LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication

Bosch BMP sensors primarily measure barometric pressure and temperature, while Bosch BME sensors are more comprehensive, adding humidity and, in newer models, gas/air quality sensing.

Type of measurement	Model	Power voltage	Measurement, range, accuracy	Communication	Note
T H P Temperature Humidity Air pressure	Bosch **BME280** 	**3.3 V** (1.71 .. 3.6V)	Temperature measurement range: -40 .. +80 °C Temperature measurement accuracy: ±0.5°C (-40..85) Humidity measurement range: 0..100% RH Humidity measurement accuracy: ±3% Air pressure Range: 300 .. 1100 hPa Air pressure accuracy: ±0.25%	I²C default addr.: **0x76/77** SPI	-
T H P Temperature Humidity Air pressure	Bosch **BME680** 	**3.3 V** (1.71 .. 3.6V)	Temperature measurement range: -40 .. +80 °C Temperature measurement accuracy: ±1.5°C Humidity measurement range: 0..100% RH Humidity measurement accuracy: ±3% Air pressure Range: 300 .. 1100 hPa Air pressure accuracy: ±0.25%	I²C default addr.: **0x76/77** SPI	Direct output of IAQ: Index for Air Quality

Type of measurement	Model	Power voltage	Measurement, range, accuracy	Communication	Note
T P Temperature Air-pressure	Bosch **BMP180** 	**3.3 V** (1.62 .. 3.6V)	Temperature measurement range: -40 .. +85 °C Temperature measurement accuracy: ±1.5°C Air pressure Range: 4.35PSI .. 15.95PSI (30kPa .. 110kPa) Air pressure accuracy: ±2%	I²C default addr.: **0x77** (fix)	Maximum Pressure: 145.04PSI (1000kPa) Temperature resolution: 0.1 °C Pressure resolution: 1 Pa
T P Temperature Air-pressure	Bosch **BMP280** 	**3.3 V** (1.71 .. 3.6V)	Temperature measurement range: -40 .. +85 °C Temperature measurement accuracy: ±1.5°C Air pressure Range: 4.35PSI .. 15.95PSI (30kPa .. 110kPa) Air pressure accuracy: ±2%	I²C default addr.: **0x76** SPI	Maximum Pressure: 290.08PSI (2000kPa) Temperature resolution: 0.01 °C Pressure resolution: 0.16 Pa

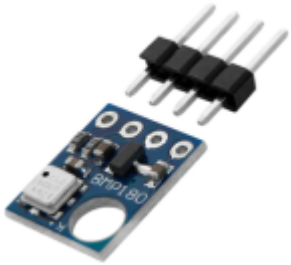
The BME/BMP sensors can be integrated with the Tasmota system. For more details, see here:

- BMP085, BMP180 and BMP280 sensors: https://tasmota.github.io/docs/BME280/
- BME280: https://tasmota.github.io/docs/BME280/
- BME680: https://tasmota.github.io/docs/BME680/

BME/BMP Modules

GY-68, BMP180 Temperature/Barometric Pressure Module

T P

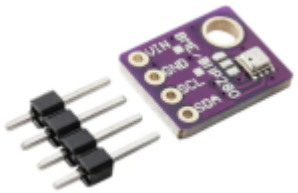


The GY-68 module is a breakout board that integrates the Bosch BMP180 sensor to measure atmospheric pressure, temperature, and altitude. The two terms refer to different components of the same product for hobbyist use: the BMP180 is the sensing chip on the GY-68 printed-circuit board.

The GY-68 BMP180 sensor module is known for its high precision, low power consumption, and ease of use via the I2C interface, making it popular for various DIY and IoT projects.

