# EVM3612-LQ-00A

## 3V to 22V Input, 1A , Ultra-Low 5μA $I_Q$, Power Module Evaluation Board

## DESCRIPTION

The EVM3612-LQ-00A evaluation board is designed to demonstrate the capabilities of MPM3612, a synchronous, rectified, step-down, switch-mode converter with built-in internal power MOSFETs and high light-load efficiency. The MPM3612 has an ultra-low 5μA $I_Q$. The device offers a very compact solution that achieves 1A of continuous output current with excellent load and line regulation across a wide input supply range.

The MPM3612 switching edge is optimized for EMI reduction. Constant-on-time (COT) control provides seamless mode transition and a fast load transient response. Full protection features include over-current protection (OCP), over-voltage protection (OVP), and thermal shutdown.

The MPM3612 requires a minimal number of readily available, standard external components. It is available in a space-saving LGA (3xmm3xmm2mm) package.

## ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Input voltage | $V_{IN}$ | 12 | V |
| Output voltage | $V_{OUT}$ | 3.3 | V |
| Output current | $I_{OUT}$ | 1 | A |

## FEATURES

- Wide 3V to 22V Operating Input Range
- 5μA Low $I_Q$
- 1A Load Current
- High Efficiency from a 100μA to 1A Load within a 4V to 22V $V_{IN}$ Range
- Power-Save Mode (PSM)
- 1.25MHz Fixed Switching Frequency during CCM
- $t_{ON}$ Extension to Support Large Duty Cycles
- Power Good (PG) Indication
- EN Shutdown Output Discharge
- Over-Current Protection (OCP), Over-Voltage Protection (OVP), and Hiccup Mode
- Adjustable $V_{OUT}$
- Available in an LGA (3mmx3mmx2mm) Package

## APPLICATIONS

- Internet of Things (IoT)
- Home Automation, Home Security
- Single-Cell or Multi-Cell Li-Ion Battery Systems
- Multi-Cell Dry Battery Systems
- Sever Power

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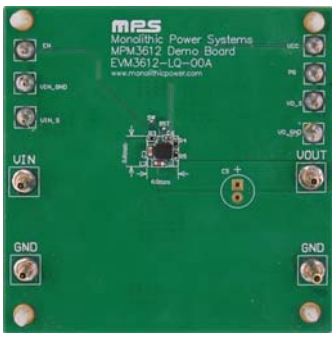
## EVALUATION BOARD

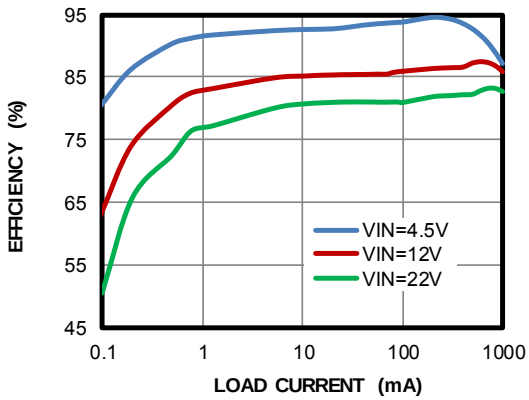



**(LxWxH) 64mmx64mmx1.6mm**

| Board Number | MPS IC Number |
|---|---|
| EVM3612-LQ-00A | MPM3612GLQ |

**Efficiency vs. Load Current**

$V_{OUT}$ = 3.3V





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## QUICK START GUIDE

1. Preset the power supply ($V_{IN}$) between 3V and 22V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. Turn the power supply on after making the connections. The board should automatically start up.


