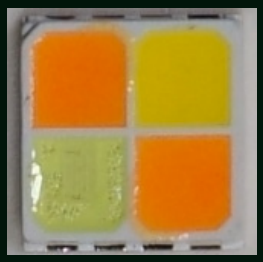
Bridgelux® SMD 3838 Triple CCT F90 3V

Product Data Sheet DS1424

22G | 27G | 30G | 35G | 40G | 50G | 57G | 65G

Introduction

SMD 3838 Triple CCT



The Bridgelux SMD 3838 low power LED is cold-color targeted, which ensures that the LEDs fall within their specified color bin at the typical application conditions of 25˚C.The SMD 3838 is ideal as a drop-in replacement for emitters with an industry standard 3.8mm x 3.8mm footprint.

Features

- Industry-standard 3838 footprint
- RoHS compliant and lead free
- Triple CCT 4 in 1
- Triple CCT color tunable along BBC to mix 2200K-6500K CRI90

Benefits

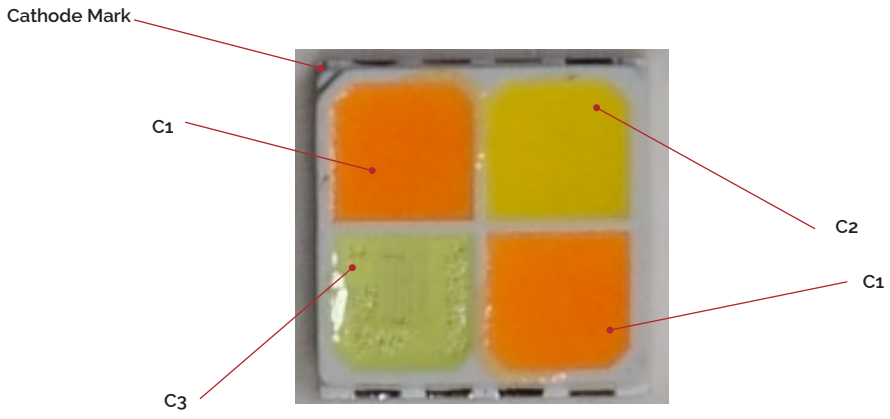
- Lower operating and manufacturing cost
- Ease of design and rapid go-to-market
- Compliant with environmental standards
- Design flexibility

Pb free RoHS

Contents

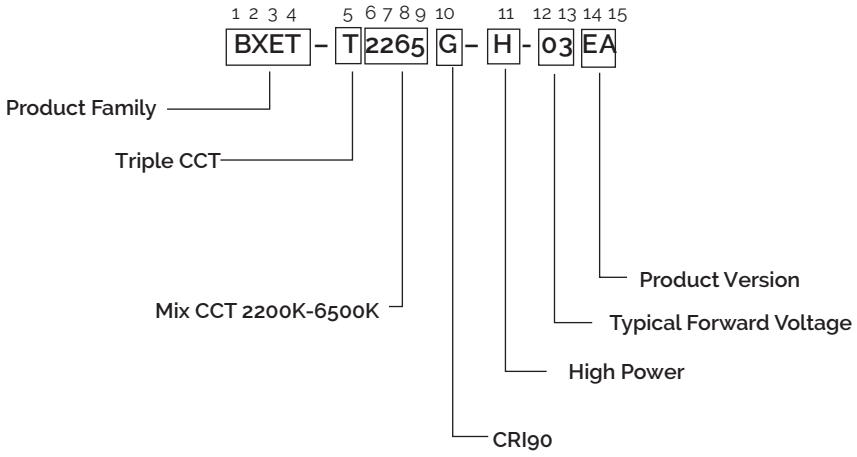
Product Feature Map

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 3838 is explained as follows:



Product Selection Guide

The following product configurations are available:

Table 1: Selection Guide, 3838 pulsed Measurement Data at 120mA (T_j=T_{sp}=25°C)

Color[1]	Nominal Drive Current (mA)	Forward Voltage[2,3] (V)			Typical Pulsed Flux (lm)[2, 3]
		Min	Typical	Max	
C1[4]	120	2.78	2.98	3.18	47.5
C1[5]	120	2.8	3.0	3.2	45.3
C2	120	2.8	3.0	3.2	62.5
C3	120	2.8	3.0	3.2	49.0

Table 2: Selection Guide, 3838 pulsed Measurement Data at 120mA (T_j=T_{sp}=85°C)

Color[1]	Nominal Drive Current (mA)	Forward Voltage[2,3] (V)			Typical Pulsed Flux (lm)[2, 3]
		Min	Typical	Max	
C1[4]	120	2.74	2.94	3.13	43.7
C1[5]	120	2.76	2.96	3.15	41.7
C2	120	2.76	2.96	3.15	57.3
C3	120	2.76	2.96	3.15	44.0

Notes for Table 1 & 2:

1. Products tested under pulsed condition (10ms pulse width) at nominal drive current where Tj=Tsp=25°C.
2. Bridgelux maintains a ±7.5% tolerance on luminous flux measurements, ±0.1V tolerance on forward voltage measurements for the SMD 3838.
3. Typical pulsed test performance values are provided as reference only and are not a guarantee of performance.
4. The luminous flux （lm） and VF are based on both C1 lighting up simultaneously in parallel.
5. The luminous flux （lm） and VF are based on C1 lighting up illuminate separately.

