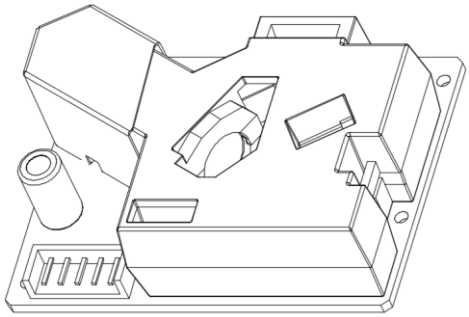
Infrared Particle Sensor Module

PM-A3

Features

- ✧ Principle of infrared particle detecting
- ✧ 100% calibration in factory
- ✧ Unique algorithm and compensation to get high accuracy
- ✧ Minimum detection particle size is 0.5 μ m
- ✧ Suitable for air purifier and fresh air system



Product Series

Series / Model	Standard	Common	Slim	Infrared Upgrade	Mini Type	Outdoor	Infrared Type
PM-D4	★						
PM-G3		★					
PM-E5	★	☆					
PM-G7		★	★				
PM-G7M		★	★				
PM-T7	★	☆	★				
PM-T7M	★	☆	★				
PM-R3				★			
PM-H3		★					
PM-S1	☆	★			★		
PM-SP1						★	
PM-A3							★

★: Available in all cases ☆: Available in some cases

Standard Series ： Patented product

Common Series ： Compatible with other models in the market

Slim Series ： Slim design, only 12mm thick

Mini Type Series ： Designed for space saving, mini size

Infrared Upgrade ： Laser principle, used to upgrade mainstream infrared sensors on the market

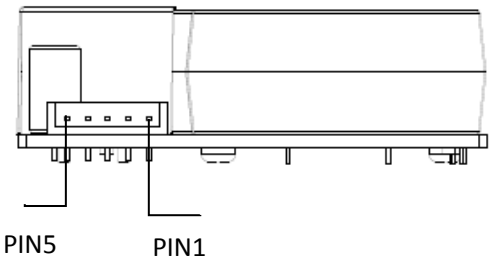
Outdoor Series ： Specially designed for the harsh outdoor environment

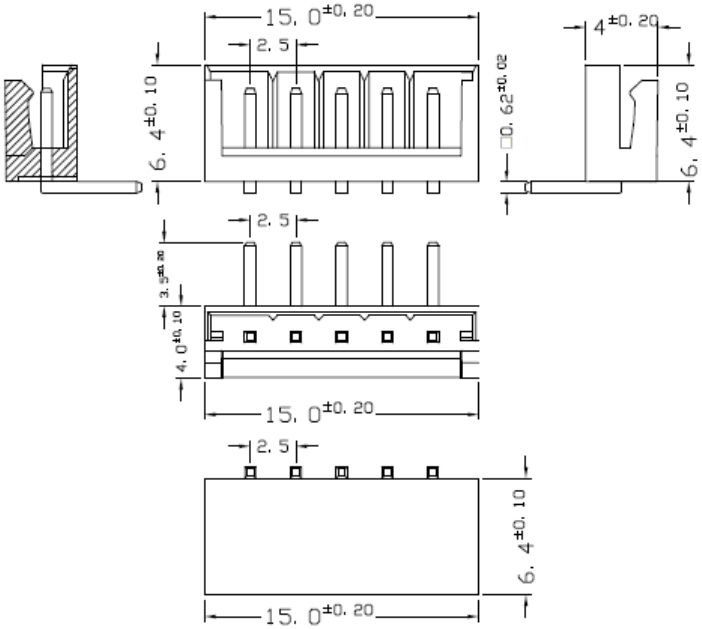
Infrared Type Series ： Infrared scattering principle, low cost

Specification

Item	Type
Minimum particle size	0.5μm
Range	0~2000μg/m^3
Maximum consistency error (PM2.5 concentration)（25±5）℃，(50 ±10)%RH，	±40%， @（50～2000 ）μg/ m^3 ±18μg/ m^3， @ （0～50）μg/ m^3
Output	UART@5V
	PWM@5V
I/o electric	（VIH）：1.8V ~5V
	（VIL）<0.8V
	（VOH）：3.3V ~5V
	（VOL）<0.4V
Power supply	5V（4.8V~5.5V）
Working Current	<120mA
working temperature/humidity	(0～50) ℃ / (0～99)% RH（not condensate）
Storage temperature	–20℃ ～60℃
Stabilization time	About 1 min（resistor temperature stabilization time）
Size	59*45*22mm

