



Bridgelux® SMD 3030 1W 6V-Low Dimming

Product Data Sheet DS297-2

Introduction

SMD 3030



The Bridgelux SMD 3030 offers exceptional performance in a compact LED package. This high power LED is hot-color targeted which ensures that the LEDs fall within their specified color bin at the typical application conditions of 85°C. With its broad lumen coverage and wide range of CCT and CRI options, the SMD 3030 provides unparalleled design-in flexibility for indoor and outdoor lighting applications. Its high flux capability reduces the number of LEDs and enables industry leading system level lumen per dollar. The SMD 3030 is ideal as a drop in replacement for emitters with an industry standard 3.0mm x 3.0mm footprint.

Features

- Industry-standard 3030 footprint
- Excellent color maintenance
- 1 bin color control
- Superior luminous flux at maximum current for reduced LED count
- Hot-color targeting ensures that color is within the ANSI bin at the typical application conditions of 85°C
- RoHS compliant and lead free
- Multiple CCT and CRI configurations for a wide range of lighting applications

Benefits

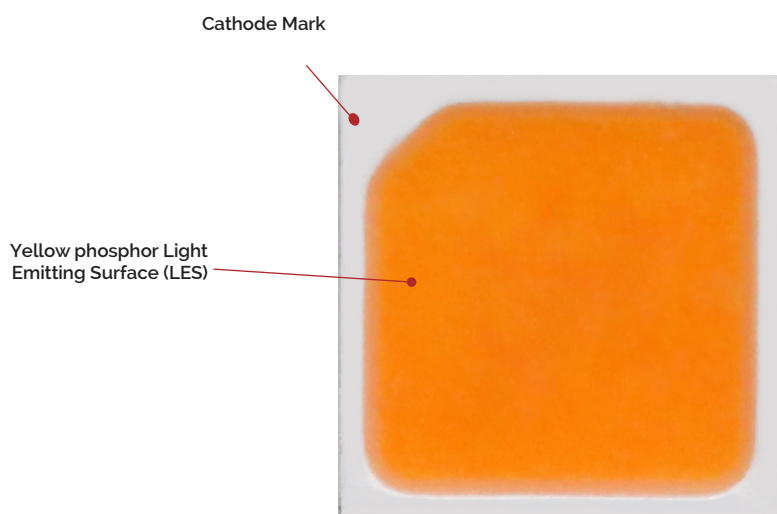
- Lower operating and manufacturing cost
- Ease of design and rapid go-to-market
- Uniform consistent white light
- Reliable and constant white point
- Compliant with environmental standards
- Design flexibility

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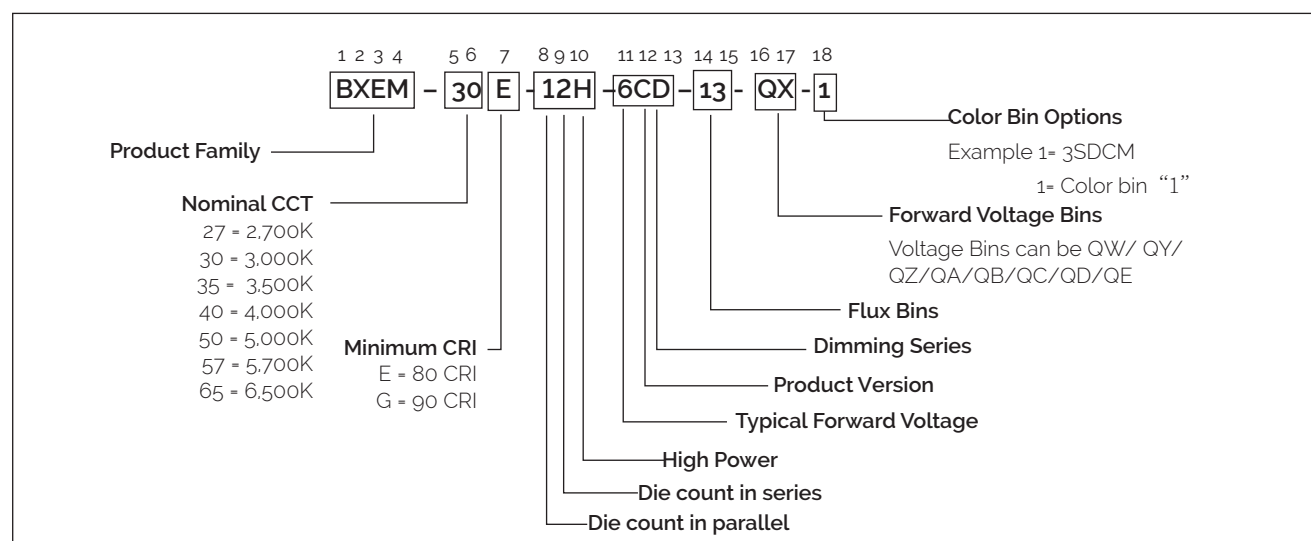
Product Feature Map

Bridgelux SMD LED products come in industry standard package sizes and follow ANSI binning standards. These LEDs are optimized for cost and performance, helping to ensure highly competitive system lumen per dollar performance while addressing the stringent efficacy and reliability standards required for modern lighting applications.



Product Nomenclature

The part number designation for Bridgelux SMD 3030 is explained as follows:



Product Test Conditions

Bridgelux SMD 3030 LEDs are tested and binned with a 10ms pulse of 150mA at T_j (junction temperature) = T_{sp} (solder point temperature) = 25°C. Forward voltage and luminous flux are binned at a $T_j = T_{sp} = 25^\circ\text{C}$, while color is hot targeted at a T_{sp} of 85°C.

Product Selection Guide

The following product configurations are available:

Table 1: Selection Guide, Pulsed Measurement Data at 150mA ($T_j = T_{sp} = 25^\circ\text{C}$)

Part Number ^{1,5}	Nominal CCT ² (K)	CRI ⁴	Nominal Drive Current (mA)	Forward Voltage ^{3,4} (V)			Typical Pulsed Flux (lm) ^{3,4}	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEM-27E-12H-6CD-13-QX-1	2700	80	150	6.0	6.1	6.2	133	0.9	145
BXEM-30E-12H-6CD-13-QX-1	3000	80	150	6.0	6.1	6.2	137	0.9	150
BXEM-35E-12H-6CD-13-QX-1	3500	80	150	6.0	6.1	6.2	140	0.9	153
BXEM-40E-12H-6CD-14-QX-1	4000	80	150	6.0	6.1	6.2	144	0.9	157
BXEM-50E-12H-6CD-14-QX-1	5000	80	150	6.0	6.1	6.2	144	0.9	157
BXEM-57E-12H-6CD-14-QX-1	5700	80	150	6.0	6.1	6.2	143	0.9	156
BXEM-65E-12H-6CD-14-QX-1	6500	80	150	6.0	6.1	6.2	143	0.9	156
BXEM-27G-12H-6CD-11-QX-1	2700	90	150	6.0	6.1	6.2	112	0.9	122
BXEM-30G-12H-6CD-11-QX-1	3000	90	150	6.0	6.1	6.2	116	0.9	127
BXEM-35G-12H-6CD-11-QX-1	3500	90	150	6.0	6.1	6.2	120	0.9	131
BXEM-40G-12H-6CD-12-QX-1	4000	90	150	6.0	6.1	6.2	124	0.9	136
BXEM-50G-12H-6CD-12-QX-1	5000	90	150	6.0	6.1	6.2	124	0.9	136
BXEM-57G-12H-6CD-12-QX-1	5700	90	150	6.0	6.1	6.2	123	0.9	134
BXEM-65G-12H-6CD-12-QX-1	6500	90	150	6.0	6.1	6.2	123	0.9	134

