

FIS GAS SENSOR SB-15

for LP-GAS (PROPANE/BUTANE) DETECTION

The SB-15 is a tin dioxide semiconductor gas sensor which has an excellent performance in propane/butane detection. The features are: high sensitivity, low sensitivity to noise gases, quick response speed, strong poisoning resistance and significant low power consumption design (120 mW).

Structure

Gas sensitive semiconductor material is a mini bead type and a heater coil and electrode wire are embedded in the element. The sensing element is installed in the metal housing which uses double stainless steel mesh (100 mesh) in the path of gas flow. The mesh is an anti-explosion feature (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.

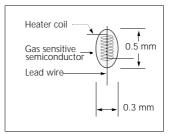


Fig 1a. Sensing element

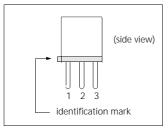


Fig 1c. Pin Layout

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-15 (typical data). Sensitivity characteristics of the FIS 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.

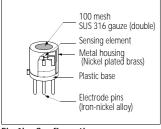


Fig 1b. Configuration

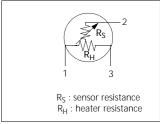


Fig 1d. Equivalent circuit

The sensitivity characteristics of the SB-15 is specified by the following parameters.

- Sensor resistance level: at iso-butane 1000 ppm
- Sensor resistance change ratio: between iso-butane 1000 ppm and 3000 ppm

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

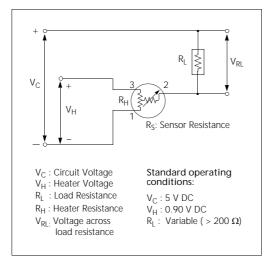


Fig 2. Standard circuit

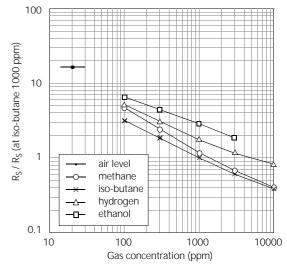


Fig 3. Sensitivity characteristics

Specifications

A. Standard operating conditions

Symbol	Parameter	Specification	Conditions etc.
V_{H}	Heater voltage	0.9 V ± 0.05 V	AC, DC or pulse driving
V _C	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
R_L	Load resistance	Variable (> 200 Ω)	P _S < 10 mW
R _H	Heater resistance	$2.8 \Omega \pm 0.2 \Omega$	at room temperature
I_{H}	Heater current	132 mA	$I_H = V_H / R_H$ (typical value)
P _H	Heater power consumption	120 mW	$P_H = V_H^2 / R_H$ (typical value)

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
Tao	Operating temperature	-10°C to 50°C	Recommended range
Tas	Storage temp	-30 °C to 100 °C	
RH	Relative humidity	Less than 95% RH	
(O ₂)	Oxygen concentration	21% ± 1% (Standard condition)	Absolute minimum level: more than 18%
		The sensitivity characteristics are influenced by the variation in oxygen concentration. Please consult FIS for details.	

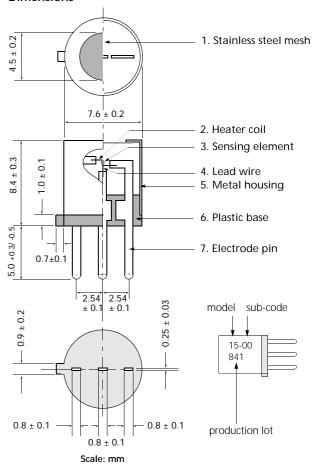
C. Sensitivity characteristics

Model	SB-15-00		
Symbol	Parameter	Specification	Conditions etc.
R_S	Sensor resistance	$0.2~\text{k}\Omega$ to $2.0~\text{k}\Omega$	at 1000 ppm of iso-butane
β	Sensitivity	0.55 to 0.75	Rs (at IB 3000 ppm) Rs (at IB 1000 ppm)
Standard Test Conditions:		Temp: $20 ^{\circ}\text{C} \pm 2 ^{\circ}\text{C}$ Humidity: $65\% \pm 5\%$ (in clean air)	V_C : 5.0 V ± 5% V_H : 0.9 V ± 5% R_L : 750 Ω ± 1%
Pre-heating time: more than 48 hours			re than 48 hours

D. Mechanical characteristics

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

Dimensions



Weight: 0.6g

E. Parts and materials

No.	Parts	Materials
1	Stainless steel mesh	SUS 316 (100 mesh, double)
2	Heater coil	Platinum
3	Sensing element	Tin dioxide (SnO ₂)
4	Lead wire	Platinum
5	Metal housing	Nickel plated brass
6	Plastic base	PBT (Poly butylene terephthalate)
7	Electrode pins	Iron-nickel alloy

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