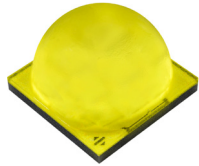
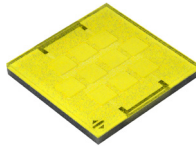


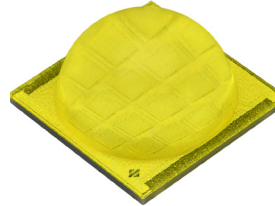
XLamp® XFL LEDs



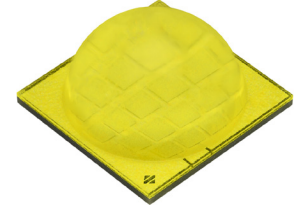
XL05K High Density



XL05K High Intensity



XFL08K



XFL10K

INTRODUCTION

This application note applies to XLamp® XFL LEDs, which have order codes in the following format.

XFLxxx-xx-xxxx-xxxxxxxxxx

This application note explains how XLamp XFL LEDs and assemblies containing these LEDs should be handled during manufacturing. Please read the entire document to understand how to properly handle XLamp XFL LEDs.

TABLE OF CONTENTS

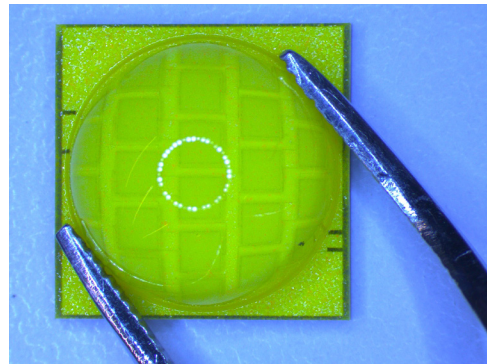
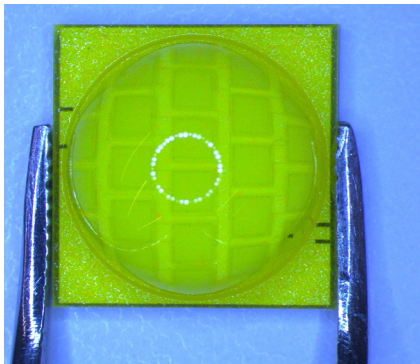
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HANDLING XLAMP® XFL LEDs

Manual Handling

Use tweezers to grab XLamp XFL LEDs at the base. Do not touch the lens with the tweezers. Do not touch the lens with fingers. Do not push on the lens.

Do not apply more than 600 g of shear force onto the lens. Excessive force on the lens could damage the LED.



Cree LED recommends the following at all times when handling XLamp XFL LEDs or assemblies containing these LEDs:

- Avoid putting excessive mechanical stress on the LED lens.
- Never touch the optical surface with fingers or sharp objects. The LED lens surface could be soiled or damaged, which would affect the optical performance of the LED.
- Cree LED recommends always handling XLamp XFL LEDs with appropriate ESD grounding.
- Cree LED recommends handling XLamp XFL LEDs wearing clean, lint-free gloves.

Whenever possible, Cree LED recommends the use of a pick & place tool to remove XLamp XFL LEDs from the factory tape & reel packaging.

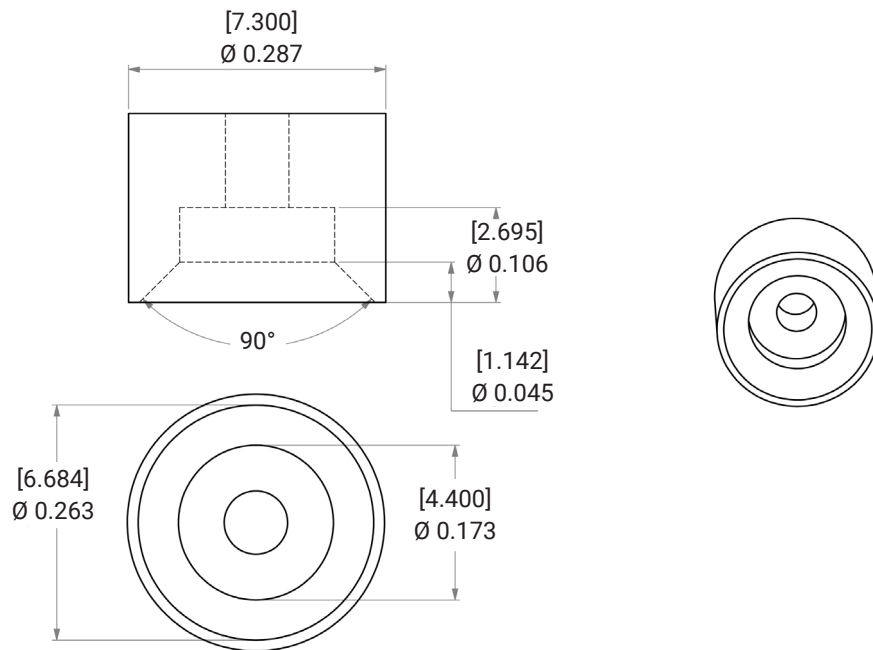
Pick & Place Nozzle

The following diagrams show examples of pick & place tools to remove XLamp XFL LEDs from the factory tape and reel packaging. For pick and place nozzles coming into contact with silicone-covered LED components, Cree LED recommends nozzles be constructed of non-metallic materials. Cree LED and several of Cree LED's customers have had good success using nozzles fabricated from Dupont™ VESPEL® SP-21.

