

PRODUCT	Particulate Matter Sensor	SHINYEI KAISHA ELECTRONICS DIVISION ENGINEERING DEPT.	Issued	July 23 1999
			Rev.1	August 16 2002
			Rev.2	
MODEL NO.	PPD20V	APPROVED BY:	Rev.3	
		CHECKED BY :	Rev.4	
		DRAWN BY :	Rev.5	

1. Scope

This specification establishes the configuration, performance, test and acceptance requirement for Particulate Matter Sensor Model No.PPD20V.

2. Configuration

The configuration of this Dust Sensor Unit is shown in the attached drawing Fig1.

3. Specification

- 3-1. Detectable particle size : approx. 1 μ m (min.)
- 3-2. Detectable range of concentration : 0 ~ 30,000 pcs/liter (0 ~ 8,000pcs/0.01 CF)
- 3-3. Sensor Characteristics : To be maintained in between the upper limit and the lower limit of the standard dust sensor unit. (Ref. the Fig2.)
- 3-4. Supply Voltage
 - Signal circuit : DC5V \pm 10%
 - Heater circuit : AC5V \pm 10% or DC5V \pm 10%
- 3-5. Power consumption
 - Signal circuit : 0.15W max.
 - Heater circuit : 0.8W max.
- 3-6. Operating range
 - Temperature : 0 ~ 40 $^{\circ}$ C
 - Humidity : under 95%RH max.(without dew condensation)
- 3-7. Recommended storage condition : - 30 ~ 60 $^{\circ}$ C
- 3-8. Time for stabilization : 1 minute after power turned on
- 3-9. Dimensions : 88(W) \times 60(H) \times 20(D) [mm]
- 3-10. Weight : 38g(approx.)

4. Standard Test Method

Burn a cigarette in an ambient of temperature 23 \pm 7 $^{\circ}$ C to generate cigarette smoke in the room. Then extinguish them after fully burned out, use air purifier (with HEPA filter) to lessen the concentration of smokes. Check the sensor output variation in accordance with fluctuation of concentration.

Sensor out put characteristics should be set in between standard “upper limit” sensor and “lower limit” sensor. Particle counter is to be referred for the smoke concentration rate.

- Cigarette : 1 pc. Cigarette (Japanese Brand : Mild seven)
- Particle counter : RION Co., Ltd. Model no. KC-01B or KC-01C
(particle size level : 1 μ m min.)
- Smoke generator : Automatic smoke suction machine (Japan Electric Industrial Organization)
- Room capacity : 20 ~ 30m³

Stirring : Stir by electric fan. During the measurement, collect dusts by air purifier, and decrease the concentration rate of cigarette smoke.

Sensor setting location : Center of the room, 40 ~ 80cm height from the floor level.

Rated input voltage : Signal voltage/heater voltage : DC5V \pm 2%

5. Mechanical Characteristics

No.	Item	Testing method	Standard
1	Drop test	Drop it unintentionally from 70 cm height down to the hard wooden board for 3 times at random.	No damage, No breakage, No failure on electrical Characteristics

6. Endurance Characteristics (Power off test)

No.	Item	Testing method	Standard
1	heat endurance	Leave it in the atmosphere of the 60℃ for 1,000 hours.	Within $\pm 0.5V$ at the original value.
2	cold endurance	Leave in the atmosphere of the - 30℃ for 500 hours.	Within $\pm 0.5V$ at the original value.
3	Heat cycle	Repeat 10 times in the following cycle. After leaving in the atmosphere of - 25℃ for 30 minutes, move it into the atmosphere of + 70℃ within 10 seconds. Further, return to the atmosphere of - 25℃ after 30 minutes.	Within $\pm 0.5V$ at the original value.
4	Heat shock	Repeat 10 times for following cycle. After soaking in the liquid of +5℃ for 5 minutes, move to the liquid of +70℃ within 10 seconds. Further, return to the liquid of +5℃ after 5 minutes.	Within $\pm 0.5V$ at the original value.
5	High temperature and humidity	Leaving it in the atmosphere of 60℃, 90%RH for 300 hours.	Within $\pm 0.5V$ at the original value.
6	H ₂ S endurance	Leaving it in the atmosphere of 25℃, over 95%RH, 10 ~ 15ppm for 10days.	Within $\pm 0.5V$ at the original value.
7	SO ₂ endurance	Leaving it in the atmosphere of 25℃, over 95%RH, 25 \pm 5ppm for 10 days.	Within $\pm 0.5V$ at the original value.

7. Endurance Characteristics (Power on test)

No.	Item	Testing way	Standard
1	High temperature and humidity	Leaving it in the atmosphere of 40℃, 95%RH for 500 hours.	Within $\pm 0.5V$ at the original value.
2	On-off cycle test	Apply the power on-off test for 500 hours in the atmosphere of 40℃, over 95%RH. On time: 5 minutes / Off time : 5 minutes	Within $\pm 0.5V$ at the original value.

