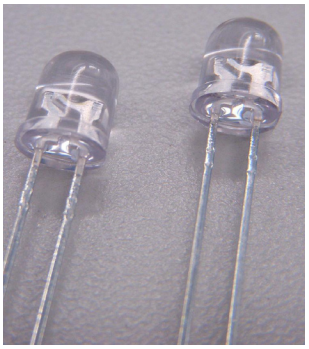
Cree® 5-mm Round LED
C513A-WSS/WSN
C513A-MSS/MSN
Data Sheet



Round LEDs offer superior light output for excellent readability in sunlight and dependable performance. They provide extremely stable light output over long periods of time.

These lamps are made with an advanced optical-grade epoxy offering superior high-temperature and high-moisture-resistance performance in lighting and illumination applications.

FEATURES

- Size (mm): 5
- Color Temperatures (K):
  - C513A-WSS/WSN: Min.(4600) / Typical (9000)
  - C513A-MSS/MSN: Min. (2500) / Typical (2800)
- Luminous Intensity (mcd)
  - Cool White (2130-8200)
  - Warm White (2130-8200)
- CRI
  - Typical CRI for Cool White is 75
  - Typical CRI for Warm White is 80
- Viewing Angle: 55 degrees
- Lead-Free
- RoHS-Compliant

APPLICATIONS

- Torch
- Light Strip
- Channel Letter
- Retail Display Lighting

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Absolute Maximum Ratings (T_A = 25°C)

Items	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	30	mA
Peak Forward Current [Note]	I_{FP}	100	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	120	mW
Operation Temperature	T_{opr}	-40 ~ +95	°C
Storage Temperature	T_{stg}	-40 ~ +100	°C
Lead Soldering Temperature	T_{sol}	Max. 260°C for 3 sec. max. (3 mm from the base of the epoxy bulb)	

Note: Pulse width ≤0.1 msec, duty ≤1/10.

Typical Electrical & Optical Characteristics (T_A = 25°C)

Characteristics	Color	Symbol	Condition	Unit	Minimum	Typical	Maximum
Forward Voltage	Cool/Warm	V_F	I_F = 20 mA	V		3.2	4.0
Reverse Current	Cool/Warm	I_R	V_R = 5 V	μA			100
Luminous Intensity	Cool	I_V	I_F = 20 mA	mcd	2130	4000	
	Warm	I_V	I_F = 20 mA	mcd	2130	3200	
Chromaticity Coordinates	Cool	x	I_F = 20 mA			0.2895	
		y	I_F = 20 mA			0.2905	
	Warm	x	I_F = 20 mA			0.4527	
		y	I_F = 20 mA			0.4255	
50% Power Angle	Cool/Warm	2θ½	I_F = 20 mA	deg		55	

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Intensity Bin Limit (I_F = 20 mA)

Cool White (C513A-WSN/WSS)

Bin Code	Min. (mcd)	Max. (mcd)
V0	2130	3000
W0	3000	4180
X0	4180	5860
Y0	5860	8200

Warm White (C513A-MSS/MSN)

Bin Code	Min. (mcd)	Max. (mcd)
V0	2130	3000
W0	3000	4180
X0	4180	5860
Y0	5860	8200

Tolerance of measurement of luminous intensity is ±15%.

VF Bin Limit (I_F = 20 mA)

Cool White (C513A-WSN/WSS)

Bin Code	Min. (V)	Max. (V)
27	2.8	3.0
28	3.0	3.2
29	3.2	3.4
2a	3.4	3.6
2b	3.6	3.8
2c	3.8	4.0

Warm White (C513A-MSS/MSN)

Bin Code	Min. (V)	Max. (V)
27	2.8	3.0
28	3.0	3.2
29	3.2	3.4
2a	3.4	3.6
2b	3.6	3.8
2c	3.8	4.0

Tolerance of measurement of VF is ±0.05 V.

