



EV4582-QVE-00A

100V, 2A, 8 μ A I_Q , Synchronous Step-Down DC/DC Converter Evaluation Board

DESCRIPTION

The EV4582-QVE-00A is an evaluation board designed to demonstrate the capabilities of the MP4582, an 8 μ A quiescent current (I_Q), integrated synchronous step-down converter. It supports up to 2A of output current (I_{OUT}) with internal compensation.

The MP4582 provides high power conversion efficiency across a wide load range, which is achieved via power-save mode (PSM) and low I_Q under light-load conditions. This reduces switching and gate driving losses.

To achieve low output ripple at light loads, pull the MODE/SYNC pin high to enter forced continuous conduction mode (FCCM). The frequency is always fixed at 400kHz under all load conditions.

The MP4582 is available in a QFN-19 (3mmx5mm) package.

It is recommended to read the MP4582 datasheet prior to making any changes to the EV4582-QVE-00A.

PERFORMANCE SUMMARY

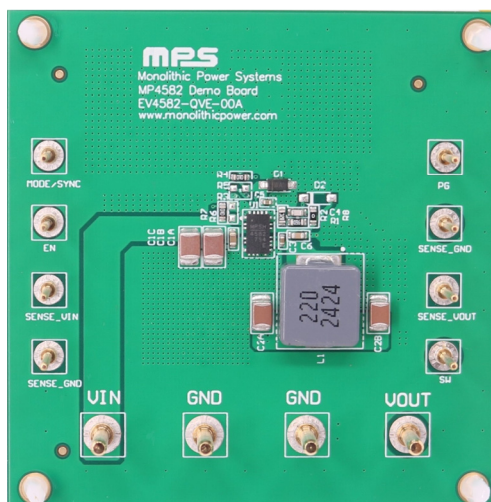
Specifications are at $T_A = 25^\circ\text{C}$, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range		12V to 100V
Output voltage (V_{OUT})	$V_{IN} = 12\text{V to } 100\text{V}$, $I_{OUT} = 0\text{A to } 2\text{A}$	$V_{OUT} = 12\text{V}^{(1)}$
Maximum output current (I_{OUT})	$V_{IN} = 12\text{V to } 100\text{V}$	2A
Typical efficiency	$V_{IN} = 48\text{V}$, $V_{OUT} = 12\text{V}$, $I_{OUT} = 2\text{A}$	94%
Peak efficiency	$V_{IN} = 24\text{V}$, $V_{OUT} = 12\text{V}$, $I_{OUT} = 1\text{A}$	96.5%
Typical switching frequency (f_{SW})		400kHz

Note:

- 1) If V_{IN} is below 14V, V_{OUT} may be below 12V due to I_{OUT} . For more details, see the Dropout Voltage vs. Load Current curve in the EVB Test Results section on page 5.

EV4582-QVE-00A EVALUATION BOARD



LxWxH (6.4cmx6.4cmx0.6cm)

Board Number	MPS IC Number
EV4582-QVE-00A	MP4582GQVE

QUICK START GUIDE

The EV4582-QVE-00A evaluation board is easy to set up and use to evaluate the performance of the MP4582. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply to be between 12V and 100V.
2. Turn off the power supply.
3. Connect the power supply terminals to:
 - a. Positive (+): VIN
 - b. Negative (-): GND
4. Connect the load terminals to:
 - a. Positive (+): VOUT
 - b. Negative (-): GND
5. After making all the connections, adjust the load to 0A, then turn on the power supply. The board should start up automatically.
6. Check for the target output voltage (V_{OUT}) between the SENSE_VOUT and SENSE_GND terminals.
7. Once the target V_{OUT} is established, adjust the load within the operating range, then measure the efficiency, V_{OUT} ripple, and other relevant parameters.
8. To use the enable (EN) function, apply a digital input to the EN pin.
9. To set forced continuous conduction mode (FCCM), use the resistor (R5) to pull up MODE/SYNC to the VCC voltage (V_{CC}).
10. The default setting is power-save mode (PSM), where MODE/SYNC is pulled down to GND using the resistor (R3). For more details, see Figure 2 on page 3.
11. After completing all the tests, adjust the load to 0A, then turn off the input power supply.

