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REFERENCE

SHARP

OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

DUST SENSOR
MODEL No. GP2Y1010AU

Specified for _____

Enclosed please find copies of the Specifications which consists of 12 pages including cover.
After confirmation of the contents, please be sure to send back copies of the Specifications with approving signature on each.

CUSTOMER'S APPROVAL

PRESENTED

DATE

DATE

BY

BY *H.O.*

H. Ogura,
Department General Manager of
Engineering Dept., III
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

Product name : DUST SENSOR

Model No. : GP2Y1010AU

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2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

(Precautions)

- (1) This product is designed for use in the following application areas :

[• OA equipment • Audio visual equipment • Home appliances
• Telecommunication equipment (Terminal) • Measuring equipment
• Tooling machines • Computers]

If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

- (2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

[• Transportation control and safety equipment (aircraft, train, automobile etc.)
• Traffic signals • Gas leakage sensor breakers • Rescue and security equipment
• Other safety equipment]

- (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

[• Space equipment • Telecommunication equipment (for trunk lines)
• Nuclear power control equipment • Medical equipment]

- (4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

1. Application

This specification applies to the outline and characteristics of Model No. GP2Y1010AU (Dust sensor).

2. Outline

Refer to the attached drawing No. SOD07169.

3. Ratings and characteristics

Refer to the attached sheet, page 6,7.

4. Reliability

Refer to the attached sheet, page 8.

5. Outgoing inspection

Refer to the attached sheet, page 9.

6. Supplement

6-1 Output voltage vs. Dust density characteristics (Example) :

Refer to the attached sheet, Page 10.

6-2 This product shall not contain the following materials.

Also, the following materials shall not be used in the production process for this product.

Materials for ODS : CFC_s, Halon, Carbon tetrachloride
1.1.1-Trichloroethane (Methylchloroform)

6-3 Product mass : Approx. 16g

6-4 Package specification

Refer to the attached sheet, page 11.

7. Notes

7-1 Connection of case and GND

Case material is used conductive resin as cover case (printed model No.) and metal (test terminal side) as bottom cover. The metal case connects with GND in sensor.

7-2 Cleaning

Please don't make cleaning, because there is a case that this device is not satisfied with its characteristics by cleaning.

7-3 Pulse input range

Please keep input condition for LED input terminal which is described in para. 3-4, in order to keep its quality influencing reliability.

7-4 Dust adhesion

There is a case that it does not detect the dust density correctly, since the dust adhered to the inside of the dust through hole may project into the detecting space which is consisted of emitter and detector light axis. Please take the structure and mechanism of the equipment into consideration regarding the adhered dust. And when the dust is adhered, please consider the maintenance such as vacuuming or blowing off the dust by air.

In addition, please pay attention to structure and placing location of the application to avoid any adhesive particle like oil, etc. to gets into the device.

If it sticks to optical part, malfunction may occur.

7-5 Light output

In circuit designing, make allowance for the degradation of the light emitting diode output that results from long continuous operation.

(50% degradation/5 years)

7-6 Sensitivity adjustment VR

VR for sensitivity adjustment is set up at shipping from Sharp.

Please do not touch the VR or Electro-optical characteristics specified on the specification will be invalid.

7-7 Resolution

Please do not disassemble the device such as removing a tapping screw and so on. Even if the device is reassembled, it may not satisfy the specification.

7-8 Application to fire alarm

Please do not use this device for a fire alarm application. When using this device to application other than air purifying and equipment with air purifying function, please inform us before usage.

7-9 Noise influence

If the sensor is located close to noise generator (ex. Electric dust collector, etc.), the sensor output may be affected by leaded noise.

On top of that noise from power supply line also may affect the sensor output.

When designing the system, please consider the effect from noise.

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7-10 Vibration influence

The sensor may change its output value under mechanical oscillation.
Before usage, please make sure that the device works normally in the application.

