SHARP

REFERENCE

SPEC No.	ED-03G027D

ISSUE : April 23, 2020

TO ;

S P E C I F I C A T I O N S

Product Name PHOTOINTERRUPTER

Model No. GP1S092HCPIF

These specifications contain 15 pages including the cover and appendix.
This specification sheets and attached sheets shall be both side copy.
After confirmation of the contents, please be sure to send back_____copy of the Specifications with approving signature on each.
If you have any objections, please contact us before issuing purchasing order.

Accepted by:

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Title :
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1. These specification sheets include materials protected under copyright of Sharp Corporation ("Sharp").
Please handle with great cares and do not reproduce or cause anyone to reproduce them without Sharp's consent.

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

(Precautions)

(1) In making catalogue or instruction manual based on the specification sheets, please verify the validity of the catalogue or instruction manuals after assembling Sharp products in customer's products at the responsibility of customer.

(2) This Sharp product is designed for use in the following application areas ;
• Computers • OA equipment • Telecommunication equipment (Terminal) • Measuring equipment
• Tooling machines • Audio visual equipment • Home appliances
If the use of the Sharp product in the above application areas is for equipment listed in paragraphs (3) or (4), please be sure to observe the precautions given in those respective paragraphs.

(3) 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 Sharp product is used for equipment in responsibility of customer 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

(4) Sharp product is designed for consumer goods and controlled as consumer goods in production and quality.
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

(5) Please contact and consult with a Sharp sales representative if there are any question regarding interpretation of the above four paragraphs.

3. Disclaimer
The warranty period for Sharp product is one (1) year after shipment.
During the period, if there are any products problem, Sharp will repair (if applicable), replace or refund.
Except the above, both parties will discuss to cope with the problems.

The failed Sharp product after the above one (1) year period will be coped with by Sharp, provided that both parties shall discuss and determine on sharing responsibility based on the analysis results thereof subject to the above scope of warranty.

The warranty described herein is only for Sharp product itself which are purchased by or delivered to customer.
Damages arising from Sharp product malfunction or failure shall be excepted.

Sharp will not be responsible for the Sharp product due to the malfunction or failures thereof which are caused by:
(1) storage keep trouble during the inventory in the marketing channel.
(2) intentional act, negligence or wrong/poor handling.
(3) equipment which Sharp products are connected to or mounted in.
(4) disassembling, reforming or changing Sharp products.
(5) installation problem.
(6) act of God or other disaster (natural disaster, fire, flood, etc.)
(7) external factors (abnormal voltage, abnormal electromagnetic wave, fire, etc.)
(8) special environment (factory, coastal areas, hotspring area, etc.)
(9) phenomenon which cannot be foreseen based on the practical technologies at the time of shipment.
(10) the factors not included in the product specification sheet.

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

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1. Application

This specification applies to the outline and characteristics of transmissive type photointerrupter; Model No. GP1S092HCPIF.

2. Outline Refer to the attached drawing No. CY11279i02.

3. Ratings and characteristics Refer to the attached sheet, Page 5,6.

4. Reliability Refer to the attached sheet, Page 7.

5. Outgoing inspection Refer to the attached sheet, Page 8.

6. Supplements

6.1 Parts Refer to the attached sheet, Page 9.

6.2 Packing Refer to the attached sheet, Page 11. to 14.

6.3 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)

6.4 Specified brominated flame retardants

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

6.5 Compliance with each regulation

6.5.1 This product complies with EU RoHS Directive (2011/65/EU) and Commission Delegated Directive (EU)2015/863

6.5.2 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).

Marking Styles for the Names and Contents of the Hazardous Substances

Category	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr^{6+})	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Photointerrupter	○	○	○	○	○	○

This table is prepared in accordance with the provisions of SJ/T 11364.

○ : Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

6.6 Product mass : Approx. 50mg

6.7 Country of origin : China

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7. Notes

1) 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)

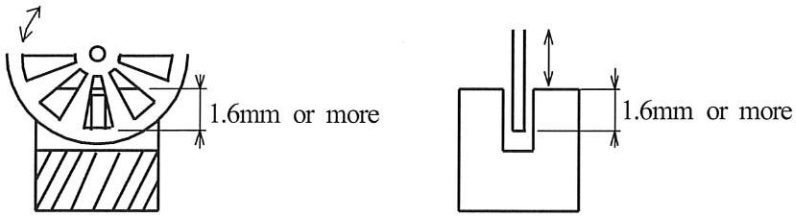
2) Prevention of faulty operation

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

3) Position of opaque board

Opaque board shall be installed at place 1.6mm or more from the top of elements.

