

### TGS 2610 - for the detection of LP Gas

#### Features:

- \* Low power consumption
- \* High sensitivity to LP and its component gases (e.g. propane and butane)
- \* Long life and low cost
- \* Uses simple electrical circuit

#### Applications:

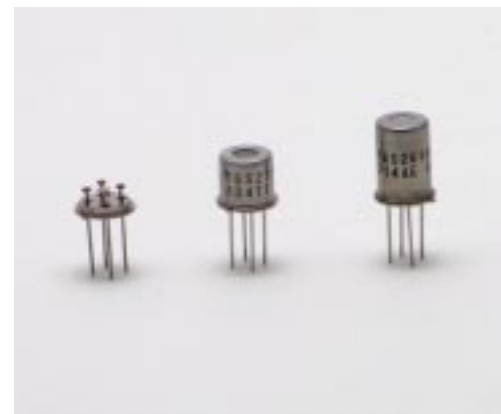
- \* Residential LP leak detectors and alarms
- \* Portable LP detectors
- \* LP gas and vapor detection

**TGS2610** is a semiconductor type gas sensor which combines very high sensitivity to LP gas with low power consumption and long life. Due to miniaturization of its sensing chip, TGS2610 requires a heater current of only 56mA and the device is housed in a standard TO-5 package.

The TGS2610 is available in two different models which have different external housings but identical sensitivity to LP gas. Both models are able to satisfy the requirements of performance standards such as UL1484 and EN50194.

**TGS2610-C00** possesses small size and quick gas response, making it suitable for gas leakage checkers.

**TGS2610-D00** uses filter material in its housing which eliminates the influence of interference gases such as alcohol, resulting in highly selective response to LP gas. This feature makes the sensor ideal for residential gas leakage detectors which require durability and resistance against interference gas.

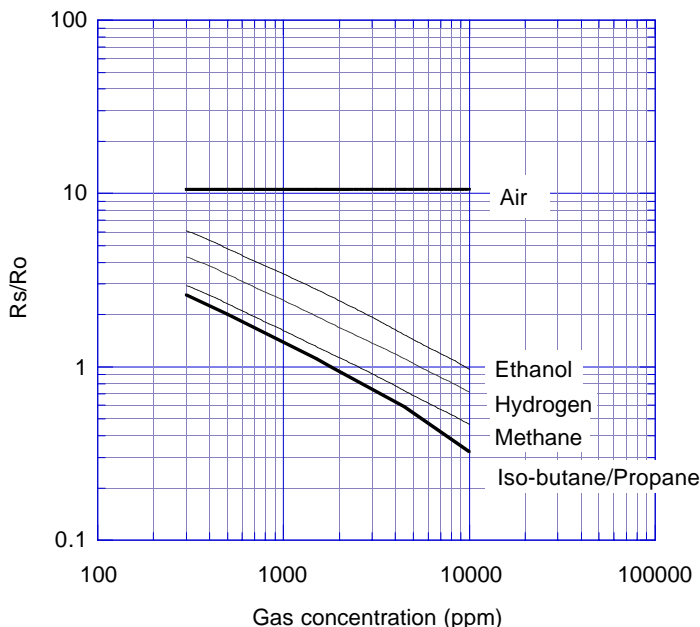


The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as *sensor resistance ratio* ( $R_s/R_o$ ) which is defined as follows:

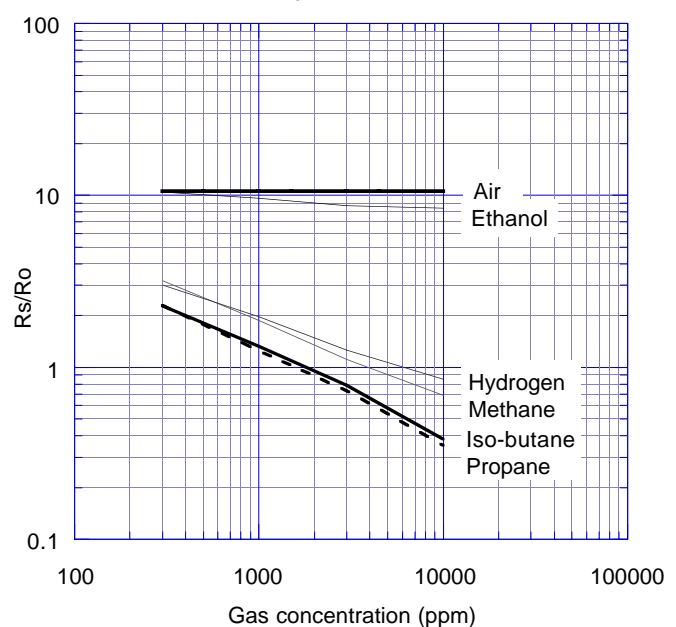
$R_s$  = Sensor resistance in displayed gases at various concentrations

