

## DESCRIPTION

The EV6538-V-00A is an evaluation board for the MP6538, a three-phase BLDC motor pre-driver.

It operates from a supply voltage of up to 100V. It is configured to drive 3 half bridges consisting of 6 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 the external controller, such as MCU, FPGA, etc.

## ELECTRICAL SPECIFICATIONS

| Parameter          | Symbol | Value       | Units |
|--------------------|--------|-------------|-------|
| Input Voltage      | VIN    | 8 - 100     | V     |
| OC_REF             | OC_REF | 0.125 – 2.4 | V     |
| Logic Power Supply | VCC    | 3.3 or 5    | V     |

## FEATURES

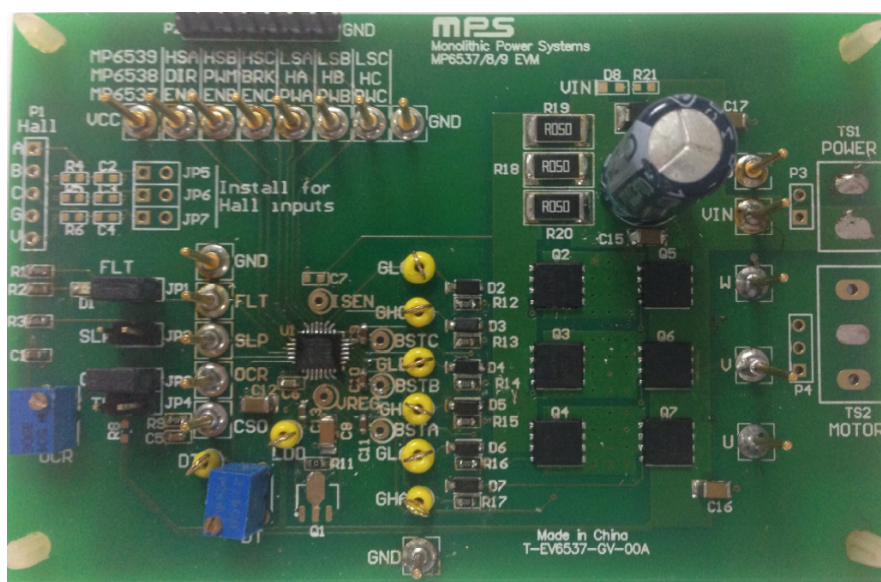
- Wide 8V to 100V Input Voltage Range
- Programmable OCP Threshold
- Support 100% Duty Cycle Operation
- OCP, OTP
- Fault Indication Output

## APPLICATIONS

- 3-Phase Brushless DC Motors and Permanent Magnet Synchronous Motors
- Power Drills
- Impact Drivers
- E-Bike

All MPS parts are lead-free, halogen-free, and adhere to the RoHS directive. For MPS green status, please visit the MPS website under quality assurance. "MPS" and "The Future of Analog IC Technology" are registered trademarks of Monolithic Power Systems, Inc.

