

Specification

AL-R-1W-XX



Features

- Dimension : 4.0mm(L)×4.0mm(W)×1.65mm(H)
- LED by InGaN Chip inside
- Good for SMT Process
- All Metal Design Cu PCB

Applications

- LED bulb
- Indoor lighting

Part Number Matrix

Type Color	160° Lens
Cool White	AL-R-1W-50
Neutral White	AL-R-1W-41
Warm White	AL-R-1W-35
Warm White	AL-R-1W-30
Warm White	AL-R-1W-27

Handling precaution



Do not poke the silicone encapsulant with sharp object



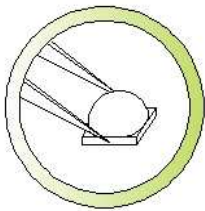
Do not stack assembled PCB



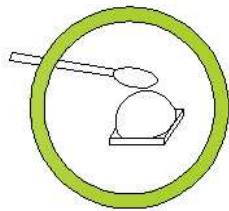
Do not hold the LED with hand



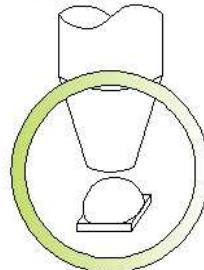
Do not touch and press the silicone encapsulant



Hold the LED only by the metal substrate



Clean the silicone surface with cotton bud with minimal pressure



Use pick and place nozzle per recommendation in datasheet

Absolute Maximum Ratings

(T_j=25°C)

Parameter		Symbol	Rating	Unit
Power Dissipation	Cool-White	P	1.05	W
	Neutral-White		1.05	
	Warm-White		1.05	
Forward Current		I _F	350	mA
Forward Pulse Current (1/10 Duty Cycle, 400msec Pulse Width)		I _{FP}	500	mA
Thermal Resistance, Junction-Case		R _{th, J-C1}	10	°C/W
Reverse Voltage		V _R	5	V
LED Junction Temperature		T _j	125	°C
Operating Temperature Range		T _{opr}	-20°C to + 80°C	
Storage Temperature Range		T _{stg}	-20°C to + 120°C	
Soldering Condition		T _{sol}	260°C For 5 Seconds	

Note: 1. The thermal resistance value is measured with MCPCB (Star).

Initial Electrical/Optical Characteristics

- Forward Voltage**

(T_j=25°C)

Color	Forward Voltage					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
Cool-White→W	V _F	-	3.0	-	I _F = 350mA	V
Neutral-White→N		-	3.0	-	I _F = 350mA	V
Warm-White→S		-	3.0	-	I _F = 350mA	V

- Luminous Flux**

(T_j=25°C)

Color	CCT	Luminous Flux					
		Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
Cool-White→W	5000	Φ _v	-	125	-	I _F = 350mA	lm
Neutral-White→N	4100	Φ _v	-	115	-	I _F = 350mA	lm
Warm-White→S	3500	Φ _v	-	95	-	I _F = 350mA	lm
Warm-White→S	3000	Φ _v	-	90	-	I _F = 350mA	lm
Warm-White→S	2700	Φ _v	-	90	-	I _F = 350mA	lm

- Corrected Color Temperature**

(T_j=25°C)

Color	Corrected Color Temperature or Dominate Wavelength					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
Cool-White→W	CCT	4260	5000	6000	I _F = 350mA	K
Neutral-White→N	CCT	3710	4100	4260	I _F = 350mA	K
Warm-White→S	CCT	3210	3500	3710	I _F = 350mA	K
	CCT	2850	3000	3210	I _F = 350mA	K
	CCT	2670	2700	2850	I _F = 350mA	K

- **Color Rendering Index (CRI, Ra Value)**

(T_j=25°C)

Color	Color Temperature or Dominate Wavelength					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
Cool-White→W	Ra	70	75	-	I _F = 350mA	-
Neutral-White→N		70	75	-	I _F = 350mA	-
Warm-White→S		80	83	-	I _F = 350mA	-

- **Typical Radiation Pattern**

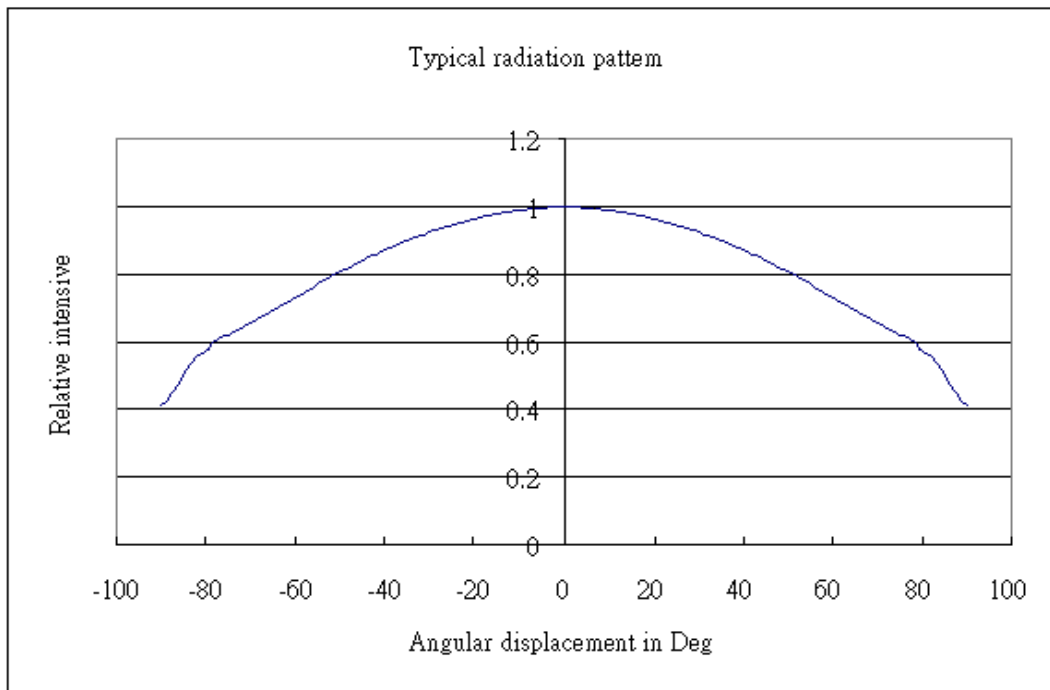


Fig. (160° Lens) Typical Representative Spatial Radiation Pattern for Cool-White, Neutral-White and Warm-White .

