

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 45 μ A 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

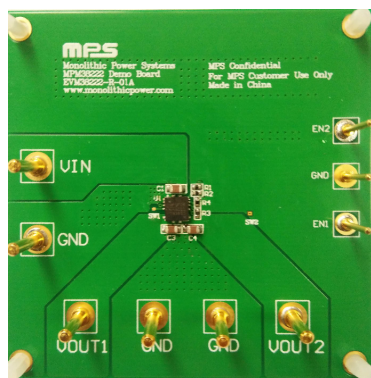
- Dual 2A-Output Current
- >93% Peak Efficiency
- >80% Light-Load Efficiency
- Ultra Low IQ: 45 μ A
- 80m Ω and 35m Ω Internal Power MOSFET
- Wide 2.7V to 6V Operating Input Range
- Default 1MHz Switching Frequency
- 180° Phase-Shifted Operation
- 4mmx4mmx1.6mm QFN14 package
- 100% Duty Cycle Operation
- 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

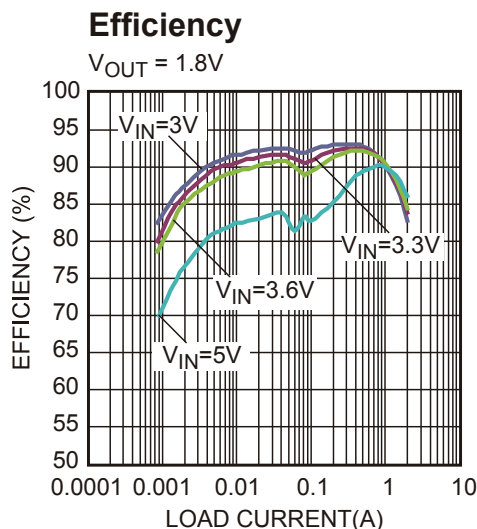
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EVM38222-R-01A EVALUATION BOARD

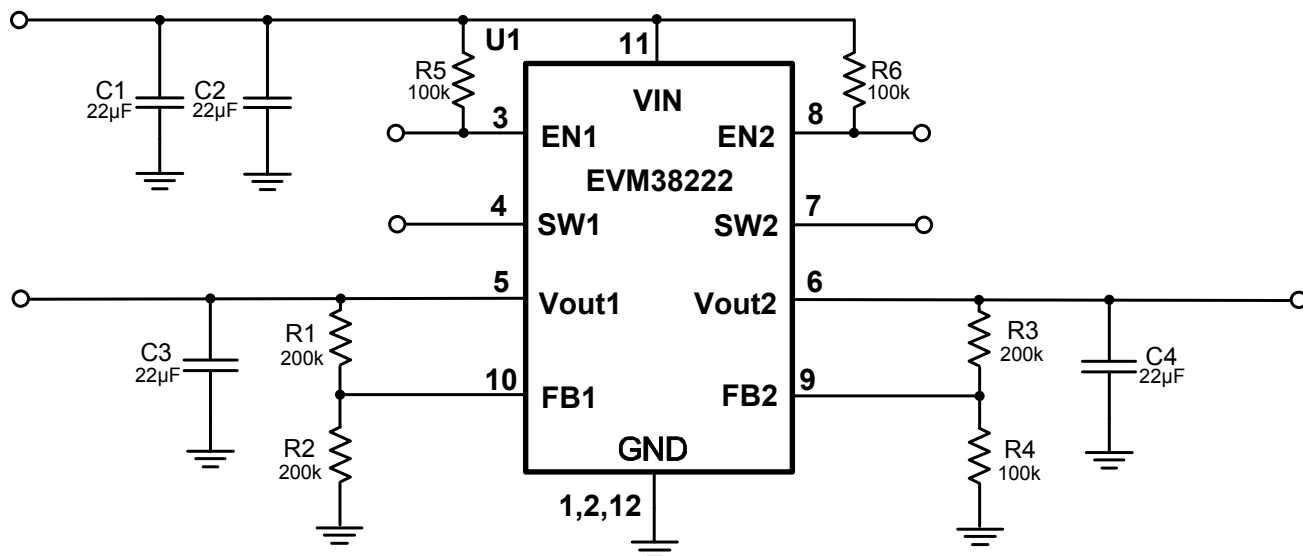


(L x W x H) 6.5cm x 6.5cm x 1.6cm

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

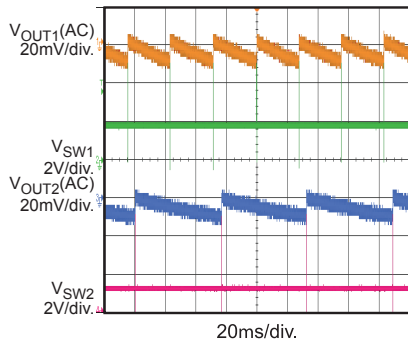
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $C_{OUT1} = C_{OUT2} = 22\mu F$, $T_A = 25^\circ C$, unless otherwise noted.

