

# TGS 3830 - for the detection Chlorofluorocarbons (CFCs)

### Features:

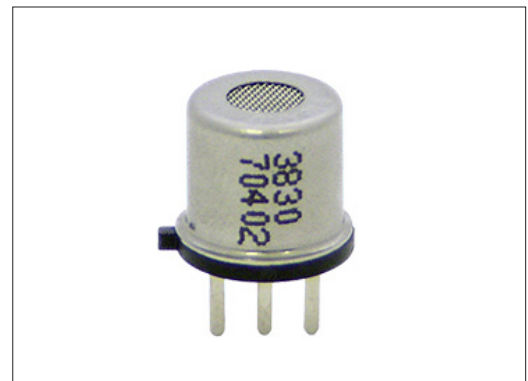
- \* Low power consumption
- \* High sensitivity to R-134a
- \* Quick response to R-134a

### Applications:

- \* Portable refrigerant leak detector

TGS 3830 is Figaro's new metal oxide semiconductor gas sensor for the detection of Chlorofluorocarbons. The sensing element of the sensor is a tin dioxide (SnO<sub>2</sub>) semiconductor which has low 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. Miniaturization of the gas sensing bead results in a heater power consumption of only 120mW.

The TGS3830 has high sensitivity to R-134a, the most promising alternative to R-12, commonly used in air conditioning systems and refrigerators. With its quick response speed, TGS3830 is an excellent, low-cost sensor for portable refrigerant leak detector.



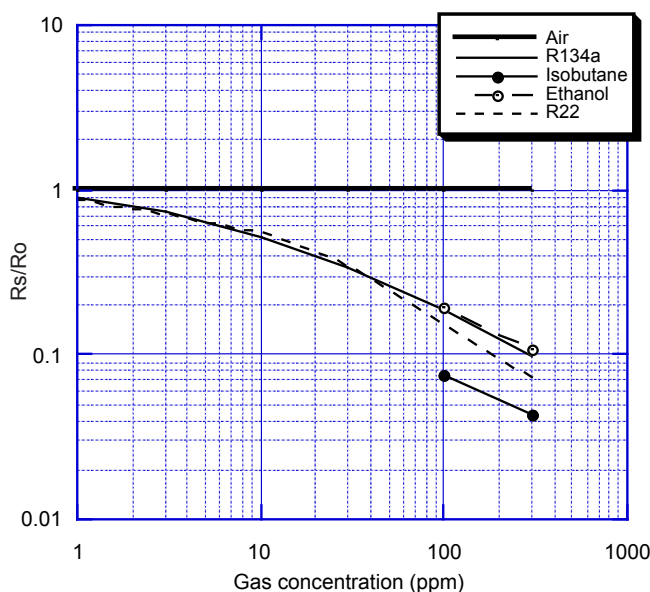
The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:

- Rs = Sensor resistance in displayed gases at various concentrations
- Ro = Sensor resistance in fresh air

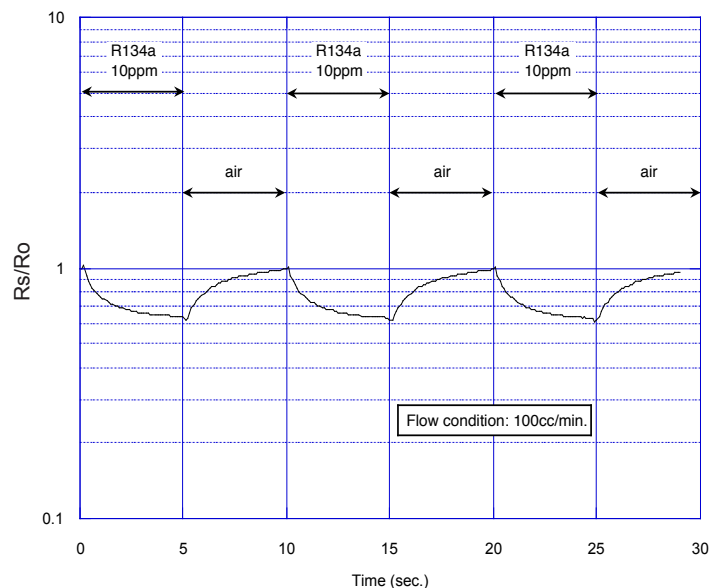
The figure below represents typical gas response and repeatability in flow conditions of 100cc/min.. The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:

- Rs = Sensor resistance in displayed gases at various concentrations
- Ro = Sensor resistance in fresh air

