EVQ20082-H-00A

40V, 300mA, Low Quiescent Current Linear Regulator Evaluation Board

DESCRIPTION

The EVQ20082-H-00A is an evaluation board designed to demonstrate the capabilities of the MPQ20082, a low quiescent current (I_Q) linear regulator that supplies power to systems with high-voltage batteries.

The MPQ20082 features a wide 3V to 40V input voltage (V_{IN}) range, a low dropout voltage, and a low I_Q. The low I_Q and low dropout voltage allow the device to operate at low power levels. This makes the MPQ20082 ideal for low-power microcontroller units (MCUs) and battery-powered equipment.

The MPQ20082 output current (I_{OUT}) is limited internally, and the device is protected against short-circuit (SC), overload, and over-temperature (OT) conditions.

Full protection features include thermal shutdown (TSD) and current-limiting fault protection.

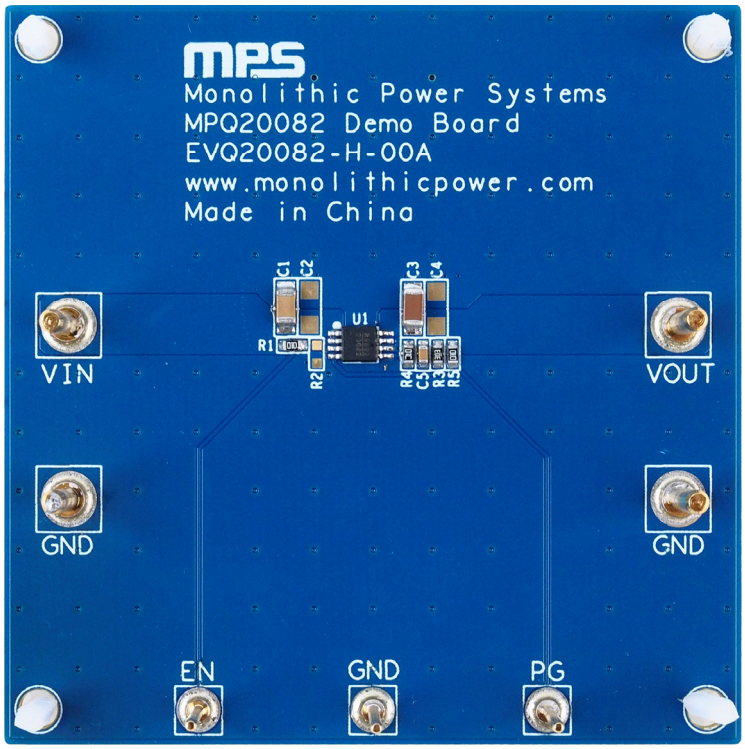
The EVQ20082-H-00A is a fully assembled and tested evaluation board. It generates a 5V output voltage (V_{OUT}) at load currents up to 300mA from a 6V to 40V V_{IN} range.

It is recommended to read the datasheet for the MPQ20082 prior to making any changes to the EVQ20082-H-00A.

PERFORMANCE SUMMARY

Parameter	Conditions	Value
Recommended input voltage (V_{IN}) range		6V to 40V
Output voltage (V_{OUT})	V_{IN} = 6V to 40V, I_{OUT} = 5mA to 300mA	5V
Maximum output current (I_{OUT})	V_{IN} = 6V to 40V	300mA

EVALUATION BOARD



LxWxH (6.35cmx6.35cmx1cm)

Board Number	MPS IC Number
EVQ20082-H-00A	MPQ20082GH-AEC1

QUICK START GUIDE

The EVQ20082-H-00A evaluation board is easy to set up and use to evaluate the performance of the MPQ20082. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Connect the load terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
2. Preset the power supply output to be between 6V and 40V, then turn it off. If longer cables (>0.5m total) are used between the source and the evaluation board, a damping capacitor should be installed at the input terminals, especially if the input voltage (V_{IN}) is 24V or greater.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Turn the power supply on. The EVQ20082-H-00A should start up automatically.
5. The PG pin is the power good (PG) test point. If PG is high (equal to the output voltage (V_{OUT})), this indicates that V_{OUT} has exceeded 93% of its set value.
6. To improve the load transient response, it is recommended to add a 2.2nF, ceramic feed-forward capacitor at C3.

