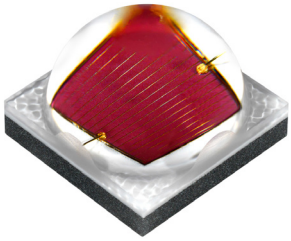
XLamp® XP-L Photo Red S Line LEDs



PRODUCT DESCRIPTION

XLamp® XP-L Photo Red S Line LEDs are designed for next-generation horticulture luminaires, with outstanding efficiency and durability that empowers growers to achieve superior results. XP-L Photo Red S Line LEDs provide a significant performance boost over XP-G3 Photo Red S Line LEDs, and can be used to lower Photo Red S Line LED count in luminaires by 35% while still maintaining the same total system efficiency.

Built with advanced S Line technology, these LEDs feature outstanding sulfur and corrosion resistance, making them ideal for harsh greenhouse environments. Featuring Cree LED's 3.45 x 3.45 mm XP footprint, XP-L Photo Red S Line LEDs are an easy upgrade for existing XP-based designs.

FEATURES

- Available in Photo Red S Line
- Binned at 25 °C
- Maximum drive current: 1500 mA
- Low thermal resistance: 1.15 °C/W
- Wide viewing angle: 125°
- Unlimited floor life at ≤ 30 ºC/85% RH
- Reflow solderable - JEDEC J-STD-020C
- Electrically neutral thermal path
- RoHS and REACH compliant
- UL® recognized component (E349212)

TABLE OF CONTENTS

Characteristics 2
Flux Characteristics 3
Relative Spectral Power Distribution 4
Relative Flux vs. Junction Temperature..... 4
Electrical Characteristics..... 5
Relative Radiant Flux vs. Current 5
Typical Spatial Distribution..... 6
Performance Groups - Radiant Flux..... 7
Performance Groups - Peak Wavelength..... 7
Performance Groups - Forward Voltage..... 7
Bin and Order Code Formats..... 8
Reflow Soldering Characteristics..... 9
Notes 10
Mechanical Dimensions 12
Tape and Reel..... 13
Packaging..... 15

Cree LED / 4001 E. Hwy. 54, Suite 2000 / Durham, NC 27709 USA / +1.919.313.5330 / www.cree-led.com

CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		1.15	
Viewing angle (FWHM)	degrees		125	
Temperature coefficient of voltage	mV/°C		-0.9	
ESD withstand voltage (HBM per Mil-Std-883D)			Class 3B	
DC forward current	mA			1500
Reverse voltage	V			1
Forward voltage (@ 700 mA, 25 °C)	V		1.92	
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.

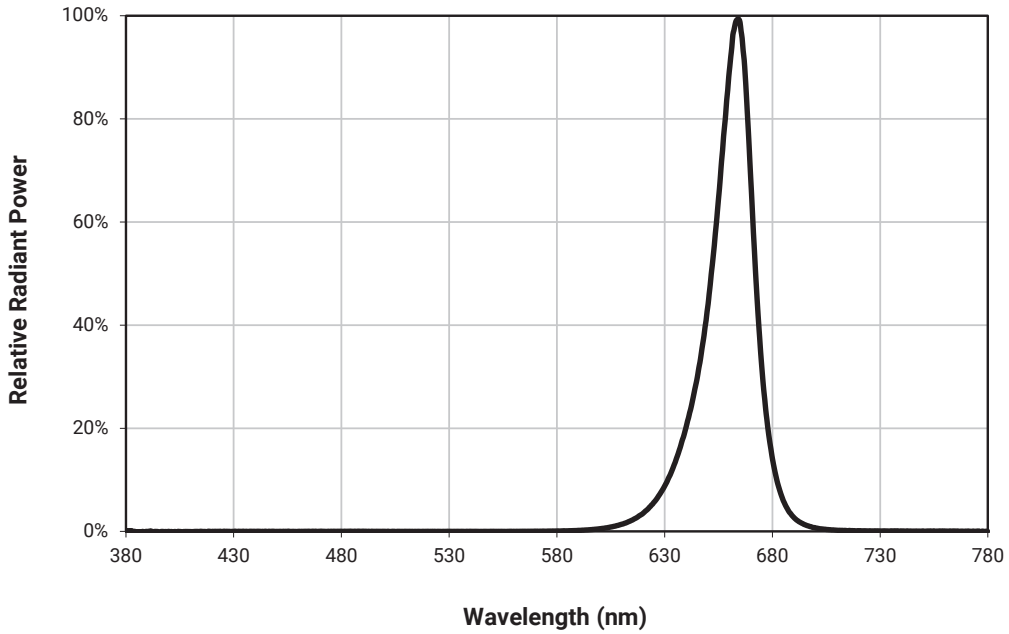
FLUX CHARACTERISTICS (T_J = 25 °C)

The following table provides the order codes for XLamp XP-L Photo Red S Line LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 8).

