Outdoor Air Quality 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^2C 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^2C 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

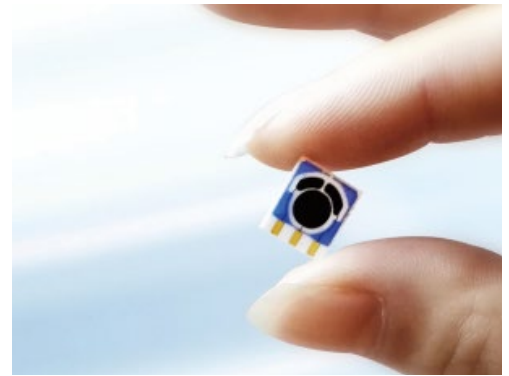☞ No zero line drift

☞ No leakage

❯❯ Applications

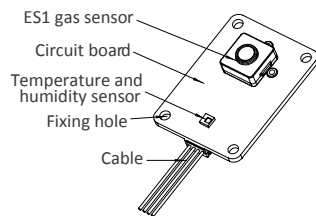☞ Outdoor Air Quality

☞ Industrial Pollution

≫ 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.
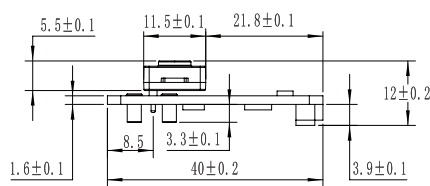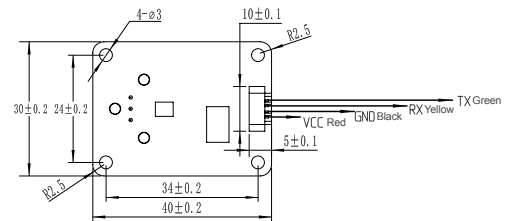
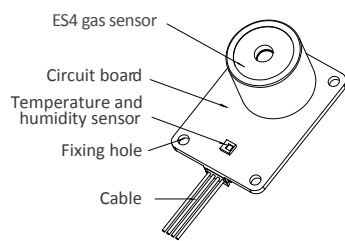## ≫ Mechanical Drawing (Unit: mm)

TB200B-ES1-AQI Dimension diagram

ES1 gas sensor
Circuit board
Temperature and humidity sensor
Fixing hole
Cable

Product Schematic

5.5±0.1   11.5±0.1   21.8±0.1
12±0.2
8.5   3.3±0.1
1.6±0.1   40±0.2   3.9±0.1

Side View

4-∅3   10±0.1   R2.5
30±0.2 24±0.2
VCC Red GND Black RX Yellow TX Green
5±0.1
R2.5
34±0.2
40±0.2

Bottom View

TB200B-ES4-AQI Dimension diagram

ES4 gas sensor
Circuit board
Temperature and humidity sensor
Fixing hole
Cable

Product Schematic

20±0.1   18.5±0.1
16.6±0.1   Sensor   22.45±0.2
6.5   3.3±0.1
5   3.9±0.1
1.6±0.1   40±0.2

Side View

4-∅3   10±0.1   R2.5
30±0.2 24±0.2
VCC Red GND Black RX Yellow TX Green
5±0.1
R2.5
34±0.2
40±0.2
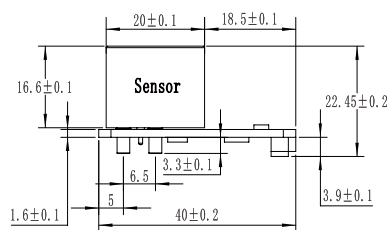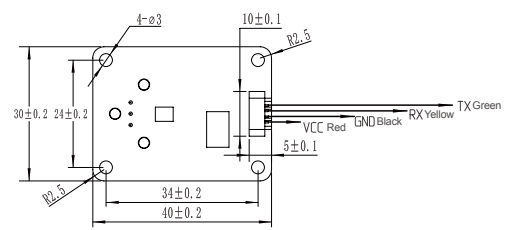
Bottom View

