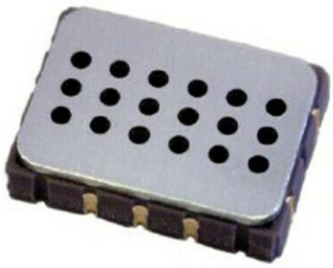

Winsen GM-502B MEMS VOC Gas Sensor User Manual

GM-502B MEMS VOC Gas Sensor
User Manual

MEMS VOC Gas Sensor
Model No.:GM-502B
Manual
Version: 2.2 Valid from: 2020.08.25
Zhengzhou Winsen Electronics Technology Co., Ltd

Contents

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Zhengzhou Winsen Electronics Technology CO., LTD
GM-502B MEMS VOC Gas Sensor

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 is exposed to the 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. Using a simple circuit can convert the change of conductivity of the gas concentration corresponding to the output signal.

Characters
MEMS technology, strong structure

Low power consumption
High sensitivity
Fast response and resume
Simple drive circuit

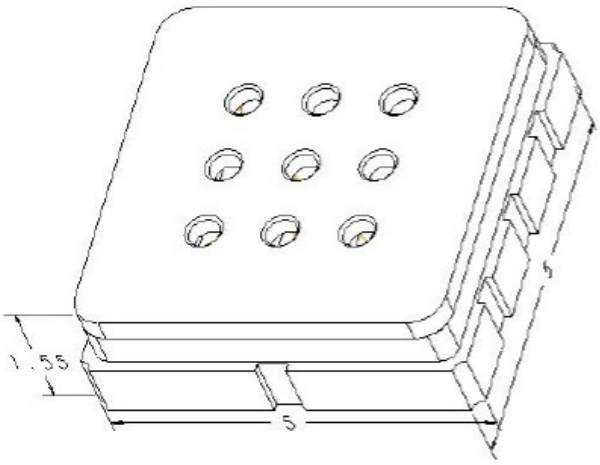
Application

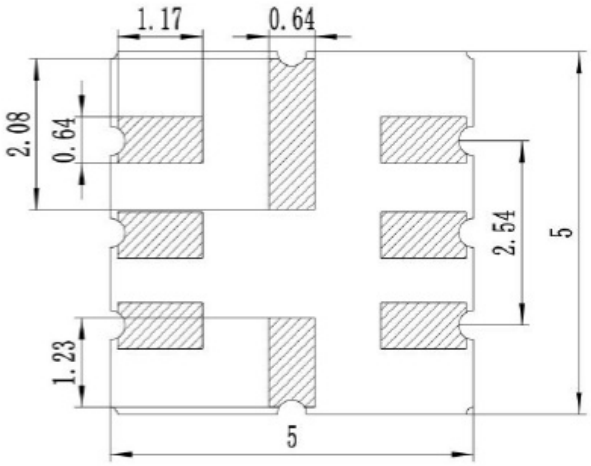
Gas leak detection for mobile phones, computers, and other consumer electronics applications, also for breathing gas detection control, smoke alarm indoor, etc.

Main Parameter:

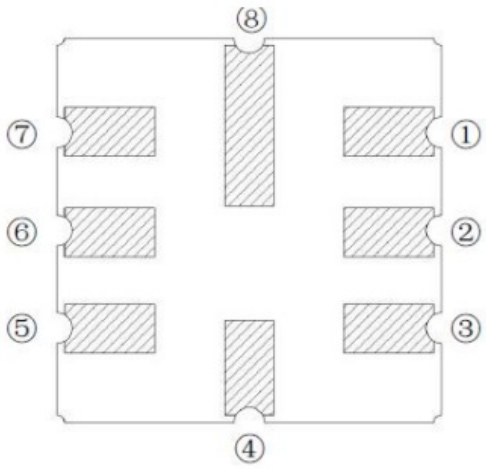
Part No.			GM-502B
Sensor Type			MEMS VOC Sensor
Standard Encapsulation			Ceramic
Detection Gas			Ethanol, formaldehyde, toluene &etc.
Detection Range			1-500ppm
Standard Circuit Conditions	Loop Voltage	Vc	524V DC
	Heater Voltage	VH	2.SV±0.1V AC or DC
	Load Resistance	RI.	Adjustable
Sensor character under standard test conditions	Heater Resistance	RH	800±200 (room temperature)
	Heater consumption	I:I.	550mW
	sensitive materials resistance	R,	1K0—30K0(in SOppm ethanol)
	Concentration slope	a	.g:).9(R20Oppm/RSOOppm ethanol)
	Sensitivity	S	Ro(in air)/Rs(in 50ppm ethanol)23.0
Standard test conditions	Temp. Humidity		20°C±2°C: 55%±5%R1-1
	Standard test circuit		VH:2.5V±0.1V: Vc:5.0V±0.1V

