EVL5472-Q-00A

Fully Integrated 12V, 6A, Dual-Output PMIC with I²C Interface and Flexible System Configurations Evaluation Board

DESCRIPTION

The EVL5472-Q-00A evaluation board is designed to demonstrate the capabilities of the MP5472, a complete power management IC (PMIC) that integrates two highly efficient step-down DC/DC converters, one adjustable-output low-dropout (LDO) regulator, and flexible logic interface.

The MP5472 adopts constant-on-time (COT) control, and the DC/DC converters provide fast transient response. A configurable 500kHz to 1.25MHz switching frequency (f_{SW}) greatly reduces external capacitance.

Full protection features include under-voltage lockout (UVLO), over-current protection (OCP), under-voltage protection (UVP), over-voltage protection (OVP), and thermal shutdown.

The output voltage (V_{OUT}) is adjustable via the I²C bus, or can be preset uding the multiple-time programmable (MTP) memory. The power-on and power-off sequence and delay are configurable via the MTP or can be controlled via the I²C bus.

The two rails can be configured to work in either independent mode or parallel mode. Current-sharing is implemented when working in parallel mode.

It is recommended to read the MP5472 datasheet prior to making any changes to the EVL5472-Q-00A.

MPL Optimized Performance with MPS Inductor MPL-AY1050 Series

PERFORMANCE SUMMARY (1)

Specifications are at T_A = 25°C, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range		3V to 16V
Buck 1		
Output voltage (V_{OUT})	V_{IN} = 3V to 16V, I_{OUT} = 0A to 6A	V_{OUT} = 0.8V
Maximum output current (I_{OUT})	V_{IN} = 3V to 16V	6A
Typical efficiency	V_{IN} = 12V, V_{OUT} = 0.8V, I_{OUT} = 6A	85.76%
Peak efficiency	V_{IN} = 12V, V_{OUT} = 0.8V, I_{OUT} = 3A	87.29%
Default switching frequency (f_{SW})		750kHz
Buck 2		
V_{OUT}	V_{IN} = 3V to 16V, I_{OUT} = 0A to 6A	V_{OUT} = 0.8V
Maximum I_{OUT}	V_{IN} = 3V to 16V	6A
Typical efficiency	V_{IN} = 12V, V_{OUT} = 0.8V, I_{OUT} = 6A	85.80%
Peak efficiency	V_{IN} = 12V, V_{OUT} = 0.8V, I_{OUT} = 3A	87.35%
Default f_{SW}		750kHz

Note:

1) For different V_{IN} and V_{OUT} specifications with different output capacitors and inductors, the application circuit parameters may require changes.

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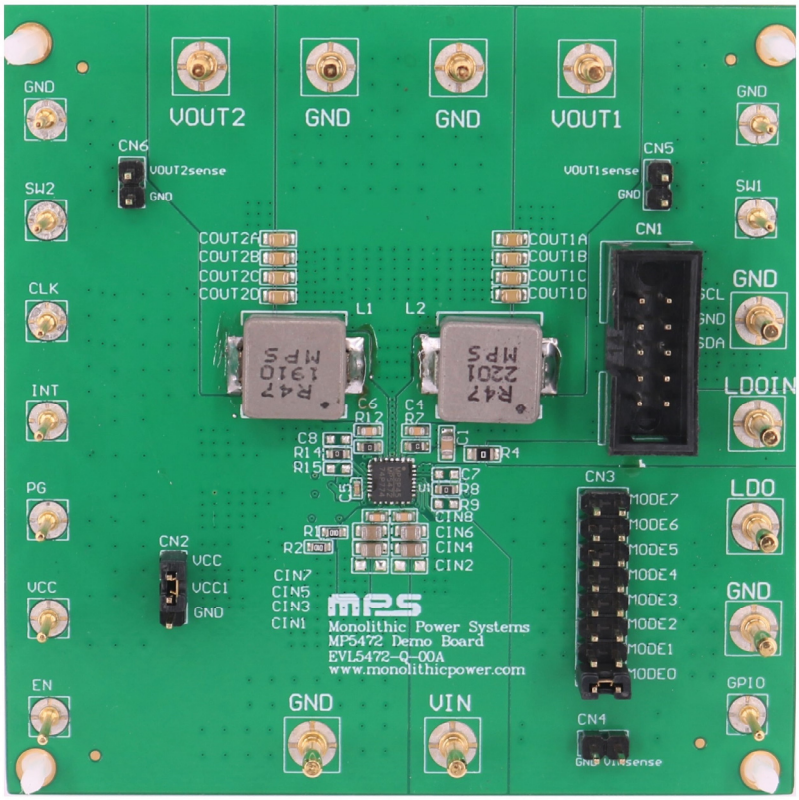
EVALUATION BOARD



LxWxH (8cmx8cmx2.5cm)

