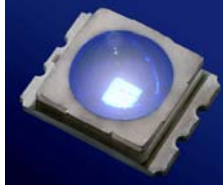


Cree® XLamp™ 7090 Packaged LEDs

Cree XLamp 7090 LEDs combine the brightness of power LED chips with a rugged package capable of operating at 1 Watt and beyond. Cree 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.



Based on Cree's industry-leading power chip expertise and innovative packaging technology for leadless surface mounting, the Cree XLamp 7090 LEDs bring the power of brightness to a wide range of lighting and backlighting applications including portable lighting and flashlights, computer and television screens, signaling, architectural, landscaping and entertainment/advertising.

*XL7090BLU XL7090CYN
XL7090GRN XL7090AMB
XL7090RED XL7090WHT*

Benefits

Cree XLamp 7090 LEDs provide:

- Industry's brightest 1-watt package.
- Maximum operating life.
- Full range of colors.
 - White, Royal Blue, Blue, Green, Cyan, Amber, Red-Orange and Red.
- Low voltage requirements.
- Instant light.
- Full dimming.
- No lead, mercury or UV.
- Integrated lens for easy integration with secondary optics.
- Small footprint — 7 mm x 9 mm.
- ESD > 2000V.
- Designed for IR reflow.
- Available on reels for high-volume assembly.

Applications

Cree XLamp 7090 LEDs offer ultimate design flexibility in lighting for:

- Architectural and landscaping.
- General illumination for home, business and public spaces.
- Business and consumer electronics — backlit computer/television screens, digital cameras, etc.
- Entertainment and advertising/signage.
- Automotive and recreational vehicles — interior and exterior.
- Safety — security, traffic/railroad signaling, portable.

Absolute Maximum Ratings

	Unit	InGaN	AllnGaP
DC Forward Current	mA	350/700	350/700
Reverse Voltage	V	5	5
LED Junction Temperature	°C	125	125
Storage Temperature	°C	-20 to +100	-20 to +100
Operating Temperature	°C	-20 to +80	-20 to +80
ESD Classification (HBM per Mil-Std-883D)		Class 2	Class 2

Optical Characteristics

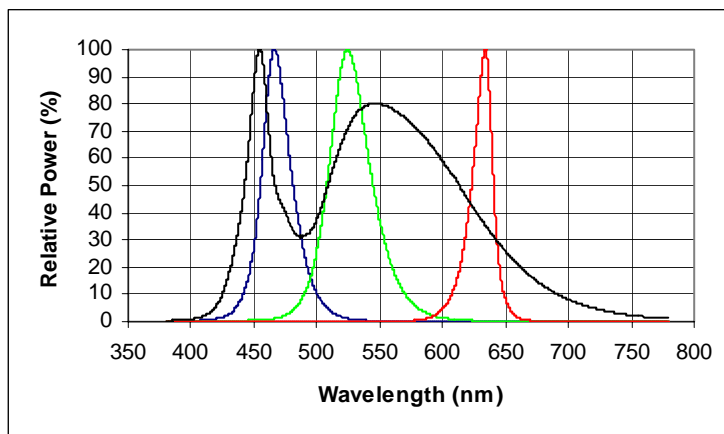
Color	Wavelength or CCT		Viewing Angle (degrees)
	Min	Max	
White	4500K	8000K	100
Royal Blue	455nm	465nm	100
Blue	465nm	475nm	100
Cyan	500nm	510nm	100
Green	520nm	535nm	100
Amber	590nm	600nm	100
Red-Orange	610nm	620nm	100
Red	620nm	635nm	100

Color	Max Forward Voltage (Volts)	Thermal Resistance, junction to solder point Typical (°C/W)	Luminous or Radiant Flux (lm) Typical 350 mA	Luminous or Radiant Flux (lm) Typical 700 mA
White	4.0	17	60	98
Royal Blue	4.0	17	255mW	410 mW
Blue	4.0	17	19	31
Cyan	4.0	17	30	48
Green	4.0	17	45	73
Amber	3.0	17	27	44
Red-Orange	3.0	17	38	62
Red	3.0	17	34	55

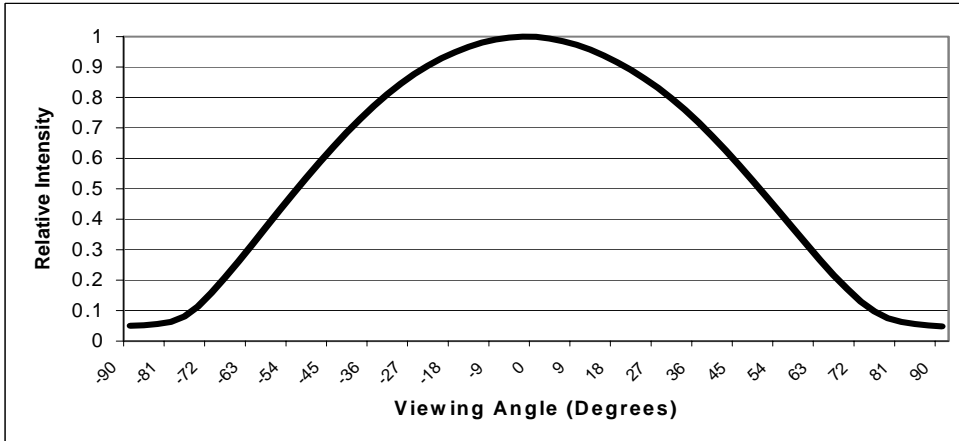
Note: Temperature coefficient of Voltage: -2.8-3m V/°C

Heat management is critical when designing LED-based applications. The coefficient of temperature increase per input of electric power at room temperature is about .05°C/mW at the LED's active layer or higher when LEDs are densely mounted. Operating current should be decided after considering the ambient maximum temperature when the LEDs are illuminating.

