

# SHARP

**REFERENCE**  
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OPTO-ELECTRONIC DEVICES DIVISION  
ELECTRONIC COMPONENTS GROUP  
SHARP CORPORATION

## SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTOINTERRUPTER

MODEL No.

GP1S59J0000F

Specified for \_\_\_\_\_

Enclosed please find copies of the Specifications which consists of 9 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 *19 0*  
\_\_\_\_\_

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Opto-Electronic Devices Div.  
ELECOM Group  
SHARP CORPORATION

Product name : PHOTOINTERRUPTER

Model No. : GP1S59J000F

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 )

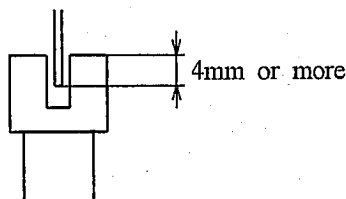
- (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

( • 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. GP1S59J0000F.
2. Outline  
 Refer to the attached drawing No. CY12183i02.
3. Ratings and characteristics  
 Refer to the attached sheet, Page 4 to 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 About the lead content  
 This product dose not contain lead which restricted by the RoHS directive.
  - 6.5 Product mass : Approx. 0.53g
  - 6.6 Country of origin : Japan, Indonesia, Philippine.
7. Notes
  - 7.1 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)
  - 7.2 Position of opaque board  
 Opaque board shall be installed at place 4mm or more from the top of elements.  
 (Example)



- 7.3 Soldering  
 To solder onto lead pins, solder at 260°C for 5 seconds or less.  
 Please take care not to let any external force exert on lead pins when soldering or just after soldering.  
 Please don't do soldering with preheating, and please don't do soldering by reflow.
- 7.4 Cleaning conditions :
  - (1) Solvent cleaning : Solvent temperature 45°C or less  
 Immersion 3 min. or less
  - (2) 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.
  - (3) Applicable solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol
- 7.5 Flux  
 Some flux, which is used in soldering, may crack the package due to synergistic effect of alcohol in flux and the rise in temperature by heat in soldering. Therefore, in using flux, please make sure that it does not have any influence on appearance and reliability of the photointerrupter.

## 2. Outline (Drawing No. : CY12183i02)

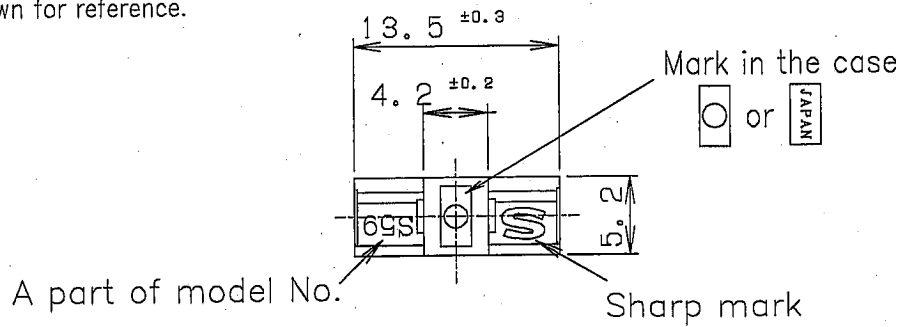
1) Unspecified tolerances shall be followed the list below.

Scale: 2/1

Unit: 1/1mm

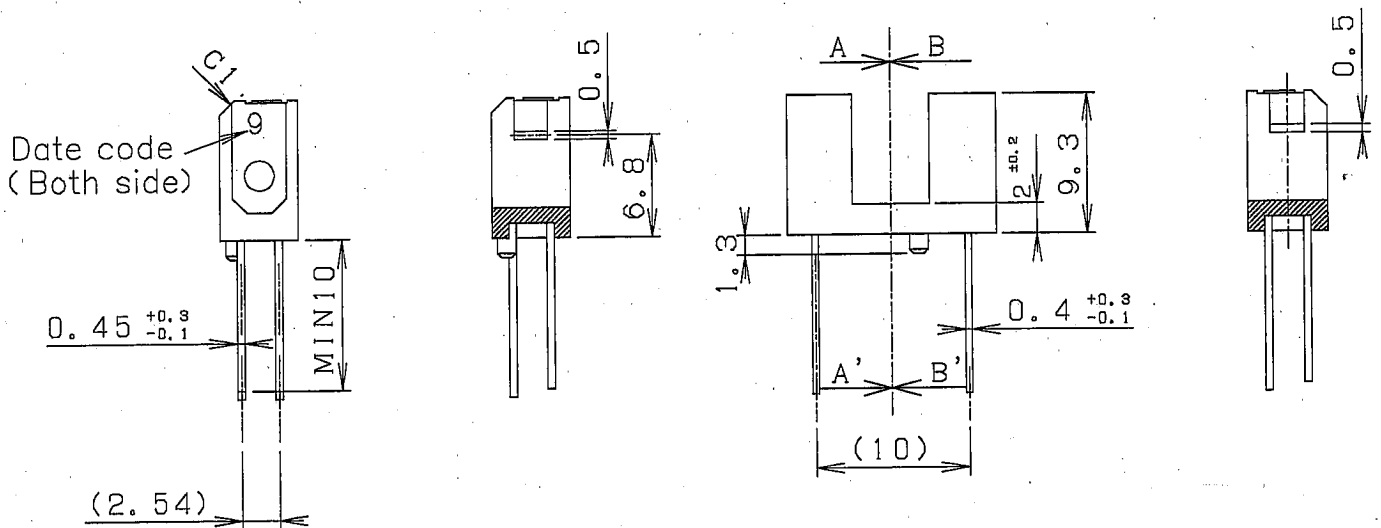
Dimension	Tolerance(±)
$d \leq 4$	0.1
$4 < d \leq 18$	0.2

2) Dimensions in parenthesis are shown for reference.

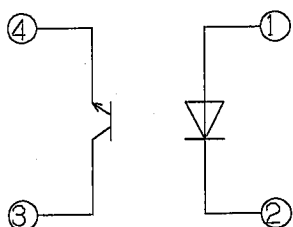


AA' Section

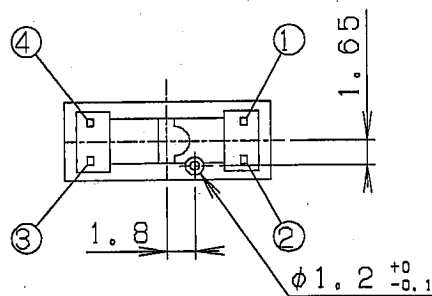
BB' Section



Internal connection diagram



- ① Anode
- ② Cathode
- ③ Collector
- ④ Emitter



### 3. Ratings and characteristics

#### 3.1 Absolute maximum ratings

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

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	$I_F$	50	mA
	*1, 2 Peak forward current	$I_{FM}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation	P	75	mW
Output	Collector-emitter voltage	$V_{CE0}$	35	V
	Emitter-collector voltage	$V_{ECO}$	6	V
	Collector current	$I_c$	20	mA
	*1 Collector power dissipation	$P_c$	75	mW
Operating temperature		$T_{opr}$	-25 to +85	$^\circ\text{C}$
Storage temperature		$T_{stg}$	-40 to +100	$^\circ\text{C}$
*3	Soldering temperature	$T_{sol}$	260	$^\circ\text{C}$

- \*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1, 2, 3.
- \*2 Pulse width  $\leq 100 \mu\text{s}$ , Duty ratio : 0.01
- \*3 For 5s

#### 3.2 Electro-optical characteristics

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	$V_F$	$I_F=20\text{mA}$	-	1.25	1.4	V
	Peak forward voltage	$V_{FM}$	$I_{FM}=0.5\text{A}$	-	3	4	V
	Reverse current	$I_R$	$V_R=3\text{V}$	-	-	10	$\mu\text{A}$
Output	Dark current	$I_{CE0}$	$V_{CE}=20\text{V}$	-	1	100	$\mu\text{A}$
Transfer characteristics	Collector current	$I_c$	$V_{CE}=5\text{V}, I_F=20\text{mA}$	0.5	-	10	mA
	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_F=40\text{mA}, I_c=0.5\text{mA}$	-	-	0.4	V
	Response time (Rise)	$t_r$	$V_{CE}=2\text{V}, I_c=2\text{mA}$	-	3	15	$\mu\text{s}$
	Response time (Fall)	$t_f$	$R_L=100\Omega$	-	4	20	$\mu\text{s}$

(Test circuit for response time)

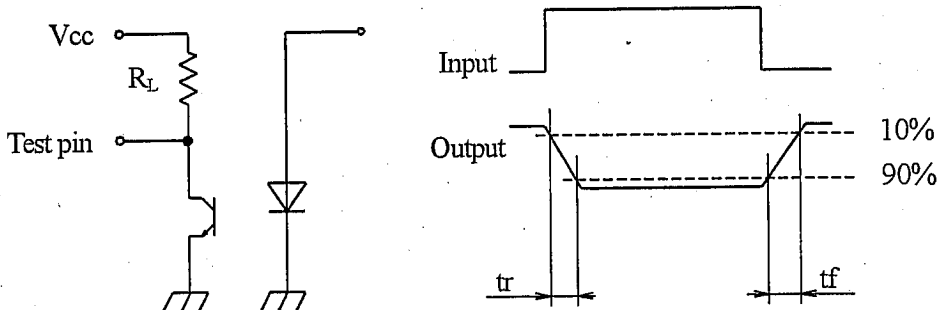


Fig.1 Forward current vs. ambient temperature

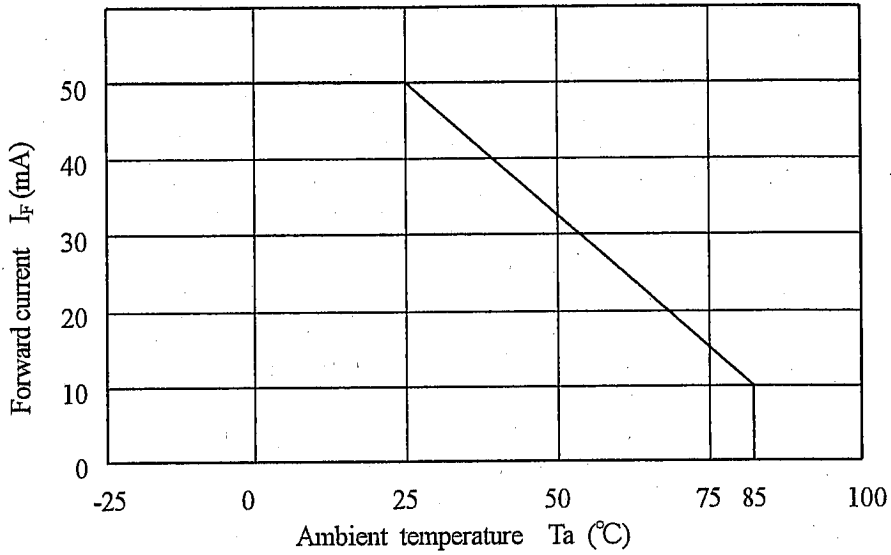


Fig.2 Collector power dissipation vs. ambient temperature

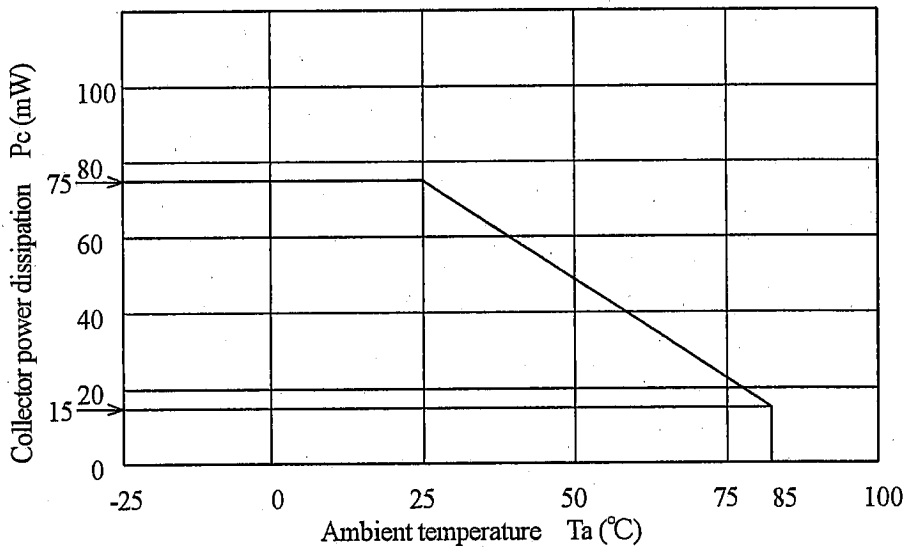
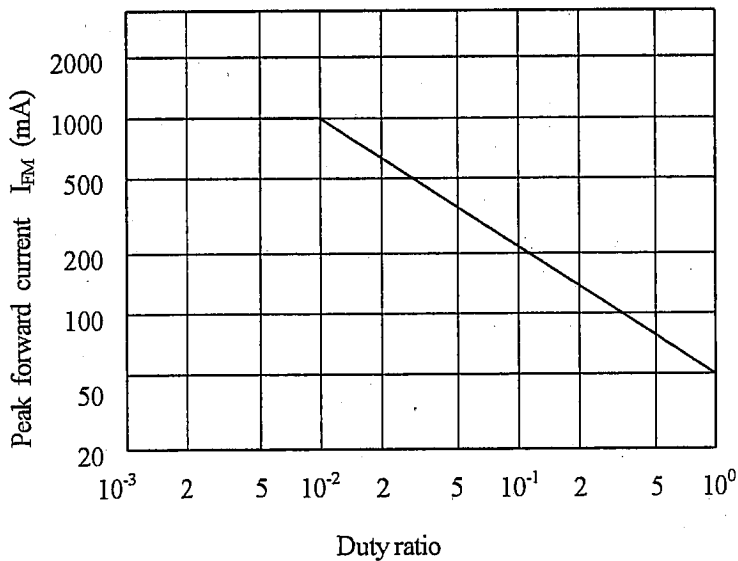


Fig.3 Peak forward current vs. duty ratio



(Pulse width  $\leq 100 \mu s$   $T_a = 25^\circ C$ )

4. Reliability

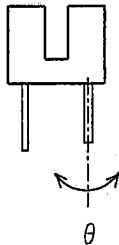
The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

LTPD : 10 or 20

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n)
			Defective (c)
Temperature cycling	1 cycle -40°C to +100°C (30min.) (30min.) 20 cycle test	$V_F \geq U \times 1.2$ $I_R \geq U \times 2$ $I_c \leq L \times 0.8$ $I_{CEO} \geq U \times 2$  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	$I_F=20mA$ , $T_a=25^\circ C$ , 500h		n=22, c=0
Mechanical shock	15000m/s <sup>2</sup> , 0.5ms 3times/ $\pm X$ , $\pm Y$ , $\pm Z$ 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: 10N 30s/each terminal		n=11, c=0
Terminal strength (Bending) *1	Weight: 5N 0° → 90° → 0° → -90° → 0° 1 time bending		n=11, c=0
Soldering heat	260°C, 5 s		n=11, c=0
Solderability *2	245°C, 5 s	Judgement 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 The alloy composition of solder used should be 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) Electro-optical characteristics

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

- (2) Appearance

5.2 Sampling method and Inspection level

A single sampling plan, normal inspection level II based on ISO 2859 is applied.

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



6. Supplements

6.1 Parts

This product uses the below parts.

6.1.1 Light detector (PT480, Q'ty : 1)

Type	Material	Maximum sensitivity wavelength (nm)	Sensitivity wavelength (nm)	Response time ( $\mu$ s)
Phototransistor	Silicon (Si)	800	400 to 1200	3

6.1.2 Light emitter (GL480, 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 flame finish
Black polysulfone resin (UL94V-0)	Solder dip (Sn-3.0Ag-0.5Cu)

6.1.4 Others

This product shall not be proof against radiation flux.