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LAMPIRAN

Datasheet TGS 2611

FIGARO PRODUCT INFORMATION

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:

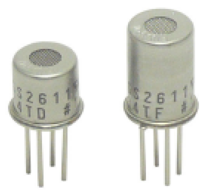
* Domestic gas alarms
* Portable gas detectors
* Gas leak detector for gas appliances

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.

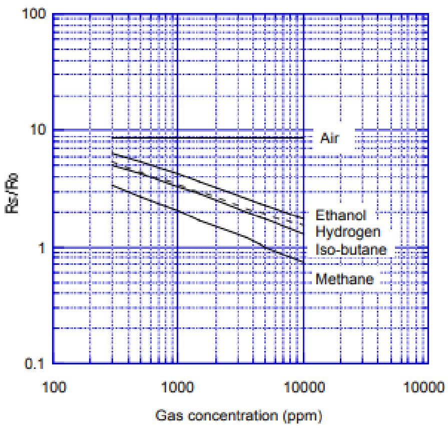
TGS2611-C00 possesses small size and quick gas response, making it suitable for gas leakage checkers.

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.

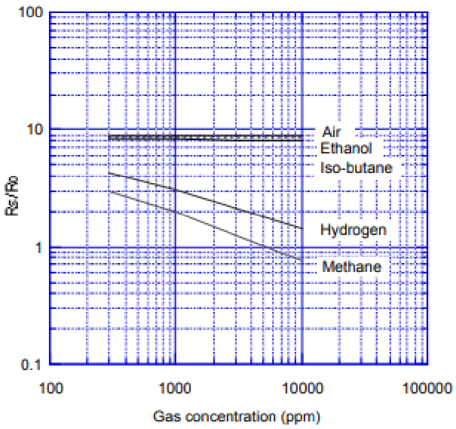


The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:
Rs = Sensor resistance in displayed gases at various concentrations
Ro = Sensor resistance in 5000ppm of methane

TGS2611-C00 Sensitivity Characteristics:



TGS2611-E00 Sensitivity Characteristics:



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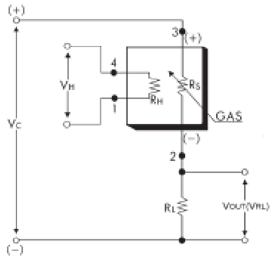
Basic Measuring Circuit:

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

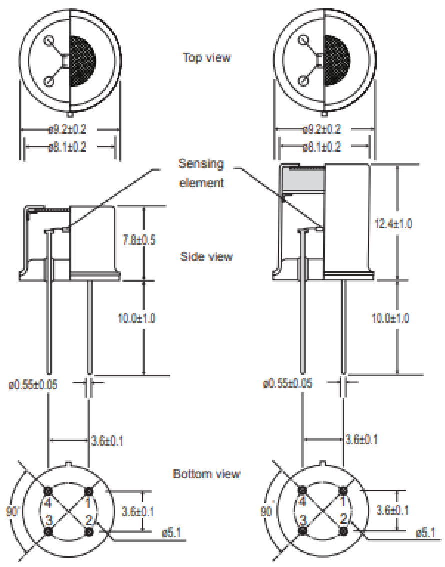
A common power supply circuit can be used for both V_C and V_H to fulfill the sensor's electrical requirements. The value of the load resistor (R_L) should be chosen to optimize the alarm threshold value, keeping power dissipation (P_S) of the semiconductor below a limit of 15mW. Power dissipation (P_S)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



Specifications:

Model number			TGS2611	
Sensing principle			MOS type	
Standard package			TO-5 metal can	
Target gases			Methane, Natural Gas	
Typical detection range			500 ~ 10,000ppm	
Standard circuit conditions	Heater voltage	V_H	5.0±0.2V AC/DC	
	Circuit voltage	V_C	5.0±0.2V DC	Ps≤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±25mW	
	Sensor resistance	R_S	0.68~6.8kΩ in 5000ppm methane	
	Sensitivity (change ratio of Rs)		0.60±0.06	Rs (9000ppm) / Rs (3000ppm)
Standard test conditions	Test gas conditions		Methane in air at 20±2°C, 65±5%RH	
	Circuit conditions		Vc = 5.0±0.01V DC VH = 5.0±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 (Rs) is calculated with a measured value of V_{OUT}(V_{RL}) by using the following formula:

$$R_S = \left(\frac{V_C}{V_{RL}} - 1\right) \times R_L$$

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.

REV: 10/13

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Datasheet TGS 2600

FIGARO

PRODUCT INFORMATION

TGS 2600 - for the detection of Air Contaminants

Features:

- Low power consumption
- High sensitivity to gaseous air contaminants
- Long life and low cost
- Uses simple electrical circuit
- Small size

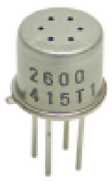
Applications:

- Air cleaners
- Ventilation control
- Air quality monitors

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 2600** has high sensitivity to low concentrations of gaseous air contaminants such as hydrogen and carbon monoxide which exist in cigarette smoke. The sensor can detect hydrogen at a level of several ppm.

Due to miniaturization of the sensing chip, TGS 2600 requires a heater current of only 42mA and the device is housed in a standard TO-5 package.



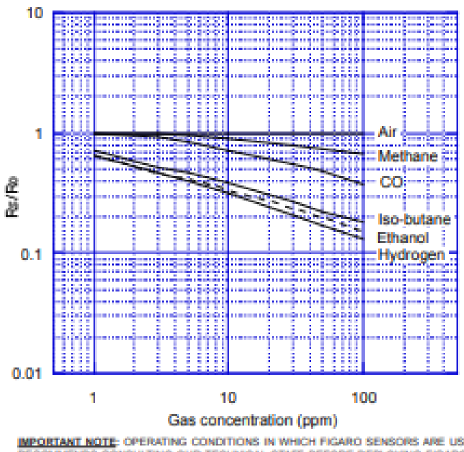
The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:

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

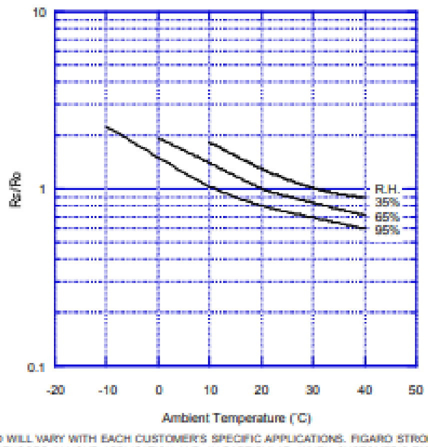
The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis is indicated as sensor resistance ratio (Rs/Ro), defined as follows:

Rs = Sensor resistance in fresh air at various temperatures/humidities
Ro = Sensor resistance in fresh air at 20°C and 65% R.H.

Sensitivity Characteristics:



Temperature/Humidity Dependency:



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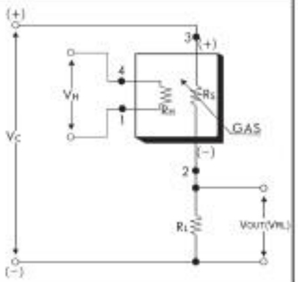
Basic Measuring Circuit:

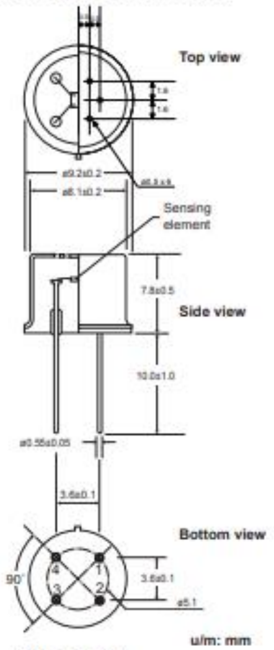
The sensor requires two voltage inputs: heater voltage (V_H) and circuit voltage (V_C). The heater voltage (V_H) is applied to the integrated heater in order to maintain the sensing element at a specific temperature which is optimal for sensing. Circuit voltage (V_C) is applied to allow measurement of voltage (V_{OUT}) across a load resistor (R_L) which is connected in series with the sensor. DC voltage is required for the circuit voltage since the sensor has a polarity. 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 consumption (P_S) of the semiconductor below a limit of 15mW. Power consumption (P_S) will be highest when the value of Rs is equal to R_L on exposure to gas.