Sensor Structure Diagram



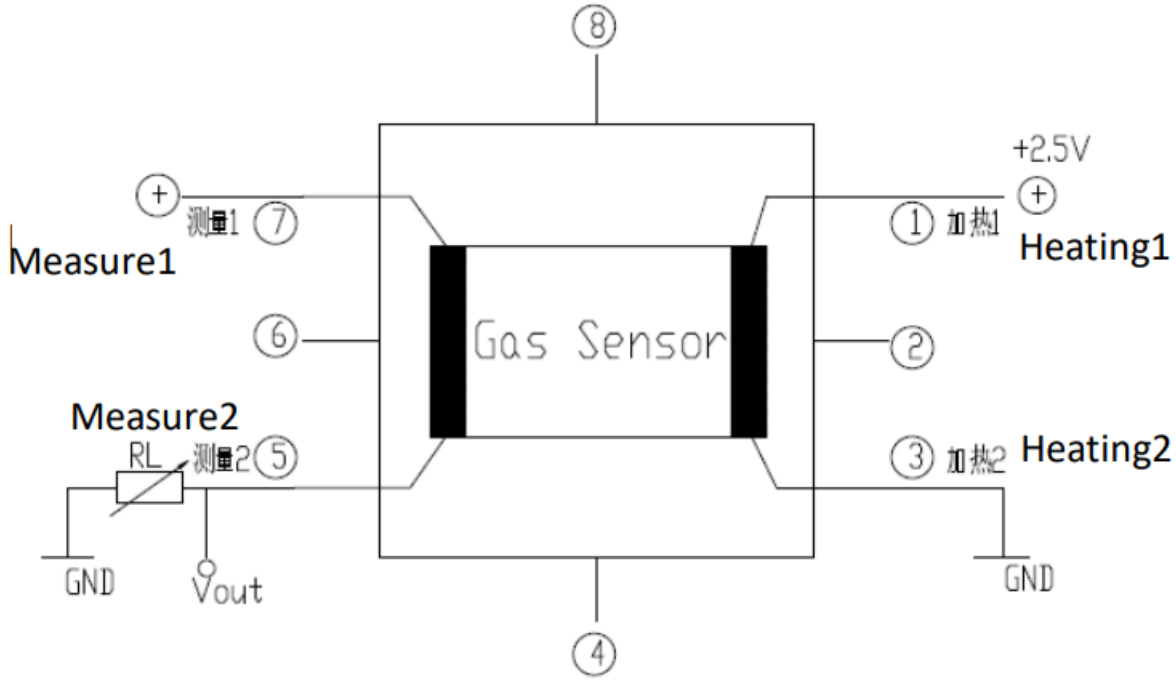


From bottom.(Unit is mm)



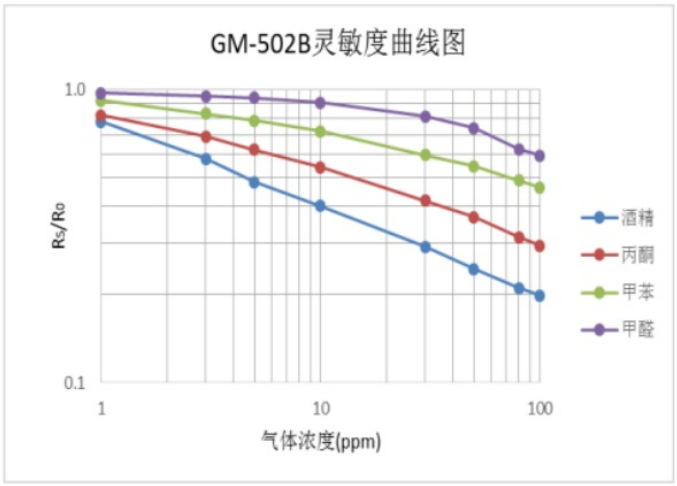
Pin	Connect
①	RH1
②	
③	RH2
④	
⑤	RS1
⑥	
⑦	RS2
⑧	

