



**ProLight PACL-78FxL-xCBN**  
**78W 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

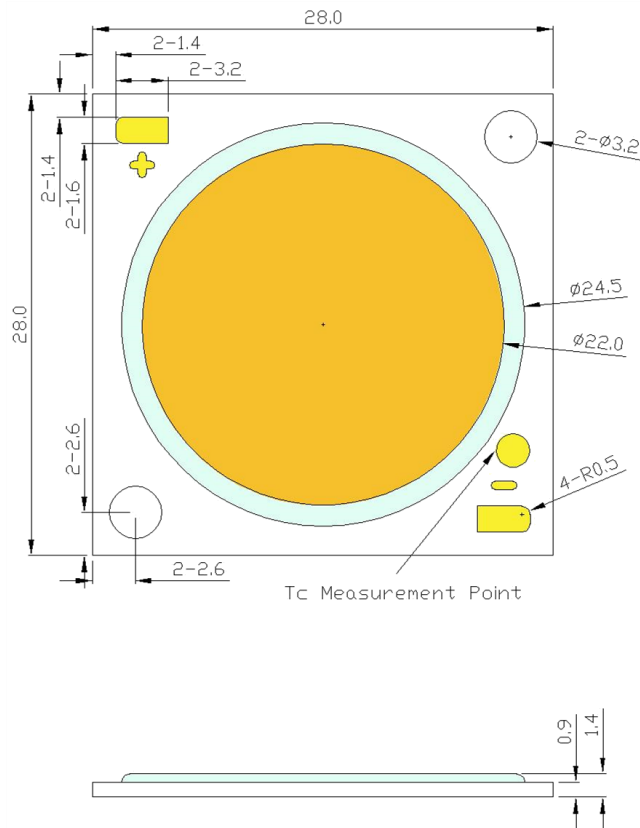
## Main Applications

- Stadium light
- Street light
- High Bay
- Spot light
- Flood light
- Low Bay

## Introduction

·The input power is 78 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 High Bay, typical applications include, Flood light, Spot light, Stadium light, Low Bay and Street light.

## 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	PACL-78FWL-ACBN	990*	4935	5760	70	-
			1980	8735	10195		
	Neutral White	PACL-78FNL-ACBN	990*	4850	5665	70	-
			1980	8585	10025		
	Warm White	PACL-78FVL-ACBN	990*	4660	5440	70	-
			1980	8250	9630		
	White	PACL-78FWL-BCBN	990*	4835	5645	80	0
			1980	8560	9990		
	Neutral White	PACL-78FNL-BCBN	990*	4750	5555	80	0
			1980	8405	9830		
	Warm White	PACL-78FVL-BCBN	990*	4565	5335	80	0
			1980	8080	9440		
	White	PACL-78FWL-DCBN	990*	4255	4965	90	50
			1980	7490	8740		
	Neutral White	PACL-78FNL-DCBN	990*	4180	4885	90	50
			1980	7355	8600		
	Warm White	PACL-78FVL-DCBN	990*	4015	4690	90	50
			1980	7065	8255		
Neutral White	PACL-78FNL-ECBN	990*	3720	4230	95	90	
		1980	6545	7445			
Warm White	PACL-78FVL-ECBN	990*	3530	4130	95	90	
		1980	6210	7270			

- 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 990mA, $T_c = 25^\circ\text{C}$

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	0.38
Neutral White	33.7	36.0	38.3	0.38
Warm White	33.7	36.0	38.3	0.38

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

## Optical Characteristics at 990mA, $T_c = 25^\circ\text{C}$

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	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  $\pm 5\%$  for CCT measurements.

## Supply Specifications

Part Number	CRI	Color Bin Code						
		V0	W0	X0	S0	M0	N0	Q0
PACL-78F <sub>x</sub> L-ACBN	70	V			V	V		
PACL-78F <sub>x</sub> L-BCBN	80	V	V	V	V	V	V	V
PACL-78F <sub>x</sub> L-DCBN	90	V			V	V	V	V
PACL-78F <sub>x</sub> L-ECBN	95				V	V	V	

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

$I_F$ (mA)	$V_F$ (V)	Power (W)	PACL-78FWL-ACBN		PACL-78FNL-ACBN		PACL-78FVL-ACBN	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
660	34.63	22.86	4282	187.3	4212	184.3	4043	176.9
990*	36.00	35.64	5760	161.6	5665	159.0	5440	152.6
1320	37.23	49.14	7238	147.3	7118	144.8	6837	139.1
1650	38.42	63.39	8717	137.5	8572	135.2	8233	129.9
1980	39.53	78.27	10195	130.3	10025	128.1	9630	123.0
$I_F$ (mA)	$V_F$ (V)	Power (W)	PACL-78FWL-BCBN		PACL-78FNL-BCBN		PACL-78FVL-BCBN	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
660	34.63	22.86	4197	183.6	4130	180.7	3967	173.6
990*	36.00	35.64	5645	158.4	5555	155.9	5335	149.7
1320	37.23	49.14	7093	144.3	6980	142.0	6703	136.4
1650	38.42	63.39	8542	134.7	8405	132.6	8072	127.3
1980	39.53	78.27	9990	127.6	9830	125.6	9440	120.6
$I_F$ (mA)	$V_F$ (V)	Power (W)	PACL-78FWL-DCBN		PACL-78FNL-DCBN		PACL-78FVL-DCBN	
			Flux (lm)	lm/W	Flux (lm)	lm/W	Flux (lm)	lm/W
660	34.63	22.86	3707	162.2	3647	159.6	3502	153.2
990*	36.00	35.64	4965	139.3	4885	137.1	4690	131.6
1320	37.23	49.14	6223	126.6	6123	124.6	5878	119.6
1650	38.42	63.39	7482	118.0	7362	116.1	7067	111.5
1980	39.53	78.27	8740	111.7	8600	109.9	8255	105.5
$I_F$ (mA)	$V_F$ (V)	Power (W)	PACL-78FNL-ECBN		PACL-78FVL-ECBN			
			Flux (lm)	lm/W	Flux (lm)	lm/W		
660	34.63	22.86	3158	138.2	3083	134.9		
990*	36.00	35.64	4230	118.7	4130	115.9		
1320	37.23	49.14	5302	107.9	5177	105.3		
1650	38.42	63.39	6373	100.5	6223	98.2		
1980	39.53	78.27	7445	95.1	7270	92.9		

