



佛山市国星光电股份有限公司

FOSHAN NATIONSTAR OPTOELECTRONICS CO., LTD

SPECIFICATION

Customer		Product	TOP LED
Customer No.		Type	FM-5630WDS-460V-R70

APPROVED SIGNATURES			



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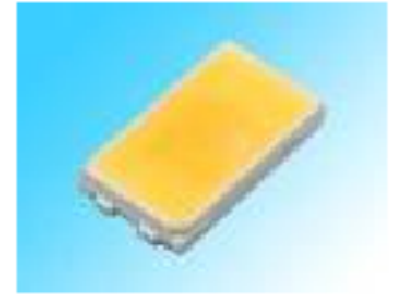
Research & Development Center		
APPROVE	CHECK	DRAW
Version NO: A3		
Release Date: 2011-06-02		

FM-5630WDS-460V-R70 Top Light Emitting Diode

Technical Data Sheet

This product is generally used as indicator and luminary for electronic equipment.

And it also be widely used for indoor and outdoor decorative lighting.



Features:

- Material: InGaN
- Encapsulation: Colored Diffused silicone
- Emitting Color: Warm White
- Reflow Solderable
- High Luminous Intensity and Low Power Dissipation
- Good Reliability and Long Life
- Complied With RoHS Directive

Catalogue

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The Specifications of the product may be modified for improvement without notice.

Electrical Characteristics

✧ Absolute Maximum Ratings (Temperature=25°C):

Parameter	Symbol	Rating	Unit
Forward Current	I_F	150	mA
Pulse Forward Current*	I_{FP}	200	mA
Reverse Voltage	V_R	5	V
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +100	°C
Power Dissipation	P_D	0.5	W
Electrostatic Discharge Threshold (HBM)		1000	V

* Note: Pulse width $\leq 0.1ms$, Duty $\leq 1/10$ *

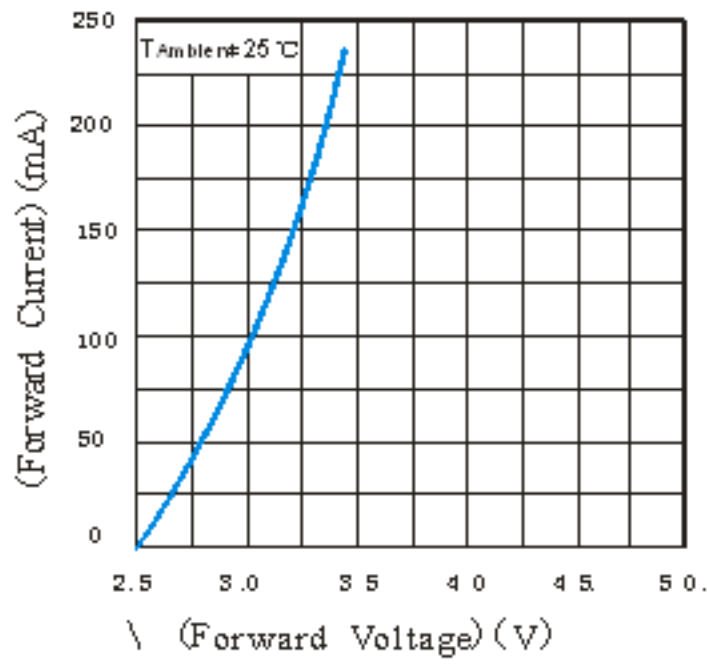
✧ Electro-Optical Characteristics (Temperature=25°C):

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
Reverse Current	I_R	$V_R=5V$			50	μA	
Forward Voltage	V_F	$I_F=120mA$	3.0	3.4	3.8	V	
Chromaticity Coordinates	X				0.38		
	Y				0.38		
Color Temperature	T_c				4000		K
Color Rendering Index	R_a			70			
Luminous Intensity*	I_v			11	14	15	cd
View Angle	$2\theta_{1/2}$				110		deg

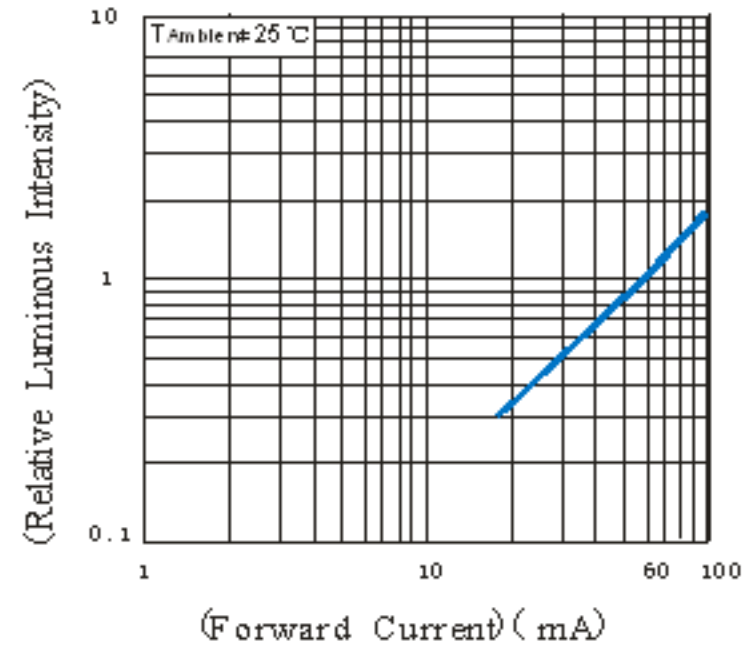
*Note: Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve. *