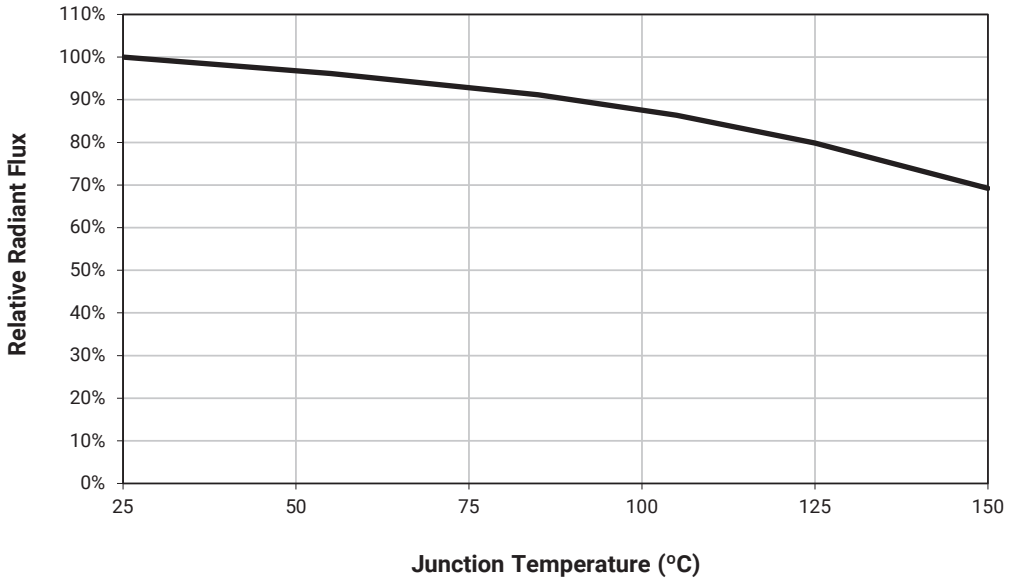
Color	PWL Kit Code	Peak Wavelength Range				Typical Dominant Wavelength (nm) @ 700 mA, T_j=25 °C	Minimum Radiant Flux (mW) @ 700 mA		Calculated Minimum PPF (µmol/s) @ 700 mA, 25 °C	Order Code
		Minimum		Maximum			Code	Flux (mW) @25 °C		
		Group	PWL (nm)	Group	PWL (nm)					
Photo Red S Line	01	P2	650	P5	670	645	J	1135	6.16	XPLAPR-LS-0000-00J01
							H	1085	5.89	XPLAPR-LS-0000-00H01

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. See the Measurements section (page 10).
- XLamp XP-L Photo Red S Line 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 bin restrictions specified by the order code.
- Dominant wavelengths are calculated based on peak wavelength specifications and are for reference only.
- Calculated Photosynthetic Photon Flux (PPF) values are for reference only.

