

## APPLICATION NOTES for Through Hole LEDs

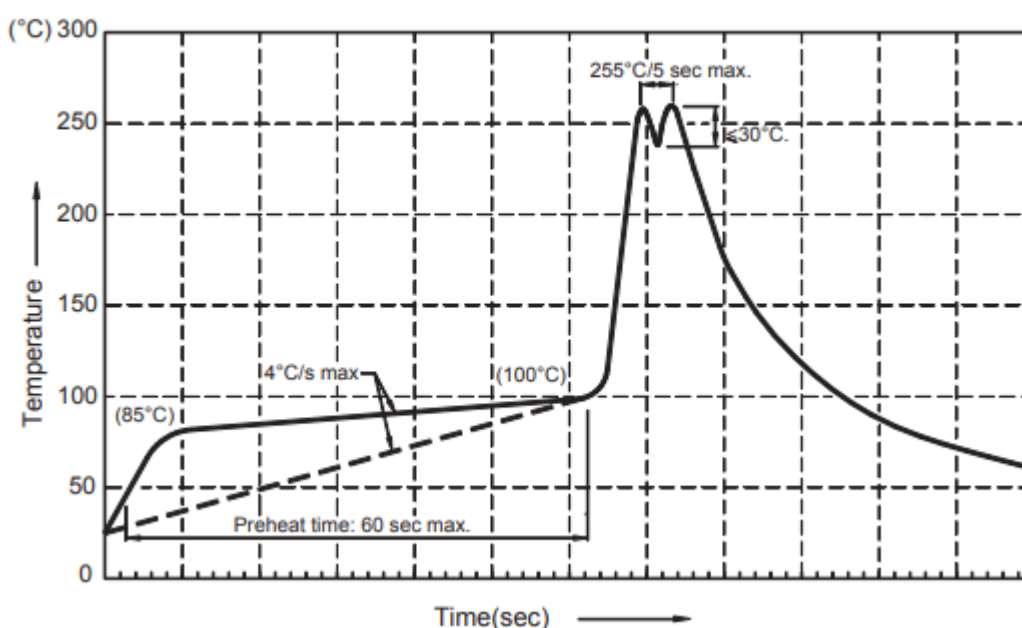
1. Scope: LED is suitable for general electronic products  
In the event that the product needs to be applied to certain special reliability, as well as when the product failure or failure may endanger life and health equipment, it is necessary to contact with Opto Plus LED Corp.
2. Through Hole LEDs must be avoid exposure to the condensing moisture environment continuously and keep the product away from rapid temperature changed.
3. Through Holed LEDs must be stored with temperature below 30°C and humidity below 60%RH.
4. After original sealed package has been opened , through hole LEDs should be assembled in 72 hours.
5. Baking  
Baking before soldering is recommended when the package has been unsealed for 72 hours and more than 1 week.  
The conditions should be 30 (+/-10) hours at 85 ~ 100°C
6. If the storage conditions do not meet specification standards or keep under high humidity environments, the leadframe will become discolored and oxidized.  
Once the leadframe become discolored and oxidized, suggest to re-plating and re-sorting before use.  
Suggest customers use out LEDs as soon as possible, and avoid long-term storage of large inventories.
7. Soldering General Note  
Lamp without stopper type must be leave a minimum of 3mm clearance from the base of the lens to the soldering point when soldering.  
Do not apply any external stress to the lead frame during soldering while the LED is at high temperature.

■ Recommended soldering conditions:

Soldering Iron g (with 1.5mm Iron tip )		Wave Soldering	
Temperature	300°C Max	Pre-heat	100°C Max
Soldering Time	3 sec (one time only)	Pre-heat Time	60 sec Max
		Temperature	255°C Max
		Soldering Time	5 sec Max

\*\*Note: Excessive soldering temperature and / or time might result in deformation of the LED lens or catastrophic failure of the LED

