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SHARP

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OPTO-ANALOG DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

OPIC LIGHT DETECTOR

MODEL No.

GA1A2S100LY

Specified for

Enclosed please find copies of the Specifications which consists of 11 pages including cover.
After confirmation of the contents, please be sure to send back ☐ copy of the Specifications with approving signature on each.

CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

DATE

BY Y. O

Y. Oda,
Department General Manager of
Engineering Dept.,III
Opto-Analog Devices Div.
ELECOM Group
SHARP CORPORATION

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Product name : OPIC LIGHT DETECTOR

Model No. : GA1A2S100LY

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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 etc.)

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.

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1. Application

This specification applies to the outline and characteristics of Silicon OPIC light detecting device Model No. GA1A2S100LY.

2. Outline

Outline drawing No. : CY13486L02A.

Detector portion shape : CY13487L02.

3. Ratings and characteristics

Refer to the attached sheet, page 6.

4. Reliability

Refer to the attached sheet, page 7.

5. Outgoing inspection

Refer to the attached sheet, page 8.

6. Supplement

(6-1) Circuit block diagram

Refer to the attached sheet, page 9.

(6-2) Packing specifications shall be refered to attached drawing.

Refer to the attached sheet, page 10.

(6-3) This product is not designed against electromagnetic and ionized-particle irradiation.

(6-4) 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 (Methyl chloroform)

(6-5) Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.

(6-6) Compliance with each regulation

6.6.1 The RoHS directive(2002/95/EC)

This product complies with the RoHS directive(2002/95/EC).

Object substances: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)

6.6.2 Content of six substances specified in Management Methods for Control of Pollution Caused by Electronic Information Products Regulation (Chinese : 电子信息产品污染控制管理办法).

Category	Toxic and hazardous substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr^{6+})	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
OPIC light detector	✓	✓	✓	✓	✓	✓

✓ : indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard .

(6-7) Product mass (Piece) : Approximately 0.1g

7. Notes

(7-1) By-pass capacitors

In order to stabilize power supply line, connect some by-pass capacitors of 0.01μF or more between Vcc and GND near the device.

(7-2) Incidence light

This device has three built-in photodiodes and amplifies the differential of the photocurrent which flows through each photodiode. It is recommended that this device is used under the condition that the light illuminates three photodiodes uniformly.

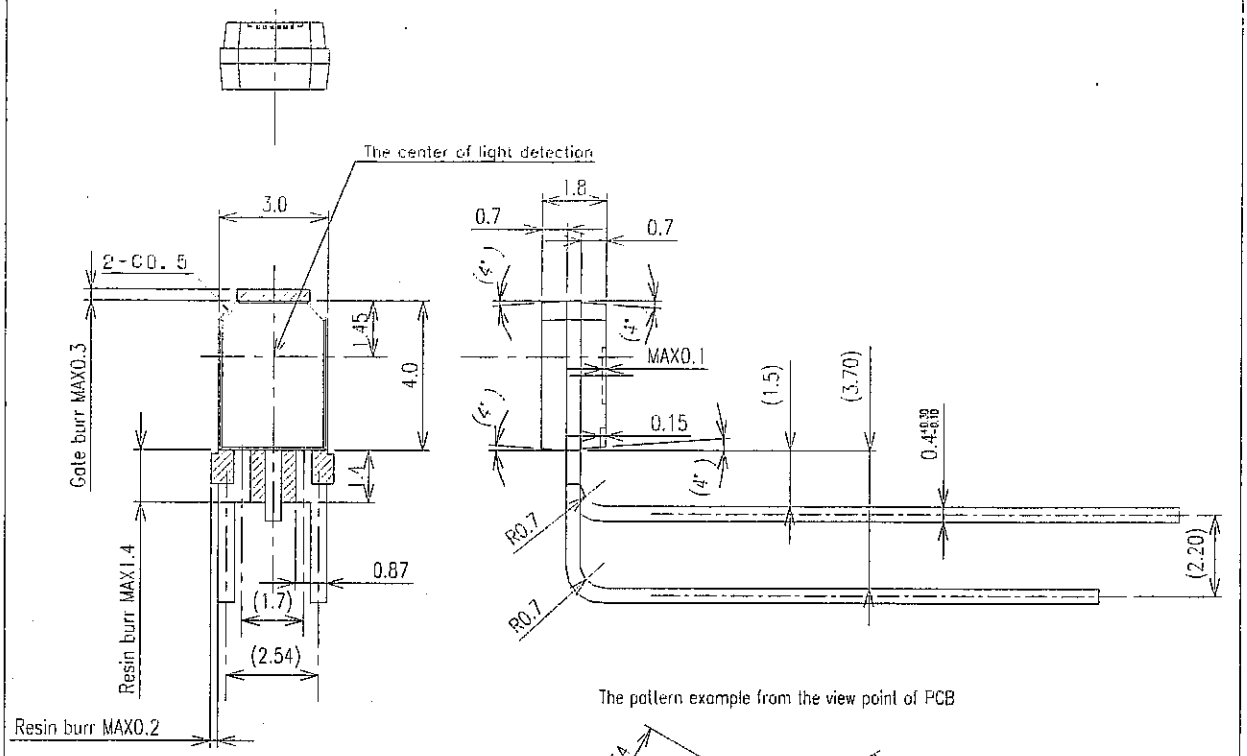
(7-3) Cleaning conditions :

