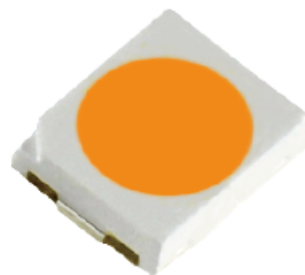


# 2T03X5PA00031SAA

Ultra high reliability and luminous efficacy ,PLCC LED Series are optimized to be used as lighting for automotive signal lighting designs or signboard.



## Applications :

- Automotive Interior/Exterior Lighting

## Features :

- Package: Ag Plated 2 pad design package with silicone resin
- Dimension: 3.5 mmx2.8 mm
- Chip technology: InGaN
- View Angle: 120°
- Color : PC Amber
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- MSL: Level 2
- Qualifications: The product qualification test based on the guidelines of AEC-Q102

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## General Information

## Ordering Code Format

|    |    |       |       |       |        |         |     |     |     |     |
|----|----|-------|-------|-------|--------|---------|-----|-----|-----|-----|
| 2  | T  | 03    | X5    | PA    | 00     | 03      | 1   | S   | A   | A   |
| X1 | X2 | X3-X4 | X5-X6 | X7-X8 | X9-X10 | X11-X12 | X13 | X14 | X15 | X16 |

| X1   |         | X2        |      | X3-X4  |      | X5-X6   |      | X7-X8     |          |
|------|---------|-----------|------|--------|------|---------|------|-----------|----------|
| Type |         | Component |      | Series |      | Wattage |      | Color/CCT |          |
| 2    | Emitter | T         | PLCC | 03     | 3528 | X5      | 0.5W | PA        | PC Amber |

| X9-X10  |   | X11-X12 |    | X13            |                   | X14               |        | X15   |            |
|---------|---|---------|----|----------------|-------------------|-------------------|--------|-------|------------|
| CRI(Ra) |   | Voltage |    | Leadframe Mode |                   | Leadframe Plating |        | Model |            |
| 00      | - | 03      | 3V | 1              | PCT 0.80H<br>2PIN | S                 | Silver | A     | Automotive |

| X16           |     |
|---------------|-----|
| Serial Number |     |
| 1             | 1   |
| 2             | 2   |
| 3             | 3   |
| 4             | 4   |
| 5             | 5   |
| 6             | 6   |
| 7             | 7   |
| 8             | 8   |
| 9             | 9   |
| 10            | 10  |
| 11            | 11  |
| 12            | 12  |
| 13            | 13  |
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| 19            | 19  |
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| 24            | 24  |
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| 39            | 39  |
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| 86            | 86  |
| 87            | 87  |
| 88            | 88  |
| 89            | 89  |
| 90            | 90  |
| 91            | 91  |
| 92            | 92  |
| 93            | 93  |
| 94            | 94  |
| 95            | 95  |
| 96            | 96  |
| 97            | 97  |
| 98            | 98  |
| 99            | 99  |
| 100           | 100 |

## Absolute Maximum Ratings

Absolute maximum ratings

| Parameter  |              | Symbol    | Values                             |
|--|--------------|-----------|------------------------------------|
| Operating Temperature  | min.<br>max. | $T_{op}$  | -40 °C<br>110 °C                   |
| Storage Temperature  | min.<br>max. | $T_{stg}$ | -40 °C<br>110 °C                   |
| Junction Temperature   | max.         | $T_j$     | 125 °C                             |
| Forward current<br>$T_j = 25\text{ °C}$  | min.<br>max. | $I_F$     | 5 mA<br>200 mA                     |
| Surge Current<br>$t \leq 10\text{ }\mu\text{s}; D = 0.005; T_j = 25\text{ °C}$ | max.         | $I_{FS}$  | 300 mA                             |
| Reverse voltage<br>$T_j = 25\text{ °C}$  | max.         | $V_R$     | Not designed for reverse operation |
| ESD withstand voltage<br>acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)         |              | $V_{ESD}$ | 2 kV                               |

Notes: Proper current derating must be observed to maintain junction temperature below the maximum at all time.

