EV2164-G-00A

3A Synchronous Step-down Converter Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The MP2164 is a monolithic step-down switch mode converter with built-in internal power MOSFETs. The DC-DC module has a small surface mount 2mm×2mm QFN12 package. It achieves 3A continuous output current from a 2.5V-to-5.5V input voltage with excellent load and line regulation. The output voltage can be regulated to as low as 0.6V.

The MP2164 is ideal for powering portable equipment that runs from a single cell Lithium-Ion (Li+) Battery.

The Constant-On-Time(COT) control scheme provides fast transient response high light-load efficiency and easy loop stabilization.

Fault condition protection includes output over voltage protection, cycle-by-cycle current limit and thermal shutdown.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.5 – 5.5	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	3	A

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

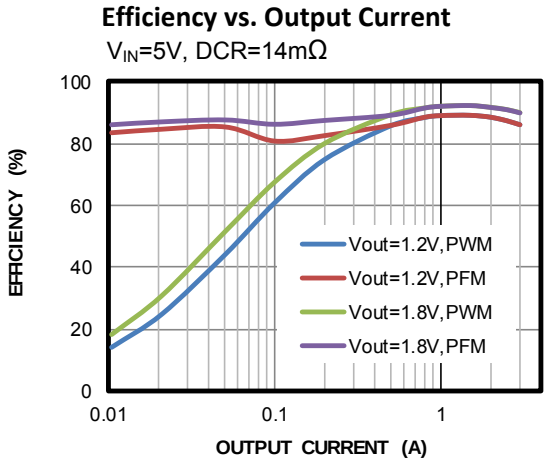
FEATURES

- Above 80% Light load efficiency
- Force PWM and Auto PFM operation
- Wide 2.5V-to-5.5V Operating Input Range
- Output Adjustable from 0.6V
- 100% Duty cycle in dropout
- Up to 3A Output Current
- 32mΩ and 20mΩ Internal Power MOSFET Switches
- 2.3MHz Frequency
- Short Circuits Protection with Hiccup Mode
- Thermal Shutdown
- Stable with Low ESR Output Ceramic Capacitors
- Available in a QFN-12(2mm×2mm) Package

APPLICATIONS

- Wireless/Networking Cards
- Smart phone
- Low Voltage I/O System Power

EV2164-G-00A EVALUATION BOARD



Board Number	MPS IC Number
EV2164-G-00A	MP2164GG

EVALUATION BOARD SCHEMATIC

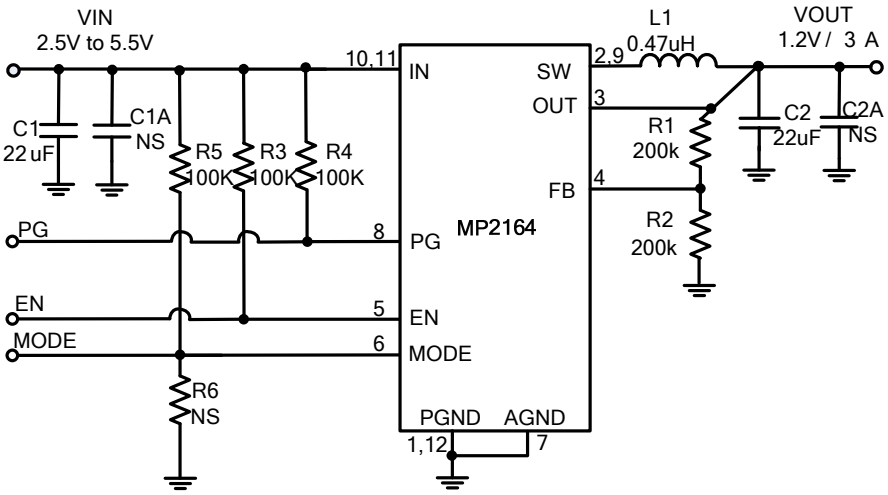


Figure 1—Typical Application Circuit for MP2164GG

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

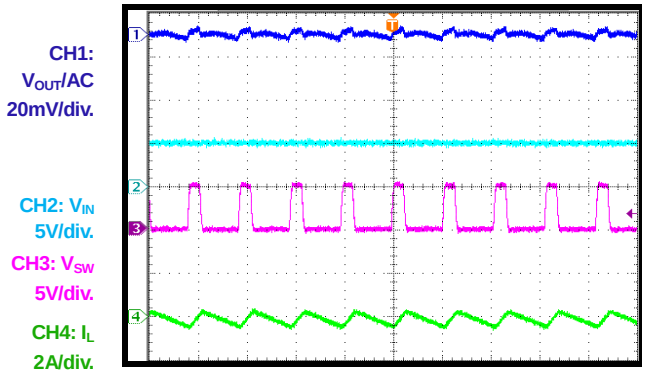
EV2164-G-00A BILL OF MATERIALS

Qty	RefDes	Vaue	Description	Package	Manufacturer	Manufacturer/PN
2	C1,C2	22μF	Ceramic Cap.,16V,X5R	0805	Murata	GRM21BR61C226ME44L
0	C1A, C2A	NS				
2	R1,R2	200k	Film Res,1%,0603,200K	0603	YAGEO	RC0603FR-07200KL
3	R3,R4, R5	100k	Film Res,1%,0603,100K	0603	YAGEO	RC0603FR-07100KL
0	R6	NS				
1	L1	0.47μH	Inductor,RDC=14mOhm, Isat=14.5A	4040	WE	74437324047
1	U1	MP2164	Synchronous Step-Down Converter	QFN-12	MPS	MP2164GG

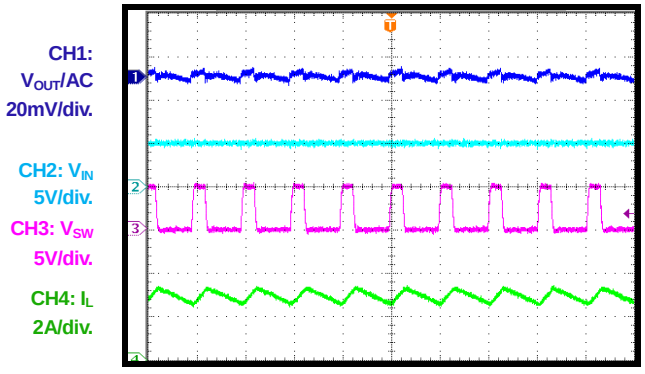
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =0.47µH, C_{OUT}=22µF,T_A = +25ºC, unless otherwise noted.

