EVM3683-7-QN-01A

16V, 8A DC/DC Power Module Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EVM3683-7-QN-01A Evaluation Board is designed to demonstrate the capabilities of MPS' MPM3683-7.The MPM3683-7 is an easy-to-use fully integrated peak10A, continuous 8A step-down DC/DC power module. MPM3683-7 can deliver output current over a wide input supply voltage range with excellent load and line regulation.

The MPM3683-7 uses Constant-On-Time (COT) control to provide fast transient response and ease the loop stabilization.

The operating frequency is set easily to 600 kHz, 800 kHz, or 1000 kHz with the MODE configuration, allowing the MPM3683-7 frequency to remain constant regardless of the input/output voltages.

The MPM3683-7 is available in a space-saving QFN-28 (7mmx7mmx4mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	4 to 16	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	10	A

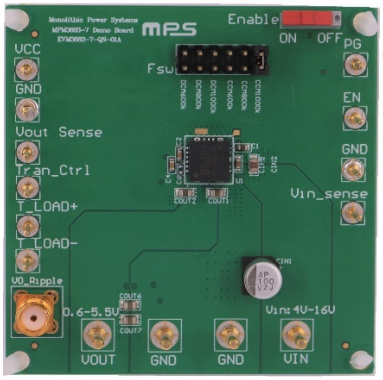
FEATURES

- Wide Input Voltage Range from 2.7V:
  - 2.7V to 16V with External 3.3V Bias
  - 4V to 16V with Internal Bias or External 3.3V Bias
- Differential Output Voltage Remote Sense
- Peak 10A, Continuous 8A Output Current
- Adaptive Constant-on-Time (COT) for Ultra-Fast Transient Response
- Selectable Pulse Skip Mode or Forced Continuous Conduction Mode (FCCM)
- Output Voltage Discharge
- Pre-Bias Start-Up
- Selectable Switching Frequency from 600kHz, 800kHz, and 1000kHz
- Non-Latch OCP, UVP, UVLO, Thermal Shutdown, and OVP
- Adjustable Output from 0.6V Up to 5.5V (5.5V Max)
- QFN-28 (7mm x 7mm x 4mm) package

APPLICATIONS

- Telecom and Networking Systems
- Base Stations
- Industrial Systems
- Servers and Storage

EVM3683-7-QN-01A EVALUATION BOARD

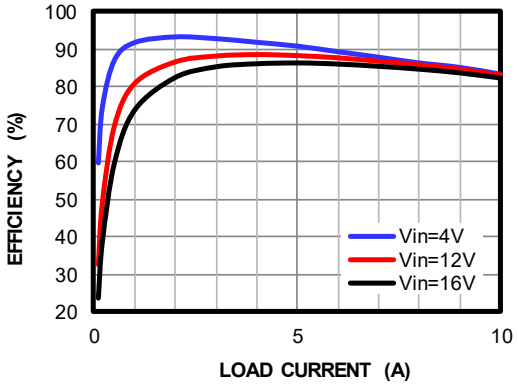


LxWxH (6.4cmx6.4cmx1.3cm)

Board Number	MPS IC Number
EVM3683-7-QN-01A	MPM3683-7

Efficiency

V_{IN} = 4V/12V/16V, V_{OUT} = 1.2V,
I_{OUT} = 0A to 10A



QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 4V and 16V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Before turn the power supply, choose the suitable Fsw by Jumper connector (JP1).
5. Turn the power supply on. The board will automatically start up.

