

# Handling instructions (Chip LED)

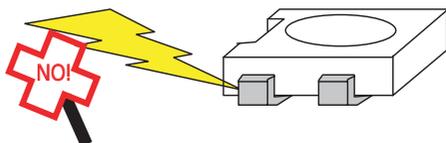
## ■ Handling precaution

This product is sensitive to static electricity, and demands a lot of attention. Please take all possible measures for static electricity. The following are examples of measures to prevent ESD damages.

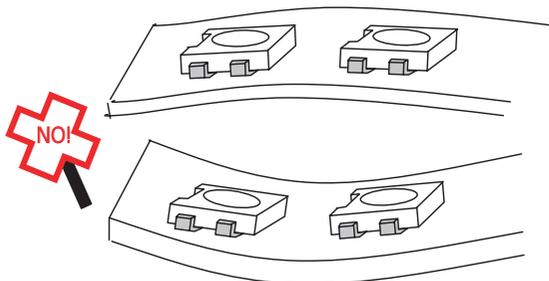
- To ground human body in order to discharge static electricity from body and cloths.
- To ground working bench, insert machine, measuring equipment, etc. that may touch directly to LED.
- To use wave soldering bath with less leak current from power line. To ground the solder bath.

Due to the smallness of the product size, the product may be damaged by external stress. Make sure to avoid any shock after product assembly.

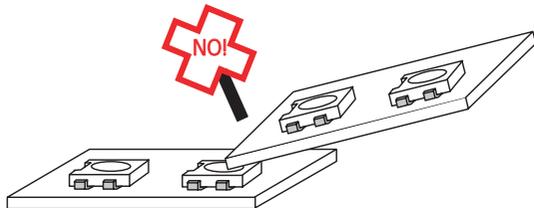
- Surge voltage, ESD and excess current should be avoided.
- Watch ambient temperature (package surface temperature).



- External stresses such as the stress by PWB wrap must be avoided.

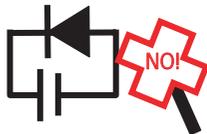


- Prevent PWB from dropping and hitting other PWBs.



## ■ Precautions for design

- Design the circuit so that it prevent LED from any reverse voltage at any moment.
- No reverse voltage at any moment

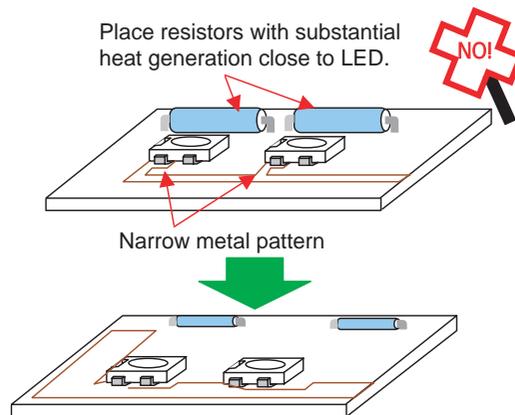


- LED are designed so that large current is allowed for their bright emission and that the heat generated at LED chip is transported through PWB metal pattern. Therefore, take the following precautions.

- Pay attentions to the material of PWB and size of the metal pattern for efficient heat transportation.
- If heat radiation components such as resistors are placed in the neighborhood of LED, the heat transportation may be prevented or LED may be heated-up. Pay attention to the components to the components arrangement.

③ Keep both package surface temperature and forward current of LED within its current derating curve described in the specification. Note that the ambient temperature to be measured at the surface of LED.

- Not to put heat generators close to LED.  
\* The package surface temperature must not exceed the maximum rating of the operating temperature.
- Consideration of heat transportation at PWB design.



