



BME680 ENVIRNOMENTAL SENSOR

BME680 Board User Manual



Purpose of the Document

The purpose of this document is to explain the BME680 environmental sensor board. This document contains the features of BM680 sensor board and how to use it to measure temperature, humidity, gas, pressure, and altitude.

Document History

Version	Author	Date	Description
A	5G HUB	06.27.2021	Initial Document

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1 Package Contents

1.1 BME680 Sensor board

- BME680 sensor board

1.2 Download

Arduino sketches for the BME680 can be downloaded from the following website:

<https://github.com/5ghub/5G-NB-IoT/tree/master/KitSketches>

To use the board with Arduino IDE and starts running Arduino projects and sketches, install the following software:

Install Arduino IDE for Windows from the following website:

<https://www.arduino.cc/en/Main/Software>

Download and install Arduino library (**5G-NB-IoT_Arduino.zip**) here:

<https://github.com/5ghub/5G-NB-IoT>

2 Introduction

The BME680 environmental sensor board is a compact board that provides all environmental sensing. It provides **temperature, humidity, pressure, and VOC gas**. The board is based on BME680 environmental sensor module. BME680 is a sensor that integrates high-linearity and high-accuracy gas, pressure, humidity, and temperature sensors with low power consumption. The BME680 has optimized consumption, long-term stability, and high EMC robustness. To measure air quality for personal wellbeing the gas sensor within the BME680 can detect a broad range of gases such as volatile organic compounds (VOC).

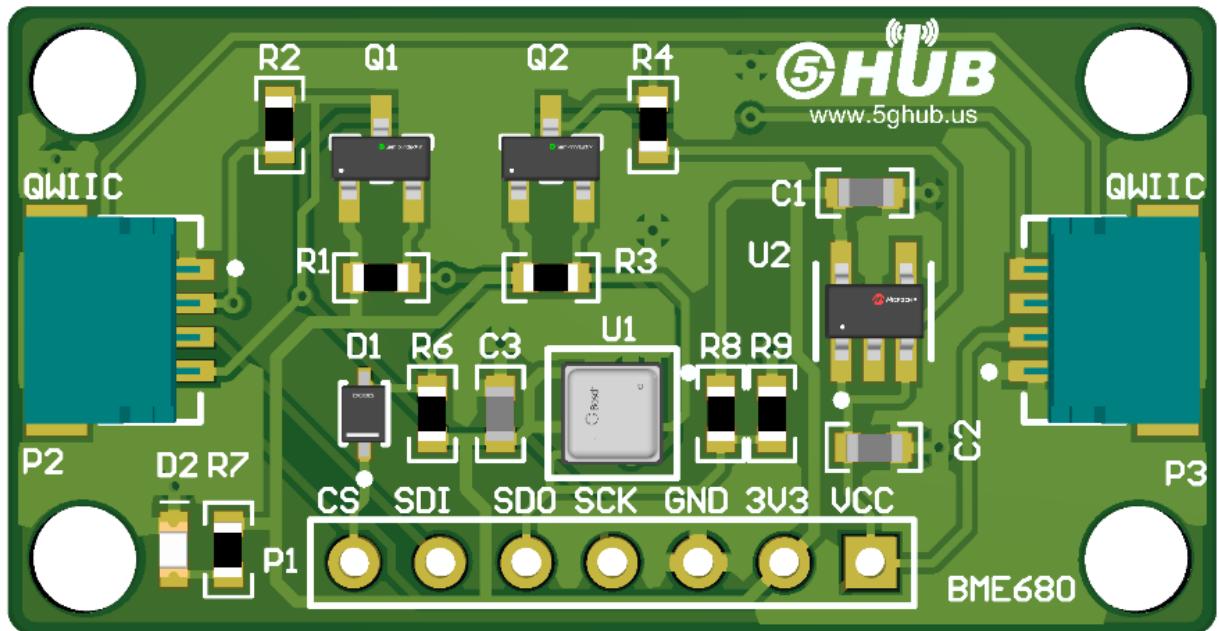
3 Feature Highlights

- Environmental sensing for temperature, humidity, pressure, gas in a single module
- Detect a broad range of gases including Volatile Organic Compound (VOC) from paints, lacquers, paint strippers, cleaning supplies, furnishing, office equipment, glues, adhesives, and alcohol
- Low power consumption, high resolution, and optimized filter performance
- Supports I2C and SPI interface
- Supports [QWIIC](#) interface for I2C
- Supports Pressure: 300...1100 hPa
- Support Humidity 0...100%
- Support Temperature: -40...85°C
- Pressure sensing at high accuracy of +/- 0.12hPa (Equivalent to +/-1 m difference in altitude)
- Humidity sensor accuracy of ± 3 % relative humidity

