

FIS GAS SENSOR SB-95

for CARBON MONOXIDE AND METHANE DETECTION

General

The SB-95 is a tin dioxide semiconductor gas sensor which has an excellent performance in detecting both CO and methane selectively with single sensor element. This unique feature was realized by using a mini-bead type sensing element with a periodic temperature changing operation method.

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. This sensor unit is placed in an external housing which contains active charcoal filter (Fig 1).

Operating conditions

When the sensor is operated with high/low periodic operation (Fig 2), sensor signal changes according to the temperature dependency characteristics. By detecting the sensor signal at sufficient timings (at a high temperature for methane and at a low temperature for CO), selective detection of both methane and CO has been achieved. Figs 3a and 3b show the sensitivity characteristics of the SB-95, at high temperature and at low temperature signals respectively.

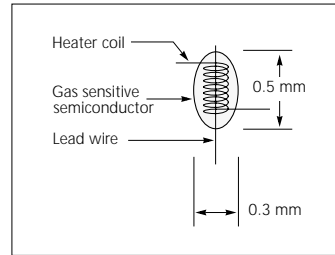


Fig 1a. Sensing element

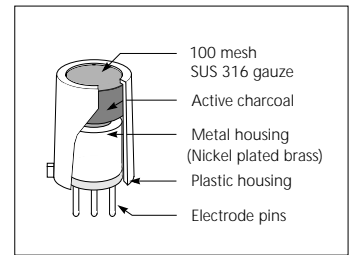


Fig 1b. Configuration

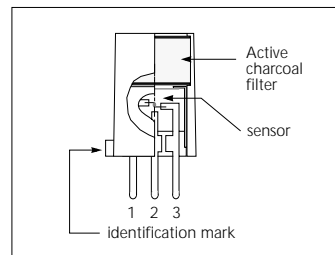


Fig 1c. Pin Layout

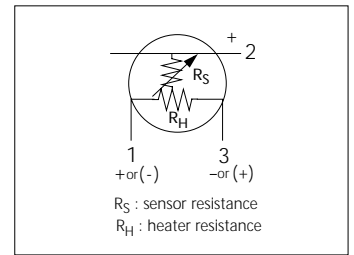


Fig 1d. Equivalent circuit

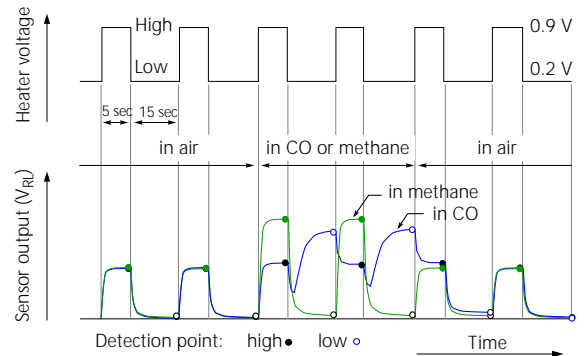


Fig 2 SB-95: Operating conditions and output signal

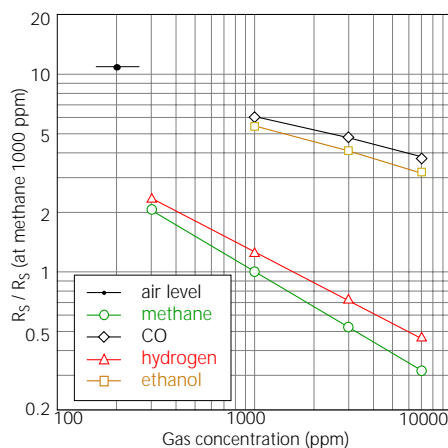


Fig 3a. SB-95: Sensitivity at HIGH signal for methane

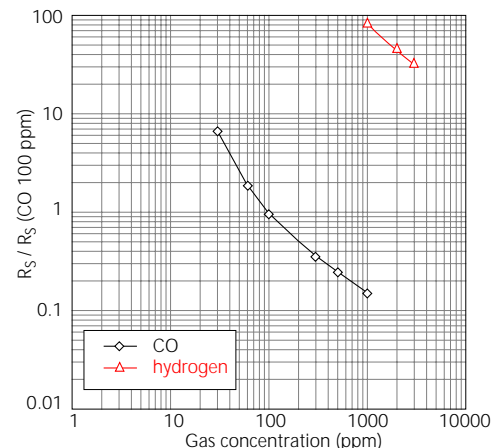


Fig 3b. SB-95/SB-500: Sensitivity at LOW signal for CO

Specifications

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH(H)	Heater voltage (high)	0.9 V ± 5%	AC or DC
VH(L)	Heater voltage (low)	0.2 V ± 5%	AC or DC
V _C	Circuit voltage	Less than 5 V	AC or DC
R _L	Load resistance	Variable (> 200 Ω)	P _S < 10 mW e.g. High: 750 Ω / Low: 10 kΩ
R _H	Heater resistance	2.8 Ω ± 0.2 Ω	at room temperature
TH (H)	Heating time (high)	5 sec ± 0.1 sec	
TH (L)	Heating time (low)	15 sec ± 0.1 sec	
DT (L)	Detection timing (low)	< 0.1 sec	before switching to LOW
I _S (H)	Current consumption (high)	132mA ± 15mA	VH=0.9V (Dynamic Driving: 26mA)
I _S (L)	Current consumption (low)	59mA ± 10mA	VH=0.2V
P _S	Power dissipation	Less than 10 mW	