Specifications:

Model number			TGS2600-B00	
Sensing principle			MOS type	
Standard package			TO-5 metal can	
Target gases			Air contaminants (hydrogen, ethanol, etc.)	
Typical detection range			1 ~ 30ppm of H_2	
Standard circuit conditions	Heater voltage	V_H	5.0±0.2V AC/DC	
	Circuit voltage	V_C	5.0±0.2V DC	P_S≤15mW
	Load resistance	R_L	variable	0.45kΩ min.
Electrical characteristics under standard test conditions	Heater resistance	R_H	approx 83Ω at room temp. (typical)	
	Heater current	I_H	42±4mA	
	Heater power consumption	P_H	210mW	V_H=5.0V DC
	Sensor resistance	R_S	10kΩ ~ 90kΩ in air	
	Sensitivity (change ratio of Rs)		0.3~0.6	Rs (10ppm of H_2) / Rs air
Standard test conditions	Test gas conditions		normal air at 20±2°C, 65±5%RH	
	Circuit conditions		V_C = 5.0±0.01V DC V_H = 5.0±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 consumption (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 $V_{OUT}(V_{RL})$ by using the following formula:

$$R_S = \left(\frac{V_C}{V_{RL}} - 1\right) \times R_L$$

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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REV: 09/13

Datasheet TGS 822

FIGARO PRODUCT INFORMATION

TGS 822 - for the detection of Organic Solvent Vapors

Features:

* High sensitivity to organic solvent vapors such as ethanol
* High stability and reliability over a long period
* Long life and low cost
* Uses simple electrical circuit

Applications:

* Breath alcohol detectors
* Gas leak detectors/alarms
* Solvent detectors for factories, dry cleaners, and semiconductor

The sensing element of Figaro gas sensors is a tin dioxide (SnO_2) semiconductor which has low conductivity in clean air. 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 822** has high sensitivity to the vapors of organic solvents as well as other volatile vapors. It also has sensitivity to a variety of combustible gases such as carbon monoxide, making it a good general purpose sensor. Also available with a ceramic base which is highly resistant to severe environments as high as 200°C (model# TGS 823).

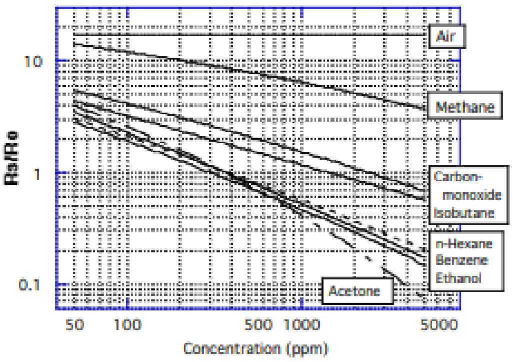
The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (Rs/Ro) which is defined as follows:

Rs = Sensor resistance of displayed gases at various concentrations
Ro = Sensor resistance in 300ppm ethanol

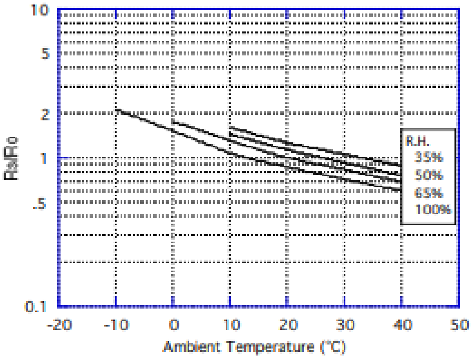
The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis is indicated as sensor resistance ratio (Rs/Ro), defined as follows:

Rs = Sensor resistance at 300ppm of ethanol at various temperatures/humidities
Ro = Sensor resistance at 300ppm of ethanol at 20°C and 65% R.H.

