

## COBP PHOTO REFLECTOR with LENS

### ■ GENERAL DESCRIPTION

The NJL5909RL-4 is a surface mount type COBP photo reflector that is 4mm focal length. The NJL5909RL-4 has achieved the small, thin package by combination of our COBP (Chip On Board Package) and Lens molding technology.

### ■ FEATURES

- Focal length : 4mm
- Miniature, thin package : 1.9mm × 2.6mm × 1.6mm
- Low operating dark current (I<sub>ceod</sub>)
- Pb free solder re-flowing permitted : 255°C, 2 times
- Built-in visible light cut-off filter

### ■ APPLICATIONS

- Detecting the rotation of various motors
- Paper detection of Printer, copy machine etc
- Detecting the Card Reader etc
- Detecting the CD/DVD Media

### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
<b>Emitter</b>			
Forward Current (Continuous)	I <sub>F</sub>	30	mA
Reverse Voltage (Continuous)	V <sub>R</sub>	6	V
Power Dissipation	P <sub>D</sub>	45	mW
<b>Detector</b>			
Collector-Emitter Voltage	V <sub>CEO</sub>	16	V
Emitter-Collector Voltage	V <sub>ECO</sub>	6	V
Collector Current	I <sub>C</sub>	10	mA
Collector Power Dissipation	P <sub>C</sub>	25	mW
<b>Coupled</b>			
Total Power Dissipation	P <sub>tot</sub>	60	mW
Operating Temperature	T <sub>opr</sub>	-20 to +80	°C
Storage Temperature	T <sub>stg</sub>	-30 to +90	°C
Reflow Soldering Temperature	T <sub>sol</sub>	255	°C

### ■ ELECTRO-OPTICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
<b>Emitter</b>						
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =4mA	0.9	—	1.3	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> =6V	—	—	10	μA
Capacitance	C <sub>t</sub>	V <sub>R</sub> =0V, f=1MHz	—	25	—	pF
<b>Detector</b>						
Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> =10V	—	—	0.2	μA
Collector-Emitter Voltage	V <sub>CEO</sub>	I <sub>C</sub> =100μA	16	—	—	V
<b>Coupled</b>						
Output Current *1	I <sub>O</sub>	I <sub>F</sub> =4mA, V <sub>CE</sub> =2V, d=4.0mm	35	—	175	μA
Operating Dark Current *2	I <sub>CEOD</sub>	I <sub>F</sub> =4mA, V <sub>CE</sub> =2V	—	—	0.2	μA
Rise Time	t <sub>r</sub>	I <sub>O</sub> =100μA, V <sub>CE</sub> =2V, R <sub>L</sub> =1KΩ, d=4.0mm	—	30	—	μs
Fall Time	t <sub>f</sub>	I <sub>O</sub> =100μA, V <sub>CE</sub> =2V, R <sub>L</sub> =1KΩ, d=4.0mm	—	30	—	μs

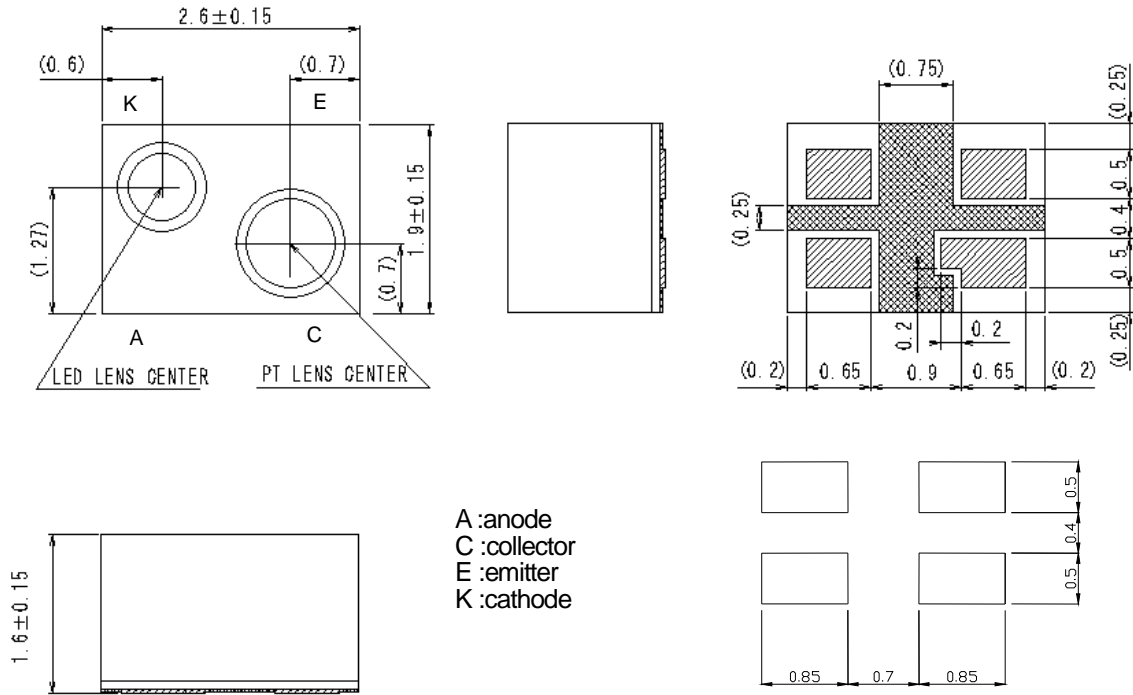
\*1 Refer to OUTPUT CURRENT TEST CONDITION

