

# SPECIFICATION

REFOND P/N

RF-W1SA35WS-AW2-50

R&D

Mass Product



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## 1. Description

### 1.1 General Description



It's a special package type that uses the total 4 chips (R/G/B +W ). The product size: 3.5mmX3.7mmX2.6mm.

### 1.2 Features

- ▶ Extremely wide viewing angle.
- ▶ Suitable for all SMT assembly and solder process.
- ▶ Water-resistant (IPX6).
- ▶ Moisture sensitivity level: 5a.
- ▶ RoHS compliant.
- ▶ Pb-free reflow soldering application.

### 1.3 Application

- ▶ Outdoor full-color video screen.
- ▶ Indoor and outdoor decorative lighting.
- ▶ Amusement.
- ▶ General use.



### 1.4 Package Dimension

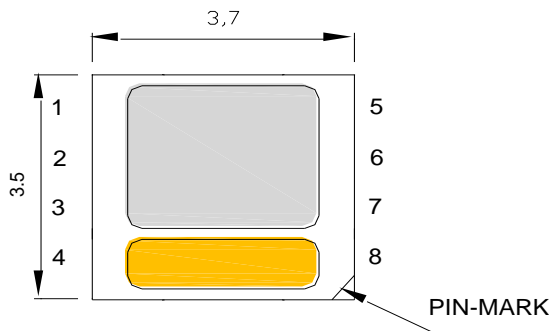


Fig.1-1 Top view

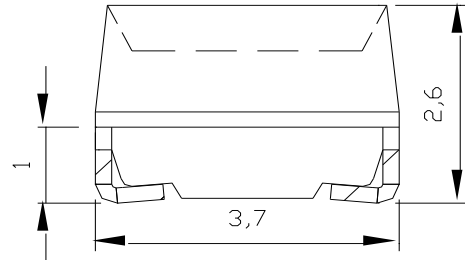


Fig.1-2 Side view

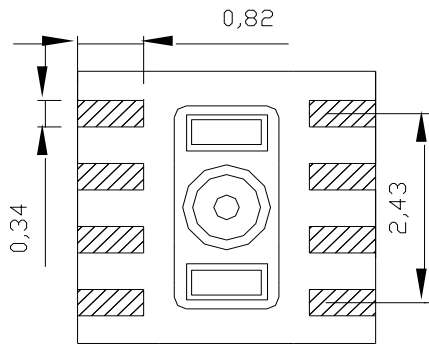


Fig.1-3 Bottom view

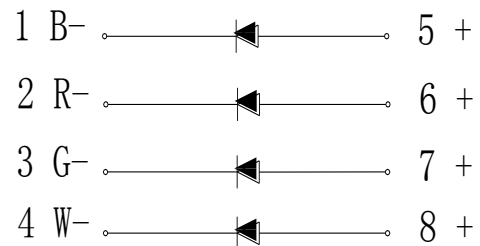


Fig.1-4 Polarity

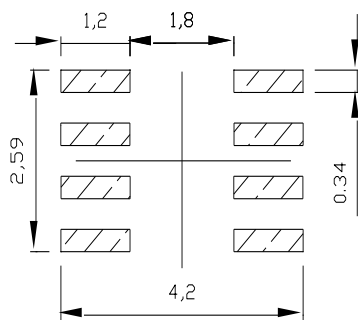


Fig.1-5 Soldering patterns

Notes:

1. All dimensions units are millimeters.
2. All dimensions tolerances are  $\pm 0.1\text{mm}$  unless otherwise noted.



## 1.5 Product Parameters

Table 1-1 Electrical / Optical Characteristics at Ts=25°C

| Item                         | Symbol           | Test Condition   | Value    |         |         |      | Unit    |
|------------------------------|------------------|--|----------|---------|---------|------|---------|
|                              |                  |  | R        | G       | B       | W    |         |
| Reverse Current              | $I_R$            | $V_R=5V$   | 6        | 6       | 6       | 6    | $\mu A$ |
| Forward Voltage              | $V_{F(min)}$     | R<br>$I_F = 20mA$<br>G<br>$I_F = 20mA$<br>B<br>$I_F = 20mA$<br>W<br>$I_F = 20mA$ | 1.7      | 2.7     | 2.7     | 2.7  | V       |
|                              | $V_{F(max)}$     |  | 2.4      | 3.4     | 3.4     | 3.4  | V       |
| Dominant Wavelength          | $\lambda_D$      |  | 618~ 628 | 518~530 | 460~474 | /    | nm      |
| Spectrum Radiation Bandwidth | $\Delta \lambda$ |  | 24       | 38      | 30      | /    | nm      |
| Luminous Intensity           | $I_{V(min)}$     |  | 570      | 1560    | 345     | 1750 | mcd     |
|                              | $I_{V(avg)}$     |  | 825      | 2180    | 485     | 2450 | mcd     |
| Viewing Angle                | 2 $\theta$ 1/2   | deg  | 110      |         |         |      |         |

