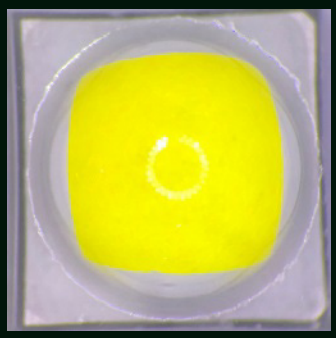
Bridgelux® SMD 3535 Series

Product Data Sheet DSxxx

BXEX-30G

Introduction

SMD 3535



The Bridgelux SMD 3535 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 options, Its high flux capability reduces the number of LEDs and enables industry leading system level lumen per dollar. The SMD 3535 is ideal as a drop in replacement for emitters with an industry standard 3.5mm x 3.5mm footprint.

Features

- Package: SMT ceramic package with silicone lens
- Color temperature: 3000K
- CRI: 90 (min.)
- Lumen maintenance: Test results according to IESNA LM-80 available
- ESD8kV HBM. JEDEC-JS-001-HBM and JE-DEC-JS-001-2012
- Operates at a maximum current of up to 1.5A
- Hot binning @ 85 °C

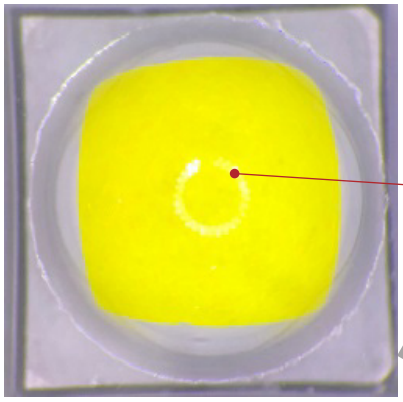
Applications

- 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

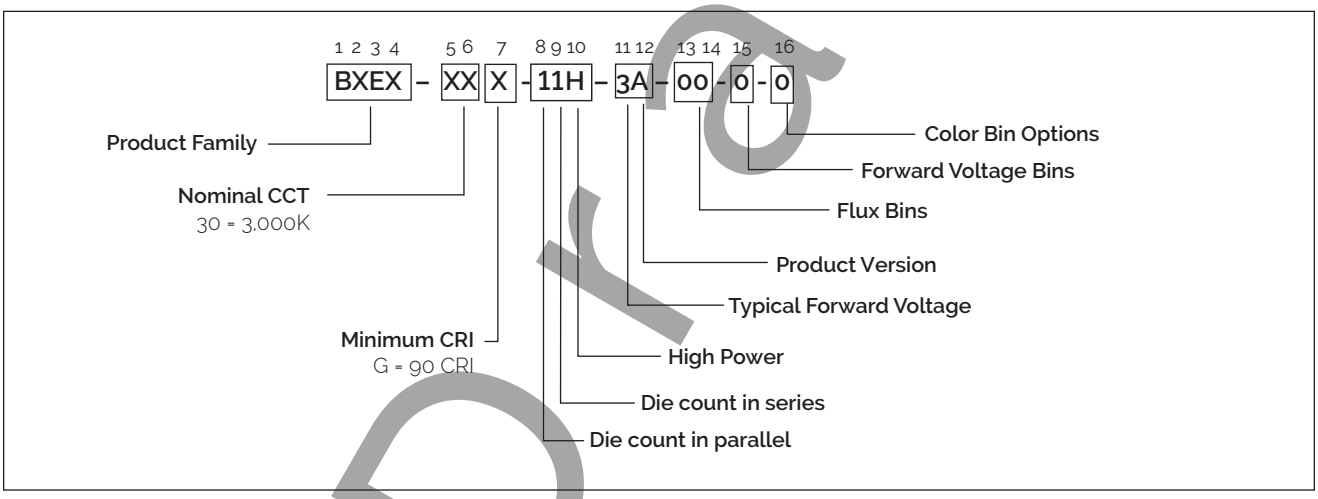
Product Feature Map

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 Test Conditions

Bridgelux SMD 3535 LEDs are tested and binned with a 10ms pulse of 700mA at T_j (junction temperature)=T_{sp} (solder point temperature) =85˚C. Forward voltage and luminous flux are binned at a T_j=T_{sp}=85˚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 700mA (T_j=T_{sp}=25˚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			
BXEX-27G-11H-3A-00-0-0	2700	90	700	2.8	3.0	3.2	229	2.1	109
BXEX-27H-11H-3A-00-0-0	2700	95	700	2.8	3.0	3.2	206	2.1	98
BXEX-30G-11H-3A-00-0-0	3000	90	700	2.8	3.0	3.2	238	2.1	113
BXEX-30H-11H-3A-00-0-0	3000	95	700	2.8	3.0	3.2	211	2.1	101
BXEX-35G-11H-3A-00-0-0	3500	90	700	2.8	3.0	3.2	243	2.1	116
BXEX-35H-11H-3A-00-0-0	3500	95	700	2.8	3.0	3.2	215	2.1	102
BXEX-40G-11H-3A-00-0-0	4000	90	700	2.8	3.0	3.2	252	2.1	120
BXEX-40H-11H-3A-00-0-0	4000	95	700	2.8	3.0	3.2	223	2.1	106

Notes for Table 1:

1. The last 7 characters (including hyphens '-') refer to flux bins, forward voltage bins, and color bin options, respectively. "00-00-0" denotes the full distribution of flux, forward voltage, and 3 SDCM color.

