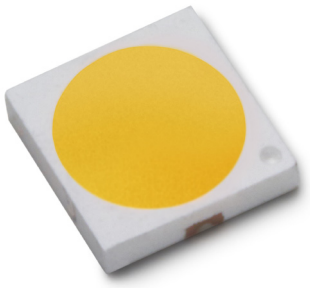
LUXEON 3030 2D

Hot color targeted 6V QFN package delivering high flux



Introduction

The LUXEON 3030 2D mid-power LED is the first hot color targeted mid power LED. The LUXEON 3030 2D uses industry standard packaging and is a 6V surface-mount emitter solution that comes in all ANSI CCTs. Hot color targeting ensures that the LEDs are within color target at 85°C application conditions.

Features

- Industry standard package
- NEW 1/9th micro color binning
- Hot color targeted
- Leading efficacy of 125 lm/W for warm white and 133 lm/W for cool white at 120 mA and 25°C

Benefits

- Drop-in replacement for existing 3030 LED packages
- Hot color targeting ensures that color is within ANSI bin at typical application conditions
- Reduced LED count
- Enables 3, 4, 5-step MacAdam Ellipse kits

Key Applications

- Downlights
- High bay and low bay
- Lamps

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General Information

Product Nomenclature

LUXEON 3030 2D is tested and binned at T_j = 25°C with a drive current of 120 mA DC.

The part number designation is explained as follows:

L 1 3 0 - A A B B 0 0 C C 0 0 W 2 1

Where:

AA — designates CCT (for example, 2700K = 27)

BB — designates CRI (70, 80 and 90)

CC — designates last 2 digits of 3030 package

For example, a LUXEON 3030 2D 2700K 80CRI emitter has the following part number.

L 1 3 0 - 2 7 8 0 0 0 3 0 0 0 W 2 1

Average Lumen Maintenance Characteristics

The LUXEON 3030 2D is being tested in accordance with LM-80 standards. Please contact your Philips Lumileds' TSM or Sales person for more detailed information.

Environmental Compliance

Philips Lumileds is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON 3030 2D is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS and REACH directives. Philips Lumileds will not intentionally add the following restricted material to the LUXEON 3030 2D L130-****003000W21: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Product Selection

Product Selection Guide for LUXEON 3030 2D
Junction Temperature = 25°C

Table 1.

Nominal CCT	Part Number	Minimum CRI [1]	Luminous Flux (lm) [1] @ 120 mA		Luminous Flux (lm) [2] @ 100 mA	$R_{th\_J\_c}$ (°C/W) [3]
			Minimum	Typical	Typical	Typical
2700K	L130-2780003000W21	80	77	84	71	12
3000K	L130-3080003000W21	80	85	90	75	
3500K	L130-3580003000W21	80	82	93	79	
4000K	L130-4080003000W21	80	84	95	81	
5000K	L130-5080003000W21	80	86	96	81	
5700K	L130-5780003000W21	80	87	97	82	
6500K	L130-6580003000W21	80	87	97	82	

Notes for Table 1:
1. Philips Lumileds maintains a tolerance of ± 7.5% on luminous flux, ± 2 on CRI.
2. Interpolated value.
3. Thermal resistance is measured junction to case.

Electrical Characteristics

Junction Temperature = 25°C, Test Current @ 120 mA

Table 2.

Part Number	Forward Voltage V_f [1] [3] (V)			Typical Temperature Coefficient of Forward Voltage Between 25°C and 85°C [2] $\Delta V_F / \Delta T_J$
	Minimum	Typical	Maximum	
L130-2780003000W21	5.8	6.1	6.6	-2.0 to -4.0
L130-3080003000W21				
L130-3580003000W21				
L130-4080003000W21				
L130-5080003000W21				
L130-5780003000W21				
L130-6580003000W21				

Notes for Table 2:
1. Philips Lumileds maintains a tolerance of ± 0.1V on forward voltage measurements.
2. Measured between T_j = 25°C and T_j = 85°C.
3. Forward voltage test tolerance: ± 0.1 volts.

Absolute Maximum Ratings

No parameter can surpass its maximum rating under any condition. Care must be maintained to insure junction and case temperatures are properly derated with current.

Table 3.

Parameter	Maximum Performance
DC Forward Current	240 mA
Peak Pulsed Forward Current	300 mA [1]
ESD Sensitivity	< 1000V Human Body Model (HBM) Class 2A JS-001-2012
Maximum Case Temperature	100°C
Soldering Temperature	JEDEC 020D 260°C
Storage Temperature	-40°C - 100°C
LED Junction Temperature	125°C
Allowable Reflow Cycles	3
Reverse Voltage [2,3]	-5V

Notes for Table 3:

1. At 10% duty cycle and pulse width 10ms.
2. LUXEON 3030 2D are not designed to be driven in reverse bias.
3. At a maximum reverse current of 10 mA.

JEDEC Moisture Sensitivity

Table 4.

Level	Floor Life		Soak Requirements	
			Standard	
	Time	Conditions	Time	Conditions
2	1 year	≤ 30°C / 60% RH	168 Hrs. + 5 / -0 Hrs.	≤ 85°C / 60% RH

Reflow Soldering Characteristics

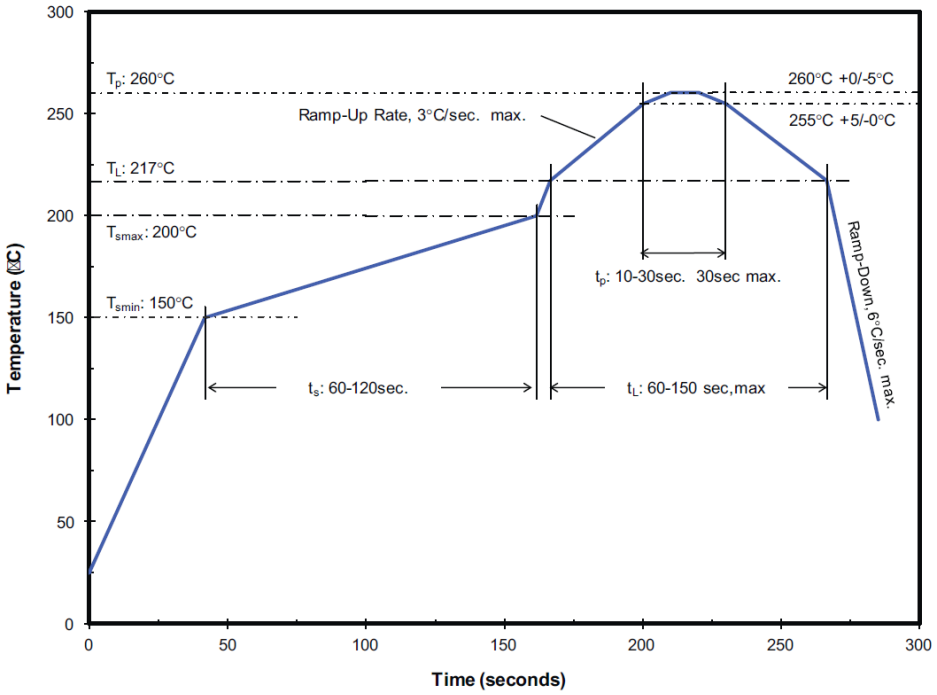


Figure 1. Temperature Profile for Table 5.

Table 5.

