

SPEC.No. ED-08G059B
ISSUE April24, 2009

SYSTEM DEVICE DIVISION I
ELECTRONIC COMPONENTS AND DEVICES GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

Analog Output Type Distance Measuring Sensor
MODEL No.

GP2Y0A60SZ0F

Specified for _____

Enclosed please find copies of the Specifications which consists of 10 pages including cover.
This specification sheets and attached sheets shall be both side copy.
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

A handwritten signature in black ink, appearing to read "M. Kubo", is written over the signature line.

for M.kubo
Department General Manager of
Development Dept. IV
System Device Division I
Electronic Components and Devices Group
SHARP CORPORATION

Product name : Analog output type distance measuring sensor



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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.

REFERENCE

1. Application

This specification applies to the outline and the characteristics of the analog output distance measuring sensor:
Model No. GP2Y0A60SZ0F

2. Outline

Refer to the attached drawing No. CY14442j02.

3. Ratings and characteristics

Refer to the attached sheet, page 4, 5.

4. Reliability

Refer to the attached sheet, Page 6.

5. Outgoing inspection

Refer to the attached sheet, Page 6.

6. Packing specification

Refer to the attached sheet, page 9.

7. Supplements

7-1 GP2Y0A60SZ0F Example of output distance characteristic

Refer to the attached sheet, page 8.

7-2 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 (Methyl chloroform)

7-3 Product mass : Approx. 1.1g (TYP)

7-4 This product does not contain the chemical materials regulated by RoHS directive.

(Except for the NOT regulated by RoHS directive.)

7-5 Compliance with each regulation

7-5-1 The RoHS directive(2002/95/EC)

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

Object substances: mercury, lead (except for lead in high melting temperature type solders and glass of electronic components), cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)

7-5-2 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)
Distance measuring sensor	✓	✓	✓	✓	✓	✓

✓ : 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 .

8. Notes

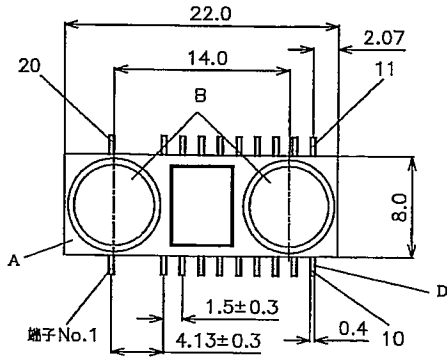
Refer to the attached sheet, page 7.

REFERENCE

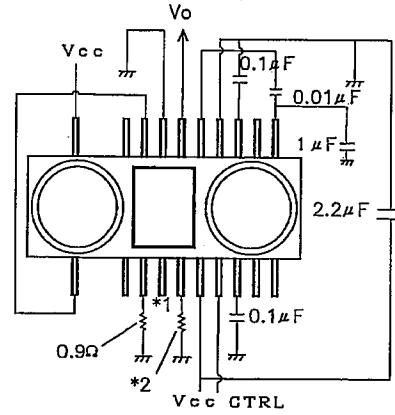
GP2Y0A60SZ0F

2.Outline (Drawing No. CY14442j02)

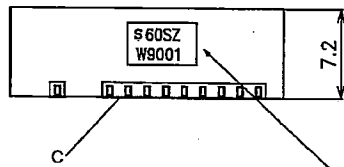
Scale: 2/1 Unit: mm



Connection diagram

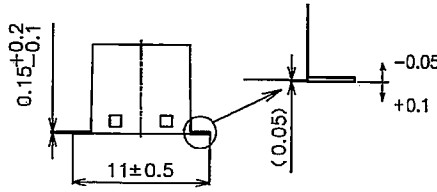


- *1) Above connection is the case of $V_{cc} = 3V$.
In the case of $V_{cc} = 5V$, terminal No.4 is connected to GND.
- *2) The AR terminal connects $36k\Omega$.



