



Laser dust sensor

(Model: ZH06-I)

Manual

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Zhengzhou Winsen Electronic Technology Co., Ltd

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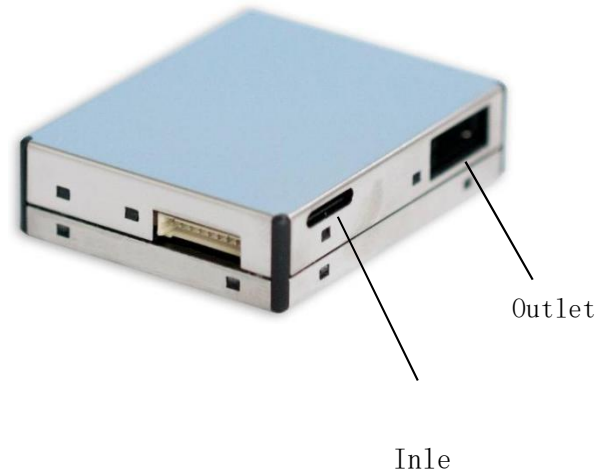
ZH06- I Laser dust sensor

Description:

Laser Dust sensor module is a common type, small size sensor, using laser scattering principle to detect the dust particles in air, with good selectivity and stability. It is easy to use, with serial port output & PWM output.

Features:

- Good consistency
- Real time response
- Accurate data
- Low power consumption
- Minus resolution of particle diameter 0.3 μm



Main Applications

It's widely used in air purifiers, ventilation systems, portable instrument, air quality monitoring equipment, air conditioner, and smart home equipment.

Technical Parameters Stable1.

Model	ZH06- I
Test type	PM1.0、PM2.5、PM10
Output	UART output
	PWM output
Working Voltage	4.9V~5.5V
Working current	<120mA
Dormancy current	<20mA
Response Time	T ₉₀ <45s
Working Humidity	0~80%RH (no condensation)
Working Temperature	-10~60°C
Storage Temperature	-30~70°C
Dimension	47×37×12.2mm (L×W×H)

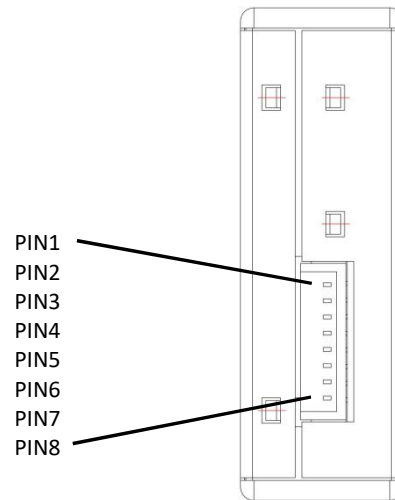


figure 1

Stable1

PIN1	VDD	4.9V~5.5V
PIN2	GND	
PIN3	reserved	
PIN4	RXD Serial receive pin	TTL@3.3V
PIN5	TXD Serial send pin	TTL@3.3V
PIN6	reserved	NC
PIN7	reserved	NC
PIN8	PWM outpu	TTL@3.3V

Sensor construction:

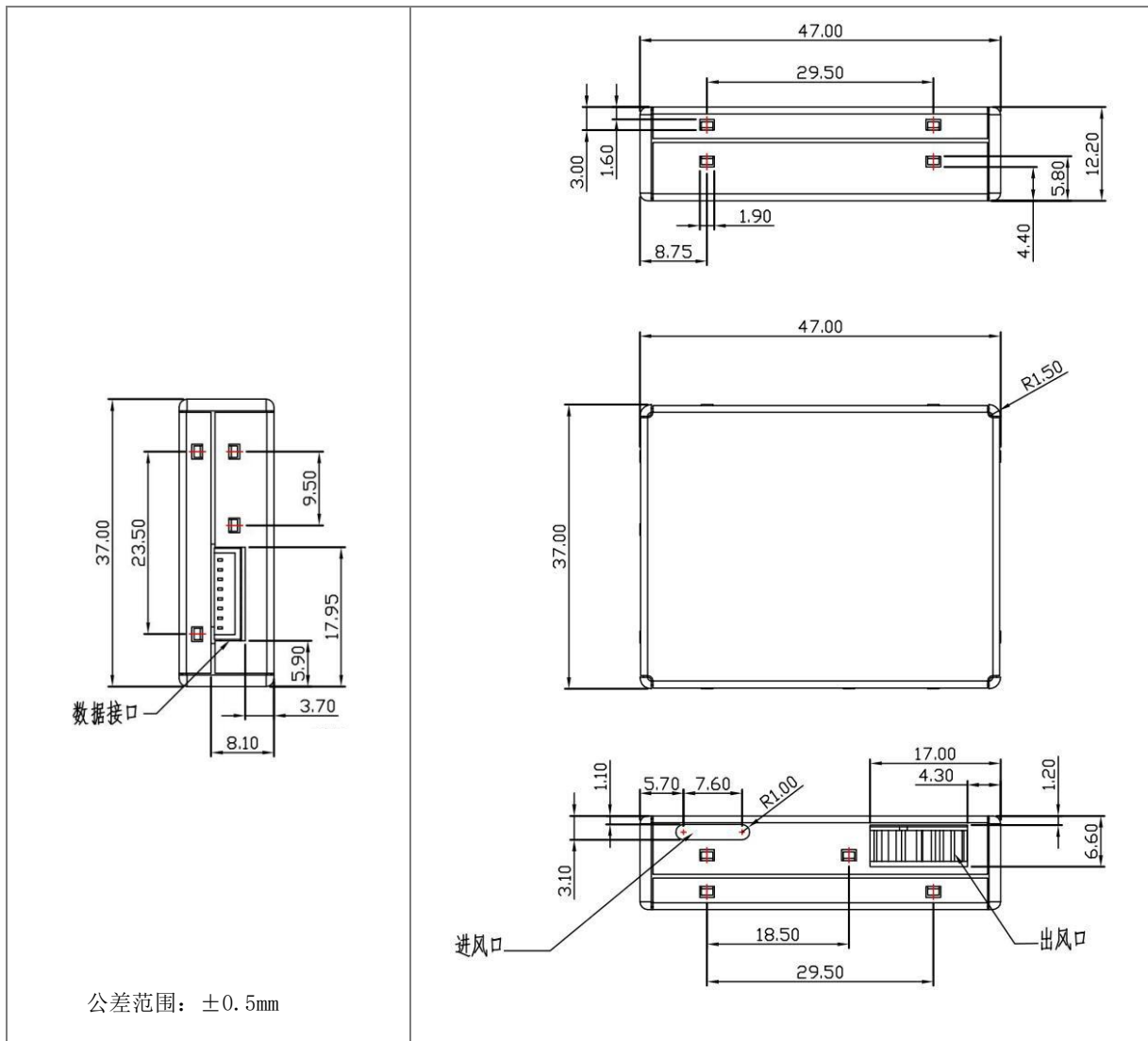


figure 2

Installation:

Both the air inlet and air outlet of the sensor need to maintain good contact with the outside air. When the sensor is installed and used, avoid strong air flow interference around the sensor; if it can not be avoided, try to make the external air flow face the inlet or outlet.

Connector description:

1.25T-8P connector, Pin spacing 1.25mm, Number of pins: 8

Communication Protocol

1. Serial communication settings

Baud rate	9600
Date byte	8 byte
Stop byte	1byte
Check byte	no

2. Initiative upload

Byte 1	Start byte 1		0x42
Byte 2	Start byte 2		0x4D
Byte 3	Frame length	high level 8	0x00
Byte 4		low level 8	0x14
Byte 5	Data 1	High Level 8	Reserved
Byte 6		Low Level 8	
Byte 7	Data 2	High Level 8	Reserved
Byte 8		Low Level 8	
Byte 9	Data 3	High Level 8	Reserved
Byte 10		Low Level 8	
Byte 11	Data 4	High Level 8	PM1.0 concentration (ug/m ³)
Byte 12		Low Level 8	
Byte 13	Data 5	High Level 8	PM2.5 concentration (ug/m ³)
Byte 14		Low Level 8	
Byte 15	Data 6	High Level 8	PM10 concentration (ug/m ³)
Byte 16		Low Level 8	
Byte 17	Data 7	High Level 8	reserved
Byte 18		Low Level 8	
Byte 19	Data 8	High Level 8	reserved
Byte 20		Low Level 8	
Byte 21	Data 9	High Level 8	reserved
Byte 22		Low Level 8	
Byte 23	Check	High Level 8	Initiative upload check= = byte1+.....+byte 22
Byte 24		Low Level 8	

NOTE:

1. The default communication mode is initiative upload mode.
2. Calculate method:

Data frames: 42 4D 00 14 00 54 00 6E 00 7C 00 54 00 6E 00 7C 00 00 00 00 00 03 1F

Check value= 0x42+0x4D+0x00+0x14+0x00+0x54+0x00+0x6E+0x00+0x7C+0x00+0x54+0x00+0x6E+0x00
+0x7C+0x00+0x00+0x00+0x00+0x00+0x00 = 0x031F

0x03 inHigh 8 level is in 23 byte of data frame, 0x1F is in 24 byte of data frame.

