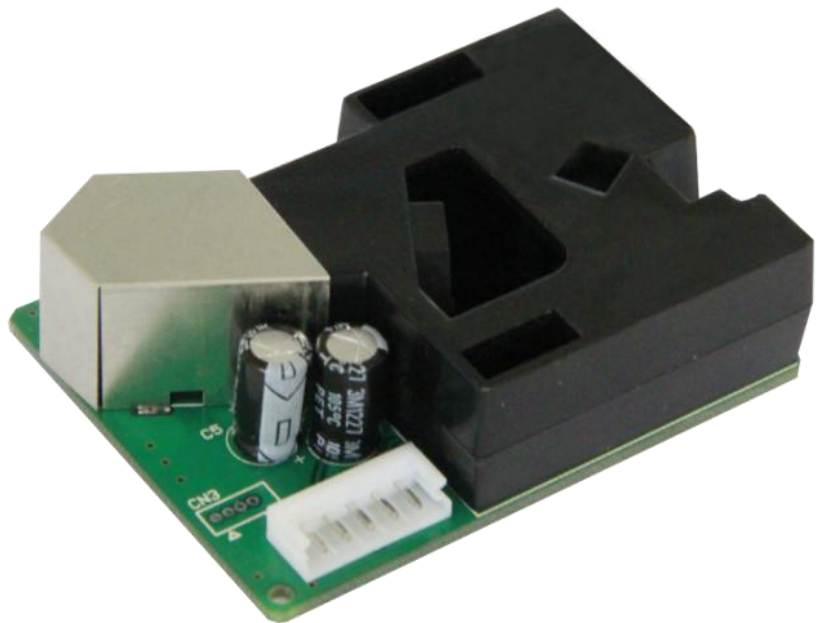




DUST SENSOR MODULE PM1001

USER MANUAL



Ver. 1.0

2013 12

Wuhan Cubic Optoelectronics Co., Ltd

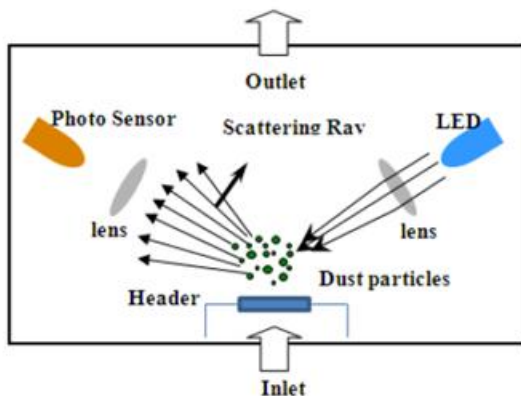
Note: The data in the picture is for reference only, and the actual delivered goods shall prevail

1 Functions

PM1001 dust sensor module is used to measure dust concentration.

Led dust sensor module PM1001 adopt the principle of optical scattering to detect the particle more than $1\mu\text{m}$ concentration in the air, there has an infrared light-emitting diode and a photoelectric built-in the sensor, led light will be reflected when come across the dust particle ,then the sensor receive intensity of the light and the output signal, it can judge the concentration of dust according to the intensity of the output signal, the sensor can output PWM signals directly as well as using UART serial signal to output particles quantity or concentration directly. The sensor is suitable for air purifier, with the function of purifying air conditioning, fresh air system and air quality testing instrument.

2 Principle



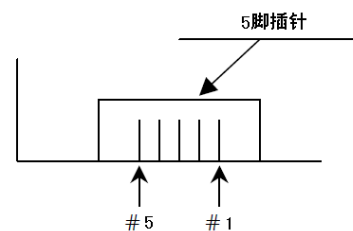
According to the principle of the dispersion of light, led light will be reflected when come across the dust particle, then the sensor receive intensity of the light and the output signal, it can judge the concentration of dust according to the intensity of the output signal . When there is no dust detected, the sensor output high pulse. On the contrary, when detected dust, low pulse sensor output. The detector detect the reflected light of dust or cigarette smoke particles. The detector output current is proportional to the light intensity, the output current was amplified and finally output digital low pulse.

