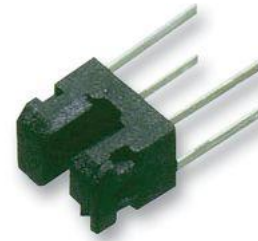


# GP1S396HCP0F

Gap : 1.2mm Slit : 0.12mm  
Phototransistor Output,  
Compact Transmissive  
Photointerrupter



## ■Description

**GP1S396HCP0F** is a phototransistor output, transmissive photointerrupter with a industry's smallest compact and low-profile package by the thin molding technology. This product detects an object between the emitter and the detector.  
In addition, by narrowing the slit width of the infrared beam to 0.12mm, this product has improved detection accuracy.

## ■Features

1. Transmissive with phototransistor output
2. Highlights :
  - Compact size
  - Low Profile
  - Narrow Gap
3. Key Parameters :
  - Gap Width : 1.2mm
  - Slit Width (detector side) : 0.12mm
  - Package : 2.26 × 1.4 × 1.6mm
4. RoHS directive compliant

## ■Agency approvals/Compliance

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

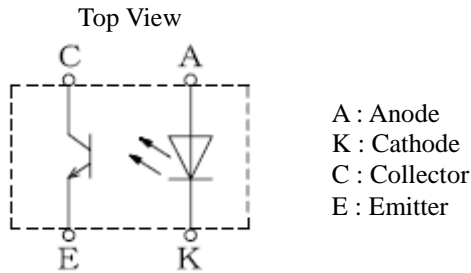
## ■Applications

1. General purpose detection of object presence or motion.  
Example : printer, lens control for camera,  
various mechanical position detection

