

**ProLight PBLC-10FxE-D4N**  
**10W High CRI Power LED**  
**Technical Datasheet**  
**Version: 1.3**

# ProLight Opto PBLC Series

## Features

- Energy Star binning structure, warm white with 3 steps guarantee.
- Best thermal material solution of the world
- Best Moisture Sensitivity: JEDEC Level 1
- RoHS compliant

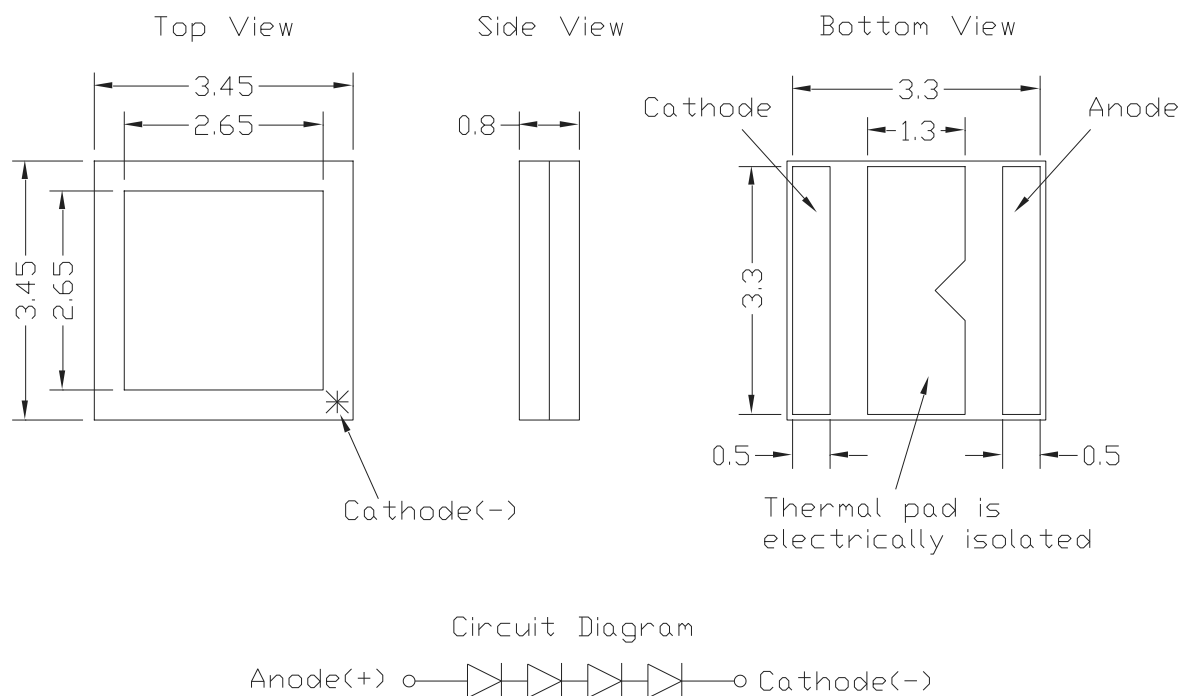
## Main Applications

- Entertainment Lighting
- Commercial Lighting
- Indoor Lighting
- Outdoor Lighting

## Introduction

- ProLight PBLC, is one of the smallest high power LED footprint available by ProLightOpto, has offered extended solid-state lighting design possibilities. PBLC using ProLight unique bonding technology which providing low thermal conductivity and high stability reliability.
- PBLC qualifies as the JEDEC Level 1 MSL sensitivity level and suitable for SMD process, Pbfree reflow soldering capability, and full compliance with EU education of Hazardous Substances (RoHS) legislation.

## Emitter Mechanical Dimensions



### Notes:

1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are  $\pm 0.1\text{mm}$ .
4. Please do not solder the emitter by manual hand soldering, otherwise it will damage the emitter.
5. **Please do not use a force of over 0.3kgf impact or pressure on the lens of the LED, otherwise it will cause a catastrophic failure.**

\*The appearance and specifications of the product may be modified for improvement without notice.

## Flux Characteristics, $T_j = 25^\circ\text{C}$

| Color         | Part Number<br>Emitter | Bin Code | Luminous Flux $\Phi_v$ (lm) |      |                       | CRI<br>Min. |
|---------------|------------------------|----------|-----------------------------|------|-----------------------|-------------|
|               |                        |          | @350mA<br>Min.              | Typ. | Refer @1050mA<br>Typ. |             |
| Neutral White | PBLC-10FNE-D4N         | Q0       | 400                         | 450  | 1100                  | 90          |
|               | PBLC-10FNE-D4N         | S0       | 400                         | 470  | 1140                  | 90          |
| Warm White    | PBLC-10FVE-D4N         | M0       | 370                         | 400  | 970                   | 90          |
|               | PBLC-10FVE-D4N         | N0       | 370                         | 410  | 1000                  | 90          |

- ProLight maintains a tolerance of  $\pm 7\%$  on flux and power measurements.
- ProLight maintains a tolerance of  $\pm 2$  on CRI measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

## Electrical Characteristics, $T_j = 25^\circ\text{C}$

| Color         | Forward Voltage $V_F$ (V) |                |                               | Thermal Resistance<br>Junction to Slug ( $^\circ\text{C/W}$ ) |
|---------------|---------------------------|----------------|-------------------------------|---------------------------------------------------------------|
|               | Min.                      | @350mA<br>Typ. | Max.<br>Refer @1050mA<br>Typ. |                                                               |
| Neutral White | 10.0                      | 11.5           | 12.5                          | 1.7                                                           |
| Warm White    | 10.0                      | 11.5           | 12.5                          | 1.7                                                           |

- ProLight maintains a tolerance of  $\pm 0.2\text{V}$  for Voltage measurements.

## Optical Characteristics at 350mA, $T_j = 25^\circ\text{C}$

| Color         | Bin Code | Color Temperature CCT |        |        | Viewing<br>Angle<br>(degrees)<br>$2\theta_{1/2}$ |
|---------------|----------|-----------------------|--------|--------|--------------------------------------------------|
|               |          | Min.                  | Typ.   | Max.   |                                                  |
| Neutral White | Q0       | 3360 K                | 3500 K | 3570 K | 115                                              |
|               | S0       | 3850 K                | 4000 K | 4120 K | 115                                              |
| Warm White    | M0       | 2660 K                | 2700 K | 2790 K | 115                                              |
|               | N0       | 2970 K                | 3000 K | 3120 K | 115                                              |

- ProLight maintains a tolerance of  $\pm 5\%$  for CCT measurements.

