

SP3-61-00

# FIS GAS SENSOR SP3-61-00

## for OZONE DETECTION

The SP3-61 is an indium/tin di-oxide semiconductor gas sensor which has a high sensitivity and selectivity to ozone. Using this model, detection of ozone is possible from low concentration ranges.

### Structure

Ozone sensitive semiconductor material is thinly formed on the alumina substrate on which the gold electrodes are printed. A thick film heater of ruthenium oxide is printed on the reverse of the substrate and placed in the mesh ceramic housing.

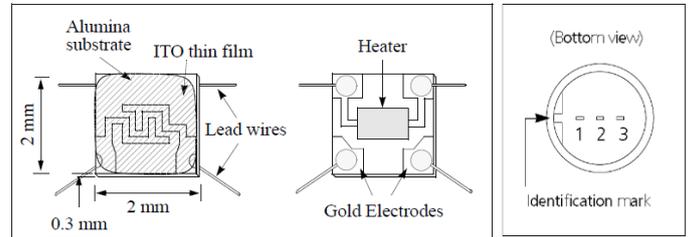


Fig 1a. Sensing element

Fig 1c. Pin Layout

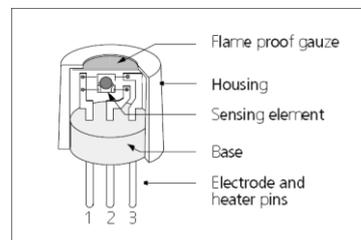


Fig 1b. Configuration

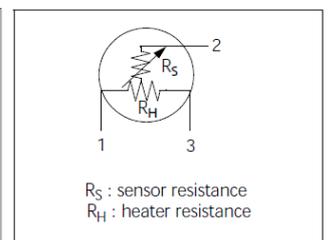


Fig 1d. Equivalent circuit

### Operating conditions

Fig 2 shows the standard operating circuit for this model. The change of the output voltage across the fixed or variable resistor ( $R_L$ ). In order to obtain the best performance and specified characteristics, the values of the heater voltage ( $V_H$ ) circuit voltage ( $V_C$ ) and load resistance ( $R_L$ ) must be within the range of values given in the standard operating conditions shown in the Specification table on the next page.

### Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SP3-61 (typical data). Sensitivity characteristics of the FIS gas sensors are expressed by the relationship between the sensor resistance and gas concentration. The sensor resistance increase with an increase of ozone concentration based on a logarithmic function. The sensitivity performance of the SP3-61 is specified by the

following parameters.

- Sensor resistance level: in clean air
- Sensor resistance level: in ozone 100ppb
- Ozone sensitivity ratio: between ozone 100ppb and air

See the specification table on the next page for further details.

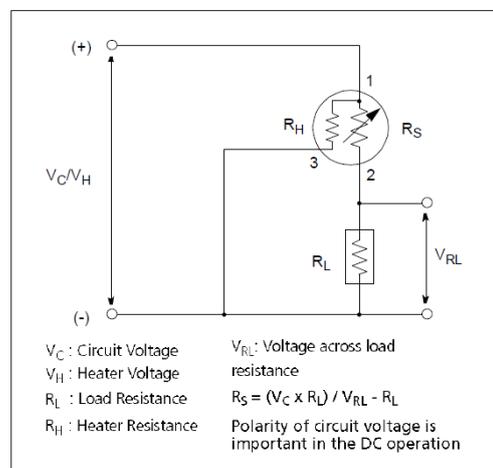


Fig 2. Standard circuit

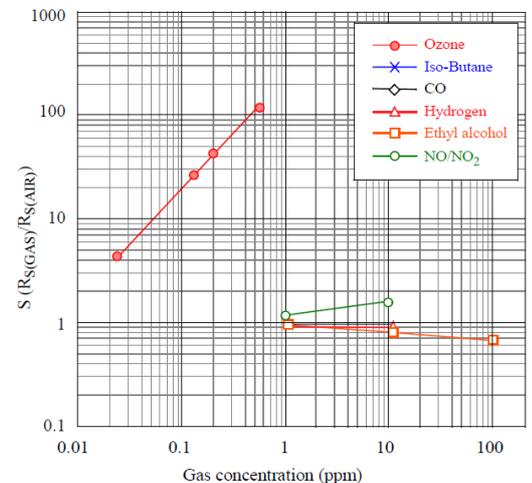


Fig 3. Sensitivity characteristics

**SPECIFICATIONS**

## Specifications: SP3-61-00

### A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH	Heater voltage	5.0 V ± 4 %	DC
VC	Circuit voltage	Less than 10 V	DC
RL	Load resistance	Variable	$P_S < 15 \text{ mW}$
RH	Heater resistance	$41 \Omega \pm 3 \Omega$	at room temperature
IH	Heater current	80 mA (Typical value)	$I_H = V_H / R_H$
PH	Heater power Consumption	400 mW (Typical value)	$P_H = V_H^2 / R_H$
PS	Power dissipation of sensing element	Less than 15 mW	$P_S = \frac{(V_C - V_{RL})^2}{R_S}$

### B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
$T_{ao}$	Operating temperature	-10°C to 50°C	
$T_{as}$	Storage temperature	-20°C to 60°C	
RH	Relative humidity	Less than 95%RH	
(O <sub>2</sub> )	Oxygen concentration	21% (Standard condition) The sensitivity characteristics are influenced by the variation in oxygen concentration.	Absolute minimum level : more than 18%.

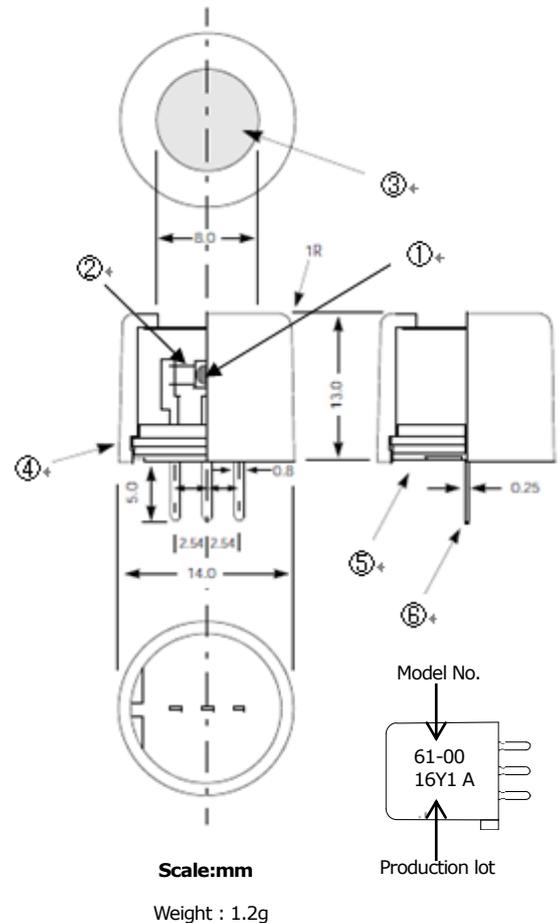
### C. Sensitivity characteristics

Model	SP3-61-00		
Symbol	Parameter	Specification	Condition etc.
$R_S$	Sensor resistance	3K $\Omega$ to 100K $\Omega$	In clean air
R/R	Sensitivity	More than 3	$\frac{R_S(\text{Ozone}100\text{ppb})}{R_S(\text{in air})}$
<b>Test condition</b> Temp : 20°C±2°C      VC=5V±1% Humidity : 65%±5%      VH=5V±1% (in clean air)      RL=100K $\Omega$ ±1%			

### D. Mechanical characteristics

Items	Conditions	Specifications
Vibration	Frequency: 5 - 500 Hz Acceleration: 1.3 G Sweep Time: 40 min.	Should satisfy the specifications shown in the sensitivity characteristics after test.
Drop	Height: 60 cm Number of impacts: 3 times	

### Dimensions



### F. Parts and Materials

No.	Parts	Materials
①	Sensing element	ITO thin film
	Substrate	Alumina(Al <sub>2</sub> O <sub>3</sub> )
	Electrode	Gold(Au)
	Heater	Ruthenium oxide(RuO <sub>2</sub> )
②	Lead wire	Gold alloy(Au-Rd-Mo)
③	Stainless steel mesh	SUS316
④	Plastic housing	PBT
⑤	Plastic base	PBT
⑥	Heater/electrode pins	Iron-nickel alloy

Please contact

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In the interest of continued product improvement, we reserve the right to change design features without prior notice.