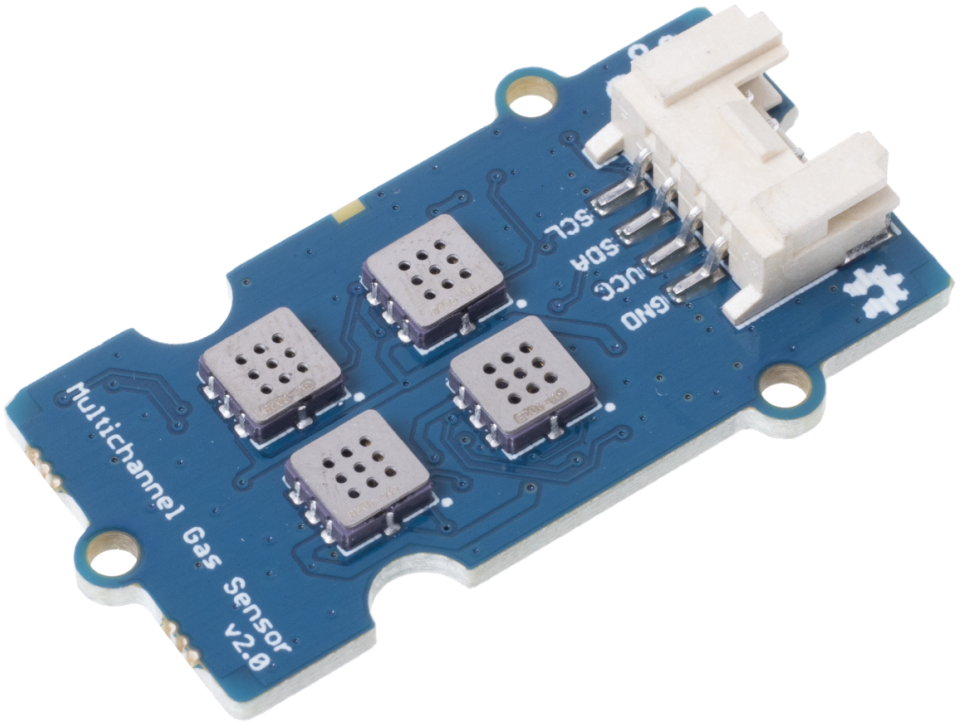
Grove - Gas Sensor V2(Multichannel)



Get One Now

[https://www.seeedstudio.com/Grove-Multichannel-Gas-Sensor-v2-p-4569.html]

Tip
We've released the Seeed Gas Sensor Selection Guide [https://wiki.seeedstudio.com/Sensor_gas/], it will help you choose the gas sensor that best suits your needs.

Grove - Multichannel Gas Sensor V2 has 4 measuring units, each of them is sensitive to various kinds of gases, which means you are able to get four sets of data at the same time. And different sorts of gases can also be judged by these four sets of data. The gas sensor used in this module is based on MEMS technology and has the advantage of being in a small size with considerable measurement stability and is more suitable for qualitative than quantitative measurement.

Features

- Four fully independent sensor elements on one package.
- The ability to detect a variety of gases, besides Carbon monoxide (CO), Nitrogen dioxide (NO2), Ethyl alcohol(C2H5CH), Volatile Organic Compounds (VOC) and etc.
- Qualitative detecting, rather than quantitative.
- Compact size for easy deployment.

Specification

Item	Value
MCU	STM32F030
Interface	Grove I2C
I2C address	0x55
Output voltage	3.3V~5V
Sensors	GM-102B; GM-302B; GM-502B; GM-702B

GM-102B

Type of product	GM-102B
V0(V)	2.5-4.5
V0-VS(V)	≥1.0
Load	Adjustable
Response time（tres，S）	≤30
Recovery Time（trec，S）	≤60
Heating resistance（RH，Ω）	80±20
Operating Voltage（V）	VH=2.0±0.1 AC or DC VC=5.0±0.1DC

GM-302B

Type of product	GM-302B
Standard package	Ceramic package

Type of product			GM-302B
Concentration			1～500ppm
Standard circuit conditions	Loop voltage	VC	≤24V DC
	Heating Voltage	VH	2.5V±0.1V AC or DC
	Load Resistance	RL	Adjustable
Gas sensor characteristics under standard test conditions	Heating resistance	RH	60~100Ω（Room Temperature）
	Heating power consumption	PH	≤50mW
	Sensitive body resistance	RS	1KΩ～30KΩ(in 50ppm Ethanol)
	Sensitivity	S	Rs(in air)/Rs(in 50ppm Ethanol)≥3.0
	Concentration slope	α	≤0.9(R200ppm/R50ppm Ethanol)
Standard test conditions	Temperature/Humidity		20℃±2℃；55%±5%RH
	Standard test circuit		VH:2.5V±0.1V；VC:5.0V±0.1V
	Preheat time		Less than 48hrs

GM-502B

Type of product			GM-502B
Standard package			Ceramic package
Concentration			1～500ppm
Standard circuit conditions	Loop voltage	VC	≤24V DC
	Heating Voltage	VH	2.5V±0.1V AC or DC
	Load Resistance	RL	Adjustable
	Heating resistance	RH	80Ω ± 20Ω（Room tempera

