

# Cree® 5mm Round LED

## C513A-WSS/WSN

## C513A-MSS/MSN



### PRODUCT DESCRIPTION

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:  
Cool White :  
Min . (4600K) / Typical (9000K)  
Warm White :  
Min . (2500K) / Typical (2800K)
- Luminous Intensity (mcd)  
C513A-WSS/WSN:(2130-12000)  
C513A-MSS/MSN:(2130-8200)
- CRI:  
Typical CRI for Cool White is 75  
Typical CRI for Warm White is 80
- Viewing angle:  
C513A-WSS/WSN: 55 degree  
C513A-MSS/MSN: 55 degree
- Lead-Free
- RoHS Compliant

### APPLICATIONS

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

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

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

**Note:** Pulse width  $\leq 0.1$  msec, duty  $\leq 1/10$ .

### TYPICAL ELECTRICAL & OPTICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

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	$\mu\text{A}$			100	
Luminous Intensity	Cool	$I_V$	$I_F = 20$ mA	mcd	2130	6800		
	Warm	$I_V$	$I_F = 20$ mA	mcd	2130	4500		
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	$2\theta_{1/2}$	$I_F = 20$ mA	deg		55		

### INTENSITY BIN LIMIT ( $I_f = 20 \text{ mA}$ )

#### Cool White(C513A-WSS/WSN)

Bin Code	Min.(mcd)	Max.(mcd)
V0	2130	3000
W0	3000	4180
X0	4180	5860
Y0	5860	8200
Z0	8200	12000

#### 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  $\pm 15\%$

### VF BIN LIMIT ( $I_f = 20 \text{ mA}$ )

#### Cool White(C513A-WSS/WSN)

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  $\pm 0.05\text{V}$ .

## COLOR BIN LIMIT ( $I_f = 20 \text{ mA}$ )

### 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
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
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  $\pm 0.01$ .

**COLOR BIN LIMIT ( $I_F = 20 \text{ mA}$ )**

Warm White

Bin Code	Sub-bin	x	y
M1	Ma1	0.3610	0.3900
		0.3715	0.3987
		0.3689	0.3853
		0.3593	0.3776
	Ma2	0.3715	0.3987
		0.3820	0.4075
		0.3786	0.3929
		0.3689	0.3853
	Ma3	0.3689	0.3853
		0.3786	0.3929
		0.3751	0.3783
		0.3664	0.3717
	Ma4	0.3593	0.3776
		0.3689	0.3853
		0.3664	0.3717
		0.3576	0.3651
	Mb1	0.3576	0.3651
		0.3664	0.3717
		0.3638	0.3582
		0.3559	0.3526
	Mb2	0.3664	0.3717
		0.3751	0.3783
		0.3717	0.3637
		0.3638	0.3582
	Mb3	0.3638	0.3582
		0.3717	0.3637
		0.3682	0.3491
		0.3612	0.3446
	Mb4	0.3559	0.3526
		0.3638	0.3582
		0.3612	0.3446
		0.3541	0.3401

Bin Code	Sub-bin	x	y
M1	Mc1	0.3820	0.4075
		0.3925	0.4163
		0.3882	0.4006
		0.3786	0.3929
	Mc2	0.3925	0.4163
		0.4030	0.4250
		0.3978	0.4083
		0.3882	0.4006
	Mc3	0.3882	0.4006
		0.3978	0.4083
		0.3926	0.3915
		0.3839	0.3849
	Mc4	0.3786	0.3929
		0.3882	0.4006
		0.3839	0.3849
		0.3751	0.3783
	Md1	0.3751	0.3783
		0.3839	0.3849
		0.3796	0.3693
		0.3717	0.3637
	Md2	0.3839	0.3849
		0.3926	0.3915
		0.3874	0.3748
		0.3796	0.3693
	Md3	0.3796	0.3693
		0.3874	0.3748
		0.3822	0.3580
		0.3752	0.3536
Md4	0.3717	0.3637	
	0.3796	0.3693	
	0.3752	0.3536	
	0.3682	0.3491	

