EV4541-N-00A

80V, 0.8A, Synchronous Buck Converter Evaluation Board

DESCRIPTION

The EV4541-N-00A is an evaluation board designed to demonstrate the capabilities of MPS's MP4541, a high-efficiency, synchronous step-down converter with integrated high-side and low-side MOSFETs. The MP4541 provides 0.8A of output current in a buck topology from up to an 80V input power supply.

The MP4541 supports high-efficiency pulse-skip mode (PSM) under light-load conditions. Valley current limit circuits protect against overload and short circuit conditions.

The MP4541 is available in an SOIC-8EP package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	8 to 80	V
Output voltage	V_{OUT}	5	V
Output current	I_{OUT}	0 to 0.8	A

FEATURES

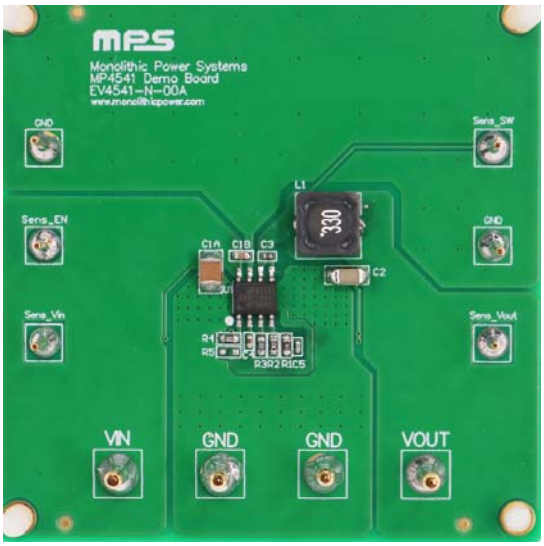
- 8V to 80V Input Voltage
- 1V to 30V Output Voltage
- 90% Maximum Operation Duty Cycle
- 625mΩ/380mΩ Internal MSOFETs
- Constant-On-Time Control Mode
- Configurable 100kHz to 1MHz Frequency
- Internal Soft Start and Loop Compensation
- Over-Current Protection (OCP) and Short-Circuit Protection (SCP) with Hiccup Mode
- High-Efficiency PSM at Light-Load
- Available in an SOIC-8EP Package

APPLICATIONS

- High-Voltage Battery Packs
- Industrial Power Supplies
- Printer Power Boards

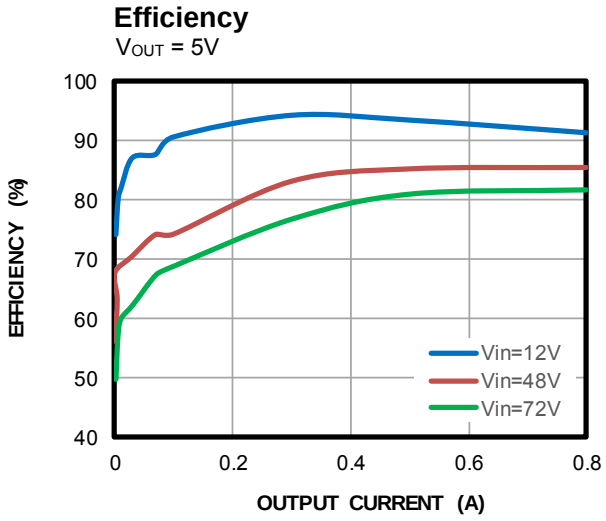
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EVALUATION BOARD



(LxWxH) 6.35cmx6.35cmx0.6cm

Board Number	MPS IC Number
EV4541-N-00A	MP4541GN



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QUICK START GUIDE

The output voltage of this board is set to 5V. The board layout accommodates most commonly used components. Follow the steps below to quick start the EV4541-N-00A:

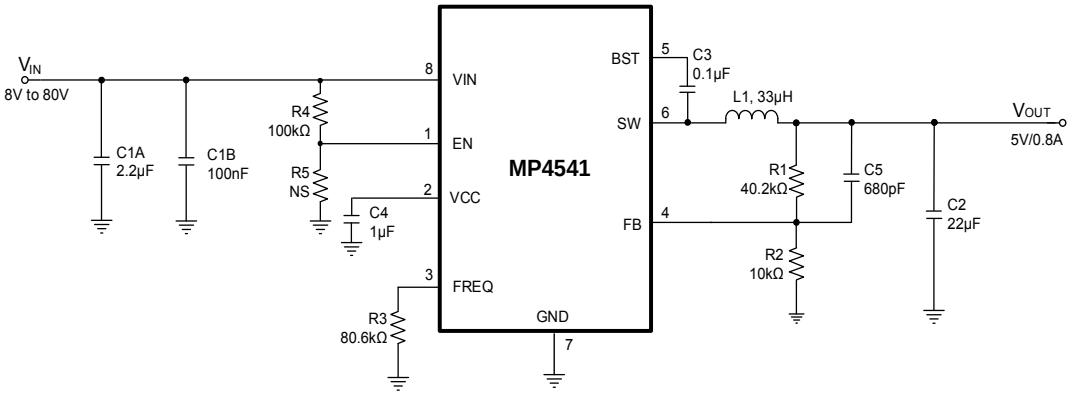
1. Preset the power supply (V_{IN}) between 8V and 80V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. Turn the power supply on after making the connections.
6. The MP4541 is enabled on the evaluation board once V_{IN} is applied.
7. The output voltage (V_{OUT}) can be adjusted by changing R1 and R2. Calculate V_{OUT} with Equation (1):

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

   Where V_{FB} = 1V.
8. To use the enable function, apply a digital input to the EN pin. Drive EN above 1.35V to turn on the EV4541-N-00A; drive it below 0.4V to turn the device off.

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EVALUATION BOARD SCHEMATIC



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BILL OF MATERIALS

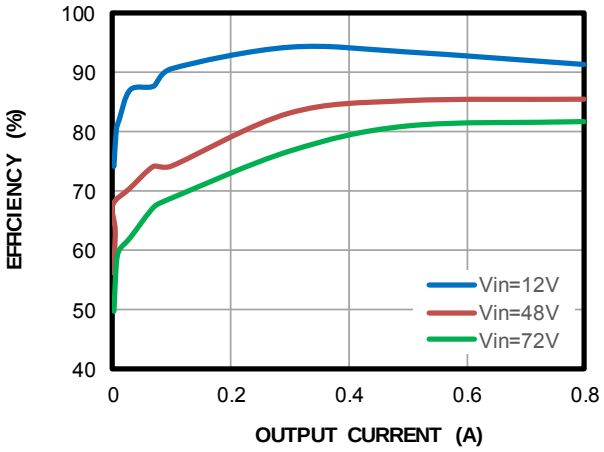
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1A	2.2µF	Ceramic capacitor, 100V, X7R	1210	muRata	GRM32ER72A225KA35L
1	C1B	100nF	Ceramic capacitor, 100V, X7R	0603	muRata	GRM188R72A104KA35D
1	C2	22µF	Ceramic capacitor, 16V, X7S	1206	muRata	GRM31CC71C226ME11L
1	C3	100nF	Ceramic capacitor, 16V, X7R	0402	muRata	GRM155R71C104KA88D
1	C4	1µF	Ceramic capacitor, 10V, X7S	0402	muRata	GRM155C71A105KE11D
1	C5	680pF	Ceramic capacitor, 16V, X7R	0402	WE	885012205024
1	R1	40.2kΩ	Film resistor, 1%	0603	YAGEO	RC0603FR-0740K2L
1	R2	10kΩ	Film resistor, 1%	0603	YAGEO	RC0603FR-0710KL
1	R3	80.6kΩ	Film resistor, 1%	0603	YAGEO	RC0603FR-0780K6L
1	R4	100kΩ	Film resistor, 1%	0603	YAGEO	RC0603FR-07100KL
0	R5	NS				
1	L1	33µH	I_{SAT} = 1.4A, 140mΩ inductor	SMD	WE	7447779133
1	U1	MP4541	80V, 0.8A, synchronous buck	SOIC-8EP	MPS	MP4541GN

