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Top Crystal Technology Inc.,

Power Light Source

Introduction :

THSP-CLW is one the highest flux LEDs in the world. Due to the special design of chip and package, the THSP-CLW is designed by particular package for high power LED. 1W THSP-CLW white has typical 130 lumens under 350mA.



Feature :

- Long operating life
- Energy efficiency
- Low thermal resistance
- Compact design
- Instant light
- Fully dimmable
- No UV
- Superior ESD protection
- ROHS compatibility

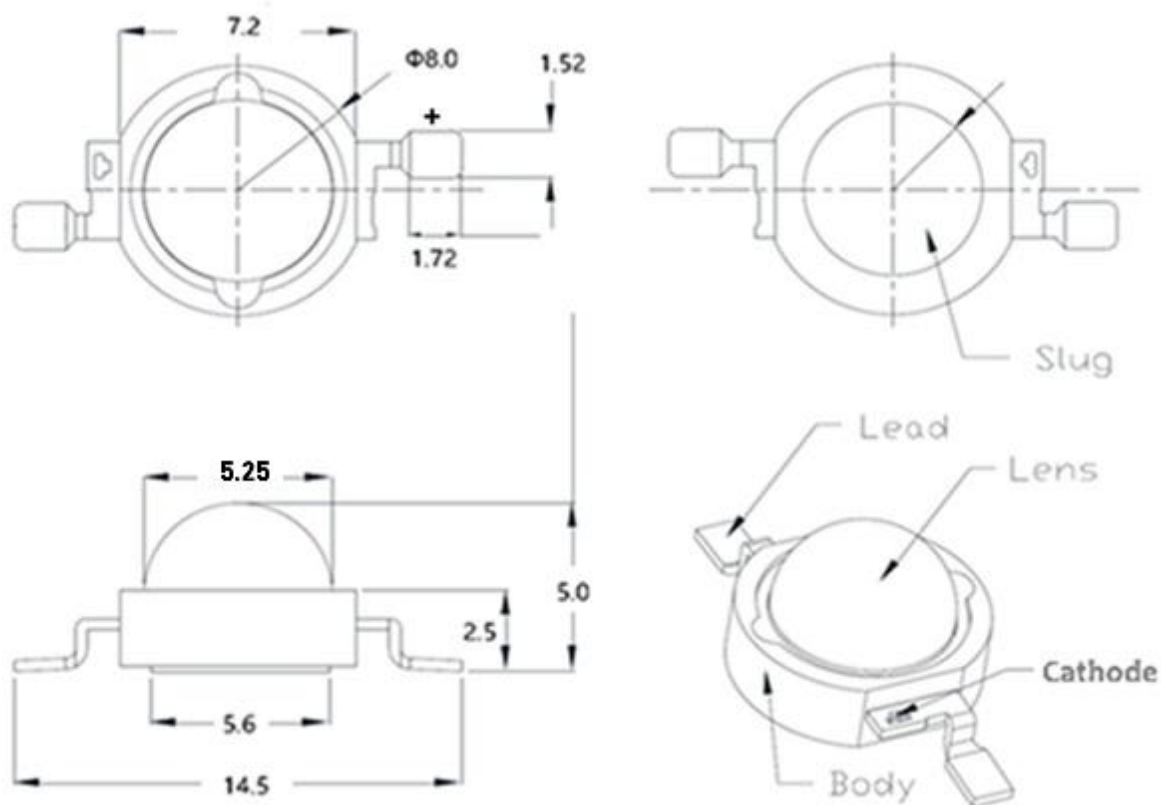
Typical Applications:

- Reading lights
- Portable light
- Orientation
- Entertainment
- Garden
- Security light
- Ceiling light
- Architectural lighting
- General lighting
- Jewel display illumination



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Emitter Mechanical Dimensions



Notes :

1. Drawings are not to scale.
2. All dimensions are in millimeter.
3. General tolerance is $\pm 0.2\text{mm}$.
4. The polarity of slug at bottom is anode.
5. It is important that the slug can't contact aluminum surface, it is strongly recommended that there should coat a uniform electrically isolated heat dissipation film on the surface.
6. It is strongly recommended that the temperature of lead be not higher than 70°C .



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Absolute Maximum Ratings

Parameter	Conditions	
DC Forward Current	1W	350mA
	3W	700 mA
Peak Pulse Current (mA)	1W	500 mA
	3W	900 mA
LED Junction Temperature (°C)	100°C	
Operating Temperature (°C)	-30~100	
Storage Temperature (°C)	-40~120	
Soldering Temperature	Manual 220°C (max) 5 seconds	
Reverse Voltage	Not design to be driven in reverse bias	

Notes :

1. Proper current derating must be observed to maintain junction temperature below the maximum at all time.
2. Allowable reflow cycles are 3 times for each LED

Optical Characteristics (Tj=25°C)

Color	Dominant Wavelength λ_d		Viewing Angle Degree 2θ1/2
	Peak Wavelength λ_p or		
	Color Temperature (CCT)		
	Min.	Max.	
Cool White	5000K	10000K	130
Neutral White	3850K	5000K	
Warm White	2700K	3850K	

Notes :

1. CCT $\pm 5\%$ tester tolerance.
2. Wavelength is measured with an accuracy of $\pm 0.5\text{nm}$.



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Flux Characteristics (Tj=25°C)

Color	Forward current	Part Number	Minimum Luminous Flux(lm)	Typical Luminous Flux(lm)	Maximum Luminous Flux(lm)	Beam Pattern
Cool White	350mA	THSP-CLWX	105Lm	130Lm	--	Lambertian
	700mA	THSP-DLWX	160LM	220Lm	--	
Neutral White	350mA	THSP-CLNX	90Lm	105Lm	--	
	700mA	THSP-DLNX	145Lm	165Lm	--	
Warm White	350mA	THSP-CLMX	80Lm	90Lm	--	
	700mA	THSP-DLMX	125LM	145Lm	--	

Electrical Characteristics (Tj=25°C)

Color	Forward current	Part Number	Forward Voltage V _F (V)			Temperature Coefficient of V _F (mV/°C)	Thermal Resistance Junction to lead (°C/W)
			Min.	Typ.	Max.	ΔV _F /ΔT _j	
Cool White	350mA	THSP-CLWX	2.9	3.3	3.6	-2	10
	700mA	THSP-DLWX	3.1	3.6	4.0		
Neutral White	350mA	THSP-CLNX	2.9	3.3	3.6	-2	10
	700mA	THSP-DLNX	3.1	3.6	4.0		
Warm White	350mA	THSP-CLMX	2.9	3.3	3.6	-2	10
	700mA	THSP-DLMX	3.1	3.6	4.0		

Notes:

1. V_F ±0.1V tester tolerance.



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RELIABILITY ITEMS and SPECTIONS

No	Test Item	Test Conditions	Remark
1	Room Temperature Operating Life	25°C	1000 hrs
2	High Temperature Storage	Temperature : 110°C	1000 hrs
3	Thermal shock	-40°C to 120°C, 20 min. dwell, <20 sec. transfer	200 cycles
4	High Temperature , High Humidity Storage	85°C/85%RH	1000 hrs
5	Low Temperature Storage	- 40°C	1000 hrs
6	Solderability	Tp = 260°C for 5 sec	3 times
7	Drop test	120 cm height , fall freely onto stainless board	3 times
8	Temperature Cycle (TMCL)	-40°C to 120°C, 30 min. dwell, <5 min. transfer	200 cycles

Failure Criteria :

1. Forward Voltage (VF) $\geq$ Initial Level x 1.1
2. Luminous Flux or Radiometric Power (ΦV) $\leq$ Initial Level x 0.7
3. Reverse Current (IR) $\geq$ 10 μ A
4. Resistance to Soldering Heat : No dead lamps or visual damage.



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Color Bins for Cool White

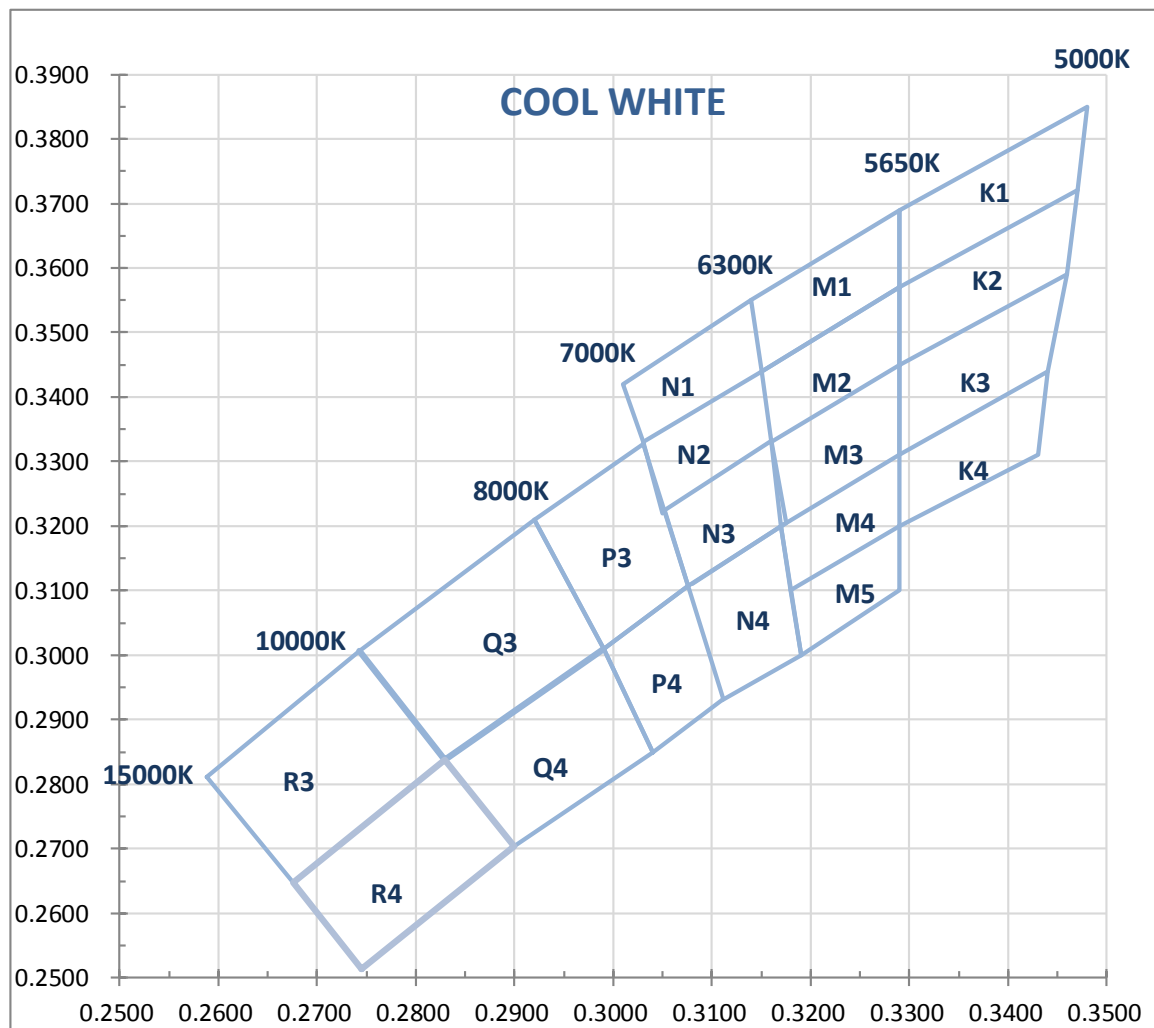
Bin Code	X	Y	Typ. CCT(K)	Bin Code	X	Y	Typ. CCT(K)
R3	0.2588 0.27424 0.28297 0.2676	0.2811 0.30067 0.28377 0.2648	12500	R4	0.2745 0.28992 0.28297 0.2676	0.2513 0.27032 0.28377 0.2648	12500
Q3	0.292 0.27424 0.28297 0.299	0.321 0.30067 0.28377 0.301	9000	Q4	0.304 0.28992 0.28297 0.299	0.285 0.27032 0.28377 0.301	9000
P3	0.299 0.292 0.30305 0.30755	0.301 0.321 0.33271 0.31078	7500	M3	0.329 0.329 0.317 0.316	0.345 0.331 0.32 0.333	5970
P4	0.304 0.299 0.30755 0.31116	0.285 0.301 0.31078 0.29319	7500	M4	0.329 0.329 0.318 0.317	0.331 0.32 0.31 0.32	5970
N1	0.303 0.301 0.314 0.315	0.333 0.342 0.355 0.344	6650	M5	0.329 0.329 0.319 0.318	0.32 0.31 0.3 0.31	5970
N2	0.305 0.303 0.315 0.316	0.322 0.333 0.344 0.333	6650	K1	0.329 0.329 0.348 0.347	0.357 0.369 0.385 0.372	5320
N3	0.30755 0.30517 0.31604 0.31747	0.31078 0.32239 0.33322 0.32044	6650	K2	0.329 0.329 0.347 0.346	0.345 0.357 0.372 0.359	5320
N4	0.308 0.317 0.319 0.311	0.311 0.32 0.3 0.293	6650	K3	0.329 0.329 0.346 0.344	0.331 0.345 0.359 0.344	5320
M1	0.314 0.329 0.329 0.315	0.355 0.369 0.357 0.344	5970	K4	0.329 0.344 0.343 0.329	0.331 0.344 0.331 0.32	5320
M2	0.315 0.329 0.329 0.316	0.344 0.357 0.345 0.333	5970				