Bin Code	Sub-bin	x	y
M2	Me1	0.4030	0.4250
		0.4145	0.4320
		0.4084	0.4145
		0.3978	0.4083
	Me2	0.4145	0.4320
		0.4260	0.4390
		0.4189	0.4206
		0.4084	0.4145
	Me3	0.4084	0.4145
		0.4189	0.4206
		0.4118	0.4021
		0.4022	0.3968
	Me4	0.3978	0.4083
		0.4084	0.4145
		0.4022	0.3968
		0.3926	0.3915
	Mf1	0.3926	0.3915
		0.4022	0.3968
		0.3961	0.3793
		0.3874	0.3748
	Mf2	0.4022	0.3968
		0.4118	0.4021
		0.4047	0.3837
		0.3961	0.3793
	Mf3	0.3961	0.3793
		0.4047	0.3837
		0.3976	0.3653
		0.3899	0.3617
Mf4	0.3874	0.3748	
	0.3961	0.3793	
	0.3899	0.3617	
	0.3822	0.3580	

- Tolerance of measurement of the color coordinates is  $\pm 0.01$ .

**COLOR BIN LIMIT ( $I_F = 20\text{ mA}$ )**

Warm White

Bin Code	Sub-bin	x	y
M2	Mg1	0.4260	0.4390
		0.4375	0.4460
		0.4295	0.4268
		0.4189	0.4206
	Mg2	0.4375	0.4460
		0.4490	0.4530
		0.4400	0.4329
		0.4295	0.4268
	Mg3	0.4295	0.4268
		0.4400	0.4329
		0.4310	0.4128
		0.4214	0.4075
	Mg4	0.4189	0.4206
		0.4295	0.4268
		0.4214	0.4075
		0.4118	0.4021
	Mh1	0.4118	0.4021
		0.4214	0.4075
		0.4134	0.3882
		0.4047	0.3837
	Mh2	0.4214	0.4075
		0.4310	0.4128
		0.4220	0.3927
		0.4134	0.3882
	Mh3	0.4134	0.3882
		0.4220	0.3927
		0.4129	0.3725
		0.4053	0.3689
Mh4	0.4047	0.3837	
	0.4134	0.3882	
	0.4053	0.3689	
	0.3976	0.3653	

Bin Code	Sub-bin	x	y
M3	Mj1	0.4490	0.4530
		0.4638	0.4578
		0.4540	0.4372
		0.4400	0.4329
	Mj2	0.4638	0.4578
		0.4785	0.4625
		0.4679	0.4414
		0.4540	0.4372
	Mj3	0.4540	0.4372
		0.4679	0.4414
		0.4572	0.4203
		0.4441	0.4166
	Mj4	0.4400	0.4329
		0.4540	0.4372
		0.4441	0.4166
		0.4310	0.4128
	Mk1	0.4310	0.4128
		0.4441	0.4166
		0.4343	0.3960
		0.4220	0.3927
	Mk2	0.4441	0.4166
		0.4572	0.4203
		0.4466	0.3993
		0.4343	0.3960
	Mk3	0.4343	0.3960
		0.4466	0.3993
		0.4359	0.3782
		0.4244	0.3754
Mk4	0.4220	0.3927	
	0.4343	0.3960	
	0.4244	0.3754	
	0.4129	0.3726	

Bin Code	Sub-bin	x	y
M3	Mm1	0.4785	0.4625
		0.4933	0.4673
		0.4818	0.4457
		0.4679	0.4414
	Mm2	0.4933	0.4673
		0.5080	0.4720
		0.4957	0.4500
		0.4818	0.4457
	Mm3	0.4818	0.4457
		0.4957	0.4500
		0.4834	0.4279
		0.4703	0.4241
	Mm4	0.4679	0.4414
		0.4818	0.4457
		0.4703	0.4241
		0.4572	0.4203
	Mn1	0.4572	0.4203
		0.4703	0.4241
		0.4589	0.4026
		0.4466	0.3993
	Mn2	0.4703	0.4241
		0.4834	0.4279
		0.4711	0.4059
		0.4589	0.4026
	Mn3	0.4589	0.4026
		0.4711	0.4059
		0.4588	0.3838
		0.4474	0.3810
Mn4	0.4466	0.3993	
	0.4589	0.4026	
	0.4474	0.3810	
	0.4359	0.3782	

