Product Datasheet

Gas Sensor based on tungsten trioxide nanoparticles (WO_3)

1. Features :

- ✓ Hight sensitivity and selectivity
- ✓ Low power consumption
- ✓ Detection of wide variety gas (NH_3, C_6H_2O)
- ✓ Easy to integrate
- ✓ Small size
- ✓ Low cost
- ✓ Short response time
- ✓ Temperature sensor included
- ✓ 2 Integrated gas sensor
- ✓ Heater included (resistor)

2. Applications :

- ✓ Domestic gas leak detector and alarm
- ✓ Portable gas detector
- ✓ Medicine
- ✓ Automotive industry
- ✓ Food industry

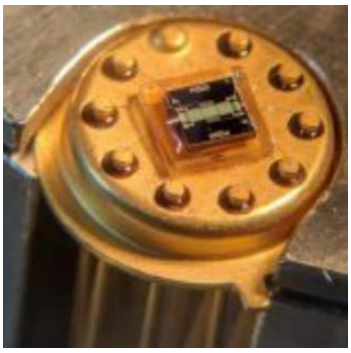

Fig 1. Nanosensor on TO-5 package

3. Description :

This gas sensor is based on WO_3 nanoparticles (NPs), it is developed at the AIME laboratory of Toulouse. The sensing element is composed of two interdigitated electrodes which host the layer of nanoparticles and which then become sensors sensitive to the gaseous environment. A buried heater (n-doped polysilicon) can increase the temperature up to 300°C. An aluminium resistance located at the surface of the chips is used as a thermistor to measure the local temperature. Therefore, an external electronic measuring device may determine the nature and concentration of gas based on the variation of resistances.

4. Pinning information :

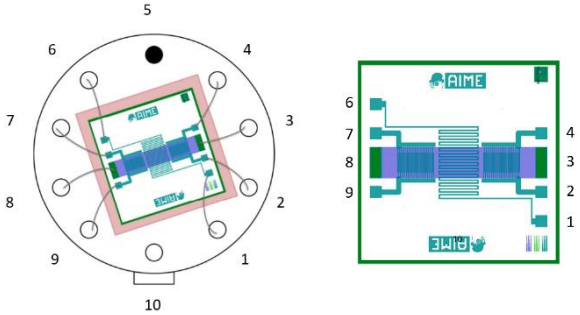

Fig 2. Discrete pinning

Pin Number	Usage
1/6	Temperature sensor (Aluminium resistor)
2/4	Gas sensor_1
3/8	Heater resistor
7/9	Gas sensor_1
5/10	Not Connected

Table 1. Pinning information

Table 1. Discrete pinning

5. Specifications :

Type	Nanoparticle based sensor
Materials	Silicon N-doped poly-silicon (heater) Aluminium (temperature measurement) Nanoparticles of tungsten trioxide (WO_3)
Sensor type	Active (power supply required)
Output signal	Analog
Gas measurement	Resistive measure
Temperature measurement	Resistive measure
Detectable gas	Ammonia (NH_3) Ethanol (C_2H_6O)
Package	10-Lead TO-5 metal
Diameter	9.5mm
Mounting	Through hole fixed
Time response	Ethanol <15s Ammonia

Table 2. Specifications

6. Standard use condition :

	Unit	Typical Value
Temperature	°C	20±5
Humidity	%	60±5
Air quality	$\%N_2/O_2$	80/20

Table 3. Standard use condition

7. Electrical characteristics :

	Unit	Value		
		Min	Typical	Max
Gas sensor resistance	MΩ	0,01	1	100
Temperature sensor resistance	Ω	150	150	350
Heater resistance	Ω	70	80	100
Gas sensor voltage	V	-	3,3	-
Temperature sensor	V	3,3	5	-
Heater	V	10	15	20

