

# LUXEON 3014

*Hot color targeted industry  
standard package for uniformed light*



## Introduction

The LUXEON 3014 low-power device is an industry standard compatible package for ease of installation into existing 3014 sockets and stays consistent with dimensions of 3.0mm x 1.4mm x 0.75mm. The LUXEON 3014 is an ideal choice when uniformity and reduction in spottiness is necessary for indoor designs.

### Features

- Industry standard package
- 1/9 micro binning
- Hot targeted
- Rectangular package design

### Benefits

- Widely compatible
- Ease of color consistency
- Leads to better color accuracy
- Increases uniformity

### Key Applications

- Indoor Area Lighting
  - Wall Grazer
  - Cove Lighting
  - Troffer
  - TLEDs
- Lamps
- Specialty
  - Freezer Display

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# General Information

## Product Nomenclature

LUXEON 3014 is tested and binned at  $T_j = 25^\circ\text{C}$  with a drive current of 60 mA DC.

The part number designation is explained as follows:

L 1 3 0 – A A B B C D 1 4 0 0 0 0 1

Where:

A — designates CCT (2700K = 27)

B — designates CRI (70, 80 and 90)

C — attributes (0)

D — designates voltage

For example, a white LUXEON 3014 4000K/80CRI emitter has the following part number:

L 1 3 0 – 4 0 8 0 0 0 1 4 0 0 0 0 1

## Average Lumen Maintenance Characteristics

The LUXEON 3014 is tested in accordance with LM-80 standards. Please contact your Philips Lumileds's 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 3014 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 3014 L130-XX8001400001: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

# Product Selection

## Product Selection Guide for LUXEON 3014 Low-Power LEDs

Junction Temperature = 25°C

Table 1.

| Typical Performance Characteristics at 30 mA & 60 mA with a Junction Temperature = 25°C <sup>[1, 2]</sup> |                    |                            |                                    |                            |       |                                                          |                                        |       |
|-----------------------------------------------------------------------------------------------------------|--------------------|----------------------------|------------------------------------|----------------------------|-------|----------------------------------------------------------|----------------------------------------|-------|
| Nominal CCT                                                                                               | Part Number        | Minimum CRI <sup>[1]</sup> | Minimum Luminous Flux (lm) @ 60 mA | Typical Luminous Flux (lm) |       | Typical Forward Voltage (V <sub>f</sub> ) <sup>[4]</sup> | Typical Efficacy (lm/W) <sup>[5]</sup> |       |
|                                                                                                           |                    |                            |                                    | 30 mA <sup>[5]</sup>       | 60 mA | 60 mA                                                    | 30 mA                                  | 60 mA |
| 2700K                                                                                                     | L130-2780001400001 | 80                         | 18                                 | 10                         | 21    | 3.1                                                      | 127                                    | 113   |
| 3000K                                                                                                     | L130-3080001400001 | 80                         | 19                                 | 11                         | 21    | 3.1                                                      | 129                                    | 113   |
| 3500K                                                                                                     | L130-3580001400001 | 80                         | 20                                 | 11                         | 21    | 3.1                                                      | 129                                    | 113   |
| 4000K                                                                                                     | L130-4080001400001 | 80                         | 21                                 | 12                         | 23    | 3.1                                                      | 140                                    | 124   |
| 5000K                                                                                                     | L130-5080001400001 | 80                         | 21                                 | 12                         | 23    | 3.1                                                      | 140                                    | 124   |
| 5700K                                                                                                     | L130-5780001400001 | 80                         | 22                                 | 13                         | 24    | 3.1                                                      | 146                                    | 129   |
| 6500K                                                                                                     | L130-6580001400001 | 80                         | 22                                 | 13                         | 24    | 3.1                                                      | 146                                    | 129   |

Notes for Table 1:

1. Philips Lumileds maintains a tolerance of  $\pm 7.5\%$  on luminous flux,  $\pm 2$  on CRI measurements.
2. Binned at 25°C.
3. Color targeted at 65°C.
4. Forward voltage test tolerance :  $\pm 0.1$  volts.
5. Estimated value.

## Electrical Characteristics

Junction Temperature = 25°C, Test Current @ 60 mA

Table 2.

| Part Number        | Forward Voltage V <sub>f</sub> (V) |         |         | Typical Temperature Coefficient of Forward Voltage Between 25°C and 85°C $\Delta V_F / \Delta T_J$ (mV/°C) | Typical Thermal Resistance Junction to Solder Pad R <sub>θ J-C</sub> |
|--------------------|------------------------------------|---------|---------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|                    | Minimum                            | Typical | Maximum |                                                                                                            |                                                                      |
| L130-2780001400001 |                                    |         |         |                                                                                                            |                                                                      |
| L130-3080001400001 |                                    |         |         |                                                                                                            |                                                                      |
| L130-3580001400001 |                                    |         |         |                                                                                                            |                                                                      |
| L130-4080001400001 | 2.8                                | 3.1     | 3.3     | -2.0 to -4.0                                                                                               | 35                                                                   |
| L130-5080001400001 |                                    |         |         |                                                                                                            |                                                                      |
| L130-5780001400001 |                                    |         |         |                                                                                                            |                                                                      |
| L130-6580001400001 |                                    |         |         |                                                                                                            |                                                                      |

# Absolute Maximum Ratings

Table 3.

| Parameter                                     | Maximum Performance                         |
|-----------------------------------------------|---------------------------------------------|
| DC Forward Current                            | 100 mA                                      |
| Peak Pulsed Forward Current <sup>[1, 2]</sup> | 120 mA                                      |
| ESD Sensitivity                               | Class 2 HBM per ANSI/ESDA/JEDEC JS-001-2012 |
| Operating Case Temperature @ 60 mA            | -40°C - 85°C                                |
| Soldering Temperature                         | JEDEC 020D 260°C                            |
| Storage Temperature                           | -40°C - 100°C                               |
| LED Junction Temperature                      | 100°C                                       |
| Allowable Reflow Cycles                       | 3                                           |
| Reverse Voltage <sup>[3, 4]</sup>             | -5V                                         |

Notes for Table 3:

1. Ripple current with a frequency of 50-150 Hz is allowed as long as the average of the current waveform is below 100 mA and the maximum of the current waveform is lower than 120 mA.
2. At 10% duty cycle and pulse width 10ms.
3. LUXEON 3014 are not designed to be driven in reverse bias.
4. At a maximum reverse current of 10 µA.

