EVQ2019A-N-00A

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

DESCRIPTION

The EVQ2019A-N-00A is an evaluation board designed to demonstrate the capabilities of the MPQ2019A, a low linear regulator that supplies power to systems with high voltage batteries.

MPQ2019A includes a wide 3V to 40V input voltage (V_{IN}) range, a low dropout voltage, and a low quiescent supply current (I_Q). The low I_Q and low dropout voltage allow the device to operate at low power levels.

This makes the MPQ2019A ideal for low-power microcontrollers (MCUs) and battery-powered equipment.

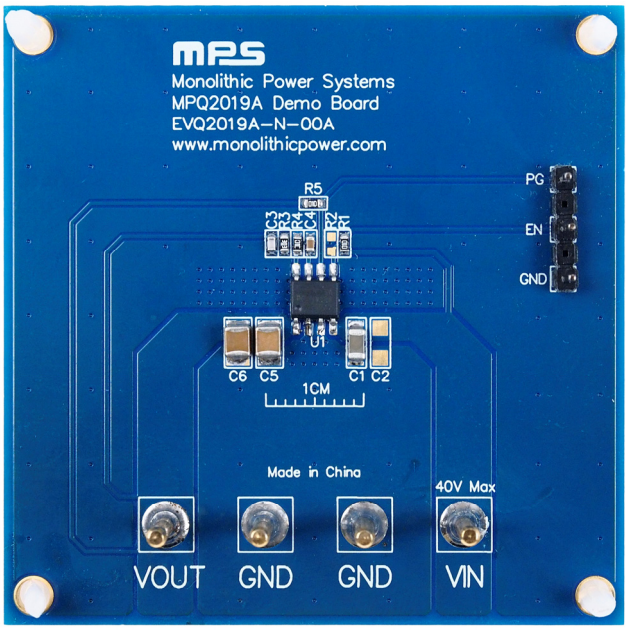
The EVQ2019A-N-00A is a fully assembled and tested evaluation board. It generates a 5V output voltage (V_{OUT}) at load currents up to 300mA from a 6V to 40V V_{IN} range.

It is recommended to read the datasheet for the MPQ2019A prior to making any changes to the EVQ2019A-N-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
EVQ2019A-N-00A	MPQ2019AGN

QUICK START GUIDE

The EVQ2019A-N-00A evaluation board is easy to set up and use to evaluate the performance of the MPQ2019A. 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 between 6V and 40V, then turn it off. If longer cables are used between the source and the EVB (>0.5m total), 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 on the power supply. The EVQ2019A-N-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. There is a delay time when PG asserts high. The delay time can be configured by adding a capacitor on the PGDL pin (C_{PGDL}). Determine the value for C_{PGDL} using Equation (1):

$$G_{PGDL}(nF) = \frac{t_{PGDL}(ms) \times I_{PGDL}(\mu A)}{V_{TH\_PGDL}(V)} \quad (1)$$

Where t_{PGDL} is the desired delay time when PG asserts high, I_{PGDL} is the PGDL charge current (5.5μA), and V_{TH_PGDL} is 1.7V.