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Sheet No.: OP13018EN

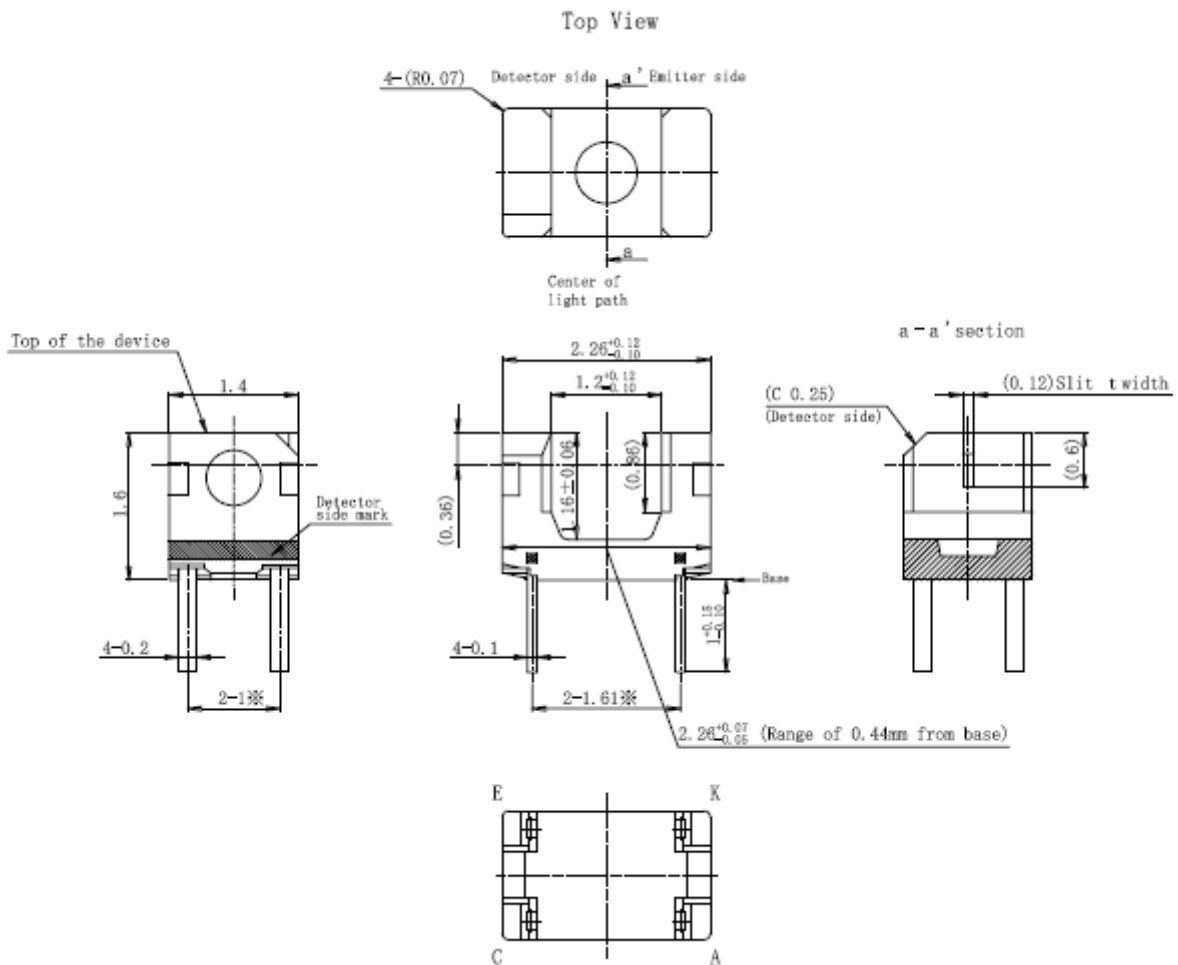
■ Internal Connection Diagram



■ Outline Dimensions

Drawing No. CY14940i02

Scale : 15/1 Unit : mm



Note

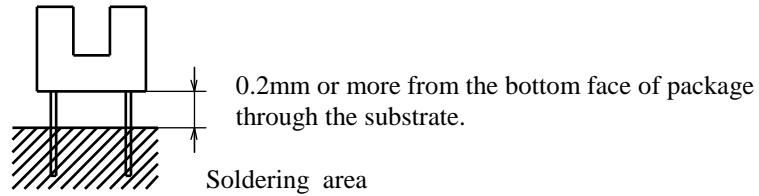
- 1) Unspecified tolerance shall be  $\pm 0.08$ mm.
- 2) Dimensions in parenthesis are shown for reference.
- 3) The dimensions indicated by  $\times$  refer to the those measured from the lead base.
- 4) The dimensions shown do not include those of burrs.  
Burr's dimensions shall be 0.15Max.
- 5) There is a possibility that the lead of part is exposed.
- 6) There is a possibility that the internal device is exposed at the top of the device because of the thin thickness of the outer package.
- 7) The mark possibly adheres partially of the side.
- 8) The dimension size doesn't contain the mark thickness.

**■ Absolute maximum ratings**

Ta=25°C

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	30	mA
	Reverse voltage	$V_R$	6	V
	Power dissipation	P	50	mW
Output	Collector-emitter voltage	$V_{CEO}$	35	V
	Emitter-collector voltage	$V_{ECO}$	6	V
	Collector current	$I_c$	20	mA
	Collector power dissipation	$P_c$	50	mW
Total power dissipation		$P_{tot}$	70	mW
Operating temperature		$T_{opr}$	-25 to +85	°C
Storage temperature		$T_{stg}$	-40 to +100	°C
* Soldering temperature		$T_{sol}$	300	°C

\* Soldering time : 3 s or less (Hand solder.)