Feature	Specification
Chipset	Bosch BMP180
Operating Voltage	**3.3V–5.5V** (module input voltage, includes voltage regulator); the chip itself runs on 1.8V–3.6V
Power Consumption	Ultra-low power, typically 0.5 µA in standard mode (at 1 Hz sampling)
Interface	I²C (Serial Data Line/SDA and Serial Clock Line/SCL)
Multiple modules on the I²C	No. Default address **0x77** is fixed, making it impossible to add multiple sensors to the same I²C bus
Pressure Range	300 to 1100 hPa (+9000m to -500m relative to sea level)
Pressure Accuracy	Up to ±0.03 hPa (~0.25m resolution) in high resolution mode
Temperature Range	-40°C to +85°C
Temperature Accuracy	±0.5°C
Calibration	Fully calibrated at the factory, and data is stored in internal E2PROM

GY-BME280 Temperature/Humidity/Barometric Pressure modul



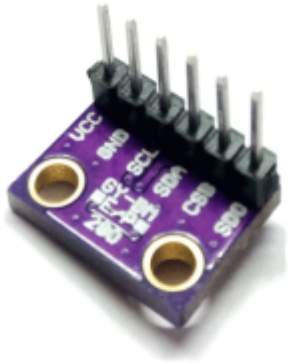
The GY-BME280 is a sensor module that integrates the Bosch BME280 environmental sensor chip and measures temperature, humidity, and atmospheric pressure. It is an upgrade to the BMP280 and is widely used in hobbyist electronics and IoT projects for comprehensive environmental monitoring.

The Bosch BME280 sensor features high precision and low power consumption, making it suitable for battery-powered systems. The GY-BME280 module often includes a voltage regulator and a logic-level converter, allowing it to operate with both 3.3V and 5V microcontrollers such as Arduino and Raspberry Pi.

Feature	Specification
Chipset	Bosch BME280
Measurements	Temperature, Humidity, and Pressure
Operating Voltage	**3.3V–5V** (via onboard regulator on some modules; chip runs on 1.71V–3.6V)
Interface	I²C (default) and SPI (optional)
Multiple modules on the I²C	Max. 2 modules. The module's default I²C address is **0x76**, which can be easily changed to 0x77 using the provided solder jumper *
Temperature Range	-40°C to +85°C
Humidity Range	0% to 100% relative humidity (±3% accuracy)
Pressure Range	300 to 1100 hPa (±1.0 hPa accuracy)
Power Consumption	As low as 0.1 µA in sleep mode, or 3.6 µA at 1 Hz for all three measurements

**: To change the I²C address to 0x77, cut the trace between the middle and left copper pads with a sharp knife. Then add a solder blob between the middle and right copper pads to short them.*

GY-BMP280-3.3 Temperature/Barometric Pressure modul



The GY-BMP280-3.3 is a sensor module featuring the Bosch BMP280 environmental sensor chip, which precisely measures atmospheric pressure and temperature. This module operates from a 3.3V DC power supply, making it a low-power solution for applications such as weather monitoring, altimetry, and navigation systems.

The Bosch BMP280 improves on its predecessors (BMP085/BMP180) by delivering better performance and lower power consumption in a smaller form factor. The GY-BMP280-3.3 module features versatile interfacing and precise measurements.

Feature	**Specification**
Chipset	Bosch BMP280
Measurements	Pressure and Temperature (Does not measure humidity)
Operating Voltage	3.3V DC (module input voltage; chip runs on 1.71V–3.6V)
Power Consumption	Ultra-low power, typically 2.7 µA at 1 Hz sampling rate
Interface	I²C (up to 3.4 MHz) and SPI (up to 10 MHz)
Multiple modules on the I²C	Max. 2 modules. Default I²C is: **0x76** (SDO pin low). 2nd I²C address is: **0x77** *
Pressure Range	300 to 1100 hPa (+9000m to -500m relative to sea level)
Pressure Accuracy	Up to ±1 hPa absolute accuracy, allowing for ~±1m altitude resolution
Temperature Range	-40°C to +85°C
Temperature Accuracy	±1.0°C
Calibration	Factory-calibrated, with data stored in internal E2PROM

*: *To set the I²C address to **0x77**, connect pin 6 of the module (SDO) to Vcc, typically the 3.3V supply, and connect pin 5 of the module (CSB) to Vcc to select the I²C interface.*

