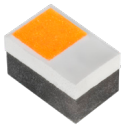
XLamp® XE-B LEDs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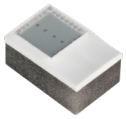
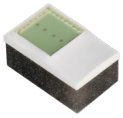

Royal Blue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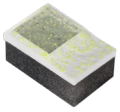
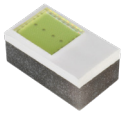
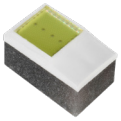

PC Blue


Cyan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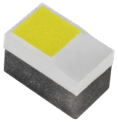
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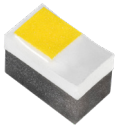
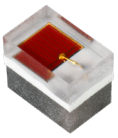
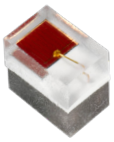

PC Yellow


PC Amber


Red-Orange


Red

PRODUCT DESCRIPTION

XLamp® Element B (XE-B) LEDs expand the Element product line with a smaller package that is optimized for highest intensity and the best possible color mixing. Element LEDs provide breakthrough solutions for color-mixing lighting applications that require high levels of light output and full control over the spectral content.

XE-B's tiny 1.4 x 0.9 mm footprint package includes key features of the larger XE-G LED, including a large isolated thermal pad and minimal spacing between the LED chip and the edge of the package.

The XE-B platform is consistent across all colors in many LED design parameters, including package size, PCB footprint, orientation, and optical source size. This consistency makes it easy to reuse core design elements, such as PCBs and optics, across a wide range of designs.

XLamp Element B (XE-B) LEDs are optimized for directional lighting applications that benefit from multi-color LED designs, including indoor directional, architectural, entertainment and aftermarket automotive.

FEATURES

- Available in 70, 80, & 90 CRI white, royal blue, blue, PC blue, cyan, green, PC lime, PC yellow, PC amber, red-orange, red
- Maximum drive current: 1.0 A
- Reflow solderable - JEDEC J-STD-020C compatible
- Unlimited floor life at ≤ 30 °C/85% RH
- RoHS and REACH compliant
- UL® recognized component (E349212)

Cree LED / 4001 E. Hwy. 54, Suite 2000 / Durham, NC 27713 USA / +1.919.313.5330 / www.cree-led.com

TABLE OF CONTENTS

XLAMP XE-B LEDs - WHITE

CHARACTERISTICS - WHITE

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		6.5	
Viewing angle (FWHM)	degrees		115	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 85 °C)	V		2.9	3.3
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - EASYWHITE® ORDER CODES AND BINS (T_J = 85 °C)

The following table provides order codes for XLamp XE-B white LEDs.

Nominal CCT	CRI	Minimum Luminous Flux @ 350 mA			2-Step		3-Step		5-Step	
	Min.	Flux Bin	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
6500K	70	R2	114	131					65E	XEBAWT-H0-0000-000-00000BR265E
		R3	122	140						XEBAWT-H0-0000-000-00000BR365E
	80	Q4	100	111			65G	XEBAWT-H0-0000-000-00000HQ465G		
		Q5	107	119				XEBAWT-H0-0000-000-00000HQ565G		
5700K	70	R2	114	131					57E	XEBAWT-H0-0000-000-00000BR257E
		R3	122	140						XEBAWT-H0-0000-000-00000BR357E
	80	Q4	100	111			57G	XEBAWT-H0-0000-000-00000HQ457G		
		Q5	107	119				XEBAWT-H0-0000-000-00000HQ557G		
5000K	70	R2	114	131					50E	XEBAWT-H0-0000-000-00000BR250E
		R3	122	140						XEBAWT-H0-0000-000-00000BR350E
	80	Q4	100	111			50G	XEBAWT-H0-0000-000-00000HQ450G		
		Q5	107	119				XEBAWT-H0-0000-000-00000HQ550G		

Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

* Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS - EASYWHITE® ORDER CODES AND BINS (T_J = 85 °C)

The following table provides order codes for XLamp XE-B white LEDs.

Nominal CCT	CRI	Minimum Luminous Flux @ 350 mA			2-Step		3-Step		5-Step	
	Min.	Flux Bin	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
4000K	70	Q5	107	119					40E	XEBAWT-H0-0000-000-00000BQ540E
		R2	114	131						XEBAWT-H0-0000-000-00000BR240E
	80	Q3	93.9	108	40H	XEBAWT-H0-0000-000-00000HQ340H	40G	XEBAWT-H0-0000-000-00000HQ340G		
		Q4	100	111		XEBAWT-H0-0000-000-00000HQ440H		XEBAWT-H0-0000-000-00000HQ440G		
		Q5	107	119		XEBAWT-H0-0000-000-00000HQ540H		XEBAWT-H0-0000-000-00000HQ540G		
	90	P4	80.6	92.3	40H	XEBAWT-H0-0000-000-00000UP440H	40G	XEBAWT-H0-0000-000-00000UP440G		
		Q2	87.4	110		XEBAWT-H0-0000-000-00000UQ240H		XEBAWT-H0-0000-000-00000UQ240G		
3500K	70	Q4	100	111					35E	XEBAWT-H0-0000-000-00000BQ435E
		Q5	107	119						XEBAWT-H0-0000-000-00000BQ535E
	80	Q3	93.9	108	35H	XEBAWT-H0-0000-000-00000HQ335H	35G	XEBAWT-H0-0000-000-00000HQ335G		
		Q4	100	111		XEBAWT-H0-0000-000-00000HQ435H		XEBAWT-H0-0000-000-00000HQ435G		
	90	P4	80.6	92.3	35H	XEBAWT-H0-0000-000-00000UP435H	35G	XEBAWT-H0-0000-000-00000UP435G		
		Q2	87.4	110		XEBAWT-H0-0000-000-00000UQ235H		XEBAWT-H0-0000-000-00000UQ235G		
3000K	70	Q4	100	111					30E	XEBAWT-H0-0000-000-00000BQ430E
		Q5	107	119						XEBAWT-H0-0000-000-00000BQ530E
	80	P4	80.6	92.3	30H	XEBAWT-H0-0000-000-00000HP430H	30G	XEBAWT-H0-0000-000-00000HP430G		
		Q2	87.4	110		XEBAWT-H0-0000-000-00000HQ230H		XEBAWT-H0-0000-000-00000HQ230G		
	90	P3	73.9	84.6	30H	XEBAWT-H0-0000-000-00000UP330H	30G	XEBAWT-H0-0000-000-00000UP330G		
		P4	80.6	92.3		XEBAWT-H0-0000-000-00000UP430H		XEBAWT-H0-0000-000-00000UP430G		

Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

* Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS - EASYWHITE® ORDER CODES AND BINS (T_J = 85 °C)

The following table provides order codes for XLamp XE-B white LEDs.

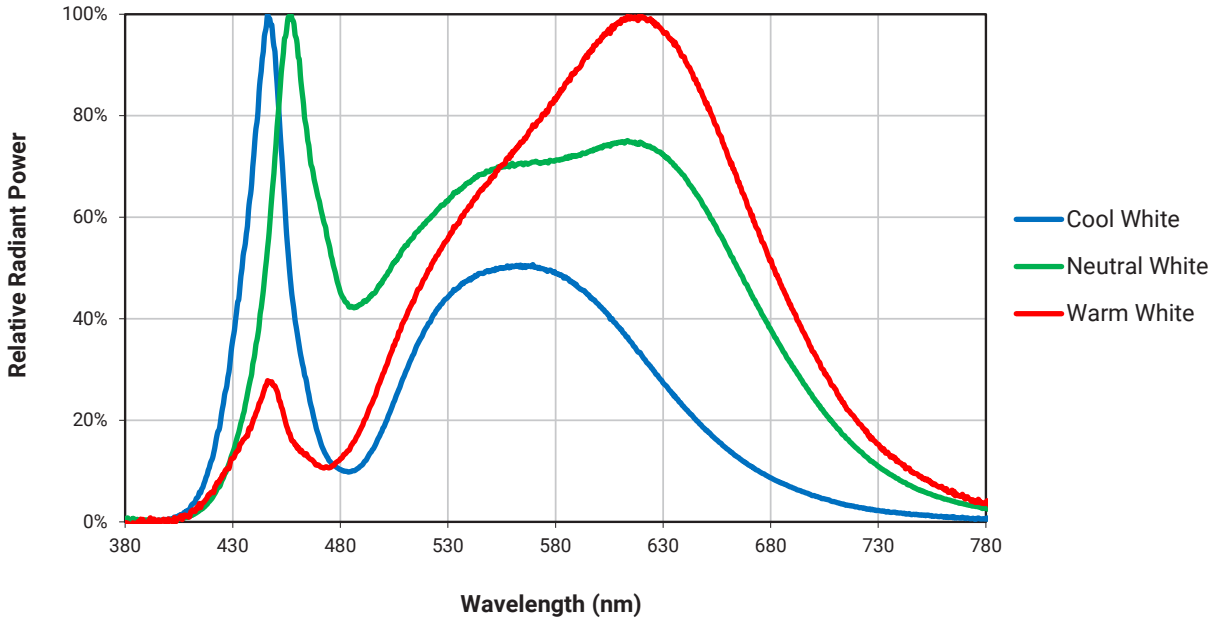
Nominal CCT	CRI	Minimum Luminous Flux @ 350 mA			2-Step		3-Step		5-Step	
	Min.	Flux Bin	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
2700K	70	Q3	93.9	108					27E	XEBAWT-H0-0000-000-00000BQ327E
		Q4	100	111						XEBAWT-H0-0000-000-00000BQ427E
	80	P4	80.6	92.3	27H	XEBAWT-H0-0000-000-00000HP427H	27G	XEBAWT-H0-0000-000-00000HP427G		
		Q2	87.4	110		XEBAWT-H0-0000-000-00000HQ227H		XEBAWT-H0-0000-000-00000HQ227G		
	90	P3	73.9	84.6	27H	XEBAWT-H0-0000-000-00000UP327H	27G	XEBAWT-H0-0000-000-00000UP327G		
		P4	80.6	92.3		XEBAWT-H0-0000-000-00000UP427H		XEBAWT-H0-0000-000-00000UP427G		
2200K	70	Q2	87.4	100					22E	XEBAWT-H0-0000-000-00000BQ222E
		Q3	93.9	108						XEBAWT-H0-0000-000-00000BQ322E
	80	P2	67.2	77	22H	XEBAWT-H0-0000-000-00000HP222H	22G	XEBAWT-H0-0000-000-00000HP222G		
		P3	73.9	84.6		XEBAWT-H0-0000-000-00000HP322H		XEBAWT-H0-0000-000-00000HP322G		
	90	N4	62	71.1	22H	XEBAWT-H0-0000-000-00000UN422H	22G	XEBAWT-H0-0000-000-00000UN422G		
		P2	67.2	77		XEBAWT-H0-0000-000-00000UP222H		XEBAWT-H0-0000-000-00000UP222G		

Notes

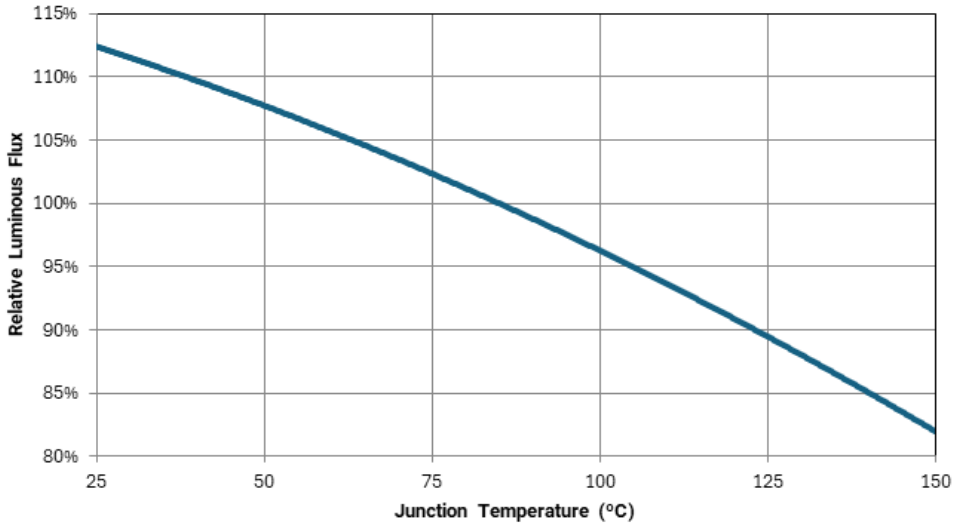
- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

* Flux values @ 25 °C are calculated and for reference only.

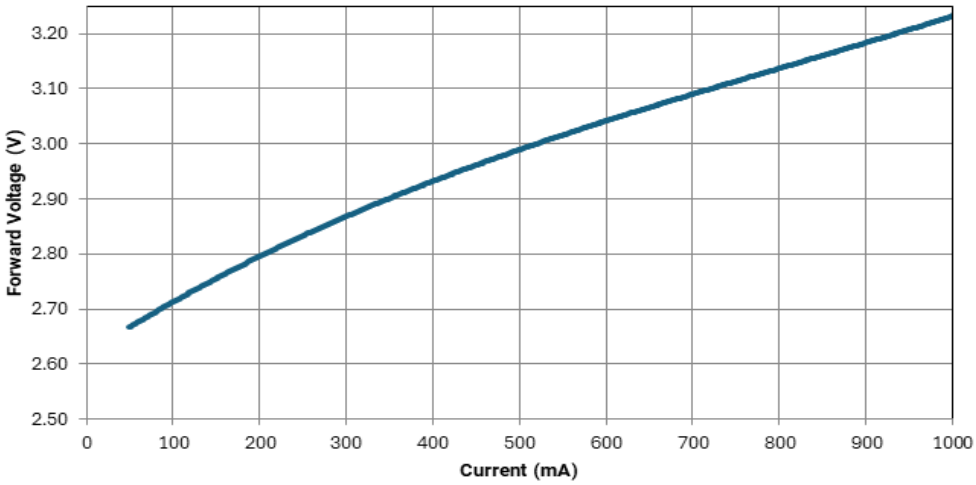
RELATIVE SPECTRAL POWER DISTRIBUTION - WHITE



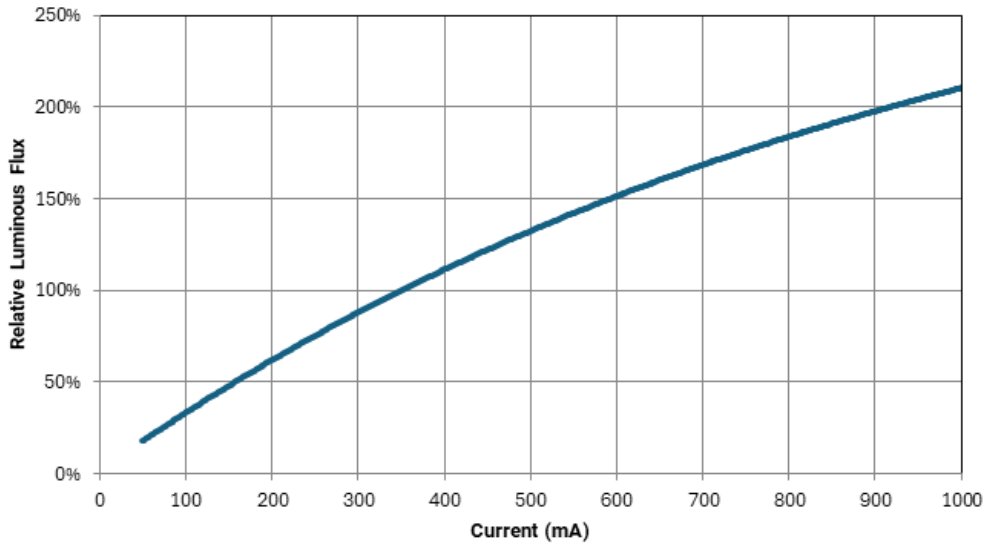
RELATIVE FLUX VS. JUNCTION TEMPERATURE - WHITE (I_F = 350 mA)



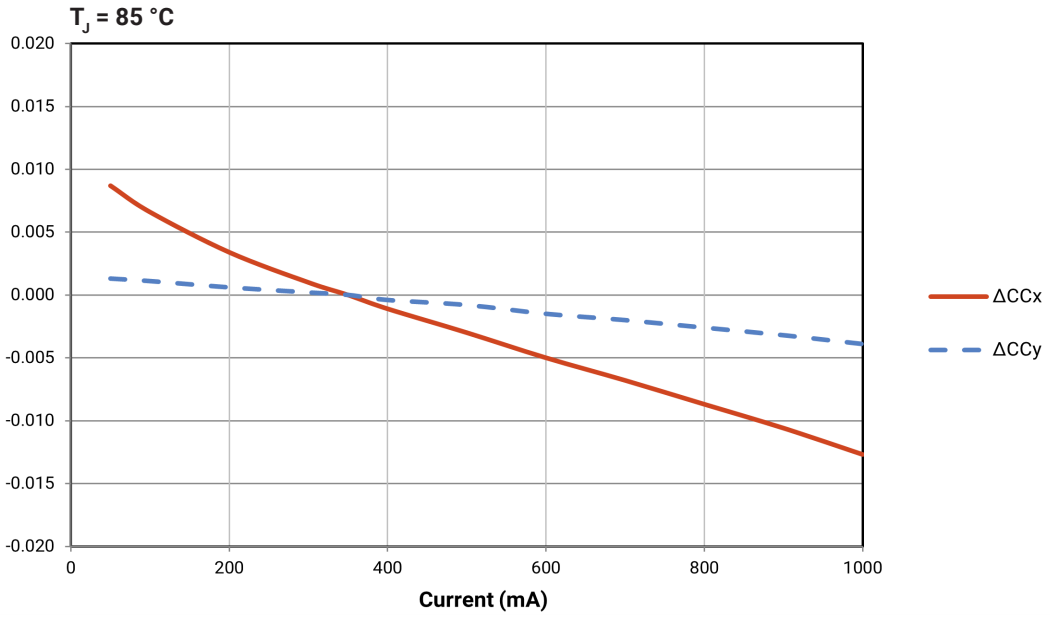
ELECTRICAL CHARACTERISTICS - WHITE (T_J = 85 °C)

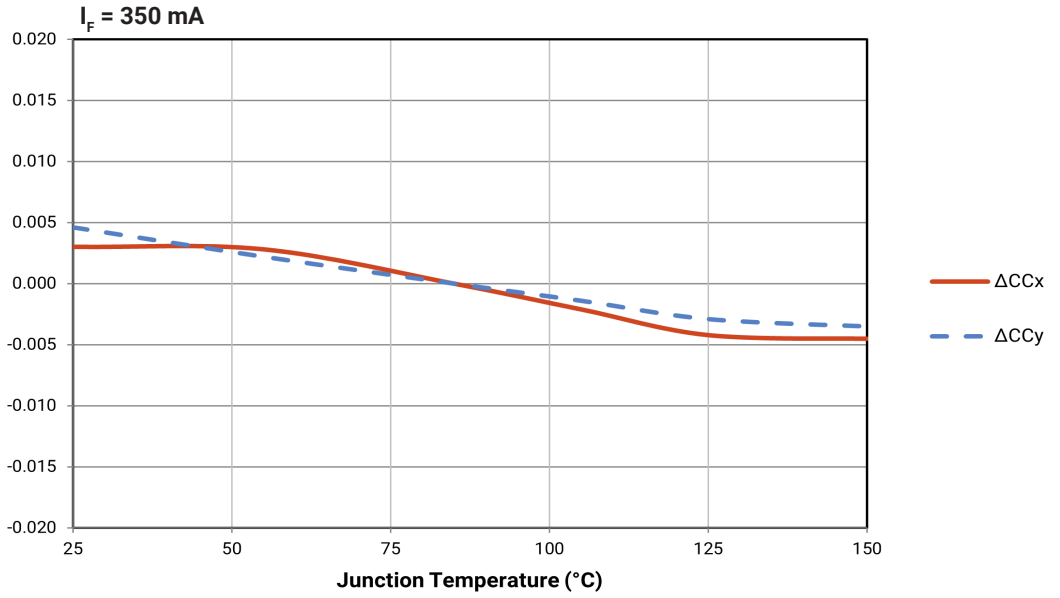


RELATIVE FLUX VS. CURRENT - WHITE (T_J = 85 °C)

