EVM3860-QW-00A

7V Input, 6A, Step-Down Converter Module Evaluation Board

DESCRIPTION

The EVM3860-QW-00A evaluation board is designed to demonstrate the capabilities of the MPM3860, a fully integrated, high-frequency, synchronous, rectified, step-down power module with an internal inductor. The MPM3860 offers a very compact solution to achieve 6A of continuous output current across a wide input range, with excellent load and line regulation. The MPM3860 has synchronous mode operation for higher efficiency over the output current load range.

Constant-on-time (COT) control operation provides very fast transient response and easy loop design, as well as very tight output regulation.

Full protection features include SCP, OCP, UVP, and thermal shutdown. The MPM3860 is available in a QFN-24 (4mmx6mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	2.75 to 7	V
Output voltage	V_{OUT}	1	V
Output current	I_{OUT}	6	A

FEATURES

- Wide 2.75V to 7V Operating Input Range
- 6A Output Current
- 100μA Quiescent Current
- FCCM for Low V_{OUT} Ripple
- Output Adjustable from 0.6V
- High-Efficiency Synchronous Mode Operation
- Pre-Biased Start-Up
- Fixed 1200kHz Switching Frequency
- Externally Programmable Soft-Start Time
- EN and Power Good for Power Sequencing
- Over-Current Protection, Hiccup Mode, and Thermal Shutdown
- Available in a QFN-24 (4mmx6mmx1.6mm) Package

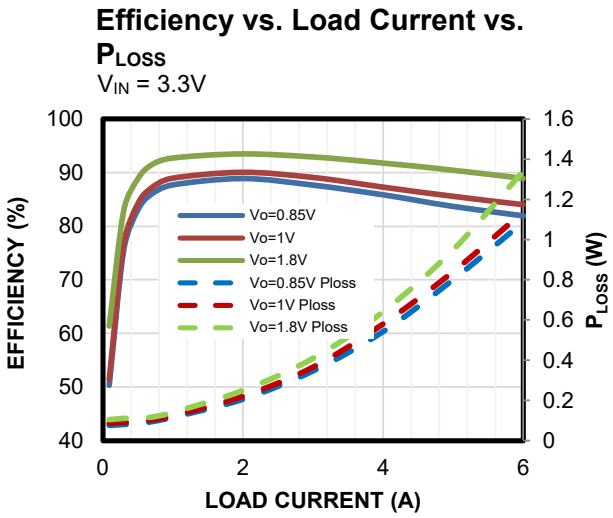
APPLICATIONS

- FPGA Power Systems
- Optical Modules

EVM3860-QW-00A EVALUATION BOARD

(LxWxH) 63.5mmx63.5mmx1.6mm

Board Number	MPS IC Number
EVM3860-QW-00A	MPM3860GQW



QUICK START GUIDE

1. Preset the power supply to 2.75V ≤ V_{IN} ≤ 7V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. Turn the power supply on after the making connections. The board should automatically start up.

