



EVL3437-J-00A

High Efficiency, Fully-Integrated Synchronous Boost Converter EV Board

DESCRIPTION

The EVL3437-J-00A evaluation board is designed to demonstrate the capabilities of the MP3437. The MP3437 is a 600kHz, fixed-frequency, highly integrated boost converter with a wide input range. It starts from an input voltage as low as 2.7V, and supports up to 20W of peak load power from a single-cell battery.

The MP3437 adopts constant-off-time (COT) control topology to provide fast transient response. The cycle-by-cycle current limit on the low-side MOSFET (LS-FET) prevents current runaway, and the high-side MOSFET (HS-FET) eliminates the need for an external Schottky diode. The integrated LS-FET and HS-FET simplify the design and save BOM cost.

The MP3437 supports auto pass-through mode when V_{IN} exceeds $V_{OUT-SET}$. It also features a configurable input under-voltage lockout (UVLO) threshold and over-temperature protection (OTP).

The MP3437 is available in QFN-10 (2mmx2.5mm) and TSOT23-8 packages. This evaluation board is available in a TSOT23-8 package.

ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|----------------|-----------|-----------|-------|
| Input voltage | V_{IN} | 2.7 to 16 | V |
| Output voltage | V_{OUT} | 8 | V |
| Output current | I_{OUT} | 2.5 | A |

FEATURES

- 2.7V to 16V Start-Up Voltage ⁽¹⁾
- 0.8V to 16V Operation Voltage
- Up to 16V Output Voltage
- Supports 20W Peak Power Load from 3.3V
- 9.5A Internal Switch Current Limit
- Integrated 14mΩ and 21mΩ Power MOSFETs
- >89% Efficiency for 3.3V to 8V $V_{IN}/2.5A$
- Auto Pass-Through Function in PSM Mode
- 600kHz Fixed Switching Frequency
- Adaptive COT for Fast Transient Response
- Internal Soft Start and Compensation
- Configurable UVLO and Hysteresis
- 150°C Over-Temperature Protection (OTP)
- Over-Voltage Protection (OVP)
- Available in a TSOT23-8 Package
- Includes an MPS-Optimized Power Inductor

APPLICATIONS

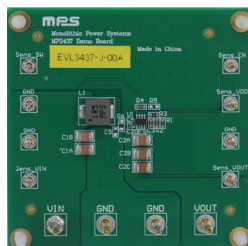
- Notebooks
- AI Speakers
- Bluetooth Speakers
- Portable POS Systems

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Note:

1) During input start-up, the inrush current through the high-side MOSFET body diode should be limited below 30A. The continuous current should not flow through high-side MOSFET body diode. Refer to the Input Power-up Inrush Current Control section in the MP3437 datasheet for additional details.

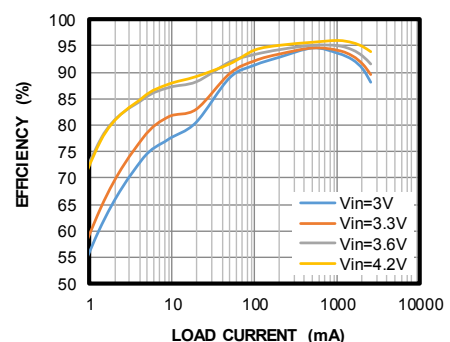
EVALUATION BOARD



(LxWxH) 6.4cmx6.4cmx0.6cm

| Board Number | MPS IC Number |
|---------------|---------------|
| EVL3437-J-00A | MP3437GJ |

Efficiency



QUICK START GUIDE

The output voltage of this board is set to 8V. The board layout accommodates most commonly used components. To quick start the EVL3437-J-00A, follow the steps below:

1. Preset the power supply (V_{IN}) between 2.7V and 16V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
 - a) Positive (+): V_{IN}
 - b) Negative (-): GND
4. Connect the load to:
 - a) Positive (+): V_{OUT}
 - b) Negative (-): GND
5. Turn the power supply on after making the connections.⁽²⁾
6. The MP3437 is enabled on the evaluation board once V_{IN} is applied.
7. The output voltage (V_{OUT}) can be changed by varying the value of R2. Calculate V_{OUT} with Equation (1):