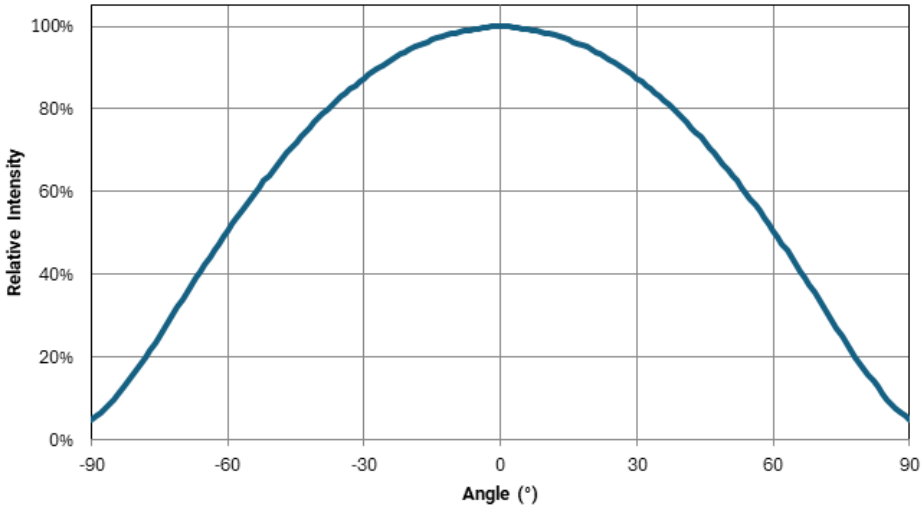


RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE - WARM WHITE



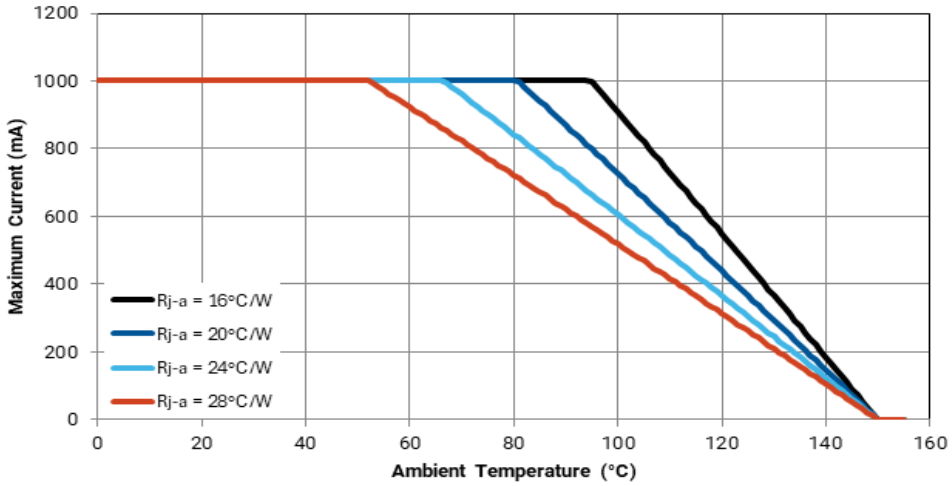


TYPICAL SPATIAL DISTRIBUTION - WHITE



THERMAL DESIGN - WHITE

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - ROYAL BLUE

CHARACTERISTICS - ROYAL BLUE

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		5.5	
Viewing angle (FWHM)	degrees		120	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3	3.5
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - ROYAL BLUE (T_J = 25 °C)

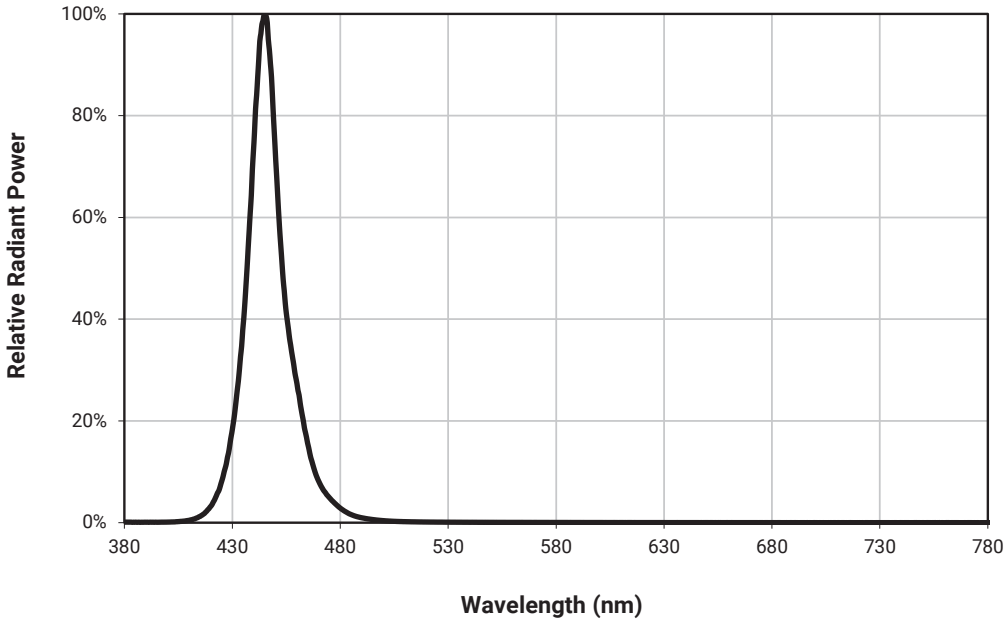
The following table provides order codes for XLamp XE-B royal blue LEDs.

Royal Blue		Minimum Radiant Flux (mW) @ 350 mA		Order Code
Kit	Dominant Wavelengh (nm)	Code	Flux (mW)	
001	450-465	33	525	XEBARY-H0-0000-000-00000033001
		34	550	XEBARY-H0-0000-000-00000034001
002	450-460	33	525	XEBARY-H0-0000-000-00000033002
		34	550	XEBARY-H0-0000-000-00000034002
004	450-455	33	525	XEBARY-H0-0000-000-00000033004
		34	550	XEBARY-H0-0000-000-00000034004

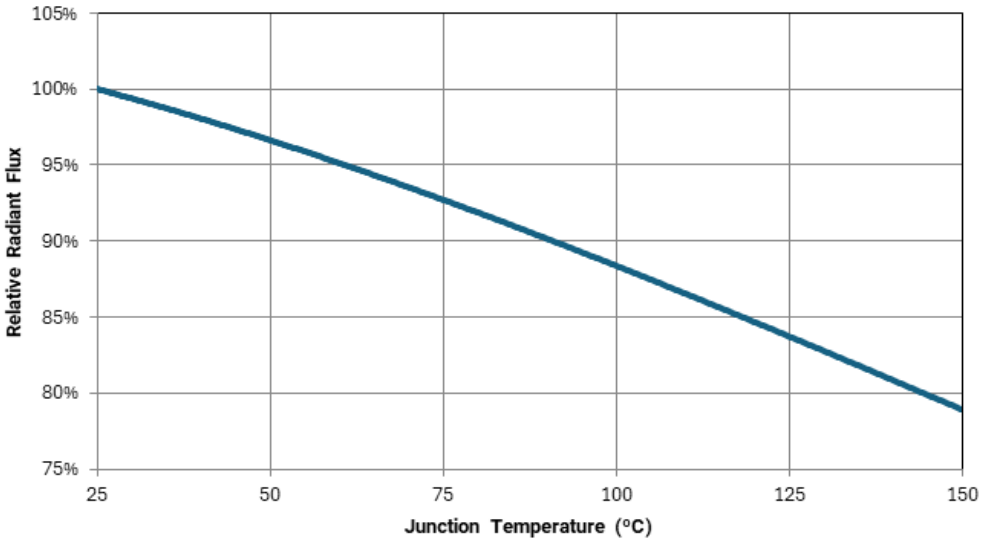
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

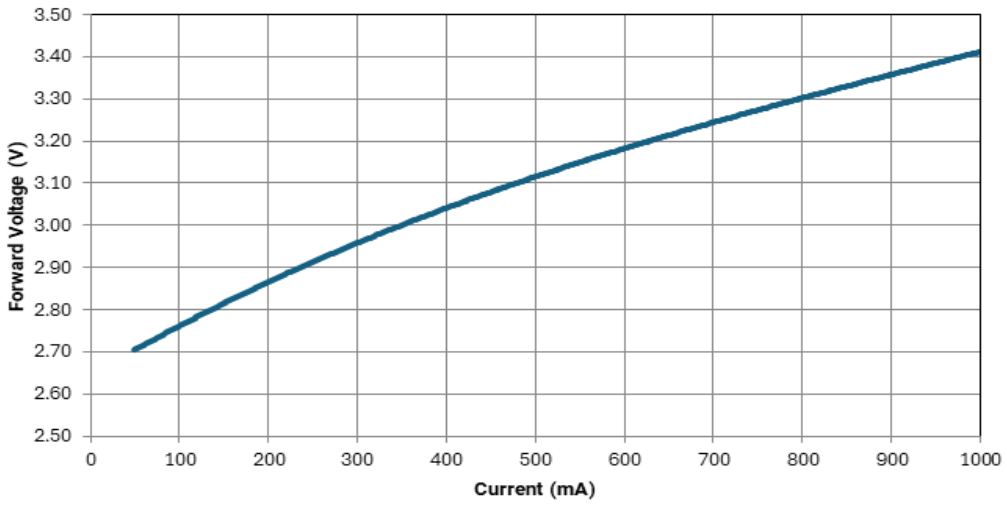
RELATIVE SPECTRAL POWER DISTRIBUTION - ROYAL BLUE



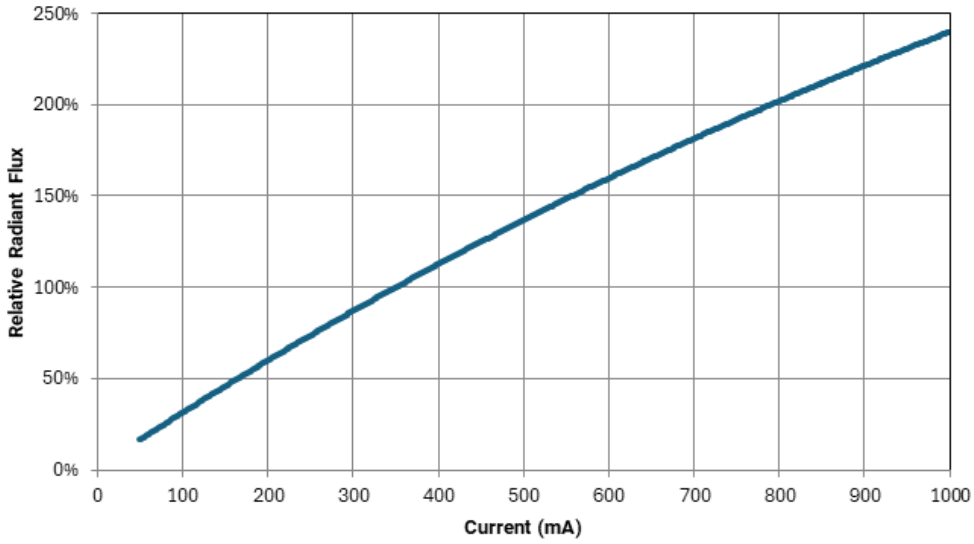
RELATIVE FLUX VS. JUNCTION TEMPERATURE - ROYAL BLUE (I_F = 350 mA)



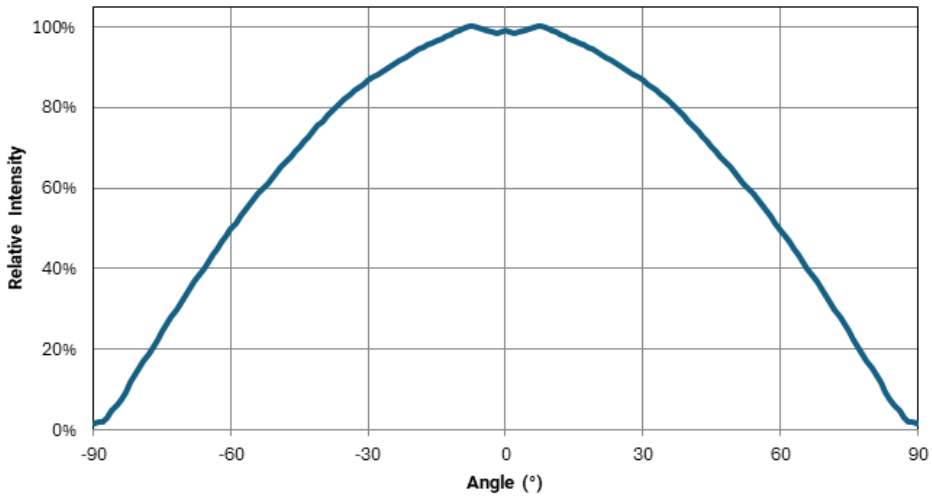
ELECTRICAL CHARACTERISTICS - ROYAL BLUE (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - ROYAL BLUE (T_J = 25 °C)

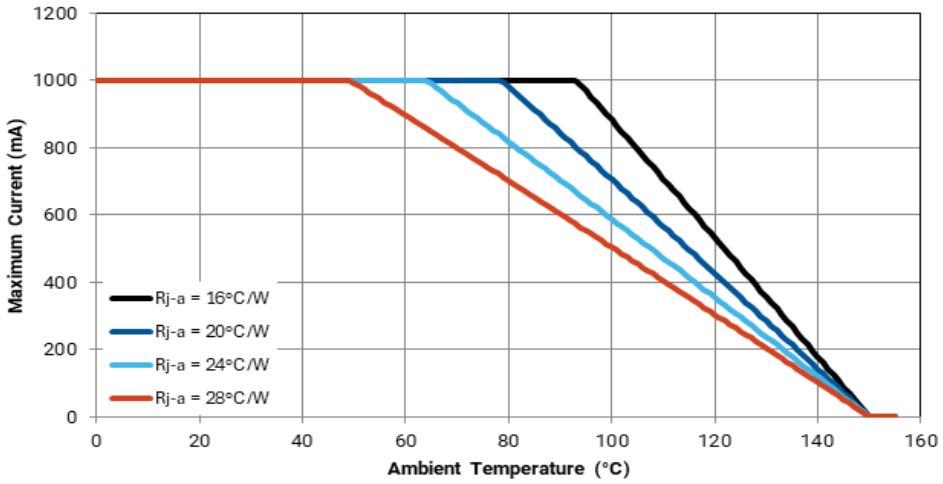


TYPICAL SPATIAL DISTRIBUTION - ROYAL BLUE



THERMAL DESIGN - ROYAL BLUE

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - BLUE

CHARACTERISTICS - BLUE

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		5.5	
Viewing angle (FWHM)	degrees		120	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3.0	3.5
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - BLUE (T_J = 25 °C)

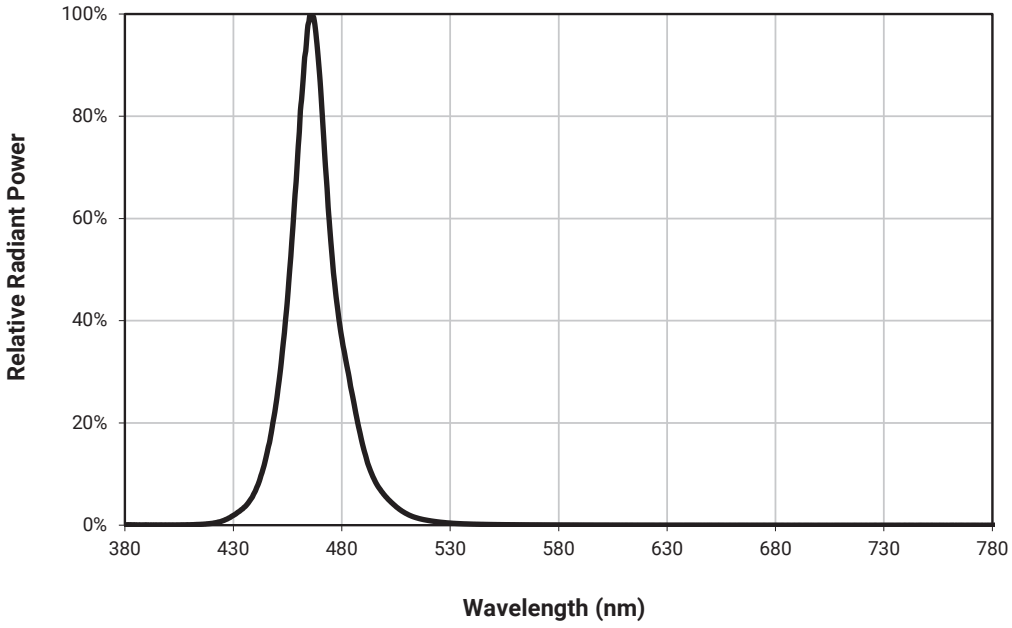
The following table provides order codes for XLamp XE-B blue LEDs.

Blue		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Dominant Wavelengh (nm)	Code	Flux (lm)	
001	465-485	J3	26.8	XEBABL-H0-0000-000-000000J3001
		K2	30.6	XEBABL-H0-0000-000-000000K2001
002	465-480	J3	26.8	XEBABL-H0-0000-000-000000J3002
		K2	30.6	XEBABL-H0-0000-000-000000K2002
003	470-485	K2	30.6	XEBABL-H0-0000-000-000000K2003
		K3	39.8	XEBABL-H0-0000-000-000000K3003
004	465-475	J3	26.8	XEBABL-H0-0000-000-000000J3004
		K2	30.6	XEBABL-H0-0000-000-000000K2004

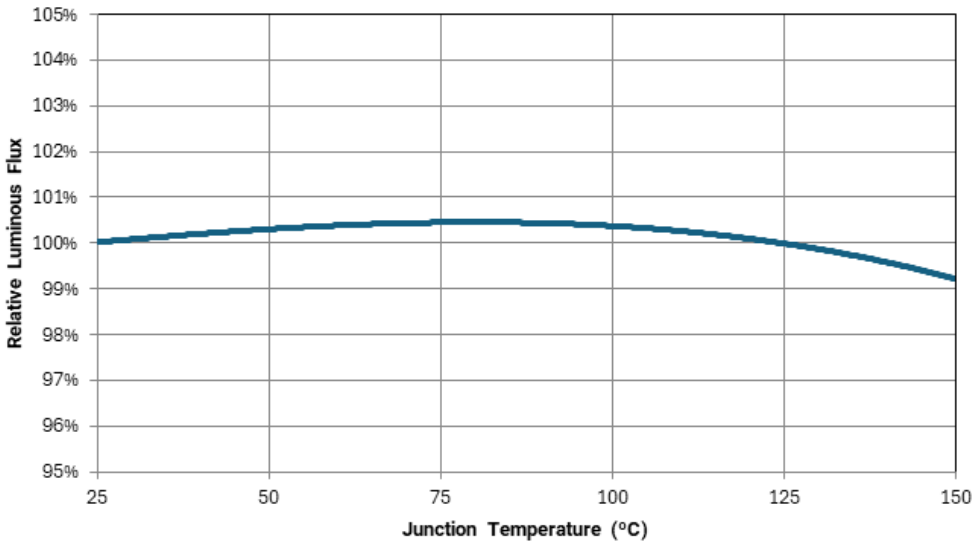
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

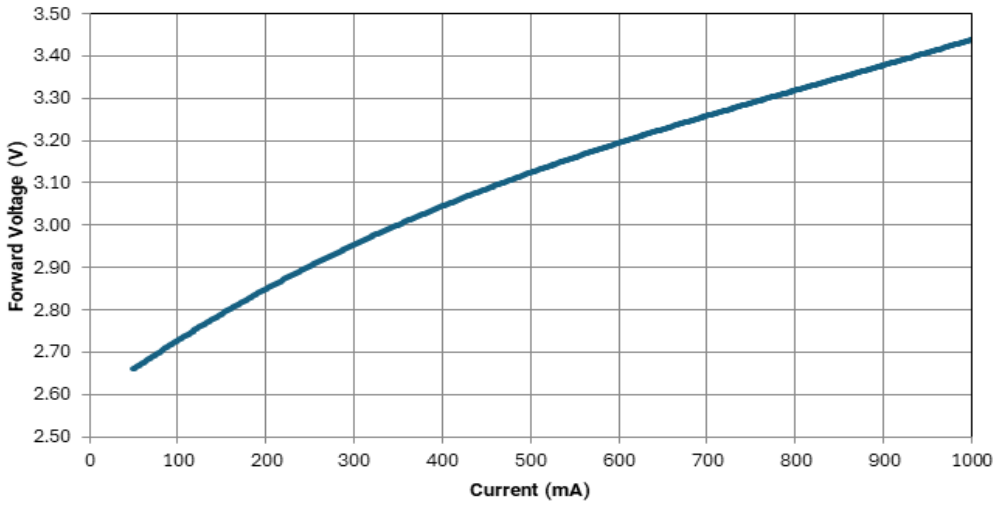
RELATIVE SPECTRAL POWER DISTRIBUTION - BLUE



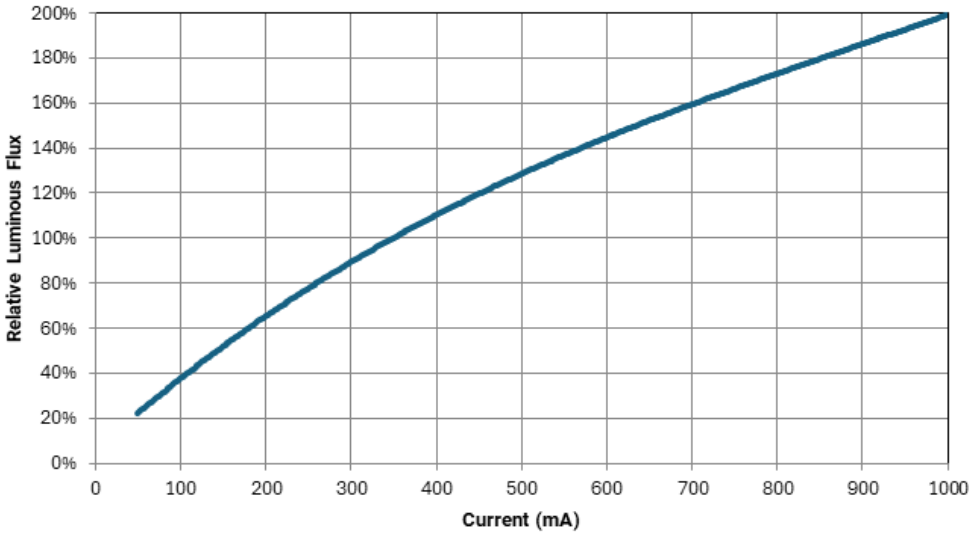
RELATIVE FLUX VS. JUNCTION TEMPERATURE - BLUE (I_F = 350 mA)



