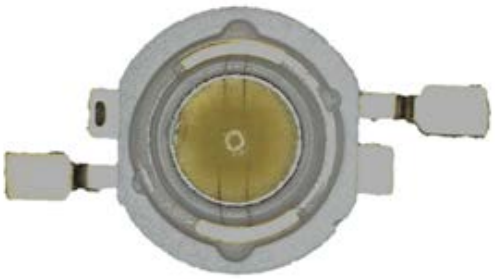
台宙晶體科技股份有限公司

Top Crystal Technology Inc.,

Power Light Source

Introduction：

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



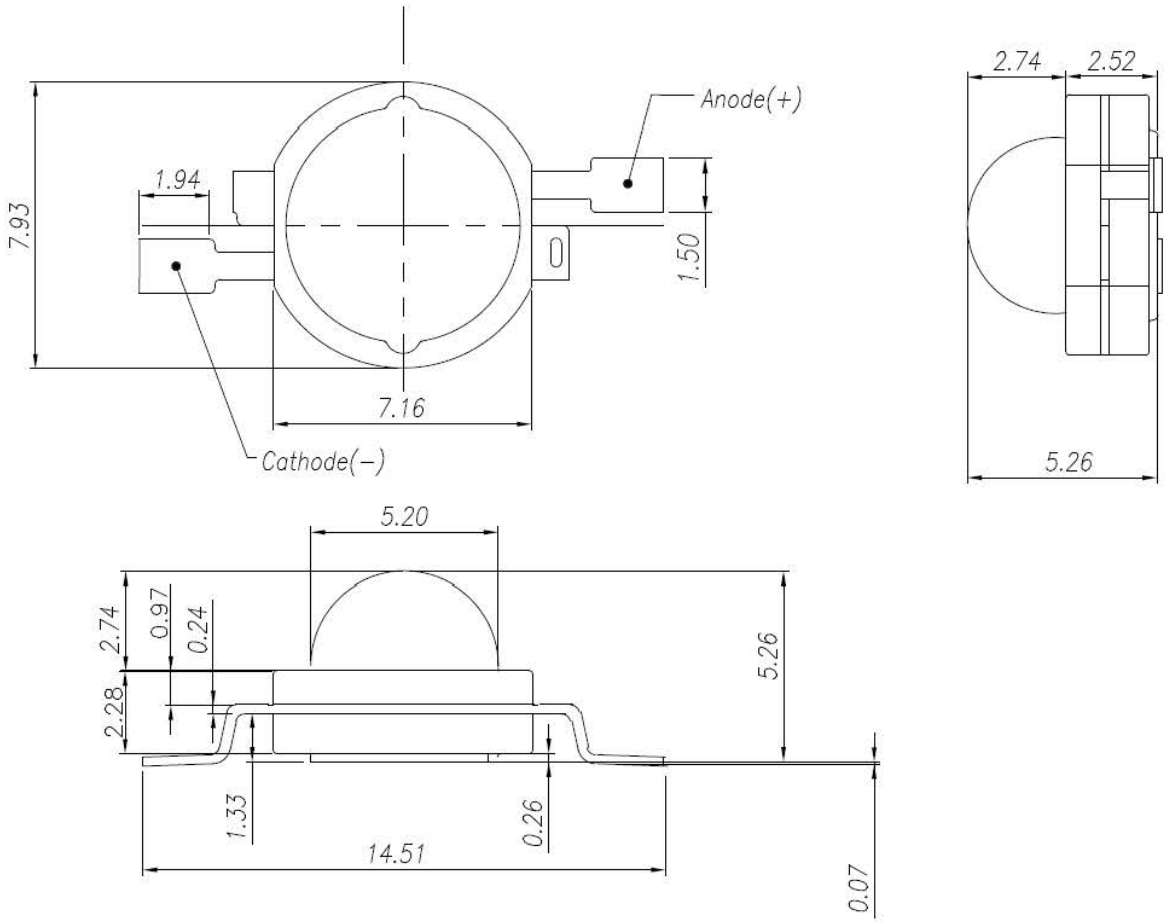
Feature：

- 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

Emitter Mechanical Dimensions



Notes：

1. Drawings are not to scale.
2. All dimensions are in millimeter.
3. General tolerance is ±0.2mm.
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℃.

Absolute Maximum Ratings

Parameter		Conditions
DC Forward Current	1W	350mA
	3W	700 mA
Peak Pulse Current (mA)	1W	400 mA
(less than 1/10 duty cycle@1KHz)	3W	800 mA
LED Junction Temperature (℃)		120℃
Operating Temperature (℃)		-30~100
Storage Temperature (℃)		-40~120
Soldering Temperature		Manual 250℃(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℃)

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

Notes :

1. CCT ±5% tester tolerance.
2. Wavelength is measured with an accuracy of ±0.5nm.

Flux Characteristics (Tj=25℃)

Color	Forward current	Part Number	Minimum Luminous Flux(lm)	Typical Luminous Flux(lm)	Maximum Luminous Flux(lm)	Beam Pattern
Cool White	350mA	THEM-CLW	125Lm	150Lm	--	Lambertian
	700mA	THEM-DLW	200Lm	250Lm	--	
Neutral White	350mA	THEM-CLN	100Lm	135Lm	--	
	700mA	THEM-DLN	180Lm	225Lm	--	
Warm White	350mA	THEM-CLM	90Lm	125Lm	--	
	700mA	THEM-DLM	150Lm	200Lm	--	

Electrical Characteristics (Tj=25℃)

Color	Forward current	Part Number	Forward Voltage V_F(V) Min.	Typ.	Max.	Thermal Resistance Junction to lead (℃/W)
Cool White	350mA	THEM-CLW	2.9	3.3	3.6	10
	700mA	THEM-DLW	3.1	3.6	4.0	
Neutral White	350mA	THEM-CLN	2.9	3.3	3.6	10
	700mA	THEM-DLN	3.1	3.6	4.0	
Warm White	350mA	THEM-CLM	2.9	3.3	3.6	10
	700mA	THEM-DLM	3.1	3.6	4.0	

