

# GP2S27T300F Photointerrupter

(Model Number: GP2S27T series)

Spec. Issue Date: October 15, 1998  
Spec No: ED-98180X

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PREPARED BY:

DATE:

*J. Yamaguchi Oct. 27 1998*

# SHARP

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ED-98180X

DATE

October 15, 1998

PAGE

16 Pages

APPROVED BY:

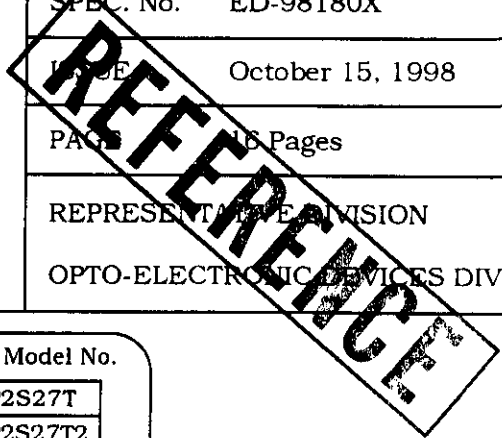
DATE:

*O. Akikawa Oct. 27 1998*

ELECTRONIC COMPONENTS  
GROUP SHARP CORPORATION  
**SPECIFICATION**

REPRESENTATIVE DIVISION

OPTO-ELECTRONIC DEVICES DIV.



DEVICE SPECIFICATION FOR  
PHOTOINTERRUPTER  
MODEL No.  
**GP2S27T series**

Applied Model No.

	GP2S27T
	GP2S27T2
	GP2S27T3
	GP2S27T5
	GP2S27T6

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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.

CUSTOMER'S APPROVAL

DATE

BY

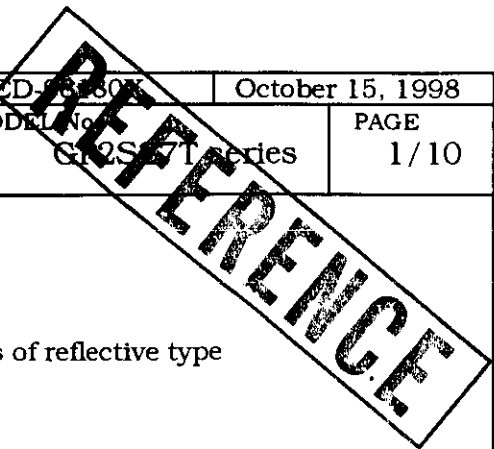
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PRESENTED

BY

*K. E*

K. Ebina,  
Department General Manager of  
Engineering Dept., V  
Opto-Electronic Devices Div.  
ELECTRONIC GROUP  
SHARP CORPORATION



1. Application

This specification applies to the outline and characteristics of reflective type photointerrupter, Model No. GP2S27T series.

2. Outline

Refer to the attached drawing No. CY4607i02A.

3. Ratings and characteristics

Refer to the attached sheet, Page 4 to 6.

4. Reliability

Refer to the attached sheet, Page 7, 8.

5. Outgoing inspection

Refer to the attached sheet, Page 9.

6. Supplements

6.1 Parts : Refer to the attached sheet, Page 10.

6.2 Package : Refer to the attached sheet-2-1 to 2-5.

6.3 Device delivery shall be delivered model that has "O" marking in the rank table below. However, in case delivered model has 2 ranks or more, the quantity of each rank shall be not prescribed.

Collector current (Ic) rank table

Rank at delivery	Model No.	Ic ( $\mu$ A)	Rank
	GP2S27T	20 to 120	A, B or C
	GP2S27T2	34 to 71	B
	GP2S27T3	58 to 120	C
	GP2S27T5	20 to 71	A or B
	GP2S27T6	34 to 120	B or C

Test conditions
V <sub>CE</sub> =2V
I <sub>F</sub> =4mA
Ta=25°C

#### 6.4 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 : CFC<sub>s</sub>, Halon, Carbon tetrachloride,  
1.1.1-Trichloroethane (Methylchloroform)

#### 6.5 Brominated flame retardants

Specific brominated flame retardants such as the PBBO<sub>s</sub> and PBB<sub>s</sub> are not used in this device at all.

