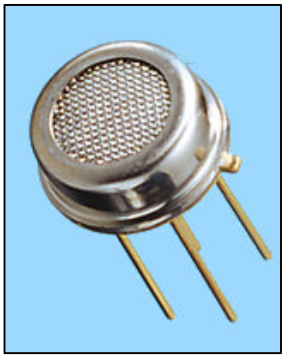
MiCS – 2610

O_3 Gas Sensor

This datasheet describes the use of the MiCS-2610 in ozone detection applications. The package and the mode of operation described in this document target the detection of the oxidizing gas O_3 in indoor or outdoor environments. Ozone is a hazardous gas, which can cause respiratory problems at concentrations above 100 ppb.

Features:



- Low heater current
- Wide detection range
- High sensitivity
- Fast thermal response
- Electro-Static Discharge protected
- Miniature dimensions
- High resistance to shocks and vibrations

Sensor Characteristics

Important Precautions:

Please read the following instructions carefully before using the MiCS-2610 sensor described in this document to avoid erroneous readings and to prevent the device from permanent damage.

- Tin oxide (SnO_2) gas sensors require a relatively long warm up period before correct O_3 measurements can be taken. It is important to follow the limits in the specifications (see Table 1) and to keep the sensor in the recommended powered operating mode until the signal reaches a stable level. After exposing the sensor to high concentrations of O_3, make sure the sensor is given enough time to recover before taking new measurements.
- The sensor must not be wave-soldered without protection or exposed to high concentrations of organic solvents or corrosive gases in order to avoid poisoning the sensitive layer. Use humidified gas for testing and calibration.
- Heater voltages above the specified maximum rating of 2.5 V will destroy the sensor. An increase of 0.5 V at 2.35 V causes an increase of the heater temperature of about 100°C. The correct operating temperature is obtained by applying a heater voltage of 2.35 ± 0.05 V.
- We strongly recommend using the operating mode and measurement circuit described in this document and referring to the heater voltage in the "Electric Specifications" section. Deviating from these procedures may produce varying results or damage the sensor.
- For any additional questions, please contact us at:

Operating Mode:

The recommended mode of operation is a constant voltage mode. A heater voltage of V_H = 2.35 V is applied. This causes the temperature of the sensing resistor (R_S) to reach about 430°C.

Detection of the O_3 concentration is achieved by measuring the sensing resistor R_S during operation.

Sensor Response:

The sensor response to O_3 in air is represented in Figure 1. The sensor resistance R_S is normalized to the resistance under 100 ppb of O_3 (R_{100ppb}).

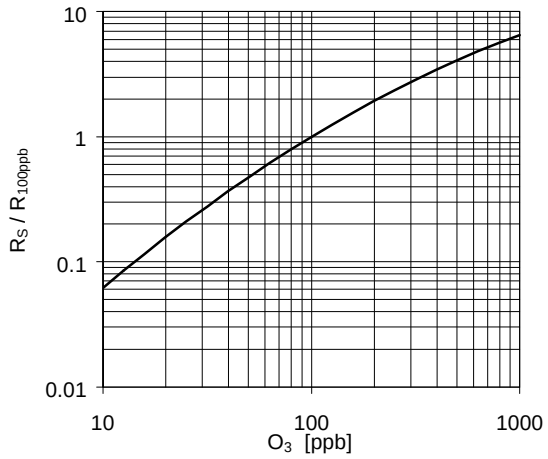
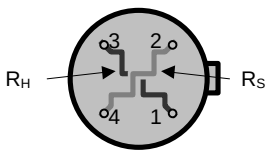


Figure 1: R_S / R_{100ppb} as a function of gas concentration at 50% RH and 25°C.

Measurement Circuit:

Figure 2 shows the pin connections of the MiCS-2610 ozone sensor. A simple circuit to measure the O_3 concentration is proposed in Figure 3. The heating voltage V_H is applied to pins 3 and 1. A load resistor R_L is connected in series with R_S to convert the resistance R_S to a voltage V_S between pins 2 and 4. R_S can then be calculated by the following expression:

$$R_S = R_L / (V_{CC} - V_S) \cdot V_S$$



Pin Number	
1	Heater Ground
2	Sensor Pin
3	Heater Power
4	Sensor Pin

Figure 2: Equivalent circuit (top view) of MiCS 2610.

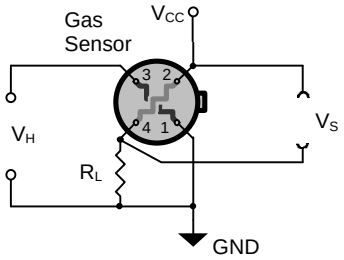


Figure 3: Measurement circuit for O_3 detection.

Electrical Specifications

Maximum Ratings:

Rating	Symbol	Value / Range	Unit
Maximum Heater Voltage	V_H	2.5	V
Maximum Sensor Supply Voltage	V_{CC}	5	V
Maximum Heater Power Dissipation	P_H	90	mW
Maximum Sensor Power Dissipation	P_S	1	mW
Relative Humidity Range	R_H	15 – 95	%RH
Ambient Operating Temperature	T_{amb}	0 – 50	°C
Storage Temperature Range	T_{sto}	-40 – +70	°C
Storage Humidity Range	RH_{sto}	15 – 95	%RH

Table 1

Operating Conditions:

Parameter	Symbol	Typ	Min	Max	Unit
Heating Voltage,	V_H	2.35	2.30	2.40	V
Heating Current,	I_H	34	28	36	mA
Heating Power, [1]	P_H	80	65	87	mW
Heating Resistance,	R_H	69	66	81	Ω

Table 2

[1] Min and Max values for the heating power are obtained by combining $V_{H, min}$. with $R_{H, max}$ and $V_{H, max}$. with $R_{H, min}$, respectively.