- Bin Code List for Reference

(T_j=25°C)

Item	Bin Code	Symbol	Condition	Min.	Max.	Unit
Forward Voltage ¹	C	V _F	I _F = 350 [mA]	1.83	2.07	V
	D			2.07	2.31	
	E			2.31	2.55	
	F			2.55	2.79	
	G			2.79	3.03	
	H			3.03	3.27	
	J			3.27	3.51	
	K			3.51	3.75	
	L			3.75	3.99	
	M			3.99	4.23	
Luminous Flux ²	A	Φ _v	I _F = 350 [mA]	8.2	10.7	lm
	B			10.7	13.9	
	C			13.9	18.1	
	D			18.1	23.5	
	E			23.5	30	
	F			30	40	
	G			40	50	
	H			50	60	
	J			60	70	
	K			70	80	
	L			80	90	
	M			90	100	
	N			100	120	
P	120	140				
Q	140	160				

Note: 1. Forward voltage measurement allowance is ± 0.1V.

2. Luminous flux measurement allowance is ± 10%.

● Hue Bin Code List for Reference

Cool-White→W color

Bin Code	X	Y	CCT(K)	Bin Code	X	Y	CCT(K)	Bin Code	X	Y	CCT(K)			
YO	0.2742	0.3007	7000~10000	WN	0.3148	0.3444	5650~6300	VP	0.3292	0.3313	5000~5650			
	0.3031	0.3327			0.3288	0.3569			0.3444	0.3442				
	0.3076	0.3108			0.3290	0.3451			0.3434	0.3320				
	0.2830	0.2838			0.3160	0.3332			0.3294	0.3202				
YA	0.2830	0.2838		WO	0.3160	0.3332		5650~6300	UM	0.3481	0.3856	4500~5000		
	0.3076	0.3108			0.3290	0.3451				0.3673	0.4003			
	0.3112	0.2932			0.3292	0.3313				0.3642	0.3829			
	0.2899	0.2703			0.3175	0.3204				0.3469	0.3717			
XM	0.3011	0.3422		WP	0.3175	0.3204		5650~6300	UN	0.3469	0.3717		4500~5000	
	0.3136	0.3550			0.3292	0.3313				0.3642	0.3829			
	0.3148	0.3444			0.3294	0.3202				0.3622	0.3716			
	0.3031	0.3327			0.3186	0.3102				0.3458	0.3592			
XN	0.3031	0.3327	WQ	0.3186	0.3102	5650~6300	UO		0.3458	0.3592	4500~5000			
	0.3148	0.3444		0.3294	0.3202				0.3622	0.3716				
	0.3160	0.3332		0.3295	0.3105				0.3594	0.3557				
	0.3052	0.3224		0.3196	0.3013				0.3444	0.3442				
XO	0.3052	0.3224	VM	0.3286	0.3690		5650~6300		UP	0.3444		0.3442		4500~5000
	0.3160	0.3332		0.3481	0.3856					0.3594		0.3557		
	0.3175	0.3204		0.3469	0.3717					0.3571		0.3426		
	0.3076	0.3108		0.3288	0.3569					0.3434		0.3320		
XP	0.3076	0.3108	VN	0.3288	0.3569			5000~5650	VO	0.3290		0.3451	5650~6300	
	0.3175	0.3204		0.3469	0.3717					0.3458		0.3592		
	0.3196	0.3013		0.3458	0.3592					0.3444		0.3442		
	0.3112	0.2932		0.3290	0.3451					0.3292		0.3313		
WM	0.3136	0.3550	VO	0.3290	0.3451	5650~6300			VO	0.3290	0.3451	5650~6300		
	0.3286	0.3690		0.3458	0.3592					0.3458	0.3592			
	0.3288	0.3569		0.3444	0.3442					0.3444	0.3442			
	0.3148	0.3444		0.3292	0.3313					0.3292	0.3313			