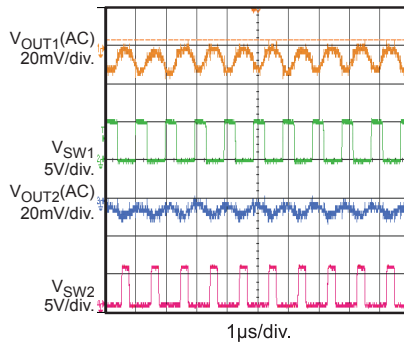
Output Ripple

$I_{OUT1} = I_{OUT2} = 0A$



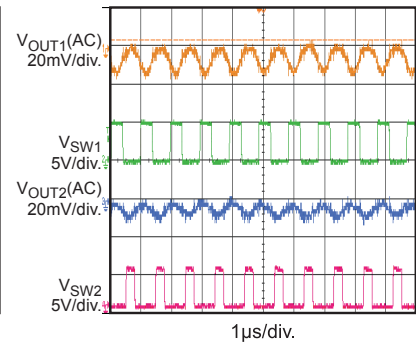
Output Ripple

$I_{OUT1} = I_{OUT2} = 1A$



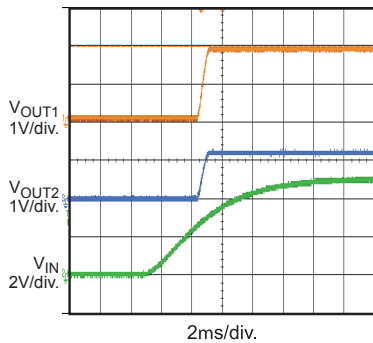
Output Ripple

$I_{OUT1} = I_{OUT2} = 2A$



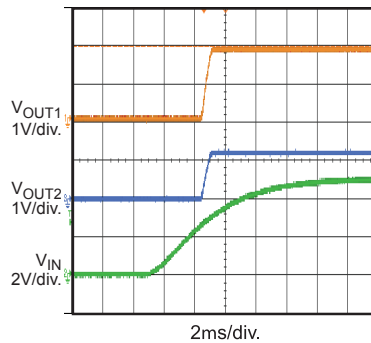
V_{IN} Power Up without Load

$I_{OUT1} = I_{OUT2} = 0A$



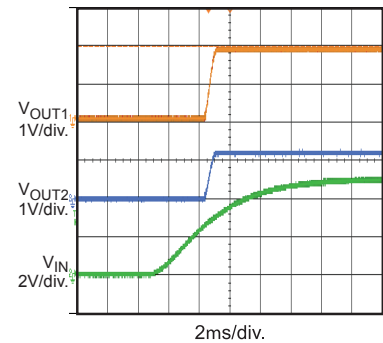
V_{IN} Power Up with 1A Load

$I_{OUT1} = I_{OUT2} = 1A$



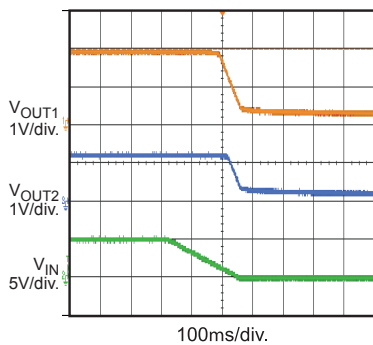
V_{IN} Power Up with 2A Load

$I_{OUT1} = I_{OUT2} = 2A$



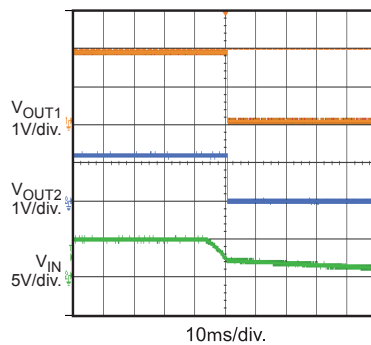
V_{IN} Power Down without Load