EVALUATION BOARD SCHEMATIC

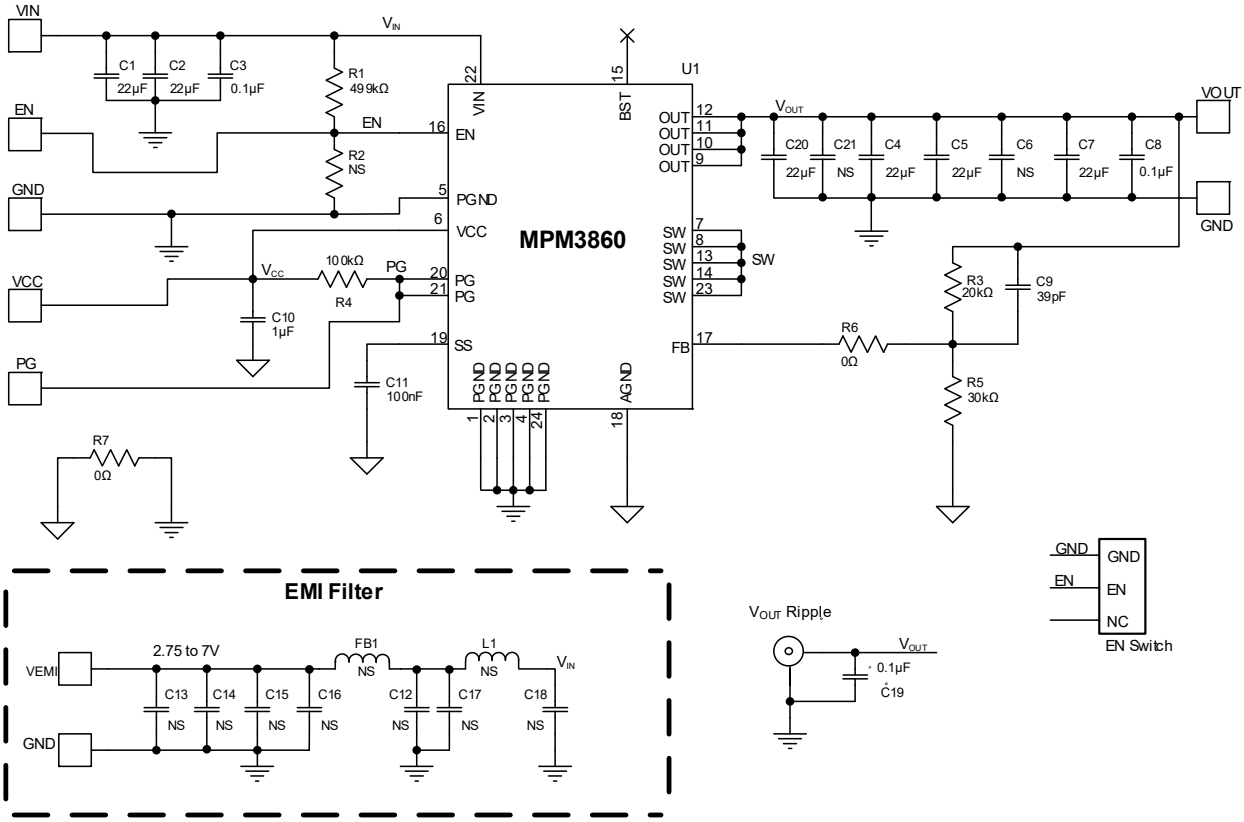


Figure 1: Evaluation Board Schematic

EVM3860-QW-00A BILL OF MATERIALS

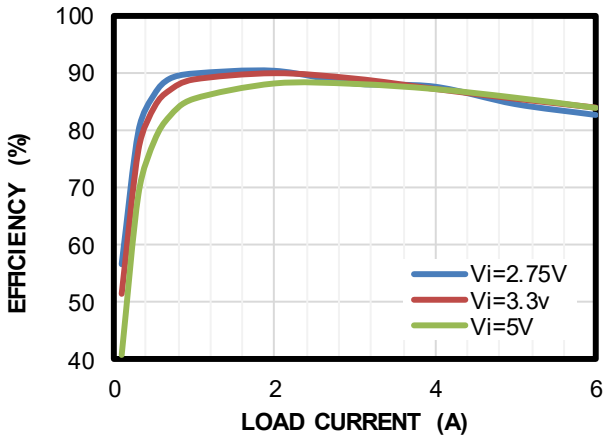
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
6	C1, C2, C4, C5, C20, C7	22µF	Ceramic capacitor, 25V, X5R	0805	Murata	GRM21BR61E226ME44L
4	C3, C8, C11, C19	0.1µF	Ceramic capacitor, 25V, X5R	0402	Wurth	885012105018
1	C10	1µF	Ceramic capacitor, 25V, X5R	0402	Murata	GRM155R61E105KA12D
1	C9	39pF	Ceramic capacitor, 50V, C0G	0402	Murata	GRM1555C1H390JA01D
1	R1	499kΩ	Film resistor, 1%, 499kΩ	0402	Yageo	RC0402FR-07499KL
1	R4	100kΩ	Film resistor, 1%, 100kΩ	0402	Yageo	RC0402FR-07100KL
2	R7, R6	0R	Film resistor, 1%, 0R	0402	Yageo	RC0402FR-070RL
1	R3	20kΩ	Film resistor, 1%, 20kΩ	0402	Yageo	RC0402FR-0720KL
1	R5	30kΩ	Film resistor, 1%, 30kΩ	0402	Yageo	RC0402FR-0730KL
1	EN	3 pins	3-pin, single-row, straight socket header	DIP	Wurth	61300311821
1	V_{OUT} Ripple	N/A	SMA-PCB mount jack straight THT	DIP	Wurth	60312002114503
5	VIN, VEMI, GND x 2, VOUT	φ2.0	φ2.0 copper pin	DIP	Custom	
4	EN, GND, VCC, PG	φ1.0	φ1.0 copper pin	DIP	Custom	
1	U1	MPM3860	7V input, 6A, step-down converter power module	QFN-24 (4mmx 6mm)	MPS	MPM3860GQW