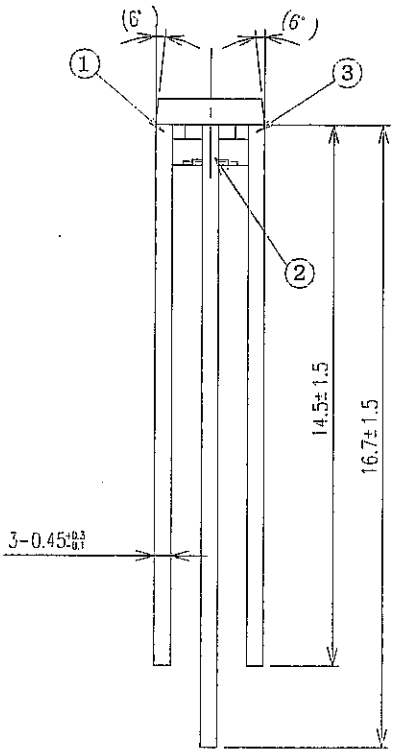
Solvent cleaning : Solvent temperature 45℃ or less Immersion for 3 min or less

Ultrasonic cleaning : The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc.
Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning.
The cleaning shall be carried out with solvent below.
Solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

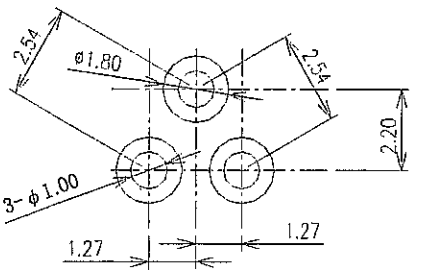
(7-4) Soldering

The lead pins should be soldered according to the absolute maximum ratings.
Please be careful not to give the mechanical force to the package when soldering because it may cause the deformation or defect due to the plated connection.
This device shall not be soldered with preheat or reflow.
In case of mounting this device in a lead free soldering process, special care should be taken to avoid any boundary exfoliation (Lift-off phenomenon) between the solder and the solder pad on the printed circuit board.





The pattern example from the view point of PCB



1) Unspecified tolerance shall be ± 0.2.
2) Package : Transparent
3) Dimensions in parenthesis are shown for reference.
4) The thin burr thickness (MAX. 0.05mm) and the gate burr (MAX. 0.3mm) shall not be inclusive to the outline dimensions.
5) Protruded resin 1.4mm MAX. However, the thin burr which attached to a lead is 1.4mm MAX. from the resin.