Color Bin Limit (I_F = 20 mA)

Cool White

Bin Code	Sub-bin	x	y
W1	Wa	0.2545	0.2480
		0.2633	0.2410
		0.2545	0.2245
		0.2450	0.2290
	Wb	0.2633	0.2410
		0.2720	0.2340
		0.2640	0.2200
		0.2545	0.2245
	Wc	0.2545	0.2480
		0.2640	0.2670
		0.2720	0.2575
		0.2633	0.2410
	Wd	0.2633	0.2410
		0.2720	0.2575
		0.2800	0.2480
		0.2720	0.2340

Bin Code	Sub-bin	x	y
W2	We	0.2640	0.2670
		0.2735	0.2860
		0.2808	0.2740
		0.2720	0.2575
	Wf	0.2720	0.2575
		0.2808	0.2740
		0.2880	0.2620
		0.2800	0.2480
	Wg	0.2735	0.2860
		0.2830	0.3050
		0.2895	0.2905
		0.2808	0.2740
	Wh	0.2808	0.2740
		0.2895	0.2905
		0.2960	0.2760
		0.2880	0.2620

Bin Code	Sub-bin	x	y
W3	Wj	0.2830	0.3050
		0.2950	0.3210
		0.2998	0.3028
		0.2895	0.2905
	Wk	0.2895	0.2905
		0.2998	0.3028
		0.3045	0.2865
		0.2960	0.2760
	Wm	0.2950	0.3210
		0.3070	0.3370
		0.3100	0.3150
		0.2998	0.3028
	Wn	0.2998	0.3028
		0.3100	0.3150
		0.3130	0.2970
		0.3045	0.2865

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Color Bin Limit (I_F = 20 mA)

Cool White

Bin Code	Sub-bin	x	y
W4	Wp	0.3070	0.3370
		0.3185	0.3485
		0.3200	0.3270
		0.3100	0.3150
	Wq	0.3100	0.3150
		0.3200	0.3270
		0.3215	0.3075
		0.3130	0.2970
	Wr	0.3185	0.3485
		0.3300	0.3600
		0.3300	0.3390
		0.3200	0.3270
	Ws	0.3200	0.3270
		0.3300	0.3390
		0.3300	0.3180
		0.3215	0.3075

Bin Code	Sub-bin	x	y
W5	Wt	0.3300	0.3600
		0.3455	0.3725
		0.3443	0.3535
		0.3300	0.3390
	Wu	0.3300	0.3390
		0.3443	0.3535
		0.3430	0.3345
		0.3300	0.3180
	Wv	0.3455	0.3725
		0.3610	0.3850
		0.3585	0.3680
		0.3443	0.3535
	Ww	0.3443	0.3535
		0.3585	0.3680
		0.3560	0.3510
		0.3430	0.3345

Tolerance of measurement of the color coordinates is ±0.01.

Warm White

Bin Code	Sub-bin	x	y
M1	Ma	0.3610	0.3900
		0.3576	0.3651
		0.3751	0.3783
		0.3820	0.4075
	Mb	0.3576	0.3651
		0.3541	0.3401
		0.3682	0.3491
		0.3749	0.3781
	Mc	0.3820	0.4075
		0.3751	0.3783
		0.3926	0.3915
		0.4030	0.4250
	Md	0.3751	0.3783
		0.3682	0.3491
		0.3822	0.3580
		0.3926	0.3915

Bin Code	Sub-bin	x	y
M2	Me	0.4030	0.4250
		0.3926	0.3915
		0.4118	0.4021
		0.4260	0.4390
	Mf	0.3926	0.3915
		0.3822	0.3580
		0.3976	0.3653
		0.4118	0.4021
	Mg	0.4260	0.4390
		0.4118	0.4021
		0.4310	0.4128
		0.4490	0.4530
	Mh	0.4118	0.4021
		0.3976	0.3653
		0.4129	0.3725
		0.4310	0.4128

