EVQ2013-J_Q_G-00A

40V, 150mA, Low Quiescent Current Linear Regulator Evaluation Board

DESCRIPTION

The EVQ2013-J_Q_G-00A is an evaluation board for the MPQ2013, a low linear regulator that supplies power to systems with high voltage batteries.

MPQ2013 includes a wide 2.5V to 40V input range, low dropout voltage and low quiescent supply current. The low quiescent current and low dropout voltage allow operations at extremely low power levels. Therefore, the MPQ2013 are ideal for the low power microcontrollers and the battery-powered equipments.

The EVQ2013-J_Q_G-00A is a fully assembled and tested evaluation board. It generates a +5V output voltage at load current up to 150mA from a 6V to 40V input range.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	6 – 40	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	150	mA

FEATURES

- 6V to 40V Input Range
- 3.2µA Quiescent Supply Current
- 150mA specified current
- 620mV Dropout at 150mA Load
- Output ±2% Accuracy
- Specified current limit
- Thermal Shutdown
- -40°C to +125°C Specified Junction Temperature Range
- Includes all three packages TSOT23-5, QFN6 (2x2mm), or QFN8 (3x3mm) Packages

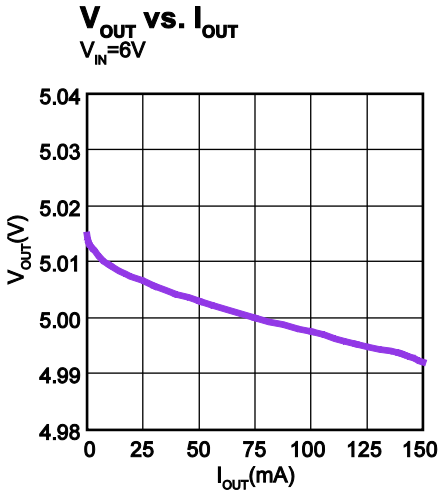
APPLICATIONS

- Industrial/Automotive Applications
- Portable/Battery-Powered Equipment
- Ultra low power Microcontrollers
- Cellular Handsets
- Medical Imaging