Material

Material	Case	Color
A	Case	Carbonic ABS (Color : Black)
B	Lens	Acrylic acid resin (Visible light cut type)
C	Device coating	PPS (Color : Black)
D	Lead pin	42ALLOY (Pd-Au plating)



Stamp (Example)

SHARP : [S]
S 60SZ GP2Y0A60SZLF
: [60SZ]
W9 0 0 1
LOT No.
Month (1 to 9, 0, N, D)
(DIN Standard symbol)
Year (DIN Standard symbol)
DIN Standard year production
(Remove G, I, O, Q, Y, Z)

(It repeats itself by a period for 20 years)

Year	Symbol
2008	W
2009	X
2010	A
2011	B
...	...
2025	T
2026	U

terminal No.	terminal Name
1	cathode
2	GND
3	I LEDFB
4	3V/5V switching
5	AR
6	Vcc
7	CTRL
8	CH1
9	NC
10	REG
11	REG
12	NC
13	CH2
14	GND
15	GINT
16	Vo
17	T
18	I LED
19	GND
20	anode

(Note1) Unspecified tolerances shall be $\pm 0.2mm$.

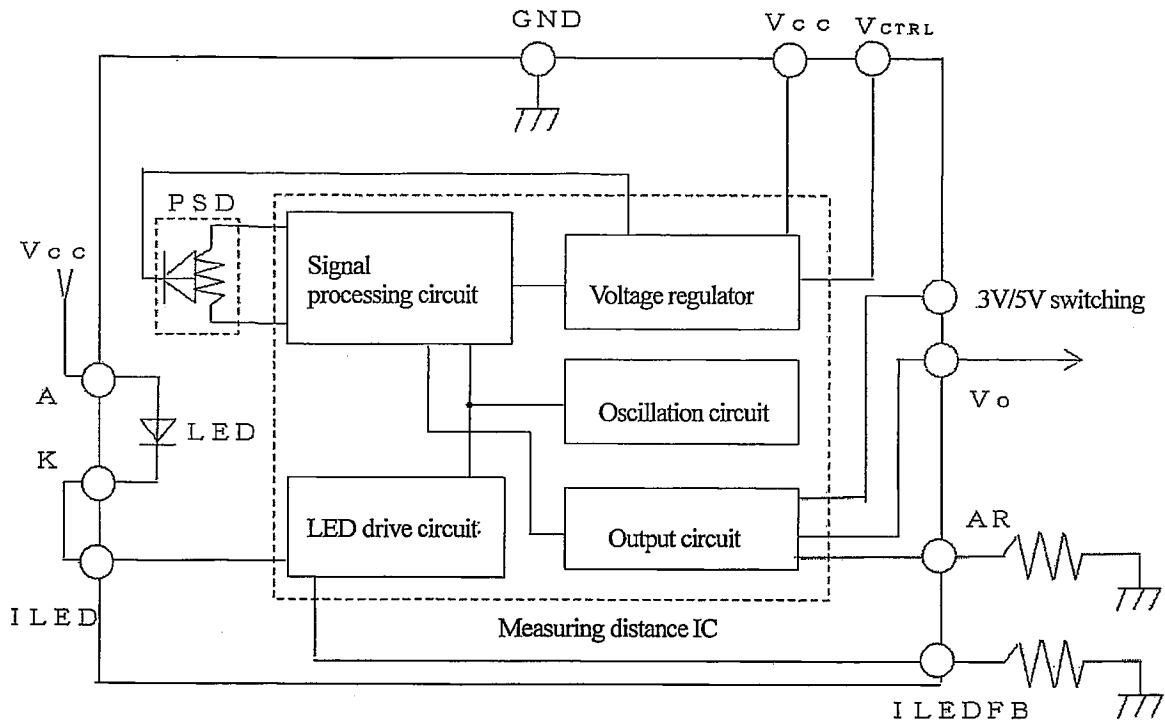
(Note2) () : Reference value

(Note3) lead terminal size is a root size of the lead.

Terminals No.2, 14, 19 are connected in device.
Thus GP2Y0A60SZ0F operates by connection of arbitrary one terminal to GND.

Terminals No.10, 11 are connected in device.
Thus GP2Y0A60SZ0F operates by connection of either terminal.

3-1 Schematic



- Showing main terminal
- Please use an electric source with an output current of 400mA or more because LED pulse current is more than 300mA.

