

**ProLight PACJ-14FxL-xC2N**  
**14W COB Light-Engine LEDs**  
**Technical Datasheet**  
**Version: 1.2**

# 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

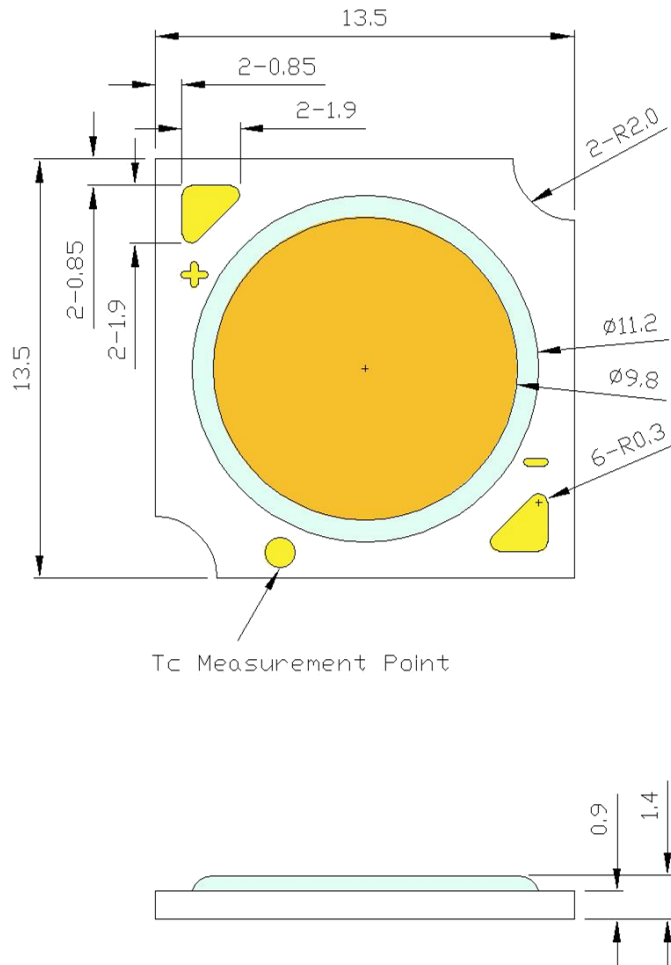
## Main Applications

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

## Introduction

·The input power is 14 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  $\pm 0.30$ 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 Min.	$\Phi_v$ (lm) Typ.	CRI Min.	R9 Min.																																																																																																
Lambertian	White	PACJ-14FWL-AC2N	180*	920	1050	70	-																																																																																																
			360	1625	1860			Neutral White	PACJ-14FNL-AC2N	180*	905	1035	70	-	360	1600	1830	Warm White	PACJ-14FVL-AC2N	180*	860	985	70	-	360	1520	1745	White	PACJ-14FWL-BC2N	180*	900	1030	80	0	360	1590	1825	Neutral White	PACJ-14FNL-BC2N	180*	885	1015	80	0	360	1565	1800	Warm White	PACJ-14FVL-BC2N	180*	840	965	80	0	360	1485	1710	White	PACJ-14FWL-DC2N	180*	720	830	90	50	360	1270	1470	Neutral White	PACJ-14FNL-DC2N	180*	670	810	90	50	360	1180	1430	Warm White	PACJ-14FVL-DC2N	180*	650	790	90	50	360	1160	1390	Neutral White	PACJ-14FNL-EC2N	180*	650	760	95	90	360	1140	1340	Warm White	PACJ-14FVL-EC2N	180*	560	680	95
	Neutral White	PACJ-14FNL-AC2N	180*	905	1035	70	-																																																																																																
			360	1600	1830			Warm White	PACJ-14FVL-AC2N	180*	860	985	70	-	360	1520	1745	White	PACJ-14FWL-BC2N	180*	900	1030	80	0	360	1590	1825	Neutral White	PACJ-14FNL-BC2N	180*	885	1015	80	0	360	1565	1800	Warm White	PACJ-14FVL-BC2N	180*	840	965	80	0	360	1485	1710	White	PACJ-14FWL-DC2N	180*	720	830	90	50	360	1270	1470	Neutral White	PACJ-14FNL-DC2N	180*	670	810	90	50	360	1180	1430	Warm White	PACJ-14FVL-DC2N	180*	650	790	90	50	360	1160	1390	Neutral White	PACJ-14FNL-EC2N	180*	650	760	95	90	360	1140	1340	Warm White	PACJ-14FVL-EC2N	180*	560	680	95	90	360	990	1200						
	Warm White	PACJ-14FVL-AC2N	180*	860	985	70	-																																																																																																
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	White	PACJ-14FWL-BC2N	180*	900	1030	80	0																																																																																																
			360	1590	1825			Neutral White	PACJ-14FNL-BC2N	180*	885	1015	80	0	360	1565	1800	Warm White	PACJ-14FVL-BC2N	180*	840	965	80	0	360	1485	1710	White	PACJ-14FWL-DC2N	180*	720	830	90	50	360	1270	1470	Neutral White	PACJ-14FNL-DC2N	180*	670	810	90	50	360	1180	1430	Warm White	PACJ-14FVL-DC2N	180*	650	790	90	50	360	1160	1390	Neutral White	PACJ-14FNL-EC2N	180*	650	760	95	90	360	1140	1340	Warm White	PACJ-14FVL-EC2N	180*	560	680	95	90	360	990	1200																										
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			360	1565	1800			Warm White	PACJ-14FVL-BC2N	180*	840	965	80	0	360	1485	1710	White	PACJ-14FWL-DC2N	180*	720	830	90	50	360	1270	1470	Neutral White	PACJ-14FNL-DC2N	180*	670	810	90	50	360	1180	1430	Warm White	PACJ-14FVL-DC2N	180*	650	790	90	50	360	1160	1390	Neutral White	PACJ-14FNL-EC2N	180*	650	760	95	90	360	1140	1340	Warm White	PACJ-14FVL-EC2N	180*	560	680	95	90	360	990	1200																																				
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	White	PACJ-14FWL-DC2N	180*	720	830	90	50																																																																																																
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	Warm White	PACJ-14FVL-DC2N	180*	650	790	90	50																																																																																																
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Neutral White	PACJ-14FNL-EC2N	180*	650	760	95	90																																																																																																	
		360	1140	1340			Warm White	PACJ-14FVL-EC2N	180*	560	680	95	90	360	990	1200																																																																																							
Warm White	PACJ-14FVL-EC2N	180*	560	680	95	90																																																																																																	
		360	990	1200																																																																																																			

- 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  $\pm 2$  on CRI measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

## Electrical Characteristics at 180mA, $T_c = 25^\circ\text{C}$

Color	Forward Voltage $V_F$ (V)			Thermal Resistance Junction to Board ( $^\circ\text{C}/\text{W}$ )
	Min.	Typ.	Max.	
White	33.7	36.0	38.3	2.4
Neutral White	33.7	36.0	38.3	2.4
Warm White	33.7	36.0	38.3	2.4

- ProLight maintains a tolerance of  $\pm 1\text{V}$  for Voltage measurements.

