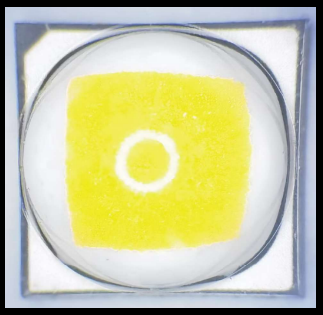
Bridgelux® SMD 3535 2W3V Series

Product Data Sheet DS1736

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 JE-DEC-JS-001-2012
- Operates at a maximum current of up to 2.0A
- 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

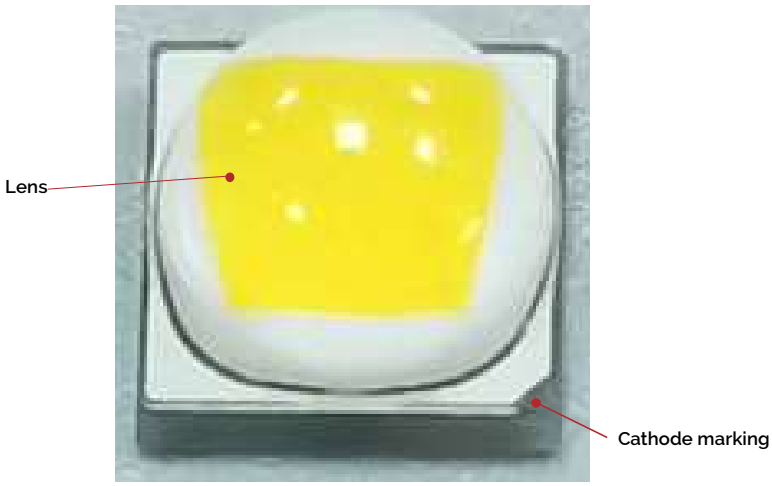
Pb free RoHS

Contents

Product Feature Map	2
Product Nomenclature	2
Product Test Conditions	2
Product Selection Guide	3
Performance at Commonly Used Drive Currents	5
Electrical and Thermal Characteristics	6
Absolute Maximum Ratings	7
Product Bin Definitions	9
Performance Curves	12
Typical Radiation Pattern	16
Typical Color Spectrum	17
Mechanical Dimensions	18
Reliability	19
Reflowing Characteristics	20
Packaging	21
Design Resources	22
Precautions	23
Disclaimers	23
About Bridgelux	24

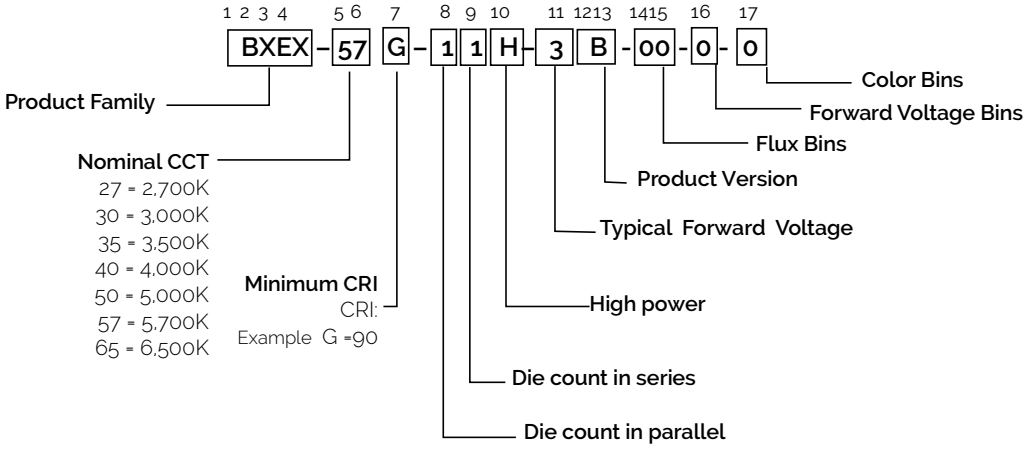
Product Feature Map

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



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. Luminous flux , color and forward voltage are binned at T_j=T_{sp}=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[1,6]	Nominal CCT[2] (K)	CRI[3,5]	Nominal Drive Current (mA)	Forward Voltage[4,5] (V)			Typical Pulsed Flux[4,5] (lm)	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEX-27G-11H-3B-00-0-0	2700	90	700	2.80	2.93	3.10	280	2.05	137
BXEX-30G-11H-3B-00-0-0	3000	90	700	2.80	2.93	3.10	290	2.05	141
BXEX-35G-11H-3B-00-0-0	3500	90	700	2.80	2.93	3.10	305	2.05	149
BXEX-40G-11H-3B-00-0-0	4000	90	700	2.80	2.93	3.10	315	2.05	154
BXEX-57G-11H-3B-00-0-0	5700	90	700	2.80	2.93	3.10	310	2.05	151

Notes for Table 1 :

1. 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-57G-11H-3B-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 90 CRI, 1x1 die configuration, high power, 2.93V typical forward voltage.
2. Product CCT is hot targeted at Tsp = 85˚C. Nominal CCT as defined by ANSI C78.377-2011.
3. Listed CRIs are minimum values and include test tolerance.
4. Products tested under pulsed condition (10ms pulse width) at nominal drive current.
5. Bridgelux maintains a ±7.5% tolerance on luminous flux measurements, ±0.15V tolerance on forward voltage measurements, and ±2 tolerance on CRI measurements for the SMD 3535.
6. Refer to Table 6 and Table 7 for Bridgelux SMD 3535 Luminous Flux Binning and Forward Voltage Binning information.

Product Selection Guide

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] (V)			Typical Pulsed Flux[4] (lm)	Typical Power (W)	Typical Efficacy (lm/W)
				Min	Typical	Max			
BXEX-27G-11H-3B-00-0-0	2700	90	700	2.70	2.83	3.00	252	1.98	127
BXEX-30G-11H-3B-00-0-0	3000	90	700	2.70	2.83	3.00	262	1.98	132
BXEX-35G-11H-3B-00-0-0	3500	90	700	2.70	2.83	3.00	276	1.98	139
BXEX-40G-11H-3B-00-0-0	4000	90	700	2.70	2.83	3.00	285	1.98	144
BXEX-57G-11H-3B-00-0-0	5700	90	700	2.70	2.83	3.00	280	1.98	142

Notes for Table 2 :

1. 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-57G-11H-3B-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 90 CRI, 1x1 die configuration, high power, 2.83V typical forward voltage.
2. Product CCT is hot targeted at Tsp = 85°C. Nominal CCT as defined by ANSI C78.377-2011.
3. Listed CRIs are minimum values and include test tolerance.
4. Products tested under pulsed condition (10ms pulse width) at nominal drive current.
5. Bridgelux maintains a ±7.5% tolerance on luminous flux measurements, ±0.15V tolerance on forward voltage measurements, and ±2 tolerance on CRI measurements for the SMD 3535.
6. Refer to Table 6 and Table 7 for Bridgelux SMD 3535 Luminous Flux Binning and Forward Voltage Binning information.