## Characteristics

$I_F = 140\text{ mA}; T_j = 25\text{ °C}$

| Parameter   |                      | Symbol                  | Values                                 |
|---|----------------------|-------------------------|--|
| Viewing angle   | typ.                 | $\phi$                  | 120 °                                  |
| Forward Voltage   | min.<br>typ.<br>max. | $V_F$                   | 2.70 V<br>3.05 V<br>3.30 V             |
| Reverse current<br>$V_R = 5\text{ V}$   | typ.<br>max.         | $I_R$                   | 0.01 $\mu\text{A}$<br>10 $\mu\text{A}$ |
| Real thermal resistance junction/solder point   | typ.<br>max.         | $R_{thJS\text{ real}}$  | 36 K / W<br>42 K / W                   |
| Electrical thermal resistance junction/<br>solder point with efficiency $\eta_e = 27\%$ | typ.<br>max.         | $R_{thJS\text{ elec.}}$ | 26 K / W<br>31 K / W                   |

## Luminous Flux Characteristic

Luminous Flux Characteristics,  $I_f=140\text{mA}$ ,  $T_j=25^\circ\text{C}$

| Symbol         | Group | Min. Luminous Flux(lm) | Max. Luminous Flux(lm) | Typ. Luminous Intensity(cd) |
|----------------|-------|------------------------|------------------------|-----------------------------|
| I <sub>v</sub> | 30    | 30                     | 35                     | 10.2                        |
|                | 35    | 35                     | 40                     | 11.7                        |
|                | 40    | 40                     | 45                     | 13.3                        |
|                | 45    | 45                     | 50                     | 14.8                        |

Note:

The luminous flux performance is guaranteed within published operating conditions. Edison Opto maintains a tolerance of  $\pm 10\%$  on flux measurements.

## Voltage Bin Structure

Voltage Bin Structure,  $I_f=140\text{mA}$ ,  $T_j=25^\circ\text{C}$

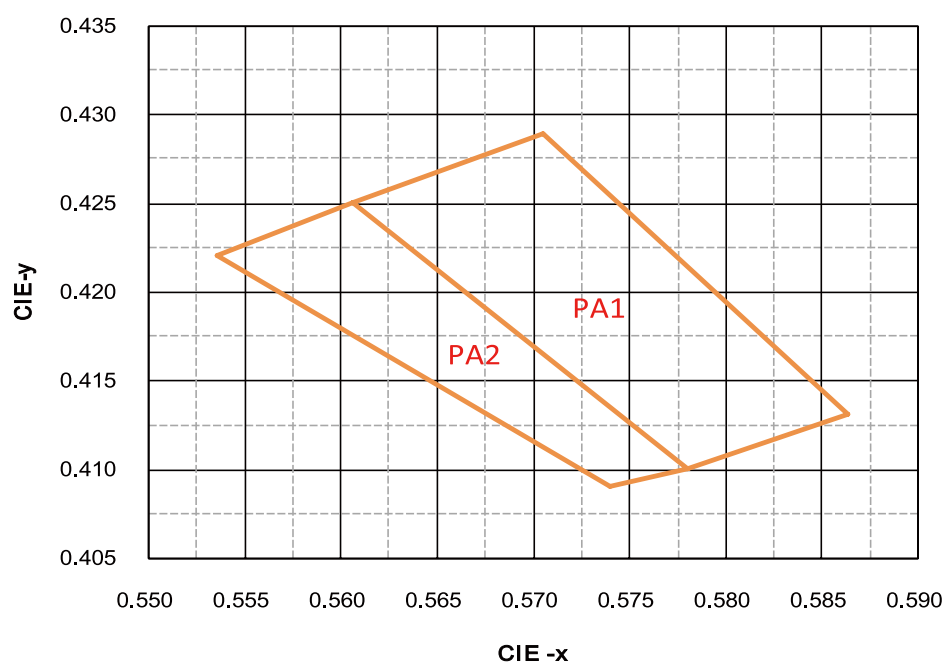
| Symbol         | Group | Min. Voltage (V) | Max. Voltage (V) |
|----------------|-------|------------------|------------------|
| V <sub>F</sub> | B70   | 2.70             | 2.90             |
|                | B90   | 2.90             | 3.10             |
|                | C10   | 3.10             | 3.30             |

Note:

Forward voltage measurement allowance is  $\pm 0.1\text{V}$ .