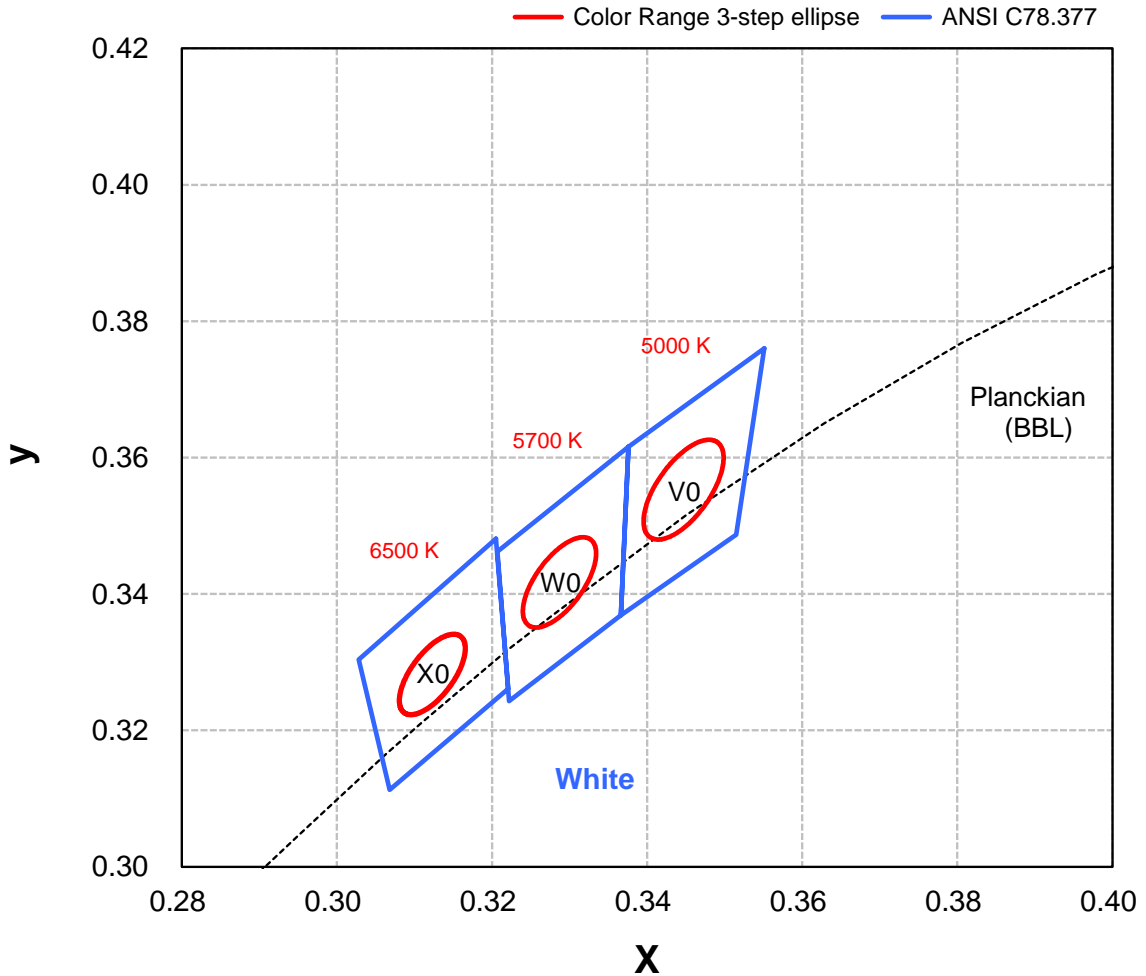
● All values are reference only.

## Absolute Maximum Ratings

Parameter	White/Neutral White/Warm White
Max DC Forward Current (mA)	1980
Max Voltage at 1980mA	42
Peak Pulsed Forward Current (mA)	2970 (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



