TGS 3870-F04 - for the detection of Carbon Monoxide

Features:

* Miniature size and low power consumption
* High sensitivity and selectivity to carbon monoxide (CO)
* Low sensitivity to alcohol vapor
* Long life and low cost

Applications:

* Carbon monoxide detectors

TGS 3870-F04 is a micro-bead type semiconductor gas sensor for the detection of carbon monoxide. Miniaturization of the gas sensing bead results in a heater power consumption of only 38mW (average).

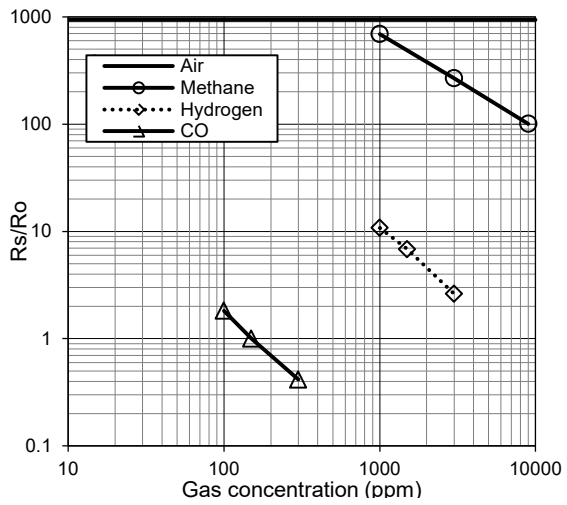
TGS 3870-F04 has low sensitivity to alcohol vapors (a typical interference gas in the residential environment) and has high durability, making the sensor ideal for consumer market gas alarms.

The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis indicates sensor resistance ratio (Rs/Ro) which is defined as follows:

Rs = Sensor resistance in displayed gases at various concentrations

Ro = Sensor resistance in 150ppm of CO

Sensitivity Characteristics :

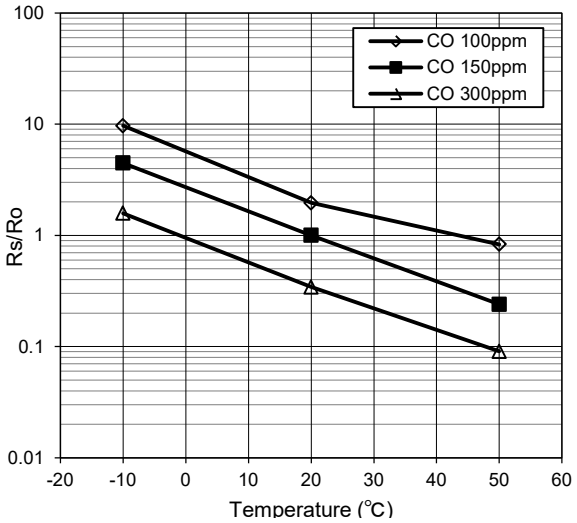


The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis indicates sensor resistance ratio (Rs/Ro), defined as follows:

Rs = Sensor resistance in various concentrations of CO at various temperatures and 65%RH

Ro = Sensor resistance in 150ppm of CO at 20˚C/65%RH

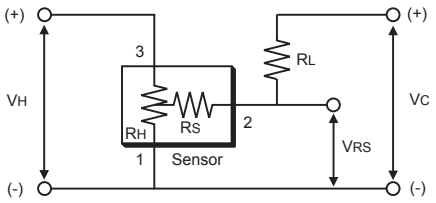
Temperature and Humidity Dependency:



Basic Measuring Circuit:

The sensor requires two voltage inputs: heater voltage (V_H) and circuit voltage (V_C). The sensor has three pins: Pin #3--heater (+), Pin #2--sensor electrode (+), and Pin #1--common (-). To maintain the sensing element at specific temperatures which are optimal for sensing two different gases, heater voltages of 0.9V and 0.2V are alternately applied between pins #1 and #3 during a 20 second heating cycle.

Circuit voltage (V_C) is applied between both ends of the sensor (Rs) and a load resistor (R_L), which are connected in series, to allow measurement of voltage (V_{RS}).
Circuit voltage (Vc) should be applied only at the moment when the signal is taken from the sensor.
Please refer to the document "Technical Information for TGS3870-F04" for details regarding the timing and application of Vc and V_H.



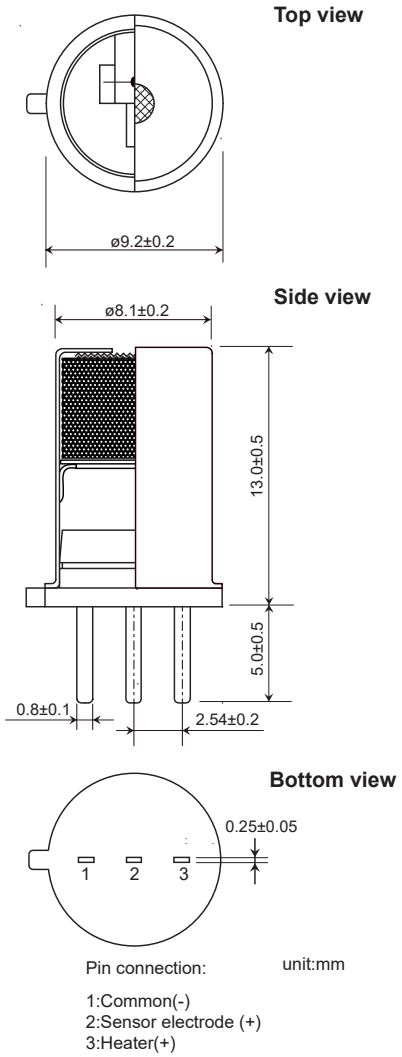
Basic measuring circuit

Caution: Do not apply a constant circuit voltage (5.0V) or the sensor would not exhibit its specified characteristics.

Specifications:

Model number			TGS3870-F04	
Sensing principle			MOS type	
Standard package			Plastic base and metal can	
Target gases			Carbon Monoxide	
Typical detection range			Carbon monoxide 50~1,000ppm	
Standard circuit conditions	Heater voltage	V_H	V_{HH} = 0.9V±3% for 5 sec. V_{HL} = 0.2V±3% for 15sec.	
	Circuit voltage	V_C	5.0±0.2V DC pulse *(refer to Technical Information for TGS3870-F04)*	
	Load resistance	R_L	variable (>0.75kΩ)	
Electrical characteristics under standard test conditions	Heater resistance	R_H	3Ω±0.3Ω at room temp.	
	Heater power consumption	P_H	120mW	V_{HH} = 0.9V DC
			11mW	V_{HL} = 0.2V DC
			38mW	average
	Sensor resistance	R_S	2kΩ~40kΩ in 200ppm CO	
	Sensitivity (change ratio of Rs)	β	0.3~0.8	$\frac{Rs\ (300ppm\ CO)}{Rs\ (200ppm\ CO)}$
Standard test conditions	Test gas conditions		Target gas in air at 20±2˚C, 65±5%RH	
	Circuit conditions		V_{HH} = 0.9V±2% for 5 sec. V_{HL} = 0.2V±2% for 15 sec. Vc = 5.0±0.02V DC pulse *(refer to Technical Information for TGS3870-F04)*	
	Preheating period before test		≥5 days	

Structure and Dimensions:



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

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

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

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

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.

Before purchasing this product, please read the Warranty Statements shown in our webpage by scanning this QR code.

https://www.figaro.co.jp/en/pdf/Limited_Warranty_en.pdf

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