Relative Spectral Power Distribution

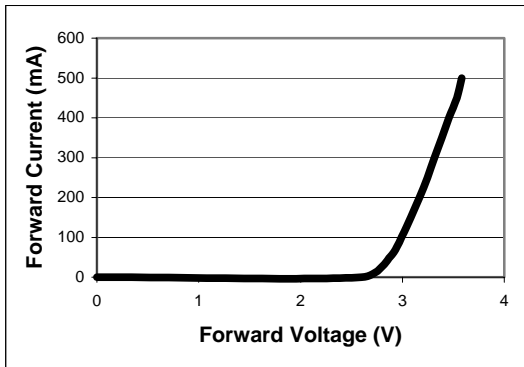


Angular Intensity (White)

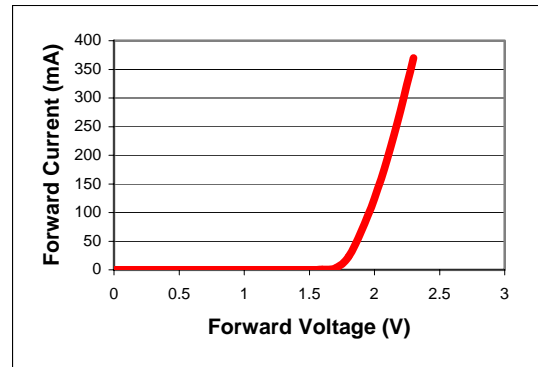


Electrical Characteristics

Forward Current vs. Forward Voltage
 $T_A = 25^\circ\text{C}$



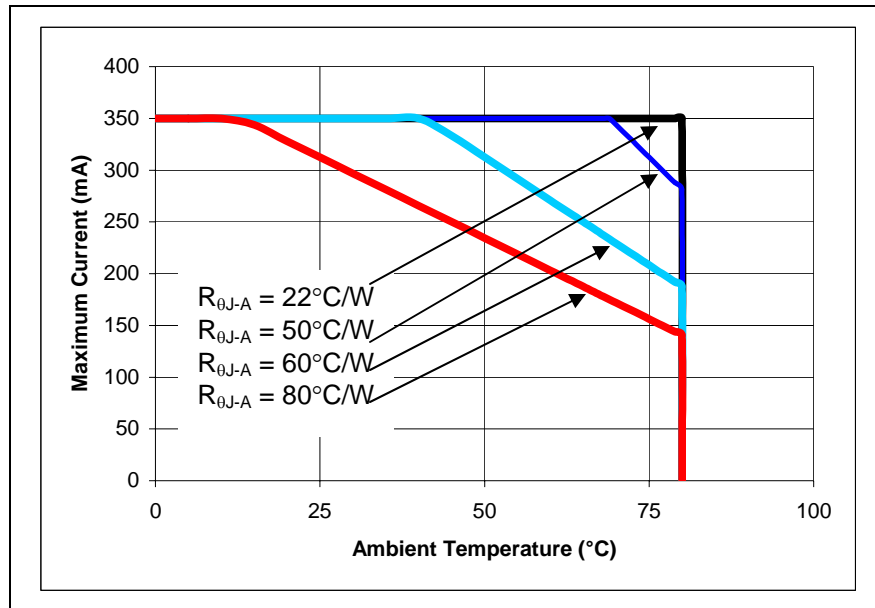
Blue/Cyan/Green/White



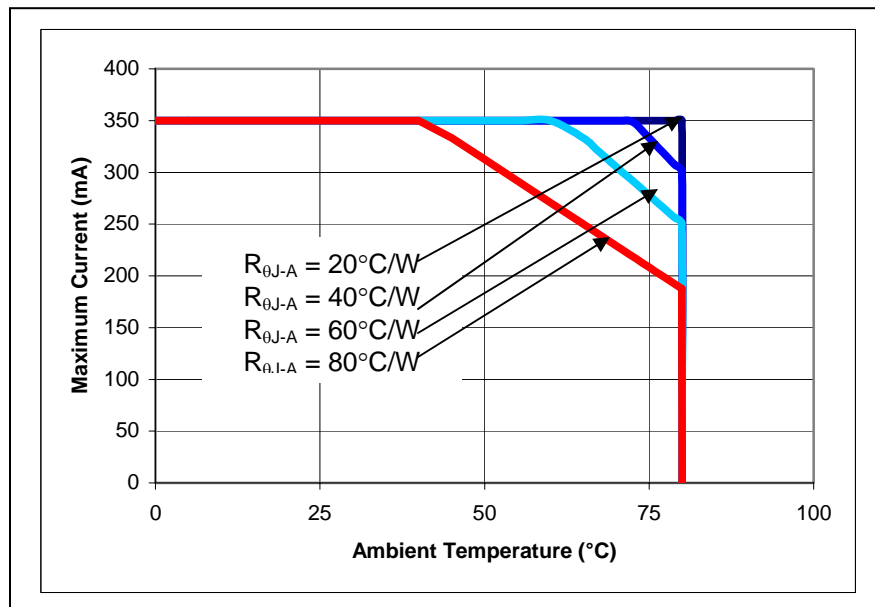
Amber/Red

Thermal Design

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. Given an existing thermal resistance of 17 °C/W between the junction and solder point, it is crucial for the application design to minimize the thermal resistance from solder point to ambient in order to optimize lamp life and optical characteristics.