EVB TEST RESULTS

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

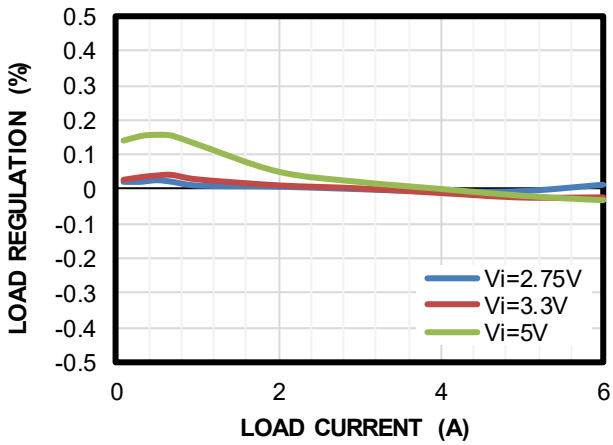
Efficiency vs. Load Current

V_{OUT} = 1V



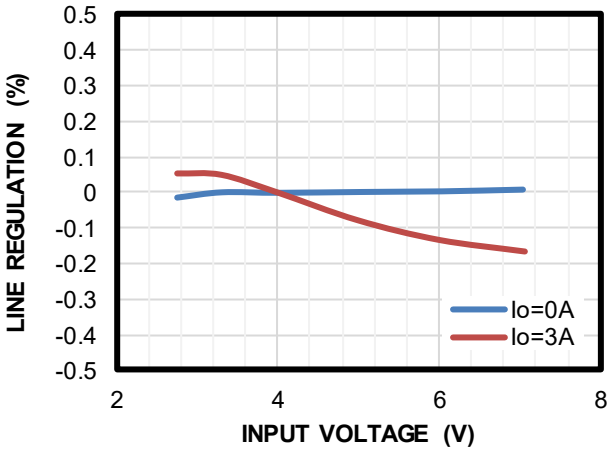
Load Regulation vs. Load Current

V_{OUT} = 1V



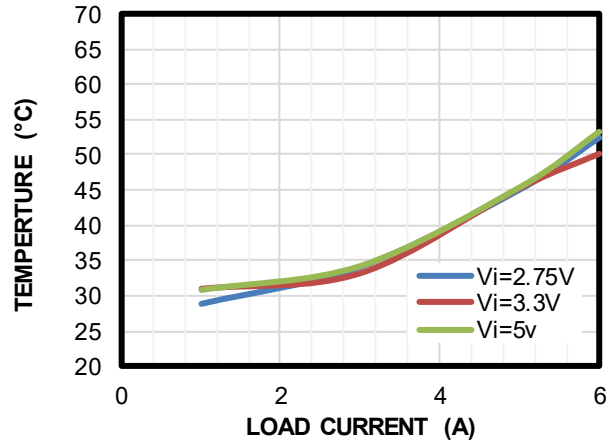
Line Regulation vs. Input Voltage

V_{OUT} = 1V



Temperature vs. Load Current

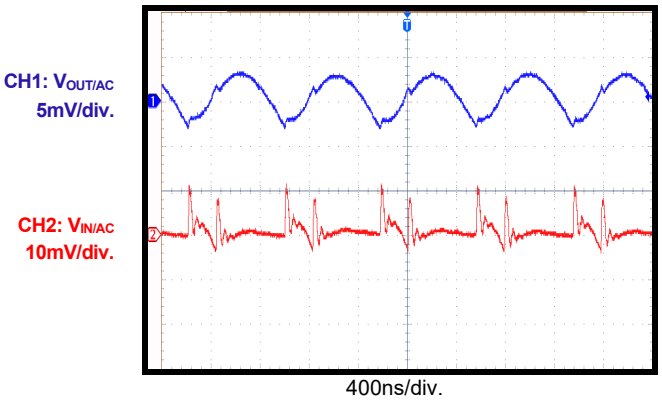
