台宙晶體科技股份有限公司

Top Crystal Technology Inc.,

Power Light Source

Introduction：

THCA-CLX is one the highest flux LEDs in the world. THCA-CLX LED has offered extended solid-state lighting design possibilities.Due to the special design of chip and package, the THCA-CLX is designed by particular package for high power LED.

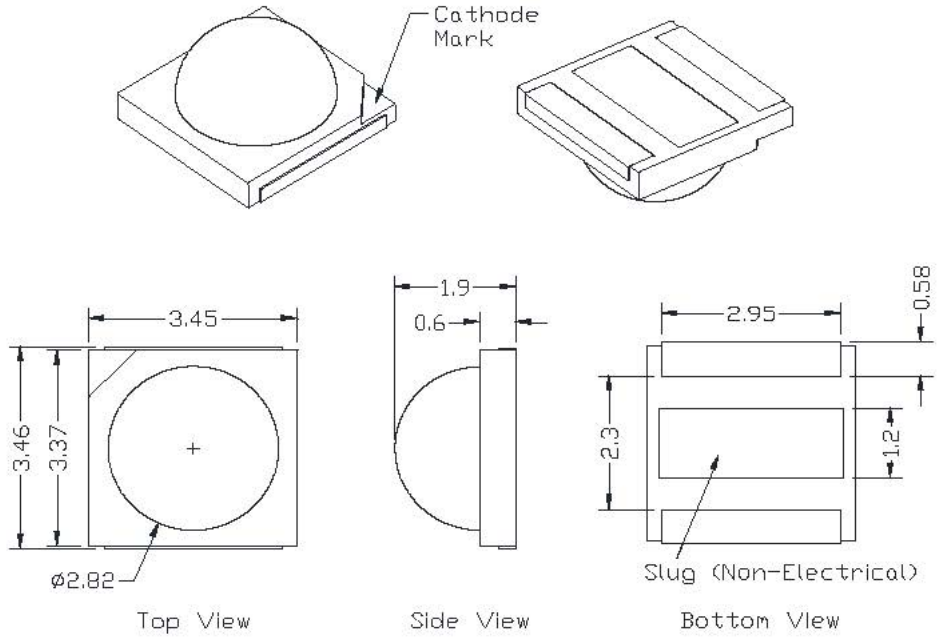
Feature：

- Long operating life
- Energy efficiency
- Low thermal resistance
- Compact design
- Instant light
- Fully dimmable
- Superior ESD protection
- ROHS compatibility

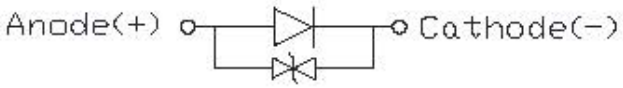
Typical Applications:

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

Package Dimensions



Circuit Diagram



Notes:

1. The cathode side of the device is denoted by the chamfer on the part body.
2. Electrical insulation between the case and the board is required. Do not electrically connect either the anode or cathode to the slug.
3. Drawing not to scale.
4. All dimensions are in millimeters.
5. Unless otherwise indicated, tolerances are ±0.10mm.
6. Please do not solder the emitter by manual hand soldering, otherwise it will damage the emitter.
7. Please do not use a force of over 0.3kgf impact or pressure on the lens of the LED, otherwise it will cause a catastrophic failure.

*The appearance and specifications of the product may be modified for improvement without notice.

Absolute Maximum Ratings

Parameter		Rating
DC Forward Current (mA)	1W	350
	3W	700
Max Pulsed Forward Current (less than 1/10 duty cycle@1KHz)	1W	400
	3W	800
ESD Sensitivity (HBM per MIL-STD-883E Method 3015.7)		±500V (Class III)
LED Junction Temperature (℃)		120
Operating Temperature (℃)		-30~90
Storage Temperature (℃)		-40~100
Soldering Temperature		JEDEC 020c 260°C
Allowable Reflow Cycles		3
Reverse Voltage (V_R)		Not designed to be driven in reverse bias

Flux Characteristics, TJ= 25°CElectrical

Color	Forward current	Part Number	Minimum Luminous Flux(lm)	Typical Luminous Flux(lm)	Maximum Luminous Flux(lm)	Beam Pattern
Cool White	350mA	THCA-CLW	130Lm	150Lm	--	Lambertian
	700mA	THCA-DLW	215Lm	250Lm	--	
Neutral White	350mA	THCA-CLN	130Lm	145Lm	--	
	700mA	THCA-DLN	215Lm	240Lm	--	
Warm White	350mA	THCA-CLM	110Lm	130Lm	--	
	700mA	THCA-DLM	180Lm	210Lm	--	

- Maintains a tolerance of ±7% on flux and power measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

Electrical Characteristics, TJ= 25°COptical

Color	Forward current	Part Number	Forward Voltage V_F(V) Min.	Typ.	Max.	Thermal Resistance Junction to lead (℃/W)
Cool White	350mA	THCA-CLW	2.8	3.1	3.3	6
	700mA	THCA-DLW	3.1	3.5	4.0	
Neutral White	350mA	THCA-CLN	2.8	3.1	3.3	6
	700mA	THCA-DLN	3.1	3.5	4.0	
Warm White	350mA	THCA-CLM	2.8	3.1	3.3	6
	700mA	THCA-DLM	3.1	3.5	4.0	

- Maintains a tolerance of ±0.1V for Voltage measurements.

