SPEC. No. ED-02218
ISSUE September 5, 2002

REFERENCE

SHARP

OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTOINTERRUPTER

MODEL No.

GP2S700HCP

Specified for _____

Enclosed please find copies of the Specifications which consists of 14 pages including cover.
After confirmation of the contents, please be sure to send back ☐ copies of the Specifications with approving signature on each.

CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

DATE _____

BY H. O

H. Ogura,
Department General Manager of
Engineering Dept.,III
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

ED-02218 GP2S700HCP
September 5, 2002

Product name : PHOTOINTERRUPTER

Model No. : GP2S700HCP

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

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 etc.)

   (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 etc.)

   (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.

1. Application
This specification applies to the outline and characteristics of transmissive type photointerrupter; Model No. GP2S700HCP.

2. Outline Refer to the attached drawing No. CY10987i02.

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 7.

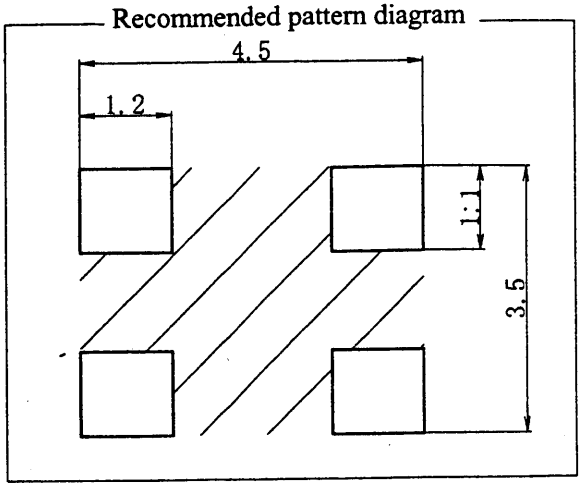
6. Supplements
6.1 Parts Refer to the attached sheet, Page 8.
6.2 ODS materials
This product shall not contain the following materials.
Also, the following materials shall not be used in the production process for this product.
Materials for ODS : CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)
6.3 Brominated flame retardants
Specific brominated flame retardants such as the PBBOs and PBBs are not used in this device at all.
6.4 Product mass : Approx. 25mg

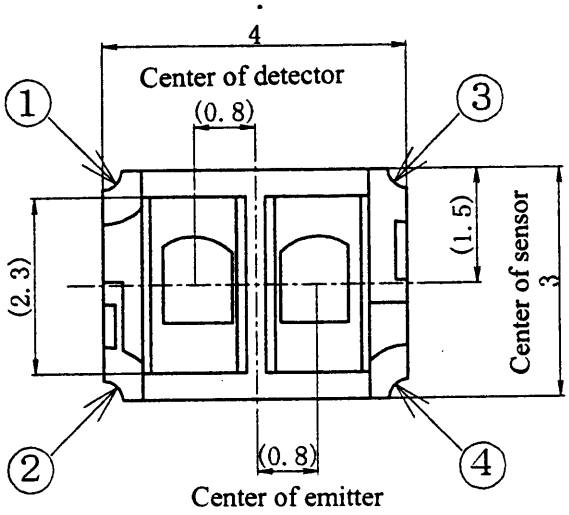
7. Notes
1) Before the circuit design
In circuit designing, make allowance for the degradation of the light emitting diode output that results from long continuous operation. (50% degradation/5 years)
2) Regarding to prevention of malfunction
To prevent photointerrupter from faulty operation caused by external light, do not set the detecting face to the external light.
Also, if some other electronic components are located close to this device, false operation may occur.
(The light reflection caused by the other components may slip into the photodetecting portion of the device and if may cause false operation.)
3) The distance between the photointerrupter and the object to be detected shall be determined the distance by referencing attached graph "Relative collector current vs. distance"..
4) For 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 mechanical stress exert on package and lead pins when soldering.
5) For cleaning
Cleaning shall carry out as the below items to avoid keeping 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) For wiring on a mounting PCB
To avoid possibility for short, please do not apply pattern wiring on the back side of the device.
7) Regarding to mounting this product
There is a possibility that the opaque molded resin portion may have a crack by force at mounting etc.
Please use this product after well confirmation of conditions in your production line.

