



EVM3864-PQ-00A

7V, 6A, Step-Down Power Module Evaluation Board

DESCRIPTION

The EVM3864-PQ-00A is an evaluation board designed to demonstrate the capabilities of the MPM3864, a fully integrated, synchronous rectified, step-down, DC/DC power module with up to 6A of continuous current.

The MPM3864 adopts constant-on-time (COT) control to provide fast transient response, easy loop design, and tight output regulation. Full

protection features include short-circuit protection (SCP), over-current protection (OCP), under-voltage protection (UVP), and thermal shutdown.

It is recommended to read the MPM3864 datasheet prior to making any changes to the EVM3864-PQ-00A.

PERFORMANCE SUMMARY ⁽¹⁾

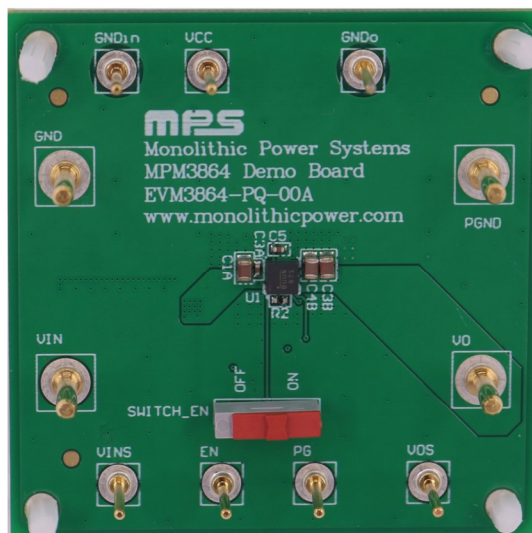
Specifications are at $T_A = 25^\circ\text{C}$, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range		2.75V to 7V
Output voltage (V_{OUT})	Default configuration	1.2V
Maximum output current (I_{OUT})	$V_{IN} = 2.75\text{V to } 7\text{V}$	6A
Typical efficiency	$V_{IN} = 5\text{V}$, $V_{OUT} = 1.2\text{V}$, $I_{OUT} = 6\text{A}$, $f_{SW} = 1.2\text{MHz}$	83.4%
Peak efficiency	$V_{IN} = 5\text{V}$, $V_{OUT} = 1.2\text{V}$, $I_{OUT} = 2\text{A}$, $f_{SW} = 1.2\text{MHz}$	89.7%
Switching frequency (f_{SW})	Default configuration	1.2MHz

Note:

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

EVALUATION BOARD



LxWxH (5.1cmx5.1cmx1.6cm)

Board Number	MPS IC Number
EVM3864-PQ-00A	MPM3864GPQ

QUICK START GUIDE

The EVM3864-PQ-00A evaluation board is easy to set up and use to evaluate the performance of the MPM3864. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply (V_{IN}) between 2.75V and 7V, then turn off the power supply. ⁽²⁾
2. Connect the power supply terminals to:
 - a. Positive (+): V_{IN}
 - b. Negative (-): GND
3. Connect the load terminals to: ⁽³⁾
 - a. Positive (+): V_{OUT}
 - b. Negative (-): GND
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 the $V_{OUTSENSE}$ and $GNDSENSE$ 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. ⁽³⁾

Notes:

- 2) Ensure that V_{IN} does not exceed 7V.
- 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.

