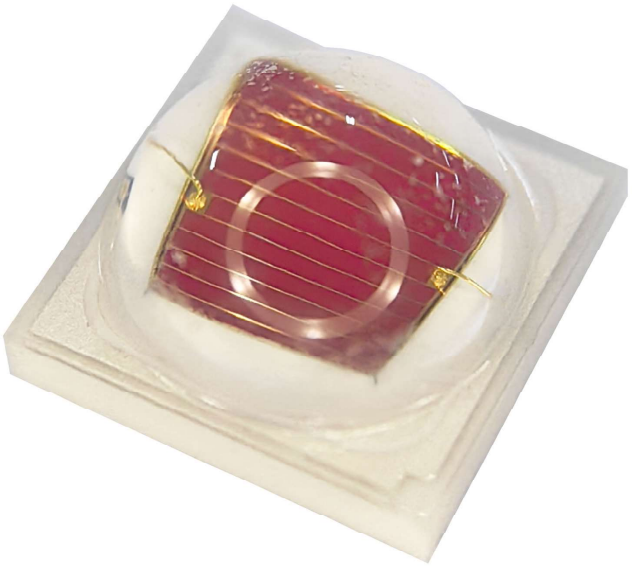
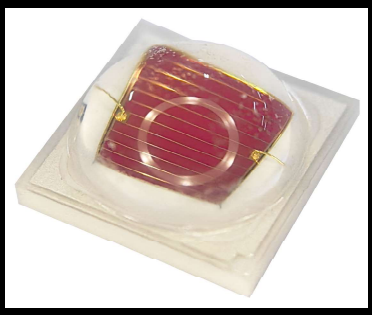


Bridgelux® SMD 3535 1.5W 2V

Product Data Sheet DS1719

Introduction

SMD 3535



The Bridgelux SMD 3535 offers exceptional performance in a compact LED package. Hyper Red with best value for Highest PPE. Most compact high-power LED with proven robustness, high reliability, long lifetime and low thermal resistance. Its high PPE 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
- ESD 8kV HBM. JEDEC-JS-001-HBM and JE-DEC-JS-001-2012
- Typ. Radiation: 130˚ (Lambertian emitter)
- Radiant Flux :Typical 1140mW @700mA
- Photosynthetic Photon Efficacy （PPE):

  typical. 4.6 µmol/J @700mA

Benefits

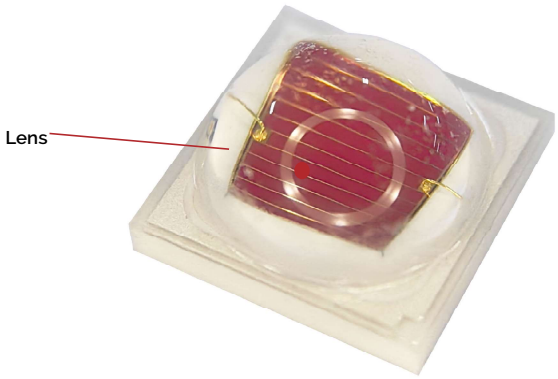
- Lower operating and manufacturing cost
- Ease of design and rapid go-to-market
- Compliant with environmental standards
- Design flexibility
- Horticultural Lighting applications

Pb free RoHS

Contents

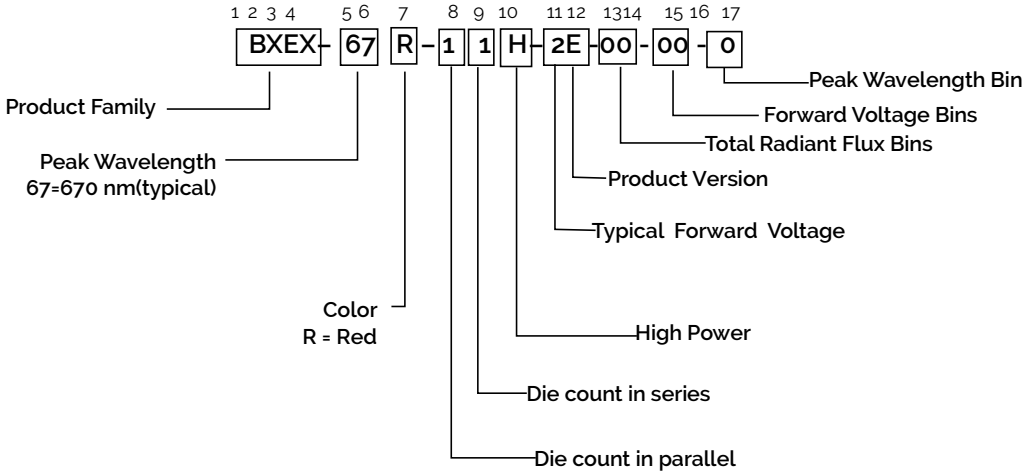
Product Feature Map

Bridgelux SMD LED products come in industry standard package sizes. 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˚C)