$R_o$  = Sensor resistance in 1800ppm of iso-butane

**TGS2610-C00 Sensitivity Characteristics:**



**TGS2610-D00 Sensitivity Characteristics:**

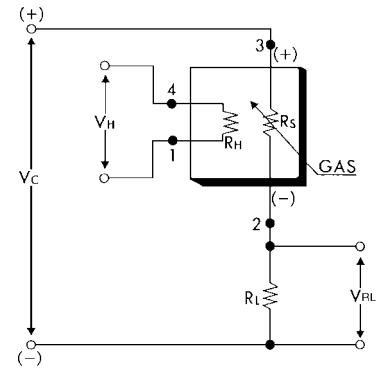


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**Basic Measuring Circuit:**

The sensor requires two voltage inputs: heater voltage (V<sub>H</sub>) and circuit voltage (V<sub>C</sub>). The heater voltage (V<sub>H</sub>) 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<sub>C</sub>) is applied to allow measurement of voltage (V<sub>RL</sub>) across a load resistor (R<sub>L</sub>) which is connected in series with the sensor.

A common power supply circuit can be used for both V<sub>C</sub> and V<sub>H</sub> to fulfill the sensor's electrical requirements. The value of the load resistor (R<sub>L</sub>) should be chosen to optimize the alarm threshold value, keeping power dissipation (P<sub>S</sub>) of the semiconductor below a limit of 15mW. Power dissipation (P<sub>S</sub>) will be highest when the value of R<sub>S</sub> is equal to R<sub>L</sub> on exposure to gas.



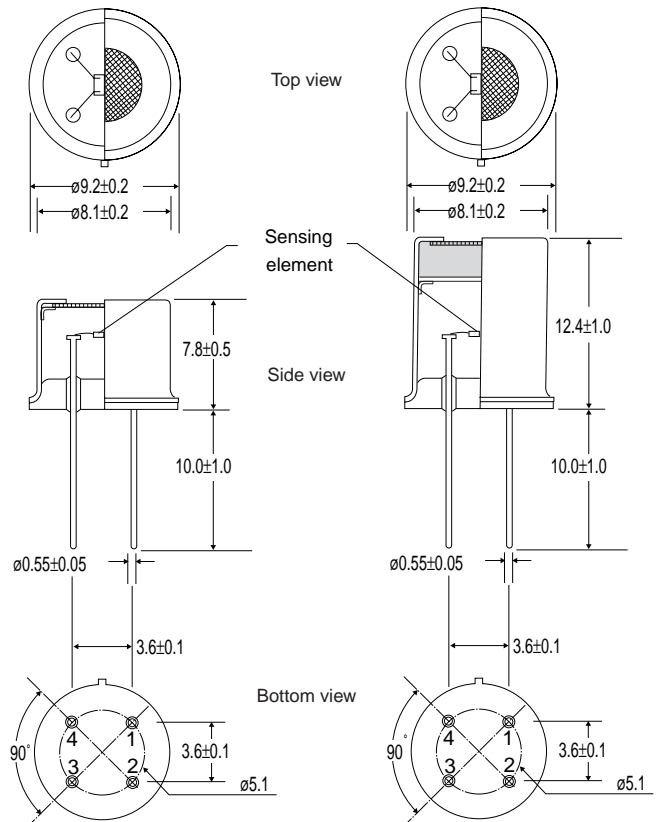
**Specifications:**

Model number		TGS 2610	
Sensing element type		D1	
Standard package		TO-5 metal can	
Target gases		Butane, LP gas	
Typical detection range		500 ~ 10,000 ppm	
Standard circuit conditions	Heater Voltage	V <sub>H</sub>	5.0±0.2V DC/AC
	Circuit voltage	V <sub>C</sub>	5.0±0.2V DC/AC    P <sub>S</sub> ≤ 15mW
	Load resistance	R <sub>L</sub>	Variable    0.45kΩ min.
Electrical characteristics under standard test conditions	Heater resistance	R <sub>H</sub>	approx. 59Ω at room temp.
	Heater current	I <sub>H</sub>	56 ± 5mA
	Heater power consumption	P <sub>H</sub>	280mW    V <sub>H</sub> = 5.0V DC
	Sensor resistance	R <sub>S</sub>	0.68~6.8kΩ in 1800ppm iso-butane
	Sensitivity (change ratio of R <sub>S</sub> )		0.56 ± 0.06 $\frac{R_S(3000ppm)}{R_S(1000ppm)}$
Standard test conditions	Test gas conditions	Iso-butane in air at 20±2°C, 65±5%RH	
	Circuit conditions	V <sub>C</sub> = 5.0±0.01V DC V <sub>H</sub> = 5.0±0.05V DC	
	Conditioning period before test	7 days	

