

PLCC-2 Package Top View  
0.2W White Chip LED  
Technical Data Sheet

Series No.: R3528WM01-WX-QXX

## Features:

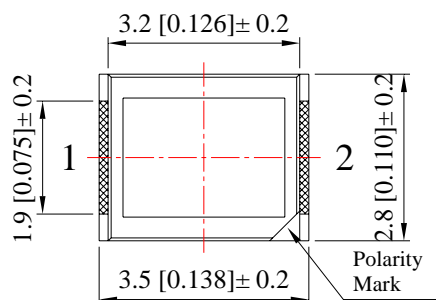
- PLCC-2 package.
- High power LED type.
- White package.
- Optical indicator.
- Yellow diffused window.
- Ideal for backlight and light pipe application.
- Inter reflector.
- Wide viewing angle.
- Very long operating life.
- Designed for high current operation.
- Suitable for automatic placement equipment.
- Suitable for vapor-phase reflow, Infrared reflow and wave solder processes.
- Available on tape and reel (8mm Tape).
- The product itself will remain within RoHS compliant Version.

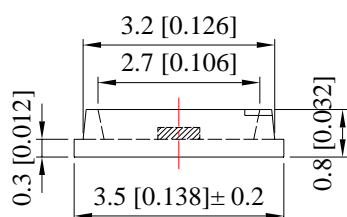
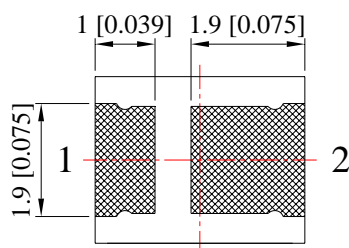
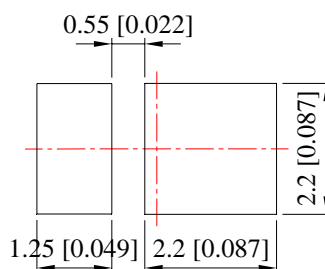
## Descriptions:

The R3528 series is available in soft red, orange, yellow, green, blue and white. Due to the package design, the LED has wide viewing angle and optimized light coupling by inter reflector. This feature makes the SMT TOP LED ideal for light pipe application. The low current requirement makes this device ideal for portable equipment or any other application where power is at a premium.

## Applications:

- Reading lights (car, bus, aircraft).
- Mini\_ accent/Up lighters/Down lighters/Orientation.
- Bollards/Security/Garden.
- Cove/Under shelf/Task.
- Automotive rear combination lamps.
- Indoor/Outdoor Commercial and Residential Architectural.
- Edge\_ lit signs (Exit, point of sale).
- LCD Backlights/Light Guides.

**Package Dimension:**

**Top View**

**Polarity**

**Side View**

**Bottom View**
**Recommended Soldering Pad Dimensions**

 Unit: mm  
 Tolerance:  $\pm 0.10\text{mm}$ 

Series No.		Chip Material	Emitting Color
R3528WM01-WX-QXX	W2-QXX	InGaN	Pure White
	W5-QXX	InGaN	Neutral White
	W6-QXX	InGaN	Warm White

**Notes:**

1. All dimensions are in millimeters (inches).
2. Tolerance is  $\pm 0.10\text{mm}$  (.004") unless otherwise specified.
3. Specifications are subject to change without notice.

**Absolute Maximum Ratings at Ta=25**

Parameters	Symbol	Max.	Unit
Power Dissipation	PD	216	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	IFP	150	mA
Continuous Forward Current	IF	80	mA
Reverse Voltage	VR	5	V
LED Junction Temperature	Tj	125	
Operating Temperature Range	Topr	-40 to +80	
Storage Temperature Range	Tstg	-40 to +85	
Soldering Temperature	Tsld	260 for 5 Seconds	

**Bin Range of Luminous Flux:**

Parameters	Symbol	Emitting Color	Range	Min.	Typ.	Max.	Unit	Test Condition
Luminous Flux *	$\Phi_v$	W2	Q18	18	---	20	lm	IF=60mA
			Q20	20	---	22		
			Q22	22	---	24		
			Q24	24	---	26		
			Q26	26	---	---		
		W5	Q18	18	---	20		
			Q20	20	---	22		
			Q22	22	---	24		
			Q24	24	---	26		
			Q26	26	---	---		
		W6	Q18	18	---	20		
			Q20	20	---	22		
			Q22	22	---	24		
			Q24	24	---	26		
			Q26	26	---	---		

