

# LPG/NG Sensor – for the detection of Hydro Carbon, LPG, NG, Hydrogen

가스누설 경보용으로 사용되는 LPG/NG sensor는 접촉 연소식 및 산화물 반도체식이 주로 사용되며 형상에 따라 Bead/Thick film type로 구분하며, 서로의 장단점이 있다.

구분	장점	단점
접촉 연소식 (bead type)	선택성 우수 (잡 가스에 의한 오 동작이 작음)	수명이 짧음(약 2년) 센서의 감도가 작음
산화물 반도체식 (Thick film type)	수명이 오래감(약 4년 이상) 센서의 감도가 큼	선택성 나쁨 (잡 가스에 의한 오 동작이 큼)



< Package(MS6100) >



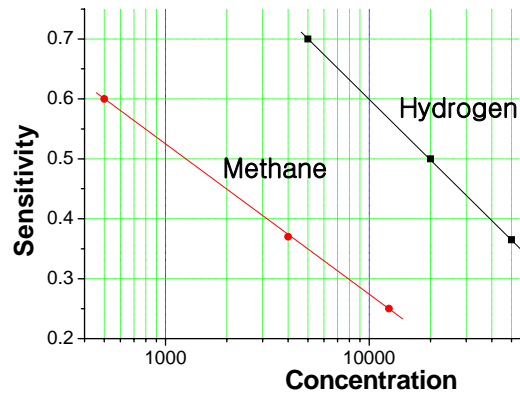
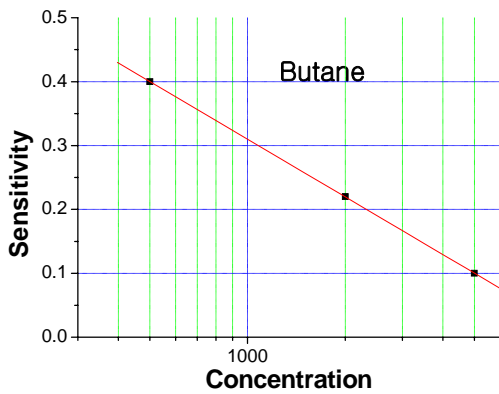
<Module(MS6100-L01)>

GSLS61 센서는 가스누설경보기용으로 개발된 센서이며, 기존 산화물 반도체 센서의 단점인 선택성을 대폭 향상 시킨 제품으로써 특히 주방 요리 시 발생하는 각종 가스에 탁월한 선택성을 가지고 있으며 안정된 감지구조를 확보하여 반 영구적 사용이 가능하다.

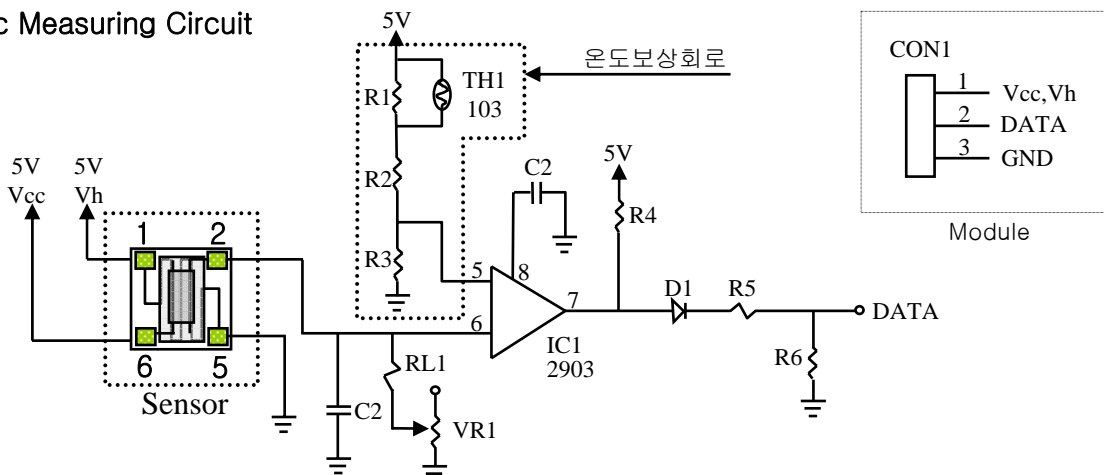
\* LPG (Liquid Petroleum Gas) : 액화석유가스, 원유 정제 시 발생하며, 액화가 잘되어 gas tank를 이용 보관 및 운송, 주성분 → Butane(부탄,  $C_4H_{10}$ ), Propane (프로판,  $C_3H_8$ ).

\* NG or LNG (Natural Gas, Liquid Natural Gas) : 천연가스, 원유 채취 또는 자연상태의 가스로 존재하며 액화가 어려워 저온 고압 하의 특수 LNG 운반선을 이용하여 수요자까지는 주로 가스 배관라인을 통하여 운송, 주성분 → Methane (메탄,  $CH_4$ ), Hydrogen (수소,  $H_2$ )

## 1. Sensitivity characteristic slope



## 2. Basic Measuring Circuit

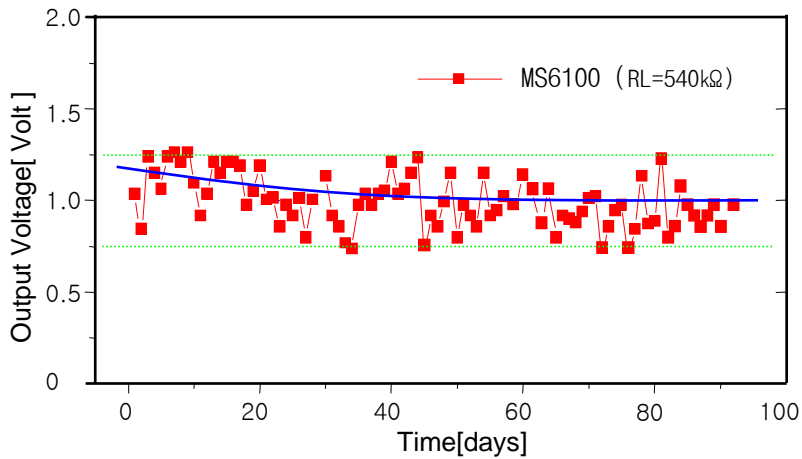


### 3. Specifications

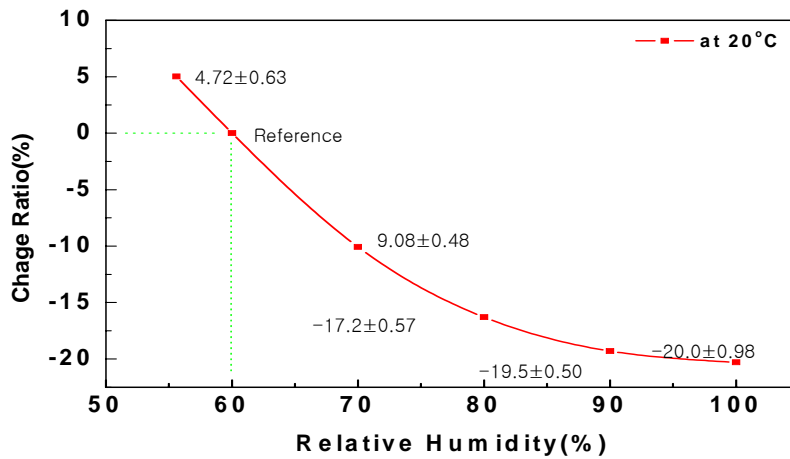
Model number		MS6100	MS6100-01
Sensing element type		Semiconductor	←
Target gas		Butane, methane	←
Electrical characteristics under standard Test conditions	R <sub>H</sub>	Heater resistance	16Ω±0.2Ω
	V <sub>H</sub>	Heater Voltage	5.0V±2%
	R <sub>L</sub>	Load resistance	Variable
	P <sub>H</sub>	Power consumption	Less than 650mW
	V <sub>c</sub>	Circuit Voltage	Less than 12.0V
		P <sub>H</sub> : Less than 680mW Circuit voltage : 5V±2%	
Sensitivity Characteristic	R <sub>s,air</sub> V <sub>out,air</sub>	Sensor resistance Out of Voltage	R <sub>s,air</sub> = 196kΩ to 789kΩ (Refer to Rank Table)
	β = R <sub>s,gas</sub> /R <sub>s,air</sub>		V <sub>out,air</sub> = 1.0V±0.2
ΔV = V <sub>out,air</sub> - V <sub>out,gas</sub>	β	i-Butane	500ppm : 0.4±0.1 4,500ppm : 0.1±0.05
		Methane	500ppm : 0.6±0.1 12,500ppm : 0.25±0.05
	ΔV	i-Butane	500ppm : 0.6 ~ 1.3volt 4,500ppm : 2.1 ~ 3.2volt
		Methane	500ppm : 0.3 ~ 0.7volt 12,500ppm : 1.2 ~ 1.8volt
		V <sub>out,air</sub> = 1.0V (청정 대기상태에서의 출력전압)	
Change ratio of sensitivity α = β <sub>2</sub> /β <sub>1</sub>	α	i-Butane	0.2 ~ 0.4 β <sub>1</sub> = Sensitivity at 500ppm β <sub>2</sub> = Sensitivity at 4,500ppm
		Methane	0.3 ~ 0.5 β <sub>1</sub> = Sensitivity at 500ppm β <sub>2</sub> = Sensitivity at 12,500ppm
Response time		Reaction : less than 16sec	Recovery : less than 30sec
Environmental condition	<ul style="list-style-type: none"> <li>* Standard test condition (balance gas : clean air, or special air) <ul style="list-style-type: none"> <li>• Temp. : 20°C ± 5°C,    • Humidity : RH65% ± 10%,    • Pressure : 1atm</li> <li>• Test chamber : more than 1ℓ/EA,    • Pre-heating time : more than 1hr</li> </ul> </li> <li>* Operation temp. &amp; Relative humidity : -10°C to 60°C, less than dew point</li> <li>* storage temp. : -20°C to 80°C</li> <li>* Oxygen concentration : 21% ± 2% (The sensitivity characteristics are influenced by variation in oxygen concentration)</li> </ul>		

#### 4. Stability & dependency

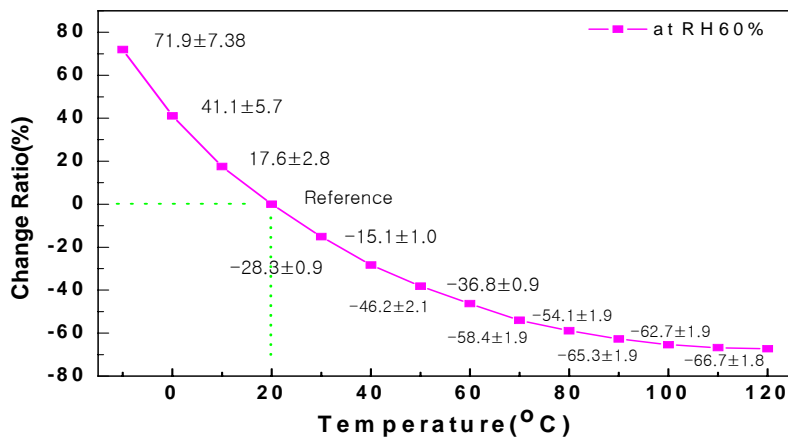
##### 4-1. Long term stability



##### 4-2. Humidity dependency



##### 4-3. Temperature dependency



## 5. Characteristics of gases ( $\beta = R_{s,gas}/R_{s,air}$ )

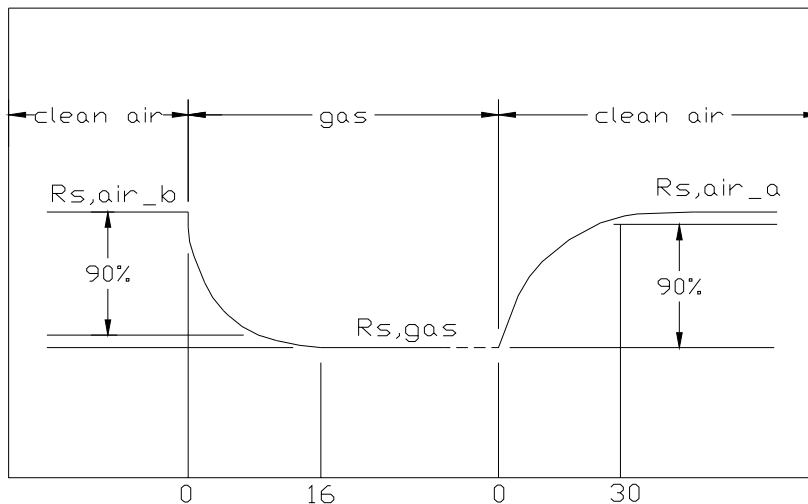
### Characteristic of interference gases

종 류	구 분	특 성	비 고
Smoke	Concentration	1,000ppm	디스, Korea
	Sensitivity ( $\alpha$ )	More than 0.9	
Alcohol	Concentration	1,000ppm	Cooking gas
	Sensitivity	More than 0.8	
Butyl Acid	Concentration	1,000ppm	부페취, 발/땀냄새
	Sensitivity	More than 0.8	

### Characteristic of explosive gases

종 류	분자식	Explosive Range (Vol.%)	허용농도 (ppm)
Methane	CH <sub>4</sub>	5.0 ~ 15.0	-
Butane	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> CH <sub>3</sub>	1.8 ~ 8.4	-
Hydrogen	H <sub>2</sub>	4.0 ~ 75.0	
Alcohol	C <sub>2</sub> H <sub>5</sub> OH	1.2 ~ 7.6	Lsee than 150

## 6. Reaction Time



Reaction Time : Less than 10sec [Between  $R_{s,air\_b}$  &  $R_{s,gas}$ ]

Recovering Time : Less than 20sec [between  $R_{s,gas}$  &  $R_{s,air\_a}$ ]

Beginning stability time : Less than 10 minute

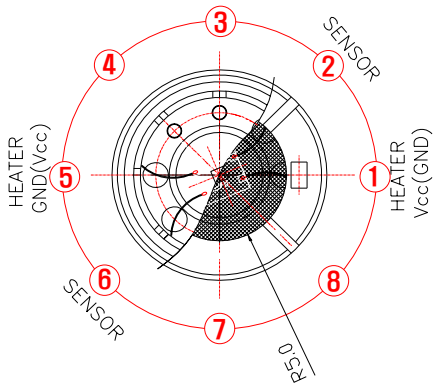
$R_{s,air\_b}$  : Sensor Resistance without gases

$R_{s,gas}$  : Sensor Resistance after blowing gases

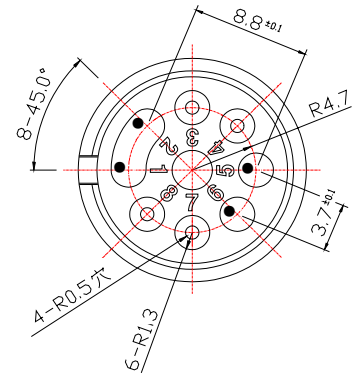
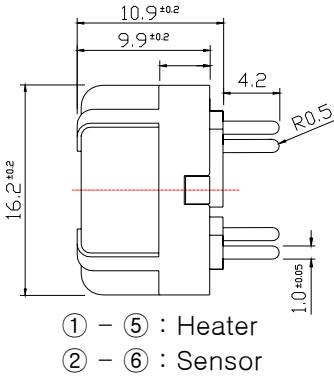
$R_{s,air\_a}$  : Sensor Resistance removing gases

## 7. Structure and Dimensions

### MS6100(Package)



Top View



Bottom View

### MS6100 -01(Module)