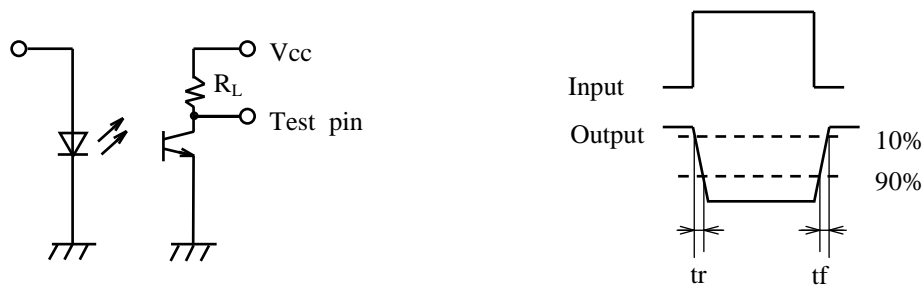


**■ Electro-optical Characteristics**

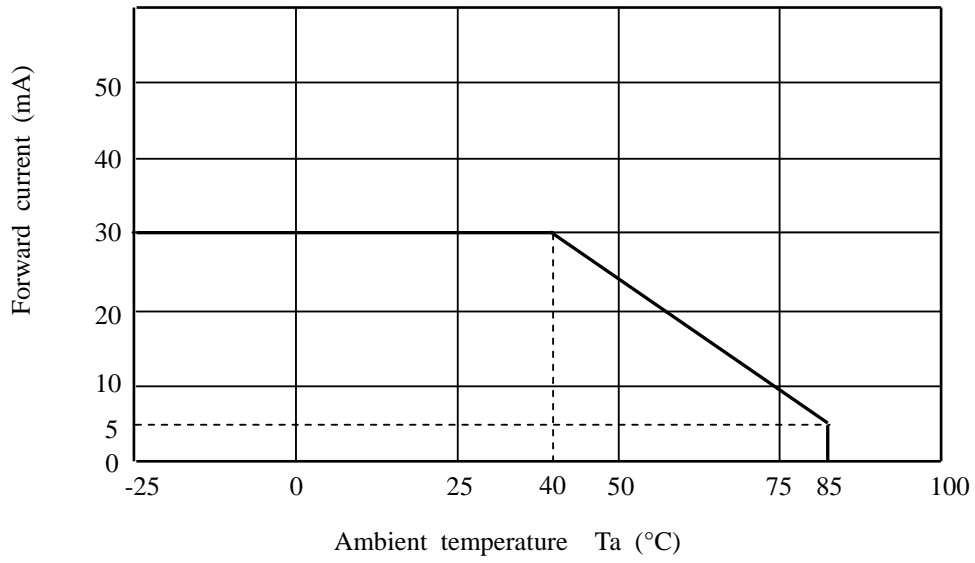
Ta=25°C

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	$V_F$	$I_F=20mA$	-	1.2	1.4	V	
	Reverse current	$I_R$	$V_R=3V$	-	-	10	$\mu A$	
Output	Collector dark current	$I_{CEO}$	$V_{CE}=20V$	-	-	100	nA	
Transfer characteristics	Collector current	$I_c$	$V_{CE}=5V, I_F=5mA$	100	-	400	$\mu A$	
	Response time	(Rise)	$t_r$	$V_{CE}=5V, I_c=100\mu A$ $R_L=1k\Omega$	-	30	120	$\mu s$
		(Fall)	$t_f$		-	30	120	$\mu s$
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_F=10mA, I_c=40\mu A$	-	-	0.4	V	

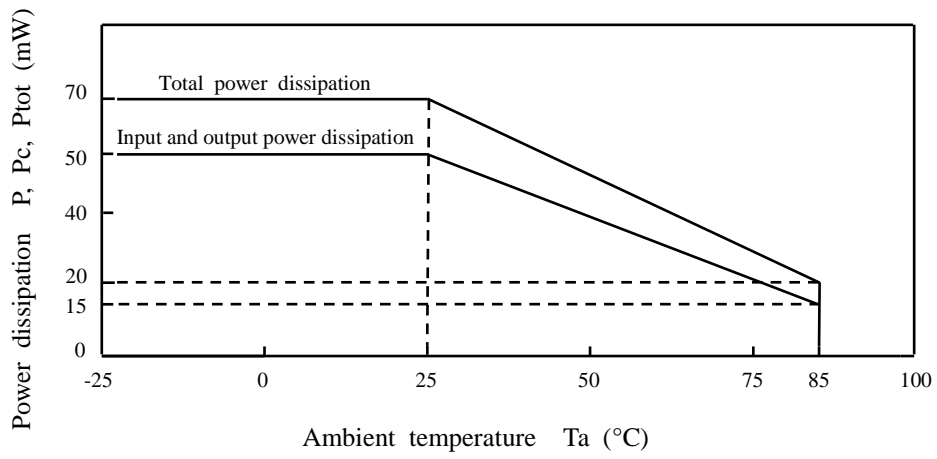
(Test circuit for response time)



