PRODUCT BRIEF

XENSIV™ KP467Q

Infineon's integrated pressure sensor for efficient thermal detection in electrical vehicles

The United Nations Global Technical Regulation (UN GTR) has, in a first step – GTR20 Phase 1 – introduced performance-based requirements to address potential safety risks of electric vehicles during use, including potential hazards associated with lithium-ion batteries and/or other rechargeable electrical energy storage systems, especially those with flammable electrolyte. In a second step – GTR20 Phase 2 – these safety precautions should also apply when vehicles are parked.

The safety goal is to avoid hazards to occupants and the environment by detecting the initial thermal runaway of a single battery cell. A warning must be issued within a time window of 5 minutes before a dangerous situation occurs in the passenger cabin. Particularly in parking mode, traditional detection methods using voltage and temperature sensors are no longer sufficient to meet these legal regulations. Therefore, better yet cost-effective sensors are needed to detect these events early enough.

To address this, Infineon has therefore developed an air pressure sensor specifically designed for thermal runaway detection. This sensor measures the pressure in the battery pack with extremely low power consumption – critical in parking mode – and features short wake-up times. The sensor is automotive qualified according to AEC-Q103, the standard qualification developed specifically for Micro-Electro-Mechanical Systems (MEMS) to ensure reliability, safety, and performance in harsh automotive environments.

Key features

- High accuracy absolute pressure sensing of ±1 kPa over lifetime and 4% of LPM threshold
- Integrated temperature sensor
- Pressure range: 50 to 140 kPa
- Wide operating temperature range from -40°C to 105°C
- Minimum LPM threshold: 0.6 kPa
- Two selectable low-power modes for current consumption e.g. 63 µA at 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
- AEC-Q103 qualified
- Green, very small 8-pin DFN package

Key benefits

- Thermal-runaway-detection in Battery Management Systems (BMS), tailored for LFP batteries
- Automotive engine management
- Seat comfort systems
- Small engine management
- Industrial control, smart gas meter
- Altimeter, weather station
- Medical



AEC Qualified

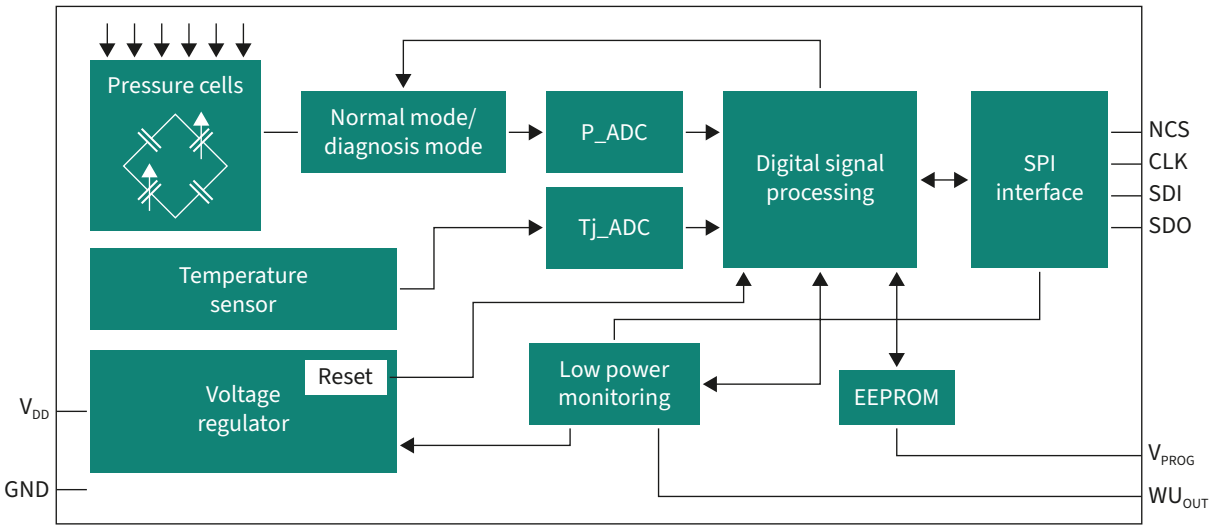
BAP

www.infineon.com/bap-map-pressure

The KP467Q supports a typical BMS pressure range of 50 to 140 kPa and converts physical pressure into a 10-, 12-, or 14-bit digital value, transmitting 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 is also transmitted via the SPI interface.
The device implements, besides a power-down mode, a specific Low-Power Monitoring (LPM) mode which offers an autonomous operation of the sensor in battery monitoring applications without a running master device. This enables the detection of pressure pulses caused by thermal runaway events. The LPM pressure threshold has been further reduced to 0.6 kPa to meet the LFP battery demand for detecting smaller pressure events related to less reactive lithium-ion battery cell chemistry.

The integrated diagnostics provide a special reliability feature, allowing testing of the sensor cells as well as the signal path. This diagnostic function can run autonomously at start-up or wake-up and can also be triggered with an SPI command. The sensors are developed and qualified to operate continuously over a full vehicle lifetime of 15 years.

Block diagram KP46x



Product table

Product name	Interface	Pressure range [kPa]	Temperature range [°C]	Pressure accuracy [kPa]	Application	Package	Ordering code
KP467Q	Digital SPI	50 to 140	-40 to 105	±1	BMS thermal-runaway-detection	PG-DFN-8-1	SP006179846

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