

GP1A057SGKLF

Case Type
With Encoder Function
Digital 2 Output (A Phase / B Phase)
Transmissive Photointerrupter



■Description

GP1A057SGKLF is a transmissive photointerrupter with digital 2 output (phase A/B) encoder function. Using this with a linear scale (or rotation disk) that forms a slit pattern, this product detects the movement (rotation) direction and the amount of movement (number of revolutions, rotation angle).

■Features

1. Transmissive Photointerrupter
2. Case type, with encoder function
3. Output signal : Digital 2 output (A Phase / B Phase)
4. Resolution : Linear scale slit pitch 0.56 [mm]
(45LPI)
5. Package : 12.2×7.4×8.27mm

■Agency approvals/Compliance

1. Compliant with RoHS directive (2002/95/EC)

■Applications

1. Detects direction of movement, the amount of movement, rotation angle of equipment and device that move horizontally or rotate.
Example : printer, copier, robot, motor control, etc.

Notice The content of data sheet is subject to change without prior notice.

In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

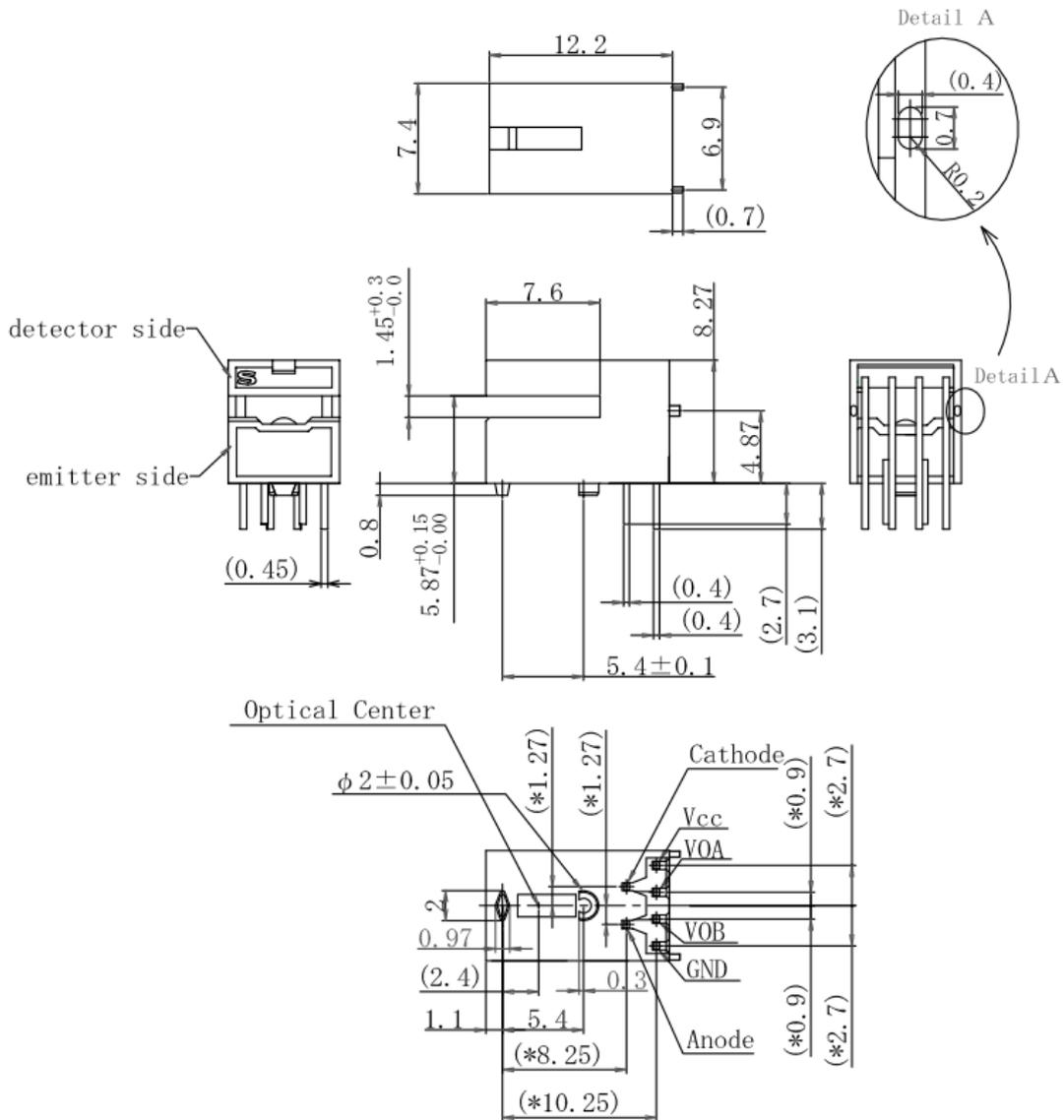
Sheet No.: OP13023EN

■ Outline

