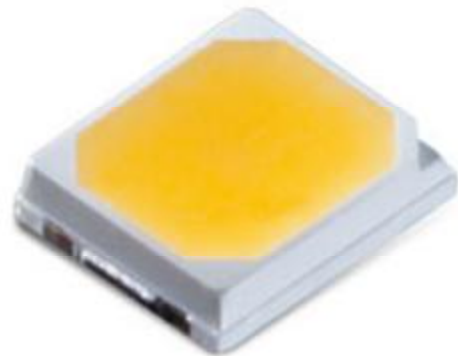


SMD LED Datasheet

WR-3528A02-80XX



Features

- PLCC package
- Top view white LED
- High luminous intensity output
- Wide viewing angle
- Pb-free
- RoHS compliant
- ANSI Binning

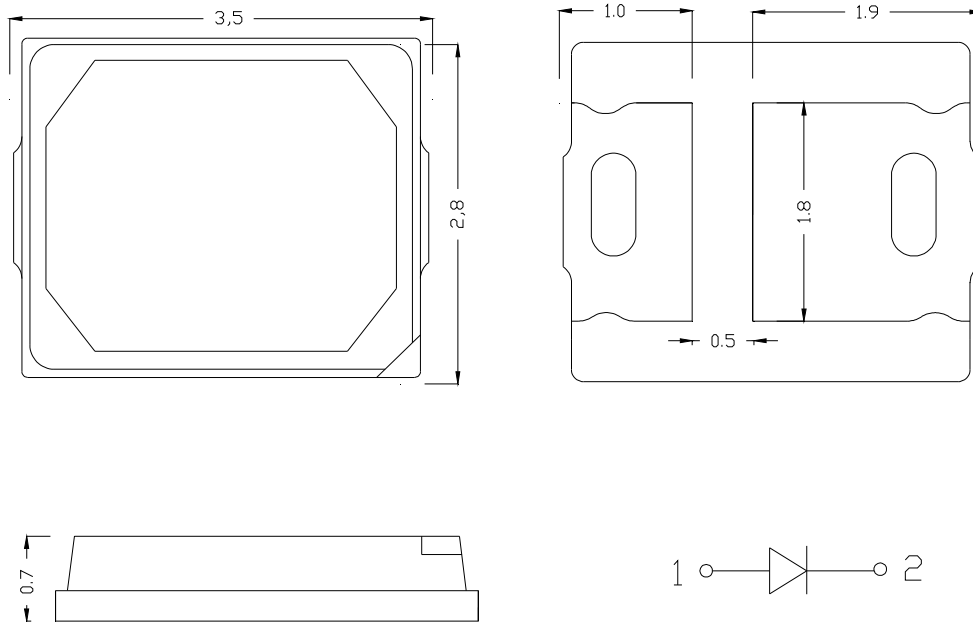
Description

The 2835 package has high efficacy, high CRI, low power consumption, wide viewing angle and a compact form factor. These features make this package an ideal LED for all lighting applications.

Applications

- General lighting
- Decorative and Entertainment Lighting
- Indicators
- Illumination
- Switch lights

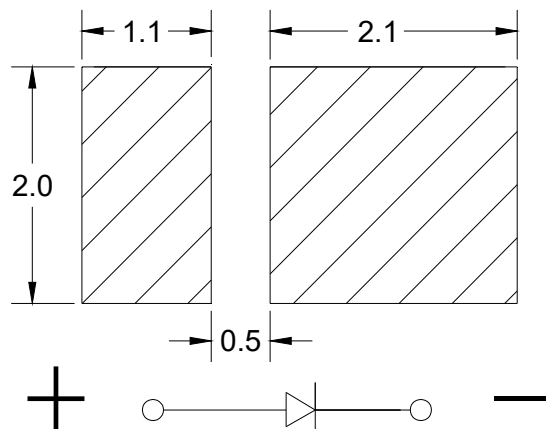
Package outline



Notes:

- 1.All dimensions are in millimeters.
- 2.Tolerances are
 - X.X ± 0.1 ;
 - X.XX ± 0.05 .