Profile Feature	Lead Free Assembly
Preheat/Soak: Temperature Min (T_{smin}) Temperature Max (Ts_{max}) Maximum Time (ts) from Ts_{min} to Ts_{max}	 150°C 200°C 120 seconds
Ramp-Up Rate (T_L to T_p)	3°C / second
Liquidous Temperature (T_L)	217°C
Maximum Time (t_L) Maintained T_L	150 seconds
Maximum Peak Package Body Temperature (T_p)	260°C
Time (t_p) Within 5°C of the Specified Temperature (T_C)	10 - 30 seconds
Maximum Ramp-Down Rate (T_p to T_L)	6°C / second
Maximum Time 25°C to Peak Temperature	8 minutes

Note for Table 5:

1. All temperatures refer to the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

Mechanical Dimensions and Package Information

Mechanical Dimensions

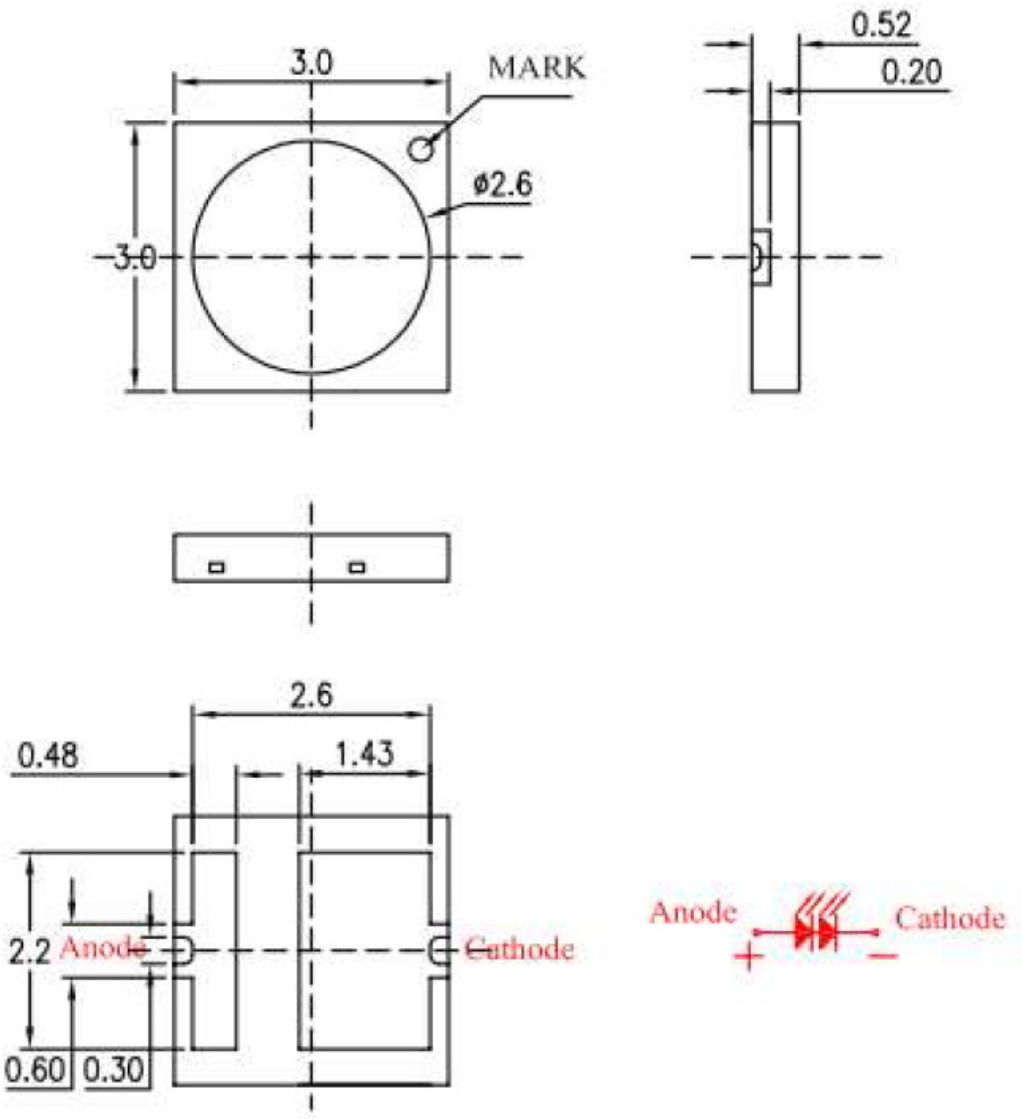
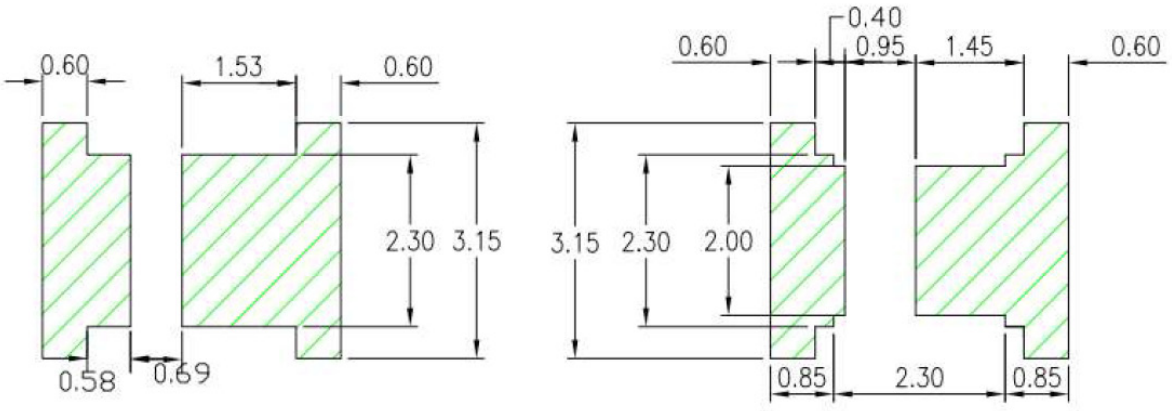


Figure 2.

Notes for Figure 2:

1. All dimensions are in millimeters.
2. Tolerance: X.X: ± 0.1mm, X. XX: ± 0.05mm, X. XXX: ± 0.05mm.

Recommended Soldering Pad Pattern and Metal Solder Stencil Aperture



Soldering Pad Pattern **Metal Solder Stencil Aperture**

Figure 3.

Package Dimensions of Tape (Unit: mm)