#### 6.6 Product mass : Approx. 0.03g

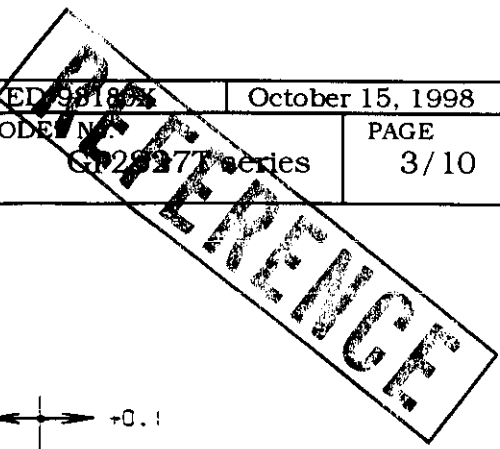
### 7. Notes

- 1) 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) To prevent photointerrupter from faulty operation caused by external light, do not set the detecting face to the external light.
- 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) Soldering
  - (1) Solder reflow  

Please do only one soldering at the temperature and the time within the temperature profile in attached sheet-1.
  - (2) Soldering by hand  

To solder onto lead pins, please solder at 260°C for 3 seconds or less. And please take care not to let any external force exert on lead pins when soldering.
  - 5) Cleaning shall carry out as the below items 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 : Please don't carry out ultrasonic cleaning.
    - (3) The cleaning shall be carried out with solvent below.  

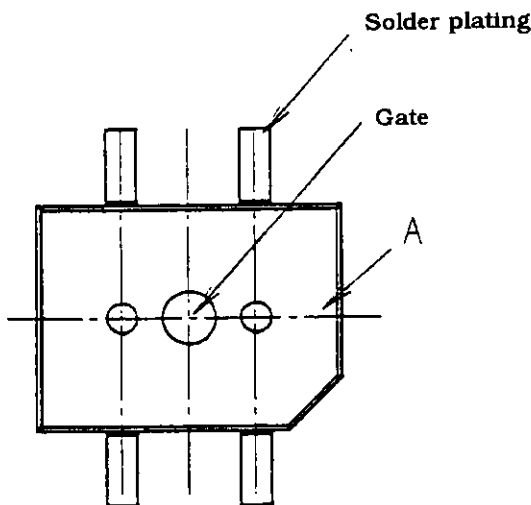
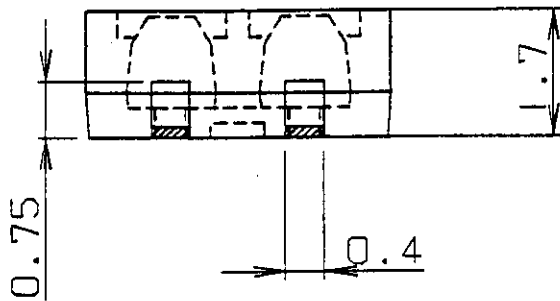
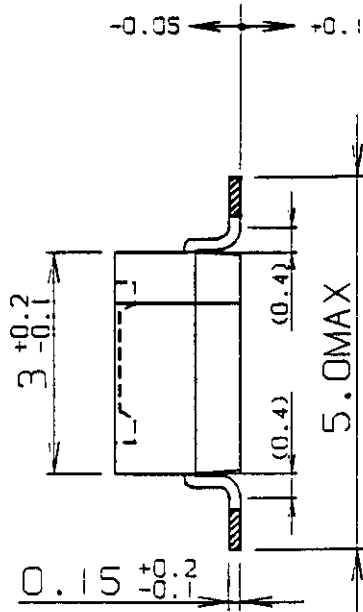
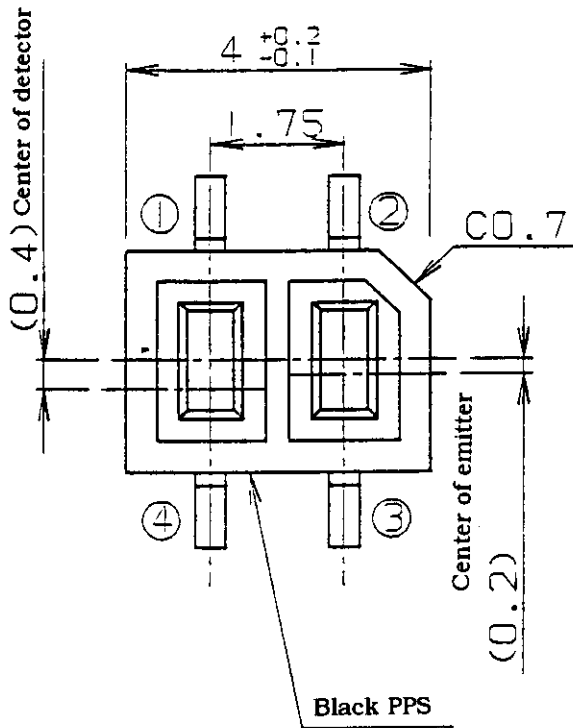
Solvent : Ethyl alcohol, Methyl alcohol