EVALUATION BOARD SCHEMATIC

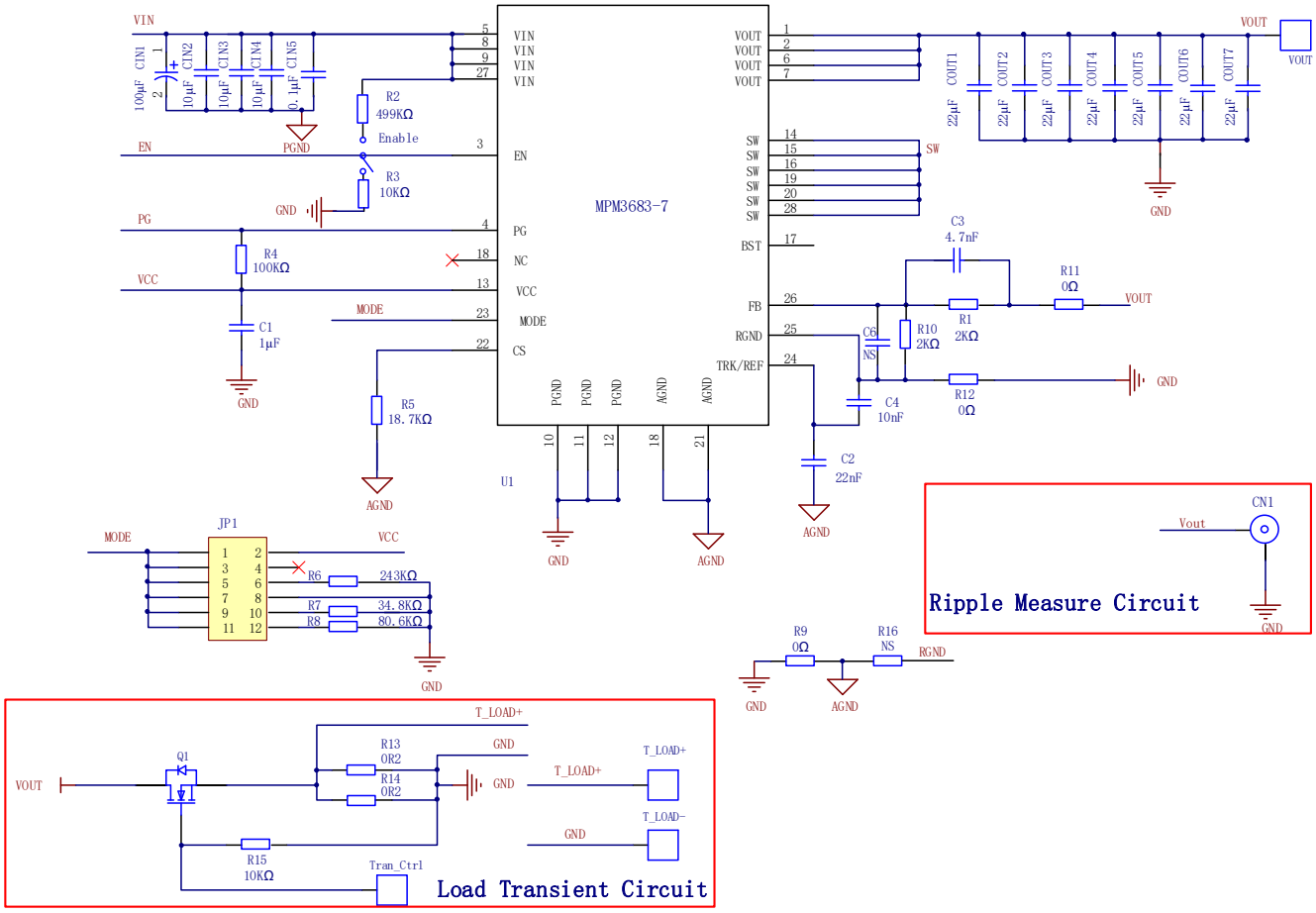


Figure 1: Evaluation Board Schematic

EVM3683-7-QN-01A BILL OF MATERIALS

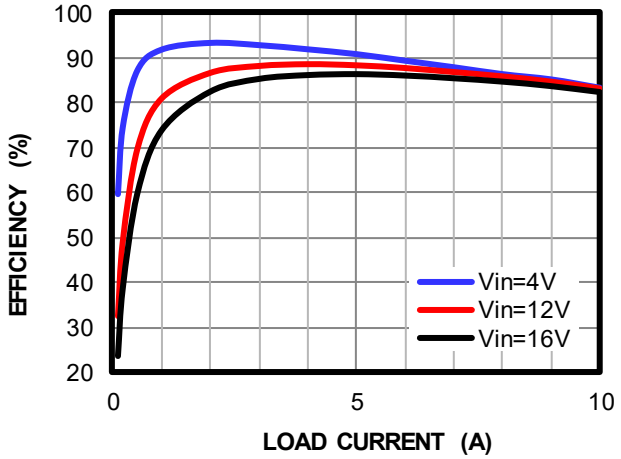
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	CIN1	100µF	Capacitor, 35V	SMD	Nippon Chemi-Con	EMZJ350ADA101 MF80G
3	CIN2, CIN3, CIN4	10µF	Ceramic capacitor, 25V, X7S	0805	Murata	GRM21BC71E106 KE11L
1	CIN5	100nF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E104 KA01D
1	C1	1µF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E105 KA12D
1	C2	22nF	Ceramic capacitor, 25V, X7R	0603	WE	885012206067
1	C3	4.7nF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H472 KA01D
1	C4	10nF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E103 KA01D
7	COUT1, COUT2, COUT3, COUT4, COUT5, COUT6, COUT7	22µF	Ceramic capacitor, 6.3V, X5R	0805	Wurth	885012107005
2	R1.R10	2kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-072KL
1	R2	499kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07499KL
1	R4	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
2	R3.R15	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	R5	18.7kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0718K7L
1	R6	243kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07243KL
1	R7	34.8kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0734K8L
1	R8	80.6kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0780K6L
3	R9, R11, R12	0Ω	Film resistor, 1%	0603	Yageo	RC0603FR-070RL
2	R13, R14	200mΩ	Film resistor, 1%	2512	Yageo	RC2512FR-00R2L
1	Q1	30V	N-channel MOSFET	DFN5X6-8L	Analog Power	AM7432N