(Example)



4) Soldering

(1) Solder reflow

Please do only one soldering at the temperature and the time within the temperature profile in attachment-1.

(2) Soldering by hand

To solder onto lead pins, please solder at 260℃ for 5 seconds or less.

And please take care not to let any external force exert on package and lead pins when soldering.

5) Cleaning

Cleaning shall be carried out as below to avoid remaining solvent, solder and flux on the device.

(1) Solvent cleaning : Solvent temperature 45℃ or less, Immersion for 3 min or less

(2) Ultrasonic cleaning : Please don't carry out ultrasonic cleaning.

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

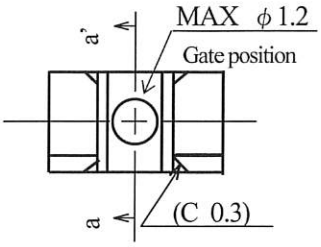
Solvent : Ethyl alcohol, Methyl alcohol

6) Lead pin

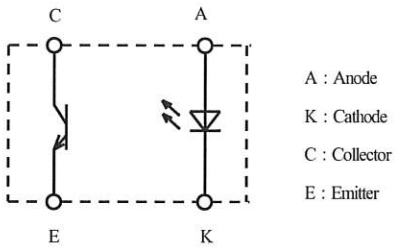
Lead terminals of this product are plated with tin copper alloy. Before usage, please evaluate solderability with actual conditions and confirm. And the uniformity in color for the lead terminals are not specified.

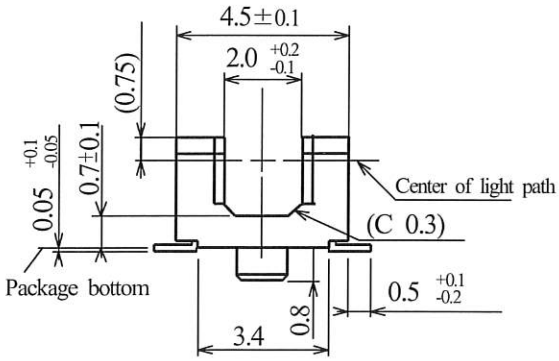
2. Outline Dimensions (Drawing No. CY11279i02) Scale : 5/1 Unit : 1/1mm