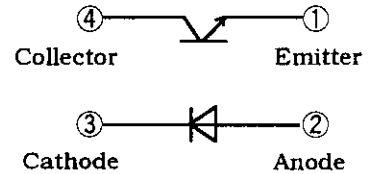
2. Outline Dimensions (Drawing No. CY4607i02A)

Scale : 10/1

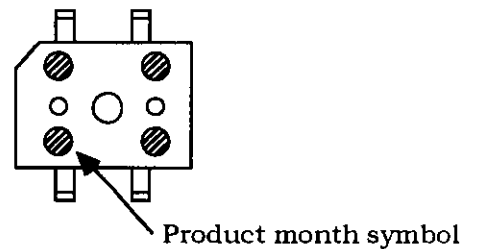
Unit : 1/1mm



- 1) Unspecified tolerance shall be  $\pm 0.15$ .
- 2) Dimensions in parenthesis are shown for reference.
- 3) Parallel balance of 4 lead pins shall be within 0.15.
- 4) The dimensions shown do not include those of burrs. Burr's dimensions shall be 0.15MAX..
- 5) Internal connection diagram is shown below.



- 6) Marked face shall be surface A. The symbols of production month is as follows.



- 7) The oblique portions are no solder plating area.

## 3. Ratings and characteristics

## 3.1 Absolute maximum ratings

Table 2

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	50	mA
	Reverse voltage	$V_R$	6	V
	Power dissipation	$P_D$	75	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	$P_c$	75	mW
Total power dissipation		$P_{tot}$	100	mW
Operating temperature		$T_{opr}$	-25 to +85	°C
Storage temperature		$T_{stg}$	-40 to +100	°C

3.2 Electro-optical characteristics

T<sub>a</sub>=25°C

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V <sub>F</sub>	I <sub>F</sub> =20mA	-	1.2	1.4	V	
	Reverse current	I <sub>R</sub>	V <sub>R</sub> =6V	-	-	10	μA	
Output	Collector dark current	I <sub>CEO</sub>	V <sub>CE</sub> =20V	-	1	100	nA	
Transfer characteristics	*1 Collector current	I <sub>c</sub>	V <sub>CE</sub> =2V, I <sub>F</sub> =4mA	20	45	120	μA	
	*2 Leak current	I <sub>LEAK</sub>	V <sub>CE</sub> =2V, I <sub>F</sub> =4mA	-	-	100	nA	
	*3 Response time	(Rise)	t <sub>r</sub>	V <sub>CE</sub> =2V, I <sub>c</sub> =100 μA R <sub>L</sub> =1000 Ω, d=1mm	-	20	100	μs
		(Fall)	t <sub>f</sub>		-	20	100	μs

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

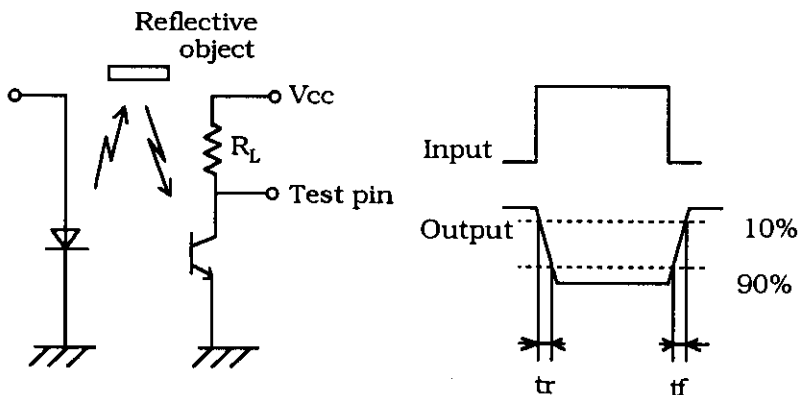
In regard to collector current(I<sub>c</sub>), the following ranking shall be carried out.

Rank	Collector current I <sub>c</sub> ( μA)
A	20 to 42
B	34 to 71
C	58 to 120

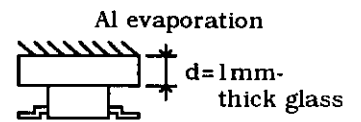
\*2 Without reflective object

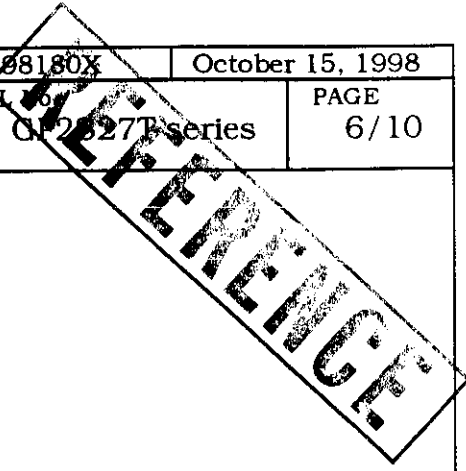
\*3 d : Glass thickness of reflective mirror

