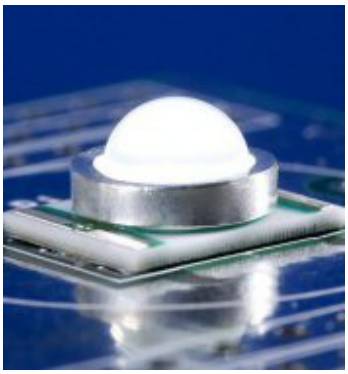
Cree® XLamp® XR LED
Binning and Labeling



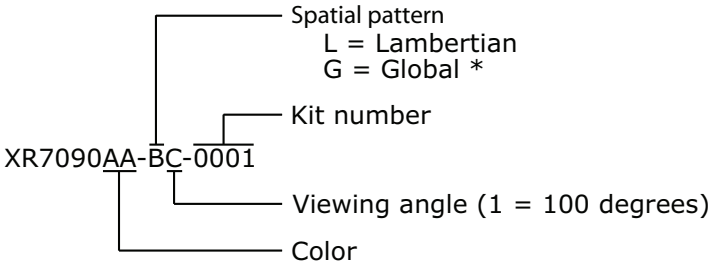
Cree XLamp LEDs combine the brightness of power LED chips with a rugged package capable of operating in excess of one watt. XLamp LEDs lead the solid-state lighting industry in brightness while providing a reflow-solderable design that is optimized for ease-of-use and thermal management. Lighting applications featuring XLamp LEDs maximize light output and increase design flexibility, while minimizing environmental impact.

This application note describes Cree's procedures for sorting XLamp LEDs by color (dominant wavelength or chromaticity) and brightness (flux) and then lists the order codes encompassing these color and brightness groups for easy reference.

Nomenclature

XLamp LEDs are tested and sorted into performance bins. A bin is specified by ranges of dominant wavelength and brightness. Sorted XLamp LEDs are packaged on reels. A reel contains lamps from one bin and is labeled with its bin code. For more information on packaging, see the XLamp LED Data Sheets.

XLamp LEDs are sold by order codes in combinations of bins called kits. Kits include a minimum of two dominant wavelength groups and two brightness groups. Order codes are configured in the following manner:

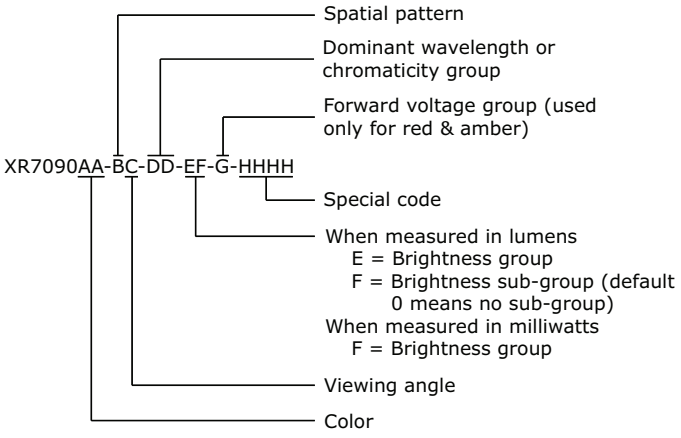


Color Codes			
RY = Royal blue	BL = Blue	CN = Cyan	GR = Green
AM = Amber	RO = Red-orange	RD = Red	WT = White

* Global - an alternative white product that has higher efficacy with slightly lower color uniformity.

Kit number 0001 is always the order code encompassing the broadest range of color and brightness groups.

Order Codes Explanation



Performance Groups – Brightness

XLamp LEDs that are tested for luminous flux are placed into one of the following groups:

Group	Minimum Luminous Flux (lm) @ 350mA	Maximum Luminous Flux (lm) @ 350mA
F	10.7	13.9
G	13.9	18.1
H	18.1	23.5
J	23.5	30.6
K	30.6	39.8
M	39.8	51.7
N	51.7	67.2

In order to minimize the perceived luminous flux variation among white lamps from the same reel, Cree bins to tighter luminous flux sub-groups. These sub-groups are defined below.

Group Code	Minimum Luminous Flux (lm)	Maximum Luminous Flux (lm)
K2	30.6	35.2
K3	35.2	39.8
M2	39.8	45.7
M3	45.7	51.7
N2	51.7	56.8
N3	56.8	62.0
N4	62.0	67.2

Royal Blue XLamp LEDs are tested for radiant flux and are placed into one of the following groups:

Group	Minimum Radiant Flux (mW) @ 350 mA	Maximum Radiant Flux (mW) @ 350 mA
10	175	210
11	210	250
12	250	300
13	300	350

Performance Groups – Dominant Wavelength

Monochromatic XLamp LEDs are tested for dominant wavelength and placed into one of the following groups.

Color	DWL Group	Min. DWL (nm) @ 350mA	Max. DWL (nm) @ 350mA
Royal Blue	D4	455	460
	D5	460	465
Blue	B3	465	470
	B4	470	475
Cyan	C2	500	505
	C3	505	510
Green	G2	520	525
	G3	525	530
	G4	530	535
Amber	A2	585	590
	A3	590	595
Red-Orange	O3	610	615
	O4	615	620
Red	R2	620	625
	R3	625	630
	R4	630	635

Amber and red XLamp LEDs are binned according to forward voltage at the rated current. Cree's forward voltage groups are:

Forward Voltage Group	Minimum Forward Voltage @ 350 mA	Maximum Forward Voltage @ 350 mA
B	1.75	2.0
C	2.0	2.25
D	2.25	2.5
E	2.5	2.75
F	2.75	3.0

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
www.cree.com/xlamp

Performance Groups – Chromaticity

White XLamp LEDs are tested for chromaticity and placed into one of the regions defined by the bounding coordinates below.

White Color Region Coordinates - 5000K – 10000K

Region	x	y	Region	x	y	Region	x	y
WA	.292	.306	WD	.329	.345	WG	.329	.369
	.295	.297		.329	.330		.329	.345
	.283	.284		.317	.319		.316	.332
	.279	.291		.316	.332		.314	.355
WB	.306	.322	WE	.301	.342	WH	.348	.384
	.308	.311		.306	.322		.346	.359
	.295	.297		.292	.306		.329	.345
	.292	.306		.287	.321		.329	.369
WC	.316	.332	WF	.314	.355	WJ	.329	.330
	.317	.319		.316	.332		.329	.345
	.308	.311		.306	.322		.346	.359
	.306	.322		.301	.342		.344	.342

White Color Region Coordinates - 3500K – 5000K

Region	x	y	Region	x	y	Region	x	y
TA	.344	.342	TD	.387	.374	TG	.3755	.372
	.346	.359		.402	.382		.380	.389
	.363	.368		.395	.364		.392	.391
	.360	.353		.382	.358		.387	.374
TB	.36	.353	TE	.346	.359	TH	.392	.391
	.363	.368		.348	.384		.387	.374
	.3755	.3715		.367	.386		.402	.382
	.371	.3555		.363	.368		.409	.399
TC	.371	.3555	TF	.363	.368			
	.3755	.3715		.367	.386			
	.387	.374		.380	.389			
	.382	.358		.3755	.372			

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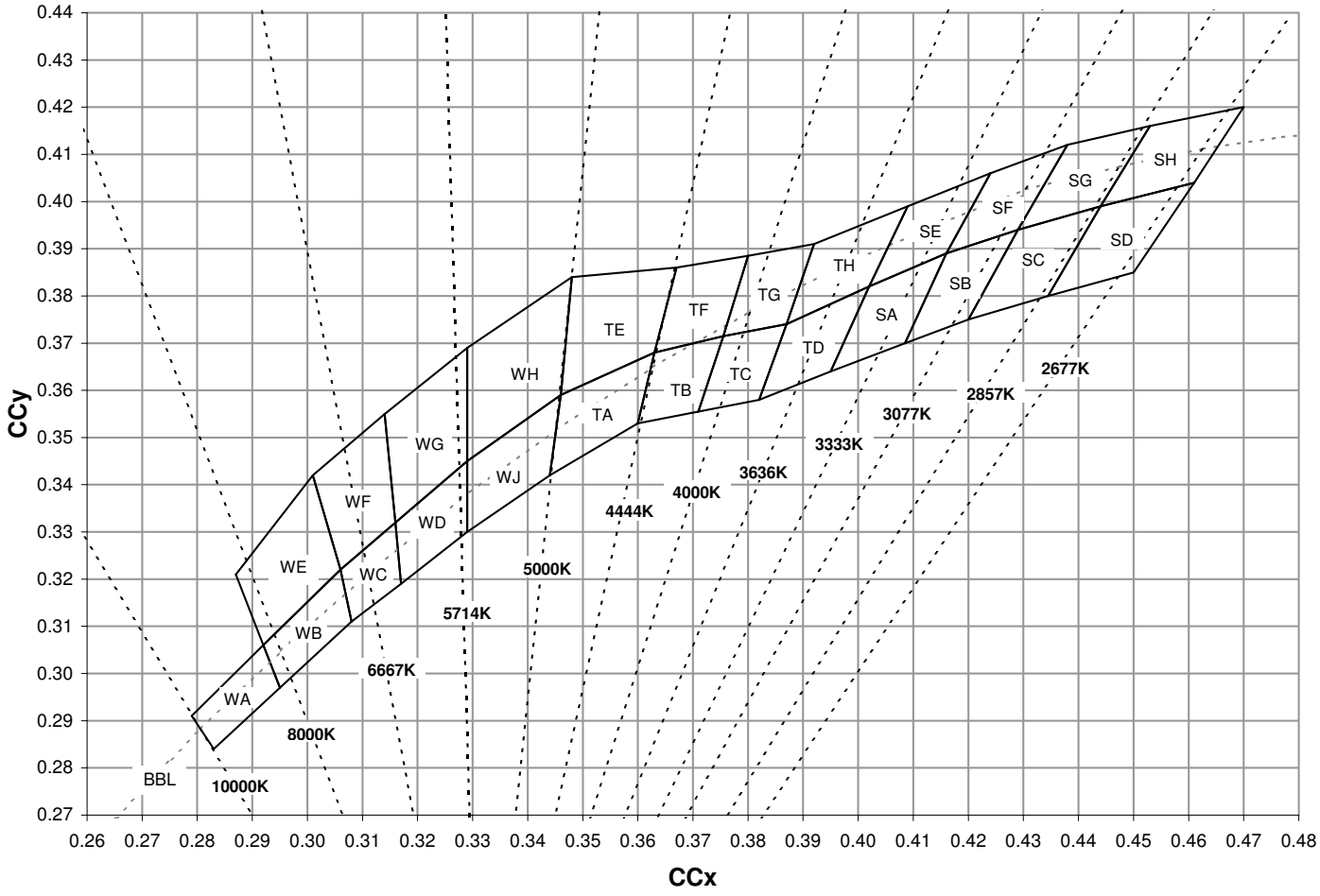
Performance Groups – Chromaticity (continued)