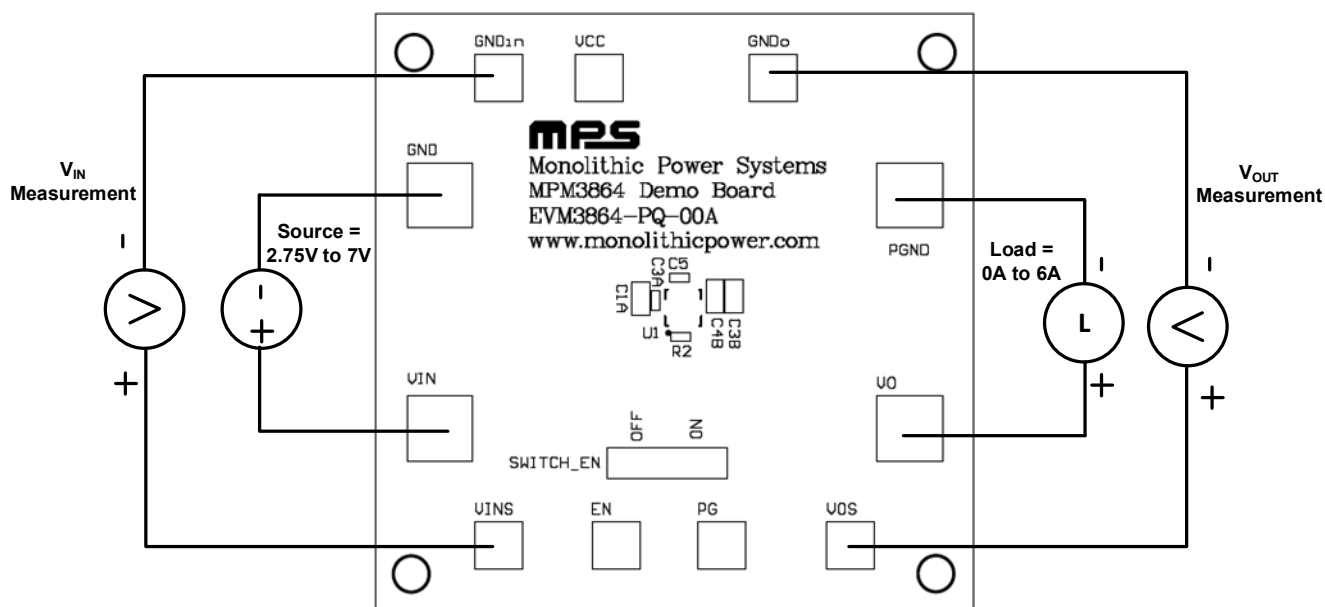


Figure 1: Proper Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

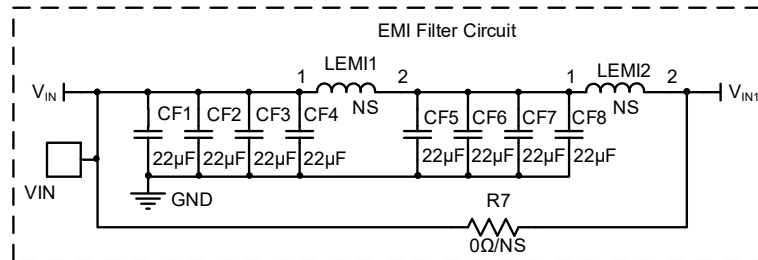
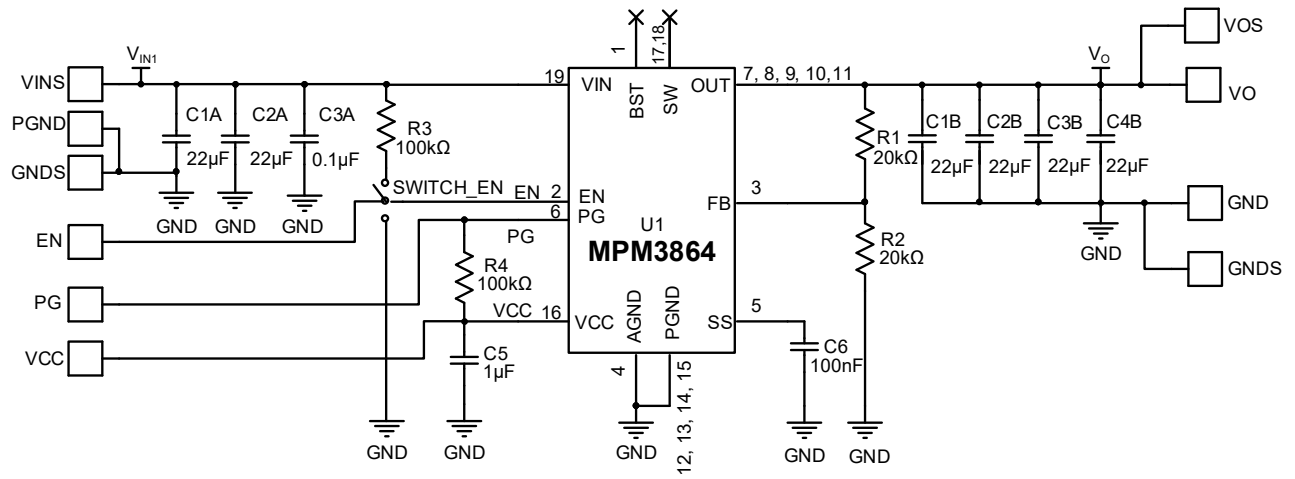


