EC Sense
Easy Gas Sensors

IAQ Indoor Air Quality Sensor Module

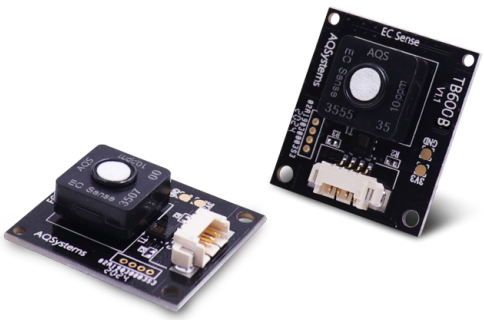
TB600B-IAQ-10

Datasheet

Easy Gas Sensor Module Solutions
Easy to Use

Overview

The TB600B-Series IAQ Indoor Air Quality Sensor Module is the perfect combination of a state-of-the-art high-precision sensing device with a sophisticated circuit board. The sensor module uses EC Sense's small-in-size solid polymer electrochemical sensor, which accurately detects very low concentrations of gases. It replaces our nose to reliably sniff out the gas concentration and enables precise gas detection. The TB600B module serves an UART digital output for ease-of-use, eliminating the need for customers to understand the sensor application and the tedious work of calibration.



Key Features

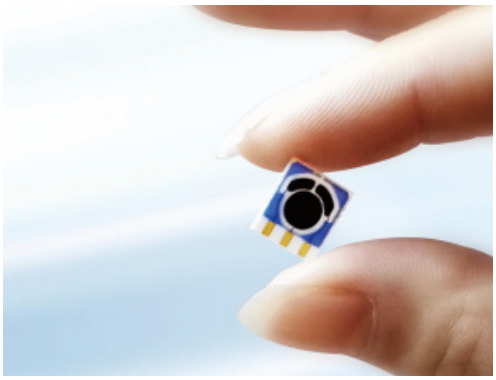
- Calculation of various kinds of harmful gas measurement response, which can effectively evaluate air freshness
- Good response to VOC, H_2S sulfides, hydrocarbons, alkanes, and ketones
- Independent temperature and humidity digital sensors output, combined with intelligent algorithms, stronger environmental adaptability
- Fast response, fast return to zero, plug and play
- Easy to use, UART digital signal output, zero drift
- Durable and reliable, long lifetime and stable detection
- New microcircuit design, strong anti-electromagnetic interference ability, good anti-toxicity
- With fixed mounting holes for easy installation
- Low power consumption and sleeping mode (suitable for and IoT applications)
- RoHS approved eco-friendly design

Applications

- Indoor air pollution monitoring
- Household and commercial fresh air purification systemAir Pollution
- Fresh air device and purifier
- Air pollution monitoring in commercial places (office, shopping malls, airports, train stations, gyms, hotels)
- Indoor temperature and humidity monitor
- Car air purifier
- Air monitoring in public transportation space
- HVAC system
- Smart wearable devices (watches, masks, mobile phones)
- Exercise equipment
- Range hoods and smart home products
- Laboratory exhaust cabinet system
- Super clean laboratory environment monitoring
- Ambient air quality monitoring of small drones

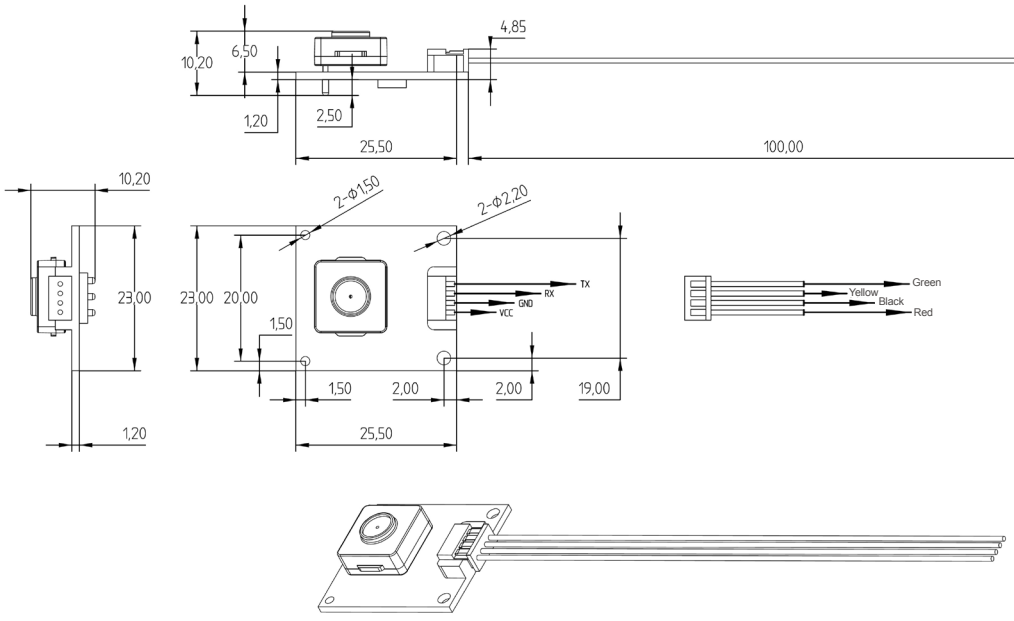
Principle

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)