Recommend Circuit



Instructions: The above fig is the basic test circuit of GM-502B.The sensor requires two voltage inputs: heater voltage (VH) and circuit voltage (VC). VH is used to supply specific working temperatures to the sensor and it can adopt DC or AC power. Vout is the voltage of load resistance RL which is in series with sensor. Vc supplies the detect voltage to load resistance RL and it should adopt DC power.

Sensitivity Characteristics:



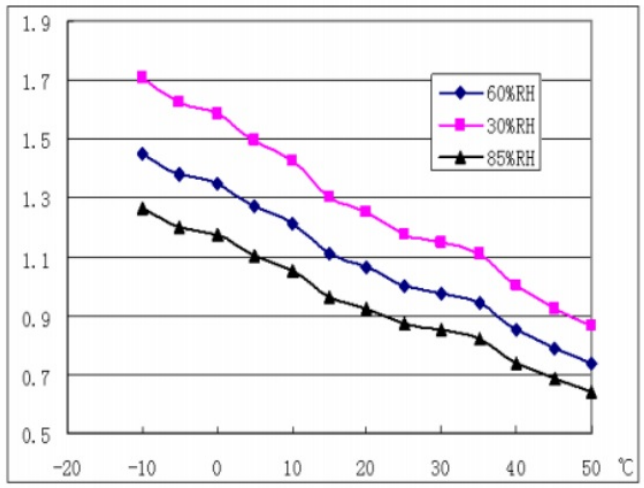
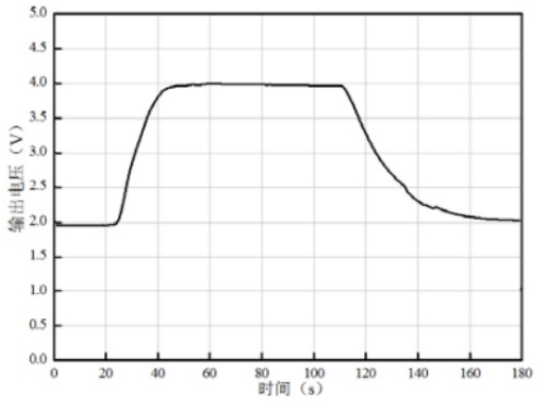


Fig3.Typical Sensitivity Curve

Rs means resistance in target gas with different concentrations, R0 means the resistance of the sensor in clean air. All tests are finished under standard test conditions.

Fig4.Typical temperature/humidity characteristics

Rs means the resistance of the sensor in 50ppm alcohol gas under different temp. and humidity. Rso means the resistance of the sensor in 50ppm alcohol gas under 20/55%RH.



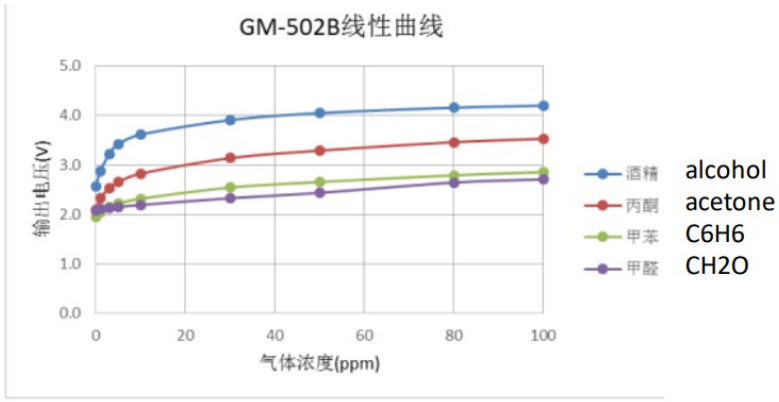


Fig5.Response and Resume

The output in the above Fig is the voltage of RL which is in series with the sensor. All tests are finished under standard test conditions and the test gas is 50ppm acohol gas.

