



Analog, Mixed-Signal and Power Management

MC33813

Applications

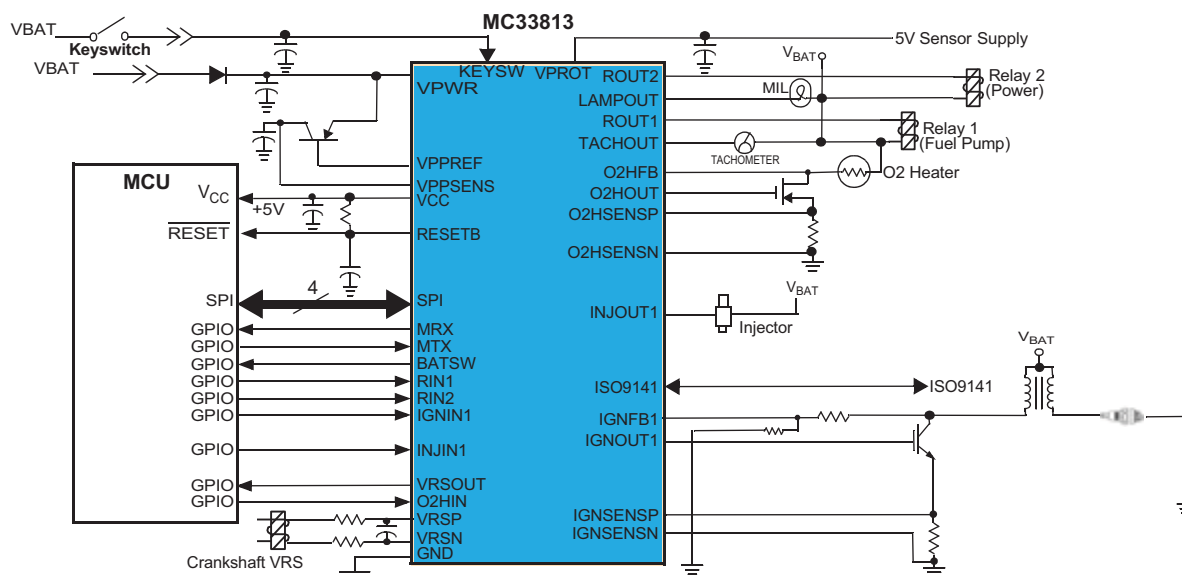
- Motorscooter Engine Control Unit (ECU)
- Motorcycle Engine Control Unit (ECU)
- Small Engine Control for:
 - Three-wheelers
 - Lawn mowers
 - Lawn trimmers
 - Snow blowers
 - Chain saws
 - Gas-driven electrical generators
 - Outboard motors
 - Marine engines and personal watercraft

One Cylinder Small Engine Control IC

Overview

The 33813 is an engine control analog power IC intended for one cylinder motorcycle and other small engine control applications. The IC consists of five integrated low side drivers, two pre-drivers, a Variable Reluctance Sensor (VRS) input circuit, a voltage pre-regulator using an external pass transistor and two 5 volt internal regulators, one for the MCU VCC supply and the other for use as a protected sensor supply. Also included is an MCU reset control circuit with watchdog, an ISO 9141 K-Line interface for diagnostic communication and a Serial Peripheral Interface (SPI). The five low side drivers are intended for driving a fuel injector, a lamp, two relays or other loads and a tachometer. The pre-driver is intended to drive IGBT or MOSFET transistors to control ignition coils, and/or a HEGO heater. The device is packaged in a 48 pin LQFP with an exposed pad.

Motorcycle and Small Engine Control



Features

- Designed to operate over supply voltage range of $4.5\text{ V} \leq \text{VPWR} \leq 36\text{ V}$
- Logic stability guaranteed down to 2.5 V
- One Fuel Injector driver - Typically 1.3 A
- One Ignition IGBT or General Purpose Gate Pre-driver
- One O2 Sensor (HEGO) Heater General Purpose Gate Pre-driver
- Relay 1 driver Typically 2.0 A , can be used for fuel pump control
- Relay 2 driver Typically 1.0 A , can be used as power relay control
- Lamp Driver Typically 1.0 A can also be used to drive a LED
- VPROT Protected sensor supply tracks VCC +5 V regulator
- MCU Reset generator -System Integrity Monitor (Watchdog)
- VPP pre-regulator provides power for VCC and VPROT regulators
- Independent fault protection with all faults reported via SPI
- Interfaces directly to microcomputer (MCU) using 5.0 V SPI and logic I/O
- ISO-9141 K-Line interface for communicating diagnostic messages
- Start-Up/ shut-down control and power sequence logic for power control
- Differential/single-ended VRS conditioning circuit with auto/manual selected thresholds and filter times with digital and tachometer outputs
- Keyswitch logic with provision for power relay and MCU controlled shutdown.
- ISO-9141 K-Line interface for communicating diagnostic messages

Benefits

- Product will eliminate many discrete devices on a PCB with improved reliability over current discrete designs
- Integrated single cylinder control IC
- Multifunctional ignition and injector driver
- Ready to use evaluation kit available
- Cost-effective solution with 16-bit MCU or 32-bit MCU
- Automotive grade quality
- Protection against short-circuit, over-current and over-temperature
- Robust solution for harsh environments in compact, easy-to-use package
- Freescale's Product Longevity Program assures supply for 15 years after launch

Performance

Parametric	Typical Values
Output Type	5 Low-side drivers, 2 Pre-drivers, ISO9141 K-Line Bi-directional
Operating Voltage (fully operational)	4.5 V to 36 V
Continuous Current (minimum)	1.3 A for Injector Driver, 1.0 A for Lamp and Relay 2 drivers, 2.0 A for Relay 1 Driver
Control	SPI and 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 a control 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?



48 pin LQFP-EP
98ASA00173D

Orderable Part Numbers

Part Number	Temp Range (Ambient)	Package
PC33813AE	-40 to 125 °C	48 pin LQFP-EP

Note: Add R2 Suffix for Tape and Reel

Documentation

Document Number	Title	Description
MC33813	One Cylinder Small Engine Control IC	Data Sheet

Development Tools

Part Number	Description
KIT33813AEEVBE	33813 Evaluation Board (Contact Sales for Availability)
KIT33813ECUEVM	33813 Reference Design (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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