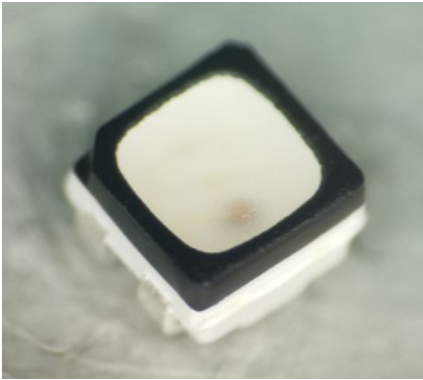


## CLMUD-FKC: PLCC4 3 in 1 SMD LED



### PRODUCT DESCRIPTION

The CLMUD-FKC full-color RGB LED offers a high-intensity light output and a wide viewing angle. The compact 1.5mm x 1.5mm package allows for a very high resolution screen and it is designed to work in a wide array of environmental conditions. Cree LED PLCC full-color RGB LEDs are suited for indoor video screen, decorative lighting and amusement applications.

### FEATURES

- Size (mm): 1.5 x 1.5
- Dominant Wavelength  
Red (619 - 624nm)  
Green (525 - 532.5nm)  
Blue (460 - 470nm)
- Luminous Intensity (mcd)  
Red (355 - 560)@ 15mA  
Green (635 - 900)@ 10mA  
Blue (101 - 202)@ 10mA
- Moisture Sensitivity Level: 5a
- Lead-Free
- RoHS Compliant
- Matte Surface

### APPLICATIONS

- Full-Color Video Screen
- Decorative Lighting
- Amusement

**ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )**

| Items                                  | Symbol     | Absolute Maximum Rating |     |     | Unit               |
|--|------------|-------------------------|-----|-----|--------------------|
|  |            | R                       | G   | B   |                    |
| Forward Current <sup>Note 1</sup>      | $I_F$      | 25                      | 13  | 13  | mA                 |
| Peak Forward Current <sup>Note 2</sup> | $I_{FP}$   | 70                      | 50  | 50  | mA                 |
| Reverse Voltage                        | $V_R$      | 5                       | 5   | 5   | V                  |
| Power Dissipation                      | $P_D$      | 65                      | 47  | 47  | mW                 |
| Operation Temperature                  | $T_{opr}$  | -40 ~ +85               |     |     | $^\circ\text{C}$   |
| Storage Temperature                    | $T_{stg}$  | -40 ~ +100              |     |     | $^\circ\text{C}$   |
| Junction Temperature                   | $T_J$      | 110                     | 110 | 110 | $^\circ\text{C}$   |
| Junction/ambient 1 chip on             | $R_{THJA}$ | 390                     | 550 | 440 | $^\circ\text{C/W}$ |
| Junction/solder point 1 chip on        | $R_{THJS}$ | 290                     | 440 | 340 | $^\circ\text{C/W}$ |

**Note:**

1. Single-color light
2. Pulse width  $\leq 0.1$  msec, duty  $\leq 1/10$ .

**TYPICAL ELECTRICAL & OPTICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**

| Characteristics                          | Condition  | Symbol           | Values  |           |         | Unit          |
|--|--|------------------|---------|-----------|---------|---------------|
|  |  |                  | R       | G         | B       |               |
| Dominant Wavelength                      | $I_F = 15\text{mA(R)}$<br>$I_F = 10\text{mA(G)}$<br>$I_F = 10\text{mA(B)}$ | $\lambda_{DOM}$  | 619~624 | 525~532.5 | 460~470 | nm            |
| Spectral bandwidth at 50% $I_{REL\_max}$ | $I_F = 15\text{mA(R)}$<br>$I_F = 10\text{mA(G)}$<br>$I_F = 10\text{mA(B)}$ | $\Delta \lambda$ | 15      | 30        | 21      | nm            |
| Forward Voltage                          | $I_F = 15\text{mA(R)}$<br>$I_F = 10\text{mA(G)}$<br>$I_F = 10\text{mA(B)}$ | $V_{F(avg)}$     | 1.9     | 2.6       | 2.7     | V             |
|  |  | $V_{F(max)}$     | 2.6     | 3.6       | 3.6     | V             |
| Luminous Intensity                       | $I_F = 15\text{mA(R)}$<br>$I_F = 10\text{mA(G)}$<br>$I_F = 10\text{mA(B)}$ | $I_{V(min)}$     | 355     | 635       | 101     | mcd           |
|  |  | $I_{V(avg)}$     | 450     | 750       | 145     | mcd           |
| Luminous Intensity(Reference)            | $I_F = 5/5/5$ mA   | $\Phi_{V(avg)}$  | 150     | 500       | 85      | mcd           |
| Reverse Current (max)                    | $V_R = 5$ V  | $I_R$            | 10      | 10        | 10      | $\mu\text{A}$ |

