EVL3424A-G-00A

CC/CV, Configurable-Current, Synchronous Boost Converter with Output Disconnect and Low Inrush Current Evaluation Board

DESCRIPTION

The EVL3424A-G-00A is an evaluation board designed to demonstrate the capabilities of the MP3424A, a high-efficiency, current-mode, synchronous, step-up converter with output disconnect.

The MP3424A provides inrush current limiting, output short-circuit protection (SCP), and a configurable load current limit. The integrated P-channel rectifier improves efficiency and eliminates the need for an external Schottky diode. During shutdown, the P-channel MOSFET disconnects the output from the input.

The 580kHz switching frequency (f_{SW}) allows for small external components, while the internal compensation and soft start (SS) minimize the number of external components.

The MP3424A is available in a QFN-14 (2mmx2mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.8 to 4.2	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	3.1	A

FEATURES

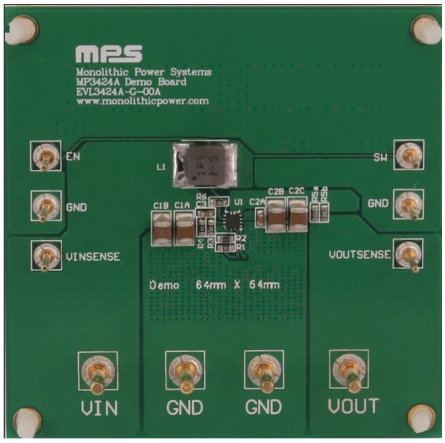
- 2V to 5.5V Operating Input Range
- 3V to 5.5V Output Voltage Range
- Supports 5V/3.1A Output from a 2.8V Input
- 270mA Linear Charge Inrush Current
- Configurable Average Load Current Limit
- 580kHz Fixed Switching Frequency (f_{SW})
- Up to 97% Efficiency
- Output Load Disconnect from Input
- Over-Current Protection (OCP), Short-Circuit Protection (SCP), Over-Temperature Protection (OTP)
- Available in a QFN-14 (2mmx2mm) Package

MPL Optimized Performance with MPS Inductor MPL-AL5030 Series

APPLICATIONS

- Battery-Powered Products
- Power Banks, Juice Packs, and Backup Batteries
- Optical Modules
- USB Power Supplies
- Consumer Electronic Accessories

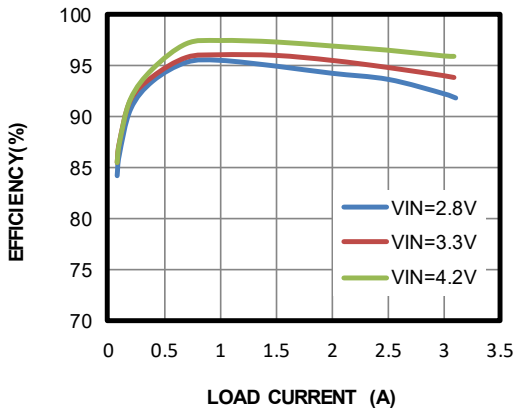
EVL3424A-G-00A EVALUATION BOARD



LxWxH (6.35cmx6.35cmx0.6cm)

Board Number	MPS IC Number	MPS Inductor
EVL3424A-G-00A	MP3424AGG	MPL-AL5030-1R5

Efficiency vs. Load Current



QUICK START GUIDE

The EVL3424A-G-00A's output voltage (V_{OUT}) is set to 5V. The board layout accommodates most commonly used components.

1. Preset the power supply between 2.8V and 4.2V.
2. Turn off the power supply.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. After making the connections, turn on the power supply. The board should start up automatically.
6. The board's V_{OUT} is set at 5V. V_{OUT} can be adjusted by changing the resistor (R2). Then V_{OUT} can be calculated with Equation (1):

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

   Where V_{FB} = 0.805V, and R1 = 1MΩ.
7. To use the enable (EN) function, apply a digital input to the EN pin. Drive EN above 1.2V to turn the converter on; drive EN below 0.4V to turn it off.

