EVM38111-R-00A

6V Input, 1A Dual Channels Module Synchronous Step-Down Converter With Integrated Inductors EV Board

DESCRIPTION

The EVM38111-R-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MPM38111. The MPM38111 is a Dual Channels DC-DC Module. The module includes monolithic step-down switch mode converter with built-in internal power MOSFETs and inductors. It's designed to simplify power system design and provide ease of use.

The MPM38111 operates from a 2.7V-to-6V input, generates an output voltage as low as 0.608V, and has a 45μA quiescent current that makes it ideal for powering portable equipment that runs on a single cell lithium-ion (Li+) battery.

FEATURES

- Dual 1A-Output Current
- >93% Peak Efficiency
- >80% Light-Load Efficiency
- Ultra Low IQ: 45μA
- 80mΩ and 40mΩ Internal Power MOSFET
- Wide 2.7V to 6V Operating Input Range
- Default 1MHz Switching Frequency
- 180° Phase-Shifted Operation
- 4mmx4mmx1.6mm QFN14 package
- 100% Duty Cycle Operation
- Cycle-by-Cycle Over-Current Protection
- Short Circuit Protection with Hiccup Mode
- Thermal Shutdown

APPLICATIONS

- Small/Handhold Devices
- DVD Drivers
- Portable Instruments
- Smart Phones and Feature Phones
- Battery-Powered Devices

ELECTRICAL SPECIFICATION

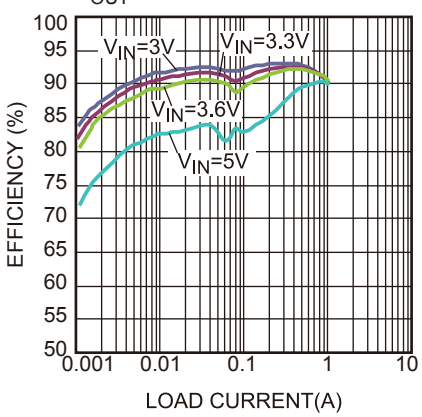
Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.7 – 6	V
Output Voltage	V_{OUT1}/V_{OUT2}	1.8/1.2	V
Output Current	I_{OUT1}/I_{OUT2}	1/1	A

EVM38111-R-00A EVALUATION BOARD

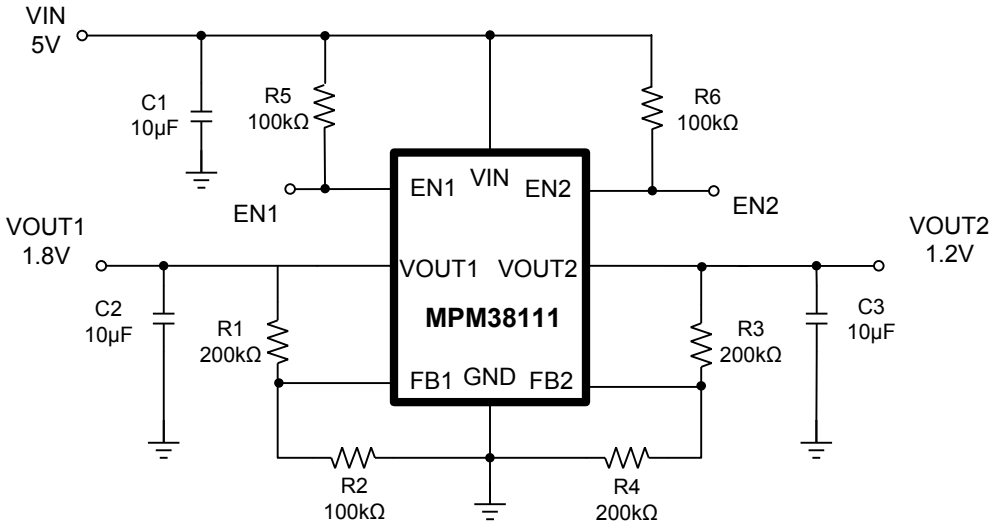
(L x W x H) 6.5cm x 6.5cm x 1.6cm

Board Number	MPS IC Number
EVM38111-R-00A	MPM38111

Efficiency



EVALUATION BOARD SCHEMATIC



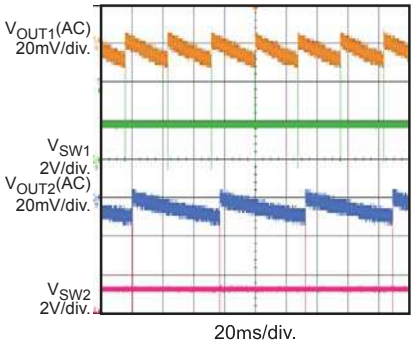
EVM38111-R-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
3	R1, R3, R4	200kΩ	Film Res,1%	0402	Any	
3	R2, R5, R6	100kΩ	Film Res,1%	0402	Any	
3	C1, C2, C3	10µF	Ceramic Cap,10V, X5R	0805	muRata	GRM21BR61A106KE19L