**Structure and Dimensions:**

**TGS2610-C00**

**TGS2610-D00**



**Pin connection:**

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

The value of power dissipation (P<sub>S</sub>) can be calculated by utilizing the following formula:

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

Sensor resistance (R<sub>S</sub>) is calculated with a measured value of V<sub>RL</sub> by using the following formula:

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

**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.**

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# TGS 2611 - for the detection of Methane

### Features:

- \* Low power consumption
- \* High sensitivity to methane
- \* Long life and low cost
- \* Uses simple electrical circuit

### Applications:

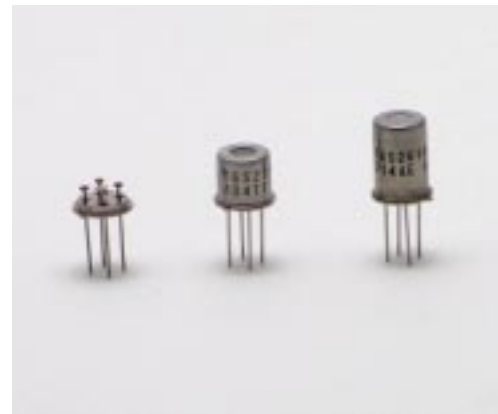
- \* Domestic gas alarms
- \* Portable gas detectors
- \* Gas leak detector for gas appliances

**TGS2611** is a semiconductor type gas sensor which combines very high sensitivity to methane gas with low power consumption and long life. Due to miniaturization of its sensing chip, TGS2611 requires a heater current of only 56mA and the device is housed in a standard TO-5 package.

The TGS2611 is available in two different models which have different external housings but identical sensitivity to methane gas. Both models are able to satisfy the requirements of performance standards such as UL1484 and EN50194.

**TGS2611-C00** possesses small size and quick gas response, making it suitable for gas leakage checkers.

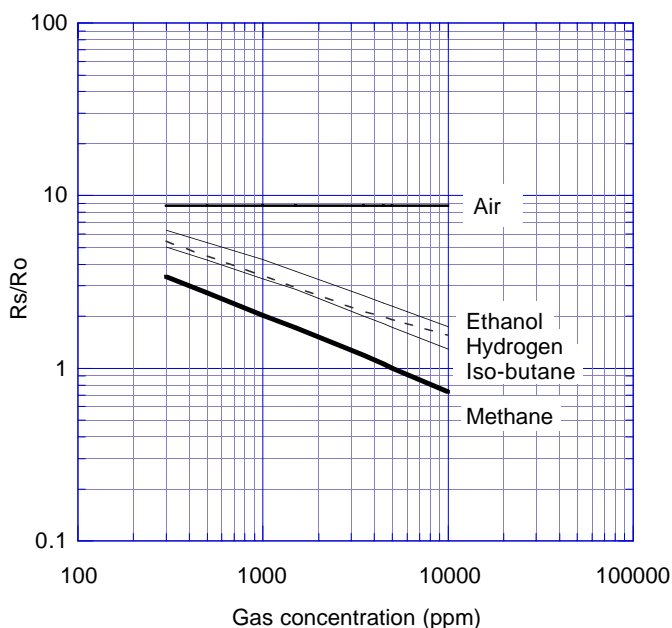
**TGS2611-E00** uses filter material in its housing which eliminates the influence of interference gases such as alcohol, resulting in highly selective response to methane gas. This feature makes the sensor ideal for residential gas leakage detectors which require durability and resistance against interference gas.



