

# Specification for approval

Customer Name : \_\_\_\_\_

Customer P/N : \_\_\_\_\_

Factory P/N : YY-2214WH-ETQ-AM

Rev. : A6

Date : 2024/09/14

| Client approval                                                                           |         |                 | Approval<br>examine and verify                                                       |         |                                                                                       |
|-------------------------------------------------------------------------------------------|---------|-----------------|--------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------|
| Approved                                                                                  | Checked | Audit<br>affirm | Approved                                                                             | Checked | Prepared<br>fabrication                                                               |
|                                                                                           |         |                 |  | 黄海军     |  |
| <input type="checkbox"/> Qualified <input type="checkbox"/> Disqualified<br>Accept or not |         |                 | DATE : 2024-09-14                                                                    |         |                                                                                       |

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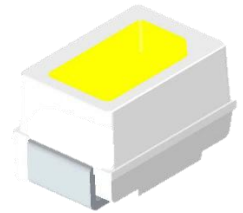
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## 1. Description

### 1.1 General Description

The white LED, which was fabricated by using a blue chip and the phosphor.

Product Package : 2.2mmX1.4mmX1.3mm



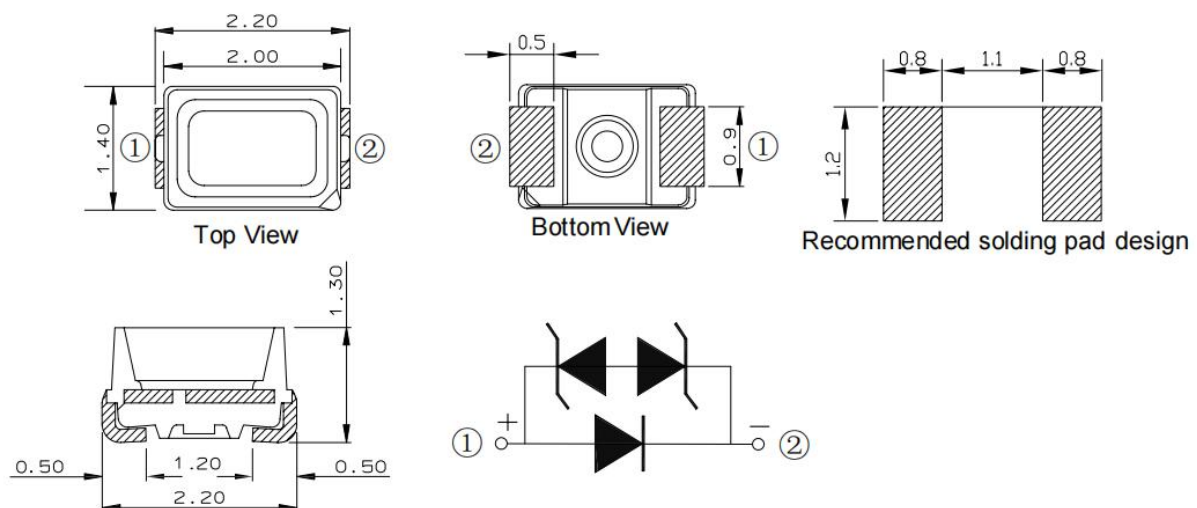
### 1.2 Features

- PLCC Package
- Extremely wide viewing angle
- Suitable for all SMT assembly and solder process
- Available on tape and reel
- Moisture sensitivity level: Level 2a
- Compliance with RoHS and REACH
- Qualifications: The product qualification test plan is based on the guidelines of AEC-Q102 Stress Test Qualification for Automotive Grade Discrete Semiconductors
- Forward current :  $2\text{mA} \leq I_F \leq 30\text{mA}$

### 1.3 Application

- Automotive backlighting or indication: gauges, switches, audio and video equipment... Etc
- Backlighting: liquid crystal display, switches, symbols, mobile phones and lighting ads

### 1.4 Package Dimension



#### Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is  $\pm 0.10\text{mm}$  (0.004") unless otherwise specified.

## 1.5 Product Parameters

Absolute Maximum Ratings at Ta = 25°C absolute maximum rating

| Parameter                  | Symbol             | Rating                                                                  | Unit |
|----------------------------|--------------------|-------------------------------------------------------------------------|------|
| Power Dissipation          | P <sub>D</sub>     | 87                                                                      | mW   |
| Forward Current            | I <sub>F</sub>     | 30                                                                      | mA   |
| Peak Forward Current * 1   | I <sub>FP</sub>    | 90                                                                      | mA   |
| Thermal Resistance         | R <sub>THJ-S</sub> | 300                                                                     | C/W  |
| Reverse Voltage            | V <sub>R</sub>     | 5                                                                       | V    |
| Electrostatic DischargeHBM | ESD                | 8000                                                                    | V    |
| Operating Temperature Rang | T <sub>OPR</sub>   | -40~+105                                                                | °C   |
| Storage Temperature Range  | T <sub>STG</sub>   | -40~+125                                                                | °C   |
| Junction Temperature       | T <sub>J</sub>     | ≤ 120 °C                                                                | °C   |
| Soldering Temperature      | T <sub>SLD</sub>   | Reflow Soldering:245°C for 10 secs<br>Hand soldering : 300°C for 3 secs |      |

