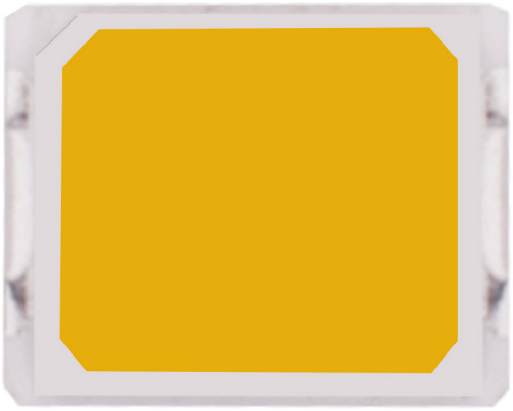

Bridgelux® SMD 2835 1W 9V Thrive™ 93

Product Data Sheet DS313

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BXEN-27R | 30R | 40R | 50R | 65R

Introduction

SMD 2835 Thrive

Bridgelux Thrive™ 93 uses proprietary technology to deliver a smoother spectrum with reduced spectral spikes and reduced blue intensity with the efficiency required to meet retrofit lamp standards. Thrive 93 has been engineered to optimize efficiency while also delivering the color quality metrics required to enable lamps compliant with JA-8 requirements for the California Title-20 energy code, where CRI R1-R8 values of >72 are required and CRI >90 with R9 >50 is desired to facilitate meeting standard compliance.

Features

- Engineered spectra with reduced blue emission
- CRI > 90, R9>50, R1-R8 >72
- High efficiency full spectrum solution
- No violet chip augmentation
- Hot color targeted
- Industry standard 2835 footprint

Benefits

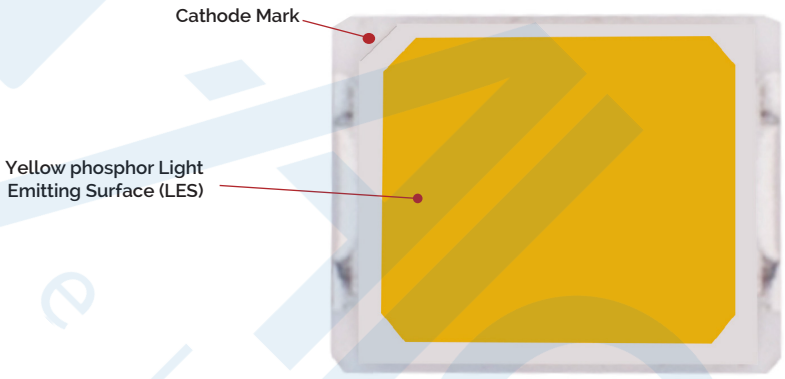
- Full spectrum lighting with fewer spectral spikes
- Natural and vivid color rendering compliant with regulatory standards
- Greater energy savings, lower utility costs
- Economical, high efficiency solution
- Uniform and consistent white light under application conditions
- Ease of design and rapid go-to-market

Pb free RoHS

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 2835 is explained as follows:

1 2 3 4	5 6	7	8	9	10	11	12	13 14	15	16
BXEN	– 27	R	– 1	3	H	– 9	C	– 00	– 0	– 0

- **Product Family**: BXEN
- **Nominal CCT**: 27 = 2,700K; 30 = 3,000K; 40 = 4,000K; 50 = 5,000K; 65 = 6,500K
- **Minimum CRI**: R = Thrive 93
- **Die count in parallel**: 1
- **Die count in series**: 3
- **High Power**: H
- **Typical Forward Voltage**: 9
- **Product Version**: C
- **Flux Bins**: 00
- **Forward Voltage Bins**: 0
- **Color Bin Options**: 0

Product Test Conditions

Bridgelux SMD 2835 LEDs are tested and binned with a 10ms pulse of 100mA 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˚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 100mA (T_j=T_{sp}=25°C)

Part Number[1,6]	Nominal CCT[2] (K)	CRI[3,5] (Typical)	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	Min	Typical	Max		
BXEN-27R-13H-9C-00-0-0	2700	-	100	8.8	9.1	9.6	100	108	112	0.9	119
BXEN-30R-13H-9C-00-0-0	3000	-	100	8.8	9.1	9.6	105	110	115	0.9	121
BXEN-40R-13H-9C-00-0-0	4000	-	100	8.8	9.1	9.6	115	120	125	0.9	132
BXEN-50R-13H-9C-00-0-0	5000	-	100	8.8	9.1	9.6	115	120	125	0.9	132
BXEN-65R-13H-9C-00-0-0	6500	-	100	8.8	9.1	9.6	115	120	125	0.9	132

Table 2: Selection Guide, Pulsed Test Performance at 100mA (T_{sp} = 85°C)[7,8]

Part Number[1,6]	Nominal CCT[2] (K)	CRI[3,5] (Typical)	Nominal Drive Current (mA)	Forward Voltage[5] (V)			Pulsed Flux (lm)[5]			Typical Power (W)	Typical Efficacy (lm/W)	Typical Photosynthetic Photon Flux[9] (µmol/s)	Typical Photon Efficiency (µmol/J)
				Min	Typical	Max	Min	Typical	Max				
BXEN-27R-13H-9C-00-0-0	2700	93	100	8.6	8.9	9.4	90	97	101	0.9	109	1.68	1.90
BXEN-30R-13H-9C-00-0-0	3000	93	100	8.6	8.9	9.4	95	99	104	0.9	111	1.70	1.92
BXEN-40R-13H-9C-00-0-0	4000	93	100	8.6	8.9	9.4	104	108	113	0.9	121	1.75	1.97
BXEN-50R-13H-9C-00-0-0	5000	93	100	8.6	8.9	9.4	104	108	113	0.9	121	1.77	1.99
BXEN-65R-13H-9C-00-0-0	6500	93	100	8.6	8.9	9.4	104	108	113	0.9	121	1.77	1.99

