Overview

The SMA130 is a new compact 3-axis acceleration sensor and belongs to the product family “Mobility Sensors”. Mobility Sensors are CE-sensors which are enhanced for automotive, non-safety applications.

With its ultra-small footprint of only 2 mm x 2 mm, the LGA package and its very low power consumption (featuring five power-safe modes with fast wake up times below 2 ms), it provides a cost-efficient one-chip solution especially for infotainment systems like in-dash navigation or telematic on-board units. The SMA130 detects accelerations in three perpendicular axes and allows tilt, motion, vibration or shock sensing regardless of the mounting orientation of the sensor.

Product description

The SMA130 contains a digital 14 bit 3-axis acceleration sensor with different measurement ranges between ±2 g and ±16 g. Numerous programming options, a low signal noise and a very small footprint make the SMA130 a highly versatile and easily applicable acceleration sensor. For individual adjustments to the application, the user can easily choose via the digital interface between four different measurement ranges and several low pass filtering options. In addition, an 8 bit temperature signal is available. An embedded self-test ensures signal integrity.

The sensor accepts supply voltages between 1.62 V and 3.6 V and can be operated in a temperature range between -40 °C and +85 °C. The sensor is RoHS compliant and qualified according to AEC-Q100.

Features:
- Low noise and low power accelerometer:
  - Temperature sensor output
  - Embedded filters with programmable bandwidth
  - Embedded self-test
  - AEC-Q100 qualification

Customer benefits:
- High performance with attractive pricing
- Extremely flexible application options
- Especially compact housing enables small format
- Low power consumption – also at system level
- Billion fold applied technology
- Significantly lower defect rates compared to CE products

Ultra small, precise and flexible – a one fits all solution:
- 3-axis allowing motion or tilt control regardless of sensor mounting orientation
- Easy to integrate single-chip sensor

Target applications:
- Telematics and tolling systems
- Navigation (dead reckoning)
- Vehicle dynamics data logging
- eCall
- Car key module and car-alarm
### Parameters SMA130

**Measurement and functional characteristics**

**Typical values**

- **Accelerometer (a_{xyz})**
  - **Measurement ranges**<sup>(1)(2)</sup>
    - ±2 g
    - ±4 g
    - ±8 g
    - ±16 g
  - **Sensitivity**
    - ±4096 LSB/g
    - ±2048 LSB/g
    - ±1024 LSB/g
    - ±512 LSB/g
  - **Digital resolution**
    - 14 bit
  - **Non-linearity**<sup>(3)</sup>
    - ±0.5 %
  - **Sensitivity temperature drift**<sup>(3)(4)</sup>
    - 0.015 %/K
  - **Zero-point offset**<sup>(2)(3)</sup>
    - ±50 mg
  - **Offset temperature drift**<sup>(3)(4)</sup>
    - ±1 mg/K
  - **Bandwidth (programmable)**
    - 8 Hz...500 Hz
  - **Output noise density, rms**<sup>(3)(3)</sup>
    - 0.12 mg/√Hz

### Operating conditions

- **Supply voltage (VDD)**
  - 1.62...3.6 V
- **Supply current (normal operation)**
  - 130 µA
- **Supply current in power-safe modes**<sup>(5)</sup>
  - 1 µA - 66 µA
- **Operating temperature**
  - -40 °C ... +85 °C
- **Interfaces**
  - SPI and I²C

<sup>(1)</sup> programmable
<sup>(2)</sup> at +25 °C
<sup>(3)</sup> valid at full scale in 2 g setting
<sup>(4)</sup> over temperature (-40 °C...+85 °C); reference +25 °C
<sup>(5)</sup> SMA130 features five power-safe modes

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### Outline 12-pin LGA package

**Top View**

- **Pin 1**
  - CSB
- **Pin 11**
  - PS
- **Pin 12**
  - SCX
- **Pin 10**
  - SDO

**Bottom View**

- **Pin 7**
  - VDD
- **Pin 6**
  - INT2
- **Pin 5**
  - INT1
- **Pin 4**
  - NC

**Bottom View Pads visible**

**11 12**

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### Package

The SMA130 features a very small and easy mountable standard RoHS compliant 2 x 2 x 0.95 mm³ 12-pin LGA package.

### Interface

The SMA130 can easily be set and read-out via a digital SPI (serial peripheral interface) or digital two-wire interface (I²C compatible).

### Portfolio

The SMA130 sensor is part of a broad sensor portfolio, which consists of acceleration sensors, angular rate sensors, combined inertial sensors, pressure sensors, and media sensors. Related applications range from occupant safety systems, vehicle dynamics control, motor management, transmission control systems, A/C systems and navigation.

Bosch has been at the forefront of micro-electro-mechanical systems (MEMS) technology since it first emerged in the 1980s. Today, Bosch is the world’s leading supplier for MEMS sensors and holds more than 1,000 patents and patent applications related to the MEMS technology.

More than 1.4 billion sensors are shipped each year from its state-of-the-art wafer fab in Reutlingen – or around 4.5 million each day. Bosch provides sensors for a wide range of uses in the automotive and consumer electronics.

For more information about automotive MEMS sensors, visit [www.bosch-sensors.com](http://www.bosch-sensors.com).

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