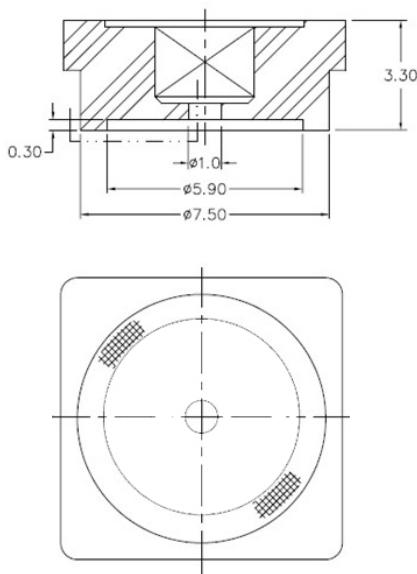
All dimensions in mm.

Measurement tolerances: .xxx = .001 mm

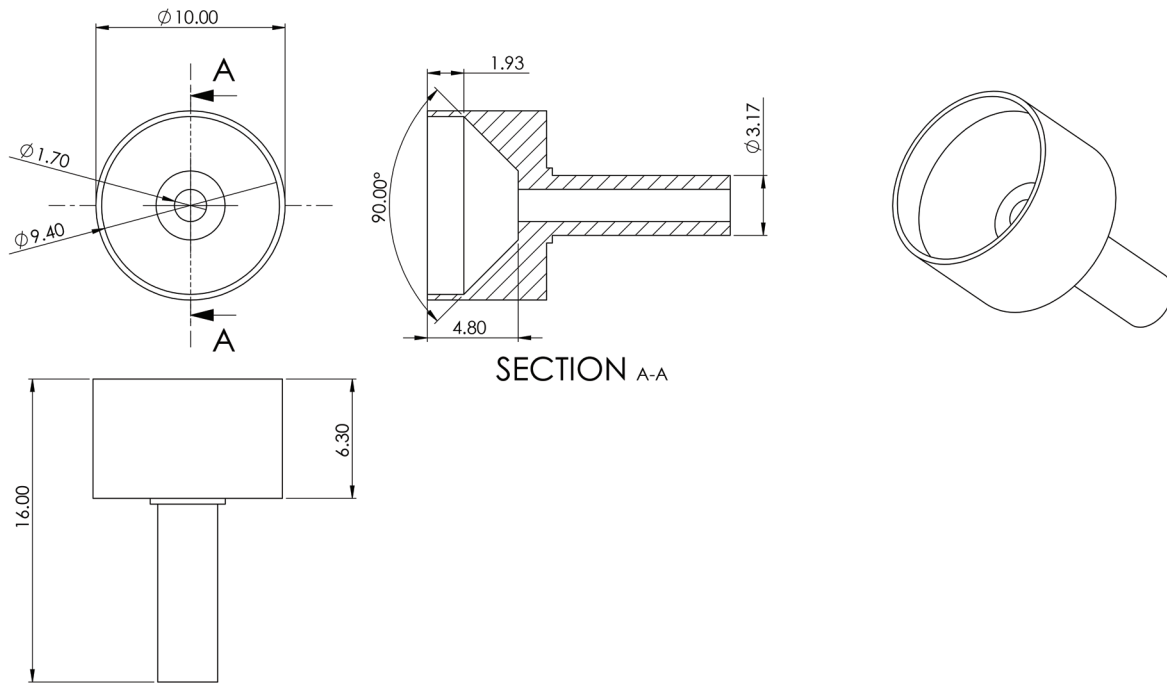
XFL05K High Density



XFL05K High Intensity



XFL08K and XFL10K



CIRCUIT BOARD PREPARATION & LAYOUTS

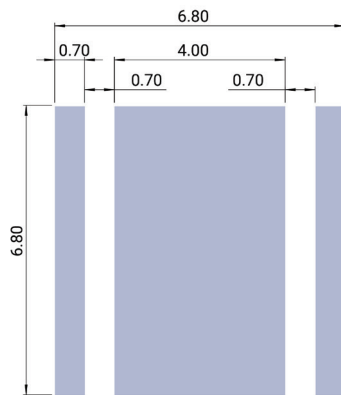
Printed circuit boards (PCBs) should be prepared and/or cleaned according to the manufacturer's specifications before placing or soldering XLamp XFL LEDs onto the PCB. When designing PCBs for XLamp XFL LEDs, make sure solder masks are used to prevent solder bridges from forming between closely spaced solder pads. The diagrams below show the recommended PCB solder pad layout for XLamp XFL LEDs.