Pin name

(1) V c c
(2) G N D
(3) I o

Scale	Material	Finish	Name	GA1A2S100LY Outline Dimensions
5/1	Lead : Fe	Lead pin: Au/Pd plating		
Unit	Package : Epoxy resin		Drawing No.	CY1348 6L02A
1 = 1/1 mm				

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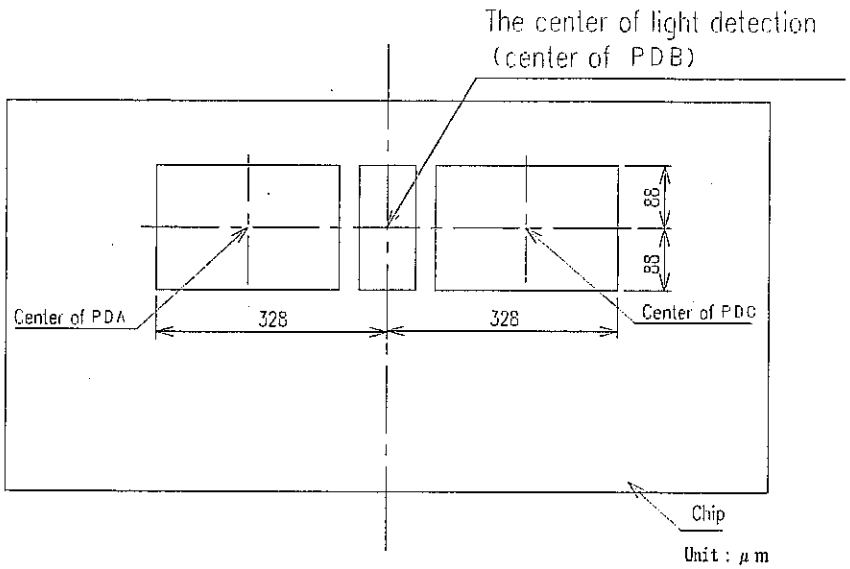


NAME	GA1A2S100LY Detector portion shape
DRAWING No.	C Y 1 3 4 8 7 L 0 2

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta =25℃

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.3 to +7.0	V
Output voltage	Vout	-0.3 to V_{CC}+0.3	V
Output current	Io	5	mA
Operating temperature	T_{Opr}	-40 to +85	℃
Storage temperature	T_{Stg}	-40 to +85	℃
Soldering temperature*	T_{Sol}	260	℃

* For 5 seconds MAX at the position of 1.4mm from the resin edge.

3.2 Recommended operating conditions

(Condition: Ta =0 to 70℃)

Parameter	Symbol	MIN.	MAX.	Unit
Operating supply voltage	V_{CC}	2.7	3.6	V
Output voltage	Vout	0	V_{CC}-1.0	V
Dynamic range	E_V	10	10000	lx

3.3 Electro-optical characteristics

Ta=25℃,Vcc=3.3V

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply current *1	I_{CC}	E_V=1000lx	325	500	675	μA
Output current 1 *1	I_O1	E_V=1000lx	312	480	648	μA
Output current 2 *1	I_O2	E_V=100lx	31.2	48	64.8	μA
Output current 3 *1	I_O3	E_V=10lx	3.12	4.8	6.48	μA
Output current 4	I_O4	E_V=0lx	-	-	1	μA
Output current temperature coefficient *2	-	E_V=1000lx Ta= -20 to 60℃	−10	-	+10	%
Peak sensitivity	λ_P	–	–	555	–	nm
Rise time (10%-90%) *2	tr1	E_V=10 to 100lx RL=1kΩ	-	-	10	ms
	tr2	E_V=100 to 1000lx RL=1kΩ	-	-	2	ms
	tr3	E_V=1000 to 10000lx RL=100Ω	-	-	500	μs
Fall time (10%-90%) *2	tf1	E_V=10 to 100lx RL=1kΩ	-	-	10	ms
	tf2	E_V=100 to 1000lx RL=1kΩ	-	-	1	ms
	tf3	E_V=1000 to 10000lx RL=100Ω	-	-	250	μs

*1: E_V: Illuminance by CIE standard light source A (tungsten lamp)