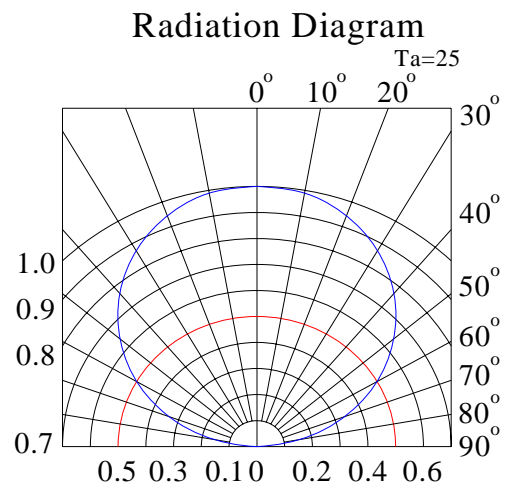
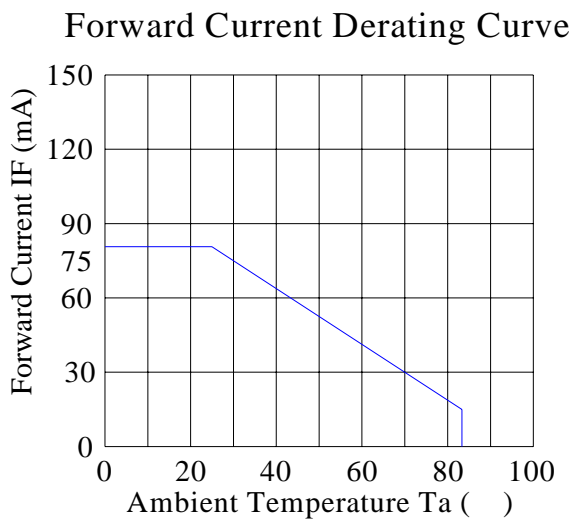
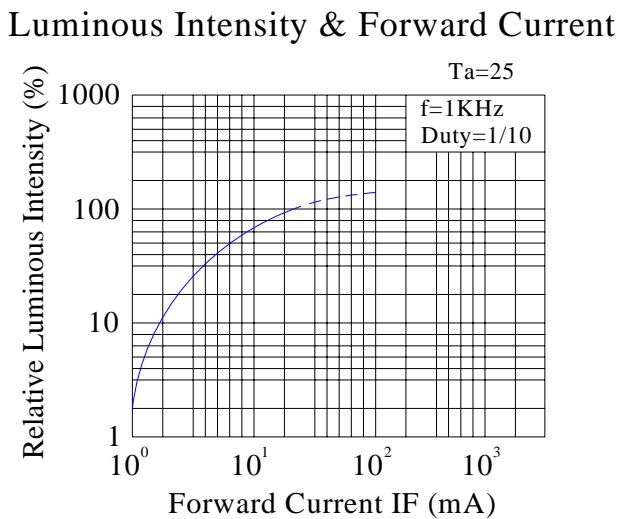
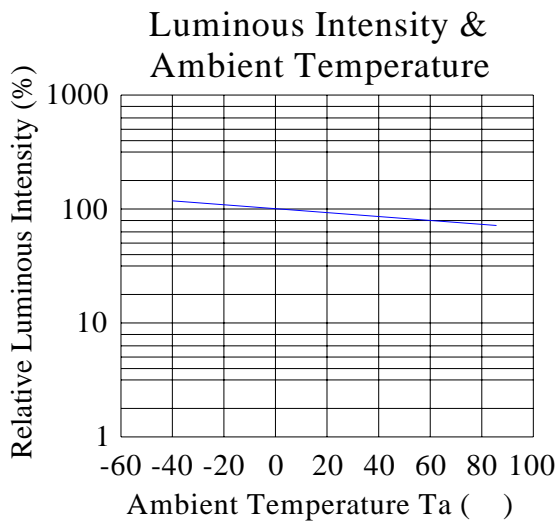
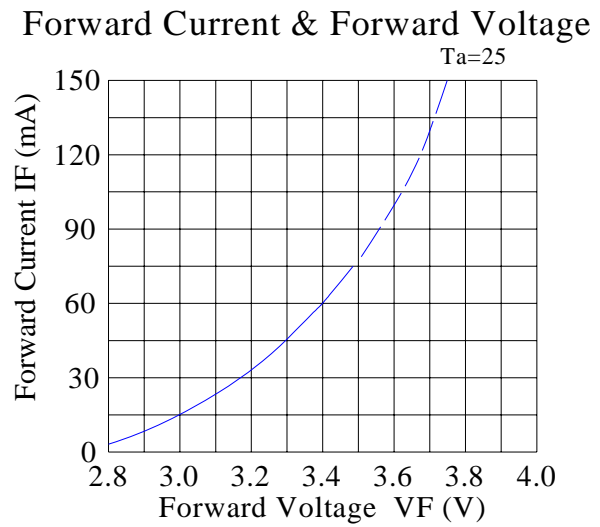
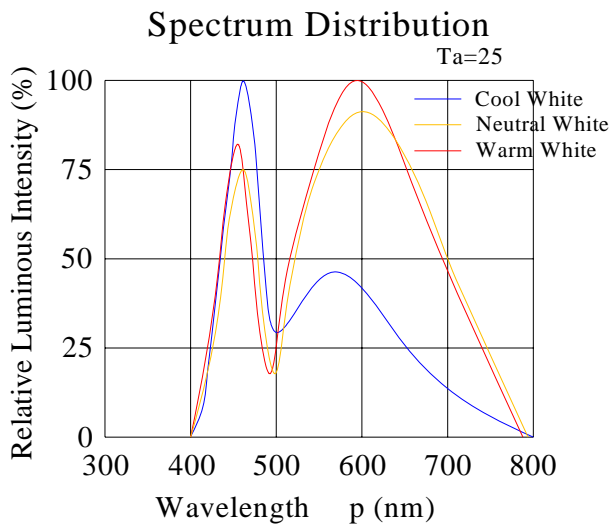
## Electrical Optical Characteristics at Ta=25