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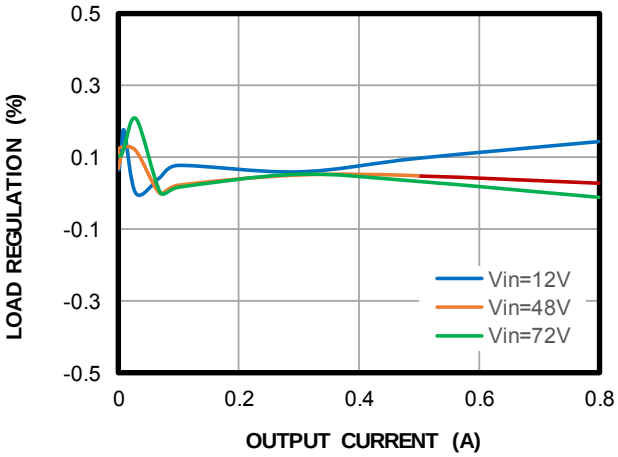
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 48V, V_{OUT} = 5V, L = 33µH, T_A = 25°C, unless otherwise noted.

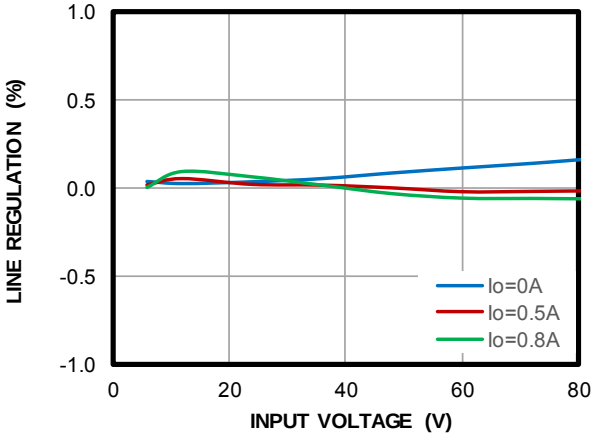
Efficiency vs. I_O



Load Regulation

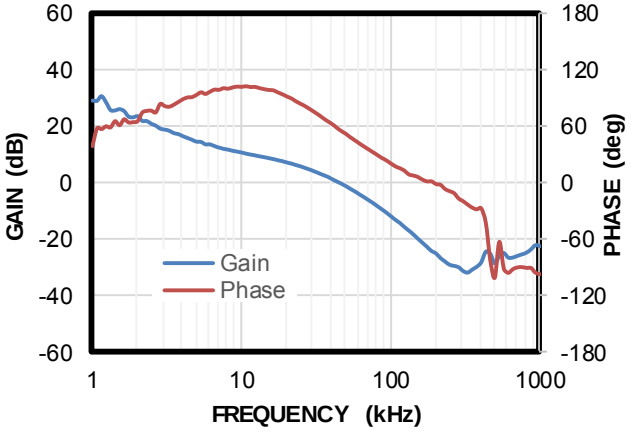


Line Regulation

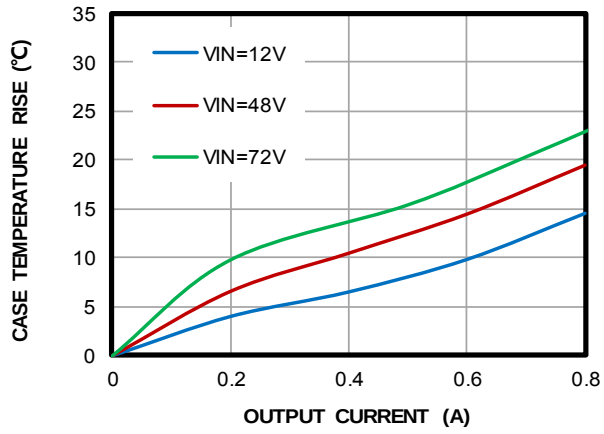