## ■ Soldering

(1) Heat stress at soldering process

- Reflow soldering is allowed for SMD LED. However, solder conditions, such as received heat, temperature increase / decrease slope which depends on the peak temperature / time duration of other profile zones cause internal temperature increase and strain, resulting destruction.
- Automated wave soldering is allowed for LED with leads. However there are possibilities that large amount of heat is conducted inside of LED depending on the diameter of through hole and the size of solder pads which leads to destruction.
- In comparison with components such as IC which does not handle light, the resin which can be used in LED has some restriction for its resistance to the terminal stress in order for efficient light transportation.
- Large current drive LED has leads or soldering electrodes of good heat transportation. A special caution is required because this design allows that the heat during soldering can be easily transported to inside.

(2) Humidity absorption and soldering

- LED has a mechanical structure of metal frame with resin encapsulation. After absorbing humidity, LED keeps water in the area of interface between metal and resin. If LED is soldered under such situation, a sudden evaporation may happen and leads a package crack and/or a break of the interface, resulting light-off defect. So, soldering at dry condition is required to sustain LED's designed strength. Control the storage conditions and drying process as described in the specification.

(Notice)

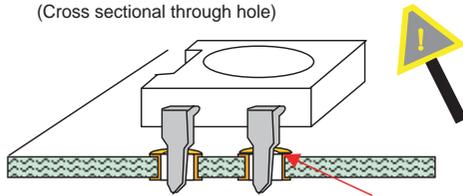
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# Handling instructions (Chip LED)

## « LED with leads for wave soldering »

- Mounting on single sided PWB of  $t = 1.6$  mm or thicker  
\* In case of double sided PWB actual test is required before the production.

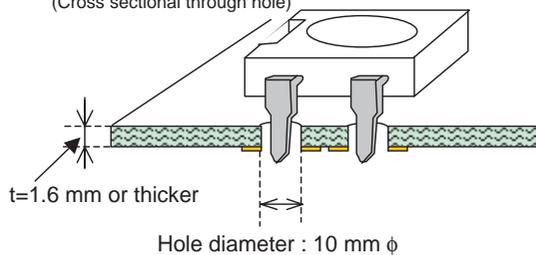
(Cross sectional through hole)



Through hole in double sided PWB

- Through hole : 10 mm  $\phi$  is recommended

(Cross sectional through hole)



Hole diameter : 10 mm  $\phi$

Larger hole : Solder which runs through hole may give resin a large heat stress.  
Smaller hole : Stress by thermal expansion or warp of the PWB may increase.

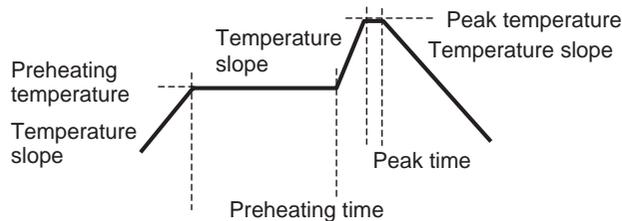
- Recommended soldering condition: Soldering point to be 1.6 mm or more from the bottom surface of the LED package.

Type of soldering	Conditions
1. Manual soldering	295 °C $\pm 5$ °C, within 3 s
2. Wave soldering	260 °C $\pm 5$ °C, within 5 s
3. Automated soldering (flow soldering)	Preheating : 70 °C to 80 °C, within 30 s Soldering : 245 °C $\pm 5$ °C, within 5 s

(Notes) Preheat temperature at automated soldering should be specified as package surface temperature.

## « SMD LED »

- To minimize temperature stress as much as possible. Temperature profile must meet the conditions recommended in the specifications.



- ① Preheating: High temperature and/or long time duration causes temperature increase inside of package resulting possible destruction.
- ② Temperature slope: An abrupt temperature change both increase and decrease side may cause destruction of the products.  
\* Especially, in down phase from the peak temperature must be as slow as possible.
- ③ Peak temperature: High temperature and/or long time duration causes temperature increase inside of package resulting possible destruction.

- Adequate volume of solder  
Determine the solder volume by solder pattern recommended in the specification and mask thickness of screen printing. Excess solder may cause thermal stress or stress during cohesion of solder, resulting destruction of the products.