The diagram below shows the recommended PCB solder pad layout for XLamp XFL LEDs.

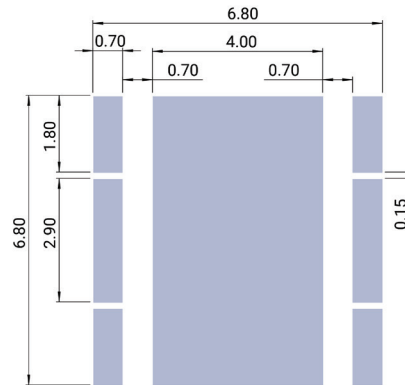
All dimensions in mm.

Measurement tolerance: .xx = ± 13 mm

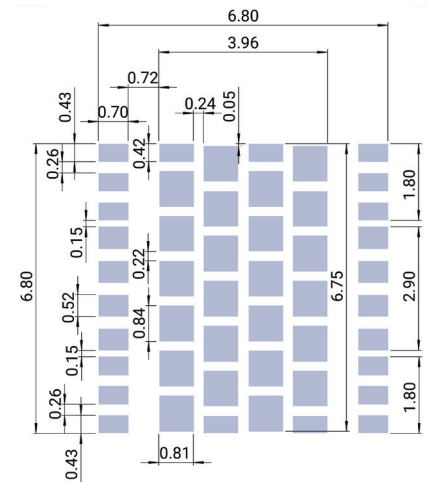
XFL05K



Recommended PCB Footprint

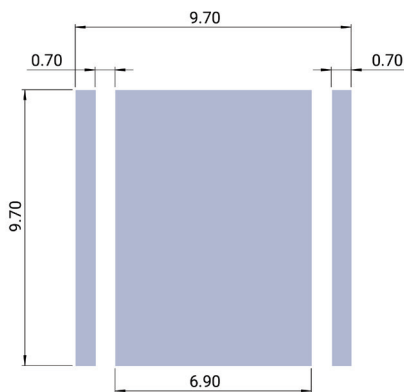


Recommended Solder Mask Opening

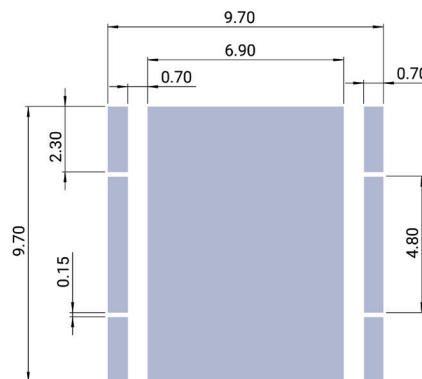


Recommended Stencil Opening

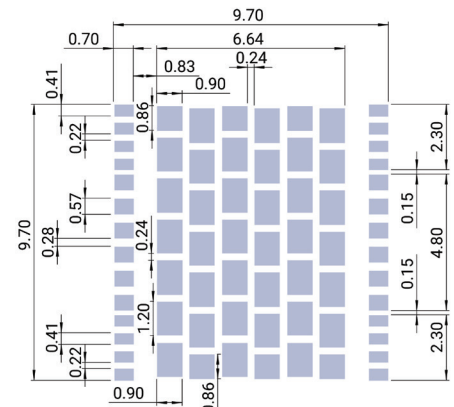
XFL08K and XFL10K



Recommended PCB Footprint



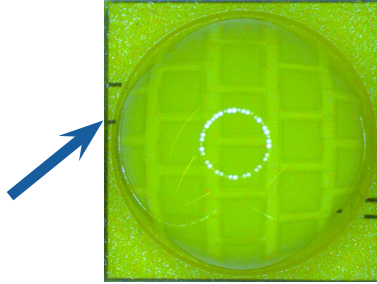
Recommended Solder Mask Opening



Recommended Stencil Opening

CASE TEMPERATURE (T_s) MEASUREMENT POINT

XLamp XFL LED case temperature (T_s) should be measured on the PCB surface, as close to the LED's thermal pad as possible. This measurement point is shown in the picture below.

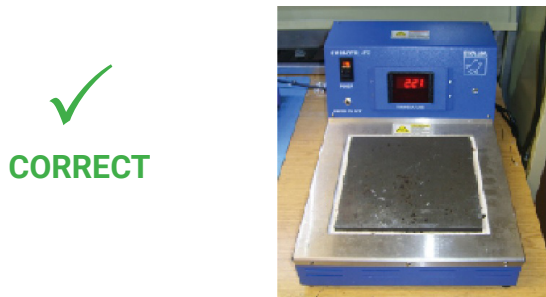


It is not required to use a solder footprint for the thermal pad that is larger than the XLamp XFL LED itself. In testing, Cree LED has found such a solder pad to have insignificant impact on the resulting T_s measurement.

