BMP380

Digital, barometric pressure sensor

GENERAL DESCRIPTION

Bosch Sensortec is the market leader in barometric pressure sensors with more than 1 billion shipped products. The BMP380 is a very small, low-power and low-noise 24 bit absolute barometric pressure sensor.

BMP380 is especially designed and ideally suited for a wide range of altitude tracking applications. This new BMP380 sensor offers outstanding design flexibility, providing a single package solution that can be easily integrated into a multitude of existing and upcoming devices such as smartphones, GPS modules, wearables and drones.

The sensor is more accurate than its predecessors, covering a wide measurement range from 300 hPA to 1250 hPa.

This new barometric pressure sensor exhibits an attractive price-performance ratio coupled with low power consumption.

It is available in a compact 10-in 2.0 x 2.0 x 0.75 mm³ LGA package with metal lid.

BMP380 TARGET APPLICATIONS

- Altitude stabilization in drones
- Improve calorie expenditure measurement accuracy in wearables and mobile devices
- Unprecedented precision to outdoor/indoor navigation and localization applications
- Enhancing GPS accuracy outdoors

SENSOR FEATURES

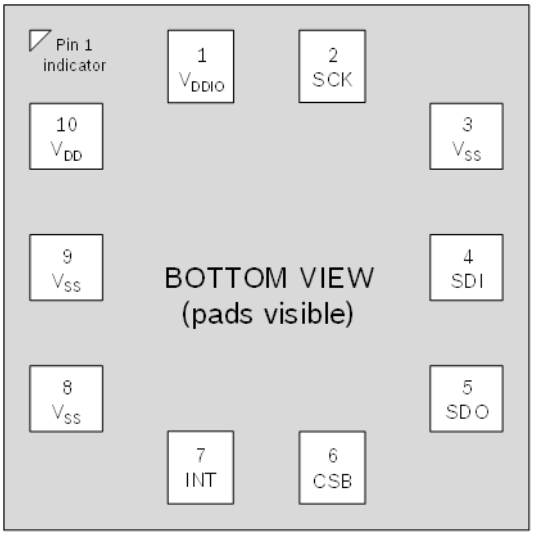
Due to the built-in hardware synchronization of the pressure sensor data and its ability to synchronize data from external devices such as acceleration sensors, the BMP380 is ideally suited for fitness and navigation applications which require highly accurate, low power and low latency sensor data fusion.

The new interrupt functionality provide simple access to data and storage. Examples of interrupts than can be issue in a power efficient manner without using software algorithms include: Data ready Interrupt, watermark interrupt (on byte level) or FIFO full Interrupt.

BMP380 also includes a new FIFO functionality. This greatly improves ease of use while helping to reduce power consumption of the overall device system during full operation. The integrated 512 byte FIFO buffer supports low power applications and prevents data loss in non-real-time systems.

TECHNICAL SPECIFICATIONS

BMP380 Technical data	
Package dimensions	10-pin LGA with metal lid 2.0 x 2.0 x 0.75 mm³
Operating range (full accuracy)	Pressure: 300 ... 1250 hPa
Supply voltage V_{DDIO} Supply voltage V_{DD}	1.2 V ... 3.6 V 1.65 V ... 3.6 V
Interface	I²C and SPI
Average typical current consumption (1 Hz data rate)	3.4 µA @ 1 Hz
Absolute accuracy P=300 ...1100 hPa (T=0 ... 65 °C)	±0.50 hPa
Relative accuracy Pressure (typ.) p=900...1100 hPa (T=25 ... 40 °C)	±0.06 hPa (equivalent to ±50 cm)
Noise in pressure lowest bandwidth, highest resolution	0.03 Pa
Temperature coefficient offset (25 ... 40 °C @ 900 Pa)	± 0.75 Pa/K (equivalent to ± 8.4 cm/K)
Long-term stability (12 months)	±0.33 hPa
Solder drift	<±0.5 hPa
Maximum sampling rate	200 Hz



Pin configuration

TECHNICAL SPECIFICATIONS

Pin		
Pin	Name	Description
1	V_{DDIO}	Digital interface supply
2	SCK	Serial clock input
3	VSS	Ground
4	SDI	Serial data input
5	SDO	Serial data output
6	CSB	Chip select
7	INT	INT output
8	VSS	Ground
9	VSS	Ground
10	V_{DD}	Analog supply

The sensor module is housed in an extremely compact 8-pin metal-lid LGA package with a footprint of only 2.0 x 2.0 and 0.75 package height. Its small dimensions and its lower power consumption of 2.74 µA @ 1Hz allow the implementation in battery driven devices. The emerging applications of indoor navigation/localization as well as altitude stabilization in drones require a high relative accuracy and a low TCO at the same time.

The BMP380 is perfectly suitable for applications like floor level detection as well as improved calorie expenditure measurement accuracy in wearables and mobile devices since the sensor features excellent relative accuracy of ±0.06 hPa which is equivalent to ±50 cm difference in altitude, and an offset temperature coefficient (TCO) of only 1.0 Pa/K (equivalent to 8.4 Pa/K).

It is the successor of the widely implemented BMP280 and achieves high performance in all applications requiring a precise pressure measurement. At the same time BMP380 features more application flexibility, new filter modes besides the shrinkage of the footprint by 20 % with respect to BMP280.

SENSOR OPERATION

The BMP380 features I²C and SPI (3-wire/4-wire) digital, serial interface.

The sensor can be operated in three power modes: The sleep mode, the normal mode and the forced mode. In sleep mode, no measurements are performed. Normal mode comprises an automated perpetual cycling between an active measurement period and an inactive standby period. In forced mode, a single measurement is performed. When the measurement is finished, the sensor returns to sleep mode.

A set of oversampling settings is available ranging from ultra-low power to highest resolution setting in order to adapt the sensor to the target application. The settings are predefined combinations of pressure measurement oversampling and temperature measurement oversampling. Pressure and temperature measurement oversampling can be selected independently from 0 to 32 times oversampling:

- Temperature measurement
- Ultra-low power
- Low power
- Standard resolution
- High resolution
- Ultra-high resolution
- Highest resolution

BMP380 is equipped with a built-in IIR filter in order to minimize short-term disturbances in the output data caused by the slamming of a door or window. The filter coefficient ranges from 0 (off) to 128.

SYSTEM COMPATIBILITY

The BMP380 has been designed for best possible fit into modern mobile consumer electronics devices. Besides the ultra-small footprint and very low power consumption, the BMP380 has very wide ranges for V_{DD} and V_{DDIO} supply voltages.

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