4 Typical Applications

- Personal air quality tracker
- Air quality mapping
- Air quality inside cars & public transport
- Enhanced context awareness
- Accurate step & calorie tracker
- Quick GPS-fix & improved navigation
- Indicator of too high / low humidity
- Air quality & well-being indicator
- Sleep / recovery tracker
- Weather forecast & trend
- Stair counter
- Floor level detection
- Home automation and control (e.g HVAC)
- Altitude tracking and calories expenditures for sports activities
- Internet of things

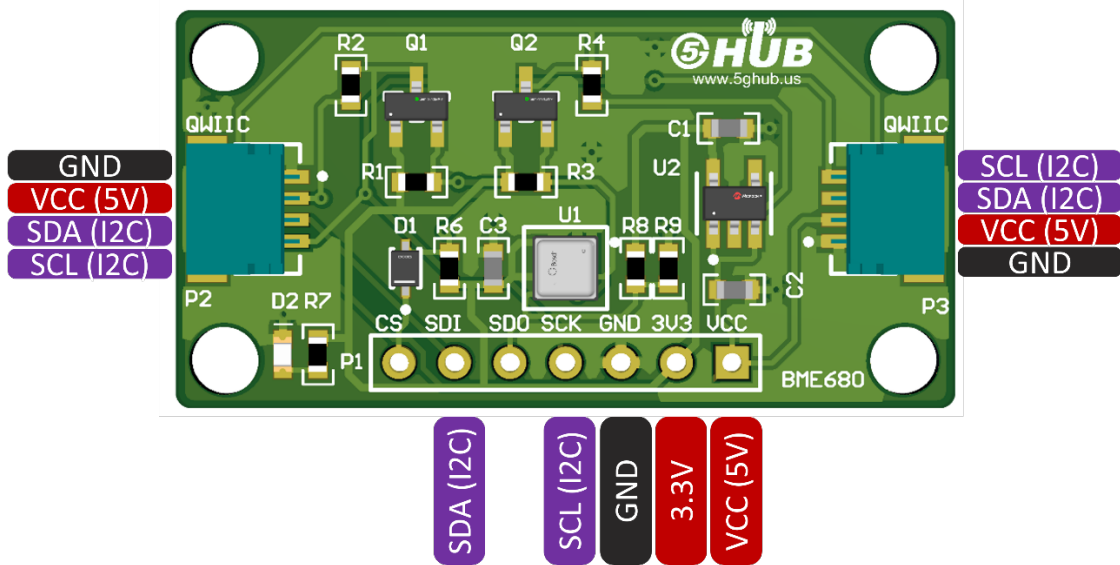
5 Hardware Board and Case Diagram



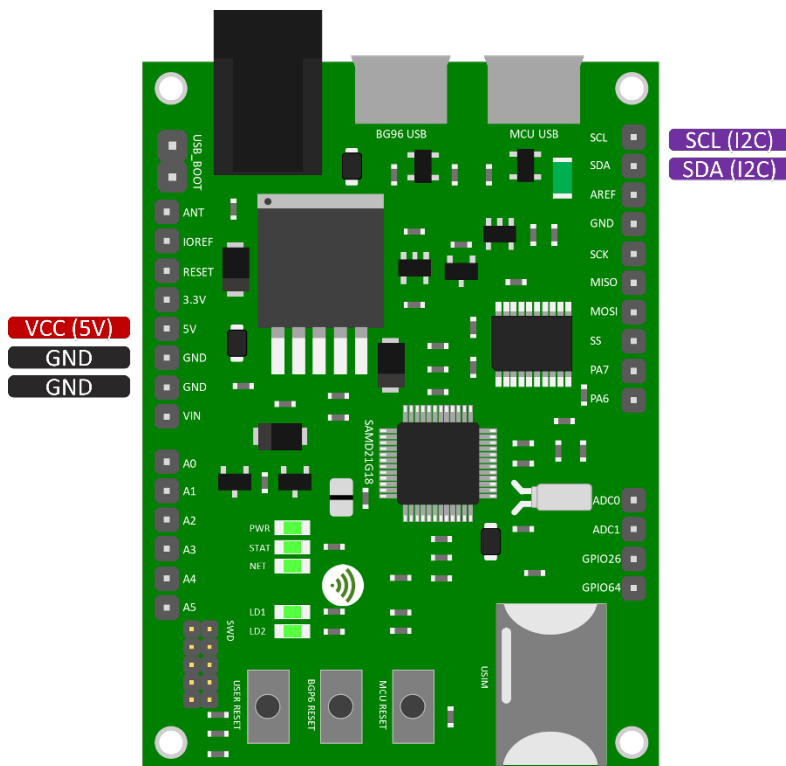
Pin #	Feature	Description
1	VCC	Input voltage (3.6V-5V)
2	3V3	Output 3.3V
3	GND	Ground
4	SCK	SCK for I2C/SPI. SPI is a 3-wire interface
5	SDO	SDO for SPI
6	SDI	SDI for I2C/SPI
7	CS	Choose I2C or SPI. Leave it unconnected for I2C or active LOW for SPI

6 Connecting using the I2C

I2C uses only two wires; **SCL** and **SDA**. The sensor board can be interfaced using these two wires only as depicted in this figure. Make sure to connect VCC and GND of the board to a source of 5V and GND.



