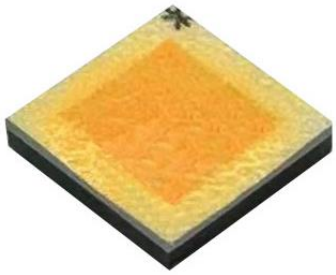


ProLight PBLC-10FxE-D4N
10W High CRI Power LED
Technical Datasheet
Version: 1.3

ProLight Opto PBLC Series

Features

- Energy Star binning structure, warm white with 3 steps guarantee.
- Best thermal material solution of the world
- Best Moisture Sensitivity: JEDEC Level 1
- RoHS compliant

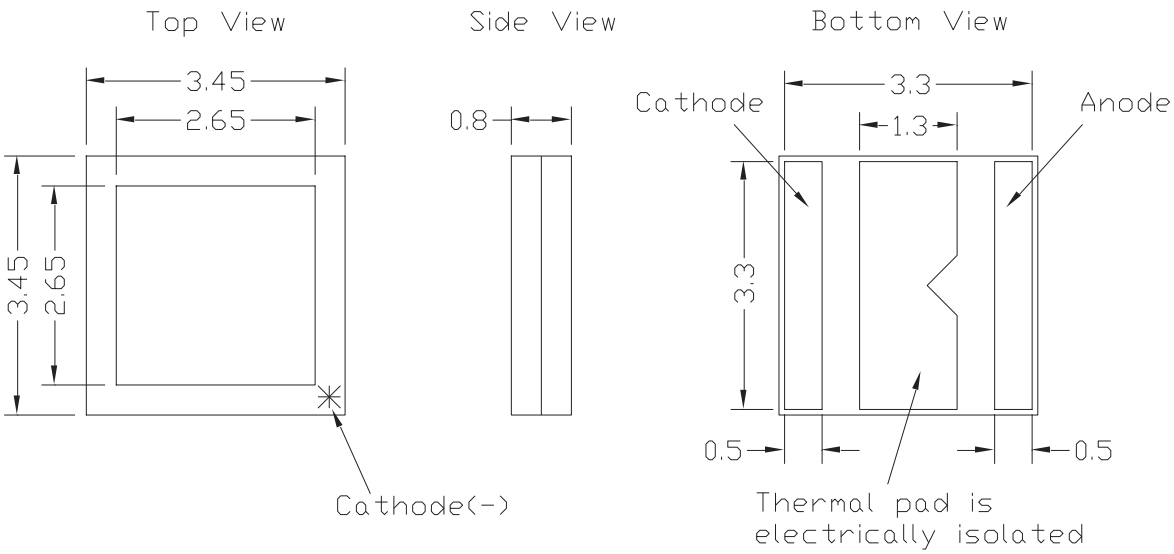
Main Applications

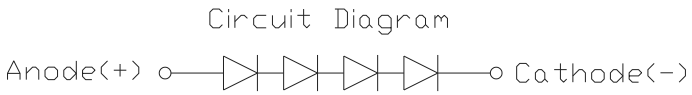
- Entertainment Lighting
- Commercial Lighting
- Indoor Lighting
- Outdoor Lighting

Introduction

- ProLight PBLC, is one of the smallest high power LED footprint available by ProLightOpto, has offered extended solid-state lighting design possibilities. PBLC using ProLight unique bonding technology which providing low thermal conductivity and high stability reliability.
- PBLC qualifies as the JEDEC Level 1 MSL sensitivity level and suitable for SMD process, Pbfree reflow soldering capability, and full compliance with EU education of Hazardous Substances (RoHS) legislation.

Emitter Mechanical Dimensions





Notes:
1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are ± 0.1mm.
4. Please do not solder the emitter by manual hand soldering, otherwise it will damage the emitter.
5. **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.

Flux Characteristics, T_J = 25˚C

Color	Part Number Emitter	Bin Code	Luminous Flux Φ_V (lm) @350mA Min.	@350mA Typ.	Refer @1050mA Typ.	CRI Min.
Neutral White	PBLC-10FNE-D4N	Q0	400	450	1100	90
	PBLC-10FNE-D4N	S0	400	470	1140	90
Warm White	PBLC-10FVE-D4N	M0	370	400	970	90
	PBLC-10FVE-D4N	N0	370	410	1000	90

- ProLight maintains a tolerance of ± 7% on flux and power measurements.
- ProLight maintains a tolerance of ± 2 on CRI measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

Electrical Characteristics, T_J = 25˚C

Color	Forward Voltage V_F (V) @350mA Min.	@350mA Typ.	@350mA Max.	Refer @1050mA Typ.	Thermal Resistance Junction to Slug (˚C/ W)
Neutral White	10.0	11.5	12.5	13.0	1.7
Warm White	10.0	11.5	12.5	13.0	1.7

- ProLight maintains a tolerance of ± 0.2V for Voltage measurements.

Optical Characteristics at 350mA, T_J = 25˚C

Color	Bin Code	Color Temperature CCT Min.	Typ.	Max.	Viewing Angle (degrees) $2\theta_{1/2}$
Neutral White	Q0	3360 K	3500 K	3570 K	115
	S0	3850 K	4000 K	4120 K	115
Warm White	M0	2660 K	2700 K	2790 K	115
	N0	2970 K	3000 K	3120 K	115

- ProLight maintains a tolerance of ± 5% for CCT measurements.