(Test circuit for response time)

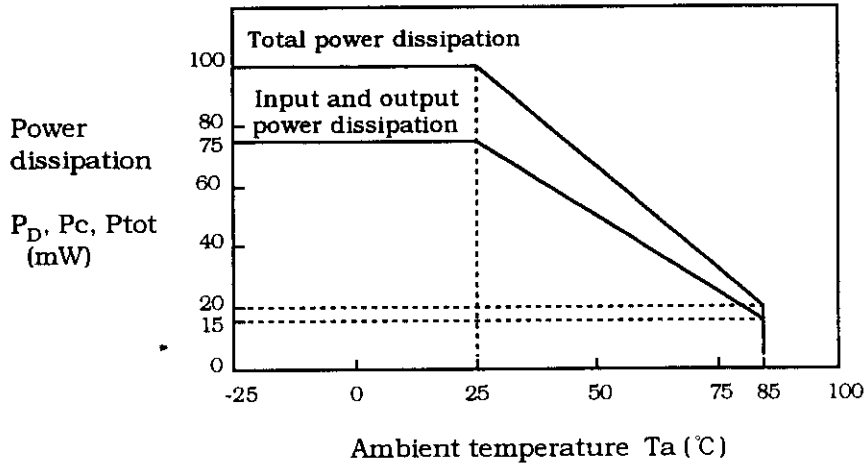


(Test arrangement for collector current)

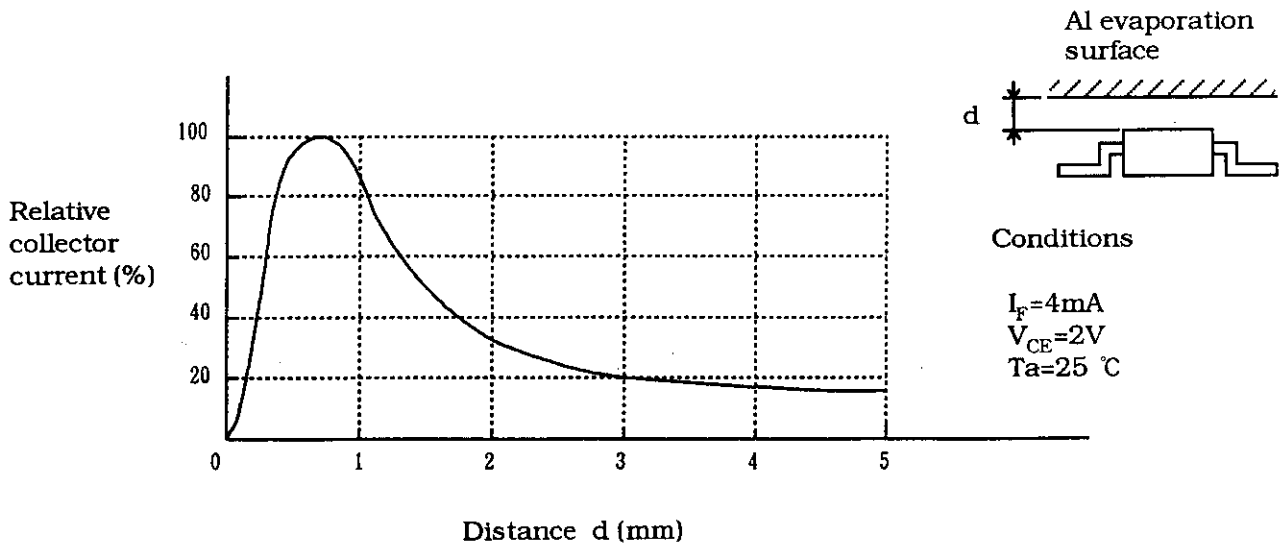




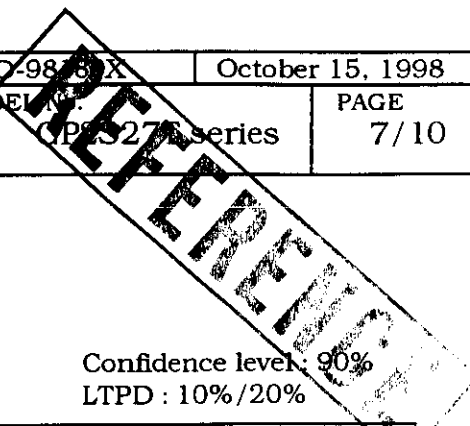
Power dissipation vs. ambient temperature



Relative collector current vs. distance (Reference value)







4. Reliability

The reliability of products shall satisfy items listed below.