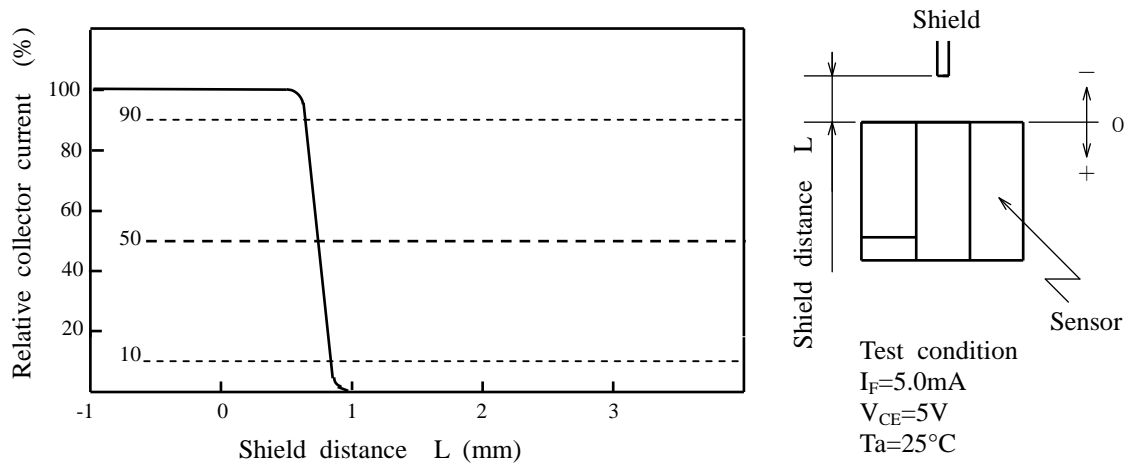
Forward current vs. ambient temperature



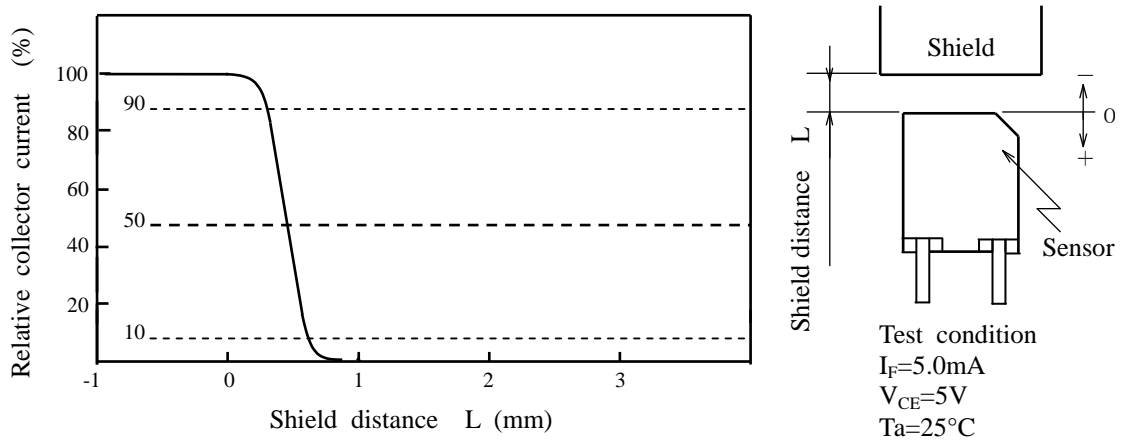
Power dissipation vs. ambient temperature



Relative collector current vs. shield distance 1 (Reference value)



Relative collector current vs. shield distance 2 (Reference value)



■ **Supplements**

● ODS materials

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)

● Halogen material

Chlorine < 900ppm , Bromine < 900ppm , Chlorine + Bromine < 1500ppm (Homogeneous material)

● 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, 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)
Photointerrupter	✓	✓	✓	✓	✓	✓

✓ : 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.