Type of product			GM-502B
Gas sensor characteristics under standard test conditions	Heating power consumption	PH	≤50mW
	Sensitive body resistance	RS	1KΩ ~ 30KΩ (in 50ppm Et
	Sensitivity	S	R0 (in air) / Rs (in 50ppm E ≥3.0
Standard test conditions	Concentration slope	α	≤0.9 (R200ppm / R50ppm E
	Temperature / Humidity		20℃ ± 2℃; 55% ± 5%
	Standard test circuit		VH:2.5V ± 0.1V; VC:5.0V ± 0.1V

GM-702B

Type of product			GM-702B
Standard package			Ceramic package
Concentration			5 ~ 5000ppm(CO)
Standard circuit conditions	Loop voltage	VC	≤24V DC
	Heating Voltage	VH	2.5V±0.1V AC or DC（H Temperature) 0.5V±0.1V AC or DC（L Temperature)
	Load Resistance	RL	60s±1s（H. T)；90s±1s（L
Gas sensor characteristics under standard test conditions	Heating resistance	RH	Adjustable
	Heating power consumption	PH	80Ω±20Ω（Room temperat
	Sensitive body resistance	RS	≤50mW
	Sensitivity	S	1KΩ ~ 30KΩ(in 150ppmC
	Concentration slope	α	R0(in air)/Rs(in 150ppmC(
Standard test conditions	Temperature / Humidity		20℃±2℃；55%±5%RI
	Standard test circuit		VH: 2.5V±0.1V（H. T) 0.5V±0.1V（L. T） VC : 5.0V

Sample test outcomes

Time：2019.06.27

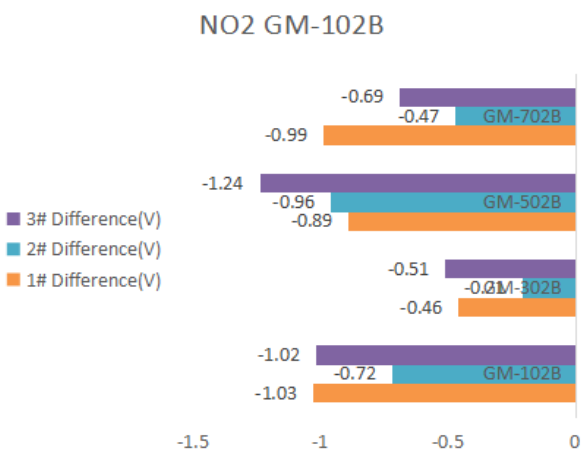
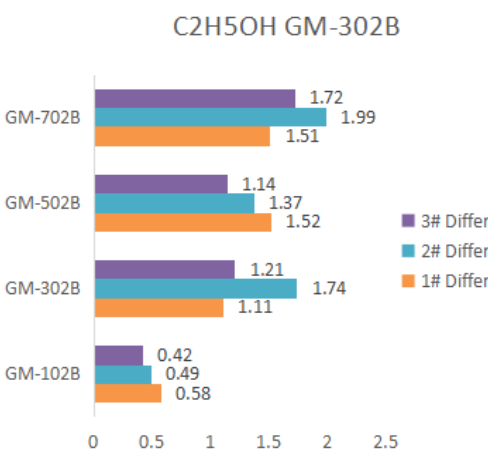
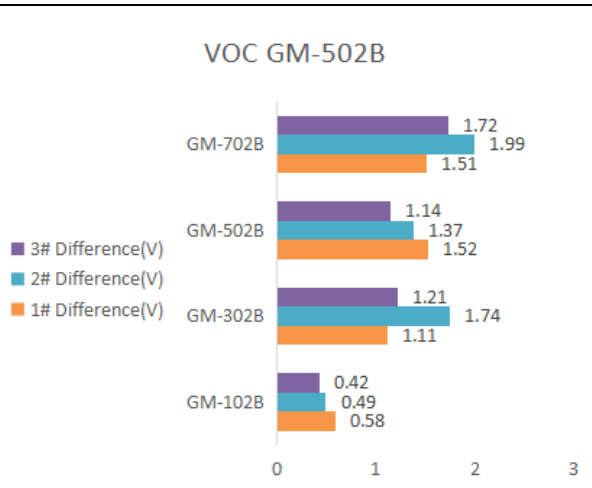
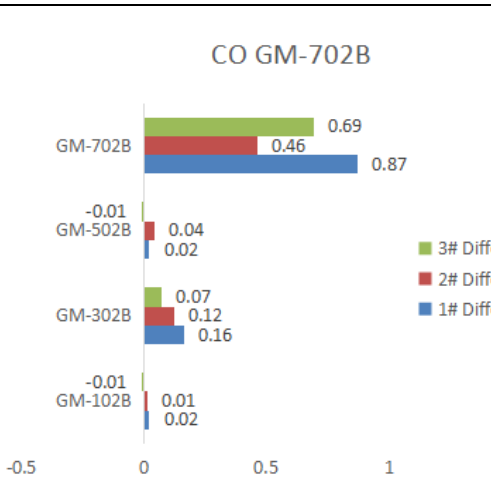
Test conditions：VH=2.5V，VC=3.3V

Type：GM-102B、GM-302B、GM-502B、GM-702B

1#	**Gas：NO2**				**Gas：C2H5OH**			
	Type	Initial value(V)	5ppm(V)	Difference(V)	Type	Initial value(V)	50ppm(V)	Differ
	GM-102B	1.41	0.38	-1.03	GM-102B	1.42	2	0
	GM-302B	0.94	0.48	-0.46	GM-302B	0.95	2.06	1
	GM-502B	1.42	0.53	-0.89	GM-502B	1.41	2.93	1
	GM-702B	1.54	0.55	-0.99	GM-702B	1.35	2.86	1
2#	**Gas：NO2**				**Gas：C2H5OH**			
	Type	Initial value(V)	5ppm(V)	Difference(V)	Type	Initial value(V)	50ppm(V)	Differ
	GM-102B	0.94	0.22	-0.72	GM-102B	0.92	1.41	0
	GM-302B	0.45	0.24	-0.21	GM-302B	0.35	2.09	1
	GM-502B	1.45	0.49	-0.96	GM-502B	1.51	2.88	1
	GM-702B	0.77	0.3	-0.47	GM-702B	0.74	2.73	1
3#	**Gas：NO2**				**Gas：C2H5OH**			
	Type	Initial value(V)	5ppm(V)	Difference(V)	Type	Initial value(V)	50ppm(V)	Differ
	GM-102B	1.29	0.27	-1.02	GM-102B	1.2	1.62	0
	GM-302B	1.12	0.61	-0.51	GM-302B	1.12	2.33	1
	GM-502B	1.82	0.58	-1.24	GM-502B	1.72	2.86	1
	GM-702B	1.06	0.37	-0.69	GM-702B	1.08	2.8	1

1#	**Gas：CO**	

Time: 2019.06.27						
	Type	Initial value(V)	150ppm(V)	Difference(V)	Types of sensors	Gases measu
	GM-102B	1.31	1.33	0.02	GM-102B	NO2
	GM-302B	0.72	0.88	0.16	GM-302B	C2H5OH
	GM-502B	1.33	1.35	0.02	GM-502B	VOC
	GM-702B	1.22	2.09	0.87	GM-702B	CO
2#	**Gas: CO**					
	Type	Initial value(V)	150ppm(V)	Difference(V)		
	GM-102B	0.94	0.95	0.01	**NOTICE: When it comes to judging what t**	
	GM-302B	0.36	0.48	0.12	**is, GM-102B can be taken as an example.**	
	GM-502B	1.46	1.5	0.04	**can be seen from the four charts above a**	
	GM-702B	0.72	1.18	0.46	**beside, GM-102B has participated three ti**	
3#	**Gas: CO**				**each gas detecting. And its number of**	
	Type	Initial value(V)	150ppm(V)	Difference(V)	**differences peaked at the most under the**	
	GM-102B	1.18	1.17	-0.01	**atmosphere of NO2 than other gases. The**	
	GM-302B	1.18	1.25	0.07	**GM-102B is sensible to NO2 and accordir**	
	GM-502B	1.72	1.71	-0.01	**able to detect NO2, which is applicable to**	
	GM-702B	1.01	1.7	0.69	**sensors and sorts of gases as well. Wher**	
					put under other kinds of gases, the senso	
					able to detect the gas which makes it the	
					differences.	

Time: 2019.06.27	
	
	