Sensitivity Characteristics:



Temperature/Humidity Dependency:



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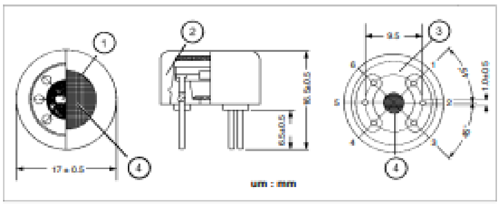
Structure and Dimensions:

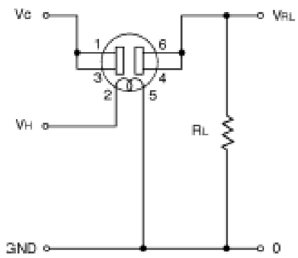


1. Sensing Element: SnO_2 is sintered to form a thick film on the surface of an alumina ceramic tube which contains an internal heater.
2. Cap: Nylon 66
3. Sensor Base: Nylon 66
4. Flame Arrestor: 100 mesh SUS 316 double gauze

Pin Connection and Basic Measuring Circuit:

The numbers shown around the sensor symbol in the circuit diagram at the right correspond with the pin numbers shown in the sensor's structure drawing (above). When the sensor is connected as shown in the basic circuit, output across the Load Resistor (V_{RL}) increases as the sensor's resistance (Rs) decreases, depending on gas concentration.

Basic Measuring Circuit:



Standard Circuit Conditions:

Item	Symbol	Rated Values	Remarks
Heater Voltage	V_H	5.0±0.2V	AC or DC
Circuit Voltage	V_C	Max. 24V	DC only $Ps \leq 15mW$
Load Resistance	R_L	Variable	0.45kΩ min.

Electrical Characteristics:

Item	Symbol	Condition	Specification
Sensor Resistance	Rs	Ethanol at 300ppm/air	1kΩ ~ 10kΩ
Change Ratio of Sensor Resistance	Rs/Ro	Rs(Ethanol at 300ppm/air) / Rs(Ethanol at 50ppm/air)	0.40 ± 0.10
Heater Resistance	R_H	Room temperature	38.0 ± 3.0Ω
Heater Power Consumption	P_H	V_H=5.0V	660mW (typical)

Standard Test Conditions:

TGS 822 complies with the above electrical characteristics when the sensor is tested in standard conditions as specified below:

Test Gas Conditions: 20°±2°C, 65±5%R.H.
Circuit Conditions: V_C = 10.0±0.1V (AC or DC), V_H = 5.0±0.05V (AC or DC), R_L = 10.0kΩ±1%
Preheating period before testing: More than 7 days

Sensor Resistance (Rs) is calculated by the following formula:

$$Rs = \left(\frac{V_C}{V_{RL}} - 1\right) \times R_L$$

Power dissipation across sensor electrodes (Ps) is calculated by the following formula:

$$Ps = \frac{V_C^2 \times Rs}{(Rs + R_L)^2}$$

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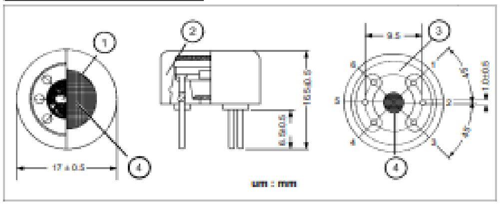
Datasheet TGS 813

Structure and Dimensions:

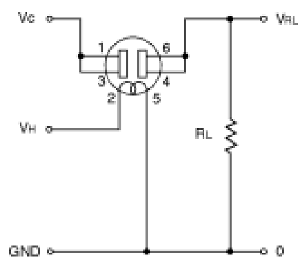


1. Sensing Element: SnO_2 is sintered to form a thick film on the surface of an alumina ceramic tube which contains an internal heater.
2. Cap: Nylon 66
3. Sensor Base: Nylon 66
4. Flame Arrestor: 100 mesh SUS 316 double gauze

Pin Connection and Basic Measuring Circuit:

The numbers shown around the sensor symbol in the circuit diagram at the right correspond with the pin numbers shown in the sensor's structure drawing (*above*). When the sensor is connected as shown in the basic circuit, output across the Load Resistor (V_{RL}) increases as the sensor's resistance (Rs) decreases, depending on gas concentration.