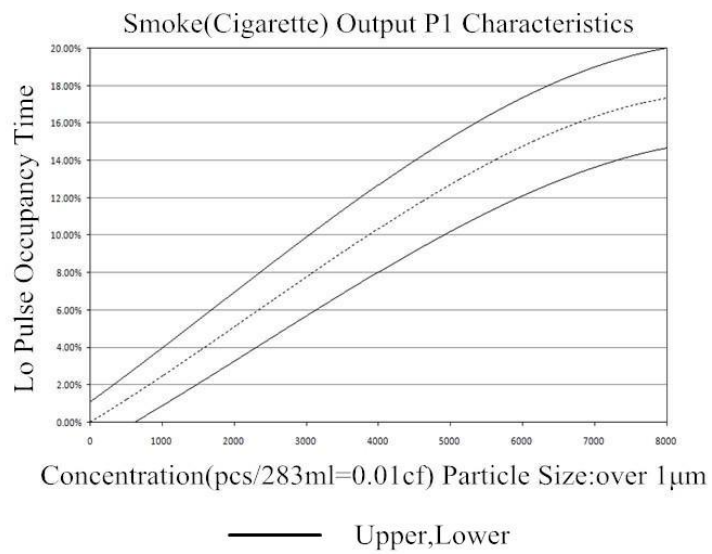
3 Specification

Measurement range	Diameter of dust: > 1μm
	8000 pcs / 283mL, ug/m3
Supply voltage	+4.75 ~ +5.25V
Working current	90mA
Working Condition	0~50℃,0-95%RH non-condensing
Storage temperature	-20~60℃
Accuracy	0-2000:±1100(PCS/283mL)
	> 2000:±(500+30% reading)
	0-71:±38ug/m3
	> 71:±(18+30%reading)
Preheating Time	60s
Size	59*45*17.2(mm)
Weight	About 26g
Stable time	1 minute after power on
Output	PWM,UART_TTL(0-5v)
Power Supply/Consumption	DC 5V , 0.45w
Lifespan	10 years

CN1 Pin definition

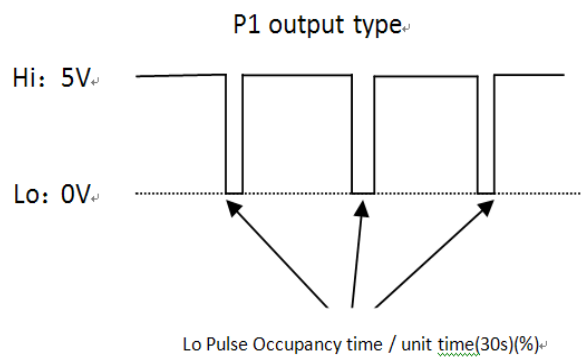
NO.	Definition	Description
1	GND	POWER SUPPLY INPUT (GND)
2	TX	UART (SENDING)
3	+5V	POWER SUPPLY INPUT (+5V)
4	P1	PWM
5	RX	UART (RECEIVING)





Current-illumination Characteristic

P1 The relationship between output voltage and particle concentration	
Curve1	Low level output upper limit value
Curve2	Low level output average value
Curve3	Low level output lower limiting value



