Digital MEMS VOC Gas Sensor Module

**（Model No.:ZM01）**

# Manual

Version: 1.4

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Zhengzhou Winsen Electronics Technology Co., Ltd

# Statement



Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &etc, please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

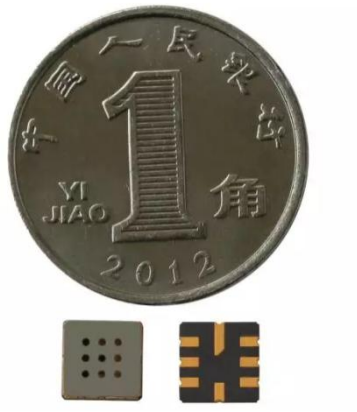
Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD

# ZM01 MEMS VOC Gas Sensor Module

**Product description**

MEMS VOC gas sensor is using MEMS micro-fabrication hot plate on a Si substrate base, gas-sensitive materials used in the clean air with low conductivity metal oxide semiconductor material. When the sensor exposed to gas atmosphere, the conductivity is changing as the detected gas concentration in the air. The higher the concentration of the gas, the higher the conductivity. The sensor has high sensitivity and small size, and adopts I2C digital signal output mode to facilitate the observation of multiple sensor networks. It can be widely used in many fields such as environmental safety and portable instruments.




**Characteristics:**

MEMS technology
Stable and strong structure
Low power consumption
High sensitivity
Anti-electromagnetic interference

**Applications:**

Environmental monitoring
Portable device
Health care
Site control

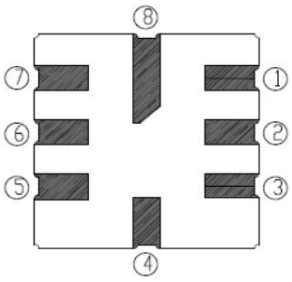
**Parameters**

| | | | |
|---|---|---|---|
| Working voltage | 2.5±0.1V | Working current | ≤25mA |
| Max heating power | 80mW | Detection range | 5ppm（alcohol） |
| Output mode | I2C slave mode | Default address | 0x55 |
| I2C rate | 10-100kbps | Pull-up resister | Need external pull-up resistor |
| Pre-heat time | ≤3min | Response time | ≤ 60s |

**Chip limit value**

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Storage temperature | -25 | - | 60 | ℃ |
| Working temperature | -10 | - | 50 | ℃ |
| Limit voltage (VCC & GND) | -0.3 | - | VCC+0.3 | V |
| Limit voltage (Other pins) | -0.3 | - | VCC+0.3 | V |
| Limit current | - | - | 100 | mA |

