FIGARO

PRODUCT INFORMATION

TGS 2201 - for detection of Gasoline and Diesel Exhaust Gas

Features:

* Dual sensor element
* High sensitivity to exhaust gases emitted by both gasoline and diesel-fueled engines
* Long life and low cost
* Uses simple electrical circuit

Applications:

* Automobile ventilation control

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. In the presence of a detectable gas, the sensor's conductivity changes 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.

The **TGS 2201** contains two independent sensing elements on one substrate and produces separate output signals for responding to diesel and gasoline exhaust gases. This feature makes TGS2201 is an ideal senor for application in automatic damper control systems for automobile ventilation.

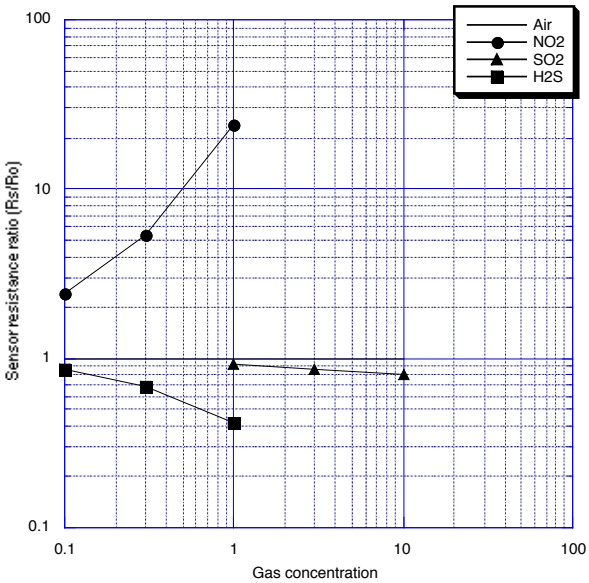
Element 1 - Diesel exhaust gas

A major component of diesel exhaust gas is NOx. The figure below represents typical sensitivity characteristics for Element 1, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:

Rs = Sensor resistance in displayed gases at various concentrations

Ro = Sensor resistance in clean air

Sensitivity Characteristics:



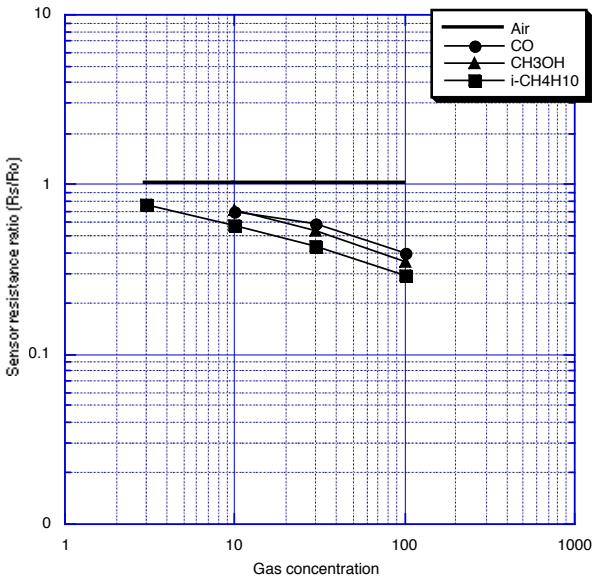
Element 2 - Gasoline exhaust gas

Gasoline exhaust gas typically contains CO, H_2, and uncombusted hydrocarbons. The figure below represents typical sensitivity characteristics for Element 2, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:

Rs = Sensor resistance in displayed gases at various concentrations

Ro = Sensor resistance in clean air

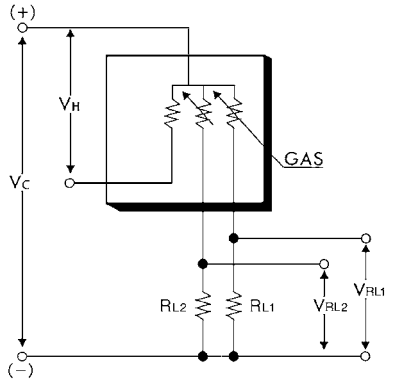
Sensitivity Characteristics:



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. Vc is applied to measure output voltages V_{RL1} and V_{RL2} across R_{L1} and R_{L2} respectively. Each of these load resistors are connected in series to their corresponding sensing elements.

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 Rs is equal to R_L on exposure to gas.



Specifications:

Model number			TGS 2201	
Sensing element type			S2	
Standard package			Plastic (P3)	
Target gases			Diesel exhaust (NO, NO_2)	Gasoline exhaust (CO,H_2,HC)
Typical detection range			0.1 ~ 10 ppm	10~1,000ppm
Standard circuit conditions	Heater voltage	V_H	5.0V DC±5%	
	Circuit voltage	V_C	15.0V DC Max., Ps ≤ 15mW	
	Load resistance	R_L	Variable, Ps ≤ 15mW	
Electrical characteristics under standard test conditions	Heater resistance	R_H	35Ω ± 10% at room temp.	
	Heater current	I_H	100mA	
	Heater power consumption	P_H	502mW	
	Sensor resistance	Rs	0.1~2MΩ in air	10~80kΩ in air
	Sensitivity (change ratio of Rs)		Rs(0.3ppm of NO2)/ Rs (air) = 12±8	Rs(10ppm of CO)/ Rs (air) = 0.65±0.15
Standard test conditions	Test gas conditions		Air at 20±2˚C, 65±5%RH	
	Circuit conditions		R_L = 200kΩ±1%	R_L = 10.0kΩ±1%
			V_C = 5.0V DC ± 3%, V_H = 5.0V DC ± 5%	
	Conditioning period before test		2~7 days	

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

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

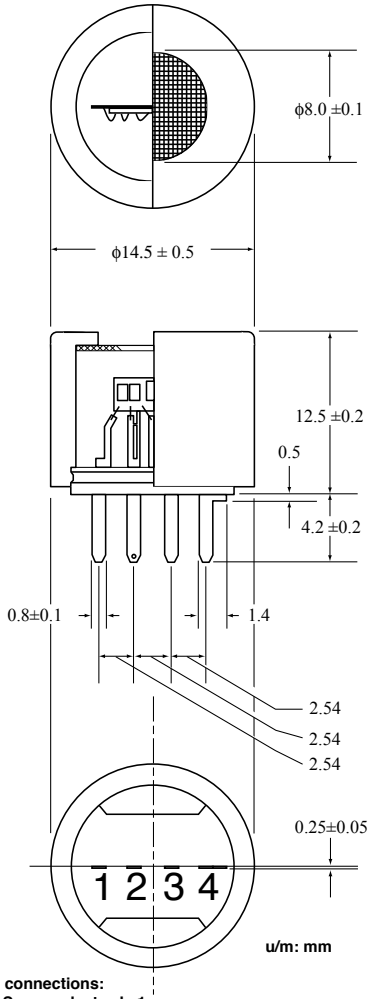
Sensor resistance (Rs) is calculated with a measured value of V_{RL} by using the following formula:

$$R_S = \frac{V_C - V_{RL}}{V_{RL}} \times R_L$$

For information on warranty, please refer to Standard Terms and Conditions of Sale of Figaro USA Inc.

REV: 10/06

Structure and Dimensions:



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

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