Part Number[4,5]	Color	Nominal Drive Current (mA)	Forward Voltage[3, 4] (V)			Typical Dominant Wavelength(nm)	Typical Peak Wavelength(nm)	Typical Pulsed Total Radiant Flux (mW)	Typical Power (W)	Typical PPF (umol/s)	Typical PPE (umol/J)
			Min	Typical	Max						
BXEX-67R-11H-2E-00-00-0	Red	700	1.80	1.94	2.10	650.0	670.0	1140	1.4	6.20	4.6

Notes for Table 1:

1. The last 7 characters (including hyphens '-') refer to flux bins, forward voltage bins and peak wave length, respectively.
2. Products tested under pulsed condition (10ms pulse width) at nominal drive current where T_j=T_{sp}=25˚C.
3. Bridgelux maintains a ±7.5% tolerance on radiant flux measurements, ±0.1V tolerance on forward voltage measurements for the SMD 3535
4. Refer to Table 5 and Table 6 for Bridgelux SMD 3535 Total Radiant Flux Binning and Forward Voltage Binning information.
5. Typical pulsed test performance values are provided as reference only and are not a guarantee of performance.
6. 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˚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.

Table 2: Performance at Commonly Used Drive Currents

Part Number	Drive Current[1] (mA)	Typical V_f T_{sp} = 25˚C (V)	Typ Pulsed Total Radiant Flux T_{sp} = 25˚C (W)	Typical PPF T_{sp} = 25˚C (umol/s)	Typical PPE T_{sp} = 25˚C (umol/J)
BXEX-67R-11H-2E-00-00-0	50	1.68	0.08	0.42	4.99
	150	1.75	0.24	1.33	5.08
	250	1.80	0.41	2.24	5.00
	350	1.84	0.57	3.15	4.91
	450	1.87	0.74	4.07	4.82
	600	1.92	0.98	5.43	4.70
	700	1.94	1.14	6.20	4.60
	800	1.99	1.31	7.22	4.54
	900	2.02	1.47	8.12	4.47
	1000	2.05	1.63	9.00	4.40
	1100	2.08	1.79	9.88	4.33
	1200	2.10	1.95	10.77	4.27
	1300	2.13	2.10	11.63	4.20
	1400	2.16	2.26	12.50	4.14

Notes for Table 2:

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

Electrical and Thermal Characteristics

Table 3: Electrical and Thermal 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] $R_{j\text{-}sp}$ (C/W)
		Minimum	Typical	Maximum		
BXEX-67R-11H-2E-00-00-0	700	1.8	1.94	2.1	/	1.2

Notes for Table 3:

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 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	1400mA
Maximum Reverse Voltage[2]	–
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 Total Radiant 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.

Table 5: Total Radiant Flux Bin Definitions at 700mA, T_{sp}=25˚C

Bin Code	Minimum	Maximum	Unit	Condition
8U	1040	1080	mW	I_F=700mA
9U	1080	1120		
AU	1120	1160		
BU	1160	1200		

Note for Table 5:

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

Table 6: Forward Voltage Bin Definition at 700mA, T_{sp}=25˚C

Bin Code	Minimum	Maximum	Unit	Condition
A	1.8	2.0	V	I_F=700mA
B	2.0	2.2		

Note for Table 6:

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

Table 7: Peak Wavelength Bin Definition at 700mA, T_{sp}=25˚C

Bin Code	Minimum	Maximum	Unit	Condition
2	660	680	nm	I_F=700mA

Note for Table 7:

1. Bridgelux maintains a tolerance of ± 1nm on peak wavelength measurements.

Performance Curves

Figure 1: Drive Current vs. Relative Voltage (T_{sp}=25°C)