Optical Characteristics at 700mA, TJ= 25°C

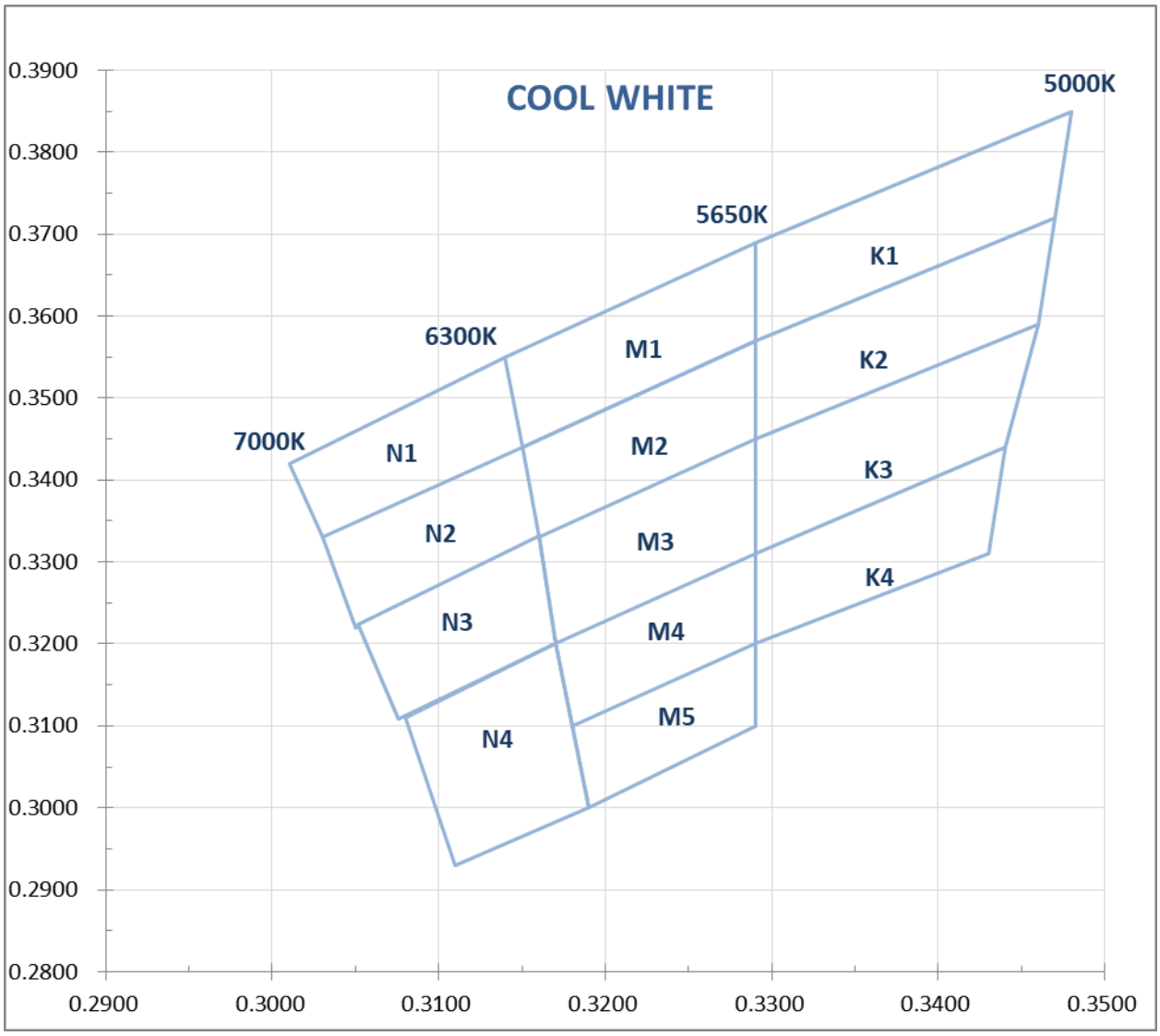
Color	Color Temperature CCT Min.	Typ.	Max.	Viewing Angle (degrees) 2θ1/2
White	5000K	6000K	7000K	130
Neutral White	3800K	4400K	5000K	
Warm White	2700K	3000K	3250K	

- Maintains a tolerance of ± 1nm for dominant wavelength measurements.

Color Bins for Cool White

Bin Code	X	Y	Typ. CCT(K)	Bin Code	X	Y	Typ. CCT(K)
M1	0.314	0.355	5970	M2	0.315	0.344	5970
	0.329	0.369			0.329	0.357	
	0.329	0.357			0.329	0.345	
	0.315	0.344			0.316	0.333	
M3	0.329	0.345	5970	M4	0.329	0.331	5970
	0.329	0.331			0.329	0.32	
	0.317	0.32			0.318	0.31	
	0.316	0.333			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	0.30755	0.31078	6650	K2	0.329	0.345	5320
	0.30517	0.32239			0.329	0.357	
	0.31604	0.33322			0.347	0.372	
	0.31747	0.32044			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	
				K4	0.329	0.331	5320
					0.344	0.344	
					0.343	0.331	
					0.329	0.32	