## JEDEC Moisture Sensitivity

Table 4.

| Level | Floor Life |                                      | Soak Requirements      |               |
|-------|------------|--------------------------------------|------------------------|---------------|
|       |            |                                      | Standard               |               |
|       | Time       | Conditions                           | Time                   | Conditions    |
| 3     | 168 hours  | 30°C / 60% RH<br>(Relative Humidity) | 192 Hrs. + 5 / -0 Hrs. | 30°C / 60% RH |

# Reflow Soldering Characteristics

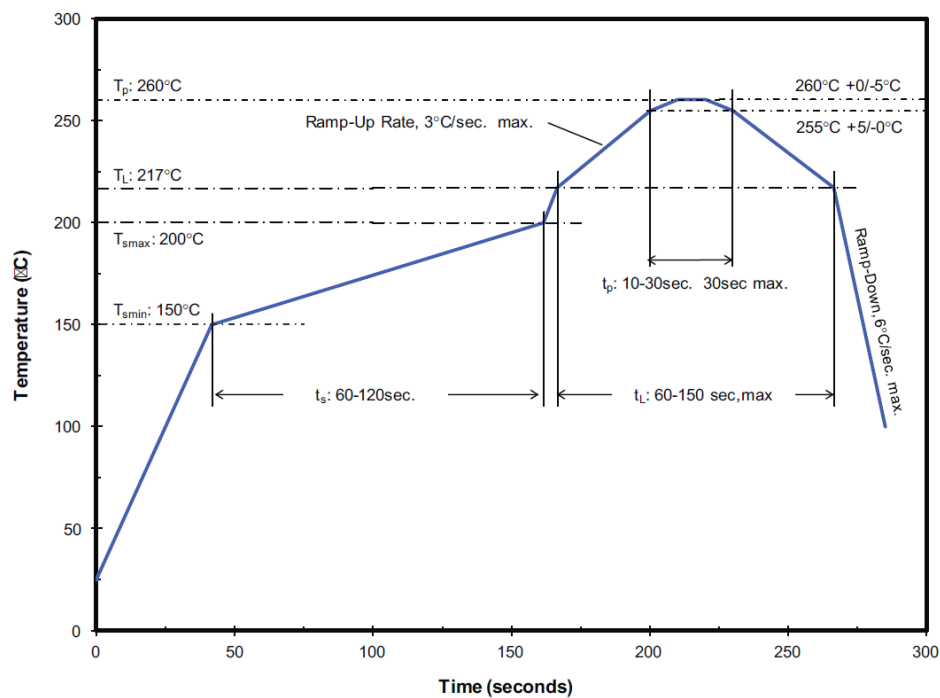


Figure 1. Temperature Profile for Table 5.

Table 5. Reflow Profile in Accordance with J-Std-020D

| Profile Feature                                                  | Lead Free Assembly |
|------------------------------------------------------------------|--------------------|
| Preheat/Soak:                                                    |                    |
| Temperature Min ( $T_{smin}$ )                                   | 150°C              |
| Temperature Max ( $T_{smax}$ )                                   | 200°C              |
| Maximum Time (ts) from $T_{smin}$ to $T_{smax}$                  | 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

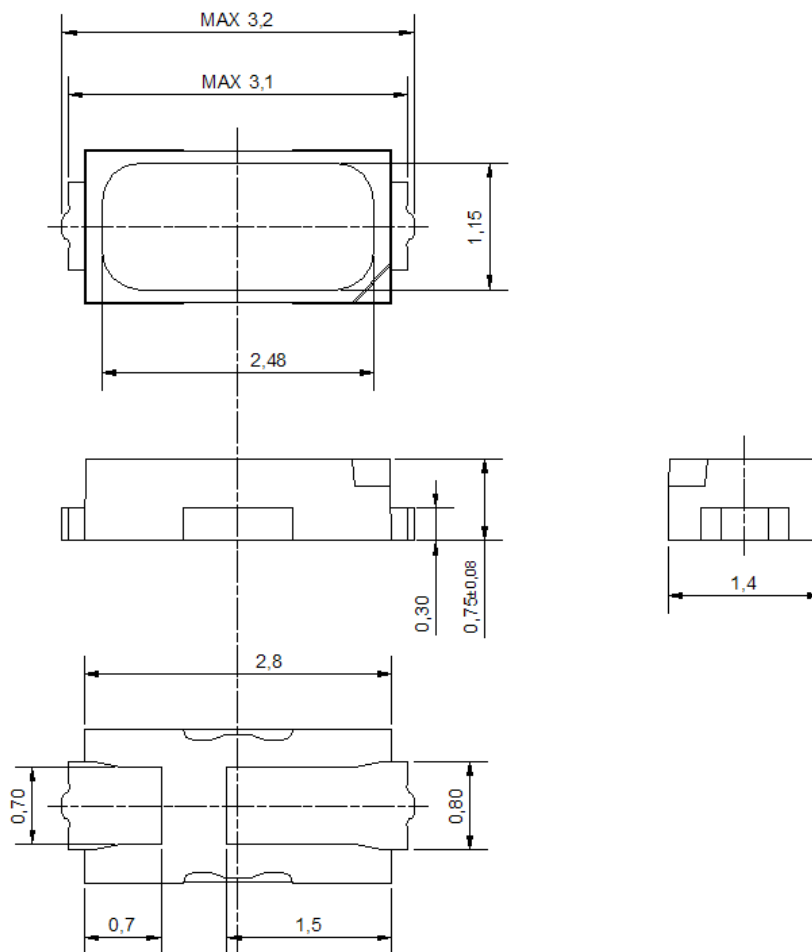


Figure 2.

Notes for Figure 2:

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10$ mm.

# Solder Pad Design

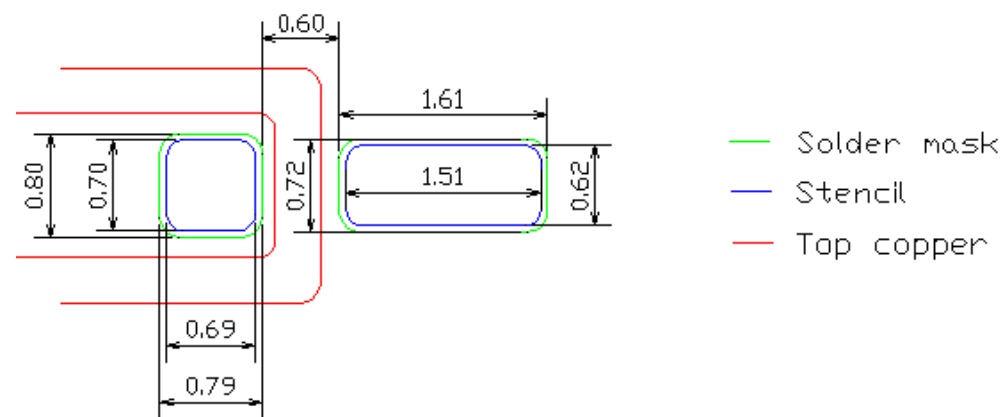


Figure 3.

- Notes for Figure 3:
- 1. The drawing above shows the recommend solder pad layout on the Printed Circuit Board (PCB).
  - 2. Application Brief AB208 provides extensive details for this layout. In addition, the drawing files are available at [www.philipslumileds.com](http://www.philipslumileds.com) and [www.philipslumileds.cn.com](http://www.philipslumileds.cn.com).

