BME680

Shipment packaging details

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Document revision	1.1
Document release date	June 2019
Document number	BST-BME680-SP000-01
Technical reference codes	0273.141.229, 0273.141.312
Notes	Data in this document are subject to change without notice. Product photos and pictures are for illustration purposes only and may differ from the real product's appearance.

BME680

Low power gas, pressure, temperature & humidity sensor

The BME680 is a digital 4-in-1 sensor with gas, humidity, pressure and temperature measurement based on proven sensing principles. The sensor module is housed in an extremely compact metal-lid LGA package with a footprint of only 3.0 × 3.0 mm² with a maximum height of 1.00 mm (0.93 ± 0.07 mm). Its small dimensions and its low power consumption enable the integration in battery-powered or frequency-coupled devices, such as handsets or wearables.

Typical applications

- Indoor air quality
- Home automation and control
- Internet of things
- Weather forecast
- GPS enhancement (e.g. time-to-first-fix improvement, dead reckoning, slope detection)
- Indoor navigation (change of floor detection, elevator detection)
- Outdoor navigation, leisure and sports applications
- Vertical velocity indication (rise/sink speed)

Target Devices

- Handsets such as mobile phones, tablet PCs, GPS devices
- Wearables
- Home weather stations
- Smart watches
- Navigation systems
- Gaming, e.g. flying toys
- IOT devices

Sensor features

The BME680 achieves high performance in all applications requiring gas, temperature, pressure and humidity measurement. Emerging applications such as home automation, indoor navigation, personalized weather stations and innovative sport and fitness tools require a gas sensor with quick response time, a pressure sensor with high relative accuracy and a low TCO, in combination with fast response, high accuracy, relative humidity and ambient temperature measurements. The BME680 is ideally suited for such barometer applications as the device features excellent relative accuracy of ±0.12 hPa (equivalent to ±1 m difference in altitude) and an offset temperature coefficient (TCO) of only 1.3 Pa/K (equivalent to 10.9 cm/K).

The gas sensor within the BME680 can detect a broad range of gases to measure indoor air quality for personal well-being. Gases that can be detected by the BME680 include: Volatile Organic Compounds (VOC) from paints (such as formaldehyde), lacquers, paint strippers, cleaning, supplies, furnishings, office equipment, glues, adhesives and alcohol.

The humidity sensor provides an extremely fast response time, particularly designed for fast context-awareness applications. In addition, it ensures a high accuracy over a wide temperature range. On the other hand, the integrated temperature sensor has been optimized for lowest noise and highest resolution. Its output is used for temperature compensation of the humidity, pressure and gas sensors and can also be used as well for estimation of the ambient temperature. Moreover, the pressure sensor is an absolute barometric pressure sensor with extremely high accuracy and resolution.

Technical specifications

The sensor provides both SPI (3-wire/4-wire) and I²C digital interfaces and can be supplied using 1.71 to 3.6 V for the sensor supply VDD and 1.2 to 3.6 V for the interface supply VDDIO. Measurements can be triggered by the host or performed in regular intervals. When the sensor is disabled, the current consumption drops to 0.1 µA. Furthermore, a variety of oversampling modes, filter modes and data rates can be selected in order to tailor, for example the data rate, noise, response time and current consumption, to the requirements of the target application.

The sensor can be operated in 2 low-level power modes: sleep mode and forced mode. No measurements are performed during sleep mode for minimal power consumption. In forced mode, temperature, pressure, humidity and gas (TPHG) conversion are performed sequentially. The sensor automatically returns to sleep mode afterwards, the gas sensor heater only operates during gas sub-measurement.

The sensor module is housed in an extremely compact 8-pin metal-lid LGA package with a footprint of only 3.0 x 3.0 and 1.0 mm³ package height.

