

# SHARP

OPTO-ELECTRONIC DEVICES DIVISION  
ELECTRONIC COMPONENTS GROUP  
SHARP CORPORATION

## SPECIFICATION

**REFERENCE**

DEVICE SPECIFICATION FOR

MODEL No. PHOTOINTERRUPTER

GP2A240LCS0F

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  copy of the Specifications  
with approving signature on each.

CUSTOMER'S APPROVAL

DATE \_\_\_\_\_

BY \_\_\_\_\_

PRESENTED

DATE \_\_\_\_\_

BY   H. Ogura  

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

**REFERENCE**Product name : PHOTOINTERRUPTERModel No. : GP2A240LCS0F

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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.

**REFERENCE**

1. Application

This specification applies to the outline and characteristics of reflective type photointerrupter with connector.  
Model No. GP2A240LCS0F.

2. Outline

Refer to the attached drawing No. CY13160i02.

3. Ratings and characteristics

Refer to the attached sheet, page 4, 5.

4. Reliability

Refer to the attached sheet, page 6.

5. Outgoing inspection

Refer to the attached sheet, page 7.

6. Supplements

- 6.1 Reflective object   Black paper (black) : Standard reflective object (SHARP Co.)  
                                      KODAK Gray Cards (use the white side to reflect about 90%)  
  : Standard reflective object (SHARP Co.)  
                                      PPC paper                     : Standard reflective object (SHARP Co.)

- 6.2 Parts : Refer to the attached sheet, page 8.

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 : CFC<sub>s</sub>, Halon, Carbon tetrachloride, 1,1,1-Trichloroethane (Methylchloroform)

6.4 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.

- 6.5 Product mass : Approximately 1.95g

6.6 RoHS restriction

This product corresponds to the RoHS directive.

7. Notes

7.1 The circuit design

V<sub>o</sub> terminal : Open collector output

GP2A240LCS0F operates the light emitter by pulse drive. Please supply the stable supply voltage in order to prevent error operation by pulse current. Please be careful that you need to keep the direct inverter light away from the photo detecting surface since the device will not operate correctly in such case. In addition, we recommend to make sure the operation test in the actual application.

Please use a capacitor between V<sub>o</sub> and GND for prevention of line noise.

7.2 Prevent error operation

Please be careful that you need to keep the direct inverter light away from the photo detecting surface since the device will not operate correctly in such case.

In addition, we recommend to make sure the operation test in the actual application.

The circuit is designed to make output become non-detection state when inverter light enters the photo detecting surface directly.

7.3 Cleaning

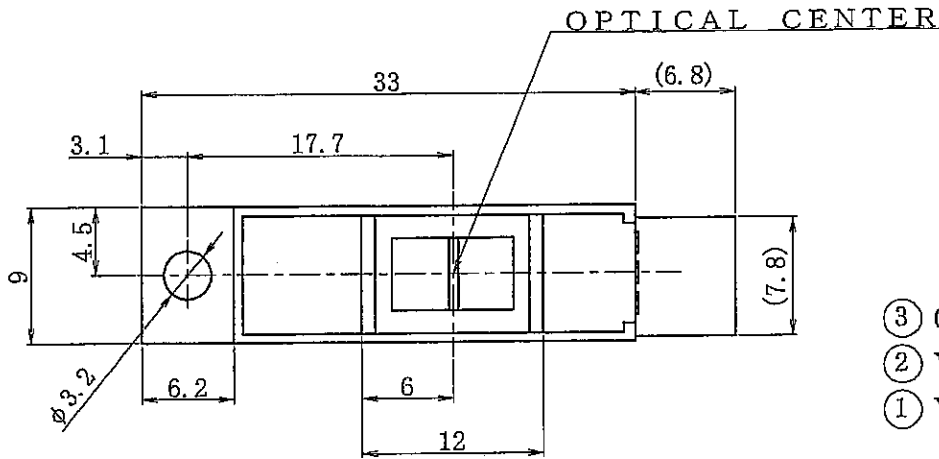
Polycarbonate resin is used as the material of the lens surface. As to cleaning, this reflective type photointerrupter shall not be cleaned by cleaning materials absolutely. Dust and stain shall clean by air blow, or shall clean by soft cloth soaked in washing materials.

7.4 Plugging in/out

The connector should be plugged in/out at normal temperature.

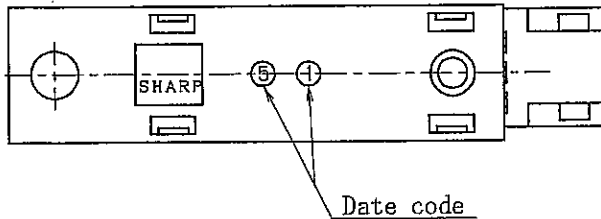
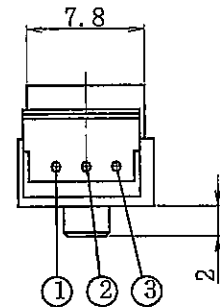
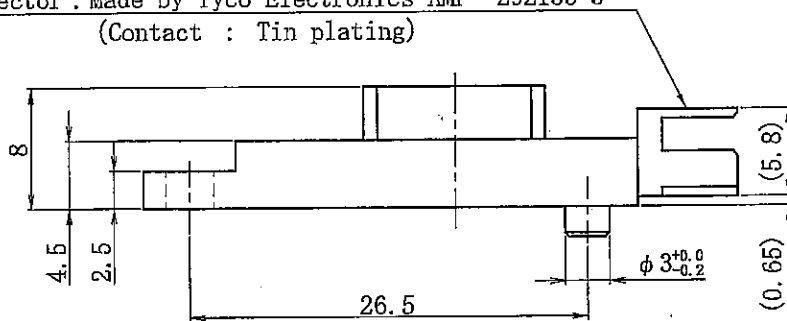
REFERENCE

2. Outline (DrawingNo. CY13160i02) Scale:2/1 Unit:1/1mm

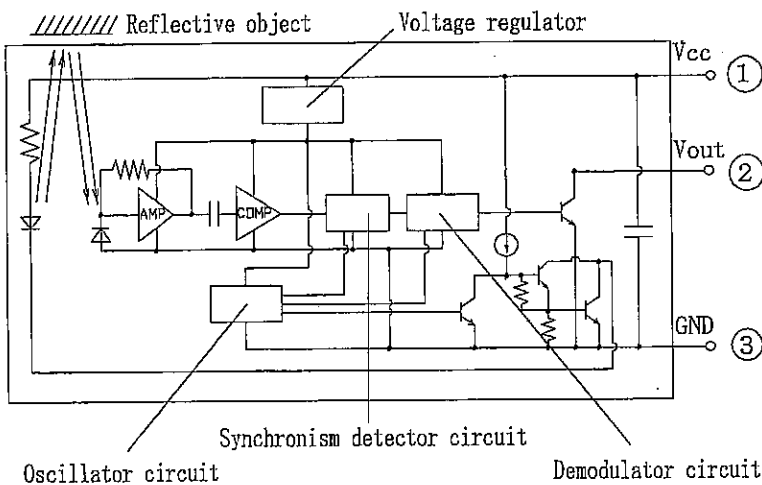


- ③ GND
- ② Vout
- ① Vcc

Connector : Made by Tyco Electronics AMP 292133-3  
(Contact : Tin plating)



Internal connection diagram



Note)

1. Unspecified tolerance shall be shown in the following list.

Dimension	Tolerance
less than 6.0	$\pm 0.2$
6.0 or more less than 14.0	$\pm 0.3$
14.0 or more	$\pm 0.4$

2. Dimensions in parenthesis are shown for reference.

3. Date code : ○○

□ First digit : Last digit of production year  
□ Second digit : Jan. to Sep. 1 to 9  
Oct. : X, Nov. : Y, Dec. : Z

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25°C

Parameter	Symbol	Rating	Unit	Remark
Supply voltage	V <sub>CC</sub>	-0.5 ~ +7	V	
Output voltage	V <sub>O</sub>	3.0	V	
Output current	I <sub>OL</sub>	5.0	mA	Sink current ※1
Operating temperature	T <sub>opr</sub>	-10 ~ +70	°C	The connector should be plugged in / out at normal temperature.
Storage temperature	T <sub>stg</sub>	-20 ~ +80	°C	

※1 Fig.1 shows output current vs. ambient temperature.

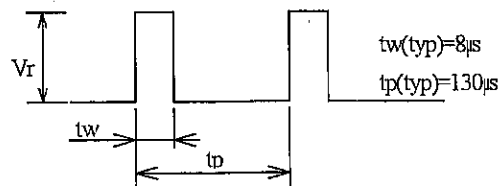
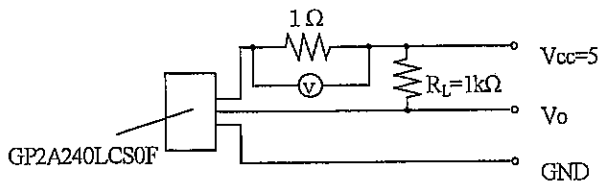
3.2 Electro-optical characteristics

Ta=25°C

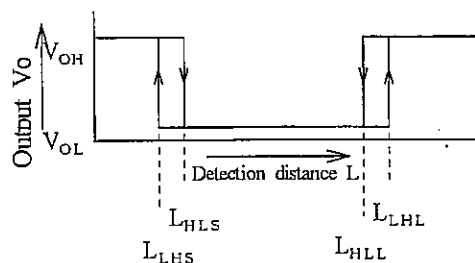
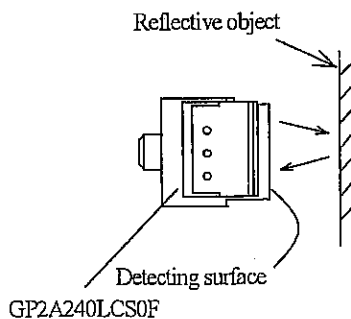
Parameter	Symbol	Rating			Unit	Conditions
		MIN.	TYP.	MAX.		
Supply voltage	V <sub>CC</sub>	4.75	—	5.25	V	-
Current dissipation (I)	I <sub>CC</sub>	—	—	30	mA	Smoothing value V <sub>CC</sub> =5V, R <sub>L</sub> =∞
Current dissipation (II)	I <sub>CCP</sub>	—	—	150	mA	Pulse peak value V <sub>CC</sub> =5V *1
Low level output voltage	V <sub>OL</sub>	—	—	0.4	V	at detection time V <sub>CC</sub> =5V, I <sub>OL</sub> =16mA
High level output voltage	V <sub>OH</sub>	4.5	—	—	V	at non detection time V <sub>CC</sub> =5V, R <sub>L</sub> =1kΩ
Non detection distance	L <sub>LHL</sub>	—	—	90.0	mm	KODAK Gray Cards (use the white side to reflect about 90%), V <sub>CC</sub> =5V *2
Detection distance	L <sub>HLS</sub>	—	—	2.0	mm	KODAK Gray Cards (use the white side to reflect about 90%), V <sub>CC</sub> =5V *2
		—	—	5.0		Black paper, V <sub>CC</sub> =5V *2
	L <sub>HLL</sub>	22.0	—	—	mm	KODAK Gray Cards (use the white side to reflect about 90%), V <sub>CC</sub> =5V *2
		15.0	—	—		Black paper, V <sub>CC</sub> =5V *2
Response time	t <sub>PLH</sub>	—	—	1.0	ms	V <sub>CC</sub> =5V *3
	t <sub>PHL</sub>	—	—	1.0		
Acceptable illuminance	Ev1	3000	—	—	lx	*4
	Ev2	1500	—	—		

\*1 Pulse peak value I<sub>CCP</sub> test method

V<sub>r</sub> wave form I<sub>CCP</sub>=V<sub>r</sub> / 1Ω

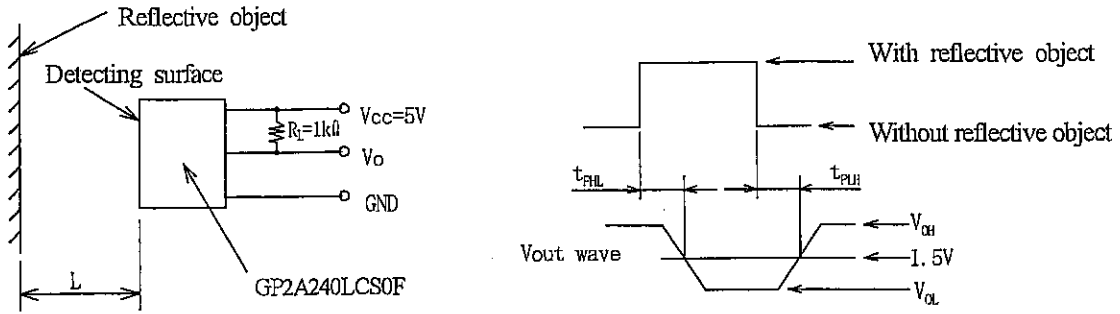


\*2 Distance characteristics test method

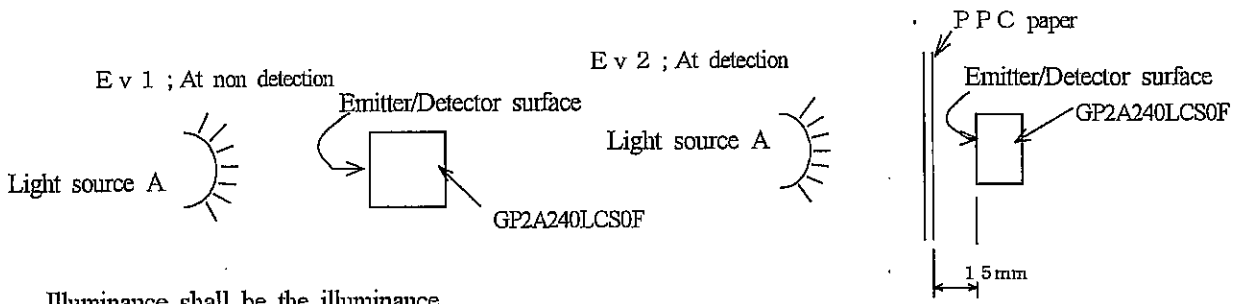


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\*3 Response time test method



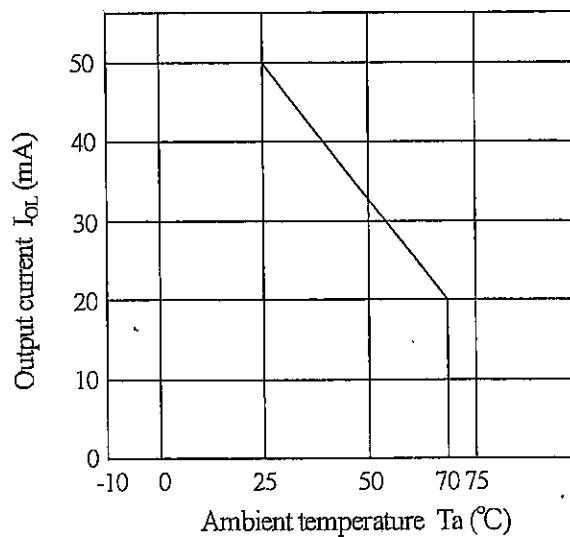
\*4 Test measurement method for acceptable illuminate of external disturbing light



Illuminance shall be the illuminance on the emitter/detector surface.  
Output should not change "H" to "L".

Illuminance shall be the illuminance on the emitter/detector surface.  
Output should not change "L" to "H".

Fig. 1 Output current vs. ambient temperature



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## 4. Reliability

The reliability of products shall satisfy items listed below

Confidence level : 90%

LTPD : 10 or 20

Test item	Test conditions	Failure Judgement Criteria	Samples (n)
			Defective(C)
Temperature cycling	1 cycle -20°C to +80°C (20min) (20min) 20 cycles test	$I_{cc} \geq U \times 1.2$ $V_{OL} \geq U \times 1.2$ $V_{OH} \leq L \times 0.8$  U : Upper specification limit L : Lower specification limit	n=22, C=0
High temp. and high humidity storage	+40°C, 95%R.H.※Note 1, 240h		n=22, C=0
High temp. storage	+80°C, 240h		n=22, C=0
Low temp. storage	-20°C, 240h		n=22, C=0
Operation life	V <sub>cc</sub> =5V, T <sub>a</sub> =25±3°C, 1000h		n=22, C=0
Mechanical shock	1000m/s <sup>2</sup> , 3 times/X, Y, Z direction		n=11, C=0
Variable vibration frequency	Overall amplitude ; 1.5mm Frequency range 10 to 55 to 10 Hz / 1min 2h / X, Y, Z direction		n=11, C=0
Connector strength I	Pull connector housing horizontally to connector terminal pin direction by 20N weight for 5s (1 time)		n=11, C=0
Connector strength II	Push connector housing perpendicular to connect- or terminal pin direction by 10N weight for 5s (1 time)		n=11, C=0
Screw tightening torque	Tighten the screw with the torque of 0.5N · m		n=11, C=0

※Note 1 R.H. : Relative humidity

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## 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	Electrical characteristics *	The same as specified in paragraph 3.2	Dedicated tester	Specimen that does not satisfied the requirements specified on the left-hand side is not acceptable.	0.4%

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

\* Electro-optical characteristics test items

Current consumption \_\_\_\_\_  $I_{cc}$

Low level output voltage \_\_\_\_\_  $V_{OL}$

High level output voltage \_\_\_\_\_  $V_{OH}$

Detection characteristics

- \_\_\_\_\_  $L_{LHL}$
- \_\_\_\_\_  $L_{HLS}$
- \_\_\_\_\_  $L_{HLL}$



**REFERENCE**

## 6.2 Supplements

Parts : This product uses the below parts.

## 6.2.1 Light detector (Quantity : 1)

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

Type	Maximum sensitivity wavelength (nm)	Sensitivity wavelength (nm)	Response time ( $\mu$ s)
Photodiode	900	700 to 1200	400

## 6.2.2 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

## 6.2.3 Material

Case	
Sensor base	: Black PPS resin (UL 94V-0)
Lens	: Polycarbonate resin (UL 94V-2)
Bottom cover	: Polycarbonate resin (Navy Blue) (UL 94V-2)

## 6.2.4 Others

This product shall not be proof against radiation flux.

Laser generator is not used.