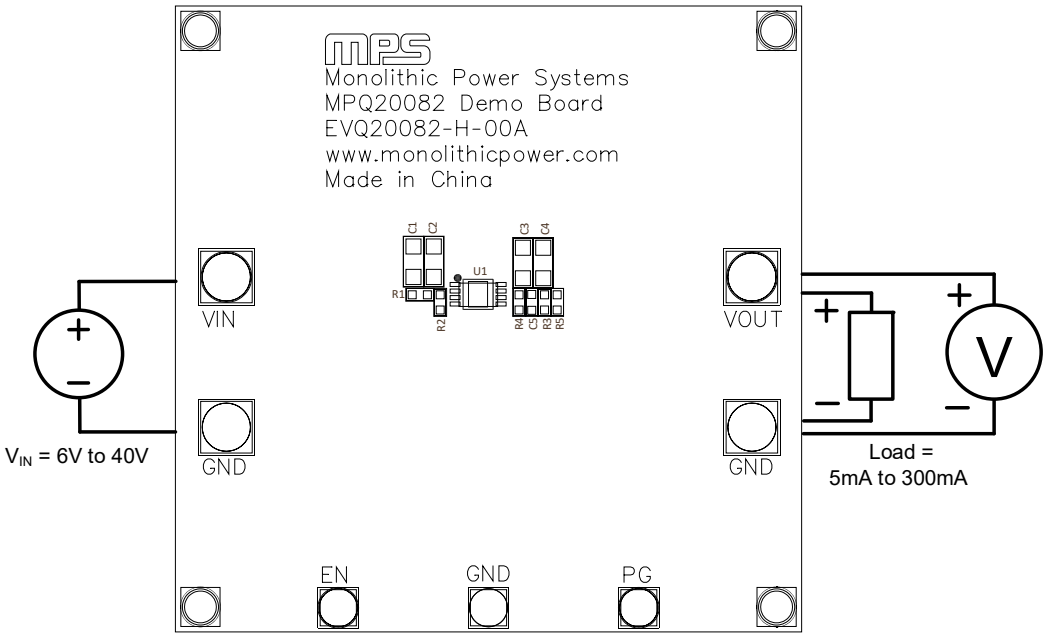


Figure 1: Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

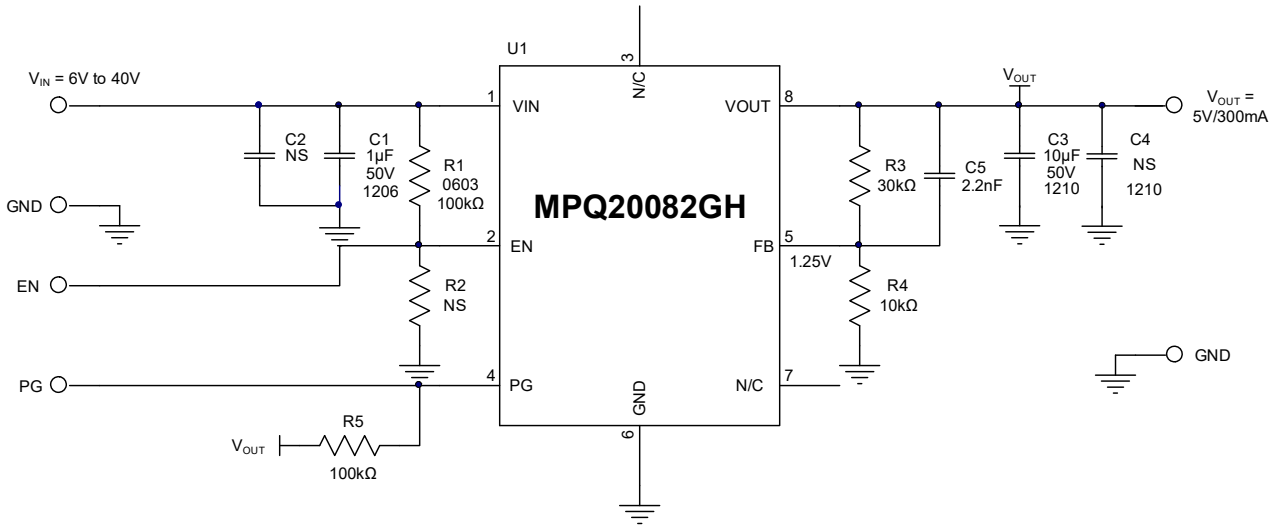
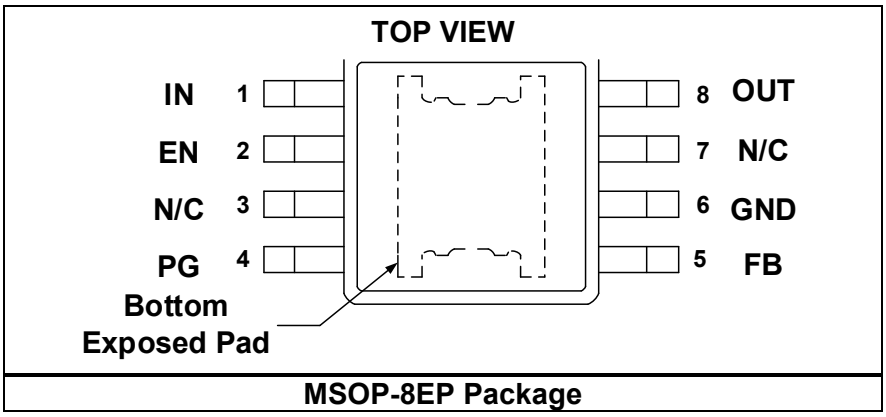


