



Analog, Mixed Signal and Power Management

# MC33912

## LIN System Basis Chip with DC Motor Pre-driver and Current Sense

### Applications

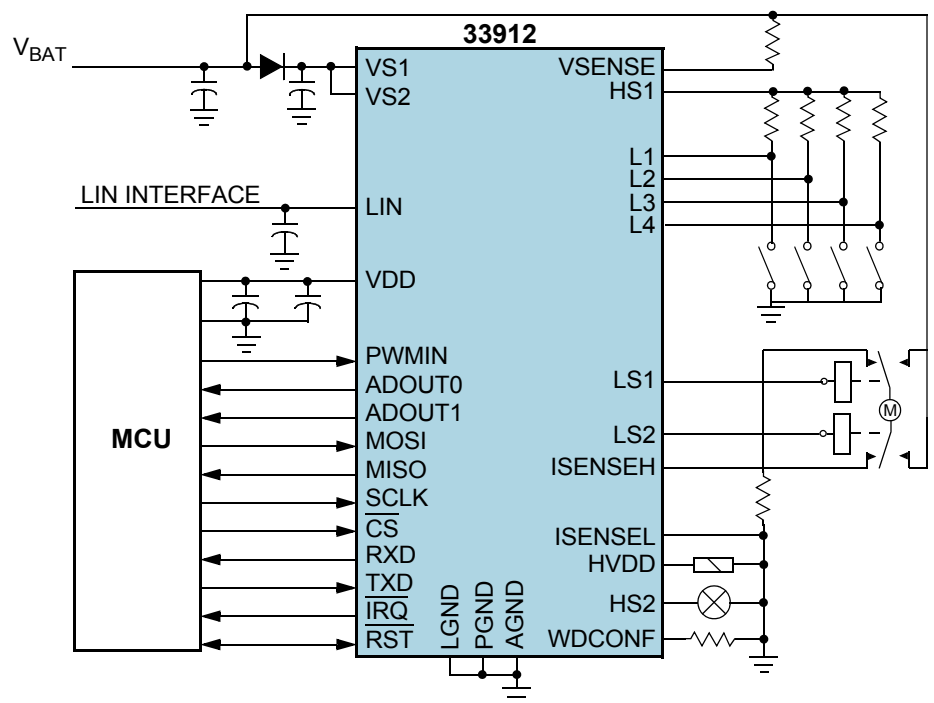
- Door module: window
- Lift, mirror, door lock, seat control switch
- Seat position motors, occupancy sensor
- Rain and light sensor, light control, sun roof
- Wiper, turning light, cruise control
- Climate: small motors, control panel
- Engine control: sensors, small motors

### Overview

The 33912G5 is a Serial Peripheral Interface (SPI) controlled System Basis Chip (SBC), combining many frequently used functions in an MCU based system, plus a Local Interconnect Network (LIN) transceiver. The 33912G5 has a 5.0 V, 50 mA low dropout regulator with full protection and reporting features. The device provides full SPI readable diagnostics and a selectable timing watchdog for detecting errant operation. The LIN Protocol Specification 2.0 and 2.1 compliant LIN transceiver has waveshaping circuitry that can be disabled for higher data rates. The LIN Physical Layer included inside the 33912G5 is also compliant with the SAEJ2602 Rev. 2, protocol specification approved at many car OEMs.

Two 50 mA high side switches, that can be used to drive LEDs, and two 150 mA low side switches with output protection that can drive relays, used in DC motor applications. All outputs can be pulse-width modulated (PWM). Four high voltage inputs are available for use in contact monitoring, or as external wake-up inputs. These inputs can be used as high voltage Analog Inputs. The voltage on these pins is divided by a selectable ratio and available via an analog multiplexer.

MC33912 Simplified Application Drawing



## Features

- Full-duplex SPI interface at frequencies up to 4.0 MHz
- LIN transceiver capable of up to 100 kbps with wave shaping
- Two 50 mA high side and two 150 mA low side protected switches
- Four high voltage analog/logic Inputs
- Configurable window watchdog
- 5.0 V low drop regulator with fault detection and low voltage reset (LVR) circuitry
- Current sense module to help controlling
- Switched/protected 5.0 V output (used for Hall sensors)

## Questions

- Q: What are the 33912G5 key functions?
- A: The device integrates a 5.0 V, 50 mA voltage regulator, a SPI interface for diagnostics and low power management, a LIN module, two High Sides and Low Sides, a current sense module, and four Wake-up inputs.
- Q: What are the key features?
- A: The 33912G5 offers a configurable window watchdog, a low power mode with cyclic wake-up feature, and a selectable LIN slew rate. The high sides and low sides have PWM capability up to 10 kHz and over-temperature and current limitation protection. The goal of the high precision differential amplifier with selectable gain is to sense the voltage drop over a shunt resistor and accurate current sensors. The device allows the monitoring of the battery voltage, wake-up pins voltage, and the die temperature.
- Q: What is the compliancy of the device?
- A: The product is LIN2.1 and SAEJ2602-2 compliant.
- Q: What are the EMC performances of the device?
- A: The 33912G5 successfully passes the "Common EMC requirements on LIN interfaces" specification defined by Audi, BMW, Daimler, Porsche, and Volkswagen. The LIN module shows a high robustness against ESD-61000-4-2 ( $\pm 11$ kV) without a bus capacitor, and a very low level in emission (50 dB $\mu$ V max at low frequency).

## Parametric Table

Part Number	Max Input Voltage	Output Current	Temperature Range	Package
MC33912G5AC	40V	Internally Limited (thermal protection)	-40°C to 125°C	32 LQFP
MC34912G5AC			-40°C to 85°C	

## Development Tools

Part Number	Description
KIT33912G5DGEVME	Easy to use kit that includes a friendly graphical interface, an MC33912G5EVB, and a USB to SPI adaptor.

## Documentation

Document Number	Title	Description
MC33912	Data Sheet	Presents the specifications for the product
SG1002	Selector Guide	Analog and power management device comparison
SG187	Selector Guide	Automotive device comparison

## Benefits

- Reduced usage of external components due to the high EMI and ESD performance.
- Very low emissive device
- Official release at many car OEMs
- Internal 5.0 V regulator to supply microcontroller
- Fail Safe protection
- Low Power Management to minimize the battery discharge
- Able to control an external relay
- Save hall sensor supply

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