

TGS 8410 - for the detection of Methane

Features:

- * Low power consumption
- * High sensitivity and selectivity to methane
- * Long life

Applications:

- * Portable/pocket type methane gas detectors
- * Battery operable/wireless gas detectors
- * Leak detection for natural gas vehicles
- * Leak detection for gas pipelines

The sensing element is comprised of a sensing chip and an integrated heater formed on a silicon substrate using MEMS technology, and a metal-oxide semiconductor layer formed on the sensing chip. Due to miniaturization of the sensing chip, **TGS 8410** requires a heater power consumption of only 0.087mW(ave.), and is suitable for low-power equipment and battery-operated instruments. 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.

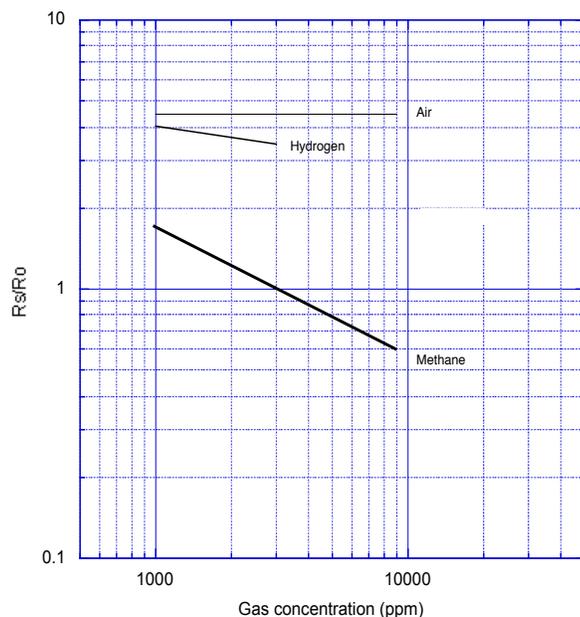
The **TGS 8410** uses filter material in its housing for eliminating the influence of interference gases such as alcohol, resulting in highly selective response to methane gas. This feature makes the sensor ideal for residential gas leakage detectors which require durability and resistance against interference 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 3000ppm of methane

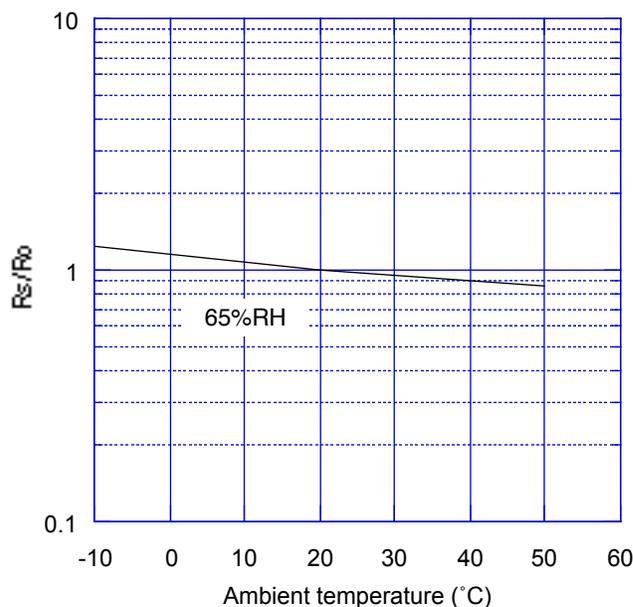
Sensitivity Characteristics:



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

- R_s = Sensor resistance in 3000ppm of methane at various temperatures
- R_o = Sensor resistance in 3000ppm of methane at 20°C and 65% R.H.