Electro-Optical Characteristics, T_J = 25°C

I_F (mA)	V_F (V)	Power (W)	PBLC-10FNE-D4N (Q0)		PBLC-10FNE-D4N (S0)	
			Flux (lm)	lm/W	Flux (lm)	lm/W
250	11.41	2.85	334.6	117.4	349.5	122.6
350	11.68	4.09	450.0	110.0	470.0	114.8
500	12.01	6.01	618.7	103.0	646.2	107.6
800	12.55	10.04	917.0	91.3	957.7	95.4
1050	12.90	13.56	1100.0	81.1	1140.0	84.1

I_F (mA)	V_F (V)	Power (W)	PBLC-10FVE-D4N (M0)		PBLC-10FVE-D4N (N0)	
			Flux (lm)	lm/W	Flux (lm)	lm/W
250	11.41	2.85	297.4	104.3	306.4	107.5
350	11.68	4.09	400.0	97.7	410.0	100.2
500	12.01	6.01	550.0	91.6	566.4	94.3
800	12.55	10.04	815.1	81.2	839.6	83.6
1050	12.90	13.56	970.0	71.5	1000.0	73.8

- All values are reference only.

Absolute Maximum Ratings

Parameter	Neutral White/Warm White
DC Forward Current (mA)	1050
Peak Pulsed Forward Current (mA)	1500 (less than 1/10 duty cycle@1KHz)
LED Junction Temperature	130°C
Operating Temperature	-40°C - 105°C
Storage Temperature	-40°C - 120°C
Soldering Temperature	JEDEC 020c 260°C
Allowable Reflow Cycles	3
Reverse Voltage	Not designed to be driven in reverse bias

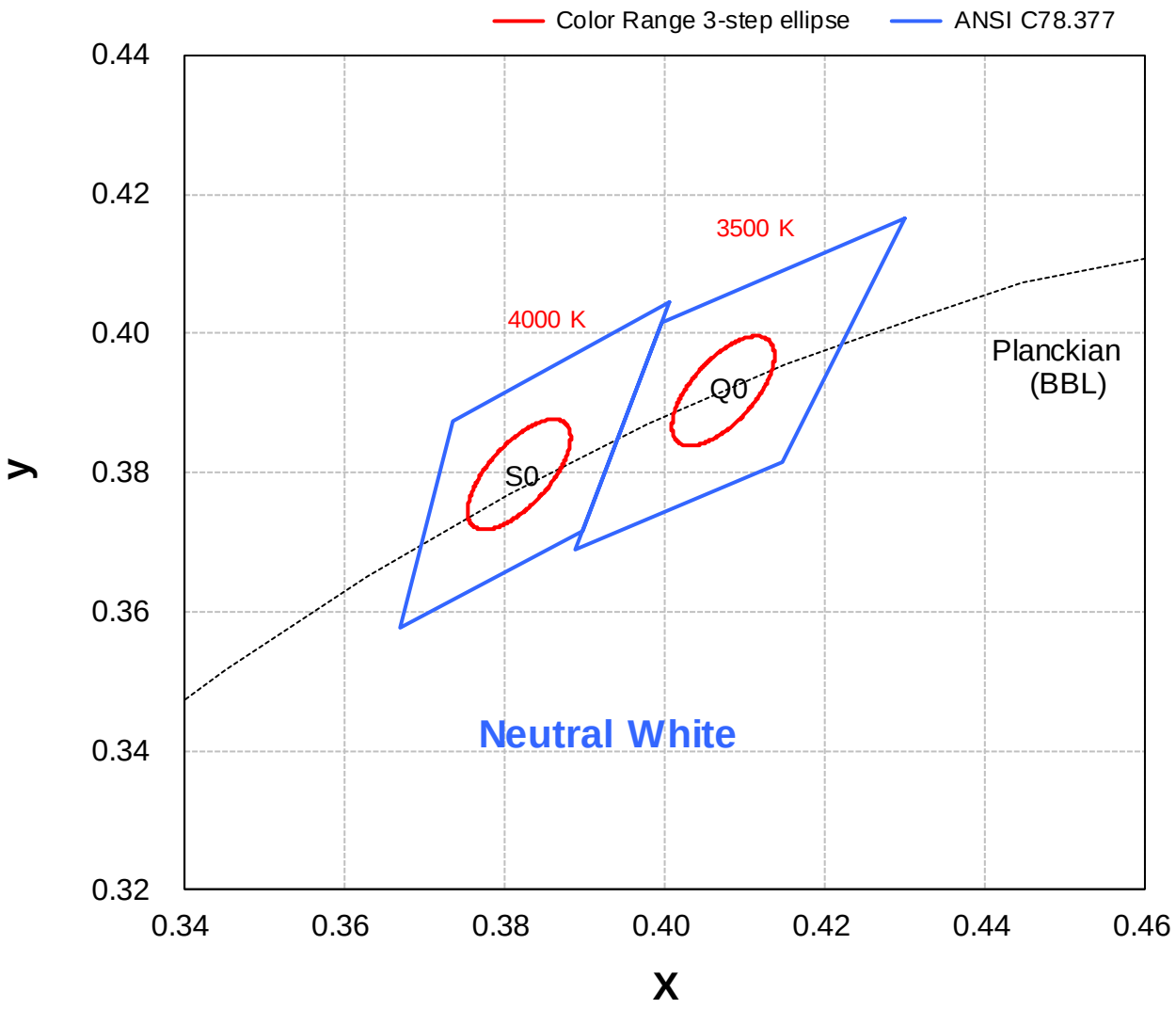
Photometric Luminous Flux Bin Structure at 350mA

Color	Bin Code	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)	Available Color Bins
Neutral White	D	400	440	All
	E	440	480	【1】
	F	480	520	【1】
Warm White	C	370	400	All
	D	400	440	【1】
	E	440	480	【1】

- ProLight maintains a tolerance of ± 7% on flux and power measurements.
- The flux bin of the product may be modified for improvement without notice.
- 【1】The rest of color bins are not 100% ready for order currently. Please ask for quote and order possibility.