Sensitivity Characteristics:

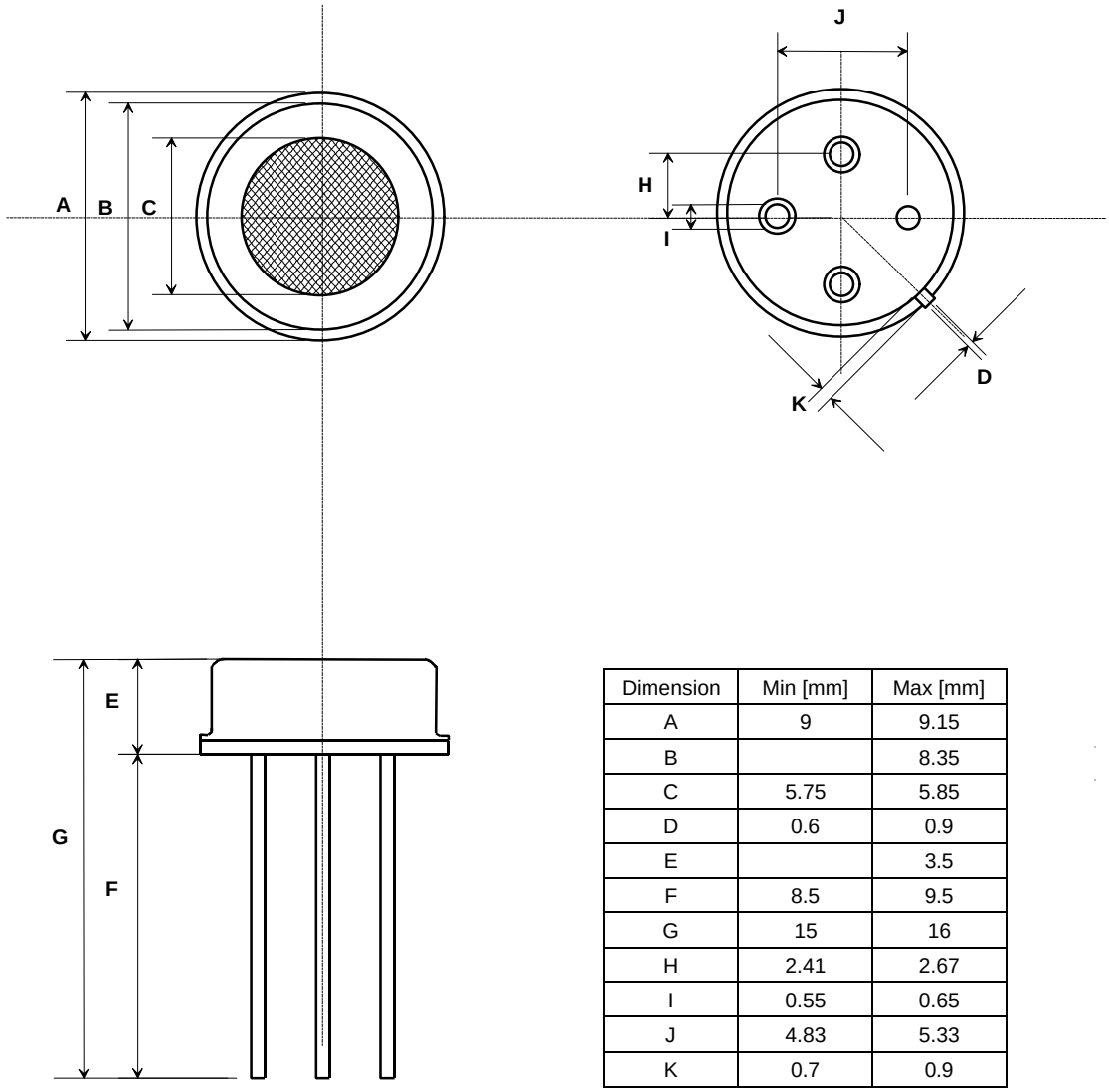
Characteristic	Symbol	Typ	Min	Max	Unit
O_3 Detection Range	FS		10	10000	ppb
Sensing Resistance at 50 ppm	R_S	70*	20*	200*	kΩ
Sensing Resistance at 100 ppm	R_S	140*	40*	400*	kΩ
Sensitivity Factor [2]	S_R	2.0*	1.5*	4.0*	-

Table 3

[2] Sensitivity Factor S_R is defined as R_S at 100ppb of O_3 divided by R_S at 50ppb of O_3. Test conditions are 50±5 %RH and 25±2°C.

* Values are subject to changes before the final datasheet is published.

Package Dimensions and Filter



Dimension	Min [mm]	Max [mm]
A	9	9.15
B		8.35
C	5.75	5.85
D	0.6	0.9
E		3.5
F	8.5	9.5
G	15	16
H	2.41	2.67
I	0.55	0.65
J	4.83	5.33
K	0.7	0.9