GMV-2021B MEMS H2 Sensor

Manual

（Model No.:GMV-2021B）

Version: 1.0

Valid from: 2021.08.28

Zhengzhou Winsen Electronic Technology Co., Ltd

Statement

This manual copyright belongs to Zhengzhou Winsen Electronics Technology Co., LTD. Without the

written permission, any part of this manual shall not be copied, translated, stored in database or

retrieval system, also can't spread through electronic, copying, record ways.

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

GMV-2021B H2 Sensor

Product Description

GMV-2021B hydrogen sensor is a gas sensor based on all solid state MOS principle of advanced MEMS architecture. Hydrogen in the environment will lead to the change of MOS conductivity, which is an exponential function of hydrogen concentration.
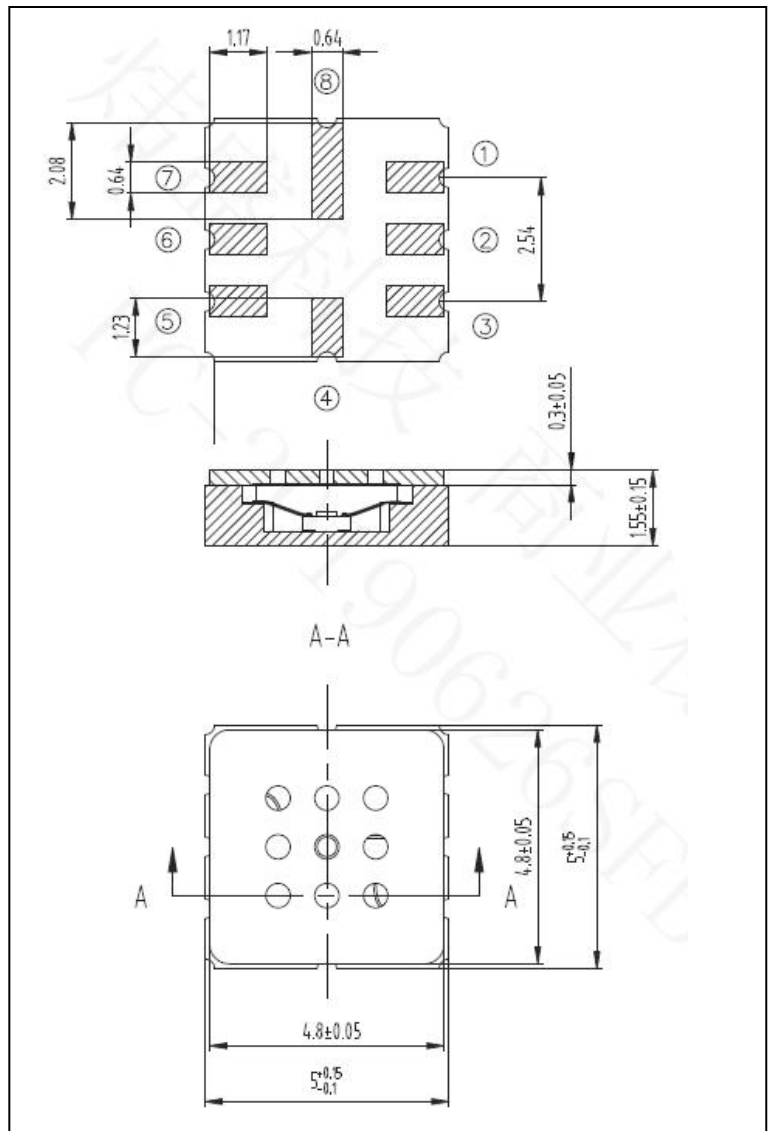
Character:

All solid state, lightweight, low power consumption, long life, excellent anti-interference capability
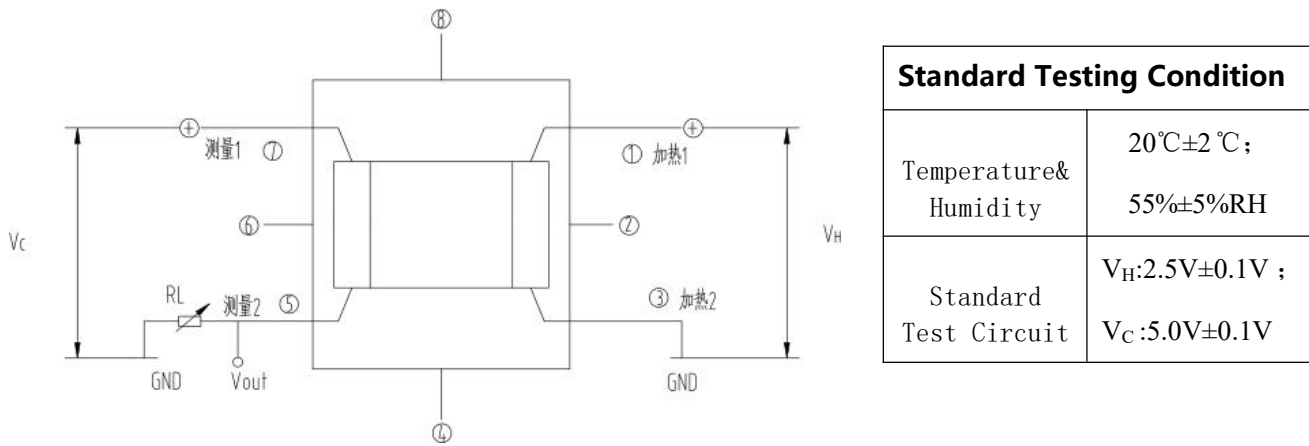
Main Application:

Hydrogen energy automobile hydrogen energy

Preparation of hydrogen energy storage

Hydrogen energy transportation and use

Hydrogen detection in other scenarios

Pin Definition:

Pin	Connection
①	R_{H1}
②	
③	R_{H2}
④	
⑤	R_{S1}
⑥	
⑦	R_{S2}
⑧	

Basic Circuit:

Standard Testing Condition	
Temperature& Humidity	20℃±2℃；55%±5%RH
Standard Test Circuit	V_H:2.5V±0.1V ；V_C :5.0V±0.1V

Note: the figure above shows the basic test circuit of GMV-2021B sensor. The sensor needs to apply two voltages: heater voltage (VH) and test voltage (VC). VH is used to provide specific working temperature for the sensor, and DC power supply or AC power supply can be used. Vout is the voltage across the load resistor (RL) in series with the sensor. VC is the voltage to provide test for load resistance RL, and DC power supply must be used.

Pic. 2 GMV-2021B Testing Circuit

Parameters **Table1**

Part No.			GMV-2021B
Sensor Type			MEMS-MOS
Standard Encapsulation			Ceramic
Target Gas			H2
Detection Range			0.1～1000ppm(H2)
Standard Circuit Conditions	Loop Voltage	V_C	≤24V DC
	Heater Voltage	V_H	2.5V±0. 1V AC or DC
	Load Resistance	R_L	Adjustable
Sensor character under standard test conditions	Heater Resistance	R_H	80Ω±5Ω（Room temperature）
	Heater consumption	P_H	≤50mW
	sensitive materials resistance	R_S	1KΩ～30KΩ(in 200ppmH_2)
	Sensitivity	S	R_0(in air)/Rs(in 200ppmH_2)≥5
	Concentration slope	α	≤0.6(R_{500ppm}/$R_{200ppmH2}$)