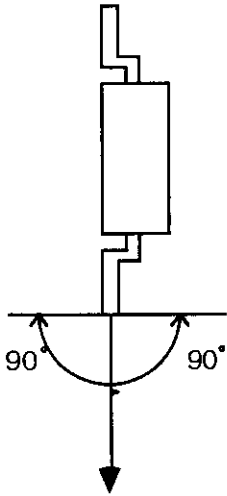
Confidence level: 90%  
LTPD : 10%/20%

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) Defective (c)
Temperature cycling	1 cycle -40°C to +100°C (30min) (30min) 20 cycles test	$V_F \geq U \times 1.2$ $I_C \leq L \times 0.8$ $I_{LEAK} \geq U \times 2$ $I_R \geq U \times 2$ $I_{CEO} \geq U \times 2$  U: Upper specification limit L: Lower specification limit	n=22, c=0
High temp. and high humidity storage	+60°C, 90%RH, 500h		n=22, c=0
High temp. storage	+100°C, 500h		n=22, c=0
Low temp. storage	-40°C, 500h		n=22, c=0
Operation life	$I_F=50mA$ , $T_a=25^\circ C$ $P_{tot}=100mW$ , 500h		n=22, c=0
Mechanical shock	15000m/s <sup>2</sup> , 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 <sup>2</sup>		n=11, c=0
Terminal strength (Tension)	Weight: 3N 30s/each terminal		n=11, c=0
Terminal strength (Bending)	Weight: 1N 0° →90° →0° 2 times bending		n=11, c=0
Soldering heat	260°C, 3s Immerse up to 0.5mm from the side face of package.		n=11, c=0
Solderability	230°C, 3s Prior disposition: Dip rogin flux. Then immerse up to 0.5mm from the side face of package.	※1	n=11, c=0

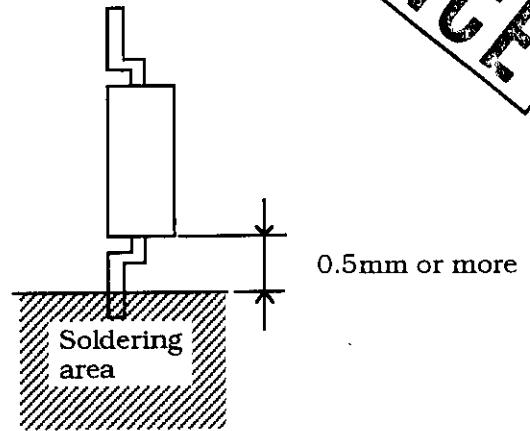
※ For details, conforms to JIS C 7021.

※1 Solder shall adhere at less than 95% area of immersed portion of lead, excepting no solder plating area.

REFERENCE



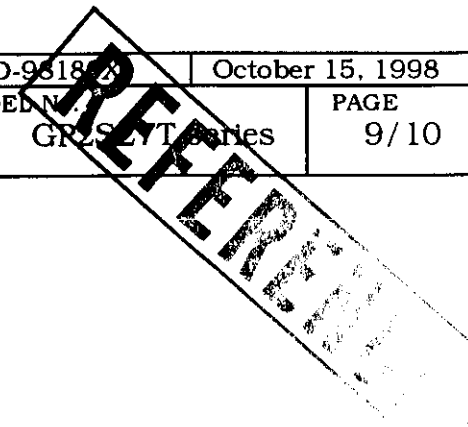
Weight: 1.0N



4.1 Solder reflow

Confidence level : 90%  
LTPD : 10%/20%

Test Item	Test condition	Failure Judgement Criteria	Sample (n)
			Defective (c)
Solder reflow	Refer to the attached sheet-1. 1 time	$I_c < L \times 0.8$	n=22, c=0



5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

$V_F, I_R, BV_{ECO}, BV_{CEO}, I_C, I_{CEO}$

(2) Appearance

5.2 Sampling method and Inspection level

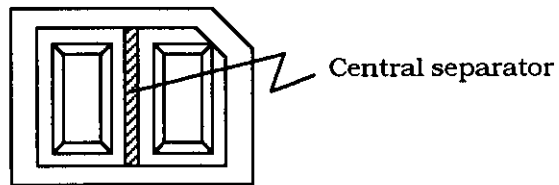
A single sampling plan, normal inspection level II based on ISO2859 is applied. The AQL according to the inspection items are shown below.

