

Overview

The PMS7003 is a digital universal particle concentration sensor based on the principle of laser scattering. It can continuously collect and calculate the number of suspended particulates in different air volumes per unit volume, that is, the particle concentration distribution, and then convert it into mass concentration. Interface form output. The sensor can be embedded in a variety of suspended particles in the air associated with the concentration of instrumentation or environmental improvement equipment, to provide timely and accurate concentration data.

Working principle

The sensor uses the principle of laser scattering. It means that the laser light on the particles in the air and making the scattering, while collecting scattered light at a particular angle , resulting in scattered light intensity with time curve. Furthermore, the microprocessor uses the algorithm based on Mie (MIE) to obtain the equivalent particle size of the particles and the number of particles with different particle diameters per unit volume.

Features

The principle of laser scattering to achieve accurate measurement

Zero error alarm rate

Real-time response and support for continuous acquisition

Minimal resolution particle size 0.3um

The new patent structure, six full range of shielding, anti-jamming performance stronger

Inlet direction is optional, the use of a wide range of users without the need for duct design

Ultra-thin design, only 12mm, for portable devices

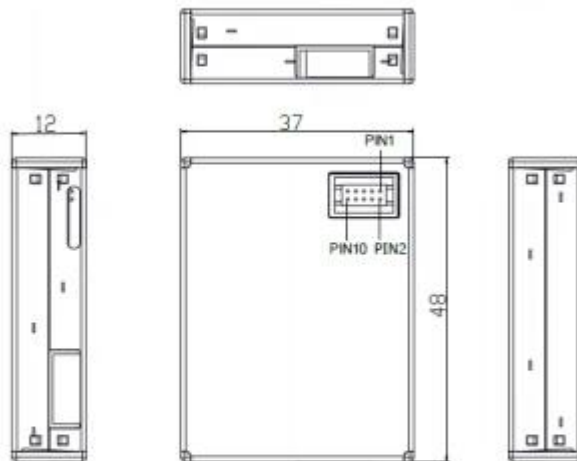
Technical indicators

Parameter	Quota	unit
Particle measurement range	0.3~1.0; 1.0~2.5; 2.5~10	um
Particle technology efficiency	50%@0.3um 98%@>=0.5um	
Particle mass concentration effective range (PM2.5 standard value)	0~500	ug/m ³
Particle mass concentration resolution	1	ug/m ³
Particle mass concentration consistency (PM2.5 standard value)	+10@100~500 ug/m ³ +10ug/m ³ @0~100ug/m ³	
Called quasi-volume	0.1	L
Single response time	<1	S
Integrated response time	<=10	S
DC supply voltage	Typ:5.0 Min:4.5 Max:5.5	V
Working current	<=100	mA
Standby current	<=200	uA
Data interface level	L<0.8@3.3 H>2.7@3.3	V
Operating temperature range	-10~60	°C
Working humidity range	0~99%	
Storage temperature range	-40~80	°C
Mean time between failures	>=3	Y
Max size	48*37*12	MM

Note:

1) Particle concentration consistency data for the communication protocol in the data 2 (see Appendix A) to measure the environmental conditions of 20 degrees Celsius, humidity of 50%.

外形结构及接口定义



引脚定义：

Pin1-----VCC
Pin2-----VCC
Pin3-----GND
Pin4-----GND
Pin5-----Reset
Pin6-----N/C
Pin7-----RX
Pin8-----N/C
Pin9-----TX
Pin10-----Set

图 2 外形及接口定义

Pin	Function	Description
Pin1	VCC	Power + (5V)
Pin2	VCC	Power + (5V)
Pin3	GND	Power -
Pin4	GND	Power -
Pin5	RESET	Module reset signal / TTL level @ 3.3V low reset
Pin6	NC	
Pin7	RX	Serial Receive Pin / TTL Level @ 3.3V
Pin8	NC	
Pin9	TX	Serial Port Transmit Pin / TTL Level @ 3.3V
Pin10	SET	Set pin / TTL level @ 3.3V, high or floating for normal operation, low level is dormant

Output the result

The main output is the mass per unit volume of particles and the number of particles, of which the number of particles per unit volume of 0.1 liters, the mass concentration in units of micrograms / cubic meter

The output is divided into active output and passive output. After the power is turned on, the default state is active output: the sensor will take the host to send the running data, the time interval is 200 ~ 800ms, the higher the

concentration of particles in the air, the shorter the time interval. Active output is divided into two modes: smooth mode and fast mode. When the change in particle concentration in the air is small, the sensor output is a smooth mode: the same set of values is output every three times, and the actual data is about 2s with the new period. When the concentration of particles in the air changes greatly, the sensor output automatically switches to fast mode, each output is a new value, the actual data update cycle of 200 ~ 800ms.