Board Number	MPS IC Number
EVL5472-Q-00A	MP5472GR

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QUICK START GUIDE

The EVL5472-Q-00A evaluation board is easy to set up and use to evaluate the performance of the MP5472. For proper measurement equipment set-up, refer to Figure 1 on page 4 and follow the steps below:

1. Preset the power supply (V_{IN}) to be between 3V and 16V, then turn off the power supply.
2. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
3. Connect buck 1's load terminals to:
   a. Positive (+): VOUT1
   b. Negative (-): GND
4. Connect buck 2's load terminals to:
   a. Positive (+): VOUT2
   b. Negative (-): GND
5. Connect the SCL, SDA, and GND signals from the I^2C and I^3C master side to their respective terminals on CN1.
6. Turn on the power supply. All the bucks should start up automatically.

Notes:

2) Ensure that the input voltage (V_{IN}) does not exceed 18V.
3) When measuring the output voltage (V_{OUT}) ripple or V_{IN} ripple, do not use the long ground lead on the oscilloscope probe.

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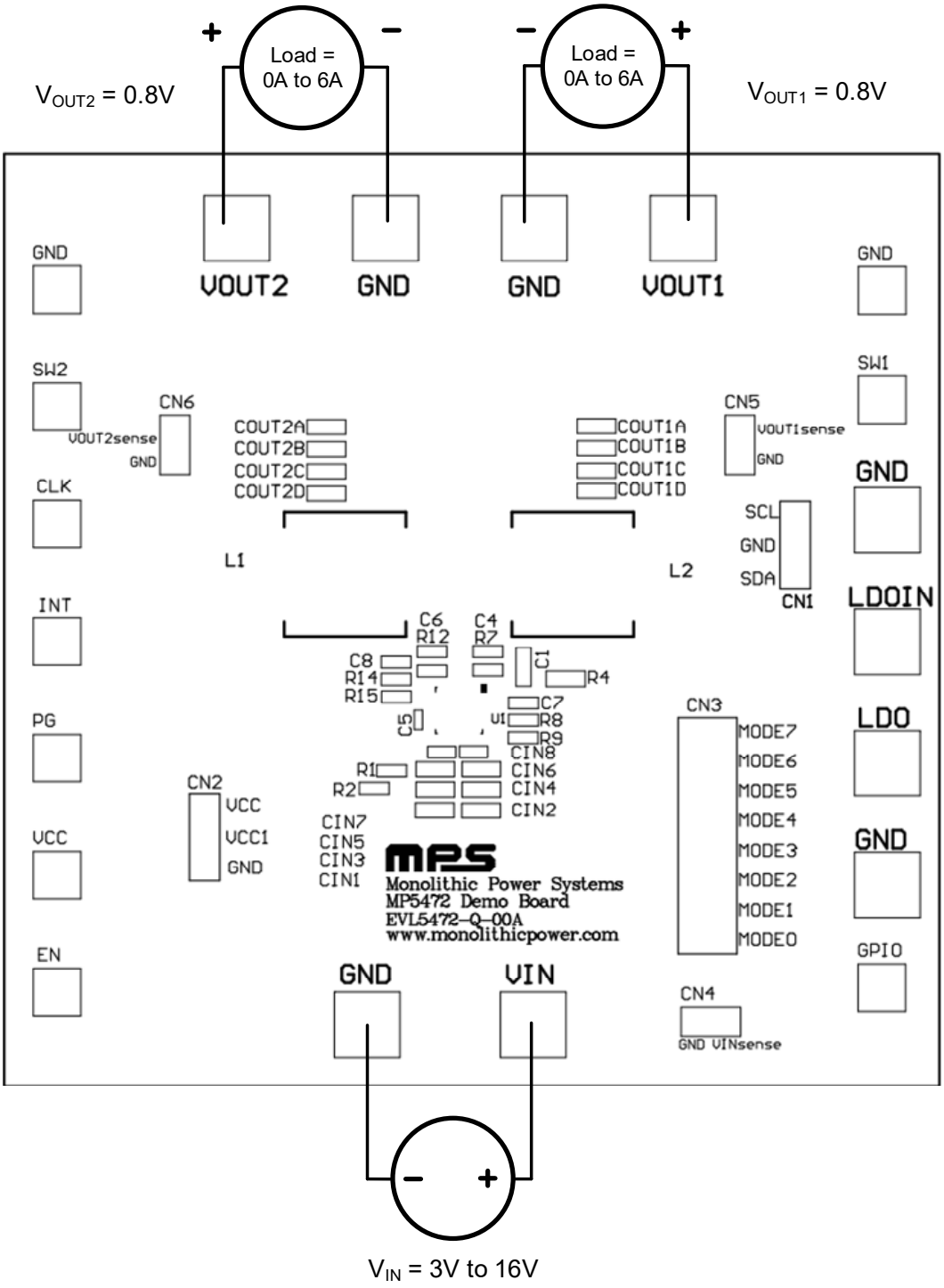