Recommend Printed Circuit Board Attachment Pad



Absolute maximum ratings at Ta=25°C

| Parameter | Symbol | Absolute Maximum Rating | Unit |
|------------------------------|--------|-------------------------|------|
| Continuous Forward current | If | 80 | mA |
| Power Dissipation | PD | 240 | mW |
| Pulse Forward Current[1] | Ifp | 160 | mA |
| Solder Point temperature | Top | 95 | °C |
| Storage temperature range | Tstg | -40 ~+100 | °C |
| Junction Temperature | Tj | 115 | °C |
| Thermal resistance | Rthj,s | 50 | °C/W |
| Electrostatic Discharge(HBM) | ESD | 2000 | V |

Notes:

[1]1/10 Duty cycle,0.1ms pulse width.

Electro-optical characteristics at Ta=25°C

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit | Test Condition |
|-----------------------|-------------------|------|------|------|------|----------------|
| Forward Voltage | V _F | 2.8 | --- | 3.4 | V | IF=60mA |
| Luminous Flux | Φ _v | 24 | --- | 30 | lm | IF=60mA |
| Color Temperature | CCT | 2850 | --- | 7000 | K | IF=60mA |
| Color Rendering Index | Ra | 80 | --- | -- | / | IF=60mA |
| View Angle | 2θ _{1/2} | --- | 120 | --- | ° | IF=60mA |
| Reverse Current | IR | --- | --- | 10 | uA | VR =5V |

Notes:

1. Tolerance of Luminous flux: ±10%.
2. Tolerance of Forward Voltage: ±0.1V.
3. Tolerance of Color Rendering Index: ±2
4. Rthj,s is the thermal resistance from junction to solder point on MCPCB with electrical power.

Mass Production List

| Product | CRI Min | CCT(K) | Φ(lm) Min. | Φ(lm)Max. |
|-----------------|---------|--------|------------|-----------|
| WR-3528A02-80W1 | 80 | 3000K | 24 | 28 |
| WR-3528A02-80W4 | 80 | 3500K | 24 | 28 |
| WR-3528A02-80N3 | 80 | 4000K | 26 | 30 |
| WR-3528A02-80C5 | 80 | 5000K | 26 | 30 |
| WR-3528A02-80C3 | 80 | 5700K | 26 | 30 |
| WR-3528A02-80C2 | 80 | 6000K | 26 | 30 |
| WR-3528A02-80C1 | 80 | 6500K | 26 | 30 |

Notes:

- 1.Tolerance of Color Rendering Index: ± 2
- 2.Tolerance of Luminous flux: $\pm 10\%$.

