



Laser Dust Module

(Model: ZH03A)

Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD

ZH03A Laser Dust Sensor Module

Profile

ZH03A 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 UART output & analog output.

Features

Zero error alarm rate

Real time response

Accurate data

Minus resolution of particle diameter 1.0μm

Main Applications

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

Technical Parameters

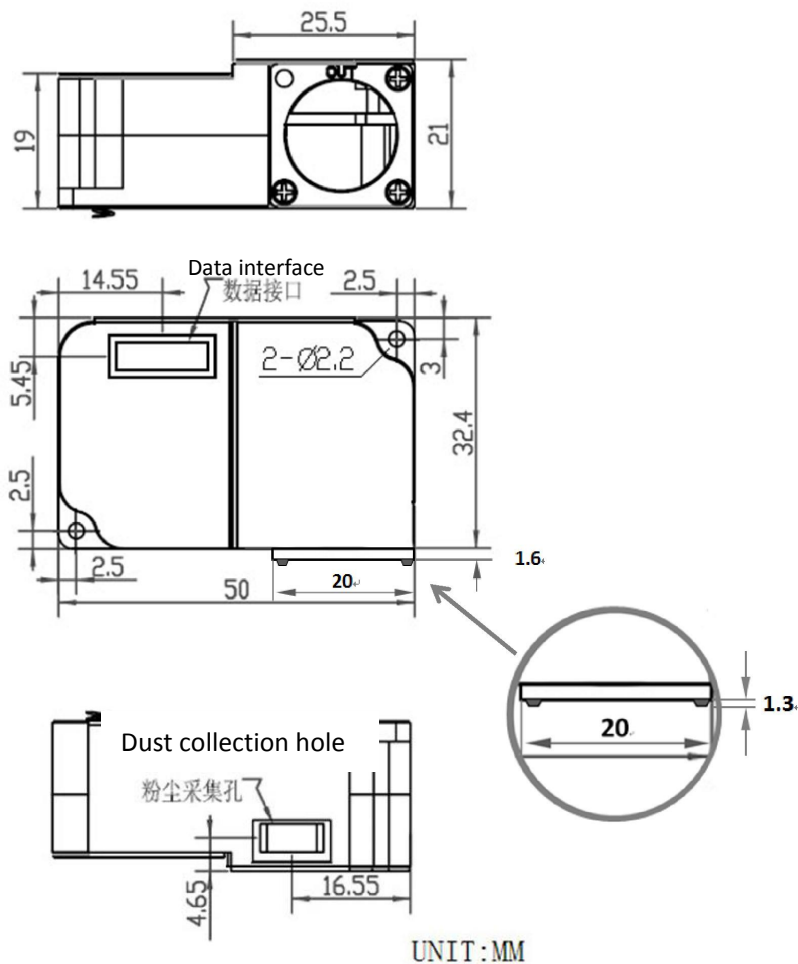
Model	ZH03A
Detection Gas	PM1.0, PM2.5, PM10
Output	UART OUTPUT (3V TTL)
	DAC (0~2V is corresponding to 0-1000)
	PWM output
Working Voltage	5V±0.1V
Working Current	70-140(mA)
Dormancy current	<10mA
Response Time	≤90s
Working Humidity	15%RH-80%RH(no condensation)
Working Temperature	-20~40℃
Storage Temperature	-40~60℃
Life Span	3 years (in air)
Dimension	50*32.4*21mm



PIN1	VDD 5V±0.1V
PIN2	GND
PIN3	SET pin TTL: 0~3V
PIN4	RXD Serial receive pin TTL: 0~3V
PIN5	TXD Serial send pin TTL: 0~3V
PIN6	RESET pin TTL: 0~3V
PIN7	DAC Analog output
PIN8	PWM output TTL: 0~3V

Note: When SET=1 or hang in the air, the module is in continuous sampling mode;

When SET=0, the module is in low consumption mode.



Note of Installation:

Avoid blast air flow; If can not, keep the air flow of outside vertical to the air flow inside the gas sensor.

Communication Protocol

1. General Settings

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

2. Initiative upload

Byte 0	Start byte 1	0x42
Byte 1	Start byte 2	0x4D
Byte 2	Frame length high level 8	0x14
Byte 3	Frame length low level 8	
Byte 4	Data 1 High Level 8	Reserve PM1.0 concentration (standard particles)
Byte 5	Data 1 Low Level 8	
Byte 6	Data 2 High Level 8	Reserve PM2.5 concentration (standard particles)
Byte 7	Data 2 Low Level 8	
Byte 8	Data 3 High Level 8	Reserve PM10 concentration (standard particles)
Byte 9	Data 3 Low Level 8	
Byte 10	Data 4 High Level 8	PM1.0 concentration (atmospheric environment)
Byte 11	Data 4 Low Level 8	
Byte 12	Data 5 High Level 8	PM2.5 concentration (atmospheric environment)
Byte 13	Data 5 Low Level 8	
Byte 14	Data 6 High Level 8	PM10 concentration (atmospheric environment)
Byte 15	Data 6 Low Level 8	
Byte 16	Data 7 High Level 8	reserve
Byte 17	Data 7 Low Level 8	
Byte 18	Data 8 High Level 8	reserve
Byte 19	Data 8 Low Level 8	
Byte 20	Data 9 High Level 8	reserve
Byte 21	Data 9 Low Level 8	
Byte 22	Data & Check High Level 8	Check= byte 0+.....+byte 21
Byte 23	Data & Check Low Level 8	

