



Product Specifications

Model: MQ-K5B

Version: V1.2

Date: Jan.1st, 2019

Taiyuan Tengxing sensor technology Co., Ltd

Declaration

1. The copyright of instructions belong to Taiyuan Tengxing sensor technology Co., Ltd(hereinafter referred to as the Company), nobody is allowed to copy, translate, spread or store without written approval.
2. Thanks for using our product. In order to use the products more smoothly, reduce faults result from inappropriate using, please read the instructions carefully before using and follow the rules suggested strictly. Anyone who don't follow the instructions, disassemble or change the internal components without permission will afford the loss.
3. The color, style and size of the product is subject to the object you received.
4. The company follows the idea of scientific and technological progress, make efforts to product-improving and technology-innovating. So we have the right to improve product without prior notice.
5. Please make sure it's valid before using the instructions. Any good suggestions from you is welcomed.
6. The instructions should be well kept.

Taiyuan Tengxing sensor technology Co., Ltd

1. Description

Semiconductor Gas Sensor MQ-K5B

The gas-sensitive material used in the MQ-K5B gas sensor is tin dioxide (SnO_2) with low conductivity in clean air. When there is combustible gas in the environment where the sensor is located, the conductivity of the sensor increases with the increase of the concentration of combustible gas in the air. A simple circuit can be used to convert the change in conductivity into an output signal corresponding to the gas concentration.

The MQ-K5B gas sensor is highly sensitive to propane and has strong anti-interference ability to alcohol and some other interfering gases.

2. Module Features

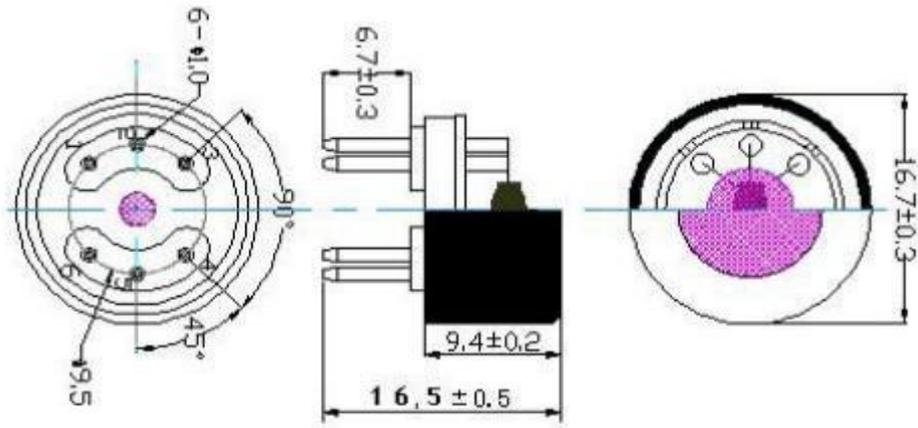
This product has good sensitivity to propane in a wide concentration range and has the advantages of long life, low cost and simple driving circuit.

3.Main applications:

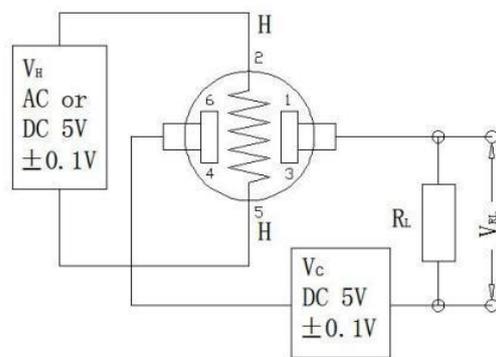
It is widely used in household gas leak alarms, industrial combustible gas alarms and portable gas detectors.

4.Technical indicators

Product model		MQ-K5B	
Product type		Semiconductor gas sensor	
Standard packaging		Plastic packaging	
Detect gas		Propane	
Detect concentration		300~10000ppm (Propane)	
Standard circuit conditions	Loop voltage	V_c	$5.0V \pm 0.1V$ DC
	Heat voltage	V_H	$5.0V \pm 0.1V$ AC or DC
	Load resistance	R_L	adjustable
Characteristics of gas sensing components under standard testing conditions	Heating resistor	R_H	$28 \Omega \pm 3 \Omega$ (indoor temperature)
	Heating power	P_H	$\leq 1W$
	Sensitivity	S	$R_s(\text{in air})/R_s(\text{in } 5000\text{ppm Propane}) \geq 5$
	Output Voltage	V_s	$2.5V \sim 4.0V$ (in 5000ppm CH ₄)
	Concentration slope	α	$\leq 0.6 (R_{5000\text{ppm}}/R_{1000\text{ppm}} \text{ CH}_4)$
Standard testing conditions	Temperature/humidity	$20^\circ\text{C} \pm 2^\circ\text{C}; 55\% \pm 5\%RH$	
	Standard Test Circuit	VC: $5V \pm 0.1V$; VH: $5V \pm 0.1V$	
	Warm-up time	no less than 48 hours	
	Oxygen concentration	21% (not less than 18%) (Oxygen concentration will affect the initial value, sensitivity, and repeatability of the sensor. Please consult for use when using at low oxygen concentrations)	
Product Life		10 years	