   Example: BXEX-30G-11H-3A-00-00-0 refers to the full distribution of flux, forward voltage, and color within a 3000K 3-step ANSI standard chromaticity region with a minimum of 90CRI, 1x1 die configuration, 2.2w power, 3.0V typical forward voltage.
2. Product CCT is hot targeted at T_{sp} = 85˚C. Nominal CCT as defined by ANSI C78.377-2011.
3. Products tested under pulsed condition (10ms pulse width) at nominal drive current where T_j=T_{sp}=25˚C.
4. Bridgelux maintains a ±7.5% tolerance on luminous flux measurements, ±0.1V tolerance on forward voltage measurements, and ±2 tolerance on CRI measurements for the SMD 3535.
5. Refer to Table 6 and Table 7 for Bridgelux SMD 3535 Luminous Flux Binning and Forward Voltage Binning information.

Table 2: Selection Guide, Pulsed Measurement Data at 700mA (T_j=T_{sp}=85˚C)

Part Number[1,5]	Nominal CCT[2] (K)	CRI[3,4]	Nominal Drive Current (mA)	Forward Voltage[4,5] (V)			Typical Pulsed Flux (lm)[4,5]	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEX-27G-11H-3A-00-0-0	2700	90	700	2.7	2.9	3.1	202	2.0	100
BXEX-27H-11H-3A-00-0-0	2700	95	700	2.7	2.9	3.1	180	2.0	89
BXEX-30G-11H-3A-00-0-0	3000	90	700	2.7	2.9	3.1	210	2.0	103
BXEX-30H-11H-3A-00-0-0	3000	95	700	2.7	2.9	3.1	185	2.0	91
BXEX-35G-11H-3A-00-0-0	3500	90	700	2.7	2.9	3.1	214	2.0	105
BXEX-35H-11H-3A-00-0-0	3500	95	700	2.7	2.9	3.1	188	2.0	93
BXEX-40G-11H-3A-00-0-0	4000	90	700	2.7	2.9	3.1	222	2.0	109
BXEX-40H-11H-3A-00-0-0	4000	95	700	2.7	2.9	3.1	195	2.0	96

Notes for Table 2:

1. The last 7 characters (including hyphens '-') refer to flux bins, forward voltage bins, and color bin options, respectively. "00-00-0" denotes the full distribution of flux, forward voltage, and 3 SDCM color.

   Example: BXEX-30G-11H-3A-00-00-0 refers to the full distribution of flux, forward voltage, and color within a 3000K 3-step ANSI standard chromaticity region with a minimum of 90CRI, 1x1 die configuration, 2.0w power, 2.9V typical forward voltage.
2. Product CCT is hot targeted at T_{sp} = 85˚C. Nominal CCT as defined by ANSI C78.377-2011.
3. Listed CRIs are minimum values and include test tolerance.
4. Bridgelux maintains a ±7.5% tolerance on luminous flux measurements, ±0.1V tolerance on forward voltage measurements, and ±2 tolerance on CRI measurements for the SMD 3535.
5. Refer to Table 6 and Table 7 for Bridgelux SMD 3535 Luminous Flux Binning and Forward Voltage Binning information.
6. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.
7. 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.

Performance at Commonly Used Drive Currents

SMD 3535 LEDs are tested to the specifications shown using the nominal drive currents in Table 1. SMD 3535 may also be driven at other drive currents dependent on specific application design requirements. The performance at any drive current can be derived from the current vs. voltage characteristics shown in Figure 2 and the relative luminous flux vs. current characteristics shown in Figure 3. The performance at commonly used drive currents is summarized in Table 3.

Table 3: Performance at Commonly Used Drive Currents

Part Number	CRI	Drive Current[1] (mA)	Typical DC Flux[2,3] T_{sp} = 85°C (lm)
BXEX-27G-11H-3A-00-0-0	90	350	109
		700	**202**
		1000	270
		1500	368
BXEX-27H-11H-3A-00-0-0	95	350	97
		700	**180**
		1000	241
		1500	328
BXEX-30G-11H-3A-00-0-0	90	350	113
		700	**210**
		1000	281
		1500	383
BXEX-30H-11H-3A-00-0-0	95	350	99
		700	**185**
		1000	247
		1500	337
BXEX-35G-11H-3A-00-0-0	90	350	115
		700	**214**
		1000	286
		1500	390
BXEX-35H-11H-3A-00-0-0	95	350	101
		700	**188**
		1000	252
		1500	343
BXEX-40G-11H-3A-00-0-0	90	350	119
		700	**222**
		1000	297
		1500	405
BXEX-40H-11H-3A-00-0-0	95	350	105
		700	**195**
		1000	261
		1500	356

Notes for Table 3:

1. Alternate drive currents in Table 3 are provided for reference only and are not a guarantee of performance.
2. Bridgelux maintains a ± 7.5% tolerance on flux measurements.
3. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.

Electrical Characteristics

Table 4: Electrical Characteristics

Part Number [1]	Drive Current (mA)	Forward Voltage (V) [1,2]			Typical Temperature Coefficient of Forward Voltage $\Delta V_f/\Delta T$ (mV/°C)	Typical Thermal Resistance Junction to Solder Point [3,4] $R_{j\text{-}sp}$ (C/W)
		Minimum	Typical	Maximum		
BXEX-xxx-11H-3A-00-0-0	700	2.8	3.0	3.2	-2.0 to -4.0	3

Notes for Table 4:

1. Bridgelux mantains a tolerance of ± 0.1V 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˚C.
3. Thermal Resistance values based on 90CRI product.
4. Thermal resistance value was calculated using total electrical input power; optical power was not subtracted from input power.

