EVM3833C-RH-00A

3A Synchronous Step-down Module Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The MPM3833C is a monolithic step-down module converter with built-in power MOSFETs and inductor. The DC-DC module comes a small surface-mount QFN-18(2.5mm×3.5mm ×1.6mm) package and acheives 3A continuous output current from 2.7V to 6V input voltage with excellent load and line regulation. The MPM3833C works into the forced continuous current mode, and has sub 10 mV voltage ripple with one output capacitor, making it suitable for optical module, FGPA, ASIC and other applications requiring low ripple noise. The output voltage is regulated as low as 0.6V. Only FB resistors and input and output capactiors are needed to compete the design.

The Constant-on-time control (COT) scheme provides fast transient repsponse and easy loop stabilization.

Fault condition protection includes cycle-by-cycle current limit and thermal shutdown.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.7 – 6	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	3	A

Note: V_{IN}<3.3V may need more input capacitor.

FEATURES

- Wide 2.7V to 6V Operating Input Range
- Adjustable Output from 0.6V
- 2.5mm×3.5mm×1.6mm QFN-18 Package
- Low Radiated Emission(EMI) Compiles with EN55022 Class B Standard
- Up to 3A Contionous Output Current
- 100% Duty Cycle In Dropout
- Forced Continuous Current Mode
- EN and Power Good for power Sequencying
- Cycle-by-Cycle Over-Current Protection
- Short Circuits Protection with Hiccup Mode
- Only Four External Components Needed

APPLICATIONS

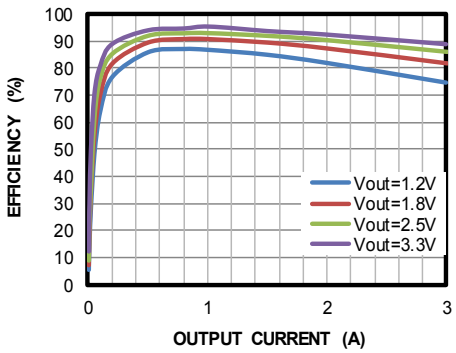
- FPGA, ASIC, DSP Power
- Optical Modules
- LDO Replacement
- Power for Portable Products
- Space-Limited Applications

EVM3833C-RH-00AEVALUATION BOARD

Board Number	MPS IC Number
EVM3833C-RH-00A	MPM3833CGRH

Efficiency vs. Output Current

V_{IN}=5V



EVALUATION BOARD SCHEMATIC

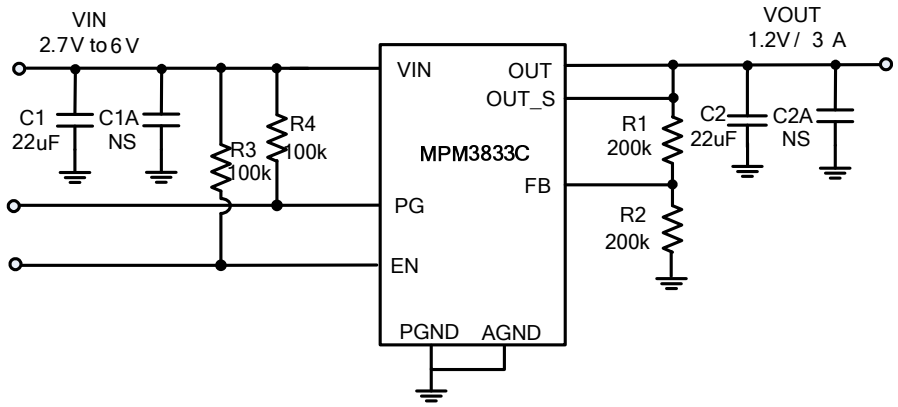


Figure 1—Typical Application Circuit for MPM3833CGRH

Note: V_{IN}<3.3V may need more input capacitor.

EVM3833C-RH-00ABILL OF MATERIALS

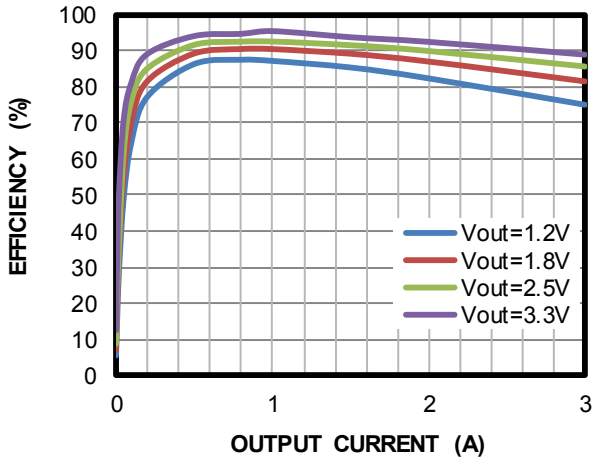
Qty	RefDes	Vaue	Description	Package	Manufacturer	Manufacturer/PN
2	C1,C2	22μF	Ceramic Cap.,16V,X7R	0805	TDK	C2012X7R1C226MT000N
0	C1A, C2A	NS				
2	R1,R2	200k	Film Res,1%,0603,200K	0603	YAGEO	RC0603FR-07200KL
2	R3,R4	100k	Film Res,1%,0603,100K	0603	YAGEO	RC0603FR-07100KL
1	U1	MPM3833C	Synchronous Step-Down Converter	QFN-18	MPS	MPM3833CGRH

EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22μF,T_A = +25ºC, unless otherwise noted.

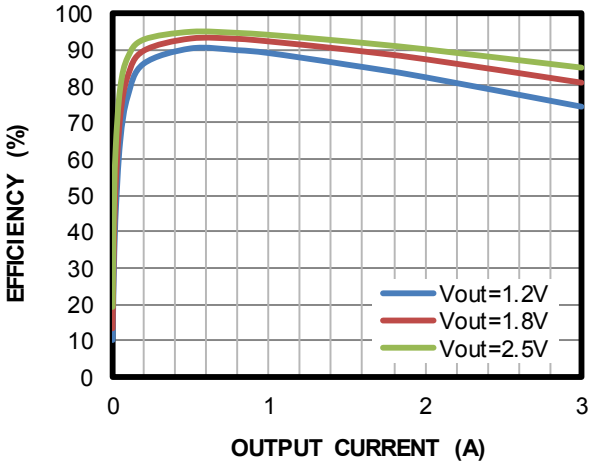
Efficiency vs. Output Current

V_{IN}=5V

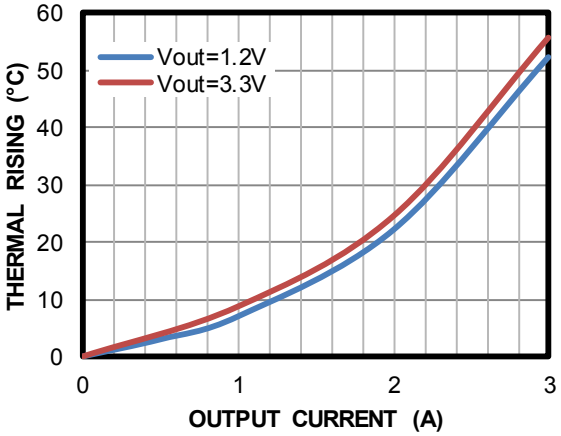


Efficiency vs. Output Current

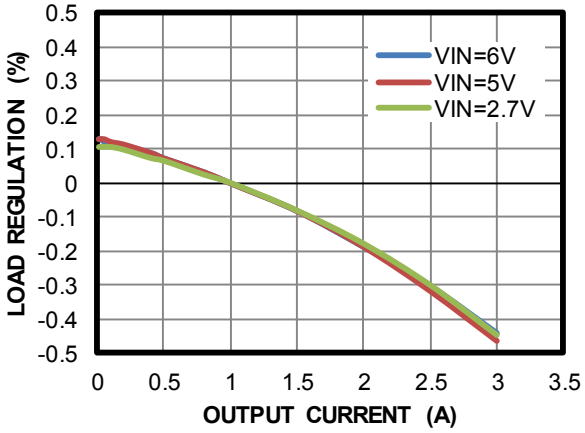
V_{IN}=3.6V



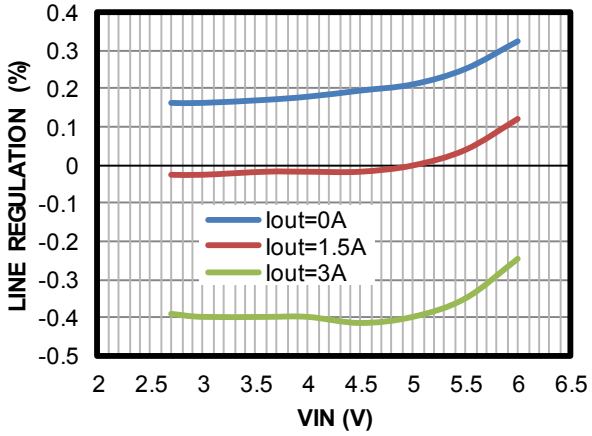