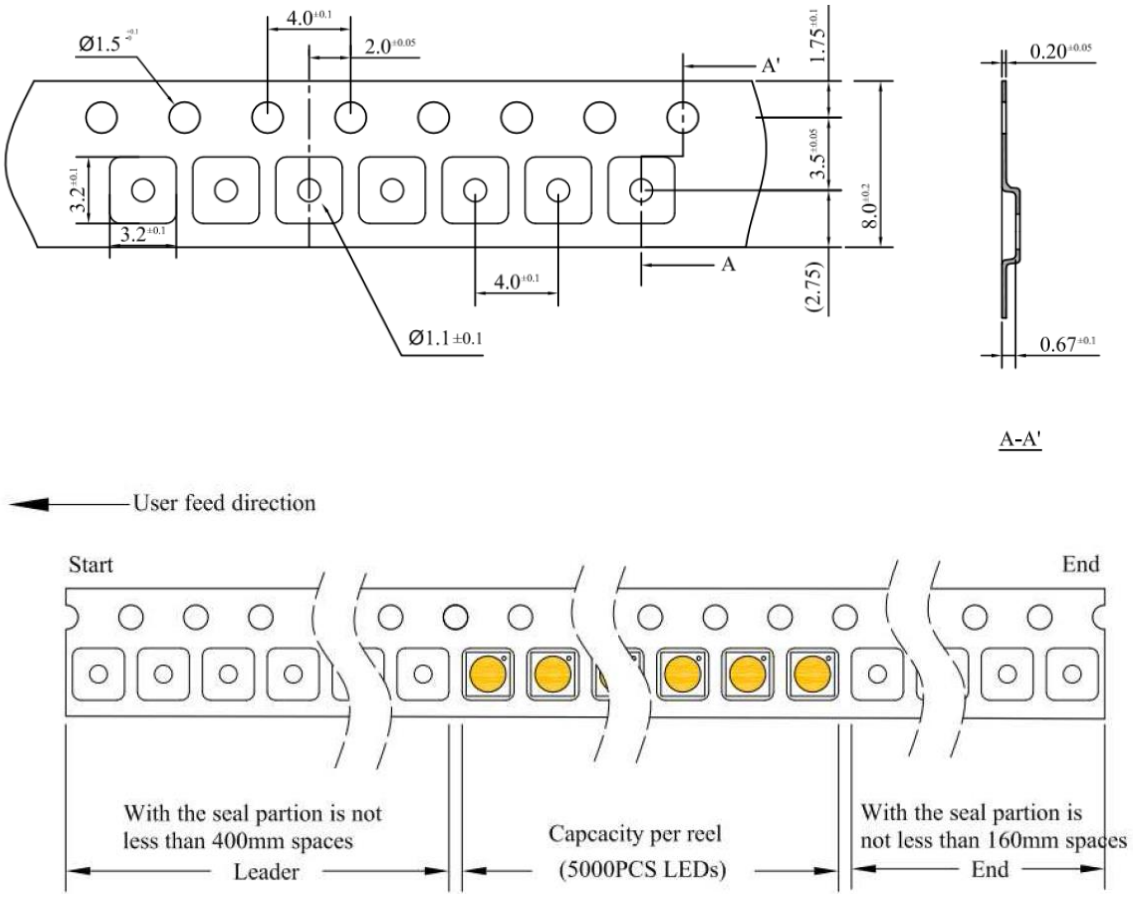


Figure 4.

Package Dimensions of Reel

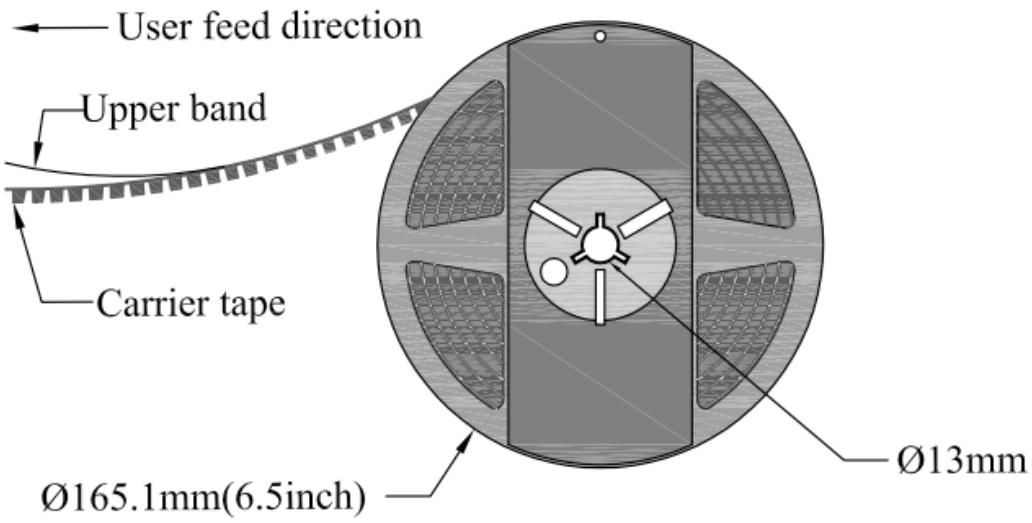


Figure 5. Reel dimensions.

Package Labeling

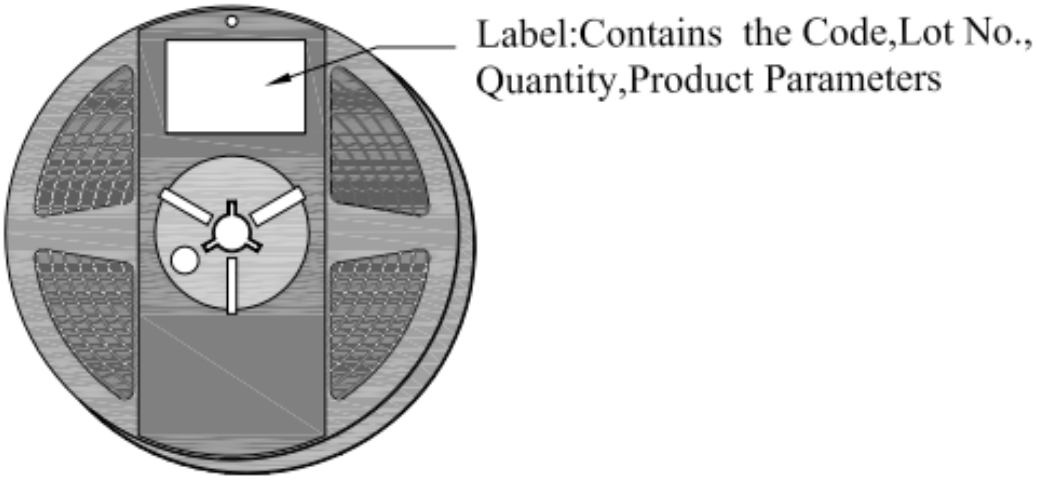


Figure 6. Label information.

Moisture Proof Package

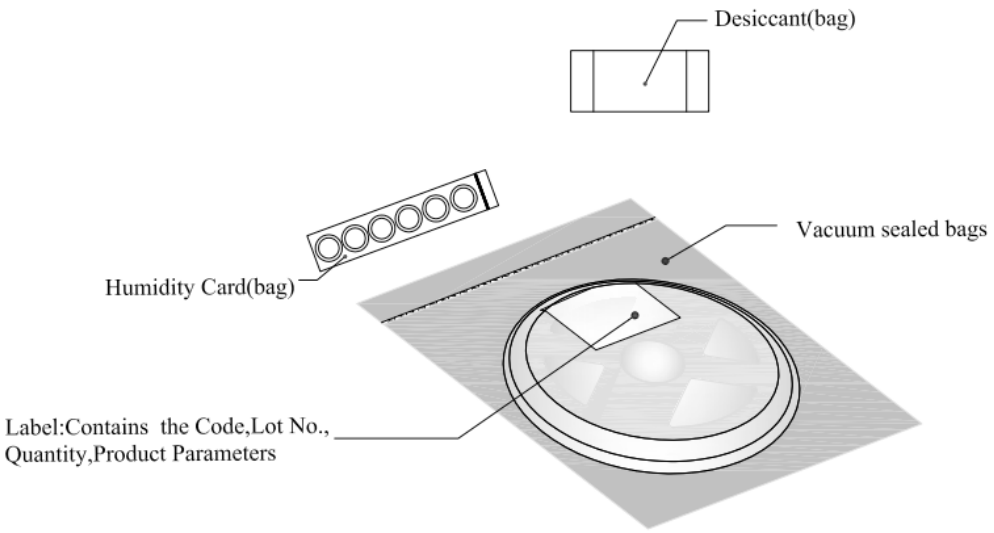


Figure 7. Vacuum sealed and moisture proof.