\*2 I<sub>ceod</sub> may increase according to the periphery situation of the surface mounted product.

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## OUTLINE (typ.)

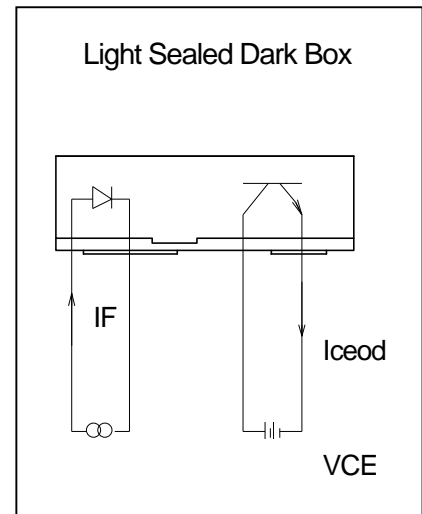
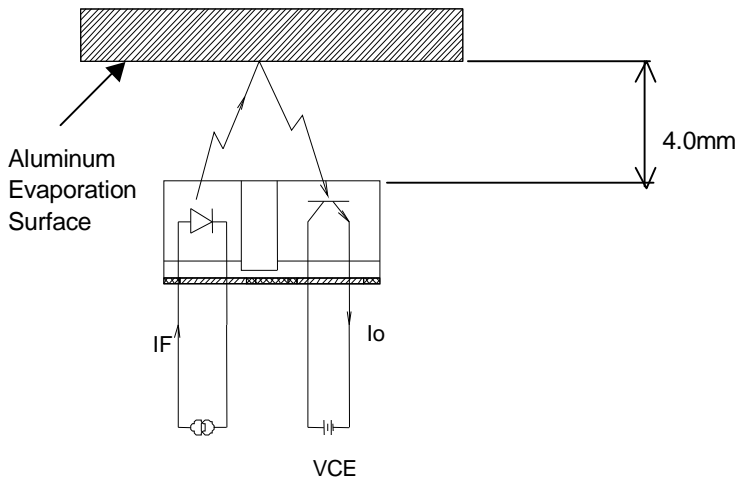
Unit : mm



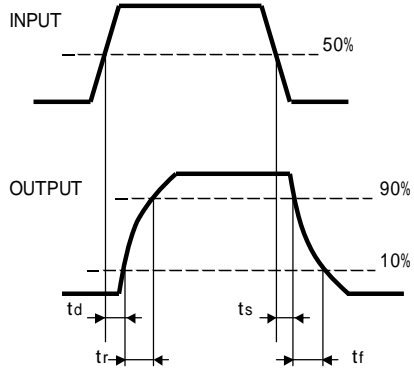
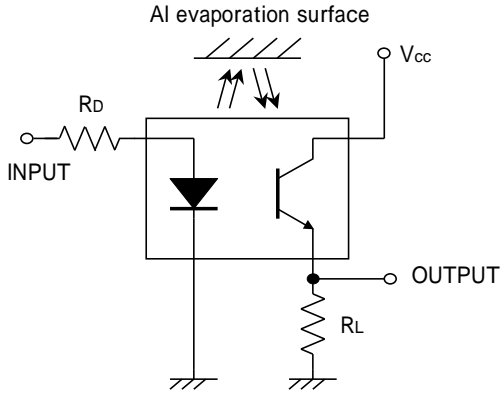
## OUTPUT CURRENT TEST CONDITION

