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Top Crystal Technology Inc.,

Power Light Source

Introduction :

THCA-CLY is one the highest flux LEDs in the world. Due to the special design of chip and package, the THCA-CLY is designed by particular package for high power LED



Feature :

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

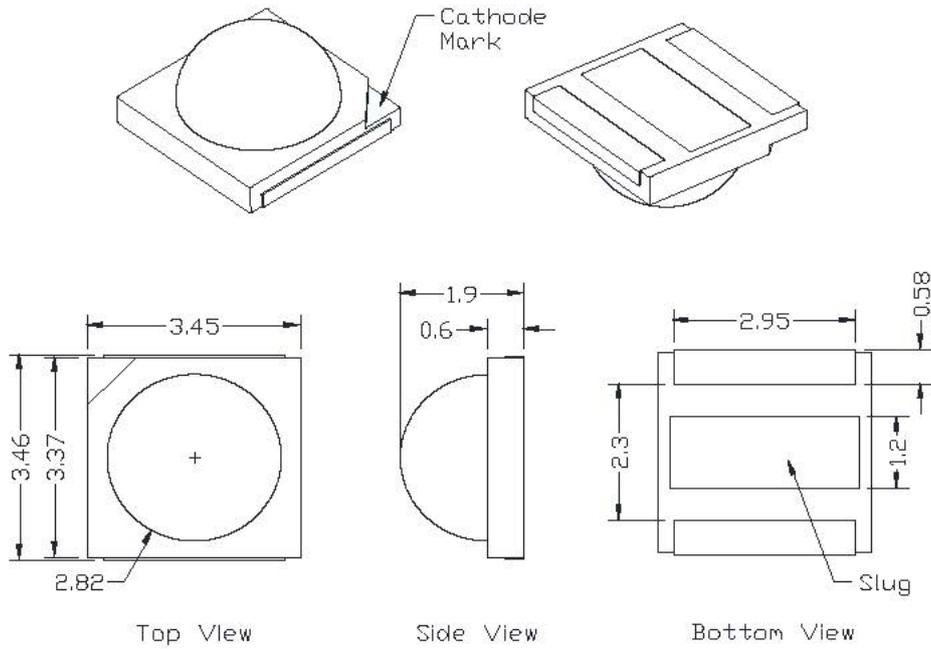
Typical Applications:

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

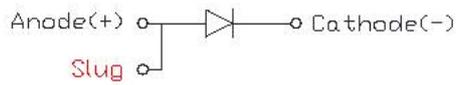


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Package Dimensions:



Circuit Diagram



Notes :

1. All dimensions are in millimeters
2. Tolerance is $\pm 0.25\text{mm}$



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Absolute Maximum Ratings

Parameter	Conditions	
DC Forward Current	1W	350mA
	3W	700 mA
Peak Pulse Current (mA) (less than 1/10 duty cycle@1KHz)	1W	400 mA
	3W	800 mA
LED Junction Temperature (°C)	120°C	
Operating Temperature (°C)	-30~80	
Storage Temperature (°C)	-40~100	
Soldering Temperature	Manual 250°C(max) 5 seconds	
Reverse Voltage	Not design to be driven in reverse bias	

Optical Characteristics (T_j=25°C)

Color	Dominant Wavelength λ _d		Viewing Angle Degree
	Min.	Max.	2θ _{1/2}
Royal Blue	450nm	460nm	130

Notes :

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



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Flux Characteristics (T_j=25°C)

Color	Forward current	Part Number	Minimum Luminous Flux(mW)	Typical Luminous Flux(mW)	Maximum Luminous Flux(mW)	Beam Pattern
Royal Blue	350mA	THCA-CLY	450mW	650mW	--	Lambertian
	700mA	THCA-DLY	850 mW	1100mW		

- TCI maintains a tolerance of $\pm 7\%$ on flux and power measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

Electrical Characteristics (T_j=25°C)

Color	Forward current	Part Number	Forward Voltage V _F (V)			Thermal Resistance Junction to lead (°C/W)
			Min.	Typ.	Max.	
Royal Blue	350mA	THCA-CLY	2.9	3.3	3.6	7
	700mA	THCA-DLY	3.1	3.6	4.0	

Notes:

1. V_F±0.1V tester tolerance.



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

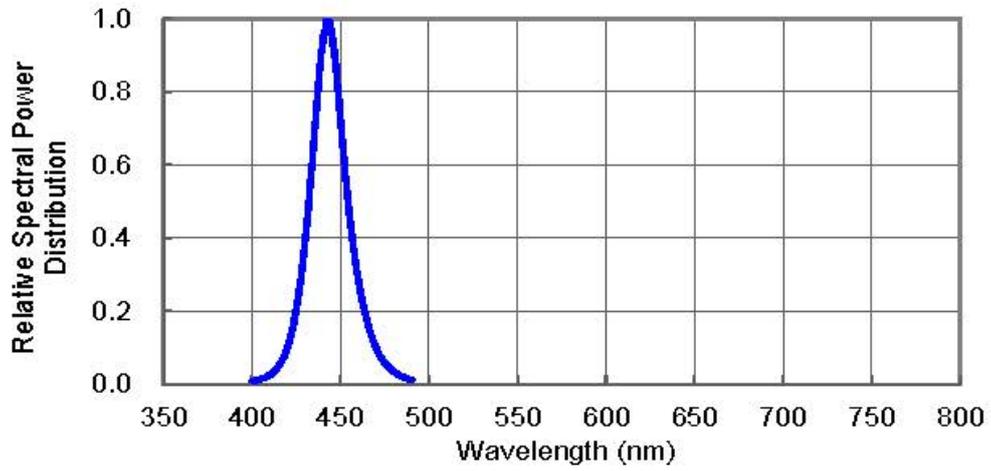
* The test is performed after the LED is cooled down to the room temperature.

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

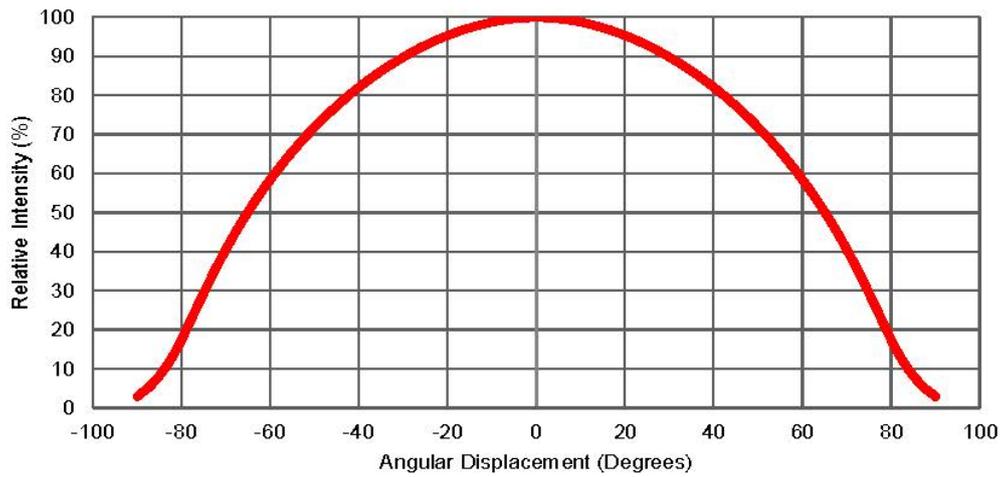


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Color Spectrum, $T_J = 25^\circ\text{C}$



