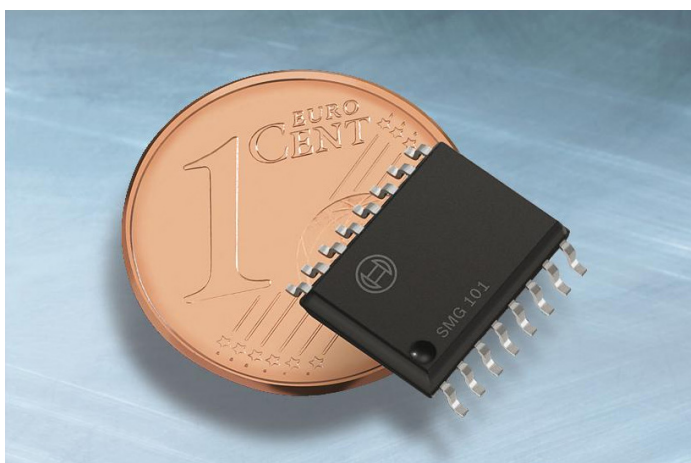


Automotive Electronics

Angular rate sensor for rollover application SMG10x



BOSCH
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Angular rate sensor SMG10x

Customer benefit / features:

- ▶ 240/300 °/s Ω_x angular rate sensor with SPI interface
- ▶ Full scale measurement range: ± 240 °/s or ± 300 °/s
- ▶ Full mechanical and electrical self test
- ▶ Continuous signal monitoring
- ▶ 10bit digital output via serial peripheral interface (SPI, 2 protocol versions available)
- ▶ Temperature range -40 °C...+105 °C
- ▶ Standard SOIC16w package
- ▶ Bosch VDC experience based on millions of angular rate sensors in the field
- ▶ Qualified for automotive applications (AEC100)
- ▶ RoHS compliant

Overview

The Bosch angular rate sensor family SMG10x is the third generation of gyroscopes for rollover applications follows the SMG06x family. The SMG10x is a micro-machined gyroscope for the detection of Ω_x angular rate in car safety applications such as rollover control units. It is the key device for the correct performance of such passenger safety systems.

Product description

The sensor is based on a two-chip concept: A MEMS sensing element and a separate evaluation ASIC. The sensing element, an oscillating polysilicon mass, is manufactured using state-of-the-art Bosch surface micro-machining technology.

The signal evaluation is fully digital. This enables sophisticated safety features like a full mechanical and electrical self-test and continuous signal monitoring, which make the sensor the first choice for safety critical applications like rollover sensing.

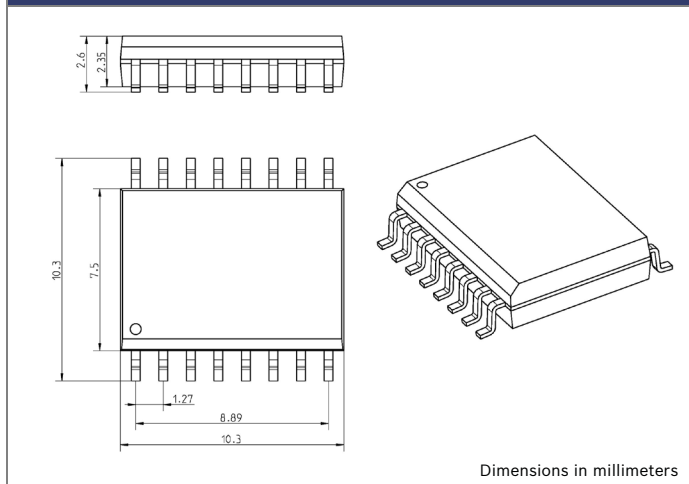
The sensor is RoHS compliant and qualified according to AEC-Q100.

Parameters SMG10x**Measurement and functional characteristics**

Measurement range	± 240 °/s or ± 300 °/s
Sensitivity	2 LSB/°/s or 1.6 LSB/°/s
Sensitivity tolerance	± 7 %
Non-linearity	± 0.5 %
Noise	< 3.5 LBS rms
Cut-off frequency (-3dB)	40 Hz
Phase delay	10 ms
Cross sensitivity	< 5.0 %
Start-up time	< 300 ms

Operating conditions

Supply voltage	5.0 V or 3.3 V
Supply current (3.3 V version)	< 9 mA
Operating temperature	-40 °C...+105 °C

Outline SOIC16w package**Package**

The SMG10x is packaged in a small and easy mountable standard RoHS compliant SOIC16w package.

Working principle

The micro-mechanical sensing element features a disc like polysilicon structure suspended at its pivot. By applying electrostatic forces to comb-like structures, the disc is forced to a rotational oscillation around the center of mass. This oscillation is stabilized by an electronic drive control loop in the evaluation ASIC of the sensor.

When rotating around the in-plane axis Ω_x , the Coriolis force will cause a swaying motion of the disc in an out-of-plane direction. Embedded electrodes underneath the disc allow a capacitive detection by the ASIC of this out-of-plane motion.

Interface

The sensor provides the digital output via SPI (Serial Peripheral Interface) in 10 bit resolution. Two different protocols are available.

Portfolio

The SMG10x sensor is 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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