EVM38222-R-01A

6V Input, 2A Dual Channels Module Synchronous Step-Down Converter With Integrated Inductors EV Board

The Future of Analog IC Technology

DESCRIPTION

The EVM38222-R-01A Evaluation Board is designed to demonstrate the capabilities of MPS' MPM38222. The MPM38222 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 MPM38222 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.

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}	2/2	A

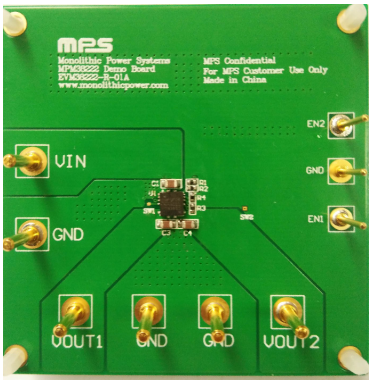
FEATURES

- Dual 2A-Output Current
- >93% Peak Efficiency
- >80% Light-Load Efficiency
- Ultra Low IQ: 45μA
- 80mΩ and 35mΩ 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

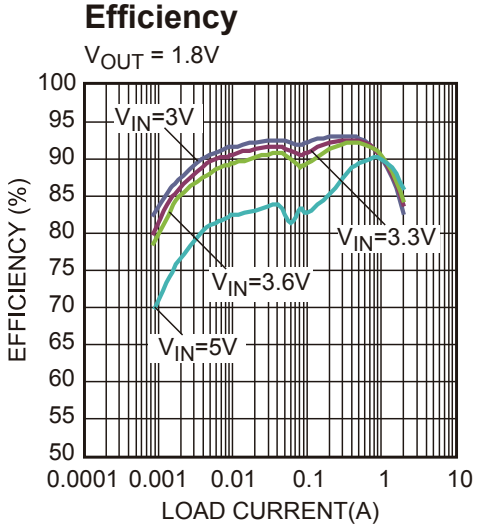
- Small/Handhold Devices
- DVD Drivers
- Portable Instruments
- Smart Phones and Feature Phones
- Battery-Powered Devices

