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

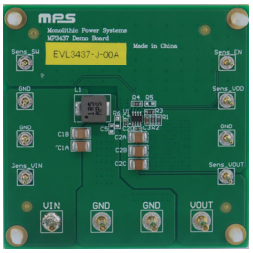
APPLICATIONS

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

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.

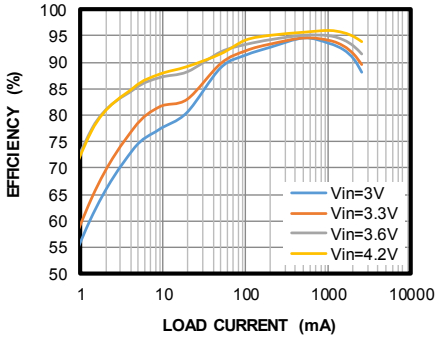
EVALUATION BOARD



(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 (+): 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.(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):

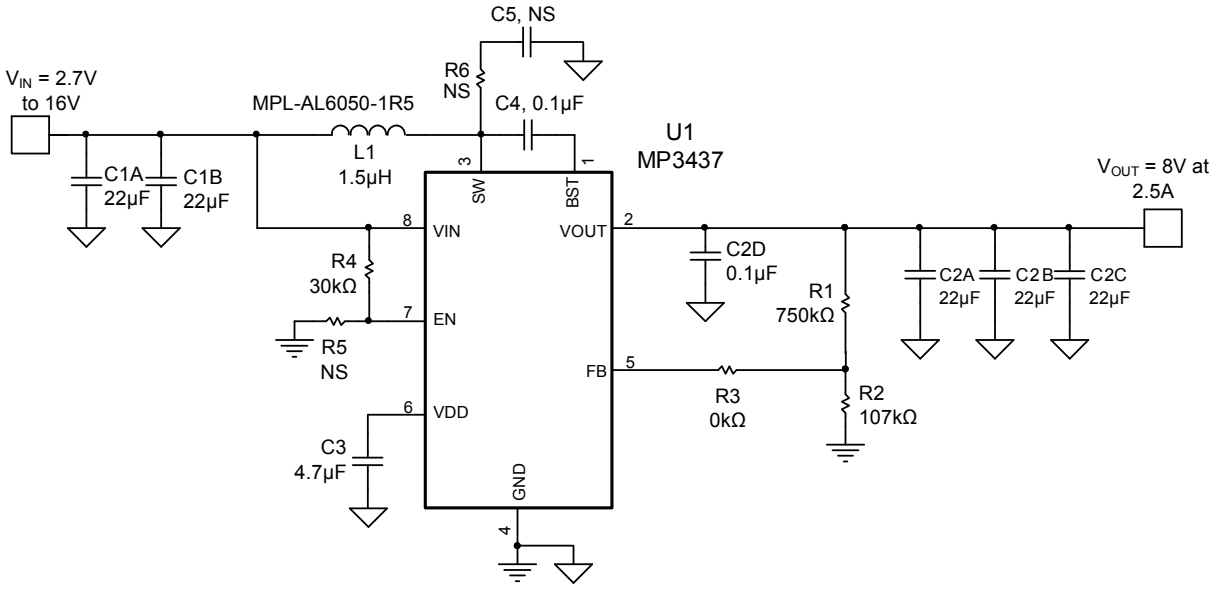
$$V_{OUT} = V_{FB} \times (1 + \frac{R1}{R2}) \quad (1)$$

