



# Ethylene Oxide Gas Sensor Module TB200B-ES1&ES4 Datasheet

## » Overview

The TB200B-ES1&ES4 series is an intelligent digital gas sensor module using a smart microprocessor combining high-reliability solid polymer electrochemical gas sensor technology and intelligent algorithm calculation. The TB200B Gas Sensor Module is suitable for indoor and outdoor industrial applications. It detects gas, temperature and humidity and receives all data simultaneously. The data is output through the transmission command, which makes it easy and convenient to recognize the right time for maintenance and replacement. Each sensor module has been professionally calibrated with the gas, and the calibration information is stored in the flash chip. The sensor module has an I<sup>2</sup>C or a UART (TTL 3.3 V) output interface, which can be easily integrated with different devices and systems.

## » Key Features

- ☞ Detects gas, temperature and humidity
- ☞ Detects with high selectivity a wide variety of gases
- ☞ Digital signal UART (TTL 3.3 V) or I<sup>2</sup>C output
- ☞ Low power consumption and sleep mode (suitable for battery and IoT applications)
- ☞ Typical warm-up time in seconds
- ☞ Wide temperature range of -40 °C to +55 °C
- ☞ RoHS approved
- ☞ Excellent accuracy
- ☞ Long lifetime > 5 years
- ☞ No-poisoning
- ☞ Fast response time
- ☞ Linear output
- ☞ No zero line drift
- ☞ No leakage



## » Applications

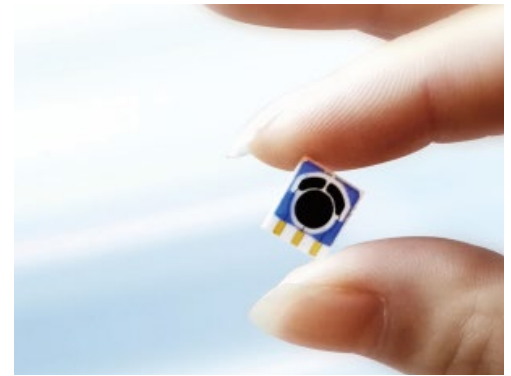
- ☞ Industrial Safety
- ☞ Leakage Detection
- ☞ Gas Manufacturing Process Monitoring
- ☞ Emission Monitoring
- ☞ Food Industry
- ☞ Warehouse Logistics Monitoring
- ☞ Medical & Health Care



## » Principle

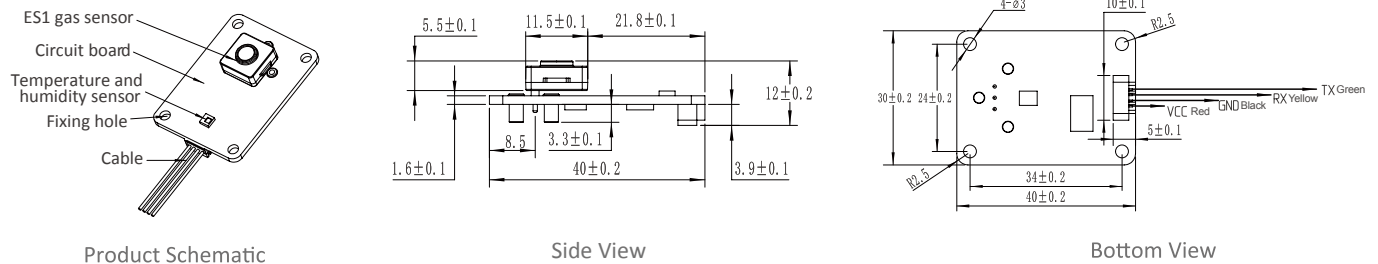
The EC Sense solid polymer electrochemical technology is a revolutionary innovation in the field of electrochemical detection. This technology is based on the principle of electrochemical catalytic reaction, detecting the output signals of the electrochemical reactions of different gases and accurately measuring the gas concentration through the signal.