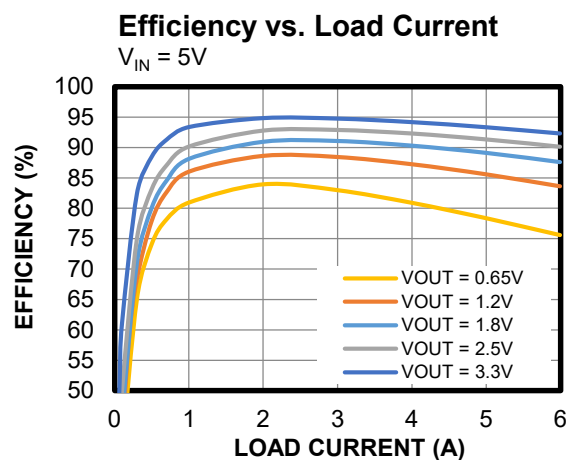
Figure 2: Evaluation Board Schematic

EVM3864-PQ-00A BILL OF MATERIALS

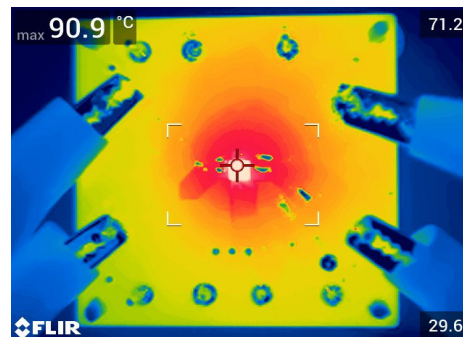
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
6	C1A, C1B, C2A, C2B, C3B, C4B	22μF	Ceramic capacitor, 25V	0805	Murata	GRM21BD71A226 ME44L
2	C3A, C6	0.1μF	Ceramic capacitor, 25V	0402	Murata	GRM155R71C104 KA88D
1	C5	1μF	Ceramic capacitor, 6.3V	0402	Würth	885012206026
0	CF1, CF2, CF3, CF4, CF5, CF6, CF7, CF8, LEM11, LEM12	NS				
7	EN, GNDS, GNDS, PG, VINS, VOS, VCC	Φ1	Copper pin	DIP	Any	
4	GND, GND, VO, VIN	Φ2	Copper pin	DIP	Any	
2	R1, R2	20kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-0720KL
2	R3, R4	100kΩ	Film resistor, 1%	0402	Yageo	RC0402FR-07100KL
1	R7	0Ω	Film resistor, 1%	2512	Yageo	RC2512FK-070RL
1	SWITCH_EN	500mA	Switch slide SPDT, 5V	10mmx 2.5mm	Würth	450301014042
1	U1	MPM3864	1.2MHz, synchronous, rectified, 6A, step-down power module	ECLGA (3mmx3mm)	MPS	MPM3864GPQ

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 5V$, $V_{OUT} = 1.2V$, $T_A = 25^{\circ}C$, unless otherwise noted.



Thermal Rise
 $I_{OUT} = 6A$, $T_A = 29.6^{\circ}C$

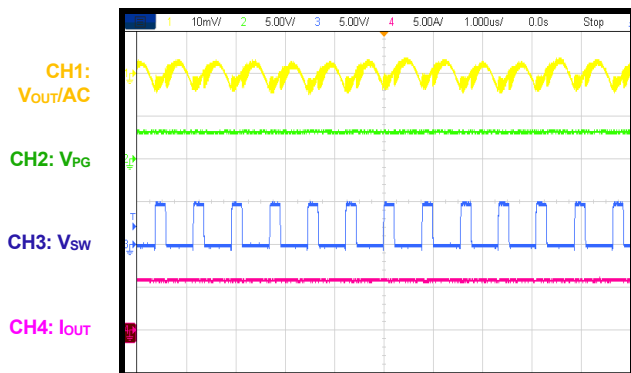


EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 5V$, $V_{OUT} = 1.2V$, $T_A = 25^{\circ}C$, unless otherwise noted.

