

# embedded adventures

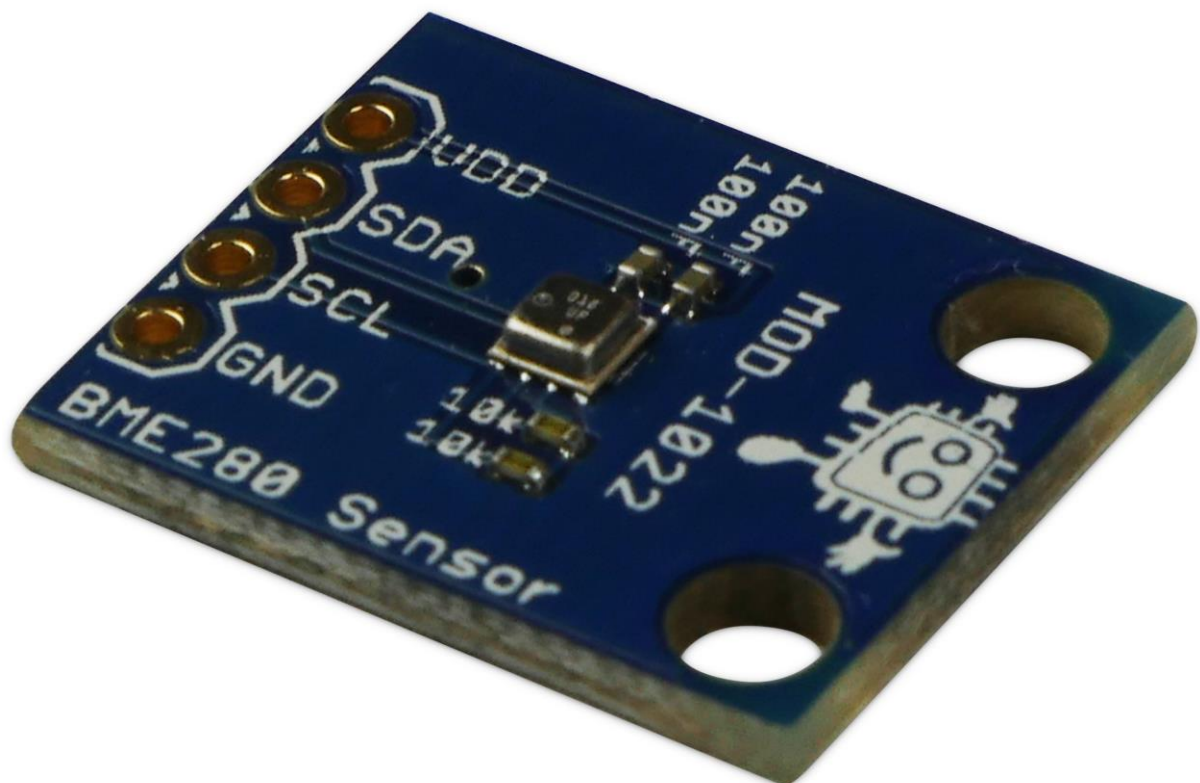
Device: MOD-1022

This document Version: v1

Matches module version: v1 [9 Mar 2015]

Date: 1 April 2015

Description: BME280 Multi Sensor (Humidity / Temperature / Pressure Sensor)



## Contents

Introduction.....	3
Features.....	3
Hackability.....	3
Construction.....	3
Connections.....	4
Power.....	4
Pull up resistors.....	4
Specifications.....	4
Tricks and traps.....	4
Schematic.....	5
Programming.....	5
PCB.....	6
Versions.....	6

## Introduction

---

The MOD-1022 is a BME280 based temperature, humidity and absolute air pressure sensor module (barometer/altimeter).

## Features

---

The MOD-1022 features the BME280 from Bosch. It is capable of measuring altimeter differences down to 7.5cm, a spectacular result. And it includes temperature and humidity measurements as well. Originally designed for smartphones, this device is virtually a weather station in a tiny chip.

The module itself has been arranged so the output from the BME280 is available as I2C.

## Hackability

---

The MOD-1022 is 100% hackable.

At Embedded Adventures, we believe you have the most fun when you have the most control over your hardware. For the MOD-1022 we provide a datasheet, complete schematic and complete source code. After that, it's all up to you. We'd love to hear about the projects you're using it for – send us information and photos to [myproject@embeddedadventures.com](mailto:myproject@embeddedadventures.com)

## Construction

---

It's all pre-built! Just add female or male header pins, or solder directly to the board, and away you go.

