MQ-135 Air Quality Gas Sensor Module

Overview

SKU: 26166

- MQ-135 semiconductor gas sensor element for air-quality and pollution-gas detection.
- Sensitive to ammonia, sulfide, benzene-series vapor, smoke and other toxic gases.
- Typical detection range: 10-1000ppm for ammonia, toluene, hydrogen and smoke under specified test conditions.
- Requires a heated sensing element and a simple load-resistor measuring circuit.
- Suitable for low-cost air-quality indicators, gas-warning experiments and educational electronics projects.

Product description

The MQ-135 is a heated semiconductor gas sensor used for general air-quality monitoring and pollution-gas detection. Its sensing material changes conductivity when exposed to target gases, allowing the external circuit to convert the resistance change into an analog output voltage.

The sensor is intended for detection and indication rather than precision laboratory measurement. For meaningful results, it must be preheated, used with a suitable load resistor, and calibrated in the final circuit and environment.

This datasheet summarizes the product-relevant information from the supplied MQ-135 manual while omitting manufacturer and supplier details. Values are based on the standard test conditions described for the sensor element.

Key specifications

Product type	MQ-135 air-quality gas sensor / gas sensor module element
Sensor principle	Heated SnO2 semiconductor gas sensor
Standard package	Bakelite body with metal cap
Target gases	Ammonia gas, sulfide, benzene-series vapor; also suitable for smoke and other toxic gases
Detection range	10-1000ppm for ammonia gas, toluene, hydrogen and smoke under specified test conditions
Loop voltage VC	<=24V DC
Heater voltage VH	5.0V±0.1V AC or DC
Load resistance RL	Adjustable
Heater resistance RH	29Ω±3Ω at room temperature
Heater consumption PH	<=950mW
Sensitivity	Rs(in air) / Rs(in 400ppm H2) >= 5
Output voltage VS	2.0V-4.0V in 400ppm H2 under standard test conditions
Concentration slope	<=0.6, specified as R400ppm/R100ppm H2
Standard test conditions	20°C±2°C, 55%±5%RH, VC=5.0V±0.1V, VH=5.0V±0.1V
Preheat time	More than 48 hours

Typical applications

- Indoor air-quality indicator projects and general pollution-gas detection experiments.
- Domestic, industrial or portable gas-warning devices where a low-cost semiconductor sensor is acceptable.
- Arduino, ESP32, Raspberry Pi Pico/RP2040, STM32 and other microcontroller projects using an analog input stage.
- Educational demonstrations of gas-sensor behavior, heating requirements, calibration, sensitivity curves and environmental influence.
- Smoke and vapor detection projects where calibration and application-specific testing are performed before use.

Physical dimensions and pinout

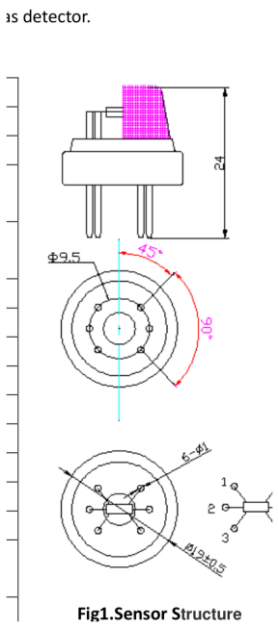


Fig1.Sensor Structure

The manual drawing shows the MQ-135 sensor element with a round metal cap, six leads and a specified body diameter of approximately Ø9.5mm. Overall height in the drawing is shown as 24mm.

The six-pin layout uses two heater pins and paired sensing electrodes. Pins 2 and 5 are heater electrodes. Pins 1 and 3 are connected together internally, and pins 4 and 6 are connected together internally as the sensing electrodes.

When used on a breakout board or module, always follow the actual module pin labels and schematic because the board may add a load resistor, comparator, potentiometer or power pins that are not part of the bare sensor element.

Basic measurement circuit

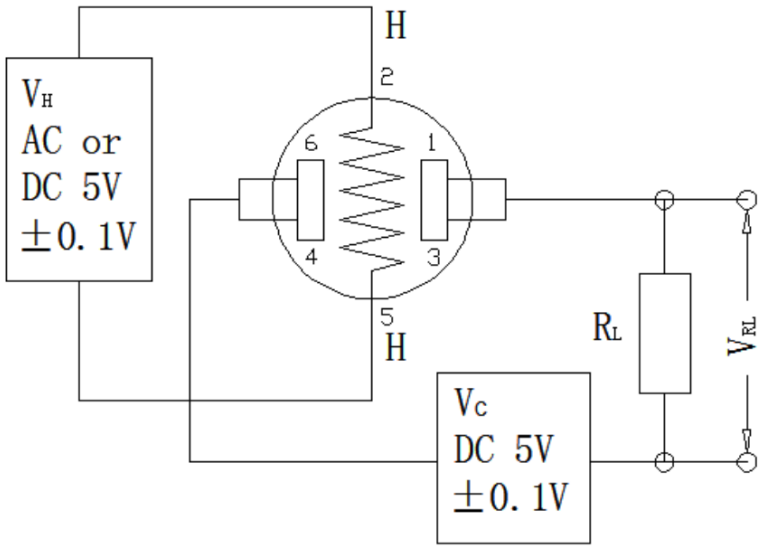


Fig2. MQ135 Test Circuit

The sensor requires two voltage inputs: heater voltage VH for the internal heater, and circuit voltage VC for the load-resistor measurement circuit. The measured output voltage VRL is taken across RL. VC must be DC, while the heater supply can be AC or DC as specified.

Sensor characteristic curves

The curves below show typical behavior under the manual's standard test conditions. They are useful for understanding sensor response, but they should not replace calibration in the final product or installation.

