Laser PM2.5 Sensor specification

Product model: SDS011

Version : V1.0

Nova Fitness Co.,Ltd
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Overview
SDS011 uses the principle of laser scattering in the air, can be obtained from 0.3 to 10 microns suspended particulate matter concentration, the data is stable and reliable; the built-in fan, digital output, high degree of integration.

Characteristics
NO1. The accurate data: laser detection, stable, good consistency;
NO2. Quick response: scene change response time of less than 10 seconds;
NO3. Facilitate the integration: the serial output (or IO output can be customized), fan;
NO4. The high resolution: the resolution up to 0.3 micron minimum diameter of particles;
**Working principle**
Using laser scattering principle: when the laser beam through the detecting position particle will produce weak light scattering, light scattering wave and particle in a particular direction is related to the diameter of the particle number concentration, through different waveform classification size statistics and conversion formula can get different size particles in real-time, calibration method to get mass concentration of unified with the official unit;

**Technical parameters**

<table>
<thead>
<tr>
<th>Number</th>
<th>Project</th>
<th>Parameter</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Measurement parameters</td>
<td>PM2.5, PM10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Range</td>
<td>0.0-999.9 micro-grams / cubic meter</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Power supply voltage</td>
<td>5V</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Maximum working current</td>
<td>220mA</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sleep current</td>
<td>2mA</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Working temperature range</td>
<td>-20-50°C</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Corresponding time</td>
<td>1 sec</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Serial data output frequency</td>
<td>1 times / sec</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Particle diameter resolution</td>
<td>&lt; 0.3 micron</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Error</td>
<td>5%</td>
<td></td>
</tr>
</tbody>
</table>
product size:
L*W*H=71*70*23mm

Interface specification:

<table>
<thead>
<tr>
<th>connector pin-out</th>
<th>Name</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CTL</td>
<td>control pin, backup</td>
</tr>
<tr>
<td>2</td>
<td>1um</td>
<td>PM2.5 0-999ug/m³, PWM Output</td>
</tr>
<tr>
<td>3</td>
<td>5V</td>
<td>5V Input</td>
</tr>
<tr>
<td>4</td>
<td>25um</td>
<td>PM10 0-999 ug/m³, PWM Output</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>ground</td>
</tr>
<tr>
<td>6</td>
<td>R</td>
<td>RX of UART (TTL)</td>
</tr>
<tr>
<td>7</td>
<td>T</td>
<td>TX of UART (TTL)</td>
</tr>
</tbody>
</table>

PS: The distance between each pin is 2.54mm.

The UART communication protocol:
bit rate : 9600
Data bit : 8
parity bit: NO
stop bit : 1

<table>
<thead>
<tr>
<th>The number of bytes</th>
<th>Name</th>
<th>Backup</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Message</td>
<td>AA</td>
</tr>
<tr>
<td></td>
<td>header</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Commander No.</td>
<td>C0</td>
</tr>
<tr>
<td>2</td>
<td>DATA 1</td>
<td>PM2.5 Low byte</td>
</tr>
<tr>
<td>3</td>
<td>DATA 2</td>
<td>PM2.5 High byte</td>
</tr>
<tr>
<td>4</td>
<td>DATA 3</td>
<td>PM10 Low byte</td>
</tr>
<tr>
<td>5</td>
<td>DATA 4</td>
<td>PM10 High byte</td>
</tr>
<tr>
<td>6</td>
<td>DATA 5</td>
<td>0 (Reserved)</td>
</tr>
<tr>
<td>7</td>
<td>DATA 6</td>
<td>0 (Reserved)</td>
</tr>
<tr>
<td>8</td>
<td>Check-sum</td>
<td>Check-sum</td>
</tr>
<tr>
<td>9</td>
<td>message tail</td>
<td>AB</td>
</tr>
</tbody>
</table>

Check-sum: \( \text{Check-sum} = \text{DATA1} + \text{DATA2} + \ldots + \text{DATA6} \) •

PM2.5 value: \( \text{PM2.5 (ug/m}^3\) = \((\text{PM2.5 High byte} \times 256) + \text{PM2.5 low byte})/10 \)

PM10 value: \( \text{PM10 (ug/m}^3\) = \((\text{PM10 high byte} \times 256) + \text{PM10 low byte})/10 \)

**PWM Output description**

<table>
<thead>
<tr>
<th>Range of PM2.5 value</th>
<th>0-999ug/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of PM10 value</td>
<td>0-999ug/m³</td>
</tr>
<tr>
<td>Cycle:</td>
<td>1004ms ± 1%</td>
</tr>
<tr>
<td>high level output at the beginning of the whole cycle:</td>
<td>2ms</td>
</tr>
<tr>
<td>The middle of this cycle</td>
<td>1000ms ± 1%</td>
</tr>
</tbody>
</table>
low level output at the end of the whole cycle: 2ms

Schematic diagram of output: