

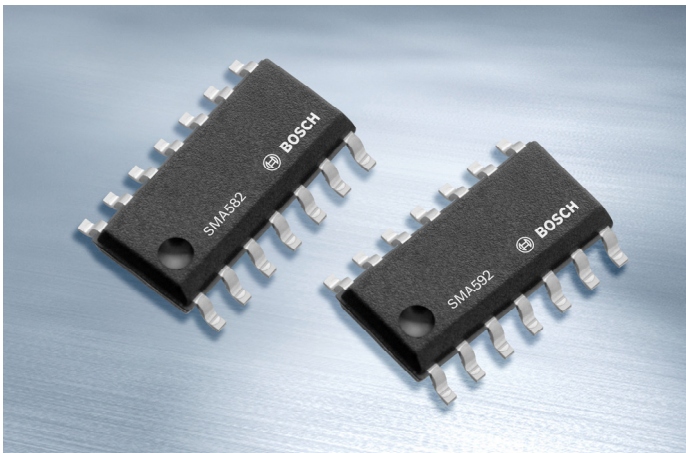
Automotive Electronics

High-g accelerometers for passive safety application

SMA58x, SMA59x

**BOSCH**

Invented for life



Accelerometers SMA582, SMA592 for airbag systems

Customer benefit / features:

- ▶ 120/240/480 g single-channel a_y high-g sensors with PSI5 interface
- ▶ Superior overload robustness & crash performance
- ▶ Automatic offset adjustment
- ▶ Fully automatic bipolar self-test
- ▶ Optional detection of V_{DDA} capacity loss
- ▶ 10 μ s microcut rejection feature
- ▶ Bidirectional PSI5 2-wire current interface
- ▶ Optional bus modes for up to four participants
- ▶ Parallel or serial (daisy chain) data transmission
- ▶ I_{Data} pin for Manchester code generation
- ▶ AEC-Q100 qualified
- ▶ Small SOIC14n package
- ▶ Lead-free and RoHS compliant

Overview

The SMA582 and SMA592 accelerometers are designed for automotive passive safety systems. They are typically used for satellite sensors for front and side crash sensing. Both sensors measure the deceleration rate of a vehicle during a collision to activate restraint systems, such as front and side airbags or seatbelt tensioners. Other applications like shock monitoring are also possible.

The sensor consists of a micromechanical (MEMS) sensor element and a signal processing ASIC mounted in a molded plastic SMD housing.

Product description

Both accelerometers are in-plane, single channel (a_y) sensors with different measurement ranges from ± 120 g up to ± 480 g.

The embedded automatic bipolar full self-tests of the mechanics and electronics and the built-in offset adjustment and FIR filter ensure highly reliable data over temperature and lifetime, especially in safety critical applications. Additionally, the microcut rejection ensures high signal stability even with supply voltage drops of up to 10 μ s. The presence of an external blocking capacitor (V_{DDA}) is verified during the start-up routine.

The functional parameters are programmable via SPI (Serial Peripheral Interface) or bidirectional PSI5. The digital PSI5 (Peripheral Sensor Interface) two-wire current interface allows for asynchronous and synchronous data transmission and bus capability for up to four bus participants. All sensor variants are applicable in a broad temperature range from -40 °C...+125 °C and require a power supply with at least 4.5 V.

Products

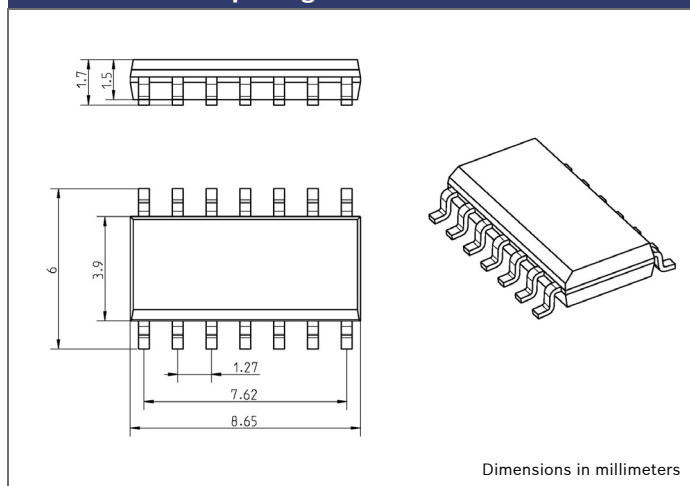
Type	Range	Sens. axes	Sensitivity
SMA582	$\pm 120/\pm 240$ g	Y	4/2 LSB/g
SMA592	$\pm 240/\pm 480$ g	Y	2/1 LSB/g

Parameters SMA58x/59x**Measurement and functional characteristics**

Tolerance of Sensitivity ^{1,2}	± 7 %
Nonlinearity of sensitivity ¹	± 2 %
3dB corner frequency	426 or 213 Hz (selectable)
Acceleration data resolution	10 bit

Operating conditions

Supply voltage	4.5 – 11 V
Supply current drain ¹	< 8 mA
Operating temperature	-40 °C...+125 °C

¹ Maximum values² Over lifetime and temperature**Outline SOIC14n package****Working principle**

The acceleration sensors SMA58x/59x are 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 by using a differential measurement principle.

Interface

The sensors communicate via a bidirectional PSI5 v1.3 interface. Please visit www.psi5.org for further information. For customer programming SPI (Serial Peripheral Interface) can also be used.

Package

The SMA582/592 is packaged in a lead-free SOIC14n package. All parts are RoHS compliant.

Portfolio

The SMA582/592 sensors are part of a larger sensor portfolio. The portfolio consists of acceleration sensors, angular rate sensors, pressure sensors, and combined inertial sensors for occupant safety systems, vehicle dynamics control VDC, active suspension systems, motor management, transmission control systems, and navigation.

Bosch has been active in the field of micro-electro-mechanical systems (MEMS) for more than 20 years, and is established as one of the pioneers of this technology. With more than 1000 MEMS patents, hundreds of engineers in this field, and more than 3 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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