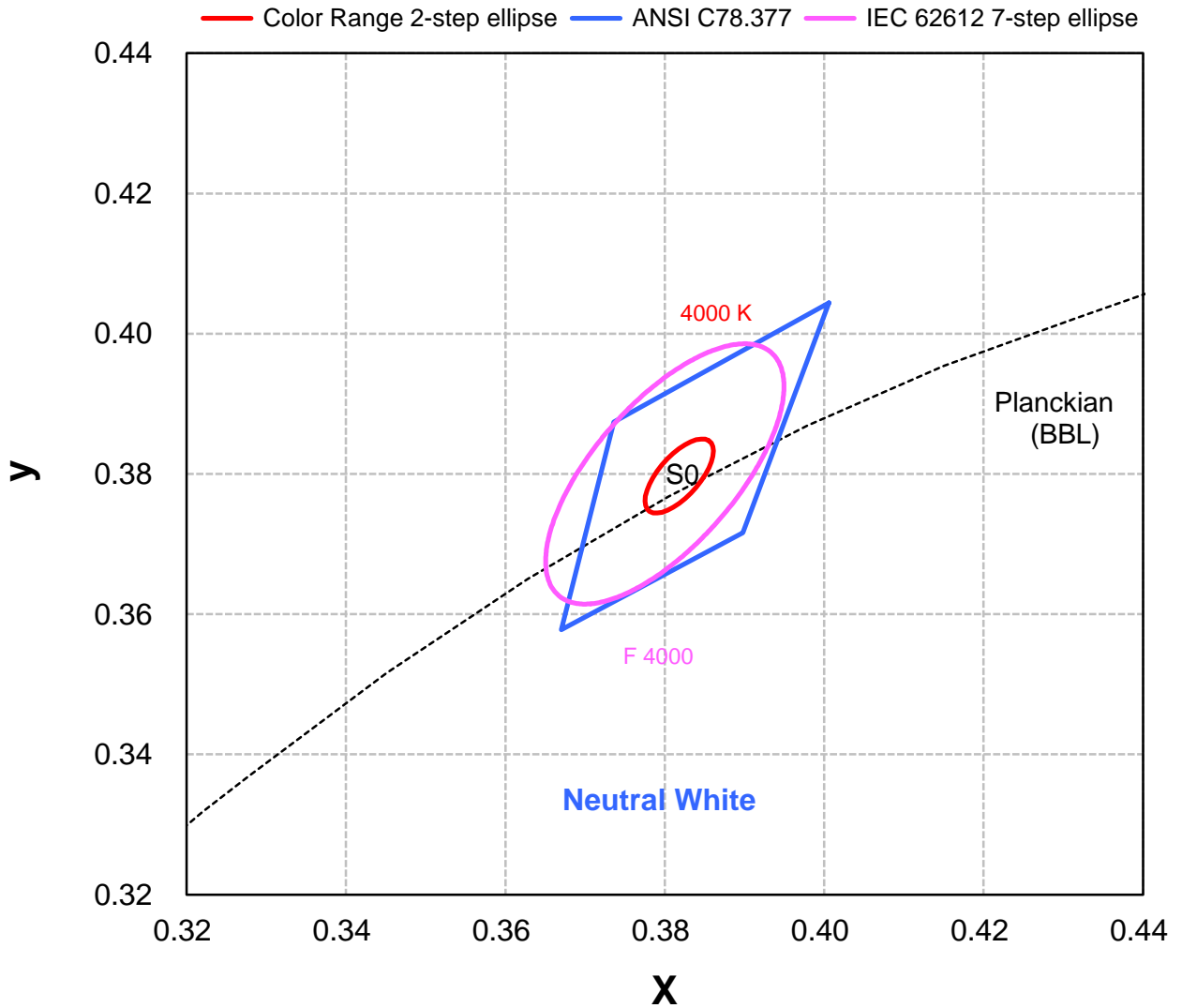
#### White Bin Structure

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

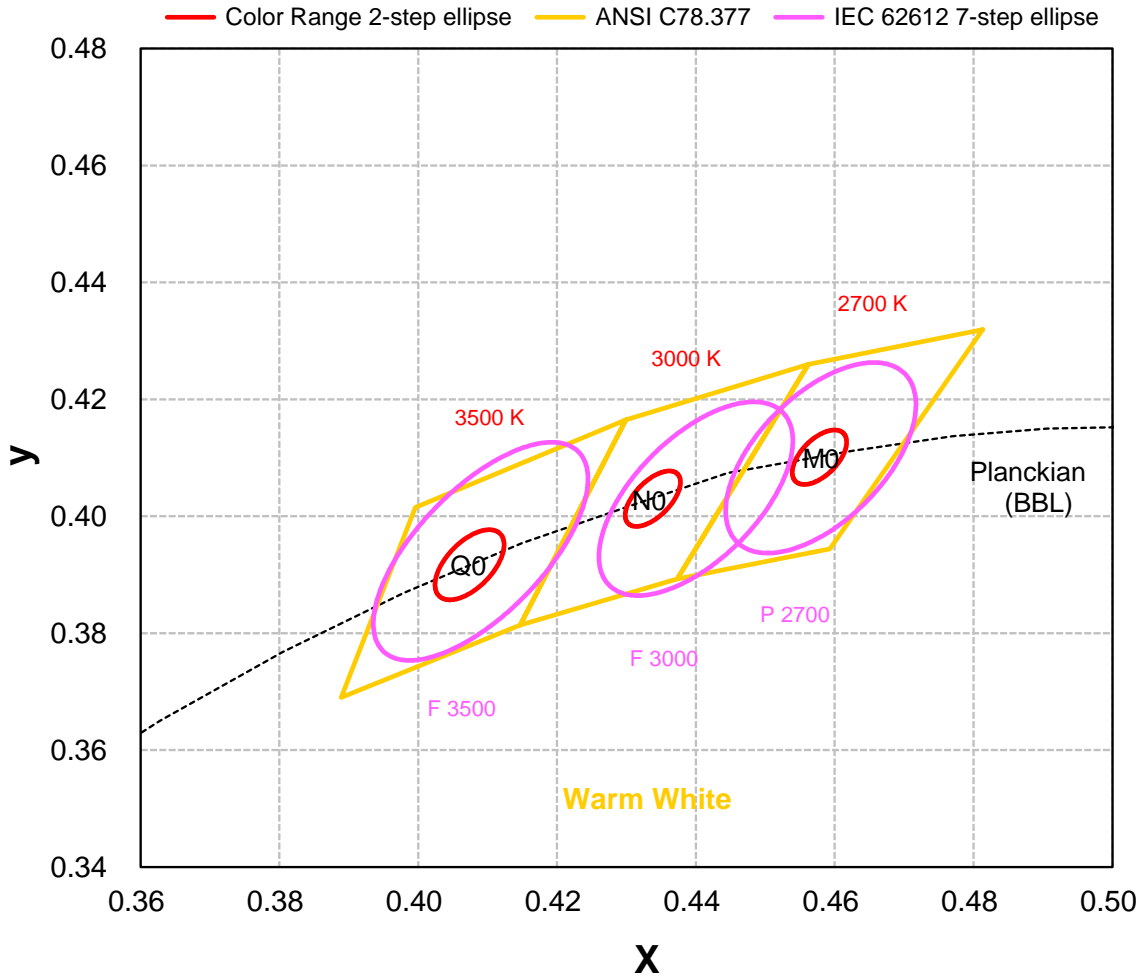
Bin Code	Center	Oval parameter	Typ. CCT (K)
S0	x	0.3818	4000
	y	0.3797	
	a	0.00626	
	b	0.00268	
		e°	53.72