Absolute Maximum Ratings

Table 5: Maximum Ratings

Parameter	Maximum Rating
LED Junction Temperature (T_j)	150˚C
Storage Temperature	-40˚C to +100˚C
Operating Solder Point Temperature (T_{Sp})	-40˚C to +100˚C
Soldering Temperature	260˚C or lower for a maximum of 40 seconds
Maximum Drive Current[2]	1500mA
Maximum Reverse Voltage	-
Moisture Sensitivity Rating	-
Electrostatic Discharge	8kV HBM. JEDEC-JS-001-HBM and JEDEC-JS-001-2012

Notes for Table 5:

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. Bridgelux suggest the T_{sp} is less than 85 degrees, when the drive current is 1.5 A

Product Bin Definitions

Table 6 lists the standard photometric luminous flux bins for Bridgelux SMD 3535 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 6: Luminous Flux Bin Definitions at 700mA, T_{sp}=85˚C

Bin Code	Minimum	Maximum	Unit	Condition
D1	150	170	lm	I_F=700mA
D2	170	190		
D3	190	210		
D4	210	230		
D5	230	250		
D6	250	270		

Note for Table 6:

1. Bridgelux maintains a tolerance of ± 7.5% on luminous flux measurements.

Table 7: Forward Voltage Bin Definition at 700mA, T_{sp}=85˚C

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

Note for Table 7:

1. Bridgelux maintains a tolerance of ± 0.1V on forward voltage measurements.

Product Bin Definitions

Table 8: Color Bin Definitions

CCT	Color Space	Center Point		Major Axis	Minor Axis	Ellipse Rotation Angle	Color Bin
		X	Y				
2700K	2 SDCM	0.4578	0.4101	0.0054	0.0028	53.70	2
	3 SDCM	0.4578	0.4101	0.0081	0.0042	53.70	C/D
3000K	2 SDCM	0.4338	0.4030	0.00556	0.00272	53.22	2
	3 SDCM	0.4338	0.4030	0.00834	0.00408	53.22	C/D
3500K	2 SDCM	0.4073	0.3917	0.00618	0.00276	54.00	2
	3 SDCM	0.4073	0.3917	0.00927	0.00414	54.00	C/D
4000K	2 SDCM	0.3818	0.3797	0.00626	0.00268	53.72	2
	3 SDCM	0.3818	0.3797	0.00939	0.00402	53.72	C/D

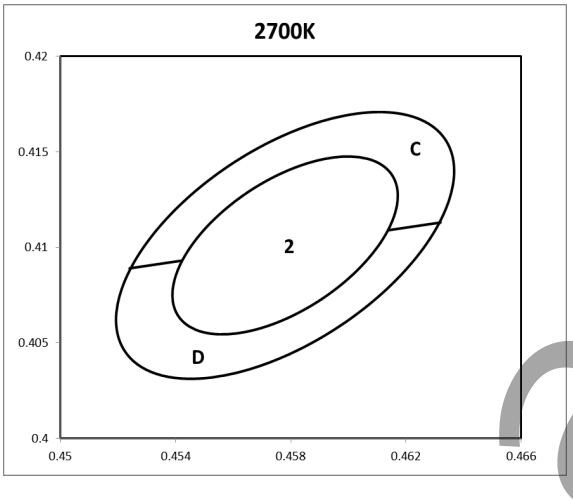
Point	2700K		3000K		3500K		4000K	
	X	Y	X	Y	X	Y	X	Y
H-left	0.4542	0.4093	0.4300	0.4015	0.4032	0.3895	0.3778	0.375
	0.4524	0.4089	0.4281	0.4007	0.4012	0.3884	0.3754	0.3737
H-right	0.4632	0.4113	0.4394	0.4049	0.4133	0.3945	0.3872	0.3809
	0.4614	0.4109	0.4375	0.4043	0.4113	0.3936	0.385	0.3798

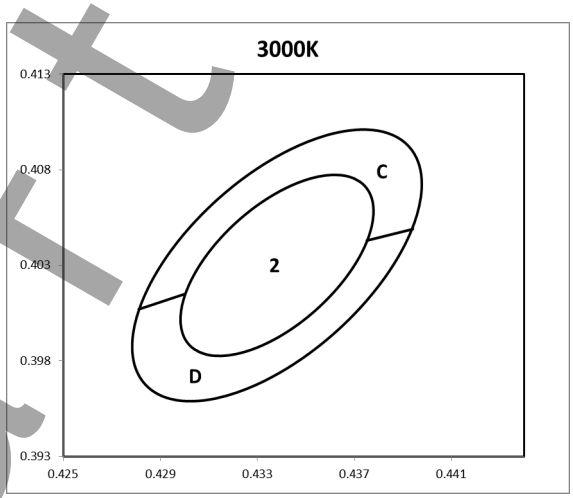
Notes for Table 8:

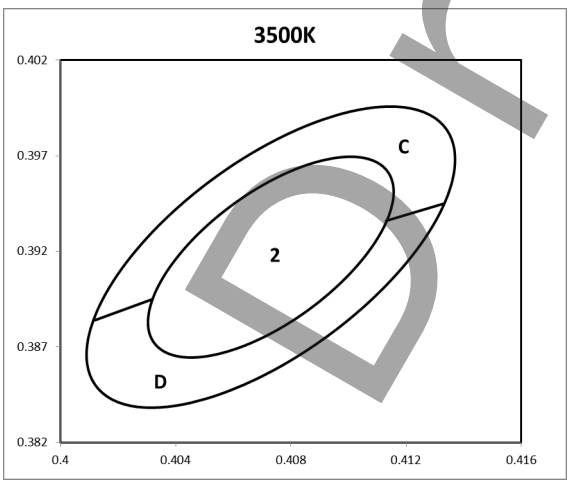
1. Color binning at T_{sp}=85˚C
2. Bridgelux maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

