Low Power Gas Sensor
Based on Tungsten Trioxide Nanoparticles

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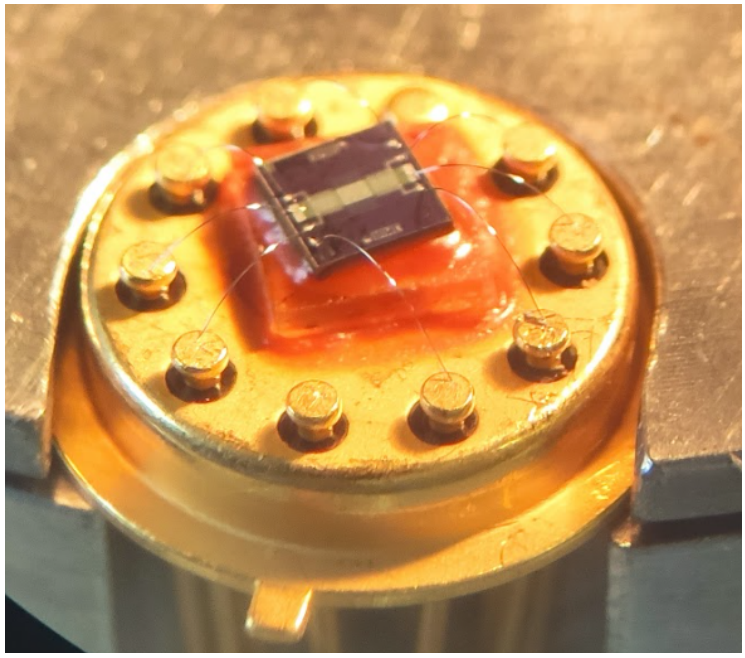


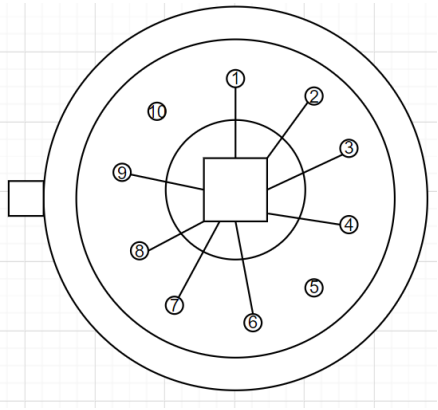
General features

- Low power consumption
- Small volume
- Low cost
- Short to moderate response time
- NH3 detection
- C2H6O detection
- Temperature sensor and heater (resistor) integrated