\* Continuous reverse voltage can cause LED damage.

## INTENSITY BIN LIMIT

| Red (15 mA) |           |           | Green (10 mA) |           |           | Blue (10 mA) |           |           |
|-------------|-----------|-----------|---------------|-----------|-----------|--------------|-----------|-----------|
| Bin Code    | Min.(mcd) | Max.(mcd) | Bin Code      | Min.(mcd) | Max.(mcd) | Bin Code     | Min.(mcd) | Max.(mcd) |
| H           | 355       | 450       | np            | 635       | 805       | 56           | 101       | 126       |
| hj          | 403       | 505       | M             | 710       | 900       | C            | 112       | 140       |
| J           | 450       | 560       |               |           |           | 78           | 126       | 160       |
|             |           |           |               |           |           | D            | 140       | 180       |
|             |           |           |               |           |           | 9a           | 160       | 202       |

\* Tolerance of measurement of luminous intensity is  $\pm 10\%$ .

## COLOR BIN LIMIT

| Red (15 mA) |          |          | Green (10 mA) |          |          | Blue (10 mA) |          |          |
|-------------|----------|----------|---------------|----------|----------|--------------|----------|----------|
| Bin Code    | Min.(nm) | Max.(nm) | Bin Code      | Min.(nm) | Max.(nm) | Bin Code     | Min.(nm) | Max.(nm) |
| RB          | 619      | 624      | G8            | 525      | 530      | B3           | 460      | 465      |
|             |          |          | G45           | 527.5    | 532.5    | B23          | 462.5    | 467.5    |
|             |          |          |               |          |          | B4           | 465      | 470      |

\* Tolerance of measurement of dominant wavelength is  $\pm 1$  nm.