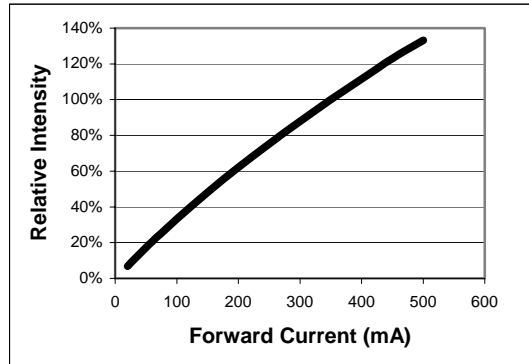
Current derating: Blue/Cyan/Green/White



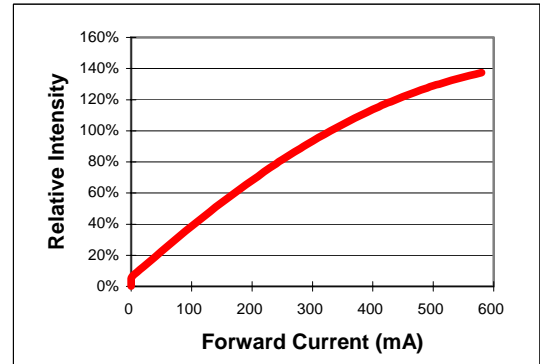
Current derating: Amber/Red

Optical Characteristics

Relative Intensity vs. Current
 $T_A = 25^\circ\text{C}$

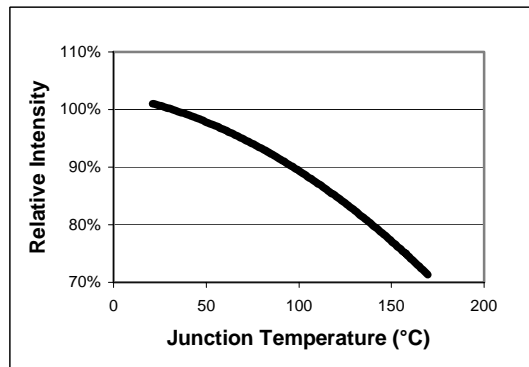


Blue/Cyan/Green/White

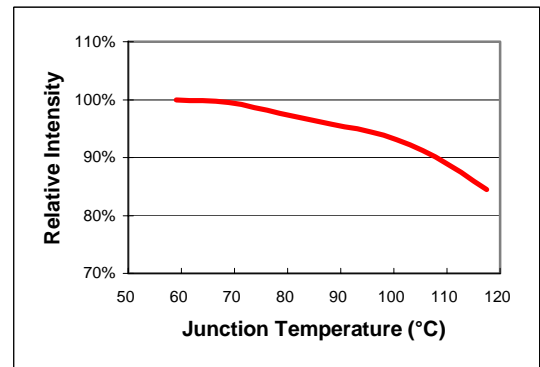


Amber/Red

Relative Intensity vs. Temperature
 $I_f = 350\text{mA}$



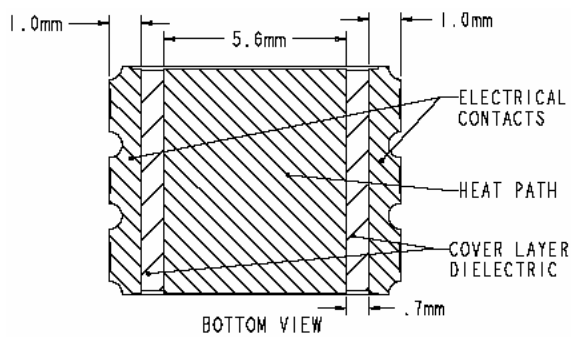
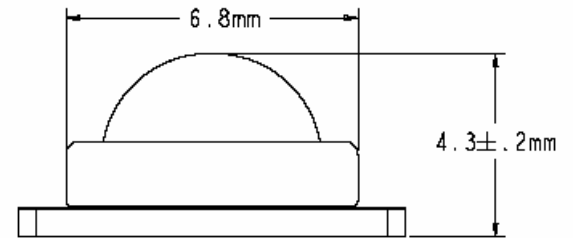
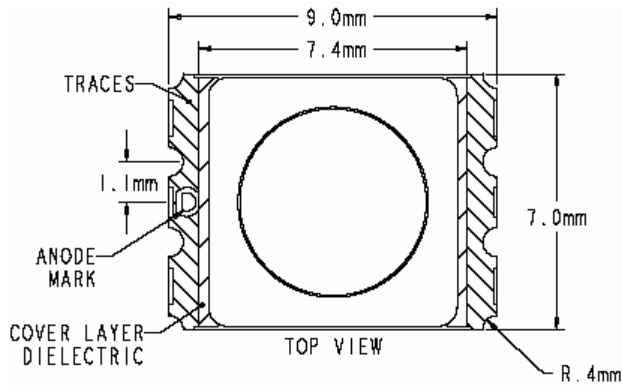
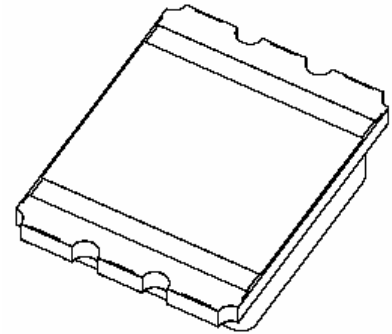
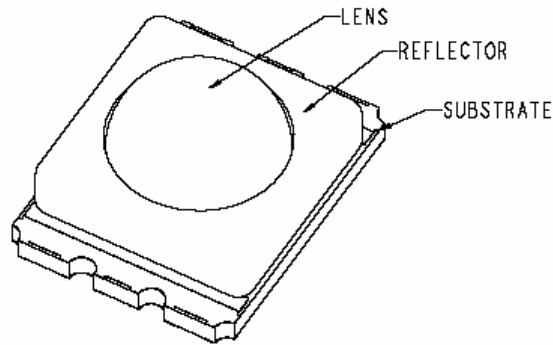
Blue/Cyan/Green/White



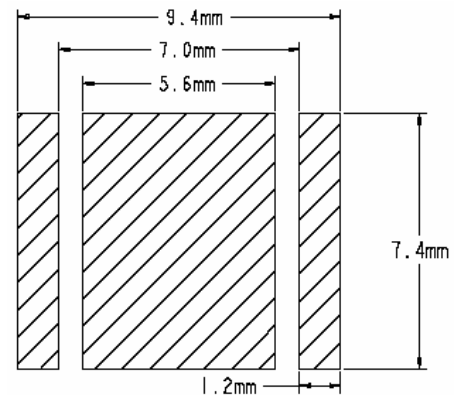
Amber/Red

Mechanical Dimensions

All measurements are $\pm .1\text{mm}$ unless otherwise indicated



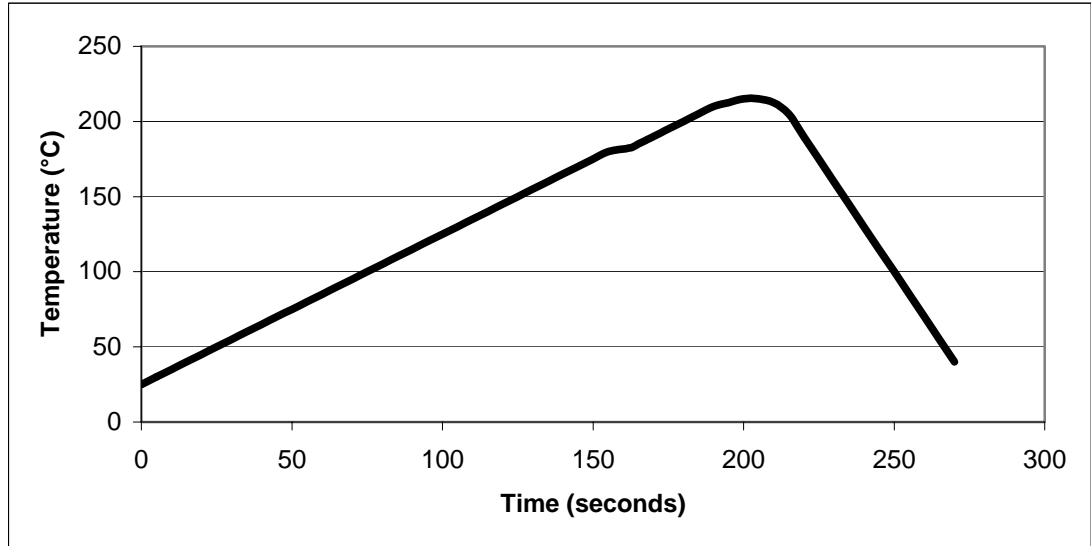
Note: Heat path is electrically neutral.



