

**REFERENCE**

SPEC. No. ED-08G004  
ISSUE January 30, 2008

**SHARP**

OPTO-ANALOG DEVICES DIVISION  
ELECTRONIC COMPONENTS GROUP  
SHARP CORPORATION

**SPECIFICATION**

DEVICE SPECIFICATION FOR

PHOTOINTERRUPTER

MODEL No.

GP2A25DJ000F

Specified for

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Enclosed please find copies of the Specifications which consists of 10 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

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BY

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PRESENTED

DATE

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BY

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Y. Oda,  
Department General Manager of  
Engineering Dept., III  
Opto-Analog Devices Division.  
ELECOM Group  
SHARP CORPORATION

# REFERENCE

Product name : PHOTOINTERRUPTER

Model No. : GP2A25DJ000F

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.

# GP2A25DJ00F REFERENCE

1. Application  
This specification applies to the outline and characteristics of reflective type photointerrupter with connector, Model No. GP2A25DJ00F.
2. Outline  
Refer to the attached drawing No. CY13186i02.
3. Ratings and characteristics  
Refer to the attached sheet, page 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 Reflective object
 

Black paper (black)	: Standard reflective object (SHARP Corporation)
KODAK Gray Cards (use the white side to reflect about 90%)	
	: Standard reflective object (SHARP Corporation)
PPC paper	: Standard reflective object (SHARP Corporation)
  - 6.2 Parts : Refer to the attached sheet, page 9.
  - 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 (Methylchloroform)
  - 6.4 Specified brominated flame retardants  
Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.
  - 6.5 Product mass : Approximately 2.40g
  - 6.6 Country of origin : Japan, China
  - 6.7 Compliance with each regulation
    - 6.7.1 The RoHS directive(2002/95/EC)  
This product complies with the RoHS directive(2002/95/EC).  
Object substances: mercury, lead (except for lead in high melting temperature type solders<sup>\*1</sup> and glass of electronic components), cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)  
<sup>\*1</sup> : i.e. tin-lead solder alloys containing more than 85% lead
    - 6.7.2 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).

Category	Toxic and hazardous substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr <sup>6+</sup> )	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Photointerrupter	*	✓	✓	✓	✓	✓

✓ : indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard .

\* : indicates that the content of the toxic and hazardous substance in at least one homogeneous material of the part exceeds the concentration limit requirement as described in SJ/T 11363-2006 standard.

Lead in high melting temperature type solders (i.e. tin-lead solder alloys containing more than 85% lead) and glass of electronic components (designated by “\*” in the above table) are exempt from the RoHS directive (2002/95/EC) , because there is no effective way to eliminate or substitute them by present scientific technology.

# REFERENCE

## 7. Notes

### 7.1 The circuit design

Vo terminal : Open collector output

GP2A25DJ000F operates the light emitter by pulse drive.

Please supply the stable supply voltage in order to prevent error operation by pulse current.

Please use this device after connecting a capacitor between Vo and GND for prevention of line noise.

### 7.2 The circuit design

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.

### 7.3 Cleaning

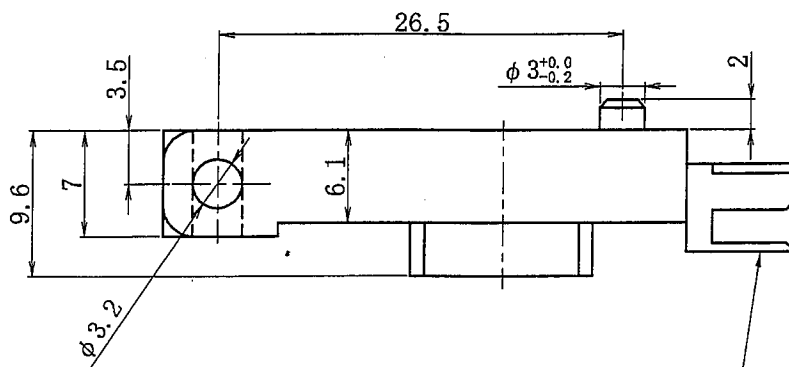
Polycarbonate resin is used as the material of the lens surface. As to cleaning, this reflective type photointerrupter shall not be cleaned by cleaning materials absolutely. Dust and stain shall clean by air blow, or shall clean by soft cloth soaked in washing materials.

