



# EV6543HA-L-00A

## 3V to 22V, Three-Phase Brushless DC Motor Driver Evaluation Board

### DESCRIPTION

The EV6543HA-L-00A is an evaluation board for the MP6543HGL-A, a three-phase brushless DC motor driver.

The EV6543HA-L-00A operates from a maximum 22V supply voltage. It integrates three half-bridges consisting of six N-channel power MOSFETs. The rotor position information is provided by the Hall sensors assembled in the motor, and the driving control signals are generated by an external controller, such as an MCU or FPGA.

### ELECTRICAL SPECIFICATIONS

| Parameter         | Symbol        | Value   | Units |
|-------------------|---------------|---------|-------|
| Input voltage     | $V_{IN}$      | 3 to 22 | V     |
| LDO input voltage | $V_{IN\_LDO}$ | 3 to 22 | V     |
| VREF voltage      | $V_{REF}$     | 3.3     | V     |
| VCC voltage       | $V_{CC}$      | 3.3     | V     |

### FEATURES

- Wide 3V to 22V Input Voltage Range
- Built-In 3.3V, 100mA LDO Regulator
- Integrated Bidirectional Current-Sense Amplifiers
- Supports 100% Duty Cycle Operation
- Low-Side/High-Side Logic Input
- Over-Current Protection (OCP), Over-Temperature Protection (OTP)
- Fault Indication Output

### APPLICATIONS

- Three-Phase Brushless DC Motors and Permanent Magnet Synchronous Motors
- Drones
- Robotics

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## EV6543HA-L-00A EVALUATION BOARD



(LxW) 6.35cmx6.35cm

| Board Number   | MPS IC Number |
|----------------|---------------|
| EV6543HA-L-00A | MP6543HGL-A   |

## QUICK START GUIDE

1. Attach the input voltage ( $3V \leq V_{IN} \leq 22V$ ) to the VIN connector, and attach the input ground to the GND connector.
2. Attach the LDO input voltage ( $3V \leq V_{IN\_LDO} \leq 22V$ ) to the VIN\_LDO connector, and attach the input ground to the GND connector.
3. Attach a 3.3V constant voltage to the VCC connector and switch SW1 to position 1 (top side) to enable the chip.
4. Attach a 3.3V constant voltage to the VREF connector to set the current-sense output reference voltage.
5. Attach the motor's Hall signals to the Hall sensor connector.
6. Attach the driving control signals generated by the external controller to the CN1 connector.