Top View

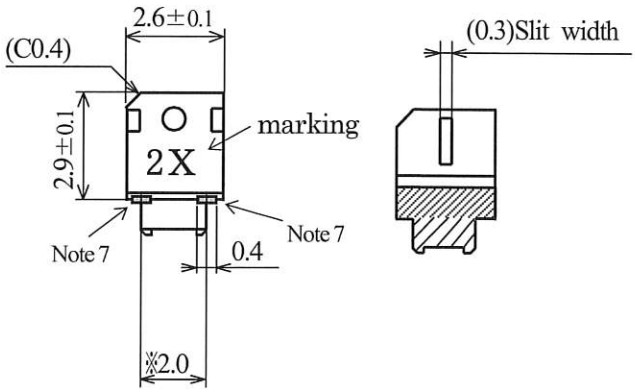


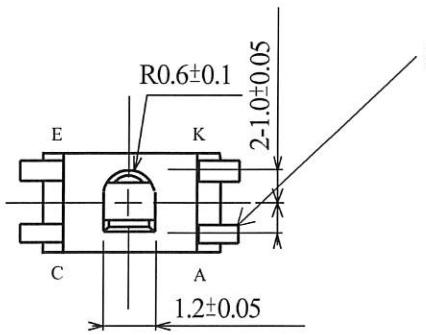
Circuit diagram : Top View



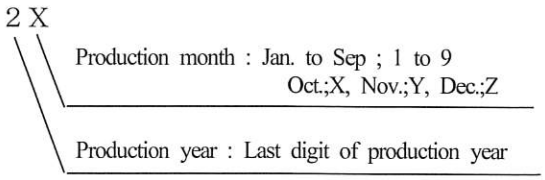


a-a' section

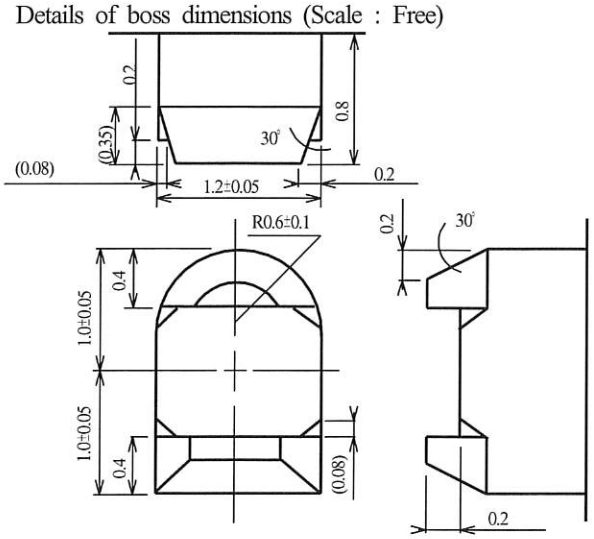




Note 1) Unspecified tolerance shall be ±0.2.
2) Dimensions in parenthesis are shown for reference.
3) The dimensions indicated by ※ refer to the those measured from the lead base.
4) The dimensions shown do not include those of burrs.
5) Leads coplanarity
Difference of distance between package bottom and bottom side of each lead shall be MAX. 0.1.
6) Coplanarity of the boss and gap of the device shall be 0.1.
7) ▨ portion : No solder plating.
8) The marking specifications are shown below.



Details of boss dimensions (Scale : Free)



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3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25℃

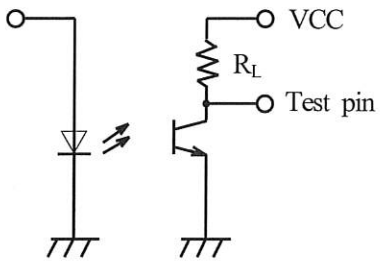
Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Reverse voltage	V_R	6	V
	Power dissipation	P	75	mW
Output	Collector-emitter voltage	V_{CEO}	35	V
	Emitter-collector voltage	V_{ECO}	6	V
	Collector current	Ic	20	mA
	Collector power dissipation	Pc	75	mW
Total power dissipation		Ptot	100	mW
Operating temperature		Topr	-25 to +85	℃
Storage temperature		Tstg	-40 to +100	℃

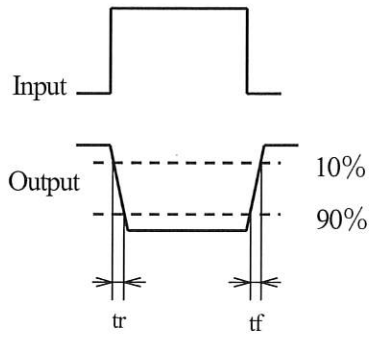
3.2 Electro-optical characteristics

Ta=25℃

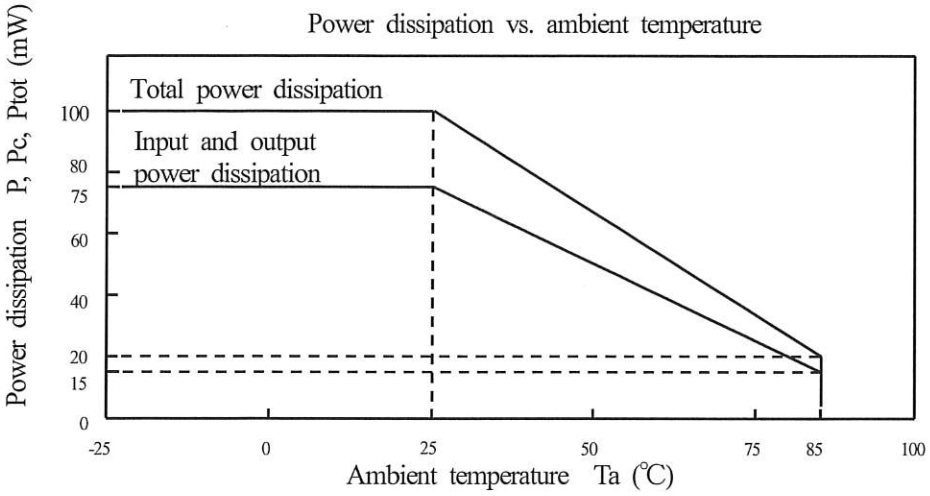
Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_F	I_F=20mA	-	1.2	1.4	V
	Reverse current		I_R	V_R=3V	-	-	10	μA
Output	Collector dark current		I_{CEO}	V_{CE}=20V	-	-	100	nA
Transfer character-istics	Collector current		Ic	V_{CE}=5V, I_F=5mA	100	-	400	μA
	Response time	(Rise)	tr	V_{CE}=5V, Ic=100 μA, R_L=1kΩ	-	50	150	μs
		(Fall)	tf		-	50	150	μs
	Collector-emitter saturation voltage		$V_{CE(sat)}$	I_F=10mA, Ic=40 μA	-	-	0.4	V