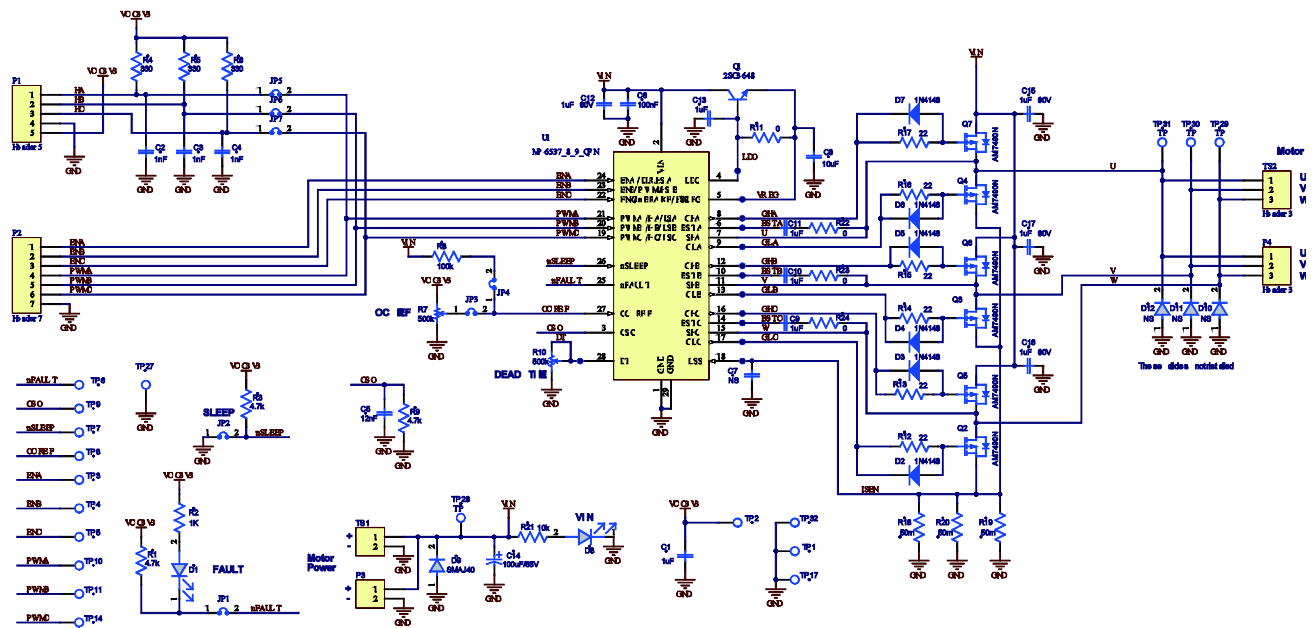
## EV6538-V-00A EVALUATION BOARD



(L x W x H) 4.68" x 3.12" x 0.4"  
(11.7cm x 7.8cm x 1cm)

| Board Number | MPS IC Number |
|--------------|---------------|
| EV6538-V-00A | MP6538        |

## EVALUATION BOARD SCHEMATIC



## EV6538-V-00A BILL OF MATERIALS

| Qty | RefDes                       | Value        | Description                                 | Package   | Manufacturer | Manufacturer P/N   |
|-----|------------------------------|--------------|---------------------------------------------|-----------|--------------|--------------------|
| 1   | C1                           | 1 $\mu$ F    | Ceramic Cap. 6.3V, X5R                      | 0603      | Murata       | GRM188R60J105KA01D |
| 3   | C2,C3,C4                     | 1nF          | Ceramic Cap. 16V, X7R                       | 0603      | Murata       | GRM188R71C102KA01D |
| 2   | C5, C7                       | 12nF         | Ceramic Cap. 50V, X7R                       | 0603      | Murata       | GRM188R71H123KA01D |
| 1   | C6                           | 100nF        | Ceramic Cap. 100V, X7R                      | 0603      | Murata       | GRM188R72A104KA35D |
| 1   | C8                           | 10 $\mu$ F   | Ceramic Cap. 25V, X7R                       | 1206      | Murata       | GRM31CR71E106KA12  |
| 4   | C9, C10, C11, C13            | 1 $\mu$ F    | Ceramic Cap. 25V, X7R                       | 0603      | Murata       | GRM188R71E105KA12D |
| 4   | C12, C15, C16, C17           | 1 $\mu$ F    | Ceramic Cap. 100V, X7R                      | 1206      | Murata       | GRM31CR72A105KA01L |
| 1   | C14                          | 100 $\mu$ F  | Electrolytic Cap. 100V                      | DIP       | Jianghai     | CD263-100V100      |
| 6   | R1, R3, R4, R5, R6, R9       | 4.7k         | Film Resistor ,1%                           | 0603      | Yageo        | RC0603FR-074K7L    |
| 1   | R2                           | 1k           | Film Resistor ,1%                           | 0603      | Yageo        | RC0603FR-071KL     |
| 2   | R7, R10                      | 500k         | Adjustable Resistor                         | DIP       |              | 3266W-1-504LF      |
| 1   | R8                           | 100k         | Film Resistor ,1%                           | 0603      | Yageo        | RC0603FR-07100KL   |
| 4   | R11, R22, R23, R24           | 0            | Film Resistor ,1%                           | 0603      | Yageo        | RC0603FR-070RL     |
| 6   | R12, R13, R14, R15, R16, R17 | 22 $\Omega$  | Film Resistor ,1%                           | 0603      | Yageo        | RC0603FR-0722RL    |
| 3   | R18, R19, R20                | 50m $\Omega$ | Film Resistor ,1%                           | 2512      | Yageo        | RL2512FK-070R05L   |
| 1   | R21                          | 10k          | Film Resistor ,1%                           | 0603      | Yageo        | RC0603FR-0710KL    |
| 2   | D1, D8                       |              | LED. 绿光                                     | 0805      | Bright LED   | BL-HGE35A-TRB      |
| 6   | D2, D3, D4, D5, D6, D7       |              | Schottky Diode. 75V, 0.15A                  | SOD-123   | Diodes       | 1N4148W            |
| 1   | D9                           |              | TVS. 100V, 2.5A                             | SMA       | Diodes       | SMAJ100A           |
| 3   | D10, D11, D12                | NS           |                                             |           |              |                    |
| 1   | Q1                           | NS           |                                             |           |              |                    |
| 6   | Q2, Q3, Q4, Q5, Q6, Q7       |              | N-channel MOSFET, 150V,8.3A, Qg=58nC,48mOhm | DFN5x6-8L | Analog Power | AM7490N            |
| 1   | P1                           |              | 5PIN. 2.54MM                                |           |              |                    |
| 1   | P2                           |              | 7PIN. 2.54MM                                |           |              |                    |
| 1   | P3                           |              | 2PIN. 2.54MM                                |           |              |                    |
| 1   | P4                           |              | 3PIN. 2.54MM                                |           |              |                    |
| 1   | TS1                          |              | Header, 2-Pin                               |           |              |                    |
| 1   | TS2                          |              | Header, 3-Pin                               |           | Würth        | 691216510003       |