### 7.4 Plugging in/out

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

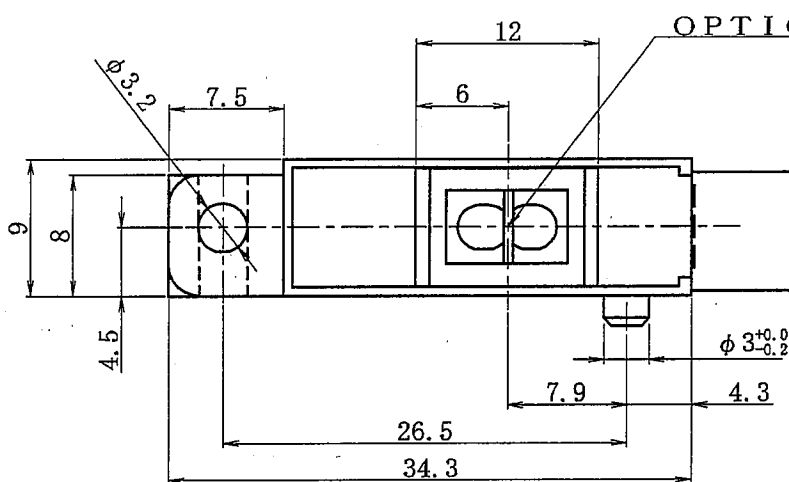
2. Outline (Drawing No. CY13186i02)

Scale: 2/1 Unit: 1/1mm

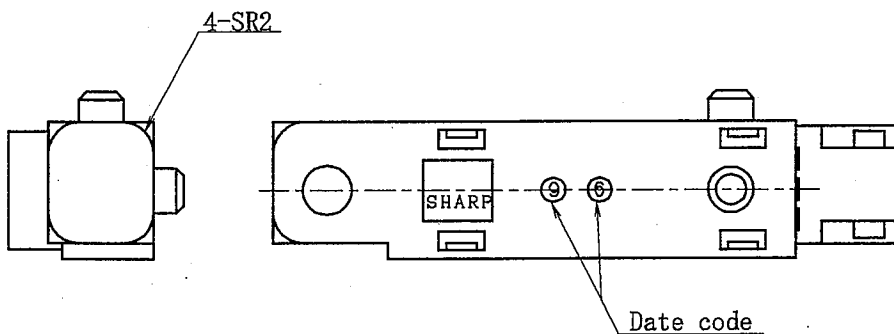
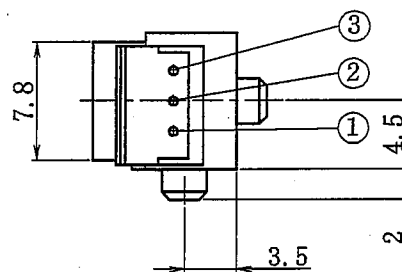


