



EV6508A-Q-00A

18V, 1.2A, Bipolar Stepper Motor Driver Evaluation Board

DESCRIPTION

The EV6508A-Q-00A evaluation board is designed to demonstrate the capabilities of the MP6508A, a bipolar stepper motor driver with dual, built-in full bridges consisting of N-channel power MOSFETs.

The MP6508A operates across a 2.7V to 18V supply voltage range, and can deliver an output current (I_{OUT}) up to 1.2A per channel. The internal safety features include over-current protection (OCP), under-voltage lockout (UVLO), and thermal shutdown.

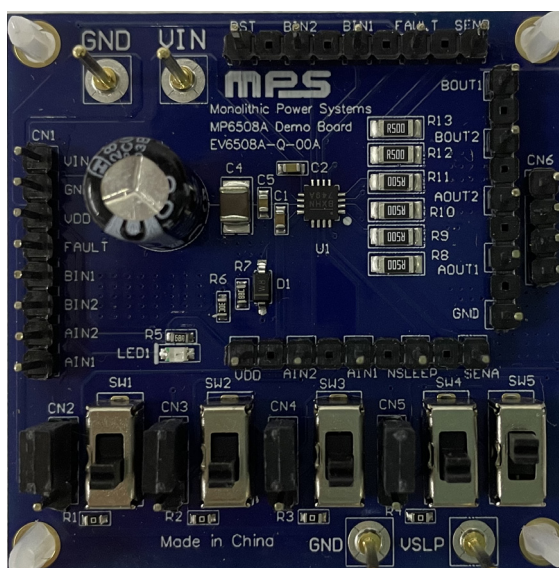
The MP6508A's input control signals are applied through the connector or generated on the board. The EV6508A-Q-00A can drive a bipolar stepper motor in full-step and half-step modes. The board can also drive two independent DC motors.

The MP6508A is available in a QFN-16 (3mmx3mm) package. It is recommended to read the MP6508A datasheet prior to making any changes to the EV6508A-Q-00A.

PERFORMANCE SUMMARY

Parameters	Conditions	Value
Input voltage (V_{IN}) range		2.7V to 18V
Maximum output current (I_{OUT_MAX})		1.2A
Sleep input voltage (V_{SLP})		3.3V or 5V

EV6508A-Q-00A EVALUATION BOARD



QUICK START GUIDE

1. The MP6508A's power and control signals are applied through the connector CN1. Each pin in CN1 is labeled on the evaluation board (see Figure 1 on page 3). CN1 also outputs the FAULT signal and the 5V VDD voltage (V_{DD}) from the IC.
2. Preset the 2.7V to 18V power supply between the VIN and GND pins on CN1, or between the external VIN and GND terminals.
3. Connect CN6 to the motor winding terminals. Each pin in CN6 is labeled on the evaluation board as AOUT1, AOUT2, BOUT1, and BOUT2 (see Figure 1). The polarity of these connections affect the DC motor direction. For a stepper motor, connect one winding to AOUT1 and AOUT2, then connect the other winding to BOUT1 and BOUT2.
4. If SW5 is switched to Terminal 3 on the top side, the nSLEEP pin is pulled up to the input voltage (V_{IN}) via a resistor divider. This ensures that the MP6508A does not enter sleep mode. If sleep mode is controlled externally, then switch SW5 to Terminal 1 on the bottom side, and directly connect the nSLEEP control signal from the external controller to the VSLP terminal (see Figure 1 on page 3).
5. The control signals (AIN1, AIN2, BIN1, and BIN2) can be generated on the board. Use the jumpers (CN2, CN3, CN4, and CN5) to select the source of AIN1, AIN2, BIN2, and BIN1, respectively.
6. Place a shunt between Terminal 1 and Terminal 2 of the CN1, CN2, CN3, and CN4 jumpers, respectively, to route the source of the control signals to CN1. This connection enables users to control the input signals via an external controller.
7. If the shunt is placed between Terminal 2 and Terminal 3 of the CN1, CN2, CN3, CN4 jumpers, respectively, then the source of the control signals is routed to the switches (SW1, SW2, SW3, and SW4). These switches control the state of the input control signals. Refer to the MP6508A datasheet for more details on the state of the motor outputs across various input combinations.
8. The LED1 diode indicates the FAULT pin status. If over-current protection (OCP) or over-temperature protection (OTP) occurs, then FAULT is pulled low and the LED lights up.
9. R8, R9, and R10 are the current-sense resistors directly connected to SENA, while R11, R12, and R13 are the current-sense resistors directly connected to SENB, respectively. The other sides of these resistors are connected to GND. These resistors control the current through the MP6508A, which is set to 1.2A per channel.
10. To change the output current (I_{OUT}), R8, R9, R10, R11, R12, and R13 must also be changed.

