Hydrogen Gas Sensor

SRE1012 Product Datasheet

1. Product Introduction

The SRE1012 hydrogen sensor is a catalytic combustion gas sensor developed based on nanotechnology. The sensor has good stability, reliability and test accuracy, and can be used to detect hydrogen gas concentration in different scenarios.

In addition to sensors, our company also provides complete detection modules which include test circuits and algorithms for direct use.

2. Sensor Characteristics

- Low temperature drift (<1.5mV)
- Wide measuring range
- Fast response and recovery
- High precision
- Strong anti-interference ability
- Anti -poisoning by HMDS, H2S , SO2 , etc.
- High stability and reliability

3. Main Application

- Hydrogen alarm instrument
- Hydrogen concentration test analysis
- Hydrogen leak detection for hydrogen powered vehicles
- Hydrogen leak detection at hydrogen fueling station

4. Working principle

The sensor is designed as a catalytic combustion gas sensor. It contains hydrogen sensing elements and environmental compensation elements. When hydrogen encounter with oxygen at surface of the sensing element, a catalytic combustion is occurred on the sensor. The heat generated will increase the temperature of the sensing element and increase the resistance, thereby detecting methane in the environment.

Since the hydrogen sensitive element is temperature sensitive, a temperature compensation element with the same temperature sensitive characteristic but no sensitive to target gas apply to eliminate the environment temperature effect. For specific usage, please refer to the design reference section.

5. Technical specifications

Environmental parameters

Temperature Range	
Work:	-40 ~ 85℃
Storage:	-40 ~ 125℃
Humidity Range	
Work:	0 ~ 95%
Storage:	0 ~ 100%
Pressure Range	70 ~ 130kPa
Test Gas	H2

Sensor Characteristics

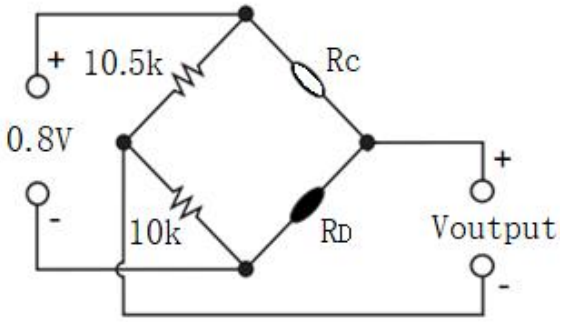
Working Voltage	0.8V
Working Current	150 ~ 180mA
Sensitivity (1%H2@0.8V)	> 25mV
Baseline Temperature Drift	< 1.5mV
Annual Drift	< 2mV
Linearity	> 99%
H2 test Range	0 ~ 4%
Response Time (T80)	< 3 sec
Recovery Time (T10)	< 3 sec
Repeatability	< 0.5mV

Selectivity

Gas	Concentration (ppm)	Response value (mV)
CO	50	< 0.5
NO2	5	< 0.5
H2S	20	< 0.5
CH4	10000	< 3
NH3	50	< 0.5
CO2	5000	< 0.5
SO2	500	< 0.5

6. Design Reference

The test circuit principle is shown in the figure below:



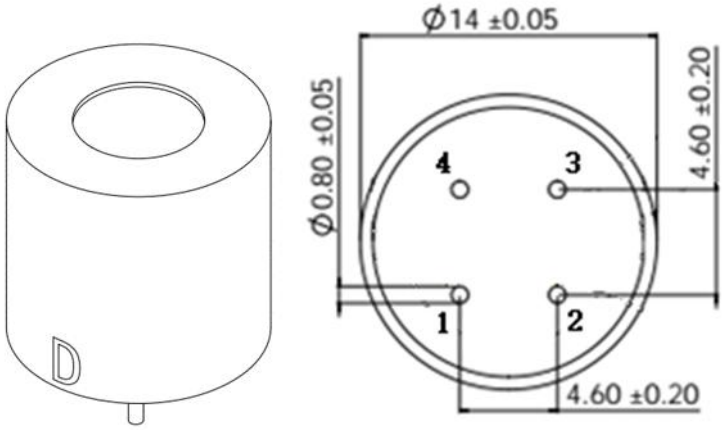
Hydrogen concentration calculation formula:

$$C = \frac{V_{output} - V_{0\%H2}}{V_{4\%H2} - V_{0\%H2}}$$

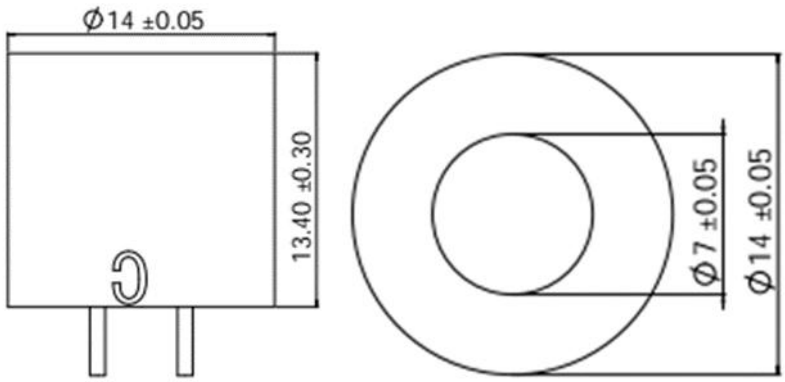
V0%H2 stands for output voltage in air

V4%H2 stands for output voltage in 4% hydrogen

Physical dimension



Unit: mm



Pin definition

Pin number	Function
Pin1	Connect to 1.8 V power supply voltage
Pin2, Pin3	Pins 2 and 3 are shortted, signal output
Pin4	GND

Note:

Pin1 and pin2 connected with compensation element inside, which marked with letter C.