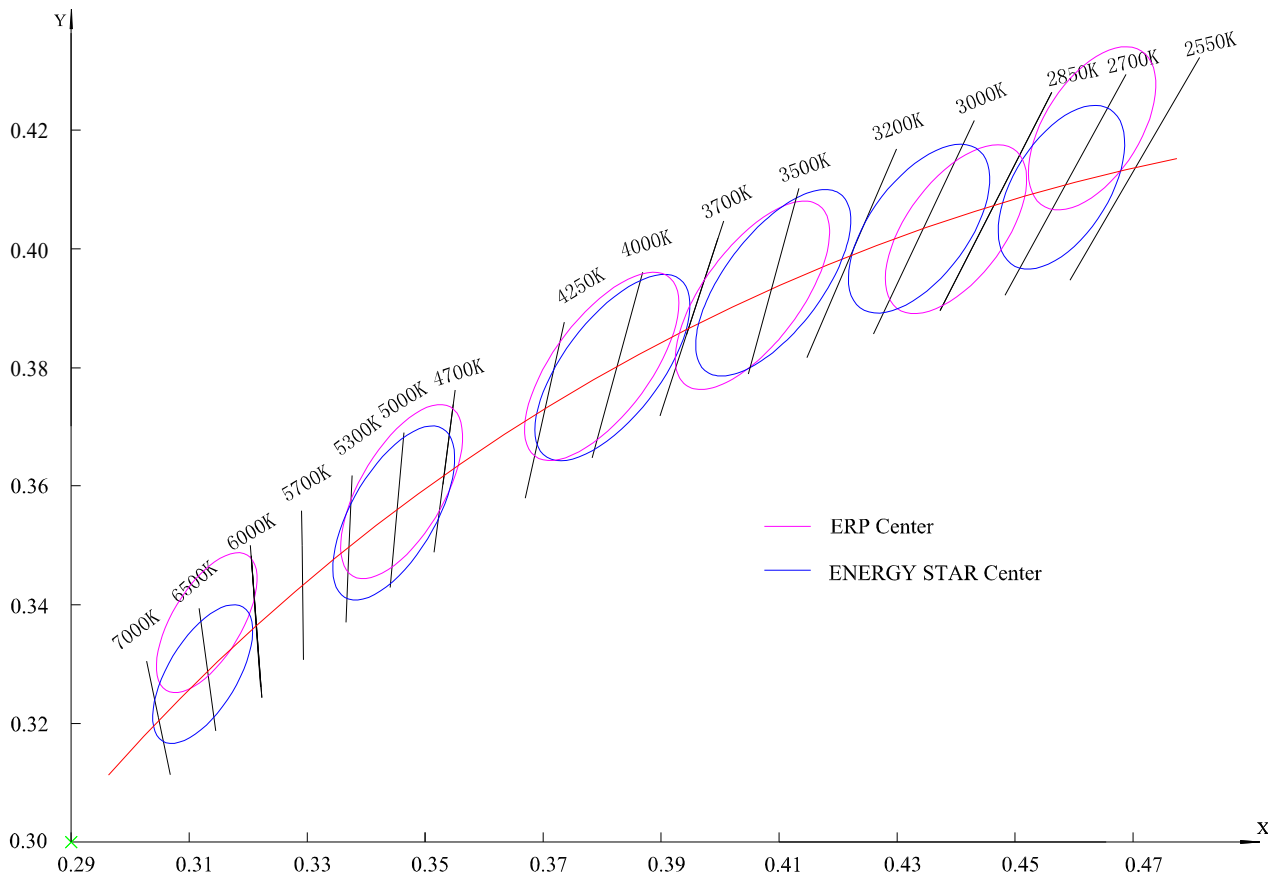
Bin Range of Forward Voltage

| Bin Code | Min. | Max. | Unit | Condition |
|----------|------|------|------|-----------|
| VAB | 2.8 | 3.0 | V | IF=60mA |
| VAC | 3.0 | 3.2 | | |
| VAD | 3.2 | 3.4 | | |

Note:

Tolerance of Forward Voltage: $\pm 0.1V$.

