EVQ4583-QVE-00A

90V, 3.5A, 9µA I_Q, Synchronous Step-Down DC/DC Converter Evaluation Board

DESCRIPTION

The EVQ4583-QVE-00A evaluation board is designed to demonstrate the capabilities of the MPQ4583, a 9µA quiescent current (I_Q), synchronous step-down converter with integrated high-side and low-side MOSFETs (HS-FET and LS-FET, respectively). It supports up to 3.5A of output current (I_{OUT}) with internal compensation.

High power conversion efficiency across a wide load range is achieved via pulse-skip mode (PSM) and low I_Q under light-load conditions to reduce switching and gate driver losses.

To achieve a small output ripple at light loads, the MODE/SYNC pin can be pulled high to set device operation to forced continuous conduction mode (FCCM). The switching frequency (f_{SW}) is always fixed at 400kHz under all load conditions.

Protection features include over-current protection (OCP), short-circuit protection (SCP) with hiccup mode, output over-voltage protection (OVP), and over-temperature protection (OTP).

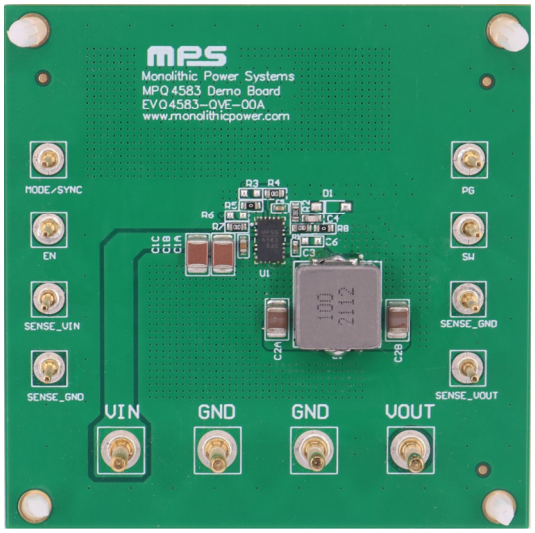
The MPQ4583 is available in a QFN-19 (3mmx5mm) package, and is available in AEC-Q100 Grade 1.

PERFORMANCE SUMMARY

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

Parameters	Conditions	Value
Input voltage (V_{IN}) range		6V to 90V
Output voltage (V_{OUT})	V_{IN} = 6V to 90V, I_{OUT} = 0A to 3.5A	V_{OUT} = 5V
Maximum output current (I_{OUT})	V_{IN} = 6V to 90V	3.5A
Switching frequency (f_{SW})		400kHz

EVALUATION BOARD



LxW (6.35cmx6.35cm)

Board Number	MPS IC Number
EVQ4583-QVE-00A	MPQ4583GQVE-AEC1

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QUICK START GUIDE

The EVQ4583-QVE-00A evaluation board is easy to set up and use to evaluate the performance of the MPQ4583. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply to be between 6V and 90V, then turn off the power supply.
2. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
3. Connect the load terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
4. The IC can be set to forced continuous conduction mode (FCCM) by pulling the MODE pin up to the VCC voltage (V_{CC}). The default setting is pulse-skip mode (PSM) by connecting to the MODE pin to GND.
5. After making the connections, turn on the power supply. The board should start up automatically.