## Electro-Optical Characteristics, T<sub>J</sub> = 25°C

| I <sub>F</sub> (mA) | V <sub>F</sub> (V) | Power (W) | PBLIC-10FNE-D4N (Q0) |       | PBLIC-10FNE-D4N (S0) |       |
|---------------------|--------------------|-----------|----------------------|-------|----------------------|-------|
|                     |                    |           | Flux (lm)            | lm/W  | Flux (lm)            | lm/W  |
| 250                 | 11.41              | 2.85      | 334.6                | 117.4 | 349.5                | 122.6 |
| 350                 | 11.68              | 4.09      | 450.0                | 110.0 | 470.0                | 114.8 |
| 500                 | 12.01              | 6.01      | 618.7                | 103.0 | 646.2                | 107.6 |
| 800                 | 12.55              | 10.04     | 917.0                | 91.3  | 957.7                | 95.4  |
| 1050                | 12.90              | 13.56     | 1100.0               | 81.1  | 1140.0               | 84.1  |

| I <sub>F</sub> (mA) | V <sub>F</sub> (V) | Power (W) | PBLIC-10FVE-D4N (M0) |       | PBLIC-10FVE-D4N (N0) |       |
|---------------------|--------------------|-----------|----------------------|-------|----------------------|-------|
|                     |                    |           | Flux (lm)            | lm/W  | Flux (lm)            | lm/W  |
| 250                 | 11.41              | 2.85      | 297.4                | 104.3 | 306.4                | 107.5 |
| 350                 | 11.68              | 4.09      | 400.0                | 97.7  | 410.0                | 100.2 |
| 500                 | 12.01              | 6.01      | 550.0                | 91.6  | 566.4                | 94.3  |
| 800                 | 12.55              | 10.04     | 815.1                | 81.2  | 839.6                | 83.6  |
| 1050                | 12.90              | 13.56     | 970.0                | 71.5  | 1000.0               | 73.8  |

- All values are reference only.

## Absolute Maximum Ratings

| Parameter                        | Neutral White/Warm White                  |
|----------------------------------|-------------------------------------------|
| DC Forward Current (mA)          | 1050                                      |
| Peak Pulsed Forward Current (mA) | 1500 (less than 1/10 duty cycle@1KHz)     |
| LED Junction Temperature         | 130°C                                     |
| Operating Temperature            | -40°C - 105°C                             |
| Storage Temperature              | -40°C - 120°C                             |
| Soldering Temperature            | JEDEC 020c 260°C                          |
| Allowable Reflow Cycles          | 3                                         |
| Reverse Voltage                  | Not designed to be driven in reverse bias |

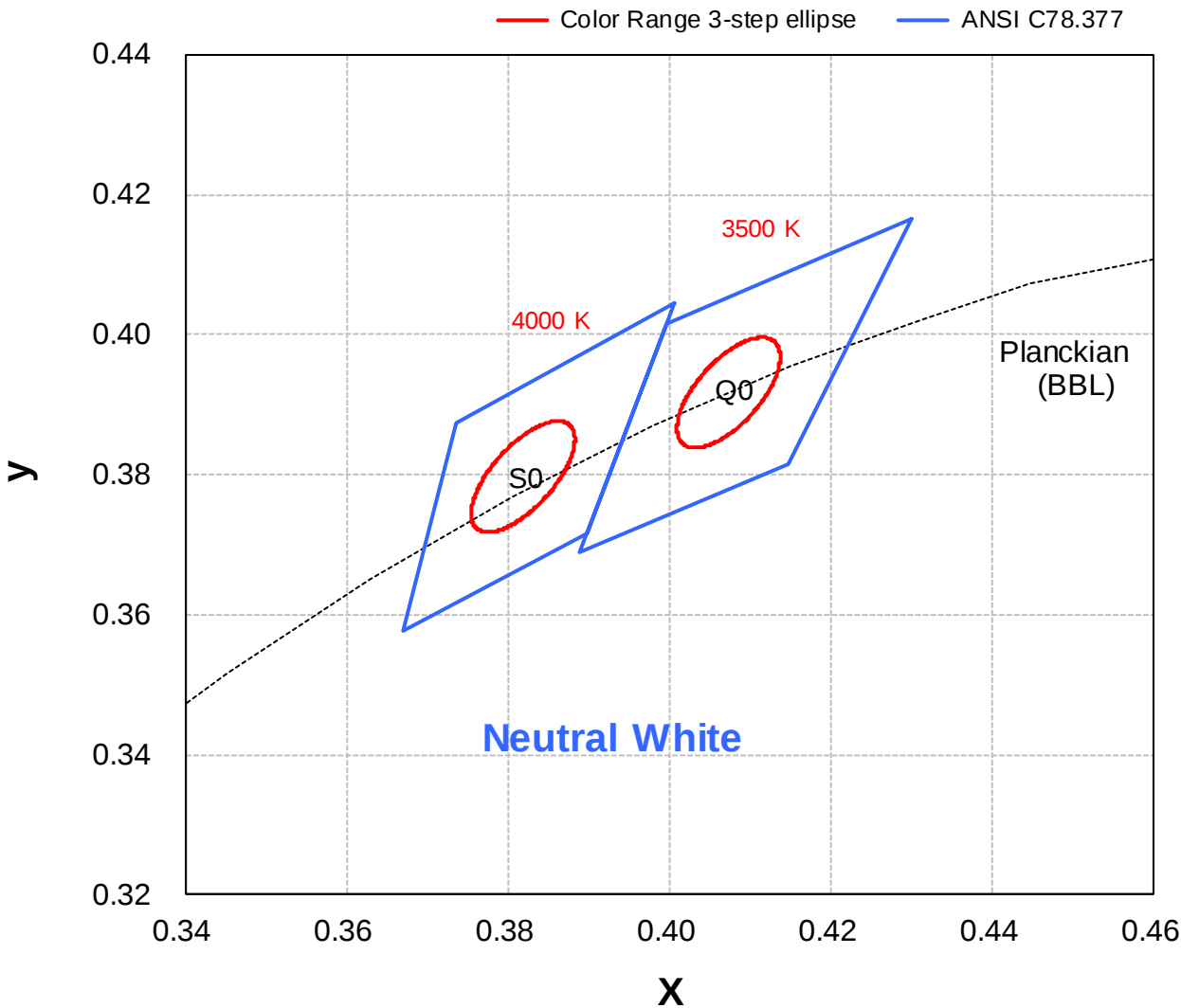
Photometric Luminous Flux Bin Structure at 350mA

| Color         | Bin Code | Minimum<br>Photometric Flux (lm) | Maximum<br>Photometric Flux (lm) | Available<br>Color Bins |
|---------------|----------|----------------------------------|----------------------------------|-------------------------|
| Neutral White | D        | 400                              | 440                              | All                     |
|               | E        | 440                              | 480                              | 【1】                     |
|               | F        | 480                              | 520                              | 【1】                     |
| Warm White    | C        | 370                              | 400                              | All                     |
|               | D        | 400                              | 440                              | 【1】                     |
|               | E        | 440                              | 480                              | 【1】                     |

- ProLight maintains a tolerance of  $\pm 7\%$  on flux and power measurements.
  - The flux bin of the product may be modified for improvement without notice.
  - <sup>【1】</sup> The rest of color bins are not 100% ready for order currently. Please ask for quote and order possibility.

