

# SMB380

## Triaxial acceleration sensor

Bosch Sensortec



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### General description

The SMB380 is a triaxial low-g acceleration sensor with digital output for consumer market applications. It allows measurements of accelerations in perpendicular axes. An evaluation circuitry converts the output of a three-channel micromechanical acceleration-sensing structure that works according to the differential capacitance principle.

The SMB380 package and interface have been defined to match a multitude of hardware requirements. Since the sensor has small footprint and flat package it is attractive for mobile applications. The sensor can be programmed to optimize functionality, performance and power consumption in customer specific applications.

The SMB380 senses tilt, motion and shock vibration in cell phones, handhelds, computer peripherals, man-machine interfaces, virtual reality features and game controllers.

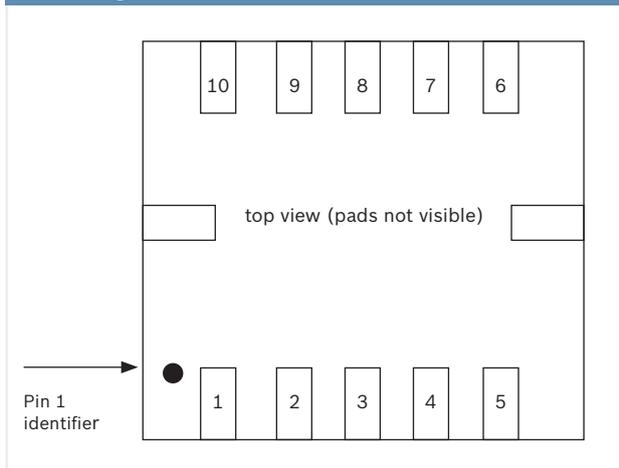
### Key features SMB380

- ▶ Switchable g-range and bandwidth
- ▶ Very low power
- ▶ SPI (3-wire/4-wire) / I<sup>2</sup>C interface
- ▶ Programmable interrupt feature for mobile wake-up or free-fall detection
- ▶ Ultra-low-power self-wake-up mode
- ▶ Self-test capability
- ▶ Absolute temperature output
- ▶ QFN package (footprint 3 mm x 3 mm, height 0.9 mm)
- ▶ RoHS compliant

### Applications based on low-g sensing

- ▶ Advanced system power management for mobile applications
- ▶ HDD protection
- ▶ Drop protection for warranty logging
- ▶ Menu scrolling, tip-tap function
- ▶ Pedometer, step-counting
- ▶ Display profile switching
- ▶ Shock detection
- ▶ Gaming

Technical data	SMB380
Sensitivity axes	x/y/z
Measurement range	±2g, ±4g, ±8g (switchable via SPI/I <sup>2</sup> C)
Sensitivity (calibrated)	2g: 256 LSB/g 4g: 128 LSB/g 8g: 64 LSB/g
Resolution	10bit → 4mg (±2g range)
Nonlinearity	±0.5% FS
Axes mixing (max.)	2%
Zero-g-offset (calibrated)	±60mg
Zero-g-offset temperature drift	1mg/K
Noise	0.5mg/√Hz
Bandwidth	25Hz ... 1500Hz (switchable via SPI/I <sup>2</sup> C)
Digital input / output	SPI & I <sup>2</sup> C, Interrupt pin
Supply voltage	2.4 ... 3.6V, 1.62 ... 3.6V IO
Current consumption	200µA
Idle current	1µA
Wake-up time	1ms
Temperature range	-40°C ... +85°C

Pin configuration I<sup>2</sup>C interface mode

Pin No.	Name	Function
1	DNC	Do not connect
2	V <sub>DD</sub>	Analog power supply
3	GND	Ground
4	INT	Interrupt
5	CSB	Chip select
6	SCK	Serial clock
7	SDO	Serial data output
8	SDI	Serial data in/out
9	V <sub>DDIO</sub>	Digital interface power supply
10	DNC	Do not connect

### Sensor operation

The function and performance of SMB380 can be tailored to customer specific applications by means of parameter and control settings.

The SMB380 provides a digital 10 bit output signal in SPI/I<sup>2</sup>C format. Via serial interface command the full measurement range can be chosen to  $\pm 2g$ ,  $\pm 4g$  or  $\pm 8g$ . A second-order filter with a pole-frequency of 1500Hz is included to provide preconditioning

of the measured acceleration signal. The maximum data conversion rate is 3kHz.

Additional digital filtering is possible to improve S/N ratio (down to 25Hz bandwidth). Typical noise level and quantization lead to a resolution of 4 mg.

The current consumption is typically 200  $\mu$ A at a supply voltage of 2.5V. In addition there are several features implemented to support the host system in reducing power consumption.

Parallel to normal operation where acceleration values are provided to the output registers the SMB380 is capable to perform internal computations of the results. The customer is enabled to define specific criteria, e.g. high-g or low-g thresholds but also criteria for the recognition of smooth motion profiles. The sensor can inform the host system about the violation of one of these criteria via an interrupt pin. This feature can be used for many purposes, e.g. to wake-up the host system from a global sleep mode, to signalise a shock situation or to indicate free fall.

The SMB380 sensor also features self-test capability. Thus, it enables testing of the complete signal evaluation path including the micromachined sensor structure and the evaluation ASIC.

The sensor is available in a standard SMD QFN package with a footprint of 3mm x 3mm and a height of 0.9mm.

A sensor version with an LGA type package of the same dimensions is also available.

The SMB380 offers this high experience and reliability for consumer applications. Please contact us for further details. We are happy to provide you with more information.

### Headquarters

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