- Hue Bin Code List for Reference
Cool-White Bin Structure

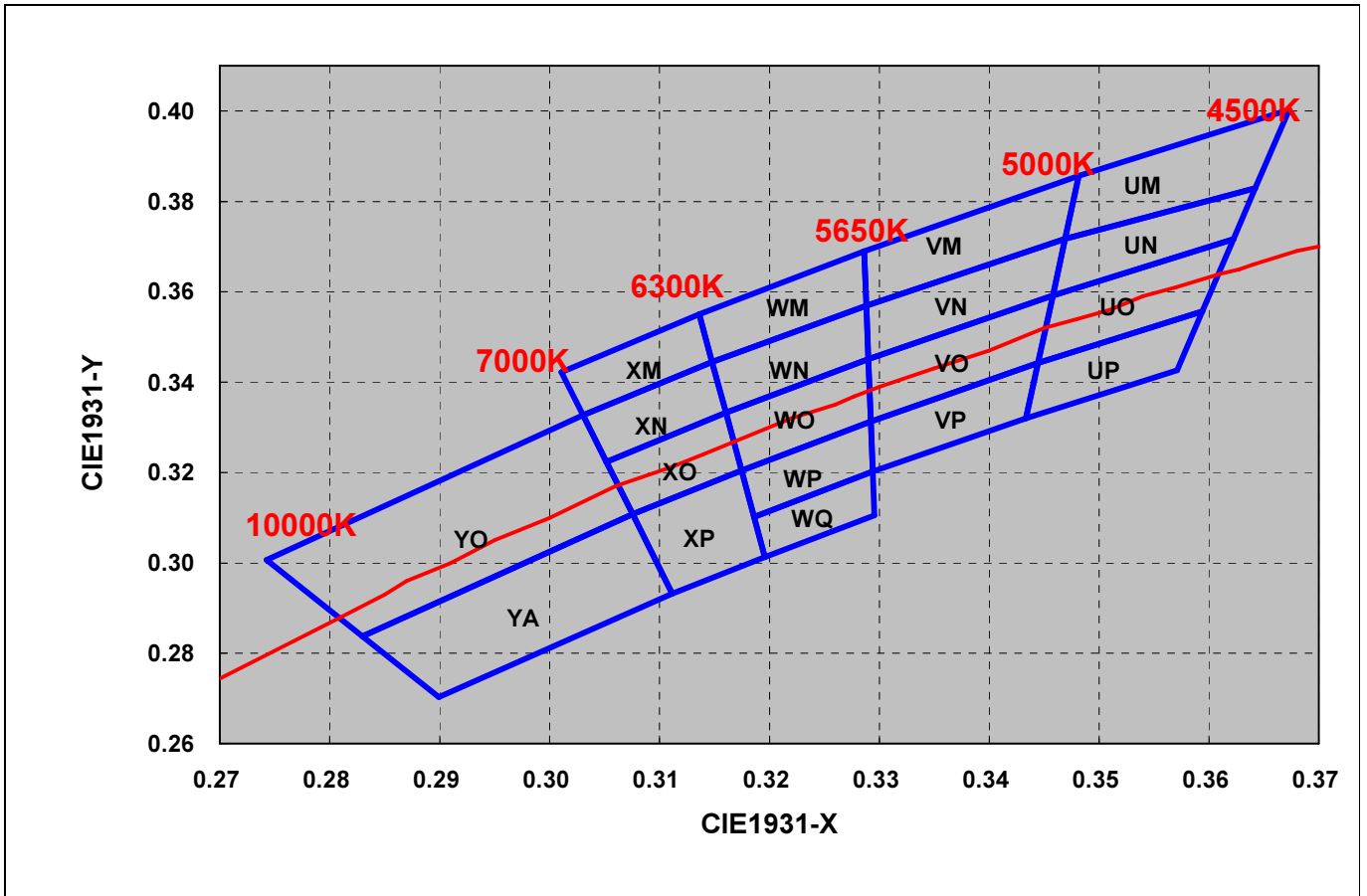


Fig. Cool-White Bin Structure.

Neutral-White→N color

Bin Code	X	Y	CCT(K)	Bin Code	X	Y	CCT(K)	Bin Code	X	Y	CCT(K)
TM	0.3673	0.4003	4100~4500	SM	0.3860	0.4130	3800~4100	RM	0.4023	0.4228	3500~3800
	0.3860	0.4130			0.4023	0.4228					
	0.3811	0.3937			0.3963	0.4035					
	0.3642	0.3829			0.3811	0.3937					
TN	0.3642	0.3829		SN	0.3811	0.3937		RN	0.3963	0.4035	
	0.3811	0.3937			0.3963	0.4035					
	0.3783	0.3825			0.3924	0.3909					
	0.3622	0.3716			0.3783	0.3825					
TO	0.3622	0.3716		SO	0.3783	0.3825		RO	0.3924	0.3909	
	0.3783	0.3825			0.3924	0.3909					
	0.3741	0.3658			0.3871	0.3739					
	0.3594	0.3557			0.3741	0.3658					
TP	0.3594	0.3557		SP	0.3741	0.3658		RP	0.3871	0.3739	
	0.3741	0.3658			0.3871	0.3739					
	0.3706	0.3520			0.3826	0.3595					
	0.3571	0.3426			0.3706	0.3520					

Neutral-White Bin Structure

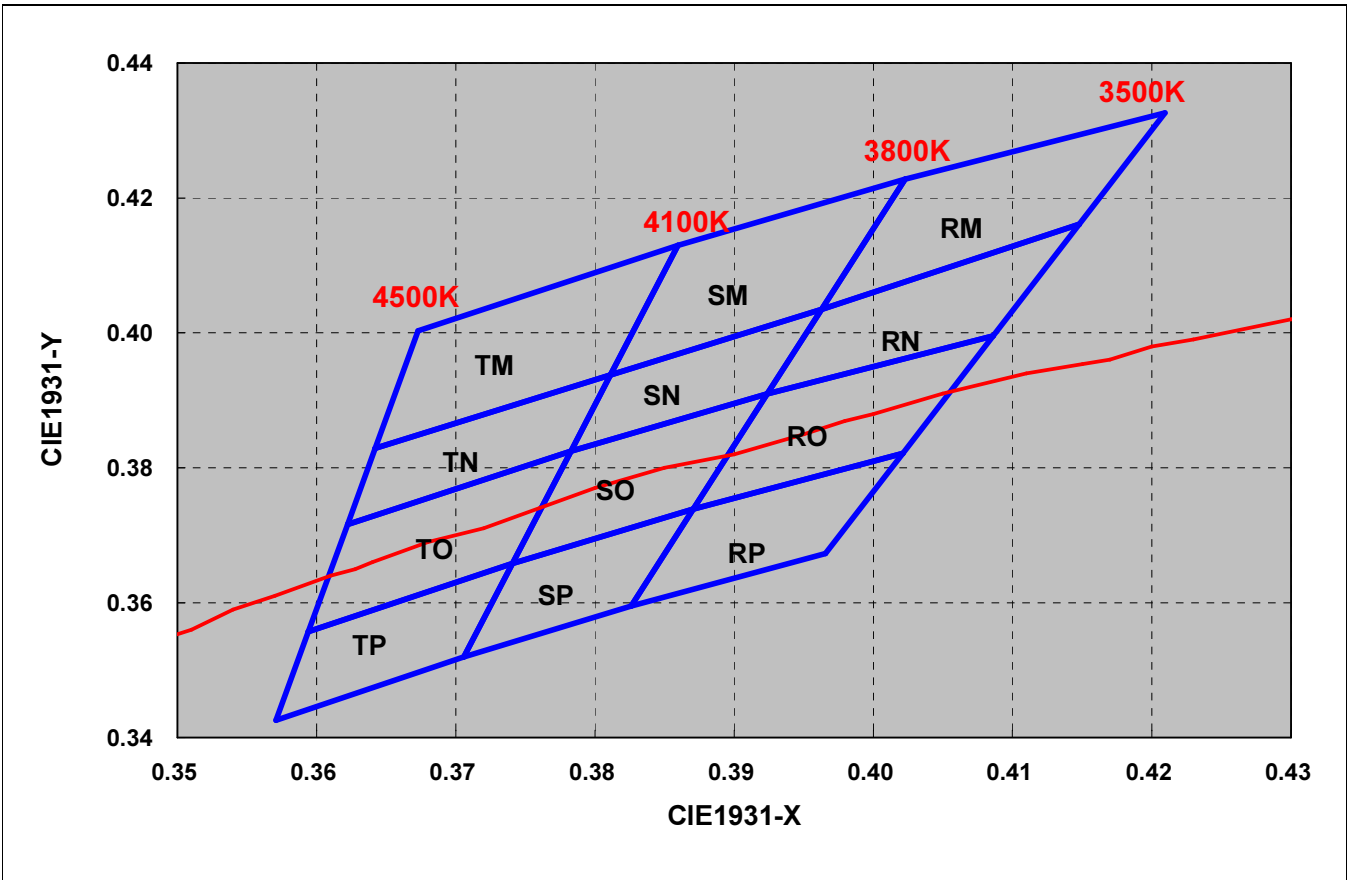


Fig. Neutral-White Bin Structure.

Warm-white→S color

Bin Code	X	Y	CCT(K)
QM	0.4209	0.4326	3250~3500
	0.4385	0.4404	
	0.4312	0.4234	
	0.4148	0.4161	
QN	0.4148	0.4161	
	0.4312	0.4234	
	0.4240	0.4065	
	0.4086	0.3995	
QO	0.4086	0.3995	
	0.4240	0.4065	
	0.4165	0.3890	
	0.4021	0.3822	
QP	0.4021	0.3822	
	0.4165	0.3890	
	0.4100	0.3738	
	0.3966	0.3673	
PM	0.4385	0.4404	3000~3250
	0.4538	0.4460	
	0.4456	0.4287	
	0.4312	0.4234	
PN	0.4312	0.4234	
	0.4456	0.4287	
	0.4376	0.4116	
	0.4240	0.4065	

Bin Code	X	Y	CCT(K)
PO	0.4240	0.4065	3000~3250
	0.4376	0.4116	
	0.4294	0.3943	
	0.4165	0.3890	
PP	0.4165	0.3890	
	0.4294	0.3943	
	0.4221	0.3790	
	0.4100	0.3738	
NM	0.4538	0.4460	2850~3000
	0.4705	0.4508	
	0.4614	0.4333	
	0.4456	0.4287	
NN	0.4456	0.4287	
	0.4614	0.4333	
	0.4525	0.4162	
	0.4376	0.4116	
NO	0.4376	0.4116	
	0.4525	0.4162	
	0.4436	0.3991	
	0.4294	0.3943	
NP	0.4294	0.3943	
	0.4436	0.3991	
	0.4356	0.3837	
	0.4221	0.3790	

Bin Code	X	Y	CCT(K)
MM	0.4705	0.4508	2670~2850
	0.4866	0.4542	
	0.4767	0.4366	
	0.4614	0.4333	
MN	0.4614	0.4333	
	0.4767	0.4366	
	0.4671	0.4196	
	0.4525	0.4162	
MO	0.4525	0.4162	
	0.4671	0.4196	
	0.4577	0.4029	
	0.4436	0.3991	
MP	0.4436	0.3991	
	0.4577	0.4029	
	0.4490	0.3875	
	0.4356	0.3837	

Warm-White Bin Structure

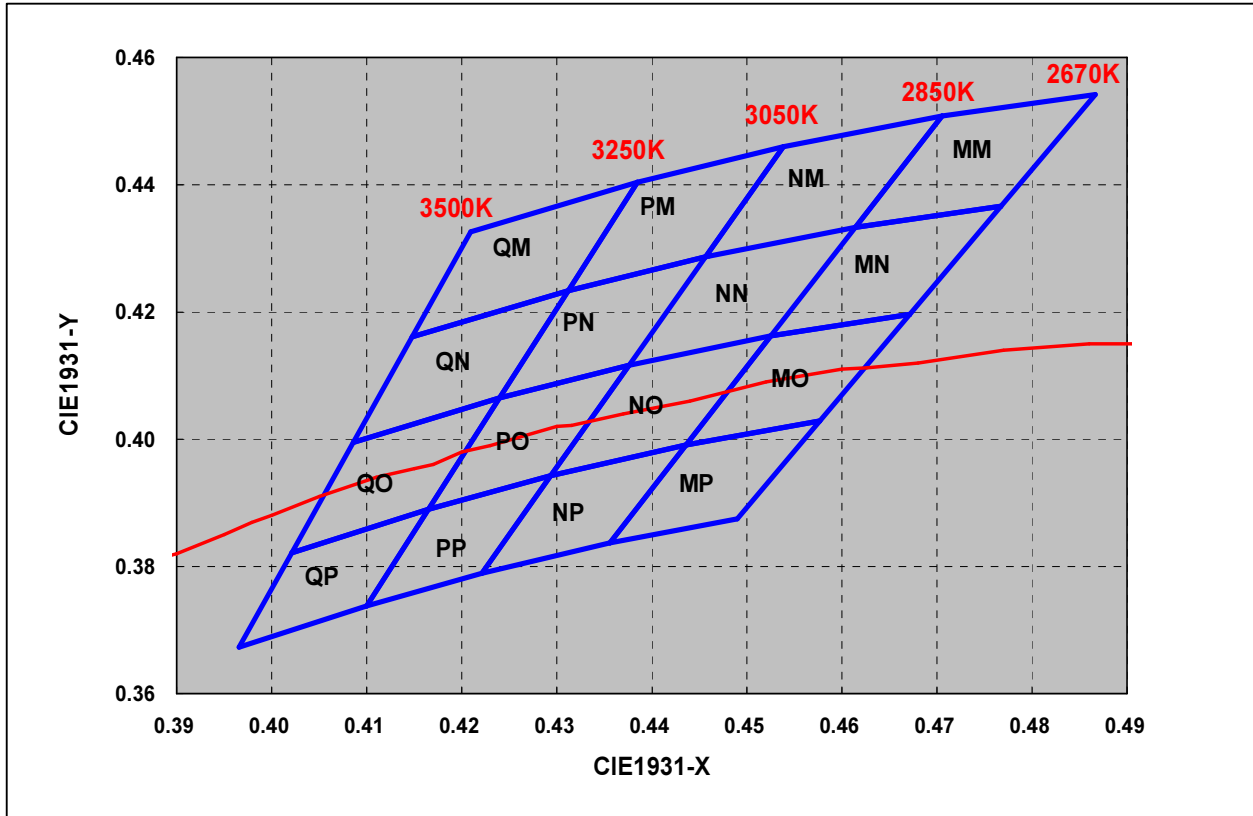


Fig. Warm-White Bin Structure.

Note: The CIE1931 x, y color coordinates measurement allowance is ± 0.01 .

Characteristic Diagram Characteristic Diagram

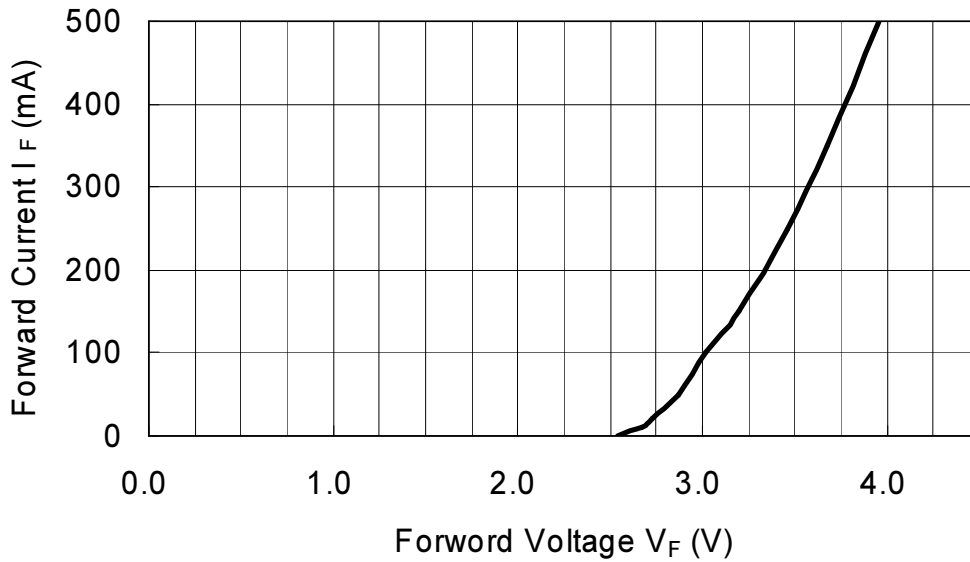


Fig. Forward Current vs. Forward Voltage: Cool White/ Neutral White/ Warm White/ Blue/ Green color.

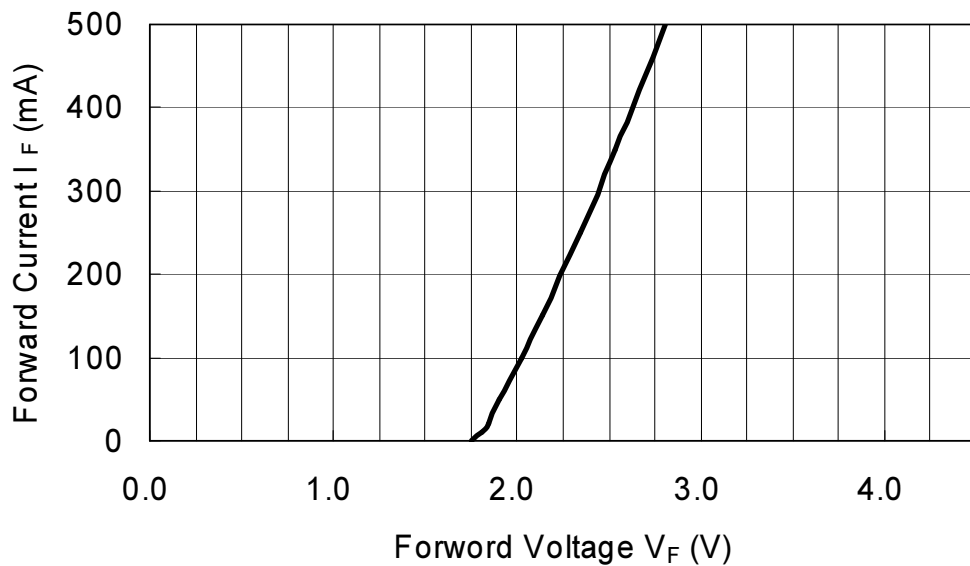


Fig. Forward Current vs. Forward Voltage: Red/Amber/Orange color.

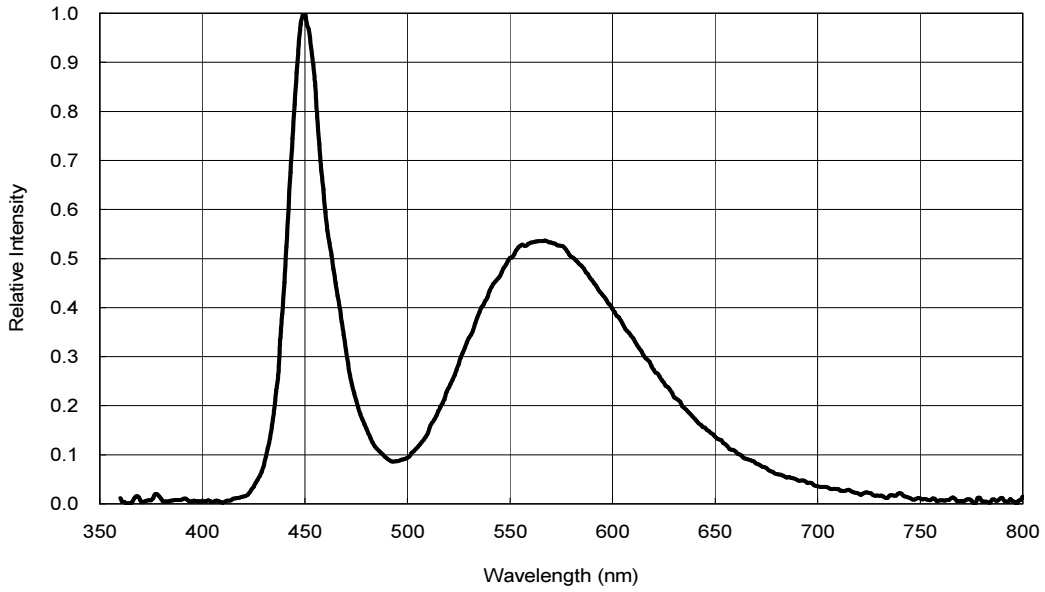


Fig. Relative Intensity vs. Wavelength: Cool White.

