

Automotive Electronics

High-g accelerometers for passive safety applications

SMA550, SMA560



BOSCH
Invented for life



Accelerometers SMA550/560 for airbag systems

Customer benefit / features:

- ▶ Single (a_x) or dual channel (a_x/a_y) sensors available
- ▶ G-range independently selectable for each channel
- ▶ Full digital signal path with 10 bit resolution of acceleration data
- ▶ Digital 16 bit SPI interface
- ▶ Bosch- or open SPI selectable
- ▶ Embedded self test
- ▶ Supply voltage between 3.3 V and 5 V possible
- ▶ Reduced current consumption
- ▶ Small size SOIC8 package
- ▶ AEC-Q100 qualified
- ▶ RoHS compliant

Overview

The SMA550 and SMA560 are versatile accelerometers for automotive passive safety systems. They are typically used as central sensors in the airbag Electronic Control Unit (ECU) and measure the deceleration rate of a vehicle during a collision to activate restraint systems, such as front and side airbags or seatbelt tensioner. Other applications like shock monitoring are also possible.

The sensors consist of a micromechanical (MEMS) sensor element and a signal processing ASIC packaged together in a molded plastic housing for surface mounting.

Product description

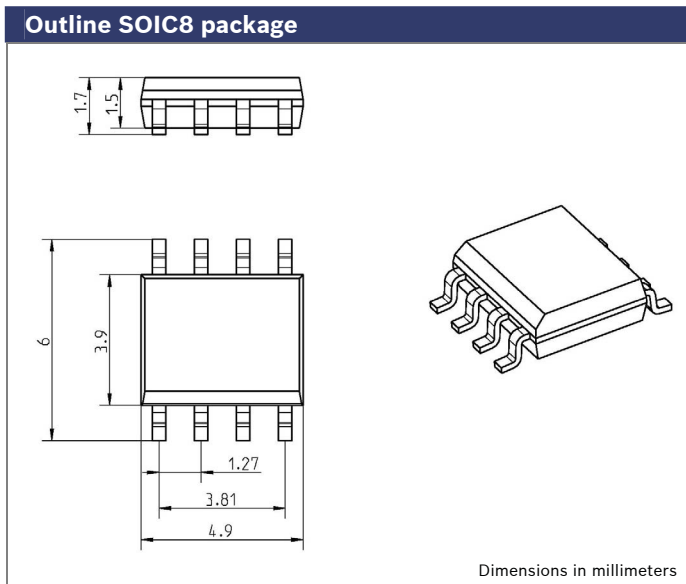
Both sensors are linear in-plane accelerometers. Each detection channel allows an individual selection of the measurement range between ± 35 g, ± 48 g, ± 70 g and ± 96 g.

Full digital signal processing and signal output via a bidirectional SPI interface ensures high signal quality. Combined with an automatic offset correction and embedded self test features both sensors are dedicated for safety critical applications.

The sensors are applicable in a broad temperature range from -40 °C... $+105$ °C. Low power consumption and a selectable supply voltage between 3.3 V and 5 V are further benefits which punctuate the high flexibility of the SMA550/560 accelerometers.

Products			
Type	Range	Sens. axes	Sensitivity
SMA550	±35 g ±48 g ±70 g ±96 g	X	13 LSB/g 10 LSB/g 6.75 LSB/g 5 LSB/g
SMA560	±35 g ±48 g ±70 g ±96 g	X, Y	13 LSB/g 10 LSB/g 6.75 LSB/g 5 LSB/g

Parameters SMA550/560	
Measurement and functional characteristics	
Nonlinearity of sensitivity	±2 %
3dB corner frequency	409 Hz
Acceleration data resolution	10 bit
Digital SPI interface	16 bit
Operating conditions	
Supply voltage (selectable)	3.3 or 5 V
Supply current drain	3.6 or 3.8 mA (typ. values)
Operating temperature	-40 °C...+105 °C



Working principle

The acceleration sensors SMA550/560 are manufactured by using surface micromachining technology. The acceleration sensors feature 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 SMA550/560 sensors communicate via a bidirectional digital 16 bit Serial Peripheral Interface (SPI). Both sensors allow Bosch SPI or open SPI standard with 10 bit resolution of acceleration data.

Package

The SMA550/560 sensors are packaged in a small and easy mountable standard RoHS compliant SOIC8 package.

Portfolio

The SMA550/560 sensors are 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) since 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 far 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.

Regional sales contacts

Europe/Japan bosch.semiconductors@de.bosch.com
 USA/Canada bosch.semiconductors@us.bosch.com
 China bosch.semiconductors@cn.bosch.com
 Korea bosch.semiconductors@kr.bosch.com

www.bosch-semiconductors.com
www.bosch-sensors.com

Robert Bosch GmbH
 AE/MKT-S
 Postfach 13 42
 72703 Reutlingen
 Germany

www.bosch.de