## Color BIN code

### PC Amber CIE



| Color Bin | X      | Y      | Color Bin | X      | Y      |
|-----------|--------|--------|-----------|--------|--------|
| PA1       | 0.5606 | 0.4250 | PA2       | 0.5536 | 0.4221 |
|           | 0.5705 | 0.4289 |           | 0.5606 | 0.4250 |
|           | 0.5863 | 0.4131 |           | 0.5780 | 0.4100 |
|           | 0.5780 | 0.4100 |           | 0.5740 | 0.4090 |

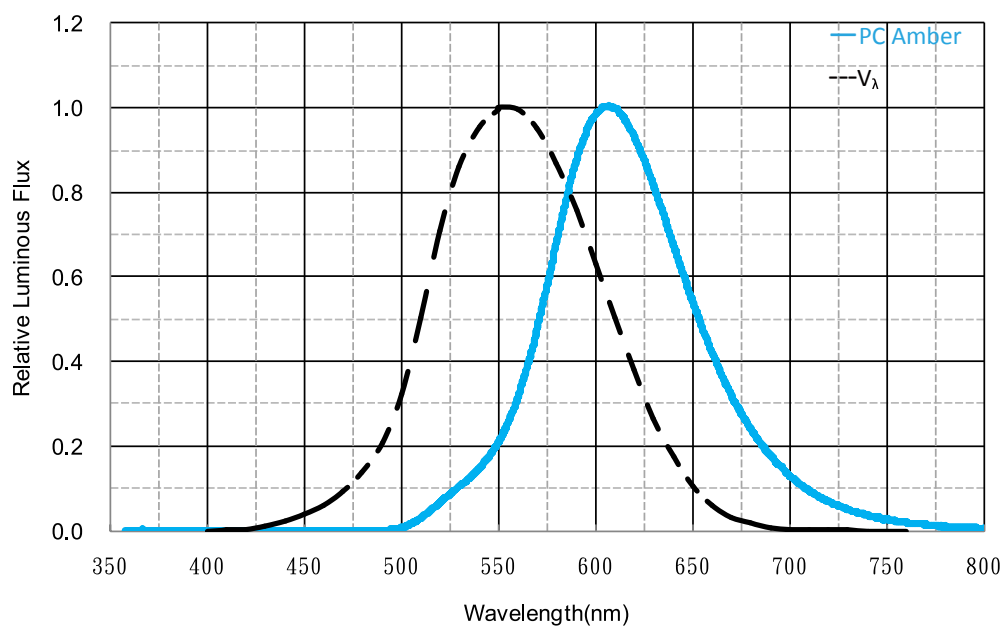
**Notes:**

1. PLCC 3528 PC Amber Emitters are tested and binned by x,y coordinates.
2. Edison maintains a tester tolerance of  $\pm 0.005$  on x, y color coordinates.

## Characteristic Curves

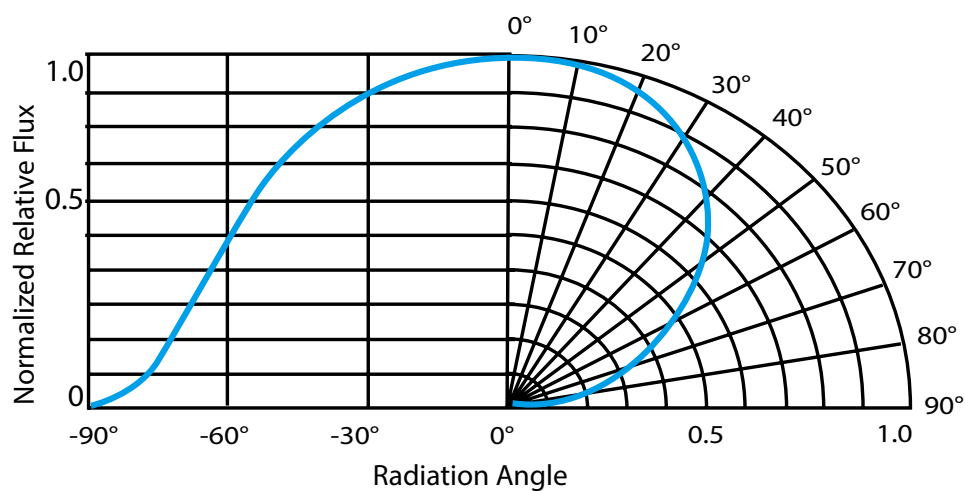
### Color Spectrum

$I_F = 140 \text{ mA}$  ;  $T_J = 25^\circ \text{C}$



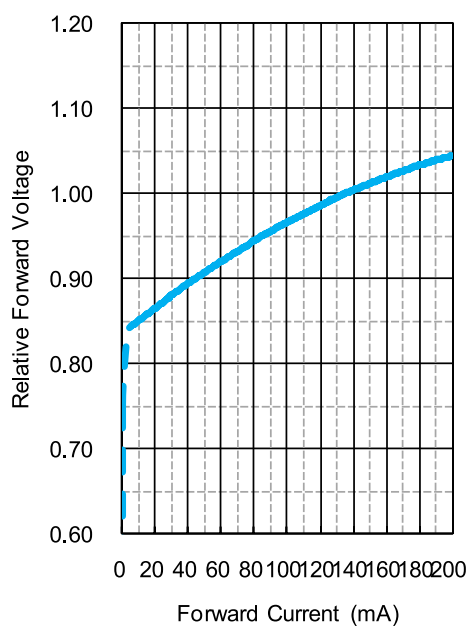
### Beam Pattern

$I_F = 140 \text{ mA}$  ;  $T_J = 25^\circ \text{C}$



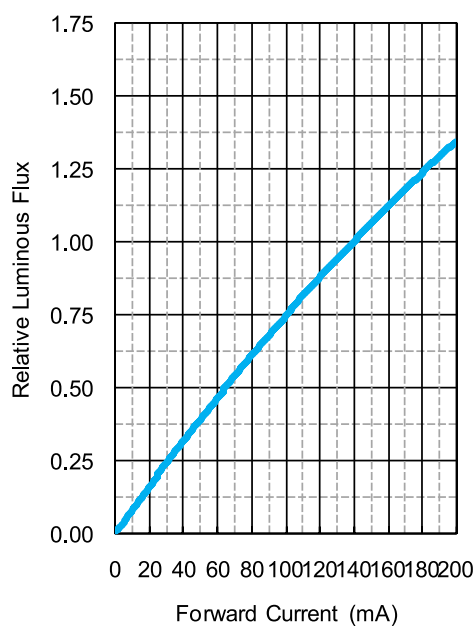
### Relative Forward Voltage

$$V_F/V_F(140\text{ mA}) = f(V_F); T_J = 25^\circ\text{C}$$



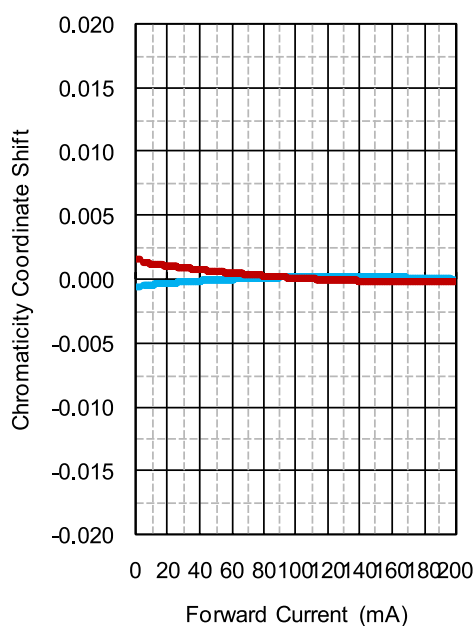
### Relative Luminous Flux

$$I_V/I_V(140\text{ mA}) = f(I_V); T_J = 25^\circ\text{C}$$



### Chromaticity Coordinate Shift

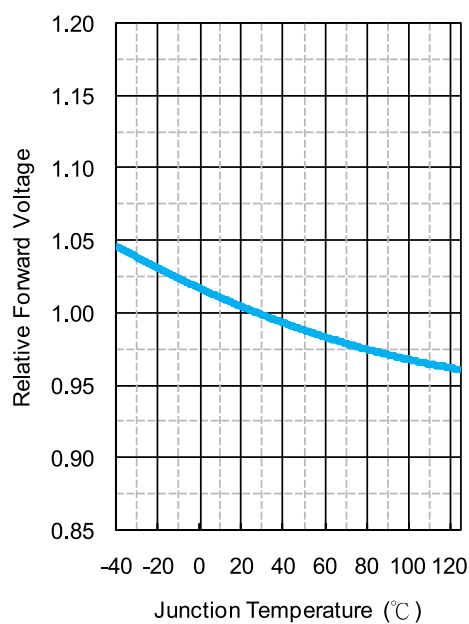
$$\Delta C_x, \Delta C_y = f(I_F); T_J = 25^\circ\text{C}$$