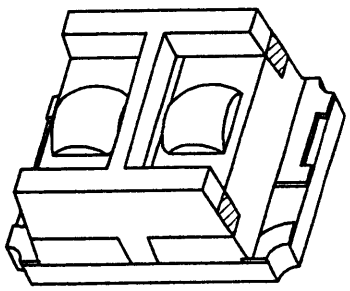
2. Outline Dimensions (Drawing No. CY10987i02) Scale : 10/1 Unit : 1/1mm

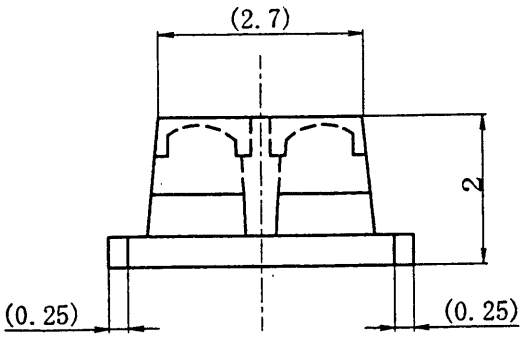
1) Unspecified tolerance shall be ±0.3mm.
2) Dimensions in parenthesis are shown for reference.
3) Dimensions on the outline drawing is the maximum value excluding burr. The maximum dimension of burr which goes over the area of (4×3×2) shall be ±0.15.
4) Internal connection diagram is shown below.
5) Recommended pattern diagram is shown the right.
6) The area within the break line of the recommended pattern must not be connected due to the risk of short circuit.
7) Both shaded portion may be filled incompletely.

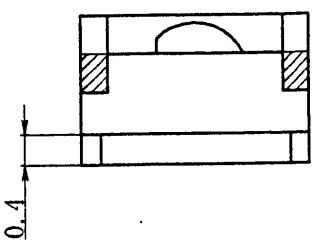
Recommended pattern diagram

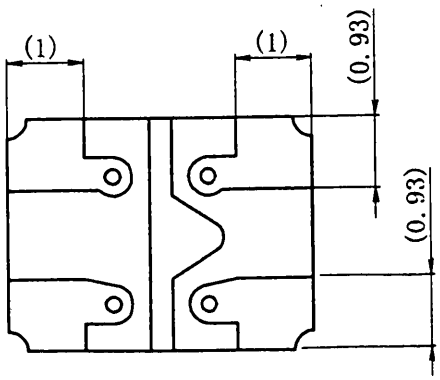




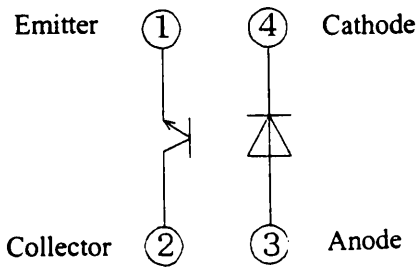








Internal connection diagram



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	℃
* Soldering temperature		Tsol	260	℃

* Soldering time : 5 s or less

3.2 Electro-optical characteristics

Ta=25℃

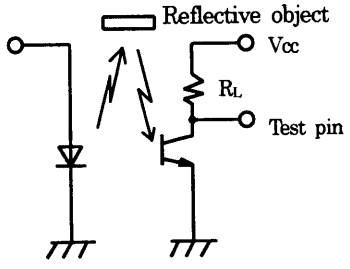
Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_F	I_F=20mA	-	1.2	1.4	V
	Reverse current		I_R	V_R=6V	-	-	10	μA
Output	Collector dark current		I_{CEO}	V_{CE}=20V	-	1	100	nA
Transfer character-istics	*1 Collector current		Ic	V_{CE}=2V, I_F=4mA	60	-	410	μA
	*2 Leak current		I_{LEAK}	V_{CE}=2V, I_F=4mA	-	-	700	nA
	*3 Response time	(Rise)	tr	V_{CE}=2V, Ic=100μA	-	20	100	μs
		(Fall)	tf	R_L=1kΩ, d=4mm	-	20	100	μs

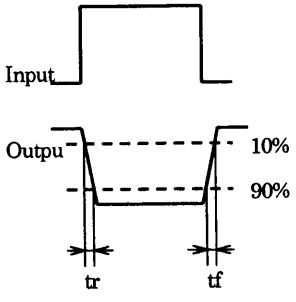
*1 The conditions and arrangement of the reflective object are shown below.

