S12G 16-bit MCUs

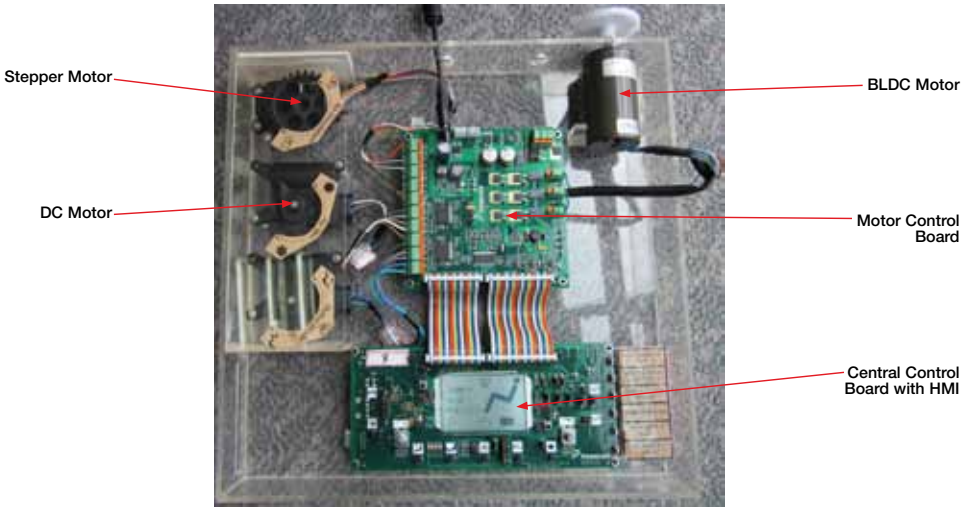
HVAC Control Platform Reference Solution

Overview

Automotive heating, ventilation and air conditioning (HVAC) systems are designed to provide a comfortable cabin driving environment while minimizing power consumption and overall load on the vehicle. This is done by taking inputs from a variety of sensors, processing those inputs with an ADC/DAC and using the data to control different types of motors. For example, stepper and DC motors are used to control the air vent flaps while DC and BLDC motors are used to control the blowers. The Freescale automotive HVAC control platform reference solution utilizes the scalable S12G 16-bit MCU family along with MC33905, MC33932 and MC33937 analog devices to drive each of these types of motors and leverages a configurable automatic climate control software algorithm providing a feature-rich solution for automotive HVAC applications.

The automotive HVAC control platform reference solution consists of a central control board with human-machine-interface (HMI), a motor control board, flap and blower motors. It enables the basic functions of an automotive HVAC system using temperature, light, humidity and air quality sense interfaces together with the configurable automatic climate control software algorithm to more efficiently control the vehicle climate. The LCD controlled by the S08LG MCU (optional) can display rich content for the driver including temperature, wind speed and calendar. This reference solution will reduce the overall R&D effort for customers, shorten overall time to market and can be tailored for both 12 and 24 V automotive HVAC systems.

The S12G MCU is the core controller of this reference solution, offering 16 to 240 KB of flash and 20, 32, 48, 64, to 100 pin count, with full pin compatibility and maximums module reuse within the family. EEPROM on board and multiple peripheral interfaces such as CAN and LIN/SCI communications to link the main control system with the distributed motor units, SPI for analog connections and PWM signal control makes the S12G MCU ideal for automotive HVAC applications.



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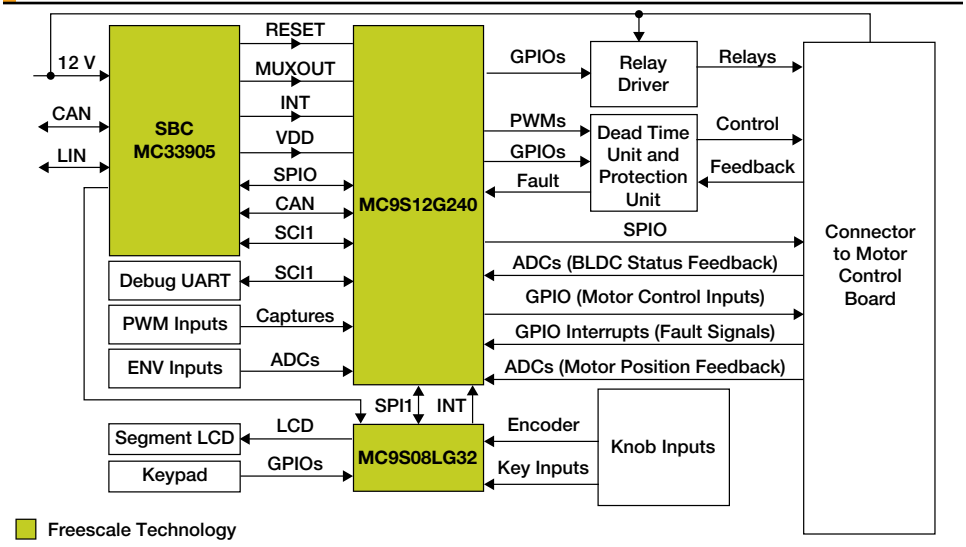
HVAC Control Platform Key Features