Relative Spectral Distribution

Relative Intensity vs. Wavelength

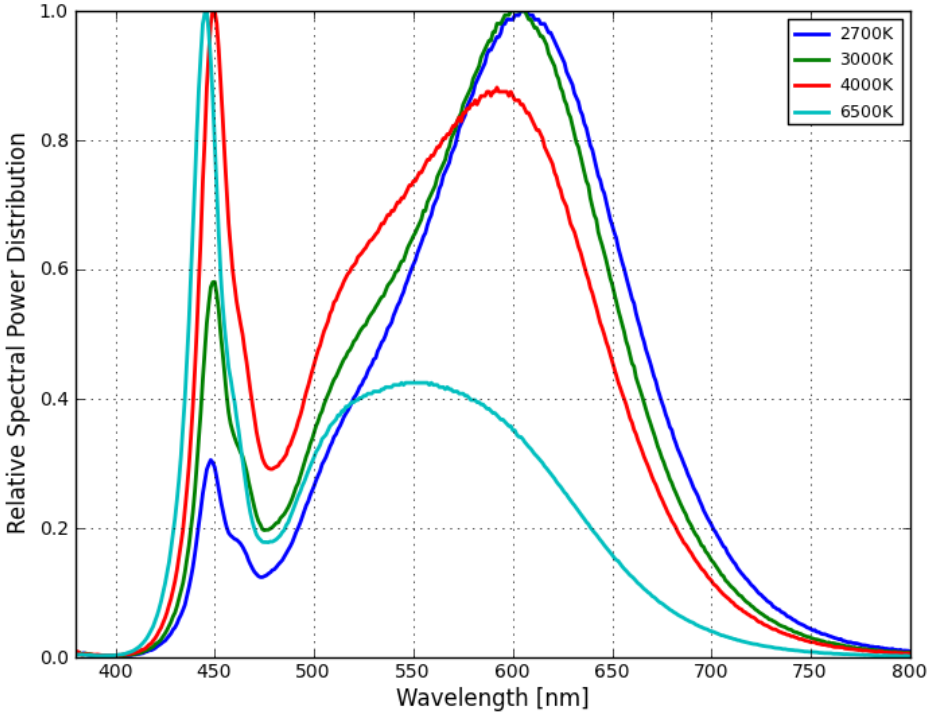


Figure 8. Typical color spectrum. Integrated measurement at solder pad temperature = 25°C, forward current = 120 mA.

Relative Flux vs. Temperature

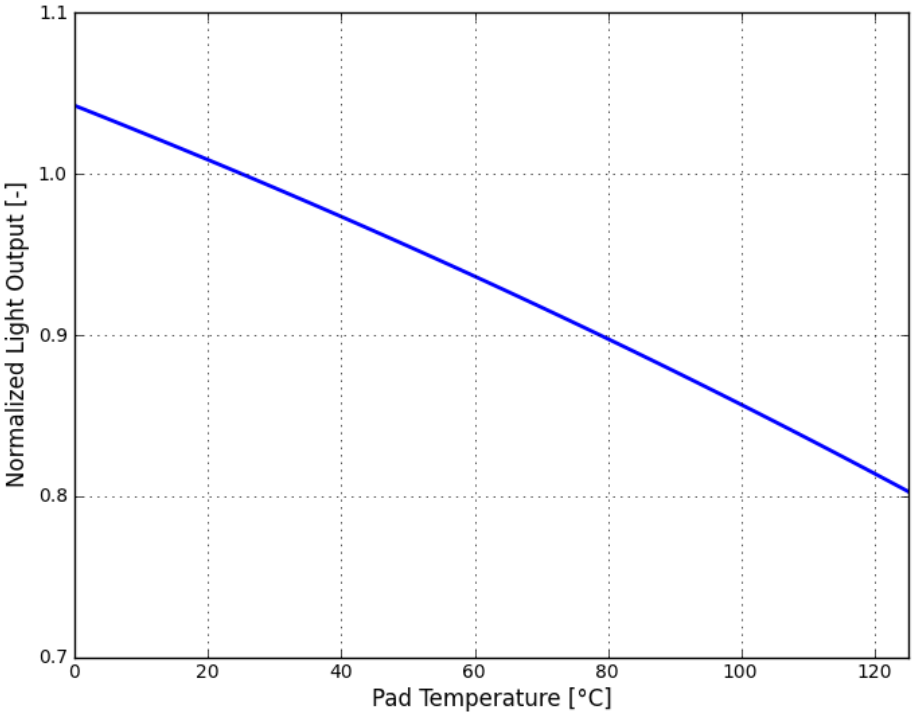


Figure 9. Typical relative light output vs. solder pad temperature, forward current = 120 mA.

Relative Flux vs. Forward Current

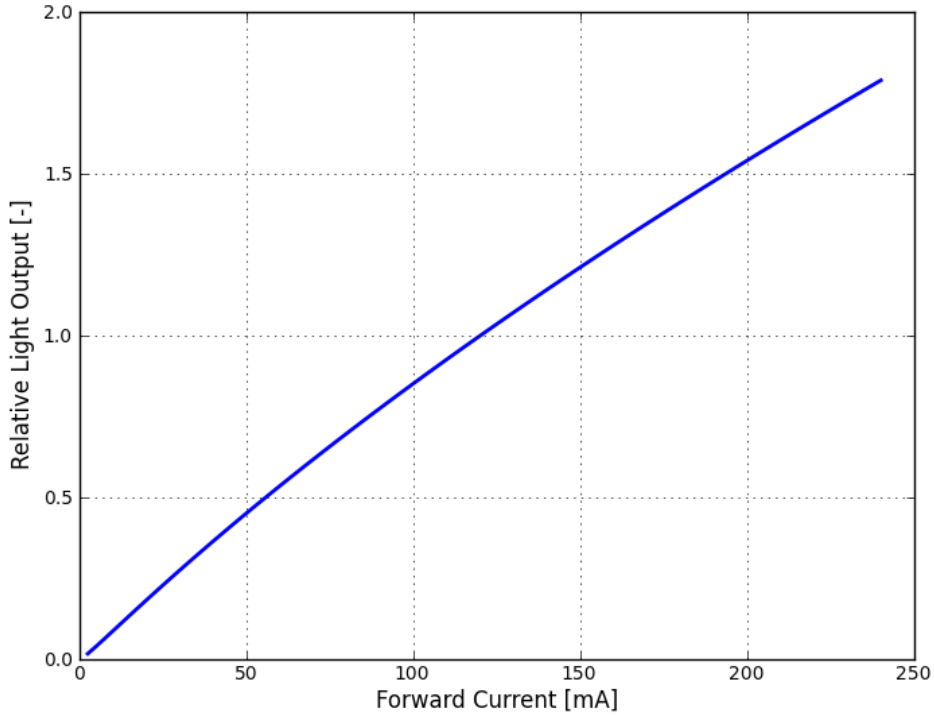


Figure 10. Typical relative light output vs. forward current = 120 mA, solder pad temperature = 25°C.