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



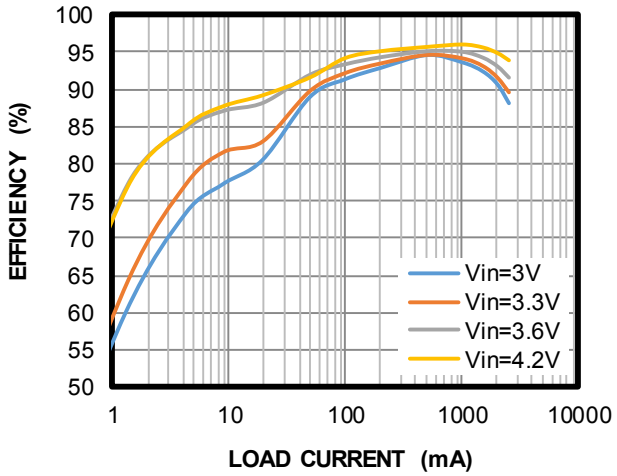
EVL3437-J-00A BILL OF MATERIALS

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

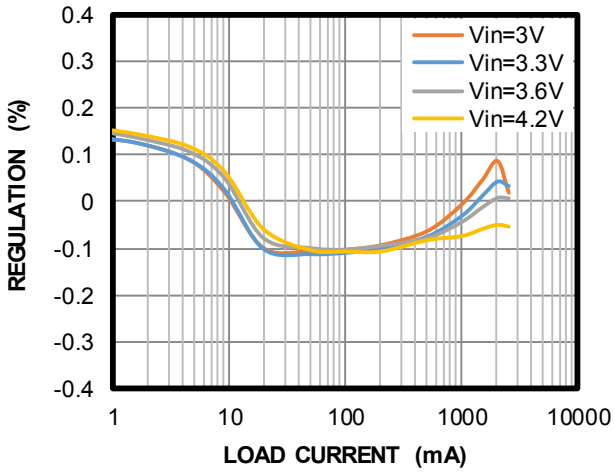
EVB TEST RESULTS

V_{IN} = 3.3V, V_{OUT} = 8V, L = 1.5µH, I_{OUT} = 2.5A, T_A = 25°C, unless otherwise noted.

