Automotive Electronics

Angular rate sensor for vehicle dynamics control SMG074

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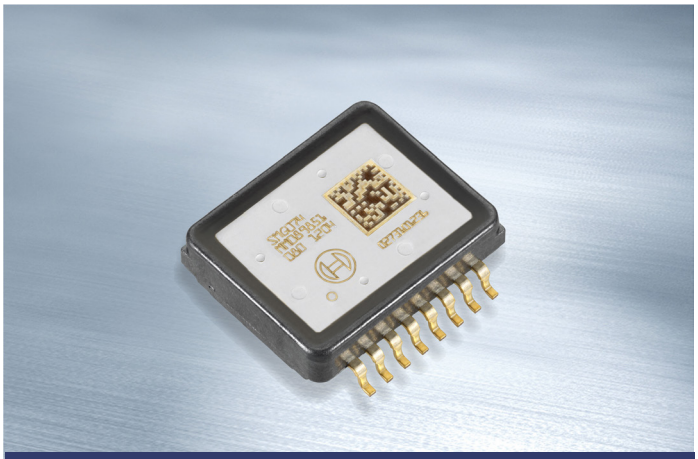


Angular rate sensor SMG074 for VDC

Customer benefit / features:

- 187 °/s high precision Ω_z angular rate sensor with SPI interface
- Fully digital signal processing
- 16 bit digital output via Serial Peripheral Interface (SPI)
- Excellent stability over temperature and lifetime
- Broad temperature range (-40 °C...+120 °C)
- On-chip self monitoring based on Bosch VDC component experience
- Temperature sensor output
- RoHS compliant

Overview

The SMG074 is a compact angular rate sensor with high accuracy and reliability, specially designed for challenging, safety relevant automotive applications like vehicle dynamics control (VDC) systems.

The sensor consists of a micro-machined sensor element and a signal conditioning ASIC mounted in a SMD plastic package.

Product description

The SMG074 sensor is a Ω_z angular rate sensor.
The fully digital signal path features a fully differential front-end operated in closed-loop mode and a digital output via Serial Peripheral Interface (SPI). The sensor is designed for excellent robustness with respect to mechanical and electrical interference (vibration, EMI).

The SMG074 allows for a multitude of customer specific signal monitoring via the SPI interface making it suitable for safety relevant applications. In addition, the sensor carries out its own internal parametric monitoring of the measuring element and the ASIC.

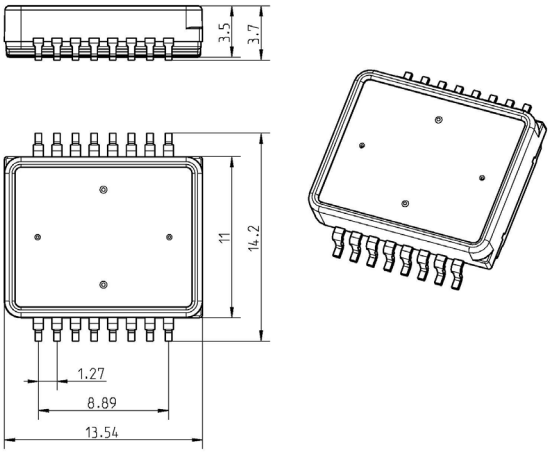
The SMG074 accepts 3.3 V or 5 V supply voltage and can be operated in a broad temperature range between -40 °C and +120 °C.

The sensor is RoHS compliant and automotive qualified.

Parameters SMG074	
Measurement and functional characteristics	
Measurement range	±187 °/s
Sensitivity (nominal)	±175 LSB/°/s
Sensitivity variation [1)]	±2.5 %
Non-linearity	±0.8 %
Offset variation [1)]	±3 °/s
Noise	< 0.2 °/s rms
Start up time	1 s
Bandwidth (-3dB)	13 Hz or 57 Hz
Operating conditions	
Supply voltage	3.3 V/5 V
Supply current	18 mA
Operating temperature	-40 °C...+120 °C

[1)] Over lifetime and temperature

Outline PM16 package



Dimensions in millimeters

Interface

The SMG074 communicates via a 16 bit digital Serial Peripheral Interface (SPI).

Package

The sensor is available in a premold (PM) 16 pin package for surface mounting.

Working principle

The sensor element of SMG074, designed yaw-rate measurement and is manufactured using state of the art Bosch surface micro-machining technology. It is based on the Coriolis Vibratory Gyroscope principle: High frequency electrostatic forces generate a 15 kHz out-of-phase oscillation of two seismic masses controlled by a closed loop drive system. A rotation around the nominal axis Ω_z leads to a Coriolis force acting on the oscillators which can be measured by capacity changes in the detection system. To guarantee the highest performance, the design of the detection circuit also makes use of the closed loop principle (Delta-Sigma-Modulator). Synchronous demodulation of the high frequency signal, necessary to counterbalance the Coriolis forces, generates a signal which is proportional to the angular rate.

Portfolio

The SMG074 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.

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
Automotive Electronics
AE/SCS
Postfach 13 42
72703 Reutlingen
Germany

www.bosch.de