GY-BMP280-3.3 Pinout

Pin	**Name**	**I²C Function**	**SPI Function (4-wire)**	**Description**	
1	VCC	Power (**3.3V**)	Power (**3.3V**)	Supply voltage (1.71V to 3.6V)	
2	GND	Ground	Ground	Common ground	
3	SCL	SCL	SCK	Serial clock line	
4	SDA	SDA	SDI (MOSI)	Serial data line	

Pin	Name	I²C Function	SPI Function (4-wire)	Description	
5	CSB	High (I²C)	CS	Chip select. Pull High for I²C (default via onboard resistor) or Low for SPI	
6	SDO	ADR	SDO (MISO)	Sets I²C address: High for 0x77, Low for 0x76 (default). *Never leave the SDO pin floating. If it is not tied to GND or VCC, the I²C address may fluctuate randomly between the two values, causing communication errors.*	

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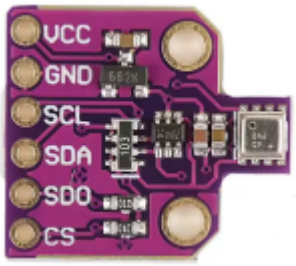
2026/02/14 22:38

CJMCU-680 Temperature/Humidity/Barometric Pressure/Gas (VOC) Module



The **CJMCU-680** is an environmental sensor breakout board based on the Bosch BME680 chip. It is a versatile *"4-in-1"* module designed for DIY electronics and IoT projects.

Core Capabilities

The module measures four distinct environmental parameters:

- **Temperature:** Provides ambient temperature readings.
- **Humidity:** Measures relative humidity.
- **Barometric Pressure:** Can be used to calculate altitude or track weather changes.
- **Gas (VOC):** Features a heated metal-oxide sensor that detects Volatile Organic Compounds (VOCs) to estimate indoor air quality.

Feature	Specification	Details
Model	CJMCU-680 / BME680	4-in-1 Environmental Sensor
Operating Voltage	**1.7V – 3.6V**	Often compatible with 5V via onboard regulator
Communication	I²C or SPI	I²C (up to 3.4 MHz), SPI (up to 10 MHz)
Multiple modules on the I²C	Max. 2 modules. Default I²C is: **0x76** (SDO pin low). 2nd I²C address is: **0x77** *	

Feature	Specification	Details
Current (Sleep)	0.15 µA	Extremely low standby power
Current (Active)	2.1 µA – 12 mA	Varies by mode; gas sensor heater uses most power
Dimensions	~30 x 14 x 10 mm	Compact breakout board size

Sensor Performance

Parameter	Measurement Range	Accuracy / Tolerance
Temperature	-40°C to +85°C	±1.0°C
Humidity	0% to 100% RH	±3% RH
Pressure	300 to 1100 hPa	±1 hPa (absolute) / ±0.12 hPa (relative)
Gas (VOC)	Qualitative IAQ Index	Detects ethanol, CO, and other VOCs

Gas Sensor Note: For accurate air quality readings, it is recommended to *"burn-in"* the sensor for 48 hours during the first use and allow 30 minutes of warm-up time for each subsequent session.

Response Times:

- **Gas Sensor:** < 1 second (τ33-63%)
- **Humidity Sensor:** ~8 seconds (τ0-63%)

CJMCU-680 Pinout

The standard CJMCU-680 module uses the following pin arrangement:

Pin	Name	Function
1	VCC	Power Supply (1.7V to 3.6V; commonly used with 3.3V)
2	GND	Ground
3	SCL	I²C Clock (SCL) or SPI Clock (SCK)
4	SDA	I²C Data (SDA) or SPI Data In (SDI/MOSI)
5	SDO	SPI Data Out (MISO). Also sets the I²C Address: connect to GND for 0x76 (default) or VCC for 0x77. *Never leave the SDO pin floating. If it is not tied to GND or VCC, the I²C address may fluctuate randomly between the two values, causing communication errors.*
6	CS	Chip Select for SPI. Pulling this high or leaving it disconnected defaults the module to I²C mode

Arduino wiring

- SCL: A5
- GND: GND
- SDA: A4
- Vdd: **3.3V** (or **5V** if your breakout board has a regulator).