## COLOR BIN LIMIT ( $I_f = 20 \text{ mA}$ )

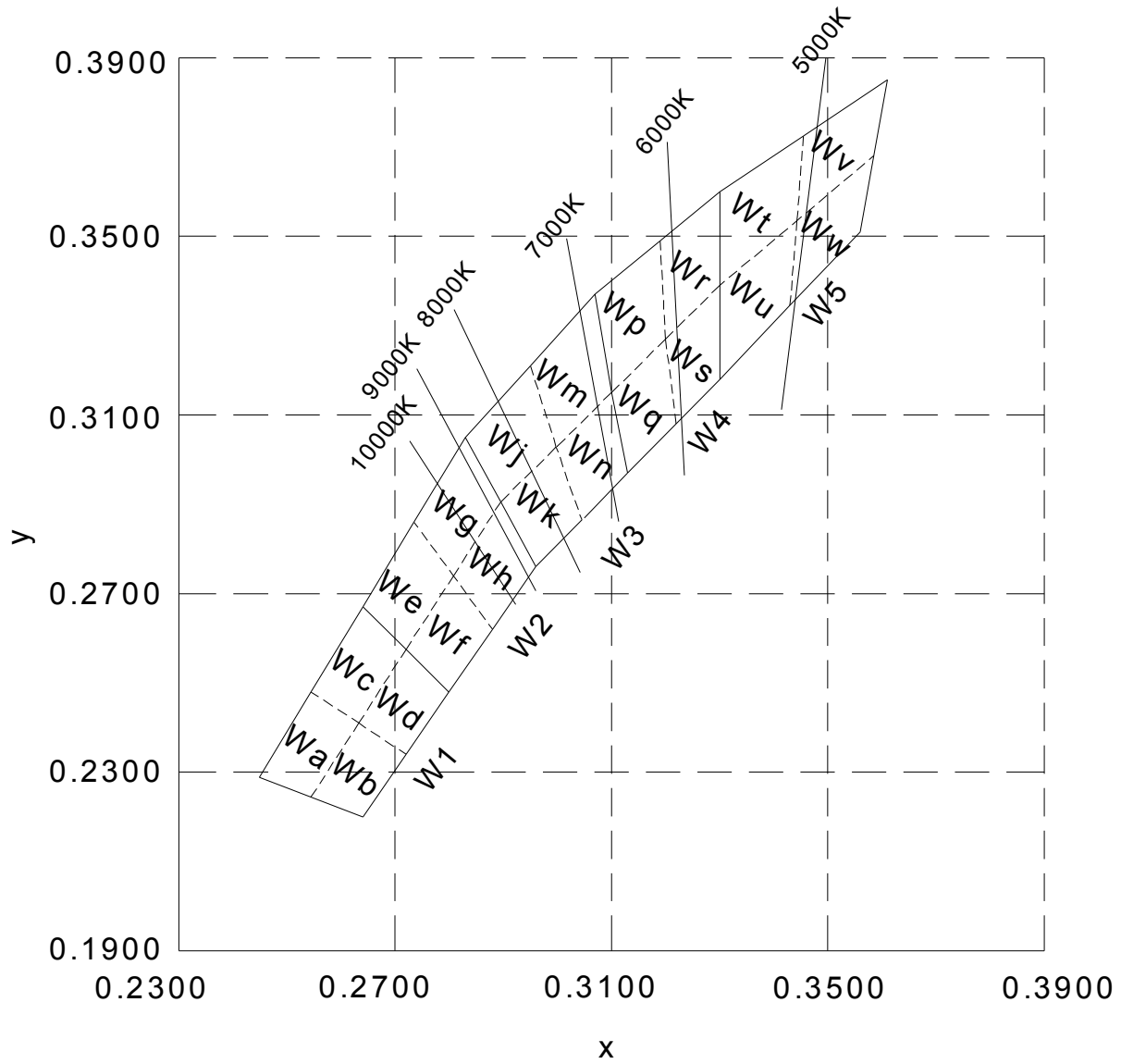
Warm White

Bin Code	Sub-bin	x	y
W5	Wt1	0.3300	0.3600
		0.3378	0.3663
		0.3375	0.3563
		0.3300	0.3495
	Wt2	0.3300	0.3495
		0.3375	0.3563
		0.3372	0.3463
		0.3300	0.3390
	Wt3	0.3378	0.3663
		0.3455	0.3725
		0.3449	0.3630
		0.3375	0.3563
	Wt4	0.3375	0.3563
		0.3449	0.3630
		0.3443	0.3535
		0.3372	0.3463
	Wu1	0.3300	0.3390
		0.3372	0.3463
		0.3368	0.3363
		0.3300	0.3285
	Wu2	0.3300	0.3285
		0.3368	0.3363
		0.3365	0.3263
		0.3300	0.3180
	Wu3	0.3372	0.3463
		0.3443	0.3535
		0.3437	0.3440
		0.3368	0.3363
Wu4	0.3368	0.3363	
	0.3437	0.3440	
	0.3430	0.3345	
	0.3365	0.3263	

Bin Code	Sub-bin	x	y
W5	Wv1	0.3455	0.3725
		0.3533	0.3788
		0.3523	0.3698
		0.3449	0.3630
	Wv2	0.3449	0.3630
		0.3523	0.3698
		0.3514	0.3608
		0.3443	0.3535
	Wv3	0.3533	0.3788
		0.3610	0.3850
		0.3598	0.3765
		0.3523	0.3698
	Wv4	0.3523	0.3698
		0.3598	0.3765
		0.3585	0.3680
		0.3514	0.3608
	Ww1	0.3443	0.3535
		0.3514	0.3608
		0.3505	0.3518
		0.3437	0.3440
	Ww2	0.3437	0.3440
		0.3505	0.3518
		0.3495	0.3428
		0.3430	0.3345
	Ww3	0.3514	0.3608
		0.3585	0.3680
		0.3573	0.3595
		0.3505	0.3518
Ww4	0.3505	0.3518	
	0.3573	0.3595	
	0.3560	0.3510	
	0.3495	0.3428	