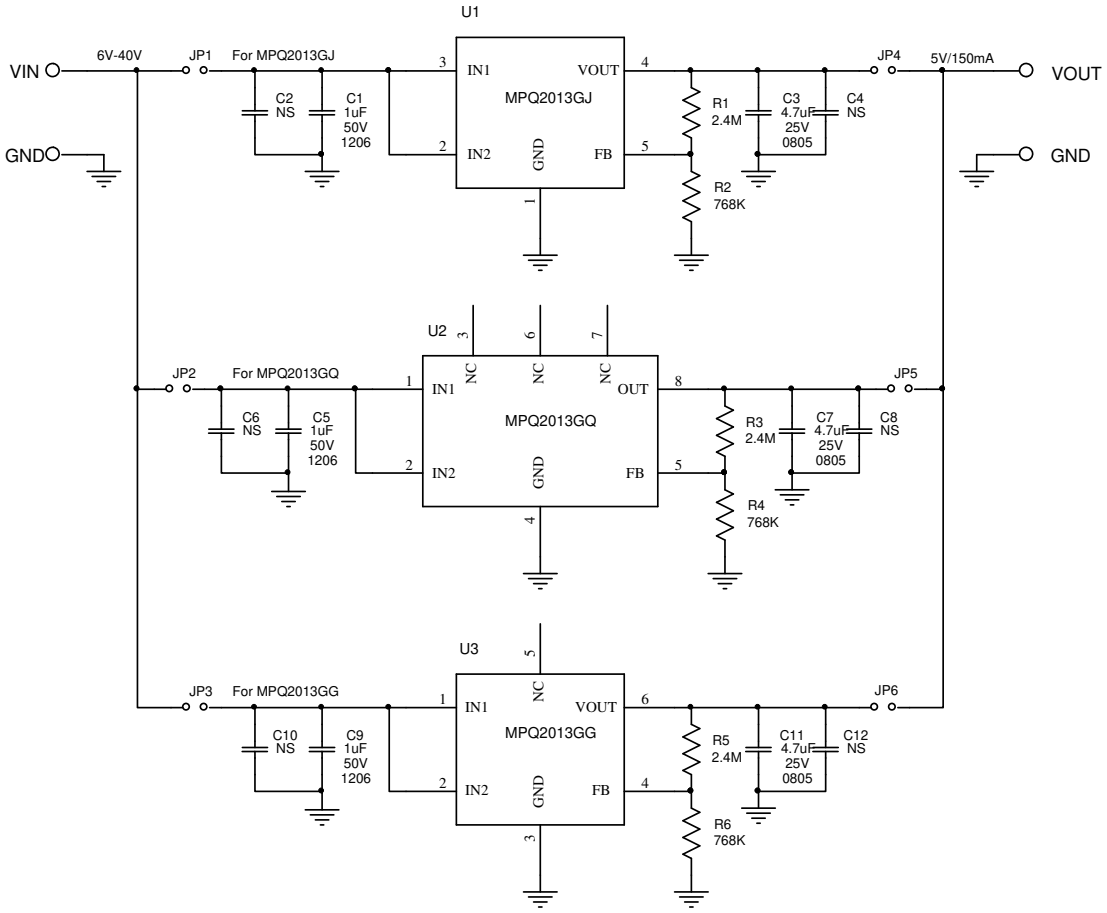
EVQ2013-J_Q_G-00A EVALUATION BOARD

(L x W x H) 2.5” x 2.5” x 0.4”
(6.4cm x 6.4cm x 1.0cm)

Board Number	MPS IC Number
EVQ2013-J_Q_G-00A	MPQ2013-GJ/GQ/GG



EVALUATION BOARD SCHEMATIC



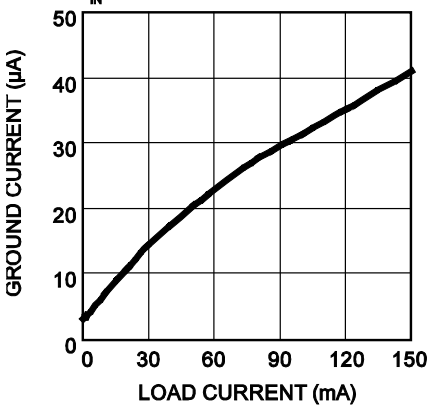
EVQ2013-J_Q_G-00A BILL OF MATERIALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufactuer_P/N
3	C1, C5, C9	1μF	Ceramic Cap., 50V, X7R	1206	muRata	GRM31MR71H105KA88L
3	C3, C7, C11	4.7μF	Ceramic Cap., 25V, X5R	0805	muRata	GRM21BR61E475KA12L
6	C2, C4, C6, C8, C10, C12	NS				
3	R1, R3, R5	2.4M	Film Res., 1%	0603	Yageo	RC0603FR-072M4L
3	R2, R4, R6	768k	Film Res., 1%	0603	Yageo	RC0603FR-07768KL
6	JP1, JP2, JP, JP4, JP5, JP6		Jumper			
1	U1	MPQ2013GJ		TSOT23-5	MPS	MPQ2013GJ
1	U2	MPQ2013GQ		QFN8-3x3	MPS	MPQ2013GQ
1	U3	MPQ2013GG		QFN6-2x2	MPS	MPQ2013GG

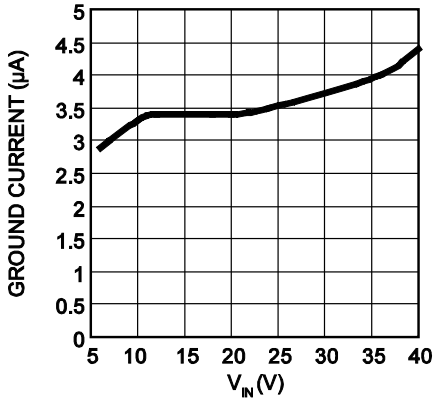
EVB TEST RESULTS

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

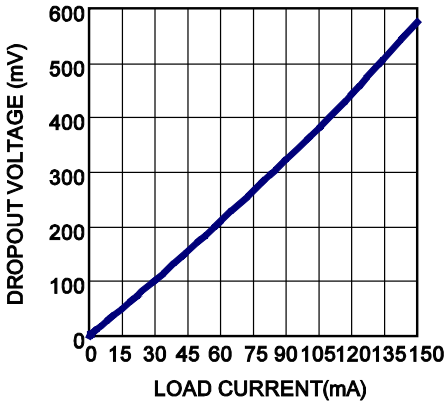
Ground Current vs. Load Current
V_{IN}=6V



