TX110-ACombustible Gas Detection Module (Model:TX110-A)

Manual V1.7

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Taiyuan Tengxing sensor technology Co., Ltd

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TX110-A Combustible Gas Detection Module

Profile

TX110-A adopts plat surfaced semiconductor sensor and it has basic functions of household gas leak alarm: status indicator, buzzer, relay, output signal of electromagnetic valve; it also supplying resetting for alarm point. This module can be used for complete device development of household gas leak alarm.

Feature

1. Small Size; 2. Fast Response; 3. UART output

Application:

For complete device development of household gas leak alarm.

Parameters stable1.

Model	TX110-A
Detection Gas	Natural gas
Type of sensor	Flat surfaced semiconductor type
Response time	< 30s
Resume time	< 30s
Working Voltage	DC (3~5) V
Working Current	< 80mA
UART output range	0~5000ppm
Resolution	50ppm
Accuracy	±3％LEL (20℃±2℃; 55%±5%RH)
Expected Lifespan	5 years
Working Conditions	Temperature: -10~55℃
	Humidity:20~90%RH
Storage Conditions	Temperature: -20~60℃
	Humidity:20%~65%RH
Dimension	25×21.1×15mm(L×W×H)

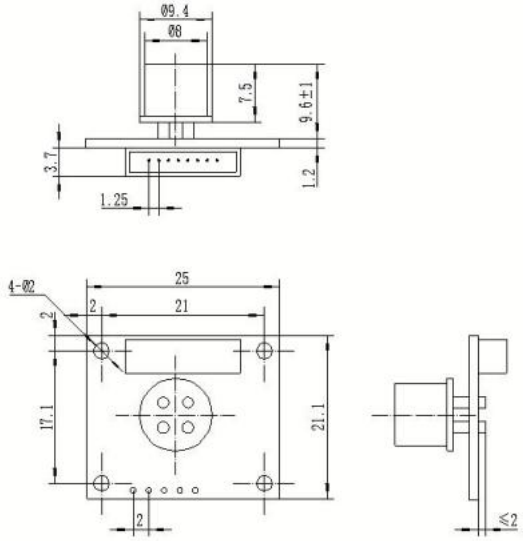


Fig1. Module structure

Pin Function Description

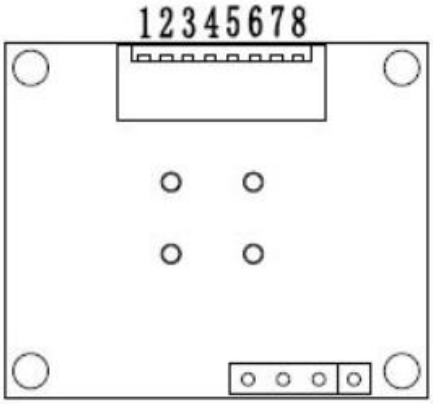


Fig2. T X 1 1 0 - A **Pins from bottom view**

Pin No.	Function	Functional description
Pin1	Vin	Power supply for the module
Pin2	GND	Direct current supply
Pin3	--	NC
Pin4	UART(RXD)	UART(RXD) Data Receiver
Pin5	UART(TXD)	UART(TXD) Data Transmitter
Pin6	Electric magnetic valve drive	1) Normal working status: persistent low level 2) Malfunction status: persistent low level 3) Alarm status: persistent high level
Pin7	Buzzer drive	1)Normal working status: high level for 120ms when power on, then persistent low level 2) Malfunction status: high level for 120ms every other 4s 3)Alarm status: pulse signal of high level for 120ms and low level for 60ms
Pin8	Status indicator	1)Normal working status: persistent high level 2) Malfunction status: persistent low level 3)Alarm status: pulse signal of high level for 1.25s and low level for 1.25s

Communication Protocol

1. General Settings

Table 3

Baud Rate	9600
Data Byte	8
Stop Byte	1
Check Byte	Null

2. Communication Commands

There are two kinds of communication, initiative upload mode and question & answer mode. Under initiative upload mode, modules upload gas concentration value every other 0.5S.

Note: The module will automatically switch to Q&A mode(question & answer mode) after an inquiry command is received; The module will automatically switch to initiative upload mode if no inquiry command is received within 15 seconds under Q&A mode.

Table 4 Data format under initiative upload mode

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Gas Name	Unit ppm	No. of decimal	Concentration (High Byte)	Concentration (Low Byte)	Full Range (High Byte)	Full Range (Low Byte)	Check sum
0xFF	0x01	0x03	0x00	0x00	0x00	0x13	0x88	0x61

Gas name: 0x01 is for CH4, while Unit ppm: 0x03 is for ppm.