Typical Characteristics Curves

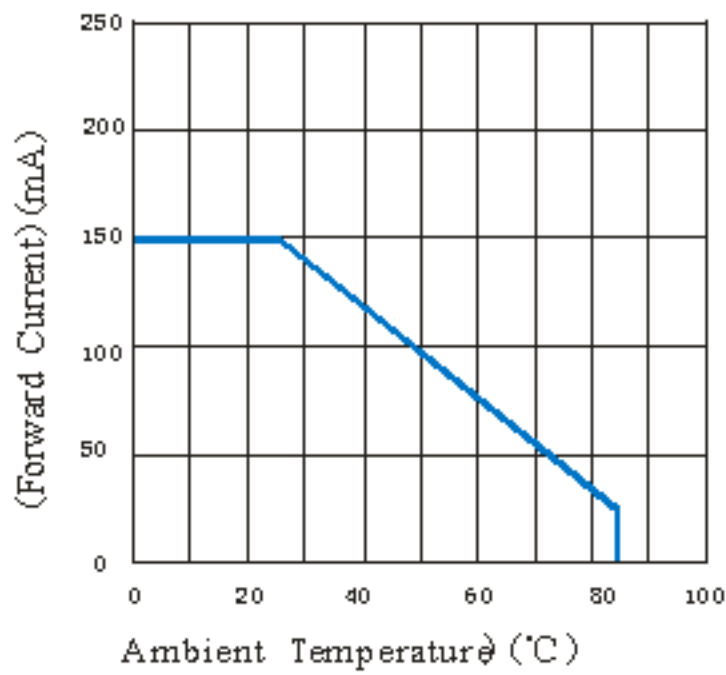
Volt-Ampere Characteristics



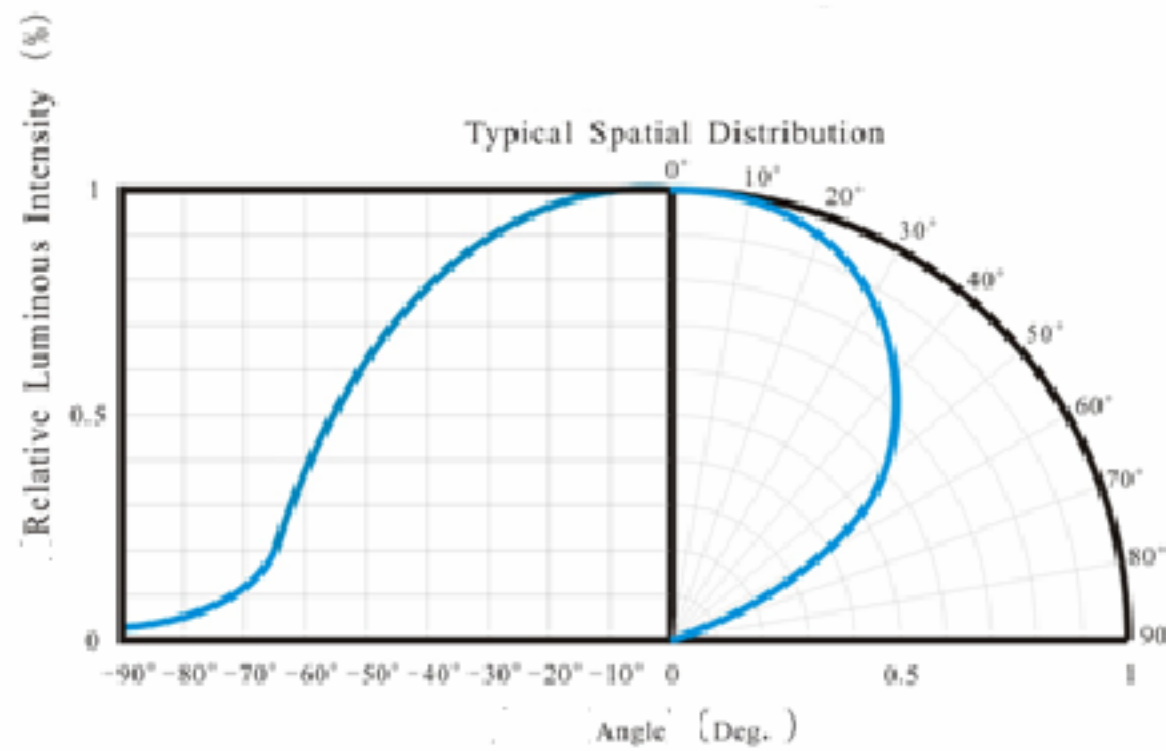
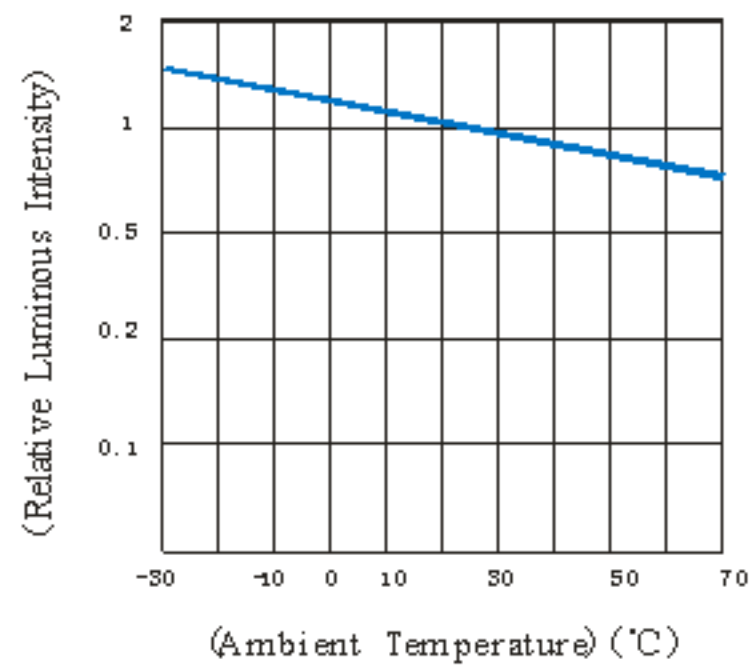
Relative Luminous Intensity VS Forward Current



Forward Current Derating Curve



Luminous Intensity VS Ambient Temperature


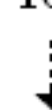


Reliability Test Items And Conditions

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “no lightup” at low current.

To verify for ESD damage, check for “lightup” and V_F of the suspect LEDs at low currents.

The V_F of “good” LEDs should be $> 2.0V @ 0.1mA$ for InGaN product and $> 1.4V @ 0.1mA$ for AlInGaP product.