The relationship between SENA's output current limit (I_{LIM-A}) and R8, R9, and R10 can be calculated with Equation (1):

$$I_{LIM-A} = \frac{200mV}{R8 // R9 // R10} \quad (1)$$

The relationship between SENB's output current limit (I_{LIM-B}) and R11, R12, and R13, can be estimated with Equation (2):

$$I_{LIM-B} = \frac{200mV}{R11 // R12 // R13} \quad (2)$$

EVALUATION BOARD SCHEMATIC

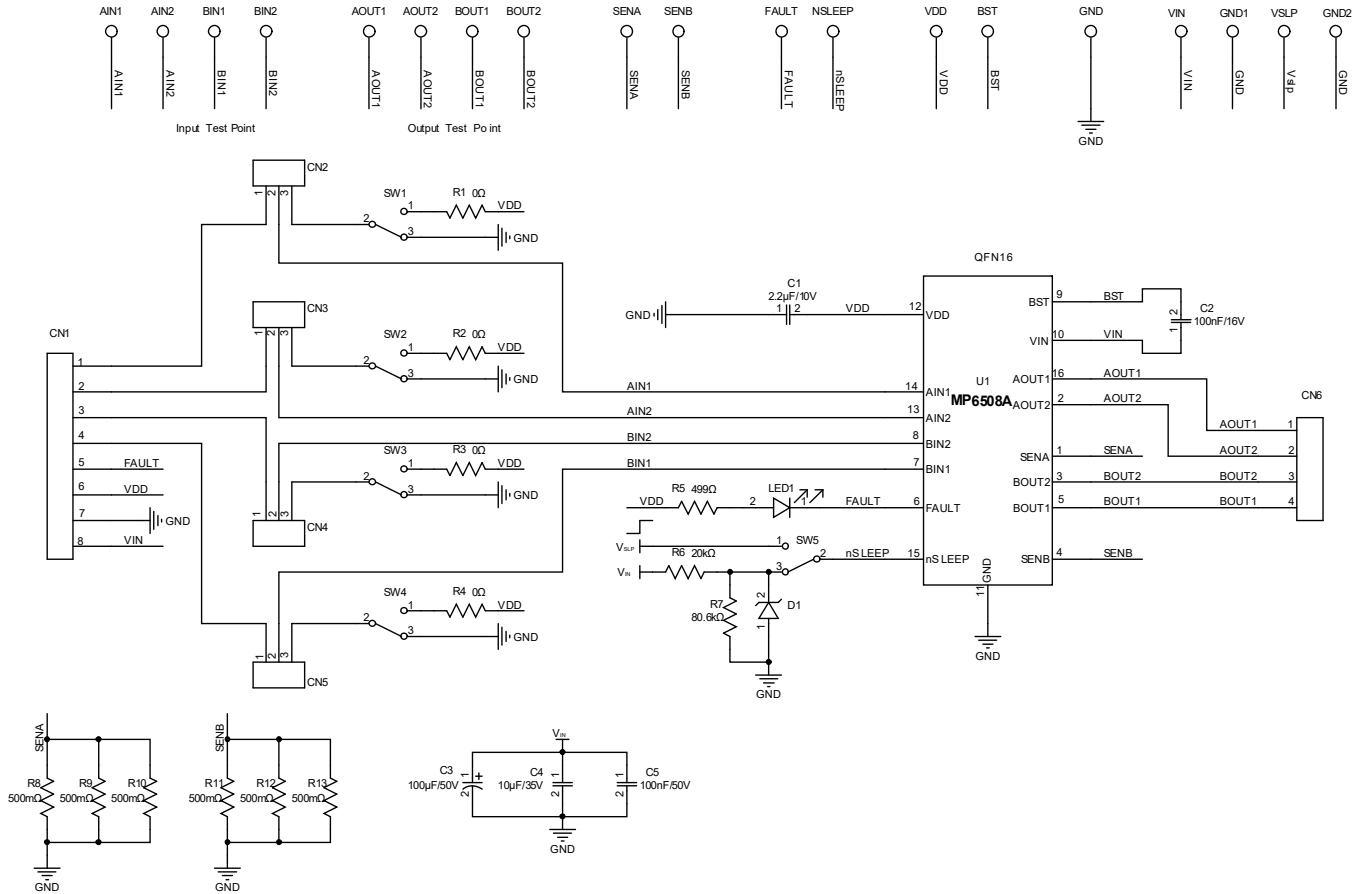


Figure 1: Evaluation Board Schematic

EV6508A-Q-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1	2.2μF	Ceramic capacitor, 10V, X7R	0603	Murata	GRM188R71A225KE15D
1	C2	100nF	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71C104KA01D
1	C3	100μF	Electrolytic capacitor, 50V	DIP	Jianghai	CD287-50V100
1	C4	10μF	Ceramic capacitor, 35V, X7R	1210	Murata	GRM32ER7YA106KA12L
1	C5	100nF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H104KA93D
4	R1, R2, R3, R4	0Ω	Film resistor, 1%	0603	Yageo	RC0603FR-070RL
1	R5	499Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07499RL
1	R6	20kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0720KL