Basic Measuring Circuit:



Standard Circuit Conditions:

Item	Symbol	Rated Values	Remarks
Heater Voltage	V_H	5.0±0.2V	AC or DC
Circuit Voltage	V_C	Max. 24V	DC only Ps≤15mW
Load Resistance	R_L	Variable	0.45kΩ min.

Electrical Characteristics:

Item	Symbol	Condition	Specification
Sensor Resistance	Rs	Methane at 1000ppm/air	5kΩ ~ 15kΩ
Change Ratio of Sensor Resistance	Rs/Ro	Rs (Methane at 3000ppm/air) / Rs (Methane at 1000ppm/air)	0.60 ± 0.05
Heater Resistance	R_H	Room temperature	30.0 ± 3.0Ω
Heater Power Consumption	P_H	V_H=5.0V	835mW (typical)

Standard Test Conditions:

TGS 813 complies with the above electrical characteristics when the sensor is tested in standard conditions as specified below:

Test Gas Conditions: 20°±2°C, 65±5%R.H.
Circuit Conditions: V_C = 10.0±0.1V (AC or DC), V_H = 5.0±0.05V (AC or DC), R_L = 4.0kΩ±1%
Preheating period before testing: More than 7 days

Sensor Resistance (Rs) is calculated by the following formula:

$$Rs = \left(\frac{V_C}{V_{RL}} - 1\right) \times R_L$$

Power dissipation across sensor electrodes (Ps) is calculated by the following formula:

$$Ps = \frac{V_C^2 \times Rs}{(Rs + R_L)^2}$$

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REV: 9/02

FIGARO PRODUCT INFORMATION

TGS 813 - for the detection of Combustible Gases

Features:

- **General purpose sensor with sensitivity to a wide range of combustible gases**
- **High sensitivity to methane, propane, and butane**
- **Long life and low cost**
- **Uses simple electrical circuit**

Applications:

- **Domestic gas leak detectors and alarms**
- **Portable gas detectors**

The sensing element of Figaro gas sensors is a tin dioxide (SnO_2) semiconductor which has low conductivity in clean air. 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 813** has high sensitivity to methane, propane, and butane, making it ideal for natural gas and LPG monitoring. The sensor can detect a wide range of gases, making it an excellent, low cost sensor for a wide variety of applications. Also available with a ceramic base which is highly resistant to severe environments up to 200°C (model# TGS 816).

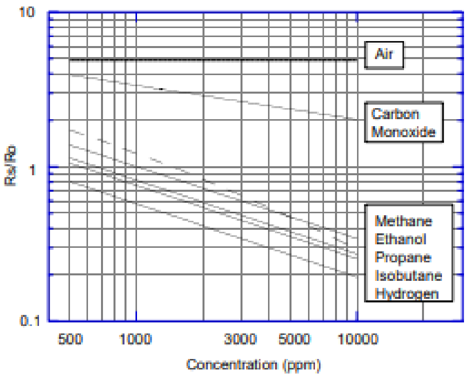
The figure below represents typical sensitivity char-acteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as *sensor resistance ratio* (Rs/Ro) which is defined as follows:

Rs = Sensor resistance of displayed gases at various concentrations
Ro = Sensor resistance in 1000ppm methane

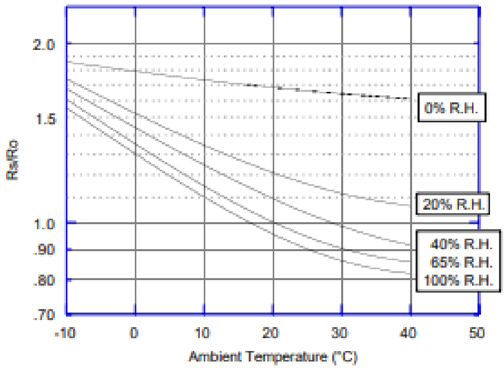
The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis is indicated as *sensor resistance ratio* (Rs/Ro), defined as follows:

Rs = Sensor resistance at 1000ppm of methane at various temperatures/humidities
Ro = Sensor resistance at 1000ppm of methane at 20°C and 65% R.H.

