

EVQ8112A-J-00A 60V, High-Side Current-Sense Amplifier Evaluation Board, AEC-Q100 Qualified

DESCRIPTION

The EVQ8112A-J-00A is an evaluation board designed to demonstrate the capabilities of the MPQ8112A, a low-cost, unipolar, high-side current-sense amplifier. The device operates from a 2.7V to 60V supply voltage and typically consumes a 300µA current. The common mode input voltage ranges between 0V and 60V with a 700kHz high bandwidth.

The MPQ8112A converts the differential input voltage to a current output. This current is converted back to a voltage with an external load resistor. The MPQ8112A has an adjustable gain based on the external, common input resistors and load resistor.

The EV8112A-J-00A is a fully assembled and tested evaluation board.

The MPQ8112A is available in a TSOT23-6L package.

Parameter	Symbol	Value	Units
VCC supply voltage	V _{cc}	2.7 to 60	V
Common input voltage	Vcm	0 to V _{CC}	V
V5 supply voltage	V5	2.7 to 5.5	V
Sense voltage	VSENSE	0 to 200	mV
Output gain	Av	50	V/V

ELECTRICAL SPECIFICATIONS

FEATURES

- Low-Cost, Compact Current-Sense Solution
- 700kHz Bandwidth
- 300µA Typical Supply Current
- 2.7V to 60V Operating Supply Voltage Range
- 0V to 60V Common Mode Input Voltage Range
- 0.2µA Typical Shutdown Current
- 300µV Input Offset Voltage
- Available with Adjustable Gain
- ±1% Current-Sense Gain Accuracy
- High-Current Sensing Capabilities
- Available in a 6-Pin TSOT23-6L Package
- Available in AEC-Q100 Grade 1

APPLICATIONS

- Advanced Driver Assistance Systems (ADAS)
- Sensor Fusion Systems
- Electric Power Steering (EPS) Systems
- Electronic Stability Control (ESC) Systems
- Brake Systems
- Battery-Operated Systems
- Energy Management Systems

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EVQ8112A-J-00A EVALUATION BOARD



LxWxH (3.6cmx3.4cmx1.3cm)

Board Number	MPS IC Number
EVQ8112A-J-00A	MPQ8112A



QUICK START GUIDE

- 1. Preset the power supply (V_{CC}) to be between 2.7V and 60V.
- 2. Turn the VCC power supply off.
- 3. Preset the V5 power supply to be between 2.7V and 5.5V.
- 4. Turn the V5 power supply off.
- 5. Preset the I_{SENSE} load to be between 0A and 2A. This sets V_{SENSE} between 0mV and 200mV (V_{SENSE} = I_{SENSE} x R_{SENSE}).
- 6. Turn the I_{SENSE} load off.
- 7. Ensure that JP1 and JP2 are not shorted simultaneously. To set the JP1 and JP2 connections, follow the guidelines below:
 - a. To test with $V_{CC} = V_{CM}$, short JP1 and open JP2.
 - b. To test with $V_{CC} > V_{CM}$ and $V_{CM} = 0V$, open JP1 and short JP2.
- 8. Connect the VCC power supply terminals to:
 - a. Positive (+): VCC
 - b. Negative (-): GND
- 9. Connect the V5 power supply terminals to:
 - a. Positive (+): V5
 - b. Negative (-): GND
- 10. To test with $V_{CC} = V_{CM}$, short JP1 and open JP2, and then connect the load terminals to:
 - a. Positive (+): RG2
 - b. Negative (-): GND
- 11. To test with $V_{CC} > V_{CM}$ and $V_{CM} = 0V$, open JP1 and short JP2. Isolate the I_{SENSE} load supply with an isolation transformer, and then connect the load terminals to:
 - a. Positive (+): RG1
 - b. Negative (-): GND
- 12. Turn the V5 power supply on. Then turn the VCC power supply on after making the connections.
- 13. Turn the I_{SENSE} load on and adjust the I_{SENSE} range. The MPQ8112A's output (V_{OUT}) can be estimated with Equation (1):

$$V_{OUT} = I_{SENSE} \times R_{SENSE} / R1 \times G_M \times R3$$
(1)

Where G_M is 5A/A. The MPQ8112A's gain (A_V) can be adjusted by selecting different combinations of R3 and R1. A_V can be estimated with Equation (2):

$$A_{V} = V_{OUT} / V_{SENSE} = R3 / R1 \times G_{M}$$
(2)

Table 1 lists the possible A_V values using different resistors.

Table 1. Selecting Av				
A _V (V/V)	R1/R2 (kΩ)	R3 (kΩ)		
100	1	20		
50	1	10		
25	1.02	5.1		
10	1	2		

Table 1: Selecting A.

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EVALUATION BOARD SCHEMATIC







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EVQ8112A-J-00A BILL OF MATERIALS

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Qty	Ref	f Value	Description	Package	Manufacturer	Manufacturer P/N
3	C1, C5, C6	, C6 NS	Ceramic capacitor, 100V, X7R	0603		
1	C2	1µF	Ceramic capacitor, X7R, 100V	1206	Murata	GRM31CR72A105KA01L
1	C3	0.1µF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H104KA93D
1	C4	5pF	Ceramic capacitor, COG, 50V	0603	TDK	C1608C0G1H050C
1	C7	10pF	Ceramic capacitor, COG, 50V	0603	muRata	GRM1885C1H100JA01
2	R1, R2	R2 1kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-071KL
1	R3	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	Rsense	se 100mΩ	Film resistor, 1%, 1W	2512	Yageo	RL2512FK-070R1L
1	U1	MPQ8112A	Current-sense amplifier	TSOT23- 6L	MPS	MPQ8112AGJ
2	JP1, JP2	IP2 2.54mm	2 x 1, 2.54mm, 180° connector		Custom	
1	JP1	1 2.54mm	2.54mm jumper		Custom	
7	V5, Vcc, RG1, RG2, GND, GND, VOUT	cc, RG2, GND, IT	1.0 golden pin		Custom	

EVB TEST RESULTS

 V_{CC} = 12V, V_{RG1} = 12V, V5 = 5V, T_A = 25°C, R1 = R2 = 1k Ω , and R3 = 10k Ω , unless otherwise noted.





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EVB TEST RESULTS (continued)

 V_{CC} = 12V, V_{RG1} = 12V, V5 = 5V, T_A = 25°C, R1 = R2 = 1k Ω , and R3 = 10k Ω , unless otherwise noted.





PCB LAYOUT



Figure 2: Top Silk Layer

Figure 3: Bottom Layer



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	06/08/2021	Initial Release	-

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