

Gravity: Laser PM2.5 Air Quality Sensor For Arduino

Overview

PM2.5 laser dust sensor is a digital universal particle concentration sensor, it can be used to obtain the number of suspended particulate matter in a unit volume of air within 0.3 to 10 microns, namely the concentration of particulate matter, and output with digital interface, also can output quality data of per particle. The Air Quality sensors can be embedded in a variety of concentrations of environment-related instruments suspended particulate matter in the air, to provide timely and accurate concentration data.



Order Code

Order Code	Brand	Description
E34006-001	DFRobot	Gravity: Laser PM2.5 Air Quality Sensor For Arduino

Specification

- Operating voltage: 4.95 ~ 5.05V
- Maximum electric current: 120mA
- Measuring pm diameter: 0.3-1.0, 1.0-2.5, 2.5-10(um)
- Measuring pm range: 0~999 ug/m3
- Standby current: ≤ 200 uA
- Response time: ≤ 10 s
- Operating temperature range: -20 ~ 50C
- Operating humidity range: 0 ~ 99% RH
- Maximum size: 65 × 42 × 23 (mm)
- MTBF: ≥ 5 years
- Quick response
- Standard serial input word output
- Second-order multi-point calibration curve
- The minimum size of 0.3 micron resolution

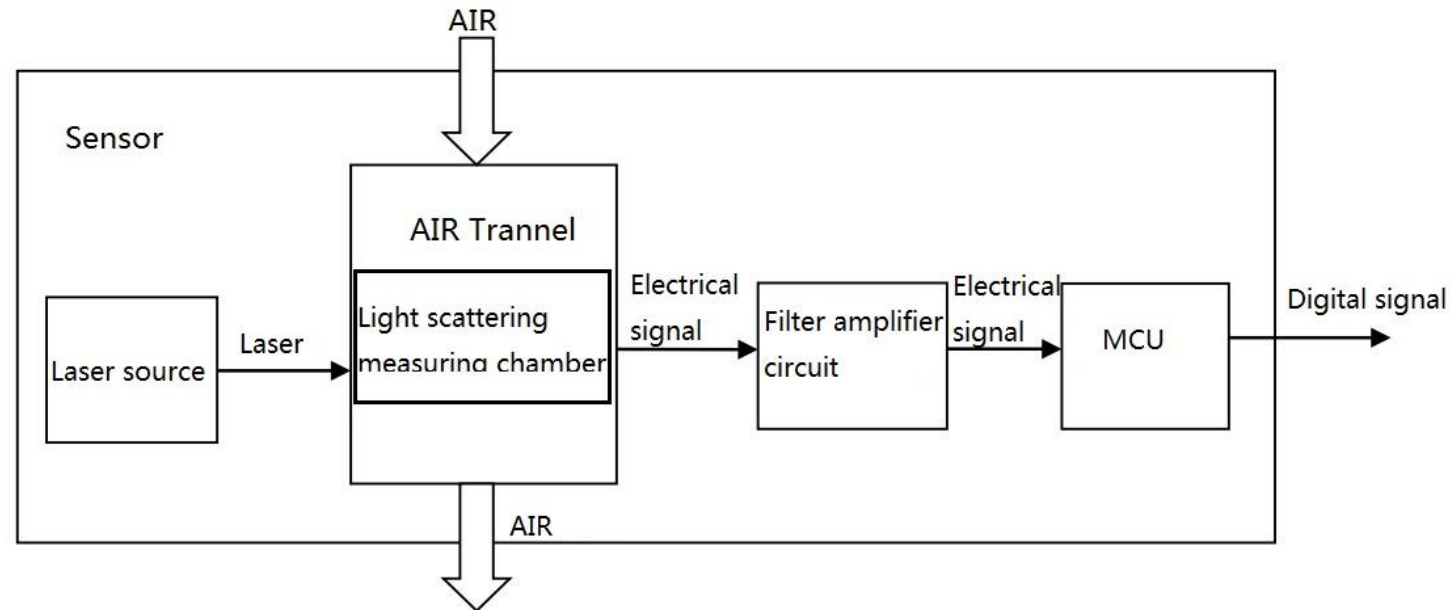
Power supply quality requirements:

- Voltage ripple: less than 100mV.
- The power supply voltage stability: 4.95 ~ 5.05V.
- Power supply: more than 1W (5V@200mA).
- The upper and lower electric voltage surge is less than 50% of the system power supply voltage.

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How it works?