- 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



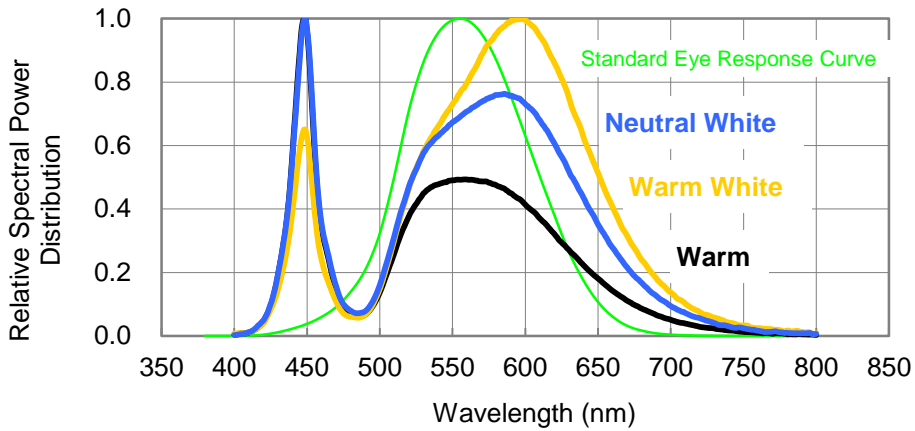
#### Warm White Bin Structure

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°					

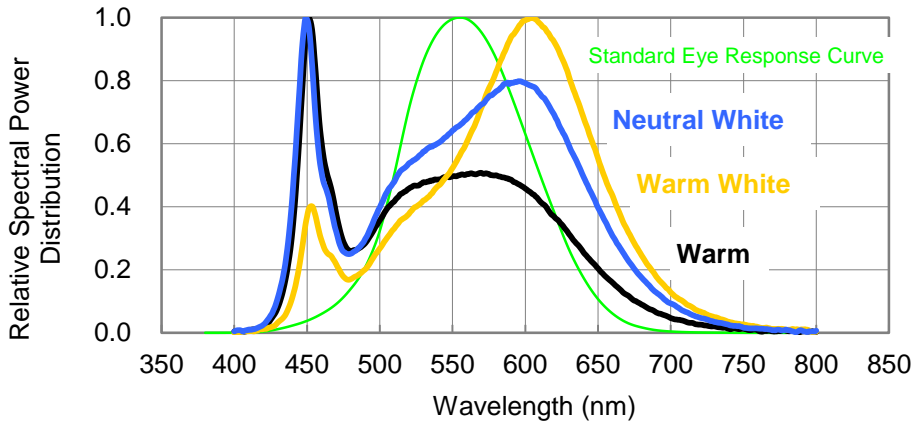
- Color range stay within MacAdam “2-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is  $\pm 0.005$

