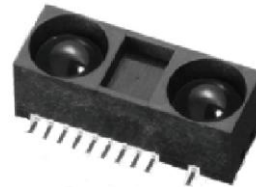


# GP2Y0A60SZ0F GP2Y0A60SZLF

Distance Measuring Sensor Unit  
Measuring distance : 10 to 150 cm  
Analog output type



## ■Description

**GP2Y0A60SZ0F/GP2Y0A60SZLF** is a distance measuring sensor unit, composed of an integrated combination of PSD (position sensitive detector) , IR-LED (infrared emitting diode) and signal processing circuit.

The variety of the reflectivity of the object, the environmental temperature and the operating duration are not influenced easily to the distance detection because of adopting the triangulation method.

This device outputs the voltage corresponding to the detection distance. So this sensor can also be used as a proximity sensor.

## ■Agency approvals/Compliance

1. Compliant with RoHS directive (2002/95/EC)

## ■Applications

1. Touch-less switch  
(Sanitary equipment, Control of illumination, etc)
2. Sensor for energy saving  
(ATM, Copier, Vending machine, Laptop computer, LCD monitor, etc)
3. Amusement equipment  
(Robot, Arcade game machine, etc)

## ■Features

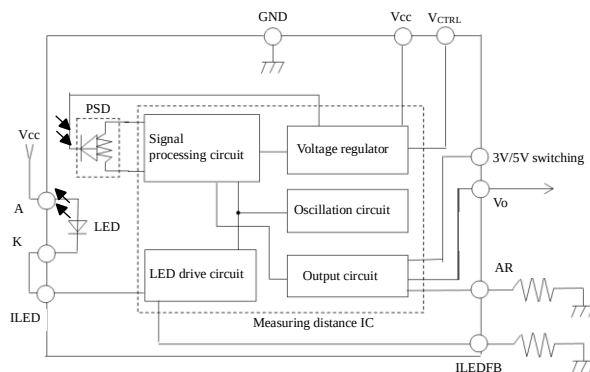
1. Distance measuring sensor is united with PSD, infrared LED and signal processing circuit
2. Distance measuring range : 10 to 150 cm
3. Compact size (22.0 × 8.0 × 7.2mm)
4. Long distance measuring type  
(No external control signal required)
5. Analog output type

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Sheet No.: OP13005EN-A

## ■Schematic



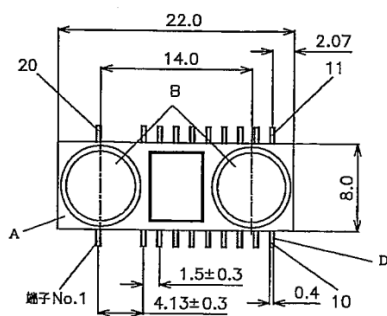
- Showing main terminal
- Please use an electric source with an output current of 400mA or more because LED pulse current is more than 300mA.

## ■Outline

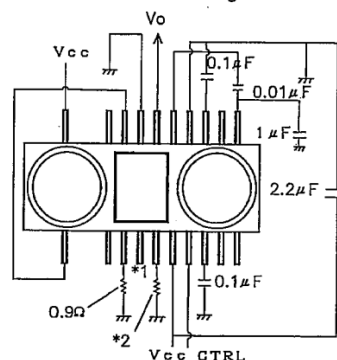
GP2Y0A60SZ0F

(Drawing No.CY14442j02)

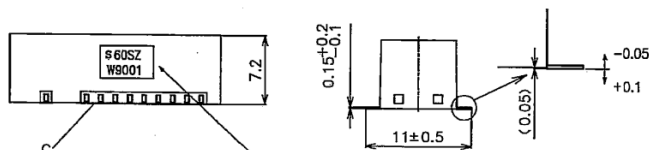
Scale : 2/1 Unit : mm



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

|   |                |                                             |
|---|----------------|---------------------------------------------|
| 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]  
GP2Y0A60SZLF  
[60SZ]  
LOT No.  
Month (1 to 9, Q, 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      |
| 2012 | C      |
| 2013 | D      |
| 2014 | E      |
| 2015 | F      |
| 2016 | G      |
| 2017 | H      |
| 2018 | I      |
| 2019 | J      |
| 2020 | K      |
| 2021 | L      |
| 2022 | M      |
| 2023 | N      |
| 2024 | O      |
| 2025 | P      |
| 2026 | Q      |
| 2027 | R      |
| 2028 | S      |
| 2029 | T      |
| 2030 | U      |

| terminal No. | terminal Name   |
|--------------|-----------------|
| 1            | cathode         |
| 2            | GND             |
| 3            | ILEDFB          |
| 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           | ILED            |
| 19           | GND             |
| 20           | anode           |

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

(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.