Sensitivity Characteristics:



Temperature/Humidity Dependency:



Datasheet TGS 2602

FIGARO — PRODUCT INFORMATION

TGS 2602 - for the detection of Air Contaminants

Features:

- * High sensitivity to VOCs and odorous gases
- * Low power consumption
- * High sensitivity to gaseous air contaminants
- * Long life
- * Uses simple electrical circuit
- * Small size

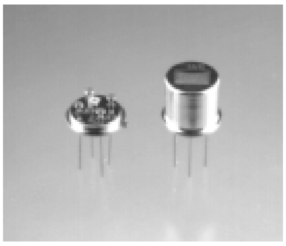
Applications:

- * Air cleaners
- * Ventilation control
- * Air quality monitors
- * VOC monitors
- * Odor monitors

The sensing element is comprised of a metal oxide semiconductor layer formed on the alumina substrate of a sensing chip together with an integrated heater. In the presence of detectable gas, sensor conductivity increases depending on 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 2602** has high sensitivity to low concentrations of odorous gases such as ammonia and H_2S generated from waste materials in office and home environments. The sensor also has high sensitivity to low concentrations of VOCs such as toluene emitted from wood finishing and construction products. Figaro also offers a microprocessor (FIC93619A) which contains special software for handling the sensor's signal for appliance control applications.

Due to miniaturization of the sensing chip, TGS 2600 requires a heater current of only 42mA and the device is housed in a standard TO-5 package.



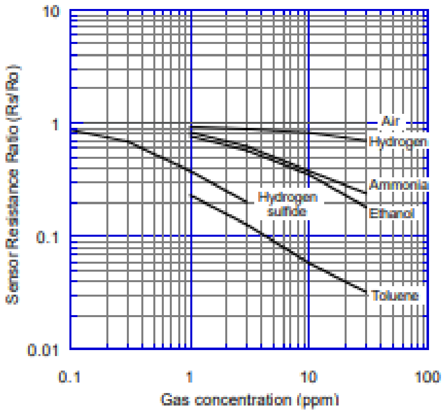
The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as *sensor resistance ratio* (Rs/Ro) which is defined as follows:

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

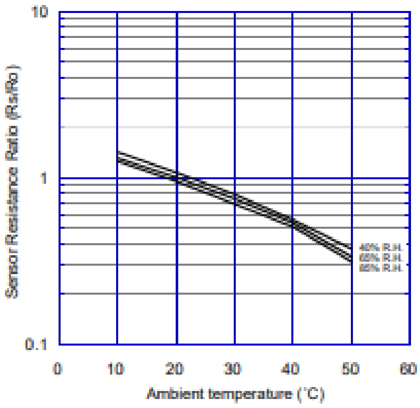
The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis is indicated as *sensor resistance ratio* (Rs/Ro), defined as follows:

Rs = Sensor resistance in fresh air at various temperatures/humidities
Ro = Sensor resistance in fresh air at 20°C and 65% R.H.

Sensitivity Characteristics:



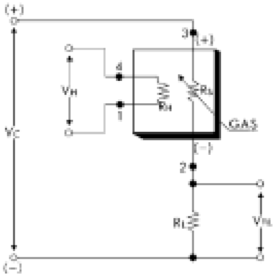
Temperature/Humidity Dependency:



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 C[illegible] 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 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 (Vout) across a load resistor (R_L) which is connected in series with the sensor. DC voltage is required for the circuit voltage since the sensor has a polarity. 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 consumption (P_S) of the semiconductor below a limit of 15mW. Power consumption (P_S) will be highest when the value of Rs is equal to R_L on exposure to gas.



Specifications:

Model number			TGS 2602	
Sensing element type			D1	
Standard package			TO-5 metal can	
Target gases			Air contaminants	
Typical detection range			1 ~ 10 ppm of H_2	
Standard circuit conditions	Heater voltage	V_H	5.0±0.2V DC/AC	
	Circuit voltage	V_C	5.0±0.2V DC	Ps≤15mW
	Load resistance	R_L	Variable	Ps≤15mW
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 (typical)	
	Sensor resistance	Rs	10k~100kΩ in air	
	Sensitivity (change ratio of Rs)		0.15~0.5	$\frac{Rs\ (10ppm\ of\ EtOH)}{Rs\ (air)}$
Standard test conditions	Test gas conditions		normal air at 20±2°C, 65±5%RH	
	Circuit conditions		V_C = 5.0±0.01V DC V_H = 5.0±0.05V DC	
	Conditioning period before test		7 days	