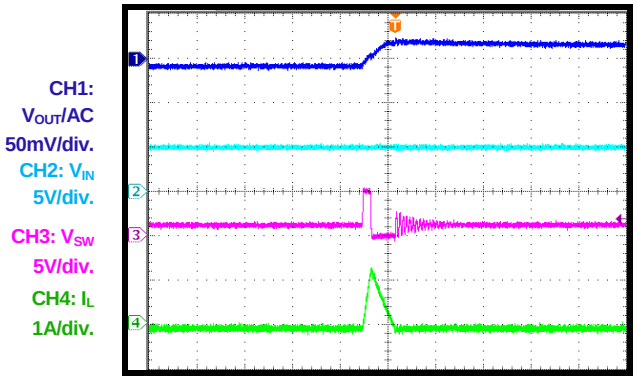
Steady State
I_{OUT}=0A, PWM



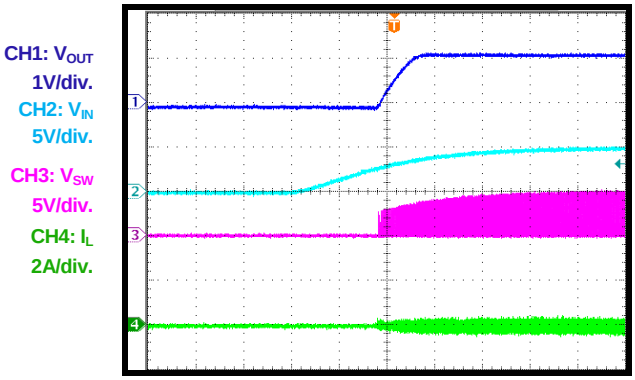
Steady State
I_{OUT}=3A, PWM



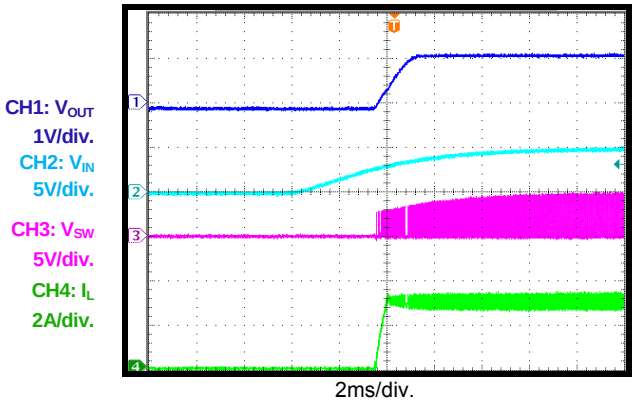
Steady State
I_{OUT}=0A, PFM



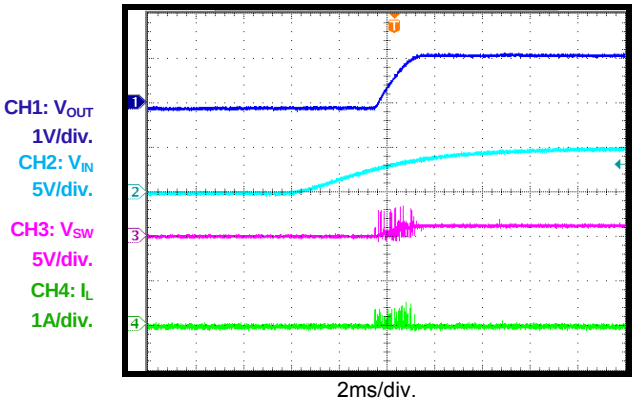
VIN Power-Up
I_{OUT}=0A, PWM



VIN Power-Up
I_{OUT}=3A, PWM



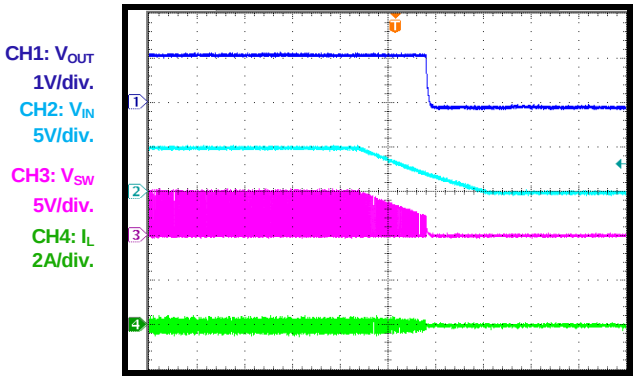
VIN Power-Up
I_{OUT}=0A, PFM



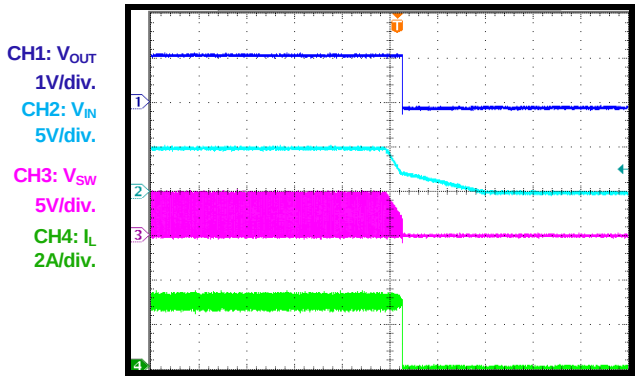
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =0.47µH, C_{OUT}=22µF, T_A = +25ºC, unless otherwise noted.