Color Bin

Neutral White Binning Structure Graphical Representation



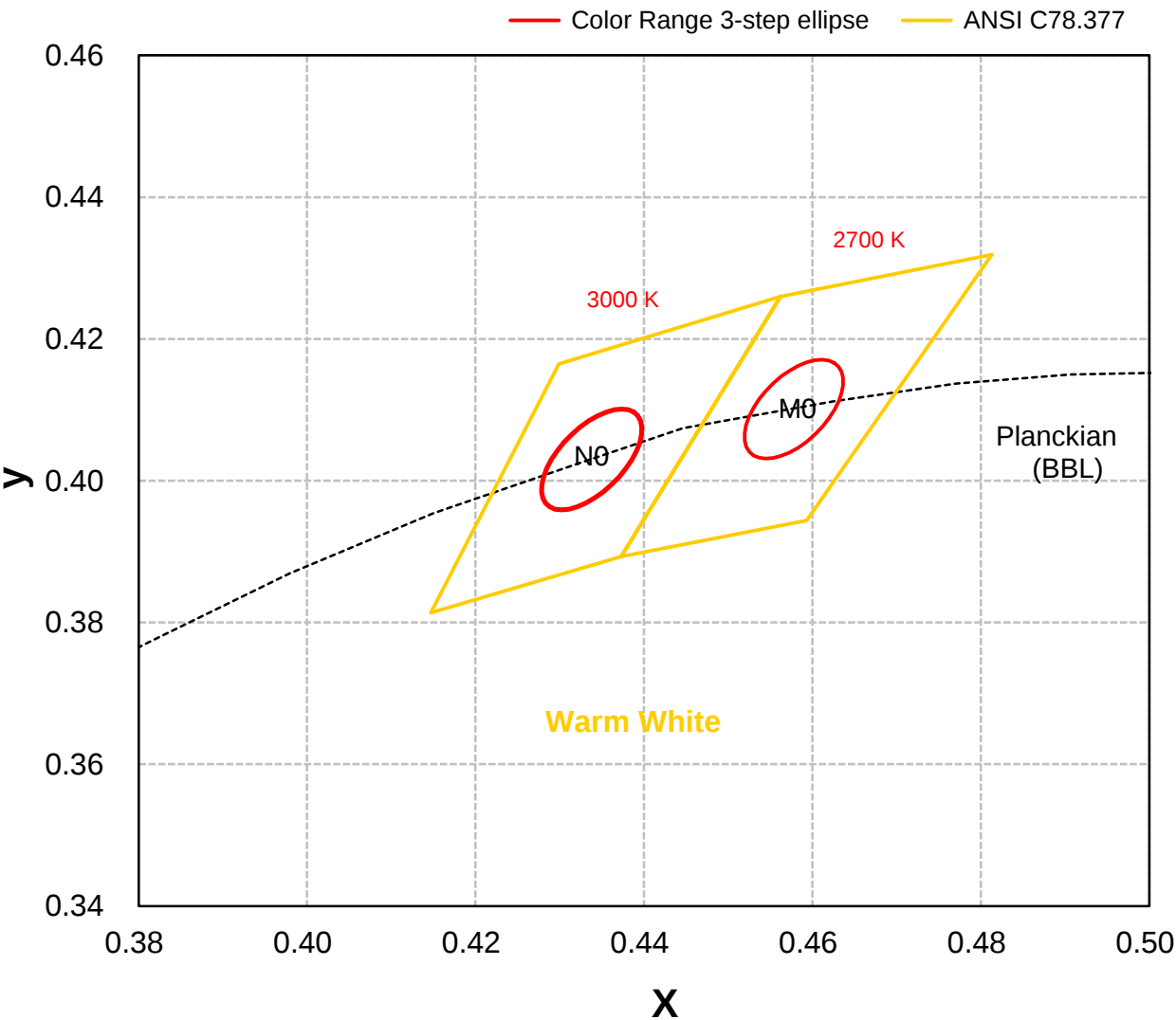
Neutral White Bin Structure

| Bin Code | Center | Oval parameter | Typ. CCT (K) | Bin Code | Center | Oval parameter | Typ. CCT (K) |
|----------|--------|----------------|--------------|----------|--------|----------------|--------------|
| Q0       | x      | a              | 3500         | S0       | x      | a              | 4000         |
|          | y      | b              |              |          | y      | b              |              |
|          |        | e°             |              |          |        | e°             |              |

- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.005

Color Bin

Warm White Binning Structure Graphical Representation



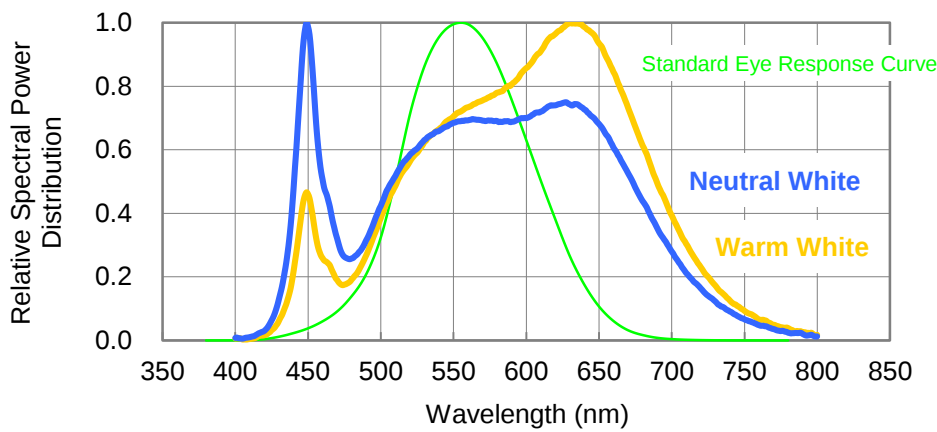
Warm White Bin Structure

| Bin Code | Center | Oval parameter | Typ. CCT (K) | Bin Code | Center | Oval parameter | Typ. CCT (K) |
|----------|--------|----------------|--------------|----------|--------|----------------|--------------|
| M0       | x      | a              | 2700         | N0       | x      | a              | 3000         |
|          |        | b              |              |          |        | b              |              |
|          |        | e°             |              |          |        | e°             |              |
|          |        |                |              |          |        |                |              |
|          | y      |                |              |          | y      |                |              |

- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.005

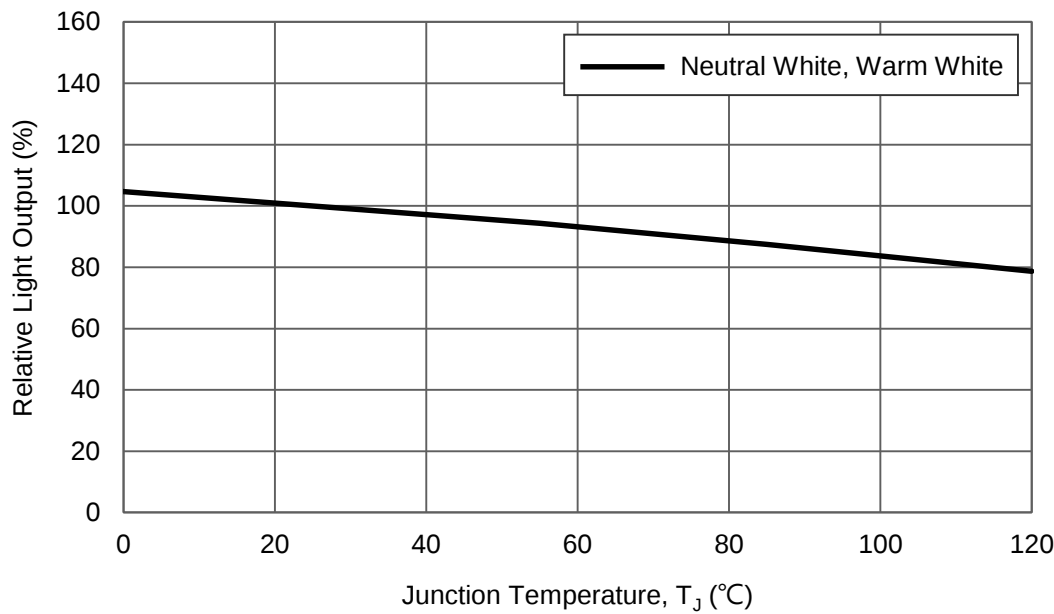
# Color Spectrum, $T_j = 25^{\circ}\text{C}$

1. Neutral White, Warm White



## Light Output Characteristics

Relative Light Output vs. Junction Temperature at 1050mA



## Forward Current Characteristics, $T_j = 25^\circ\text{C}$

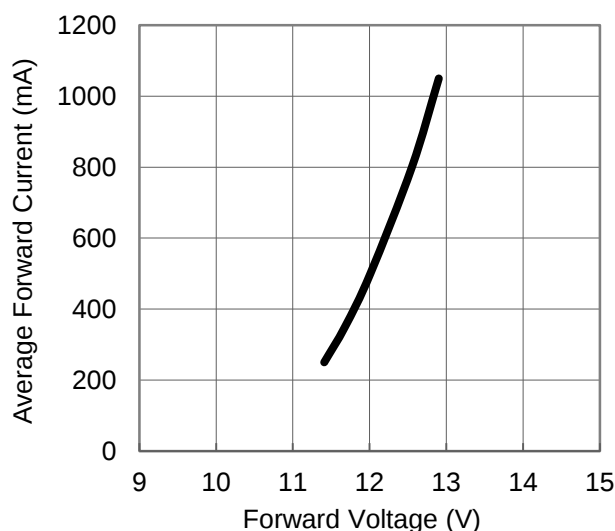


Fig 1. Forward Current vs. Forward Voltage for Neutral White, Warm White.

