

## PHOTO REFLECTOR

### ■FEATURES

- Miniature, thin package: 1.66 x 1.24 x 0.35mm
- Built-in visible light cut-off filter function
- Pb free solder reflowing permitted: 255deg.C, 2times
- Halogen free, Pb free
- Compliant with RoHS directive

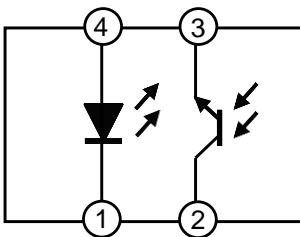
### ■GENERAL DESCRIPTION

The NJL5911R is the ultra thin surface mount type photo reflector, which is built in an Infrared LED and a high sensitive photo transistor. This product has applied the COBP technology and has realized the thinness 0.35mm.

### ■APPLICATION

- Detecting the location of lens for DSC and Cellular phone's camera module
- Detecting the watch hand for radio controlled watch
- Detecting the original point of encoder

### ■BLOCK DIAGRAM

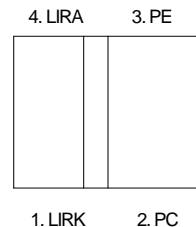


- 1. LIRK
- 2. PC
- 3. PE
- 4. LIRA

### ■PIN CONFIGURATION

PIN NO.	SYMBOL	DESCRIPTION
1	LIRK	Cathode for IR LED
2	PC	Collector for PTr
3	PE	Emitter for PTr
4	LIRA	Anode for IR LED

(Top View)



### ■ORDERING INFORMATION

PART NUMBER	PACKAGE OUTLINE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ(pcs)
NJL5911R	COBP	✓	✓	Au	No marking	1.7	3,000

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

PARAMETER	SYMBOL	RATINGS	UNIT
Emitter			
Forward Current (Continuous)	IF	20	mA
Reverse Voltage (Continuous)	VR	6	V
Power Dissipation	PD	45	mW
Detector			
Collector - Emitter Voltage	VCEO	16	V
Emitter - Collector Voltage	VECO	6	V
Collector Current	IC	10	mA
Collector Power Dissipation	PD	25	mW
Coupled			
Total Power Dissipation	P <sub>tot</sub>	60	mW
Operating Temperature Range	T <sub>opr</sub>	-30 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +100	°C
Reflow Soldering Temperature	T <sub>sol</sub>	255	°C

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Emitter						
Forward Voltage	VF	IF=4mA	0.9	—	1.3	V
Reverse Current	IR	VR=6V	—	—	10	μA
Capacitance	C <sub>t</sub>	VR=0V, f=1MHz	—	25	—	pF
Detector						
Dark Current	ICEO	VCE=10V	—	—	0.5	μA
Collector - Emitter Voltage	VCEO	IC=100μA	16	—	—	V
Coupled						
Output Current *1	IO	IF=4mA, VCE=2V, D=1.05mm (*3)	400	—	1,000	μA
Operating Dark Current *2	ICEOD	IF=4mA, VCE=2V	—	—	5	μA
Response Time(Rise/Fall)	t <sub>r</sub>	IC=100μA, VCE=2V, RL=1kΩ, D=1.05mm (*3)	—	20	—	μs
	t <sub>f</sub>	IC=100μA, VCE=2V, RL=1kΩ, D=1.05mm (*3)	—	20	—	μs

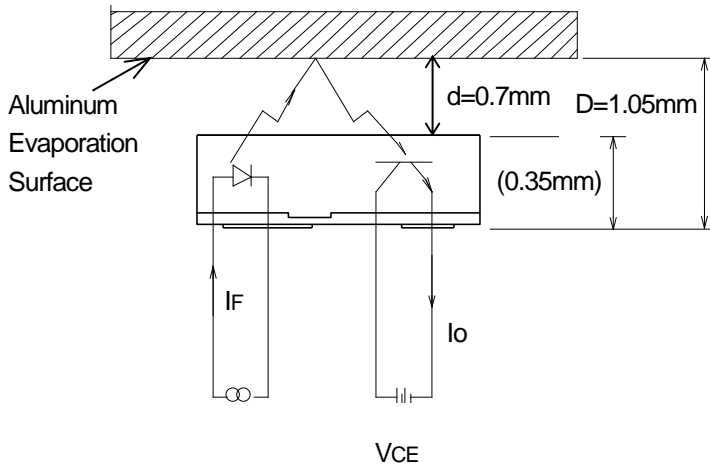
\*1 Refer to OUTPUT CURRENT TEST CONDITION

\*2 Iceod may increase according to the periphery situation of the surface mounted product.