EVB TEST RESULTS

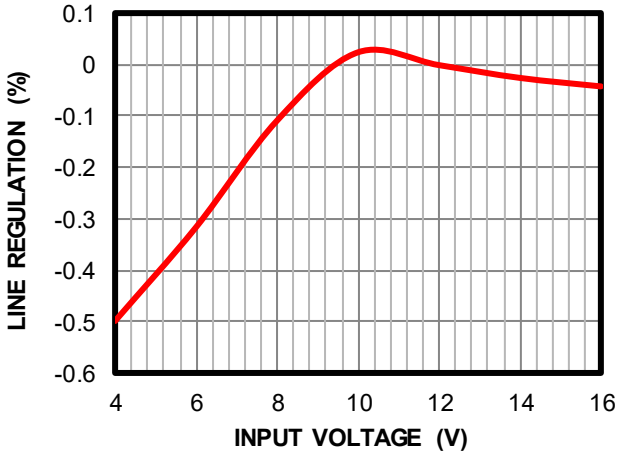
V_{IN} =12V, V_{OUT} =1.2V, T_A = 25°C, CCM = 1000kΩ, unless otherwise noted.

Efficiency

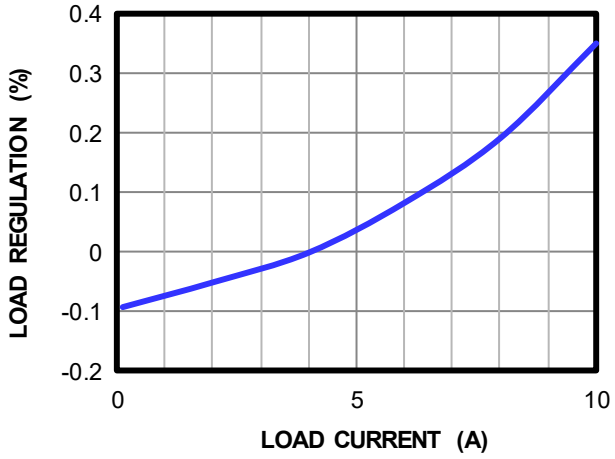
V_{IN} = 4V/12V/16V, V_{OUT} = 1.2V,
I_{OUT} = 0A to 10A



Line Regulation



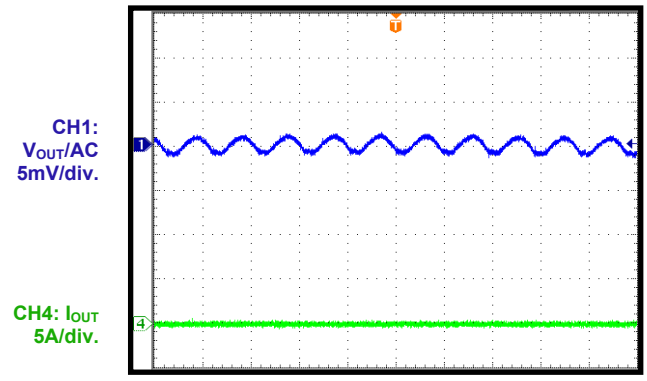
Load Regulation



EVB TEST RESULTS *(continued)*

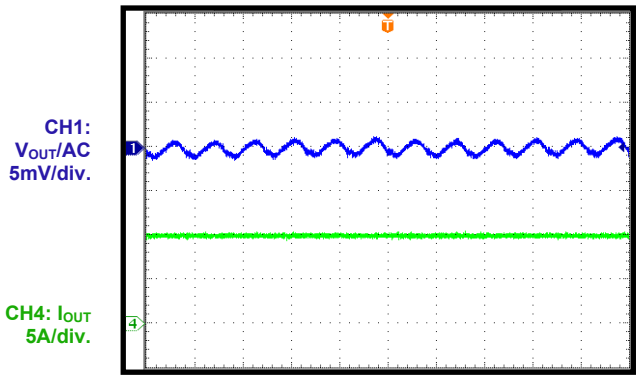
V_{IN} =12V, V_{OUT} =1.2V, T_A = 25°C, CCM = 1000kΩ, unless otherwise noted.