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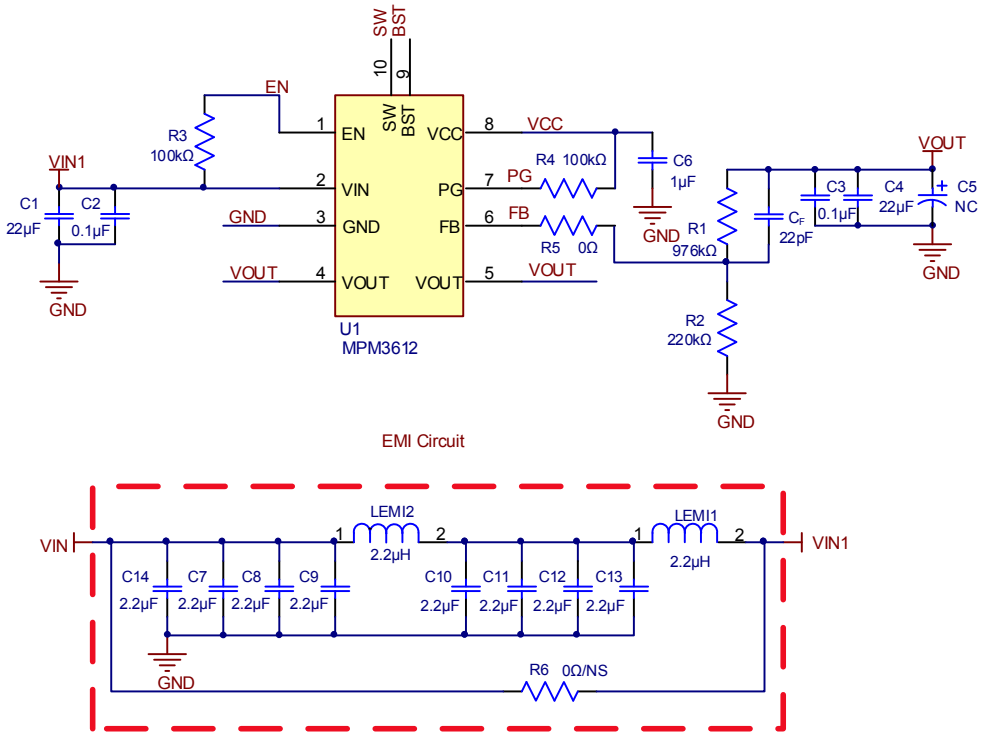
## EVALUATION BOARD SCHEMATIC





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## BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer P/N |
|---|---|---|---|---|---|---|
| 2 | C2, C3 | 100nF | Ceramic capacitor, 25V, X7R | 0603 | Murata | GRM188R71E104KA01D |
| 2 | C1,C4 | 22μF | Ceramic capacitor, 25V, X5R | 0805 | SAMSUNG | CL21A226MAQNNNE |
| 1 | C6 | 1μF | Ceramic capacitor, 25V, X5R | 0402 | Murata | GRM155R61E105KA12D |
| 1 | R1 | 976kΩ | Film resistor, 1%, 976kΩ | 0402 | YAGEO | RC0402FR-07976KL |
| 1 | R2 | 220kΩ | Film resistor, 1%, 220kΩ | 0402 | YAGEO | RC0402FR-07220KL |
| 1 | Cf | 22pF | Ceramic capacitor, 50V, COG | 0402 | Murata | GRM1555C1H220JA01D |
| 2 | R3,R4 | 100kΩ | Film resistor, 1%, 100kΩ | 0402 | YAGEO | RC0402FR-07100KL |
| 1 | R5 | 0Ω | Film resistor, 1%, 0Ω | 0402 | YAGEO | RC0402FR-070RL |


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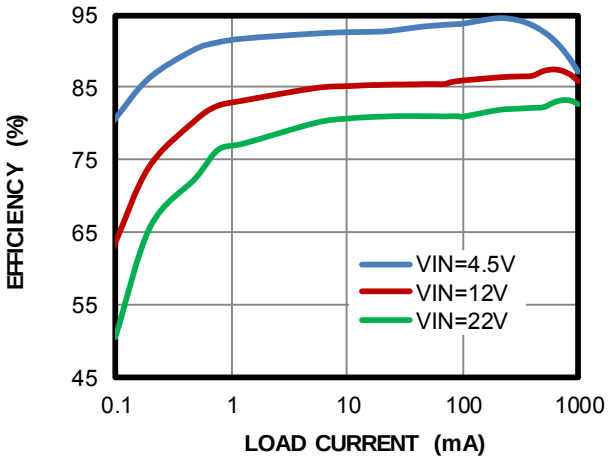
## EVB TEST RESULTS

**Performance waveforms are tested on the evaluation board. $V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $T_A$ = 25°C, unless otherwise noted.**