Performance at Commonly Used Drive Currents

SMD 3535 LEDs specifications at nominal drive current are shown in Table 1 and Table 2. 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	ERI	Drive Eurrent[1] (mA)	TypiEal V_f T_{sp} = 25°E (V)	TypiEal Power T_{sp} = 25°E (W)	TypiEal Pulsed Flux[2] T_{sp} = 25°E (lm)	TypiEal Pulsed Flux[3] T_{sp} = 85°E (lm)	TypiEal EffiEaEy T_{sp} = 25°E (lm/W)
BXEX-27G-11H-3B-00-0-0	90	100	2.69	0.3	45	40	167
		350	2.81	1.0	148	133	150
		700	**2.93**	**2.1**	**280**	**252**	**137**
		840	2.98	2.5	330	297	132
		1100	3.05	3.4	417	376	124
		1400	3.13	4.4	510	459	116
		1800	3.23	5.8	622	559	107
		2000	3.28	6.6	671	604	102
BXEX-30G-11H-3B-00-0-0	90	100	2.69	0.3	46	42	173
		350	2.81	1.0	153	138	156
		700	**2.93**	**2.1**	**290**	**262**	**141**
		840	2.98	2.5	341	309	137
		1100	3.05	3.4	432	391	129
		1400	3.13	4.4	529	478	121
		1800	3.23	5.8	644	582	111
		2000	3.28	6.6	695	629	106
BXEX-35G-11H-3B-00-0-0	90	100	2.69	0.3	46	42	173
		350	2.81	1.0	158	143	161
		700	**2.93**	**2.1**	**305**	**276**	**149**
		840	2.98	2.5	360	326	144
		1100	3.05	3.4	458	414	137
		1400	3.13	4.4	563	509	129
		1800	3.23	5.8	690	624	119
		2000	3.28	6.6	748	676	114
BXEX-40G-11H-3B-00-0-0	90	100	2.69	0.3	48	43	178
		350	2.81	1.0	164	148	166
		700	**2.93**	**2.1**	**315**	**285**	**154**
		840	2.98	2.5	372	337	149
		1100	3.05	3.4	473	428	141
		1400	3.13	4.4	582	526	133
		1800	3.23	5.8	713	645	122
		2000	3.28	6.6	773	698	118
BXEX-57G-11H-3B-00-0-0	90	100	2.69	0.3	47	42	176
		350	2.81	1.0	161	145	164
		700	**2.93**	**2.1**	**310**	**279**	**151**
		840	2.98	2.5	366	330	147
		1100	3.05	3.4	466	419	139
		1400	3.13	4.4	573	515	131
		1800	3.23	5.8	702	631	121
		2000	3.28	6.6	760	684	116

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 pulsed performance values are provided as reference only and are not a guarantee of performance.

Electrical and Thermal Characteristics

Table 4: Electrical and Thermal Characteristics

Part Number [1]	Drive Current (mA)	Forward Voltage[2,3] (V)			Typical Temperature Coefficient of Forward Voltage[4] $\Delta V_f/\Delta T$ (mV/°C)	Typical Thermal Resistance Junction to Solder Point[5,6] $R_{j\text{-}sp}$ (°C/W)
		Minimum	Typical	Maximum		
BXEX-xxx-11H-3B-00-0-0	700	2.70	2.83	3.0	-1.3	3.0

Notes for Table 4:

1. The last 6 characters (including hyphens '-') refer to nominal flux, nominal forward voltage, and color bins, respectively. "00-0-0" denotes the full distribution of flux, forward voltage, and color bin .

   Example: BXEX-57G-11H-3B-00-0-0 refers to the full distribution of flux, forward voltage, and color within a 5700K ANSI standard chromaticity region with a minimum of 90 CRI.
2. Products tested under pulsed condition (10ms pulse width) where T_{sp} = 85°C.
3. Bridgelux maintains a tolerance of ± 0.15V on forward voltage measurements.
4. Products measured between 25°C and 105°C under pulsed condition (10ms pulse width).
5. Thermal Resistance values based on 5700K 90 CRI product.
6. 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 +120˚C
Operating Solder Point Temperature (T_{Sp})	-40˚C to +105˚C
Soldering Temperature	260˚C or lower for a maximum of 10 seconds
DC Forward Current	Minimum : 100mA Maximum : 2000mA
Reverse Voltage[2]	-
Peak Pulse Forward Current [1]	2600mA
Moisture Sensitivity Rating	MSL2a
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 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 6 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 6: Luminous Flux Bin Definitions at 700mA, T_{sp}=85˚C

Bin Code	Minimum	Maximum	Unit	Condition
D5	230	250	lm	I_F=700mA
D6	250	270		
D7	270	290		
D8	290	310		
D9	310	330		
E6	330	350		

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		

Note for Table 7:

1. Bridgelux maintains a tolerance of ± 0.15V on forward voltage measurements.

Table 8: Color Bins at 700mA, T_{sp}=85˚C

CCT(K)	CRI(Ra)	Color Rank	Chromaticity Bins
2700/3000/ 3500/4000/5700	90	0(All bin)	1/A/B/C/D
		3(Main bin)	MacAdam 3-step

Product Bin Definitions

Table 8: Color Bin Definition

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

Product Bin Definitions

Table 8: Color Bin Definition

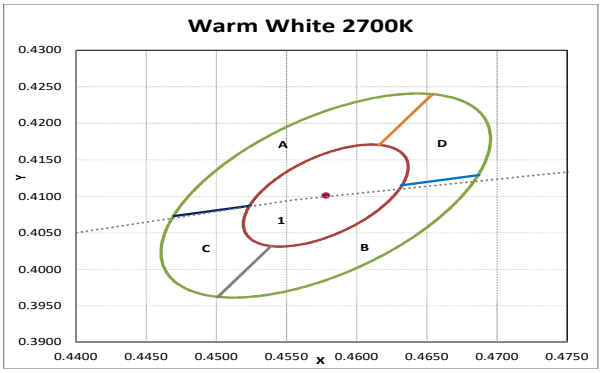
5700K	Center_x	Center_y	Major_Axis	Minor_Axis	Angle		Color Bin	
3SDCM	0.3287	0.3417	0.00746	0.0032	59.09		1	
6SDCM	0.3287	0.3417	0.01492	0.0064	59.09		A/B/C/D	
ITEM	A		B		C		D	
Point 1	0.3287	0.3518	0.3288	0.3317	0.3194	0.335	0.3381	0.3499
Point 2	0.3287	0.3468	0.3287	0.3366	0.324	0.3383	0.3334	0.3451