V_{OUT} Ripple
I_{OUT} = 0A



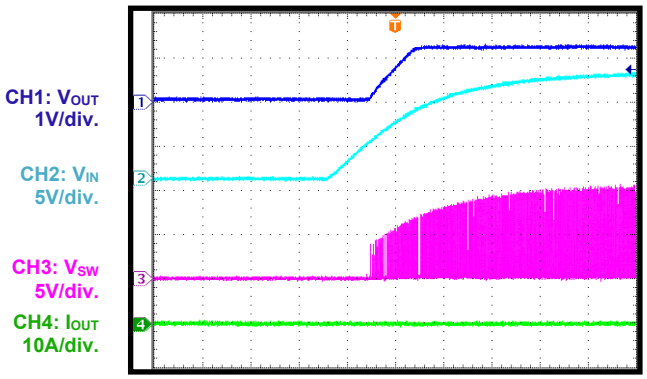
1µs/div.

V_{OUT} Ripple
I_{OUT} = 10A



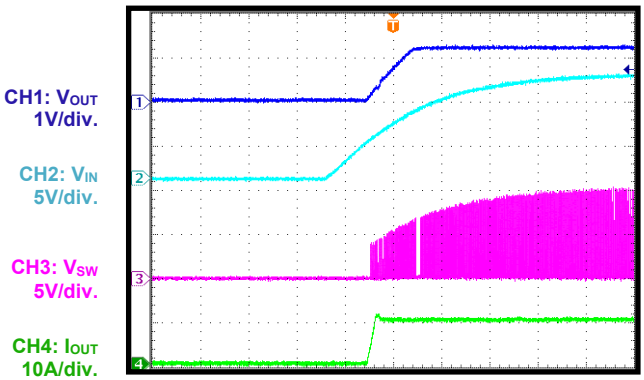
1µs/div.

Start-Up through VIN
I_{OUT} = 0A



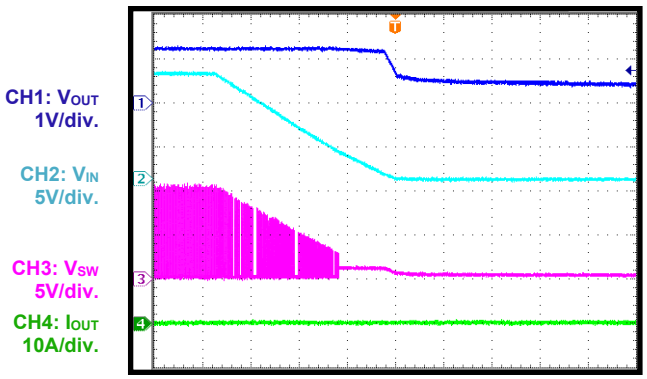
2ms/div.

Start-Up through VIN
I_{OUT} = 10A



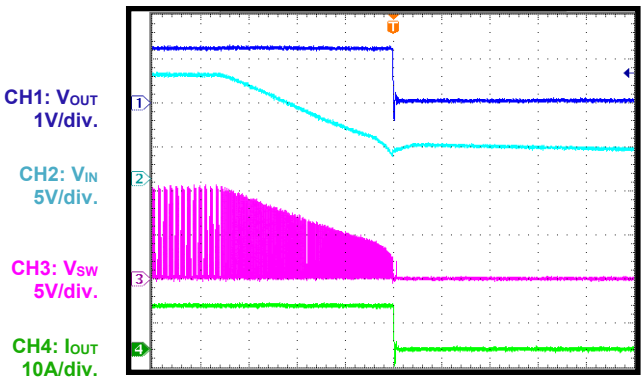
2ms/div.

Shutdown through VIN
I_{OUT} = 0A



20ms/div.

Shutdown through VIN
I_{OUT} = 10A



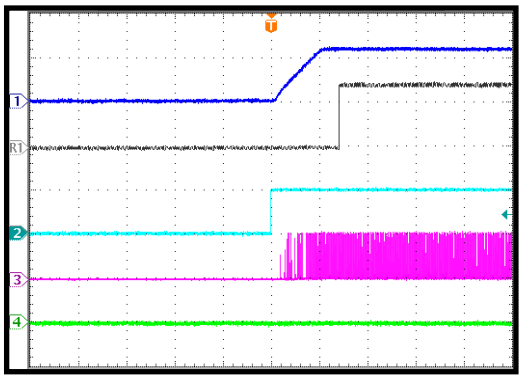
1ms/div.

EVB TEST RESULTS *(continued)*

V_{IN} =12V, V_{OUT} =1.2V, T_A = 25°C, CCM = 1000kΩ, unless otherwise noted.

