

ProLight PACJ-21FxL-xC3N
21W COB Light-Engine LEDs
Technical Datasheet
Version: 1.1

ProLight Opto ® ProEngine Series

Features

- High flux density of lighting source
- Good color uniformity
- RoHS compliant
- Energy Star binning structure, neutral white and warm white with 2 steps guarantee.
- More energy efficient than incandescent and most halogen lamps
- No UV
- Long lifetime
- 5 year warranty

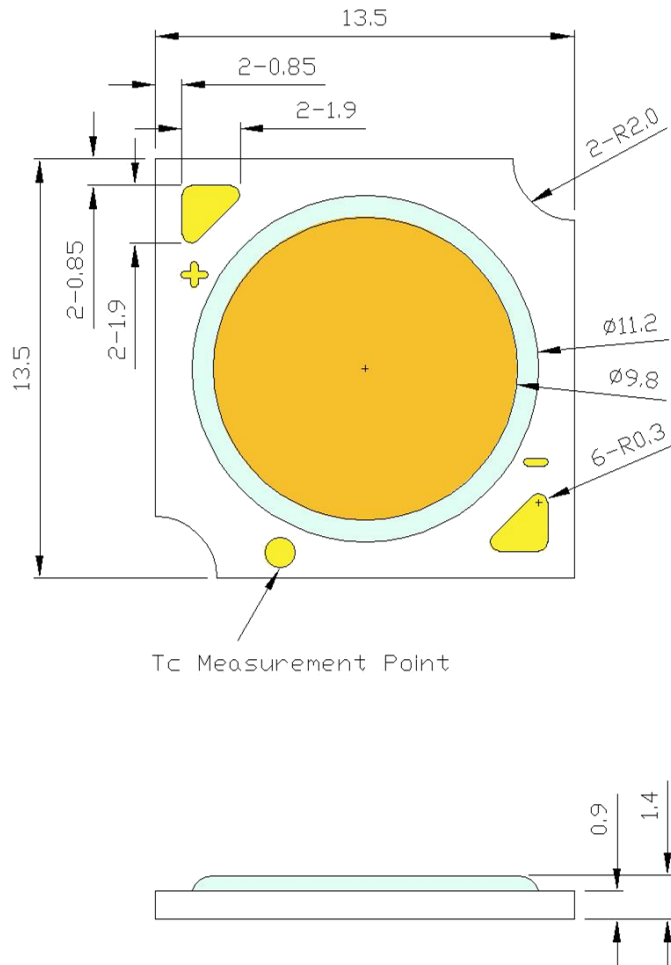
Main Applications

- Par lighting
- LED Bulb
- Ceiling lighting
- Spot lighting
- Down lighting

Introduction

·The input power is 21 Watt, the multi-chip ultra high power ProEngine Series delivers never before seen luminous flux output from a single emitter. The superficial illuminating nature of ProEngine makes them the preference in Par lighting, typical applications include commercial down lighting, LED bulb, accent lighting, ceiling lighting and spot lighting.

Emitter Mechanical Dimensions



Notes:

1. Slots in aluminum-core PCB for M3 mounting screw.
2. Solder pads are labeled "+" and "-" to denote positive and negative, respectively.
3. Drawing not to scale.
4. All dimensions are in millimeters.
5. Unless otherwise indicated, tolerances are ± 0.30 mm.
6. **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, $T_c = 25^\circ\text{C}$

Radiation Pattern	Color	Part Number COB	DC Forward Current (mA)		Luminous Flux Φ_v (lm)		CRI Min.	R9 Min.
			270*	540	Min.	Typ.		
Lambertian	White	PACJ-21FWL-AC3N	270*	1380	1575	70	-	
			540	2440	2790			
	Neutral White	PACJ-21FNL-AC3N	270*	1350	1545	70	-	
			540	2390	2735			
	Warm White	PACJ-21FVL-AC3N	270*	1290	1485	70	-	
			540	2270	2615			
	White	PACJ-21FWL-BC3N	270*	1350	1545	80	0	
			540	2390	2735			
	Neutral White	PACJ-21FNL-BC3N	270*	1320	1515	80	0	
			540	2335	2680			
	Warm White	PACJ-21FVL-BC3N	270*	1265	1455	80	0	
			540	2225	2560			
	White	PACJ-21FWL-DC3N	270*	1190	1360	90	50	
			540	2105	2410			
	Neutral White	PACJ-21FNL-DC3N	270*	1160	1330	90	50	
			540	2050	2355			
Warm White	PACJ-21FVL-DC3N	270*	1110	1280	90	50		
		540	1950	2250				
Neutral White	PACJ-21FNL-EC3N	270*	1020	1170	95	90		
		540	1795	2060				
Warm White	PACJ-21FVL-EC3N	270*	975	1130	95	90		
		540	1715	1990				

- The mark "*" indicated product is tested and binned at the specified drive current.
- 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 270mA, T_c = 25°C

Color	Forward Voltage V _F (V)			Thermal Resistance Junction to Board (°C/W)
	Min.	Typ.	Max.	
White	33.7	36.0	38.3	1.7
Neutral White	33.7	36.0	38.3	1.7
Warm White	33.7	36.0	38.3	1.7

- ProLight maintains a tolerance of ± 1V for Voltage measurements.

Optical Characteristics at 270mA, T_c = 25°C

Color	Bin Code	Color Temperature CCT			Total included Angle (degrees) θ _{0.90V}	Viewing Angle (degrees) 2 θ _{1/2}
		Min.	Typ.	Max.		
White	V0	4740 K	5000 K	5310 K	160	120
	W0	5310 K	5700 K	6010 K	160	120
	X0	6020 K	6500 K	7030 K	160	120
Neutral White	S0	3900 K	4000 K	4070 K	160	120
	M0	2670 K	2700 K	2770 K	160	120
Warm White	N0	2990 K	3000 K	3090 K	160	120
	Q0	3380 K	3500 K	3550 K	160	120

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

Supply Specifications

Part Number	CIR	Color Bin Code						
		V0	W0	X0	S0	M0	N0	Q0
PACJ-21F _x L-AC3N	70	V			V	V		
PACJ-21F _x L-BC3N	80	V	V	V	V	V	V	V
PACJ-21F _x L-DC3N	90	V			V	V	V	V
PACJ-21F _x L-EC3N	95				V	V	V	