3-2 Absolute maximum ratings

Parameter	Symbol	Ratings	Unit	Remark
Supply voltage	Vcc	-0.3 to +5.5	V	-
Output terminal voltage	Vo	-0.3 to Vcc+0.3	V	-
Input terminal voltage 1	—	-0.3 to VREG+0.3	V	Terminal(NC,CH1,CH2,CINT,AR,T)
Input terminal voltage 2	—	-0.3 to Vcc+0.3	V	Terminal(CTRL)
Operating temperature	Topr	-10 to +60	°C	-
Storage temperature	Tstg	-40 to +70	°C	-
Soldering temperature	Tsol	260	°C	5s or less/time up 2 times

Recommended operating conditions

Parameter	Symbol	Rating	Unit	Remark
Supply voltage	Vcc	4.5 to 5.5	V	5V
Supply voltage	Vcc	2.7 to 3.6	V	3V
High level input voltage	VCTRLH	2.3 to Vcc	V	Operating
Low level input voltage	VCTRL	MAX 0.2	V	Stand-by state

3-3 Electro-optical Characteristics

($T_a=25^\circ\text{C}$, $V_{CC}=3\text{V}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Measuring distance range	ΔL	(Note 1)	10	-	150	cm
Output terminal voltage	V_o	$L=150\text{cm}$ (Note 1)	0.05	0.35	0.65	V
Output voltage difference	ΔV_o	Output change at L change (10cm \rightarrow 150cm) (Note 1)	1.35	1.60	1.85	V
Average supply current	I_{cc1}	$V_{CC}=3\text{V}$, $V_{CTRL}=3\text{V}$	-	33	50	mA
Stand-by supply current	I_{cc2}	$V_{CC}=3\text{V}$, $V_{CTRL}=0\text{V}$	-	-	5	μA

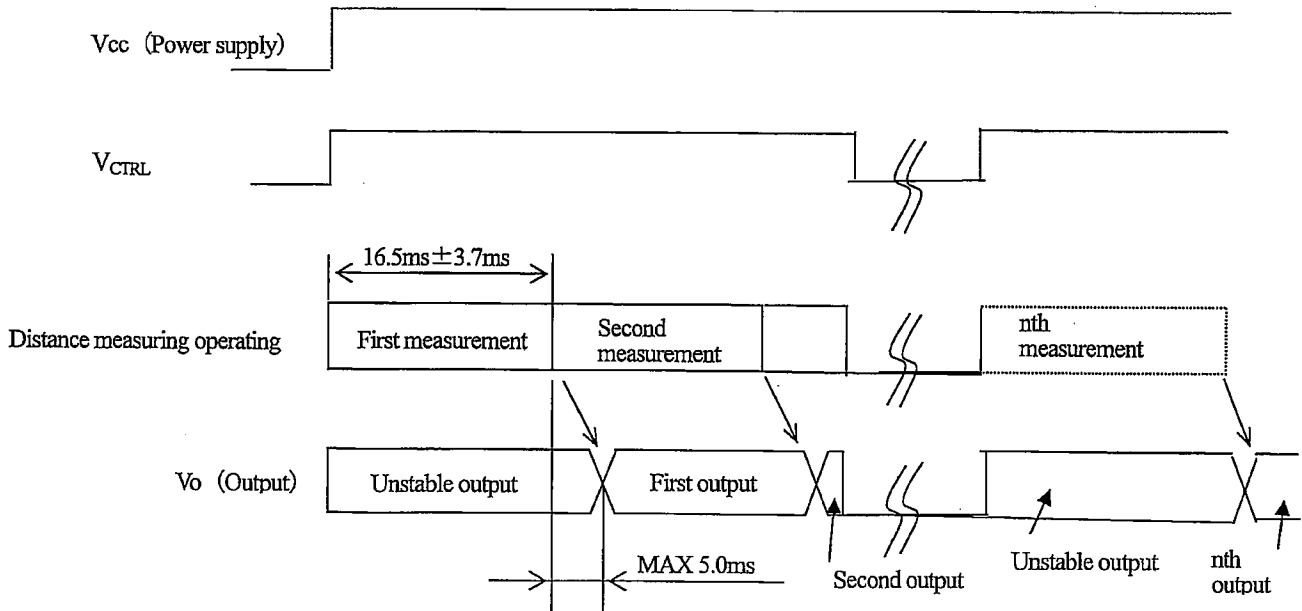
($T_a=25^\circ\text{C}$, $V_{CC}=5\text{V}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Measuring distance range	ΔL	(Note 1)	10	-	150	cm
Output terminal voltage	V_o	$L=150\text{cm}$ (Note 1)	0.15	0.65	1.15	V
Output voltage difference	ΔV_o	Output change at L change (10cm \rightarrow 150cm) (Note 1)	2.75	3.0	3.25	V
Average supply current	I_{cc1}	$V_{CC}=5\text{V}$, $V_{CTRL}=5\text{V}$	-	33	50	mA
Stand-by supply current	I_{cc2}	$V_{CC}=5\text{V}$, $V_{CTRL}=0\text{V}$	-	-	5	μA