Notes:

1. V_F ±0.1V tester tolerance.

RELIABILITY ITEMS and SPECTIONS

No	Test Item	Test Conditions	Remark
1	Room Temperature Operating Life	25℃	1000 hrs
2	High Temperature Storage	Temperature：110℃	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℃	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

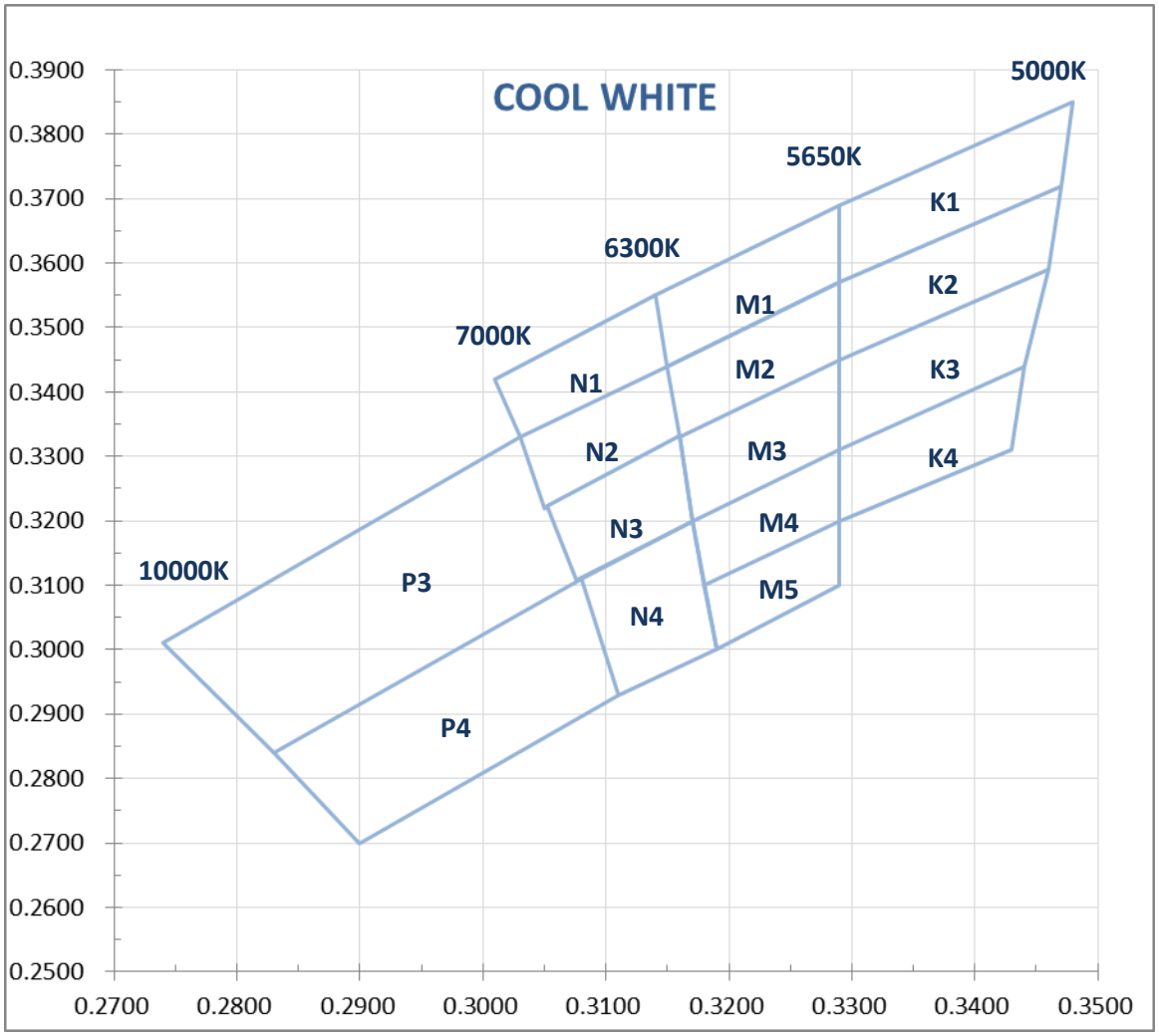
Failure Criteria：

1. Forward Voltage (VF) ≧ Initial Level x 1.1
2. Luminous Flux or Radiometric Power (ΦV) ≦ Initial Level x 0.7
3. Reverse Current (IR) ≧ 10μA
4. Resistance to Soldering Heat：No deaqd lamps or visual damage.

Color Bins for Cool White

Bin Code	X	Y	Typ. CCT(K)	Bin Code	X	Y	Typ. CCT(K)
P3	0.308	0.311	8000	M3	0.329	0.345	5970
	0.283	0.284			0.329	0.331	
	0.274	0.301			0.317	0.32	
	0.303	0.333			0.316	0.333	
P4	0.308	0.311	8000	M4	0.329	0.331	5970
	0.311	0.293			0.329	0.32	
	0.29	0.27			0.318	0.31	
	0.283	0.284			0.317	0.32	
N1	0.303	0.333	6650	M5	0.329	0.32	5970
	0.301	0.342			0.329	0.31	
	0.314	0.355			0.319	0.3	
	0.315	0.344			0.318	0.31	
N2	0.305	0.322	6650	K1	0.329	0.357	5320
	0.303	0.333			0.329	0.369	
	0.315	0.344			0.348	0.385	
	0.316	0.333			0.347	0.372	
N3	0.308	0.311	6650	K2	0.329	0.345	5320
	0.305	0.322			0.329	0.357	
	0.316	0.333			0.347	0.372	
	0.317	0.32			0.346	0.359	
N4	0.308	0.311	6650	K3	0.329	0.331	5320
	0.317	0.32			0.329	0.345	
	0.319	0.3			0.346	0.359	
	0.311	0.293			0.344	0.344	
M1	0.314	0.355	5970	K4	0.329	0.331	5320
	0.329	0.369			0.344	0.344	
	0.329	0.357			0.343	0.331	
	0.315	0.344			0.329	0.32	
M2	0.315	0.344	5970				
	0.329	0.357					
	0.329	0.345					
	0.316	0.333					

