

The purpose of this document is to provide information regarding SMD LED handling and application precautions to the customers. The following precautions statement must be taken to protect the LED.

### **1. Moisture Barrier Bag**

- SMD LED is a moisture sensitive device. If moisture is absorbed into the SMT package, it may vaporize and expand during soldering. This can damage the optical characteristics of LED. In order to prevent moisture absorption into LED during transportation and storage, moisture barrier bag is used for packing the LED.
- An aluminum moisture barrier bag is used to pack the LED. Moisture absorbent material (silica gel) is packed together with LED in the aluminum moisture barrier bag as the secondary protection. A humidity indicator card act as an indicator provides the information of humidity within SMD packaging by changing its colour.

### **2. Storage**

- It is recommended to store the original sealed bag at <40 °C and <90% RH. The shelf life of LED in sealed bag is 24 months. If shelf life is expired, baking is required.
- After the package is opened the SMD LED must be stored under the condition  $\leq 30$  °C and < 60% RH and must be used (subject to re-flow) within specific period which depend on Moisture Sensitivity Level. Re-baking is required when floor life exceeds this time period.
- In case of SMD LED not used within the specific time frame and conditions, the SMD LED must be baked in oven at temperature  $60$  °C  $\pm$   $5$  °C and relative humidity  $\leq 1\%$  RH, for 20 hours.
- If unused LED remains, they should be stored in the original moisture barrier bag and reseal it again.
- It is recommended to solder SMD LED as soon as possible after opening the moisture barrier bag.

### **3. Cleaning**

- It is recommended not to use unspecified chemical liquids as cleaning material for cleaning the LED. The chemical could harm the SMD LED.
- If cleaning is necessary, please immerse the SMD LED in alcohol at normal room temperature for less than 1 minute and dry at normal room temperature for 15 minutes before use.
- When using other than alcohol as cleaning material, it should be confirmed that the material would not dissolve the package.
- When ultrasonic cleaning is used, the influence of ultrasonic cleaning on the LED depends on factors such as ultrasonic power and the assembly condition. Verification should be done to ensure ultrasonic settings would not damage the LED.

### **4. Electrostatic Discharge**

- Electrostatic discharge (ESD) or surge current may damage the LED.
- It is recommended that ESD wrist strap; ESD shoe strap or anti-electrostatic glove be used whenever handling the LED.
- All devices, equipments and machinery must be properly grounded.
- It is important to eliminate the possibility of surge current during circuitry design.

### **5. Heat Management**

- Heat management of LED must be taken into consideration during the design stage. It is necessary to avoid intense heat. Poor heat management will affect product life span and performance.
- The operating current should be de-rated appropriately when used in high temperature environment. Please refer to the de-rating curve attached on each product specification for the details.

## **6. Silicone Encapsulant**

- Silicone encapsulant is normally used for white and high power LEDs. This silicone material will enhance the performance and reliability of these parts.
- If the encapsulation material of the LEDs is silicone, the LEDs will have a soft surface on the emitting area. Any stress or pressure to this surface will influence the reliability and performance of the LEDs. Precautions should be taken to avoid exerting strong pressure on the encapsulated part while picking the LEDs. When using the chip mounter during SMT, the picking up nozzle setting must be optimized so that it does not damage the silicone resin.
- Silicone material will also be easily contaminated by particles. However a small amount of particles on the LEDs does not affect the lifetime or the brightness of the LEDs. Therefore a small amount of particles on the surface of LEDs can be ignored.

## **7. Manual Soldering using Soldering Iron**

- The use of the commercially available SN60 (60% tin and 40% lead) solder or solder with silver content is recommended.
- The use of a soldering iron of less than 25W is recommended and the temperature of the iron must not be higher than 300°C (572°F). Maximum soldering time of three seconds is allowed.
- The heated soldering iron tip must not touch the resin portion of SMTLED.
- Mechanical force must not be applied to the SMTLED while it is soldered.

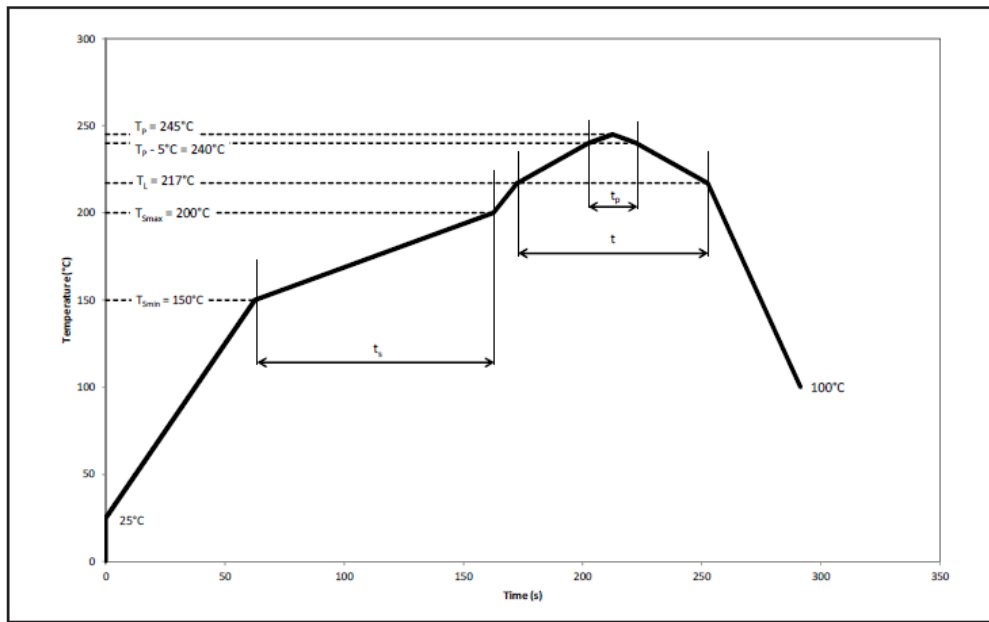
## **8. Soldering Using Re-flow Soldering**

- The soldering paste should be applied to the necessary soldering pads by the screen-printing or with the dispenser.
- In the case of the screen-printing, it is desirable to have the thickness of 0.1mm (0.0039 inch) to 0.2mm (0.0079 inch) depend on package type.
- It is recommended to use a re-flow furnace with upper and lower heater type.
- The temperature profile as shown in Figure 1 is recommended for SMTLED soldering.
- Mechanical force must not be applied to the SMTLED while it is soldered.

- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used if the LED needs to be removed. Please refer to the recommendations for manual soldering using soldering iron if additional rework is needed.

**Recommended IR-Reflow Profile**

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



**Figure 1: Recommended Pb-free Soldering Profile**

Profile Feature	Symbol	Pb-Free Assembly			Unit
		Min.	Recommended	Max.	
Ramp-up rate to preheat 25°C to $T_{smin}$	-	-	2	3	°C/s
Time $t_s$ $T_{smin}$ to $T_{smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak $T_L$ to $T_p$	-	-	2	3	°C/s
Liquidous temperature	$T_L$	-	217	-	°C
Time above liquidous temperature	t	60	80	150	s
Peak temperature	$T_p$	-	245	260	°C
Time within 5°C of the specified peak temperature $T_p - 5^\circ\text{C}$	$T_p$	10	20	30	s
Ramp-down rate $T_p$ to 100°C	-	-	3	6	°C/s
Time 25°C to $T_p$	-	-	-	480	s

## **9. Others**

- The light output from LED maybe very strong and may harm human eyes. Precautions must be taken such as avoiding from looking directly into lighted LED.