PB_MC33XS2410

Quad 100 mΩ / dual 50 mΩ, 3.0 V to 60 V high-side switch

Rev. 1 — 6 November 2019 Product brief

1 About this document

This Product brief is intended to provide overview/summary information for the purpose of evaluating a product for design suitability. It is intended for quick reference only and should not be relied upon to contain detailed and full information.

Some of the content in this product brief is extracted from the product's full data sheet. In case of any inconsistency or conflict, the full data sheet shall prevail.

For detailed and full information, contact the technical experts through http://www.nxp.com/support.

2 General description

The MC33XS2410 is a four channel self-protected high-side switch. Featuring advanced digital monitoring and control function, the device is operational from 3.0 V to 60 V. As a result of high-level integration, the embedded 12-bit analog-to-digital converter enables a drastically simplified hardware design and MCU software control. The device is controlled by SPI port for configuration, monitoring and diagnostics of the outputs. Whenever communication with the MCU is lost, the device enters a safe operation mode, but remains operational, controllable and protected.

This product has been qualified to the appropriate Automotive Electronics Council (AEC) standard Q100 and is suitable for use in automotive applications.

3 Features and benefits

- Four fully protected 100 mΩ / dual 50 mΩ (at 25 °C) high-side switches
- Configurable active current limitation from 5 A to 10A
- Configurable parallel mode to double current capability
- 16-bit SPI port communication 3.3 V / 5.0 V compatible with daisy chain capability
- Outputs controllable via SPI-bus or direct inputs
- Diagnostic status reported via SPI-bus
- Watchdog for invalid commands or inactive SPI, with programmable timeout
- Programmable interrupt generator that reports to $\overline{\text{FAULT}}$ pin or SPI-bus
- Four independent PWM modules programmable from 0.5 Hz to 2.0 kHz with internal or external clock
- Protection for battery transient overvoltage and reversed polarity battery connection
- Configurable safe mode
- Standby mode with very low power consumption
- Digital PI PWM closed loop current regulation
- External FAULTB pin for warning or IRQ reporting
- 10 mA open load detection in ON state

- Latch off with configurable auto retry
- Configurable severe short-circuit and overload protection
- Programmable active current limit threshold to minimize short-circuit effect
- 12 bits ADC:
  - Current from 5.0 mA to 5.0 A with ± <tbd> % above 100 mA
  - Voltage from 0.5 V to 65 V with ± 5 % above 5.0 V
  - Temperature warning for each channel and central die monitoring
- Qualified in accordance with AEC Q100 grade 1
- Electrical transient disturbance immunity according of ISO 7637-2 and ISO 16750-2

4 Applications

- 12 V automotive, truck, and off-highway equipment
- 12 V and 24 V systems as well as industrial applications up to 60 V
- LED modules
- Solenoids valve and solenoid valve proportional with PI regulation
- DC motor up to 20 W with PWM control
- Incandescent bulbs up to 21 W
- ECU module with large input bypass capacitor, 470 µF and above

5 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{PWR}	Power supply voltage	operating	3.0	14 / 28	60	V
V_{OVP}	Overvoltage protection	—	–35	—	65	V
I_{OUT_4DC}	Nominal load current	4 outputs active	—	1.8	—	A
I_{OUT_2DC}	Parallel mode load	2 outputs active	—	3.6	—	A
T_J	Junction temperature	—	–40	—	+150	°C
I_{STB}	Stand-by current	25 °C	—	—	1	µA
F_{SPI}	SPI frequency	—	—	—	10	MHz

6 Ordering information

Table 2. Ordering information

Part number [1]	Package		
	Name	Description	Version
PC33XS2410EL	HTSSOP28	Plastic thermal enhanced thin shrink small outline package; 28 leads; body width 4.4 mm; lead pitch 0.65 mm; exposed die pad	SOT1172-4

[1] To order parts in tape and reel, add the R2 suffix to the part number.