*2: Illuminance by white LED

4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%
LTPD : 10 or 20

Test Items	Test Conditions	Failure Judgment Criteria	Samples (n) Defective(C)
Temperature cycling	1 cycle -40℃⟷+85℃ (30min) (30min) 20 cycles test	$I_{CC}<L \times 0.8$ $I_{CC}>U \times 1.2$ $I_O1<L \times 0.8$ $I_O1>U \times 1.2$ $I_O2<L \times 0.8$ $I_O2>U \times 1.2$ $I_O3<L \times 0.8$ $I_O3>U \times 1.2$ U: Upper specification limit L: Lower specification limit	n=22, C=0
High temp. and high humidity storage	+60℃,90%RH, 240h		n=22, C=0
High temp. storage	+85℃, 240h		n=22, C=0
Low temp. storage	-40℃, 240h		n=22, C=0
Operation test	V_{CC}=3.6V, Ta=+25℃, E_V=3000lx 240h		n=22, C=0
Mechanical shock	1000m/s^2, 6ms, Half sine wave 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration	200m/s^2 100 to 2000 to 100Hz / Sweep for 4min 48min/X, Y, Z direction		n=11, C=0
Terminal strength (Tension)	Weight: 5.0N 10 s/each terminal		n=11, C=0
Terminal strength (Bending)	Weight: 2.5N 0° →90° →0° →-90° →0° The two tests should be performed.		n=11, C=0
Soldering heat	260±5℃ , 5±0.5 s Position of 1.4mm from the resin edge.		n=11, C=0
Solderability	245±5℃, 5±1 s Flux:EC-19S (Tamura kaken corporation) No pretreatment Position of 1.4mm from the resin edge.	Solder shall adhere at less than 95% area of dipped portion.	n=11, C=0

5. Outgoing inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

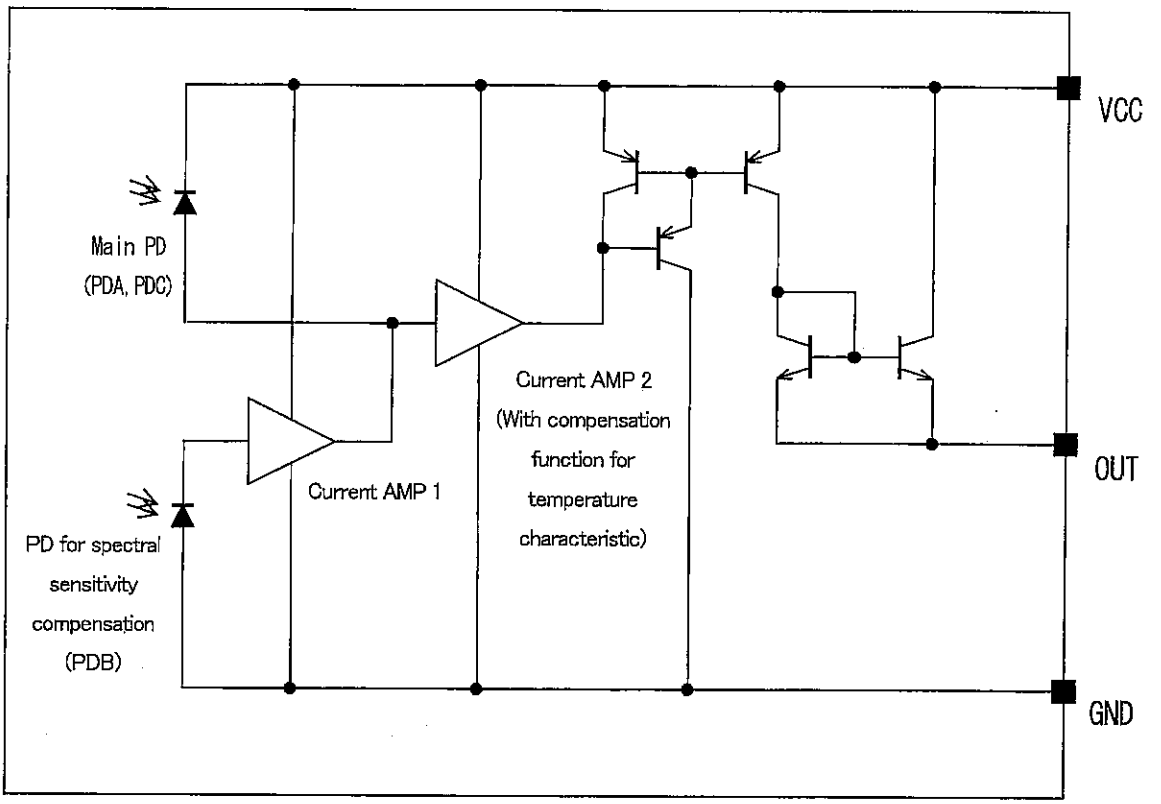
(2) Inspection method

A single sampling plan, normal inspection level II based on ISO2859 shall be adopted.