Sensor Characteristics:
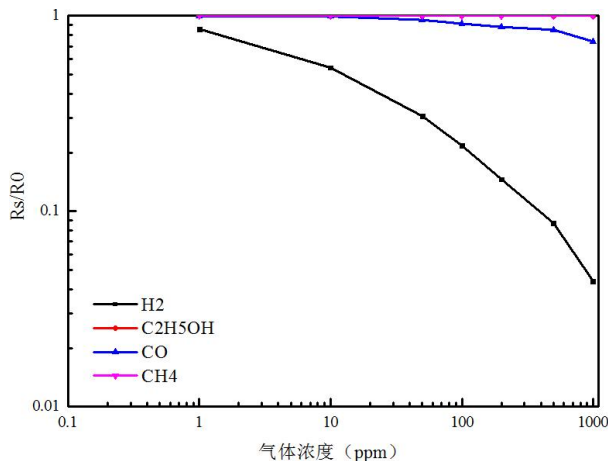
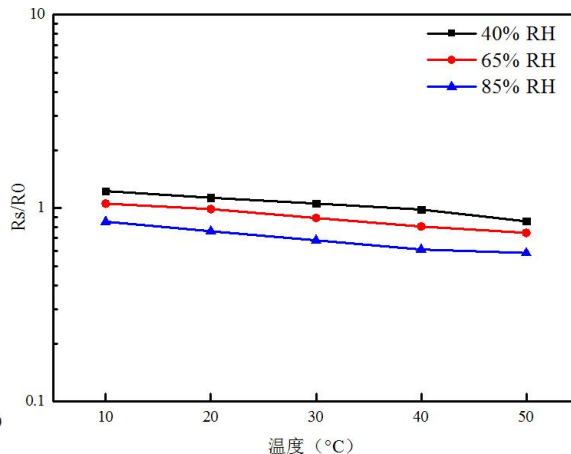**Fig3.Typical Sensitivity Curve**

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

Fig4.Typicaltemperature/humidity characteristics

Rs means resistance of sensor in 200ppm H2 gas under different temp. and humidity. Rso means resistance of the sensor in 200ppm H2 gas under 20℃/65%RH.
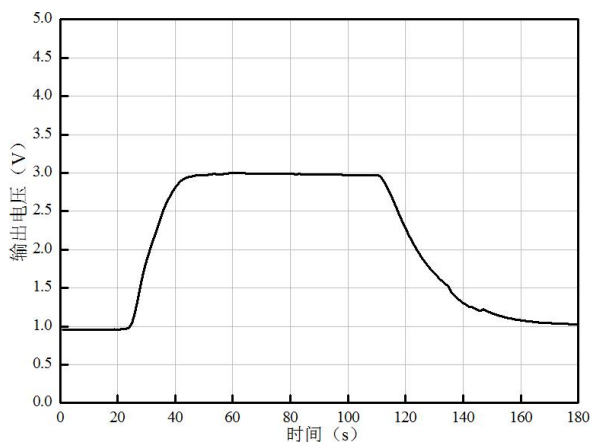

Fig5.Responce and Resume

The output in above Fig is the voltage of RL which is in series with sensor. All tests are finished under standard test conditions and the test gas is 200ppm H2 gas.
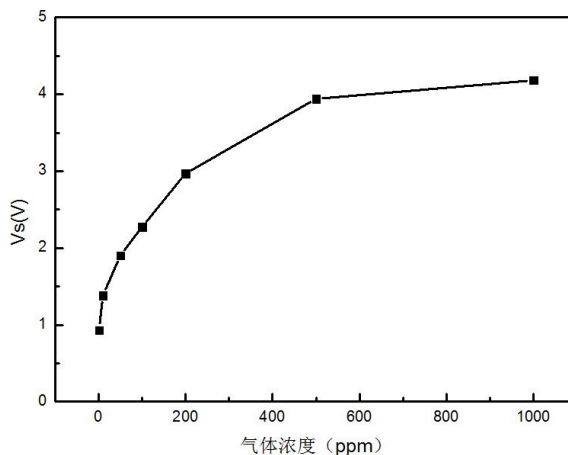

Fig6. Linearity character

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

。

Instructions:

1. Preheating time

Sensor's resistance may drift reversibly after long-term storage without power. It need to preheat the sensor to reach inside chemical equilibrium. Preheating voltage is same with heating voltage V_H. 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

2. Calibration

Sensor's accuracy is effected by many factors such as reference resistance's 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-points calibration for full scale) to ensure that the measuring value is accurate. For relative measurement calibration is not required.