- ③ GND
- ② Vout
- ① Vcc

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



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Internal connection diagram

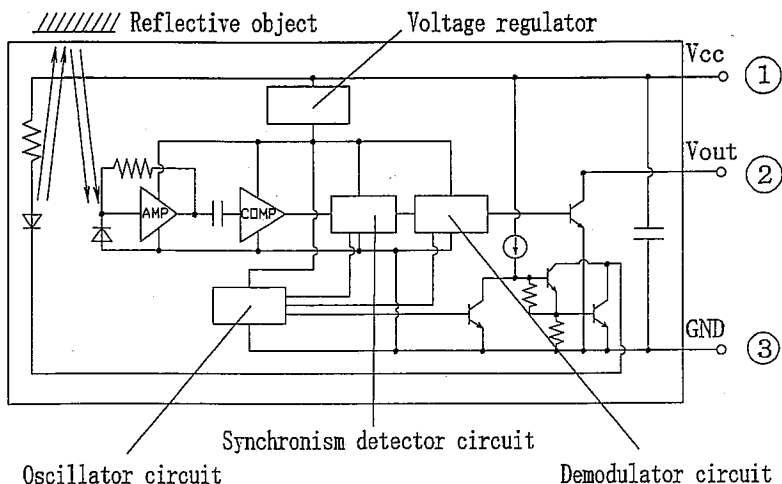
Note)

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

Dimension	Tolerance
less than 6.0	± 0. 2
6.0 or more less than 14.0	± 0. 3
14.0 or more	± 0. 4

2. Date code : ○○

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



# REFERENCE

## 3. Ratings and characteristics

## 3-1 Absolute maximum ratings

Ta=25°C

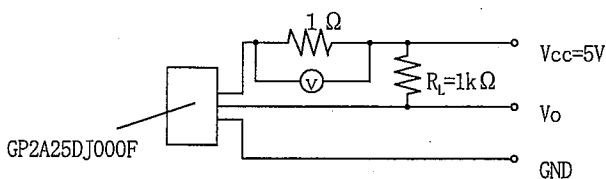
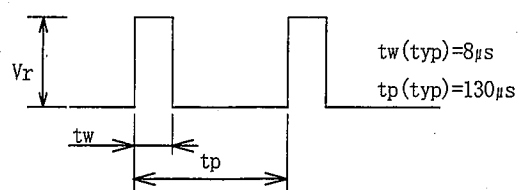
Parameter	Symbol	Rating	Unit	Remark
Supply voltage	V <sub>CC</sub>	-0.5 ~ +7	V	
Output voltage	V <sub>O</sub>	3.0	V	
Output current	I <sub>OL</sub>	50	mA	Sink current ※1
Operating temperature	Topr	-10 ~ +60	°C	The connector should be plugged in / out at normal temperature.
Storage temperature	Tstg	-20 ~ +80	°C	

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

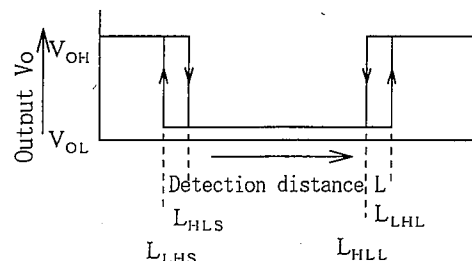
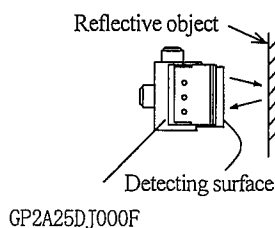
## 3-2 Electro-optical characteristics

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>	—	—	27.0	mm	KODAK Gray Cards (use the white side to reflect about 90%), V <sub>CC</sub> =5V *2
Detection distance	L <sub>HLS</sub>	—	—	1.0	mm	KODAK Gray Cards (use the white side to reflect about 90%), V <sub>CC</sub> =5V *2
		—	—	3.0		
	L <sub>HLL</sub>	9.0	—	—	mm	KODAK Gray Cards (use the white side to reflect about 90%), V <sub>CC</sub> =5V *2
		7.0	—	—		
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	—	—		