Figure 2: Evaluation Board Schematic

PACKAGE REFERENCE



EVQ20082-N-00A BILL OF MATERIALS

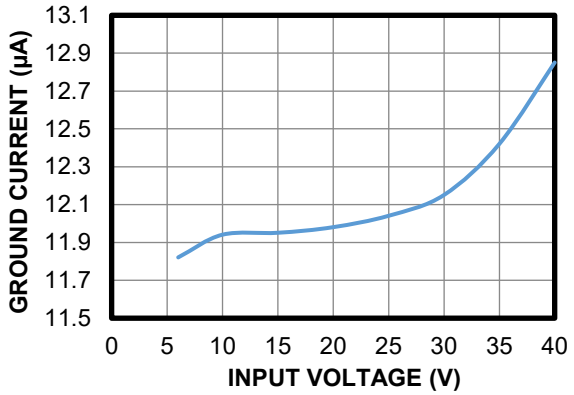
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1	1µF	Ceramic capacitor, 50V, X7R	1206	Murata	885012208093
2	C2, C4	NS				
1	C3	10µF	Ceramic capacitor, 50V, X7R	1206	TDK	CGA5L1X7R1H106KT0Y0N
1	C5	2.2nF	Ceramic capacitor, 50V, X7R	0603	Murata	C1608X7R1H222K
2	R1, R5	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R2	NS				
1	R3	30kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0730KL
1	R4	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
4	VIN, GND, GND, VOUT	2mm male	Connector	DIP	Any	
3	PG, GND, EN	2.54mm	2.54mm test pin	2.54mm	Any	
1	U1	MPQ20082-AEC1	40V, 300mA, low-I_Q linear regulator	MSOP-8EP	MPS	MPQ20082GH-AEC1