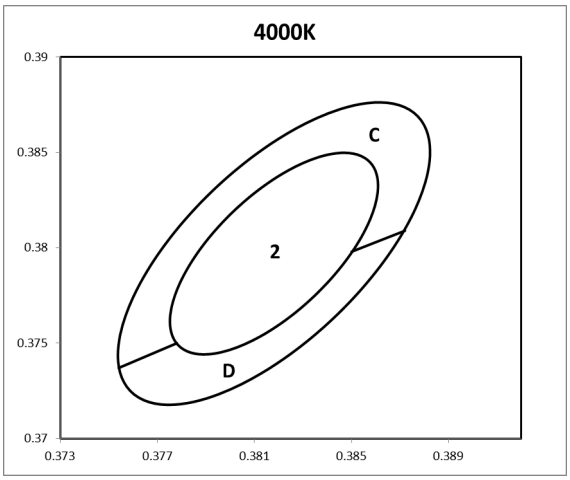
Product Bin Definitions

Figure 1: C.I.E. 1931 Chromaticity Diagram (3 Color Bin Structure, hot-color targeted at T_{sp}=85°C)









Performance Curves

Figure 2: Drive Current vs. Voltage (T_{sp}=85˚C)

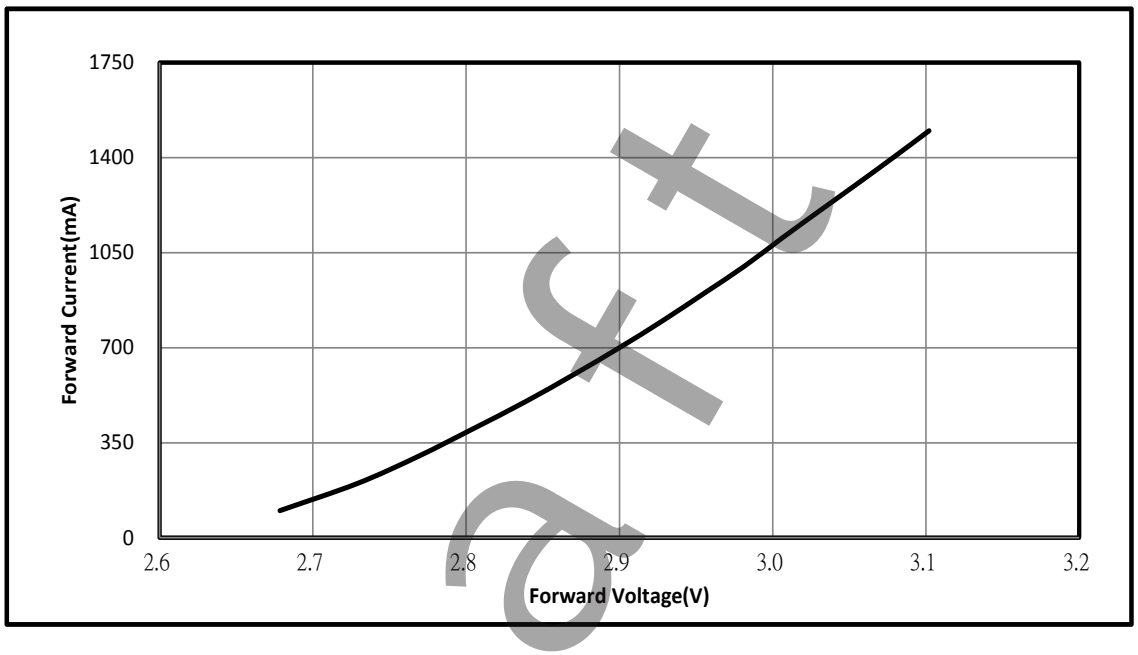
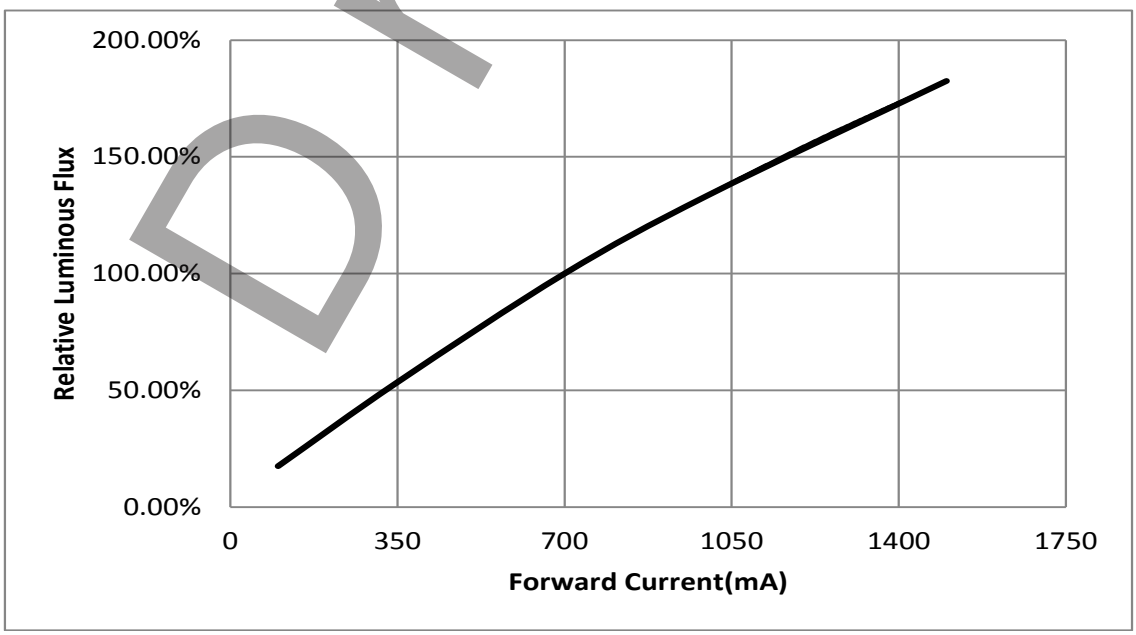