EVM38222-R-01A EVALUATION BOARD

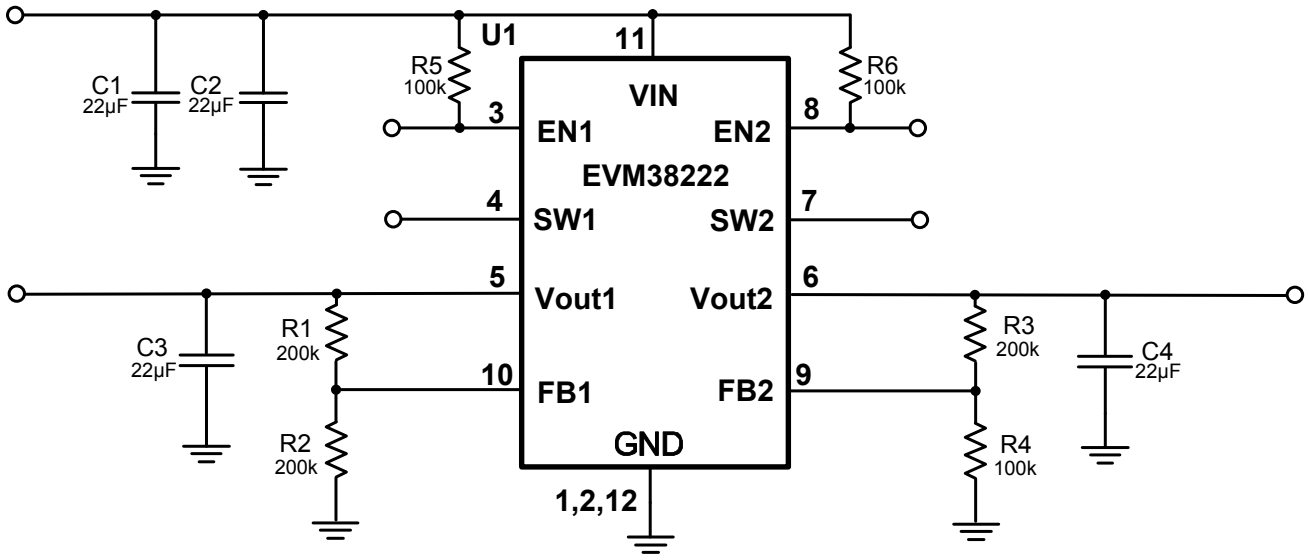


(L x W x H) 6.5cm x 6.5cm x 1.6cm

Board Number	MPS IC Number
EVM38222-R-01A	MPM38222



EVALUATION BOARD SCHEMATIC



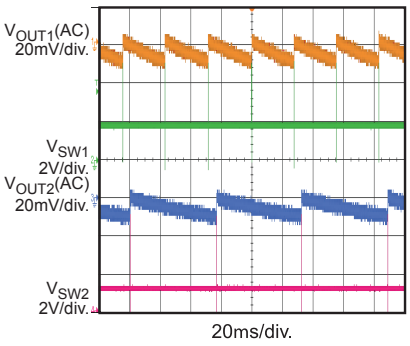
EVM38222-R-01A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
3	R1, R3, R2	200kΩ	Film Res,1%	0603	ROYAL	RL0603FR-07200KL
3	R4, R5, R6	100kΩ	Film Res,1%	0603	ROYAL	RL0603FR-07100KL
4	C1, C2, C3, C4	22µF	Ceramic Cap,10V, X5R	0805	muRata	GRM21BR61A226ME51L
1	U1	MPM38222	Dual Channel Step Down Switcher	QFN-14 4.0x4.0mm	MPS	MPM38222GR

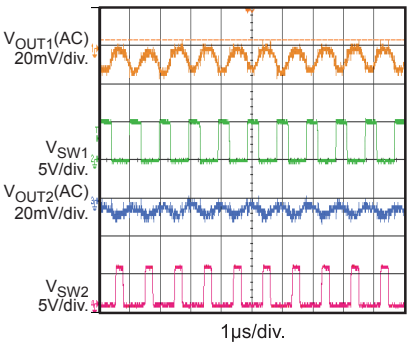
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT1} =1.8V, V_{OUT2} =1.2V, C_{OUT1}=C_{OUT2}=22µF, T_A = 25ºC, unless otherwise noted.