This pm2.5 sensor uses a laser scattering theory. And namely the scattering of laser irradiation in the air suspended particles, while collecting the scattered light at a specific angle, to obtain the scattering intensity versus with time curve. After the microprocessor data collection, get the relationship between the time domain and frequency domain by Fourier transform, and then through a series of complex algorithms to obtain the number of particles in the equivalent particle size and volume units of different size. Each functional block diagram of the sensor portion as shown:



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Connection

Sensor Pin	Arduino Pin	Function Description
Pin 1	VCC	Positive Power
Pin 2	GND	Negative Power
Pin 3	SET	Mode setting (More hereof later)
Pin 4	RXD	receive serial port pin (3.3V level)
Pin 5	TXD	Transferring serial port pin (3.3V level)
Pin 6	RESET	Reset
Pin 7/ 8	NC	NULL



****SET: ****

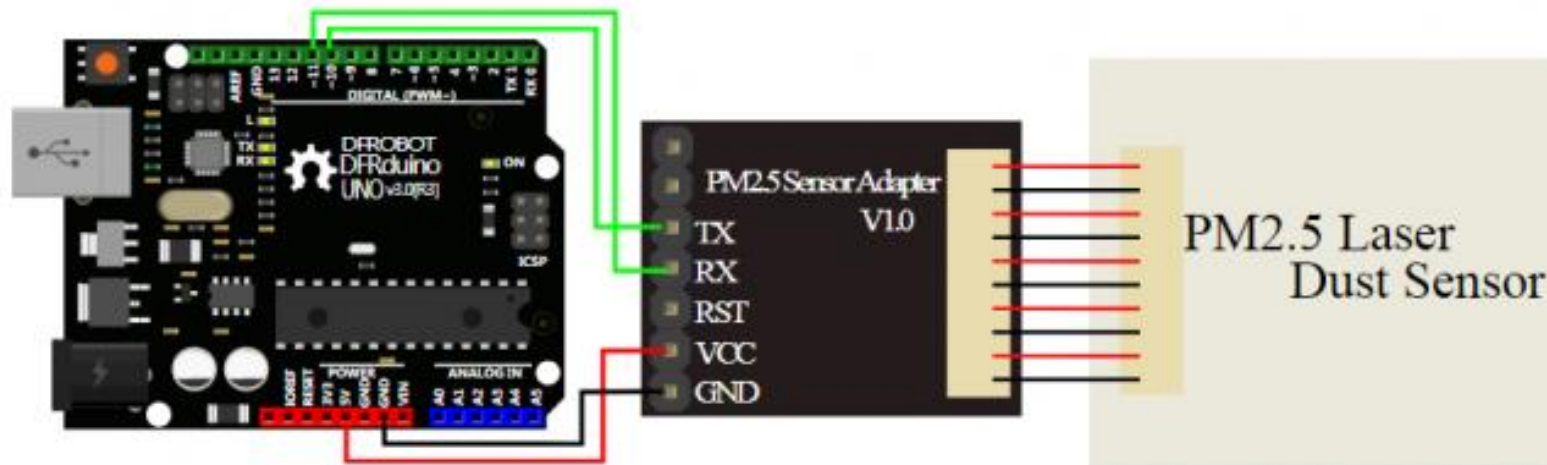
SET = 1, the module works in continuous sampling mode, it will upload the sample data after the end of each sampling. (The sampling response time is 1S)

SET = 0, the module enters a low-power standby mode.

RESET: leave it empty is OK.