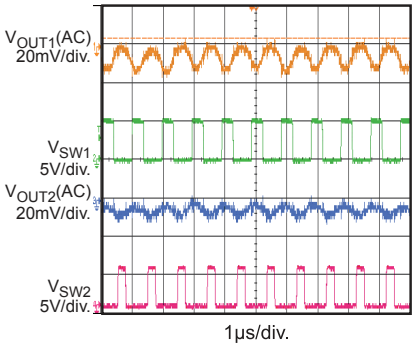
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT1} =1.8V, V_{OUT2} =1.2V, C_{OUT1}=C_{OUT2}=10µF, T_A = 25ºC, unless otherwise noted.

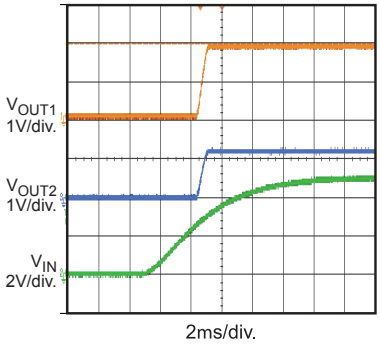
Output Ripple
I_{OUT1} =I_{OUT2} = 0A



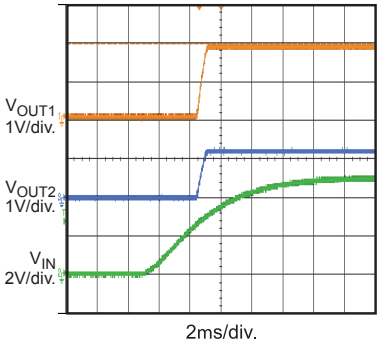
Output Ripple
I_{OUT1} =I_{OUT2} = 1A



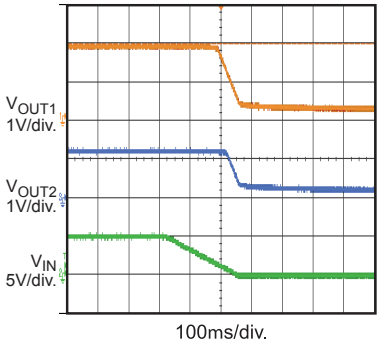
V_{IN} Power Up without Load
I_{OUT1} =I_{OUT2} = 0A



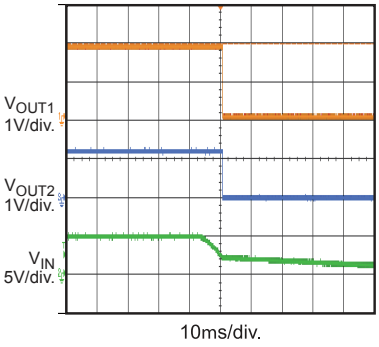
V_{IN} Power Up with 1A Load
I_{OUT1} =I_{OUT2} = 1A



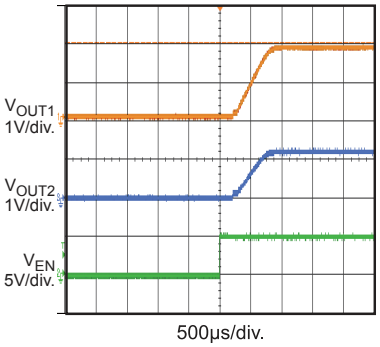
V_{IN} Power Down without Load
I_{OUT1} =I_{OUT2} = 0A



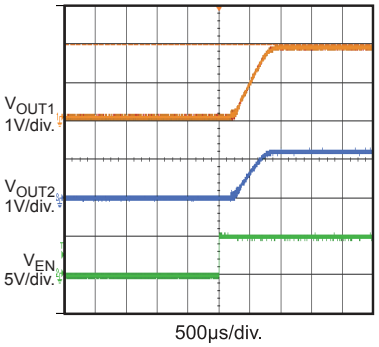
V_{IN} Power Down with 1A Load
I_{OUT1} =I_{OUT2} = 1A



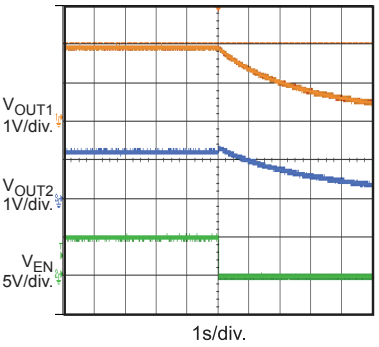
EN On without Load
I_{OUT1} = I_{OUT2} =0A



EN On with 1A Load
I_{OUT1} = I_{OUT2} =1A



EN Down without Load
I_{OUT1} = I_{OUT2} =0A



EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
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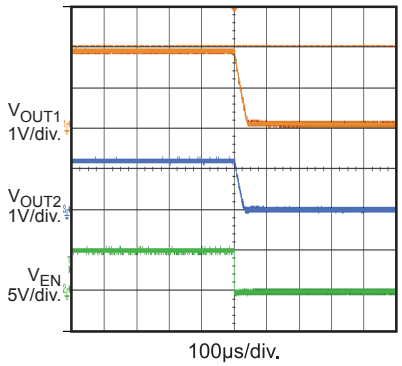
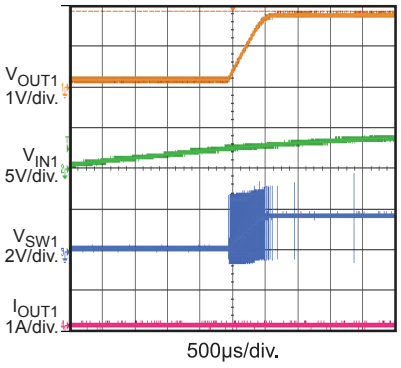
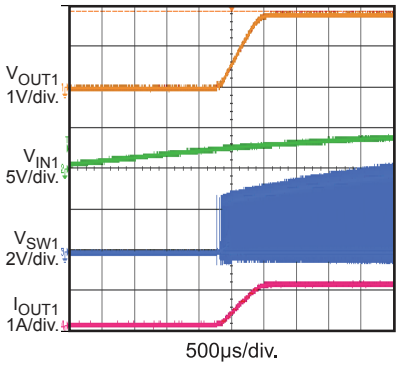
EN Down with 1A Load
I_{OUT1} = I_{OUT2} =1A



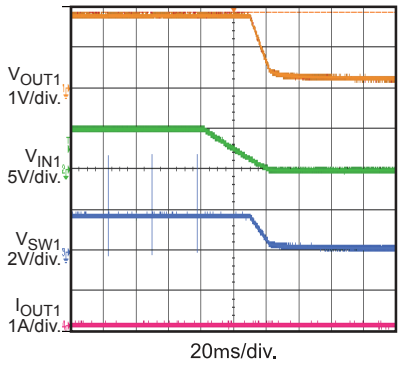
V_{IN} Power On without Load
I_{OUT1} = I_{OUT2} =0A



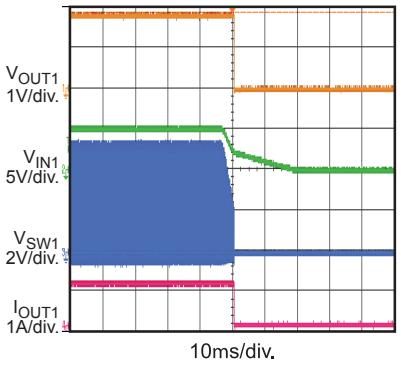
V_{IN} Power On with 1A Load
I_{OUT1} =1A, I_{OUT2} =0A



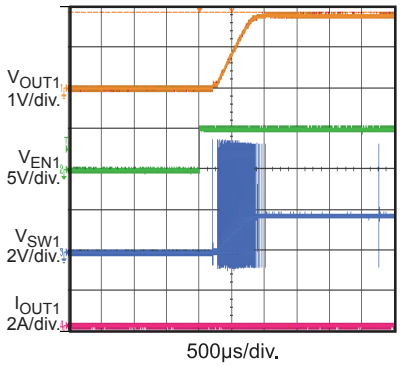
V_{IN} Power Down without Load
I_{OUT1} = I_{OUT2} =0A



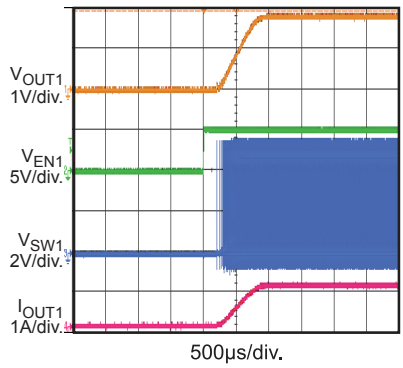
V_{IN} Power Down with 1A Load
I_{OUT1} =1A, I_{OUT2} =0A



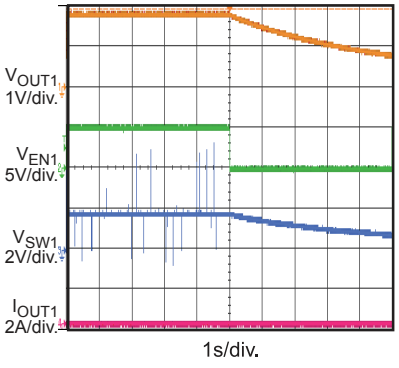
Enable On without Load
I_{OUT1} = I_{OUT2} =0A



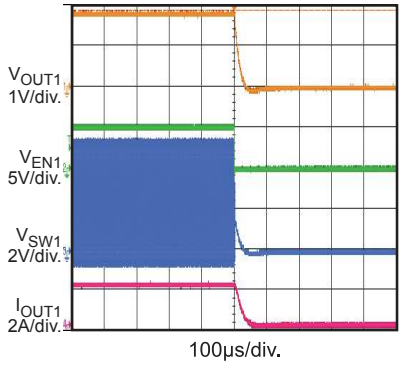
Enable On with 1A Load
I_{OUT1} =1A, I_{OUT2} =0A



Enable Down without Load
I_{OUT1} = I_{OUT2} =0A



Enable Down with 1A Load
I_{OUT1} =1A, I_{OUT2} =0A



PRINTED CIRCUIT BOARD LAYOUT

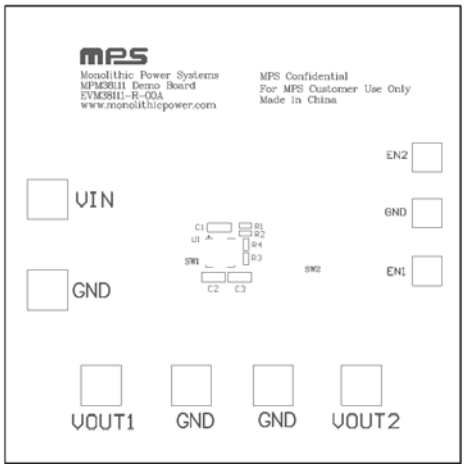


Figure 1—Top Silk Layer

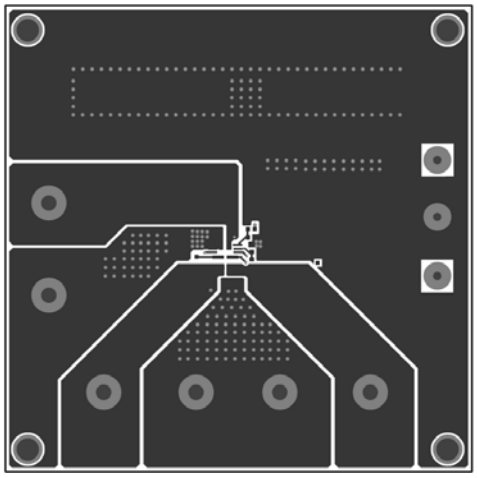


Figure 2—Top Layer

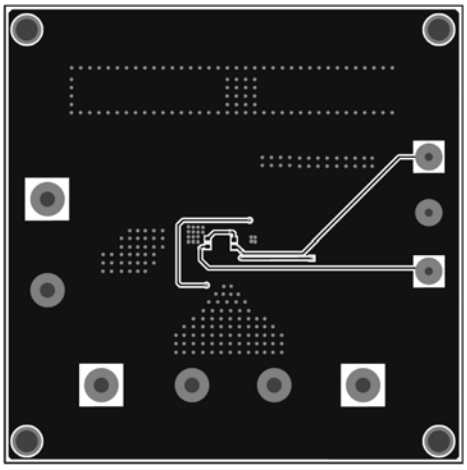


Figure 3—Bottom Layer

QUICK START GUIDE

The output voltage of this board is set externally by operating from +2.7V to +6V input. The default output voltage of this board is set to V_{OUT1}=1.8V, V_{OUT2}=1.2V.

1. Preset Power Supply to 2.7V ≤ V_{IN} ≤ 6V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
    a. Positive (+): VIN
    b. Negative (–): GND
4. Connect Load to:
    a. Positive (+): VOUT1
    b. Negative (–): GND
    c. Positive (+): VOUT2
    d. Negative (–): GND
5. Turn Power Supply on after making connections.
6. To enable the MPM38111, apply a voltage, 1.2V ≤ V_{EN} ≤ 6V, to the EN pin. To disable the MPM38111, apply a voltage, V_{EN} <0.4V, to the EN pin. The EN pin can be connected to V_{IN} with a 100kΩ resistor for automatic startup.
7. The output voltage V_{OUT} can be changed by varying R1. Calculate the new value by formula:

$$R2 = \frac{R1}{\frac{V_{OUT}}{0.608V} - 1}$$

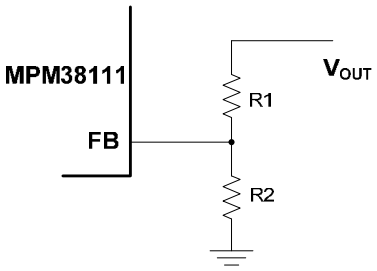


Figure 4