TION

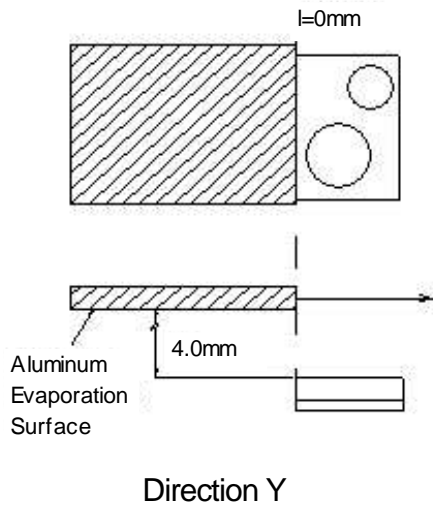
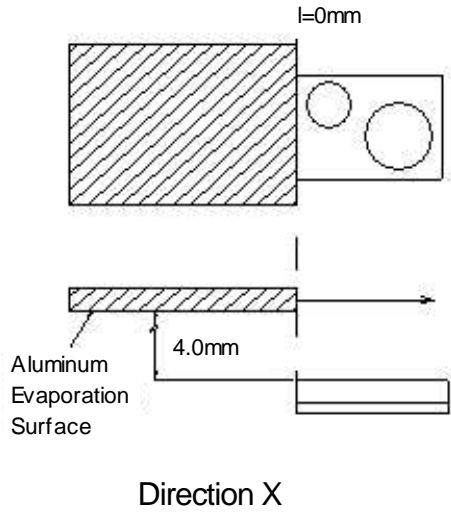
The infrared signal from LED is reflected at the aluminum surface



■ RESPONSE TIME TEST CONDITION

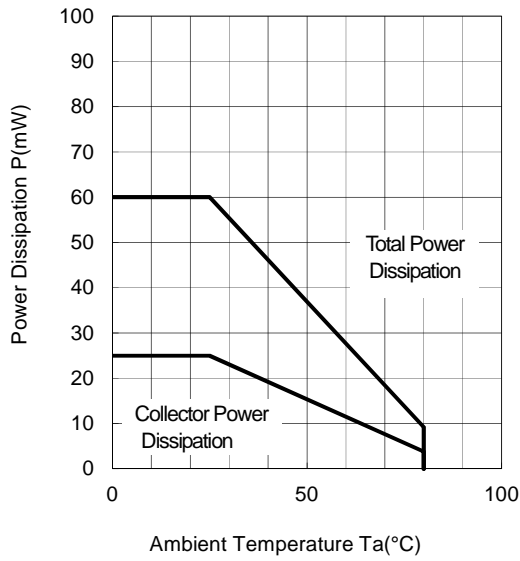


■ EDGE RESPONSE TEST CONDITION

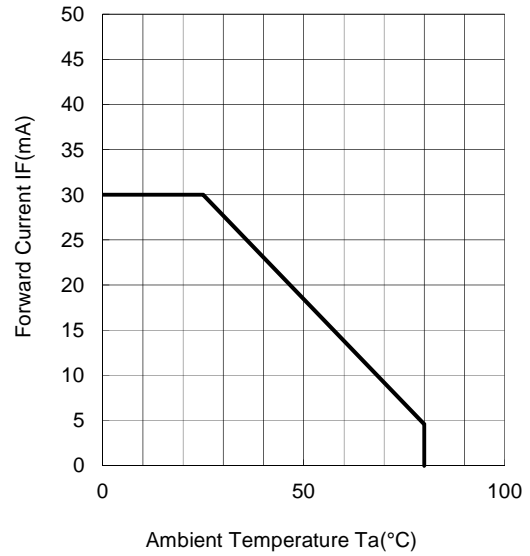


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Power Dissipation vs. Temperature