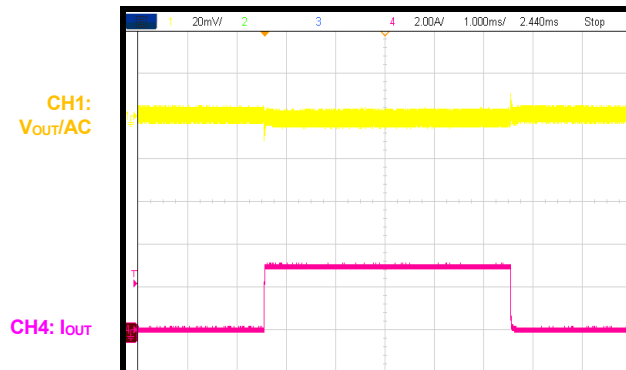
Steady State and Output Ripple

$I_{OUT} = 6A$



Load Transient Output Ripple

$I_{OUT} = 0A$ to $3A$, slew rate = $2.5A/\mu s$



PCB LAYOUT

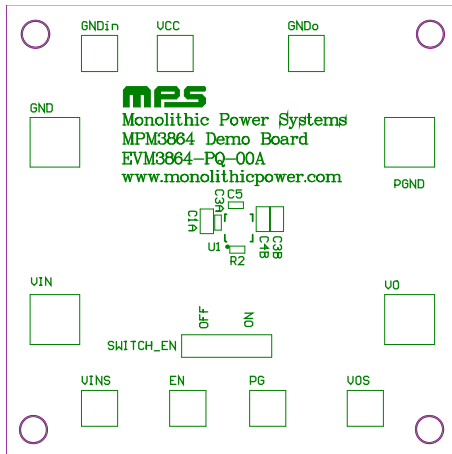


Figure 3: Top Silk

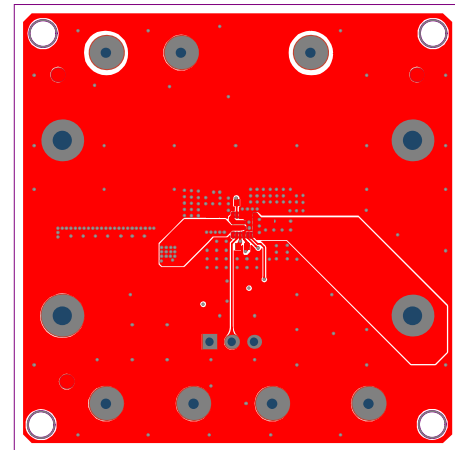


Figure 4: Top Layer

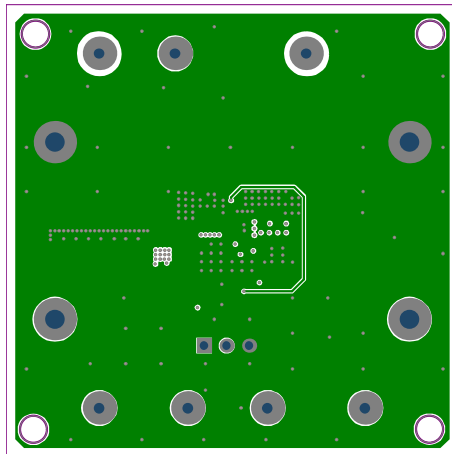


Figure 5: Mid-Layer 1

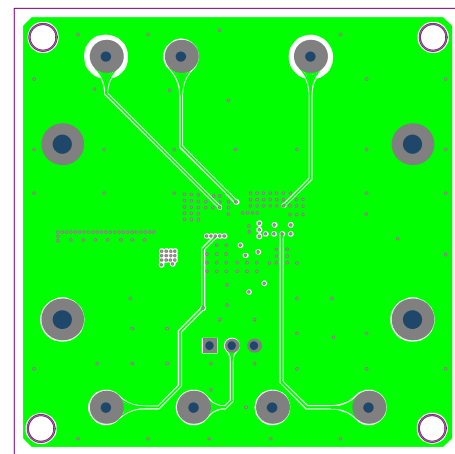


Figure 6: Mid-Layer 2

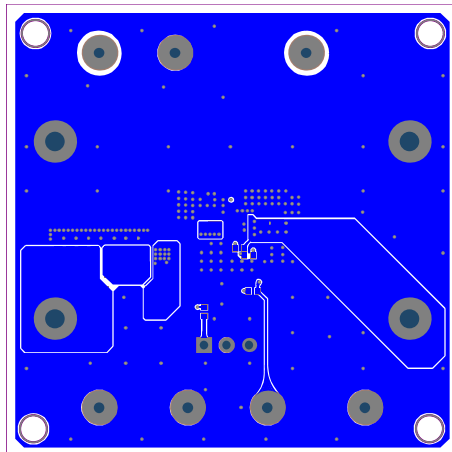


Figure 7: Bottom Layer

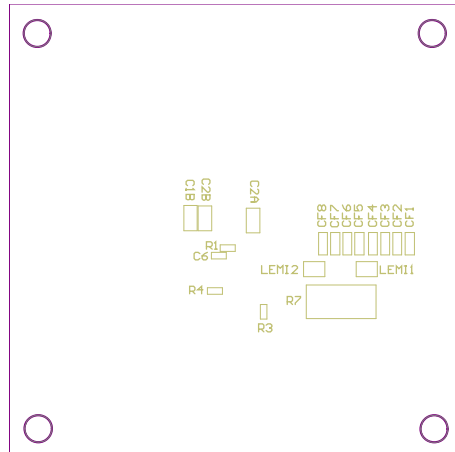


Figure 8: Bottom Silk

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	10/13/2021	Initial Release	-
1.01	9/5/2025	Updated Figure 2 to correct R2 connection and formatting.	3

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