Figure 1: Measurement Equipment Set-Up

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EVALUATION BOARD SCHEMATIC

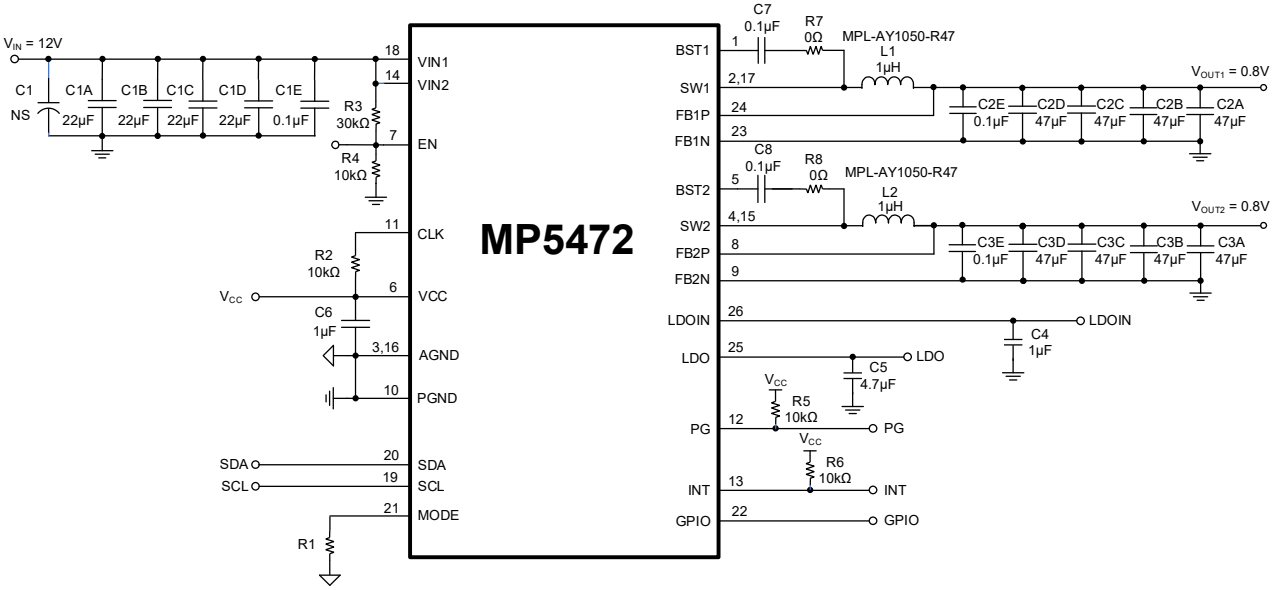

Figure 2: Evaluation Board Schematic

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EVL5472-Q-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
2	CIN1A, CIN2A	1µF	Ceramic capacitor, 25V, X7R	0805	Murata	
2	CIN5, CIN6, CIN3, CIN4	22µF	Ceramic capacitor, 25V, X5R	0805	Murata	GRM21BR61E226ME44L
4	CIN7, CIN8, C4, C6	0.1µF	Ceramic capacitor, 25V, X7R	0603	WE	885012206071
1	C1	1µF	Ceramic capacitor, 10V, X7R	0805	Murata	GRM21BR71A105KA01L
2	C2, C3	4.7µF	Ceramic capacitor, 10V, X5R	0805	Murata	GRM21BR61A475ME15L
1	C5	1µF	Ceramic capacitor, 10V, X5R	0402	Murata	GRM155R61A105KE01D
2	C7, C8	NS				
8	COUT1A, COUT1B, COUT1C, COUT1D, COUT2A, COUT2B, COUT2C, COUT2D	47µF	Ceramic capacitor, 10V, X5R	0805	Murata	GRM21BR61A476ME15L
4	R5, R6, R9, R15	NS				
2	R1, R2	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
3	R3, R10, R11	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	R4	0Ω	Film resistor, 1%	0805	Yageo	RC0805FR-070RL
6	R7, R8, R12, R13, R14, R22	0Ω	Film resistor, 1%	0603	Yageo	RC0603FR-070RL
1	R16	6.2kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-076K2L
1	R17	13kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0713KL
1	R18	27kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0727KL
1	R19	51kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0751KL
1	R20	75kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0775KL
1	R21	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R23	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
2	L1, L2	0.47µH	Molded Inductor	1050	MPS	MPL-AY1050-R47
1	U1	MP5472	12V, 6A dual-output PCIC integrating two with step-down DC/DC converters, one LDO, and a flexible logic interface	QFN-26 (4mmx 4mm)	MPS	MP5472

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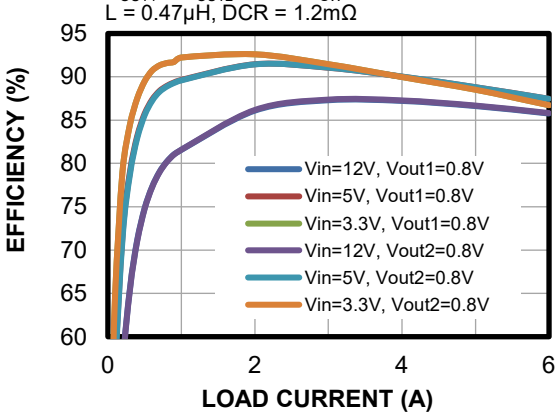
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 12V, V_{OUT1} = 0.8V, V_{OUT2} = 0.8V, T_A = 25°C, unless otherwise noted.