## ■ Cleaning

- Basically, non-cleaning type soldering is recommended. If necessary, ultrasonic cleaning can be allowed within the conditions below. (Because the conditions and/or cleaning solvent allowed by product model, consult with the individual specification.)  
① Recommended conditions of ultrasonic cleaning : R.T. 40 kHz, 30 W/l, 3 to 5 minutes.  
② Recommended solvents : water, isopropyl alcohol
- The affect on the device from ultrasonic cleaning differs depending on the size of the ultrasonic bath, ultrasonic power, duration, board size and device mounting method. Test the cleaning method under actual conditions and check if the conditions are appropriate before actual use.

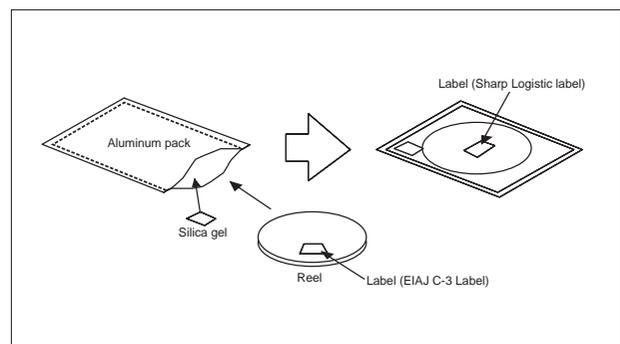
## ■ Dampproof packing

In order to avoid the absorption of humidity during transport and storage, the products are packed in aluminum pack.

- Storage conditions before opening  
Temperature: 5 to 30 °C, Humidity: 60 % RH or less
- Treatment after opening  
① Use (solder) products within the time duration specified in the specification after opening from aluminum pack under following conditions.  
Temperature: 5 to 30 °C, Humidity: 60 % RH or less  
② In case the products are not used for a long time after opening, the storage in dry box is recommendable. Or it is better to repack the devices with a desiccative by the sealer and put them in the some conditions as mentioned in above "Storage conditions". [Storage time : 1 year or less after shipping]  
③ In case after long time storage mentioned in above ② and if original blue color of enclosed silica gel discolored, following mentioned Baking treatment just before usage.

\* Recommendable conditions :

- In taped condition  
Temperature : 60 to 65 °C, Time: 36 to 48 hours (Baking of LED in taped condition may affect the stick of cover tape. We do not recommend at all to perform Baking more than one.)
- In bulk condition ( on PWB or metal tray)  
Temperature : 100 to 120 °C, Time: 12 hours or more



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# Handling instructions (LED LAMP)

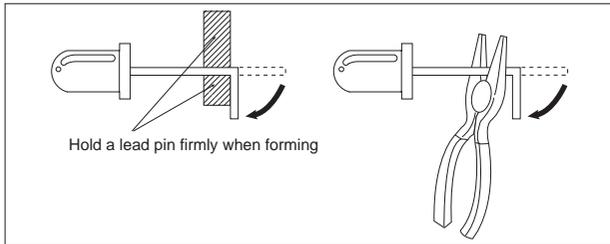
## ■ Handling precaution

This product is sensitive to static electricity, and demands a lot of attention. Please take all possible measures for static electricity. The following are examples of measures to prevent ESD damages.

- To ground human body in order to discharge static electricity from body and cloths.
- To ground working bench, insert machine, measuring equipment, etc. that may touch directly to LED.
- To use wave soldering bath with less leak current from power line. To ground the solder bath.

## ■ Lead Forming Method

Avoid forming a lead pin with the lead pin base as a fulcrum: be sure to hold a lead pin firmly when forming. Lead pins should be formed before soldering.

