

Automotive Motor Control Development Solutions

Three-Phase Sensorless BLDC Kit with MC9S12G128 MCU

Target Automotive Applications

- Heating, ventilation and air conditioning (HVAC)
- Electric pumps, motor control and auxiliaries
- Transmission and gearbox
- Doors, window lift and seat control

Overview

This development kit featuring the MC9S12G128 MCU helps you get your development started within minutes. You don't need to wait for your own hardware design to be available, nor start software development from scratch. This development kit offers you a fully documented working setup for three-phase sensorless brushless DC (BLDC) motor control.

The hardware consist of one MC9S12G128 controller board, featuring the MC33905S system basis chip, connected to a power stage board with the MC33937A MOSFET pre-driver onboard.

The complete hardware and software documentation will help you use and adapt this solution for your own application use cases.

The application software available in this development kit provides a complete, easy-to-use solution for the BLDC sensorless motor control applications, covering speed control and torque limitation.

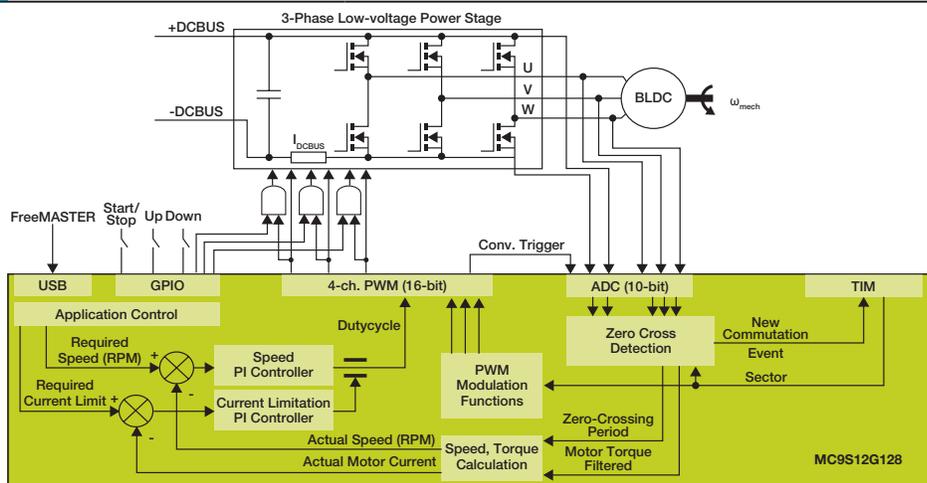
Three-Phase Sensorless BLDC Kit



Development Kit Features

- MC9S12G128 MCU controller board
- Three-phase BLDC/PMSM low-voltage power stage (10 A) based on a SMARTMOS™ MC33397A FET pre-driver
- 24 V BLDC motor
- FreeMASTER tool for instrumentation/ visualization
- Sensorless control using back-EMF zero-crossing detection
- DC-bus overvoltage, overcurrent and undervoltage fault detection
- Hardware support for hall sensor-based motor control

Motor Control Algorithm Concept

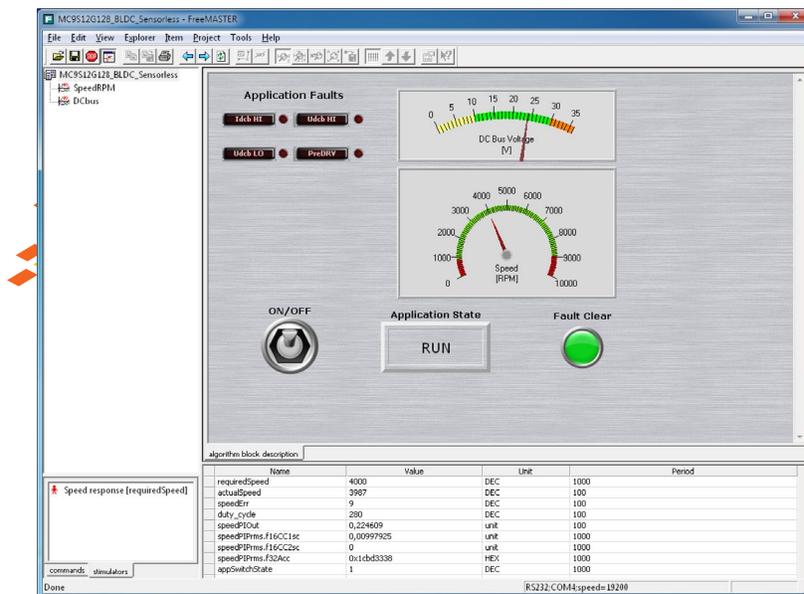


Freescale Technology

MC9S12G128 Features

- 16-bit S12 CPU core with bus frequency up to 25 MHz
- 128 KB of flash with ECC, 4 KB of EEPROM with ECC and 8 KB of SRAM
- One MSCAN and three SCI modules with LIN support
- 8-channel 8-bit PWM module with 4-channel 16-bit concatenated PWM option
- 8-channel timer module with 16-bit counter
- 16-channel 10-bit ADC module with external trigger control

FreeMASTER Project Page



MC33397A Features

- Fully specified from 8 to 40 V (covers 12 and 24 V automotive systems)
- Extended operating range from 6.0 to 58 V (covers 12 and 42 V systems)
- Greater than 1.0 A gate drive capability with protection
- Protection against reverse charge injection from C_{GD} and C_{GS} capacitances of external FETs

- SPI programmable dead time
- Simultaneous output capability enabled via safe SPI command
- Advanced SPI, MCU, ECU power supply, and critical pin diagnostics and monitoring
- Extremely low quiescent current in low power modes

MC33905S Features

- 5 or 3.3 V voltage regulator with current, temperature and voltage protection
- One CAN and one LIN transceiver

For more information, visit freescale.com/automcdevkits