Performance at Each CCT

Table 3: Tunable White with CRI90

Power	CCT	C1 ratio	C1 ratio	C2 ratio	C3 ratio	C1 Drive Current (mA)	C1 Drive Current (mA)	C2 Drive Current (mA)	C3 Drive Current (mA)	CIE-X[1]	CIE-Y[1]	CRI[1]	Rg[1]	Power[2] (W)	Flux[2] (lm)	Efficacy[2] (lm/w)
0.5W	1800	50.00%	50.00%	0.00%	0.00%	75.0	75.0	0.0	0.0	0.5433	0.4092	84.4	19.0	0.429	60.12	140.2
	2200	38.64%	38.64%	18.55%	4.17%	58.0	58.0	27.8	6.3	0.5028	0.4162	91.1	42.4	0.417	66.19	158.6
	2700	28.26%	28.26%	32.61%	10.87%	42.4	42.4	48.9	16.3	0.4585	0.4102	94.2	58.8	0.413	70.28	170.1
	3000	23.08%	23.08%	38.46%	15.38%	34.6	34.6	57.7	23.1	0.4345	0.4035	94.7	64.6	0.414	71.77	173.4
	3500	18.21%	18.21%	42.22%	21.37%	27.3	27.3	63.3	32.1	0.4078	0.3922	94.7	69.2	0.415	72.69	175.2
	4000	13.69%	13.69%	44.69%	27.93%	20.5	20.5	67.0	41.9	0.3823	0.3798	94.0	70.9	0.414	73.29	176.9
	5000	8.60%	8.60%	43.01%	39.78%	12.9	12.9	64.5	59.7	0.3451	0.3557	92.9	68.0	0.419	73.16	174.5
	5700	7.34%	7.34%	39.45%	45.87%	11.0	11.0	59.2	68.8	0.3293	0.3423	92.8	70.3	0.421	72.48	172.1
	6500	5.95%	5.95%	35.71%	52.38%	8.9	8.9	53.6	78.6	0.3138	0.3291	92.2	69.2	0.423	71.47	169.0
1W	1800	50.00%	50.00%	0.00%	0.00%	150.0	150.0	0.0	0.0	0.5419	0.4090	83.7	15.8	0.917	111.20	121.3
	2200	38.64%	38.64%	18.55%	4.17%	115.9	115.9	55.6	12.5	0.5002	0.4149	90.5	40.2	0.877	125.96	143.6
	2700	28.26%	28.26%	32.61%	10.87%	84.8	84.8	97.8	32.6	0.4566	0.4076	93.7	56.7	0.861	134.54	156.3
	3000	23.08%	23.08%	38.46%	15.38%	69.2	69.2	115.4	46.2	0.4332	0.4004	94.4	63.1	0.861	137.20	159.3
	3500	18.21%	18.21%	42.22%	21.37%	54.6	54.6	126.6	64.1	0.4074	0.3892	94.7	68.6	0.861	139.28	161.7
	4000	13.69%	13.69%	44.69%	27.93%	41.1	41.1	134.1	83.8	0.3823	0.3770	94.2	70.8	0.870	139.84	160.8
	5000	8.60%	8.60%	43.01%	39.78%	25.8	25.8	129.0	119.4	0.3460	0.3534	93.3	69.6	0.881	138.99	157.8
	5700	7.34%	7.34%	39.45%	45.87%	22.0	22.0	118.3	137.6	0.3314	0.3410	93.5	73.0	0.885	137.66	155.6
	6500	5.95%	5.95%	35.71%	52.38%	17.9	17.9	107.1	157.1	0.3164	0.3286	93.1	73.2	0.892	135.44	151.8

Notes for Table 3:

1. Products tested at 0.5W for Tsp = 55°C, tested at 1W for Tsp = 85°C
2. The performance tested when Tj-Tsp=25°C.

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		
	C1	C2	C3
Maximum Drive Current	160mA	160mA	160mA
Peak Pulsed Forward Current[1]	200mA	200mA	200mA
Maximum Power	1W		
Maximum Reverse Voltage[2]	-5V		
Moisture Sensitivity Rating	MSL 3		
Electrostatic Discharge	2kV 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. Maximum rating provided for reference only.

Product Bin Definitions

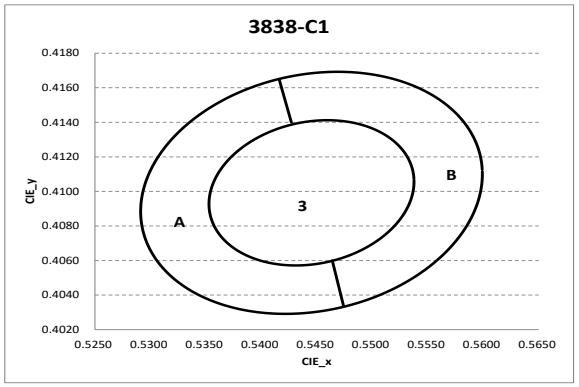
Table 5: MacAdam Ellipse Color Bin Definitions

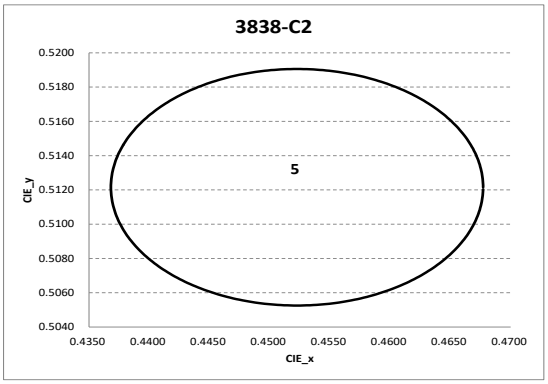
Color	Center Point		Major Axis	Minor Axis	Ellipse Rotation Angle	Color Bin
	X	Y				
C1[3]	0.5445	0.4099	0.01545	0.0069	5.0°	3/A/B
C2	0.4523	0.5122	0.01545	0.0069	0°	5
C3	0.2228	0.2458	0.01545	0.0069	70.0°	3/A/B

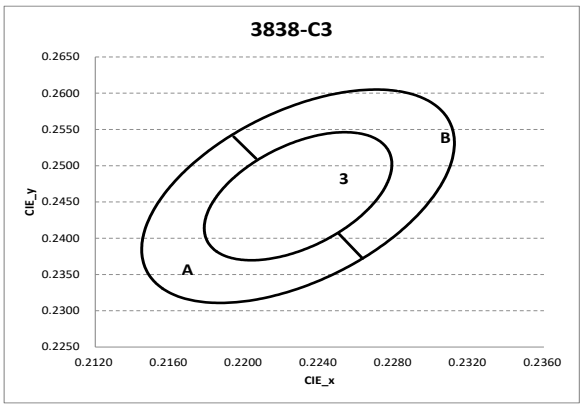
Notes for Table 5:

1. Color binning at T_{sp}=25°C unless otherwise specified
2. Bridgelux maintains a tolerance of ± 0.007 on x and y color coordinates .
3. The performance is based on both C1 lighting up simultaneously in parallel.

Figure 1: Chromaticity Coordinate Group (Color Bin Structure, Color Targeted at T_{sp}=25°C)







Notes for Figure 1 :

1. The performance is based on both C1 lighting up simultaneously in parallel.

Product Bin Definitions

Table 6 lists the standard photometric luminous flux bins for SMD 3838 Triple CCT F90. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Table 6: Luminous Flux Range Definitions at 120mA, T_{sp}=25˚C

Color	Luminous Flux[1]		Unit	Condition
	Minimum	Maximum		
C1[2]	46	52	lm	I_F=120mA
C2	60	70		
C3	46	55		

Note for Table 6:

1. Bridgelux maintains a tolerance of ± 7.5% on luminous flux measurements.
2. The luminous flux (lm) is based on both C1 lighting up simultaneously in parallel.
3. No flux bin.