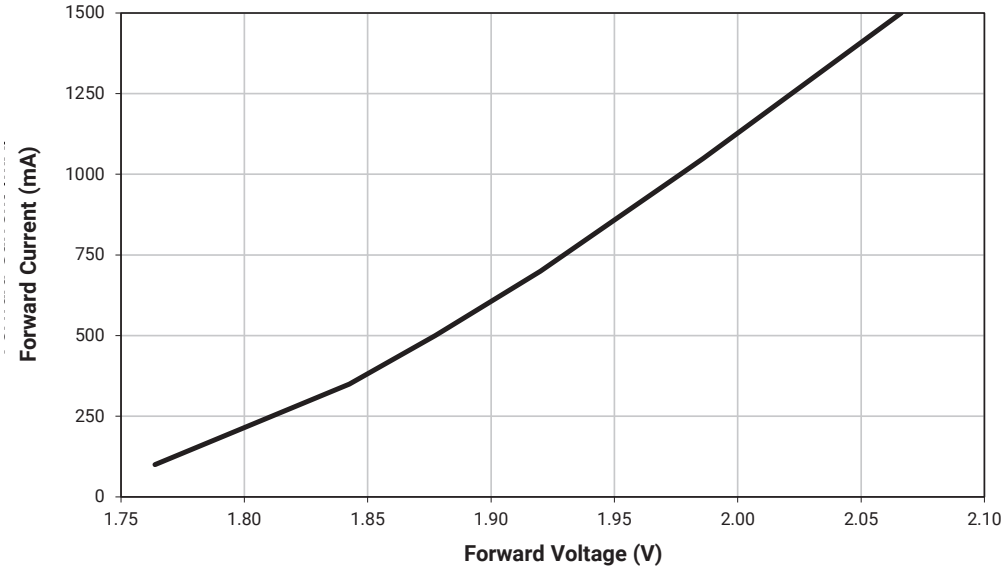
RELATIVE SPECTRAL POWER DISTRIBUTION



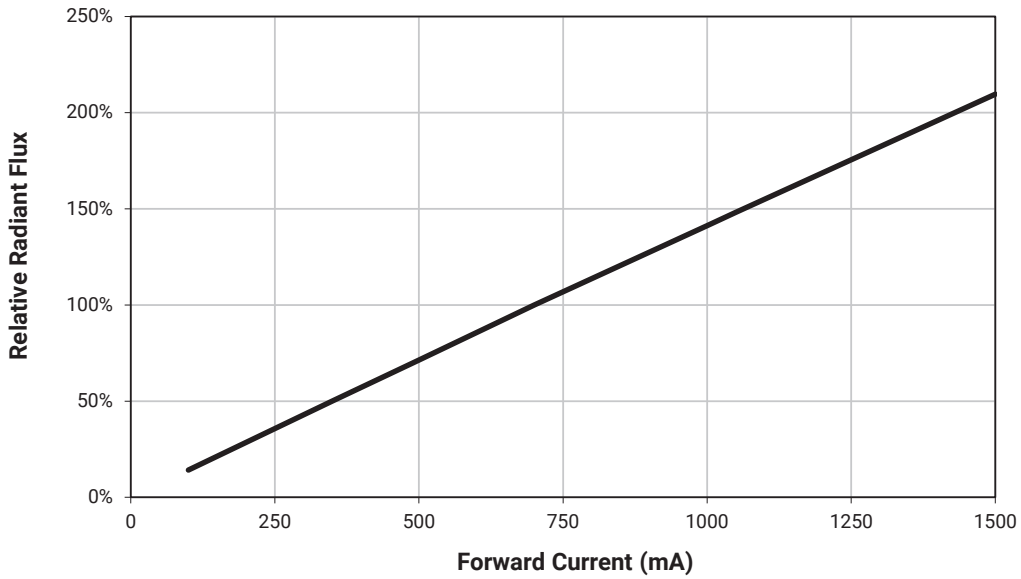
RELATIVE FLUX VS. JUNCTION TEMPERATURE (I_F = 700 mA)



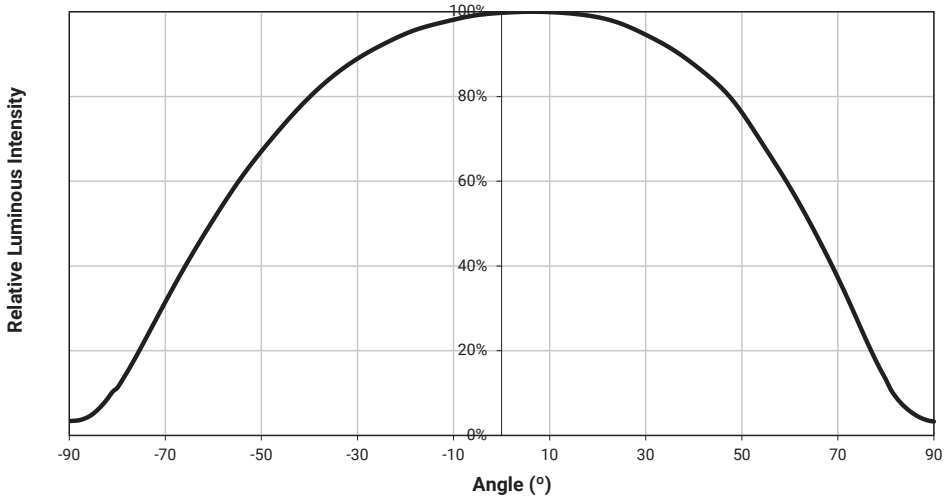
ELECTRICAL CHARACTERISTICS (T_J = 25 °C)



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



TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - RADIANT FLUX (T_J = 25 °C)

XLamp XP-L Photo Red S Line LEDs are tested for radiant flux and placed into one of the following bins.