Figure 3: Typical Relative Luminous Flux vs. Drive Current (T_{sp}=85˚C)

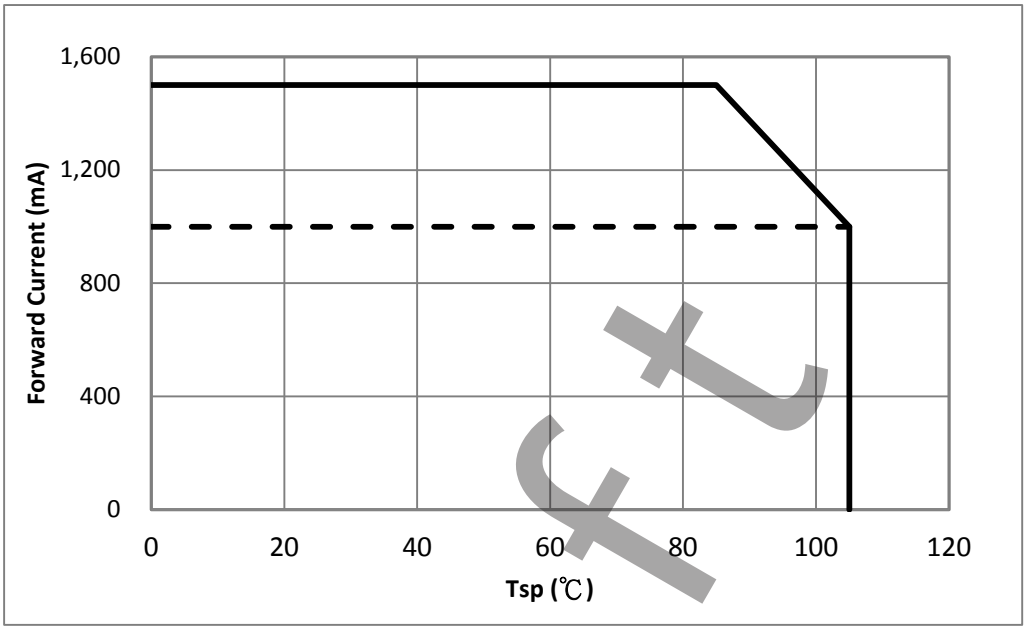


Note for Figure 3:

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.