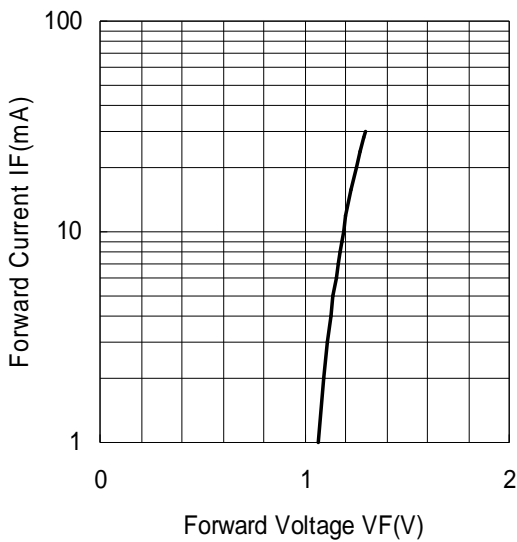


Forward Current vs. Temperature

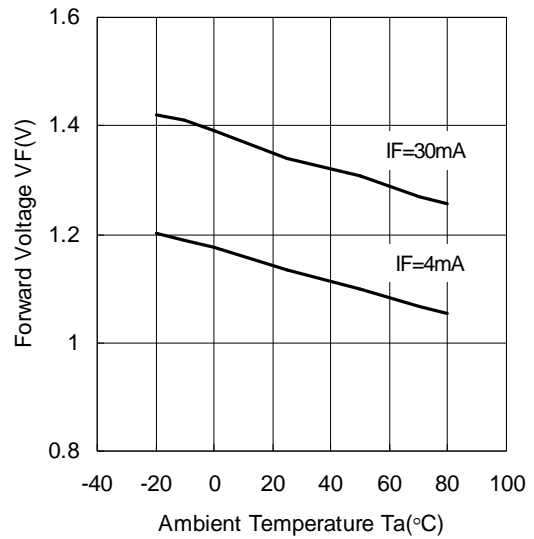


## ■ TYPICAL CHARACTERISTICS

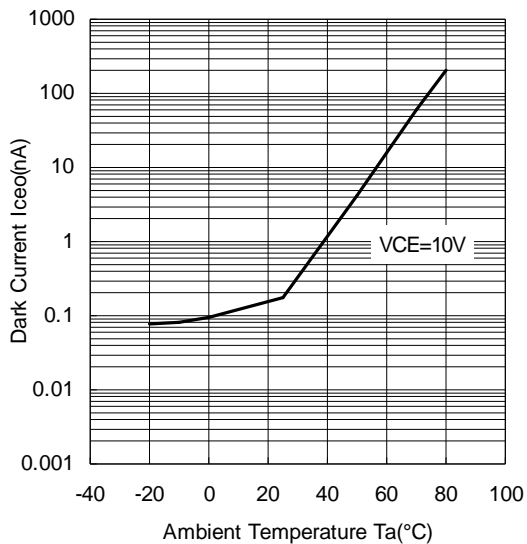
Forward Voltage vs. Forward Current



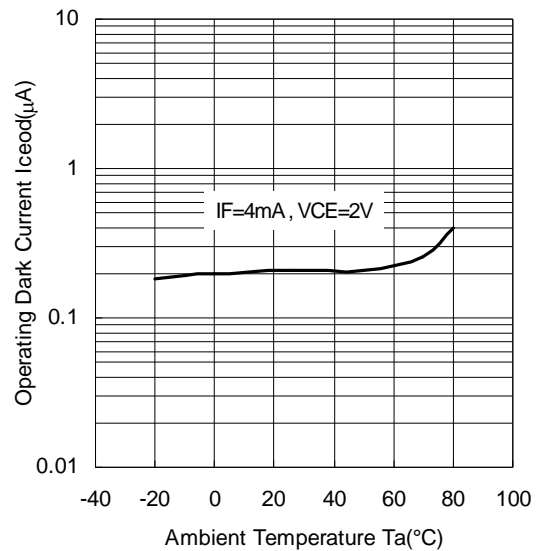
Forward Voltage vs. Temperature



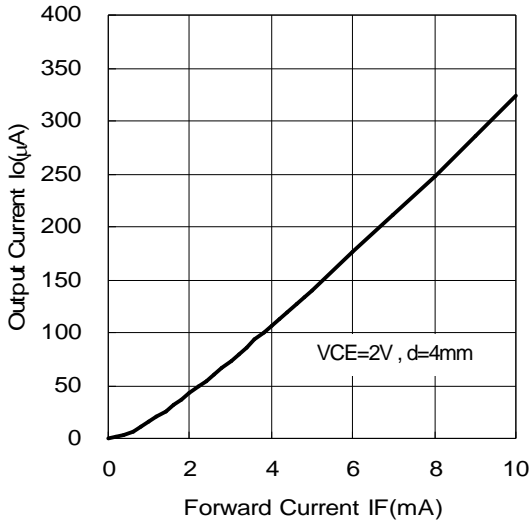
Dark Current vs. Temperature



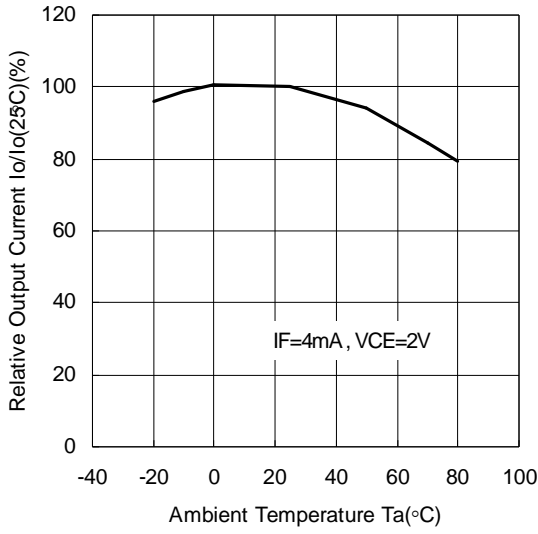