Color Bin

Neutral White Binning Structure Graphical Representation



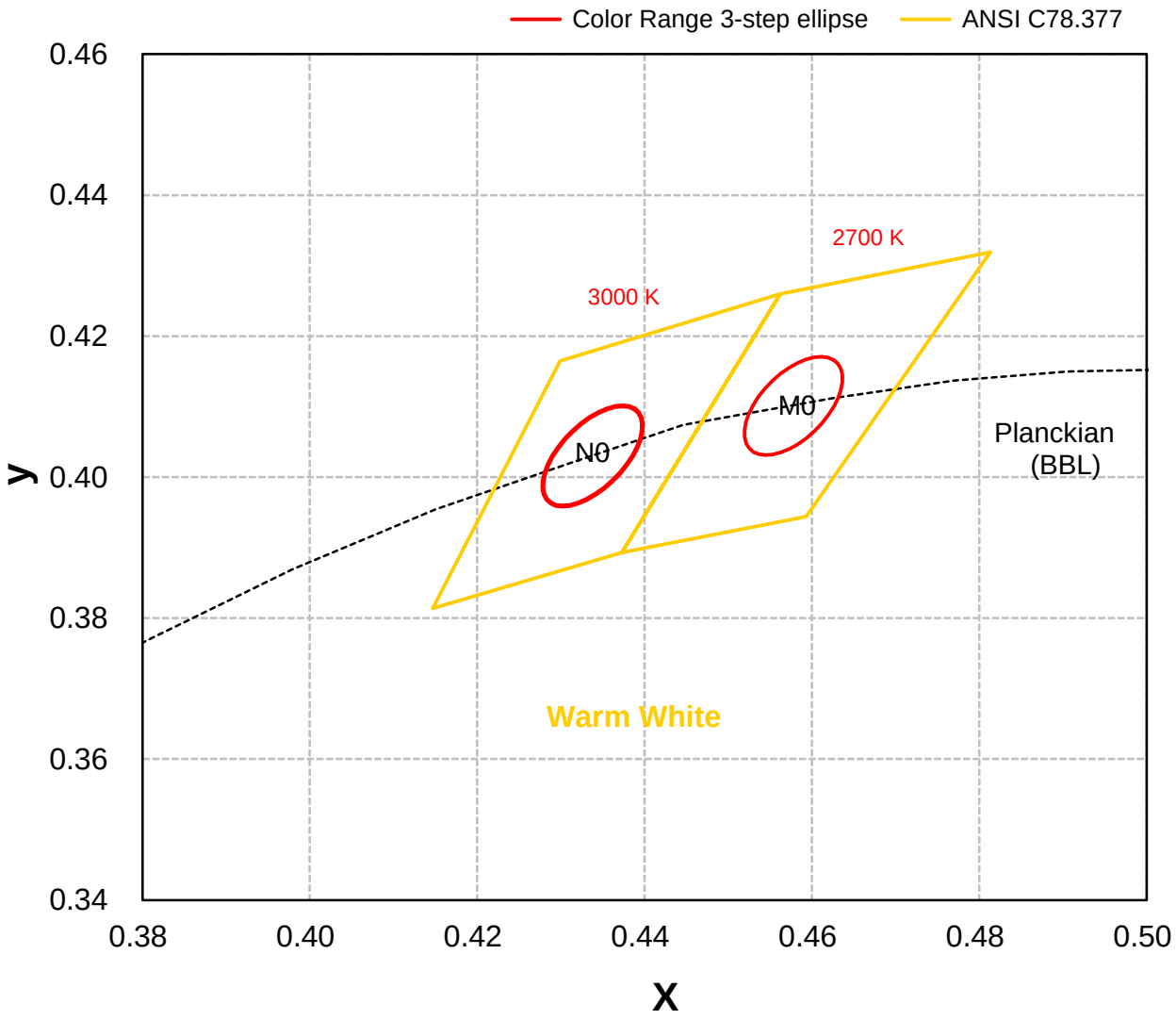
Neutral White Bin Structure

Bin Code		Center	Oval parameter		Typ. CCT (K)	Bin Code		Center	Oval parameter		Typ. CCT (K)
Q0	x	0.4073	a	0.00927	3500	S0	x	0.3818	a	0.00939	4000
	y	0.3917	b	0.00414			y	0.3797	b	0.00402	
			Θ°	54.00					Θ°	53.72	

- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.005

Color Bin

Warm White Binning Structure Graphical Representation



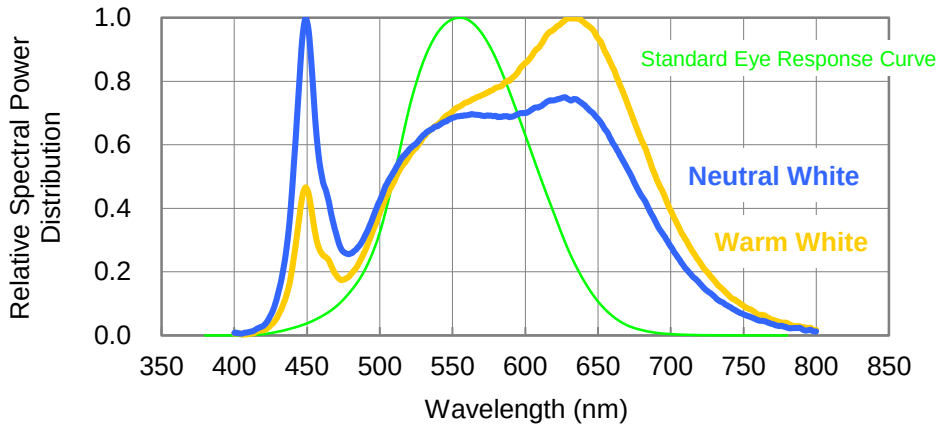
Warm White Bin Structure

Bin Code		Center	Oval parameter		Typ. CCT (K)	Bin Code		Center	Oval parameter		Typ. CCT (K)
M0	x	0.4578	a	0.00810	2700	N0	x	0.4338	a	0.00834	3000
	y	0.4101	b	0.00420			y	0.4030	b	0.00408	
			θ˚	53.70					θ˚	53.22	

- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.005

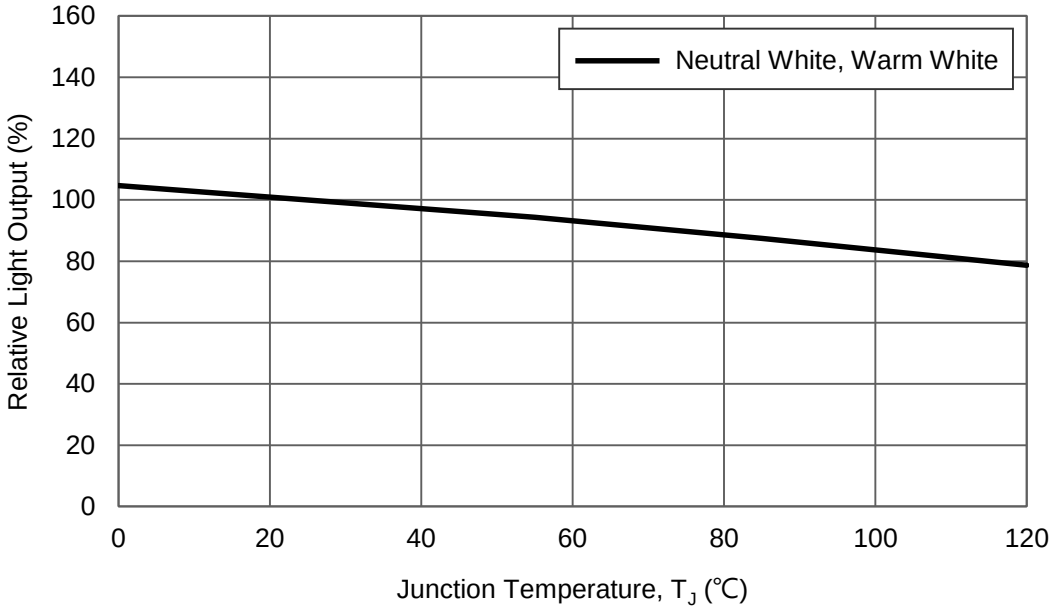
Color Spectrum, T_J = 25˚C

1. Neutral White, Warm White



Light Output Characteristics

Relative Light Output vs. Junction Temperature at 1050mA



Forward Current Characteristics, T_J = 25˚C

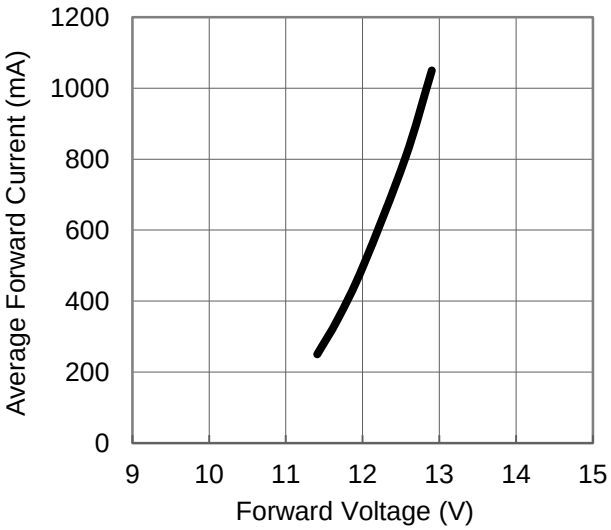


Fig 1. Forward Current vs. Forward Voltage for Neutral White, Warm White.

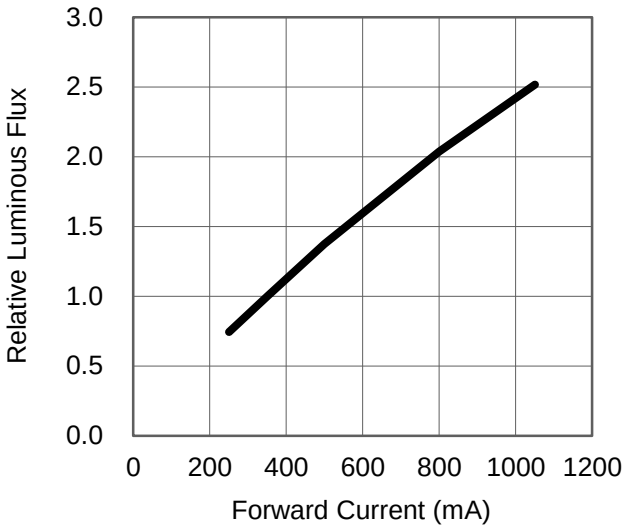
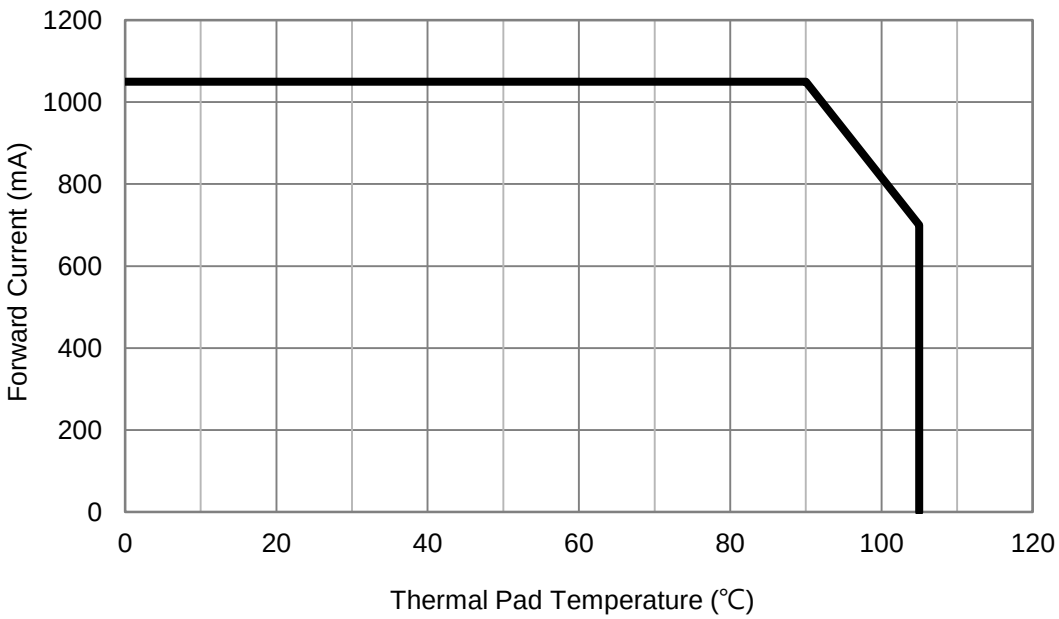
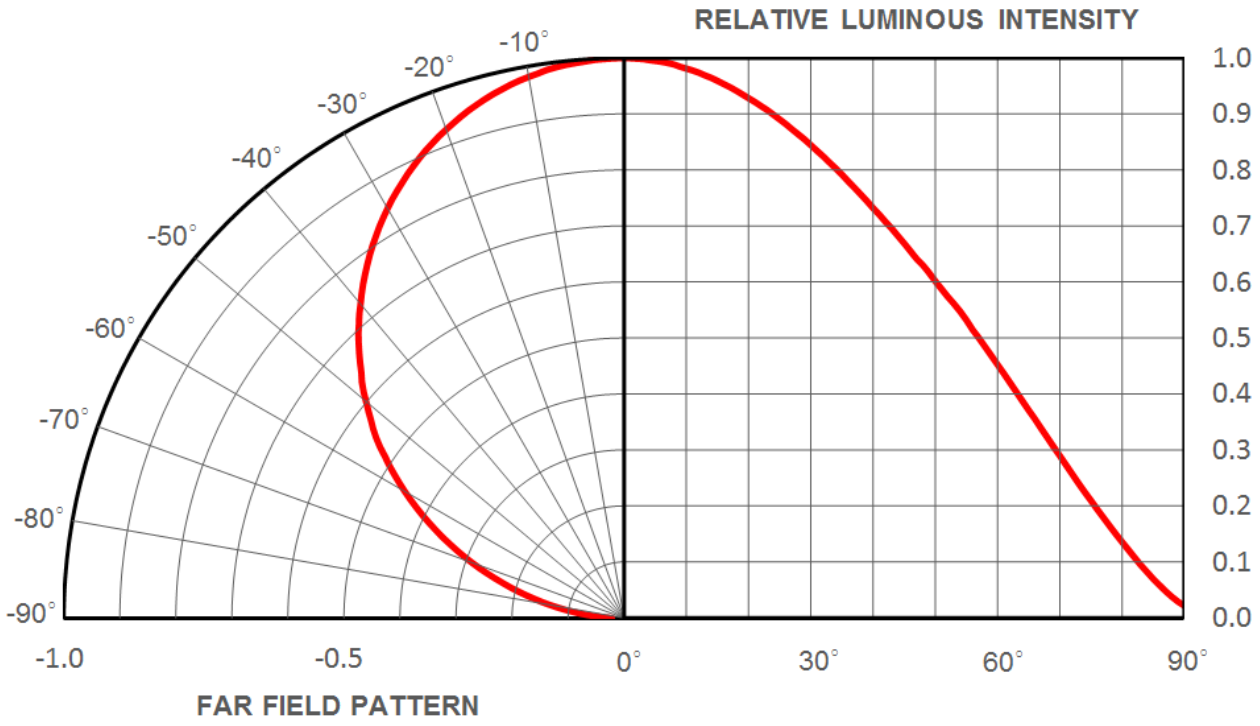


Fig 2. Relative Luminous Flux vs. Forward Current for Neutral White, Warm White at T_J=25 maintained.