EVB TEST RESULTS

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

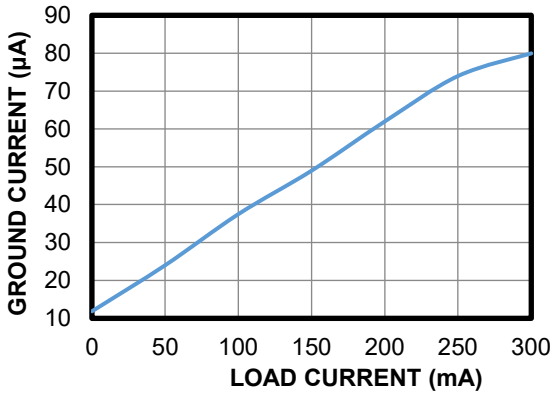
Ground Current vs. Input Voltage

I_{OUT} = 0mA



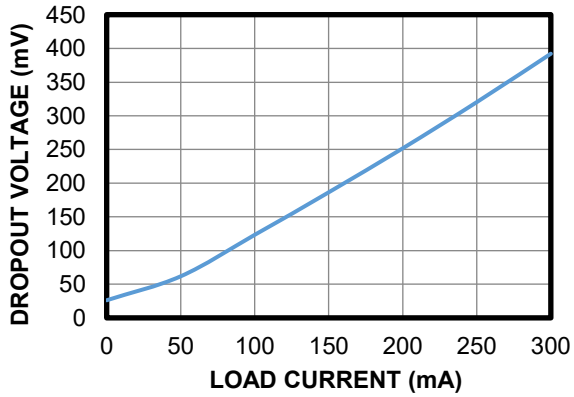
Ground Current vs. Load Current

V_{IN} = 6V



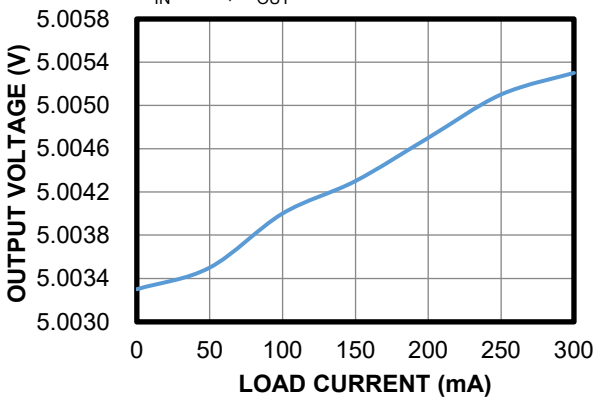
Dropout Voltage vs. Load Current

V_{OUT} = 5V



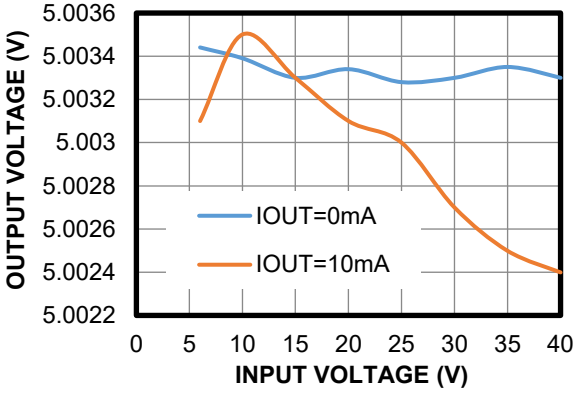
Output Voltage vs. Load Current

V_{IN} = 6V, V_{OUT} = 5V



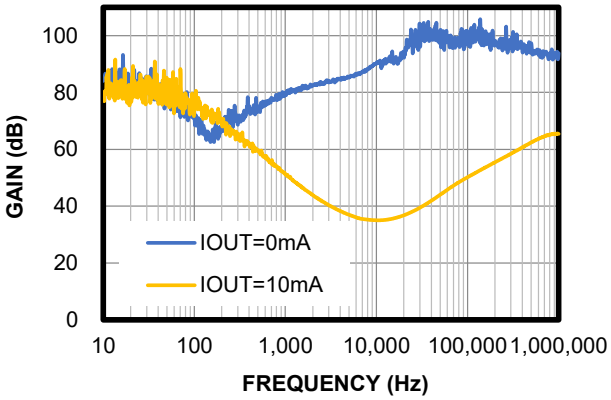
Output Voltage vs. Input Voltage

V_{OUT} = 5V



PSRR vs. Frequency

V_{OUT} = 5V

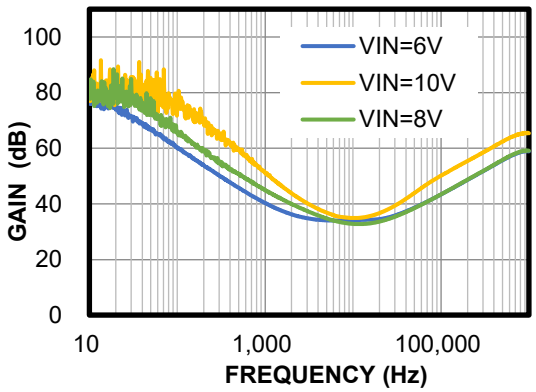


EVB TEST RESULTS *(continued)*