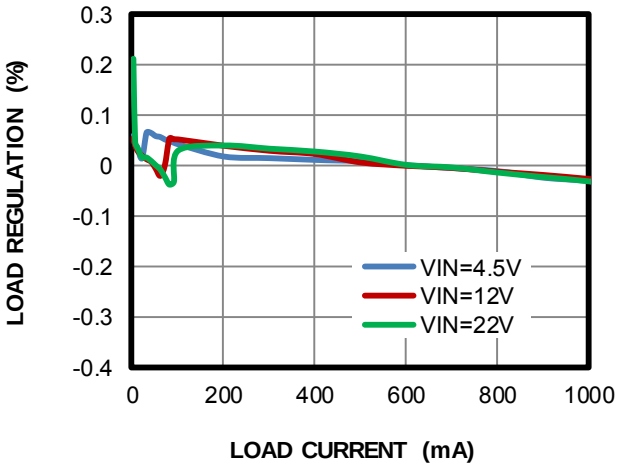
### Efficiency vs. Load Current

$V_{OUT}$ = 3.3V



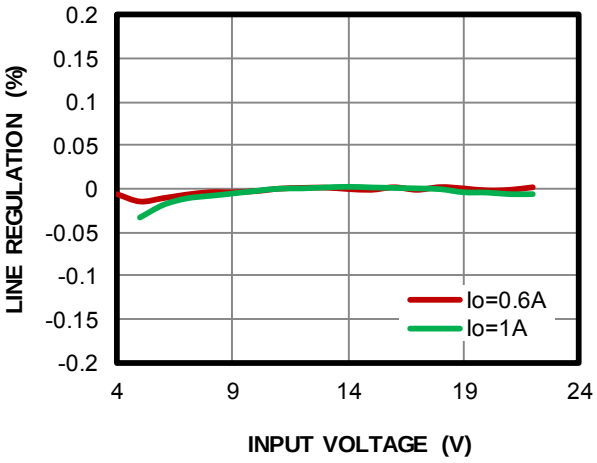

### Load Regulation vs. Load Current

$V_{OUT}$ = 3.3V




### Line Regulation vs. Load Current

$V_{OUT}$ = 3.3V





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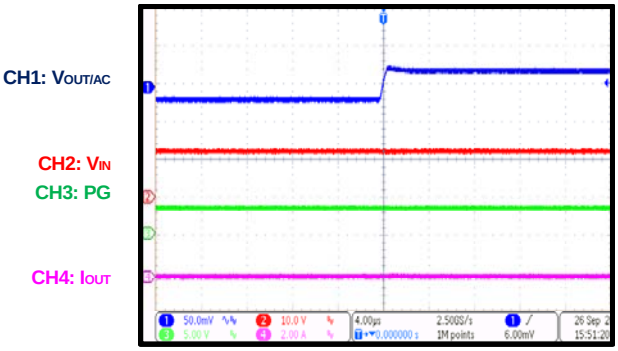
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board. $V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $T_A$ = 25°C, unless otherwise noted.**