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

### 1. PACL-78FWL-ACBN、PACL-78FNL-ACBN、PACL-78FVL-ACBN

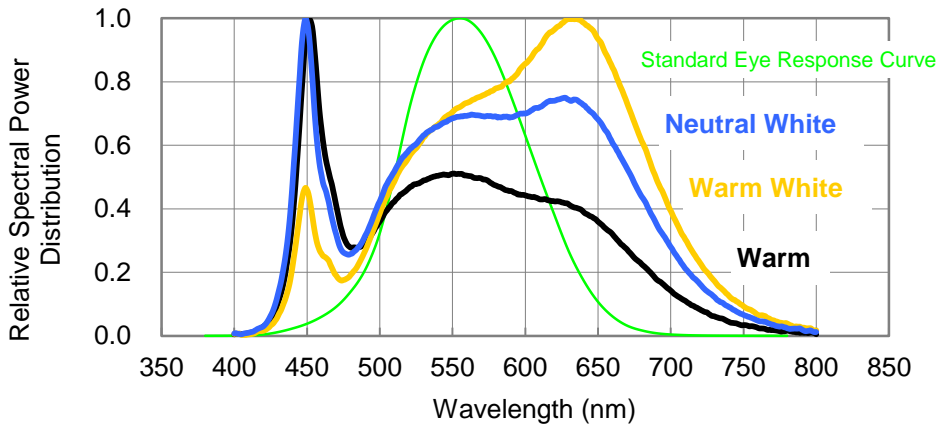


### 2. PACL-78FWL-BCBN、PACL-78FNL-BCBN、PACL-78FVL-BCBN

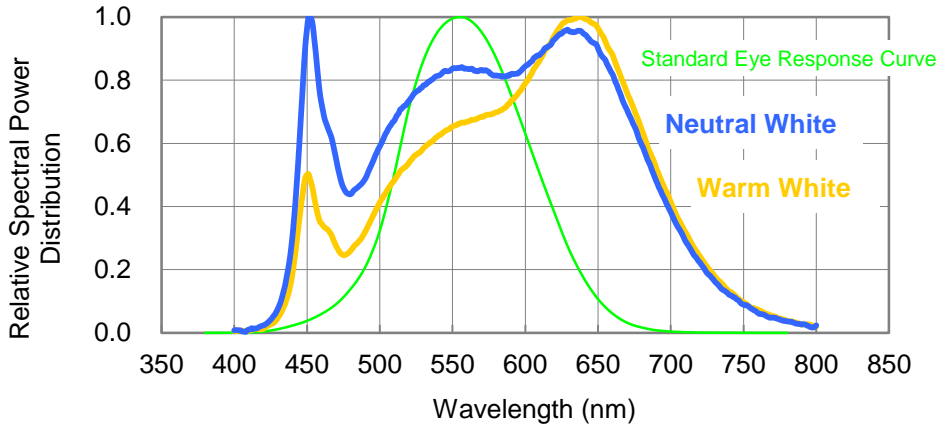


## Color Spectrum, $T_c = 25^\circ\text{C}$

### 3. PACL-78FWL-DCBN、PACL-78FNL-DCBN、PACL-78FVL-DCBN



### 4. PACL-78FNL-ECBN、PACL-78FVL-ECBN



## Case Temperature Relative Characteristics

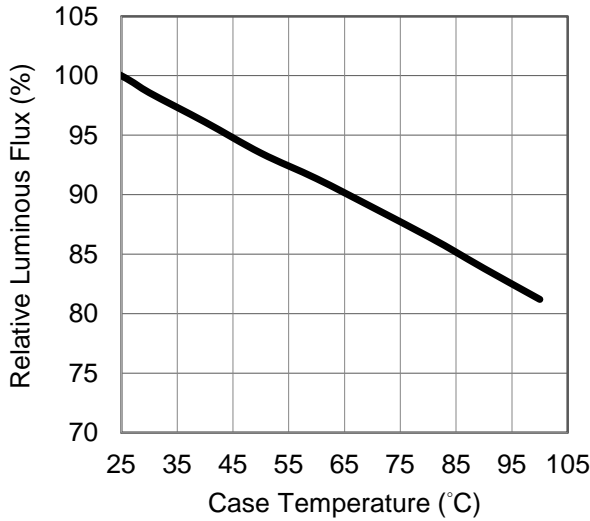


Fig 1. Case Temperature vs. Relative Luminous Flux at 990mA.

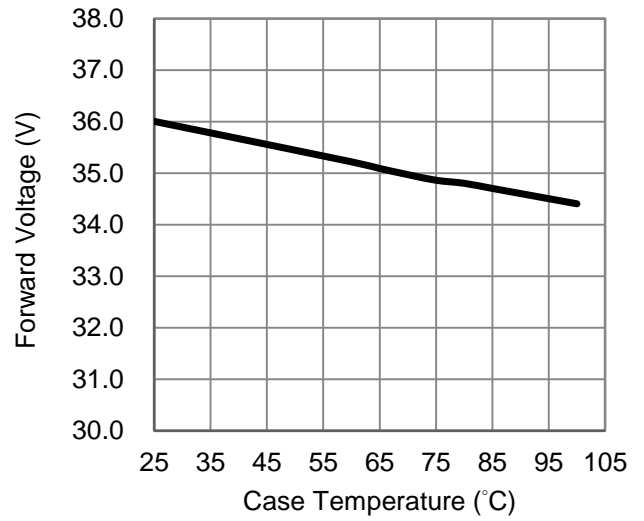


Fig 2. Case Temperature vs. Forward Voltage at 990mA.

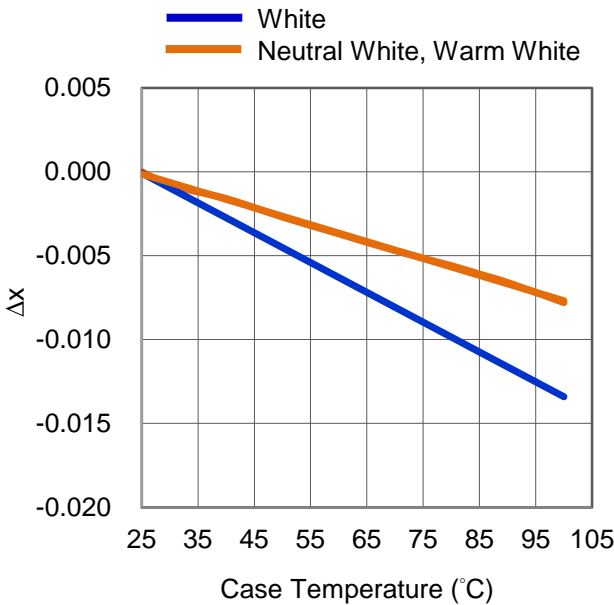


Fig 3. Case Temperature vs. Chromaticity Coordinate  $\Delta x$  at 990mA.

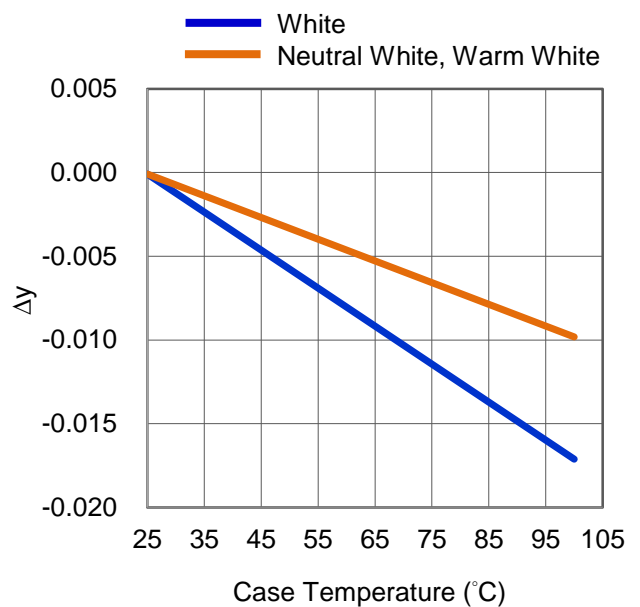


Fig 4. Case Temperature vs. Chromaticity Coordinate  $\Delta y$  at 990mA.

## Forward Current Relative Characteristics

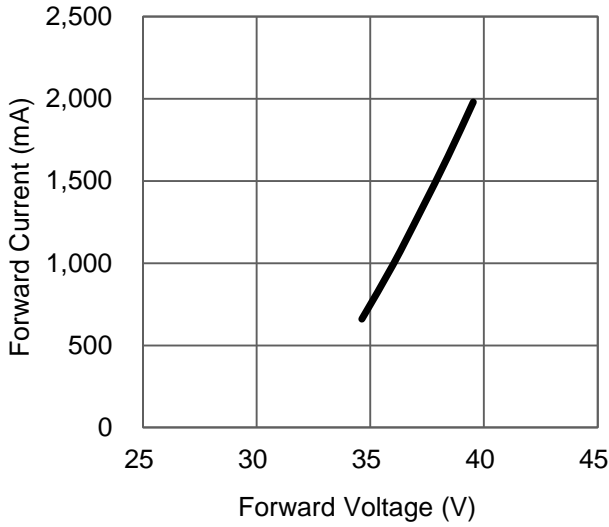


Fig 5. Forward Current vs. Forward Voltage at  $T_C=25^\circ\text{C}$ .