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
T _{ao}	Operating temperature	-20 °C to 50 °C	Recommended range
T _{as}	Storage temp	-20 °C to 70 °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.	Absolute minimum level: more than 18%

C. Sensitivity characteristics

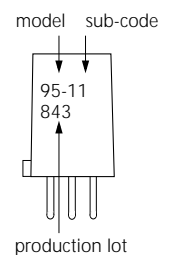
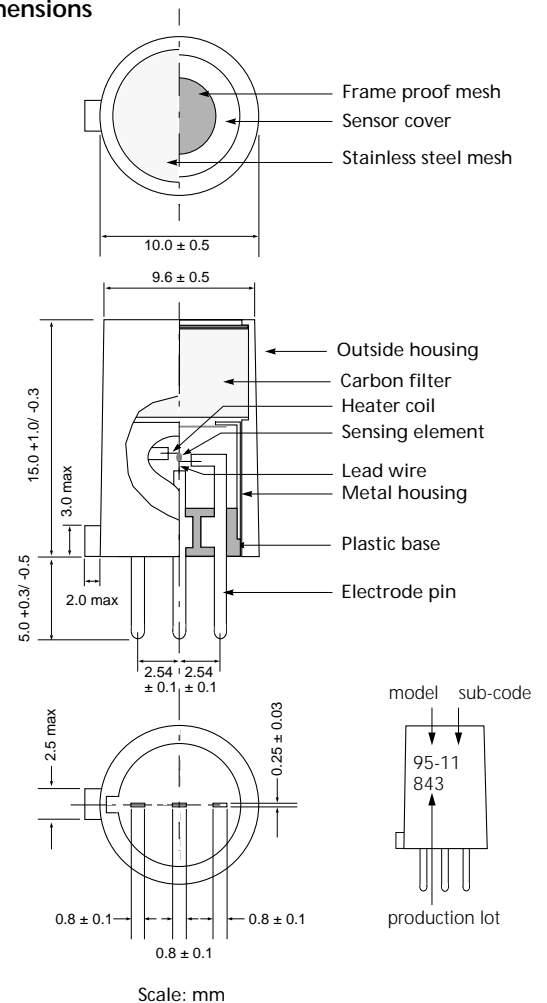
Model	SB-95-11		
Symbol	Parameter	Specification	Conditions etc.
R _S (L)	Sensor resistance at LOW period	2.5 kΩ - 50 kΩ	at 100ppm of CO / air
α _(L) (30-100)	Sensitivity slope (30 - 100 ppm)	1.05 to 2.10	$\frac{\log(Rs(30\text{ ppm}) / Rs(100\text{ ppm}))}{\log(30/100)}$
α _(L) (100-300)	Sensitivity slope at LOW	0.75 to 1.20	$\frac{\log(Rs(300\text{ ppm}) / Rs(100\text{ ppm}))}{\log(300/100)}$
R _S (H)	Sensor resistance at HIGH period	0.35 kΩ - 3.5 kΩ	at 1000 ppm of methane / air
β _(H)	Sensitivity slope at HIGH period	0.50 to 0.65	R _S (3000 ppm) / R _S (1000ppm)
Standard Test Conditions: Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air) V _C : 5.0 V ± 1% V _H (high) : 0.9 V ± 1% V _H (low) : 0.2 V ± 1% R _L (high) : 750 Ω ± 5% (Low) : 10 kΩ ± 5% Pre-heating time: more than 5 days			

D. Mechanical characteristics

Items	Conditions	Specifications
Vibration	Frequency:	100 cpm
	Vertical amplitude:	4 mm
	Duration:	1 hour
Shock	Acceleration:	100 G
	Number of impacts:	5 times

Should satisfy the specifications shown in the sensitivity characteristics.

Dimensions



E. Parts and Materials

No.	Parts	Materials
1.	Sensing element	Tin dioxide
2.	Heater coil/ Lead wire	Platinum
3.	Stainless steel mesh	SUS 316 (100 mesh, single)
4.	Carbon filter	Activated carbon
5.	Outside housing	Nylon 6 (UL94 V-0)
6.	Flameproof mesh	SUS 316 (100 mesh, double)
7.	Metal housing	Nickel plated brass
8.	Plastic base	PBT (poly butylene telephthalate)
9.	Electrode pins	Iron-nickel alloy

Please contact

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