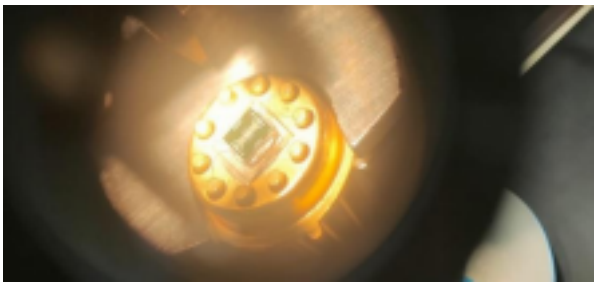
Low Power Gas Sensor



Main features

- Dependable
- High sensitivity and selectivity
- Minimal Power requirements
- Compact dimensions
- Extended lifespan
- Short response time
- Integrated temperature sensor
- Integrated heater

Description

The HHG2023 is a highly adaptable analog gas sensor designed for a multitude of applications, with a focus on IoT and security. Its core features include two identical interdigitated combs of silicon substrate, housing a thin deposit of tungsten trioxide nanoparticles (WO3) for the identification of various gases. The sensor incorporates a resistor for efficient heating, optimizing the sensitivity of the tungsten trioxide nanoparticles, and a built-in thermistor for precise temperature control.

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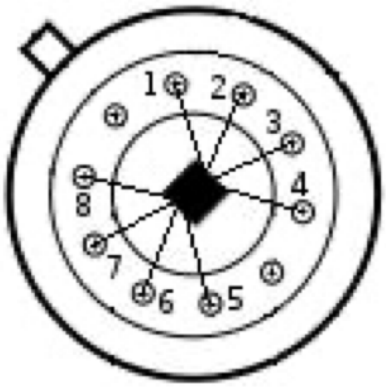
Pin Description

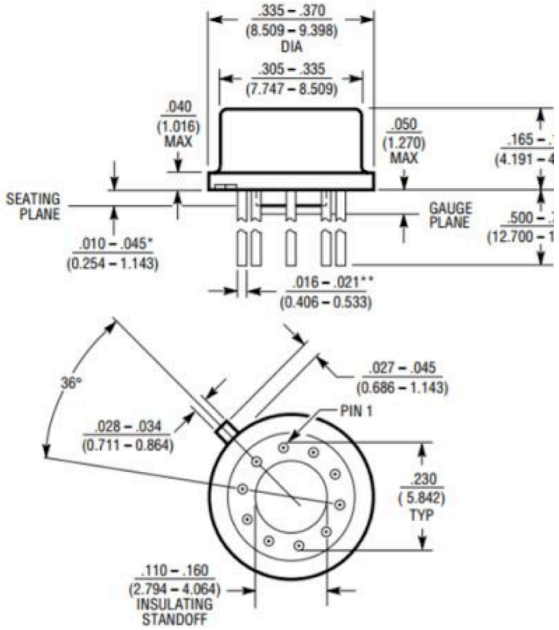


Pin	Usage
1 and 6	Temperature Sensor (Aluminium Resistor)
2 and 4	Gas Sensor (WO3 nanoparticles between aluminum interdigitated combs)
3 and 8	Heater Resistor (Polysilicon resistor)
7 and 9	Gas Sensor (WO3 nanoparticles between aluminum interdigitated combs)
5 and 10	NC

Specifications

Type	Chemical sensor
Sensing principle	MOS type
Materials	Silicon - Doped polysilicon - Aluminium - Tungsten trioxide nanoparticles
Power supply requirement	Active sensor
Nature of output signals	Analog
Nature of measurands	Resistance

Structure and dimensions



Package	10-Lead TO-5 metal can
Head diameter	< 9.5 mm
Head height	< 4.7 mm
Package height	< 25 mm
Pin diameter	< 0.6 mm
Mounting	Through hole fixed
Detectable gases	NO2 - CO - SO2 - H2 - CH4 - OH
Typical detection range	> 1ppm
Typical response time	< 10 s
Typical recuperation time	> 60 s
Service temperature range	-30°C to 60°C
Typical applications	Air quality monitoring

Standard test conditions

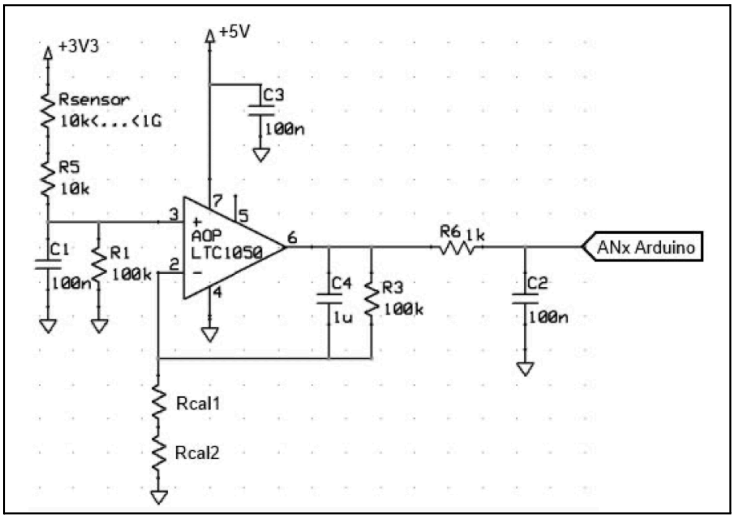
	Unit	Value
Air composition	%N2/O2	80/20
Temperature	°C	20
Humidity	%	60
Gas sensor resistance	MΩ	1 - 20
Temperature sensor resistance	Ω	60 - 75
Heater resistance	Ω	120 - 150
Gas sensor Voltage	V	5
Temperature sensor	V	5
Heater voltage	V	10 - 20

Environmental Performance

In an oxidizing environment, the gas sensor demonstrates an increase in resistance, while in a reducing environment, it exhibits a decrease in resistance. Notably, a higher gas sensor voltage corresponds to advantageous characteristics such as lower noise detection, reduced initial resistance, limited resistance excursion, and increased power consumption.

Moreover, an elevated temperature sensor voltage enhances measurement precision but contributes to higher power consumption. Additionally, an increase in heater voltage results in elevated temperatures in sensitive areas, heightened sensitivity, increased power consumption, and a trade-off with selectivity.

Examples of integration



Here is an example of an integration circuit used to interface the gas sensor with an Arduino.

The operational amplifier will convert and amplify a current proportional to the resistance of the gas sensitive element.

Graphs depicting resistances and currents under standard test conditions.