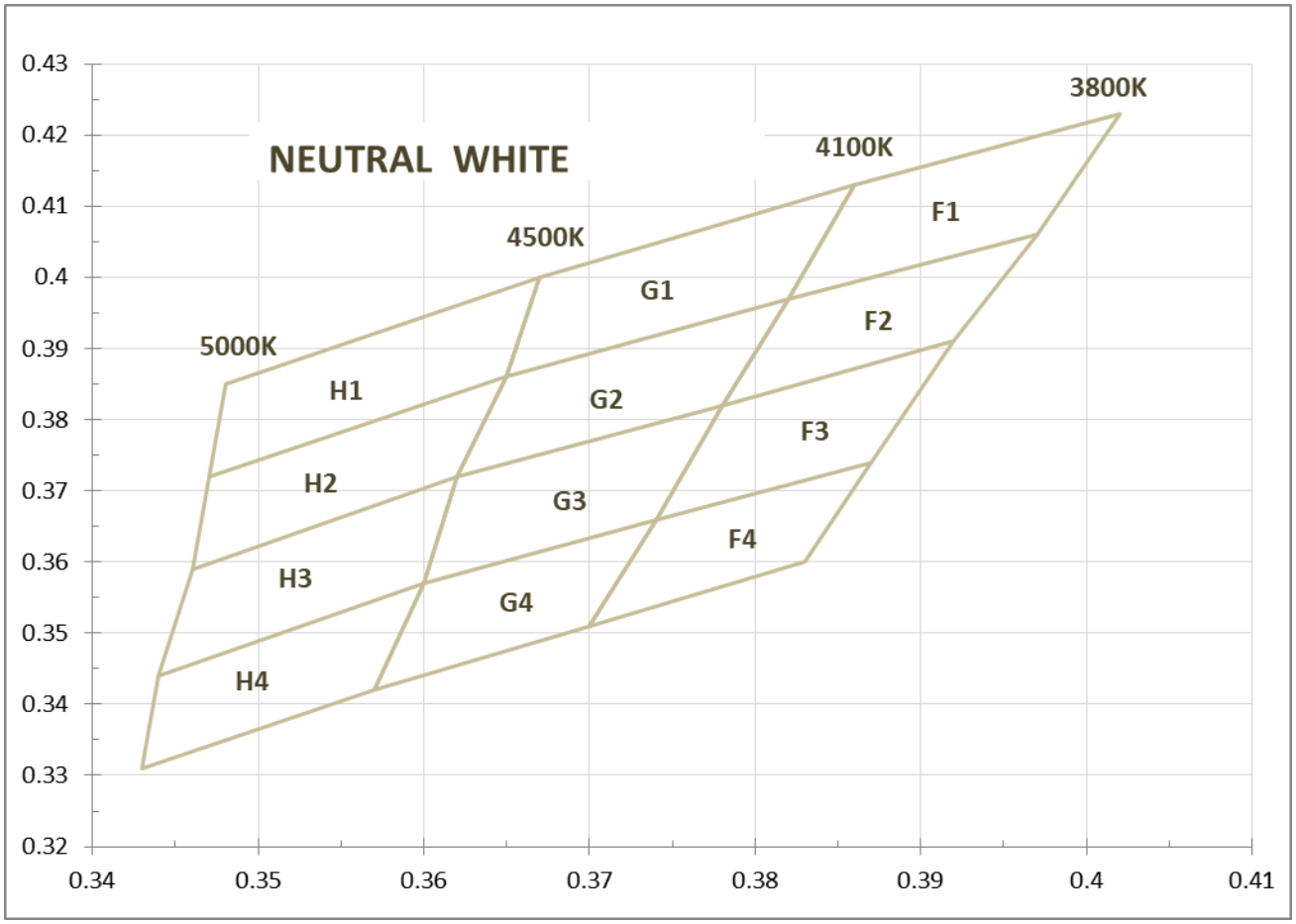
- Tolerance on each Color bin (x, y) is ±0.01