*2 Without reflective object

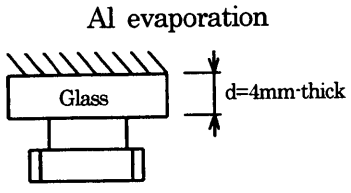
*3 d : Glass thickness of reflective mirror

(Test circuit for response time)

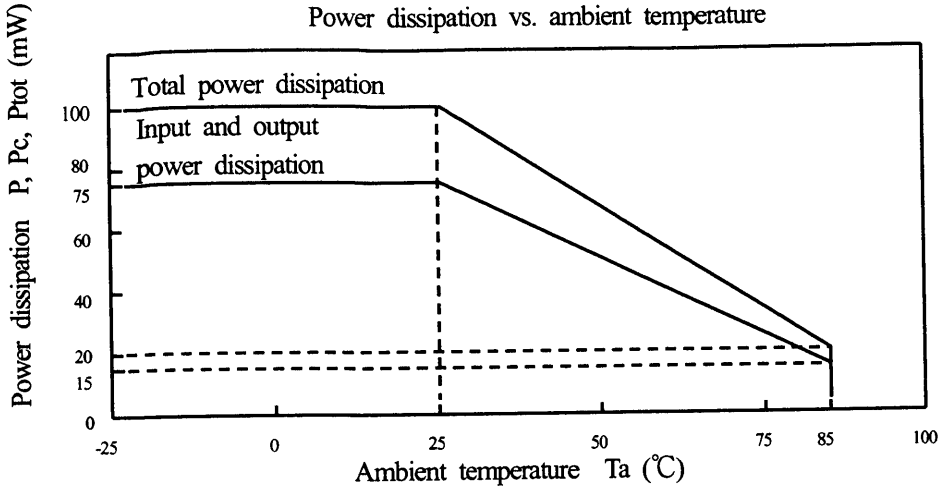




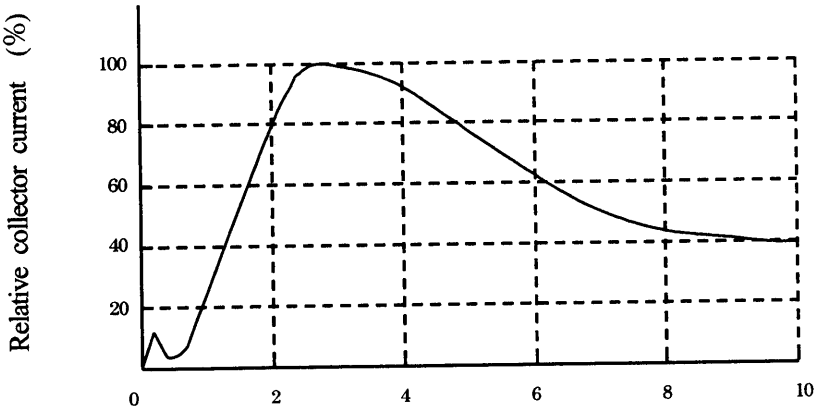
(Test arrangement for collector current)

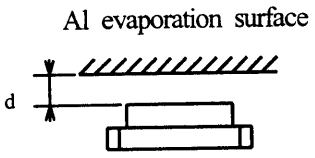


Power dissipation vs. ambient temperature



Relative collector current vs. distance (Reference value)





Conditions

I_F = 4mA

V_{CE} = 2V

Ta = 25℃

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	$V_F \geqq U \times 1.2$ $Ic \leqq L \times 0.8$ $I_{LEAK} \geqq U \times 2$ $I_R \geqq U \times 2$ $I_{CEO} \geqq U \times 2$ 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=50mA, Ta=25℃ Ptot=100mW, 500h		n=22, c=0
Mechanical shock	15km/s^2, 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, c=0
Variable frequency vibration	100 to 2000 to 100Hz/20min 100m/s^2, 2h/X, Y, Z direction		n=11, c=0
Solder reflow	Refer to the attachment-1. 1 time	$Ic < L \times 0.8$	n=22, c=0