Thermal Pad Temperature vs. Maximum Forward Current



Typical Representative Spatial Radiation Pattern



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

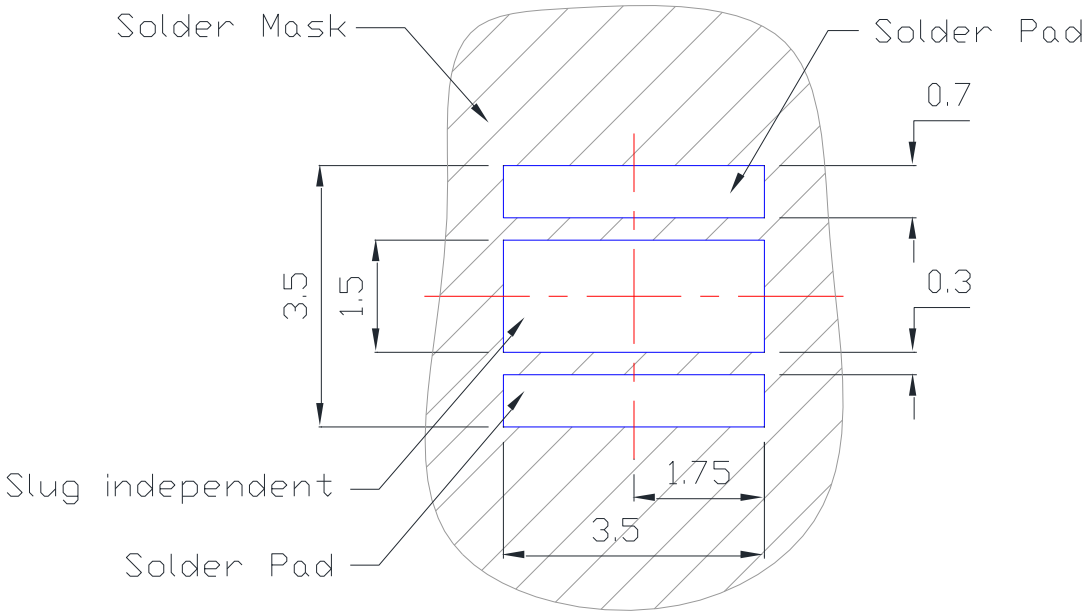
- The standard soak time includes a default value of 24 hours for semiconductor manufature's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility.
- Table below presents the moisture sensitivity level definitions per IPC/JEDEC's J-STD-020C.

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

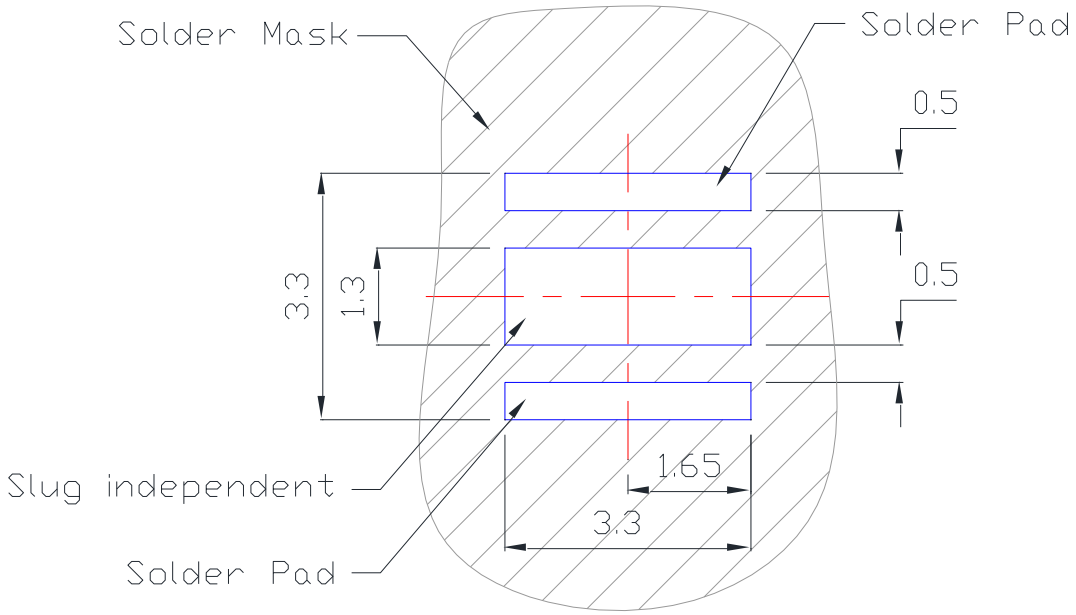
Recommended Solder Pad Design

Standard Emitter

TYPE A.