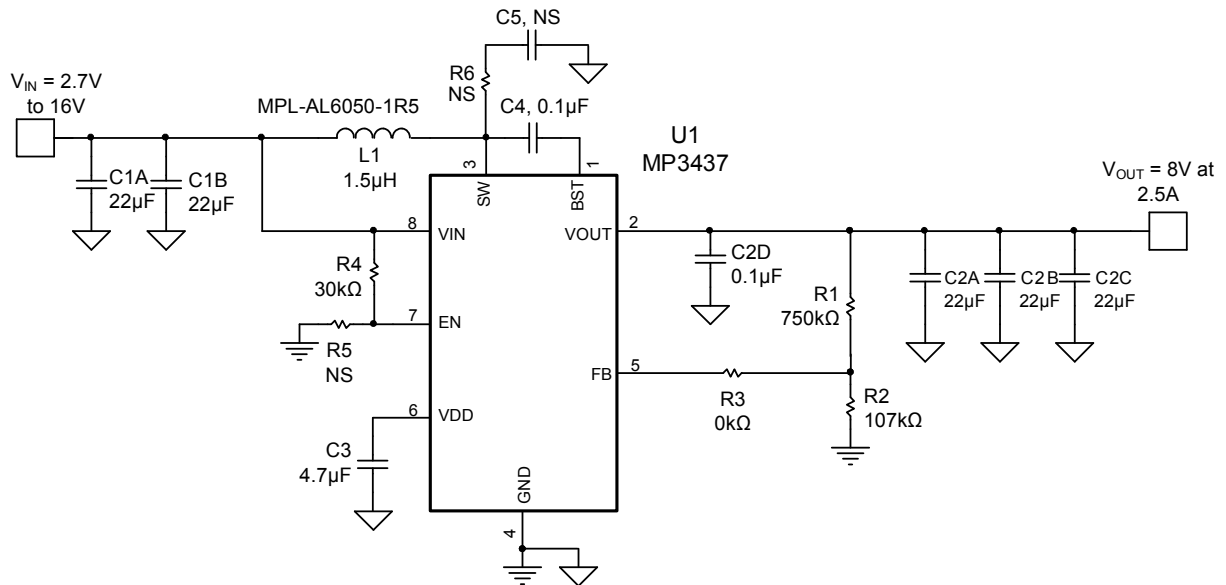
$$V_{OUT} = V_{FB} \times \left(1 + \frac{R1}{R2}\right) \quad (1)$$

Where $V_{FB} = 1V$ and $R1 = 750k\Omega$. If $V_{OUT-SET}$ exceeds 15V, place an RC snubber on SW to GND. The recommended values are $R6 = 1\Omega$, and $C5 = 2.2nF$.

8. If the auto pass-through function is required, increase the input voltage above $V_{OUT-SET}$. The MP3437 automatically enters auto pass-through.

Note:

2) The inrush current through high-side MOSFET body diode should be limited less than 30A. Refer to the Input Power-up Inrush Current Control section in the MP3437 datasheet for more details.

EVALUATION BOARD SCHEMATIC




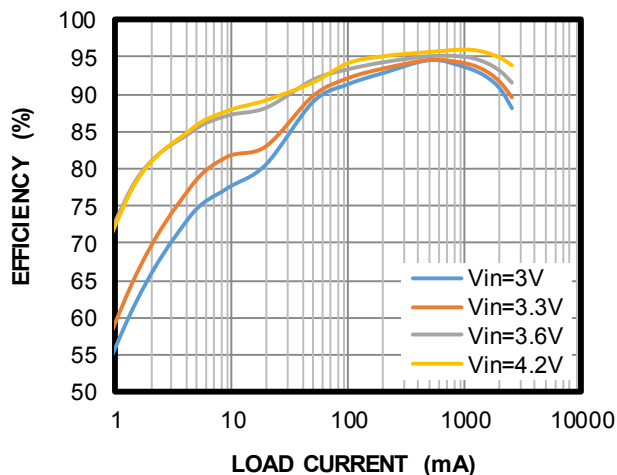
EVL3437-J-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer P/N |
|-----|-------------------------------|---------------|--|----------|--------------|--------------------|
| 1 | L1 | 1.5 μ H | Inductor, RDC = 6m Ω , I _{SAT} = 18A | SMD | MPS | MPL-AL6050-1R5 |
| 5 | C1A, C1B, C2A, C2B, C2C | 22 μ F | Ceramic capacitor, 25V, X7R | 1210 | Murata | GRM32ER71E226KE20L |
| 2 | C2D, C4 | 100nF | Ceramic capacitor, 25V, X7R | 0402 | Murata | GRM155R71E104KA88D |
| 1 | C3 | 4.7 μ F | Ceramic capacitor, 16V, X7R | 0603 | Murata | GRM188Z71C475KE21D |
| 1 | R1 | 750k Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-07750KL |
| 1 | R2 | 107k Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-07107KL |
| 1 | R3 | 0 Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-070RL |
| 1 | R4 | 30k Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-0730KL |
| 0 | R5, R6, C5 | NS | | | | |
| 1 | U1 | MP3437 | 16V/9.5A boost converter | TSOT23-8 | MPS | MP3437GJ |