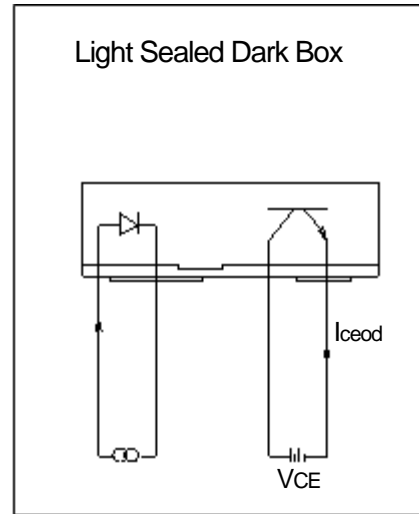
\*3 Distance from the package undersurface to the aluminum evaporation surface.

### ■ OUTPUT CURRENT TEST CONDITION

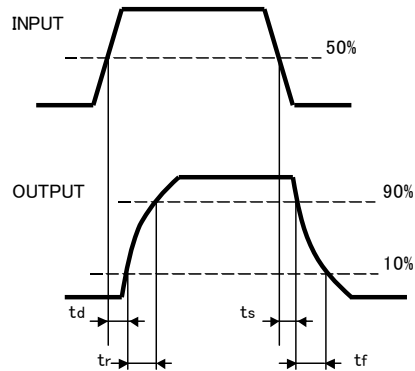
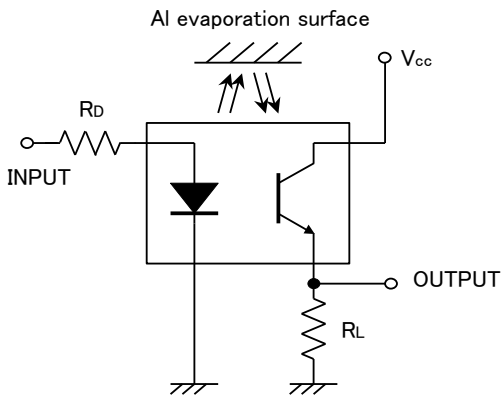
The infrared signal from LED is reflected at the aluminum surface



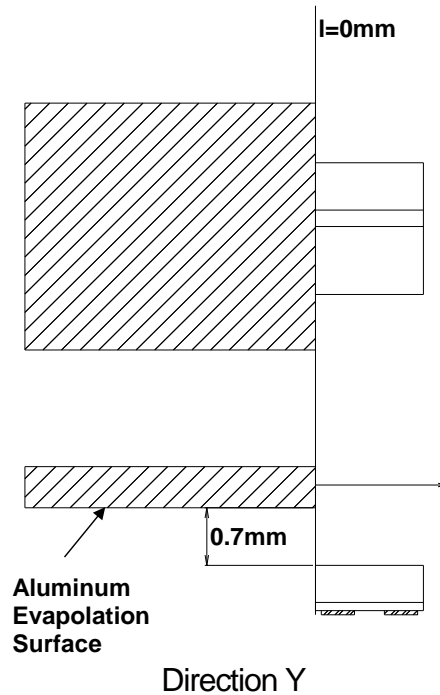
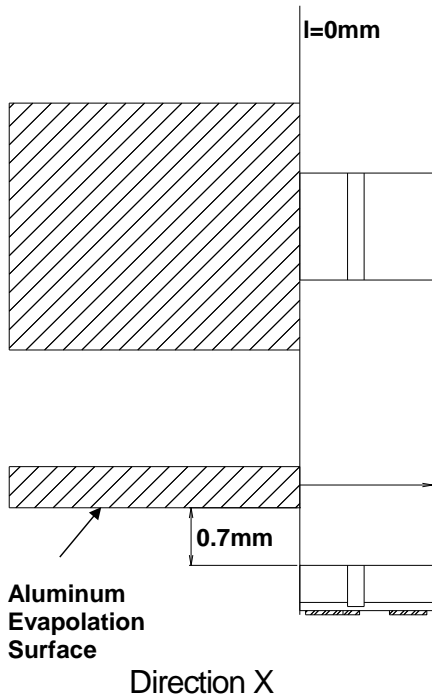
### ■ DARK CURRENT TEST CONDITION



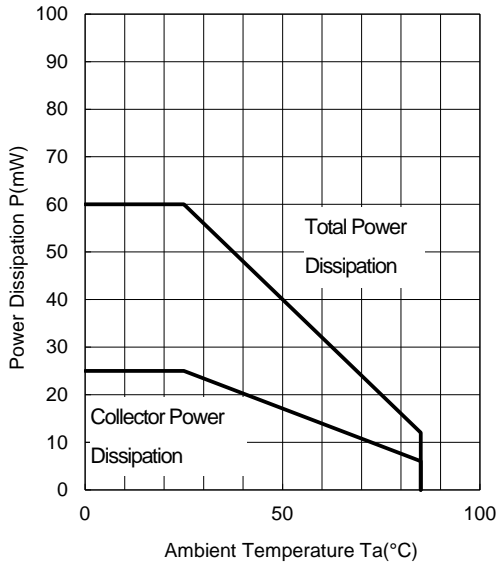
### ■ RESPONSE TIME TEST CONDITION



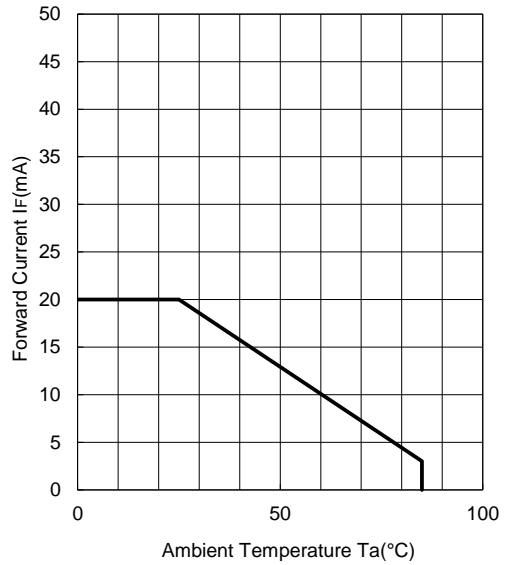
### ■ EDGE RESPONSE TEST CONDITION



**Power Dissipation vs. Temperature**

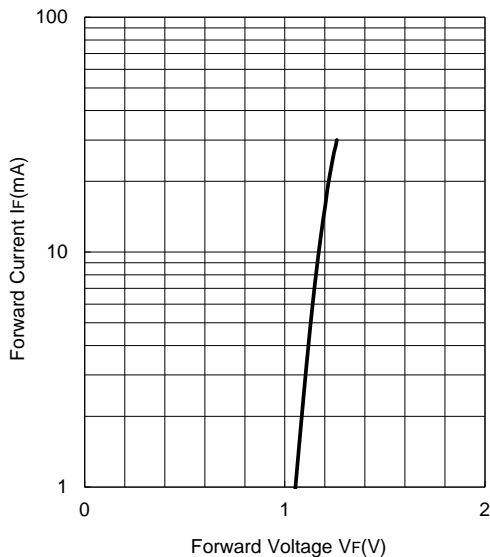


**Forward Current vs. Temperature**

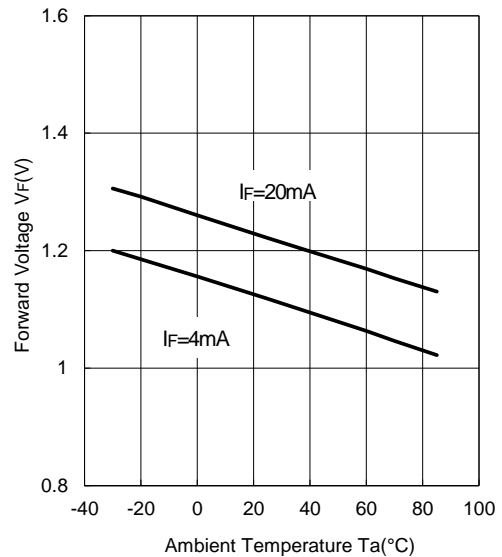


■ **TYPICAL CHARACTERISTICS**

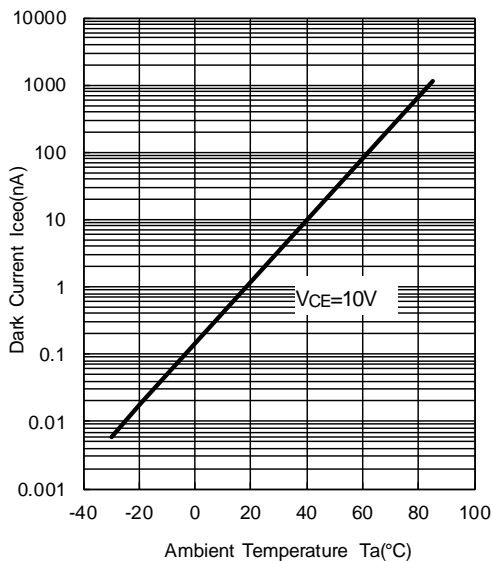