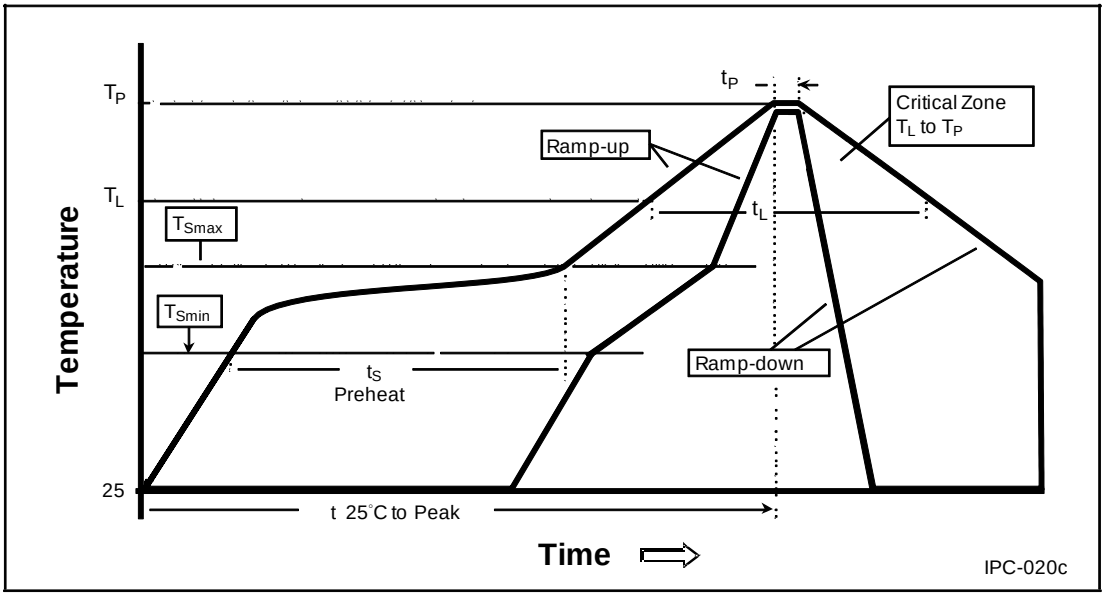
TYPE B.



- All dimensions are in millimeters.

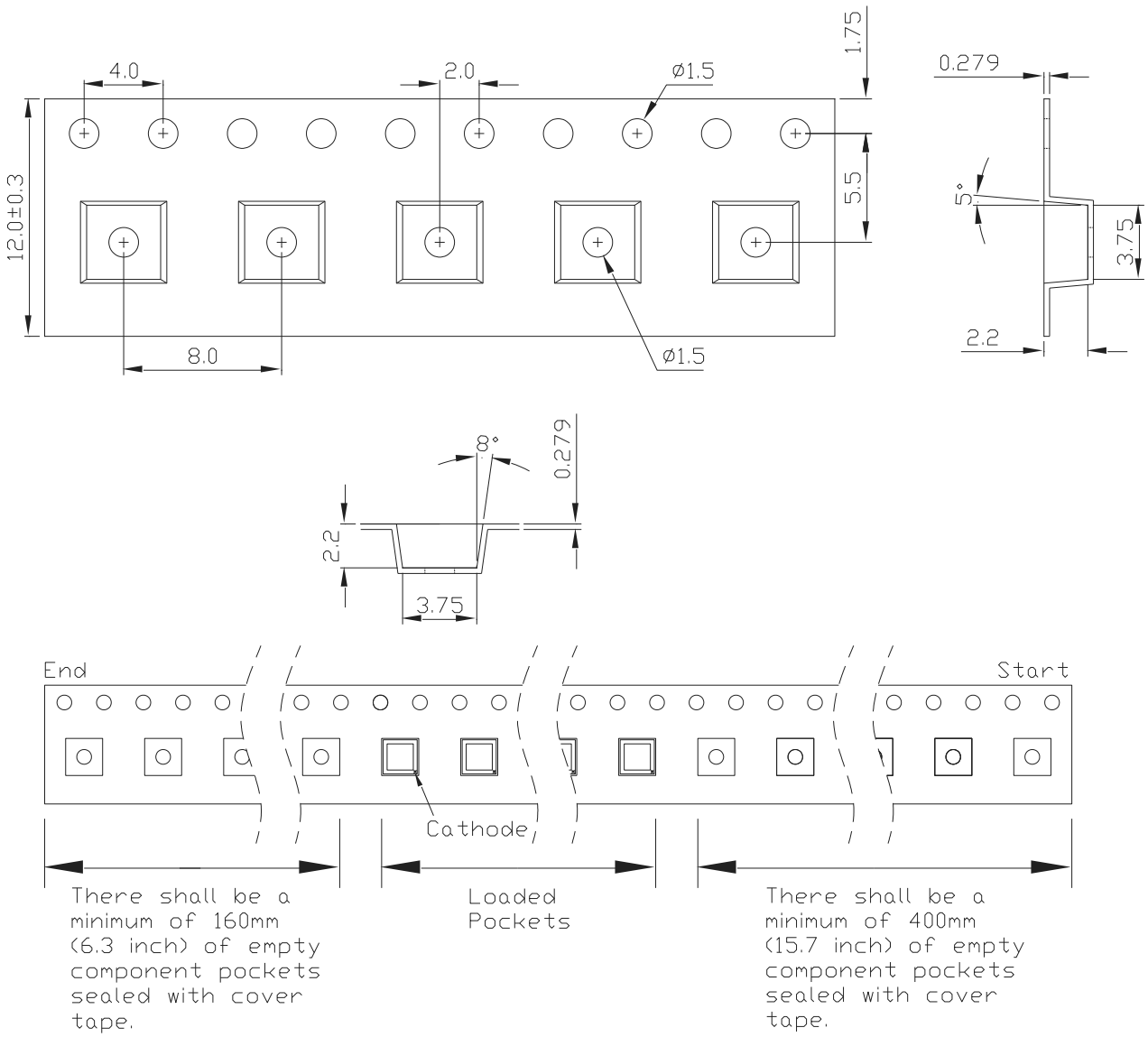
Reflow Soldering Condition

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.