EVALUATION BOARD SCHEMATIC

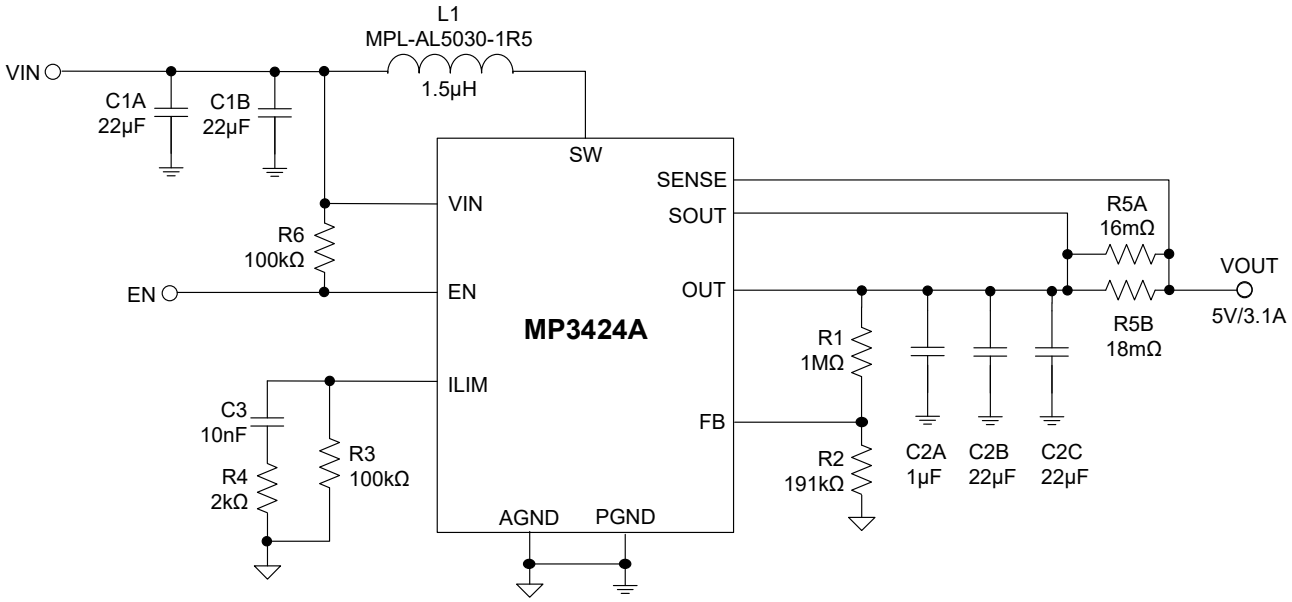


Figure 1: Evaluation Board Schematic

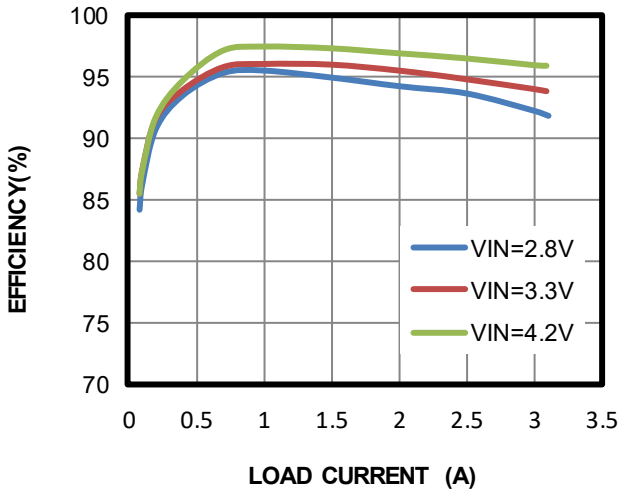
EVL3424A-G-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
4	C1A, C1B, C2B, C2C	22µF	Ceramic capacitor, 16V, X7R	1210	Murata	GRM32ER71C226KEA8L
1	C2A	1µF	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71C105KE15D
1	C3	10nF	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71C103KA01D
1	L1	1.5µH	Inductor, RDC = 9.7mΩ, I_{SAT} = 12.5A	SMD	MPS	MPL-AL5030-1R5
1	R1	1MΩ	Film resolution, 1%	0603	Yageo	RC0603FR-071ML
1	R2	191kΩ	Film resolution, 1%	0603	Yageo	RC0603FR-07191KL
2	R3, R6	100kΩ	Film resolution, 1%	0603	Yageo	RL0603FR-07100KL
1	R4	2kΩ	Film resolution, 1%	0603	Yageo	RC0603FR-072KL
1	R5A	16mΩ	Film resolution, 1%	0603	Yageo	RL0603FR-070R016L
1	R5B	18mΩ	Film resolution, 1%	0603	Yageo	RL0603FR-070R018L
1	U1	MP3424A	Synchronous, step-up converter with output disconnect	QFN (2mmx 2mm)	MPS	MP3424AGG