### Sensitivity Characteristics:



### Gas Response and Repeatability:



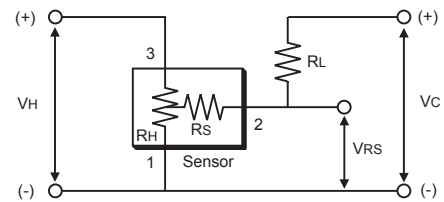
**IMPORTANT NOTE:** OPERATING CONDITIONS IN WHICH FIGARO SENSORS ARE USED WILL VARY WITH EACH CUSTOMER'S SPECIFIC APPLICATIONS. FIGARO STRONGLY RECOMMENDS CONSULTING OUR TECHNICAL STAFF BEFORE DEPLOYING FIGARO SENSORS IN YOUR APPLICATION AND, IN PARTICULAR, WHEN CUSTOMER'S TARGET GASES ARE NOT LISTED HEREIN. FIGARO CANNOT ASSUME ANY RESPONSIBILITY FOR ANY USE OF ITS SENSORS IN A PRODUCT OR APPLICATION FOR WHICH SENSOR HAS NOT BEEN SPECIFICALLY TESTED BY FIGARO.

### 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

voltage of 0.8V is applied continuously between pins #1 and #3.

Circuit voltage ( $V_C$ ) is applied between both ends of the sensor ( $R_S$ ) and a load resistor ( $R_L$ ), which are connected in series, to allow measurement of voltage ( $V_{RS}$ ).

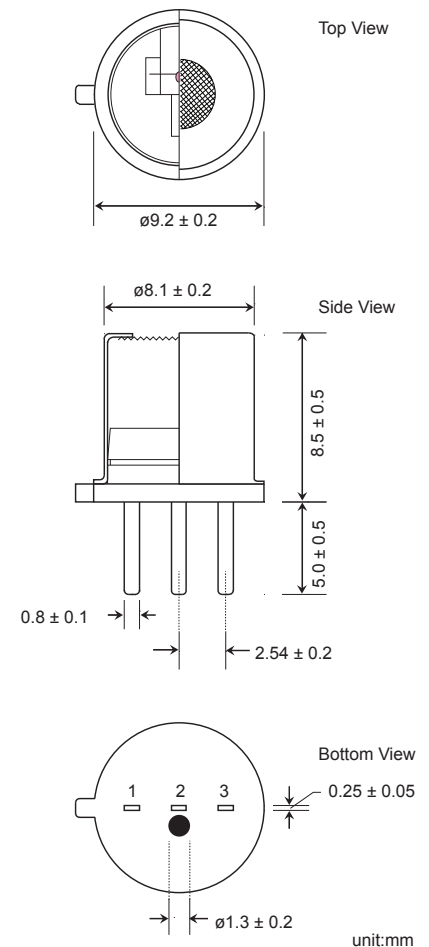


Basic measuring circuit

### Specifications:

Model number		TGS3830	
Sensing element type		Micro-bead	
Standard package		Plastic base and metal can	
Target gases		R-134a	
Typical detection range		5~100ppm	
Standard circuit conditions	Heater voltage	$V_H$	$V_H = 0.8V \pm 3\%$
	Circuit voltage	$V_C$	5.0V DC max.
	Load resistance	$R_L$	variable (10k $\Omega$ min.)
Electrical characteristics under standard test conditions	Heater resistance	$R_H$	3.0 $\pm$ 0.3 $\Omega$ at room temp.
	Heater power consumption	$P_H$	approx. 100mW
	Sensor resistance	$R_S$	10~640k $\Omega$ in air
	Sensitivity (change ratio of $R_S$ )	$\leq 0.85$	$\frac{R_S (10ppm R134a)}{R_S (air)}$
Standard test conditions	Test gas conditions	Target gas in air at 20 $\pm$ 2 $^{\circ}$ C, 65 $\pm$ 5%RH	
	Circuit conditions	$V_H = 0.8V \pm 2\%$	
	Conditioning period before test	1 hour	
Expected lifetime (total operating time)		2,000 hours in air	

### Structure and Dimensions:



Pin connection:

- 1: Heater(-)
- 2: Electrode
- 3: Heater(+)

unit:mm

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

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

**IMPORTANT:** This product is not designed and authorized for use as a critical component in life support applications wherein a failure or malfunction of the products may result in injury or threat to life. Figaro Engineering Inc. reserves the right to make changes without notice to this product to improve reliability, functioning or design.

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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