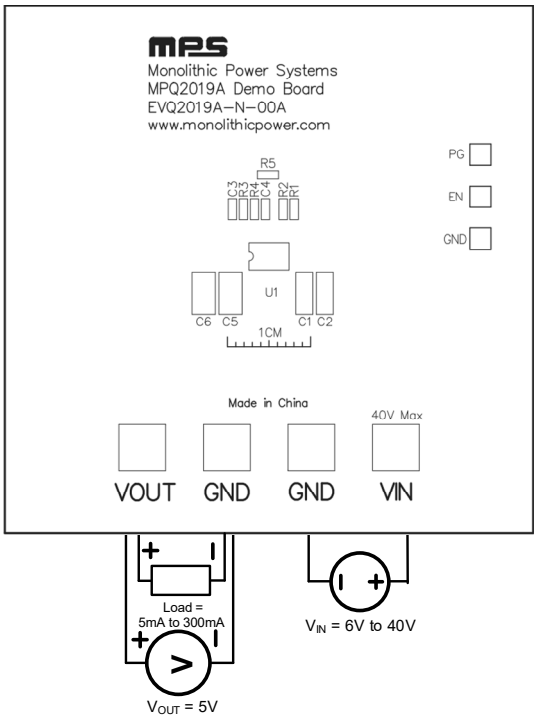
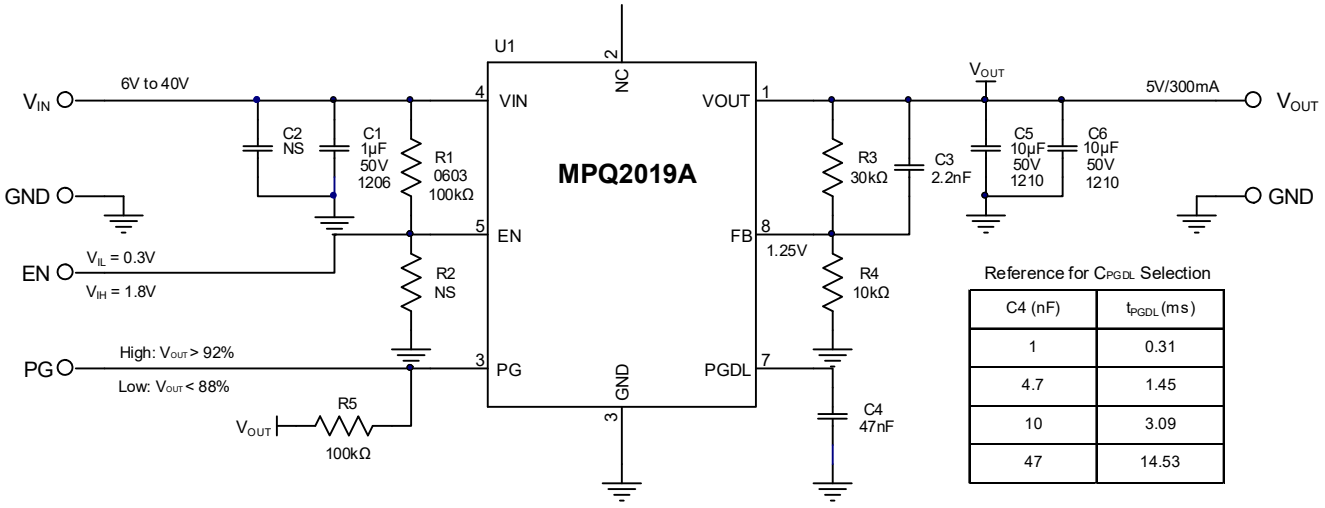


Figure 1: Measurement Equipment Set-Up

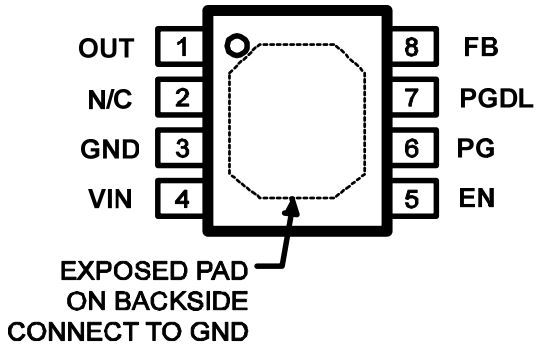
EVALUATION BOARD SCHEMATIC



Reference for C_{PGDL} Selection

C4 (nF)	t_{PGDL} (ms)
1	0.31
4.7	1.45
10	3.09
47	14.53

TOP VIEW



SOIC-8EP Package

EVQ2019A-N-00A BILL OF MATERIALS

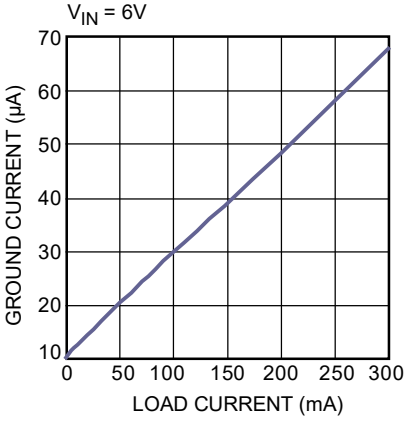
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1	1µF	Ceramic capacitor, 50V, X7R	1206	Murata	885012208093
2	C2	NS				
1	C3	2.2nF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H222KA01D
1	C4	47nF	Ceramic capacitor, 50V, X7R	0603	Murata	885012206093
2	C5, C6	10µF	Ceramic capacitor, 50V, X7R	1210	Murata	GRM32ER71H106KA12L
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	MPQ2019A	Linear regulator	SOIC-8EP	MPS	MPQ2019AGN