I/O Interface Definition



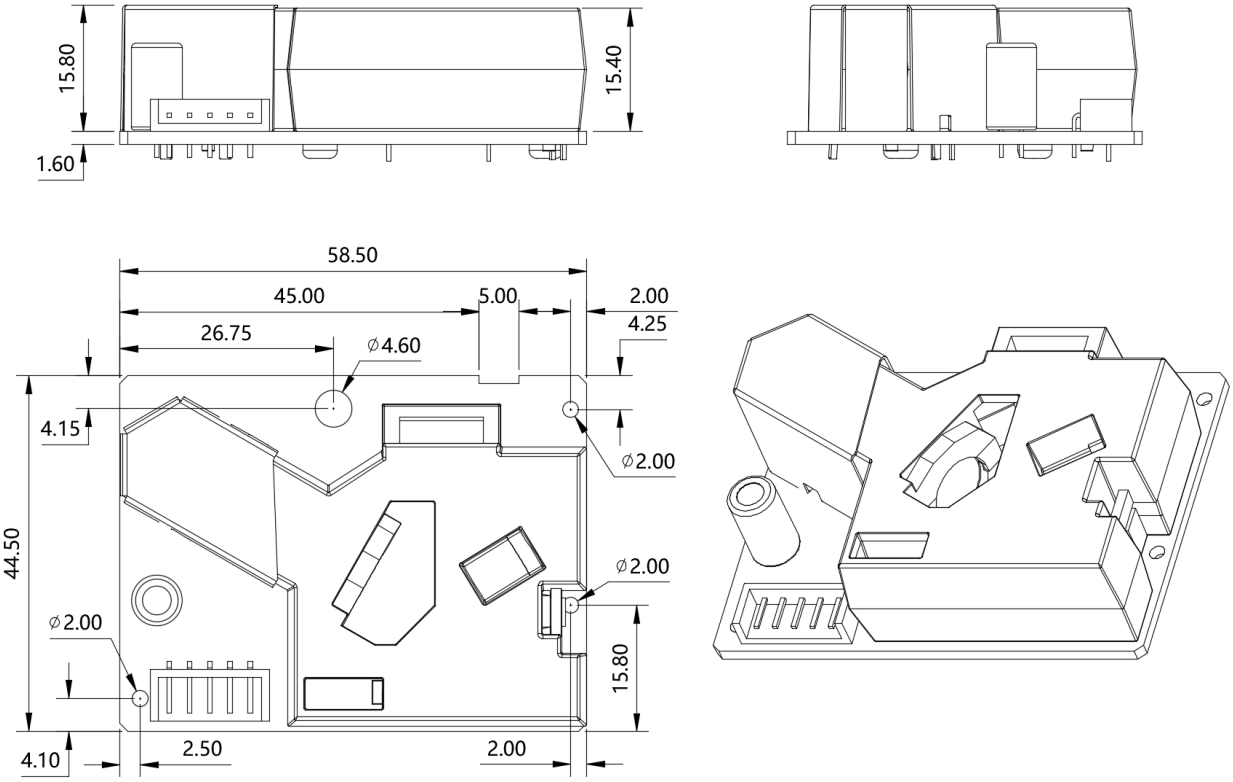


5PIN Connector

Pin Description

PIN No.	PIN Function	PIN Description
PIN1	GND	Ground
PIN2	TXD	UART Digital Output
PIN3	VCC	Power Supply
PIN4	PWM	PWM Output (It should be not-connected if no use)
PIN5	RXD	UART Digital Input

