VOCs Sensor

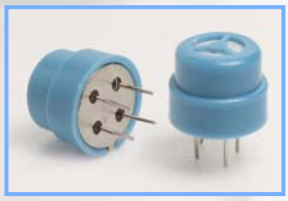
- **for the detection of Formaldehyde Toluene, Organic Solvent**
- **Semi conductor type,**

◑ General
It is applied detection of VOCs gases (toluene, formaldehyde, benzene, ect.)

◑ Application : Ventilator, Air cleaner, Hood.

◑ Operation range
- Working temperature : -10℃ ~ 50℃
- Working humidity : below saturation point
- Storage temperature : -20℃ ~ 80℃

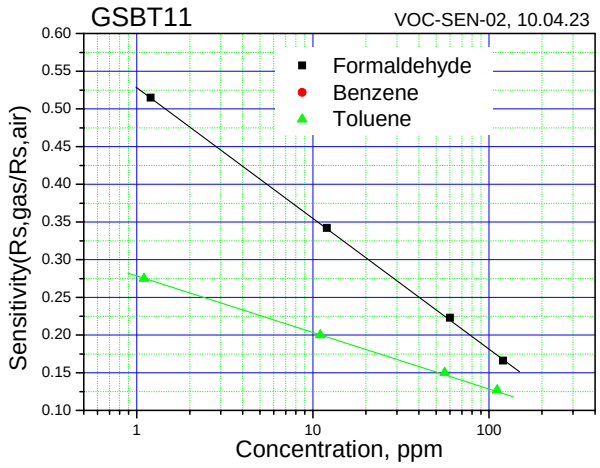

<GSBT11>

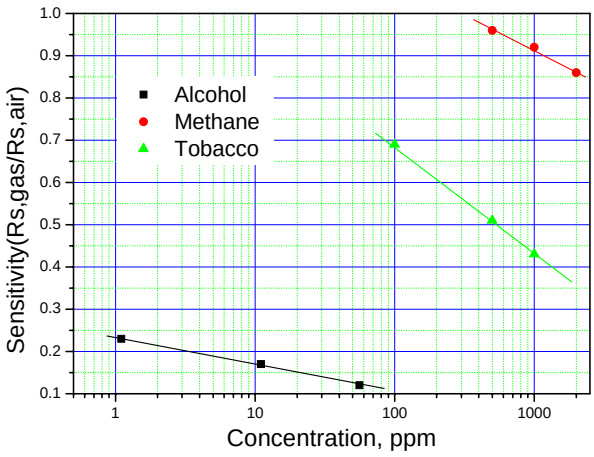

<GSBT12>

◑ Products characteristics

Product code		Characteristics	Output data	Worm-up time, PH
Pac-kage	GSBT11	Wide detection of VOCs gases Application : Air cleaner, Hood	Analogue (1 ~ 5Volt) Basic circuit	5min 350㎽
	GSBT12	Wide detection of VOCs gases Application : Air cleaner, Hood	↑	3min 420㎽
Module	GSBT11 - P1XX	Standard, Op-amp amplifying Relay output : fixed concentration	Analogue (0.5 ~ 5Volt) Relay : Hi(4V), Low(0V)	5min 380㎽
	GSBT12 - P3XX	μ-processor control, Digital output Relay output, Open collect	Digital (RS232, ppm) Relay : Open collect	1min 470㎽

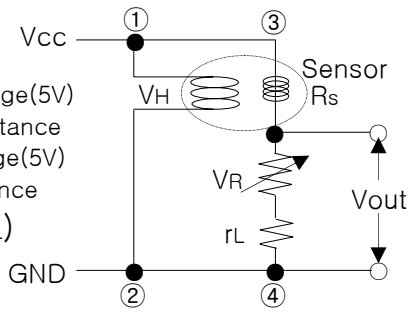
1. Sensitivity Characteristic Slope (β = Rs,gas / Rs,air)

