INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Data Sheet	Low Power Gas Sensor based on tungsten trioxide nanoparticles

FEATURES

- **Low power consumption**
- **Easy to use**
- **Small size**
- **Low cost**
- **Short response time**
- **Several gas detection : NH3 / C2H60 / NO2 / CO…**
- **Integrate 2 different gas sensor**
- **Integrate temperature sensor**
- **Integrate heating resistor**
- **High sensitivity**
- **Long lifetime**

GENERAL DESCRIPTION

The following gas sensor is designed for monitoring air quality. It is based on tungsten trioxide nanoparticles, and developed at the AIME laboratory as part of 5ISS major.

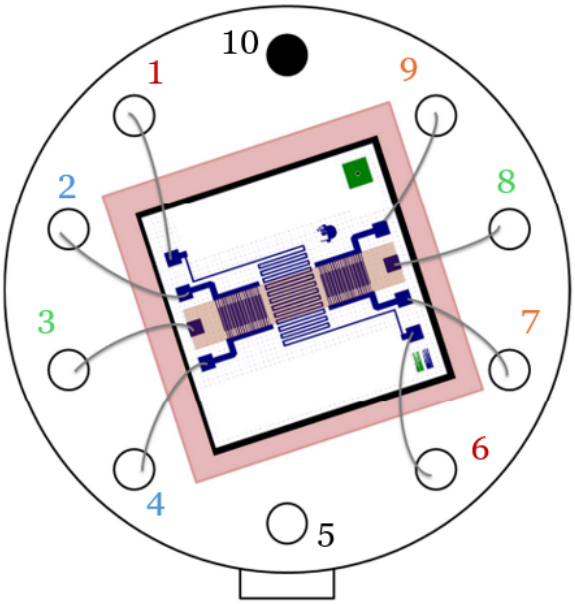
The sensor includes two sensing elements, based on a combination of a silicon substrate and a thin tungsten trioxide deposit. In contact with a gas, sensor's conductivity is modified, depending on the type and concentration of the gas. It also includes an intern heating resistor formed on metal oxide semiconductor, that can be used to adjust sensitivity and selectivity.

Therefore, an external electronic circuit can determine the spotted gas and its concentration.

This sensor only needs a few mA to works, which makes it low power consumption like, and has a high sensitivity (can detect gas with only few ppm concentration).

It is integrated in a 10-Lead TO-5 package, to give access to its 10 pins.

PIN CONFIGURATION



Pin number	Usage
1/6	Temperature sensor
2/4	Gas sensor 1
3/8	Heater
7/9	Gas sensor 2
5/10	Non connected

SPECIFICATIONS

Type	Chemical sensor
Materials	• Silicon • N-doped poly-silicon (heater) • Aluminium (teperature sensor) • Tungsten trioxide nanoparticles
Sensor type	Active (need power supply)
Gas measurement	Resistive
Temperature measurement	Resistive
Detectable gas	• Amonia (NH3) • Ethanol (C2H6O) • Nitrogen dioxide (NO2) • Carbon monoxide (CO)
Package	10-Lead TO-5 metal
Diameter	< 9.5 mm
Mounting	Through hole fixed