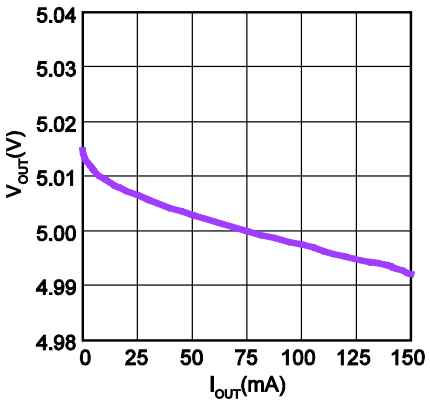
Ground Current vs. V_{IN}
I_O=0mA



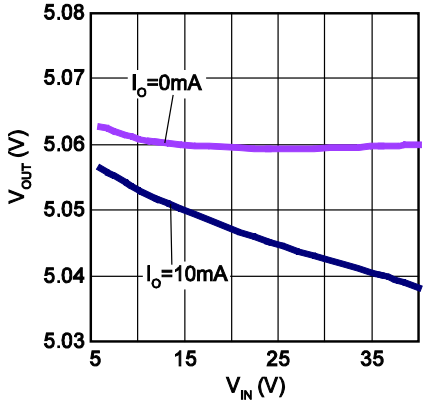
Dropout Voltage vs. Load Current



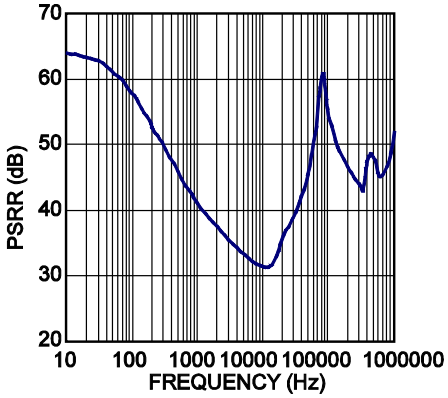
V_{OUT} vs. I_{OUT}
V_{IN}=6V



V_{OUT} vs. V_{IN}
V_O=5V



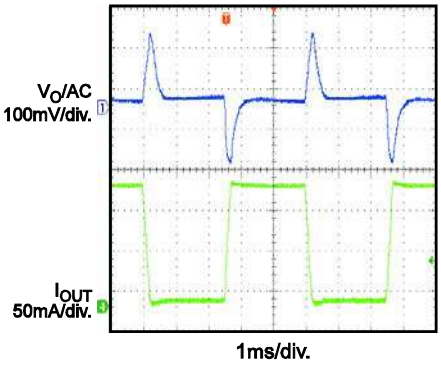
PSRR vs. Frequency
V_{IN1}=V_{IN2}=6V, I_O=10mA, C_{IN}=100pF



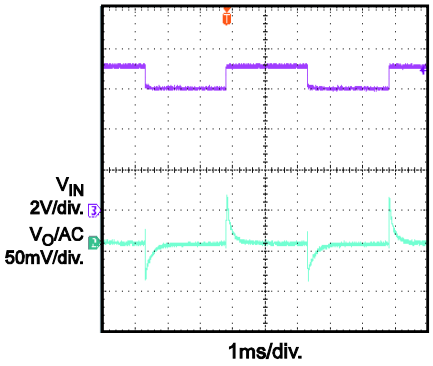
EVB TEST RESULTS *(continued)*

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

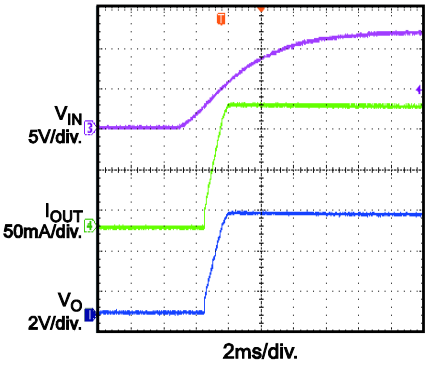
Load Transient
V_{IN} = 12V, I_{OUT} = 8mA-150mA