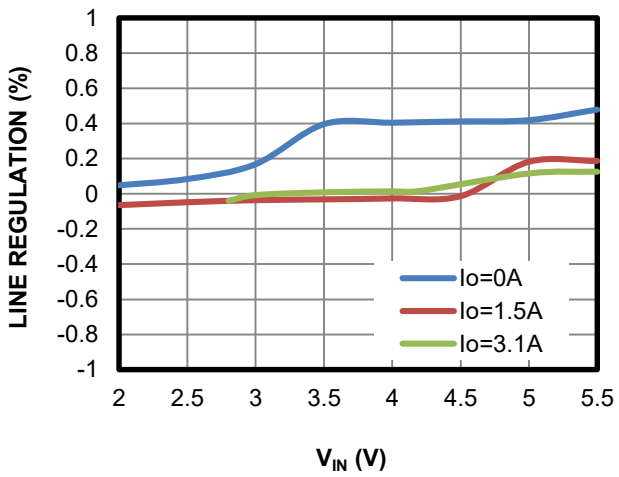
EVB TEST RESULTS

V_{IN} = 3.3V, V_{OUT} = 5V, L = 1.5µH, T_A = 25°C, unless otherwise noted.

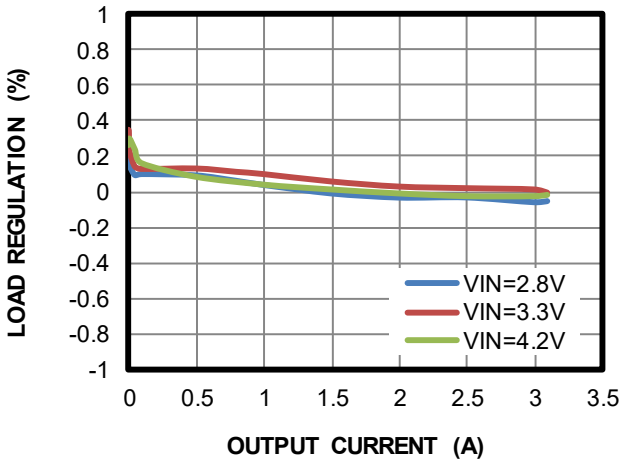
Efficiency vs. Load Current



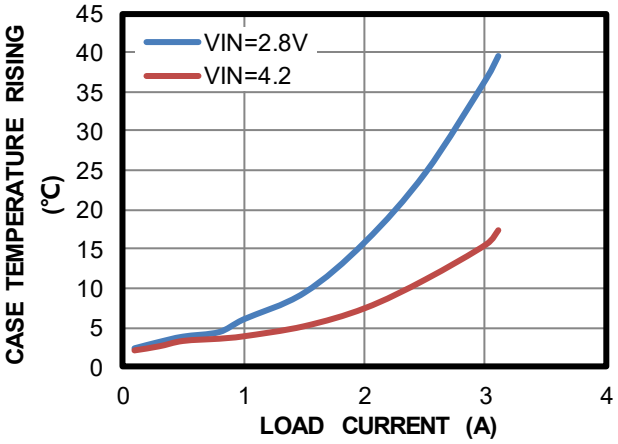
Line Regulation



Load Regulation



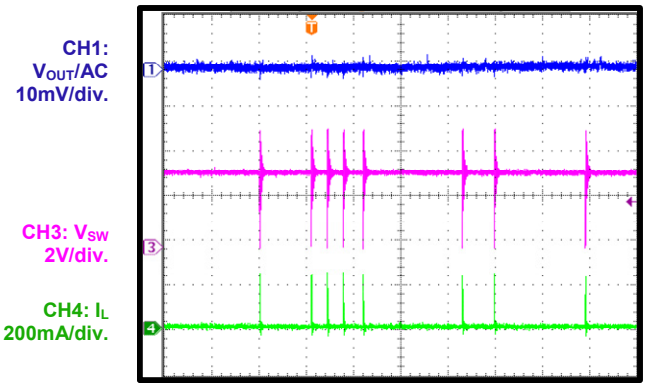
Case Temperature Rise vs. Load Current



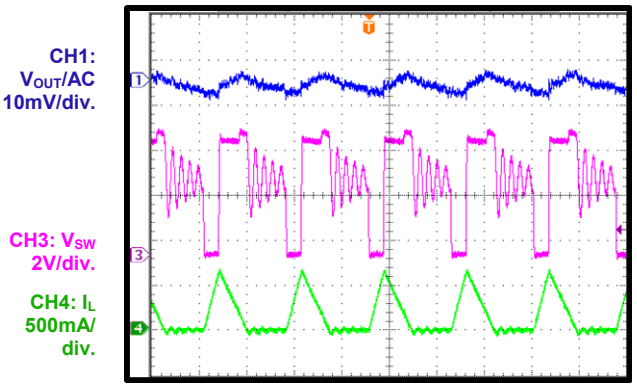
EVB TEST RESULTS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, L = 1.5µH, T_A = 25°C, unless otherwise noted.