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

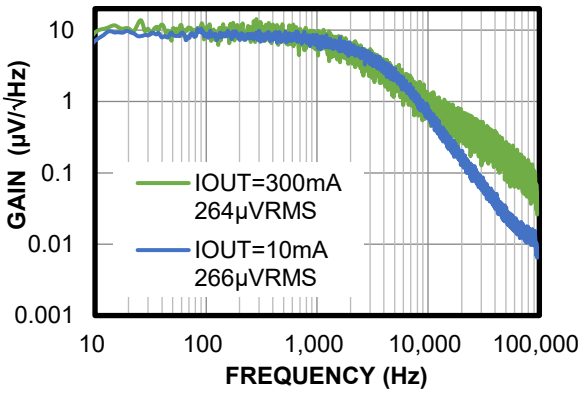
PSRR vs. Frequency

I_{OUT} = 10mA



Noise vs. Frequency

V_{OUT} = 5V, C_{OUT} = 10µF

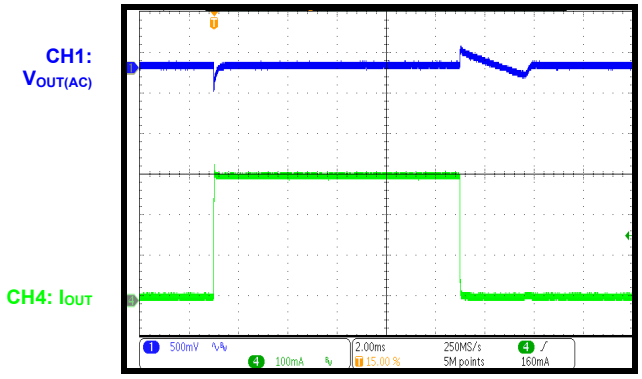


EVB TEST RESULTS *(continued)*

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

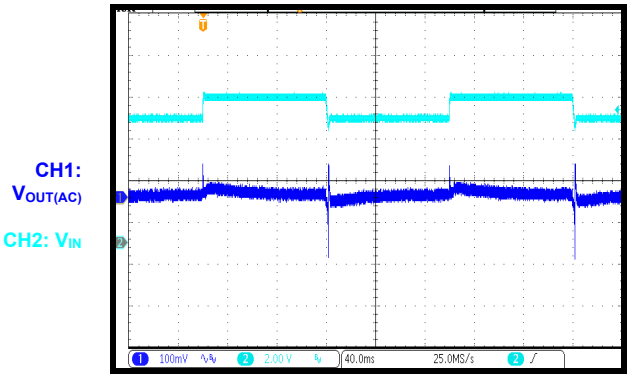
Load Transient Response

V_{IN} = 12V, I_{OUT} = 0mA to 300mA



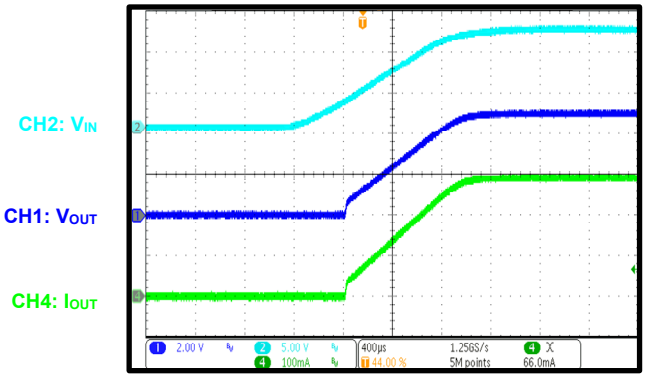
Line Transient Response

V_{IN} = 6V to 7V, I_{OUT} = 300mA



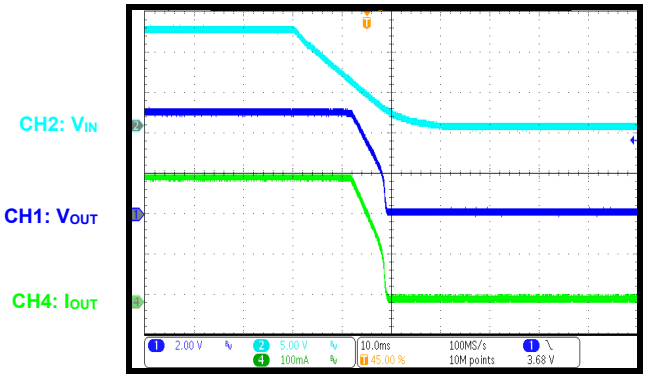
Start-Up through VIN

V_{IN} = 12V, I_{OUT} = 300mA