V_{OUT} = 1V



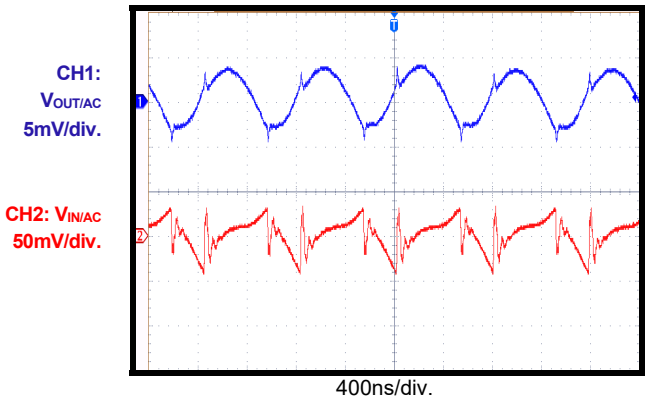
EVB TEST RESULTS *(continued)*

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

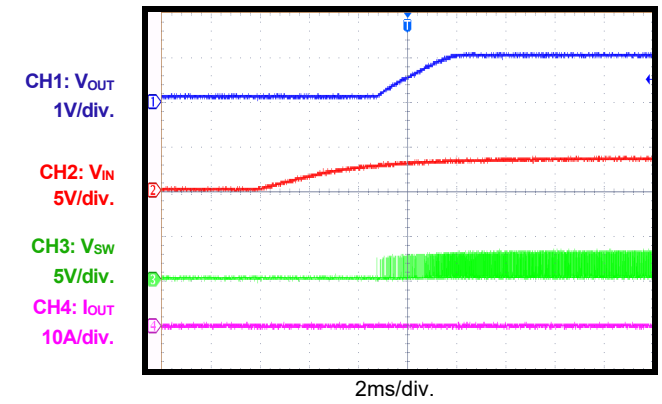
V_{OUT} Ripple
I_{OUT} = 0A



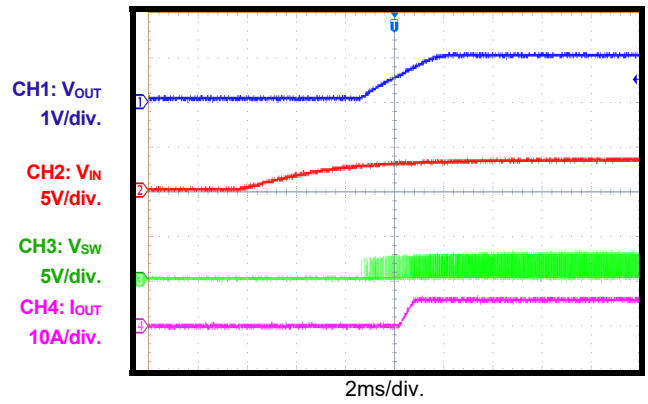
V_{OUT} Ripple
I_{OUT} = 6A



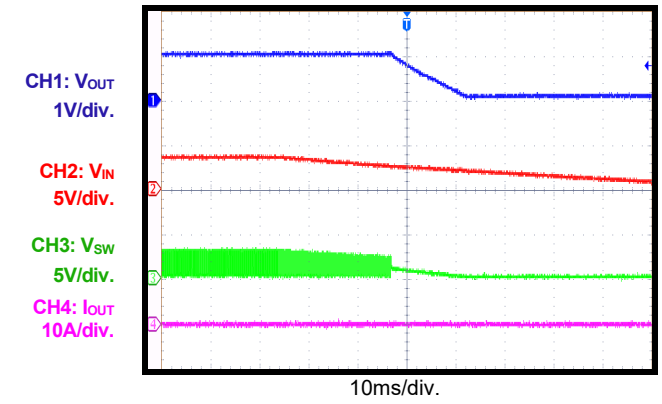
Start-Up through VIN
I_{OUT} = 0A



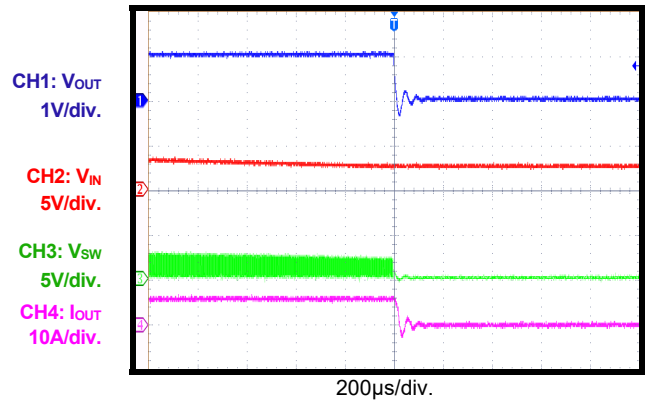