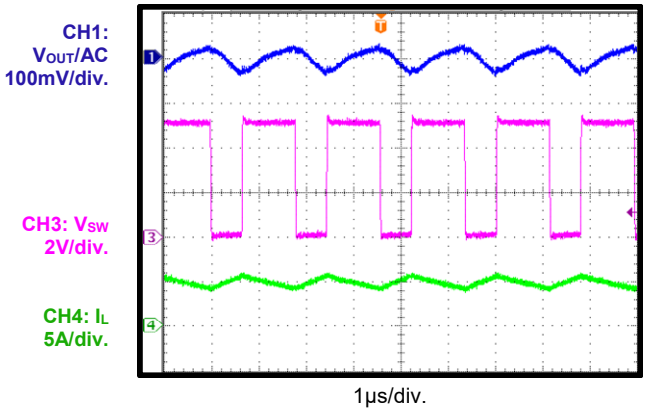
Output Voltage Ripple
Load = 0A



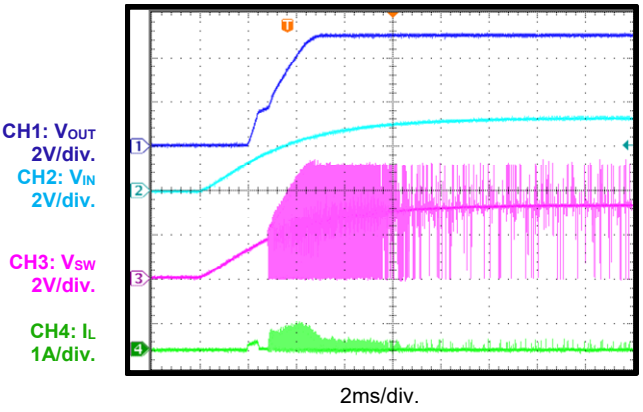
Output Voltage Ripple
Load = 0.1A



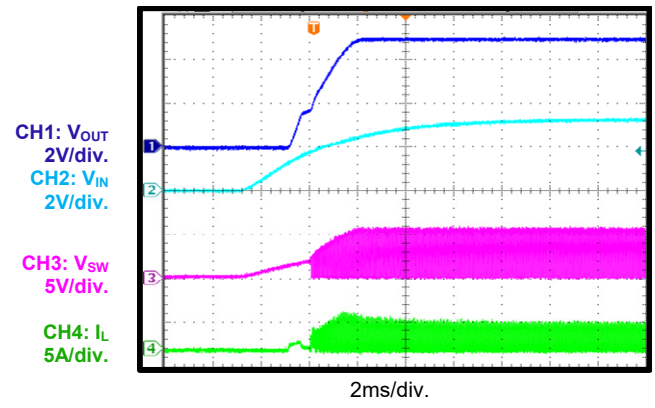
Output Voltage Ripple
Load = 3.1A



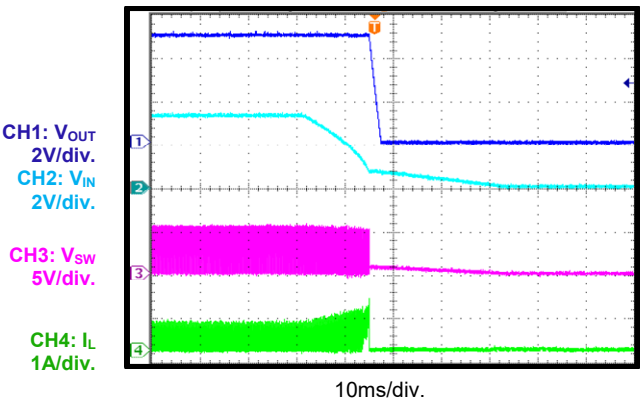
Start-Up through VIN
Load = 0A



Start-Up through VIN