- Tolerance on each Color bin (x, y) is ± 0.01



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Color Bins for Neutral White

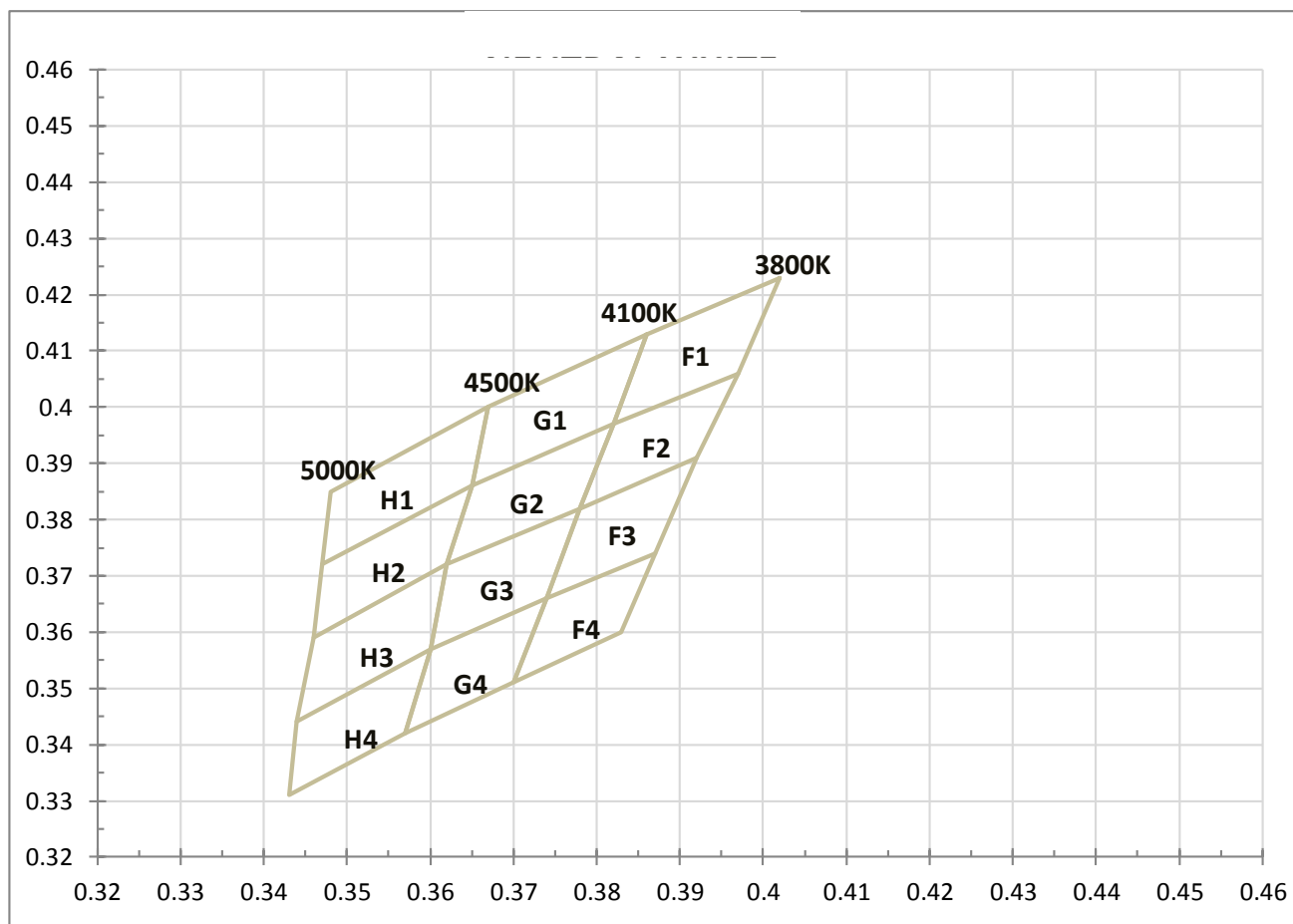
Bin Code	X	Y	Typ. CCT(K)	Bin Code	X	Y	Typ. CCT(K)
H1	0.365 0.367 0.348 0.347	0.386 0.400 0.385 0.372	4750	G3	0.378 0.374 0.360 0.362	0.382 0.366 0.357 0.372	4300
H2	0.365 0.362 0.346 0.347	0.386 0.372 0.359 0.372	4750	G4	0.374 0.370 0.357 0.36	0.366 0.351 0.342 0.357	4300
H3	0.362 0.36 0.344 0.346	0.372 0.357 0.344 0.359	4750	F1	0.402 0.397 0.382 0.386	0.423 0.406 0.397 0.413	3950
H4	0.36 0.357 0.343 0.344	0.357 0.342 0.331 0.344	4750	F2	0.397 0.392 0.378 0.382	0.406 0.391 0.382 0.397	3950
G1	0.386 0.382 0.365 0.367	0.413 0.397 0.386 0.4	4300	F3	0.392 0.387 0.374 0.378	0.391 0.374 0.366 0.382	3950
G2	0.382 0.378 0.362 0.365	0.397 0.382 0.372 0.386	4300	F4	0.387 0.383 0.370 0.374	0.374 0.360 0.351 0.366	3950

