



Analog, Mixed-Signal and Power Management

MM912_S812

S12XS Multifunctional Ignition and Injector Driver

Applications

- Small Engine Control
- Lawn Mowers
- Scooters
- Motorcycles
- Lawn Trimmers
- Snow Blowers
- Chain Saws
- Gas-driven Electrical
- Generators
- Outboard Motors

Overview

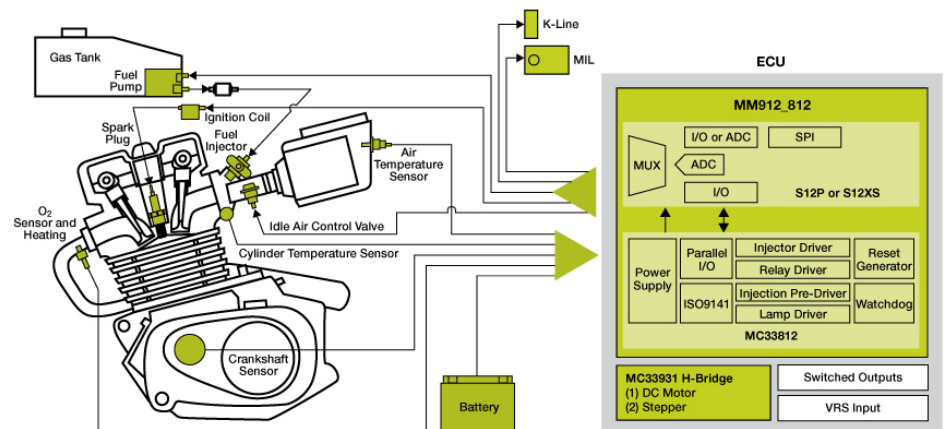
The MM912_S812 is an analog IC and MCU (S12XS) in one package for motorcycle and other single/dual cylinder small engine control applications. The IC reduces design complexity, bill of materials and manufacturing cost while helping to shorten the customer's time to market.

The IC integrates a voltage regulator, fuel injector driver and ignition pre-driver along with relay driver, lamp driver and watchdog timer / reset generator specifically targeted for small engine Engine Control Units (ECUs) and other S12 family MCU applications.

Dual die integrations lead to fewer parts and a reduced circuit board area to meet the requirements of small engine manufacturers.

MM912_S812 Small Engine System Controls

Small Engine System Controls



Freescale Technology



Product Features

- Core: S12XS, Flash Memory: 128K/256K
- VCC voltage pre-regulator provides +5.0 V power for the MCU
- MCU Power-On-RESET (RESET) generator, MCU watchdog timer circuit with parallel refresh/time setting line
- Designed to operate over the range of $4.7\text{ V} \leq \text{VPWR} \leq 36\text{ V}$
- Interfaces directly to MCU using 5.0 V parallel interface
- Fuel injector driver - current limit - 4.0 A typical
- Ignition pre-driver can drive IGBT or Darlington bipolar junction transistor
- Ignition pre-driver has independent high and low side outputs
- Relay/injector/fuel pump driver - current limit - 4.0 A typical
- Lamp driver - current limit - 1.5 A typical
- All external outputs protected against short to battery and over-current
- All drivers protected against over-temperature
- ISO-9141 K-Line transceiver for communicating diagnostic messages
- Independent fault annunciation outputs for ignition, injection and relay
- All signal lines are accessible
- Also available with the MC9S12XEP100 MCU for calibration
- Allows one package ECU for minimum PC Board area

Benefits

- Increased fuel efficiency when converting from a mechanical system to an electrical system
- Improved emissions using electrical system of this IC compared to a mechanical system
- Easiest way to interface a micro controller to DC loads
- Simplified system design
- Reduced board space
- Reduce number of components
- Enhanced reliability

Performance

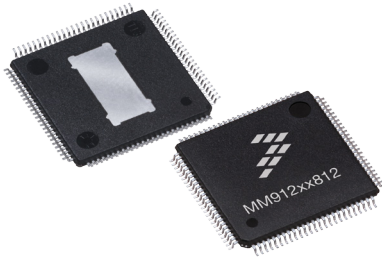
Parametric	Typical Values
Output Type	3 Low-side Drivers, 1 Pre-driver, ISO9141 K-Line Bi-directional
$R_{DS(on)}$ @ 25 °C	0.2 Ohms
Operating Voltage (fully operational)	4.7 to 36 V
Continuous Current (minimum)	2.0 A for Injector Driver (1.0 A for lamp driver)
Control	Parallel
ESD, Human Body Model	±2000 V
Ambient Operating Temperature (T_A)	40 °C to 125 °C

Protection

Protection	Detect	Limiting	Shut Down	Auto Retry	Status Reporting
Over-voltage	•		•	•	
Over-current/SC	•	•	•		•
Over-temperature	•		•	•	•
Open Load	•				•

Questions

- Are you designing an application for a small engine?
- Is your local government planning to issue environmental regulations for small engines?
- Are you planning to move from a mechanical to an electrical engine control system?
- Do you need a reference design for a transition from mechanical to an electrical engine control system?
- Is the space limited in your current electronically controlled small engine?
- Do you want to consolidate/integrate multiple functions into a single IC? Independent fault annunciation outputs for ignition, injection and relay
- All signal lines are accessible
- Also available with the MC9S12XEP100 MCU for calibration
- Allows one package ECU for minimum PC Board area



100pin LQFP-EP
98ASA00371D

Orderable Part Numbers

Part Number	Core	Memory	Temp Range (Ambient)	Package
MM912JS812AMAF	S12XS	128k	-40 to 125 °C	100 pin LQFP-EP
MM912KS812AMAF		256k		

Note: Add R2 Suffix for Tape and Reel

Documentation

Document Number	Title	Description
MM912_S812	S12XS MCU and Multifunctional Ignition and Injector Driver System in a Package (SiP)	Data Sheet
SG1002	Analog, Mixed Signal and Power Management	Selector Guide
SG187	Automotive	Selector Guide

Development Tools

Part Number	Description
KIT912S812ECUEVM	S12XS Reference Design with BDM multi-link.
MC9S12XEP100	Calibration Board (Contact Sales for Availability)

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Expanding on its more than 30-year heritage of automotive innovation and its high-performance products, Freescale's solutions are designed with the right combination of high-performance capability, processing capacity and customizable software to help deliver smart, differentiated automotive solutions. With Analog, Mixed Signal, and Power parts, our vision is to offer a diverse and differentiated product portfolio to meet the expanding needs of the automotive, consumer and industrial segments. Freescale solutions offer ideal blends of functionality and intelligence designed to help our customers differentiate and win in highly competitive markets.

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