Start-Up through EN

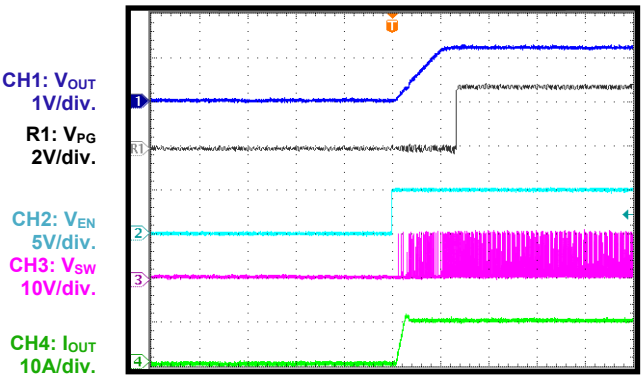
I_{OUT} = 0A



2ms/div.

Start-Up through EN

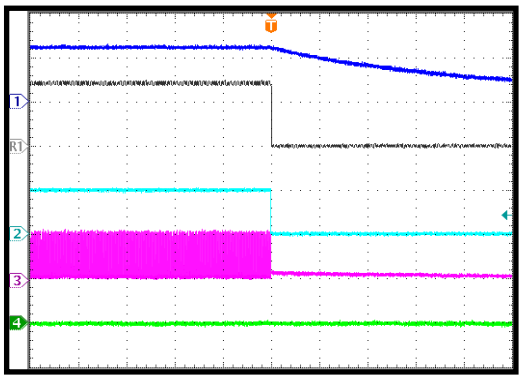
I_{OUT} = 10A



2ms/div.

Shutdown through EN

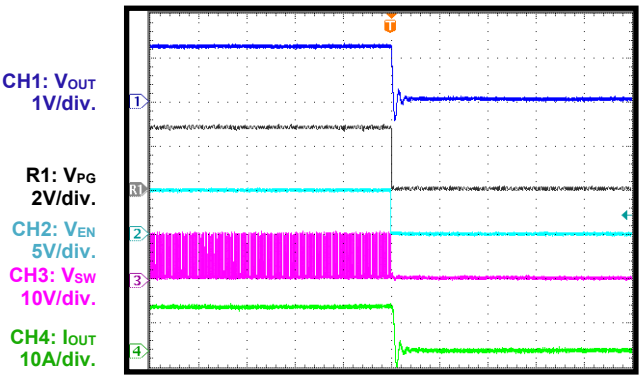
I_{OUT} = 0A



2ms/div.

Shutdown through EN

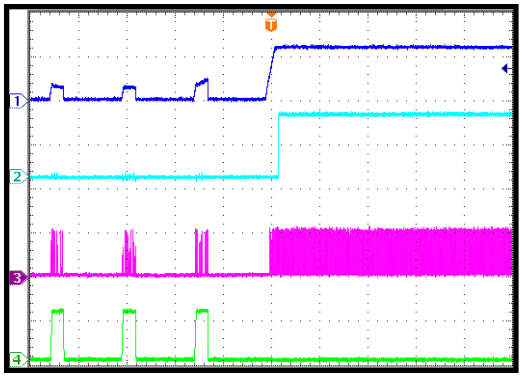
I_{OUT} = 10A



400µs/div.

SCP Recovery

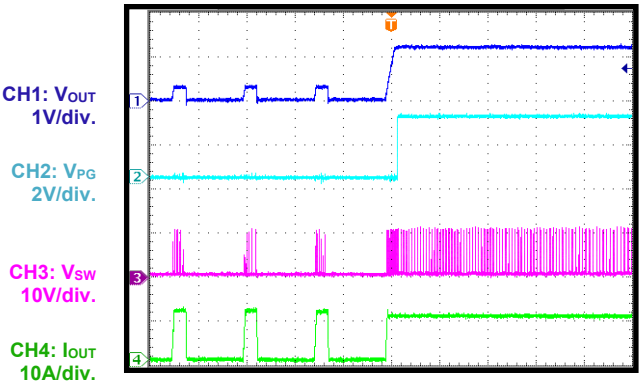
I_{OUT} = 0A



10ms/div.

SCP Recovery

I_{OUT} = 10A



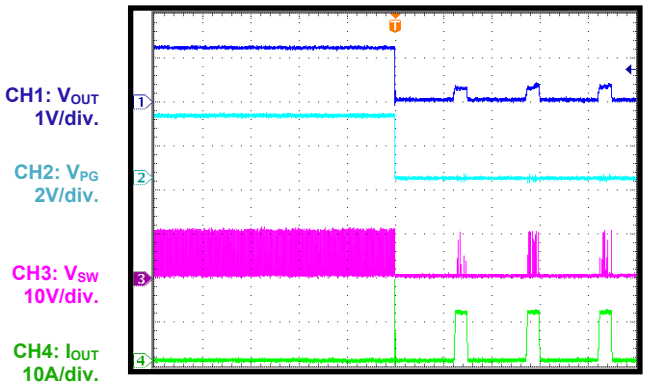
10ms/div.

