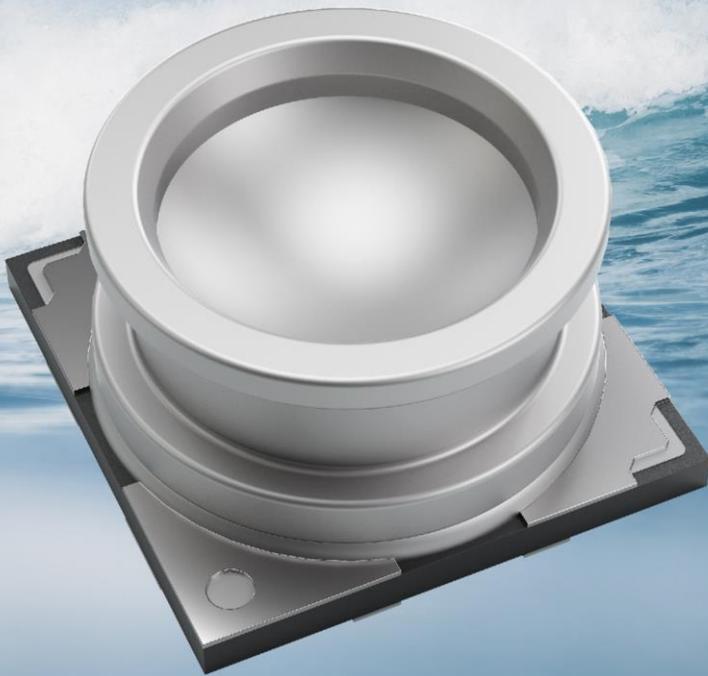


## **BMP585**

Robust barometric pressure sensor



## 1 General description

Bosch Sensortec is the market leader in barometric pressure sensors with more than 1 billion shipped products. The BMP585 is a small, liquid resistant, low-power, and low-noise 24-bit absolute barometric pressure sensor.

The BMP585 has a gel-filled cavity that allows highest protection against water and other liquids such as chemicals with the suitable integration concept. The sensor can be used for applications like height measurement, water-level detection and navigation with a maximum absolute accuracy of  $\pm 50$  Pa and an offset temperature coefficient (TCO) of  $\pm 0.5$  Pa/K. It is compatible for use with other Bosch Sensortec sensors, including the BMI270 for better performance, robustness, and stability. The new BMP585 sensor with its small footprint offers outstanding design flexibility, providing a single package solution that is easy to integrate into other existing and upcoming devices for smartwatches, other wearables, hearables, home appliances, smart homes, and industrial products.

The BMP585 with its new capacitive MEMS sensor is very accurate, covering a wide measurement range from 300 hPa to 1250 hPa. This new barometric pressure sensor exhibits an attractive price-performance ratio coupled with very low power consumption of only 1.3  $\mu$ A (typical) at 1 Hz.

### BMP585 TARGET APPLICATIONS

- Fitness applications in wearables and hearables with waterproof and robustness needs
- Outdoor and indoor navigation
- Water-level measurement in home appliances like washing machines
- Clog detection in white goods like dryers
- Measurement of relative pressure changes in humidifiers or smart inhalers

## 2 Sensor features

Due to its water and chemical resistance, the BMP585 is perfectly suitable for wearables, hearables, industrial applications, or smart home appliances like air flow monitoring. Air flow monitoring is useful in different applications such as air conditioning or ventilation systems.

The new interrupt functionality provides simple access to data and storage. Examples of interrupts that can be used in a power efficient manner without using software algorithms include FIFO watermark interrupt, FIFO full interrupt, data ready interrupt, pressure out-of-range interrupt, power-on reset (POR) interrupt.

BMP585 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 on-chip FIFO buffer for up to 32 pressure samples supports low-power applications and prevents data loss in non-real-time systems.