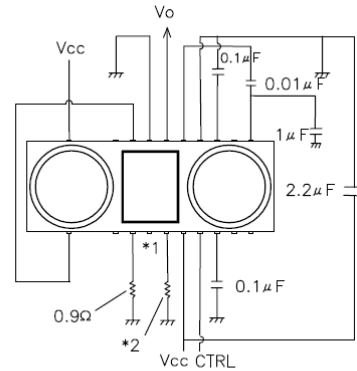
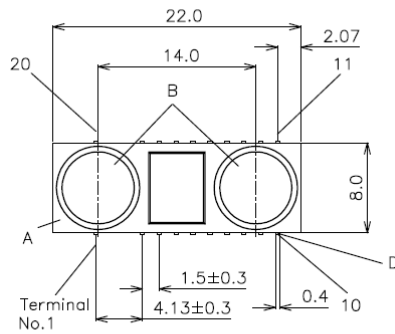
Terminals No.10, 11 are connected in device.  
Thus GP2Y0A60SZ0F operates by connection of either terminal.

## GP2Y0A60SZLF

(Drawing No.CY14591i02)

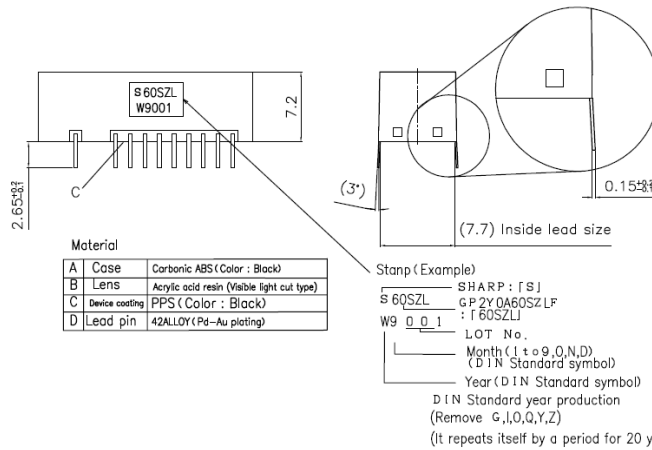
Scale : 2/1 Unit : mm

Connection diagram



\*1) Above connection is the case of Vcc = 3V.  
In the case of Vcc=5V, terminal No.4 is connected to GND.

\*2) The AR terminal connects 36kΩ.



| terminal No. | terminal Name   |
|--------------|-----------------|
| 1            | cathode         |
| 2            | GND             |
| 3            | ILED FB         |
| 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           | CINT            |
| 16           | Vo              |
| 17           | T               |
| 18           | ILED            |
| 19           | GND             |
| 20           | anode           |

(Note1) Unspecified tolerances shall be ±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 GP2Y0A60SZLF operates by connection of arbitrary one terminal to GND.

Terminals No.10, 11 are connected in device.  
Thus GP2Y0A60SZLF operates by connection of either terminal.

## ■Absolute maximum ratings

(Ta=25°C)

| Parameter                | Symbol          | Ratings                       | Unit | Remark                             |
|--------------------------|-----------------|-------------------------------|------|------------------------------------|
| Supply voltage           | V <sub>CC</sub> | -0.3 to +5.5                  | V    | -                                  |
| Output terminal voltage  | V <sub>O</sub>  | -0.3 to V <sub>CC</sub> +0.3  | V    | -                                  |
| Input terminal voltage 1 | -               | -0.3 to V <sub>REG</sub> +0.3 | V    | Terminal<br>(NC,CH1,CH2,CINT,AR,T) |
| Input terminal voltage 2 | -               | -0.3 to V <sub>CC</sub> +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           | V <sub>CC</sub>     | 4.5 to 5.5             | V    | 5V             |
| Supply voltage           | V <sub>CC</sub>     | 2.7 to 3.6             | V    | 3V             |
| High level input voltage | V <sub>CTRLH</sub>  | 2.3 to V <sub>CC</sub> | V    | Operating      |
| Low level input voltage  | V <sub>CTRL</sub> L | MAX 0.2                | V    | Stand-by state |