3. Question & answer mode

0	1	2	3	4	5	6	7	8
Starting byte	Reserve	command	reserve	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	High Level (ug/m ³)	Low Level (ug/m ³)	reserve	reserve	reserve	reserve	Check value
0xFF	0x86	0x00	0x85	0x00	0x00	0x00	0x00	0xF5

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

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

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

5. Calibration

0	1	2	3	4	5	6	7	8
Starting byte	Reserve	command	To calibrate high level 8 of concentration (ug/m ³)	To calibrate low level 8 of concentration (ug/m ³)	Reserve	Reserve	Reserve	Check value
0xFF	0x01	0x88	0x00	0x64	0x00	0x00	0x00	0x13

For example:

The calibration command for 100ug/m³ concentration must be done in 80-120 ug/m³ concentration, when the concentration is stable, wait for at least 3 until the sensor gets stable.

Calibrate checksum:

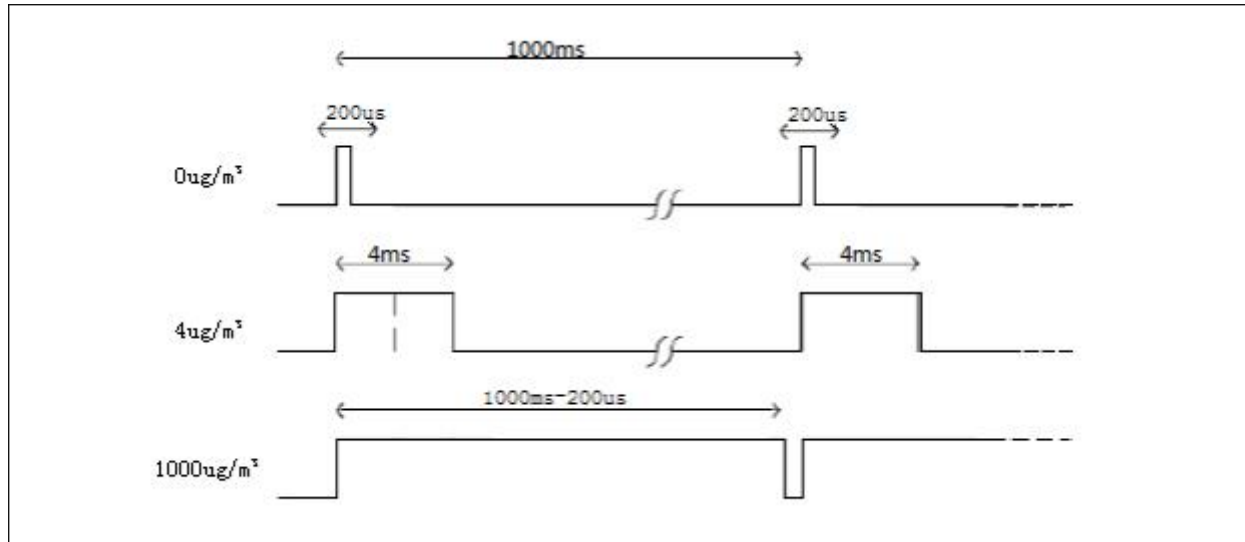
```
unsigned char FucChecksum(unsigned char *i,unsigned char ln)
{
    unsigned char j,tempq=0;
    i+=1;
    for(j=0;j<(ln-2);j++)
    {
        tempq+=*i;
        i++;
    }
    tempq=(~tempq)+1;
    return(tempq);
}
```

6. DAC analog voltage output

PIN 7 is DAC analog voltage output, analog voltage 0-2 v is corresponding to 0 ~ 1000 $\mu\text{g}/\text{m}^3$. For example: 0.5v analog voltage is corresponding to 250 $\mu\text{g}/\text{m}^3$; 1v analog voltage is corresponding to 500 $\mu\text{g}/\text{m}^3$. When using DAC output, the length of the signal line will impact the testing result, the suggested length is within 20cm.

7. PWM output way

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

**Cautions:**

1. Do not change or displace any electronic components.
2. Please avoid heavy shock and vibration
3. Avoid the the air flow's influence of outside
4. Make sure that the air circulation of dust collecting holes is normal when installation.
5. Please avoid sticky particles into the sensor to affect the sensor's performance.

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