

ProLight PBLC-10FxE-B4NHxx
10W High CRI Power LED
Technical Datasheet
Version: 1.0

ProLight Opto PBLC Series

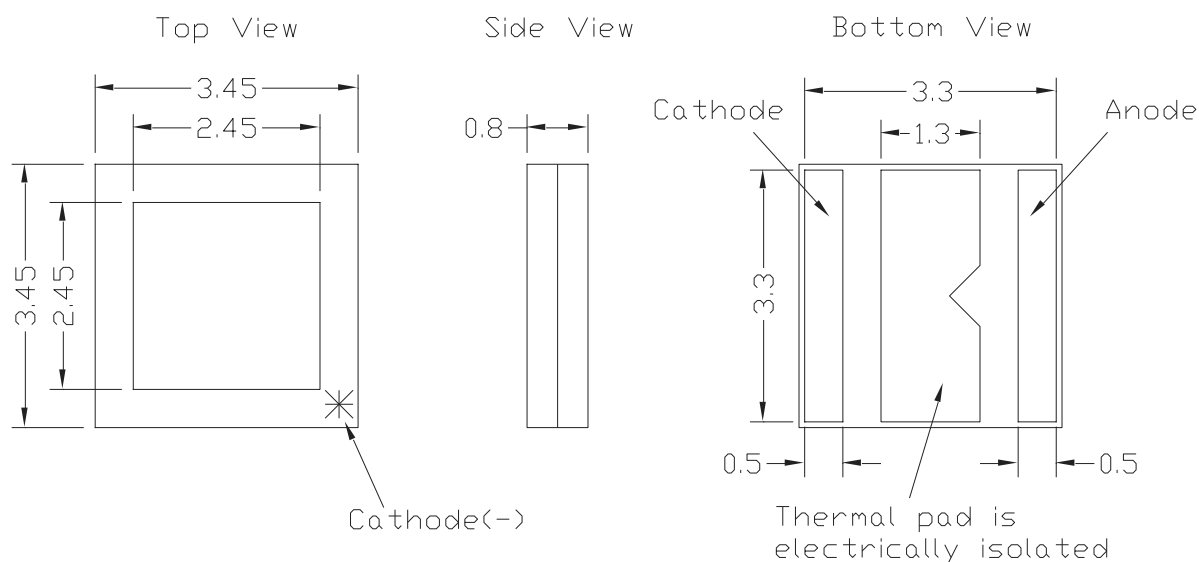
Features

- 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

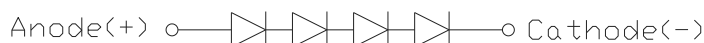
Main Applications

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

Emitter Mechanical Dimensions



Circuit Diagram



Notes:

1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are ± 0.1 mm.
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 at 1000mA, $T_j = 25^\circ\text{C}$

Color	Part Number Emitter	Bin Code	Luminous Flux Φ_v (lm)		CRI Min.
			Min.	Typ.	
White	PBLC-10FWE-B4NH60	W0	1350	1500	80
Neutral White	PBLC-10FNE-B4NH40	S0	1350	1500	80
	PBLC-10FNE-B4NH35	Q0	1100	1320	80
Warm White	PBLC-10FVE-B4NH30	N0	1100	1270	80
	PBLC-10FVE-B4NH27	M0	1000	1120	80
	PBLC-10FVE-B4NH24	L0	950	1080	80
	PBLC-10FVE-B4NH21	K0	850	950	80

- ProLight maintains a tolerance of $\pm 7\%$ 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 at 1000mA, $T_j = 25^\circ\text{C}$

Color	Forward Voltage V_F (V)			Thermal Resistance Junction to Slug ($^\circ\text{C/W}$)
	Min.	Typ.	Max.	
White	11.48	12.48	13.56	1.7
Neutral White	11.48	12.48	13.56	1.7
Warm White	11.48	12.48	13.56	1.7

- ProLight maintains a tolerance of $\pm 0.2\text{V}$ for Voltage measurements.

Optical Characteristics at 1000mA, $T_j = 25^\circ\text{C}$

Color	Bin Code	Color Temperature CCT			Viewing Angle (degrees) $2\theta_{1/2}$
		Min.	Typ.	Max.	
White	W0	5810 K	6000 K	6240 K	115
Neutral White	S0	3850 K	4000 K	4120 K	115
	Q0	3360 K	3500 K	3570 K	115
Warm White	N0	2970 K	3000 K	3120 K	115
	M0	2660 K	2700 K	2790 K	115
	L0	2380 K	2400 K	2510 K	115
	K0	2090 K	2100 K	2190 K	115

- ProLight maintains a tolerance of $\pm 5\%$ for CCT measurements.