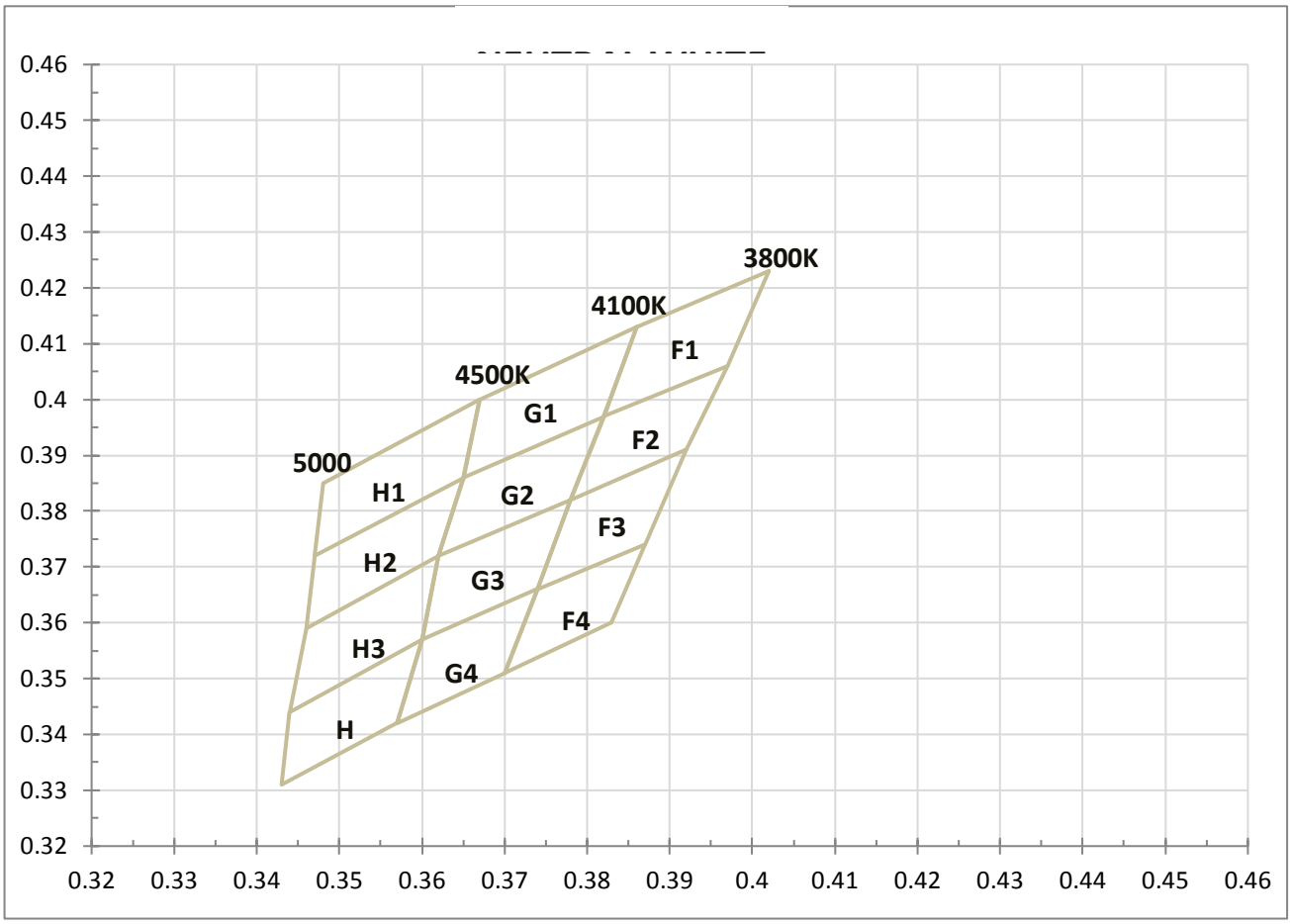
- Tolerance on each Color bin (x, y) is ±0.01


COOL WHITE
5000K
5650K
6300K
7000K
10000K
K1
K2
K3
K4
M1
M2
M3
M4
M5
N1
N2
N3
N4
P3
P4
0.3900
0.3800
0.3700
0.3600
0.3500
0.3400
0.3300
0.3200
0.3100
0.3000
0.2900
0.2800
0.2700
0.2600
0.2500
0.2700
0.2800
0.2900
0.3000
0.3100
0.3200
0.3300
0.3400
0.3500