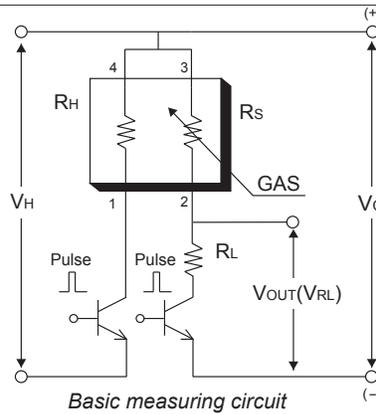
Temperature Dependency:



Basic Measuring Circuit:

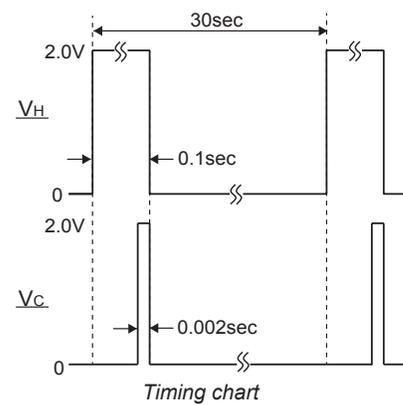
The sensing element is heated by an integrated heater connected to pin Nos. 1 and 4. The sensor requires application of a 30-second heater voltage cycle comprised of a 2.0V pulse (V_H) being applied to the heater for 0.1 seconds, followed by 0V for the remaining 29.9 seconds.

Circuit voltage (V_C) is applied across the sensing element which has a resistance (R_S) between the sensor's two electrodes (pin Nos. 2 and 3) and a load resistor (R_L) connected in series. A 2.0V circuit voltage pulse is applied for the final 0.002 seconds of each V_H pulse, followed by 0V for the remaining period.



Basic measuring circuit

The sensor's signal should be measured during the 0.002 second V_C pulse (see timing chart). The numbers shown around



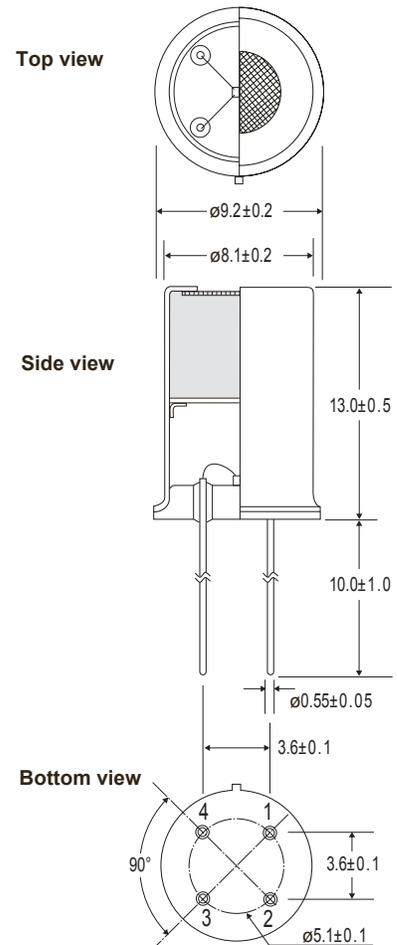
Timing chart

the sensor symbol in the circuit diagram correspond with the pin numbers shown in the structure drawing.

Specifications (tentative):

Model number		TGS8410		
Sensing principle		MOS type		
Standard package		TO-5 metal can		
Target gas		Methane		
Typical detection range		1 ~ 25% LEL		
Standard circuit conditions	Heater voltage	V _H	V _H =2.0V±2% DC for 0.1sec V _H L=0.0V for 29.9sec.	
	Circuit voltage	V _C	2.0V±2% DC pulse	
	Load resistance	R _L	variable (2kΩ min.)	
Electrical characteristics under standard test conditions	Heater resistance	R _H	approx. 70Ω at room temp.	
	Heater current	I _H	13±2mA	
	Heater power consumption	P _H	0.087mW (ave.)	
	Sensor resistance	R _S	2.5~150kΩ in 3000ppm methane	
	Sensitivity (change ratio of R _S)	0.44~0.76		$\frac{R_S(3000\text{ppm methane})}{R_S(1000\text{ppm methane})}$
Standard test conditions	Test gas conditions	methane in air at 20±2°C, 65±5%RH		
	Circuit conditions	same as std circuit conditions		
	Conditioning period before test	3 days or longer		

Structure and Dimensions:



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

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