MEMS VOC Gas Sensor

（Model No.:GM-503A）

Manual

Version: 1.0

Valid from: 2015.12.1

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.

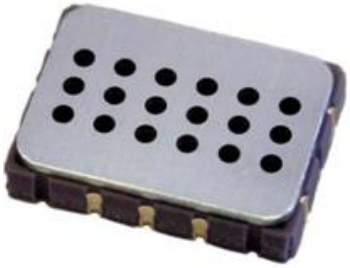
Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD

GM-503A MEMS VOC Gas Sensor

Product description

MEMS combustible 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. Use simple circuit can convert the change of conductivity of the gas concentration corresponding to the output signal.



Character:

MEMS technology, strong structure
Low power consumption
High sensitivity
Fast response and resume
Simple drive circuit
Anti-vibration

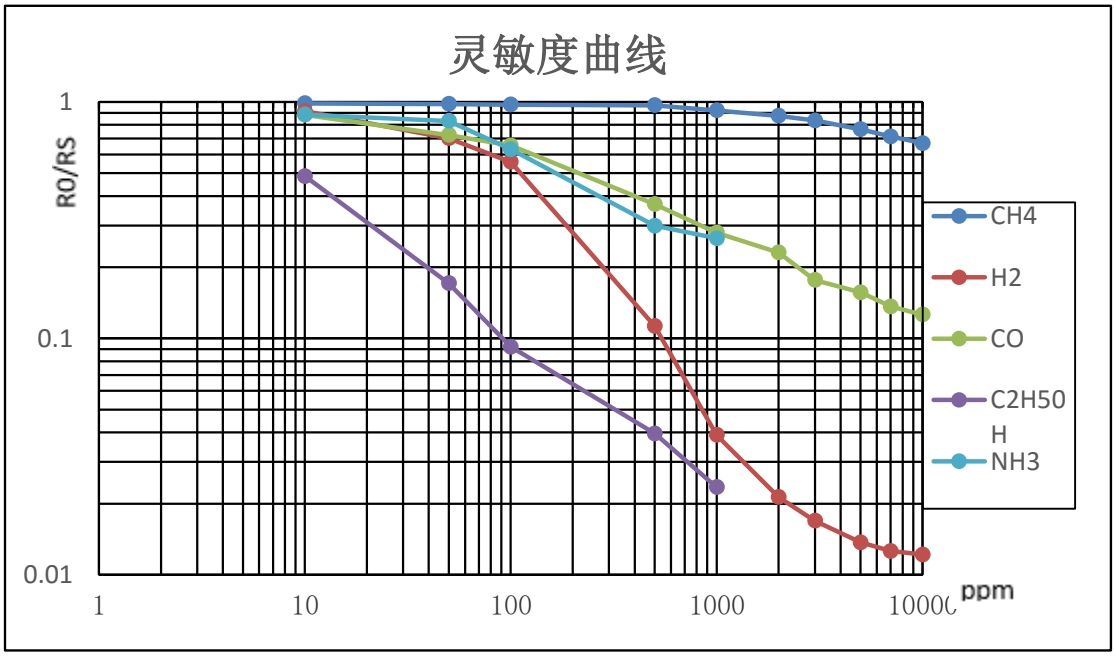
Target gas

Alcohol (C_2H_5OH) : 10–500ppm
Hydrogen(H_2):1 – 1000ppm
Formaldehyde(CH_2O):10-100ppm

Application

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

Sensitivity Characteristics:



Technical Index

Gas sensor character	Symbol	standard	Minimum	Maximum	Unit
Sensor Resistance	R0	-	100	1500	K Ω
Gas (C2H5OH) concentration	FS	-	1	1000	ppm
Sensitivity	S50	-	1.2	50	-

Note:

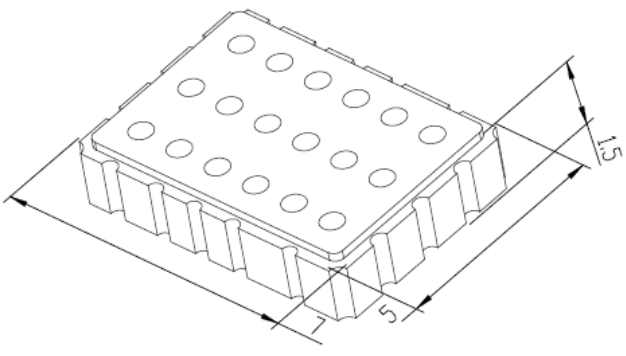
1.R_0 is measured at ambient temperature 23 ± 5 ℃, humidity at 50 ± 10% RH standard working conditions;

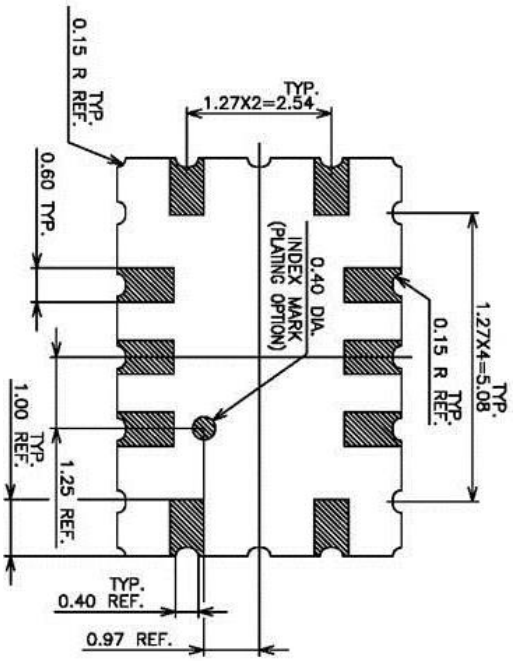
2. S_{50} is the ratio : Rs (in 50ppm C2H5OH) / R_0(in air) at ambient temperature of 23 ± 5 ℃, humidity 50 ± 10% RH conditions.