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 extreme 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

2.6.1 Recommended conditions for reflow soldering

Neutral atmosphere, 250±10℃ welding temperature, avoid flux vapors

2.6.2 Recommended conditions for manual welding

Rosin soldering flux with least chlorine, ≤ 350℃ welding temperature, ≤ 5s duration time.

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

Package:

The MEMS sensor has a special protective film on its surface to prevent the influence of dust, water, atmosphere and high temperature. The protective film should be removed after welding.

Adopting taping packaging method, other packaging methods can also be provided according to customer requirements.
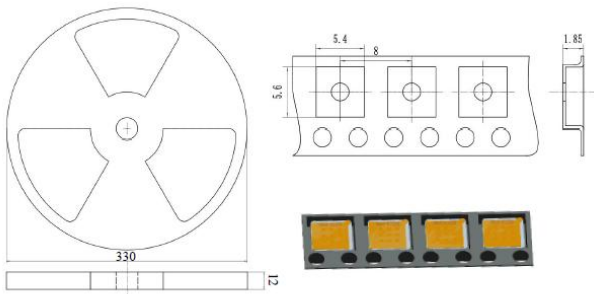
This product is RoHS compliance.

图8 传感器包装图

Zhengzhou Winsen Electronics Technology Co., Ltd
Add: No.299, Jinsuo Road, National Hi-Tech Zone, Zhengzhou 450001 China
Tel: +86-371-67169097/67169
Fax: +86-371-60932988
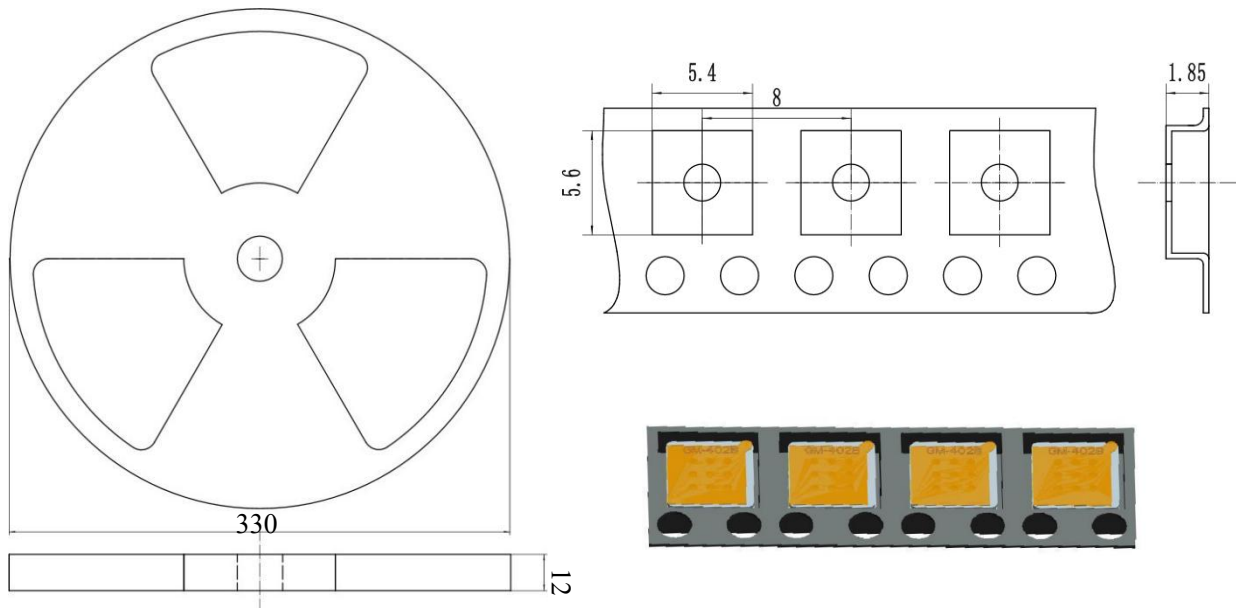**E-mail:** sales@winsensor.com
Website: www.winsen-sensor.c

图 8 传感器包装图

环保条款

RoHS：本产品符合现行 RoHS 指令，产品不含环境限制的十种化学物质。