



EV6508-F-00A

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

DESCRIPTION

The EV6508-F-00A is an evaluation board designed for the MP6508GF, a bipolar stepper motor driver with dual, built-in full bridges consisting of N-channel power MOSFETs.

The MP6508 operates from a 2.7V to 18V supply voltage range, and can deliver output currents up to 1.2A per channel. The safety features include sink and source current limits implemented with external sensors, under-voltage lockout (UVLO), and thermal shutdown. An over-temperature output flag is available to indicate thermal shutdown.

The EV6508-F-00A is a fully assembled and tested PCB. The input control signals for the MP6508 are applied through the connector or generated on the board. The board can drive a bipolar stepper motor with both full-step and half-step mode. It also can drive two independent DC motors.

FEATURES

- Wide 2.7V to 18V Input Voltage Range
- Over-Current and Over-Temperature Indication
- Alternative Input Control Signals (External or Generated on Board)

APPLICATIONS

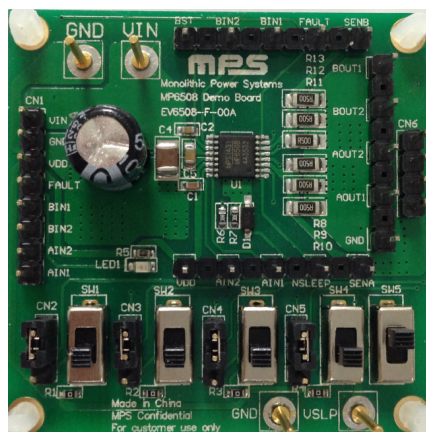
- POS Printers
- Video Security Cameras
- Battery-Powered Devices
- USB-Powered Devices

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ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|----------------|------------------|-----------|-------|
| Input voltage | V _{IN} | 2.7 to 18 | V |
| Output current | I _{OUT} | 1.2 | A |

EV6508-F-00A EVALUATION BOARD



(LxWxH) 5cmx5cmx1cm

| Board Number | MPS IC Number |
|--------------|---------------|
| EV6508-F-00A | MP6508GF |

QUICK START GUIDE

1. The power and control signals for the MP6508 are applied through connector CN1. Each pin in the connector is labeled on the EVB. The control signals for AIN1, AIN2, BIN1, and BIN2 can be generated on the board (see step 5 for more details). CN1 also outputs the FAULT signal and VDD (5V) from the IC.
2. Preset the power supply (2.7V to 18V) between the VIN and GND pins on CN1, or the external VIN and GND terminals.
3. Connector CN6 should be connected to the motor winding terminals. Each pin in the connector is labeled on the EVB as AOUT1, AOUT2, BOUT1, or BOUT2. The polarity of these connections affects the direction of the DC motor. For a stepper motor, one winding should be connected to AOUT1 and AOUT2, while the other should be connected to BOUT1 and BOUT2.
4. If SW5 is switched to the VIN position (top side), the SLEEP pin is pulled up to V_{IN} by a resistor divider. This ensures that the part does not enter sleep mode. If sleep mode is controlled externally, switch SW5 to the VSLP position (bottom side) and connect the SLEEP control signal from the external controller directly to the VSLP terminal.
5. Jumpers (CN2, CN3, CN4, and CN5) select the source of the control signals (AIN1, AIN2, BIN2, and BIN1, respectively).

By placing a shunt between positions 1 and 2, the source of the control signals is routed to connector CN1. This connection allows the user to set these signals through an external controller.

If the shunt is placed between positions 2 and 3, then the source of the control signals is routed to the switches (SW1, SW2, SW3, and SW4). These switches can be used to control the state of the input control signals. Refer to the MP6508 datasheet for more details on the state of the motor outputs for various input combinations.

6. Diode LED1 indicates the FAULT pin status. If over-current (OC) or over-temperature protection (OTP) occurs, the FAULT pin is pulled low, and the LED lights up.
7. R8, R9, and R10, as well as R11, R12, and R13 are the current-sense resistors connected directly to SENA and SENB, respectively. The other sides of these resistors are connected to GND. These resistors control the current through the MP6508, which is set to be 1.2A per channel. To change the output current, the resistor values must also be changed. The relationship between the output current limit and R8 through R10, and R11 through R13, can be calculated with Equation (1) and Equation (2), respectively:

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

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

EVALUATION BOARD SCHEMATIC

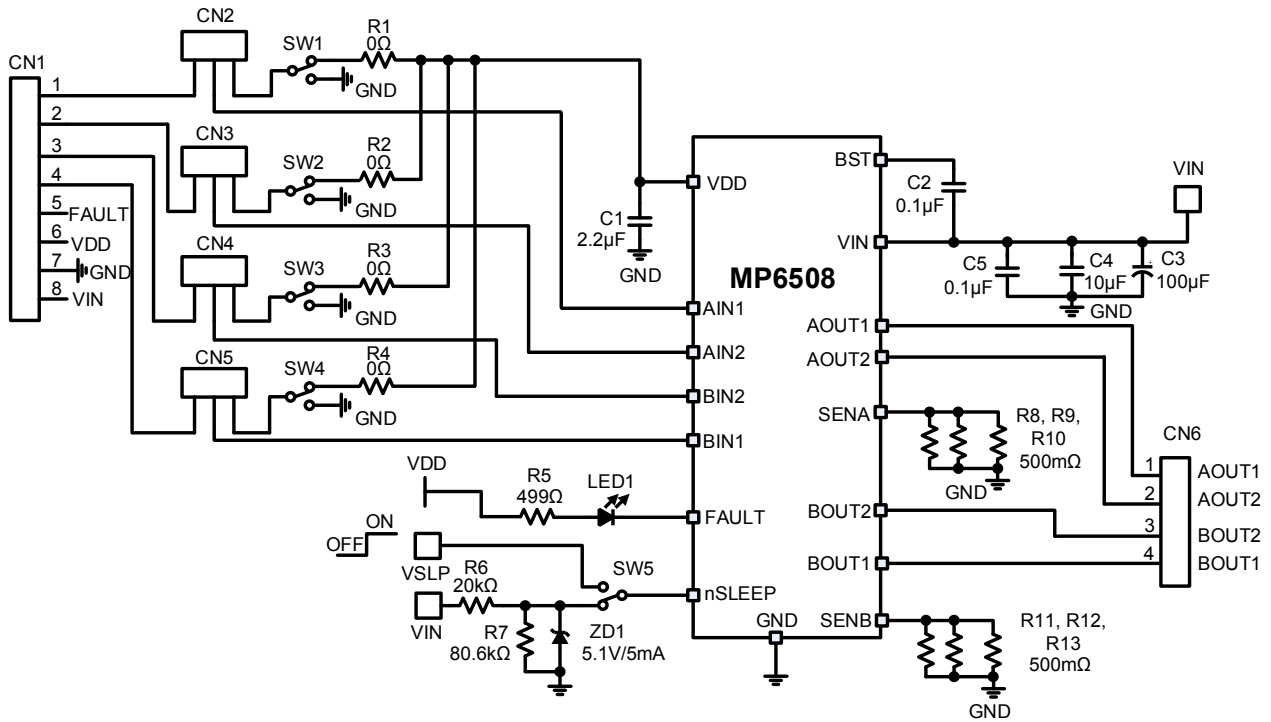


Figure 1: Evaluation Board Schematic

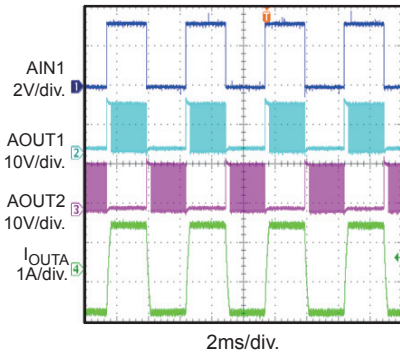
EV6508-F-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Part Number |
|-----|----------------------------------|---------------------|-------------------------------------|------------|--------------|--------------------|
| 1 | C1 | 2.2 μ F | Ceramic capacitor, 10V, X7R | 0603 | Murata | GRM188R71A225KE15D |
| 2 | C2, C5 | 0.1 μ F | Ceramic capacitor, 25V, X7R | 0603 | Murata | GRM188R71E104KA01D |
| 1 | C3 | 100 μ F | Electrolytic capacitor, 50V, X5R | DIP | Jianghai | CD287-50V100 |
| 1 | C4 | 10 μ F | Ceramic capacitor, 50V, X7R | 1206 | Murata | GRM32ER71H106KA12L |
| 4 | R1, R2 R3, R4 | 0 Ω | Film resistor, 5% | 0603 | Royal Ohm | 0603J0000T5E |
| 1 | R5 | 499 Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-07499RL |
| 1 | R6 | 20k Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-0720KL |
| 1 | R7 | 80.6k Ω | Film resistor, 1% | 0603 | Yageo | RC0603FR-0780K6L |
| 6 | R8, R9, R10, R11, R12, R13 | 500m Ω | Film resistor, 1% | 1206 | Yageo | RL1206FR-070R5L |
| 1 | ZD1 | 5.1V, 5mA | Zener diode | SOD-123 | Diodes | BZT52C5V1 |
| 1 | LED1 | Red | LED | 0805 | Bright LED | BL-HUF35A-TRB |
| 5 | SW1, SW2, SW3, SW4, SW5 | SPDT | Button | DIP | Any | |
| 1 | CN1 | 8-bits/ 2.54mm | Connector | DIP | Any | |
| 4 | CN2, CN3, CN4, CN5 | 3-bits/ 2.54mm | Connector | DIP | Any | |
| 4 | CN2, CN3, CN4, CN5 | 2.54mm | Short jumper | DIP | Any | |
| 1 | CN6 | 4-bits/ 2.54mm | Connector | DIP | Any | |
| 4 | VIN, VSLP, GND, GND | $\Phi = 1\text{mm}$ | Connector | DIP | Any | |
| 1 | U1 | 18V, 1.2A | Stepper motor driver | TSSOP-16EP | MPS | MP6508GF |