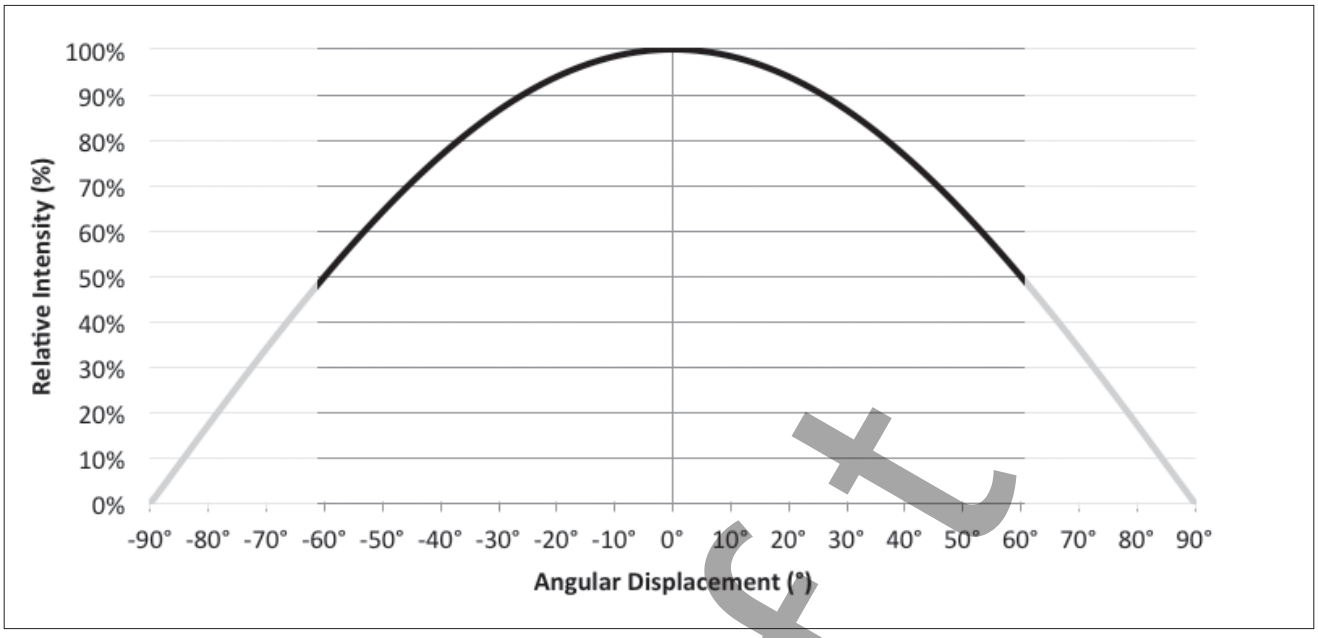
Performance Curves

Figure 4: Drive Current Derating Curve



Typical Radiation Pattern

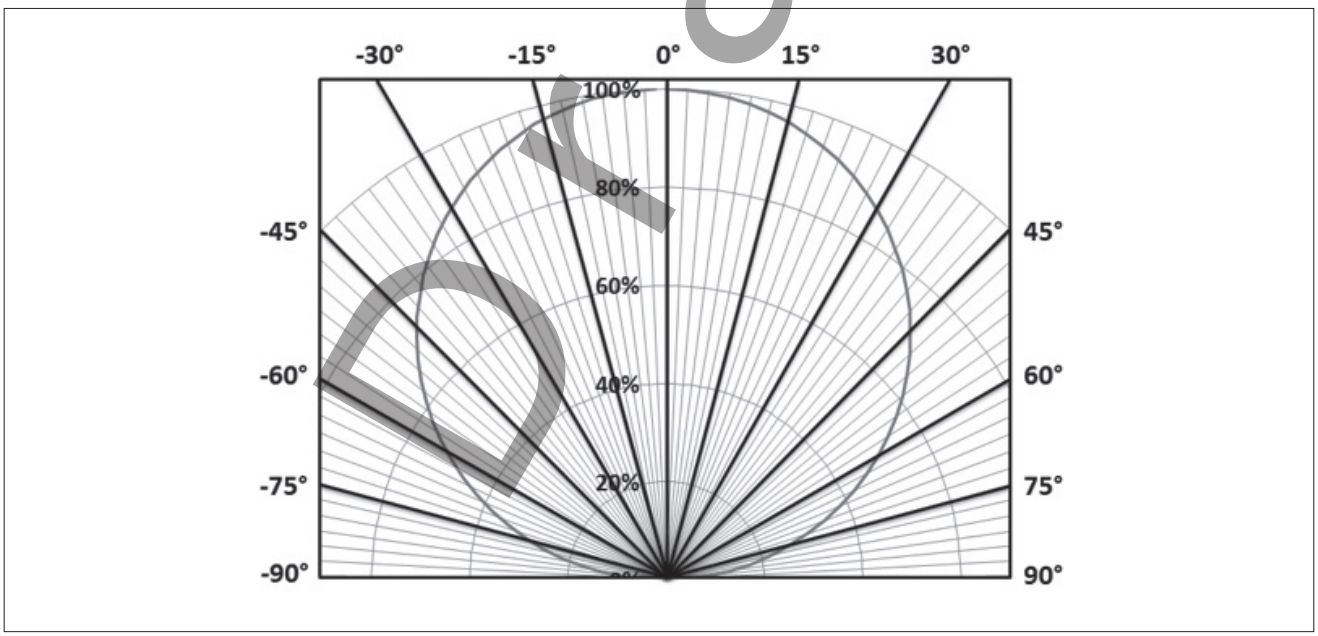
Figure 5: Typical Spatial Radiation Pattern at 700mA, T_{sp}=25°C



Notes for Figure 5:

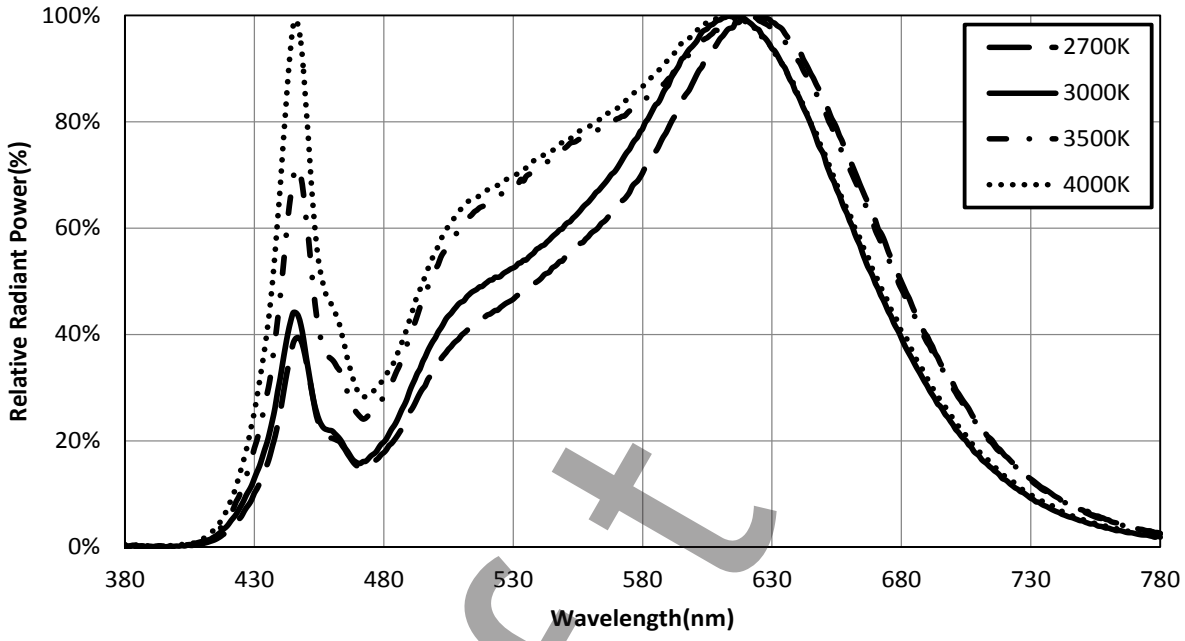
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where Iv is ½ of the peak value.

