

BME680

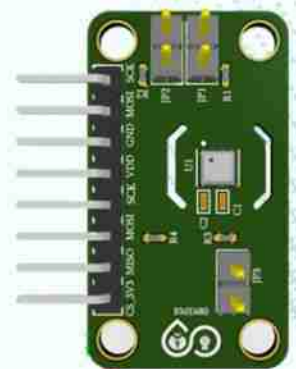
Digital Temperature, Humidity ,Pressure Sensor

Overview

The BME680 is a compact 4-in-1 environmental sensor from Bosch Sensortec that combines temperature, humidity, barometric pressure, and gas sensing for indoor air quality measurement. It supports both I²C and SPI interfaces, making it easy to integrate into a wide range of systems. Designed to operate from -40°C to $+85^{\circ}\text{C}$ and across a pressure range of 300 to 1100 hPa, it delivers reliable performance in diverse environments. With its low power consumption and high accuracy, it is well suited for battery-powered devices. The BME680 is widely used in IoT applications, smart home devices, wearables, and mobile products for environmental monitoring and air quality tracking.

Key Features

- Integrated 4-in-1 environmental sensor (gas, pressure, humidity, temperature).
- Provides direct Indoor Air Quality (IAQ) index output.
- Supports I²C and SPI digital interfaces.
- Designed for low power consumption, suitable for battery devices.
- Compact $3.0 \times 3.0 \times 0.93$ mm package for easy integration.



Technical Specifications

- Package: $3.0 \text{ mm} \times 3.0 \text{ mm} \times 0.93 \text{ mm}$, metal lid LGA

Digital Interfaces:

- I²C (up to 3.4 MHz)
- SPI, 3-/4-wire (up to 10 MHz)

Supply Voltage:

- VDD (main): 1.71 V to 3.6 V
- VDDIO (interface): 1.2 V to 3.6 V

Current Consumption (typical):

- $2.1 \mu\text{A}$ @ 1 Hz (humidity + temperature)
- $3.1 \mu\text{A}$ @ 1 Hz (pressure + temperature)

- 3.7 μA @ 1 Hz (humidity + pressure + temperature)
- 0.09–12 mA (depending on mode, including gas measurement)
- 0.15 μA in sleep mode

Operating Range:

- Temperature: $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
- Humidity: 0 % to 100 % r.H.
- Pressure: 300 hPa to 1100 hPa

Gas Sensor Parameters:

- Response time: $< 1\text{ s}$ (new sensors)
- Power consumption: $< 0.1\text{ mA}$ in ultra-low power mode
- Output: Direct Indoor Air Quality (IAQ) index

Humidity Sensor Parameters:

- Response time: $\sim 8\text{ s}$
- Accuracy tolerance: $\pm 3\text{ \% r.H.}$
- Hysteresis: $\pm 1.5\text{ \% r.H.}$

Pressure Sensor Parameters:

- RMS noise: 0.12 Pa ($\approx 1.7\text{ cm}$)
- Offset temperature coefficient: $\pm 1.3\text{ Pa/K}$ ($\approx \pm 10.9\text{ cm per }1\text{ }^{\circ}\text{C}$)

Application

- Indoor air quality
- Home automation and control Internet of Things
- Weather Forecast
- GPS enhancement etc.