Defect	Inspection item	Inspection level	AQL (%)
Major defect	Characteristics defect Unreadable marking	Normal inspection II	0.065
Minor defect	Appearance defect except the above mentioned.	Normal inspection II	0.25

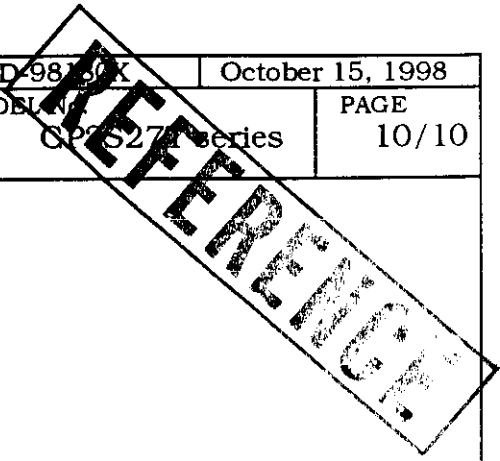
※ Crack ... Visible crack shall be defect.

※ Split  
 ※ Chip  
 Scratch  
 The others ] ... One which affects the electrical characteristics shall be defect.

※ Void ... One which is void across central separator on photo sensor shall be defect.



The other place voids, 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 ( $\mu$ s)
Phototransistor*	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	Lead frame	Lead frame plating
Black PPS resin	42 Alloy	Solder plating

6.1.4 Others

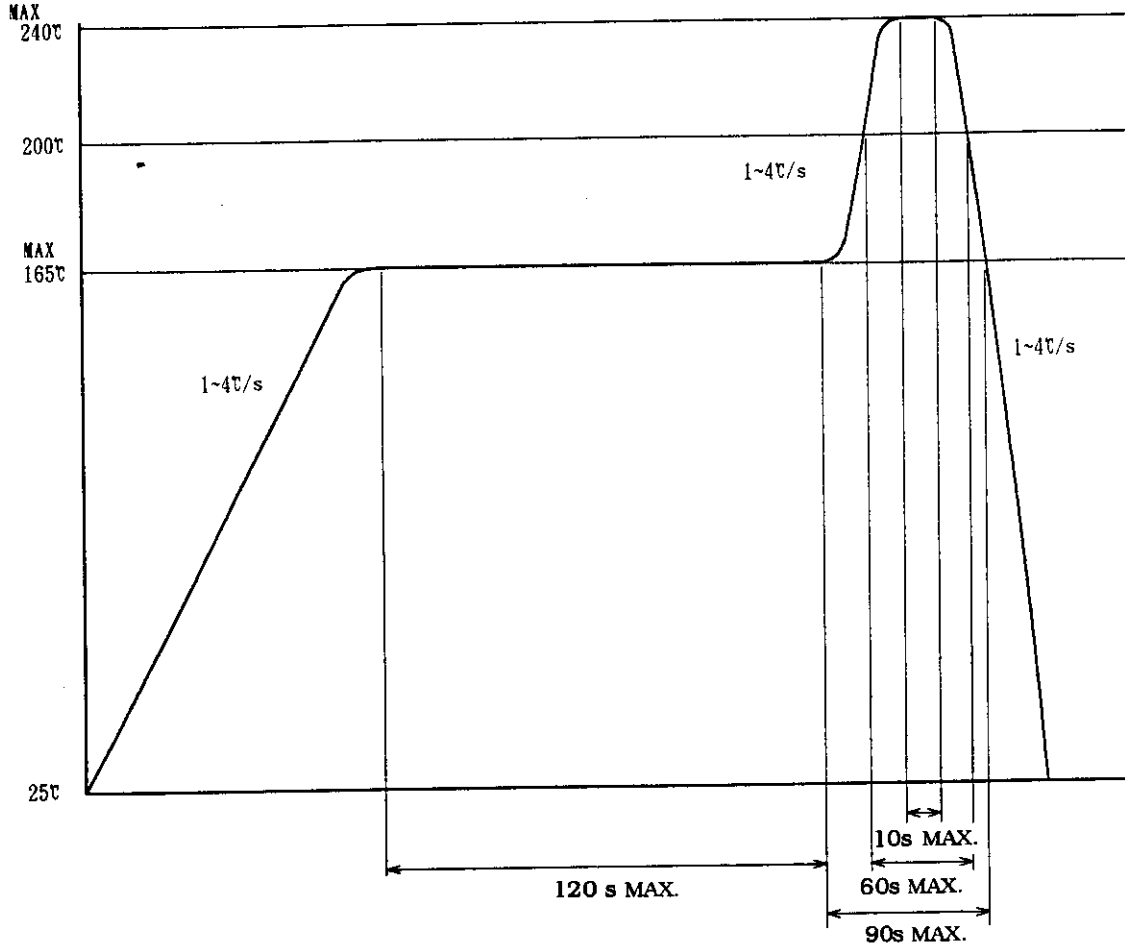
This product shall not be proof against radiation flux.