EVB TEST RESULTS *(continued)*

V_{IN} =12V, V_{OUT} =1.2V, T_A = 25°C, CCM = 1000kΩ, unless otherwise noted.

SCP Entry

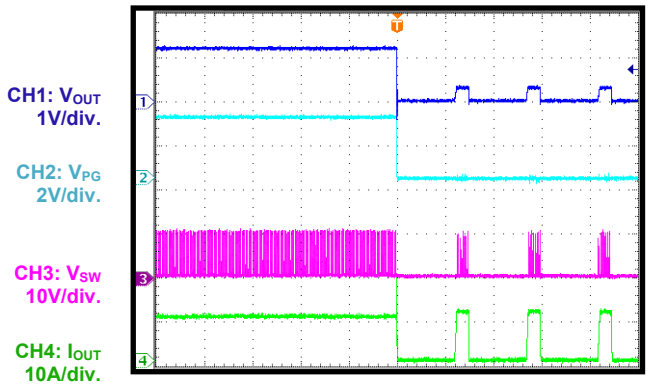
I_{OUT} = 0A



10ms/div.

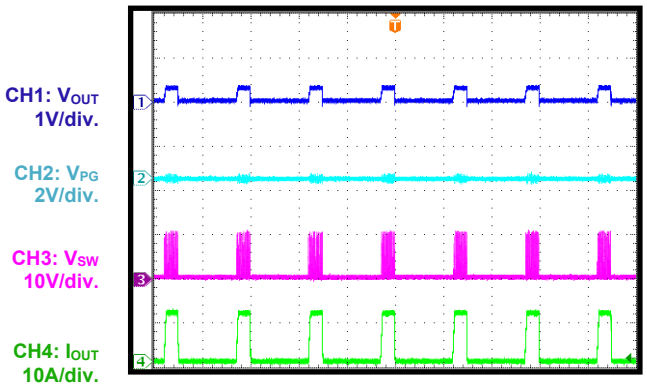
SCP Entry

I_{OUT} = 10A



10ms/div.

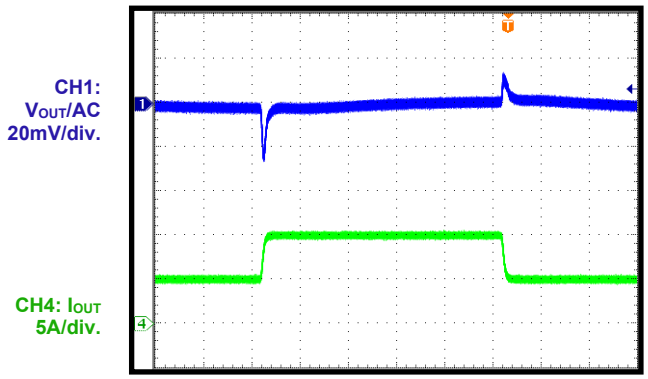
SCP Steady State



10ms/div.

Load Transient

I_{OUT} = 5A to 10A, 1A/μs



100μs/div.