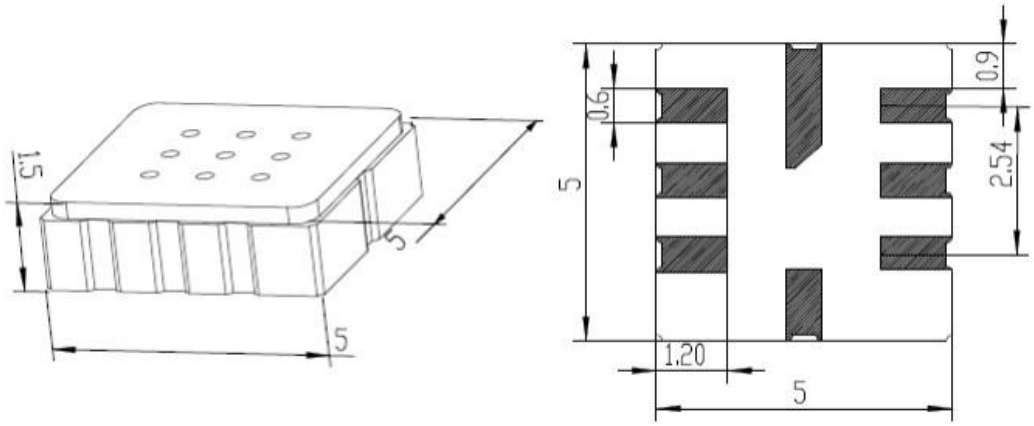
## Pin definition




| | | | |
|---|---|---|---|
| 1 | / | 5 | NC |
| 2 | SCL | 6 | NC |
| 3 | SDA | 7 | VCC |
| 4 | / | 8 | GND |

**Figure 1： pin definition of sensor(botom view**

## Size




## Sensitivity curve

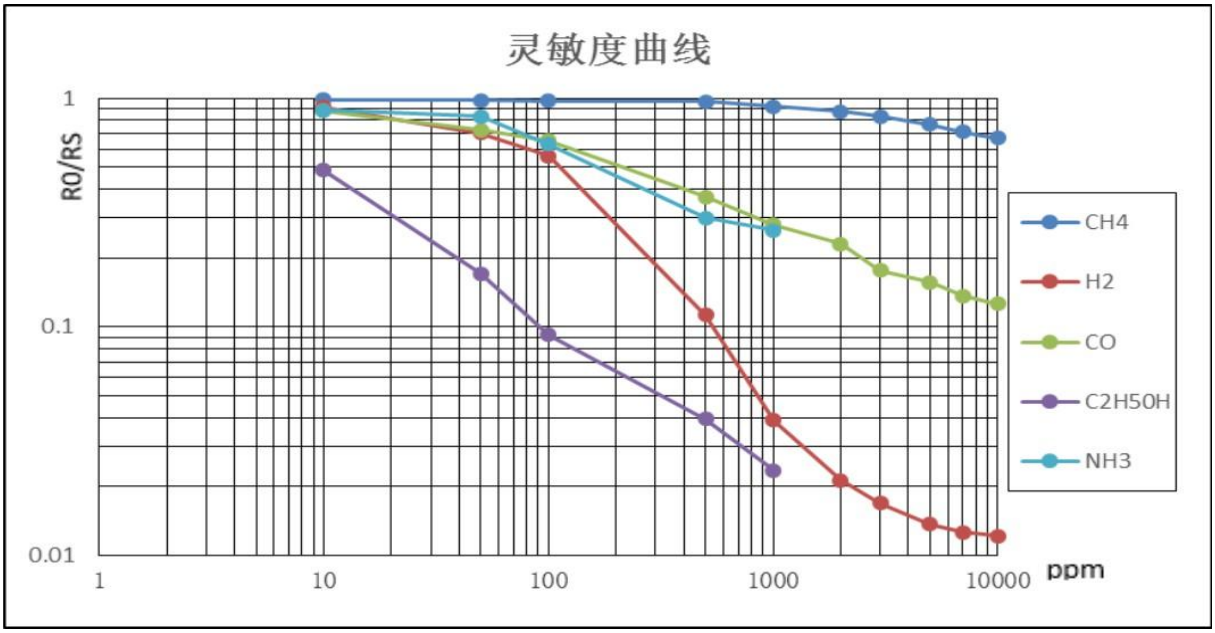
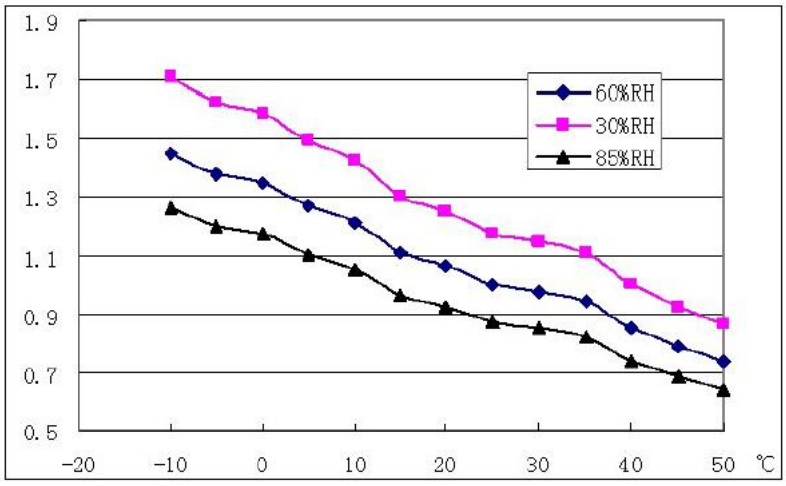



