EV4581-N-00A

100V, 0.8A Synchronous Buck Converter

DESCRIPTION

The EV4581 Evaluation Board is designed to demonstrate the capabilities of MPS' MP4581.

The MP4581 is a high efficiency synchronous step-down converter with integrated high-side and low-side MOSFETs. It provides 0.8A output in buck topology from up to 100V input power supply.

MP4581 supports high efficiency pulse-skip-mode (PSM) in light load condition. Valley current limit circuits protect against overload and short circuit conditions.

The MP4581 is available in a SOIC8EP packages.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	10 - 100	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	0 – 0.8	A

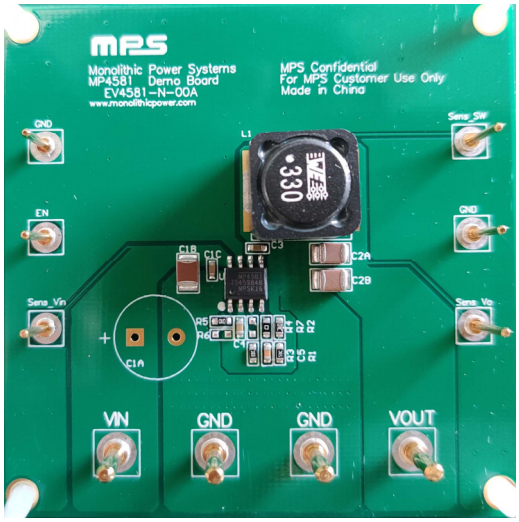
FEATURES

- 10V-to-100V Input Voltage Range
- 1V-to-30V Output Voltage Range
- 90% Maximum Operation Duty Cycle
- 625mΩ / 380mΩ Internal MSOFETs
- Constant On Time Control Mode
- Programmable 100kHz to 1MHz Frequency
- Internal Soft-Start and Loop Compensation
- OCP, SCP with Hiccup
- High Efficiency PSM in Light Load
- Available in SOIC8EP Package

APPLICATIONS

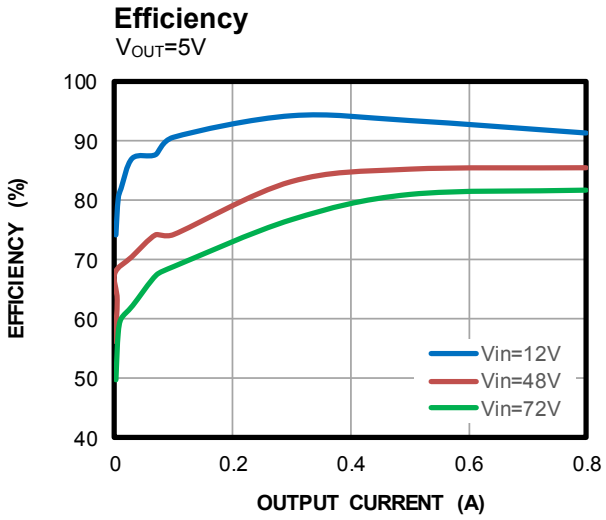
- High Voltage Battery Packs
- Industrial Power Supplies
- Printer Power Board