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

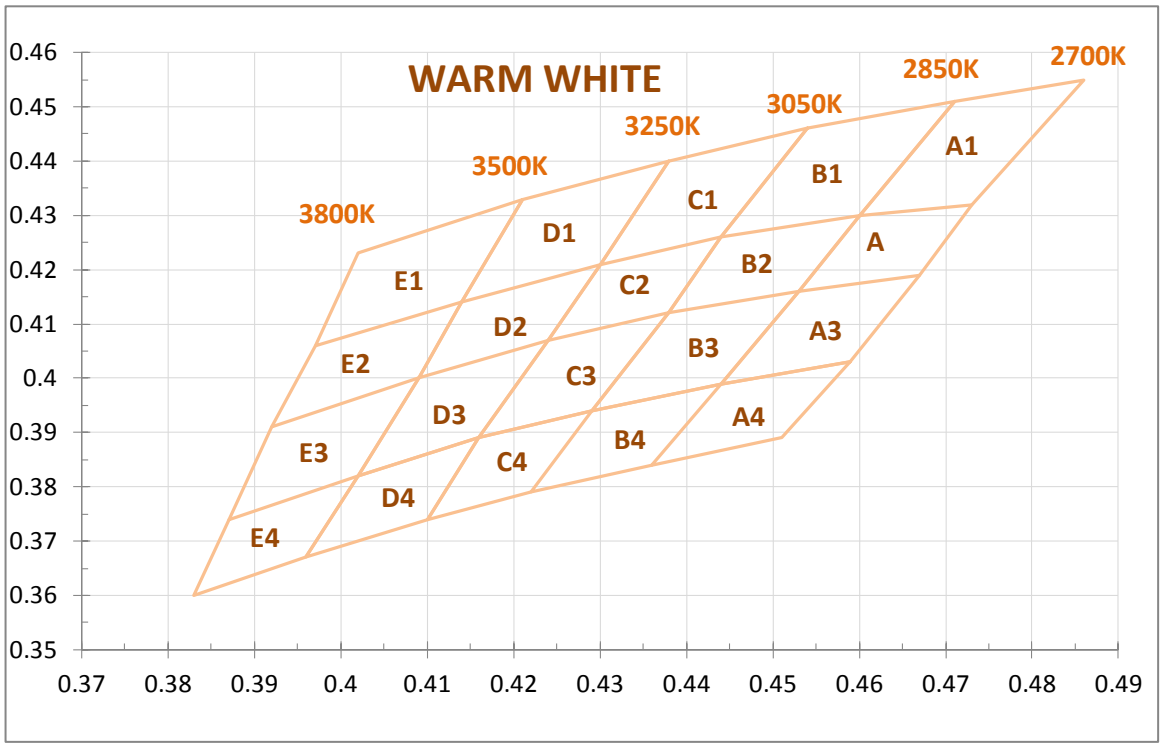

0.46
0.45
0.44
0.43
0.42
0.41
0.4
0.39
0.38
0.37
0.36
0.35
0.34
0.33
0.32
0.32
0.33
0.34
0.35
0.36
0.37
0.38
0.39
0.4
0.41
0.42
0.43
0.44
0.45
0.46
3800K
4100K
4500K
5000
F1
F2
F3
F4
G1
G2
G3
G4
H1
H2
H3
H

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	C3	0.424 0.416 0.429 0.438	0.407 0.389 0.394 0.412	3150
C2	0.43 0.424 0.438 0.444	0.421 0.407 0.412 0.426	3150	C4	0.429 0.416 0.410 0.422	0.394 0.389 0.374 0.379	3150

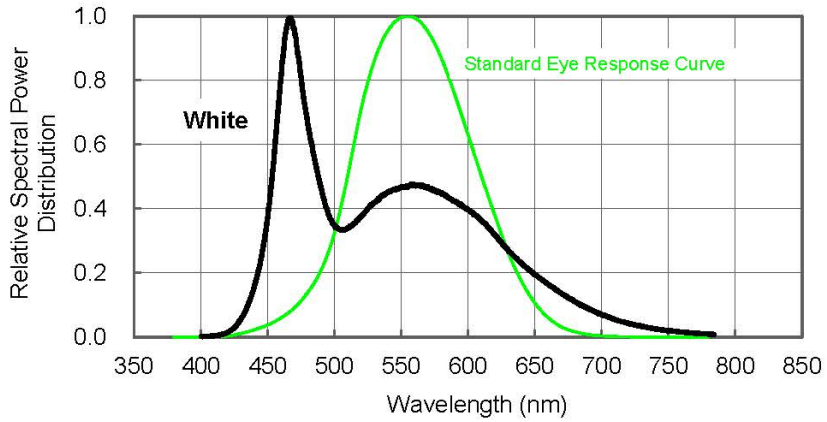
- Tolerance on each Color bin (x, y) is ±0.01

