



Analog, Mixed Signal and Power Management

MM912_634

Integrated S12 Based Relay Drivers with LIN

Applications

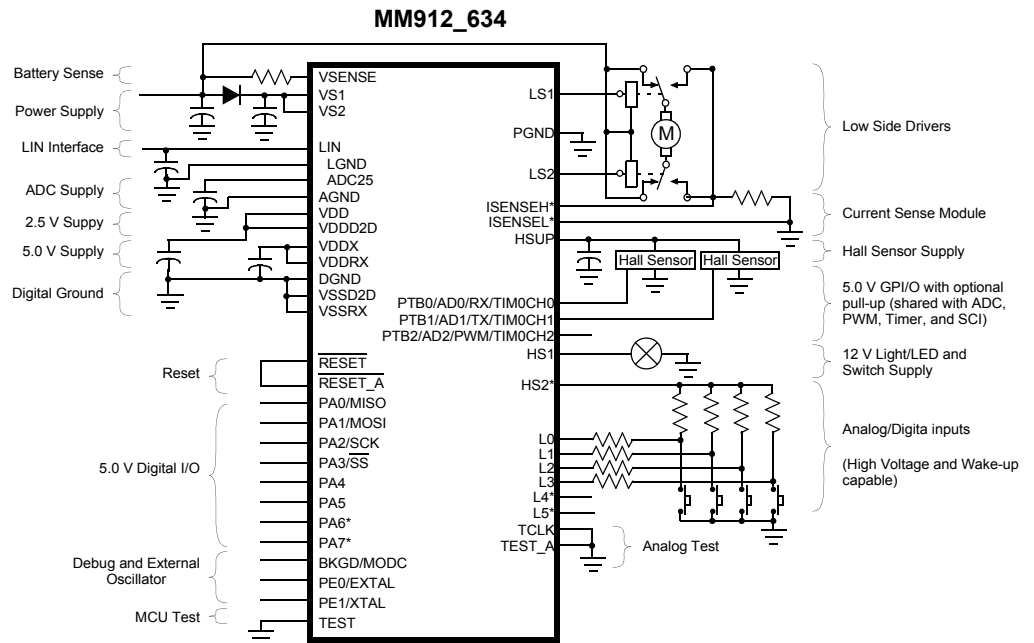
- Window Lift
- Seat Control
- Sun Roof Control
- Fan Control
- Key Pad Interface
- Switch Panel Interface

Overview

The MM912_634 is a family of network-enabled controllers for automotive applications that integrate an HCS12 microcontroller and a SMARTMOS analog control IC into a single package. The analog die combines System Basis Chip (SBC) functionality and application specific functions, which include a Local Interconnect Network (LIN) transceiver, relay drivers, a DC motor current sense circuit, and a selection of high and low side digital I/O.

Control of the analog die is via a new high performance internal Die to Die interface (D2D), which seamlessly integrates the analog IC registers into the MCU register map, to provide faster access than SPI based systems.