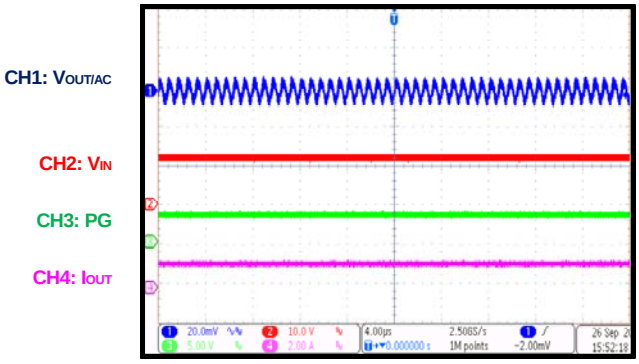
### Steady State

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A



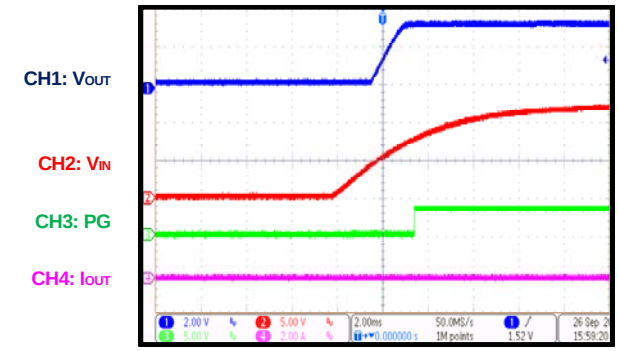

### Steady State

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 1A



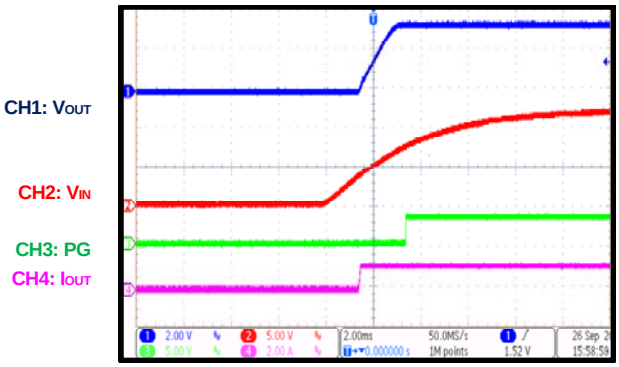

### VIN On

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A



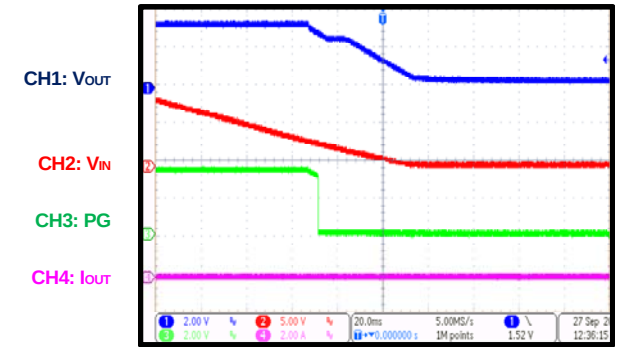

### VIN On

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 1A



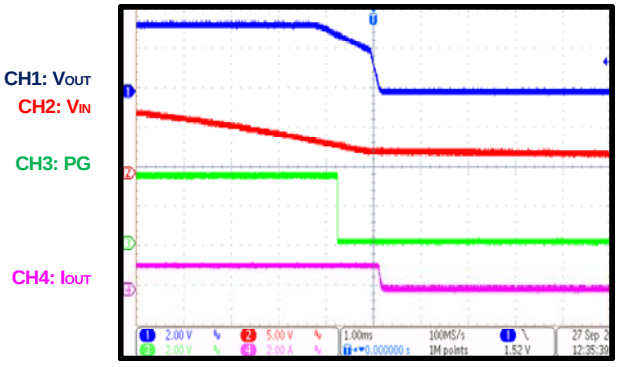

### VIN Off

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A




### VIN Off

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 1A





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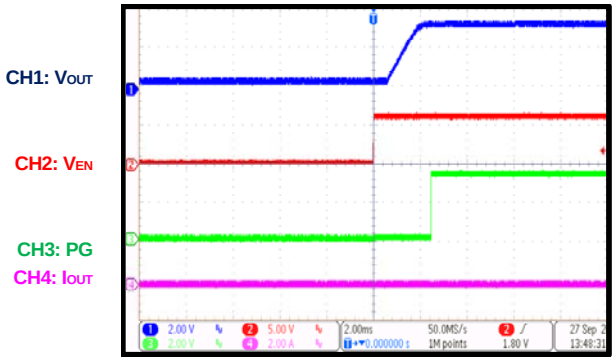
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board. $V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $T_A$ = 25°C, unless otherwise noted.**