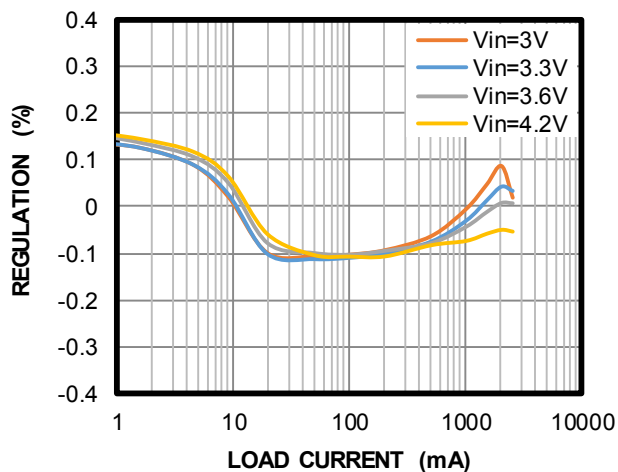
EVB TEST RESULTS

$V_{IN} = 3.3V$, $V_{OUT} = 8V$, $L = 1.5\mu H$, $I_{OUT} = 2.5A$, $T_A = 25^\circ C$, unless otherwise noted.

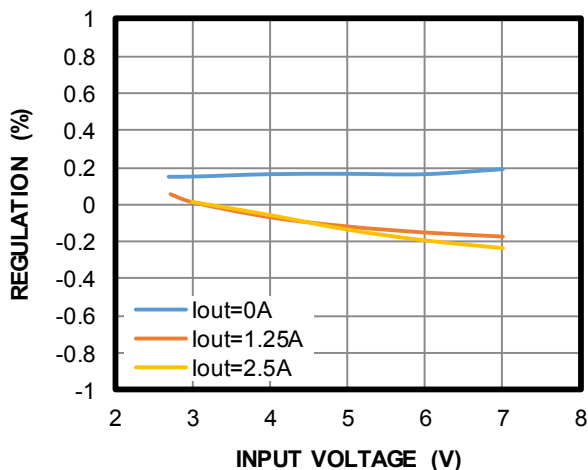
Efficiency



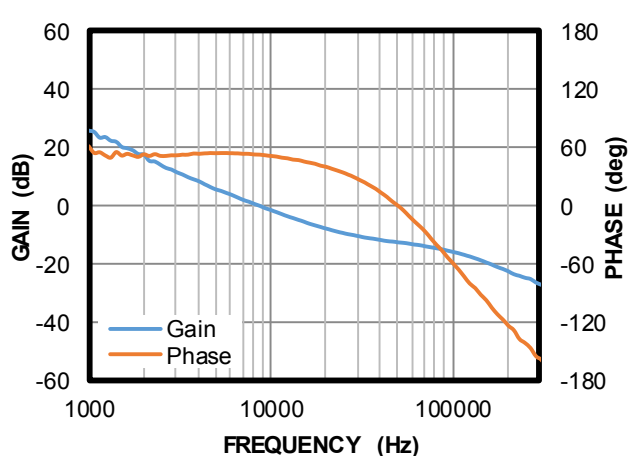
Load Regulation



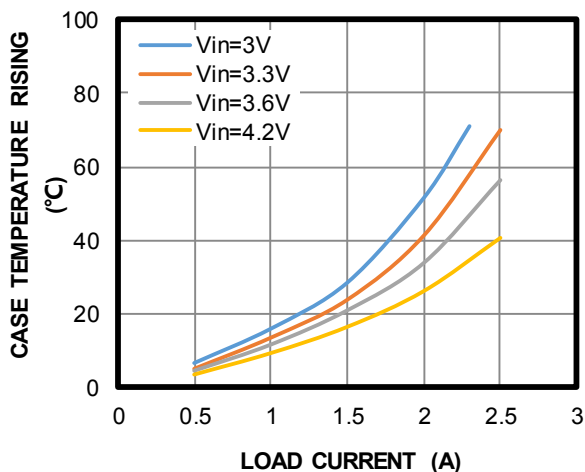
Line Regulation



Bode Plot



Case Temperature Rising

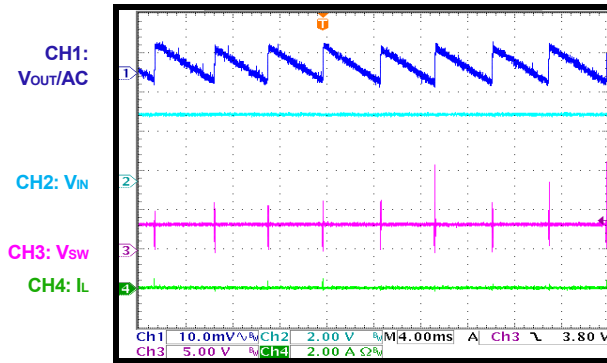


EVB TEST RESULTS (continued)

$V_{IN} = 3.3V$, $V_{OUT} = 8V$, $L = 1.5\mu H$, $I_{OUT} = 2.5A$, $T_A = 25^\circ C$, unless otherwise noted.

