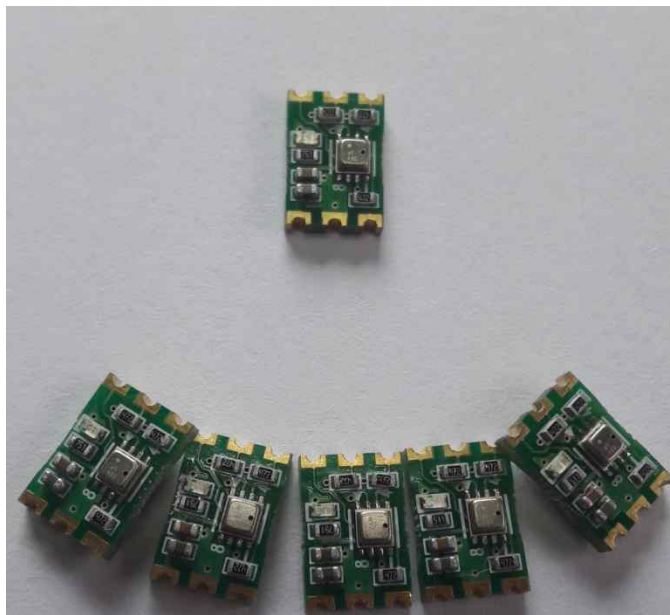


# OSTSen-E280 User Guide



**Ver 1.0**

**Hara Systems Inc.**

## 1. OSTSen-E280 Overview

OSTSen-E280 is a humidity, pressure and temperature sensing module, which is based on Bosch Sensortec BME280. The BME280 is a combined digital humidity, pressure and temperature sensor based on proven sensing principles. The sensor module is housed in an extremely compact metal-lid LGA package with a footprint of only 2.5 x 2.5 mm<sup>2</sup> with a height of 0.94 mm. Its small dimensions and its low power consumption allow implementation in battery driven devices such as handsets, GPS modules or watches. The BME280 is register and performance compatible to the Bosch Sensortec BMP280 digital pressure sensor.

The BME280 achieves high performance in all application requiring humidity and pressure measurement. These emerging applications of home automation control, indoor navigation, health care as well as GPS refinement require a high accuracy and a low TCO at the same time.

The humidity sensor provides an extremely fast response time for fast context awareness applications and high overall accuracy over a wide temperature range.

The pressure sensor is an absolute barometric pressure sensor with extremely high accuracy and resolution and drastically lower noise than the Bosch Sensortec BMP180.

The integrated temperature sensor has been optimized for lowest noise and highest resolution. Its output is used for temperature compensation of the pressure and humidity sensors and can also be used for estimation of the ambient temperature.

The sensor provides both SPI and I2C interface and can be supplied using 1.71V to 3.6V for the sensor supply VDD and 1.2 to 3.6 V for the interface supply VDDIO. Measurements can be triggered by the host or performed in regular intervals. When the sensor is disabled, current consumption drops to 0.1uA.

BME280 can be operated in three power modes: sleep mode, normal mode, forced mode

In order to tailor data rate, noise, response time and current consumption to the needs of the user, a variety of oversampling modes, filter modes and data rates can be selected.

## 2. Application

- Context awareness, e.g. skin detection, room change detection
- Health monitoring/well-being
  - Warning regarding dehydration or heat stroke
  - Spirometry(measurement of lung volume and air flow)
- Home automation control
  - Control heating, venting, air conditioning (HAVC)
- Internet of things
- GPS enhancement
- Indoor navigation
- Outdoor navigation, leisure and sports applications
- Weather forecast
- Vertical velocity indication (rise/sink speed)

### 3. Features

#### 3.1 key feature

- Package type : 2.5m x 2.5mm x 0.93mm metal lid LGA
- Digital interface : I2C (up to 3.4MHz) and SPI(3 and 4 wire, up to 10MHz)
- Supply voltage : VDD main supply voltage range : 1.71V to 3.6V  
VDDIO interface voltage range : 1.2V to 3V
- Current range : 1.8uA @1Hz humidity and pressure  
2.8uA @1Hz pressure and temperature  
3.6uA @1Hz humidity, pressure and temperature  
0.1uA in sleep mode
- Current range : -40°C ~ 85°C , 0 ~ 100 relative humidity, 300~1100hPa
- Humidity sensor and pressure sensor can be independently enabled / disabled
- Register and performance compatible to Bosch Sensortec BMP280 digital pressure sensor
- RoHS compliant, halogen-free, MSL1