Notes for Tables 1 & 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 6 SDCM color.
   Example: BXEN-27R-13H-9C-00-0-0 refers to the full distribution of flux, forward voltage, and color within a 2700K 6-step ANSI standard chromaticity region with a minimum of 90 CRI, 1x3 die configuration, high power, 9.1V typical forward voltage.
2. Product CCT is hot targeted at T_{sp} = 85°C. Nominal CCT as defined by ANSI C78.377-2011.
3. The listed minimum CRI is 90 and include test tolerance.
4. Products tested under pulsed condition (10ms pulse width) at nominal drive current where T_j=T_{sp}=25°C.
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 2835.
6. Refer to Table 6 and Table 7 for Bridgelux SMD 2835 Luminous Flux Binning and Forward Voltage Binning information.
7. Typical pulsed test performance values are provided as reference only and are not a guarantee of performance.
8. 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 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.
9. Photosynthetic Photon Flux is measure of photon flux in the 400nm-700nm region.

Spectrum Characteristics

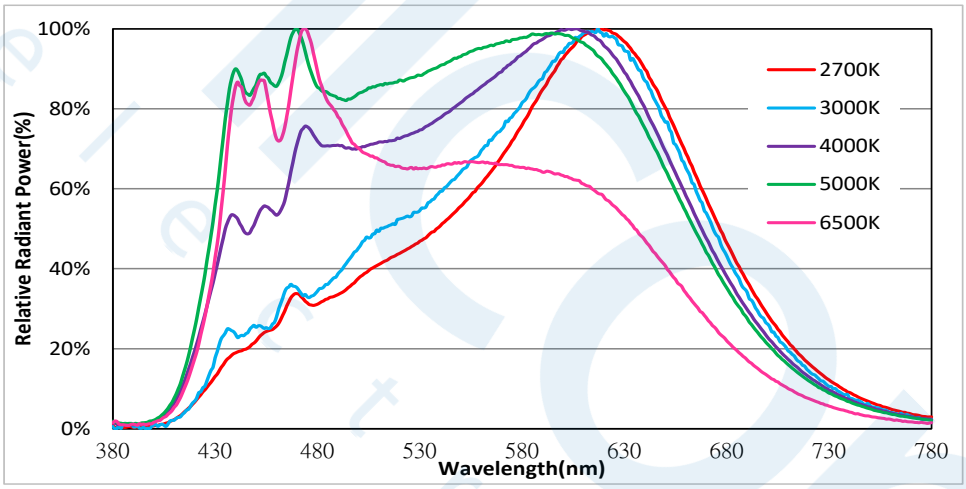
Table 3: Minimum Color Rendering Index , 100mA, T_{sp}=85˚C [1]

Nominal CCT[1]	R1	R2	R3	R4	R5	R6	R7	R8	R9
2700K	90	90	90	90	90	90	90	72	50
3000K	90	90	90	90	90	90	90	72	50
4000K	90	90	90	90	90	90	90	72	50
5000K	90	90	90	90	90	90	90	72	50
6500K	90	90	90	90	90	90	90	72	50

Note for Table 3:

1. Bridgelux maintains a tolerance of ± 3 on Color Rendering Index R1-R9 measurements.

Figure 1: Typical Color Spectrum



Note for Figure 1:

1. Color spectra measured at typical current for T_{sp} = 85˚C.
2. Spectra are provided as reference only and are not a guarantee of spectra .
3. Spectra under different current will be different from the Spectra under typical current.

Electrical Characteristics

Table 4: 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] $R_{j\text{-}sp}$ (°C/W)
		Minimum	Typical	Maximum		
BXEN-XXX-13H-9C-00-0-0	100	8.8	9.1	9.6	-2.76	16

Notes for Table 4:

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 6 SDCM color.
   Example: BXEN-27R-13H-9C-00-0-0 refers to the full distribution of flux, forward voltage, and color within a 2700K 6-step ANSI standard chromaticity region with a minimum of 90 CRI, 1x3 die configuration, high power, 9.1V typical forward voltage.
2. Bridgelux maintains a tolerance of ± 0.15V 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 Tsp = 25°C.
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)	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	120mA
Maximum Peak Pulsed Forward Current[1]	240mA
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 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 2835 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 100mA, T_{sp}=25˚C

Bin Code	Minimum	Maximum	Unit	Condition
5C	100	105	lm	I_F=100mA
5D	105	110		
5E	110	115		
5F	115	120		
5G	120	125		
5H	125	130		

Note for Table 6:

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

Table 7: Forward Voltage Bin Definition at 100mA, T_{sp}=25˚C

Bin Code	Minimum	Maximum	Unit	Condition
U	8.8	9.0	V	I_F=100mA
V	9.0	9.2		
W	9.2	9.4		
X	9.4	9.6		

Note for Table 7:

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

Product Bin Definitions

Table 8: MacAdam Ellipse Color Bin Definitions

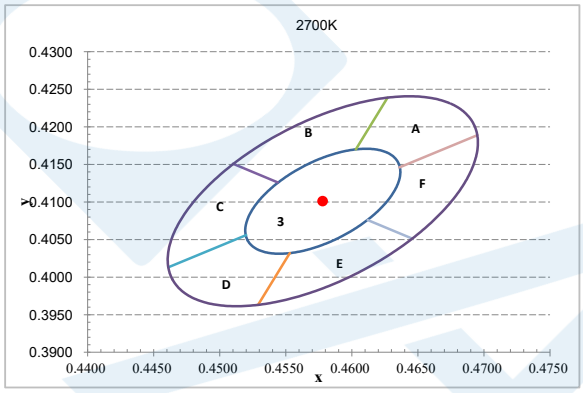
CCT	Color Space	Center Point		Major Axis	Minor Axis	Ellipse Rotation Angle	Color Bin
		X	Y				
2700K	3 SDCM	0.4578	0.4101	0.0081	0.0042	53.70	3
	6 SDCM	0.4578	0.4101	0.0162	0.0084	53.70	3/A/B/C/D/E/F
3000K	3 SDCM	0.4338	0.4030	0.00834	0.00408	53.22	3
	6 SDCM	0.4338	0.4030	0.01668	0.00816	53.22	3/A/B/C/D/E/F
4000K	3 SDCM	0.3818	0.3797	0.00939	0.00402	53.72	3
	6 SDCM	0.3818	0.3797	0.01878	0.00804	53.72	3/A/B/C/D/E/F
5000K	3 SDCM	0.3447	0.3553	0.00822	0.00354	59.62	3
	6 SDCM	0.3447	0.3553	0.01644	0.00708	59.62	3/A/B/C/D/E/F
6500K	3 SDCM	0.3123	0.3282	0.00669	0.00285	58.57	3
	6 SDCM	0.3123	0.3282	0.01338	0.0057	58.57	3/A/B/C/D/E/F

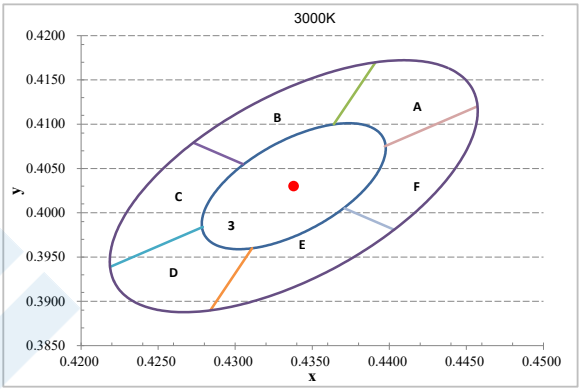
Notes for Table 8:

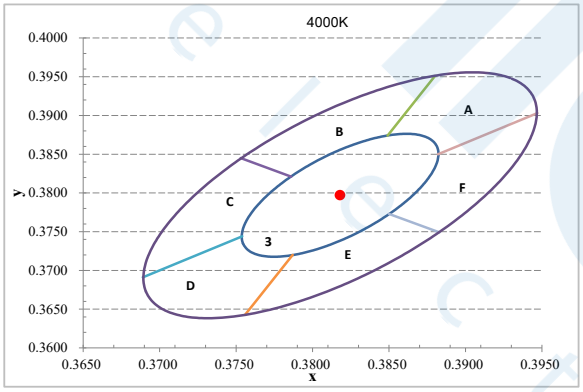
1. Color binning at T_{sp}=85˚C unless otherwise specified
2. Bridgelux maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

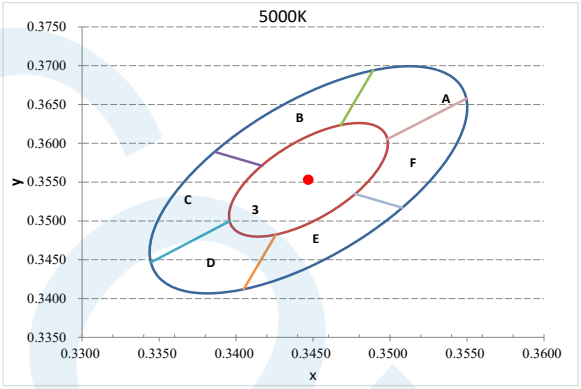
Product Bin Definitions

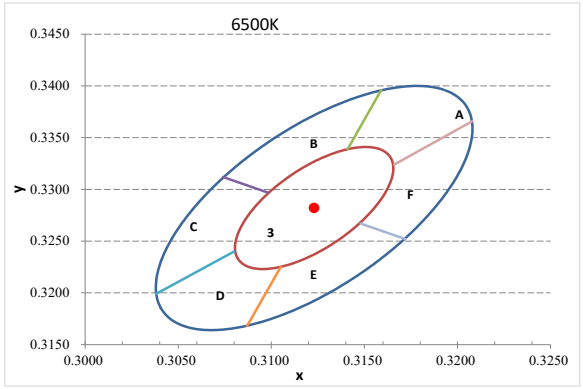
Figure 2: C.I.E. 1931 Chromaticity Diagram (Color Targeted at T_{sp}=85°C)











Kitting bins matching	
BIN#1	BIN#2
3	3
A	D
B	E
C	F

Performance Curves

Figure 3: Drive Current vs. Voltage (T_{sp}=25˚C)