Lead-Free Wave Soldering Profile

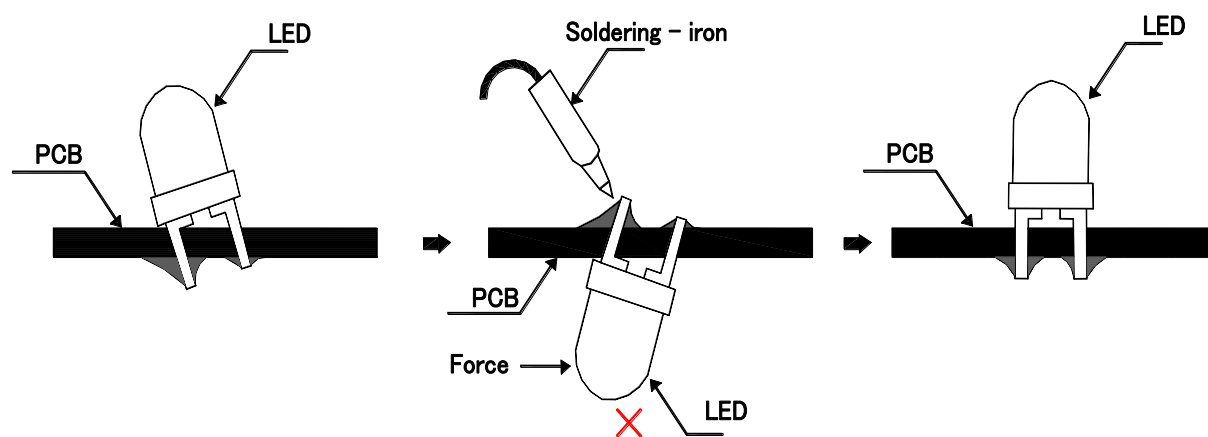


Note: • Recommend pre-heat temperature of 100° C or less (as measured with a thermocouple attached to the LED pins) prior to immersion in the solder wave with a maximum solder bath temperature of 260° C.

- Peak wave soldering temperature between 245° C ~ 255°C for 3 sec (5 sec max).
- Do not apply stress to the epoxy resin while the temperature is above 85°C.
- No more than one wave soldering pass

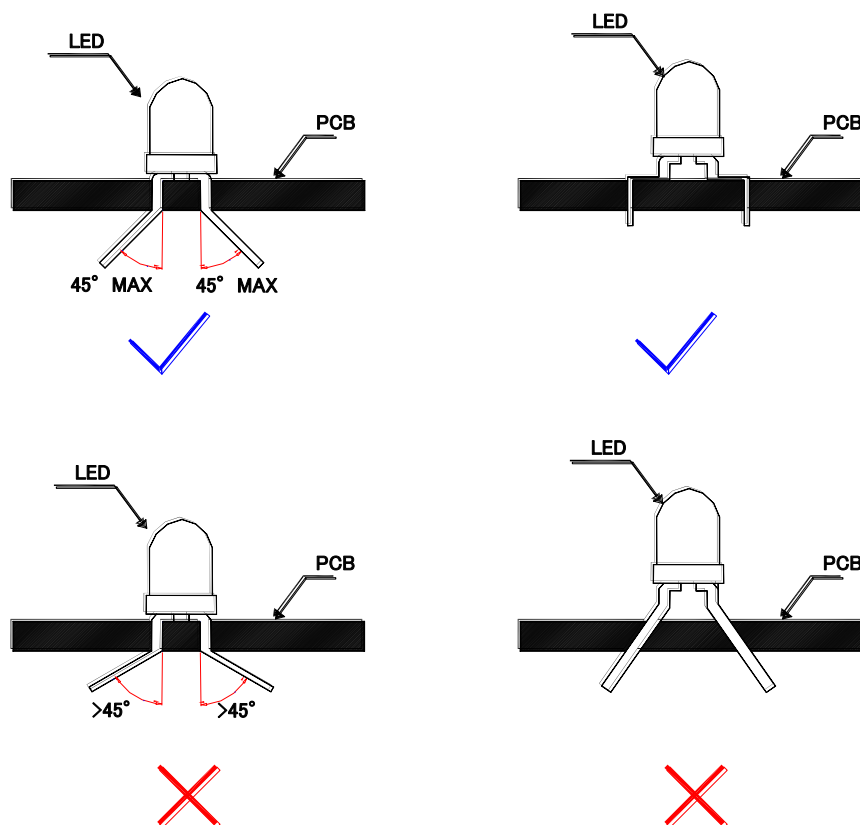
- Manual soldering is not recommended unless necessary such as when repair or rework is required.
- Soldering iron power shall not exceed 30 W. The recommended maximum temperature for lead soldering is 300°C for Pb-Sn solder and 350°C for lead-free soldering. For blue (typical  $\lambda_d$  465 nm), green (typical  $\lambda_d$  525 nm), and all white LEDs, the maximum soldering iron temperature is 280°C.  
Do not place the soldering iron on the component for more than 3 seconds.