Dimensions （Unit : mm）

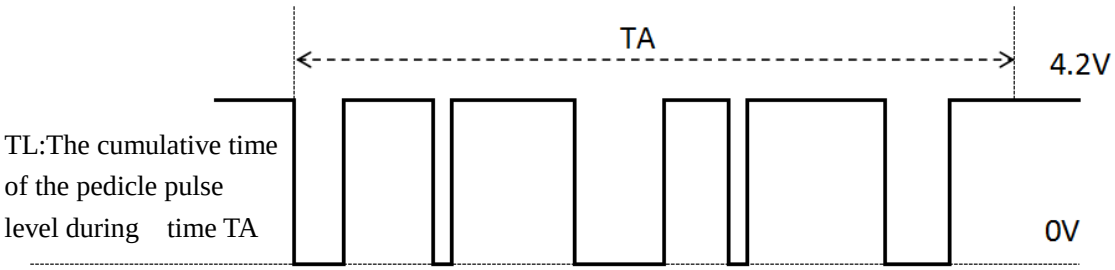


Communication Protocol

- **TTL Output（5V）**
- **Baud Rate：9600Kbps ,Check Bit：none ,Stop Bit：1,32 bytes Data Package**

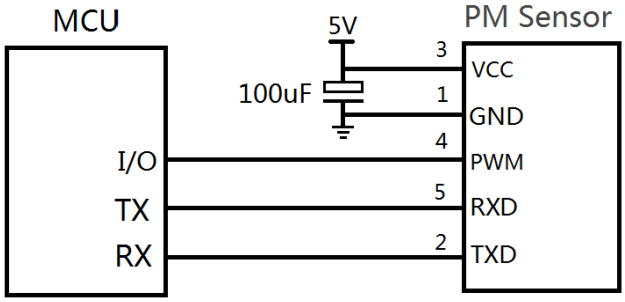
No.（Hexadecimal）	Data No.	Data	Data Description
0x00	Header 1	0x42	Frame header
0x01	Header 2	0x4d	
0x02	Frame Length high byte	0xXX	Frame Length=2*13+2(Data+Check)
0x03	Frame Length low byte	0xXX	
0x04	Data 1 High byte	0xXX	Reserved
0x05	Data 1 Low byte	0xXX	
0x06	Data 2 High byte	0xXX	Concentration of PM 2.5 Unit: μg/m^3
0x07	Data 2 Low byte	0xXX	
0x08	Data 3 High byte	0xXX	Reserved
0x09	Data 3 Low byte	0xXX	
0x0A	Data 4 High byte	0xXX	Reserved
0x0B	Data 4 Low byte	0xXX	
0x0C	Data 5 High byte	0xXX	Reserved
0x0D	Data 5 Low byte	0xXX	
0x0E	Data 6 High byte	0xXX	Reserved
0x0F	Data 6 Low byte	0xXX	
0x10	Data 7 High byte	0xXX	Reserved
0x11	Data 7 Low byte	0xXX	
0x12	Data 8 High byte	0xXX	Reserved
0x13	Data 8 Low byte	0xXX	
0x14	Data 9 High byte	0xXX	Reserved
0x15	Data 9 Low byte	0xXX	
0x16	Data 10 High byte	0xXX	Reserved
0x17	Data 10 Low byte	0xXX	
0x18	Data 11 High byte	0xXX	Reserved
0x19	Data 11 Low byte	0xXX	
0x1A	Data 12 High byte	0xXX	Reserved
0x1B	Data 12 Low byte	0xXX	
0x1C	Data 13 High byte	0xXX	Reserved
0x1D	Data 13 Low byte	0xXX	
0x1E	Check High byte	0xXX	Check =Start Symbol 1+Start Symbol 2+……+Data 13 Low byte
0x1F	Check Low byte	0xXX	

PWM Output



- Relationship between low pulse time and dust concentration: PM2.5 dust concentration = TL/TA*4000 (μg/ m^3)
  (TA generally takes 30 seconds)