- Tolerance on each Color bin (x, y) is ± 0.01



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Color Bins for Warm White

Bin Code	X	Y	Typ. CCT(K)	Bin Code	X	Y	Typ. CCT(K)
E1	0.421 0.414 0.397 0.402	0.433 0.414 0.406 0.423	3650	B1	0.454 0.444 0.460 0.471	0.446 0.426 0.430 0.451	2950
E2	0.414 0.409 0.392 0.397	0.414 0.400 0.391 0.406	3650	B2	0.444 0.438 0.453 0.460	0.426 0.412 0.416 0.430	2950
E3	0.392 0.387 0.402 0.409	0.391 0.374 0.382 0.400	3650	B3	0.438 0.429 0.444 0.453	0.412 0.394 0.399 0.416	2950
E4	0.387 0.383 0.396 0.402	0.374 0.360 0.367 0.382	3650	B4	0.444 0.429 0.422 0.436	0.399 0.394 0.379 0.384	2950
D1	0.421 0.414 0.43 0.438	0.433 0.414 0.421 0.440	3370	A1	0.471 0.460 0.473 0.486	0.451 0.430 0.432 0.455	2770
D2	0.414 0.409 0.424 0.430	0.414 0.400 0.407 0.421	3370	A2	0.460 0.453 0.467 0.473	0.430 0.416 0.419 0.432	2770
D3	0.409 0.402 0.416 0.424	0.400 0.382 0.389 0.407	3370	A3	0.453 0.444 0.459 0.467	0.416 0.399 0.403 0.419	2770
D4	0.416 0.402 0.396 0.410	0.389 0.382 0.367 0.374	3370	A4	0.459 0.444 0.436 0.451	0.403 0.399 0.384 0.389	2770
C1	0.438 0.430 0.444 0.454	0.440 0.421 0.426 0.446	3150	AA	0.4860 0.4730 0.4900 0.5050	0.4550 0.4320 0.4340 0.4580	2600
C2	0.43 0.424 0.438 0.444	0.421 0.407 0.412 0.426	3150	AB	0.4730 0.4670 0.4820 0.4900	0.4320 0.4190 0.4210 0.4340	2600
C3	0.424 0.416 0.429 0.438	0.407 0.389 0.394 0.412	3150	AC	0.4670 0.4590 0.4710 0.4820	0.4190 0.4030 0.4050 0.4210	2600
C4	0.429 0.416 0.410 0.422	0.394 0.389 0.374 0.379	3150	AD	0.4590 0.4510 0.4640 0.4710	0.4030 0.3890 0.3930 0.4050	2600

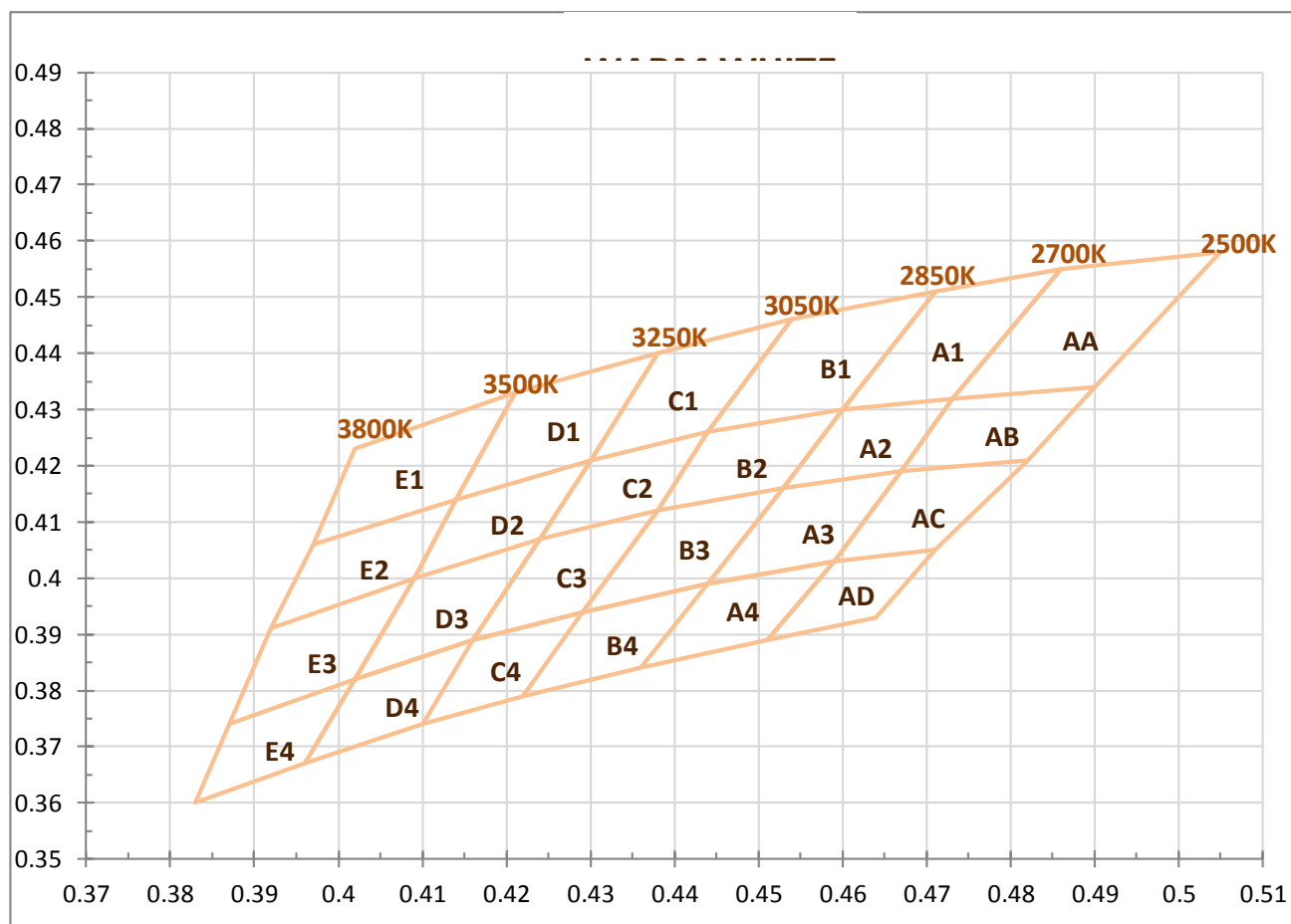
- Tolerance on each Color bin (x, y) is ± 0.01