$I_{OUT1} = I_{OUT2} = 0A$



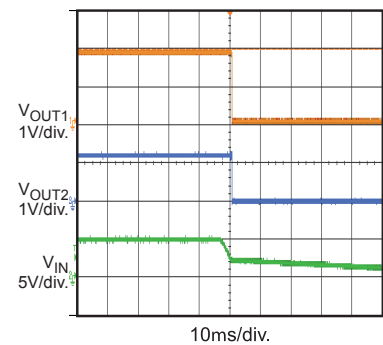
V_{IN} Power Down with 1A Load

$I_{OUT1} = I_{OUT2} = 1A$



V_{IN} Power Down with 2A Load

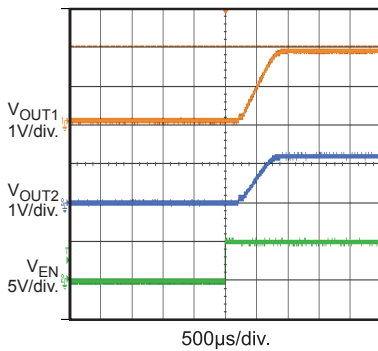
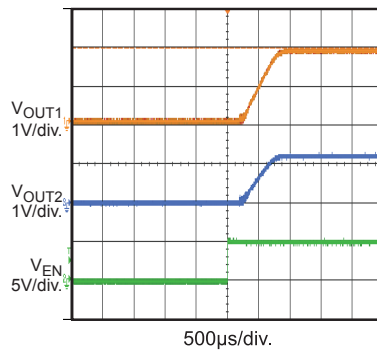
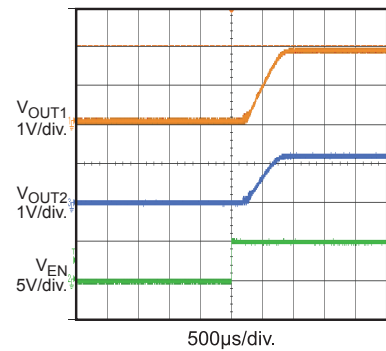
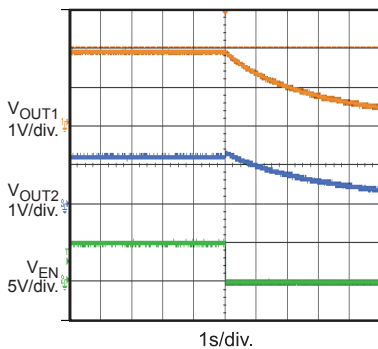
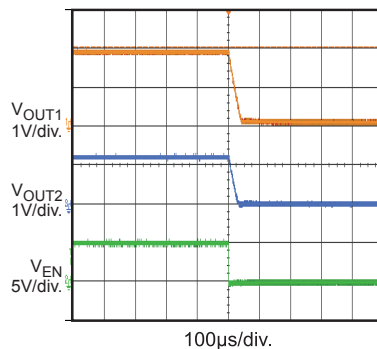
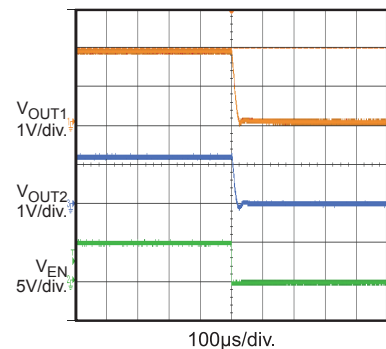
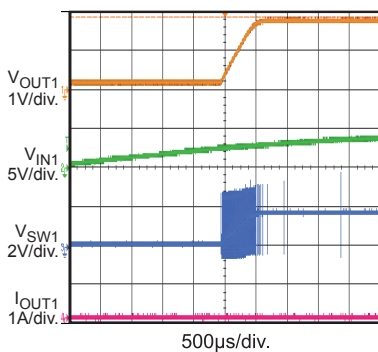
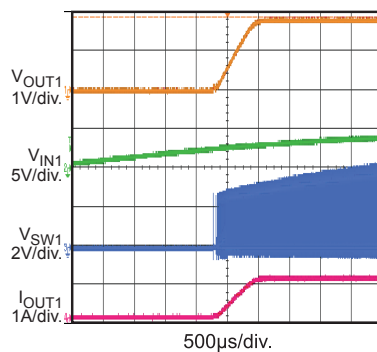
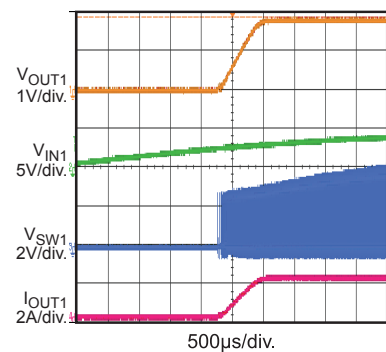
$I_{OUT1} = I_{OUT2} = 2A$



EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board.