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

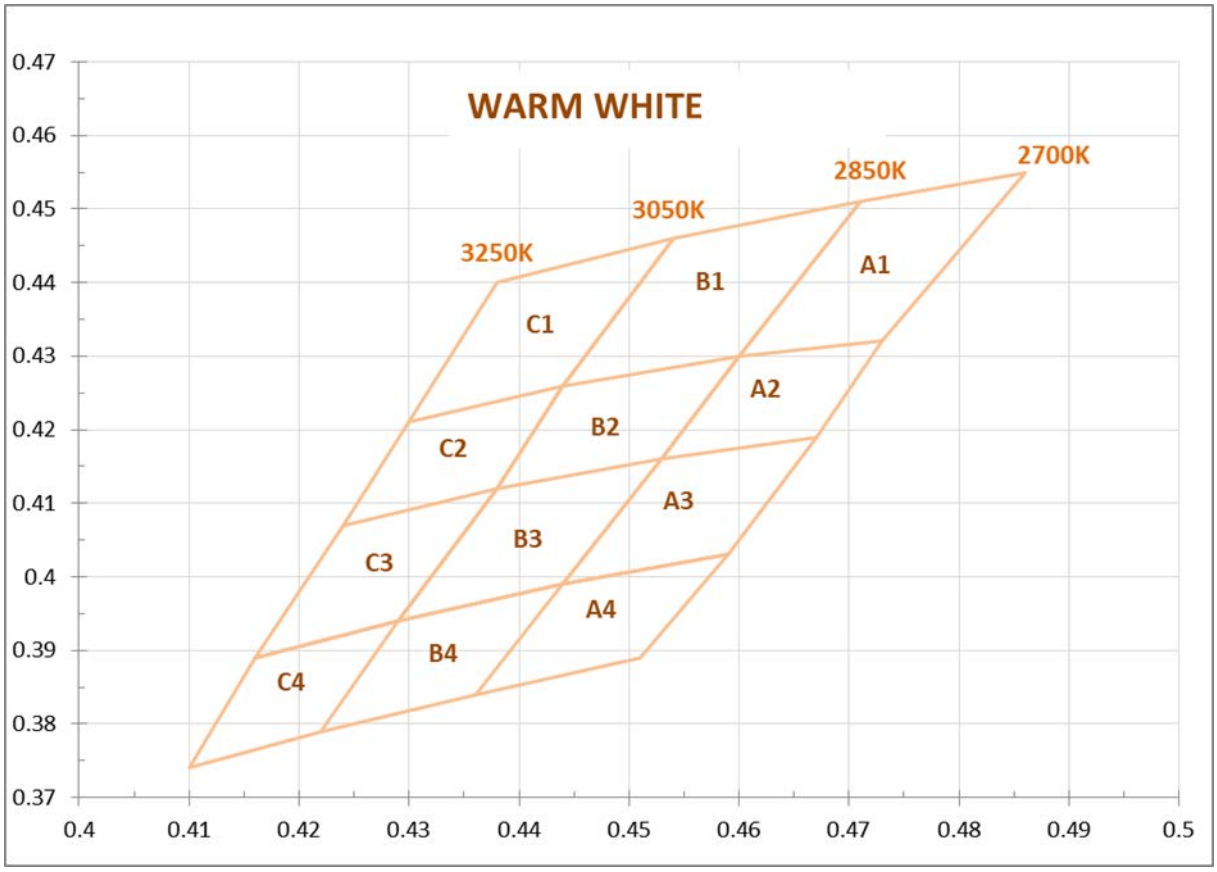

NEUTRAL WHITE
3800K
4100K
4500K
5000K
F1
F2
F3
F4
G1
G2
G3
G4
H1
H2
H3
H4
0.43
0.42
0.41
0.4
0.39
0.38
0.37
0.36
0.35
0.34
0.33
0.32
0.34
0.35
0.36
0.37
0.38
0.39
0.4
0.41

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	C2	0.43 0.424 0.438 0.444	0.421 0.407 0.412 0.426	3150
C3	0.424 0.416 0.429 0.438	0.407 0.389 0.394 0.412	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



RELIABILITY ITEMS and SPECTIONS

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life (RTOL)	25°C, I_F = max DC (Note 1)	1000 hours	Note 2
Wet High Temperature Operating Life (WHTOL)	85°C/60%RH, I_F = max DC (Note 1)	1000 hours	Note 2
Wet High Temperature Storage Life (WHTSL)	85°C/85%RH, non-operating	1000 hours	Note 2
High Temperature Storage Life (HTSL)	110°C, non-operating	1000 hours	Note 2
Low Temperature Storage Life (LTSL)	-40°C, non-operating	1000 hours	Note 2
Non-operating Temperature Cycle (TMCL)	-40°C to 120°C, 30 min. dwell, <5 min. transfer	200 cycles	Note 2
Mechanical Shock	1500 G, 0.5 msec. pulse, 5 shocks each 6 axis		Note 3
Natural Drop	On concrete from 1.2 m, 3X		Note 3
Variable Vibration Frequency	10-2000-10 Hz, log or linear sweep rate, 20 G about 1 min., 1.5 mm, 3X/axis		Note 3
Solder Heat Resistance (SHR)	260°C ± 5°C, 10 sec.		Note 3
Solderability	Steam age for 16 hrs., then solder dip at 260°C for 5 sec.		Solder coverage on lead

Notes:

1. Depending on the maximum derating curve.
2. Criteria for judging failure

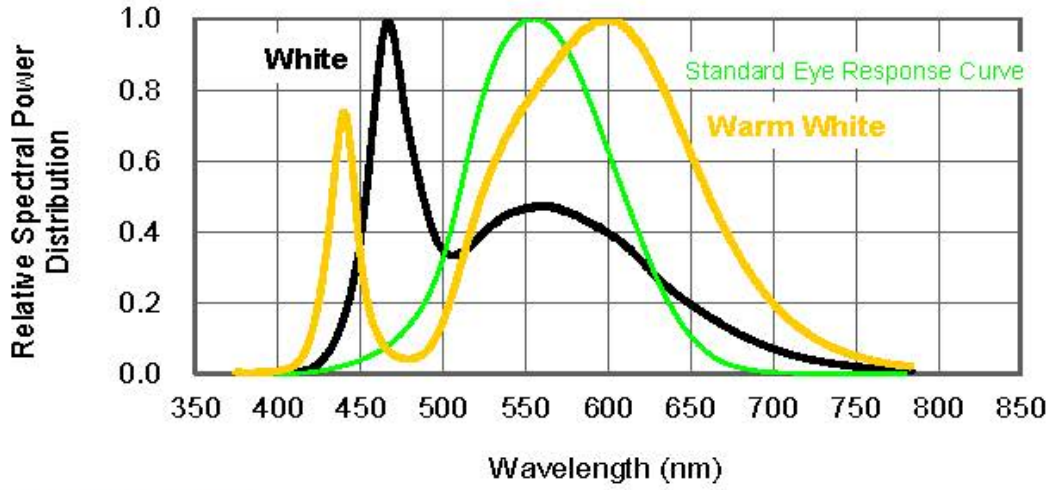
Item	Test Condition	Criteria for Judgement	
		Min.	Max.
Forward Voltage (V_F)	I_F = max DC	--	Initial Level x 1.1
Luminous Flux or	I_F = max DC	Initial Level x 0.7	--
Reverse Current (I_R)	V_R = 5V	--	50 μA

* The test is performed after the LED is cooled down to the room temperature.

