Dual Gas Sensor CO/H $_2$ S Micro

PATENTED and PATENT PENDING

Introduction Since the 1970s, multi-gas, portable personal safety monitors hav worldwide, and their industrial applications are increasing. Most of these instruments have a common requirement to detect both carbon monoxide and hydrogen sulfide.

Alphasense now offers a compact dual gas sensor that significantly reduces the manufacturing costs for gas detectors and decreases product dimensions. The D2 sensor features a unique dual-gas configuration in both product size and working electrode design. A high-capacity filter installed on the carbon monoxide working electrode eliminates cross-sensitivity between hydrogen sulfide and carbon monoxide.

D2 has been proven in the industrial field for many years, and its performance is still good even under long-term harsh conditions.

CO channel specification		
Performance sensitivity	**Sensitivity in 400ppmCO nA/ppm**	27~55
reaction time	**Time from zero to 400ppmCO t90 (s)**	< 25
zero current	**Equivalent ppm value in zero air**	< ± 6
resolution ratio	**RMS noise (equivalent ppm value)**	1
scope	**CO measurement limit (ppm) that guarantees product performance**	1000
degree of linearity	**The ppm value of the full scale error is linear at 0~400ppmCO**	< 40
overload	**Maximum ppm value of gas pulse stabilization reaction**	5000
Lifetime zero drift	**Equivalent ppm values that change in the laboratory air from year to year**	< 0.5
sensitivity drift	**Percentage change in laboratory air over the year, measured monthly**	< 4
working life	**Number of months output drops to 80% of original signal (24 months guaranteed)**	> 18
Sensitivity at ambient 20°C	**100ppmCO when, (-20°C output/20°C output)%**	45~70
Sensitivity at 50°C	**100ppmCO when, (50°C output/20°C output)%**	105~125
-20°C when zero point	**Change in equivalent ppm value, reference 20°C**	-1~1
50°C at zero point	**Change in equivalent ppm value, reference 20°C**	-1~4
Cross-cutting filter capacity	**ppm- hour** H_2S	15000
Sensitivity H $_2$ S	**Gas sensitivity percentage at 20ppmH $_2$ S**	< 8
NO_2	**Gas sensitivity percentage $_2$ measured at 10ppmNO**	< 0.1
Cl_2	**Gas sensitivity percentage measured $_2$ at 10ppmCl**	< 0.1
NO	**Gas sensitivity percentage measured at 50ppmNO**	< 50
SO_2	**Gas sensitivity percentage $_2$ measured at 20ppmSO**	< 0.1
H_2	**Gas sensitivity percentage measured $_2$ at 400 ppmH(20°C)**	< 55
C_2H_4	**Gas sensitivity percentage measured at 400ppmC $_2$ H $_4$**	< 200
NH_3	**Gas sensitivity percentage $_3$ at 20ppmNH**	< 0.1
Key parameters Temperature range	℃	-30~50
pressure limit	Kpa	80~120
Humidity range	**Percentage of continuous relative humidity (see below)**	15~90
Storage period	**3~20℃ Sealing storage period (months)**	6
load resistance	**Ω （recommend）**	10~47
weight	**can**	< 2

Note: When the sensor is used in an environment with humidity above 85%rh and temperature above 40℃, the product performance can only be guaranteed for 10 days. If the above environment exists, the sensor should be placed in a low humidity and low temperature environment for several days to restore the electrolyte quantity to normal state before use.

