



TVOC Sensor Module
AGM-1
Technical Manual

Version: V1.1

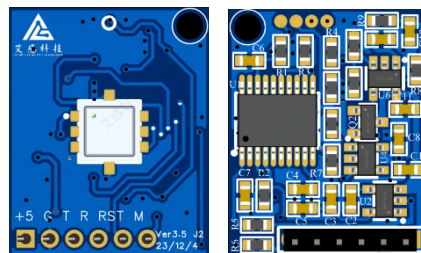
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I . Product Introduction

The TVOC gas sensor module is specifically designed for accurately measuring the concentration of TVOC (Total Volatile Organic Compounds) in the environment, providing an efficient tool for air quality assessment. Its core advantage lies in its excellent adaptability and scalability, allowing customization according to users' specific needs.



Note: Design tool - Li Chuang EDA,
PCB manufacturer - Jia Lichuang PCB.

II . Module Features

This sensor module is renowned for its outstanding performance characteristics, including:

- 1. High Sensitivity:** Capable of quickly responding to minute changes in the environment, ensuring the accuracy of detection results.
- 2. Stability:** Maintains consistent performance over long-term operation, reducing the need for maintenance and calibration.
- 3. Compact Design:** Its small size makes it easy to integrate into various devices, facilitating portability and deployment.
- 4. Simple Measurement Circuit:** Simplifies installation and operation processes, lowering the technical threshold.
- 5. Long Lifespan:** Durable materials and design ensure long-term use of the sensor module, reducing replacement frequency.
- 6. High Cost-Effectiveness:** Provides high-quality detection capabilities while maintaining reasonable costs, offering an economical choice for users.

These features collectively build the competitive advantage of this sensor module in the market, meeting different users' expectations for high performance, ease of use, and low cost.

III. Main Applications

The application scope of this sensor module is extremely wide, covering multiple fields:

- 1. Smart Home:** Provides real-time air quality monitoring for households, ensuring a healthy and comfortable living environment.
- 2. Environmental Air Quality Monitoring:** Continuously monitors air quality outdoors or in specific areas to assess and improve environmental conditions.
- 3. In-Car Air Purifier:** Monitors and purifies air inside vehicles, safeguarding the health of drivers and passengers.
- 4. Livestock Farming Air Detection:** Monitors air quality in farming facilities, providing a better growth environment for animals.
- 5. Handheld Air Quality Detector:** Portable device, allowing users to detect air quality anytime, anywhere.
- 6. Factory Workshop Fresh Air System:** Monitors air quality in industrial environments, improving ventilation conditions through fresh air systems.

This sensor module, with its high applicability and flexibility, meets the diverse needs for air quality monitoring in different environments, providing effective solutions for various industries.

IV. Technical Parameters

4.1 Technical Indicators

Model	AGM-1
Physical Interface	2.0MM*6P Pin Header
Detection Gas	TVOC
Working Voltage	$5.0 \pm 0.2V$ DC (No Reverse Voltage Protection)
Working Current	$\leq 60mA$
Communication Interface	UART
Operating Temperature	$-20^{\circ}C \sim 50^{\circ}C$
Operating Humidity	$\leq 96\%RH$
Storage Temperature	$-25^{\circ}C \sim 65^{\circ}C$
Storage Humidity	$\leq 65\%RH$
Dimensions	$20.5 \times 16.5 \times 3.6mm$ (L×W×H)
Weight	$\leq 20g$
Lifespan	5 Years

Table 4-1 Technical Specifications

4.2 Pin Definitions

Pins	Pin Name	Remark
1	+5V	Positive terminal of power input
2	GND	The power input is negative
3	TX	UART(TX)
4	RX	UART(RX)
5	RST	Reset Pin (Active Low)
6	MODECHANGE	Serial Port Mode (Active High or Floating)

Table 4-2 Pin Definition

Note: Pins3(TX), Pins4(RX), Pins5(RST), Pins6(MODECHANGE) are 3.3V TTL level. If other types of level signals are used, a level matching circuit must be connected to ensure compatibility and normal operation. When Pins5 (RST) and Pins6 (MODECHANGE) are not in use, they can be left floating.