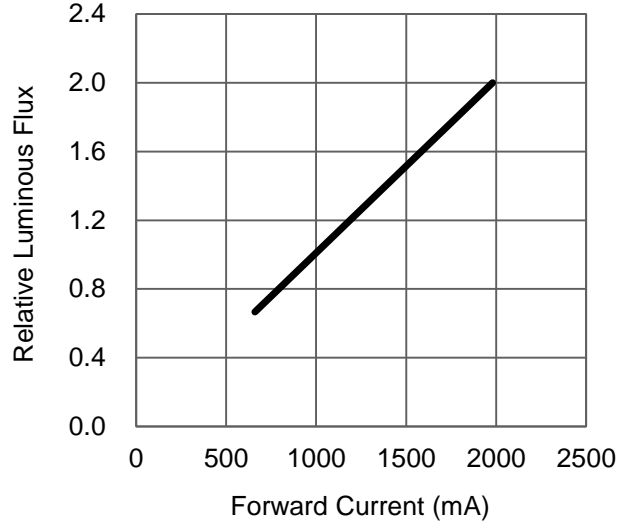


Fig 6. Forward Current vs. Relative Luminous Flux at  $T_C=25^\circ\text{C}$ .

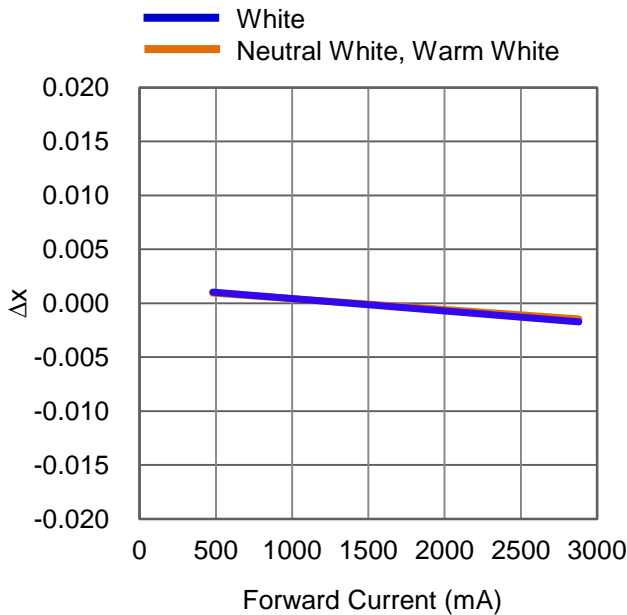


Fig 7. Forward Current vs. Chromaticity Coordinate  $\Delta x$  at  $T_C=25^\circ\text{C}$ .

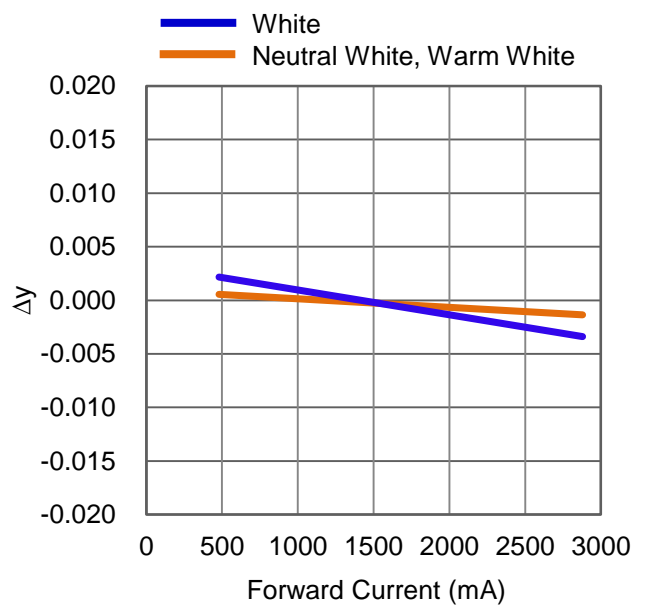


Fig 8. Forward Current vs. Chromaticity Coordinate  $\Delta y$  at  $T_C=25^\circ\text{C}$ .

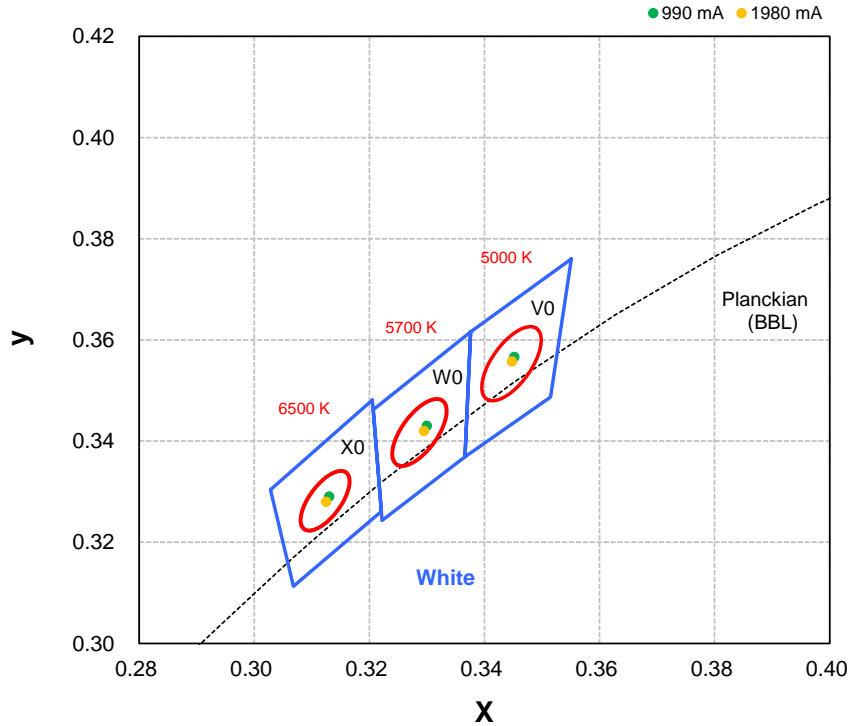
## Case Temperature vs. Junction Temperature Characteristics