## ORDER CODE TABLE

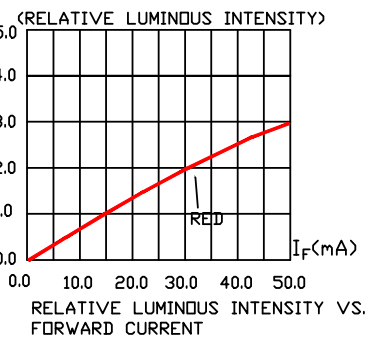
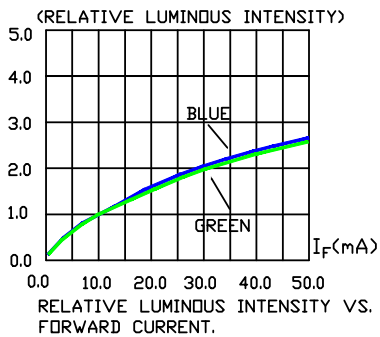
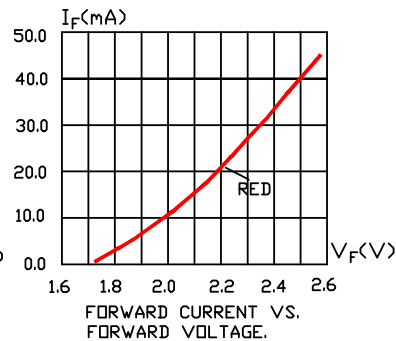
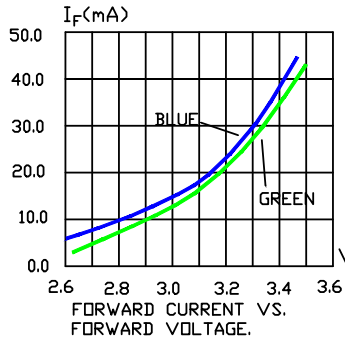
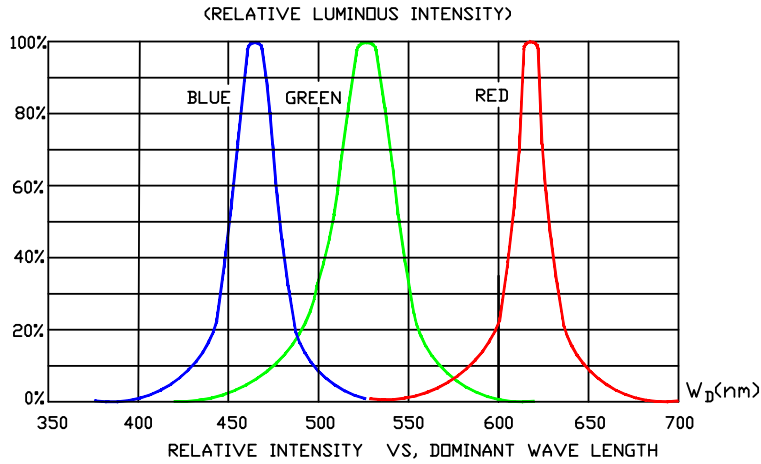
| Kit Number                   | Color | Luminous Intensity (mcd)                   |      | Dominant Wavelength (nm)              |          |           |           | Package |
|------------------------------|-------|--|------|---------------------------------------|----------|-----------|-----------|---------|
|                              |       | Min.                                       | Max. | Color Bin                             | Min.(nm) | Color Bin | Max. (nm) |         |
| CLMUD-FKC-CHJnpM569aBB845343 | Red   | 355  | 560  | RB                                    | 619      | RB        | 624       | Reel    |
|                              | Green | 635  | 900  | G8                                    | 525      | G45       | 532.5     | Reel    |
|                              | Blue  | 101  | 202  | B3                                    | 460      | B4        | 470       | Reel    |
| CLMUD-FKC-CH1np1561BB7T4S3   | Red   | Any 1 Intensity bin from H(355) - J(560)   |      | RB                                    | 619      | RB        | 624       | Reel    |
|                              | Green | Any 1 Intensity bin from np(635) - M(900)  |      | Any 1 hue bin from G8(525)-G45(532.5) |          |           |           | Reel    |
|                              | Blue  | Any 1 Intensity bin from 56(101) - 9a(202) |      | Any 1 hue bin from B3(460)-B4(470)    |          |           |           | Reel    |

## Notes:

- The above kit numbers represent order codes that include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped on each bulk. Single intensity-bin code and single color-bin codes will not be orderable.
- Please refer to the [HB LED Lamp Reliability Test Standards](#) document for reliability test conditions.
- Please refer to the [HB LED Lamp Soldering & Handling](#) document for information about how to use this LED product safely.