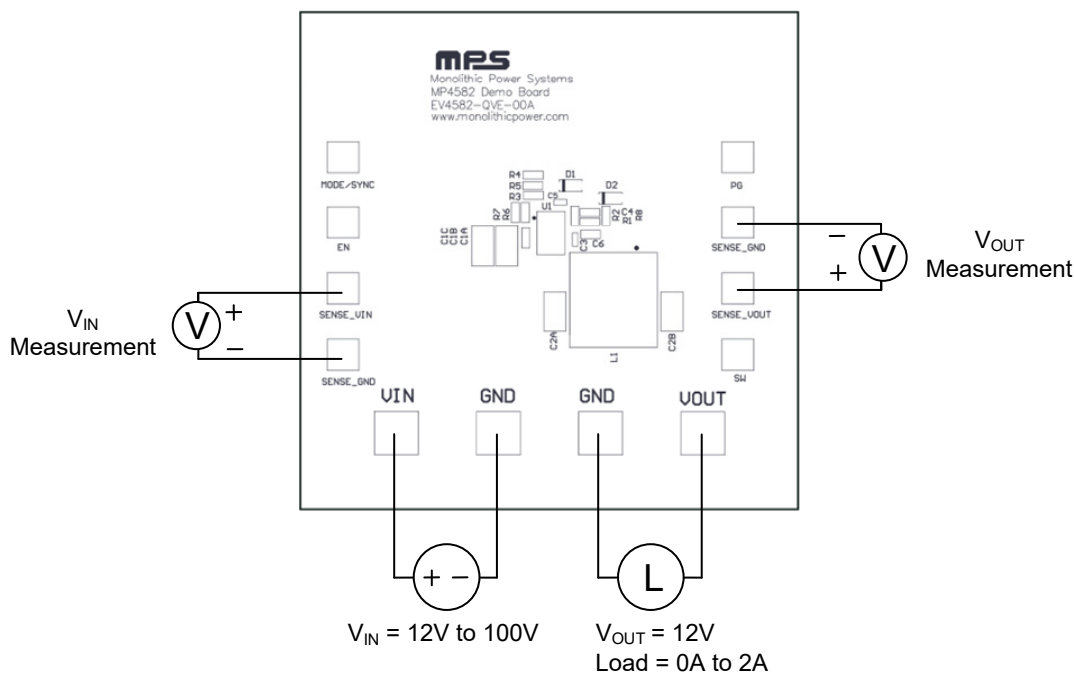


Figure 1: Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

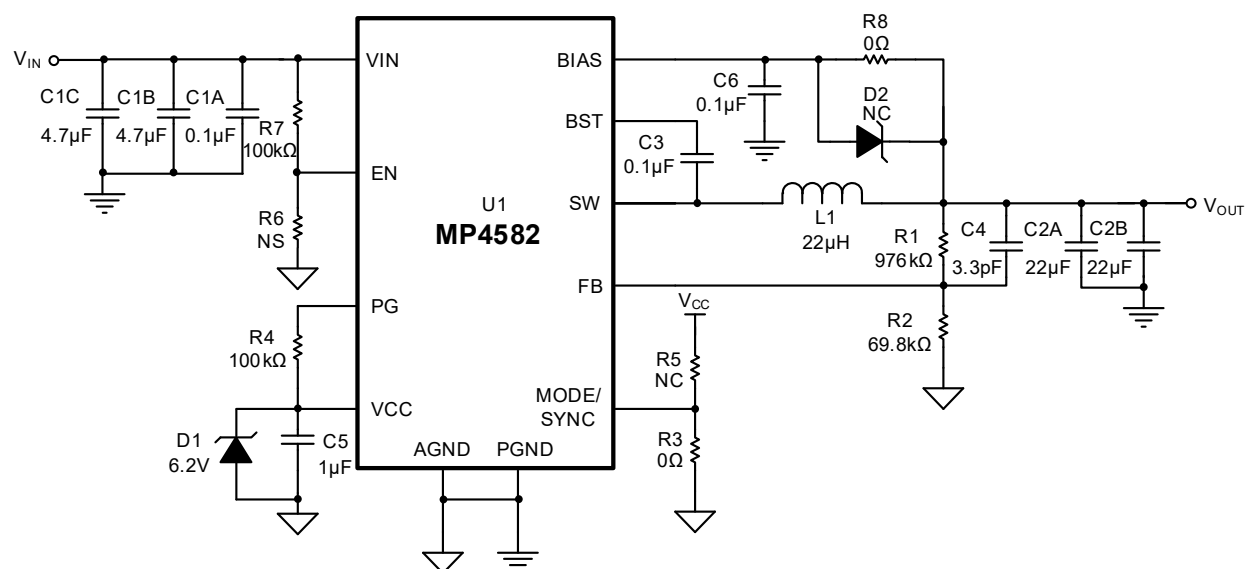


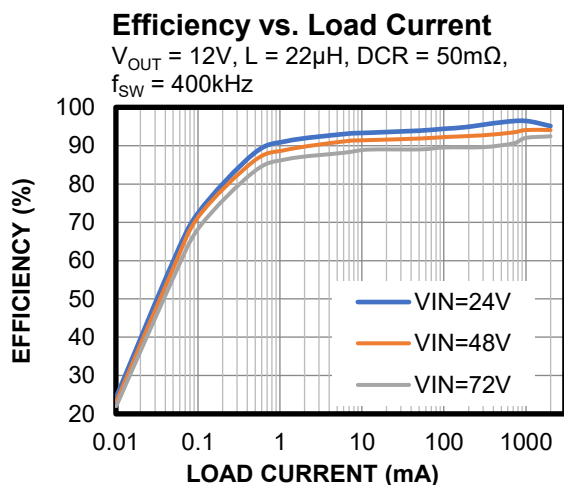
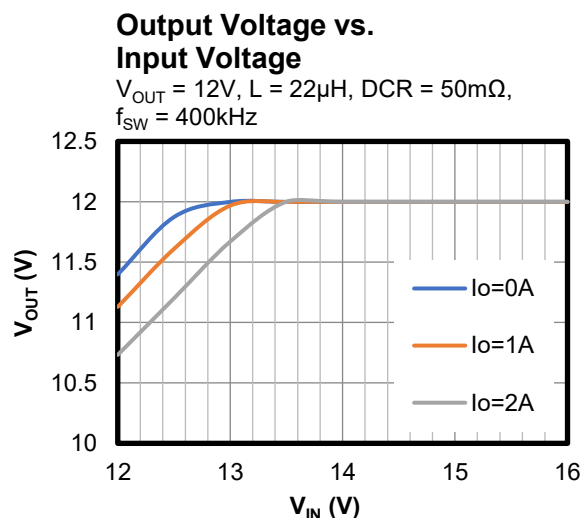
Figure 2: Evaluation Board Schematic

EV4582-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	4.7 μ F	Ceramic capacitor, 100V, X7S	1210	Murata	GRM32DC72A475KE01L
2	C2A, C2B	22 μ F	Ceramic capacitor, 25V, X7R	1210	Murata	GRM32ER71E226KE15L
1	C3	0.1 μ F	Ceramic capacitor, 16V, X5R	0402	Murata	GRM155R61C104KA88D
1	C4	3.3pF	Ceramic capacitor, 50V, NP0	0603	Würth	885012006048
1	C5	1 μ F	Ceramic capacitor, 10V, X5R	0402	Murata	GRM155R61A105KE01D
1	C6	0.1 μ F	Ceramic capacitor, 25V, X7R	0603	Yageo	CC0603KRX7R8BB104
3	R5, R6, D2	NS				
1	R1	976k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07976KL
1	R2	69.8k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0769K8L
2	R4, R7	100k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
2	R3, R8	0 Ω	Film resistor, 1%	0603	Yageo	RC0603FR-070RL
1	D1	6.2V	Zener diode, 500mW	SOD123	Diodes, Inc.	BZT52C6V2-7-F
1	L1	22 μ H	Inductor, R _{DC} = 50m Ω , I _{SAT} = 9A	11mmx 10mmx 5mm	Superworld	PIC1005H220MF
1	U1	MP4582	100V, 2A, 8 μ A I _Q , synchronous step-down DC/DC converter	QFN-19 (3mmx 5mm)	MPS	MP4582GQVE

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 48V$, $V_{OUT} = 12V$, $L = 22\mu H$, $T_A = 25^\circ C$, unless otherwise noted.