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

I_F (mA)	V_F (V)	Power (W)	PACJ-21FWL-AC3N		PACJ-21FNL-AC3N		PACJ-21FVL-AC3N	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
180	34.63	6.23	1170	187.8	1148	184.3	1108	177.9
270*	36.00	9.72	1575	162.0	1545	159.0	1485	152.8
360	37.23	13.40	1980	147.8	1942	144.9	1862	138.9
450	38.42	17.29	2385	137.9	2338	135.2	2238	129.5
540	39.53	21.34	2790	130.7	2735	128.1	2615	122.5
I_F (mA)	V_F (V)	Power (W)	PACJ-21FWL-BC3N		PACJ-21FNL-BC3N		PACJ-21FVL-BC3N	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
180	34.63	6.23	1148	184.3	1127	180.8	1087	174.4
270*	36.00	9.72	1545	159.0	1515	155.9	1455	149.7
360	37.23	13.40	1942	144.9	1903	142.0	1823	136.1
450	38.42	17.29	2338	135.2	2292	132.5	2192	126.8
540	39.53	21.34	2735	128.1	2680	125.6	2560	120.0
I_F (mA)	V_F (V)	Power (W)	PACJ-21FWL-DC3N		PACJ-21FNL-DC3N		PACJ-21FVL-DC3N	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
180	34.63	6.23	1010	162.1	988	158.6	957	153.6
270*	36.00	9.72	1360	139.9	1330	136.8	1280	131.7
360	37.23	13.40	1710	127.6	1672	124.8	1603	119.7
450	38.42	17.29	2060	119.1	2013	116.4	1927	111.4
540	39.53	21.34	2410	112.9	2355	110.4	2250	105.4
I_F (mA)	V_F (V)	Power (W)	PACJ-21FNL-EC3N		PACJ-21FVL-EC3N			
			Flux (lm)	lm/W	Flux (lm)	lm/W		
180	34.63	6.23	873	140.2	843	135.4		
270*	36.00	9.72	1170	120.4	1130	116.3		
360	37.23	13.40	1467	109.5	1417	105.7		
450	38.42	17.29	1763	102.0	1703	98.5		
540	39.53	21.34	2060	96.5	1990	93.3		

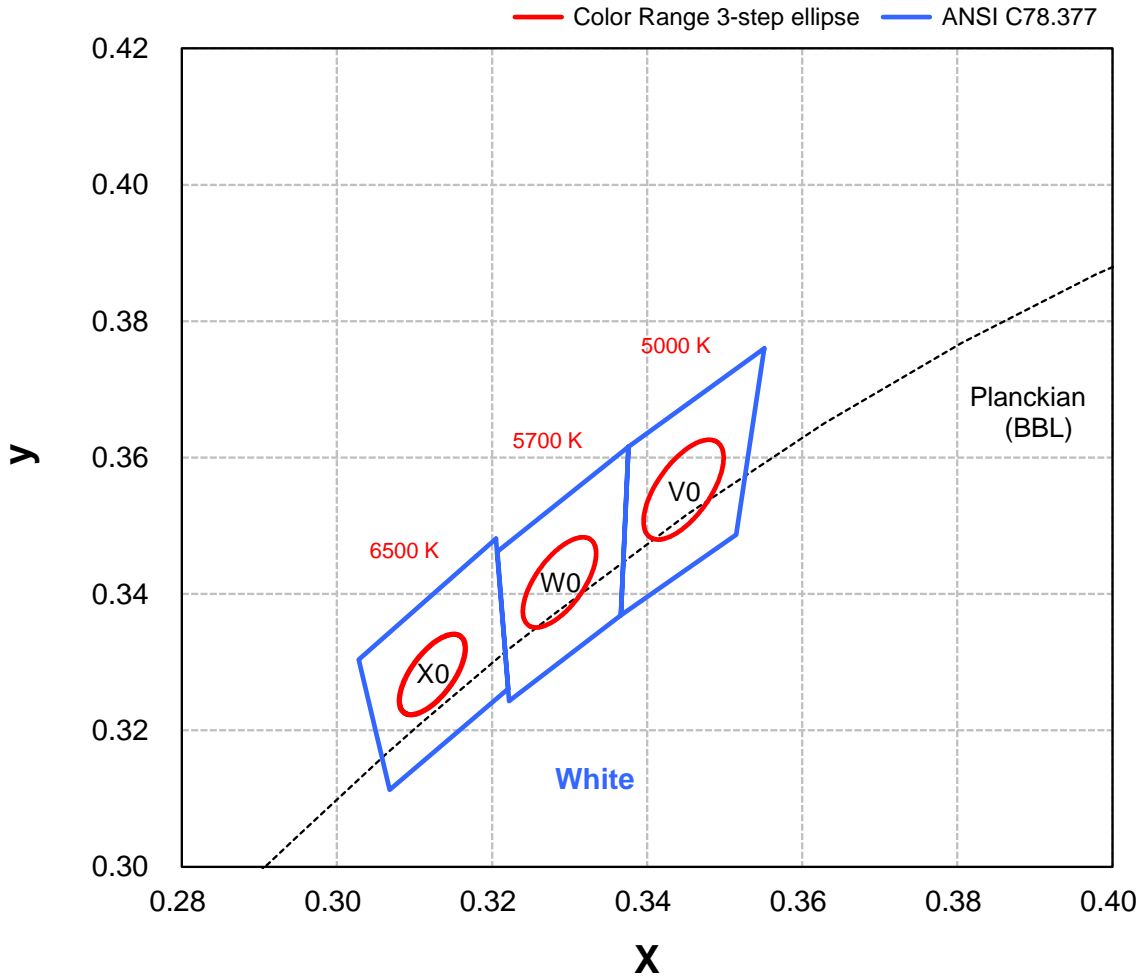
● All values are reference only.

Absolute Maximum Ratings

Parameter	White/Neutral White/Warm White
Max DC Forward Current (mA)	540
Max Voltage at 540mA	42
Peak Pulsed Forward Current (mA)	810 (less than 1/10 duty cycle@1KHz)
ESD Sensitivity (HBM per MIL-STD-883E Method 3015.7)	±2000V
LED Junction Temperature	120°C
Operating Board Temperature at Maximum DC Forward Current	-40°C - 90°C
Storage Temperature	-40°C - 120°C
Reverse Voltage	Not designed to be driven in reverse bias