Forward Current vs. Forward Voltage

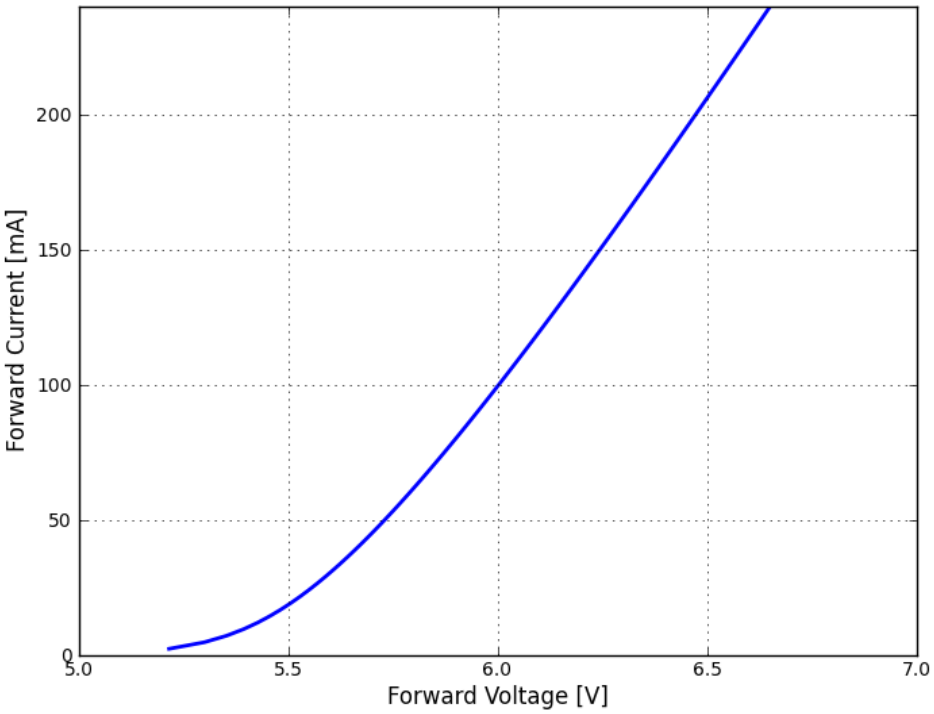


Figure 11. Typical forward current vs. forward voltage, solder pad temperature = 25°C.

Typical Radiation Patterns

Radiation in Cartesian coordinate system

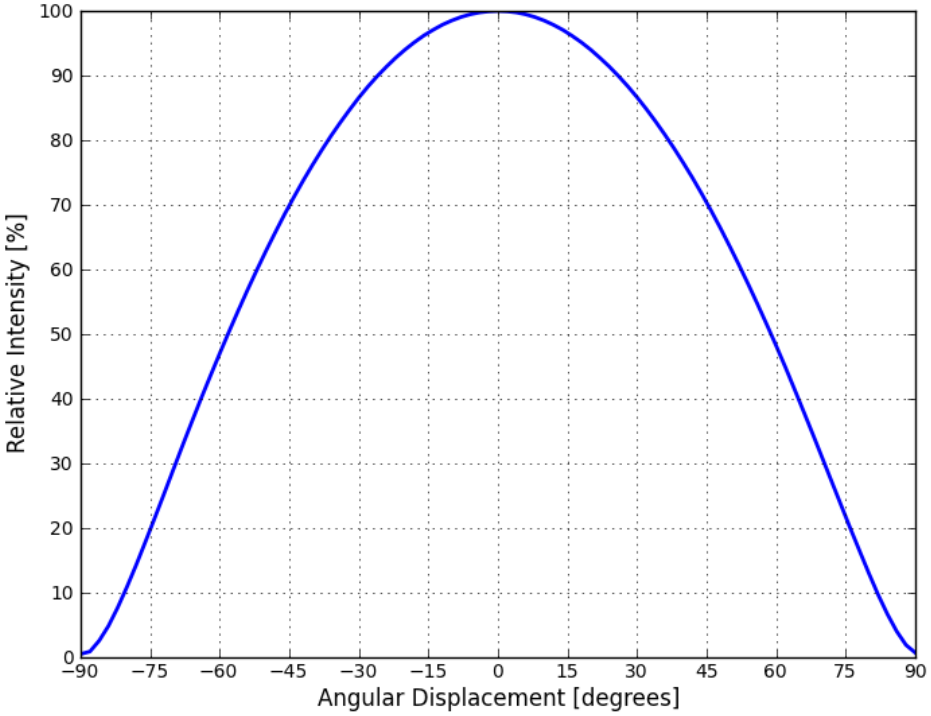


Figure 12. Typical radiation pattern in Cartesian coordinate system.

Radiation Pattern in Polar Coordinate System

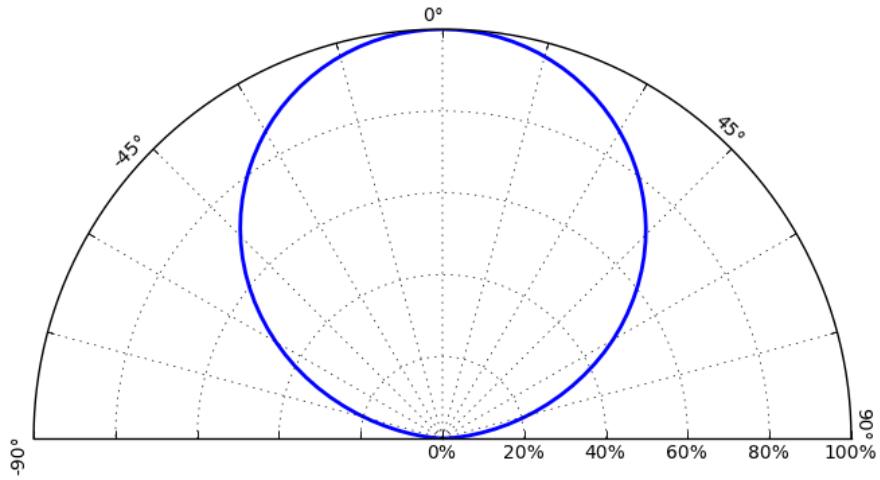


Figure 13. Typical radiation pattern in Polar coordinate system.

Product Binning and Labeling

Purpose of Product Binning

In the manufacturing of semiconductor products, there is a variation of performance around the average values given in the technical data sheets. For this reason, Philips Lumileds bins the LED components for luminous flux, color and forward voltage (V_f).

Decoding Product Bin Labeling

LUXEON mid-power emitters are labeled using a four digit alphanumeric code (CAT code) depicting the bin values for emitters packaged on a single reel. All emitters packaged within a reel are of the same 3-variable bin combination. Using these codes, it is possible to determine optimum mixing and matching of products for consistency in a given application.

Reels for all emitters are labeled with the CAT code following the format below.

ABCD

Where:

A = Flux bin (H etc.)

B & C = Color bin (For example 8D, 8E, 8F, etc.)

D = V_f bin

Luminous Flux Bins

Table 6 and Table 7 list the standard photometric luminous flux bins for LUXEON 3030 2D mid-power emitters (tested and binned at 120 mA and a junction temperature of 25°C). Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all colors. Please contact your Philips Lumileds representative for the supportable flux bins.

Table 6.

Bin Code	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
A	50	55
B	55	60
C	60	65
D	65	70
E	70	75
F	75	80
G	80	85
H	85	90
I	90	95
J	95	100
K	100	105
L	105	110

Note for Table 6:

1. Tested and binned at 25°C, I_f=120 mA. Tester tolerance: ± 7.5%.

Forward Voltage Bins

Table 7.