Arduino code

Install the Adafruit BME680 Library (this will also prompt you to install the Adafruit Unified Sensor and

Adafruit BME680 Library, which you need)

```
/*
 * BME680 Sensor - Arduino Uno/Nano
 * Connection: I2C
 * Data: Temperature, Humidity, Pressure, Gas (Air Quality)
 *
 * Required Libraries (Arduino Library Manager):
 *   - "Adafruit BME680 Library" by Adafruit
 *   - "Adafruit Unified Sensor" by Adafruit
 *
 * Wiring (I2C):
 *   BME680  -->  Arduino Uno/Nano
 *   VCC     -->  3.3V (or 5V depending on module)
 *   GND     -->  GND
 *   SDA     -->  A4
 *   SCL     -->  A5
 */

#include <Wire.h>
#include <Adafruit_Sensor.h>
#include <Adafruit_BME680.h>

// Sea level pressure for altitude calculation (adjust to your location in hPa!)
#define SEA_LEVEL_PRESSURE_HPA 1013.25

// Create BME680 object (I2C address: 0x76 or 0x77)
Adafruit_BME680 bme;

void setup() {
  Serial.begin(9600);
  while (!Serial);  // Wait until Serial is ready

  Serial.println(F("============================="));
  Serial.println(F("  BME680 Sensor - Arduino   "));
  Serial.println(F("============================="));

  // Initialize sensor
  if (!bme.begin(0x76)) {
    Serial.println(F("ERROR: BME680 not found!"));
    Serial.println(F("Please check your wiring."));
    Serial.println(F("Trying address 0x77 ..."));

    if (!bme.begin(0x77)) {
      Serial.println(F("ERROR: BME680 not found on 0x77 either!"));
      while (1); // Halt program
    }
  }

  Serial.println(F("BME680 found successfully!"));
```

```
  // Configure sensor settings
  bme.setTemperatureOversampling(BME680_OS_8X);
  bme.setHumidityOversampling(BME680_OS_2X);
  bme.setPressureOversampling(BME680_OS_4X);
  bme.setIIRFilterSize(BME680_FILTER_SIZE_3);
  bme.setGasHeater(320, 150); // Heater temperature: 320°C, Heating time:
150ms

  Serial.println(F("Sensor configured. Starting measurements...\n"));
  delay(2000);
}

void loop() {
  // Start measurement and wait for result
  if (!bme.performReading()) {
    Serial.println(F("ERROR: Reading failed!"));
    delay(2000);
    return;
  }

  // Print sensor values
  Serial.println(F("----------------------------"));

  // Temperature
  Serial.print(F("Temperature:      "));
  Serial.print(bme.temperature, 1);
  Serial.println(F(" °C"));

  // Humidity
  Serial.print(F("Humidity:         "));
  Serial.print(bme.humidity, 1);
  Serial.println(F(" %"));

  // Pressure
  Serial.print(F("Pressure:         "));
  Serial.print(bme.pressure / 100.0, 2);
  Serial.println(F(" hPa"));

  // Altitude above sea level (calculated)
  Serial.print(F("Altitude (approx): "));
  Serial.print(bme.readAltitude(SEA_LEVEL_PRESSURE_HPA), 1);
  Serial.println(F(" m"));

  // Gas resistance (air quality)
  Serial.print(F("Gas Resistance:   "));
  Serial.print(bme.gas_resistance / 1000.0, 2);
  Serial.println(F(" kΩ"));

  // Air quality as simple rating
  Serial.print(F("Air Quality:      "));
```

```
  Serial.println(getAirQuality(bme.gas_resistance));

  Serial.println();

  // Wait 3 seconds until next measurement
  delay(3000);
}

// Simple air quality rating based on gas resistance
String getAirQuality(uint32_t gasResistance) {
  uint32_t kOhm = gasResistance / 1000;

  if (kOhm >= 300) {
    return F("Very Good");
  } else if (kOhm >= 150) {
    return F("Good");
  } else if (kOhm >= 50) {
    return F("Moderate");
  } else if (kOhm >= 10) {
    return F("Poor");
  } else {
    return F("Very Poor");
  }
}
```

