

# Passive safety systems

SMA6xy high-g acceleration sensor for airbag systems



**BOSCH**

Invented for life



## PRODUCT BENEFITS

- ▶ Target applications
  - Airbag ECUs and satellite sensors
- ▶ Complies with VDA AK-LV 27 specification
- ▶ Robustness against microcuts
- ▶ High degree of mounting flexibility of satellite sensors made possible by the availability of x, y, z channels
- ▶ RoHS compliant

- 1 Lead-free SOIC8n package, 6 mm × 4.9 mm × 1.7 mm

# reliable operation

due to broad operating temperature range from  $-40^{\circ}\text{C}$  up to  $+125^{\circ}\text{C}$  (SMA68x/69x)

## TASK

The SMA66x, SMA68x and SMA69x sensors are versatile accelerometers for automotive passive safety systems and detect the deceleration of a vehicle. SMA66x accelerometers are typically used as central sensors in the airbag electronic control unit (ECU), whereas SMA68x/69x devices are typically used for satellite sensors for front and side crash sensing.

## FUNCTION

All SMA6xy use fully digital signal processing and signal output either via a Serial Peripheral Interface (SPI) or via a Peripheral Sensor Interface 5 (PSI5) to ensure high signal quality. The SMA66x sensors communicate via a bidirectional digital 32-bit SPI. Both sensors allow Bosch SPI or open SPI standard with 12-bit resolution of acceleration data. The SMA68x/69x sensors communicate via a PSI5 v1.3. All sensor data are processed by the central airbag ECU, which recognizes a crash based on the acceleration data and activates the respective airbags. The SMA6xy therefore provide vital information to the central airbag ECU during the first milliseconds of a crash. Combined with an automatic offset correction and embedded self test features, the SMA6 sensor family is specifically suited for safety critical applications. For this reason, SMA6xy sensors are developed in accordance with ISO26262 for use in ASIL D systems.

# highly robust

due to  $10\mu\text{s}$  microcut rejection feature of the high-g accelerometers

## PRODUCT VARIANTS

| Type   | Application | Interface | Range                     | Sens. axes |
|--------|-------------|-----------|---------------------------|------------|
| SMA660 | ECU         | SPI       | $\pm 120\text{g}$         | X, Y       |
| SMA665 | ECU         | SPI       | $\pm 120\text{g}$         | X, Z       |
| SMA682 | PAS         | PSI5      | $\pm 120/240/480\text{g}$ | Y          |
| SMA684 | PAS         | PSI5      | $\pm 120/240\text{g}$     | Z          |
| SMA685 | PAS         | PSI5      | $\pm 120/240/480\text{g}$ | X, Y       |
| SMA686 | PAS         | PSI5      | $\pm 120/240\text{g}$     | X, Z       |
| SMA694 | PAS         | PSI5      | $\pm 480\text{g}$         | Z          |
| SMA696 | PAS         | PSI5      | $\pm 480\text{g}$         | X, Z       |

## TECHNICAL CHARACTERISTICS

|                                    | SMA66X    | SM68X/69X |
|------------------------------------|-----------|-----------|
| Tolerance of sensitivity           | $\pm 5\%$ | $\pm 7\%$ |
| -3dB corner frequency <sup>1</sup> | 400–426Hz | 400–426Hz |
| Acceleration data resolution       | 12 bit    | 10 bit    |

## OPERATING CONDITIONS

|                              |   |   |
|------------------------------|---|---|
| Supply voltage               | 3.3V, 5.0V, 6.7V                                | 4.5–11V   |
| Supply current               | <6mA  | <6 mA (sink current 26mA)                       |
| Operating temperature        | $-40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ | $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ |
| Acceleration data resolution | 12 bit  | 10 bit  |

<sup>1</sup>Depends on type and channel