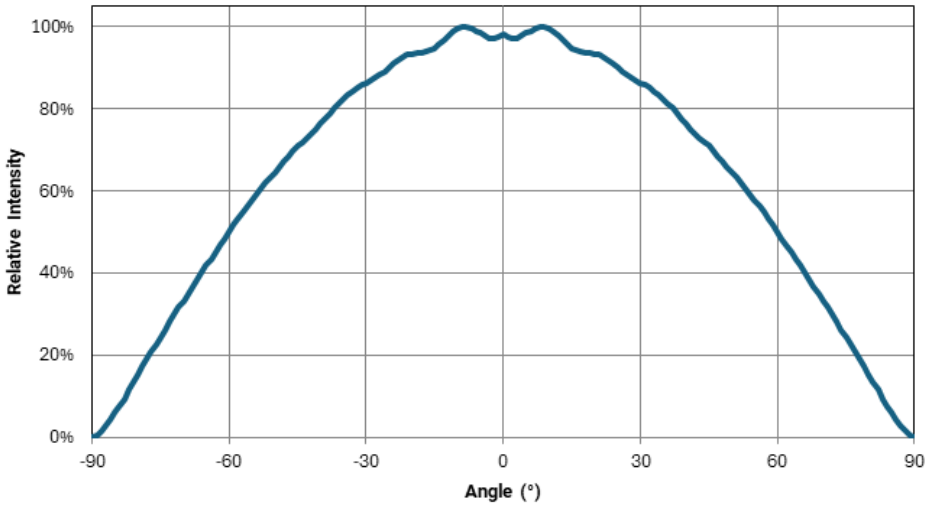
ELECTRICAL CHARACTERISTICS - BLUE (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - BLUE (T_J = 25 °C)

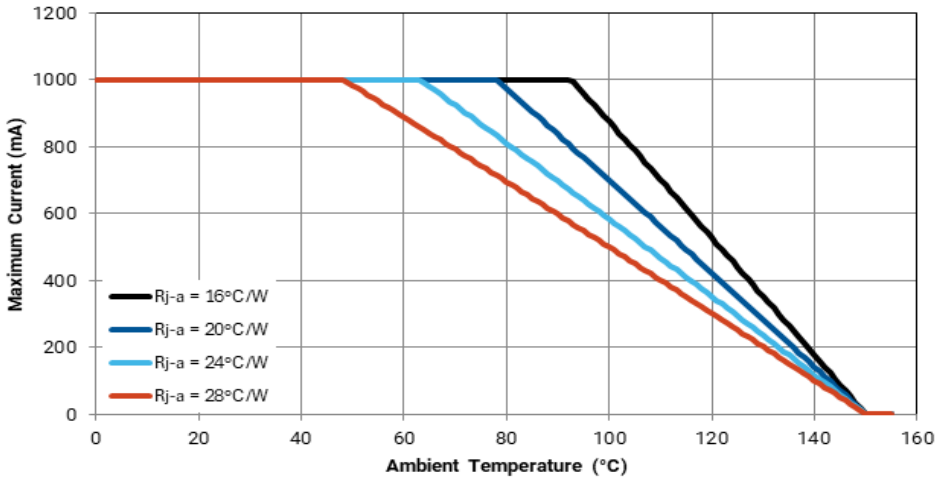


TYPICAL SPATIAL DISTRIBUTION - BLUE



THERMAL DESIGN - BLUE

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - PC BLUE

CHARACTERISTICS - PC BLUE

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		6	
Viewing angle (FWHM)	degrees		120	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3.0	3.5
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - PC BLUE (T_J = 25 °C)

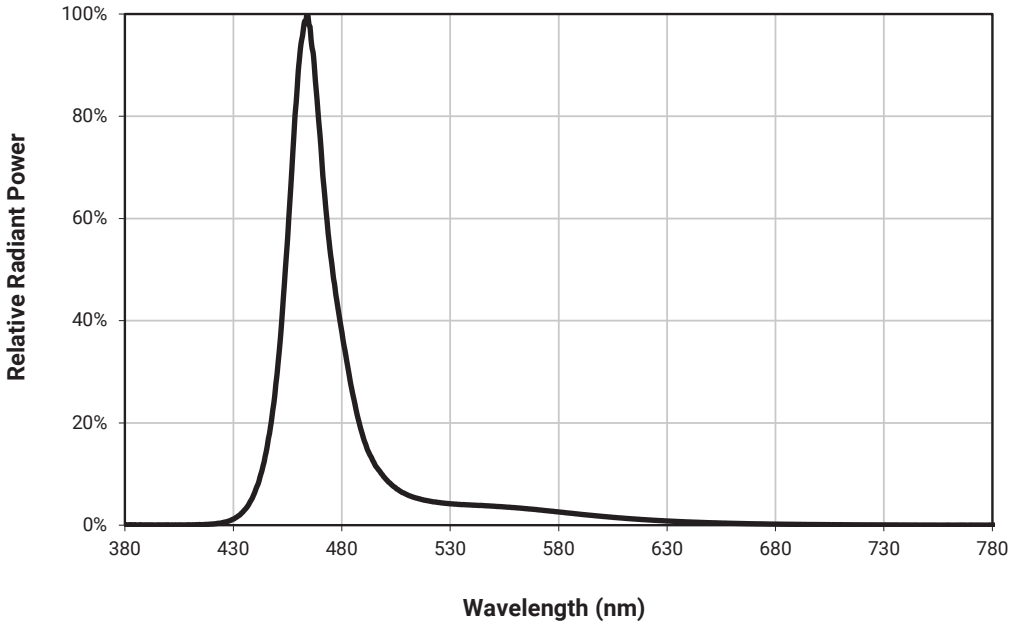
The following table provides order codes for XLamp XE-B PC blue LEDs.

PC Blue		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Chromaticity Bin	Code	Flux (lm)	
001	N4B & N5B	M3	45.7	XEBAPB-H0-0000-000-000000M3001
		N2	51.7	XEBAPB-H0-0000-000-000000N2001

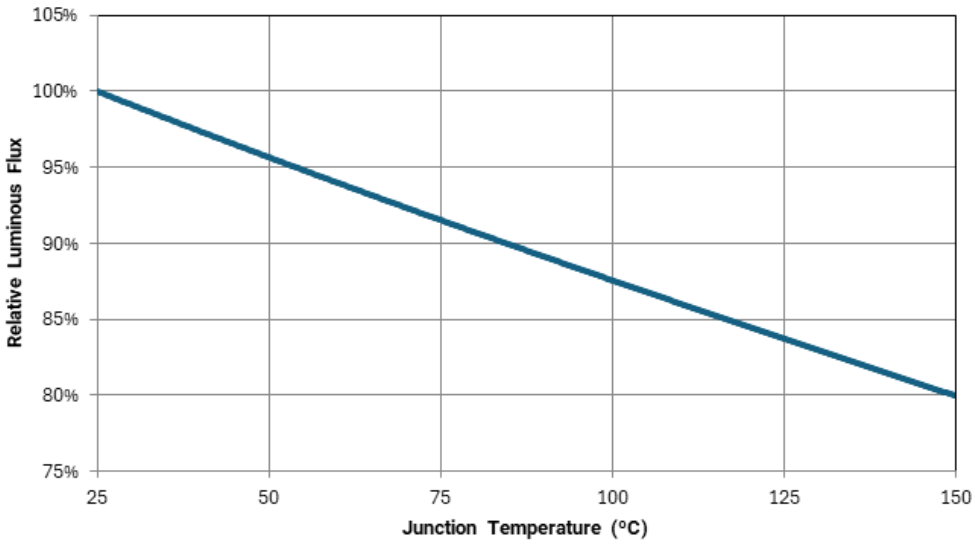
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

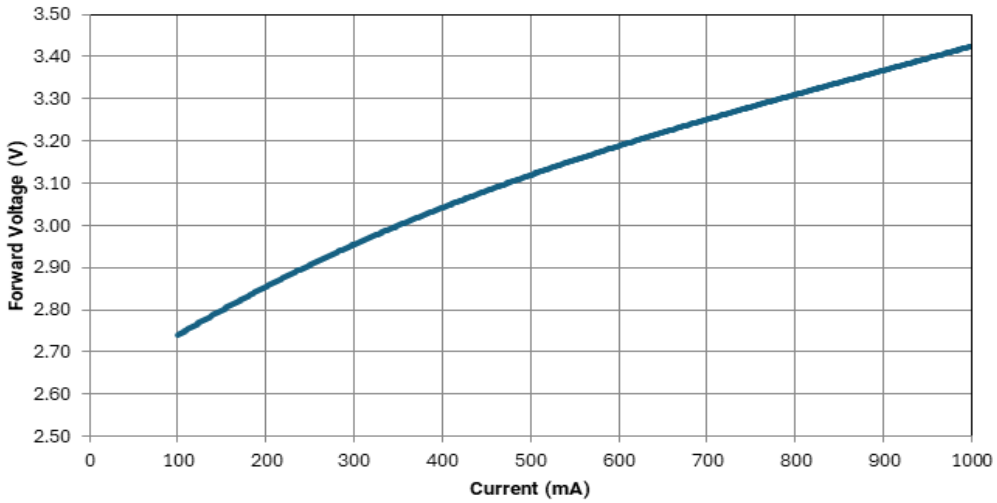
RELATIVE SPECTRAL POWER DISTRIBUTION - PC BLUE



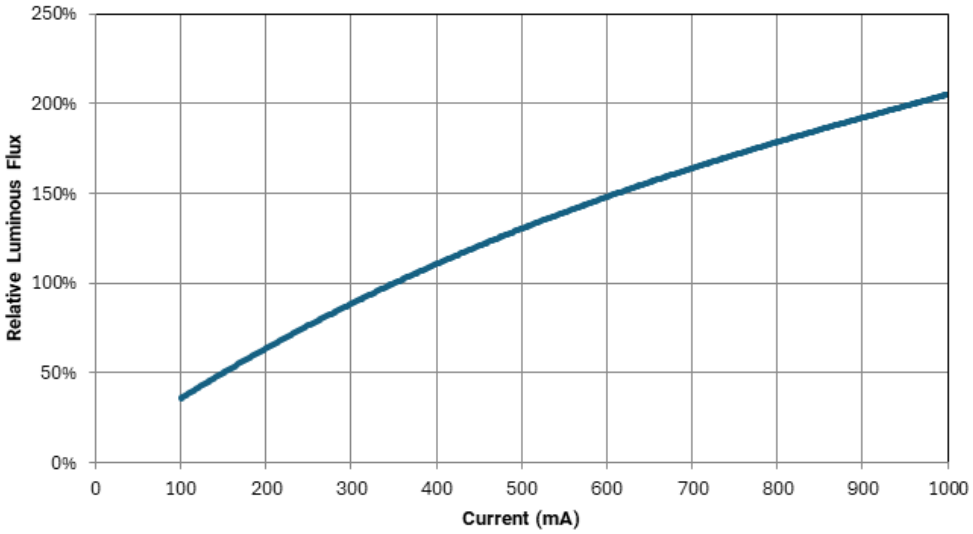
RELATIVE FLUX VS. JUNCTION TEMPERATURE - PC BLUE (I_F = 350 mA)



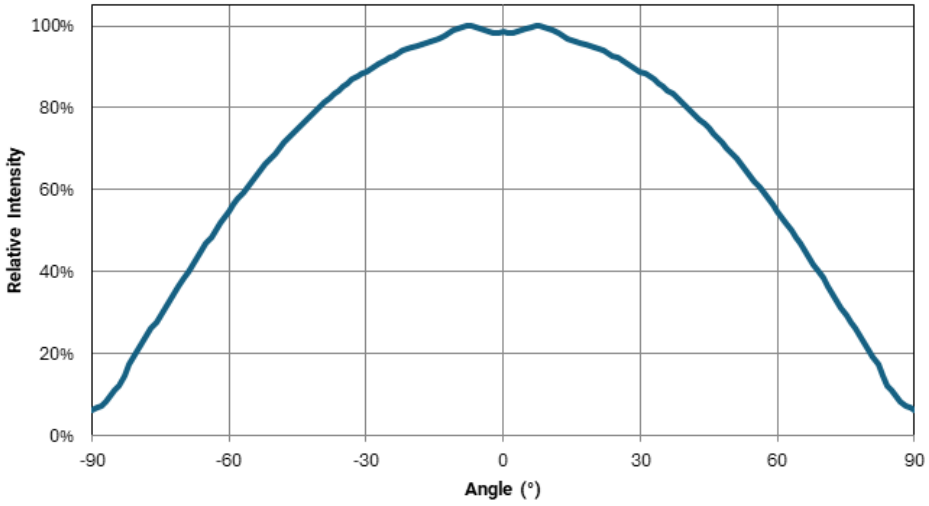
ELECTRICAL CHARACTERISTICS - PC BLUE (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - PC BLUE (T_J = 25 °C)

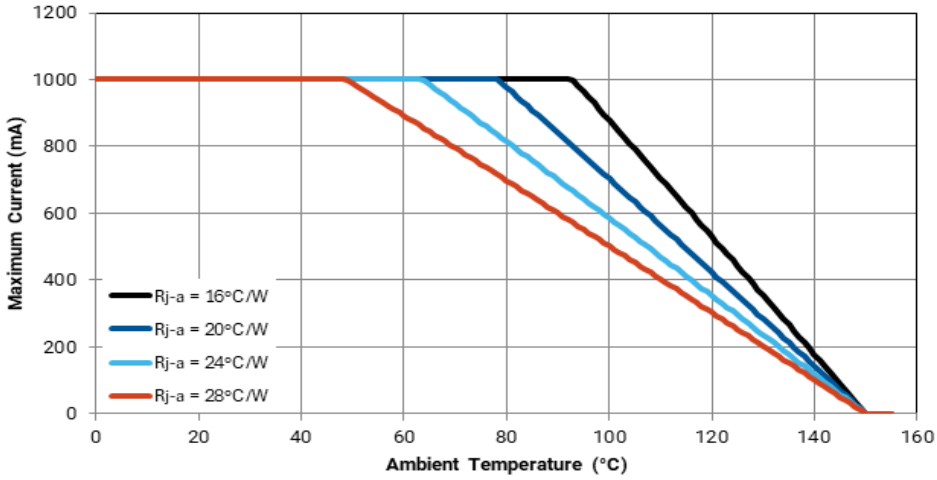


TYPICAL SPATIAL DISTRIBUTION - PC BLUE



THERMAL DESIGN - PC BLUE

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - CYAN

CHARACTERISTICS - CYAN

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		7	
Viewing angle (FWHM)	degrees		120	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		2.9	3.5
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - CYAN (T_J = 25 °C)

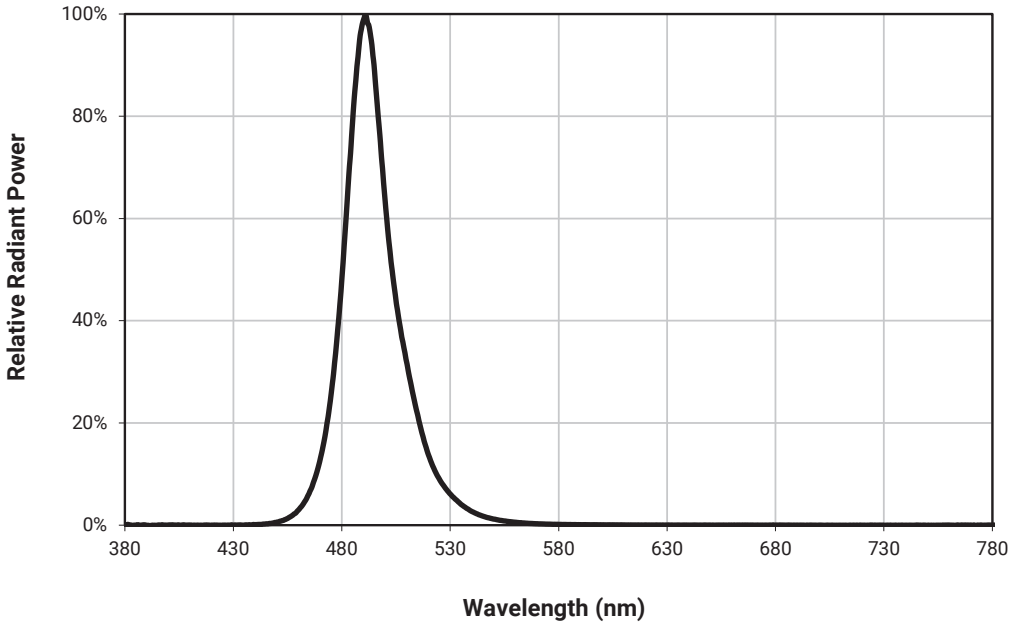
The following table provides order codes for XLamp XE-B cyan LEDs.

Blue		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Dominant Wavelengh (nm)	Code	Flux (lm)	
001	490-510	N4	62	XEBACY-H0-0000-000-000000N4001
		P2	67.2	XEBACY-H0-0000-000-000000P2001
		P3	73.9	XEBACY-H0-0000-000-000000P3001
004	490-500	N4	62	XEBACY-H0-0000-000-000000N4004
		P2	67.2	XEBACY-H0-0000-000-000000P2004
006	500-510	P4	80.6	XEBACY-H0-0000-000-000000P4006
		Q2	87.4	XEBACY-H0-0000-000-000000Q2006

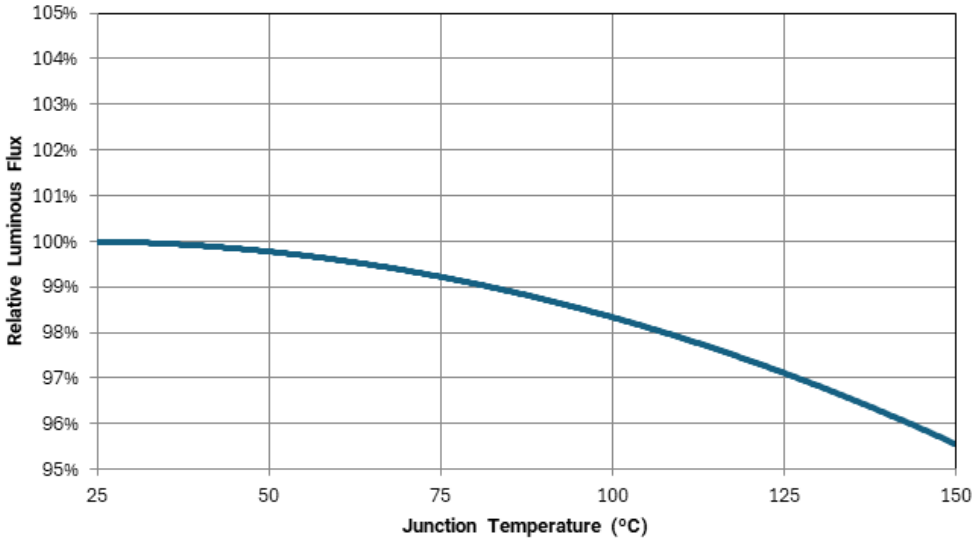
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

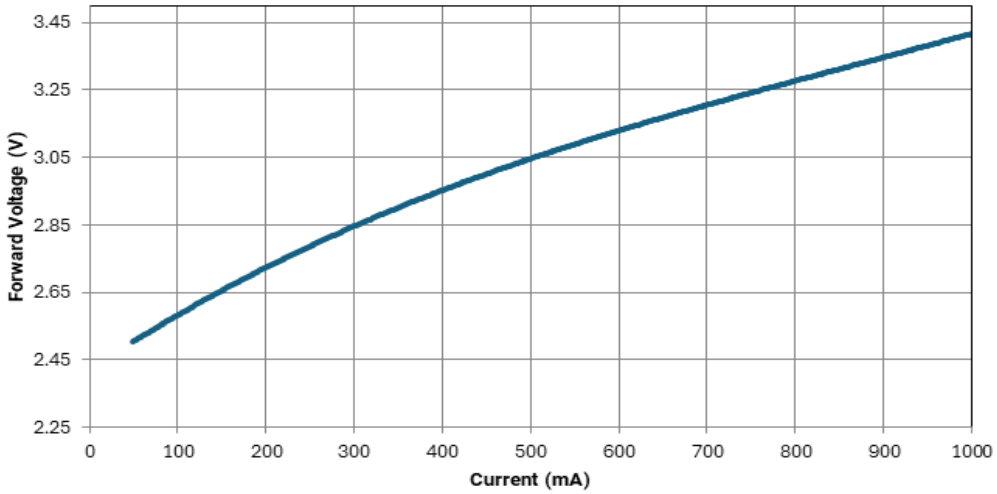
RELATIVE SPECTRAL POWER DISTRIBUTION - CYAN



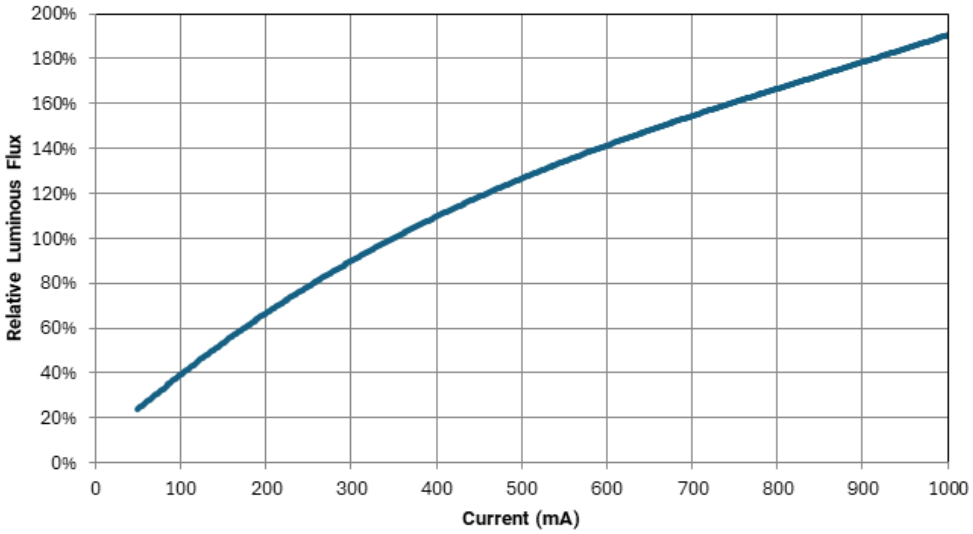
RELATIVE FLUX VS. JUNCTION TEMPERATURE - CYAN (I_F = 350 mA)