Operating Dark Current vs. Temperature



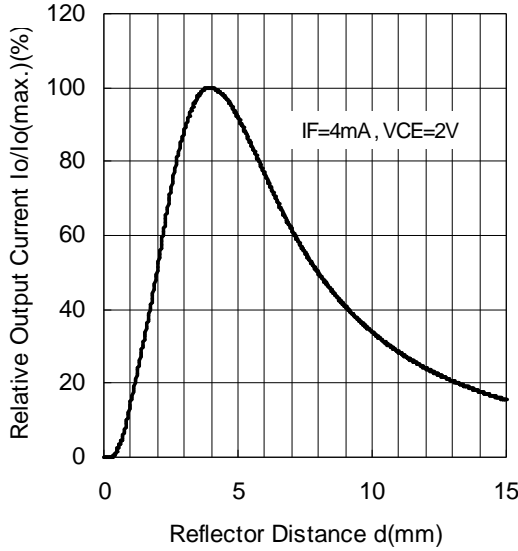
**Output Current vs. Forward Current (Ta=25°C)**



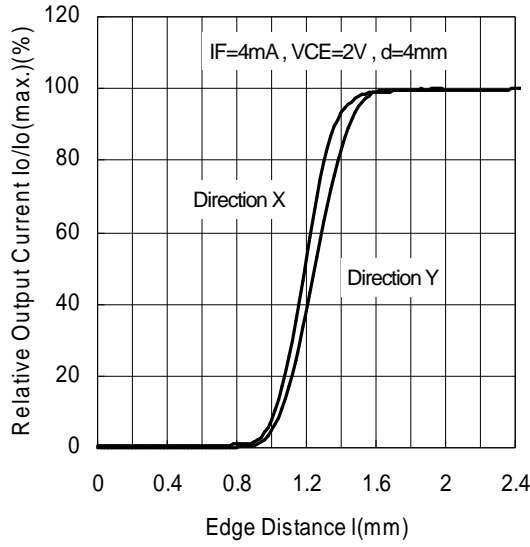
**Output Current vs. Temperature**



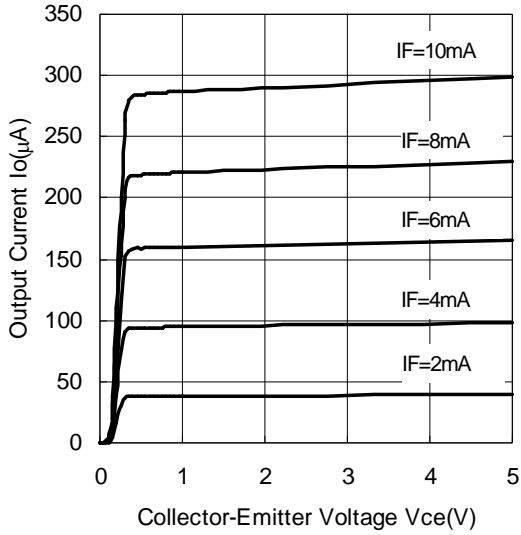
**Output Current vs. Distance (Ta=25°C)**



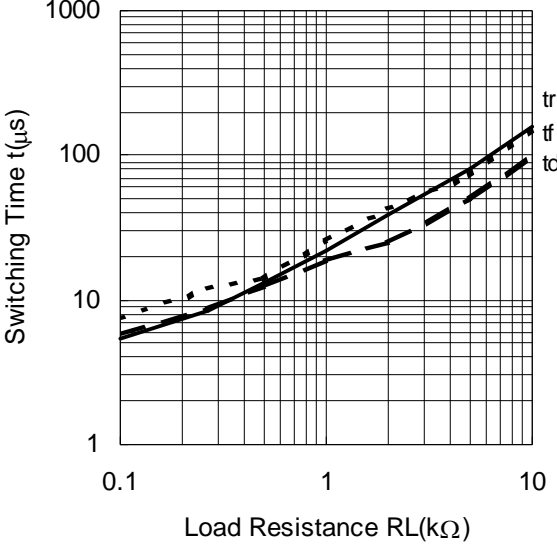
**Output Current vs. Edge Distance (Ta=25°C)**