Group Code	Minimum Radiant Flux (mW)	Maximum Radiant Flux (mW)	Calculated PPF (µmol/s)	
			Minimum	Maximum
34	1085	1135	5.89	6.16
35	1135	1185	6.16	6.43

Note
- Calculated PPF values are for reference only.

PERFORMANCE GROUPS - PEAK WAVELENGTH (T_J = 25 °C)

XLamp XP-L Photo Red S Line LEDs are tested for peak wavelength and sorted into one of the PWL bins defined below.

Group Code	Minimum Peak Wavelength (nm)	Maximum Peak Wavelength (nm)	Typical Dominant Wavelength (nm)
P2	650	655	638
P3	655	660	643
P4	660	665	647
P5	665	670	652

Note
- Typical dominant wavelength values are calculated and for reference only.

PERFORMANCE GROUPS - FORWARD VOLTAGE

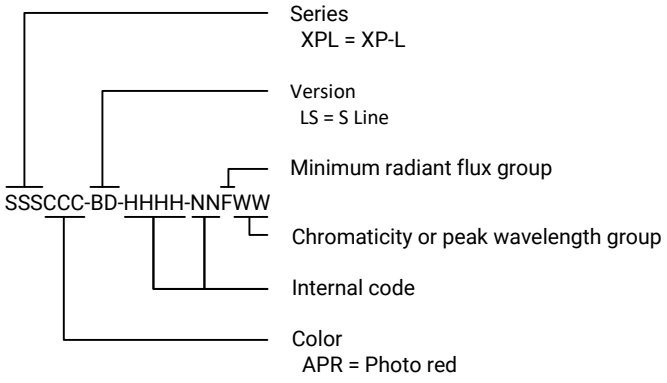
XLamp XP-L Photo Red S Line LEDs are tested for forward voltage and sorted into one of the forward voltage bins defined below.

Forward Voltage Group	Minimum Forward Voltage (V) @ 700 mA	Maximum Forward Voltage (V) @ 700 mA
W	1.8	1.9
X	1.9	2.0
Y	2.0	2.1
Z	2.1	2.2

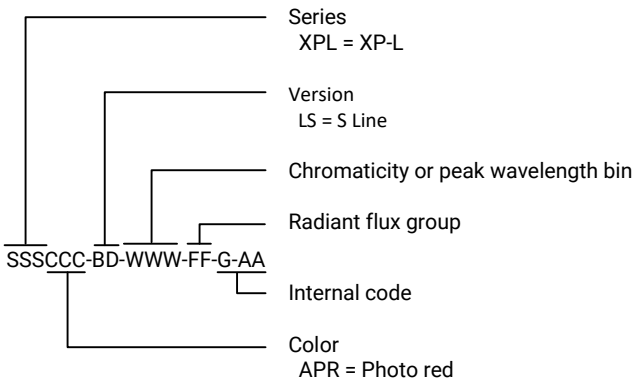
BIN AND ORDER CODE FORMATS

XP-L Photo Red S Line bin codes and order codes are configured in the following manner:

Order Code



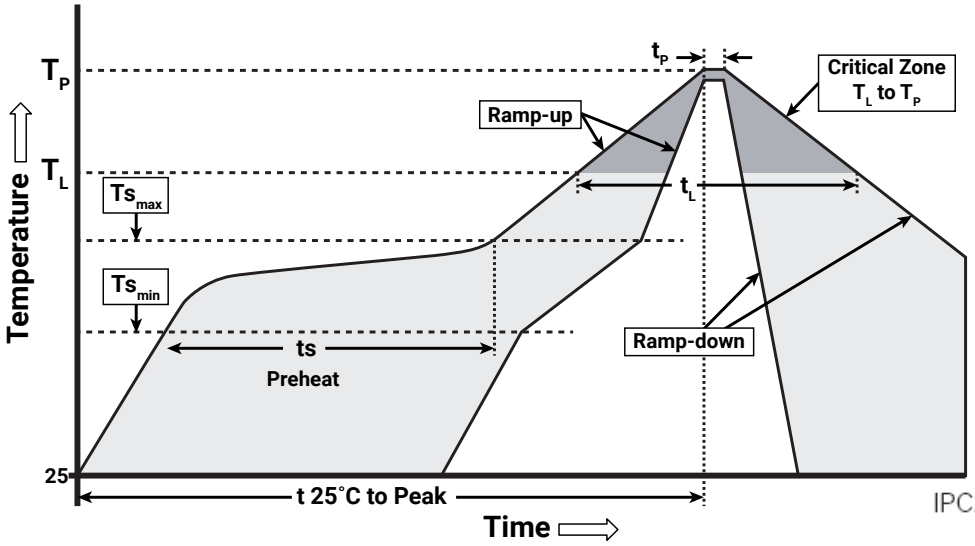
Bin Code



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XP-L Photo Red S Line LEDs to be compatible with JEDEC J-STD-020C, with the exception of the peak temperature requirements listed in the table 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 T_p)	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. Cree LED did not perform Room Temperature Operating Life (RTOL) testing on the XP-L Photo Red S Line LED.

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 XP-L Photo Red S Line 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 the 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 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 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

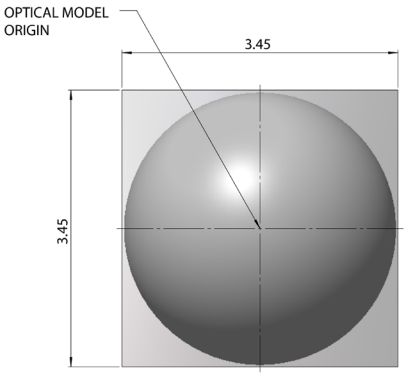
Vision Advisory

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.

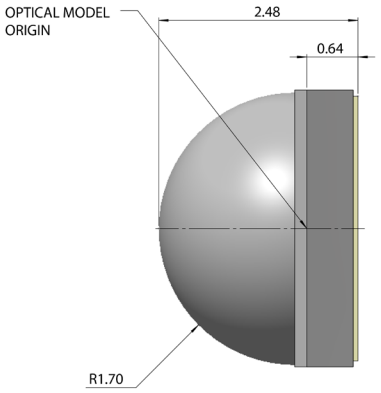
MECHANICAL DIMENSIONS (T_A = 25 °C)

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

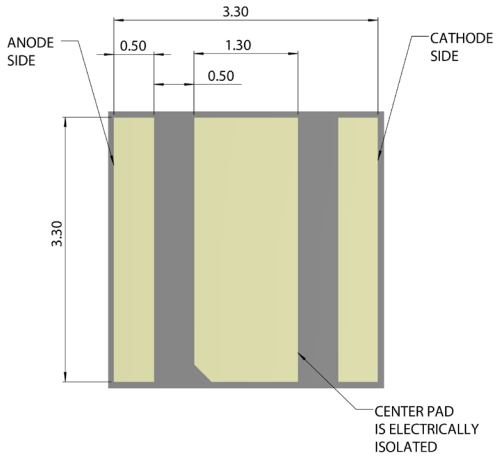
All measurements are ±.13 mm unless otherwise indicated.



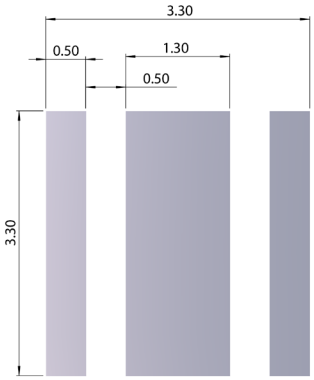
Top View



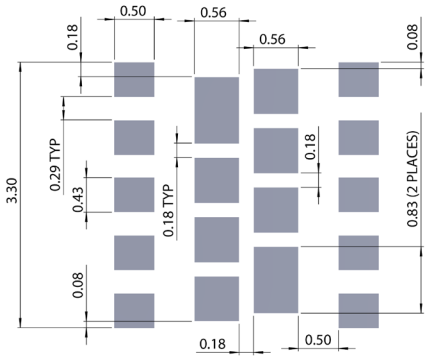
Side View



Bottom View



Recommended PCB Footprint



Recommended Stencil Openings*

Notes:

- Cree LED recommends using thermal pad kickouts to maximize component thermal performance.
- Cree LED recommends using white solder mask material to minimize system optical loss.