Table 7: Forward Voltage Range Definitions at 120mA, T_{sp}=25˚C

VF Bin	Forward Voltage[1]		Unit	Condition
	Minimum	Maximum		
E	2.98	3.05	V	I_F=120mA
F	3.05	3.15	V	I_F=120mA

Note for Table 7:

1. Bridgelux maintains a tolerance of ± 0.1V on forward voltage measurements.
2. No vf bin.

Table 8: Color Bin in combination at 120mA

Bin Code	Color Bin		
	C1	C2	C3
GE1	3	5	3
GE2	3	5	A
GE3	3	5	B
GE4	A	5	3
GE5	A	5	A
GE6	A	5	B
GE7	B	5	3
GE8	B	5	A
GE9	B	5	B

Note for Table 8:

The bin combination is as follows:

1. Bin GE1 can be used independently.
2. Other bin codes used in 1:1 combinations of GE1+GE3, GE2+GE3, GE4+GE7, GE4+GE9, GE5+GE9, GE6+GE7, GE6+GE8
3. Different VF Bins cannot be mixed for use.

Performance Curves

Figure 2: Drive Current vs. Voltage (T_{sp}=25˚C)

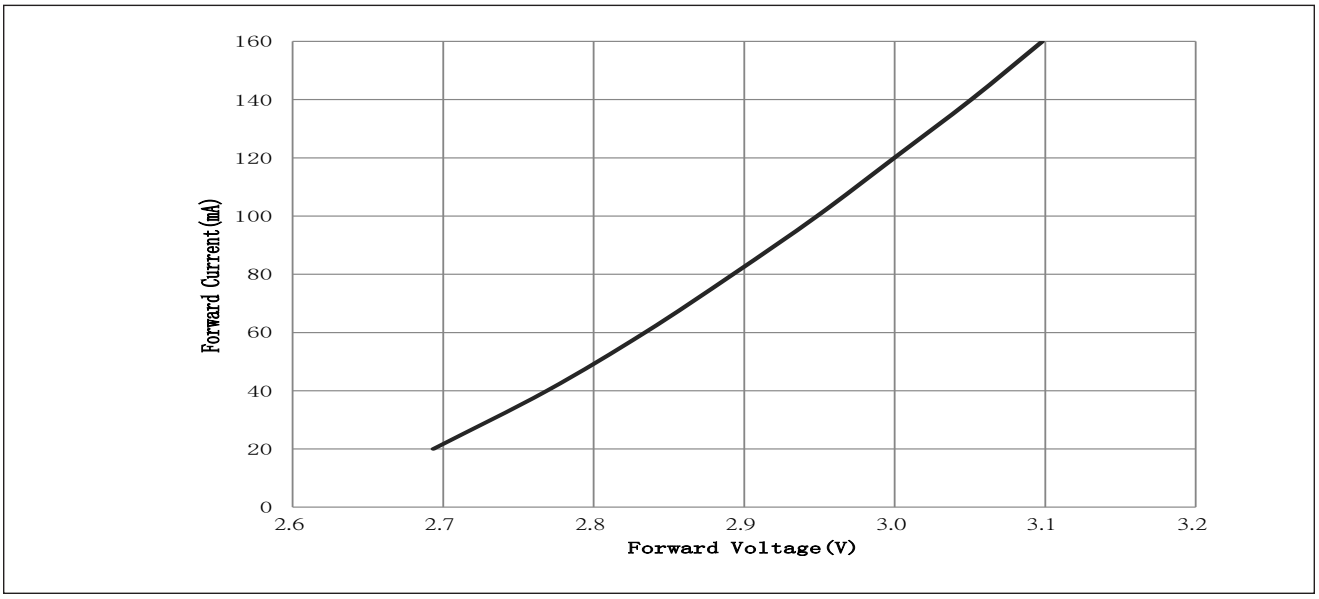
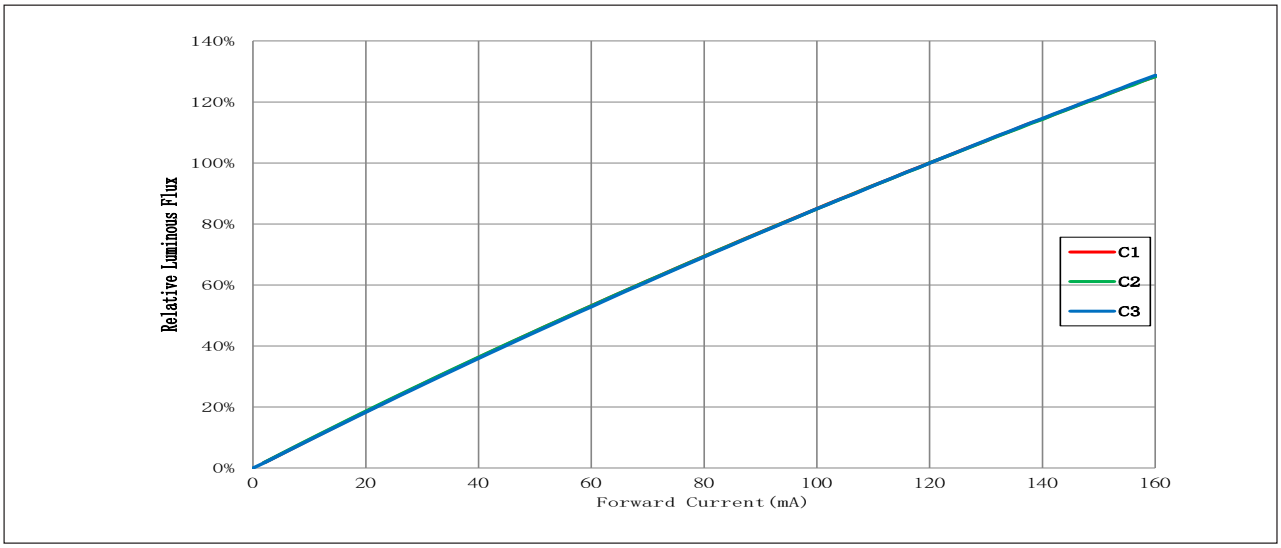


Figure 3: Typical Relative Luminous Flux vs. Drive Current (T_{sp}=25˚C)