EV4581-N-00A EVALUATION BOARD

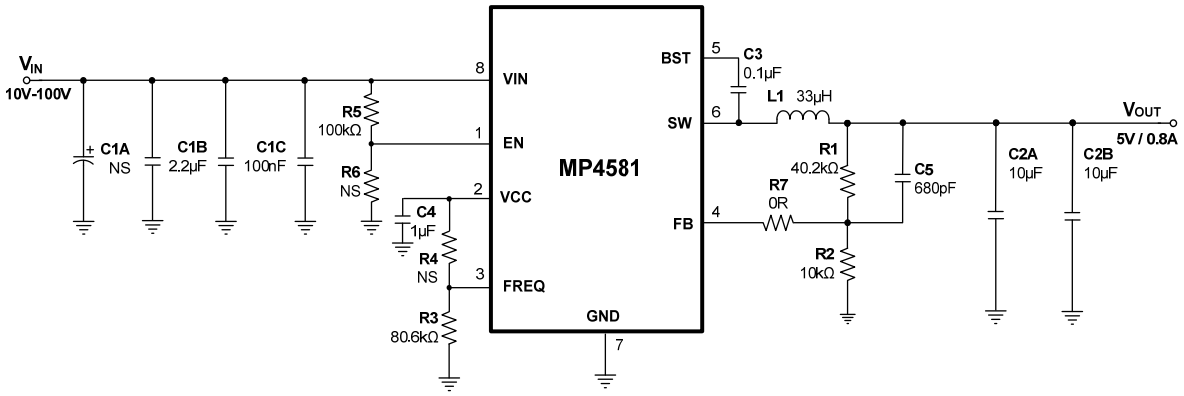


(L × W × H) 6.35cm x 6.35cm x 0.6cm

Board Number	MPS IC Number
EV4581-N-00A	MP4581GN



EVALUATION BOARD SCHEMATIC



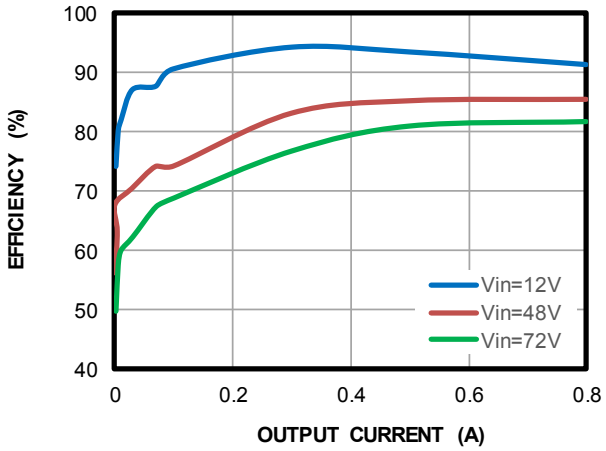
EV4581-N-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1B	2.2μF	Ceramic Cap,100V, X7R	1210	muRata	GRM32ER72A225KA88L
2	C1C, C3	100nF	Ceramic Cap,100V, X7R	0603	muRata	GRM188R72A104KA01D
2	C2A, C2B	10μF	Ceramic Cap, 25V, X7R	1210	muRata	GRM32DR71E106KA12L
1	C4	1μF	Ceramic Cap, 16V, X7R	0603	muRata	GRM188R71C105KA01D
1	C5	680pF	Ceramic Cap, 50V, COG	0603	muRata	GRM1885C1H681JA01D
1	R1	40.2K	Film resistor, 1%	0603	YAGEO	RC0603FR-0740K2L
1	R2	10K	Film resistor, 1%	0603	YAGEO	RC0603FR-0710KL
1	R3	80.6K	Film resistor, 1%	0603	YAGEO	RC0603FR-0780K6L
1	R5	100K	Film resistor, 1%	0603	YAGEO	RC0603FR-07100KL
1	R7	0R	Film resistor, 1%	0603	YAGEO	RC0603FR-070RL
0	C1A, R4, R6	NS				
1	L1	33μH	Isat=4.2A, 45mΩ inductor	SMD	Wurth	7447709330
1	U1	MP4581	100V, 0.8A Synchronous Buck	SOIC8EP	MPS	MP4581GN

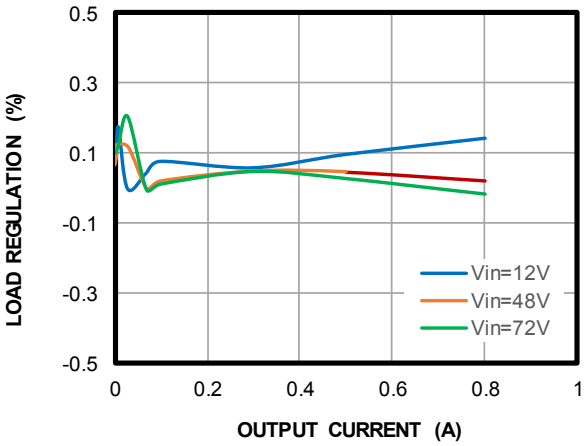
EVB TEST RESULTS

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.