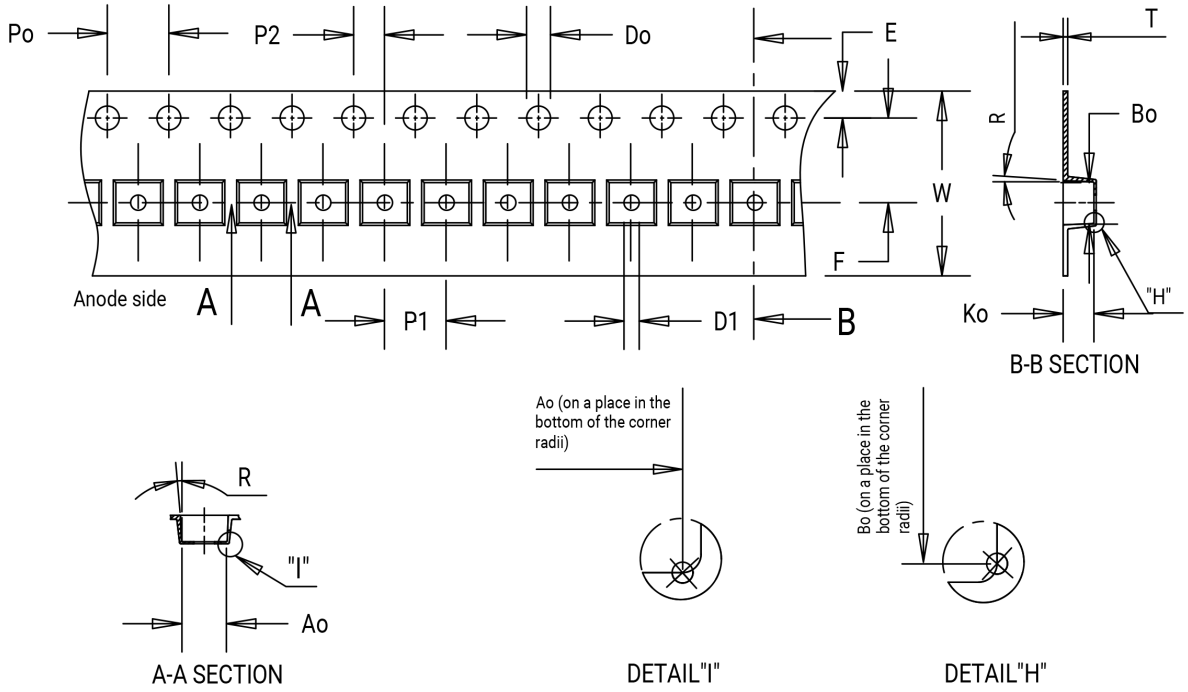
* This stencil has been tested and optimized for the avoidance of voiding when using ALPHA® LUMET® P30 Maxrel solder paste. For other solder pastes, a “window pane” design for the thermal pad stencil may result in a lower voiding percentage.

TAPE AND REEL

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

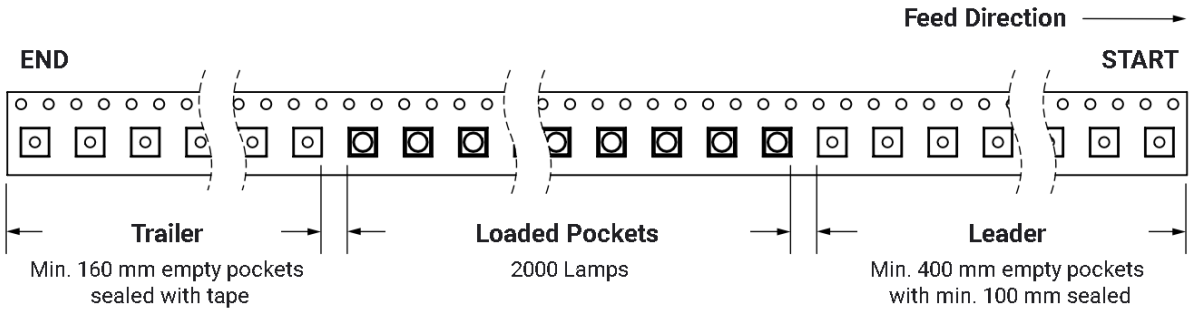
All dimensions in mm.

