EVQ6541A-QK-00A

40V, 8A, Three-Phase BLDC Motor Driver with High-Side and Low-Side Logic Inputs Evaluation Board

DESCRIPTION

The EVQ6541A-QK-00A is an evaluation board designed to demonstrate the capabilities of the MPQ6541A, a three-phase brushless DC (BLDC) motor driver. It operates from a wide 4.75V to 40V input voltage range.

The MPQ6541A has three integrated half-bridges consisting of six N-channel power MOSFETs. The rotor position information is provided by the Hall sensors assembled in the motor. The driver control signals are generated via an external controller, such a microcontroller unit (MCU) or field-programmable gate array (FPGA).

The MPQ6541A is available in a QFN-26 (6mmx6mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	4.75 to 40	V
Maximum output current	I_{OUT_MAX}	8	A
Reference voltage	V_{REF}	3.3 or 5	V
Logic input voltage	V_{3P3}	3.3 or 5	V

FEATURES

- Wide 4.75V to 40V Operating Input Range
- Integrated Bidirectional Current-Sense Amplifiers
- Supports 100% Duty Cycle Operation
- High-Side (HS) and Low-Side (LS) Logic Inputs
- Over-Current Protection (OCP) and Over-Temperature Protection (OTP)
- Fault Indication

APPLICATIONS

- Three-Phase Brushless DC (BLDC) Motors
- Permanent Magnet Synchronous Motors (PMSMs)
- Power Drills
- Impact Drivers

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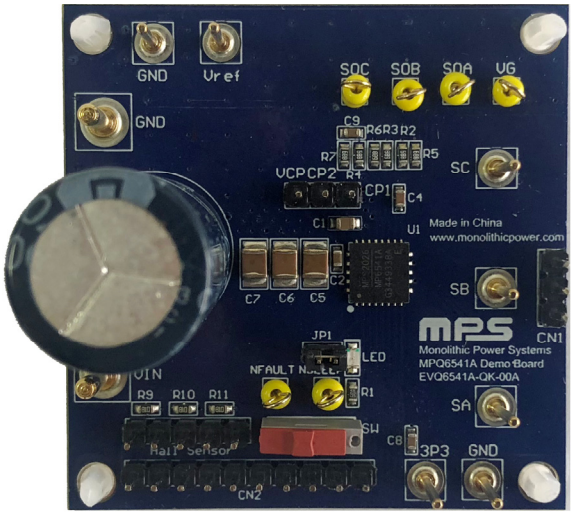
EVQ6541A-QK-00A EVALUATION BOARD



LxW (5.08cmx5.08cm)

Board Number	MPS IC Number
EVQ6541A-QK-00A	MPQ6541AGQKTE

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QUICK START GUIDE

1. Preset the power supply between 4.75V and 40V, then turn off the power supply.
2. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
3. Switch SW1 to position 1 (left) to turn the motor driver on.
4. Apply a 3.3V or 5V constant voltage to the 3P3 pin.
5. To set the current-sense output reference voltage (V_{REF}), apply a 3.3V or 5V constant voltage to the VREF pin.
6. Connect the motor driver's Hall signals to the Hall sensor connector.
7. Connect the driver control signals (generated by the external controller) to the CN2 connector.
8. After making the connections, turn on the power supply.