(Test circuit for response time)

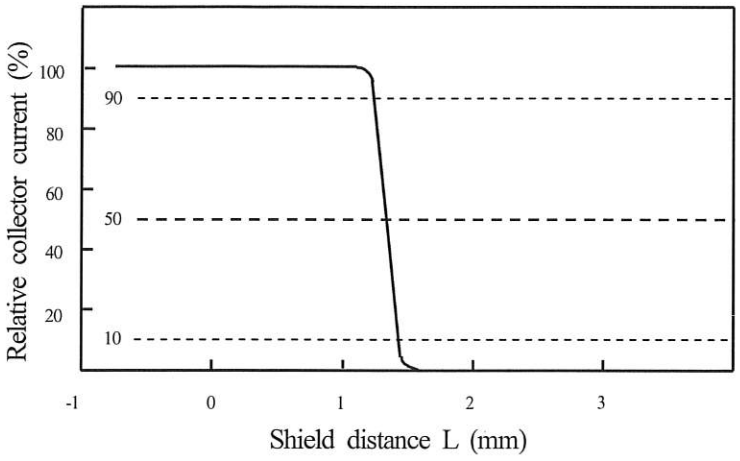


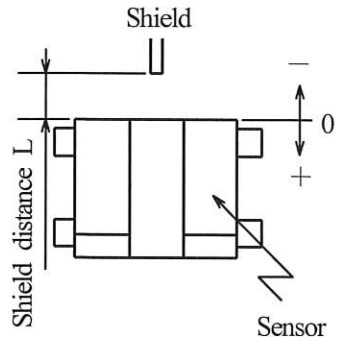


Power dissipation vs. ambient temperature



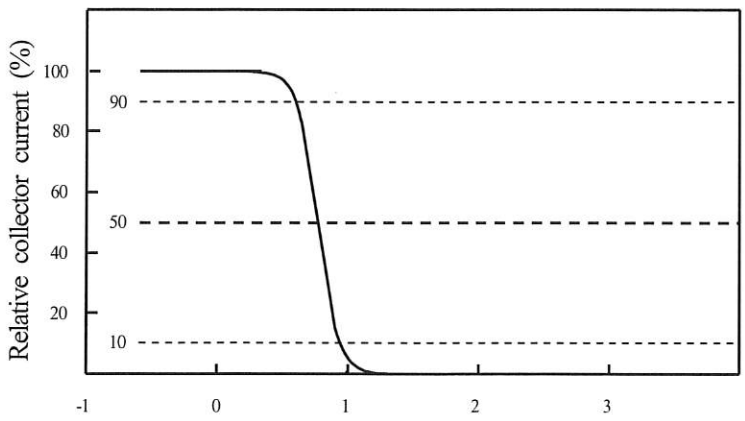
Relative collector current vs. shield distance 1 (Reference value)

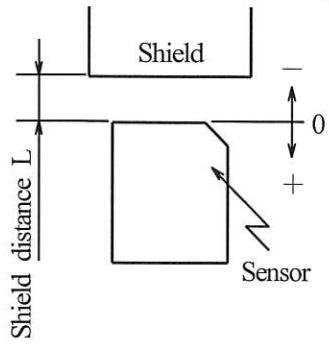




Test condition
I_F=5.0mA
V_{CE}=5V
Ta=25°C

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





Test condition
I_F=5.0mA
V_{CE}=5V
Ta=25°C

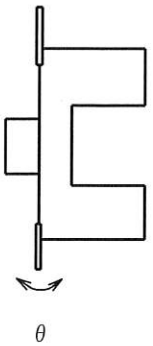
4. Reliability

The reliability of products shall satisfy items listed below.

