Combustible Gas Sensor

（Model Part：MH-Z1341A）

User Manual

Version：1.1

Valid Date：2024.04.30

Zhengzhou Winsen Electronics Technology Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD.

MH-Z1341A Combustible Gas Sensor

Product Description

The MH-Z1341A combustible gas sensor (hereinafter referred to as the sensor) is a universal and compact sensor that uses the principle of non dispersive infrared (NDIR) to detect combustible gases in the air. It has good selectivity, no oxygen dependence, long lifespan, built-in temperature compensation, digital output, and is convenient to use. This sensor is a high-performance sensor that combines mature infrared absorption gas detection technology with precision optical path design and sophisticated circuit design.

Features

- The air chamber is treated with electroplating, waterproof and corrosion-resistant
- High sensitivity, low power consumption
- Excellent stability
- Temperature compensation, excellent linear output
- Provide UART output mode
- Long life-span
- Anti moisture interference, anti-poisoning

Applications

- Home Alarms
- HVAC equipment
- Agriculture and animal husbandry

Technical Parameters

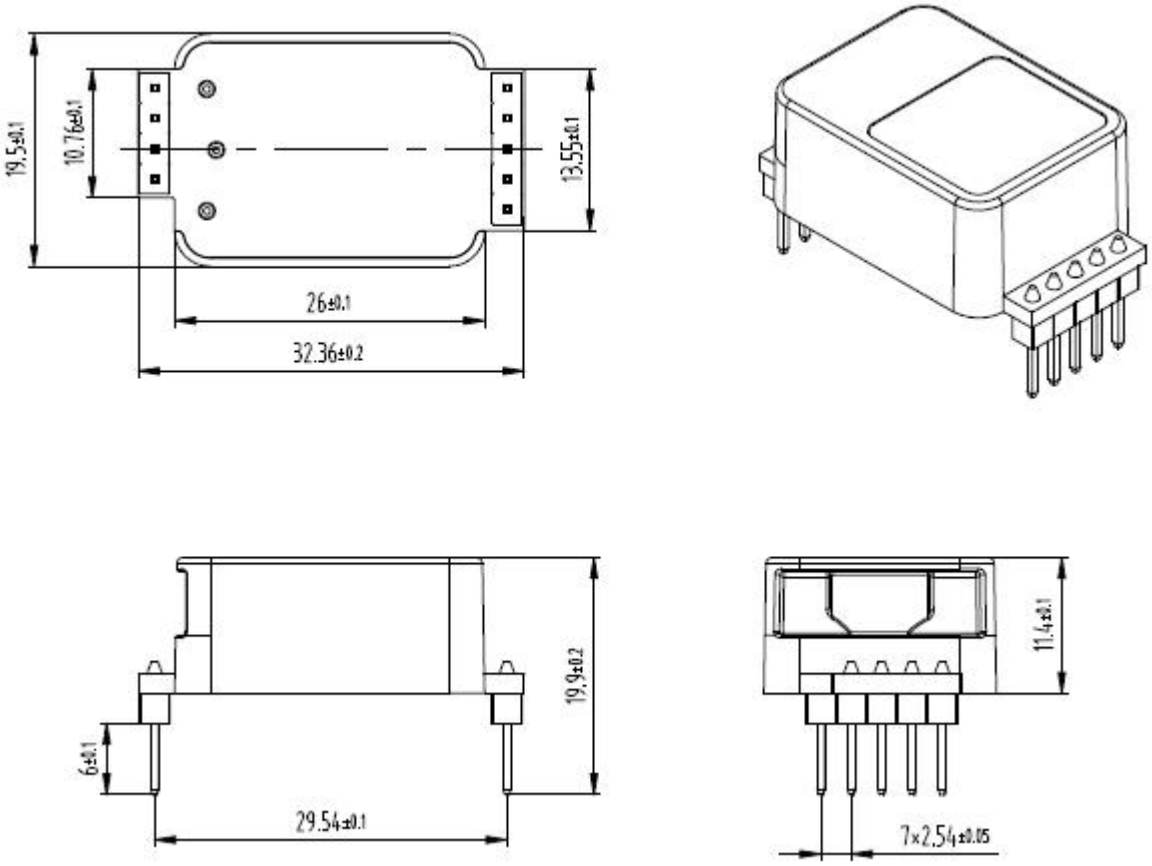
Tab 1 Parameters

Model No.	MH-Z1341A
Target Gas	Combustible gas
Power Supply	DC(5.0±0.1)V
Average Current	<150μA（@5Vpower supply）
Peak Current	40 mA（@5Vpower supply）
Interface level	3.0V(compatible with 5V)
Range	0~100%LEL optional（see Tab2）
Output Signal	Serial (UART)(TTL level 3.0V)
Pre-heating time	10s
Response time	T_{90} < 30s
Working Temperature	-10℃～60℃
Working humidity	0～95%RH(Non-condensation)
Storage Temperature	-20℃～60℃
Weight	5 g
Anticipated Life	>10 years

Tab 2 Regular Measurement Range and Accuracy

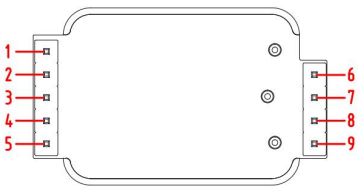
Gas	Molecular formula	Measurement range	Resolution	Accuracy
Methane	CH_4	0～5.00%VOL	0.01%VOL	±0.15%VOL(@10~40℃) ±0.25%VOL(-10~10℃，40~60℃)
Propane	C_3H_8	0～100%LEL	1%LEL	±3%LEL(@10~40℃) ±5%LEL(-10~10℃，40~60℃)

Product Appearance and Structural Diagram



Tab 3

Pin No.	Pin definition
