MEMS Hydrogen Sulfide/H2S Gas Sensor
（Model No.: GM-602B）

Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd
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Zhengzhou Winsen Electronics Technology CO., LTD
GM-602B MEMS H2S Gas Sensor

Product description
MEMS H2S 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 construction
High sensitivity to H2S gases
Small sizes and low power consumption
Fast response and resume
Simple drive circuit, Long lifespan

Application
Portable and fixed type hydrogen sulfide monitor, and H2S detector

Parameters Stably.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>GM-602B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Type</td>
<td>MEMS</td>
</tr>
<tr>
<td>Standard Encapsulation</td>
<td>Ceramic</td>
</tr>
<tr>
<td>Detection Gas</td>
<td>H2S &amp; Benzene etc.</td>
</tr>
<tr>
<td>Detection Range</td>
<td>0.5~50ppm (H2S)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Circuit Conditions</th>
<th>Loop Voltage $V_C$</th>
<th>≤24V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Voltage $V_H$</td>
<td>1.9V±0.1V AC or DC</td>
<td></td>
</tr>
<tr>
<td>Load Resistance $R_L$</td>
<td>Adjustable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor character under standard test conditions</th>
<th>Heater Resistance $R_H$</th>
<th>80Ω±20Ω (room temperature)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater consumption $P_H$</td>
<td>≤40mW</td>
<td></td>
</tr>
<tr>
<td>sensitive materials resistance $R_S$</td>
<td>1KΩ～30KΩ(in 50ppm H2S )</td>
<td></td>
</tr>
<tr>
<td>Sensitivity $S$</td>
<td>$R_S$(in air)/$R_S$(in 50ppm H2S)≥3</td>
<td></td>
</tr>
<tr>
<td>Concentration Slope $\alpha$</td>
<td>≤0.6($R_{20ppm}$/R_{50ppm}≤2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard test conditions</th>
<th>Temp. Humidity</th>
<th>20℃±2℃; 55%±5%RH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard test circuit</td>
<td>$V_H$:1.9V±0.1V; $V_C$:±0.0V±0.1V</td>
<td></td>
</tr>
</tbody>
</table>

Sensor Structure Diagram
Instructions: The above fig is the basic test circuit of GM-602B. The sensor requires two voltage inputs: heater voltage \((V_H)\) and circuit voltage \((V_C)\). \(V_H\) is used to supply specific working temperature to the sensor and it can adopt DC or AC power. \(V_{out}\) is the voltage of load resistance \(R_L\) which is in series with sensor. \(V_C\) supplies the detect voltage to load resistance \(R_L\) and it should adopt DC power.
Sensor’s 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. Typical temperature/humidity characteristics
Rs means resistance of sensor in 50ppm hydrogen sulfide (H2S) under different temp. and humidity. Rs0 means resistance of the sensor in 50ppm H2S under 20℃/55%RH.

Fig5. Response 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 50ppm H2S.

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.

Long-term stability:
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:

<table>
<thead>
<tr>
<th>Storage Time</th>
<th>Suggested aging time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one month</td>
<td>No less than 48 hours</td>
</tr>
<tr>
<td>1 ~ 6 months</td>
<td>No less than 72 hours</td>
</tr>
<tr>
<td>More than six months</td>
<td>No less than 168 hours</td>
</tr>
</tbody>
</table>

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, CI2, 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
Soldering flux: Rosin soldering flux contains least chlorine and safeguard procedures.

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