Table 4. Electrical characteristics

8. Temperature sensor characteristics:

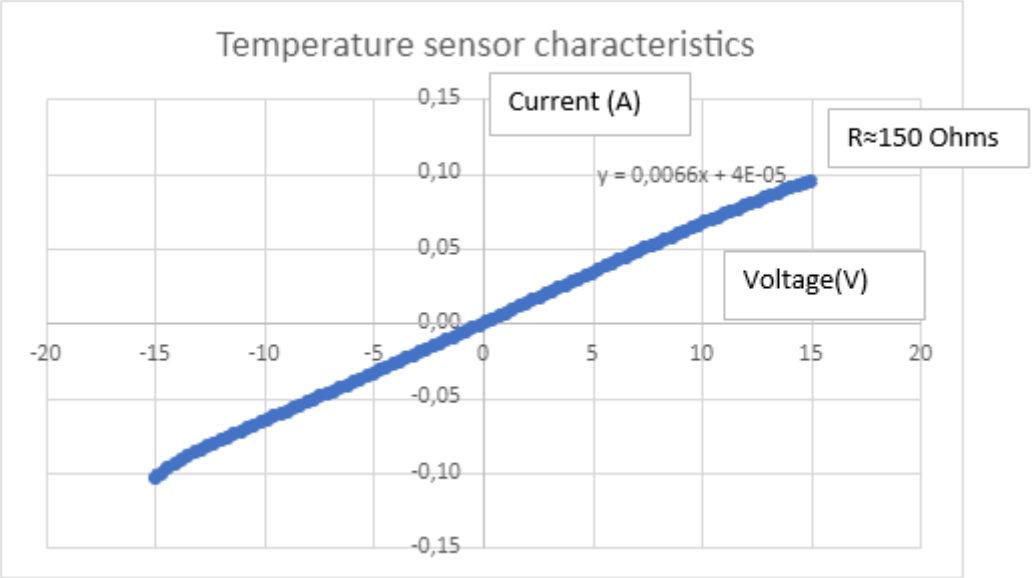

Fig 3. Current/Voltage characteristics of the sensor (aluminium) at T_{amb} = 20°C

9. Heating resistor characteristics:

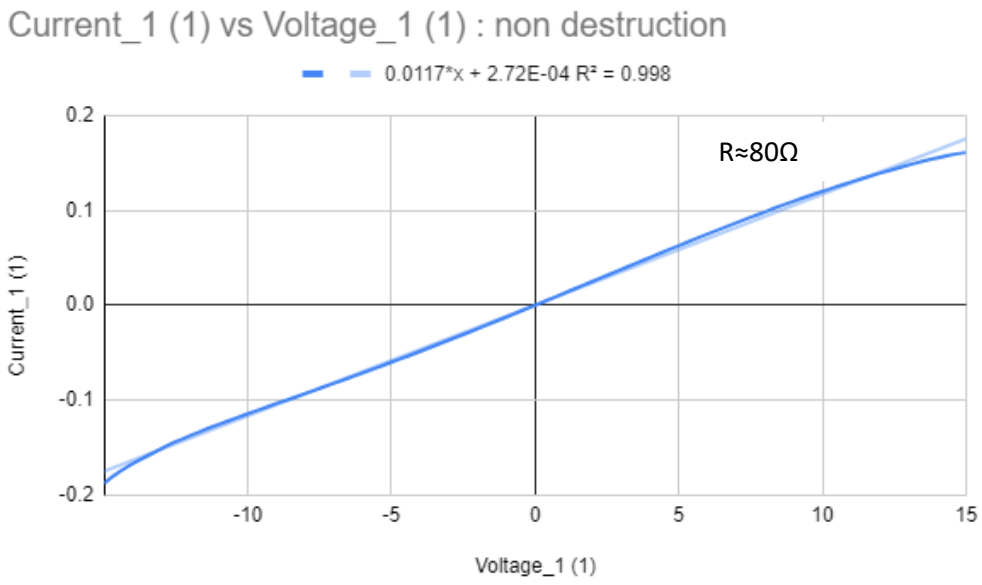

Fig 4. Current/Voltage characteristics of the Heating resistor (Polysilicon) at 20°C

10. Gas sensor characteristics:

The characterisation of the gas sensor has been performed around several temperatures, following a specific gas exposure procedure.