Notes for Table 1:

- The last 7 characters (including hyphens '-') refer to flux, forward voltage, and color bins, respectively. "XX-XX-X" denotes the full distribution of flux, forward voltage, and 3 SDCM color.
Example: BXEM-30E-12H-6CD-13-QX-1 refers to the full distribution of flux, forward voltage, and color within a 3000K 3-step ANSI standard chromaticity region with a typical of 80CRI, 1x2 die configuration, high power, 6.1V typical forward voltage.
- Product CCT is hot targeted at $T_{sp} = 85^\circ\text{C}$. Nominal CCT as defined by ANSI C78.377-2011.
- Products tested under pulsed condition (10ms pulse width) at nominal drive current where $T_j = T_{sp} = 25^\circ\text{C}$.
- Bridgelux maintains a $\pm 7.5\%$ tolerance on luminous flux measurements, $\pm 0.1\text{V}$ tolerance on forward voltage measurements, and ± 2 tolerance on CRI measurements for the SMD 3030.
- Refer to Table 5 and Table 6 for Bridgelux SMD 3030 Luminous Flux Binning and Forward Voltage Binning information.

Product Selection Guide

Table 2: Selection Guide, Stabilized DC Performance ($T_{sp} = 85^{\circ}\text{C}$)^{5,6}

Part Number ^{1,4}	Nominal CCT ² (K)	CRI ³	Nominal Drive Current (mA)	Forward Voltage ³ (V)			Typical DC Flux (lm) ⁵	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEM-27E-12H-6CD-13-QX-1	2700	80	150	5.8	5.9	6.0	120	0.9	135
BXEM-30E-12H-6CD-13-QX-1	3000	80	150	5.8	5.9	6.0	124	0.9	139
BXEM-35E-12H-6CD-13-QX-1	3500	80	150	5.8	5.9	6.0	127	0.9	142
BXEM-40E-12H-6CD-14-QX-1	4000	80	150	5.8	5.9	6.0	130	0.9	146
BXEM-50E-12H-6CD-14-QX-1	5000	80	150	5.8	5.9	6.0	130	0.9	146
BXEM-57E-12H-6CD-14-QX-1	5700	80	150	5.8	5.9	6.0	129	0.9	145
BXEM-65E-12H-6CD-14-QX-1	6500	80	150	5.8	5.9	6.0	129	0.9	145
BXEM-27G-12H-6CD-11-QX-1	2700	90	150	5.8	5.9	6.0	101	0.9	114
BXEM-30G-12H-6CD-11-QX-1	3000	90	150	5.8	5.9	6.0	105	0.9	118
BXEM-35G-12H-6CD-11-QX-1	3500	90	150	5.8	5.9	6.0	109	0.9	122
BXEM-40G-12H-6CD-12-QX-1	4000	90	150	5.8	5.9	6.0	112	0.9	126
BXEM-50G-12H-6CD-12-QX-1	5000	90	150	5.8	5.9	6.0	112	0.9	126
BXEM-57G-12H-6CD-12-QX-1	5700	90	150	5.8	5.9	6.0	111	0.9	125
BXEM-65G-12H-6CD-12-QX-1	6500	90	150	5.8	5.9	6.0	111	0.9	125

Notes for Table 2:

- The last 7 characters (including hyphens '-') refer to flux, forward voltage, and color bins, respectively. "XX-XX-X" denotes the full distribution of flux, forward voltage, and 3 SDCM color.
Example: BXEM-30E-12H-6CD-13-QX-1 refers to the full distribution of flux, forward voltage, and color within a 3000K 3-step ANSI standard chromaticity region with a typical of 80CRI, 1x2 die configuration, high power, 5.9V typical forward voltage.
- Product CCT is hot targeted at $T_{sp} = 85^{\circ}\text{C}$. Nominal CCT as defined by ANSI C78.377-2011.
- Bridgelux maintains a $\pm 7.5\%$ tolerance on luminous flux measurements, $\pm 0.1\text{V}$ tolerance on forward voltage measurements, and ± 2 tolerance on CRI measurements for the SMD 3030.
- Refer to Table 5 and Table 6 for Bridgelux SMD 3030 Luminous Flux Binning and Forward Voltage Binning information.
- Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.
- Typical performance is estimated based on operation under DC (direct current) with LED emitter mounted onto a heat sink with thermal interface material and the solder point temperature maintained at 85°C . Based on Bridgelux test setup, values may vary depending on the thermal design of the luminaire and/or the exposed environment to which the product is subjected.

Electrical Characteristics

Table 3: Electrical Characteristics

Part Number ¹	Drive Current (mA)	Forward Voltage (V) ^{2,3}			Typical Temperature Coefficient of Forward Voltage $\Delta V_f / \Delta T$ (mV/°C)	Typical Thermal Resistance Junction to Solder Point ^{4,5} R_{j-sp} (C/W)
		Minimum	Typical	Maximum		
BXEM-xxx-12H-6CD-XX-XX-X	150	6.0	6.1	6.2	-2.0 to -4.0	12

Notes for Table 3:

1. The last 7 characters (including hyphens '-') refer to flux, forward voltage, and color bins, respectively. "XX-XX-X" denotes the full distribution of flux, forward voltage, and 3 SDCM color.
Example: BXEM-30E-12H-6CD-13-QX-1 refers to the full distribution of flux, forward voltage, and color within a 3000K 3-step ANSI standard chromaticity region with a typical of 80CRI, 1x2 die configuration, high power, 6.1V typical forward voltage.
2. Bridgelux maintains a tolerance of $\pm 0.1V$ on forward voltage measurements. Voltage minimum and maximum values at the nominal drive current are guaranteed by 100% test.
3. Products tested under pulsed condition (10ms pulse width) at nominal drive current where $T_{sp} = 25^\circ C$.
4. Thermal Resistance values based on 3000K 80CRI product.
5. Thermal resistance value was calculated using total electrical input power; optical power was not subtracted from input power.

Absolute Maximum Ratings

Table 4: Maximum Ratings

Parameter	Maximum Rating
LED Junction Temperature (T_j)	125°C
Storage Temperature	-40°C to +105°C
Operating Solder Point Temperature (T_{sp})	-40°C to +105°C
Soldering Temperature	260°C or lower for a maximum of 10 seconds
Maximum Drive Current	240mA
Maximum Peak Pulsed Forward Current ¹	480mA
Maximum Reverse Voltage ²	-
Moisture Sensitivity Rating	MSL 3
Electrostatic Discharge	2kV HBM. JEDEC-JS-001-HBM and JEDEC-JS-001-2012

Notes for Table 4:

1. Bridgelux recommends a maximum duty cycle of 10% and pulse width of 10 ms when operating LED SMD at maximum peak pulsed current specified. Maximum peak pulsed currents indicate values where LED SMD can be driven without catastrophic failures.
2. Light emitting diodes are not designed to be driven in reverse voltage and will not produce light under this condition. no rating is provided.

Product Bin Definitions

Table 5 lists the standard photometric luminous flux bins for Bridgelux SMD 3030 LEDs. 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 CCTs.