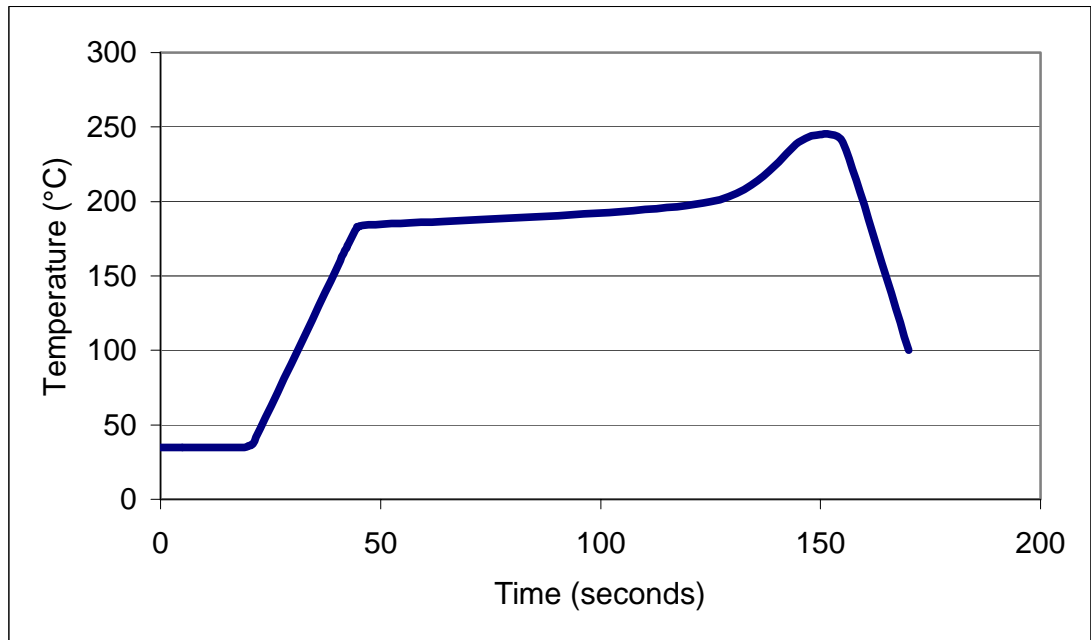
Recommended Solder Pad

Soldering

Common IR
reflow solder
profile
(peak at
215°C)



Common
Pb-free IR
reflow profile



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 pages 15-17.

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

Order Code
Configuration

Family	Color	Spatial Pattern	Viewing Angle (degrees)	Kit # (combination of bins)
XL7090	ROY	L - Lambertian	100	0001-9999
	BLU			
	CYN			
	GRN			
	AMB			
	RDO			
	RED			
	WHT			

XLamp LED product order codes specify package family, color, optical configuration (spatial pattern and viewing angle) and kit number (combination of bins.)

Kit number 0001 is the ordering code encompassing the broadest range of dominant wavelength and brightness groups. For standard kits and available bins see Pages 10-14.

Group	Minimum Luminous Flux (lm)	Maximum Luminous Flux (lm)
C	4.8	6.3
D	6.3	8.2
E	8.2	10.7
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
P	67.2	87.4
Q	87.4	113.6
R	113.6	147.7
S	147.7	192
T	192	249.6

Dominant Wavelength Groups
(All values specified at $I_f = 350\text{mA}$)

Group	Minimum Radiant Flux (mW)	Maximum Radiant Flux (mW)
8	122	147
9	147	175
10	175	210
11	210	250
12	250	300

Bin Codes

Color	Bin Code	Minimum Dominant Wavelength (nm)	Maximum Dominant Wavelength (nm)
Royal Blue	4	455	460
	5	460	465
Blue	3	465	470
	4	470	475
Cyan	2	500	505
	3	505	510
Green	2	520	525
	3	525	530
	4	530	535
Amber	2	585	590
	3	590	595
Red-Orange	3	610	615
	4	615	620
Red	2	620	625
	3	625	630
	4	630	635

Family	Color	Spatial Pattern	Viewing Angle (degrees)	Wavelength Group	Flux Group	Special Code
XL7090	ROY	L - Lambertian	100	1 - 6	A - T	xxxx
	BLU					
	CYN					
	GRN					
	AMB					
	RDO					
	RED					
	WHT					

Example: XL7090BLU-L100-B3-G-0001

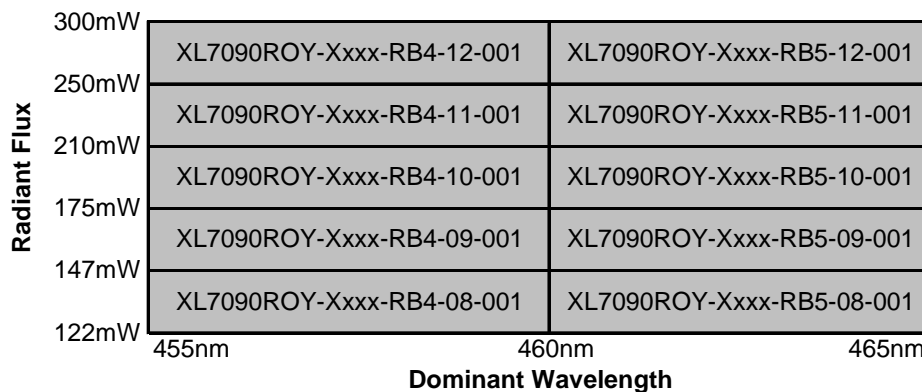
XL7090 — blue, Lambertian with 100-degree viewing angle, blue wavelength group 3 — between 465 nm and 470 nm, luminous flux group G — between 13.9 lm and 18.1 lm, special code 0001.