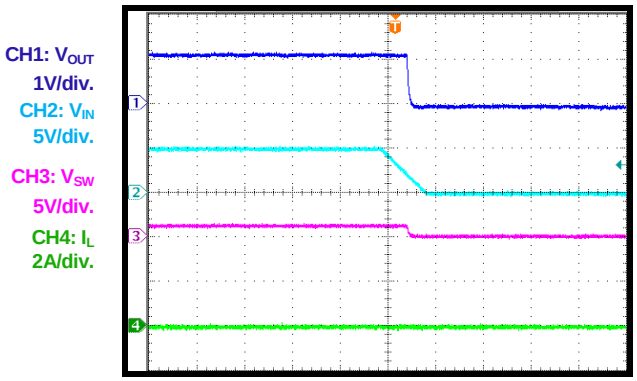
VIN Shutdown
I_{OUT}=0A, PWM



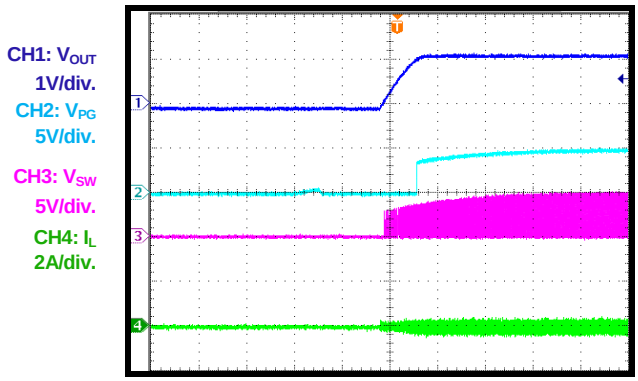
VIN Shutdown
I_{OUT}=3A, PWM



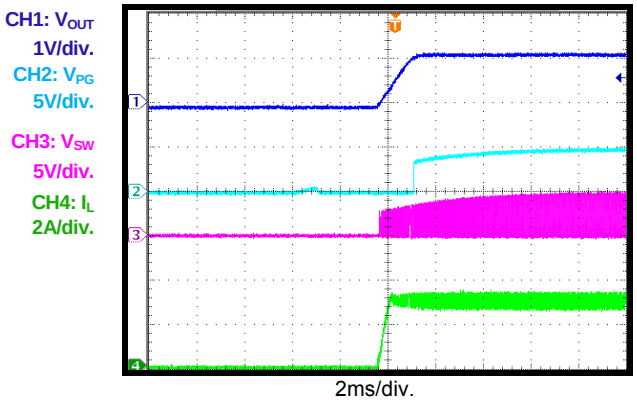
VIN Shutdown
I_{OUT}=0A, PFM



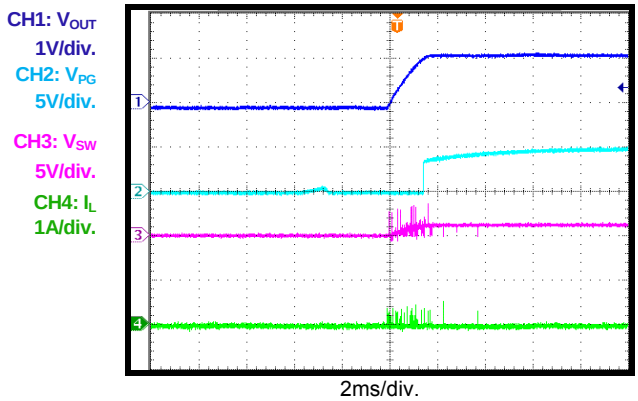
PG On
I_{OUT}=0A, PWM



PG On
I_{OUT}=3A, PWM



PG On
I_{OUT}=0A, PFM



EVB TEST RESULTS *(continued)*

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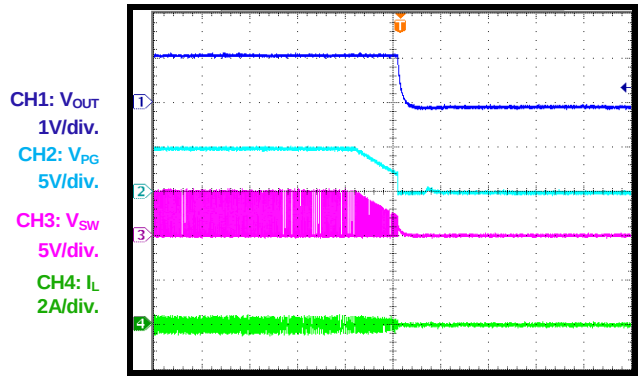
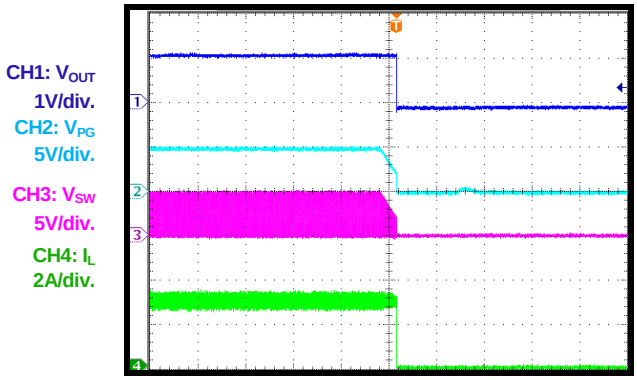
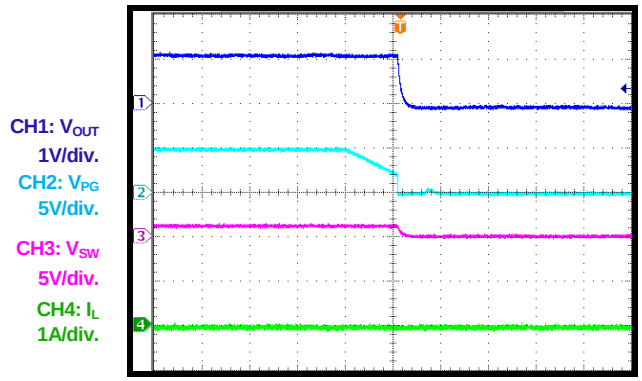
PG Off
I_{OUT}=0A, PWM