The value of power consumption (Ps) can be calculated by utilizing the following formula:

$$P_s = \frac{(V_C - V_{out})^2}{R_s}$$

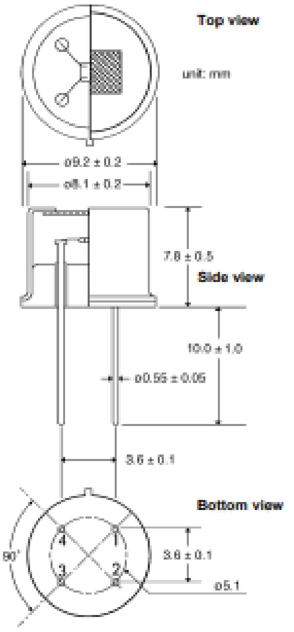
Sensor resistance (Rs) is calculated with a measured value of Vout by using the following formula:

$$R_s = \frac{V_C \times R_L}{V_{out}} - R_L$$

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

REV: 09/01

Structure and Dimensions:



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

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Datasheet MQ 135

HANWEI ELECTRONICS CO.,LTD　　MQ-135　　http://www.hwsensor.com

TECHNICAL DATA　　MQ-135 GAS SENSOR

FEATURES

Wide detecting scope　　Fast response and High sensitivity
Stable and long life　　Simple drive circuit

APPLICATION

They are used in air quality control equipments for buildings/offices, are suitable for detecting of NH3,NOx, alcohol, Benzene, smoke,CO_2 ,etc.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
Vc	Circuit voltage	5V±0.1	AC OR DC
V_H	Heating voltage	5V±0.1	ACOR DC
R_L	Load resistance	can adjust	
R_H	Heater resistance	33Ω±5%	Room Tem
P_H	Heating consumption	less than 800mw	

B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-10℃-45℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Ramark 2
Rs	Sensing Resistance	30KΩ-200KΩ (100ppm NH_3)	Detecting concentration scope: 10ppm-300ppm NH_3 10ppm-1000ppm Benzene 10ppm-300ppm Alcohol
α (200/50) NH_3	Concentration Slope rate	≤0.65	
Standard Detecting Condition	Temp: 20℃±2℃ Vc:5V±0.1 Humidity: 65%±5% Vh: 5V±0.1		
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

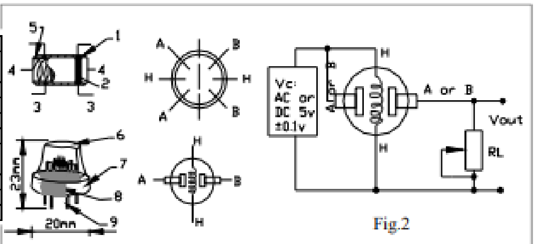
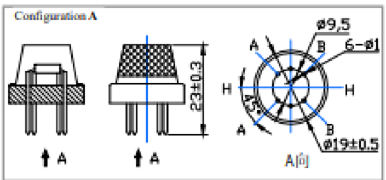
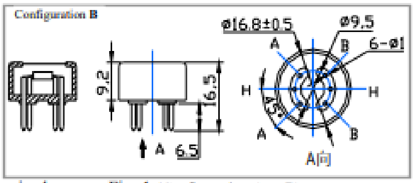


Fig.2
Fig. 1





Structure and configuration of MQ-135 gas sensor is shown as Fig. 1 (Configuration **A or B**), sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of

TEL: 86-371-67169070 67169080　　FAX: 86-371-67169090　　E-mail: sales@hwsensor.com sensitive components. The enveloped MQ-135 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