7-11 Incident light influence

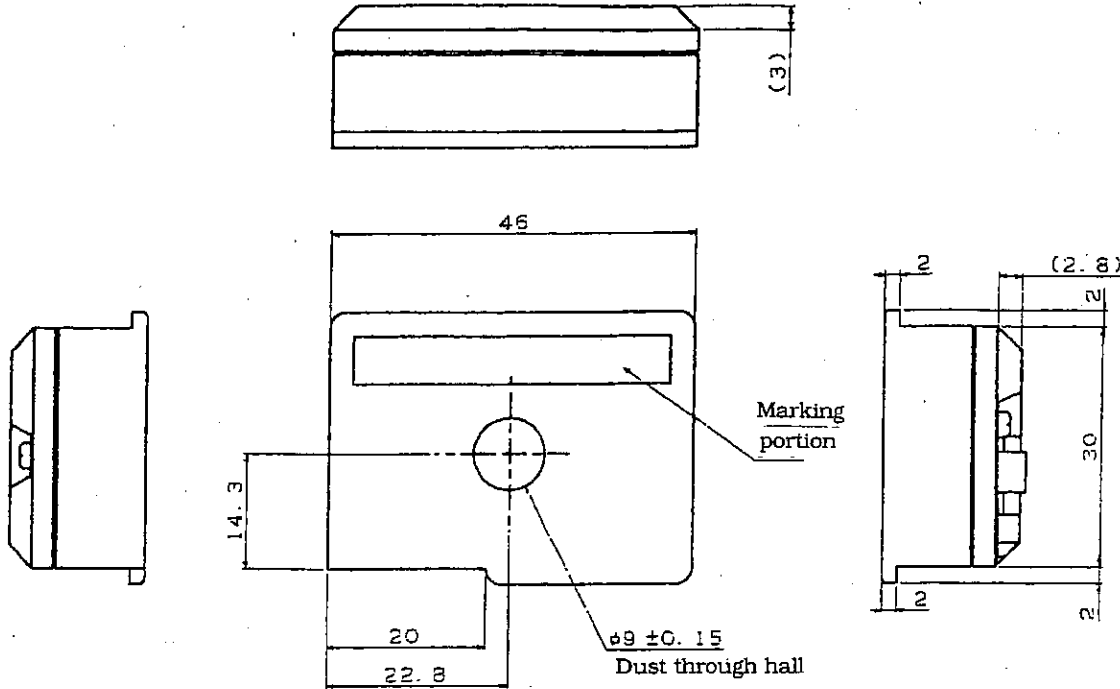
There is a case that the sensor output may be affected when outer-light comes through dust through hole on printed side.
In order to avoid any influence from outer-light, please located the printed side of the sensor facing to inside of the application.

7-12 Dewing

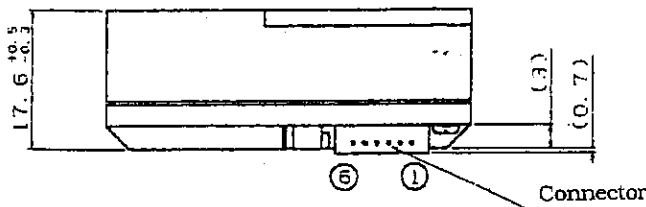
When inside of the sensor is moisturized, it does not keep its proper function.
Please design the application so that moisturization of the sensor does not happen.

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2. Outline

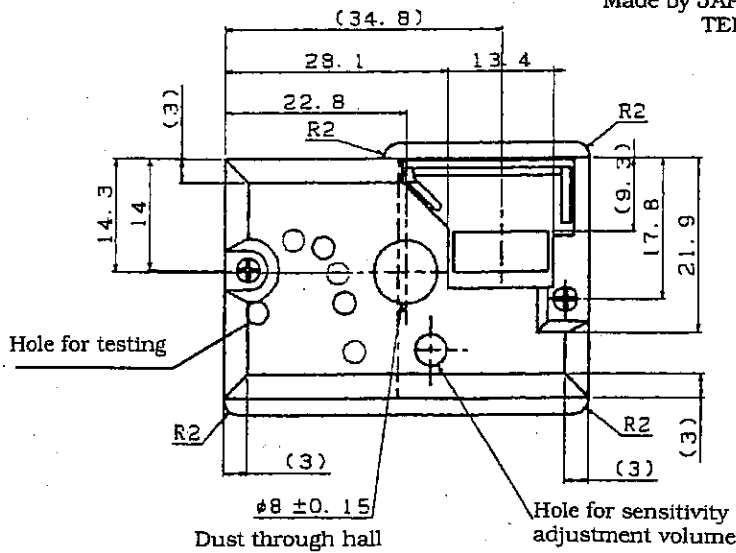


Connector arrangement



| No. | Pin name |
|-----|----------|
| ① | V-LED |
| ② | LED-GND |
| ③ | LED |
| ④ | S-GND |
| ⑤ | Vo |
| ⑥ | Vcc |

Made by JAPAN SOLDERLESS
TERMINAL CO. LTD. S6B-ZR-SM3A



(Marking portion)

SHARP GP2Y10 10 2X

Company name Model No.