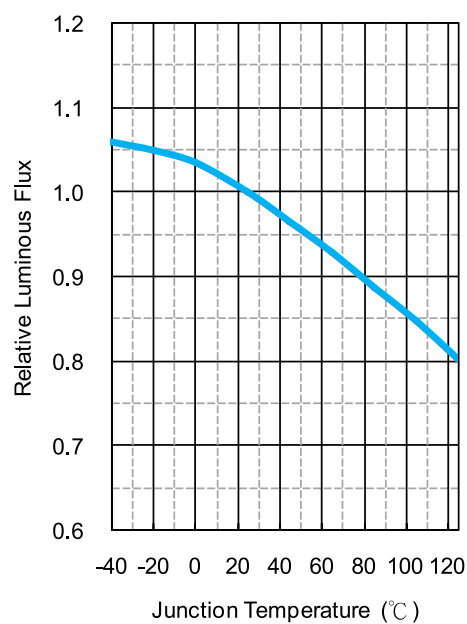
### Relative Forward Voltage

$$V_F/V_F(25^\circ\text{C}) = f(V_F); I_F = 140\text{ mA}$$



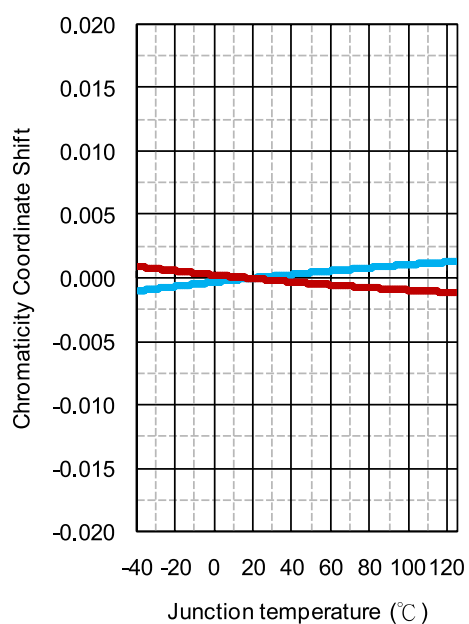
### Relative Luminous Flux

$$I_V/I_V(25^\circ\text{C}) = f(I_V); I_F = 140\text{ mA}$$



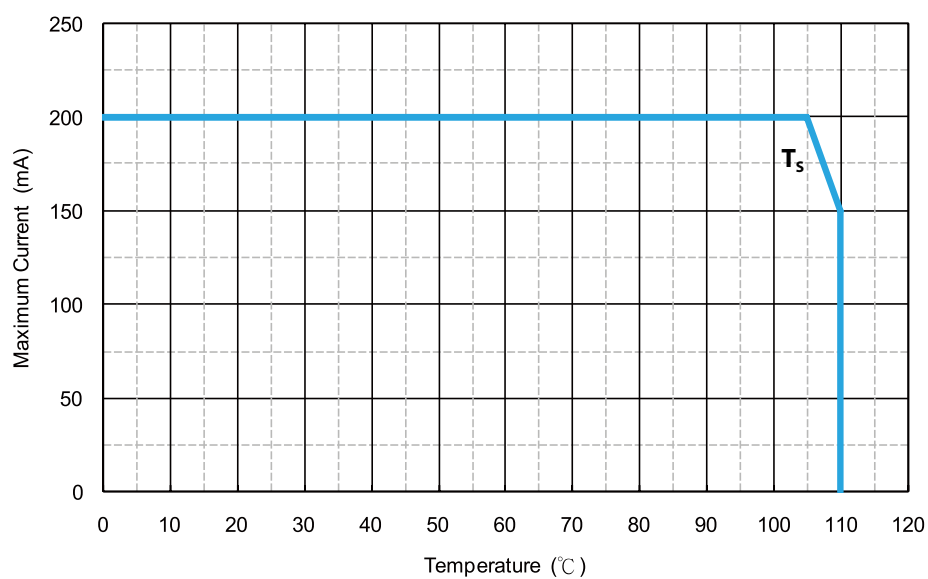
### Chromaticity Coordinate Shift

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 140\text{ mA}$$