Table 1-2 Absolute Maximum Ratings at Ts=25°C

| Parameter               | Symbol    | Rating     |    |    |    | Unit |
|-------------------------|-----------|------------|----|----|----|------|
|                         |           | R          | G  | B  | W  |      |
| Forward Current         | $I_F$     | 25         | 20 | 20 | 20 | mA   |
| Peak Forward Current    | $I_{FP}$  | 80         | 80 | 80 | 80 | mA   |
| Reverse Voltage         | $V_R$     | 5          | 5  | 5  | 5  | V    |
| Operating Temperature   | $T_{OPR}$ | -30 ~ +70  |    |    |    | °C   |
| Storage Temperature     | $T_{STQ}$ | -40 ~ +100 |    |    |    | °C   |
| Power Dissipation       | $P_D$     | 60         | 68 | 68 | 68 | mW   |
| Electrostatic Discharge | $E_{SD}$  | 1000V      |    |    |    |      |



Table 1-3 The C.I.E Color coordinates

| BIN | X1     | Y1     | X2     | Y2     | X3     | Y3     | X4     | Y4     |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| 50A | 0.3486 | 0.3797 | 0.3628 | 0.3714 | 0.3573 | 0.3619 | 0.3430 | 0.3703 |
| 50B | 0.3430 | 0.3703 | 0.3573 | 0.3619 | 0.3490 | 0.3477 | 0.3347 | 0.3561 |
| 50C | 0.3347 | 0.3561 | 0.3490 | 0.3477 | 0.3434 | 0.3383 | 0.3292 | 0.3466 |

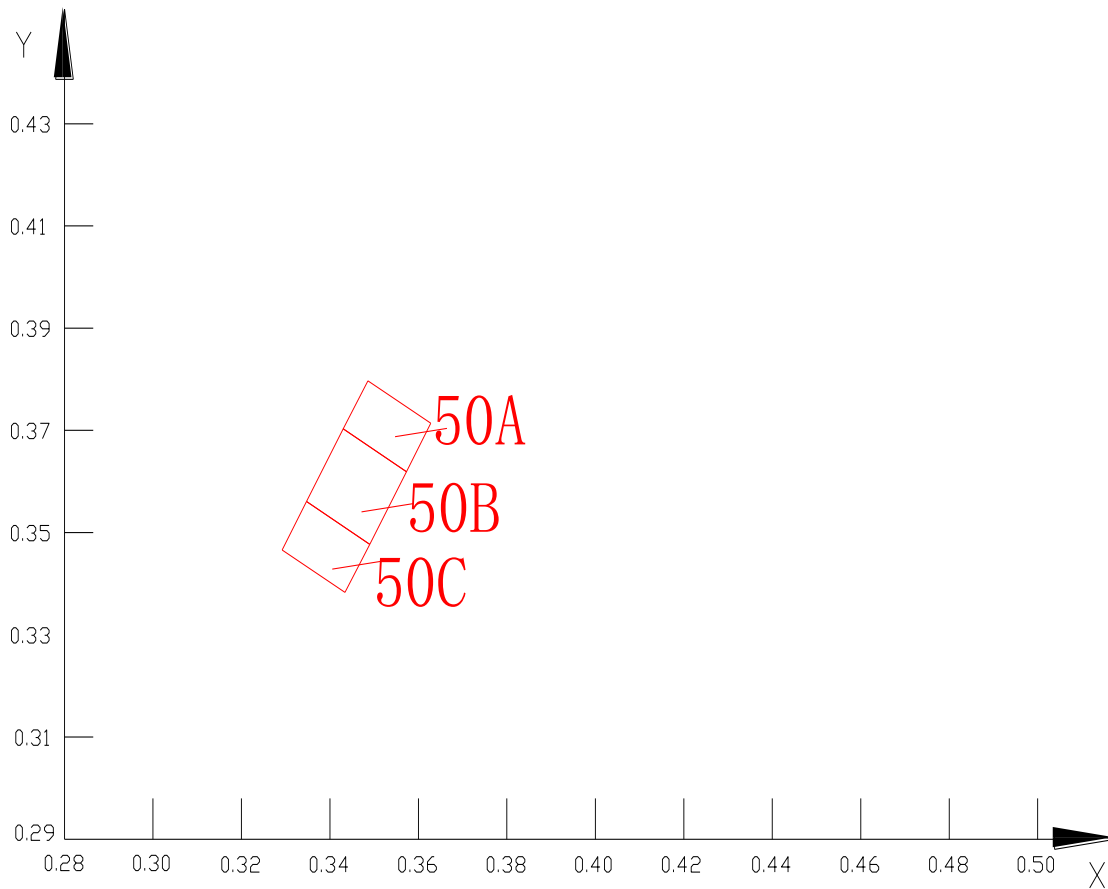
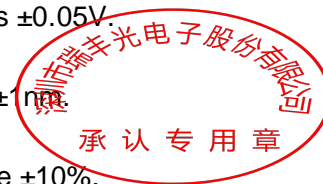


Fig 1.6 The C.I.E Chromaticity Diagram

## Notes:

1. 1/10 Duty cycle, 0.1ms pulse width.
2. The above forward voltage measurement allowance tolerance is  $\pm 0.05V$ .
3. The above Tolerance of measurement of dominant wavelength  $\pm 1nm$ .
4. The above luminous intensity measurement allowance tolerance  $\pm 10\%$ .



5. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
6. All measurements were made under the standardized environment of Refond.
7. All the datas are just for reference, specific parameters please refer to the label.

## 1.6 Typical optical characteristics curves

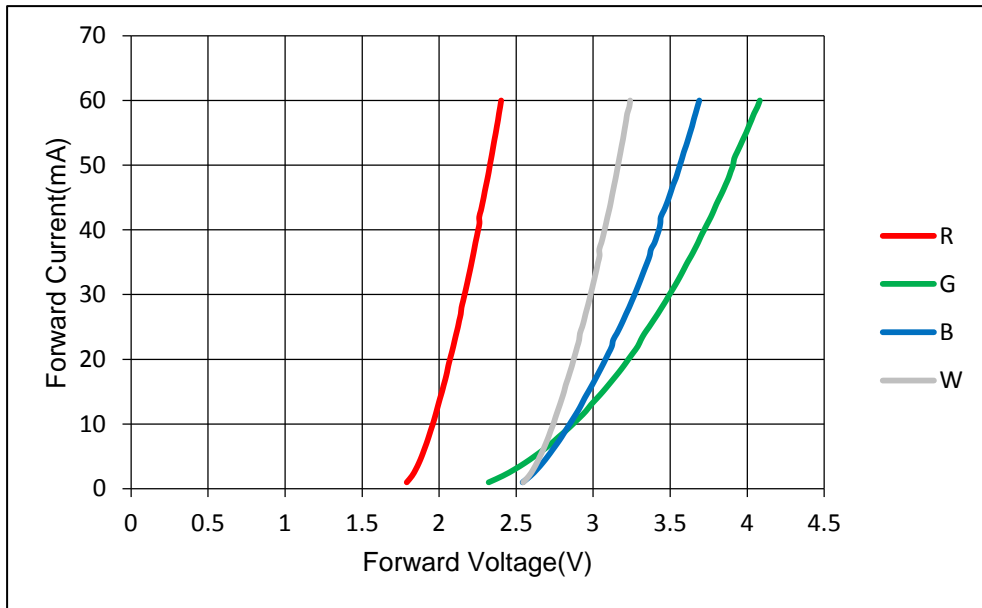