Pin 1,2,5-7	reserved
Pin 3	UART（TXD） 0～3.0 V data output
Pin 4	UART（RXD） 0～3.0 V data input
Pin 8	GND
Pin 9	VIN



Pin Definition Diagram

Communication Protocol

1. Protocol overview

- The data in this agreement is all in hexadecimal format.
- The data length of this agreement is fixed at 9 bytes.
- Baud rate: 9600; Data bits: 8 bits; Stop position: 1 position; Parity bit: None.

2. Protocol Command list and explaination

Tab 4

Protocol command definition	
0x86	Read gas concentration
0x87	Zero-point Calibration
0x88	Span Calibration

3. Communication Mode

The default mode is active upload mode. When the concentration is below the threshold, the upload cycle is once every 5 seconds, and once every 1 second above the threshold. The default threshold is 3% LEL; After the host sends the 86 command to read the concentration, it automatically switches to question and answer mode and no longer actively uploads until the next power on.

Active upload mode：

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Command	（HIGH）	(LOW)	-	-	-	-	Checksum
0xFF	0x86	0x00	0x64	0x47	0x00	0x00	0x00	0xCF
Gas concentration = HIGH * 256 + LOW Example：Convert hexadecimal to decimal：01 equals 01，64 equals 100； Gas value：0*256+64=100				Methane sensor (unit% VOL): data with 2 decimal places: value 100=1.00% VOL Propane sensor (unit:% LEL): Data without decimal places: Value 100=100% LEL				

4. Communication Commands

0x86-Read gas concentration								
Send Command								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Sensor No.	Command	-	-	-	-	-	Checksum
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	0x79
Return								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Command	（HIGH）	(LOW)	-	-	-	-	Checksum
0xFF	0x86	0x00	0x64	0x47	0x00	0x00	0x00	0xCF
Gas concentration = HIGH * 256 + LOW Example：Convert hexadecimal to decimal：01 equals 01，64 equals 100； Gas value：0*256+64=100				Methane sensor (unit% VOL): data with 2 decimal places: value 100=1.00% VOL Propane sensor (unit:% LEL): Data without decimal places: Value 100=100% LEL				