8. Open-Short Circuit Test

8-1. Test method : Keep the mutual terminals of electronic parts in short circuit, or keep the terminals opened, and supply the electric current to it.

8-2. Evaluation standard : Not to cause the smoking, firing, burning on the electric circuits, for which open-short circuit test was taken. But the simple smoke or burn, which is not in danger of fire can be disregarded.

9. Tracking Endurance Test

9-1. Test method : Fall 200 drops of the 5% solution of saltwater on the printed board for 30 seconds interval.

9-2. Standard : Not to cause the smoke or fire.

10. Life expectancy

The light emitter is continuously turned on for 7 years minimum.

11. Marking for Lot Number

Indicate the model number, lot number on label.

1) Model Name : PPD20V

2) Lot Number : A 9 7 9.18
a b

a: Lot No.

b: Branch No.

12. Maintenance of the Sensor

Lens need to be cleaned depending on the condition. Cigarette tar on the lens should affect the sensitivity of the sensor. Wet a end of the swab with water and wipe the lens with it and then dry lens with the other end of swab.

13. Standard Sensor

We hold “upper limit” sensor and “lower limit” sensor as standard against which every unit of sensor to be set its characteristics in between upper and lower limit characteristics curve. Those standard “upper limit” sensor and “lower limit” sensor are to be tested, calibrated periodically.

14. Instruction for operation/Caution

14-1. Setting position : Use it on the Vertical position (within $\pm 3^\circ$)

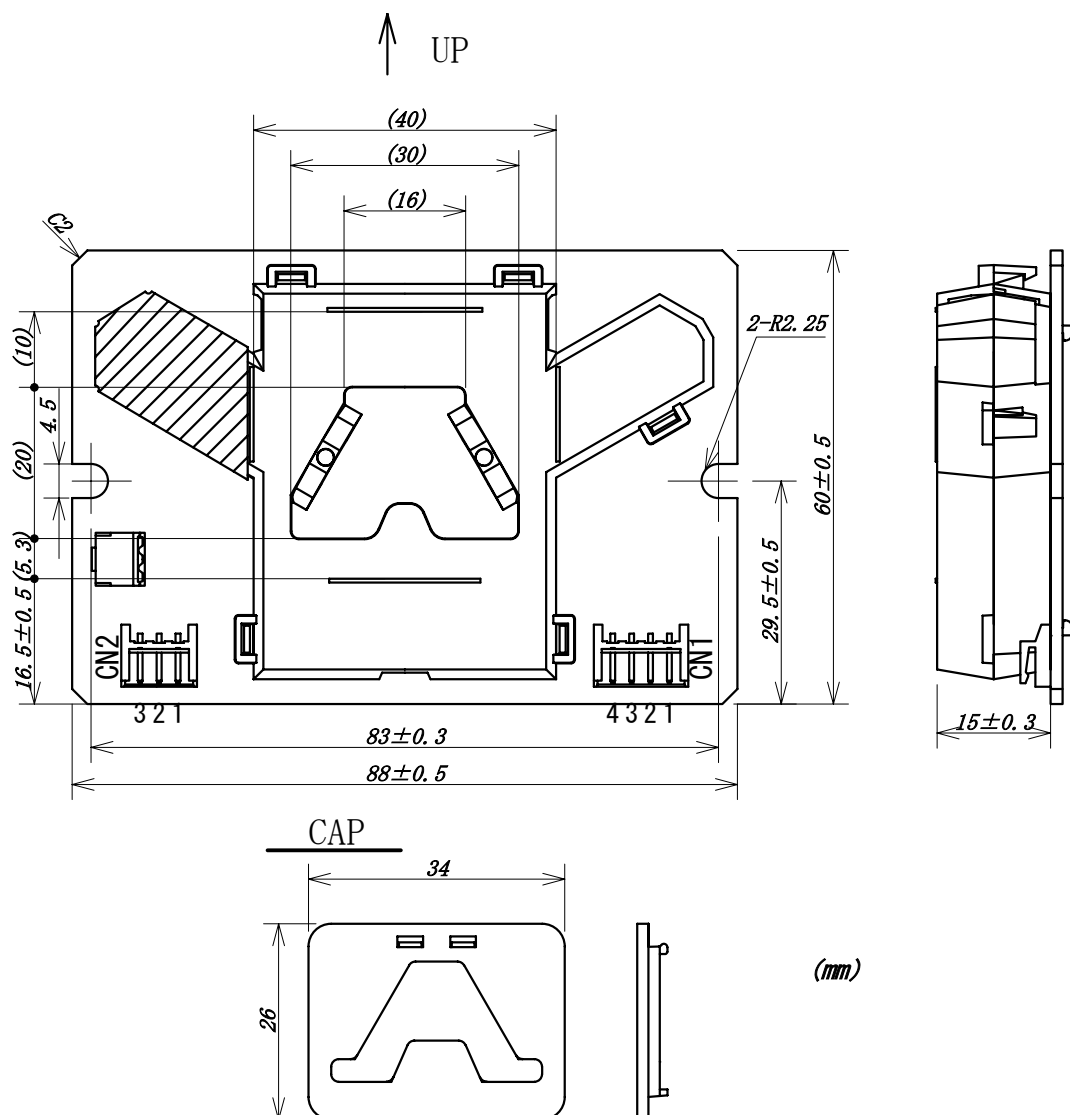
14-2. Please have a kind of door to cover the front window to make sensing area completely dark condition.