Load = 0.1A



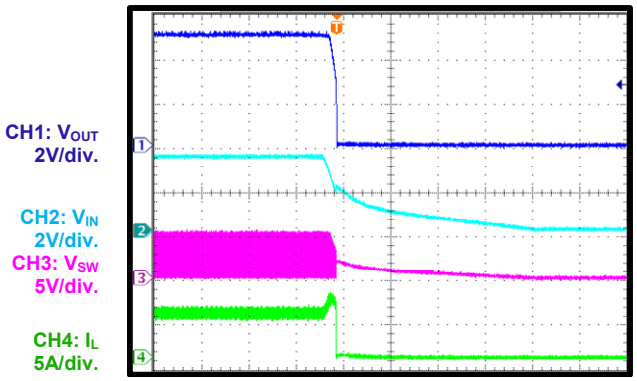
Shutdown through VIN
Load = 0.1A



EVB TEST RESULTS *(continued)*

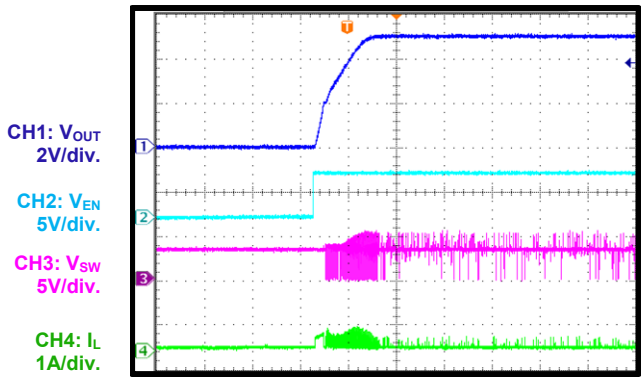
V_{IN} = 3.3V, V_{OUT} = 5V, L = 1.5µH, T_A = 25°C, unless otherwise noted.

Shutdown through VIN
Load = 3.1A



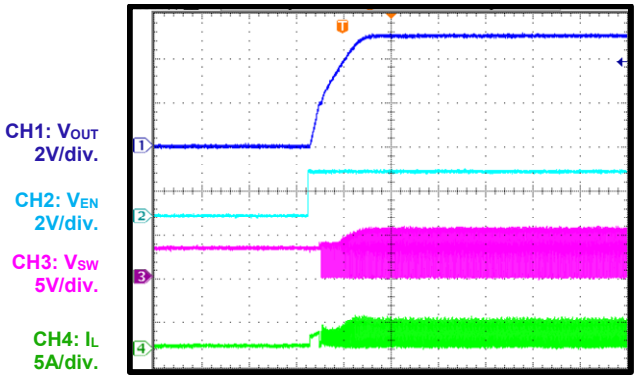
10ms/div.