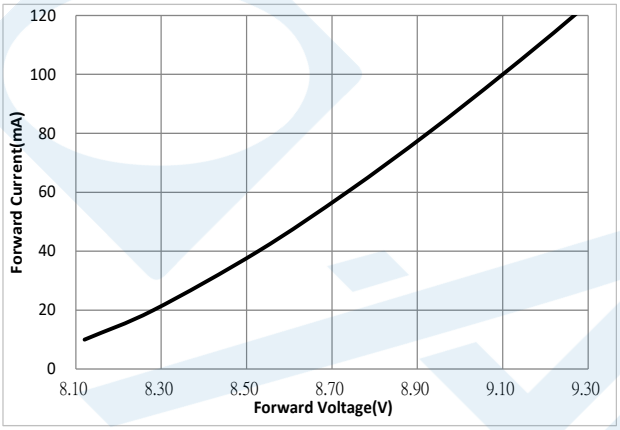


Figure 4: Typical Relative Luminous Flux vs. Drive Current (T_{sp}=25˚C)[1]

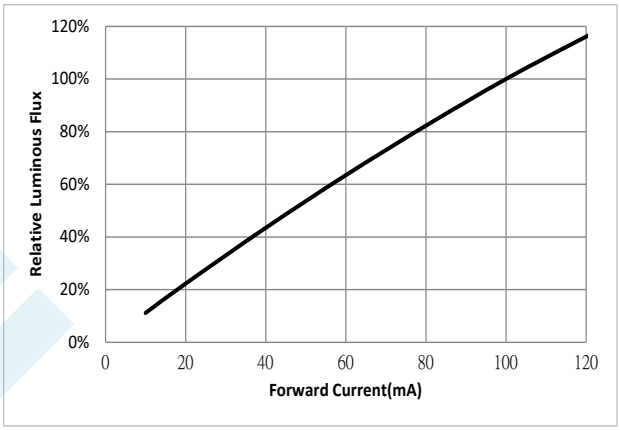


Figure 5: Typical Relative Flux vs. Solder Point Temperature[2,3,4,5]

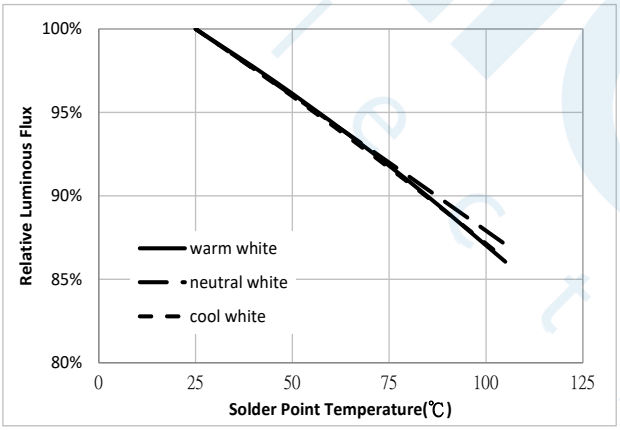


Figure 6: Typical ccx Shift vs. Solder Point Temperature[2,3,4,5]

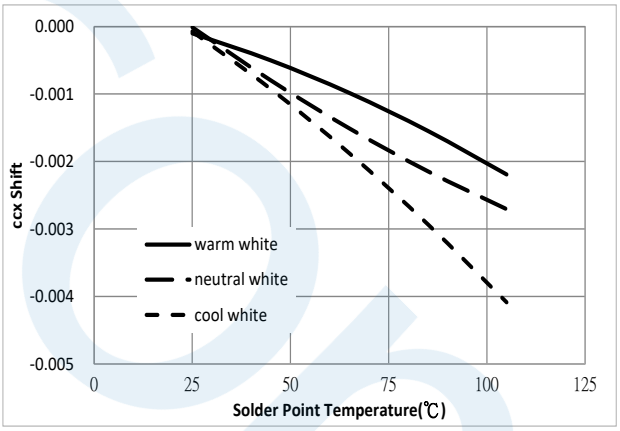
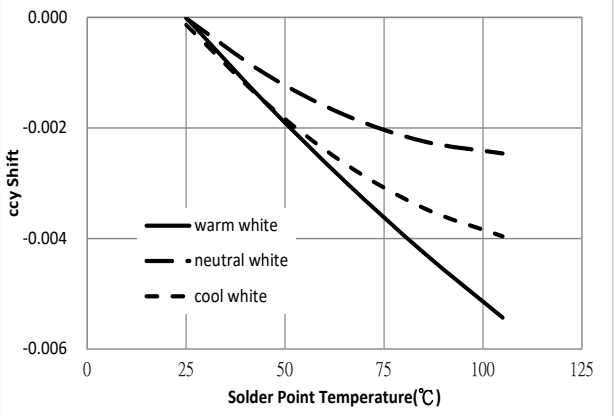


Figure 7: Typical ccy Shift vs. Solder Point Temperature[2,3,4,5]

