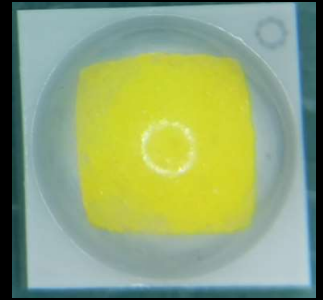


# Bridgelux® SMD 3535 2W 3V

Product Data Sheet DS889

# Introduction

SMD 3535



## Features

- Package: SMT ceramic package with silicone lens
- Lumen maintenance: Test results according to IESNA LM-80 available
- ESD8kV HBM. JEDEC-JS-001-HBM and JEDEC-JS-001-2012
- Operates at a maximum current of up to 1.5A
- Hot binning @ 85 °C

## Application

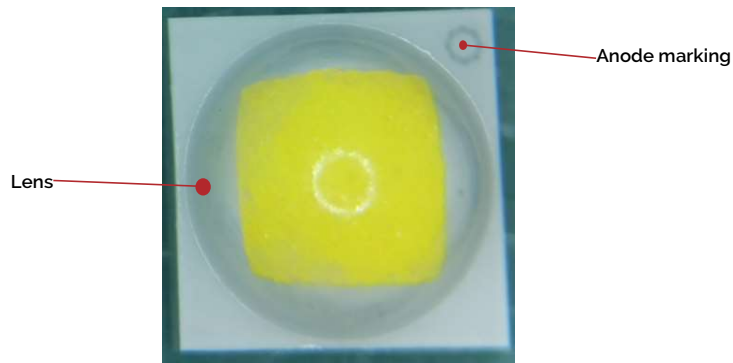
- Indoor Lighting: Spotlight, Downlight
- Outdoor Lighting: Street Light, Tunnel Light, Security Light, Area Light, Stadium/Arena Light
- Industrial Lighting: High Bay Light, Low Bay Light
- Consumer Lighting: Torch Light

# Contents

Product Feature Map	2
Product Nomenclature	2
Product Selection Guide	3
Electrical Characteristics	4
Absolute Maximum Ratings	5
Product Bin Definitions	6
Performance Curves	9
Typical Radiation Pattern	12
Typical Color Spectrum	13
Mechanical Dimensions	14
Reliability	15
Reflow Characteristics	16
Packaging	17
Design Resources	19
Precautions	19
Disclaimers	19
About Bridgelux	20

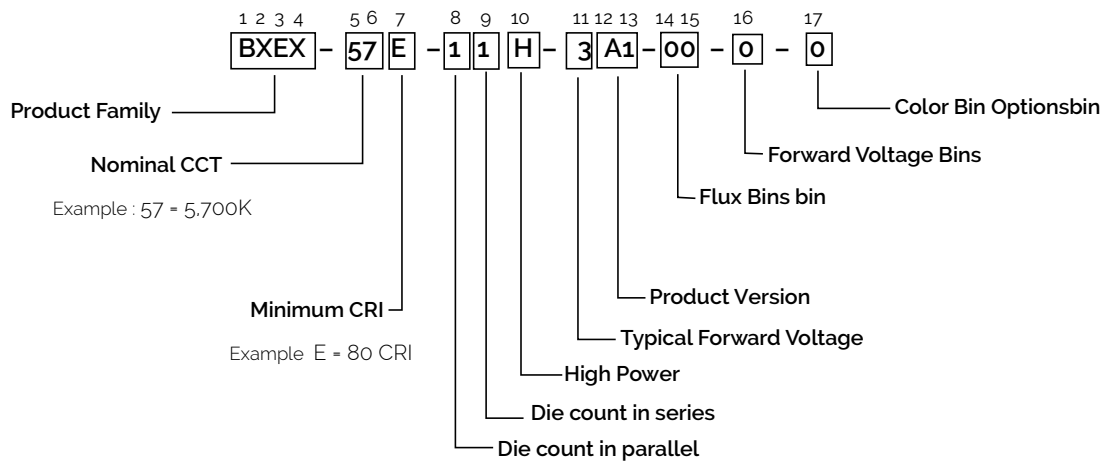
# Product Feature Map

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 3535 is explained as follows:



# Product Selection Guide

The following product configurations are available:

**Table 1:** Selection Guide, Pulsed Measurement Data at 700mA ( $T_j = T_{sp} = 25^\circ\text{C}$ )

Part Number <sup>6</sup>	Nominal CCT <sup>2</sup> (K)	CRI <sup>3,5</sup>	Nominal Drive Current (mA)	Forward Voltage <sup>4,5</sup> (V)			Typical Pulsed Flux (lm) <sup>4,5</sup>	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEX-27E-11H-3A1-00-0-0	2700	80	700	2.8	3.0	3.2	284	2.1	135
BXEX-30E-11H-3A1-00-0-0	3000	80	700	2.8	3.0	3.2	295	2.1	141
BXEX-35E-11H-3A1-00-0-0	3500	80	700	2.8	3.0	3.2	301	2.1	143
BXEX-40E-11H-3A1-00-0-0	4000	80	700	2.8	3.0	3.2	316	2.1	150
BXEX-50E-11H-3A1-00-0-0	5000	80	700	2.8	3.0	3.2	316	2.1	150
BXEX-57E-11H-3A1-00-0-0	5700	80	700	2.8	3.0	3.2	313	2.1	149
BXEX-65E-11H-3A1-00-0-0	6500	80	700	2.8	3.0	3.2	313	2.1	149

**Table 2:** Selection Guide, Pulsed Test Performance ( $T_{sp} = 85^\circ\text{C}$ )<sup>7,8</sup>

Part Number <sup>6</sup>	Nominal CCT <sup>2</sup> (K)	CRI <sup>3,5</sup>	Nominal Drive Current (mA)	Forward Voltage <sup>4,5</sup> (V)			Typical Pulsed Flux (lm) <sup>4,5</sup>	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEX-27E-11H-3A1-00-0-0	2700	80	700	2.7	2.9	3.1	250	2.0	123
BXEX-30E-11H-3A1-00-0-0	3000	80	700	2.7	2.9	3.1	260	2.0	128
BXEX-35E-11H-3A1-00-0-0	3500	80	700	2.7	2.9	3.1	265	2.0	131
BXEX-40E-11H-3A1-00-0-0	4000	80	700	2.7	2.9	3.1	278	2.0	137
BXEX-50E-11H-3A1-00-0-0	5000	80	700	2.7	2.9	3.1	278	2.0	137
BXEX-57E-11H-3A1-00-0-0	5700	80	700	2.7	2.9	3.1	275	2.0	135
BXEX-65E-11H-3A1-00-0-0	6500	80	700	2.7	2.9	3.1	275	2.0	135