Drawing No.CY14112i02

Scale : 2/1

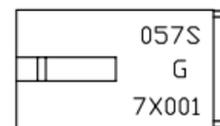
Unit : mm



Notes

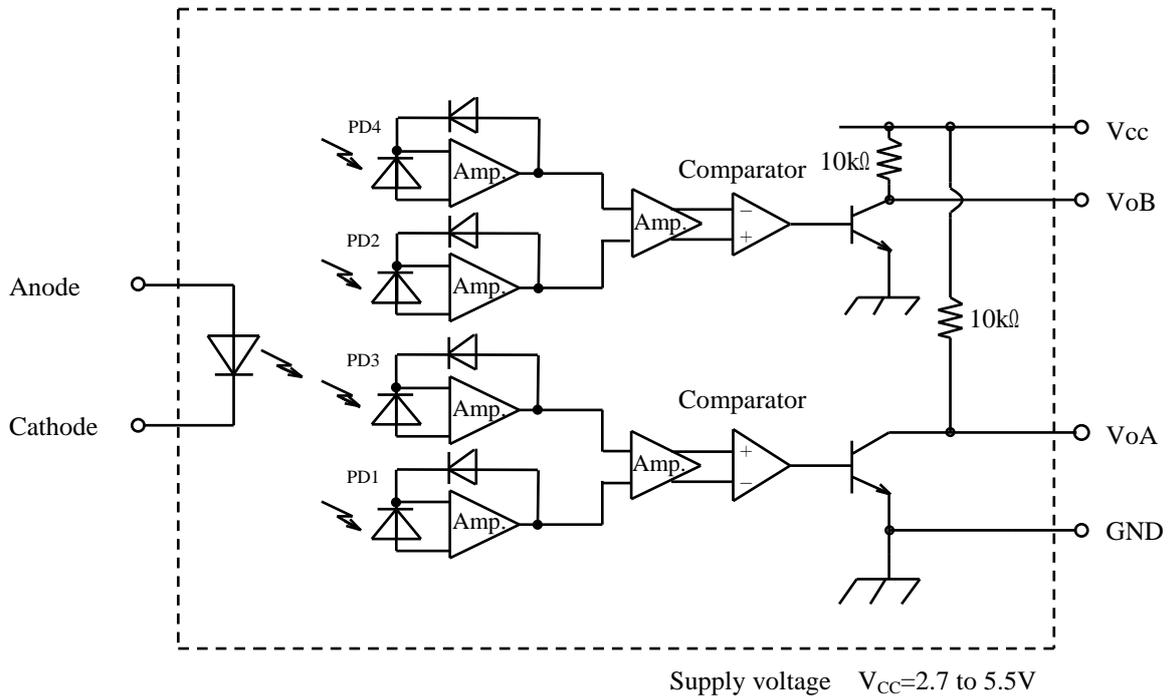
- 1) Unspecified tolerances shall be ± 0.3 .
- 2) Dimensions in parenthesis are shown for reference.
- 3) The dimensions indicated by * refer to the those measured from the lead base.
- 4) Datecode is 5 digit.
 (Production year)
 The last number of the year.
 (Production Month)
 From 1 to 9, it mean January to September.
 X is October, Y is November and Z is December.
 (Production Lot)
 001 means Production Lot No. "001"

Marking



- Production year (1 digit)
- Production Month (1 digit)
- Production Lot (3 digit)

■Block diagram



■Absolute maximum ratings

$T_a=25^{\circ}C$

Parameter		Symbol	Rating	Unit
Input	Forward current *1	I_F	30	mA
	Reverse voltage	V_R	4	V
Output	Supply voltage	V_{CC}	6	V
	Low level output current	I_{OL}	8	mA
	Power dissipation *1	P_o	150	mW
Operating temperature		T_{opr}	-10 to +70	$^{\circ}C$
Storage temperature		T_{stg}	-40 to +80	$^{\circ}C$
Soldering temperature *2		T_{sol}	260	$^{\circ}C$

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1, 2.