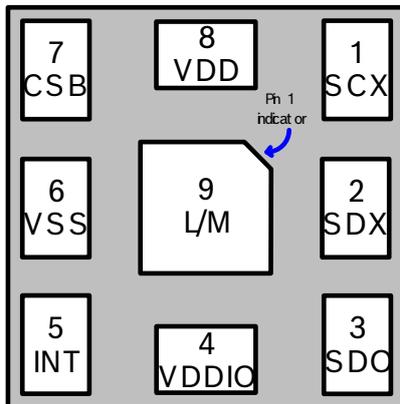
## 3 Technical specifications

### BMP585 technical data

Package dimensions (typ.)	3.25 x 3.25 x 1.86 mm <sup>3</sup> metal lid LGA
Operating range (full accuracy)	Pressure: 300 ... 1250 hPa
Supply voltage V <sub>DDIO</sub>	1.08 ... 3.6 V
Supply voltage V <sub>DD</sub>	1.71 ... 3.6 V
Interface	I2C, I3C and SPI
Average typical current consumption (1 Hz data rate)	1.3 $\mu$ A @ 1 Hz pressure and temperature, 0.55 $\mu$ A in deep standby mode
Max. absolute accuracy P = 300 ... 1100 hPa (T = -5 ... 65 °C)	$\pm 50$ Pa*
Relative accuracy (typ.) p = 700 ... 1100 hPa (T = 15 ... 55 °C)	$\pm 6$ Pa*
Noise in pressure (typ.), highest resolution	0.08 PaRMS
Temperature coefficient offset (typ.) (-5 ... 65 °C @ 30 - 110 kPa)	$\pm 0.5$ Pa/K*
Long-term drift (typ.)	$\pm 0.2$ hPa (12 months)
Solder drift (typ.)	$\pm 0.6$ hPa

\*Pre-soldered

## Pin configuration



BOTTOM VIEW  
(pads visible)

Pin	Name	Description
1	SCX	Serial clock
2	SDX	I2C serial data, SPI serial data input (4-wire) or I/O (3-wire)
3	SDO	I2C slave address, SPI serial data output (4-wire)
4	VDDIO	Digital power supply
5	INT	Interrupt
6	VSSIO/VSS	Ground
7	CSB	SPI chip select
8	VDD	Analog power supply
9	L/M Pad	Laser marking, no external connection

The sensor module is housed in a compact 9-pin metal-lid LGA package with a typical footprint of 3.25 x 3.25 x 1.86 mm<sup>3</sup>. Its small dimensions and its lower power consumption allow the implementation in battery driven devices. The emerging applications in the addressed devices require a high relative accuracy and a low total cost of ownership at the same time.

The sensor features excellent relative accuracy and a wide temperature range between 15 and 55 °C from 700 to 1100 hPa. Thanks to these features, the BMP585 is perfectly suited for improved calorie consumption measurement accuracy in sports devices as well.

## 4 Sensor operation

The communication interface supports I2C, I3C or SPI (3-wire/4-wire) digital, serial interfaces. The BMP585 knows four major power modes of operation: sleep mode, continuous mode, normal mode, and forced mode. In sleep mode, no measurements are being performed. The normal mode comprises an automated perpetual cycling between an active measurement period and an inactive standby period. In forced mode, a single measurement is being performed. When the measurement is finished, the sensor returns to sleep mode. Continuous mode performs pressure measurements similar to normal mode. However, the ODR setting is ignored. Sampling is performed with the maximum frequency that is possible with the selected oversampling settings.

A set of settings called “oversampling” are available ranging from ultra-low power to highest resolution setting to adapt the sensor to the target application. The settings are predefined combinations of pressure and temperature measurement oversampling that can be selected independently from 0 to 128 times oversampling.

Bosch Sensortec provides separate software API which helps setting the oversampling/noise performance. The API checks for illegal combinations of settings as well. BMP585 has a built-in IIR filter to minimize short-term disturbances in the output data caused by for example the slamming of a door or window. The filter coefficient ranges from 0 (off) to 127.

## 5 System compatibility

The BMP585 has been designed for the best possible fit into modern mobile consumer electronics devices. Besides the small footprint and extremely low power consumption, the BMP585 has very wide ranges for V<sub>DD</sub> and V<sub>DDIO</sub> supply voltages.

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