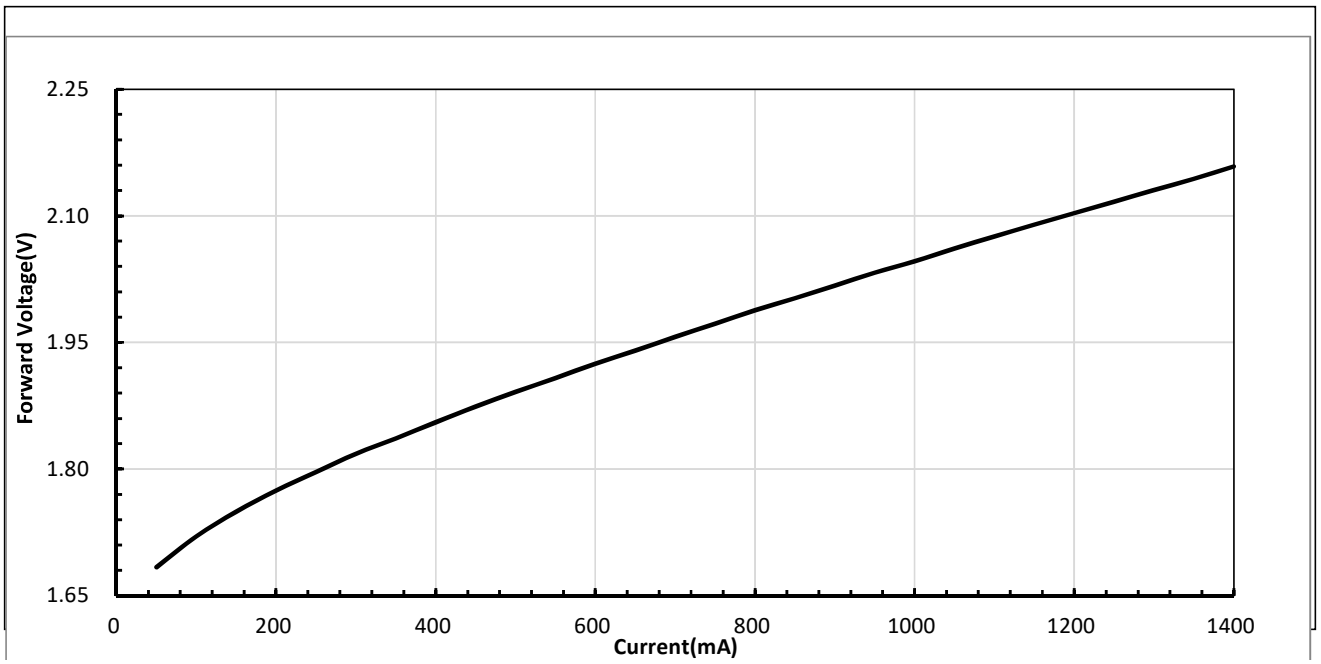
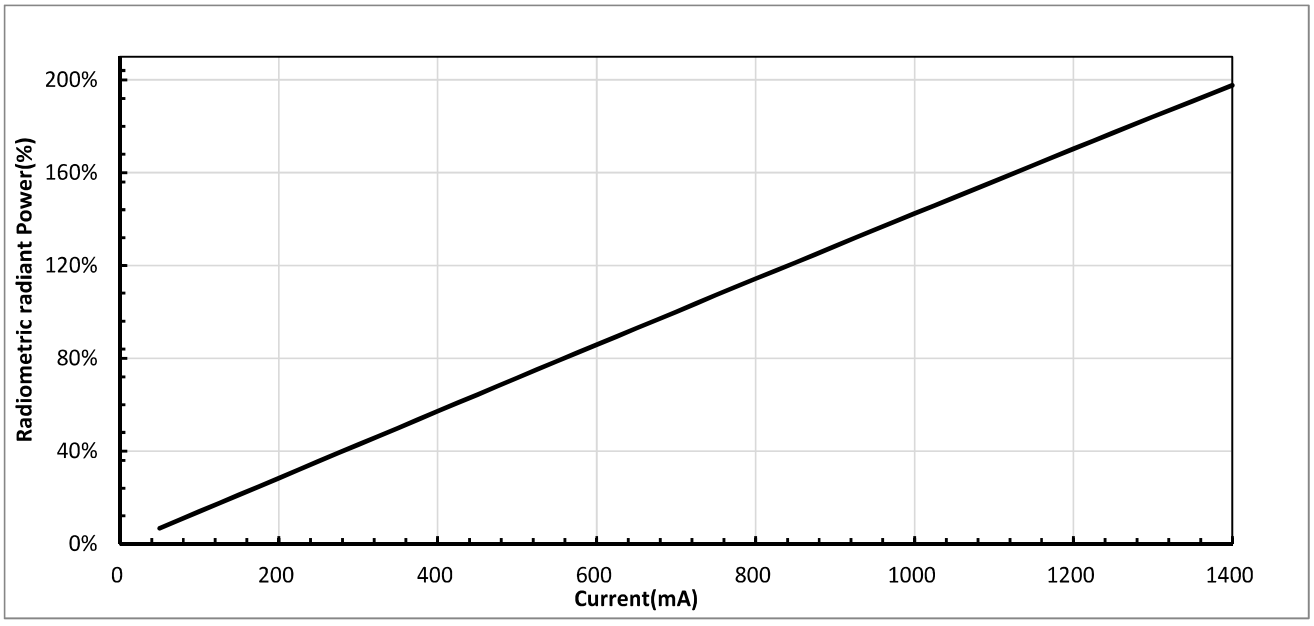