NOTES ON SOLDERING XLAMP® XFL LEDs

XLamp XFL LEDs are designed to be reflow soldered to a PCB. Reflow soldering may be done by a reflow oven or by placing the PCB on a hotplate and following the reflow soldering profile listed on page 8.

Do not wave solder XLamp XFL LEDs. Do not hand solder XLamp XFL LEDs.



Solder Paste Type

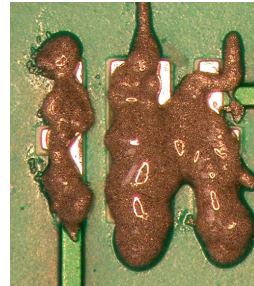
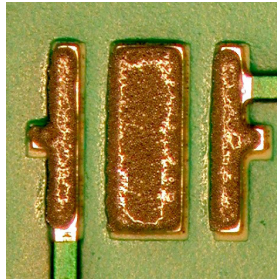
Cree LED strongly recommends using "no clean" solder paste with XLamp XFL LEDs so that cleaning the PCB after reflow soldering is not required. Cree LED uses Alpha P30 internally.

Cree LED recommends the following solder paste compositions: SnAgCu (tin/silver/copper) and SnAg (tin/silver).

Solder Paste Thickness

The choice of solder and the application method will dictate the specific amount of solder. For the most consistent results, an automated dispensing system or a solder stencil printer is recommended. Cree LED has seen positive results using solder thickness that results in a 4-mil (102- μm) bond line, i.e., the solder joint thickness after reflow soldering.

✓
CORRECT



✗
WRONG

Cree LED strongly recommends using “no clean” solder paste with XLamp XFL LEDs so that cleaning the PCB after reflow soldering is not required.

After Soldering

After soldering, allow XLamp XFL LEDs to return to room temperature before subsequent handling. Handling of the device, especially around the lens, before cooling could result in damage to the LED.

Cree LED recommends verifying the solder process by checking the consistency of the solder bond of several trial PCBs after reflow. This can be done by X-ray or by shearing selected devices from the circuit board. The solder should appear completely re-flowed (no solder grains evident). The solder areas should show minimum evidence of voids on the backside of the package and the PCB.

Cleaning PCBs After Soldering

Cree LED recommends using “no clean” solder paste so that flux cleaning is not necessary after reflow soldering. If PCB cleaning is necessary, Cree LED recommends the use of isopropyl alcohol (IPA).

Do not use ultrasonic cleaning.

MOISTURE SENSITIVITY

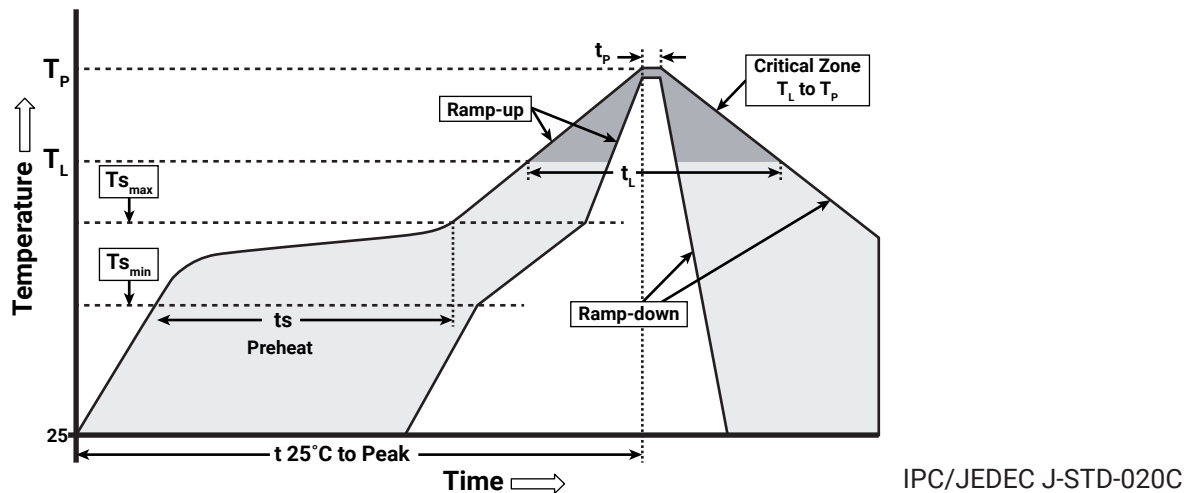
Cree LED recommends keeping XLamp LEDs in the provided, resealable moisture-barrier packaging (MBP) until immediately prior to soldering. Unopened MBPs that contain XLamp LEDs do not need special storage for moisture sensitivity. Bare XLamp LEDs have a storage temperature range of -40 °C to 100 °C. However, the MBP, reel, tape and box have a more limited storage temperature range.