Thermal Rising vs. Output Current



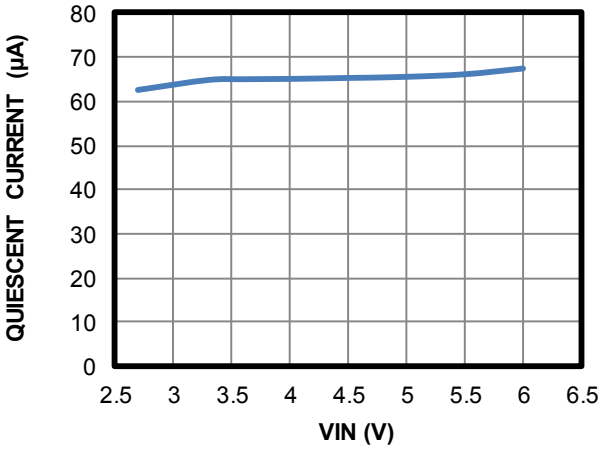
Load Regulation vs. Output Current



Line Regulation vs. VIN



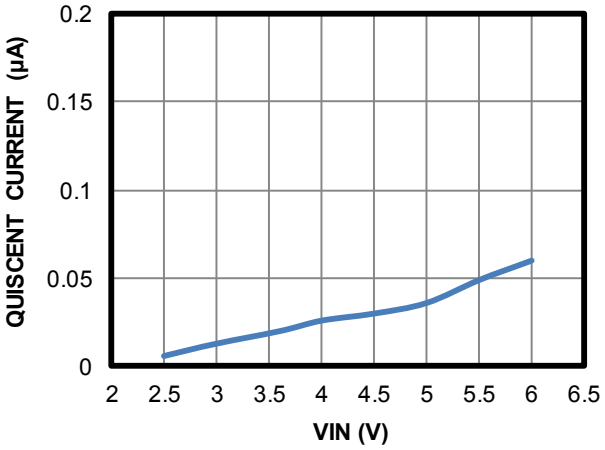
Quiescent Current vs. VIN



EVB TEST RESULTS *(continued)*

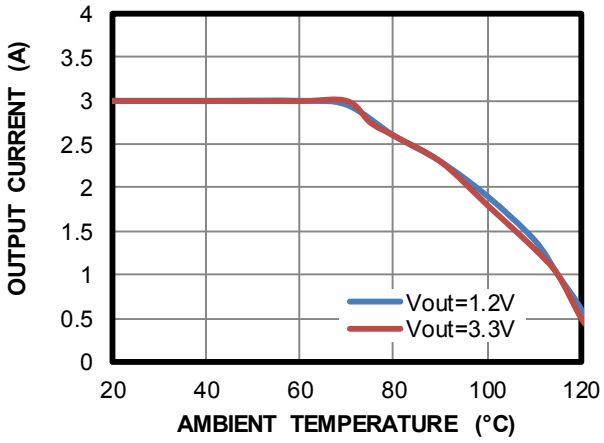
Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

