Automotive Motor Control Development Solutions

3-Phase Hall Sensor BLDC S12ZVM Application Based on the MTRCKTSBNZVM128 Dev Kit

Target Automotive Applications

- Actuators and valve controls
- Blower fan in HVAC systems
- Electric fuel, water and oil pumps
- Engine cooling fans
- Wind shield wipers

Overview

The 3-phase Hall sensor BLDC MC9S12ZVML128 application enables the rapid prototyping of BLDC motor control design. Once the application source code is downloaded onto the MTRCTKSBNZVM128 development kit, the complete hardware and software solution is ready to be used and adapted to the end application.

The MTRCTKSBNZVM128 development kit consists of a LIN-enabled MC9S12ZVM128 evaluation board, a BLDC motor, power supply and USB cable.

The application software provided as AN4718SW is a complete solution for a BLDC Hall sensor-based motor control application, covering motor speed control and torque limitation. The development kit application is controlled and visualized using the FreeMASTER tool.

The AN4718 provides a detailed desciption of an application as well as applied motor control techniques.

3-Phase BLDC Kit

freescale™
S12 MagniV

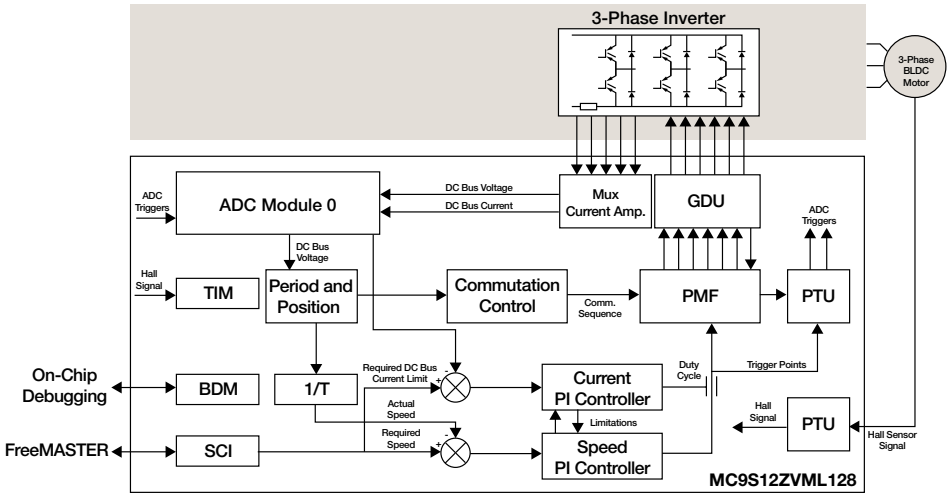
Development Kit Features

- MC9S12ZVML128 evaluation board including a 10 A 3-phase BLDC/PMSM low-voltage power stage
- BLDC motor
- Power supply
- FreeMASTER visualization
- Parameters: 20 KHz PWM switching frequency 1 ms speed control loop
- Hall sensor-based control
- DC bus overvoltage and undervoltage fault detection
- DC bus maximal current limit control
- BLDC motor stall detection

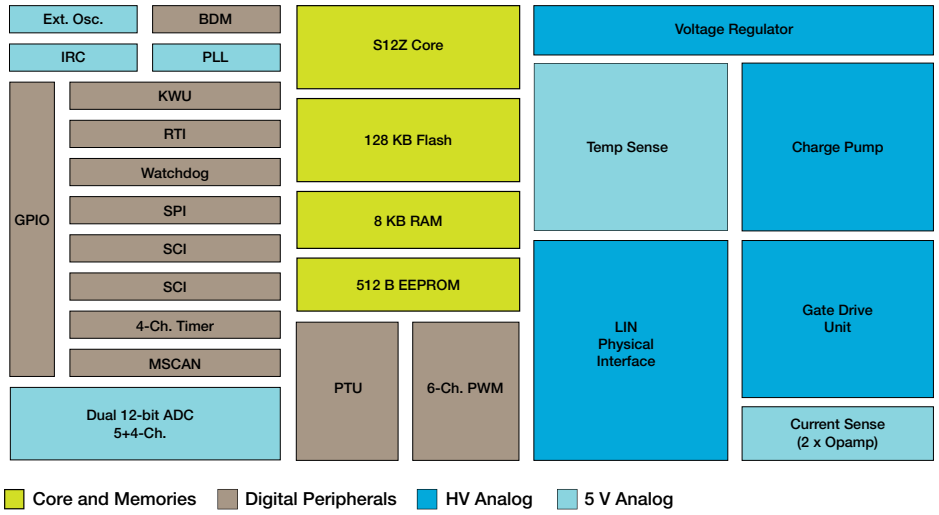
MC9S12ZVML128 Features

- Enhanced S12Z core at 50 MHz bus speed
- Up to 128 KB flash, 512 B EEPROM, 8 KB RAM
- PMF module for motor control PWM generation
- Dual 12-bit analog-to-digital converter (ADC)
- Programmable trigger unit to synchronize ADC conversions
- Built-in automotive voltage regulator operating between 3.5 and 40 V
- Built-in LIN physical layer meets automotive OEM specifications for LIN conformance and EMC requirements
- Built-in gate drive unit with charge pump, and protected low-side and high-side gate drivers capable of driving six external MOSFETs up to a 100 percent duty cycle
- Two built-in current sense operational amplifiers

Motor Control Algorithm Concept



MC9S12ZVML128: S12 MagniV Mixed-Signal MCU



The MagniV MCUs offer the right blend of digital programmability and high-precision analog to streamline an automotive design. The S12ZVM product family integrates an MCU built on proven S12 technology, a voltage regulator, a LIN and CAN physical interface and a gate drive unit in order to control six external power MOSFETs.

The MC9S12ZVML128 MCU introduces an integrated LIN-enabled solution for 3-phase BLDC motor control applications.

For more information, visit freescale.com/automcdevkits

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