## Package Information

Table 6. Package Information for L130-xx800014-00001

| Material/Component | Specification                    |
|--------------------|----------------------------------|
| Lead Frame Base    | Copper Alloy                     |
| Package Body       | High Temperature Thermal Plastic |
| Encapsulate        | Silicone Resin, with Phosphor    |
| Weight             | 0.008gram                        |



# Characteristic Curves

## Relative Spectral Distribution vs. Wavelength

Junction Temperature = 25°C; Test Current = 60 mA

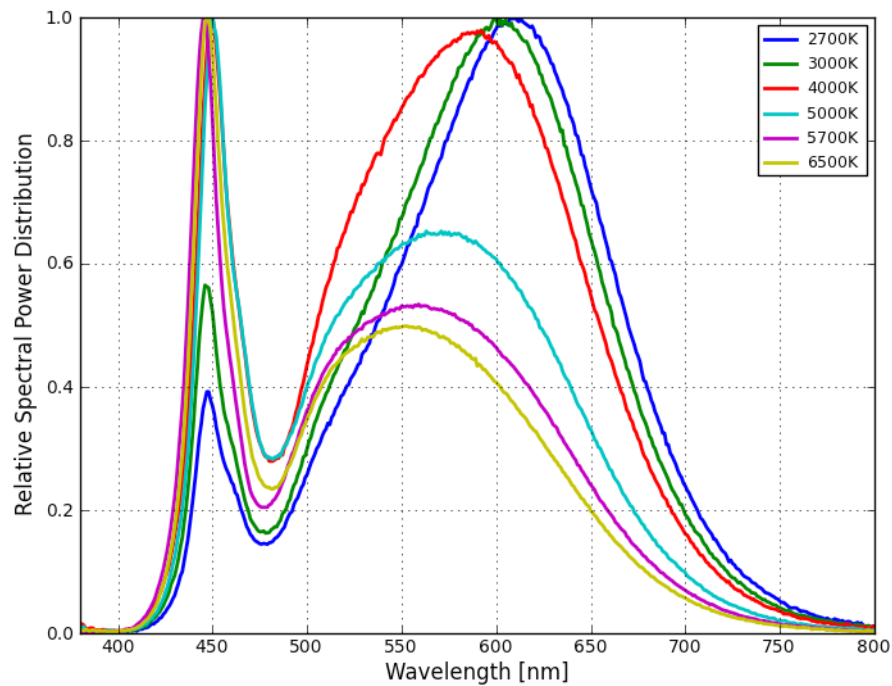


Figure 4. Color spectrum, L130-xx80-0014-00001.

## Relative Light Output Characteristics over Junction Temperature

Test Current = 60 mA

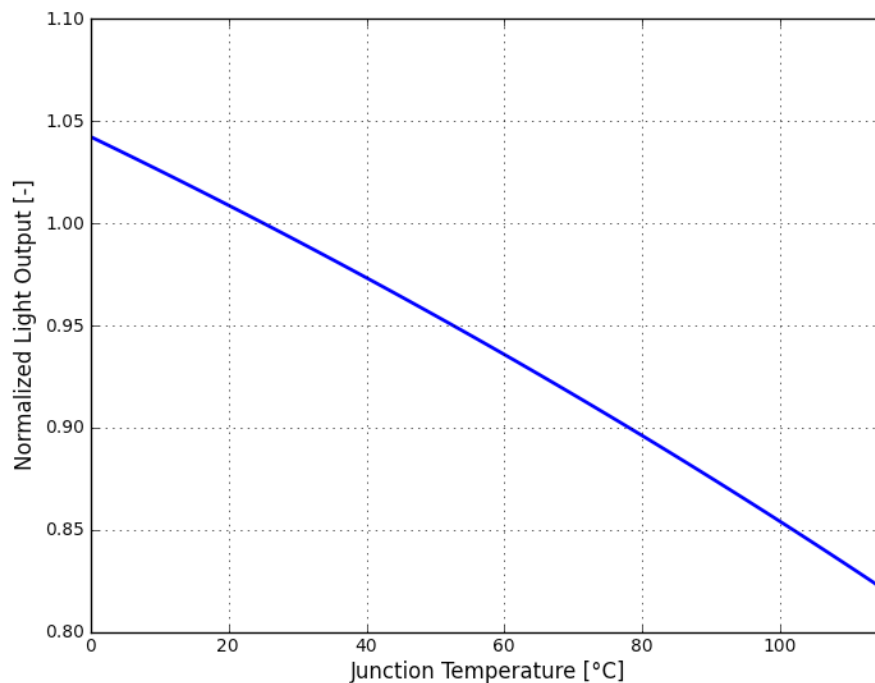


Figure 5. Relative light output vs. junction temperature, L130-xx8001400001.

# Typical Forward Current Characteristics

Forward Current vs. Forward Voltage for L130-xx80001400001  
Junction Temperature = 25°C

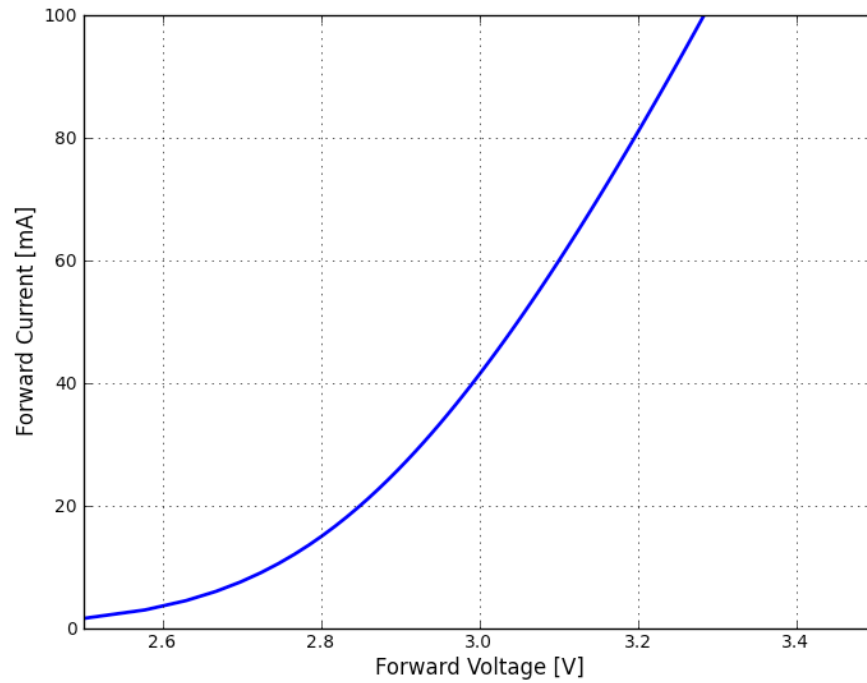


Figure 6. Typical forward current vs. forward voltage, L130-xx8001400001.