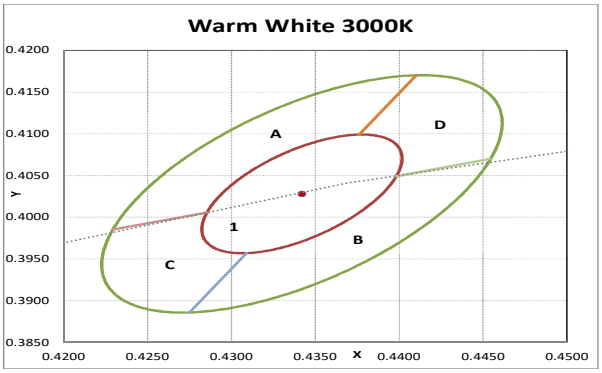
Note for Table 8:

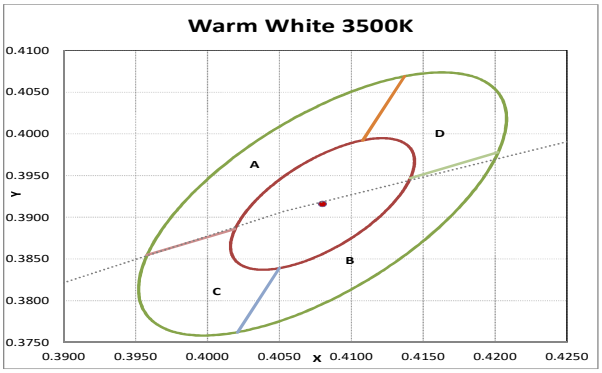
1. Color binning at T_{sp}=85°C unless otherwise specified
2. Bridgelux maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

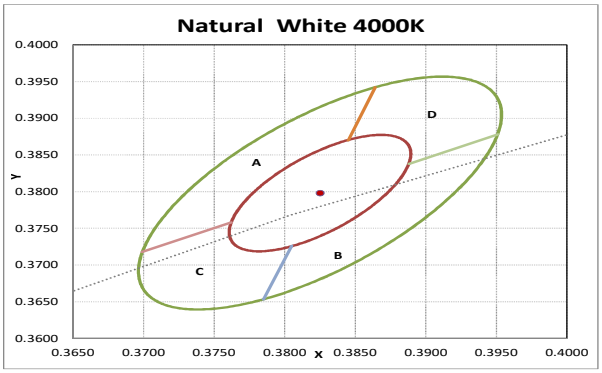
Product Bin Definitions

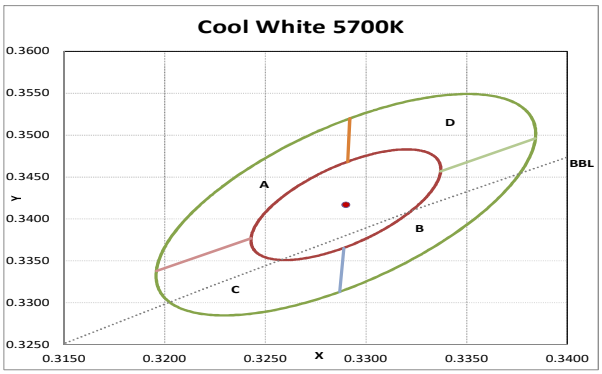
Figure 1: C.I.E. 1931 Chromaticity Diagram (16 or 4 Color Bin Structure, Hot-color Targeted at T_{sp}=85°C)











Performance Curves

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

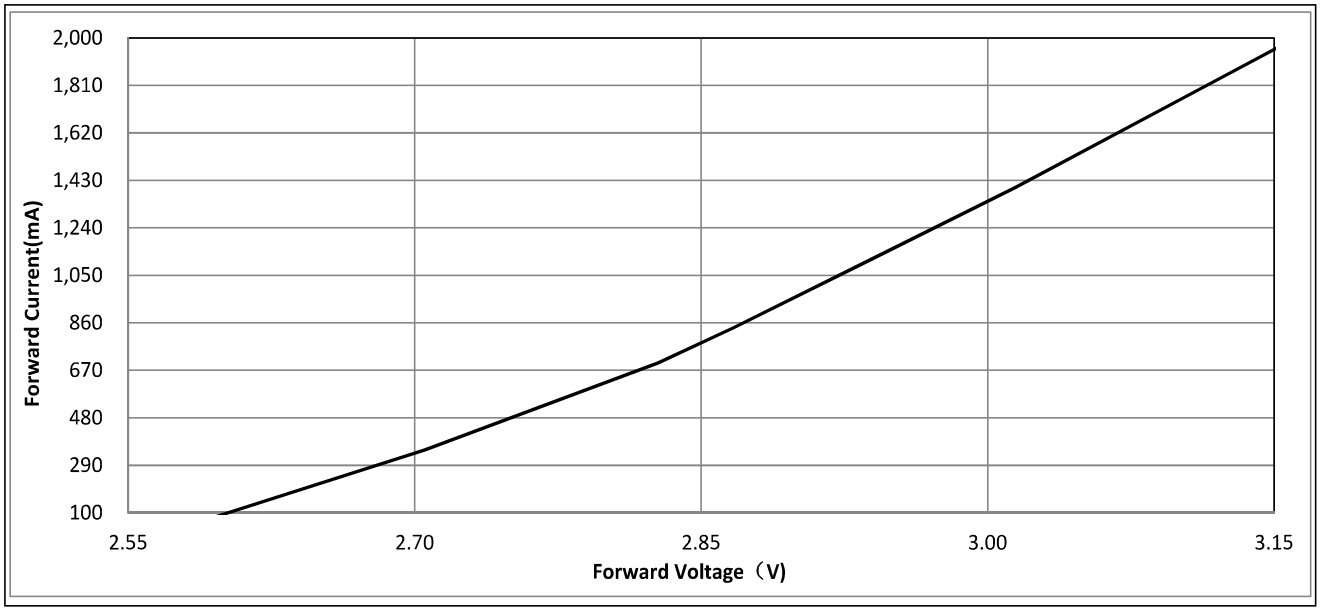
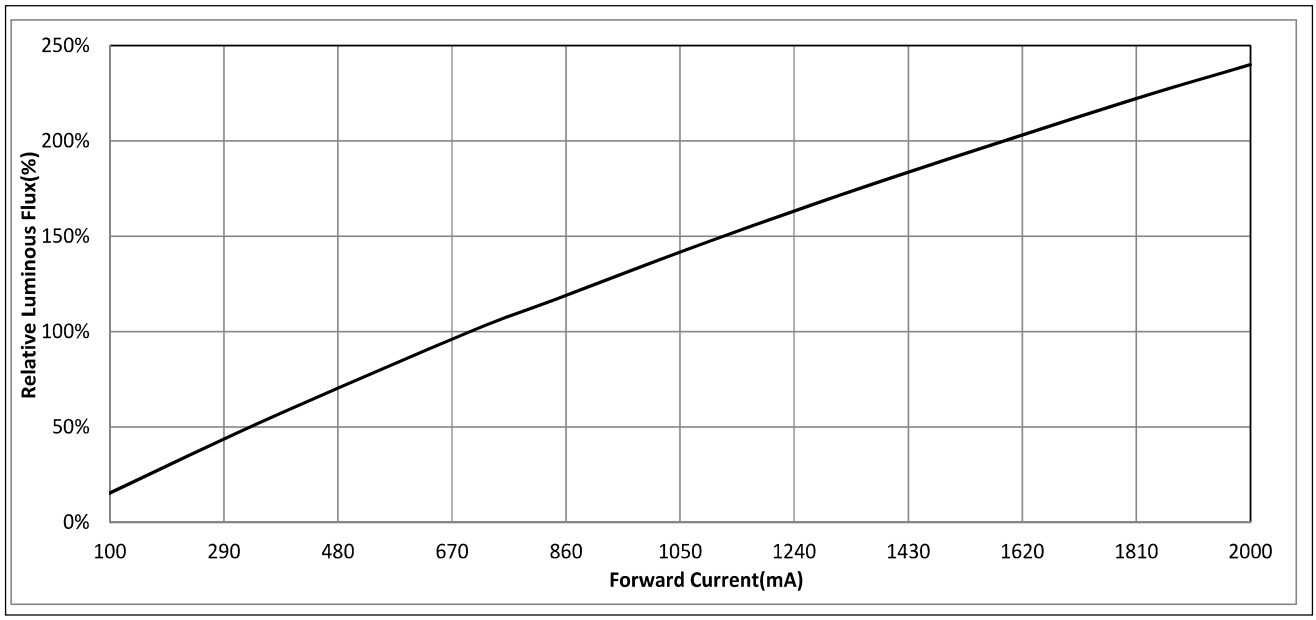