### CIE CHROMATICITY DIAGRAM

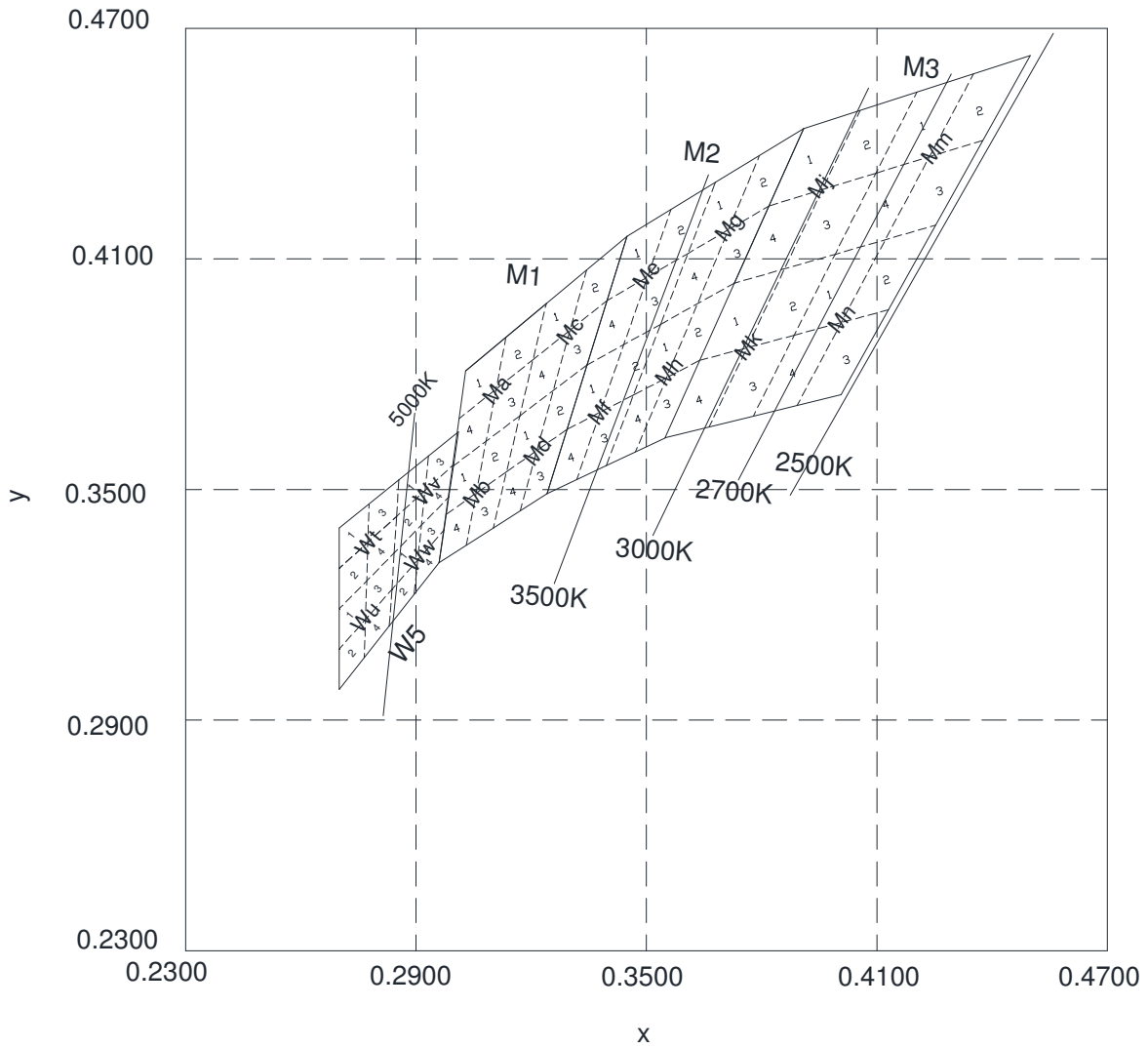
Cool White





## CIE CHROMATICITY DIAGRAM

Warm White



## ORDER CODE TABLE\*

### Cool White

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Color Bin Code	Package	Standoff
			Min.	Max.			
Cool White	C513A-WSS-CV0Y0151	55	2130	8200	W1,W2,W3,W4,W5	Bulk	Yes
Cool White	C513A-WSS-CW0Y0231	55	3000	8200	W2,W3	Bulk	Yes
Cool White	C513A-WSS-CW0Z0231	55	3000	12000	W2,W3	Bulk	Yes
Cool White	C513A-WSS-CV0Y0152	55	2130	8200	W1,W2,W3,W4,W5	Ammo	Yes
Cool White	C513A-WSS-CW0Y0232	55	3000	8200	W2,W3	Ammo	Yes
Cool White	C513A-WSS-CW0Z0232	55	3000	12000	W2,W3	Ammo	Yes
Cool White	C513A-WSN-CV0Y0151	55	2130	8200	W1,W2,W3,W4,W5	Bulk	No
Cool White	C513A-WSN-CW0Y0231	55	3000	8200	W2,W3	Bulk	No
Cool White	C513A-WSN-CW0Z0231	55	3000	12000	W2,W3	Bulk	No
Cool White	C513A-WSN-CV0Y0152	55	2130	8200	W1,W2,W3,W4,W5	Ammo	No
Cool White	C513A-WSN-CW0Y0232	55	3000	8200	W2,W3	Ammo	No
Cool White	C513A-WSN-CW0Z0232	55	3000	12000	W2,W3	Ammo	No