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Color Bins for Warm White



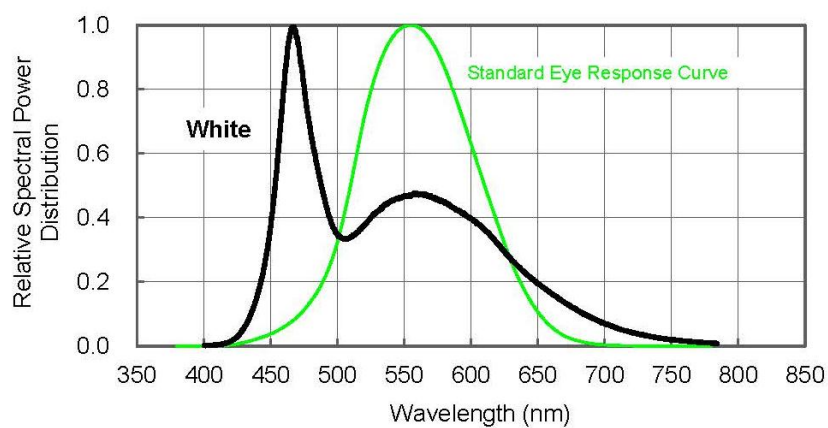


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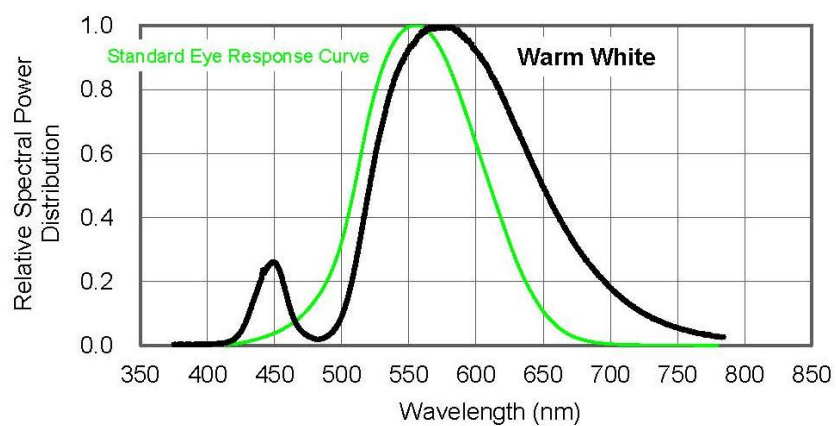
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Wavelength Spectrum, Ta=25 °C

White Color Spectrum



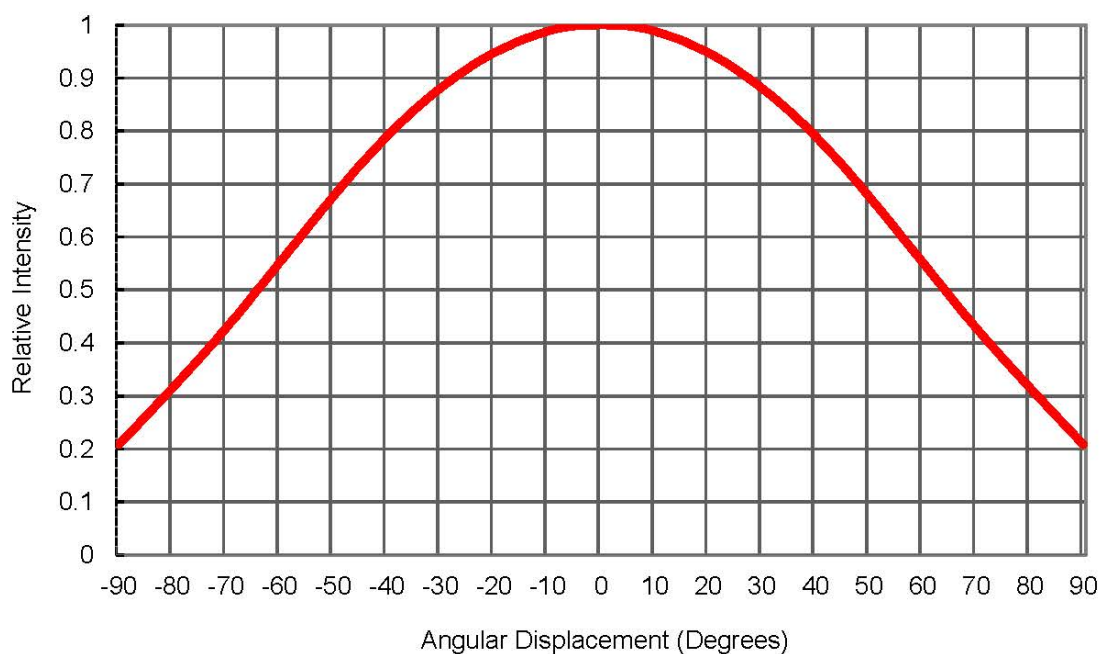
Warm White Spectrum





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Typical Spatial Radiation Pattern