Bin Code	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
F	5.6	5.8
G	5.8	6.0
H	6.0	6.2
I	6.2	6.4
J	6.4	6.6

Note for Table 7:

1. Tested and binned at 25°C, I_f=120 mA.

Color Bin Structure

The LUXEON 3030 2D is hot color targeted so that at 85°C, the color is within ANSI.

Typical bin structure at 85°C

In application conditions, the LED temperature rises and at 85°C the typical color bins will be as shown.

Note: Bin *N will represent the entire ANSI bin for that corresponding CCT. For example, bin 7N will represent the entire bin for 3000K ANSI.

L130-2780003000W21 Color Bin Structure

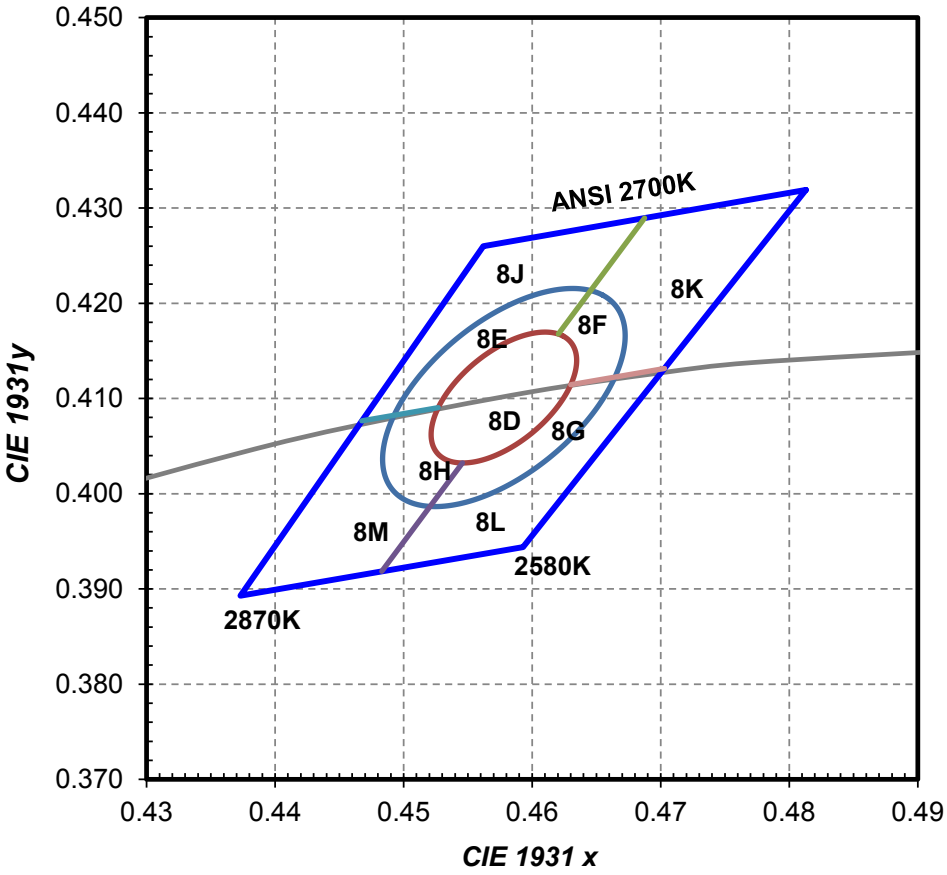


Figure 14. 2700K 1/9th color bin structure.

Table 8.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
2700K	Single 3-step MacAdam ellipse	(0.4578, 0.4101)	0.00810	0.00420	53.70°
2700K	Single 5-step MacAdam ellipse	(0.4578, 0.4101)	0.01350	0.00700	53.70°

L130-3080003000W21 Color Bin Structure

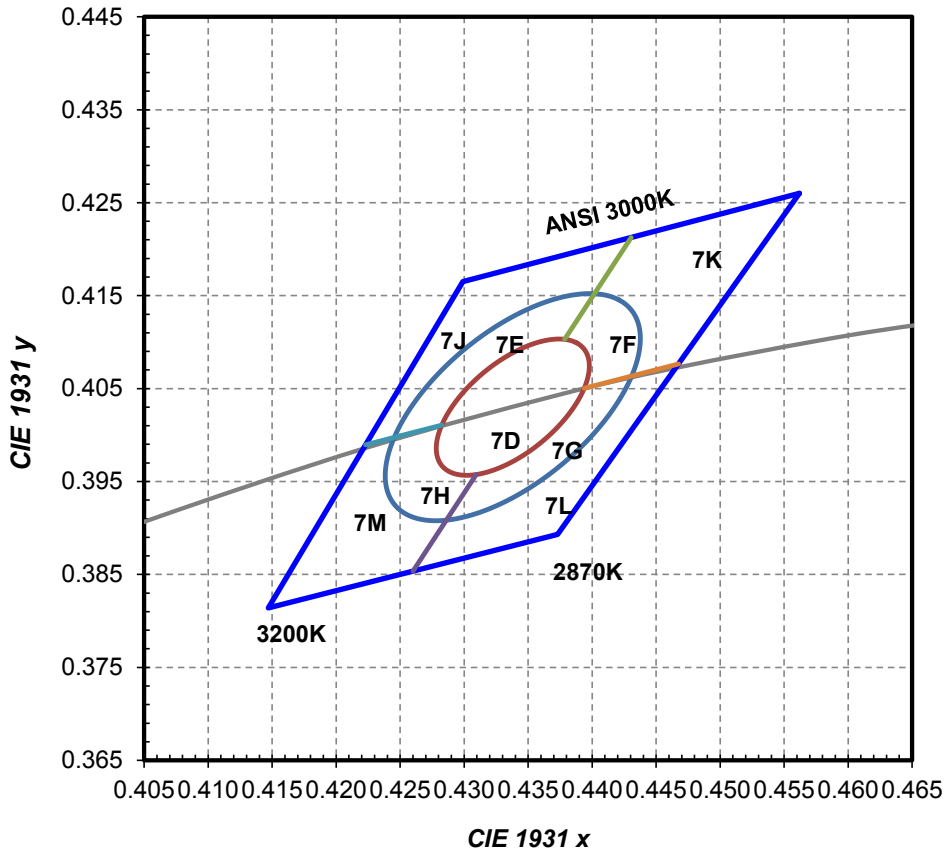


Figure 15. 3000K 1/9th color bin structure.

Table 9.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
3000K	Single 3-step MacAdam ellipse	(0.4338, 0.403)	0.00834	0.00408	53.22°
3000K	Single 5-step MacAdam ellipse	(0.4338, 0.403)	0.01390	0.00680	53.22°