## ■Electro-optical Characteristics

(Ta=25°C, V<sub>CC</sub>=3V)

| Parameter                 | Symbol           | Conditions                                           | MIN. | TYP. | MAX. | Unit |
|---------------------------|------------------|------------------------------------------------------|------|------|------|------|
| Measuring distance range  | ΔL               | (Note 1)                                             | 10   | -    | 150  | cm   |
| Output terminal voltage   | V <sub>O</sub>   | L=150cm (Note 1)                                     | 0.05 | 0.35 | 0.65 | V    |
| Output voltage difference | ΔV <sub>O</sub>  | Output change at L change<br>(10cm → 150cm) (Note 1) | 1.35 | 1.60 | 1.85 | V    |
| Average supply current    | I <sub>CC1</sub> | V <sub>CC</sub> =3V, V <sub>CTRL</sub> =3V           | -    | 33   | 50   | mA   |
| Stand-by supply current   | I <sub>CC2</sub> | V <sub>CC</sub> =3V, V <sub>CTRL</sub> =0V           | -    | -    | 5    | μA   |

(Ta=25°C, V<sub>CC</sub>=5V)

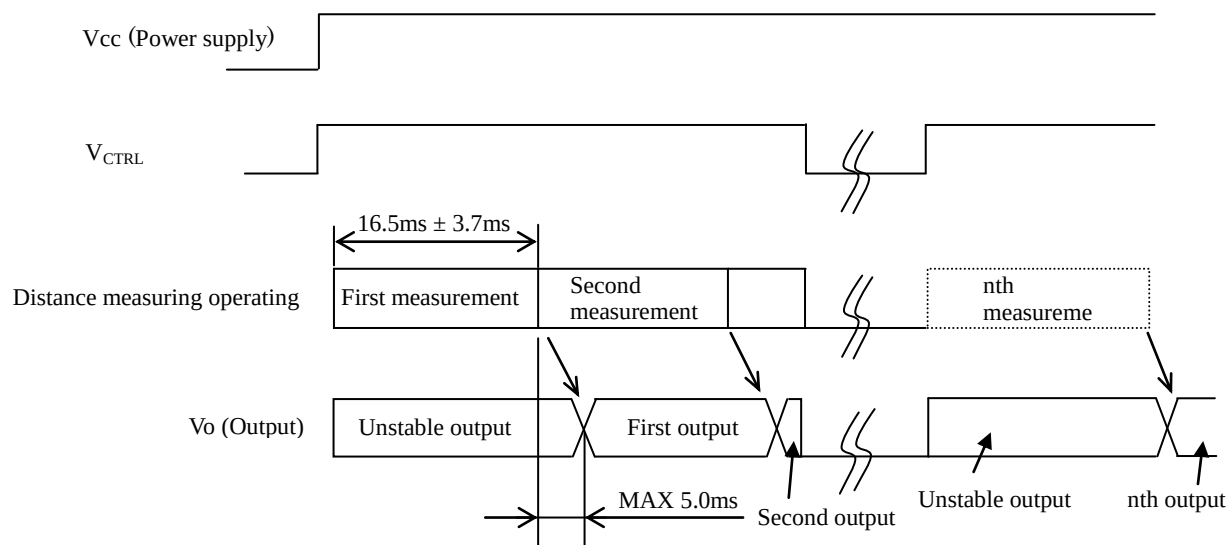
| Parameter                 | Symbol           | Conditions                                           | MIN. | TYP. | MAX. | Unit |
|---------------------------|------------------|------------------------------------------------------|------|------|------|------|
| Measuring distance range  | ΔL               | (Note 1)                                             | 10   | -    | 150  | cm   |
| Output terminal voltage   | V <sub>O</sub>   | L=150cm (Note 1)                                     | 0.15 | 0.65 | 1.15 | V    |
| Output voltage difference | ΔV <sub>O</sub>  | Output change at L change<br>(10cm → 150cm) (Note 1) | 2.75 | 3.00 | 3.25 | V    |
| Average supply current    | I <sub>CC1</sub> | V <sub>CC</sub> =5V, V <sub>CTRL</sub> =5V           | -    | 33   | 50   | mA   |
| Stand-by supply current   | I <sub>CC2</sub> | V <sub>CC</sub> =5V, V <sub>CTRL</sub> =0V           | -    | -    | 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%)

