AGSM-NO_2-5

(Allsensing gas sensor module)

Homepage: https://www.allsensing.com/ wiki: http://docs.k-allsensing.com/agsm:agsm_no2

Summary

AGSM can be easily applied to devices linked to the Internet of Things (IoT) and provides an easy way to monitor sensor values and environmental changes.

- AGSM completes gas calibration and transmits the sensor concentration value (PPB) data using UART communication.
- It is not suitable for applications requiring fast response time (T90<30sec) and is designed to be suitable for monitoring environmental changes for a long time.
- At least 30 minutes to 1 hour or more of sensor stabilization time is required.
- Applied to temperature compensation and gas sensor calibration algorithm.
- It can check the sensor signal value (raw data) output from the sensor driving circuit.
- AGSM product can be applied by interworking with Arduino and compatible products.
- It can be easily integrated into wireless gas detector, portable and network solutions that require small size, light weight, high performance and low power.
- AGSM is supplied with individual gas sensors for CO, H_2S, SO_2, NO_2 and O_3.
- Sensor Calibration
  - If the user has calibration gas and test environment, Zero calibration and Span Calibration can be performed using communication commands.
  - It is recommended to perform Span Calibration of the gas sensor every 6 months.
  - AGSM products are calibrated by using a small chamber of 400mL.

Product specification and connection method

1) Module Specifications

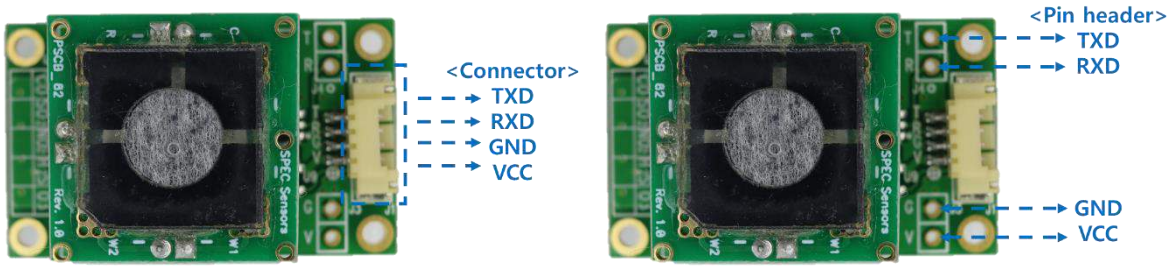
Performance Characteristics	
Detection Gas	NO_2(Nitrogen Dioxide)
Operating Principle	Solid electrolyte electrochemical formula (3-electorde)
Measurement Range	0~5PPM
Low Detection Limit	0.1PPM (100PPB)
Resolution	0.001PPM (1PPB)
Accuracy	<5% @ Full Range
T90 response time	<150 sec
Communication output	UART (TTL 3.3V, 5.0V) 3.3VDC Power input: 3.3V TTL Level 5.0VDC Power input: 5.0V TTL Level
Expected Operating Life	> 5 years (10 years @ 25± 10C; 60 ± 30% RH)
Electrical Characteristic	
Operating Input Voltage Range	DC 3.3V ~ 5.0V
Operating Current and Power Consumption	(1 Sec period data transmission/reception power consumption) LED ON - Average: 1.13mA at 3.3VDC (3.7mW) - Max 1.17mA at 3.3VDC LED OFF - Average: 0.38mA at 3.3VDC (1.3mW) - Max 0.47mA at 3.3VDC
Dimension	Size: L X W X H (35 x 21.1 mm x 11.8mm), Height: 11.8mm (Sensor socket applied, standard product), 8mm (Sensor socket not applied, user request)
Environmental	
Operating Temperature	-20 to 40 °C
Operating Humidity Range	15 to 95%

Based on Standard Conditions	25 ºC, 50% RH and 1 atm

Connect the product

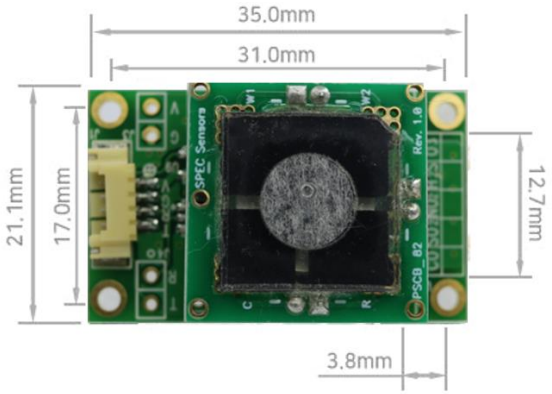
1) Pin Connection

- Connector(default): Molex 53261, Yeonho 12505WR
- Pin header(option): 2.54 pitch (V:VCC, G:GND, R: RXD, T: TXD)