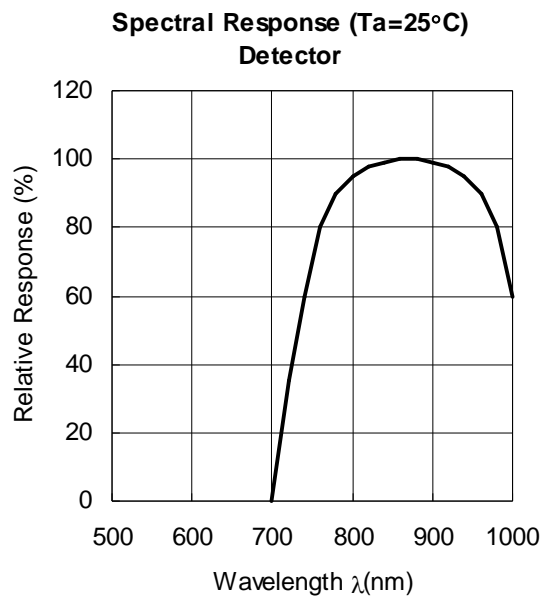
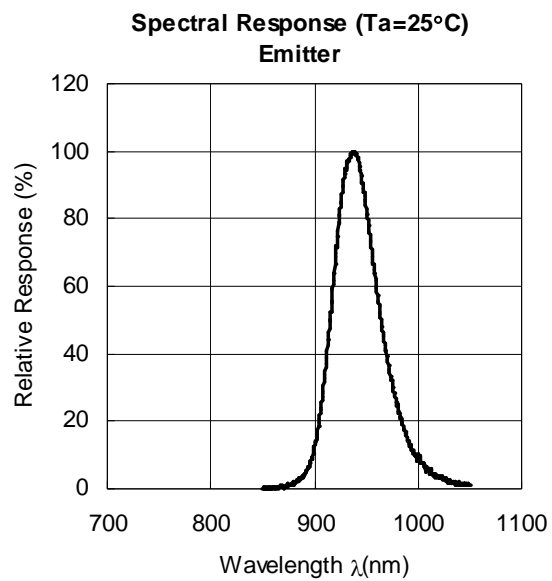


**Output Characteristics (Ta=25°C)**



**Switching Time vs. Load Resistance (Ta=25°C)**





## ■ MOUNTING METHOD

### NOTE

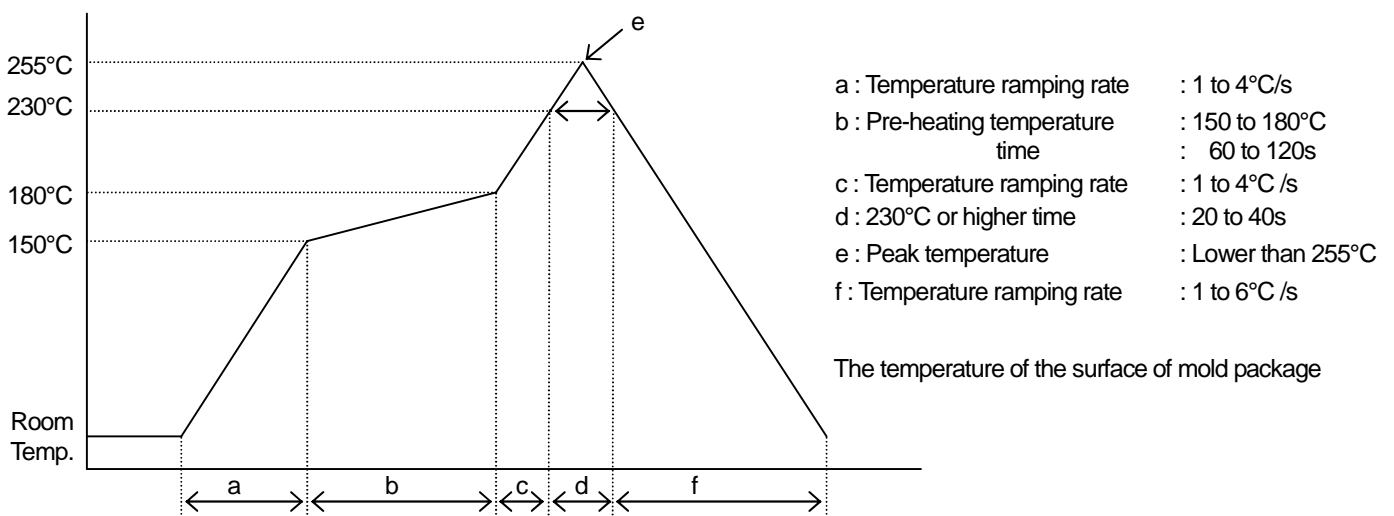
Mounting was evaluated with the following profiles in our company, so there was no problem.  
However, confirm mounting by the condition of your company beforehand.

