

## DESCRIPTION

The MPM3840 is a monolithic step-down converter with built-in internal power MOSFETs and inductor. The DC-DC module is housed in a small surface QFN package which is sized 3mm width by 5mm length by 1.6mm height. It can provide 4A continuous output current from a 2.8V to 5.5V input voltage with excellent load and line regulation. The MPM3840 is ideal for powering portable equipment that runs with a single cell Lithium-Ion (Li+) Battery. The output voltage can be regulated as low as 0.6V. Only input, output capacitors and FB resistors are needed to complete the design.

The Constant-On-time (COT) control scheme provides fast transient response high light-load efficiency and easy loop stabilization. Fault condition protection includes cycle-by-cycle current limit and thermal shutdown.

The MPM3840 requires a minimum number of readily available standard external components and is available in an ultra-small QFN-20 (3mmx5mm) package.

## ELECTRICAL SPECIFICATION

| Parameter      | Symbol    | Value    | Units |
|----------------|-----------|----------|-------|
| Input Voltage  | $V_{IN}$  | 2.8– 5.5 | V     |
| Output Voltage | $V_{OUT}$ | 1.2      | V     |
| Output Current | $I_{OUT}$ | 4        | A     |

## FEATURES

- Above 80% Light Load Efficiency
- Low IQ: 40 $\mu$ A
- Wide 2.8V to 5.5V Operating Input Range
- Output Voltage as Low as 0.6V
- 100% Duty Cycle in Dropout
- 4A Output Current
- 25m $\Omega$  and 12m $\Omega$  Internal Power MOSFET
- 1.2MHz Frequency
- EN and Power Good for Power Sequencing
- Available in a QFN-20 (3mmx5mmx1.6mm)
- Cycle-by-Cycle Over Current Protection
- 1.5ms Internal SS Time with Pre-Bias Startup
- Short Circuit Protection with Hiccup Mode
- Thermal Shutdown
- Stable with Low ESR Output Ceramic Capacitors

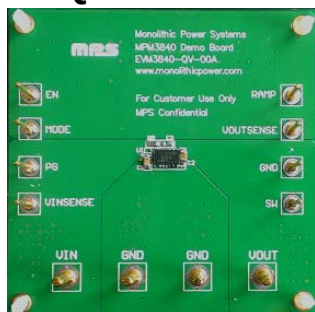
## APPLICATIONS

- Wireless Card
- Smart Phone
- Noise Sensitive Application
- Low Voltage I/O System Power

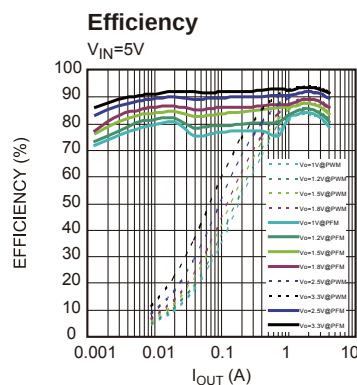
All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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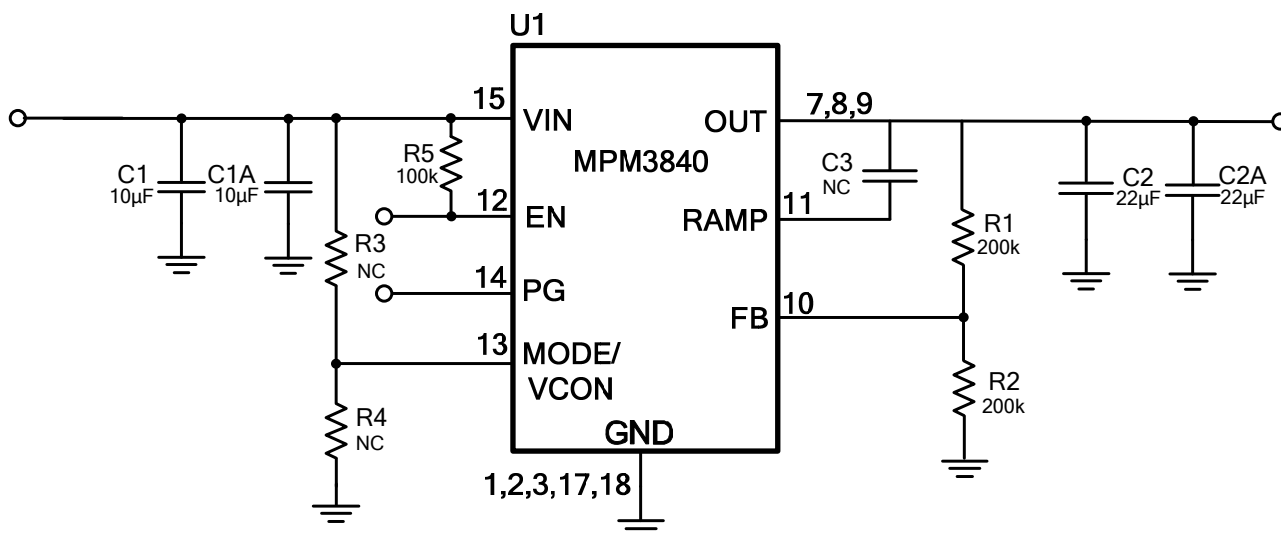
## EVM3840-QV-00A EVALUATION BOARD



| Board Number   | MPS IC Number |
|----------------|---------------|
| EVM3840-QV-00A | MPM3840GQV    |