Figure 2: Typical Relative Total Radiant Photometric vs. Drive Current (T_{sp}=25°C)



Note for Figure 2:

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

Performance Curves

Figure 3: Typical Relative Total Radiant Radiometric vs. Solder Point Temperature

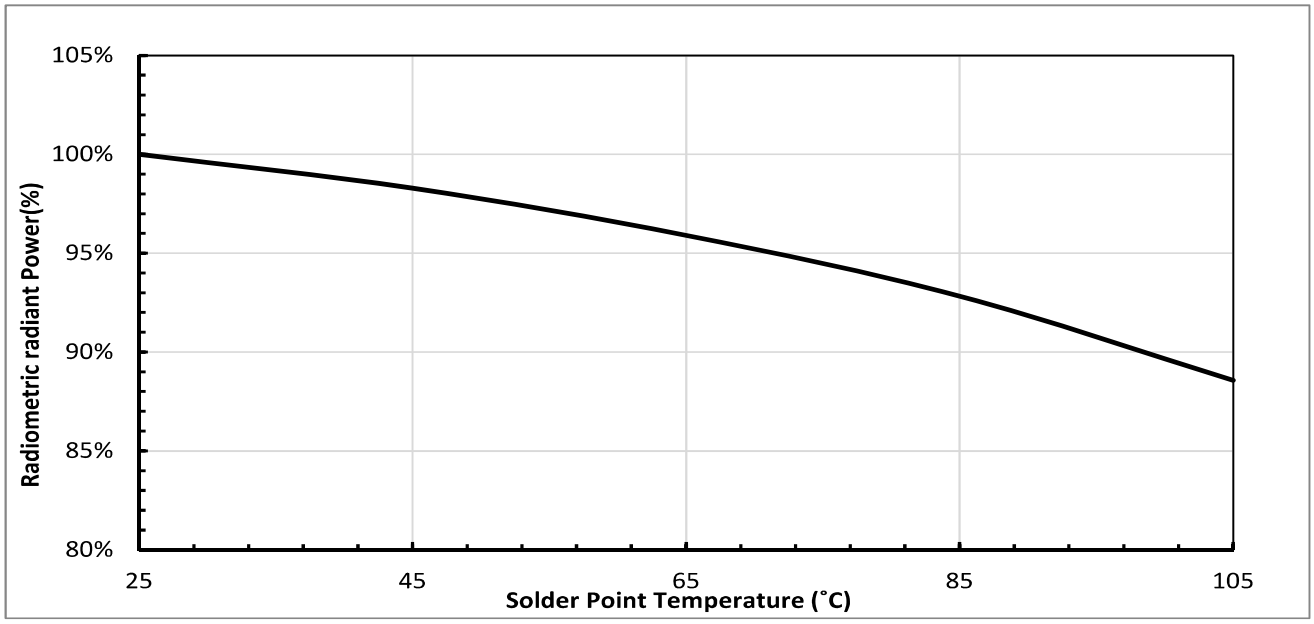
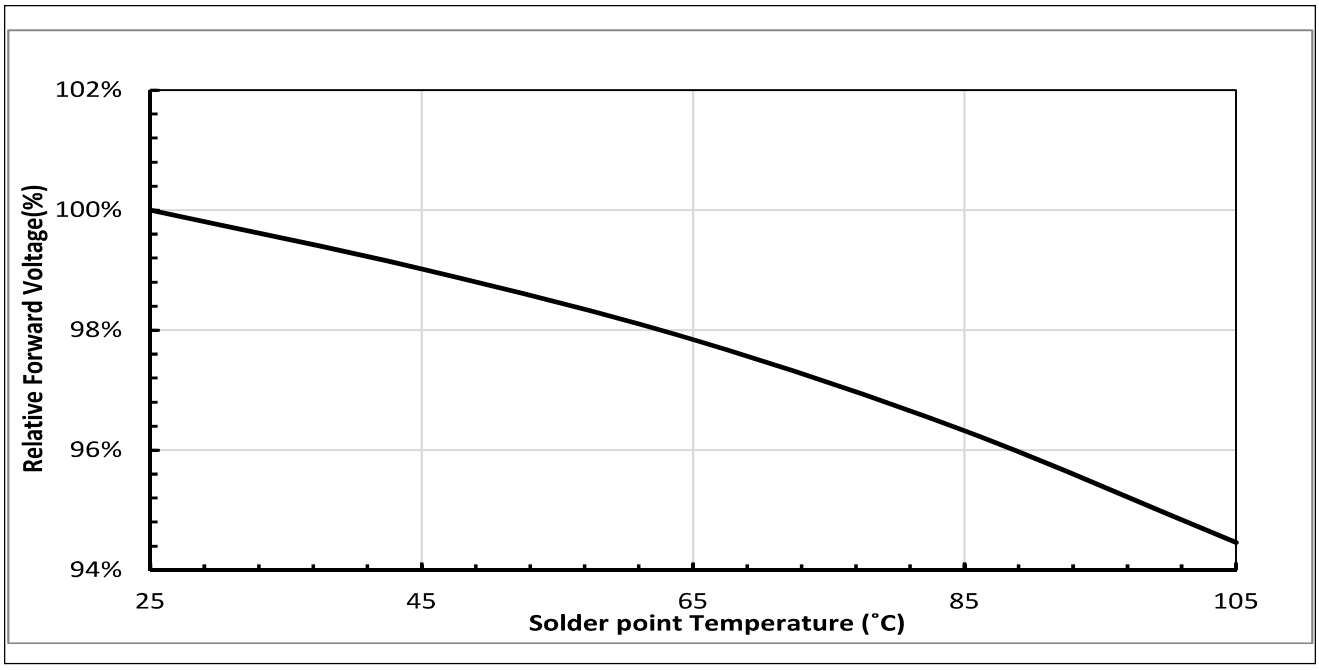