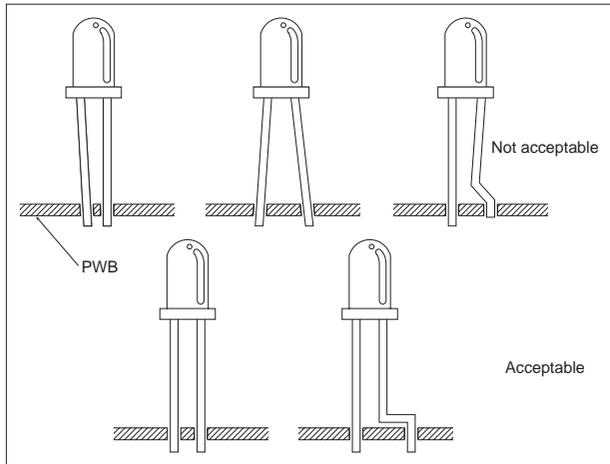


## ■ Mounting

### (1) Mounting on a PWB

When mounting an LED lamp on a PWB, do not apply physical stress to the lead pins.

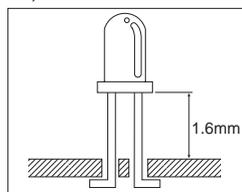
- The lead pin pitch should match the PWB pin-hole pitch: do not broaden out or narrow down the distance between lead pins.
- When positioning an LED lamp, basically employ an LED with tie-bar cut or use a spacer.



### (2) When an LED lamp is mounted directly on a PWB

If the bottom face of an LED lamp is mounted directly on single-sided PWB (1.6 mm t or thicker), the base of the lead pins may be subjected to have physical stress due to PWB warp, or cutting or clinching process of lead pins. Prior to use, be sure to check that no disconnection inside of the resin or damage to resin etc., is found.

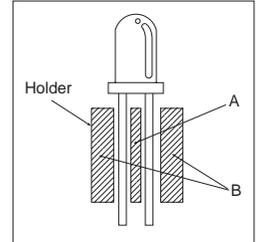
When an LED lamp is mounted



on a double-sided PWB, the heat during soldering affects the resin; therefore, keep the LED lamp more than 1.6 mm afloat above the soldering position.

### (3) Mounting using a holder

During an LED lamp positioning, in case of using a holder, holder A should be designed to be smaller than the inside space dimension between 2-leads. Holder B should be designed to be larger than the outside space dimension between 2-lead pins.

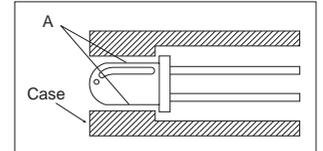


(Notes) Pay attention to the thermal expansion coefficient of the material used for the holder. Since the holder expands and/or contracts due to preheat and soldering heat, mechanical stress may be applied to the lead pins, resulting in electrical disconnection.

### (4) Mounting to a case

Do not fix part A with adhesives when fixed to a case as shown in the figure.

A hole of the case should be designed not to be smaller than the outside diameter of LED lamp resin.



## ■ Soldering Conditions

Solder the lead pins under the following conditions. (1.6 mm or more from the resin package)

Type of soldering	Conditions
1. Manual soldering	295 °C ±5 °C, within 3 s
2. Wave soldering	260 °C ±5 °C, within 5 s
3. Reflow soldering	Preheating : 70 °C to 80 °C, within 30 s Soldering : 245 °C ±5 °C, within 5 s

(Notes) ● Avoid dipping resin into soldering bath.

- Avoid applying stress to lead pins while they are heated. For example, when the LED lamp is moved with having the heat at the lead pins during manual soldering or solder repair, electric disconnection may occur.

## ■ Cleaning

Conditions described below shall be observed in cleaning process.

- Solvent cleaning : Solvent temperature 45 °C or less, for 3 minutes or less.
- Ultrasonic cleaning : The affect on the device is different depending on the size of the cleaning bath, ultrasonic power, board size, and device mounting method. Test the cleaning method under actual conditions and check if the conditions are appropriate before actual use.
- Recommended solvents are shown below.

Methyl alcohol, Ethyl alcohol, Isopropyl alcohol.

When other solvents are used, package resin may be penetrated by solvents. Please perform a test under actual conditions before use.

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