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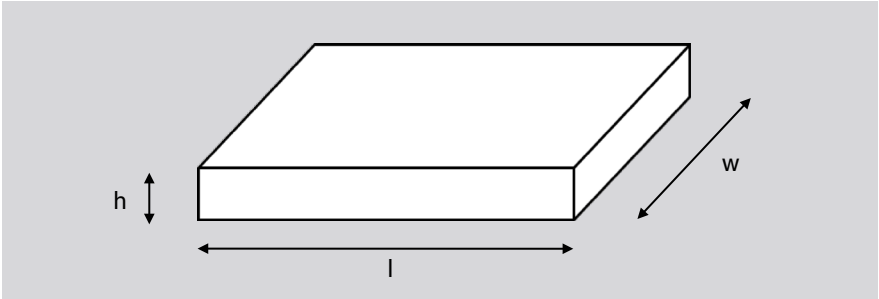
1. Inner box

Dimensions of inner box



Inner box version	width (w)	length (l)	height (h)
1	~35cm	~35cm	~5cm

2. Outer box

2.1 Dimensions

The size of the outer box depends on delivered quantity

Carton Type	Capacity	Dimension
Carton 2	Up to 2 inner boxes	42*42*15 cm
Carton 5	Up to 5 inner boxes	42*42*28 cm
Carton 10	Up to 10 inner boxes	42*42*39 cm
Carton 15	Up to 15 inner boxes	42*42*68 cm

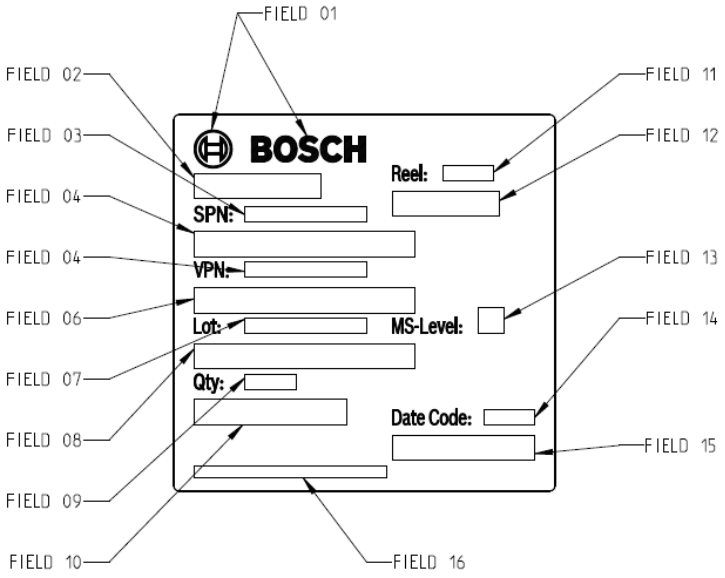
2.2 Weights

Weight [kg]* depending on reels in carton:	Carton 2	Carton 5	Carton 10	Carton 15
1 reel	1,4	1,6	1,6	2,0
2 reels	2,1	2,3	2,3	2,7
3 reels	-	3,0	3,0	3,4
4 reels	-	3,7	3,7	4,1
5 reels	-	4,4	4,4	4,8
6 reels	-	-	5,1	5,5
7 reels	-	-	5,8	6,2
8 reels	-	-	6,5	6,9
9 reels	-	-	7,2	7,6
10 reels	-	-	7,9	8,3
11 reels	-	-	-	9,0
12 reels	-	-	-	9,7
13 reels	-	-	-	10,4
14 reels	-	-	-	11,1
15 reels	-	-	-	11,8

*Note: Weights may vary slightly depending on product and inner box

3. Bar code labeling

3.1 Label design and fields



The dimension of the bar code label is approximately 72mm x 73mm (h x w).

Field	Description	Format
01	Bosch Symbol	
02	Part description	Text
03	Sales Part number (SPN)	Text
04		Barcode
05	Bosch internal number (VPN)	Text
06		Barcode
07	Lot Number	Text
08		Barcode
09	Quantity	Text
10		Barcode
11	Reel number	Text
12		Barcode
13	MS-Level	Text
14	Date Code	Text (yy/ww)
15		Barcode
16	CoO / Made in*	Text

