

SP-53B-00

FIS GAS SENSOR SP-53B-00

for AMMONIA DETECTION

The SP-53B is a tin dioxide semiconductor gas sensor which has a good sensitivity to low concentration ranges of ammonia with improved response speed compared with conventional models.

Structure

Gas sensitive semiconductor material is 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 housing (Fig 1).

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.

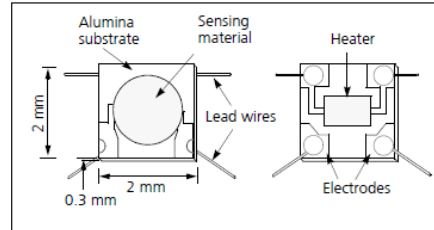


Fig 1a. Sensing element

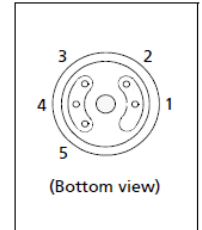


Fig 1c. Pin Layout

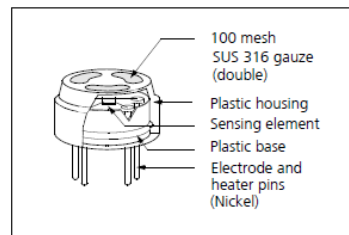


Fig 1b. Configuration

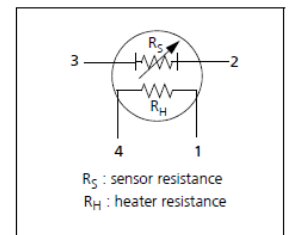


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SP-53B (typical data). Sensitivity characteristics of our gas sensors are expressed by the relationship between the sensor resistance and gas concentration. The sensor resistance decreases with an increase of gas concentration based on a logarithmic function.

The sensitivity characteristics of the SP-53B is specified by the following parameters.

- Sensor resistance level: at ammonia 50 ppm
- Sensor resistance change ratio: between ammonia 50ppm and 150 ppm

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

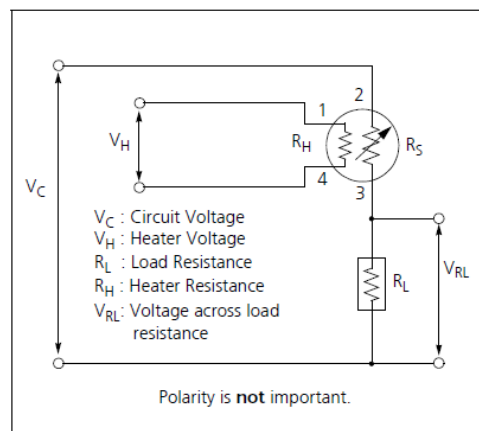


Fig 2. Standard circuit

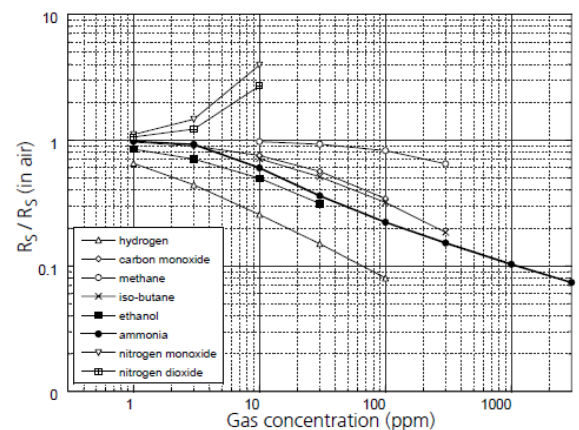


Fig3. Sensitivity characteristics

Specifications: SP-53B-00

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH	Heater voltage	5.0 V ± 4%	AC or DC
VC	Circuit voltage	5.0 V ± 4%	AC or DC
RL	Load resistance	Variable	Ps < 15 mW
RH	Heater resistance	40Ω ± 2Ω	at room temperature
IH	Heater current	80 mA (Typical value)	IH = VH / RH
PH	Heater power consumption	400 mW (Typical value)	PH = VH ² / RH
PS	Power dissipation of sensing element	Less than 15 mW	$P_s = \frac{(V_C - V_{RL})^2}{R}$

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
T _{ao}	Operating temperature	-10 °C to 50 °C	
T _{as}	Storage temp	-20 °C to 60 °C	
RH	Relative humidity	Less than 95%RH	
(O ₂)	Oxygen concentration	21% ± 1% (Standard condition) The sensitivity characteristics are influenced by the variation in oxygen concentration. Please consult us for details.	Absolute minimum level : more than 18%.

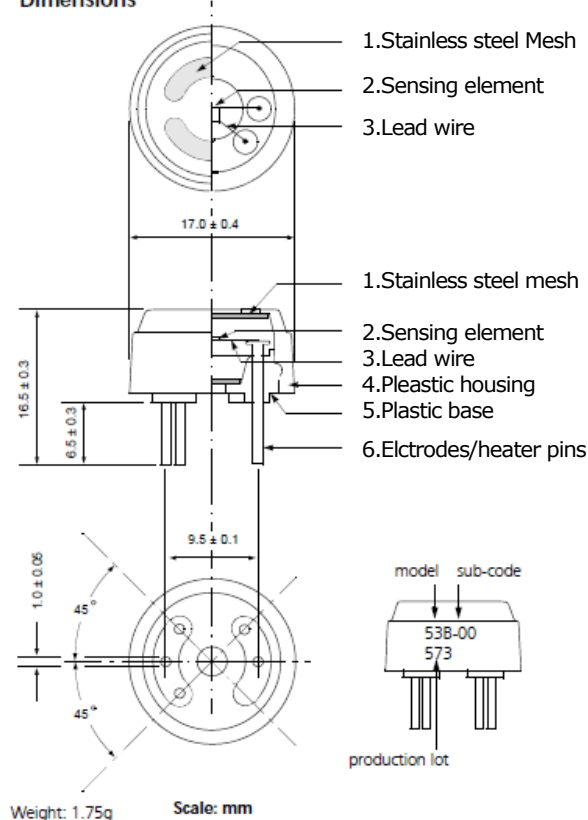
C. Sensitivity characteristics

Model	SP-53B-00		
Symbol	Parameter	Specification	Conditions etc.
R _s	Sensor resistance	10k to 100kΩ	at 50 ppm of ammonia
β	Sensitivity slope	0.40 to 0.55	$\frac{R_s \text{ at 150 ppm of ammonia}}{R_s \text{ at 50 ppm of ammonia}}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air) Pre-heating time: more than 48 hours	VC: 5.0 ± 1% VH: 5.0 ± 1% RH: 10 kΩ ± 5%

D. Mechanical characteristics

Items	Conditions	Specifications
Vibration	Frequency: 100cpm Vertical amplitude: 4mm Duration: 1hour	Should satisfy the specifications shown in the sensitivity characteristics after test.
Drop	Acceleration: 100 G Number of impacts: 5 times	

Dimensions



E. Parts and Materials

No.	Parts	Materials
1	Stainless steel mesh	SUS 316 (100 mesh, double)
2	Sensing element	Tin dioxide (SnO ₂)
3	Lead wire	Gold alloy (Au-Pd-Mo)
4	Plastic housing	Nylon 46 (UL94HB)
5	Plastic base	Nylon 66 (UL94HB)
6	Heater/electrode pins	Nickel

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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