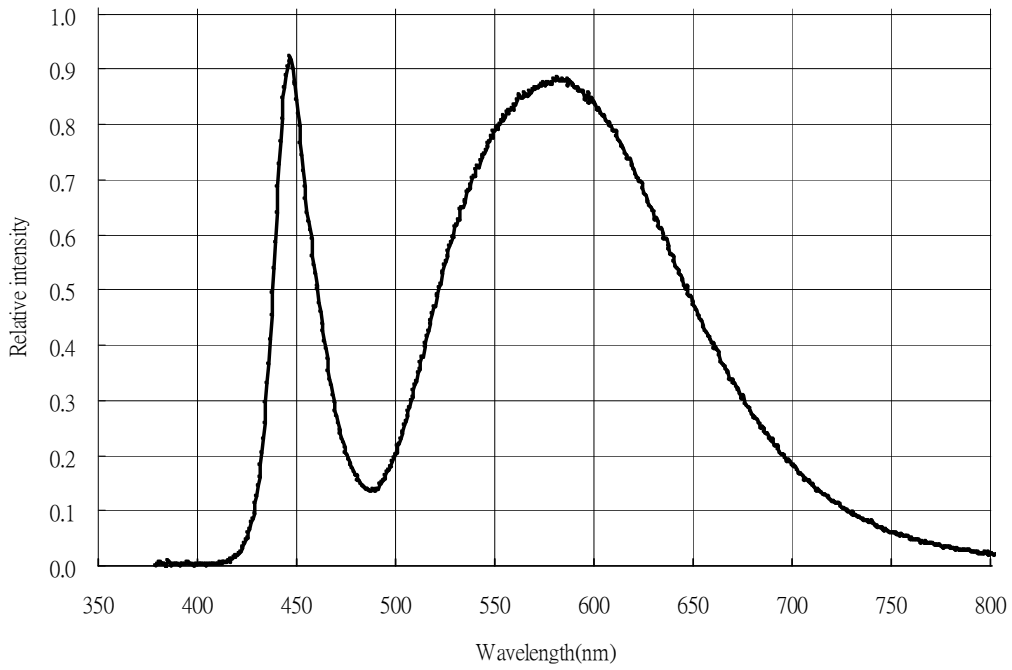


Fig. Relative Intensity vs. Wavelength: Nature White.

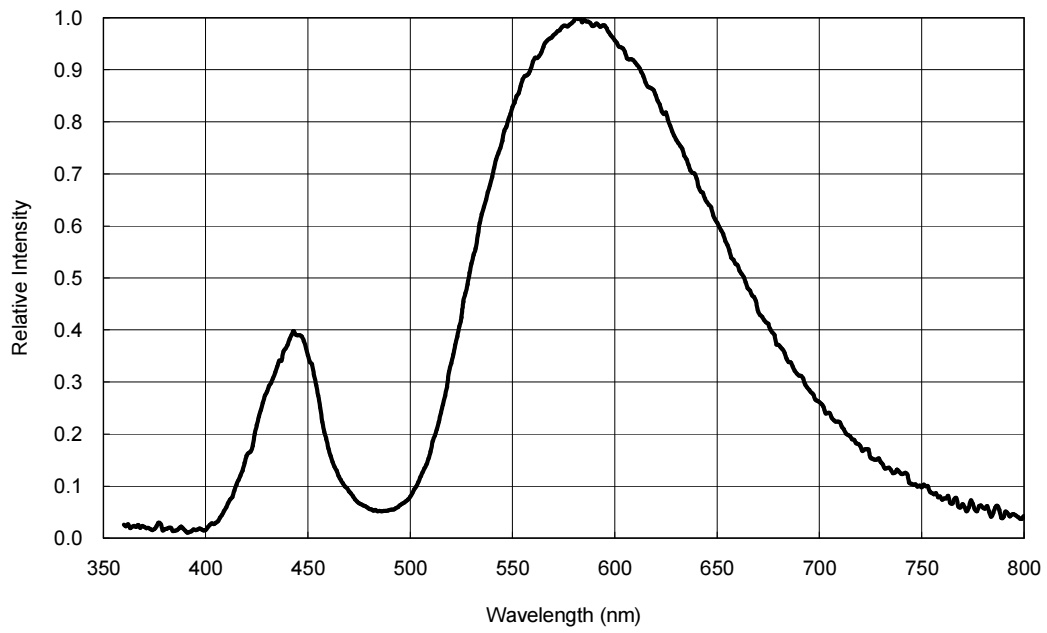


Fig. Relative Intensity vs. Wavelength: Warm White.

Outline Dimension

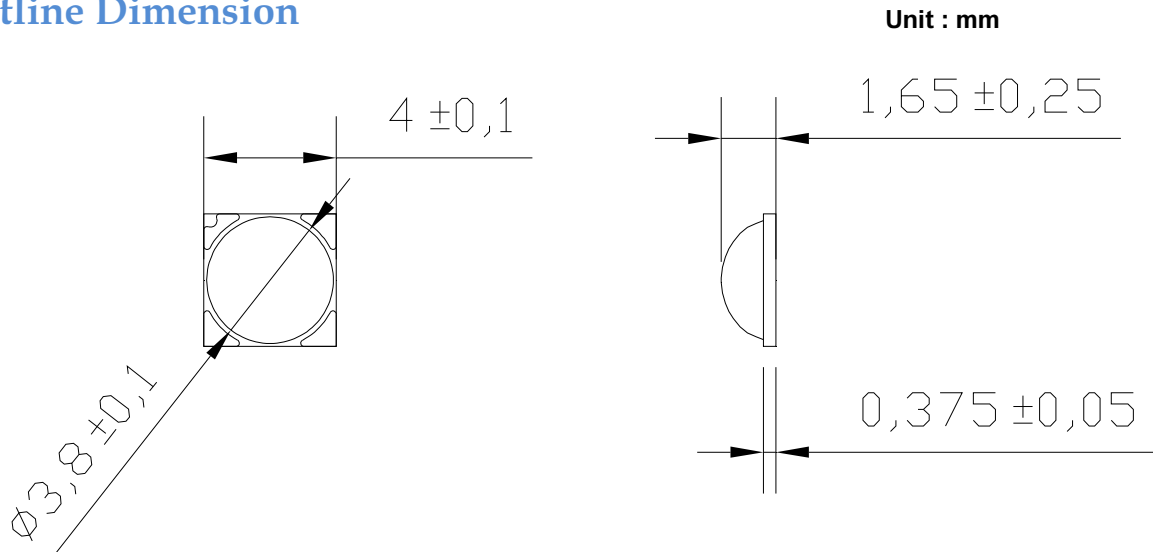
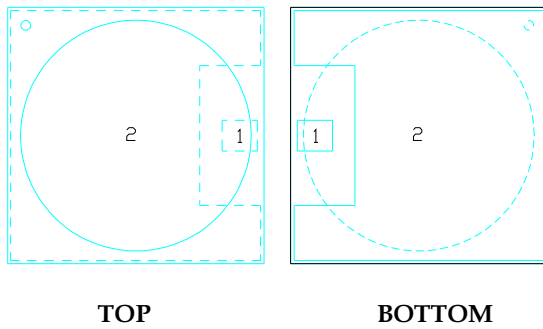


Fig. Package Outline Drawing.