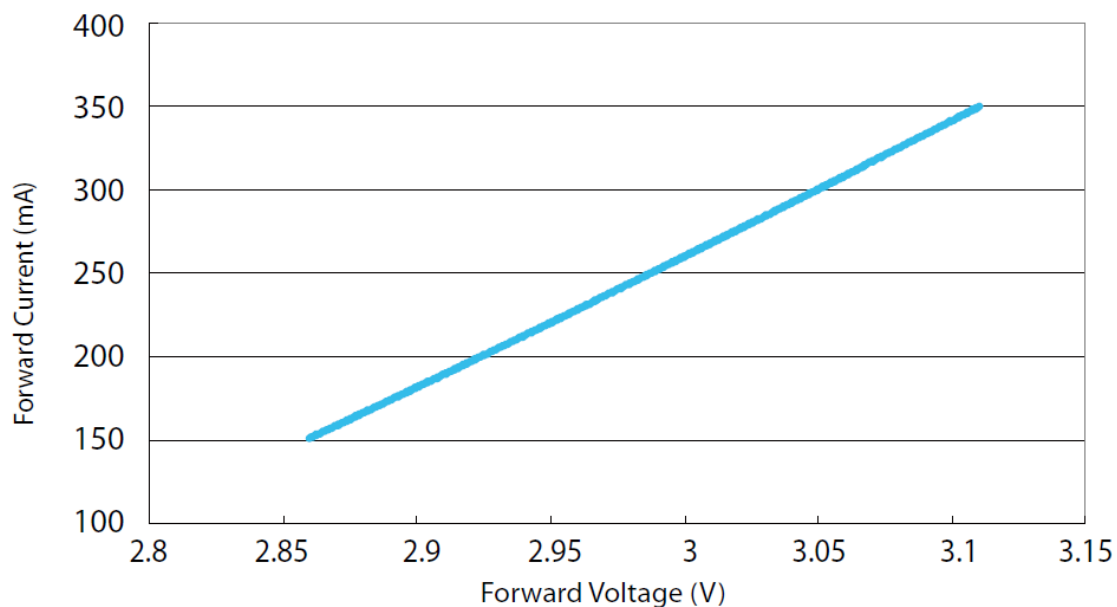




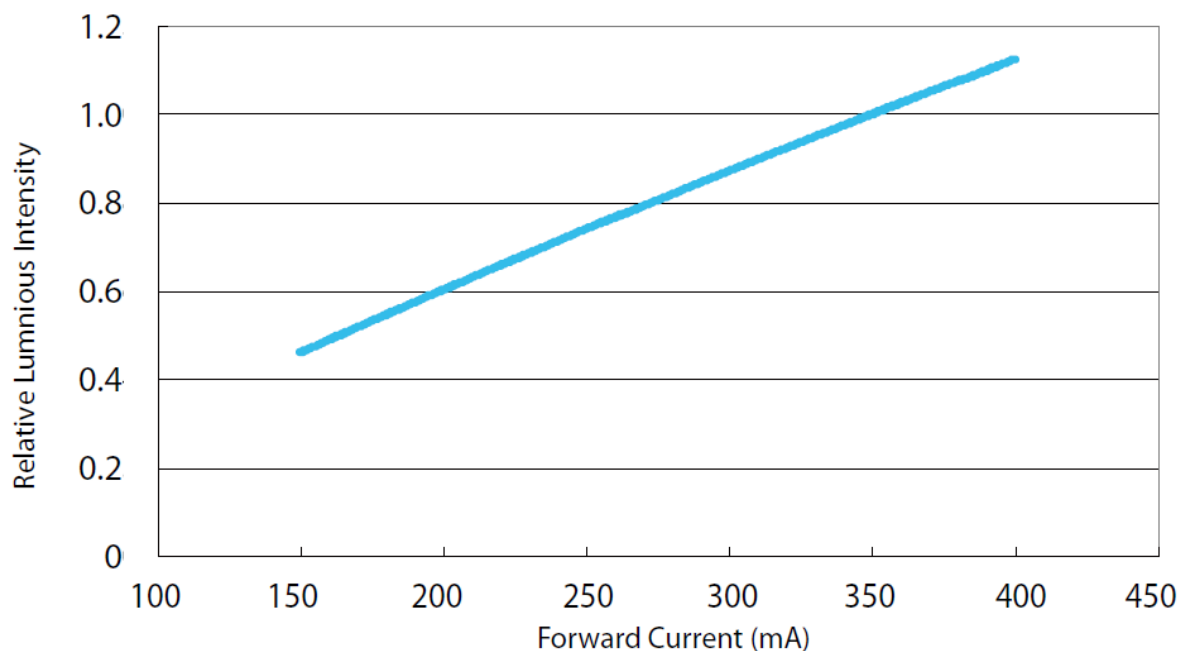
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Forward current vs Forward Voltage



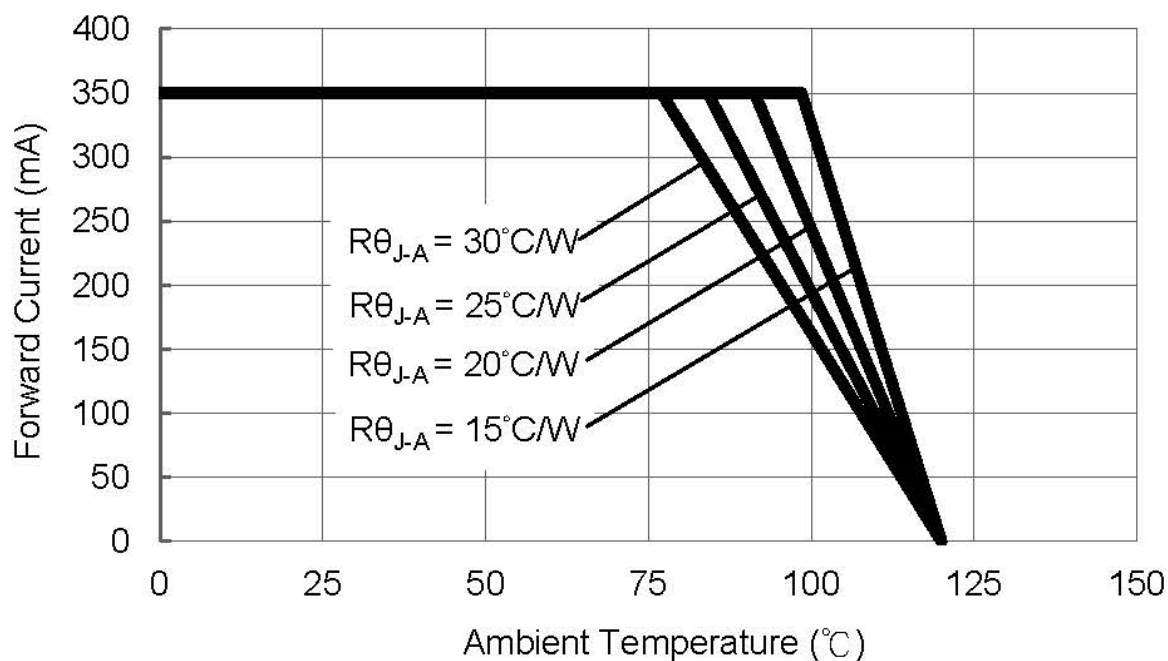
Relative Luminous intensity vs Forward Current





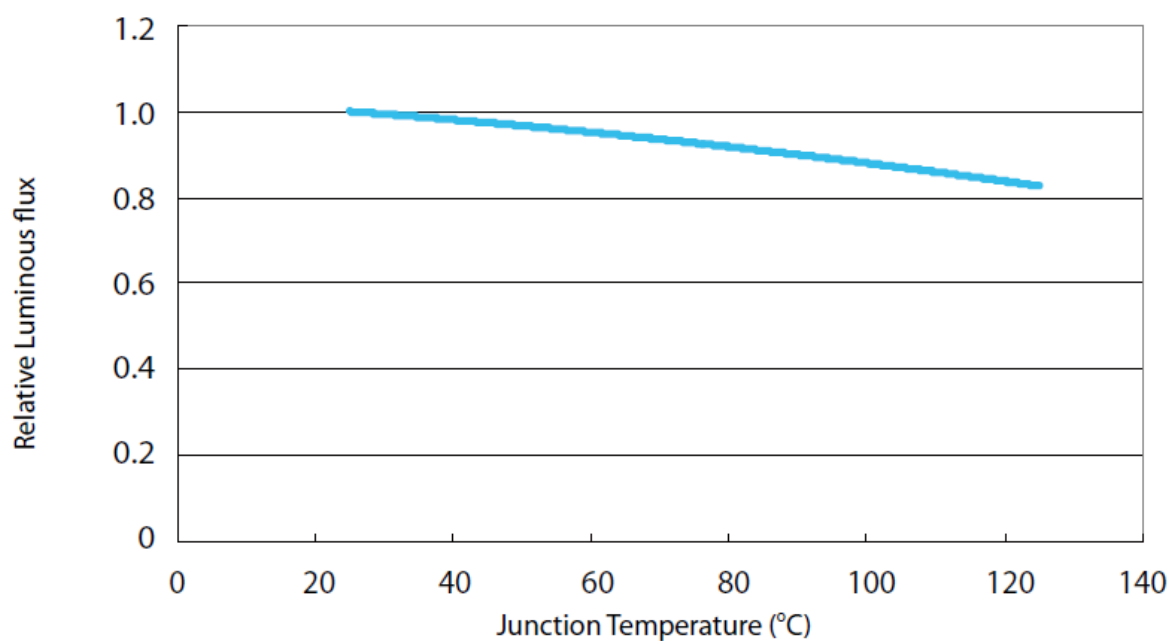
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Ambient Temperature vs. Maximum Forward Current White, Warm White