Figure 4: Forward Voltage vs. Solder Point Temperature

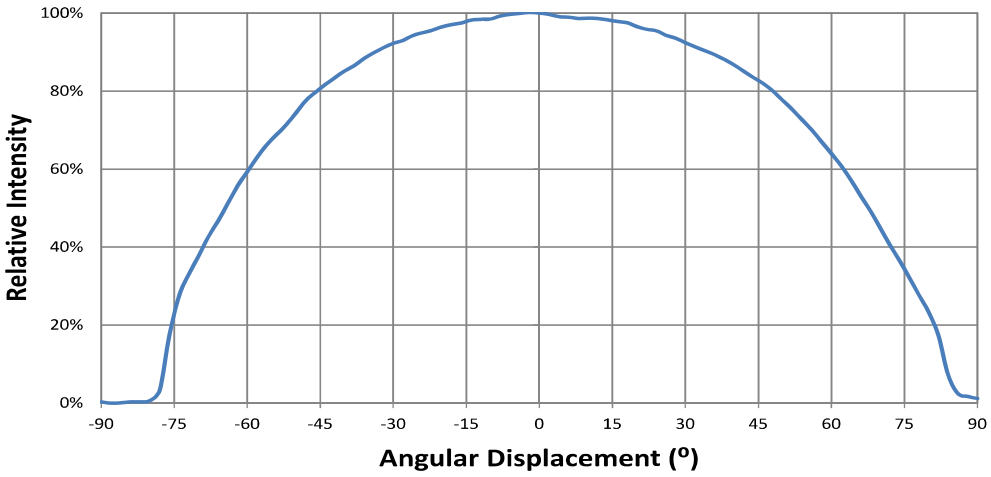


Notes for Figure 3 :