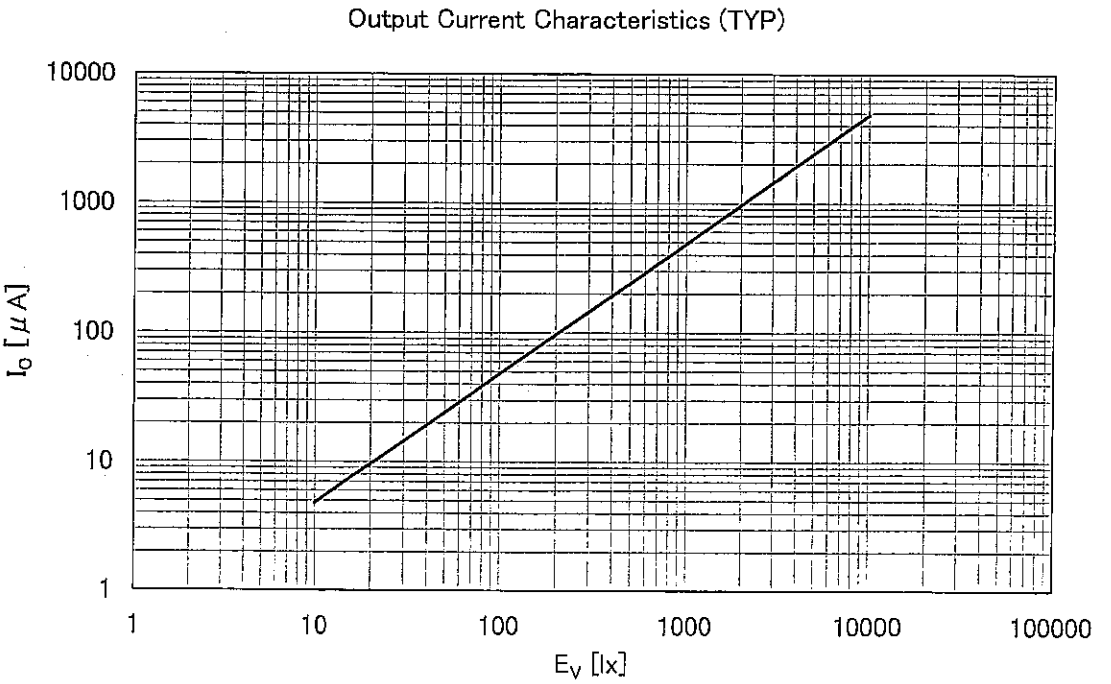
<table>
<tr><th colspan="2">Parameter</th><th colspan="5">Inspection items and test method</th><th>AQL(%)</th></tr>
<tr><td rowspan="8">Major defect</td><td>1</td><td colspan="5">Disconnection, short</td><td rowspan="8">0.1</td></tr>
<tr><td>2</td><td colspan="5">Inverse polarity on terminal</td></tr>
<tr><td rowspan="6">3</td><td colspan="5">Characteristics defect</td></tr>
<tr><td rowspan="2">Parameter</td><td rowspan="2">Symbol</td><td colspan="2">Judgment criteria</td><td rowspan="2">Unit</td></tr>
<tr><td>MIN.</td><td>MAX.</td></tr>
<tr><td>Supply current</td><td>I_{CC}</td><td>325</td><td>675</td><td>μA</td></tr>
<tr><td>Output current 1</td><td>$I_{O}1$</td><td>312</td><td>648</td><td>μA</td></tr>
<tr><td>Output current 2</td><td>$I_{O}2$</td><td>31.2</td><td>64.8</td><td>μA</td></tr>
<tr><td>Output current 3</td><td>$I_{O}3$</td><td>3.12</td><td>6.48</td><td>μA</td></tr>
<tr><td>Output current 4</td><td>$I_{O}4$</td><td>-</td><td>1</td><td>μA</td></tr>
<tr><td colspan="6">Measurement conditions are described in 3.3.</td></tr>
<tr><td rowspan="4">Minor defect</td><td rowspan="4">1</td><td colspan="5">Appearance defect</td><td rowspan="4">0.25</td></tr>
<tr><td>Parameter</td><td colspan="4">Judgment criteria</td></tr>
<tr><td>Crack</td><td colspan="4">Visible crack irrespective of its position shall be defect.</td></tr>
<tr><td>Split, Chip, Scratch, Stain, Blur</td><td colspan="4">One which affects the characteristics of paragraph 3.3 shall be defect.</td></tr>
<tr><td>Bubble, Foreign matter (One on resin surface which can wipe off shall not be applied.)</td><td colspan="4">・φ1.0mm or more shall be defect.
・One which affects the characteristics of paragraph 3.3 shall be defect.</td></tr>
</table>