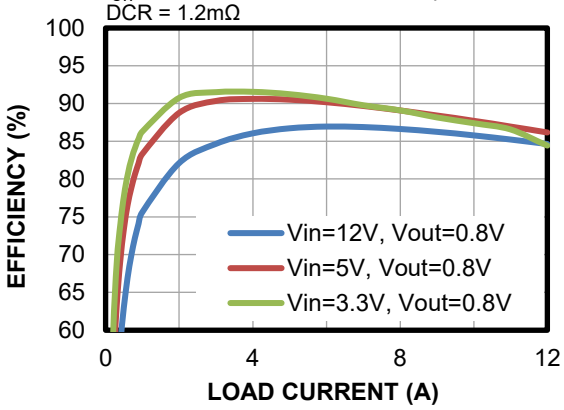
Efficiency vs. Load Current

Single-phase, dual-output,
V_{OUT1} = V_{OUT2} = 0.8V, f_{SW} = 750kHz with FCCM,
L = 0.47µH, DCR = 1.2mΩ



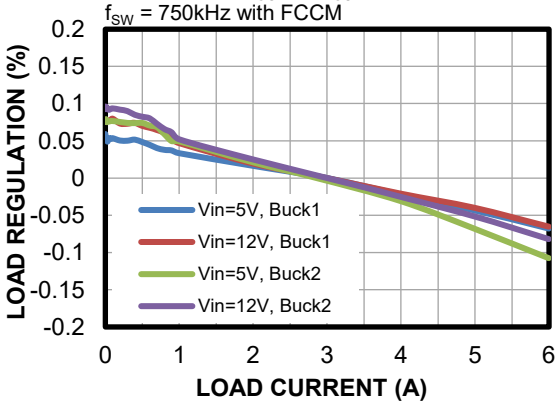
Efficiency vs. Load Current

Dual-phase, single-output, V_{OUT} = 0.8V,
f_{SW} = 750kHz with FCCM, L = 0.47µH,
DCR = 1.2mΩ