Table 5: Luminous Flux Bin Definitions at 150mA, $T_{sp}=25^{\circ}\text{C}$

CCT	Bin Code	Minimum	Maximum	Unit	Condition
2700 CRI80	13	130	140	lm	$I_F=150\text{mA}$
3000 CRI80	13	130	140		
3500 CRI80	13	135	145		
4000/5000/5700/6500 CRI80	14	140	150		
2700 CRI90	11	110	120		
3000 CRI90	11	110	120		
3500 CRI90	11	115	125		
4000/5000/5700/6500 CRI90	12	120	130		

Note for Table 5:

1. Bridgelux maintains a tolerance of $\pm 7.5\%$ on luminous flux measurements.

Table 6: Forward Voltage Bin Definition at $T_{sp}=25^{\circ}\text{C}$

	Bin Code	Minimum	Maximum	Minimum	Maximum	Unit
CRI	Voltage Bin	$I_F=150\text{mA}$		$I_F=5\text{mA}$		V
80	QA	6.0	6.2	5.16	5.17	
	QB	6.0	6.2	5.17	5.18	
	QC	6.0	6.2	5.18	5.19	
	QD	6.0	6.2	5.19	5.20	
	QE	6.0	6.2	5.20	5.21	
90	QW	6.0	6.2	5.13	5.14	V
	QY	6.0	6.2	5.14	5.15	
	QZ	6.0	6.2	5.15	5.16	
	QA	6.0	6.2	5.16	5.17	
	QB	6.0	6.2	5.17	5.18	

Note for Table 6:

1. The voltage tolerance is $\pm 0.1\text{V}$ when the drive current is 150 mA
1. The voltage tolerance is $\pm 0.01\text{V}$ when the drive current is 5 mA

Product Bin Definitions

Table 7: 3- step MacAdam Ellipse Color Bin Definitions

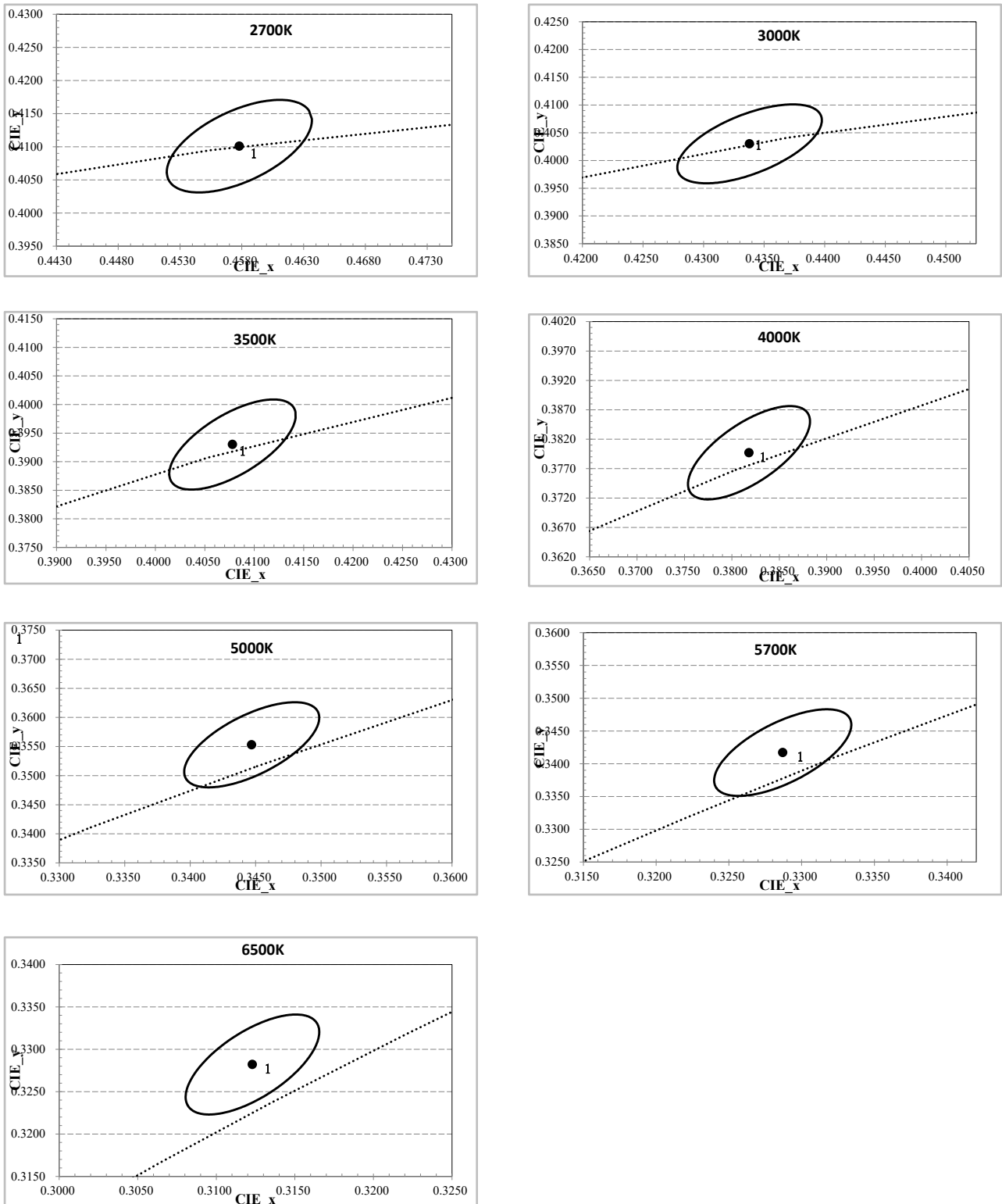
CCT	Color Space	Center Point		Major Axis	Minor Axis	Ellipse Rotation Angle	Color Bin
		X	Y				
2700K	3 SDCM	0.4578	0.4101	0.00810	0.00420	53.70	1
3000K	3 SDCM	0.4338	0.4030	0.00834	0.00408	53.22	1
3500K	3 SDCM	0.4073	0.3917	0.00927	0.00414	54.00	1
4000K	3 SDCM	0.3818	0.3797	0.00939	0.00402	53.72	1
5000K	3 SDCM	0.3447	0.3553	0.00822	0.00354	59.62	1
5700K	3 SDCM	0.3287	0.3417	0.00746	0.00320	59.09	1
6500K	3 SDCM	0.3123	0.3282	0.00669	0.00285	58.57	1

Notes for Table 7:

1. Color binning at T_{sp} -85°C unless otherwise specified
2. Bridgelux maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

Product Bin Definitions

Figure 1: C.I.E. 1931 Chromaticity Diagram (Color Bin Structure, Hot-color Targeted at $T_{sp}=85^{\circ}\text{C}$)



Performance Curves

Figure 2: Drive Current vs. Voltage ($T_{sp}=25^{\circ}\text{C}$)