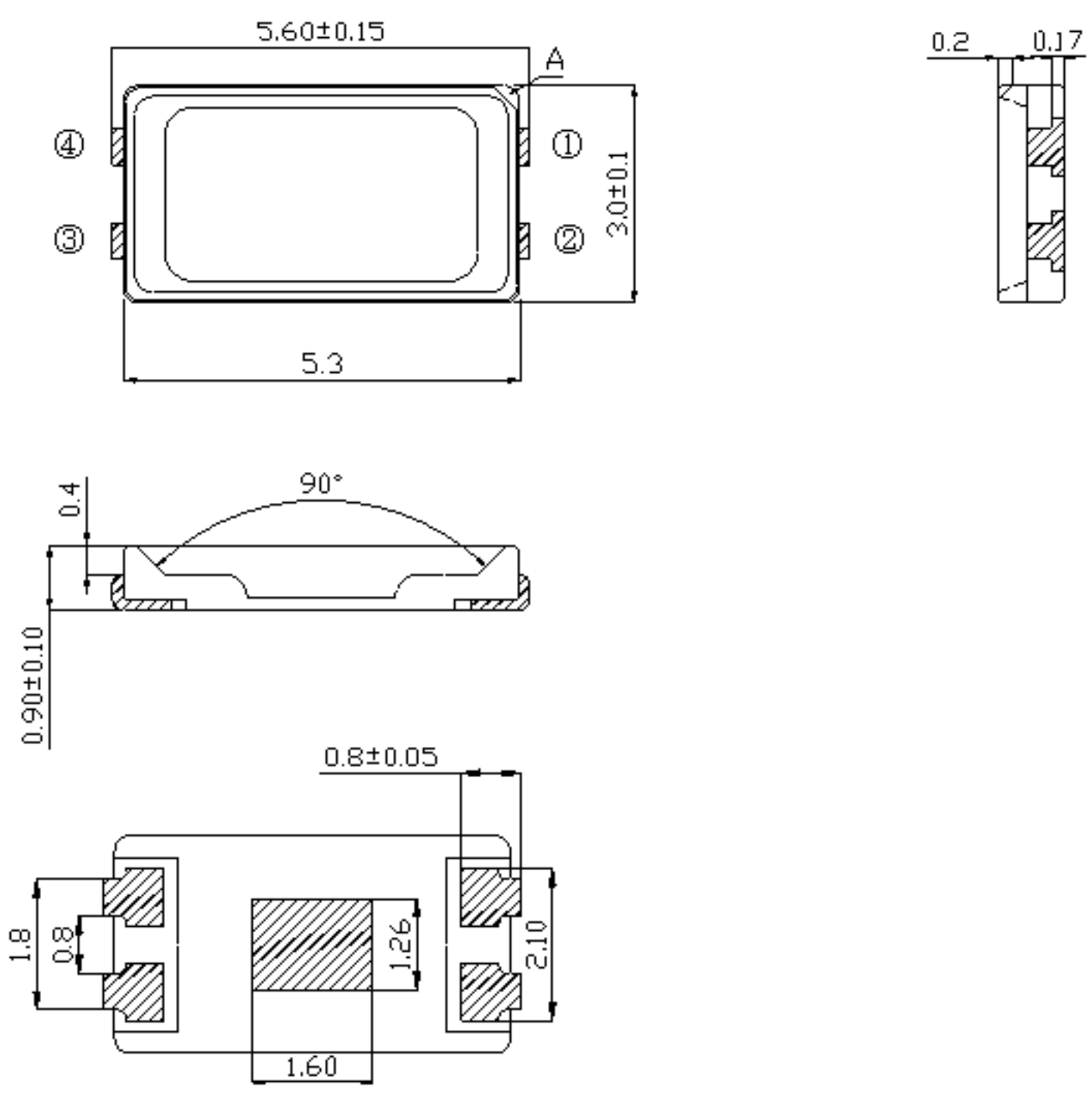
Test Items	Reference Standard	Test Conditions	Quantity	Judging Criteria
Solderability	GB/T 4937, II,2.1	Solder Temperature: 300 °C Solder Duration: (3.5±0.5) sec.	15	Solderable Area Over 95%
Thermal Shock Followed by High Temperature And High Humidity Cyclic	GB/T 4937, III,1.1 GB/T 4937, III.4	5 Cycles $-40^{\circ}C \rightarrow 10 \text{ min.}$  Shift (2~3) min. $100^{\circ}C \rightarrow 10 \text{ min.}$  $25^{\circ}C \sim 55^{\circ}C$ (90%~95%) RH 2 Cycles for 48 hrs. Recover for 2 hrs.	11	C=0 & I ⁺⁺
Resistance For Soldering Heat	GB/T 4937, II,2.2 GB/T 4937, II,2.3	Reflow Soldering	15	C=0 & I ⁺⁺
DC Operating Life	GB/T 4938, 2.2.1	1000 hrs. Forward Current: 25mA	22	C=0 & I ⁺
High Temperature Storage	GB/T 4937, III.2	100 °C → 1000 hrs.	15	C=0 & I ⁺
High Temperature And High Humidity Cyclic	GB/T 4937, III.4	25 °C~55 °C (90%~95%) RH 6 Cycles for 144 hrs. Recover for 2 hrs.	11	C=0 & I ⁺

Criteria For Judging Damage

Items	Symbol	Test Conditions	Criteria For Judging Damage I ⁺	Criteria For Judging Damage I ⁺⁺
Forward Voltage	V_F	$I_F=120mA$	$\geq USL \times 1.2$	$\geq USL$
Reverse Current	I_R	$V_R=5V$	$\geq USL \times 2.0$	$\geq USL$
Luminous Intensity	I_V	$I_F=120mA$	$\leq LSL \times 0.5$	$\leq LSL$

USL: Upper Standard Level, LSL: Lower Standard Level

Outline Dimensions



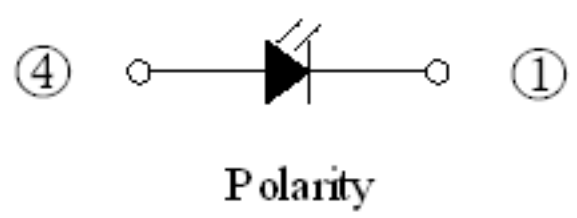
Recommended Soldering Pad

Note:

A: Nick Mark

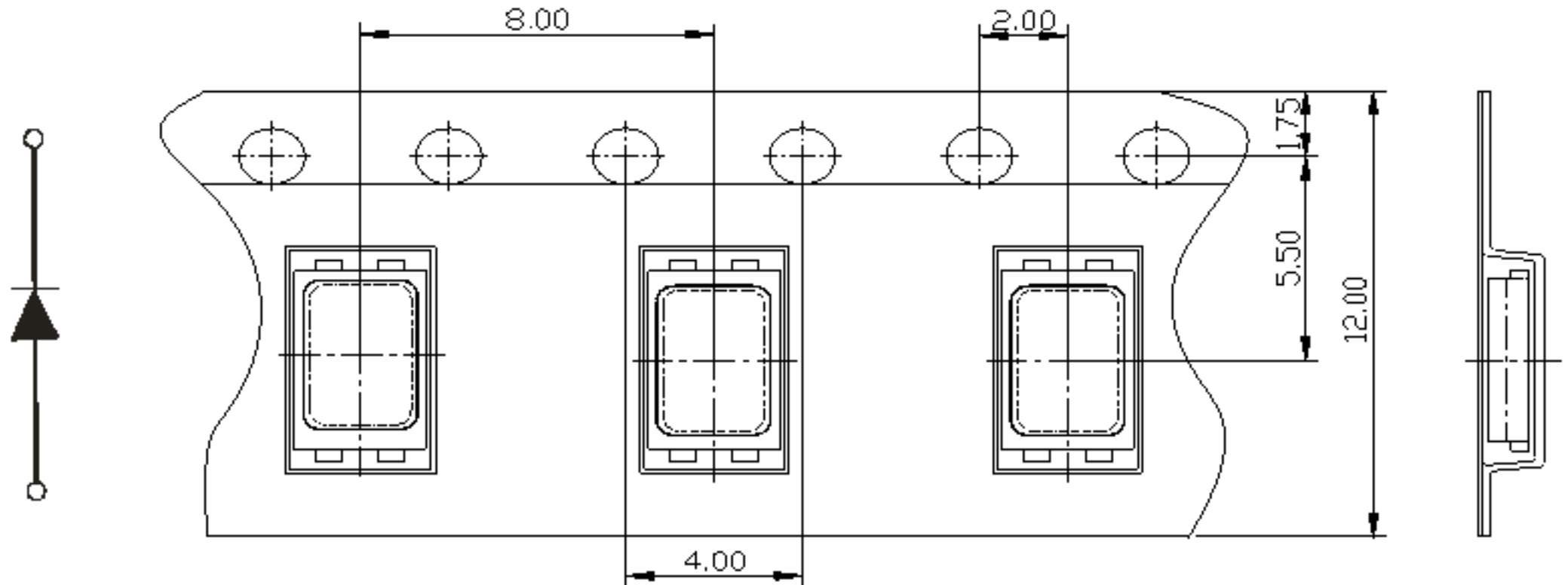
All dimensions in mm.

Tolerances unless mentioned is ± 0.1 mm.



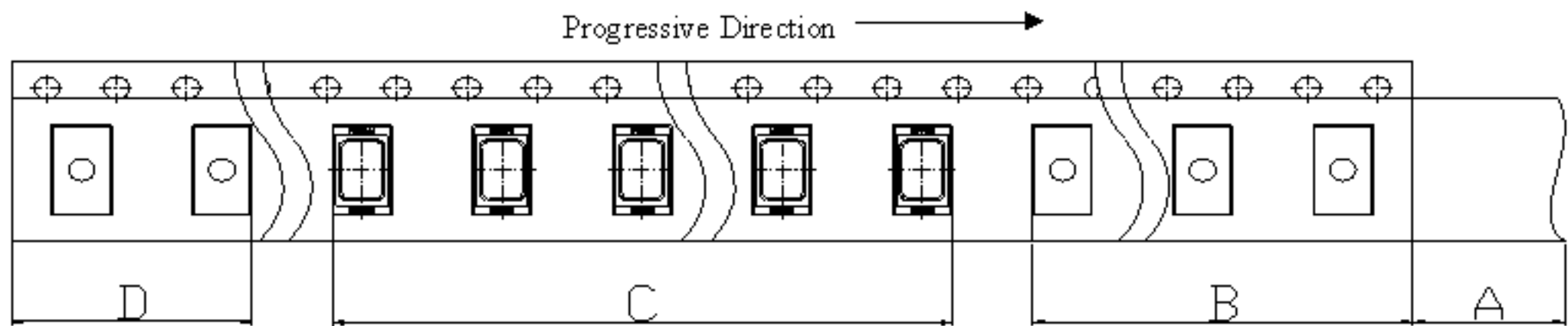
Packaging (1)

Carrier Tape



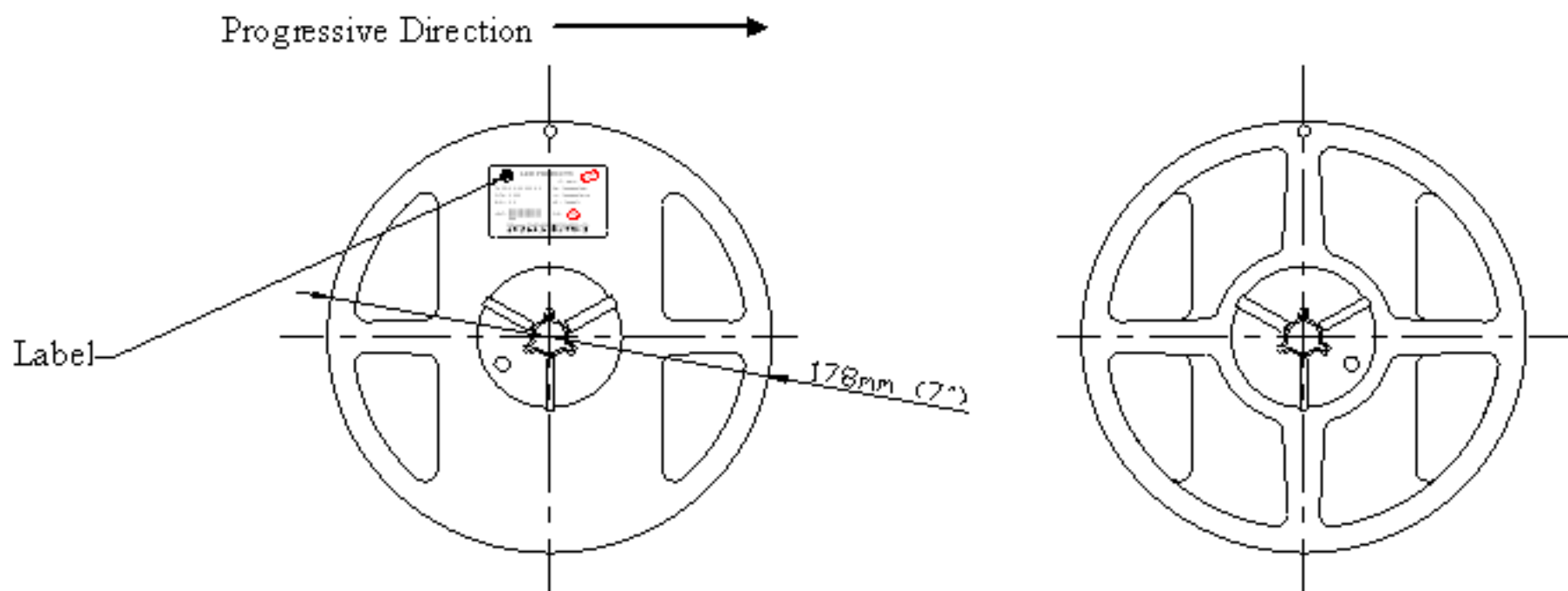
All dimensions in mm, tolerances unless mentioned is ± 0.1 mm.