3. Question & answer mode

User sends instructions:

0	1	2	3	4	5	6	7	8
Starting byte	Reserve	comman d	reserv e	reserve	reserve	reserve	reserve	Check value
0XFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	0x79

Return value as follow:

0	1	2	3	4	5	6	7	8
Starting byte	Command	PM2.5		PM10		PM1.0		Check value
		High 8 Level (ug/m ³)	Low 8 Level (ug/m ³)	High 8 Level (ug/m ³)	Low 8 Level (ug/m ³)	High 8 Level (ug/m ³)	Low 8 Level (ug/m ³)	
0xFF	0x86	0x00	0x85	0x00	0x96	0x00	0x65	0xFA

Note: The question-and-answer data frame check value calculation method is different from the method for actively uploading data frames. Refer to the question-and-answer check value calculation example code.

4. Switch between Q&A mode and Initiative upload mode

User sends instructions: set Q&A mode:

0	1	2	3	4	5	6	7	8
Starting byte	Reserve	command	Q&A	Reserve	Reserve	Reserve	Reserve	Check value
0xFF	0x01	0x78	0x41	0x00	0x00	0x00	0x00	0x46

User sends instructions : Set initiative upload mode

0	1	2	3	4	5	6	7	8
Starting byte	Reserve	Command	Upload	Reserve	Reserve	Reserve	Reserve	Check value
0xFF	0x01	0x78	0x40	0x00	0x00	0x00	0x00	0x47

Note: Please refer to the sample code for calculating the data frame check value.

5. Dormant mode

User sends instructions: set Q&A mode:

0	1	2	3	4	5	6	7	8
Starting byte	Reserve	Main command	Dormant command	Reserve	Reserve	Reserve	Reserve	Check value
0xFF	0x01	0xA7	Enter:0x01	0x00	0x00	0x00	0x00	0x57
			Quit:0x00					0x58

Return value as follow:

0	1	2	3	4	5	6	7	8
Starting byte	Main command	Return	Reserve	Reserve	Reserve	Reserve	Reserve	Check value
0xFF	0xA7	Success: 0x01	0x00	0x00	0x00	0x00	0x00	0x58
		Failure:0x00						0x59

Note:Data frame check value calculation please refer to sample code;

Calculate method for check value:

In Q&A mode, the return value is “FF 86 00 47 00 C7 03 0F 5A”

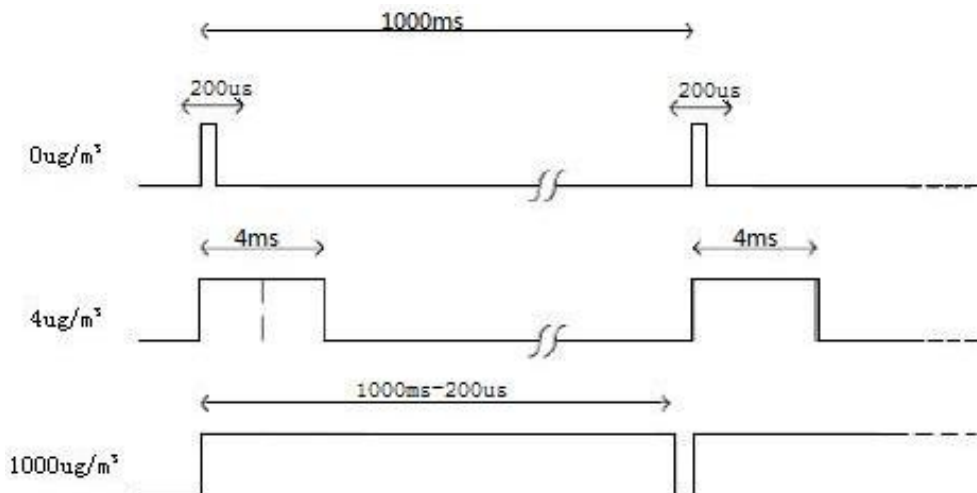
Check value== 0x86 + 0x00 + 0x47 + 0x00 + 0xC7 + 0x03 + 0x0F
 = 0xA6(keep low 8 level)
 = 0x59(positive)
 = 0x5A(plus 1)

Eg of code:

```
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);
}
```

PWM Output:

PWM output way	
detection range is 0-1000ug/m ³	
PM2.5 concentration output range	0-1000ug/m ³
Period	1000ms ± 5%
High level output at the period start	200us(theoretical value)
Middle of the period	1000ms ± 5%
Low level output at the period end	200us (theoretical value)
To calculate PM2.5 through PMW: $P (ug/m^3)=1000x(TH)/(TH+TL)$	
P (ug/m ³) is calculated value of PM2.5 concentration, its unit is ug/m ³ TH is the time of high level during one period TL is the time of low level during one period	



Note: PWM calculated value only represents PM2.5

Cautions:

- 1、 Do not change or displace any electronic components.
- 2、 Please avoid heavy shock and vibration
- 3、 The sensor should be vertical installed, to extend fan's lifespan.
- 4、 Avoid sticky particles entering the sensor, preventing moisture, to prevent affecting performance.
- 5、 The fan is the air outlet, and the dust collection hole is the air inlet. Please ensure that the air inlet and outlet are open to the outside world.

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