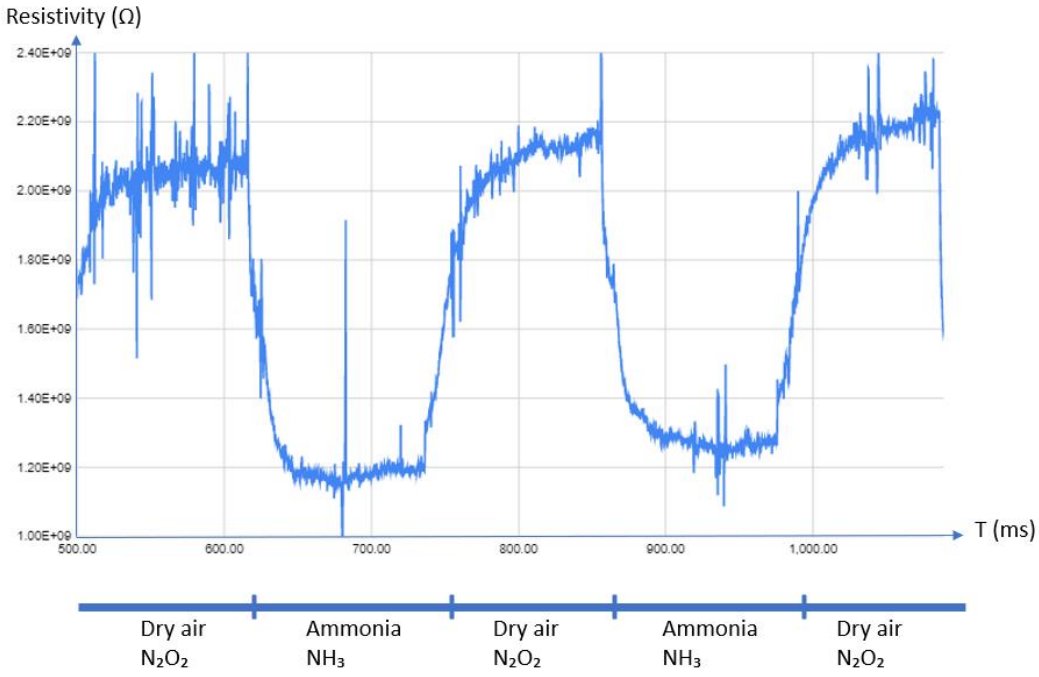

Fig 5. Sensor resistivity with different gas

11. Integration diagram:

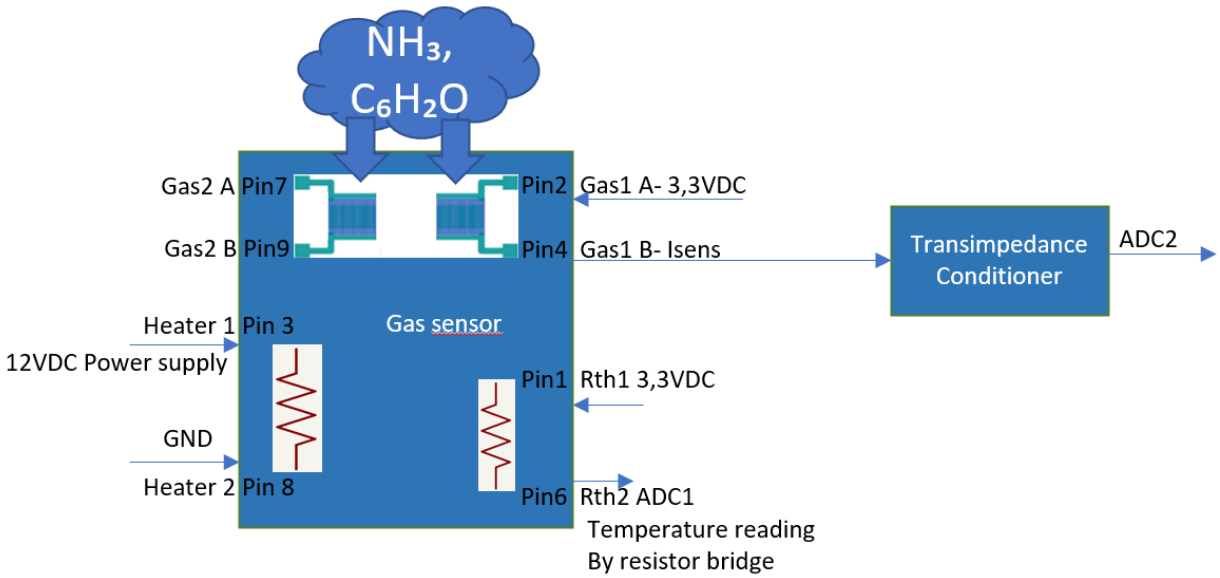

Fig 6. Typical diagram integration

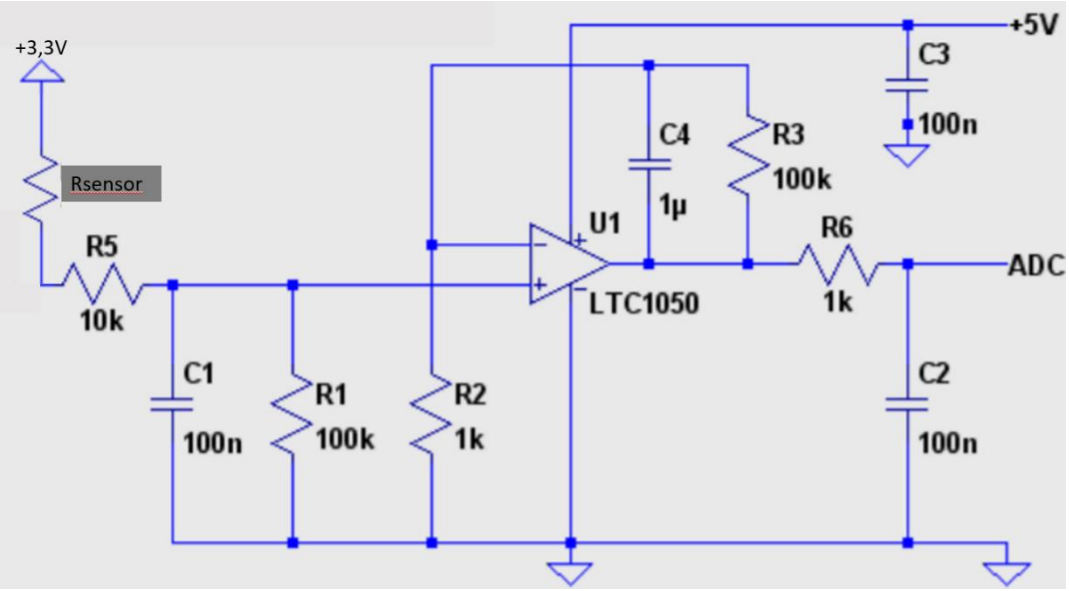

Fig 7. Typical conditioner circuit

12. Package outline :