# Typical Light Output Characteristics

Relative Light Output vs. Forward Current  
Junction Temperature = 25°C

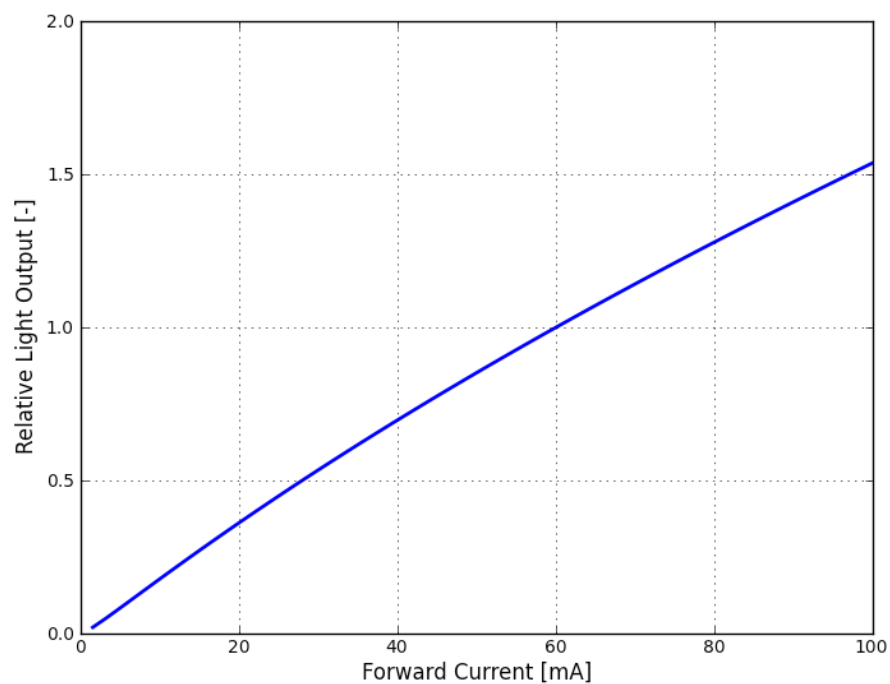


Figure 7. Typical forward current vs. forward voltage, L130-xx8001400001.

# Typical Radiation Patterns

## Radiation Pattern in Cartesian Coordinate System

Junction Temperature = 25°C

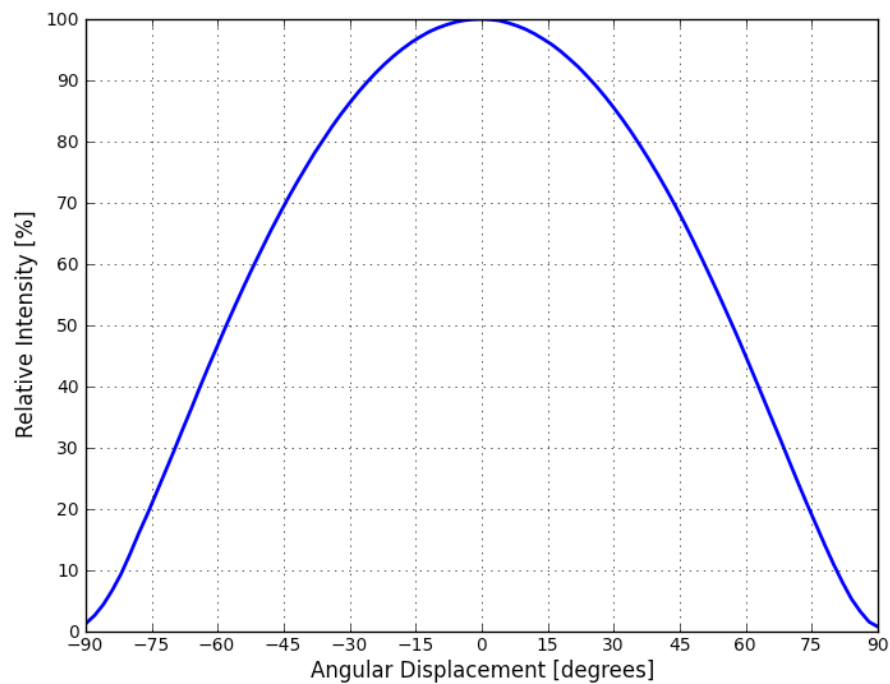


Figure 8. Typical spatial radiation pattern, L130-xx8001400001.

## Radiation Pattern in Polar Coordinate System

Junction Temperature = 25°C

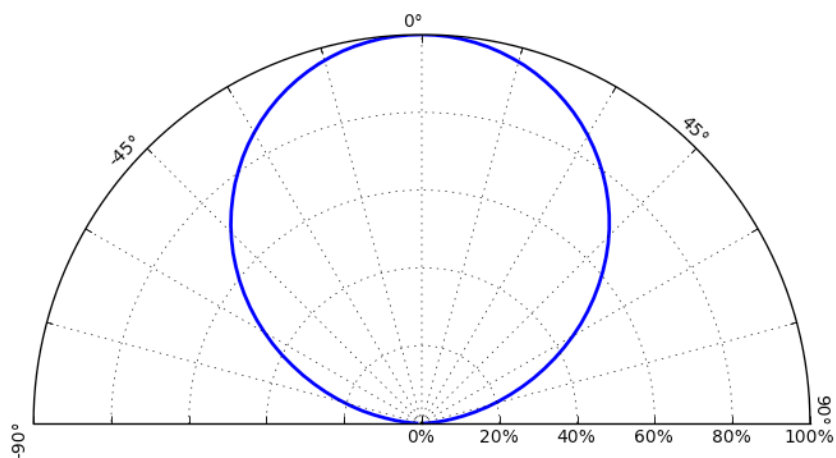


Figure 9. Typical polar radiation pattern, L130-xx8001400001.