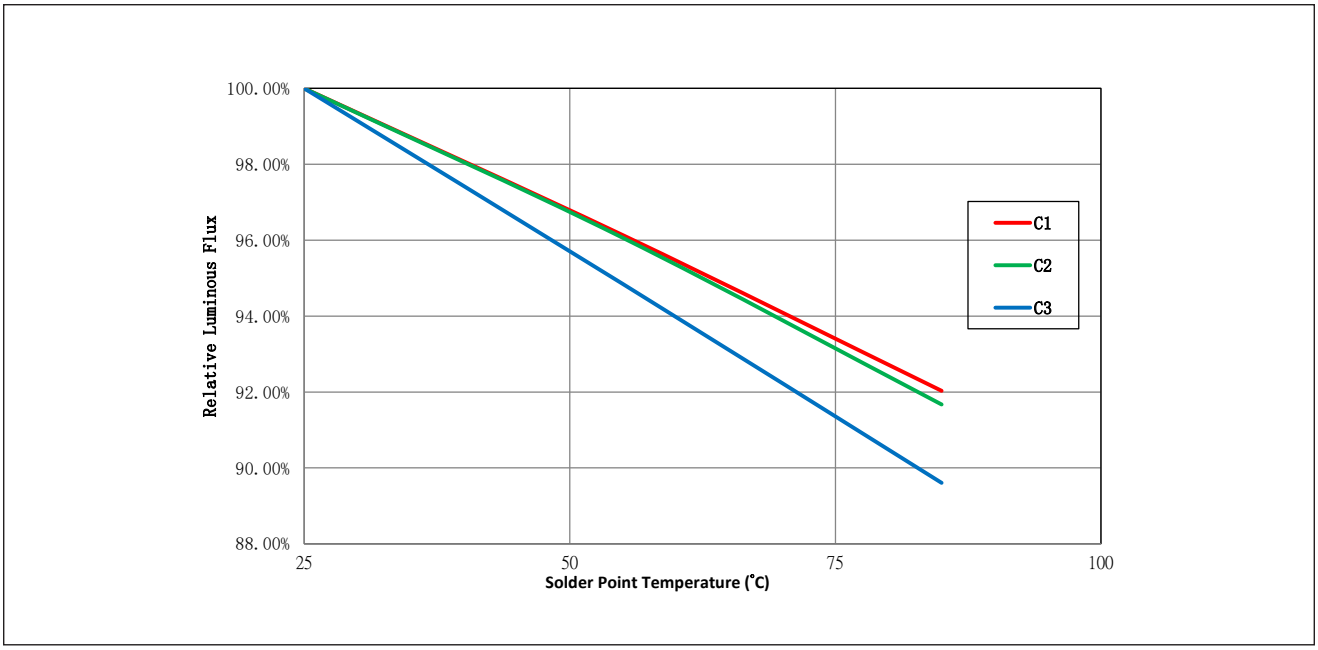


Note for Figure 3:

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

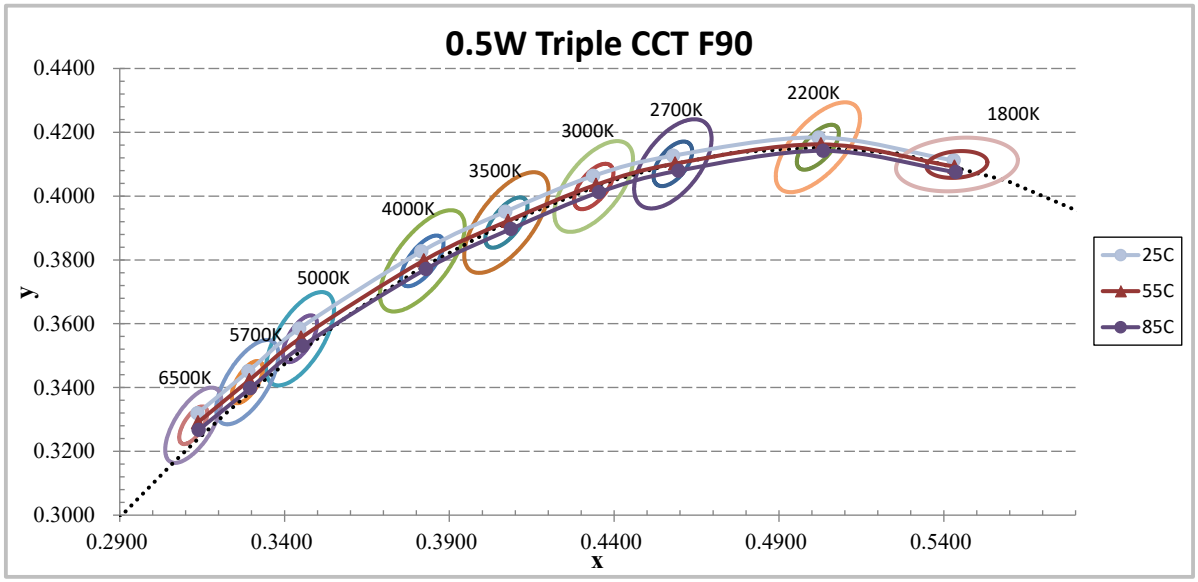
Performance Curves

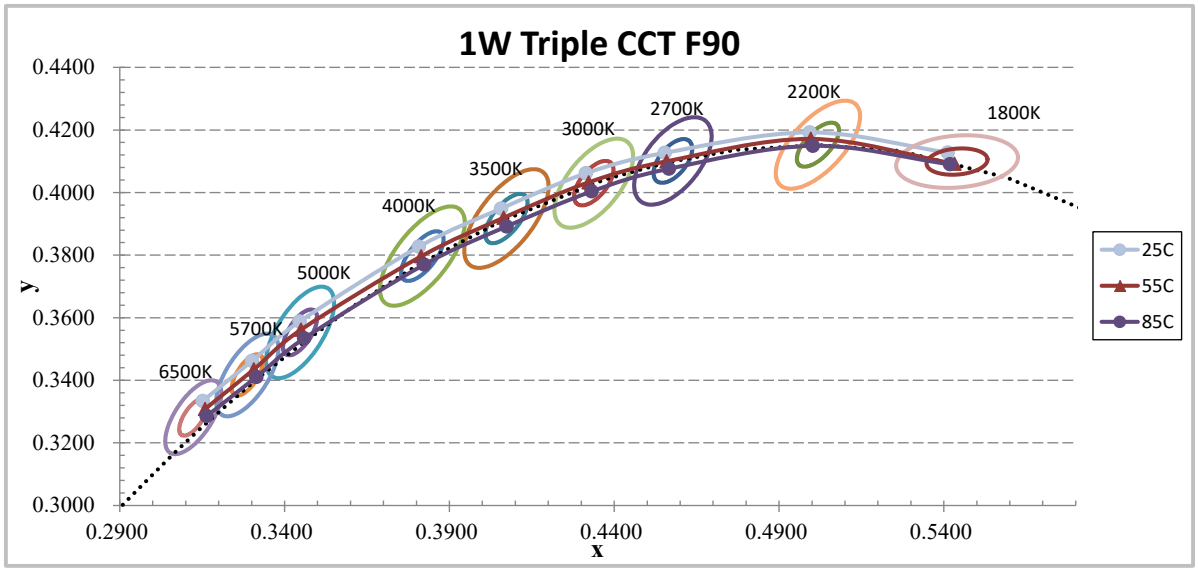
Figure 4: Typical Relative Flux vs. Solder Point Temperature