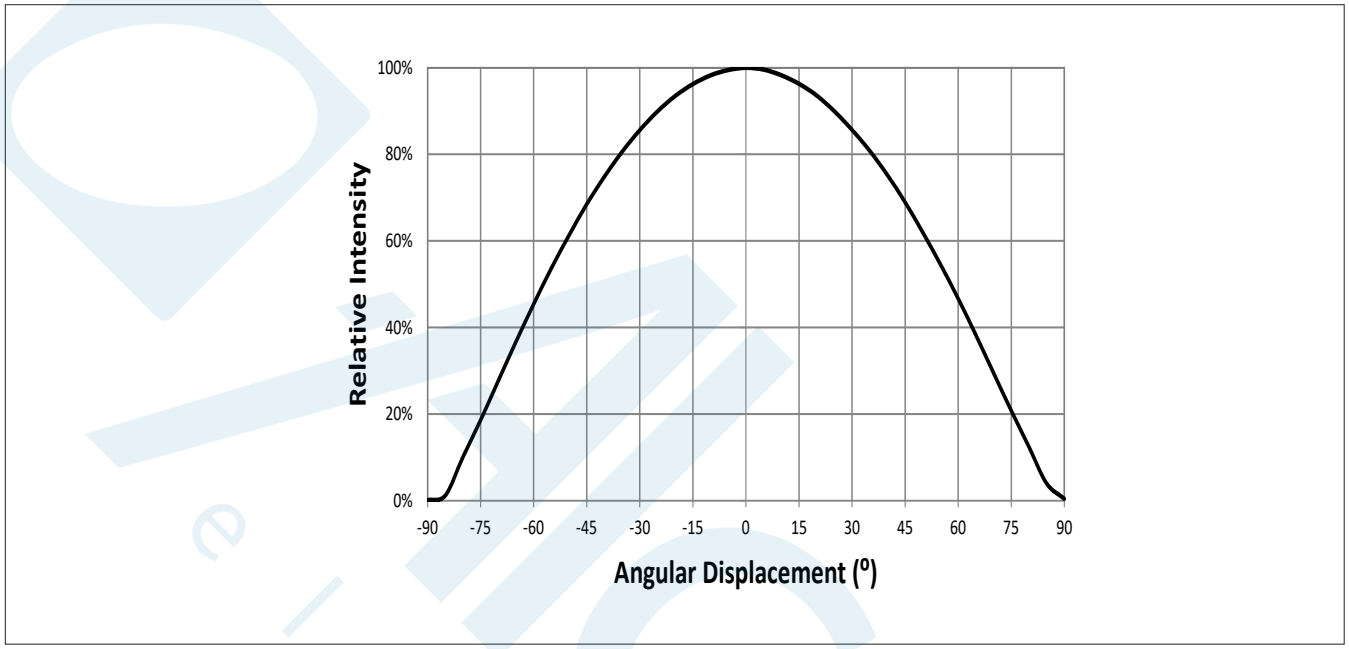


Note for Figures 3-7:

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

Typical Radiation Pattern

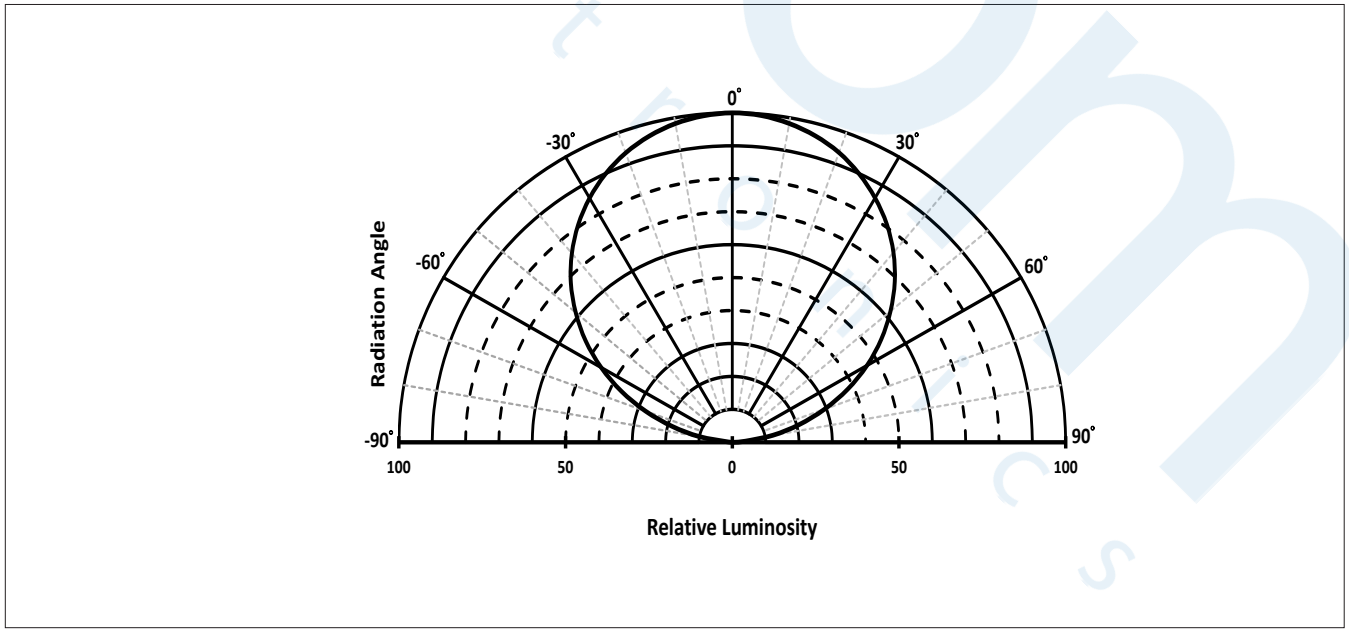
Figure 8: Typical Spatial Radiation Pattern at 100mA, T_{sp}=25˚C



Notes for Figure 8:

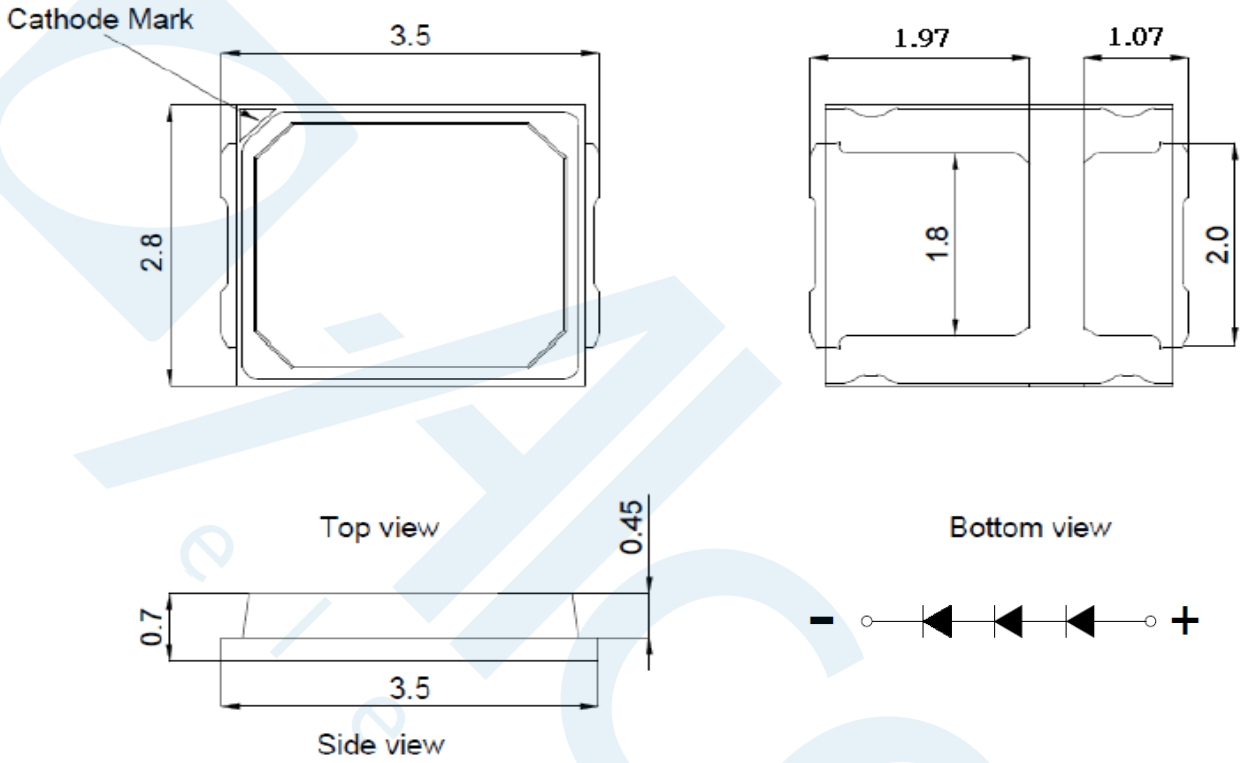
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where luminous intensity (Iv) is ½ of the peak value.

Figure 9: Typical Polar Radiation Pattern at 100mA, T_{sp}=25˚C



Mechanical Dimensions

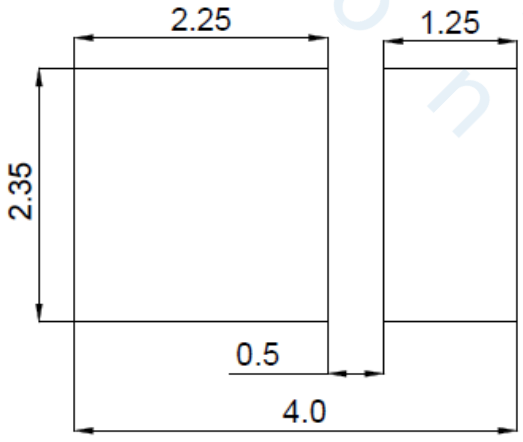
Figure 10: Drawing for SMD 2835



Notes for Figure 10:

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

Recommended PCB Soldering Pad Pattern



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: 60°C, 60%RH, 168hr	-	3 reflows	0/22
2	Low Temperature Storage	JESD22-A119	T_a=-40°C	-	1000 hours	0/22
3	High Temperature Storage	JESD22-A103D	T_a= 105°C	-	1000 hours	0/22
4	Low Temperature Operating Life	JESD22-A108D	T_a=-40°C	100mA	1000 hours	0/22
5	Temperature Humidity Operating Life	JESD22-A101C	T_{sp}=85°C, RH=85%	100mA	1000 hours	0/22
6	High Temperature Operating Life	JESD22-A108D	T_{sp}=105°C	120mA	1000 hours	0/22
7	Power switching	IEC62717:2014	T_{sp}= 105°C 30 sec on, 30 sec off	120mA	30000 cycles	0/22
8	Thermal Shock	JESD22-A106B	T_a=-40°C ~100°C; Dwell : 15min; Transfer: 10sec	-	200 cycles	0/22
9	Temperature Cycle	JESD22-A104E	T_a=-40°C ~100°C; Dwell at extreme temperature: 15min; Ramp rate < 105°C/min	-	200 cycles	0/22
10	Electrostatic Discharge	JS-001-2012	HBM, 2KV, 1.5kΩ, 100pF, Alternately positive or negative	-	-	0/22