## EVALUATION BOARD SCHEMATIC



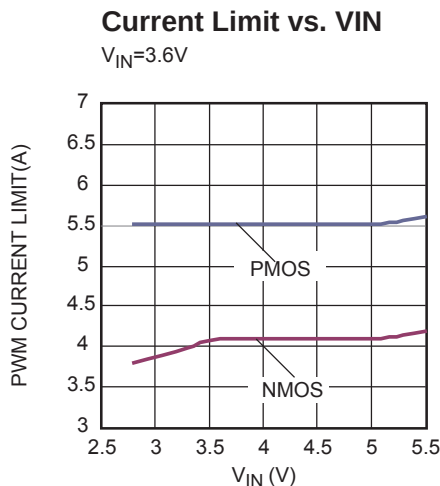
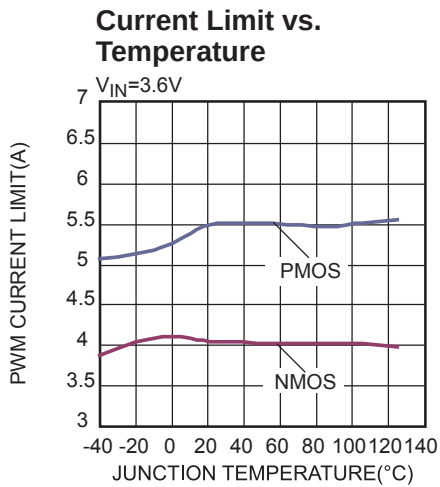
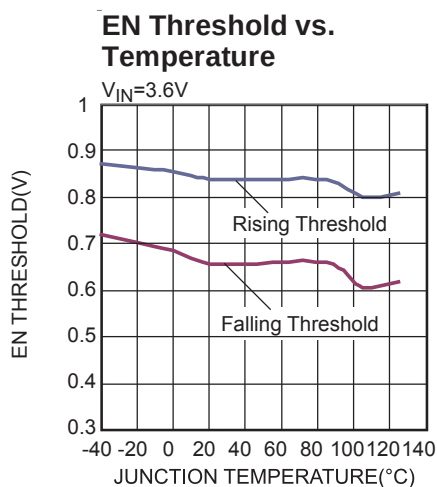
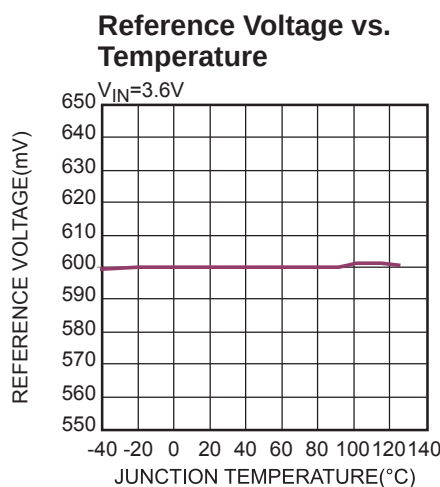
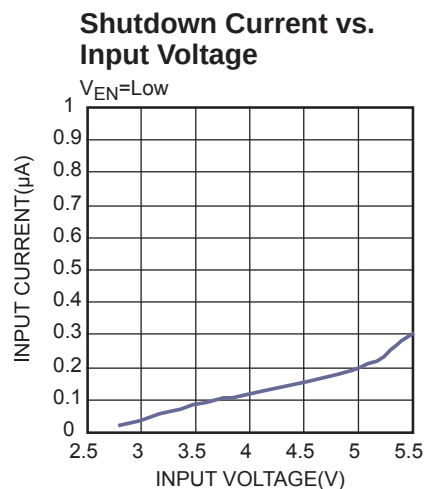
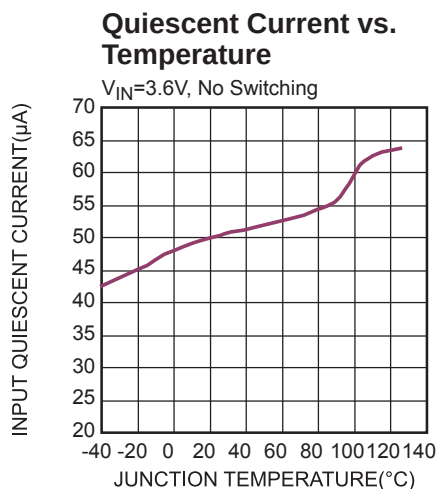
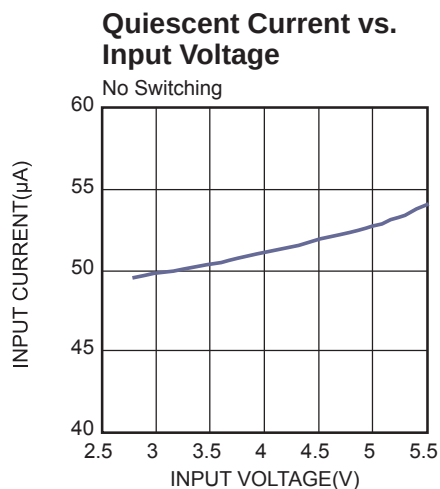
## EVM3840-QV-00A BILL OF MATERIALS