Bode Plot

I_{OUT} = 0.8A



Case Temperature Rise vs. Output Current

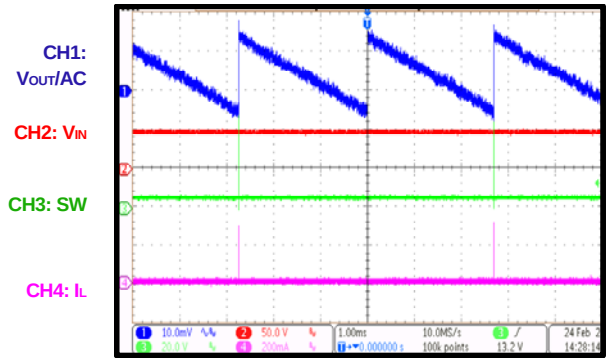


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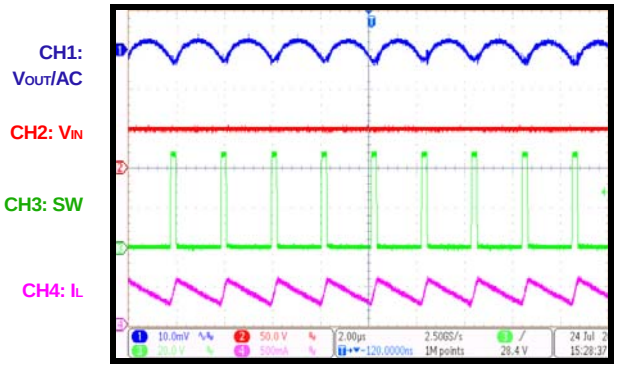
EVB TEST RESULTS *(continued)*

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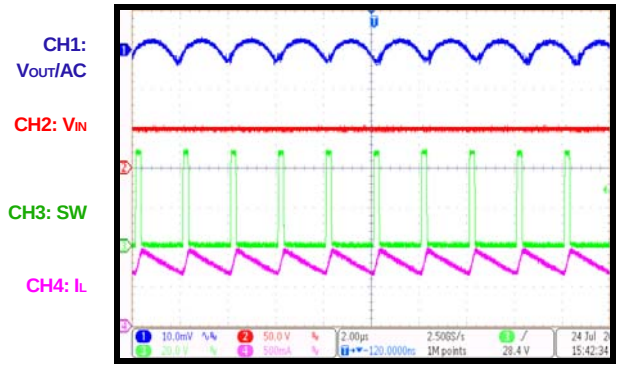
Steady State
I_{OUT} = 0A