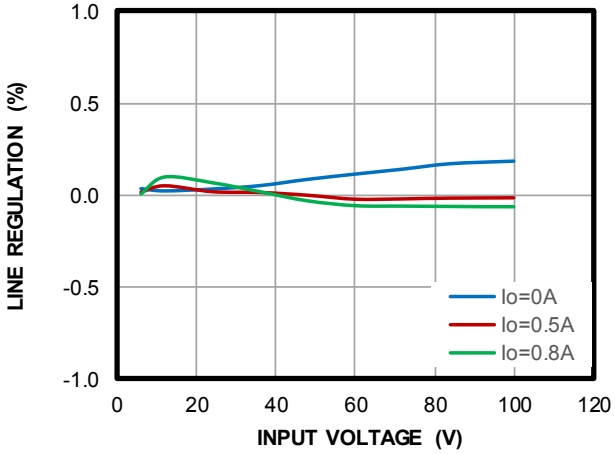
Efficiency vs. Io



Load Regulation

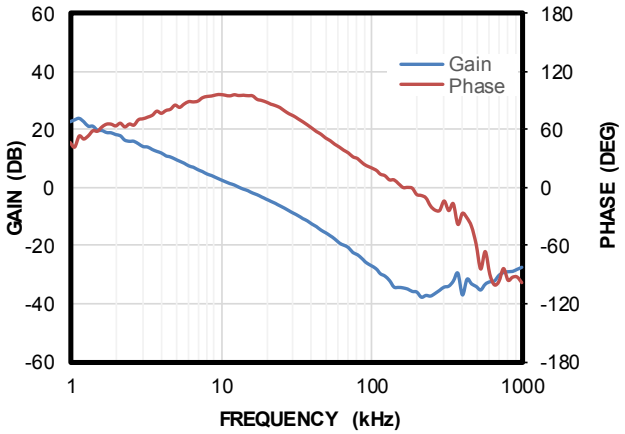


Line Regulation

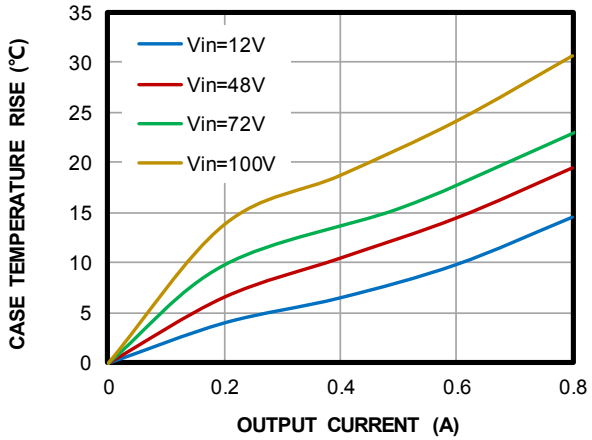


Bode Plot

I_{OUT}=0.8A



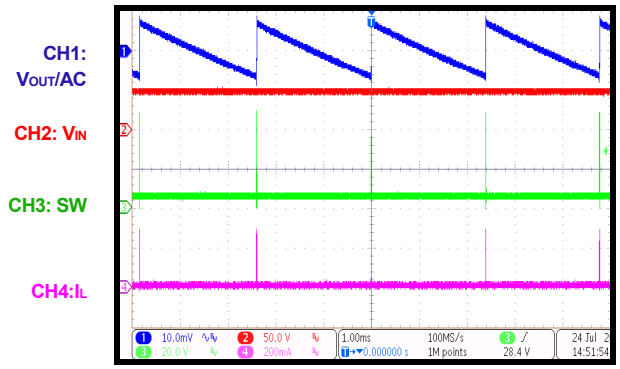
Case Temperature Rise. vs. Output Current



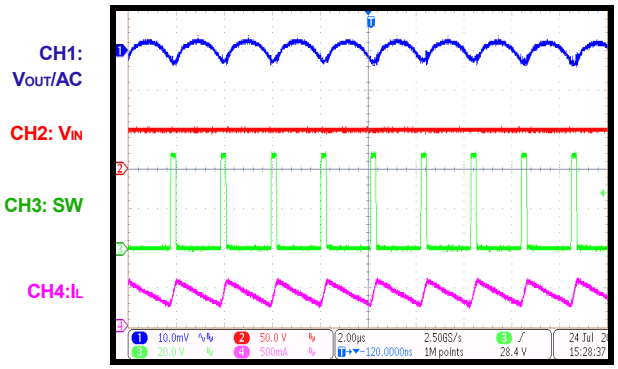
EVB TEST RESULTS *(continued)*

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.