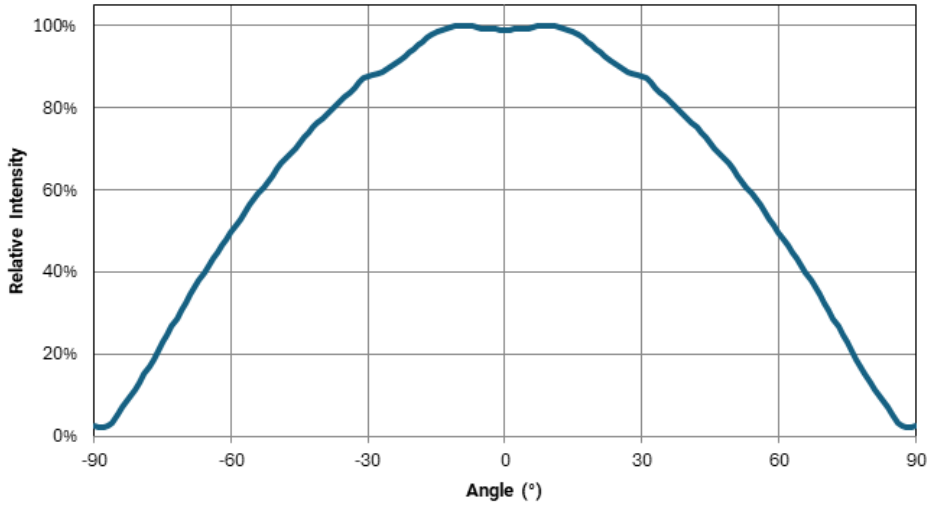
ELECTRICAL CHARACTERISTICS - CYAN (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - CYAN (T_J = 25 °C)

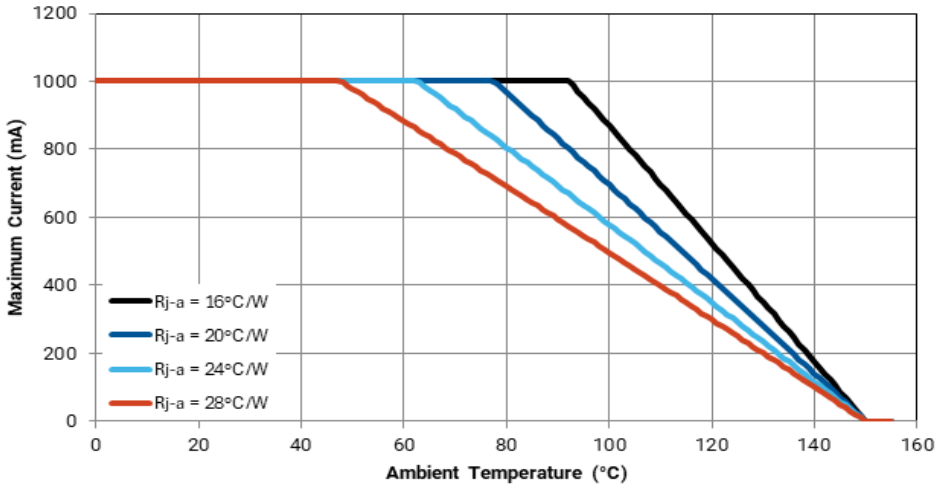


TYPICAL SPATIAL DISTRIBUTION - CYAN



THERMAL DESIGN - CYAN

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - GREEN

CHARACTERISTICS - GREEN

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		8.5	
Viewing angle (FWHM)	degrees		120	
Temperature coefficient of voltage	mV/°C		-1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3.0	3.9
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - GREEN (T_J = 25 °C)

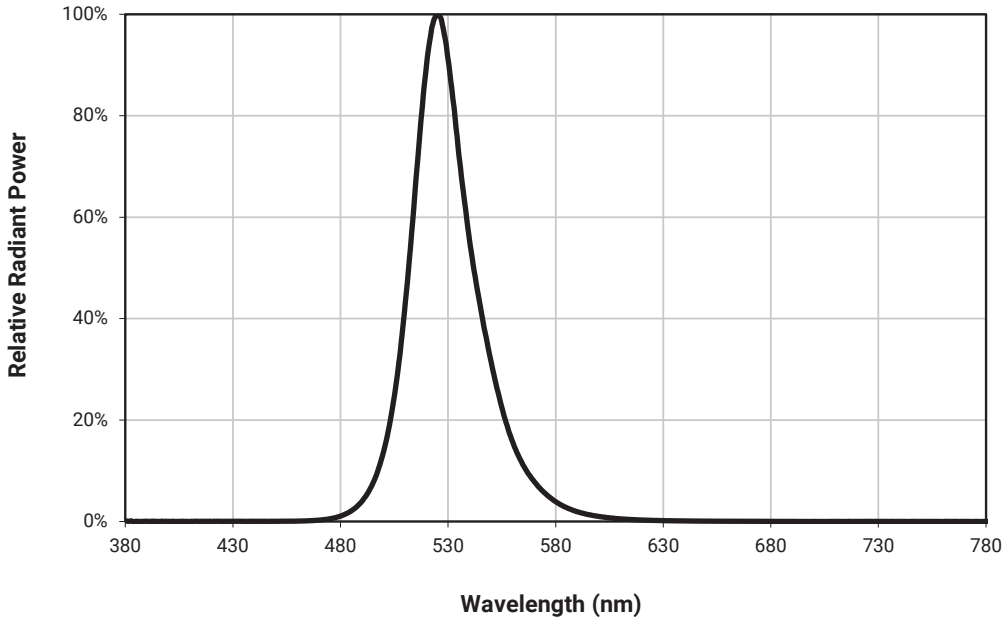
The following table provides order codes for XLamp XE-B green LEDs.

Green		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Dominant Wavelengh (nm)	Code	Flux (lm)	
001	520-535	R2	114	XEBAGR-H0-0000-000-000000R2001
		R3	122	XEBAGR-H0-0000-000-000000R3001
002	520-530	R2	114	XEBAGR-H0-0000-000-000000R2002
		R3	122	XEBAGR-H0-0000-000-000000R3002
003	525-535	R2	114	XEBAGR-H0-0000-000-000000R2003
		R3	122	XEBAGR-H0-0000-000-000000R3003

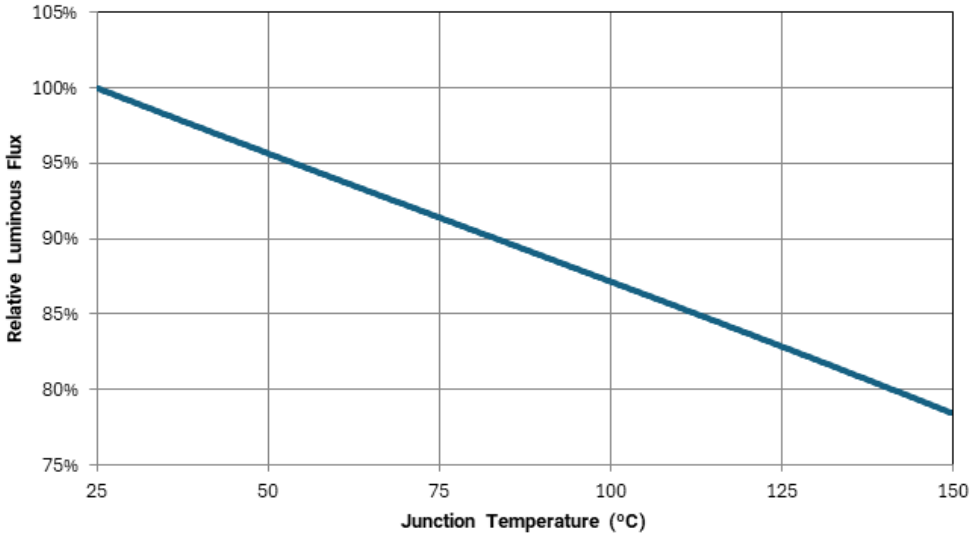
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

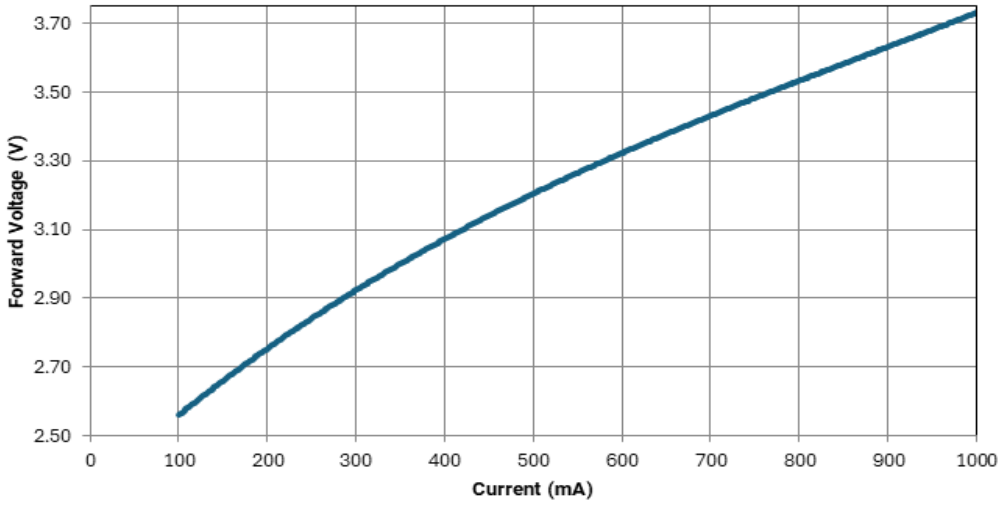
RELATIVE SPECTRAL POWER DISTRIBUTION - GREEN



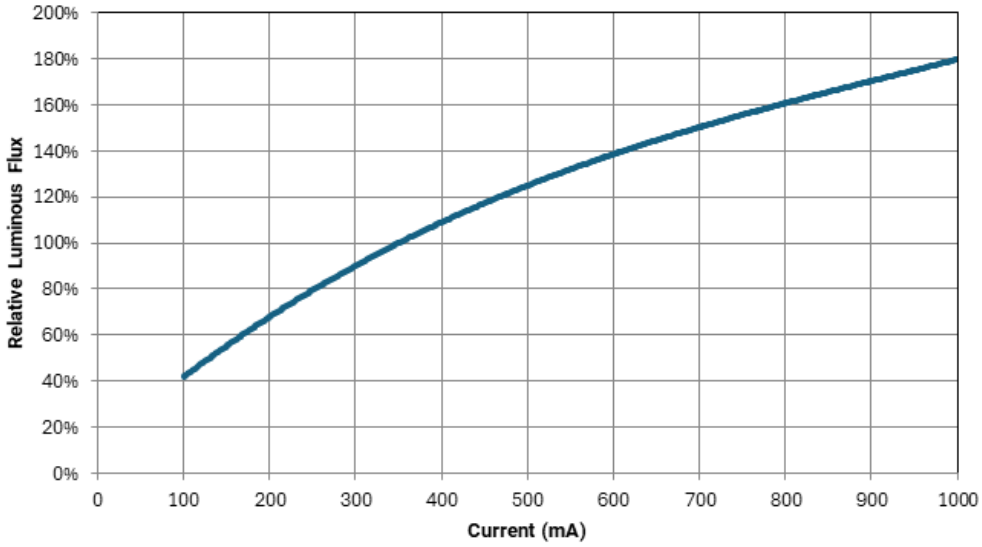
RELATIVE FLUX VS. JUNCTION TEMPERATURE - GREEN (I_F = 350 mA)



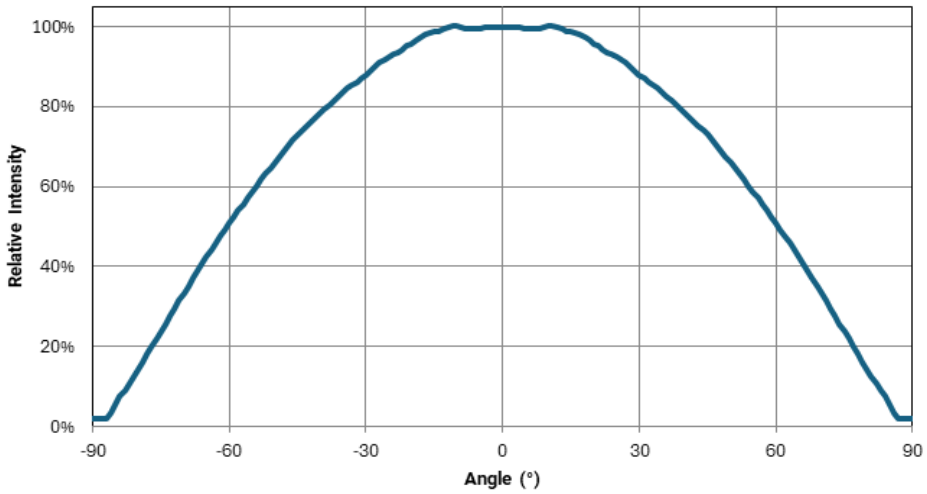
ELECTRICAL CHARACTERISTICS - GREEN (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - GREEN (T_J = 25 °C)

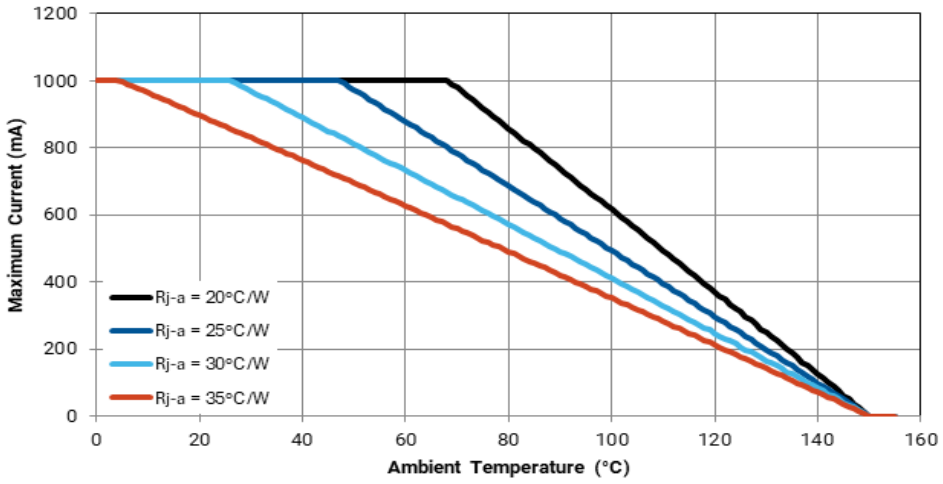


TYPICAL SPATIAL DISTRIBUTION - GREEN



THERMAL DESIGN - GREEN

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - PC LIME

CHARACTERISTICS - PC LIME

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		5.5	
Viewing angle (FWHM)	degrees		115	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3.00	3.5
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - PC LIME (T_J = 25 °C)

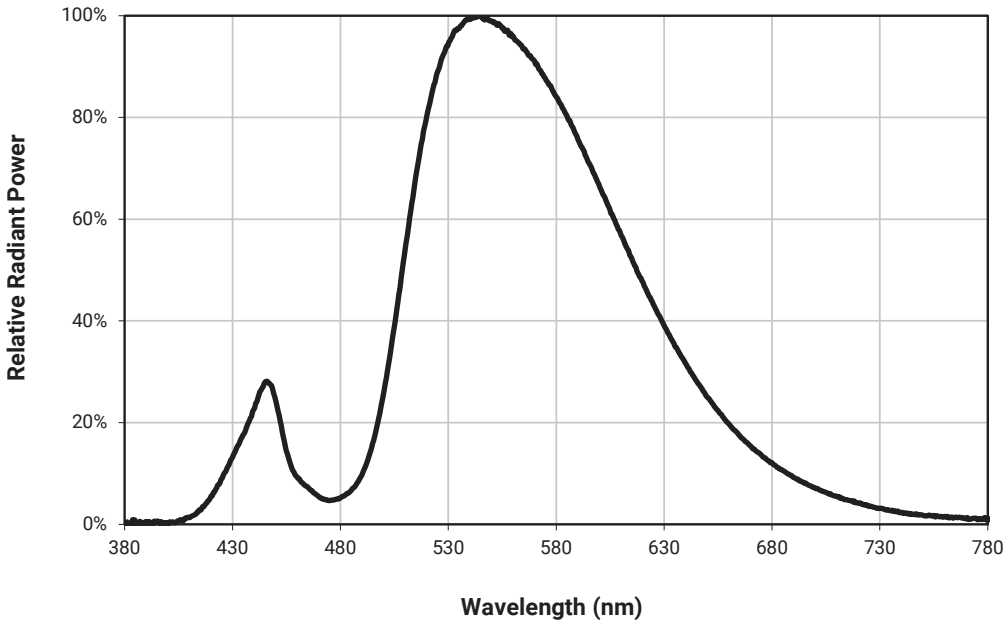
The following table provides order codes for XLamp XE-B PC lime LEDs.

PC Lime		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Chromaticity Bin	Code	Flux (lm)	
001	PL3 & PL4	S4	164	XEBAPL-H0-0000-000-000000S4001
002	PL3	S4	164	XEBAPL-H0-0000-000-000000S4002
003	PL4	S4	164	XEBAPL-H0-0000-000-000000S4003

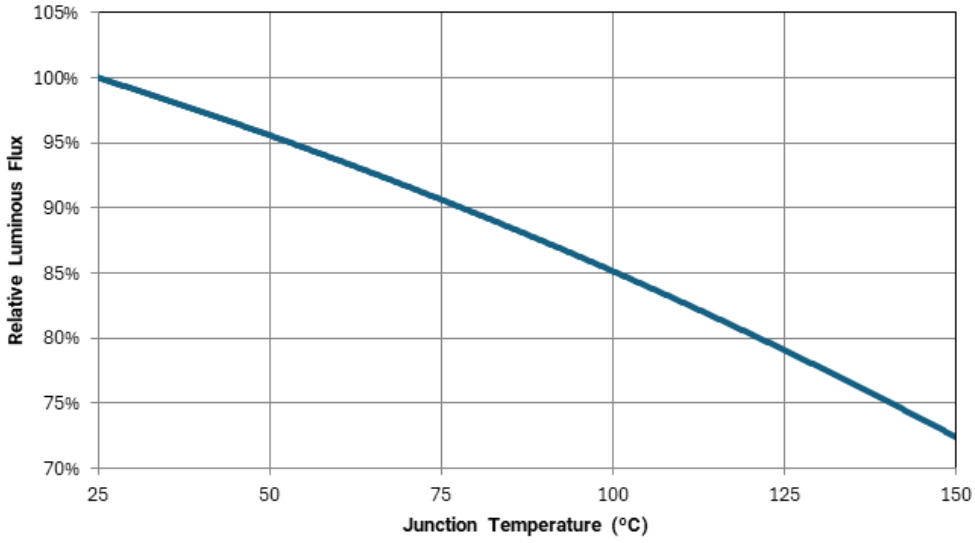
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

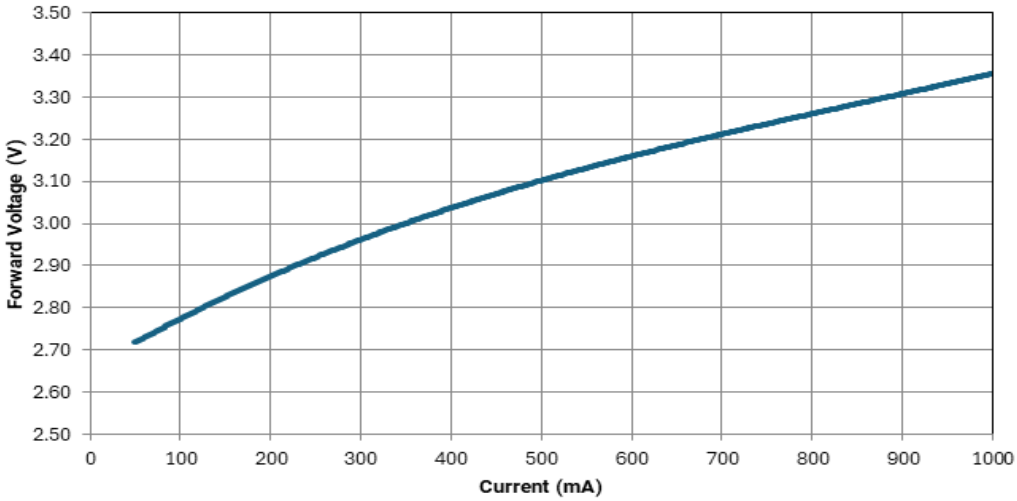
RELATIVE SPECTRAL POWER DISTRIBUTION - PC LIME



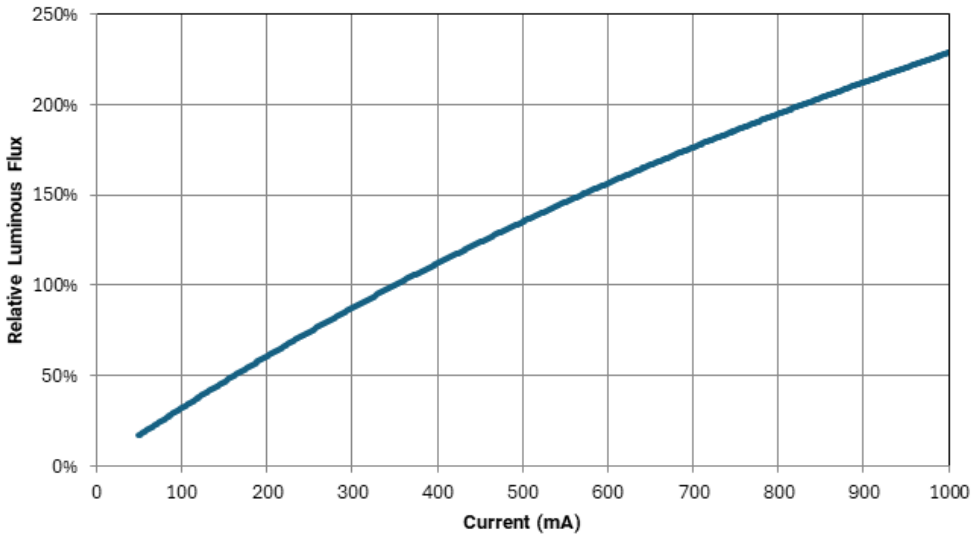
RELATIVE FLUX VS. JUNCTION TEMPERATURE - PC LIME (I_F = 350 mA)