## Connections

---

The MOD-1022 has one connection port.

VDD	Positive supply. 1.71V – 3.6V.
SDA	I2C data
SCL	I2C clock
GND	Ground (Vss) connection.

## Power

---

The MOD-1022 can be powered from 1.71V – 3.6V. If your microcontroller is using 5V, consider using a bidirectional level converter such as the MOD-1003 from Embedded Adventures (that's us!).

## Pull up resistors

---

I2C requires the use of pull-up resistors. The board comes with the pull-up resistors enabled. If you are connecting to an existing I2C buss that already has pull-up resistors, or you are using internal pull-ups in your microcontroller, you can disable the pull-up resistors by unsoldering the 10k resistors from the MOD-1022 board and making sure the pads are not connected with any residual solder.

## Specifications

---

Absolute accuracy – humidity	±3%
Absolute accuracy – pressure	±1hPa
Absolute accuracy – temperature (at 25°C)	±0.5°C

More detailed specifications are available in the BME280 datasheet. The humidity and temperature results can be considered "solid" whereas the pressure sensor accuracy is best in class.

## Tricks and traps

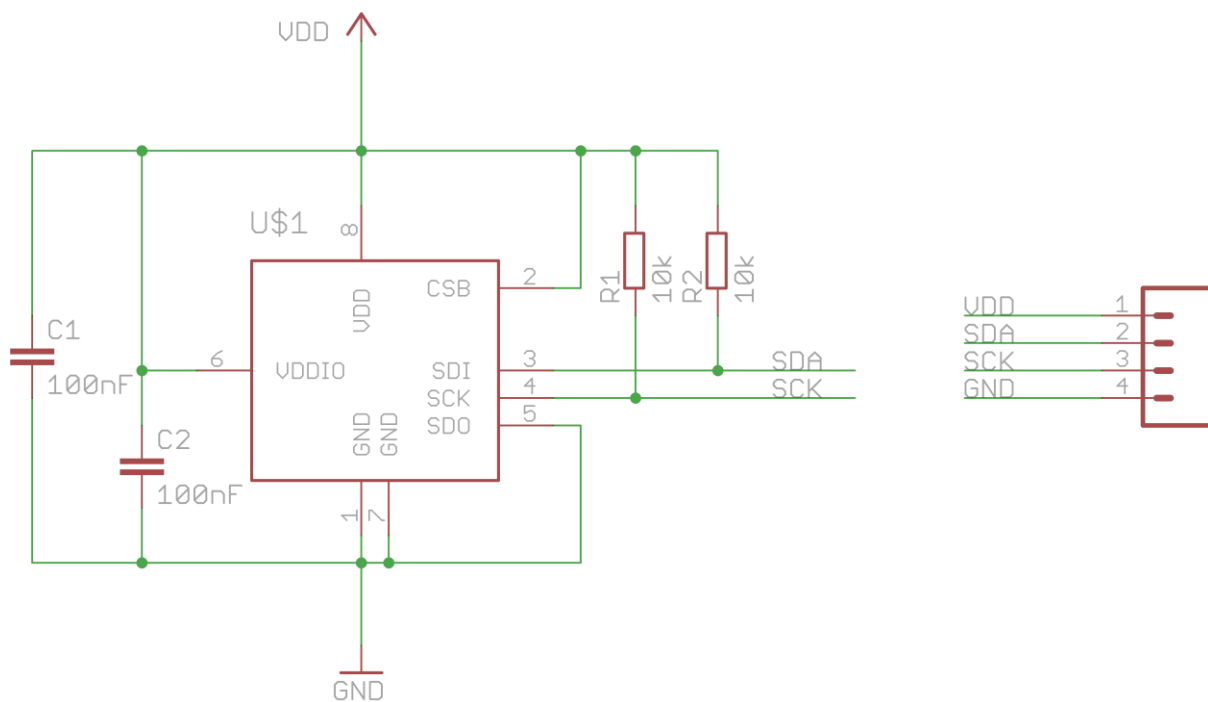
---

Arduino code is available for use, including the detailed calculations of the humidity, temperature and pressure taken from the datasheet source code examples. There are several different methods offered depending on how accurate you want your results to be versus program size. The example sketch uses all available methods by way of showing the differences.