*2 Soldering time : 5s or less

Electro-optical characteristics

Ta=25°C

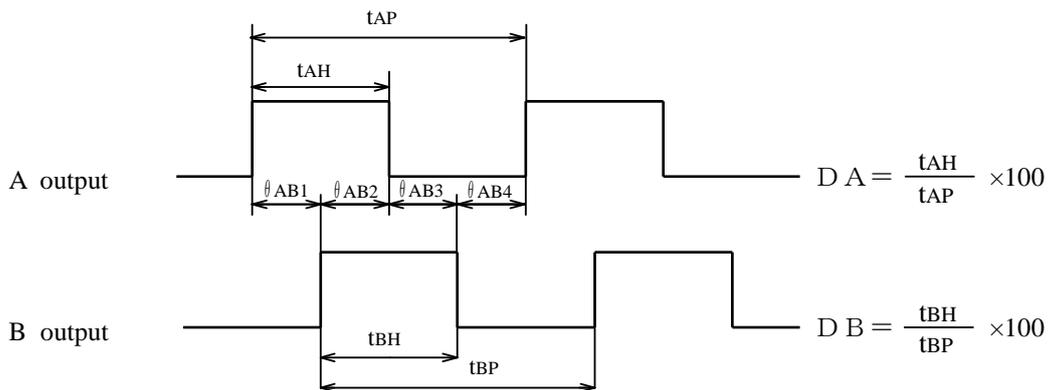
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V _F	I _F =20mA	-	2.1	2.6	V
	Reverse current	I _R	V _R =1V	-	-	100	μA
Output	Operating supply voltage range	V _{CC}	-	2.7	3.3	5.5	V
	Low level output voltage	V _{OL}	V _{CC} =3.3V, I _F =20mA I _{OL} =8mA	-	-	0.4	V
	High level output voltage	V _{OH}	V _{CC} =3.3V, I _F =20mA	2.4	3.2	-	V
	Supply current	I _{CC}	V _{CC} =3.3V, I _F =20mA Phases A and B both at low level	-	2.2	5.5	mA
Transfer characteristics *1	Duty	D _A	V _{CC} =3.3V I _F =20mA f=2.5kHz 0.1mm < Z ≤ 1.35mm *2	35	50	65	%
		D _B					
	Phase difference	θ _{AB1 to 4}		45	90	135	°
	Response	tr		-	1.0	2.0	μs
		tf					
Response frequency	fmax	V _{CC} =3.3V, I _F =20mA 0.1mm < Z ≤ 1.35mm *2	-	-	25	kHz	

*1 The test condition is according to Fig.3 (CY14439i06)
And transfer characteristics value does not include any error of code-wheel (Liner scale).
The error of slit-pattern shall not be included.

*2 Z stands for distance between code-wheel (Liner scale) surface (patterned surface) and detector holder surface,
and patterned surface shall be arranged face to face with detector holder surface.
The code-wheel (Liner scale) shall not contact with the holder surface.

Note: It is recommended that the GP1A057SGKLF be used under the condition of typical I_F=20mA for which it is designed.

Output waveform



Refer to note 1 in Fig.3 (CY14439i06) for the rotation direction of code-wheel (Liner scale).