| Qty | Ref      | Value | Description         | Package | Manufacturer | Manufacturer P/N   |
|-----|----------|-------|---------------------|---------|--------------|--------------------|
| 2   | R1, R2   | 200kΩ | Film Res,1%         | 0603    | ROYAL        | RL0603FR-07200K5L  |
| 0   | R3,R4,C3 | NC    |                     |         |              |                    |
| 1   | R5       | 100k  | Film Res,1%         | 0603    | ROYAL        | RL0603FR-07100KL   |
| 2   | C2A,C2   | 22μF  | Ceramic Cap,10V,X5R | 0805    | muRata       | GRM21BR61A226ME51L |
| 2   | C1,C1A   | 10μF  | Ceramic Cap,10V,X5R | 0805    | muRata       | GRM21BR61A106ME51L |

## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

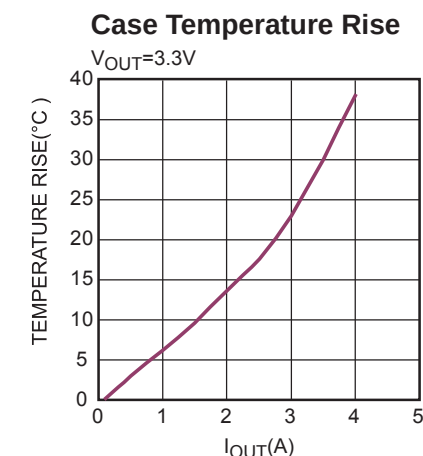
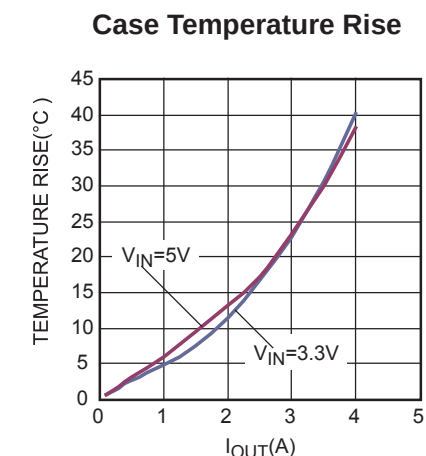
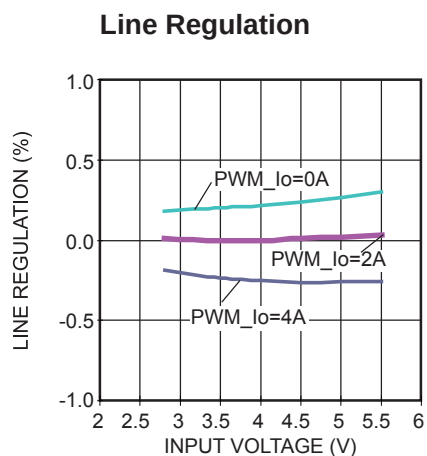
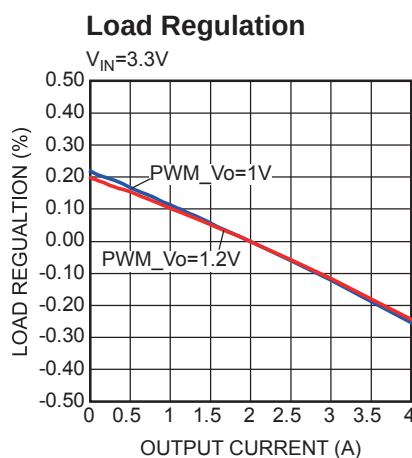
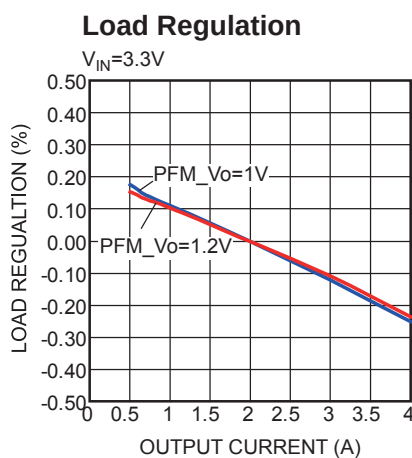
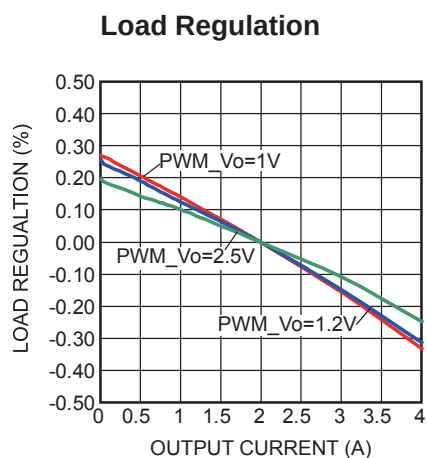
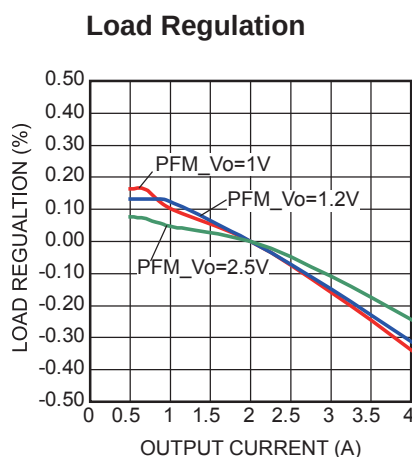
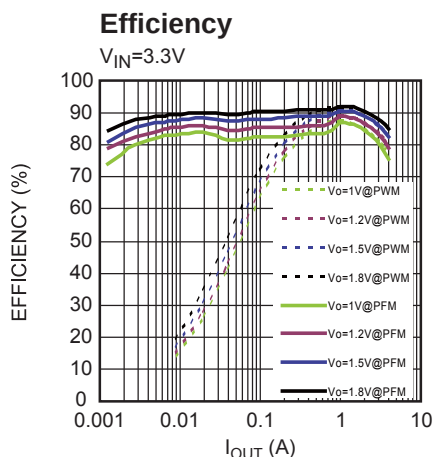
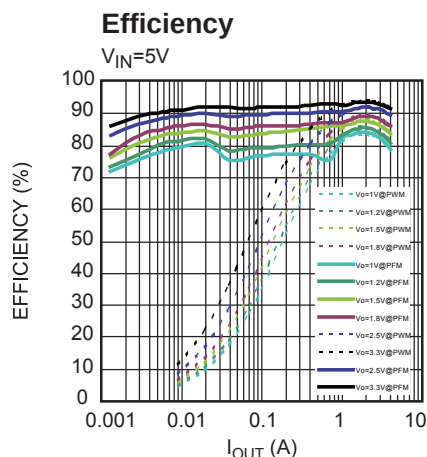
$V_{IN}=5V$ ,  $V_{OUT}=1.2V$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.



# EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board.

$V_{IN}=5V$ ,  $V_{OUT}=1.2V$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.

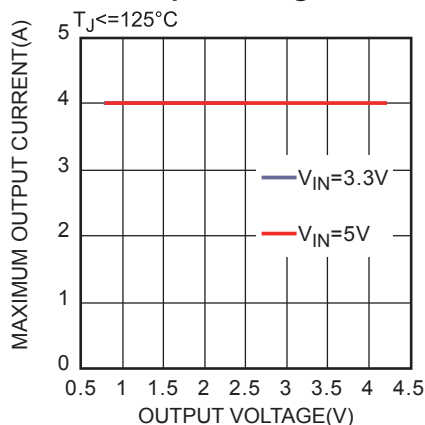


**EVB TEST RESULTS (continued)**

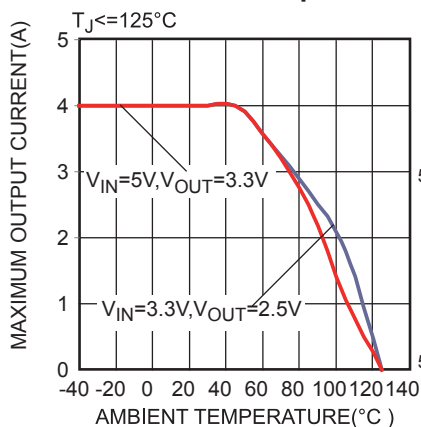
Performance waveforms are tested on the evaluation board.

$V_{IN}=5V$ ,  $V_{OUT}=1.2V$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.