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EVALUATION BOARD SCHEMATIC

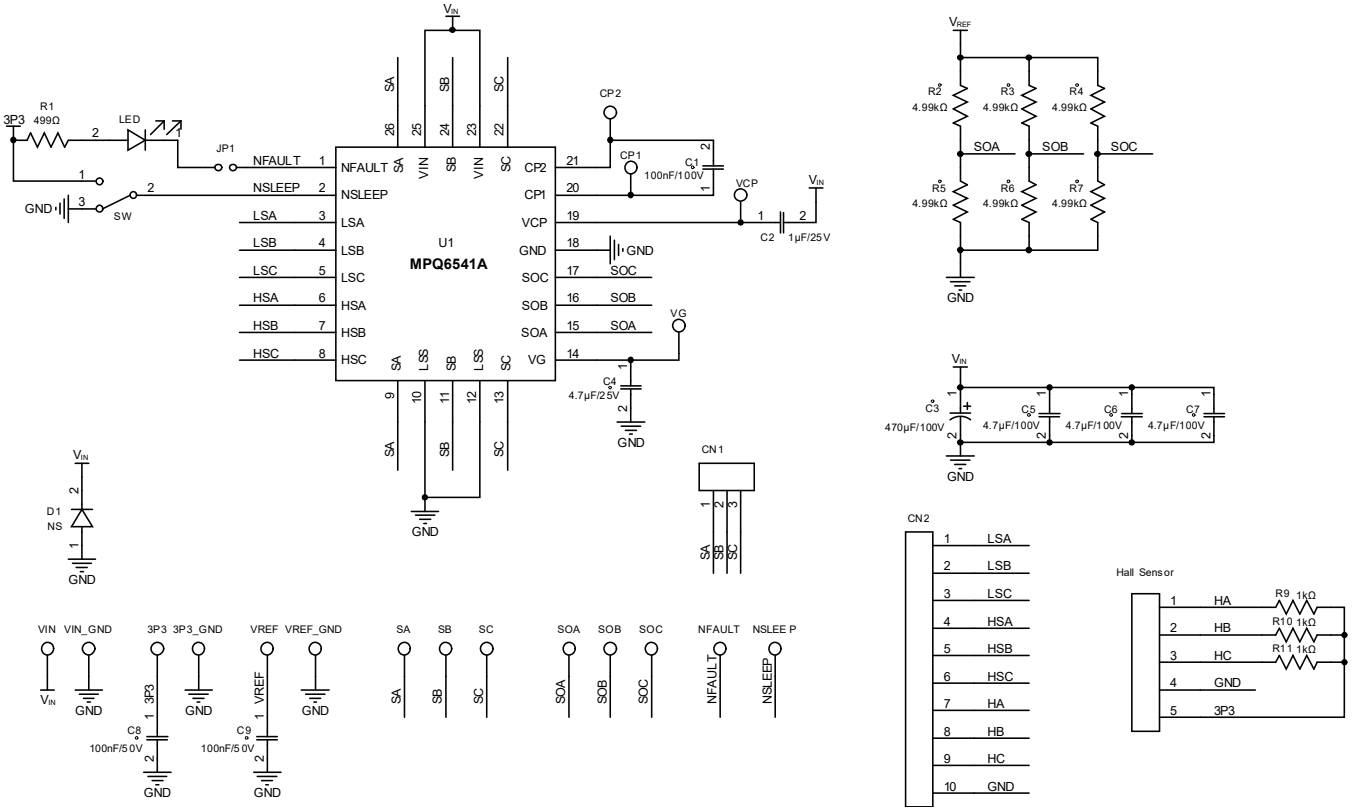

Figure 1: Evaluation Board Schematic

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EVQ6541A-QK-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	R1	499Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07499RL
6	R2, R3, R4, R5, R6, R7	4.99kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-074K99L
3	R9, R10, R11	1kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-071KL
1	C1	100nF	Ceramic capacitor, 100V, X7R	0805	Murata	GRM21BR72A104KAC4L
1	C2	1μF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E105KA12D
1	C3	470μF	Electrolytic capacitor, 100V	DIP	Jianghai	CD263-100V470
1	C4	4.7μF	Ceramic capacitor, 25V, X6S	0603	Murata	GRM188C81E475KE11D
3	C5, C6, C7	4.7μF	Ceramic capacitor, 100V, X8L	1210	Murata	GCM32DL8EL475KE07L
2	C8, C9	100nF	Ceramic capacitor, 50V, X7R	0603	Murata	GCJ188R71H104KA12D
1	LED	2.6V	Red LED	0805	Baihong	BL-HUE35A-AV-TRB
1	SW	$12V_{DC}$	SPDT button	DIP	Wurth	450301014042
1	U1	MPQ6541A	Three-phase BLDC motor driver	QFN-26 (6mmx 6mm)	MPS	MPQ6541AGQKTE
1	D1	NS				
1	CN1	2.54mm	3-bit connector	DIP	Any	
1	CN2	2.54mm	10-bit connector	DIP	Any	
1	Hall sensor	2.54mm	5-bit connector	DIP	Any	
1	CP1, CP2, VCP	2.54mm	3-bit connector	DIP	Any	
1	JP1	2mm	2-bit connector	DIP	Any	
1	JP1	2mm	2-bit short jumper	DIP	Any	
6	NFAULT, NSLEEP, SOA, SOB, SOC, VG	1mm	Yellow test point	DIP	Any	
2	VIN, VIN_GND	2mm	Connector, 2mm needle	DIP	Any	
7	3P3, 3P3_GND, SA, SB, SC, VREF, VREF_GND	1mm	Connector, 1mm needle	DIP	Any	