Thermal Performance

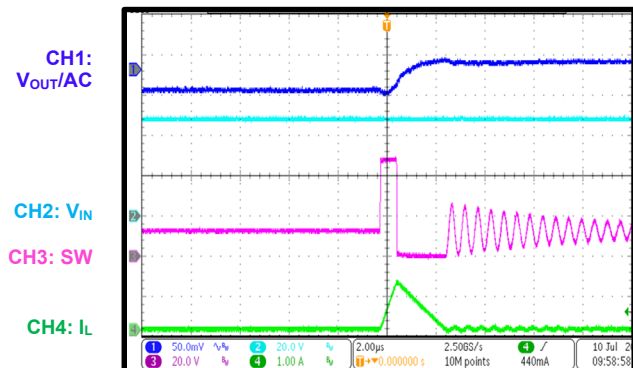
$V_{IN} = 48V$, $I_{OUT} = 2A$, $T_C - T_A = 39^\circ C$, no forced airflow



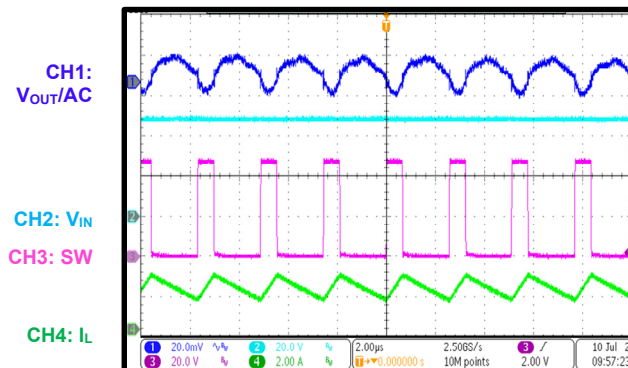
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 48V$, $V_{OUT} = 12V$, $L = 22\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

