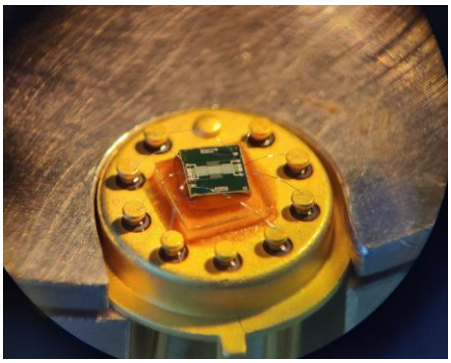
Low Power Gas Sensor based on tungsten trioxide nanoparticles



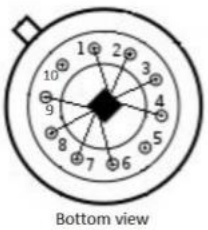
Features:

- Small in size
- Detection of C2H6O
- Detection of NH3
- Low cost
- Low power consumption
- Short response time

Description

This gas sensor was developed at the multi-university laboratory of micro-nano electronics (AIME). The sensor is based on nanoparticles of tungsten trioxide, which is a metal oxide semiconductor. Two identical sensing elements composed of interdigitated combs of silicon substrate allow accurate gas measurement. A thin layer of tungsten trioxide deposited on the sensing elements form the active component of the sensor. Foreign gases react with the tungsten trioxide, altering the resistivity of the interdigitated combs.An aluminium resistor acts as a temperature sensor for additional measurement. The high sensitivity and selectivity of the sensor can be adjusted by altering the temperature via the aluminium resistor.

Pin Description



Bottom view

Pin number	Usage
1/6	Temperature sensor (aluminium resistir)
2/4	Gas sensor (WO3 nanoparticles integrated on aluminium interdigital combs)
3/8	Heater resistor (polysilicon resistor)
7/9	Gas sensor (WO3 nanoparticles integrated on aluminium interdigital combs)
5	Not connected
10	Not connected

Specifications

Type	Nanoparticle-based sensor
Materials	• N-doped poly-silicon (heater) • Aluminium (for temperature measurement) • Silicon • Tungsten trioxide nanoparticles
Sensor type	Active (power supply required)
Temperature measurement	Resistive measure
Gas measurement	Resistive measure
Detectable gas	• NH3 • C2H6O
Diameter	9.5mm
Mounting	Through fixed hole
Time response	• Ethanol < 30s • Ammonia < 15s
Package	10-Lead TO-5 metal