\*IFP Conditions: Duty 1/10 @1KHz

Typical Optical / Electrical Charactristics at Ta=25°C Photoelectric property

| Parameter                    | Condition            | Symbol            | Min. | Typ.   | Max. | Unit |
|------------------------------|----------------------|-------------------|------|--------|------|------|
| Forward Voltage              | I <sub>F</sub> =10mA | V <sub>F</sub>    | 2.7  | 2.9    | 3.1  | V    |
| Luminous intensity           | I <sub>F</sub> =10mA | I <sub>V</sub>    | 565  | 800    | 900  | mcd  |
| Reverse Current*1            | V <sub>R</sub> =5V   | I <sub>R</sub>    | -    | -      | 10   | uA   |
| The CIE XY color coordinates | I <sub>F</sub> =10mA | X                 | -    | 0.3250 | -    | -    |
|                              |                      | Y                 | -    | 0.3400 | -    | -    |
| Color Temperature            | I <sub>F</sub> =5mA  | T <sub>c</sub>    | 5400 | -      | 6400 | K    |
| Viewing Angle                | I <sub>F</sub> =10mA | 2θ <sub>1/2</sub> | -    | 120    | -    | deg  |

Notes:

1. Tolerance of luminous intensity is ±10%.
2. Tolerance of forward voltage is ±0.1V.
3. \*1 No design for long-term use .

## 1.6 Photoelectric parameters are divided into BIN specifications

### Bin Range of Forward Voltage

| Bin | Min | Max | Unit | Condition |
|-----|-----|-----|------|-----------|
| V27 | 2.7 | 2.8 | V    | IF = 10mA |
| V28 | 2.8 | 2.9 |      |           |
| V29 | 2.9 | 3.0 |      |           |
| V30 | 3.0 | 3.1 |      |           |

Notes: Tolerance of Forward Voltage:  $\pm 0.05V$

### Bin Range of Luminous intensity

| Bin | Min | Max | Unit | Condition |
|-----|-----|-----|------|-----------|
| X   | 565 | 715 | mcd  | IF = 10mA |
| Y   | 715 | 900 |      |           |

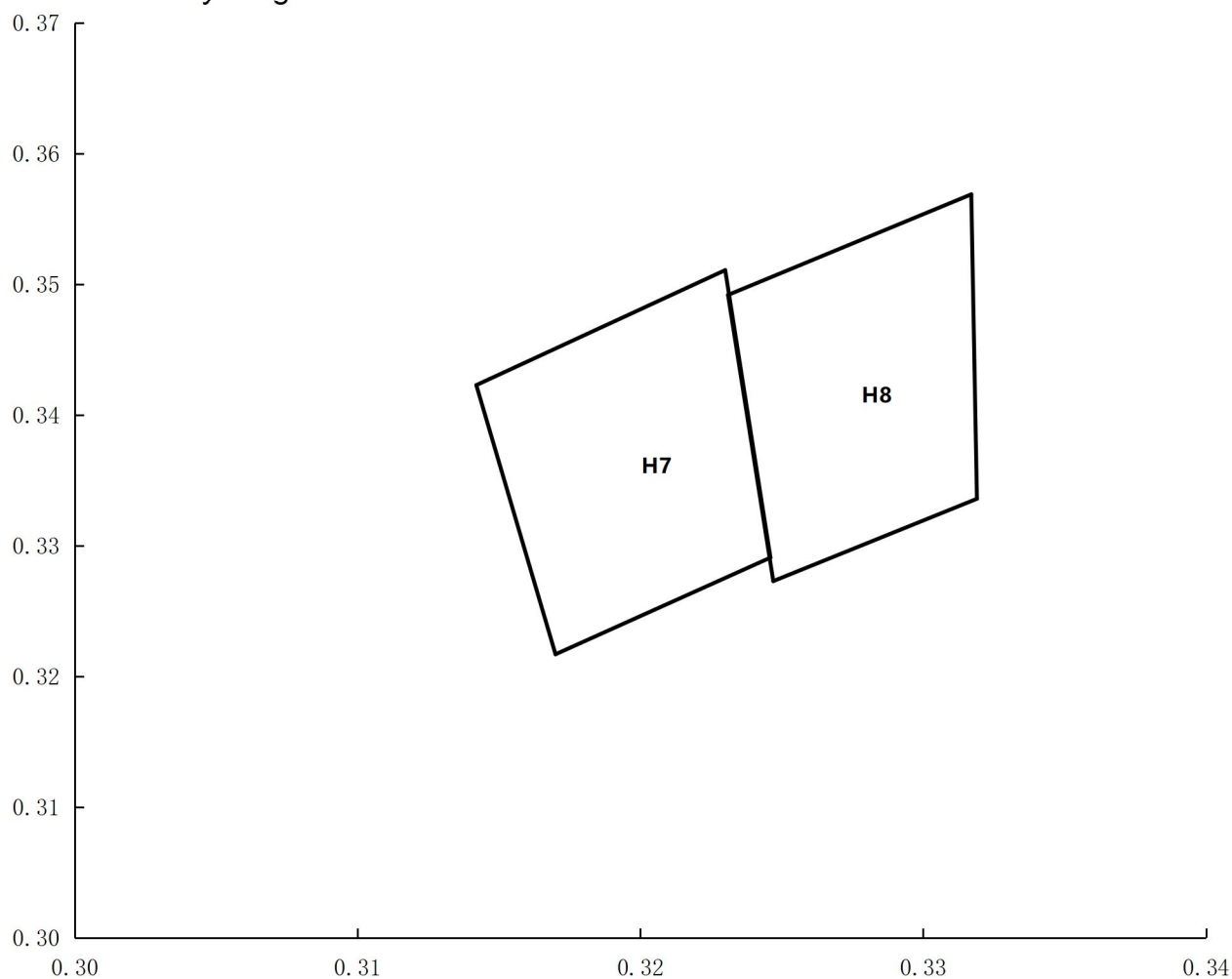
Notes: Tolerance of Luminous Intensity:  $\pm 10\%$

## Bin Range of CIE

| color zone | X1     | Y1     | X2     | Y2     | X3     | Y3     | X4     | Y4     |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|
| H7         | 0.323  | 0.3511 | 0.3142 | 0.3423 | 0.317  | 0.3217 | 0.3246 | 0.3291 |
| H8         | 0.3317 | 0.3569 | 0.3231 | 0.3492 | 0.3247 | 0.3273 | 0.3319 | 0.3336 |

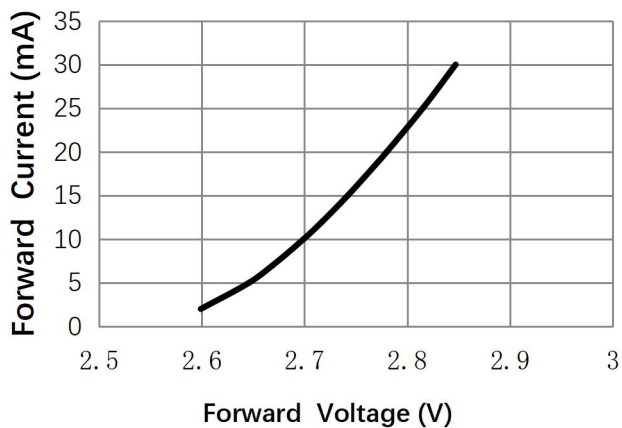
Notes: Measurement uncertainty of the color coordinates:  $\pm 0.005$ .

## C.I.E Chromaticity Diagram

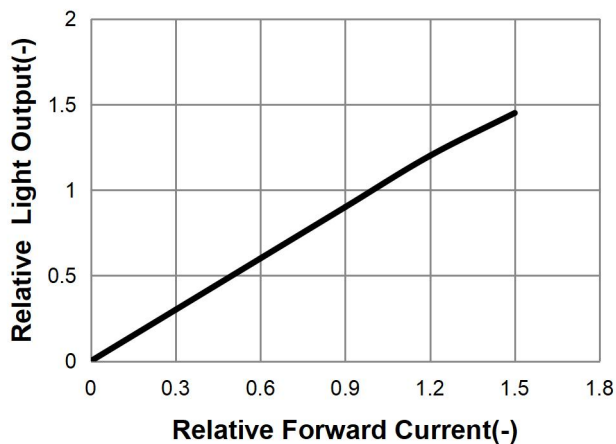


## 1.7 Typical optical characteristics curves

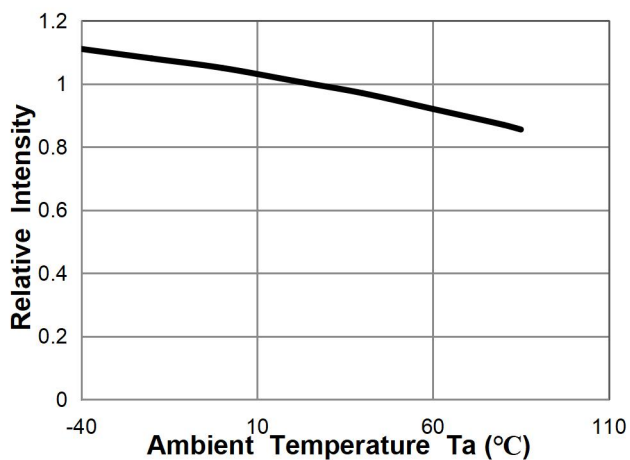
Forward Current VS. Forward Voltage  
(Ta=25°C)



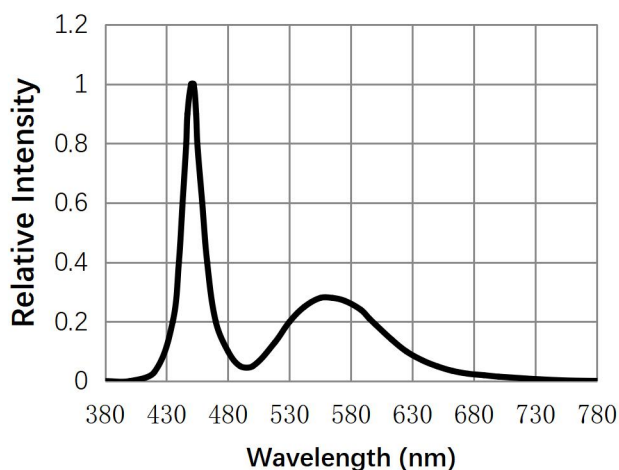
Forward Current VS. light Output  
(Ta=25°C)



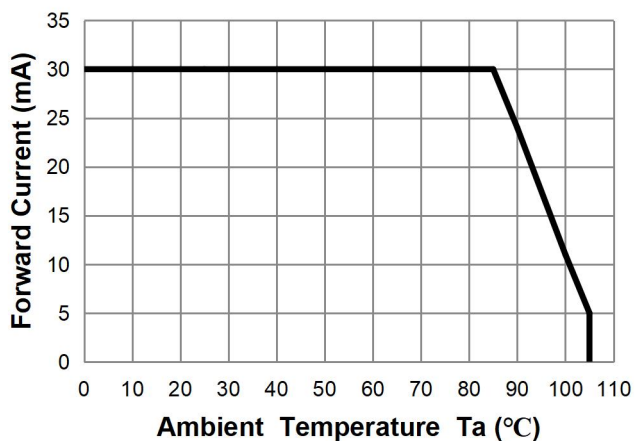
Relative Intensity VS. Ambient Temperature (Ta=25°C)



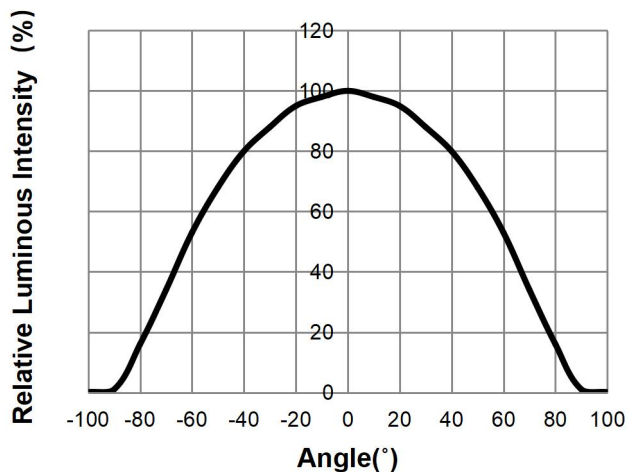
Spectrum Distribution (Ta=25°C)



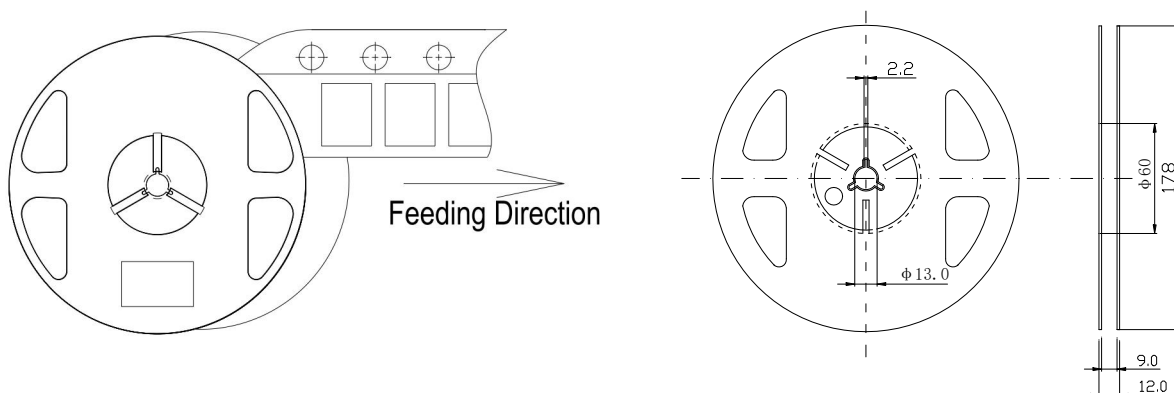
Maximum Forward Current VS. Ambient temperature



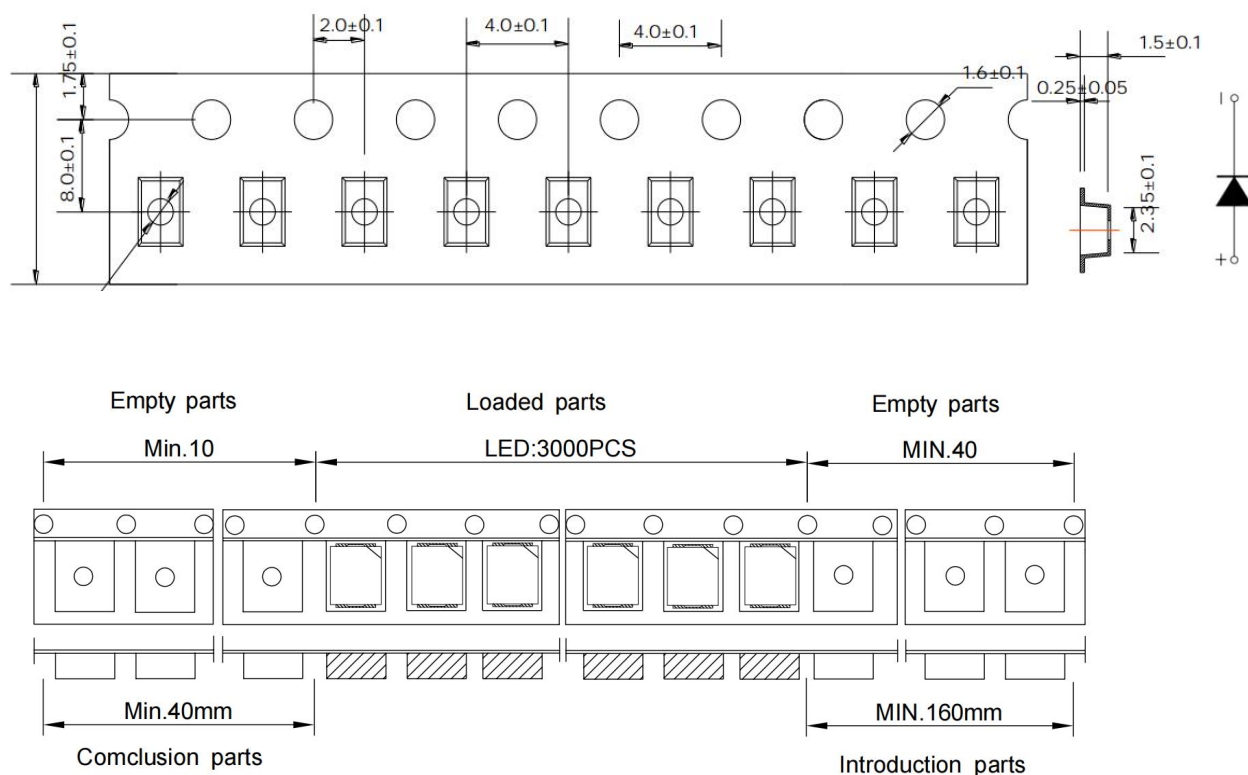
Spectrum Distribution (Ta=25°C)