Start-Up through EN
Load = 0A



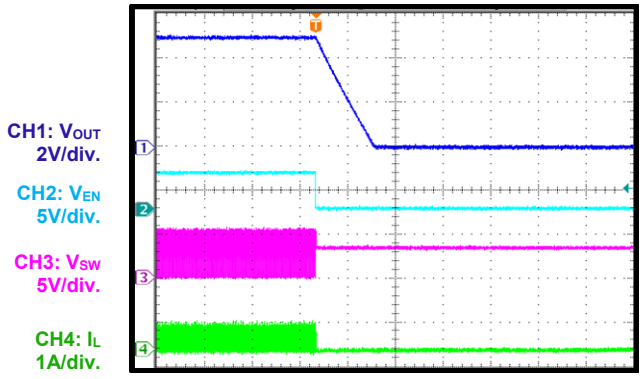
2ms/div.

Start-Up through EN
Load = 0.1A



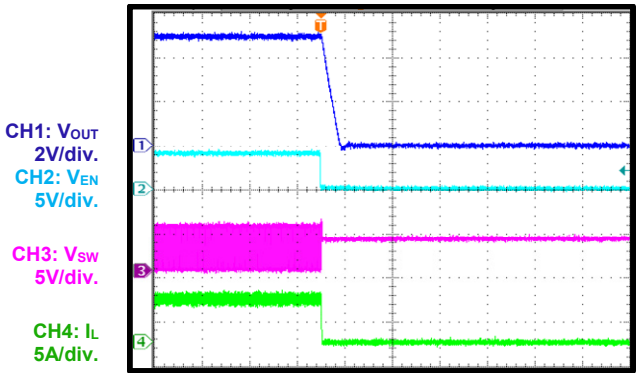
2ms/div.

Shutdown through EN
Load = 0.1A



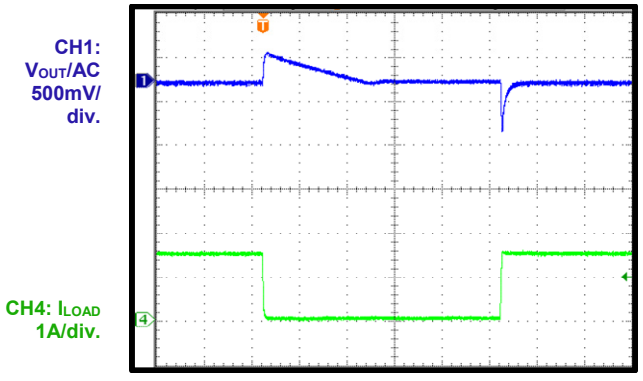
2ms/div.

Shutdown through EN
Load = 3.1A



200µs/div.

Load Transient
I_{LOAD} = 0A to 1.5A at 150mA/µs



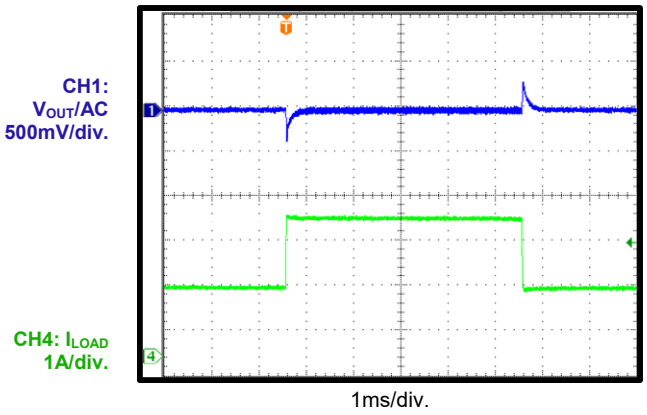
1ms/div.