I²C topics on lamaPLC

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• lamaPLC Communication: I²C	2025/09/23 19:25	i2c, i c, smbus, philips, bus, communication, arduino
• LamaPLC: AHT10 Modul	2026/03/21 19:20	communication, i2c, temperature, humidity, sensor, aht, aht 10, modul
• LamaPLC: AHT20 / BMP280 Modul	2026/02/15 20:33	bmp280, aht20, adafruit, temperature, humidity, pressure, sensor, arduino, code, i2c
• LamaPLC: APDS - Avago ALS and proximity detection sensors with I²C communication	2026/02/14 22:24	avago, apds-9900, apds-9930, apds-9960, als, proximity, detection, gesture recognition, gesture, i2c, communication, sensor, arduino, code
• lamaPLC: AS5600 Magnetic Induction Angle Measurement Sensor Module	2026/03/28 22:07	communication, i2c, as5600, as-5600, magnetic, induction, angle, sensor
• lamaPLC: Bi-Directional Logic Level Converter 3.3V ↔ 5V	2026/04/11 21:51	bi-directional, logic level converter, i2c, uart, spi
• LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication	2026/02/15 20:40	bme280, bme680, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, cjmcu

• LamaPLC: CJMCU-219/INA-219 breakout board/IC with I²C communication	2026/02/14 23:37	cjmcu-219, ina-219, ina219, breakout board, i2c, communication, sensor, voltage, current, arduino, code, cjmcu
• LamaPLC: CJMCU-3216 / AP-3216 integrated digital ambient light and proximity sensor module/IC with I²C communication	2026/02/14 22:40	cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication
• lamaPLC: CJMCU-811 CCS811 Gas Sensor (VOCs TVOC CO2)	2026/03/21 22:25	cjmcu-811, ccs811, gas, sensor, vocs, tvoc, eco2, co2, arduino, air quality metal oxide, mox, i2c
• LamaPLC: D6T Omron Non-Contact Thermal Sensors with I²C communication	2026/02/14 18:19	d6t, d6t-32l, d6t-44l, d6t-8l, d6t-1a, omron, non-contact, thermal, sensor, i2c, arduino, code
• LamaPLC: DPS Infineon Temperature/Pressure sensors with I2C communication	2026/02/14 18:11	dps310, infineon, temperature, pressure, sensor, arduino, i2c, communication, code
• lamaPLC: Energy, power, current, and voltage	2025/05/31 21:32	i2c, i c, communication, arduino, energy, power, current, sensor, ina226
• LamaPLC: ENS ScioSense Multi-gas sensors with I²C communication	2026/02/14 19:29	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco₂, tvoc, aqi, indoor air quality, iaq, co₂, voc
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• LamaPLC: Gas sensors	2023/07/01 15:29	gas, sensor, i2c, onewire, communication, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-135, gm-102b, gm-302b, gm-502b, gm-702b, alcohol, ch4, natural gas, smoke, lng, co, co2, lpg, h2, iso-butane, nox, nh3, benzene, town gas, formaldehyde, propane, humidity, temperature, voc, grv gas sens v2
• lamaPLC: GY-511 6DOF sensor module	2026/03/22 00:26	stmicroelectronics, lsm303dlhc, i2c, lsm303, sensor, gy-511, 6dof, pololu, module, arduino
• LamaPLC: GY-9250 MPU-9250/6500 9-axis Attitude Sensor Board	2026/02/14 22:45	ak8963, gy-9250, mpu-9250, 9-axis, motion detection, magnetometer, communication, i c, i2c, spi
• LamaPLC: HDC Texas Instruments Temperature/humidity sensors with I²C communication	2026/02/14 22:09	sht21, htu21, si7021, gy-21, gy-213v, hdc1080, gy-213v-hdc1080, cjmcu, cjmcu-1080, texas instruments, temperature, humidity, sensor, i2c, communication, arduino, code