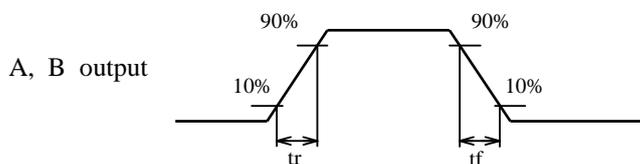


Fig.1 Forward current vs. ambient temperature

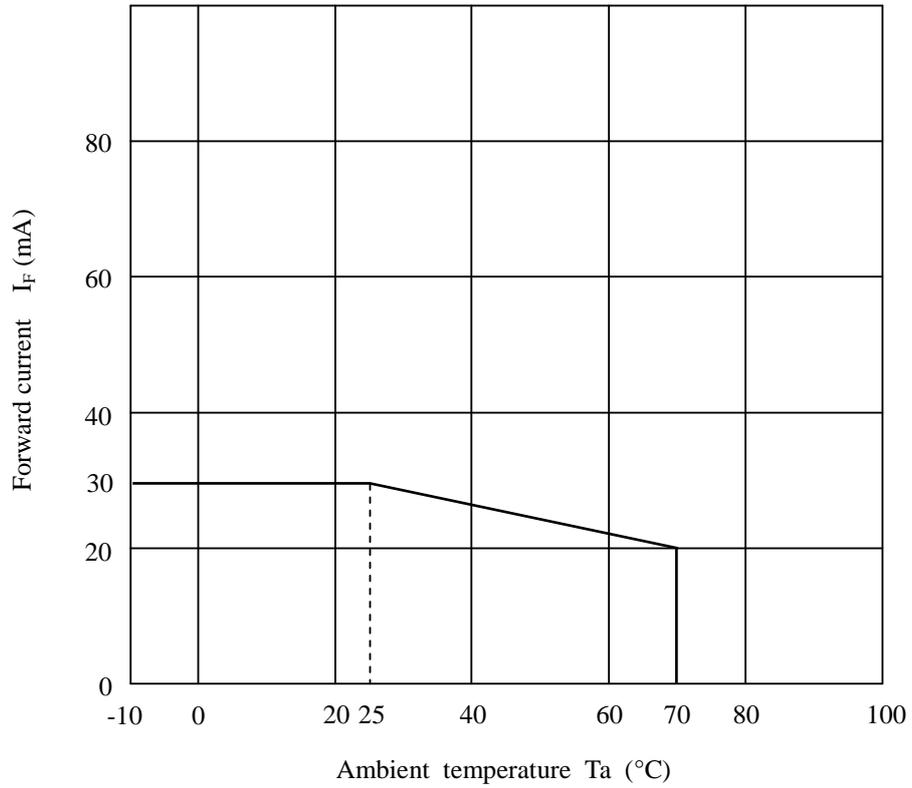


Fig.2 Output power dissipation vs. ambient temperature

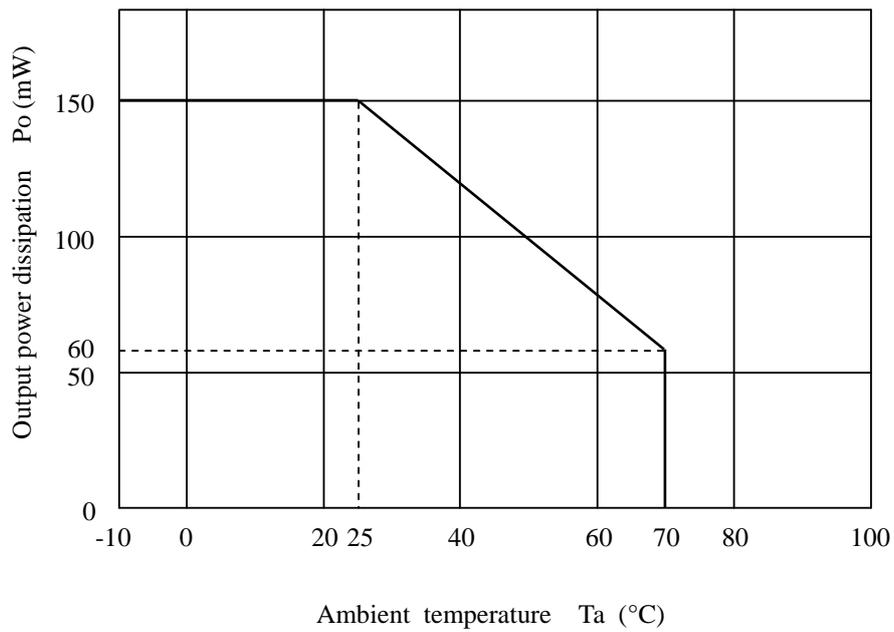
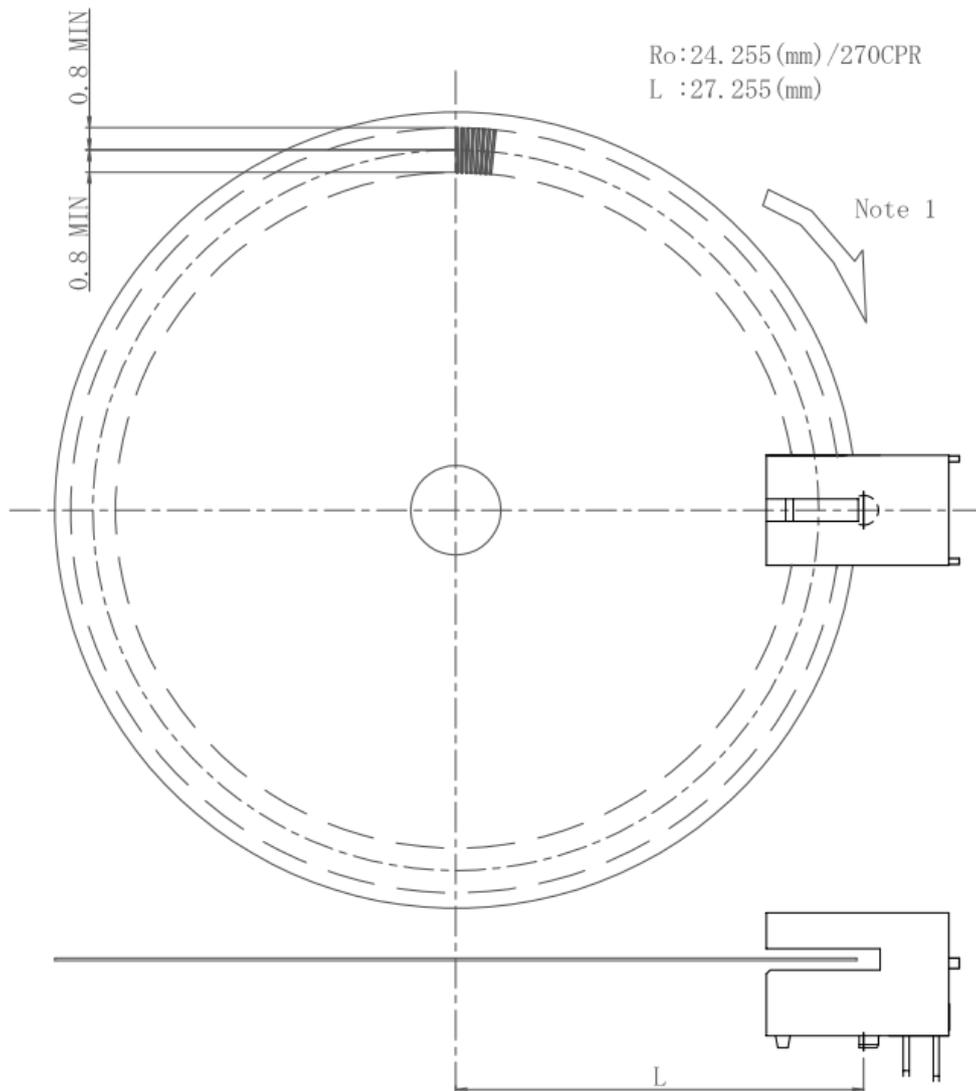
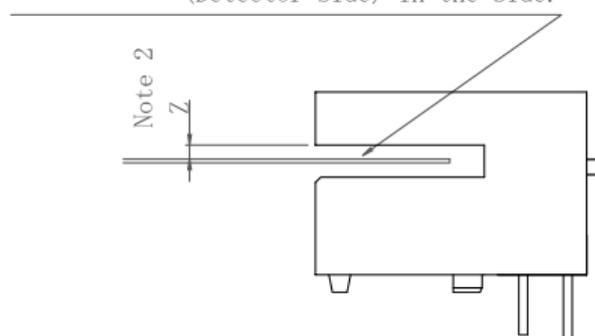


Fig.3 GP1A057SGKLF Test Condition (Drawing No.CY14439i06) Scale : Free Unit : 1/1mm



Please make sure the code-wheel(Liner scale) surface.
(slit patterned surface) is upper side
(Detector side) in the side.