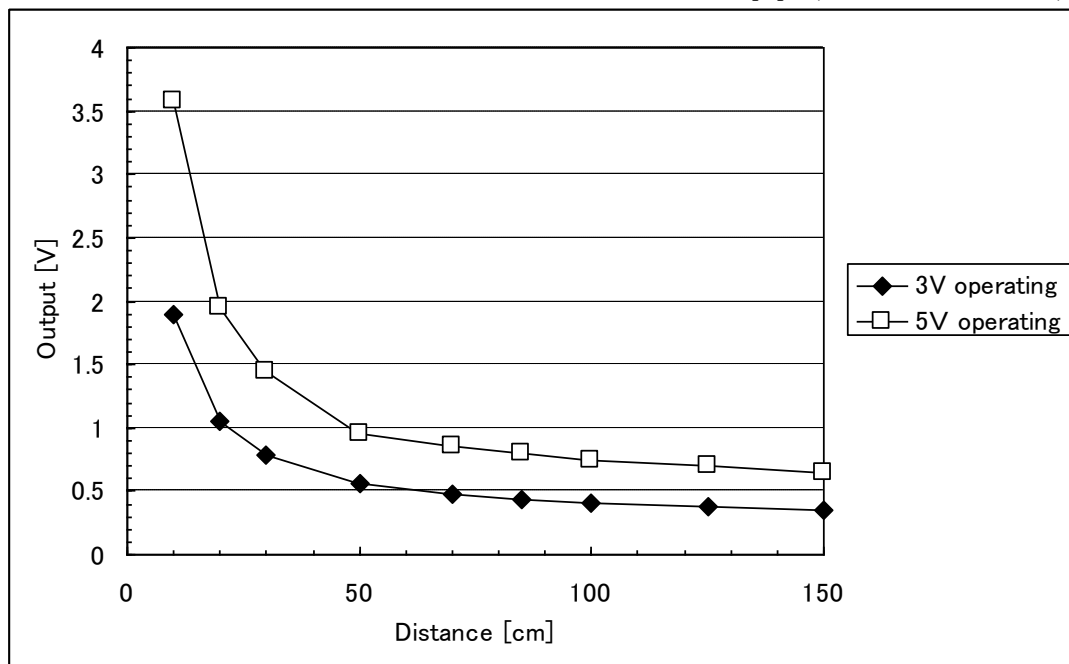
## ■Timing Chart



## ■Supplements

- Example of output distance characteristics

White paper(Reflectance ratio 90%)



- 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 : CFCs, Halon, Carbon tetrachloride 1.1.1-Trichloroethane (Methyl chloroform)

- Product mass : Approx. 1.1g (TYP)

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

(Except for the NOT regulated by RoHS directive.)

- Compliance with each regulation

- 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)

- 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 <sup>6+</sup> ) | 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 .

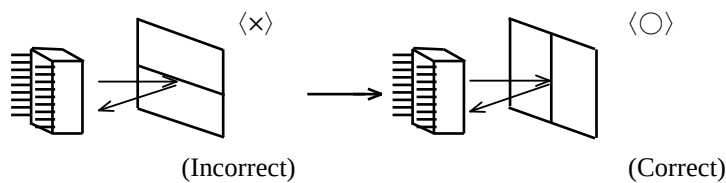
## ■Notes

[Advice for the optics]

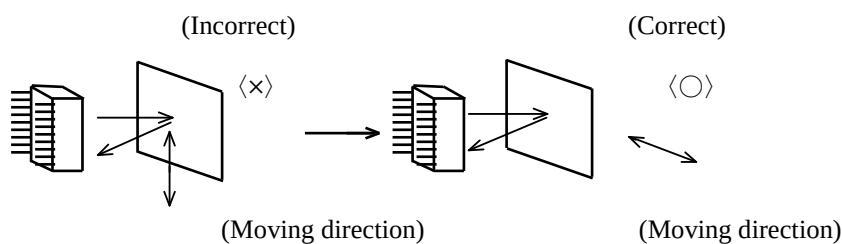
- Lens of this device shall be kept cleanly. There are cases that dust, water or oil and so on deteriorate the characteristics of this device. Please consider in actual application.
- In case that protection is set in front of the emitter and detector portion, the protection cover which has the most 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]