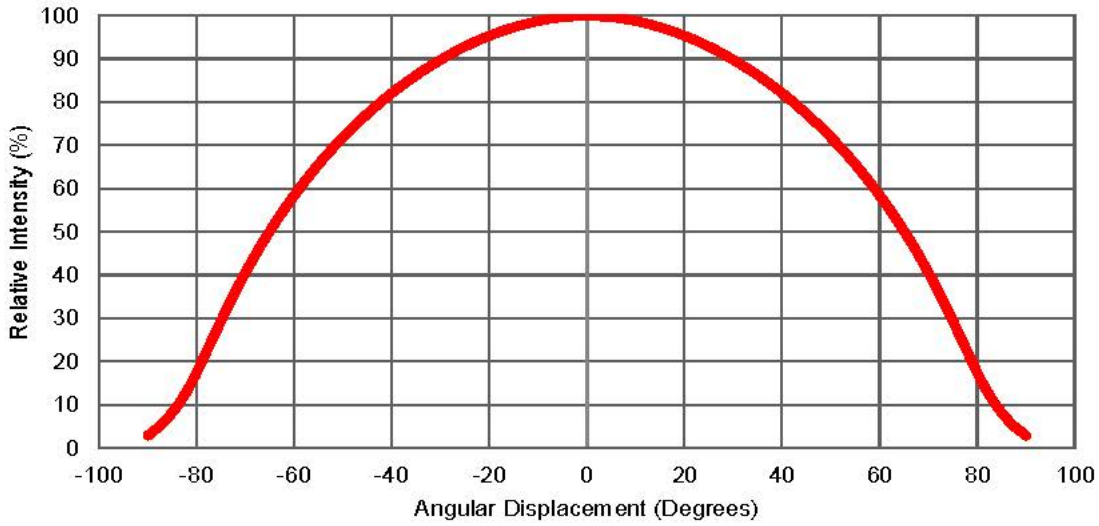
3. A failure is an LED that is open or shorted.