### EVALUATION BOARD SCHEMATIC

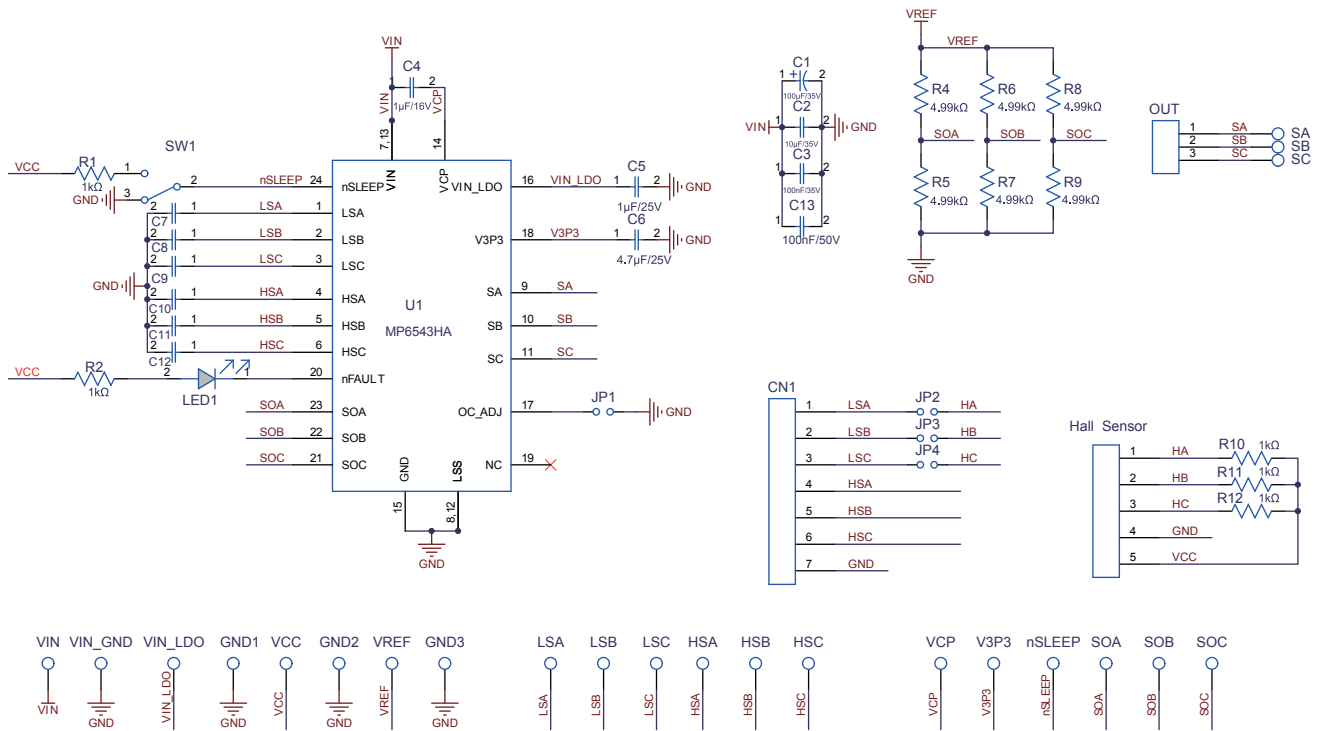


Figure 1: Evaluation Board Schematic

**EV6543HA-L-00A BILL OF MATERIALS**

| Qty | Ref   | Value             | Description                           | Package         | Manufacturer      | Part Number        |
|-----|---|-------------------|---------------------------------------|-----------------|-------------------|--------------------|
| 5   | R1, R2, R10, R11, R12                         | 1kΩ               | Film resistor, 1%                     | 0603            | Yageo             | RC0603FR-071KL     |
| 6   | R4, R5, R6, R7, R8, R9                        | 4.99kΩ            | Film resistor, 1%                     | 0603            | Yageo             | RC0603FR-074K99L   |
| 1   | C1  | 100μF             | Electrolytic capacitor, 35V           | DIP             | Jianghai          | CD287-35V100       |
| 1   | C2  | 10μF              | Ceramic capacitor, 35V, X7R           | 1210            | Murata            | GRM32ER7YA106KA12L |
| 2   | C3, C13                                       | 100nF             | Ceramic capacitor, 50V, X7R           | 0603            | Würth             | 885012206095       |
| 1   | C4  | 1μF               | Ceramic capacitor, 16V, X7R           | 0603            | Würth             | 885012206052       |
| 1   | C5  | 1μF               | Ceramic capacitor, 25V, X5R           | 0603            | Würth             | 885012106022       |
| 1   | C6  | 4.7μF             | Ceramic capacitor, 25V, X5R           | 0603            | Murata            | GRM188R61E475KE11D |
| 6   | C7, C8, C9, C10, C11, C12                     | NS                |                                       |                 |                   |                    |
| 1   | LED1  | Red               | LED                                   | 0805            | Baihong           | BL-HUE35A-AV-TRB   |
| 1   | U1  | 22V, 2A           | Three-phase brushless DC motor driver | QFN24 (3mmx4mm) | MPS               | MP6543HGL-A        |
| 1   | SW1   | SPDT              | Button                                | DIP             | Würth             | 450301014042       |
| 4   | JP1, JP2, JP3, JP4                            | 2-bits/<br>2.54mm | Connector                             | DIP             | Electrical market | 61304011121        |
| 1   | JP1   | 2-bits/<br>2.54mm | Short jumper                          | DIP             | Electrical market | 60900213421        |
| 1   | CN1   | 7-bits/<br>2.54mm | Connector                             | DIP             | Electrical market | 61304011121        |
| 1   | Hall sensor                                   | 5-bits/<br>2.54mm | Connector                             | DIP             | Electrical market | 61304011121        |
| 1   | PWMA, PWMB, PWMC, ENA, ENB, ENC               | 6-bits/<br>2.54mm | Connector                             | DIP             | Electrical market | 61304011121        |
| 1   | OUT   | 3-bits/<br>2.54mm | Connector                             | DIP             | Electrical market | 61304011121        |
| 6   | VCP, V3P3, SOA, SOB, SOC, NSLEEP              | Yellow            | Test point                            | DIP             | Electrical market | Test point         |
| 2   | VIN, VIN_GND                                  | Φ = 2mm           | Connector                             | DIP             | Electrical market | Φ = 2mm Needle     |
| 9   | VIN_LDO, VREF, VCC, GND, GND, GND, SA, SB, SC | Φ = 1mm           | Connector                             | DIP             | Electrical market | Φ = 1mm Needle     |