Color Bins for Warm White

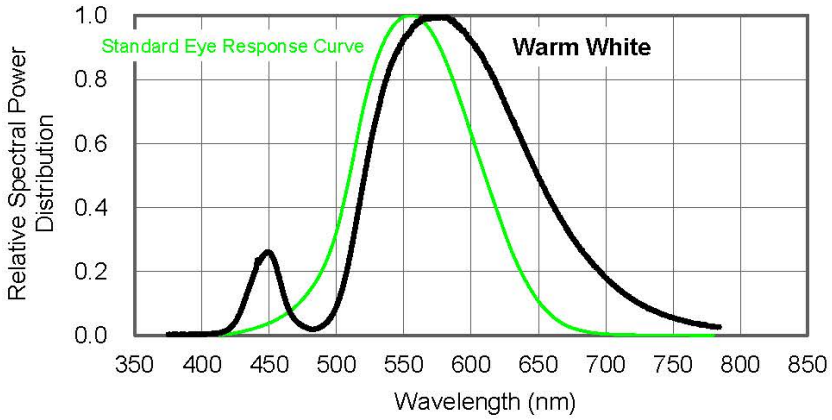


Wavelength Spectrum, Ta=25 ℃

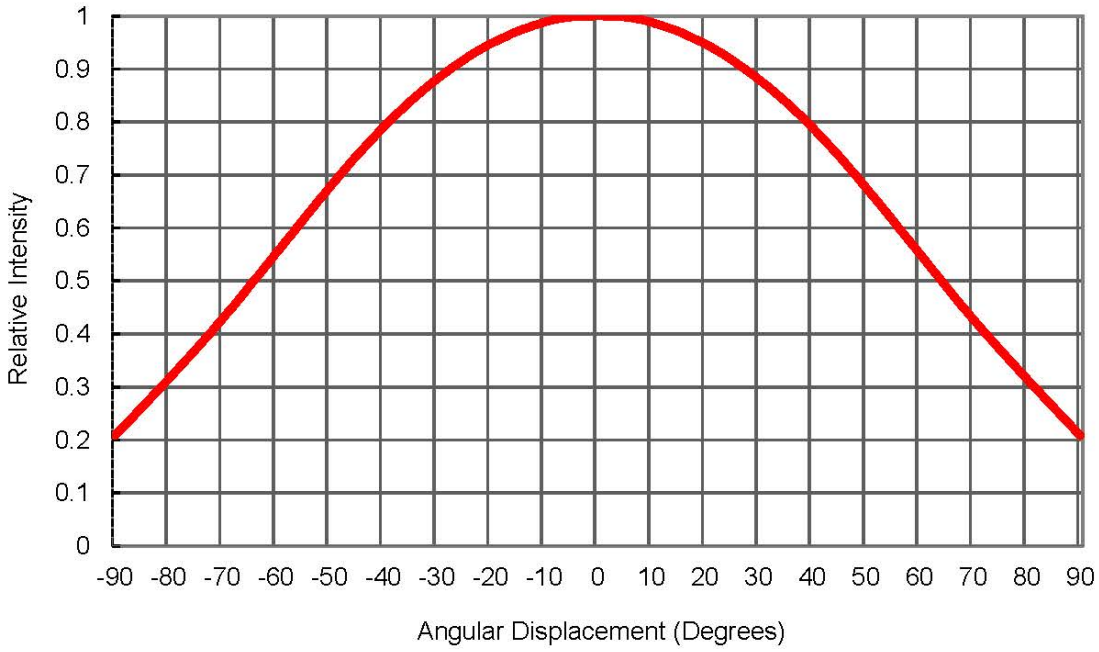
White Color Spectrum



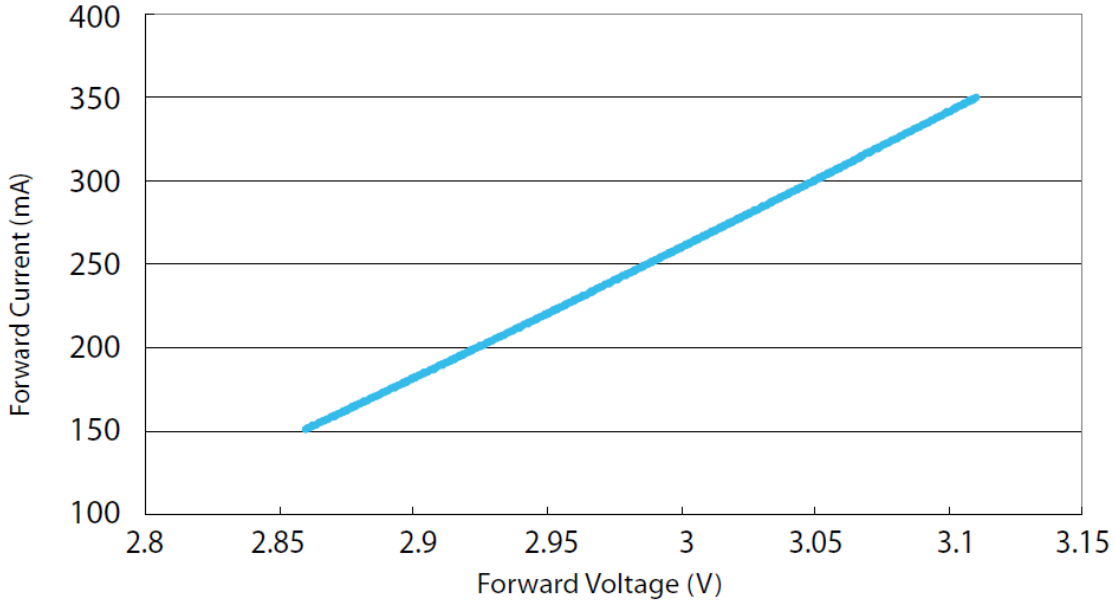
Warm White Spectrum



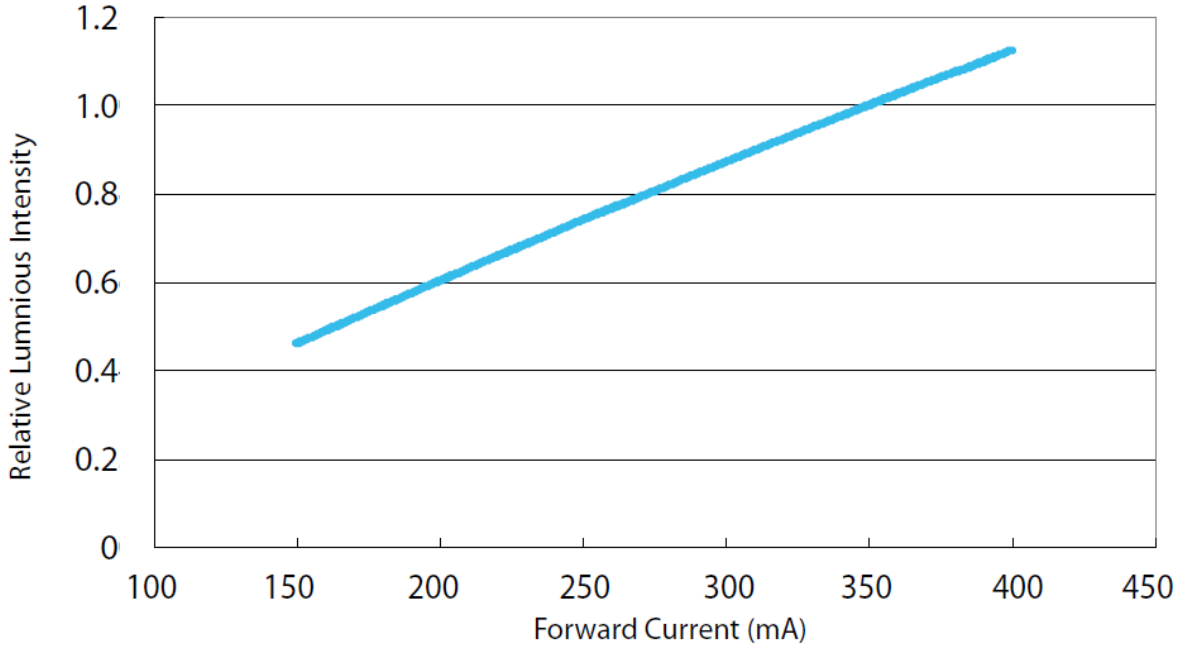