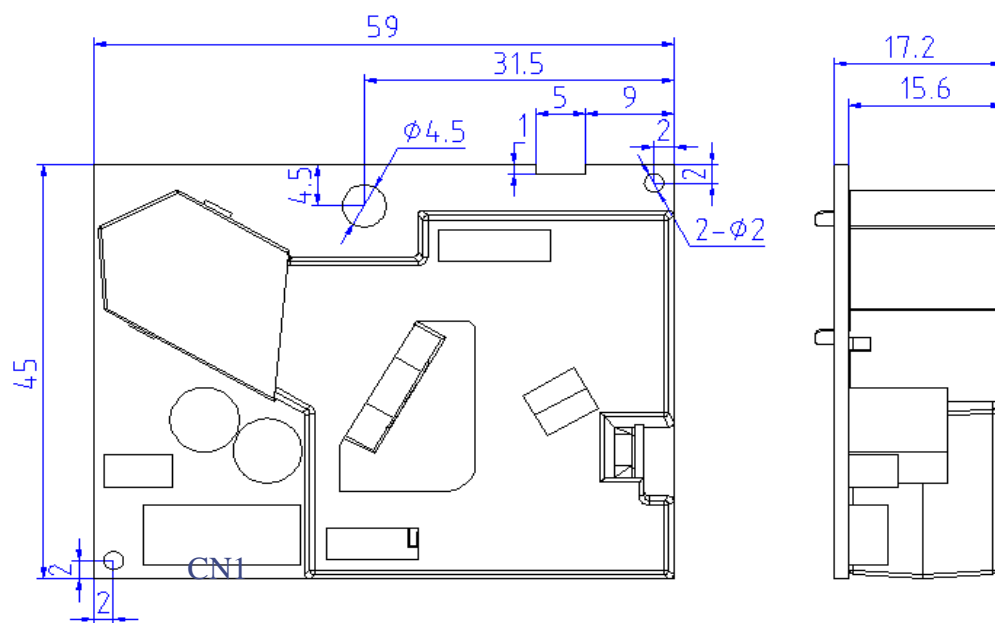
The relationship between pulse width and the dust concentration:

low pulse width is determined by the dust particle size and concentration.

Under the condition of the environment not polluted, 100-200 $\mu\text{g}/\text{m}^3$ smoke, the output pulse width of P1 pins is greater than 1.0 microns dust particle concentration (P2 pin output pulse width is greater than 2.5 microns of dust particle concentration).

4 Structure

3.1 size



3.2 Product image



5 Cautions

4.1 Suggest using LG GIL CN1 pin - S - 5 S - S2C2 or compatible plug

4.2 Please install PM1001 at a vertical direction(Error is less than $\pm 3^\circ$). Because it uses resistor to generate heating, the air flow is generated and rising inside the chamber.

4.3 air intake has heating resistance which is in the bottom;The sensor has been installed inside the device,.Black sponge should be equipped in front of the windows , try to make sure the sensor is in the dark environment, to reduce the influence of the light interference; To ensure that the air inlet and air outlet flow;If the rising air flow inside the chamber disordered, it would impact on the sensor performance. Consider air flow around the sensor.

4.4 Sensor should not be used in organic gas and flammable gas environment, when the dust pollute sensors cavity, pls using a clean lens paper or vacuum to clean it; pls using medical swabs moistened with water to wipe the lens , then using clean cotton swabs to dry lens,remember not to do not use alcohol.

6 Operation instruction

5.1 Install it at an vertical direction (+/- 3°)

- 5.2 Please cover PM1101 with black sponge, making sure it is covered by darkness
- 5.3 Don't use PM1001 at the environment of organic gases or combustion gases
- 5.4 Don't use alcohol to clean optical lens in PM1101; Just use fresh water to clean it.

7 Maintenance

Please clean optical lens in PM1101 after using for some time.

Cigarette tar has influenced sensitivity of the sensor.

Way to clean: using medical cotton bud with fresh water to wipe optical lens, and then dry the optical lens by a dry medical cotton bud

Clean period: 3-6 months per time

8 After-sales services and consultancy

TEL: 86-27-81628831

**ADD: Fenghuang No.3 Road, Fenghuang Industrial Park, Eastlake Hi-tech Development
Zone, Wuhan 430205, China**

FAX: 86-27-87401159

Http://www.gassensor.com.cn

E-mail:info@gassensor.com.cn

UART Communication protocol

Baud rate: 9600bps

Start bit:1 Data bit: 8 Stop bit: 1 Check bit: null

General Statement:

1. The data in the explanation are all hex data. Such as 46 is decimal [70]
2. [xx] is single byte data(no symbol,0-255) ;(xx) is double byte data, signed integer (-32768 to +32767),the top one is ahead. “—— ” followed by explanation;
3. All the data are integer. It has (100, 10, and 1) times relationship with true data.
4. The length of the command byte is [LB]+3.