Electro-Optical Characteristics, $T_j = 25^{\circ}\text{C}$

I_F (mA)	V_F (V)	Power (W)	PBLIC-10FWE-B4NH60 (W0)		PBLIC-10FNE-B4NH40 (S0)	
			Flux (lm)	lm/W	Flux (lm)	lm/W
250	11.14	2.78	476.2	171.0	476.2	171.0
350	11.36	3.98	640.1	161.0	640.1	161.0
800	12.18	9.74	1266.3	130.0	1266.3	130.0
1000	12.48	12.47	1500.0	120.2	1500.0	120.2
1200	12.75	15.31	1710.3	111.7	1710.3	111.7
I_F (mA)	V_F (V)	Power (W)	PBLIC-10FNE-B4NH35 (Q0)		PBLIC-10FVE-B4NH30 (N0)	
			Flux (lm)	lm/W	Flux (lm)	lm/W
250	11.14	2.78	419.0	150.5	403.2	144.8
350	11.36	3.98	563.3	141.7	542.0	136.3
800	12.18	9.74	1114.4	114.4	1072.2	110.0
1000	12.48	12.47	1320.0	105.8	1270.0	101.8
1200	12.75	15.31	1505.1	98.3	1448.0	94.6
I_F (mA)	V_F (V)	Power (W)	PBLIC-10FVE-B4NH27 (M0)		PBLIC-10FVE-B4NH24 (L0)	
			Flux (lm)	lm/W	Flux (lm)	lm/W
250	11.14	2.78	355.6	127.7	342.9	123.1
350	11.36	3.98	477.9	120.2	460.9	115.9
800	12.18	9.74	945.5	97.0	911.8	93.6
1000	12.48	12.47	1120.0	89.8	1080.0	86.6
1200	12.75	15.31	1277.0	83.4	1231.4	80.4
I_F (mA)	V_F (V)	Power (W)	PBLIC-10FVE-B4NH21 (K0)			
			Flux (lm)	lm/W		
250	11.14	2.78	301.6	108.3		
350	11.36	3.98	405.4	102.0		
800	12.18	9.74	802.0	82.3		
1000	12.48	12.47	950.0	76.2		
1200	12.75	15.31	1083.2	70.7		

● All values are reference only.

Absolute Maximum Ratings

Parameter	White/Neutral White/Warm White
DC Forward Current (mA)	1200
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

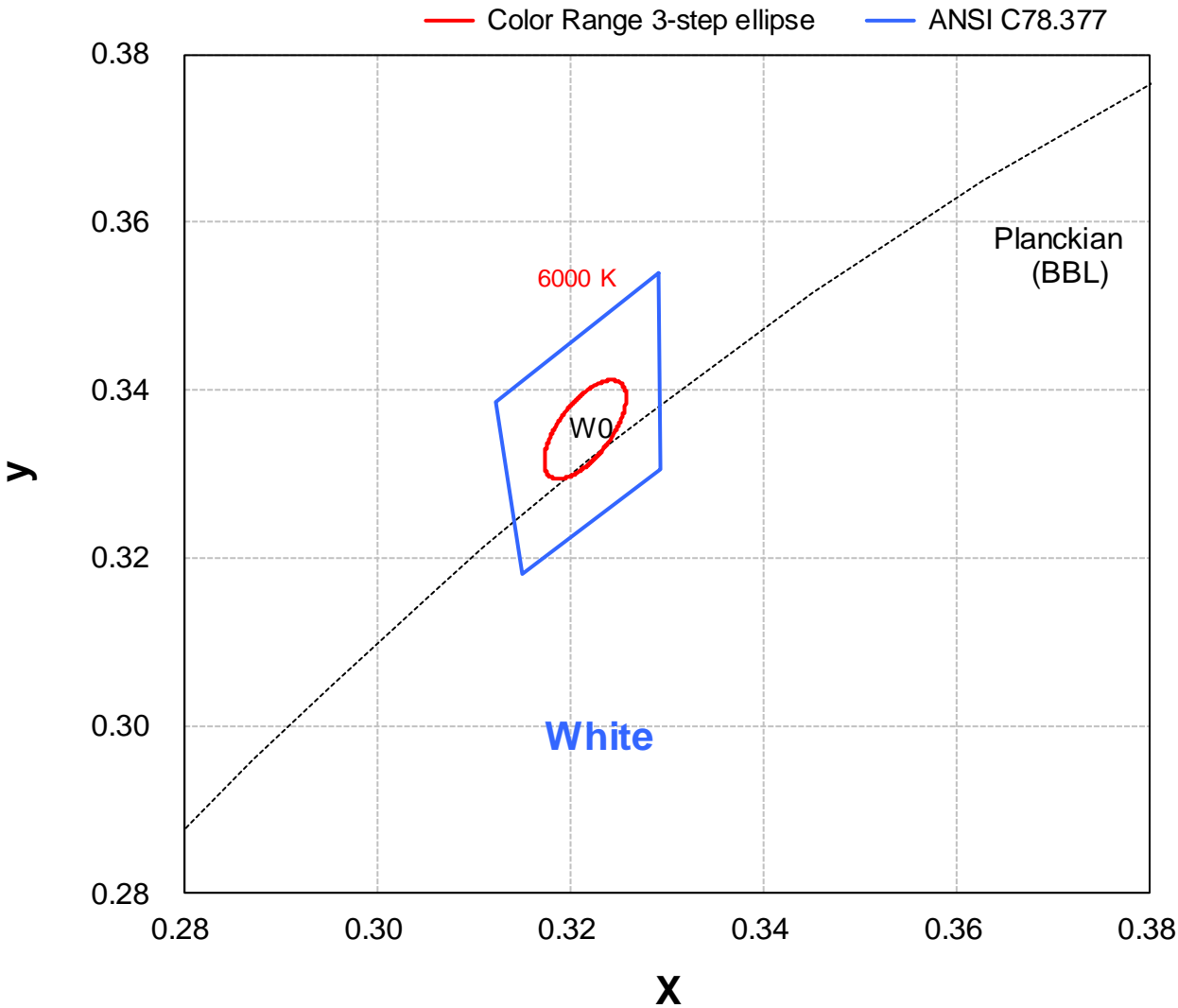
Photometric Luminous Flux Bin Structure

Color	Bin Code	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)	Available Color Bins
PBLC-10FWE-B4NH60	A	1350	1500	All 【1】
	B	1500	1700	
PBLC-10FNE-B4NH40	A	1350	1500	All 【1】
	B	1500	1700	
PBLC-10FNE-B4NH35	B	1100	1250	All 【1】
	C	1250	1450	
PBLC-10FVE-B4NH30	B	1100	1250	All 【1】
	C	1250	1450	
PBLC-10FVE-B4NH27	A	1000	1100	All 【1】
	B	1100	1250	
PBLC-10FVE-B4NH24	B	950	1050	All 【1】
	C	1050	1200	
PBLC-10FVE-B4NH21	A	850	950	All 【1】
	B	950	1050	