4.3 Module Dimensions

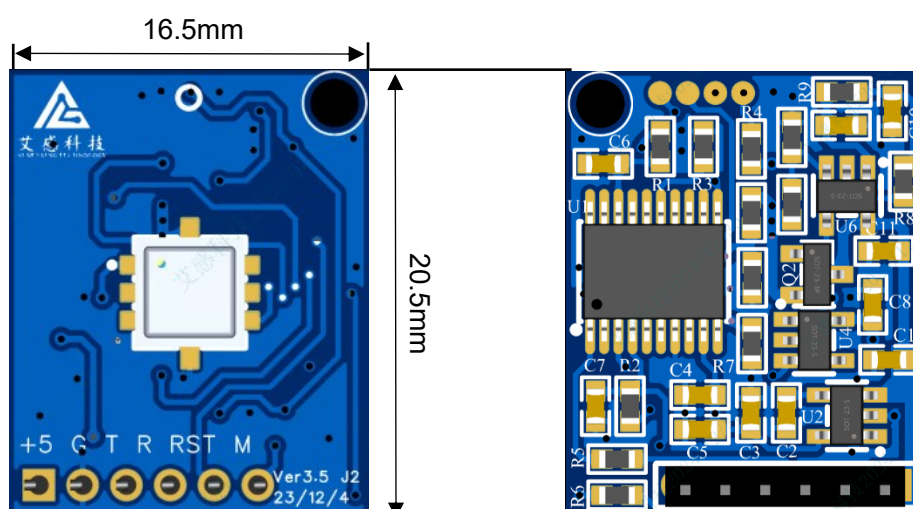




Figure 4-3 Module Dimensions

V. Communication Protocol

5.1 Communication Settings

Baud Rate	115200
Data Bits	8 Bits
Stop Bit	1 Bit
Check digit	None
Hardware Flow Control	None

Table 5-1 Communication Settings

5.2 Communication Commands

5.2.1 Active Upload Mode

The active upload data format is as follows:

The communication methods are divided into: active upload mode and response mode. The module is set to active upload mode by default (data upload interval is 1S).

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5
Frame Header			XX	Alarm Bit	High Gas Concentration Level

Table 5-2(1) Active Upload Mode (Byte0 - Byte5)

Byte6	Byte7	Byte8	Byte9	Byte10
Low Gas Concentration	High ADC Value	Low ADC Value	Checksum	Frame End

Table 5-2(2) Active Upload Mode (Byte6 - Byte10)

Data Calculation:

Gas Concentration Value = (High Gas Concentration * 256 + Low Gas Concentration) / 100

ADC Value = (High ADC Value * 256 + Low ADC Value)

Example: FE FE 68 01 01 18 09 09 40 6C 16

Concentration Value = (24 * 256 + 9) / 100 = 61.53, so the concentration value is 61.53ppm

ADC Value = (9 * 256 + 64) = 2368, so the ADC value is 2368

Alarm Bit 01 indicates alarm triggered; 00 indicates no alarm triggered

If the user needs to switch to active mode, send the following command to the module:

Table 5-3 Restore Active Mode

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Frame Header	Reserved	Switch Mode Command	Active Upload Mode	Reserved	Reserved	Reserved	Reserved	Checksum
0xFE	0x00	0x78	0x40	0x00	0x00	0x00	0x00	0xB8
EXP	FE 00 78 40 00 00 00 00 B8							

5.2.2 Question and Answer Mode

When the user needs to switch to the question-and-answer mode, they should first send the command to stop the active upload mode. The command format is as follows:

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Frame Header	Reserved	Switch Mode Command	Stop Active Upload	Reserved	Reserved	Reserved	Reserved	Checksum
0xFE	0x00	0x78	0x41	0x00	0x00	0x00	0x00	0xB9
EXP	FE 00 78 41 00 00 00 00 B9							

Table 5-4 Question-and-Answer Mode

In the question-and-answer mode state, the command format for reading concentration is as follows:

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Frame Header	Reserved	Question-and-Answer Mode Command	Reserved	Reserved	Reserved	Reserved	Reserved	Checksum
0xFE	0x00	0x86	0x00	0x00	0x00	0x00	0x00	0x86
EXP	FE 00 86 00 00 00 00 00 86							

Table 5-5 Question-and-Answer Mode Data Retrieval

Note: The data returned in the question-and-answer mode is consistent with the data format in the active upload mode.

5.2.3 Query Model

When the user needs to query the module model, they can send the query model command. The command format is as follows:

Table 5-6 Query Model

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Frame Header	Reserved	Module Model Command	Reserved	Reserved	Reserved	Reserved	Reserved	Checksum
0xFE	0x00	0x96	0x00	0x00	0x00	0x00	0x00	0x96
EXP	FE 00 96 00 00 00 00 00 96							

VI. Checksum Calculation

The Module Emits A Data Check alue = (Byte 3 + Byte 4 + ... + Byte 8);

Host-to-Module Data Checksum = (Byte 1 + Byte 2 + ... + Byte 7);

Reference Example:

/******

* Function Name: uint8_t CRC_Check(uint8_t *Data, uint32_t Size)

* Function Description: Checksum Calculation

* Function Explanation: Sums the elements of the array

*****/

uint8_t CRC_Check(uint8_t *Data, uint32_t Size)

```
{
    uint32_t Count;
    uint8_t CrC=0;
    for(Count=0;Count<Size;Count++)
    {
        CrC+=*Data;
        Data++;
    }
    return CrC;
}
```



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