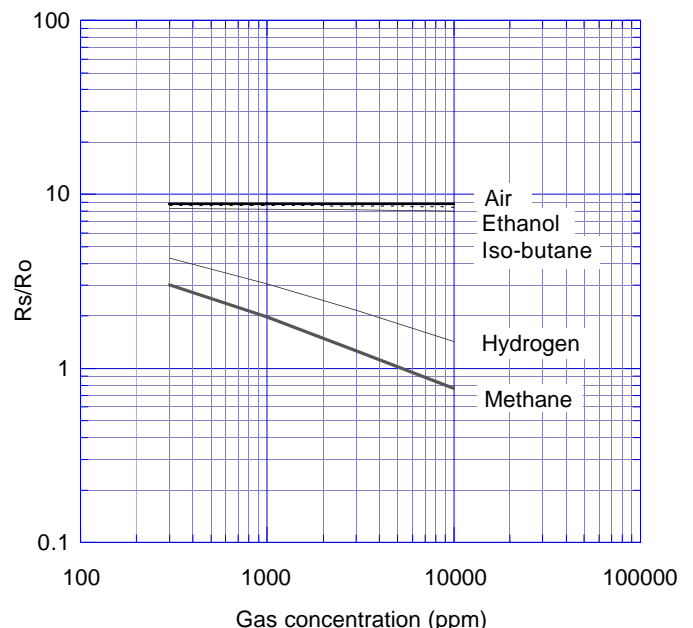
The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as *sensor resistance ratio* ( $R_s/R_o$ ) which is defined as follows:

- $R_s$  = Sensor resistance in displayed gases at various concentrations
- $R_o$  = Sensor resistance in 5000ppm of methane

**TGS2611-C00 Sensitivity Characteristics:**



**TGS2611-E00 Sensitivity Characteristics:**

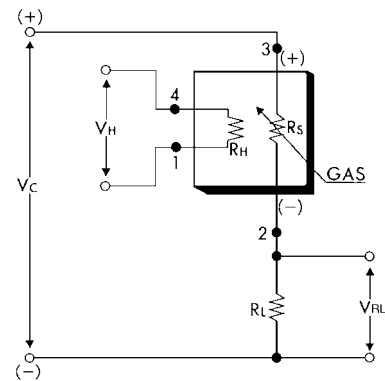


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### Basic Measuring Circuit:

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 ( $V_{RL}$ ) across a load resistor ( $R_L$ ) which is connected in series with the sensor.

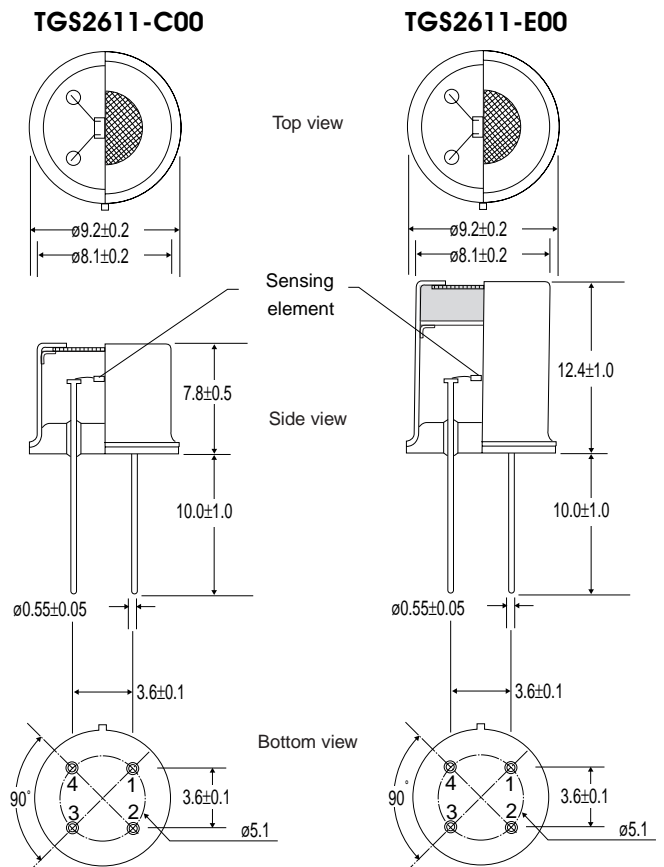
A common power supply circuit can be used for both  $V_C$  and  $V_H$  to fulfill the sensor's electrical requirements. The value of the load resistor ( $R_L$ ) should be chosen to optimize the alarm threshold value, keeping power dissipation ( $P_S$ ) of the semiconductor below a limit of 15mW. Power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