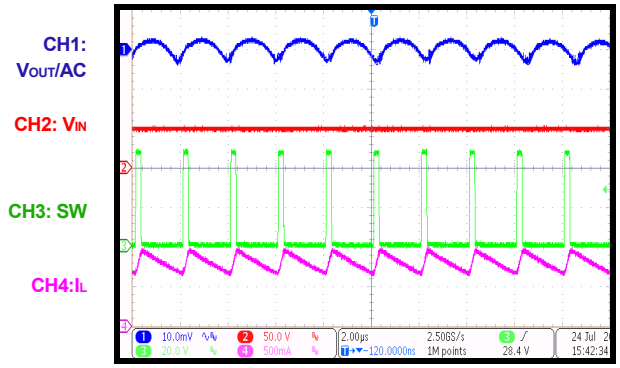
Steady State
I_{OUT}=0A



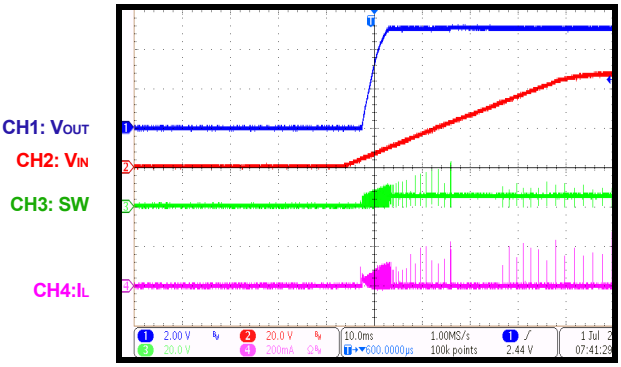
Steady State
I_{OUT}=0.4A



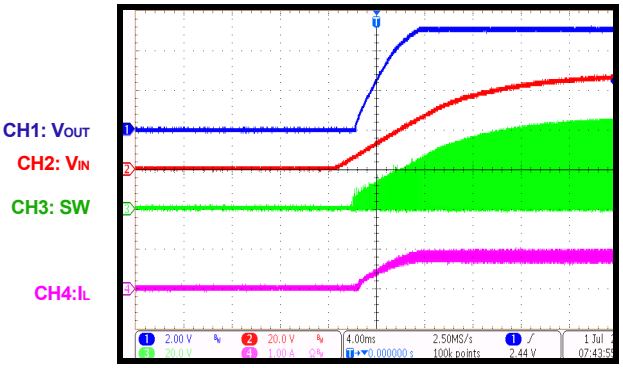
Steady State
I_{OUT}=0.8A



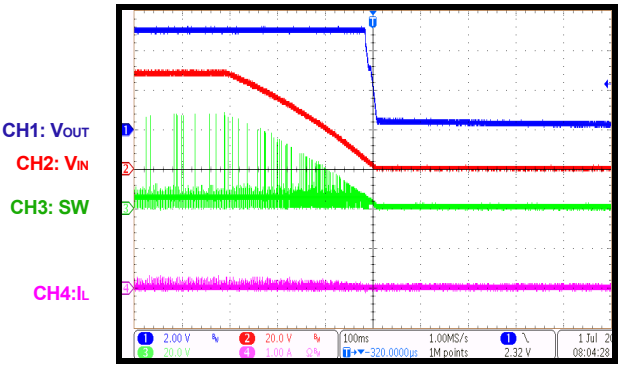
VIN Start-Up
I_{OUT}=0A



VIN Start-Up
I_{OUT}=0.8A



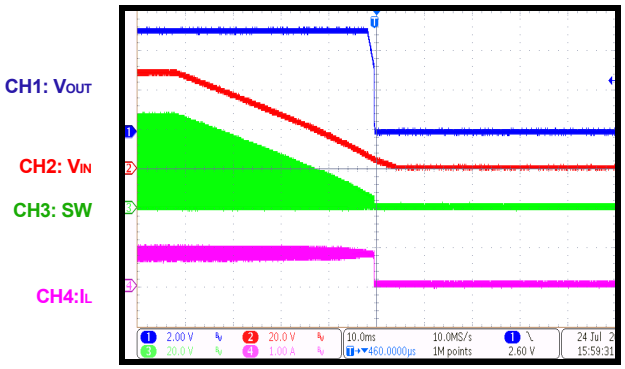
VIN Shutdown
I_{OUT}=0A



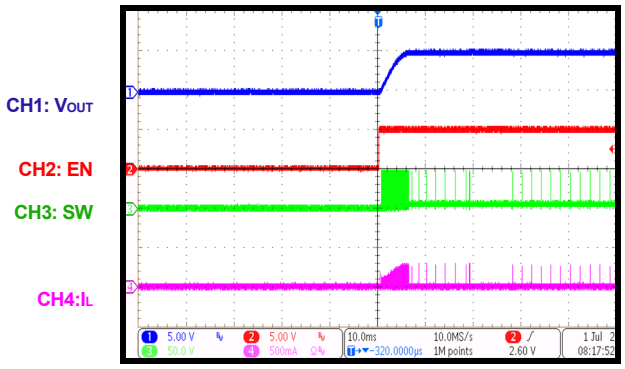
EVB TEST RESULTS *(continued)*

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.