Typical Spatial Radiation Pattern



Forward current vs Forward Voltage

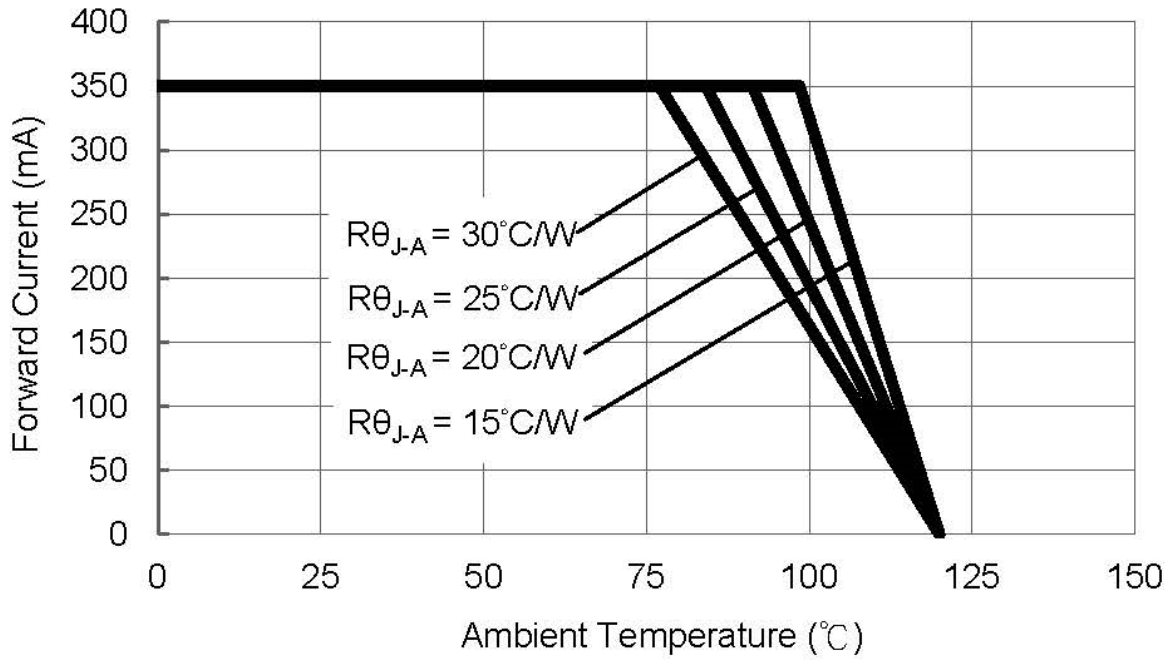


Relative Luminous intensity vs Forward Current



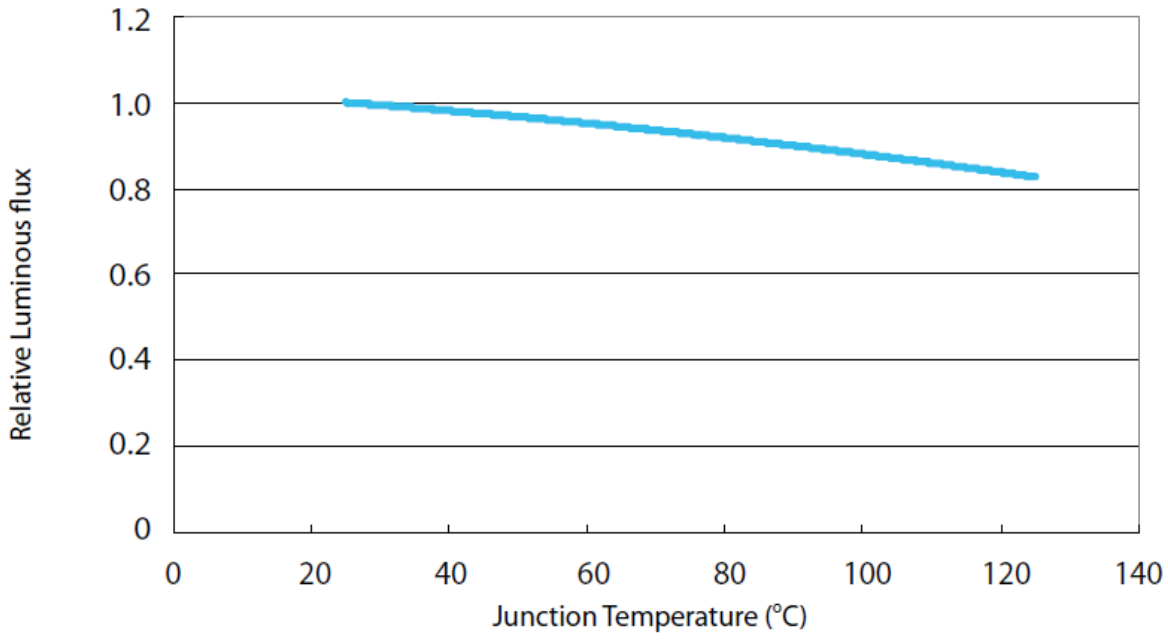
Ambient Temperature vs. Maximum Forward Current

