



Analog, Mixed Signal, and Power Management

MC09XS3400

Quad High Side Switch (9.0 mΩ)

Overview

The MC09XS3400 is one in a family of devices designed for low-voltage automotive lighting applications. Its four low $R_{DS(ON)}$ MOSFETs (quad 9.0 mΩ) can control four separate 55 W / 28 W bulbs, and/or Xenon modules, and/or LEDs. Programming, control, and diagnostics are accomplished using a 16-bit SPI interface.

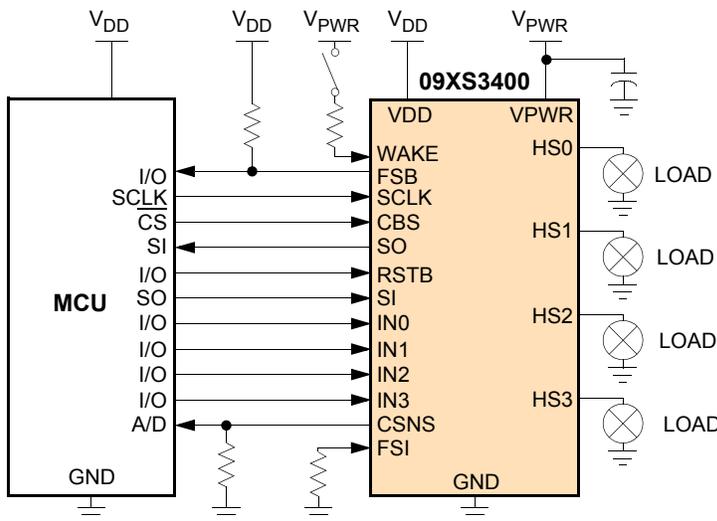
Output slew rate are selectable to control electromagnetic emissions. Additionally, each output has its own parallel input or SPI control for pulse width modulation (PWM) control if desired. The MC09XS3400 allows the user to program via the SPI, the fault current trip levels and duration of acceptable lamp inrush. The device has fail-safe mode

to provide fail-safe functionality of the outputs in case of MCU damage.

Applications

- Low-voltage automotive lighting
- Halogen bulbs
- Light-emitting diodes (LEDs)
- High beam
- Low beam
- Flashers
- Low-voltage industrial lighting

MC09XS3400 Simplified Application Diagram



Product Features

- Four protected 9.0 mΩ high side switch switches at 25 °C
- Operating voltage range of 6.0 to 20 V with sleep current < 5.0 μA, extended mode from 4.0 to 28 V
- 8.0 MHz 16-bit 3.3 V and 5.0 V SPI control and status reporting with daisy chain capability
- Pulse width modulation (PWM) module using external clock or calibratable internal oscillator with programmable outputs delay management
- Smart over-current shutdown compliant to huge inrush current, severe short-circuit, over-temperature protections with time limited auto retry, and fail-safe mode in case of MCU damage
- Output OFF or ON open-load detection compliant to bulbs or LEDs and short to battery detection. Analog current feedback with selectable ratio and board temperature feedback

Performance	Typical Values
# of Outputs	4
R _{DS(ON)} @ 25 °C	4 x 9 mOhms
Operating Voltage	nominal range: 6 to 20V extended range: 4 to 28V
Peak Current	89.4A
ESD	± 8.0 kV power I/Os ± 2.0 kV digital I/Os
Ambient Operating Temperature	- 40 < T _A < 125 °C
Junction Operating Temperature	- 40 < T _J < 150 °C

Ordering Information

Part Number	Temp. Ranges	Features	Package
MC09XS3400AFK	- 40 to + 125 °C	Quad - 9 mΩ High Side Switches	24 PQFN

Development Tools

Part Number	Description
KIT09XS3400EVBE	Evaluation Board - Contact Freescale Sales

Documentation

Document Number	Title	Description
MC09XS3400	Quad High Side Switch (9.0 mΩ)	Data Sheet
SG1002	Analog, Mixed Signal and Power Management	Selector Guide
SG187	Automotive	Selector Guide
AN2467	Power Quad Flat No-Lead (PQFN) Package	Appnote

Protection

Protection	Detect	Shut Down	Auto Retry	Status Reporting
Short Circuit	•	•		•
Over-temperature	•	•	•	•
Over-current	•	•	•	•
Over-voltage	•	•		•
Under-voltage	•	•	•	•
Open-load Detect	•			•
Output Shorted to Battery	•			•



PB-FREE
FK SUFFIX
98ARL10596D
24-PIN PQFN

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