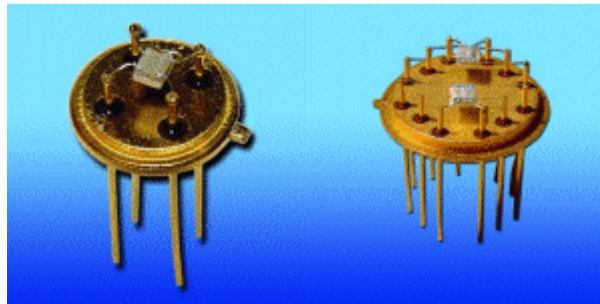
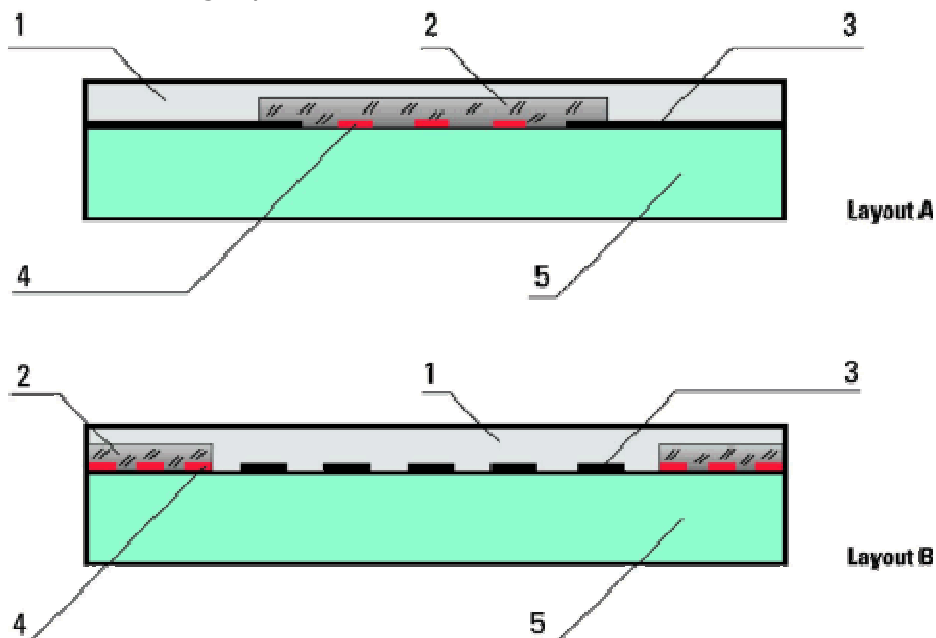


UST develops and manufactures semi conductor gas sensor elements for a wide range of applications, i.e. environmental technology, leak detection, location of smouldering underground fires, detection of lower explosive limit (LEL), air quality monitoring and process measurement.



These sensor elements are produced in hybrid technology. The main response of the sensor is based on the changes in conductivity of the sensitive semi conductor layer when exposed to gases.

The gas sensor element consists of a Al_2O_3 substrate with a structured Pt-film, which in turn consists of heater channels and contact electrodes covered by an insulating and a sensitive semiconducting layer.



Sensor structure:

- 1** sensitive layer
- 2** insulating layer
- 3** Pt-contacts
- 4** Pt-heater
- 5** ceramics substrate

The heater resistance has a defined temperature coefficient, which permits the control of the working temperature of the sensor. This allows for the compensation of varying ambient temperatures and permits defined influence of the sensitivity of the sensor.

Calculation of the operating temperature of sensor above Pt-heater:

$$T_H = - \left[\frac{A}{2B} + \sqrt{\frac{A^2}{4B^2} - \frac{R_{H0} - U_H/I_H}{R_{H0}B}} \right] \text{ whereby: } T_H \text{ temperature}$$

R_{H0} heater resistance at 0 °C
 U_H current
 I_H power input
 A linear coefficient $3,9083 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$
 B quadratic coefficient $-5,775 \times 10^{-7} \text{ } ^\circ\text{C}^{-2}$

Sensor types can be differentiated by

- shape and dimensions
- sensitivity to selected gases
- cross sensitivity

- response time

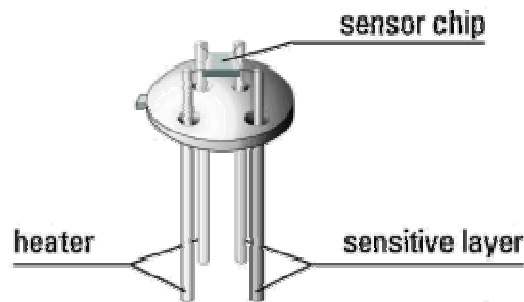
The gas sensor reacts to oxidised and reducible gases in a concentration range from a few ppb to 5 vol. % max. The detection range depends on the sensor type and type of gas (see data sheets).