CIE chromaticity



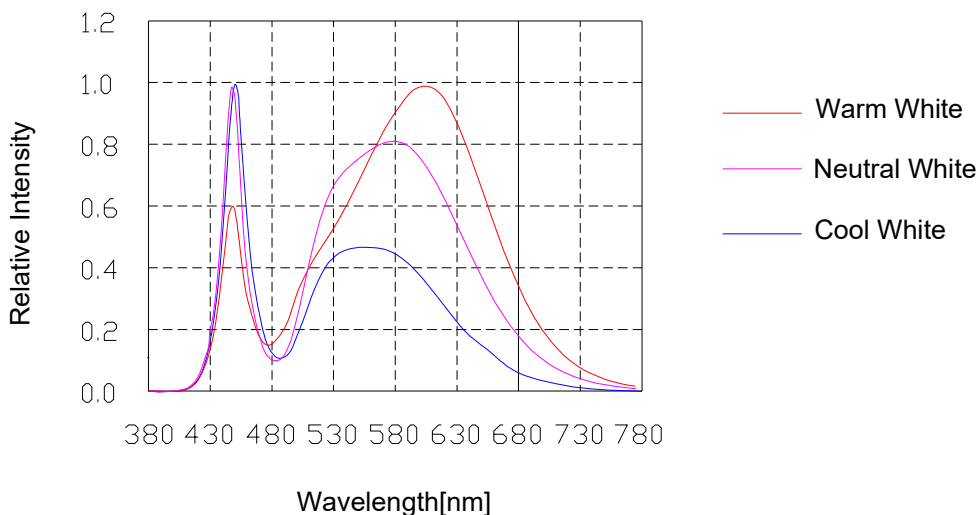
Bin data

1、ERP or Energy Star BIN (SDCM<6 or 5)

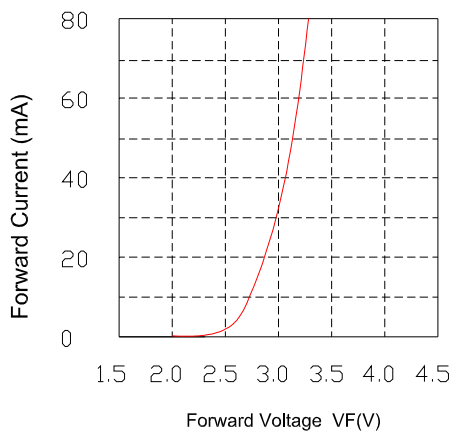
| CCT Range: 2550K~2850K | | | | | | CCT Range: 2850K~3200K | | | | | |
|------------------------|---|-------|-------------|---|--------|--------------------------|---|-------|-------------|---|--------|
| ERP | X | 0.463 | ENERGY STAR | X | 0.4578 | ERP | X | 0.440 | ENERGY STAR | X | 0.4338 |
| | Y | 0.420 | | Y | 0.4101 | | Y | 0.403 | | Y | 0.4030 |
| CCT Range: 3200K~3700K | | | | | | CCT Range: 3700K~4250K K | | | | | |
| ERP | X | 0.409 | ENERGY STAR | X | 0.409 | ERP | X | 0.380 | ENERGY STAR | X | 0.3818 |
| | Y | 0.394 | | Y | 0.394 | | Y | 0.380 | | Y | 0.3797 |
| CCT Range: 5300K~6000K | | | | | | CCT Range: 6000K~7000K | | | | | |
| ERP | X | --- | ENERGY STAR | X | 0.3287 | ERP | X | 0.313 | ENERGY STAR | X | 0.3123 |
| | Y | --- | | Y | 0.3417 | | Y | 0.337 | | Y | 0.3282 |

Typical optical characteristics curves (Ta=25°C unless specified)

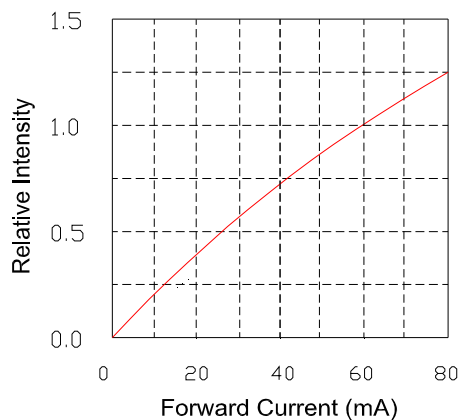
Spectral Distribution
Relative Intensity vs. Wavelength (Ta=25°C)