Notes

- 1) The rotation direction of code-wheel(Liner scale) against output waveform (Refer to 3.4).
- 2) Z:Distance between code-wheel(Liner scale) surface (patterned surface) and detector holder surface.
※ $0.1\text{mm} < Z \leq 1.35\text{mm}$
The code-wheel(Liner scale) shall not contact with the holder surface.

■ **Supplements**

● **Parts**

Refer to the attached sheet, Page 9.

● **Packing**

Refer to the attached drawing No. CY14440i09A, Page 10.

● **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)

● **Specified brominated flame retardants**

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

● **Compliance with each regulation**

1) The RoHS directive(2002/95/EC)

This product complies with the RoHS directive(2002/95/EC)

Object substances: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB)

and polybrominated diphenyl ethers (PBDE)

2) Content of six substances specified in Management Method 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 ⁶⁺)	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.

● **Product mass : Approximately 0.6g**

● **Country of origin : Japan, China, Indonesia**

■Notes

- The recommendation conditions of forward current:

This product is designed in consideration of using this product under the condition of typical $I_F=20\text{mA}$ as a standard.

- In order to stabilize power supply line, it is recommended to have a by-pass capacitor of $0.1\mu\text{F}$ or more between Vcc and GND near the device.
- Lens is made from resin, as to cleaning, this photointerrupter should not be cleaned by cleaning materials absolutely. (Dust and stain shall be cleaned by air blow.)
- Soldering
To solder onto lead pins, please solder at 260°C for 5s or less with longer distance than 1.6mm from the bottom surface of the package.
Please take care not to let any external force exert on lead pins when soldering or just after soldering.
Please don't do soldering by reflow.
- OPIC chip due to micro design is easily affected by the Electro static discharge.
At operating, in order to prevent the destruction and the defect of characteristics by Electro static discharge, please take a general countermeasure of the Electro static discharge.
- Prevention of malfunction
For this product, the transparent material is used as the case material .
Before using this product, please confirm the following items with the actual equipment.
1) The product does not malfunction by the ambient light illuminating the photo-detector surface.
2) Other equipment is not affected by the light leaking from the light-emitting device.
- Storage and usage environment
Polycarbonate is used as the case material of this product. If polycarbonate contacts with the hot liquid and the alkaline solution (alkaline atmosphere), polycarbonate is hydrolyzed. Therefore, please do not store and use this product in such an environment.

■Parts

This product uses the below parts.

- 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 (μs)
Photodiode	780	400 to 1200	40

- Light emitter (Quantity : 1)