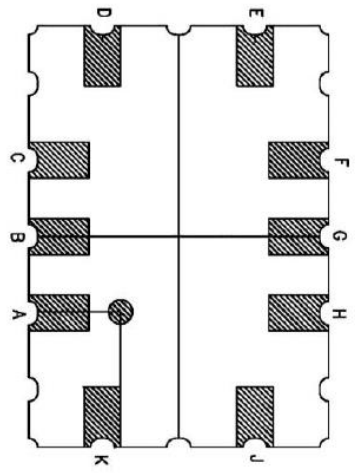
Condition	Symbol	Range	Unit
Max heater consumption	P_H	88	mW
Circuit Voltage	V_S	4.9 – 5.1	V
relative humidity	RH	5 – 95	%RH
Working temp	Ta	-30 – 85	°C
Storage temp	T_S	-40 – 120	°C
Storage humidity	RH	5 - 95	%RH

Name	Symbol	Standard value	Minimum	Maximum	Unit
Heater consumption	P_H	76	71	81	mW
Heater voltage	V_H	2.4	-	-	V
Heater current	I_H	32	-	-	mA
Heater resistance	R_H	74	66	82	Ω

Sensor Structure Diagram

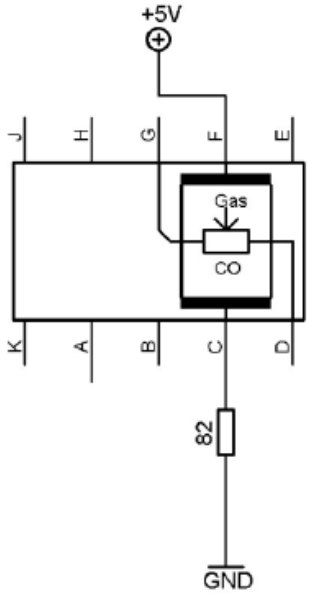


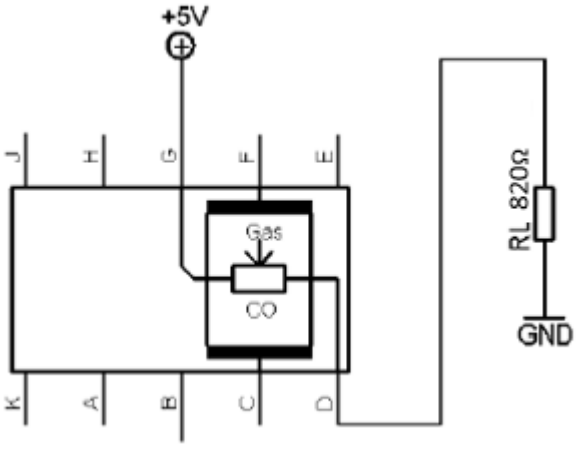




Pins	
A	
B	
C	RH1
D	RS1
E	
F	RH2
G	RS2
H	
J	
K	

Recommend Circuit





Note:

1. Use a 82Ω resistor at 5V voltage circuit, the sensor is heated voltage of 2.4V, so that the sensor can work under suitable heating temperature.

2. The sensor connects load resistance not less than 820Ω, and will not damage the sensitive surface layer of sensor.

Manual:

1. Preheating time

Sensor needs some time to reach inside chemical equilibrium so it takes some preheating time. Generally, the sensor at a relatively high temperature will reach equilibrium faster, so you can boot in the first tens of seconds, it can give a higher voltage sensor to warm up. For C2H50H working at 50mW, the first 30 seconds use 80mw heating. In general, the longer the preheating time, the better the accuracy of the sensor.

2. Sensor Calibration

For absolute concentration measurement, sensors accuracy can be affected by many factors such as reference resistance difference, the sensitivity difference, temperature, humidity, interfering gases, aging time, therefore they need regular calibration. For relative measurement calibration is not required. Because the sensor characteristic curve is not linear, it is recommended in the whole range of multi-point calibration and consider the influence of temperature and humidity. Once the calibration data obtained can be linear or polynomial fit to organize the data.

3. Long-term stability of the sensor

With the increase in working hours, the heating circuit resistance will increase, through a certain circuit to resolve. Experimental data indicates that at 40mW power supply condition, the resistance is not change after 6000 working hours; under 80mW power supply conditions, heat resistance increased by 30%. A series resistor on the heating circuit, the effect of the resistance value of the power of 2% or less by this method can solve the problem. Of course, you can also use peer power circuit to solve.

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.

1.6 Applied voltage

Applied voltage on sensor should not be higher than 120mW, it will cause irreversible heater damaged, also hurt from static, so anti-static precautions should be taken when touching sensors.

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.

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