The exposure of device under higher temperature may affect to the reliability of the products, it is recommended to complete soldering in the shortest time possible.

Mounting: Twice soldering is allowed.

## ■ INFRARED REFLOW SOLDERING METHOD

### Recommended reflow soldering procedure



(NOTE1) Using reflow furnace with short wave infrared radiation heater such as halogen lamp

Regarding temperature profile, please refer to those of reflow furnace.

In this case the resin surface temperature may become higher than lead terminals due to endothermic ally of black colored mold resin. Therefore, please avoid from direct exposure to mold resin.

(NOTE2) Other method

Such other methods of soldering as dipping the device into melted solder and vapor phase method (VPS) are not appropriate because the body of device will be heated rapidly. Therefore, these are not recommended to apply.

(NOTE3) The resin gets softened right after soldering, so, the following care has to be taken

Not to contact the lens surface to anything.

Not to dip the device into water or any solvents.

## ■ FLOW SOLDERING METHOD

Flow soldering is not possible.

## ■ IRON SOLDERING METHOD

Iron soldering is not possible.

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## ■ CLEANING

Avoid washing the device after soldering by reflow method.

## ■ IC STORAGE CONDITIONS AND ITS DURATION

### (1) Temperature and humidity ranges

Pack Sealing	Temperature:	5 to 40 [°C]
	Humidity:	40 to 80 [%]
Pack Opening	Temperature:	5 to 30 [°C]
	Humidity:	40 to 70 [%]

After opening the bag, solder products within 48h.

Avoid a dry environment below 40% because the products are easily damageable by the electrical discharge.

Store the products in the place where it does not create dew with the products due to a sudden change in temperature.

- (2) When baking, place the reel vertically to avoid load to the side.
- (3) Do not store the devices in corrosive-gas atmosphere.
- (4) Do not store the devices in a dusty place.
- (5) Do not expose the devices to direct rays of the sun.
- (6) Do not allow external forces or loads to be applied to IC's.
- (7) BE careful because affixed label on the reel might be peeled off when baking.
- (8) The product is recommended to do the baking before using for the stability of the quality.

## ■ BAKING

In case of keeping expect above condition be sure to apply baking. (Heat-resistant tape)

Baking method: Ta=60°C, 48 to 72h, Three times baking is allowed

## ■ STORAGE DURATION

Within a year after delivering this device.

For the products stored longer than a year, confirm their terminals and solder ability before they are used.

## ■ APPLICATION NOTES

### (1) Attention in handling

Treat not to touch the light receiving and light emitting part.

Avoid to adhering the dust and any other foreign materials on the light receiving and light emitting part when using.

Never apply reverse voltage (VEC) of over 6V to the photo transistor when measuring the characteristics or adjusting the system. If applied, it causes to lower the sensitivity.

When LED has operated by voltage, it should be connected the resistor of current adjustment. Avoid to applying direct voltage to LED, because there is possibility that LED is destroyed.

When mounting, special care has to be taken on the mounting position and tilting of the device because it is very important to place the device to the optimum position to the object.

### (2) Attention in designing

Avoid the entering ambient light into light receiving part for avoid the malfunction by ambient light. Furthermore, there is possibility of malfunction when there are the other mounted parts by near this product peripheral.

There will be changing characteristics by detection object. Refer to this datasheet and evaluate by actual detection object.

When LED has been applied continuous power on long period of time, the output current is dropped. If it uses by always applying power to LED, have to consider the circuit designing of including output current decrease.