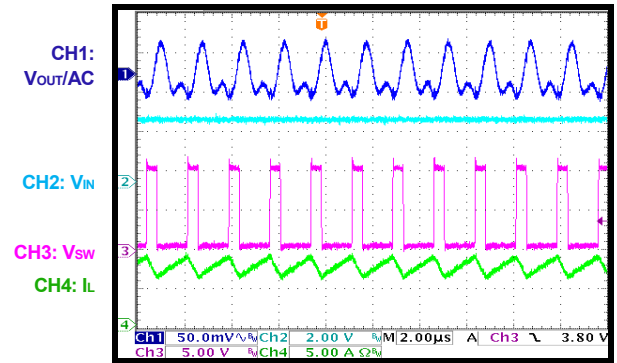
Steady State

$I_{OUT} = 0A$



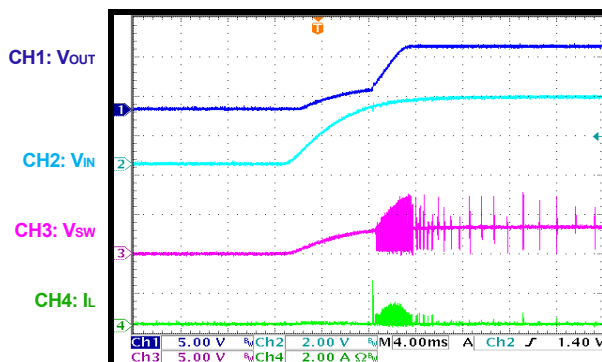
Steady State

$I_{OUT} = 2.5A$



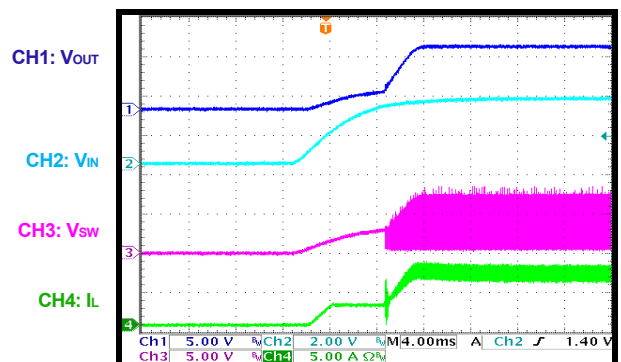
VIN Start-Up

$I_{OUT} = 0A$



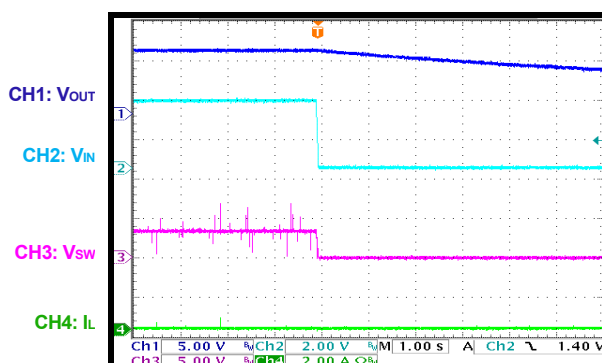
VIN Start-Up

$I_{OUT} = 2.5A$



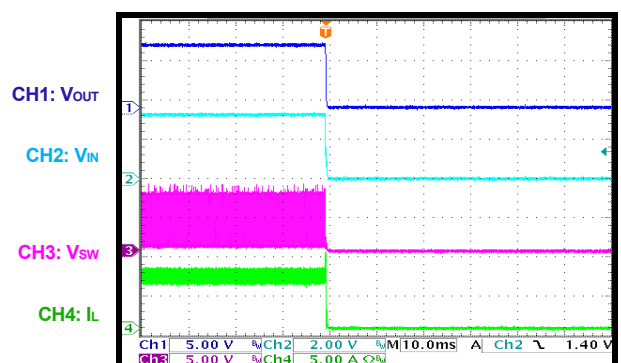
VIN Shutdown

$I_{OUT} = 0A$



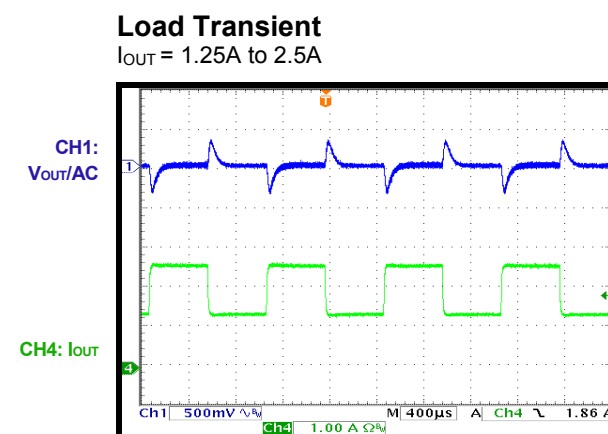
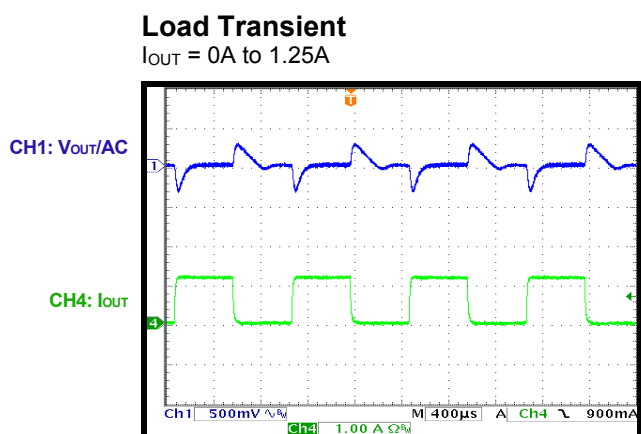
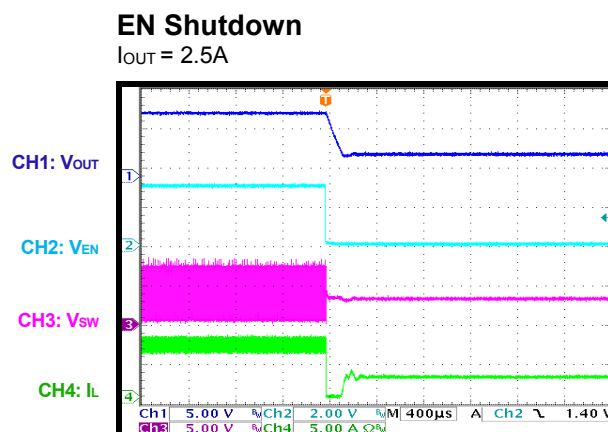
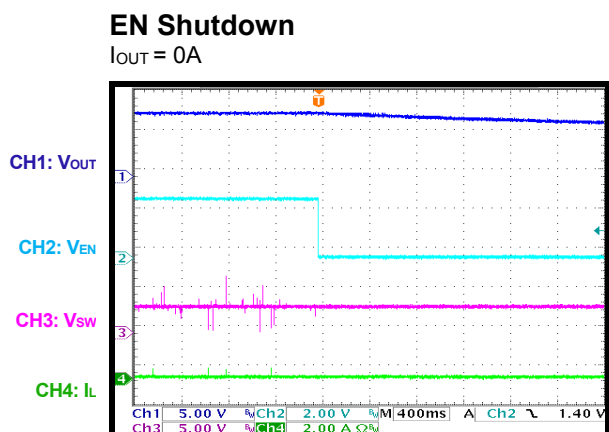
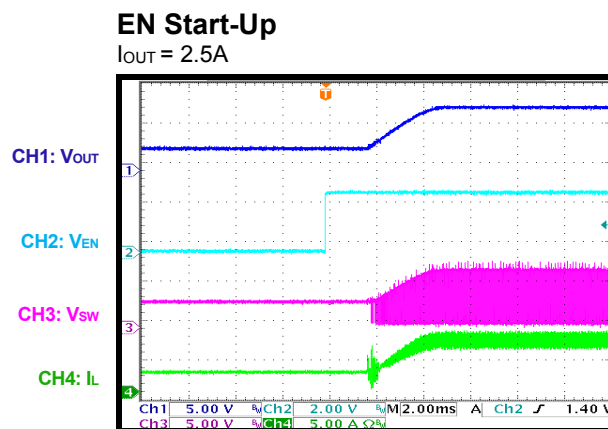
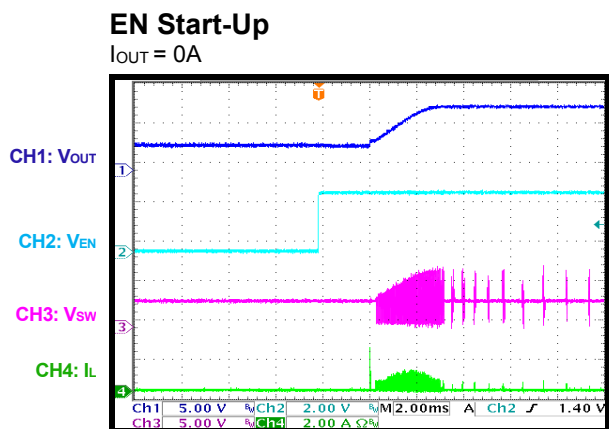
VIN Shutdown