Standard Order Codes & Available Bins

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

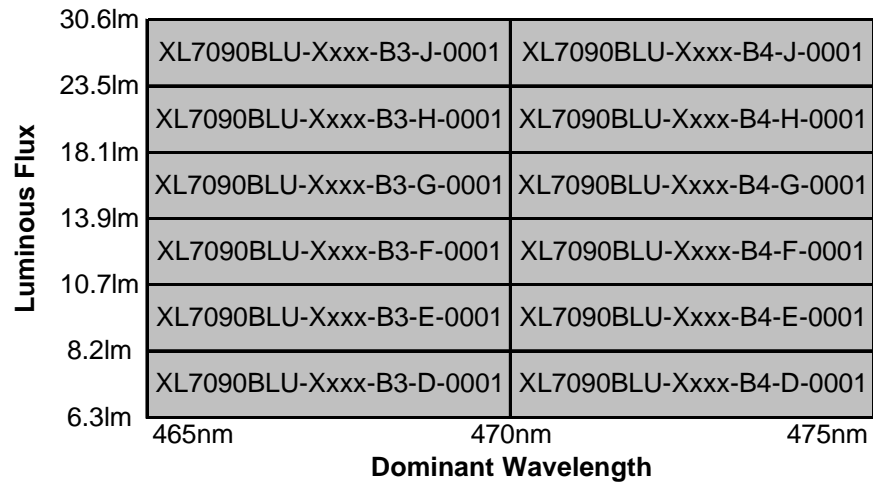
Royal Blue

Name	Bins	DWL (nm)		Rad. Flux (mW)	
		Min.	Max.	Min.	Max.
XL7090ROY-L100-0001	ALL	455	465	ALL	
XL7090ROY-L100-0002	6	455	465	122	210
XL7090ROY-L100-0003	6	455	465	175	300



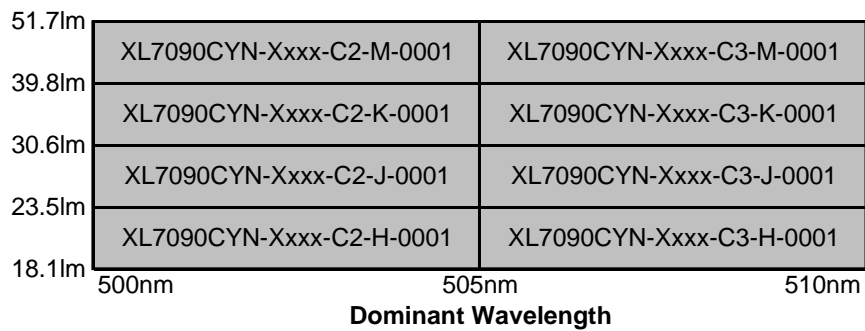
Blue

Name	Bins	DWL (nm)		Lum. Flux (lm)	
		Min.	Max.	Min.	Max.
XL7090BLU-L100-0001	8	465	475	ALL	
XL7090BLU-L100-0002	6	465	475	6.3	13.9
XL7090BLU-L100-0003	6	465	475	8.2	18.1
XL7090BLU-L100-0004	4	465	475	6.3	10.7
XL7090BLU-L100-0005	4	465	475	8.2	13.9
XL7090BLU-L100-0006	4	465	475	10.7	18.1
XL7090BLU-L100-0007	6	465	475	13.9	30.6
XL7090BLU-L100-0008	6	465	475	10.7	23.5
XL7090BLU-L100-0009	6	465	475	6.3	13.9



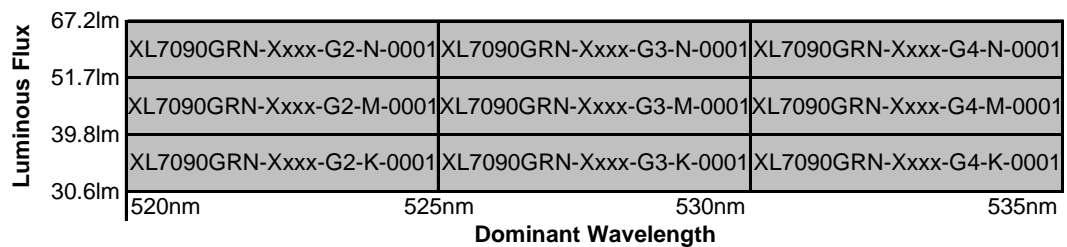
Cyan

Name	Bins	DWL (nm)		Lum. Flux (lm)	
		Min.	Max.	Min.	Max.
XL7090CYN-L100-0001	8	500	510	ALL	
XL7090CYN-L100-0002	6	500	510	18.1	39.8
XL7090CYN-L100-0003	6	500	510	23.5	51.7
XL7090CYN-L100-0004	4	500	510	18.1	30.6
XL7090CYN-L100-0005	4	500	510	23.5	39.8
XL7090CY N-L100-0006	4	500	510	30.6	51.7



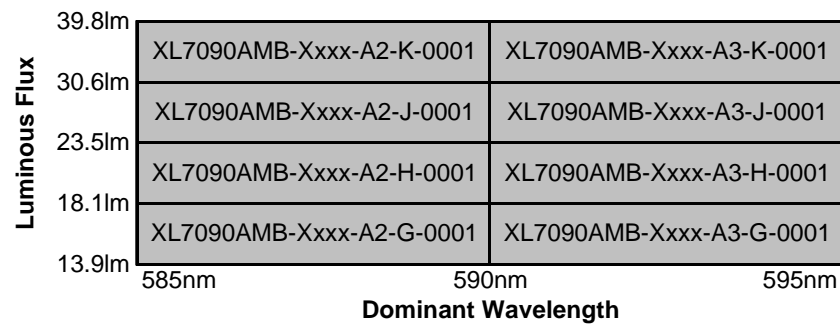
Green

Name	Bins	DWL (nm)		Lum. Flux (lm)	
		Min.	Max.	Min.	Max.
XL7090GRN-L100-0001	ALL	520	535	ALL	
XL7090GRN-L100-0010	6	520	535	30.6	51.7
XL7090GRN-L100-0011	6	520	530	30.6	67.2
XL7090GRN-L100-0012	6	525	535	30.6	67.2
XL7090GRN-L100-0013	6	520	535	39.8	67.2