## Optical Characteristics at 180mA, $T_c = 25^\circ\text{C}$

Color	Bin Code	Color Temperature CCT			Total included Angle (degrees) $\theta_{0.90\text{V}}$	Viewing Angle (degrees) $2\theta_{1/2}$
		Min.	Typ.	Max.		
White	V0	4840 K	5000 K	5230 K	160	120
	W0	5400 K	5700 K	5910 K	160	120
	X0	6250 K	6500 K	6840 K	160	120
Neutral White	S0	3890 K	4000 K	4080 K	160	120
	M0	2660 K	2700 K	2790 K	160	120
Warm White	N0	2970 K	3000 K	3110 K	160	120
	Q0	3380 K	3500 K	3550 K	160	120

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

## Supply Specifications

Part Number	CRI	Color Bin Code						
		V0	W0	X0	S0	M0	N0	Q0
PACJ-14FxL-AC2N	70	V			V	V		
PACJ-14FxL-BC2N	80	V	V	V	V	V	V	V
PACJ-14FxL-DC2N	90	V			V	V	V	V
PACJ-14FxL-EC2N	95				V	V	V	

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

$I_F$ (mA)	$V_F$ (V)	Power (W)	PACJ-14FWL-AC2N		PACJ-14FNL-AC2N		PACJ-14FVL-AC2N	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
120	34.63	4.16	780	187.5	770	185.1	732	175.9
180*	36.00	6.48	1050	162.0	1035	159.7	985	152.0
240	37.23	8.94	1320	147.7	1300	145.4	1238	138.5
300	38.42	11.53	1590	137.9	1565	135.7	1492	129.4
360	39.53	14.23	1860	130.7	1830	128.6	1745	122.6
$I_F$ (mA)	$V_F$ (V)	Power (W)	PACJ-14FWL-BC2N		PACJ-14FNL-BC2N		PACJ-14FVL-BC2N	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
120	34.63	4.16	765	183.9	753	181.1	717	172.3
180*	36.00	6.48	1030	159.0	1015	156.6	965	148.9
240	37.23	8.94	1295	144.9	1277	142.8	1213	135.7
300	38.42	11.53	1560	135.3	1538	133.4	1462	126.8
360	39.53	14.23	1825	128.3	1800	126.5	1710	120.2
$I_F$ (mA)	$V_F$ (V)	Power (W)	PACJ-14FWL-DC2N		PACJ-14FNL-DC2N		PACJ-14FVL-DC2N	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
120	34.63	4.16	617	148.2	603	145.0	590	141.8
180*	36.00	6.48	830	128.1	810	125.0	790	121.9
240	37.23	8.94	1043	116.7	1017	113.7	990	110.7
300	38.42	11.53	1257	109.0	1223	106.1	1190	103.2
360	39.53	14.23	1470	103.3	1430	100.5	1390	97.7
$I_F$ (mA)	$V_F$ (V)	Power (W)	PACJ-14FNL-EC2N		PACJ-14FVL-EC2N			
			Flux (lm)	lm/W	Flux (lm)	lm/W		
120	34.63	4.16	567	136.2	507	121.8		
180*	36.00	6.48	760	117.3	680	104.9		
240	37.23	8.94	953	106.6	853	95.5		
300	38.42	11.53	1147	99.5	1027	89.0		
360	39.53	14.23	1340	94.2	1200	84.3		

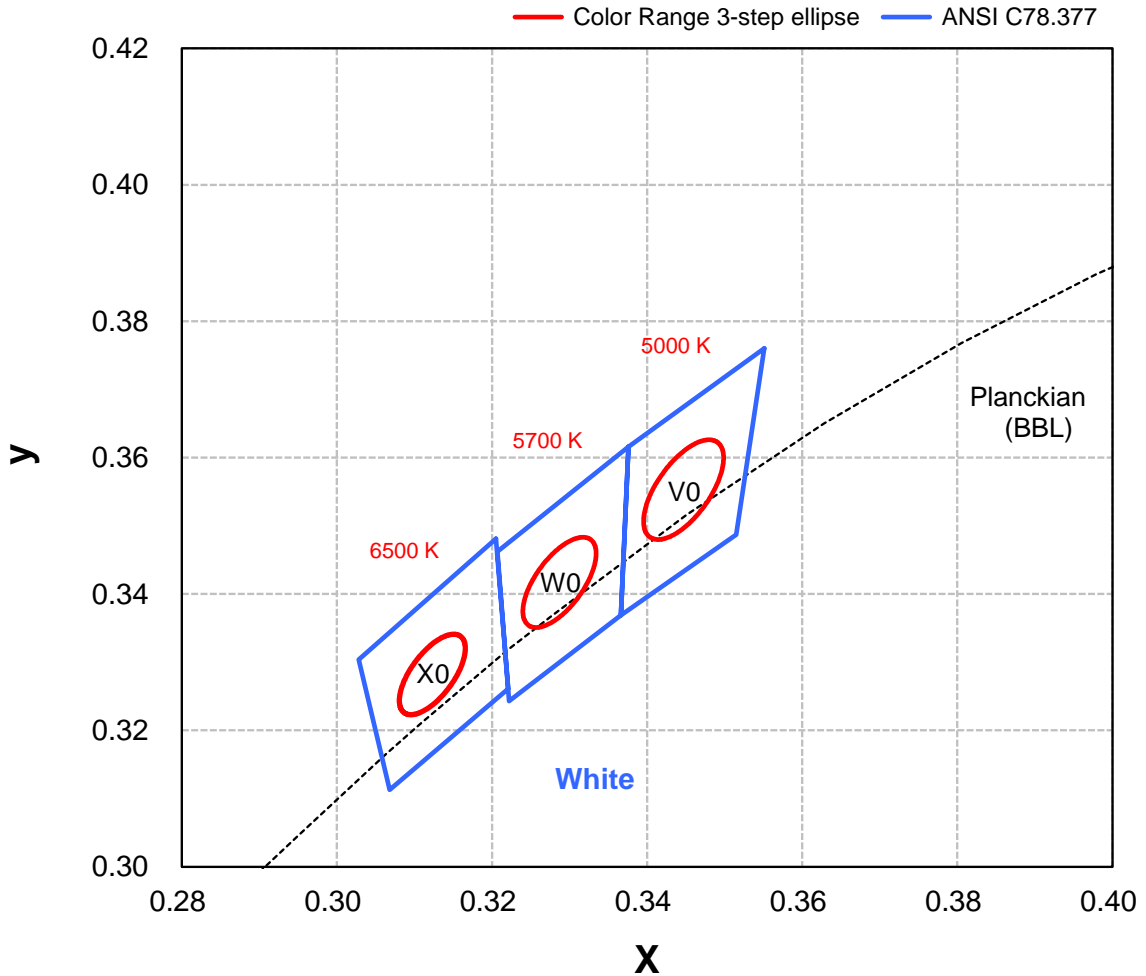
● All values are reference only.