Characteristic descriptions

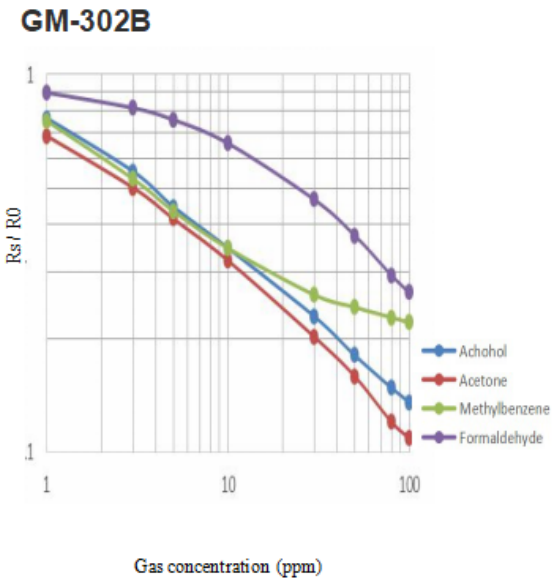


Chart 1 Typical sensitivity characteristic curve of sensor

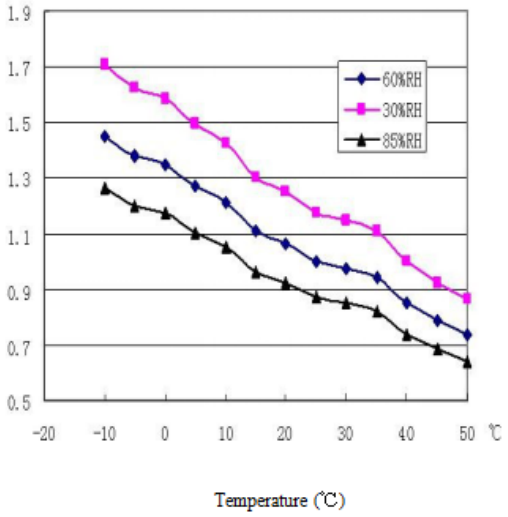


Chart 2 Typical temperature and humidity characteristic curves

Rs in the figure represents the resistance value of the sensorin different concentrations of gas; R0 represents the resistance value of the sensor in clean air. All tests in the picture are completed under standard test conditions. Yellow line is Toluene, blue line is Ethanol, red line is Acetone and purple line is Formaldehyde, which is the same as the ones in charts below.

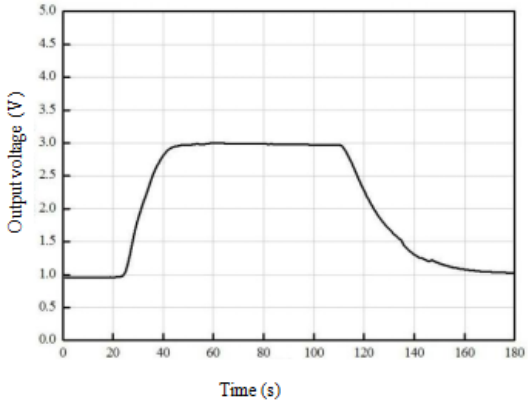


Chart 3 Response recovery curve

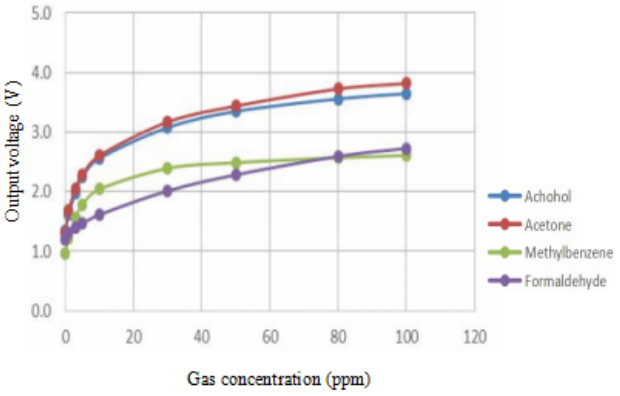


Chart 4 Sensor linear characteristic curve

The output voltage in Chart 3 is the voltage across the load resistance (RL) of the sensor in series. The test in the figure is completed under standard test conditions, with a test gas of 50 ppm ethanol. The output voltage in Chart 4 is the voltage across the load resistance (RL) of the sensor in series. All tests in the figure are completed under standard test conditions.

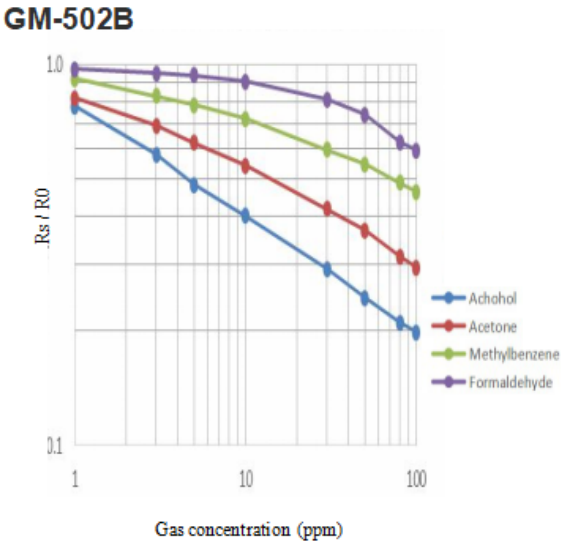


Chart 5 Typical sensitivity characteristic curve of sensor

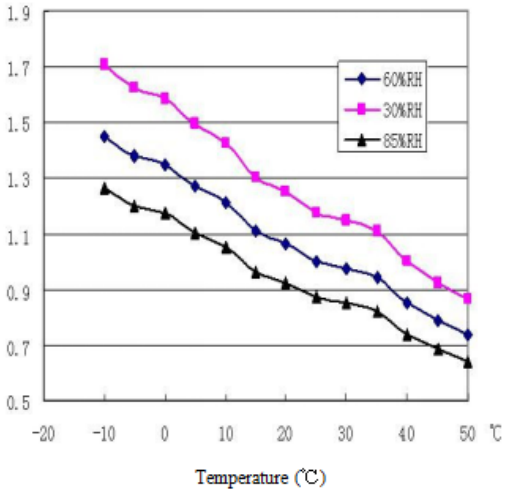


Chart 6 Typical temperature and humidity characteristic curves

Rs in Chart 5 represents the resistance value of the sensorin different concentrations of gas; R0 represents the resistance value of the sensor in clean air. All tests in the picture are completed under standard test conditions. Yellow line is Toluene, blue line is Ethanol, red line is Acetone and purple line is Formaldehyde, which is the same as the ones in charts below. In Chart 6, Rs represents the resistance value under 50ppm ethanol and various temperatures / humidities; Rs0 represents the resistance value under 50ppm ethanol, 20 ℃ and 55% RH.