Figure 3: Relative Luminous Flux vs. Drive Current (T_{sp}=85°C)



Note for Figure 3:

1. Pulse width modulation (PWM) is recommended for dimming effects.
2. Using less than 100mA is not recommended.

Performance Curves

Figure 4: Relative Flux vs. Solder Point Temperature_700mA

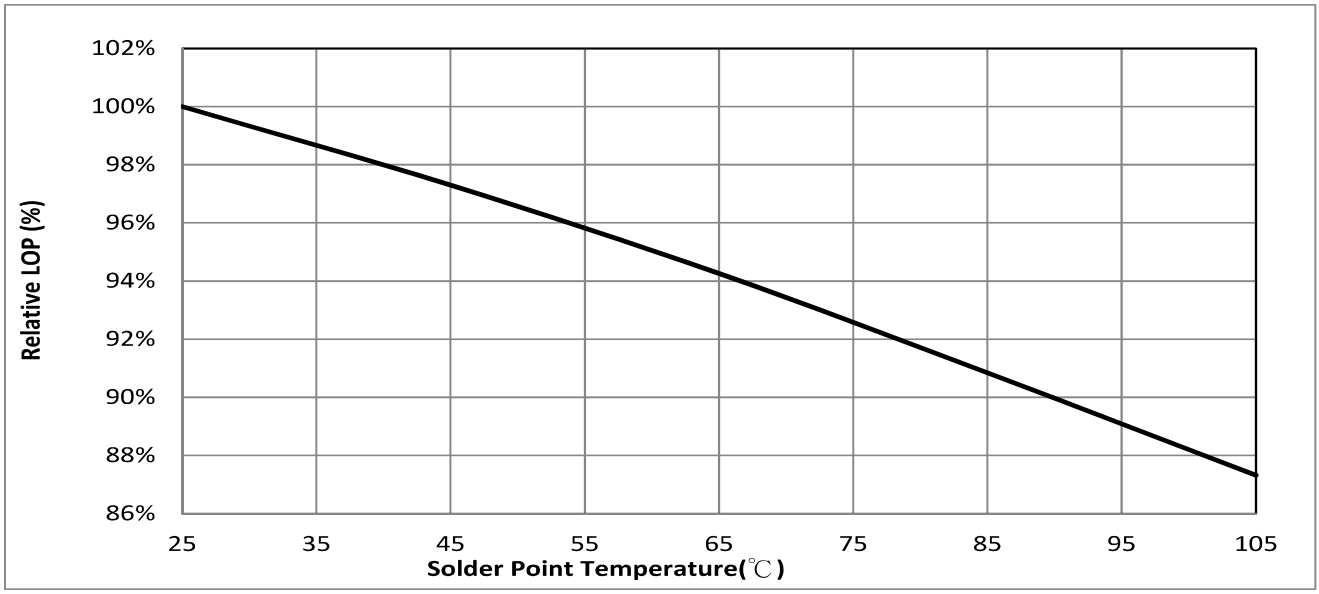
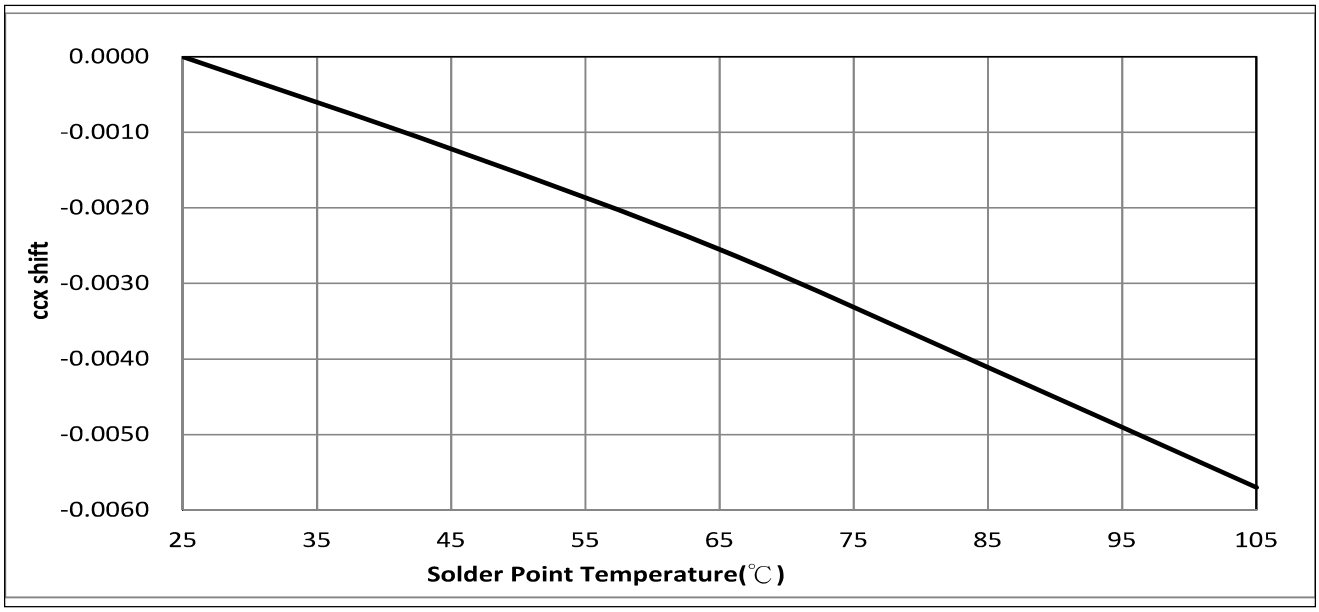