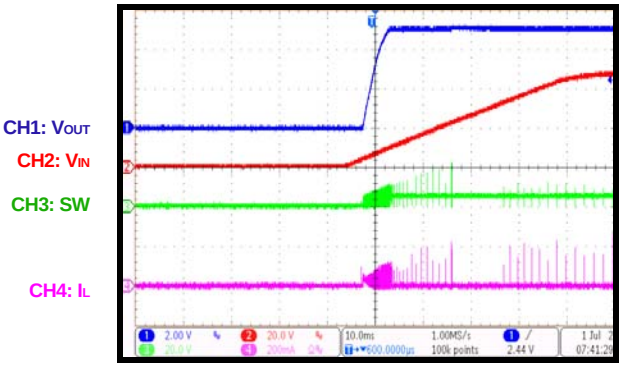
Steady State
I_{OUT} = 0.4A



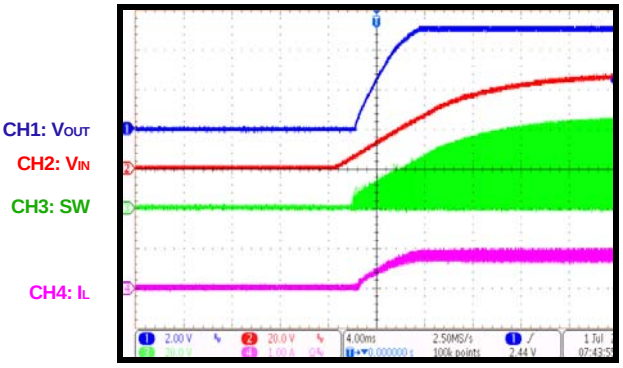
Steady State
I_{OUT} = 0.8A



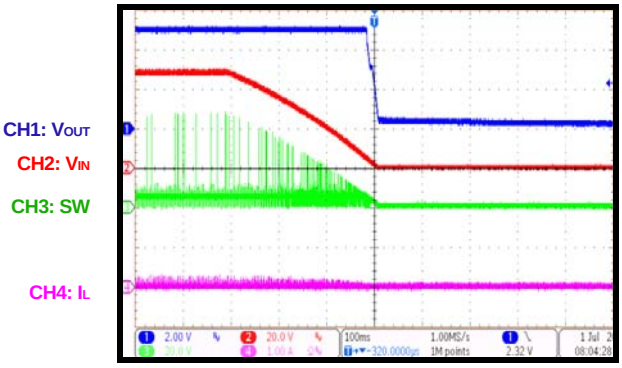
VIN Start-Up
I_{OUT} = 0A



VIN Start-Up
I_{OUT} = 0.8A



VIN Shutdown
I_{OUT} = 0A

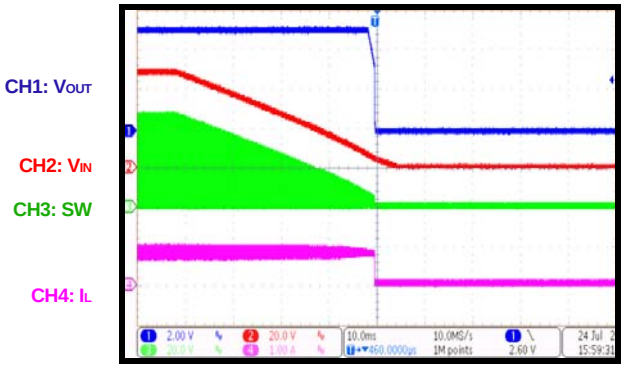


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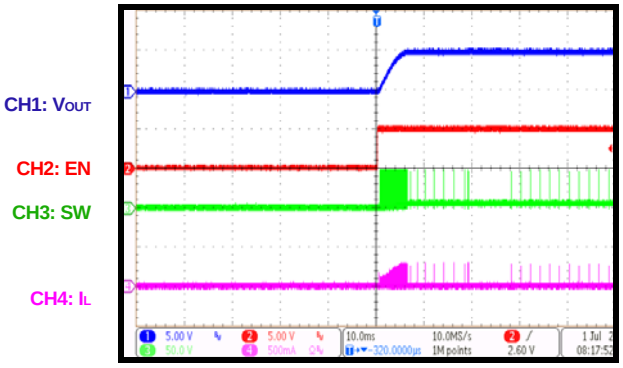
EVB TEST RESULTS *(continued)*

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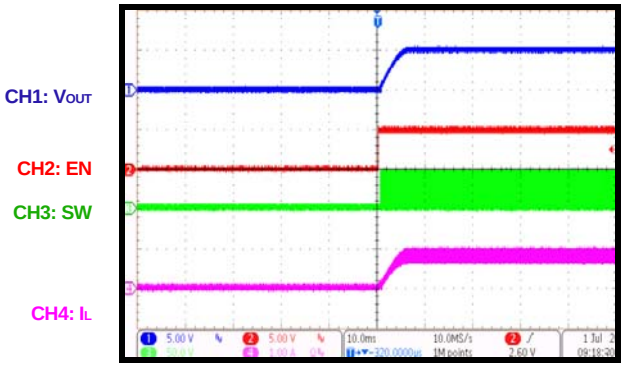
VIN Shutdown
I_{OUT} = 0.8A