Typical Spatial Radiation Pattern

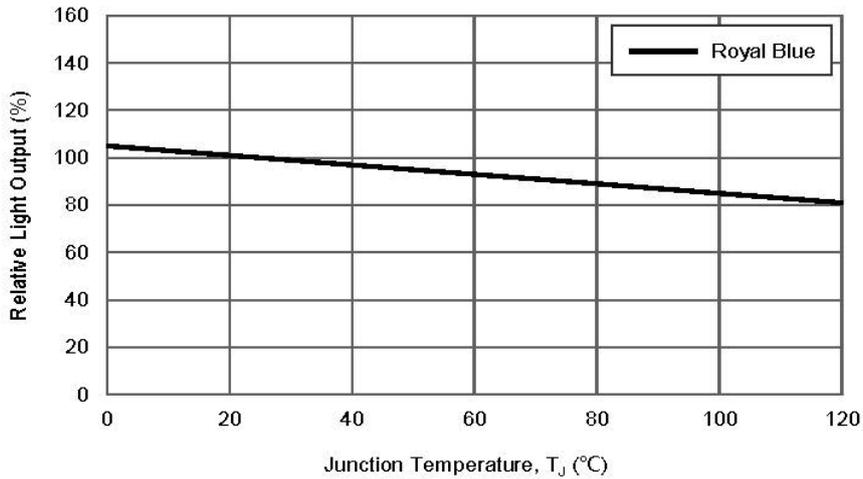




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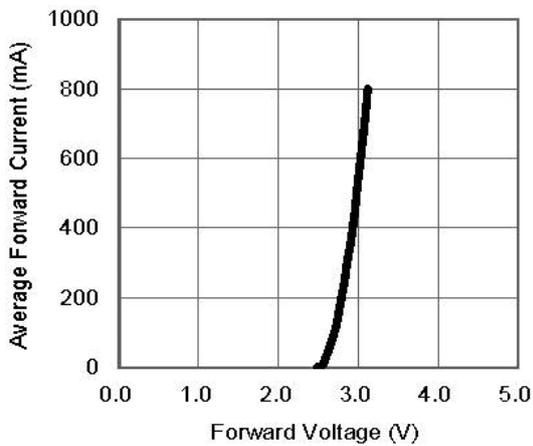
Light Output Characteristics

Relative Light Output vs. Junction Temperature at 700mA

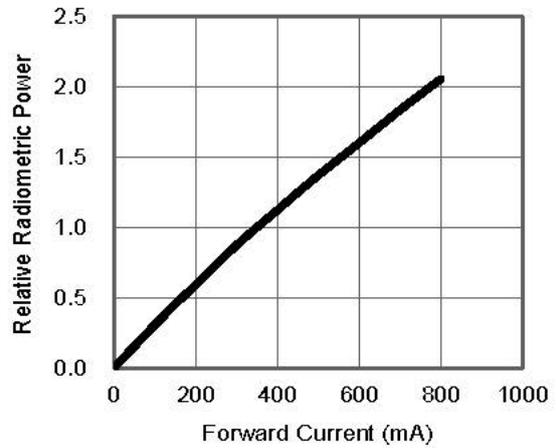


Forward Current Characteristics, $T_J = 25^\circ\text{C}$

Forward Voltage vs. Forward Current



Forward Current vs. Luminous Flux





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Moisture Sensitivity Level - JEDEC Level 1

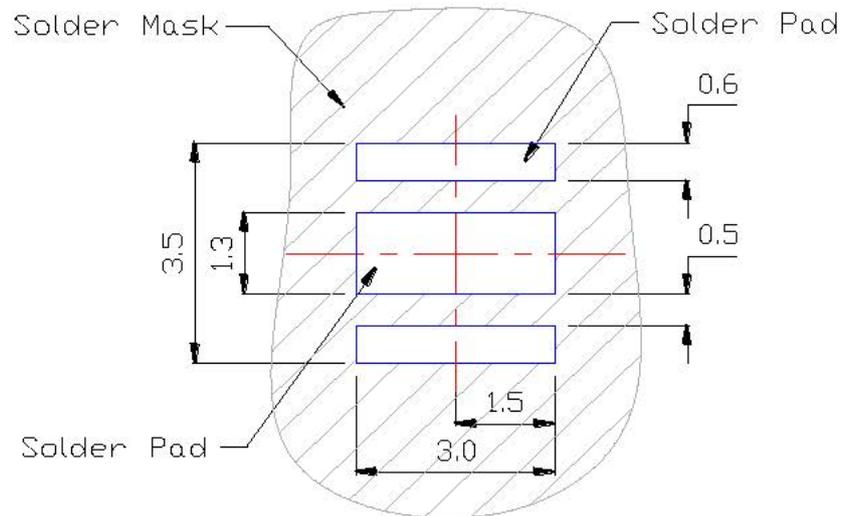
Level	Floor Life		Soak Requirements			
			Standard		Accelerated Environment	
	Time	Conditions	Time (hours)	Conditions	Time (hours)	Conditions
1	Unlimited	≤30°C / 85% RH	168 +5/-0	85°C / 85% RH	NA	NA

- The standard soak time includes a default value of 24 hours for semiconductor manufacture'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