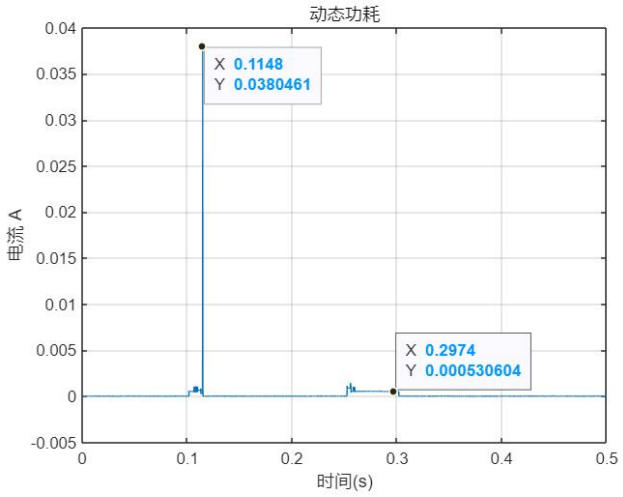
0x87-Zero Point Calibration								
Send Command								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Sensor No.	Command	-	-	-	-	-	Checksum
0xFF	0x01	0x87	0x00	0x00	0x00	0x00	0x00	0x78
Return								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Command	-	-	-	-	-	-	Checksum
0xFF	0x87	0x00	0x00	0x00	0x00	0x00	0x00	0x79
Received 87 return instructions indicating successful calibration at Zero point								

0x88-Calibrate the sensor span point (SPAN) by injecting 2.5% VOL methane gas								
Send Command								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Sensor No.	Command	High gas value	Low gas value	-	-	-	Checksum
0xFF	0x01	0x88	0x00	0xFA	0x00	0x00	0x00	0x7D
Return								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Command	（HIGH）	(LOW)	-	-	-	-	Checksum
0xFF	0x88	0x00	0xFA	0x00	0x00	0x00	0x00	0x7E
Gas Concentration = HIGH * 256 + LOW Example：Convert hexadecimal to decimal：00 equals 0，FA equals 250； Calibration Point：0*256+250=250，which equals 2.50%VOL								

Verification and calculation method								
Checksum = (reversed(Byte1+Byte2+Byte3+Byte4+Byte5+Byte6+Byte7))+1								
Example：								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Sensor No.	Command	-	-	-	-	-	checksum
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	checksum
Caculation as following： 1、Add from Byte1to Byte7: 0x01 + 0x86 + 0x00 + 0x00 + 0x00 + 0x00 + 0x00 = 0x87 2、Reversed：0xFF - 0x87 = 0x78 Reversed values+1：0x78 + 0x01 = 0x79								
C language calculation checksum routine								

```
char getCheckSum(char *packet)
{
    char i, checksum;
    for( i = 1; i < 8; i++)
    {
        checksum += packet[i];
    }
    checksum = 0xff – checksum;
    checksum += 1;
    return checksum;
}
```

5. Dynamic power consumption curve



Peak power consumption of 38mA, average power consumption of 50uA @ low concentration (below 3% LEL) operation, average power consumption of 120uA @ high concentration (above 3% LEL) operation (active upload mode).

Notes

- During the welding, installation, and use of sensors, it is necessary to avoid any direction of pressure on their optical cavity.
- If the sensor needs to be placed in a small space, the space should be well ventilated, especially the intake window should be located in a well ventilated position.
- Sensors should be kept away from heat sources and avoid direct sunlight or other thermal radiation.
- Sensors should be calibrated regularly, with a recommended calibration cycle of no more than 6 months.
- Do not use sensors in environments with high dust density for a long time.
- To ensure the normal operation of the sensor, the power supply voltage must be maintained within the range of DC (5.0 ± 0.1) V, and the power supply current must not be less than 150mA. If it is not within this range, the sensor may malfunction, the sensor output concentration may be low, or the sensor may not work properly.
- When manually calibrating the zero point or sending a command to calibrate the zero point, it is necessary to work continuously for more than 20 minutes in a stable zero gas environment.

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