BMP180
Digital, barometric pressure sensor

Bosch Sensortec

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General description

The BMP180 is the new digital barometric pressure sensor of Bosch Sensortec, with a very high performance, which enables applications in advanced mobile devices, such as smart phones, tablet PCs and sports devices. It follows the BMP085 and brings many improvements, like the smaller size and the expansion of digital interfaces.

The ultra-low power consumption down to 3 µA makes the BMP180 the leader in power saving for your mobile devices. BMP180 is also distinguished by its very stable behavior (performance) with regard to the independency of the supply voltage.

Technology and specification

Through its high relative accuracy of ±0.12 hPa (±1m) the BMP180 has become the most reliable sensor for precise applications, like indoor-navigation. The small size of $3.6 \times 3.8\,mm^2$ and the height of only 0.93 mm makes it very suitable for the implementation in small mobile devices. The high absolute accuracy (please see parameter sheet beside) and a noise level down to 0.02 hPa (altitude of 17 cm) open new perspectives for applications in the sport devices.

The BMP180 is a sensor based on piezo-resistive MEMS technology for EMC robustness and high quality standards. The dies of the BMP180 are protected by a stable and thin LGA package with a metal lid. The package has seven optimized pins. The BMP180 can communicate directly with a microcontroller in the device through I²C or SPI as a variant.

BMP180 target applications

▶ Indoor navigation
▶ GPS-enhancement for dead-reckoning, slope detection, etc.
▶ Sport devices, e.g. altitude profile

▶ Weather forecast
▶ Vertical velocity indication (rise/sink speed)

| Technical Data	BMP180
Pressure range	300 ... 1100 hPa
RMS noise expressed in pressure	0.06 hPa, typ. (ultra low power mode) 0.02 hPa, typ (ultra high resolution mode)
RMS noise expressed in altitude	0.06 hPa, typ. (ultra low power mode)
	0.02 hPa, typ. (ultra high resolution mode)
Relative accuaracy pressure V_{DD} = 3.3 V	950 ... 1050 hPa ±0.12 hPa @ 25 °C ±1.0 m
	700 ... 900 hPa ±0.12 hPa 25 ... 40 °C ±1.0 m
Absolute accuracy p=300 ... 1100hPa (T=0 ... +65°C,	Pressure: -4.0 ... +2.0 hPa Temperature: -1 hPa (+/- 1 hPa), typ.
Average current consumption (1Hz data refresh rate)	3 µA, typ. (ultra-low power mode)
	32 µA, typ. (advanced mode)
Peak current	650 µA, typ.
Stand-by current	0.1 µA, typ.
Supply voltage V_{DDIO} Supply voltage V_{DD}	1.62 ... 3.6 V 1.8 ... 3.6 V
Operation temp. range full accuracy	-40 ... +85 °C 0 ... +65 °C
Pressure conv. time	-5 msec, typ. (std. mode)
I²C date transfer rate	3.4 MHz, max.
Package type / pin no.	LGA / 7
Package dimensions	$3.6 \times 3.8 \times 0.93\ mm^3$

Pin configuration and dimensions (bottom view)
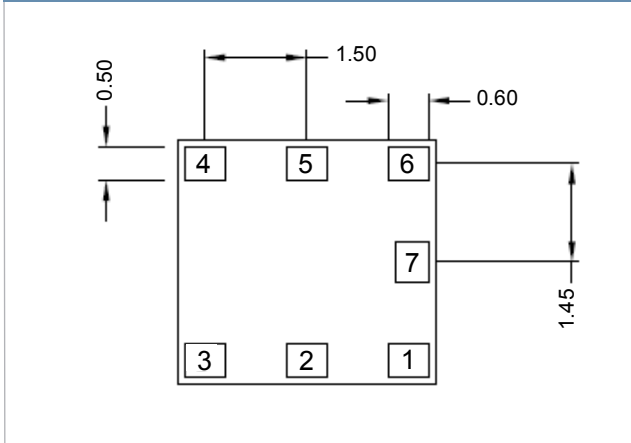
Pin	Name	Function
1	CSB	Chip select
2	V_{DD}	Power supply
3	V_{DDIO}	Power supply
4	SDO	SPI
5	SCK	Serial clock
6	SDA	SPI/I^{2}C
7	GND	Ground

Sensor operation

The BMP180 comes as a fully calibrated, ready-to-use sensor module without the need for additional external circuitry. Pressure and temperature data are provided as 16 bit values, which, together with the stored calibration data, are used for temperature compensation on the external microcontroller. Data transfer can be performed via I^{2}C or SPI interfaces.
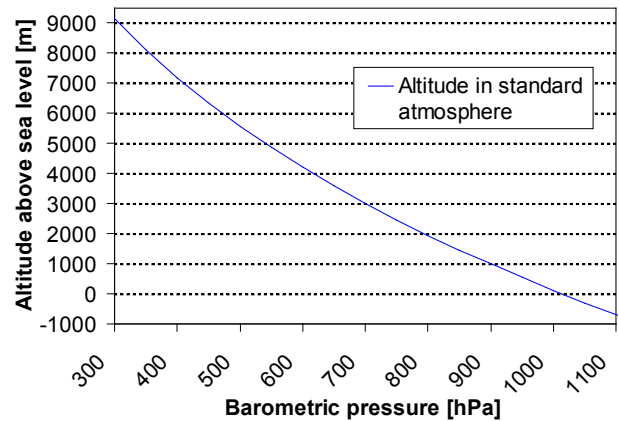
Bosch is the world market leader in MEMS sensors.The BMP180 combines this extensive experience and reliability for consumer applications. Bosch Sensortec is a subsidiary of Bosch that focuses on micromechanical components for the non-automotive markets.

Data & Specification subject to change without notice Doc.-Number: BST-BMP180-FL000-02 / Version_2.0_052011