Color Bin

White Binning Structure Graphical Representation



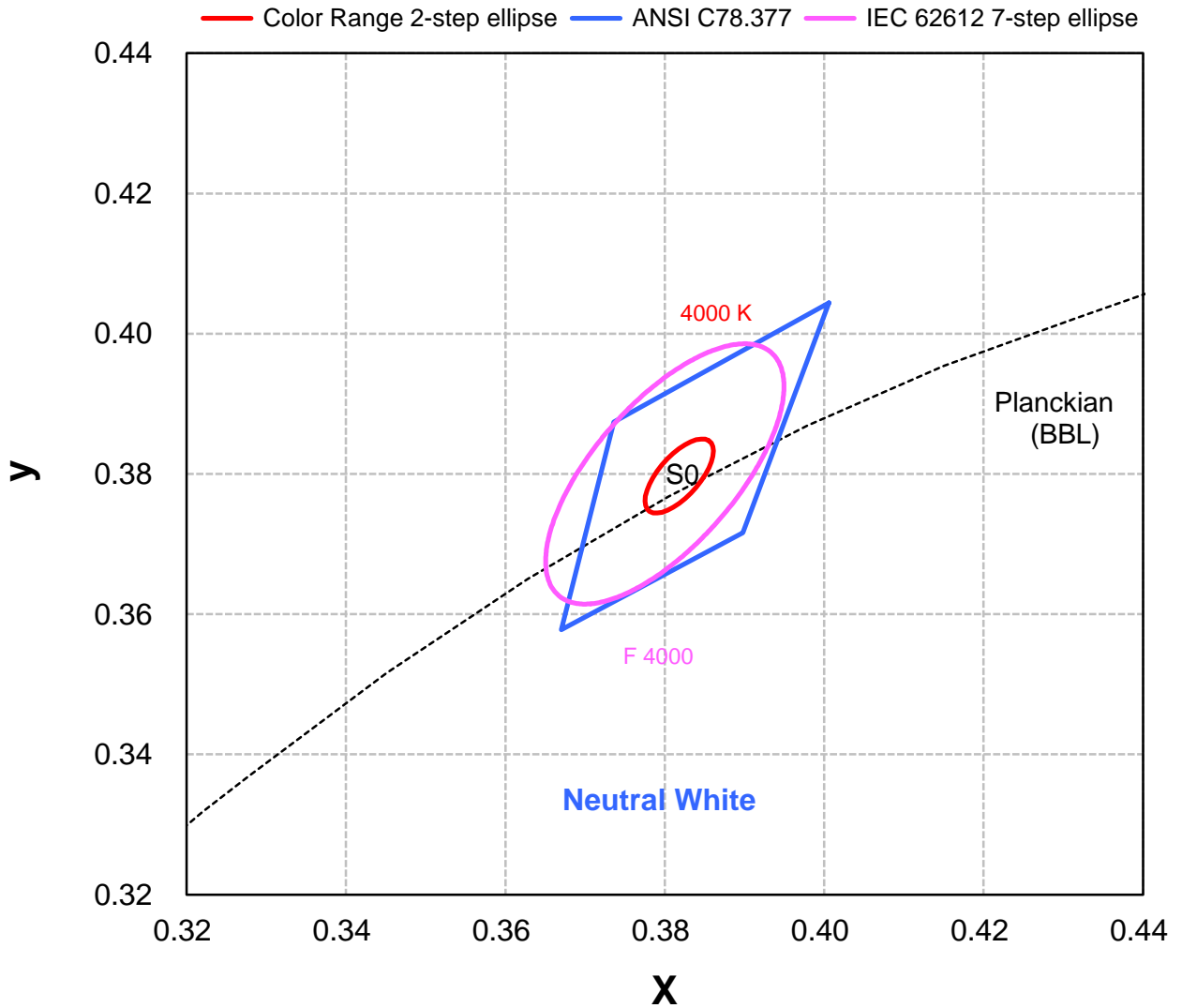
White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)	Bin Code	Center	Oval parameter	Typ. CCT (K)
V0	x	a	5000	X0	x	a	6500
	y	b			y	B	
		e°				e°	
W0	x	a	5700				
	y	B					
		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

Neutral White Binning Structure Graphical Representation



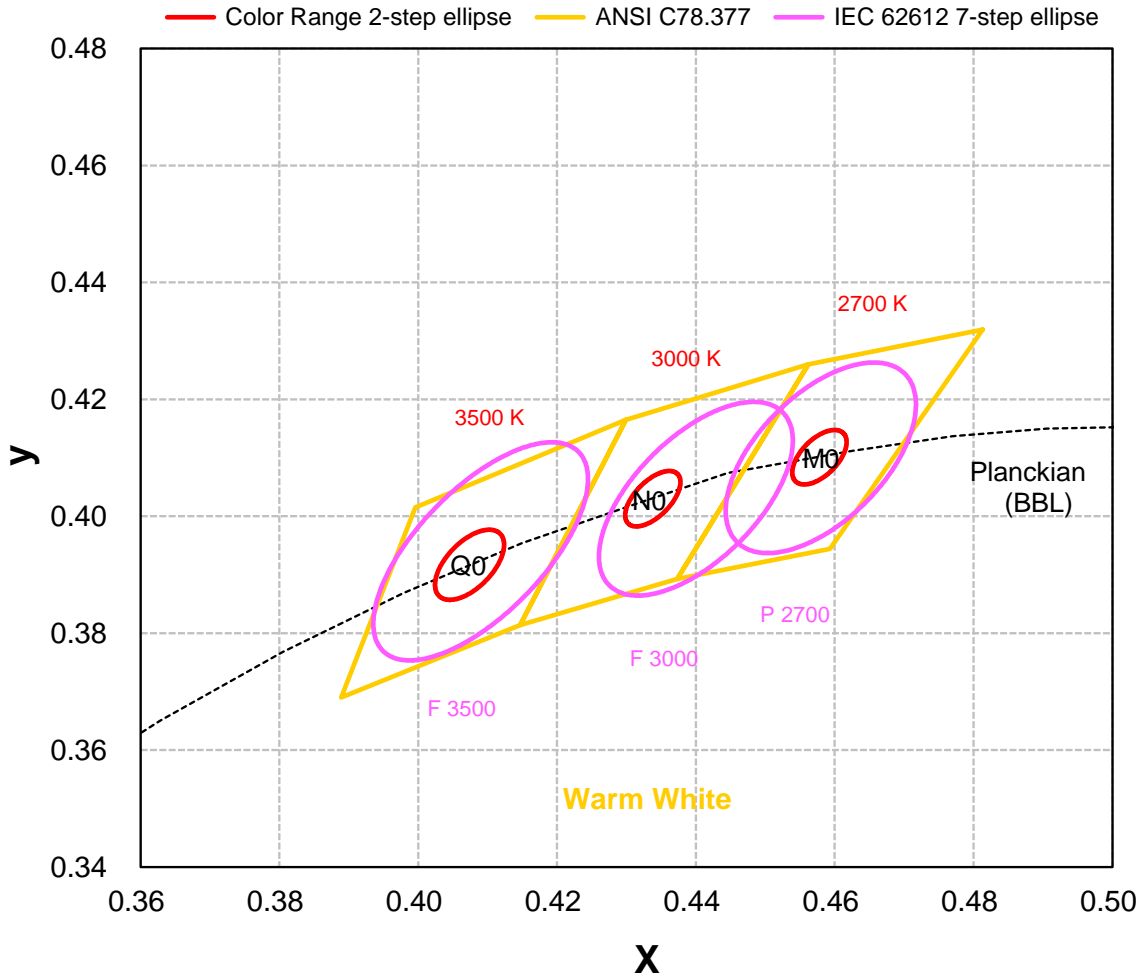
Neutral White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)
S0	x	0.3818	4000
	y	0.3797	
	a	0.00626	
	b	0.00268	
		e°	53.72

- Color range stay within MacAdam "2-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



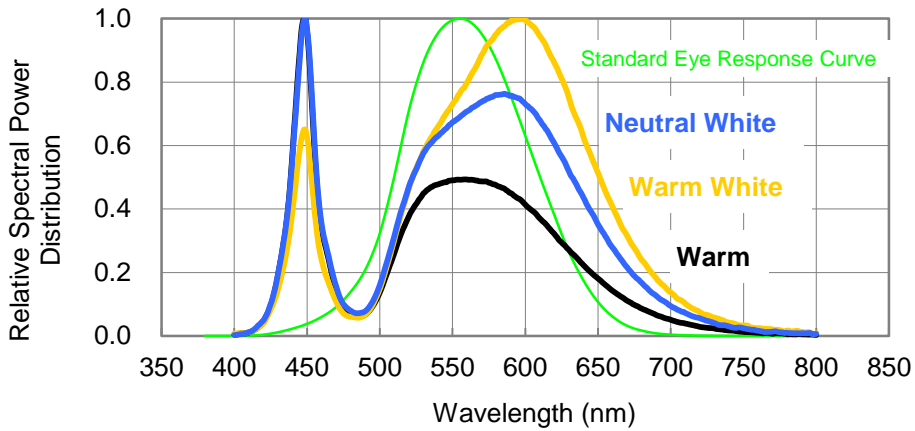
Warm White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)	Bin Code	Center	Oval parameter	Typ. CCT (K)
M0	x	0.4578	2700	Q0	x	0.4074	3500
	y	0.4101			y	0.3917	
	a	0.0054			a	0.00695	
		b	0.0028			b	0.00352
		e°	53.70			e°	54.09
N0	x	0.4338	3000				
	y	0.4030					
	a	0.00556					
		b	0.00272				
		e°	53.22				

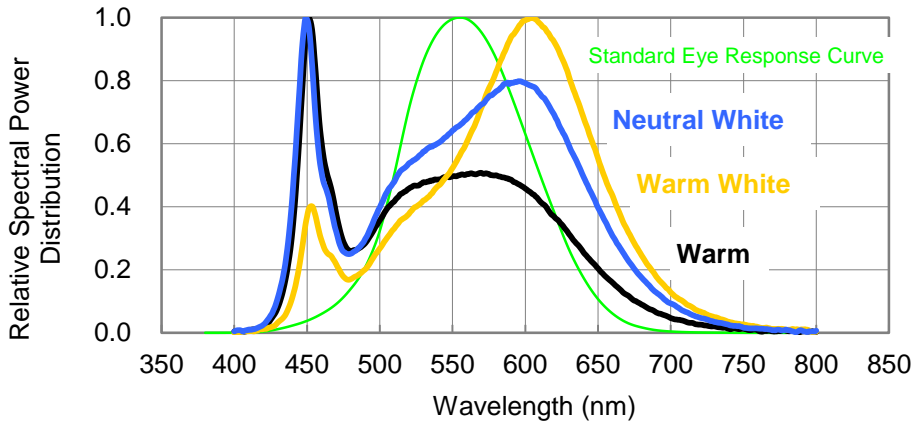
- Color range stay within MacAdam “2-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.005

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

1. PACJ-21WL-AC3N 、 PACJ-21FNL-AC3N 、 PACJ-21FVL-AC3N

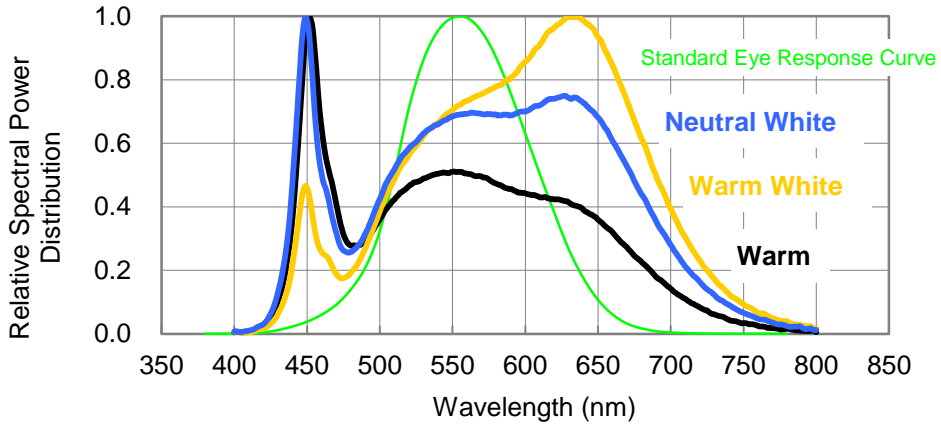


2. PACJ-21FWL-BC3N 、 PACJ-21FNL-BC3N 、 PACJ-21FVL-BC3N

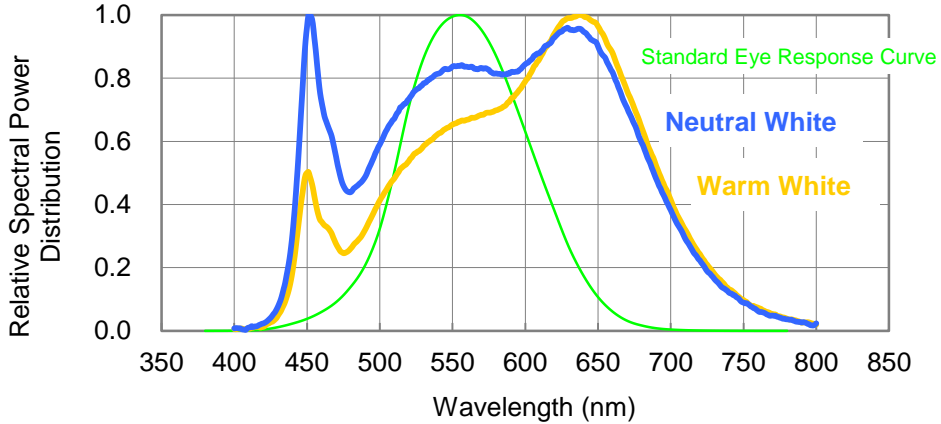


Color Spectrum, $T_c = 25^\circ\text{C}$

3. PACJ-21FWL-DC3N 、 PACJ-21FNL-DC3N 、 PACJ-21FVL-DC3N



4. PACJ-21FNL-EC3N 、 PACJ-21FVL-EC3N



Case Temperature Relative Characteristics

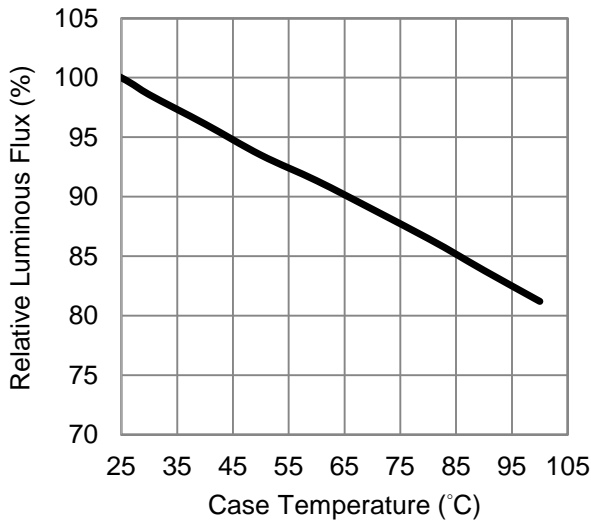


Fig 1. Case Temperature vs. Relative Luminous Flux at 270mA.

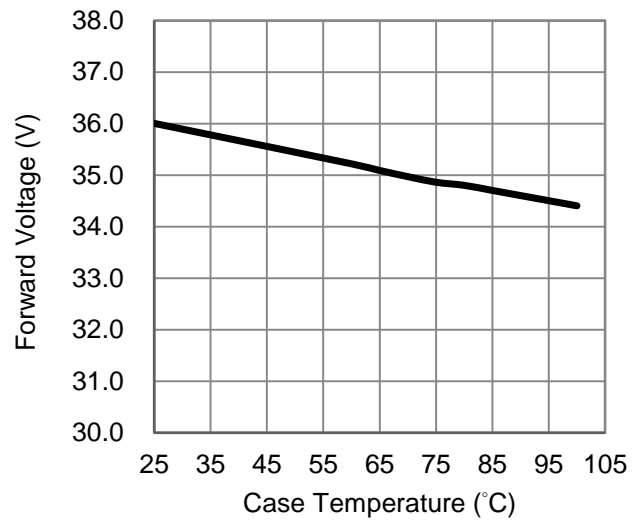


Fig 2. Case Temperature vs. Forward Voltage at 270mA.

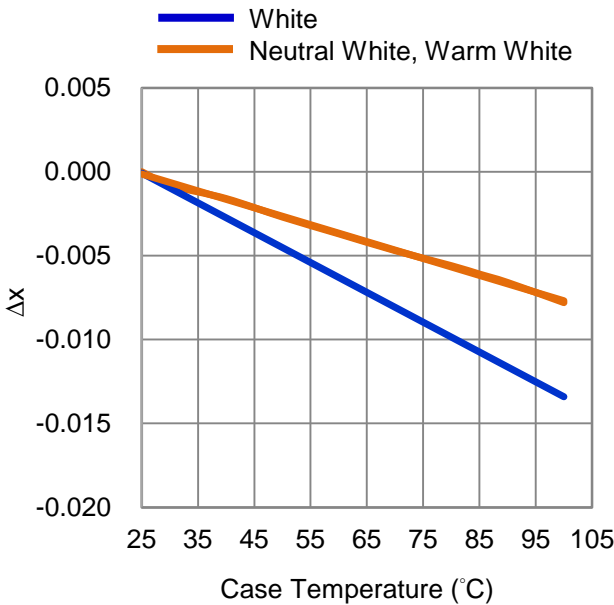


Fig 3. Case Temperature vs. Chromaticity Coordinate Δx at 270mA.

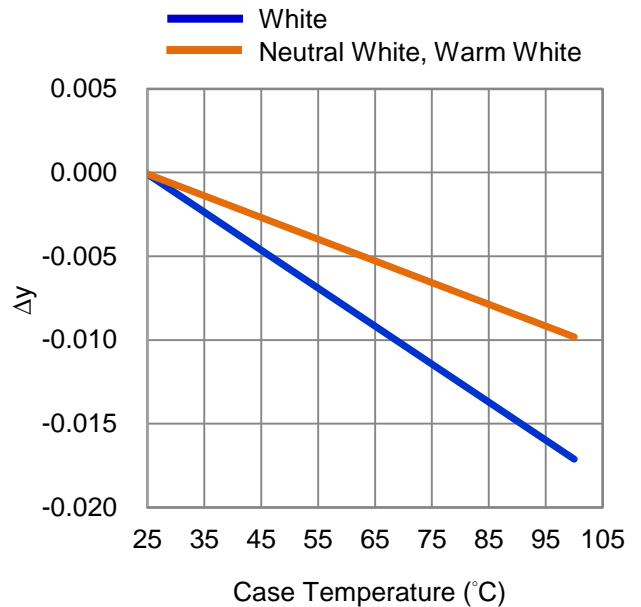


Fig 4. Case Temperature vs. Chromaticity Coordinate Δy at 270mA.

Forward Current Relative Characteristics

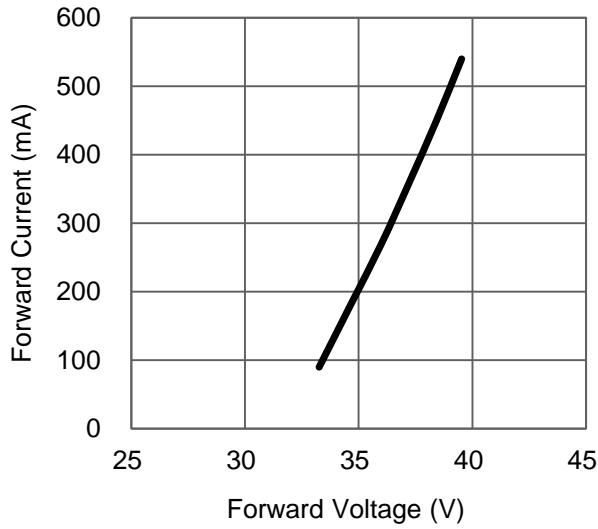


Fig 5. Forward Current vs. Forward Voltage at $T_C=25^\circ\text{C}$.

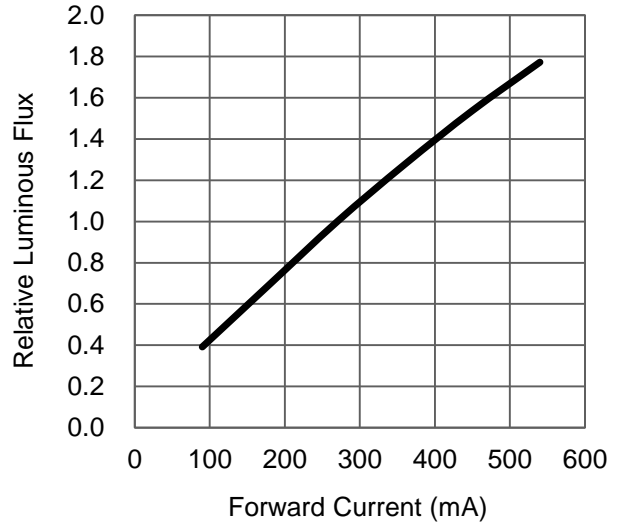


Fig 6. Forward Current vs. Relative Luminous Flux at $T_C=25^\circ\text{C}$.

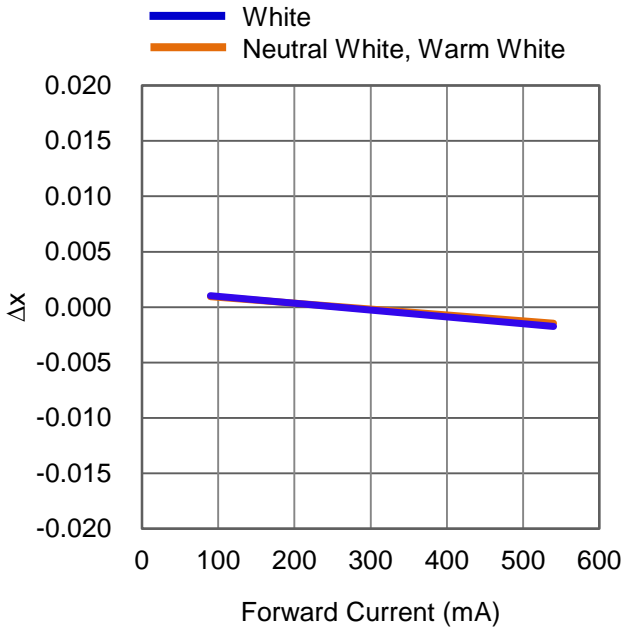


Fig 7. Forward Current vs. Chromaticity Coordinate Δx at $T_C=25^\circ\text{C}$.

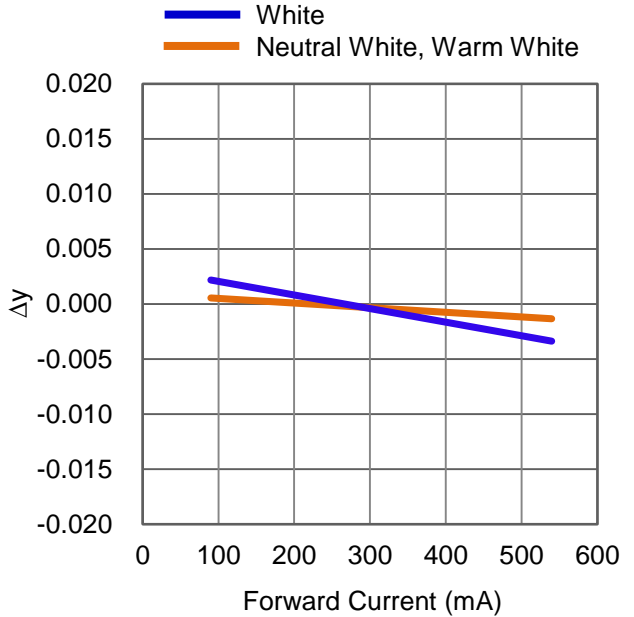


Fig 8. Forward Current vs. Chromaticity Coordinate Δy at $T_C=25^\circ\text{C}$.

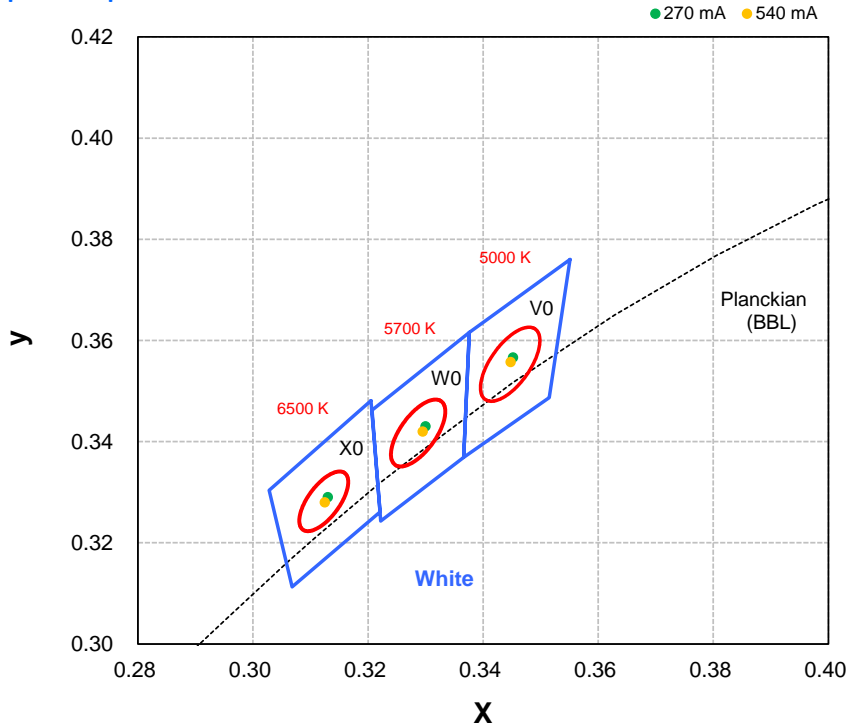
Case Temperature vs. Junction Temperature Characteristics

T _c (°C)	T _j (°C)	
	270 (mA)	540 (mA)
0	17	36
5	22	41
10	27	46
15	32	51
20	37	56
25	42	61
30	47	66
35	52	71
40	57	76
45	62	81
50	67	86
55	72	91
60	77	96
65	82	101
70	87	106
75	92	111
80	97	116
85	102	121

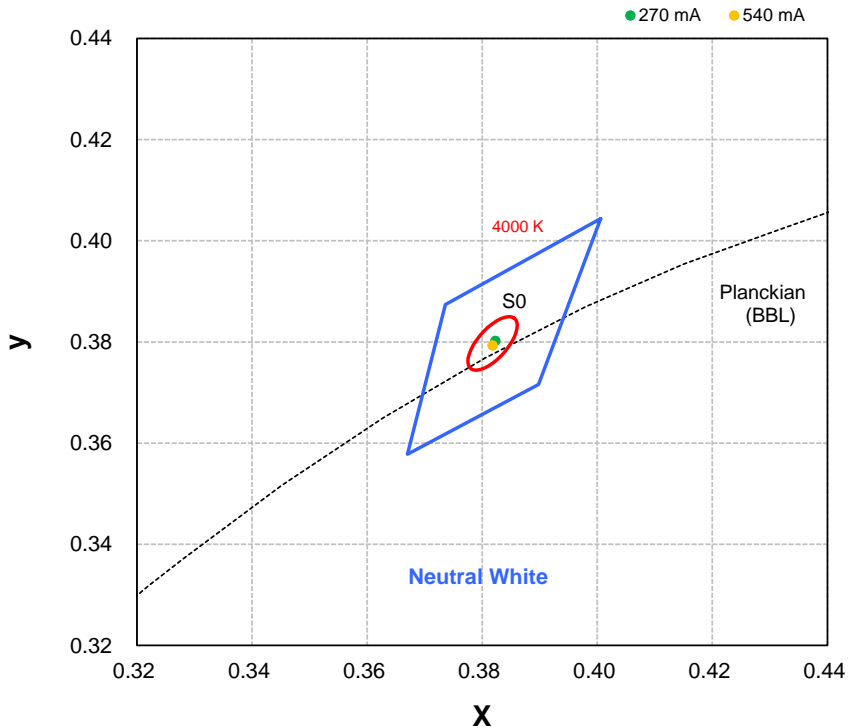
Fig 9. Case Temperature vs. Junction Temperature at 270 、540mA.

Color Coordinate vs. Forward Current, $T_c = 25^\circ\text{C}$

White Binning Graphical Representation

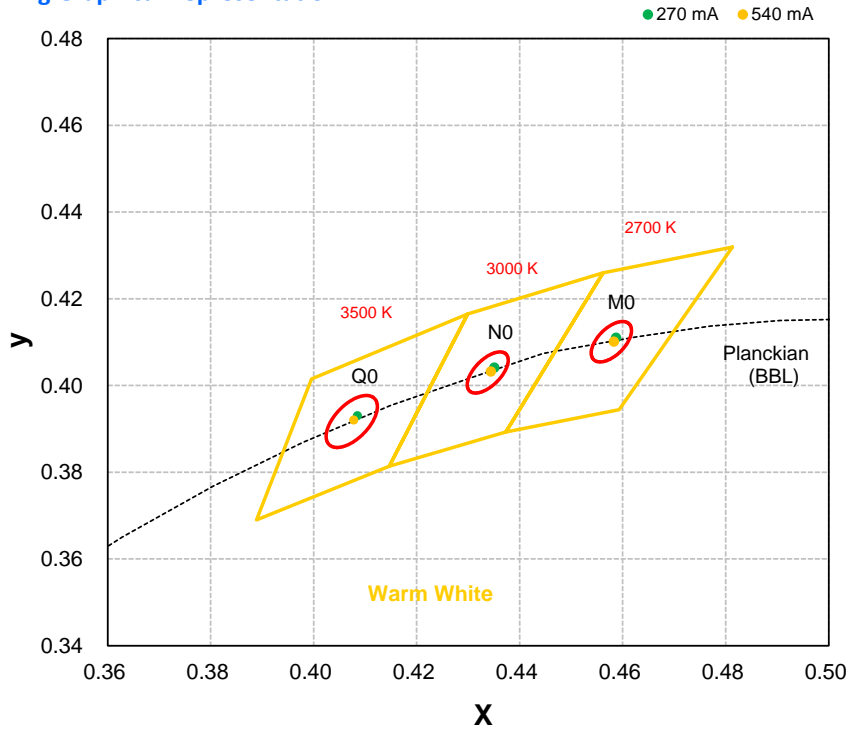


Neutral White Binning Graphical Representation



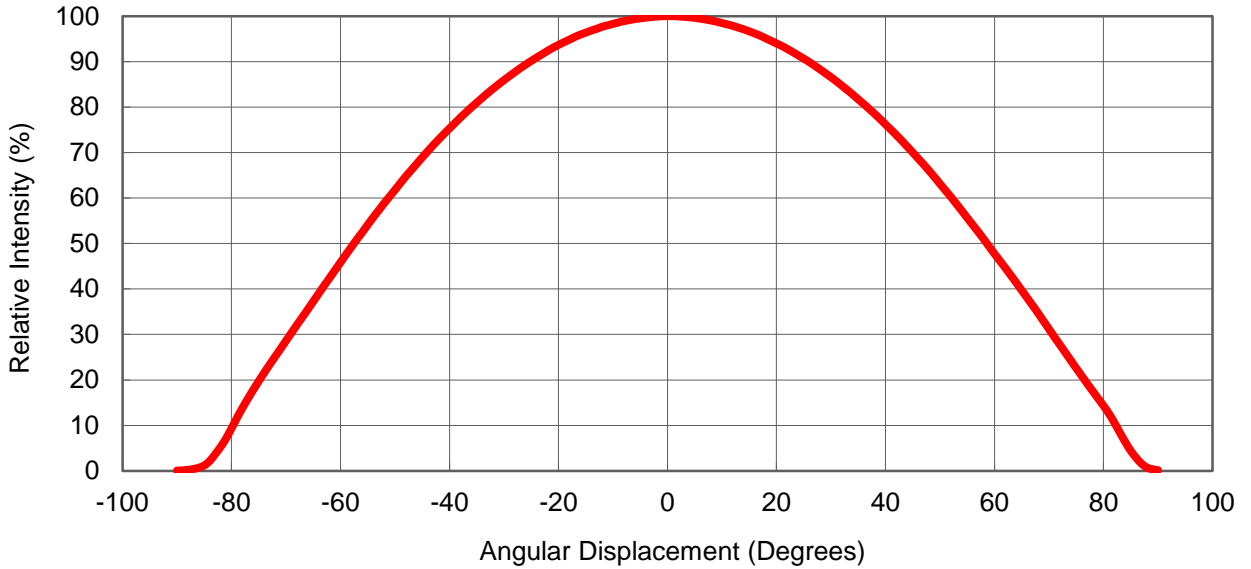
Color Coordinate vs. Forward Current, $T_c = 25^\circ\text{C}$