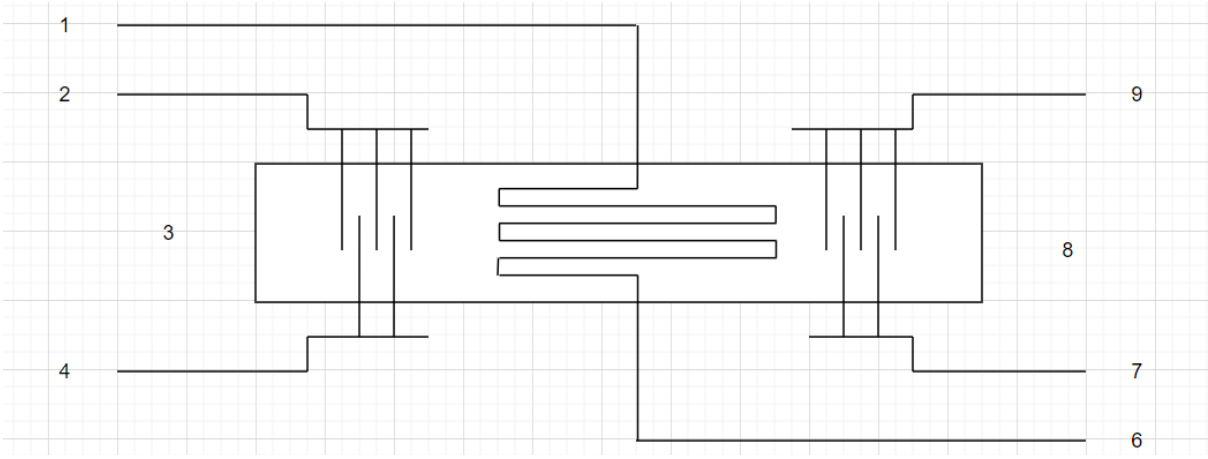
Description

This sensor is developed based on tungsten trioxide nanoparticles. It is composed of two interdigitated combs of silicon substrate with a thin tungsten trioxide nanoparticles (WO3) deposit. The resistance evolution of the two pins connected to the combs with deposits of WO3 depends on the nature of the gaz. It also includes a temperature sensor made of an aluminum band: the resistance of the aluminium varies with the temperature of the sensor. It is possible to capture temperature. In addition, a heater resistor is integrated to heat the sensor. The energy consumption of this sensor depends on how much you want to heat the gas sensor with these two pins. The hotter the sensor is, the lower the noise is and the faster the reaction is, but the higher the power consumption.

Pins information



Pin number	Usage
1 & 6	Temperature sensor (aluminium resistor)
2 & 4	Gas sensor
3 & 8	Heater resistor (polysilicon resistor)
7 & 9	Gas sensor
5	NC
10	NC



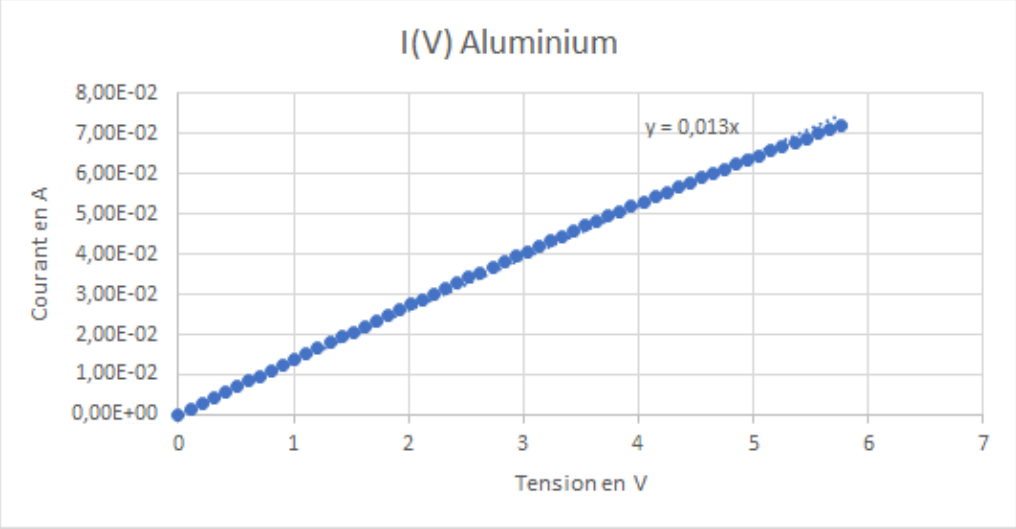
Specifications

Type	Active nanoparticle based sensor (external power needed)
Package	10-Lead TO-5 metal
Diameter	9.5 mm
Mounting	Through hole fixed
Measurement type	Resistive measure for: • Gaz • Temperature
Detectable gaz	Ethanol (C_2H_6O)
Time response	Ethanol : < 40 s
Standard use condition	Temperature: 20±5 (°C) Humidity: 60±5 (%) Air Quality: 80/20 (%N_2/O_2)