Figure 5: Typical CCX Shift vs. Solder Point Temperature_700mA

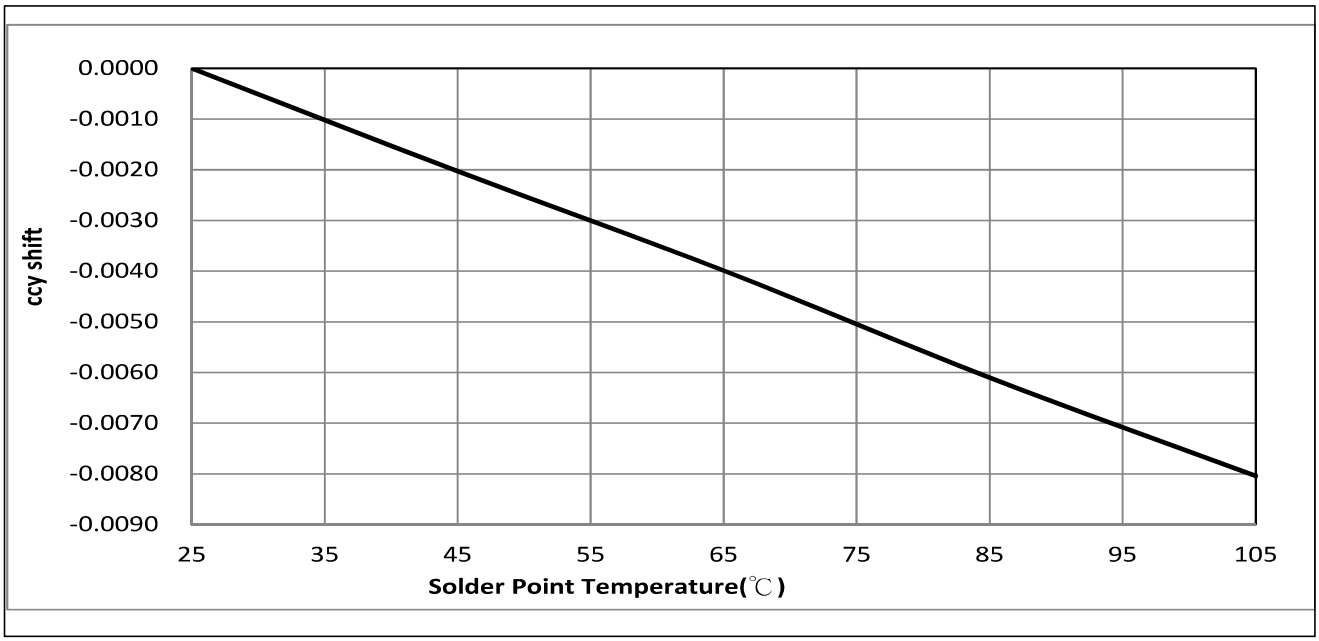


Notes for Figures 4 & 5:

1. Characteristics shown for cool white based on 5000K and 90 CRI.
2. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information

Performance Curves

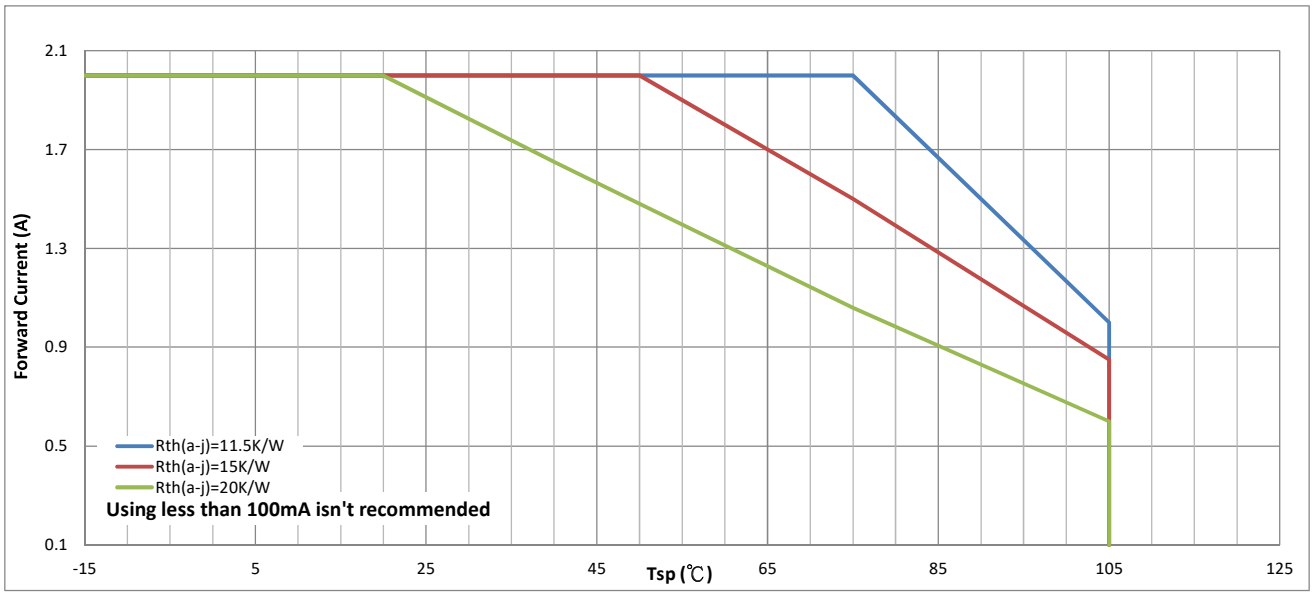
Figure 6: Typical CCY Shift vs. Solder Point Temperature_700mA