2) Dimension

- Size: L X W (35 x 21.1 mm)
- Height: 11.8mm (Sensor socket applied, standard product), 8mm (Sensor socket not applied, user request)
- 2mm instrument hall: 4ea



Size: L X W (35 x 21.1 mm)

Communication Protocol

1) Basic setting

- TTL level: DC 3.3 V or 5.0V
- Baud: 9600
- Data bits: 8
- Stop bits: 1
- Parity: None
- Flow Control: None

2) Communication command

Command	Function
\r, <CR>	Once Data output Output: SN [XXXXXXXXXXXX], PPB [0 : 999999], TEMP [-99 : 99], RH [0 : 99], ADC[ADCCount], TempDigital, RHDigital
C\r **c\r**	CONTINUOUS data output It is initialized after restarting and the state level is not stored in the internal memory
Z	Zero user calibration Calibrate by recalculating the sensor value so that the sensor output is 0PPM
B	Barcode entry Enter the barcode information recorded on the sensor
S	Span user calibration Calibration by injecting calibration gas to recalculate the measurement sensitivity of the sensor (based on PPM)
E	Internal memory readout Check the setting information value stored inside the module
D\r	LED ON/OFF Status information is not stored in the internal memory
r\r	System reset

3) Communication command example

'\r'
081821011255, 212, 23, 18, 2194921, 23490, 18665

'C\r'
'c\r'
081821011255, 212, 23, 18, 2194921, 23490, 18665

'S'
Enter span gas value in PPM: xxx.xx\r(Enter span gas value in PPM: 4.50\r)
Setting span...
done

'Z'
Setting zero...
done

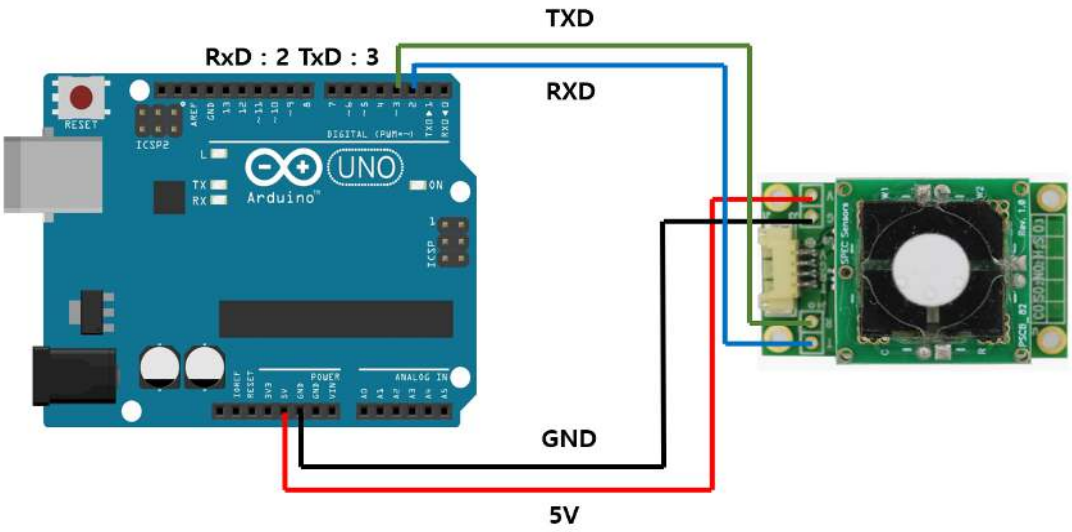
'B'
Remove Sensor and Scan:
Setting OC...done

'e'
Serial Number= 112020010530
Barcode= 081821011255 110507 NO2 2108 -28.57
ADC Zero= 2165186
ADC_SpanCalValue= 1890818
Temperature Zero(x1000)= 24366
Humidity Zero(x1000)= 16797
Temperature Span(x1000)= 24205
Humidity Span(x1000)= 17139
Calibration GAS(x100)(ppm)= 250
Calibration InA(x100)= -2857
Max Range(ppm)= 5
NoneSensorADC Zero= 2165186
Firmware Version= 2022-03-23B-04"