**Forward Voltage vs. Forward Current**



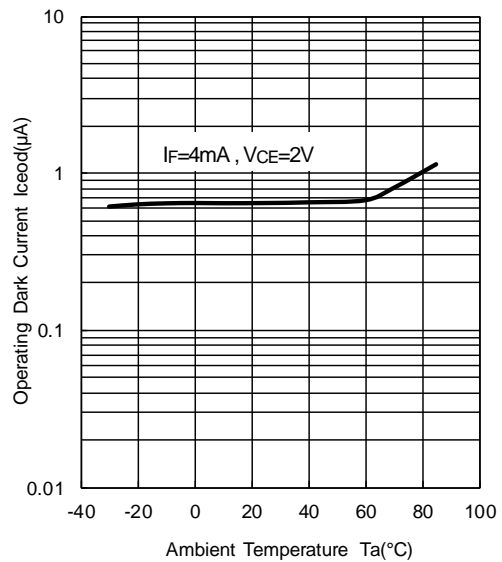
**Forward Voltage vs. Temperature**



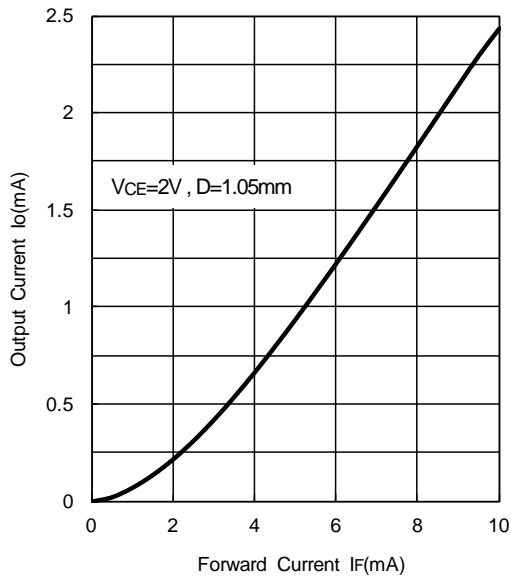
**Dark Current vs. Temperature**



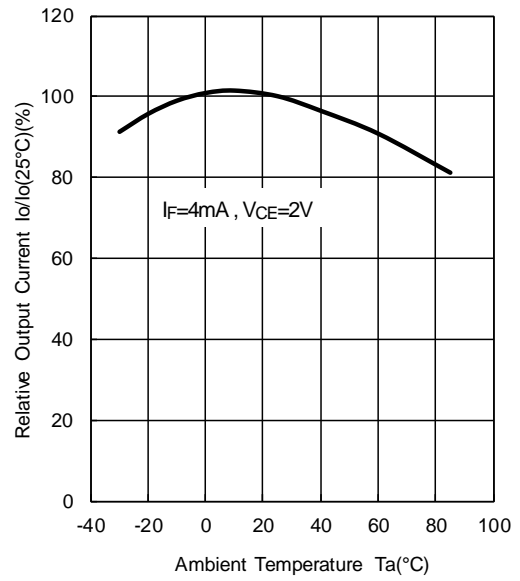
**Operating Dark Current vs. Temperature**



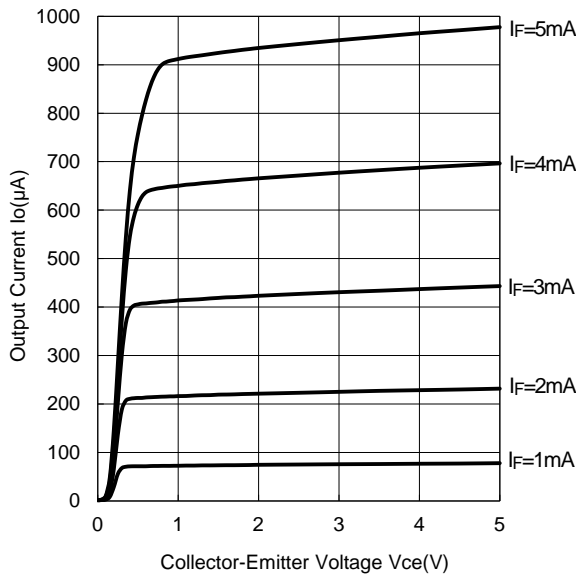
**Output Current vs. Forward Current (Ta=25°C)**