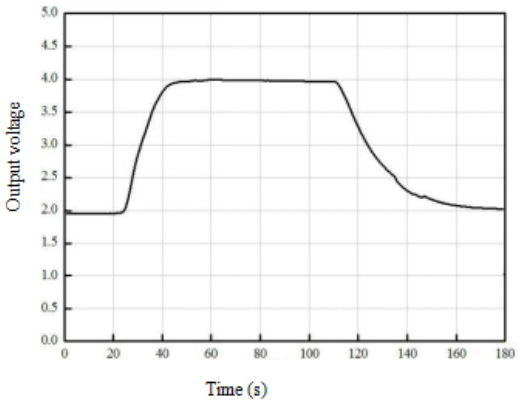


Chart 7 Response recovery curve

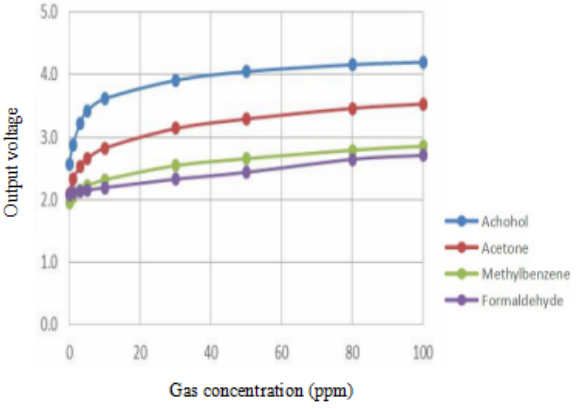


Chart 8 Sensor linear characteristic curve

The output voltage in Chart 7 is the voltage across the load resistance (RL) of the sensor in series. The test in the figure is completed under standard test conditions, with a test gas of 50 ppm ethanol. The output voltage in Chart 8 is the voltage across the load resistance (RL) of the sensor in series. All tests in the figure are completed under standard test conditions.

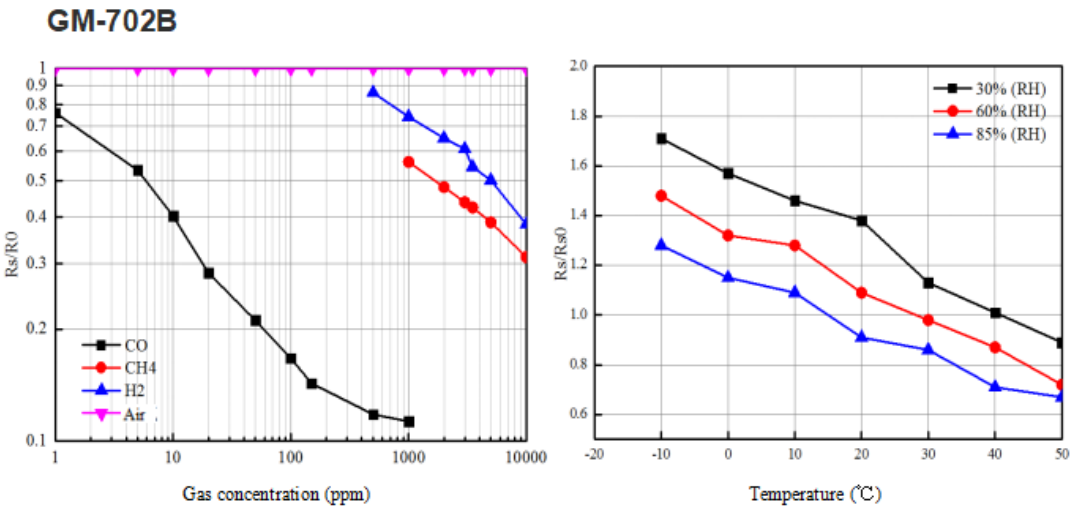


Chart 9 Typical sensitivity characteristic curve of sensor

Chart 10 Typical temperature and humidity characteristic curves

In Chart 9, Rs represents the resistance of the sensor in different concentrations of gas Value; R0 represents the resistance value of the sensor in clean air. All tests in the picture are completed under standard test conditions. The black line is for CO, red one is CH4, Purple is for H2 and pink one is Air.In Chart 10 , Rs represents the temperature at 150ppmCO and various temperatures / humidities. Resistance value; Rs0 means resistance value under 150ppmCO, 20 ℃, 55% RH.