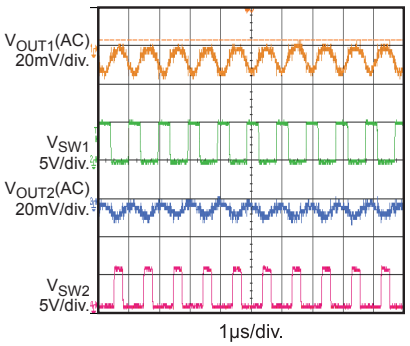
Output Ripple
I_{OUT1} =I_{OUT2} = 0A



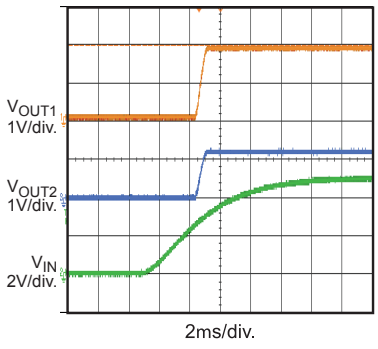
Output Ripple
I_{OUT1} =I_{OUT2} = 1A



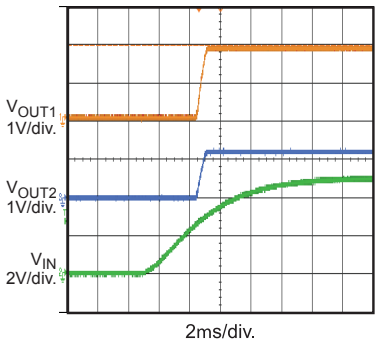
Output Ripple
I_{OUT1} =I_{OUT2} = 2A



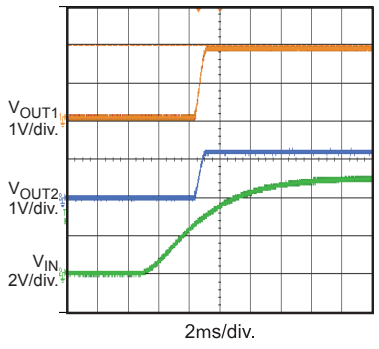
V_{IN} Power Up without Load
I_{OUT1} =I_{OUT2} = 0A



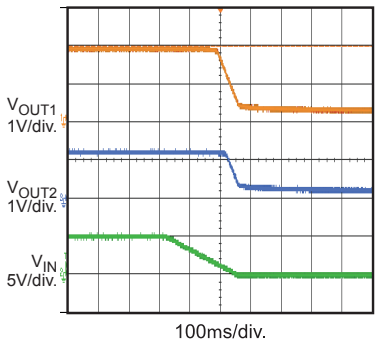
V_{IN} Power Up with 1A Load
I_{OUT1} =I_{OUT2} = 1A



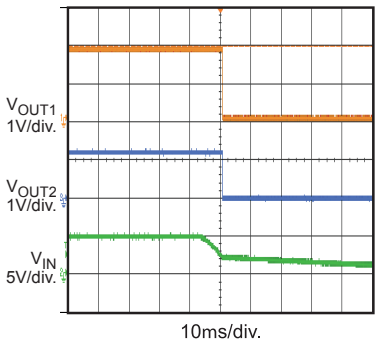
V_{IN} Power Up with 2A Load
I_{OUT1} =I_{OUT2} = 2A



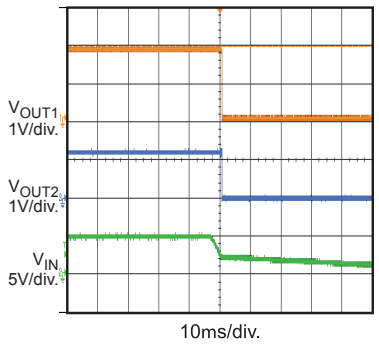
V_{IN} Power Down without Load
I_{OUT1} =I_{OUT2} = 0A



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



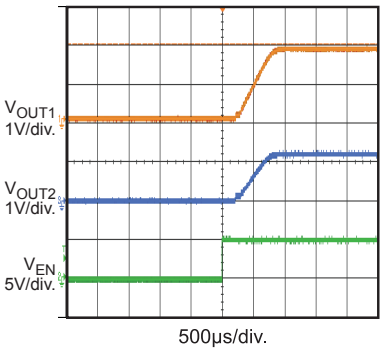
V_{IN} Power Down with 2A Load
I_{OUT1} =I_{OUT2} = 2A



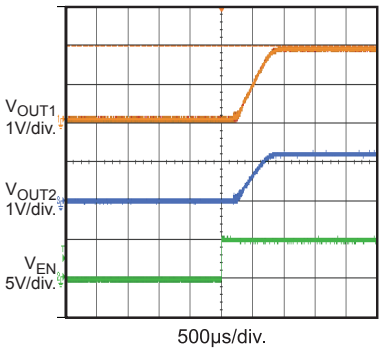
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT1} =1.8V, V_{OUT2} =1.2V, C_{OUT1}=C_{OUT2}=22µF, T_A = 25ºC, unless otherwise noted.