EVB TEST RESULTS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, L = 1.5µH, T_A = 25°C, unless otherwise noted.

Load Transient

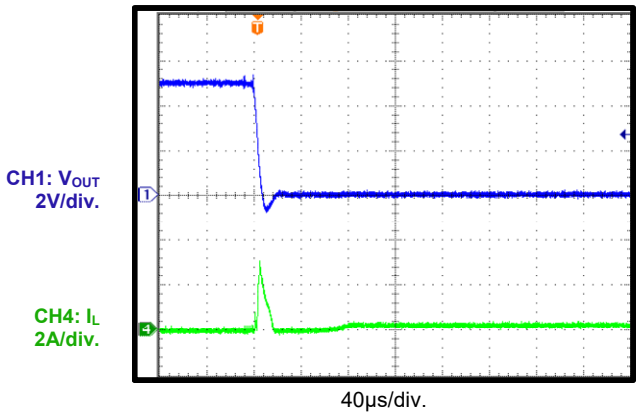
I_{LOAD} = 1.5A to 3.1A at 150mA/µs



1ms/div.

SCP Entry

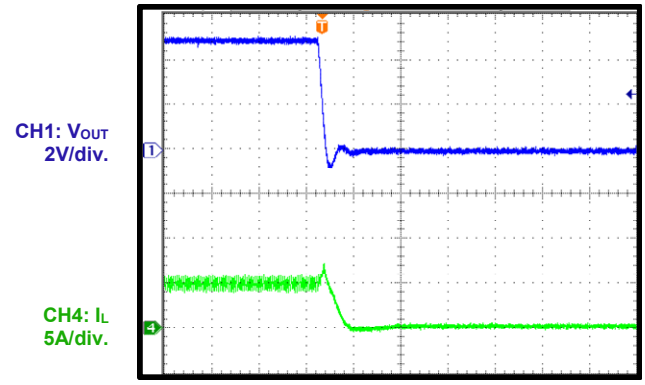
0A load to short



40µs/div.

SCP Entry

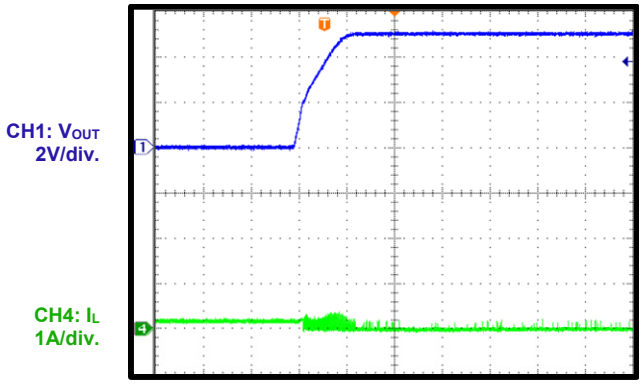
3.1A load to short



40µs/div.

SCP Recovery

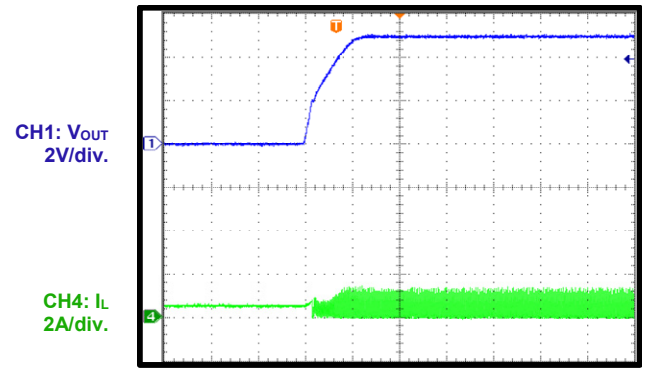
Recover to 0A load



2ms/div.

SCP Recovery

Recover to 0.1A load



2ms/div.