### PCB LAYOUT

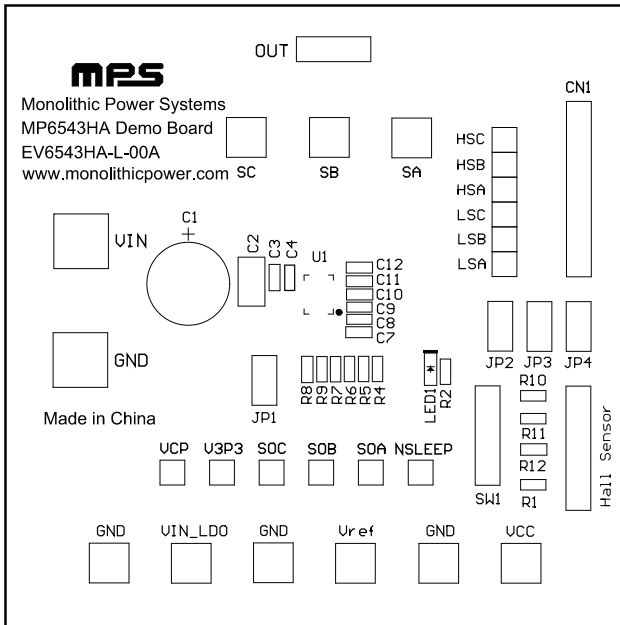


Figure 2: Top Silk Layer

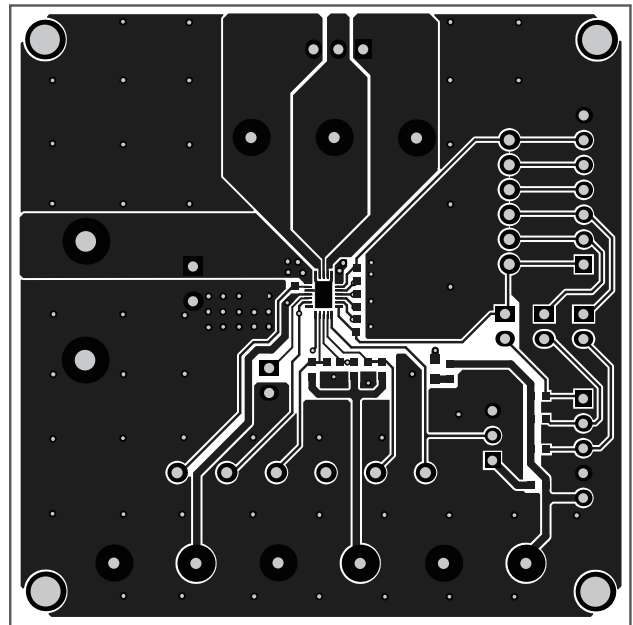


Figure 3: Top Layer

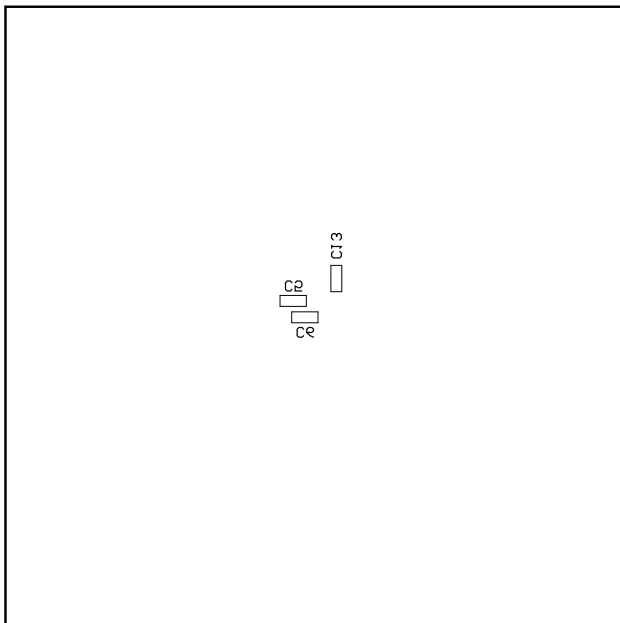


Figure 4: Bottom Silk Layer

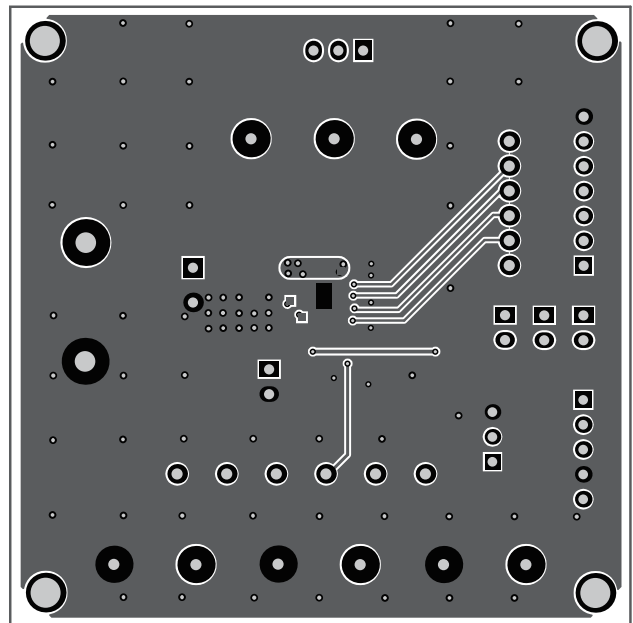


Figure 5: Bottom Layer

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