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $C_{OUT1} = C_{OUT2} = 22\mu F$, $T_A = 25^\circ C$, 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** $I_{OUT1} = 2A$, $I_{OUT2} = 0A$ 

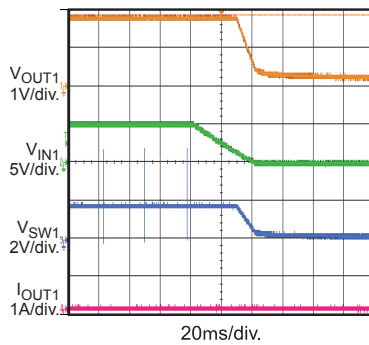
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $C_{OUT1} = C_{OUT2} = 22\mu F$, $T_A = 25^\circ C$, unless otherwise noted.

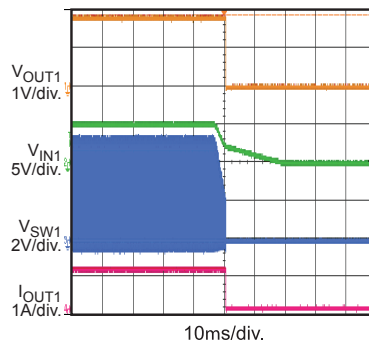
**V_{IN} Power Down
without Load**

$I_{OUT1} = I_{OUT2} = 0A$



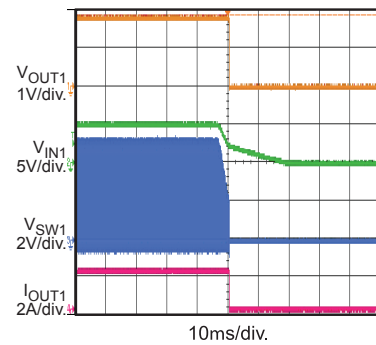
**V_{IN} Power Down
with 1A Load**

$I_{OUT1} = 1A$, $I_{OUT2} = 0A$



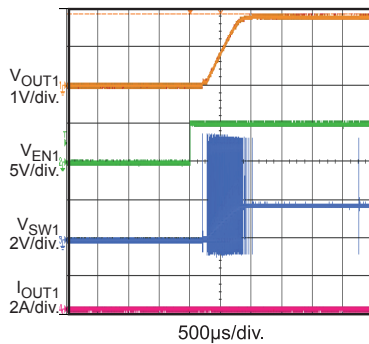
**V_{IN} Power Down
with 2A Load**

$I_{OUT1} = 2A$, $I_{OUT2} = 0A$



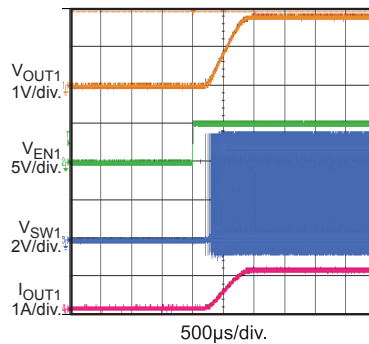