Figure 1 Temperature Sensitivity Characteristics of CO Channel

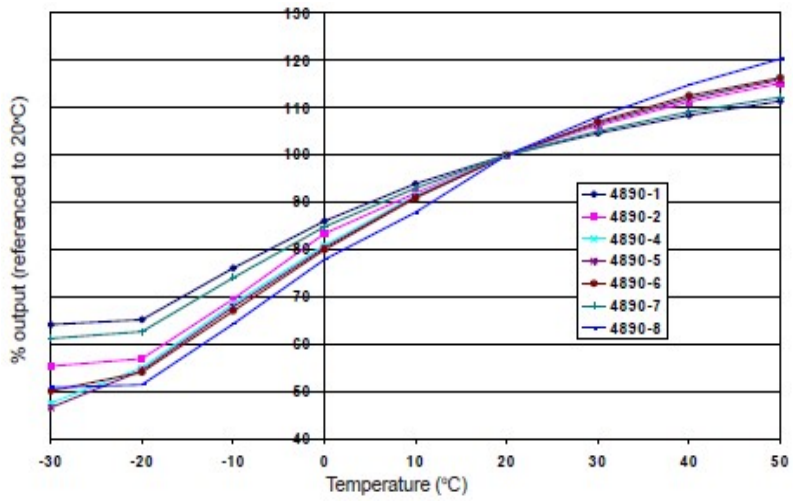


Figure 1 shows the sensitivity changes caused by temperature changes.

Data was taken from a typical batch of sensors.

FIG. 2 Zero Point Temperature Characteristics of CO Channel

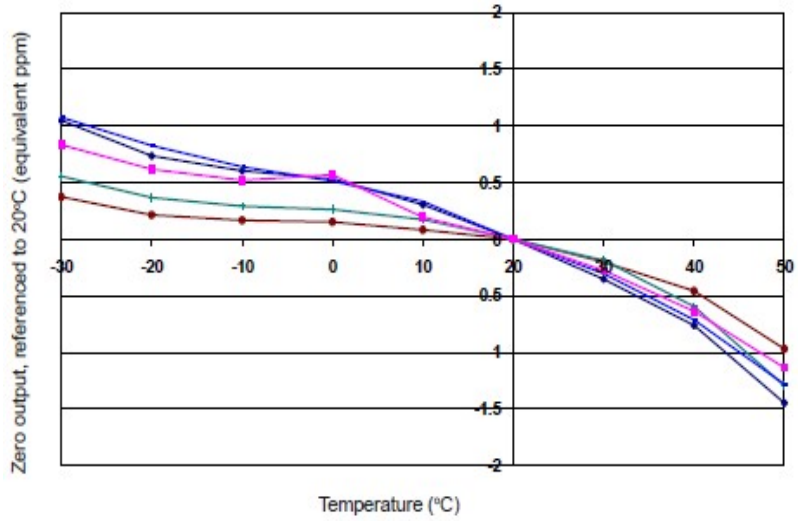


Figure 2 shows the zero point output variation caused by temperature changes, expressed in equivalent ppm values, with reference to the zero point at 20℃.

Data was taken from a typical batch of sensors.

Figure 3 Reaction of CO Channel to High Concentration of CO

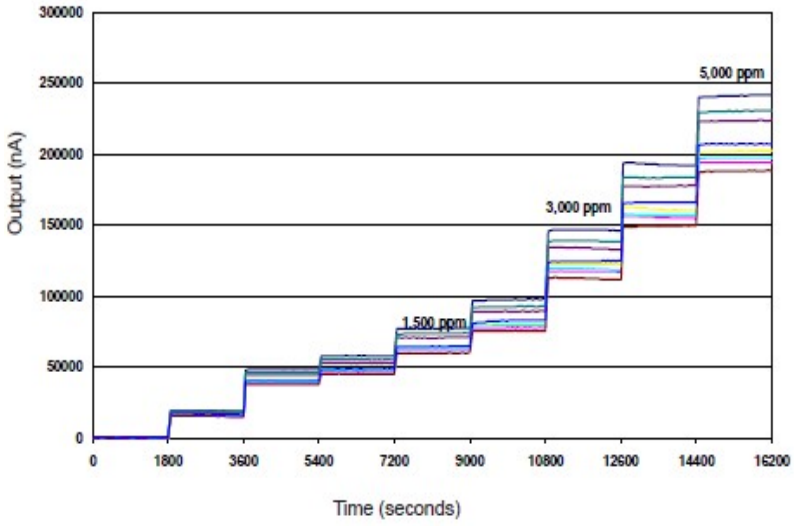
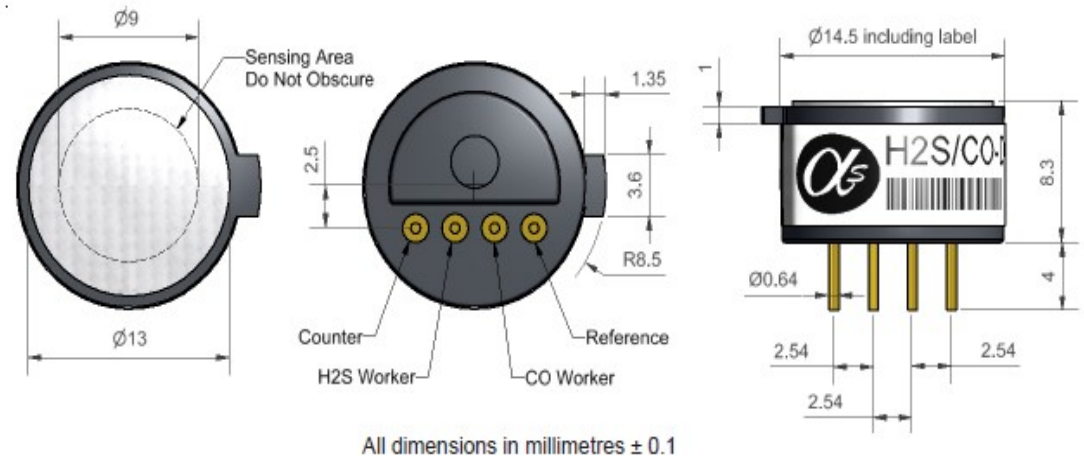


Figure 3 shows the reaction condition of a batch of D2 transducers tested for 5000ppmCO. Fast and stable reaction is the embodiment of a robust sensor running well within the parameter range.

D2 Performance Parameters Parameters on the Previous Page

Figure 4 D2 Diagram



vertical view **upward view** **side-looking**

graph **H_2S channel specification**

Performance sensitivity		**Sensitivity in ppmH_2S nA /ppm**	90~175
	reaction time	**Time of t90 from zero to 20ppmH_2S at 20℃ (s)**	< 30
	zero current	**Equivalent ppm value of zero air**	< ± 1
	resolution ratio	**RMS noise (equivalent ppm value)**	< 0.25
	scope	**H_2S measurement limit (ppm) that guarantees product performance**	100
	degree of linearity	**The ppm value of the full scale error is linear at 0~20ppmH_2S**	0~-9
	overload	**Maximum ppm value of gas pulse stabilization reaction**	400
life span	**zero drift**	**Equivalent ppm values that change in the laboratory air from year to year**	< 0.1
	sensitivity drift	**Percentage change in laboratory air over the year, measured monthly**	< 2
	working life	**Number of months output drops to 80% of original signal (guaranteed 24 months)**	18
environment	**-20°C sensitivity**	**At 20ppmH_2S, (output at-20°C/ output at 20°C)%**	75~90
	Sensitivity at 50°C	**At 20ppmH_2S, (output at 50°C/ output at 20°C)%**	103~112
	-20°C when zero point	**Change in equivalent ppm value, reference 20℃**	-0.3~0.2
	50°C at zero point	**Change in equivalent ppm value, reference 20℃**	< ±1
cross sensitivity	NO_2	**Gas sensitivity percentage measured at 10ppmNO**	< -10
	Cl_2	**Gas sensitivity percentage measured at 10 ppmCl_2 Gas sensitivity percentage measured at 50ppmNO Gas sensitivity percentage measured at 20ppmSO_2 Gas sensitivity percentage measured at 400ppmCO**	< -10
	NO		< 10
	SO_2		< 10
	CO		< 2
	H_2 C_2H_4	**Gas sensitivity percentage at 400ppmH**	< 1
		Gas sensitivity percentage at 400ppmC_4	< 1
	NH_3	**Gas sensitivity percentage at 20ppmNH**	< 0

Note: When the sensor is used in an environment with humidity above 85%rh and temperature above 40℃, the product performance can only be guaranteed for 10 days. If the above environment exists, the sensor should be placed in a low humidity and low temperature environment for several days to restore the electrolyte quantity to normal state before use.

Figure 5 Temperature Characteristics of Sensitivity of H_2S Channel

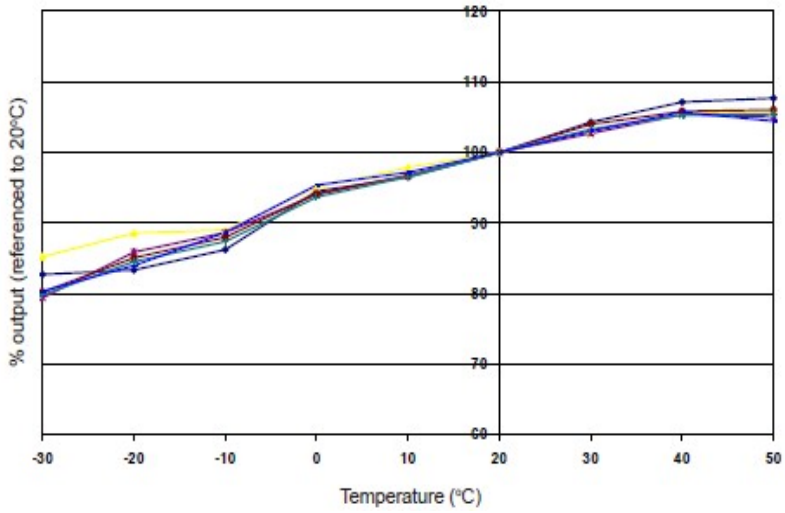


Figure 5 shows the sensitivity changes caused by temperature changes.

Data was taken from a typical batch of sensors.

Figure 6 Zero Point Temperature Characteristics of H_2S Channel

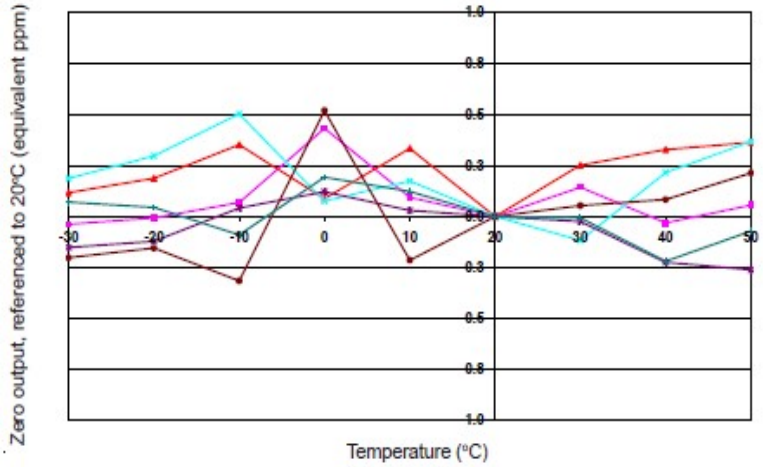


Figure 6 shows the change in zero point output caused by temperature changes, expressed as equivalent ppm values with reference to the zero point at 20℃.

Data was taken from a typical batch of sensors.

Figure 7 Long-Term Environmental Test Results

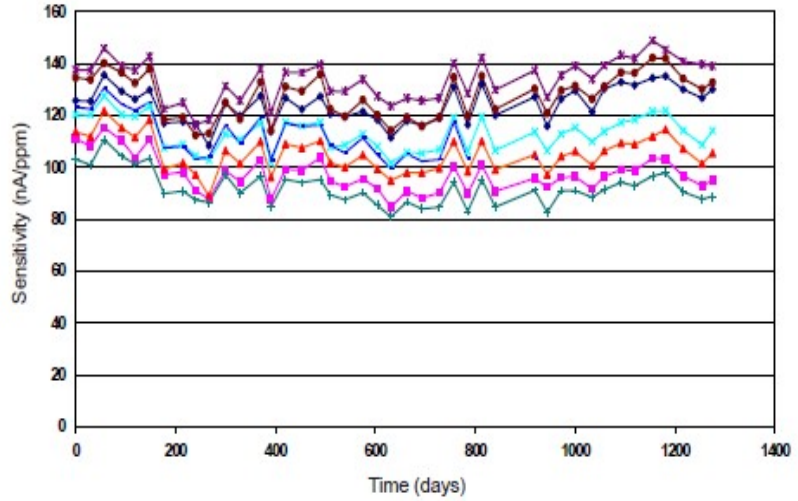


Figure 7 shows the long-term excellent stability of D2 sensor detection H_2S.

The figure shows the results of monthly measurements of sensors stored under environmental laboratory conditions.

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