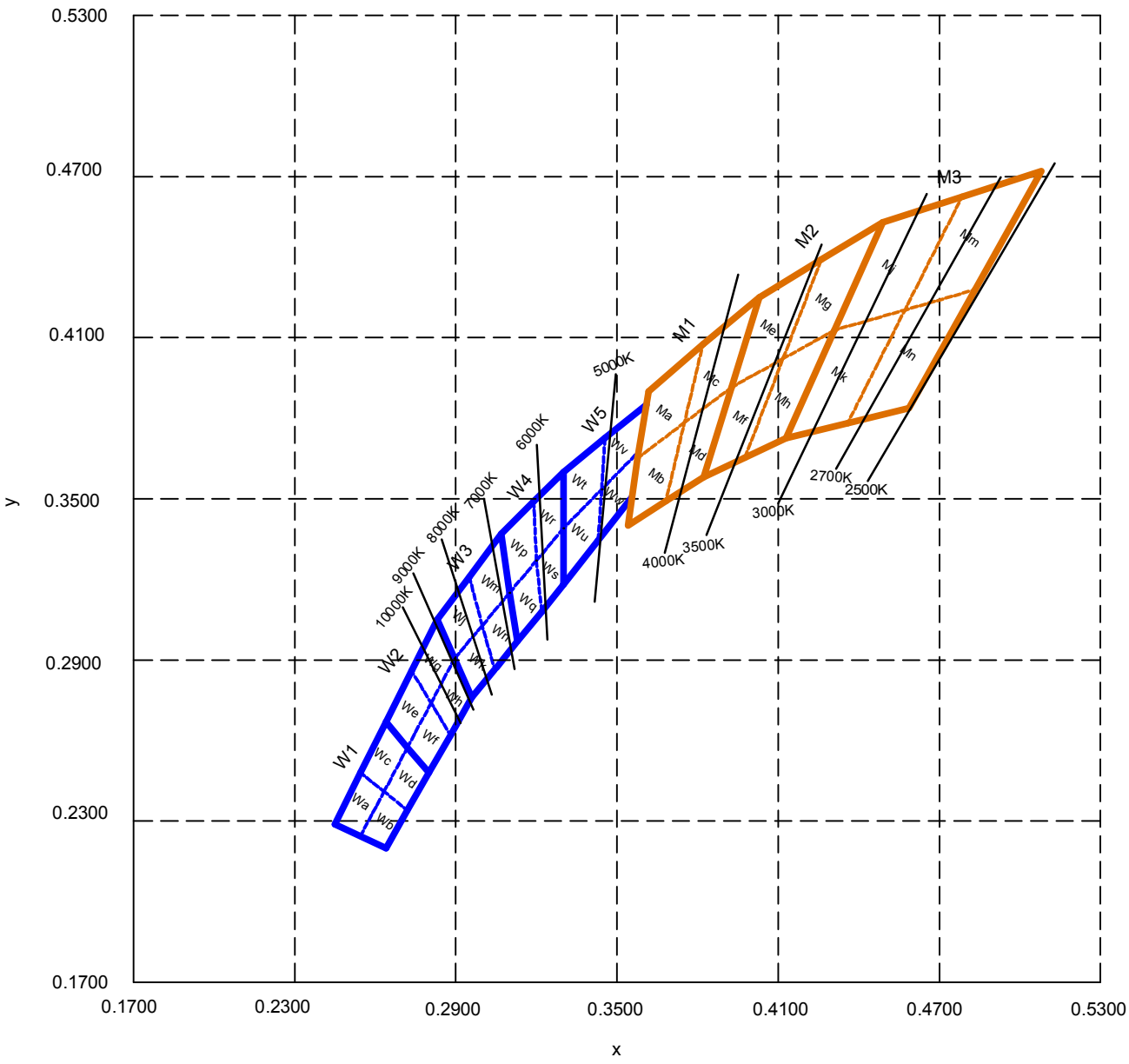
Bin Code	Sub-bin	x	y
M3	Mj	0.4490	0.4530
		0.4310	0.4128
		0.4572	0.4203
		0.4785	0.4625
	Mk	0.4310	0.4128
		0.4129	0.3726
		0.4359	0.3782
		0.4572	0.4203
	Mm	0.4785	0.4625
		0.4572	0.4203
		0.4834	0.4279
		0.5080	0.4720
	Mn	0.4572	0.4203
		0.4359	0.3782
		0.4588	0.3838
		0.4834	0.4279

Tolerance of measurement of the color coordinates is ±0.01.