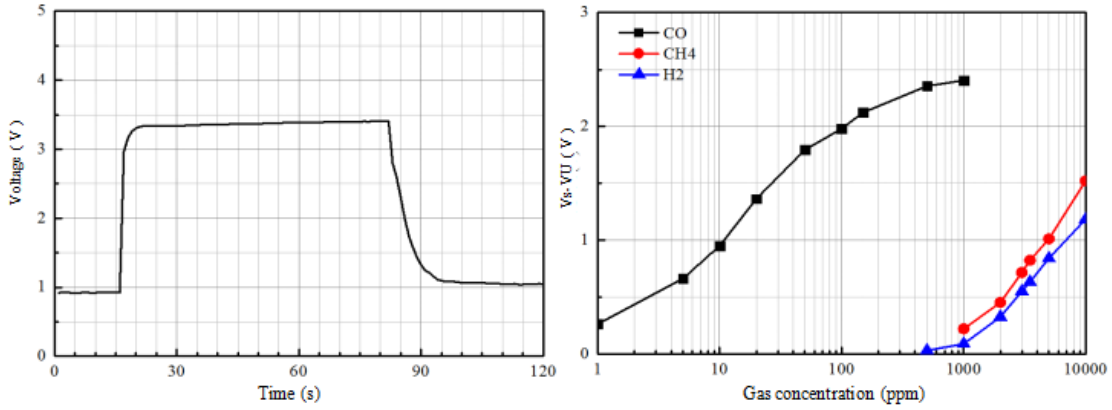


Chart 11 Response recovery curve

Chart 12 Sensor linear characteristic curve

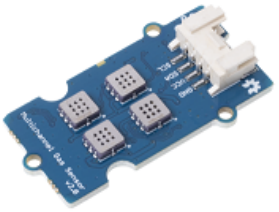
The voltage in Chart 11 is the voltage across the load resistance (RL) of the sensor in series. The test in the picture is completed under standard test conditions, test gas 150ppmCO. The output voltage in Chart 12 is the voltage across the load resistance (RL) of the sensor in series. All tests in the picture are completed under standard test conditions.

