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REFERENCE

SPEC. No. ED-01042

ISSUE February 26, 2001

SHARP

OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTODIODE
MODEL No.

PD3122F

Specified for

Enclosed please find copies of the Specifications which consists of 11 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

PRESENTED

DATE

BY

DATE

BY

O. I.

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

REFERENCEProduct name : PHOTODIODEModel No. : PD3122F

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

- (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.

REFERENCE

1. Application

This specification applies to the outline and characteristics of position sensitive detector photodiode Model No. PD3122F.

2. Outline

Outline drawing No. : CY7444G02

Mark specification drawing No. : CY7445G06

3. Ratings and characteristics

Refer to the attached sheet, page 6, 7.

4. Reliability

Refer to the attached sheet, page 8.

5. Outgoing inspection

Refer to the attached sheet, page 9.

6. Supplement

6-1 Packaging specifications

Refer to the attached drawing No. CY10247G09.

6-2 Appearance : Such appearance changes as discoloring, rust, smear or blur shall be accepted, which doesn't affect electro-optical characteristics.

6-2 This product is not designed against electromagnetic and ionized-particle irradiation.

6-3 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_s, Halon, Carbon tetrachloride
1.1.1-Trichloroethane (Methylchloroform)

6-4 Product mass (Piece) : Approximately 60mg

REFERENCE

7. Notes

(7-1) Cleaning conditions :

Solvent cleaning : Solvent temperature 45°C or less
Immersion for 3 min or less

Ultrasonic cleaning : The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc. Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning.

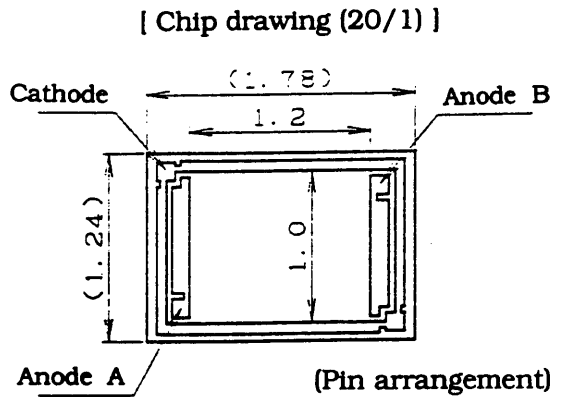
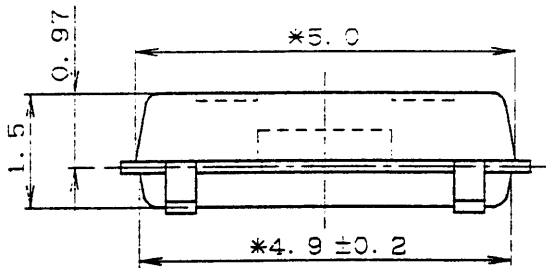
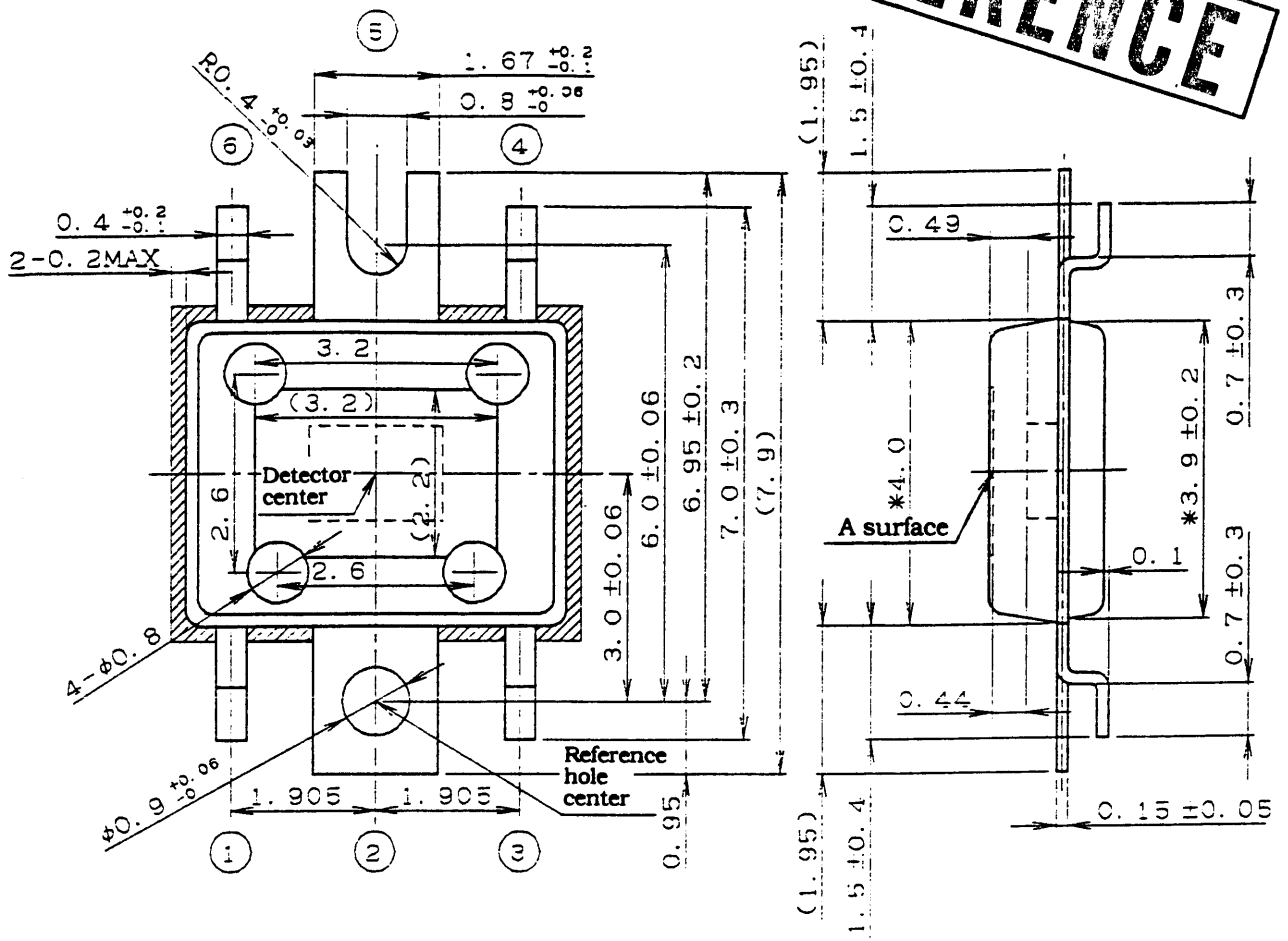
The cleaning shall be carried out with solvent below.

Solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

(7-2) Soldering

The lead pins should be soldered according to the absolute maximum ratings. While or after soldering, the lead pins shall be free from physical stress. This device shall not be soldered with preheat or reflow.

REFERENCE

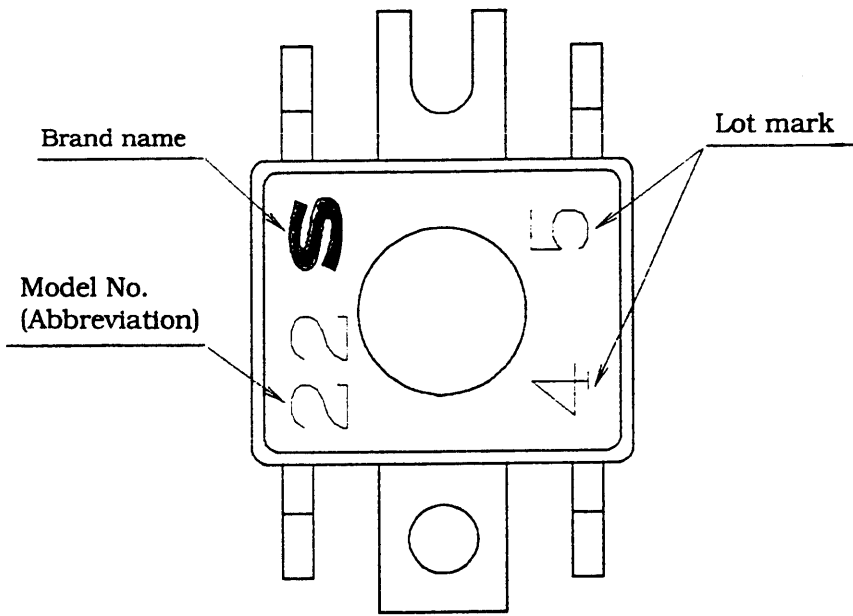


- 1) Unspecified tolerance shall be ±0.1.
- 2) Dimensions in parenthesis are shown for reference.
- 3) Chip position tolerance : ±0.06
chip rotary tolerance : ±3°
- 4) area : Burr
- 5) Resin burr shall not be included in outline dimensions.
- 6) Refractive index of the resin. n=1.52 (λ=5893 Å NaD)
- 7) A surface is transparent and flat finish, the other portion is sand brushing finish.
- 8) Dimensions of * mark are excluded the parting surface.
- 9) Package taper : 10°
- 10) Horizontal tolerance : MAX. ±0.15
Vertical tolerance : MAX. ±0.2

- ① Anode A
- ② Cathode
- ③ Cathode
- ④ Anode B
- ⑤ Cathode
- ⑥ Cathode

SCALE	MATERIAL	FINISH	NAME	PD3122F Outline Dimensions
10/1	Lead: 42 Alloy	Lead: solder plating		
UNIT			Drawing No.	CY7444G02
1=1/1mm				

REFERENCE



Name	PD3122F Marking specification
Drawing No.	CY7445G06

REFERENCE

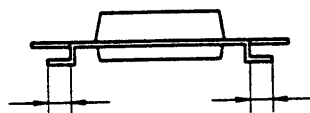
3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25°C

Parameter	Symbol	Rating	Unit
Reverse voltage	V_R	30	V
Operating temperature	Topr	-25 to +85	°C
Storage temperature	Tstg	-40 to +85	°C
Soldering temperature *	Tsol	260	°C

* MAX. for 3 seconds at soldering area



Solderable area

3.2 Electro-optical characteristics

Ta=25°C

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Reverse voltage	V_R	$I_R=10\ \mu\text{A}$	30	-	-	V
Dark current	I_d	$V_R=1\text{V}$	-	-	2.0	nA
Output current	I_L *1	$V_R=1\text{V}$, $E_v=1000\ \ell\text{x}$	6.4	9.2	12	μA
Terminal capacitance	C_t	$V_R=1\text{V}$, $f=10\text{kHz}$	-	10	30	pF
Peak sensitivity	λ_p	$V_R=0\text{V}$	-	940	-	nm
Response time	tr, tf *2	$V_R=1\text{V}$, $R_L=1\text{k}\Omega$	-	5	35	μs
Resistance between electrode	R_{ie}	$V_R=1\text{V}$, $V_a=0.5\text{V}$	110	140	170	k Ω
Error of position detection	- *3	-	-	-	± 25	μm
Sensitivity	R	-	-	0.5	-	A/W
Forward voltage	V_F	$I_F=1\text{mA}$	-	-	1.0	V

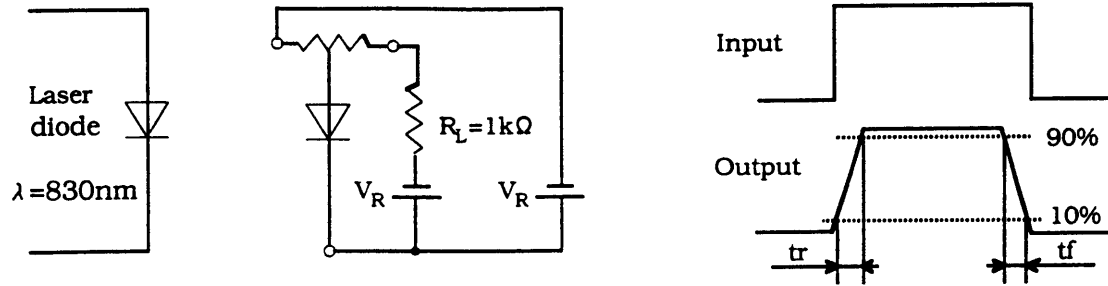
REFERENCE

*1 $I_L = I_1 + I_2$

However, I_1 and I_2 are output current of Anode A and Anode B

Ev: Illuminance by CIE standard light source A (tungsten lamp)

*2 Test circuit for response time is shown below.

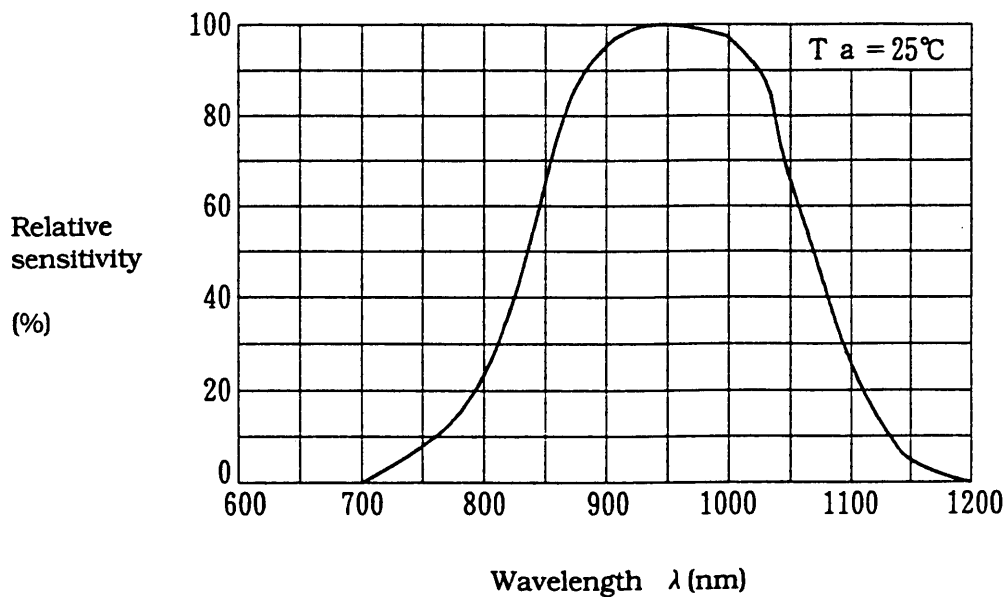


*3 75% area from detecting portion center to the edge of detecting portion
 Definition of error of position detection ($\lambda = 830\text{nm}$, $\phi 200\ \mu\text{m}$ spot)
 Error of position detection of each incident light position defines the following formula if electrical center position is $I_1 = I_2$.

$$\text{Error of position detection } (\mu\text{m}) = \frac{L}{2} \times \frac{I_1 - I_2}{I_1 + I_2} - \text{incident light position } (\mu\text{m})$$

L: Length of light detector surface = 1.2mm

(3-3) Spectral sensitivity (TYP.)



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 ↔ +85°C (30min) (30min) 20 cycles test		n=22, C=0
High temp. and high humidity storage	+60°C, 90%RH, 500h	$R_{ie} \geq U \times 1.2$	n=22, C=0
High temp. storage	+85°C, 500h	$R_{ie} \leq L \times 0.8$	n=22, C=0
Low temp. storage	-40°C, 500h	$V_R \leq L \times 0.8$	n=22, C=0
Operation life	$E_v = 3000 \ell x$, $T_a = 25^\circ\text{C}$, 500h	$I_d \geq U \times 2.0$	n=22, C=0
High temp. reverse bias	+85°C, $V_R = 10\text{V}$, $R_L = 100\text{k}\Omega$ 500h	$I_L \leq L \times 0.8$	n=22, C=0
Mechanical shock	1000m/s ² , 6ms, Sine wave 3 times/±X, ±Y, ±Z direction	$I_L \geq U \times 1.2$	n=11, C=0
Variable frequency vibration	200m/s ² 100 to 2000 to 100Hz/4 min 48 min/X, Y, Z direction	U: Upper specification limit	n=11, C=0
Terminal strength (Tension)	Weight: 2.5N 10 s/each terminal	L: Lower specification limit	n=11, C=0
Terminal strength (Bending)	Weight: 1.25N 0° → 90° → 0° → -90° → 0° The one test should be performed.		n=11, C=0
Solvent resistivity	Immerse in Isopropyl alcohol and Ethyl alcohol for 1 minute each		n=11, C=0
Soldering heat	260°C, 3 s Soldering area : Refer to page 6		n=11, C=0
Solderability	230±5°C, 5±0.5 s Dipped area : Soldering area (Refer to page 6)	Solder shall be adhere at the area of 95% or more of dipped portion.	n=11, C=0

5. Outgoing inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

(2) Inspection method

A single sampling plan, normal inspection level II based on ISO2859 shall be adopted.

Parameter	Inspection items and test method		AQL(%)
Major defect	1	Disconnection, short	0.065
	2	Inverse polarity on terminal	
	3	Soldering defect (Obstacle to use)	
	4	Characteristics defect (I _L , Id) in parameter 3.2.	
Minor defect	1	Appearance ※ (Crack, Split, Chip, Scratch, Stain, Blur, Foreign matter, Bubble)	0.65

※ ・Crack …Visible crack irrespective of its position shall be defect.

※ ・Split, Chip,] One which affects the characteristics of
 ・Scratch,] …characteristics of parameter 3.2 shall be defect.
 ・Stain, Blur

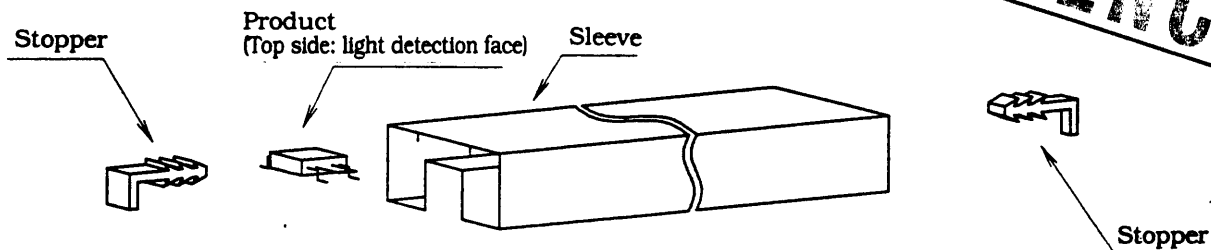
・Bubble
 Foreign matter (One on resin surface which can wipe off shall not be applied.)

1. On light detector : φ 0.2mm or more shall be defect.

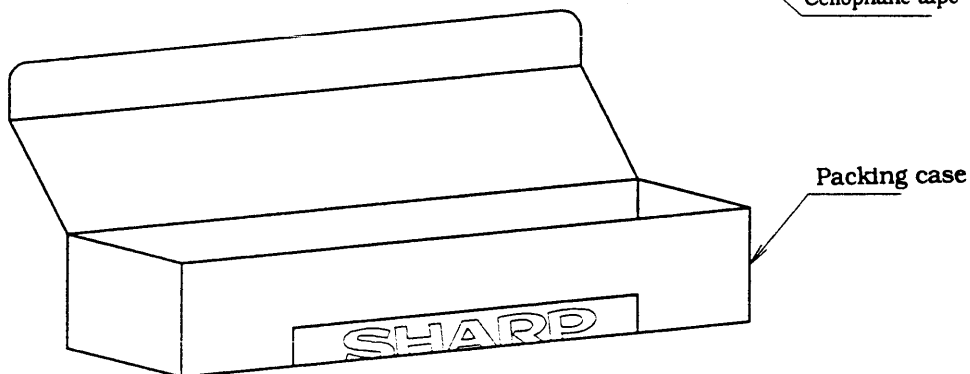
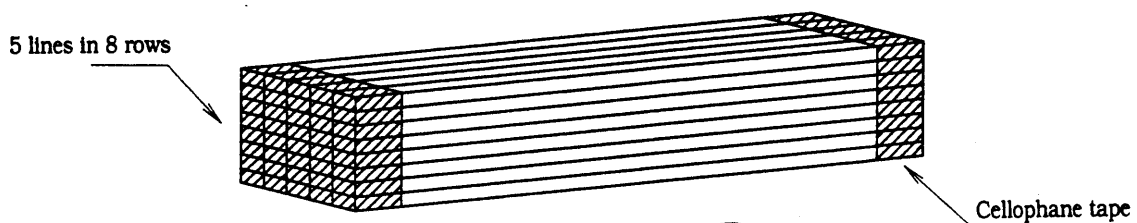
2. Area excepting on light detector : φ 0.4mm or more shall be defect.

REFERENCE

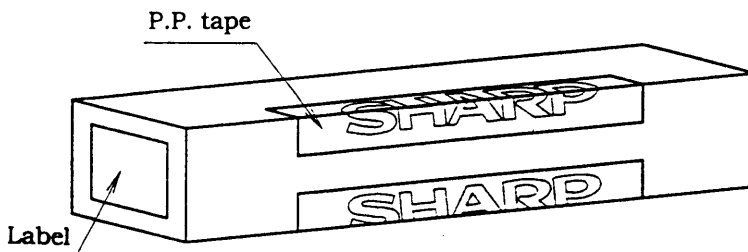
Packaging (Drawing No. : CY10247G09)



(Fig.1)



(Fig.2)



(Fig.3)

Package method (Quantity per a packing case : 2000pcs.)

- (1) 50pcs. products shall be packaged in a sleeve and both of sleeve edges shall be fixed by stoppers. (Fig. 1)
- (2) MAX. 40 sleeves (5 lines in 8 rows) above shall be packaged in a packaging case. (Fig.2)
- (3) Model No., quantity and inspection date shall be marked on the label and this label shall be put on the side of the packaging case. Case shall be closed with the lid and enclosed with P.P. tape. (Fig.3)
- (4) Formal packaged mass : Approximately 400g