Shutdown Current vs. VIN

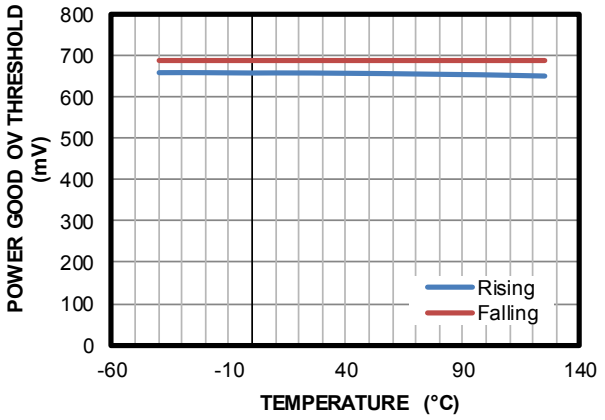


Output Current vs. Ambient Temperature

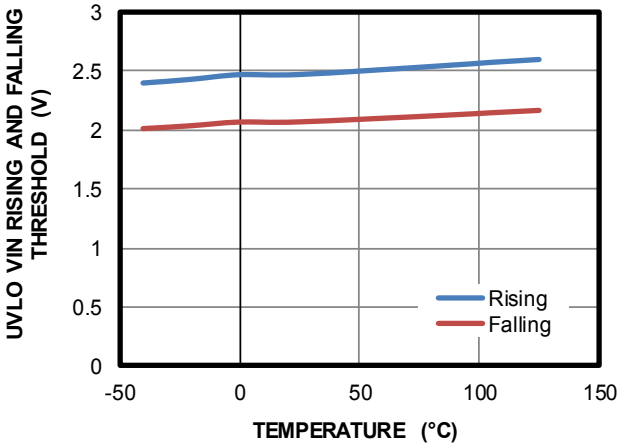
T_J<125°C



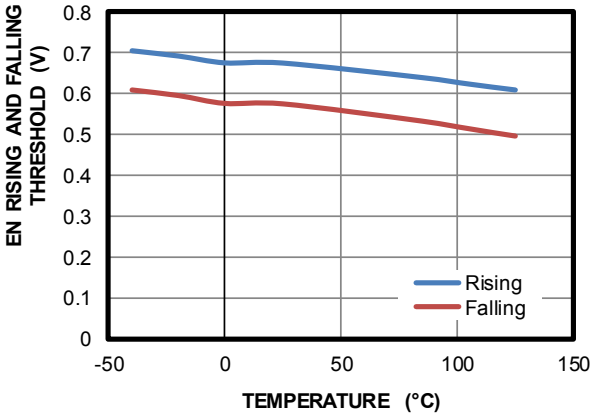
Power Good OV Threshold vs. Temperature



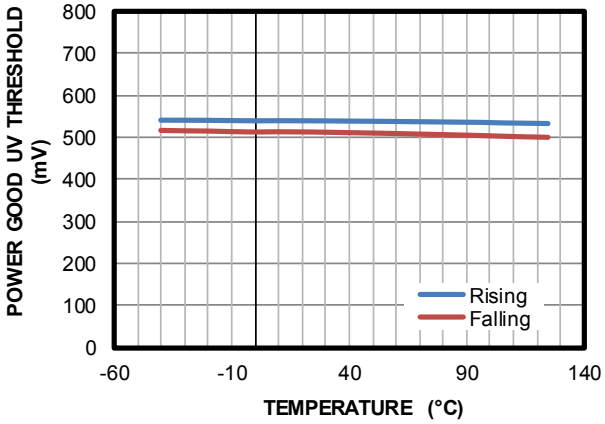
UVLO VIN Rising and Falling Threshold vs. Temperature



EN Rising and Falling Threshold vs. Temperature



Power Good UV Threshold vs. Temperature

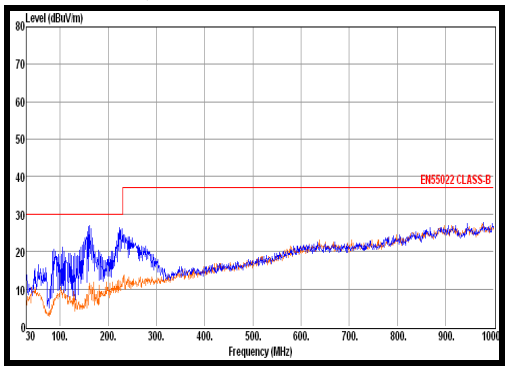


EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

Radiated Emission

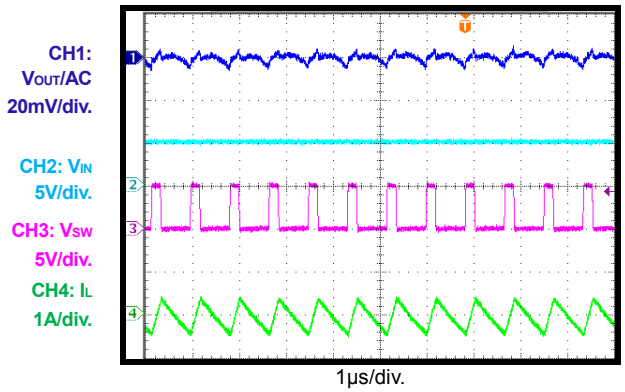
I_{OUT}=3A,Tested on EVM3833C-RH-00A



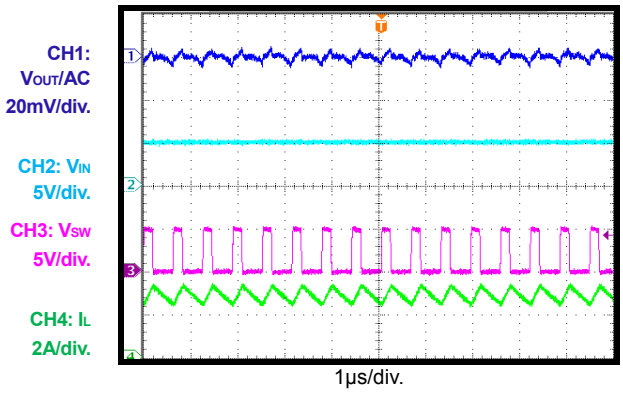
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