Production year
(Last digit of prod. year)

Production month :
(1 to 9 ; Jan. to Sep.
X; Oct., Y; Nov., Z; Dec.)

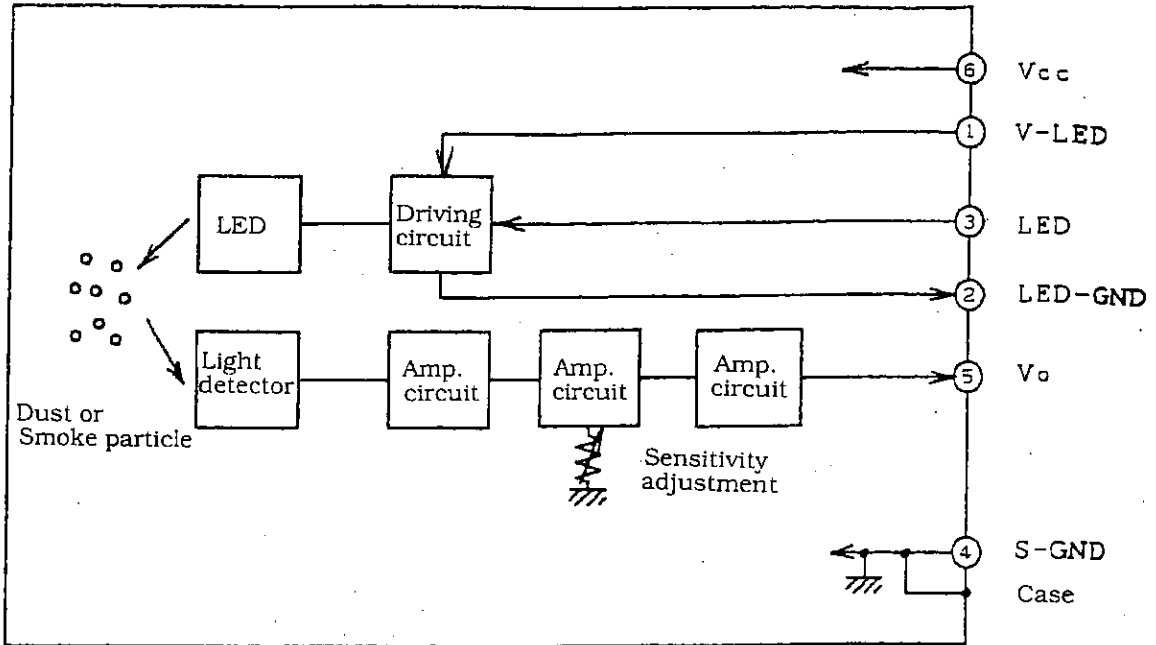
Carved seal
Stamp

- 1) Unspecified tolerance shall be $\pm 0.3\text{mm}$.
(): Reference value
Unit : mm

| | |
|-------------|----------------------------------|
| Name | GP2Y1010AU Outline Dimensions |
| Drawing No. | SOD07169 |

3. Ratings and characteristics

3-1 Constitution diagram



3-2 Absolute maximum ratings

(Ta=25°C, Vcc=5V)

| Parameter | Symbol | Rating | Unit | Remark |
|------------------------|------------------|-------------|------|------------------------|
| Supply voltage | Vcc | -0.3 to +7 | V | |
| Input terminal voltage | V _{LED} | -0.3 to Vcc | V | Open Drain drive input |
| Operating temperature | Topr | -10 to +65 | °C | |
| Storage temperature | Tstg | -20 to +80 | °C | |

• Operating Supply Voltage

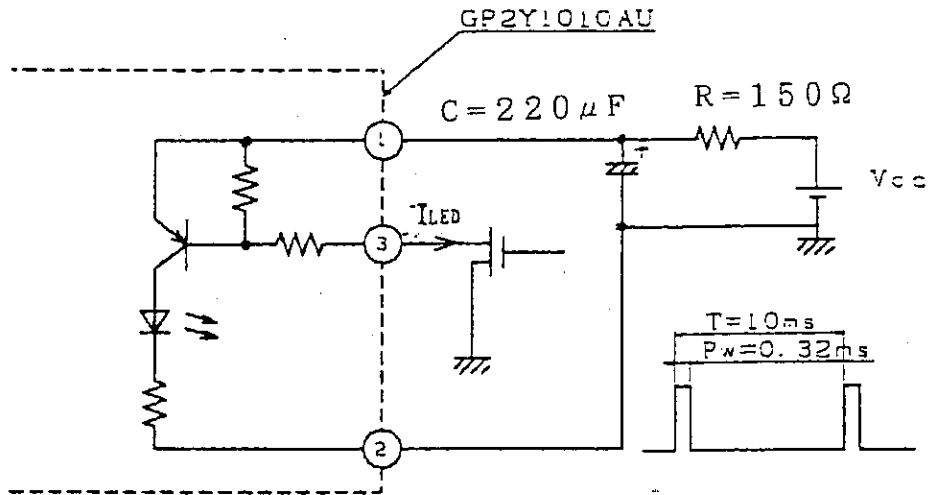
| Symbol | Rating | Unit | Remark |
|--------|---------|------|--------|
| Vcc | 5 ± 0.5 | V | |