Light Output Characteristics

Relative Light Output vs. Junction Temperature

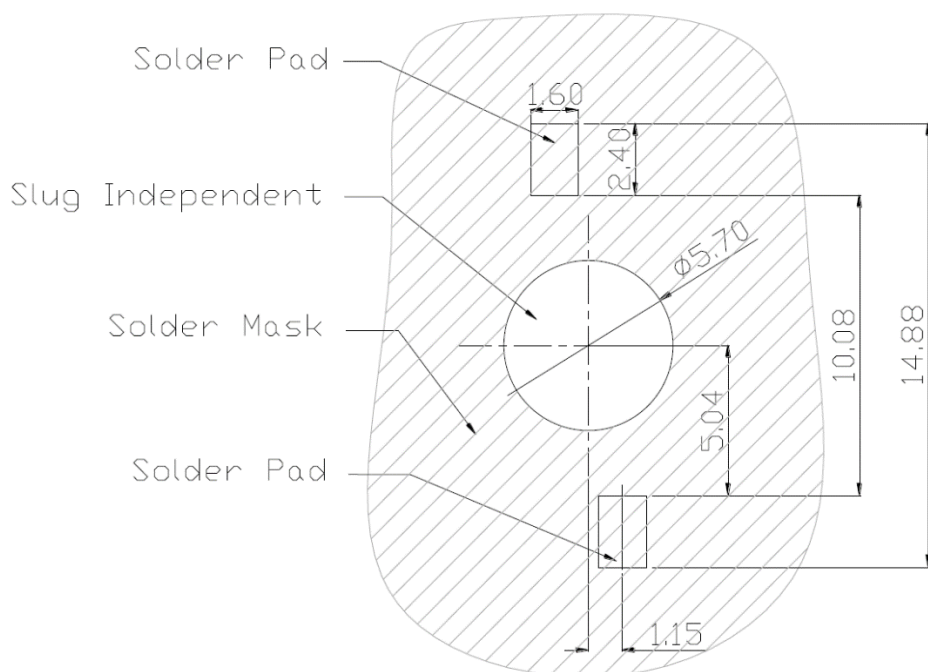




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Recommended Solder Pad Design



Notes :

1. Drawing is not to scale
2. All dimensions are in millimeter
3. Solder pad can't be connected to slug

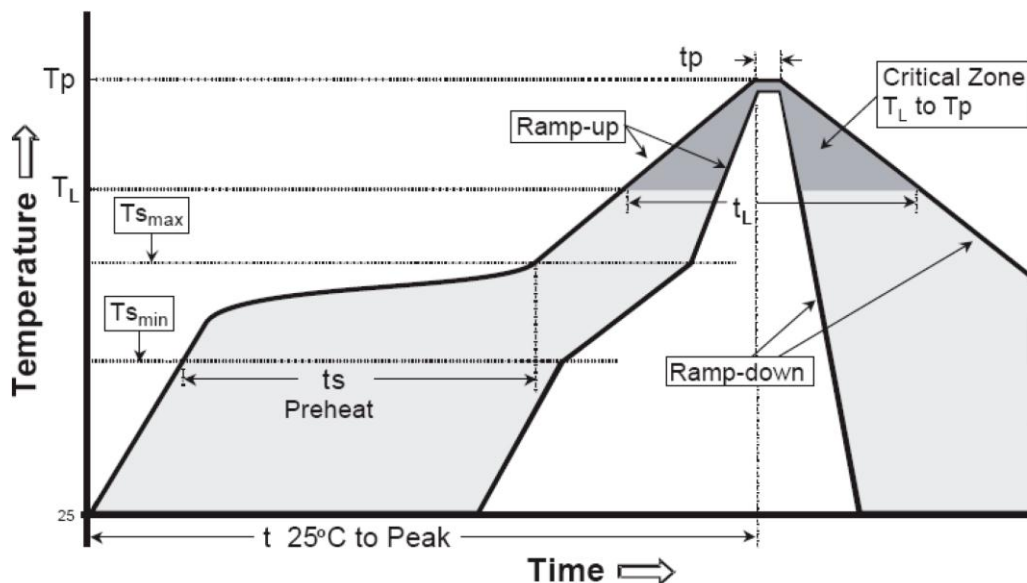


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Recommended Soldering Profile

The LEDs can be soldered using the parameter listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest possible temperature is preferred for the LEDs.



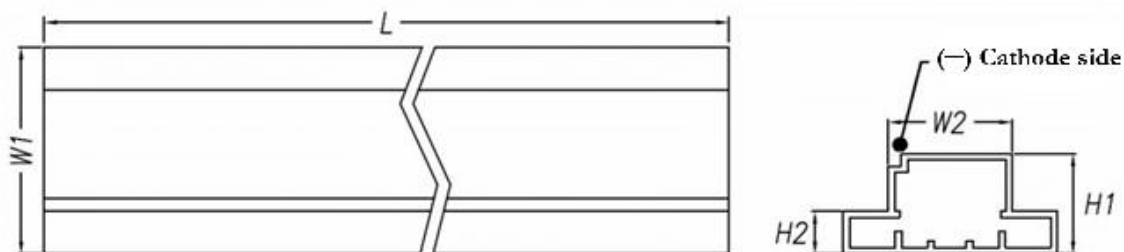
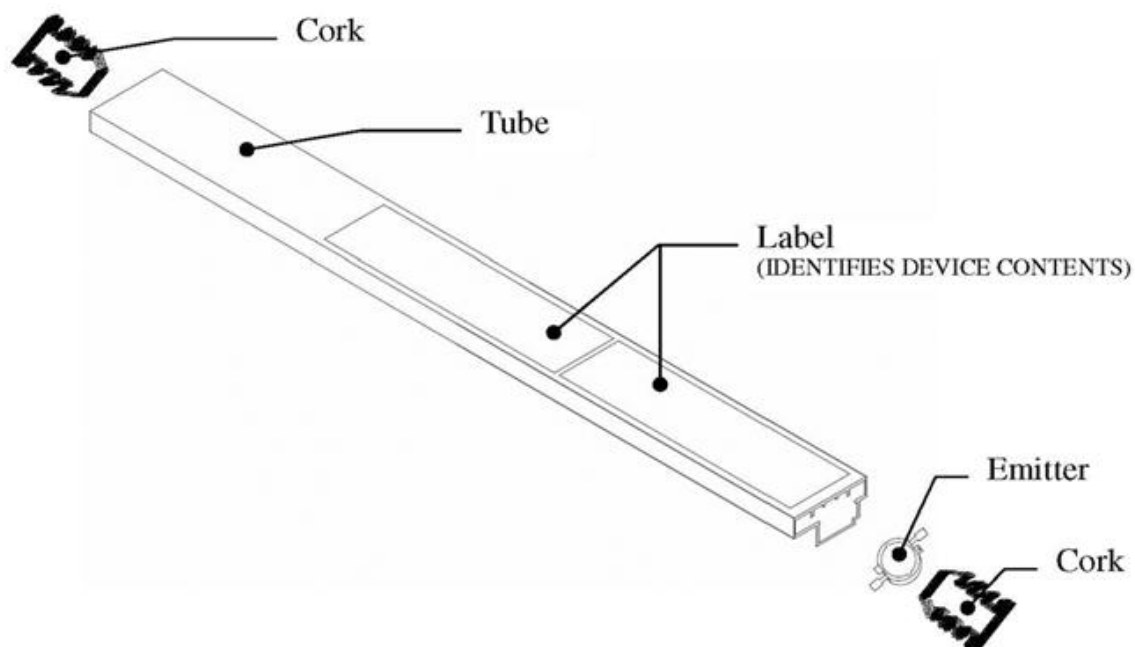
Profile Feature	Sn-Pb Eutectic Assembly
Average Ramp-Up Rate (T_{Smax} to T_p)	3°C / second max.
Preheat – Temperature Min (T_{Smin}) – Temperature Max (T_{Smax}) – Time (t_{Smin} to t_{Smax})	100°C 150°C 60-120 seconds
Time maintained above: – Temperature (T_L) – Time (t_L)	187°C 60-150 seconds
Peak/Classification Temperature (T_p)	220°C
Time Within 5°C of Actual Peak Temperature (t_p)	5 seconds
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