T <sub>c</sub> (°C)	T <sub>j</sub> (°C)	
	990 (mA)	1980 (mA)
0	15	30
10	25	40
20	35	50
30	45	60
40	55	70
50	65	80
60	75	90
70	85	100
80	95	110
90	105	120

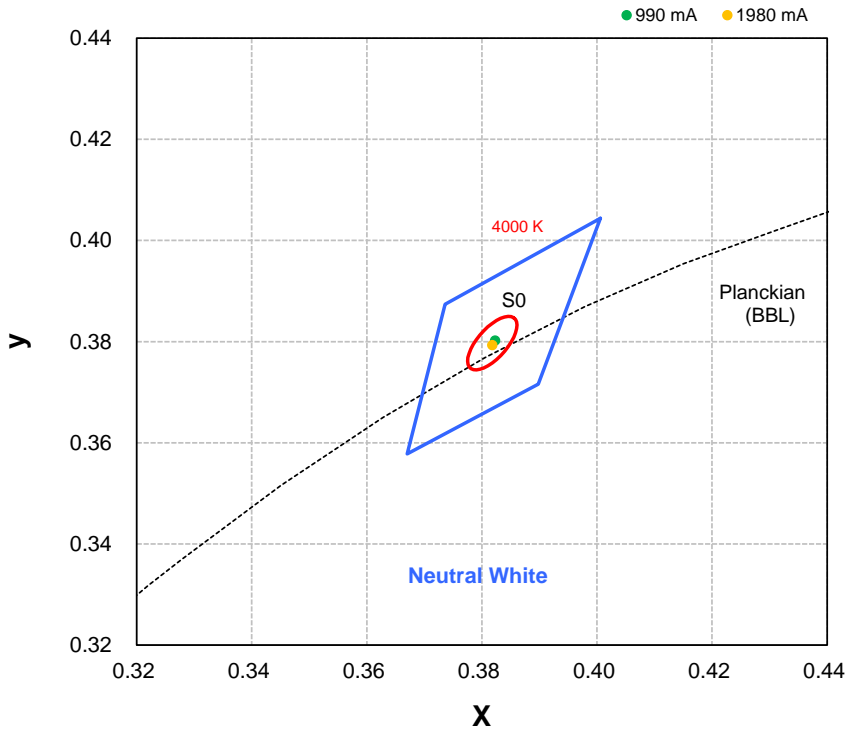
Fig 9. Case Temperature vs. Junction Temperature at 990 、1980mA.