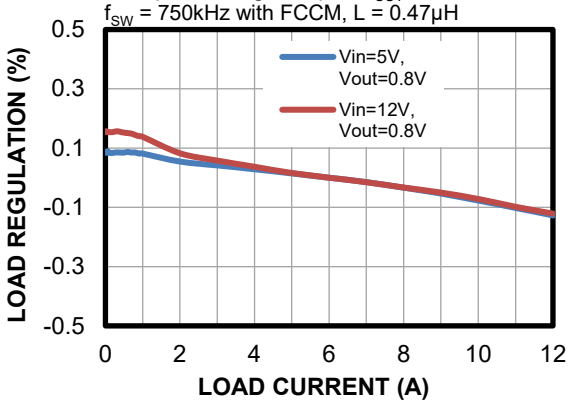
Load Regulation vs. Load Current

Single-phase, V_{OUT1} = V_{OUT2} = 0.8V,
f_{SW} = 750kHz with FCCM



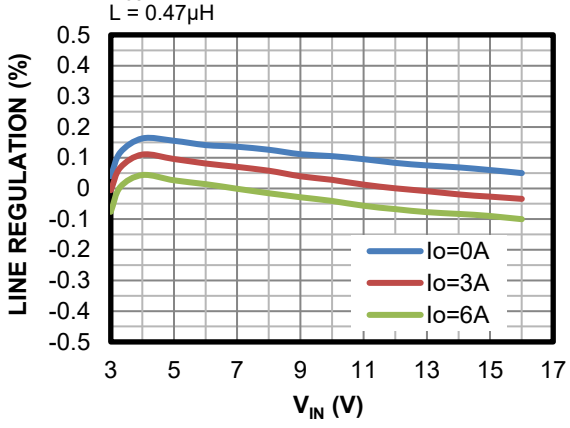
Load Regulation vs. Load Current

Dual-phase, single-output, V_{OUT} = 0.8V,
f_{SW} = 750kHz with FCCM, L = 0.47µH



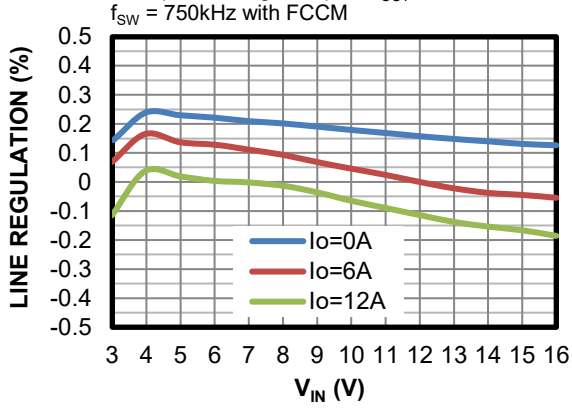
Line Regulation vs. Input Voltage

Buck 1 channel, single-phase,
V_{OUT1} = 0.8V, f_{SW} = 750kHz with FCCM,
L = 0.47µH



Line Regulation vs. Input Voltage

Dual-phase, single-output, V_{OUT} = 0.8V,
f_{SW} = 750kHz with FCCM



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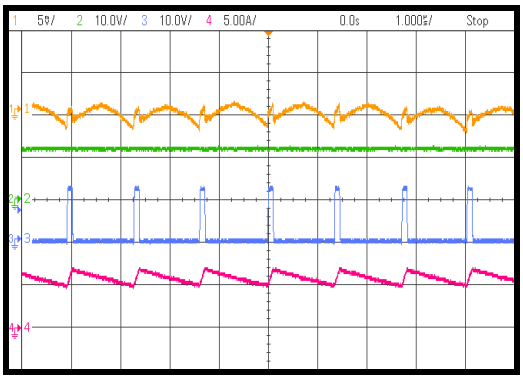
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 12V, V_{OUT1} = 0.8V, V_{OUT2} = 0.8V, T_A = 25°C, unless otherwise noted.