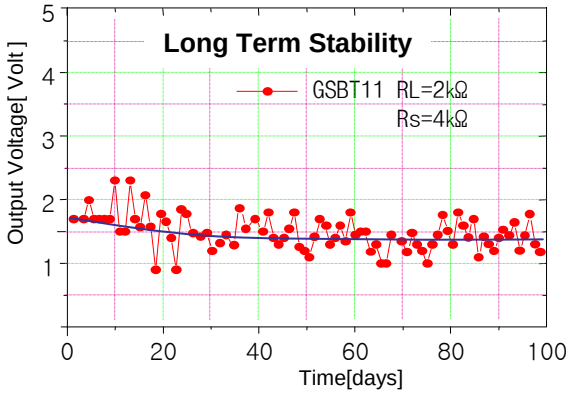




2. Basic Measuring Circuit Stability

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





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3. Specifications

3.1 Package (sensor)

a. Characteristics

Index		Spec. & test condition				
		GSBT11			GSBT12	
Circuit Voltage	Vc	Sensor input Voltage :1~12Volt, Sensor Resistance : refer to Rank table				
	VH	Heater input voltage : 5volt±1% Heater Resistance : 31.0Ω±0.2Ω			Heater input voltage : 5volt±1% Heater Resistance : 27.0Ω±0.2Ω	
	PH	Power consumption : Less than350㎽ Inrush current : Less than 165mA			Power consumption : Less than420㎽ Inrush current : Less than 185mA	
Sensitivity (β)	Gas	* TMA	Acetaldehyde	Alcohol		
	Con.	0.1ppm	1ppm	10ppm		
	β	0.6	0.4	0.17		
Guarantee		- 3years - Calibration interval 1years recommended				
Operating environment		- Temp. : -20 ~ 50℃, Humidity : 5 ~ 90%RH, Non-condensing - Storage → Temp. : -10 ~70℃, Humidity : 0 ~90%RH				
Reaction time (T_{90})		- Reaction Time(T90) : Less then 10sec - Recovering Time(T90) : Less then 30sec				

*TMA :Trimethylamine,
*Sensitivity (β) = Rs,gas / Rs,air
- Rs,gas : output resistance after gas inlet, - Rs,air : output resistance in special air
*T_{90} : 90% of saturation point

b. Sensor Resistance (Only package)

Rank Table(No.:GA-30)

Rank	R_L	Rs (Sensor resistance)	Rank	R_L	Rs (Sensor resistance)	Rank	R_L	Rs (Sensor resistance)
30A	0.30kΩ	1.0~1.5kΩ	30D	1.00kΩ	3.5~5.0kΩ	30G	3.90kΩ	12.5~20.4kΩ
30B	0.43kΩ	1.5~2.2kΩ	30E	1.50kΩ	5.0~7.8kΩ	30H	6.20kΩ	20.4~32.5kΩ
30C	0.68kΩ	2.2~3.5kΩ	30F	2.40kΩ	7.8~12.5kΩ	30I	10.0kΩ	32.5~52.5kΩ

c. Sensor connection

- Be connected to "Basic measuring circuit('2')" after select Sensor resistance (Rs) and R_L (reference '3.1-b')

d. Product code

G S B T 1 ■ - 30■
(1) (2)

- GSBT1 : Original code of VOCs sensor
- 30 : Serial No. of Rank Grade
(1) Sensor characteristics → 1:standard sensor
2:precision grade
(2) Rank No. (Sensor resistance) in special air

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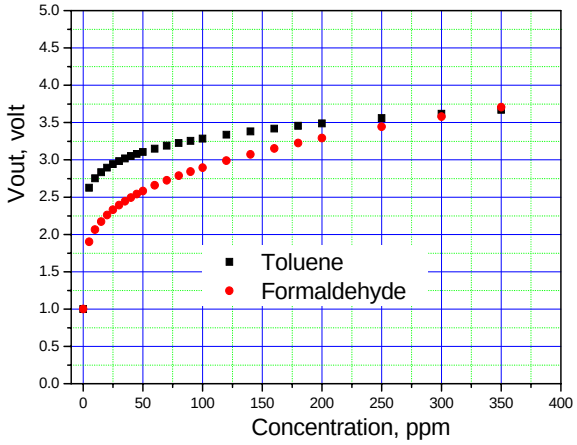
f. Characteristics (Package)

GSBT11

- Error : ±15%
- No compensation of Humidity & temperature

Stand. → RL : 3.9kΩ, Sensor resistance : 15.6kΩ
Vout,air : 1.0volt (input voltage 5volt)



Formaldehyde 100322				**Toluene** 100322			
Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)
0	1.00	70	2.72	0	1.00	70	3.19
5	1.90	80	2.79	5	2.62	80	3.22
10	2.06	90	2.84	10	2.75	90	3.26
15	2.17	100	2.89	15	2.83	100	3.28
20	2.26	120	2.99	20	2.89	120	3.34
25	2.33	140	3.07	25	2.94	140	3.38
30	2.39	160	3.15	30	2.98	160	3.42
35	2.45	180	3.22	35	3.02	180	3.45
40	2.49	200	3.29	40	3.05	200	3.49
45	2.54	250	3.44	45	3.08	250	3.56
50	2.58	300	3.58	50	3.10	300	3.62
60	2.66	350	3.70	60	3.15	350	3.67