5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

V_F, I_R, BV_{ECO}, BV_{CEO}, Ic, I_{CEO}

(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 (Q'ty : 1)

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

6.1.2 Light emitter (Q'ty : 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	PCB	Lead frame plating
Black epoxy resin	Grass epoxy resin	Au plating

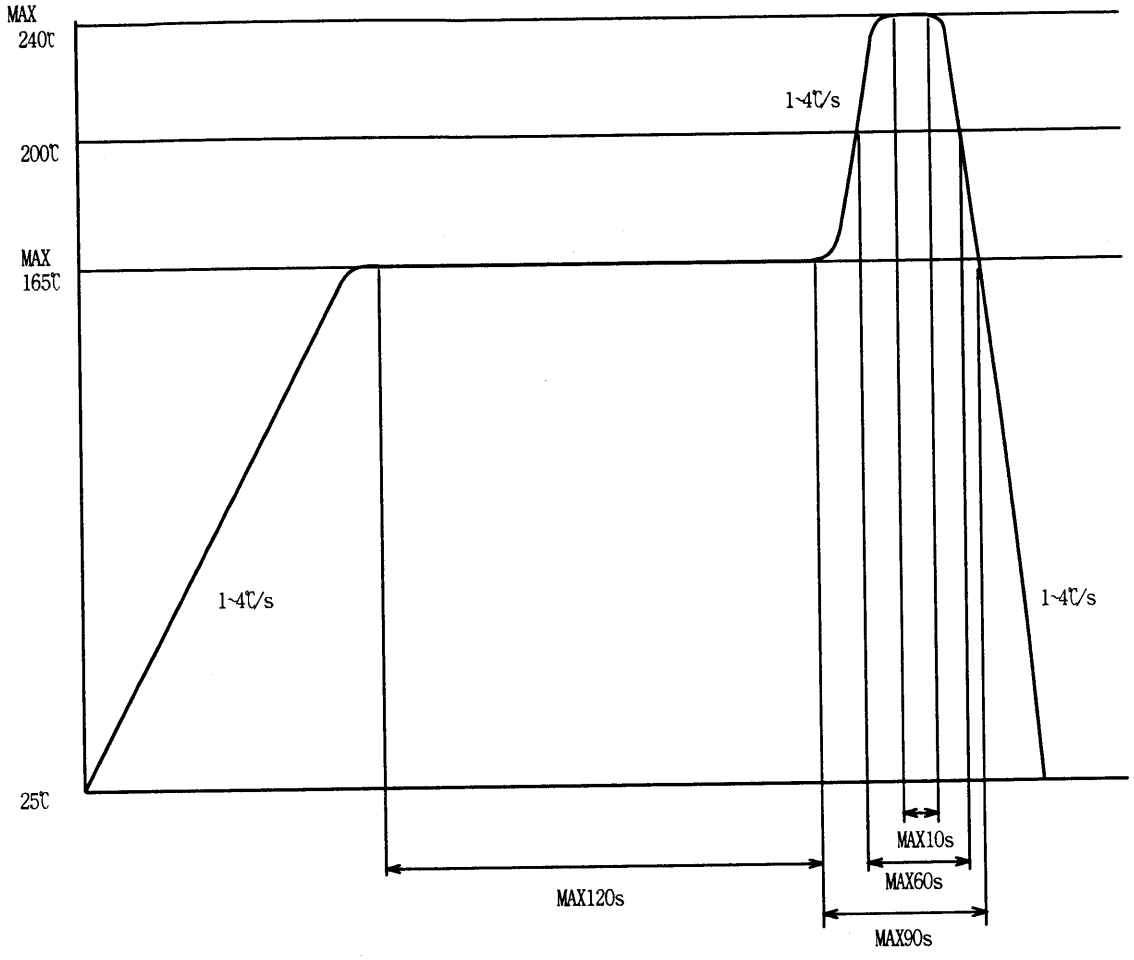
6.1.4 Others

This product shall not be proof against radiation flux.

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.

Package specifications (ϕ 180mm reel)

1. Application

This specification applies to the taping specifications and the relation items for the GP2S700HCP.