Notes for Tables 1 & 2:

- The last 6 characters (including hyphens '-') refer to flux bins, forward voltage bins, and color bin options, respectively. "00-0-0" denotes the full distribution of flux, forward voltage, and color bin.  
Example: BXEX-57E-11H-3A1-00-0-0 refers to the full distribution of flux, forward voltage, and color within a 5700K 6-step ANSI standard chromaticity region with a minimum of 80CRI, 1x1 die configuration, high power, 3.0V typical forward voltage.
- Product CCT is hot targeted at  $T_{sp} = 85^\circ\text{C}$ . Nominal CCT as defined by ANSI C78.377-2011.
- Listed CRIs are minimum values and include test tolerance.
- Products tested under pulsed condition (10ms pulse width) at nominal drive current.
- Bridgelux maintains a  $\pm 7.5\%$  tolerance on luminous flux measurements,  $\pm 0.15\text{V}$  tolerance on forward voltage measurements, and  $\pm 2$  tolerance on CRI measurements for the SMD 3535.
- Refer to Table 5 and Table 6 for Bridgelux SMD 3535 Luminous Flux Binning and Forward Voltage Binning information.
- Typical pulsed test performance values are provided as reference only and are not a guarantee of performance.
- Typical performance is estimated based on operation under pulsed current with LED emitter mounted onto a heat sink with thermal interface material and the solder point temperature maintained at  $25^\circ\text{C}$ . 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 <sup>1</sup>	Drive Current (mA)	Forward Voltage (V) <sup>2,3</sup>			Typical Temperature Coefficient of Forward Voltage $\Delta V_f / \Delta T$ (mV/°C)	Typical Thermal Resistance Junction to Solder Point <sup>4</sup> $R_{j-sp}$ (°C/W)
		Minimum	Typical	Maximum		
BXEX-xxx-11H-3A1-00-0-0	700	2.80	3.00	3.20	-2.0 to -4.0	3.0

Notes for Table 3:

1. Bridgelux maintains a tolerance of  $\pm 0.15V$  on forward voltage measurements. Voltage minimum and maximum values at the nominal drive current are guaranteed by 100% test.
2. Products tested under pulsed condition (10ms pulse width) at nominal drive current where  $T_{sp} = 25^\circ C$ .
3. 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 ( $T_j$ )	150°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 40 seconds
Maximum Drive Current	1500mA
Maximum Reverse Voltage <sup>2</sup>	-
Moisture Sensitivity Rating	MSL3
Electrostatic Discharge	8kV 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 current 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 3535 LEDs. Although several bins are listed, 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 700mA,  $T_{sp}=85^{\circ}\text{C}$

Bin Code	Minimum	Maximum	Unit	Condition
D5	230	250	lm	$I_F=700\text{mA}$
D6	250	270		
D7	270	290		
D8	290	310		
D9	310	330		

Note for Table 5:

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

**Table 6:** Forward Voltage Bin Definition at 700mA,  $T_{sp}=85^{\circ}\text{C}$

Bin Code	Minimum	Maximum	Unit	Condition
H	2.5	2.7	V	$I_F=700\text{mA}$
J	2.7	2.9		
K	2.9	3.1		
L	3.1	3.3		

Note for Table 6:

1. Bridgelux maintains a tolerance of  $\pm 0.15\text{V}$  on forward voltage measurements.



# Product Bin Definitions

**Table 7:** MacAdam Ellipse Color Bin Definitions

2700K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.4578	0.4101	0.0081	0.0042	53.7		1	
6SDCM	0.4578	0.4101	0.0162	0.0084	53.7		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.4655	0.424	0.4501	0.3962	0.4471	0.4079	0.4687	0.4129
Point 2	0.4615	0.4169	0.4539	0.4031	0.4523	0.4087	0.4631	0.4112

3000K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.4338	0.403	0.00834	0.00408	53.22		1	
6SDCM	0.4338	0.403	0.01668	0.00816	53.22		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.4406	0.4172	0.4271	0.3888	0.4227	0.3993	0.445	0.4072
Point 2	0.4371	0.4099	0.4303	0.3957	0.4281	0.4008	0.4393	0.4048

3500K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.4078	0.393	0.00927	0.00414	54		1	
6SDCM	0.4078	0.393	0.01854	0.00828	54		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.4137	0.4084	0.4019	0.3776	0.3957	0.3873	0.42	0.3992
Point 2	0.4106	0.4006	0.4048	0.3852	0.4016	0.3899	0.4138	0.3958

4000K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.3818	0.3797	0.00939	0.00402	53.72		1	
6SDCM	0.3818	0.3797	0.01878	0.00804	53.72		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.3859	0.3942	0.3778	0.3652	0.3693	0.3722	0.3944	0.3877
Point 2	0.3837	0.3867	0.3797	0.3723	0.3754	0.3756	0.388	0.3834

5000K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.3447	0.3553	0.00822	0.00354	59.62		1	
6SDCM	0.3447	0.3553	0.01644	0.00708	59.62		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.3458	0.3675	0.3437	0.3431	0.3344	0.3473	0.355	0.3642
Point 2	0.3452	0.3612	0.3441	0.349	0.3394	0.3512	0.3497	0.3592

**Table 7:** MacAdam Ellipse Color Bin Definitions

5700K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.3287	0.3417	0.00746	0.0032	59.09		1	
6SDCM	0.3287	0.3417	0.01492	0.0064	59.09		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.3287	0.3518	0.3288	0.3317	0.3194	0.335	0.3381	0.3499
Point 2	0.3287	0.3468	0.3287	0.3366	0.324	0.3383	0.3334	0.3451