Electrical characteristic

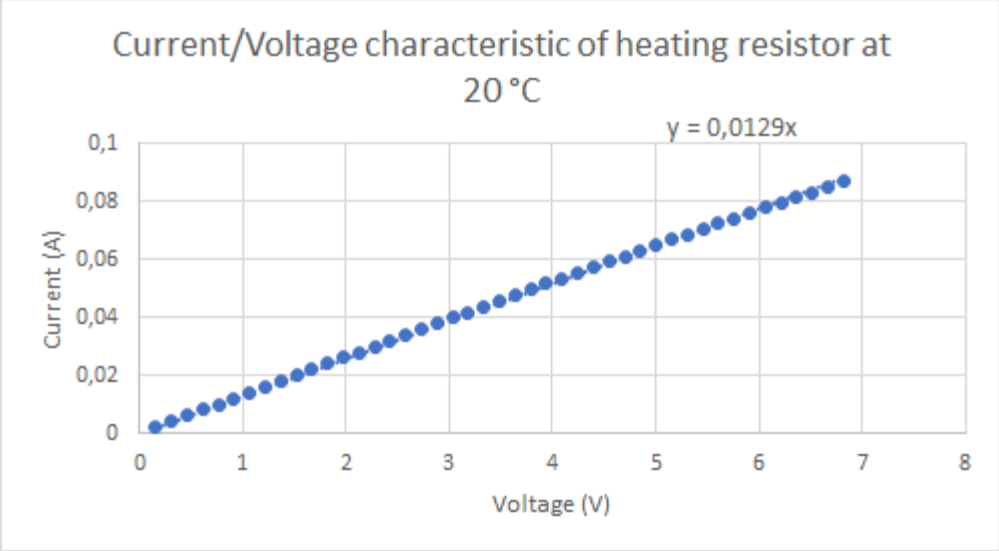
Gas sensor voltage	-20 to +20	V
Temperature sensor voltage	-15 to +15	V
Heater voltage	-10 to +10	V

Temperature sensor characteristic



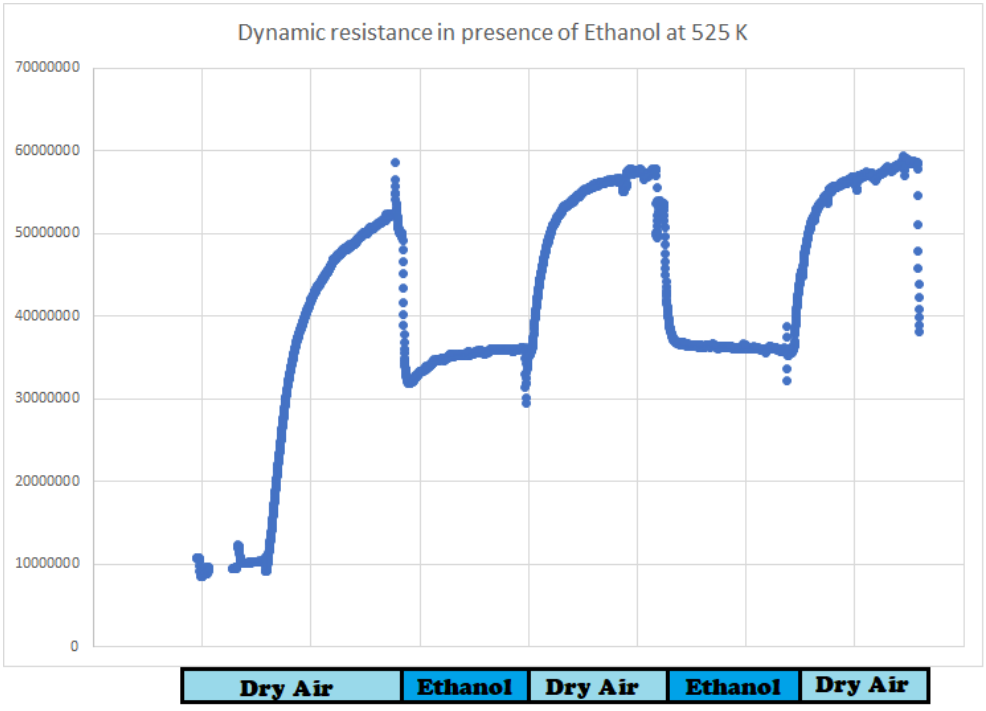
The graph above shows the current/voltage characteristic of the temperature sensor (aluminium) at 20 °C, the resistance is 77 Ω.

Heating resistor characteristic



The graph above shows the current/voltage characteristic of the heating resistor (polysilicon) at 20 °C, the resistance is 77 Ω.