Parameters	Symbol	Emitting Color	Min.	Typ.	Max.	Unit	Test Condition
Viewing Angle *	2θ1/2		---	120	---	Deg	IF=60mA
Chromaticity Coordinates	X	W2-QXX	---	0.31	---		IF=60mA
		W5-QXX	---	0.35	---		
		W6-QXX	---	0.43	---		
	Y	W2-QXX	---	0.32	---		
		W5-QXX	---	0.36	---		
		W6-QXX	---	0.40	---		
Color Temperature	CCT	W2-QXX	5000	6500	---	K	IF=60mA
		W5-QXX	3800	4500	5500		
		W6-QXX	2600	3000	3800		
Color Rendering Index	CRI	W2-QXX	---	70	---	Ra	IF=60mA
		W5-QXX	---	70	---		
		W6-QXX	---	70	---		
Forward Voltage	VF	W2-QXX	2.80	3.40	3.80	V	IF=60mA
		W5-QXX	2.80	3.40	3.80		
		W6-QXX	2.80	3.40	3.80		
Reverse Current	IR	W2-QXX	---	---	10	μA	VR=5V
		W5-QXX	---	---	10		
		W6-QXX	---	---	10		

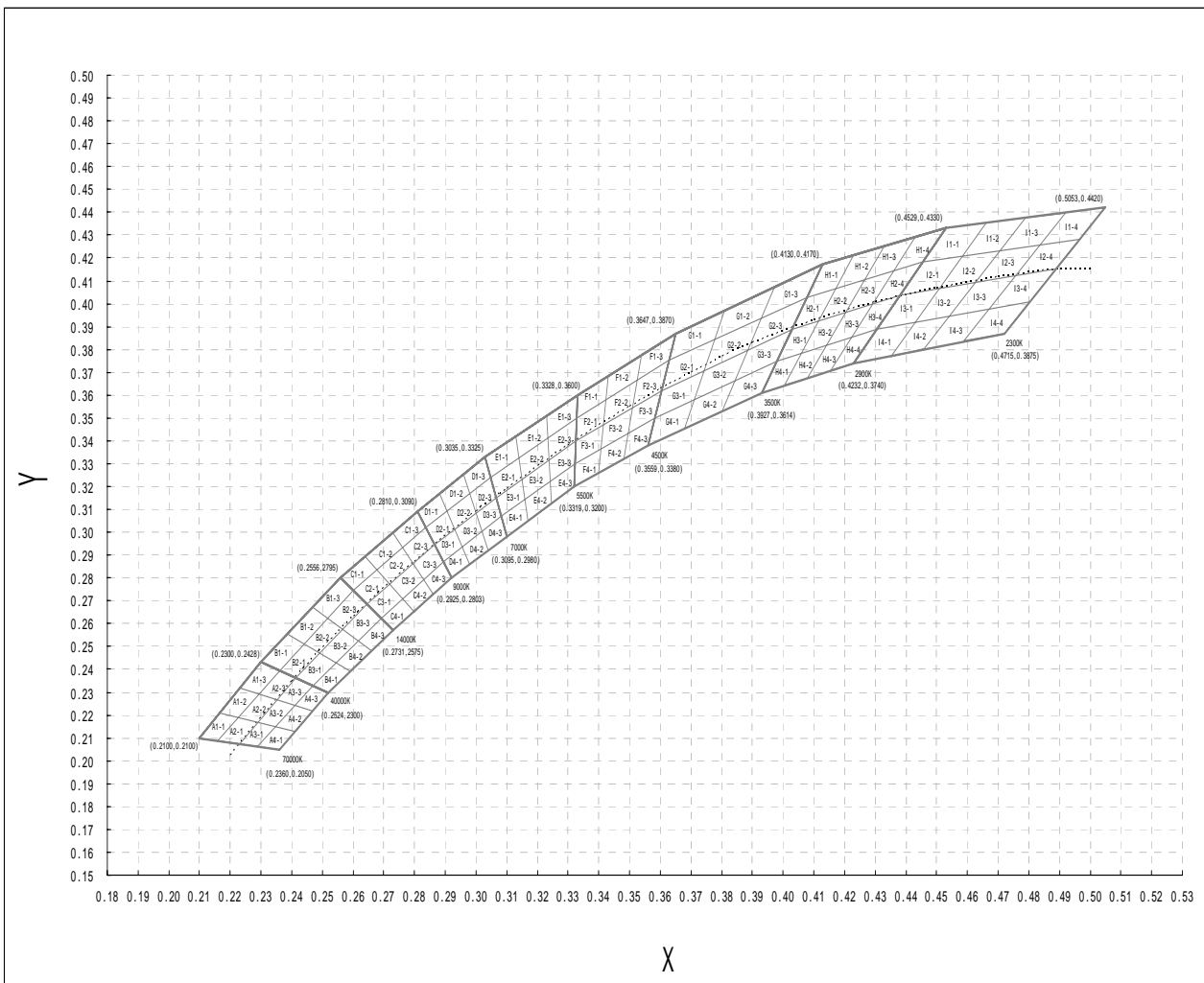
### Notes:

- Luminous Intensity (Flux) Measurement allowance is  $\pm 10\%$ .
- $\theta_{1/2}$  is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
- It use many parameters that correspond to the CIE 1931 2°. X, Y, and Z are CIE 1931 2° values of Red, Green and Blue content of the measurement.