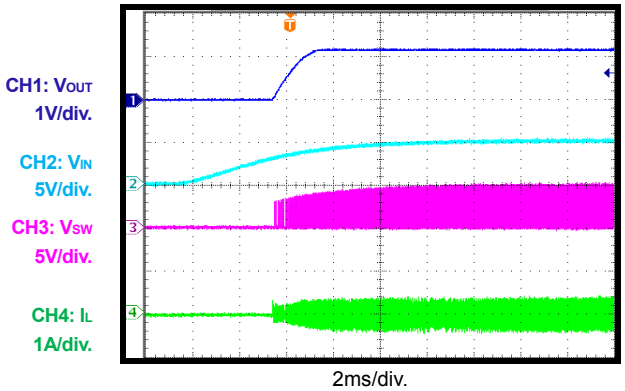
Steady State
I_{OUT}=0A



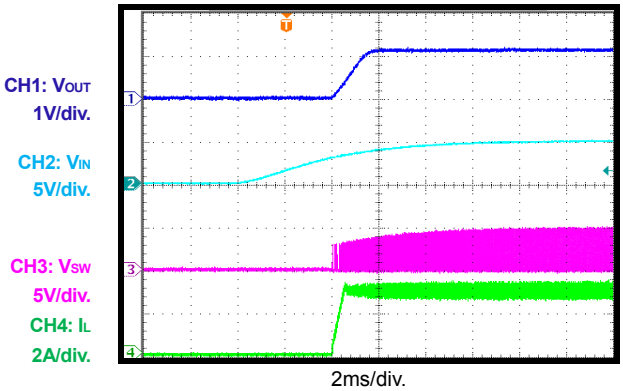
Steady State
I_{OUT}=3A



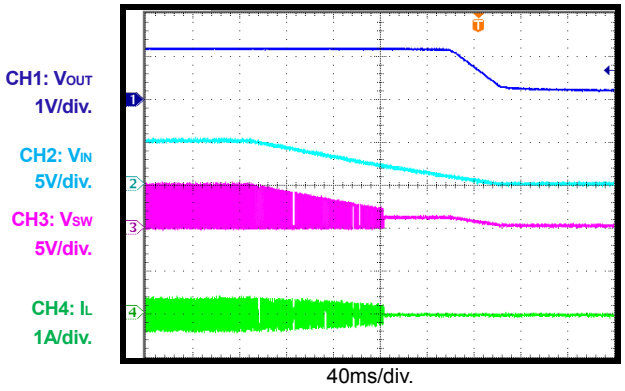
VIN Power-Up
I_{OUT}=0A



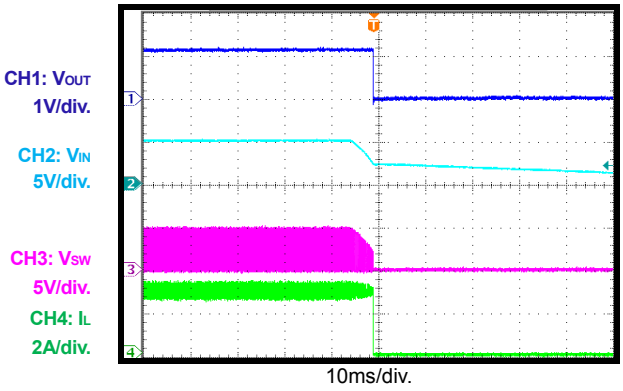
VIN Power-Up
I_{OUT}=3A



VIN Shutdown
I_{OUT}=0A



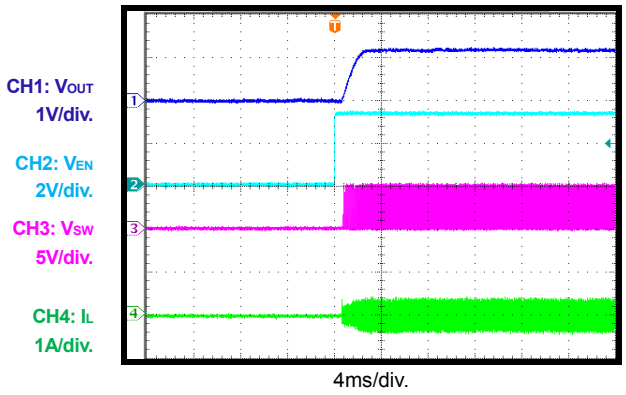
VIN Shutdown
I_{OUT}=3A



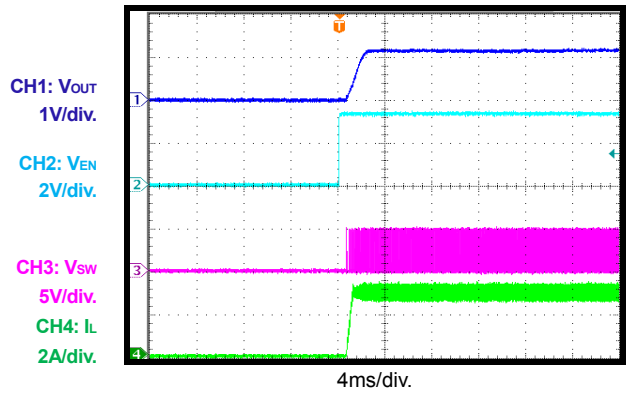
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

