STBM 271
DUST SENSOR MODULE

1. Scope of application

The Dust Sensor Module STBM 271 detects the level of indoor airborne dust, particles, and pollen, and is ideal for use in stand-alone air cleaner or IAQ monitor applications. The PWM output of the sensor can be connected directly to a µ-processor to control fan speed or ventilation and also to display the concentration of particles. Detectable size of particles is limited to about 1 µm.
Usage in security relevant applications (for example smoke or fire alarm) is not allowed.

2. Technical Data

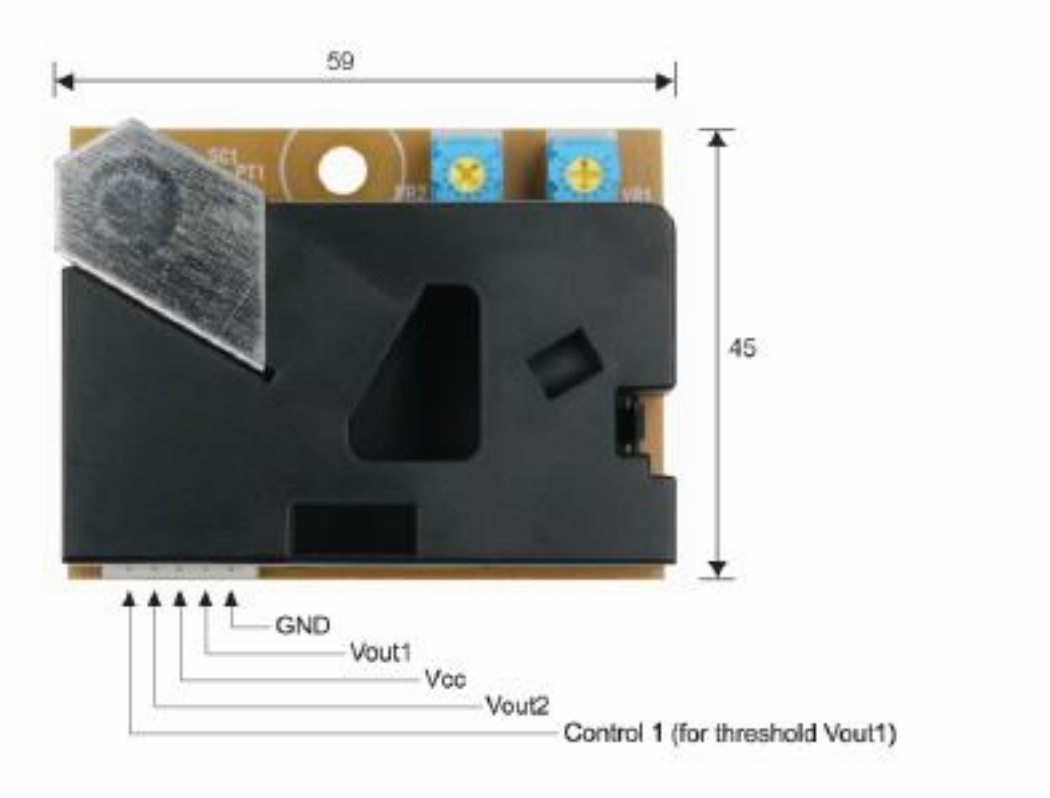


Fig. 1: Dimensions in millimeters

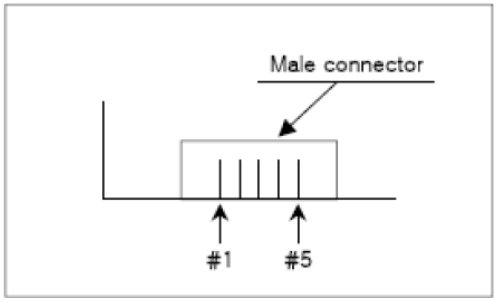
3. Electrical characteristics

3 - 1. Supply voltage	: DC 5V±10%
3 - 2. Power consumption	: 90mA
3 - 3. Operating temperature range	: -10~ +65°C
3 - 4. Operating humidity range	: 95%RH or less (without dew condensation)
3 - 5. Recommend storage condition	: -20~ +80°C
3 - 6. Dimension	: W59 * H45 * D20 (mm)
3 - 7. Detectable particle size	: approx. 1㎛ (minimum)
3 - 8. Detectable range of concentration	: up to 1.4 mg/m³
3 - 9. Output signal	: PWM (pulse width modulation)
3 - 10. Time for stabilization	: 1 minute after power turned on
3 - 11. Sensor characteristics	: Between the upper limit and lower limit of the standard dust sensor unit