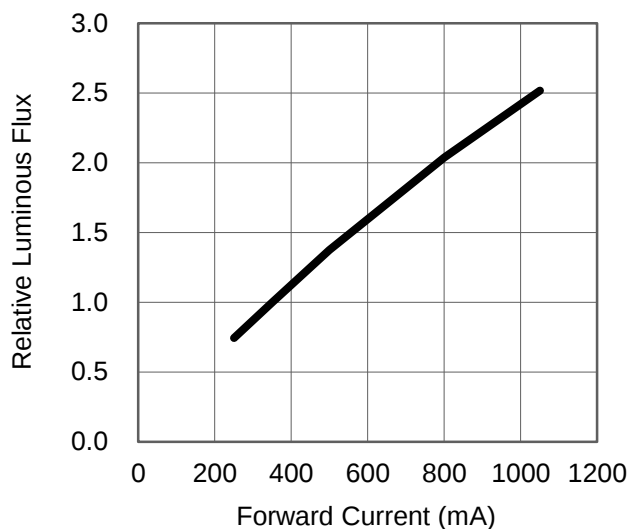
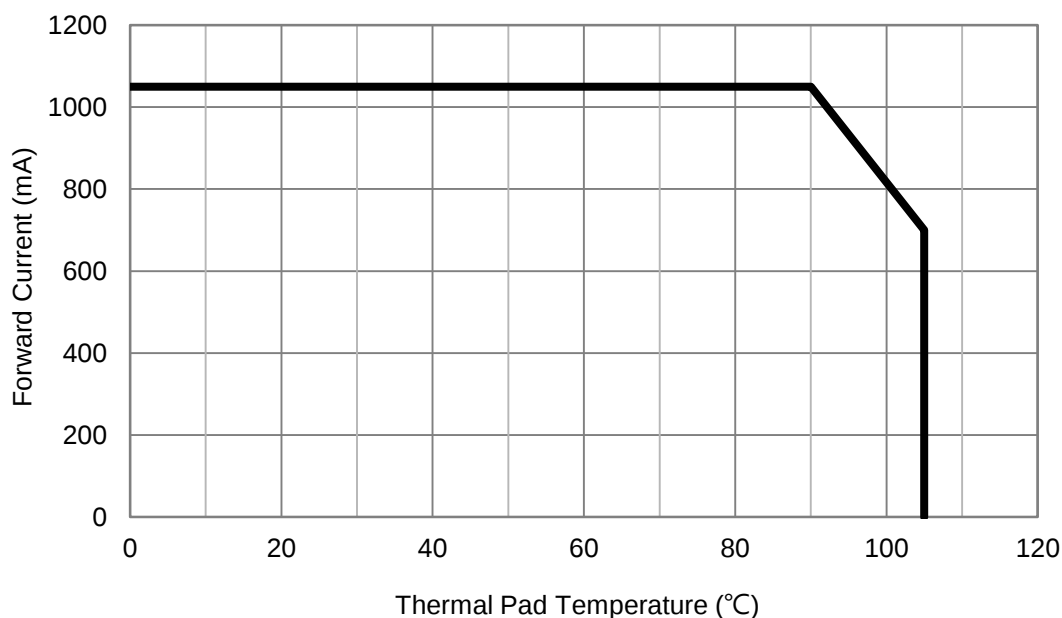
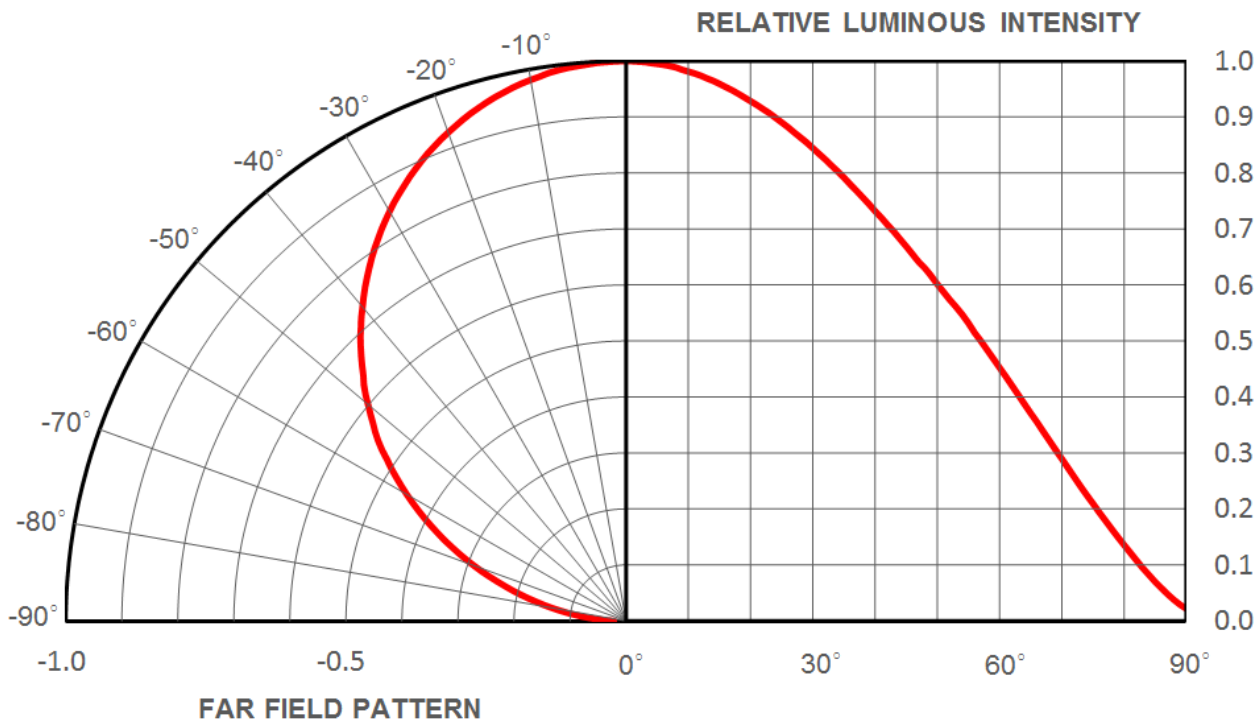


Fig 2. Relative Luminous Flux vs. Forward Current for Neutral White, Warm White at  $T_j=25$  maintained.

## Thermal Pad Temperature vs. Maximum Forward Current



# Typical Representative Spatial Radiation Pattern



## Moisture Sensitivity Level - JEDEC Level 1

| Level | Floor Life |                   | Soak Requirements |                  |                         |            |
|-------|------------|-------------------|-------------------|------------------|-------------------------|------------|
|       |            |                   | Standard          |                  | Accelerated Environment |            |
|       | Time       | Conditions        | Time (hours)      | Conditions       | Time (hours)            | Conditions |
| 1     | Unlimited  | ≤30°C /<br>85% RH | 168 +5/-0         | 85°C /<br>85% RH | NA                      | NA         |

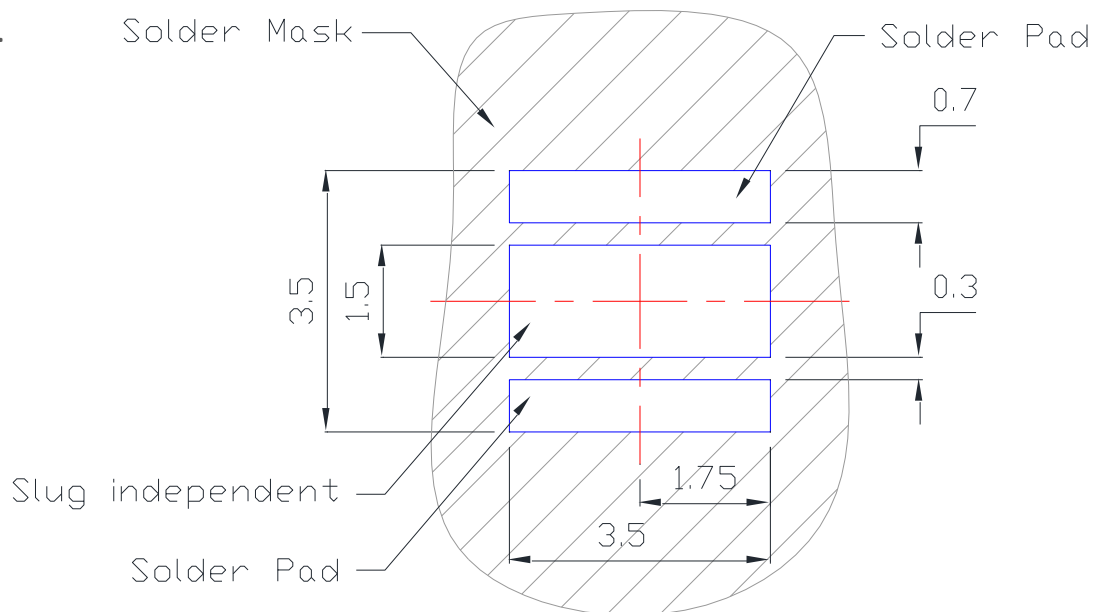
- The standard soak time includes a default value of 24 hours for semiconductor manufacture's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility.
- Table below presents the moisture sensitivity level definitions per IPC/JEDEC's J-STD-020C.