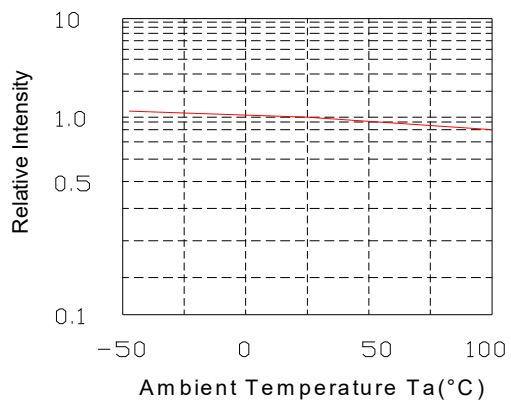
Forward Current vs. Forward Voltage (Ta=25°C)



Relative Intensity vs. Forward Current (Ta=25°C)



Relative Intensity vs. Ambient Temperature



Max. Driving Forward Current vs. Soldering Temperature

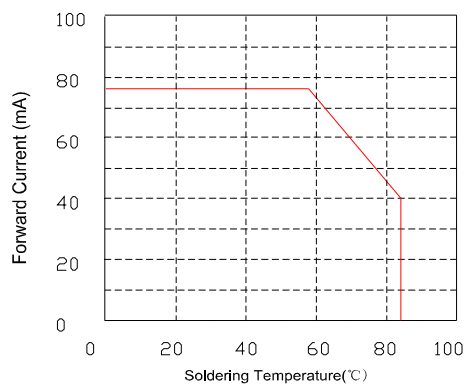
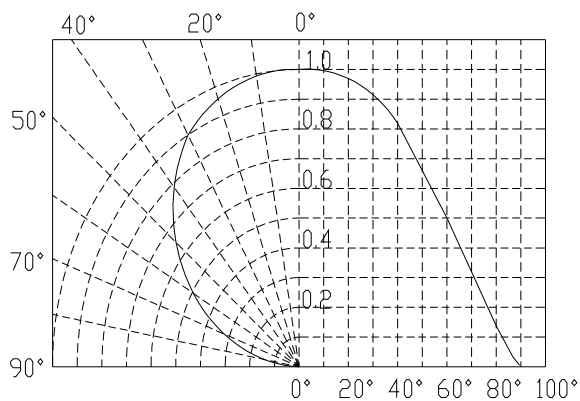


Diagram characteristics of radiation



Reflow profile

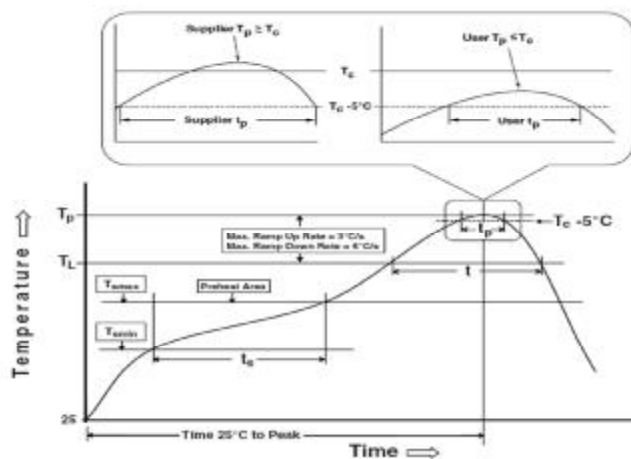
- Soldering condition(JEDEC-020D)

Suggestion IR Reflow Profile For Pb Free Process

| Profile Feature | Pb-Free Assembly |
|---|--|
| Preheat & Soak | |
| Temperature min (Ts min) | 150°C |
| Temperature max(Ts max) | 200°C |
| Time (Ts min to Ts max)(ts) | 60-120seconds |
| Average ramp –up rate (Ts max to Tp) | 3°C/second max |
| Liquidous temperature (TL) | 217°C |
| Time at liquidous (TL) | 60-150 seconds |
| Peak package body temperature (Tp)* | See classification temp in the table below |
| Time (tp)**within 5°C of thespecified | 30** seconds |
| Classification temperature (Tc) | |
| Average ramp-down rate (Tp to Ts max) | 6°C/second max |
| Time 25°C to peak temperature | 8 minutes max |
| *Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum . | |
| **Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum . | |

Pb-Free Process-Classfication Temperatures (Tc)

| Package Thickness | Volume mm ³ <350 | Volume mm ³ 350-2000 | Volume mm ³ >2000 |
|-------------------|-----------------------------|---------------------------------|------------------------------|
| <1.6mm | 260°C | 260°C | 260°C |
| 1.6mm-2.5mm | 260°C | 250°C | 245°C |
| >2.5mm | 250°C | 245°C | 245°C |



- 1.Reflow soldering should not be done more than two times.
- 2.When soldering ,do not put stress on the LEDs during heating.

Reliability

Test items and results

| Type | Test Item | Ref. Standard | Test Conditions | Note | Number of Damaged |
|------------------------|--|---------------|--------------------------------------|-----------|-------------------|
| Environmental Sequence | Resistance to Soldering Heat(Reflow Soldering) | JESD22-B106 | Tsld=260°C,10sec | 3 times | 0/22 |
| | Temperature Cycle | JESD22-A104 | -40°C 30min ↑↓5min 100°C 30min | 300 cycle | 0/22 |
| | Thermal Shock | JESD22-A106 | -40°C 15min ↑↓ 100°C 15min | 300 cycle | 0/22 |
| | High Temperature Storage | JESD22-A103 | Ta=100°C | 1000 hrs | 0/22 |
| | Low Temperature Storage | JESD22-A119 | Ta=-40°C | 1000 hrs | 0/22 |
| Operation Sequence | Life Test | JESD22-A108 | Ta=25°C IF=60mA | 1000 hrs | 0/22 |
| | High Temperature Life Test | JESD22-A108 | Ta=85°C IF=60mA | 1000 hrs | 0/22 |
| | High Humidity Heat Life Test | JESD22-A101 | 60°C RH=90% IF=60mA | 1000 hrs | 0/22 |

Criteria for judging the damage

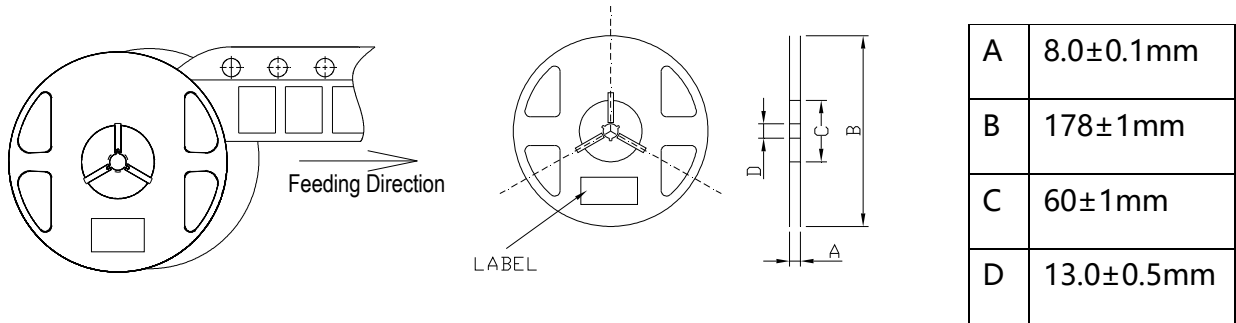
| Item | Symbol | Test Conditions | Criteria for Judgement | |
|--------------------|--------|-----------------|------------------------|-------------|
| | | | Min. | Max. |
| Forward Voltage | VF | IF=60mA | - | U.S.L*)×1.1 |
| Luminous Intensity | IV | IF=60mA | L.S.L**)×0.7 | - |

