Bottom Layer

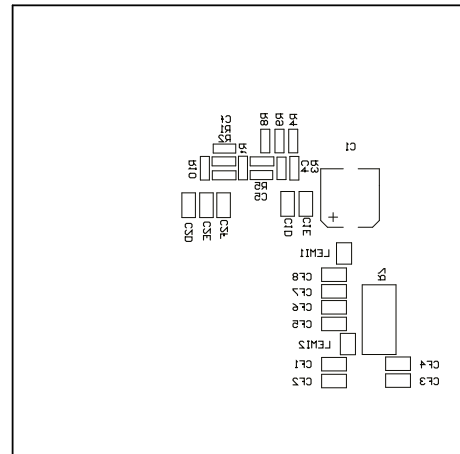


Figure 8: Bottom Silk



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	9/29/2023	Initial Release	-

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