**EV6538-V-00A BILL OF MATERIALS (continued)**

| Qty | RefDes                                                                                           | Value | Description                                    | Package           | Manufacturer | Manufacturer P/N |
|-----|--------------------------------------------------------------------------------------------------|-------|------------------------------------------------|-------------------|--------------|------------------|
| 7   | JP1, JP2, JP3,<br>JP4, JP5, JP6,<br>JP7                                                          |       | 2PIN. 2.54MM(JP1,<br>JP3 with Short<br>Jumper) |                   |              |                  |
| 19  | ENA, ENB,<br>ENC, PWMA,<br>PWMB,<br>PWMC, VCC,<br>GND, FLT,<br>SLP, OCR,<br>CSO, VIN, U,<br>V, W |       | 1.0 公针                                         |                   |              |                  |
| 13  | DT, LDO,<br>VREG, ISEN,<br>BSTA, BSTB,<br>BSTC, GLA,<br>GLB, GLC,<br>GHA, GHB,<br>GHC            |       | Test Points                                    |                   |              |                  |
| 1   | U1                                                                                               |       | 3-Phase BLDC Motor<br>Pre-Driver               | QFN-<br>28(4x5mm) | MPS          | MP6538GV         |

**MPS538**  
Monolithic Power Systems  
MPS538 Demo Board  
EV6538--V--00A VIN

**P1** Hall  
**P2** JND  
**P3** VIN  
**P4** TS2 MOTOR  
**P5** TS1 MOTOR  
**P6** VIN

**ICs:** MPS538, MPS537, MPS539, MPS538

**Resistors:** R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24

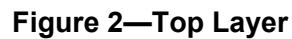
**Capacitors:** C1, C2, C3, C4, C5, C6

**Inductors:** L1, L2, L3, L4

**Other components:** GLC, GLA, GLB, GLC, GLD, GLE, GLF, GLG, GLH, GLI, GLJ, GLK, GLL, GLM, GLN, GLO, GLP, GLQ, GLR, GLS, GLT, GLU, GLV, GLW, GLX, GLY, GLZ

**Connections:** GND, VIN, TS1, TS2, MOTOR, Hall inputs

**Labels:** Install for Hall inputs, Made in China



## QUICK START GUIDE

1. Attach the input voltage ( $8V \leq V_{IN} \leq 100V$ ) and input ground to the VIN and GND connectors respectively.
2. Attach a 3.3V or 5V constant voltage to the VCC terminal of the P1 connector.
3. Adjust R7 to give OCP reference voltage ( $0.125V \leq V_{REF} \leq 2.4V$ ) to set OCP threshold.
4. Attach the hall signals coming from the motor to the P1 connector and short the JP5, JP6, JP7.
5. Attach the driving control signals generated by the external controller to the P2 connector.

**NOTICE:** The information in this document is subject to change without notice. Users should warrant and guarantee that third party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS will not assume any legal responsibility for any said applications.