- ProLight maintains a tolerance of $\pm 7\%$ 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

White Binning Structure Graphical Representation



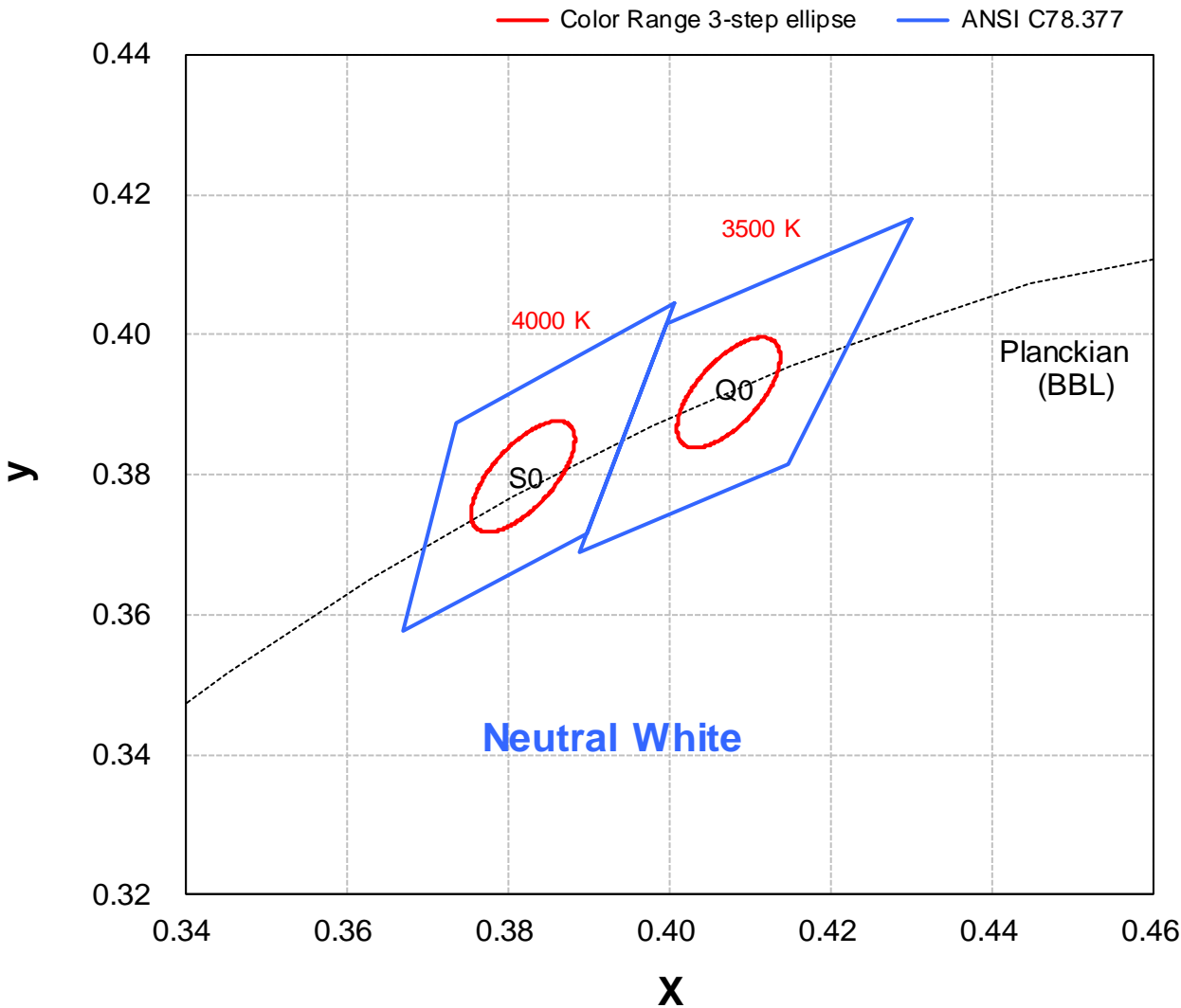
White Bin Structure

Bin Code	Center		Oval parameter	Typ. CCT (K)
W0	x	0.3215	a 0.00669	6000
	y	0.3353	b 0.00285	
			θ° 58.57	