Details Of Carrier Tape



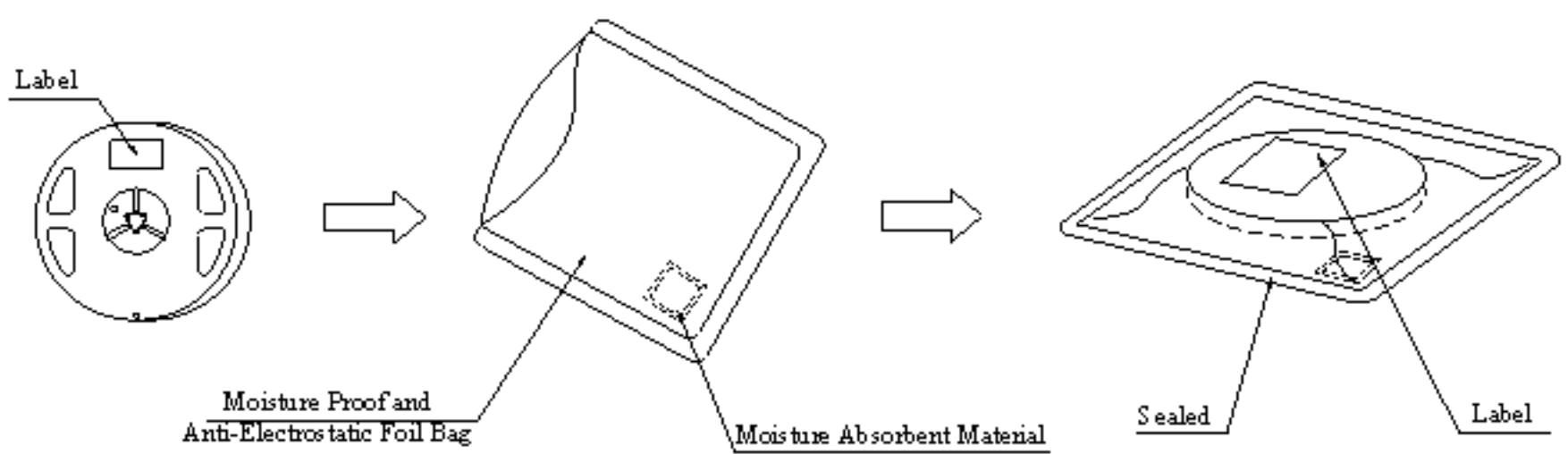
A: Top Cover Tape, 300mm; B: Leader, Empty, 200mm; C: 1500 Lamps Loaded; D: Trailer, Empty, 200mm.

Reel Dimension

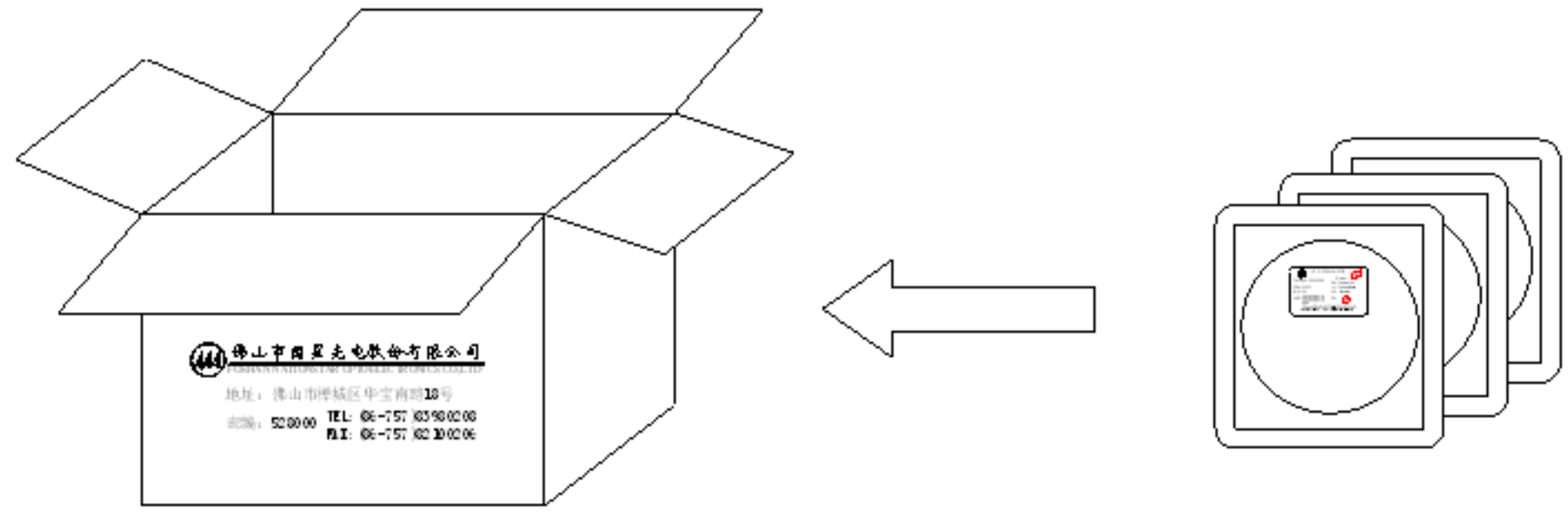


Packaging (2)