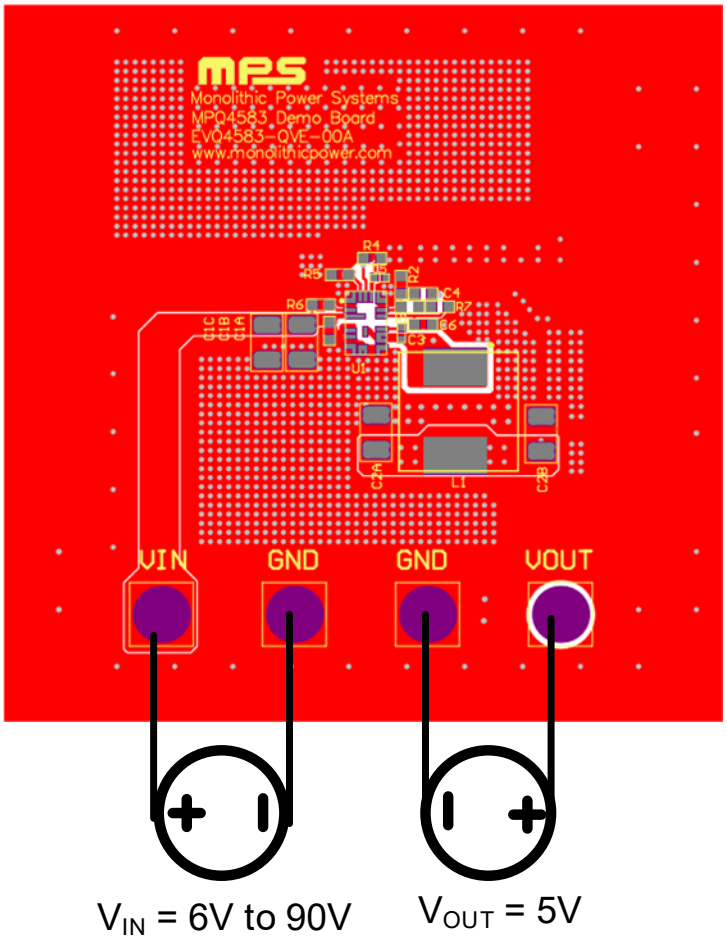

Figure 1: Measurement Equipment Set-Up

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EVALUATION BOARD SCHEMATIC

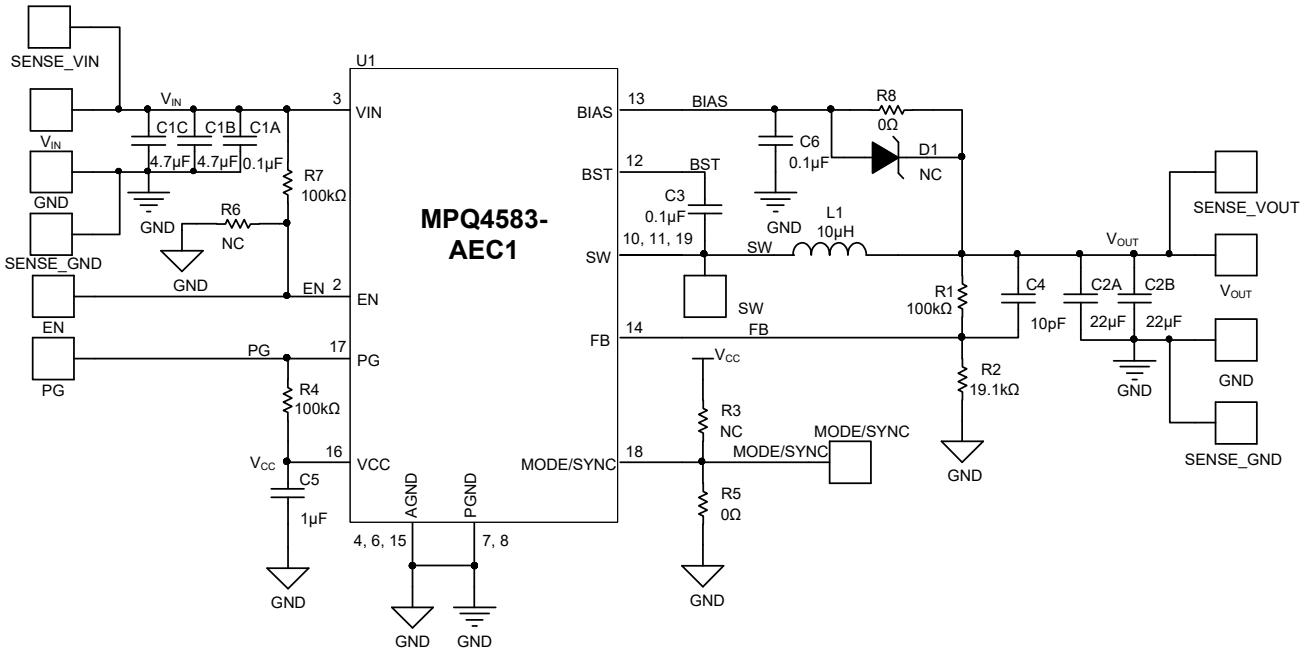

Figure 2: Evaluation Board Schematic

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EVQ4583-QVE-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1A	100nF	Ceramic capacitor, 100V, X7R	0603	Murata	GRM188R72A104KA35D
2	C1B, C1C	4.7μF	Ceramic capacitor, 100V, X7S	1210	Murata	GRM32DC72A475KE01L
2	C2A, C2B	22μF	Ceramic capacitor, 16V, X5R	1210	Murata	GRM32ER61C226KE20L
2	C3, C6	100nF	Ceramic capacitor, 16V, X5R	0402	Murata	GRM155R61C104KA88D
1	C5	1μF	Ceramic capacitor, 10V, X5R	0402	Murata	GRM155R61A105KE01D
4	C4, R3, R6, D1	NS				
2	R4, R7	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R1	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R2	19.1kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0719K1L