- 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

Neutral White Binning Structure Graphical Representation



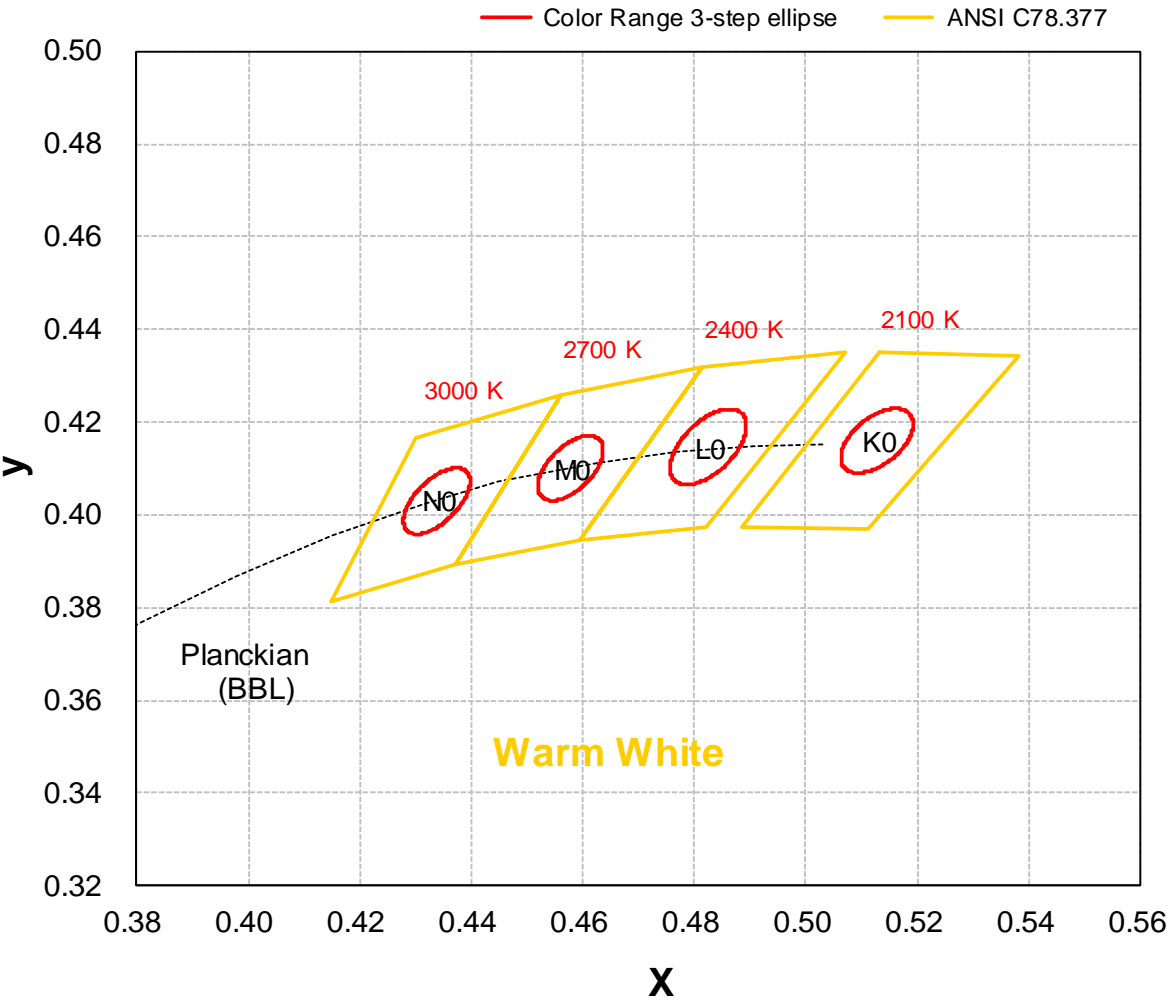
Neutral White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)	Bin Code	Center	Oval parameter	Typ. CCT (K)
Q0	x	a	3500	S0	x	a	4000
	y	b			y	b	
		e°				e°	

- 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



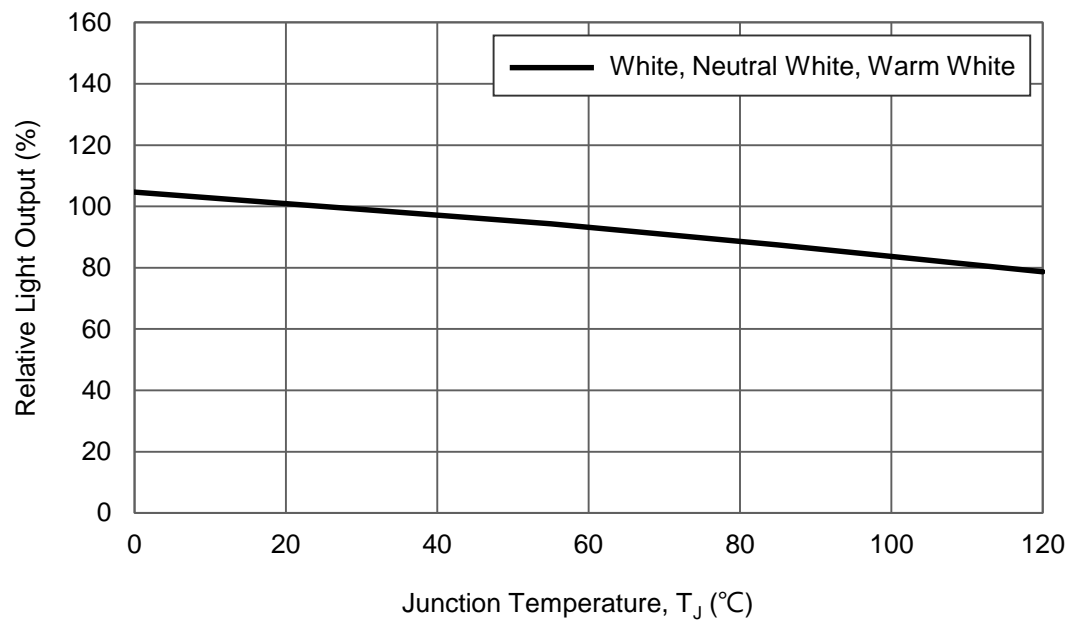
Warm White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)	Bin Code	Center	Oval parameter	Typ. CCT (K)
K0	x	a 0.0083	2100	M0	x	a 0.00810	2700
	y	b 0.0046			y	b 0.00420	
		e° 48.65				e° 53.70	
L0	x	a 0.0095	2400	N0	x	a 0.00834	3000
	y	b 0.0049			y	b 0.00408	
		e° 53.70				e° 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