3-3 Electro-optical Characteristics

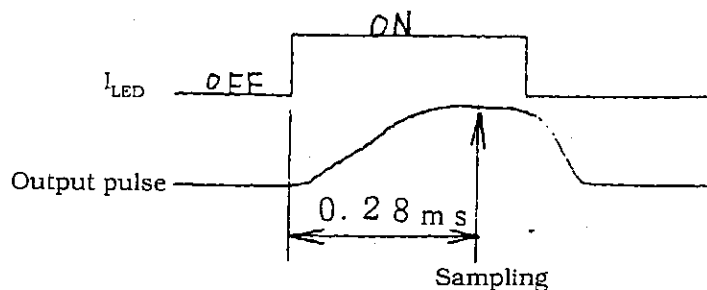
(Ta=25°C, Vcc=5V)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|------------------|---|------|------|------|-------------------------------|
| Sensitivity | K | (*1) (*2) (*3) (*4) | 0.35 | 0.5 | 0.65 | V/ (0.1mg/m ³) |
| Output voltage at no dust | V _{oc} | (*2) (*3) (*4) | 0 | 0.9 | 1.5 | V |
| Output voltage range | V _{OH} | R _L =4.7kΩ (*2) (*3) (*4) | 3.4 | - | - | V |
| LED terminal current | I _{LED} | LED terminal=0V (*2) (*3) | - | 10 | 20 | mA |
| Supply current | I _{cc} | R _L =∞ (*2) (*3) | - | 11 | 20 | mA |

- (*1) • Dust density shall be measured the density of Mild seven by using a digital dust indicator. (P-5L2 made by SIBATA SCIENTIFIC TECHNOLOGY LTD.)
- Sensitivity : K shall be specified about output voltage change when dust density is changed 0.1mg/m³.
- (*2) Input condition for LED input terminal (Pulse driving condition)
- (*3) Connect C and R of value shown in below drawing.



(*4) Sampling timing of output pulse



3-4 Recommended input condition for LED input terminal

| Parameter | Symbol | Recommendation | Unit |
|-------------|--------|----------------|------|
| Pulse cycle | T | 10±1 | ms |
| Pulse width | Pw | 0.32±0.02 | ms |

4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%
 LTPD : 20 or 40

| No. | Test Items | Test Conditions | Failure Judgement Criteria | Samples (n) Defective(C) |
|-----|--|--|---|-----------------------------|
| 1 | Temperature cycling | | LX0.8>K K>UX1.2 LX0.8>Voc U: Upper specification limit L: Lower specification limit | n=11, C=0 |
| 2 | High temp. and high humidity storage | +60°C, 90%RH, 500h | | n=11, C=0 |
| 3 | High temp. and high humidity operation | +60°C, 90%RH, Vcc=5V, 500h | | n=11, C=0 |
| 4 | High temp. storage | +80°C, 500h | | n=11, C=0 |
| 5 | High temp. operation | +65°C, Vcc=5V, 500h | | n=11, C=0 |
| 6 | Low temp. storage | -20°C, 500h | | n=11, C=0 |
| 7 | Low temp. operation | -10°C, Vcc=5V, 500h | | n=11, C=0 |
| 8 | Mechanical shock | 1000m/s ² , 6.0ms 3 times/±X, ±Y, ±Z direction | | n= 6 , C=0 |
| 9 | Variable frequency vibration | 5 to 55 to 5Hz/1min Overall amplitude : 1.5mm 2h/X, Y, Z direction | | n= 6 , C=0 |

*1 Test conditions are according to 3-3 Electro-optical characteristics.

*2 After test, measurement shall be done after leaving under the normal temperature and the normal humidity for 2h. And there should be no dew.