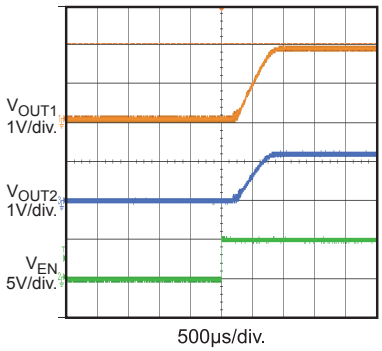
EN On without Load
I_{OUT1} = I_{OUT2} =0A



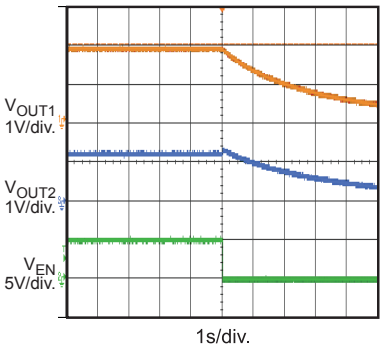
EN On with 1A Load
I_{OUT1} = I_{OUT2} =1A



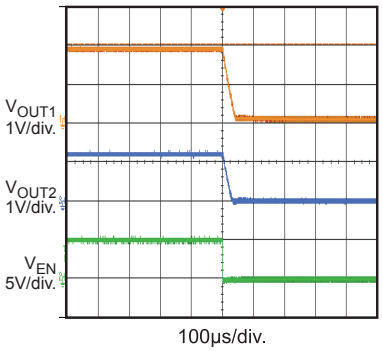
EN On with 2A Load
I_{OUT1} = I_{OUT2} =2A



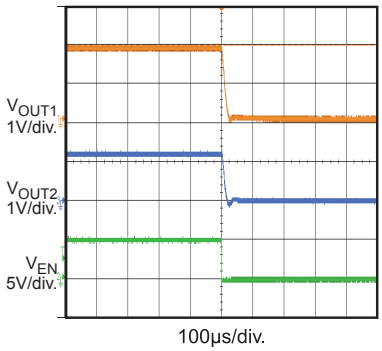
EN Down without Load
I_{OUT1} = I_{OUT2} =0A



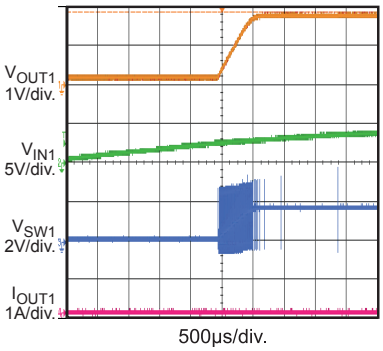
EN Down with 1A Load
I_{OUT1} = I_{OUT2} =1A



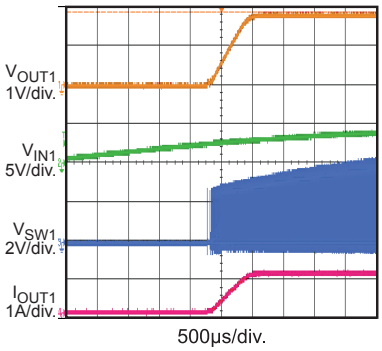
EN Down with 2A Load
I_{OUT1} = I_{OUT2} =2A



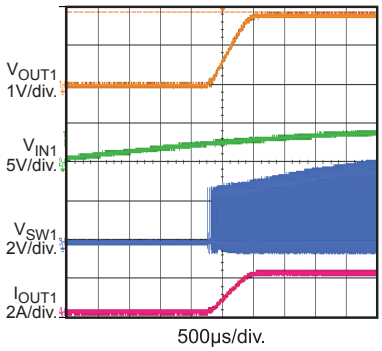
V_{IN} Power On without Load
I_{OUT1} = I_{OUT2} =0A



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



V_{IN} Power On with 2A Load
I_{OUT1} =2A, I_{OUT2} =0A



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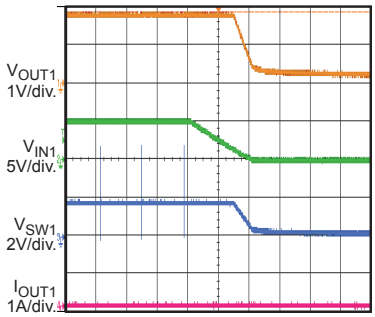
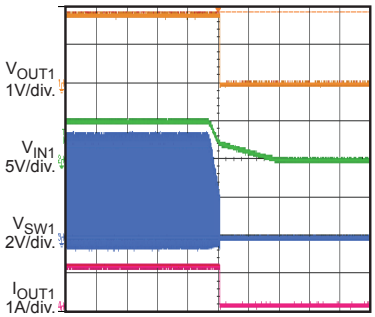
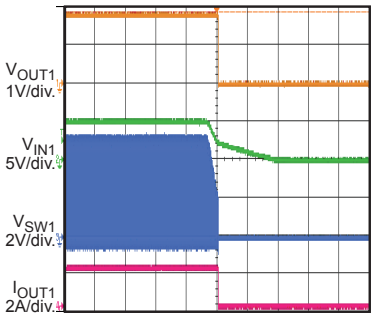
V_{IN} Power Down without Load
I_{OUT1} = I_{OUT2} =0A



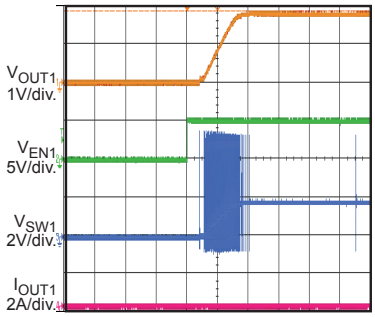
V_{IN} Power Down with 1A Load
I_{OUT1} =1A, I_{OUT2} =0A



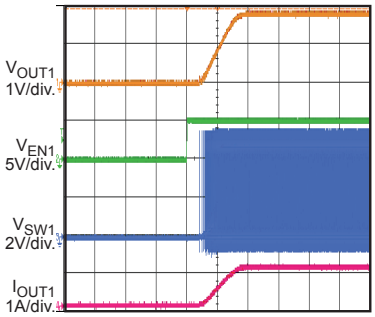
V_{IN} Power Down with 2A Load
I_{OUT1} =2A, I_{OUT2} =0A



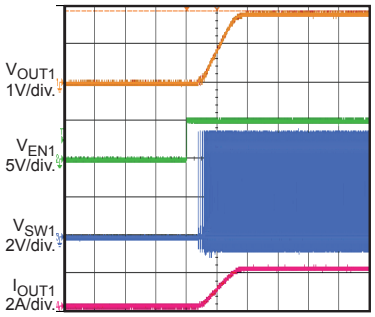
Enable On without Load
I_{OUT1} = I_{OUT2} =0A



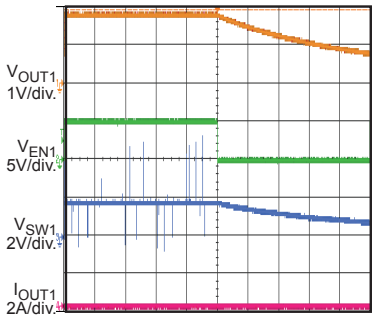
Enable On with 1A Load
I_{OUT1} =1A, I_{OUT2} =0A



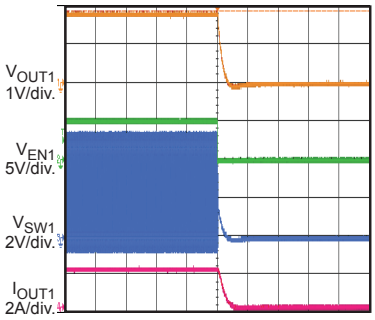
Enable On with 2A Load
I_{OUT1} =2A, I_{OUT2} =0A