Fig 1-7 Forward Voltage Vs. Forward Current

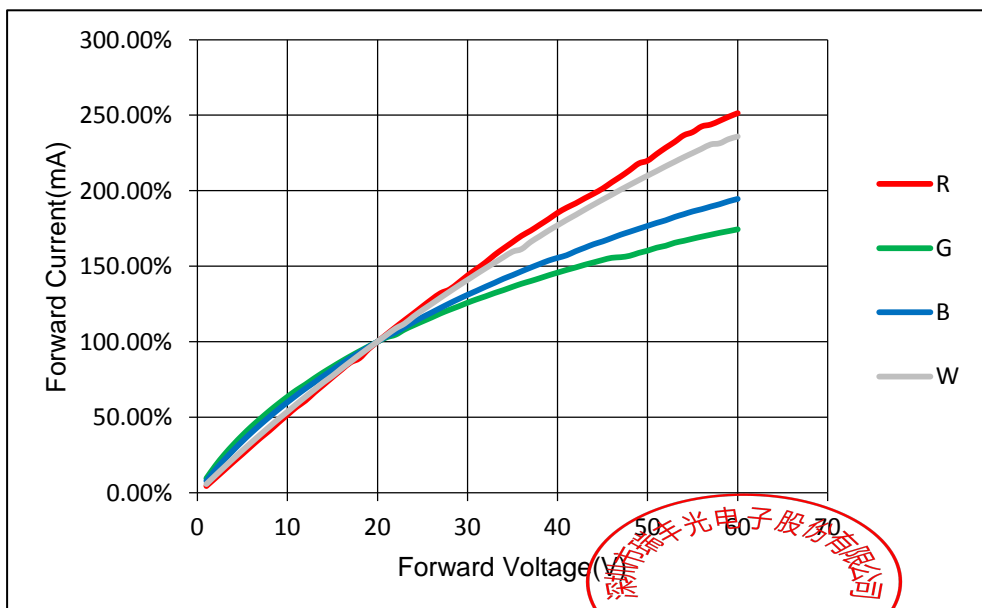


Fig 1-8 Forward Current Vs. Relative Intensity



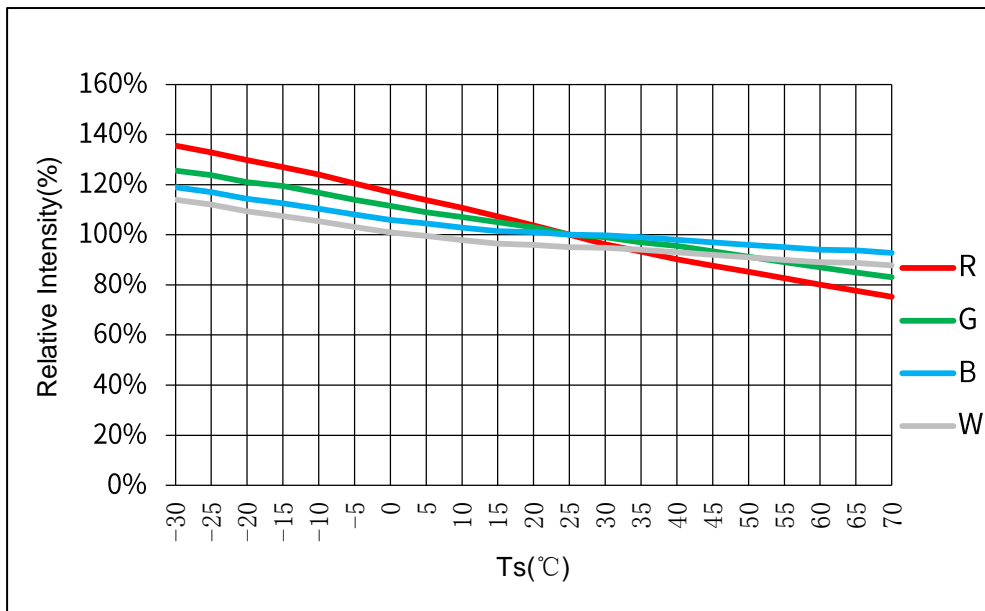


Fig 1-9 Luminous Intensity VS Ambient Temperature

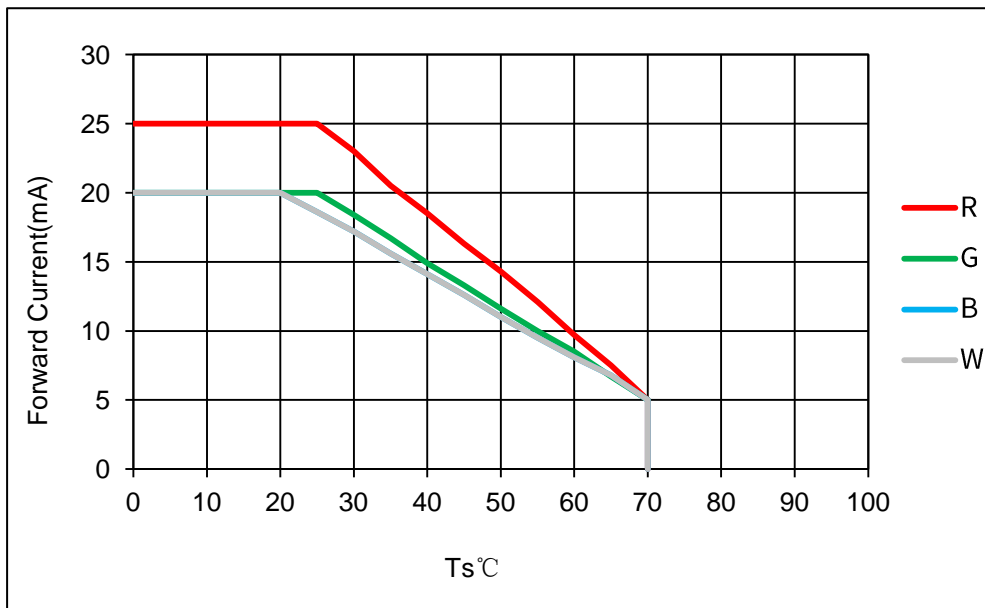