*3 LED terminal input conditions for operating test (No. 3, 5, 7) apply according to electro-optical characteristics (3-3).

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5. Outgoing inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

(2) Inspection method

A single sampling plan, normal inspection level II based on ISO 2859 shall be adopted.

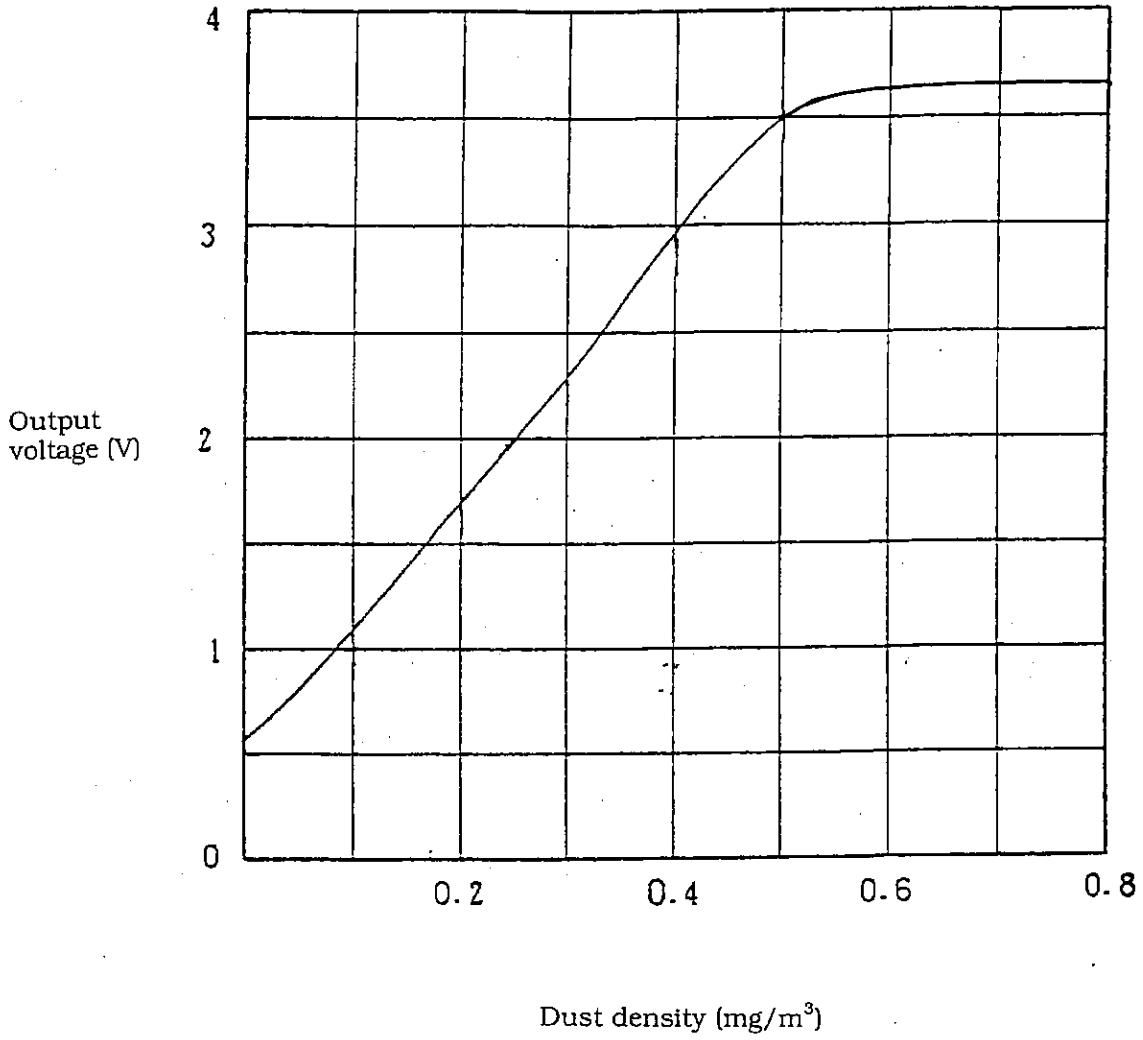
| Defect | Inspection items and test method | AQL(%) |
|--------------|---|--------|
| Major defect | Electro-optical characteristics defect (In para. 3-3) | 0.4 |
| Minor defect | Defect on appearance and dimension * Split, chip, scratch, stain | 1.0 |

* Split
Chip One which affects the characteristics
Scratch of para. 3-3 shall be defect.
Stain