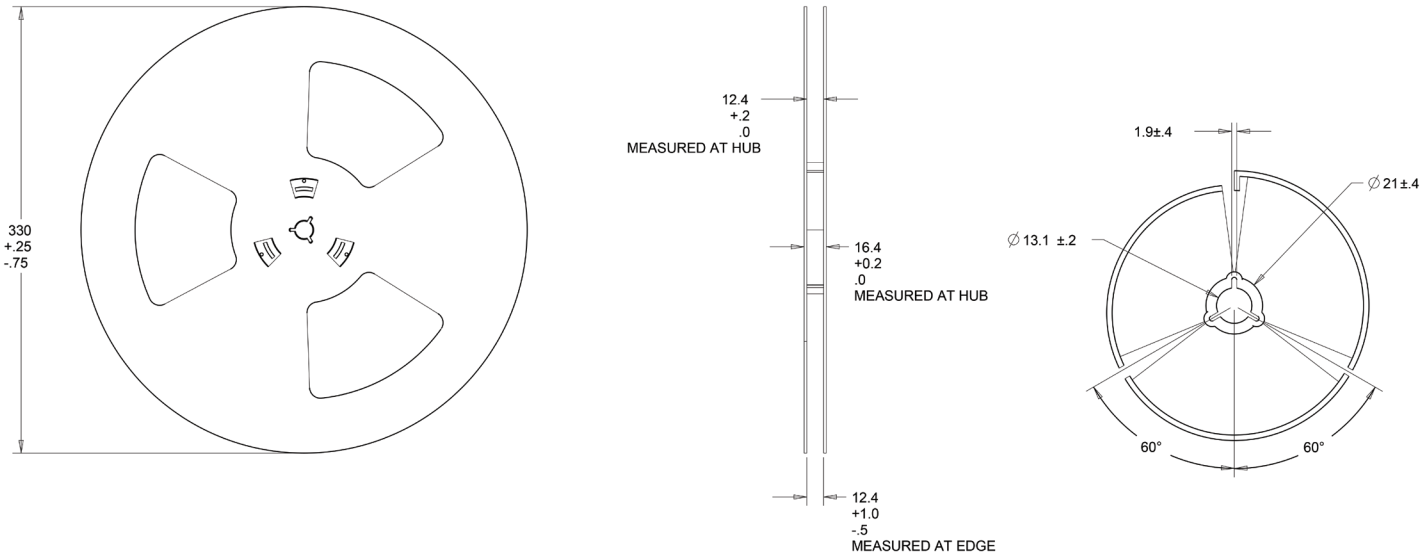
All measurements are ±.15 mm unless otherwise indicated.



Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dim.	3.70	3.70	2.40	4.00	8.00	2.00	0.30	1.75	5.50	1.55	1.50	12.00	5°

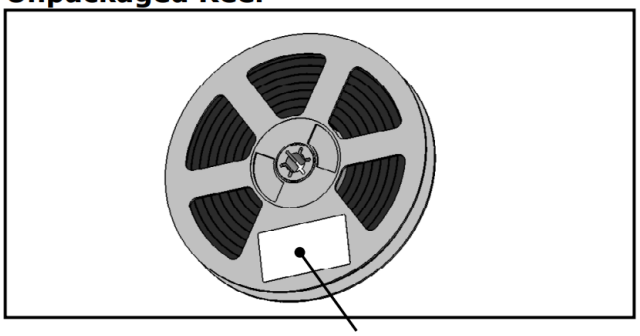
TAPE AND REEL - CONTINUED



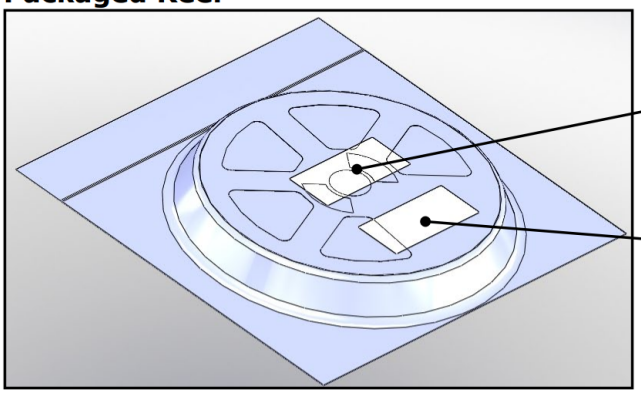


PACKAGING

Unpackaged Reel



Packaged Reel



Boxed Reel