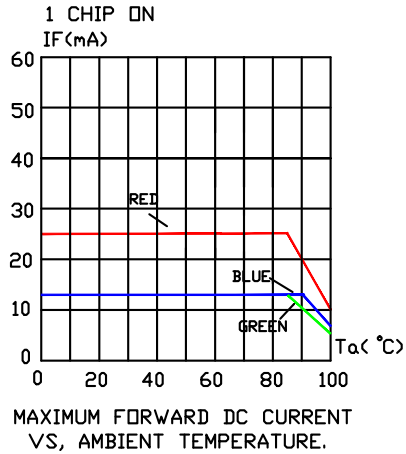
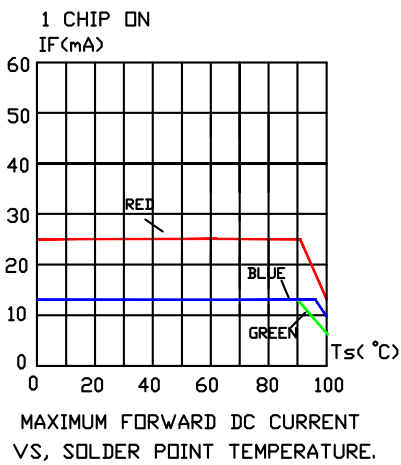
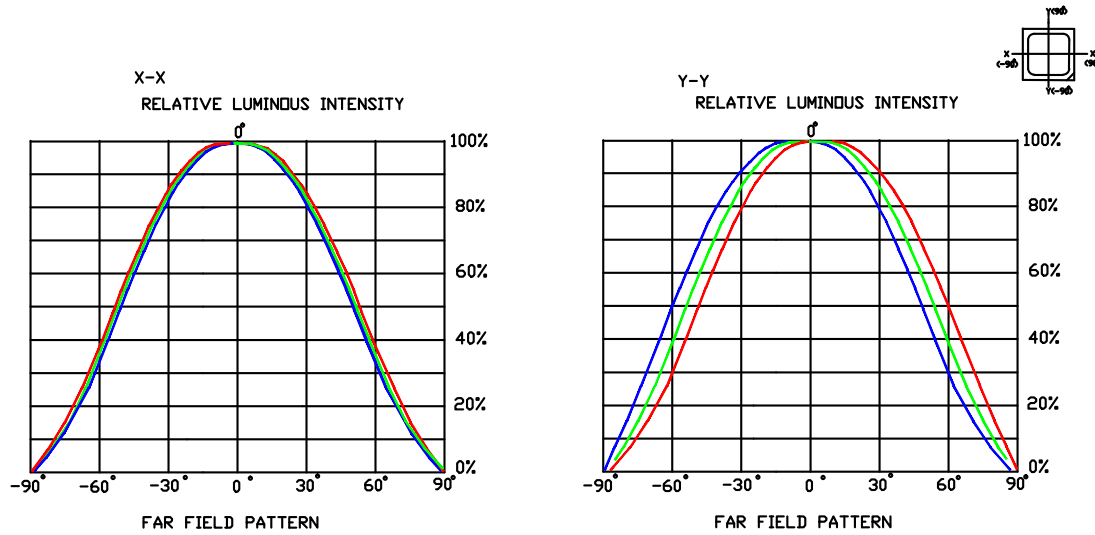
GRAPHS

The data below are collected from statistical figures that do not necessarily correspond to the actual parameters of each single LED. Hence, these data will be changed without further notice.



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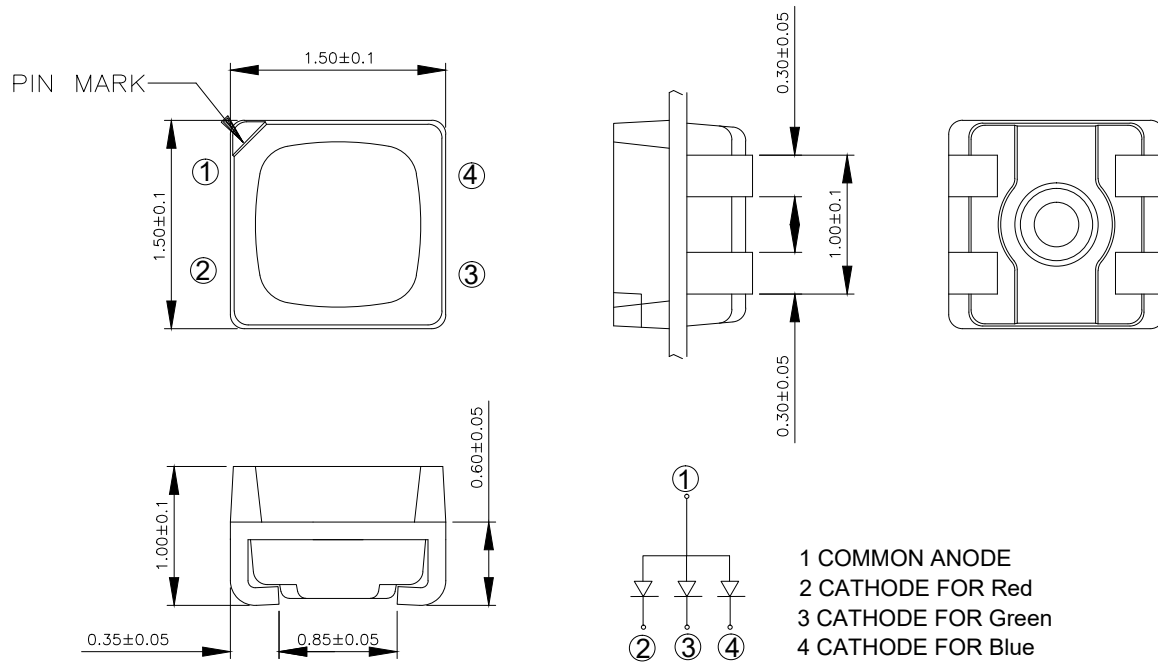


The graph shows the maximum allowable DC current for a LED die of each color.