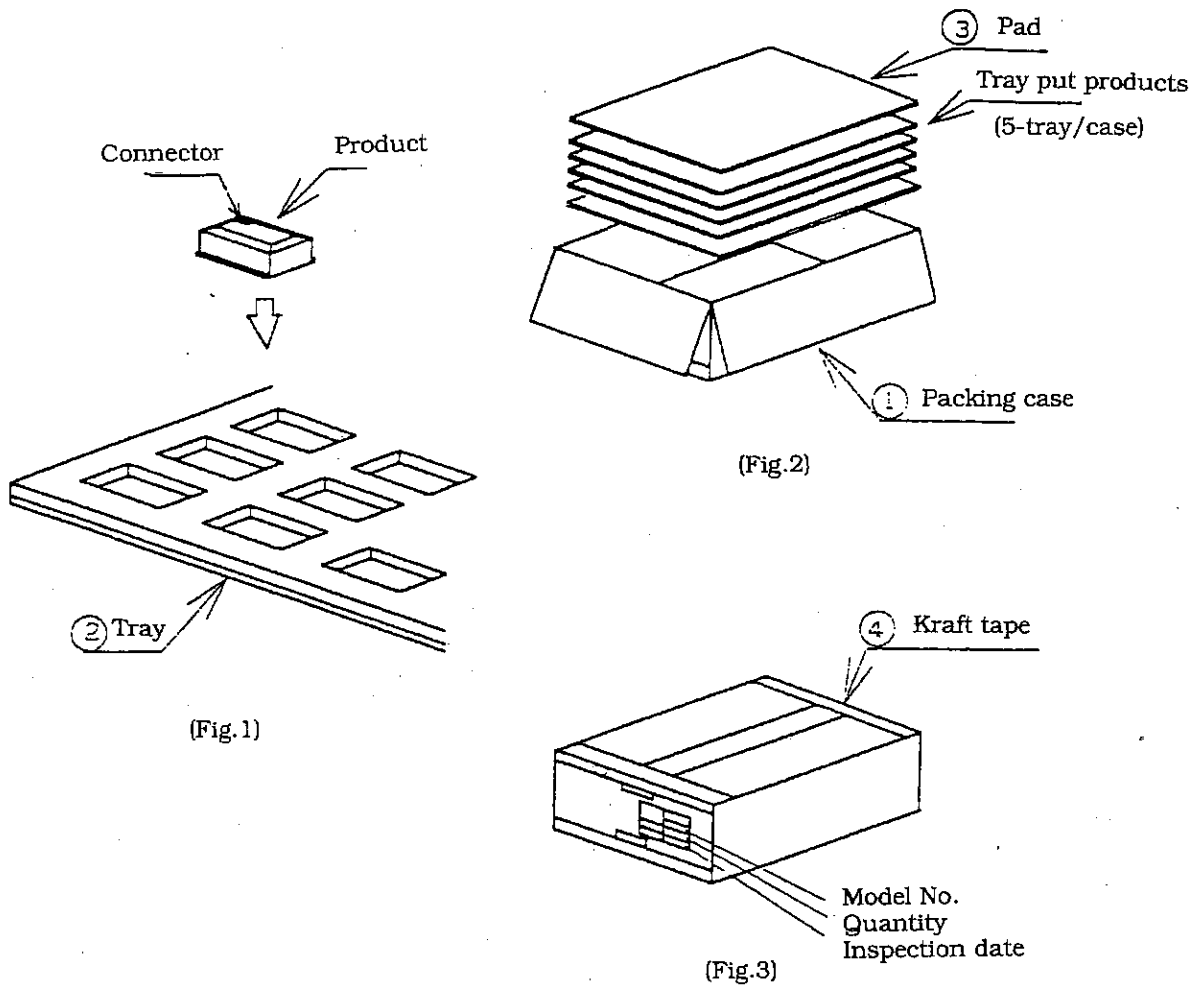
* Rust shall not be defect.

6.1 Test conditions are according to 3-3 Electro-optical characteristics.

GP2Y1010AU Output voltage vs. Dust density characteristics (Example)



6.4 Packing specification



Packaging method

1. Put products of 50pcs. in tray. Packing methode is showed in the above fig. (Fig. 1)
2. Put them (5-tray) in the packing box. Put pad on thier top. (Fig. 2)
3. Seal the packing box with kraft tape.
Print the model No., quantity, inspection date. (250 pcs./a packing box) (Fig.3)

(Formal packed mass : Approximately 5.6kg)