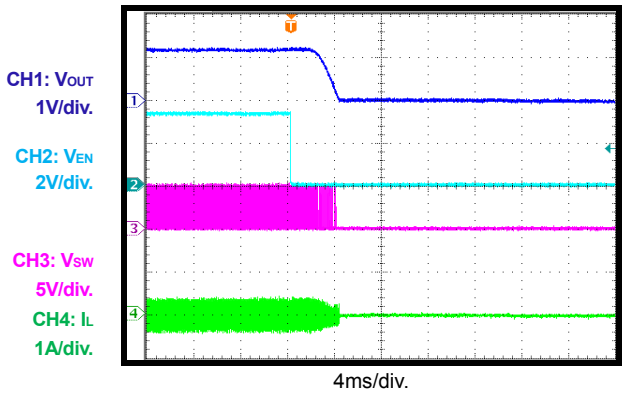
EN On
I_{OUT}=0A



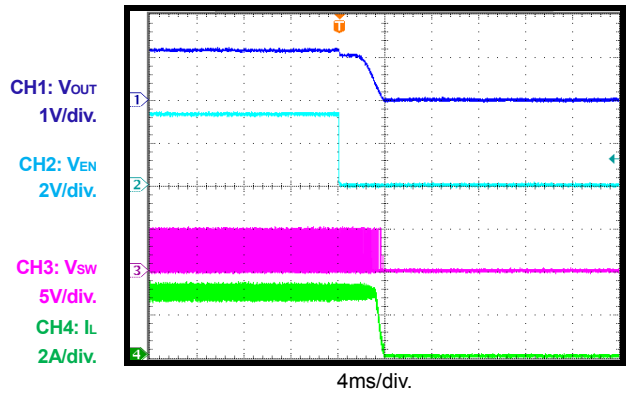
EN On
I_{OUT}=3A



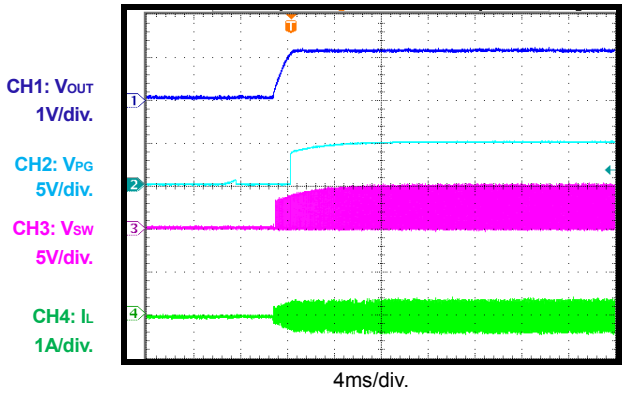
EN Off
I_{OUT}=0A



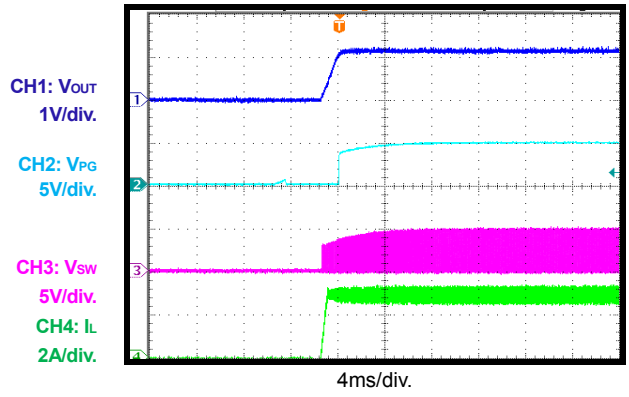
EN Off
I_{OUT}=3A



Power Good On
I_{OUT}=0A



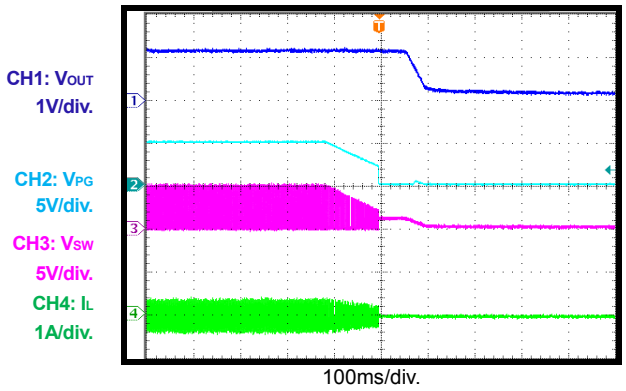
Power Good On
I_{OUT}=3A



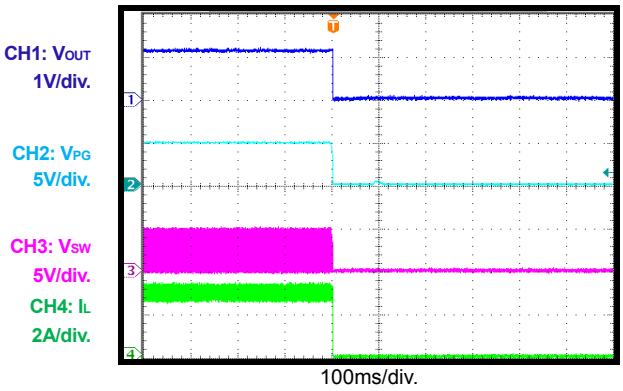
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