Enable On without Load

$I_{OUT1} = I_{OUT2} = 0A$



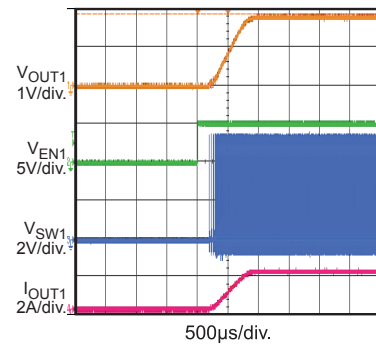
Enable On with 1A Load

$I_{OUT1} = 1A$, $I_{OUT2} = 0A$



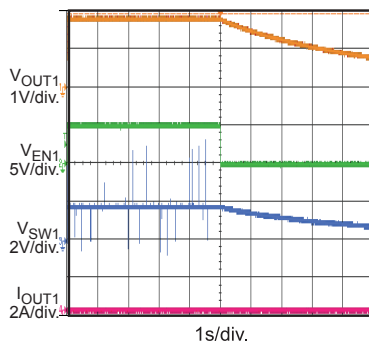
Enable On with 2A Load

$I_{OUT1} = 2A$, $I_{OUT2} = 0A$



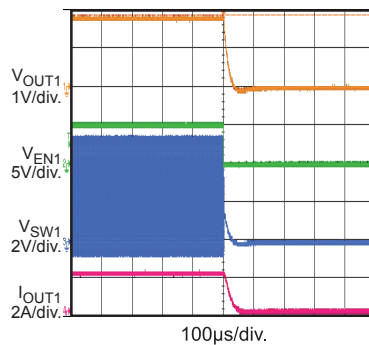
Enable Down without Load

$I_{OUT1} = I_{OUT2} = 0A$



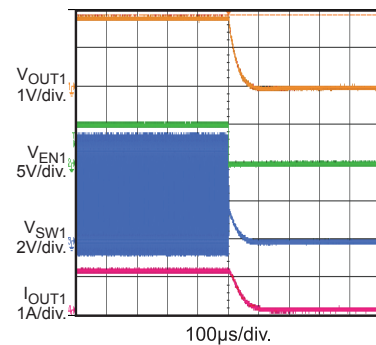
Enable Down with 1A Load

$I_{OUT1} = 1A$, $I_{OUT2} = 0A$



Enable Down with 2A Load

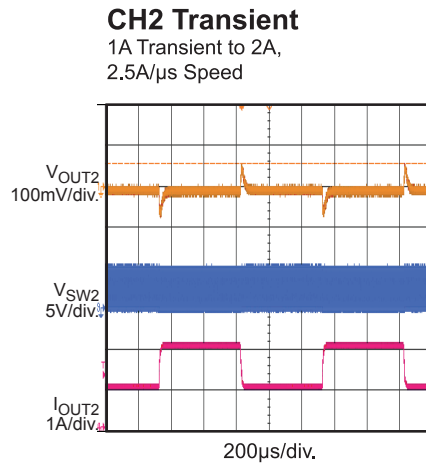
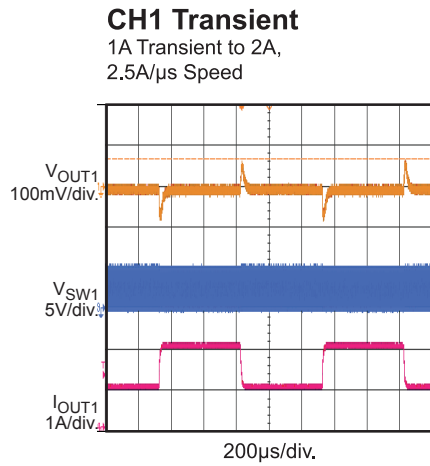
$I_{OUT1} = 2A$, $I_{OUT2} = 0A$



EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $C_{OUT1} = C_{OUT2} = 22\mu F$, $T_A = 25^\circ C$, unless otherwise noted.