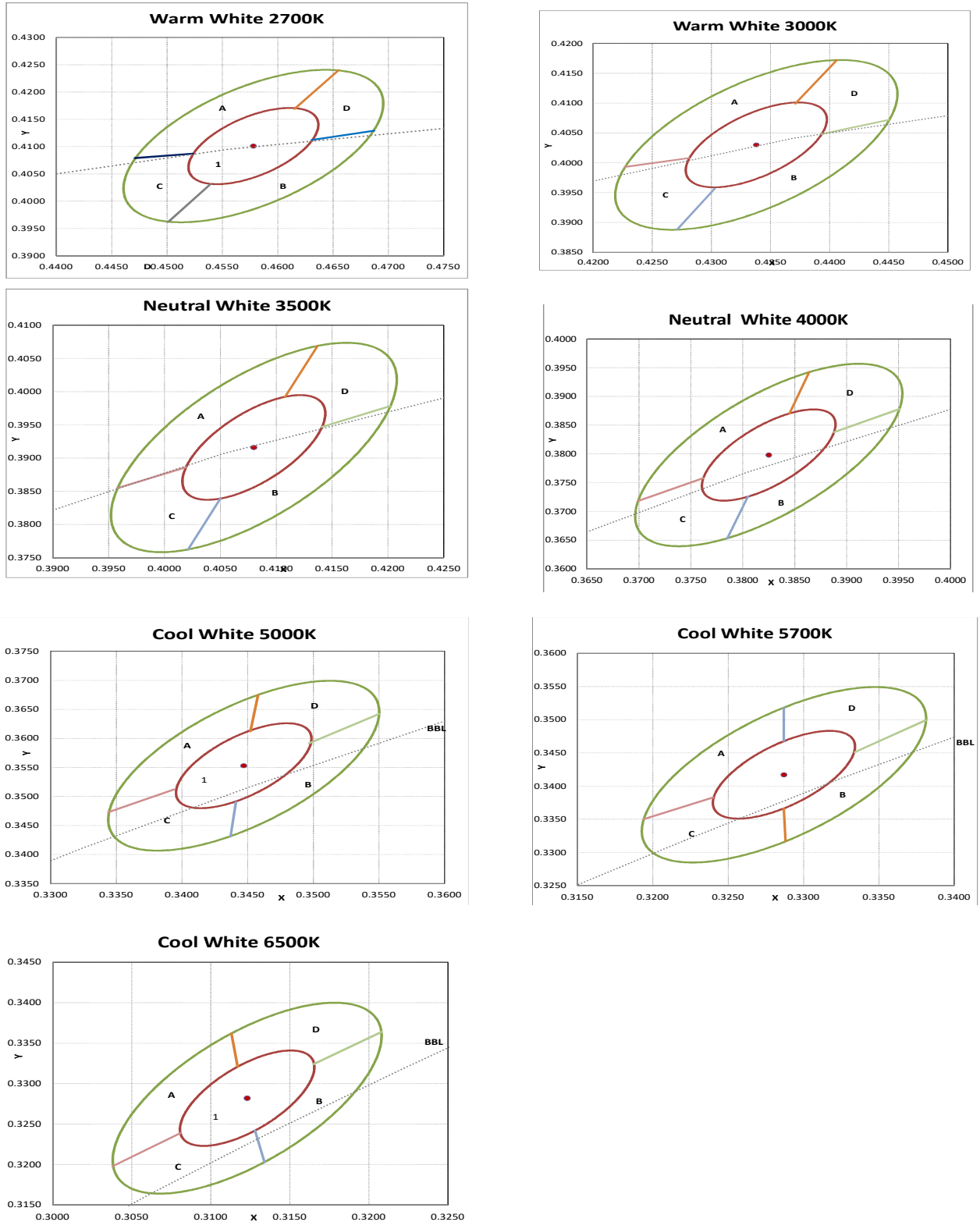
6500K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.3123	0.3282	0.00669	0.00285	58.57		1	
6SDCM	0.3123	0.3282	0.01338	0.0057	58.57		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.3113	0.3362	0.3134	0.3203	0.3038	0.3198	0.3208	0.3364
Point 2	0.3117	0.3321	0.3128	0.3242	0.3081	0.3239	0.3165	0.3324

Notes for Table 7:

1. Color binning at  $T_{sp} = 85^{\circ}\text{C}$  unless otherwise specified
2. Bridgelux maintains a tolerance of  $\pm 0.007$  on x and y color coordinates in the CIE 1931 color space.