1. Characteristics shown for red color .
2. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information.

Typical Radiation Pattern

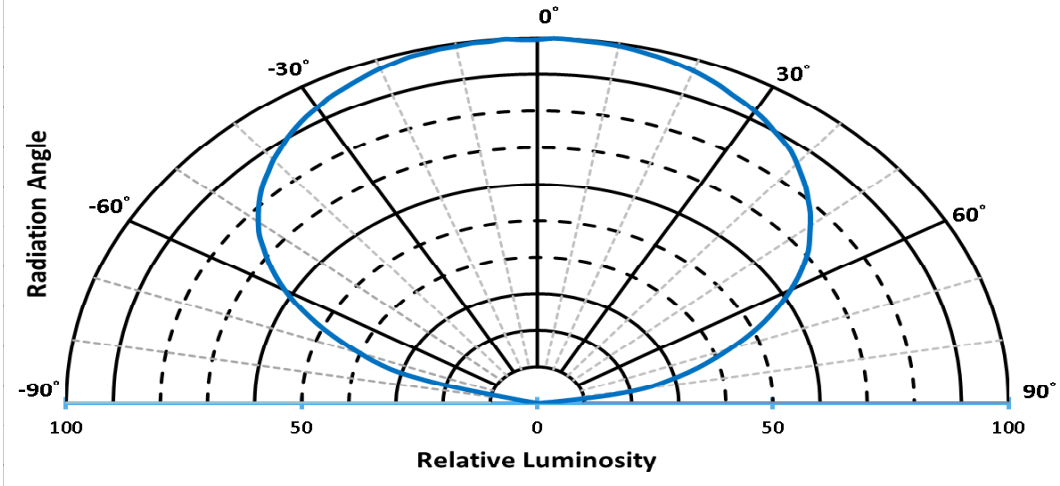
Figure 5: Typical Spatial Radiation Pattern at 700mA, T_{sp}=25°C



Notes for Figure 5:

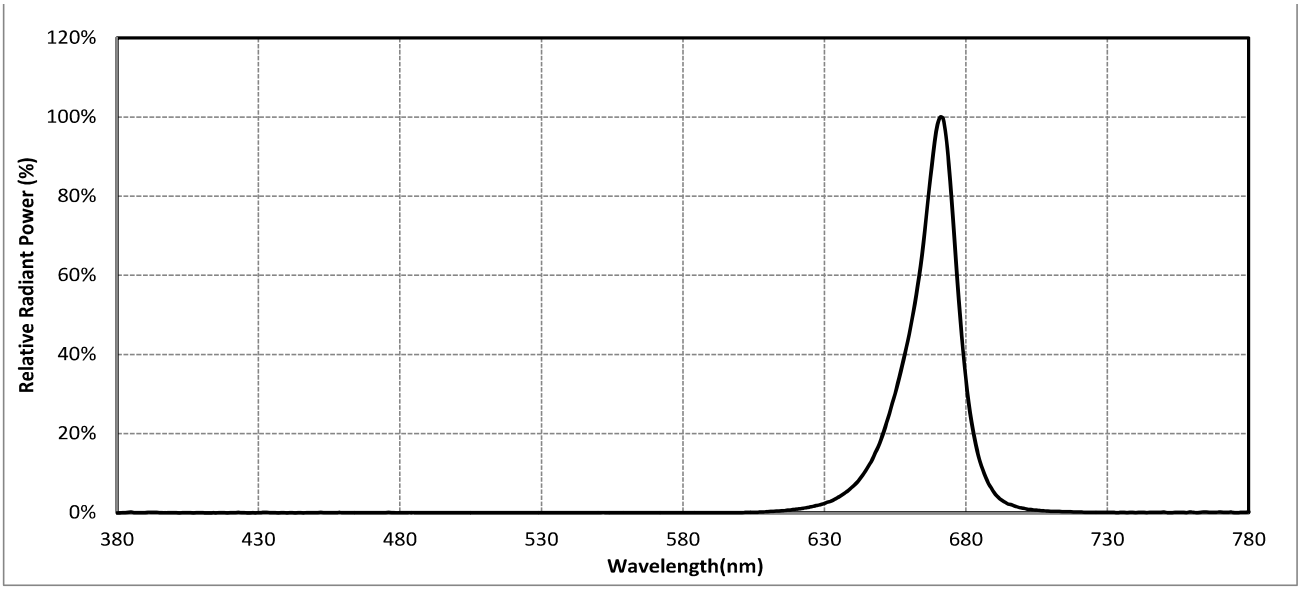
1. Typical viewing angle is 130°.
2. The viewing angle is defined as the off axis angle from the centerline where Iv is ½ of the peak value.