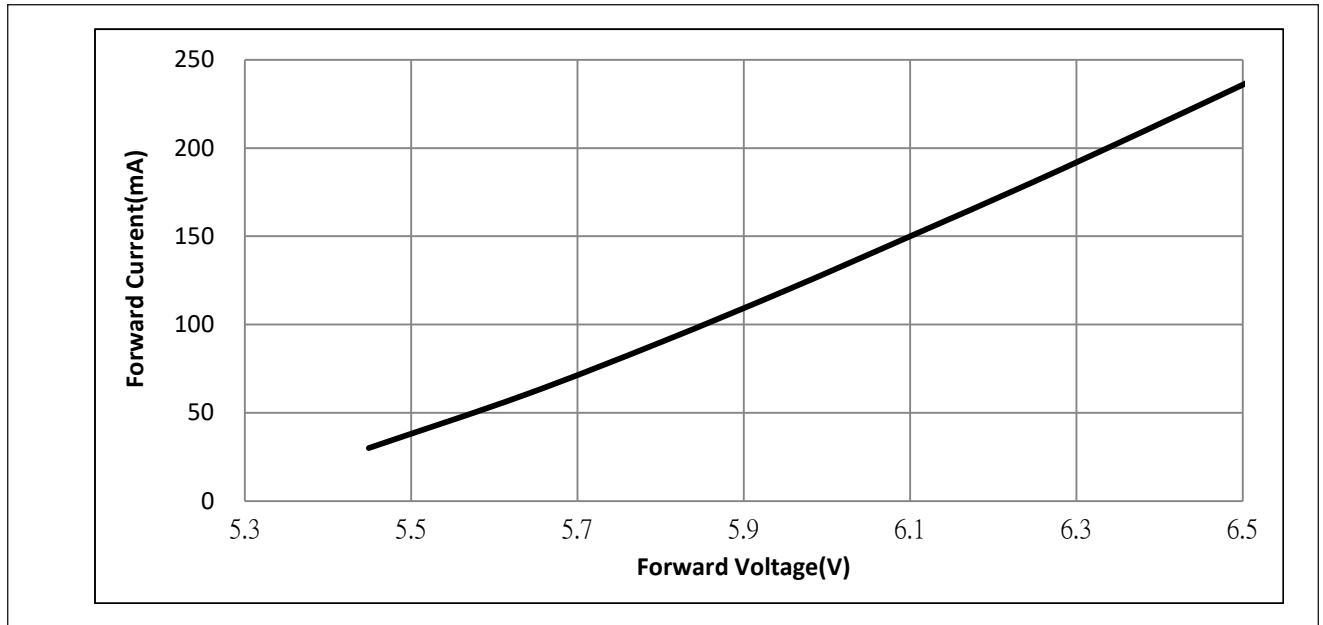
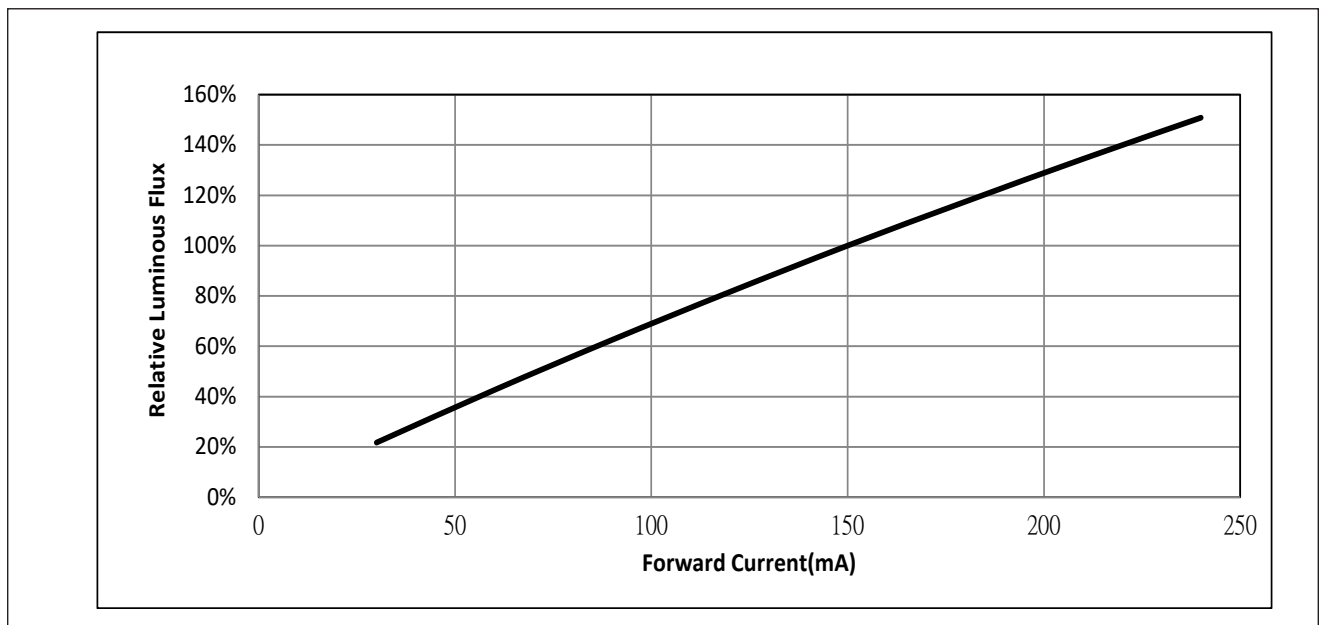


Figure 3: Relative Luminous Flux vs. Drive Current ($T_{sp}=25^{\circ}\text{C}$)



Note for Figure 3:

1. Bridgelux does not recommend driving high power LEDs at low currents. Doing so may produce unpredictable results. Pulse width modulation (PWM) is recommended for dimming effects.