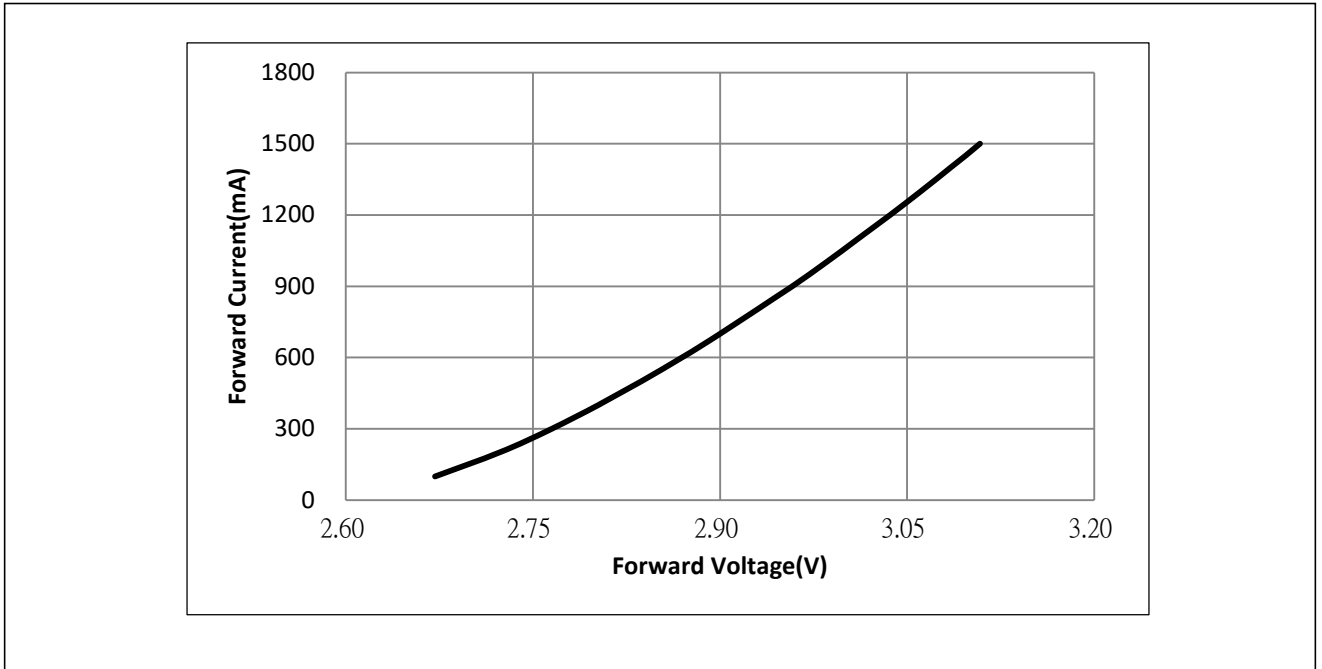
# Product Bin Definitions

Figure 1: C.I.E. 1931 Chromaticity Diagram (5 Color Bin Structure, Hot-color Targeted at  $T_{sp}=85^{\circ}\text{C}$ )

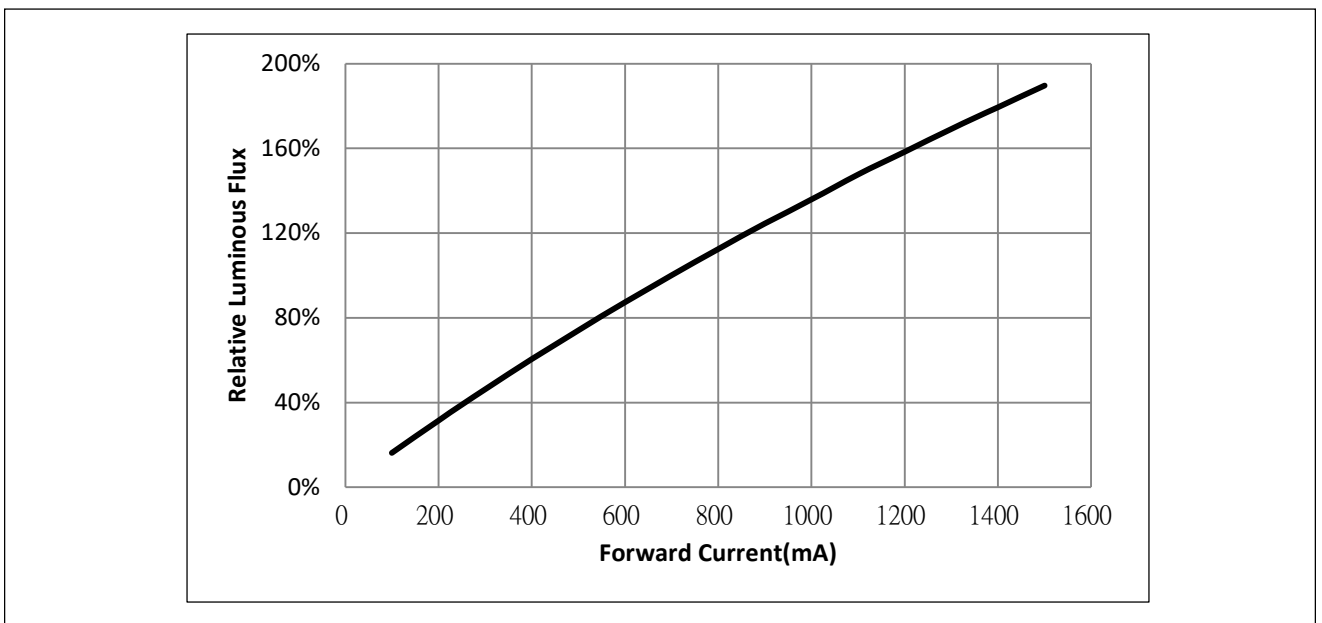


# Performance Curves

**Figure 2: Drive Current vs. Forward Voltage ( $T_{sp}=85^{\circ}\text{C}$ )**



**Figure 3: Typical Relative Luminous Flux vs. Forward Current ( $T_{sp}=85^{\circ}\text{C}$ )**



Note for Figure 3:

1. Pulse width modulation (PWM) is recommended for dimming effects.

# Performance Curves

Figure 4: Typical Relative Flux vs. Solder Point Temperature

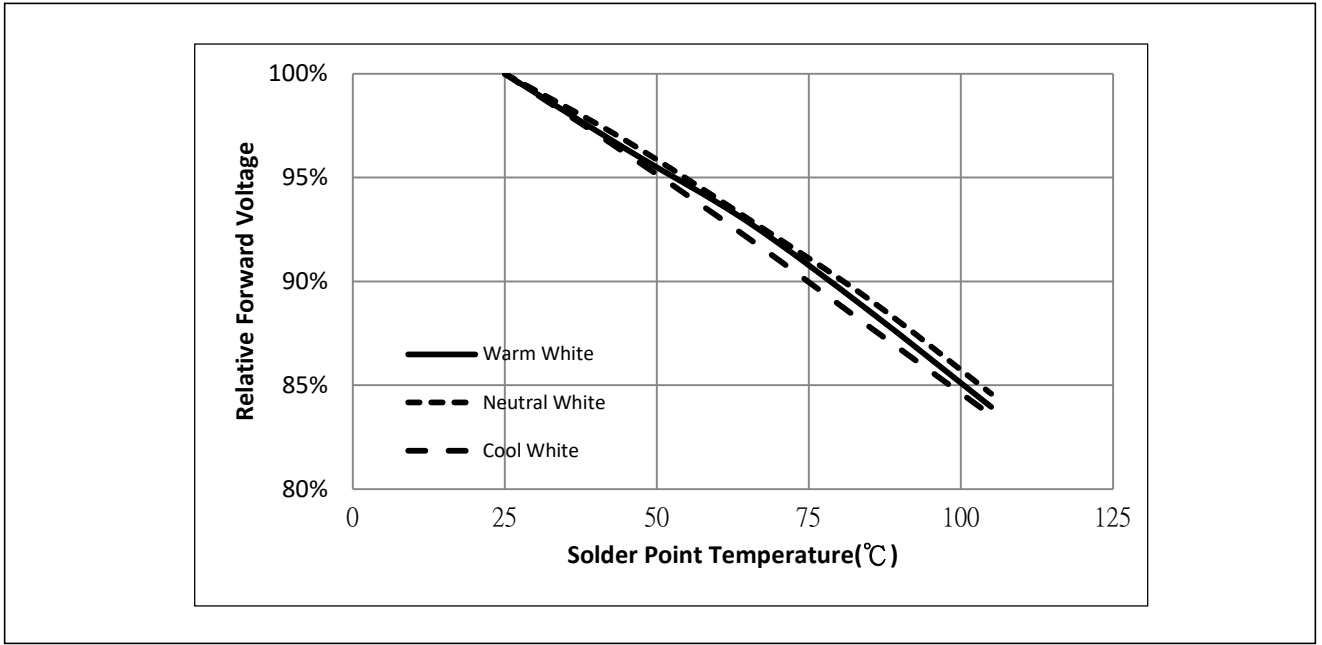
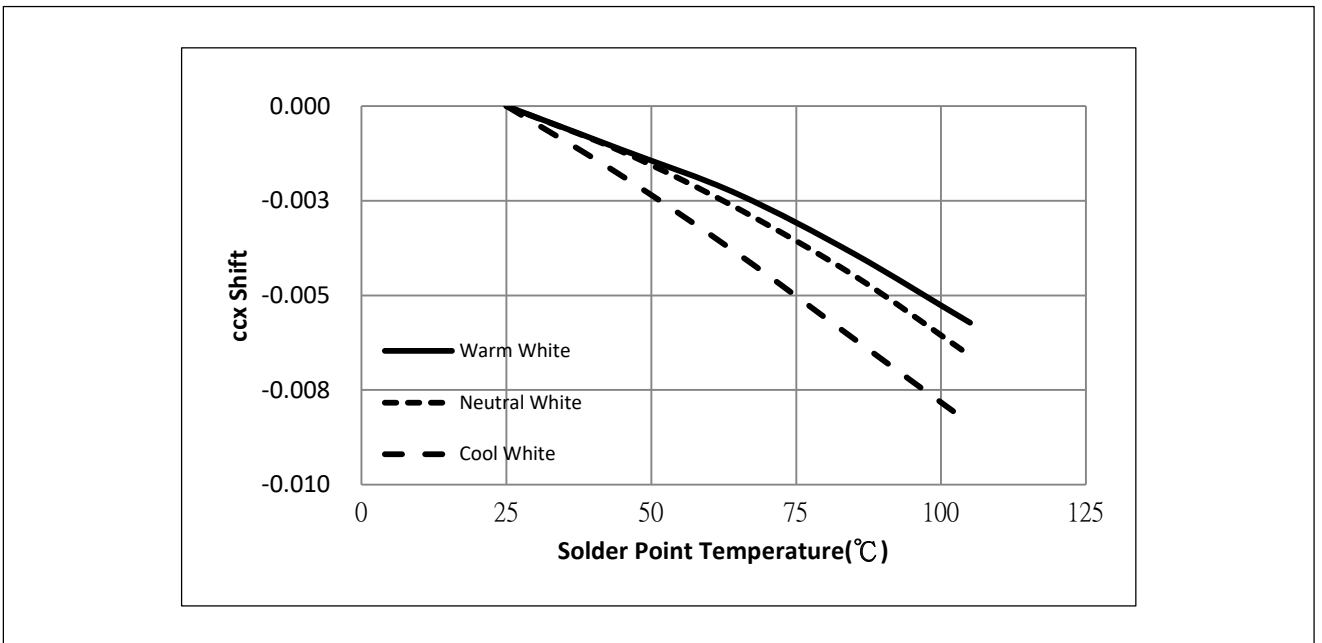