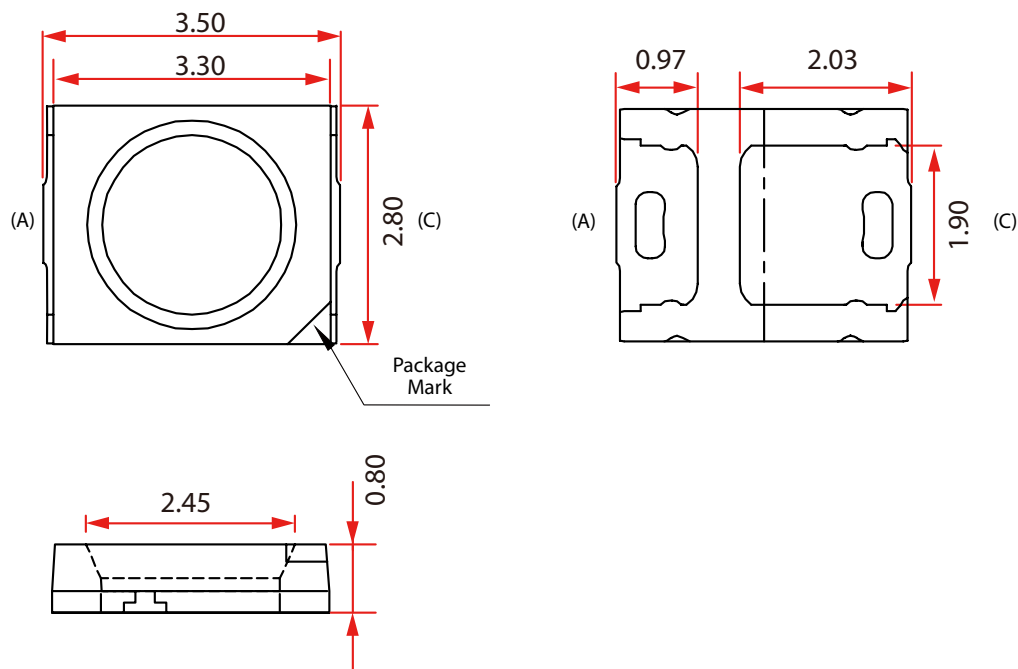
## Max. Permissible Forward Current

$$I_F = f(T)$$

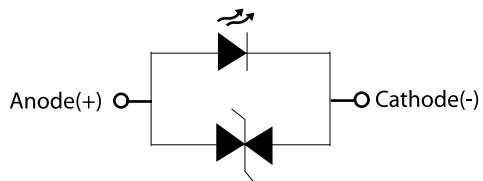


## Mechanical Dimensions

### Dimensional Drawing



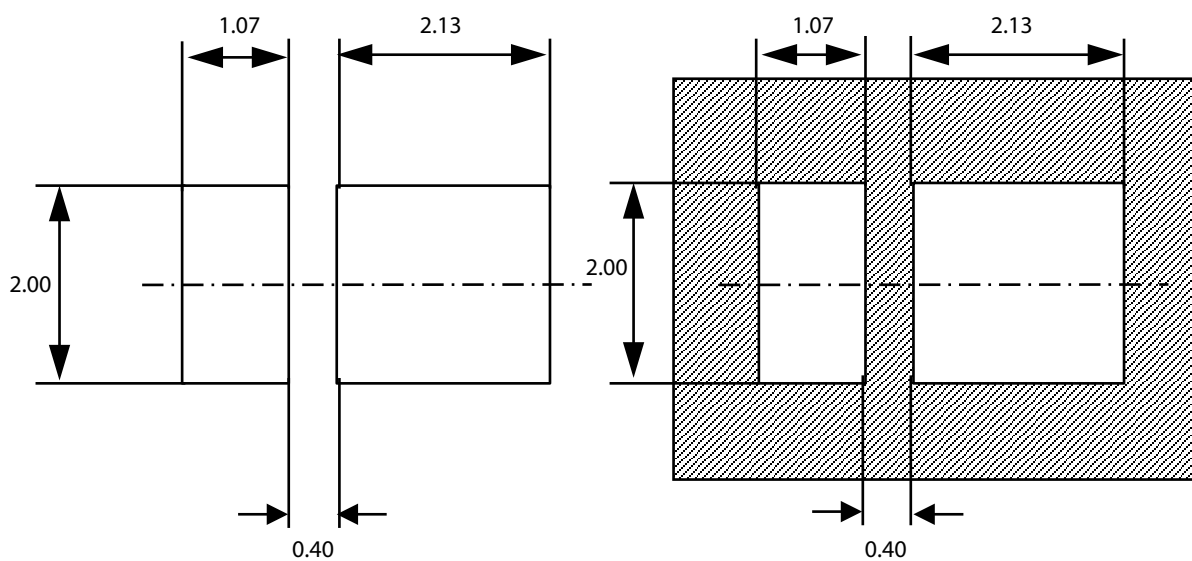
### Circuit



#### Notes:

1. All dimensions are measured in mm.
2. Tolerance :  $\pm 0.1$  mm
3. Approximate Weight : 25.0 mg