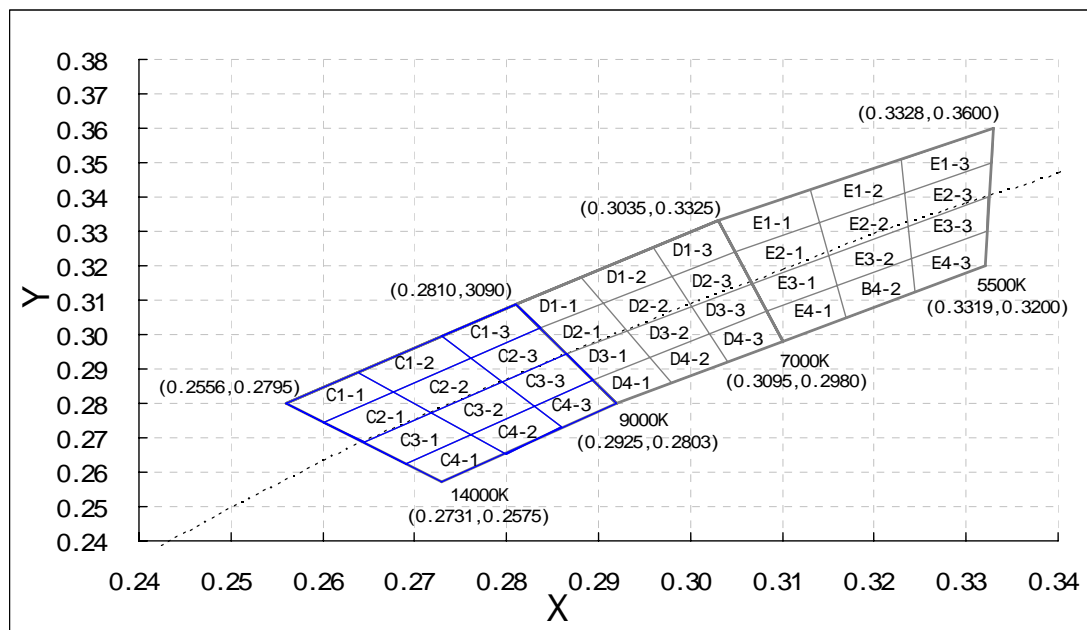
Typical Electrical / Optical Characteristics Curves  
(25 Ambient Temperature Unless Otherwise Noted)



### CIE Chromaticity Diagram:



Pure White:



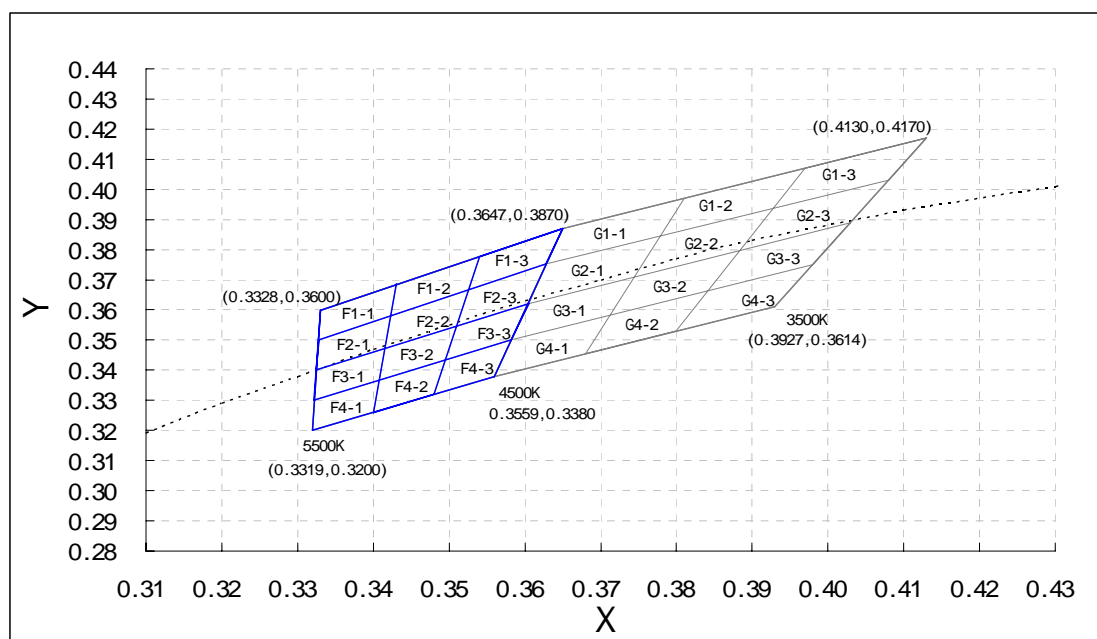
CIE Rank

Chromaticity Coordinates Specifications for Bin Rank (Ta=25 )::