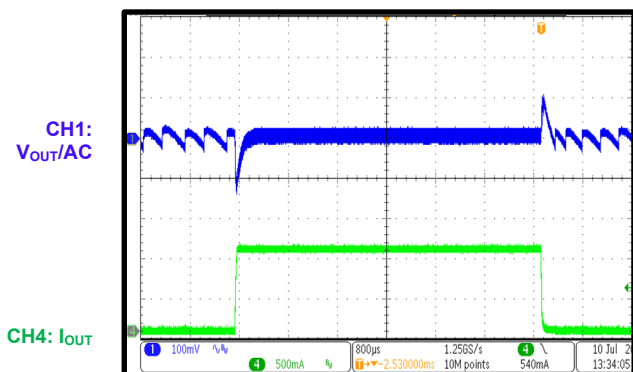
Steady State

 $I_{OUT} = 0A$


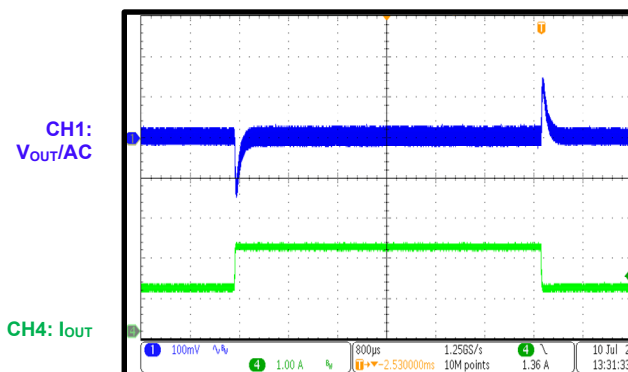
Steady State

 $I_{OUT} = 2A$


Load Transient

 $I_{OUT} = 0A$ to 1A


Load Transient

 $I_{OUT} = 1A$ to 2A


PCB LAYOUT

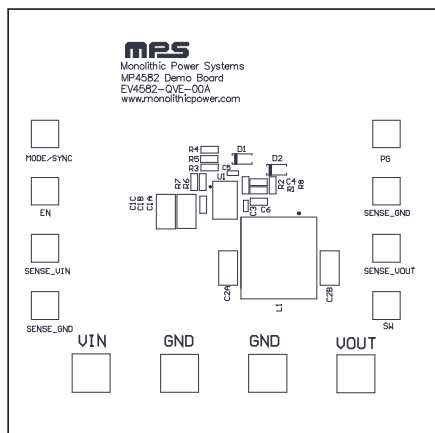


Figure 3: Top Silk

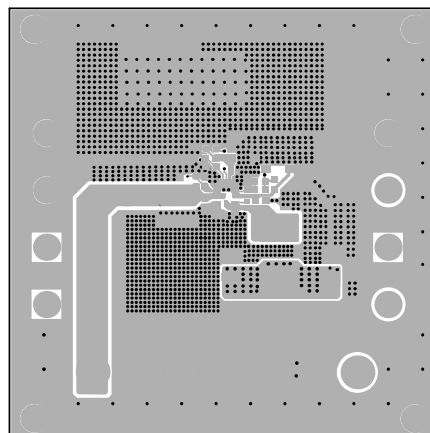


Figure 4: Top Layer

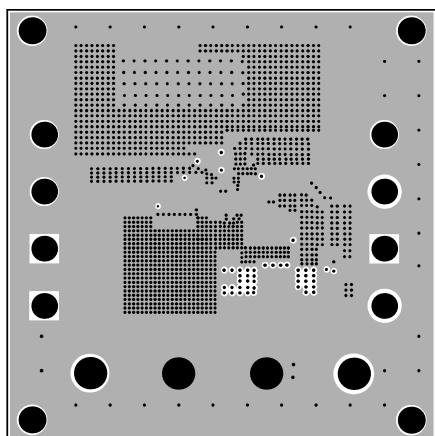


Figure 5: Mid-Layer 1

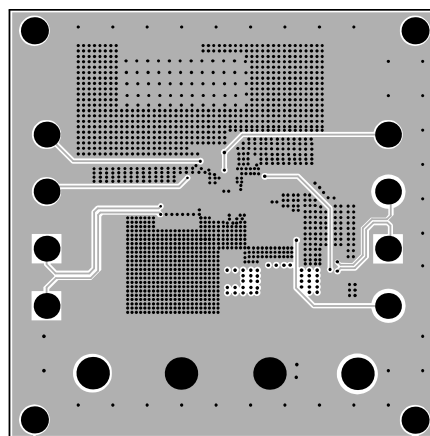


Figure 6: Mid-Layer 2

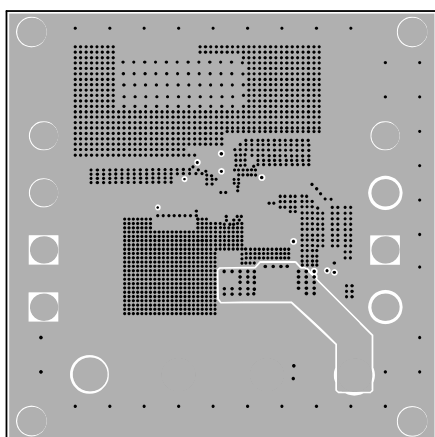


Figure 7: Bottom Layer

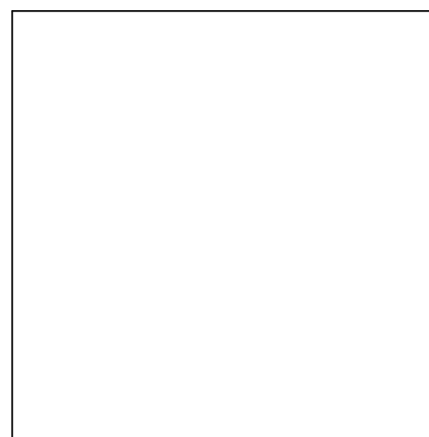


Figure 8: Bottom Silk



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	3/20/2025	Initial Release	-

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