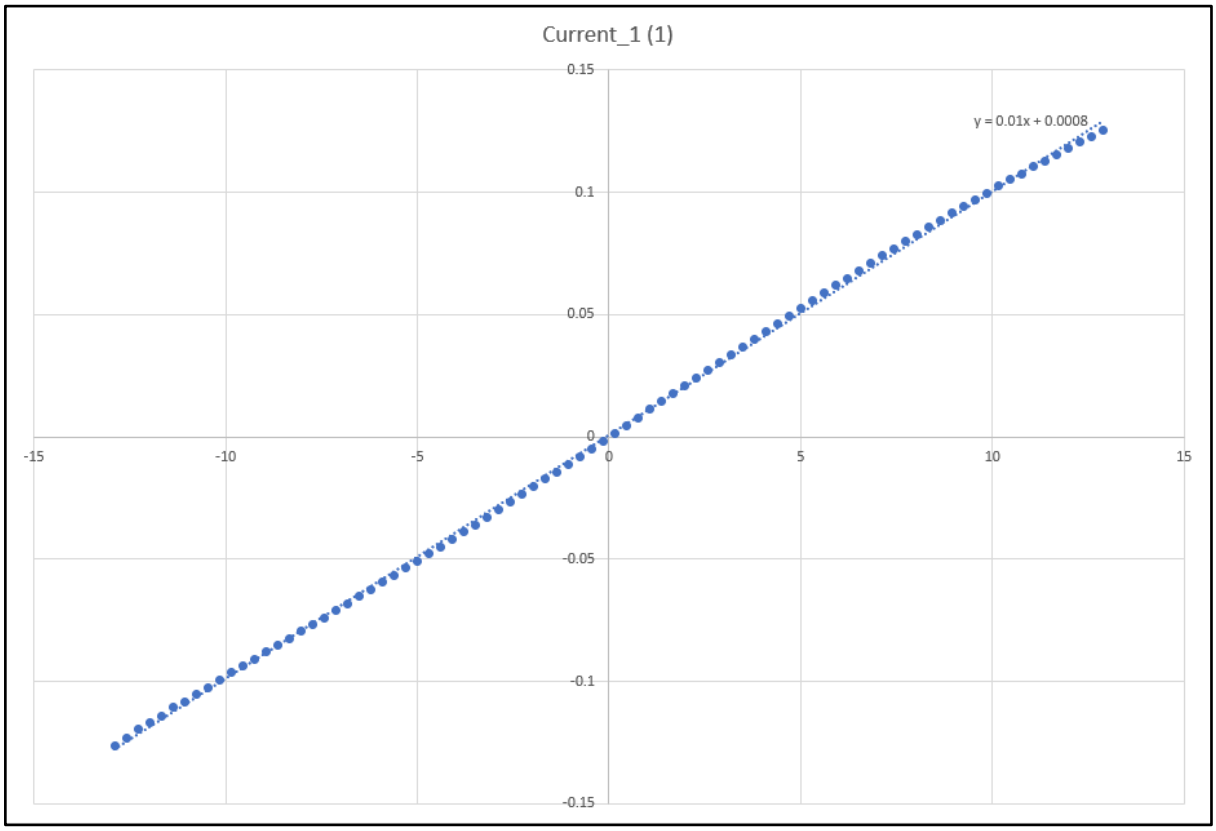
Standard use conditions

	Unit	**Typical value**
Temperature	°C	20±5
Humidity	%	60±5
Air quality	%N2/O2	80/20

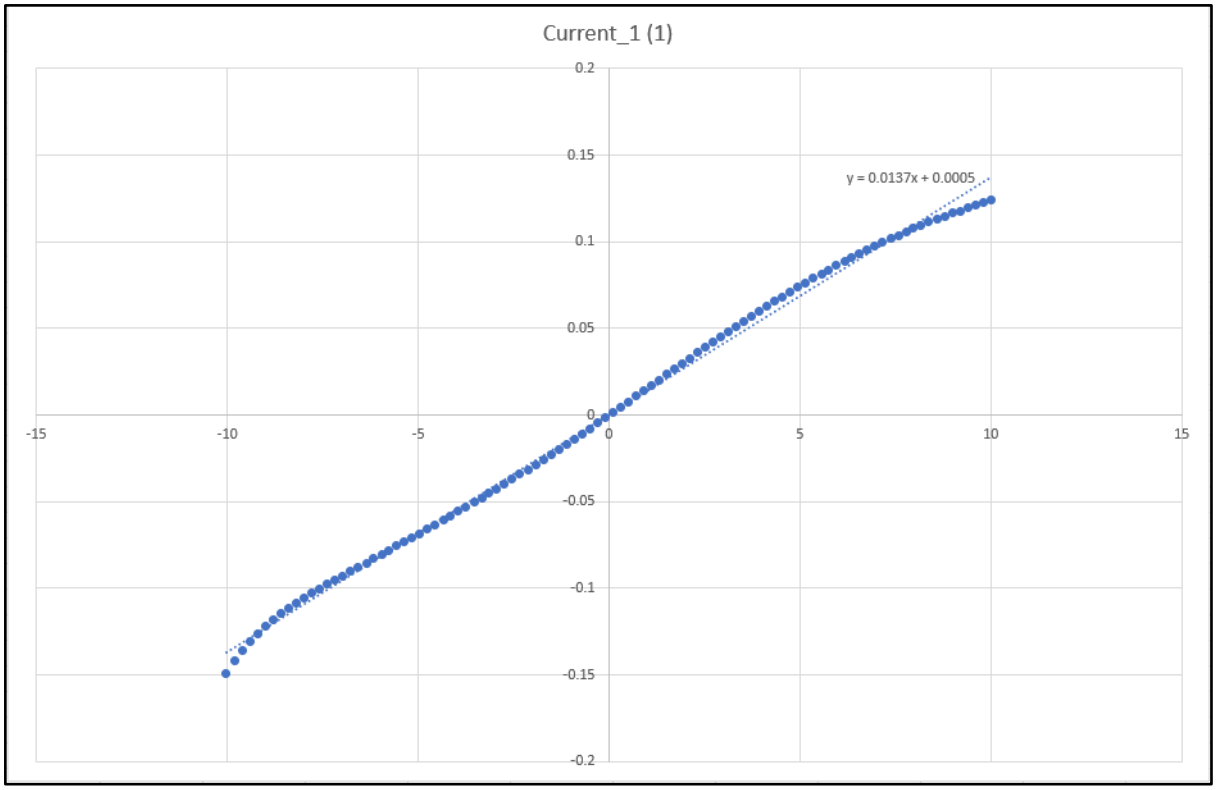
Electrical characteristics

	Unit	**Value**		
		Min	Typical	Max
Gas sensor resistance	MΩ	0,01	1	100
Temperature sensor	Ω	150	151	350