Color Spectrum, TJ = 25°C

White and Warm White

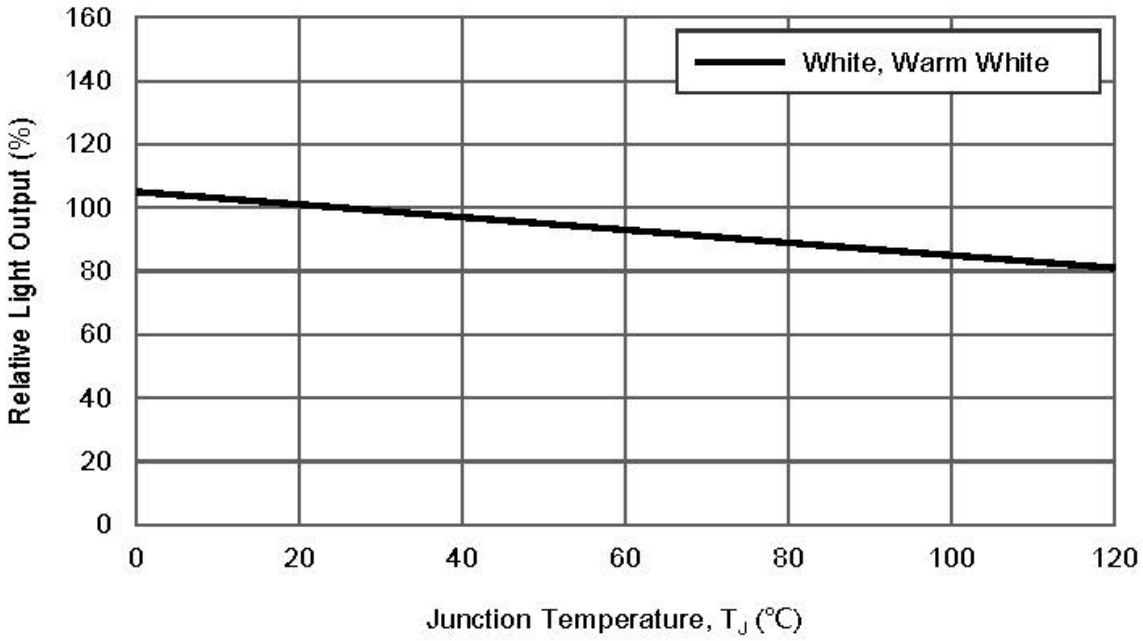


Typical Spatial Radiation Pattern

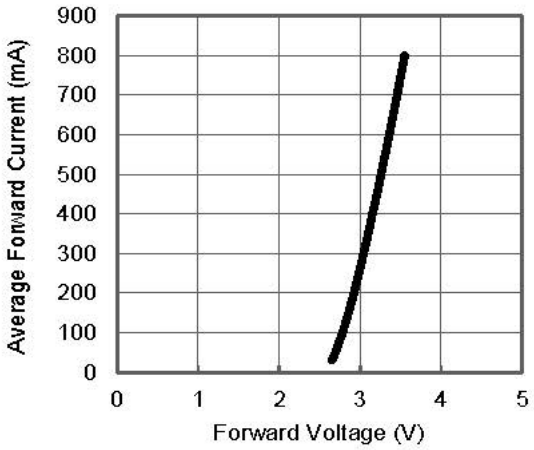


Light Output Characteristics

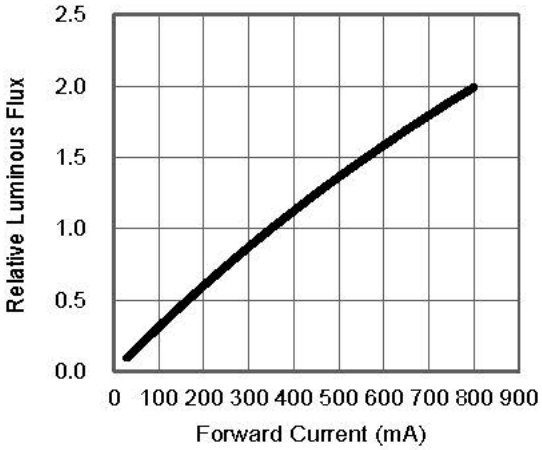
Relative Light Output vs. Junction Temperature at 700mA



Forward Current Characteristics, TJ = 25°C



Forward Voltage vs. Forward Current



Luminous Flux vs.Forward Current

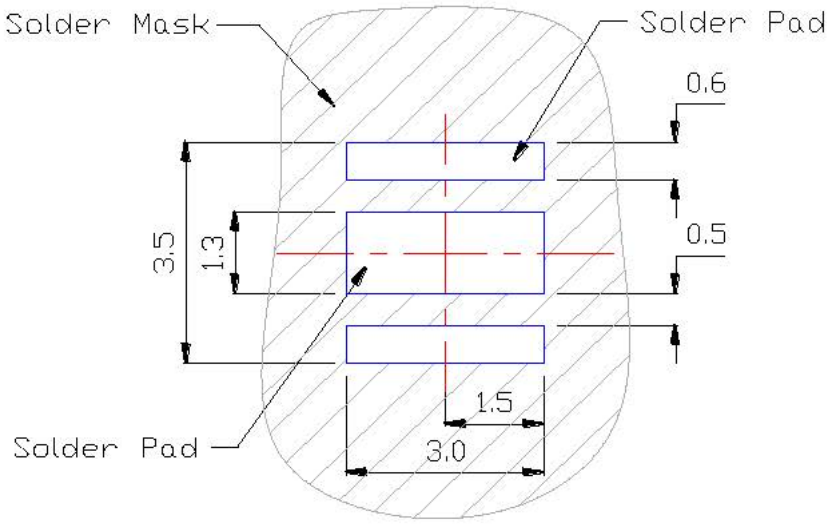
Moisture Sensitivity Level - JEDEC Level 1

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Environment	
	Time	Conditions	Time (hours)	Conditions	Time (hours)	Conditions
1	Unlimited	≤30˚C / 85% RH	168 +5/-0	85˚C / 85% RH	NA	NA

- **The standard soak time includes a default value of 24 hours for semiconductor manufature's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility.**
- **Table below presents the moisture sensitivity level definitions per IPC/JEDEC's J-STD-020C.**

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Environment	
	Time	Conditions	Time (hours)	Conditions	Time (hours)	Conditions
1	Unlimited	≤30˚C / 85% RH	168 +5/-0	85˚C / 85% RH	NA	NA
2	1 year	≤30˚C / 60% RH	168 +5/-0	85˚C / 60% RH	NA	NA
2a	4 weeks	≤30˚C / 60% RH	696 +5/-0	30˚C / 60% RH	120 +1/-0	60˚C / 60% RH
3	168 hours	≤30˚C / 60% RH	192 +5/-0	30˚C / 60% RH	40 +1/-0	60˚C / 60% RH
4	72 hours	≤30˚C / 60% RH	96 +2/-0	30˚C / 60% RH	20 +0.5/-0	60˚C / 60% RH
5	48 hours	≤30˚C / 60% RH	72 +2/-0	30˚C / 60% RH	15 +0.5/-0	60˚C / 60% RH
5a	24 hours	≤30˚C / 60% RH	48 +2/-0	30˚C / 60% RH	10 +0.5/-0	60˚C / 60% RH
6	Time on Label (TOL)	≤30˚C / 60% RH	Time on Label (TOL)	30˚C / 60% RH	NA	NA