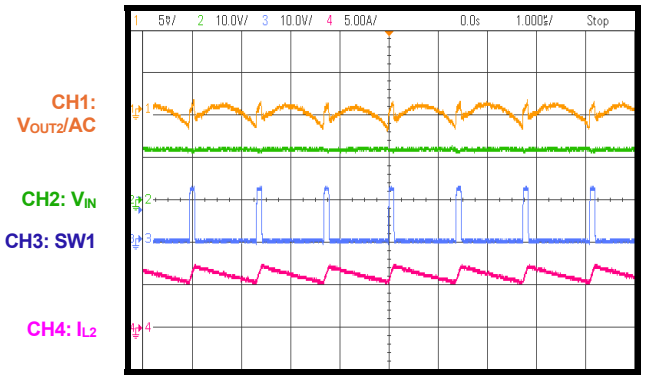
Steady State

Single-phase, V_{OUT1} = 0.8V, f_{SW} = 750kHz, I_{OUTA} = 6A



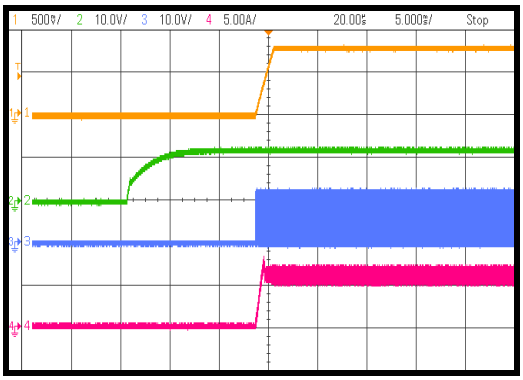
Steady State

Single-phase, V_{OUT2} = 0.8V, f_{SW} = 750kHz, I_{OUTA} = 6A



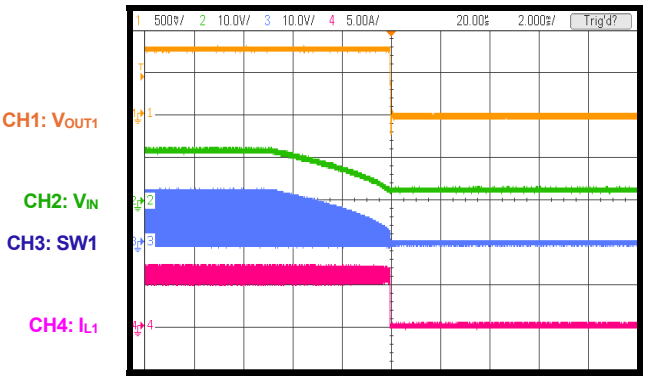
Start-Up through VIN

Single-phase, V_{OUT1} = 0.8V, I_{OUT1} = 6A



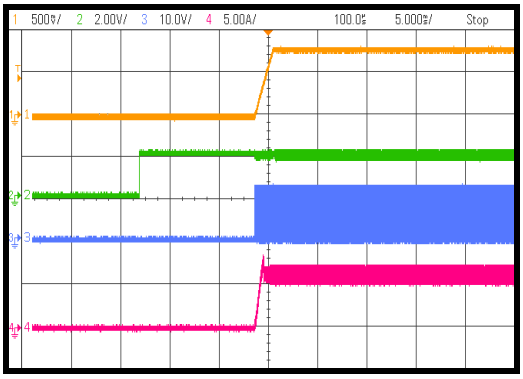
Shutdown through VIN

Single-phase, V_{OUT1} = 0.8V, I_{OUT1} = 6A



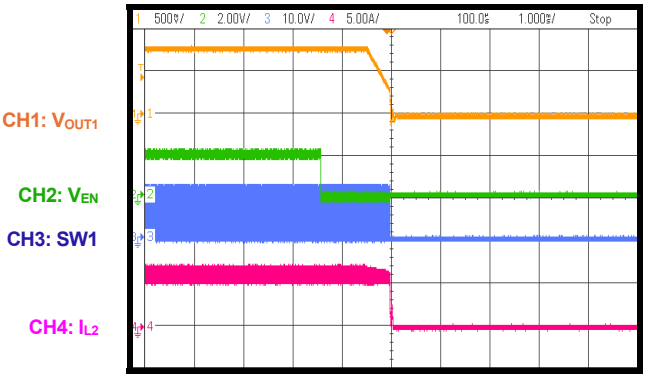
Start-Up through EN

Single-phase, V_{OUT1} = 0.8V, I_{OUT1} = 6A



Shutdown through EN

Single-phase, V_{OUT1} = 0.8V, I_{OUT1} = 6A



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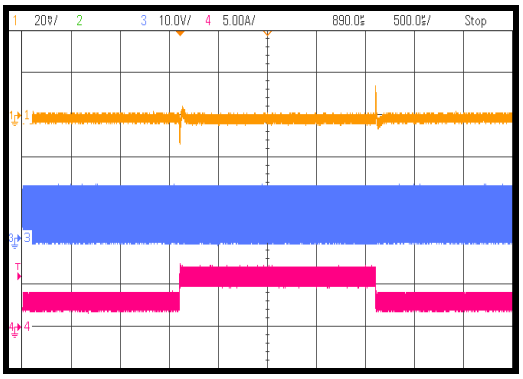
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 12V, V_{OUT1} = 0.8V, V_{OUT2} = 0.8V, T_A = 25°C, unless otherwise noted.