$I_{OUT} = 2.5A$



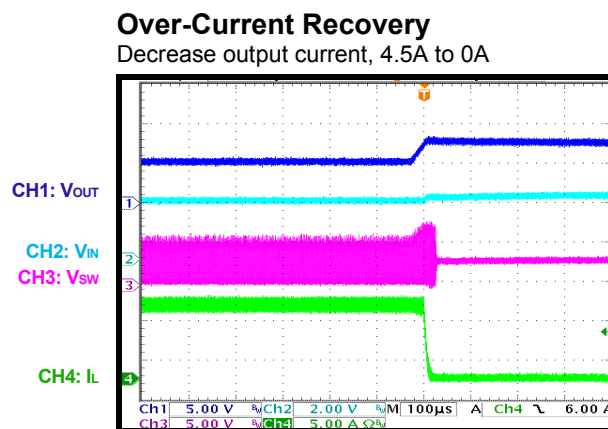
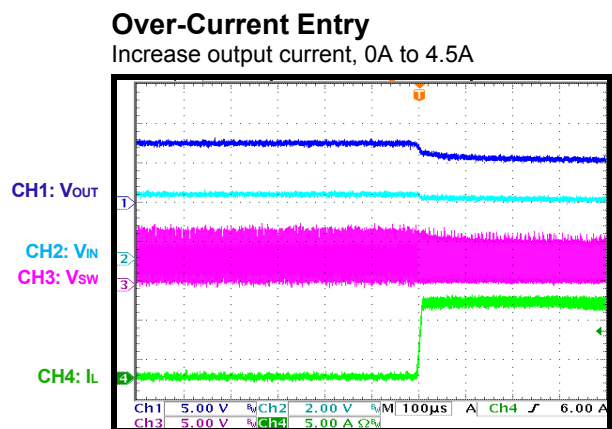
EVB TEST RESULTS (continued)

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EVB TEST RESULTS *(continued)*

$V_{IN} = 3.3V$, $V_{OUT} = 8V$, $L = 1.5\mu H$, $I_{OUT} = 2.5A$, $T_A = 25^\circ C$, unless otherwise noted.



