

TGS 2616-C01 - for the detection of Hydrogen

Features:

- * Small interference from acetylene
- * High selectivity to hydrogen
- * Small size and low power consumption
- * Uses simple electrical circuit

Applications:

- * Hydrogen detection for transformer oil maintenance

The sensing element is comprised of a metal oxide semiconductor layer formed on an alumina substrate of a sensing chip together with an integrated heater, and it is housed in a standard TO-5 package. In the presence of a detectable gas, the sensor's conductivity increases depending on the gas concentration in the air. A simple electrical circuit can convert the change in conductivity to an output signal which corresponds to the gas concentration.

TGS2616-C01 has a newly developed sensing element which reduces the influence of interference gases such as acetylene, resulting in highly selective response to hydrogen.

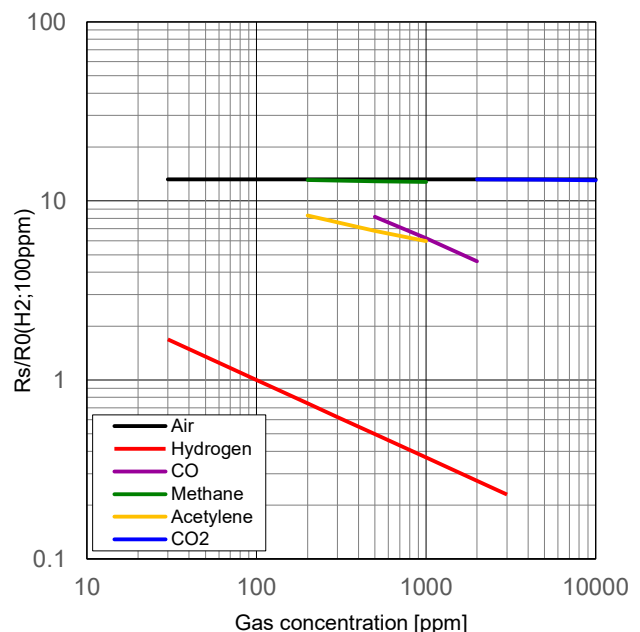


Sensitivity Characteristics:

The figure on the right represents typical sensitivity characteristics that are measured at standard test conditions. (see reverse side of this sheet for more details) The Y-axis indicates sensor resistance ratio R_s/R_o , where R_s and R_o are defined as below:

R_s = Sensor resistance in various gases and concentrations

R_o = Sensor resistance in 100 ppm of hydrogen

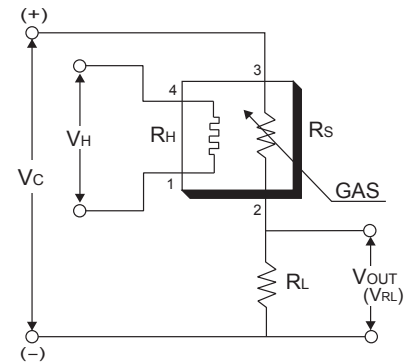


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Basic Measuring Circuit:

The sensor requires two voltage inputs: heater voltage (V_H) and circuit voltage (V_C). The heater voltage (V_H) is applied to the integrated heater in order to maintain the sensing element at a specific temperature which is optimal for sensing. Circuit voltage (V_C) is applied to allow measurement of voltage $V_{OUT}(V_{RL})$ across a load resistor (R_L) which is connected in series with the sensor.

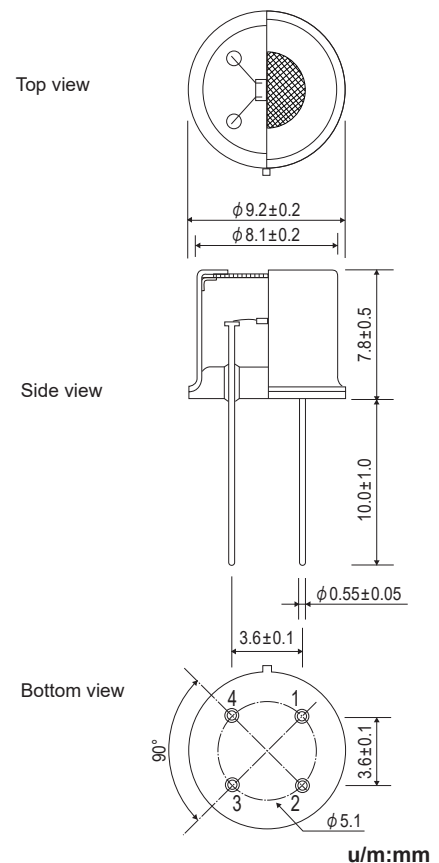
A common power supply circuit can be used for both V_C and V_H to fulfill the sensor's electrical requirements. The value of the load resistor (R_L) should be chosen to optimize the alarm threshold value, keeping power dissipation (P_S) of the semiconductor below a limit of 15mW. Power dissipation (P_S) will be highest when the value of R_S is equal to R_L on exposure to gas.



Specifications:

Model number		TGS2616-C01	
Sensing principle		MOS type	
Standard package		TO-5 metal can	
Target gases		Hydrogen	
Typical detection range		30~3000ppm	
Standard circuit conditions	Heater voltage	V_H	5.0±0.2V DC
	Circuit voltage	V_C	5.0±0.2V DC $P_S \leq 15mW$
	Load resistance	R_L	variable 0.45kΩ min.
Electrical characteristics under standard test conditions	Heater resistance	R_H	approx 59Ω at room temp.
	Heater current	I_H	56±5mA
	Heater power consumption	P_H	280mW $V_H = 5.0V$ DC
	Sensor resistance	R_S	0.30kΩ ~ 30kΩ in 100ppm hydrogen
	Sensitivity (change ratio of R_S)		0.25~0.60 in hydrogen $\frac{R_S(1000ppm)}{R_S(100ppm)}$
	Selectivity		>1 $\frac{R_S(500ppm \text{ of } C_2H_2)}{R_S(3ppm \text{ of } H_2)}$
Standard test conditions	Test gas conditions	Hydrogen in air at 20±2°C, 65±5%RH	
	Circuit conditions	$V_C = 5.0 \pm 0.01V$ DC $V_H = 5.0 \pm 0.05V$ DC	
	Preheating period before test	2 days	

Structure and Dimensions:



u/m:mm

The value of power dissipation (P_S) can be calculated by utilizing the following formula:

$$P_S = \frac{(V_C - V_{RL})^2}{R_S}$$

Sensor resistance (R_S) is calculated with a measured value of $V_{OUT}(V_{RL})$ by using the following formula:

$$R_S = \left(\frac{V_C}{V_{RL}} - 1 \right) \times R_L$$

Pin connection:

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

All sensor characteristics shown in this brochure represent typical characteristics. Actual characteristics vary from sensor to sensor. The only characteristics warranted are those in the Specification table above.



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