## MECHANICAL DIMENSIONS

All dimensions are in mm.

Tolerance of measurement of the dimension is  $\pm 0.1$ .



## NOTES

### RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree LED representative or from the [Product Ecology](#) section of the Cree LED website.

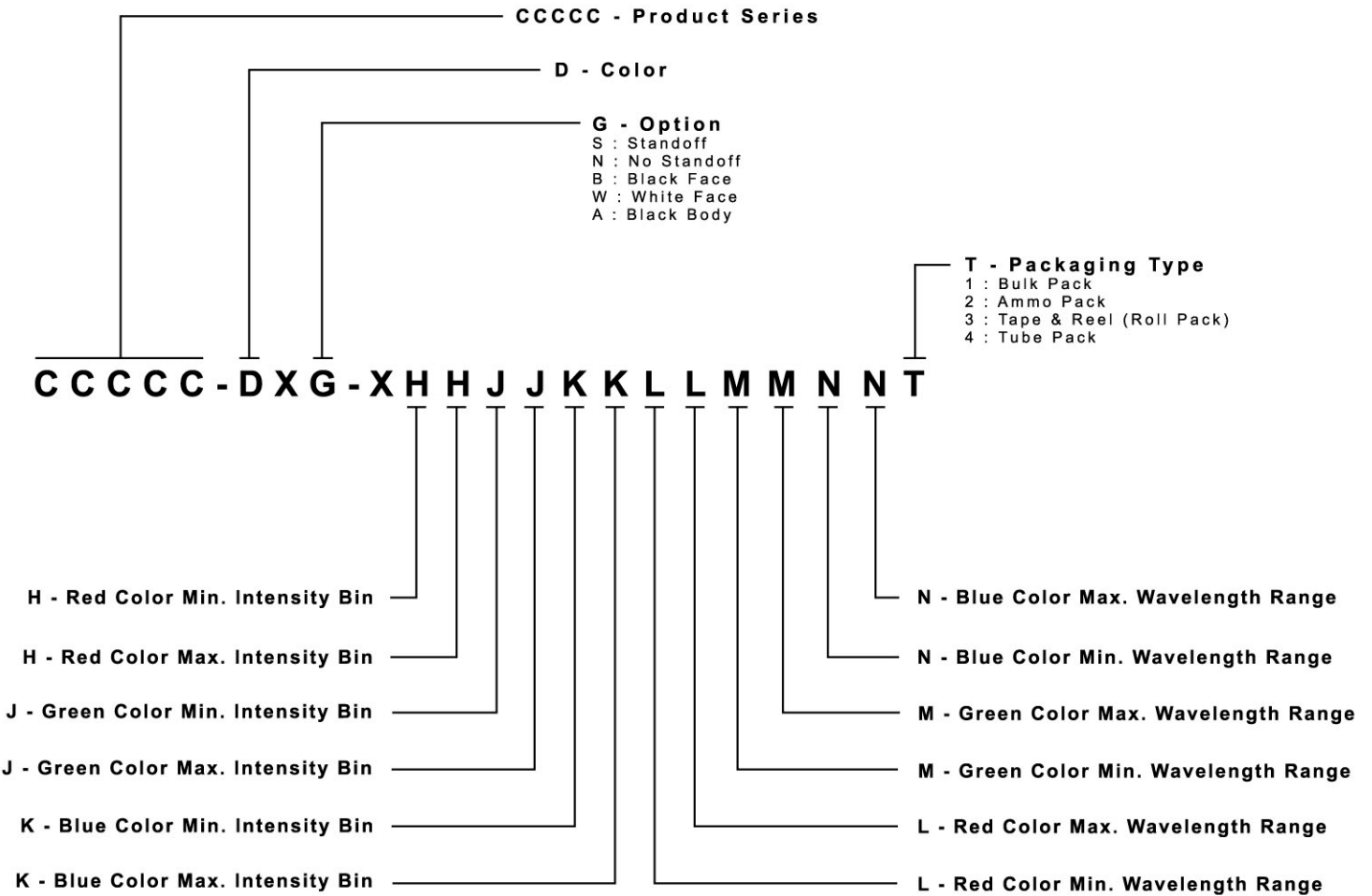
### Vision Advisory

**WARNING:** Do not look at an exposed lamp in operation. Eye injury can result.

**KIT NUMBER SYSTEM**

Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness.