Performance Curves

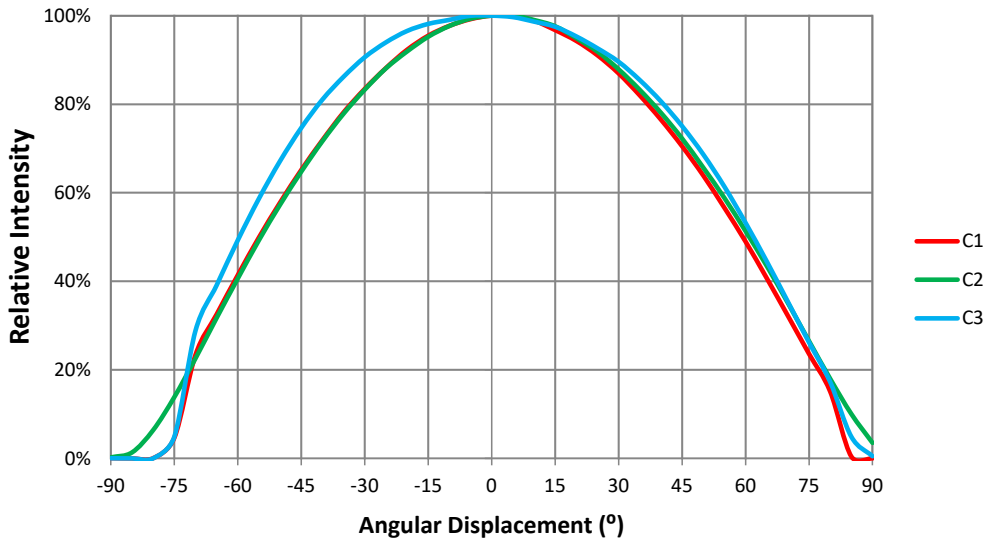
Figure 5: Chromaticity Coordinate Group (Color Targeted at T_{sp}=25˚C&55˚C&85˚C)





Typical Radiation Pattern

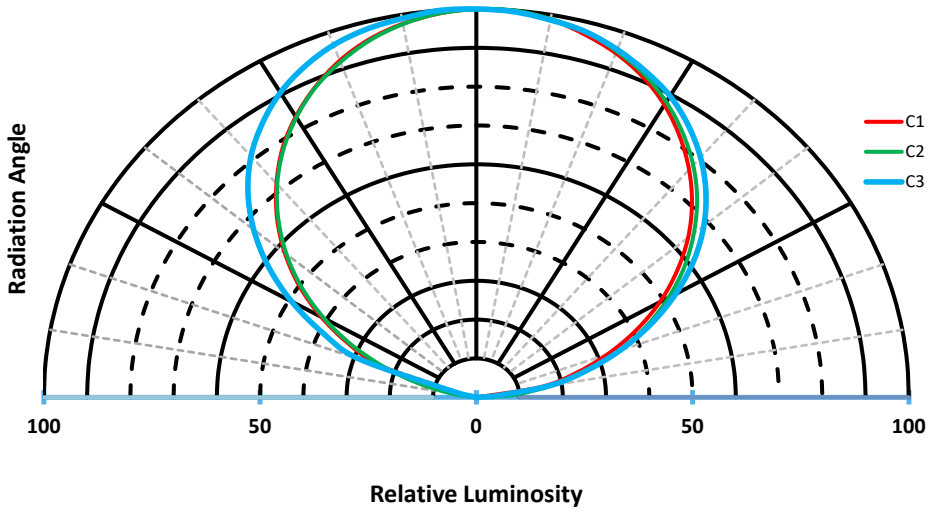
Figure 6: Typical Spatial Radiation Pattern at 120mA, T_{sp}=25˚C



Notes for Figure 6:

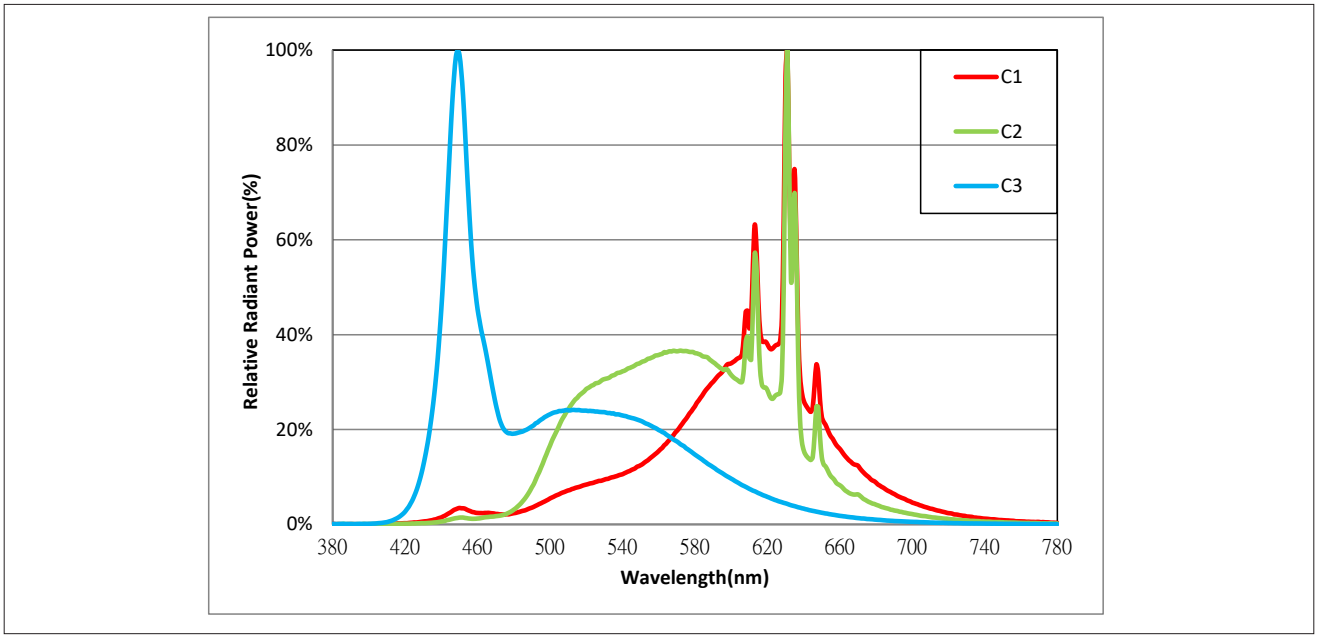
1. C1 typical viewing angle is 114˚, C2 typical viewing angle is 116˚, C3 typical viewing angle is 122˚,
2. The viewing angle is defined as the off axis angle from the centerline where Iv is ½ of the peak value.