## Recommended Solder Pad



Pad design for improved heat dissipation



Solder resist

Cu-area > 16mm<sup>2</sup> per pad

### Notes:

1. All dimensions are measured in mm.
2. Tolerance :  $\pm 0.1$  mm

## Reflow Profile

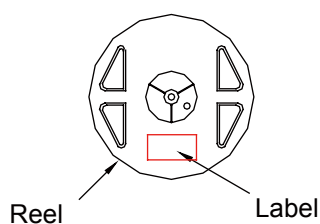
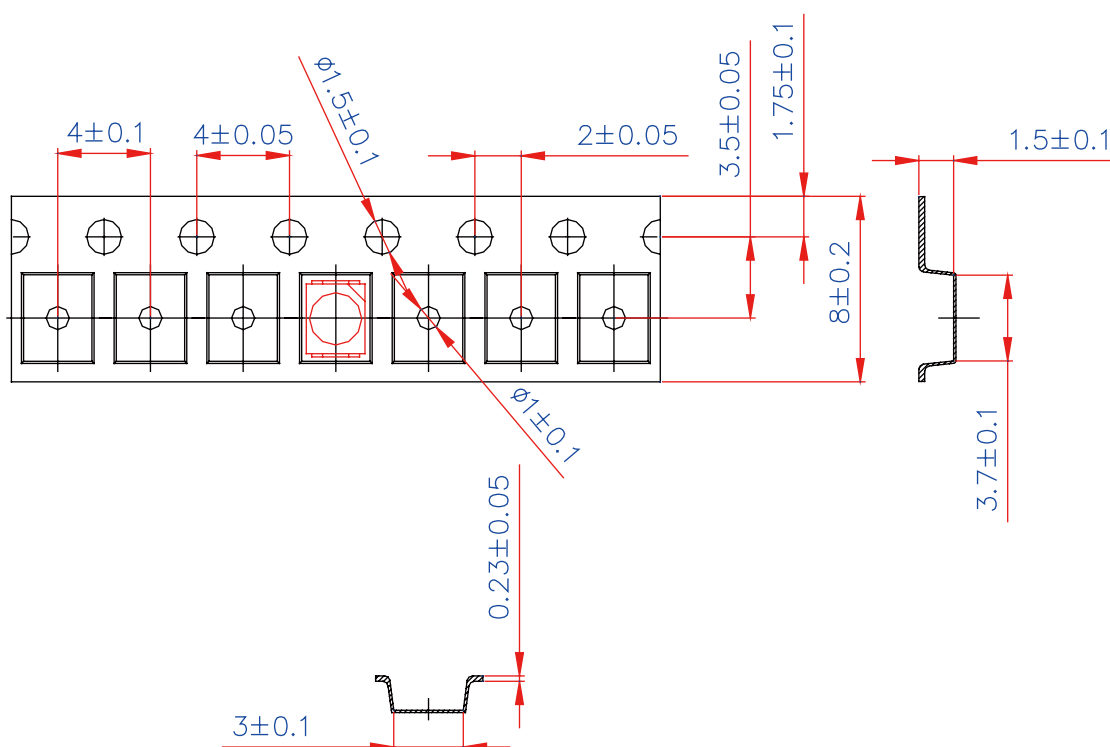
The following reflow profile is from IPC/JEDEC J-STD-020D which provided here for reference.