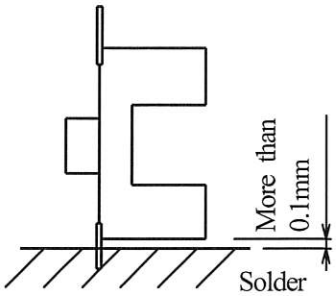
Confidence level : 90%
LTPD : 10 or 20

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) Defective (c)
Temperature cycling	1 cycle -40℃ to +100℃ (30min) (30min) 20 cycles test	$I_R \geqq U \times 2$ $I_{CEO} \geqq U \times 2$ $V_F \geqq U \times 1.2$ $Ic \leqq L \times 0.8$ U: Upper specification limit L: Lower specification limit	n=22, c=0
humidity storage	+60℃, 90%RH, 500h		n=22, c=0
High temp. storage	+100℃, 500h		n=22, c=0
Low temp. storage	-40℃, 500h		n=22, c=0
Operation life	I_F=20mA, Ta=25℃, 500h		n=22, c=0
Mechanical shock	15000m/s^2, 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, c=0
Variable frequency vibration	100 to 2000 to 100Hz/20min 2h/X, Y, Z direction 100m/s^2		n=11, c=0
Terminal strength (Tension)	Weight: 3N 30s/each terminal		n=11, c=0
Terminal strength (Bending)*1	Weight: 1N 0° →90° →0° →-90° →0 1time bending		n=11, c=0
Soldering heat *2	260℃, 5s		n=11, c=0
Solderability *2,*3	245℃, 5s Prior disposition: Dip rogin flux. Then immerse up to 0.1mm from the bottom face of package.	Judgement only appearance Solder shall adhere at less than 95% area of immersed portion of lead.	n=11, c=0
Solder reflow	Refer to the attached sheet-1. 1 time	Ic＜L×0.8	n=22, c=0

*1 Terminal bending direction is shown below.



*2 Soldering area is shown below.



*3 The alloy composition of solder used for lead free should be Sn-2.5Ag-1Bi-0.5Cu or Sn-3.0Ag-0.5Cu.
Flux used for precleaning should be equivalent to EC-19S-8(TAMURA KAKEN CORPORATION).

5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

V_F, I_R, BV_{ECO}, BV_{CEO}, Ic, I_{CEO}, $V_{CE(sat)}$

(2) Appearance

5.2 Sampling method and Inspection level

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	Characteristics defect	0.065
Minor defect	Defects on appearance except shown above. *	0.25

※ Crack … Visible crack shall be defect.
Split
Chip
Scratch
The others
… One which affects the electrical characteristics shall be defect.

6. Supplements

6.1 Parts

This product uses the below parts.

6.1.1 Light detector (Quantity : 1)

Type	Material	Maximum sensitivity (nm)	Sensitivity (nm)	Response time (μ s)
Phototran-sistor	Silicon (Si)	930	700 to 1200	20

6.1.2 Light emitter (Quantity : 1)

Type	Material	Maximum light emitting wavelength (nm)	I/O Frequency (MHz)
Infrared light emitting diode (non-coherent)	GaAs	950	0.3

6.1.3 Material

Case	Lead frame	Lead frame plating
Black PPS resin (UL 94V-0)	42 Alloy	SnCu plating

6.1.4 Others

This product shall not be proof against radiation flux.