White, Warm White



Light Output Characteristics

Relative Light Output vs. Junction Temperature



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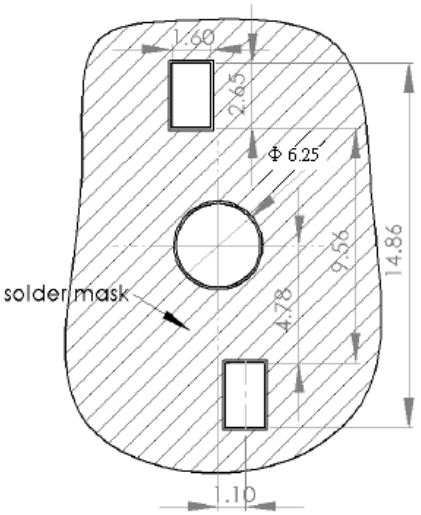
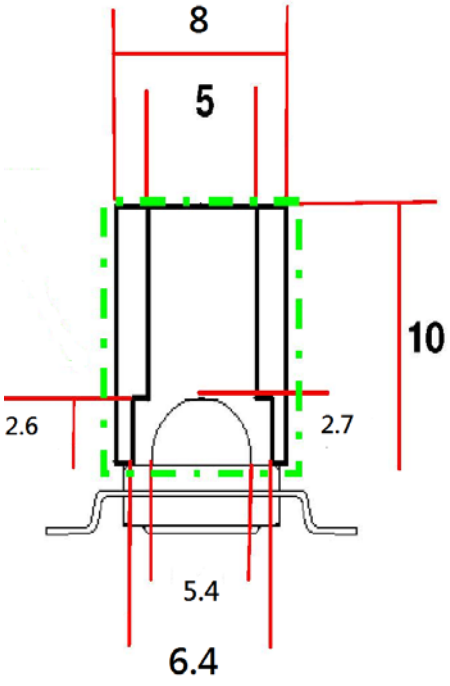
Recommended Solder Pad Design

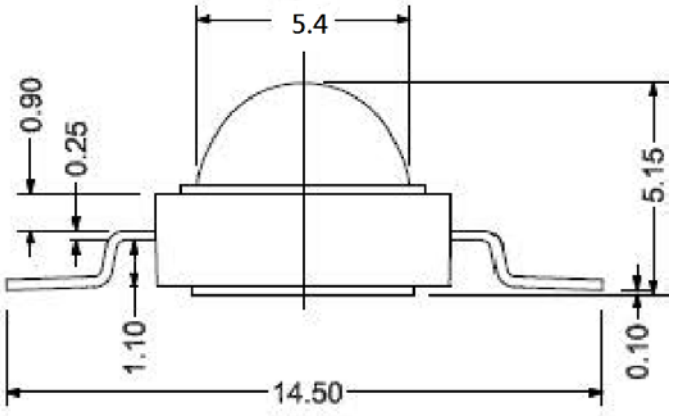


Notes :

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

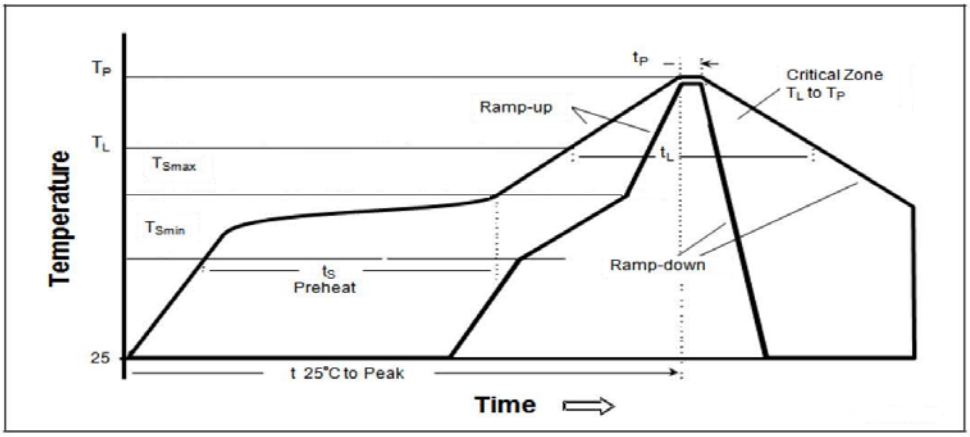
5. Recommended nozzle style





Recommended Soldering Profile

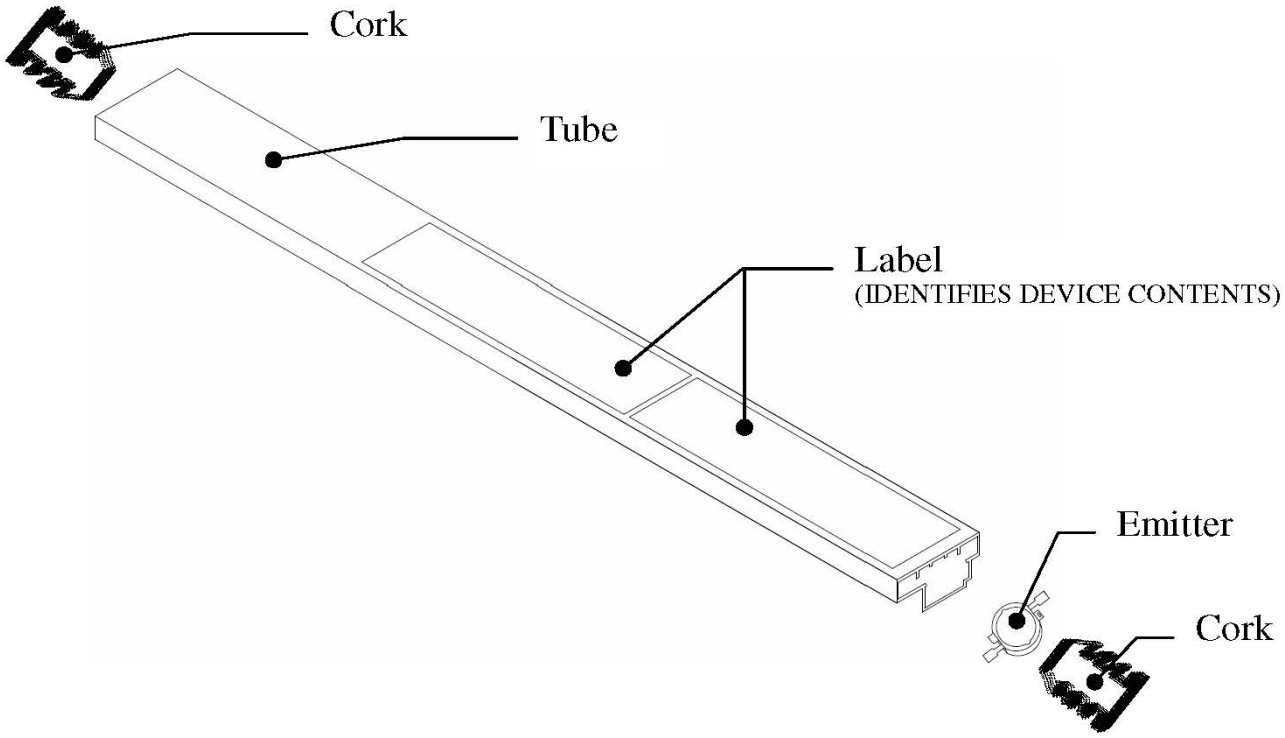
The LEDs can be soldered using the parameter listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest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