PCB LAYOUT

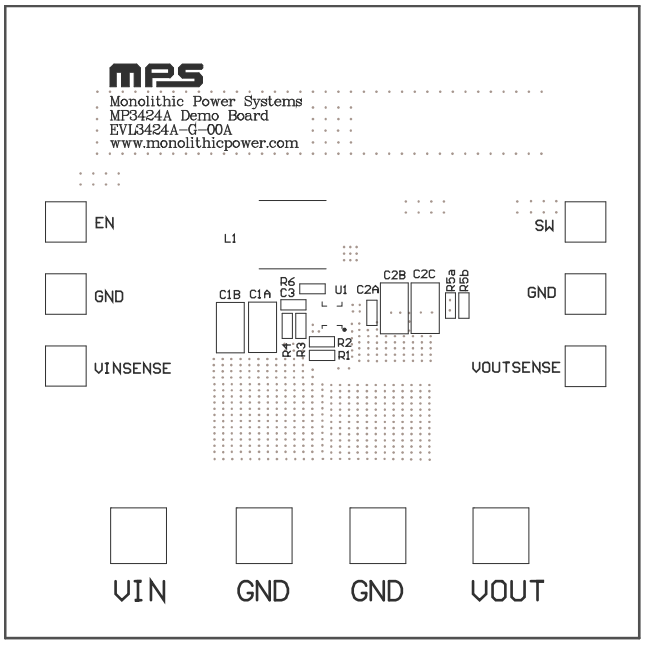


Figure 2: Top Silk

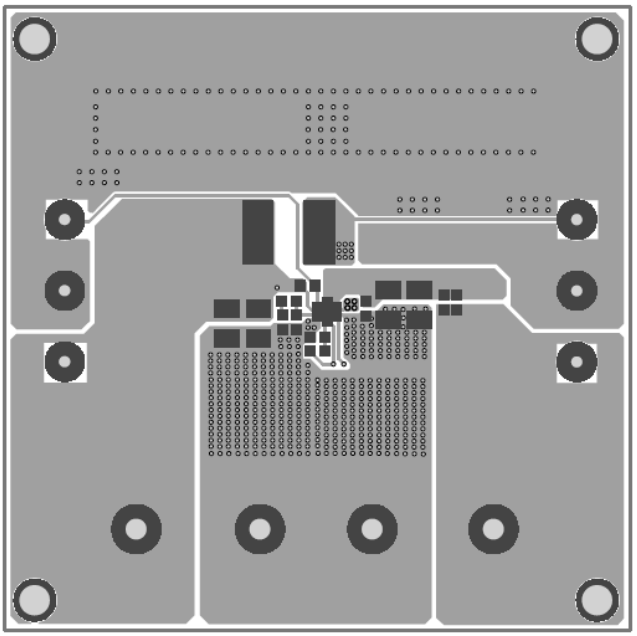


Figure 3: Top Layer

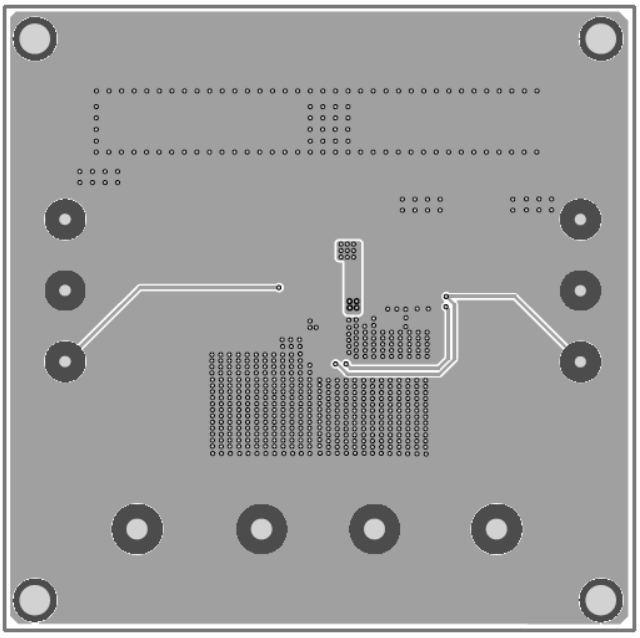


Figure 4: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	07/01/2021	Initial Release	-