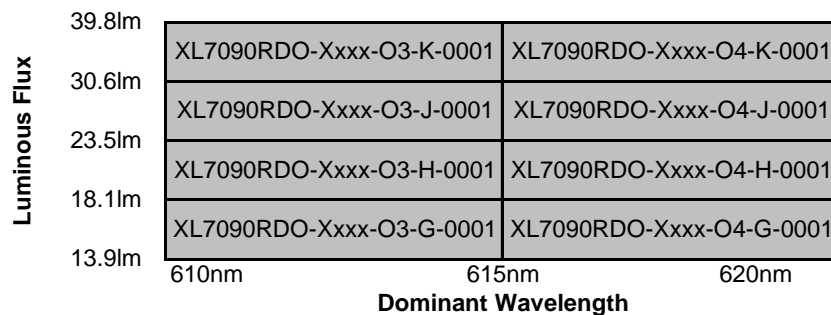
Amber

Name	Bins	DWL (nm)		Lum. Flux (lm)	
		Min.	Max.	Min.	Max.
XL7090AMB-L100-00001	8	585	595	ALL	
XL7090AMB-L100-00002	6	585	595	13.9	30.6
XL7090AMB-L100-00003	6	585	595	18.1	39.8
XL7090AMB-L100-00004	4	585	595	13.9	23.5
XL7090AMB-L100-00005	4	585	595	18.1	30.6
XL7090AMB-L100-00006	4	585	595	23.5	39.8



Red-Orange

Name	Bins	DWL (nm)		Lum. Flux (lm)	
		Min.	Max.	Min.	Max.
XL7090RDO-L100-00001	8	610	620	ALL	
XL7090RDO-L100-00002	6	610	620	13.9	30.6
XL7090RDO-L100-00003	6	610	620	18.1	39.8
XL7090RDO-L100-00004	4	610	620	13.9	23.5
XL7090RDO-L100-00005	4	610	620	18.1	30.6
XL7090RDO-L100-00006	4	610	620	23.5	39.8



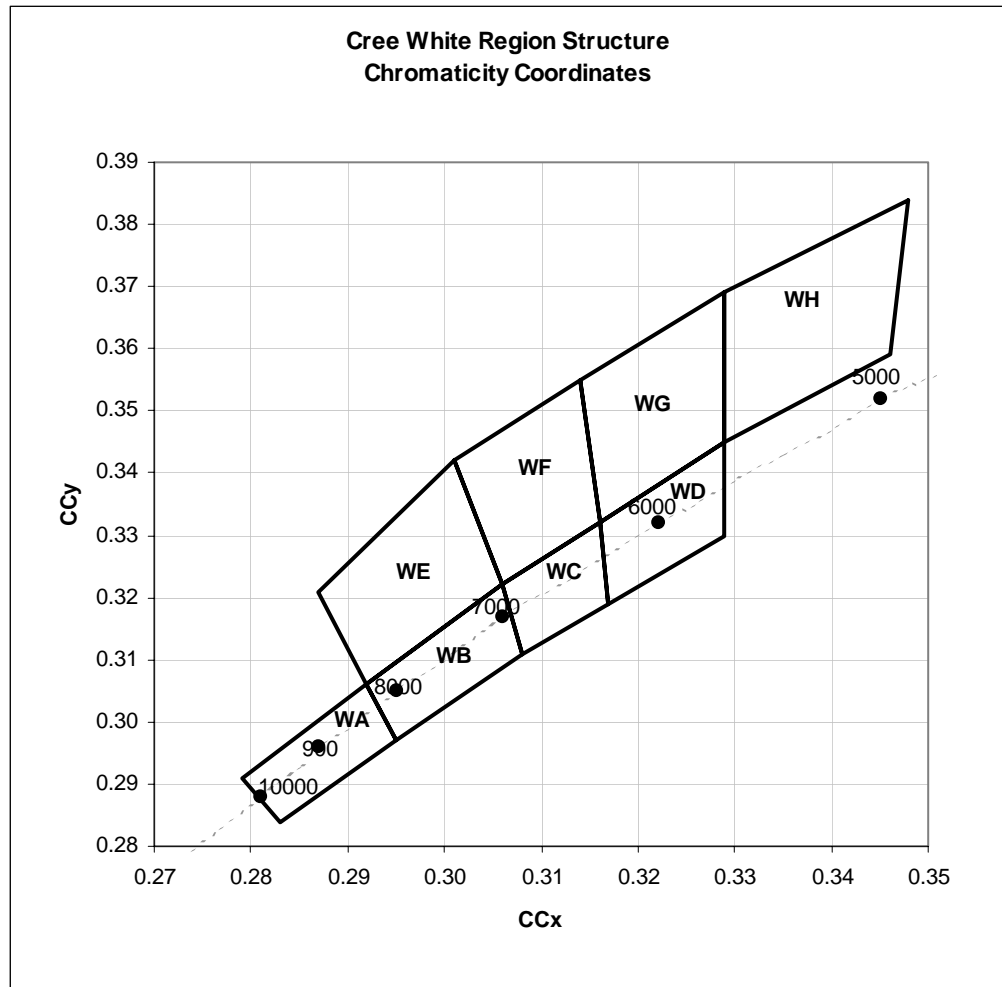
Red

7090: Red Kits					
Name	Bins	DWL (nm)		Lum. Flux (lm)	
		Min.	Max.	Min.	Max.
XL7090RED-L100-0001	9	620	635	ALL	
XL7090RED-L100-0010	6	620	630	18.1	39.8
XL7090RED-L100-0011	6	625	630	18.1	39.8
XL7090RED-L100-0012	6	620	635	23.5	39.8

Luminous Flux	39.8lm	XL7090RED-Xxxx-R2-K-0001	XL7090RED-Xxxx-R3-K-0001	XL7090RED-Xxxx-R4-K-0001	
	30.6lm	XL7090RED-Xxxx-R2-J-0001	XL7090RED-Xxxx-R3-J-0001	XL7090RED-Xxxx-R4-J-0001	
	23.5lm	XL7090RED-Xxxx-R2-H-0001	XL7090RED-Xxxx-R3-H-0001	XL7090RED-Xxxx-R4-H-0001	
	18.1lm				
		620nm	625nm	630nm	635nm
		Dominant Wavelength			

White

White XLamp LEDs are binned according to CIE 1931 chromaticity coordinates and brightness. Cree's standard white groups, bins and kits are presented below.



