

# UNIT BNO055 + BMP280 Module Product Brief

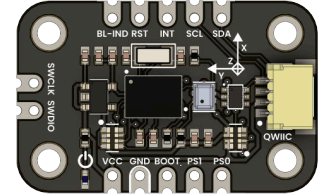
Integrated 9-DOF IMU and Barometric Sensor Module for Orientation and Environmental Sensing

Version: 1.0

Modified: 2025-12-15 14:53

## Introduction

The UNIT BNO055 + BMP280 Module is a compact, ready-to-use board that combines two powerful sensors: a 9-axis absolute orientation sensor and a high-precision barometric pressure and temperature sensor. The BNO055 integrates an accelerometer, gyroscope, and magnetometer with an onboard microcontroller that performs real-time sensor fusion, delivering orientation data such as quaternions, Euler angles, and gravity vectors directly—eliminating the need for complex processing on the host device.



Complementing this, the BMP280 provides accurate atmospheric pressure and temperature readings, making it well-suited for altitude estimation and environmental monitoring. Together, these sensors enable comprehensive motion and environmental awareness, making the module an excellent choice for robotics, drones, VR/AR systems, and IoT applications where both orientation tracking and environmental data are essential.

## Functional Description

The module provides full 9-DOF sensing with absolute orientation through the BNO055, which includes sensor fusion in hardware, eliminating the need for complex calculations on the host MCU. It supports I<sup>2</sup>C or UART interfaces for flexible integration.

The BMP280 complements the system by offering accurate barometric pressure and temperature measurements, useful for altimetry and environmental logging. Communication is possible through I<sup>2</sup>C, UART

The board includes clearly labeled pins and a QWIIC-compatible JST-SH connector for rapid prototyping.

## Electrical Characteristics

- Operating voltage: 3.3 V (typical)
- Logic compatibility: 3.3 V
- BNO055 interfaces: I<sup>2</sup>C, UART (selectable via PS0/PS1)
- BMP280 interfaces: I<sup>2</sup>C, UART, SWD
- The BNO055 sensor is highly configurable, offering an accelerometer that operates at  $\pm 2g$ ,  $\pm 4g$ ,  $\pm 8g$ , or  $\pm 16g$ , a gyroscope that measures angular velocities from  $\pm 125^\circ/s$  up to  $\pm 2000^\circ/s$ , and a magnetometer with ranges adjustable from  $\pm 1.3$  gauss to  $\pm 8.1$  gauss.
- BMP280 pressure range: 300 to 1100 hPa
- BMP280 temperature accuracy:  $\pm 1^\circ C$

## Features

- BNO055 on-chip sensor fusion with Euler/quaternion output
- BMP280 pressure and temperature sensing
- Dual sensor integration in compact board
- Selectable UART/I<sup>2</sup>C interfaces
- SWD debug header
- QWIIC-compatible JST-SH connector
- Breadboard-friendly form factor

## Applications

- Portable weather stations
- Altimeter and variometer systems

- Human posture tracking
- Inertial navigation systems
- VR/AR orientation sensing
- Flight controllers for drones and robotics
- Motion gesture interfaces
- IoT environmental data logging

## Settings

### Interface Overview

Interface	Signals / Pins	Typical Use
I2C	SDA, SCL	Communication with microcontroller
UART	TX, RX (via SDA, SCL)	Alternative communication protocol
GPIO	PS0, PS1	Protocol selection for BNO055
Interrupt	INT	Orientation or motion event signaling

### Supported Pins

Symbol	I/O	Description
SDA	I/O	I2C data / UART TX (shared)
SCL	I/O	I2C clock / UART RX (shared)
PS0	I	BNO055 protocol select (bit 0)
PS1	I	BNO055 protocol select (bit 1)
SWDIO	I/O	SWD data
SWCLK	I	SWD clock
INT	O	Motion/interrupt signal (BNO055)

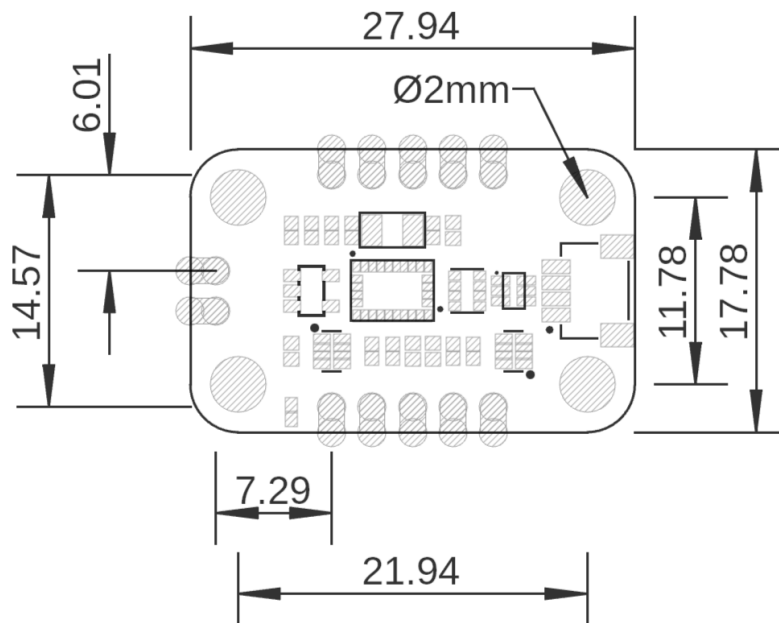
### Pin & Connector Layout

PIN	Description
VCC	Power supply input (3.3 V)
GND	Ground
SDA	I2C data / UART TX (configurable)
SCL	I2C clock / UART RX (configurable)
PS0	Protocol select bit 0
PS1	Protocol select bit 1
INT	BNO055 interrupt output

## Block Diagram

./images/pinout.png

## Dimensions



**Mechanical dimensions in millimeters**

## Usage

- Arduino (Nano, Mega, Due)
- ESP32, ESP8266
- Raspberry Pi (via I2C)
- STM32 and ARM Cortex-M
- Unity or Processing (3D visualization)

## Downloads

- Schematic PDF
- PinOut

## Purchase

- Buy from UNIT Electronics