Fig 1-10 Solder Temperature Vs Forward Current



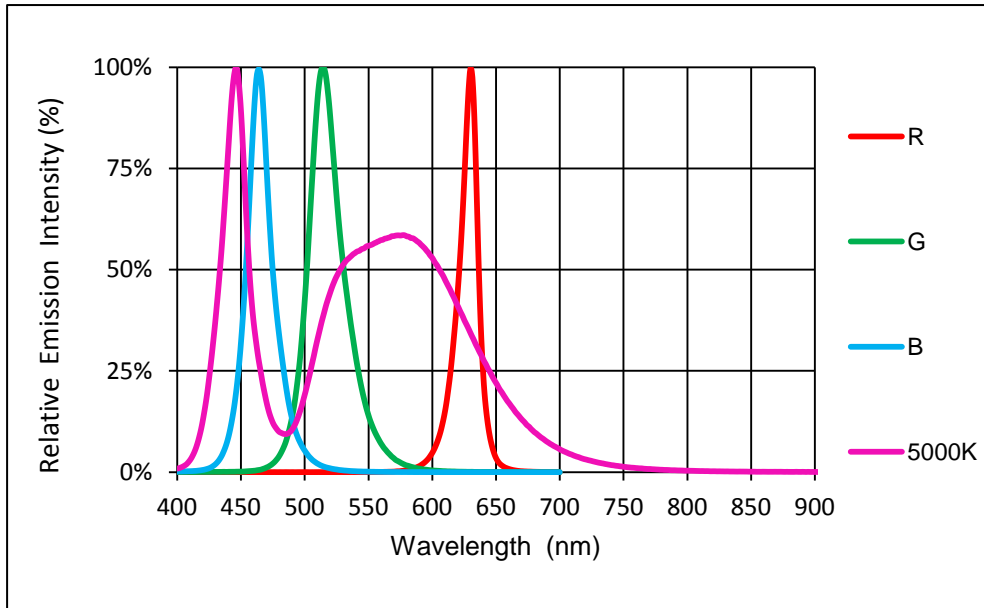


Fig 1-11 Spectrum Distribution

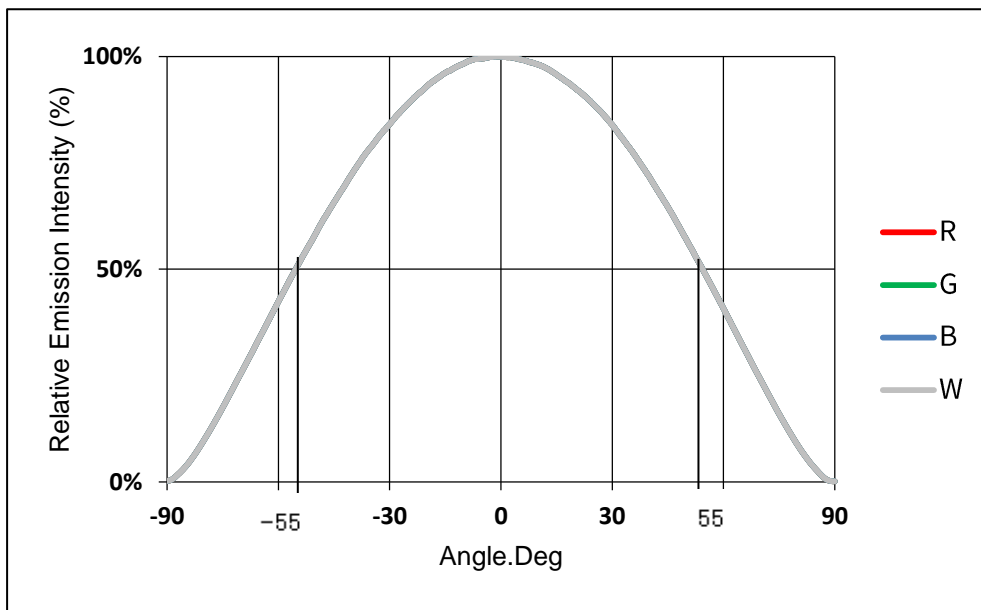


Fig 1-12 Radiation diagram



## 2. Packaging

### 2.1 Packaging Specification

Package:3000pcs/reel.