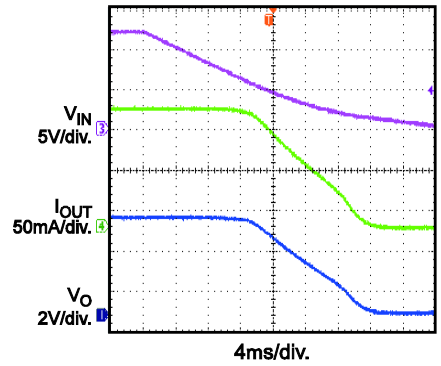
Line Transient
V_{IN} = 6V-7V, I_{OUT} = 150mA



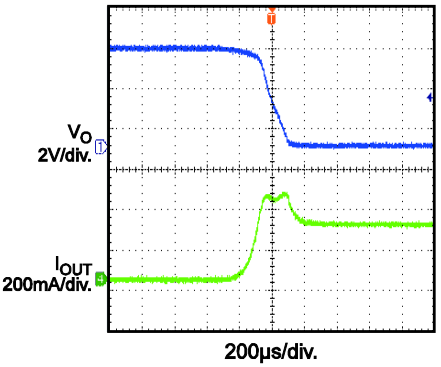
Startup Through V_{IN}
V_{IN} = 12V, I_{OUT} = 150mA



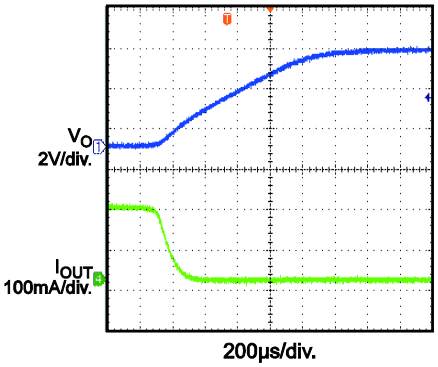
Shutdown Through V_{IN}
V_{IN} = 12V, I_{OUT} = 150mA



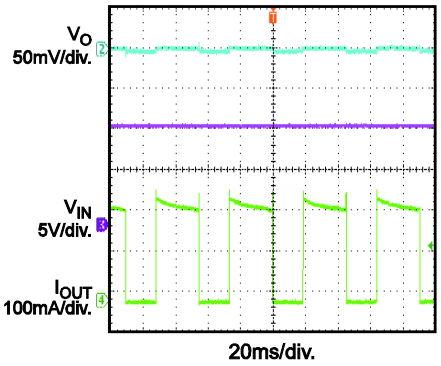
Short Circuit Entry
V_{IN} = 12V, I_{OUT} = 0mA to short circuit