Moisture Proof and Anti-Static Foil Bag



Cardboard Box



Label Explanation

- QTY: Quantity
- BIN: Rank
- LOT: Lot Number
- Color Bin: Chromaticity Coordinate
- IV: Luminous Intensity Range
- VF: Forward Voltage Range
- IF: Testing Current

AAA TOP LED RoHS

IF = x mA

TYPE: XX-XXXXXX-XX **Color Bin: xxxx**

QTY: XXXX **IV: (xxx-xxx) cd**

BIN: XX **VF: (xx-xx) V**

LOT:  **QC: **

XXXXXXXX

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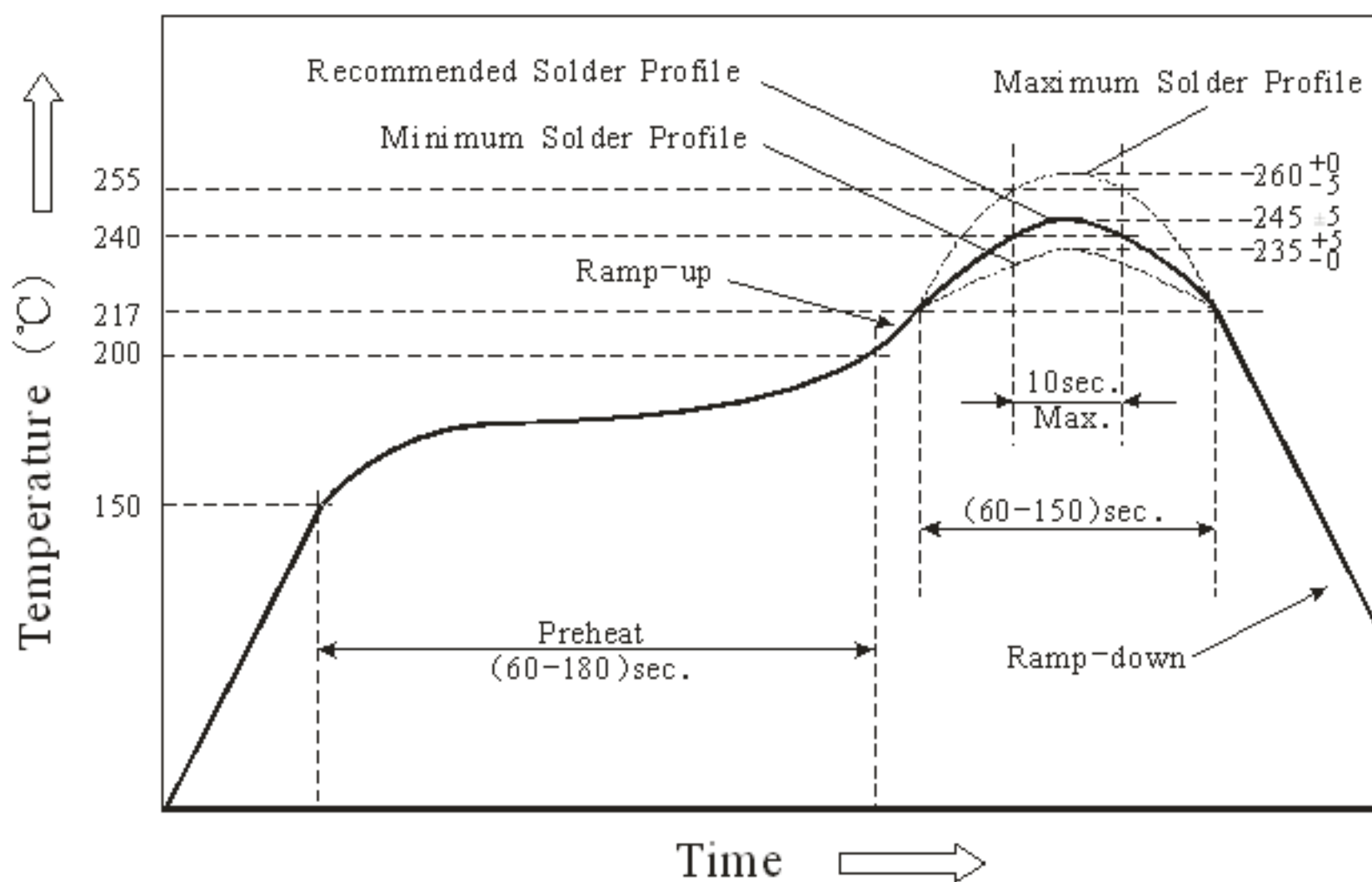
Guideline for Soldering

1. Hand Soldering

A soldering iron of less than 20W is recommended to be used in Hand Soldering. Please keep the temperature of the soldering iron under 360°C while soldering. Each terminal of the LED is to go for less than 3 second and for one time only.

Be careful because the damage of the product is often started at the time of the hand soldering.

2. Reflow Soldering: Use the conditions shown in the under Profile of Pb-Free Reflow Soldering.



- Reflow soldering should not be done more than two times.
- Stress on the LEDs should be avoided during heating in soldering process.
- After soldering, do not deal with the product before its temperature drop down to room temperature.

3. Cleaning

It is recommended that alcohol be used as a solvent for cleaning after soldering. Cleaning is to go under 30°C for 3 minutes or 50°C for 30 seconds. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not.

Ultrasonic cleaning is also an effective way for cleaning. But the influence of Ultrasonic cleaning on LED depends on factors such as ultrasonic power. Generally, the ultrasonic power should not be higher than 300W. Before cleaning, a pre-test should be done to confirm whether any damage to LEDs will occur.

Note: This general guideline may not apply to all PCB designs and configurations of all soldering equipment. The technique in practice is influenced by many factors it should be specialized base on the PCB designs and configurations of the soldering equipment.