resistance				
Heater resistance	Ω	67	86	105
Gas sensor voltage	V	-	3,3	-
Temperature sensor	V	3,3	5	-
Heater	V	10	15	20



Current(y) in relation to voltage(x) to determine standard-conditions resistance(slope) in the polymer bar



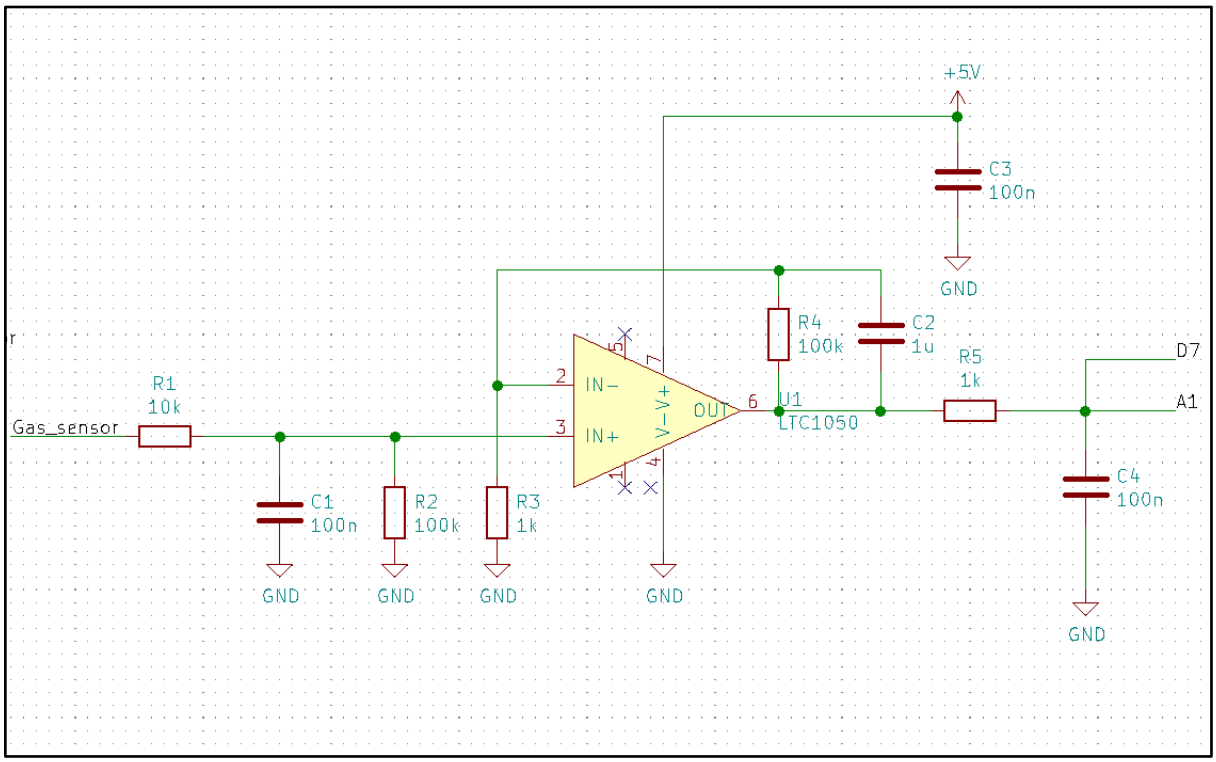
Current(y) in relation to voltage(x) to determine standard-conditions resistance(slope) in the akuminium resistance

Temperature sensor characteristics

[GRAPH]

Temperature(°C)	Resistance(Ω)
20	151
150	270
180	283
250	334

Typical Applications



Above is typical application of the sensor in an analogic circuit.