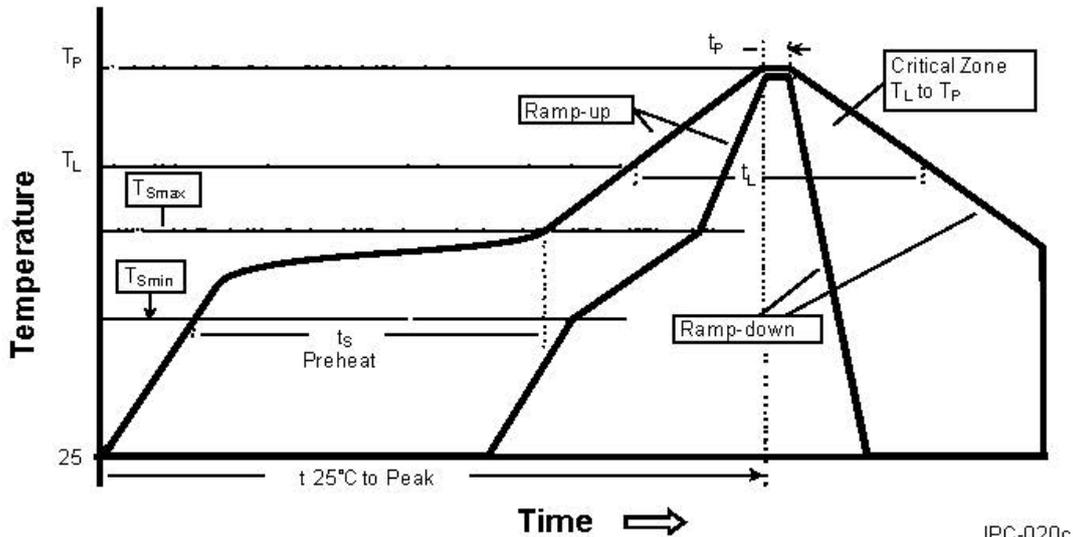
- All dimensions are in millimeters.
- Electrical isolation is required between Slug and Solder Pad



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Reflow Soldering Temperature Profile



IPC-020c

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})	100°C	150°C
- Temperature Max (T_{Smax})	150°C	200°C
- Time (t_{Smin} to t_{Smax})	60-120 seconds	60-180 seconds
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_l)	60-150 seconds	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.

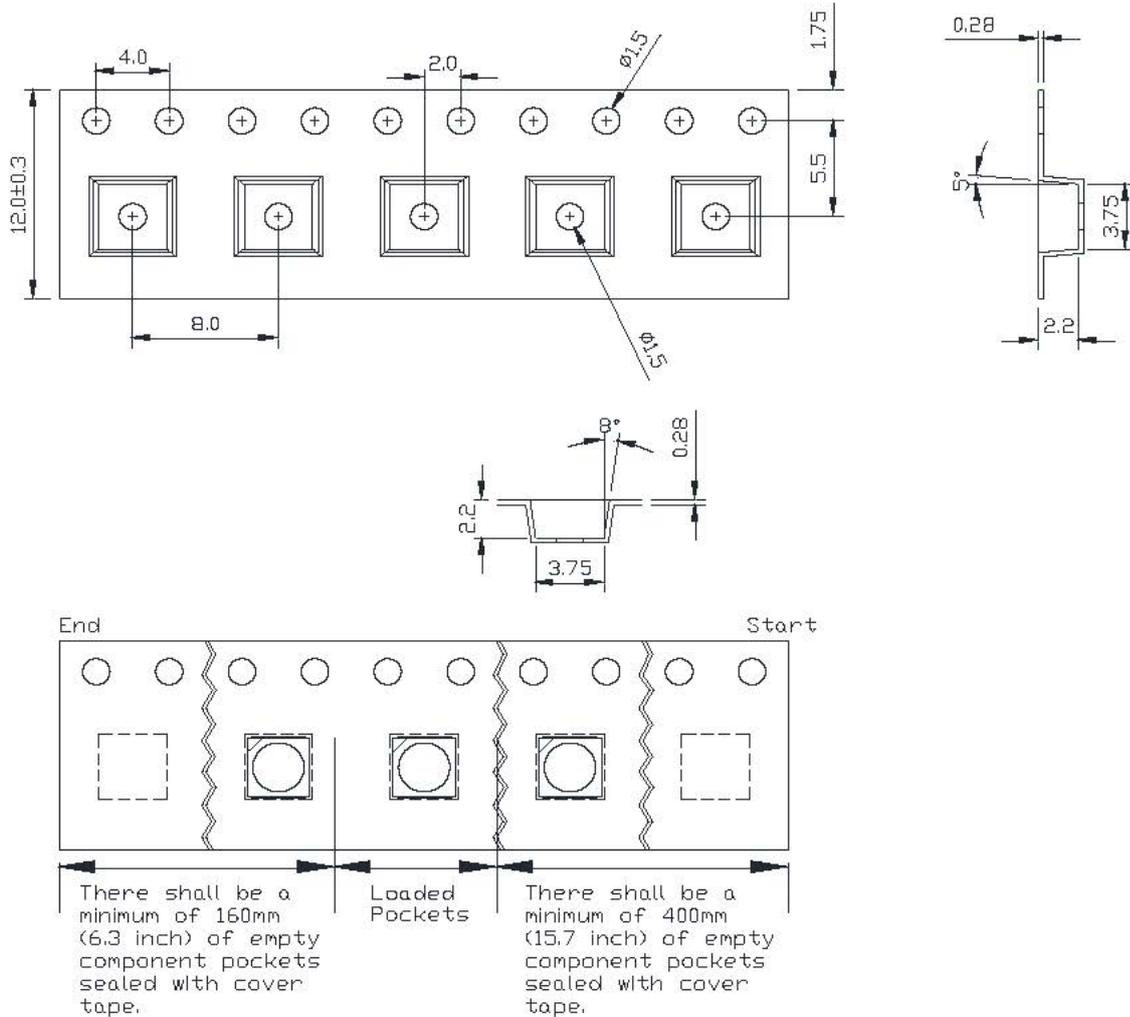
- Do not use solder pastes with post reflow flux residue > 47%. (58Bi-42Sn eutectic alloy, etc) This kind of solder pastes may cause a reliability problem to LED.
- All temperatures refer to topside of the package, measured on the package body surface.
- Repairing should not be done after the LEDs have 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.