White Color Region Coordinates - 2600K – 3500K

Region	x	y	Region	x	y	Region	x	y
SA	.402	.382	SD	.444	.399	SG	.438	.412
	.416	.389		.461	.404		.429	.394
	.409	.370		.450	.385		.444	.399
	.395	.364		.435	.380		.453	.416
SB	.409	.370	SE	.409	.399	SH	.444	.399
	.416	.389		.402	.382		.461	.404
	.429	.394		.416	.389		.470	.420
	.420	.375		.424	.406		.453	.416
SC	.429	.394	SF	.424	.406			
	.444	.399		.416	.389			
	.435	.380		.429	.394			
	.420	.375		.438	.412			

Cree's Standard Chromaticity Regions Plotted on the 1931 CIE Curve



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Standard Order Codes and Bins

The following tables list standard order code configurations and performance bins. Contact Cree at +1 919.313.5300 if custom order codes are required.

Standard Order Codes – Royal Blue						
Order Code	Bins		DWL (nm)		Radiant Flux (mW)	
	Color	Flux	Min.	Max.	Min.	Max.
XR7090RY-L1-0001	D4, D5	10, 11, 12, 13	455	465	175	350

Standard Order Codes – Blue						
Order Code	Bins		DWL (nm)		Luminous Flux (lm)	
	Color	Flux	Min.	Max.	Min.	Max.
XR7090BL-L1-0001	B3, B4	F, G, H, J	465	475	10.7	30.6

Standard Order Codes – Cyan						
Order Code	Bins		DWL (nm)		Luminous Flux (lm)	
	Color	Flux	Min.	Max.	Min.	Max.
XR7090CN-L1-0001	C2, C3	K, M	500	510	30.6	51.7

Standard Order Codes – Green						
Order Code	Bins		DWL (nm)		Luminous Flux (lm)	
	Color	Flux	Min.	Max.	Min.	Max.
XR7090GR-L1-0001	G2, G3, G4	K, M, N	520	535	30.6	67.2

Standard Order Codes – Amber							
Order Code	Bins			DWL (nm)		Luminous Flux (lm)	
	Color	Flux	Voltage	Min.	Max.	Min.	Max.
XR7090AM-L1-0001	A2, A3	J, K, M, N	B, C, D, E, F	585	595	23.5	67.2

Standard Order Codes – Red-Orange						
Order Code	Bins		DWL (nm)		Luminous Flux (lm)	
	Color	Flux	Min.	Max.	Min.	Max.
XR7090RO-L1-0001	O3, O4	K, M, N	610	620	30.6	67.2

Standard Order Codes – Red							
Order Code	Bins			DWL (nm)		Luminous Flux (lm)	
	Color	Flux	Voltage	Min.	Max.	Min.	Max.
XR7090RD-L1-0001	R2, R3, R4	H, J, K, M	B, C, D, E, F	620	635	18.1	51.7

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Standard Order Codes – White				
Order Code	Bins		Lum. Flux (lm)	
	Chromaticity	Flux	Min.	Max.
XR7090WT-L1-0001	WA, WB, WC, WD, WE, WF, WG, WH, WJ	M2, M3, N2	39.8	56.8
XR7090WT-L1-0002	WC,WD, WF, WG	M2, M3, N2	39.8	56.8
XR7090WT-G1-0001	WA, WB, WC, WD, WE, WF, WG, WH, WJ	M2, M3, N2, N3	39.8	62
XR7090WT-G1-0002	WC, WD, WF, WG	M2, M3, N2, N3	39.8	62
XR7090WT-G1-0003	WB, WC, WD, WE, WF, WG, WH, WJ	N2, N3	51.7	62
XR7090WT-L1-1001	TA, TB, TC, TD, TE, TF, TG, TH	K2, K3, M2, M3	30.6	51.7
XR7090WT-L1-2001	SA, SB, SC, SD, SE, SF, SG, SH	K2, K3, M2	30.6	45.7

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