2	R5, R8	0Ω	Film resistor, 1%	0603	Yageo	RC0603FR-070RL
1	L1	10μH	Inductor, R_{DC} = 38mΩ, I_{SAT} = 6.9A	7.7mmx 7.2mmx 5.2mm	Cyntec	VCHA075D-100MS6
4	VIN, GND, GND, VOUT	φ2.0	φ2.0 copper pin	DIP	QJJCJ	φ2.0 copper pin
6	SENSE_GND, SENSE_GND, EN, PG, SW, MODE/SYNC	φ1.0	φ1.0 copper pin	DIP	QJJCJ	φ1.0 copper pin
1	U1	MPQ4583-AEC1	90V, 3A, synchronous step-down DC/DC converter, AEC-Q100 qualified	QFN-19 (3mmx 5mm)	MPS	MPQ4583GQVE-AEC1

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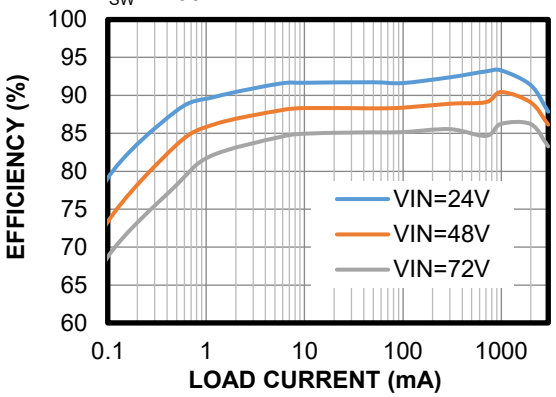
EVB TEST RESULTS

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

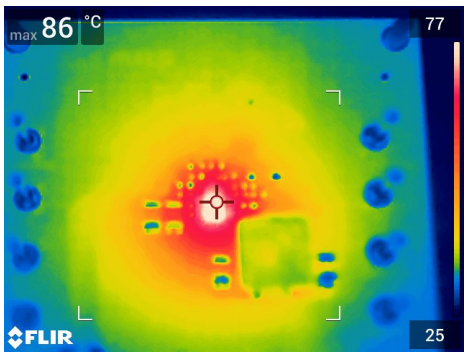
Efficiency vs. Load Current

V_{OUT} = 5V, L = 10μH, DCR = 34.5mΩ, f_{SW} = 400kHz



Thermal Performance

V_{OUT} = 5V, L = 10μH, DCR = 34.5mΩ, f_{SW} = 400kHz, I_{OUT} = 3A, T_A = 25°C



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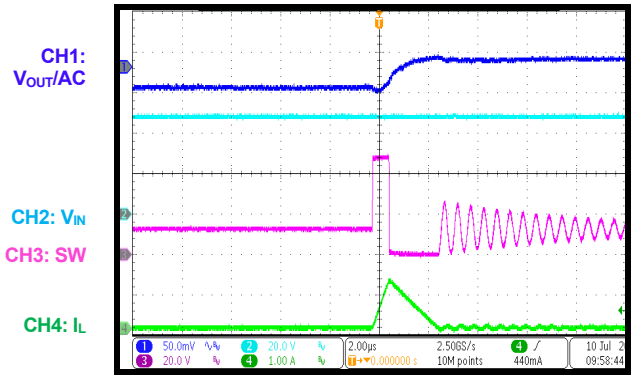
EVB TEST RESULTS *(continued)*