Figure 3： sensitivity curve

**Temperature & Humidity Curve**




**Application Method:**

The sensor needs warm-up after power-on for about 100 seconds. After preheating is completed, the sensor enters into normal working condition.

Connecting the sensor to the I2C bus, the host sends a read command 0x55 0Xaa (hexadecimal) for the sensor address in turn, and the sensor returns an 8-bit data value immediately, which indicates current VOC concentration. The larger of current VOC concentration value, the higher of the VOC concentration.

The lowest value is 1, while the highest value is 200. If the range is 5 ppm, the reading value is 50, then the current concentration is 5 * 50/200 = 1.25 ppm.

The following figure is a complete waveform of I2C communication process for reference. It starts with “start”, sends slave address 0x55, receives slave response signal ACK, sends read command 0xAA, receives slave response signal ACK; starts signal “start”, sends slave address 0x55, receives slave response signal ACK, reads the VOC concentration level value and end the signal stops;

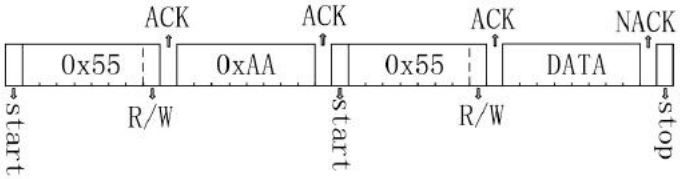



Figure 4: I2C communication waveform

**Cautions**

**1. Following conditions must be prohibited**

1.1 Exposed to organic silicon steam

Sensing material will lose sensitivity and never recover if the sensor absorbs organic silicon steam. Sensors must be avoid exposing to silicon bond, fixature, silicon latex, putty or plastic contain silicon environment.

1.2 High Corrosive gas

If the sensors are exposed to high concentration corrosive gas (such as H2S, SOX, Cl2, HCL etc.), it will not only result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

1.3 Alkali, Alkali metals salt, halogen pollution

The sensors performance will be changed badly if sensors be sprayed polluted by alkali metals salt especially

brine, or be exposed to halogen such as fluorine.

1.4 Touch water

Sensitivity of the sensors will be reduced when spattered or dipped in water.

1.5 Freezing

Do avoid icing on sensor's surface, otherwise sensing material will be broken and lost sensitivity.

## 2. Following conditions must be avoided

2.1 Water Condensation

Indoor conditions, slight water condensation will influence sensors' performance lightly. However, if water condensation on sensors surface and keep a certain period, sensors' sensitive will be decreased.

2.2 Used in high gas concentration

No matter the sensor is electrified or not, if it is placed in high gas concentration for long time, sensors characteristic will be affected. If lighter gas sprays the sensor, it will cause extremely damage.

2.3 Long time exposed to adverse environment

No matter the sensors electrified or not, if exposed to adverse environment for long time, such as high humidity, high temperature, or high pollution etc., it will influence the sensors' performance badly.

2.4 Vibration

Continual vibration will result in sensors down-lead response then break. In transportation or assembling line, pneumatic screwdriver/ultrasonic welding machine can lead this vibration.

2.5 Concussion

If sensors meet strong concussion, it may lead its lead wire disconnected.

2.6 Soldering

Soldering flux: Rosin soldering flux contains least chlorine and safeguard procedures.

**If disobey the above using terms, sensors sensitivity will be reduced.**

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