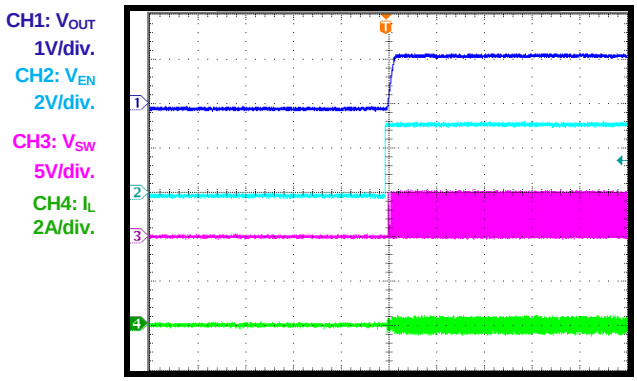
PG Off
I_{OUT}=3A, PWM



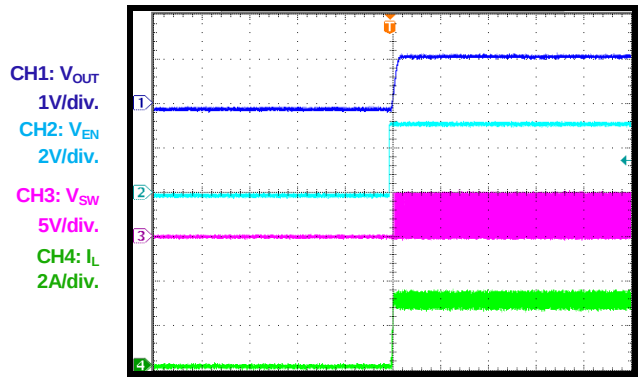
PG Off
I_{OUT}=0A, PFM



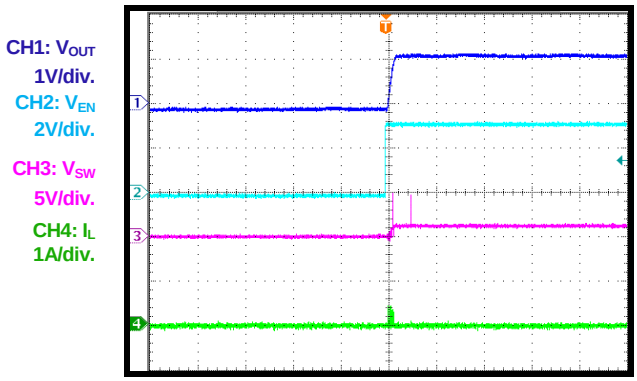
EN On
I_{OUT}=0A, PWM



EN On
I_{OUT}=3A, PWM



EN On
I_{OUT}=0A, PFM



EVB TEST RESULTS *(continued)*

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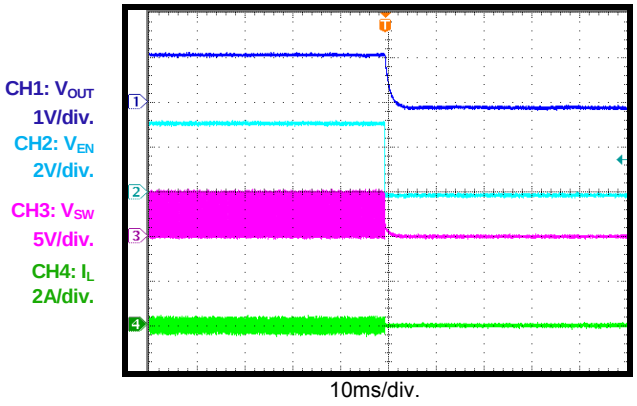