Command Format:

Send: [IP] [LB] [CMD] [DF] [CS]

[IP] address (fixed as 11)。

[LB] byte length followed does not include CS

[CMD] command

[DF] parameter items with command, optional

[CS] CS= — (IP +LB+CMD +DF)

Response:

- a. When the command is implemented correctly, it responses

[ACK] [LB] [CMD] [DF] [CS]

[ACK]=0X16 right command

[LB] byte length followed does not include CS

[CMD] command

[DF] parameter items with command, optional

[CS] CS=— (ACK +LB+CMD+DF)

- b. When the command is not implemented correctly, it responses

[NAK] [LB] [CMD] [EC] [CS]

[NAK]=0X06 Command is not implemented correctly

[LB]=00 02 byte length followed does not include CS

[CMD] command

[EC] the error code that command is not implemented correctly

[CS] CS= — (NAK +LB+CMD+DF)

[EC]

0x 01 Order length is wrong or wrongly analysis

0x 02 this is not a real command

0x 03 can't implement this command under current status

0x 04 Command can't be implemented correctly

Function List:

NO	Function	CMD	Description
1	Read the measuring results	0x01/0B	
2	Write user's co-efficient A	0x0E	
3	Write user's co-efficient B	0x0F	
4	Check user's co-efficient A	0x1B	
5	Check user's co-efficient A	0x1C	
6	Check software version	0x1E	
7	Check product's number	0x1F	

1. Read the measuring value of dust

Send: 11 01 01 ED

Response: [ACK] 0D 01 (PM1.0) (PM1.0) (PM1.0) [CS]

Send: 11 01 0B E3

Response: [ACK] 0D 0B (PM1.0) (PM1.0) (PM1.0) [CS]

Descriptions:

- 1) Read the measuring results of dust
- 2) (PMxx) constitute a 32bit unsigned long integer ; such as (DF0 DF1 DF2 DF3)
Measured value = $DF0 * 256 * 256 * 256 + DF1 * 256 * 256 + DF2 * 256 + DF3$

2. Write user's Coefficient A

Send: 11 07 0E DF0 DF1 DF2 DF3 DF4 DF5 [CS]

Answer: [ACK] 01 0E [CS]

Descriptions:

- 1) Coefficients A = $DF0 * 256 + DF1$ (the coefficient is considered as A%)
- 2) DF0 DF1: PM1.0
DF2 DF3: PM1.0
DF4 DF5: PM1.0

3. Write user's Coefficient B [dust offset]

Send: 11 07 0F DF0 DF1 DF2 DF3 DF4 DF5 CS

Answer: [ACK] 01 0F CS

Descriptions: DF0 DF1: PM1.0 dust Drift
DF2 DF3: PM1.0 dust Drift
DF4 DF5: PM1.0 dust Drift

4. Check user's Coefficient A

Send: 11 011B D3

Answer: [ACK] 07 1B DF0 DF1 DF2 DF3 DF4 DF5 [CS]

Descriptions:

1) Back to User's coefficient A.

DF0 * 256 + DF1 is coefficient of PM1.0

DF2 * 256 + DF3 is coefficient of PM1.0

DF4 * 256 + DF5 is coefficient of PM1.0

5. Check user's Coefficient B [dust offset]

Send: 11 01 1C D2

Answer: [ACK] 07 01 DF0 DF1 DF2 DF3 DF4 DF5 CS

Description: DF0 DF1: PM1.0 dust Drift

DF2 DF3: PM1.0 dust Drift

DF4 DF5: PM1.0 dust Drift

6. Check the software version

Send: 11 01 1E D0

Answer: [ACK] 09 1E [CH11] [CH21] [CH31] [CH41] [CH51] [CH61] [CH71] [CH81][CS]

Description:

Output software version number. [CHx] for the software version number, ASCII code

7. Check the product number

Send: 11 01 1F CF

Answer: [ACK] 0B 1F (SN11) (SN21) (SN31) (SN41) (SN51) [CS]

Function: Check the product number

Descriptions:

1 output software instrument number. SNx range of 0 to 9999, the first zero hold, such as 0100, four integer constitute 20 numbers.