典型电路连接

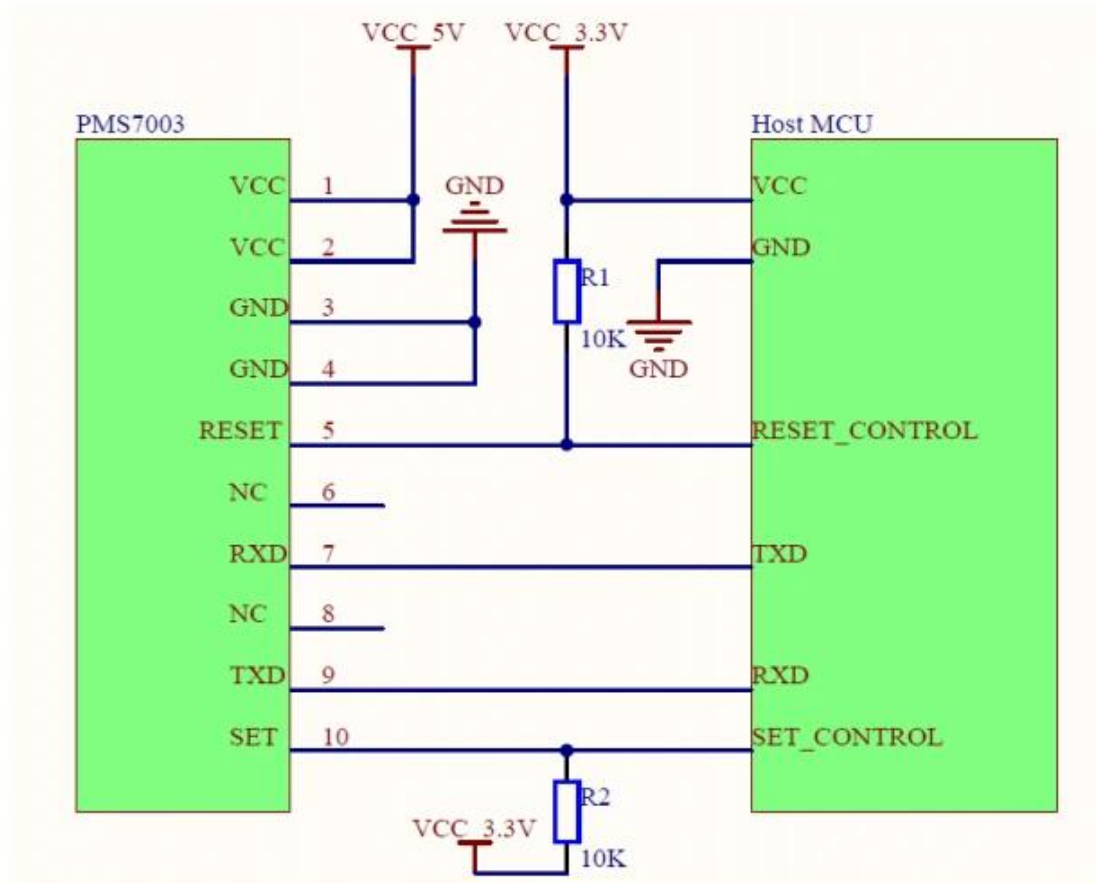


图 3 典型电路连接图

Reliability test

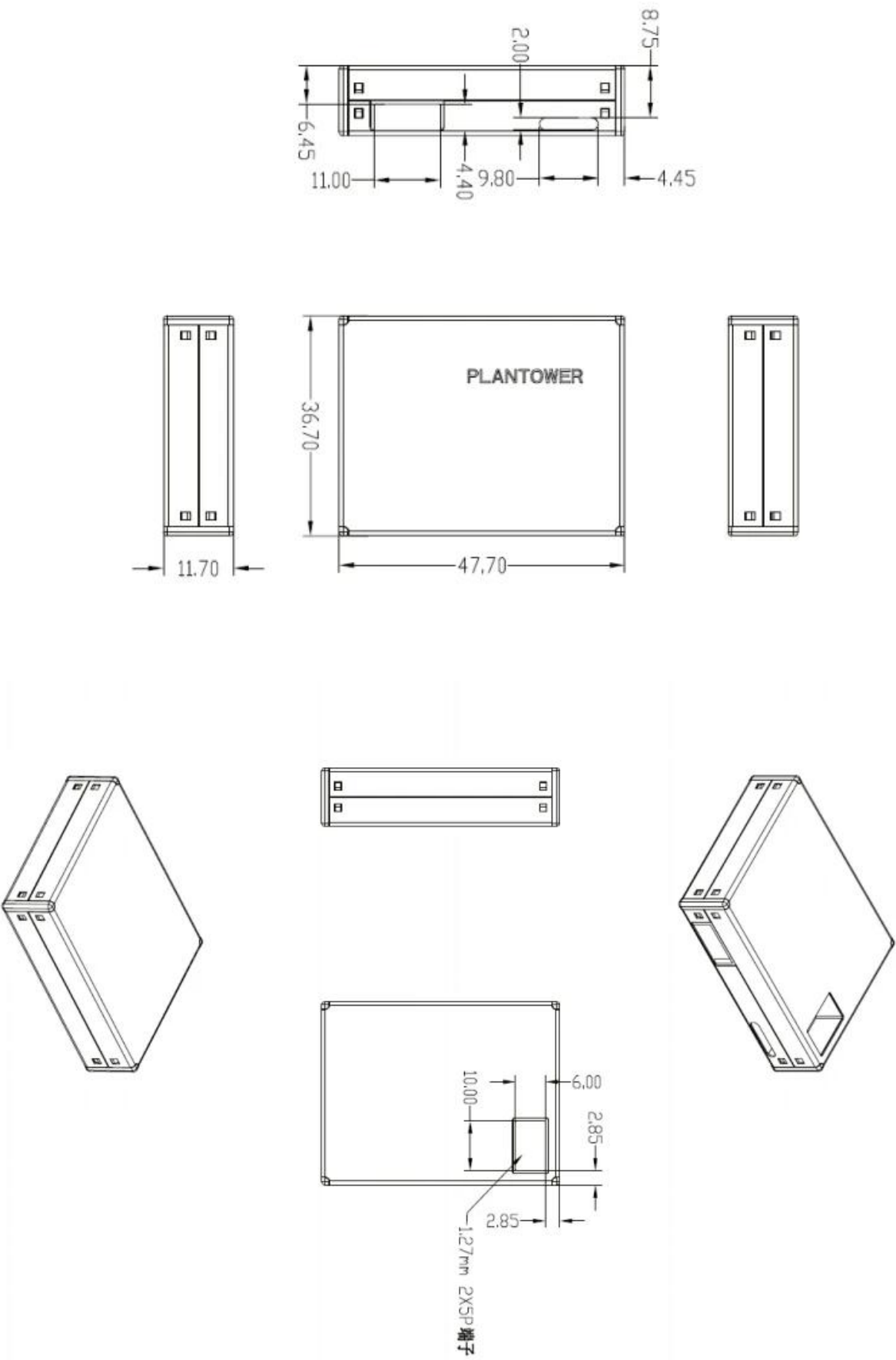
Number	Project	Test Methods	Judgement standard	N/C
1	Run for a long time	1) 10m ³ meters of closed laboratory, temperature 20 to 25 degrees Celsius, humidity 30 to 70%, particulate matter generator to send smoke, air purifier regulation. 2) Power DC 5V 3) Test for consistency after 720 hours of continuous operation	1) 10 sample points are set between 0 ~ 500u g / m ³ of particulate matter concentration;	N=30 C=0
3	High temperature operation	1) 10m ³ constant temperature laboratory, temperature 43 degrees Celsius, humidity 70%, particulate matter generator to send smoke, air purifier regulation. 2) Power DC 5V test consistency	2) 0 ~ 100u g / m ³ The maximum error between the test prototype and the standard machine is within + -15u g / m ³ ;	N=10 C=0
4	Low temperature operation	1) 10m ³ constant temperature laboratory, temperature -5 degrees Celsius, humidity 30%, particulate matter generator to send smoke, air purifier regulation. 2) Power DC 5V test consistency	3) 100 ~ 500u g /	N=10 C=0