4Pin cable size diagram

2.5±0.1   3.1±0.1   0.8±0.1
4.2±0.1
100±0.1

6.8±0.1
6±0.1
4.2±0.1
100±1
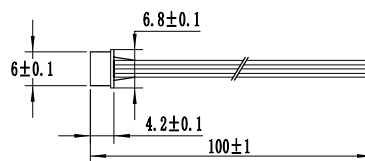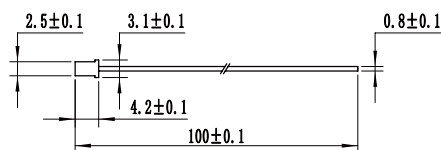
➤➤ Order Information

Product	Partnumber	Range	Resolution	Response Time	Output
	04-TB200B-ES1-AQI-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)	UART (TTL 3.3 V)
	04-TB200B-ES1-AQI-200-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)	UART (TTL 3.3 V)
	04-TB200B-ES1-AQI-10-I2C-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)	I^{2}C
Outdoor Air Quality Gas Sensor Module	04-TB200B-ES1-AQI-200-I2C-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)	I^{2}C
	04-TB200B-ES4-AQI-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)	UART (TTL 3.3 V)
	04-TB200B-ES4-AQI-200-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)	UART (TTL 3.3 V)
	04-TB200B-ES4-AQI-10-I2C-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)	I^{2}C
	04-TB200B-ES4-AQI-200-I2C-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)	I^{2}C
4Pin Cable	02-MOD-CABLE-4PIN-01				

➤➤ Technology Specifications

Gas Sensor Specifications

Principle	Solid Polymer Electrochemical Sensing Technology
Detection Gas	TVOC, Sulfide SOx, Nitrogen Oxide NOx, Hydrogen Sulfide H$_2$S, Carbon Monoxide CO, Alcohols, Odor Gases, Other Organic Volatiles, Other Inorganic Gases.
Accuracy	± 5% (Mesurement 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)
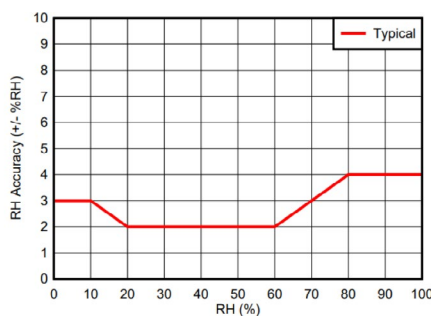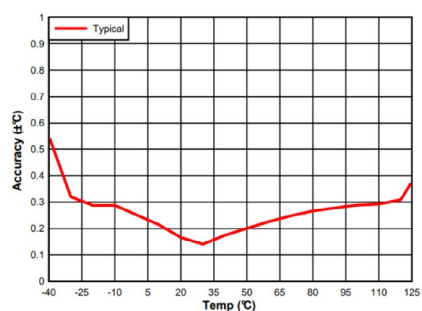
⟫ Technology Specifications

Environment Specifications

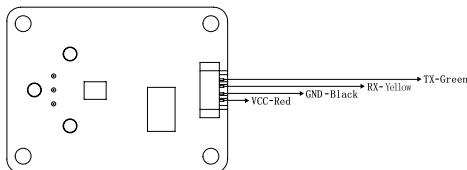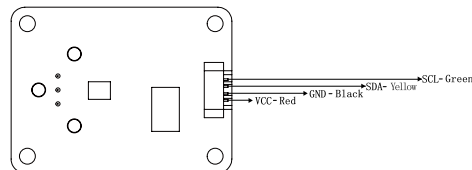|	
Working Temperature	-40 °C to +55 °C
Working Humidity	15-95% RH. (Non-condensing)
Working Pressure	Atmospheric pressure ± 10 %

Mechanical Specifications

Size (Including gas sensor)	TB200B-ES1: 40 x 30 x 12 mm 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 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^2C 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^2C Interface definition: VCC-red, GND-black, SDA-yellow, SCL-green
	I^2C Frequency: ≦ 20 kHz I^2C Signal Voltage: 3.3 V

UART TTL 3.3 V

I^2C 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.
	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^2C: 6.2 mA @ 5V DC
Current (Switch on LED lamp)	UART: 2.5 mA @ 5V DC I^2C: 4.7 mA @ 5V DC
Current (Switch off LED lamp)	UART: 1.2 mA @ 5V DC I^2C: 3.4 mA @ 5V DC
Sleep Mode Current	UART: 0.8 mA @ 5V DC I^2C: 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.

EC Sense
Easy Gas Sensors

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