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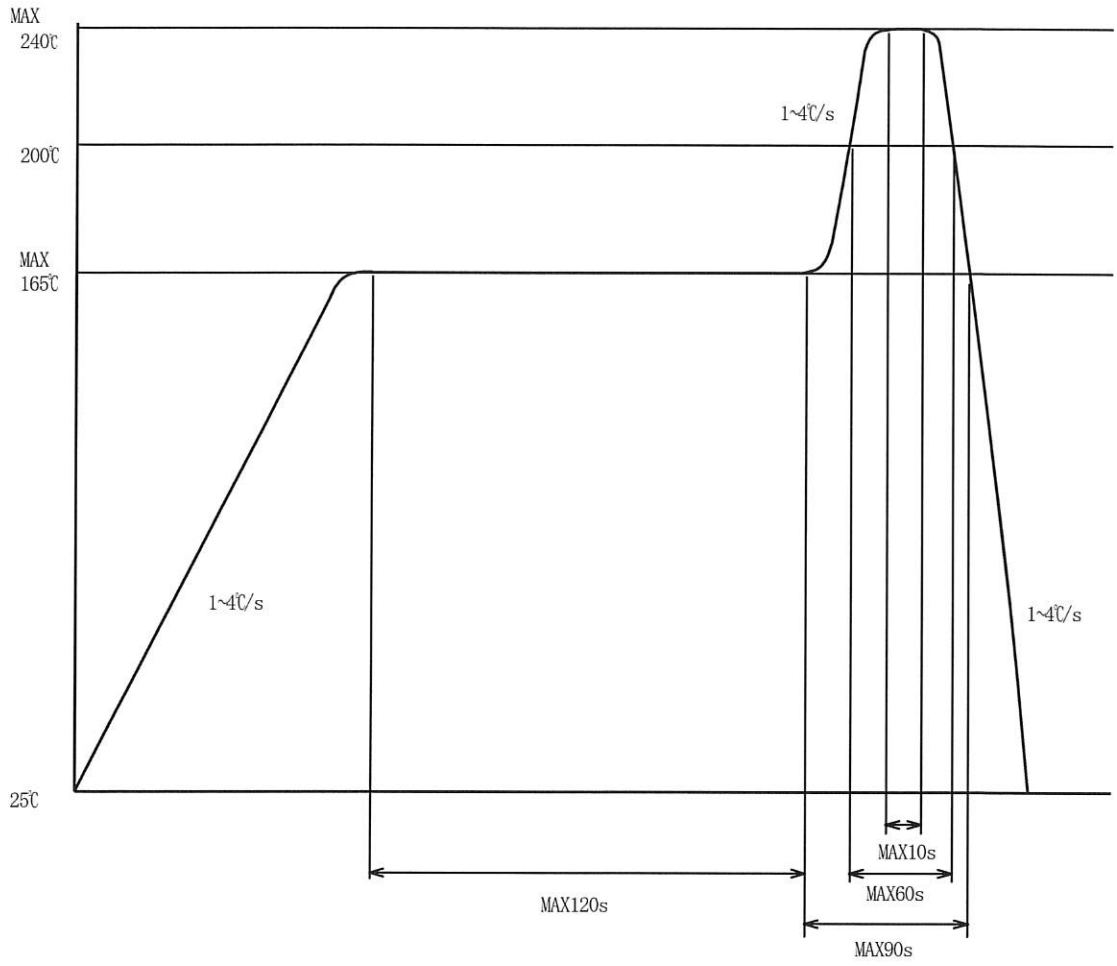
(Attachment-1)

Precautions for Soldering photointerrupter

1. In case, solder reflow

Please do only one soldering at the temperature and the time within the temperature profile as shown in the figure below.



2. Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin.
So keep the package temperature within that specified in Item 1.
Also avoid immersing the resin part in the solder.
Even if within the temperature profile above, there is the possibility that the
gold wire in package is broken in case that the deformation of PCB gives the affection to lead pins.
Please use after confirmation the conditions fully by actual solder reflow machine.

(Attachment-2-1)

Package specifications (ϕ 330mm reel)

1. Application

This specification applies to the taping specifications and the relation items for the GP1S092HCPIF.

2. Taping method

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

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

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

The taping reel material shall be polystyrene with its dimensions as shown in the attached drawing.

(2.3) Direction of product insertion (Refer to the attached sheets-2-3)

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

3. Adhesiveness of cover tape

The exhalation force between carrier tape and cover tape shall be 0.2N to 1.0N for the angle from 160° to 180° .

4. Rolling method and quantity

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

Attach more than 20cm of blank tape to the trailer and the leader of the tape and fix the both ends with adhesive tape.

One reel shall contain 2000 pcs.