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

XLAMP® XFL LED REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XFL 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.



Profile Feature	Lead-Free Solder
Average Ramp-Up Rate ($T_{s_{max}}$ to T_p)	1.2 °C/second
Preheat: Temperature Min ($T_{s_{min}}$)	120 °C
Preheat: Temperature Max ($T_{s_{max}}$)	170 °C
Preheat: Time ($t_{s_{min}}$ to $t_{s_{max}}$)	65-150 seconds
Time Maintained Above: Temperature (T_L)	217 °C
Time Maintained Above: Time (t_L)	45-90 seconds
Peak/Classification Temperature (T_p)	235 - 245 °C
Time Within 5 °C of Actual Peak Temperature (t_p)	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.

CHEMICALS & CONFORMAL COATINGS

Below are representative lists of chemicals and materials to be used or avoided in LED manufacturing activities. For a complete and current list of recommended chemicals, conformal coatings and harmful chemicals consult Cree LED's [Chemical Compatibility Application Note](#). For assistance with the process for testing the compatibility of chemicals and materials with LEDs, consult your regional Cree LED Field Applications Engineer.

Recommended Chemicals

In testing, Cree LED has found the following chemicals to be safe to use with XLamp XFL LEDs.

- Water
- Isopropyl alcohol (IPA)

Chemicals Tested as Harmful

In general, subject to the specifics in Cree LED's [Chemical Compatibility Application Note](#), Cree LED has found certain chemicals to be harmful to XLamp XFL LEDs. Cree LED recommends not using these chemicals anywhere in an LED system containing XLamp XFL LEDs. The fumes from even small amounts of the chemicals may damage the LEDs.

- Chemicals that might outgas aromatic hydrocarbons (e.g., toluene, benzene, xylene)
- Methyl acetate or ethyl acetate (i.e., nail polish remover)
- Cyanoacrylates (i.e., "Superglue")
- Glycol ethers (including Radio Shack® Precision Electronics Cleaner - dipropylene glycol monomethyl ether)
- Formaldehyde or butadiene (including Ashland® PLIOBOND® adhesive)

Hermetically Sealing Luminaires

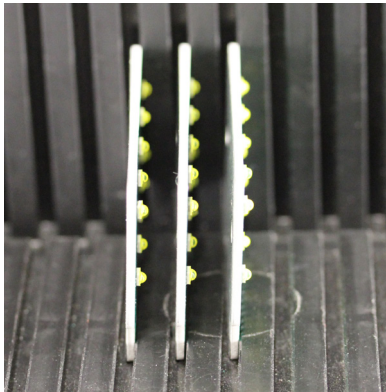
For proper LED operation and to avoid potential lumen depreciation and/or color shift, LEDs of all types must operate in an environment that contains oxygen. Simply allowing the LEDs to ventilate to air is sufficient; no extraordinary measures are required. Hermetically sealing LEDs in an enclosed space is not recommended.

ASSEMBLY STORAGE & HANDLING

Do not stack PCBs or assemblies containing XLamp XFL LEDs so that anything rests on the LED lens. Force applied to the LED lens may result in the lens being knocked off. PCBs or assemblies containing XLamp XFL LEDs should be stacked in a way to allow at least 1 cm clearance above the LED lens.

Do not use bubble wrap directly on top of XLamp XFL LEDs. Force from the bubble wrap can potentially damage the LED.