PCB LAYOUT

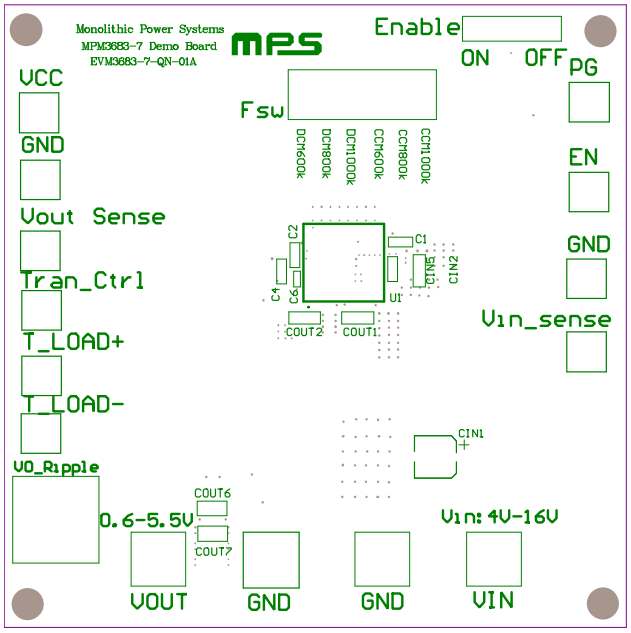


Figure 2: Top Silk

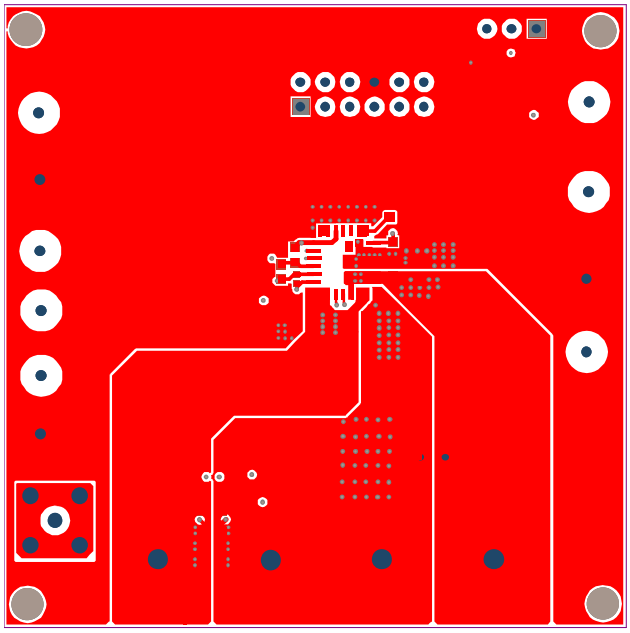


Figure 3: Top Layer

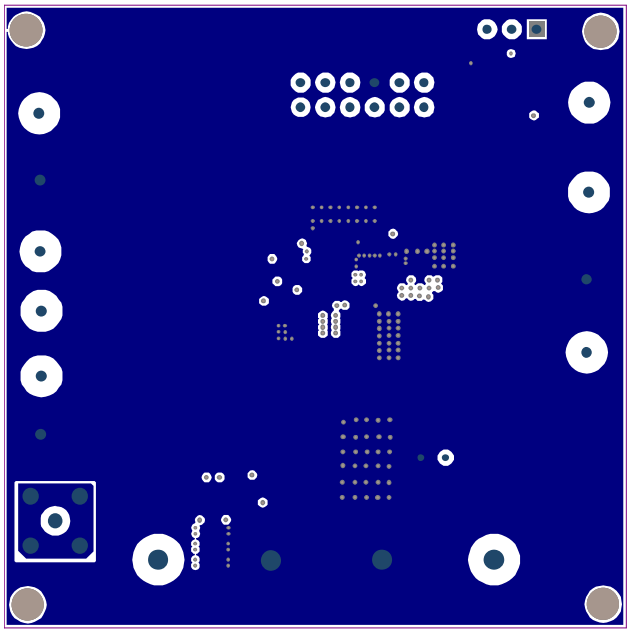


Figure 4: Mid-Layer 1

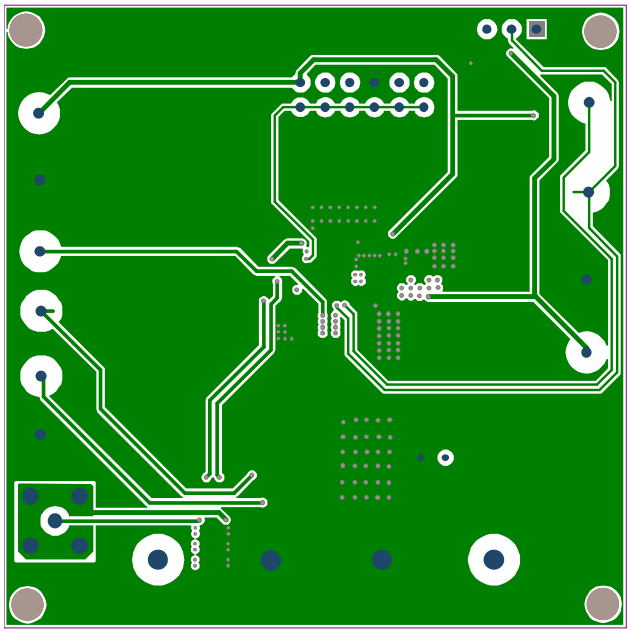


Figure 5: Mid-Layer 2