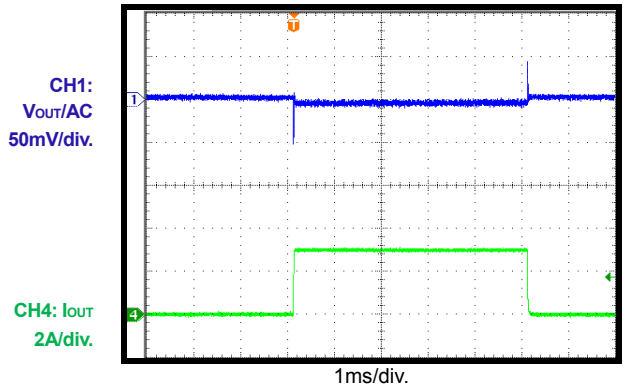
Power Good Off
I_{OUT}=0A



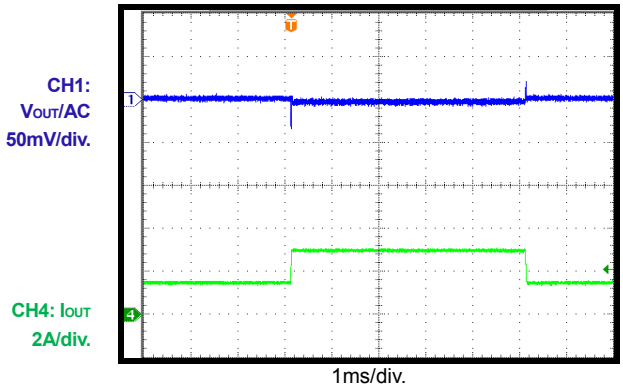
Power Good Off
I_{OUT}=3A



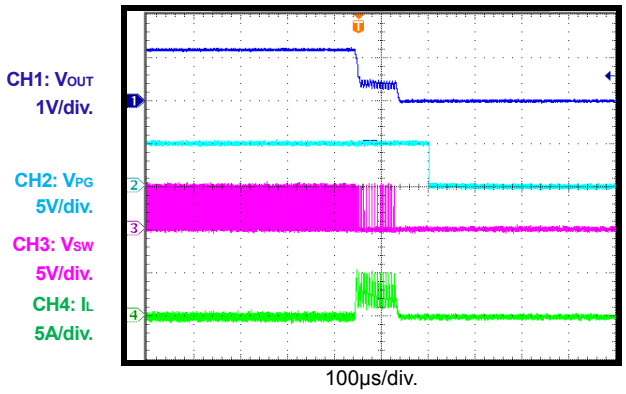
Load Transient
I_{OUT}=0A to 3A, 2.5A/µs



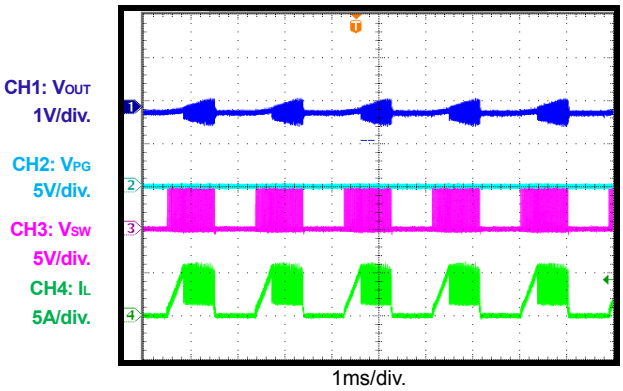
Load Transient
I_{OUT}=1.5A to 3A, 2.5A/µs