● Product mass : Approx. 6mg

● Country of origin : China

● Taping specification : Refer to the attachment-1.

## ■Notes

- Circuit design

In circuit designing, make allowance for the degradation of the light emitting diode output that results from long continuous operation. (50% degradation/5 years)

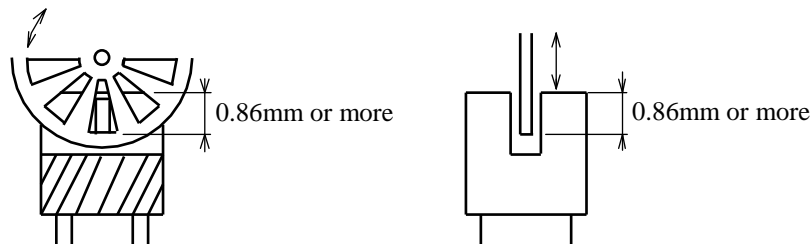
- Prevention of detection error

To prevent photointerrupter from faulty operation caused by external light, do not set the detecting face to the external light.

- Position of opaque board

Opaque board shall be installed at place 0.86mm or more from the top of elements.

(Example)



- Soldering

Hand soldering

Please solder to each lead pin at 0.2mm or more from the bottom face of package through the substrate at 300°C for 3 seconds or less.

Please don't bend lead pins from the root of package when soldering.

And please take care not to apply outer force to both lead pins and the package.

Please don't do soldering with preheating, and please don't do soldering by reflow.

In case of repairing, please make sure GP1S396HCP0F is cooled down, please consider the outer mold resin is meltdown in case a continuous heat is applied.

Since the tip of the lead has exposed lead frame base material, there is a case not to be soldered.

- Cleaning

Cleaning shall be carried out under the below conditions to avoid keeping solvent, solder and flux on the device.

(1) Solvent cleaning : Solvent temperature 45°C or less, Immersion for 3 min. or less

(2) Ultrasonic cleaning : Since the influence to the product may changes by the conditions of the ultrasonic power, time, the tank size, PCB size, the product installation condition, etc., please evaluate with actual conditions and confirm before usage.

(3) The cleaning shall be carried out with solvent below.

Solvent : Ethyl alcohol, Methyl alcohol

- Lead pin

Lead terminals of this product have Copper, Nickel, Palladium and Gold plating.

Before usage, please evaluate solder ability with actual conditions and confirm.

The uniformity in color for the lead terminals are not specified.

- Storage and management after open

Storage condition : Storage shall be in accordance with the below conditions.

Storage temp. : 5 to 30°C

Storage humidity : 70%RH or less

**■Parts**

This product uses the below parts.

- Light detector (Quantity : 1)

Type	Material	Maximum sensitivity (nm)	Sensitivity (nm)	Response time (μs)
Phototransistor	Silicon (Si)	920	700 to 1200	20

- Light emitter (Quantity : 1)

Type	Material	Maximum light emitting wavelength (nm)	I/O Frequency (MHz)
Infrared light emitting diode (non-coherent)	GaAs	940	0.3

- Material

Case	Lead frame	Lead frame plating
Black PPA resin	42 Alloy	Au-Pd-Ni-Cu

- Others

This product shall not be proof against radiation flux.