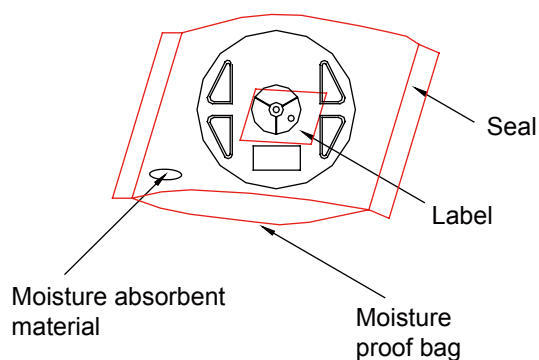
## Classification Reflow Profiles

| Profile Feature  | Pb-Free Assembly |
|--|------------------|
| Preheat & Soak   |                  |
| Temperature min (T <sub>smin</sub> )   | 150 °C           |
| Temperature max (T <sub>smax</sub> )   | 200 °C           |
| Time (T <sub>smin</sub> to T <sub>smax</sub> ) (ts)  | 60-120 seconds   |
| Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )                                      | 3 °C/second max. |
| Liquidous temperature (T <sub>L</sub> )  | 217 °C           |
| Time at liquidous (t <sub>L</sub> )  | 60-150 seconds   |
| Peak package body temperature (T <sub>p</sub> )  | 255 °C ~260 °C   |
| Classification temperature (T <sub>c</sub> )   | 260 °C           |
| Time (t <sub>p</sub> ) within 5 °C of the specified classification temperature (T <sub>c</sub> ) | 30 seconds       |
| Average ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )                                    | 6°C/second max.  |
| Time 25°C to peak temperature  | 8 minutes max.   |

## Product Packaging Information



Taping reel dimensions



Package & label

| Item   | Quantity | Total    | Dimensions(mm) |
|--|----------|----------|----------------|
| Reel   | 4,000pcs | 4,000pcs | R=178          |
| Starting with 250pcs empty, and 150pcs empty at the last |          |          |                |

## Cautions

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- (1) Moisture monitoring is vital during the storage of LEDs for if too much moisture is absorbed, interface delamination and optical performance degradation will occur. Therefore, products should be packed in moisture-proof aluminum bags so as to reduce moisture absorption to the lowest degree during transportation and storage. Included moisture-proof aluminum bag are the key indicators that they will change from brown to azure if bags are invaded by moisture.
- (2) Soldering process in compliance with the range of the conditions stated above should be conducted after opening the moisture-proof aluminum bag. The rest LEDs should be stored in a hermetically sealed container, silica gel desiccants included. And the original moisture-proof aluminum bags are recommended.
- (3) If the "Period After Opening" storage time is too long or silica gel desiccants don't maintain blue any more, baking process should be done once.

## Revision History

| Versions | Description           | Release Date |
|----------|-----------------------|--------------|
| 1        | Establish a Datasheet | 2024/01/12   |

## About Edison Opto

Edison Opto is a leading manufacturer of high power LED and a solution provider experienced in LDMS. LDMS is an integrated program derived from the four essential technologies in LED lighting applications- Thermal Management, Electrical Scheme, Mechanical Refinement, Optical Optimization, to provide customer with various LED components and modules. More Information about the company and our products can be found at [www.edison-opto.com](http://www.edison-opto.com)

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[www.edison-opto.com](http://www.edison-opto.com)

For general assistance please contact:  
[service@edison-opto.com.tw](mailto:service@edison-opto.com.tw)

For technical assistance please contact:  
[LED.Detective@edison-opto.com.tw](mailto:LED.Detective@edison-opto.com.tw)