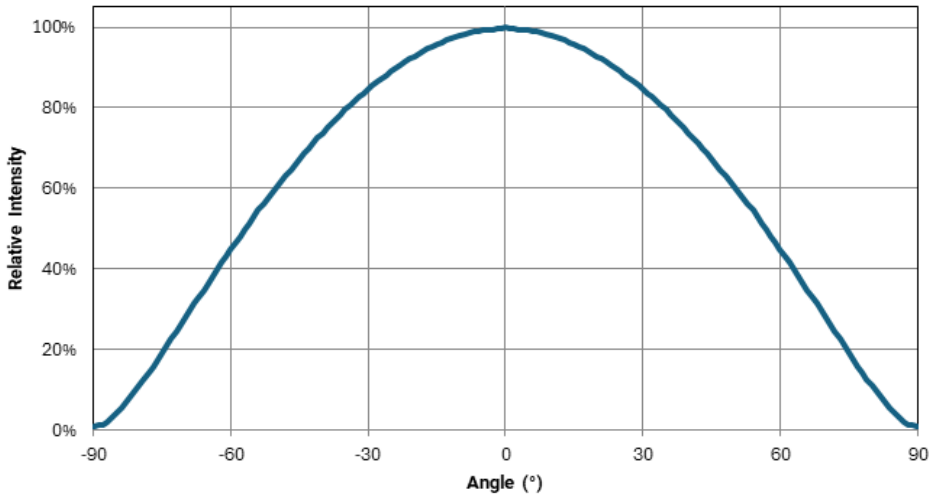
ELECTRICAL CHARACTERISTICS - PC LIME (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - PC LIME (T_J = 25 °C)

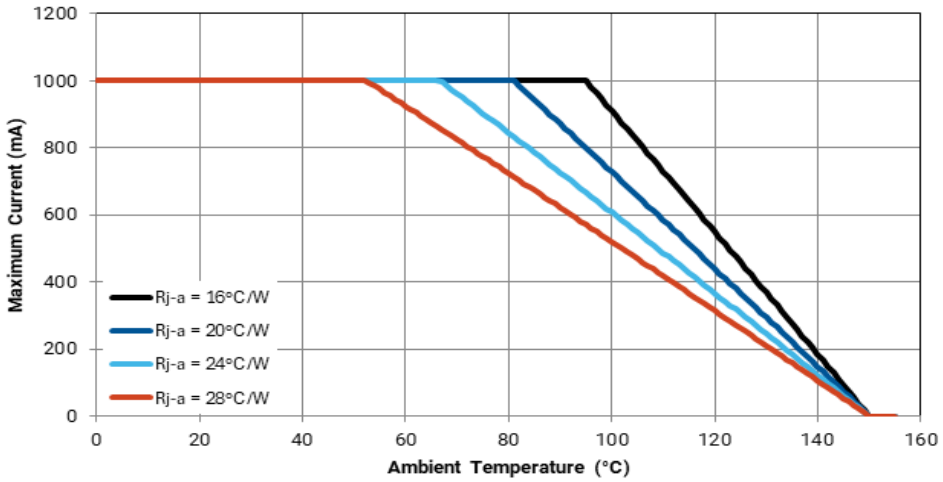


TYPICAL SPATIAL DISTRIBUTION - PC LIME



THERMAL DESIGN - PC LIME

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - PC YELLOW

CHARACTERISTICS - PC YELLOW

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		6	
Viewing angle (FWHM)	degrees		115	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3.0	3.5
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - PC YELLOW (T_J = 25 °C)

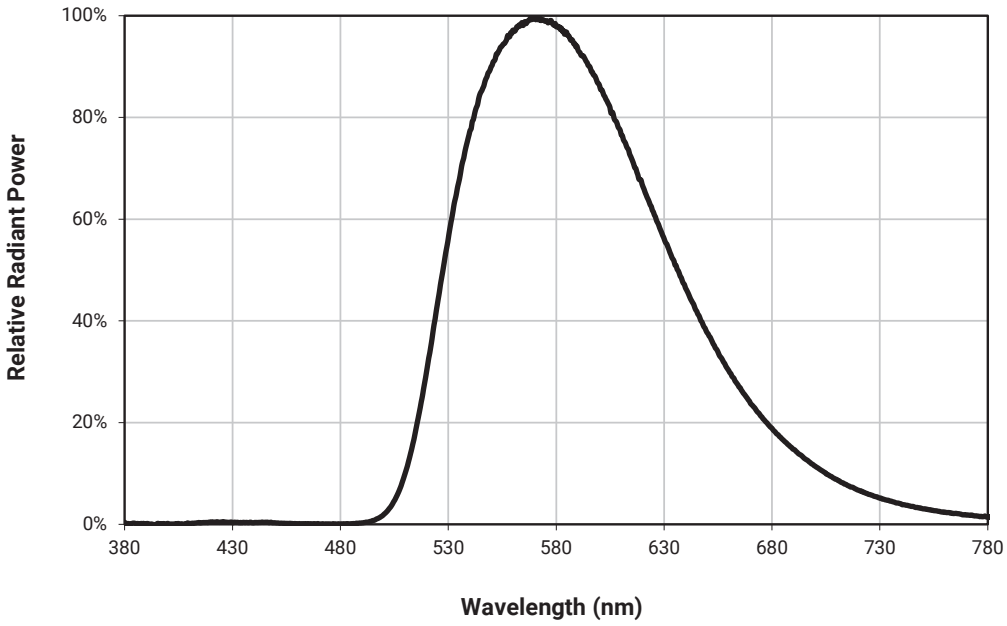
The following table provides order codes for XLamp XE-B PC yellow LEDs.

PC Lime		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Chromaticity Bin	Code	Flux (lm)	
001	PY0	Q3	93.9	XEBAPY-H0-0000-000-000000Q3001

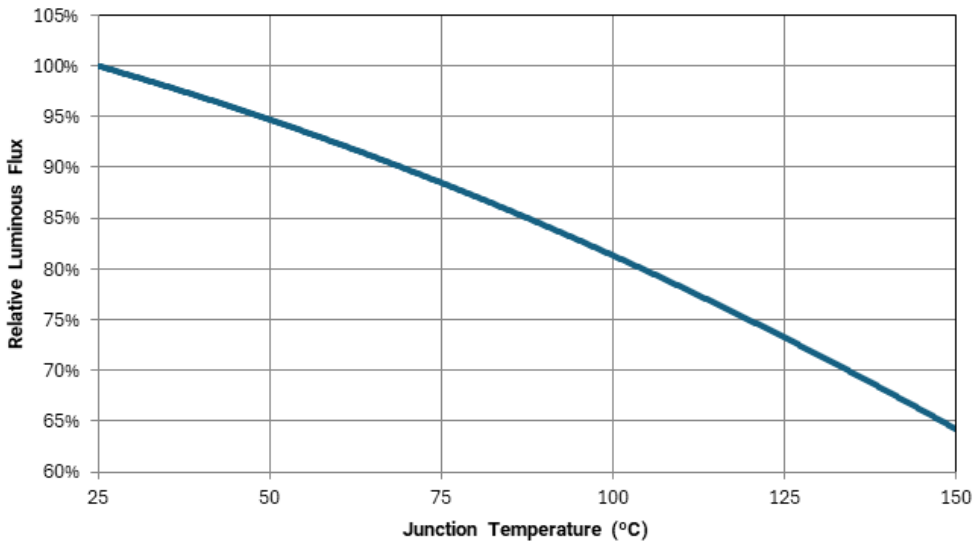
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

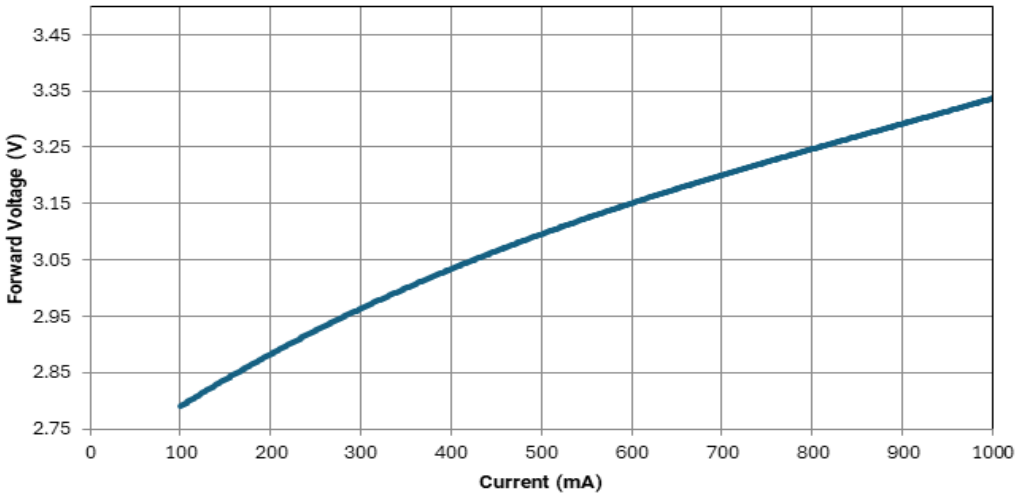
RELATIVE SPECTRAL POWER DISTRIBUTION - PC YELLOW



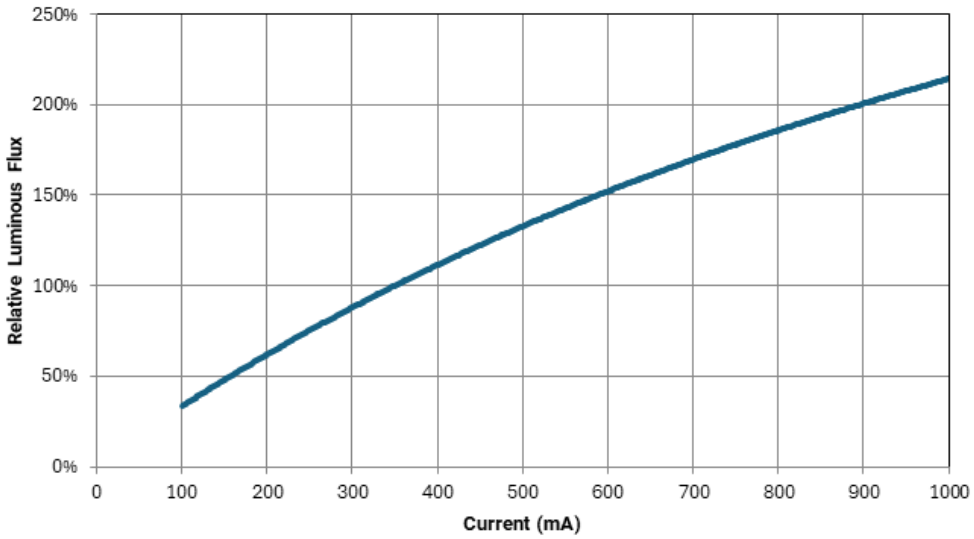
RELATIVE FLUX VS. JUNCTION TEMPERATURE - PC YELLOW (I_F = 350 mA)



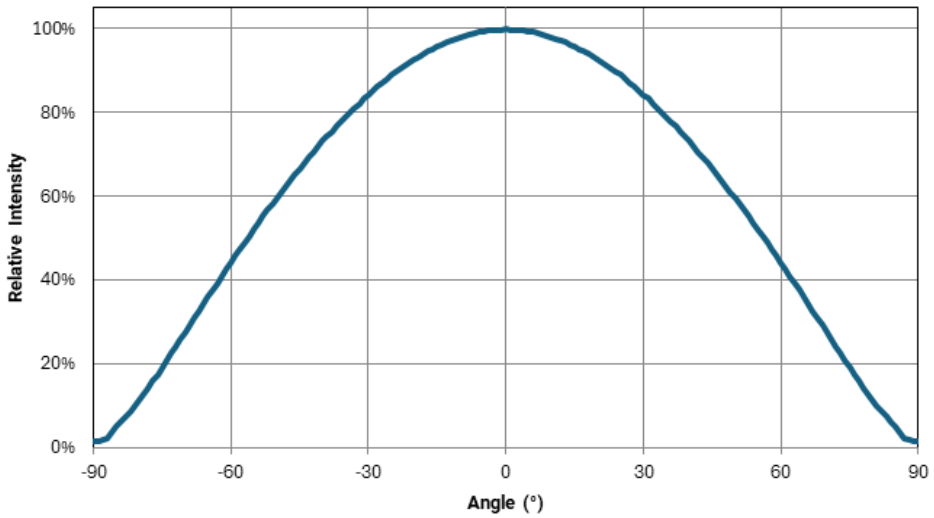
ELECTRICAL CHARACTERISTICS - PC YELLOW (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - PC YELLOW (T_J = 25 °C)

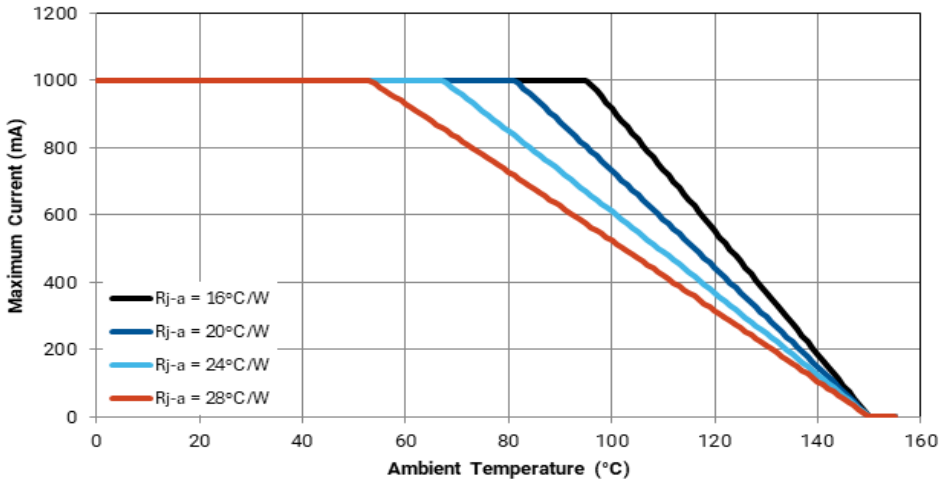


TYPICAL SPATIAL DISTRIBUTION - PC YELLOW



THERMAL DESIGN - PC YELLOW

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - PC AMBER

CHARACTERISTICS - PC AMBER

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		5.5	
Viewing angle (FWHM)	degrees		115	
Temperature coefficient of voltage	mV/°C		-1.1	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		3.0	3.4
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - PC AMBER (T_J = 25 °C)

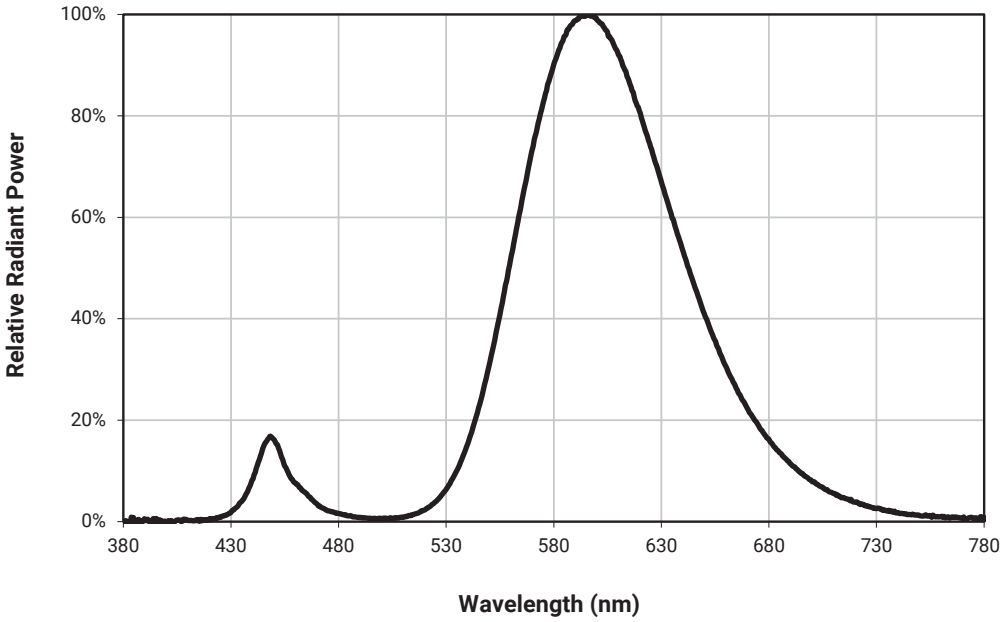
The following table provides order codes for XLamp XE-B PC amber LEDs.

PC Amber		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Chromaticity Bin	Code	Flux (lm)	
001	Y20	Q3	93.9	XEBAPA-H0-0000-000-000000Q3001
		Q4	100	XEBAPA-H0-0000-000-000000Q4001

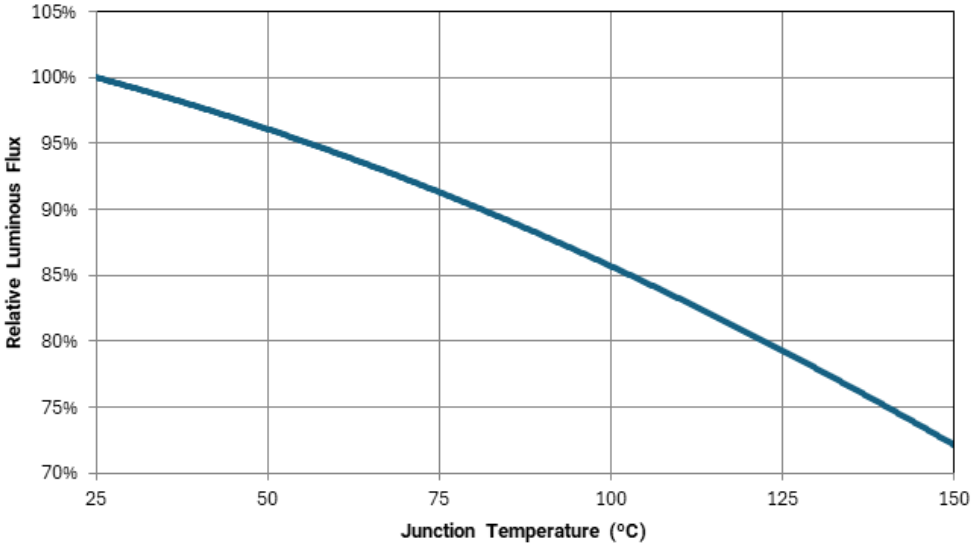
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

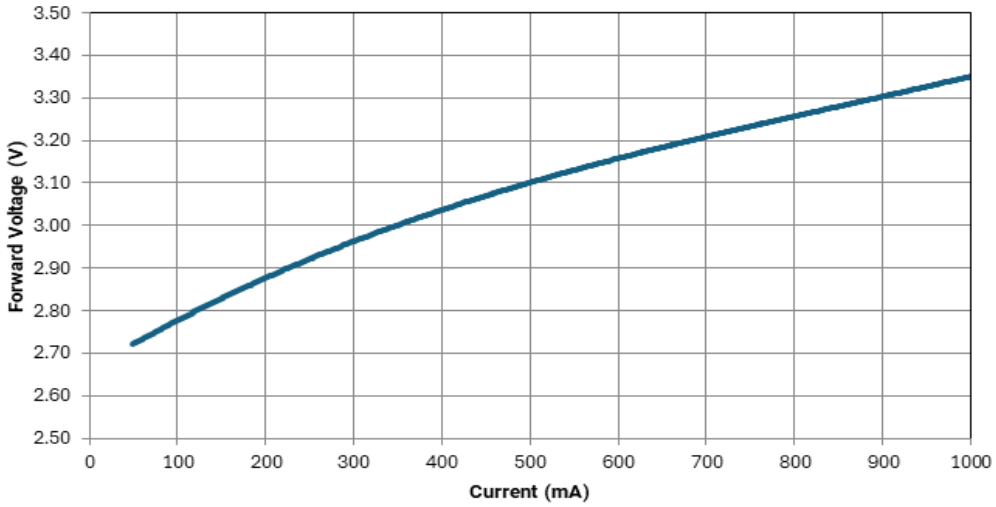
RELATIVE SPECTRAL POWER DISTRIBUTION - PC AMBER



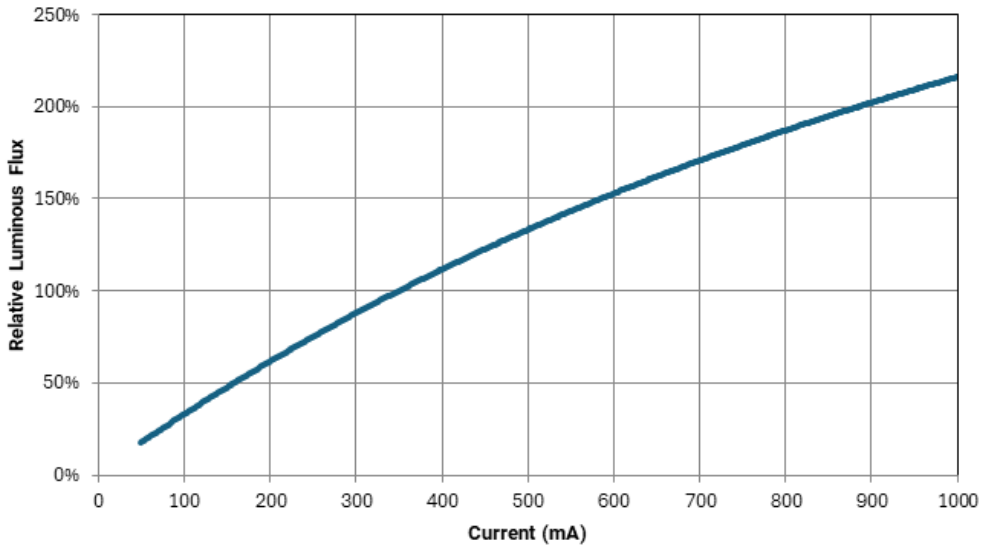
RELATIVE FLUX VS. JUNCTION TEMPERATURE - PC AMBER (I_F = 350 mA)