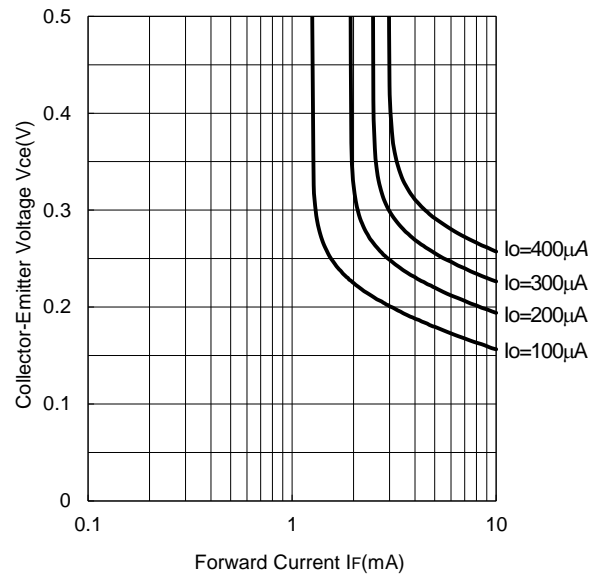
**Output Current vs. Temperature**



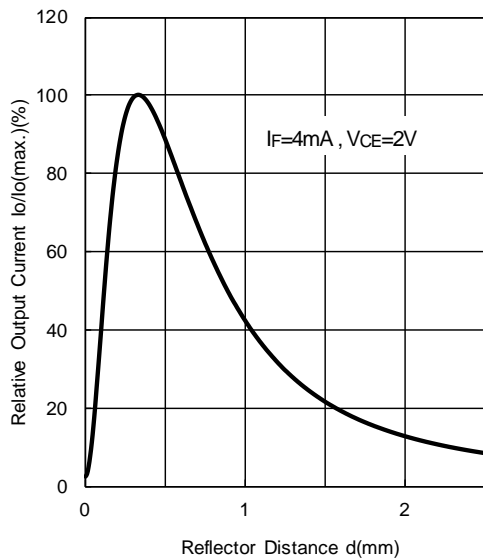
**Output Characteristics (Ta=25°C)**



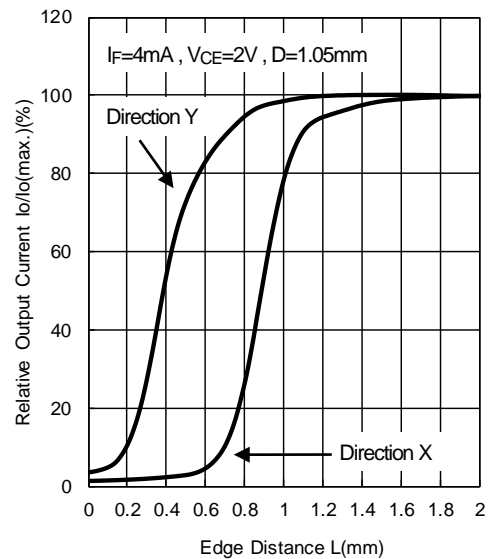
**Vce Saturation (Ta=25°C)**



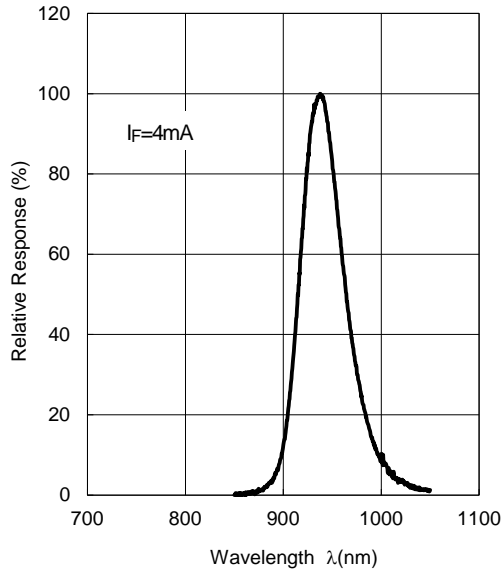
**Output Current vs. Distance (Ta=25°C)**



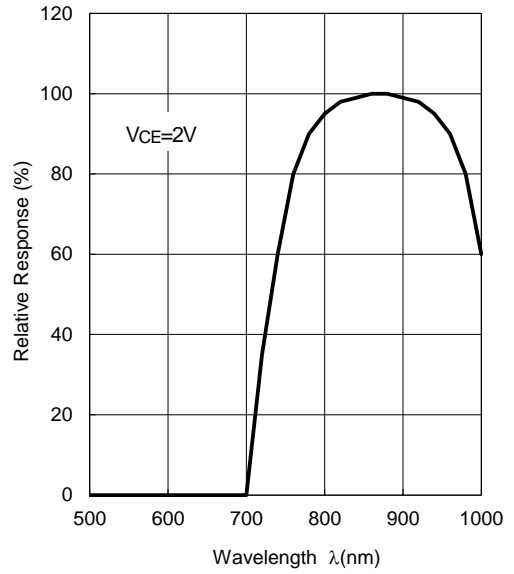
**Output Current vs. Edge Distance (Ta=25°C)**