※ L: Distance to reflective object

(Note 1) Using reflective object: White paper (Made by Kodak Co., Ltd. gray cards R-27 • white face, reflective ratio ; 90%)

3-4 Timing chart



GP2Y0A60SZ0F

REFERENCE

4. Reliability

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

LTPD : 20 or 30

No.	Test Items	Test Conditions	Failure Judgement Criteria	Samples (n)
				Defective (c)
1	Temperature cycling	1 cycle -40°C to +70°C (30min.) (30min.) 25 cycle test	Initial $\times 0.8 > V_o$ $V_o > \text{Initial} \times 1.2$ (Note 1)	n=11, c=0
2	High temp. and high humidity storage	+40°C, 90%RH, 500h		n=11, c=0
3	High temp. storage	+70°C, 500h		n=11, c=0
4	Low temp. storage	-40°C, 500h		n=11, c=0
5	Operation life (High temp.)	+60°C, $V_{cc}=5V$, 500h		n=11, c=0
6	Soldering heat	$T_{sol}=260^\circ\text{C}$, 3s or less/time up 2 times		n=11, c=0
7	Mechanical shock	1000m/s ² , 6.0ms 3times/ $\pm X$, $\pm Y$, $\pm Z$ direction		n=8, c=0
8	Variable frequency vibration	10 to 55 to 10Hz/1min. 2h/ X , Y , Z direction overall amplitude : 1.5mm		n=8, c=0

(Note 1) Test conditions are according to 3-3 Electro-optical characteristics.

(Note 2) After test, measurement shall be measured after leaving under the normal temperature and the normal humidity for two hours. But no dew point.

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 is applied.

The AQL according to the inspection items are shown below.

Defect	Inspection item	AQL (%)
Major defect	Electro-optical characteristics defect (In para. 3-3)	0.4
Minor defect	Defect on appearance and dimension ※ Crack, chip, scratch, stain	1.0

※ Crack, chip, scratch, stain

One which affects the characteristics of para. 3-3 shall be defect.

REFERENCE

8. Notes

[Advice for the optics]

8-1 Lens of this device shall be kept cleanly. There are cases that dust, water or oil and so on deteriorate the characteristics of this device. Please consider in actual application.

8-2 In case that protection is set in front of the emitter and detector portion, the protection cover which has the most efficient transmittance at the emitting wavelength range of LED for this product ($\lambda=870\text{nm}\pm 70\text{nm}$), shall be recommended to use. The face and back of protection cover should be mirror polishing. Also, as there are cases that the characteristics may not be satisfied with according to the distance between the protection cover and this product or the thickness of the protection cover, please use this product after confirming the operation sufficiently in actual application.

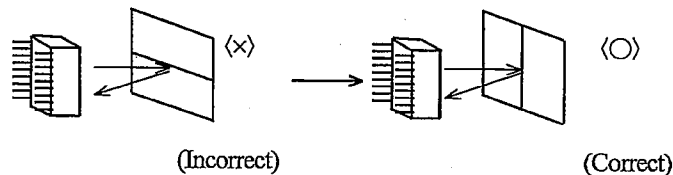
[Advice for the characteristics]

8-3 In case that there is an object near to light exits of the sensor between the sensor and the detected object, please use this device after confirming sufficiently what the characteristics of this sensor do not change by the object.