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Connection Diagram



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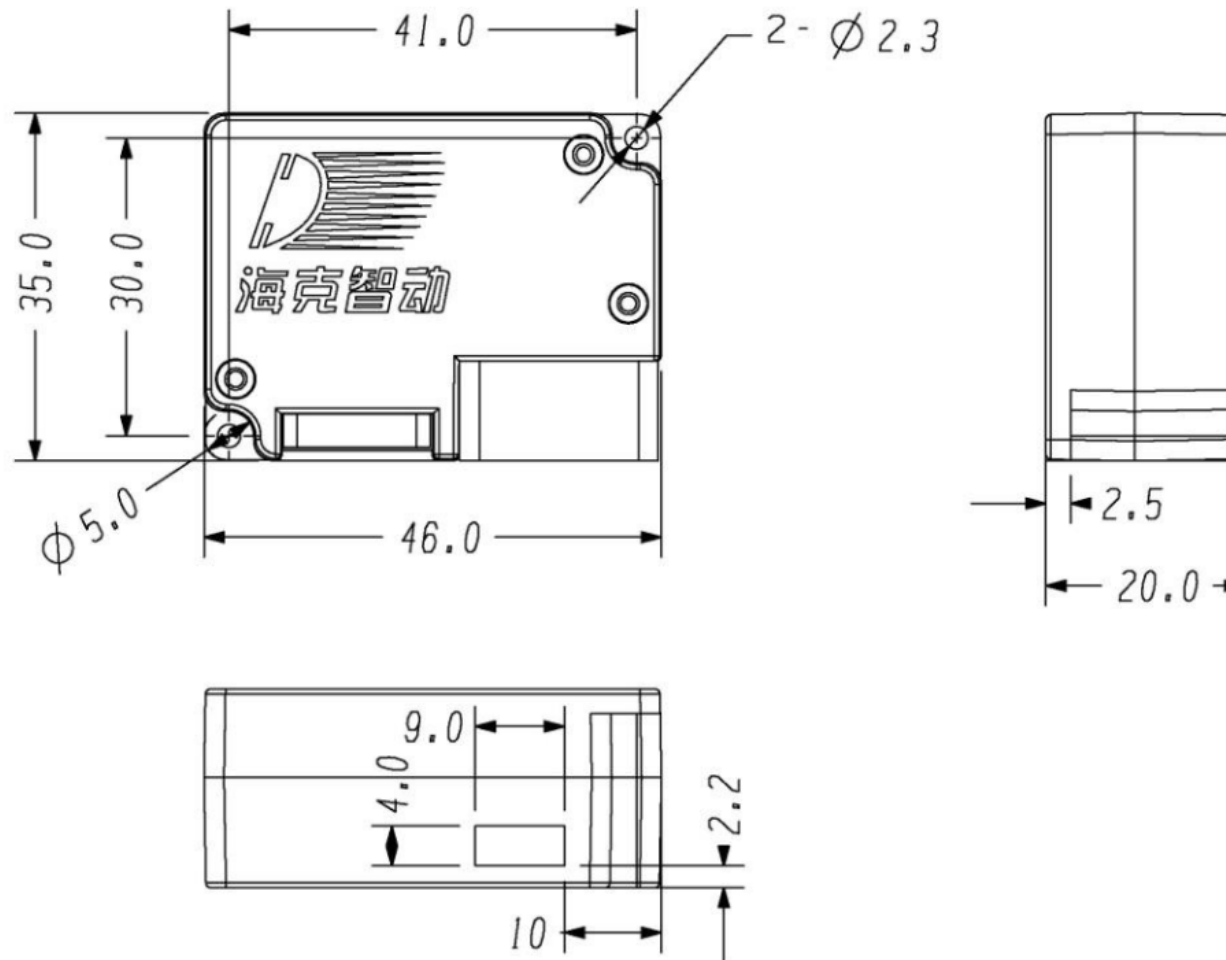
Communication protocol

Serial port baudrate: 9600; Parity: None; Stop Bits: 1; packet length is fixed at 32 bytes.

Start Character 1	0x42(fixed bit)
Start Character 2	0x4d(fixed bit)
Frame Length 16-byte	Frame Length = 2*9+2 (data+check bit)
Data 1, 16-byte	concentration of PM1.0, ug/m3
Data 2, 16-byte	concentration of PM2.5, ug/m3
Data 3, 16-byte	concentration of PM10.0, ug/m3
Data 4, 16-byte	Internal test data
Data 5, 16-byte	Internal test data
Data 6, 16-byte	Internal test data
Data 7, 16-byte	the number of particulate of diameter above 0.3um in 0.1 liters of air
Data 8, 16-byte	the number of particulate of diameter above 0.5um in 0.1 liters of air
Data 9, 16-byte	the number of particulate of diameter above 1.0um in 0.1 liters of air
Data 10, 16-byte	the number of particulate of diameter above 2.5um in 0.1 liters of air
Data 11, 16-byte	the number of particulate of diameter above 5.0um in 0.1 liters of air
Data 12, 16-byte	the number of particulate of diameter above 10.0um in 0.1 liters of air
Data 13, 16-byte	Internal test data
Check Bit for Data Sum, 16-byte	Check Bit = Start Character 1 + Start Character 2 + ...all data

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Dimension



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Documents

- [HK-A5 Laser PM2.5/10 Sensor Datasheet](#)

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Revision History

Date	Revision	Change description
30/10/2025	1.0	Initial release