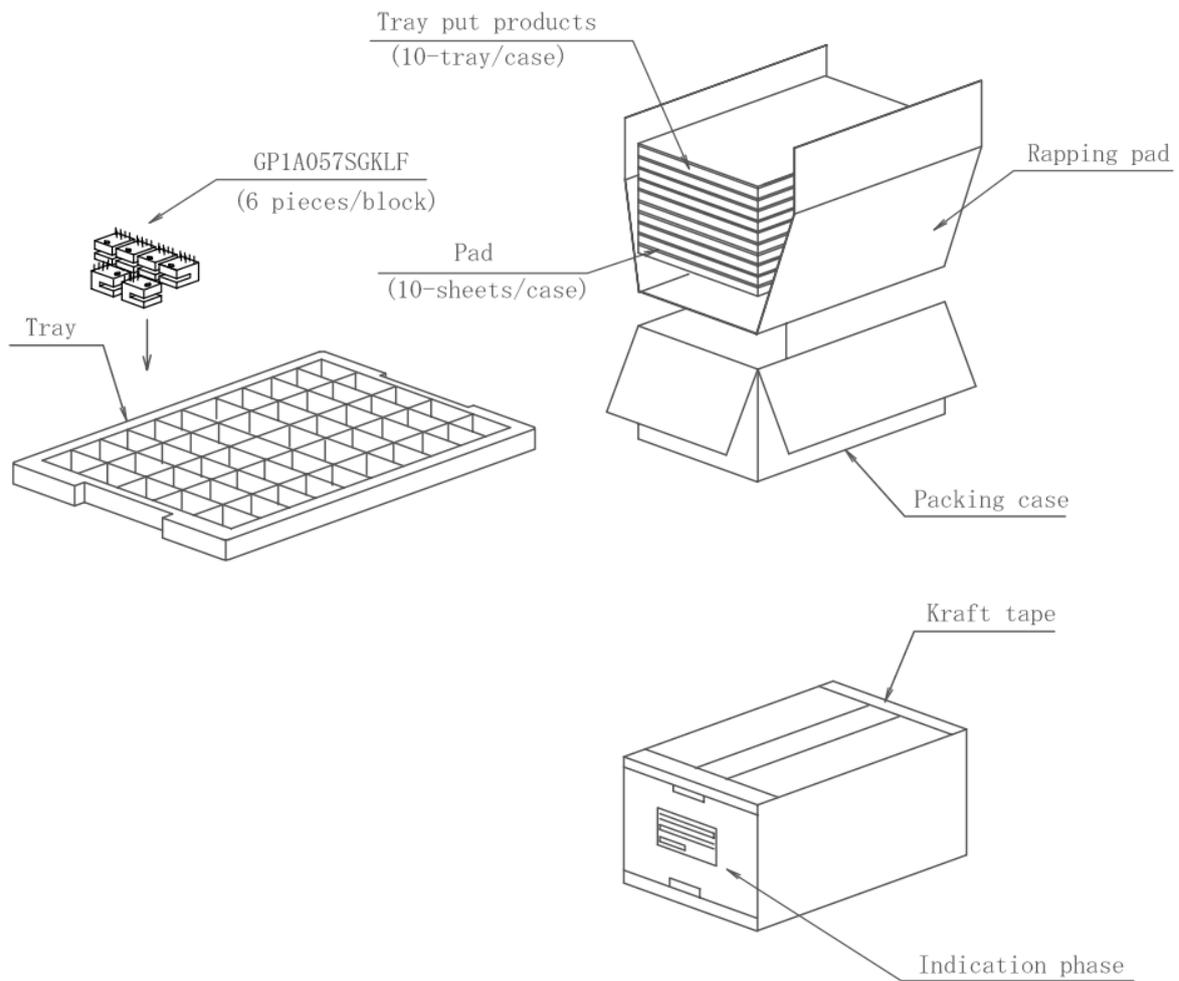
Type	Material	Maximum light emitting wavelength (nm)
Light emitting diode (Non-coherent)	AlGaInP /GaAs	652

- Material

Holder integrated with Lens	Lead flame finish
Transparent polycarbonate resin	Solder dip (Sn-Ag-Cu)

- Others
This product shall not be radiation flux proof.
Laser generator is not used.

■Packing (Drawing No.:CY14440i09A)



- 1) Package materials
 - Outer package : Outer case (Paper corrugated cardboard)
 - Inner package : Pad (Polyethylene)
Rapping pad (Polyethylene)
Tray (Polysthylene)
- 2) Packaging number
 - Max. 300 pieces per tray
 - Max. 3000 pieces per case
- 3) Package specifications
 - Put them (10 tray) in the packing box.
 - Put pads on their top and bottom, between them.
 - Seal the packing box with kraft tape.
- 4) Indication item
 - 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.
- 5) Regular packing mass
(Excluding fractions, however above packing material, packing count, packing style)
 - Approximately 2.9kg

■ Important Notices

· The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.

· Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.

· Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

(i) The devices in this publication are designed for use in general electronic equipment designs such as:

- Personal computers
- Office automation equipment
- Telecommunication equipment [terminal]
- Test and measurement equipment
- Industrial control
- Audio visual equipment
- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

with equipment that requires higher reliability such as:

- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

- Space applications
- Telecommunication equipment [trunk lines]
- Nuclear power control equipment
- Medical and other life support equipment (e.g., scuba).

· If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Law of Japan, it is necessary to obtain approval to export such SHARP devices.

· This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.

· Contact and consult with a SHARP representative if there are any questions about the contents of this publication.