TGS3870-F00 Gas Sensor for Detecting Methane and Carbon Monoxide

characteristic：

Small size, low power consumption

* Good selectivity and high sensitivity for methane and carbon monoxide

* Low sensitivity to ethanol vapor

:: Long service life and low cost

apply：

* Methane, carbon monoxide composite alarm

The TGS3870-F00 is a microsphere semiconductor gas sensor designed for detecting methane and carbon monoxide. Utilizing a unique microsphere sensing structure, this sensor detects both gases by applying periodic high-low voltage variations to its heater. The sensor features an ultra-compact design, with the heater consuming only 38mW (average) power consumption.

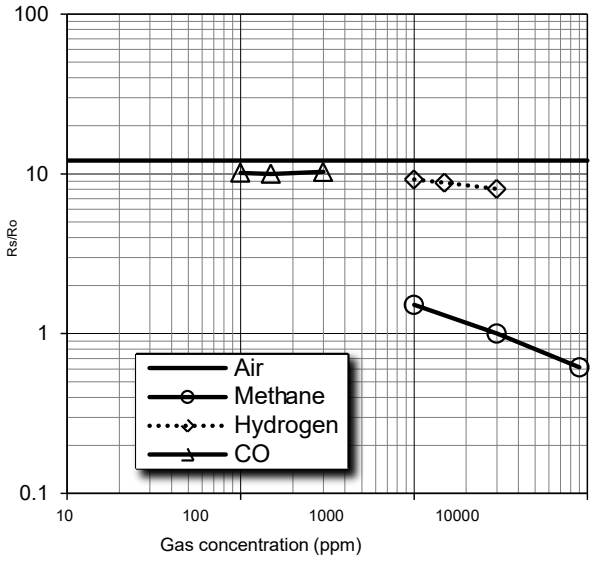
The TGS3870-F00 is extremely sensitive to ethanol vapor, a typical interfering gas in residential environments, and very durable, making it an ideal sensor for the gas alarm market.

Sensitivity characteristics (methane):

The representative sensitivity characteristic curve is shown in the figure below under standard test conditions (see back).

The vertical axis shows the sensor resistance ratio Rs / Ro, where Rs and Ro are defined as follows:

Rs = resistance of the sensor in various concentrations of gas Ro = resistance of the sensor in 3000ppm methane

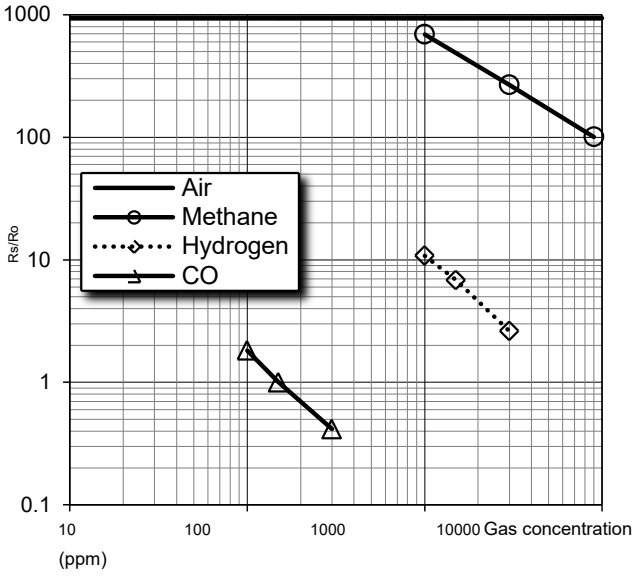


Sensitivity characteristics (carbon monoxide):

The representative sensitivity characteristic curve is shown in the figure below under standard test conditions (see back).

The vertical axis indicates the ratio of sensor resistance Rs / Ro, where Rs and Ro are defined as follows: Rs = the resistance value of the sensor in various concentrations of gas

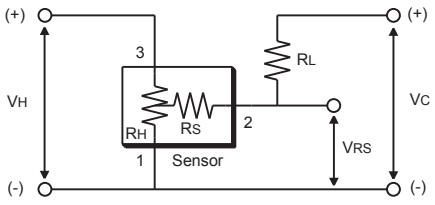
Ro = Resistance of the sensor in 150ppm carbon monoxide



Basic test circuit:

This sensor requires heater voltage (V_H) and circuit voltage (V_C). The sensor has three pins: Pin #3-Heater (+), Pin #2-Sensor (+), and Pin #1-Common Negative (-). To heat the gas sensor to the ideal temperature for detecting different gases, alternating voltages of 0.9V and 0.2V are applied between Pins #1-#3 at 20-second intervals. To measure the power output (V_{RS}), a voltage is applied across Pin #1 in the V_C circuit between the load resistor (R_L) and the sensor resistor (R_S).