U.S.L.: Upper Standard Level

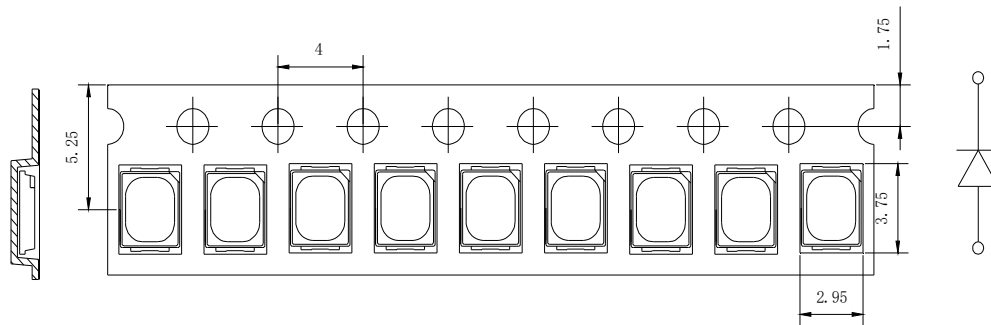
L.S.L.: Lower Standard Level

Packaging specifications

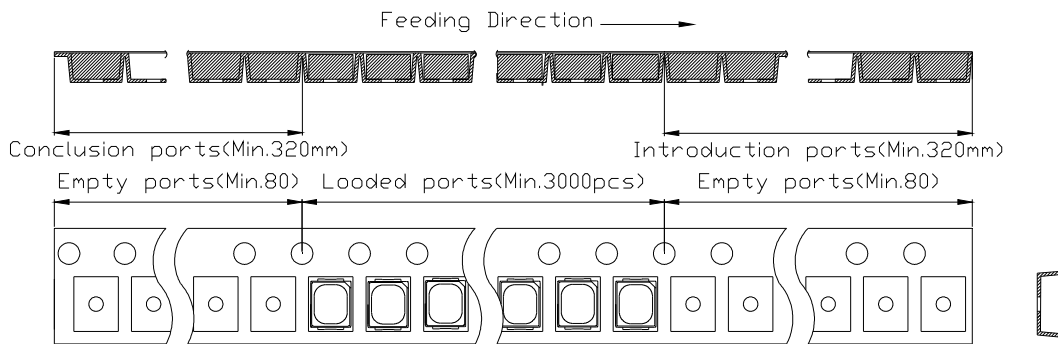
- Feeding direction
- Dimensions of reel (unit: mm)



- Dimensions of tape (unit: mm)