## Absolute Maximum Ratings

Parameter	White/Neutral White/Warm White
Max DC Forward Current (mA)	360
Max Voltage at 360mA	42
Peak Pulsed Forward Current (mA)	540 (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



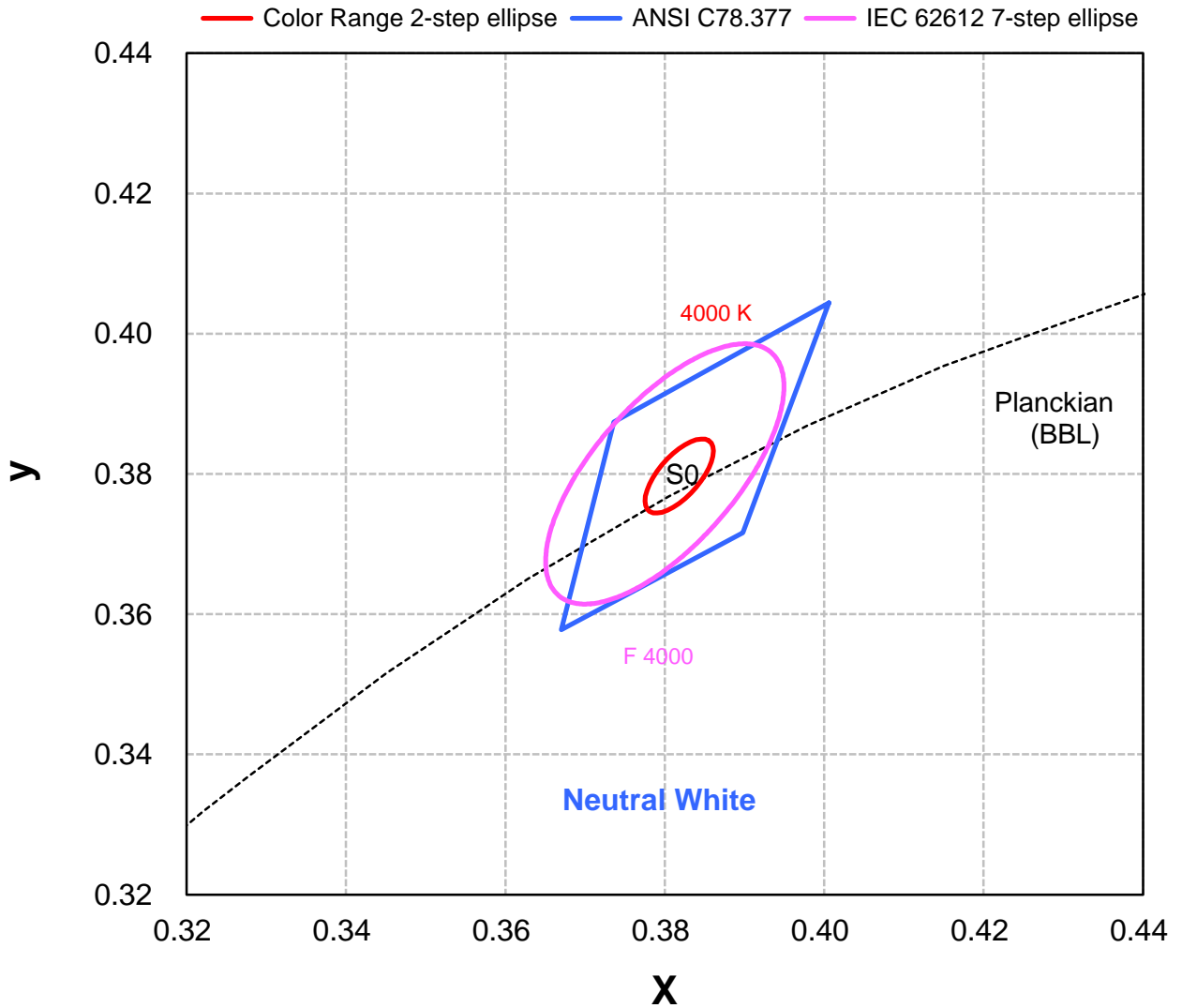
#### White Bin Structure

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  $\pm 0.005$

## Color Bin

### Neutral White Binning Structure Graphical Representation



#### Neutral White Bin Structure

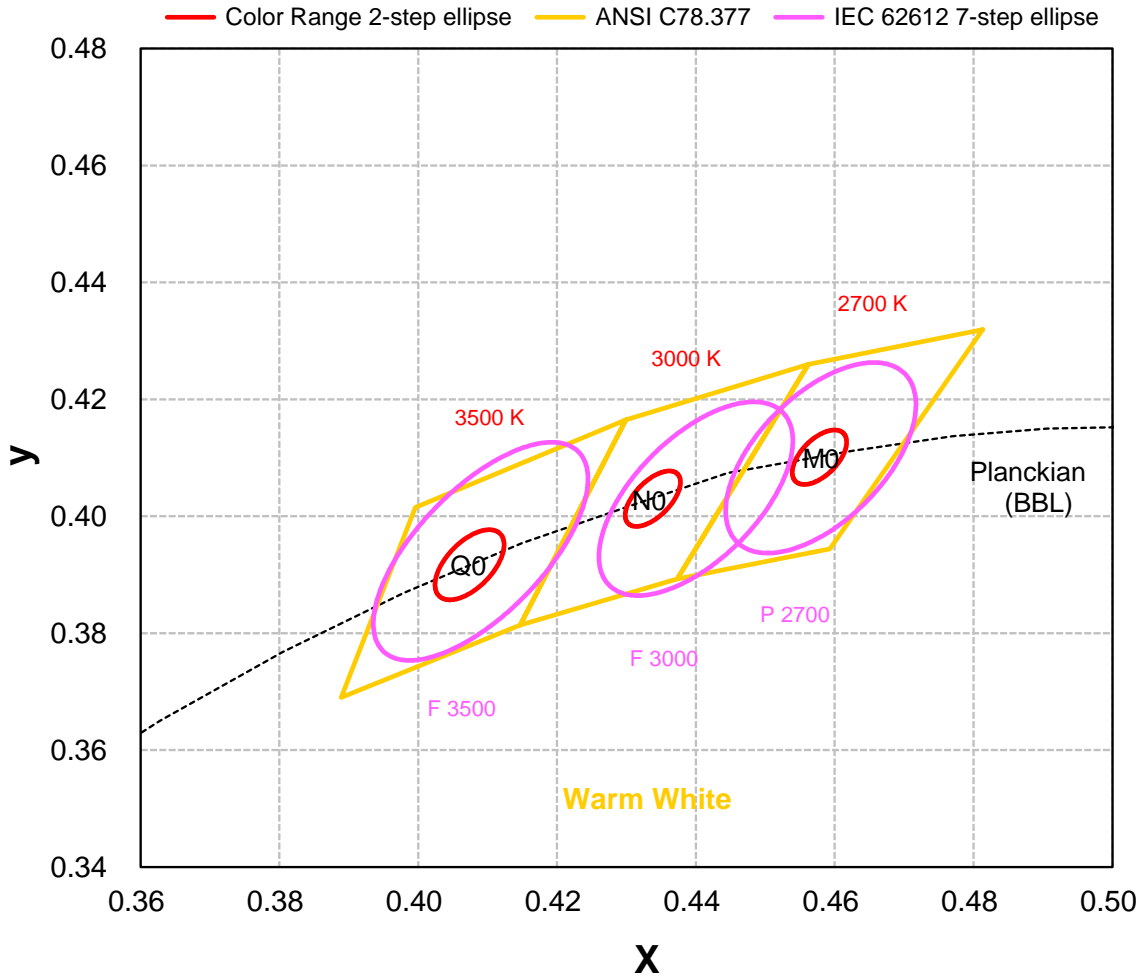
Bin Code	Center	Oval parameter	Typ. CCT (K)
S0	x	0.3818	4000
	y	0.3797	