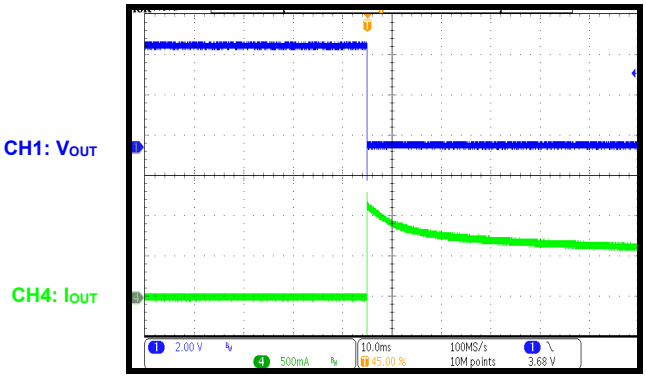
Shutdown through VIN

V_{IN} = 12V, I_{OUT} = 300mA



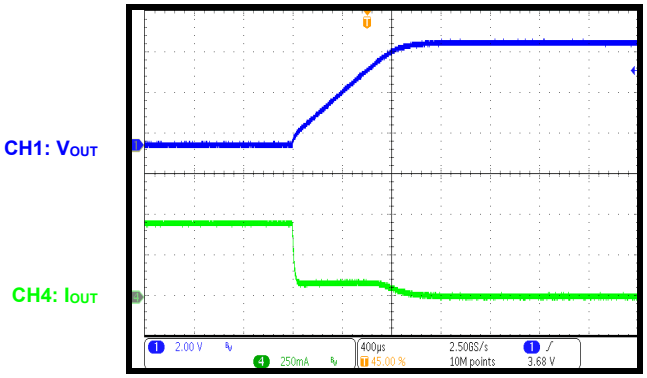
Short-Circuit Entry

V_{IN} = 12V, I_{OUT} = 0mA to short circuit



Short-Circuit Recovery

V_{IN} = 12V, short circuit to I_{OUT} = 0mA

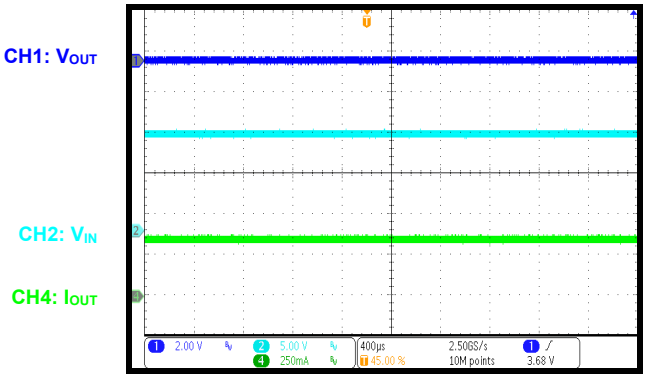


EVB TEST RESULTS *(continued)*

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

Short-Circuit Steady State

V_{IN} = 12V



PCB LAYOUT

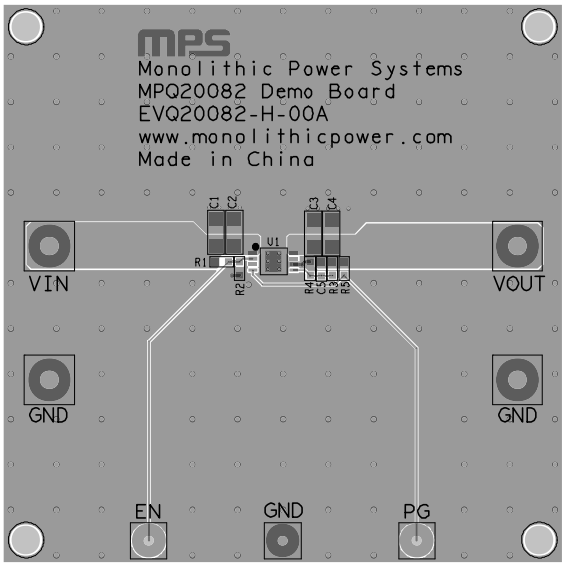


Figure 4: Top Layer

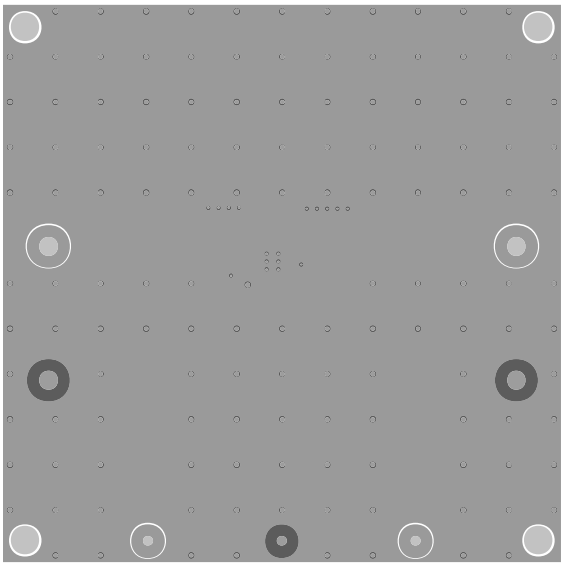


Figure 5: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	1/21/2025	Initial Release	-