## ORDER CODE TABLE\*

### Warm White

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Color Bin Code	Package	Standoff
			Min.	Max.			
Warm White	C513A-MSS-CV0Y0131	55	2130	8200	M1,M2,M3	Bulk	Yes
Warm White	C513A-MSS-CV0Y0231	55	2130	8200	M2,M3	Bulk	Yes
Warm White	C513A-MSS-CW0Y0231	55	3000	8200	M2,M3	Bulk	Yes
Warm White	C513A-MSS-CV0Y0511	55	2130	8200	W5,M1	Bulk	Yes
Warm White	C513A-MSS-CW0Y0511	55	3000	8200	W5,M1	Bulk	Yes
Warm White	C513A-MSS-CV0Y0132	55	2130	8200	M1,M2,M3	Ammo	Yes
Warm White	C513A-MSS-CV0Y0232	55	2130	8200	M2,M3	Ammo	Yes
Warm White	C513A-MSS-CW0Y0232	55	3000	8200	M2,M3	Ammo	Yes
Warm White	C513A-MSS-CV0Y0512	55	2130	8200	W5,M1	Ammo	Yes
Warm White	C513A-MSS-CW0Y0512	55	3000	8200	W5,M1	Ammo	Yes
Warm White	C513A-MSN-CV0Y0131	55	2130	8200	M1,M2,M3	Bulk	No
Warm White	C513A-MSN-CV0Y0231	55	2130	8200	M2,M3	Bulk	No
Warm White	C513A-MSN-CW0Y0231	55	3000	8200	M2,M3	Bulk	No
Warm White	C513A-MSN-CV0Y0511	55	2130	8200	W5,M1	Bulk	No
Warm White	C513A-MSN-CW0Y0511	55	3000	8200	W5,M1	Bulk	No
Warm White	C513A-MSN-CV0Y0132	55	2130	8200	M1,M2,M3	Ammo	No
Warm White	C513A-MSN-CV0Y0232	55	2130	8200	M2,M3	Ammo	No
Warm White	C513A-MSN-CW0Y0232	55	3000	8200	M2,M3	Ammo	No
Warm White	C513A-MSN-CV0Y0512	55	2130	8200	W5,M1	Ammo	No
Warm White	C513A-MSN-CW0Y0512	55	3000	8200	W5,M1	Ammo	No

### Notes:

1. 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 on each bulk. Single intensity-bin code and single color-bin codes will not be orderable.
2. Please refer to the "Cree LED Lamp Reliability Test Standards" document for reliability test conditions.
3. Please refer to the "Cree LED Lamp Soldering & Handling" document for information about how to use this LED product safely.

## GRAPHS

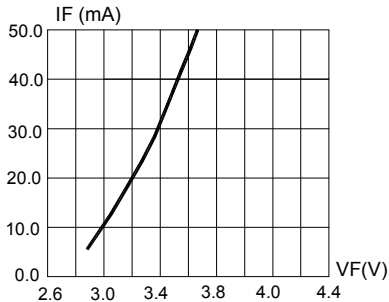


FIG.1 FORWARD CURRENT VS. FORWARD VOLTAGE.

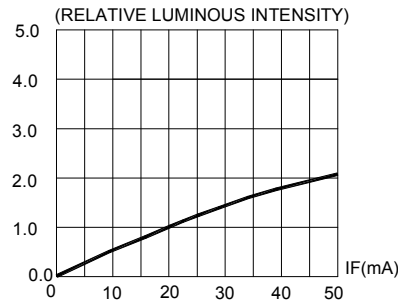


FIG.2 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

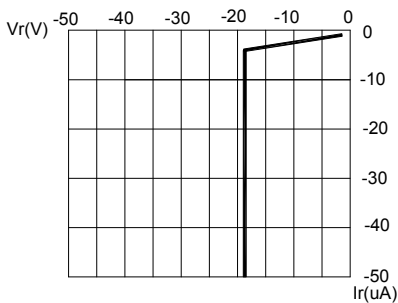


FIG.3 REVERSE CURRENT VS. REVERSE VOLTAGE.

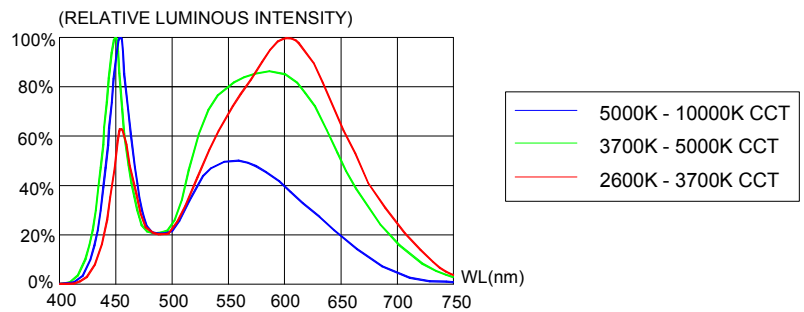


FIG.4 RELATIVE LUMINOUS INTENSITY VS. WAVELENGTH.