Figure 5: Typical ccx Shift vs. Solder Point Temperature

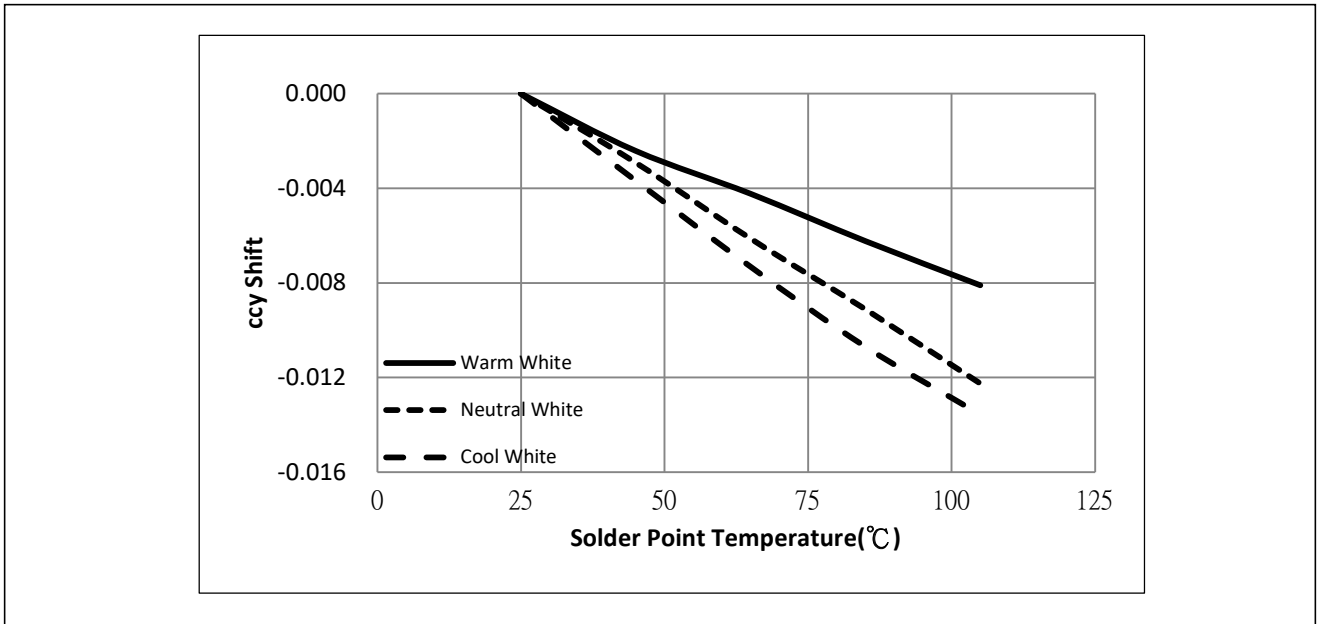


Notes for Figures 4 & 5:

1. Characteristics shown for warm white based on 2700K and 80 CRI.
2. Characteristics shown for neutral white based on 4000K and 80 CRI.
3. Characteristics shown for cool white based on 6500K and 80 CRI.
4. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information

# Performance Curves

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

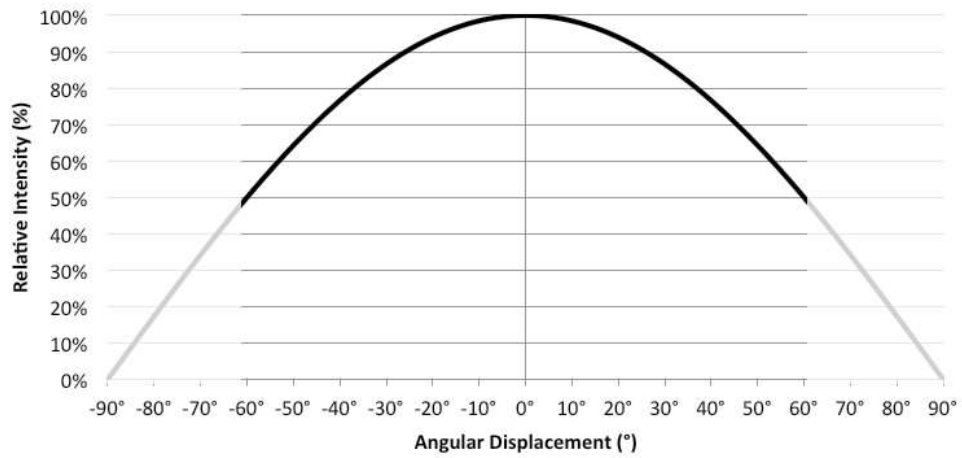


Notes for Figure 6:

1. Characteristics shown for warm white based on 2700K and 80 CRI.
2. Characteristics shown for neutral white based on 4000K and 80 CRI.
3. Characteristics shown for cool white based on 6500K and 80 CRI.
4. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information

# Typical Radiation Pattern

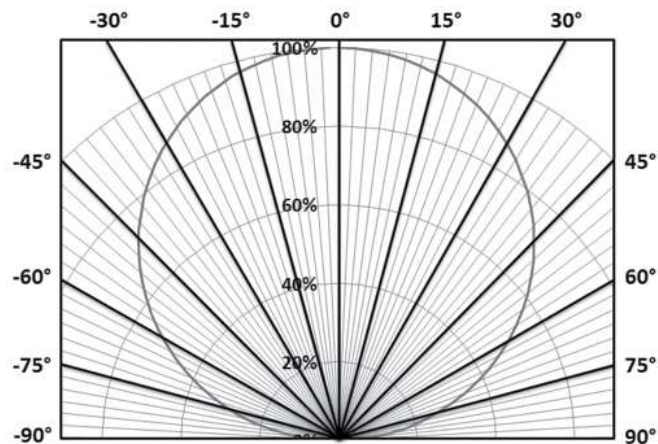
**Figure 7: Typical Spatial Radiation Pattern at 700mA,  $T_{sp} = 25^{\circ}\text{C}$**



Notes for Figure 7:

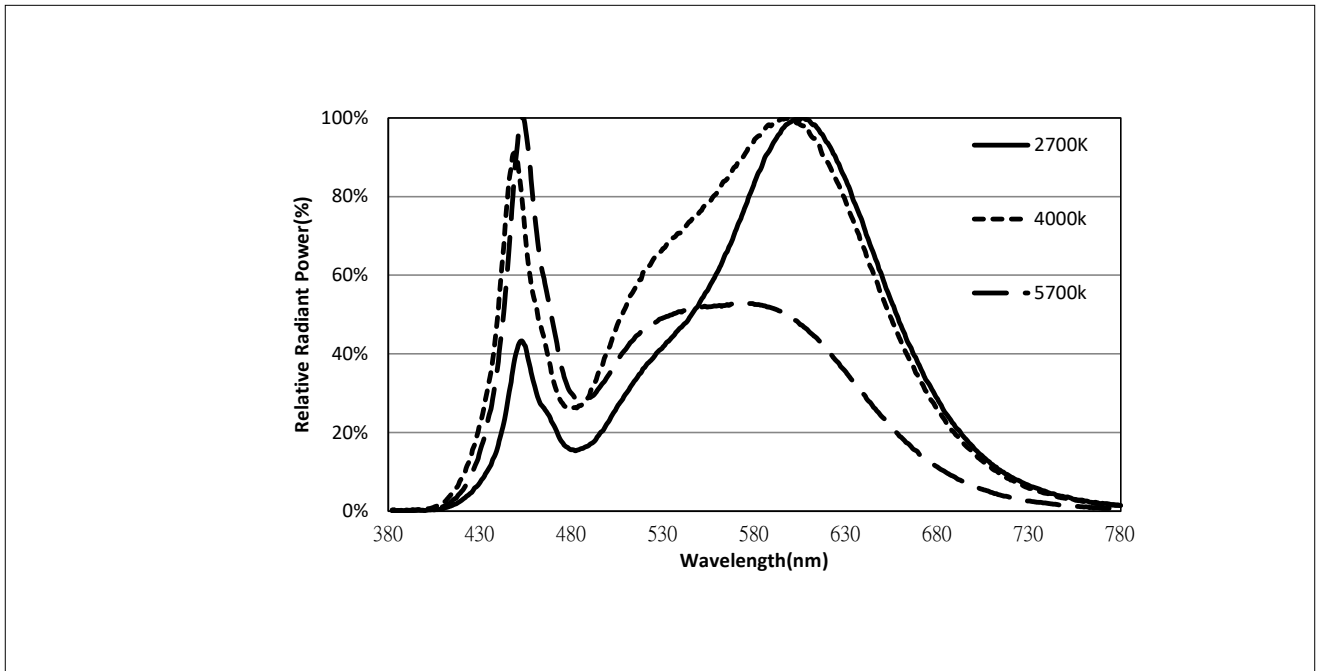
1. Typical viewing angle is  $120^{\circ}$ .
2. The viewing angle is defined as the off axis angle from the centerline where luminous intensity (Iv) is  $\frac{1}{2}$  of the peak value.