1	R7	80.6kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0780K6L
6	R8, R9, R10, R11, R12, R13	500mΩ	Film resistor, 1%	1206	Yageo	RL1206FR-070R5L
1	D1	500mW	Zener diode, 5.1V	SOD-123	Diodes, Inc.	BZT52C5V1
1	LED1	50mW	Red LED	0805	Baihong	BL-HUE35A-AV-TRB
5	SW1, SW2, SW3, SW4, SW5	500mA	Switch slide SPDT	DIP	Any	
4	VIN, GND, VLSP, GND	1mm	Connector, φ = 1mm	DIP	Any	
1	CN1	2.54mm	Connector, 8-bit	DIP	Any	
4	CN2, CN3, CN4, CN5	2.54mm	Connector, 3-bit	DIP	Any	
4	CN2, CN3, CN4, CN5	2.54mm	Short jumper	DIP	Any	
1	CN6	2.54mm	Connector, 4-bit	DIP	Any	
15	AIN1, AIN2, BIN1, BIN2, AOUT1, AOUT2, BOUT1, BOUT2, SENA, SENB, FAULT, NSLEEP, VDD, BST, GND	2.54mm	Connector, 9-bit	DIP	Any	
1	U1	MP6508A	18V, 1.2A stepper motor driver	QFN-16 (3mmx3mm)	MPS	MP6508AGQ

PCB LAYOUT

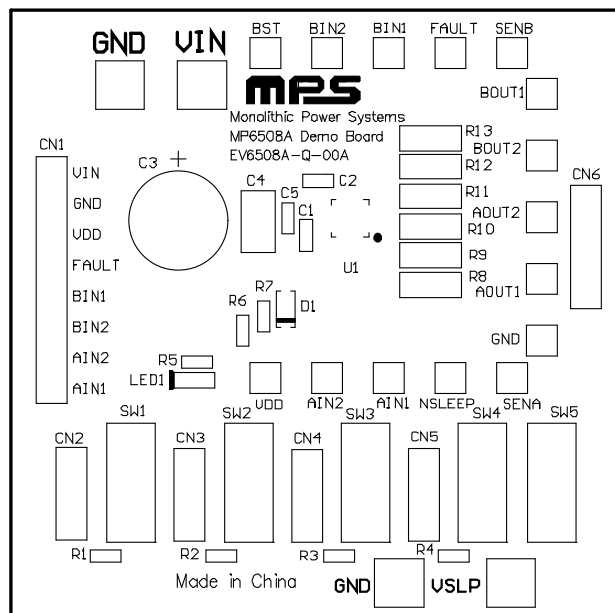


Figure 2: Top Silk

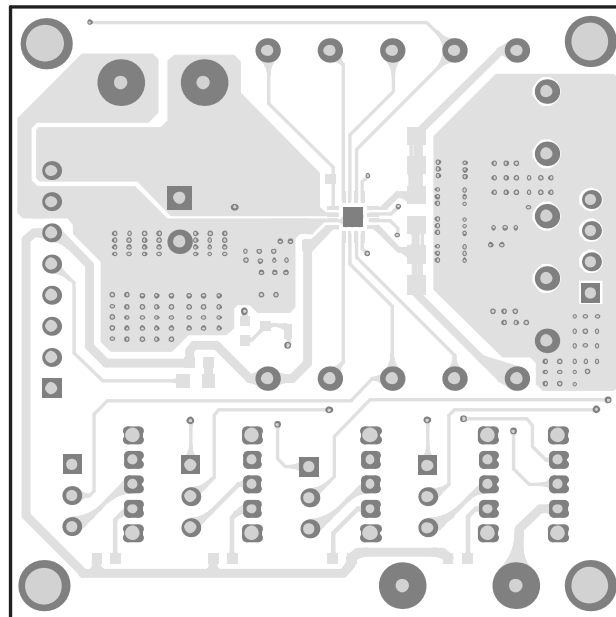


Figure 3: Top Layer

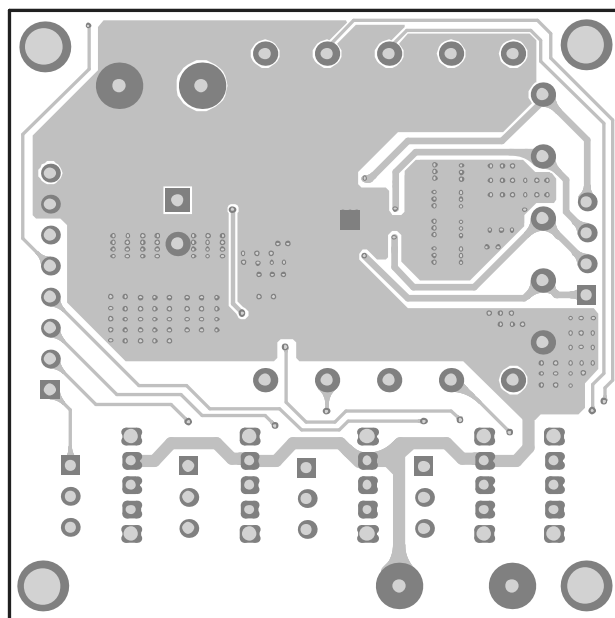


Figure 4: Bottom Layer



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	7/11/2022	Initial Release	-

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