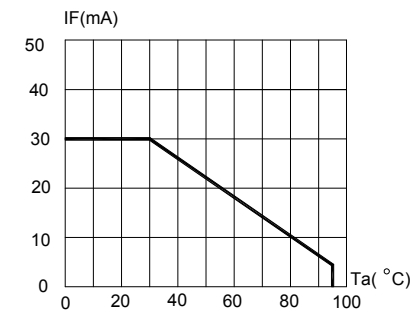


FIG.5 MAXIMUM FORWARD DC CURRENT VS AMBIENT TEMPERATURE ( $T_{jmax}=105^{\circ}C$ )

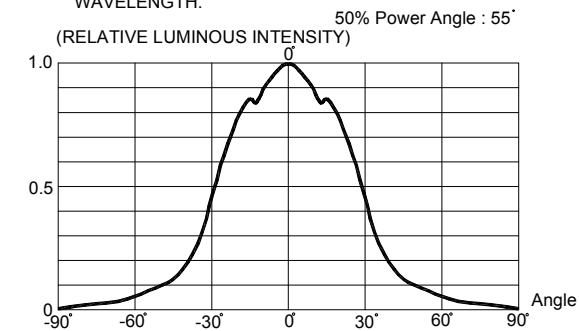


FIG.6 FAR FIELD PATTERN

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.

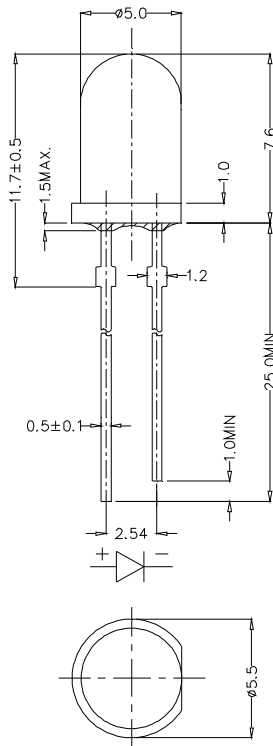
## MECHANICAL DIMENSIONS

All dimensions are in mm. Tolerance is  $\pm 0.25$  mm unless otherwise noted.

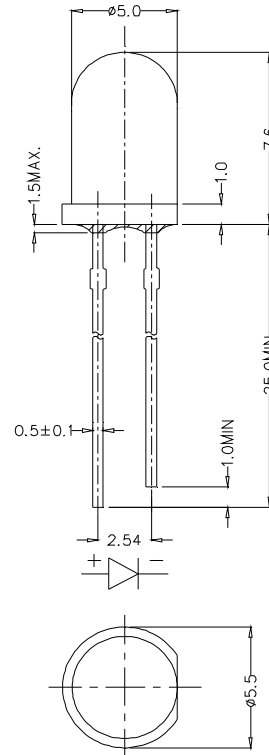
An epoxy meniscus may extend about 1.5 mm down the leads.

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.