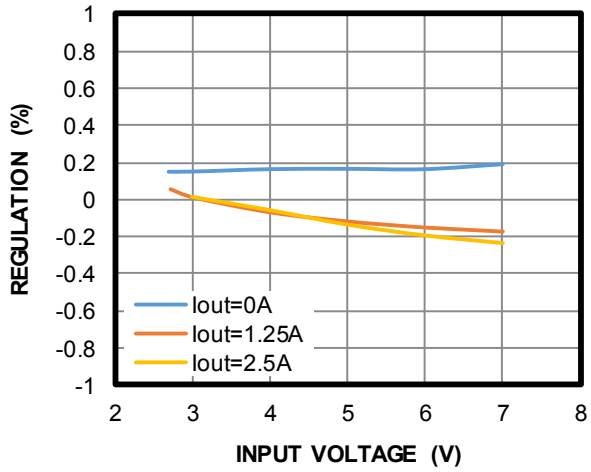
Efficiency



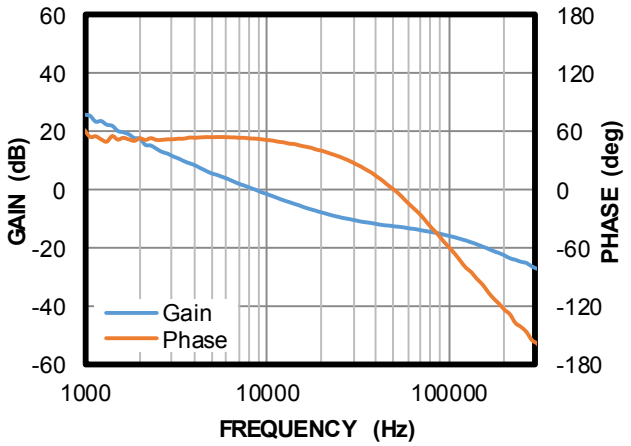
Load Regulation



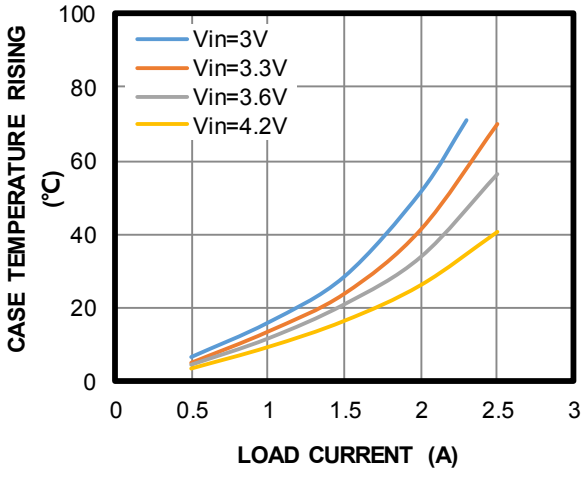
Line Regulation



Bode Plot



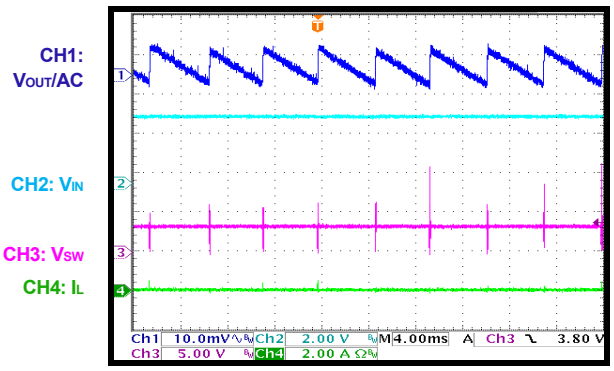
Case Temperature Rising



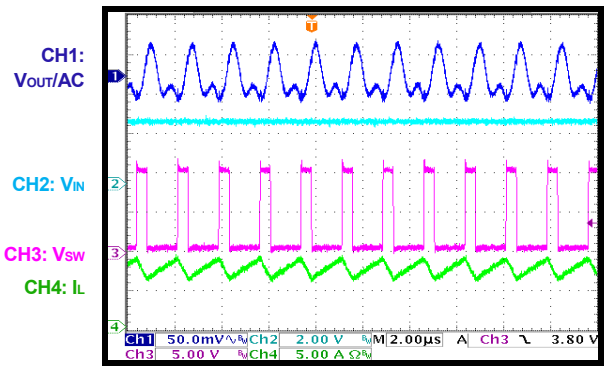
EVB TEST RESULTS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 8V, L = 1.5µH, I_{OUT} = 2.5A, T_A = 25°C, unless otherwise noted.