The package is a 10-Lead TO-5 metal :

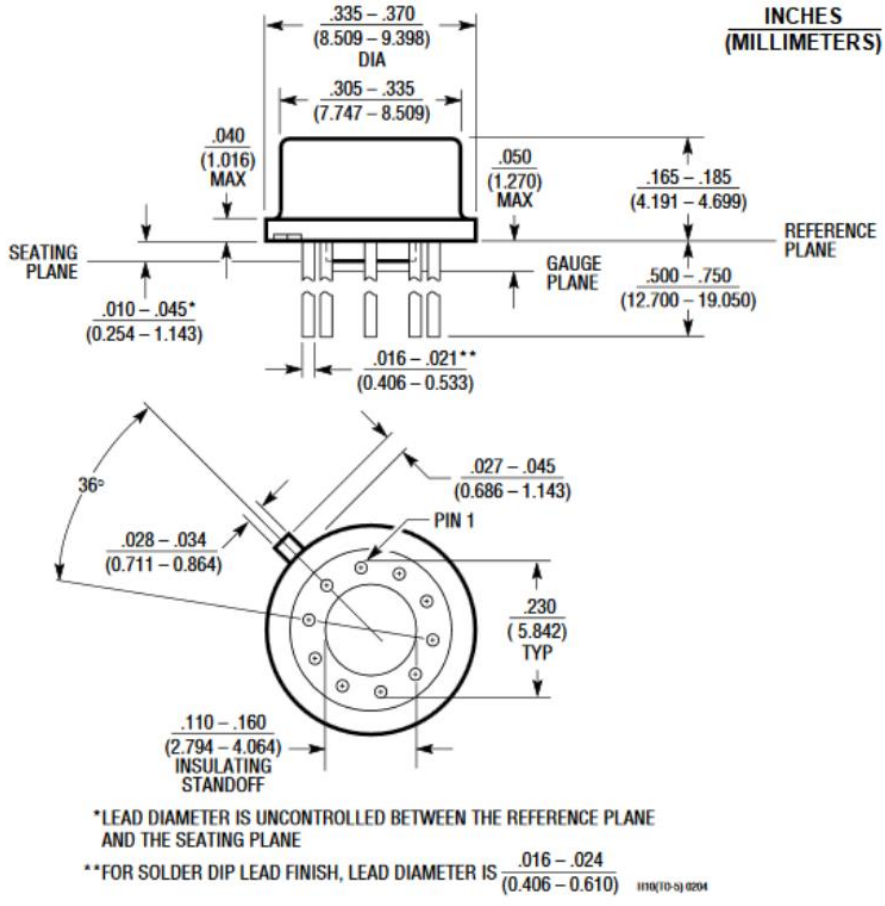

Fig 8. Package outline

13. Revision history :

DATE	RELEASE	DESCRIPTION OF CHANGES	PAGES
10/11/2021	1.0	First revision	All

Table 5. Revision history

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