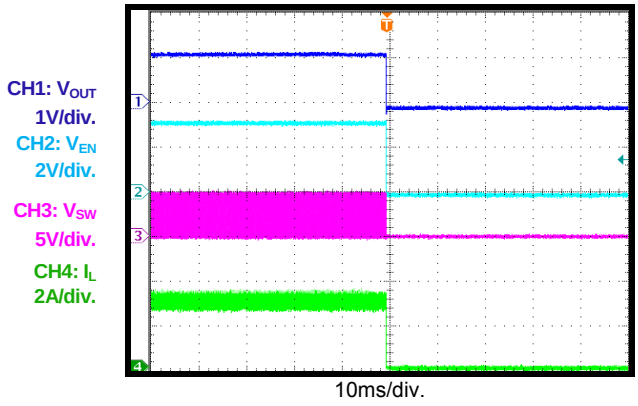
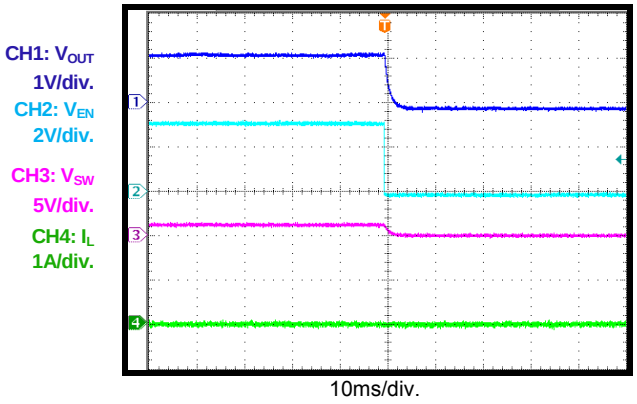
EN Off
I_{OUT}=0A, PWM



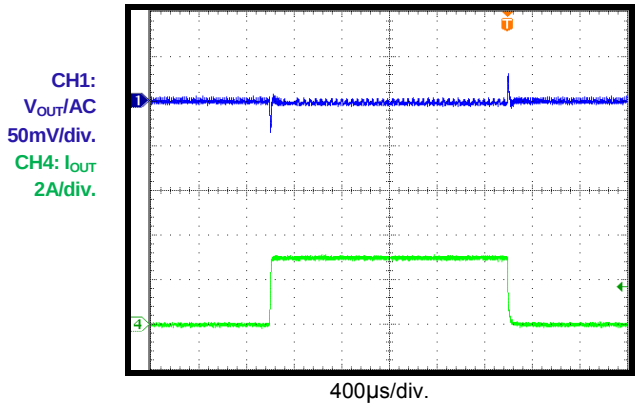
EN Off
I_{OUT}=3A, PWM



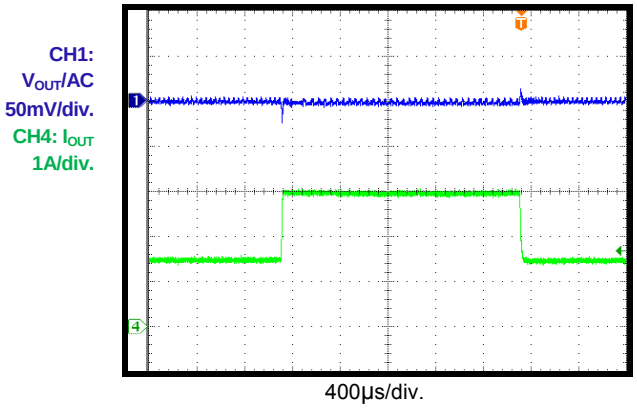
EN Off
I_{OUT}=0A, PFM



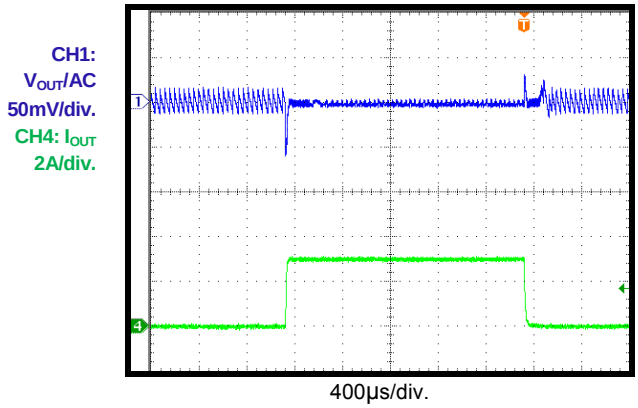
Load Transient
I_{OUT}=0A to 3A, 2.5A/µs, PWM