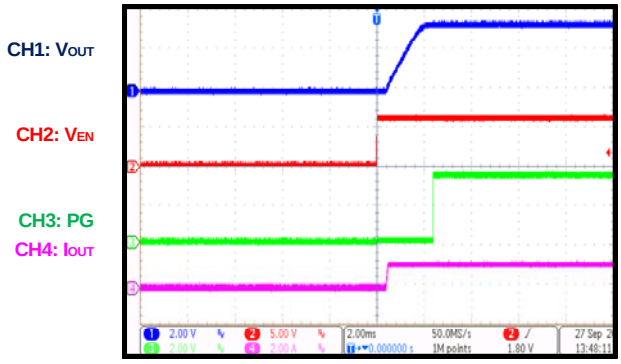
### EN On

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A



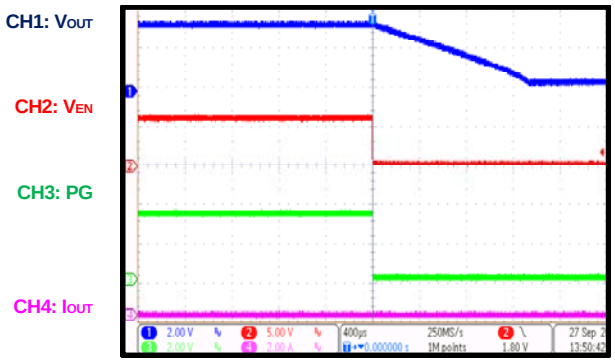

### EN On

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 1A



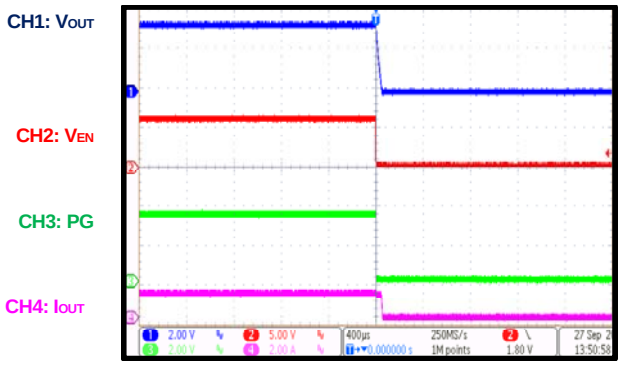

### EN Off

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A



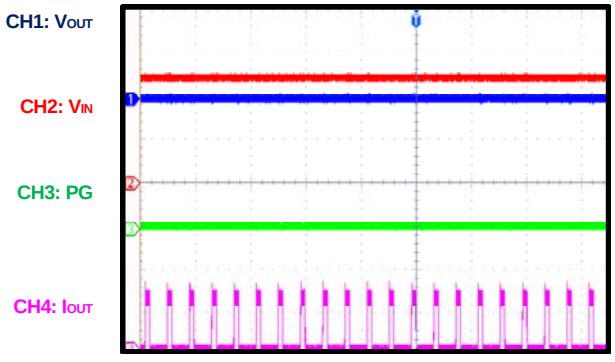

### EN Off

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 1A



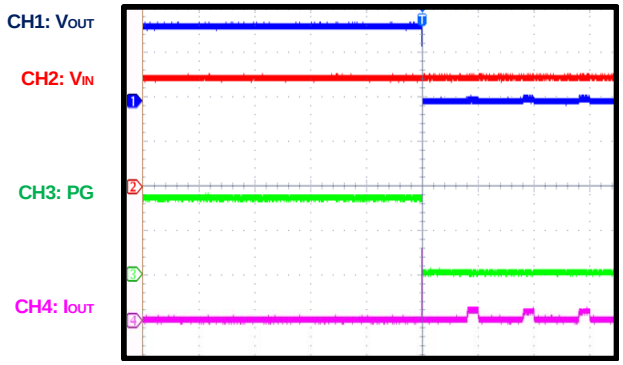

### SCP Steady State

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A




### SCP Entry

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A





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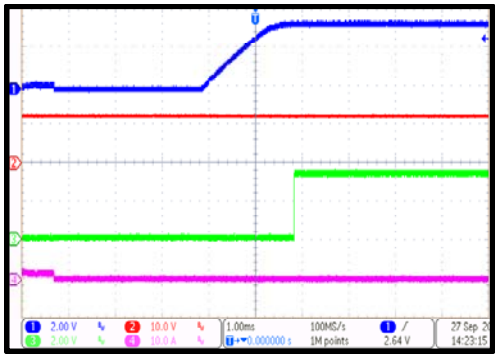
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board. $V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $T_A$ = 25°C, unless otherwise noted**

