

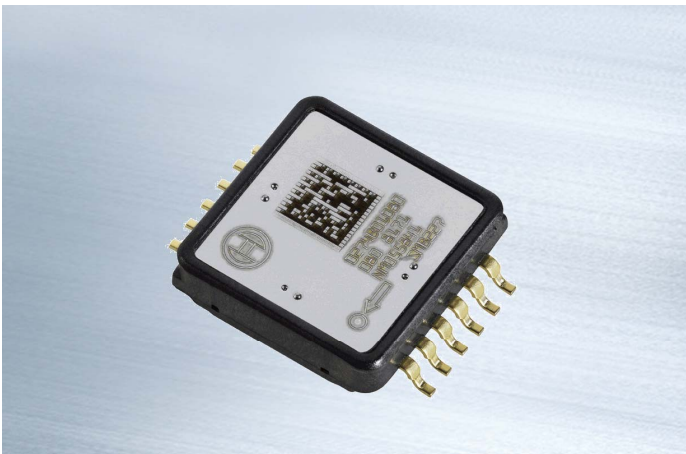
Automotive Electronics

Low-g accelerometer for Vehicle Dynamics Control

SMB227



BOSCH
Invented for life



Accelerometer SMB227 for VDC

Customer benefit / features:

- ▶ Linear dual axis accelerometer (a_y/a_z)
- ▶ Full digital signal processing
- ▶ Two output channels per axis with different measurement ranges and sensitivities:
 - 16 bit ± 3.2 g low-g output (SPI)
 - 8 bit ± 27 g (a_z) / ± 32 g (a_y) high-g output (SPI)
- ▶ High operation temperature from -40 °C... $+135$ °C
- ▶ Excellent vibration rejection
- ▶ Multiple internal test functions
- ▶ Temperature sensor output
- ▶ 3.3 V or 5 V supply operation

Overview

The SMB227 dual axis low-g acceleration sensor is newly designed for improved accuracy and robustness. The sensor is designed for integration into safety relevant automotive applications with demanding environmental conditions, like Vehicle Dynamics Control, VDC. Other suitable applications include inclination and tilt measurements.

The SMB227 consists of a micromechanical (MEMS) sensor element and a signal processing ASIC packaged together in a single SMD package for surface mounting.

Product description

The SMB227 senses in-plane accelerations and out of plane accelerations (a_y/a_z), with linear response. Specific design features allow for excellent vibration robustness, high mechanical g-range survivability, and superior protection against external interference.

For each axis the sensor provides acceleration data on two separate channels, each with nominal measurement ranges and sensitivities.

Multiple built in self-test features monitor signals and verify correct sensor function to ensure the highest signal reliability. In addition, the sensor measures and transmits on-chip temperature.

The built in digital serial peripheral interface (SPI) enables bidirectional communication with an external microcontroller (μ C) for data transmissions.

The sensor is suitable for use in environments with a particularly wide temperature range from -40 °C to $+135$ °C and operates with a 3.3 V or 5 V power supply.

Parameters SMB227**Measurement and functional characteristic**

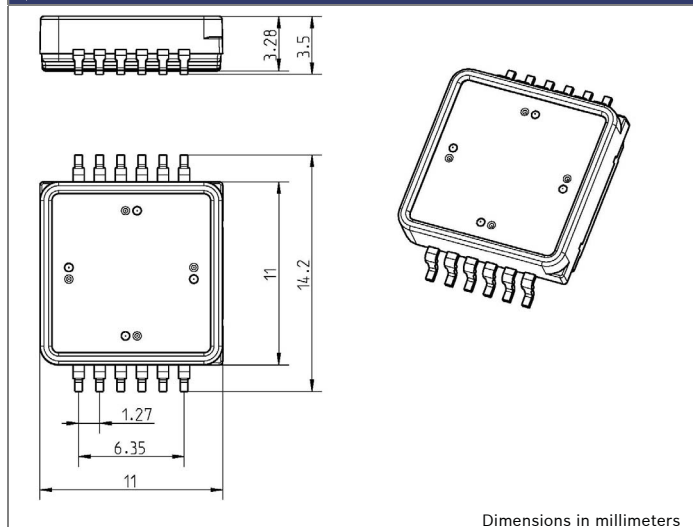
Measurement range	± 3.277 g
Nominal sensitivity	10 000 LSB/g
Acceleration data resolution	16 bit
Sensitivity variation ²⁾	± 5 %
Non-linearity ²⁾	± 15 mg
Variation of offset ²⁾	± 90 mg
Bandwidth (-3dB) ¹⁾	DC ... 14 Hz
Output noise ²⁾	5 mg rms
Cross axis sensitivity ²⁾	± 2 %

Operating conditions

Supply voltage ¹⁾	3.3 V (SPI) or 5 V
Current consumption ¹⁾	8 mA
Power-on time	< 0.35 s
Operating temperature	-40 °C...+135 °C
Storage temperature	-40 °C...+85 °C
	JEDEC Level 3

¹⁾ Typical values for main output path (output range ± 3.2 g)

²⁾ Maximum values

Outline PM12 package**Working principle**

The accelerometer is manufactured by using surface micromachining technology. The acceleration sensor features suspended free moving comb-like seismic mass elements and fixed counter-electrodes. As a result of external forces acting on the vehicle, deflections of the seismic masses along the sensitive axis generate changes in system capacitance. These changes are detected using the differential measurement principle.

Interface

The sensor communicates via a bidirectional digital Serial Peripheral Interface (SPI) with 16 bit for low-g output (± 3.2 g) or 8 bit for high-g output ($\pm 27/32$ g).

Package

The SMB227 is packaged in a pre-molded (PM) 12-pin package for surface mount processes. All parts are RoHS compliant.

Portfolio

The SMB227 sensor is part of a larger sensor portfolio. This portfolio consists of acceleration sensors, angular rate sensors, pressure sensors, torque sensors, and CO₂ sensors for occupant safety systems, Vehicle Dynamics Control VDC, active suspension systems, motor management, steering systems, and A/C systems.

Bosch has been active in the field of micromechanics (MEMS) for more than 20 years, and is established as one of the pioneers of this technology. With more than 900 MEMS patents, hundreds of engineers in this field, and more than 1.6 billion MEMS sensors shipped to date, Bosch is the global market leader for MEMS sensors.

For more information about automotive MEMS sensors, visit www.bosch-sensors.com.

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