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. Method of incomplete seal

In case of repair taped failure devices, cut a surface of cover tape at three side of square hole on carrier tape by cutter, and after replacing to good devices, the cut portion shall be sealed with adhesive tape.

4. 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° .

5. Rolling method and quantity

Wind the tape back on the reel so that the cover tape will be outside the tape.
Attach more than 25cm of blank tape to the trailer and the leader of the tape and fix the both ends with adhesive tape.
One reel shall contain 1000 pcs.

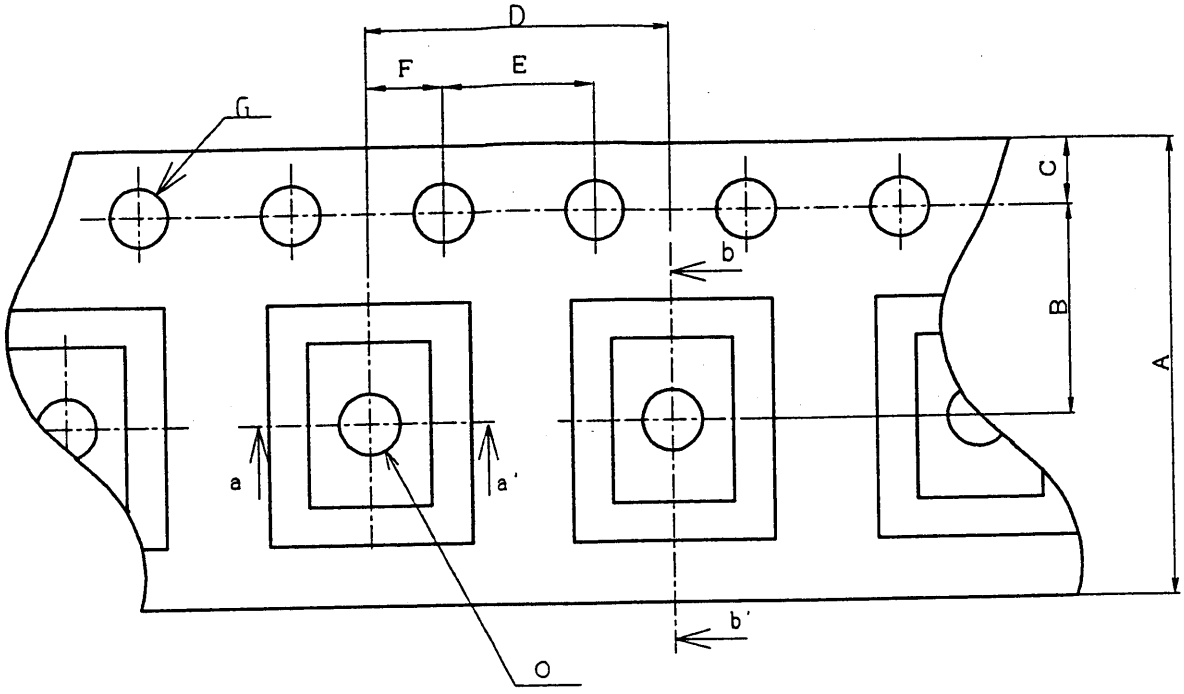
6. Marking

The outer packaging case shall be marked with following information.
* Model No. * Number of pieces delivered * Production date