The circuit voltage V_C is applied only when there is a signal from the sensor. For details about the timing of V_H and V_C voltage application, please refer to Technical Information for TGS 3870-F00.



Note: Do not continuously apply a constant 5V voltage, otherwise the sensor may lose its characteristics.

specifications：

model			TGS3870-F00	
Subtype			Oxidized semiconductor type	
Standard encapsulation			Plastic base metal cap	
Object gas			Methane, carbon monoxide	
Scope of detection			Methane 1 ~ 25%LEL Carbon monoxide 50 ~ 1000ppm	
Standard loop conditions	heater voltage	V_H	V_{HH} =0.9V DC±3%, 5 seconds V_{HL} =0.2V DC±3%, 15 seconds	
	Loop voltage (note)	V_C	5.0±0.2V DC pulses	
	load resistance	R_L	Variable (>0.75kΩ)	
Electrical characteristics under standard test conditions	Heating element resistance	R_H	Room temperature 3.0±0.3Ω	
	Heater power consumption	P_H	120mW	V_{HH}=0.9V DC
			11mW	V_{HL}=0.2V DC
			38mW	average
	Sensor resistor	R_S	0.3kΩ ~ 5.0kΩ 3000ppm methane in	
			2 ~ 40Ω 200ppm in carbon monoxide	
	Sensitivity (rate of change of Rs)		0.44~0.7	$\frac{Rs\ (CH_4\ 3000ppm)}{Rs\ (CH_4\ 1000ppm)}$
			0.3~0.8	$\frac{Rs\ (CO\ 300ppm)}{Rs\ (CO\ 200ppm)}$
standard test conditions	Test gas conditions		Target gas in air 20±2. C,65±5%R.H.	
	Loop conditions (note)		V_{HH} = 0.9V ±2%, 5 seconds V_{HL} = 0.2V ±2%, 15 seconds Vc = 5.0±0.02V DC pulse	
	Pre-test warm-up time		5 Above the sky	

(Note) For details, please refer to "Technical Information for TGS3870-F00".

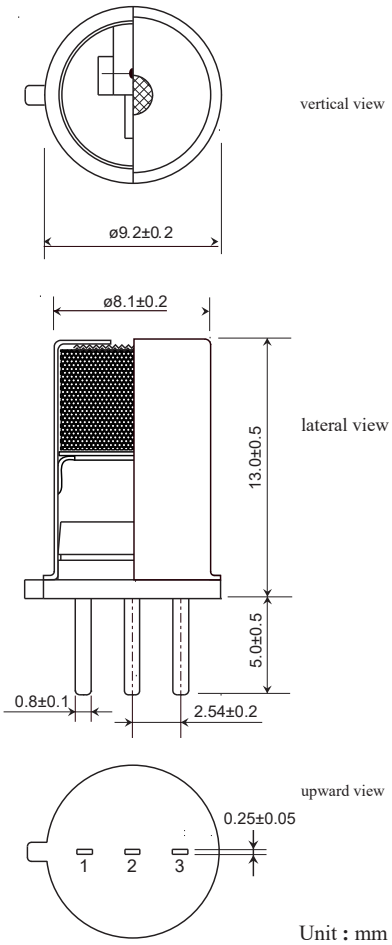
The power consumption value (P_S) can be calculated by the following formula:

$$P_S = \frac{(V_{RS})^2}{R_S}$$

The sensor resistance (R_S) can be measured according to V_{RS} It can be calculated by the following formula:

$$R_S = \frac{(V_{RS} - 0.5V_H)}{(Vc - V_{RS})} \times R_L$$

Structure and size:



Unit：mm

pin connection：

1: Common negative electrode (-)
2: Sensors(+)
3: Heater (+)

The typical characteristics of the sensor are shown in this product specification. The actual characteristics of the sensor vary from product to product. Please refer to the specifications for each sensor.

When purchasing the sensor, please scan the QR code to confirm the limited warranty.

https://www.figaro.co.jp/cn/pdf/Limited_Warranty_cn.pdf

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