### Specifications:

Model number		TGS 2611	
Sensing element type		D1	
Standard package		TO-5 metal can	
Target gases		Methane, Natural Gas	
Typical detection range		500 ~ 10,000 ppm	
Standard circuit conditions	Heater Voltage	$V_H$	5.0±0.2V DC/AC
	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	$R_H$	59Ω at room temp. (typical)
	Heater current	$I_H$	56 ± 5mA
	Heater power consumption	$P_H$	280±25mW
	Sensor resistance	$R_S$	0.68~6.8 kΩ in 5000ppm methane
	Sensitivity (change ratio of $R_S$ )		0.60 ± 0.06 $\frac{R_S(9000ppm)}{R_S(3000ppm)}$
Standard test conditions	Test gas conditions	Methane 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	
	Conditioning period before test	7 days	

### Structure and Dimensions:



#### Pin connection:

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

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  $V_{RL}$  by using the following formula:

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

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.

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## TGS 2612 - for the detection of Methane and LP Gas

### Features:

- \* Low power consumption
- \* Similar sensitivity at same %LEL levels for both methane and LP gas
- \* Long life and low cost
- \* Uses simple electrical circuit

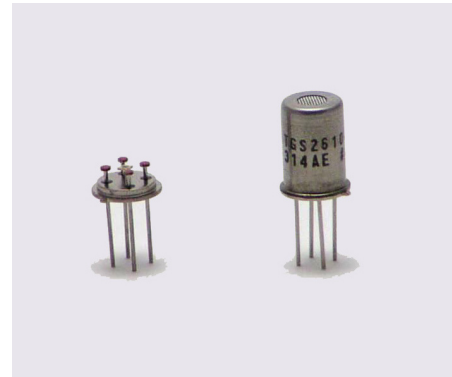
### Applications:

- \* Residential LNG and LPG alarms
- \* Portable combustible gas leak detectors
- \* Detectors for LNG and LPG

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 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.

The TGS 2612 has high sensitivity to methane, propane and butane, making it ideal for LNG and LPG monitoring. Due to its low sensitivity to alcohol vapors (a typical interference gas in the residential environment), the sensor is ideal for consumer market gas alarms.

Due to miniaturization of the sensing chip, TGS 2612 requires a heater current of only 56mA and the device is housed in a standard TO-5 package.



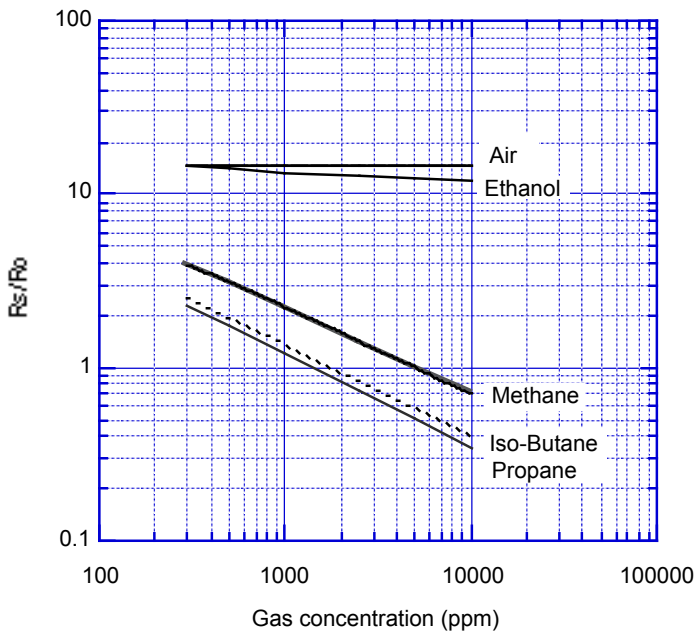
The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio ( $R_s/R_o$ ) which is defined as follows:

- $R_s$  = Sensor resistance in displayed gases at various concentrations
- $R_o$  = Sensor resistance in 5000ppm of methane