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CIE Chromaticity Diagram



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Order Code Table*

Cool White

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Color Bin Code
			Min.	Max.	
Cool White	C513A-WSS-CV0Y0151	55	2130	8200	W1,W2,W3,W4,W5
Cool White	C513A-WSS-CW0Y0231	55	3000	8200	W2,W3
Cool White	C513A-WSN-CV0Y0151	55	2130	8200	W1,W2,W3,W4,W5
Cool White	C513A-WSN-CW0Y0231	55	3000	8200	W2,W3

Warm White

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Color Bin Code
			Min.	Max.	
Warm White	C513A-MSS-CV0Y0131	55	2130	8200	M1,M2,M3
Warm White	C513A-MSS-CV0Y0231	55	2130	8200	M2,M3
Warm White	C513A-MSS-CW0Y0231	55	3000	8200	M2,M3
Warm White	C513A-MSS-CV0Y0511	55	2130	8200	W5,M1
Warm White	C513A-MSS-CW0Y0511	55	3000	8200	W5,M1
Warm White	C513A-MSN-CV0Y0131	55	2130	8200	M1,M2,M3
Warm White	C513A-MSN-CV0Y0231	55	2130	8200	M2,M3
Warm White	C513A-MSN-CW0Y0231	55	3000	8200	M2,M3
Warm White	C513A-MSN-CV0Y0511	55	2130	8200	W5,M1
Warm White	C513A-MSN-CW0Y0511	55	3000	8200	W5,M1

Notes:

- The above kit numbers represent order codes that include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped in each bulk package. Single intensity-bin codes and single color-bin codes will not be orderable.
- Please refer to the "Cree LED Lamp Reliability Test Standards" document for reliability test conditions.
- Please refer to the "Cree LED Lamp Soldering & Handling" document for information about how to use this LED product safely.

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Graphs

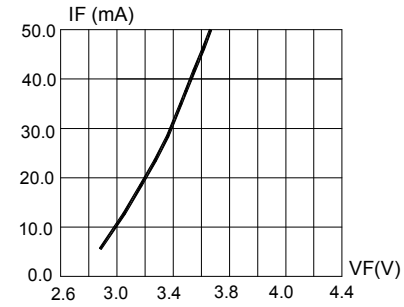


FIG.1 FORWARD CURRENT VS. FORWARD VOLTAGE.

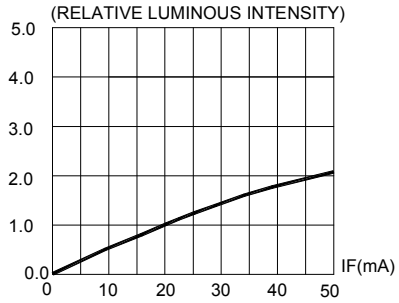


FIG.2 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

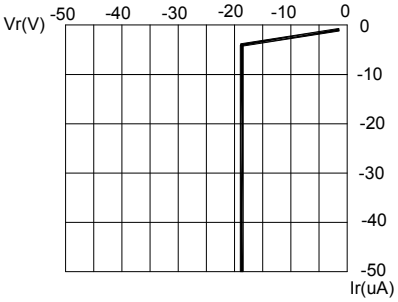


FIG.3 REVERSE CURRENT VS. REVERSE VOLTAGE.

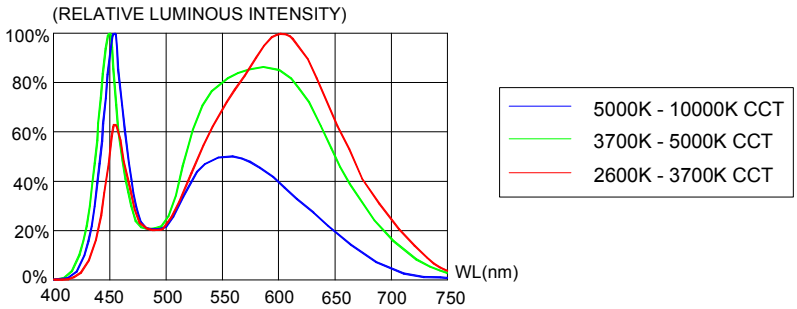


FIG.4 RELATIVE LUMINOUS INTENSITY VS. WAVELENGTH.

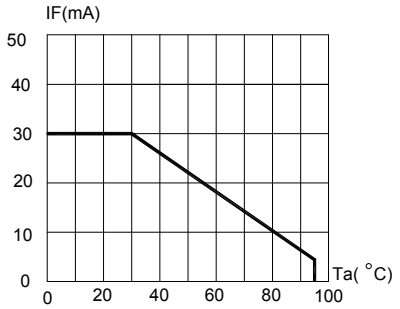


FIG.5 MAXIMUM FORWARD DC CURRENT VS AMBIENT TEMPERATURE (Tjmax=105°C)