PCB LAYOUT

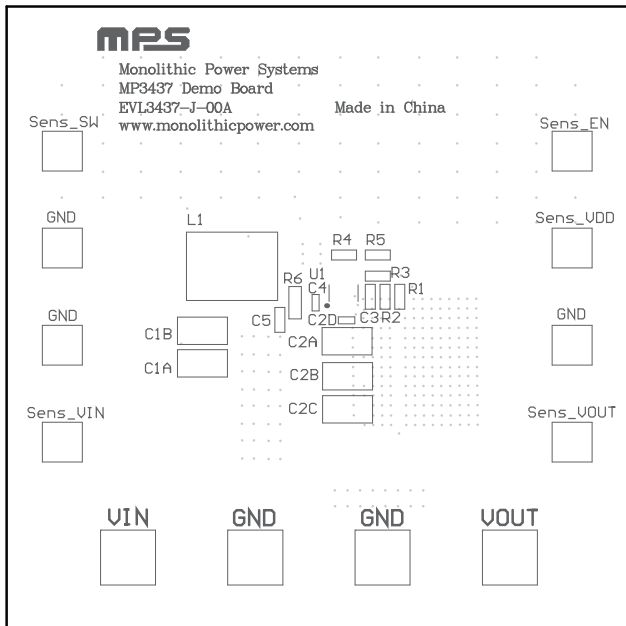


Figure 1: Top Silk

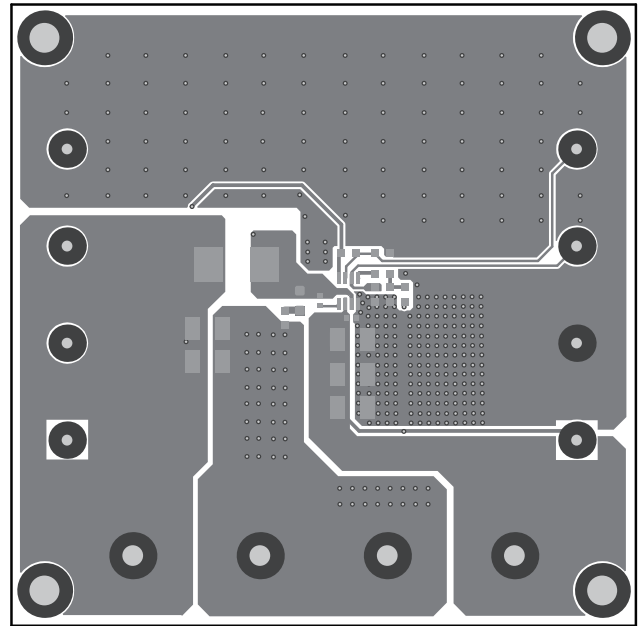


Figure 2: Top Layer

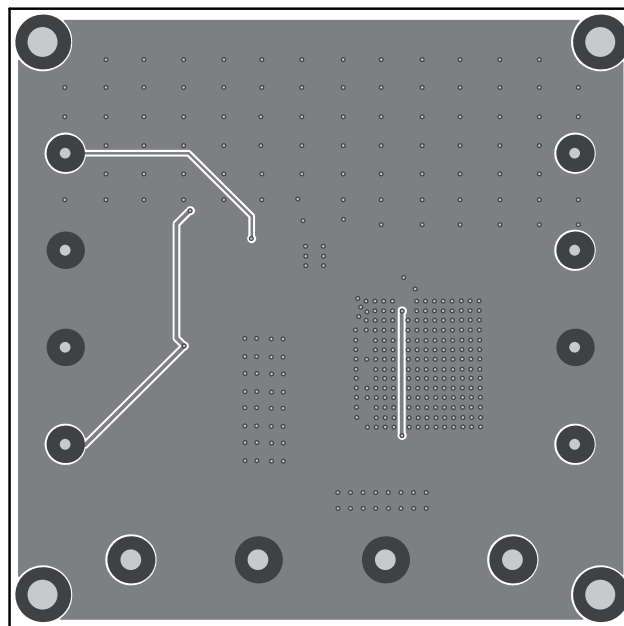


Figure 3: Bottom Layer

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