**Figure 8: Typical Polar Radiation Pattern at 700mA,  $T_{sp} = 25^{\circ}\text{C}$**



# Typical Color Spectrum

Figure 9: Typical Color Spectrum



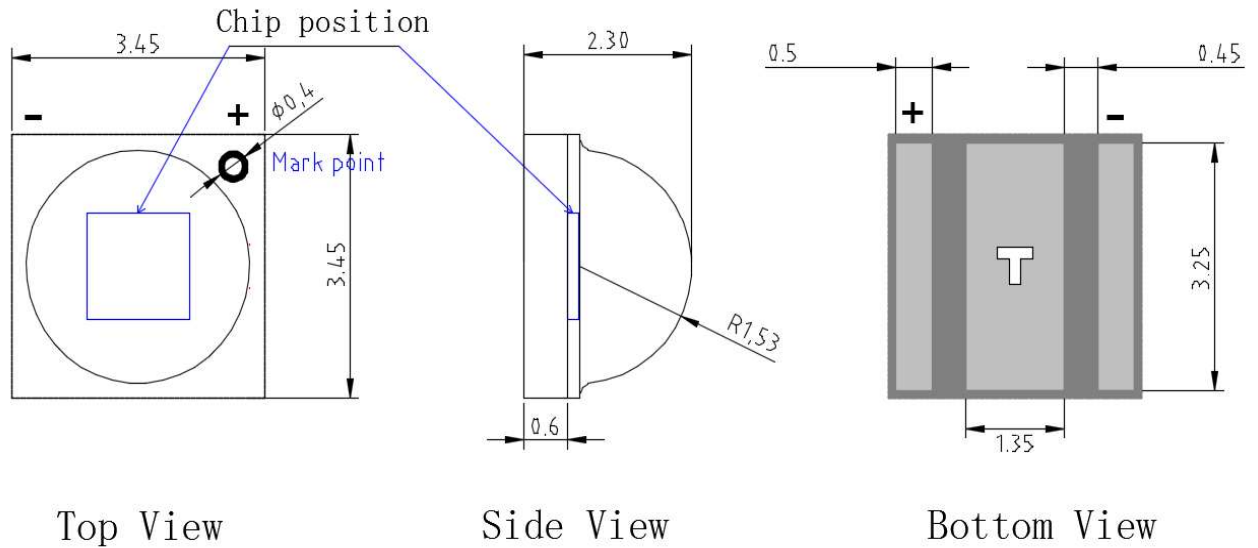
Notes for Figure 9:

1. Color spectra measured at nominal current for  $T_{sp} = 85^{\circ}\text{C}$
2. Color spectra shown for 80 CRI products.



# Mechanical Dimensions

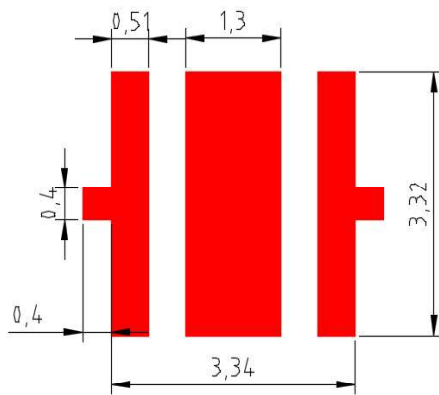
**Figure 10: Drawing for SMD 3535**



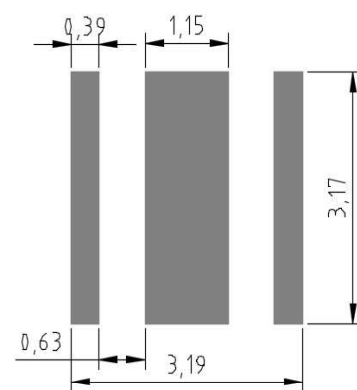
Notes for Figure 10:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are  $\pm 0.10$ mm.

## Welded plate and steel mesh Dimensions



Welded plate Dimensions



Steel mesh Dimensions

# 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	$T_{sld} = 260^{\circ}\text{C}$ , 10sec. Precondition: $85^{\circ}\text{C}$ , 60%RH, 168hr		3 reflows	0/20
2	Low Temperature Storage	JESD22-A119	$T_a = -40^{\circ}\text{C}$		1000 hours	0/20
3	High Temperature Storage	JESD22-A103D	$T_a = 105^{\circ}\text{C}$		1000 hours	0/20
4	Low Temperature Operating Life	JESD22-A108D	$T_a = -40^{\circ}\text{C}$	700mA	1000 hours	0/20
5	Temperature Humidity Operating Life	JESD22-A101C	$T_{sp} = 85^{\circ}\text{C}$ , RH=85%	700mA	1000 hours	0/20
6	High Temperature Operating Life	JESD22-A108D	$T_{sp} = 105^{\circ}\text{C}$	700mA	1000 hours	0/20
7	Thermal Shock	JESD22-A106B	$T_a = -40^{\circ}\text{C} - 100^{\circ}\text{C}$ ; Dwell: 15min; Transfer: 10sec		200 Cycle	0/20
8	Temperature Cycle	JESD22-A104E	$T_a = -40^{\circ}\text{C} - 100^{\circ}\text{C}$ ; Dwell at extreme temperature: 15min; Ramp rate $< 105^{\circ}\text{C}/\text{min}$		200 Cycle	0/20
9	Electrostatic Discharge	JS-001-2012	HBM, 8KV, 15k $\Omega$ , 100pF, Alternately positive or negative			0/20

