

Automotive <100W Brushless DC Motor Drive

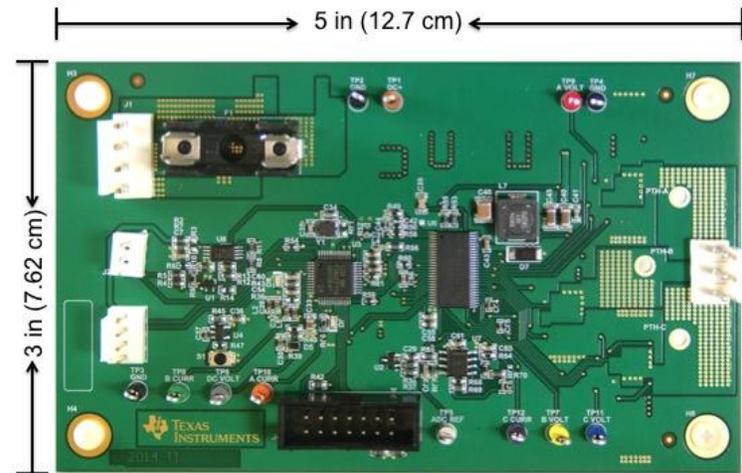


System Description

This BLDC motor controller is designed to operate from a single 12V (nominal) power supply, which can vary over a wide range of voltages, as found in typical automotive applications. The board is designed to drive motors in the 60W range, which require currents of 5 Amps. The size and layout of the board is intended to facilitate evaluation of the drive electronics and firmware, with easy access to key signals on individual test points. Connection to a wide variety of motors is possible using either the 3-contact connector or by soldering motor phase wires to plated-through holes in the board. The 12Vdc power is fused to prevent damage to the board or to bench power supplies in case of a motor fault during testing. Command and status of the motor can be communicated through the standard JTAG connector, or through PWM input and output signals. Users can also re-program the microcontroller through the JTAG connector, allowing customization to a wide variety of applications.

- Test points provide easy access to key motor control signals
- Microcontroller programmable through JTAG connector for customization

Design Photo



Featured Applications

- BLDC Variable Valve Lift
- BLDC Electronic Throttle Control
- BLDC Cooling Fans
- BLDC Coolant Pumps
- BLDC EGR Valves

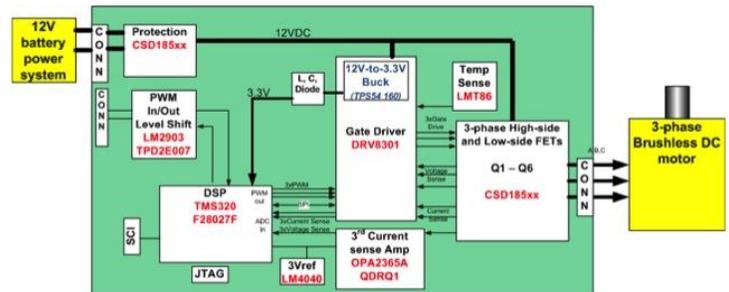
Design Resources

- Block Diagram and Schematic
- Test Data
- Gerber Files
- Design Files
- Bill of Materials
- Wiki Page

Design Features

- Operates from a single 12V automotive supply (7V to 40V operational range)
- Drives 3-phase Brushless DC (BLDC) motors up to 60W with no position sensors needed
- Easy to get started with MotorWare software

Block Diagram



Jump start system design and speed time to market

Comprehensive designs include schematics or block diagrams, BOMs, design files and test reports by experts with deep system and product knowledge. Designs span TI's portfolio of analog, embedded processor and connectivity products and supports a board range of applications including industrial, automotive, medical, consumer, and more. To explore the designs, go to <http://www.ti.com/tidesigns>

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Associated Part Numbers

<u>Part Number</u>	<u>Part Description</u>	<u>EVM Link</u>
DRV8301-Q1	Automotive 3-Phase BLDC Pre-Driver w/ Dual Current Sense Amp and Buck Converter	
TMS320F28027F	Piccolo Microcontroller with InstaSPIN-FOC	EVM

Design Considerations:

- Components connected to automotive battery power rail were selected to withstand 40V load dump condition
- Reverse polarity and short circuit protection on the automotive battery input
- Motor Pre-Driver was selected based on its wide VIN range, integrated DC/DC converter and integrated current sense amplifiers
 - 60V 1.5A DC/DC buck converter for 3.3V processor power
 - 2 – Integrated current sense amplifiers with Adjustable Gain and Offset
- Microprocessor with automotive qualification was chosen with integrated ADC, PWM, and SCI communications
- Voltage reference was selected with automotive qualification
 - 3.0V Vout +/-2% accuracy
 - Small SOT 23 package
- Temperature Sensor was chosen with automotive qualification
 - Small SOT23 package

Quick Start Guide:

Equipment Needed:

- SAT0042 E4 Motor Drive board
- 3-phase Brushless DC (BLDC) motor
- InstaSPIN-FOC software – InstaSPIN FOC Example GUI
- Code Composer Studio V5.4
- 12V 5A DC Power Supply
- Coupling, cable, PC



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