| Level | Floor Life             |                   | Soak Requirements      |                  |                         |                  |
|-------|------------------------|-------------------|------------------------|------------------|-------------------------|------------------|
|       |                        |                   | Standard               |                  | Accelerated Environment |                  |
|       | Time                   | Conditions        | Time (hours)           | Conditions       | Time (hours)            | Conditions       |
| 1     | Unlimited              | ≤30°C /<br>85% RH | 168 +5/-0              | 85°C /<br>85% RH | NA                      | NA               |
| 2     | 1 year                 | ≤30°C /<br>60% RH | 168 +5/-0              | 85°C /<br>60% RH | NA                      | NA               |
| 2a    | 4 weeks                | ≤30°C /<br>60% RH | 696 +5/-0              | 30°C /<br>60% RH | 120 +1/-0               | 60°C /<br>60% RH |
| 3     | 168 hours              | ≤30°C /<br>60% RH | 192 +5/-0              | 30°C /<br>60% RH | 40 +1/-0                | 60°C /<br>60% RH |
| 4     | 72 hours               | ≤30°C /<br>60% RH | 96 +2/-0               | 30°C /<br>60% RH | 20 +0.5/-0              | 60°C /<br>60% RH |
| 5     | 48 hours               | ≤30°C /<br>60% RH | 72 +2/-0               | 30°C /<br>60% RH | 15 +0.5/-0              | 60°C /<br>60% RH |
| 5a    | 24 hours               | ≤30°C /<br>60% RH | 48 +2/-0               | 30°C /<br>60% RH | 10 +0.5/-0              | 60°C /<br>60% RH |
| 6     | Time on Label<br>(TOL) | ≤30°C /<br>60% RH | Time on Label<br>(TOL) | 30°C /<br>60% RH | NA                      | NA               |

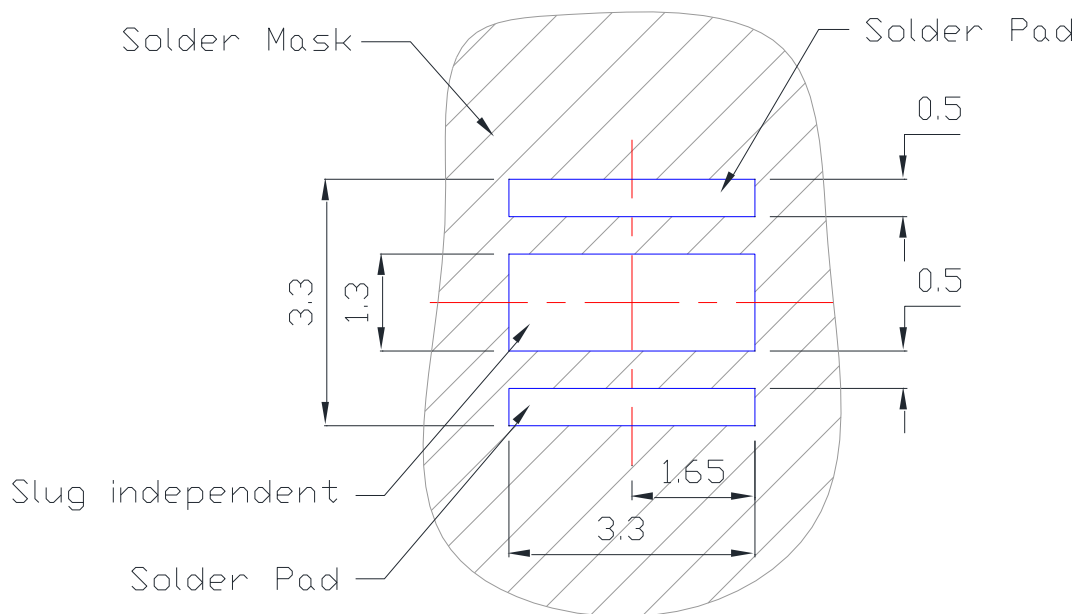
## Recommended Solder Pad Design

### Standard Emitter

#### TYPE A.



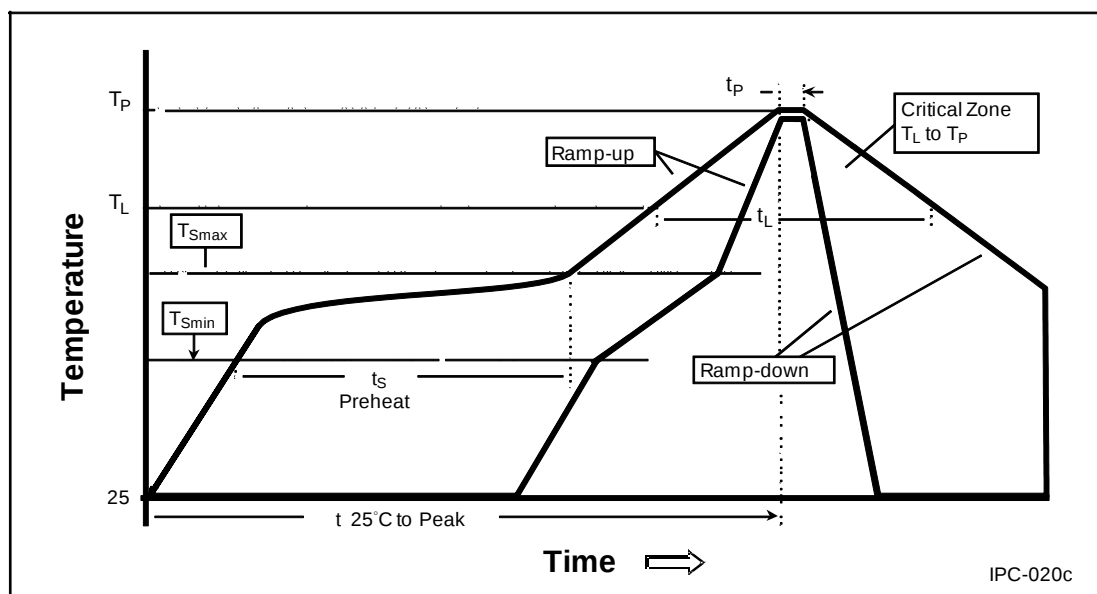
#### TYPE B.



- All dimensions are in millimeters.