5. 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

6. Safety protection during shipping

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

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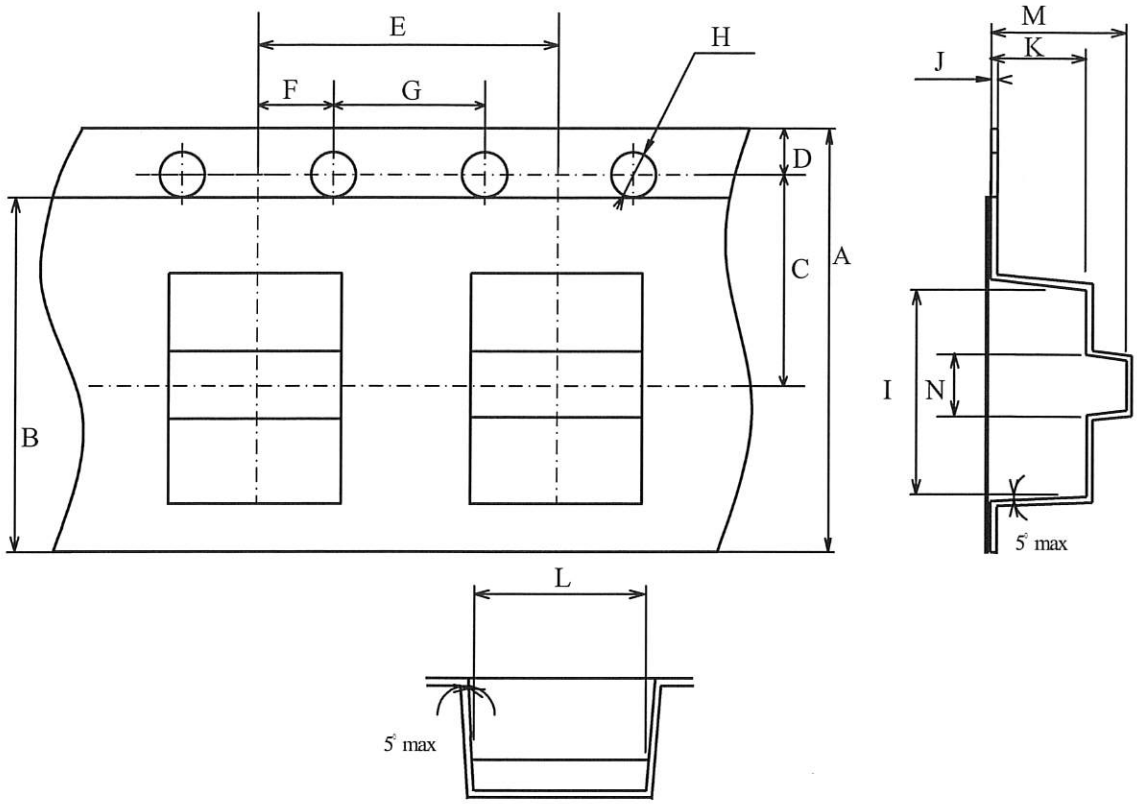
(Attachment-2-2)

Tape structure and Dimensions



Symbol / Unit	A	B	C	D	E	F	G	H
mm	12.0 ±0.3	9.5 ±0.3 ±0.2	5.5 ±0.05	1.75 ±0.1	8.0 ±0.1	2.0 ±0.05	4.0 ±0.1	φ1.5 ±0.1 ±0.0

Symbol / Unit	I	J	K	L	M	N
mm	6.1 ±0.1	0.4 ±0.05	3.2 ±0.1	2.8 ±0.1	4.3 ±0.1	1.45 ±0.1