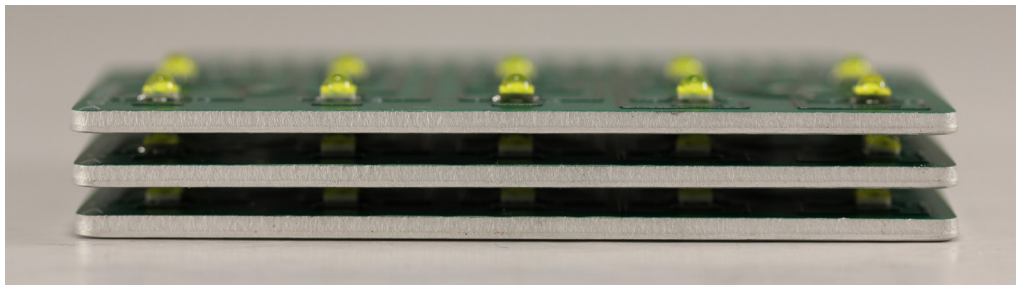
✓
CORRECT



✓
CORRECT



✗
WRONG



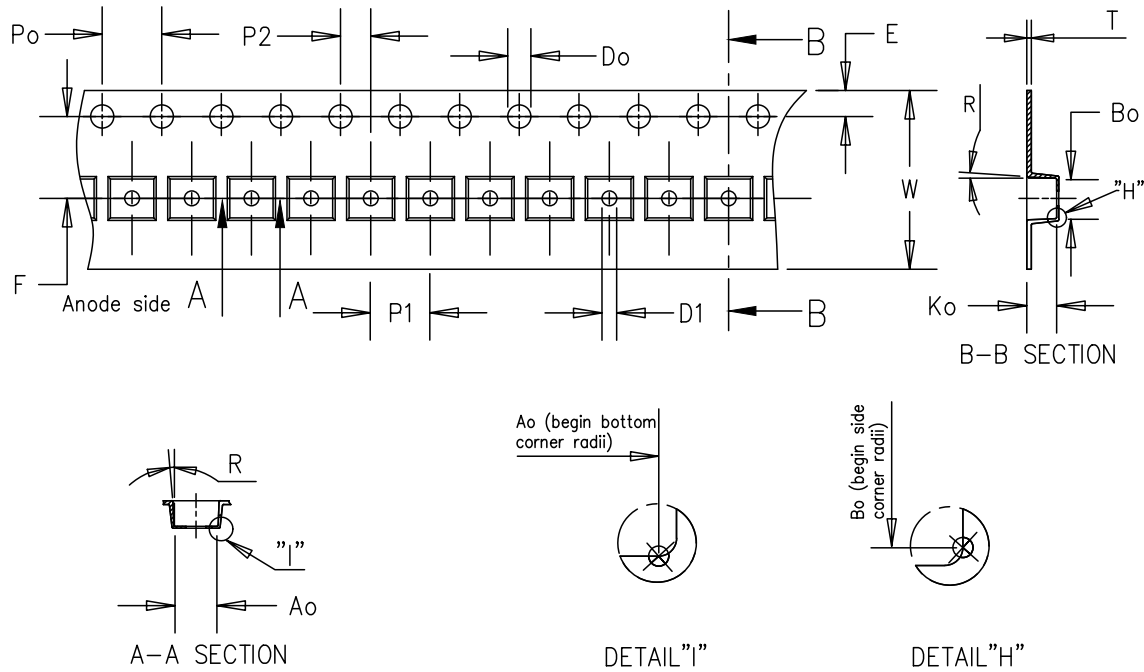
TAPE AND REEL

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

All dimensions in mm.

All measurements are ± 0.13 mm unless otherwise indicated.

XFL05K



XFL05K High Density

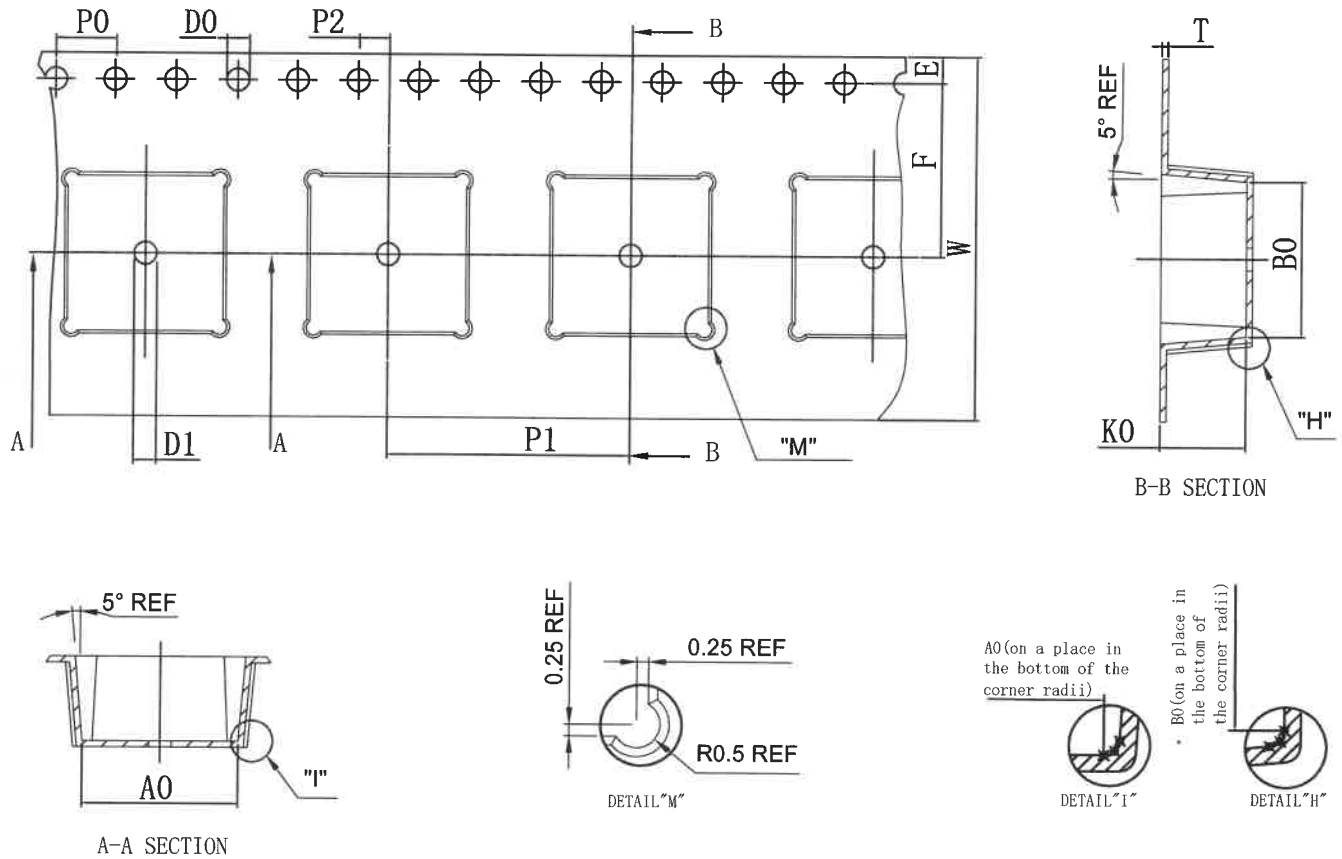
Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dim.	7.40	7.40	4.60	4.00	12.00	2.00	0.36	1.75	7.50	1.50	1.50	16.00	5°