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



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



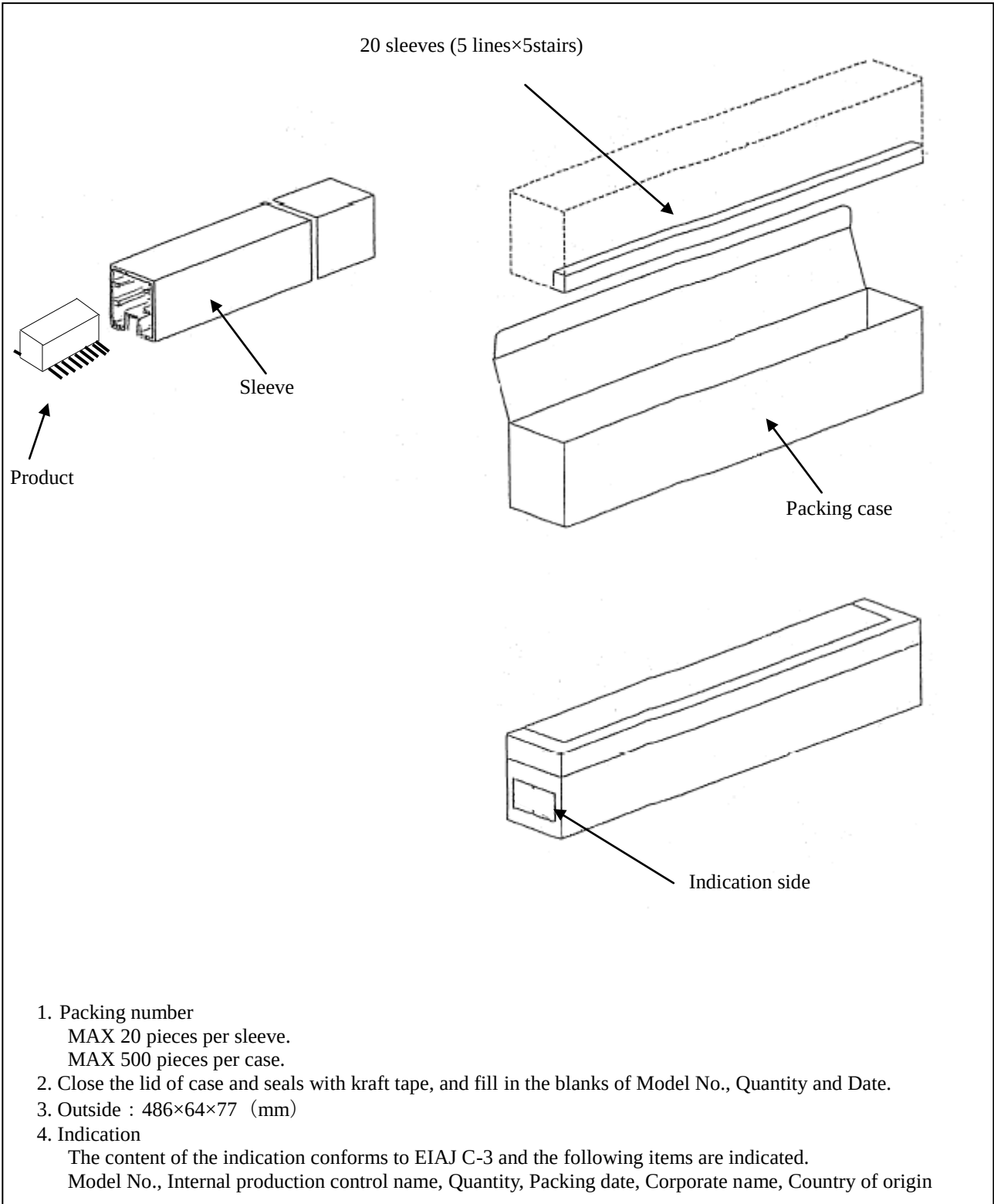
[Notes on handling]

- 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.
- Please solder under the condition below within 2 times.
  - below  $260^{\circ}\text{C}$  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.