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

## White Binning Graphical Representation

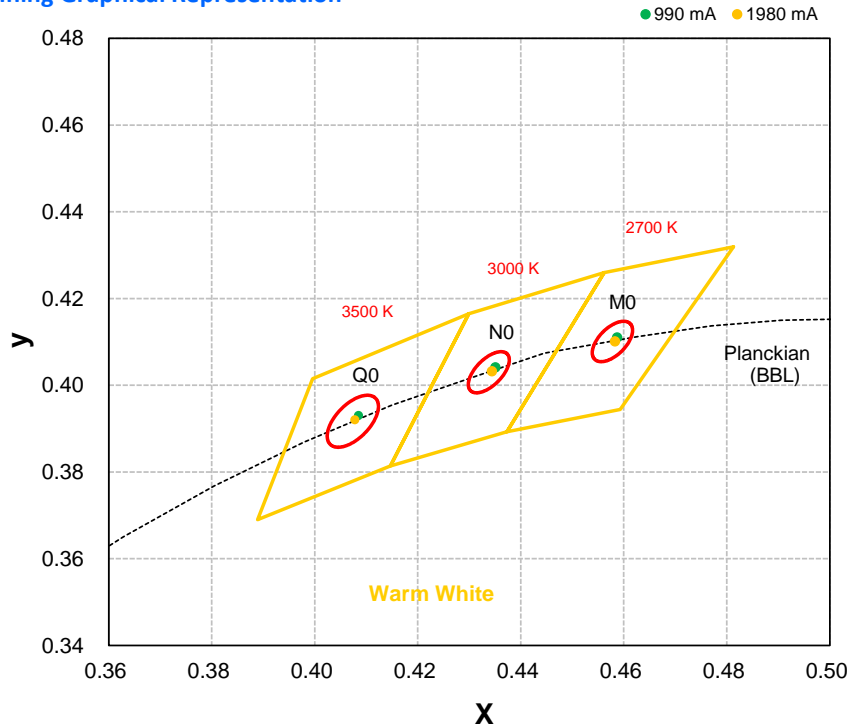


## Neutral White Binning Graphical Representation



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

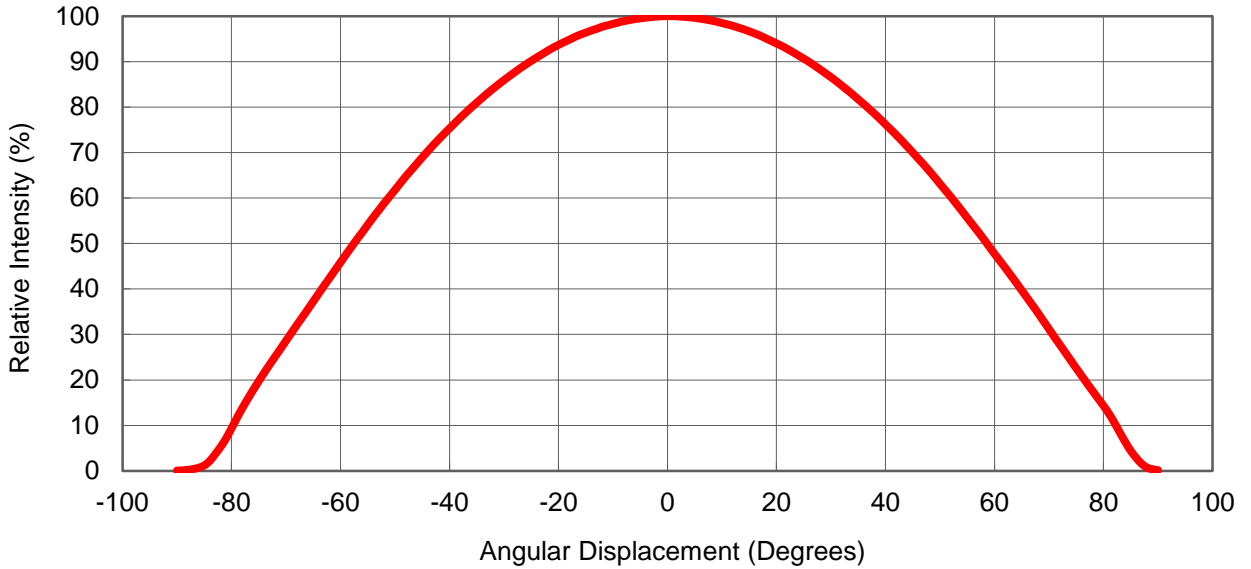
### Warm White Binning Graphical Representation



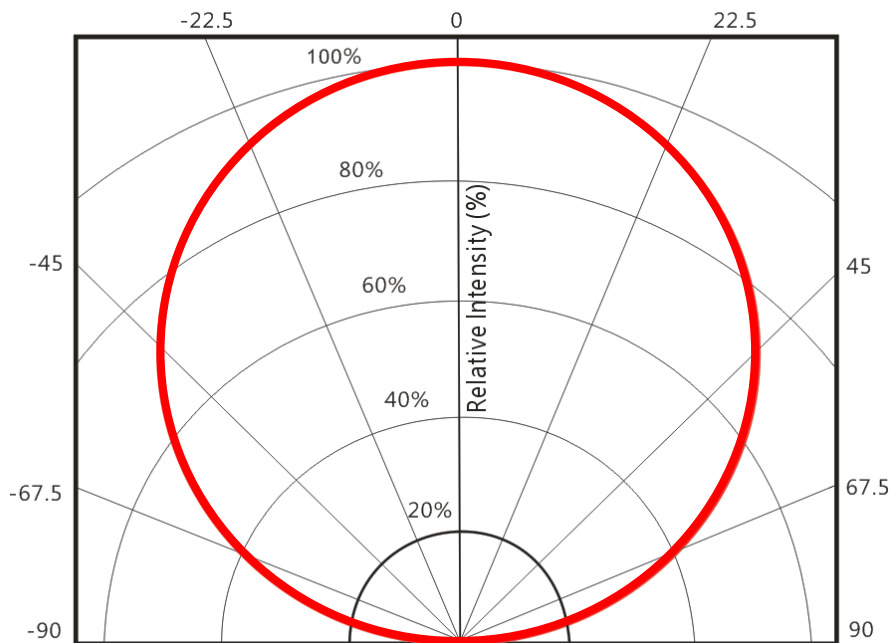


# Typical Representative Spatial Radiation Pattern

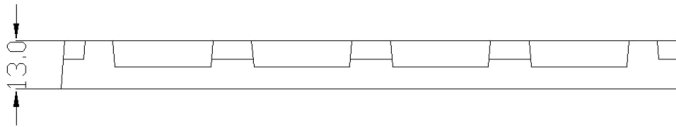
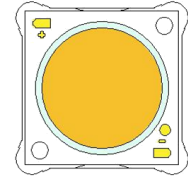
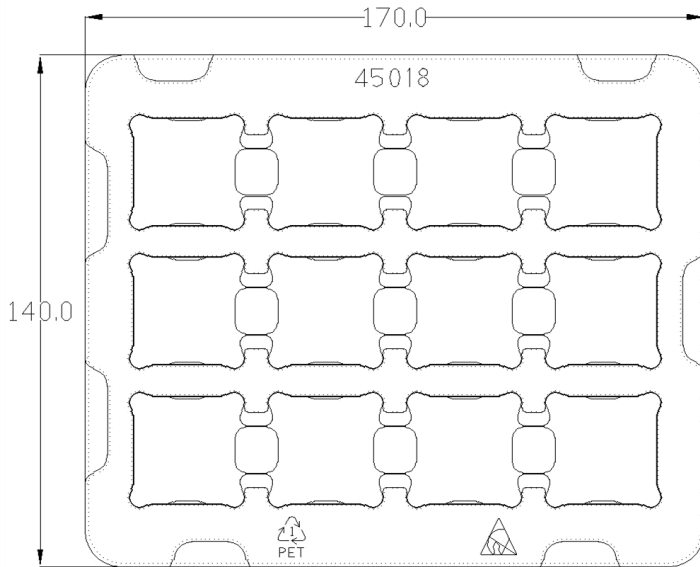
## Lambertian Radiation Pattern



## Polar Radiation Pattern



## Packing Specifications



Product 12 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**.

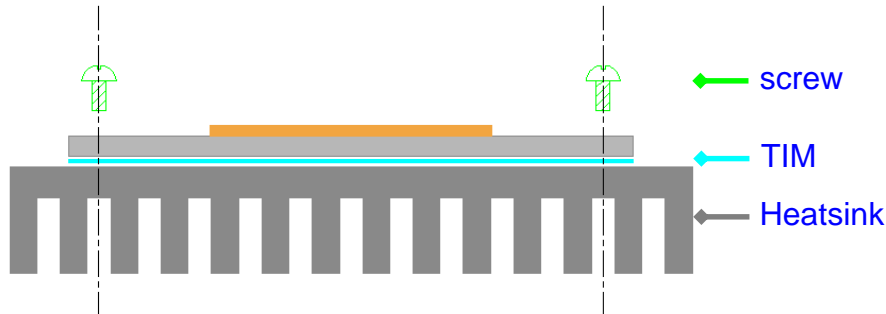


Fig 10. Reference assembly as fixing with screws

## 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)