Performance Curves

Figure 4: Relative DC Flux vs. Solder Point Temperature

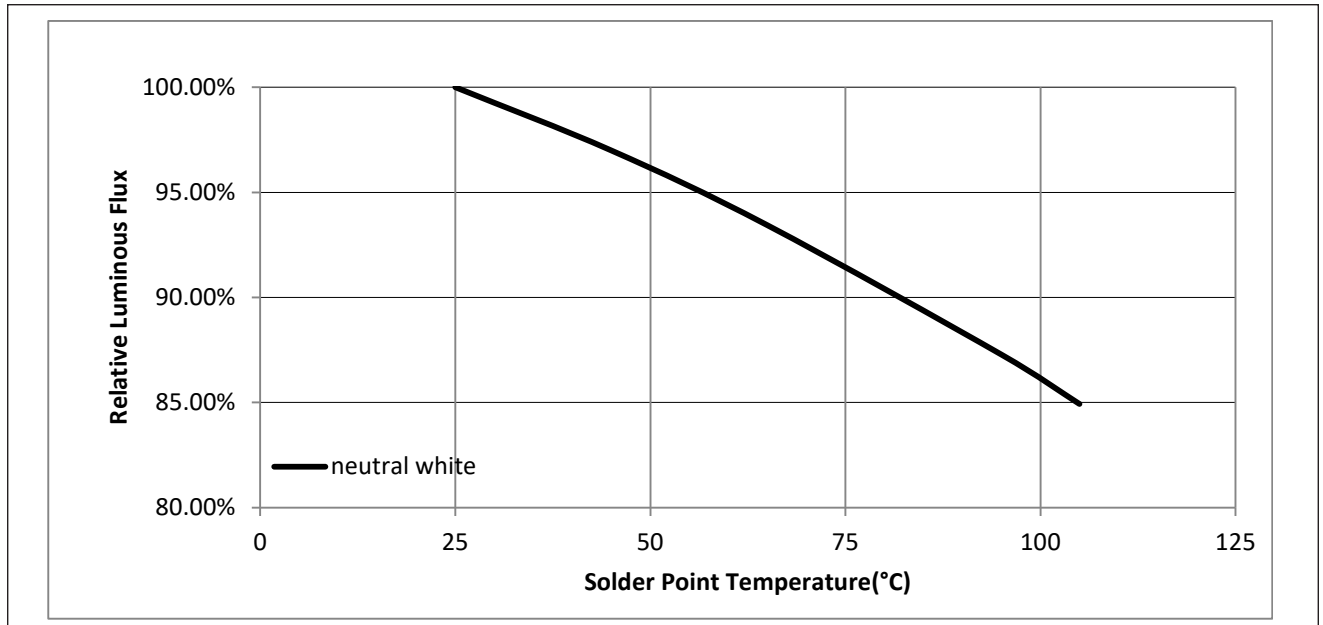
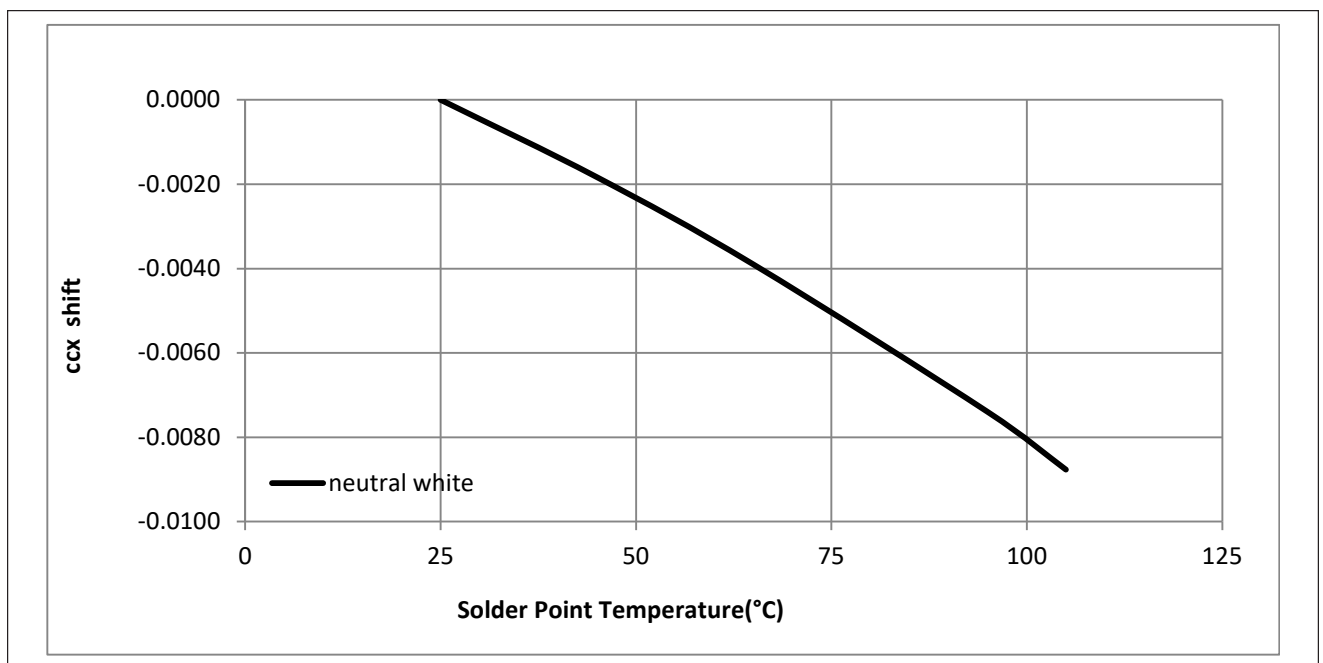


Figure 5: Typical DC ccx Shift vs. Solder Point Temperature

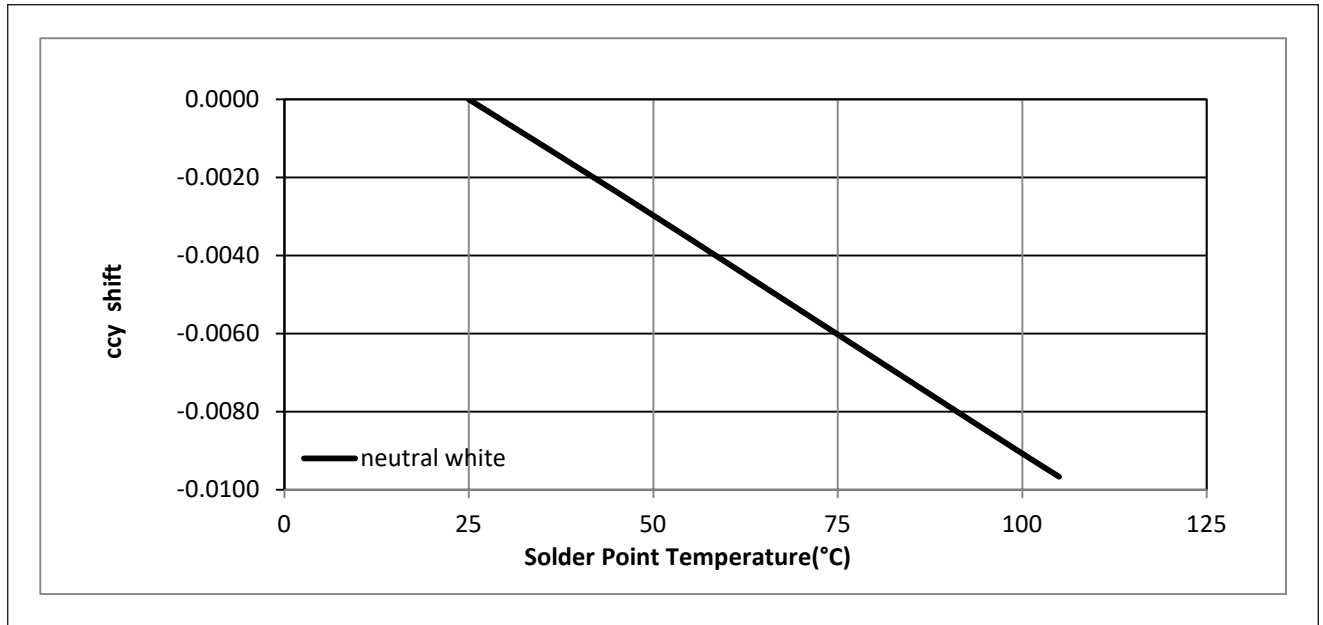


Notes for Figures 4 & 5:

1. Characteristics shown for neutral white based on 4000K and 80 CRI.
2. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information.