REFERENCE

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 PWB 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 GP2S27T series.

## 2. Taping method

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

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

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

The taping reel shall be plastic-made with its dimensions as shown in the attached drawing.

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

Product direction in carrier tape shall direct to the anode mark 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 1N 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 1000 pcs.

## 5. Marking

The outer packaging case shall be marked with following information.

\* Model No.    \* Number of pieces delivered    \* Production date

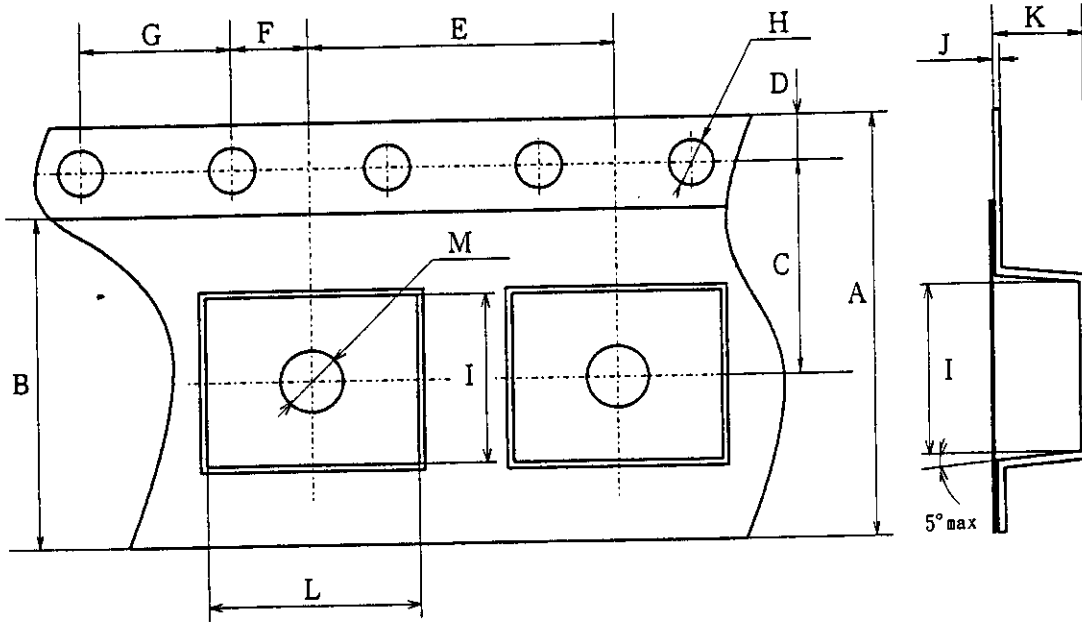
## 6. Safety protection during shipping

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

REFERENCE

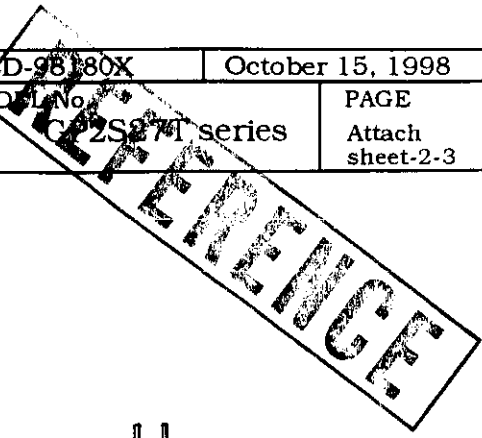
REFERENCE

Tape structure and Dimensions

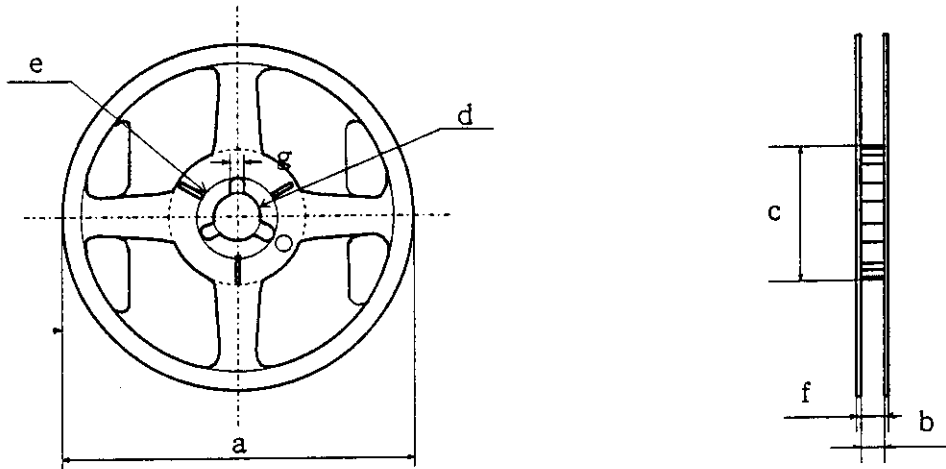


Symbol	A	B	C	D	E	F
Unit						
mm	±0.3 12.0	+0.3 -0.0 7.6	±0.05 5.5	±0.1 1.75	±0.1 8.0	±0.05 2.0

Symbol	G	H	I	J	K	L	M
Unit							
