

## GAS SENSOR MQ-306 for FLAMMABLE GAS

- \* High sensitivity
- \* Low power consumption
- \* Miniature-size

The MQ-306 is a tin dioxide semiconductor gas sensor which has a high sensitivity to Flammable Gas with quick response speed. This model is suitable for LPG,LNG, iso-butane,propane,H<sub>2</sub> detection such as portable gas detector.

### 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).

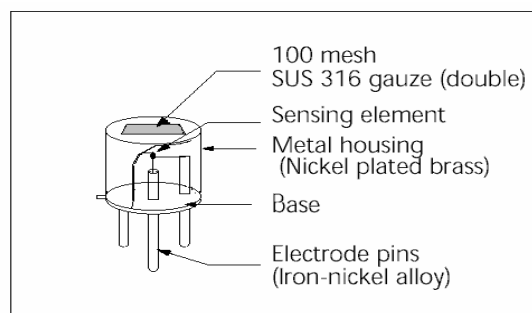


Fig 1a. Configuration

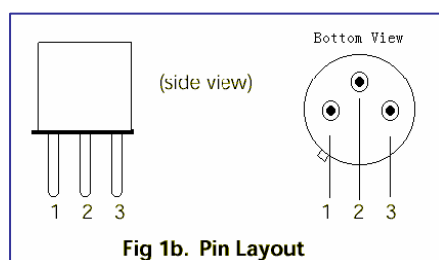


Fig 1b. Pin Layout

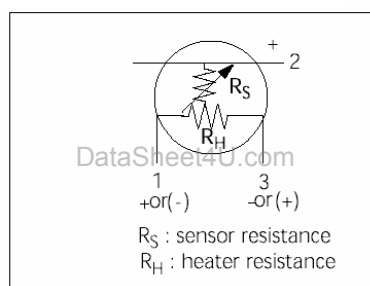


Fig 1c. Equivalent circuit

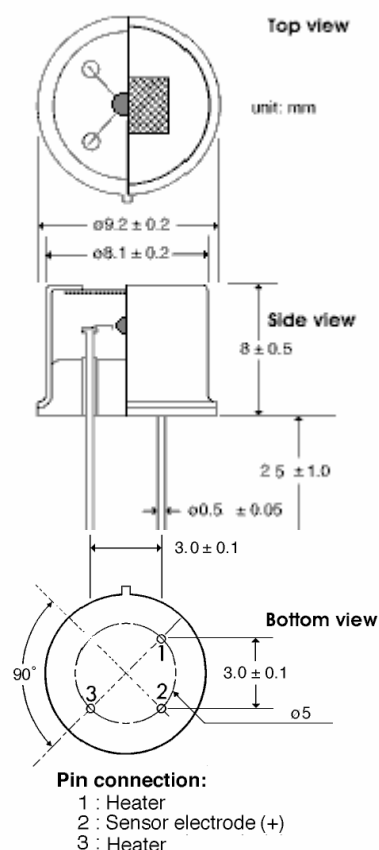
### Operating conditions

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 MQ-306 (typical data). Sensitivity characteristics of the 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.

### Structure and Dimensions:



#### Pin connection:

- 1: Heater
- 2: Sensor electrode (+)
- 3: Heater

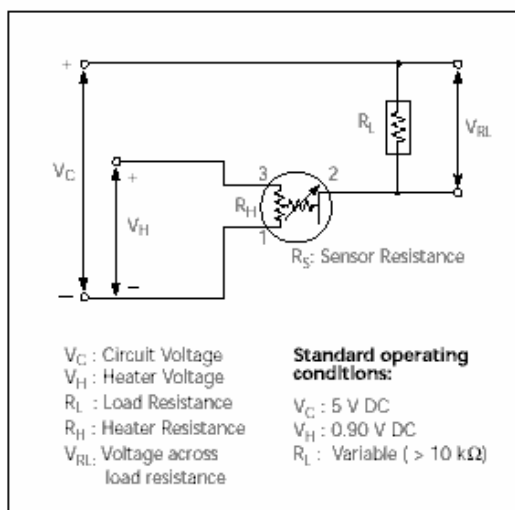


Fig 2. Standard circuit

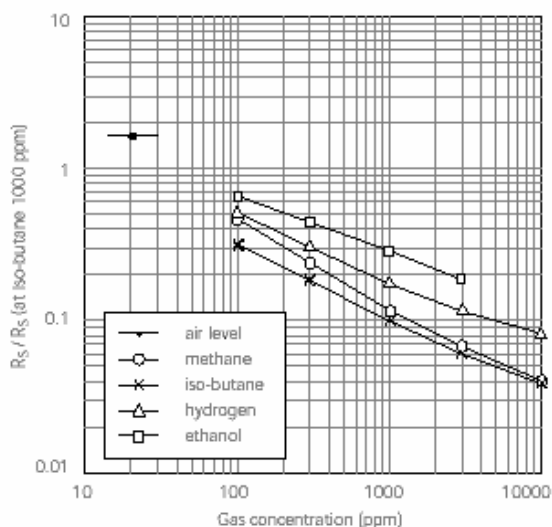


Fig 3. Sensitivity characteristics

### A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
$V_H$	Heater voltage	$3.0V \pm 0.10V$	AC or DC
$V_C$	Circuit voltage	Less than 6 V	DC (polarity is important)
$R_L$	Load resistance	Variable ( $> 10 \text{ k}\Omega$ )	$P_S < 10 \text{ mW}$
$R_H$	Heater resistance	$16 \text{ k}\Omega \pm 2 \%$	at room temperature
$I_H$	Heater current	Less than 80 mA	$I_H = V_H / R_H$ (typical value)
$P_H$	Heater power consumption	Less than 250 mW	$P_H = V_H^2 / R_H$ (typical value)
$P_S$	Power dissipation of sensing element	Less than 10 mW	$P_S = (V_C - V_{RL})^2 / R_S$

### B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
$T_{ao}$	Operating temperature	$-20^\circ\text{C}$ to $50^\circ\text{C}$	Recommended range
$T_{as}$	Storage temp	$-20^\circ\text{C}$ to $70^\circ\text{C}$	
RH	Relative humidity	Less than 95% RH	
(O <sub>2</sub> )	Oxygen concentration	$21\% \pm 1\%$ (Standard condition) The sensitivity characteristics are influenced by the variation in oxygen concentration.	Absolute minimum level: more than 18%

### C. Sensitivity characteristics

Model	MQ-306 (tentative specifications)		
Symbol	Parameter	Specification	Conditions etc.
$R_S$	Sensor resistance	( $20 \text{ k}\Omega$ to $200 \text{ k}\Omega$ )	at iso-butane 1000 ppm
$\gamma$	Sensitivity	(0.70 $\pm$ 0.1)	$R_S$ (at iso-butane 3000 ppm) / $R_S$ (at iso-butane 1000 ppm)
Standard Test Conditions: Temp: $20^\circ\text{C} \pm 2^\circ\text{C}$ $V_C$ : 5.0 V $\pm 1\%$ Humidity: 65% $\pm 5\%$ $V_H$ : 3.0V $\pm 1\%$ (in clean air) $R_L$ : 50K $\pm 5\%$ Pre-heating time: more than 48 hours			

### D. Mechanical characteristics

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

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