Cree White Color Region

	0.292	0.306			0.301	0.342	
WA	0.295	0.297			WE	0.306	0.322
	0.283	0.284				0.292	0.306
	0.279	0.291				0.287	0.321
<hr/>							
	0.306	0.322			0.314	0.355	
WB	0.308	0.311			WF	0.316	0.332
	0.295	0.297				0.306	0.322
	0.292	0.306				0.301	0.342
<hr/>							
	0.316	0.332			0.329	0.369	
WC	0.317	0.319			WG	0.329	0.345
	0.308	0.311				0.316	0.332
	0.306	0.322				0.314	0.355
<hr/>							
	0.329	0.345			0.348	0.384	
WD	0.329	0.33			WH	0.346	0.359
	0.317	0.319				0.329	0.345
	0.316	0.332				0.329	0.369

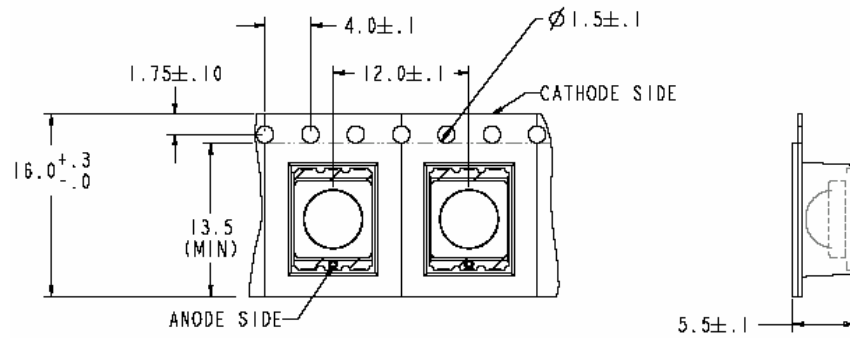
	WA	WB	WC	WD	WE	WF	WG	WH	Lum. Flux (lm)	
									Min.	Max.
XL7090WHT-L100-0001	X	X	X	X	X	X	X	X	ALL	
XL7090WHT-L100-0009			X	X		X	X		23.5	51.7
XL7090WHT-L100-0010			X	X		X	X		39.8	87.4
XL7090WHT-L100-0011	X	X			X				23.5	87.4
XL7090WHT-L100-0012				X			X	X	23.5	87.4

Luminous Flux	87.4lm*	XL7090WHT-Xxxx-WA-P-0004	XL7090WHT-Xxxx-WB-P-0004	XL7090WHT-Xxxx-WC-P-0004
		XL7090WHT-Xxxx-WA-P-0003	XL7090WHT-Xxxx-WB-P-0003	XL7090WHT-Xxxx-WC-P-0003
	67.2lm*	XL7090WHT-Xxxx-WA-P-0002	XL7090WHT-Xxxx-WB-P-0002	XL7090WHT-Xxxx-WC-P-0002
		XL7090WHT-Xxxx-WA-N-0004	XL7090WHT-Xxxx-WB-N-0004	XL7090WHT-Xxxx-WC-N-0004
		XL7090WHT-Xxxx-WA-N-0003	XL7090WHT-Xxxx-WB-N-0003	XL7090WHT-Xxxx-WC-N-0003
	51.7lm*	XL7090WHT-Xxxx-WA-N-0002	XL7090WHT-Xxxx-WB-N-0002	XL7090WHT-Xxxx-WC-N-0002
		XL7090WHT-Xxxx-WA-M-0003	XL7090WHT-Xxxx-WB-M-0003	XL7090WHT-Xxxx-WC-M-0003
	39.8lm*	XL7090WHT-Xxxx-WA-M-0002	XL7090WHT-Xxxx-WB-M-0002	XL7090WHT-Xxxx-WC-M-0002
		XL7090WHT-Xxxx-WA-K-0003	XL7090WHT-Xxxx-WB-K-0003	XL7090WHT-Xxxx-WC-K-0003
	30.6lm*	XL7090WHT-Xxxx-WA-K-0002	XL7090WHT-Xxxx-WB-K-0002	XL7090WHT-Xxxx-WC-K-0002
23.5lm	XL7090WHT-Xxxx-WA-J-0001	XL7090WHT-Xxxx-WB-J-0001	XL7090WHT-Xxxx-WC-J-0001	
	WA	WB	WC	
	Chromaticity Region			

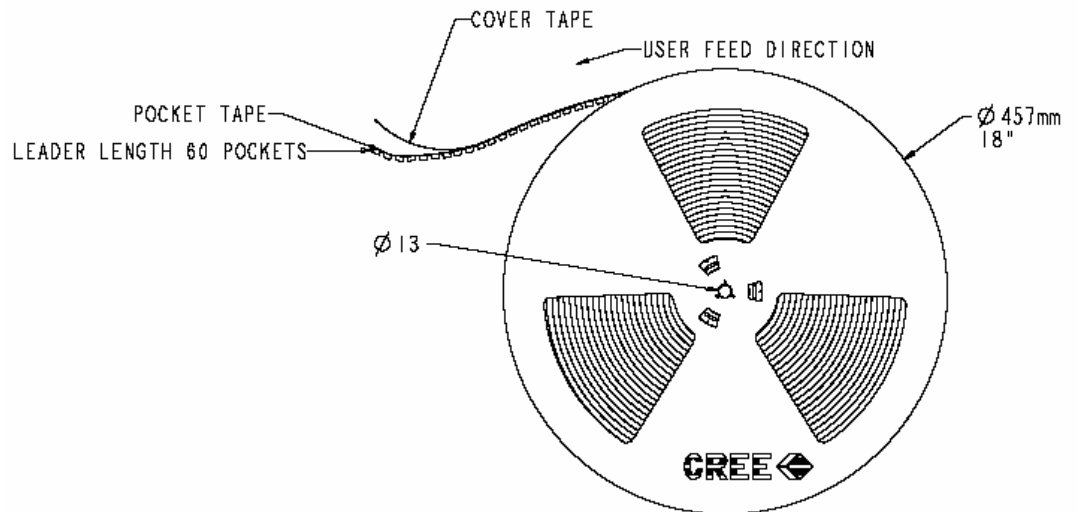
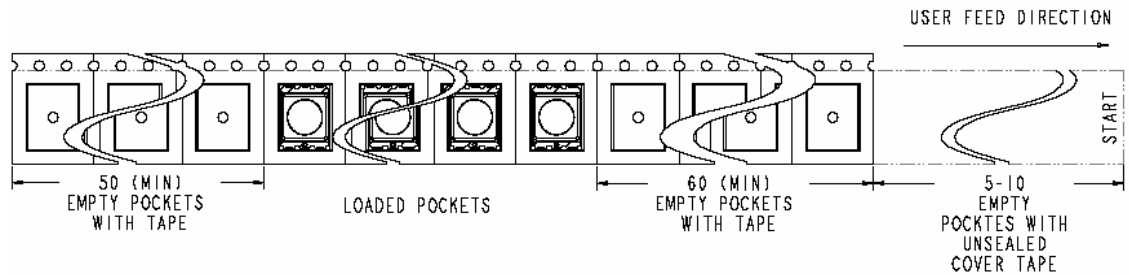
Luminous Flux	87.4lm*	XL7090WHT-Xxxx-WD-P-0004	XL7090WHT-Xxxx-WE-P-0004	XL7090WHT-Xxxx-WF-P-0004
		XL7090WHT-Xxxx-WD-P-0003	XL7090WHT-Xxxx-WE-P-0003	XL7090WHT-Xxxx-WF-P-0003
	67.2lm*	XL7090WHT-Xxxx-WD-P-0002	XL7090WHT-Xxxx-WE-P-0002	XL7090WHT-Xxxx-WF-P-0002
		XL7090WHT-Xxxx-WD-N-0004	XL7090WHT-Xxxx-WE-N-0004	XL7090WHT-Xxxx-WF-N-0004
		XL7090WHT-Xxxx-WD-N-0003	XL7090WHT-Xxxx-WE-N-0003	XL7090WHT-Xxxx-WF-N-0003
	51.7lm*	XL7090WHT-Xxxx-WD-N-0002	XL7090WHT-Xxxx-WE-N-0002	XL7090WHT-Xxxx-WF-N-0002
		XL7090WHT-Xxxx-WD-M-0003	XL7090WHT-Xxxx-WE-M-0003	XL7090WHT-Xxxx-WF-M-0003
	39.8lm*	XL7090WHT-Xxxx-WD-M-0002	XL7090WHT-Xxxx-WE-M-0002	XL7090WHT-Xxxx-WF-M-0002
		XL7090WHT-Xxxx-WD-K-0003	XL7090WHT-Xxxx-WE-K-0003	XL7090WHT-Xxxx-WF-K-0003
	30.6lm*	XL7090WHT-Xxxx-WD-K-0002	XL7090WHT-Xxxx-WE-K-0002	XL7090WHT-Xxxx-WF-K-0002
23.5lm	XL7090WHT-Xxxx-WD-J-0001	XL7090WHT-Xxxx-WE-J-0001	XL7090WHT-Xxxx-WF-J-0001	
	WD	WE	WF	
	Chromaticity Region			

