

O₃ 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 O₃ 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



This Preliminary Data Sheet accompanies MicroChemical Systems MiCS-2610 sensors for O₃ gas. Reproduction and distribution of this document is restricted by MicroChemical Systems. The following specifications are subject to change to accommodate continuous improvement.

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 (SnO₂) gas sensors require a relatively long warm up period before correct O₃ 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 O₃, 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 O₃ concentration is achieved by measuring the sensing resistor R_S during operation.

Measurement Circuit:

Figure 2 shows the pin connections of the MiCS-2610 ozone sensor. A simple circuit to measure the O₃ 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:

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

Sensor Response:

The sensor response to O₃ in air is represented in Figure 1. The sensor resistance R_S is normalized to the resistance under 100 ppb of O₃ (R_{100ppb}).

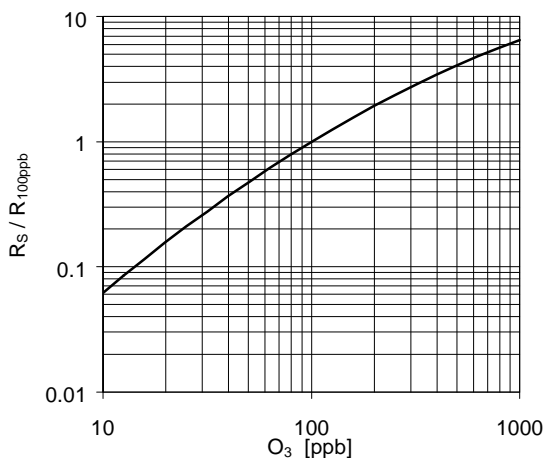


Figure 1: R_S / R_{100ppb} as a function of gas concentration at 50% RH and 25°C.

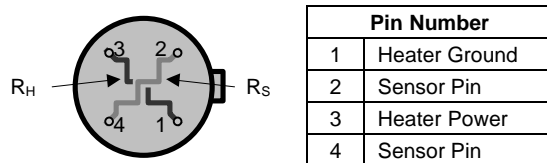


Figure 2: Equivalent circuit (top view) of MiCS 2610.

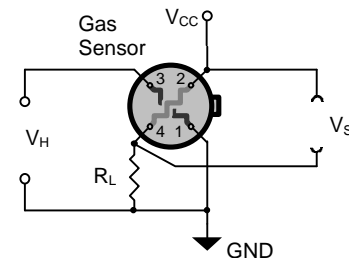


Figure 3: Measurement circuit for O₃ detection.

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 O₃ divided by R_S at 50ppb of O₃. 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