#### 2.1.1 Carrier Tape Dimension

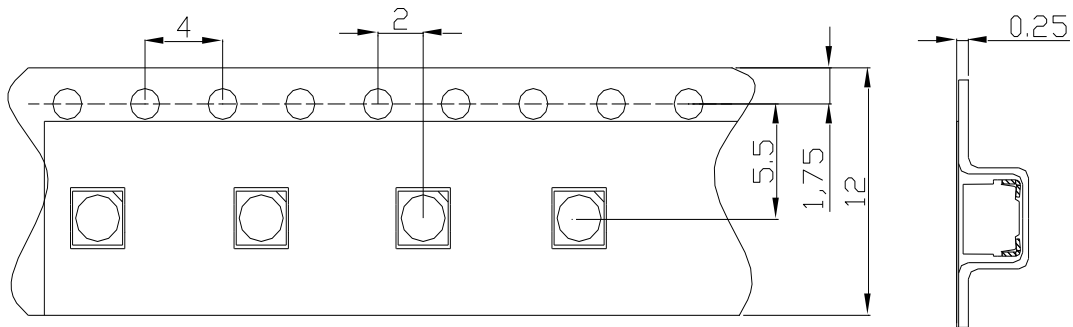


Fig.2-1 Carrier Tape Dimension

#### 2.1.2 Reel Dimension

Table 2-1 Title

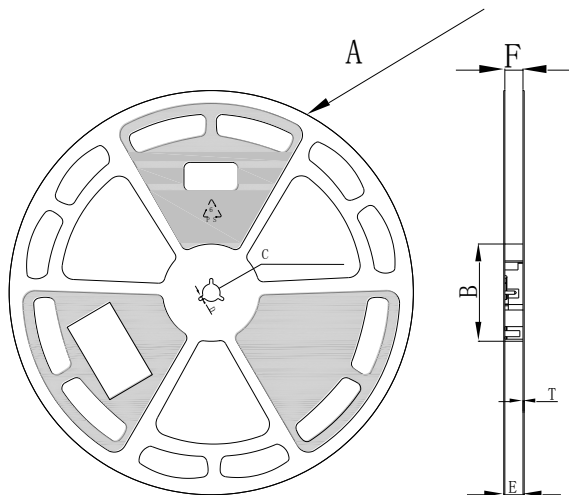


Fig.2-2 Title

|   |                         |
|---|-------------------------|
| A | $320.2 \pm 2\text{mm}$  |
| B | $79.5 \pm 0.2\text{mm}$ |
| C | $14.3 \pm 0.2\text{mm}$ |
| D | $2.5 \pm 0.2\text{mm}$  |
| E | $15.5 \pm 0.2\text{mm}$ |
| F | $12.7 \pm 0.3\text{mm}$ |
| T | $2.0 \pm 0.2\text{mm}$  |

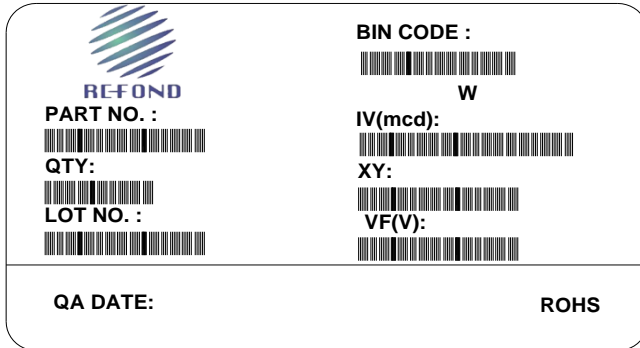
Notes:

The tolerances unless mentioned  $\pm 0.1\text{mm}$ . Unit : mm



### 2.1.3 Label Form Specification

Table 2-2 Title



|          |                  |
|----------|------------------|
| PART NO. | Part Number      |
| LOT NO.  | Lot Number       |
| BIN CODE | Bin Code         |
| IV       | Llight intensity |
| VF       | Forward Voltage  |
| XY       | Chromaticity Bin |
| QTY      | Packing Quantity |
| DATE     | Made Date        |