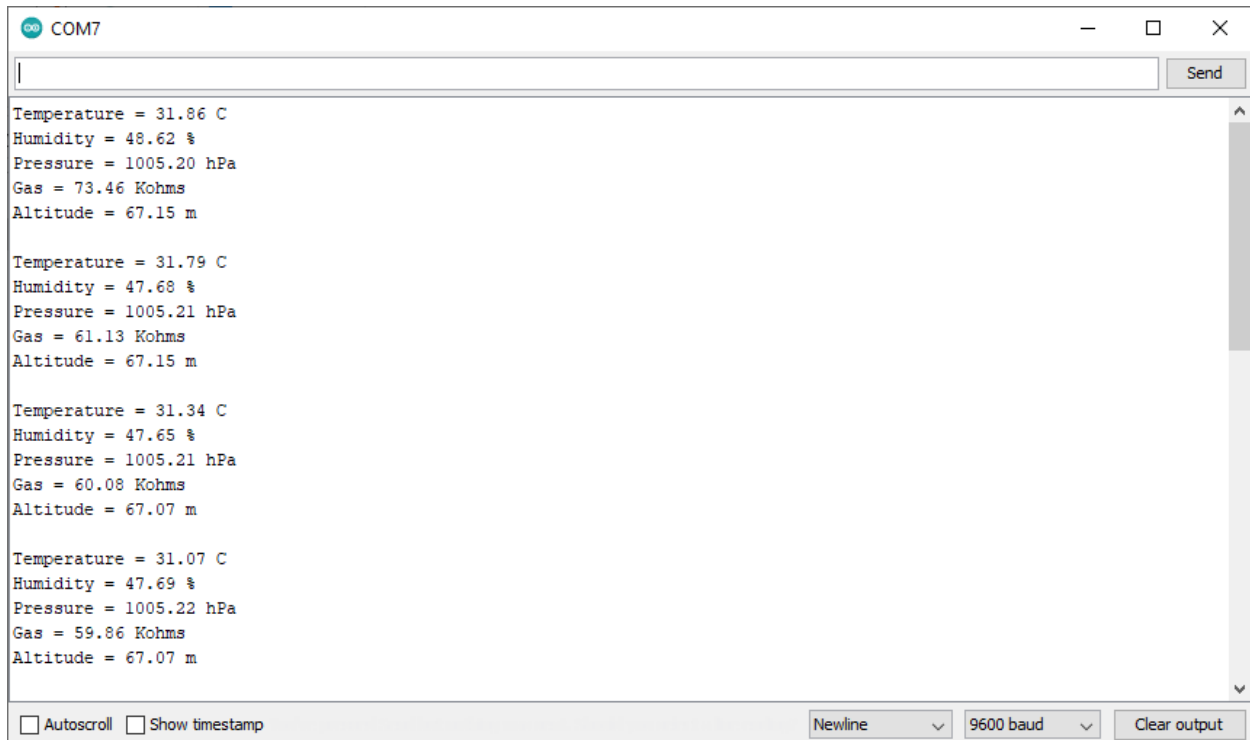
If used with the NB-IOT board as below, connect the **SCL**, **SDA**, **GND**, **VCC** lines in the two boards together.



7 Working with Arduino

The sensor board can work with the [5G NB-IoT board](#) or any other Arduino board. Simply connect VCC and GND to the sensor board and wire the two I2C wires between the Arduino board and sensor board. Run Arduino sketch, and you will see all readings from the BME680 sensor module.

The following shows the Arduino sketch for BME680 sensor board running and displaying temperature, humidity, pressure, gas, and altitude.



The screenshot shows a serial monitor window titled "COM7" with a "Send" button. The output displays four sets of sensor readings, each consisting of five lines: Temperature (C), Humidity (%), Pressure (hPa), Gas (Kohms), and Altitude (m). The data values change slightly between each set of readings.

```
Temperature = 31.86 C
Humidity = 48.62 %
Pressure = 1005.20 hPa
Gas = 73.46 Kohms
Altitude = 67.15 m

Temperature = 31.79 C
Humidity = 47.68 %
Pressure = 1005.21 hPa
Gas = 61.13 Kohms
Altitude = 67.15 m

Temperature = 31.34 C
Humidity = 47.65 %
Pressure = 1005.21 hPa
Gas = 60.08 Kohms
Altitude = 67.07 m

Temperature = 31.07 C
Humidity = 47.69 %
Pressure = 1005.22 hPa
Gas = 59.86 Kohms
Altitude = 67.07 m
```

At the bottom of the window, there are checkboxes for "Autoscroll" and "Show timestamp", and dropdown menus for "Newline" (set to "\n") and "9600 baud". A "Clear output" button is also present.