Light Output Characteristics

Relative Light Output vs. Junction Temperature at 1000mA



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

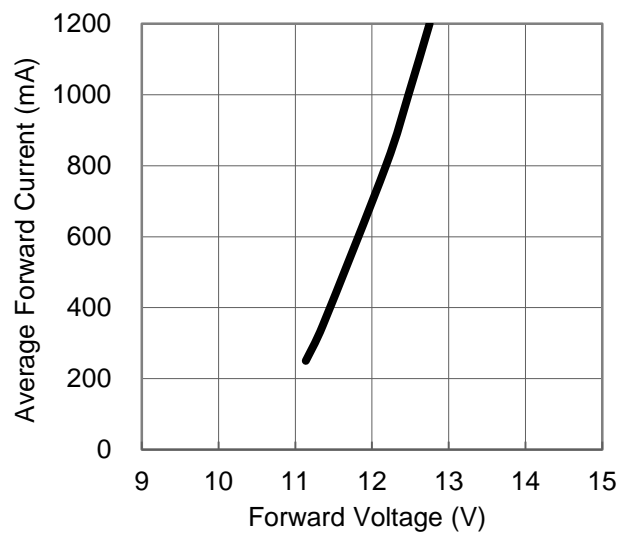


Fig 1. Forward Current vs. Forward Voltage for White, Neutral White, Warm White.

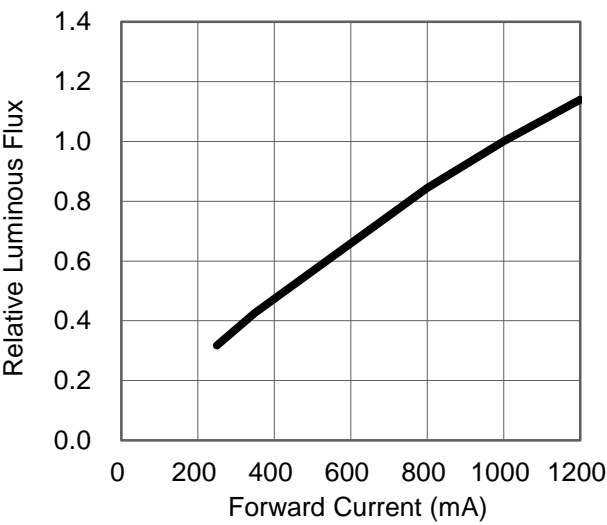
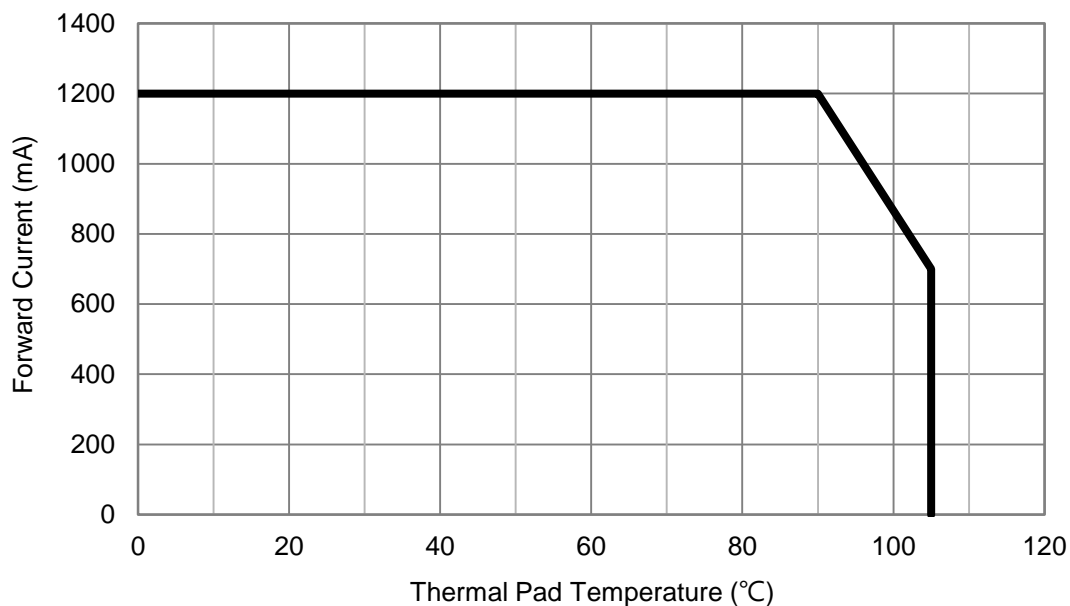
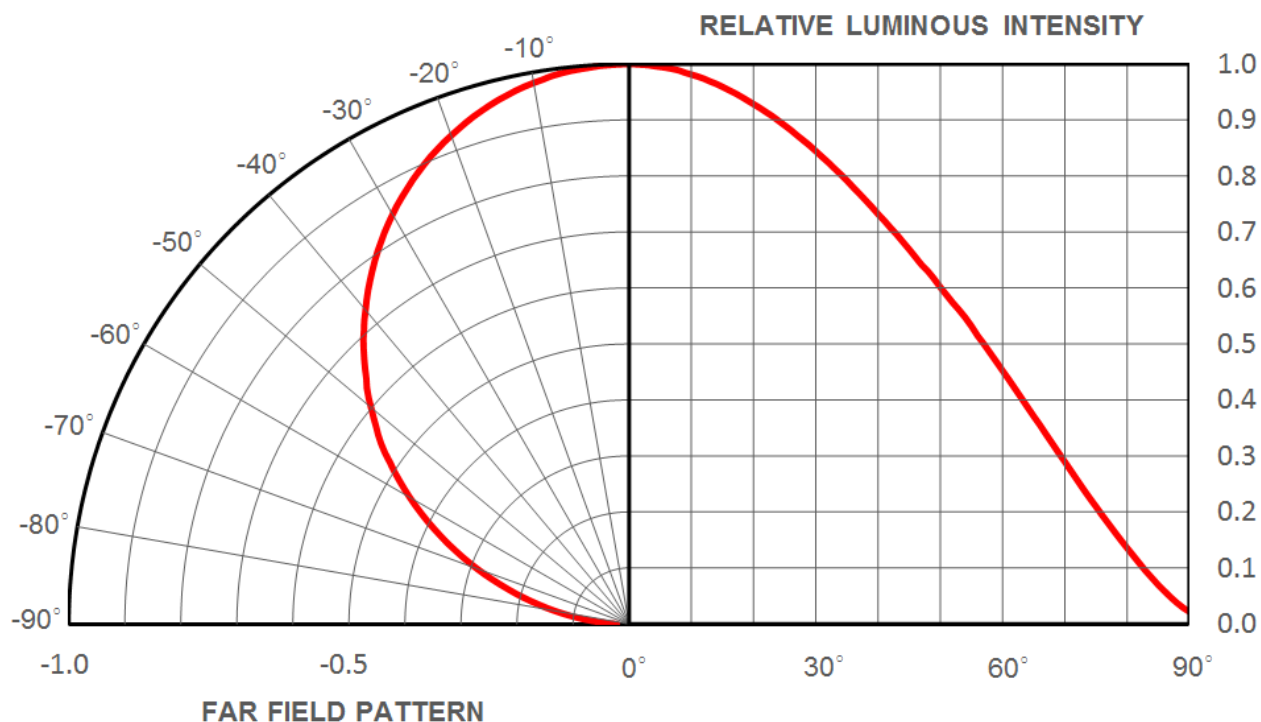