Start-Up through VIN
I_{OUT} = 6A



Shutdown through VIN
I_{OUT} = 0A



Shutdown through VIN
I_{OUT} = 6A

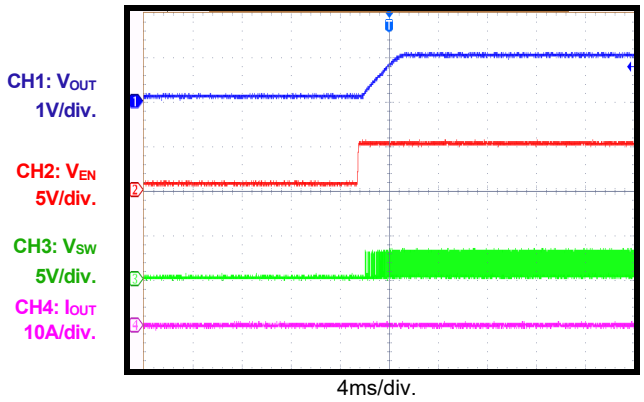


EVB TEST RESULTS *(continued)*

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

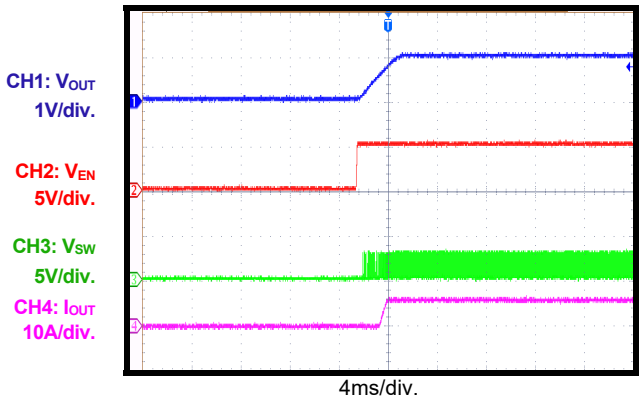
Start-Up through EN

I_{OUT} = 0A



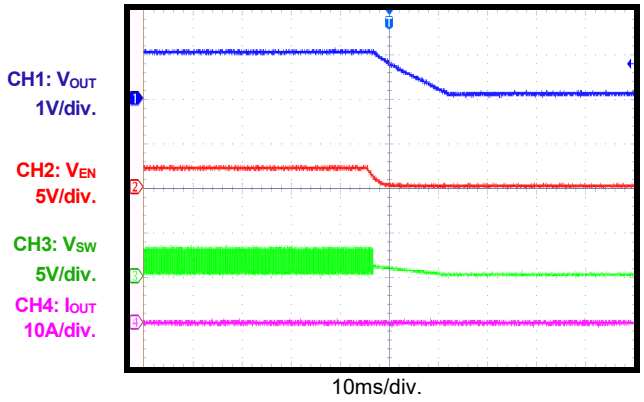
Start-Up through EN

I_{OUT} = 6A