Precautions:

1. Situations that must be avoided

1.1 Exposure to volatile silicon compound vapors

The sensor should avoid being exposed to silicone adhesives, hair spray, silicone rubber, putty or other places where volatile silicone compounds exist. If the surface of the sensor is adsorbed with silicone compound vapor, the sensitive material of the sensor will be wrapped by silicon dioxide formed by the decomposition of the silicone compound, which will degrade the sensitivity of the sensor and cannot be restored.

1.2 Highly corrosive environment

The sensor is exposed to high concentration of corrosive gas (such as H2S , SOx , Cl2 , HCl , etc.), it will not only cause corrosion or damage to the sensor lead, but also cause irreversible deterioration of the performance of the sensing material.

1.3 Pollution by alkali, alkali metal salts and halogens

The performance of the sensor may also deteriorate when it is contaminated by alkali metals, especially salt water spray, or exposed to halogens such as Freon.

1.4 Applied voltage is too high

If the voltage applied to the sensor is higher than the specified value, even if the sensor is not physically damaged or destroyed, it may cause damage to the leads and degrade the sensor's sensitivity characteristics.

2. Situations need attention

2.1 In high concentration gas

Regardless of whether the sensor is powered on or not, long-term exposure to high-concentration gas will affect the sensor's characteristics. For example, spraying lighter gas (butane) directly at the sensor will cause the damage to the sensor.

2.2 Long-term storage

When the sensor is stored for a long time without power on, it should be stored in a sealed bag without volatile silicon compounds. After long-term storage, the sensor needs to be powered for a longer time preheating. The storage time and corresponding preheating time are recommended as following:

(Chips stored for less than 3 days do not need aging):

Storage time	Recommended preheating time
Less than 1 month	Not less than 6 hours
1-6 months	Not less than 12 hours
More than 6 months	No less than 24 hours

2.3 Long-term exposure to extreme environments

Regardless of whether the sensor is powered or not, to exposure in extreme conditions, such as high humidity, high temperature or high pollution for long time, it will seriously affect sensor performance.

2.4 Vibration

Frequent, excessive vibration can cause the sensor's internal leads to resonate and break. This type of vibration can be generated during transportation and by using pneumatic tools/ultrasonic welders on the assembly line.

2.5 Impact

If the sensor is subjected to a strong impact or falls, its lead wires may break.

3. Conditions of Use

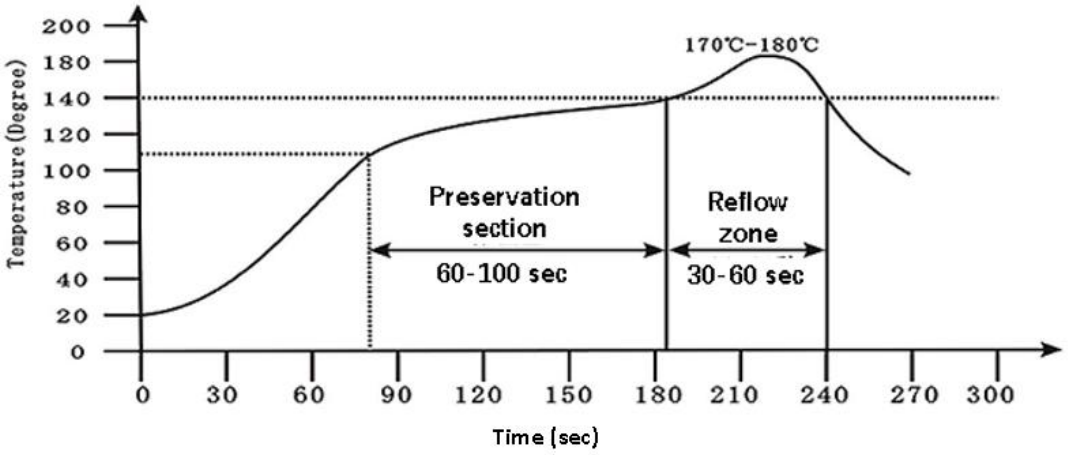
3.1 Manual welding is the most ideal welding method for sensors. The recommended welding conditions are as following:

- Flux: Rosin flux with minimal chlorine content
- Constant temperature soldering iron
- Temperature: 250℃
- Time: no more than 3 seconds

3.2 The following conditions are recommended when using reflow soldering:

Solder paste: low temperature lead-free solder paste (Sn42Bi58)

The furnace curve is as follows:



3.3 Anti-static

Anti-static bag packaging

Violation of the above usage conditions will degrade the sensor characteristics.

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