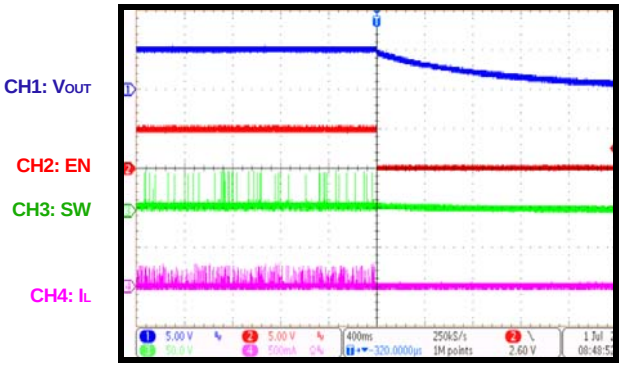
EN On
I_{OUT} = 0A



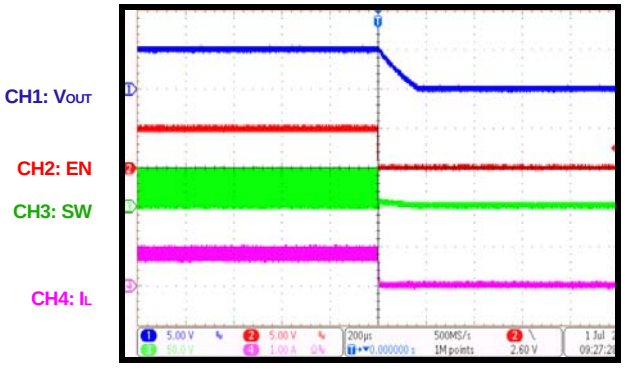
EN On
I_{OUT} = 0.8A



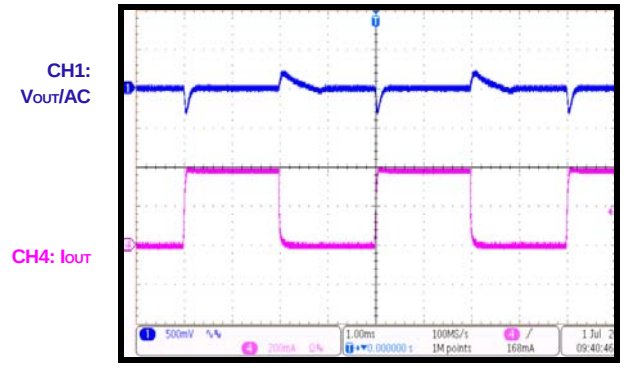
EN Off
I_{OUT} = 0A



EN Off
I_{OUT} = 0.8A



Load Transient
I_{OUT} = 0A to 0.4A



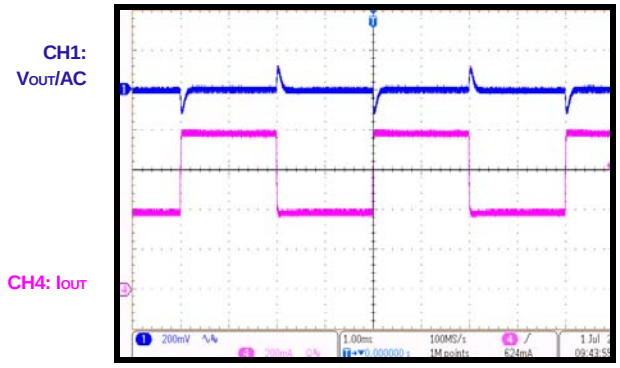
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EVB TEST RESULTS *(continued)*

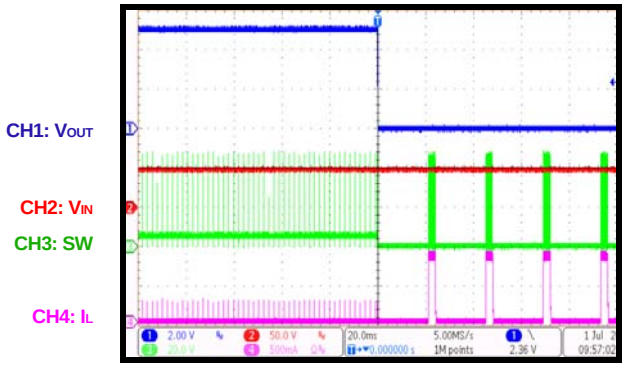
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Load Transient