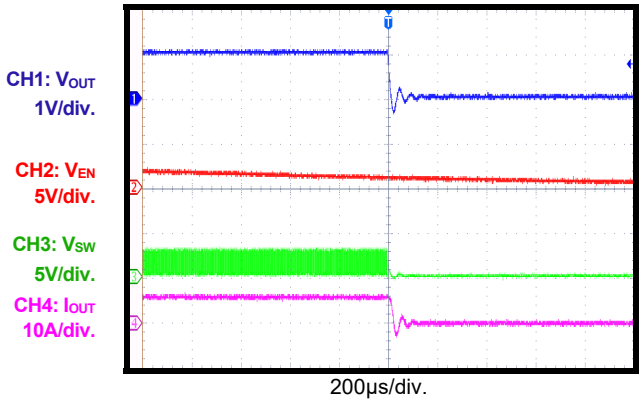
Shutdown through EN

I_{OUT} = 0A

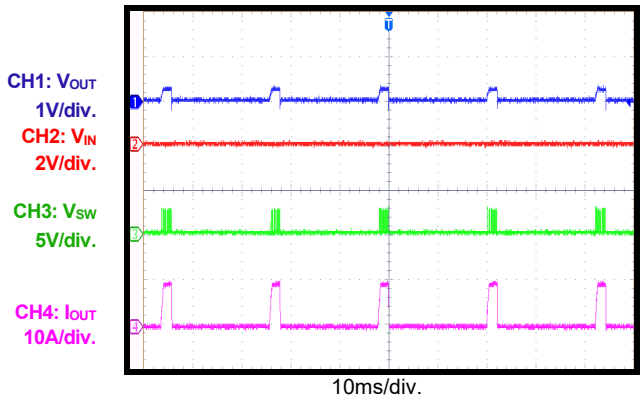


Shutdown through EN

I_{OUT} = 6A

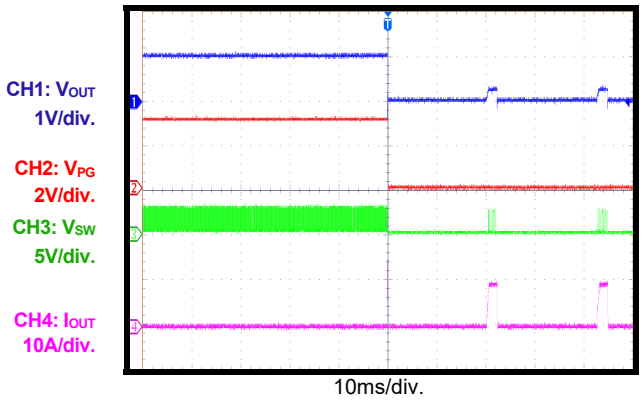


SCP Steady State



SCP Entry

I_{OUT} = 0A

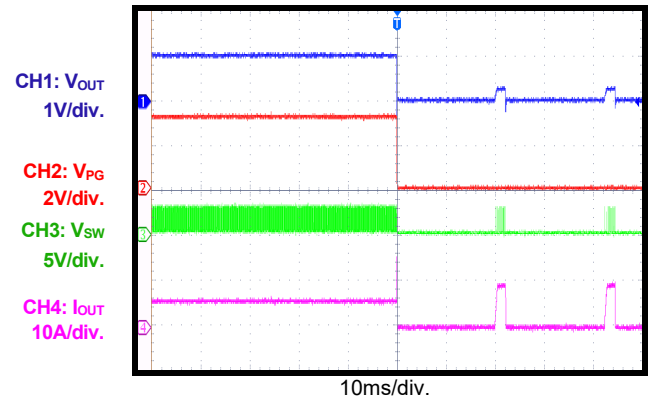


EVB TEST RESULTS *(continued)*

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

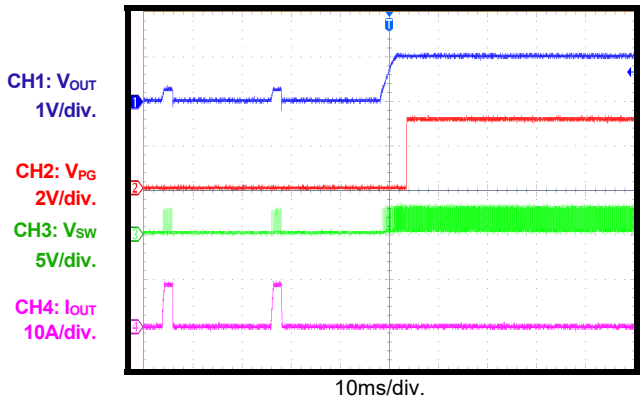
SCP Entry

