



3V to 12V, LS & HS Input, Three-Phase **Brushless DC Motor Driver Evaluation Board**

DESCRIPTION

The EV6543A-L-01A is an evaluation board for the MP6543AGL, a three-phase, brushless DC motor driver.

The EV6543A-L-01A operates from a maximum 12V supply voltage. It integrates three halfbridges consisting of six N-channel power MOSFETs. The rotor position information is provided by the Hall sensors assembled in the motor. 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 12 | V |
| LDO input voltage | $V_{\text{IN_LDO}}$ | 3 to 12 | V |
| VREF voltage | V_{REF} | 3.3 | V |
| VCC voltage | Vcc | 3.3 | V |

FEATURES

- Wide 3V to 12V 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 (PMSMs)
- **Drones**
- Robotics

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EV6543A-L-01A EVALUATION BOARD



(LxW) 6.35cmx6.35cm

| Board Number | MPS IC Number | |
|---------------|---------------|--|
| EV6543A-L-01A | MP6543AGL | |

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QUICK START GUIDE

- 1. Attach the input voltage (3V \leq V_{IN} \leq 12V) to the VIN connector, and attach the input ground to the GND connector.
- 2. Attach the LDO input voltage ($3V \le V_{IN_LDO} \le 12V$) 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

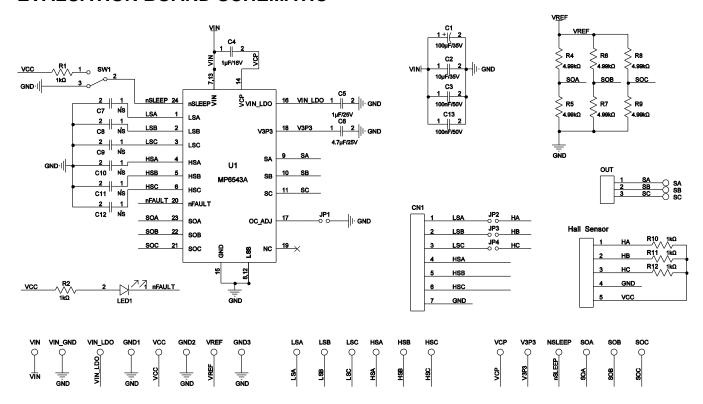


Figure 1: Evaluation Board Schematic

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EV6543A-L-01A BILL OF MATERIALS

| | Γ | Г | OI WATERIALS | Т | T | T |
|-----|---|-------------------|---|-------------------------|--------------|------------------------|
| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer PN |
| 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 | GRM32ER7YA106K A12L |
| 2 | C3, C13 | 100nF | Ceramic capacitor, 50V, X7R | 0603 | Wurth | 885012206095 |
| 1 | C4 | 1µF | Ceramic capacitor, 16V, X7R | 0603 | Wurth | 885012206052 |
| 1 | C5 | 1µF | Ceramic capacitor, 25V, X5R | 0603 | Wurth | 885012106022 |
| 1 | C6 | 4.7µF | Ceramic capacitor, 25V, X5R | 0603 | Murata | GRM188R61E475KE 11D |
| 6 | C7, C8, C9, C10, C11, C12 | NS | | | | |
| 1 | LED1 | Red | LED | 0805 | Baihong | BL-HUE35A-AV-TRB |
| 1 | U1 | MP6543A | 12V, 2A, three-phase brushless DC motor driver | QFN-24 (3mmx 4mm) | MPS | MP6543AGL |
| 1 | SW1 | SPDT | Button | DIP | Wurth | 450301014042 |
| 4 | JP1, JP2, JP3, JP4 | 2 bits/ 2.54mm | Connector | DIP | Any | |
| 1 | JP1 | 2 bits/ 2.54mm | Short jumper | DIP | Any | |
| 1 | CN1 | 7 bits/ 2.54mm | Connector | DIP | Any | |
| 1 | Hall sensor | 5 bits/ 2.54mm | Connector | DIP | Any | |
| 1 | PWMA, PWMB, PWMC, ENA, ENB, ENC | 6 bits/ 2.54mm | Connector | DIP | Any | |
| 1 | OUT | 3 bits/ 2.54mm | Connector | DIP | Any | |
| 6 | VCP, V3P3, SOA, SOB, SOC, NSLEEP | Yellow | Test point | DIP | Any | |
| 2 | VIN, VIN_GND | Φ = 2mm | Connector, $\Phi = 2mm$ needle | DIP | Any | |
| 9 | VIN_LDO, VREF, VCC, GND, GND, GND, SA, SB, SC | Φ = 1mm | Connector, $\Phi = 1$ mm needle | DIP | Any | |



PCB LAYOUT

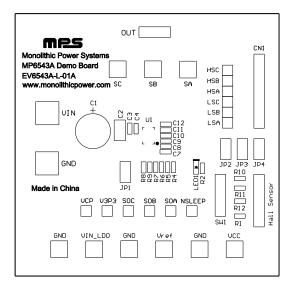


Figure 2: Top Silk Layer

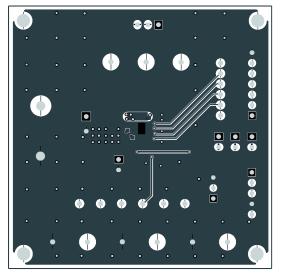


Figure 4: Bottom Layer

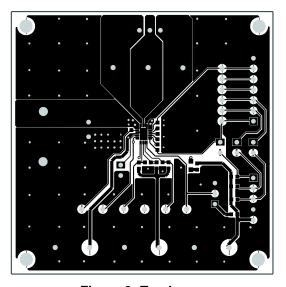


Figure 3: Top Layer

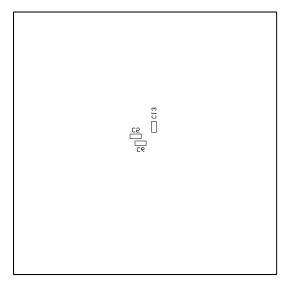


Figure 5: Bottom Silk Layer



Revision History

| Revision # | Revision Date | Description | Pages Updated |
|------------|------------------|-----------------|------------------|
| 1.0 | 12/1/2020 | Initial Release | |

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