Fig 2. Relative Luminous Flux vs. Forward Current for White, Neutral White, Warm White at $T_j=25$ maintained.

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	$\leq 30^{\circ}\text{C}$ / 85% RH	168 +5/-0	85°C / 85% RH	NA	NA

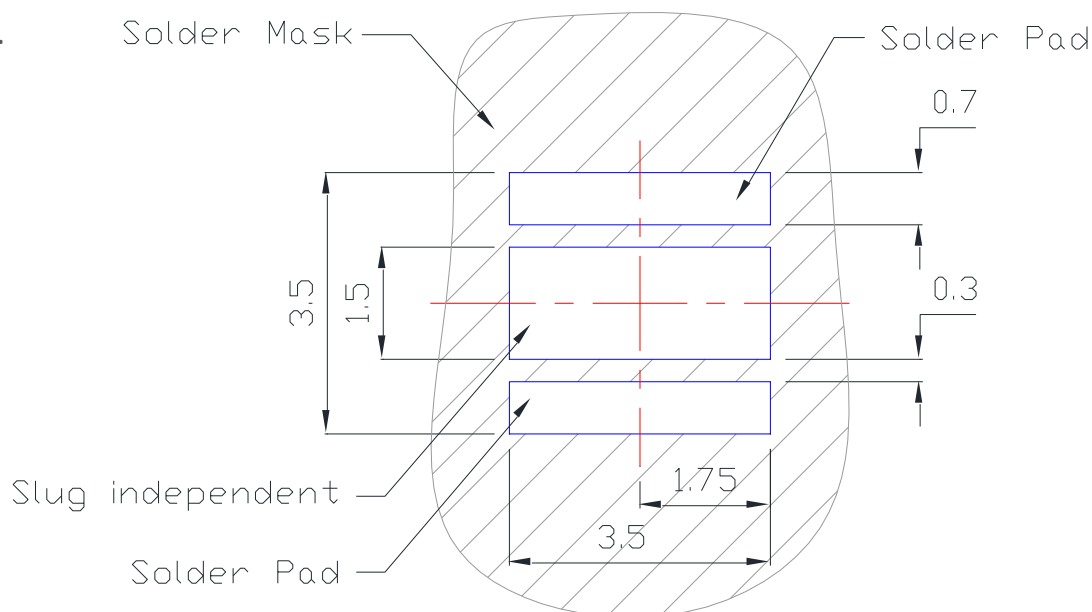
- The standard soak time includes a default value of 24 hours for semiconductor manufacture's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility.
- Table below presents the moisture sensitivity level definitions per IPC/JEDEC's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

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

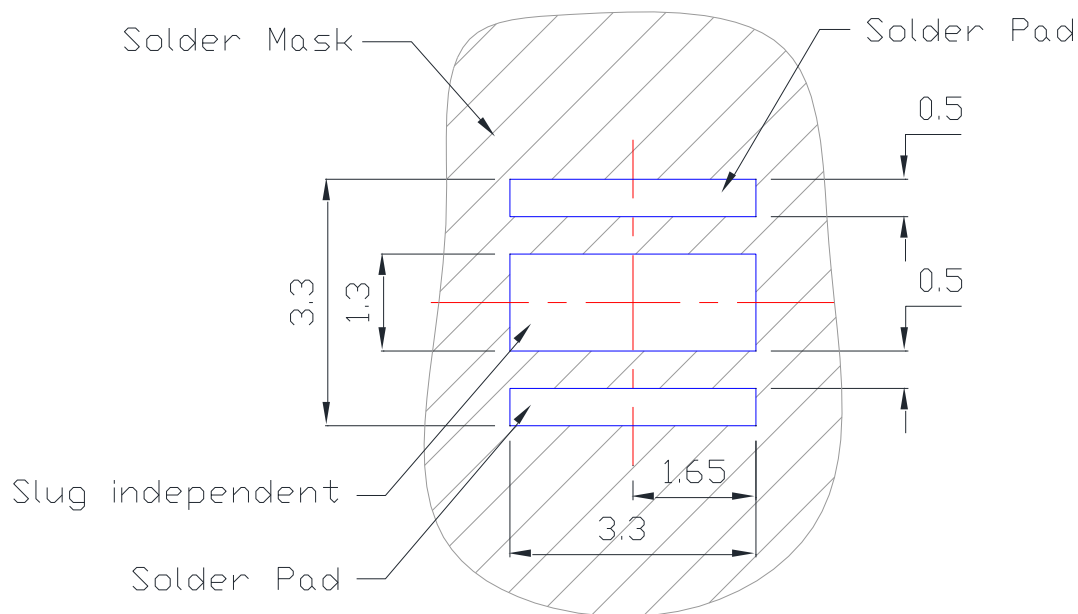
Recommended Solder Pad Design

Standard Emitter

TYPE A.