# Emitter Packaging

## Emitter Pocket Tape Packaging

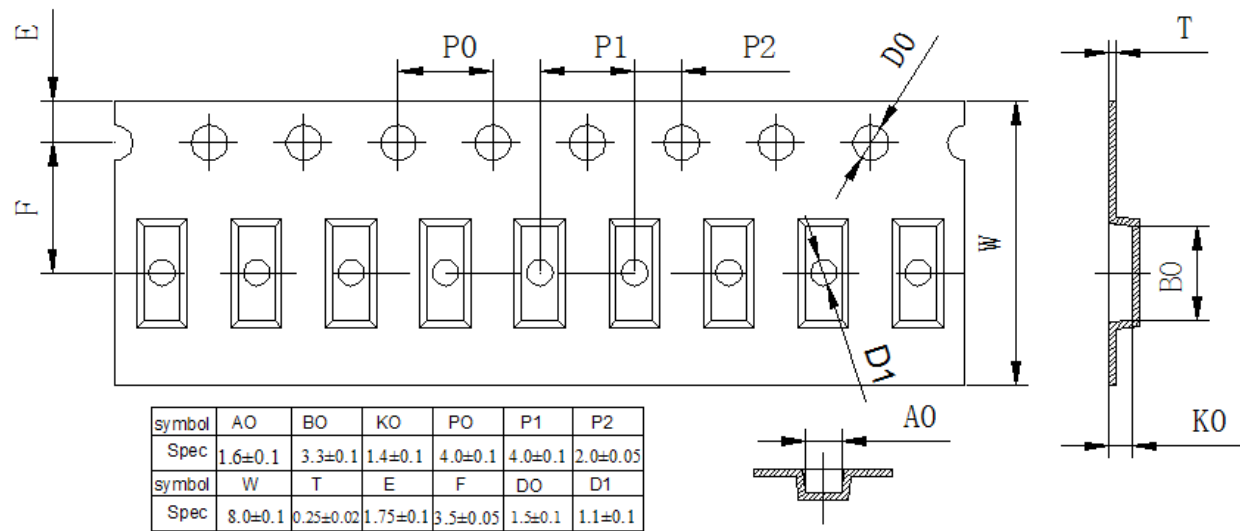


Figure 10.

- Notes for Figure 10:
- 1. All dimensions are in millimeters.
  - 2. Empty component pockets sealed with top cover tape.
  - 3. The maximum number of consecutive missing LEDs is two.

# Emitter Reel Packaging

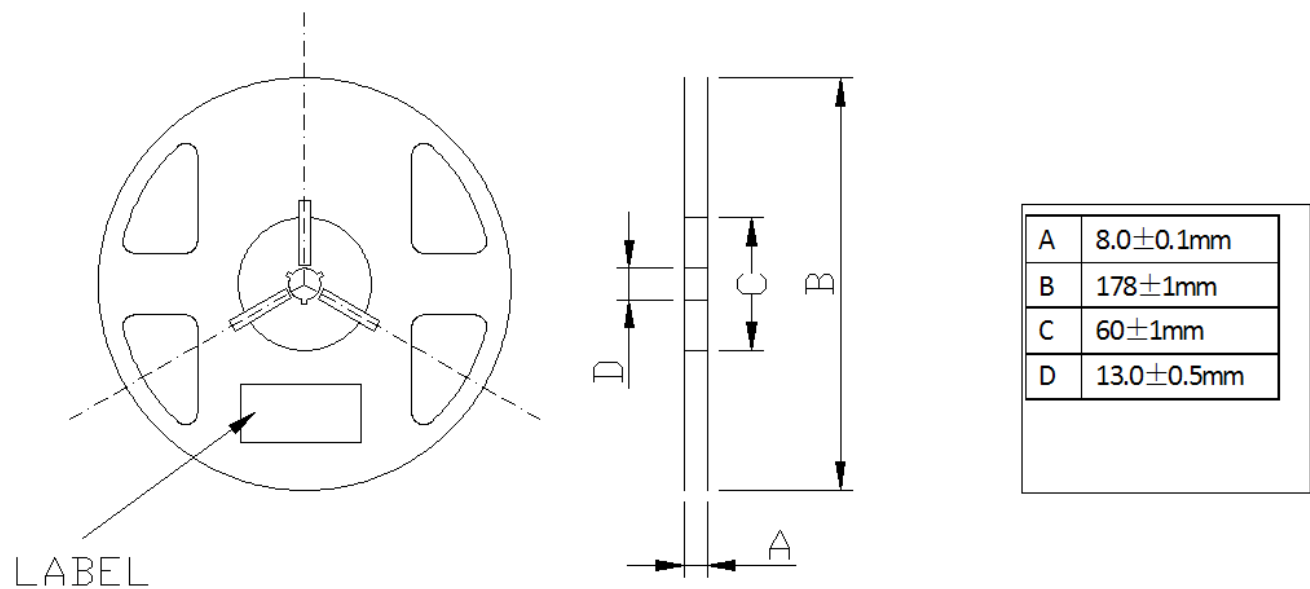


Figure 11.

- Notes for Figure 11:
- 1. All dimensions are in millimeters.
  - 2. Empty component pockets sealed with top cover tape.
  - 3. 7 inch reel-3000 pieces per reel.
  - 4. Minimum packing quantity is 500 pieces.
  - 5. The maximum number of consecutive missing LEDs is two.
  - 6. In accordance with EIA-481-1-B specification.

# 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 of 2700K, 3000K, 3500K, 4000K, 5000K, 5700K, 6500K emitters are labeled with a four digit alphanumeric CAT code following the format below.

ABCD

Where:

A = Flux bin (L etc.)

B & C = Color bin (For example 5J, 5E, 5D, 5K)

D =  $V_f$  bin

## Luminous Flux Bins

Table 7 and Table 8 list the standard photometric luminous flux bins for LUXEON mid-power emitters (tested and binned at 60 mA). 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 L130-XX80014-00001 & L130-XX8001400001 flux bins.

Table 7.

| Bin Code | Minimum Photometric Flux (lm) | Maximum Photometric Flux (lm) |
|----------|-------------------------------|-------------------------------|
| A        | 8.5                           | 10                            |
| B        | 10                            | 11.5                          |
| C        | 11.5                          | 13                            |
| D        | 13                            | 15                            |
| E        | 15                            | 17                            |
| F        | 17                            | 19                            |
| G        | 19                            | 21                            |
| H        | 21                            | 24                            |
| J        | 24                            | 28                            |
| K        | 28                            | 32                            |

Note for Table 7:

1. Tested and binned at 25°C,  $I_f=60$  mA.
2. Tester tolerance:  $\pm 7.5\%$ .

# Forward Voltage Bins

Table 8.  $V_f$  Bin for L130-xx80014-00001

| Bin Code | Minimum Forward Voltage (V) | Maximum Forward Voltage (V) |
|----------|-----------------------------|-----------------------------|
| T        | 2.8                         | 2.9                         |
| V        | 2.9                         | 3.0                         |
| W        | 3.0                         | 3.1                         |
| X        | 3.1                         | 3.2                         |
| Y        | 3.2                         | 3.3                         |
| Z        | 3.3                         | 3.4                         |

Note for Table 8:

- 1. Tested and binned at 25°C,  $I_f=60$  mA.
- 2. Forward voltage test tolerance:  $\pm 0.1$  volts.



# Color Bin Structure

The LUXEON 3014 is hot color targeted so that at 65°C, the color is within ANSI.  
Typical bin structure at 65°C.  
In application conditions, the LED temperature rises and at 65°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.