Fig 2-3 Title

### 2.2 Moisture Resistant Packing

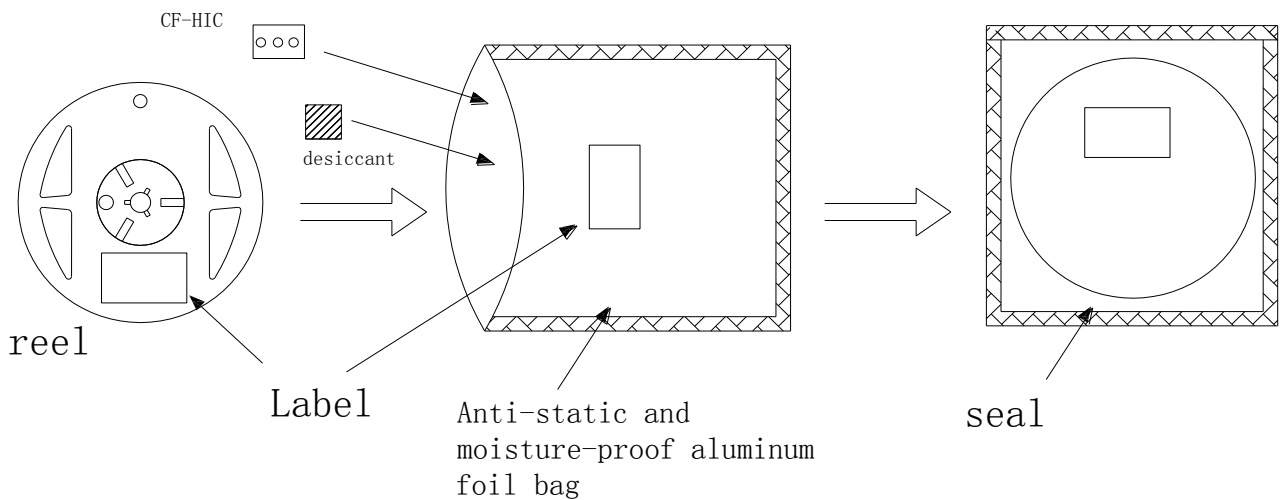


Fig.2-4 Title



## 2.3 Cardboard Box

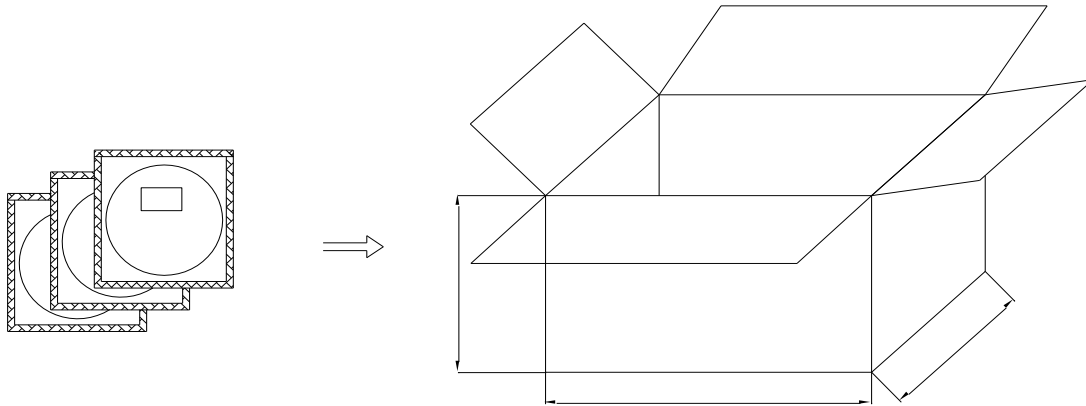


Fig.2-5 Title

## 2.4 Reliability Test Items And Conditions

Table 2-3 Title

| Test Items                      | Ref.Standard             | Test Condition                               | Time     | Quantity | Ac/Re |
|---------------------------------|--------------------------|--|----------|----------|-------|
| Resistance to Soldering Heat    | JESD22-B106              | Temp:260°Cmax<br>T=10 sec                    | 3times   | 22pcs.   | 0/1   |
| Thermal Shock                   | JEITAED-4701<br>300 307  | -40°C 15min<br>↑↓10s<br>100°C 15min          | 500cycle | 22pcs.   | 0/1   |
| High Temperature Storage        | JEITAED-4701<br>200 201  | Temp:100°C                                   | 1000hrs. | 22pcs.   | 0/1   |
| Low Temperature Storage         | JEITA ED-4701<br>200 202 | Temp:-40°C                                   | 1000hrs. | 22pcs.   | 0/1   |
| Room Temperature Operating Life | JESD22-A108              | T <sub>A</sub> =25°C<br>I <sub>F</sub> =20mA | 1000hrs. | 22pcs    | 0/1   |

|  |                          |   |          |        |     |
|--|--------------------------|---|----------|--------|-----|
| High Temperature High Humidity Life Test | JESD22-A101              | 85°C/ 85%RH<br>I <sub>F</sub> =10mA         | 500hrs.  | 22pcs. | 0/1 |
| Temperature Humidity Storage             | JEITA ED-4701<br>100 103 | T <sub>A</sub> =85°C<br>R <sub>H</sub> =85% | 1000hrs. | 22pcs. | 0/1 |
| Low Temperature Life Test                | JESD22-A108D             | T <sub>A</sub> =-40°C, I <sub>F</sub> =20mA | 1000hrs. | 22pcs. | 0/1 |

## 2.5 Criteria For Judging Damage

Table 2-4 Title

| Test Items                   | Symbol         | Test Condition       | Criteria For Judgement  |
|------------------------------|----------------|----------------------|---|
| Forward Voltage              | V <sub>F</sub> | I <sub>F</sub> =20mA | Initial Data ± 10%  |
| Reverse Current              | I <sub>R</sub> | V <sub>R</sub> = 5V  | I <sub>R</sub> ≤ 10μA   |
| Luminous Intensity           | I <sub>V</sub> | I <sub>F</sub> =20mA | Average I <sub>V</sub> degradation rate ≤ 30%                     |
| Resistance to Soldering Heat | /              | /                    | No internal cracks, no material between stripped, no deaded light |

Notes:

1. The Reliability tests are based on Refond existing test platform.
2. The above reliability tests is based on the verification of a single/strip LED of Refond's existing experimental platform, the reliability experiment was taken under good heat dissipation conditions. when customers applies the



LED to the series and parallel circuit, should take consideration of all the factors such as the current, voltage distribution, heat dissipation and others.