Short Entry



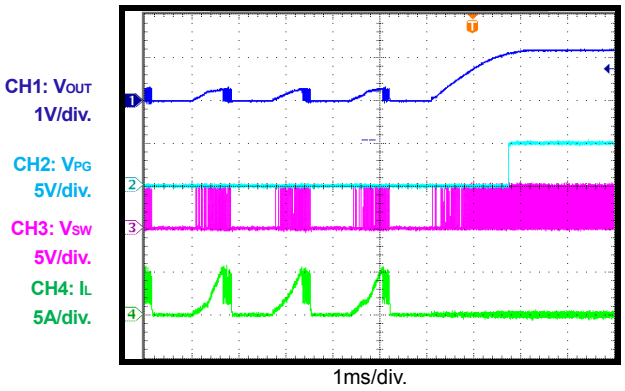
Short Steady State



TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

Short Recovery
I_{OUT}=0A



CIRCUIT BOARD LAYOUT

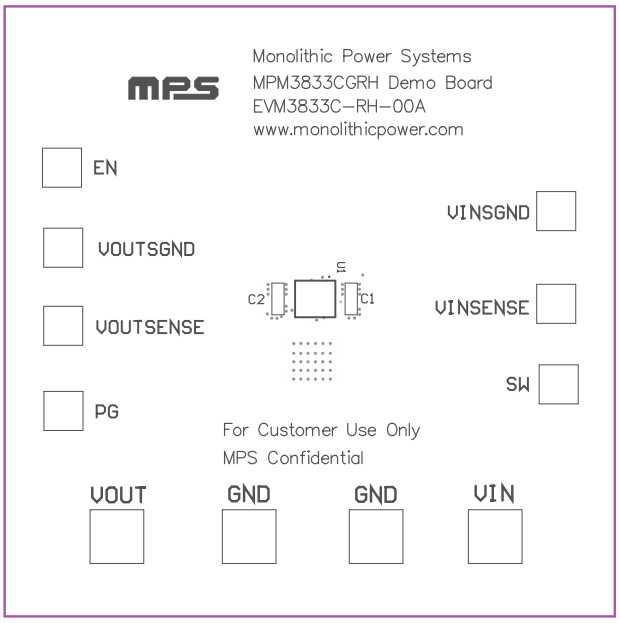


Figure 3—Top Silk Layer

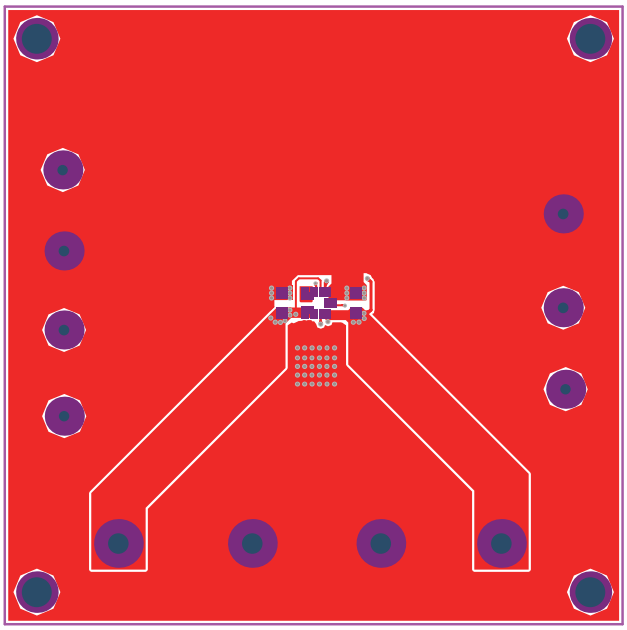


Figure 4—Top Layer

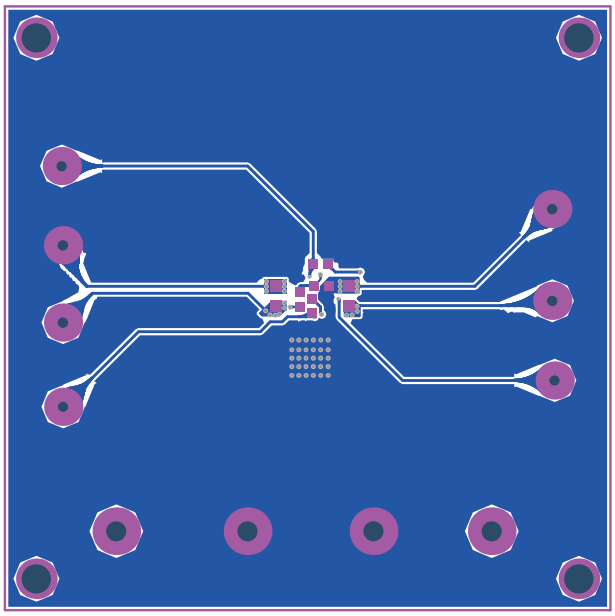


Figure 5—Bottom Layer

QUICK START GUIDE (MPM3833CGRH)

The output voltage of this board is set externally which can be regulated as low as 0.6V by operating from +2.7V to +6V input. The default output voltage of this board is set to 1.2V.

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 2.7V and 6V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on. The board will automatically start up.
5. The Output Voltage can be changed by varying R2. Choose R1 to 200k typically. R2 is then given by:

$$R2 = \frac{R1}{\frac{V_{out}}{0.6} - 1}$$

Example: For Vout= 1.8V, R1=200kΩ, R2=100kΩ.