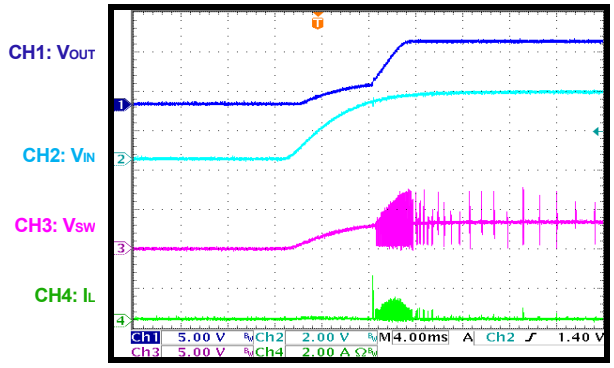
Steady State
I_{OUT} = 0A



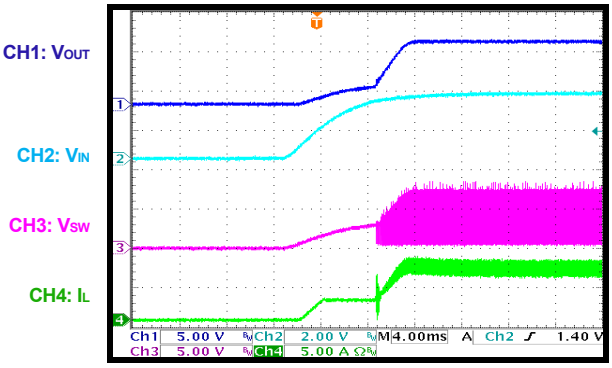
Steady State
I_{OUT} = 2.5A



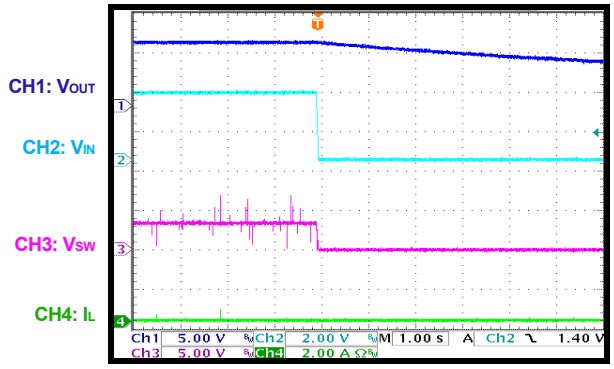
VIN Start-Up
I_{OUT} = 0A



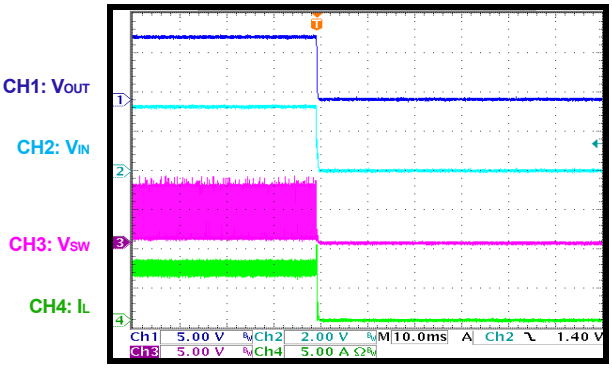
VIN Start-Up
I_{OUT} = 2.5A



VIN Shutdown
I_{OUT} = 0A



VIN Shutdown
I_{OUT} = 2.5A

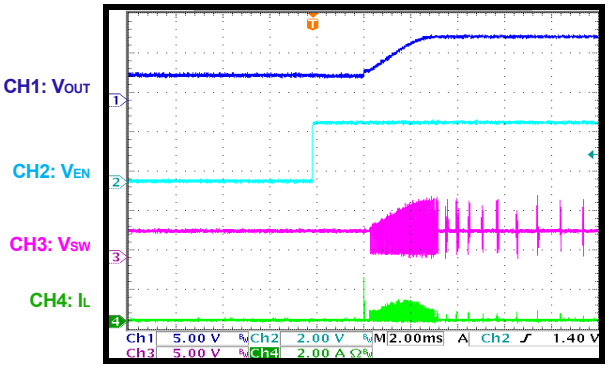


EVB TEST RESULTS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 8V, L = 1.5µH, I_{OUT} = 2.5A, T_A = 25°C, unless otherwise noted.