## Passing Criteria

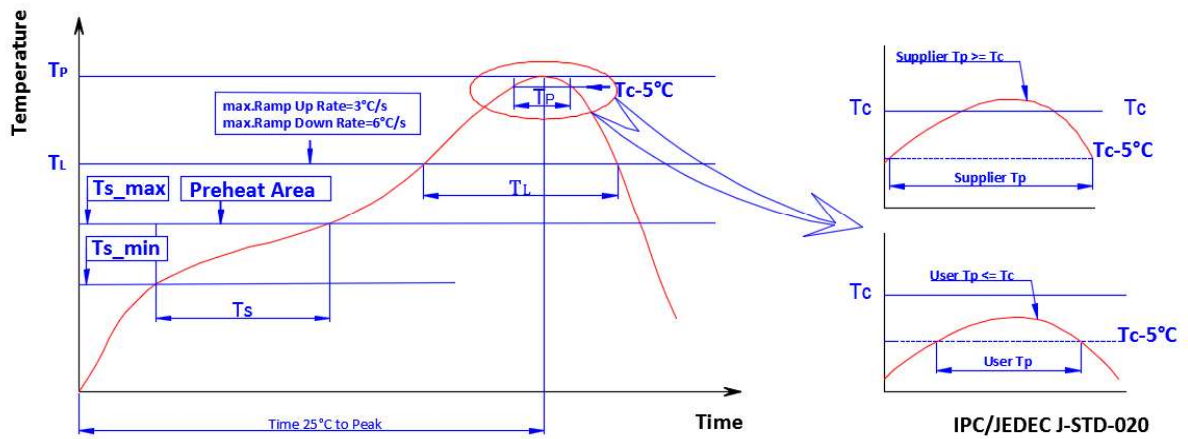
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	700mA	$\Delta Vf < 10\%$
Luminous Flux	Fv	700mA	$\Delta Fv < 30\%$
Chromaticity Coordinates	(x, y)	700mA	$\Delta u'v' < 0.007$

Notes for Table 8:

1. Measurements are performed after allowing the LEDs to return to room temperature
2.  $T_{sld}$ : reflow soldering temperature;  $T_a$ : ambient temperature

# Reflow Characteristics

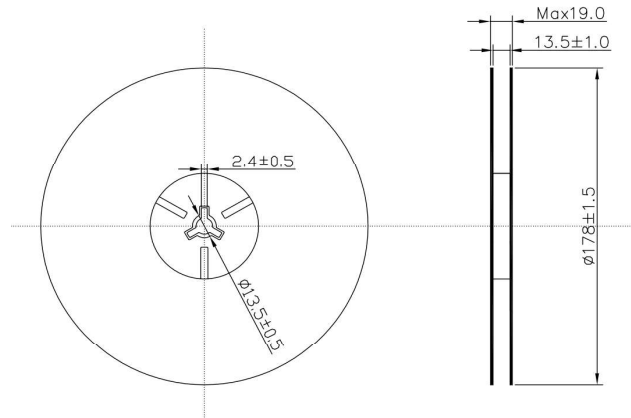
Figure 11 : Reflow Profile



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

# Packaging

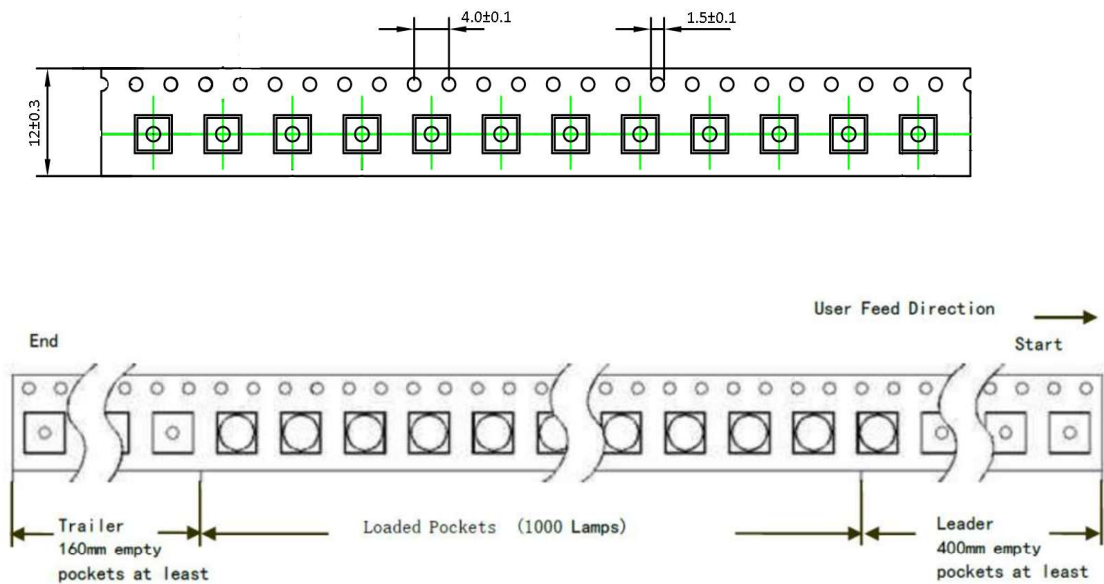
**Figure 12: Emitter Reel Drawings**



Note for Figure 12:

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

**Figure 13: Emitter Tape Drawings**



Note for Figure 13:

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

# Packaging

**Figure 14: Emitter Reel Packaging Drawings**



Note for Figure 14:  
1. Drawings are not to scale.

# Design Resources

Please contact your Bridgelux sales representative for assistance.

## Precautions

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### **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 emitter 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

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### **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.

# 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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