** Formulation of **Formaldehyde**

$Log(ppm) = (-0.883) + 0.972 * (Vout)$

$Lpg(ppm) = (-3.665) + 3.009 * (Vout) + (-0.362) * (Vout)^2$

** Formulation of **Toluene**

$Log(ppm) = (-3.672) + 1.717 * (Vout)$

$Log(ppm) = (-9.234) + 5.249 * (Vout) + (-0.557) * (Vout)^2$

GSBT12

Be getting ready

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3.2 Module

a. Characteristics

Index		Spec. & Test condition	
		GSBT11-P1XX	GSBT12-P3XX
Circuit Voltage	Vc	Module input Voltage : 5±0.1Volt	←
	PH	Power consumption : 380㎽ 이하 Inrush current : Less than 195mA	Power consumption : 450㎽ 이하 Inrush current : Less than 215mA
Characteristics of Output data		- Analogue output (refer to 3.1, f.) - Relay output (Special ppm)	- Digital output ppm (Open collect)
Guarantee		- 3years over - Calibration interval 1years recommended	
Operating environment		- Temp. : -10 ~ 50℃, Humidity : 5 ~ 90%RH, Non-condensing - Storage → Temp. : -20 ~70℃, Humidity : 0 ~90%RH	
Reaction time(T90)		- Reaction Time(T90) : Less then 10sec - Recovering Time(T90) : Less then 180sec	

b. Product code

GSET11-P■ ■ ■
1 2 3

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

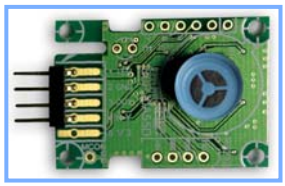
(2) Gas sensing range → **1:50ppm**, Max.: 75ppm
2:200ppm

(3) Connector → 0:None 1:Straight 2:Angle 3:Opposite angle

c. Relay Output

Max. Output range 1ppm : Hi(4.0~4.1volt) output at 1ppm(Toluene)

<GSBT11-P1XX>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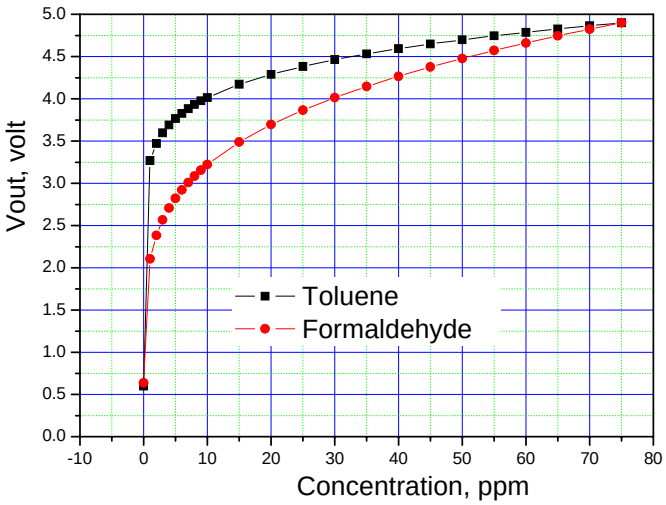
d. Characteristics (Module)

- Error : ±7%
- No compensation of Humidity & temperature

GSBT11-P111



Formaldehyde 100322				Toluene 100322			
Con. (ppm)	output (Volt)	Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)	Con. (ppm)	Output (Volt)
0	0.64	20	3.69	0	0.60	20	4.29
1	2.10	25	3.87	1	3.27	25	4.38
2	2.38	30	4.02	2	3.47	30	4.46
3	2.57	35	4.15	3	3.60	35	4.53
4	2.71	40	4.27	4	3.69	40	4.59
5	2.82	45	4.38	5	3.77	45	4.65
6	2.92	50	4.48	6	3.83	50	4.70
7	3.01	55	4.57	7	3.88	55	4.75
8	3.09	60	4.66	8	3.93	60	4.79
9	3.16	65	4.74	9	3.98	65	4.83
10	3.22	70	4.82	10	4.01	70	4.86
15	3.49	75	4.90	15	4.17	75	4.90

** Formulation of Formaldehyde

$Log(ppm) = (-1.095) + 0.627 * (Vout)$

$Log(ppm) = (-2.631) + 1.528 * (Vout) + (-0.125) * (Vout)^2$

** Formulation of Toluene

$Log(ppm) = (-3.478) + 1.104 * (Vout)$

$Log(ppm) = (-7.071) + 2.852 * (Vout) + (-0.210) * (Vout)^{2.}$

GSBT12-P211 Be getting ready

e. Product code

GSET11-P■ ■ ■

1 2 3

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

(2) Gas sensing range → **1:50ppm**(Toluene), 2:200ppm

(3) Connector → 0:None 1:Straight 2:Angle 3:Opposite angle

f. Relay Output

Max. Output range 1ppm : Hi(4.0~4.1volt) output at 1ppm(Toluene)

