



**MEMS Combustible Gas Sensor**  
**(Model No.: GM-402B)**

# **Manual**

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Zhengzhou Winsen Electronics Technology Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD

## GM-402B MEMS combustible 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
- Low power consumption
- High sensitivity
- Fast response and resume
- Simple drive circuit

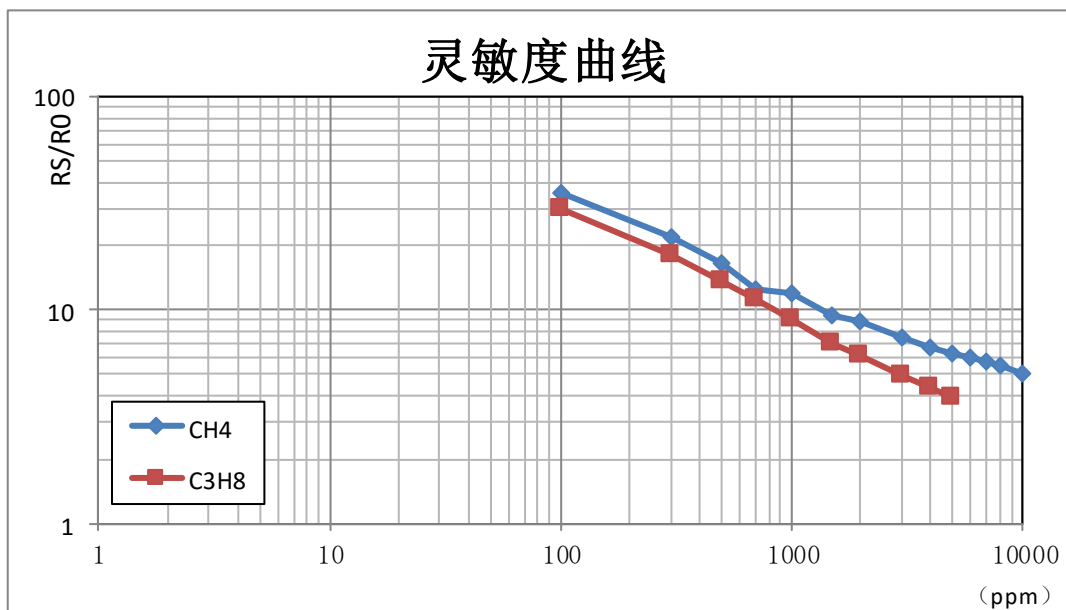
### Detection gas

- Methane (CH<sub>4</sub>) : 1 – 1000ppm
- Propane (C<sub>3</sub>H<sub>8</sub>): 1-5000ppm

### Application

Gas leak detection for mobile phones, computers and other consumer electronics applications; also apply for home, commercial use of the combustible gas leakage monitoring devices, gas leak detectors, fire / security detection system.

### Sensitivity Characteristics:



**Technical Index**

Gas sensor character	Symbol	standard	Minimum	Maximum	Unit
Sensor Resistance	$R_0$	-	100	1500	K $\Omega$
Gas (CH <sub>4</sub> ) concentration	$F_s$	-	1	500	ppm
Sensitivity	$S_{50}$	-	1.2	50	-