XFL05K High Intensity

Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dim.	7.60	7.60	1.70	4.00	12.00	2.00	0.30	1.75	7.50	1.50	1.50	16.00	3°

TAPE AND REEL - CONTINUED

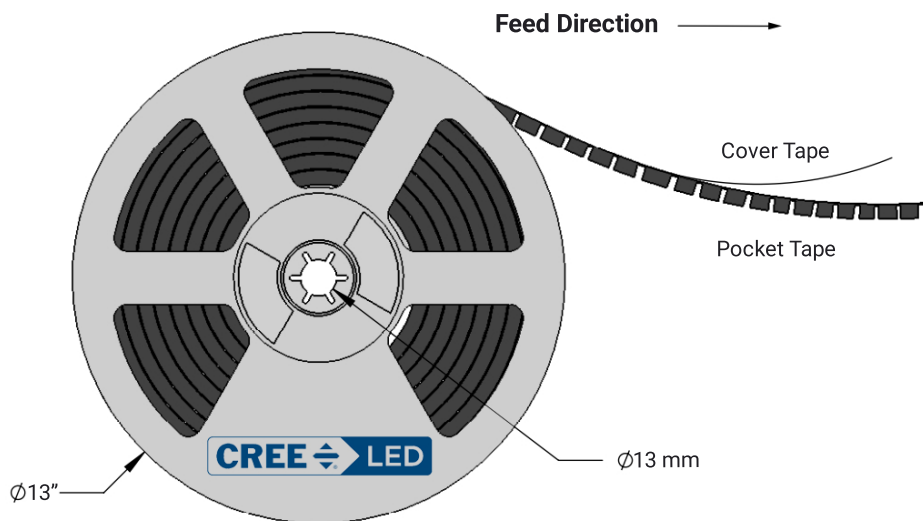
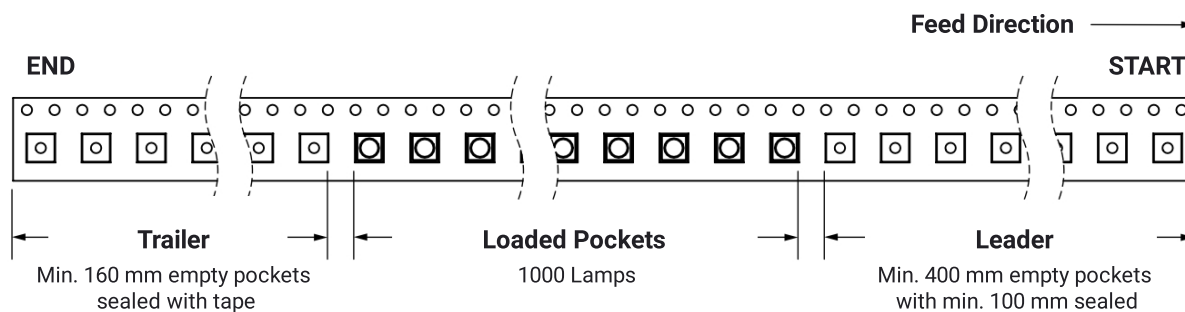
XFL08K and XFL10K