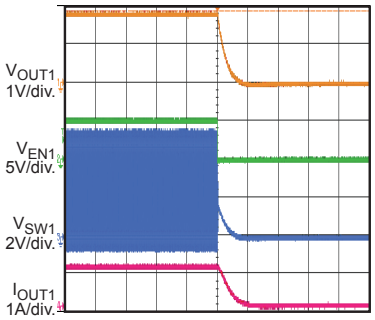
Enable Down without Load
I_{OUT1} = I_{OUT2} =0A



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



Enable Down with 2A Load
I_{OUT1} =2A, I_{OUT2} =0A



EVB TEST RESULTS *(continued)*

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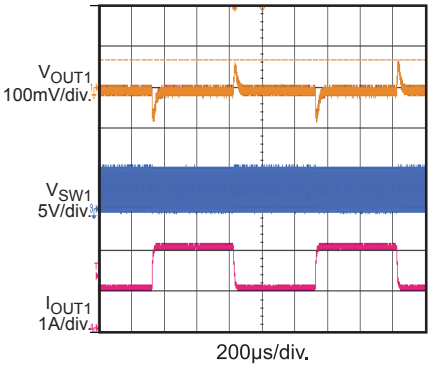
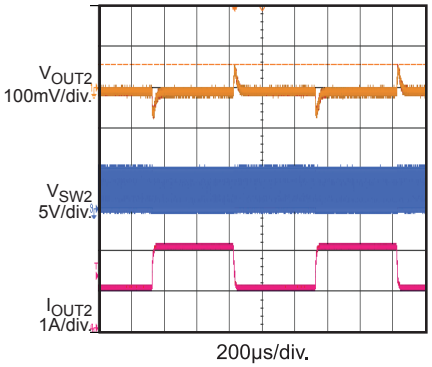
CH1 Transient
1A Transient to 2A,
2.5A/µs Speed