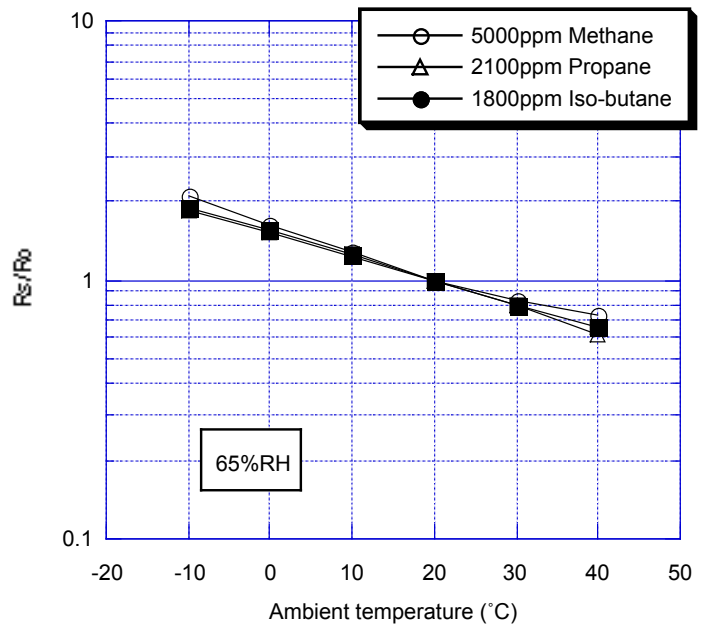
The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis is indicated as sensor resistance ratio ( $R_s/R_o$ ), defined as follows:

- $R_s$  = Sensor resistance at 10%LEL of each gas at various temperatures/65%RH
- $R_o$  = Sensor resistance at 10%LEL of each gas at 20°C and 65% R.H.

### Sensitivity Characteristics:



### Temperature/Humidity Dependency:



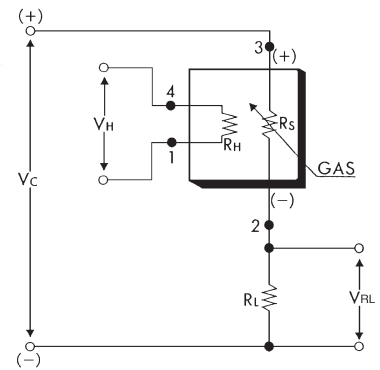
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### Basic Measuring Circuit:

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 ( $V_{RL}$ ) 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 (tentative):

Model number		TGS2612	
Sensing element type		D1	
Standard package		TO-5 metal can	
Target gases		Methane, propane, iso-butane	
Typical detection range		1 ~ 25%LEL of each gas	
Standard circuit conditions	Heater voltage	$V_H$	5.0±0.2V AC/DC
	Circuit voltage	$V_C$	5.0±0.2V DC/AC $P_S \leq 15mW$
	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	$R_S$	0.68 ~ 6.8kΩ in 5000ppm methane
	Sensitivity (change ratio of $R_S$ )		0.50~0.65 $\frac{R_S(9000ppm)}{R_S(3000ppm)}$
Standard test conditions	Test gas conditions	Methane, propane, iso-butane 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	
	Conditioning period before test	7 days	

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

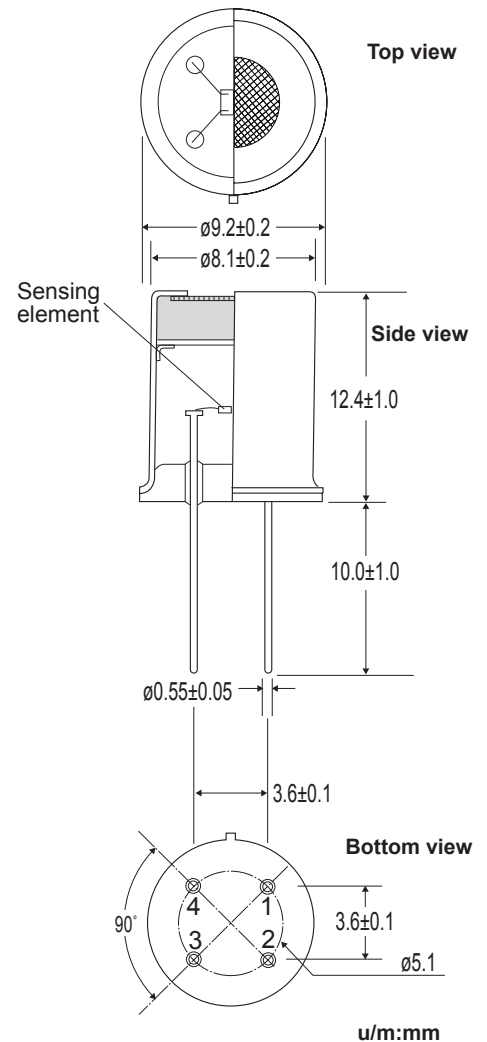
$$P_S = \frac{(V_C - V_{RL})^2}{R_S}$$

Sensor resistance ( $R_S$ ) 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. 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.

### Structure and Dimensions:



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