- All temperatures refer to topside of the package, measured on the package body surface.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- Reflow soldering should not be done more than three times.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.



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Tube Package Specifications



Unit : mm

W1	W2	H1	H2	L
16.5	9.6	8	3.4	424

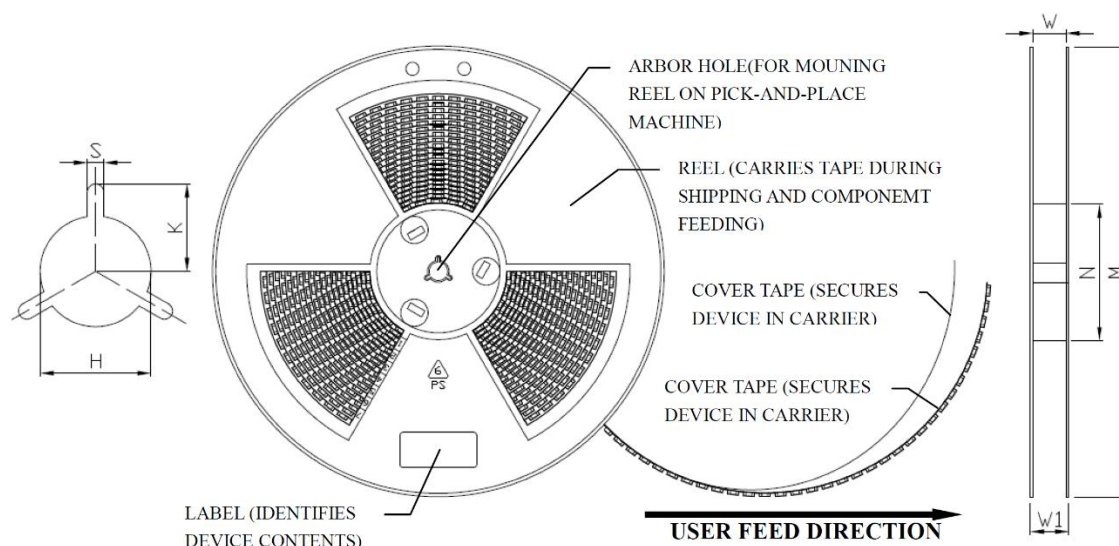
Notes

1. There are 50pcs emitters in a tube.



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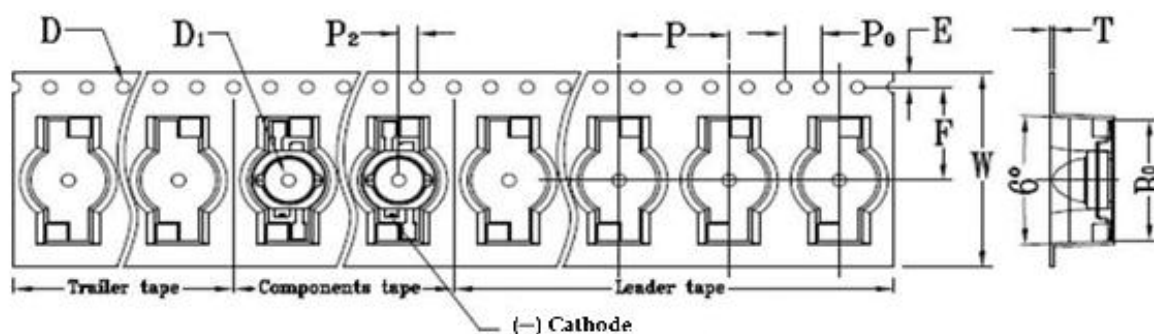
Tape and Reel Packaging Specifications



Unit : mm

M	N	W	W1	H	K	S
Φ330.0	Φ99.5	24.4	29	Φ13.5	10.75	2.5
±1.0	±1.0	±1.0	±1.0	±0.5	±0.5	±0.5

Carrier tape dimensions



Unit : mm

W	P	E	F	P ₂	D	D ₁	P ₀	A ₀	B ₀	K ₀	T
24.0	12.0	1.75	11.5	2.0	1.5	1.5	4.0	8.2	15.0	6.7	0.4
±0.3	±0.1	±0.1	±0.1	±0.1	±0.1	±0.25	±0.1	±0.1	±0.1	±0.1	±0.05



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Notice

1. Unavailable directly touch the colloid surface and squeeze
2. Use tweezers to pick up the external sides of the housing part carefully. Do not grab, puncture or push the emitting region. Over stress on the lens may cause the damage of component and raise the risk to break the wire inside the package.
3. In order to avoid absorption of moisture, it is recommended that the products are stored in the dry box (or desiccators) with a desiccants. Alternatively the following environment is recommended: Storage temperature : 5°C~30°C Humidity:60% HR max.
4. If the storage conditions are of high humidity the product should be dried before use.
Recommended drying conditions: 12 hours at 60°C±5°C
5. Any mechanical force or any excess vibration should be avoid during the cooling process after soldering.
6. Reflow rapidly cooling should be avoided.
7. Components should not be mounted on distorted Printed Circuit Boards.
8. Devices should not contact with any types of fluid, such as water , oil , organic solvents....
etc.
9. The maximum ambient temperature should be taken into consideration when determining the operating current.