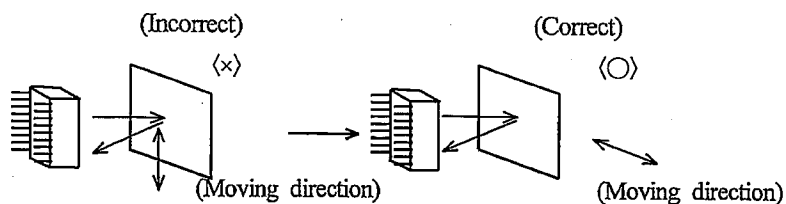
8-4 When the detector surface receive direct light from the sun, tungsten lamp and so on, there are cases that it can not measure the distance exactly. Please consider the design that the detector does not receive direct light from such light source.

8-5 Distance between sensor and mirror reflector cannot be measured exactly.

8-6 In case that reflective object has boundary line clearly, there is cases that distance can not measure exactly. At that time, if direction of boundary line and the line between emitter center and detector center are parallels, it is possible to decrease deviation of measuring distance.



8-7 In order to decrease measuring error due to moving direction of object, we recommend to mount the sensor like below drawing.



[Notes on handling]

8-8 Please don't do washing. Washing may deteriorate the characteristics of optical system and so on.

Please confirm resistance to chemicals under the actual usage since this product has not been designed against washing.

8-9 Please solder under the condition below within 2 times.

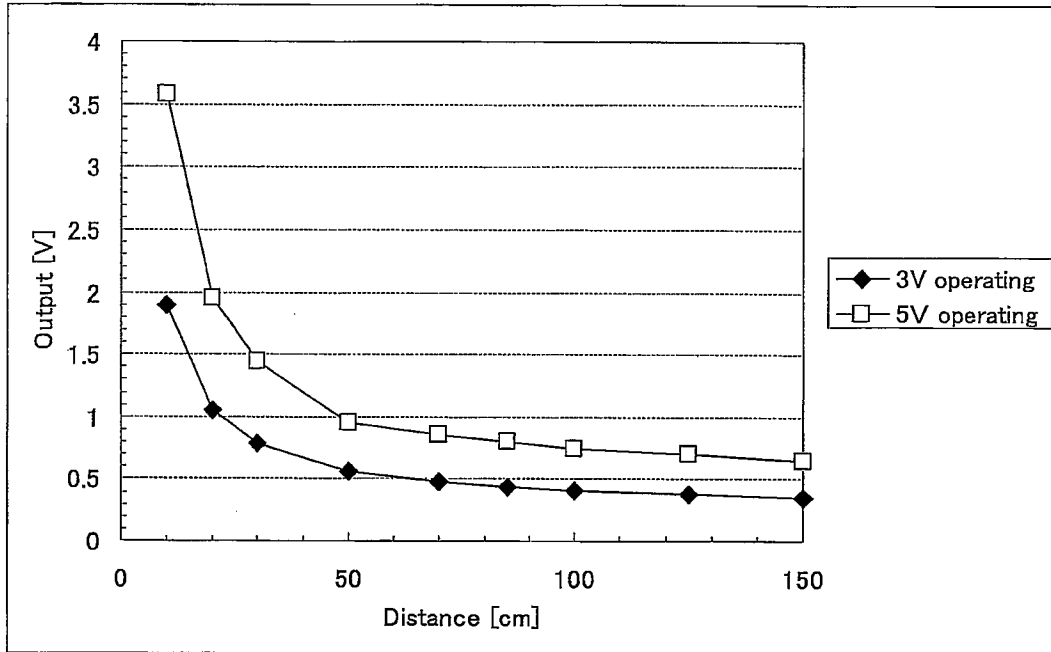
- below 260°C at the tip of soldering tool
- less than 5 seconds

Please take care not to let any external force exert on lead pins when soldering.