Bin Code	Left x	Left y	Top x	Top y	Right x	Right y	Bottom x	Bottom y
C1-1	0.2560	0.2800	0.2640	0.2890	0.2680	0.2830	0.2600	0.2740
C2-1	0.2600	0.2740	0.2680	0.2830	0.2720	0.2770	0.2640	0.2690
C3-1	0.2640	0.2690	0.2720	0.2770	0.2760	0.2710	0.2690	0.2630
C4-1	0.2690	0.2630	0.2760	0.2710	0.2800	0.2650	0.2730	0.2570
C1-2	0.2640	0.2890	0.2730	0.2990	0.2760	0.2930	0.2680	0.2830
C2-2	0.2680	0.2830	0.2760	0.2930	0.2790	0.2860	0.2720	0.2770
C3-2	0.2720	0.2770	0.2790	0.2860	0.2830	0.2790	0.2760	0.2710
C4-2	0.2760	0.2710	0.2830	0.2790	0.2860	0.2730	0.2800	0.2650
C1-3	0.2730	0.2990	0.2810	0.3090	0.2840	0.3020	0.2760	0.2930
C2-3	0.2760	0.2930	0.2840	0.3020	0.2870	0.2950	0.2790	0.2860
C3-3	0.2790	0.2860	0.2870	0.2950	0.2900	0.2870	0.2830	0.2790
C4-3	0.2830	0.2790	0.2900	0.2870	0.2920	0.2800	0.2860	0.2730
D1-1	0.2810	0.3090	0.2880	0.3170	0.2910	0.3090	0.2840	0.3020

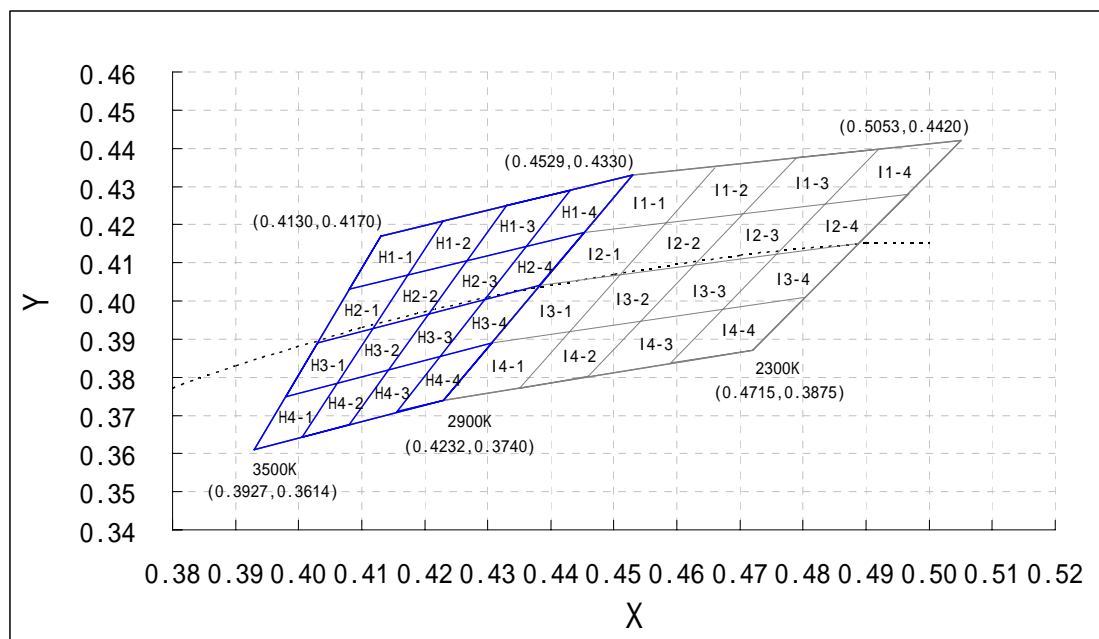


D2-1	0.2840	0.3020	0.2910	0.3090	0.2930	0.3020	0.2870	0.2950
D3-1	0.2870	0.2950	0.2930	0.3020	0.2960	0.2940	0.2900	0.2870
D4-1	0.2900	0.2870	0.2960	0.2940	0.2980	0.2860	0.2920	0.2800
D1-2	0.2880	0.3170	0.2960	0.3250	0.2980	0.3170	0.2910	0.3090
D2-2	0.2910	0.3090	0.2980	0.3170	0.3000	0.3080	0.2930	0.3020
D3-2	0.2930	0.3020	0.3000	0.3080	0.3020	0.3000	0.2960	0.2940
D4-2	0.2960	0.2940	0.3020	0.3000	0.3040	0.2920	0.2980	0.2860
D1-3	0.2960	0.3250	0.3030	0.3330	0.3050	0.3240	0.2980	0.3170
D2-3	0.2980	0.3170	0.3050	0.3240	0.3070	0.3150	0.3000	0.3080
D3-3	0.3000	0.3080	0.3070	0.3150	0.3080	0.3070	0.3020	0.3000
D4-3	0.3020	0.3000	0.3080	0.3070	0.3100	0.2980	0.3040	0.2920
E1-1	0.3030	0.3330	0.3130	0.3420	0.3140	0.3330	0.3050	0.3240
E2-1	0.3050	0.3240	0.3140	0.3330	0.3150	0.3240	0.3070	0.3150
E3-1	0.3070	0.3150	0.3150	0.3240	0.3160	0.3140	0.3080	0.3070
E4-1	0.3080	0.3070	0.3160	0.3140	0.3170	0.3050	0.3100	0.2980
E1-2	0.3130	0.3420	0.3230	0.3510	0.3230	0.3410	0.3140	0.3330
E2-2	0.3140	0.3330	0.3230	0.3410	0.3240	0.3320	0.3150	0.3240
E3-2	0.3150	0.3240	0.3240	0.3320	0.3240	0.3220	0.3160	0.3140
E4-2	0.3160	0.3140	0.3240	0.3220	0.3240	0.3130	0.3170	0.3050
E1-3	0.3230	0.3510	0.3330	0.3600	0.3330	0.3500	0.3230	0.3410
E2-3	0.3240	0.3320	0.3330	0.3500	0.3320	0.3400	0.3240	0.3310
E3-3	0.3240	0.3320	0.3320	0.3400	0.3320	0.3300	0.3240	0.3220
E4-3	0.3240	0.3220	0.3320	0.3300	0.3320	0.3200	0.3240	0.3130