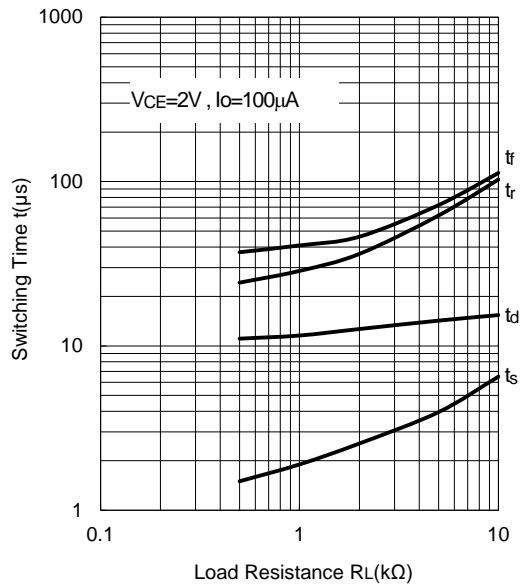
**Spectral Response (Ta=25°C)  
Emitter**



**Spectral Response (Ta=25°C)  
Detector**



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



**■APPLICATION NOTE**

## (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 ( $V_{EC}$ ) 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.

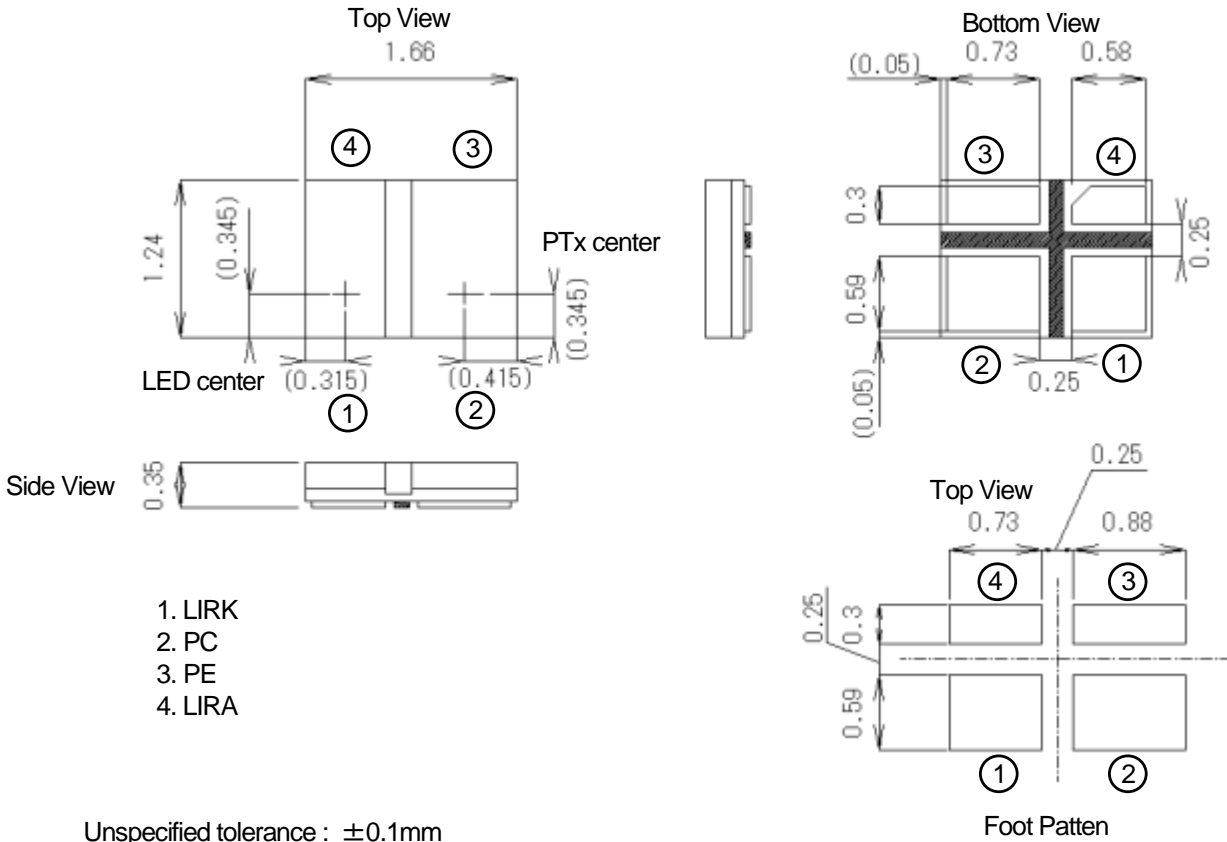
## (2) Attention in designing

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.

