Prana Air

Ozone Sensor Module

PA-O3-9.999PPM

Product Overview

The Prana Air Ozone (O_3) Sensor is a highly accurate, industrial-grade electrochemical sensor designed for precise detection and monitoring of ozone gas concentrations in ambient air. Engineered with advanced sensing technology, this module offers an exceptional measurement range from 0.001 ppm to 9.999 ppm with an ultra-fine resolution of 0.001 ppm, making it ideal for both environmental monitoring and stringent industrial safety applications.

The sensor features standard UART digital output (TX/RX) for seamless integration into various microcontrollers and air quality monitoring systems. Its robust cylindrical design (22.8mm diameter) ensures durability while maintaining a compact footprint for versatile deployment.

Key Features

- Ultra-high precision with 0.001 ppm resolution.
- Wide detection range (0 to 9.999 ppm).
- Digital UART output for easy integration.
- Wide operating temperature range (-20°C ~ 50°C).
- Long operational lifespan with low power consumption.
- Standardized pin layout for mass production.

Target Applications

- Ambient Air Quality Monitoring Stations
- Industrial Safety & Leak Detection
- Water Treatment Plant Monitoring
- HVAC and Indoor Air Quality (IAQ) Systems
- Portable Gas Detectors
- Medical and Sterilization Equipment

Technical Specifications

Parameter	Specifications
Product Model	PA-O3-9.999PPM
Target Gas	Ozone (O_3)
Measurement Range	0.001 ppm to 9.999 ppm
Resolution	0.001 ppm
Operating Humidity Range	15%RH-90% RH (non-condensing)
Operating Temperature Range	-20°C ~ 50°C
Storage Temperature	0°C ~ 25°C
Output Data	UART Output (3.3V Level)
Dimensions (Body)	22.8 mm x 25.0 mm (Height)
Pin Length	5.6 mm
Pin Diameter	1.4 mm
Test Accuracy	±0.01PPM or ±10% of test value, whichever is greater
Service Life	2 years (in air, -20°C ~ 50°C)
Operating Voltage	3.7V ~ 5.5V
Preheat Time	≤30 Seconds
Response Time	≤30 Seconds
Recovery Time	≤60 Seconds
Maximum Allowable Overload	50PPM (prolonged overload will damage the sensor)

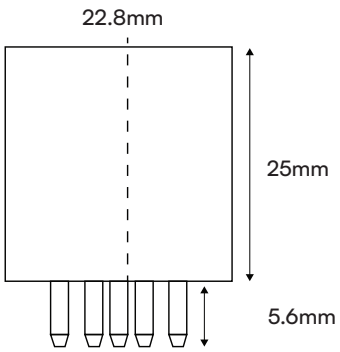
Pin Configuration & Output

The Sensor Module is equipped with 5 connecting pins.

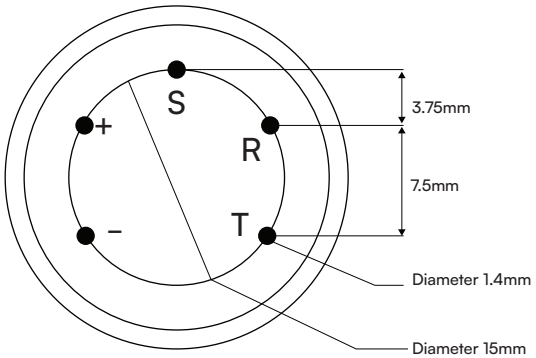
Pin Name	Original Label (Diagram)	Description/ Function
+	Power Positive (+)	Power Positive (VCC)
-	Power Negative (-)	Power Negative (GND)
R	R : RX (Receive)	UART Receive Data
T	T : TX (Transmit)	UART Transmit Data
S	S : Calibration pin	Calibration pin **(Note: Please leave floating/ Do not connect)**

Structural Dimensions

The diagram below illustrates the mechanical dimensions and bottom-view pin layout of the sensor.

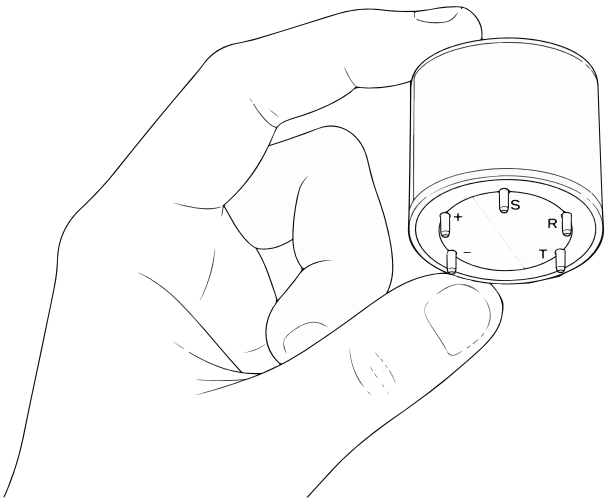


Technical Drawing



Bottom View

Dimension Reference Guide	
Sensor Body Diameter	22.8 mm
Sensor Body Height	25 mm
Pin Length	5.6 mm
Pin Circle Diameter	15 mm
Pin Spacing (Vertical Axis)	3.75 mm/ 7.5 mm



Communication Protocol

General Settings

Baud Rate	9600
Data Bits	8 bits
Stop Bits	1 bit
Parity	None

Communication Commands

Communication is divided into active upload mode and query-response mode. The factory default is active upload, sending a concentration value every 1 second. The active upload data display format is as follows:

Table 5

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Gas name	Unit	Decimal places (none)	Gas conc. high byte	Gas conc. low byte	Full scale high byte	Full scale low byte	Checksum
0xFF	0x12	0x04	0x00	0x00	0x25	0x27	0x0F	0x25

Gas concentration value PPM = (gas concentration high byte x 256 + gas concentration low byte) / 1000

If the user has switched to query-response mode and needs to switch back to active upload mode, send the following command format:

Table 6

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Reserved	Switch command	Active upload	Reserved	Reserved	Reserved	Reserved	Checksum
0xFF	0x01	0x78	0x40	0x00	0x00	0x00	0x00	0x47

When the user needs query-response mode, they can turn off active upload by sending the command format below, and then send the read-concentration command. The command format to turn off active upload is as follows:

Table 7

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Reserved	Switch command	Query-response	Reserved	Reserved	Reserved	Reserved	Checksum
0xFF	0x01	0x78	0x41	0x00	0x00	0x00	0x00	0x46

In query-response mode, the command format to read the concentration is as follows:

Table 8

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Reserved	Command	Reserved	Reserved	Reserved	Reserved	Reserved	Checksum
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	0x79

The returned sensor concentration value is in the following display format (same as the active upload format):

Table 9

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Gas name	Unit	Decimal places (none)	Gas conc. high byte	Gas conc. low byte	Full scale high byte	Full scale low byte	Checksum
0xFF	0x12	0x04	0x00	0x00	0x25	0x27	0x0F	0x25

Gas concentration value PPM = (gas concentration high byte x 256 + gas concentration low byte) / 1000

HEX to Decimal

H2S		
HEX	0XFF	0X19
Decimal	255	25

O3		
HEX	0XFF	0X11
Decimal	255	17

NO2		
HEX	0XFF	0X12
Decimal	255	18

CO		
HEX	0XFF	0X14
Decimal	255	20

SO2		
HEX	0XFF	0X13
Decimal	255	19

NH3		
HEX	0XFF	0X18
Decimal	255	24

HCHO		
HEX	0XFF	0X17
Decimal	255	23

Checksum Calculation

Checksum = (Bitwise inversion of (Byte1+Byte2+.....+Byte7)) + 1

Reference example code is as follows:

```
/*****************************************************************************
* Function name: unsigned char FucCheckSum(uchar *i, uchar ln)
* Description: Sum checksum (sum of protocol elements 1\2\3\4\5\6\7
*    for send/receive, then invert +1)
* Notes: Sum elements 1 through the second-to-last element of the
*    array, then invert and add 1 (array must contain more than 2
*    elements)
*****************************************************************************/

unsigned char FucCheckSum(unsigned char *i, unsigned char ln)
{
  unsigned char j, tempq = 0;
  i += 1;
  for (j = 0; j < (ln - 2); j++)
  {
    tempq += *i;
  } i++;

  tempq = (~tempq) + 1;
  return (tempq);
}
```

Cross Sensitivity

H_2S sensitivity	% measured gas @ 5ppm	H_2S	< -80
NO sensitivity	% measured gas @ 5ppm	NO	<5
Cl_2 sensitivity	% measured gas @ 5ppm	Cl_2	<100
SO_2 sensitivity	% measured gas @ 5ppm	SO_2	< -3
CO sensitivity	% measured gas @ 5ppm	CO	< -3
C_2H_4 sensitivity	% measured gas @ 100ppm	C_2H_4	< 0.1
NH_3 sensitivity	% measured gas @ 20ppm	NH_3	< 0.1
H_2 sensitivity	% measured gas @ 100ppm	H_2	< 0.1
CO_2 sensitivity	% measured gas @ 5% volume	CO_2	< 0.1
Halothane sensitivity	% measured gas @ 100ppm	Halothane	< 0.1

Product Gallery & Modules

The Prana Air sensor ecosystem includes the core electrochemical sensing elements (shown in the protective foam packaging.

Mass Production Trays

Sensor Elements

Disclaimer: The specifications and dimensions provided in this datasheet are based on testing at standard optimal conditions (24°C). Actual performance may vary depending on environmental factors such as humidity, pressure, and integration methods. Prana Air Private Limited reserves the right to modify product specifications without prior notice.

Precautions

- Electrolyte leakage can cause damage; do not disassemble the sensor without authorization.
- Avoid exposing the sensor to organic solvents (including silicone rubber and other adhesives), paints, chemical agents, oils, and high-concentration gases.
- All electrochemical sensors must not be completely encapsulated with resin materials, nor immersed in an oxygen-free environment, as this will damage the sensor's performance.
- All electrochemical sensors must not be used for extended periods in environments containing corrosive gases, as corrosive gases will damage the sensor.
- Zero-point gas calibration must be performed in a clean atmosphere.
- During sensor testing and application, avoid direct vertical gas intake onto the front of the sensor.
- The gas intake surface of the sensor must not be blocked or contaminated.
- The waterproof, breathable membrane on top of the sensor must never be removed or artificially damaged.
- The sensor must not be subjected to excessive impact or vibration.
- Do not use the sensor if the housing is damaged, deformed, or otherwise compromised.
- After prolonged use in high-concentration gas environments, the sensor will recover to its initial state relatively slowly.
- During storage, the working electrode and counter electrode of the sensor should be kept in a short-circuited state.
- Do not use hot-melt adhesive or sealants with a curing temperature above 80°C to encapsulate the sensor.
- Do not store or use the sensor for extended periods in high-concentration alkaline gas environments.