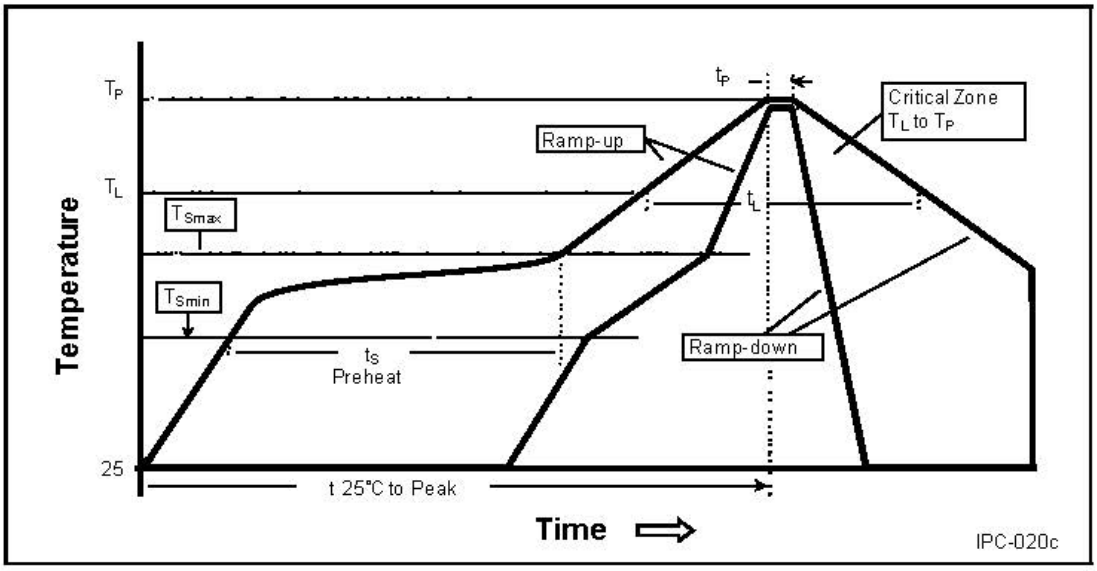
Recommended Solder Pad Design



- All dimensions are in millimeters.
- Electrical isolation is required between Slug and Solder Pad.

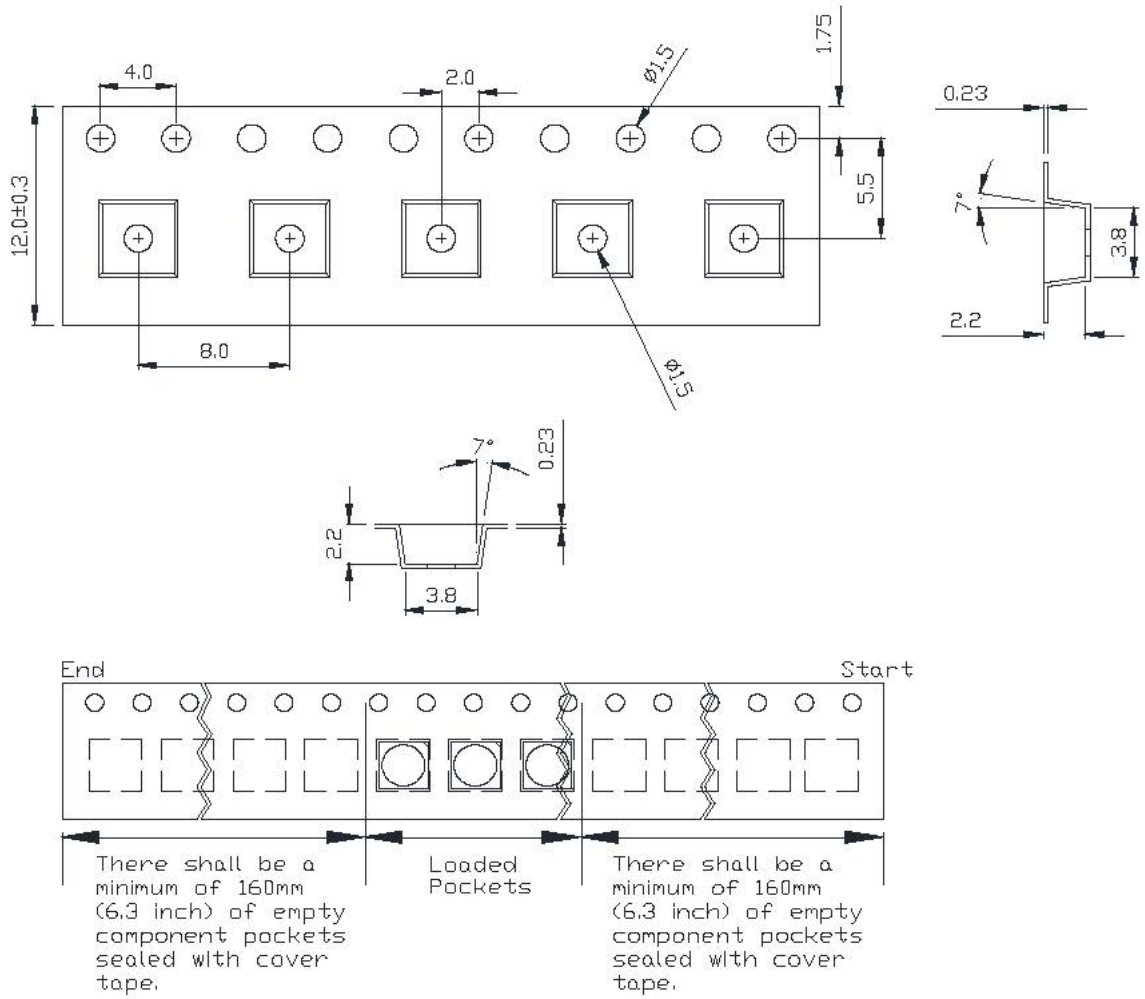
Reflow Soldering Temperature Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-Up Rate (T_{Smax} to T_P)	3°C / second max.	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	 150°C 200°C 60-180 seconds
Time maintained above: – Temperature (T_L) – Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak/Classification Temperature (T_P)	240°C	260°C
Time Within 5°C of Actual Peak Temperature (t_P)	10-30 seconds	20-40 seconds
Ramp-Down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.