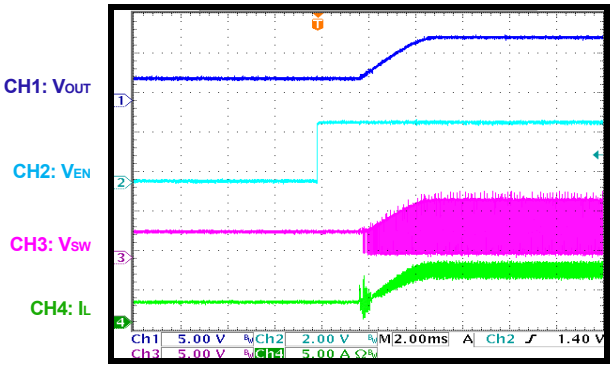
EN Start-Up

I_{OUT} = 0A



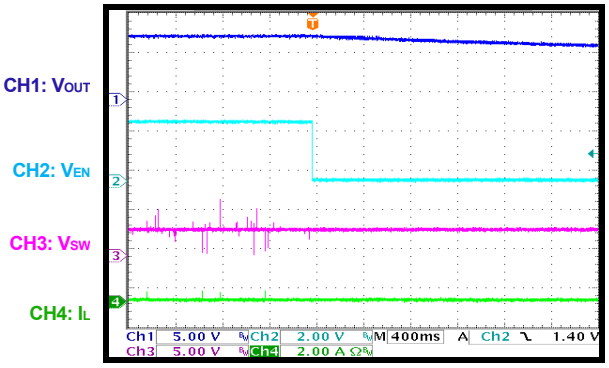
EN Start-Up

I_{OUT} = 2.5A



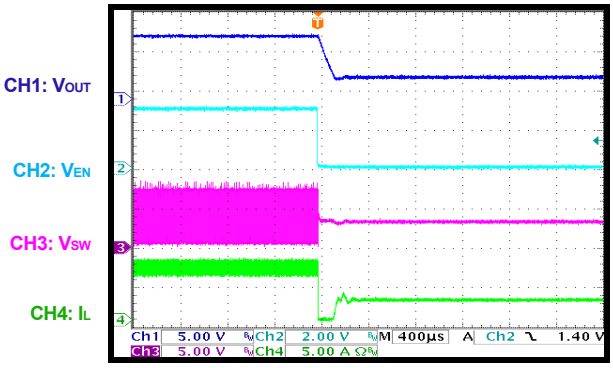
EN Shutdown

I_{OUT} = 0A



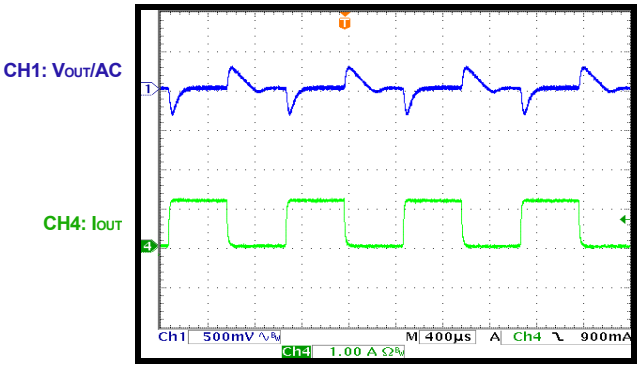
EN Shutdown

I_{OUT} = 2.5A



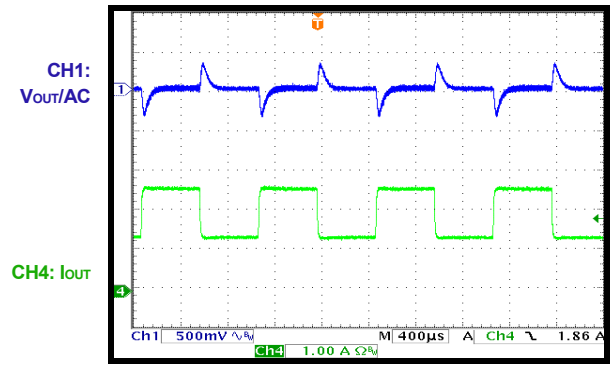
Load Transient

I_{OUT} = 0A to 1.25A



Load Transient

I_{OUT} = 1.25A to 2.5A

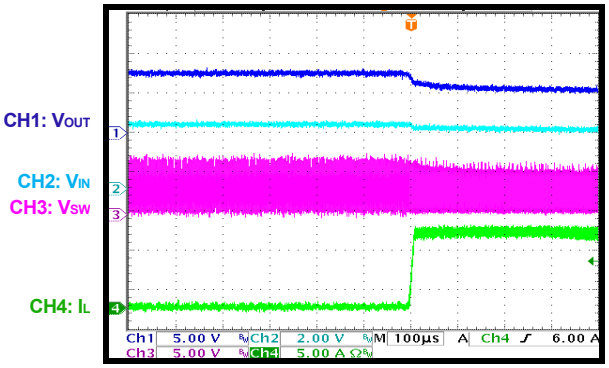


EVB TEST RESULTS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 8V, L = 1.5µH, I_{OUT} = 2.5A, T_A = 25°C, unless otherwise noted.