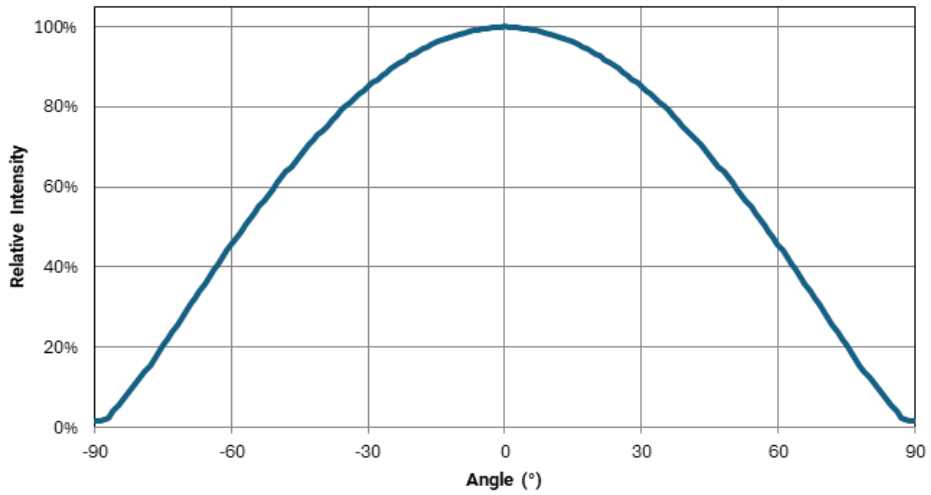
ELECTRICAL CHARACTERISTICS - PC AMBER (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT -PC AMBER (T_J = 25 °C)

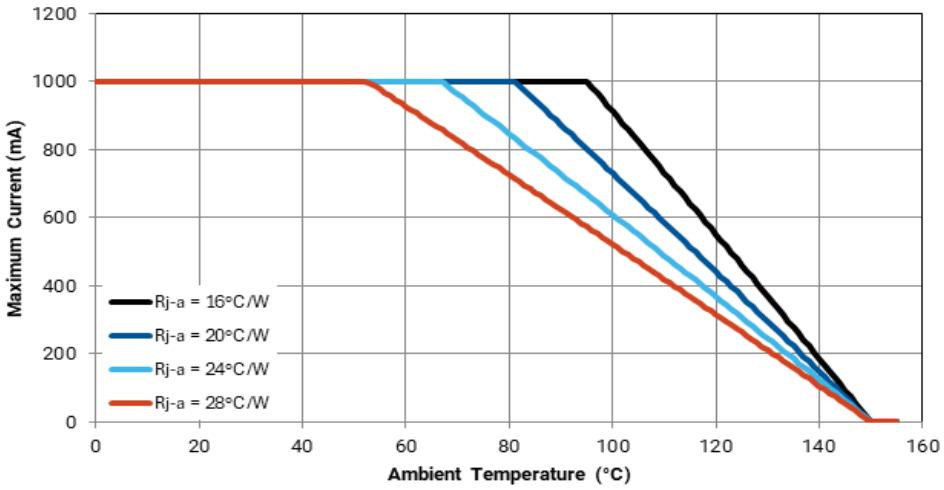


TYPICAL SPATIAL DISTRIBUTION - PC AMBER



THERMAL DESIGN - PC AMBER

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - RED-ORANGE

CHARACTERISTICS - RED-ORANGE

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		5	
Viewing angle (FWHM)	degrees		140	
Temperature coefficient of voltage	mV/°C		-2	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		2.2	2.7
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - RED-ORANGE (T_J = 25 °C)

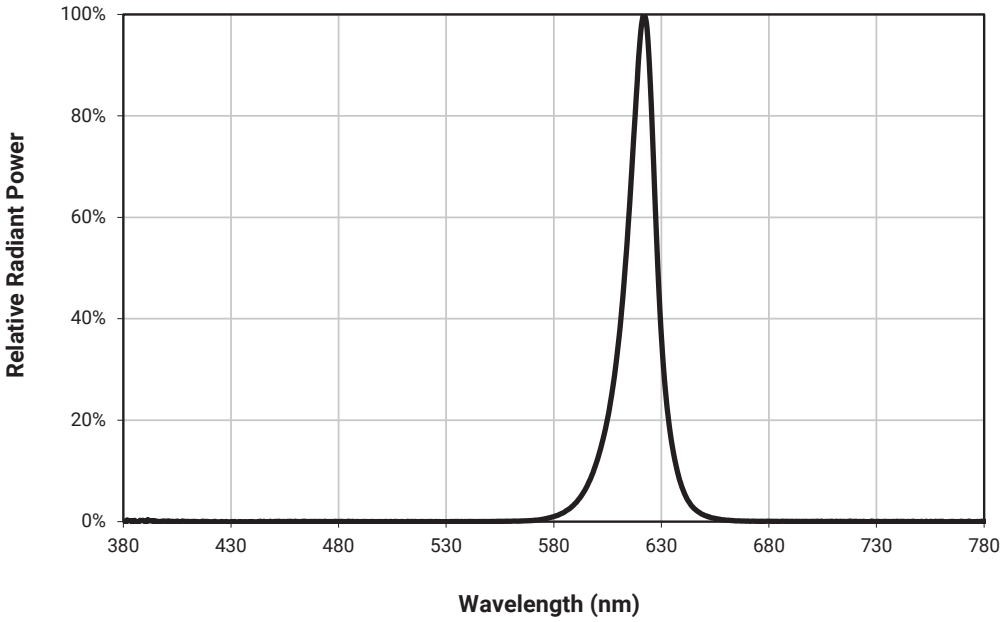
The following table provides order codes for XLamp XE-B Red-Orange LEDs.

Red-Orange		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Dominant Wavelengh (nm)	Code	Flux (lm)	
001	610 - 620	P2	67.2	XEBARO-H0-0000-000-000000P2001
		P3	73.9	XEBARO-H0-0000-000-000000P3001

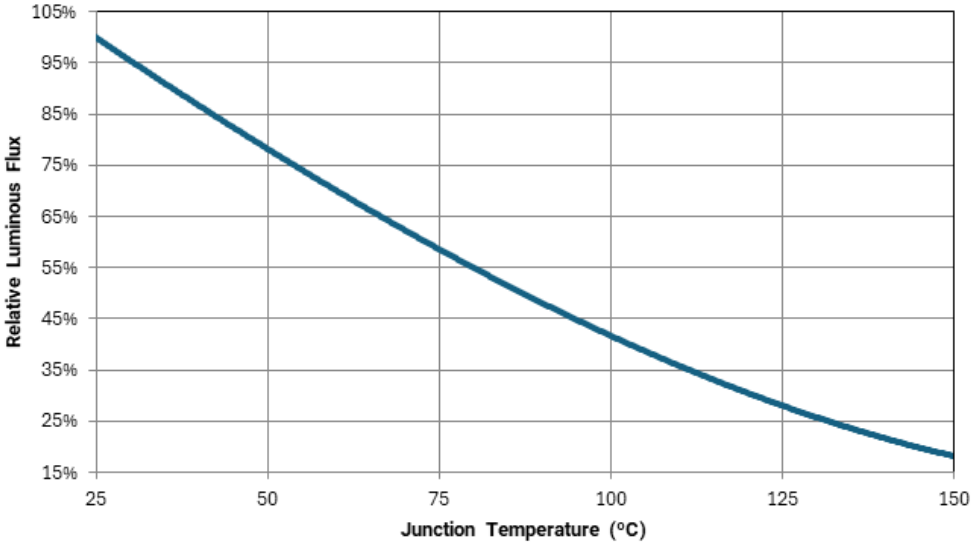
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

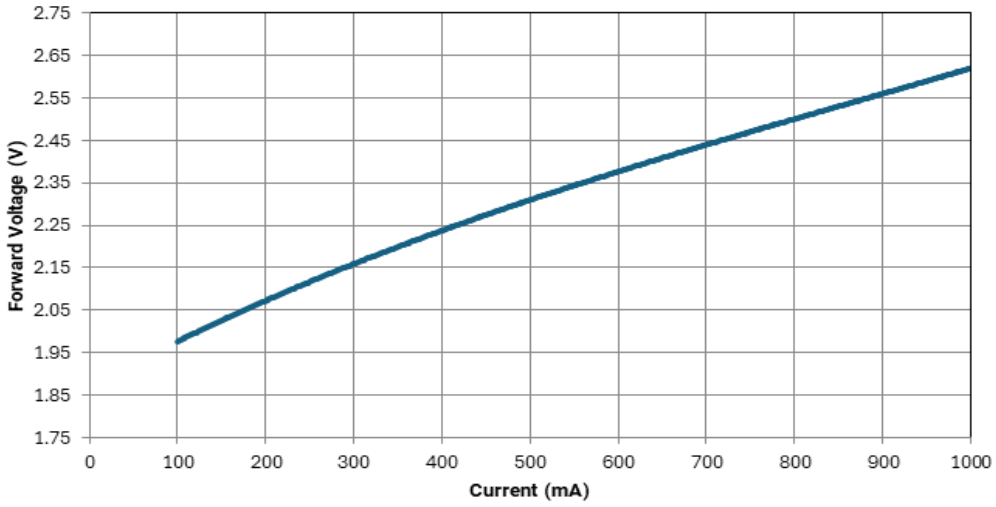
RELATIVE SPECTRAL POWER DISTRIBUTION - RED-ORANGE



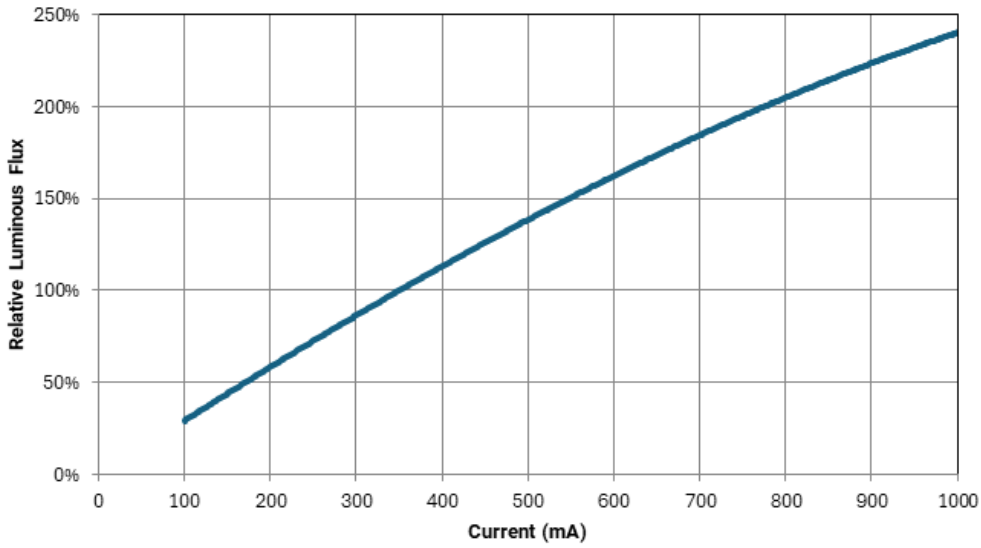
RELATIVE FLUX VS. JUNCTION TEMPERATURE - RED-ORANGE (I_F = 350 mA)



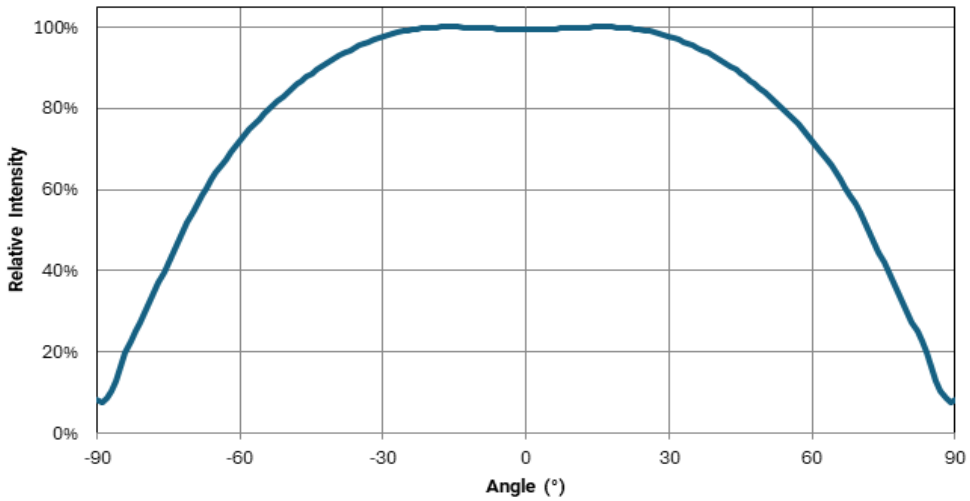
ELECTRICAL CHARACTERISTICS - RED-ORANGE (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT -RED-ORANGE (T_J = 25 °C)

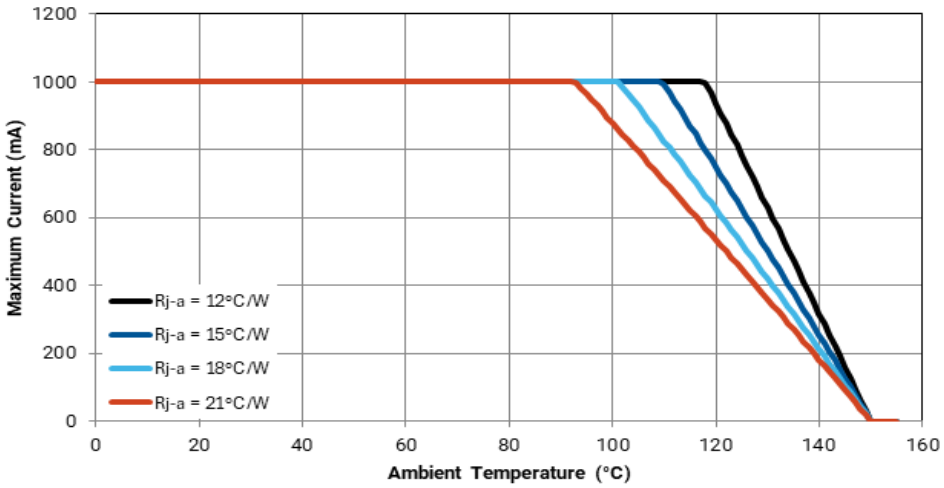


TYPICAL SPATIAL DISTRIBUTION - RED-ORANGE



THERMAL DESIGN - RED-ORANGE

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



XLAMP XE-B LEDs - RED

CHARACTERISTICS - RED

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		6	
Viewing angle (FWHM)	degrees		140	
Temperature coefficient of voltage	mV/°C		-2	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 25 °C)	V		2.2	3
LED junction temperature	°C			150

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

FLUX CHARACTERISTICS - RED (T_J = 25 °C)

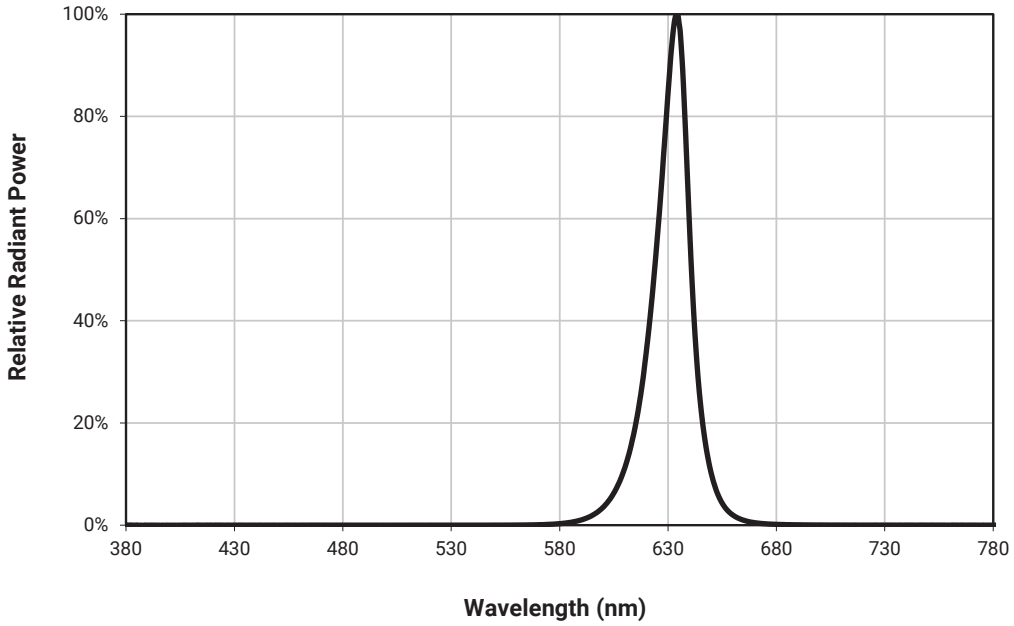
The following table provides order codes for XLamp XE-B red LEDs.

Red		Minimum Luminous Flux (lm) @ 350 mA		Order Codes
Kit	Dominant Wavelengh (nm)	Code	Flux (lm)	
001	620 - 630	N2	51.7	XEBARD-H0-0000-000-000000N2001

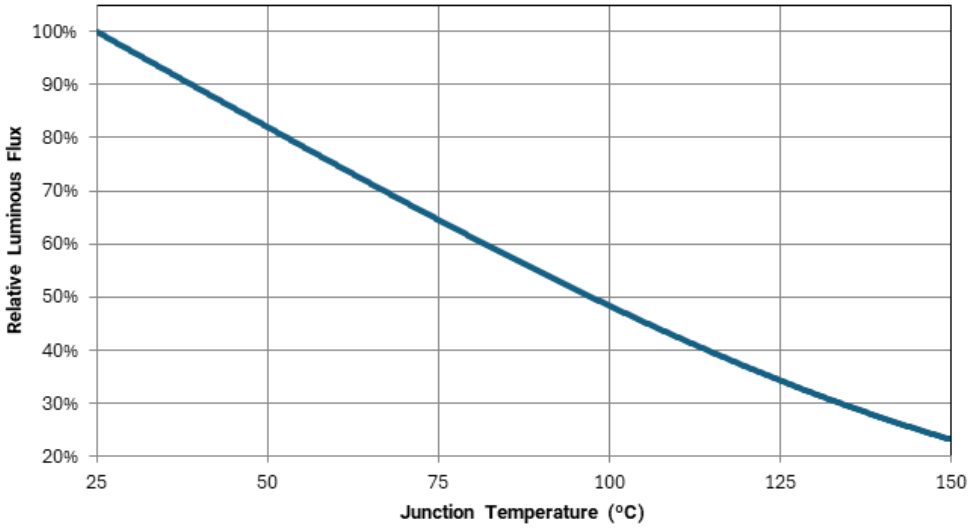
Notes

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements.
- XLamp XE-B LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or DWL bin restrictions specified by the order code.