Figure 7: Typical Polar Radiation Pattern at 120mA, T_{sp}=25˚C



Typical Color Spectrum

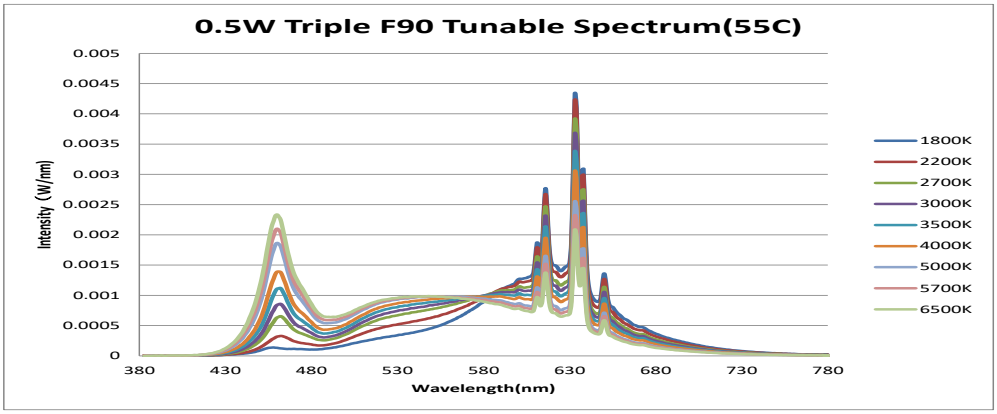
Figure 8: Typical Color Spectrum

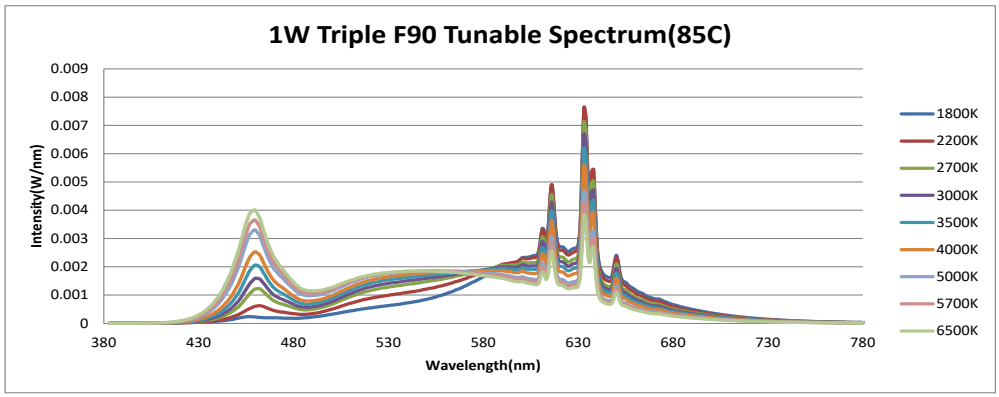


Notes for Figure 8:

Color spectra measured at nominal current for Tsp = 25°C

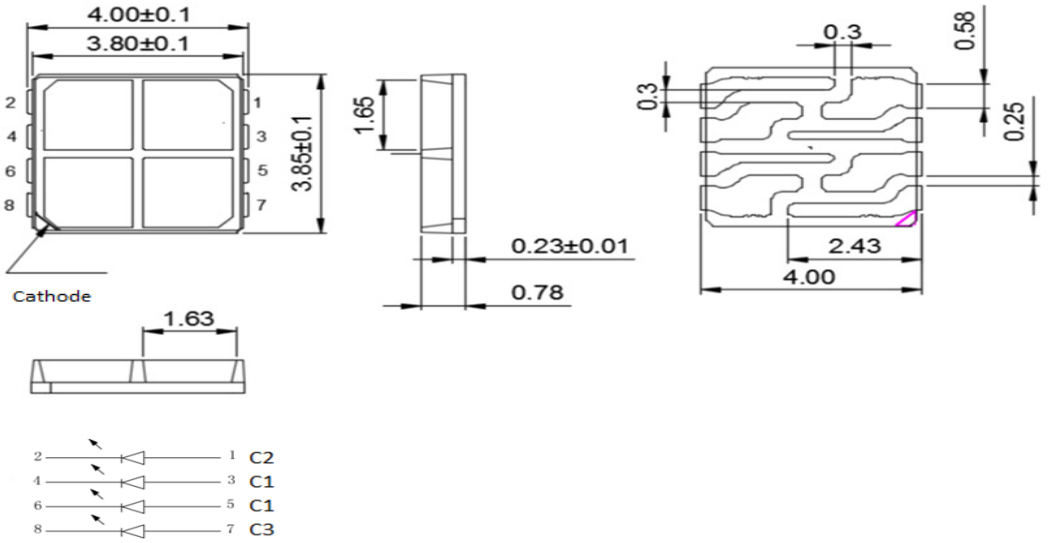
Figure 9: Tunable White Spectrum





Mechanical Dimensions

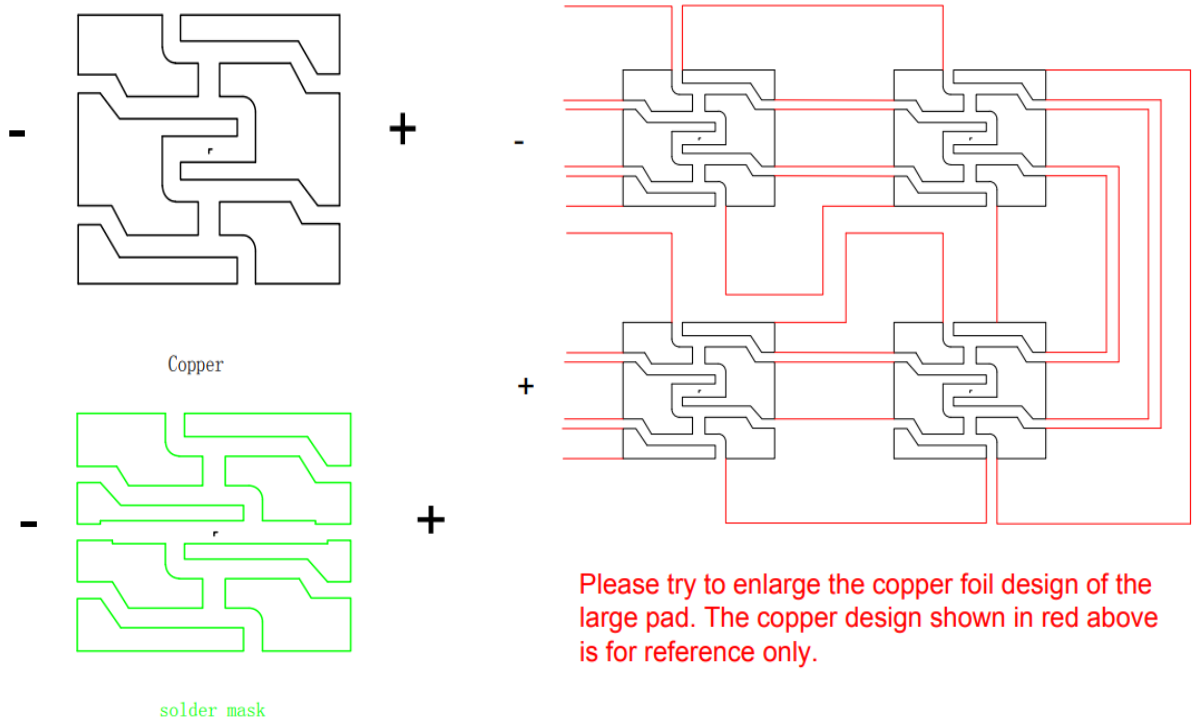
Figure 10: Drawing for SMD 3838



Notes for Figure 10:

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



Reliability

Table 9: Reliability Test Items and Conditions

No .	Items	Reference Standard	Test Conditions	Drive Current	Test Duration	Units Failed/Tested
1	Moisture Sensitivity Level	J-STD-020D.1	T_{sld} = 260˚C, 10sec, Precondition: 85˚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-A103	T_a=105˚C		1000 hours	0/22
4	Low Temperature Operating Life	JESD22-A108	T_a=-40˚C	120mA	1000 hours	0/22
5	Temperature Humidity Operating Life	JESD22-A101	T_{sp}=85˚C, RH=85%	120mA	1000 hours	0/22
6	High Temperature Operating Life	JESD22-A108	T_{sp}=105˚C, 4 channel all on	total 300mA	1000 hours	0/22
7	Thermal Shock	JESD22-A104	T_a=-40˚C ~100˚C, Dwell : 15min; Transfer: 10sec		200 Cycles	0/22
8	Temperature Cycle	JESD22-A104	T_a=-40˚C ~100˚C, Dwell at extreme temperature: 15min; Ramp rate < 105˚C/min		200 Cycles	0/22

Passing Criteria

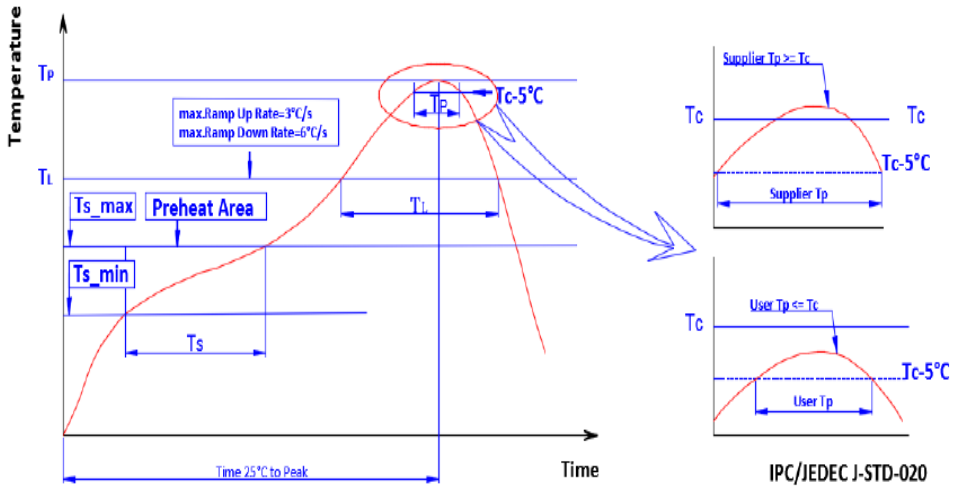
Item	Symbol	Test Condition	Passing Criteria
Forward Voltage	Vf	120mA	ΔVf<10%
Luminous Flux	Iv	120mA	ΔIv<30%
Chromaticity Coordinates	(x, y)	120mA	Δu'v'<0.007

Notes for Table 9:

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

Reflowing Characteristics

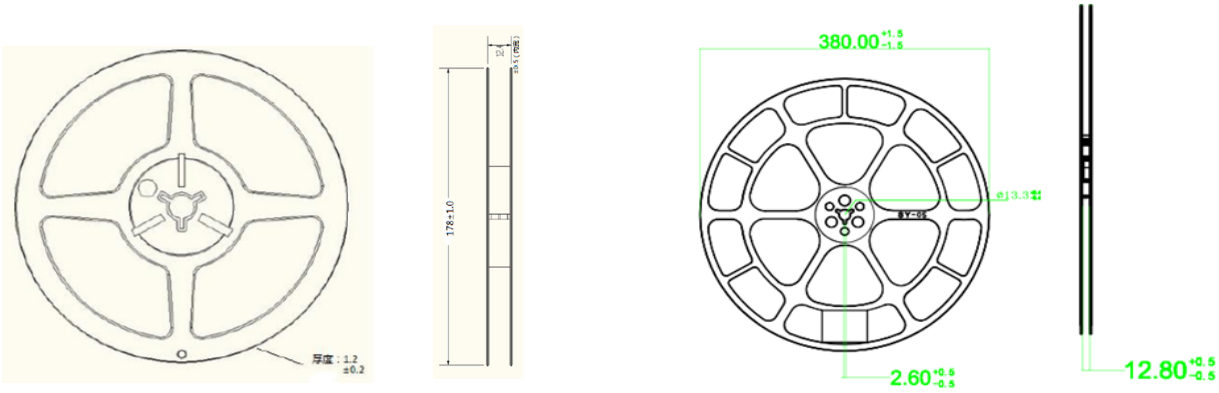
Figure 11 : Reflow Profile



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.