The sensor is composed of three electrodes in contact with the electrolyte. A typical electrode consists of a large surface area of noble metal and other materials. The electrode, electrolyte and the surrounding air are in contact and the gas diffuses into the working electrode. Here the gas will be oxidized, this causes a current, which is proportional to the gas concentration.

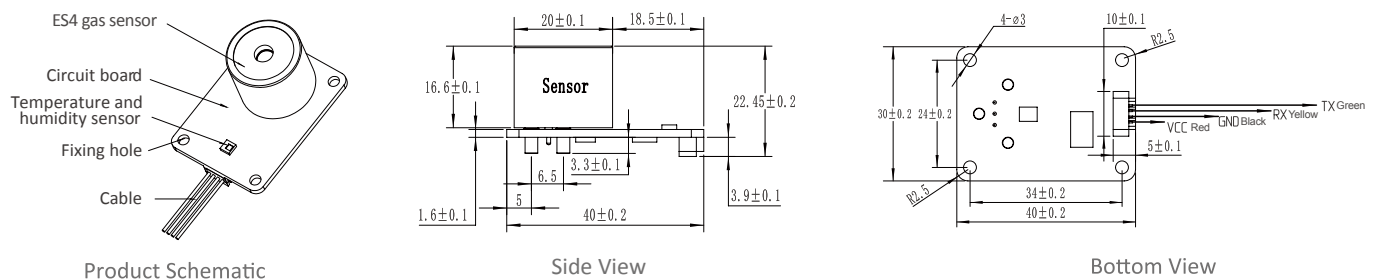


## » Mechanical Drawing (Unit: mm)

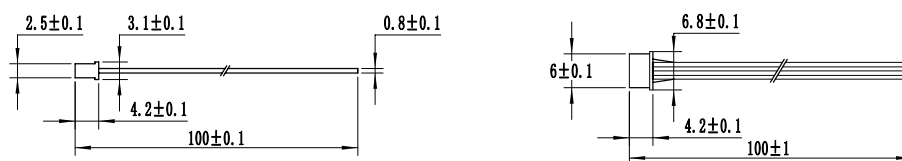
TB200B-ES1-ETO Dimension diagram



TB200B-ES4-ETO Dimension diagram



4Pin cable size diagram



## Order Information

| Product                          | Partnumber                    | Range      | Resolution | Response Time      | Output           |
|----------------------------------|-------------------------------|------------|------------|--------------------|------------------|
| Ethylene Oxide Gas Sensor Module | 04-TB200B-ES1-ETO-10-01       | 0-10 ppm   | 0.001 ppm  | < 3 s (T90 < 30 s) | UART (TTL 3.3 V) |
|                                  | 04-TB200B-ES1-ETO-200-01      | 0-200 ppm  | 0.1 ppm    | < 3 s (T90 < 30 s) | UART (TTL 3.3 V) |
|                                  | 04-TB200B-ES1-ETO-1000-01     | 0-1000 ppm | 0.1 ppm    | < 3 s (T90 < 30 s) | UART (TTL 3.3 V) |
|                                  | 04-TB200B-ES1-ETO-10-I2C-01   | 0-10 ppm   | 0.001 ppm  | < 3 s (T90 < 30 s) | I <sup>2</sup> C |
|                                  | 04-TB200B-ES1-ETO-200-I2C-01  | 0-200 ppm  | 0.1 ppm    | < 3 s (T90 < 30 s) | I <sup>2</sup> C |
|                                  | 04-TB200B-ES1-ETO-1000-I2C-01 | 0-1000 ppm | 0.1 ppm    | < 3 s (T90 < 30 s) | I <sup>2</sup> C |
|                                  | 04-TB200B-ES4-ETO-10-01       | 0-10 ppm   | 0.001 ppm  | < 3 s (T90 < 30 s) | UART (TTL 3.3 V) |
|                                  | 04-TB200B-ES4-ETO-200-01      | 0-200 ppm  | 0.1 ppm    | < 3 s (T90 < 30 s) | UART (TTL 3.3 V) |
|                                  | 04-TB200B-ES4-ETO-1000-01     | 0-1000 ppm | 0.1 ppm    | < 3 s (T90 < 30 s) | UART (TTL 3.3 V) |
|                                  | 04-TB200B-ES4-ETO-10-I2C-01   | 0-10 ppm   | 0.001 ppm  | < 3 s (T90 < 30 s) | I <sup>2</sup> C |
|                                  | 04-TB200B-ES4-ETO-200-I2C-01  | 0-200 ppm  | 0.1 ppm    | < 3 s (T90 < 30 s) | I <sup>2</sup> C |
|                                  | 04-TB200B-ES4-ETO-1000-I2C-01 | 0-1000 ppm | 0.1 ppm    | < 3 s (T90 < 30 s) | I <sup>2</sup> C |
| 4Pin Cable                       | 02-MOD-CABLE-4PIN-01          |            |            |                    |                  |