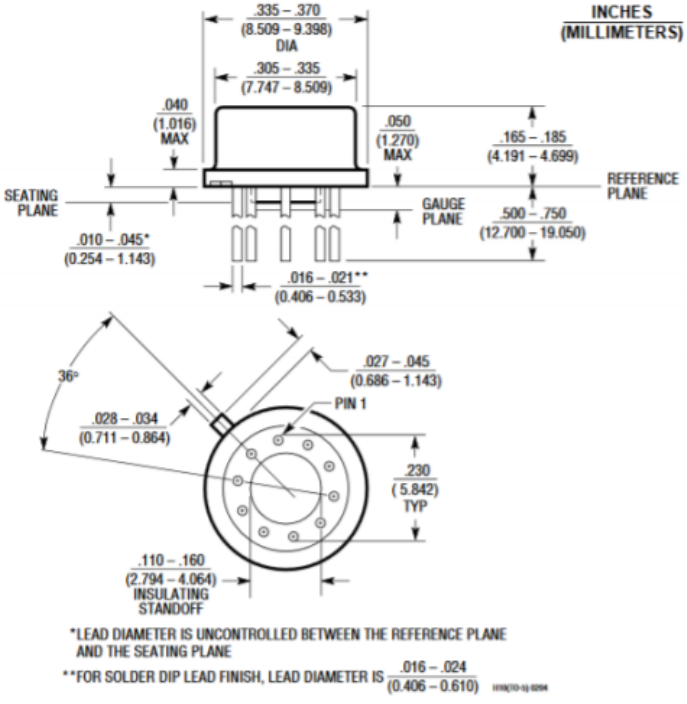
Gas sensor characteristics



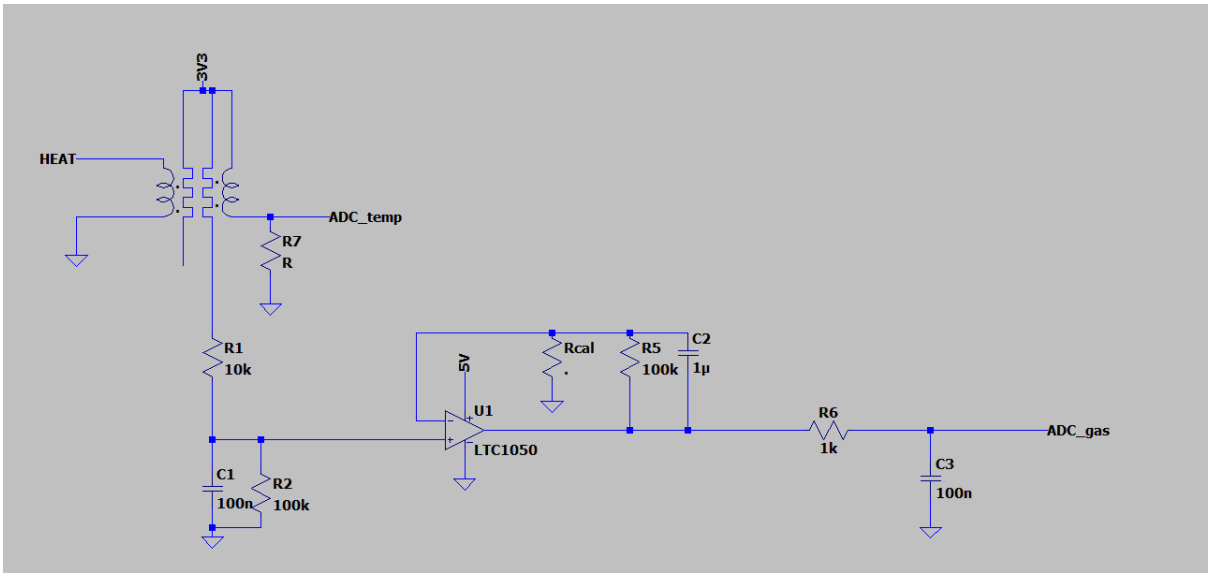
In order to determine the gas sensor characteristic, the resistance evolution is measured in presence of different gases. In the case of a resistance drop, that reveals gas presence and the gap observed is proportional to the concentration. The time response is the parameter used to determine the nature of the gas.

Dimensions

Our package is a 10-Lead TO-5 metal, with the following dimensions:



Typical Applications



Above is the typical application of the sensor we built, with an analogical circuit. in order to be able to read the gas value we have to amplify the sensor's output. For the amplification we recommend using the LTC1050 with the analogical system described above. The tension from the ADC_gas label can be connected to a 5V ADC, like an Arduino. The tension to heat the sensor should be up to 10V during the measurement.