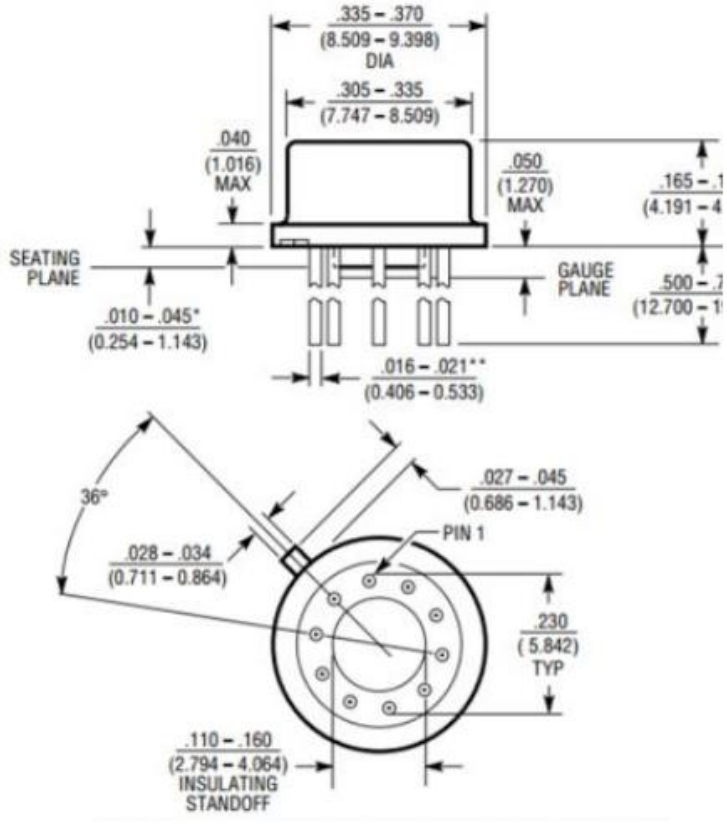
STANDARD USE CONDITIONS

	Unit	**Value**
Air composition	N2/O2 (%)	80/20
Temperature	°C	20
Humidity	%	60

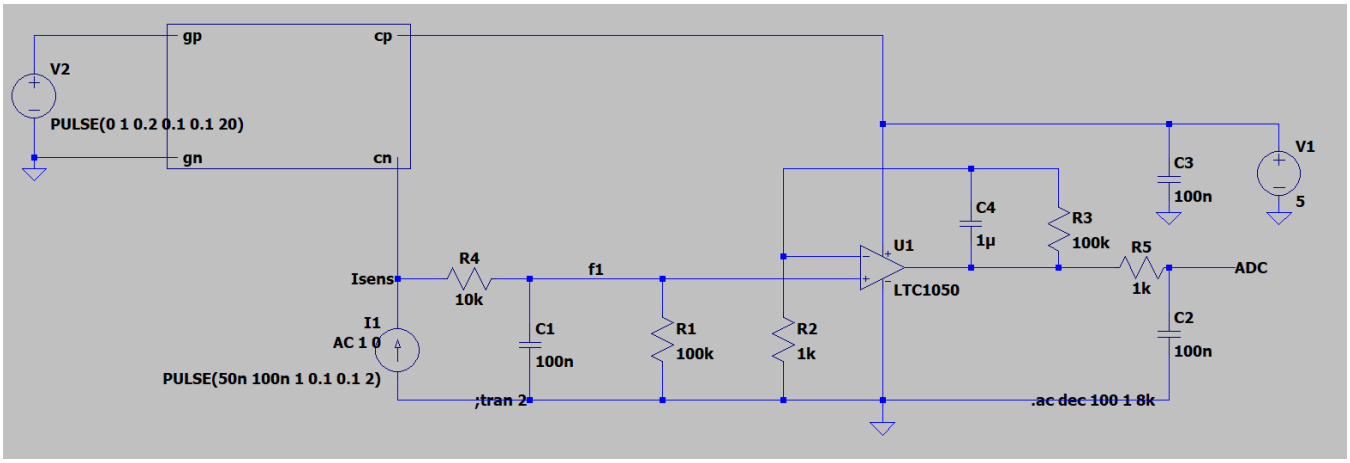
TYPICAL ELECTRICAL CHARACTERISTICS UNDER STANDARD CONDITIONS

	Unit	Value		
		Min	Typical	Max
Gas sensor resistance	MΩ	1	10	20
Temperature sensor resistance	Ω	60	64	75
Heater resistance	Ω	100	130	150
Gas sensor voltage	V	-	5	-
Temperature sensor	V	-	5	-
Heater	V	10	15	20

PACKAGE AND DIMENSIONS



INTEGRATION EXAMPLE



In this example, the gas sensor in included is connected to an amplifier circuit. The amplified signal is therefore exploted by an Arduino to retrieve the gas concentration measured by the sensor. Various filters are added to reduce noise and make the received current as usable as possible.