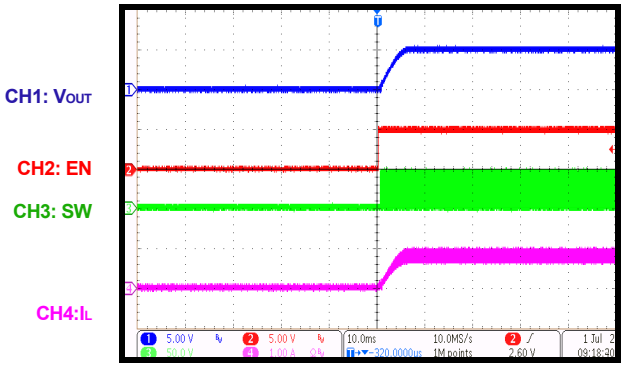
VIN Shutdown
I_{OUT}=0.8A



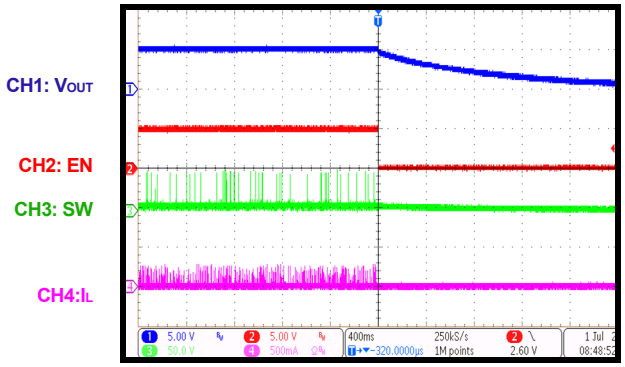
EN ON
I_{OUT}=0A



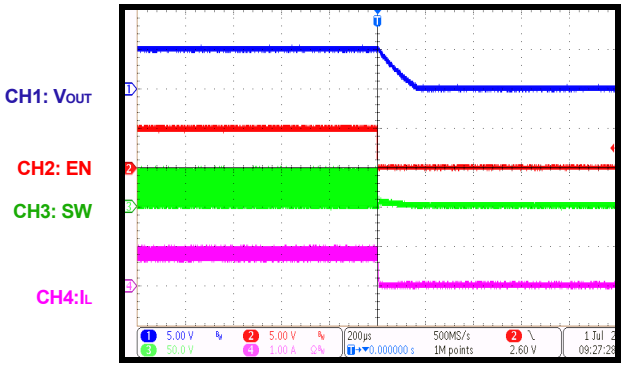
EN ON
I_{OUT}=0.8A



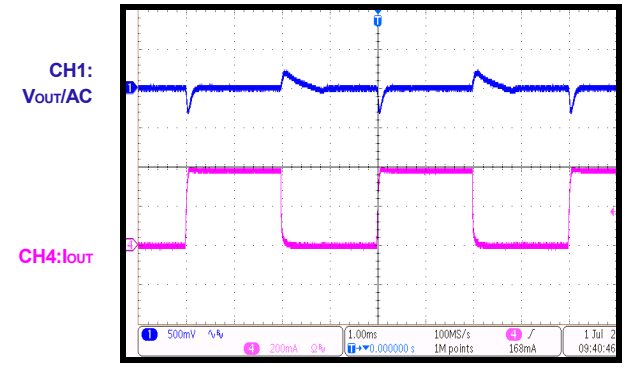
EN OFF
I_{OUT}=0A



EN OFF
I_{OUT}=0.8A



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

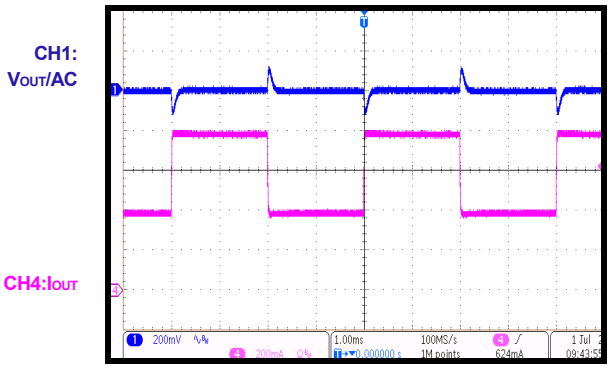


EVB TEST RESULTS *(continued)*

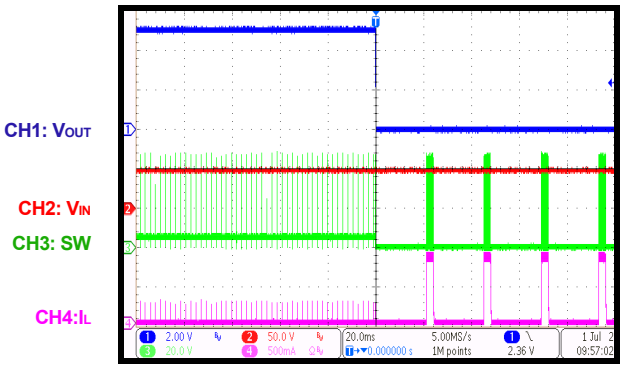
Performance curves and waveforms are tested on the evaluation board.
V_{IN} = 48V, V_{OUT} = 5V, L = 33µH, T_A = 25°C, unless otherwise noted.

