

## 15x15 O3 Sensor 20 ppm C Package 110-407

### BENEFITS

- Small Size with Low Profile (20x20x3 mm)
- Long Life (10 years expected life)
- Fast Response (< 15 seconds)
- Low Power Consumption
- Individually Calibrated (NIST Traceable)
- ROHS Compliant
- *Improved stability and low ppb performance*

*\*See App Notes AN-104 and AN-107 for required temperature calibration and compensation*

### DESCRIPTION

SPEC's printed electrochemical gas sensors offer high performance at a fraction of the price. SPEC's printed sensors are also ultra-thin, offering easy integration into wireless, portable, and networked solutions. These sensors are ideal for health, environmental, industrial and residential monitoring, because of their high performance, low cost and small size.

### APPLICATIONS

- Air Quality Monitoring\*
- Industrial Safety
- Air Purification Control

*NOTE: Has 1:1 cross sensitivity to NO<sub>2</sub>*

Measurement Range	0 to >20 ppm
Lower Detection Limit**	< 20 ppb (instrumentation dependent)
Resolution**	< 20 ppb (instrumentation dependent)
Response Time	< 15 seconds typical
Sensitivity nA/ppm @ 5ppm	-60 +/- 10 nA/ppm
Expected Operating Life	> 5 years (10 years @ 23+/-3C; 40+/-10% RH)
Operating Temperature Range	-30 to 50 C (-20 to 40 C continuous)
Operating Humidity Range – non-condensing	0 to 100% RH (15 to 95% continuous)
Power Consumption	10 to 50 uW (circuit & ambient O3 dependent)

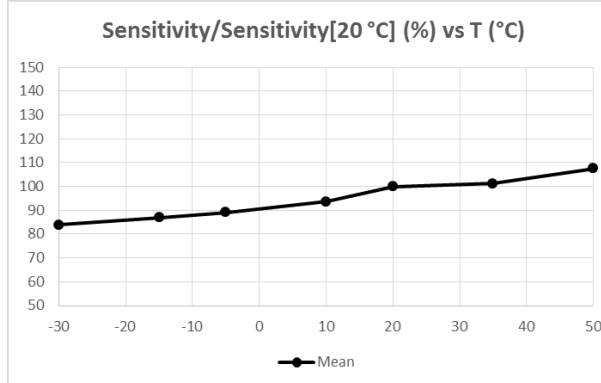
## CROSS SENSITIVITY

Gas/Vapor	Concentration	Typical Response PPM O3
Methane	500 ppm	< 0.05
<b>Nitrogen Dioxide</b>	<b>5 ppm</b>	<b>5</b>
Hydrogen Sulfide	25 ppm	-12.5
Carbon Monoxide	400 ppm	< 0.05
Ozone	5 ppm	5
Chlorine	10 ppm	10
n-Heptane	500 ppm	-0.2

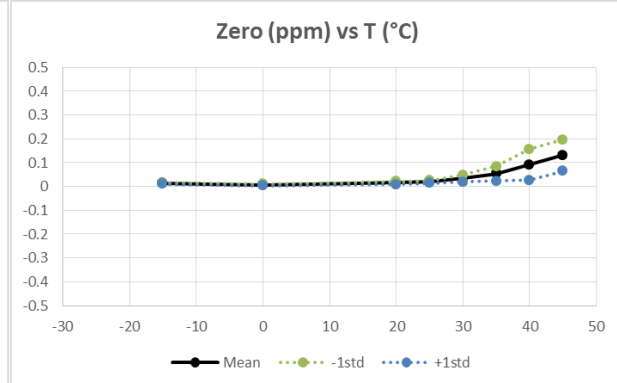
## TEMPERATURE EFFECT

Temperature fluctuations have a predictable, easily compensated effect on the sensor signal. The figures at below shows the typical Temperature dependency the output and baseline of 3SP\_O3\_5 sensor. This information was collected under constant humidity of 40-50 % RH. It is a very uniform and repeatable effect, easily compensated for in hardware or software.