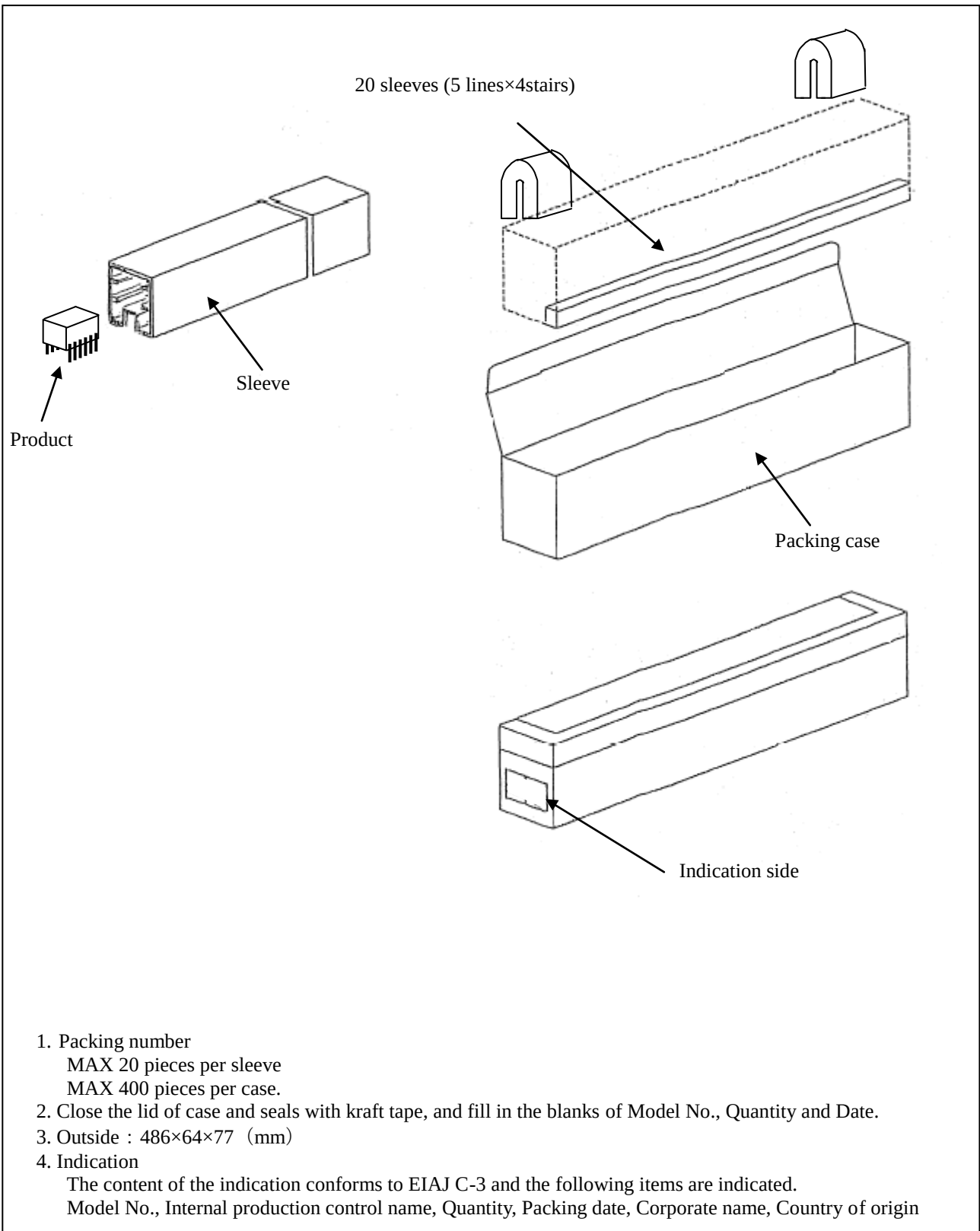
## ■Packing specification

### GP2Y0A60SZ0F





## GP2Y0A60SZLF



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(i) The devices in this publication are designed for use in general electronic equipment designs such as:

- Personal computers
- Office automation equipment
- Telecommunication equipment [terminal]
- Test and measurement equipment
- Industrial control
- Audio visual equipment
- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

with equipment that requires higher reliability such as:

- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

- Space applications
- Telecommunication equipment [trunk lines]
- Nuclear power control equipment
- Medical and other life support equipment (e.g., scuba).

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