PRINTED CIRCUIT BOARD LAYOUT

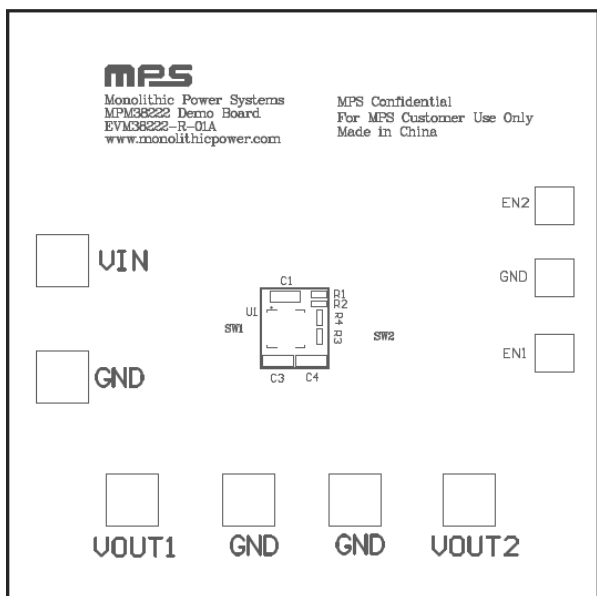


Figure 1: Top Silk Layer

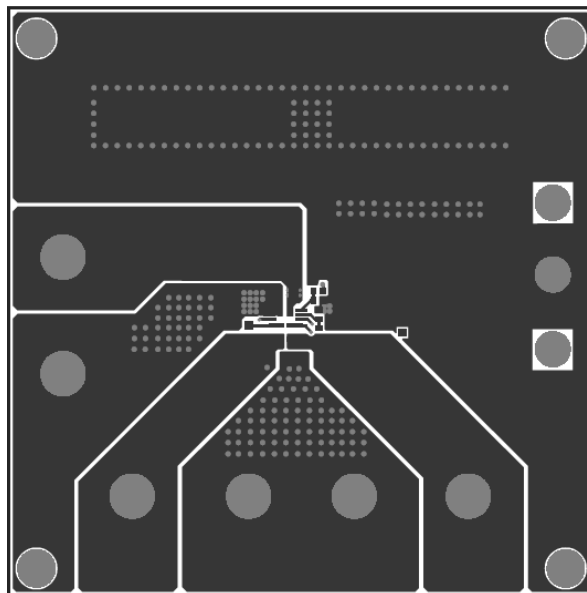


Figure 2: Top Layer

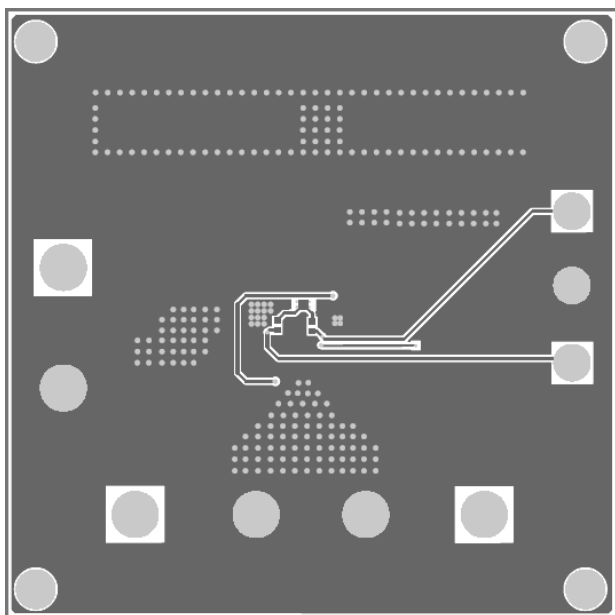


Figure 3: Bottom Layer

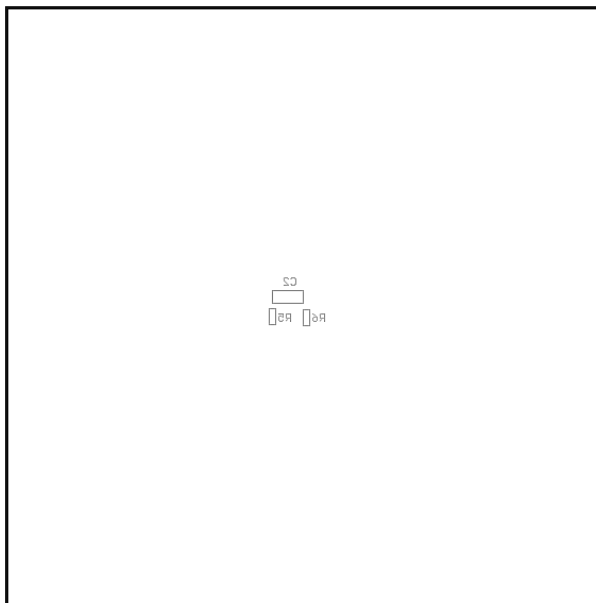


Figure 4: Bottom Silk Layer

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 $2.7V \leq V_{IN} \leq 6V$.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
 - a. Positive (+): V_{IN}
 - b. Negative (-): GND
4. Connect Load to:
 - a. Positive (+): V_{OUT1}
 - b. Negative (-): GND
 - c. Positive (+): V_{OUT2}
 - d. Negative (-): GND
5. Turn Power Supply on after making connections.
6. To enable the MPM38222, apply a voltage, $1.2V \leq V_{EN} \leq 6V$, 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 100k Ω resistor for automatic startup.
7. The output voltage V_{OUT} can be changed by varying R1. Calculate the new value by formula:

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

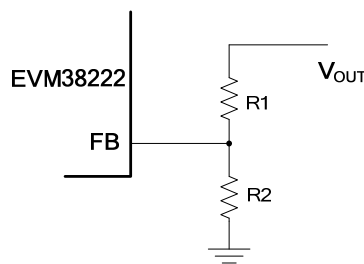


Figure 5

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