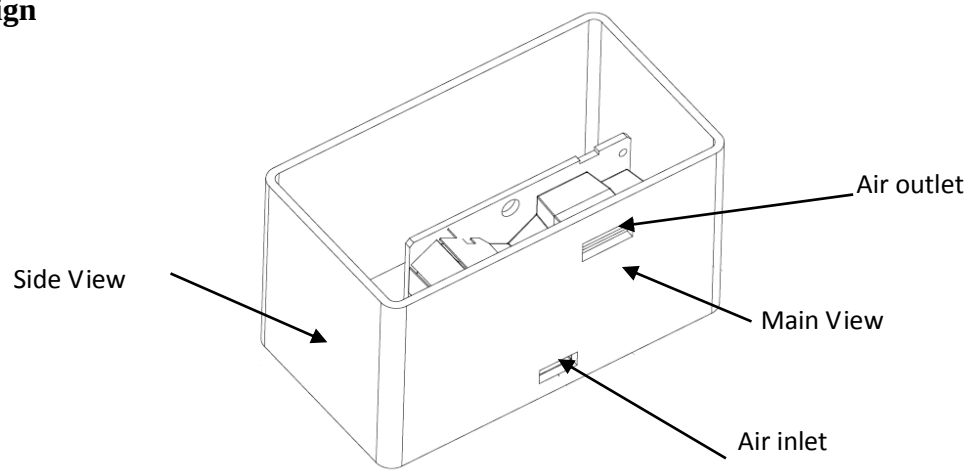
Circuit Design



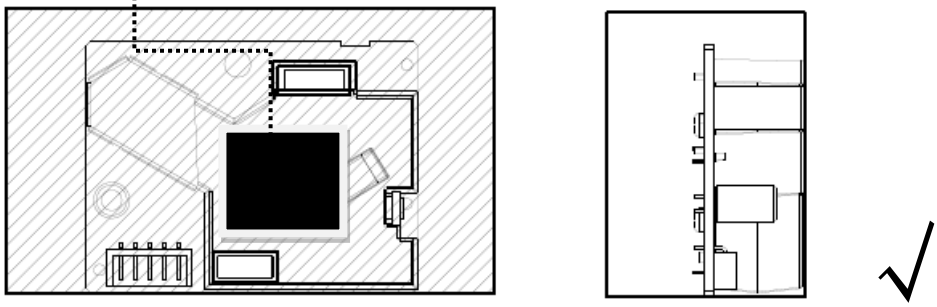
Note of the circuit design:

1. The sensor is 5V power supply. The sensor has no reverse protection. It cannot be reversed connected. It is recommended to add a 100μF capacitor to the power supply for filtering.
2. Other I/O pins are 5V level interfaces.
3. PIN 5 is the RXD port. If it is not used, it is recommended to be not connected.
4. PN4 is the PWM output .If it is not used, it is recommended to be not connected.

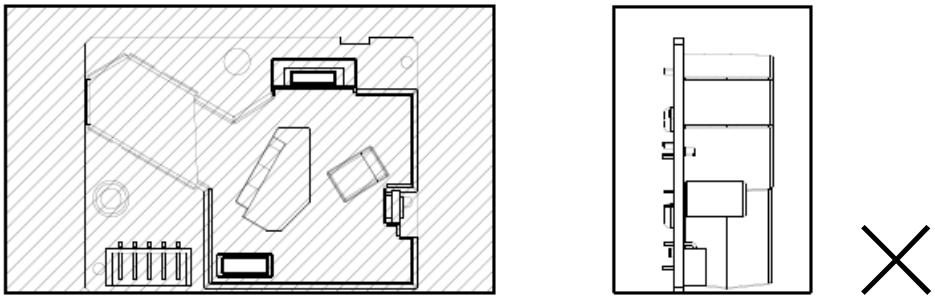
Structural Design



The front window needs to be covered with black matte material, not to enter or reflect light



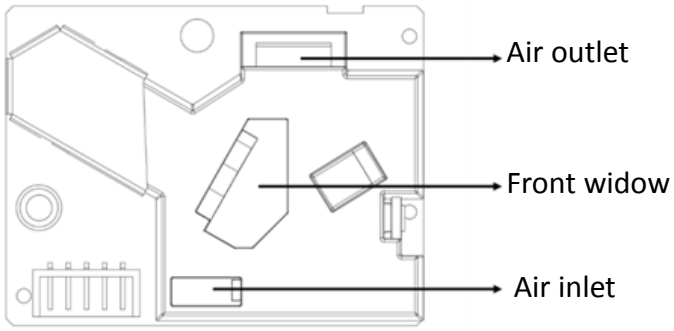
Main View　　Side View



Main View　　Side View

Note

1. Mounting and fixed：The sensor recommended use the screw to fixed；
2. Inlet and outlet can not be intercepted between the measurement environment;
3. The air inlet and outlet must be in a plane close to the outside wall of the equipment and communicate with the outside by using the air holes, while keeping away from the position of larger airflow.
4. The sensor must be placed vertically in the device (error less than ±3°) and the air inlet is placed at the lower end.