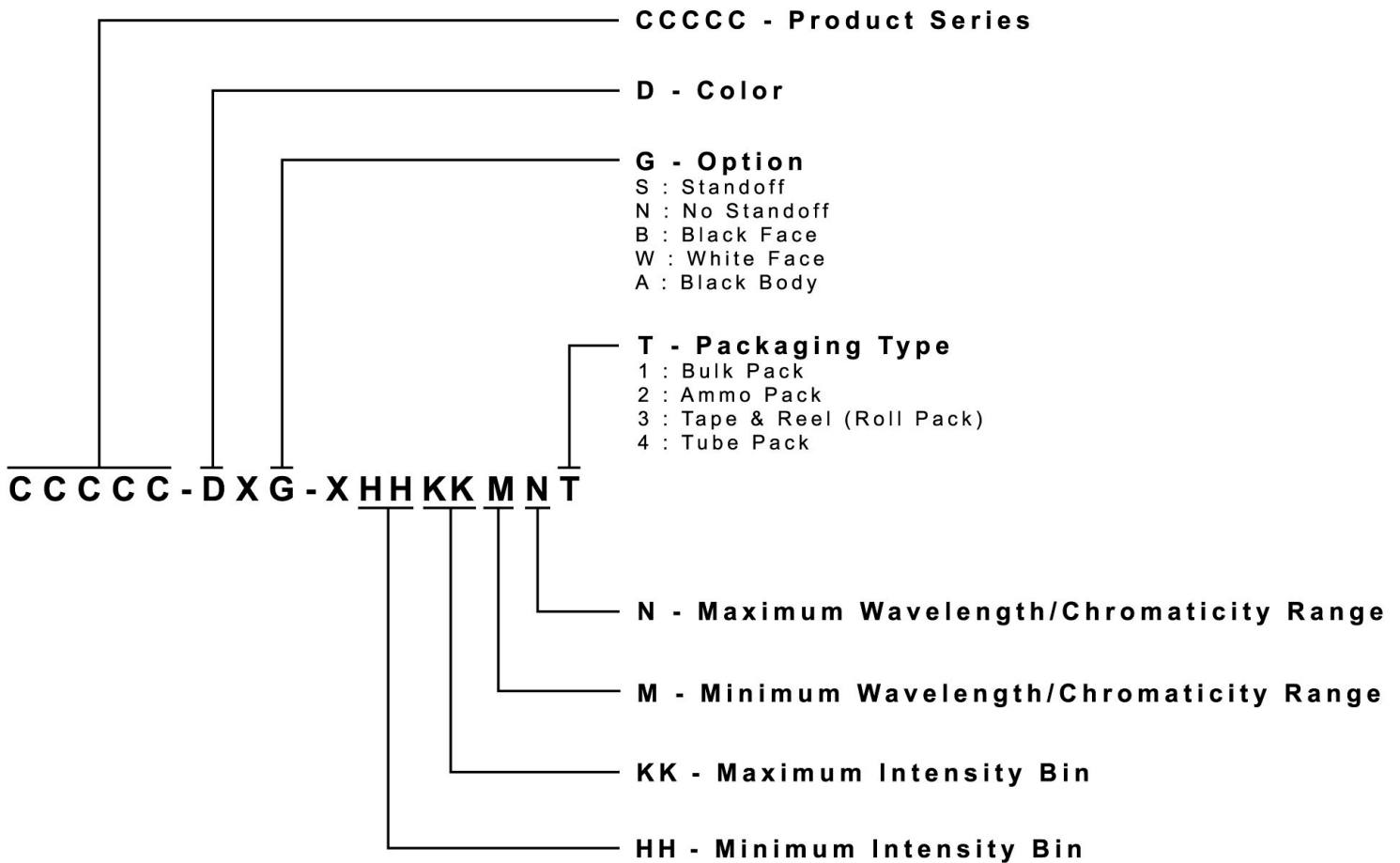
### Vision Advisory Claim

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

## KIT NUMBER SYSTEM

All dimensions in mm. 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:

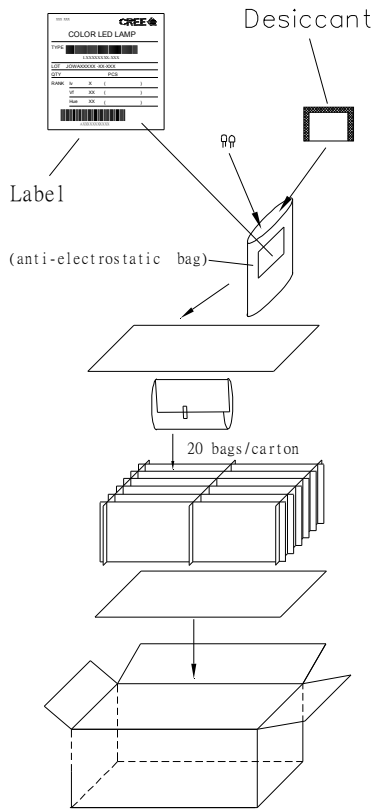


**PACKAGING**

**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 bulk and Max 2500 pcs per ammo.

**Bulk Pack Packaging Type:**



**Ammo Pack Packaging Type:**