PCB LAYOUT *(continued)*

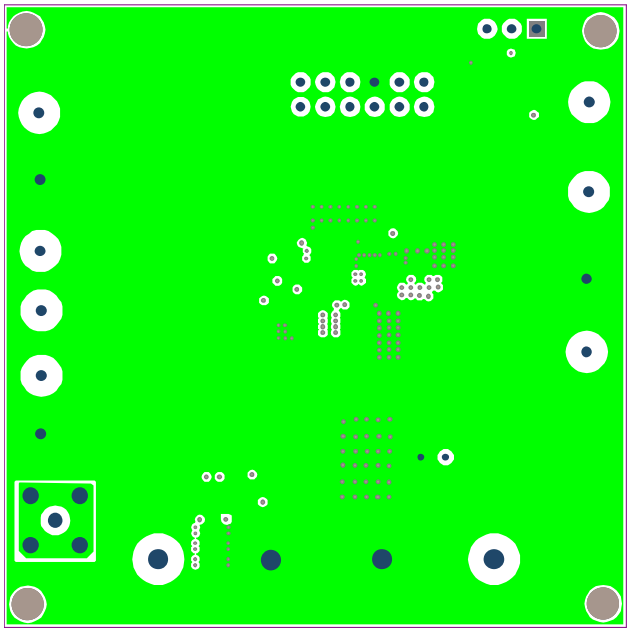


Figure 6: Mid-Layer 3

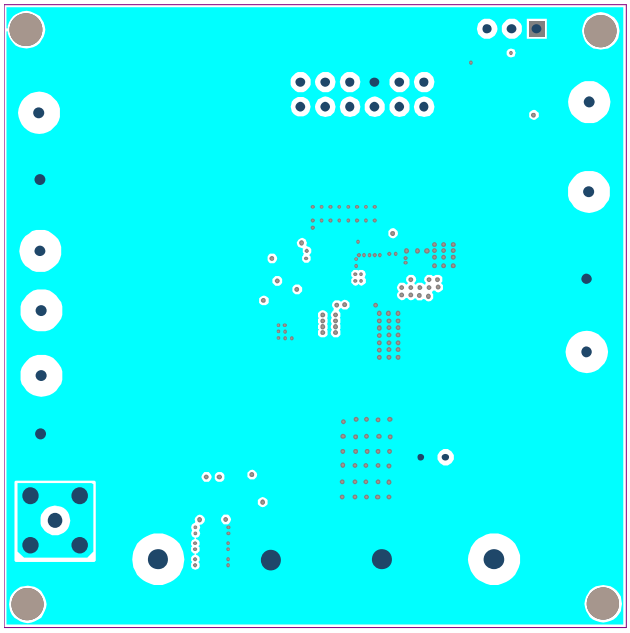


Figure 7: Mid-Layer 4

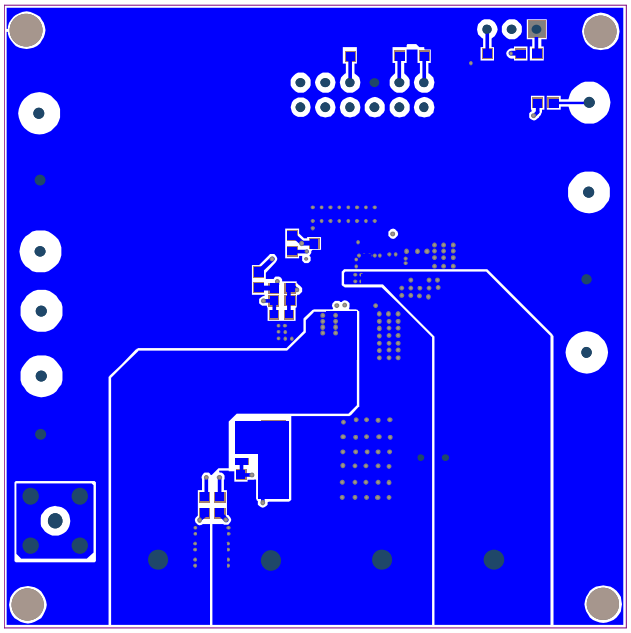


Figure 8: Bottom Layer

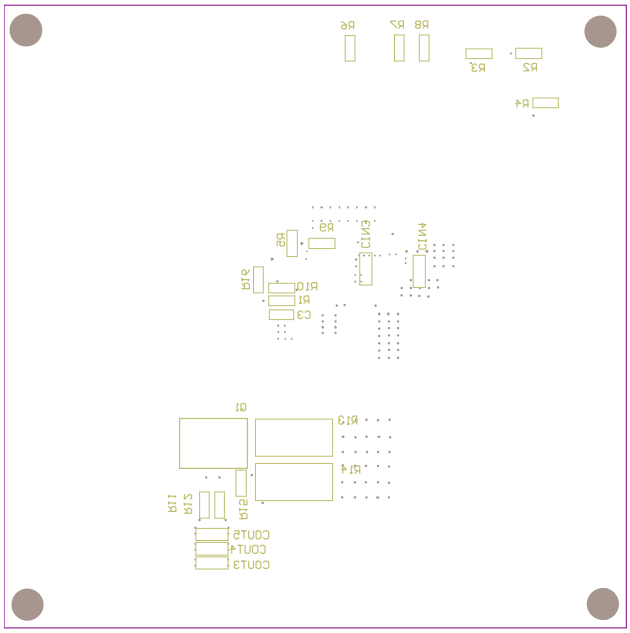


Figure 9: Bottom Silk