Automotive Electronics

Angular rate sensor for rollover applications SMG06x

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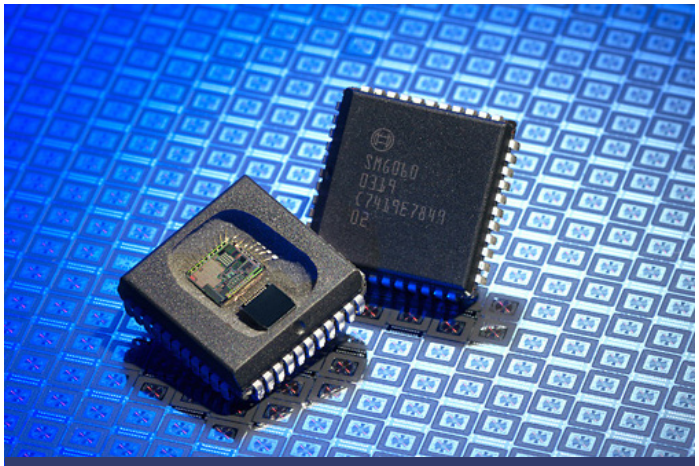


Angular rate sensor SMG06x for rollover applications

Customer benefit / features:

- 240 °/s Ω_x gyroscope with analog or with digital SPI interface
- Full self-test capability
- Continuous on-chip monitoring
- Driving frequency (5 kHz) for straightforward mechanical ECU design
- Only two external components needed for the digital, five for the analog version
- Bosch RoSe experience is based on field experience of millions of sensors.

Overview

The SMG06x is a micro-machined gyroscope for the detection of x-axis (Ω_x) angular rate for in car safety applications, such as rollover control. Its design and quality standards make the SMG06x the right product for passenger safety systems.

Product description

The SMG06x sensor is based on a two-chip concept including the micro-machined sensing element and a separate evaluation ASIC. The oscillating polysilicon mass sensing element, is manufactured using state-of-the-art Bosch surface micro-machining technology.

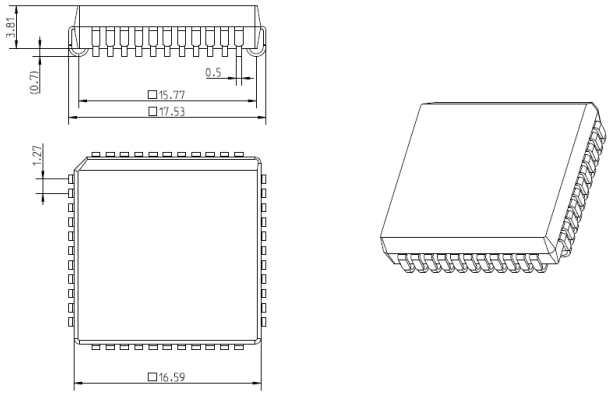
The custom ASIC provides comprehensive digital signal evaluation enabling sophisticated safety features like a fully mechanical and electrical self-test, and continuous signal monitoring, which make the sensor a proven choice for safety critical applications like rollover sensing.

The SMG06x is RoHS compliant.

Parameters SMG060/061	
Measurement and functional characteristics	
Measurement range	±240 °/s
Sensitivity	2 LSB/°/s or 7 mV/°/s
Sensitivity tolerance	±7 %
Non-linearity	±0.5 %
Noise	< 1.5 °/s rms
Bandwidth (-3 dB)[1]	30 Hz
Cross sensitivity	< 5.0 %
Start-up time	< 1.0 s
Operating conditions	
Digital supply voltage[1] Analog supply voltage[1]	5.0 V or 3.3 V 5.0 V
Supply current[1]	10 mA (SMG060) 12 mA (SMG061)
Operating temperature	-40 °C...+105 °C

1) Nominal values

Outline PLCC44 package



Dimensions in millimeters

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 SMG061 provides ratiometric analog output whereas the SMG060 provides digital output via SPI (Serial Peripheral Interface) in 10 bit resolution.

Package

The SMG06x is packaged in a standard RoHS compliant PLCC44 package.

Portfolio

The SMG06x 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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