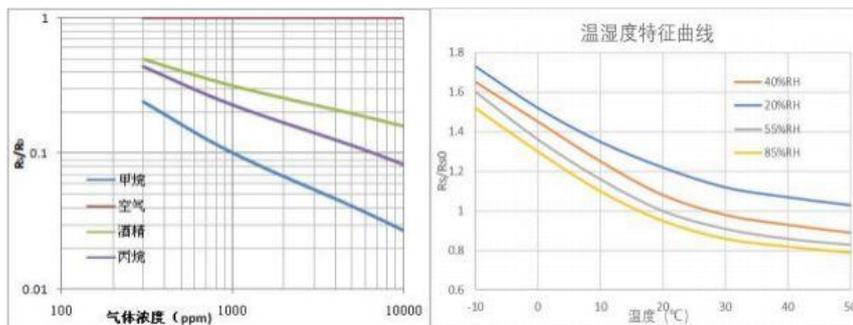


5. Basic Circuit



Description: The figure above is the basic test circuit of the MQ-K5B sensor. The sensor needs to apply 2 voltages: heater voltage (V_H) and test voltage (V_C). V_H is used to provide a specific operating temperature for the sensor, and can be a DC power supply or an AC power supply. V_{RL} is the voltage on the load resistor (R_L) connected in series with the sensor. V is the test voltage for the load resistor R_L , and a DC power supply must be used. The sensor resistance (R_s) can be calculated using the following formula: $R_s = (V_C/V - 1) \times R_L$; the sensitive body power consumption (P_s) can be calculated using the following formula $P_s = V_C^2 \times R_s / (R_s + R_L)^2$.

6. Sensor Characterization

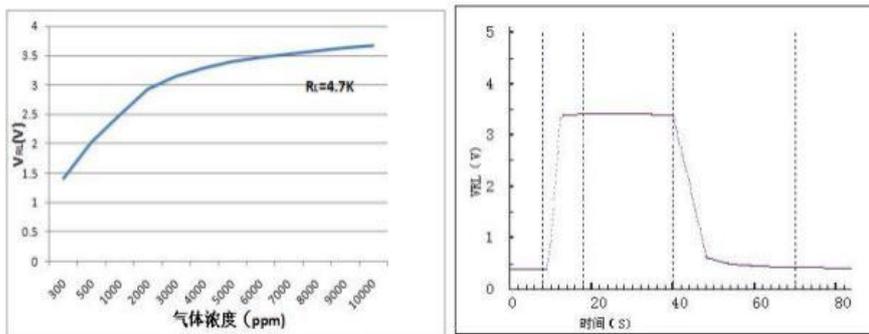


Left: Typical sensitivity characteristic curve of the sensor

The vertical axis in the figure is the resistance ratio of the sensor (R_s/R_0), and the horizontal axis is the gas concentration. R_s represents the resistance value of the sensor in different concentrations of gas, and R_0 represents the resistance value of the sensor in clean air. All tests in the figure were completed under standard test conditions.

Right: Typical temperature and humidity characteristic curve of the sensor

The vertical axis in the figure is the resistance ratio of the sensor (R_s/R_{50}). R_s represents the resistance value of the sensor under 5000ppm methane and different temperatures/humidities. R_{50} represents the resistance value of the sensor under 5000ppm methane and 20°C/55%RH environmental conditions.

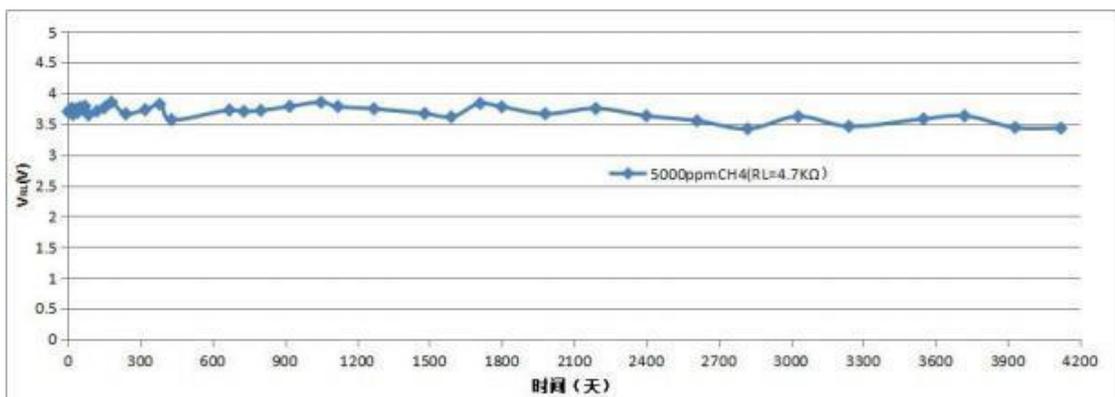


Left: Sensitivity characteristic curve

The left figure shows the VRL value of the sensor in different concentrations of methane. The load (RL) used is 4.7 K Ω . All tests in the figure were completed under standard test conditions.