## L130-2780-0014-00001 Color Bin Structure

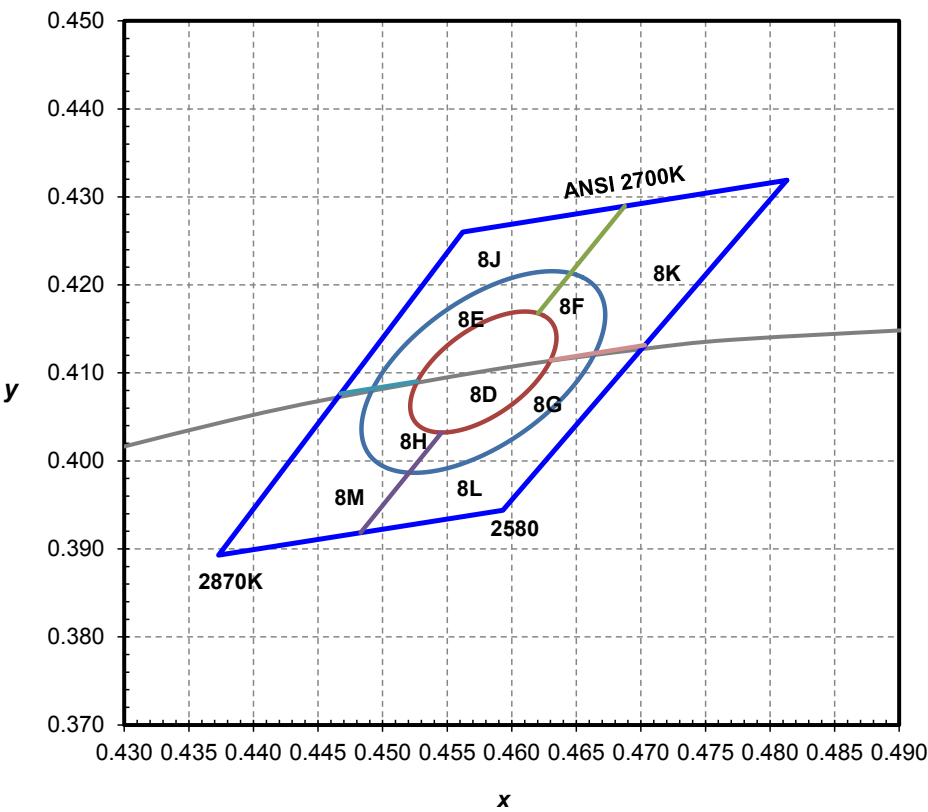


Figure 12. 2700K 1/9<sup>th</sup> color bin structure.

Table 9.

| 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°                 |

Note for Table 9:

1. Philips Lumileds maintains a tester tolerance of ± 0.005 on x, y color coordinates.

## L130-3080-0014-00001 Color Bin Structure

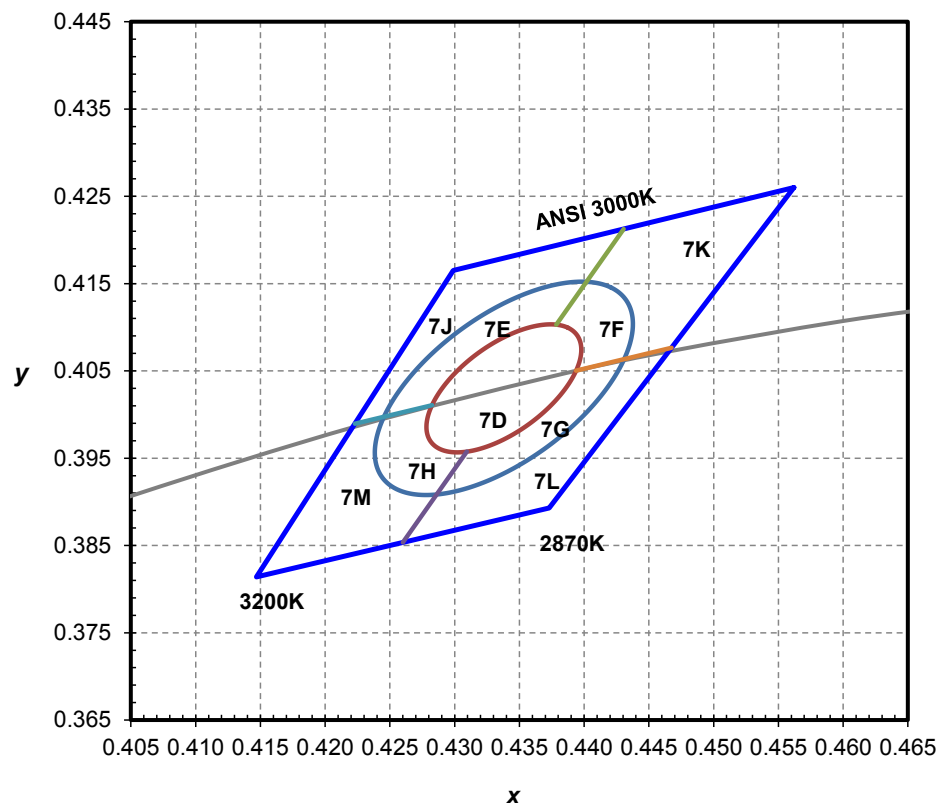


Figure 13. 3000K 1/9<sup>th</sup> color bin structure.

Table 10.

| 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°                 |

Note for Table 10:

1. Philips Lumileds maintains a tester tolerance of  $\pm 0.005$  on x, y color coordinates.

## L130-3580-0014-00001 Color Bin Structure

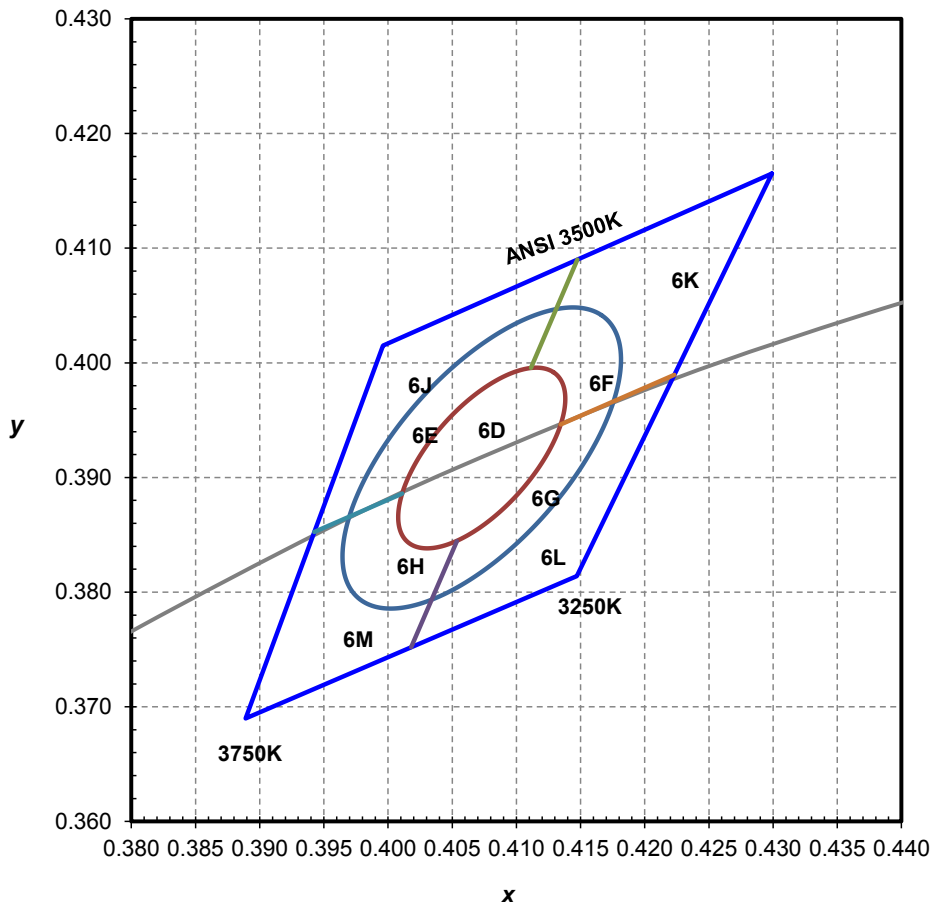


Figure 14. 3500K 1/9<sup>th</sup> color bin structure.

Table 11.

| 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       | 54.00°                 |
| 3500K            | Single 5-step MacAdam ellipse | (0.4073, 0.3917)             | 0.01545       | 0.00690       | 54.00°                 |

Note for Table 11:

1. Philips Lumileds maintains a tester tolerance of  $\pm 0.005$  on x, y color coordinates.

L130-4080-0014-00001 Color Bin Structure

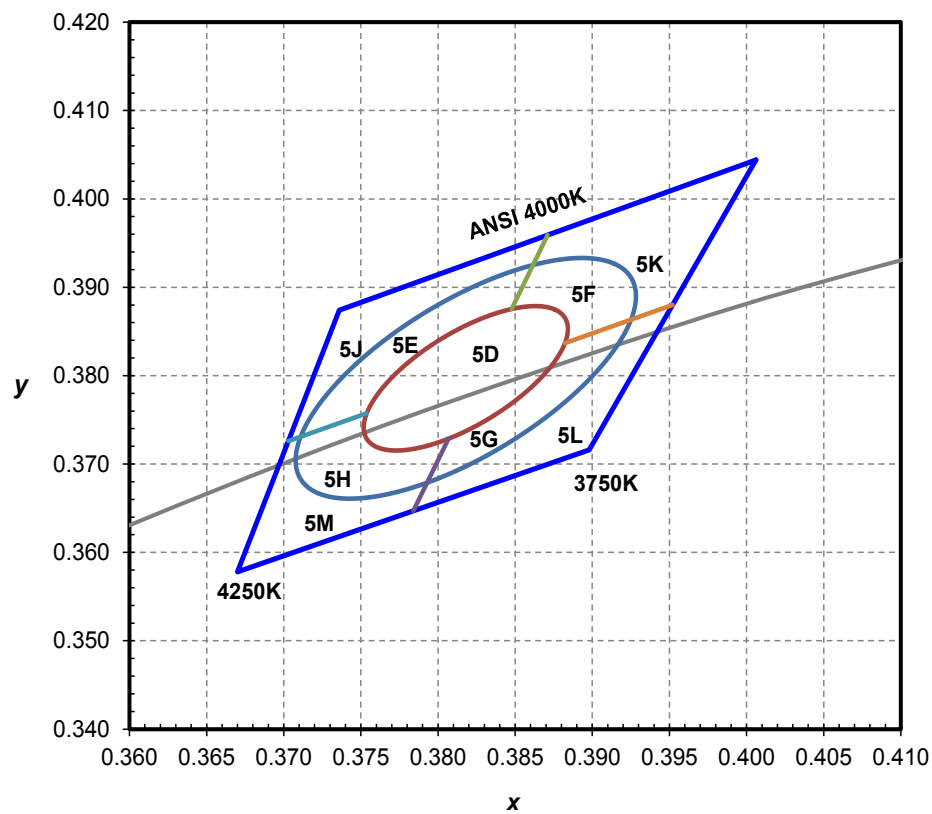


Figure 15. 4000K 1/9<sup>th</sup> color bin structure.

Table 12.

| Nominal<br>ANSI CCT | Color Space                   | Target Center Point<br>(cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse<br>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°                    |

Note for Table 12:

1. Philips Lumileds maintains a tester tolerance of ± 0.005 on x, y color coordinates.

L130-5080-0014-00001 Color Bin Structure

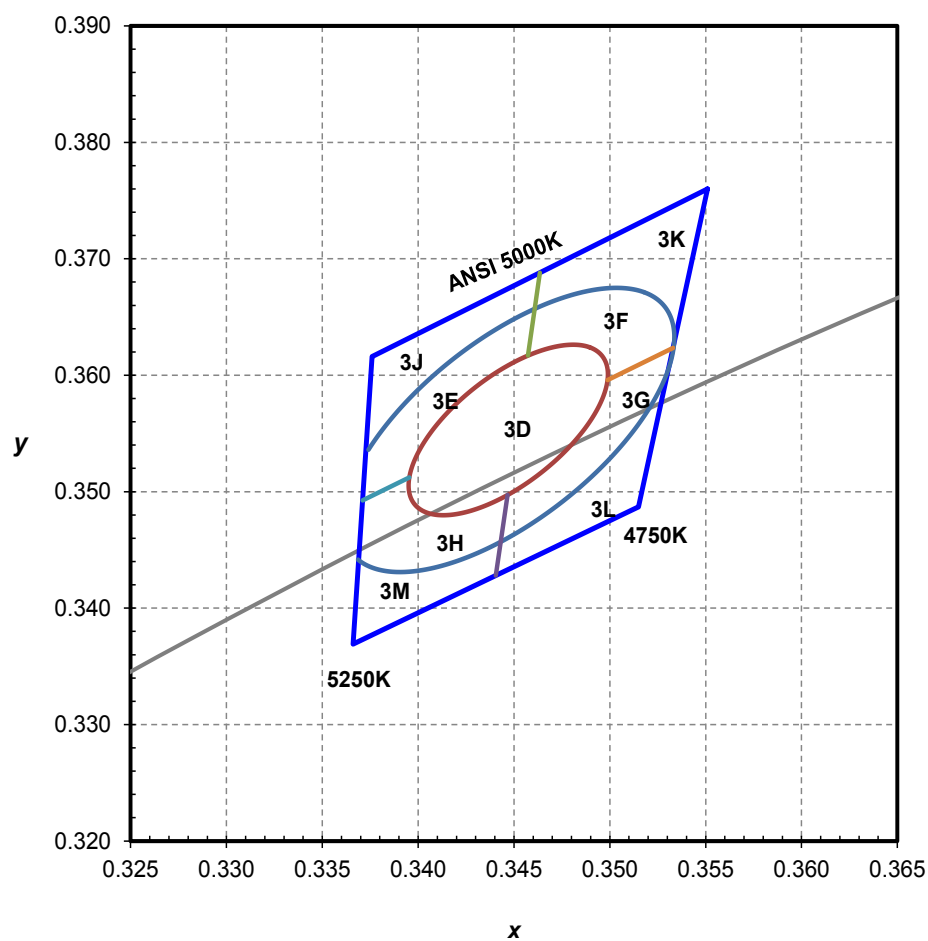


Figure 16. 5000K 1/9<sup>th</sup> color bin structure.

Table 13.

| Nominal<br>ANSI CCT | Color Space                   | Target Center Point<br>(cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse<br>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°                    |

Note for Table 13:

1. Philips Lumileds maintains a tester tolerance of ± 0.005 on x, y color coordinates.

L130-5780-0014-00001 Color Bin Structure

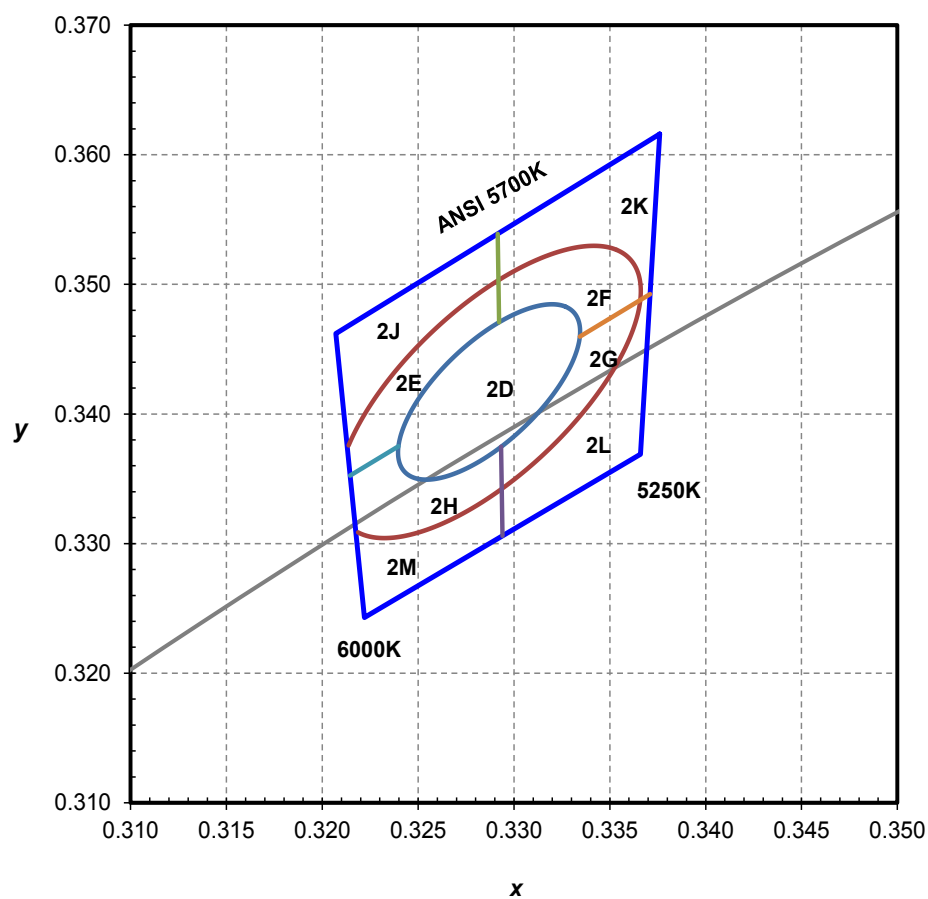


Figure 17. 5700K 1/9<sup>th</sup> color bin structure.

Table 14.

| 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°                 |

Note for Table 14:

1. Philips Lumileds maintains a tester tolerance of ± 0.005 on x, y color coordinates.

L130-6580-0014-00001 Color Bin Structure

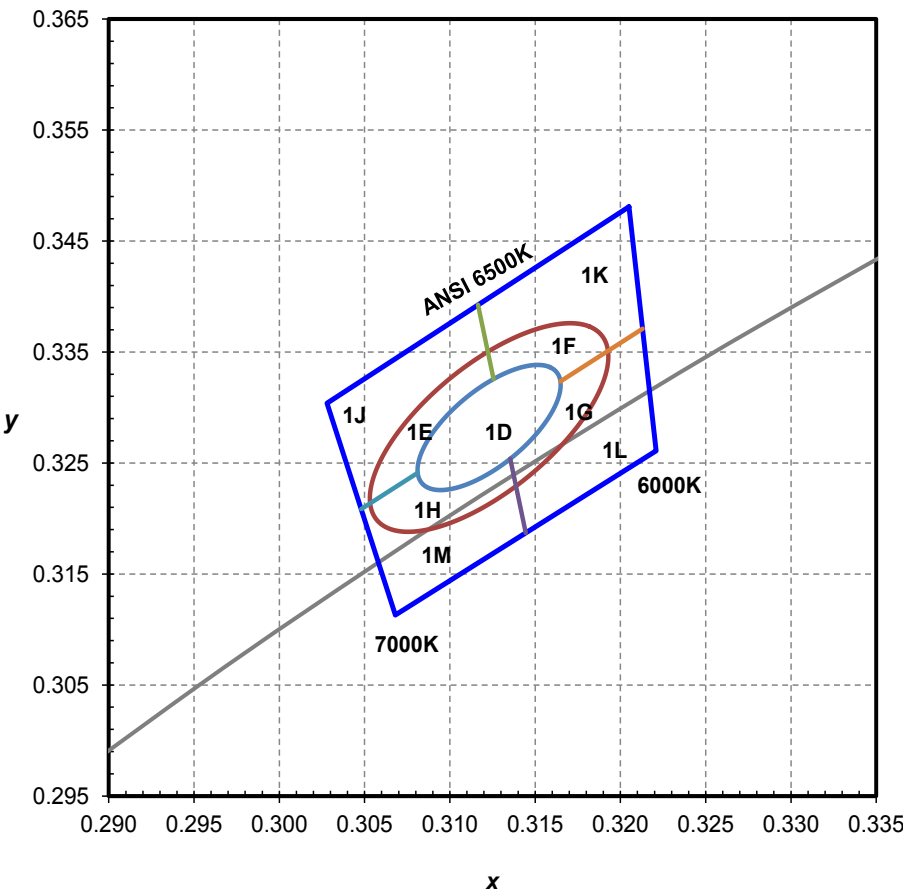


Figure 18. 6500K 1/9<sup>th</sup> color bin structure.

Table 15.

| 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°                 |

Note for Table 15:

1. Philips Lumileds maintains a tester tolerance of ± 0.005 on x, y color coordinates.

## 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](http://www.philipslumileds.com).

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