#### 3.2 key parameters for humidity sensor

- Response time 1s
- Accuracy tolerance  $\pm 3\%$  relative humidity
- Hysteresis  $\pm 1\%$  relative humidity

#### 3.2 key parameters for pressure sensor

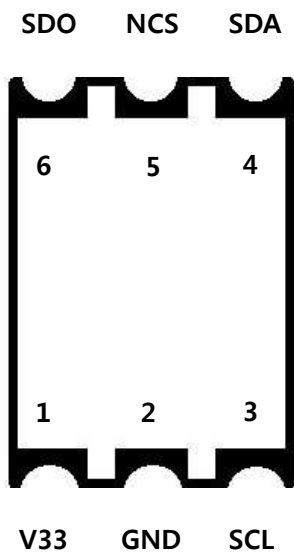
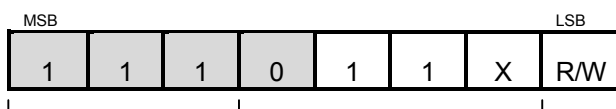
- RMS Noise 0.2 Pa, equivalent to 1.7cm
- Offset temperature coefficient  $\pm 1.5\text{Pa/K}$ , equivalent to  $\pm 12.6\text{cm}$  at 1°C temperature change

## 4. Application Information

### 4.1 Module Pin Out and Signal Description

Pin Number	Pin Name	Pin Description
1	V33	Power supply voltage (1.71V ~ 3.6V)
2	GND	Power supply ground
3	SCL	[I2C] Serial clock (SCL) 7bit device address : 0x76/0x77 [SPI] Serial clock (SCK)
4	SDA	[I2C] Serial data (SDA) [SPI] Serial data (SDI)
5	NCS	[I2C] VDDIO ( internal pull-up in OSTSen-E280 ) [SPI] Chip Select (CS)
6	SDO	[I2C] Device address [ '0': 0x76, '1': 0x77 ] [SPI] Serial data output (SDO)

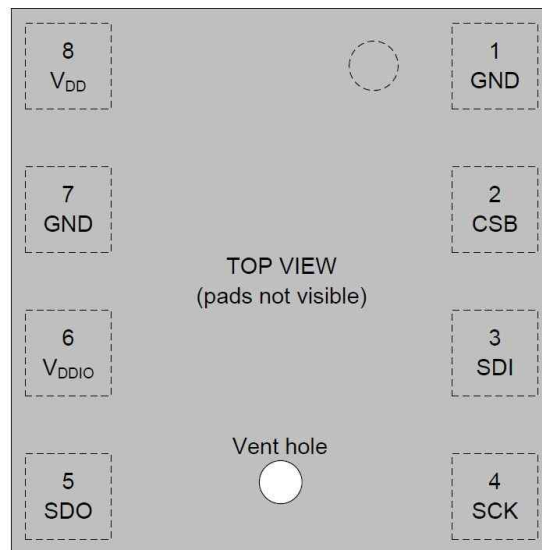
- **BME280 I2C 7bit Device Address : 0x76 / 0x77**



< Top View >

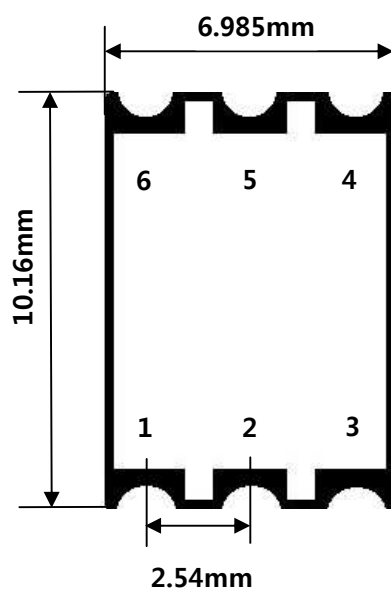
## 4.2 BME280 Pin out and Signal Description