4. PINOUT I/O DESCRIPTION

Pin number	Pin name	Description
#1	Control	Vout 1 control
#2	Vout 2	Vout 2 output (PWM)
#3	Vcc	Positive power supply
#4	Vout 1	Vout 1 output (PWM)
#5	GND	Ground

PIN ARRAY (component view)



Control (Pin #1)
This pin is used for tuning the sensitivity when Vout1 is used.

Vout 2 (Pin #2) (PWM output)
The Vout 2 is the standard output port.
The sensitivity of Vout 2 pin is preset at the factory.
This port gives PWM output for density of particles over 1 μm.

Vcc (Pin #3)
Positive power (DC 5V) supply

Vout 1 (Pin #4) (PWM output)

Use this pin as output of the module instead of Vout 2 (Pin #2) when adjustments to the minimum particle size that shall be detected are needed.

By adding a resistor between Control (pin #1) and Ground (pin #5), the minimum size of the particles detected can be adjusted from 1μm to 2.5μm.

The standard (open) minimum size of particles is 2.5μm. (refer to Table 4.1)

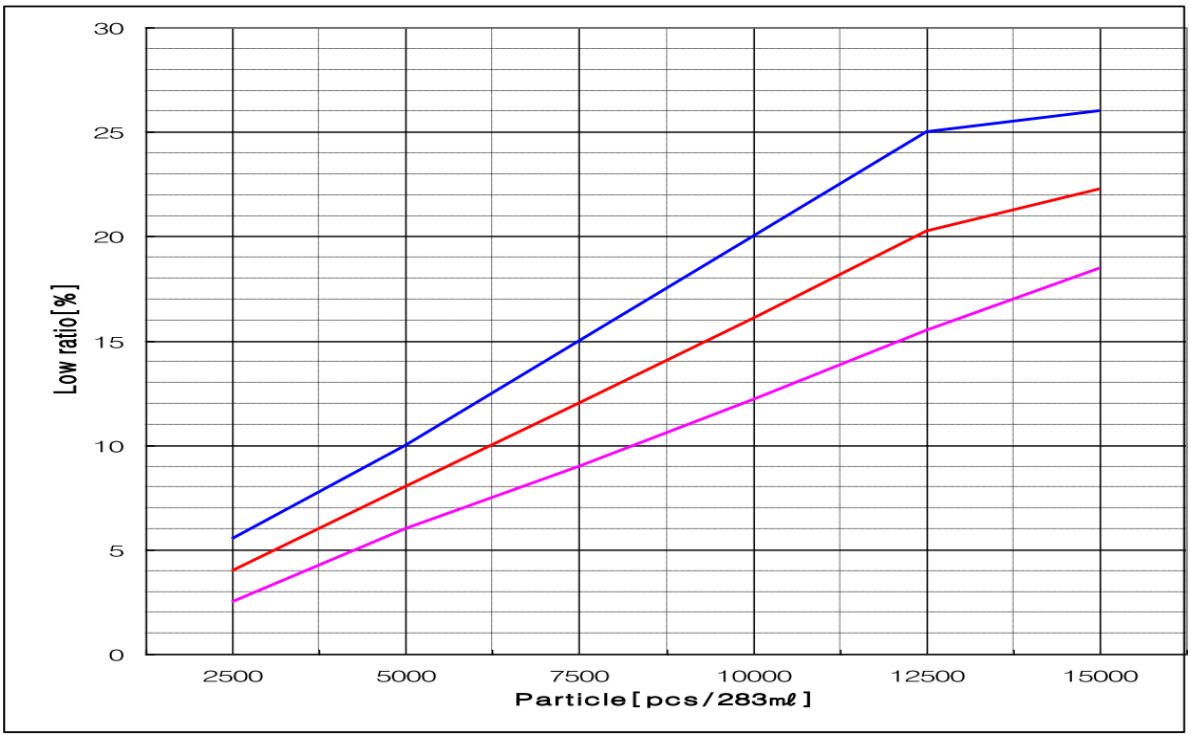
Resistor value	Description
open	Preset sensitivity (over 2.5 μm)
100K	Half sensitivity (over 1.75 μm)
27K	Equal sensitivity of Vout 2 (over 1 μm)