■PACKAGE OUTLINE Unit:mm

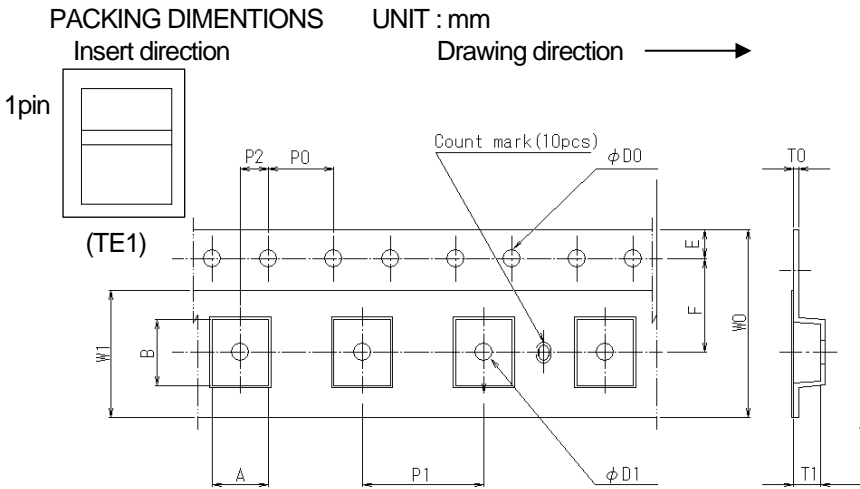


- 1. LIRK
- 2. PC
- 3. PE
- 4. LIRA

Unspecified tolerance :  $\pm 0.1$ mm  
 Dimensions in parenthesis are shown for reference.



## PACKING SPECIFICATION



SYMBOL	DIMENSION	REMARKS
A	1.54 ±0.10	BOTTOM DIMENSION
B	1.96 ±0.10	BOTTOM DIMENSION
D0	$\phi 1.50 +0.1/-0$	
D1	$\phi 0.50 \pm 0.05$	
E	1.75 ±0.10	
F	3.50 ±0.05	
P0	4.00 ±0.10	
P1	4.00 ±0.10	
P2	2.00 ±0.05	
T0	0.20 ±0.05	
T1	0.55 ±0.10	
W0	8.0 +0.30/-0.1	
W1	9.3 ±0.10	THICKNESS 0.1MAX

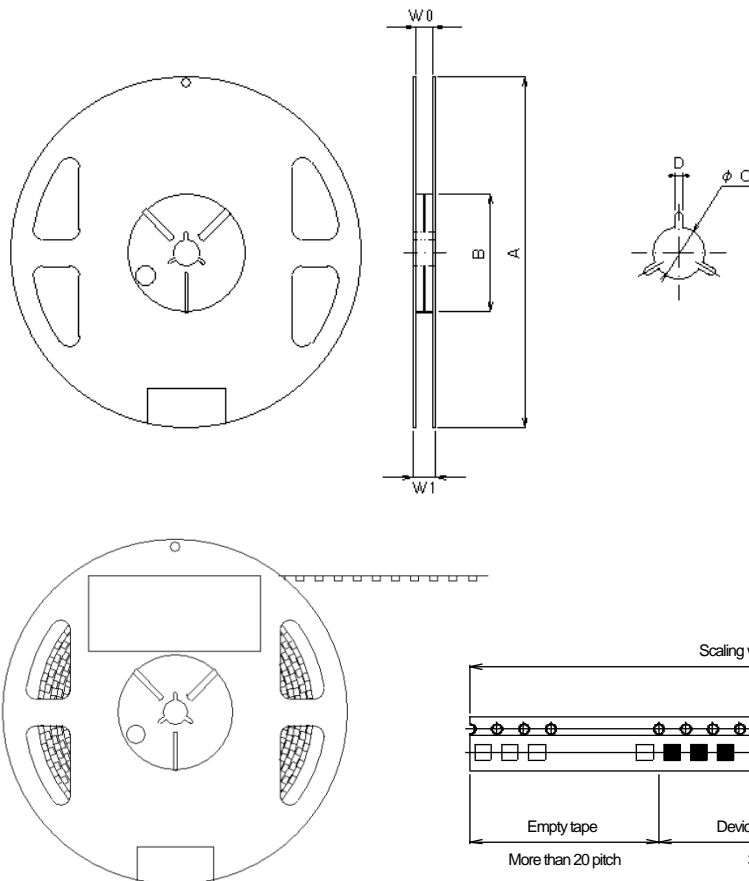
\* Carrier tape material : Polycarbonate(antistatic)  
Cover tape material : PP(antistatic)