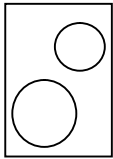
**PACKING SPECIFICATION**

**PACKING DIMENTIONS**

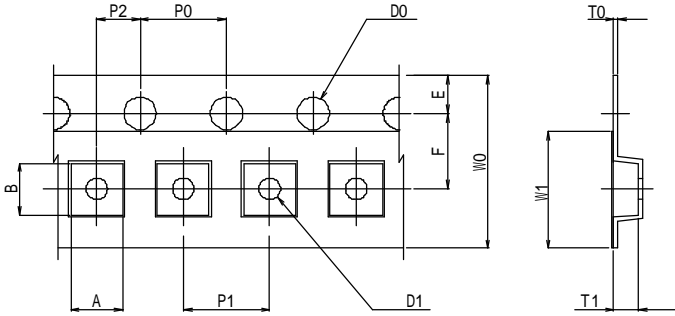
UNIT : mm

→ Drawing direction

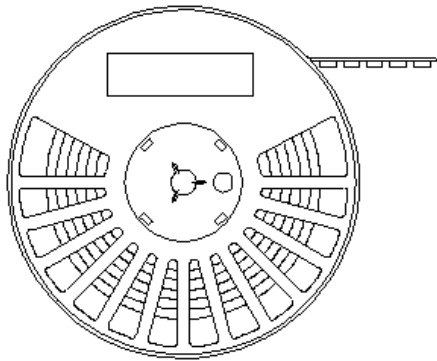
Insert direction



(TE1)



SYMBOL	DIMENSION	REMARKS
A	2.15 ±0.10	BOTTOM DIMENSION
B	2.85 ±0.10	BOTTOM DIMENSION
D0	1.5 <sup>+0.1</sup> / <sub>0</sub>	
D1	1.0 ±0.10	
E	1.75 ±0.10	
F	3.5 ±0.05	
P0	4.0 ±0.10	
P1	4.0 ±0.10	
P2	2.0 ±0.05	
T0	0.23 ±0.05	
T1	1.8 ±0.10	
W0	8.0 ±0.20	
W1	5.4 ±0.10	THICKNESS 0.1MAX



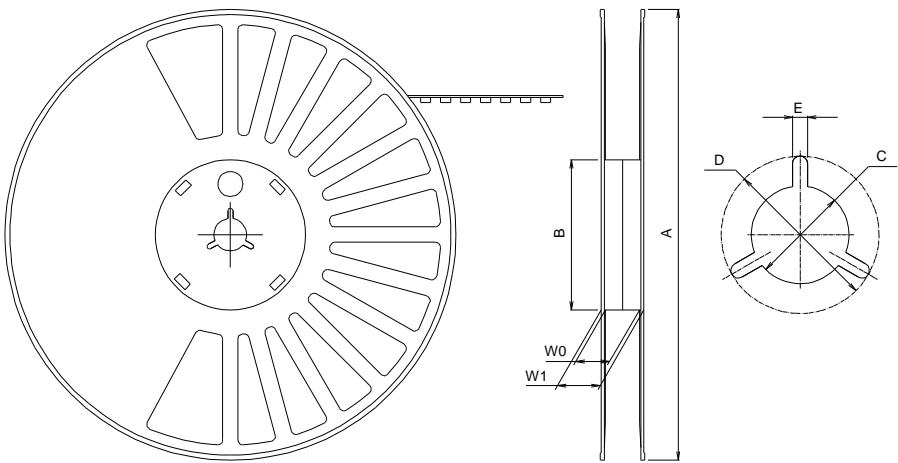
\* Carrier tape material : Polycarbonate(antistatic)  
 Cover tape material : Polyethylene(antistatic)

**Taping Strength**

Pull up the cover tape from the carrier tape, and when the opening angle comes around 10 to 15 , and the peeling-off strength is to be within the power of 20 to 70g.

**Packaging**

- 1) The taped products are to be rolled up on the taping reel as on the drawing.
- 2) Rolling up specification
  - 2-1) Start rolling : Carrier tape open space more than 20 Pieces.
  - 2-2) End of rolling : Carrier tape open space more than 20 Pieces, and 2 round of reel space at the cover tape only.
- 3) Taping quantity : 1,500 Pieces
- 4) Seal off after putting each reels in a damp proof bag with silica gel.



SYMBOL	DIMENSION
A	φ180 ±1.0
B	φ60 ±0.5
C	φ13 ±0.2
D	φ21 ±0.8
E	2 ±0.5
W0	9.0 ±0.5
W1	12.6 ±1.0

\* Reel material : PPE(antistatic)

[CAUTION]  
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