**Neutral White:**

**CIE Rank**
**Chromaticity Coordinates Specifications for Bin Rank (Ta=25 ):** 

Bin Code	Left x	Left y	Top x	Top y	Right x	Right y	Bottom x	Bottom y
F1-1	0.3330	0.3600	0.3430	0.3690	0.3430	0.3580	0.3330	0.3500
F2-1	0.3330	0.3500	0.3430	0.3580	0.3420	0.3480	0.3320	0.3400
F3-1	0.3320	0.3400	0.3420	0.3480	0.3410	0.3370	0.3320	0.3300
F4-1	0.3320	0.3300	0.3410	0.3370	0.3400	0.3260	0.3320	0.3200
F1-2	0.3430	0.3690	0.3540	0.3780	0.3530	0.3660	0.3430	0.3580
F2-2	0.3430	0.3580	0.3530	0.3660	0.3510	0.3550	0.3420	0.3480
F3-2	0.3420	0.3480	0.3510	0.3550	0.3490	0.3430	0.3410	0.3370
F4-2	0.3410	0.3370	0.3490	0.3430	0.3480	0.3320	0.3400	0.3260
F1-3	0.3540	0.3780	0.3650	0.3870	0.3620	0.3750	0.3530	0.3660
F2-3	0.3530	0.3660	0.3620	0.3750	0.3600	0.3620	0.3510	0.3550
F3-3	0.3510	0.3550	0.3600	0.3620	0.3580	0.3500	0.3490	0.3430
F4-3	0.3490	0.3430	0.3580	0.3500	0.3560	0.3380	0.3480	0.3320
G1-1	0.3650	0.3870	0.3810	0.3970	0.3780	0.3840	0.3620	0.3750
G2-1	0.3620	0.3750	0.3780	0.3840	0.3740	0.3710	0.3600	0.3620
G3-1	0.3600	0.3620	0.3740	0.3710	0.3710	0.3590	0.3580	0.3500
G4-1	0.3580	0.3500	0.3710	0.3590	0.3680	0.3460	0.3560	0.3380
G1-2	0.3810	0.3970	0.3970	0.4070	0.3930	0.3940	0.3780	0.3840
G2-2	0.3780	0.3840	0.3930	0.3940	0.3890	0.3800	0.3740	0.3710
G3-2	0.3740	0.3710	0.3890	0.3800	0.3850	0.3670	0.3710	0.3590
G4-2	0.3710	0.3590	0.3850	0.3670	0.3800	0.3540	0.3680	0.3460
G1-3	0.3970	0.4070	0.4130	0.4170	0.4080	0.4030	0.3930	0.3940
G2-3	0.3930	0.3940	0.4080	0.4030	0.4030	0.3890	0.3890	0.3800
G3-3	0.3890	0.3800	0.4030	0.3890	0.3980	0.3750	0.3850	0.3670
G4-3	0.3850	0.3670	0.3980	0.3750	0.3930	0.3610	0.3800	0.3540

Warm White:



CIE Rank

Chromaticity Coordinates Specifications for Bin Rank (Ta=25 )::

Bin Code	Left x	Left y	Top x	Top y	Right x	Right y	Bottom x	Bottom y
H1-1	0.4130	0.4170	0.4230	0.4210	0.4170	0.4070	0.4080	0.4030
H2-1	0.4080	0.4030	0.4170	0.4070	0.4120	0.3930	0.4030	0.3890
H3-1	0.4030	0.3890	0.4120	0.3930	0.4060	0.3790	0.3980	0.3750
H4-1	0.3980	0.3750	0.4060	0.3790	0.4000	0.3650	0.3930	0.3610
H1-2	0.4230	0.4210	0.4330	0.4250	0.4270	0.4110	0.4170	0.4070
H2-2	0.4170	0.4070	0.4270	0.4110	0.4200	0.3960	0.4120	0.3930
H3-2	0.4120	0.3930	0.4200	0.3960	0.4140	0.3820	0.4060	0.3790
H4-2	0.4060	0.3790	0.4140	0.3820	0.4080	0.3680	0.4000	0.3650
H1-3	0.4330	0.4250	0.4430	0.4290	0.4360	0.4140	0.4270	0.4110
H2-3	0.4270	0.4110	0.4360	0.4140	0.4290	0.4000	0.4200	0.3960
H3-3	0.4200	0.3960	0.4290	0.4000	0.4220	0.3850	0.4140	0.3820
H4-3	0.4140	0.3820	0.4220	0.3850	0.4160	0.3710	0.4080	0.3680
H1-4	0.4430	0.4290	0.4530	0.4330	0.4450	0.4180	0.4360	0.4140