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



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



EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
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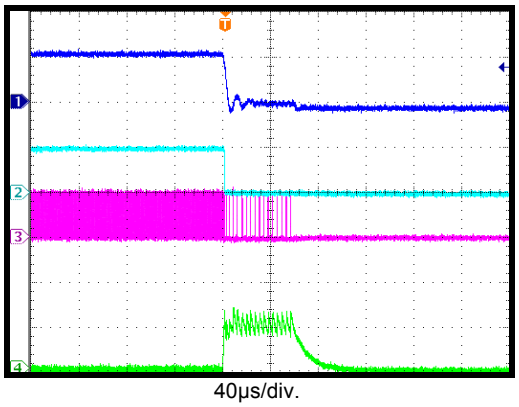
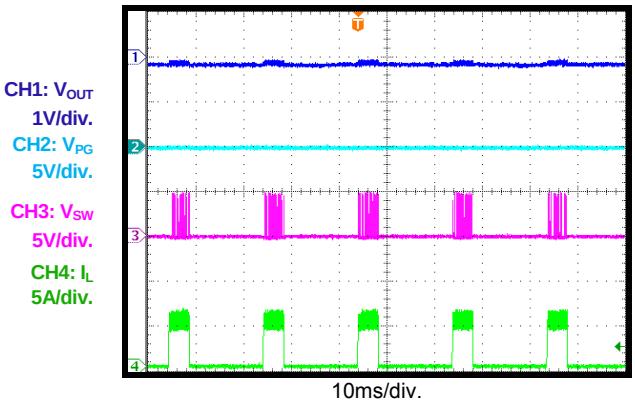
Short-Circuits Entry
PWM



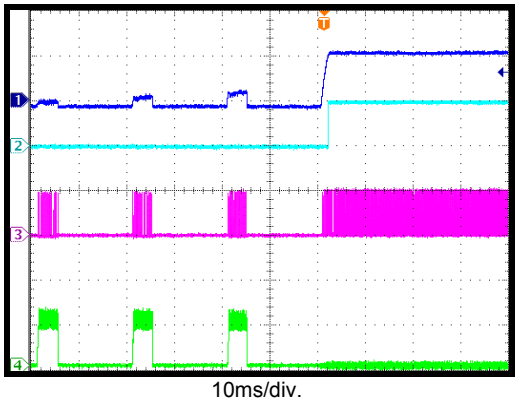
40µs/div.

Short-Circuits Steady State



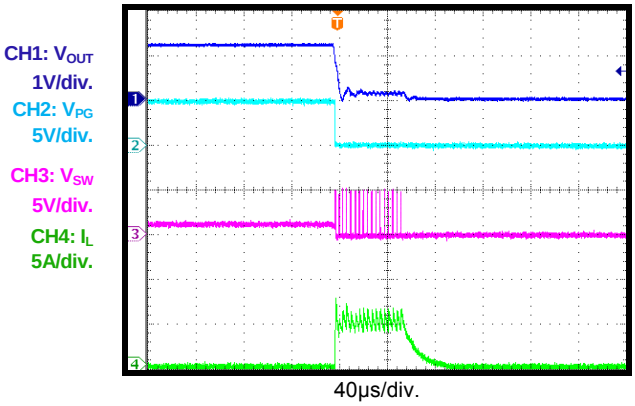
10ms/div.

Short-Circuits Recovery
PWM



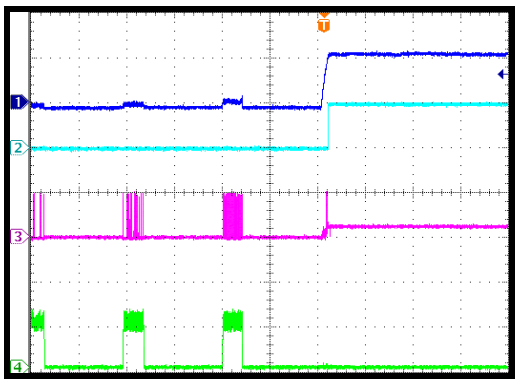
10ms/div.

Short-Circuits Entry
PFM



40µs/div.

Short-Circuits Recovery
PFM



10ms/div.