Load Transient

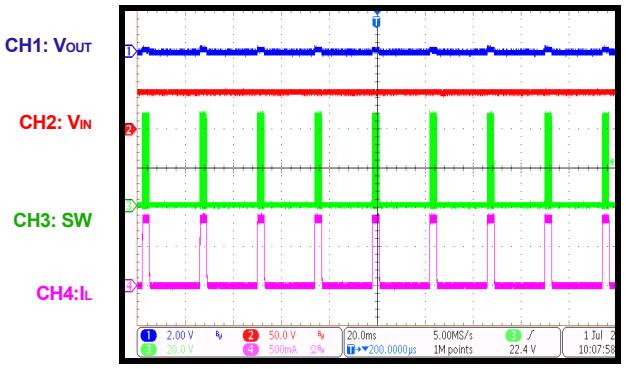
I_{OUT}=0.4A to 0.8A



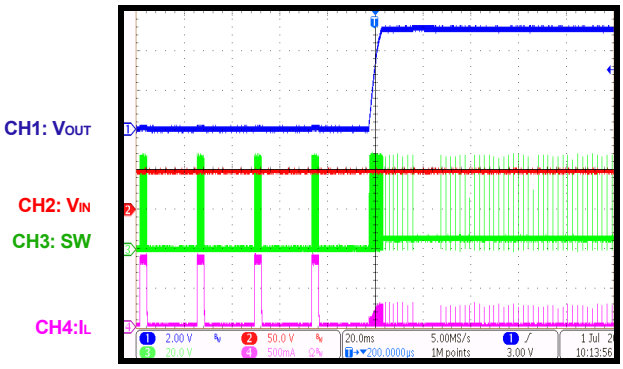
SCP Entry



SCP Steady State



SCP Recovery



PRINTED CIRCUIT BOARD LAYOUT

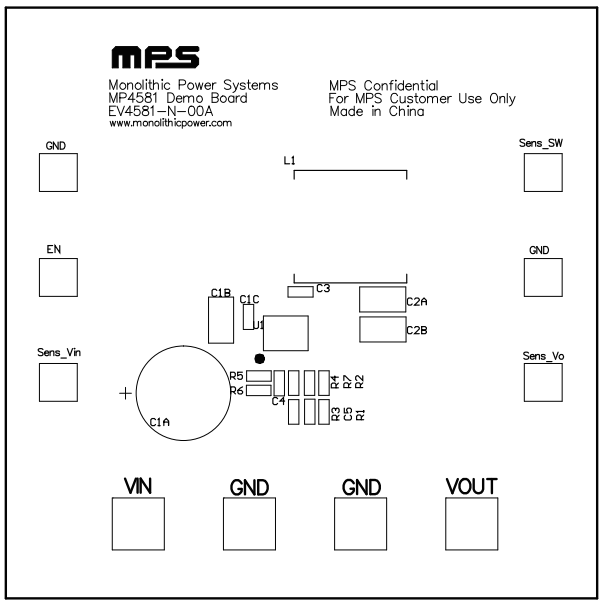


Figure 1: Top Silkscreen Layer

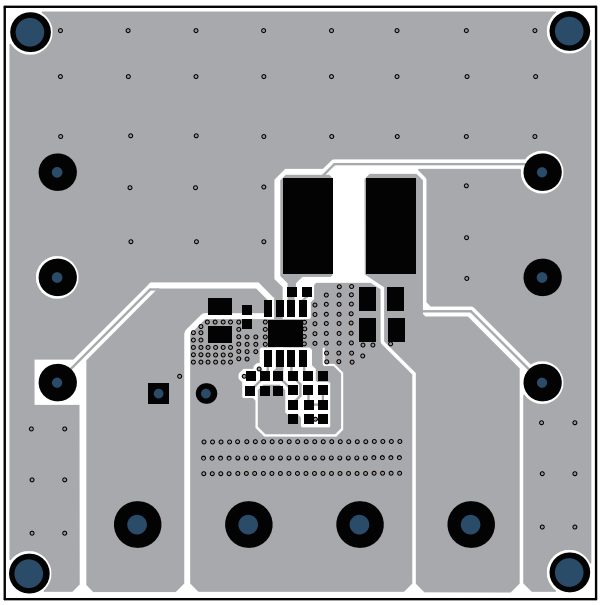


Figure 2: Top Layer

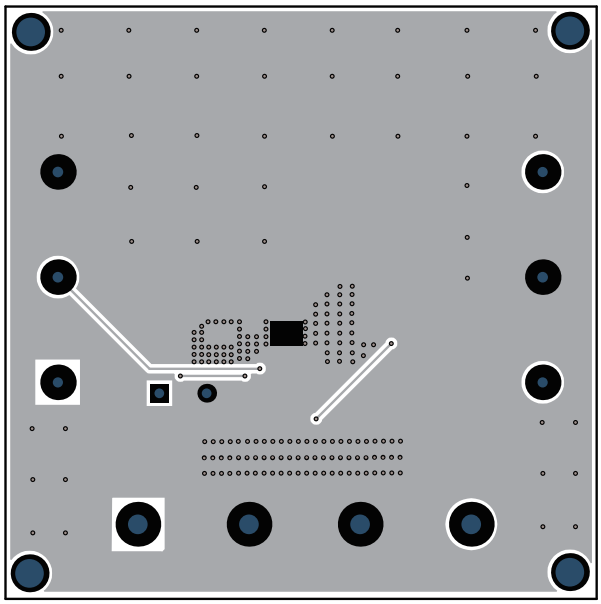


Figure 3: Bottom Layer

QUICK START GUIDE

The output voltage of this board is set to 5V. The board layout accommodates most commonly used components. Following blew steps to quick start EV4581-N-00A.

1. Preset Power Supply to 10V ≤ VIN ≤ 100V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
   a. Positive (+): VIN
   b. Negative (–): GND
4. Connect Load to:
   a. Positive (+): VOUT
   b. Negative (–): GND
5. Turn Power Supply on after making connections.
6. The MP4581 is enabled on the evaluation board once VIN is applied.
7. The output voltage VOUT can be changed by varying R1 and R2. Calculate the new value using the formula:

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

   Where VFB = 1V.
8. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.35V to turn on EV4581-N-00A or less than 0.4V to turn it off.