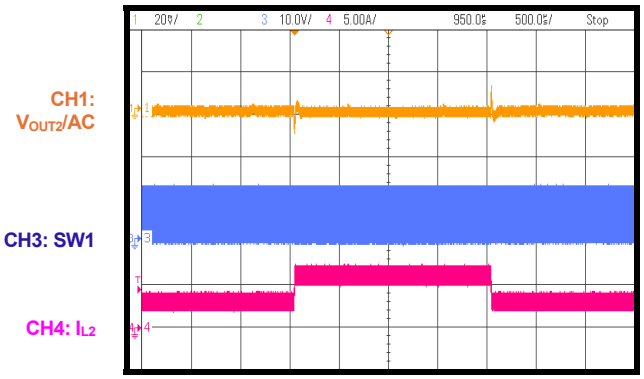
Load Transient Response

Single-phase, V_{OUT1} = 0.8V, I_{OUT} = 3A to 6A, slew rate = 1A/μs



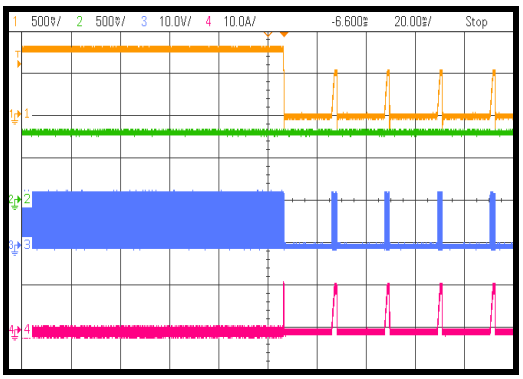
Load Transient Response

Single-phase, V_{OUT2} = 0.8V, I_{OUT} = 3A to 6A, slew rate = 1A/μs



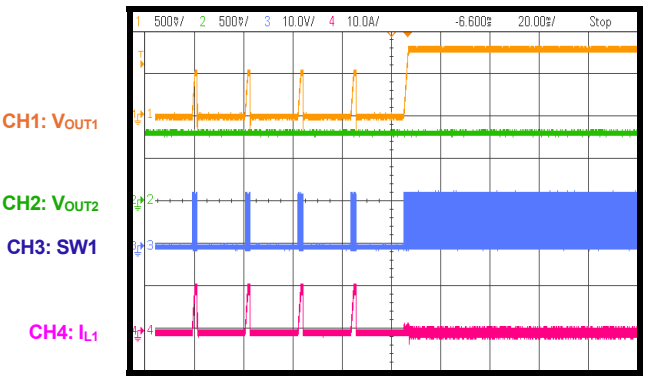
SCP Entry

Single-phase, V_{OUT1} = V_{OUT2} = 0.8V, V_{OUT1} short to GND



SCP Recovery

Single-phase, V_{OUT1} = V_{OUT2} = 0.8V, V_{OUT1} short to GND



SCP Entry

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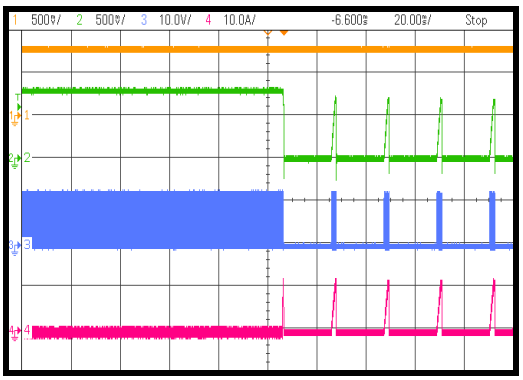
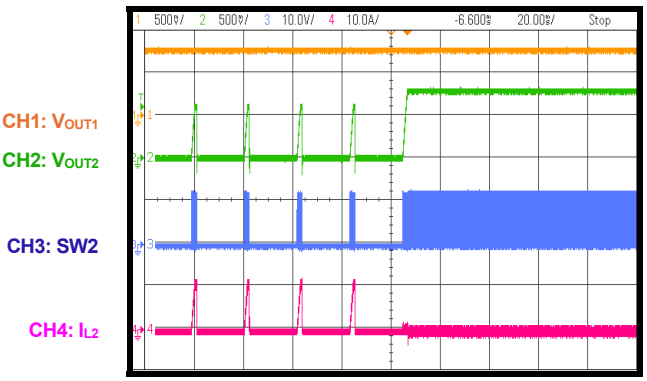