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• LamaPLC: HTU TE Connectivity temperature/humidity sensors with I²C communication	2026/02/14 21:54	htu, htu31d, htu21d, htu20d, sht20, htu20, sht21, htu21, si7021, gy-21, gy-213v, hdc1080, si702, gy-20, sht31, htu31, si7031, gy-31, te connectivity, temperature, humidity, i2c, communication, sensor, arduino, code
• lamaPLC: INA modules with Arduino libraries	2026/03/28 18:02	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina219, gy-219, ina226, gy-216, ina228, gy-228, ina237, ina238, ina260, ina3221, ina
• lamaPLC: INA226 - current/voltage/power monitor with I²C communication	2026/02/14 23:58	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina226, ina219, ina
• lamaPLC: LCD 1602/2004 with I²C communication	2026/02/14 17:27	communication, i2c, display, lcd, 1602, 2004, hd44780, pcf8574, pcf8574t, pcf8574at, arduino
• LamaPLC: MAX30100/MAX30102 Heart Rate Click Sensor Module	2026/02/14 23:38	max30102, max30100, heart rate click, sensor, communication, i2c, arduino, code
• lamaPLC: MCP23017 / MCP23S17 16-Bit I/O Expander with Serial Interface I²C / SPI	2026/02/14 22:52	communication, i2c, mcp23017, mcp23s17, spi, i o expander, serial, cjmcu-2317, cjmcu
• LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I²C communication	2026/02/14 22:23	paj7620u2, gy-paj7620, pixart, gesture recognition, i2c, communication, sensor, arduino, code
• LamaPLC: SC16IS750 / SC16IS752: One or two serial (UART) ports from microcontroller via I²C or SPI communication	2026/02/14 22:53	cjmcu-750, cjmcu-752, cjmcu, nxp, sc16is750, sc16is752, uart, serial, i2c, spi, modul, converter, arduino, code
• LamaPLC: SGP Sensirion Gas-sensors with I²C communication	2026/02/15 20:27	sgp30, sgp40, sgp41, sensirion, gas-sensor, i2c, communication, sensor, arduino, code, eco₂, voc, tvoc, indoor air quality, iaq, nox, hydrogen
• LamaPLC: SHT Sensirion Temperature/humidity sensor with I²C communication	2026/02/15 20:29	sht20, sht21, sht25, sht30, sht31, sht35, sht40, gy21, temperature, humidity, i2c, communication, sensor, arduino, code
• lamaPLC: Signal level converters	2026/02/14 22:47	pca9306, i2c, voltage, level, converter
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• lamaPLC: TM1637 7-segment display	2026/02/14 17:26	i2c, 7-segment display, display, tm1637, arduino
• LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I²C communication	2026/02/14 22:22	tof050c, vl6180, tof200c, vl53l0x, tof400c, vl53l1x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I²C communication	2026/02/14 22:21	vl53l0x, vl53l1x, vl53l0 1xv2, gy-530, time-of-flight, tof, laser-ranging, i2c, communication, sensor, arduino, code

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• Magnetic angle sensors	2026/03/05 20:19	magnetic angle sensor, magnetic flux, sensor, spi, i2c, pwm, communication, modul, as5047p, as5600, mt6701, mt6816, mt6835, tle5012b, amr, gmr, tmr, anisotropic magnetoresistive
• SSH1106/SSD1306 OLED Display with I²C communication	2026/02/14 17:27	i2c, oled, display, ssd1306, sh1106, ssh1106, arduino, cmos

BME280, BME680, BMP180, BMP280, Bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, CJMCU