## 2.1.1 Dimensions for Reel (Unit: mm)



## 2.1.2 Dimensions of Tape (Unit: mm)



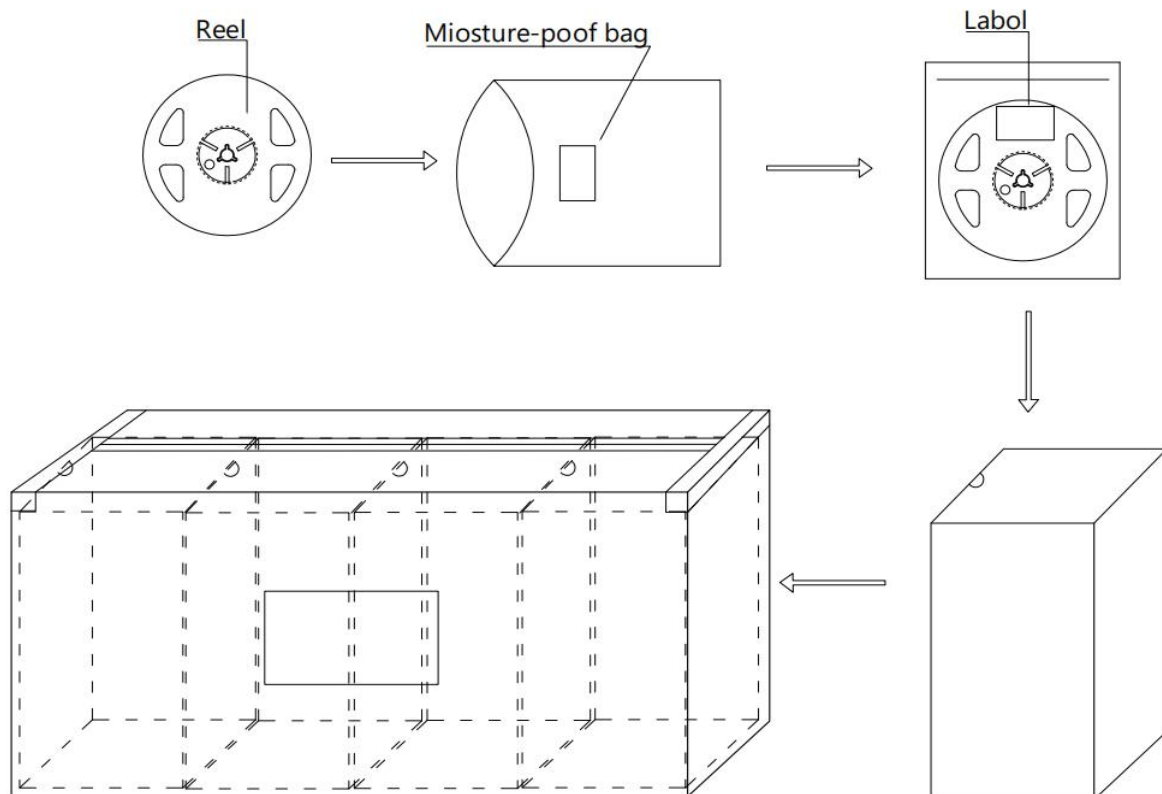
### Notes:

1. All dimensions are in mm, tolerance is  $\pm 0.1$ mm unless otherwise noted.
2. Loaded quantity: 3000 pcs/reel.

## 2.1.3 Label Form Specification

Label Size : 90mm X 40mm

## 2.2 Cardboard Box



Inner Box : 230mm\*130mm\*250mm

Outer Box : 545mm\*245mm\*270mm

Al BAG : Inner Box 10 Reel

Outer Box : Inner Box\*4EA \* 10Reel = 40Reel

## 2.3 Reliability Test Items And Conditions

The reliability of products shall be satisfied with items listed below (&AEC-Q102)

\* The technical information shown in the data worksheet is limited to products referenced by typical features and circuit instances. It constitutes neither a warranty of an industrial character nor an authorization of any license

| Test Item                                   | Reference     | Test Conditions                      | Test Hours / Times | Number of amage | Ac/Re/ |
|---------------------------------------------|---------------|--------------------------------------|--------------------|-----------------|--------|
| Reflow Soldering                            | JESD22-B106   | 245°C(Max.), within 10seconds.(Max.) | 2 times            | 0/20            | 0/1    |
| Thermal Shock                               | JESD22 A-104  | -40°C 15min t↓10s<br>105°C 15min     | 1000 cycles        | 0/20            | 0/1    |
| Humidity Heat Storage                       | JESD22 A-108  | Ta=85°C<br>RH=85%                    | 1000 hours         | 0/20            | 0/1    |
| High Temperature<br>High Humidity Life Test | JESD22 A-108  | 85°C/ 85%RH<br>IF=5mA                | 1000 hours         | 0/20            | 0/1    |
| Electrostatic<br>Discharge(ESD)Test         | AEC Q102      | According to the<br>SPRC             | 1000 hours         | 0/20            | 0/1    |
| High Temperature Storage                    | JESD22 A-103D | Ta=125°C                             | 1000 hours         | 0/20            | 0/1    |
| Low Temperature Storage                     | JESD22 A-103D | Ta=-40°C                             | 1000 hours         | 0/20            | 0/1    |
| Life Test                                   | JESD22 A-108  | Ta=25°C<br>IF=10mA                   | 1000 hours         | 0/20            | 0/1    |

## 2.4 Criteria For Judging Damage

| Item               | Symbol | Test conditions    | Criteria for Judgement |           |
|--------------------|--------|--------------------|------------------------|-----------|
|                    |        |                    | Min.                   | Max.      |
| Luminous intensity | IV     | IF=I <sub>FT</sub> | L.S.L*0.7              | -         |
| Forward Voltage    | VF     | IF=I <sub>FT</sub> | -                      | U.S.L*1.1 |
| Reverse current    | IR     | VR=5v              | -                      | U.S.L*2   |