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



Typical Color Spectrum

Figure 7: Typical Color Spectrum

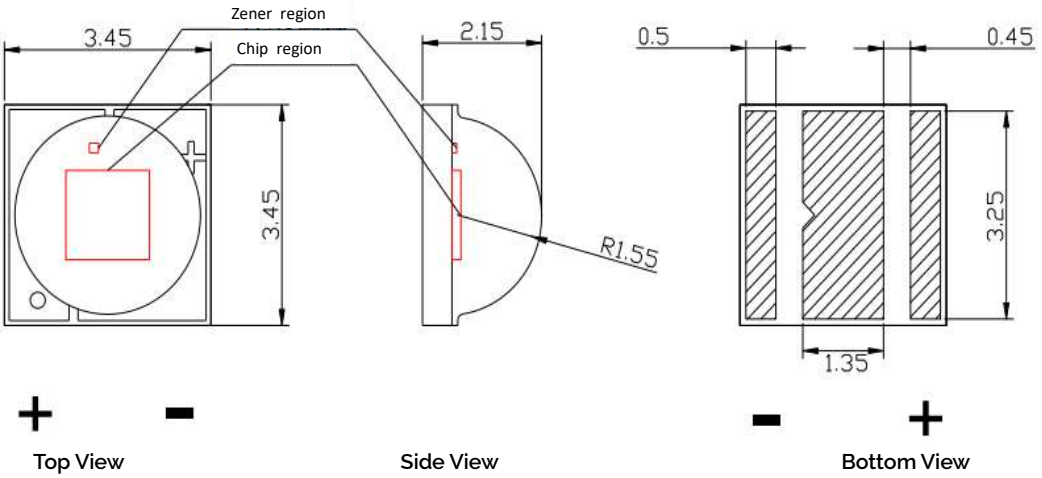


Notes for Figure 7:

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

Mechanical Dimensions

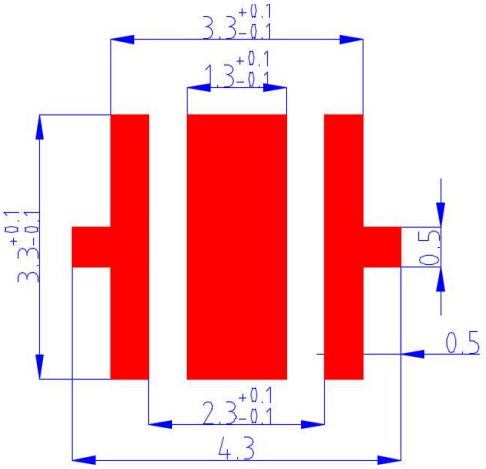
Figure 8: Drawing for SMD 3535



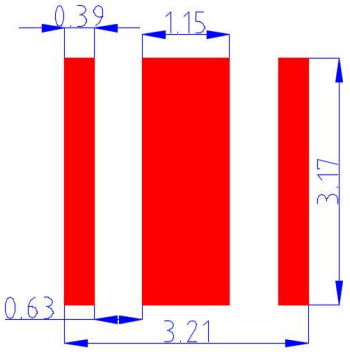
Notes for Figure 8:

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



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°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	0/22
4	Low Temperature Operating Life	JESD22-A108D	T_a=-40°C	700mA	1000 hours	0/22
5	Temperature Humidity Operating Life	JESD22-A101C	T_{sp}=85°C, RH=85%	700mA	1000 hours	0/22
6	High Temperature Operating Life	JESD22-A108D	T_{sp}=105°C	1400mA	1000 hours	0/22
7	Thermal Shock	JESD22-A106B	T_a=-40°C ~100°C; Dwell : 15min; Transfer: 10sec		200 Cycle	0/22
8	Temperature Cycle	JESD22-A104E	T_a=-40°C ~100°C; Dwell at extreme temperature: 15min; Ramp rate < 105°C/min		200 Cycle	0/22
9	Electrostatic Discharge	JS-001-2012	HBM, 8KV, 1.5kΩ, 100pF, Alternately positive or negative			0/22