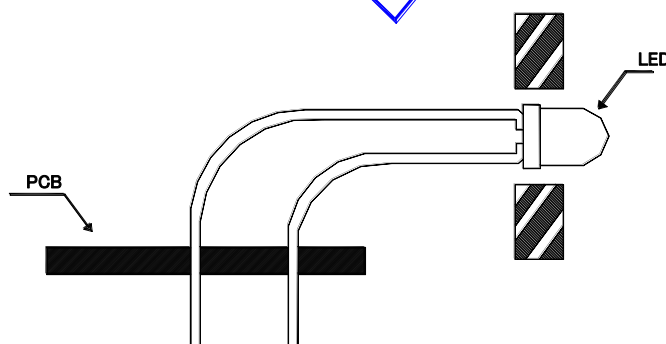
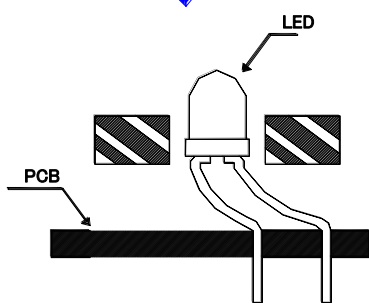
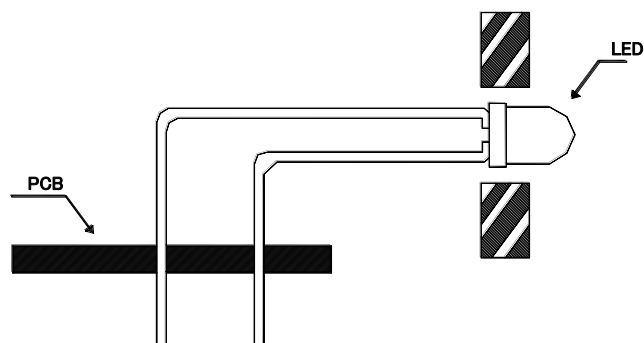
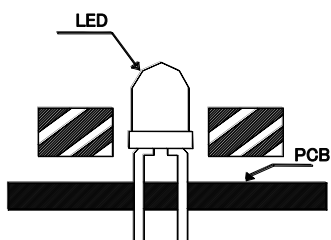
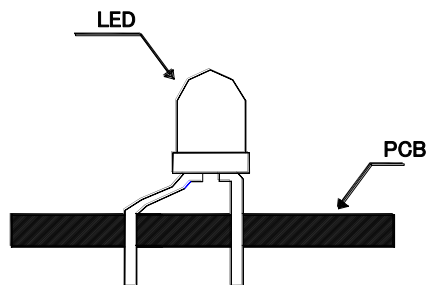
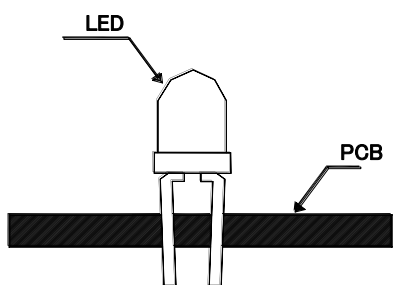
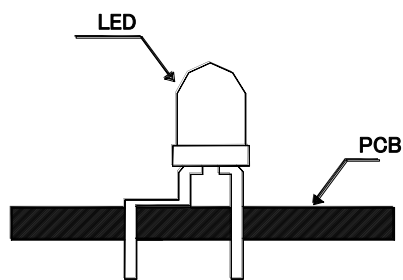
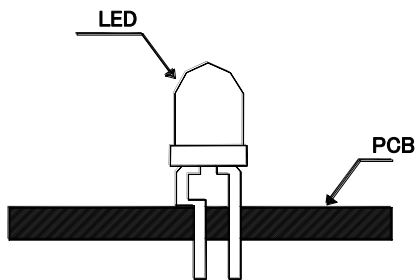
- The tip of the soldering iron should never touch the lens epoxy.
- Do not apply stress to the leads when the component is heated above 85°C, otherwise internal wire bonds may be broken.
- After soldering, Need three minutes for the component to cool down to room temperature at least before further operations



#### 8. LED MOUNTING METHOD

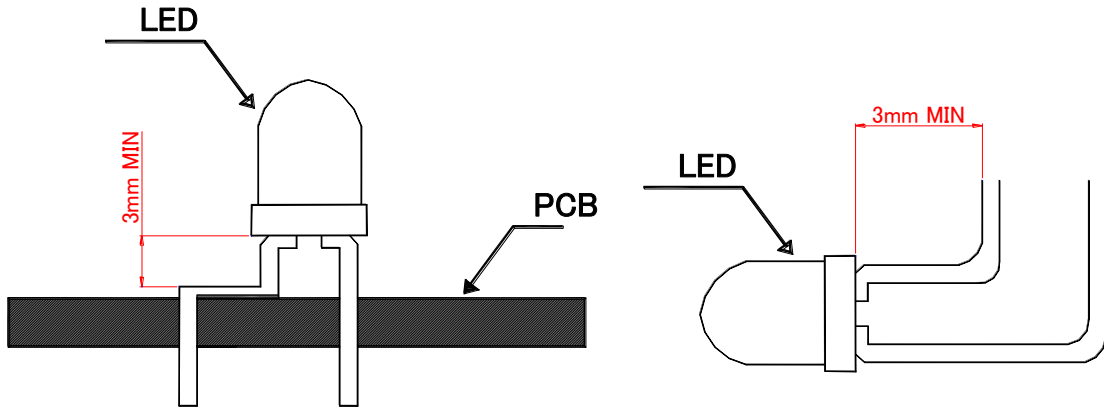
- The lead pitch of the LED must match the pitch of PCB holes during component assembly. Lead-forming needs to insure the lead pitch matches the hole pitch. Refer to the figure below for proper lead forming procedures.





## 9. LEAD FORMING PROCEDURES

- Reserve a minimum of 3mm clearance between the base of the LED lens and the first lead bend.



- Lead forming must be done before soldering at normal temperature.
- During lead forming, use tools or jigs to keep the leads securely so that the bending force will not be damage into the LED lens and its internal structures. Do not perform lead forming once the component has been mounted onto the PCB.
- Do not bend the leads more than twice.
- During assembly on PCB, use minimum force possible to avoid excessive mechanical stress.

## 10. REPAIRING

Repair should not be done after the LEDs have been soldered.

When repairing is unavoidable, suggest to use double-head soldering iron.

It should be confirmed if the characteristics of the LEDs will or will not be damaged by repairing.

## 11. Cleaning

- Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LEDs if necessary
- Do not use acidic solvents or unknown chemicals, as they might will corrosion or damage to the component
- Do not soak the component in solution.

## 12. ESD (Electrostatic Discharge)

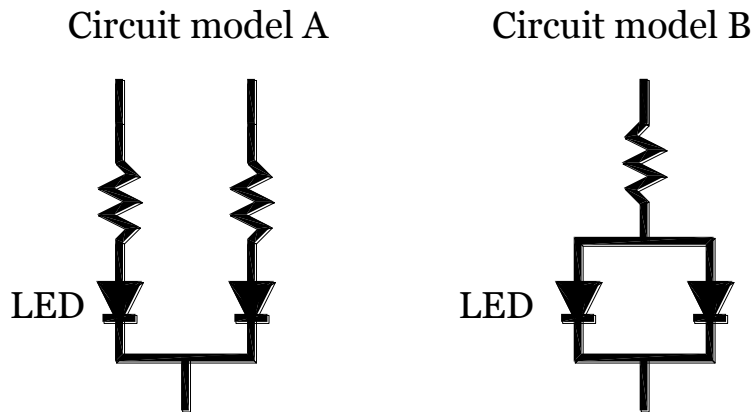
Static Electricity or power surge will damage the LED especially for InGaN/Gan

Products, so would like to suggest to prevent ESD damage in working area as below:

- Use a conductive wrist band or anti- electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Avoid touching by hands without wear antistatic garments and wrist straps and usage of common plastic containers, transport mediums or tools.
- Use ionizer to neutralize the static charge which might have built up on surface of the LEDs lens as a result of friction between LEDs during storage and handling.
- All workstations that handle IC and ESD-sensitive components must maintain an electrostatic potential of 150V or less.
- Relative humidity levels maintained between 40% and 60% in production area are recommended to avoid the build-up of static electricity

### 13. CIRCUIT DESIGN NOTES

- An LED is a current-operated base. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.



(A) Recommended circuit

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

- Customer's PCB circuit should be designed to avoid reverse voltages and transient voltage spikes when the circuit is powered up or shut down.
- It is recommended to operate LEDs at the binning current 20 mA to reduce visible difference in color and intensity.  
If LEDs are to be driven at very small current (eg. 2mA or 5mA), please contact with Opto Plus first.
- Please refer to the Current vs. Temperature graph on the datasheet for the current limit at each temperature.

#### 14. RESTRICTIONS ON PRODUCT USE

- If a reverse bias continuously applied to LEDs, it can cause LEDs damage.
- The information contained within this document is subject to change without notice. Before referencing this document, please confirm that it is the most current version available.
- Not all LEDs type are available in every country.
- The light output from UV, blue, and white color LEDs may cause injury to the human eye when viewed directly.
- Prolonged reverse bias should be avoided, as it could cause LEDs in leakage current or causing a short circuit.
- Excess driving current and/or operating temperature higher than recommended conditions in Specification, may affect the life of LEDs.

#### 15. TERMS AND CONDITIONS FOR THE USAGE OF THIS DOCUMENT

- The information included in this document reflects representative usage scenarios and is intended for technical reference only.
- The part number, type, and specifications mentioned in this document are subject to future change and improvement without notice. Before production usage customer should refer to the latest datasheet for the updated specifications.
- When using the products referenced in this document, please make sure the product is being operated within the environmental and electrical limits specified in the datasheet. If customer usage exceeds the specified limits, OPTO PLUS will not be responsible for any subsequent issues.
- The information in this document applies to typical usage in consumer electronics applications. If customer's application has special reliability requirements or have life-threatening liabilities, such as automotive or medical usage, please contact with OPTO PLUS representative for further assistance.
- All Through Hole LEDs operating should refer to Data Sheet and Application Notes.