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TO ;  
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## S P E C I F I C A T I O N S

Product Name PHOTOINTERRUPTER

REFERENCE

Model No. GP1A173LCS5F

These specifications contain 12 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 2 copy of the  
Specifications with approving signature on each.  
If you have any objections, please contact us before issuing purchasing order.

Accepted by:

By :  
\_\_\_\_\_

Name :

Title :

Date :

By :  
\_\_\_\_\_

Name :

Title :

Date :

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By : 

Name : T. Ichinose,

Title : General Manager, Head of  
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System Device Business Unit  
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Date : Jul. 25, 2016

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By : M.h

Name : M.Hamano

Title : Supervisor

Date : July. 25. 2016

REFERENCE

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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 appliancesIf 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, hot spring 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.

REF ID: A173LCS5F

## 1. Application

This specification applies to the outline and characteristics of transmissive type photointerrupter with connector, Model No. GP1A173LCS5F.

## 2. Outline

2.1 Outline : Refer to the attached drawing No. CY15335i02.

Coupling and contact to CT connector by Tyco Electronics Japan G.K. (2mm pitch)

2.2 Recommended Installation Hole drawing : Refer to the attached drawing No. CY15335i06.

## 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. Supplements

### 6.1 Parts

Refer to the attached sheet, Page 10.

### 6.2 Package drawing

Refer to the attached sheet, Page 11 .

### 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 The RoHS directive(2011/65/EU)

This product complies with the RoHS directive(2011/65/EU) .

Object substances: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)

#### 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

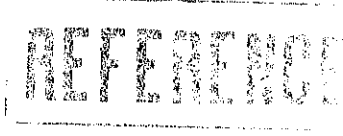
Category	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr <sup>6+</sup> )	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
photointerrupter	○	○	○	○	○	○

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. 1.0g

6.7 Country of origin : China



7. Notes

7.1 Truth Table (In case of external addition pull-up resistance to Vout terminal)

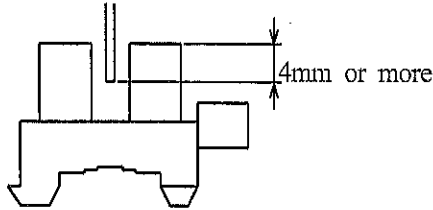
Light beam	Output
Interrupted	High
Uninterrupted	Low

7.2 Power supply line

In order to stabilize power supply line, connect a by-pass capacitor of More than 0.01μF between Vcc and GND near the device.

7.3 Opaque board

Opaque board shall be installed at place 4mm or more from the top of elements. (Example)



In case opaque board is the material with an low light blocking effect, There is a possibility of malfunctioning because the light of LED transmits the opaque board .When you design the opaque board, please note transmittance of infrared rays wave length (950nm) and the thickness of the opaque board .

And, please adjust the amount of transmitted light to 0.1% or less.

7.4 Cleaning

Please don't carry out immersion cleaning or ultrasonic cleaning to avoid keeping solvent inside case of this device.

7.5 Washing material

Dust and stain shall clean by air blow, or shall clean by soft cloth soaked in washing materials.

And washing material to clean shall be used the below materials only.

Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

7.6 Connector connection

For the electrical connection to the connector terminal, please certainly use the connector specified in this specifications.

Please avoid the connection by the soldering or welding which may damage the main body of the device, and also avoid the contact by the clip and so on which may cause the malfunction by the contact failure.

Please avoid the use condition that it always occurs the vibration

in the spot where the connector fits in by the resonance of the sensor and the harness. It may cause the malfunction of the contact failure.

7.7 Put-in and pull-out of connector

The connection other than to the correct connection direction, forcing-into, and the pulling-out diagonally (if being not put-in and pulled-out straight) may deform or break the connector terminal and/or housing, which may cause the unusable state of the device.

7.8 Interference light (external ambient light)

Because the upper, bottom and "Date Code" side are not covered by outer case, please do not use this device under ambient light circumstances including infrared component.

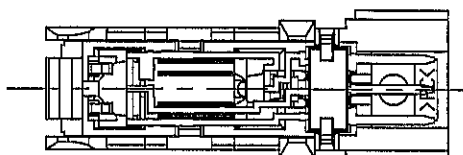
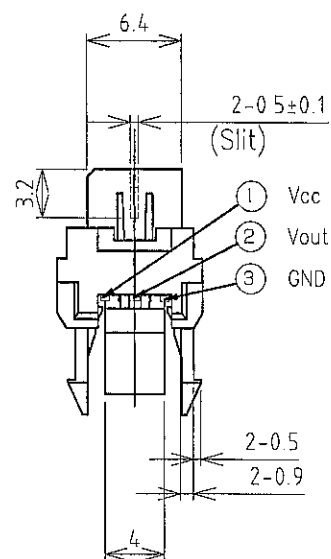
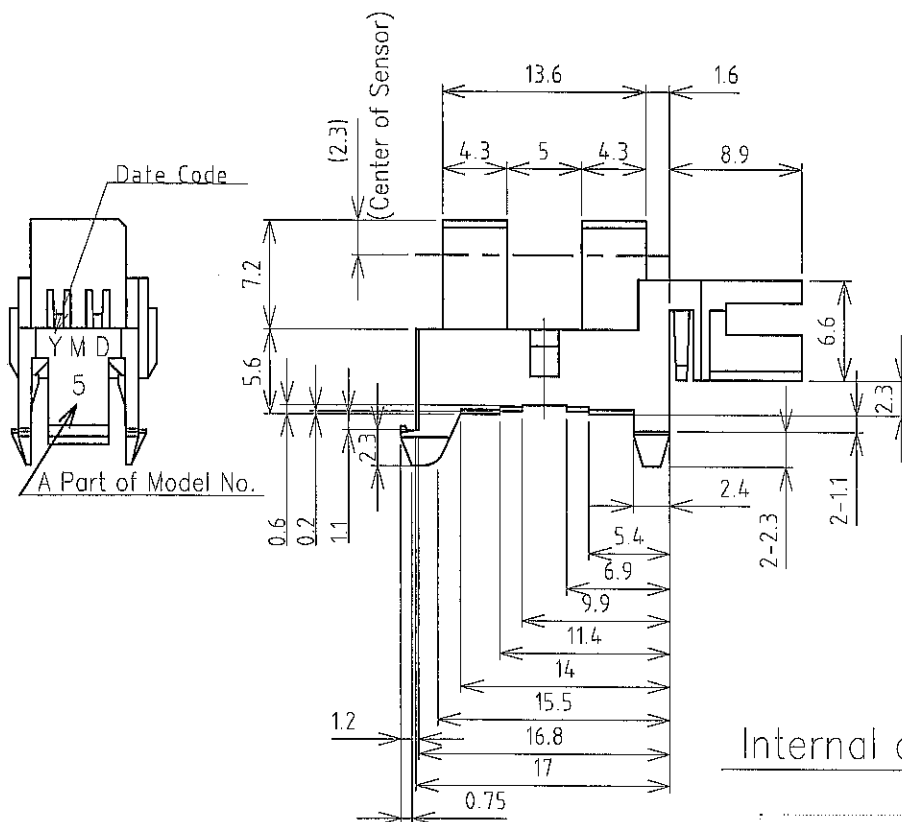
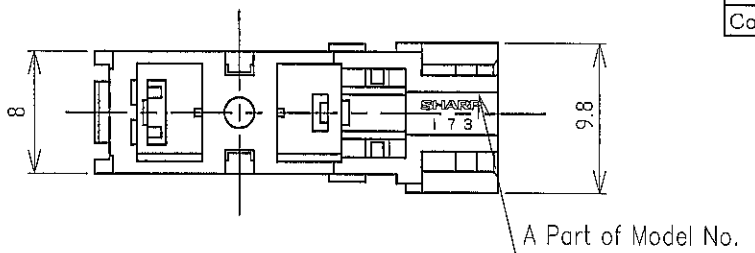


2.1 Outline (Drawing No.CY15335i 02)

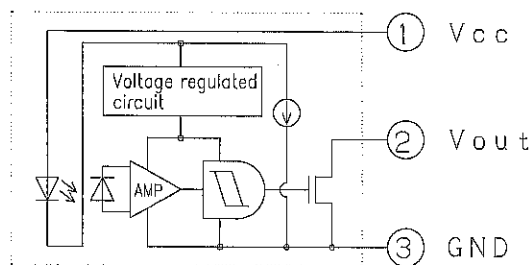
Scale : 2/1 Unit : 1/1mm

- Note) 1. Unspecified tolerance shall be followed the list below.  
 2. Dimensions in parenthesis are shown for reference.  
 3. Coupling and contact : CT receptacle connector (173977-3 and 179228-3) by Tyco Electronics Japan G.K.  
 4. Date code  
 Y : Year (2016 : 6) Number of the end of the Christian era  
 M : Month (1~9, X, Y, Z)  
 D : Date (1~9, Please refer to a right list other than it.)

Date	10	11	12	13	14
Code	A	B	C	D	E
Date	15	16	17	18	19
Code	F	G	H	J	K
Date	20	21	22	23	24
Code	M	N	O	P	R
Date	25	26	27	28	29
Code	S	T	U	W	X
Date	30	31			
Code	Y	Z			



Internal connection diagram



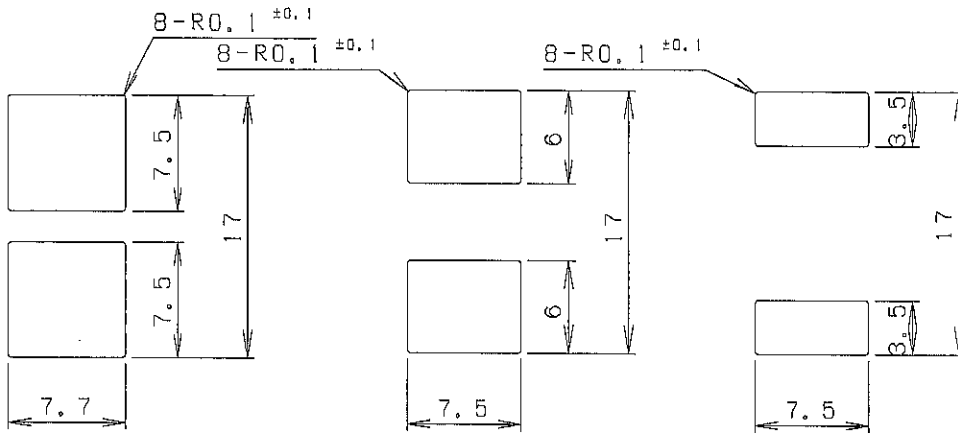
Dimension	Tolerance
less than 5.0	±0.15
5.0 or more, less than 15.0	±0.2
15.0 or more	±0.3

2-2 Recommended Installation Hole drawing  
(Drawing No. CY15335i06)

Scale : 2/1

- \*1 We recommend to fix GP1A173LCS5F at punching side on the fixing plate (metal plate).
- \*2 Please decide the final dimensions at your side after confirmation by the actual applications, Because mounting efficiency and mounted stabilization are dependent on mounting plate corner-R and punched state.
- \*3 Tolerance shall be  $\pm 0.1\text{mm}$
- \*4 Please don't hold connector area but sensor area when fitting in or putting out on the metal plate.

Normal mounting type

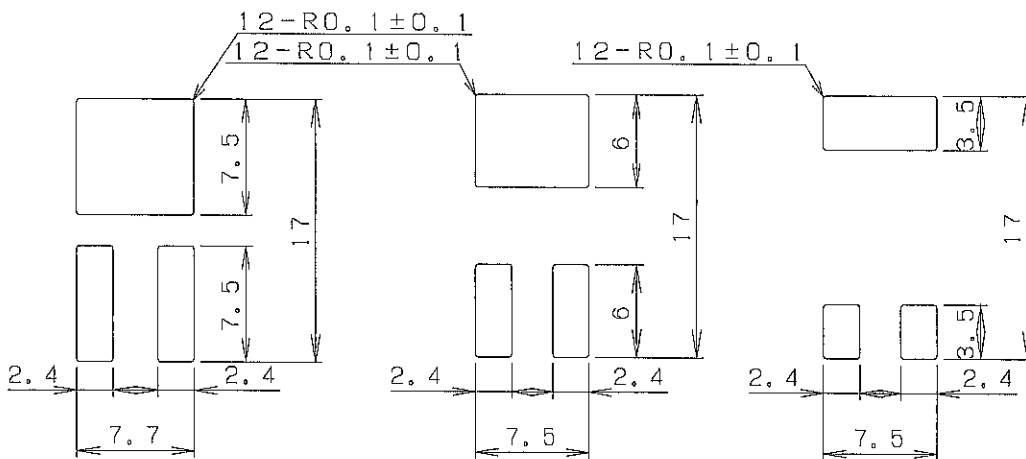


Thickness of plate for 1.6mm

Thickness of plate for 1.2mm

Thickness of plate for 1.0mm

Irregular mounting protection type



Thickness of plate for 1.6mm

Thickness of plate for 1.2mm

Thickness of plate for 1.0mm

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25°C

Parameter	Symbol	Rating	Unit	Remark
Supply voltage	Vcc	-0.5 to +6	V	
Output voltage	Vout	-0.5 to +6	V	Output transistor between collector and emitter
Output current	I <sub>OL</sub>	8	mA	Output transistor collector current *1
Operating temperature	T <sub>opr</sub>	-30 to +95	°C	The connector should be plugged in/out at normal temperature.
Storage temperature	T <sub>stg</sub>	-40 to +100	°C	

\*1 Fig.1 shows output current vs. ambient temperature.

3.2 Electro-optical characteristics

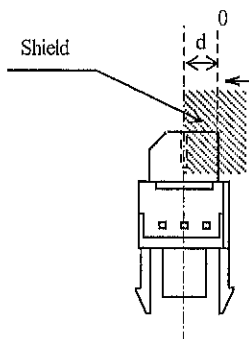
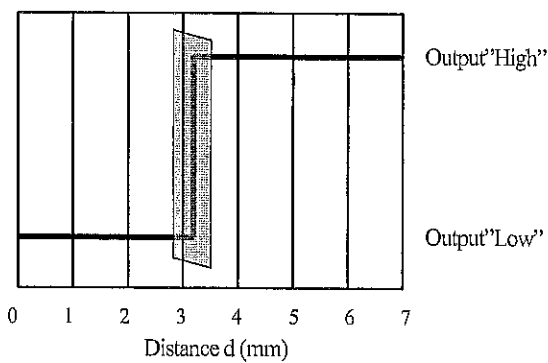
Vcc=5V, Ta=25°C

Parameter	Symbol	Rating	Unit	Conditions
Current dissipation	I <sub>CCL</sub>	16.5 MAX.	mA	Light beam uninterrupted
Low level output voltage	V <sub>OL</sub>	0.35 MAX	V	Light beam uninterrupted I <sub>OL</sub> =4 mA
Current dissipation	I <sub>CCH</sub>	16.5 MAX	mA	Light beam interrupted
High level output voltage	V <sub>OH</sub>	Vcc×0.9 MIN	V	Light beam interrupted R <sub>L</sub> =10 kΩ
Operating voltage	V <sub>cc</sub>	3.0~5.5	V	
Response characteristics	Min. interrupted time	t <sub>H</sub>	166 MIN	μs R <sub>L</sub> =4.7 kΩ
	Min. uninterrupted time	t <sub>L</sub>	166 MIN	

3.3 Detection position characteristics (Ta= 25°C, Vcc= 5V, R<sub>L</sub>= 10kΩ)

Horizontal detecting position characteristics

(d = 3.2 ± 0.3 mm)



Vertical detecting position characteristics

(d = 3.0 +0.3 / -1.8 mm)

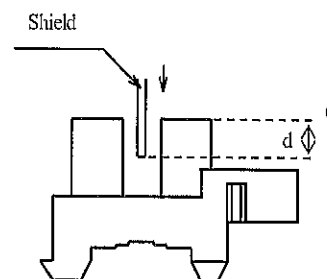
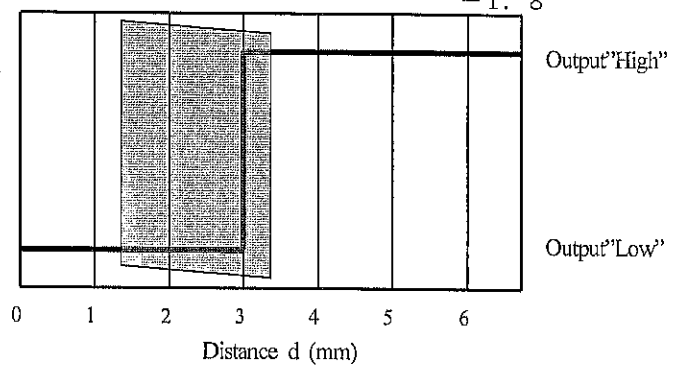
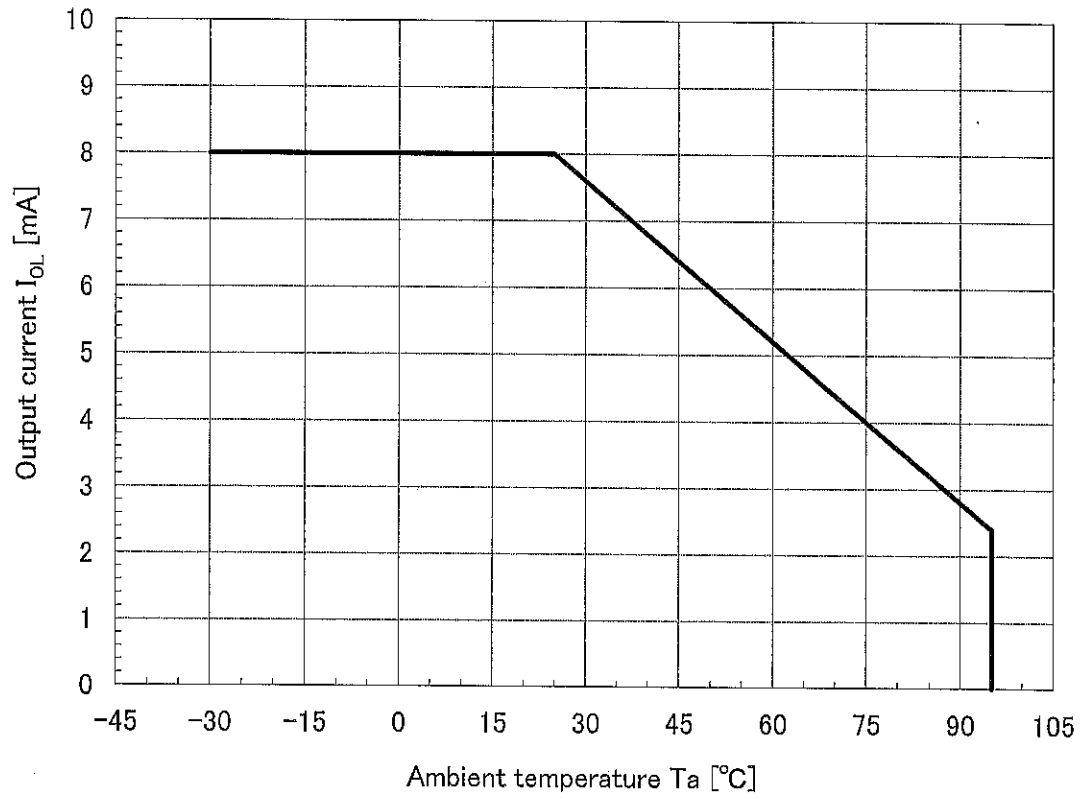




Fig.1 Output current vs. ambient temperature



## 4. Reliability

The reliability of products shall satisfy items listed below.

**REFERENCE**  
Confidence level : 90%  
LTPD : 10 or 20

Test item	Test conditions	Failure Judgement Criteria	Samples (n)
			Defective(C)
Temperature cycling	1 cycle -40°C to +100°C (30min) (30min) 100 cycles test	$I_{CC1} \geq U \times 1.2$	n=22, C=0
High temp. and high humidity storage	+40°C, 90%RH, 240h	$I_{CCH} \geq U \times 1.2$	n=22, C=0
High temp. storage	+100°C, 240h, Without connector	$V_{OL} \geq U \times 1.2$	n=22, C=0
Low temp. storage	-40°C, 240h	$V_{OH} \leq L \times 0.8$	n=22, C=0
Operation life	$V_{CC} = 5V, T_a = 25 \pm 3^\circ C, 1000h$		n=22, C=0
Mechanical shock	1000m/s <sup>2</sup> , 3times/ $\pm X, \pm Y, \pm Z$ direction	U : Upper specification limit L : Lower specification limit	n=11, C=0
Variable vibration frequency	Overall amplitude ; 1.5mm Frequency range 10 to 55 to 10 Hz/1 min 2h/ $\pm X, \pm Y, \pm Z$ direction		n=11, C=0
Connector strength I	Pull connector housing horizontally to connector terminal pin direction by 20N weight for 5 s (1 time)	Abnormal electro-optical characteristics	n=11, C=0
Connector strength II	Push connector housing perpendicular to connector terminal pin direction by 10N weight for 5 s (1 time)		n=11, C=0

REFERENCE

## 5. Outgoing inspection

	Item	Conditions	Instrument	Judge Criteria	AQL
1	Appearance	No defects that may conflict with product specifications, including crack, split, chip scratch, burr and blur, No bent connector pin and loosened pin	Visual inspection	Any of the specified defects at left is not acceptable	1.0%
2	Electro-optical characteristics	Specified in 3.2 ( $I_{CCL}$ , $V_{OL}$ , $I_{CCH}$ , $V_{OH}$ , $V_{CC}$ )	Dedicated tester	Specimen that does not satisfied the requirements specified at left is not acceptable	0.4%

A single sampling plan, normal inspection level II based on ISO 2859 shall be adopted.

REF ID: A173LCS5F

## 6. Supplements

### 6.1 Parts

This product uses the below parts.

#### 6.1.1 Light detector (Quantity : 1)

(Using a silicon photodiode as light detecting portion, and a CMOS IC as signal processing circuit.)

Type	Maximum sensitivity wavelength (nm)	Sensitivity wavelength (nm)	Response time ( $\mu$ s)
Photodiode	900	400 to 1200	10

#### 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
Black polycarbonate resin (UL94V-0)	Copper Alloy (With plating)

#### 6.1.4 Others

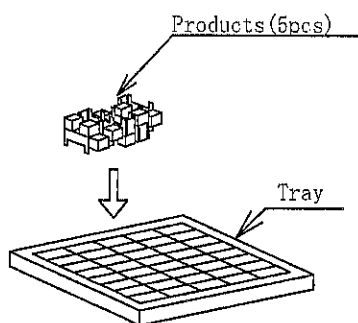
This product shall not be radiation flux proof.

The laser oscillator is not equipped on this product.

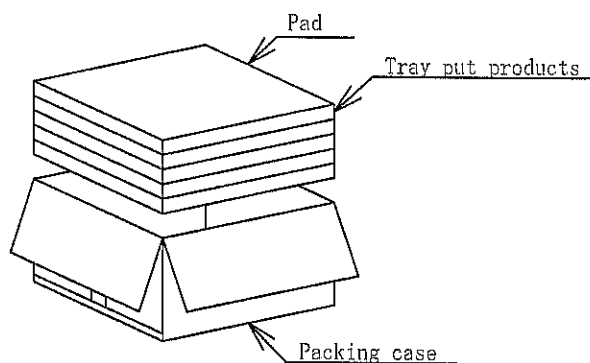
The terminals are covered with Tin Plating (more than 99.99%).

## 6.2 Package drawing

### Package

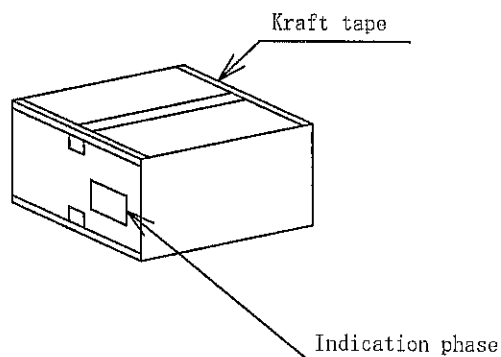


<Fig 1>



<Fig 2>

No	Name	Material	Quantity
1	Packing case	Corrugated cardboard	1/1000
2	Pad	Corrugated cardboard	6/1000
3	Tray	Polystyrene	1/200
4	Kraft tape	-	-



<Fig 3>

### Packing method

- 1 5 products are put in 1 pocket.  
The longer direction of the product is arranged in the arbitrary direction.  
200 products are put in the tray. <Fig.1>
- 2 The pads are attached at the top and the bottom of the trays  
and also inserted between the trays. <Fig.2>
- 3 Seal packing case with kraft tape. <Fig.3>
- 4 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 < Fig.3>  
(1000pcs./ packing case)  
(Approximately 2.26kg/ packing mass)