7 Block diagram

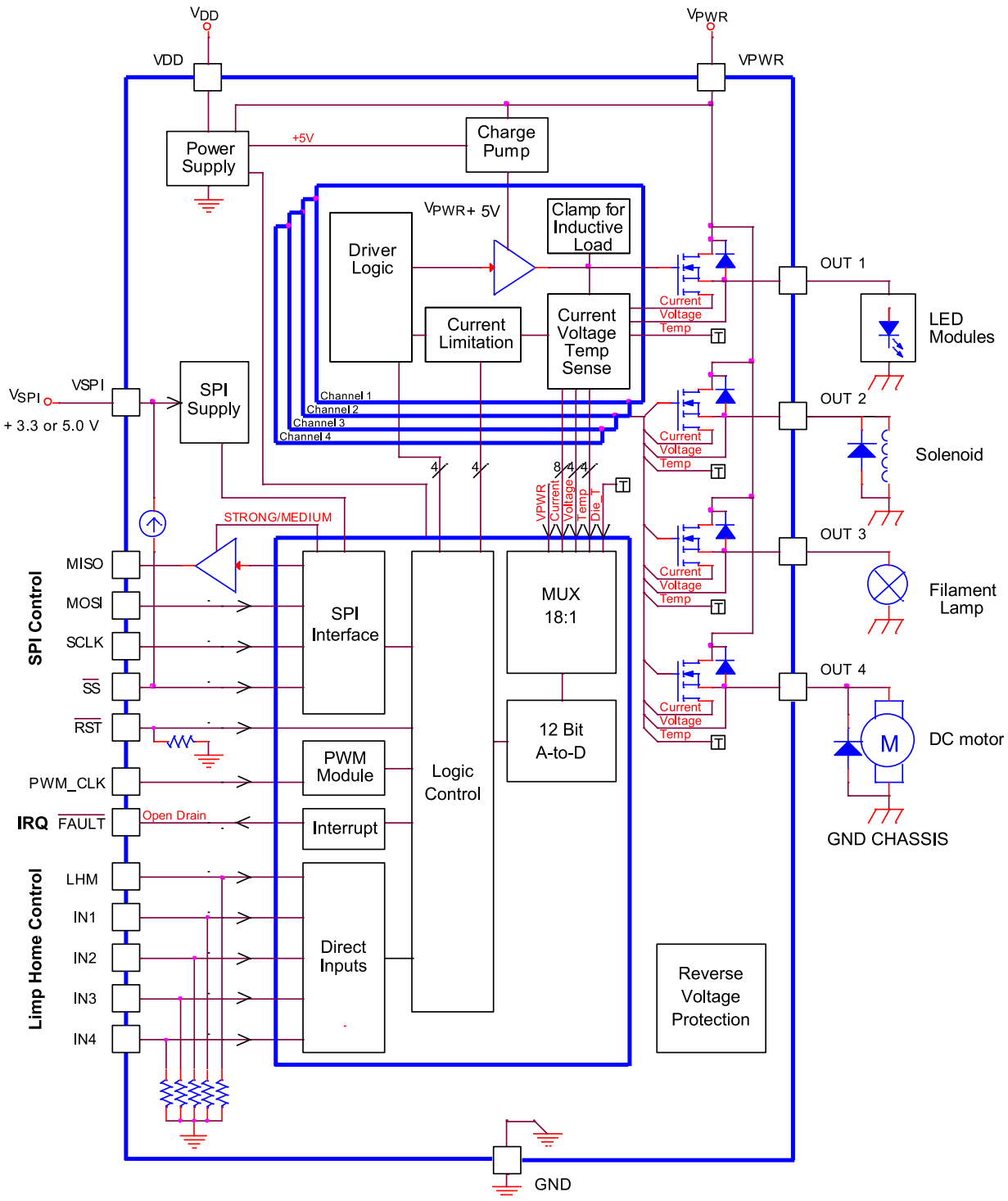

Figure 1. Block diagram

8 Abbreviations

Table 3. Abbreviations

Acronym	Description
ADC	Analog-to-Digital Converter
ECU	Electronic Control Unit: is embedded system that controls one or more of the electrical system or subsystems in a transport vehicle
SPI	Serial Peripheral Interface
PWM	Pulse-width Modulation

9 Revision history

Table 4. Revision history

Rev	Date	Description
v.1	20191106	Initial version corresponding to data sheet, MC33XS2410 v.2, 11 September 2019.

10 Legal information

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