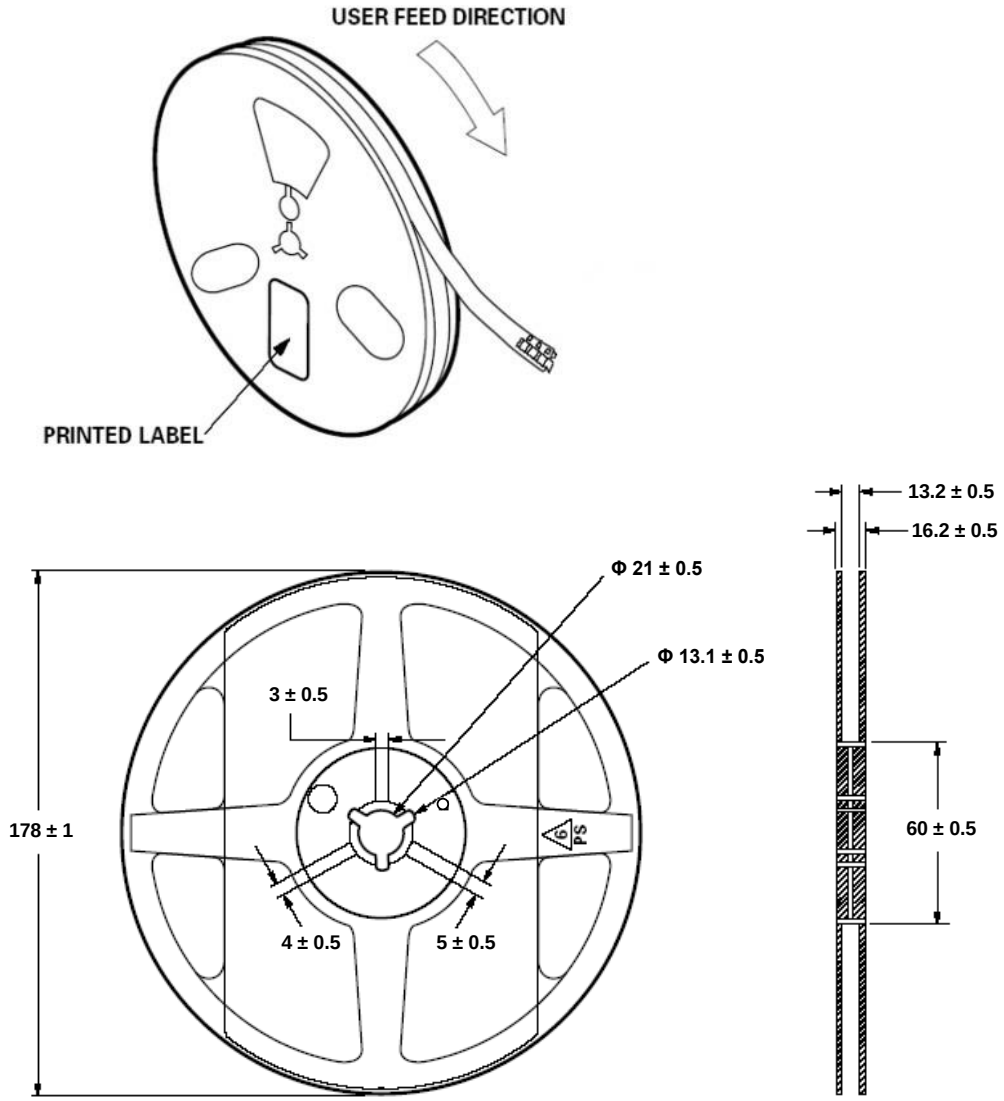
- **We recommend using the M705-S101-S4 solder paste from SMIC (Senju Metal Industry Co., Ltd.) for lead-free soldering.**
- **Do not use solder pastes with post reflow flux residue>47%. (58Bi-42Sn eutectic alloy, etc) This kind of solder pastes may cause a reliability problem to LED.**
- All temperatures 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.

Emitter Reel Packaging



Notes:
1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are ± 0.1mm.

Emitter Reel Packaging



Notes:
1. Empty component pockets sealed with top cover tape.
2. 250, 500 and 1000 pieces per reel.
3. Drawing not to scale.
4. All dimensions are in millimeters.

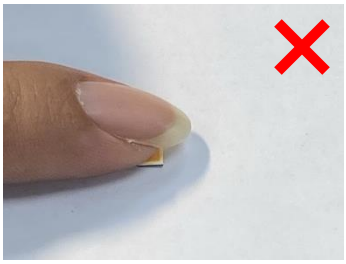
Precaution for Use

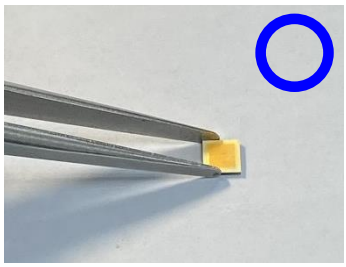
- Storage
  Please do not open the moisture barrier bag (MBB) more than one week. This may cause the leads of LED discoloration. We recommend storing ProLight's LEDs in a dry box after opening the MBB. The recommended storage conditions are temperature 5 to 30°C and humidity less than 40% RH. It is also 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.
- **We recommend using the M705-S101-S4 solder paste from SMIC (Senju Metal Industry Co., Ltd.) for lead-free soldering.**
- **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.
  http://www.prolightopto.com/

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)





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2. A critical component is any component of a life support device or system whose failure can reasonably be expected to cause the failure of the device or system, or to affect its safety or effectiveness.