Order Information

Product	Partnumber	Range	Resolution
Air Quality Sensor Module	04-TB600B-IAQ-10-01	0-10ppm	0.001ppm
Air Quality Sensor Module	04-TB600B-IAQ-10-I2C-01	0-10ppm	0.001ppm
4Pin Cable	02-MOD-CABLE-4PIN-01		

Technology Specifications

Principle	Solid Polymer Electrochemical Sensing Technology
Detection of Gas	TVOC gas, formaldehyde, methanol, toluene, sulfur dioxide SO_2, carbon monoxide CO, hydrogen sulfide H_2S, methyl mercaptan CH_4S, CH hydrocarbon, etc.
Full-Scale Accuracy Error	± 5% F.S
Warm-Up Time	Stored in clean air for the first power on < 30 seconds (There is no high-concentration polluting gas or large air flow in the site environment or storage environment)
Response Time	< 3 seconds (T50: < 40 seconds; T90: < 80 seconds; T100: < 180 seconds;)
Time to Zero	Standard time to zero: < 40 seconds (zero return is required in a relatively clean environment)
	Note: If the module is affected by other gases in the detection environment, it will increas its zero return time
Calibration Substance	Sulfur compounds, VOCs, CO and other harmful gases are mixed and calibrated
	Note: The smaller the range, the higher the detection accuracy. It is not recommended for users to use it beyond the range.
Expected Sensor Lifetime	More than three years in relatively clean air, temperature 0-25℃ , humidity 30-70% (Sensor life will be reduced if often exposed to corrosive gas, high temperature environment and < 20% low humidity environment)
Relative Temperature Error	± 0.2℃
Relative Humidity Error	± 2%
Output	3.3V UART digital signal (see below for communication protocol)
	Interface definition: VCC- red, GND- black, RX- yellow, TX- green;
	Baud rate: 9600 Data bits: 8 bits Stop bits: 1 bit;
Get Data Command	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.
	Or Q & A mode is restored by power off or switch power mode
Supply Voltage	3.3 to 5.5V DC, Recommended 5V DC
Supply Current	9.5mA @ 5VDC
Current (Switch off LED lamp)	8.7mA @ 5V DC
Peak Current	11mA @ 5V DC
Sleep Mode Current	0.85mA @ 5V DC
Power Consumption	40mW @ 5V DC
Working Voltage	3.3 to 5.5V DC
Working Current	< 5mA
Power Consumption	Ad sleeping mode power consumption 25mW @ 5V ad Q&A mode power consumption
Repeatability	Full range ± 1% is the normal range
Working Temperature	0℃ to 40℃ , suitable for indoor use. -40℃ to +55℃ , need for temperature compensation
Optimal Working Temperature	20℃ to 35℃
Working Humidity	15% - 95% RH. (Non-condensing)
Optimum Working Humidity	50% RH.
Working Pressure	Atm ± 10%
Board Size	23 x 25.5 x 10.2mm (with sensor)
Board Size	23 x 25.5 x 4.85mm (without sensor)
Weight	3.1g
Signal Cable	The standard length is shown in the structure diagram and can be customized if there are special requirements.

Cross Sensitivity

Gas	Molecules Formula	Concentration (ppm)	Response (ppm)
Isobutylene	C_4H_8	5	18.46
Formaldehyde	HCHO	5	19.54
Carbon Monoxide	CO	5	12.5
Nitrogen Dioxide	NO_2	5	7.27
Hydrogen Sulfide	H_2S	1	35.34
Sulfur Dioxide	SO_2	5	19.82
Hydrogen	H_2	5	4.27
Hydrogen Chloride	HCl	5	1
Hydrogen Cyanide	HCN	5	1.36
Ammonia	NH_3	5	5.58
Ozone	O_3	5	6.15
Trimethylamine	C_3H_9N	5	2.36
Ethylene	C_2H_4	5	11.67
Methyl Mercaptan	CH_4S	5	25.84
Ethanol	C_2H_6O	5	6.76
Ethylene Oxide	C_2H_4O	5	14.17
Carbon Disulfide	CS_2	5	4.55
Dimethyl Disulfide	$C_2H_6S_2$	2	25.08
Methanol	CH_3OH	5	21.99
Methyl Sulfide	C_2H_6S	5	33.12
Styrene	C_8H_8	0.5	27.69
Benzene	C_6H_6	5	4.07
Toluene	C_7H_8	5	2.99
P-xylene	C_8H_{10}	5	2.17
Gasoline Volatilization (dimensionless)	Aliphatic hydrocarbons, cycloalkanes, aromatic hydrocarbons	5	10.15
Dining Lampblack (dimensionless)	Unsaturated hydrocarbons	5	17.17
Formic Acid	HCOOH	5	19.82
Acetic Acid	CH_3COOH	5	4.07

Note: 1) The above interference factors may vary due to different sensors and service life. Please refer to the actual test results.
2) This table is not complete for all gases, and the sensor may be sensitive to other gases.

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. General-purpose PCB circuit board application methods and illegal applications / 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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