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



Short Circuit Steady State
V_{IN} = 12V



PRINTED CIRCUIT BOARD LAYOUT

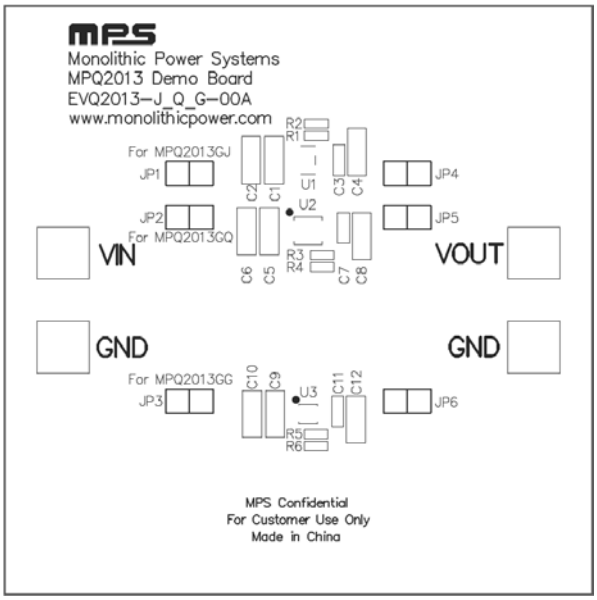


Figure 1—Top Silk Layer

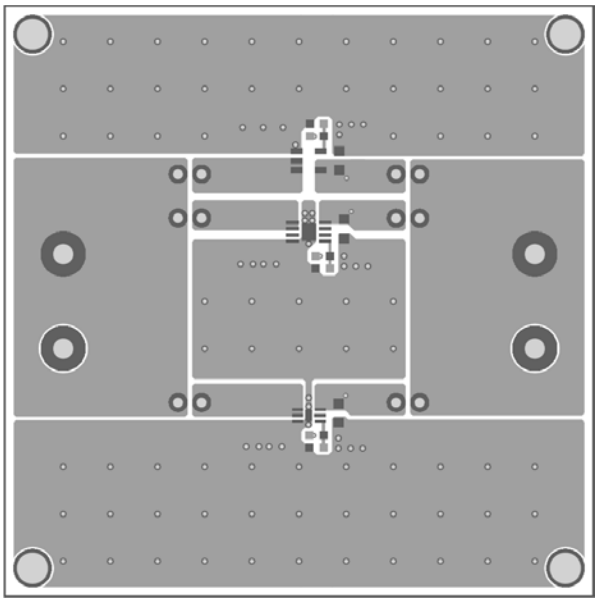


Figure 2—Top Layer

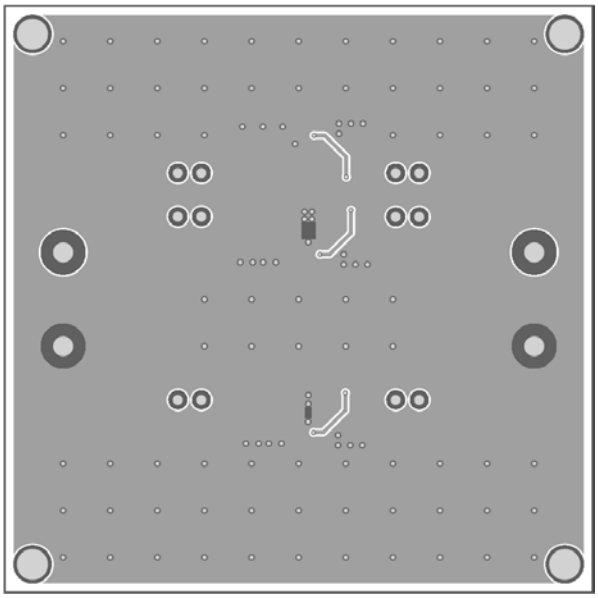


Figure 3—Bottom Layer

QUICK START GUIDE

1. Connect different jumpers to select different MPQ2013 ICs with different packages for evaluation:

Connected Jumpers	Selected IC
JP1, JP4	MPQ2013GJ
JP2, JP5	MPQ2013GQ
JP3, JP6	MPQ2013GG

2. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
3. Preset the power supply output between 6 and 40V, and then turn it off.
4. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
5. Turn the power supply on. The MPQ2013 will automatically startup.
6. To lower the additional current dissipation, resistors of FB divider on the demo board are chosen to high value. If part would performance no load when Ta>85°C, FB dividers should be lower to maintain a minimum load to draw the leakage current from OUT pin. The recommended maxim value of R2/R4/R6 is 506k when Ta≤105°C and 173k when Ta≤125°C. Once R2/R4/R6 is determined, R1/R3/R5 can be calculated by below formula (take R1 as an example):

$$R1 = R2 \times \left(\frac{V_{OUT}}{1.215V} - 1 \right)$$