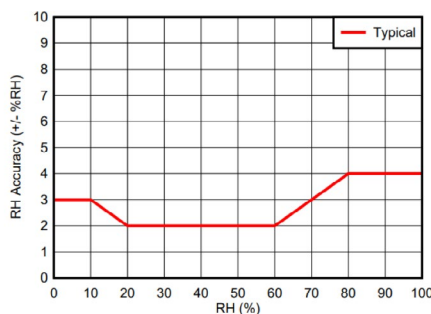
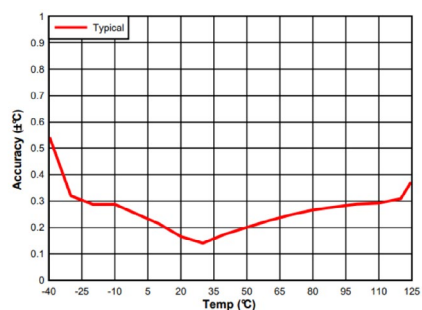
## Technology Specifications

### Gas Sensor Specifications

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Principle         | Solid Polymer Electrochemical Sensing Technology |
| Detection Gas     | Ethylene Oxide Gas                               |
| Accuracy          | ± 5% (Measurement value)                         |
| Repeatability     | 1 %                                              |
| Linearity         | Linear                                           |
| Long-Term Drift   | < 5 %/year                                       |
| Expected Lifetime | > 5 years                                        |

### Temperature & Relative Humidity Sensor Specification

|                      |                          |
|----------------------|--------------------------|
| Temperature Range    | -20 °C to +70 °C         |
| Temperature Accuracy | ± 0.2 °C (Typical Value) |
| Humidity Range       | 0 to 100% RH             |
| Humidity Accuracy    | ± 2 % (Typical Value)    |



## Technology Specifications

### Environment Specifications

|                     |                                 |
|---------------------|---------------------------------|
| Working Temperature | -40 °C to +55 °C                |
| Working Humidity    | 15-95% RH. (Non-condensing)     |
| Working Pressure    | Atmospheric pressure $\pm$ 10 % |

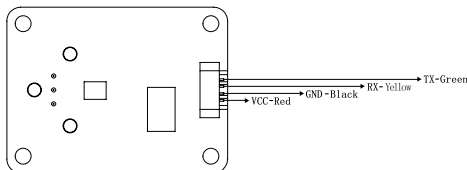
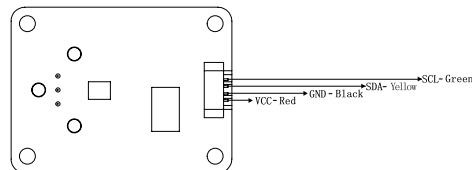
### Mechanical Specifications

|                             |                                                               |
|-----------------------------|---------------------------------------------------------------|
| Size (Including gas sensor) | TB200B-ES1: 40 x 30 x 12 mm<br>TB200B-ES4: 40 x 30 x 22.45 mm |
| Size (Without gas sensor)   | 40 x 30 x 5.6 mm                                              |
| Weight                      | TB200B-ES1: < 15 g<br>TB200B-ES4: < 25 g                      |
| Warranty                    | 12 months from the date of shipment                           |
| Cable Length                | 100 mm, special length by request                             |