Concentration(High Byte): The highest bit(bit 8) is for sensor fault judgment; bit 7 is for sensor concentration judgment.

Note: sensor fault judgment: 1 is for sensor failure, 0 is for no failure.

Sensor concentration judgment: 1 is for concentration over alarm-point, 0 is for under alarm-point.

Gas concentration value = The low 6 bit of High Byte*256+Low Byte.

Full range= full range (high byte)*256+ full range(low byte) (0x1388=5000ppm, which means the max UART output is 5000ppm)

To read gas concentration, command line format as follow: **Stable5.**

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	command	Reserved	Reserved	Reserved	Reserved	Reserved	Check sum
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	0x79

Sensor's return value under Q&A mode: **Stable6**

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	command	Concentration (High Byte)ppm	Concentration (Low Byte)ppm	Reserved	Reserved	Concentration (High Byte)ppm	Concentration (Low Byte)ppm	Check sum
0xFF	0x86	0x00	0x00	0x00	0x00	0x00	0x00	0x7A

Concentration(High Byte): The highest bit(bit 8) is for sensor fault judgment;
sensor fault judgment: 1 is for sensor failure, 0 is for no failure

Gas concentration value = The low 6 bit of High Byte*256+Low Byte.

3. Check sum and calculation

```
unsigned char FucCheckSum(unsigned char *i,unsigned char ln)
{
    unsigned char j,tempq=0;
    i+=1;
    for(j=0;j<(ln-2);j++)
    {
        tempq+=*i;
        i++;
    }
    tempq=(~tempq)+1;
    return(tempq);
 }
```

Construction for working status:

Preheating status: indicator flashes slowly after powering on, it becomes be off for long in 3 min.

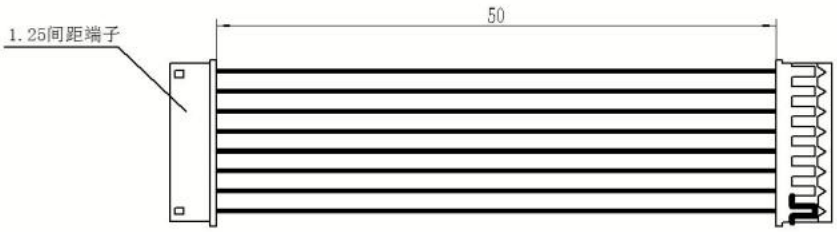
Malfunction status: when the sensor malfunctions, green indicator will start the cycle of 75ms on and 175ms off .

Alarm status: when the target gas's concentration reaches the alarm point, green indicator will start the cycle of 25ms lighting and 75ms off.

Installation instruction

This module connects with external part by adopting Pin1.25mm*8 single-row inserting pin, there are four holes with 2mm diameters at the four corners, users fix the module through locations holes and make connection through Pin1.25mm*8

wire.



Cautions

1 .Following conditions must be prohibited

1.1 Exposed to organic silicon steam

Module will lose sensitivity and never recover if it absorbs organic silicon steam.

Module must avoid exposing to silicon bond, fixature, silicon latex, putty or plastic contain silicon environment.

1.2 High Corrosive gas

If the sensors are exposed to high concentration corrosive gas (such as H2S, SOX, Cl2, HCl etc.), it will not only result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

1.3 Touch water

Sensitivity of the sensors will be reduced when spattered or dipped in water.

1.4 Freezing

Do avoid icing on sensor's surface, otherwise sensing material will be broken and lost sensitivity.

2 .Following conditions must be avoided

2.1 Water Condensation

Indoor conditions, slight water condensation will influence sensors' performance lightly. However, if water condensation on sensing material surface and keep a certain period, sensors' sensitive will decrease.

2.2 Used in target gas with high concentration

No matter the sensor is electrified or not, if it is placed in high gas concentration for long time, sensors characteristic will be affected. If lighter gas sprays the sensor, it will cause extremely damage.

2.3 Long time storage

The sensors resistance will drift reversibly if the module is stored for long time

without electrify, this drift is related with storage conditions. Modules should be stored in airproof bag without volatile silicon compound. For the modules with long time storage but no electrify, they need long galvanical aging time for stability before using. The suggested aging time as follow:

Stable3.

Storage Time	Suggested aging time
Less than one month	No less than 48 hours
1 ~ 6 months	No less than 72 hours
More than six months	No less than 168 hours

2.4 Long time exposed to adverse environment

No matter the modules electrified or not, if exposed to adverse environment for long time, such as high humidity, high temperature, or high pollution etc., it will influence the module's performance badly.

3. Please make sure the three anti-paint on the control board is completely dry before the module is installed.

4. Please do not plug the module under power-on condition.