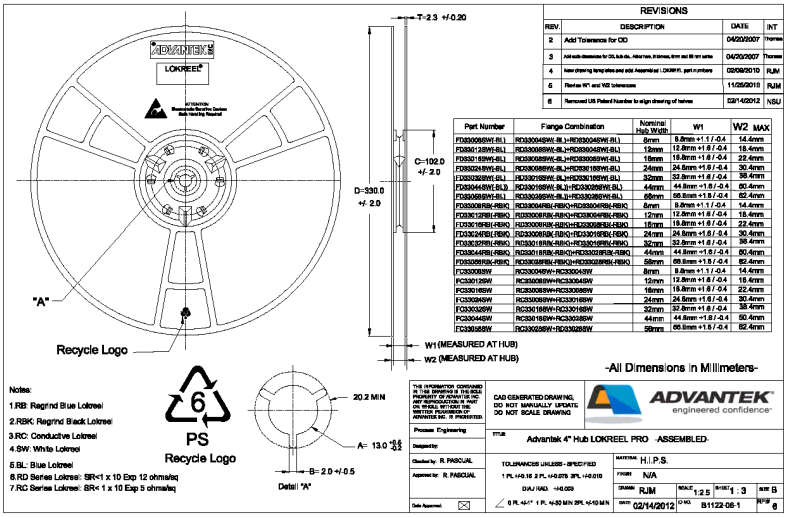
* except for Taiwan: only Made in Taiwan, no CoO

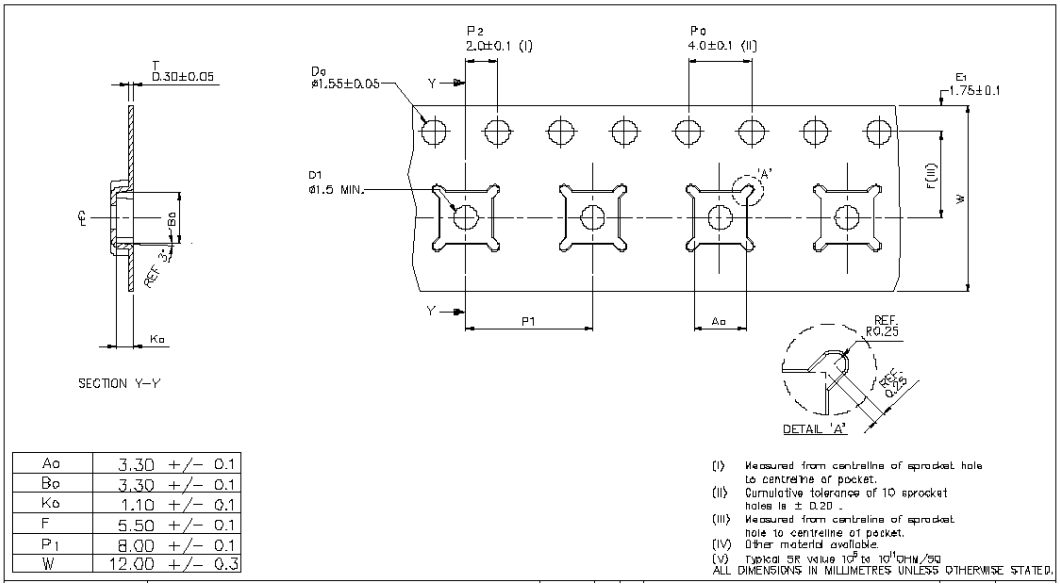
Notes:

- The ink on the label is lead-free.
- Heat-pressure method for label is used.
- Bar code label is on reel and the inner box

3.2 Label example: BMA253

4. Reel dimensions





Ao	3.30 +/- 0.1
Bo	3.30 +/- 0.1
Ko	1.10 +/- 0.1
F	5.50 +/- 0.1
P1	8.00 +/- 0.1
W	12.00 +/- 0.3

- Reel size is 13".
- 1 reel contains 6,000 parts

5. Legal disclaimer

5.1 Engineering samples

Engineering Samples are marked with an asterisk (*) or (e) or (E). Samples may vary from the valid technical specifications of the product series contained in this data sheet. They are therefore not intended or fit for resale to third parties or for use in end products. Their sole purpose is internal client testing. The testing of an engineering sample may in no way replace the testing of a product series. Bosch Sensortec assumes no liability for the use of engineering samples. The Purchaser shall indemnify Bosch Sensortec from all claims arising from the use of engineering samples.

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5.3 Application examples and hints

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6. Document history and modification

Rev. No	Chapter	Description of modification/changes	Date
1.0	All	Document creation	July 2017
1.1	2 3 5	Outer box Bar code labelling Disclaimer	June 2019

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Document number: BST-BME680-SP000-01
Revision_1.1