DSM501A
Dust sensor module

■ Features
PWM output
Compact size and Lightweight
Easy installation
Single power supply

■ Application
Air cleaner or Air purifier
Air conditioner
Air quality monitor
Ventilator etc

■ Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Vcc</td>
<td>-0.3 to +7</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-10 to +65</td>
<td>℃</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-20 to +80</td>
<td>℃</td>
</tr>
</tbody>
</table>

■ Operating supply voltage

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating supply voltage</td>
<td>Vcc</td>
<td>5 ± 0.5</td>
<td>V</td>
</tr>
</tbody>
</table>

■ Electro-optical characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td></td>
<td>&gt; 1μm *1</td>
<td>–</td>
<td>15,000/283ml</td>
<td>–</td>
<td>pcs</td>
</tr>
</tbody>
</table>

*1: At condition that the particle diameter is over than one micro meter.
1.0. DEVICE OVERVIEW

This specification applies to the characteristics of model No. DSM501A.
The dust sensor module DSM501A is low cost, compact size for a particle density sensor.
* Quantitative particle density measurement with the principle of particle counter.
* Fine particles of which diameters are bigger than one micron could be detected with high sensitivity.
* Inside heater realizes the self-air taking.
* One control contact and two output contacts

A block diagram is illustrated in figure 1.1. The DSM501A consists of:
* Light Emitting Diode (LED) Lamp
* Detector
* Signal amplifier circuit
* Output drive circuit 1
* Output drive circuit 2
* Heater

FIGURE 1.1. BLOCK DIAGRAM
TABLE 1.1. PINOUT I/O DESCRIPTION

<table>
<thead>
<tr>
<th>Pin number</th>
<th>Pin name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Control 1</td>
<td>Vout 1 control</td>
</tr>
<tr>
<td>#2</td>
<td>Vout 2</td>
<td>Vout 2 output</td>
</tr>
<tr>
<td>#3</td>
<td>Vcc</td>
<td>Positive power supply</td>
</tr>
<tr>
<td>#4</td>
<td>Vout 1</td>
<td>Vout 1 output</td>
</tr>
<tr>
<td>#5</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

FIGURE 1.2. PIN ARRAY (component view)

The male and female connector’s maker is LG cable in Korea.

TABLE 1.2. CONNECTOR PART NUMBER

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>GIL-S-5P-S2L2-EF</td>
</tr>
<tr>
<td>Female</td>
<td>GIL-S-5S-S2C2</td>
</tr>
</tbody>
</table>
2.0. CIRCUIT DESCRIPTION

This section gives a circuit description of the external connections and components of the DSM501A. The following connections and external components provide starting points for designs.

2.1. Vout 2
The Vout 2 is normal output port.
The sensitivity of Vout 2 pin is preset up. This port is detect particle which is over 1 micrometer.

2.2. Vout 1
Use this pin when sensitivity of Vout 2 is sensitive.
The sensitivity of Vout 1 is dull than Vout 2 about 2.5 times. (Vout 1’s sensitivity x 2.5 times = Vout 2’s sensitivity) It means size of particle is 2.5 micrometers.

Vout 1 is adjustable output. You can adjust to detecting level of particle size.

2.3. Control 1
This pin is adjustable sensitivity of Vout 1.
Use this pin when output of Vout 1 is not proper.

> How to control
Add a resistor between Control 1 pin and ground. And you can tune resistor’s value.

<table>
<thead>
<tr>
<th>Resistor value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>open</td>
<td>Preset sensitivity (over 2.5 micrometer)</td>
</tr>
<tr>
<td>100K</td>
<td>Half sensitivity</td>
</tr>
<tr>
<td>27K</td>
<td>Equal sensitivity of Vout 2 (over 1 micrometer)</td>
</tr>
</tbody>
</table>
3.0. APPLICATION

This section provides general information on application for the DSM501A.

3.1. Heater
This module has a heater (resistor) to generate heat. Heat creates updraft (upward current of air) which draw air outside of the module into the module.

3.2. Detect particle
This module is designed to detect the particle whose size is over one micrometer, which means it can detect cigarette smoke, house dust, tick, spore, pollen and mildew.

3.3. Install
The dust sensor module DSM501A should be installed vertically and kept away from any artificial current of air by fans. In case it is used for air purifier of which fan located in front or rear part, we request it to be installed at ether side of the housing, not too much deep inside of the housing. Also need to have slit around the module so that air can come inside.
In addition, please pay attention to structure and placing location of the application to avoid any adhesive particle like oil, etc. to get into the module. If it sticks to optical part, malfunction may occur.
When inside of the module is moisturized, it does not keep its proper function. Please design the application so that moisturization of the module does not happen.

3.4. Lens
Lens needs to be cleaned depending on the condition. (once a six months) Cigarette tar on the lens should affect the sensitivity of the sensor. Wet one side of swab with water and rub the lens with it and then dry lens with the other end of swab.
4.0. ELECTRICAL CHARACTERISTIC

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vout 1, 2 at high *1</td>
<td>Voh</td>
<td>No particle</td>
<td>4.0</td>
<td>4.3</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Vout 1, 2 at low *2</td>
<td>Vol</td>
<td>Particle</td>
<td>0.7</td>
<td>1.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Supply current</td>
<td>Icc</td>
<td></td>
<td>–</td>
<td>–</td>
<td>90</td>
<td>mA</td>
</tr>
<tr>
<td>Time for stabilization *3</td>
<td></td>
<td></td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>minute</td>
</tr>
</tbody>
</table>

*1: Vout 1 and Vout 2 are high state when not detect particle. (=clean room)
*2: Vout 1 and 2 are go to low state when detect particle.
*3: after the power turned on.

FIGURE 4.1. VOLTAGE VS CURRENT

![Voltage vs Current Graph](image1)

FIGURE 4.2. VOLTAGE LOW RATIO VS PARTICLE

![Voltage Low Ratio vs Particle Graph](image2)

X–axis shows number of particles and y–axis shows output characteristics. Upper curve shows upper limit output characteristics and lower one shows lower limit.
5.0. PACKAGING INFORMATION

5.1. Package marking information

5.2. Package details

Package dimensions: W59 x H45 x D20 mm
Weight: Approx. 24g

6.0. PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the listed sales office.

DSM501A

Device name

Sales & Support
Notes

VR trimmer for sensitivity adjustment is set up at shipping from SYhitech. Please don’t touch the VR trimmer.

Please don’t disassemble the device. Even if the device is reassembled, it may not satisfy the specification.

There is a case that it does not detect the dust density correctly, since the dust adhered to the outside of the lens. When the dust is adhered, please consider the maintenance such as vacuuming or blowing off the dust by air.

Please don't use this device for an emergency application or fire alarm application.

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