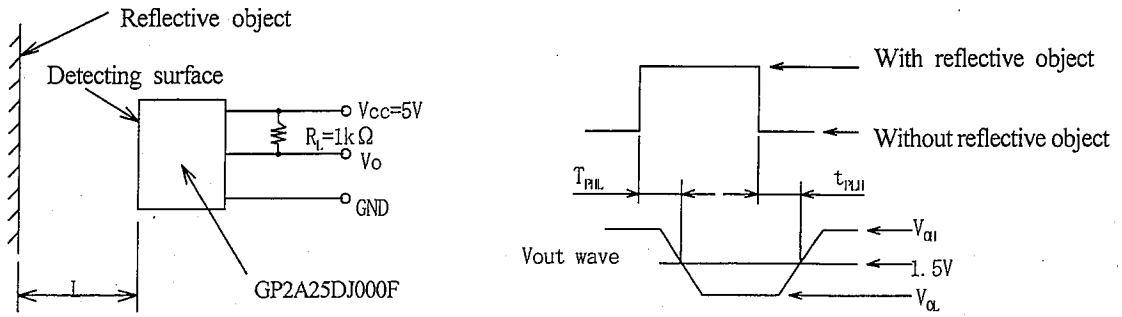
\*1 Pulse peak value I<sub>CCP</sub> test methodV<sub>r</sub> wave form I<sub>CCP</sub>=V<sub>r</sub> / 1Ω

\*2 Distance characteristics test method



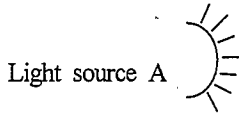
# REFERENCE

\*3 Response time test method



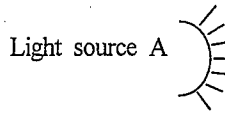
\*4 Test measurement method for acceptable illuminate of external disturbing light

E v 1 ; At non detection



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

E v 2 ; At detection



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

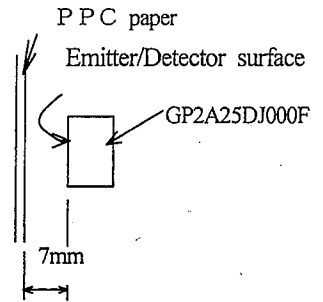
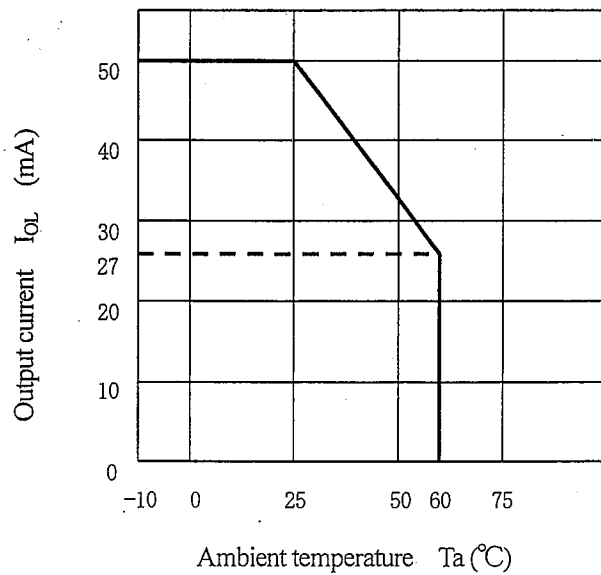


Fig.1 Output current vs. ambient temperature



# REFERENCE

## 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 connector 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



# REFERENCE

## 5. Outgoing inspection

	Item	Conditions	Instrument	Judge, Criteria	AQL
1	Appearance	<ul style="list-style-type: none"> <li>• Defects that may conflict with product specifications, including crack, split, chip scratch, burr and blur,</li> <li>• Bent connector pin and loosened pin</li> </ul>	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 <sub>cc</sub>
Low level output voltage	——	V <sub>OL</sub>
High level output voltage	——	V <sub>OH</sub>
Detection characteristics	┌——	L <sub>LHL</sub>
	├——	L <sub>HLS</sub>
	└——	L <sub>HLL</sub>

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## 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	: Acryl resin (UL 94HB)
Bottom cover	: Polycarbonate resin (Black) (UL 94V-2)

### 6-2.4 Others

This product shall not be radiation flux proof.

Laser generator is not used.