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PCB LAYOUT

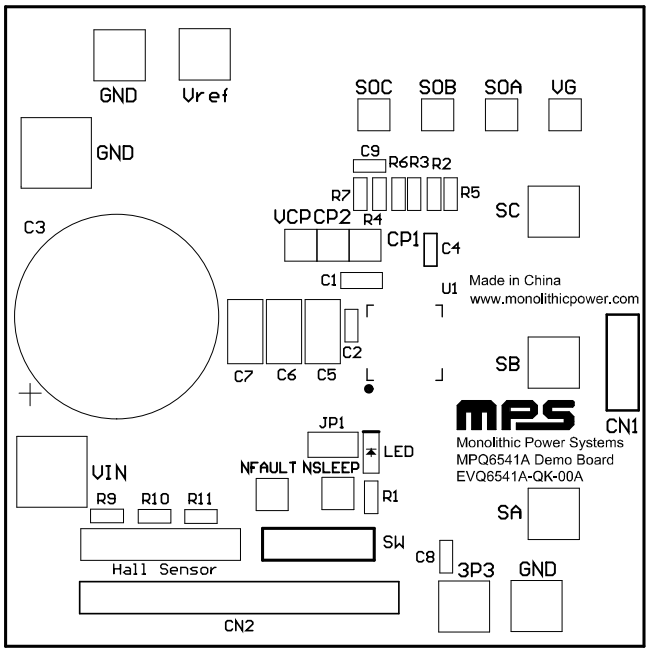

Figure 2: Top Silk

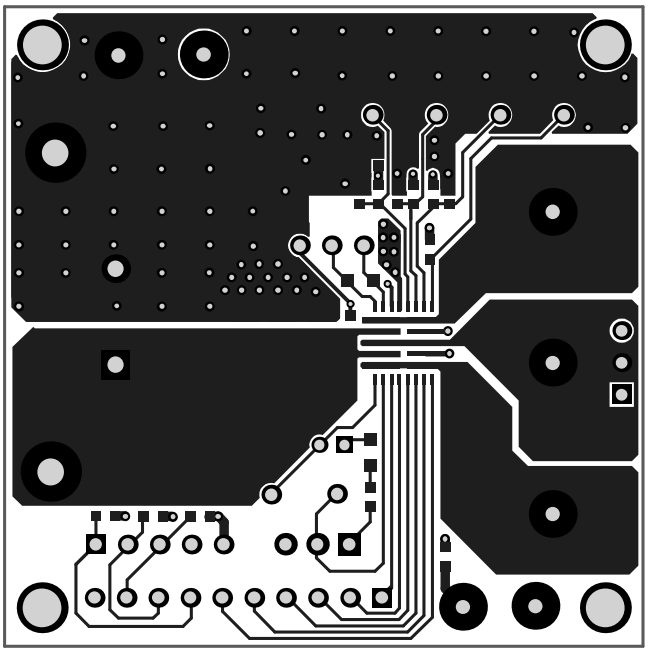

Figure 3: Top Layer

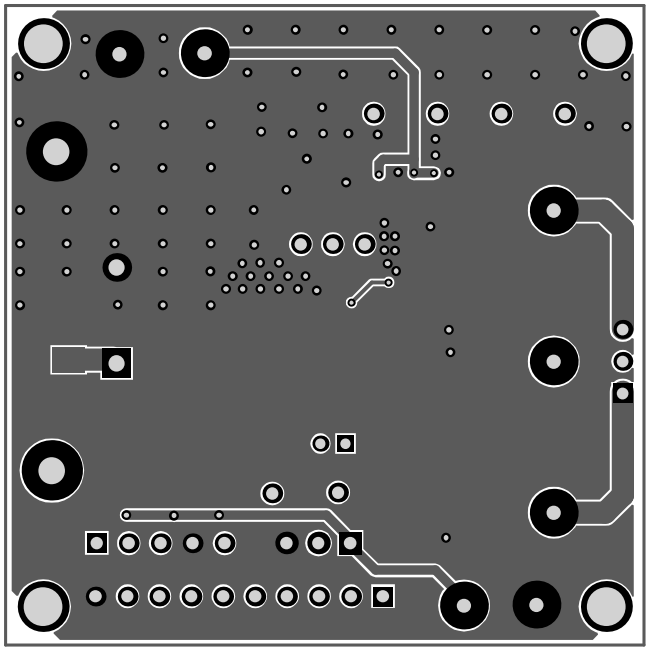

Figure 4: Bottom Layer

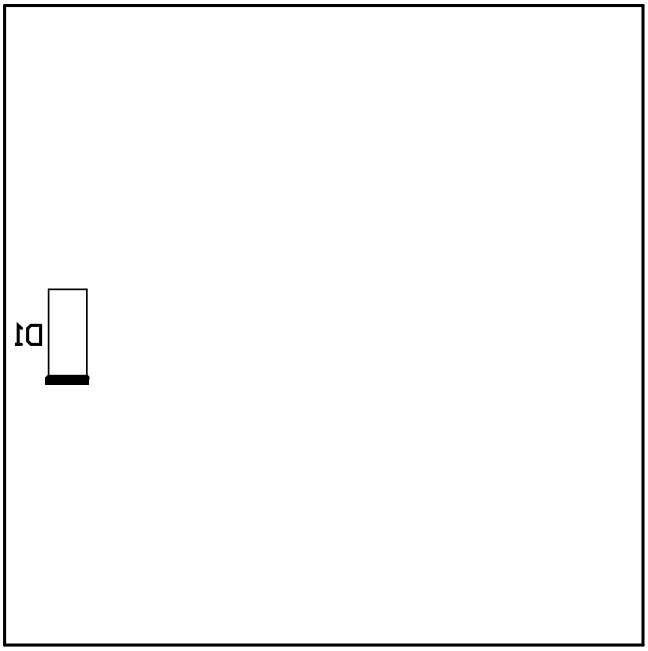

Figure 5: Bottom Silk

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	5/10/2021	Initial Release	-

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