Right: Response recovery characteristic curve

The right figure shows the change of VRL value of the sensor when the sensor is first placed in the detection atmosphere and then removed from the atmosphere.



Long-term observation sensitivity curve

All tests in the figure were completed under standard test conditions, with the horizontal axis representing the observation time and the vertical axis representing the VRL value.

7. Precautions

1 Situations that must be avoided

1.1 Exposure to volatile silicon compound vapor

The sensor should avoid exposure to silicone adhesives, hair spray, silicone rubber, putty or other places where volatile silicon compounds are stored. If the surface of the sensor is adsorbed with silicon compound vapor, the sensitive material of the sensor will be wrapped by silicon dioxide formed by the decomposition of the silicon compound, inhibiting the sensitivity of the sensor and making it irreversible.

1.2 Highly corrosive environment

Sensors exposed to high concentrations of corrosive gases (such as H₂S, SO_x, Cl₂, HCl, etc.) will not only cause corrosion or damage to the heating material and sensor leads, but also cause irreversible deterioration of the performance of the sensitive material.

1.3 Pollution by alkali, alkali metal salts, and halogens

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

1.4 Contact with water

Splashing or immersion in water may cause the sensor's sensitivity to deteriorate.

1.5 Ice

Freezing of water on the surface of the sensor's sensitive material may

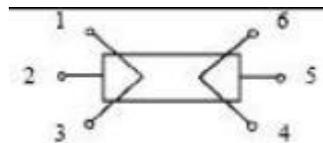
cause the sensitive layer to break and lose its sensitivity.

1.6 Excessive voltage applied

If the voltage applied to the sensor or heater is higher than the specified value, even if the sensor is not physically damaged or destroyed, it may cause damage to the lead wire and/or heater and cause the sensor's sensitivity to deteriorate.

1.7 Voltage applied to the wrong pin (only for the indirectly heated series)

For 6-pin sensors, 2 and 5 are heating electrodes, (1, 3)/(4, 6) are test electrodes, 1 and 3 are connected, and 4 and 6 are connected. If voltage is applied to pins 1, 3 or 4, 6, the lead wire will burn out, and no signal will be obtained if voltage is applied to pins 2 and 4.(See follows)



2 Situations to avoid as much as possible

2.1 Condensation

Under indoor conditions, slight condensation will have a slight effect on sensor performance. However, if water condenses on the surface of the sensitive layer and remains for a period of time, the sensor characteristics will decrease.

2.2 In high-concentration gas

Regardless of whether the sensor is powered on or not, long-term placement in high-concentration gas will affect the sensor characteristics.

For example, if lighter gas is directly sprayed on the sensor, it will cause great damage to the sensor.

2.3 Long-term storage

When the sensor is stored for a long time without power, its resistance will have a reversible drift, which is related to the storage environment. The sensor should be stored in a sealed bag that does not contain volatile silicon compounds. Sensors that have been stored for a long time need to be powered on for a longer time before use to stabilize them. The storage time and corresponding aging time recommendations are shown in under Table :

Storage time	Recommended aging time
Under 1 month	not less than 48 hours
1 to 6 months	not less than 72 hours
More than 6 months	not less than 168 hours

2.4 Long-term exposure to extreme environments

Regardless of whether the sensor is powered on or not, long-term exposure to extreme conditions such as high humidity, high temperature or high pollution will seriously affect the performance of the sensor.

2.5 Vibration

Frequent and excessive vibration can cause the internal leads of the

sensor to resonate and break. Use pneumatic screwdrivers/ultrasonic welding machines can generate such vibrations.

2.6 Impact

If the sensor is subjected to strong impact or falls, its leads may break.

2.7 Conditions of use:

2.7.1 Manual soldering is the most ideal soldering method for sensors.

The recommended soldering conditions are as follows:

Flux: lead-free and halogen-free flux

Constant temperature soldering iron

Temperature: $\leq 350^{\circ}\text{C}$

Time: no more than 3 seconds

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

Name: Taiyuan Tengxing sensor technology Co., Ltd

Add.: No.89, West Nanneihuan St., Wanbailin District, Taiyuan City,

Shanxi Province, China

Tel.: 0351-5249552

Fax.:0351-6335115

Web.: www.sxtxcgjs.com