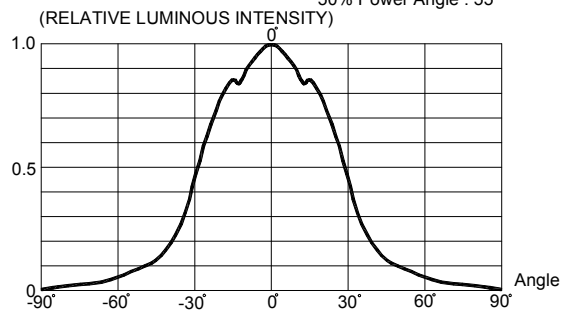


FIG.6 FAR FIELD PATTERN

The above data are collected from statistical figures that do not necessarily correspond to the actual parameters of each single LED. Hence, these data will be changed without further notice.

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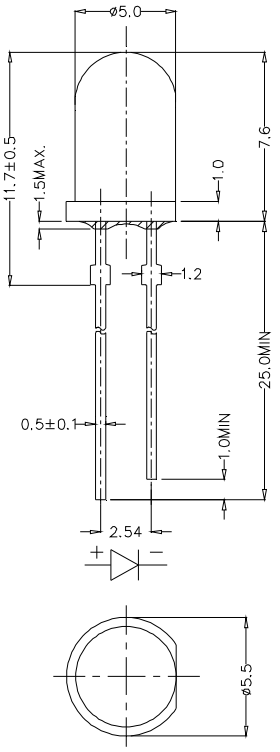
Mechanical Dimensions

All dimensions are in mm. Tolerance is ±0.25 mm unless otherwise noted.

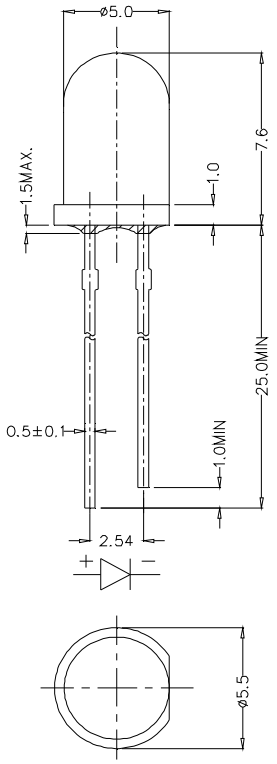
An epoxy meniscus may extend about 1.5 mm down the leads.

Burr around bottom of epoxy may be 0.5 mm max.

C513A-WSS/MSS:



C513A-WSN/MSN:



Notes

RoHS Compliance

The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.