	a	0.00626	
	b	0.00268	
		e°	53.72

- 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  $\pm 0.005$



## Color Bin

### Warm White Binning Structure Graphical Representation



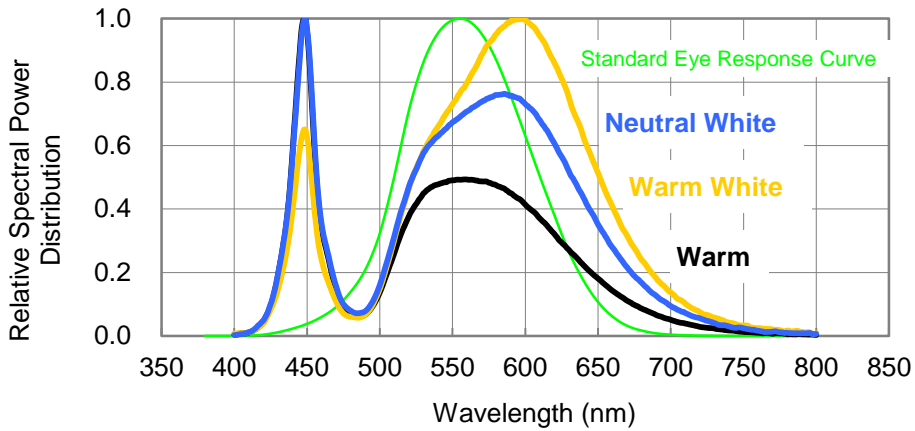
#### Warm White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)	Bin Code	Center	Oval parameter	Typ. CCT (K)
M0	x	a	2700	Q0	x	a	3500
	y	b			y	b	
		e°				e°	
N0	x	a	3000				
	y	b					
		e°					

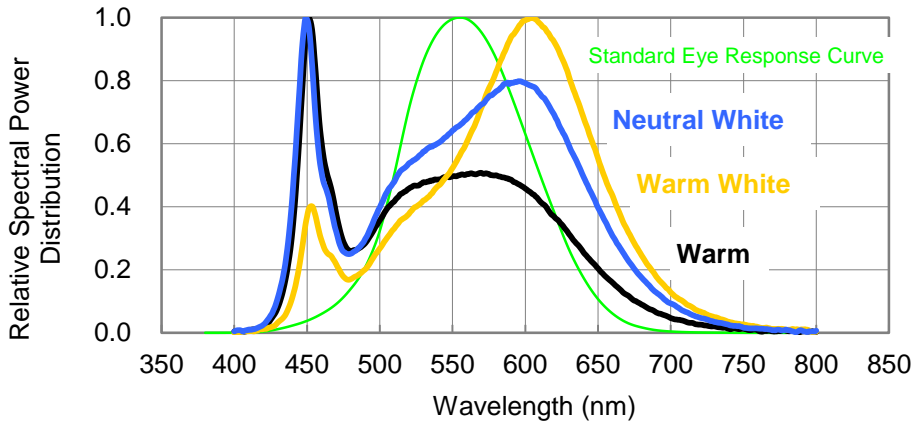
- Color range stay within MacAdam “2-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is  $\pm 0.005$

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

1. PACJ-14WL-AC2N 、 PACJ-14FNL-AC2N 、 PACJ-14FVL-AC2N

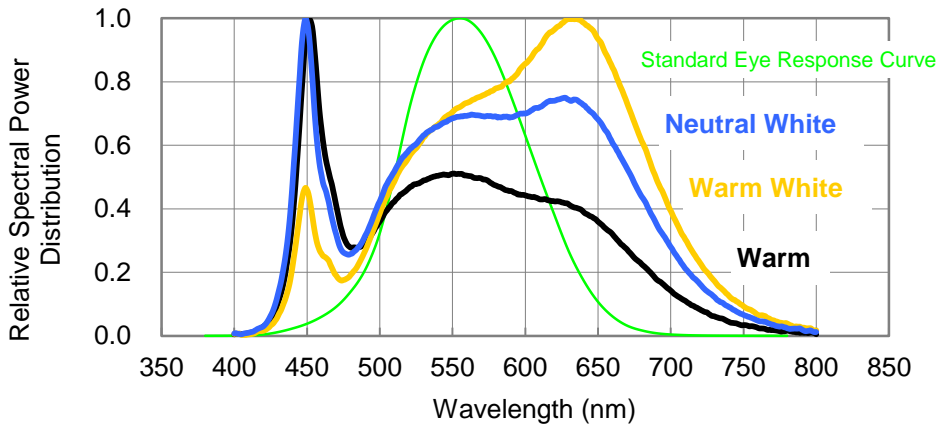


2. PACJ-14FWL-BC2N 、 PACJ-14FNL-BC2N 、 PACJ-14FVL-BC2N

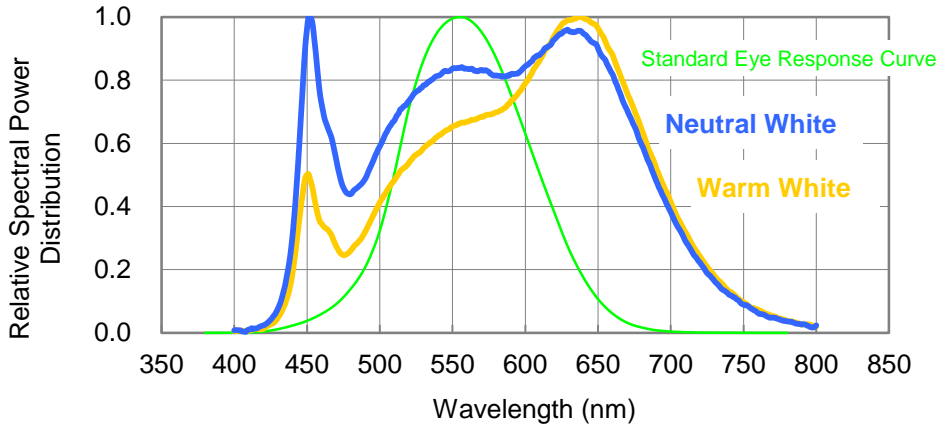


## Color Spectrum, $T_c = 25^\circ\text{C}$

3. PACJ-14FWL-DC2N 、 PACJ-14FNL-DC2N 、 PACJ-14FVL-DC2N



4. PACJ-14FNL-EC2N 、 PACJ-14FVL-EC2N



## Case Temperature Relative Characteristics

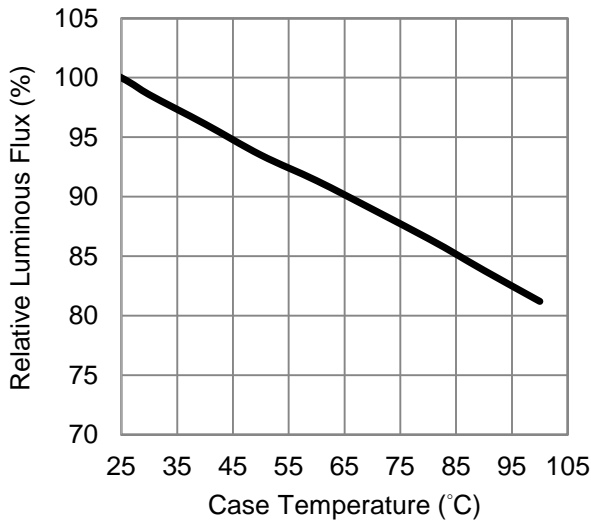


Fig 1. Case Temperature vs. Relative Luminous Flux at 180mA.

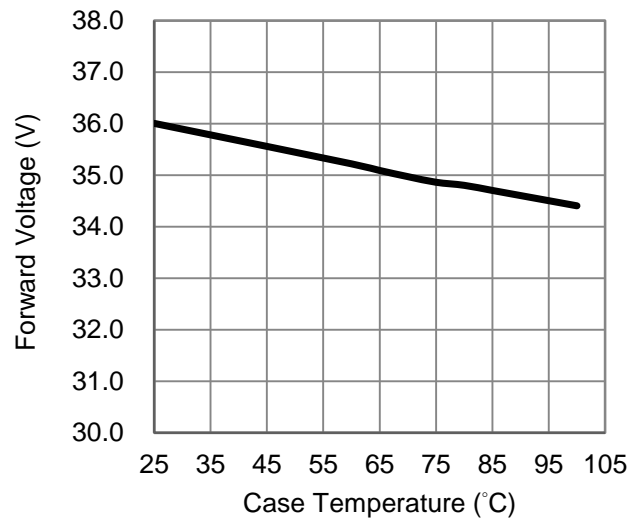


Fig 2. Case Temperature vs. Forward Voltage at 180mA.

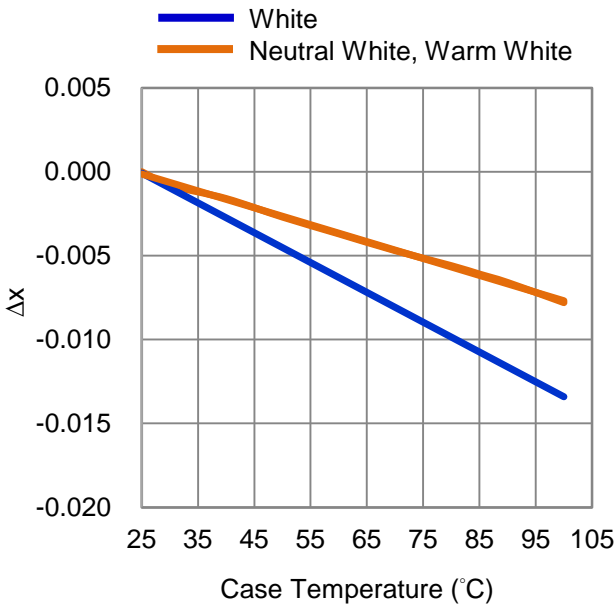


Fig 3. Case Temperature vs. Chromaticity Coordinate  $\Delta x$  at 180mA.

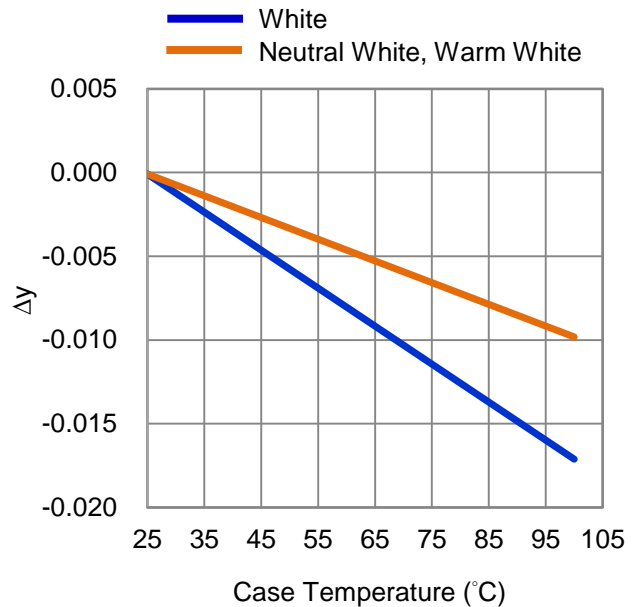


Fig 4. Case Temperature vs. Chromaticity Coordinate  $\Delta y$  at 180mA.

## Forward Current Relative Characteristics

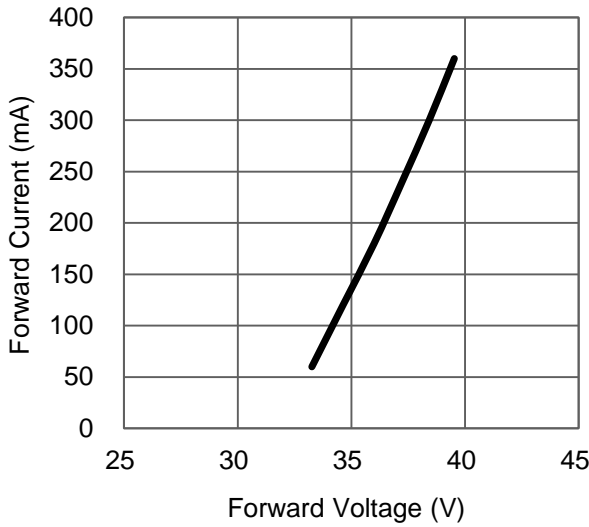


Fig 5. Forward Current vs. Forward Voltage at  $T_C=25^\circ\text{C}$ .

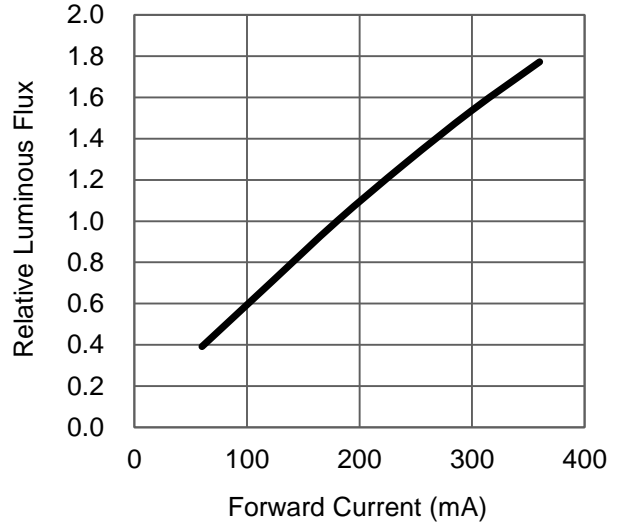


Fig 6. Forward Current vs. Relative Luminous Flux at  $T_C=25^\circ\text{C}$ .

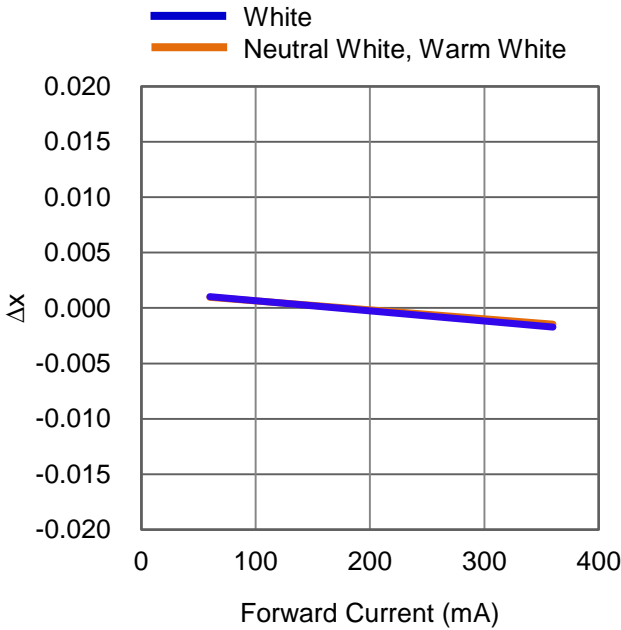


Fig 7. Forward Current vs. Chromaticity Coordinate  $\Delta x$  at  $T_C=25^\circ\text{C}$ .

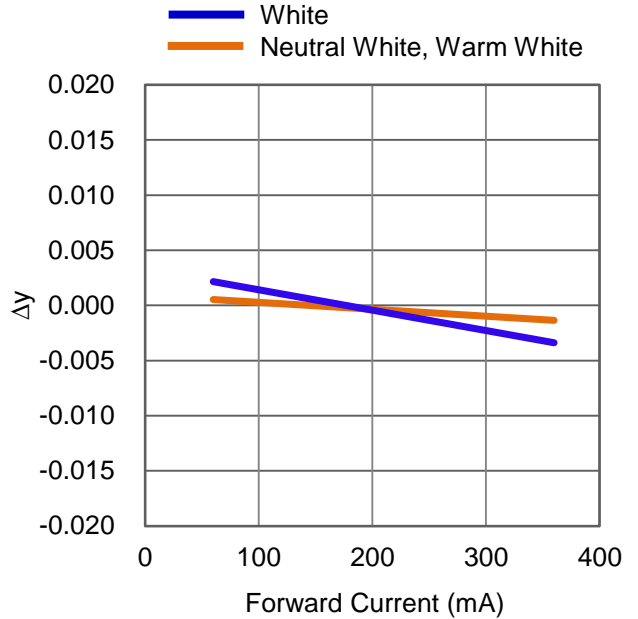


Fig 8. Forward Current vs. Chromaticity Coordinate  $\Delta y$  at  $T_C=25^\circ\text{C}$ .