3. The technical information shown in the data sheets are limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.

### 3. SMT Reflow Soldering Instructions

#### 3.1 SMT Reflow Soldering Instructions

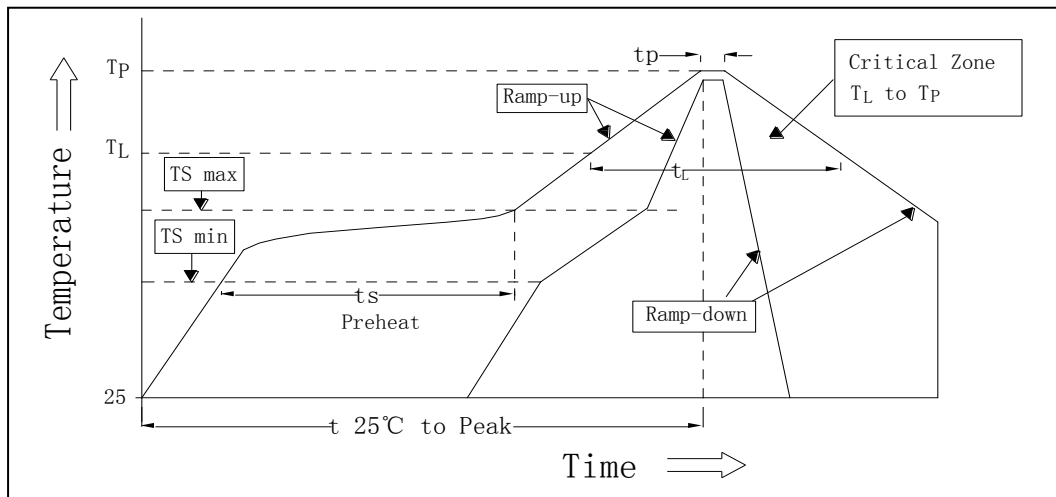


Fig.3-1 Title

Table 3-1 Title

|   |             |
|---|-------------|
| Average temperature rise speed (T <sub>smax</sub> to T <sub>P</sub> ) | Max 4 °C/ s |
| Preheating: minimum temperature (T <sub>sm</sub> )                    | 150 °C      |
| Preheating: Max temperature (T <sub>smax</sub> )                      | 200 °C      |
| Preheating: Time (T <sub>sm</sub> to T <sub>smax</sub> )              | 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: (T <sub>P</sub> )                | 250°C       |

|   |               |
|---|---------------|
| Time limit classification of peak temperature time (T <sub>P</sub> )    | Max 10s       |
| Hold time within 5 °C with the actual peak temperature(T <sub>P</sub> ) | Max 30s       |
| Cooling speed   | Max 6 °C/ s   |
| Needed time from 25 °C to T <sub>p</sub>                                | Max 8 minutes |

Notes:

- 1.Reflow soldering should not be done more than one times.
- 2.It is recommended that use the middle temperature solder paste.
- 3.Stress on the LEDS should be avoided during heating in soldering process.
- 4.After soldering ,do not deal with the product before its temperature drop down to room temperature.

### 3.1.1 Soldering Iron

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

### 3.1.2 Repairing

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

### 3.1.3 Cleaning

Try to use "no clean solder paste type", so, after reflow need not cleaning. If you need to clean the PCB, after the completion of welding recommended the use of isopropyl alcohol (IPA) cleaning. When using other solvents, it should be confirmed beforehand the solvents do not damage the LED.Do not use ultrasonic cleaning.





## 4.Handling Precautions

### 4.1Handling Precautions

#### 4.1.1 Storage

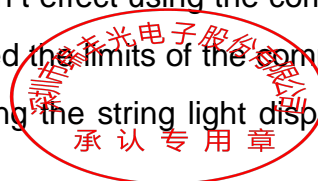
- (1) Moisture proof and anti-electrostatic package with moisture absorbent material is used, Packaged products have one year to save time.
- (2) Before opening the package, the product should be kept at 30°C or less and humidity less than 60%RH.
- (3) Seal anti-electrostatic bag humidity card should immediately check bag humidity indicator card in the open the bag after, Humidity is greater than or equal to 30%, Must be baked before use
- (4) After opening the package, the product should be soldered within 24 hours. If not, please store at 30°C or less and humidity less than 10%RH. It is recommended that the product be operated at the workshop condition of 30°C or less and humidity less than 60%RH.
- (5) If the moisture absorbent material has fade away or the LEDs have exceeded the storage time, baking treatment should be performed based on the following condition : 65±5°C for 24 hours.

#### 4.1.2 Static Electricity

- (1) The following procedures may decrease the possibility of ESD damage.
- (2) Minimize friction between the product and surroundings to avoid static buildup.
- (3) All production machinery and test instruments must be electrically grounded.
- (4) Operators must wear anti-static bracelets.
- (5) Wear anti-static suit when entering work areas with conductive machinery.
- (6) All workstations that handle IC and ESD-sensitive components must maintain an electrostatic potential of 150V or less.

#### 4.1.3 Reverse voltage protection

In generally the reverse current of LED is very small, it can't effect using the component normally, but when it often suffered the reverse voltage which exceed the limits of the component than it will be damaged, the reverse current increases rapidly causing the string light display gray scale so



when designing, please pay attention to control the reverse voltage we suggest the reverse voltage less than 10V.

#### 4.1.4 The safe temperature for LEDs working

The high temperature will make the LED's Luminous Intensity decreased radically, if LEDs worked in hot environment for a long time, they will be disabled easily. When LEDs are working in a closed array, we suggest that the LED's surface temperature should be lower than 55°C and the leg's temperature should be lower than 75°C.

#### 4.1.5 Others

Do not directly touch or handle the epoxy surface. It may damage the internal circuitry. Handle the component along the side surfaces by using forceps or appropriate tools.

#### 4.1.6 Declare

(1) Both the customers and Refond will agree on official specifications of supplied products before a customer's volume production. The specification is valid only after be signed. And Refond reserves the right to further modify the specification for technical reference and sample without noticing the customers.