Pad Configuration



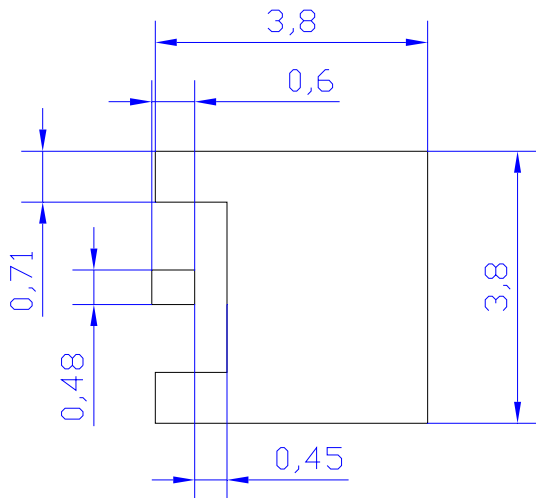
PAD	Function
1	Cathode
2	Anode · Thermal

Fig8. Pad configuration.

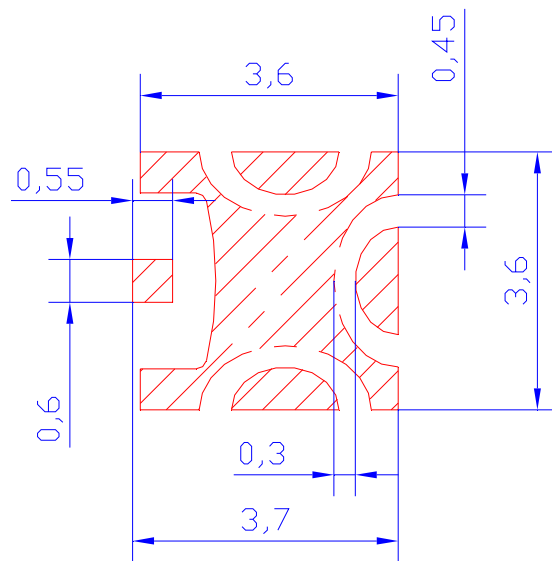
Recommended Solder Pattern

Unit : mm

Tolerance ± 0.05



MCPCB LAYOUT



SOLDER MASK

Fig. Solder Pad Layout.

Shipping Package Style

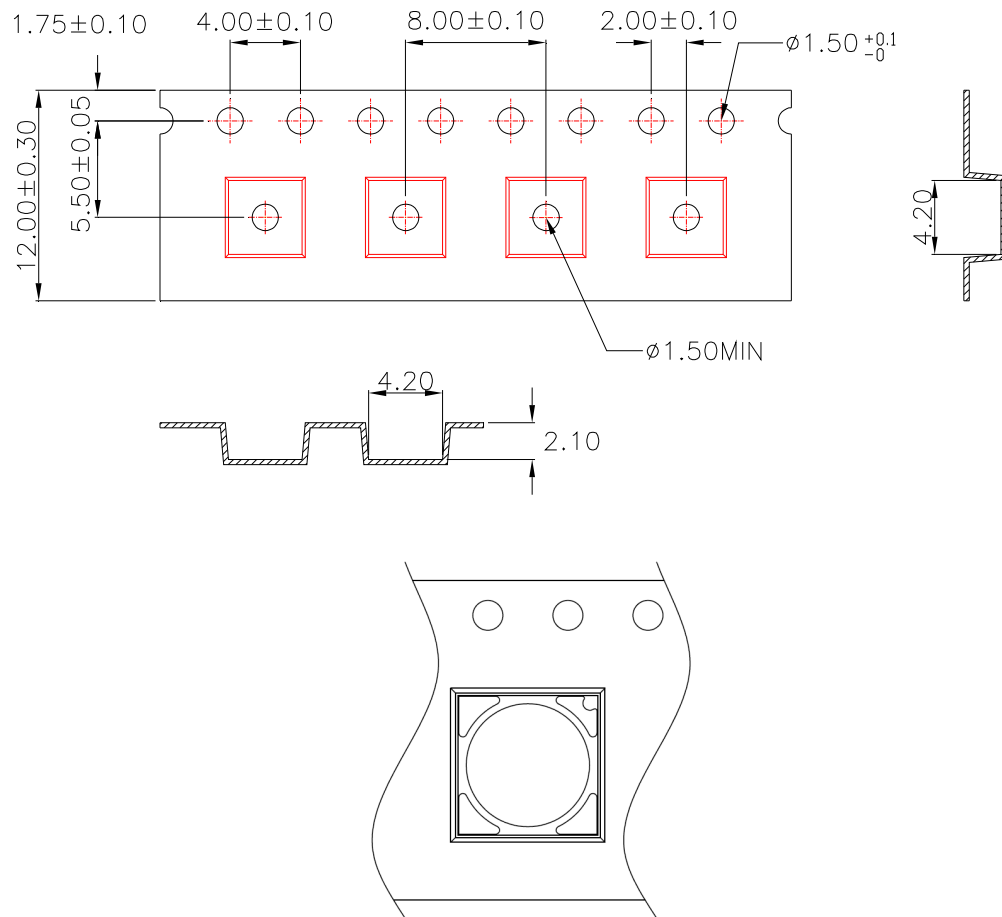
Lens Type

Tapping Dimension Packaging Specification

160 Degree Lens Type :

- Moisture proof bag.
- 1 Reel/bag.
- Qty: 1000 (MAX)/Reel.