H2-4	0.4360	0.4140	0.4450	0.4180	0.4380	0.4040	0.4290	0.4000
H3-4	0.4290	0.4000	0.4380	0.4040	0.4310	0.3890	0.4220	0.3850
H4-4	0.4220	0.3850	0.4310	0.3890	0.4230	0.3740	0.4160	0.3710
I1-1	0.4530	0.4330	0.4660	0.4350	0.4580	0.4210	0.4450	0.4180
I2-1	0.4450	0.4180	0.4580	0.4210	0.4510	0.4060	0.4380	0.4040
I3-1	0.4380	0.4040	0.4510	0.4060	0.4430	0.3920	0.4310	0.3890
I4-1	0.4310	0.3890	0.4430	0.3920	0.4350	0.3770	0.4230	0.3740
I1-2	0.4660	0.4350	0.4790	0.4380	0.4710	0.4230	0.4580	0.4210
I2-2	0.4580	0.4210	0.4710	0.4230	0.4630	0.4090	0.4510	0.4060
I3-2	0.4510	0.4060	0.4630	0.4090	0.4550	0.3950	0.4430	0.3920
I4-2	0.4430	0.3920	0.4550	0.3950	0.4470	0.3810	0.4350	0.3770
I1-3	0.4790	0.4380	0.4920	0.4400	0.4840	0.4260	0.4710	0.4230
I2-3	0.4710	0.4230	0.4840	0.4260	0.4760	0.4120	0.4630	0.4090
I3-3	0.4630	0.4090	0.4760	0.4120	0.4680	0.3980	0.4550	0.3950
I4-3	0.4550	0.3950	0.4680	0.3980	0.4590	0.3840	0.4470	0.3810
I1-4	0.4920	0.4400	0.5050	0.4420	0.4970	0.4280	0.4840	0.4260
I2-4	0.4840	0.4260	0.4970	0.4280	0.4880	0.4150	0.4760	0.4120
I3-4	0.4760	0.4120	0.4880	0.4150	0.4800	0.4010	0.4680	0.3980
I4-4	0.4680	0.3980	0.4800	0.4010	0.4720	0.3870	0.4590	0.3840

**Notes:**

1. Color coordinates measurement allowance is  $\pm 0.01$ .
2. One delivery will include up to two consecutive color ranks and three luminous intensity ranks of the products the quantity-ratio of the ranks is decided by *LuckyLight*.

## Reliability Test Items And Conditions:

The reliability of products shall be satisfied with items listed below:

Confidence level: 90%.

LTPD: 10%.

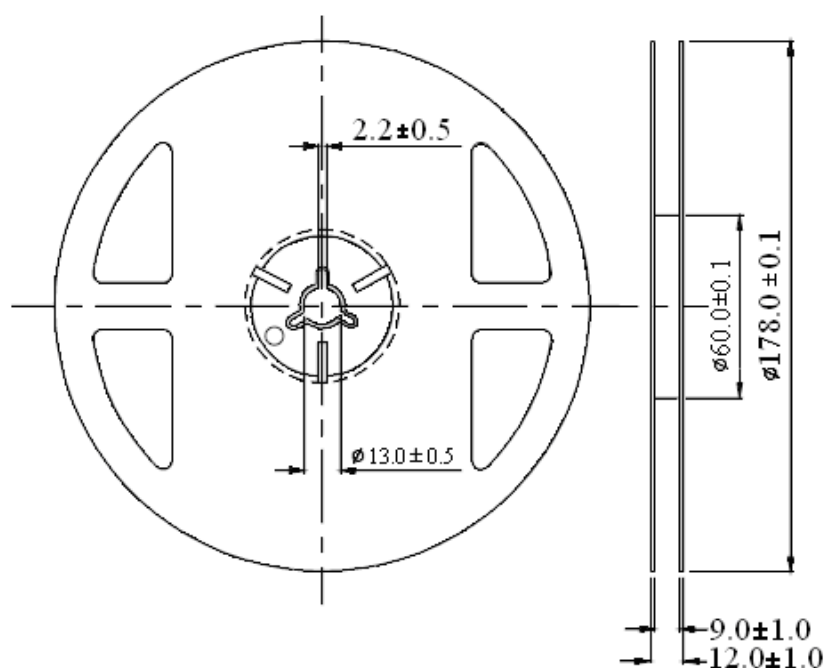
### 1) Test Items and Results:

No.	Test Item	Test Hours/Cycles	Test Conditions	Sample Size	Ac/Re
1	Resistance to Soldering Heat	6 Min	Tsld=260±5 , Min. 5sec	25pcs	0/1
2	Thermal Shock	300 Cycles	H: +100 5min ∫ 10sec L: -10 5min	25pcs	0/1
3	Temperature Cycle	300 Cycles	H: +100 15min ∫ 5min L: -40 15min	25pcs	0/1
4	High Temperature Storage	1000Hrs.	Temp: 100	25pcs	0/1
5	DC Operating Life	1000Hrs.	IF=60mA	25pcs	0/1
6	Low Temperature Storage	1000Hrs.	Temp: -40	25pcs	0/1
7	High Temperature/ High Humidity	1000Hrs.	85 /85%RH	25pcs	0/1