Platform Supported

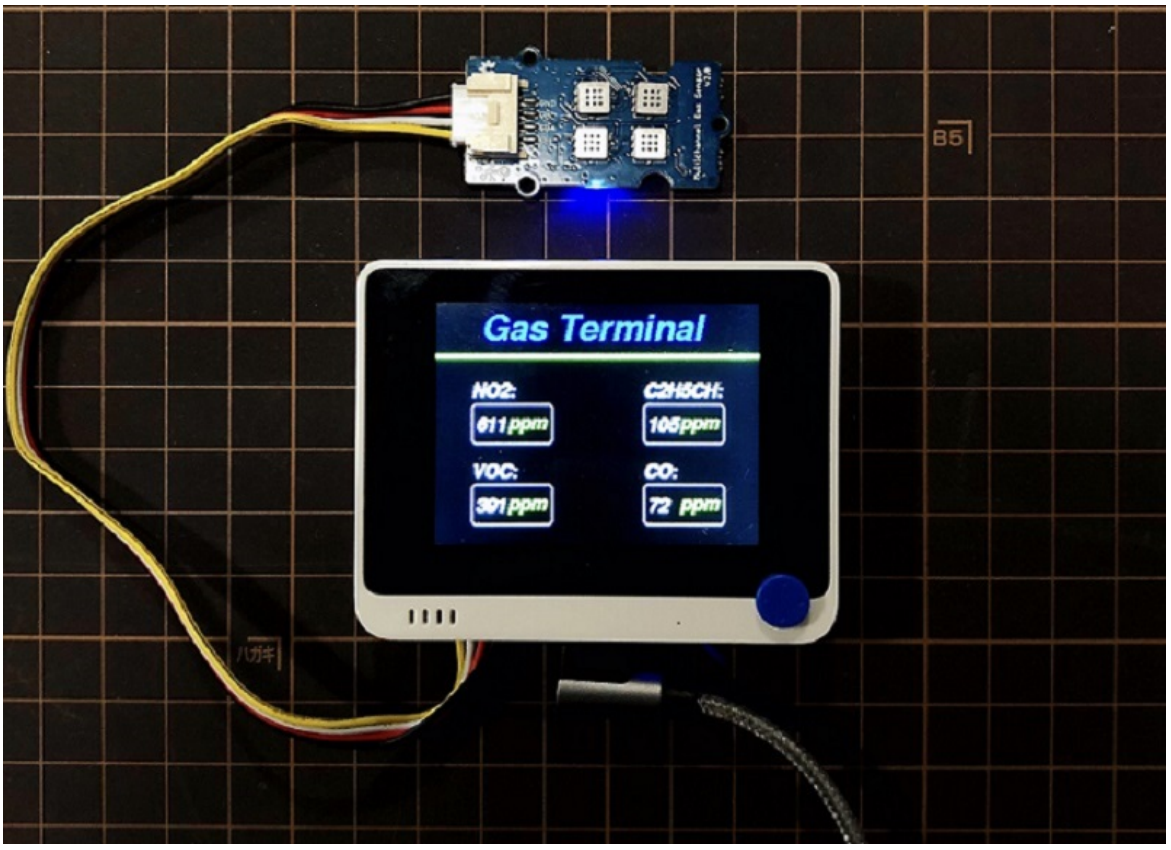
Arduino	Raspberry Pi	

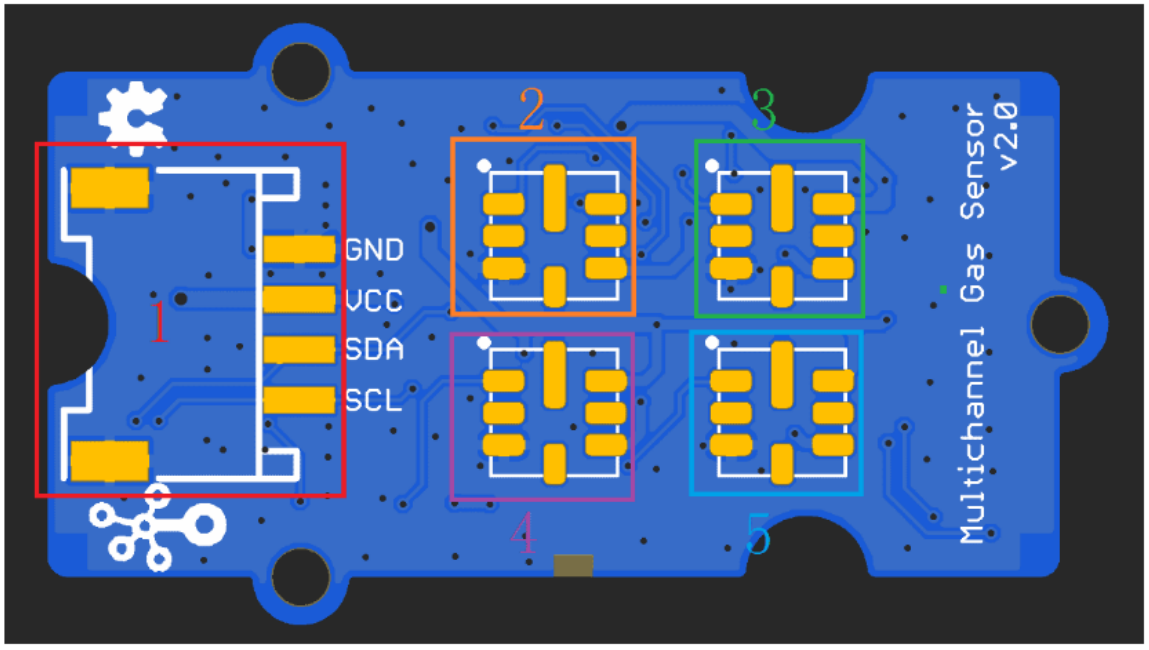
Getting Started

Materials Requied

Wio Terminal	Grove-Multichannel Gas Sensor V2
	
Get ONE Now [https://www.seeedstudio.com/Wio-Terminal-p-4509.html]	Get ONE Now [https://www.seeedstudio.com/Grove-Multichannel-Gas-Sensor-v2-p-4569.html]

Hardware Overview





1、Grove interface

2、GM102B NO2 sensor

3、GM302B C2H5CH sensor

4、GM502B VOC sensor

5、GM702B CO sensor

Notice

> The module in the image of Hardware Connection has the same arrangement as the one in the image of Hardware Diagram above. As you can see in the Hardware Diagram, the outlined area in the left is the Grove Interface. And there are four squares with tiny holes refer to the gas sensors. When the board with sensors is connected with Wio Terminal, the information of the gases will display on the screen.

- **Step 1.** Connect Grove - Multichannel Gas Sensor V2 to port I2C of Grove-Base Shield. Plug Grove - Base Shield into Wio Terminal. And connect Wio Terminal to PC via a USB cable.
- **Step 2.** Download the Grove_Multichannel_Gas_Sensor_v2 Library [https://github.com/Seeed-Studio/Seeed_Multichannel_Gas_Sensor/archive/master.zip] from Github. And refer How to install library [https://wiki.seeedstudio.com/How_to_install_Arduino_Library] to install library for Arduino.
- **Step 3.** Copy the code into Wio Terminal and upload. If you do not know how to upload the code, please check how to upload code [https://wiki.seeedstudio.com/Wio-Terminal-Getting-Started/].
- **Step 4.** Refer How to TFT LCD Library [https://wiki.seeedstudio.com/Wio-Terminal-LCD-Overview/] to install TFT LCD Library. Lastly, upload code from the Software Code below and the data has to be displayed successfully.