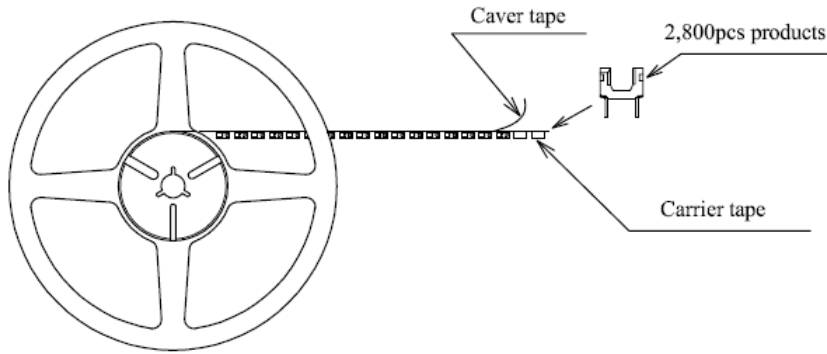


■ Packing

Drawing No. CY14941i09

● Inner Packing

1) Inner Packaging drawing

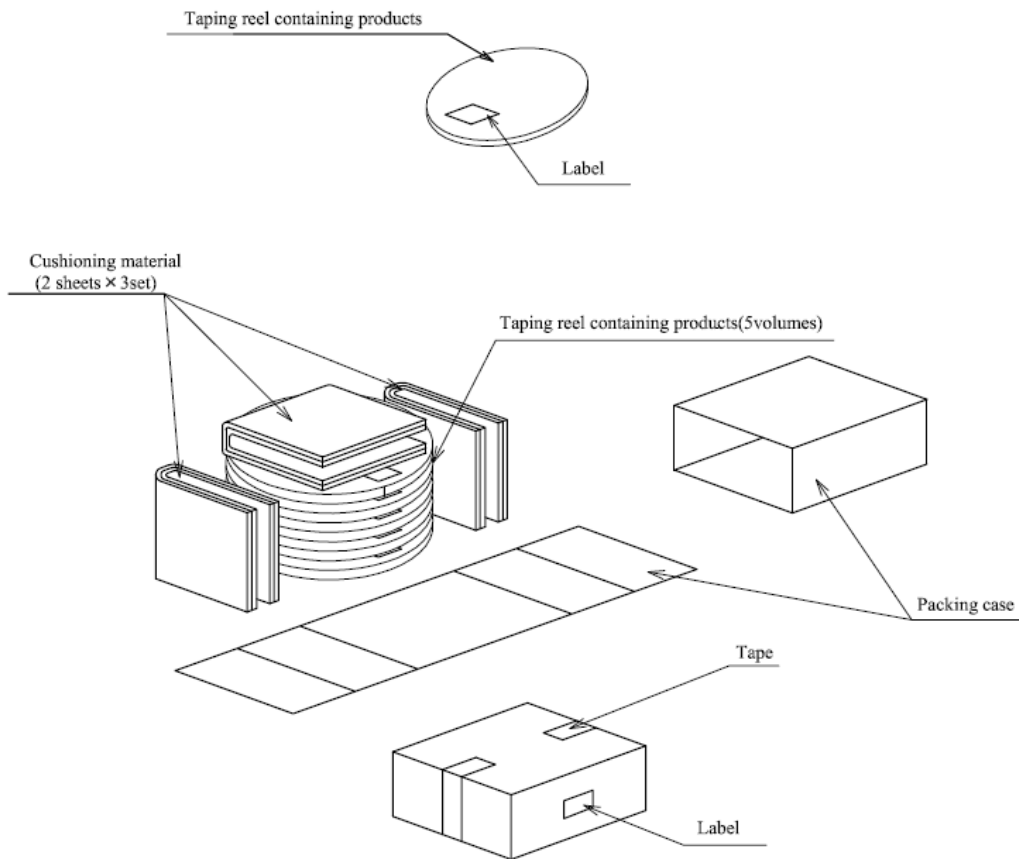


2) Inner Packing material : • Reel(PS) • Carrier tape(PC) • Caver tape(PET)

3) Quantity : 2,800pcs./Reel

● Outer Packaging

1) Outer Packaging drawing



2) Outer Packing material : Packing case(Corrugated cardboard), Cushioning material(Urethane)  
Label(paper), Tape

3) Quantity : 14,000pcs./box

4) The contents of the carton 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

5) Regular packaged mass : Approximately 500g

(Attachment-1-1)

Package specifications (φ180mm reel)

1) Application

This specification applies to the taping specifications and the relation items for the GP1S396HCP0F.