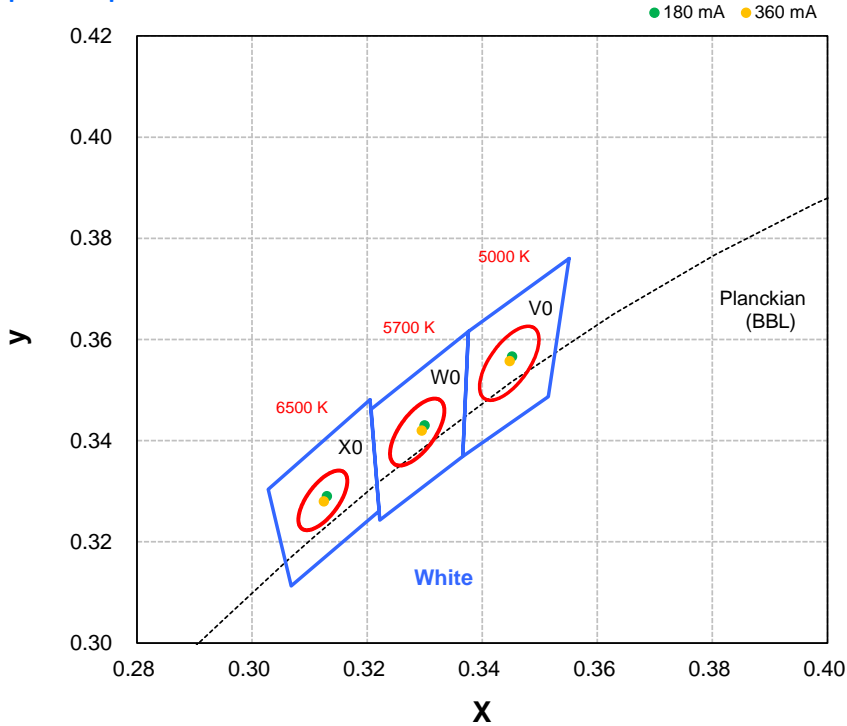
## Case Temperature vs. Junction Temperature Characteristics

T <sub>c</sub> (°C)	T <sub>j</sub> (°C)	
	180 (mA)	360 (mA)
0	16	34
5	21	39
10	26	44
15	31	49
20	36	54
25	41	59
30	46	64
35	51	69
40	56	74
45	61	79
50	66	84
55	71	89
60	76	94
65	81	99
70	86	104
75	91	109
80	96	114
85	101	119
90	106	124

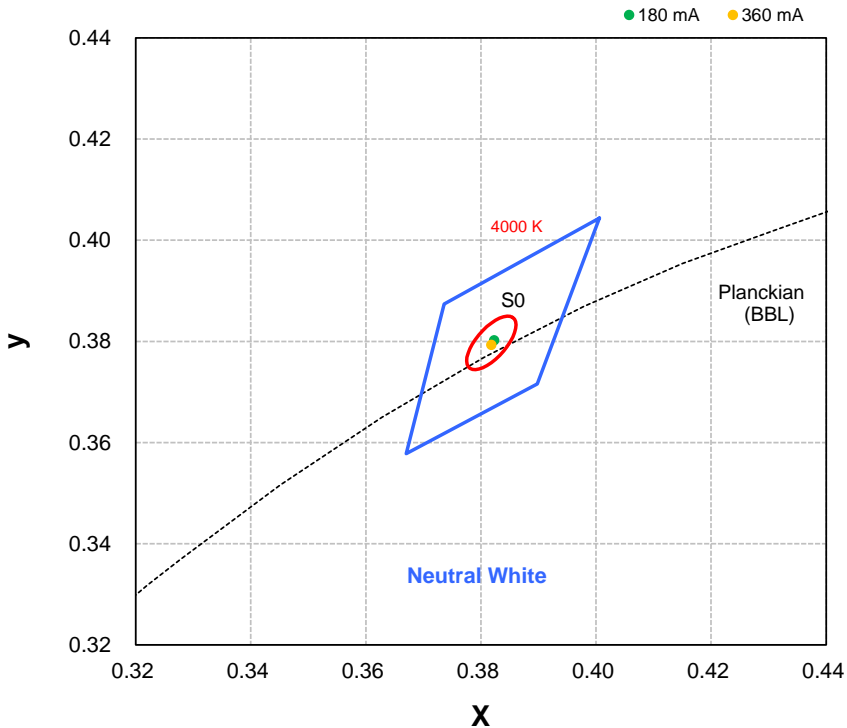
Fig 9. Case Temperature vs. Junction Temperature at 180 ~ 360mA.

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

### White Binning Graphical Representation

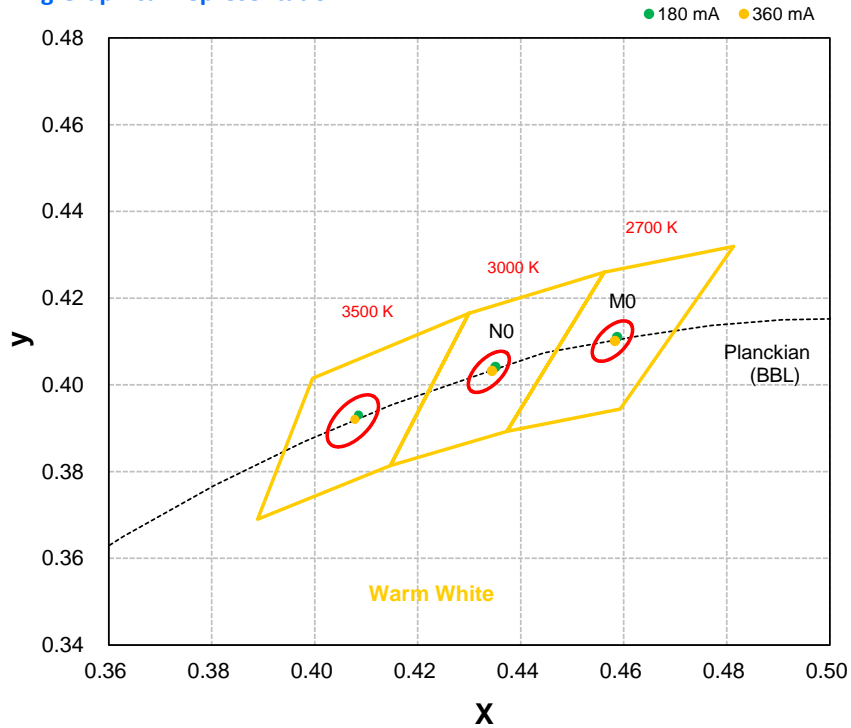


### Neutral White Binning Graphical Representation



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

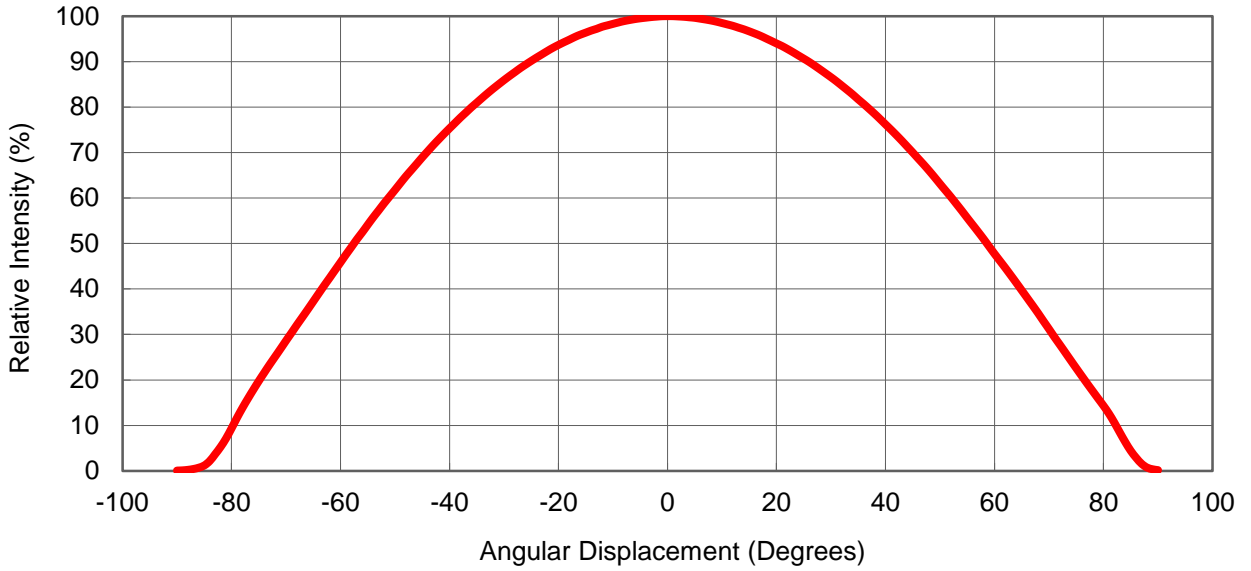
### Warm White Binning Graphical Representation



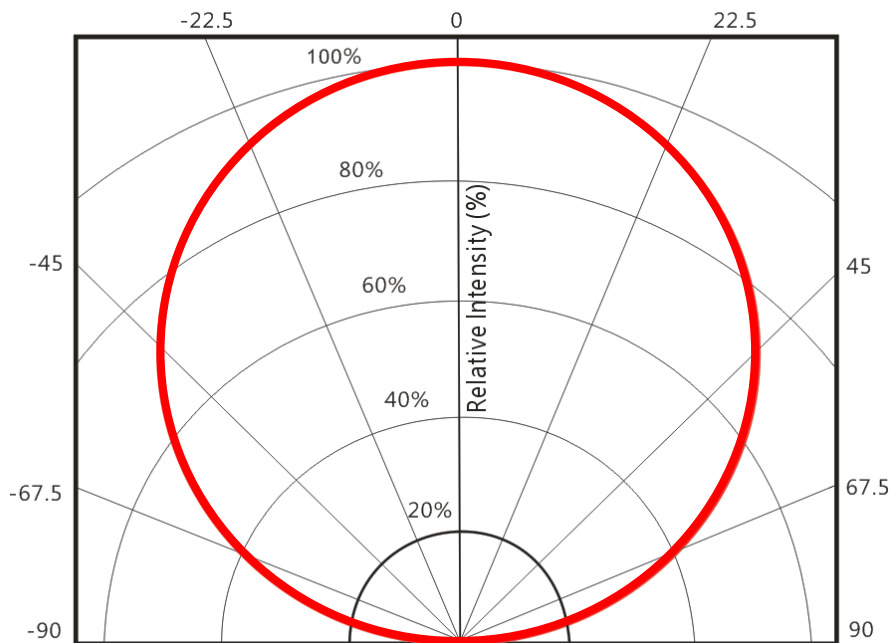


# Typical Representative Spatial Radiation Pattern

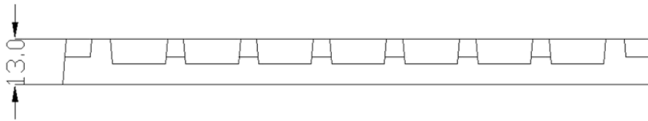
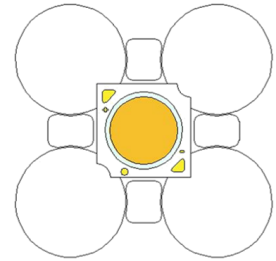
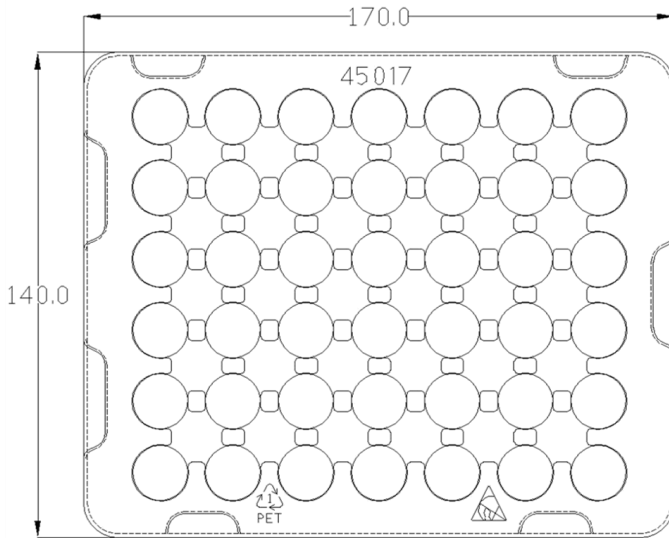
## Lambertian Radiation Pattern



## 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**.

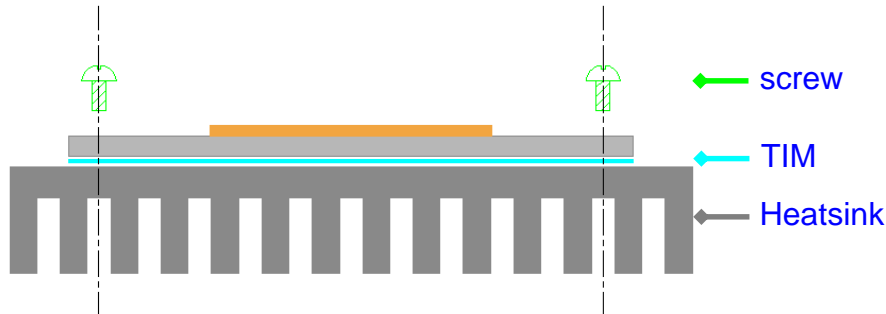


Fig 10. Reference assembly as fixing with screws

## 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)