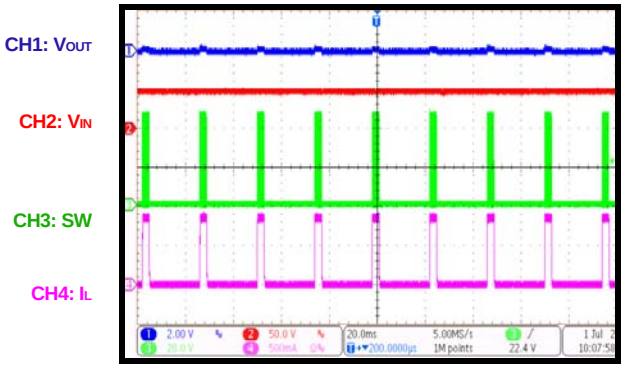
I_{OUT} = 0.4A to 0.8A



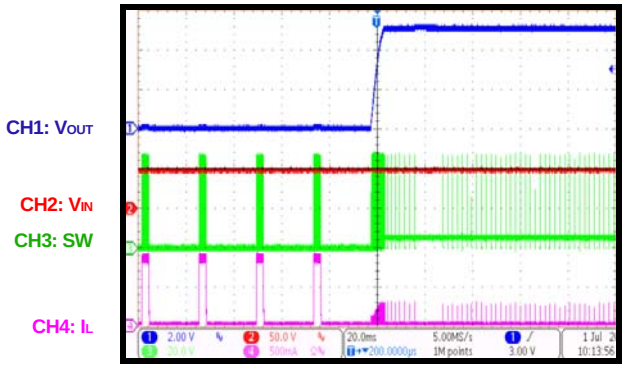
SCP Entry



SCP Steady State



SCP Recovery



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PCB LAYOUT

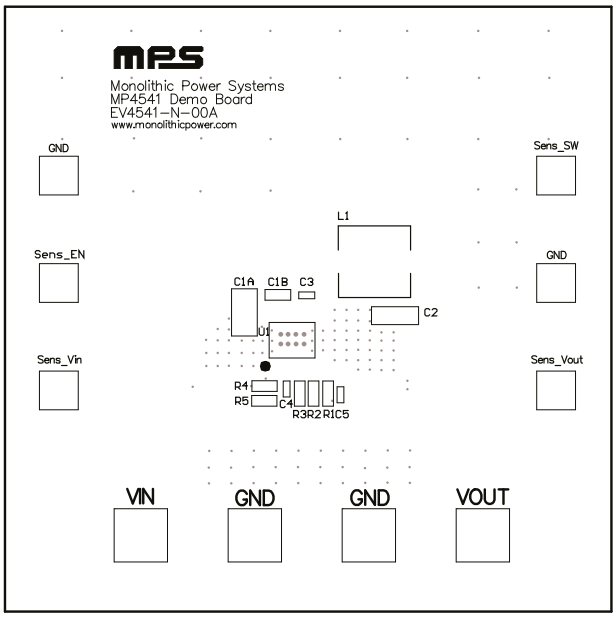


Figure 1: Top Silkscreen Layer

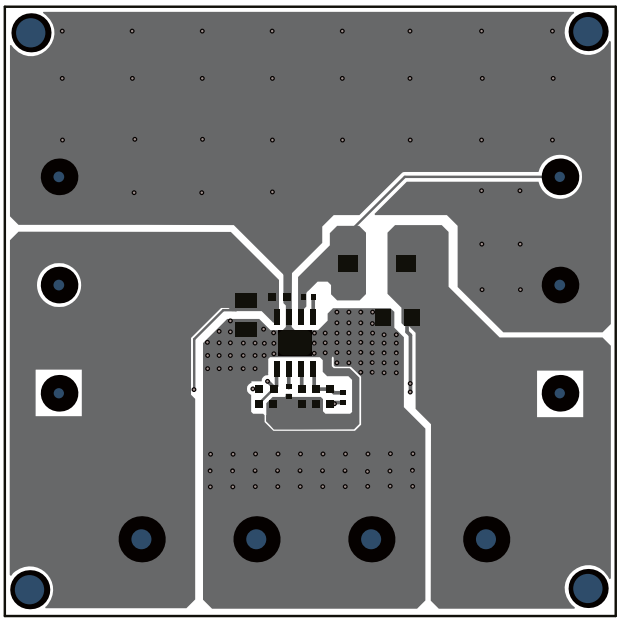


Figure 2: Top Layer

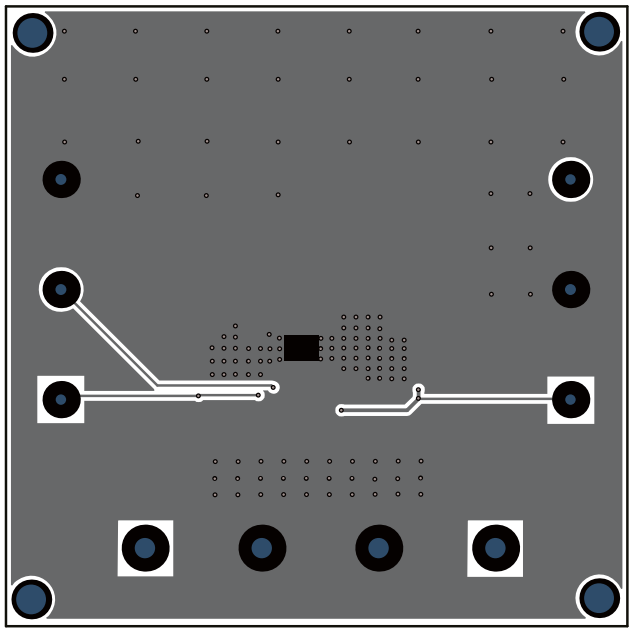


Figure 3: Bottom Layer

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