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

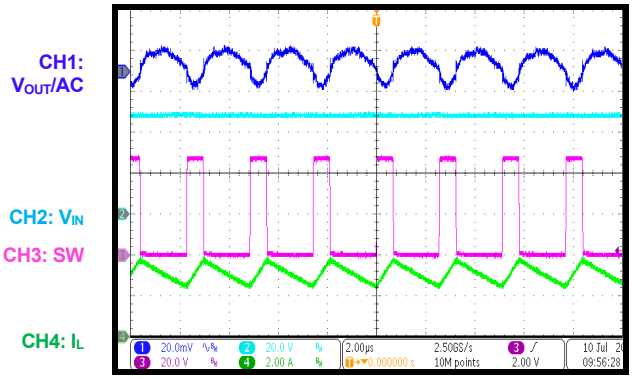
Steady State

I_{OUT} = 0A



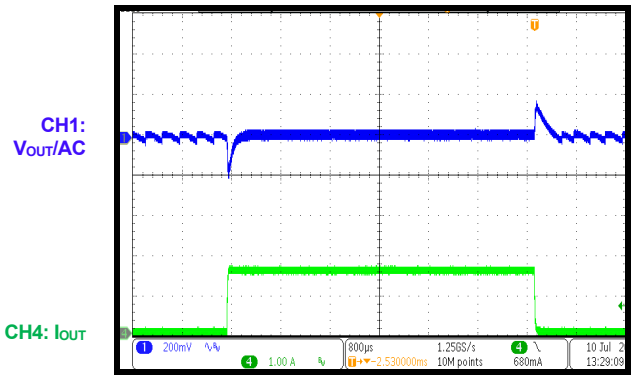
Steady State

I_{OUT} = 3A



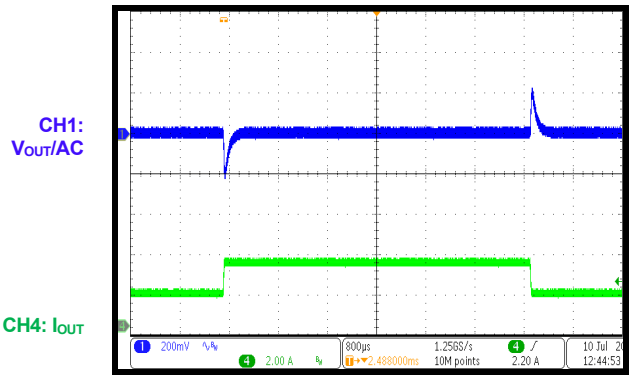
Load Transient

I_{OUT} = 0A to 1.5A



Load Transient

I_{OUT} = 1.5A to 3A



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PCB LAYOUT

Figure 3: Top Silk

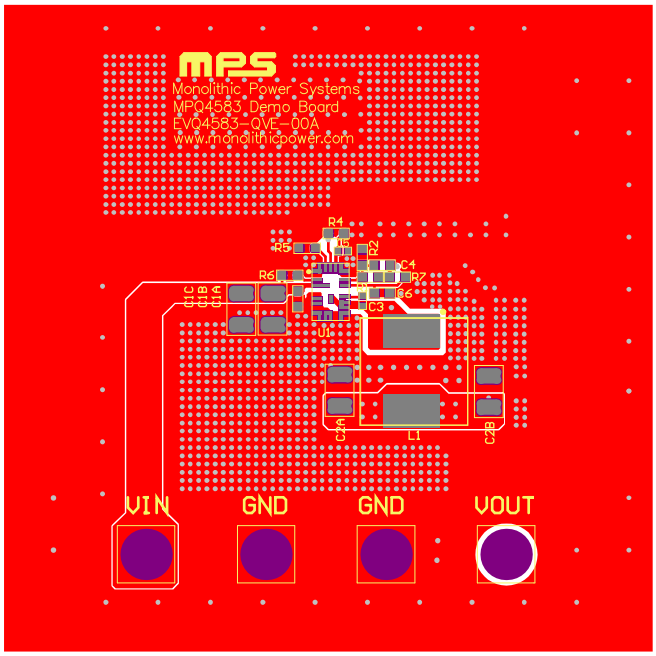