The sensitive layer reacts to reducible gases with a decrease in resistance and to oxidised gases with an increase. For special gases we can produce characteristic data relating to sensor behaviour.

- **Graph 1:** operating temperature of GGS-sensors in TO39-housing on air $T_u=25\text{ °C}$, current=0 m/s
- **Table 1:** dimensions and power of different types

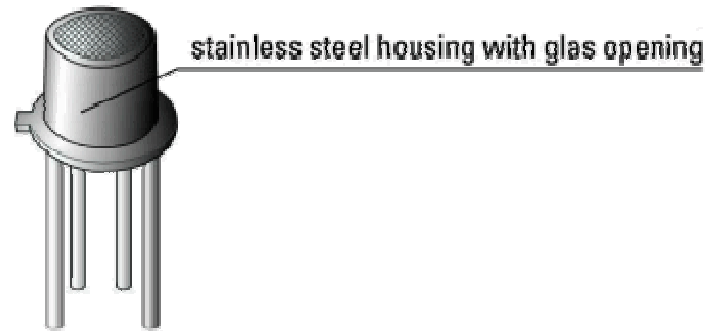
The insulating resistance between heater and sensitive layer is over 10 MOhm at the according operating temperature.

- **Table 2:** Classes of heater resistance based on 0 °C
- **Table 3:** Classes of accuracy



Order example: **GGG 1470 T**

GGG	Gas sensor (single
1	sensor)
4	type of sensor
7	(table 4)
0	size of sensor (2
T	mm x 2,3 mm
	Chip) (table 1)
	R_0 heater in Ohm
	($R_0 = 16 \pm 1,0$
	Ohm) (table 2)
	class of accuracy
	(table 3)
	sensor in stainless
	steel housing



After ageing the gas sensor elements will be selected for sensitivity and basic resistance R_0 of the sensitive layer (see **table 3:** classes of accuracy). Physical and chemical limitations relating to the influence of basic resistance and sensitivity apply.

To select the most suitable sensor for a given application the following criteria apply:

- type of sensor / type of sensitive layer
- shape / dimensions
- classes of heater resistance
- type of gas
- accuracy requirements
- surrounding media

Attention:

Silicium containing media may cause contamination of the gas sensor, which may result in reduction of the resistance R_0 and/or lead to changes in characteristics. We can assist you in the selection of the correct sensor for special applications and can produce "tailor-made" sensors in medium and large volume manufacture.

- GGG 1000 T** universal sensor with wide range of application, especially suitable for leak detection of combustible gases
- GGG 2000 T** sensor for CO-, hydrogen- und alcohol, low cross sensitivity to CH₄ methane
- GGG 3000 T** sensor for hydrocarbons, optimal for C₁ ... C₈ hydrocarbon, especially suitable for stationary observation of LEL
- GGG 4000 T** selective sensor for ammonia, with low cross sensitivity to CH₄, CO, H₂ and humidity
- GGG 5000 T** sensor especially sensitive to nitric oxide and ozone
- GGG 6000 T** sensor for hydrogen, with low cross sensitivity to CH₄, humidity and alcohol
- GGG 7000 T** sensor for detection of NO₂ - smouldering fires
- GGG 9000 T** sensor for detection of R134a

Based on UST developed and produced semi conductor gas sensors we also manufacture complete equipment and monitor modules. These include

- Gas leak detectors for quick and selective detection of gases - PEAKER
- gas leak detectors for methane and propane gas - SNIFFER
- Gas leak detectors, hand held and mobile, for leak detection from underground pipes - SNIFFER-T
- Micro-detectors, for hydrogen and combustible gases