I_{OUT} = 6A



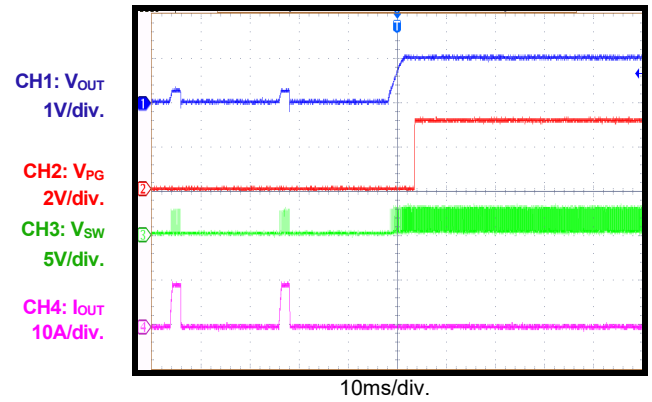
SCP Recovery

I_{OUT} = 0A



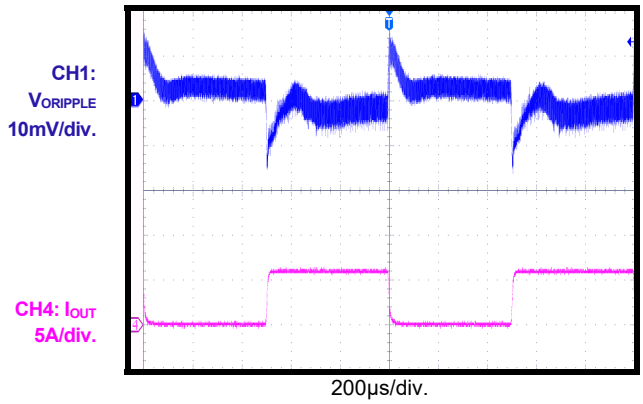
SCP Recovery

I_{OUT} = 6A



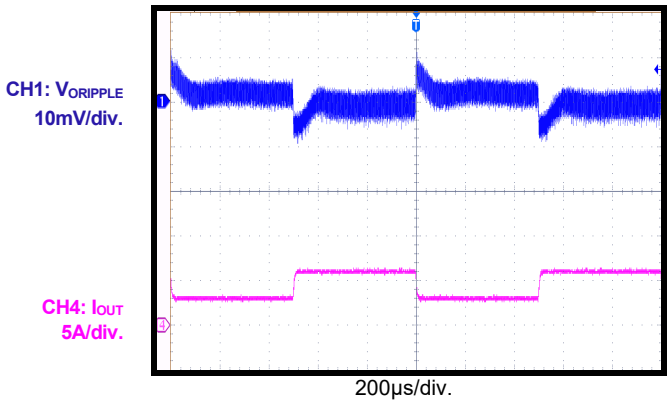
Transient

I_{OUT} = 0A to 6A



Transient

I_{OUT} = 3A to 6A



PCB LAYOUT

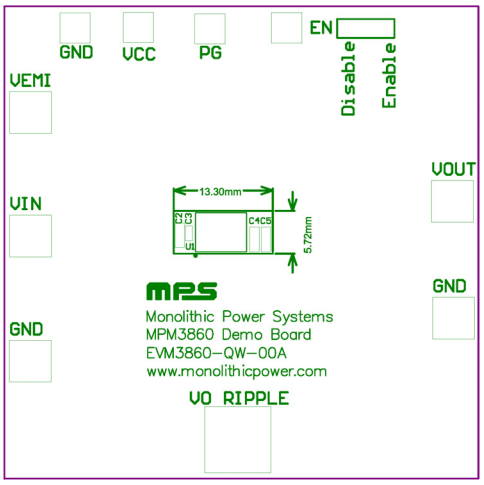


Figure 2: Top Silk Layer

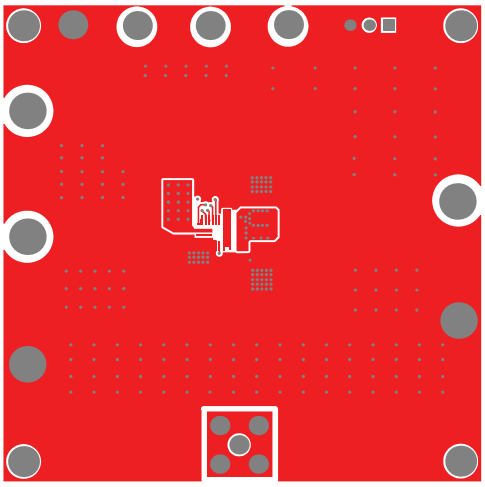


Figure 3: Top Layer