Precautions (1)

1. Storage

- Moisture proof and anti-electrostatic package with moisture absorbent material is used, to keep moisture to a minimum.
- Before opening the package, the product should be kept at 30°C or less and humidity less than 60% RH, and be used within a year.
- After opening the package, the product should be stored at 30°C or less and humidity less than 10%RH, and be soldered within 168 hours (7 days). It is recommended that the product be operated at the workshop condition of 30°C or less and humidity less than 60%RH.
- 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: $(60 \pm 5)^\circ\text{C}$ for 24 hours.

2. Static Electricity

Static electricity or surge voltage damages the LEDs. Damaged LEDs will show some unusual characteristics such as the forward voltage becomes lower, or the LEDs do not light at the low current, even not light.

All devices, equipment and machinery must be properly grounded. At the same time, it is recommended that wrist bands or anti-electrostatic gloves, anti-electrostatic containers be used when dealing with the LEDs.

3. Vulcanization

LED curing is due to sulfur being in bracket and the +1 price of silver in the chemical reaction generated Ag_2S in the process. It will lead to the capacity of reflecting of silver layer reducing, light color temperature drift and serious decline, seriously affecting the performance of the product. So we should take corresponding measures to avoiding vulcanization, such as to avoid using sulphur volatile substances and keeping away from high sulphur content of the material.

4. Safety Advice For Human Eyes

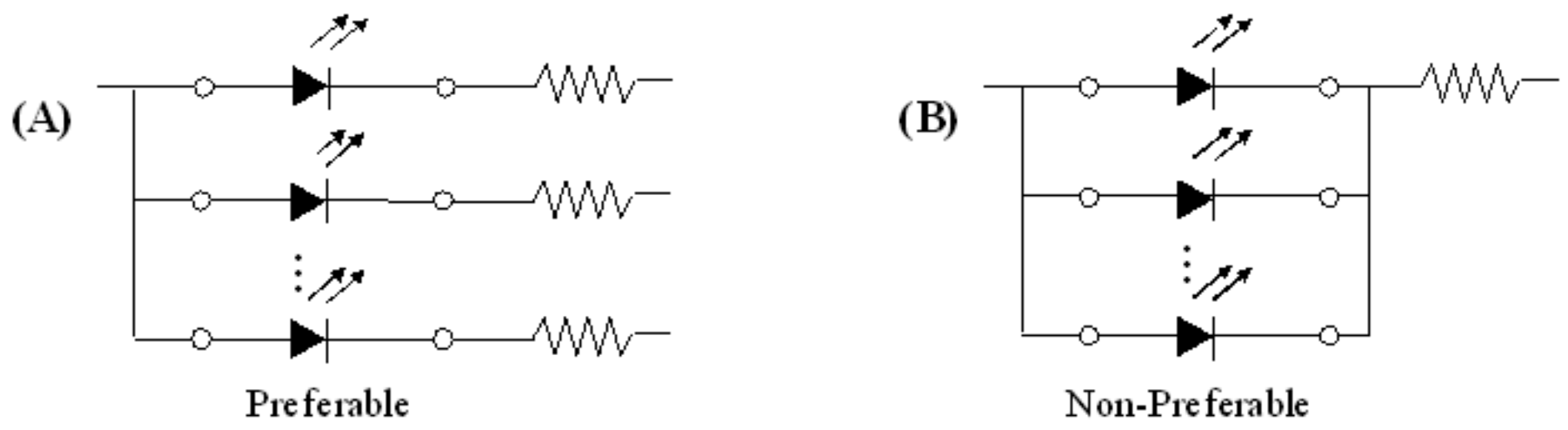
Viewing direct to the light emitting center of the LEDs, especially those of great Luminous Intensity will cause great hazard to human eyes. Please be careful.

5. Design Consideration

In designing a circuit, the current through each LED must 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.

It is recommended to use Circuit A which regulates the current flowing through each LED rather than Circuit B. When driving LEDs with a constant voltage in Circuit B, the current through the LEDs may vary due to the variation in Forward Voltage (VF) of the LEDs. In the worst case, some LED may be subjected to stresses in excess of the Absolute Maximum Rating.

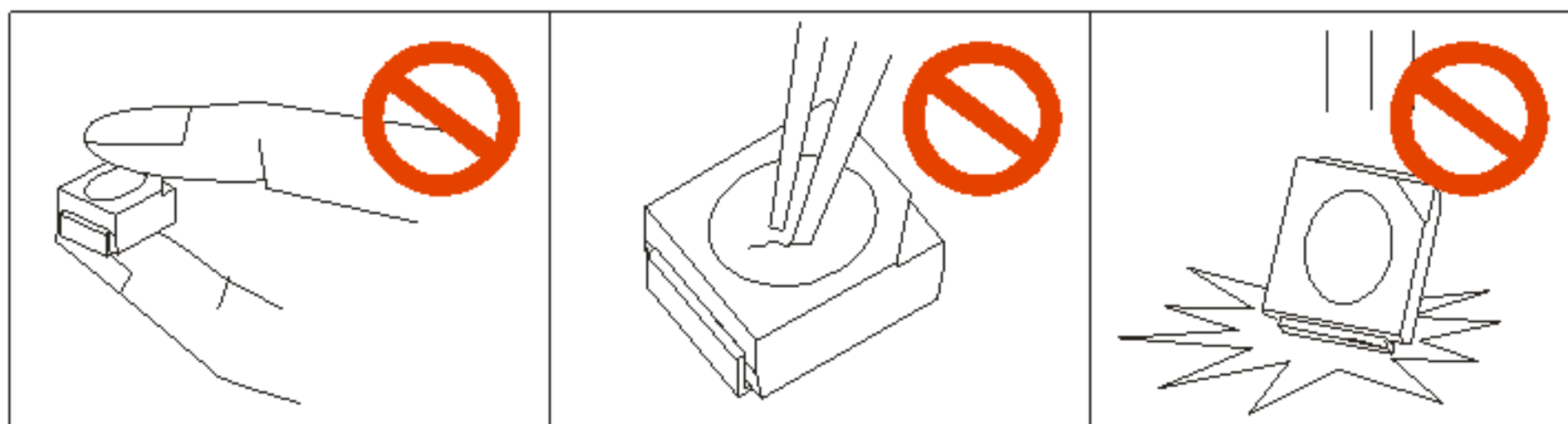
Precautions (2)



Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color changed and so on. Please consider the heat generation of the LEDs when making the system design.