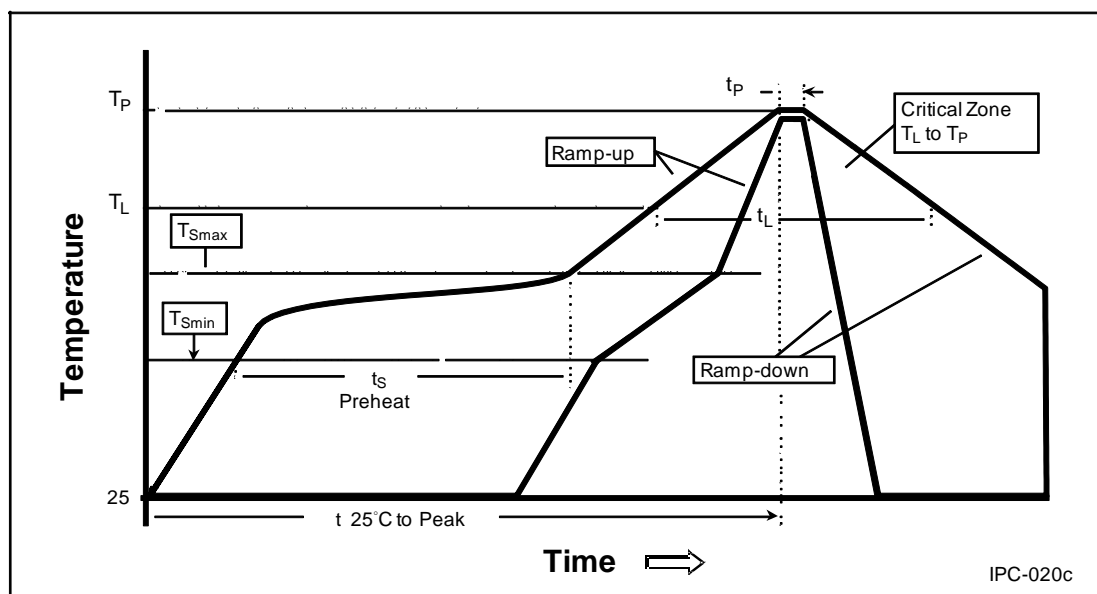
TYPE B.



- All dimensions are in millimeters.