Packaging

Figure 12: Emitter Reel Drawings

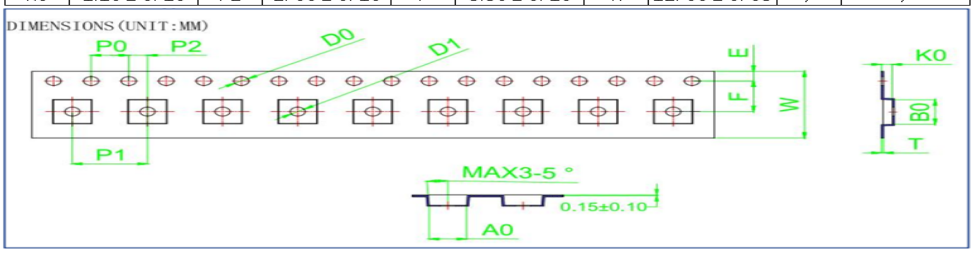


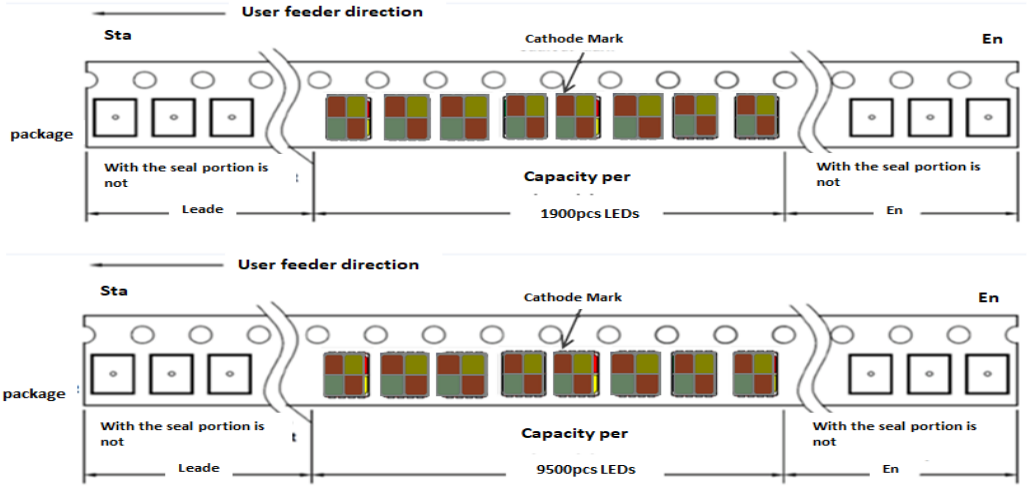
Note for Figure 12:

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

Figure 13: Emitter Tape Drawings

A0	4.10 ± 0. 10	P0	4. 00 ± 0. 10	T	0. 18 ± 0. 05	D0	1.60 ± 0. 10	10P0	40. 00 ± 0. 20
B0	4.20 ± 0. 10	P1	8.00 ± 0. 10	E	1.75 ± 0. 10	D1	1.60 ± 0. 10	/	/
K0	1.10 ± 0. 10	P2	2. 00 ± 0. 10	F	5.50 ± 0. 10	W	12. 00 ± 0. 05	/	/



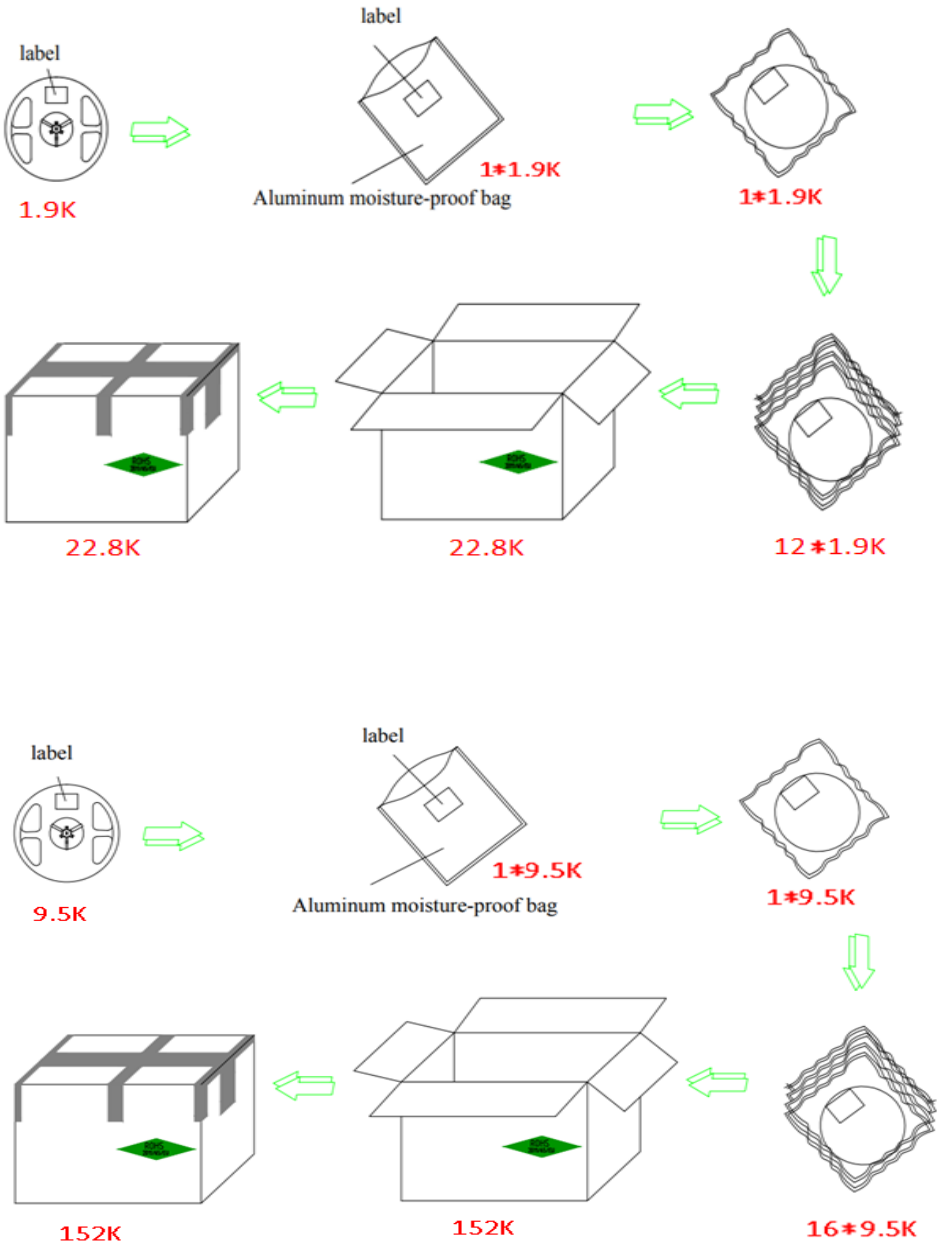


Note for Figure 13:

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

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

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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