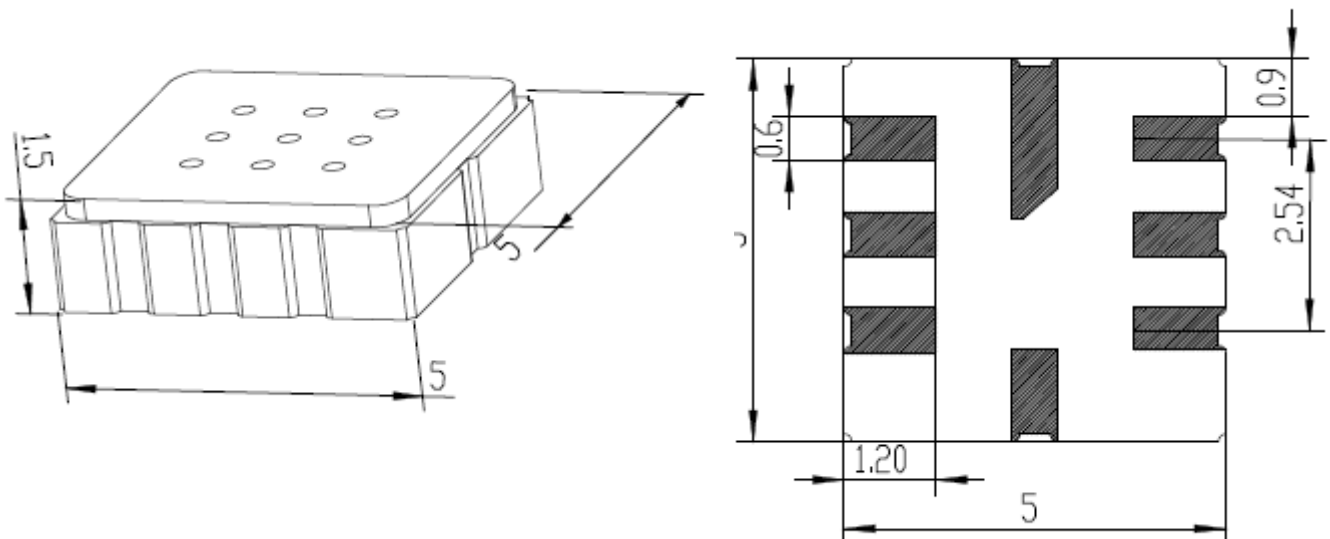
**Note:**

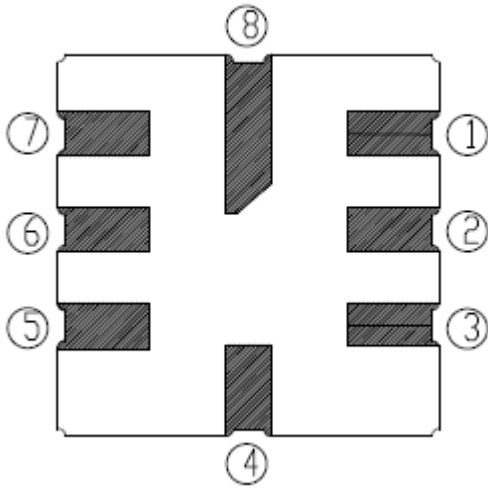
1.  $R_0$  is measured at ambient temperature  $23 \pm 5$  °C, humidity at  $50 \pm 10\%$  RH standard working conditions;
2.  $S_{50}$  is the ration:  $R_s$  (in 3000ppm CH<sub>4</sub>) /  $R_0$  (in air) ,at ambient temperature of  $23 \pm 5$  °C, humidity  $50 \pm 10\%$  RH conditions

Condition	Symbol	Range	Unit
Max heater consumption	$P_H$	80	mW
Circuit Voltage	$V_s$	4.9~ 5.1	V
relative humidity	RH	5 ~ 95	%RH
Working temp	$T_a$	-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	$P_H$	70	60	80	mW
Heater voltage	$V_H$	3.0	-	-	V
Heater current	$I_H$	23	-	-	mA
Heater resistance	$R_H$	77	70	87	$\Omega$

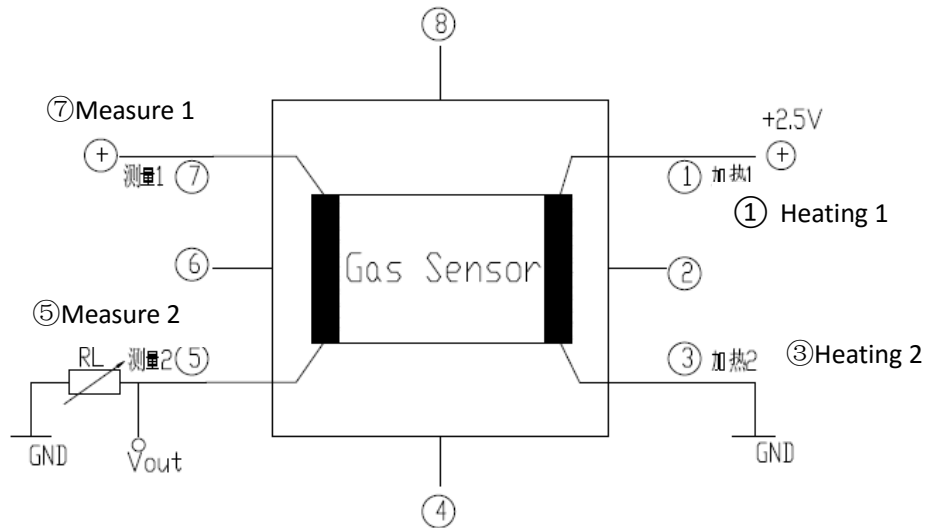
**Sensor Structure Diagram**





Pins	Connetion
①	RH1
②	
③	RH2
④	
⑤	RS1
⑥	
⑦	RS2
⑧	

**Recommend Circuit**



**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. 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.

## 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, fixture, 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 H<sub>2</sub>S, SO<sub>x</sub>, Cl<sub>2</sub>, 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 splattered 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.

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