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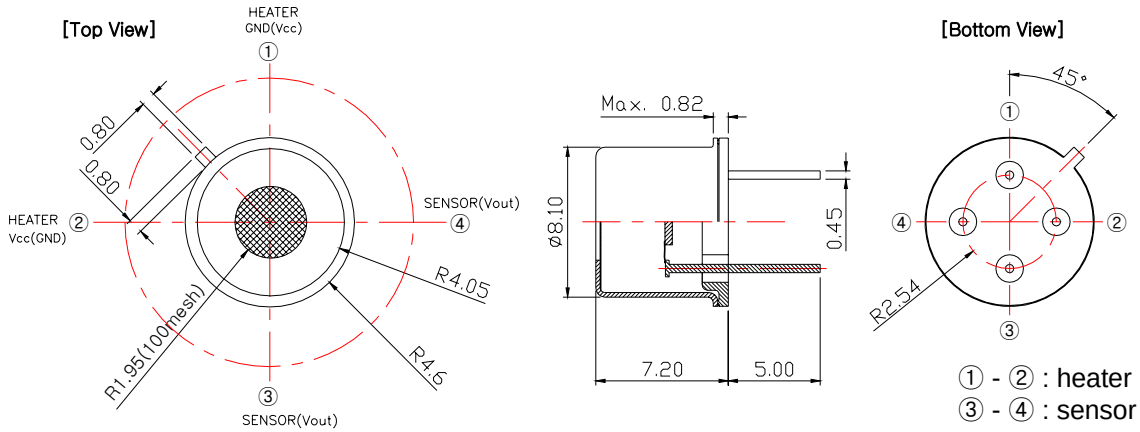
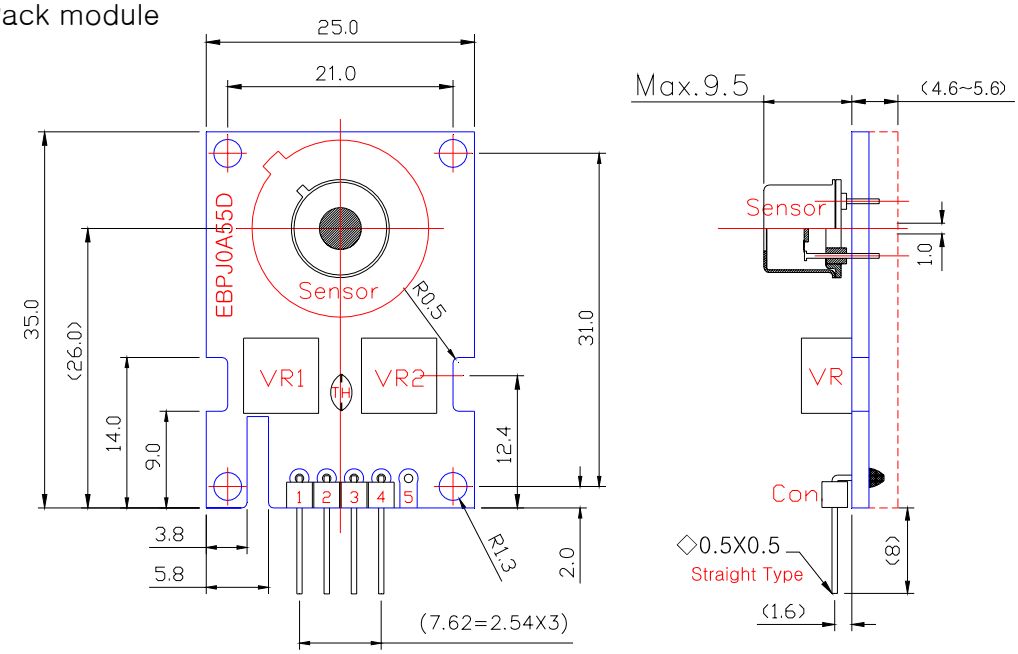
4. Structure and Dimensions

4.1 Package



4.2 Pack module



a. Data output

□ □ □ □
① ② ③ ④

① Vcc : 5.0volt
② GND
③ Data(Vout, analogue signal)
④ Relay

b. Relay Output

Max. output range H2 340ppm : Hi(4.0~4.1volt) output at 70ppm(H2)
: Hi(4.0~4.1volt) output at 480ppm(Smoke)

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