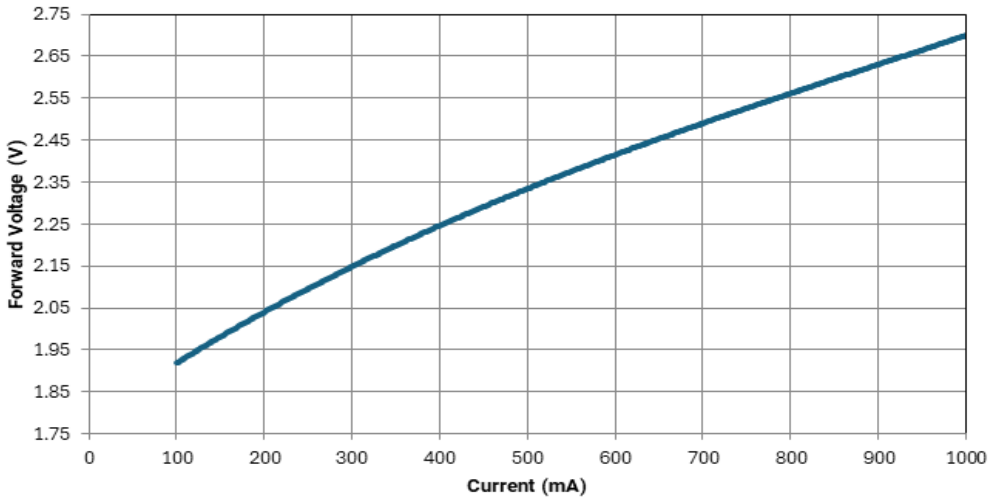
RELATIVE SPECTRAL POWER DISTRIBUTION - RED



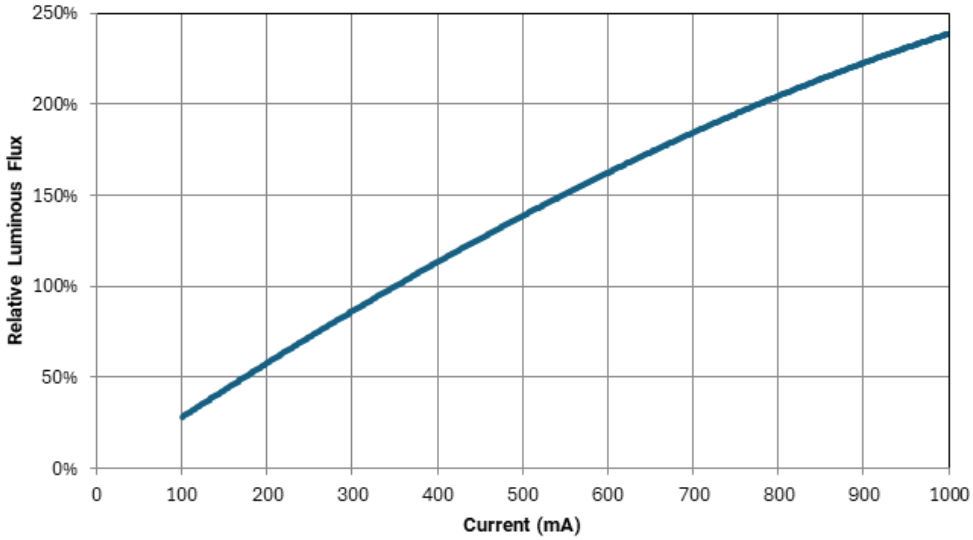
RELATIVE FLUX VS. JUNCTION TEMPERATURE - RED (I_F = 350 mA)



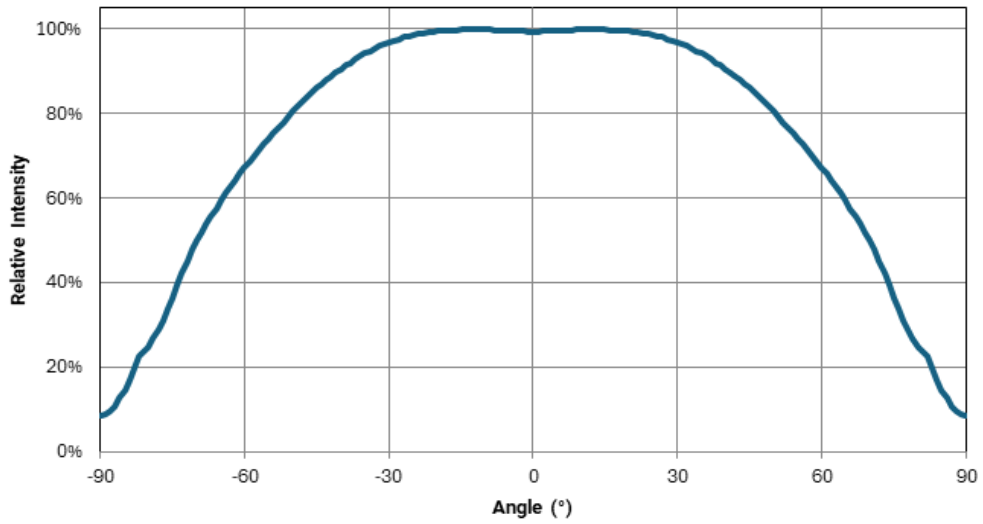
ELECTRICAL CHARACTERISTICS - RED (T_J = 25 °C)



RELATIVE FLUX VS. CURRENT - RED (T_J = 25 °C)

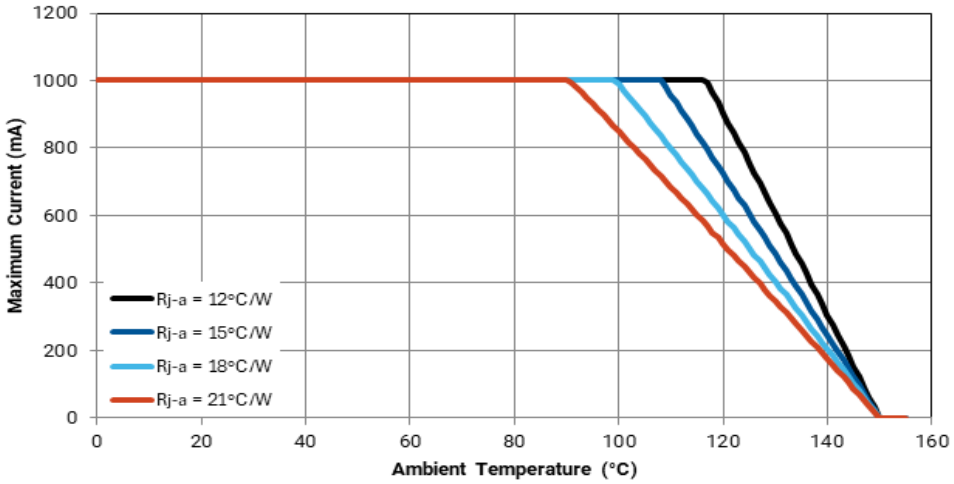


TYPICAL SPATIAL DISTRIBUTION - RED



THERMAL DESIGN - RED

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



PERFORMANCE GROUPS – LUMINOUS FLUX

XLamp XE-B LEDs tested for luminous flux are placed into one of the following luminous-flux groups. These group codes, with a 0 appended, are used in the Bin Code “Luminous flux group.”

Group Code	Minimum Luminous Flux (lm) @ 350 mA	Maximum Luminous Flux (lm) @ 350 mA
J3	26.8	30.6
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
P2	67.2	73.9
P3	73.9	80.6
P4	80.6	87.4
Q2	87.4	93.9
Q3	93.9	100
Q4	100	107
Q5	107	114
R2	114	122
R3	122	130
R4	130	139
R5	139	148
S2	148	156
S3	156	164
S4	164	172
S5	172	180
T1	180	200
T2	200	220
T3	220	240
T4	240	260
T5	260	280
T6	280	300
U2	300	320
U4	320	340

PERFORMANCE GROUPS – RADIANT FLUX

XLamp XE-B royal blue LEDs tested for radiant flux are placed into one of the following radiant-flux groups. These group codes, with a 0 appended, are used in the Bin Code “Radiant flux group.”

Group	Minimum Radiant Flux (mW) @ 350 mA	Maximum Radiant Flux (mW) @ 350 mA
33	525	550
34	550	575
35	575	600
36	600	625
37	625	650
38	650	675
39	675	700

PERFORMANCE GROUPS – DOMINANT WAVELENGTH

XLamp XE-B LEDs tested for dominant wavelength (DWL) are sorted into one of the bins defined below.

Color	DWL Group	Minimum DWL (nm) @ 350 mA	Maximum DWL (nm) @ 350 mA
Royal Blue	D36	450	452.5
	D37	452.5	455
	D46	455	457.5
	D47	457.5	460
	D56	460	462.5
	D57	462.5	465
Blue	B3	465	470
	B4	470	475
	B5	475	480
Cyan	C2	490	495
	C3	495	500
	C4	500	505
	C5	505	510
Green	G2	520	525
	G3	525	530
	G4	530	535
Red-Orange	O3	610	615
	O4	615	620
Red	R2	620	625
	R3	625	630

PERFORMANCE GROUPS – FORWARD VOLTAGE

XLamp XE-B red-orange and red LEDs are tested for forward voltage and sorted into one of the forward voltage bins defined below.

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

PERFORMANCE GROUPS – CHROMATICITY

XLamp XE-B white LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

EasyWhite Color Temperatures – 2-Step			
Code	**CCT**	**x**	**y**
40H	4000 K	0.3777	0.3739
		0.3797	0.3816
		0.3861	0.3855
		0.3838	0.3777
35H	3500 K	0.4022	0.3858
		0.4053	0.3942
		0.4125	0.3977
		0.4091	0.3891
30H	3000 K	0.4287	0.3975
		0.4328	0.4064
		0.4390	0.4086
		0.4347	0.3996
27H	2700 K	0.4524	0.4048
		0.4574	0.4140
		0.4633	0.4154
		0.4581	0.4062

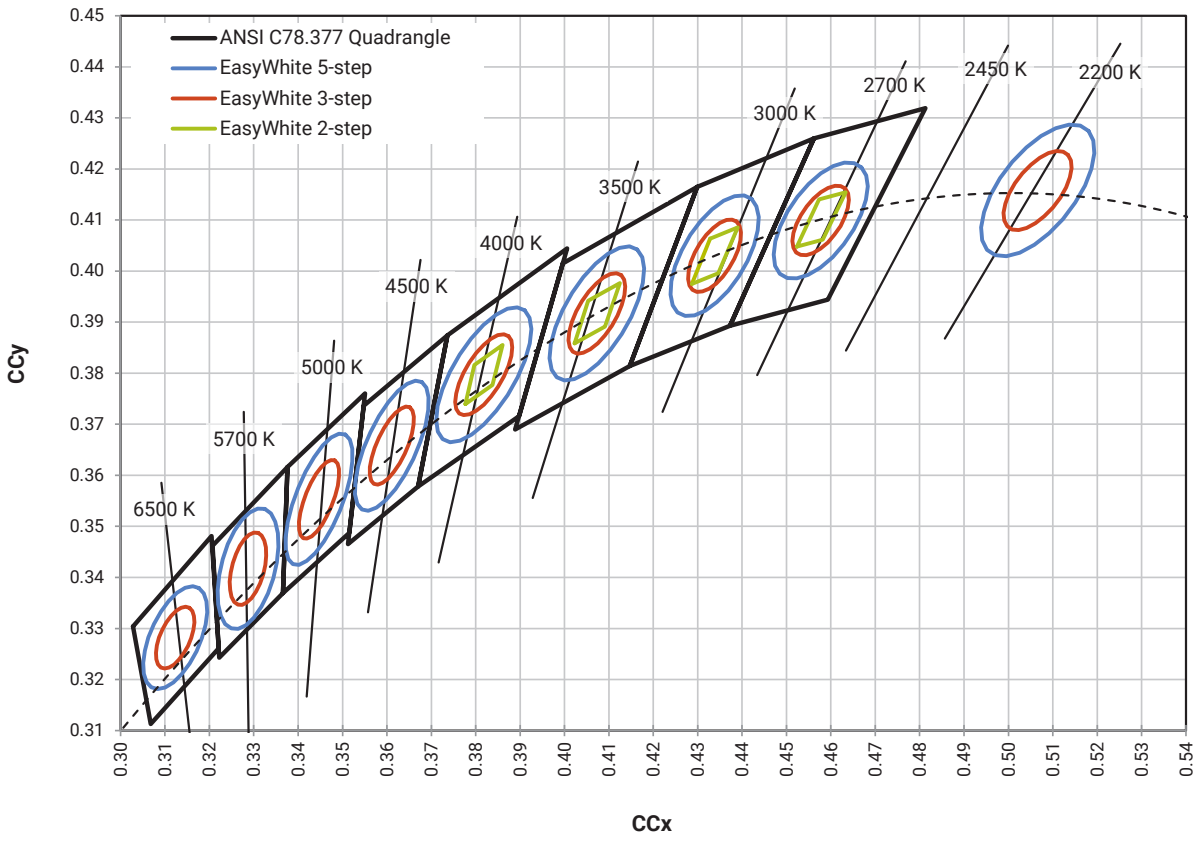
EasyWhite Color Temperatures – 3-Step Ellipse						
Bin Code	**CCT**	**Center Point**		**Major Axis**	**Minor Axis**	**Rotation Angle (°)**
		x	**y**	**a**	**b**	
1G	6500 K	0.3123	0.3282	0.00666	0.00330	61.0
2G	5700 K	0.3287	0.3417	0.00738	0.00360	72.0
3G	5000 K	0.3447	0.3553	0.00840	0.00312	65.0
5G	4000 K	0.3818	0.3797	0.00939	0.00402	53.7
6G	3500 K	0.4073	0.3917	0.00927	0.00414	54.0
7G	3000 K	0.4338	0.4030	0.00834	0.00408	53.2
8G	2700 K	0.4577	0.4099	0.00834	0.00420	48.5
AG	2200 K	0.5066	0.4158	0.00980	0.00480	45.5

PERFORMANCE GROUPS – CHROMATICITY

XLamp XE-B white LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

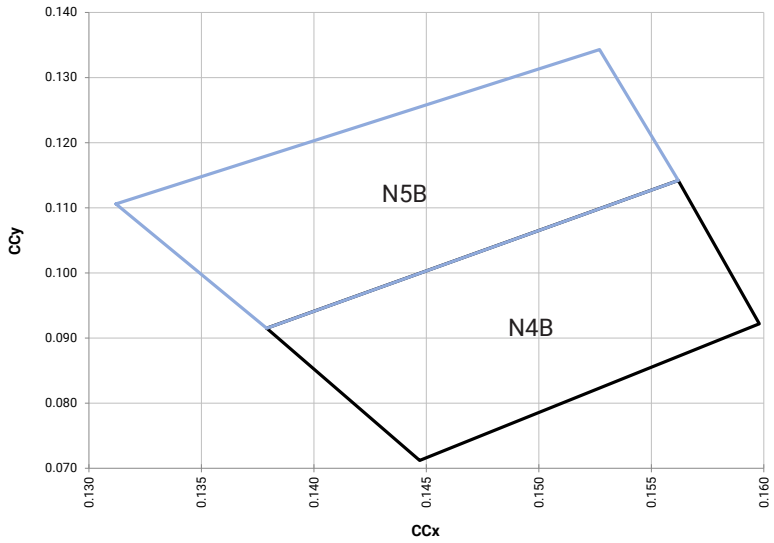
EasyWhite Color Temperatures – 5-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
1E	6500 K	0.3123	0.3282	0.01110	0.00550	61.0
2E	5700 K	0.3287	0.3417	0.01230	0.00600	72.0
3E	5000 K	0.3447	0.3553	0.01400	0.00520	65.0
5E	4000 K	0.3818	0.3797	0.01565	0.00670	53.7
6E	3500 K	0.4073	0.3917	0.01545	0.00690	54.0
7E	3000 K	0.4338	0.4030	0.01390	0.00680	53.2
8E	2700 K	0.4577	0.4099	0.01390	0.00700	48.5
AE	2200 K	0.5066	0.4158	0.01630	0.00800	45.5

EASYWHITE® CHROMATICITY REGIONS PLOTTED IN CIE 1931 COLOR SPACE



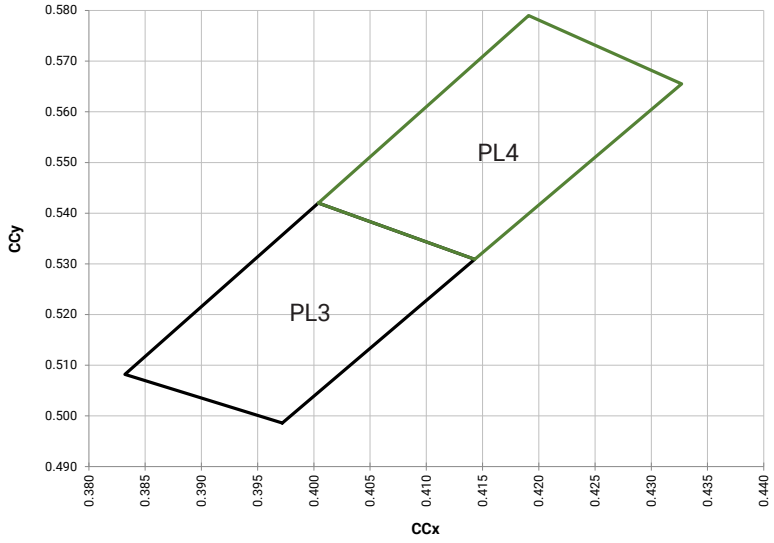
PC COLOR KITS PLOTTED IN CIE 1931 COLOR SPACE

PC Blue



Chromaticity Bin	x	y
N4B	0.1379	0.0915
	0.1562	0.1142
	0.1598	0.0922
	0.1447	0.0712
N5B	0.1312	0.1106
	0.1527	0.1343
	0.1562	0.1142
	0.1379	0.0915

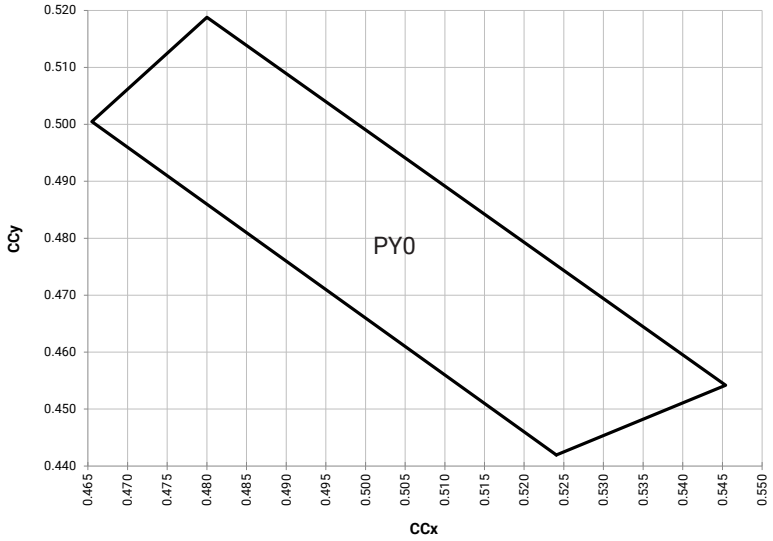
PC Lime



Chromaticity Bin	x	y
PL3	0.3972	0.4986
	0.3832	0.5082
	0.4004	0.5420
	0.4143	0.5309
PL4	0.4004	0.5420
	0.4143	0.5309
	0.4327	0.5655
	0.4191	0.5790

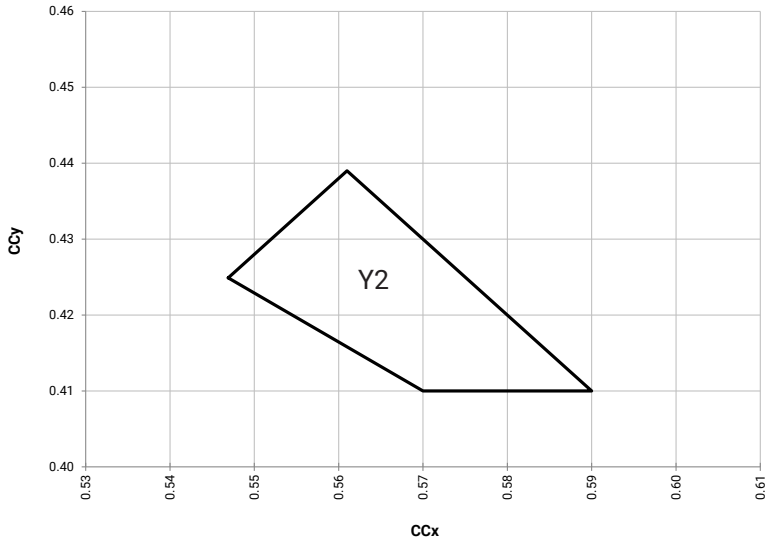
PC COLOR KITS PLOTTED IN CIE 1931 COLOR SPACE - CONTINUED

PC Yellow



Chromaticity Bin	x	y
PY0	0.5241	0.4419
	0.5454	0.4542
	0.4800	0.5188
	0.4655	0.5005

PC Amber

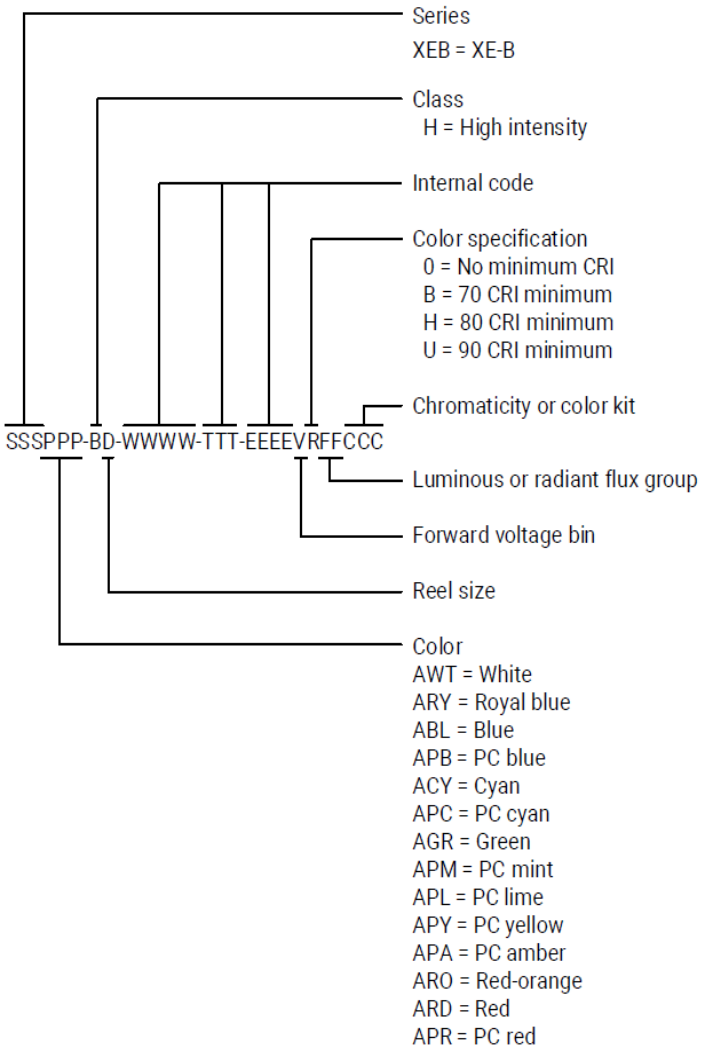


Chromaticity Bin	x	y
Y2	0.5469	0.4249
	0.5700	0.4100
	0.5900	0.4100
	0.5610	0.4390

