

Passive safety systems

SMI720 combined inertial sensor for rollover sensing



BOSCH

Invented for life



PRODUCT BENEFITS

- ▶ Target applications
 - Rollover sensing
- ▶ Excellent vibration resistance and offset stability over temperature and lifetime
- ▶ Wide range of customized signal monitoring options
- ▶ RoHS compliant

- 1 Ball grid array package (BGA),
7 mm × 7 mm × 1.5 mm

reliable operation

due to excellent vibration resistance

TASK

The inertial sensor SMI720 is especially designed for rollover sensing (RoSe) functions.

Thanks to three chips in one housing, the SMI720 is able to measure data regarding the vehicle's rotation around its roll axis. In addition, it delivers data about the vertical acceleration, which is important to determine the dynamic state of the vehicle and to check the plausibility of the rotation rate signal.

FUNCTION

The MEMS elements of the SMI720 have been optimized for vibration resistance and ultra-robust offset stability.

The angular rate sensor is based on the Coriolis vibratory gyroscope principle: High-frequency electrostatic forces generate an oscillation of two seismic masses controlled by a closed loop drive system. When rotating around the nominal axis, the Coriolis forces acting on the oscillators can be measured by capacity changes in the detection system.

The acceleration sensor consists of movable comb-like seismic masses suspended from silicon spring bars and fixed counter-electrodes. As a result of external forces acting on the vehicle, deflections of the seismic masses along the sensitive axis generate changes in the capacity of the system.

safe and economical

integrated sensor solution, applicable in systems up to ASIL C requirements.

MEASUREMENT CHARACTERISTICS

Measurement axis	a_z	Ω_x
Measurement range	$\pm 5.0\text{g}$	$\pm 300\text{ }^\circ/\text{s}$
Sensitivity (nominal)	5,000 LSB/g	100 LSB/ $^\circ/\text{s}$
Sensitivity variation ¹	$\pm 6\%$	$\pm 5\%$
Offset variation ¹	$\pm 10\text{mg}$ regulated	$\pm 1\text{ }^\circ/\text{s}$ regulated
Noise (rms) ²	12.5mg	1.5 $^\circ/\text{s}$

TECHNICAL CHARACTERISTICS

Communication	SPI
-3dB corner frequency ³	43Hz
Start-up time	500ms

OPERATING CONDITIONS

Supply voltage (digital)	3.3V
Supply current ⁴	<21 mA
Operating temperature	-40 °C to +105 °C

¹ Over lifetime and temperature

² Depends on filter setting and interface – here: 43Hz

³ Nominal f_{-3dB} for the rate channel corresponding to programmable filter settings

⁴ SPI, PS15