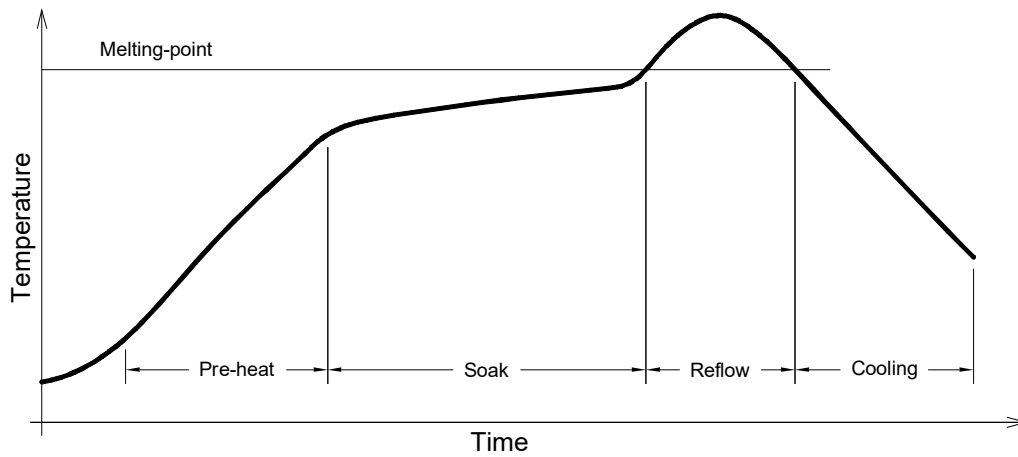
Cree LEDs are sold by order codes in combinations of bins called kits. Order codes are configured in the following manner:





## REFLOW SOLDERING

- The CLMUD-FKC is rated as a MSL 5a product.
- After opening the sealed bag, the SMD LED must be stored under the condition  $<30^{\circ}\text{C}$  and  $<60\%RH$ . Under these conditions, the SMD LEDs must be used (subject to reflow) within 24 hours after bag opening, and baking 24-hour/ $80^{\circ}\text{C}$  is required when exceeding 24 hours.
- Note that baking must only be done once.
- The temperature profile is as below.

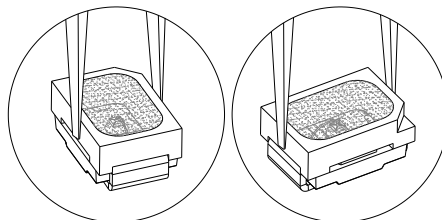


Use only with CLMUD-FKC

| Solder   |
|--|
| Average ramp-up rate = $4^{\circ}\text{C/s}$ max                     |
| Preheat temperature = $150^{\circ}\text{C} \sim 200^{\circ}\text{C}$ |
| Preheat time = 120s max  |
| Ramp-down rate = $6^{\circ}\text{C/s}$ max                           |
| Peak temperature = $235^{\circ}\text{C}$ max                         |
| Time within $5^{\circ}\text{C}$ of actual Peak Temperature = 10s max |
| Duration above $217^{\circ}\text{C}$ is 45s max                      |

## NOTES

- The packaging sizes of these SMD products are very small and the resin is still soft after solidification. Users are required to handle with care. Never touch the resin surface of SMD products.
- To avoid damaging the product's surface and interior device, it is recommended to choose a special nozzle to pick up the SMD products during the process of SMT production. If handling is necessary, take special care when picking up these products. The following method is necessary:



## PACKAGING

- The boxes are not water resistant and they must be kept away from water and moisture.
- The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags.
- Cardboard boxes will be used to protect the LEDs from mechanical shocks during transportation.
- The reel pack is applied in SMD LED.
- Max 12800 pcs per reel.