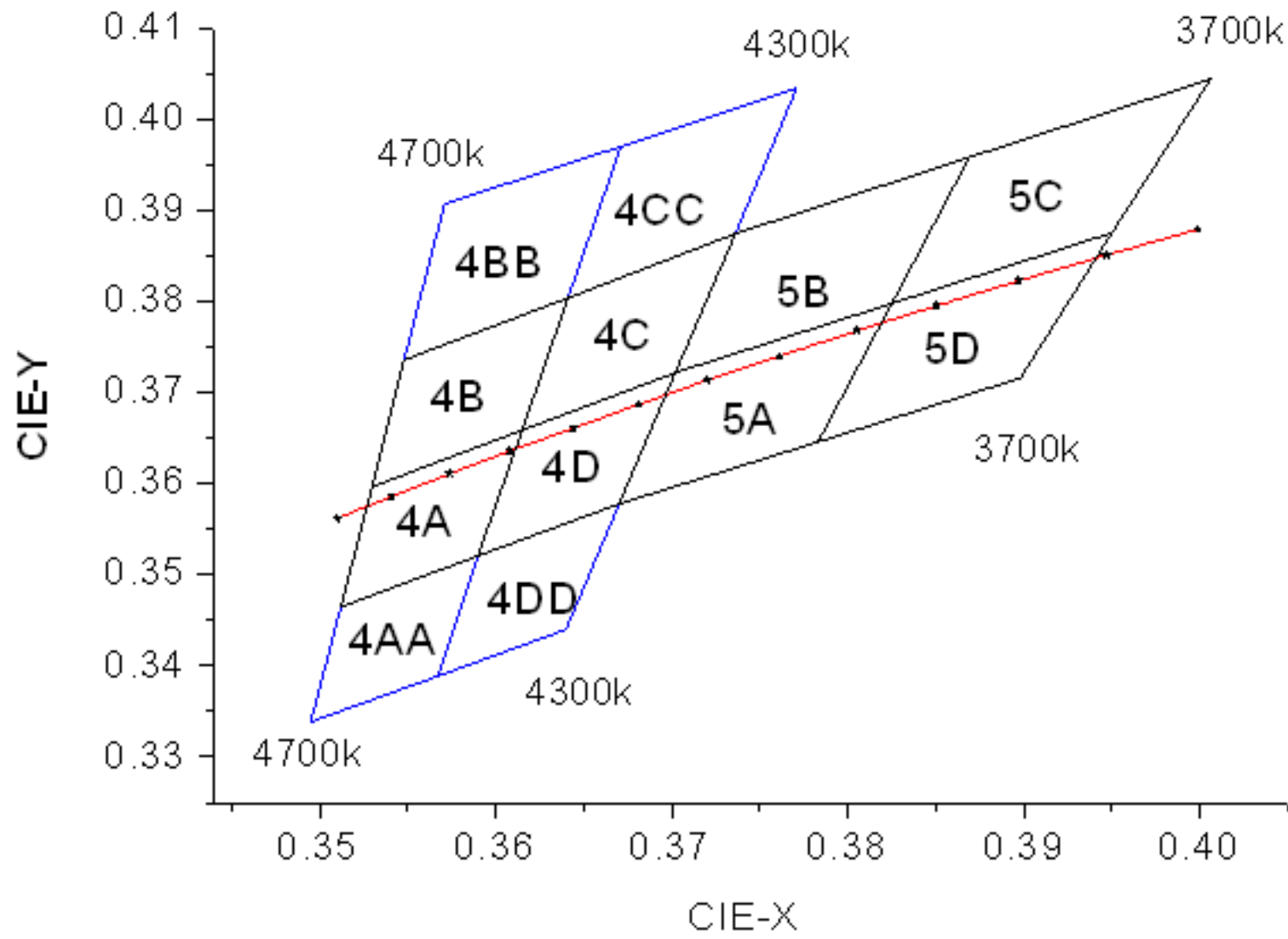
6. Others

When handling the product, touching the encapsulant with bare hands will not only contaminate its surface, but also affect on its optical characteristics. Excessive force to the encapsulant might result in catastrophic failure of the LEDs due to die breakage or wire deformation. For this reason, please do not put excessive stress on LEDs, especially when the LEDs are heated such as during Reflow Soldering.



The epoxy resin of encapsulant is fragile, so please avoid scratch or friction over the epoxy resin surface. While handling the product with tweezers, do not hold by the epoxy resin, be careful.

Appendix: Chromaticity Diagram



		Bottom	Left	Top	Right			Bottom	Left	Top	Right
4A 4600K	X	0.3530	0.3615	0.3590	0.3512	4B 4600K	X	0.3548	0.3641	0.3615	0.3530
	Y	0.3597	0.3659	0.3521	0.3465		Y	0.3736	0.3804	0.3659	0.3597
4C 4400K	X	0.3641	0.3736	0.3702	0.3615	4D 4400K	X	0.3615	0.3702	0.3670	0.3590
	Y	0.3804	0.3874	0.3722	0.3659		Y	0.3659	0.3722	0.3578	0.3521
5A 4100K	X	0.3670	0.3702	0.3825	0.3783	5B 4100K	X	0.3702	0.3736	0.3869	0.3825
	Y	0.3578	0.3722	0.3798	0.3646		Y	0.3722	0.3874	0.3958	0.3798
5C 3800K	X	0.3825	0.3869	0.4006	0.3950	5D 3800K	X	0.3783	0.3825	0.3950	0.3898
	Y	0.3798	0.3958	0.4044	0.3875		Y	0.3646	0.3798	0.3875	0.3716
4AA 4600K	X	0.3495	0.3512	0.3590	0.3567	4BB 4600K	X	0.3571	0.3671	0.3641	0.3548
	Y	0.3339	0.3465	0.3521	0.3389		Y	0.3907	0.3970	0.3804	0.3736
4CC 4400K	X	0.3671	0.3771	0.3736	0.3641	4DD 4400K	X	0.3567	0.3590	0.3670	0.3640
	Y	0.3970	0.4034	0.3874	0.3804		Y	0.3389	0.3521	0.3578	0.3440

Notes: *Tolerance : ± 0.01