TABLE 4.1. RESISTOR VALUE

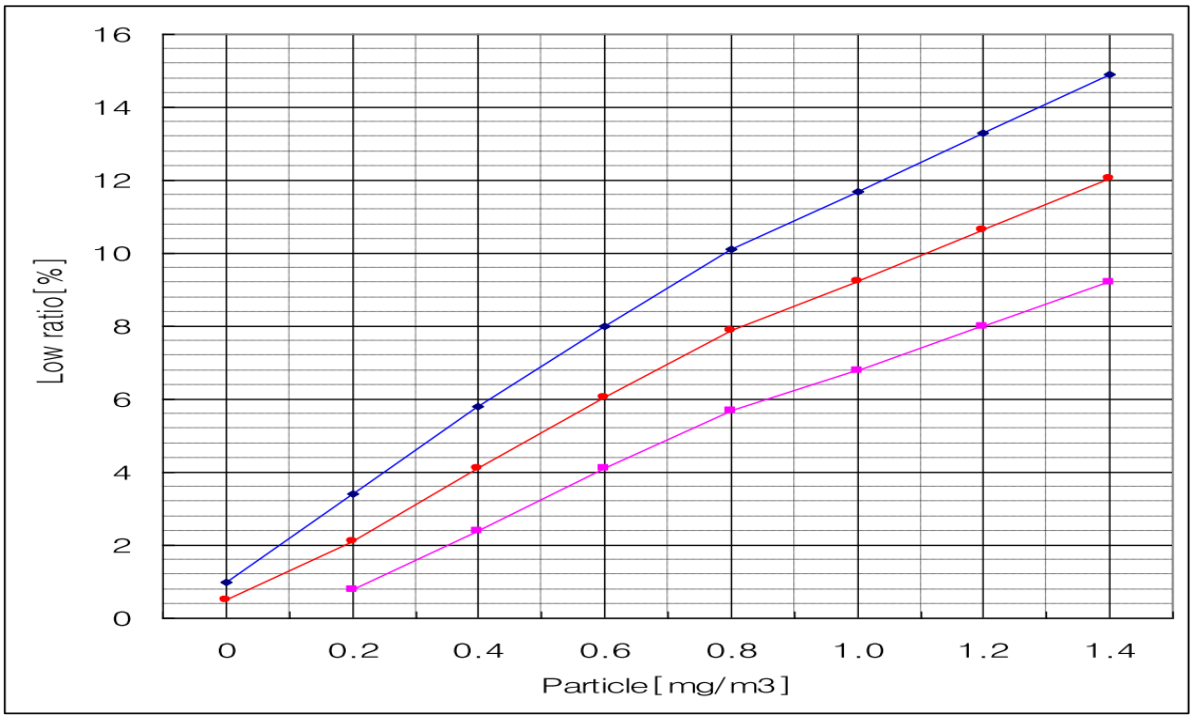
Ground (Pin #5)
This pin is used for Ground.

SENSOR CHARACTERISTICS

LOW RATIO vs. CONCENTRATION
X-axis shows number of particles and Y-axis shows output characteristics. Upper curve (blue) shows upper limit output characteristics and lower one (magenta) shows lower limit.