L130-3580003000W21 Color Bin Structure

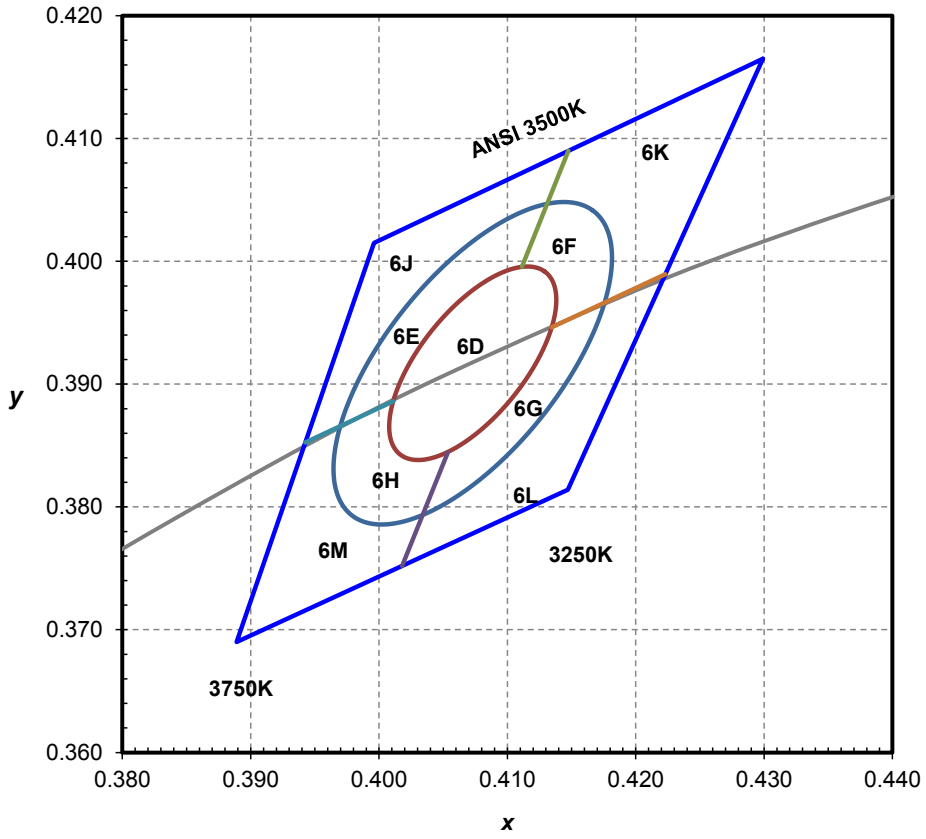


Figure 16. 3500K 1/9th color bin structure.

Table 10.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
3500K	Single 3-step MacAdam ellipse	(0.4073, 0.3917)	0.00927	0.00414	53.22°
3500K	Single 5-step MacAdam ellipse	(0.4073, 0.3917)	0.01545	0.00690	53.22°

L130-4080003000W21 Color Bin Structure

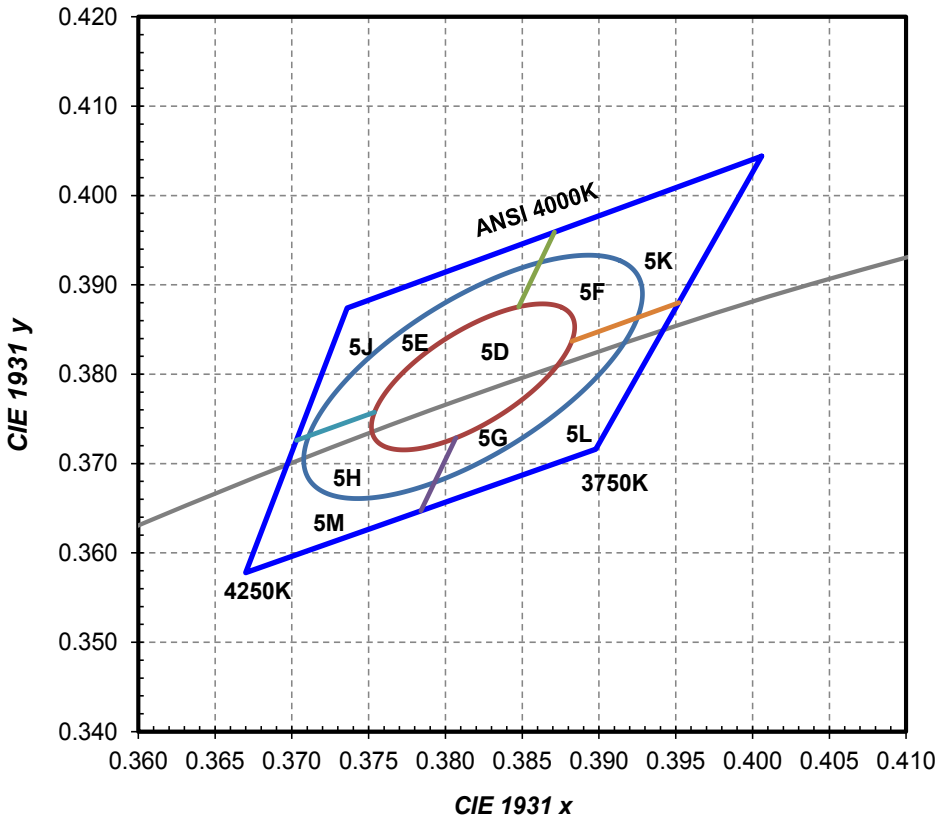


Figure 17. 4000K 1/9th color bin structure.

Table 11.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
4000K	Single 3-step MacAdam ellipse	(0.3818, 0.3797)	0.00939	0.00402	53.72°
4000K	Single 5-step MacAdam ellipse	(0.3818, 0.3797)	0.01565	0.00670	53.72°

L130-5080003000W21 Color Bin Structure

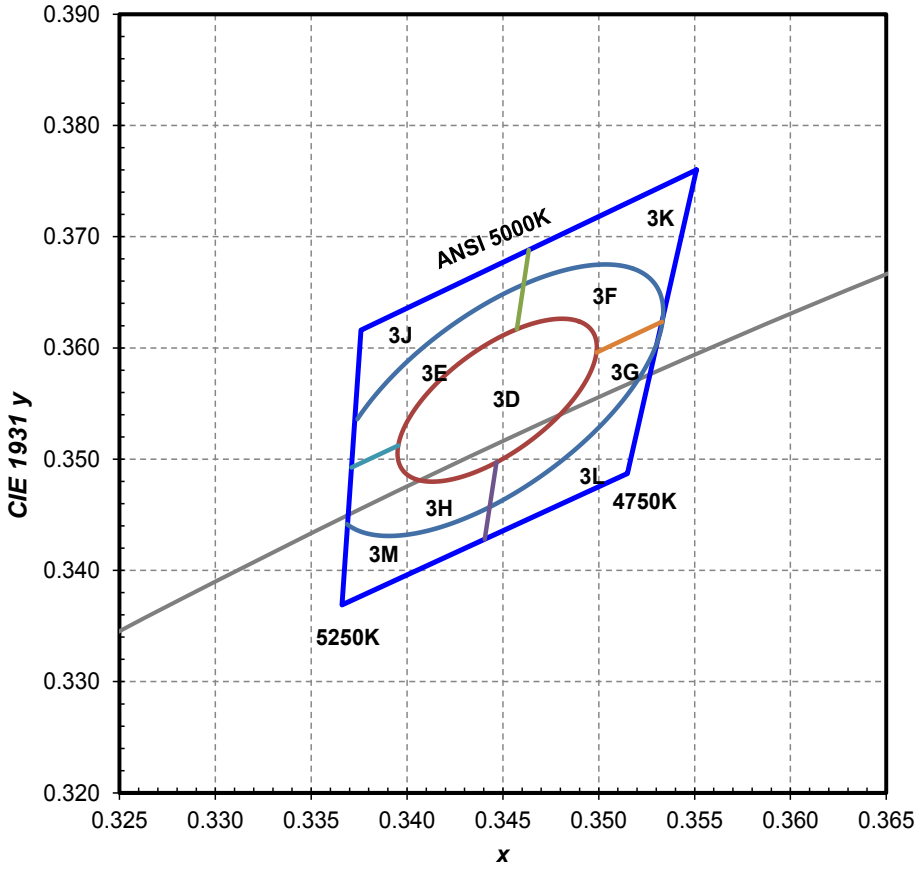


Figure 18. 5000K 1/9th color bin structure.