Passing Criteria

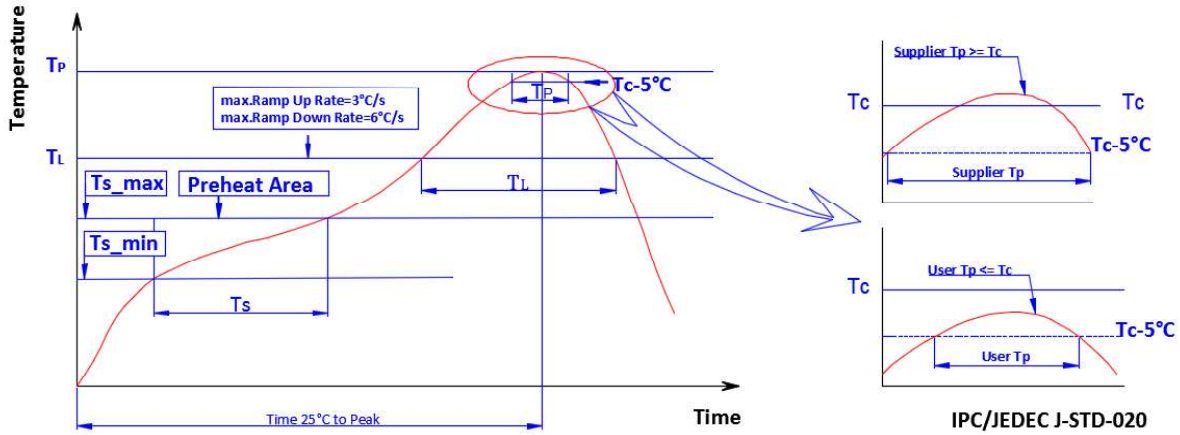
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	700mA	ΔVf<10%
Luminous Flux	Iv	700mA	ΔIv<30%
Chromaticity Coordinates	(x, y)	700mA	Δu'v'<0.007

Notes for Table 8:

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

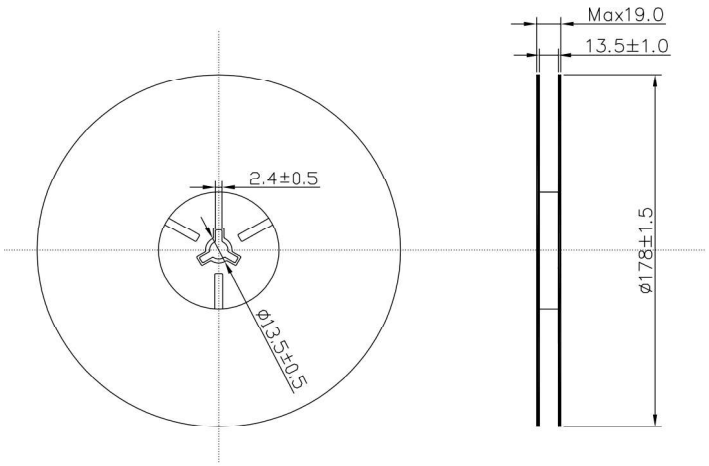
Figure 9 : Reflow Profile



Profile Feature	Lead Free Assembly
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

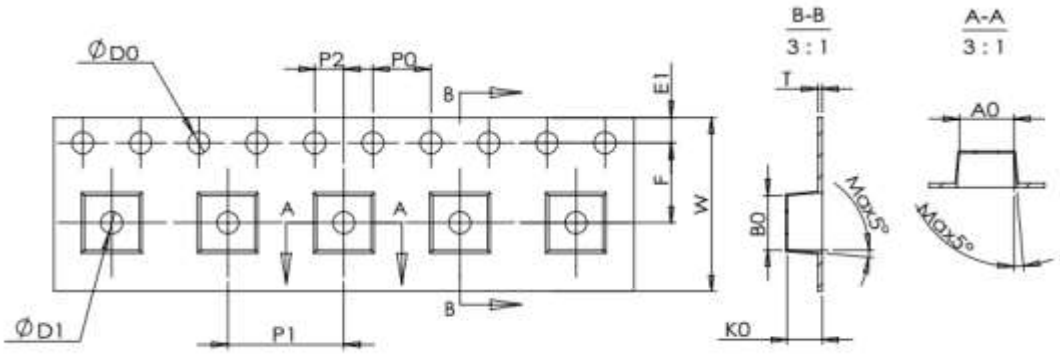
Figure 10: Emitter Reel Drawings



Note for Figure 10:

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

Figure 11: Emitter Tape Drawings



Item	W	P1	E1	F	D0	D1	P0	Po10	P2	A0	B0	K0	T
Spec	12.00±0.30	8.00±0.10	1.75±0.10	5.50±0.10	1.50±0.10/0	1.50±0.10/0	4.00±0.10	40.00±0.20	2.00±0.10	3.72±0.10	3.72±0.10	2.60±0.10	0.30±0.05

Note for Figure 11:

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

Packaging

Figure 12: **Emitter Reel Packaging Drawings**

Note for Figure 12:

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 0 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 (transparent silicone resin area). Contact may cause damage to the emitter

Optics and reflectors must not be mounted in contact with the LES (transparent silicone 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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WeChat ID: BridgeluxInChina

46410 Fremont Boulevard
Fremont, CA 94538 U.S.A.
Tel (925) 583-8400
www.bridgelux.com

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