- Do not use solder pastes with post reflow flux residue>47%. (58Bi-42Sn eutectic alloy, etc) This kind of solder pastes may cause a reliability problem to LED.
- 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.

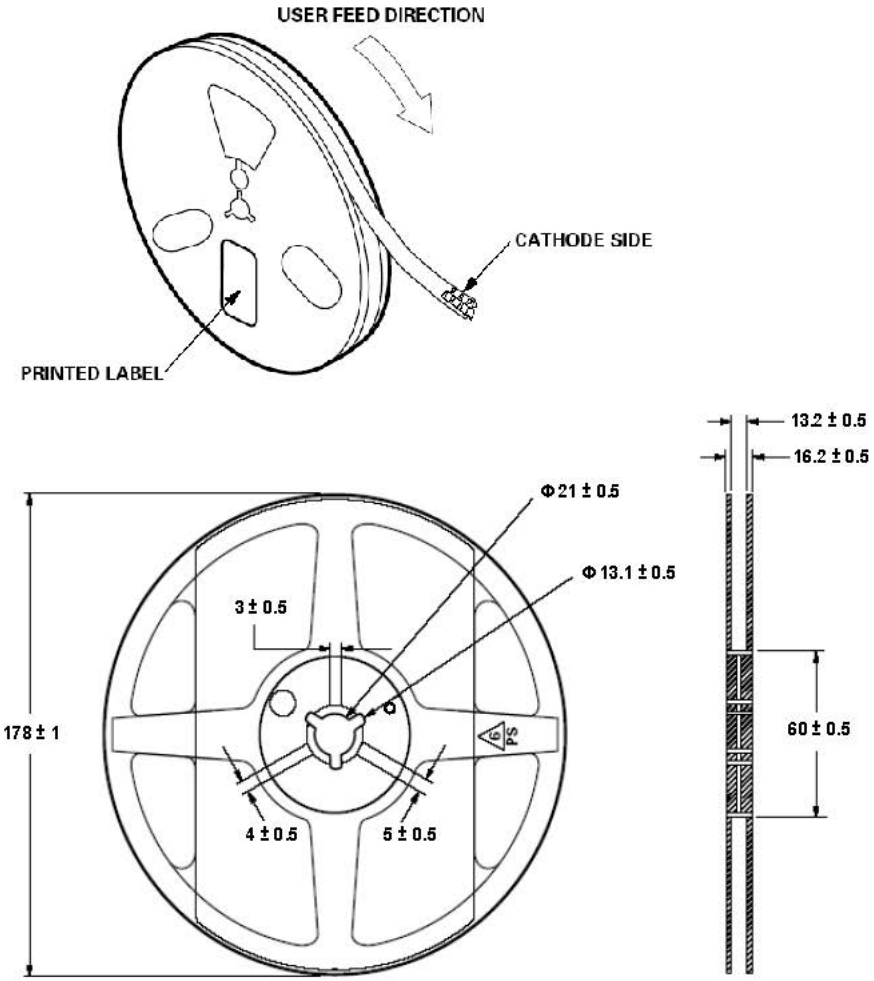
Tape and Reel Packaging Specifications



Notes:

- Drawing not to scale.
- All dimensions are in millimeters.
- Unless otherwise indicated, tolerances are ± 0.10mm.

Tape and Reel Packaging Specifications



Notes:

- Empty component pockets sealed with top cover tape.
- 250, 500 and 1000 pieces per reel.
- Drawing not to scale.
- All dimensions are in millimeters

Notice

- **Storage**
  Please do not open the moisture barrier bag (MBB) more than one week. This may cause the leads of LED discoloration. We recommend storing ProLight's LEDs in a dry box after opening the MBB. The recommended storage conditions are temperature 5 to 30°C and humidity less than 40% RH. It is also recommended to return the LEDs to the MBB and to reseal the MBB.
- The slug is is not electrically neutral. Therefore, we recommend to isolate the heat sink.
- **Do not use solder pastes with post reflow flux residue>47%. (58Bi-42Sn eutectic alloy, etc) This kind of solder pastes may cause a reliability problem to LED.**
- Any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temperature after soldering.
- Please avoid rapid cooling after soldering.
- Components should not be mounted on warped direction of PCB.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a heat plate should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- This device should not be used in any type of fluid such as water, oil, organic solvent and etc. When cleaning is required, isopropyl alcohol should be used.
- When the LEDs are illuminating, operating current should be decide after considering the package maximum temperature.
- The appearance, specifications and flux bin of the product may be modified for improvement without notice. Please refer to the below website for the latest datasheets

Handling of Silicone Lens LEDs

Notes for handling of silicone lens LEDs

- Please do not use a force of over 0.3kgf impact or pressure on the silicone lens, otherwise it will cause a catastrophic failure.
- The LEDs should only be picked up by making contact with the sides of the LED body.
- Avoid touching the silicone lens especially by sharp tools such as Tweezers.
- Avoid leaving fingerprints on the silicone lens.
- Please store the LEDs away from dusty areas or seal the product against dust.
- When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the silicone lens must be prevented.
- Please do not mold over the silicone lens with another resin. (epoxy, urethane, etc)