Table 12.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
5000K	Single 3-step MacAdam ellipse	(0.3447, 0.3553)	0.00822	0.00354	59.62°
5000K	Single 5-step MacAdam ellipse	(0.3447, 0.3553)	0.01370	0.00590	59.62°

L130-5780003000W21 Color Bin Structure

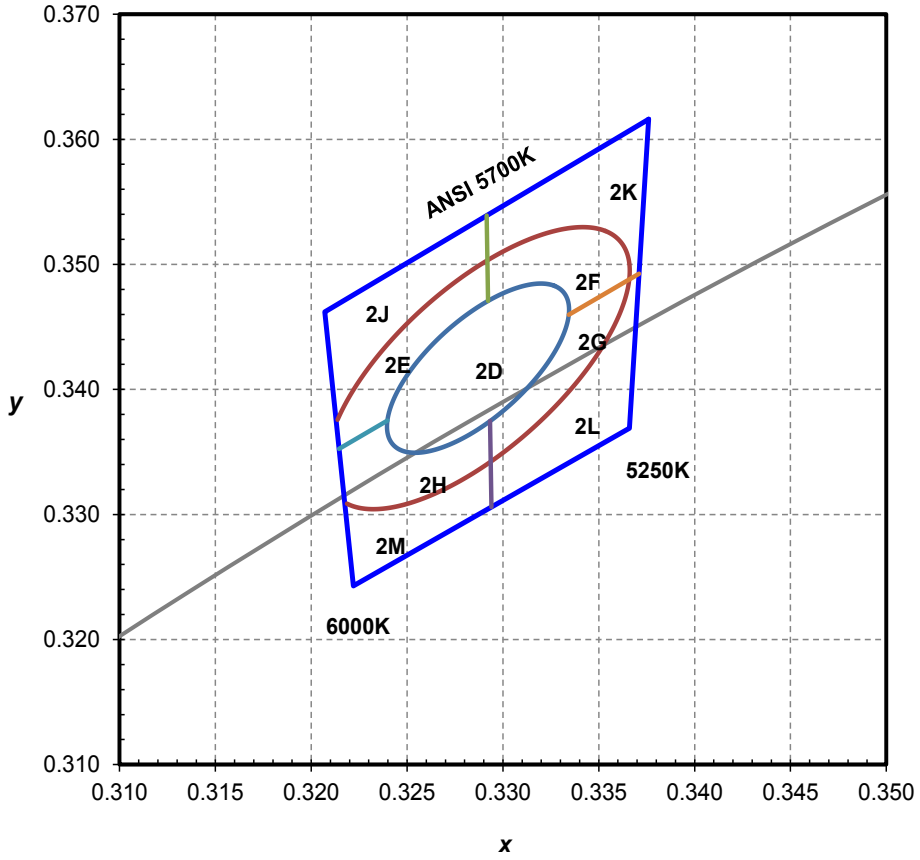


Figure 19. 5700K 1/9th color bin structure.

Table 13.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
5700K	Single 3-step MacAdam ellipse	(0.3287, 0.3417)	0.00746	0.00320	59.09°
5700K	Single 5-step MacAdam ellipse	(0.3287, 0.3417)	0.01243	0.00533	59.09°

L130-6580003000W21 Color Bin Structure

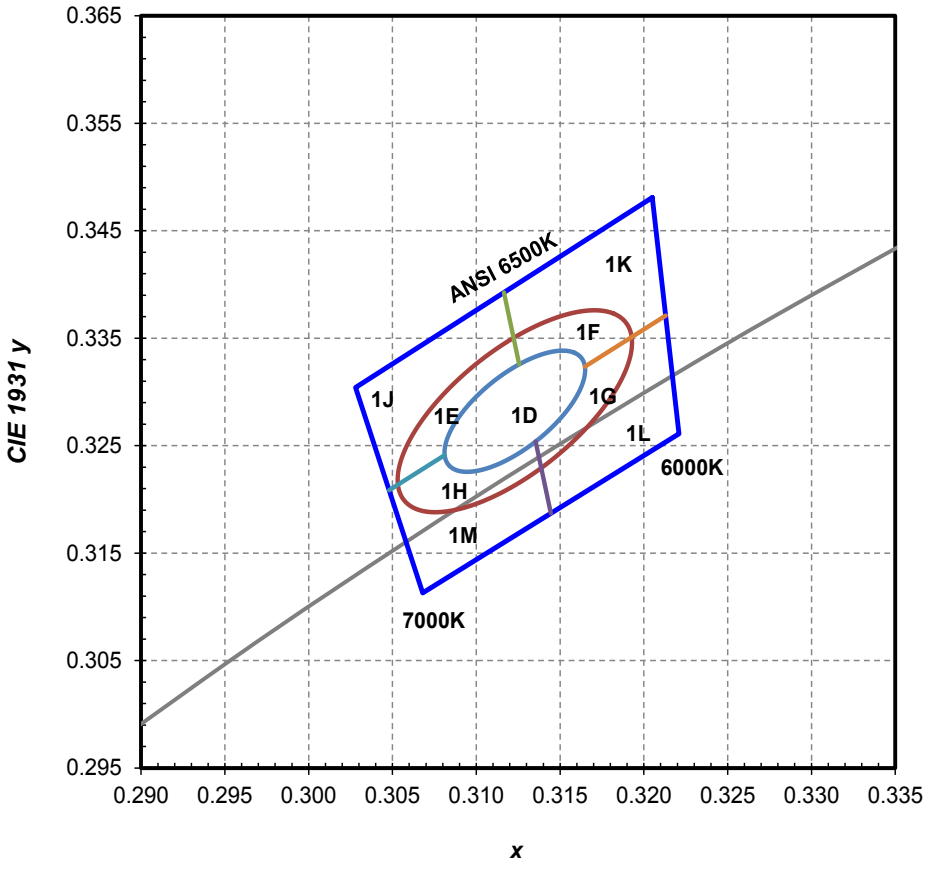


Figure 20. 6500K 1/9th color bin structure.

Table 14.

Nominal ANSI CCT	Color Space	Target Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
6500K	Single 3-step MacAdam ellipse	(0.3123, 0.3282)	0.00669	0.00285	58.57°
6500K	Single 5-step MacAdam ellipse	(0.3123, 0.3282)	0.01115	0.00475	58.57°

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Who We Are

Philips Lumileds focuses on one goal: Creating the world's highest performing LEDs. The company pioneered the use of solid-state lighting in breakthrough products such as the first LED backlit TV, the first LED flash in camera phones, and the first LED daytime running lights for cars. Today we offer the most comprehensive portfolio of high quality LEDs and uncompromising service.

Philips Lumileds brings LED's qualities of energy efficiency, digital control and long life to spotlights, downlights, high bay and low bay lighting, indoor area lighting, architectural and specialty lighting as well as retrofit lamps. Our products are engineered for optimal light quality and unprecedented efficacy at the lowest overall cost. By offering LEDs in chip, packaged and module form, we deliver supply chain flexibility to the inventors of next generation illumination.

Philips Lumileds understands that solid state lighting is not just about energy efficiency. It is about elegant design. Reinventing form. Engineering new materials. Pioneering markets and simplifying the supply chain. It's about a shared vision. Learn more about our comprehensive portfolio of LEDs at www.philipslumileds.com.

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