Fig.2 sensitivity characteristics of the MQ-135

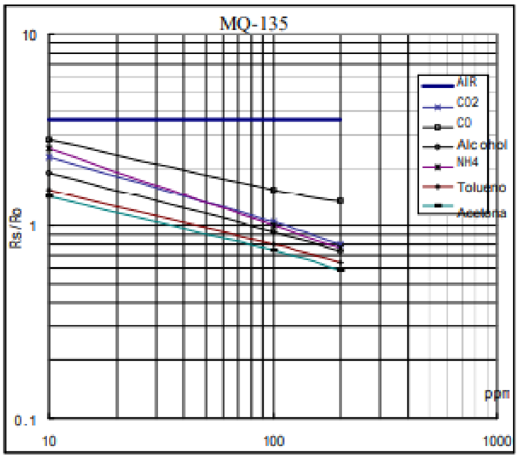


Fig.3 is shows the typical sensitivity characteristics of the MQ-135 for several gases.
in their: Temp: 20℃、
Humidity: 65%、
O_2 concentration 21%
RL=20k Ω
Ro: sensor resistance at 100ppm of NH_3 in the clean air.
Rs: sensor resistance at various concentrations of gases.

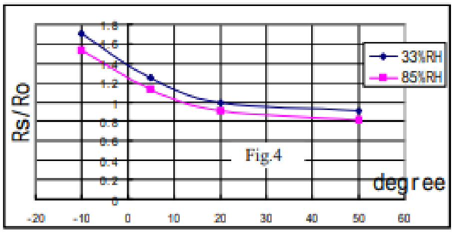


Fig.4 is shows the typical dependence of the MQ-135 on temperature and humidity.
Ro: sensor resistance at 100ppm of NH_3 in air at 33%RH and 20 degree.
Rs: sensor resistance at 100ppm of NH_3 at different temperatures and humidities.

SENSITIVITY ADJUSTMENT

Resistance value of MQ-135 is difference to various kinds and various concentration gases. So,When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 100ppm NH_3 or 50ppm Alcohol concentration in air and use value of Load resistancethat(R_L) about 20 K Ω (10K Ω to 47 K Ω).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

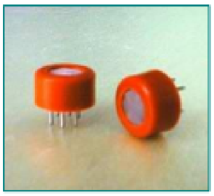


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Foto atau keterangan tentang sawi yang dipakai

Data hasil dari pembacaan sawi organik

Time	MQ-3	MQ-9	MQ-135	MQ-137	TGS-2600	TGS-2602	TGS-2611	TGS-813	TGS-822
0	870	241	870	916	841	842	825	558	194
00.05	870	241	870	915	840	842	824	557	194
00.05	869	241	870	915	839	842	823	556	194
00.05	869	241	871	915	839	842	823	555	193
00.06	869	240	870	915	838	842	823	554	193
00.08	869	240	870	914	838	841	823	554	192
00.09	868	240	871	915	838	842	824	554	192
01.01	868	240	871	915	838	842	824	553	191
01.02	868	241	871	915	838	842	824	553	191
01.04	868	240	871	915	838	842	824	552	191
01.05	869	240	870	914	837	842	823	551	191
01.07	869	242	871	915	837	842	823	551	190
01.08	869	242	871	915	837	842	822	551	189
02.00	869	241	871	915	836	842	823	550	189
02.01	869	241	871	915	837	843	823	550	189
02.03	869	241	871	915	837	843	823	550	188
02.04	868	241	870	915	837	843	823	550	188
02.05	868	241	871	915	836	843	823	550	188
02.07	868	241	870	915	836	843	823	550	188
02.08	869	241	871	915	836	843	823	550	187
03.00	870	241	872	915	836	844	823	550	187
03.01	869	241	872	916	836	844	823	550	187
03.03	869	242	872	916	836	844	824	550	187
03.04	870	241	872	916	836	845	824	550	187
03.06	870	241	873	916	836	845	824	550	187
03.07	870	240	873	916	835	845	824	550	187
03.09	870	240	872	916	836	845	824	551	188
04.00	869	240	872	916	836	846	824	551	187
04.02	869	240	872	916	836	845	824	550	187
04.03	870	240	872	916	835	845	824	550	187
04.04	871	241	872	917	836	846	824	551	187
04.06	871	239	872	917	836	847	824	551	186
04.07	871	239	873	917	836	847	824	552	187
04.09	870	239	873	917	836	848	825	552	187
05.00	871	239	873	916	836	847	824	552	187
05.02	872	240	873	916	836	847	825	552	186