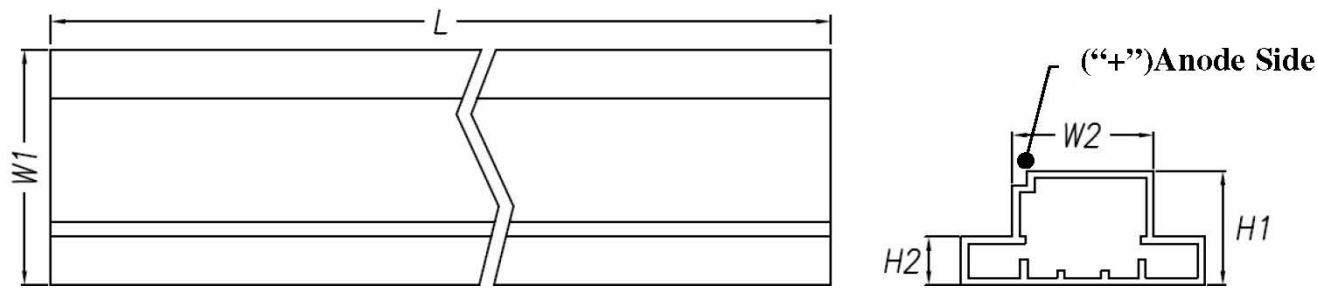


Profile Feature	Typical parameters
Average Ramp-Up Rate (Ts_{max} to Tp)	3 ℃/second max.
Preheat Temperature Min (Ts_{min})	150 ℃
Preheat Temperature Max (Ts_{max})	200 ℃
Time (ts_{min} to ts_{max})	60-180 seconds
Time maintained above Temperature (TL)	217 ℃
Time maintained above Time (tL)	60-150 seconds
Peak/Classification Temperature (Tp)	240 ℃
Time within 5 ℃ of Actual Peak Temperature (tp)	5 seconds
Ramp-Down Rate	6 ℃/second max.
Time 25 ℃ 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.

Tube Package Specifications





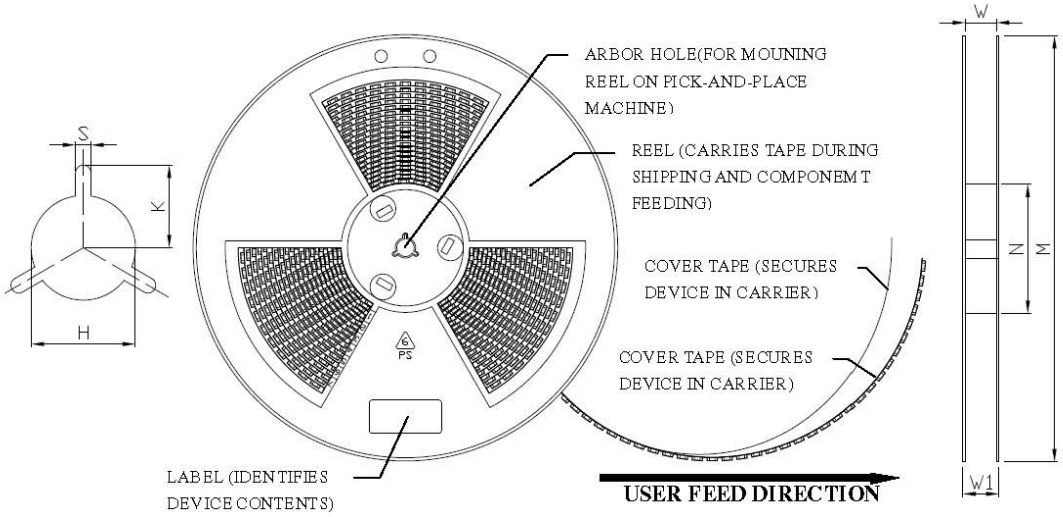
Unit：mm

W1	W2	H1	H2	L
16.5	9.6	8	3.4	424

Notes

1. There are 50pcs emitters in a tube.

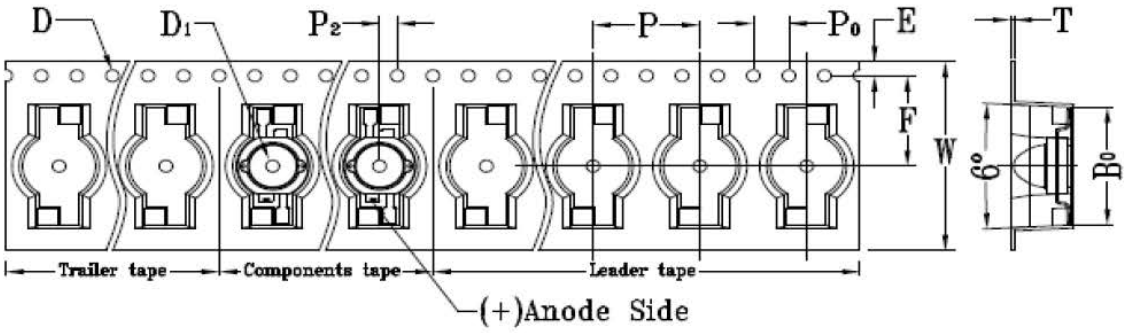
Tape and Reel Packaging Specifications



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

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 gamage 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.