Pin Number	Pin Name	Pin Description
1	GND	Ground
2	CSB	Chip select
3	SDI	Serial data input [I2C]SDA, [SPI]SDI
4	SCK	Serial clock input [I2C]SCL, [SPI]SCK
5	SDO	Serial data output [I2C]address, [SPI]SDO
6	VDDIO	Digital/Interface supply
7	GND	Ground
8	VDD	Power supply



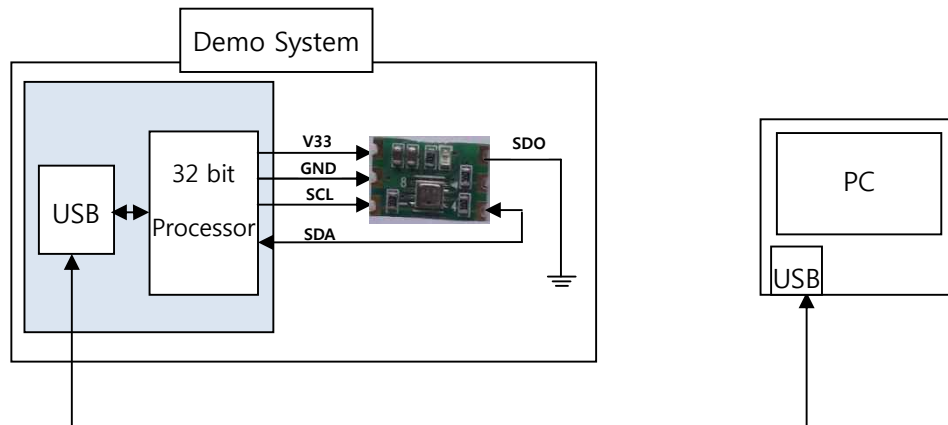
< BME280 Pinout ( top view ) >

## 5. Module Dimension

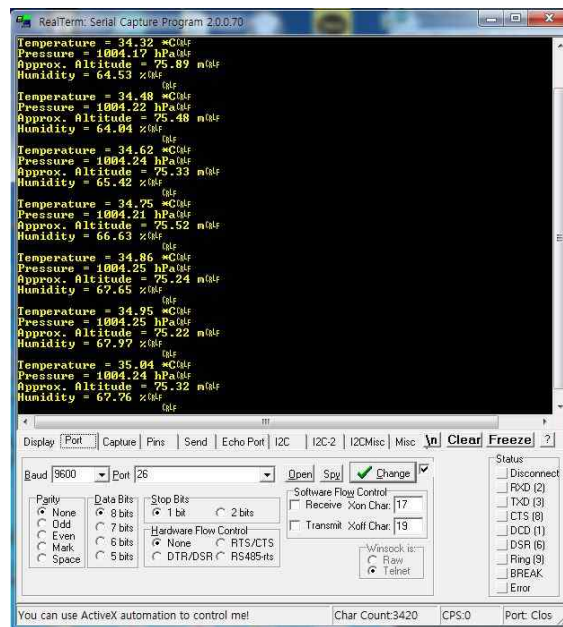


< OSTSen-E280 module >

## 6. Demo System



### OSTSen-E280 Data Display on PC



## 7. Reference

- 1) [https://www.bosch-sensortec.com/bst/products/all\\_products/bme280](https://www.bosch-sensortec.com/bst/products/all_products/bme280)
  - 2) [https://ae-bst.resource.bosch.com/media/tech/media/datasheets/BST-BME280\\_DS001-11.pdf](https://ae-bst.resource.bosch.com/media/tech/media/datasheets/BST-BME280_DS001-11.pdf)
  - 3) [https://github.com/adafruit/Adafruit\\_BME280\\_Library](https://github.com/adafruit/Adafruit_BME280_Library)
  - 4) [https://github.com/sparkfun/SparkFun\\_BME280\\_Arduino\\_Library](https://github.com/sparkfun/SparkFun_BME280_Arduino_Library)
- If you need more information or have some questions about OSTSen-E280, contact [ostsen@hanmail.net](mailto:ostsen@hanmail.net).