- Three types of motor control (sensor-less BLDC, DC and stepper motor)
- Automatic climate control
- Supports multiple temperature zones
- Ultra-low-power mode, can be woke up by HMI or LIN/CAN bus
- CAN and LIN communication interfaces
- 3 x 3 matrix keypad and two encoder knob inputs
- 4 x 37 segment LCD and adjustable backlighting
- Sensor interfaces for temperature, light, humidity and air quality available
- Two logic relay interfaces to compressor/ defrost module
- Real-time clock and date display, adjustment for calendar
- Extensible with touch keyboard or touch screen board
- Suitable for both 12 and 24 V HVAC systems

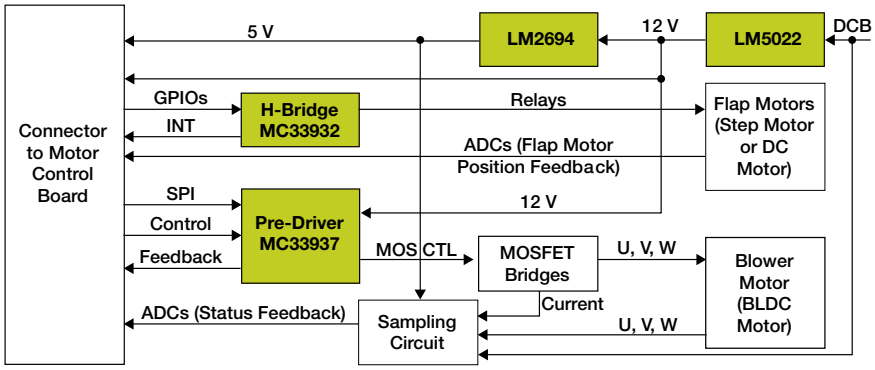
S12G MCU Key Features

- S12 CPU core, 25 MHz bus
- Up to 240 KB on-chip flash with ECC
- Up to 4 KB EEPROM with ECC
- Up to 11 KB on-chip SRAM
- Up to one multi-scalable controller area network (MSCAN) module
- Supporting CAN protocol 2.0 A/B
- Up to three serial communication interface modules, supporting LIN communications
- Up to three serial peripheral interface modules
- Precision fixed voltage reference for analog-to-digital conversion
- 1 MHz internal oscillator
- On-chip voltage regulator for input supply and internal voltages
- This product is included in the Freescale Product Longevity program, with assured supply for a minimum of 15 years after launch

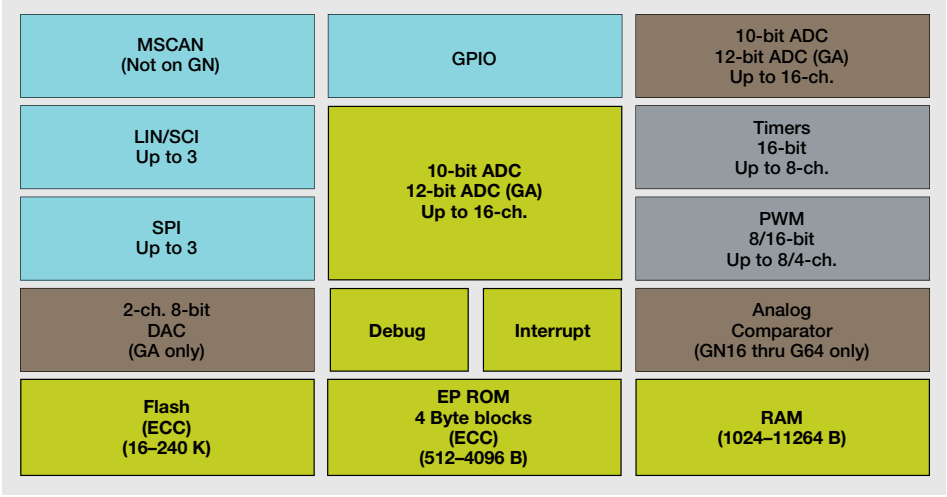
HVAC Central Control Board Block Diagram



HVAC Motor Control Board Block Diagram



S12G Family Block Diagram



Note: Not all peripherals are available in all package types

For more information, visit freescale.com/automotive

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