

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.

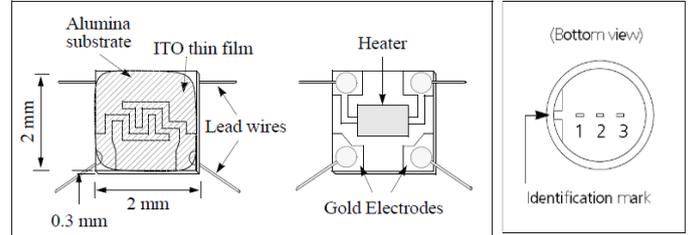


Fig 1a. Sensing element

Fig 1c. Pin Layout

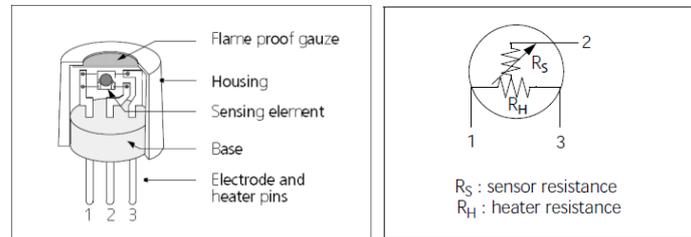


Fig 1b. Configuration

Fig 1d. Equivalent circuit

Operating conditions

Fig 2 shows the standard operating circuit for this model. The change of the sensor resistance (R_S) is obtained as 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
- Ozone sensitivity ratio: between ozone 100ppb and air

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

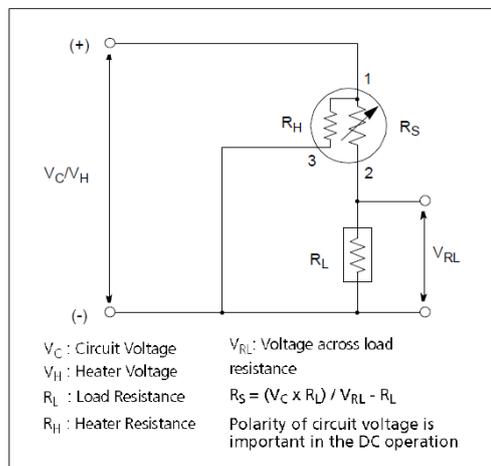


Fig 2. Standard circuit

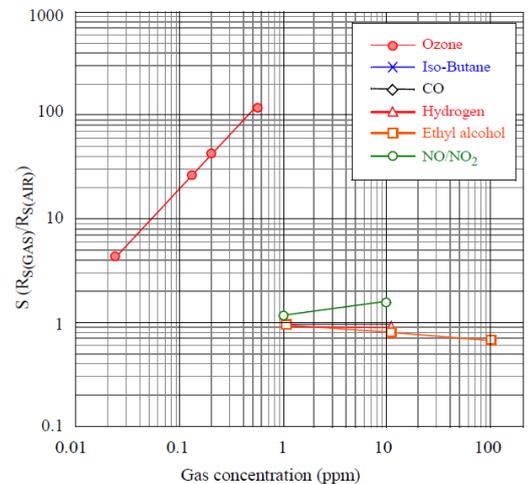


Fig 3. Sensitivity characteristics

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 ₂) | Oxygen concentration | 21% (Standard condition) The sensitivity characteristics are influenced by the variation in oxygen concentration. | Absolute minimum level : more than 18%. |

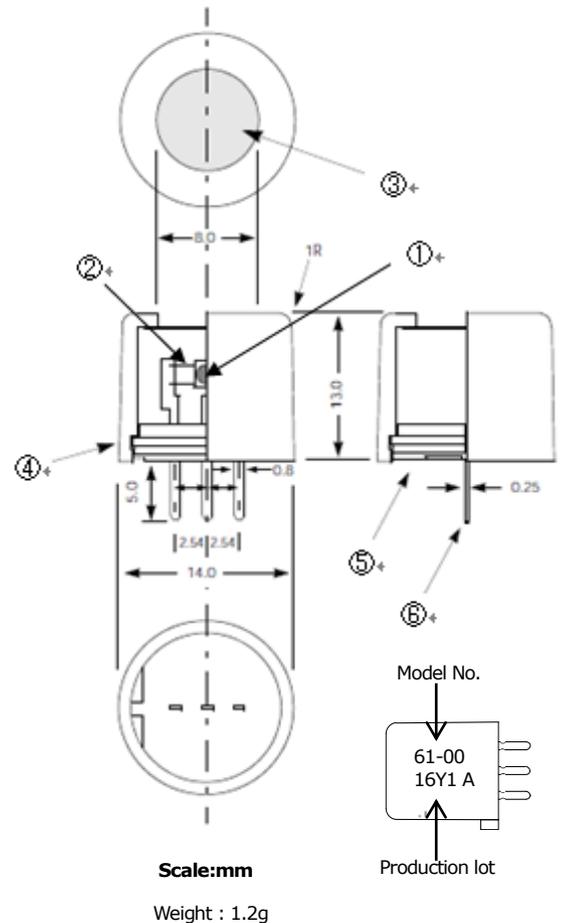
C. Sensitivity characteristics

| Model | SP3-61-00 | | |
|-------------------------------------|-------------------|----------------------|---|
| Symbol | Parameter | Specification | Condition etc. |
| R_S | Sensor resistance | 3K to 100K Ω | in clean air |
| R/R | Sensitivity | More than 3 | $\frac{R_S(\text{ozone}100\text{ppb})}{R_S(\text{in air})}$ |
| <u>Test condition</u> | | | |
| Temp : 20°C±2°C | | VC=5V±1% | |
| Humidity : 65%±5% (in clean air) | | VH=5V±1% | |
| | | RL=100K Ω ±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 ₂ O ₃) |
| | Electrode | Gold(Au) |
| | Heater | Ruthenium oxide(RuO ₂) |
| 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.

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