Effect of Temperature on Sensitivity

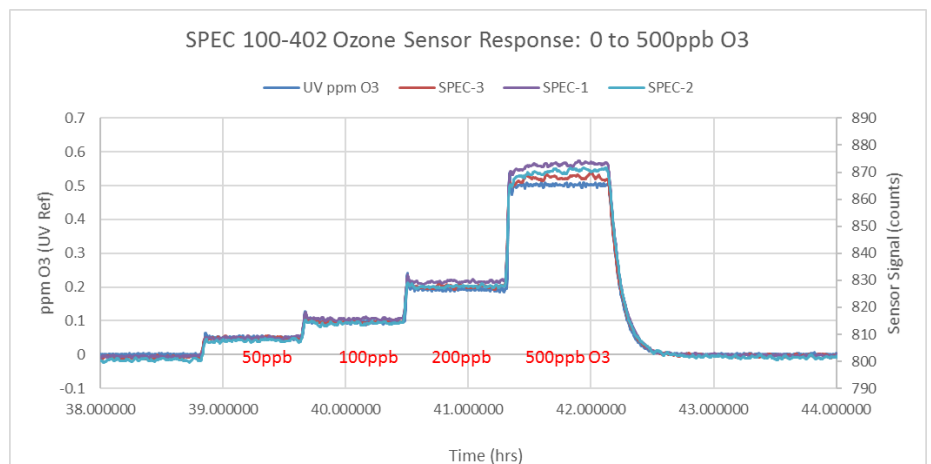


Effect of Temperature on Zero



### **\*\*Response of sensor to ozone concentrations from 0ppb O3 to 500ppb O3.**

Use of SPEC circuit reduces noise to 10 ppb; additional measures may further reduce noise. Offset of 800cts is due to intentional AFE circuit electronic offset



## IMPORTANT PRECAUTIONS


All sensor designs are made for air monitoring @ 1 atm +/- 0.2 atm. Because applications of use and device implementation are outside our control, SPEC Sensors cannot guarantee performance in a given device or application, and disclaims any and all liability therefore. **Customers should test under their own conditions to ensure the sensors are suitable for their requirements.**

Contact the factory to discuss specific concerns that might damage the sensor performance or life.

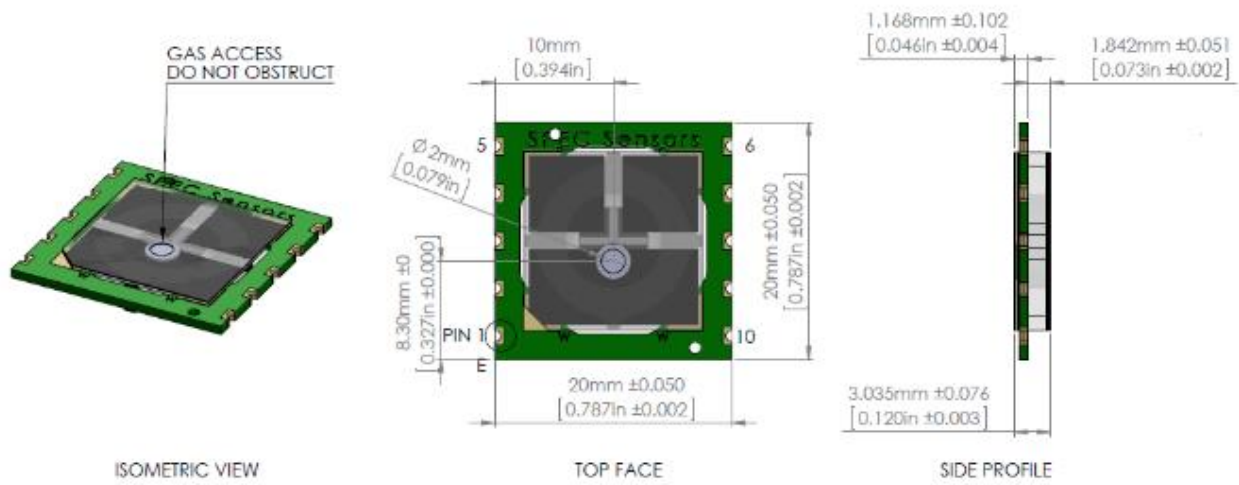
- Condensation and Water (1)
  - Salt Water Contamination (1)
  - High Temperature Operation (> 70C) for more than 1 month
  - Low Humidity Operation (< 15% RH) for more than 3 months
  - High Bias voltage
  - Highly contaminated air over a prolonged period
  - High levels of particles or soot (unless proper filtering is provided)
- (1) Use of porous PTFE membrane or filter cap may address this concern)