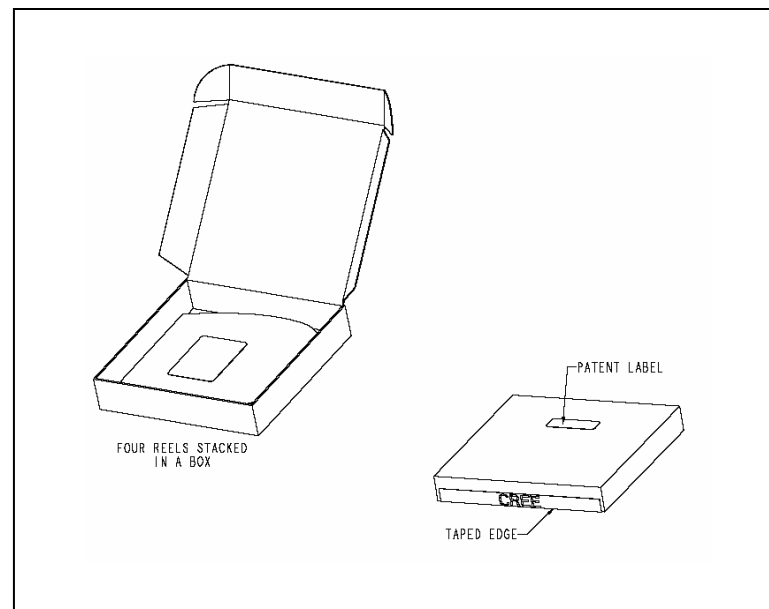
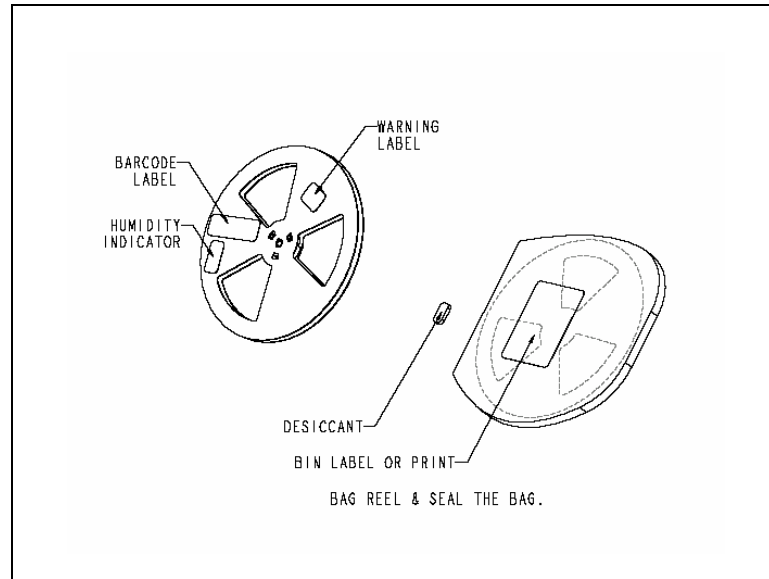
Luminous Flux	87.4lm*	XL7090WHT-Xxxx-WG-P-0004	XL7090WHT-Xxxx-WH-P-0004
		XL7090WHT-Xxxx-WG-P-0003	XL7090WHT-Xxxx-WH-P-0003
	67.2lm*	XL7090WHT-Xxxx-WG-P-0002	XL7090WHT-Xxxx-WH-P-0002
		XL7090WHT-Xxxx-WG-N-0004	XL7090WHT-Xxxx-WH-N-0004
		XL7090WHT-Xxxx-WG-N-0003	XL7090WHT-Xxxx-WH-N-0003
	51.7lm*	XL7090WHT-Xxxx-WG-N-0002	XL7090WHT-Xxxx-WH-N-0002
		XL7090WHT-Xxxx-WG-M-0003	XL7090WHT-Xxxx-WH-M-0003
	39.8lm*	XL7090WHT-Xxxx-WG-M-0002	XL7090WHT-Xxxx-WH-M-0002
		XL7090WHT-Xxxx-WG-K-0003	XL7090WHT-Xxxx-WH-K-0003
	30.6lm*	XL7090WHT-Xxxx-WG-K-0002	XL7090WHT-Xxxx-WH-K-0002
23.5lm	XL7090WHT-Xxxx-WG-J-0001	XL7090WHT-Xxxx-WH-J-0001	
	WG	WH	
	Chromaticity Region		

Packaging



Tape and Reel
(Dimensions
in mm)





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