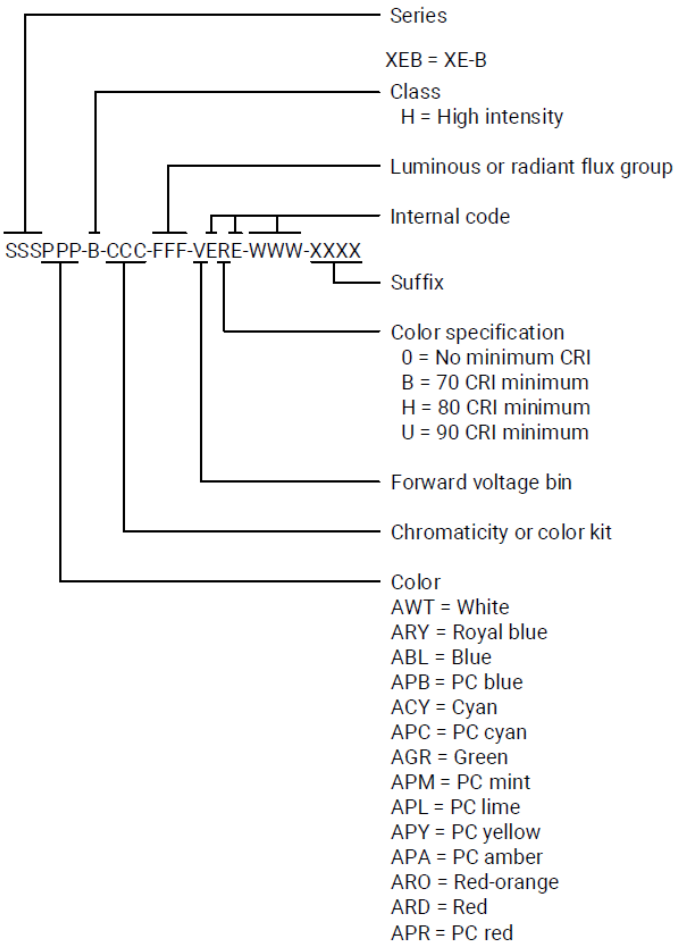
BIN AND ORDER CODE FORMATS

Bin codes and order codes for XE-B LEDs are configured in the following manner:

Order Code



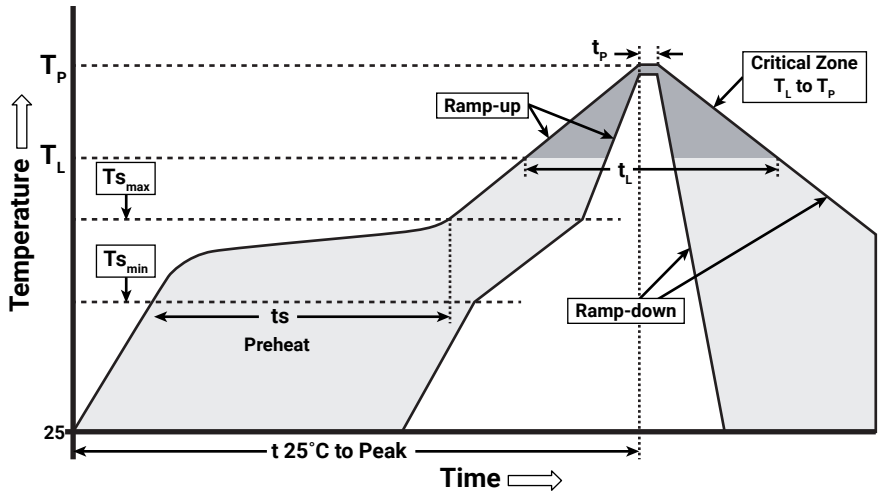
Bin Code



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XE-B LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree LED recommends that users follow the recommended soldering profile provided by the manufacturer of the solder paste used, and therefore it is the lamp or luminaire manufacturer's responsibility to determine applicable soldering requirements.

Note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment.



IPC/JEDEC J-STD-020C

Profile Feature	Lead-Free Solder
Average Ramp-Up Rate (Ts_{max} to Tp)	1.2 °C/second
Preheat: Temperature Min (Ts_{min})	120 °C
Preheat: Temperature Max (Ts_{max})	170 °C
Preheat: Time (ts_{min} to ts_{max})	65-150 seconds
Time Maintained Above: Temperature (T_L)	217 °C
Time Maintained Above: Time (t_L)	45-90 seconds
Peak/Classification Temperature (Tp)	235 - 245 °C
Time Within 5 °C of Actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	1 - 6 °C/second
Time 25 °C to Peak Temperature	4 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

NOTES

Measurements

The luminous flux, radiant power, chromaticity, forward voltage and CRI measurements in this document are binning specifications only and solely represent product measurements as of the date of shipment. These measurements will change over time based on a number of factors that are not within Cree LED's control and are not intended or provided as operational specifications for the products. Calculated values are provided for informational purposes only and are not intended or provided as specifications.

Pre-Release Qualification Testing

Please read the LED Reliability Overview for details of the qualification process Cree LED applies to ensure long-term reliability for XLamp LEDs and details of Cree LED's pre-release qualification testing for XLamp LEDs.

Lumen Maintenance

Cree LED now uses standardized IES LM-80-08 and TM-21-11 methods for collecting long-term data and extrapolating LED lumen maintenance. For information on the specific LM-80 data sets available for this LED, refer to the public LM-80 results document.

Please read the Long-Term Lumen Maintenance application note for more details on Cree LED's lumen maintenance testing and forecasting. Please read the Thermal Management application note for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

Moisture Sensitivity

Cree LED recommends keeping XLamp LEDs in the provided, resealable moisture-barrier packaging (MBP) until immediately prior to soldering. Unopened MBPs that contain XLamp LEDs do not need special storage for moisture sensitivity.

Once the MBP is opened, XLamp XE-B LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of ≤ 30 ºC/85% relative humidity (RH). Regardless of storage condition, Cree LED recommends sealing any unsoldered LEDs in the original MBP.

RoHS Compliance

The levels of RoHS 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 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree LED representative or from the Product Ecology section of the Cree LED website.

REACH Compliance

REACH substances of very high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree LED representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

NOTES - CONTINUED

UL® Recognized Component

This product meets the requirements to be considered a UL Recognized Component with Level 1 enclosure consideration. The LED package or a portion thereof has not been investigated as a fire enclosure or a fire and electrical enclosure per ANSI/UL 8750.

Vision Advisory

WARNING: Do not look at an exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

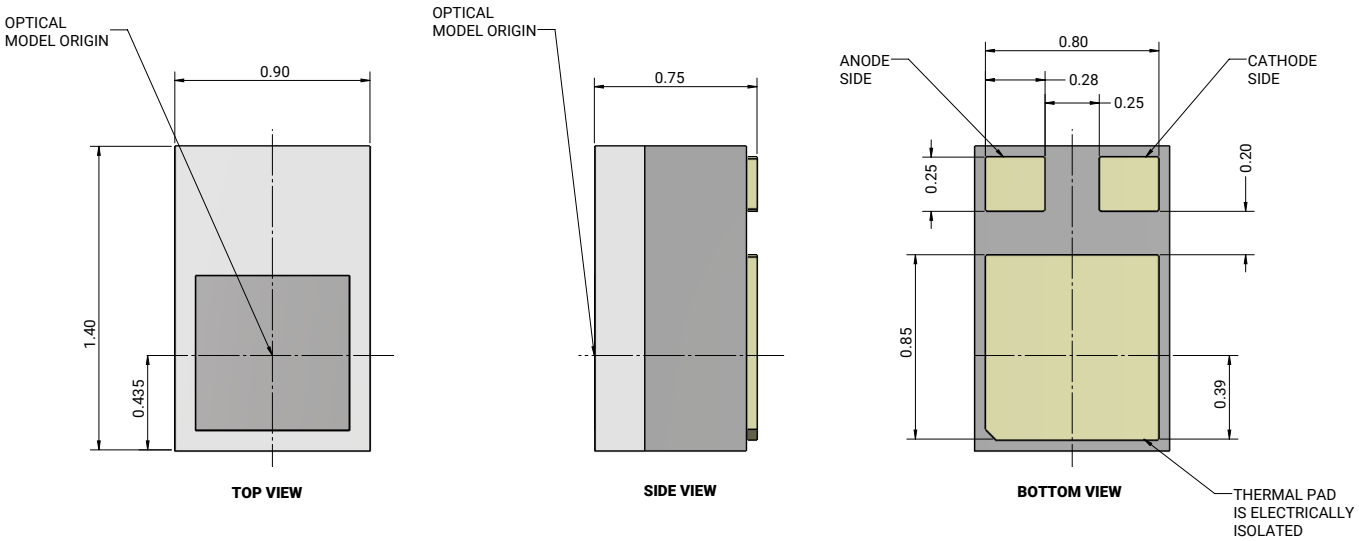
MECHANICAL DIMENSIONS

Thermal vias, if present, are not shown on these drawings.

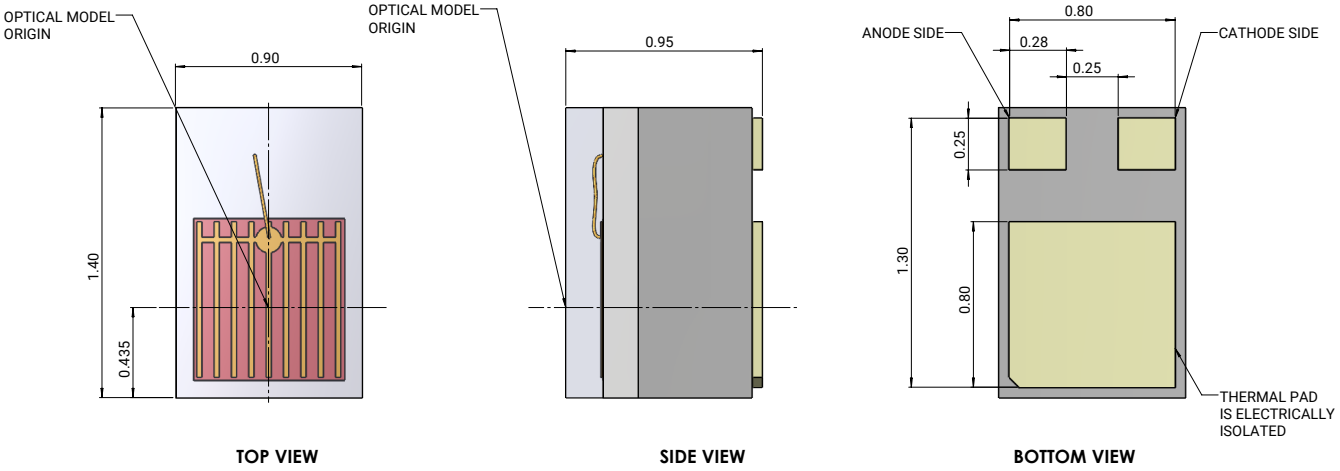
All dimensions in mm.

Measurement tolerances unless indicated otherwise: ±.13 mm

Royal Blue, Blue, Cyan, Green, PC-Blue



Red-Orange, Red



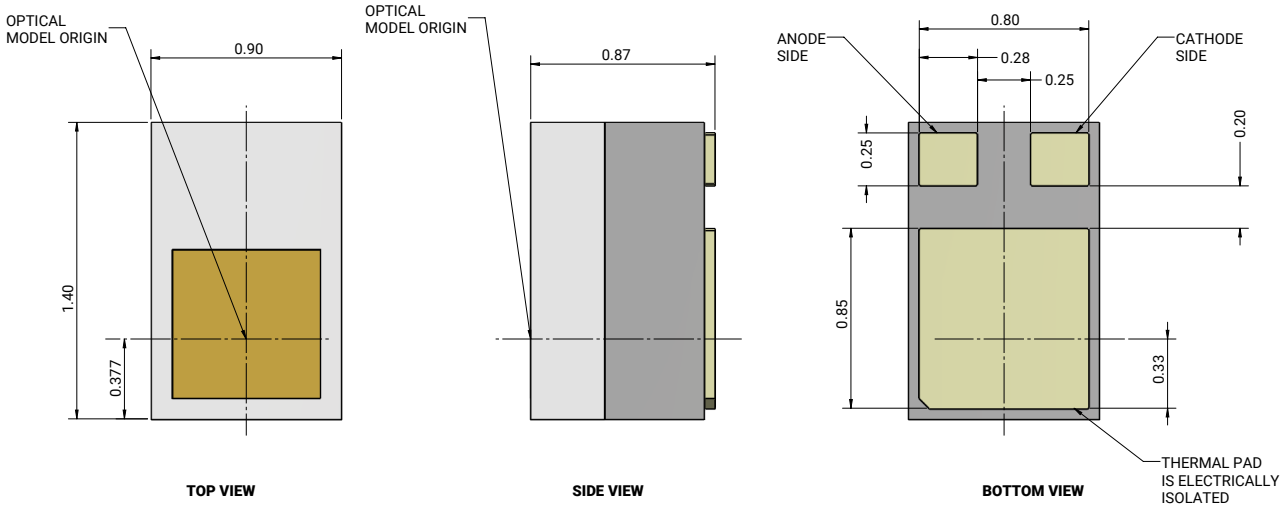
MECHANICAL DIMENSIONS - CONTINUED

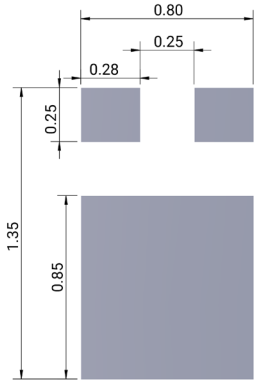
Thermal vias, if present, are not shown on these drawings.

All dimensions in mm.

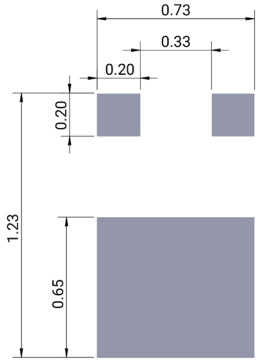
Measurement tolerances unless indicated otherwise: ±.13 mm

White and PC Colors





Recommended PCB Footprint



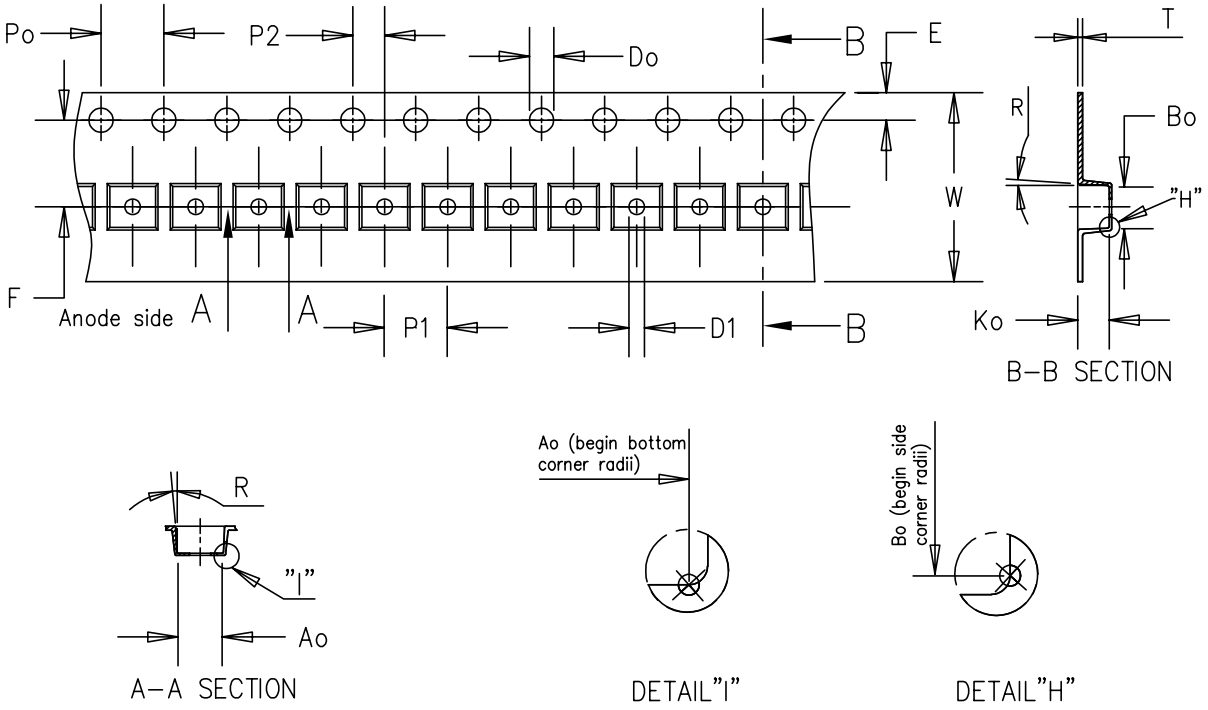
Recommended Stencil Openings

TAPE AND REEL

All Cree LED carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

Except as noted, all dimensions in mm

Measurement tolerances unless indicated otherwise: .xx = ±.15 mm



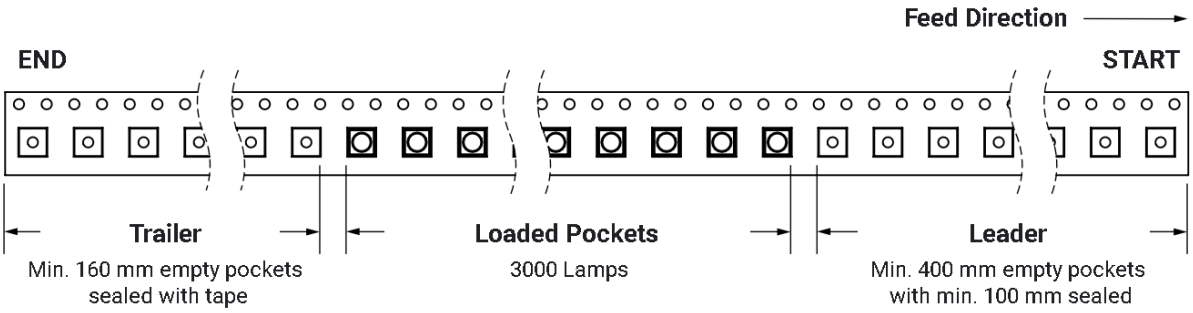
All XE-B products except XEBARD and XEBARO:

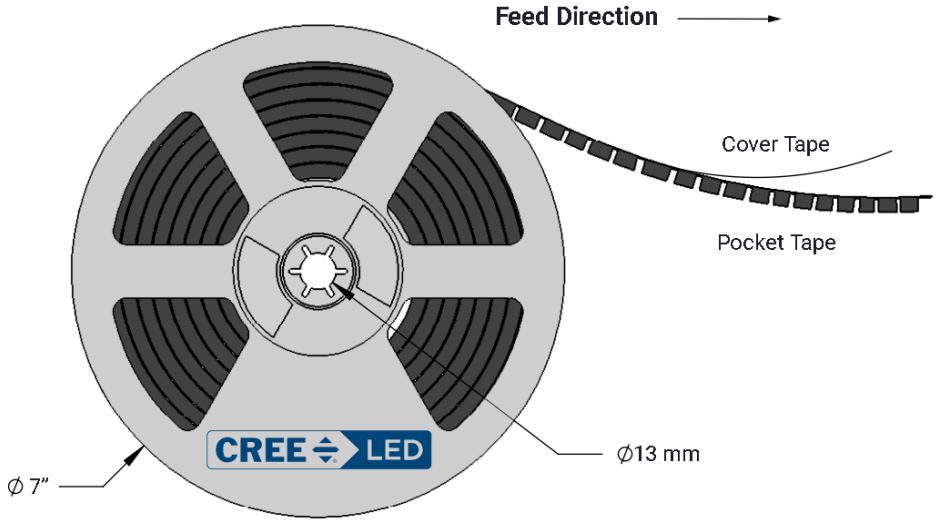
Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dimension	1.05	1.55	0.93	4.00	4.00	2.00	0.25	1.75	3.50	1.50	0.50	8.00	3°

XEBARD and XEBARO

Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dimension	1.05	1.55	1.15	4.00	4.00	2.00	0.25	1.75	3.50	1.50	0.50	8.00	3°

TAPE AND REEL - CONTINUED

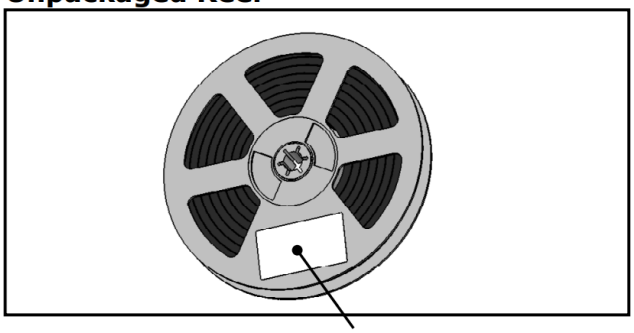




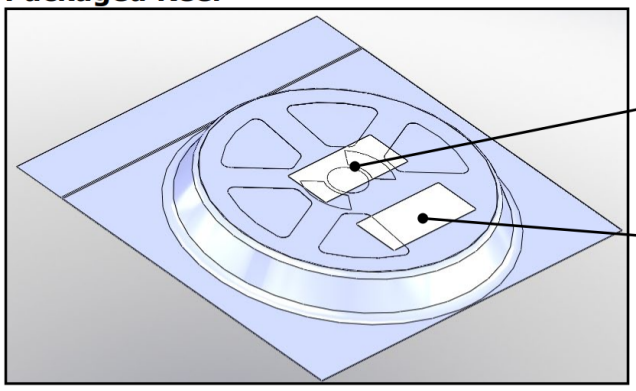
PACKAGING

The diagrams below show the packaging and labels Cree LED uses to ship XLamp XE-B LEDs. XLamp XE-B LEDs are shipped in tape loaded on a reel. Each box contains only one reel in a moisture barrier bag.

Unpackaged Reel



Packaged Reel



Boxed Reel