EVB TEST RESULTS

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

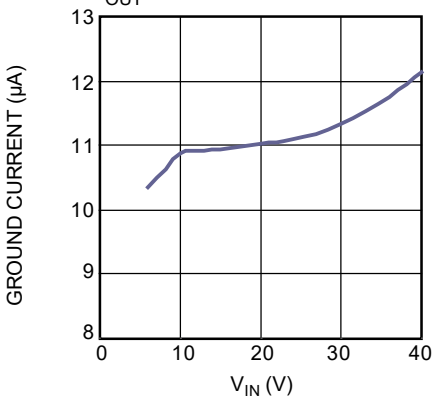
Ground Current vs. Load Current

V_{IN} = 6V

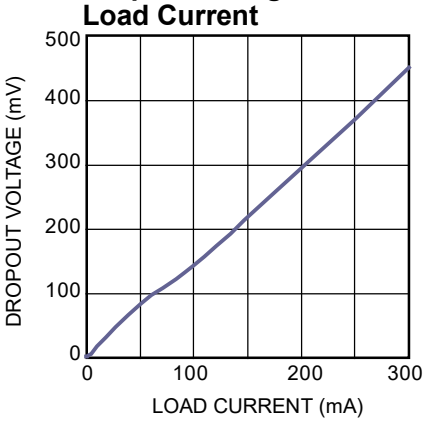


Ground Current vs. V_{IN}

I_{OUT} = 0mA

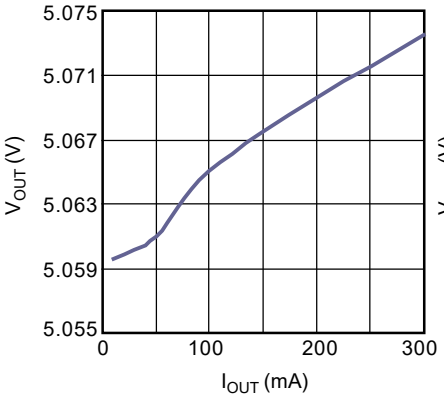


Dropout Voltage vs. Load Current

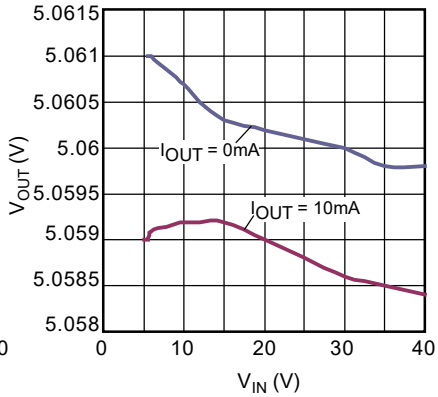


Output Voltage vs. Output Current

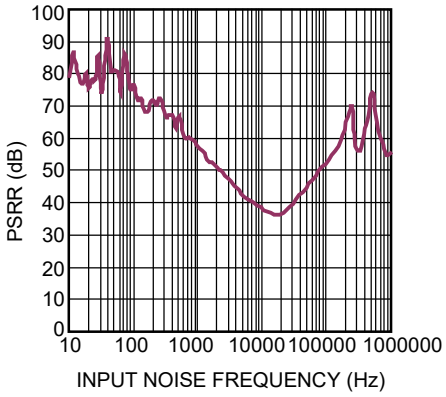
V_{IN} = 6V



Output Voltage vs. Input Voltage



PSRR vs. Input Noise Frequency

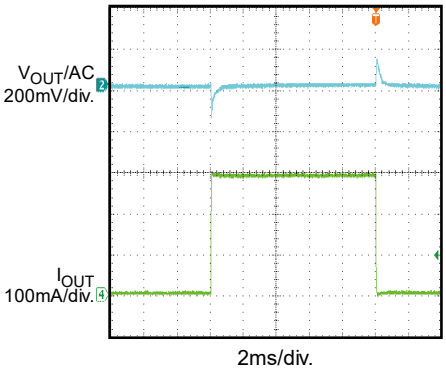


EVB TEST RESULTS *(continued)*

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

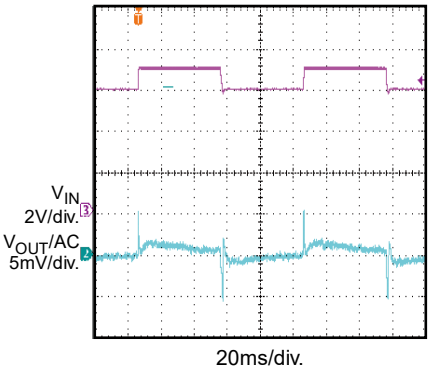
Load Transient

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



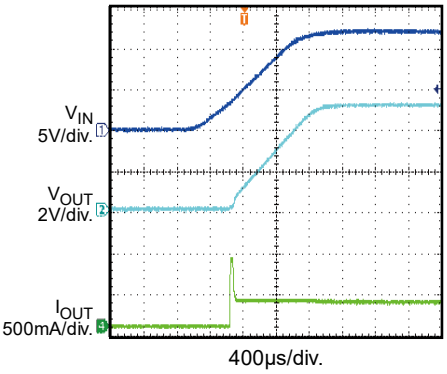