Performance Curves

Figure 6: Typical DC ccy Shift vs. Solder Point Temperature

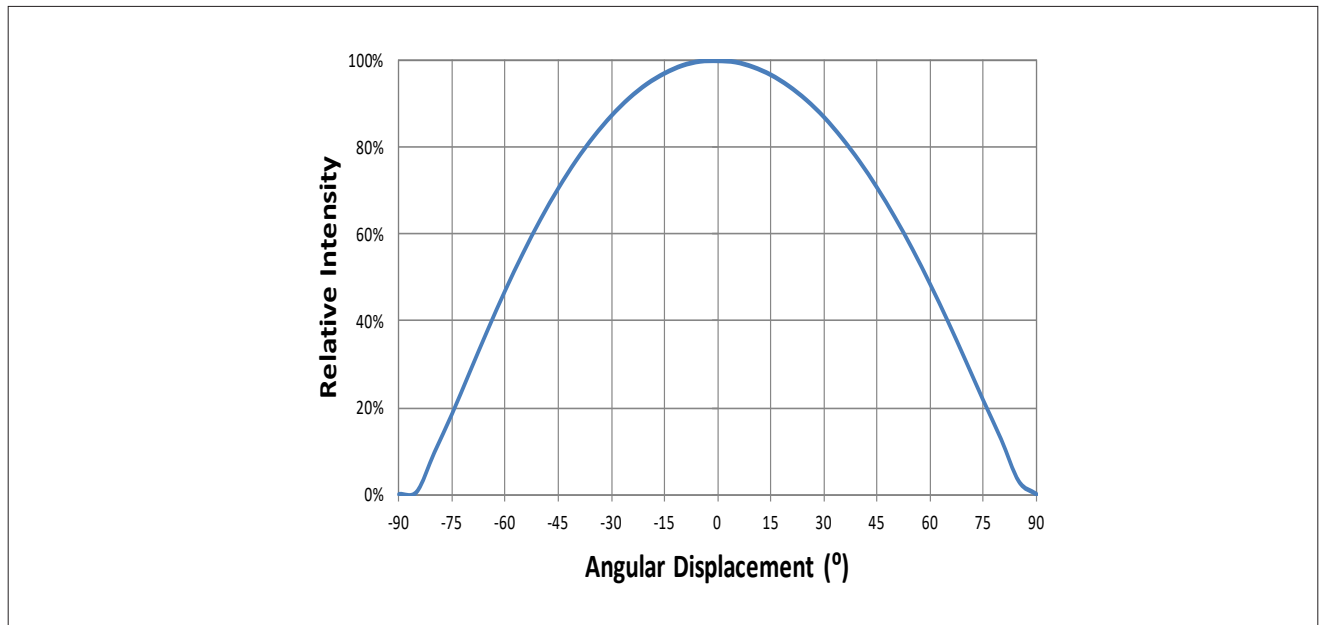


Notes for Figure 6:

1. Characteristics shown for neutral white based on 4000K and 80 CRI.
2. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information.

Typical Radiation Pattern

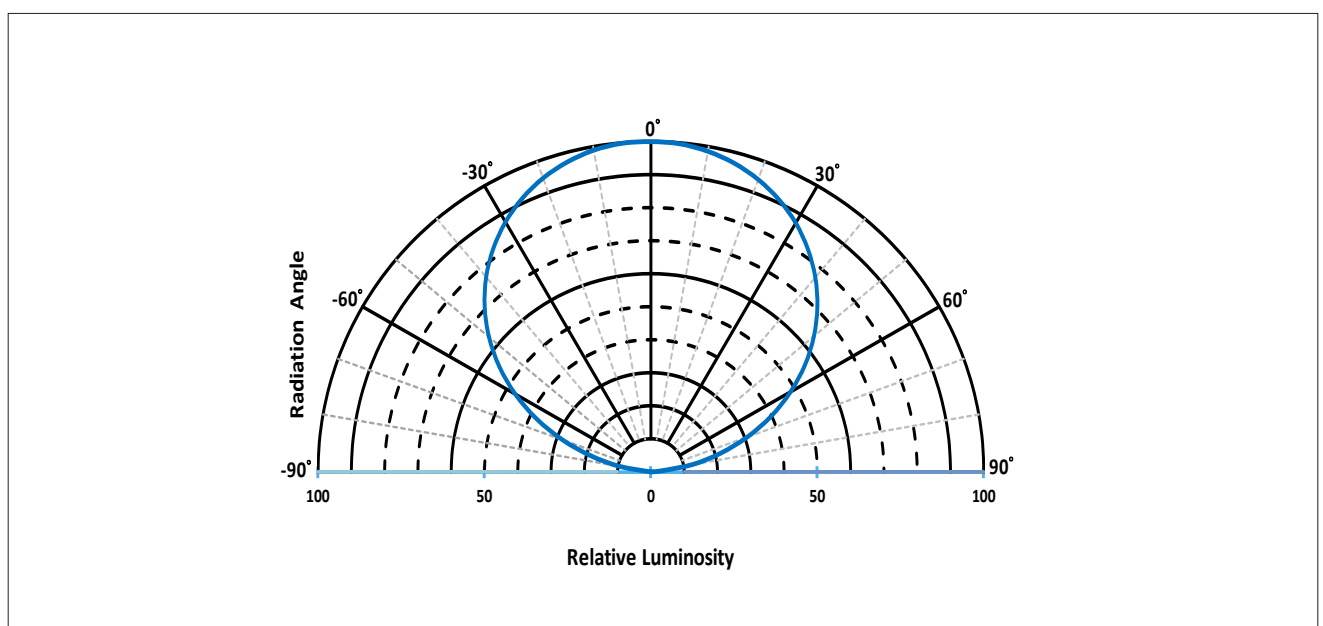
Figure 7: Typical Spatial Radiation Pattern at 150mA, $T_{sp}=25^{\circ}\text{C}$



Notes for Figure 7:

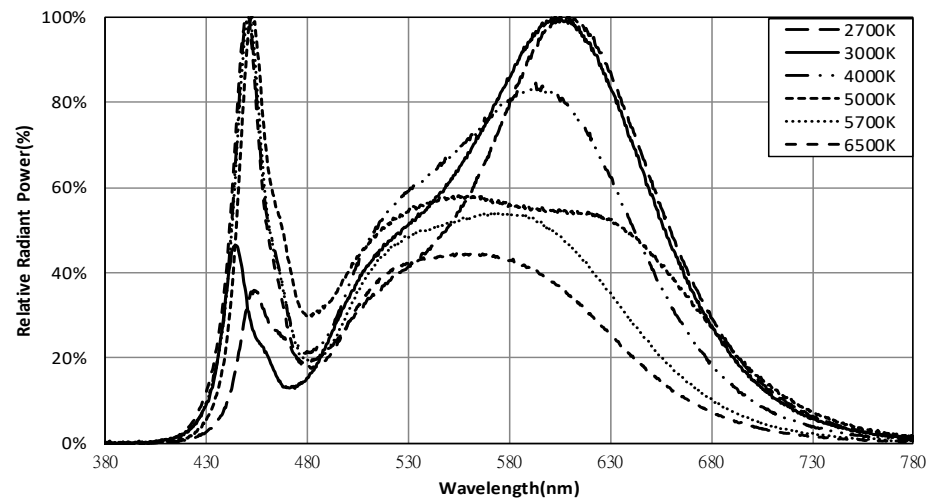
1. Typical viewing angle is 120° .
2. The viewing angle is defined as the off axis angle from the centerline where I_v is $\frac{1}{2}$ of the peak value.