2) Taping method

(1) Tape structure and Dimensions (Refer to the attached sheets-1-2)

The tape shall have a structure in which a cover tape is sealed pressed on the carrier tape made by polycarbonate to protect against static electricity.

(2) Reel structure and Dimensions (Refer to the attached sheets-1-3)

(3) Direction of product insertion (Refer to the attached sheets-1-3)

Product direction in carrier tape shall direct to the detector at the hole side on the tape.

3) Repair method of sealing error

In case of repairing a sealing error, three sides of a cover tape matching to the product insertion portion are opened by a cutter and it will be closed by adhesiveness tape after repairing.

4) Adhesiveness of cover tape

The exhalation force between carrier tape and cover tape shall be 0.1N to 1.0N for the angle from 165° to 180°.

5) Rolling method and quantity

(1) Wind the tape back on the reel so that the cover tape will be outside the tape.

(2) Attach more than 16cm of blank tape to the trailer and attach more than 10cm of the leader.

Attach more than 40cm of cover tape to the leader to the tape and fix the both ends with adhesive tape.

(3) One reel shall contain 2,800 pcs.

6) Indication items

The contents of the carton indication conforms to EIAJ C-3 and the following items are indicated.

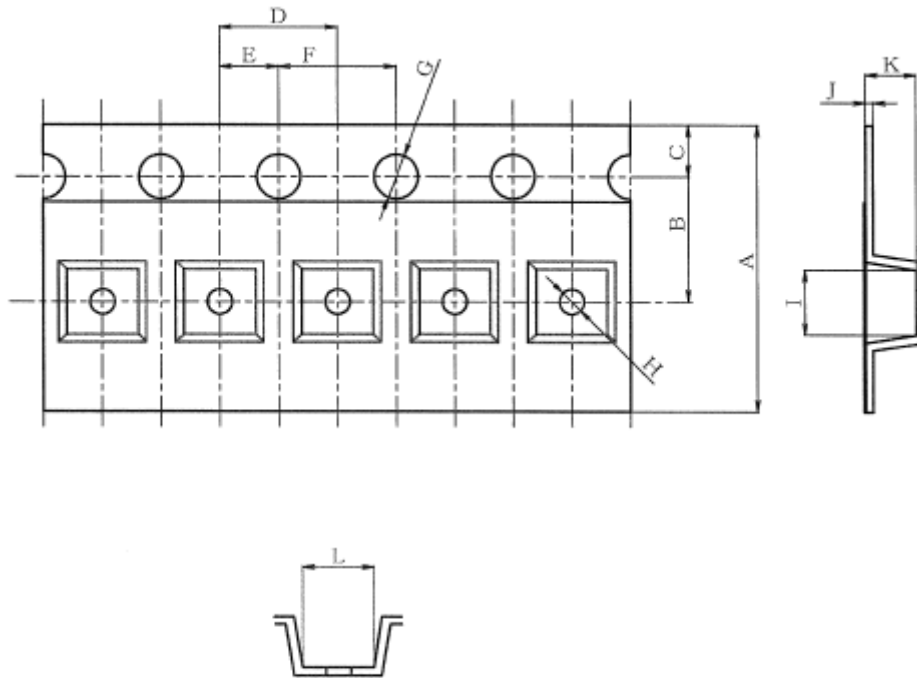
Model No., Internal production control name, Quantity, Packing date, Corporate name, Country of origin

7) Safety protection during shipping

There shall be no deformation of component or degradation of electrical characteristics due to shipping.

(Attachment-1-2)