Figure 6: Typical Polar Radiation Pattern at 700mA, T_{sp}=25°C



Typical Color Spectrum

Figure 7: Typical Color Spectrum

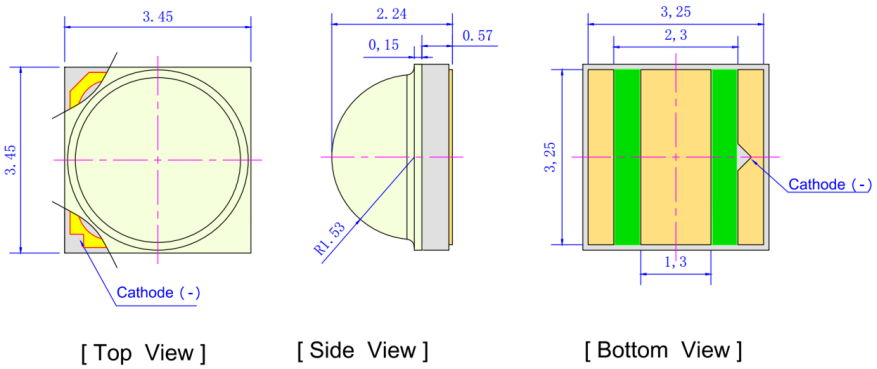


Notes for Figure 7:

1. Color spectra measured at nominal current for T_{sp} = 25°C
2. Color spectra shown for 90 CRI products.

Mechanical Dimensions

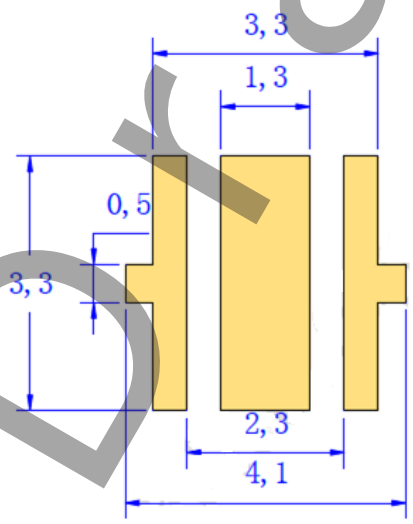
Figure 8: Drawing for SMD 3535



Notes for Figure 8:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Tolerances are ± 0.10mm.
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 ± 0.2 mm

Recommended PCB Soldering Pad Pattern



Solder Pad

Reliability

Table 9: 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°C, 10sec, Precondition: 85°C, 60%RH, 168hr		3 reflows	
2	Low Temperature Storage	JESD22-A119	T_a=-40°C		1000 hours	
3	High Temperature Storage	JESD22-A103D	T_a=100°C		1000 hours	
4	Low Temperature Operating Life	JESD22-A108D	T_a=-40°C	700mA	1000 hours	
5	Temperature Humidity Operating Life	JESD22-A101C	T_{sp}=85°C, RH=85%	700mA	1000 hours	
6	High Temperature Operating Life	JESD22-A108D	T_{sp}=105°C	700mA	1000 hours	
7	Thermal Shock	JESD22-A106B	T_a=-40°C ~100°C; Dwell : 15min; Transfer: 10sec		200 Cycle	
8	Temperature Cycle	JESD22-A104E	T_a=-40°C ~100°C; Dwell at extreme temperature: 15min; Ramp rate < 105°C/min		200 Cycle	
9	Electrostatic Discharge	JS-001-2012	HBM, 8KV, 1.5kΩ, 100pF, Alternately positive or negative			

Passing Criteria

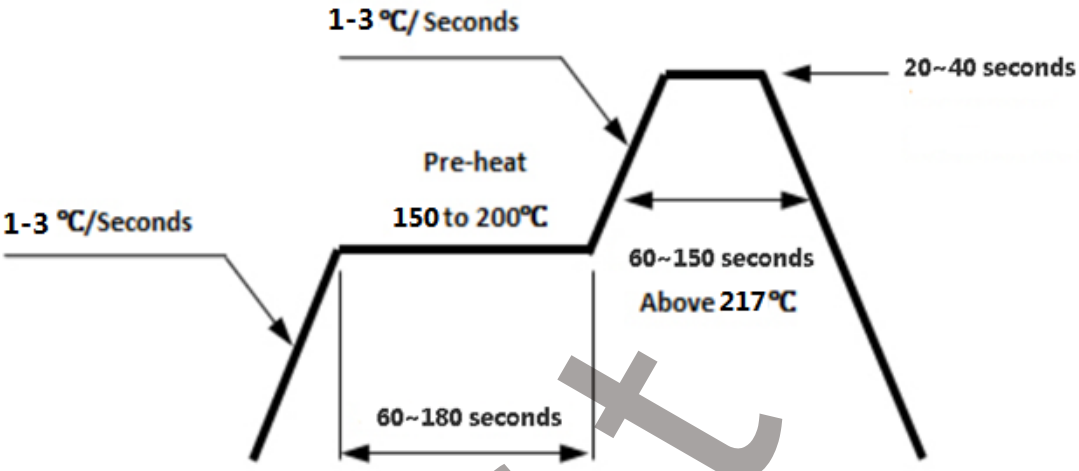
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	700mA	ΔVf<10%
Luminous Flux	Iv	700mA	ΔIv<30%
Chromaticity Coordinates	(x, y)	700mA	Δu'v'<0.007