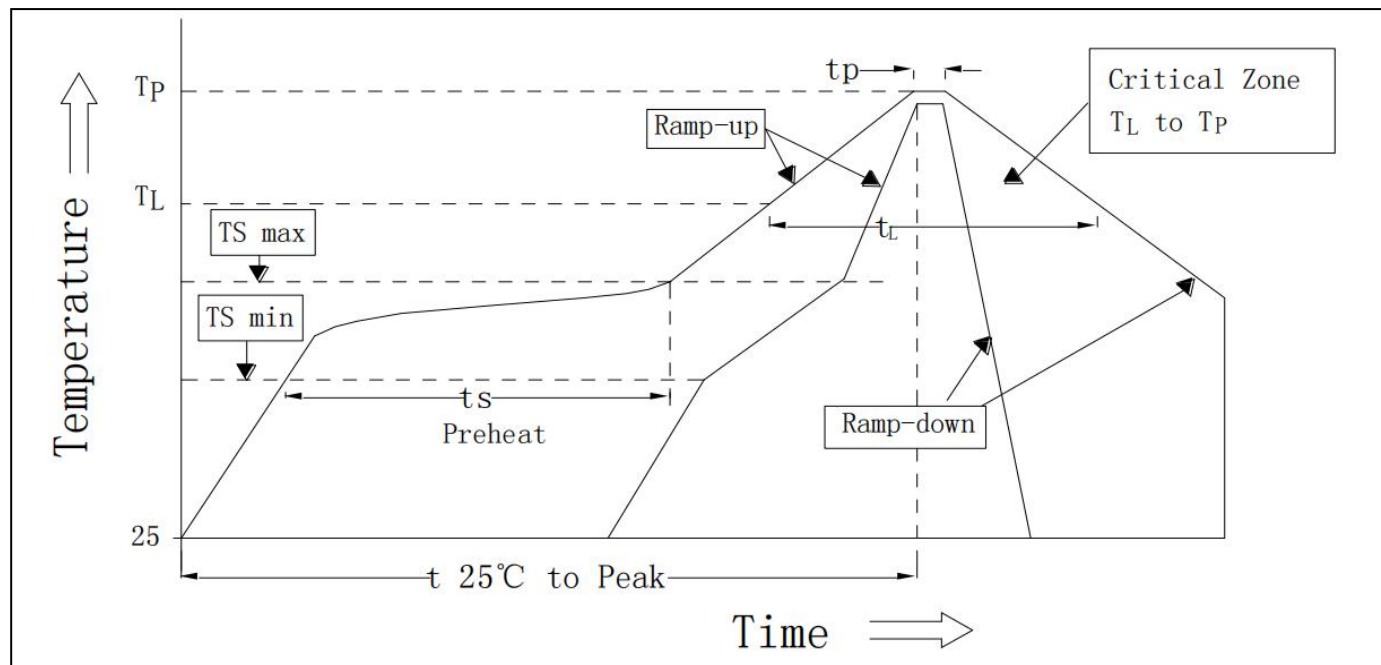
\* U.S.L.: Upper Standard Level

\* L.S.L.: Lower Standard Level

\* Note: T<sub>sol</sub>-Temperature of tin liquid; I<sub>FT</sub>: Typical current

## 3. SMT Reflow Soldering Instructions

### 3.1 Sriteria For Judging Damage



SMT Reflow Soldering Instructions SMT

### Reflow parameters

|                                                            |             |
|------------------------------------------------------------|-------------|
| Average temperature rise speed                             | Max 3 °C/ s |
| Preheating: minimum temperature                            | 150 °C      |
| Preheating: Max temperature                                | 200 °C      |
| Preheating: Time                                           | 60s-120s    |
| Time limited to maintain high temperature: the temperature | 217 °C      |
| Time limited to maintain high temperature: The Time        | Max 60s     |

|                                                             |               |
|-------------------------------------------------------------|---------------|
| Peak /Classification of temperature                         | 245°C         |
| Time limit classification of peak temperature time          | Max 10s       |
| Hold time within 5 °C with the actual peak temperature (TP) | Max 30s       |
| Cooling speed                                               | Max 6 °C/ s   |
| Needed time from 25 °C to Tp                                | Max 8 minutes |

Note:

1. SMT 2 times available (within 24 hours).
2. When soldering , do not put stress on the LEDs during heating .

### 3.1.1 Soldering Iron

- (1) When do soldering by hand, keep the temperature of iron below less 300C less than 3 seconds.
- (2) Soldering by hand should be done only one time .