## MARKING INFORMATION

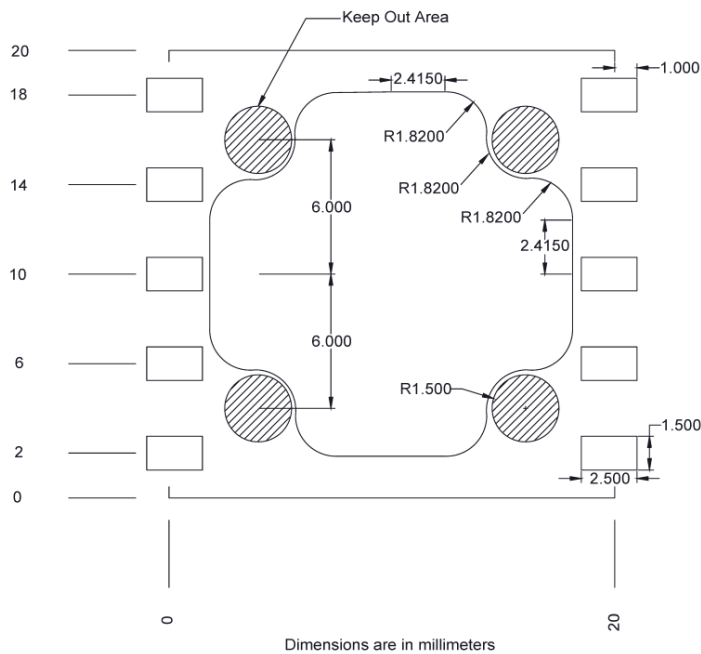
Sensors have serial numbers printed with individual NIST Traceable calibration data printed on each sensor. (CO version shown)

	Unique Serial Number	Sensor Part Number	Target Gas	Date Code	(YYMM)	Sensitivity Code	(nA/ppm)
Alph-Numerica Code:		100105	CO	1510		2.78	
2D Code:	101915010903	100105	CO	1510		2.78	

## DIMENSIONS



## PCB LAYOUT GUIDELINES



PIN	CONNECTION
1	WORKING
2	NC
3	NC
4	NC
5	REFERENCE
6	COUNTER
7	NC
8	NC
9	NC
10	WORKING

## SENSOR STORAGE, HANDLING AND SOLDERING

This information embodies various general recommendations concerning the storage, handling, and manual soldering conditions for SPEC SENSORS CSPEC Modules. It is only applicable for modules guaranteed by SPEC SENSORS stated in SPEC SENSORS Sensor Specification Sheet. Moreover, SPEC SENSORS' modules are NOT warranted and should NOT be used in high temperature soldering (reflow) or pre-tinning baths.

### Sensor & Module Handling

Handle sensors with care. Take precautions, including but not limited to the following:

- A. DO NOT apply excessive pressure to the top or bottom of the sensor module.
- B. Whenever possible, handle or make contact with the sensor module from the sides of the PCB or substrate.
- C. Light vacuum pressure is possible during handling, DO NOT apply vacuum over gas sensor port.
- D. If the sealed sensor package is opened, DO NOT re-seal using vacuum or nitrogen gas. DO NOT reseal with desiccant.
- E. DO NOT obstruct the gas sensor port by making direct contact with any tape, apparatus, weights, etc.
- F. DO NOT use silicone or other conformal coatings around the sensor or gas port-holes.
- G. Operators are requested to wear powder free antistatic gloves.

### Manufacturing Assembly Floor Environment

SPEC SENSORS recommends that the manufacturing assembly floor environment be maintained at controlled conditions:

- A. Temperature: 18 - 26°C
- B. Relative Humidity: 40 to 60%
- C. Pressure: 1.0 ± 0.2 atm

### Sensor & Module Storage Conditions

The shelf life for sealed, packaged components is 12 months from the pack seal date, when stored in the factory-sealed bag under the following conditions:

- A. Temperature: 5 to 25 °C
- B. Relative Humidity: 20 to 80%
- C. Pressure: 1.0 ± 0.2 atm
- D. Storage Time: 12 months

When moving from Storage Conditions to the Manufacturing Assembly Floor Environment, the sensors should be allowed to equilibrate at the new conditions for at least 24 hours prior to manufacturing.

### Module Attach Soldering Process

Hand solder only. Keep the soldering iron or solder process tool away from the sensor. The sensor should not see pre-heat temperatures above 70 °C. There have been suggested cases where a heat sink cover over the sensor may be applicable to protect the sensor during processing. No Application notes to this approach available. Only to be used as reference only.

- A. DO NOT heat sensor above 70 °C
- B. Hand or peripheral process type approach
- C. Use solder wire alloy with the lowest possible eutectic temperature
- D. Use lowest possible soldering iron temperature
- E. Contact the host board with the soldering iron at a 45° angle on the solder pad
- F. Keep the soldering iron away from the top and bottom of the sensor module
- G. DO NOT place in reflow, wave or IR reflow type processes
- H. DO NOT place mounted board in a wash