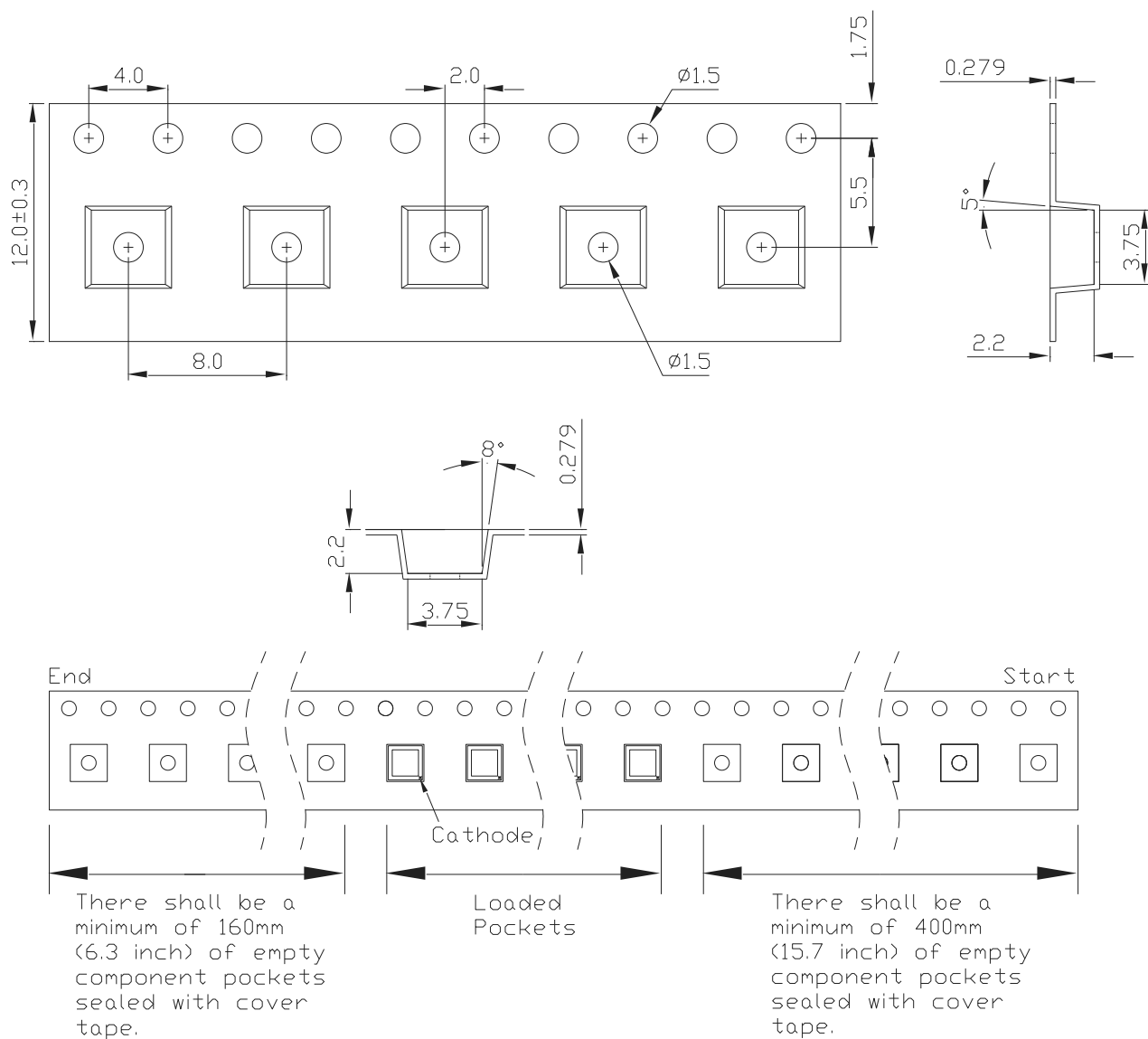
## Reflow Soldering Condition

| Profile Feature                                                                                                                                                                                                         | Sn-Pb Eutectic Assembly          | Pb-Free Assembly                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|
| Average Ramp-Up Rate<br>( $T_{Smax}$ to $T_p$ )                                                                                                                                                                         | 3°C / second max.                | 3°C / second max.                |
| Preheat <ul style="list-style-type: none"> <li>– Temperature Min (<math>T_{Smin}</math>)</li> <li>– Temperature Max (<math>T_{Smax}</math>)</li> <li>– Time (<math>t_{Smin}</math> to <math>t_{Smax}</math>)</li> </ul> | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-180 seconds |
| Time maintained above: <ul style="list-style-type: none"> <li>– Temperature (<math>T_L</math>)</li> <li>– Time (<math>t_l</math>)</li> </ul>                                                                            | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
| Peak/Classification Temperature ( $T_p$ )                                                                                                                                                                               | 240°C                            | 260°C                            |
| Time Within 5°C of Actual Peak Temperature ( $t_p$ )                                                                                                                                                                    | 10-30 seconds                    | 20-40 seconds                    |
| Ramp-Down Rate                                                                                                                                                                                                          | 6°C/second max.                  | 6°C/second max.                  |
| Time 25°C to Peak Temperature                                                                                                                                                                                           | 6 minutes max.                   | 8 minutes max.                   |



- We recommend using the M705-S101-S4 solder paste from SMIC (Senju Metal Industry Co., Ltd.) for lead-free soldering.
- Do not use solder pastes with post reflow flux residue>47%. (58Bi-42Sn eutectic alloy, etc) This kind of solder pastes may cause a reliability problem to LED.
- All temperatures refer to topside of the package, measured on the package body surface.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- Reflow soldering should not be done more than three times.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.

