PRODUCT BRIEF

XENSIV™ TCI-B

Infineon's integrated thermal conductivity hydrogen gas sensor

Battery technology is vital for the fast-growing BEV sector, but lithium-ion batteries carry risks like thermal runaway. In the early stages of thermal runaway, battery materials decompose chemically, releasing gases – most notably hydrogen – before a significant temperature rise occurs. Gas sensors, such as hydrogen (H2) sensors, can detect these emissions at very low concentrations, providing an early warning of potential thermal runaway, much sooner than traditional temperature sensors or smoke detectors.

Early detection is essential to prevent failures and ensure safety. The TCI-B gas sensor addresses this by enabling real-time monitoring and rapid detection of thermal events in battery packs. It supports timely interventions, such as driver alerts or automatic safety system activation, before temperatures become critical. This proactive response not only enhances safety but also assists automakers in meeting regulatory standards like GTR20. Beyond its use in BEVs, the TCI-B sensor offers early and precise detection of thermal event precursors in energy storage systems (ESS), enabling quick response and mitigation actions. Continuous monitoring increases reliability, lowers the risk of catastrophic failures, and helps protect both assets and personnel.

Infineon's XENSIV™ TCI-B hydrogen sensor operates using thermal conductivity (TC) and a differential MEMS sensor design. By measuring the heat transfer through gases by heating parts of the MEMS structure, TC sensing ensures robust, stable performance in tough automotive conditions. Unlike metal oxide (MOX) or catalytic combustion (CC) chemical sensors, TC sensors use a physical principle, making them immune to sensor poisoning and high offset drift, resulting in greater reliability.

Potential applications

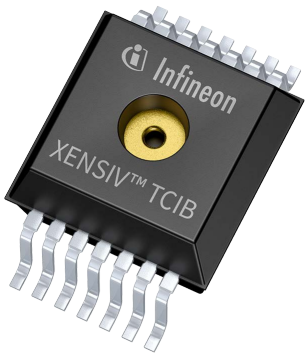
- **Automotive battery monitoring systems** (thermal runaway detection)
- **Automotive fuel cell hydrogen leakage** measurement
- **Industrial hydrogen leakage measurement**
  (e.g. electrolyzers, energy storage systems, stationary fuel cells)

Key features

- Insensitivity to poisoning
- Low lifetime offset drift
- Ultra-low power consumption
- Fast response time < 100 ms
- AEC-Q100 qualified
- JEDEC and JESD47L qualified
- ASIL B grade
- 15 years lifetime

Key benefits

- Automotive-grade sensor reliability
- No maintenance or replacement costs
- Flexible field configuration possible
- Superior robustness and stability compared to catalytic- or metal-oxide-sensors
- Autonomous mode

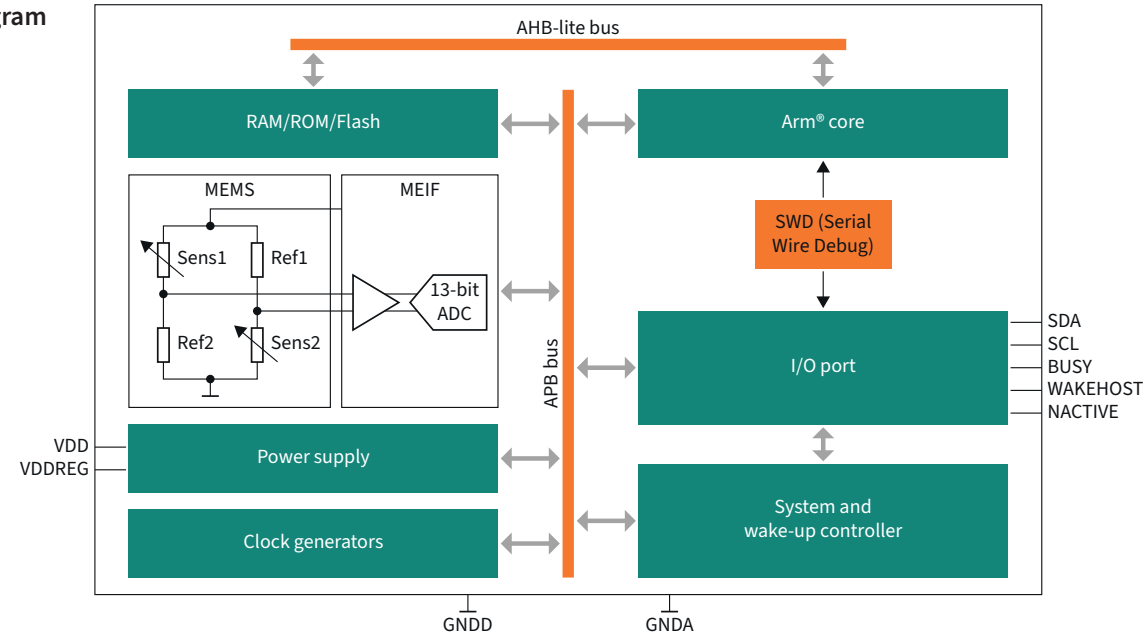


RoHS

ISO 26262 compliant

www.infineon.com/gas-sensors

Block diagram



Product overview

Parameter	Min.	Typ.	Max.	Unit	Note or test condition
Hydrogen measurement range	0		16	%H2	
Accuracy	-0.34		0.34	%H2	Humidity compensated with external humidity sensor. Absolute humidity < 150 g/m^3. Temperature ≤ 90°C. Pressure between 60 and 130 kPa.
Temperature operating range	-40		105	°C	
Avg. current consumption		112		µA	

Orderable Part Number (OPN)	Ordering code (SP number)
TCIBXTMA1	SP006101806

Published by
Infineon Technologies AG
Am Campeon 1-15, 85579 Neubiberg
Germany

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Public

Date: 06/2026

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