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Tape and Reel Packaging Specifications



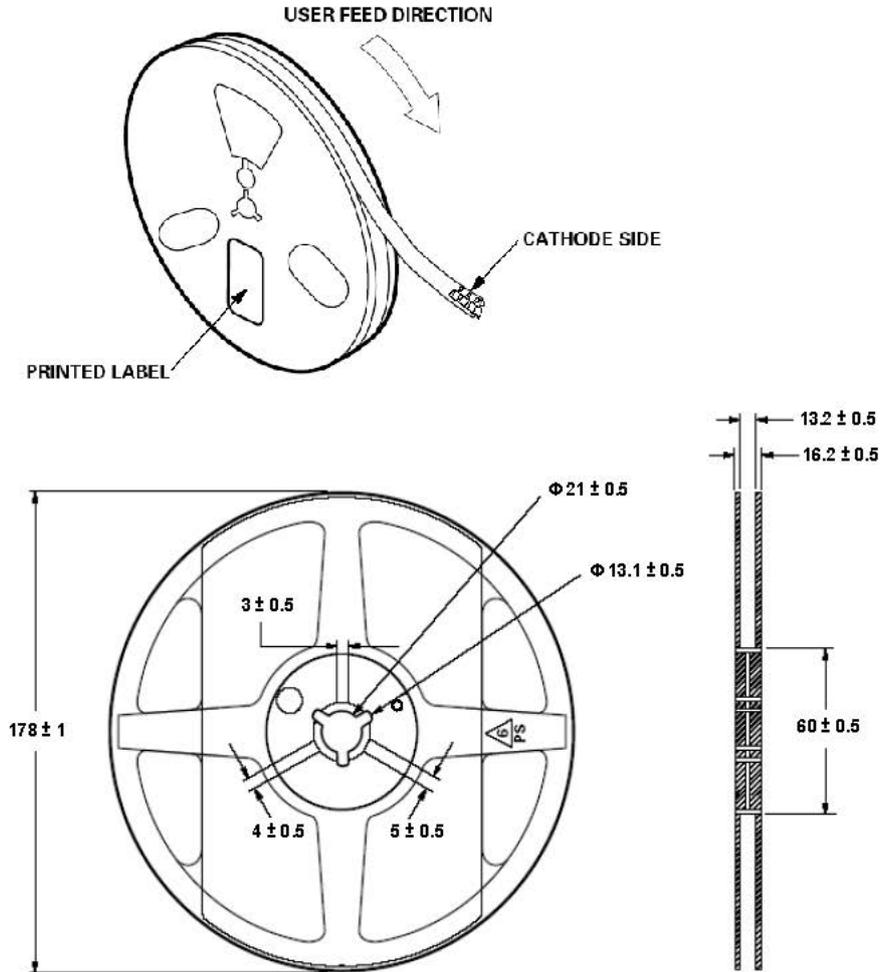
Notes:

1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are $\pm 0.10\text{mm}$.



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Emitter Reel Packaging



Notes:

1. Empty component pockets sealed with top cover tape.
2. 1000 pieces per reel.
3. Drawing not to scale.
4. All dimensions are in millimeters



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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 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 decided 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)