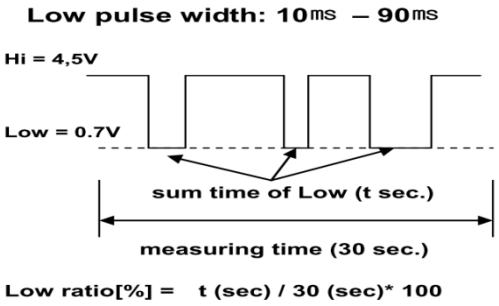


Number Concentration given in particles / 283 ml



Mass Concentration estimate in mg/m³

Definition of low ratio:



Output Characteristics:

Vcc=5V, Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Vout 1, 2 at high *1	Voh	No particle	4.0	4.3	-	V
Vout 1, 2 at low *2	Vol	Particle	-	0.7	1.0	V
Supply current	Icc		-	-	90	mA
Time for stabilization *3			1	-	minute	

*1 : Vout 1 and Vout 2 are high state when particles are not detected. (=clean room)
*2 : Vout 1 and 2 go to low state when particles are detected.
*3 : After the power is turned on.

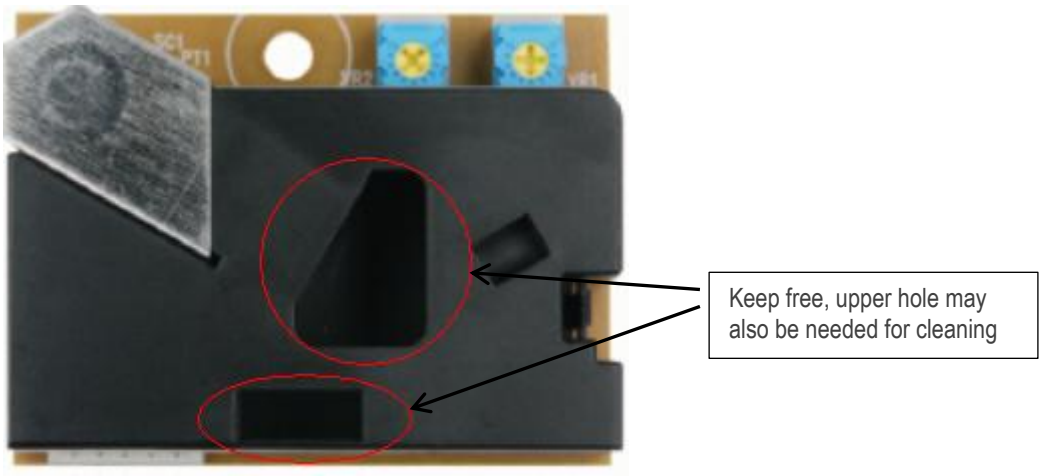
5. Application

This section provides general information on the STBM 271

5-1. Heater
This module has a heater (resistor) to generate heat. Heat creates updraft (upward current of air) which draws outside air into the module.

5-2. Detectable Particles
This module is designed to detect the particle of the size bigger than one micrometer, which usually includes cigarette smoke, house dust, tick, spore, pollen and mildew.

5-3. Installation
The dust sensor module STBM 271 should be installed vertically and kept away from any artificial current of air by fans. In case it is used for air purifier with a fan located in front or rear part, it should be installed at either side of the housing and not in the middle of the housing.
Air must be able to flow through both holes:



In addition, please pay attention to structure and placing location of the application to avoid any adhesive particles (such as oil, etc) getting into the module, which may cause malfunction by sticking to the optical part.
Moisture presence inside of the module may cause malfunction of the sensor. Please avoid locations where condensation may frequently occur.

5-4. Lens
The lens is coated with anti-static and anti-dust polymer. But for better performance, it needs to be cleaned depending on the conditions. Cleaning every six months for office environment and every three months for industrial environment is recommended. When cleaning, wet one side of a swab with destilled water and rub the lens with it. Then dry lens with the other end of the swab.

■ Caution for Use:

VR trimmer for sensitivity adjustment is set up at factory.
Please do not touch the VR trimmer.

Please do not disassemble the device. If the device is reassembled, it may not satisfy the specification.

If the device is used in heavily smoked or dusted environment, more frequent cleaning of the lens and maintenance such as vacuuming or air blowing is recommended.

Please NEVER use this device for Emergency or Fire Alarm application.