Passing Criteria

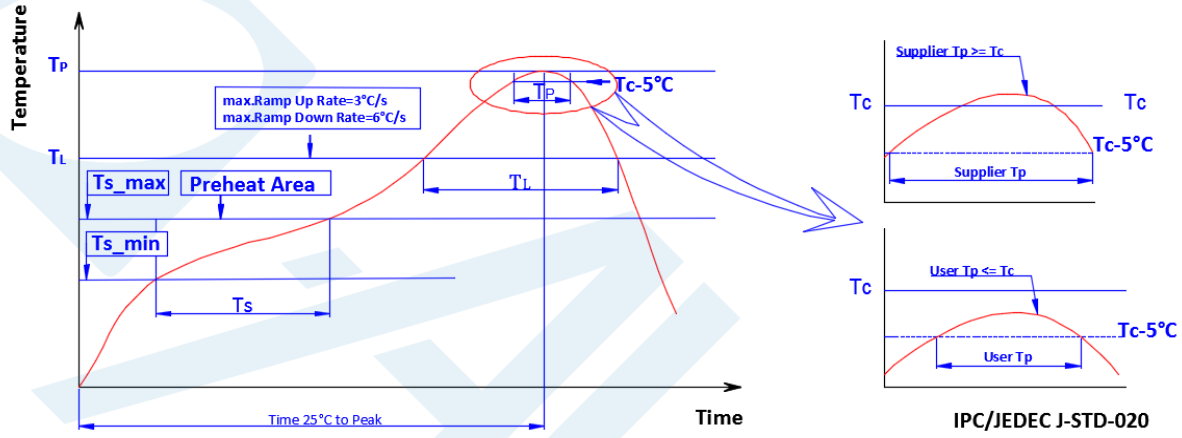
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	100mA	Vf<10%
Luminous Flux	Fv	100mA	Fv<30%
Chromaticity Coordinates	(x, y)	100mA	u'v'<0.007

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

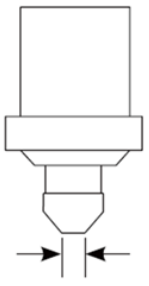
Reflow Characteristics

Figure 11 : 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.

Figure 12 : Pick and Place



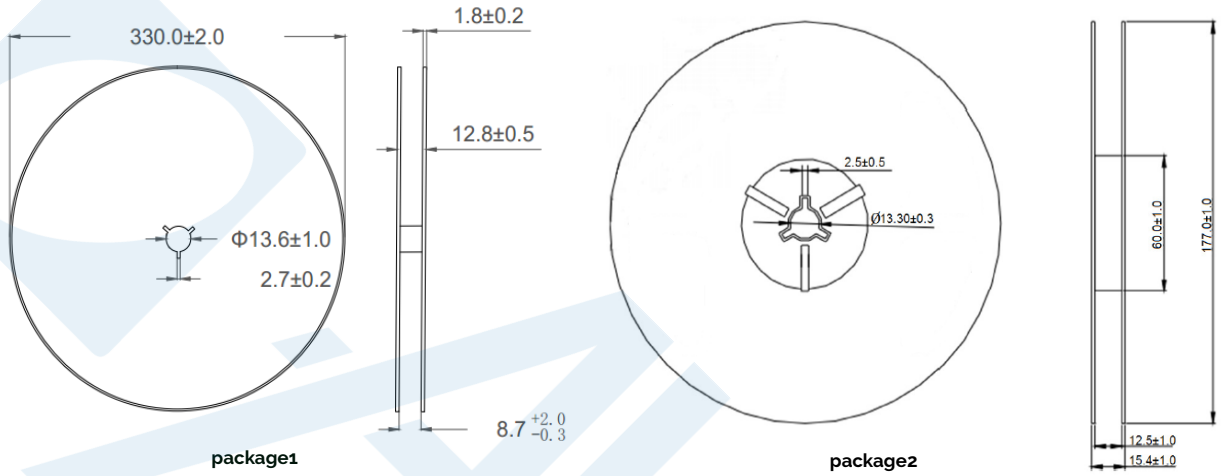
Is greater than LEDs emitting surface

Note for Figure 12:

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

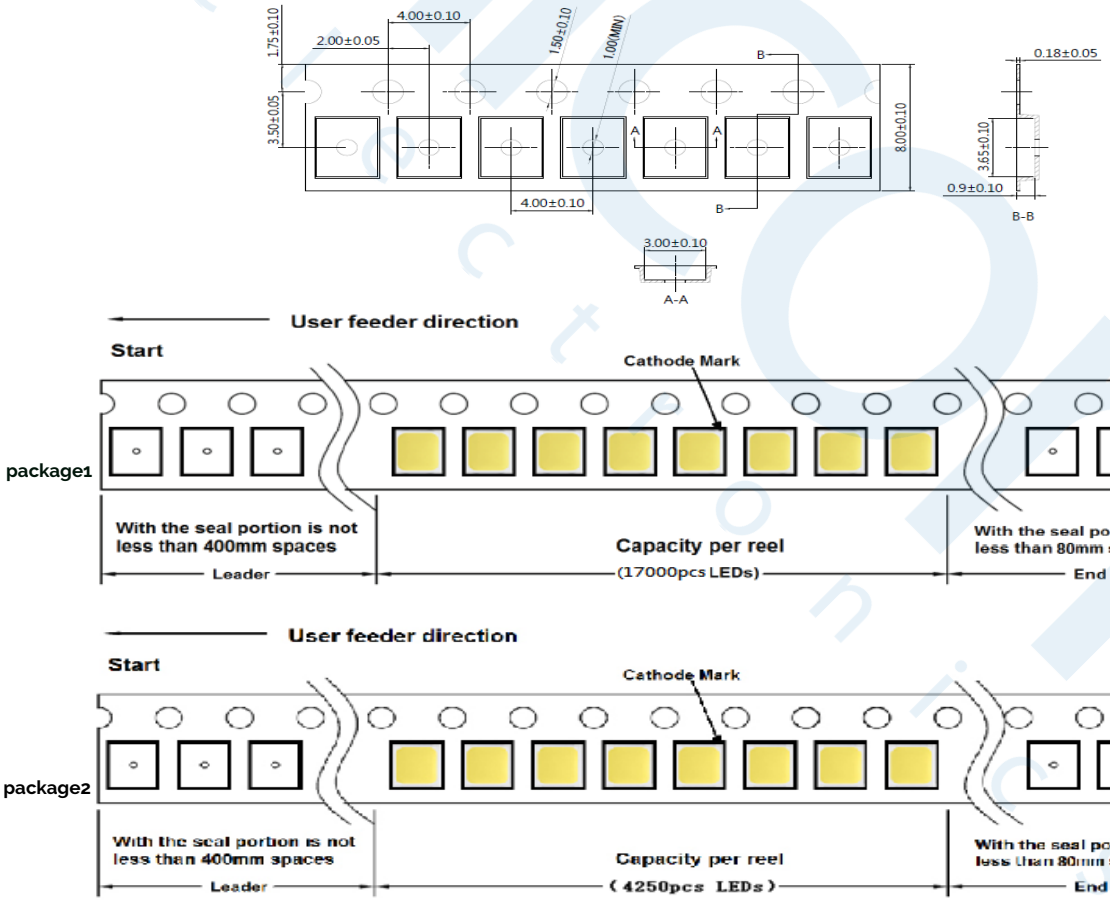
Figure 13: Emitter Reel Drawings



Note for Figure 13:

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

Figure 14: Emitter Tape Drawings

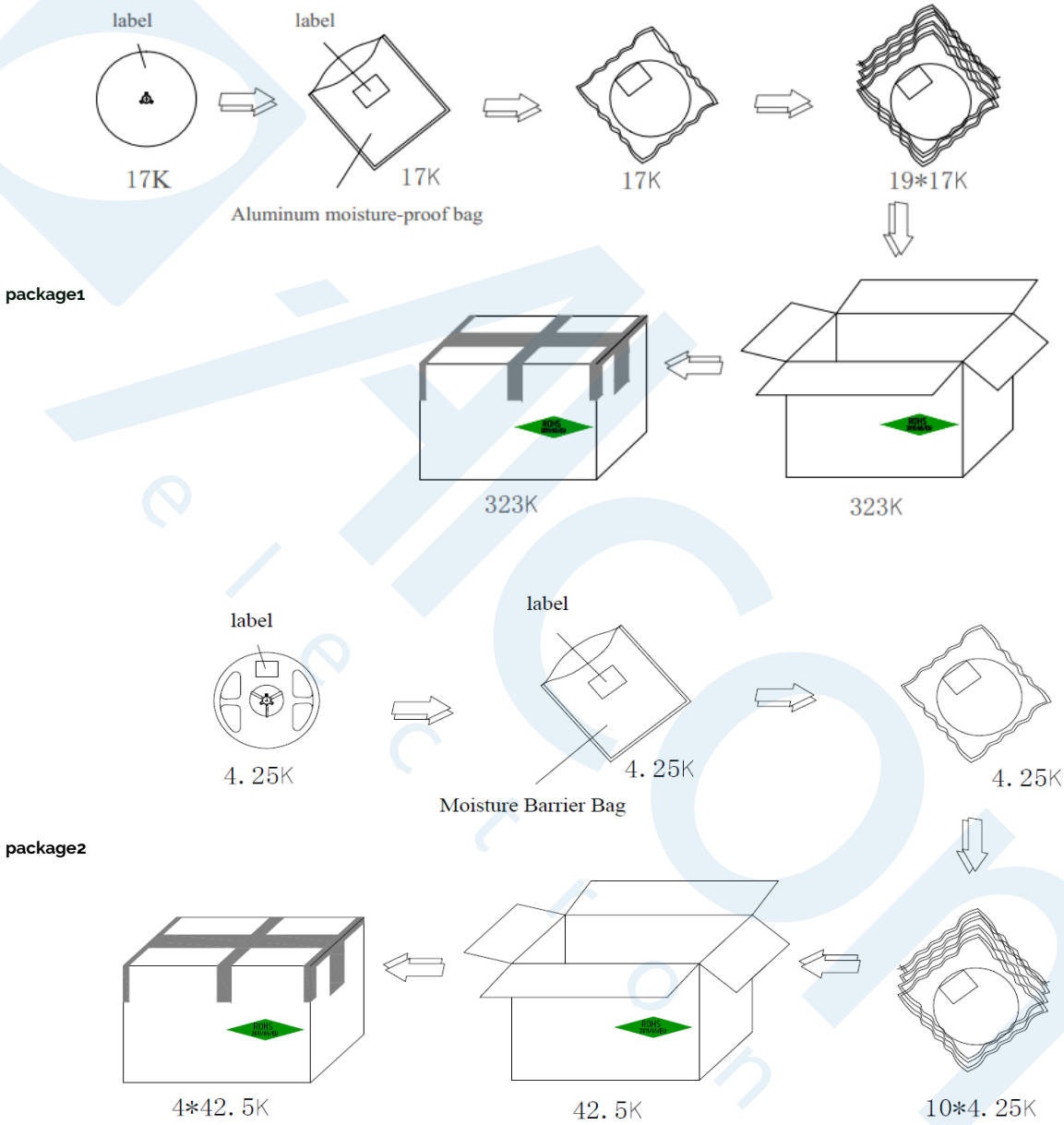


Note for Figure 14:

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

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 EN62778: Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires 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

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.