Software Code

```
#include <TFT_eSPI.h>
#include <Multichannel_Gas_GMXXX.h>
#include <Wire.h>
GAS_GMXXX<TwoWire> gas;

TFT_eSPI tft;
// Stock font and GFXFF reference handle
TFT_eSprite spr = TFT_eSprite(&tft);  // Sprite

void setup() {
  // put your setup code here, to run once:
  tft.begin();
  tft.setRotation(3);
  spr.createSprite(tft.width(),tft.height());
  gas.begin(Wire, 0x08); // use the hardware I2C
}

void loop() {
  // put your main code here, to run repeatedly:
  int val;
  spr.fillSprite(TFT_BLACK);
  spr.setFreeFont(&FreeSansBoldOblique18pt7b);
  spr.setTextColor(TFT_BLUE);
  spr.drawString("Gas Terminal", 60 - 15, 10 , 1);// Print the test text in the custom font
  for(int8_t line_index = 0;line_index < 5 ; line_index++)
  {
    spr.drawLine(0, 50 + line_index, tft.width(), 50 + line_index, TFT_GREEN);
  }

  spr.setFreeFont(&FreeSansBoldOblique9pt7b);                // Select the font
  // GM102B NO2 sensor
  val = gas.getGM102B();
  if (val > 999) val = 999;
  spr.setTextColor(TFT_WHITE);
  spr.drawString("NO2:", 60 - 24, 100 -24 , 1);// Print the test text in the custom font
  spr.drawRoundRect(60 - 24,100,80,40,5,TFT_WHITE);
  spr.setTextColor(TFT_WHITE);
```

```
    spr.drawNumber(val,60 - 20,100+10,1);
    spr.setTextColor(TFT_GREEN);
    spr.drawString("ppm", 60 + 12, 100+8, 1);
    // GM302B C2H5CH sensor
    val = gas.getGM302B();
    if (val > 999) val = 999;
    spr.setTextColor(TFT_WHITE);
    spr.drawString("C2H5CH:", 230 -24 , 100 - 24 , 1);// Print the test text in the custom fc
    spr.drawRoundRect(230 - 24,100,80,40,5,TFT_WHITE);
    spr.setTextColor(TFT_WHITE);
    spr.drawNumber(val,230 - 20,100+10,1);
    spr.setTextColor(TFT_GREEN);
    spr.drawString("ppm", 230 + 12, 100+8, 1);
    // GM502B VOC sensor
    val = gas.getGM502B();
    if (val > 999) val = 999;
    spr.setTextColor(TFT_WHITE);
    spr.drawString("VOC:", 60 - 24, 180 -24 , 1);// Print the test text in the custom font
    spr.drawRoundRect(60 - 24,180,80,40,5,TFT_WHITE);
    spr.setTextColor(TFT_WHITE);
    spr.drawNumber(val,60 - 20,180+10,1);
    spr.setTextColor(TFT_GREEN);
    spr.drawString("ppm", 60 + 12, 180+8, 1);
    // GM702B CO sensor
    val = gas.getGM702B();
    if (val > 999) val = 999;
    spr.setTextColor(TFT_WHITE);
    spr.drawString("CO:", 230 -24 , 180 - 24, 1);// Print the test text in the custom font
    spr.drawRoundRect(230 - 24 ,180,80,40,5,TFT_WHITE);
    spr.setTextColor(TFT_WHITE);
    spr.drawNumber(val ,230 - 20 ,180+10,1);
    spr.setTextColor(TFT_GREEN);
    spr.drawString("ppm", 230 + 12, 180+8, 1);

    spr.pushSprite(0, 0);
    delay(100);

}
```

Cautions

- The module should avoid being placed in the volatile silicon compound steam, or it will cause the sensitivity to be reduced and irrecoverable.
- The module should avoid being exposured to high concentrations of corrosive gases (such as H2S, SOX, Cl2, HCl, etc.), otherwise it will be irreversibly damaged.
- The module should not be placed in water or ice.
- After the module is powered on, the sensor will heat up to a certain degree during the process, which is a normal phenomena.
- Users MUST preheat the module before starting measuring gases.

Schematic Online Viewer

Resources

- **[Zip]** Grove_Multichannel_Gas_Sensor_v2 Library [https://github.com/Seeed-Studio/Seeed_Multichannel_Gas_Sensor/archive/master.zip]
- **[PDF]** GM-102B Technical Parameter.pdf [https://files.seeedstudio.com/wiki/Grove-Multichannel_Gas_Sensor/img/Grove-Multichannel_Gas_Sensor_V2_101020820/res/GM-102B+Technical+Parameter.pdf]
- **[PDF]** GM-302B MEMS Technical Parameterv2.1.pdf [https://files.seeedstudio.com/wiki/Grove-Multichannel_Gas_Sensor/img/Grove-Multichannel_Gas_Sensor_V2_101020820/res/GM-302B+MEMS+Technical+Parameterv2.1.pdf]
- **[PDF]** GM-502B MEMS VOC Technical Parameter v2.1.pdf [https://files.seeedstudio.com/wiki/Grove-Multichannel_Gas_Sensor/img/Grove-Multichannel_Gas_Sensor_V2_101020820/res/GM-502B+MEMS+VOC+Technical+Parameter+v2.1.pdf]
- **[PDF]** GM-702B Technical Parameter(Ver1.1).pdf [https://files.seeedstudio.com/wiki/Grove-Multichannel_Gas_Sensor/img/Grove-Multichannel_Gas_Sensor_V2_101020820/res/GM-702B+Technical+Parameter(Ver1.1).pdf]

Tech Support

Please submit any technical issue into our forum [https://forum.seeedstudio.com/].

[https://www.seeedstudio.com/act-4.html?utm_source=wiki&utm_medium=wikibanner&utm_campaign=newproducts]