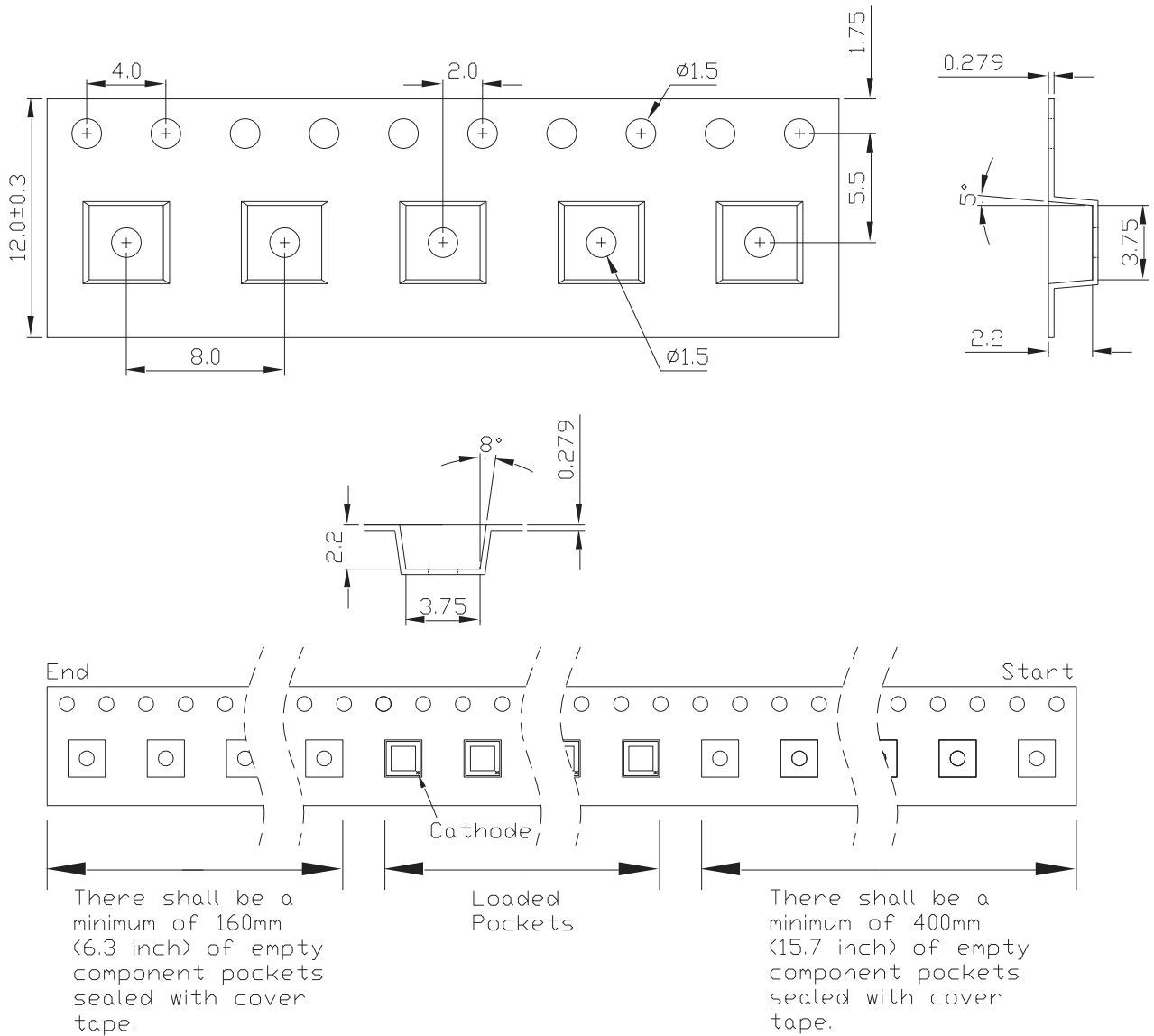
Reflow Soldering Condition

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 <ul style="list-style-type: none"> – 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: <ul style="list-style-type: none"> – 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.

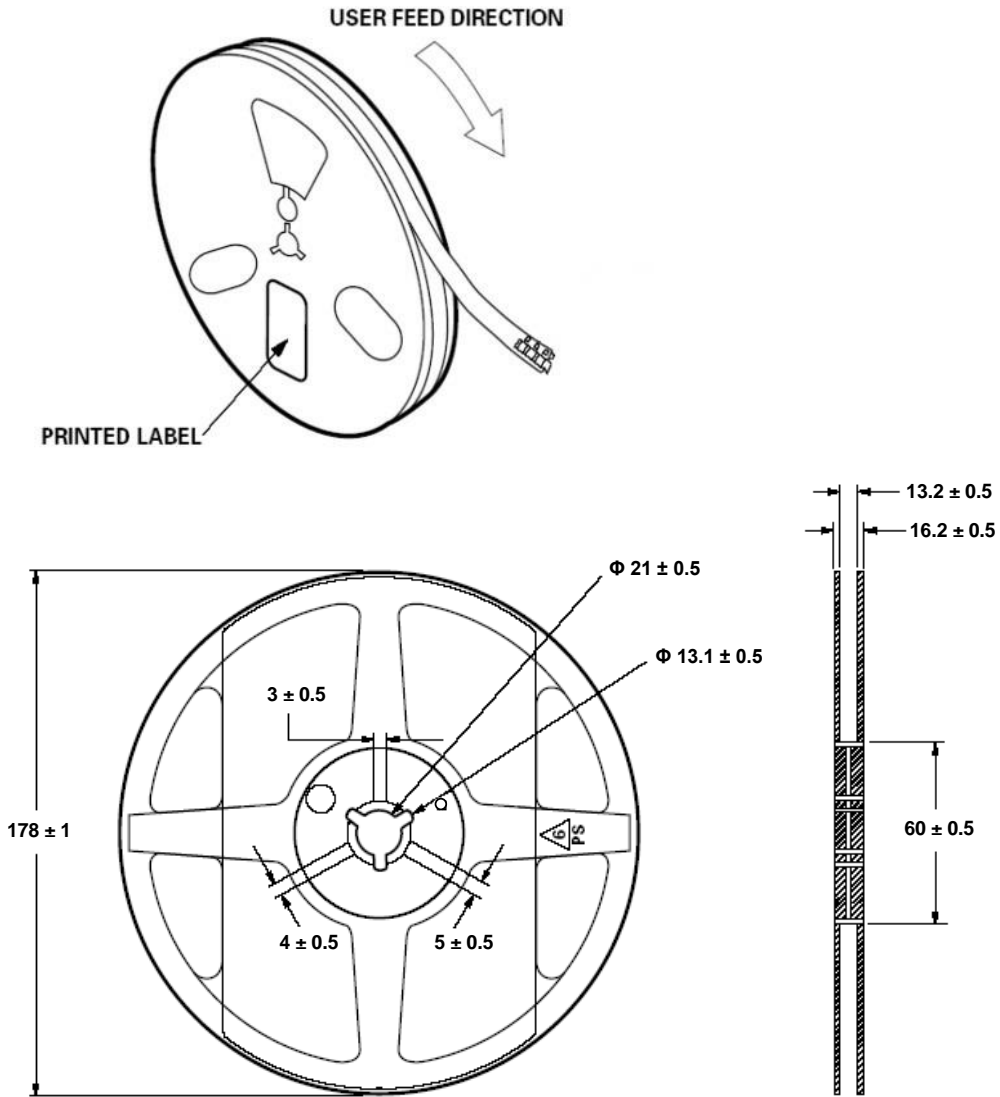
Emitter Reel Packaging



Notes:

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

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.

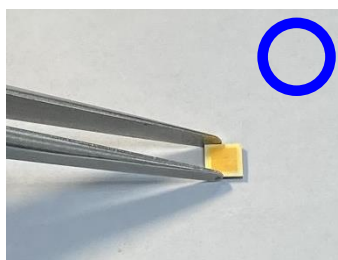
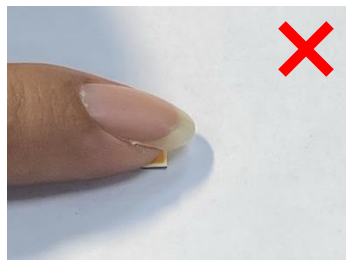
Precaution for Use

- 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 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 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.
<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.