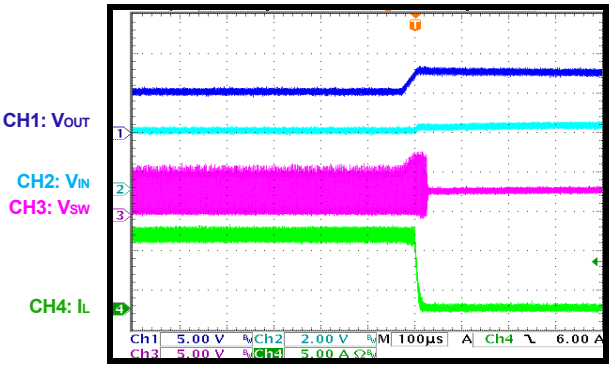
Over-Current Entry

Increase output current, 0A to 4.5A



Over-Current Recovery

Decrease output current, 4.5A to 0A



PCB LAYOUT

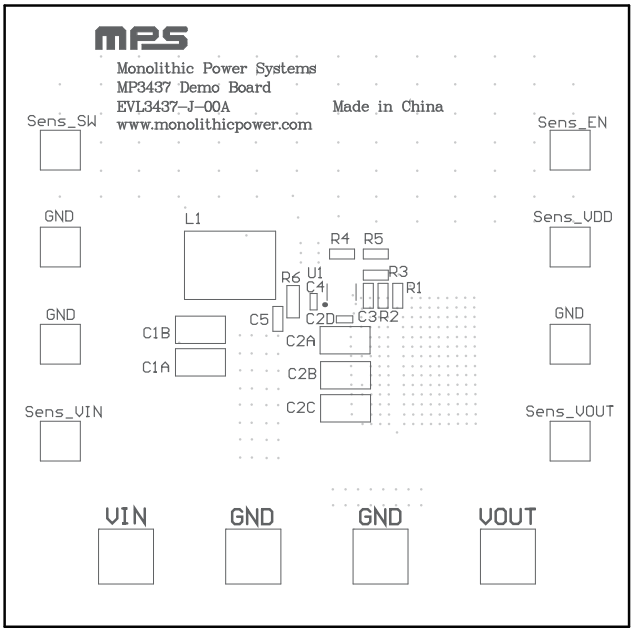


Figure 1: Top Silk

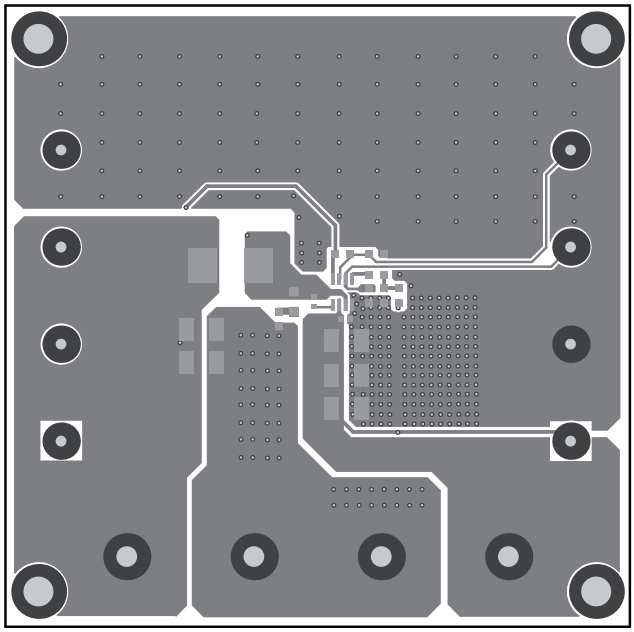


Figure 2: Top Layer

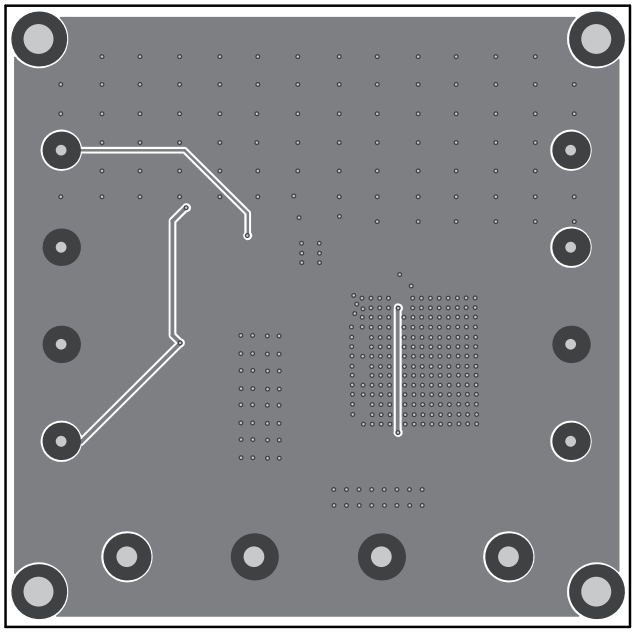


Figure 3: Bottom Layer