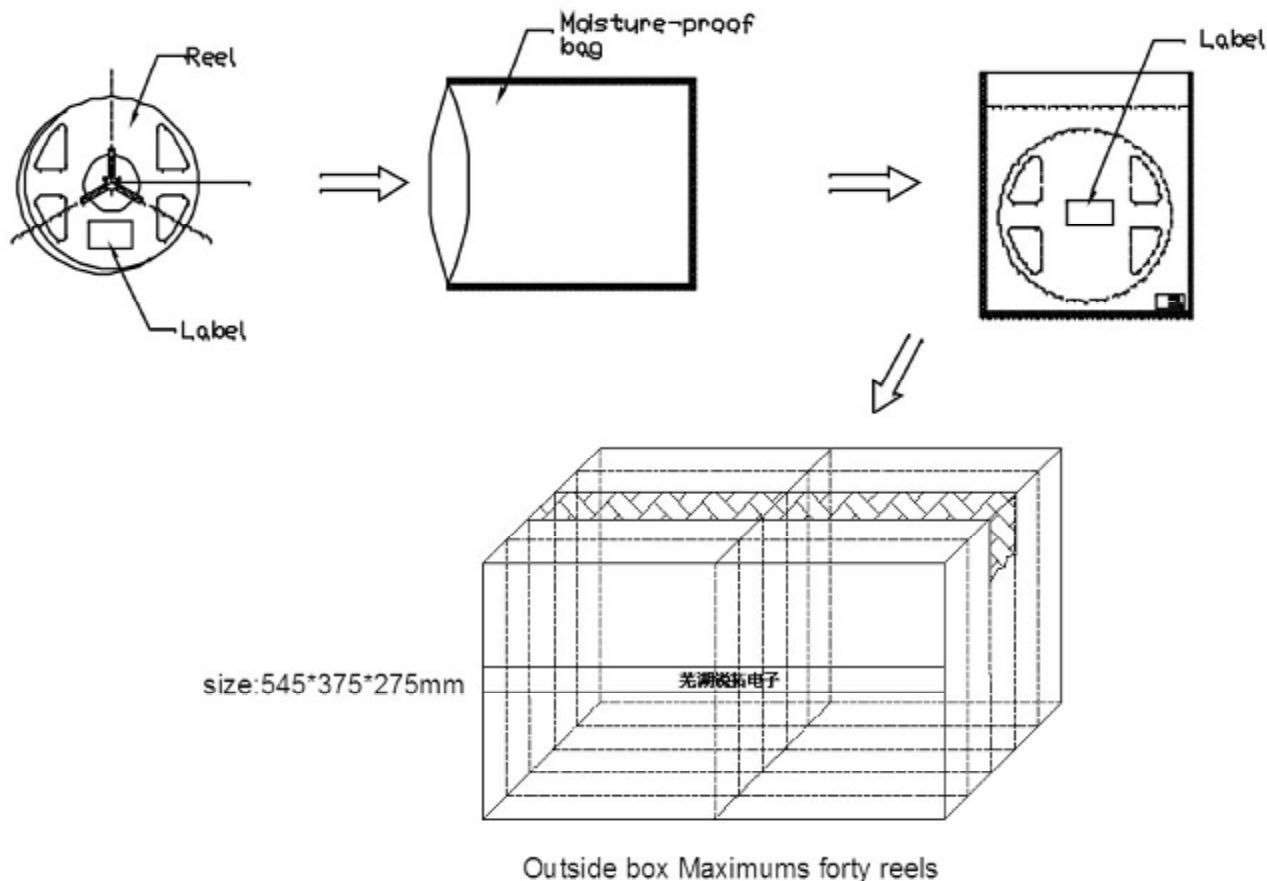
- Arrangement of tape



Notes:

1. Empty component pockets are sealed with top cover tape.
2. The maximum number of missing lamps is two.
3. The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications.
4. 4,000 pcs/ Reel.

Packaging specifications



■ Label

芜湖锐拓电子有限公司

规格型号: WR-3528XXX-XXXX

物料编码: 13528XXXXXXXXXX

RoHS

| | | | |
|------|--|-------|--|
| VF: | | IF: | |
| φv: | | BIN: | |
| CCT: | | QTY: | |
| CIE: | | DATE: | |

- VF: Forward Voltage Rank
- IF: Forward Current
- φv: Luminous Intensity Rank
- CIE: XYRank
- BIN: Retop Rank
- QTY: Packing Quantity
- DATE: Date of shipment

Cautions

Volatile substances

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. LED

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. Retop advises against the use 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, Retop 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.

Storage conditions

Before opening the package:

The LEDs should be kept at 30°C or less and 70%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.

After opening the package:

The LEDs should be kept at 30°C or less and 50%RH or less. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again. If the color of the desiccant changes, components should be dried for 10-12hr at 60±5°C.

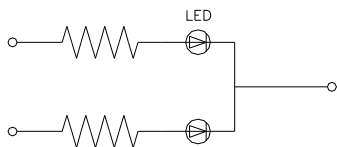
Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.

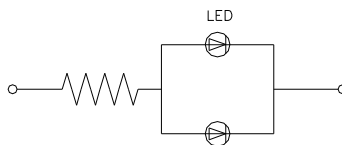
Drive method

An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.

Circuit model A



Circuit model B



(A) Recommended circuit.

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

The cooling requirements

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.LED

Reflow profile

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 influence to the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when using the picking up nozzle, the pressure on the silicone resin should be proper.