Figure 8: Typical Polar Radiation Pattern at 150mA, $T_{sp}=25^{\circ}\text{C}$



Typical Color Spectrum

Figure 9: Typical Color Spectrum

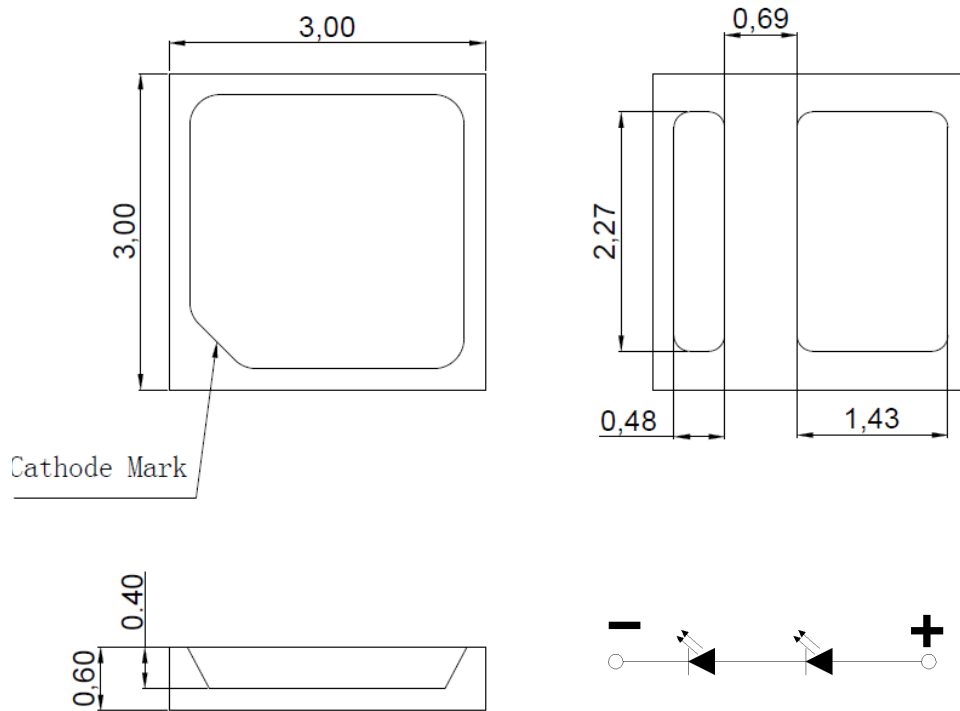


Note for Figure 9:

1. Color spectra measured at nominal current for $T_{sp} = 25^{\circ}\text{C}$
2. Color spectra shown for 80 CRI products.

Mechanical Dimensions

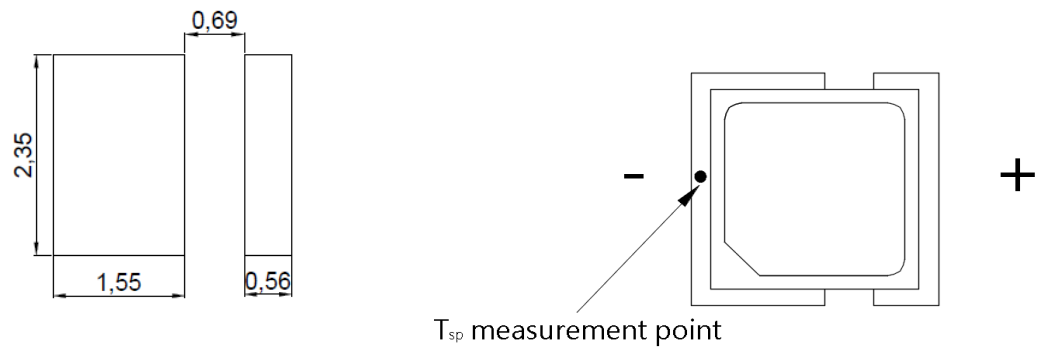
Figure 10: Drawing for SMD 3030



Notes for Figure 10:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are $\pm 0.10\text{mm}$.
4. The optical center of the LED emitter is nominally defined by the mechanical center of the emitter. The light emitting surface (LES) is centered on the mechanical center of the LED emitter to a tolerance of $\pm 0.2\text{ mm}$

Recommended PCB Soldering Pad Pattern



Reliability

Table 8: Reliability Test Items and Conditions

No .	Items	Reference Standard	Test Conditions	Drive Current	Test Duration	Units Failed/Tested
1	Moisture/Reflow Sensitivity	J-STD-020E	$T_{\text{slid}} = 260^{\circ}\text{C}$, 10sec, Precondition: 30°C , 60%RH, 168hr		3 reflows	0/20
2	Low Temperature Storage	JESD22-A119	$T_{\text{a}} = -40^{\circ}\text{C}$		1000 hours	0/20
3	High Temperature Storage	JESD22-A103D	$T_{\text{a}} = 100^{\circ}\text{C}$		1000 hours	0/20
4	Low Temperature Operating Life	JESD22-A108D	$T_{\text{a}} = -40^{\circ}\text{C}$	150mA	1000 hours	0/20
5	Temperature Humidity Operating Life	JESD22-A101C	$T_{\text{sp}} = 85^{\circ}\text{C}$, RH-85%	150mA	1000 hours	0/20
6	High Temperature Operating Life	JESD22-A108D	$T_{\text{sp}} = 105^{\circ}\text{C}$	240mA	1000 hours	0/20
7	Thermal Shock	JESD22-A106B	$T_{\text{a}} = -40^{\circ}\text{C} \sim 100^{\circ}\text{C}$; Dwell : 15min; Transfer: 10sec		200 Cycle	0/20
8	Temperature Cycle	JESD22-A104E	$T_{\text{a}} = -40^{\circ}\text{C} \sim 100^{\circ}\text{C}$; Dwell at extreme temperature: 15min; Ramp rate $< 105^{\circ}\text{C}/\text{min}$		200 Cycle	0/20
9	Electrostatic Discharge	JS-001-2012	HBM, 2KV, 15k Ω , 100pF, Alternately positive or negative			0/20
10	Power switching	IEC62171:2014	$T_{\text{sp}} = 105^{\circ}\text{C}$ 30 sec on, 30 sec off	240mA	30000 cycles	0/20

Passing Criteria

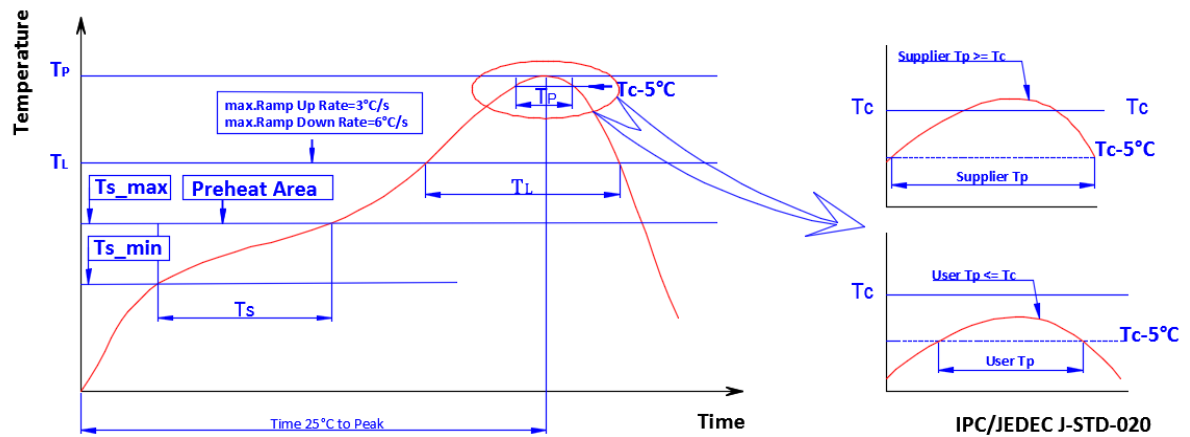
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	150mA	$\Delta V_f < 10\%$
Luminous Flux	Iv	150mA	$\Delta I_v < 30\%$
Chromaticity Coordinates	(x, y)	150mA	$\Delta u'v' < 0.007$

Notes for Table 8:

- Measurements are performed after allowing the LEDs to return to room temperature
- T_{slid} : reflow soldering temperature; T_{a} : ambient temperature

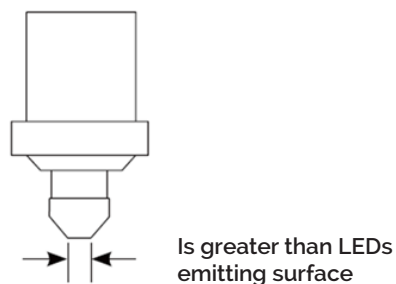
Reflow Characteristics

Figure 11 : Reflow Profile



Profile Feature	Lead Free Assembly
Temperature Min. (T_{s_min})	160°C
Temperature Max. (T_{s_max})	205°C
Time (t_s) from T_{s_min} to T_{s_max}	60-150 seconds
Ramp-Up Rate (T_L to T_p)	3 °C/second
Liquidus Temperature (T_L)	220 °C
Time (T_L) Maintained Above T_L	60-150 seconds
Peak Temp(T_p)	260 °C max.
Time (T_p) Within 5 °C of the Specified Classification Temperature (T_c)	25 seconds max.
Ramp-Down Rate (T_p to T_L)	5 °C/second max.
Time 25 °C to Peak Temperature	10 minutes max.

Figure 12 : Pick and Place

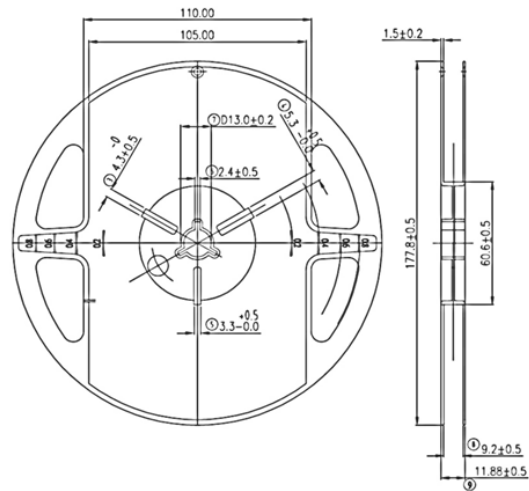


Note for Figure 12:

- When using a pick and place machine, choose a nozzle that has a larger diameter than the LED's emitting surface. Using a Pick-and-Place nozzle with a smaller diameter than the size of the LEDs emitting surface will cause damage and may also cause the LED to not illuminate.

Packaging

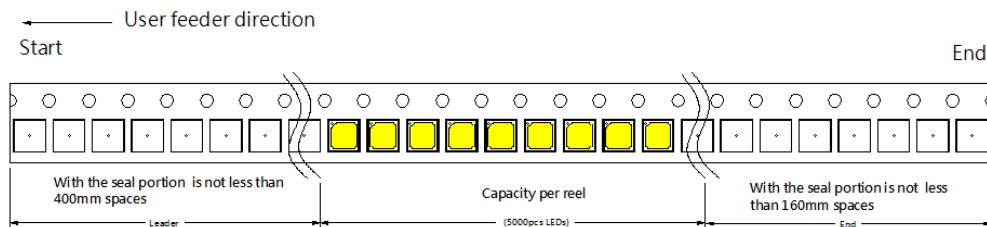
Figure 13: Emitter Reel Drawings



Note for Figure 13:

1. Drawings are not to scale. Drawing dimensions are in millimeters.

Figure 14: Emitter Tape Drawings

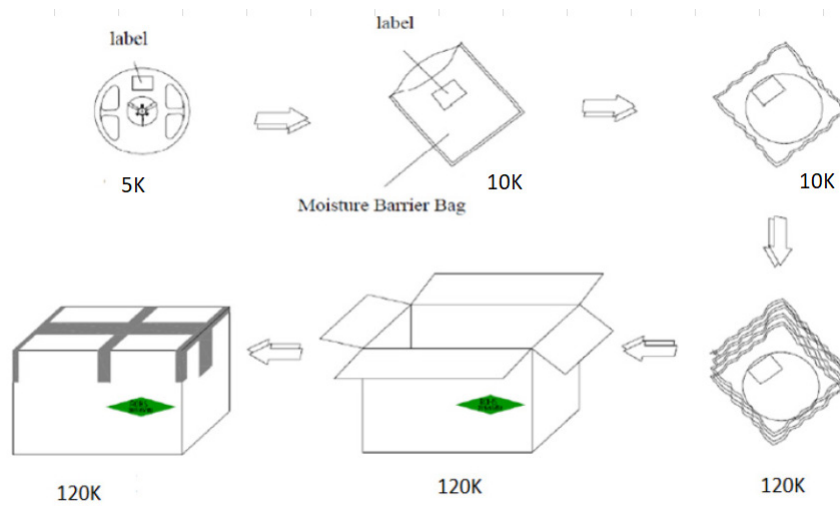


Note for Figure 14:

1. Drawings are not to scale. Drawing dimensions are in millimeters.

Packaging

Figure 15: Emitter Reel Packaging Drawings



Note for Figure 15:

1. Drawings are not to scale.

Design Resources

Optical Source Models

Please contact your Bridgelux sales representative for assistance.

Precautions

CAUTION: CHEMICAL EXPOSURE HAZARD

Exposure to some chemicals commonly used in luminaire manufacturing and assembly can cause damage to the LED emitter. Please consult Bridgelux Application Note AN51 for additional information.

CAUTION: EYE SAFETY

Eye safety classification for the use of Bridgelux SMD LED emitter is in accordance with IEC specification EN62471: Photobiological Safety of Lamps and Lamp Systems. SMD LED emitters are classified as Risk Group 1 when operated at or below the maximum drive current. Please use appropriate precautions. It is important that employees working with LEDs are trained to use them safely.

CAUTION: RISK OF BURN

Do not touch the SMD LED emitter during operation. Allow the array to cool for a sufficient period of time before handling. The SMD LED emitter may reach elevated temperatures such that could burn skin when touched.

CAUTION

CONTACT WITH LIGHT EMITTING SURFACE (LES)

Avoid any contact with the LES. Do not touch the LES of the emitter or apply stress to the LES (yellow phosphor resin area). Contact may cause damage to the emitter.

Optics and reflectors must not be mounted in contact with the LES (yellow phosphor resin area).

Disclaimers

MINOR PRODUCT CHANGE POLICY

The rigorous qualification testing on products offered by Bridgelux provides performance assurance. Slight cosmetic changes that do not affect form, fit, or function may occur as Bridgelux continues product optimization.

STANDARD TEST CONDITIONS

Unless otherwise stated, LED emitter testing is performed at the nominal drive current.

About Bridgelux: Bridging Light and Life™

At Bridgelux, we help companies, industries and people experience the power and possibility of light. Since 2002, we've designed LED solutions that are high performing, energy efficient, cost effective and easy to integrate. Our focus is on light's impact on human behavior, delivering products that create better environments, experiences and returns—both experiential and financial. And our patented technology drives new platforms for commercial and industrial luminaires.

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