It is important to read the compensation parameters before taking measurements and also to turn on at least 1x oversampling for all three sensors (humidity, temperature, pressure), if you want to get values back from all three sensors. The default is not to sample at all, so triggering a measurement will result in a 0x8000 read in value for all three!

The chip starts out in **sleep** mode when powered up. You can choose to force it to make a single measurement by changing to the **forced** mode. To make use of the oversampling and filter to smooth out readings over time, put the chip in **normal** mode. It will then take regular measurements based on the `tstandby` parameter (see `writeStandbyTime`).

## Schematic



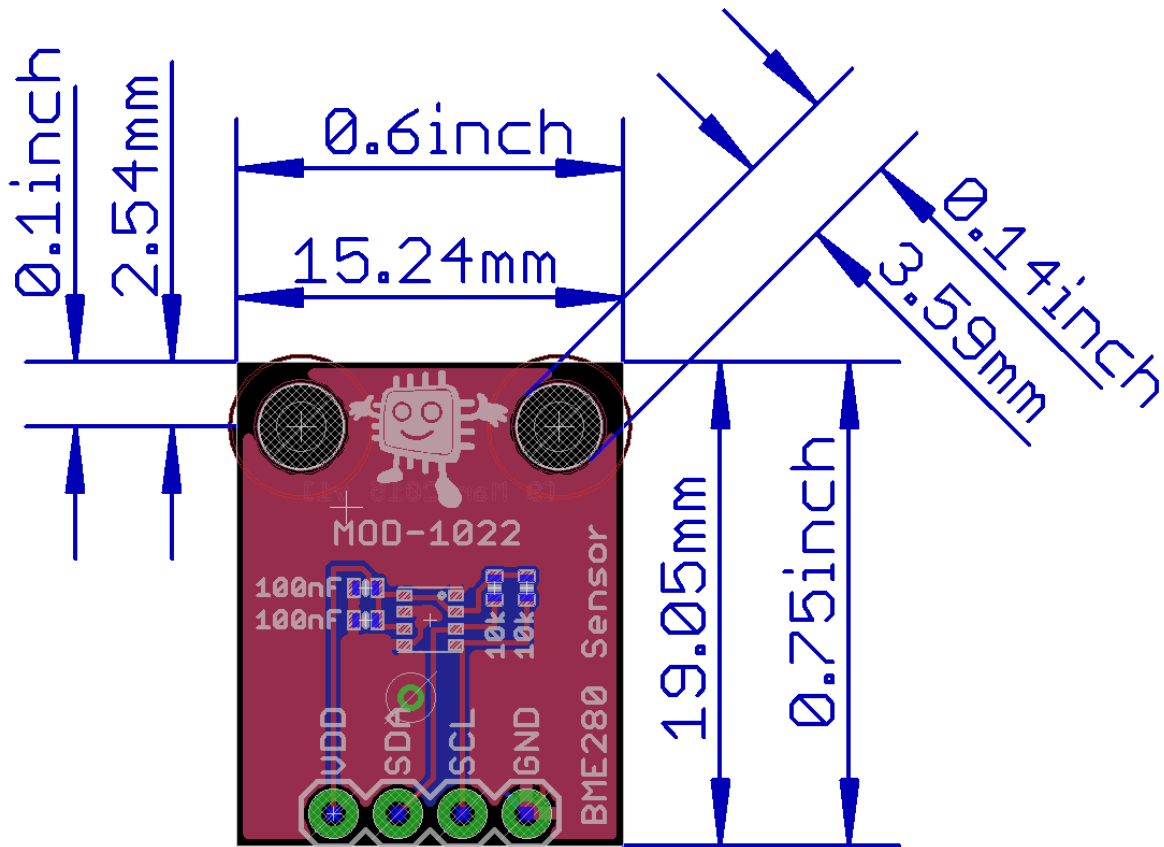
The MOD-1022 schematic is pretty straightforward. Don't forget to have a look at the BME280 datasheet so you know how to get the most out of the sensor.

## Programming

Grab the BME280.zip from the product page at [www.embeddedadventures.com](http://www.embeddedadventures.com), and unzip it into your Arduino/libraries directory.

Load up the `bme280_test` sketch from the examples directory and you're up and running!

PCB



Versions

Version	Date	Comments
Version 1	1 April 2015	Initial Version for board v1