

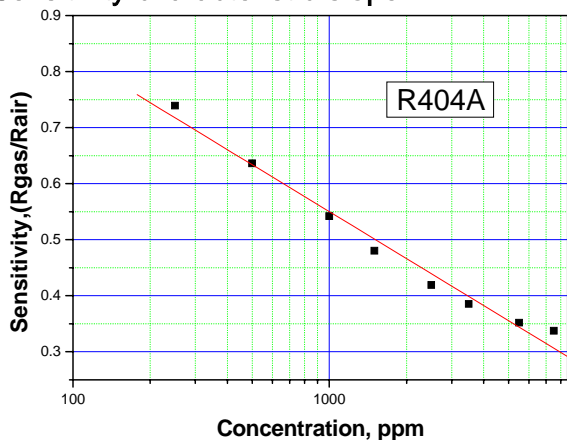
## RFGs Sensor – for the detection of Refrigerants

Target Gases	Chemical name		(%)		(g/cc)
R125	pentafluoroethane	CHF <sub>2</sub> CF <sub>3</sub>	44%	120.030	1.530
R134A	Tetrafluoroethane	CH <sub>2</sub> FCF <sub>3</sub>	4%	102.030	1.207
R143A	1,1,1-Trifluoroethane	CH <sub>3</sub> CF <sub>3</sub>	52%	84.000	0.455
				100.574	0.958
	1g	(liq.15 )	= 0.225(liter)		
	1cc	(liq. 15 )	= 0.216(liter)		



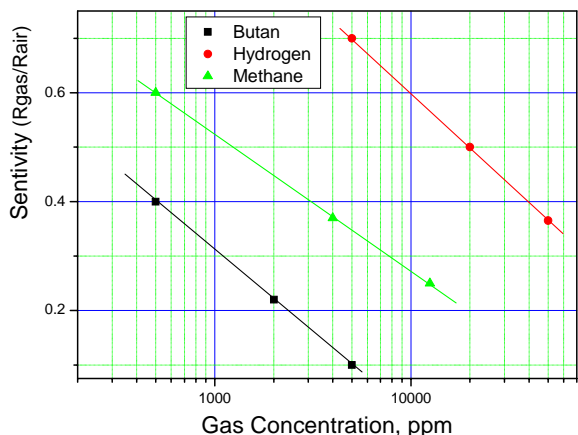
< Module(GSR61 - P110) >

### 1. Sensitivity characteristic slope

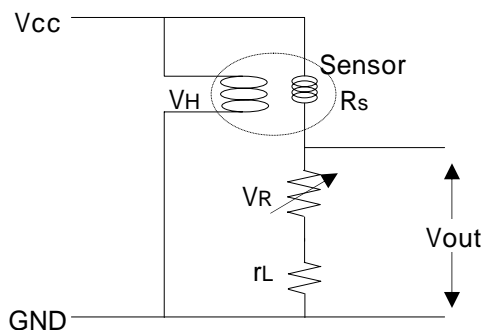


$$(Sensitivity) = 1.385 - 0.278 \times \log_{10}(ppm)$$

(ppm)	(ppm)	(ppm)	(ppm)
0	0.969	2,400	2.040
200	1.324	2,600	2.077
400	1.484	2,800	2.112
600	1.592	3,000	2.145
800	1.677	3,200	2.177
1,000	1.747	3,400	2.208
1,200	1.808	3,600	2.238
1,400	1.863	3,800	2.266
1,600	1.912	4,000	2.293
1,800	1.958	4,200	2.320
2,000	2.000	4,400	2.346
2,200	2.040	4,600	2.371
		4,800	2.419
		5,000	2.442
		5,200	2.464
		5,400	2.486
		5,600	2.508
		5,800	2.529
		6,000	2.550
		6,200	2.570
		6,400	2.590
		6,600	2.609
		6,800	2.629
		7,000	2.648
		7,200	2.67
		7,400	2.68
		7,600	2.70
		7,800	2.72
		8,000	2.74
		8,200	2.75
		8,400	2.77
		8,600	2.79
		8,800	2.81
		9,000	2.82
		9,200	2.84
		9,400	2.85



### 2. Basic Measuring Circuit



Vcc : Circuit Voltage(5V)    VH : Heater Voltage(5V)  
 RL : Load Resistance        Rs : Sensor Resistance  
 (RL=VR+RL)

### 3. Specifications

#### 3.1 Package (GSR61 sensor)

a.

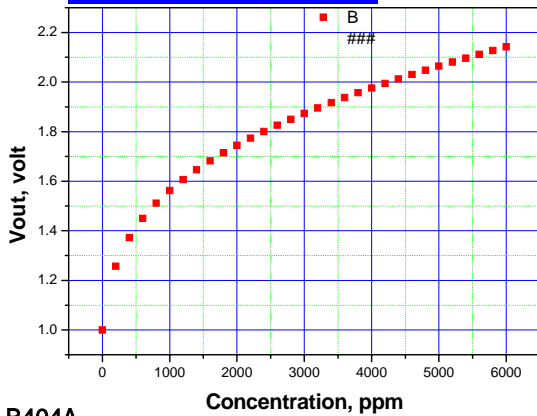
- Heater input voltage : 5volt±1%
- Resistance : 16.0 ±0.2
- Power consumption : 680mV
- Sensor input Voltage : 1 ~ 12Volt

b. 가

- → RL : 100kΩ, Sensor resistance : 400kΩ, : ±7% ( , )
- Vout,air : 1.0volt ( 가 5volt)

-> R404A : 1,000ppm~6,000ppm  
R22 : 100ppm~2,000ppm)

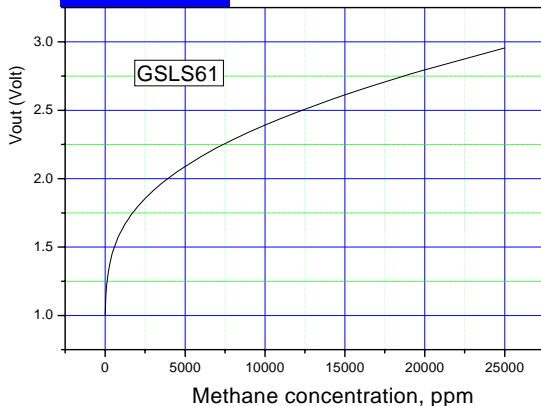
**R404A/R22**



R404A

$$(ppm) = 10^{(1.2228 + (3.0240E-4)(volt) - (2.636E-8)(volt)^2)}$$

**Methane**



R404A		R22	
(ppm)	(Volt)	(ppm)	(Volt)
0	1.000	3,000	1.873
200	1.324	3,200	1.895
400	1.484	3,400	1.917
600	1.592	3,600	1.937
800	1.677	3,800	1.957
1,000	1.747	4,000	1.976
1,200	1.808	4,200	1.995
1,400	1.863	4,400	2.013
1,600	1.912	4,600	2.030
1,800	1.958	4,800	2.048
2,000	2.000	5,000	2.064
2,200	2.040	5,200	2.081
2,400	2.077	5,400	2.096
2,600	2.112	5,600	2.112
2,800	2.145	5,800	2.127

(ppm)	(Volt)	(ppm)	(Volt)	(ppm)	(Volt)	(ppm)	(Volt)
0	1.00	700	1.54	1,900	1.78	10,000	2.39
50	1.14	800	1.57	2,000	1.79	11,000	2.44
100	1.22	900	1.59	2,500	1.86	12,000	2.49
150	1.28	1,000	1.62	3,000	1.91	13,000	2.53
200	1.32	1,100	1.64	3,500	1.96	14,000	2.57
300	1.38	1,300	1.68	4,500	2.05	16,000	2.65
400	1.43	1,500	1.71	6,000	2.16	18,000	2.73
500	1.47	1,700	1.75	8,000	2.29	20,000	2.80
600	1.51	1,800	1.76	9,000	2.34	25,000	2.96

가

$$= R_{s,gas} / R_{s,air}$$

	Sensitivity, (1,000ppm)	
Smoke	Less than 0.9	, Korea
Alcohol	Less than 0.8	Cooking gas
Butyl Acid	Less than 0.8	, /

### 3.2 Module ( , Refrigerants)

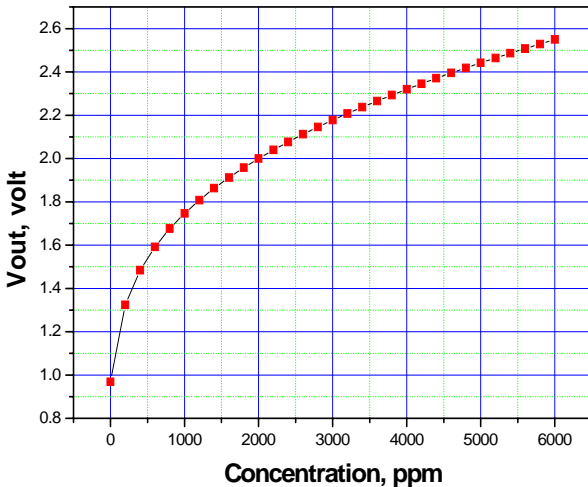
a.

- Input voltage : 5Volt±1%
- Power consumption : 710mW

- Output data : 0.5 ~ 5Volt
- Relay Output : 4.0Volt

b. 가 data sheet : ±5% ( , )

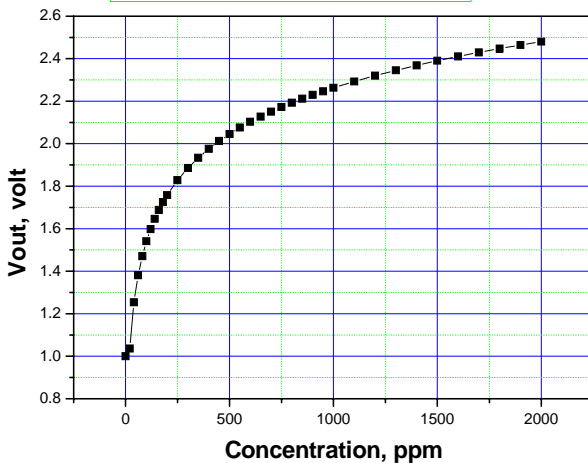
#### R404A GSR561-P110



(Vout) =  
(ppm) =

(ppm)	(Volt)	(ppm)	(Volt)	(ppm)	(Volt)	(ppm)	(Volt)
0	0.969	3,000	2.177	6,000	2.550	9,000	2.82
200	1.324	3,200	2.208	6,200	2.570	9,200	2.84
400	1.484	3,400	2.238	6,400	2.590	9,400	2.85
600	1.592	3,600	2.266	6,600	2.609	9,600	2.87
800	1.677	3,800	2.293	6,800	2.629	9,800	2.89
1,000	1.747	4,000	2.320	7,000	2.648	10,000	2.90
1,200	1.808	4,200	2.346	7,200	2.666	10,200	2.92
1,400	1.863	4,400	2.371	7,400	2.684	10,400	2.93
1,600	1.912	4,600	2.395	7,600	2.702	10,600	2.95
1,800	1.958	4,800	2.419	7,800	2.720	10,800	2.96
<b>2,000</b>	<b>2.000</b>	5,000	2.442	8,000	2.738	11,000	2.98
2,200	2.040	5,200	2.464	8,200	2.755	11,200	2.99
2,400	2.077	5,400	2.486	8,400	2.772	11,400	3.00
2,600	2.112	5,600	2.508	8,600	2.789	11,600	3.02
2,800	2.145	5,800	2.529	8,800	2.805	11,800	3.03

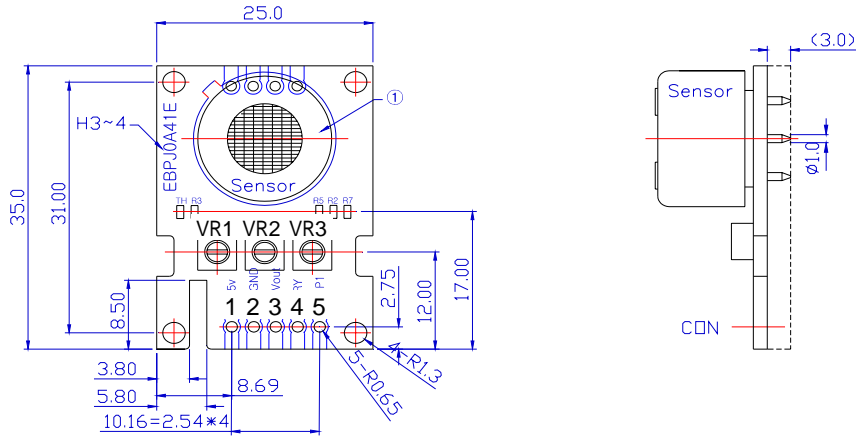
#### R22 GSR561-P110



(Vout) = 0.09696 + 0.72197Log(ppm,10)  
(ppm) = 10<sup>(Vout-0.09696)/0.72197</sup>

(ppm)	(Volt)	(ppm)	(Volt)	(ppm)	(Volt)	(ppm)	(Volt)
0	1.00	450	2.01	1400	2.37		
20	1.04	500	2.05	1500	2.39		
40	1.25	550	2.08	1600	2.41		
60	1.38	600	2.10	1700	2.43		
80	1.47	650	2.13	1800	2.45		
100	1.54	700	2.15	1900	2.46		
120	1.60	750	2.17	2000	2.48		
140	1.65	800	2.19				
160	1.69	850	2.21				
180	1.73	900	2.23				
200	1.76	950	2.25				
250	1.83	1000	2.26				
300	1.89	1100	2.29				
350	1.93	1200	2.32				
400	1.98	1300	2.35				

#### 4. Characteristics and Dimensions



##### a. Output Data

1	2	3	4
+5V	GND	Vout	Relay

- Calibration (refer to specification)

[ Front View ]

VR1 : RL Set    VR2 : Gain Calibration    VR3 : Offset Calibration

##### c. Relay Output

Vout    3volt(2,000ppm)

Hi(4volt)

##### b. Product code

GSR61-P

**1 2 3**

(1) Division Circuit → 1:standard circuit  
2:Precision grade  
3:Micro-processor

(2) Sensing range → **1 : 3,000ppm**

(3) Connector → Customer

#### 5. Reaction time(T90)

Reaction Time(T90) : Less then 10sec

[ Between Rs,air\_b & Rs,gas ]

Recovering Time(T90) : Less then 30sec

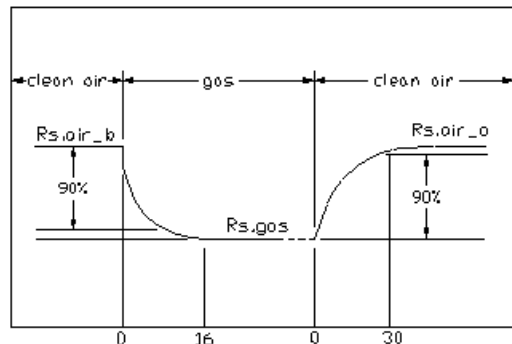
[ between Rs,gas & Rs,air\_a ]

Beginning stability time(T90) : Less then 10 min

Rs,air\_b : Sensor Resistance without gases

Rs,gas : Sensor Resistance after blowing gases

Rs,air\_a : Sensor Resistance removing gases



#### 6. Application

- \* Hood, Ventilator
- \* Damper
- \* Gas Leak Alarm (Explosive gases)

\*

#### summary