PRODUCT BRIEF

XENSIV™ – KP467 air pressure sensor

Integrated pressure sensor for efficient thermal runaway detection in BMS

The United Nations Global Technical Regulation (UN GTR) has, in a first step – GTR20 Phase 1 – introduced performance-based requirements that address potential safety risks of electric vehicles during use, including potential hazards associated with lithium-ion batteries and/or or other rechargeable electrical energy storage systems, especially with flammable electrolyte. In a second step – GTR20 Phase 2 – these safety precautions should also apply when parking. The safety goal is to avoid hazards to occupants and the environment and therefore, to detect the first thermal runaway of a single battery cell. The warning must be given within a time window of 5 minutes before a dangerous situation occurs in the passenger cabin. Especially in parking mode, classic detection methods using voltage and temperature sensors are no longer sufficient to adequately consider these legal regulations. Better, but also cheaper sensors are therefore needed to detect these events sufficiently early. Infineon has therefore developed an air pressure sensor specifically designed for thermal tunaway detection, which measures the pressure in the battery pack with extremely low power consumption - particularly important in parking mode - and short wake-up times. In addition, the sensor follows the extremely important functional safety requirements and has been developed in compliance to ISO 26262 and is rated ASILB. This corresponds to today's safety requirements for high-voltage car batteries.

The KP467 supports a typical BMS pressure range of 45 to 200 kPa and convert a physical pressure into a 10-, 12- or 14-bit digital value and transmits the information via the SPI interface. In addition, a temperature sensor is integrated on chip. Based on the received SPI command, the 10-, 12- or 14-bit temperature information will also be transmitted via the SPI interface. The device has implemented besides a power-down mode also a particular low power monitoring (LPM) mode which offers an autonomous operation of the sensor in battery monitoring applications without a running master device in order to detect pressure pulses caused by thermal runaway events. The integrated diagnostics are a special reliability feature, which allows testing the sensor cells as well as the signal path. This diagnosis can run autonomously at start or wake-up and can be triggered with a SPI command. The sensors are developed and qualified to operate permanently within a full vehicle lifetime of 15 years.

The "green" 8-pin DFN package with a very small body size of 4.5 x 4.3 x 1.8 mm^3 is protected by a 5-hole lid for tiny particle protection.



www.infineon.com/bap-map-pressure

Key features

- High accuracy pressure sensing of ±3 kPa over lifetime
- Integrated temperature sensor
- Pressure range from 45 to 200 kPa
- Wide operating temperature range from -40 to 105 °C
- Two selectable low-power-mode for current consumption of e.g. 63 µA @ 80 ms sampling rate
- Digital SPI interface
- Up to 14-bit pressure and temperature resolution
- Calibrated and compensated
- Self-diagnosis features
- Fast startup time of less than 5 ms
- ISO 26262-compliant
- Green, very small 8-pin DFN package

Key applications

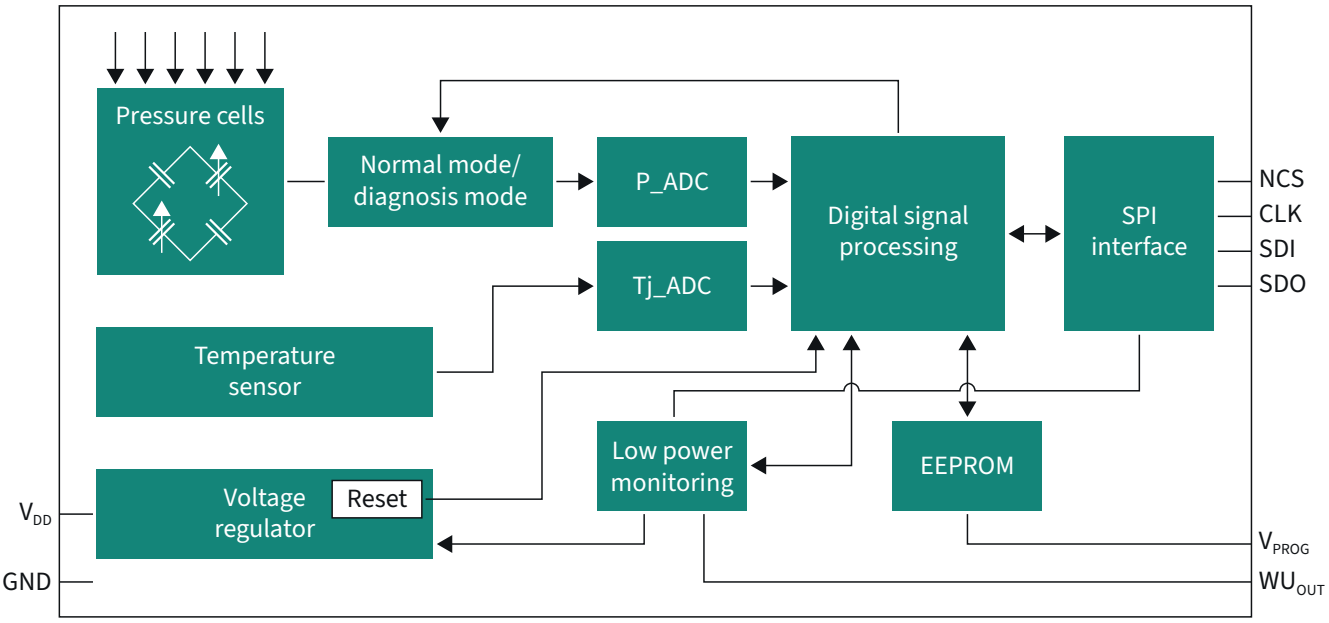
- Thermal runaway detection in battery management systems (BMS)
- Automotive engine management
- Seat comfort systems
- Small engine management
- Industrial control, smart gas meter
- Altimeter, weather station

BAP

PRO SIL

ISO 26262 compliant

Block diagram KP46x



Product table

Product name	Interface	Pressure range [kPa]	Temperature range [°C]	Pressure accuracy [kPa]	Application	Ordering code	Package
KP467	Digital SPI	45 ... 200	-40 ... +105	±3	BMS thermal runaway detection	SP005580018	PG-DFN-8-1

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