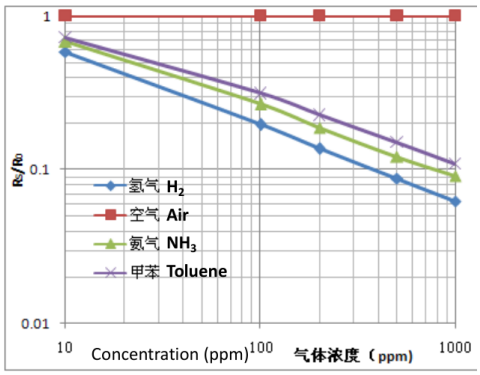


Fig3.Typical Sensitivity Curve

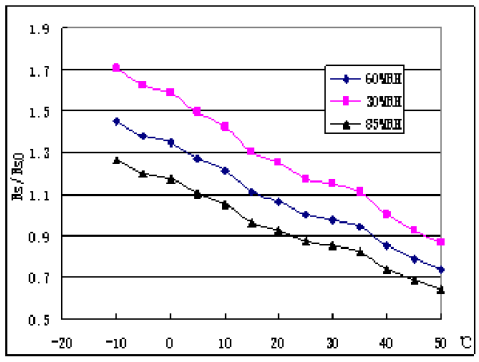
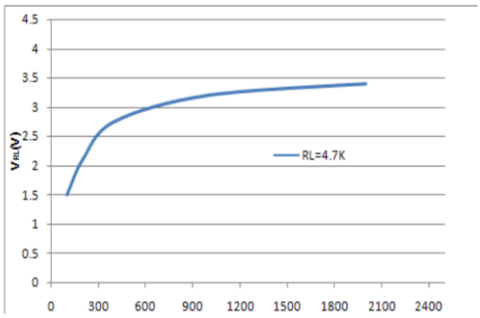
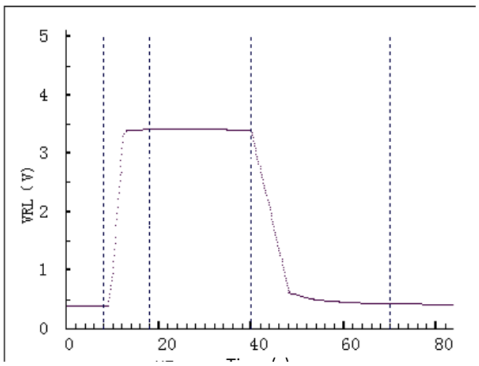


Fig4.Typical temperature/humidity characteristics

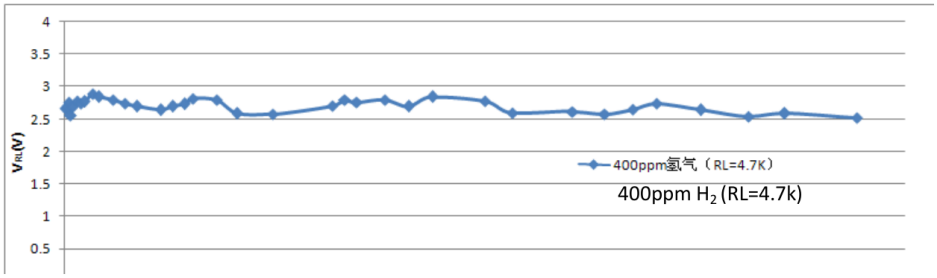
The ordinate is resistance ratio of the sensor (Rs/Rso).Rs





The resistance load R_L is 4.7 KΩ and the test is finished in standard test conditions.

the sensor into target gas and removing it out.



Using the sensor in a circuit

Item	Design note
Heater supply	Provide 5.0V±0.1V to the heater pins. The heater can consume up to 950mW, so the supply must be sized accordingly.
Sensing circuit	Use a load resistor RL in series with the sensing element and read VRL with an analog input or comparator circuit.
Calibration	Determine clean-air and target-gas reference values in the final circuit. Raw analog voltage alone is not a calibrated gas concentration.
Warm-up	Allow more than 48 hours of preheat/aging for a new or long-stored sensor before relying on stable readings.
Environment	Temperature and humidity affect sensor resistance. For better repeatability, compensate or characterize readings in the expected environment.

Storage, aging and handling notes

Condition	Required / recommended action
Less than 1 month storage	Age/preheat for no less than 48 hours before stable use.
1-6 months storage	Age/preheat for no less than 72 hours before stable use.
More than 6 months storage	Age/preheat for no less than 168 hours before stable use.

Silicone vapors	Avoid organic silicone vapors from silicone adhesive, sealant, putty, latex or silicone-containing plastics.
Corrosive gases	Avoid high concentrations of corrosive gases such as H2S, SOx, Cl2 and HCl.
Water and freezing	Do not splash, immerse or freeze the sensor. Condensation and icing can reduce sensitivity or damage the sensing material.
Mechanical stress	Avoid strong vibration, impact and harsh assembly methods that can damage the lead wires.
Soldering	Hand soldering is preferred. Use rosin flux with low chlorine content, about 250°C, and less than 3 seconds soldering time per lead.

Quick-start checklist

Step	Action
1	Identify the module pins or bare sensor pins before applying power.
2	Power the heater from a stable 5V source capable of supplying the required heater power.
3	Build the VC/RL measurement circuit and connect the analog output to a suitable ADC input.
4	Preheat or age the sensor for the required time, especially before first use or after long storage.
5	Record clean-air baseline values in the final enclosure and application environment.
6	Calibrate or characterize the response for the target gas and concentration range relevant to the project.

Source and reference links

- MQ-135 source manual supplied with this datasheet project
- MQ-135 sensor structure, test circuit and characteristic-curve drawings reused from the supplied manual

Disclaimer

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