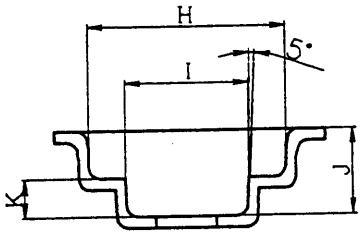
7. Safety protection during shipping

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

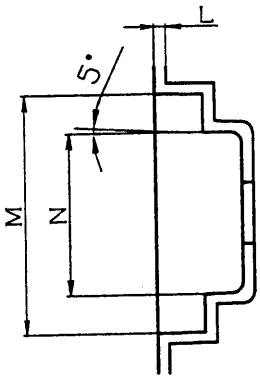
Tape structure and Dimensions



a-a' section



b-b' section

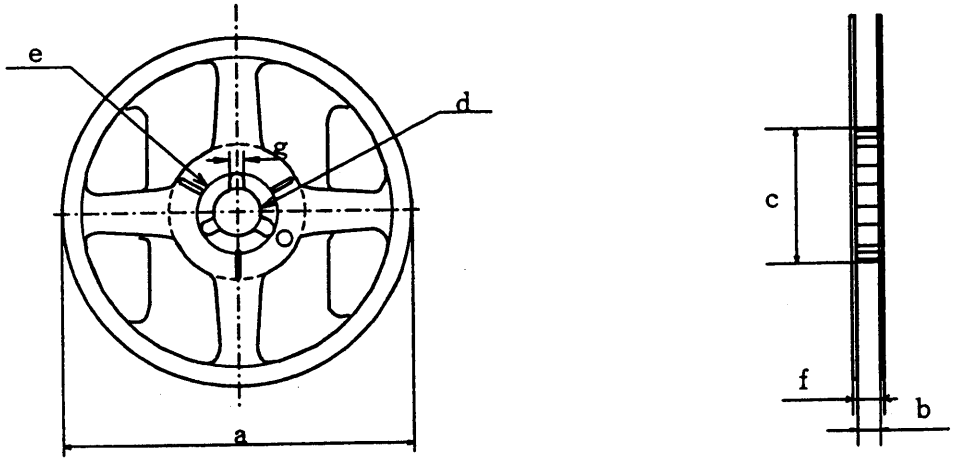


Symbol / Unit	A	B	C	D	E	F	G	H
mm	12.0 ±0.3	5.5 ±0.05	1.75 ±0.1	8.0 ±0.1	4.0 ±0.1	2.0 ±0.1	ϕ1.55 ±0.05	5.2 ±0.1

Symbol / Unit	I	J	K	L	M	N	O
mm	3.2 +0.2 -0	2.2 ±0.1	1.2 ±0.1	0.3 ±0.05	6.3 ±0.1	4.2 +0.2 -0	ϕ1.6 ±0.1

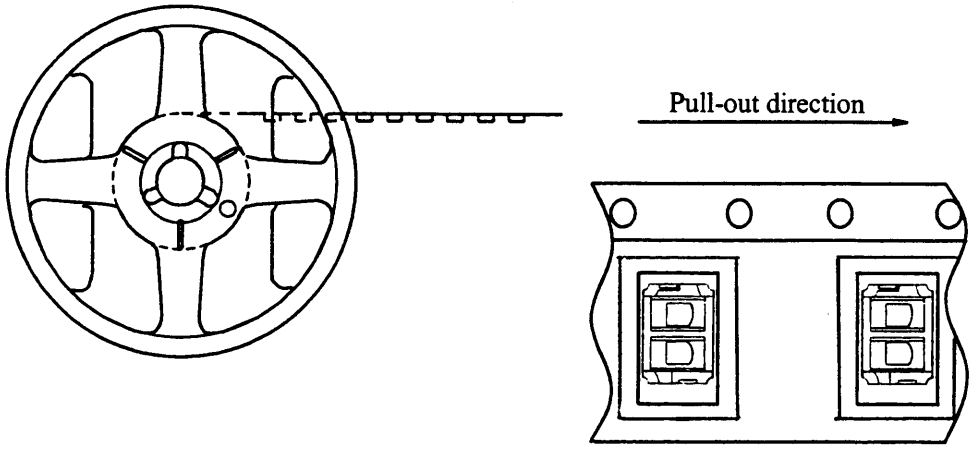
REFERENCE

Reel structure and Dimensions



Symbol / Unit	Check word						
	a	b	c	d	e	f	g
mm	180	12±1	60 $^{+0.5}_{-0}$	13±0.2	21±0.8	15.4±1.0	2 $^{+0.3}_{-0}$

Direction of product insertion



Rolling method and quantity

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

Attach more than 25cm of blank tape to the trailer and the leader of the tape and fix the both ends with adhesive tape.

One reel shall contain 1000 pcs.

Moisture-proof package specification (ϕ 180mm reel)

1. Application

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

2. Packaging specifications

2.1 Packaging material

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

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	Q'ty	Moisture-proof sack Q'ty
Tape-reel (ϕ 180mm)	1ch. type	1000pcs./reel	1reel/bag

Minimum order Q'ty : 1 reel/bag

2.3 Regular packing mass

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

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.