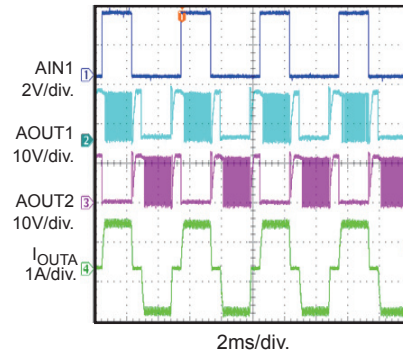
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board, $V_{IN} = 12V$, $I_{OUT} = 1.2A$, $f_{STEP} = 200Hz$, R + L Load: L = 1.5mH, R = 3.3Ω, $T_A = 25^\circ C$, unless otherwise noted.

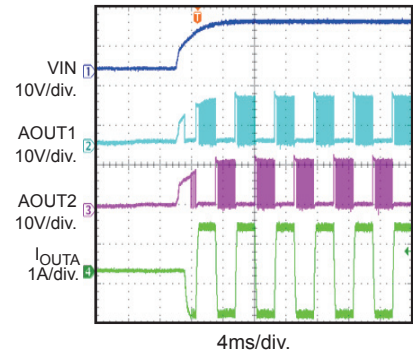
Steady State (Full Step)



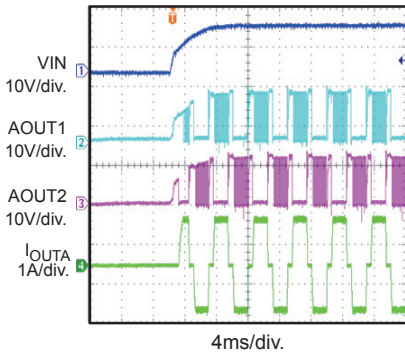
Steady State (Half-Step)



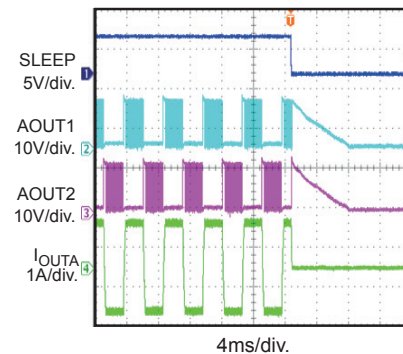
Power Ramp Up (Full Step)



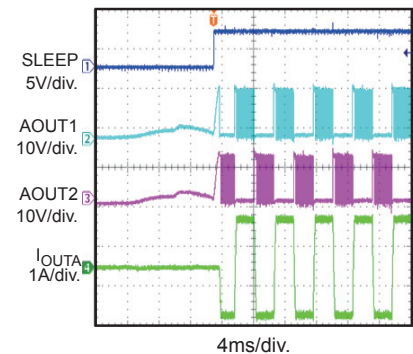
Power Ramp Up (Half-Step)



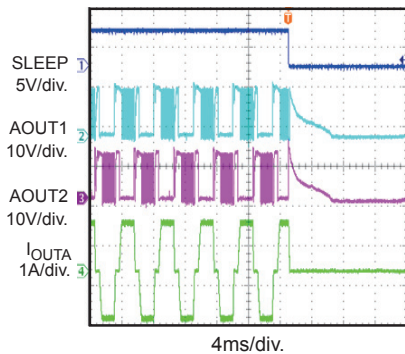
Sleep Entry (Full Step)