6. Supplement

(6-1) Circuit block diagram



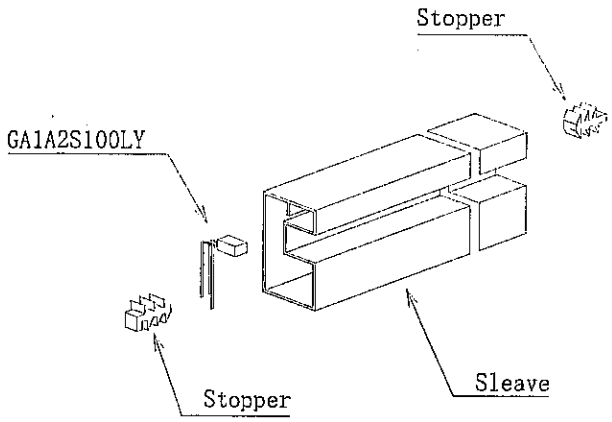
(6-2) Output Current Characteristic



(6-3) Packaging

(6-3-1) Inner packing

① Inner packing drawing

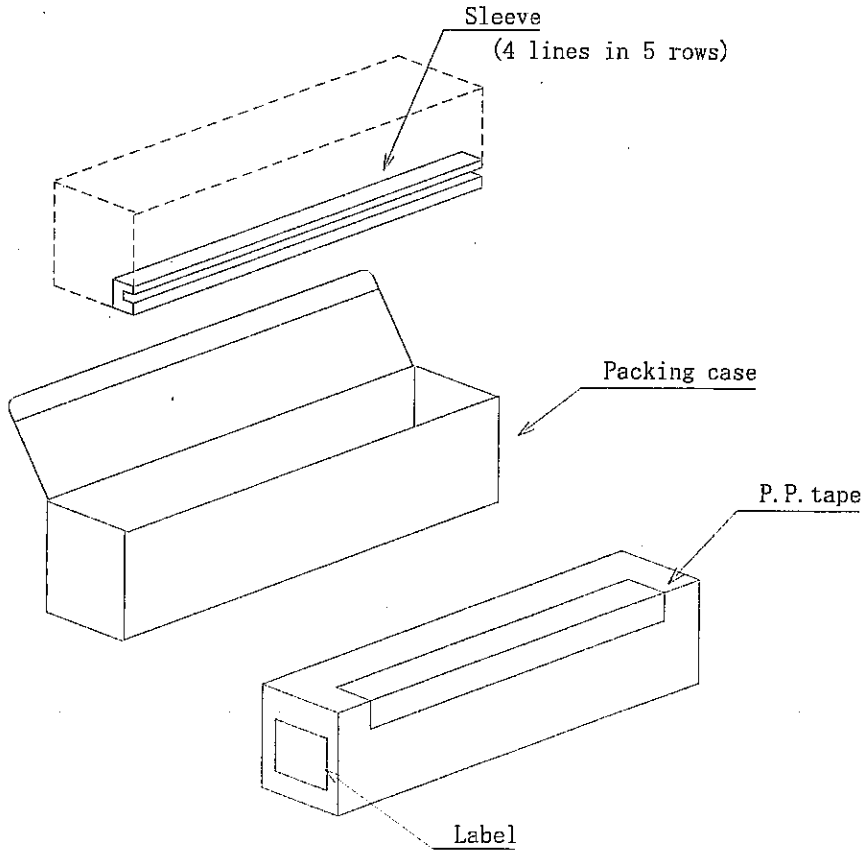


② Inner packing material : Sleeve(HIPS) , Stopper(SBR)

③ Quantity : 100pcs./sleeve

(6-3-2) Outer packing

① Outer packing drawing



② Outer material : Packing case (Corrugated cardboard),P.P. tape

③ Quantity : 2000pcs./box

④ Indication : Model No., quantity and inspection date