Notes for Table 9:

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

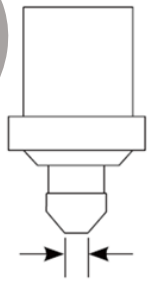
Reflowing Characteristics

Figure 9 : Reflow Profile



Profile Feature	Lead Free Assembly
Preheat: Temperature Range	150˚C – 200˚C
Preheat: Time (Maximum)	180 seconds
Peak Temperature	255˚C
Soldering Time (Maximum)	40 seconds
Allowable Reflow Cycles	2

Figure 10 : Pick and Place



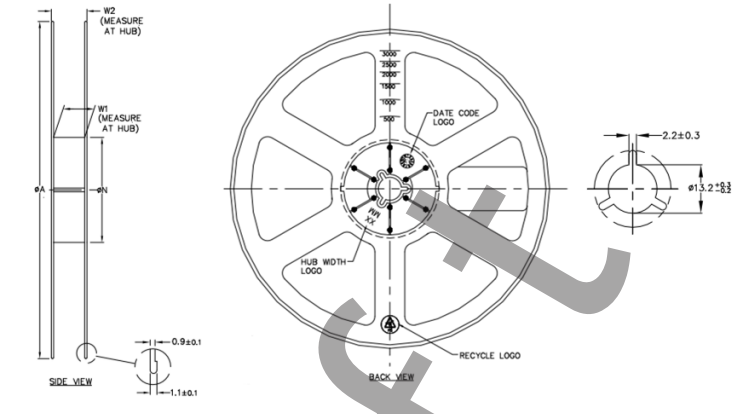
Is greater than LEDs emitting surface

Note for Figure 10:

1. 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 11: Emitter Reel Drawings

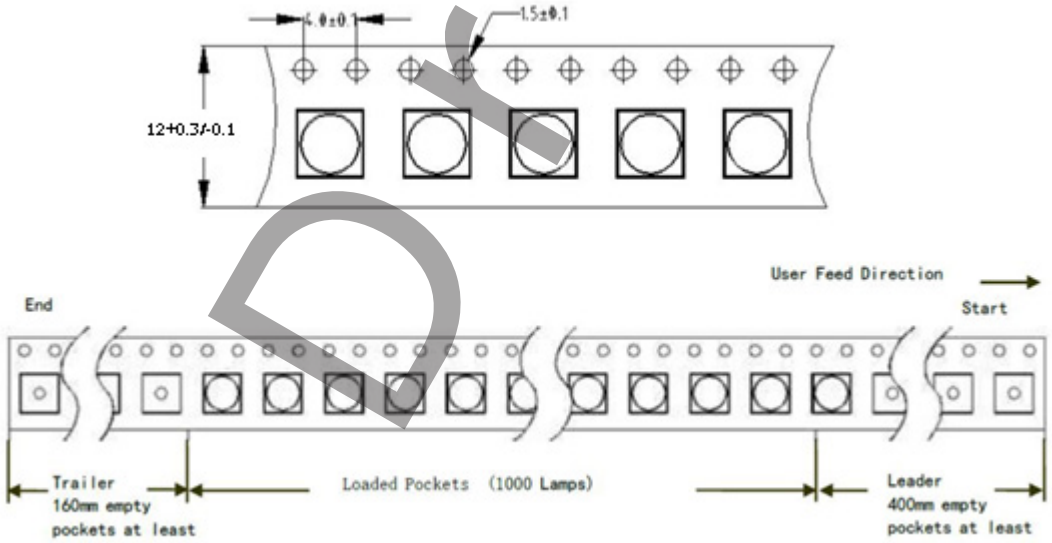


PRODUCT SPECIFICATIONS				
TAPE WIDTH	øA ±1.0	øN ±0.5	W1 ±0.5	W2 (MAX)
12MM	ø178.0	54.0	13.5	19.0

Note for Figure 11:

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

Figure 12: Emitter Tape Drawings

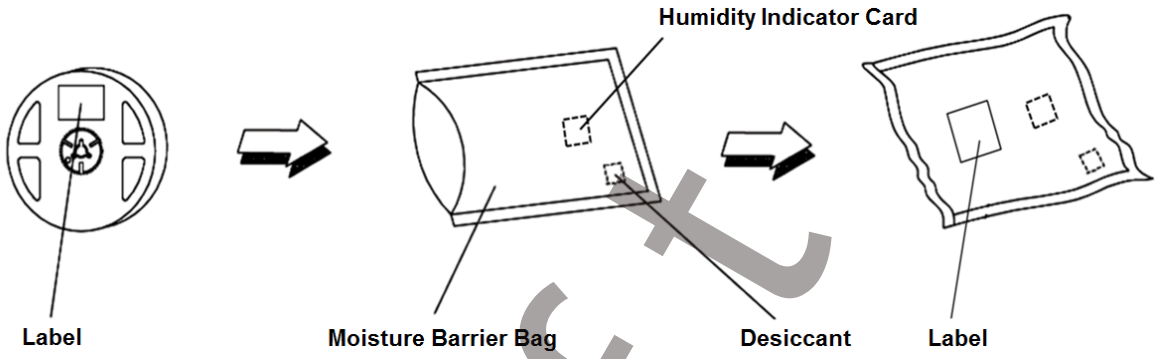


Note for Figure 12:

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

Packaging

Figure 13: Emitter Reel Packaging Drawings



Note for Figure 13:

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.

For more information about the company, please visit
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