## 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

- The taped products are to be rolled up on the taping reel as on the drawing.
- Rolling up specification
  - Start rolling : Carrier tape open space more than 20 Pieces.
  - End of rolling : Carrier tape open space more than 20 Pieces, and 2 round of reel space at the cover tape only.
- Taping quantity : 3,000 Pieces
- Seal off after putting each reels in a damp proof bag with silica gel.



SYMBOL	DIMENSION	REMARKS
A	$\phi 180.0 \pm 1.0$	
B	$\phi 60.0 \pm 1.0$	
C	$\phi 13.0 \pm 0.2$	
D	2.0 ±0.5	
W0	9.0 ±1.0	INNER DIMENSION
W1	11.4 ±1.0	OUTER DIMENSION

\* Reel material : PS(antistatic)

## ■ RECOMMENDED MOUNTING METHOD

### NOTE

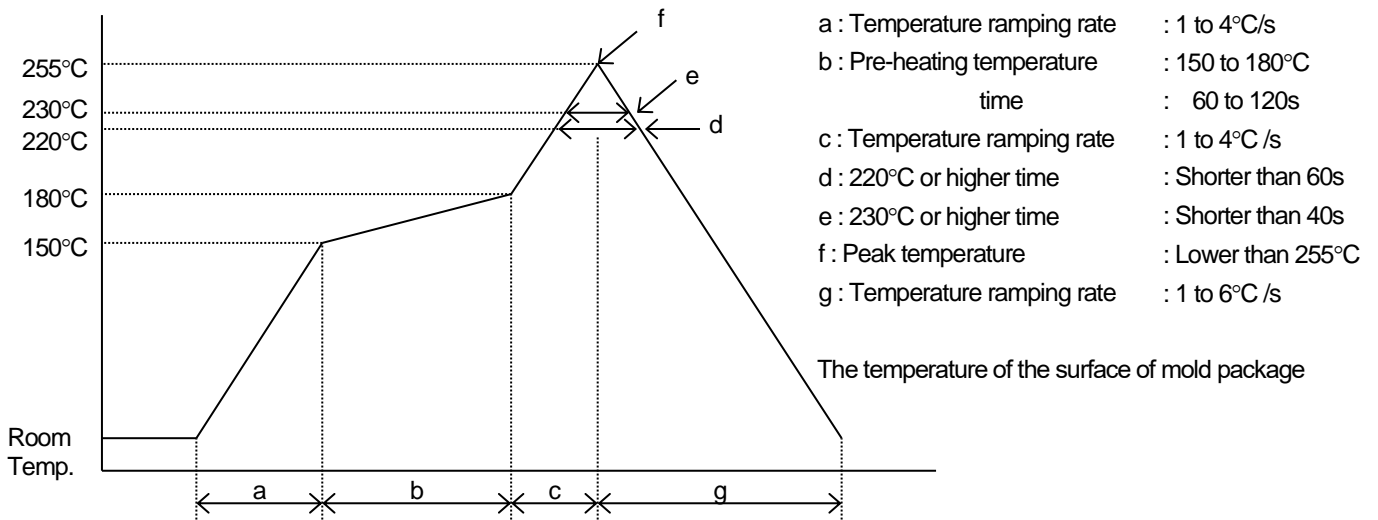
Mounting was evaluated with the following profiles in our company, so there was no problem.  
However, confirm mounting by the condition of your company beforehand.

The exposure of device under higher temperature many 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 temperature profile is in the following.



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

Regarding temperature profile, please refer to those fo 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.

## ■ FLOE SOLDERING METHOD

Flow soldering is not possible.

## ■ IRON SOLDERING METHOD

Iron soldering is not possible.

**■ 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.

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

**■ STORAGE DURATION**

Within a year after delivering this device.

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

**■ MOISTURE SENSITIVITY LEVELS**

JEDEC : Level 5

**[ CAUTION ]**

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  - Equipment Used in the Deep Sea
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  - Life Maintenance Medical Equipment
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  - Various Safety Devices
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