S12VR Family: S12 MagniV Mixed-Signal Microcontrollers

Anti-Pinch Window Lift Reference Design

Development Tools

- S12VR evaluation board
- CodeWarrior development tool suite
- S12 development software

Overview

The S12 MagniV portfolio of mixed-signal microcontrollers (MCUs) streamlines automotive engineering by offering smart, optimized integration of high-precision analog components with the proven S12 MCU. The S12VR family is the first set of devices in the portfolio based on the LL18UHV process technology targeting automotive anti-pinch window lift, power sun roof modules, LIN-controlled relay drivers, smart actuators and other space-constrained applications.

LL18UHV technology combines the highly reliable 180 nm non-volatile memory (NVM) process with modifications that allow integration of high-voltage (up to 40-volt) analog components (voltage regulator, LIN physical layer, low-side drivers, high-side drivers and inputs) on a single piece of silicon. The new high-voltage components are integrated with the industry-proven 16-bit S12 CPU and memory subsystem, maintaining compatibility with other S12 MCUs. The compatibility extends to the development environment.

This anti-pinch window lift reference design demonstrates its functionality in automotive designs and is ideal for the development of power windows and sun roof systems. The reference design also includes the hardware for real door/window in-vehicle applications, as well as software including anti-pinch algorithms and low-level S12VR drivers.

Aimed at reducing time to market, this reference design leverages unique features of the MagniV S12VR MCU. In addition to helping reduce unnecessary external components, the reference design lowers the total bill of material (BOM), improves system quality and saves space in automotive applications through a smaller PCB.

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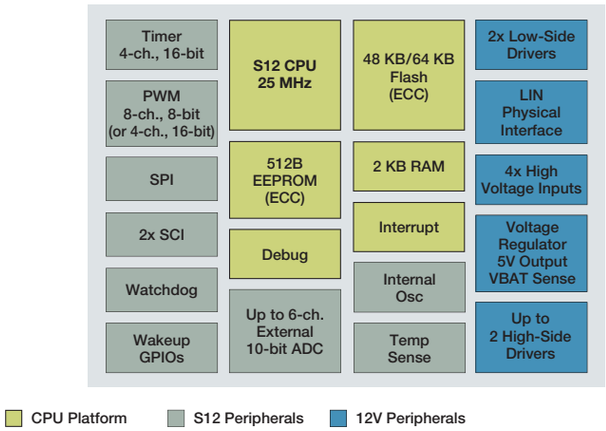
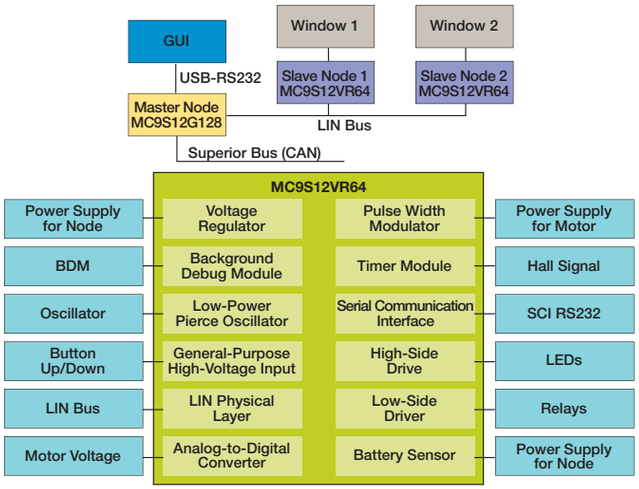
Key Features

- Window manual/automatic up/down, automatic up/down with stop function
- Adjustable force and anti-pinch in manual/automatic mode and anti-pinch region
- Stuck detection out of anti-pinch region, motor overload protection
- Soft stop when window is close to the top/bottom
- Fault diagnosis indicates low voltage, over voltage/current/temperature, and more
- Low power mode (leveraging S12VR low power mode) reduces power consumption
- Self learning and calibration by updating the window/motor parameters stored in EEPROM
- Use of hall sensor and current sense to judge anti-pitch in algorithm
- Easy-to-control graphical user interface (GUI) sets parameters and obtains status
- Window lift can be controlled by multiple LIN slave nodes or LIN master node via GUI
- Ability to comply with relevant content in U.S. Federal Motor Vehicle Safety Standard (FMVSS No. 118)

S12VR Family Block Diagram



Anti-Pitch Window Lift Reference Platform Block Diagram



For information on the Freescale MagniV portfolio, visit freescale.com/MagniV

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