'r\r'
reset

'D\r'
LED OFF
LED ON

Arduino connection method and example code




```
#define ContinueMode    disable
#define PollingMode    enable

#include<SoftwareSerial.h>
const int rxPin = 2;
const int txPin = 3;
SoftwareSerial Serial1(rxPin, txPin);

void setup()
{
   Serial.begin(9600);
   Serial1.begin(9600);
   delay(1000);

   #if ContinueMode
     Serial.println("Continuous Mode");
   #else if PollingMode
     Serial.println("Polling Mode");
   #endif

   Serial.println("Serial, Conc.(PPB), Temp.(C), Rh(%), Adc.(Counts), Temp.(Counts),
Rh(%Counts)");
```

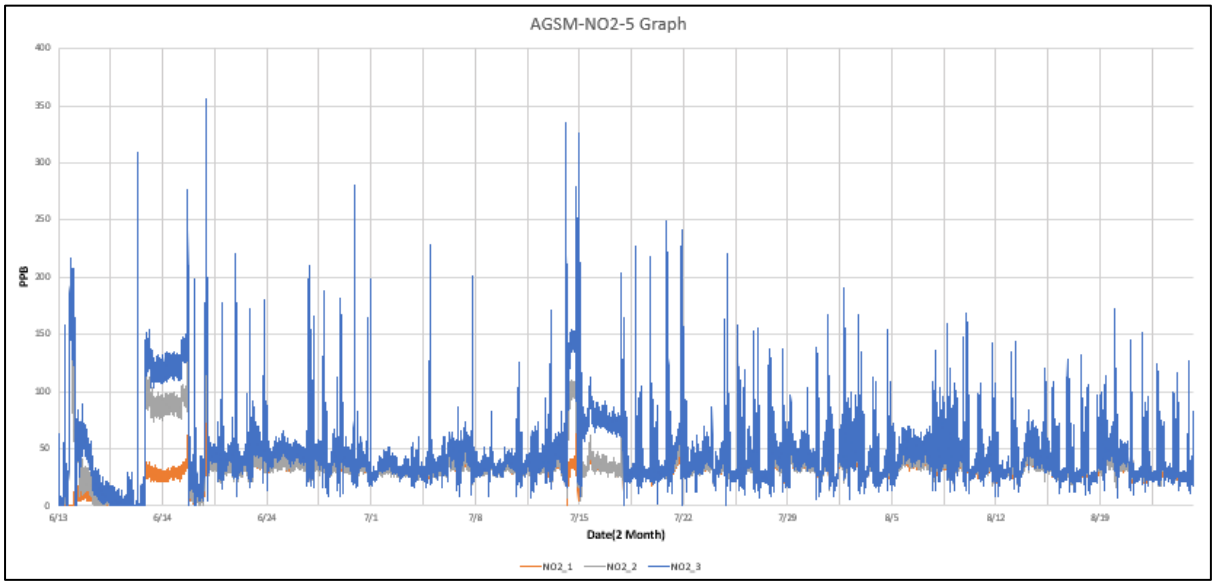
```
    #if ContinueMode
        Serial1.write('c');
        Serial1.write('\r');
    #endif
}

void loop()
{
    #if PollingMode
        Serial1.write('\r');
        delay(1000);
    #else
        delay(100);
    #endif
      while (Serial1.available()) // read from AGSM port, send to Serial port to interrupt continuous
output send 'c''/r' without line ending, may have to send more than once.
    {
      int inByte = Serial1.read();
      Serial.write(inByte);
    }
}
```

AGSM-NO_2-5 Long Term Graph

This is a graph accumulated for about two months to understand the trend of the AGSM-NO_2-5 Sensor.

* The sensor under test is placed in Allsensing Co., Ltd Lab.

Lab Average Temp, Humi: 28℃, 48%



Precautions for use

- Please use it within the specified specifications and be careful with the connection.
- Using in the vicinity of excessive chemicals may damage the sensor.
- If left unattended at high humidity for a long time, there is a possibility of sensor malfunction.
- Soldering with the sensor installed may damage the sensor.
- If a certain amount of shock occurs, malfunction may occur for a short time.

  * Failure to follow these instructions may results in product damage.

  * For safety reasons, it is recommended to use it as an auxiliary device or a supplementary device.

Manufacturer / Contact (A/S)

- Homepage: https://www.allsensing.com/
- E-MAIL: support@allsensing.com

Docs revision history

버전	Changes Contents
V1.0	Drafting (2022.03.11)
V1.1	Fixing typos and add Arduino connection method and code (2022.04.28)
V1.2	Fixing typos and added AGSM-NO_2-5 Long Term graph (2022.09.29)