Line Transient

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



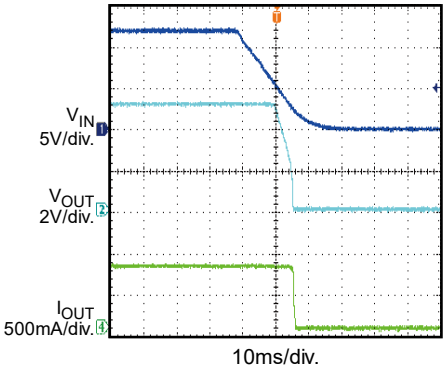
Start-Up through VIN

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



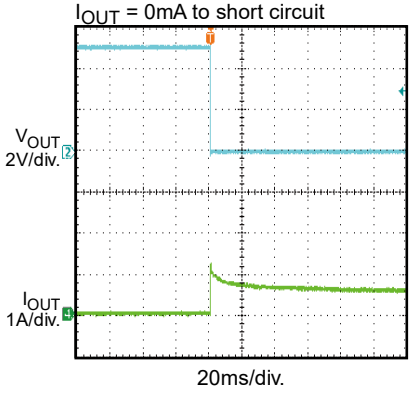
Shutdown through VIN

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



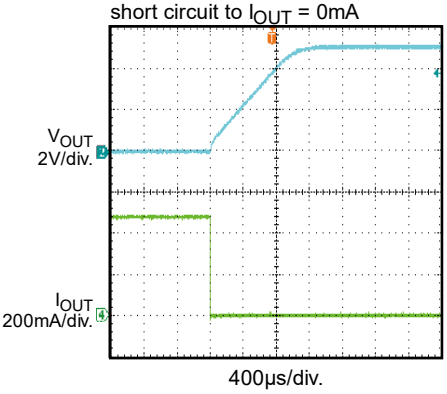
SCP Entry

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



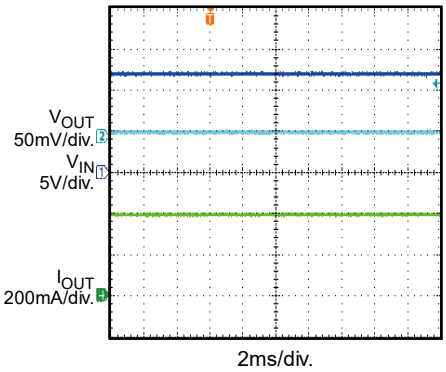
SCP Recovery

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



SCP Steady State

V_{IN} = 12V



PCB LAYOUT

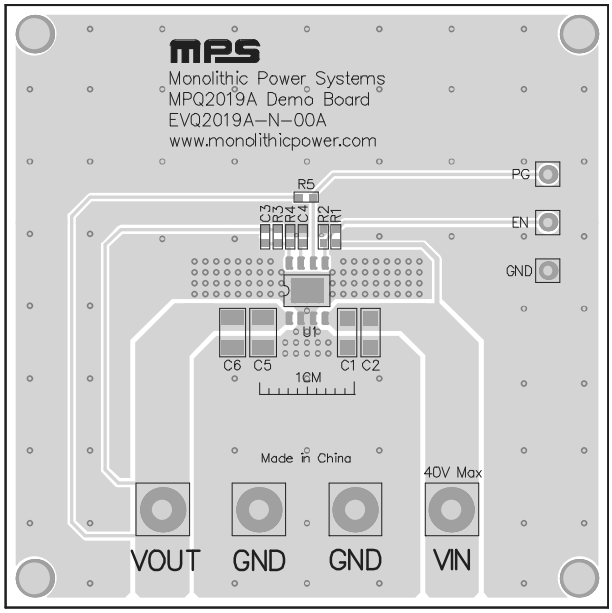


Figure 2: Top Layer

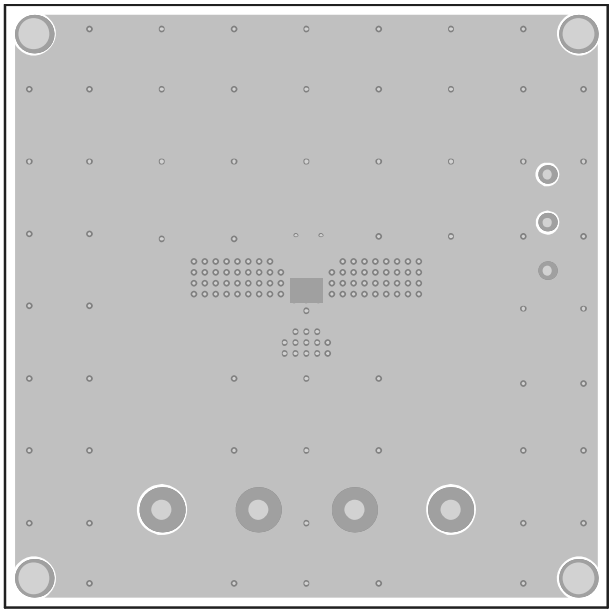


Figure 3: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	9/4/2024	Initial Release	-