CIRCUIT BOARD LAYOUT

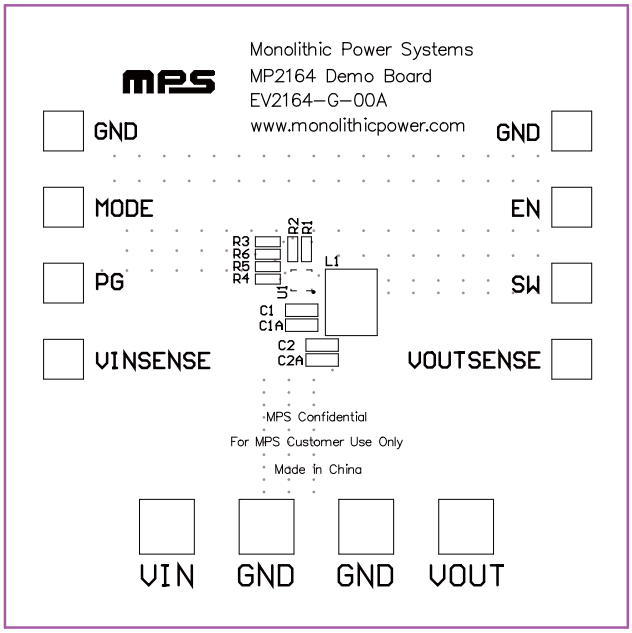


Figure 3—Top Silk Layer

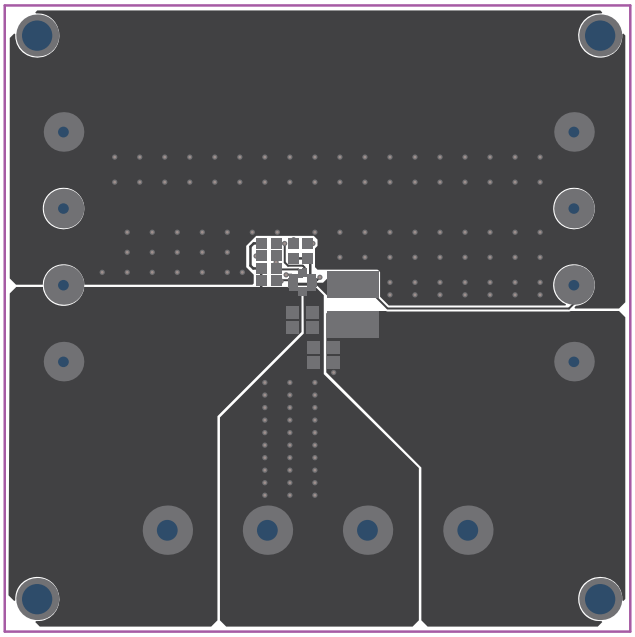


Figure 4—Top Layer

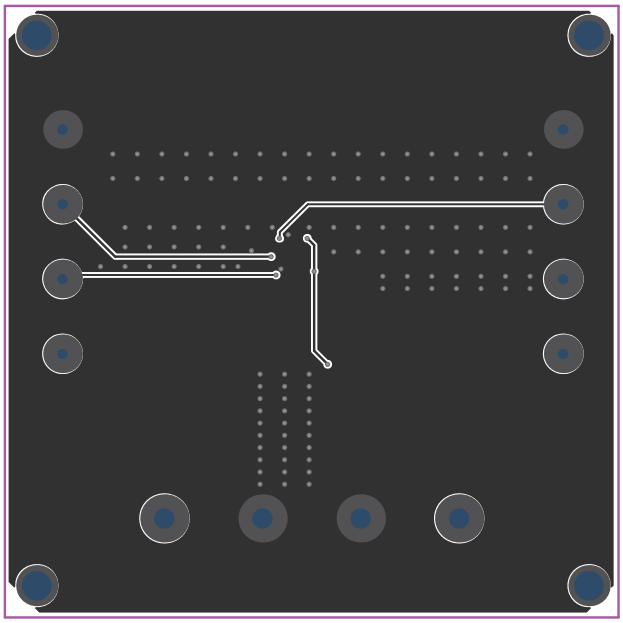


Figure 5—Bottom Layer

QUICK START GUIDE (MP2164GG)

The output voltage of this board is set externally which can be regulated as low as 0.6V by operating from +2.5V to +5.5V 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 2.5V and 5.5V, 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.