mm	±0.1 4.0	+0.1 -0.0 φ 1.5	±0.1 4.4	±0.05 0.3	±0.1 2.0	±0.1 5.2	+0.1 -0.0 φ 1.6

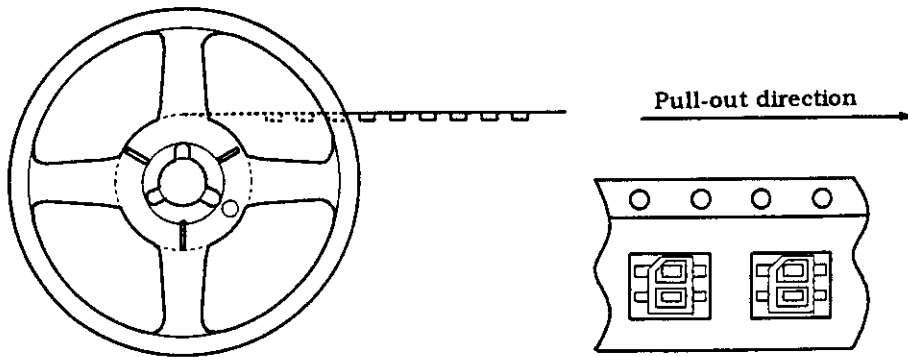


Reel structure and Dimensions

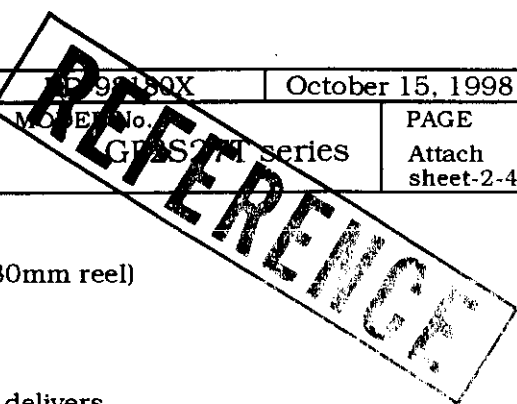


Symbol Unit	Check word						
	a	b	c	d	e	f	g
mm	180	13±0.8	60 <sup>+0.5</sup> <sub>0</sub>	13±0.2	21±0.8	15.4±1.0	2 <sup>+0.3</sup> <sub>0</sub>

Direction of product insertion







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).

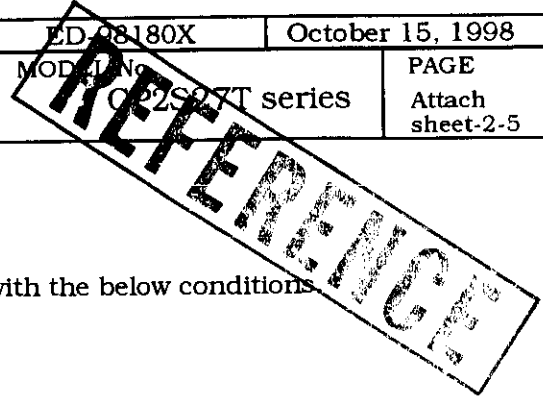
Package shape	Product	Q'ty	Moisture-proof sack Q'ty
Tape-reel ( φ 180mm)	1ch. type	1000pcs./reel	1reel/bag

Minimum order Q'ty : 1 reel/bag

2.3 Regular packing mass

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

Product mass : Approx. 840g



3. Storage and management after open

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

Storage temp. : 5 to 30°C

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°C 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°C within 2 weeks by using dry box or resealing with desiccant in moisture-proof sack 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°C, 16 to 24 hours

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

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