CH2 Transient
1A Transient to 2A,
2.5A/µs Speed



PRINTED CIRCUIT BOARD LAYOUT

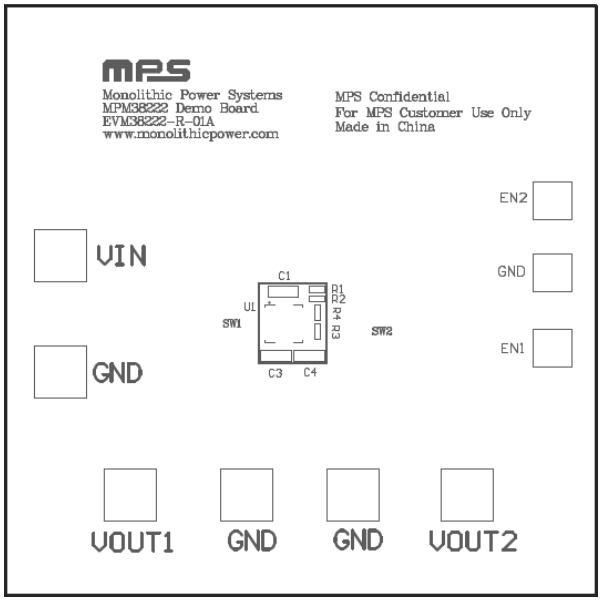


Figure 1: Top Silk Layer

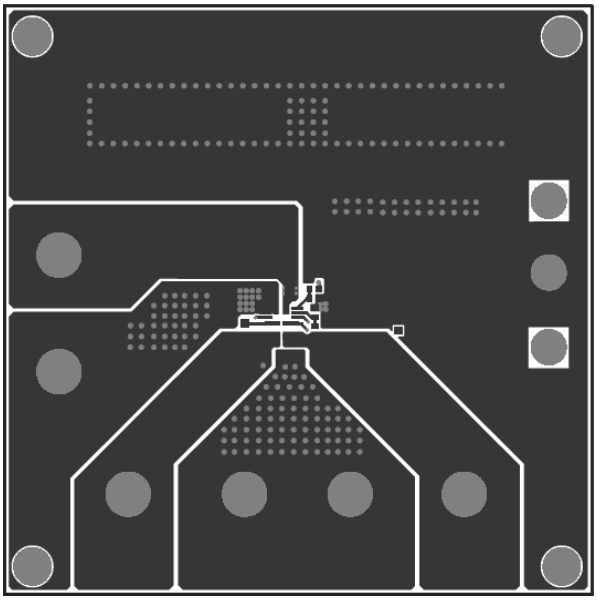


Figure 2: Top Layer

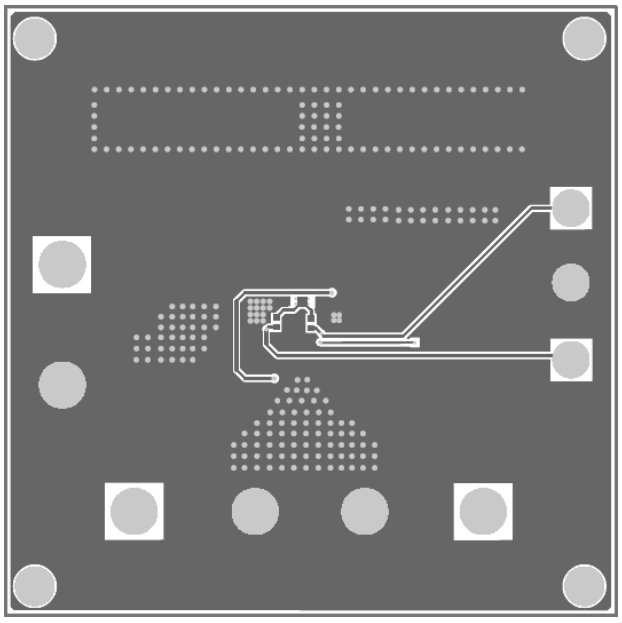


Figure 3: Bottom Layer

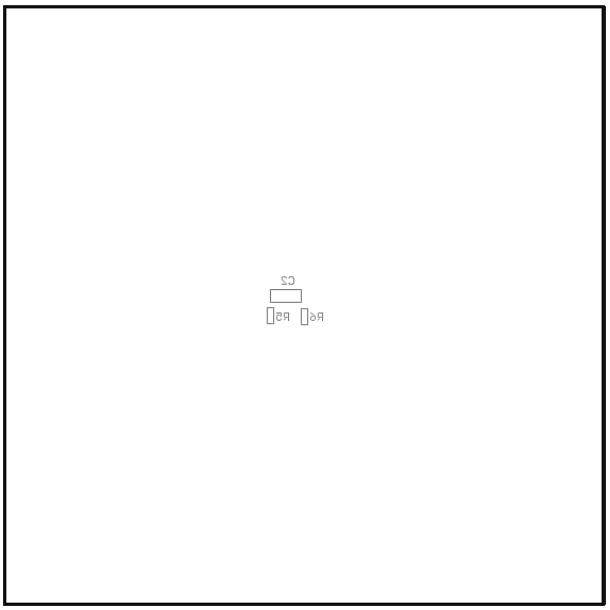


Figure 4: Bottom Silk Layer

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 MPM38222, apply a voltage, 1.2V ≤ V_{EN} ≤ 6V, to the EN pin. To disable the MPM38222, 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:

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

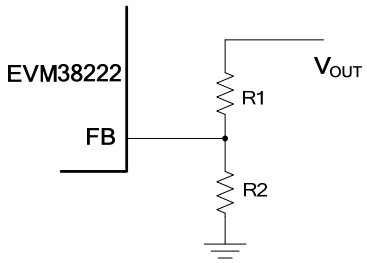


Figure 5