**Output Current Derating  
vs. Output Voltage**

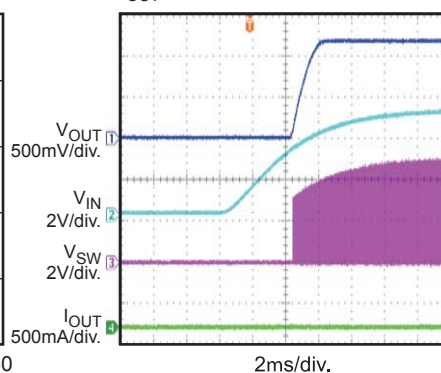


**Output Current Derating  
vs. Ambient Temperature**



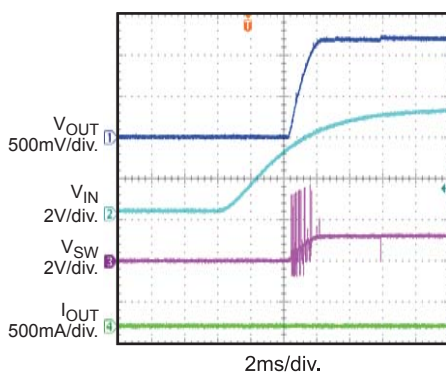
**Power On**

$I_{OUT}=0A$ , PWM Mode



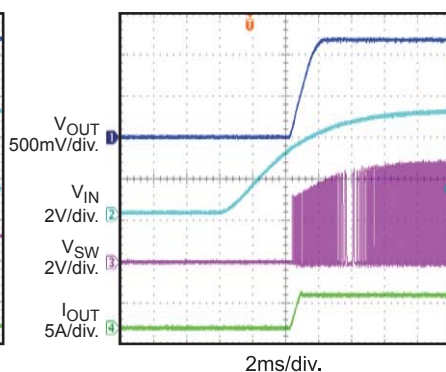
**Power On**

$I_{OUT}=0A$ , PFM Mode



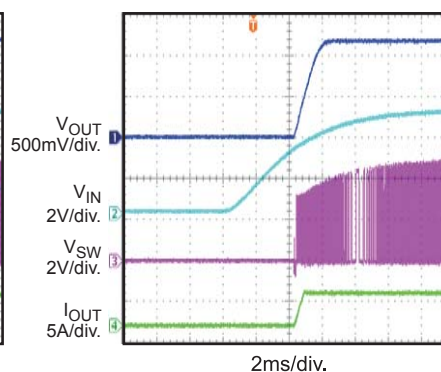
**Power On**

$I_{OUT}=4A$ , PWM Mode



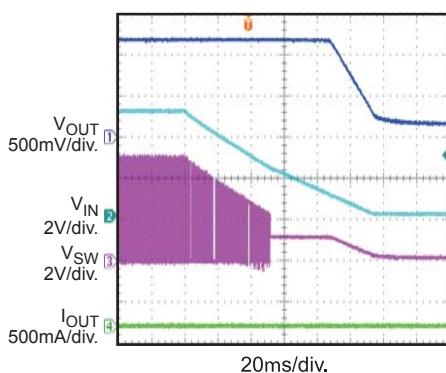