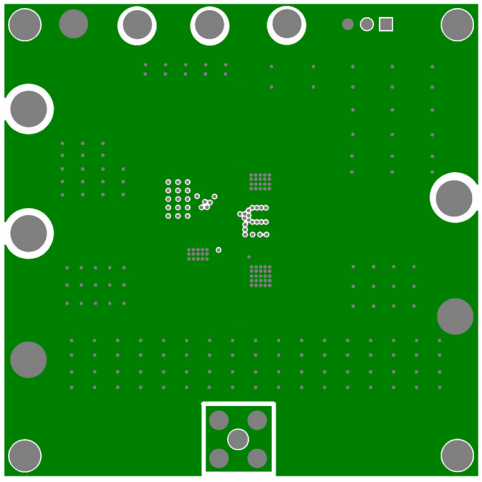


Figure 4: Mid-Layer 1

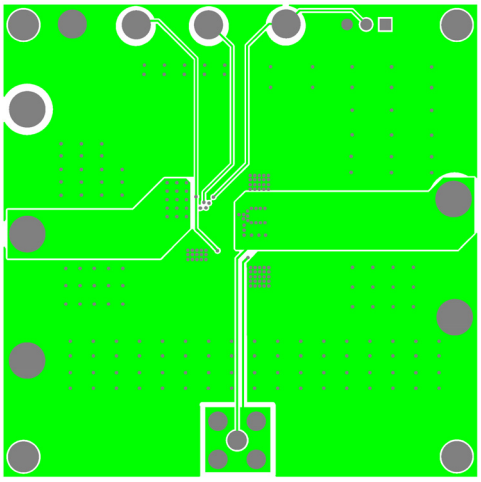


Figure 5: Mid-Layer 2

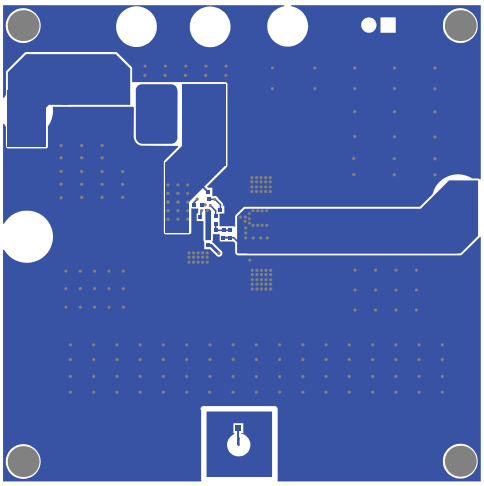


Figure 6: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	12/10/2018	Initial Release	-
1.1	7/16/2021	Grammar and formatting updates	All
		Updated figure numbers	9
		Updated schematic	3
1.11	12/5/2024	Updated the MPS IC number to MPM3860GQW	1