2	Vibration	1) 10m closed laboratory, temperature 20 degrees Celsius, humidity 50%, particulate matter generator to send smoke, air purifier regulation. 2) Power DC 5V test consistency 3) Vibration frequency: 50Hz 4) Acceleration: $9.8 / S^2$ 5) Vibration direction: XYZ direction 6) Amplitude (vertical direction): + - 2mm 7) Test time: XYZ direction for 60 minutes.	m^3 between the test prototype and the standard machine between the UI big error within + -15%; 4) fan no obvious abnormal sound	N=5 C=0
5	High temperature and high humidity storage	1) constant temperature cabinet, temperature 70 degrees Celsius, humidity 90 ~ 95% 2) for 500 hours 3) Remove, connect power DC 5V ,test consistency	1) 10 sample points are set between 0 ~ 500u g / m of particulate matter concentration;	N=10 C=0
6	Low temperature storage	1) constant temperature cabinet, temperature 70 degrees Celsius, humidity 90 ~ 95% 2) for 500 hours 3) Remove, connect power DC 5V ,test consistency	2) 0 ~ 100u g / m^3 The maximum error between the test prototype and the standard	N=10 C=0

7	Power fluctuation	1) 10m ³ closed laboratory, temperature 20 degrees Celsius, humidity 50%, particulate matter generator to send smoke, air purifier regulation. 2) adjustable DC power supply, from 4.5V rise 5.5V, and then down to 4.5V, repeated cycle changes 2 hours, the voltage change rate of 0.1V / Min. Simultaneous detection of consistency	machine is within + -10u g / m ³ ; 3) 100 ~ 500u g / m ³ between the test prototype and the standard machine between the UI	N=5 C=0
8	Switch	1) 10m ³ closed laboratory, temperature 20 degrees Celsius, humidity 50%, particulate matter generator to send smoke, air purifier regulation. 2) DC 5V power supply, power switching frequency 0.5Hz, for 72 hours. After the end of the test consistency	big error within + -10%; 4) fan no obvious abnormal sound	N=10 C=0
9	Sleep switch	1) 10m ³ closed laboratory, temperature 20 degrees Celsius, humidity 50%, particulate matter generator to send smoke, air purifier regulation. 2) DC 5V power supply, sleep control pin (SET) level conversion frequency 0.5Hz, for 72 hours. After the end of the test consistency.		N=10 C=0
10	Laser switch	1) 10m ³ closed laboratory, temperature 20 degrees Celsius, humidity 50%, particulate matter generator to send smoke, air purifier regulation. 2) laser switching frequency 50HZ, for 240 hours, after the end of testing consistency.		N=10 C=0
11	Salt spray	1) concentration of 5% industrial salt water, spray spray 100 hours, remove the pure water washed, placed 48 hours.	1) Metal parts without rust and discoloration	N=1 C=0

Size(mm)

产品外观尺寸详图



Installation Precautions

- 1) The metal case is connected to the internal power source. Be careful not to connect with other external board groups or chassis.
- 2) the air inlet and outlet where the plane close to the user's machine wall and the outside of the pores connected to the best installation, such as can not be achieved, the outlet around 2cm without shelter. Between the air inlet and the outlet should be the structure of the air separation, to avoid air flow inside the user from the outlet directly back to the air inlet.
- 3) The inner wall of the user's machine shall not be smaller than the size of the air inlet.
- 4) When applying to the purifier, try to avoid placing the sensor directly in the purifier's own air duct. If it is unavoidable, set up a separate structural space and place the sensor in the same way as the purifier's own duct isolation.
- 5) Application with the purifier or fixed detection equipment, the sensor position should be higher than the ground 20cm or more. Otherwise there may be near the ground of large dust particles and even floc contamination caused by fan winding resistance.
- 6) sensors used in outdoor fixed equipment, for dust storms, rain and snow and the protection of Yang catkins, should be completed by the equipment.
- 7) The sensor is an integral part and the user will not disassemble it, including metal shields, to prevent irreversible damage.