MM912_634 Simplified Application Drawing

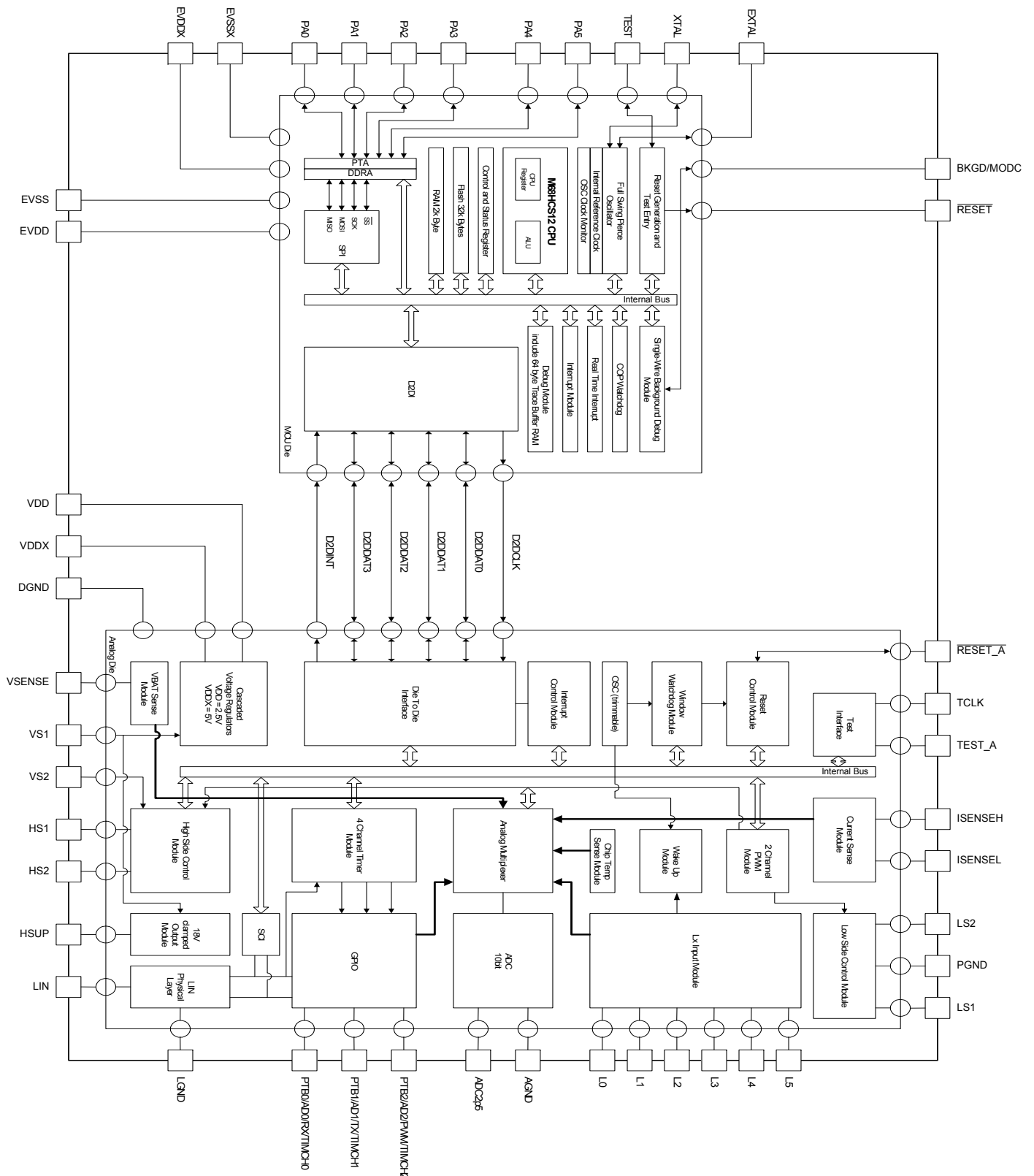


* Feature not available in all part numbers - see Data Sheets



TYPICAL MM912_634 INTERNAL BLOCK DIAGRAM

(MM912F634 Shown Below - see Data Sheet for part number differences)



FEATURES

- High performance 16-bit HCS12 CPU
- 32/48/64 kB FLASH (see Orderable Part Numbers Table)
- 2/4 kB Data Flash (see Orderable Part Numbers Table)
- 2/6 kB RAM (see Orderable Part Numbers Table)
- Background Debug Module (BDM)
- Debug Module (DBG)
- On-chip oscillator
- Die-to-Die bus interface for transparent memory mapping
- Two autonomous window watchdogs with dedicated oscillator
- LIN 2.1 Physical Layer Interface, fast mode capable
- Serial Communication Interface (SCI)
- Configurable cyclic sense & forced wake-up feature
- Current sense with selectable gain
- Two protected low side outputs to drive inductive loads
- Two protected high side outputs
- Battery voltage sense with low battery warning (IRQ), reverse battery protected
- Chip temperature sensor
- Hall sensor supply implemented as switchable 18 V voltage regulator
- Digital (5.0 V) general purpose input/output (GPIO) shared with SPI
- Six high voltage inputs L[5:0] (shared digital and analog inputs, with wake-up capability)
- Three low voltage GPIO PB[2:0] shared with timer, PWM, ADC, and SCI with selectable pull-up resistor per terminals
- Cascaded Low Dropout (LDO) voltage regulators (5.0 and 2.5 V) with fault detection and Low Voltage Reset (LVR) circuitry
- 16-bit timer module with four channels (connected to PTB and Rx)
- Two-channel eight-bit Pulse Width Modulation (PWM) module for direct control of the high side (HS), low side (LS) and PTB2 output(s).
- 10-bit Analog-to-Digital converter (ADC) with 15 channel MUX (internal/external)