Fig6. Linearity character

The output in the above Fig is the voltage of RL which is in series with the sensor. All tests are finished under standard test conditions.

Long-term stability

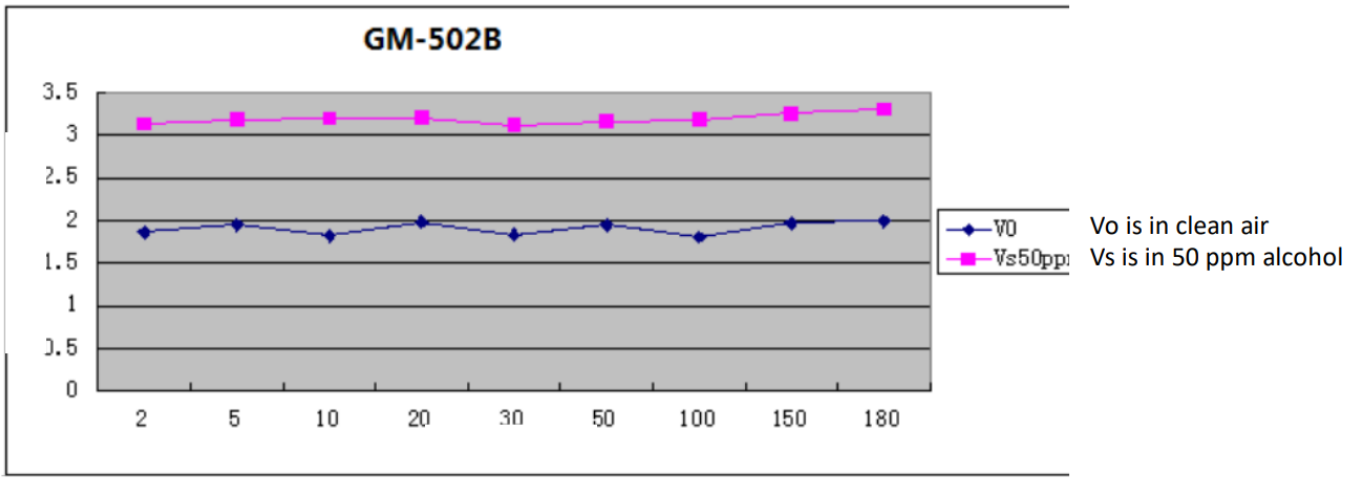


Fig7.long-term Stability

The test is finished in standard test conditions, the abscissa is observing time and the ordinate is the voltage

output of RL.

Instructions:

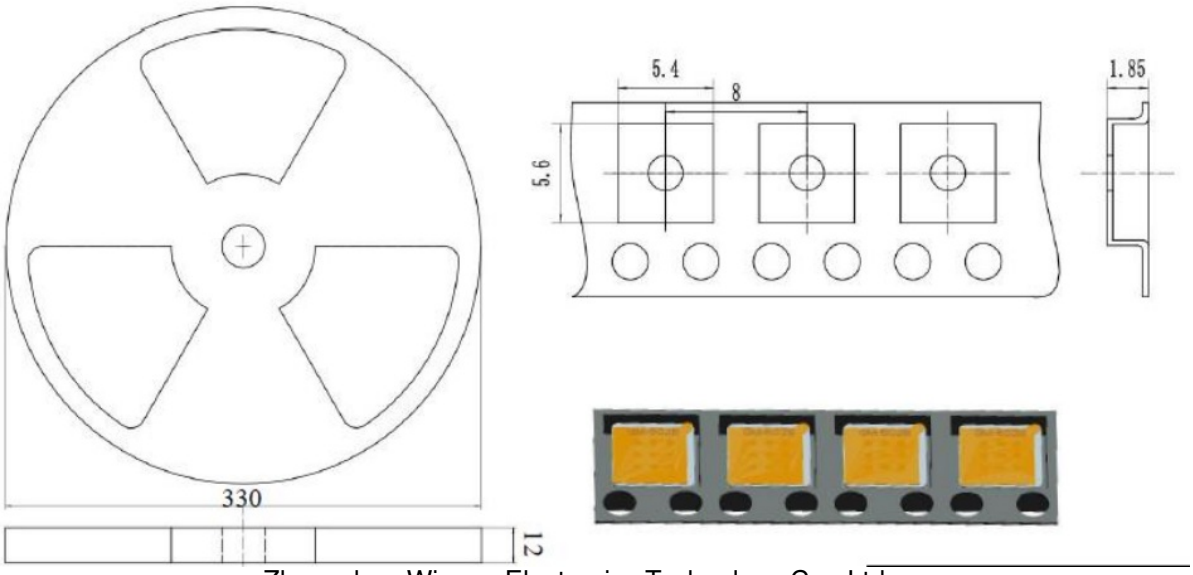
1. Preheating time
Sensors' resistance may drift reversibly after long-term storage without power. It needs to preheat the sensor to reach inside chemical equilibrium. Preheating voltage is the same as heating voltage VH. The suggested preheating time as follow:

Storage Time	Suggested aging time
Less than one month	No less than 24 hours
1 ~ 6 months	No less than 48 hours
More than six months	No less than 72 hours

Calibration
Sensor's accuracy is affected by many factors such as reference resistance difference, the sensitivity difference, temperature, humidity, interfering gases, preheating time, the relationship between input and output is not linear, hysteretic and non-repetitive. For absolute concentration measurement, they need regular calibration (one-point calibration / multi-point calibration for full scale) to ensure that the measuring value is accurate. For relative measurement, calibration is not required.
Cautions 1. The 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 avoid exposure to silicon bonds, fixtures, silicon latex, putty or plastic-containing 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 the structure of the sensor, but also it causes sincere sensitivity attenuation.
1.3 Alkali, Alkali metals salt, halogen pollution
The sensor's performance will be changed badly if sensors are sprayed polluted by alkali metals salt, especially brine, or 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 the sensor's surface, otherwise sensing material will be broken and lost sensitivity
. 1.6 Applied voltage
The applied voltage on the sensor should not be higher than 120mW, it will cause irreversible heater damage, also hurt from static, so anti-static precautions should be taken when touching sensors.
2. Following conditions must be avoided
2.1 Water Condensation In Indoor conditions, slight water condensation will influence sensors' performance lightly. However, if water condensation on sensors' surface and keeps a certain period, the sensors' sensitivity will be decreased. 2.2 Used in high gas concentration
No matter whether the sensor is electrified or not, if it is placed in high gas concentration for a long time, sensors characteristic will be affected. If lighter gas sprays the sensor, it will cause extreme damage.
2.3 Long time exposed to extreme environment
No matter the sensors are electrified or not, if exposed to an adverse environment for a 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 lines, a 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
2.6.1Recommended conditions for reflow soldering neutral atmosphere soldering temperature 250±10 avoid flux steam
2.6.2Recommended conditions for manually soldering rosin flux with least chlorine soldering temperature 350 lasting time 5s. If disobeying the above-using terms, sensors sensitivity will be reduced.

Package

The surface of the MEMS sensor is affixed with a special protective film to prevent the influence of dust, water, atmosphere, and high temperature. After the welding is completed, the protective film can be removed.



Zhengzhou Winsen Electronics Technology Co., Ltd
Add No.299, Jinsuo Road, National Hi-Tech Zone,
Zhengzhou 450001 China
Tel: +86-371-67169097/67169670
Fax: +86-371-60932988

E-mail: sales@winsensor.com
Website: www.winsen-sensor.com

Documents / Resources

	Winsen GM-502B MEMS VOC Gas Sensor [pdf] User Manual GM-502B, MEMS VOC Gas Sensor, VOC Gas Sensor, Gas Sensor, GM-502B, Sensor

References

- Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics