



SPEC. No. ED-05G45B  
ISSUE August 8, 2006

OPTO-ANALOG DEVICES DIVISION  
ELECTRONIC COMPONENTS GROUP  
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR  
PHOTOINTERRUPTER  
MODEL No. GP1S196HCZ0F

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  copy of the Specifications  
with approving signature on each.

CUSTOMER'S APPROVAL

PRESENTED

DATE \_\_\_\_\_

DATE \_\_\_\_\_

BY \_\_\_\_\_

BY \_\_\_\_\_

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

Product name : PHOTOINTERRUPTER

Model No. : GP1S196HCZ0F

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.

1. Application

This specification applies to the outline and characteristics of transmissive type photointerrupter; Model No. GP1S196HCZ0F.

2. Outline : Refer to the attached drawing No. CY1245li02.

3. Ratings and characteristics : Refer to the attached sheet, Page 4, 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 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)

6.2 Specified brominated flame retardants

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

6.3 RoHS restriction

This product does not contain LEAD(Pb) more than RoHS restriction level.

Object : Lead, hexavalent chromium, cadmium, mercury, and two types of brominated flame retardants (PBB, PBDE).

6.4 Product mass : Approx. 22mg

6.5 Country of origin : Japan , China

6.6 Packing : Refer to the attached drawing No. CY12452i09.

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)

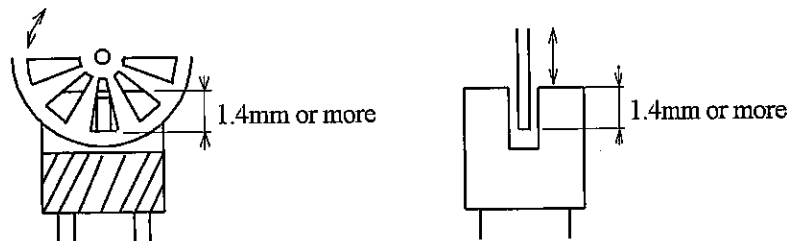
2) Prevention of malfunction

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 1.4mm or more from the top of elements.

(Example)



4) Hand soldering

To hand solder onto lead pins, solder at the position of 0.3mm or more from the package's bottom at 350°C for 1 s or less.

Please don't bend lead pins from the root of package.

And please take care not to apply outer force to both lead pins and the package.

Please execute it after confirming there is no problem on reliability in a real machine enough because it changes depending on the work method etc.

Please don't do soldering with preheating, and please don't do soldering by reflow. In case of repairing, please make sure GP1S196HCZ0F is cooled down, please consider the outer mold resin is meltdown in case a continuous heat is applied.

5) 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°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

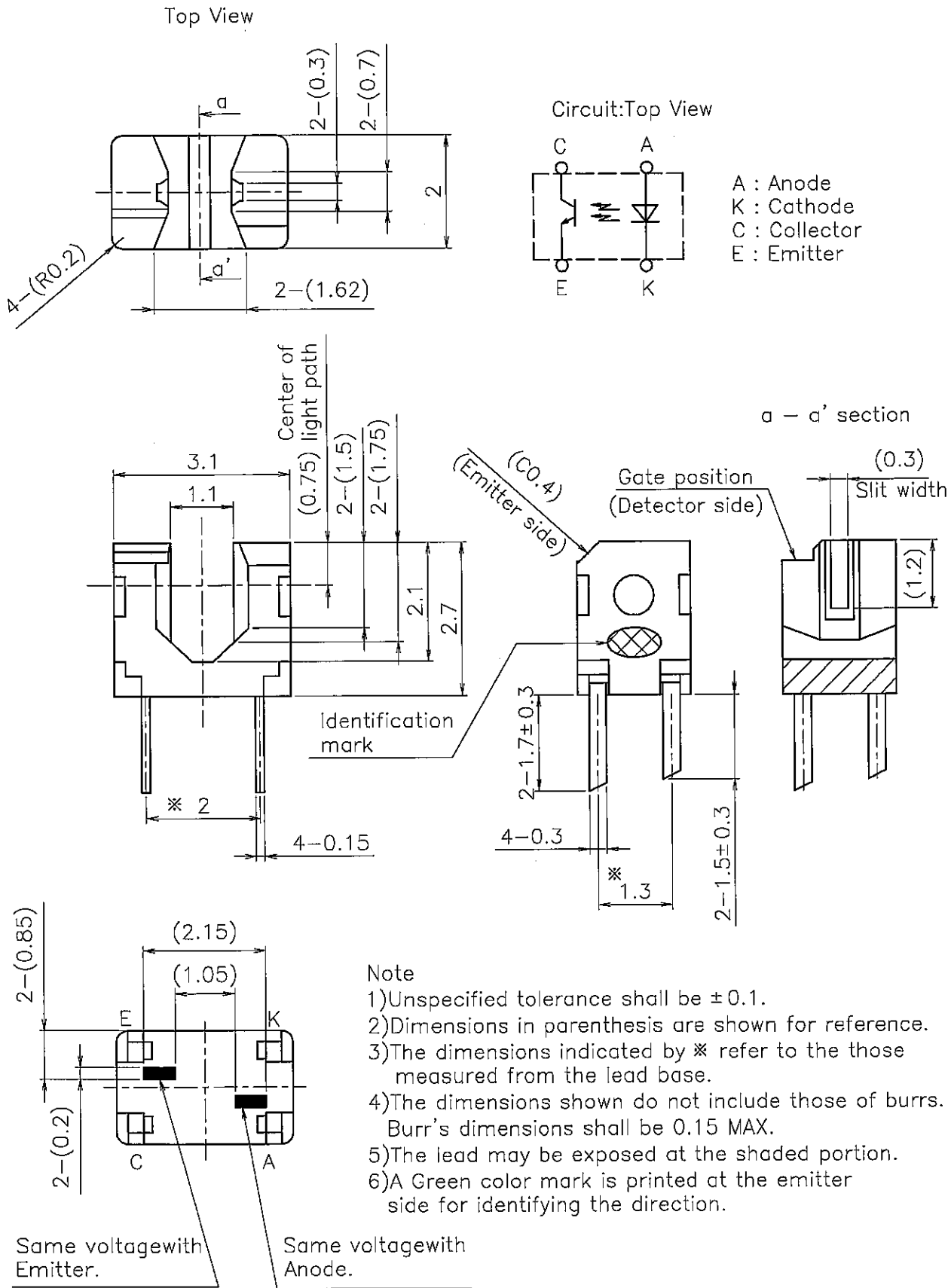
6) Lead pin

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

# REFERENCE

3/10  
ED-15G045P GP1S196HCZ0F  
August 8, 2006

2.1 Outline Dimensions (Drawing No.CY12451i02)      Scale:10/1      Unit:mm



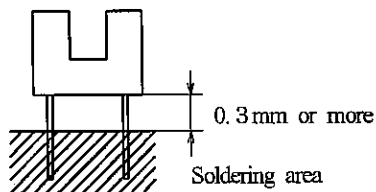
### 3. Ratings and characteristics

#### 3.1 Absolute maximum ratings

$T_a=25^\circ\text{C}$

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	30	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	$I_c$	20	mA
	Collector power dissipation	$P_c$	75	mW
Total power dissipation		$P_{tot}$	100	mW
Operating temperature		$T_{opr}$	-25 to +85	$^\circ\text{C}$
Storage temperature		$T_{stg}$	-40 to +100	$^\circ\text{C}$
* Soldering temperature		$T_{sol}$	260	$^\circ\text{C}$

\* Soldering time : 1 s or less

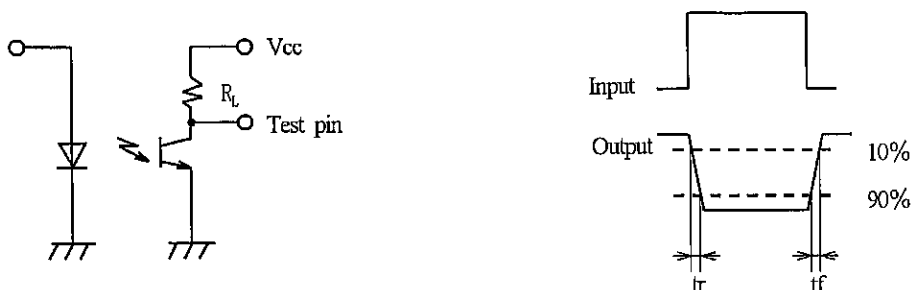


#### 3.2 Electro-optical characteristics

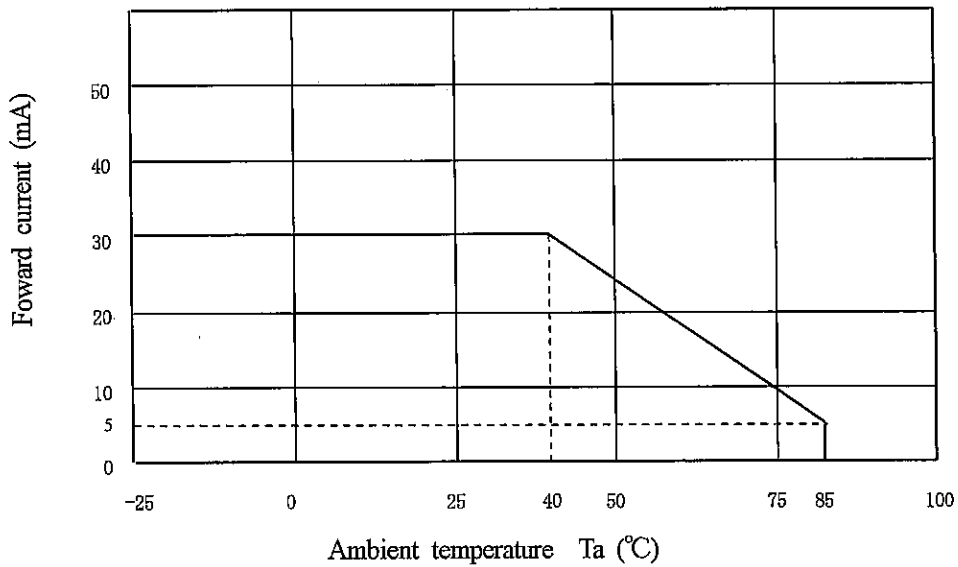
$T_a=25^\circ\text{C}$

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	$V_F$	$I_F=20\text{mA}$	-	1.2	1.4	V	
	Reverse current	$I_R$	$V_R=3\text{V}$	-	-	10	$\mu\text{A}$	
Output	Collector dark current	$I_{CEO}$	$V_{CE}=20\text{V}$	-	-	100	nA	
Transfer characteristics	Collector current	$I_c$	$V_{CE}=5\text{V}, I_F=5\text{mA}$	100	-	400	$\mu\text{A}$	
	Response time	(Rise)	$t_r$	$V_{CE}=5\text{V}, I_c=100\mu\text{A}$	-	50	150	$\mu\text{s}$
		(Fall)	$t_f$	$R_L=1\text{k}\Omega$	-	50	150	$\mu\text{s}$
	Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_F=10\text{mA}, I_c=40\mu\text{A}$	-	-	0.4	V

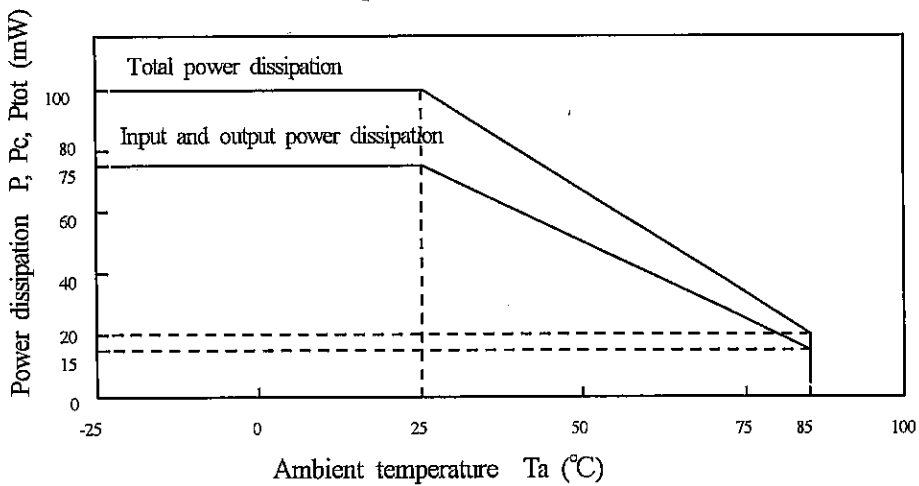
(Test circuit for response time)



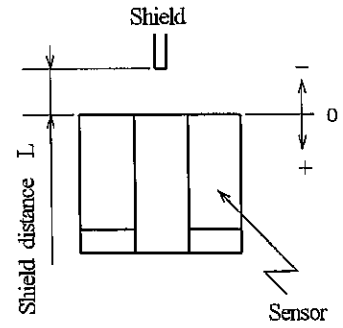
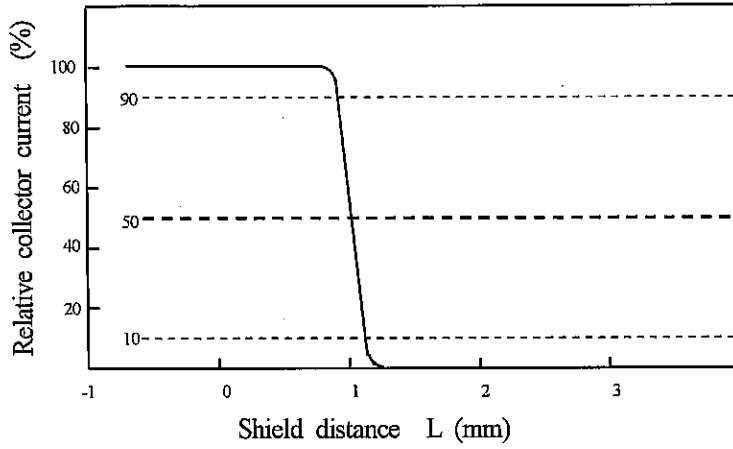
Forward current vs. ambient temperature



Power dissipation vs. ambient temperature

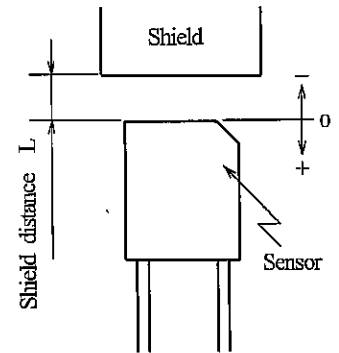
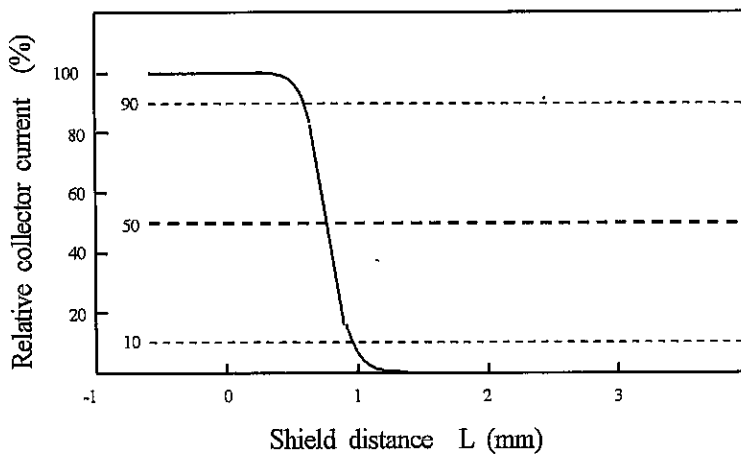


Relative collector current vs. shield distance 1 (Reference value)



Test condition  
 $I_F=5.0\text{mA}$   
 $V_{CE}=5\text{V}$   
 $T_a=25^\circ\text{C}$

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



Test condition  
 $I_F=5.0\text{mA}$   
 $V_{CE}=5\text{V}$   
 $T_a=25^\circ\text{C}$

# REFERENCE

4. Reliability

The reliability of products shall satisfy items listed below.

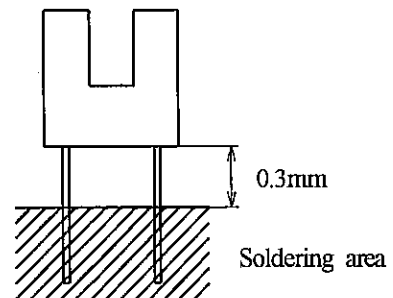
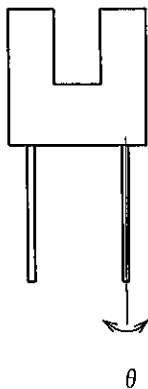
Confidence level : 90%

LTPD : 10 or 20

Test Items	Test Conditions	Failure Judgment Criteria	Samples (n)
			Defective (c)
Temperature cycling	1 cycle -40°C to +100°C (30min) (30min) 20 cycles test	$I_R \geq U \times 2$ $I_{CEO} \geq U \times 2$ $V_F \geq U \times 1.2$ $I_c \leq L \times 0.8$  U: Upper specification limit L: Lower specification limit	n=22, c=0
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	$I_F=20mA$ , $T_a=25^\circ C$ , 500h		n=22, c=0
Mechanical shock	15km/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: 3.0N 30s/each terminal		n=11, c=0
Terminal strength (Bending) *1	Weight: 1.0N 0° →90° →0° →-90° →0° 1time bending		n=11, c=0
Soldering heat *2	260°C, 3s Immerse up to 0.3mm from the bottom face of package.		n=11, c=0
Solder ability *2, *3	245°C, 3s Prior disposition: Dip rogin flux. Then immerse up to 0.3mm from the bottom face of package.	Judgment only appearance Solder shall adhere at less than 95% area of immersed portion of lead.	n=11, 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(TAMURA KAKEN CORPORATION).



5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

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

(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 *	0.25

\* Crack ... Visible crack shall be defect.

Split

\* Chip ... One which affects the electrical characteristics shall be defect.

Scratch

The others

# REFERENCE

## 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 ( $\mu$ s)
Phototransistor	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

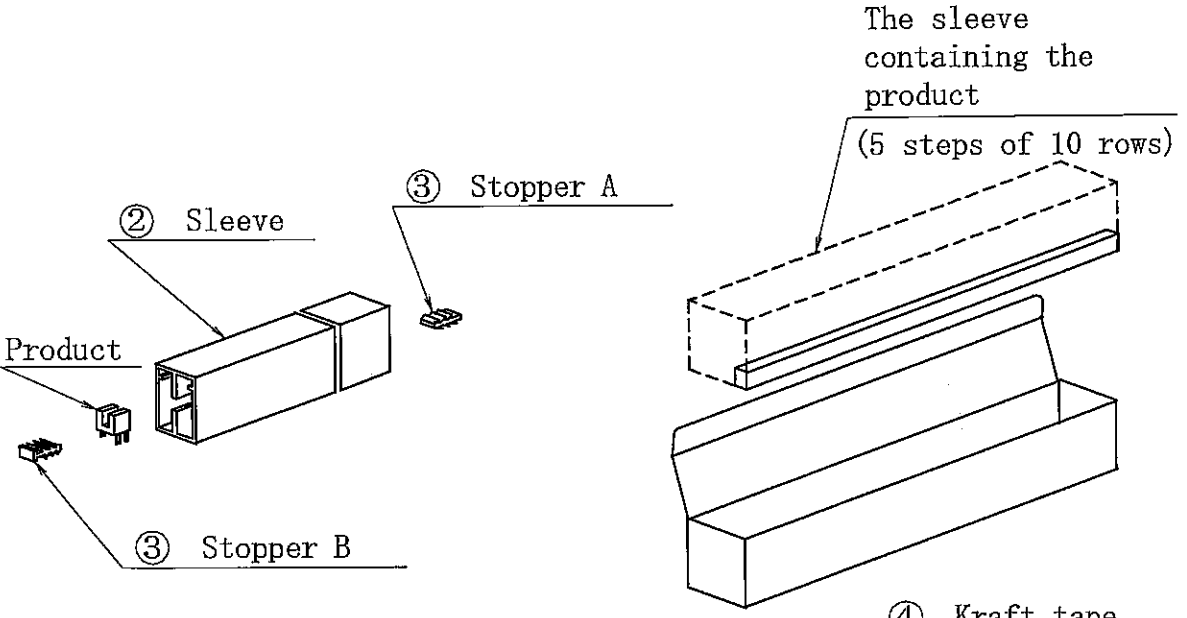
Case	Lead frame	Lead frame plating
Black PPS resin (UL 94V-0)	42 Alloy	SnCu plating

#### 6.1.4 Others

This product shall not be radiation flux proof.

6.4 Packing (Drawing No. CY12452i09)

August 8, 2006

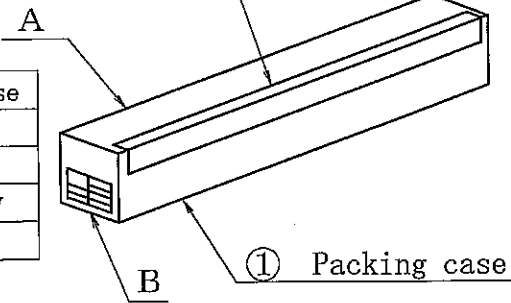


<Fig. 1>

<Fig. 2>

1. Packing material

No	Name	material	The number of use
1	Packing case	Paper corrugated cardboard	1
2	Sleeve	Polycarbonate	50
3	Stopper A, B	rubber	50, respectively
4	Kraft tape	Paper	—



<Fig. 3>

2. Packing quantity

- 1. Packing sleeve : 200pieces per 1 sleeve
- 2. Packing case : 10000pieces per 1 case  
(Gross weight : Approx 825 g)

3. Indication phase diagram

1)Made in Japan

A section : MADE IN JAPAN  
B section : Filling out the following table

2)Made in China

A section : MADE IN CHINA  
B section : Filling out the following table

TYPE	GP1S196HCZOF	← Model No.
QUANTITY		← Quantity
LOT (DATE)		← Lot No.

TYPE	GP1S196HCZOF	← Model No.
	(GP1S196HCZ06)	← Internal production control name
QUANTITY		← Quantity
LOT (DATE)		← Lot No.

4. Packing method

- 1. 200 pcs. are contained to a sleeve.  
(The method of packing is shown in the above figure.) <Fig.1>
- 2. Outer packing case contains 50 sleeves ; 5 steps of 10 rows.  
<Fig.2>
- 3. The packing case is sealed off with the kraft tape.  
The contents to be indicated on the packing case "Model No.", "Internal production control name", "Quantity" and "LotNo." <Fig.3>