14-3. Don't use in an ambient of the organic gas and flammable gas.

14-4. Don't use the material such as alcohol to clean the lens. Use water only.

15. Specification is subject to change for improvement, without prior notice.

Fig 1



connector

CN2 : S3B-EH(JST)

1; INPUT (GND)

2; NC

3; INPUT(5VAC or DC)

(HEATER)

CN1 : S4B-EH

1; COMMON(GND)

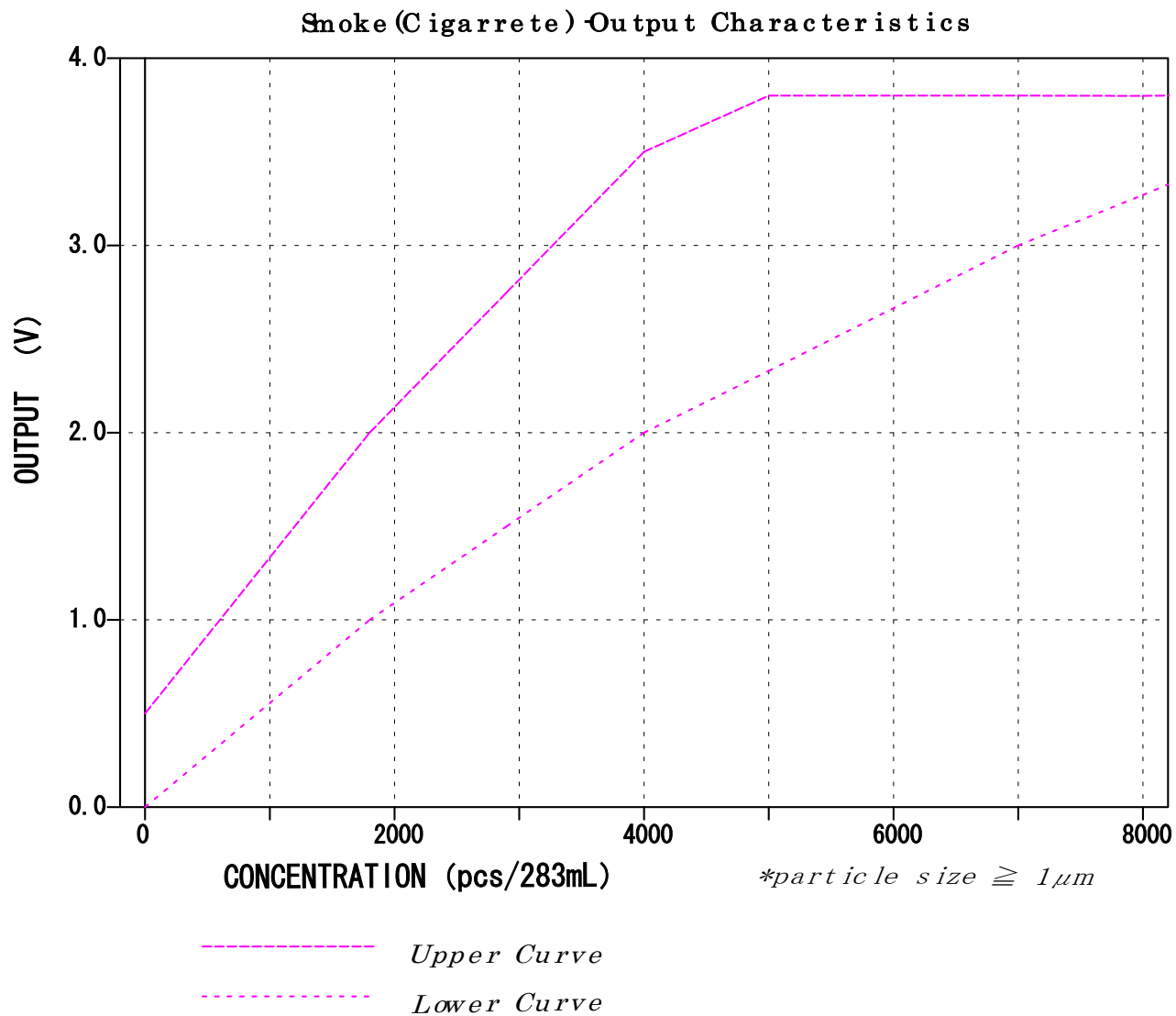
2; OUTPUT

3; INPUT(5VDC)

4; NO USE

(SIGNAL CIRCUIT)

Fig 2



The value should stay between the upper limit and the lower limit of standard dust sensor unit.

But the value of the instant measurement between each standard sensors (upper and lower) should be allowed.