### 3.1.2 Repairing

Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, adouble-head soldering iron should be used (as below figure). It should be confirmed in advance whether the characteristics of LEDs will or not be damaged by repairing.

### 3.1.3 Cautions

- (1) The encapsulated material of the LEDs is silicone. Therefore the LEDs have a soft surface on the top of package. The pressure to the top surface will be impacted on the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when use the picking up nozzle, the pressure on the silicone resin should be proper.
- (2) Components should not be mounted on warped (non coplanar) portion of PCB. After soldering, do not warp the circuit board.
- (3) Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering. Do not rapidly cool device after soldering.

## 4. Handling Precautions

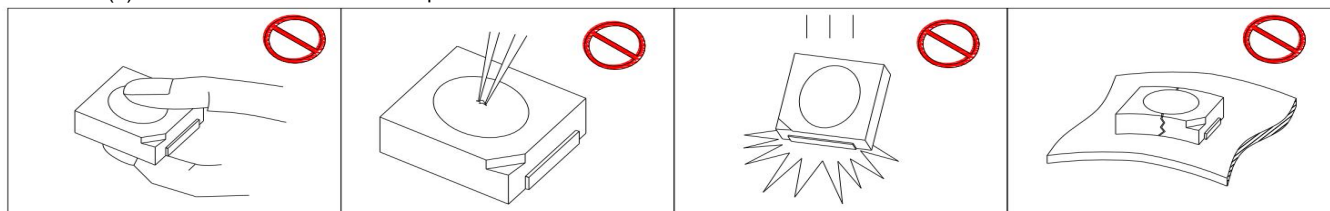
### 4.1 Handling Precautions

\* Compliance with RoHS and REACH

- (1) LED operating environment and sulfur element composition cannot be over 100PPM in the LED mating usage material. This is provided for informational purposes only and is not a warranty or endorsement.
- (2) In order to prevent ex-ternal material from getting into the inside of LED, which may cause the malfunction of LED, the single content of Bromine element is required to be less than 900PPM,the single content of Chlorine elementis required to be less than 900PPM,the total content of Bromine element and Chlorine element in the external materials of the application products is required to be less than1500PPM . This is provided for informational purposes only and is not a warranty or endorsement.
- (3) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LEDs and discolor when exposed to heat and photonic energy. The result can be a significant loss of light output from the fixture. Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues. Yongyu advises against theuse of any chemicals or materials that have been found or are suspected to have an adverse affect on device performance or reliability.

To verify compatibility, Yongyu recommends that all chemicals and materials be tested in the specific application and environment for which they are intended to be used. Attaching LEDs, do not use adhesives that outgas organic vapor.

- (4) Handle the component along the side surface by using forceps or appropriate tools; Do not directly touch or Handle the silicone lens surface, it may damage the internal circuitry.
- (5) Do not stack after SMT operation.



- (6) In designing a circuit, the current through each LED can not exceed the absolute maximum rating specified for each LED. In the meanwhile, resistors for protection should be applied, otherwise slight voltage shift will cause big current change, burn out may happen. The driving circuit must be designed to allow forward voltage only when it is ON or OFF. If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.
- (7) Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color change and so on. Please consider the heat generation of the LEDs when making the system design.
- (8) Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust, requiring special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components. Yongyu suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

## Storage

| Conditions |                             | Temperature                | Humidity    | Time                                |
|------------|-----------------------------|----------------------------|-------------|-------------------------------------|
|            | Before Opening Aluminum Bag | $\leq 30^{\circ}\text{C}$  | $\leq 75\%$ | Within 1 Year From Date             |
| Storage    | After Opening Aluminum Bag  | $\leq 30^{\circ}\text{C}$  | $\leq 60\%$ | Recommended for use within 24 hours |
| Baking     |                             | $60 \pm 5^{\circ}\text{C}$ | -           | $\geq 24$ hours                     |

- (9) If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed after unpacking and based on the following condition ( $65 \pm 5^{\circ}\text{C}$ ) for above 24 hours.  
If the package is flatulence or damaged, please notify the sales staff to assist.  
Similar to most Solid state devices; LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).
- (10) Other points for attention, please refer to our relevant information.

## 5. Specification Review History

| Review Ver. | Date       | Correction List                                   | Etc. |
|-------------|------------|---------------------------------------------------|------|
| A1          | 2023.2.15  | First Edition Development                         |      |
| A2          | 2023.03.01 | Update the CIE                                    |      |
| A3          | 2023.03.27 | Update the diode drawing                          |      |
| A4          | 2023.03.30 | Update the moisture level in the specification    |      |
| A5          | 2023.04.26 | Upgrade specification book templates and drawings |      |
| A6          | 2024.09.14 | Adjust the specification template                 |      |
|             |            |                                                   |      |
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