5. The inlet and outlet of the equipment should be greater than or equal to the size of the sensor inlet and outlet, and ensure that all the inlet and outlet are exposed.
6. Equipment designed air duct do not have corners, to ensure the airflow can be measured and go into the sensor ;
7. When the sensor is in use, the front window must be completely covered with a black sponge or black sticker(inner surface frosting) to ensure that it works in a dark environment, reducing the interference of ambient light.
8. When the sensor is applied to purifier products, it is necessary to avoid placing the sensor directly in the purifier's own air duct; if it is unavoidable, it is necessary to design a separate structural space to install the sensor to isolate the air inlet and outlet of the sensor from the air duct of the purifier.
9. When applied to purifiers or fixed testing equipment, the working position of the sensor should be higher than 20cm above the ground to prevent the large particles of dust and floccules in that causing the measurement error;
10. Sensor be should away from the higher fever and radiation components;
11. When the sensor is used in outdoor equipment, the protection of large particulate dust, rain and snow, willow catkins and so on should be completed by the structure of the equipment.

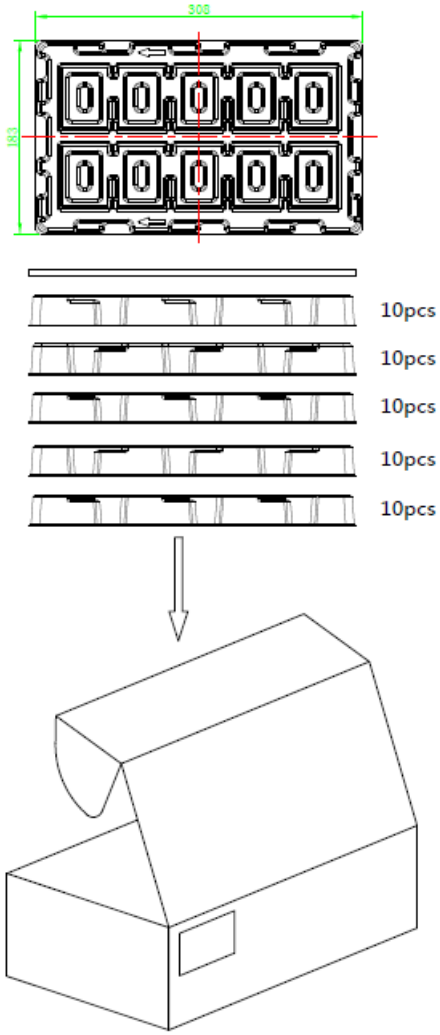
Others

1. Due to the electrostatic sensitive components on the module, installation and use of anti-static facility is necessary, such as wearing anti-static gloves;
2. In the process of installation, avoid non-standard operation such as hot swap;
3. Do not disassemble the sensor, or it will lead to irreversible damage;
4. The sensor is designed for indoor air quality measurement. If the equipment is working in the following actual environment, the necessary design should be added to make sure the sensor shows good consistency and long service life,
   a) the annual dust concentration greater than 300 micrograms per cubic meter for more than 50% of the time, or more than 500 micrograms per cubic meter for more than 20% of the time;

b) a fume environment, such as a kitchen;

c) high water fog environment, such as bathroom.

Packing



Qty. per layer	Layer	Carton	Carton dimensions	Packing material
10pcs	5 Layers	50pcs	310*184*105	Pearl cotton(ESD)

Technical consultancy and After-sales services

Hippocampus Technology Co.,Ltd
Tel： +86 0519-85552750
Address： Building No.15 Innovative Industrial Park ,No.377 Wuyi road(south),Wuijin District ,Changzhou City
Web： www.topsensor.cn