**Power On**

$I_{OUT}=4A$ , PFM Mode



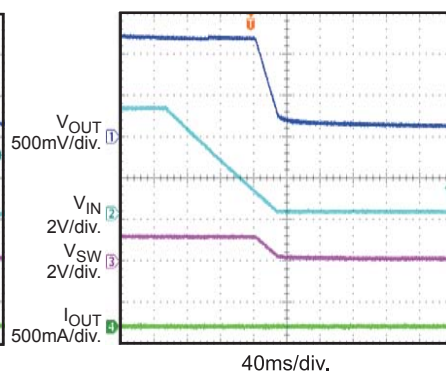
**Power Off**

$I_{OUT}=0A$ , PWM Mode



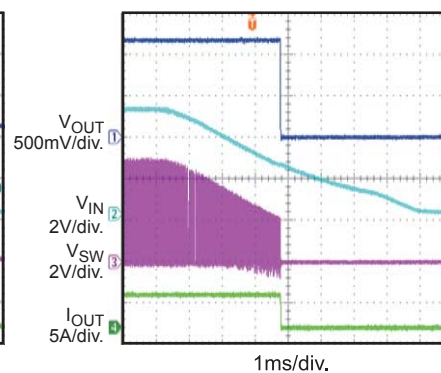
**Power Off**

$I_{OUT}=0A$ , PFM Mode



**Power Off**

$I_{OUT}=4A$ , PWM Mode

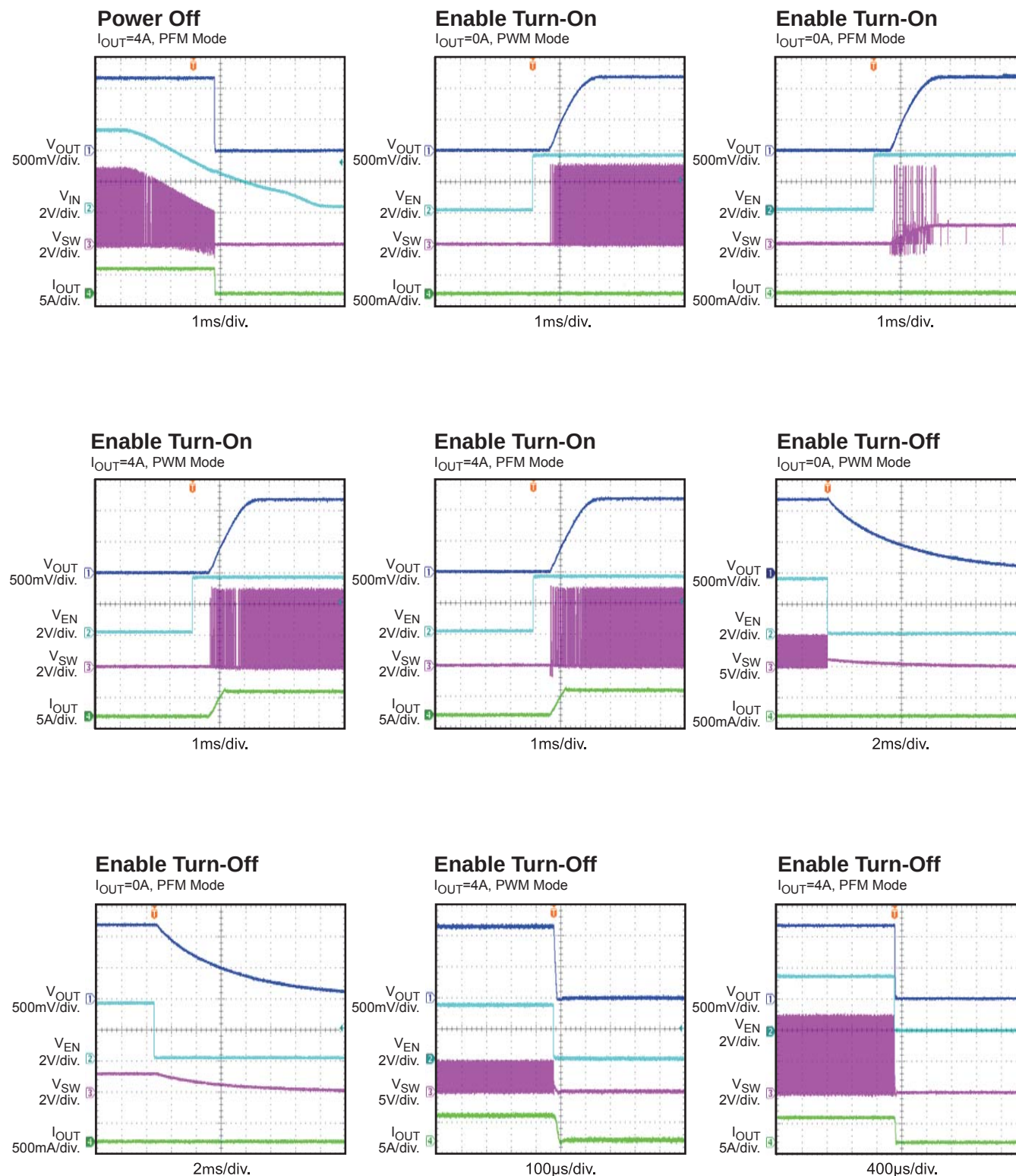




## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

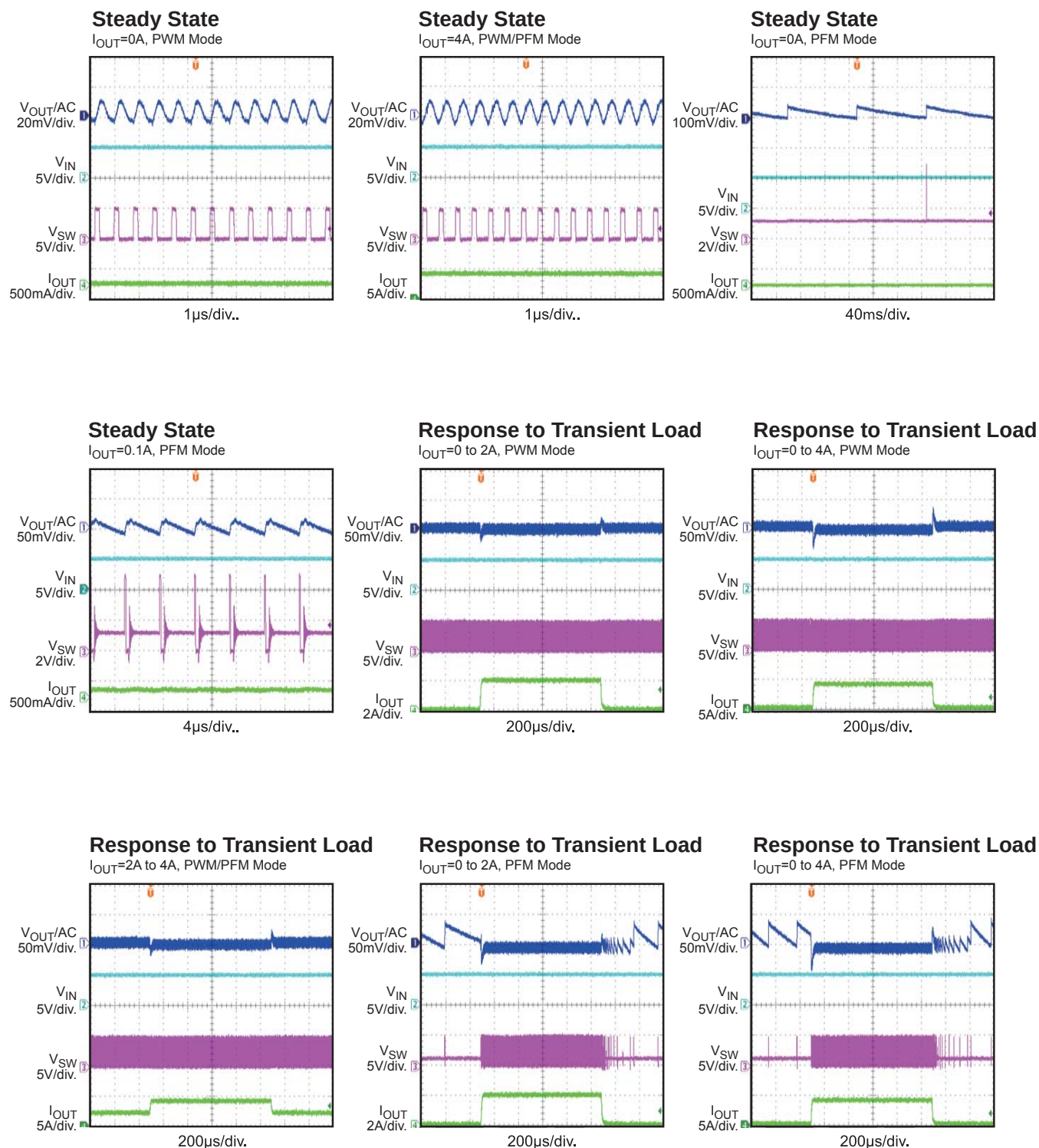
$V_{IN}=5V$ ,  $V_{OUT}=1.2V$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.



## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

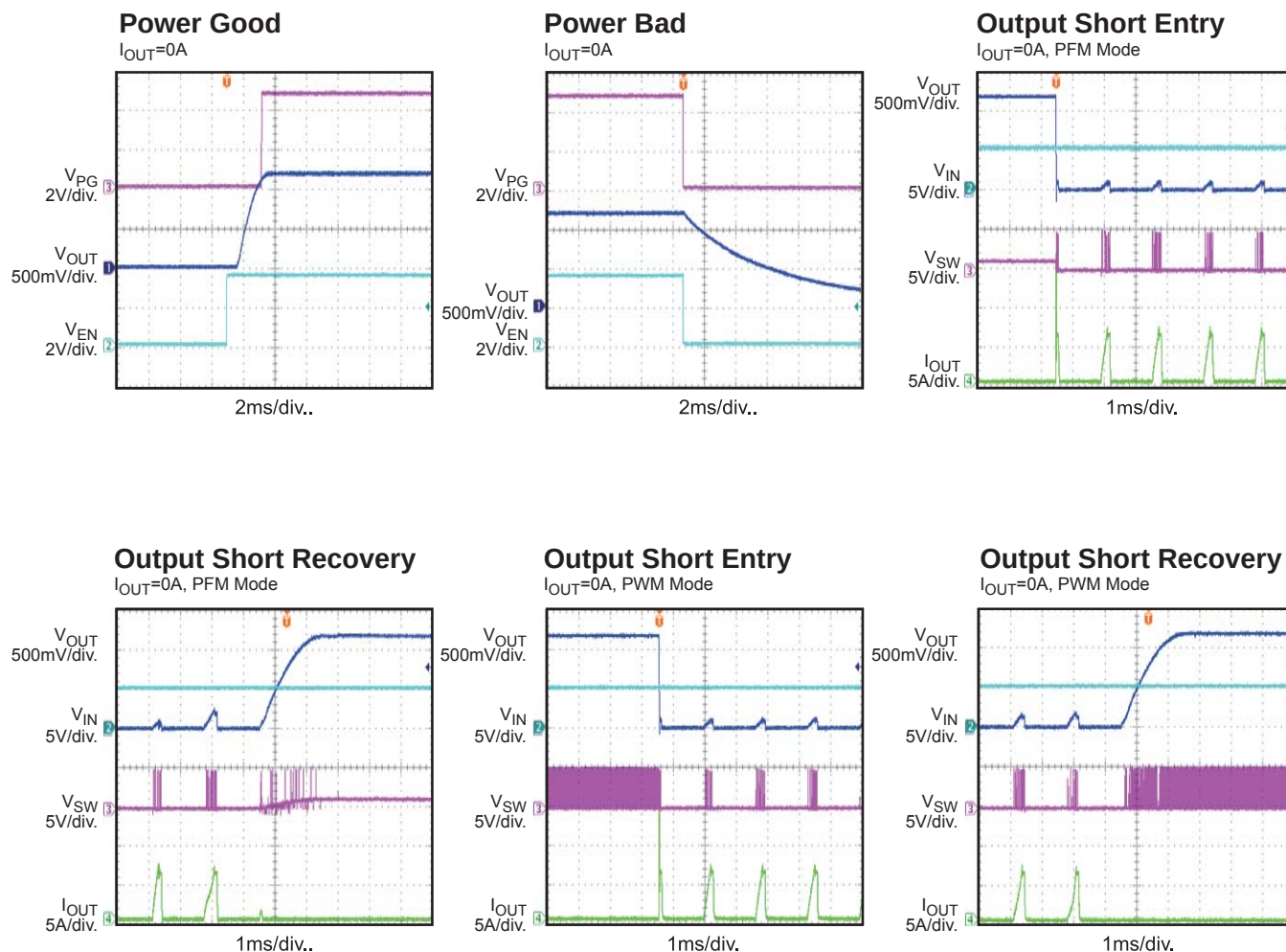
$V_{IN}=5V$ ,  $V_{OUT}=1.2V$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.



## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

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## PRINTED CIRCUIT BOARD LAYER

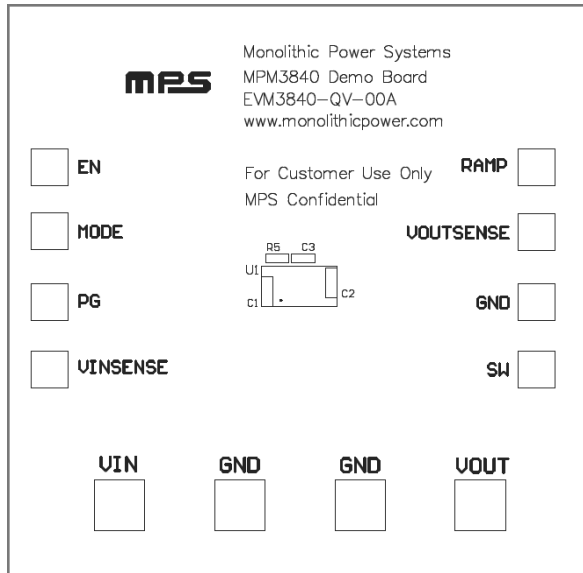


Figure 1: Top Silk Layer

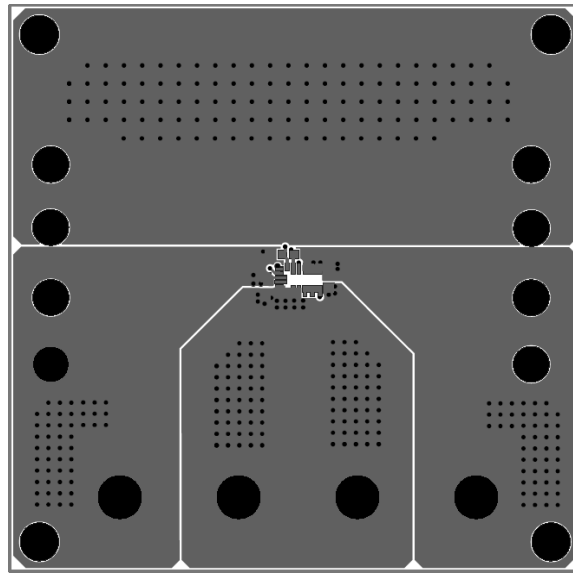


Figure 2: Top Layer

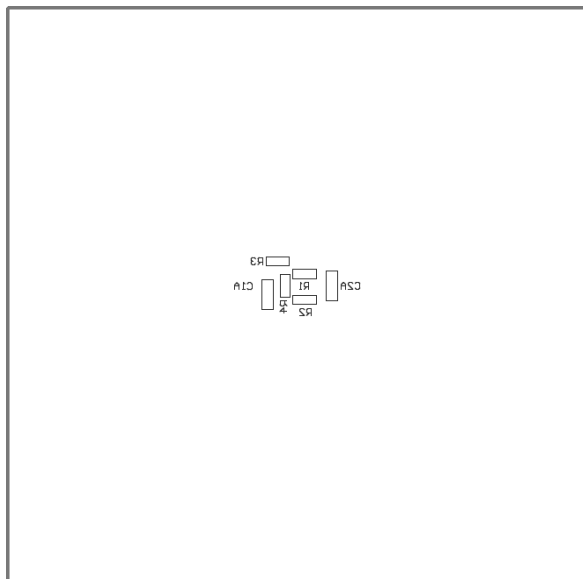


Figure 3: Bottom Silk Layer

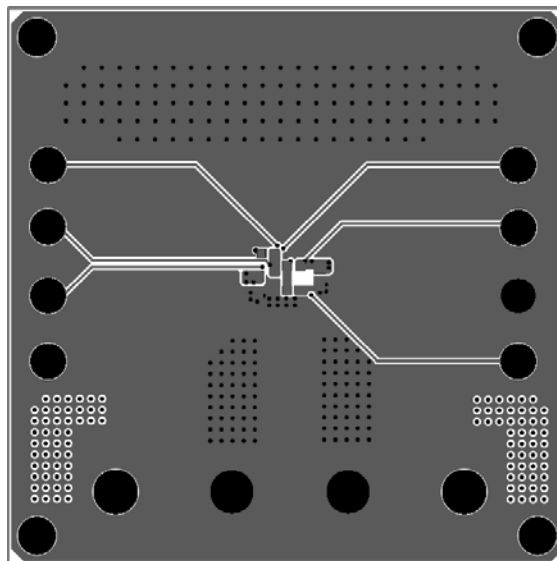


Figure 4: Bottom Layer

## QUICK START GUIDE

The output voltage of this board is set externally which can be regulated as low as 0.6V by operating from +2.8V 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 2.8V 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.

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