Unit : mm



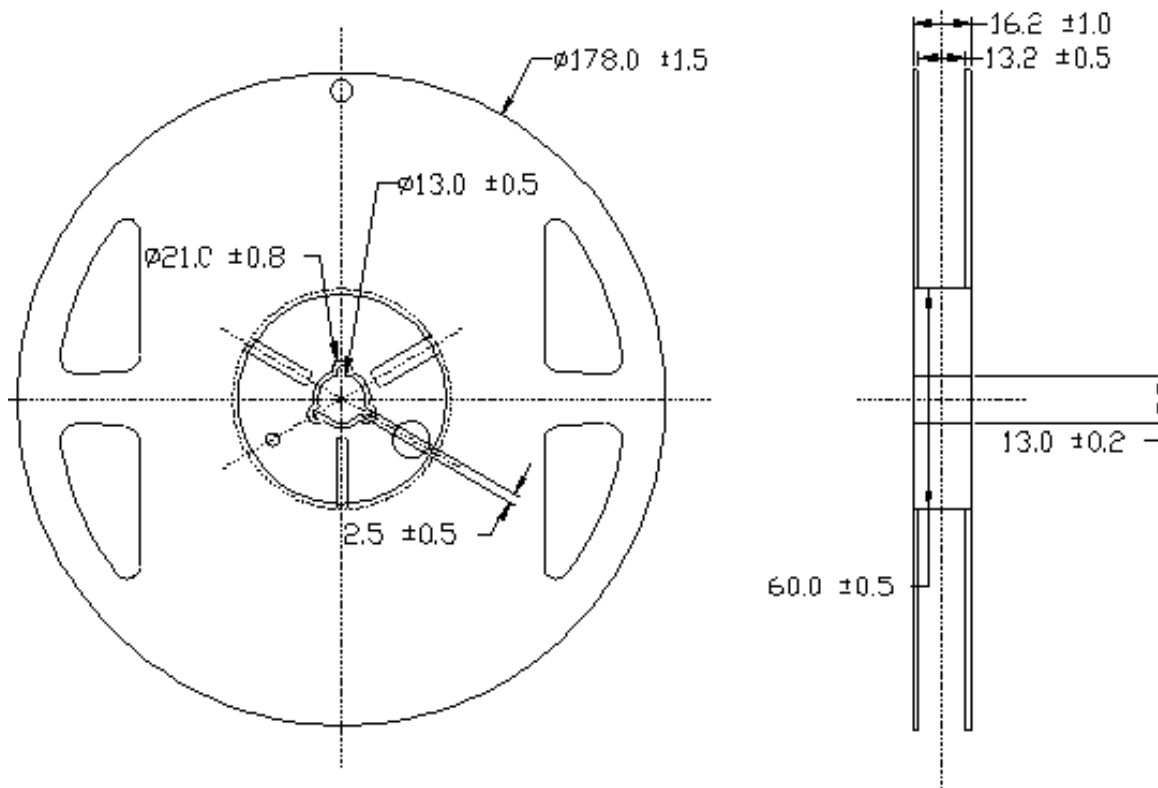
Package

Box Type	Dimension (mm)	Reel/Box	160°Lens Type (Pcs)
Small Box(S)	230x85x265	4 Reel/Box	4000
Middle Box(M)	470x265x270	24 Reel/Box	24000
Large Box(L)	470x435x270	40 Reel/Box	40000

Reel Packaging :

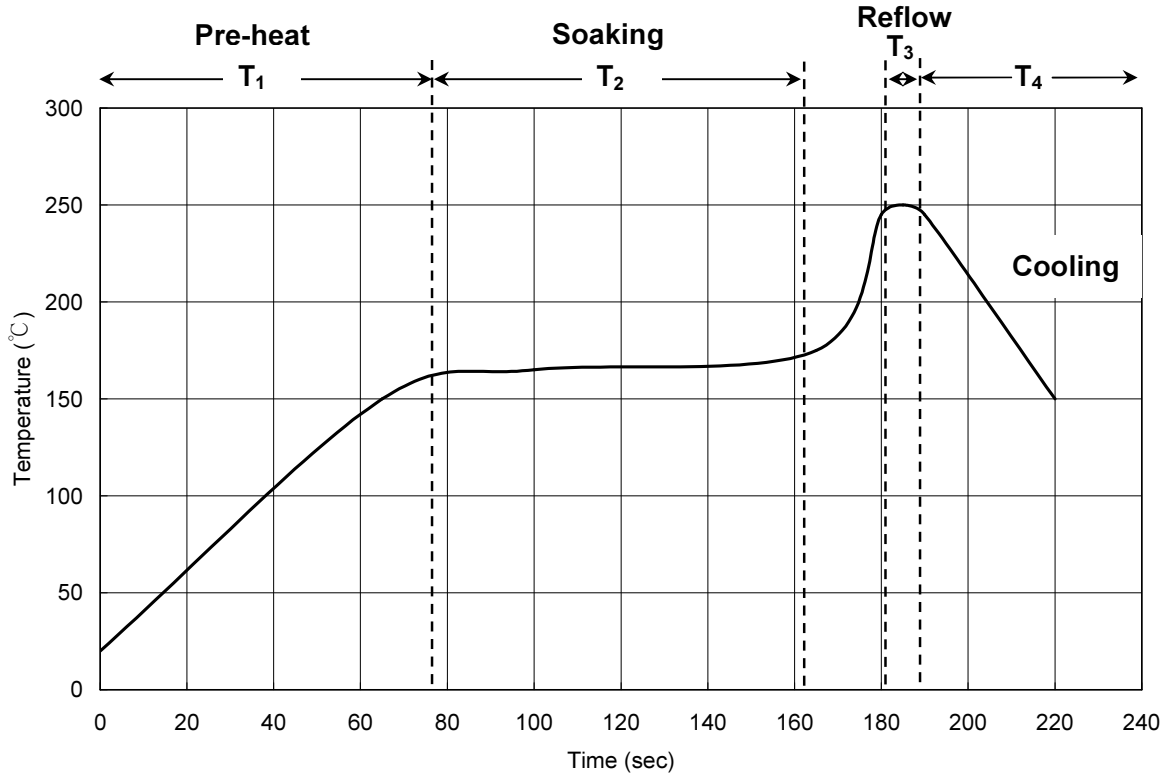
Reel Part :

Unit : mm



Recommended Solder profile

Soldering Recommended soldering conditions:



T ₁	Ramp up rate	1.0 ~ 3.0 °C/sec
	Pre-heat time	50 ~ 80 sec
T ₂	Soaking temperature	155 ~ 185 °C
	Dwell time during soaking	60 ~ 120 sec
T ₃	Reflow temperature	240 ~ 250 °C
	Reflow time	Max 10 sec
	Ramp up rate during reflow	1.2 ~ 2.3 °C/sec
T ₄	Cooling	1.0 ~ 6.0 °C/sec

Note: Suggest using Sn96Ag3Cu0.5 lead free solder.

Cleaning

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

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