- Tape structure and dimensions



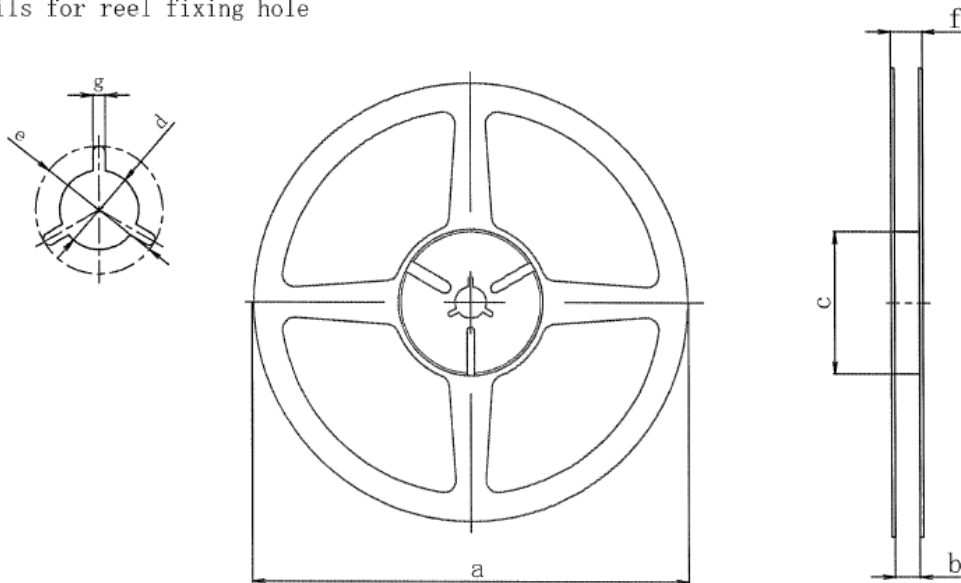
Symbol	Dimensions					
Unit	A	B	C	D	E	F
mm	8.0 <sup>±0.3</sup>	3.5 <sup>±0.1</sup>	1.75 <sup>±0.1</sup>	4.0 <sup>±0.1</sup>	2.0 <sup>±0.1</sup>	4.0 <sup>±0.1</sup>

Symbol	Dimensions					
Unit	G	H	I	J	K	L
mm	φ 1.5 <sup>+0.1</sup> <sub>-0</sub>	φ 1.0 <sup>±0.2</sup>	2.43 <sup>±0.1</sup>	0.25 <sup>±0.05</sup>	1.56 <sup>±0.1</sup>	2.86 <sup>±0.1</sup>

(Attachment-1-3)

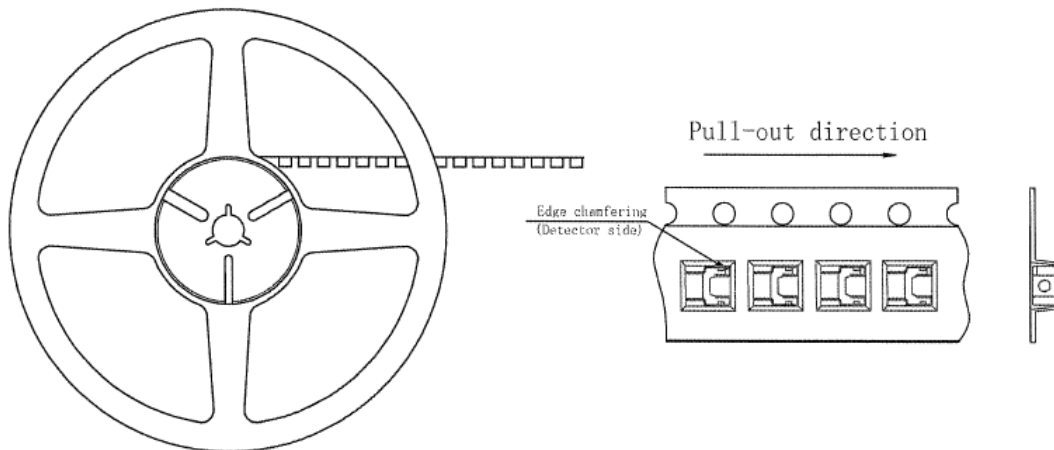
• Reel structure and dimensions

Details for reel fixing hole



Symbol Unit	Dimensions						
	a	b	c	d	e	f	g
mm	$\phi 180 \pm 2.0$	$9.0 \pm 1.0$	$\phi 60 \pm 1.0$	$\phi 13 \pm 0.2$	$21 \pm 0.8$	$11.4 \pm 1.0$	$2 \pm 0.5$

• Direction of product insertion



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- 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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