SCP Recovery

Single-phase, V_{OUT1} = V_{OUT2} = 0.8V, V_{OUT2} short to GND



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PCB LAYOUT

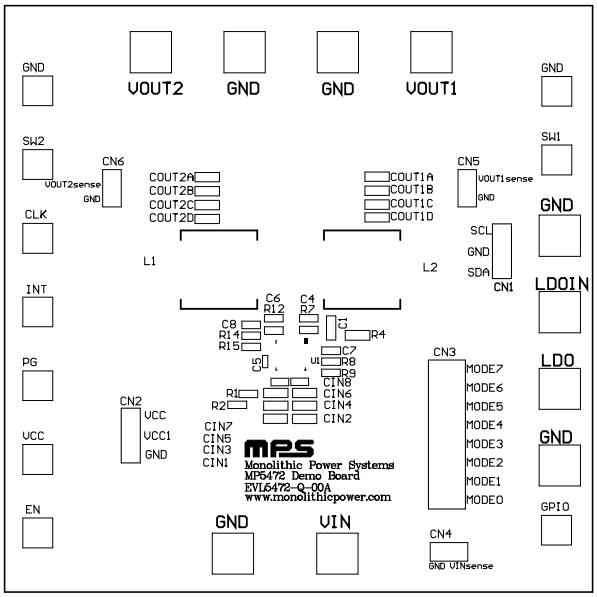

Figure 3: Top Silk

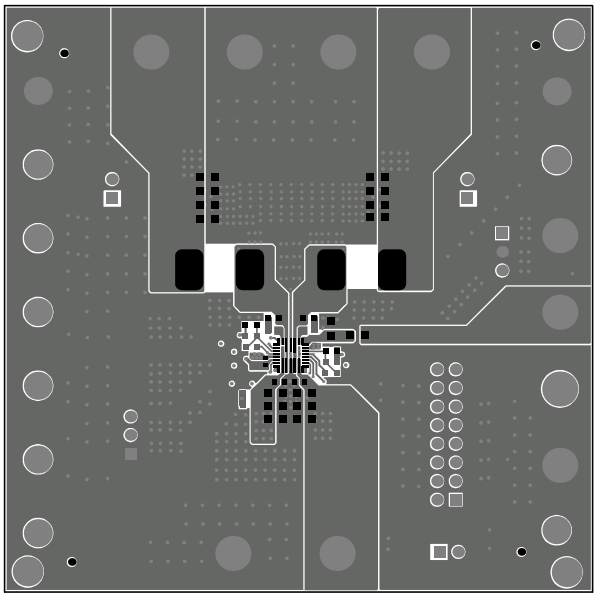

Figure 4: Top Layer

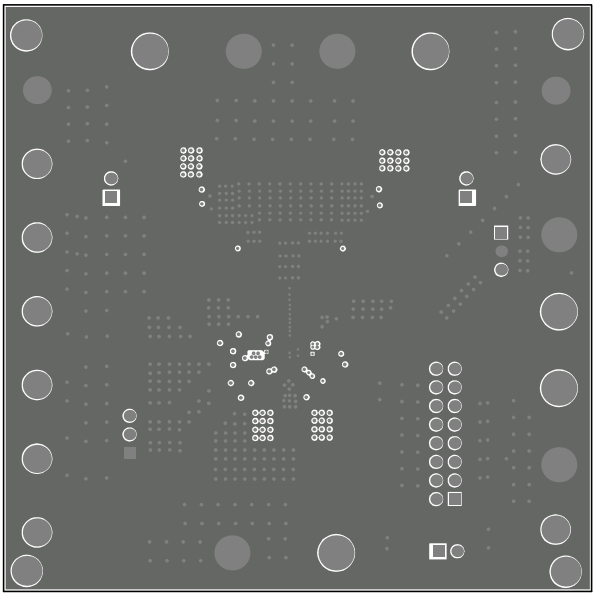

Figure 5: Mid-Layer 1

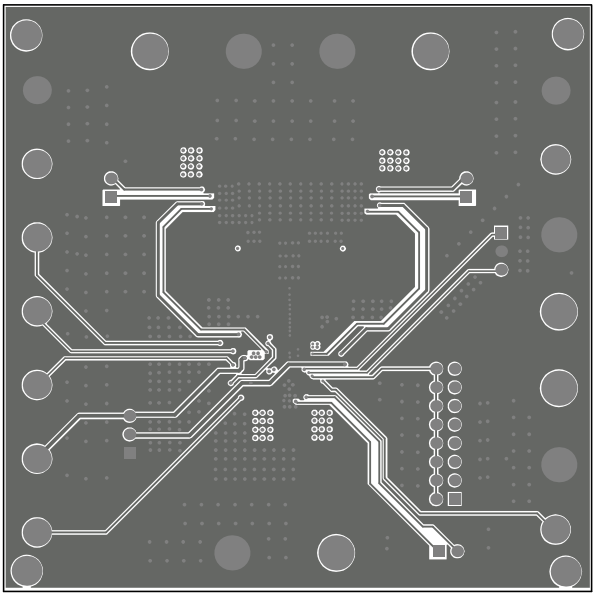

Figure 6: Mid-Layer 2

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PCB LAYOUT *(continued)*

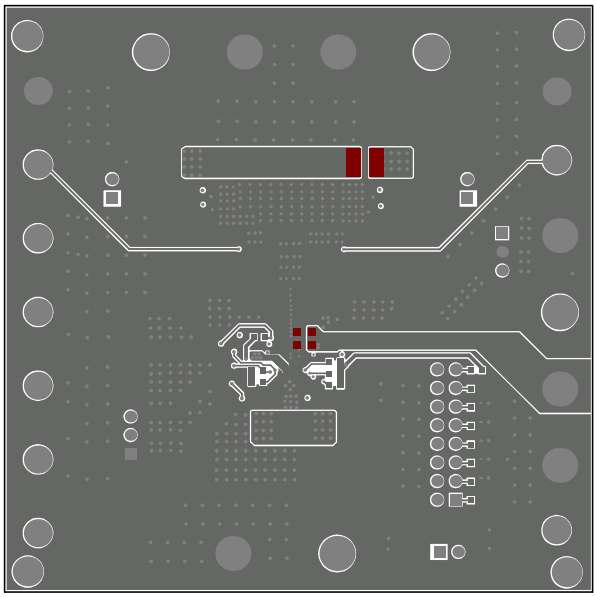

Figure 7: Bottom Layer

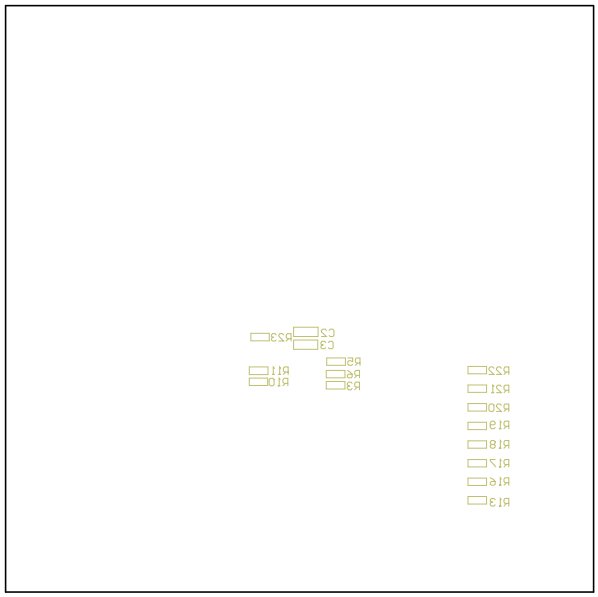

Figure 8: Bottom Silk

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	11/15/2024	Initial Release	-

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