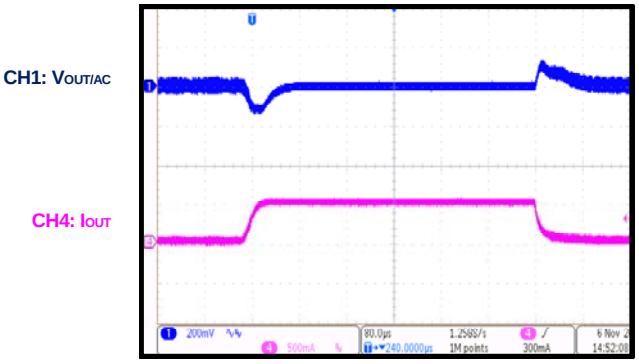
### SCP Recovery

$V_{IN}$ = 12V, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 0A



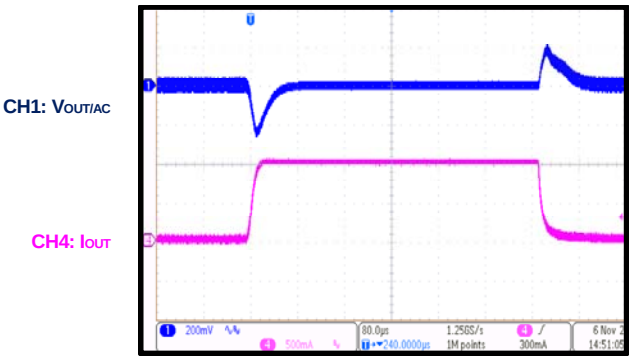

### Load Transient

0.8A/μs, 0A to 0.5A, $V_{IN}$ = 12V, $V_{OUT}$ = 3.3V




### Load Transient

0.8A/μs, 0A to 1A, $V_{IN}$ = 12V, $V_{OUT}$ = 3.3V





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## PCB LAYOUT

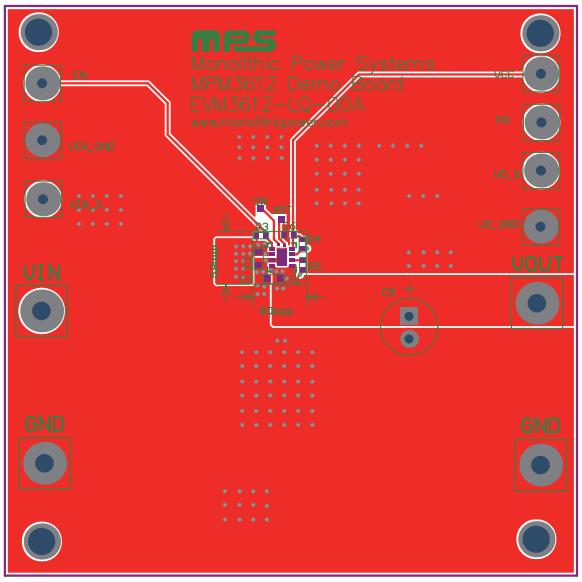


**Figure 1: Top Layer**

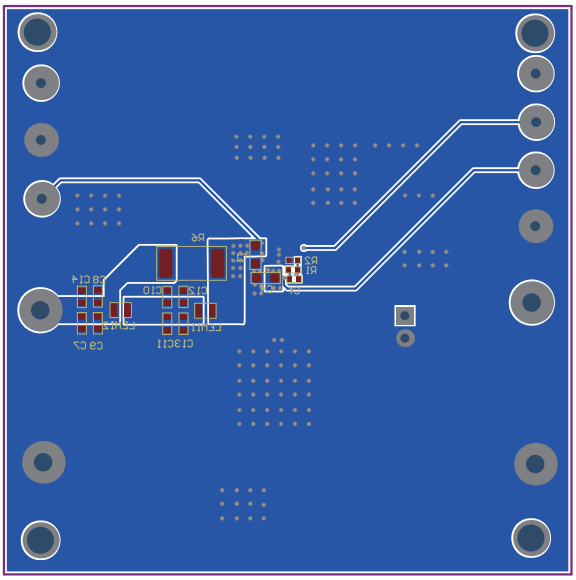

**Figure 2: Bottom Layer**

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