### 2) Criteria for Judging the Damage:

Item	Symbol	Test Conditions	Criteria for Judgment	
			Min	Max
Forward Voltage	VF	IF=60mA	---	F.V.*)×1.1
Reverse Current	IR	VR=5V	---	F.V.*)×2.0
Luminous Intensity	IV	IF=60mA	F.V.*)×0.7	---

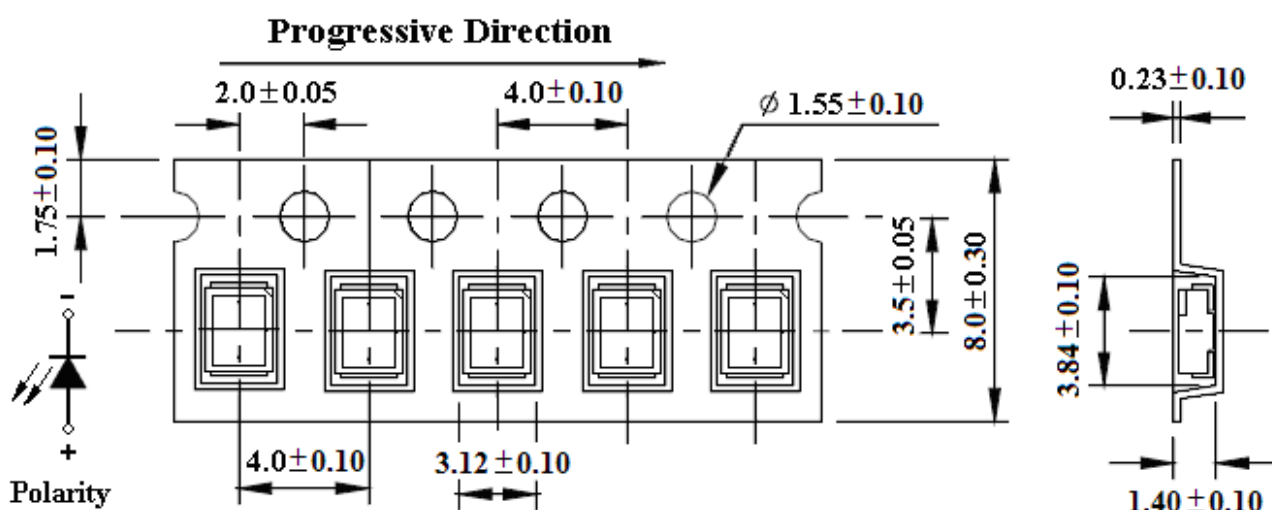
\*) F.V.: First Value.

**Reel Dimensions:**


Unit: mm  
Tolerance:  $\pm 0.25$ mm

**Carrier Tape Dimensions:**

Loaded quantity 3000PCS per reel.



Unit: mm  
Tolerance:  $\pm 0.10$ mm

Please read the following notes before using the product:

1. Over-current-proof

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (Burn out will happen).

2. Storage

2.1 Do not open moisture proof bag before the products are ready to use.

2.2 Before opening the package, the LEDs should be kept at 30 °C or less and 80%RH or less.

2.3 The LEDs should be used within a year.

2.4 After opening the package, the LEDs should be kept at 30 °C or less and 60%RH or less.

2.5 The LEDs should be used within 168 hours (7 days) after opening the package.

2.6 If the moisture adsorbent material has fabled away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment: 60±5 °C for 24 hours.

3. Soldering Condition

When soldering, for Lamp without stopper type and must be leave a minimum of 3mm clearance from the base of the lens to the soldering point.

To avoided the Epoxy climb up on lead frame and was impact to non-soldering problem, dipping the lens into the solder must be avoided.

Do not apply any external stress to the lead frame during soldering while the LED is at high temperature.

Recommended soldering conditions:

Soldering Iron		Wave Soldering	
Temperature	300 Max.	Pre-heat	100 Max.
Soldering Time	3 sec. Max. (one time only)	Pre-heat Time	60 sec. Max.
		Solder Wave	260 Max.
		Soldering Time	5 sec. Max.

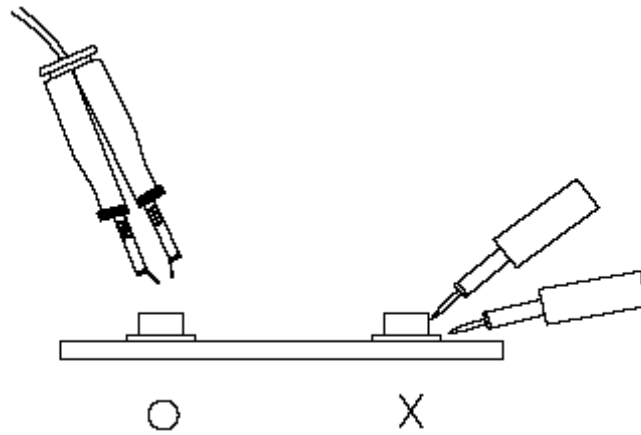
Note: Excessive soldering temperature and / or time might result in deformation of the LED lens or catastrophic failure of the LED.

4. Soldering Iron

Each terminal is to go to the tip of soldering iron temperature less than 260 °C for 5 seconds within once in less than the soldering iron capacity 25W. Leave two seconds and more intervals, and do soldering of each terminal. Be careful because the damage of the product is often started at the time of the hand solder.

5. 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 beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.



## 6. Caution in ESD

Static Electricity and surge damages the LED. It is recommended to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.