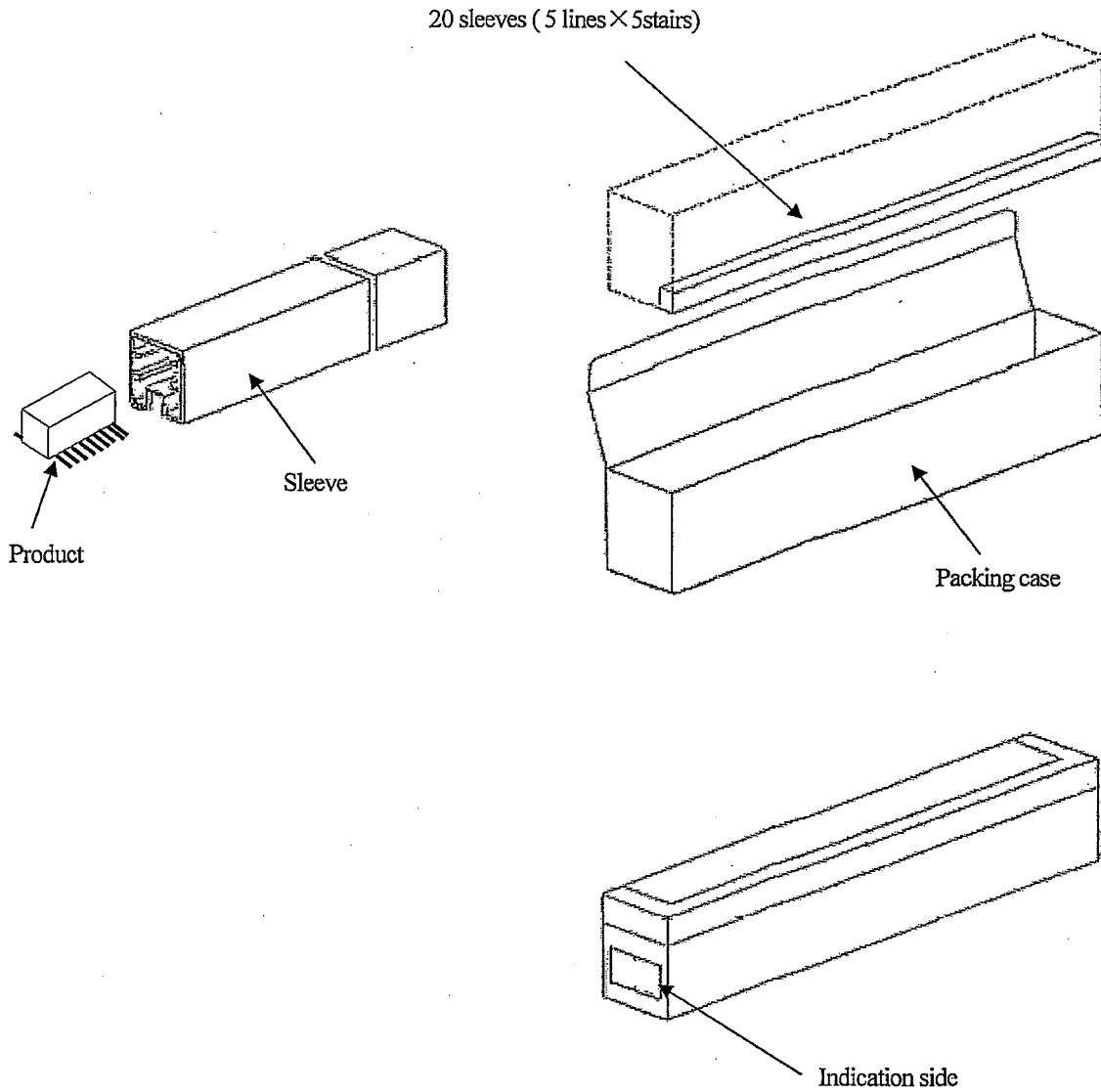
Please do not do soldering by reflow and flow-soldering.

7-1 GP2Y0A60SZ0F Example of output distance characteristics

White paper (Reflectance ratio 90%)



6. Packing specification



1. Packing number
 MAX 20 pieces per sleeve
 MAX 500 pieces per case.
2. Close the lid of case and seals with kraft tape, and fill in the blanks of Model No., Quantity and Date.
3. Outside : 486 × 64 × 77 (mm)
4. Indication
 The content of the indication conforms to EIAJ C-3 and the following items are indicated.
 Model No., Internal production control name, Quantity, Packing date, Corporate name, Country of origin