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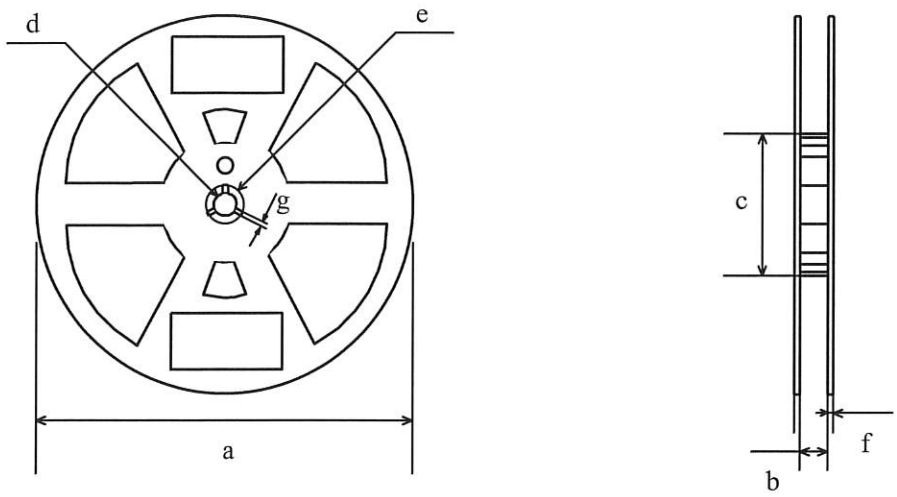
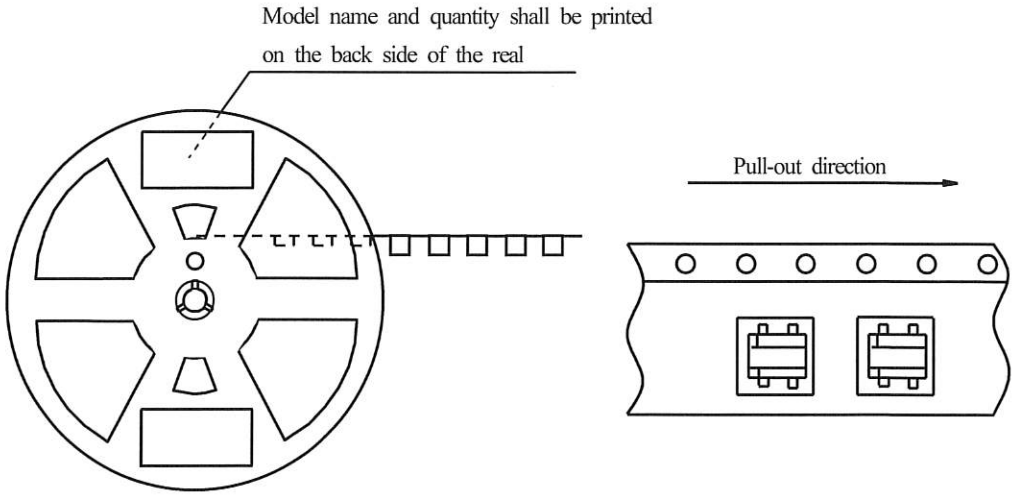
(Attachment-2-3)

Reel structure and Dimensions



Symbol / Unit	Check word						
	a	b	c	d	e	f	g
mm	ϕ330±1	13±1	80±1	ϕ13±0.5	ϕ21±1.0	2.0±0.5	2.0±0.5

Direction of product insertion



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(Attachment-2-4)

Moisture-proof package specification (ϕ 330mm reel)

1. Application

This specification applies to the products which Sharp delivers to customer.

2. Packaging specifications

2.1 Packaging material

Name	Material	Quantity	Aim
Aluminum laminated sack	Aluminum polyethylene	Refer to 2.2	Moisture-proof
Label	Paper(-made)	-	Indication of Model No. and Quantity

2.2 Packaging method

(1) Seal the aluminum laminated bag included the ruled tape-reel quantity.

(2) Fill up the blank of label and paste on the bag.

(3) Put the moisture-proof laminated bag in the ruled case (5 bag/case).

Package shape	Product	Quantity	Moisture-proof sack Quantity
Tape-reel (ϕ 330mm)	1ch. type	2000pcs./reel	1reel/bag

Minimum order Quantity : 1 reel/bag

2.3 Regular packing mass

(Excluding fractions, however above packing material, packing count, packing style)

Product mass : Approx. 2.6kg

3. Storage and management after open

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

Storage temp. : 5 to 30℃

Storage humidity : 70%RH or less

3.2 Treatment after open

(1) After open, please mount at the conditions of humidity 60%RH or less and temperature 5 to 25℃ within 2 days.

(2) In case of long time storage after open, please mount at the conditions of humidity 70%RH or less and temperature 5 to 30℃ within 2 weeks by using dry box or resealing with desiccant in moisture-proof bag by sealer.

3.3 Baking before mounting

In case that it could not carry out the above treatment, it is able to mount by baking treatment.
However baking treatment shall be limited only 1 time.

Recommended conditions : 125℃, 16 to 24 hours

※ Baking treatment can not carry out at the packaged state.
Please carry out baking at the state of mounting on PCB or getting on the metal tray.