PROTECTION	DETECT	SHUT DOWN	STATUS REPORTING
Power Output Protection			
Over-current/Short-circuit	●	●	●
Over-temperature	●	●	●
Over-voltage/Under-voltage	●	●	●
LIN Bus Line Protection			
Over-temperature	●	●	

PERFORMANCE	TYPICAL VALUES
Outputs	2 HS, 2 LS
$R_{DS(ON)}$ @ 25°C	
Low Side Drivers	2.5 Ω
High Side Drivers	7.0 Ω
Operating Voltage (Nominal)	5.5 V to 18 V
Operating Voltage (Functional)	5.5 V to 27 V
Ambient Operating Temperature	See Orderable Part Numbers Table
Junction Operating Temperature	-40 °C ≤ T _J ≤ 125 °C

CUSTOMER BENEFITS

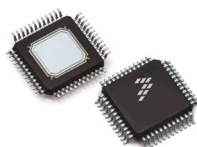
- Integrate microcontroller and analog features in the same package solution
- Provide a full LIN solution
- Easy control of high-current motors using relays and current sense features
- Reduced space, resulting in enhanced reliability
- Internal protection features provide full protection for output stages (with status reporting)
- Economical and autonomous multi-function solution with few components
- Six configurable wake-up inputs for maximum system flexibility
- Low-power mode flexibility and wake-up options, including 7 wake-up sources
- Reverse-battery-protected voltage sense

Questions

- Are you using a LIN communication system?
- Do you need a single package solution, integrating an HCS12 microcontroller, a LIN node, and relay drivers?
- Do you have to minimize the size of your PCB application?
- Do you need to control high-current motors?
- Do you need to reduce system cost?

Freescale Semiconductor is a leading provider for over 25 years of high-performance products using SMARTMOS™ technology that combines digital, power and standard analog functions. The company supplies analog and power management ICs for the automotive, consumer, networking and industrial markets. Freescale's analog and power ICs complement our broad portfolio of micro controllers, microprocessors, ZigBee® technology, digital signal processors, sensors, with development tools and support to provide system solutions to customers.

Orderable Part Numbers					
Part Number (Add an R2 suffix for Tape and Reel orders)	Flash (kB)	Data Flash (kB)	RAM (kB)	Temperature Range (T _A)	Package
MM912F634CV1AE	32	-	2	-40 °C to 105 °C	48 LQFP-EP
MM912F634DV1AE					
MM912F634CV2AE					
MM912F634DV2AE					48 LQFP
MM912F634CV2AP					
MM912F634DV2AP					
MM912G634CM1AE	48	2	2	-40 °C to 125 °C	48 LQFP-EP
MM912G634CV1AE					
MM912G634CV2AP				-40 °C to 105 °C	48 LQFP
MM912H634CM1AE	64	4	6	-40 °C to 125 °C	48 LQFP-EP
MM912H634CV1AE				-40 °C to 105 °C	
Development Tools					
Part Number	Description				
KIT912F634EVME	Evaluation board to demonstrate the key features of the MM912F634				
KIT912H634EVME	Evaluation board to demonstrate the key features of the MM912G634 and MM912H634				
Documentation					
Document Number	Title				
MM912F634	Data Sheet for the MM912F634				
MM912_634D1	Data Sheet for the MM912G634 and MM912H634				
MM912F634ER	Errata for the MM912F634				
MM912_634ER1	Errata for the MM912G634 and MM912H634				
SG1002	Analog and power management device comparison Selector Guide				
SG187	Automotive device comparison Selector Guide				



48-PIN LQFP-EP
98ASA00173D



48-PIN LQFP
98ASH00962A

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