### Electrical Specifications

|               |                                                                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Signal | UART (TTL 3.3 V) or I <sup>2</sup> C digital signal, for more information please see "Communication Protocol"                                                           |
|               | UART Interface definition: VCC- red, GND- black, RX- yellow, TX- green                                                                                                  |
|               | UART Baud rate: 9600    Data bits: 8 bits    Stop bits: 1 bit                                                                                                           |
|               | I <sup>2</sup> C Interface definition: VCC-red, GND-black, SDA-yellow, SCL-green<br>I <sup>2</sup> C Frequency: $\leq$ 20 kHz    I <sup>2</sup> C Signal Voltage: 3.3 V |

UART TTL 3.3 V


I<sup>2</sup>C 3.3 V


|                               |                                                                                                                                                                                                                                                     |                                  |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Communication Notes           | 1) Communication has active upload and Q&A mode. The default mode is Q&A mode after power-on. You can use instructions to switch between the two modes.<br>2) If you switch off the module or switch to sleep mode, the module remains in Q&A mode. |                                  |
| Supply Voltage                | 3.3 to 5.5V DC, Recommended 5V DC                                                                                                                                                                                                                   |                                  |
| Working Current               | < 5 mA                                                                                                                                                                                                                                              |                                  |
| Peak Current                  | UART: 3.8 mA @ 5V DC                                                                                                                                                                                                                                | I <sup>2</sup> C: 6.2 mA @ 5V DC |
| Current (Switch on LED lamp)  | UART: 2.5 mA @ 5V DC                                                                                                                                                                                                                                | I <sup>2</sup> C: 4.7 mA @ 5V DC |
| Current (Switch off LED lamp) | UART: 1.2 mA @ 5V DC                                                                                                                                                                                                                                | I <sup>2</sup> C: 3.4 mA @ 5V DC |
| Sleep Mode Current            | UART: 0.8 mA @ 5V DC                                                                                                                                                                                                                                | I <sup>2</sup> C: 0.9 mA @ 5V DC |
| Power Consumption             | 40 mW @ 5V DC                                                                                                                                                                                                                                       |                                  |
| Sleep Mode Power Consumption  | 25 mW @ 5V DC                                                                                                                                                                                                                                       |                                  |

### Certifications

|                        |                    |
|------------------------|--------------------|
| RoHS Certification No. | A2200167659101001C |
|------------------------|--------------------|

**Disclaimer**

The EC Sense performance data stated above is based on data obtained under test conditions using the EC Sense gas distribution system and AQS test software. In the interest of continuous product improvement, EC Sense reserves the right to change design features and specifications without notice. We are not responsible for any loss, injury or damage caused by this. EC Sense assumes no responsibility for any indirect loss, injury or damage resulting from the use of this document, the information contained therein or any omissions or errors herein. This document does not constitute an offer to sell. The data it contains are for informational purposes only and cannot be considered a guarantee. Any use of the given data must be evaluated and determined by the user to comply with federal, state and local laws and regulations. All specifications outlined are subject to change without notice.

 **Warning**

EC Sense sensors are designed for use in a variety of environmental conditions. However, due to the principles and characteristics of solid polymer electrochemical sensors and to ensure normal use, users must strictly follow this article during storage, assembly and operation of the module. Avoid cleaning the sensors with alcohol, acetone or other strong solvents. General-purpose PCB circuit board application methods and illegal applications or violation of the application will not be covered by the warranty. Although our products are highly reliable, we recommend checking the module's response to the target gas prior to utilization to ensure on-site use. At the end of the product's service life, please do not discard any electronics in the domestic waste, instead follow the local governments electronic waste recycling regulations for disposal.



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