Vision Advisory Claim

Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

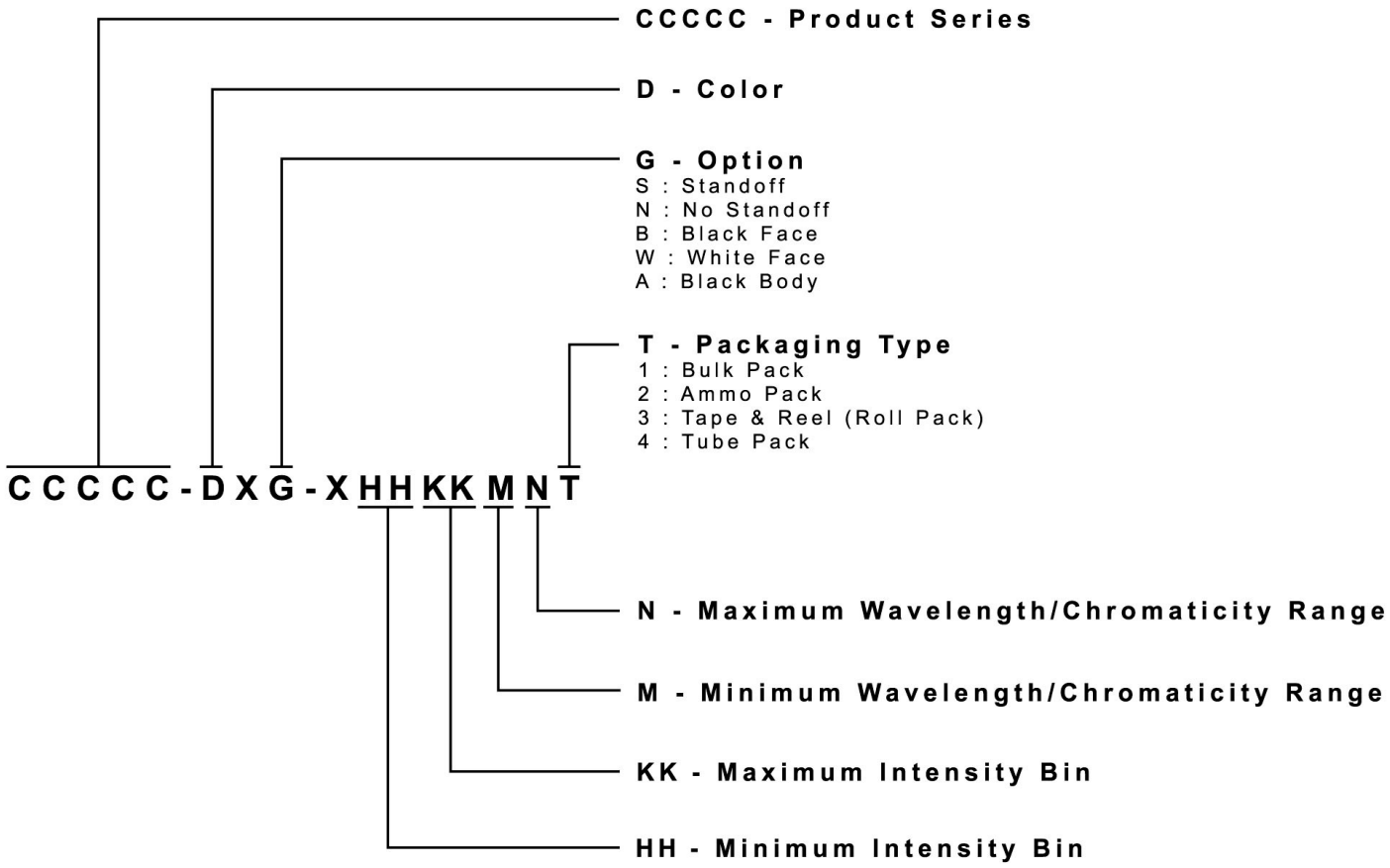
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Kit Number System

Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness. Sorted LEDs are packaged for shipping in various convenient options. Please refer to the "Cree LED Lamp Packaging Standard" document for more information about shipping and packaging options.

Cree LEDs are sold by order codes in combinations of bins called kits. Order codes are configured in the following manner:



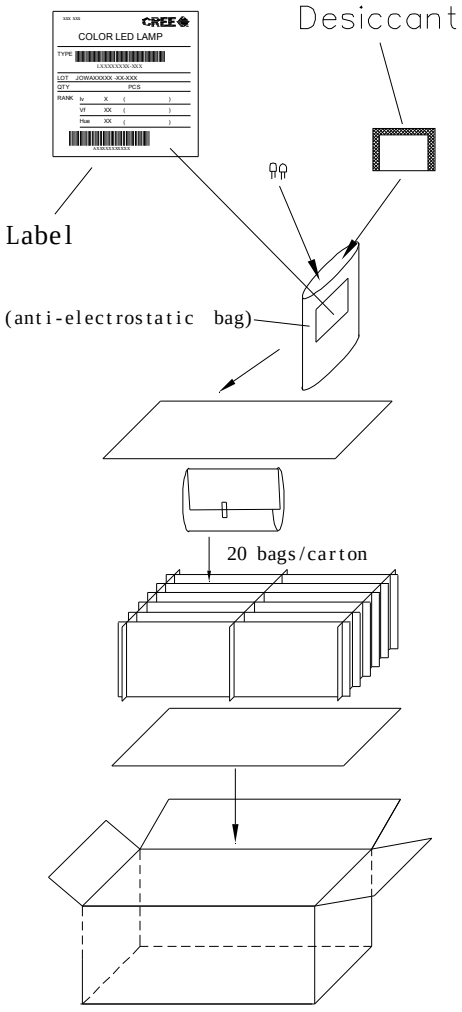
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Package

Features:

- The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags.
- Cardboard boxes will be used to protect the LEDs from mechanical shock during transportation.
- The boxes are not water-resistant, and they must be kept away from water and moisture.
- The Bulk Pack types of packaging.
- Max 500 pcs per bag.



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