Figure 4: Top Layer

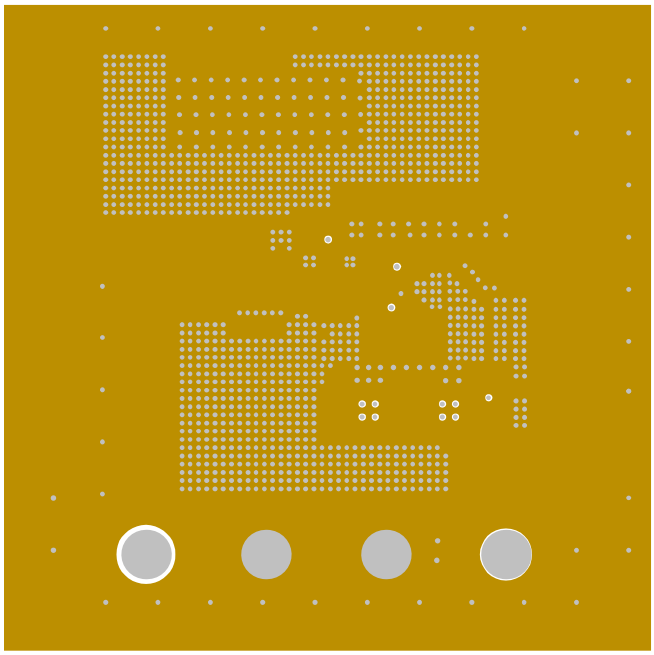

Figure 5: Mid-Layer 1

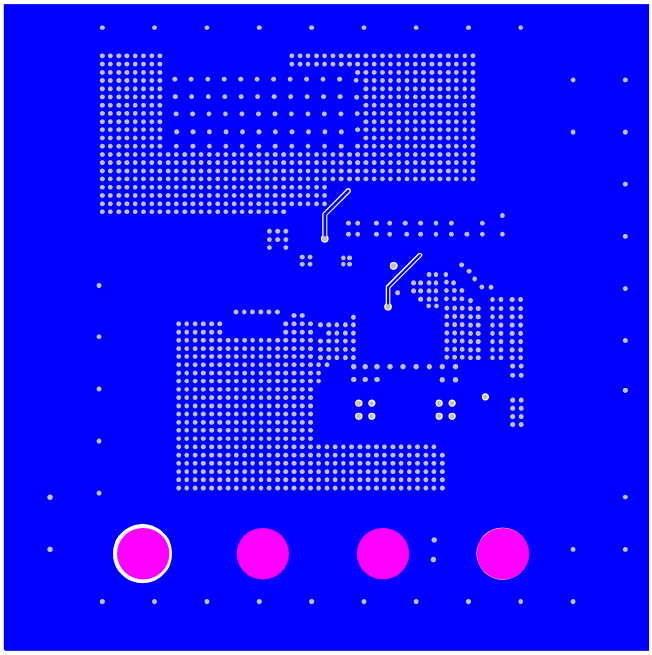

Figure 6: Mid-Layer 2

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PCB LAYOUT *(continued)*

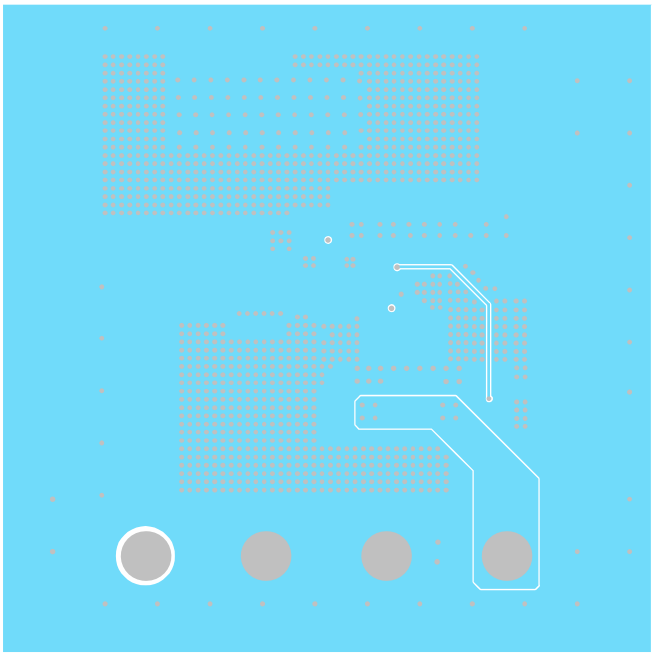

Figure 7: Bottom Layer

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	4/15/2025	Initial Release	-

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