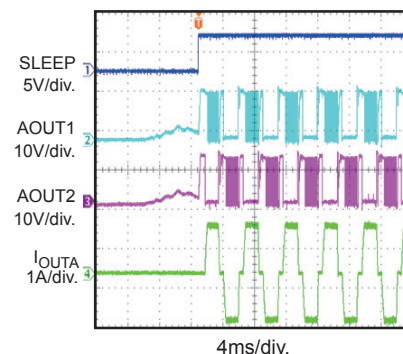
Sleep Recovery (Full Step)



Sleep Entry (Half-Step)



Sleep Recovery (Half-Step)



PCB LAYOUT

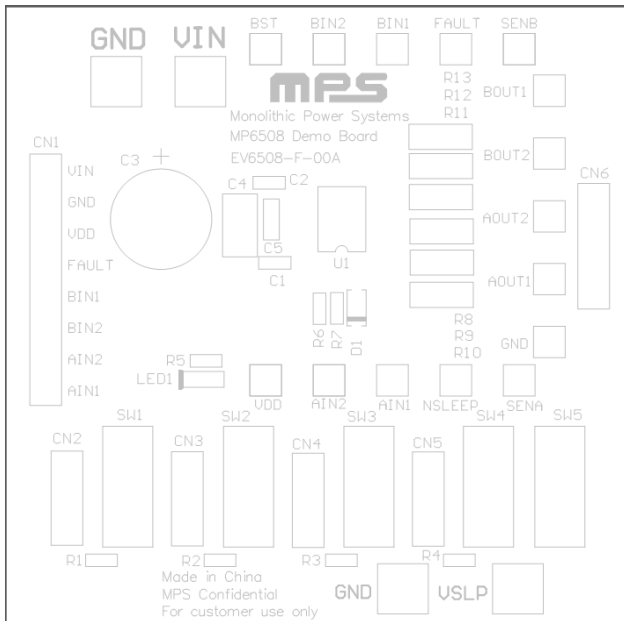


Figure 2: Top Silk Layer

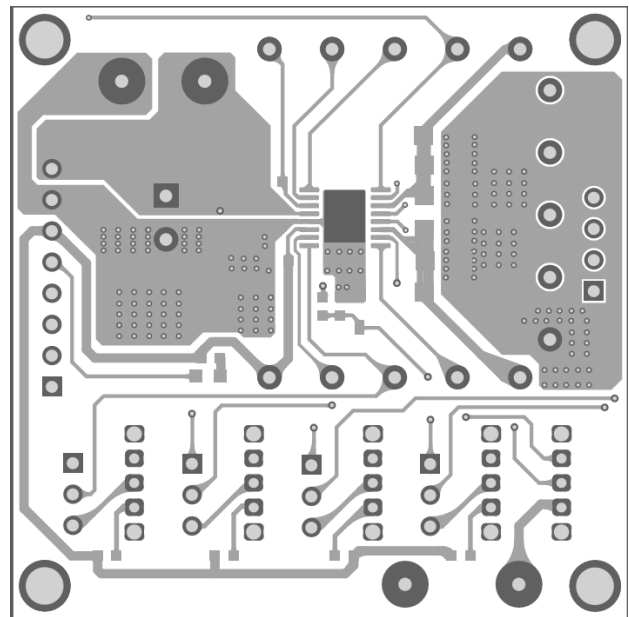


Figure 3: Top Layer

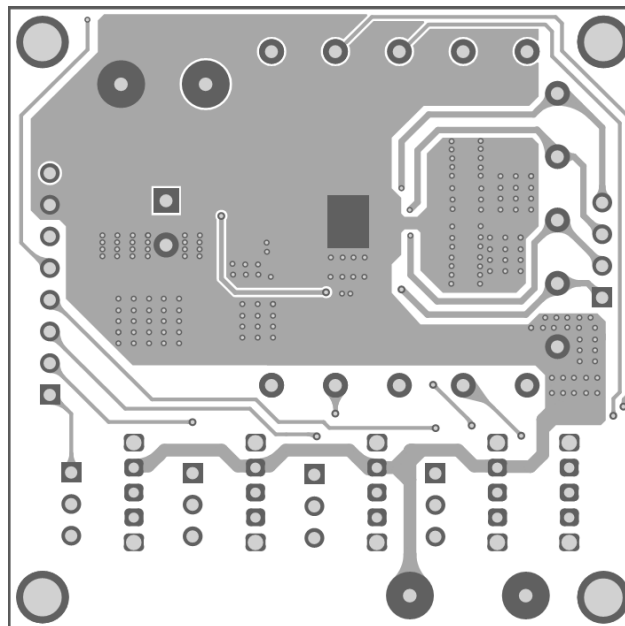


Figure 4: Bottom Layer

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