Notes for Figure 6:

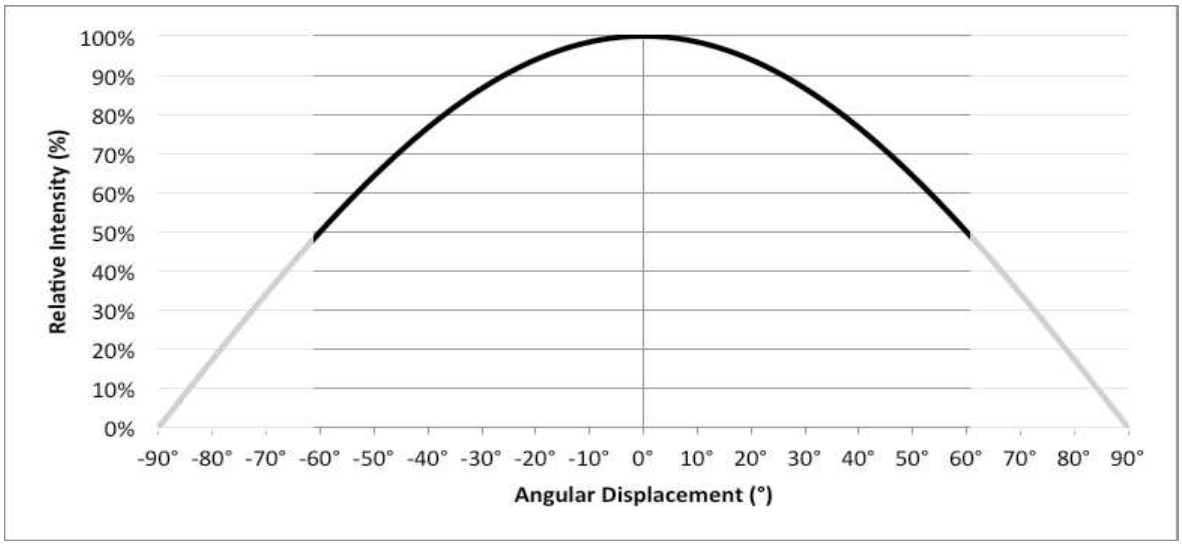
1. Characteristics shown for cool white based on 5000K and 90 CRI.
2. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information

Figure 7: Drive Current vs Solder Point Temperature



Typical Radiation Pattern

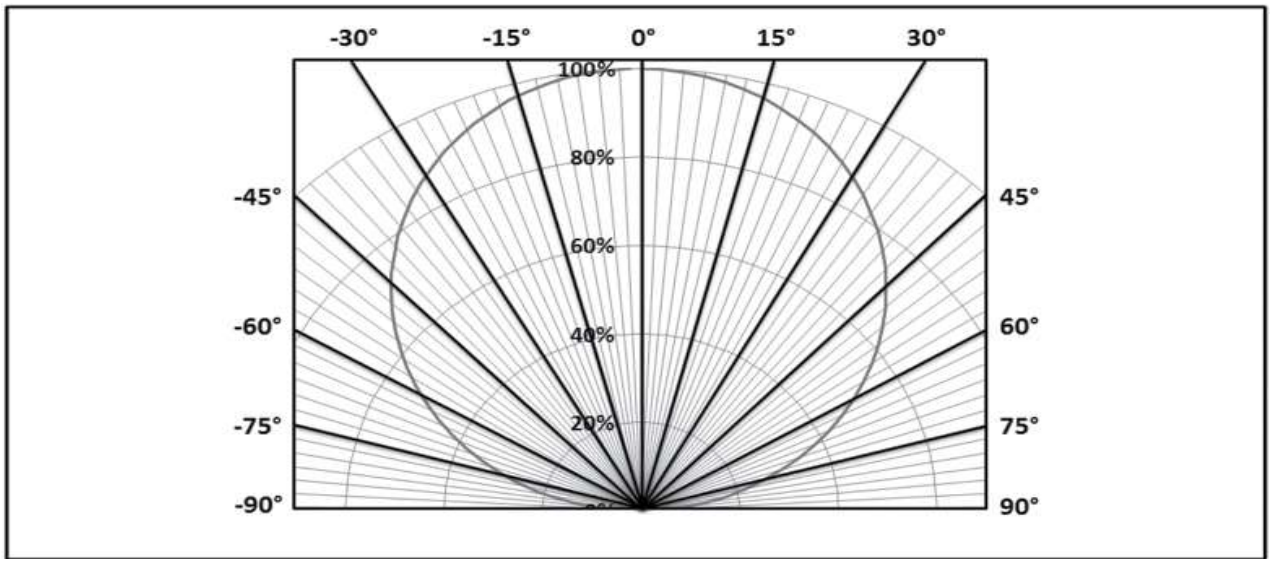
Figure 8: Typical Spatial Radiation Pattern at 700mA, T_{sp}=25˚C



Notes for Figure 8:

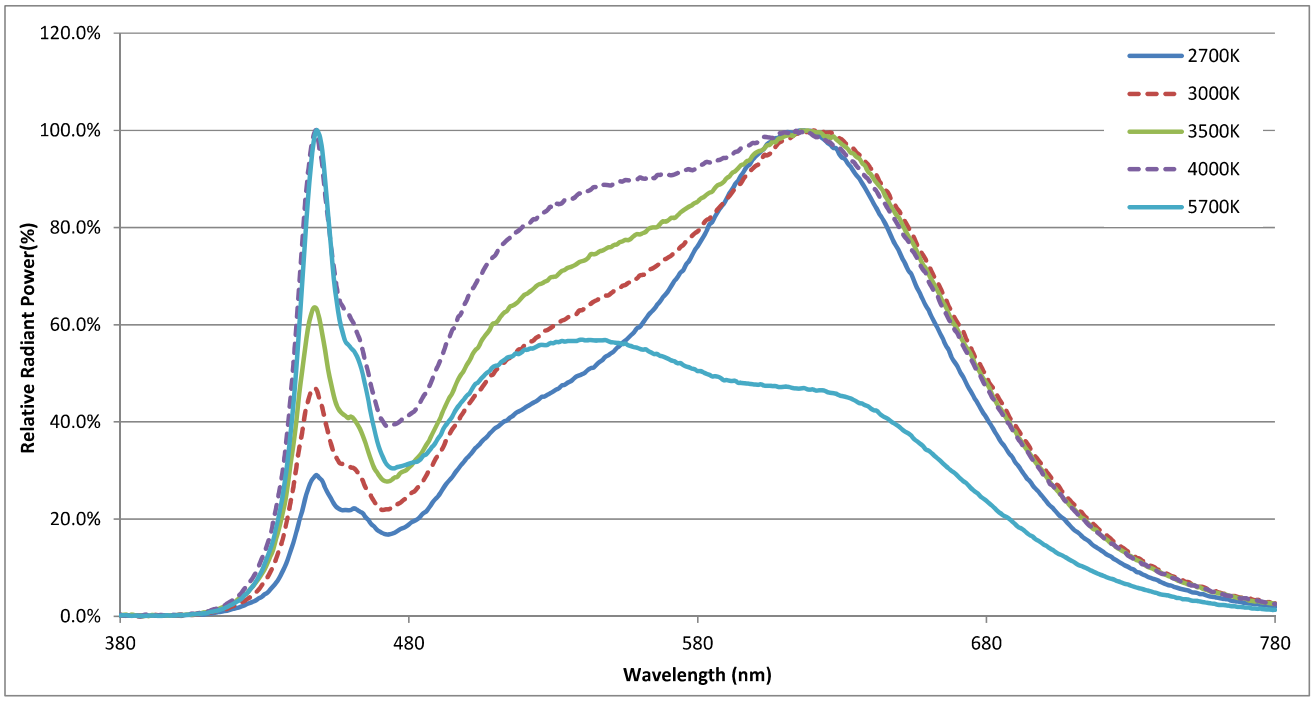
1. Typical viewing angle is 120˚.
2. The viewing angle is defined as the off axis angle from the centerline where luminous intensity (Iv) is ½ of the peak value.

Figure 9: Typical Polar Radiation Pattern at 700mA, T_{sp}=25˚C



Typical Color Spectrum

Figure 10: Typical Color Spectrum

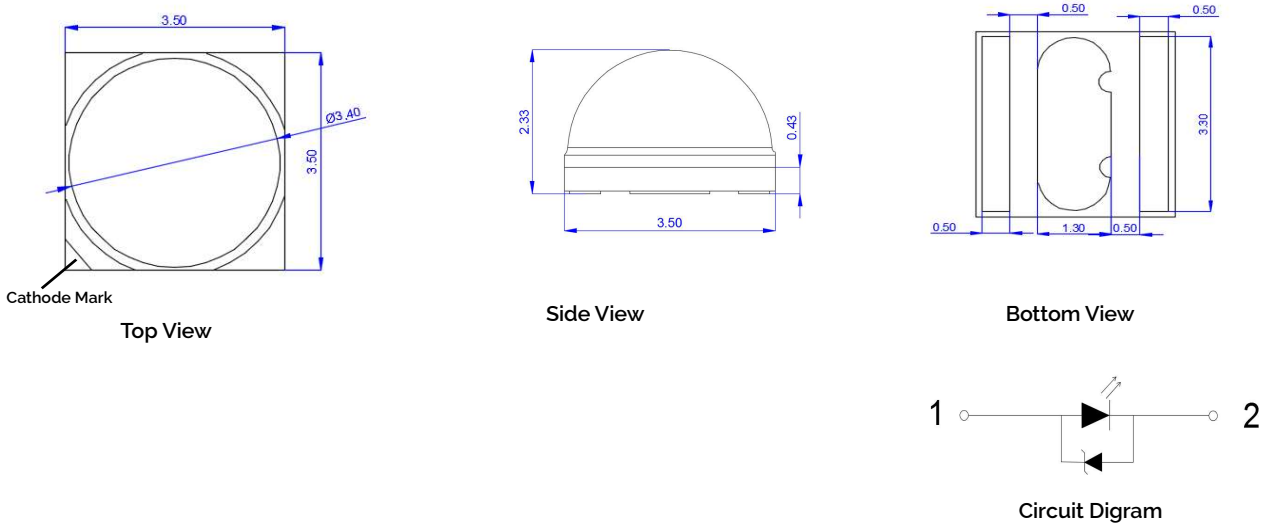


Notes for Figure 10:

1. Color spectra measured at nominal current for Tsp = 85°C
2. Color spectra shown for 90 CRI products.

Mechanical Dimensions

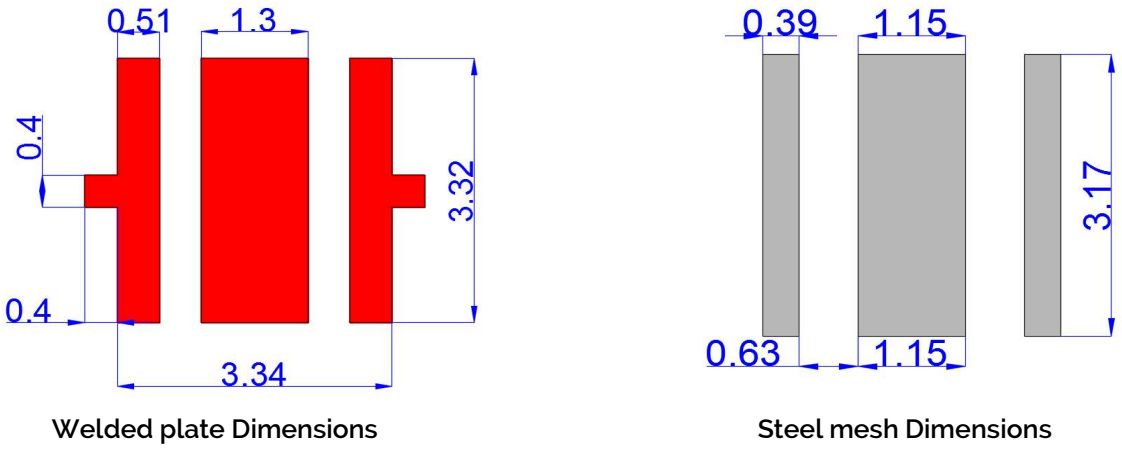
Figure 11: Drawing for SMD 3535



Notes for Figure 11:

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

Welded plate and steel mesh Dimensions



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	0/20
2	Low Temperature Storage	JESD22-A119	T_a=-40°C		1000 hours	0/20
3	High Temperature Storage	JESD22-A103D	T_a=105°C		1000 hours	0/20
4	Low Temperature Operating Life	JESD22-A108D	T_a=-40°C	700mA	1000 hours	0/20
5	Temperature Humidity Operating Life	JESD22-A101C	T_{sp}=85°C, RH=85%	700mA	1000 hours	0/20
6	High Temperature Operating Life	JESD22-A108D	T_{sp}=85°C	700mA	1000 hours	0/20
7	Thermal Shock	JESD22-A106B	T_a=-40°C ~125°C; Dwell : 15min; Transfer: 10sec		200 Cycle	0/20
8	Temperature Cycle	JESD22-A104E	T_a=-40°C ~100°C; Dwell at extreme temperature: 15min; Ramp rate < 105°C/min		200 Cycle	0/20
9	Electrostatic Discharge	JS-001-2012	HBM, 8KV, 1.5kΩ, 100pF, Alternately positive or negative		pass	0/20

Passing Criteria

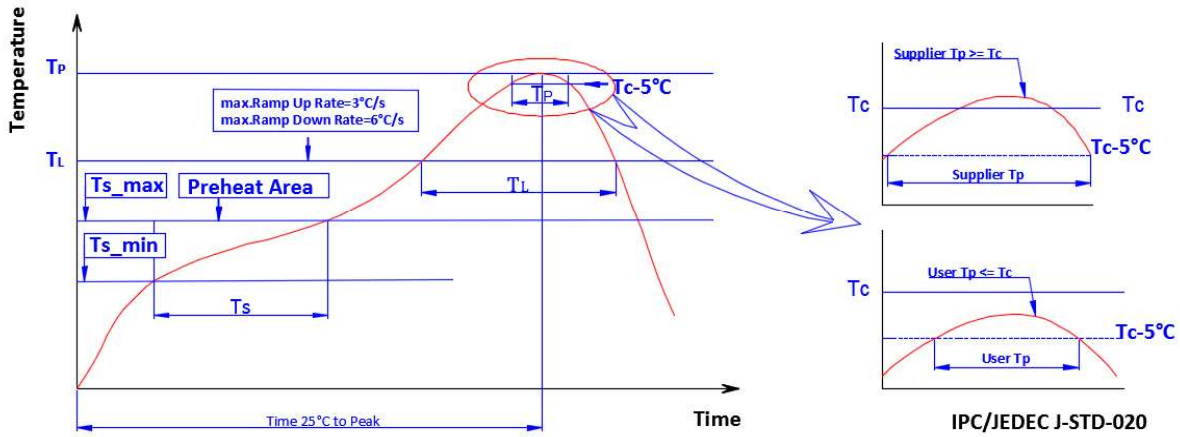
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	700mA	ΔVf<10%
Luminous Flux	Fv	700mA	ΔFv<30%
Chromaticity Coordinates	(x, y)	700mA	Δu'v'<0.007

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

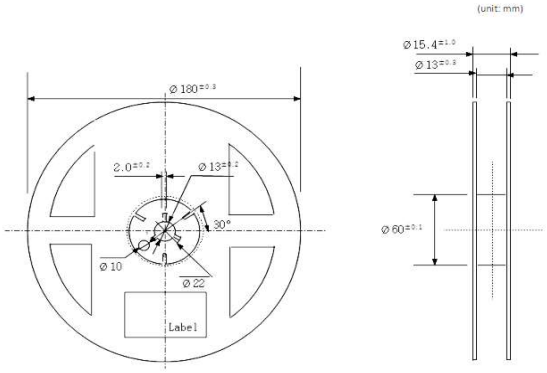
Figure 12 : Reflow Profile



Profile Feature	Lead Free Assembly
Temperature Min. (Ts_min)	160°C
Temperature Max. (Ts_max)	205°C
Time (ts) from Ts_min to Ts_max	60-150 seconds
Ramp-Up Rate (TL to Tp)	3 °C/second
Liquidus Temperature (TL)	220 °C
Time (TL) Maintained Above TL	60-150 seconds
Peak Temp(Tp)	260 °C max.
Time (Tp) Within 5 °C of the Specified Classification Temperature (Tc)	25 seconds max.
Ramp-Down Rate (Tp to TL)	5 °C/second max.
Time 25 °C to Peak Temperature	10 minutes max.

Packaging

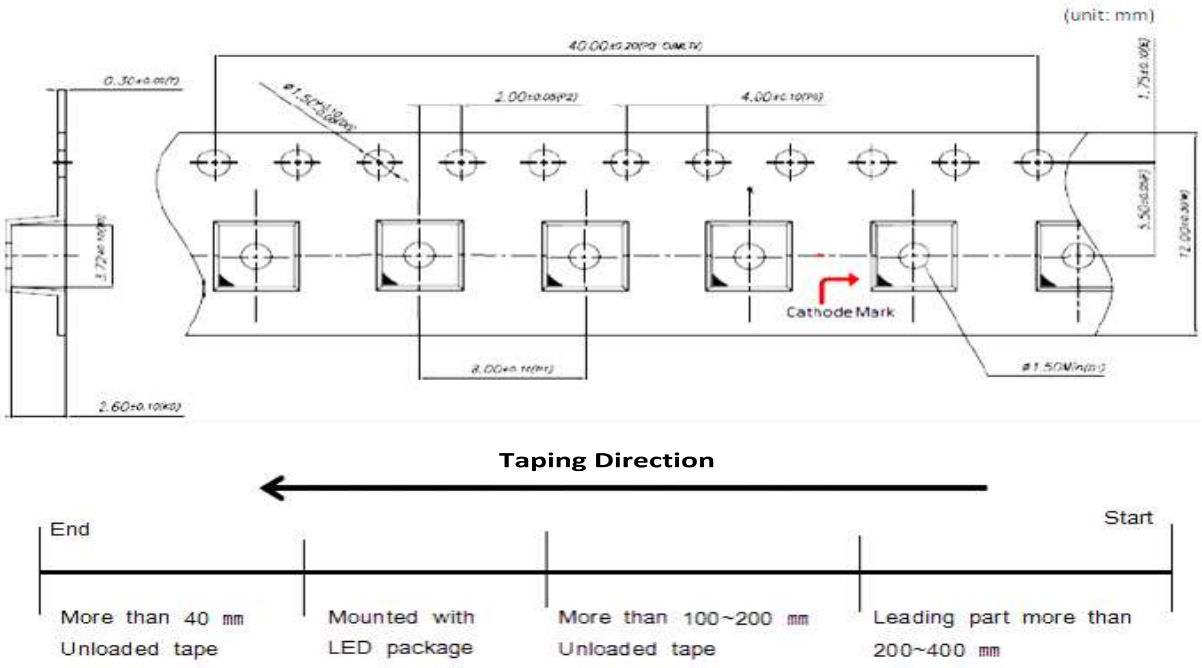
Figure 13: Emitter Reel Drawings



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 2 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

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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