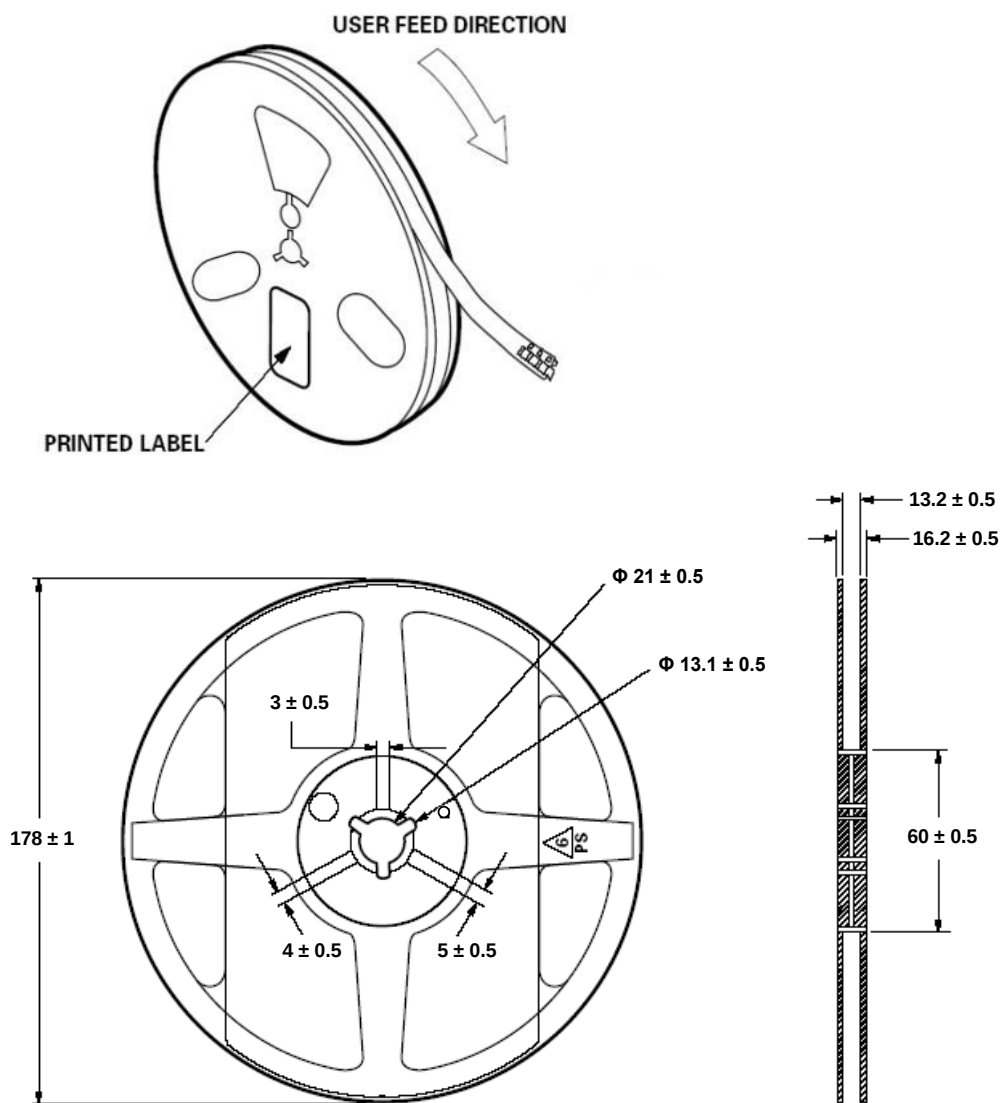
## Emitter Reel Packaging



### Notes:

1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are  $\pm 0.1$ mm.

## Emitter Reel Packaging



### Notes:

1. Empty component pockets sealed with top cover tape.
2. 250, 500 and 1000 pieces per reel.
3. Drawing not to scale.
4. All dimensions are in millimeters.

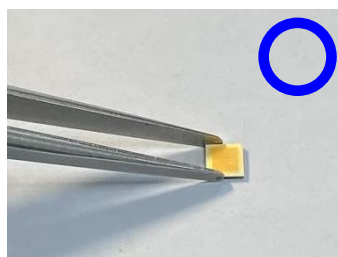
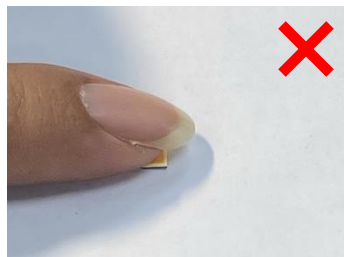
## Precaution for Use

- Storage  
Please do not open the moisture barrier bag (MBB) more than one week. This may cause the leads of LED discoloration. We recommend storing ProLight's LEDs in a dry box after opening the MBB. The recommended storage conditions are temperature 5 to 30 °C and humidity less than 40% RH. It is also recommended to return the LEDs to the MBB and to reseal the MBB.
- The slug is not electrically neutral. Therefore, we recommend to isolate the heat sink.
- **We recommend using the M705-S101-S4 solder paste from SMIC (Senju Metal Industry Co., Ltd.) for lead-free soldering.**
- **Do not use solder pastes with post reflow flux residue > 47%. (58Bi-42Sn eutectic alloy, etc) This kind of solder pastes may cause a reliability problem to LED.**
- Any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temperature after soldering.
- Please avoid rapid cooling after soldering.
- Components should not be mounted on warped direction of PCB.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a heat plate should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- This device should not be used in any type of fluid such as water, oil, organic solvent and etc. When cleaning is required, isopropyl alcohol should be used.
- When the LEDs are illuminating, operating current should be decided after considering the package maximum temperature.
- The appearance, specifications and flux bin of the product may be modified for improvement without notice. Please refer to the below website for the latest datasheets.  
<http://www.prolightopto.com/>

## Handling of Silicone Lens LEDs

Notes for handling of silicone lens LEDs

- Please do not use a force of over 0.3kgf impact or pressure on the silicone lens, otherwise it will cause a catastrophic failure.
- The LEDs should only be picked up by making contact with the sides of the LED body.
- Avoid touching the silicone lens especially by sharp tools such as Tweezers.
- Avoid leaving fingerprints on the silicone lens.
- Please store the LEDs away from dusty areas or seal the product against dust.
- When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the silicone lens must be prevented.
- Please do not mold over the silicone lens with another resin. (epoxy, urethane, etc)



## Disclaimers

ProLightopto Technology has made every reasonable effort to ensure the accuracy of the information in this datasheet. However, it should be understood that this information is for guidance only and does not constitute any offer or part of a contract.

ProLightopto Technology does not guarantee or accept any legal liability for the accuracy, completeness, or usefulness of any information, product, technology, or process disclosed in this datasheet. The company reserves the right to make changes or improvements to this datasheet at its discretion.

Unless this datasheet is incorporated into a formal contract, customers should not rely on the information as a binding commitment to any specifications or product parameters by ProLightopto Technology. Customers are advised to verify that the information is current and complete before entering into any contract or acknowledging any purchase order. Therefore, all products described herein are subject to ProLightopto Technology's terms and conditions at the time of order acknowledgment.

Unless agreed upon by contractual agreement, not all parameters of each product are necessarily tested. ProLightopto Technology does not warrant or grant any license, either expressed or implied, under its patent rights or the rights of others.

Reproduction of the information contained herein is permitted only if done without any modifications or alterations. Altering this information and reproducing it is considered an unfair and deceptive business practice. ProLightopto Technology is not responsible or liable for any such altered documentation.

Reselling ProLightopto Technology's products with statements that differ from or exceed the parameters specified by ProLightopto Technology voids all express or implied warranties for the associated product or service and is considered an unfair and deceptive business practice. ProLightopto Technology is not responsible or liable for any such statements.

ProLightopto Technology's products are not authorized for use as critical components in life support devices or systems without explicit written approval from ProLightopto Technology.

For the purposes of this disclaimer :

1. Life support devices or systems are defined as those intended for surgical implant into the body or those that support or sustain life. Their failure, when used according to instructions for use provided in the labeling, can reasonably be expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure can reasonably be expected to cause the failure of the device or system, or to affect its safety or effectiveness.