Warm White Binning Graphical Representation

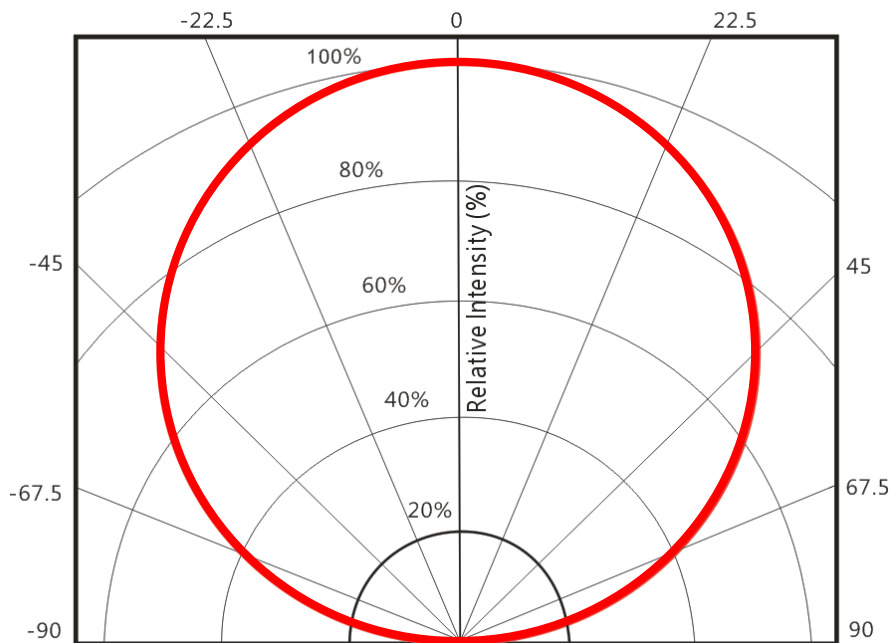


Typical Representative Spatial Radiation Pattern

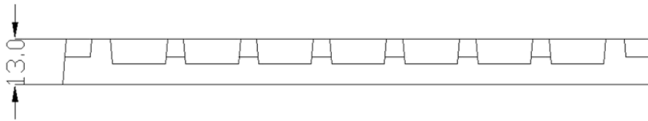
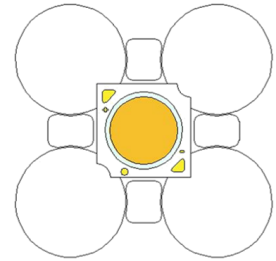
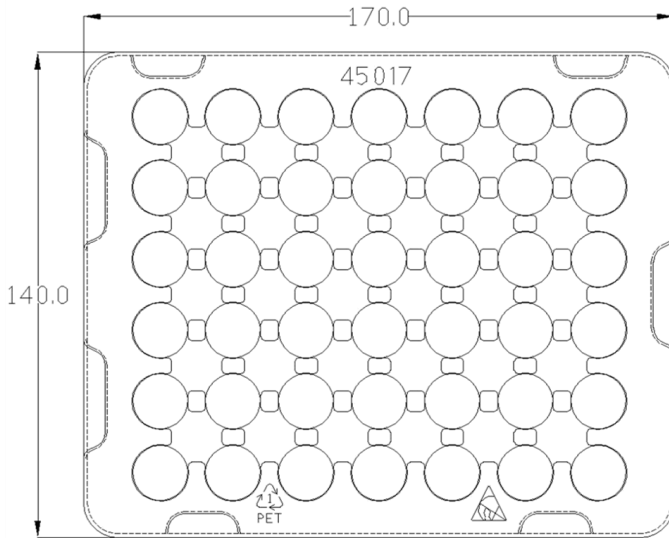
Lambertian Radiation Pattern



Polar Radiation Pattern



Packing Specifications



Product 30 pcs/tray

Notes:

1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are $\pm 0.20\text{mm}$.

Assembly note

Regarding the high power density of LED Array, it is strongly recommend to use thermal grease and screws.

In order to reduce thermal resistance at assembly, it is necessary to use TIM (thermal interface Material) uniformly and tighten screws on heatsink, otherwise the bad thermal resistance may cause the packages **burned out**.

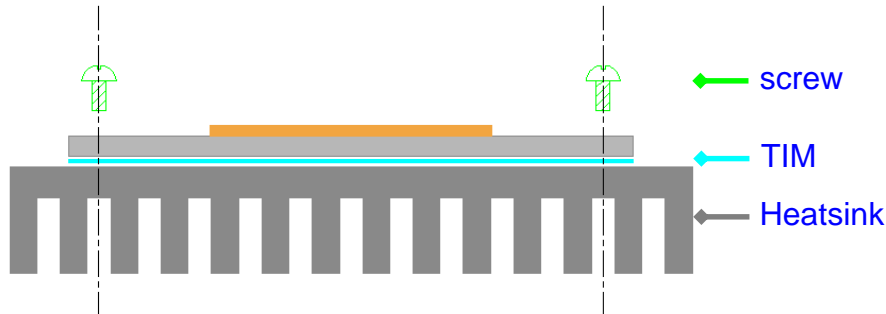


Fig 10. Reference assembly as fixing with screws

Limited Warranty : COB Light Engine Series

This limited warranty is provided by ProLight Opto described below (“Seller”) to you as the original purchaser of the LED lighting product that is identified on Seller’s invoice reflecting its original purchase (the “Product”). We warrant the identification as such on the invoice, will be free of defects in material and workmanship for a period of five (5) YEARS from the date of original purchase. This limited warranty excludes field labor and service charges related to the repair or replacement of the Product. Seller’s aggregate liability with respect to a defective product shall in any event be limited to the monies paid to seller for that defective product. The determination of whether the Product is defective shall be made by Seller in its sole discretion with consideration given to the overall performance of the Product. This limited warranty cannot be transferred to subsequent purchasers of the Product, provided that such Product is resold in new condition and in its original packaging. This limited warranty is void if the product is not used for the purpose for which it is designed.

Recommended Soldering Condition

- Please use lead free and “no clean ” solders.
- Soldering shall be implemented using a soldering tip at a temperature lower than 350 °C, and shall be finished within 3.5 seconds for each pad.
- During the soldering process, put the LEDs on materials whose conductivity is poor enough not to radiate heat of soldering.
- Properly solder tin wires before soldering them to LEDs.
- Avoid touching the silicone lens with the soldering iron.
- Please prevent flux from touching to the silicone lens.
- Please solder evenly on each pad.
- Contacts number of a soldering tip should be within twice for each pad.
- Next process of soldering should be carried out after the LEDs have return to ambient temperature.

*ProLight cannot guarantee if usage exceeds these recommended conditions.

Please use it after sufficient verification is carried out on your own risk if absolutely necessary.

Precaution for Use

- The modules light output are intense enough to cause injury to human eyes if viewed directly. Precautions must be taken to avoid looking directly at the modules with unprotected eyes.
- The modules are sensitive to electrostatic discharge. Appropriate ESD protection measures must be taken when working with the modules. Non-compliance with ESD protection measures may lead to damage or destruction of the product.
- Chemical solvents or cleaning agents must not be used to clean the modules. Mechanical stress on the Emitters must be avoided. It is best to use a soft brush, damp cloth or low-pressure compressed air.
- The products should be stored away from direct light in dry location.
- 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.
- Avoid touching the silicone lens and the optical area of the COB Array especially by sharp tools such as Tweezers
- 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.
- Please do not mold over the silicone lens with another resin. (epoxy, urethane, etc)

