

SMB-AQ1-00

FIS GAS SENSOR SMB-AQ1 for AIR QUALITY CONTROLS (VOCs)

The SMB-AQ1-00 is a tin dioxide semiconductor gas sensor which has a very high sensitivity to VOCs, solvents and many other gases. This model is suitable for air quality monitoring for general applications. A significant feature of low power consumption design 3.2mW) is advantageous for portable devices.

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 compact ceramic housing which has pin holes in the path of gas flow.

Operating conditions

Fig 2 shows the standard operating condition and Fig 3 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 SMB-AQ1-00 (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.

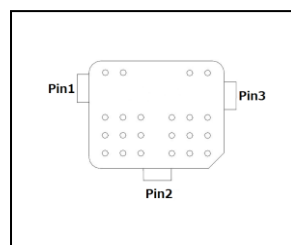


Fig 1a. Configuration

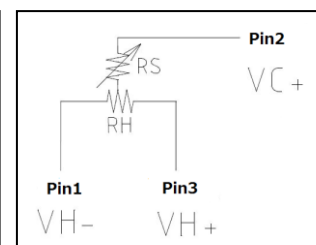


Fig 1b. Equivalent circuit

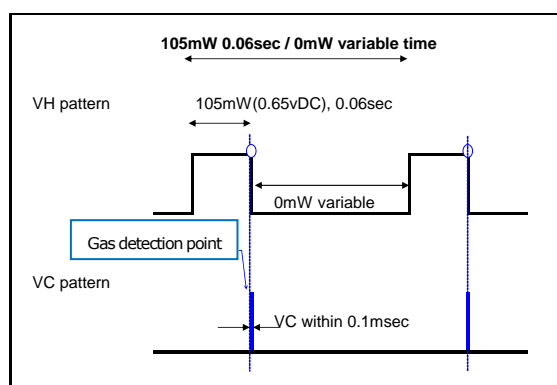


Fig 2. SMB-AQ1: Operating condition and output signal

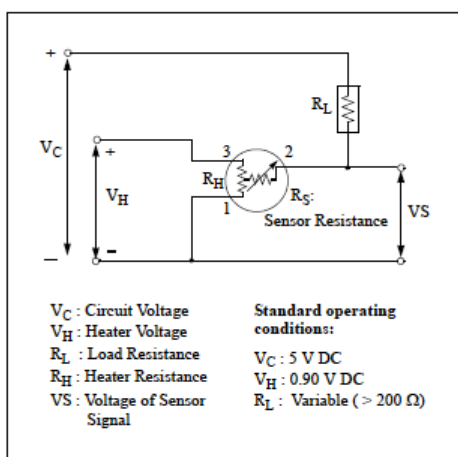


Fig 3. Standard circuit

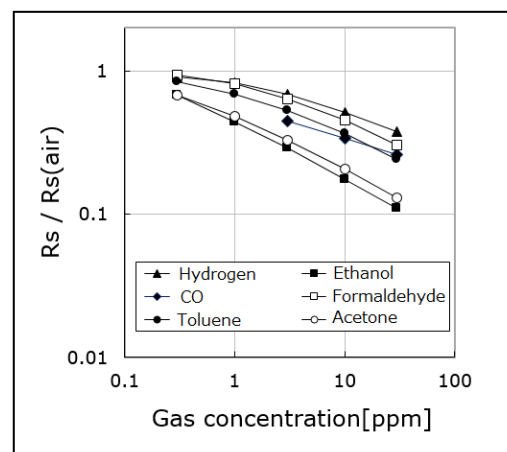


Fig 4. Sensitivity characteristics

Specifications

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH(H)	Heater voltage (high)	1.2V to 5.2VDC	Pulse, PWM control
VC	Circuit voltage	1.2V to 5.2VDC Less than 0.1msec	DC: Pin2(+) - Pin1 (-) PWM
RL	Load resistance	Variable (> 200 Ω)	PS < 10 mW
RH	Heater resistance	1.8ohm (Typical value)	at room temperature
TH(H)	Heating time (high)	0.06sec	
TH(OFF)	Heating time (OFF)	1.94sec	
DT (L)	Detection timing	Less than 0.1msec	before switching to OFF
IH	Current consumption	161mA	VH=0.65VDC
PH	Power consumption	105mW	VH=0.65VDC
PS	Power dissipation of sensing element	Less than 10 mW	$P_s = \frac{(V_C - V_{RL})^2}{R}$

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
Tao	Operating temperature	0 °C to 40 °C	
Tas	Storage temp	-10 °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. Please consult FIS for details.	Absolute minimum level: more than 18%

C. Sensitivity characteristics

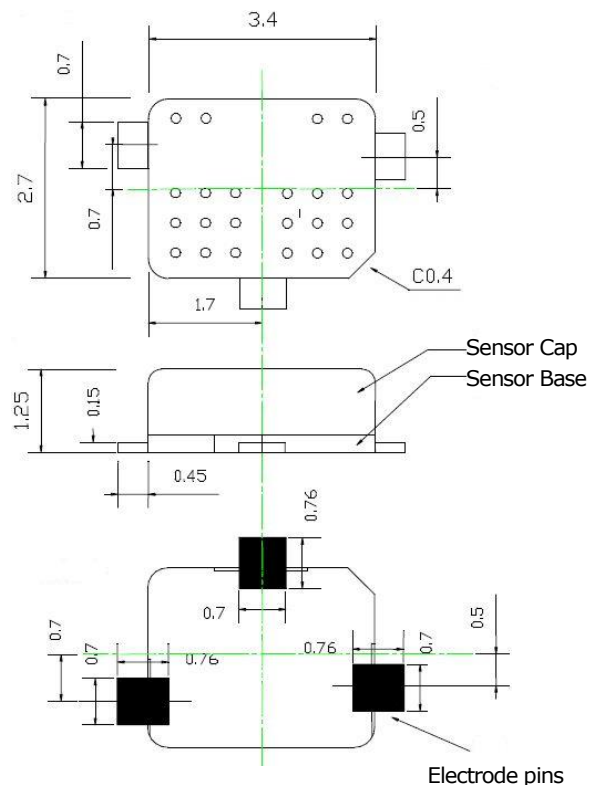
Model	SMB-AQ1-00		
Symbol	Parameter	Specification	Conditions etc.
Rs	Sensor resistance	10kΩ (center value)	at clean air
Δ	Hydrogen Sensitivity	0.45(center value)	<u>Rs at Hydrogen 10 ppm</u> Rs in air
Δ	Ethanol Sensitivity	0.15(center value)	<u>Rs at Ethanol 10 ppm</u> Rs in air
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air) Pre-heating time: more than 48 hours	VC: 5.0 V ± 5% VH: 0.65 V ± 5% 0.06sec +0 V 1.94sec RL: 10 kΩ ± 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	

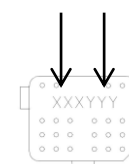
Please contact

Dimension



Weight: 0.02g

Model No. Production lot



E. Parts and Materials

No.	Parts	Materials
1	Sensor Cap	LCP(Black, UL-94-V0)
2	Sensor Base	LCP(Black, UL-94-V0)
3	Electrode pins	SUS304-1/2h
4	Heater coil	Platinum
5	Sensing element	Tin dioxide(SnO ₂)
6	Lead wire	Platinum

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