Item	A0	B0	K0	P0	P1	P2	T	E	F	D0	D1	W
Dim.	10.28	10.28	5.63	4.00	16.00	2.00	0.40	1.75	11.50	1.55	1.5 MIN	24.00

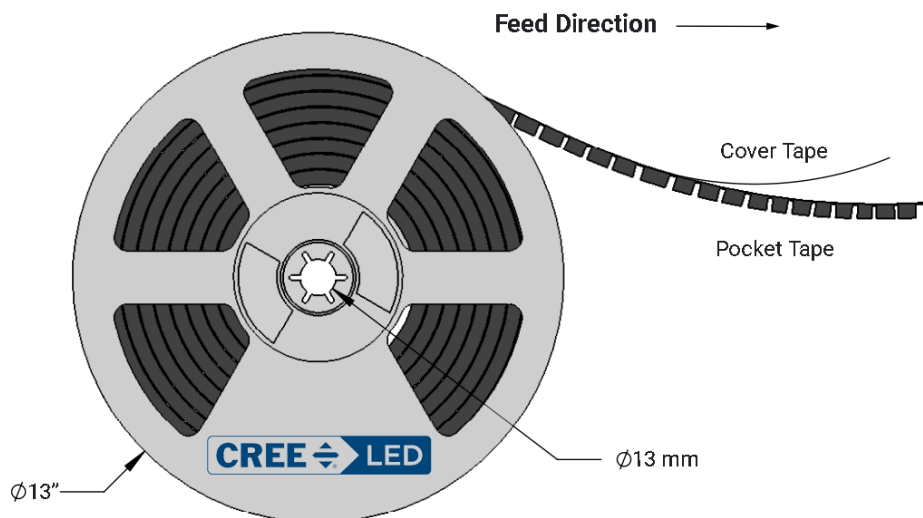
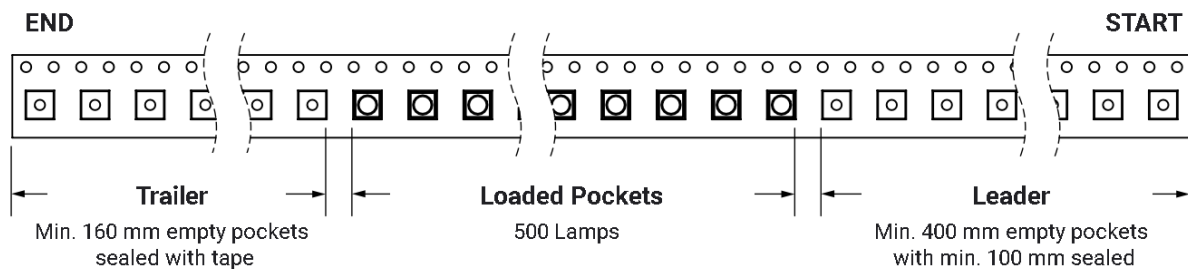
TAPE AND REEL - CONTINUED

XFL05K



TAPE AND REEL - CONTINUED

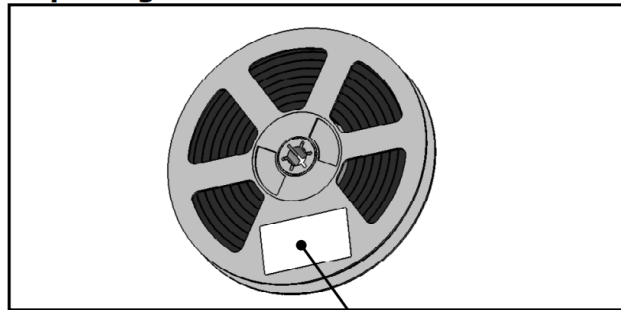
XFL08K and XFL10K



PACKAGING & LABELS

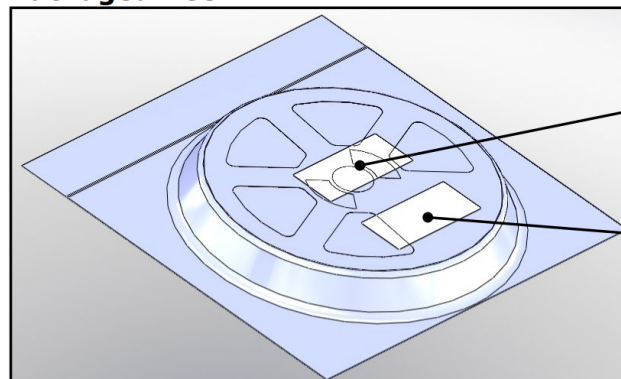
The diagrams below show the packaging and labels Cree LED uses to ship XLamp XFL LEDs. XLamp XFL LEDs are shipped in tape loaded on a reel. Each box contains only one reel in a moisture barrier bag.

Unpackaged Reel



Label with Cree LED Bin Code, Quantity, Reel ID

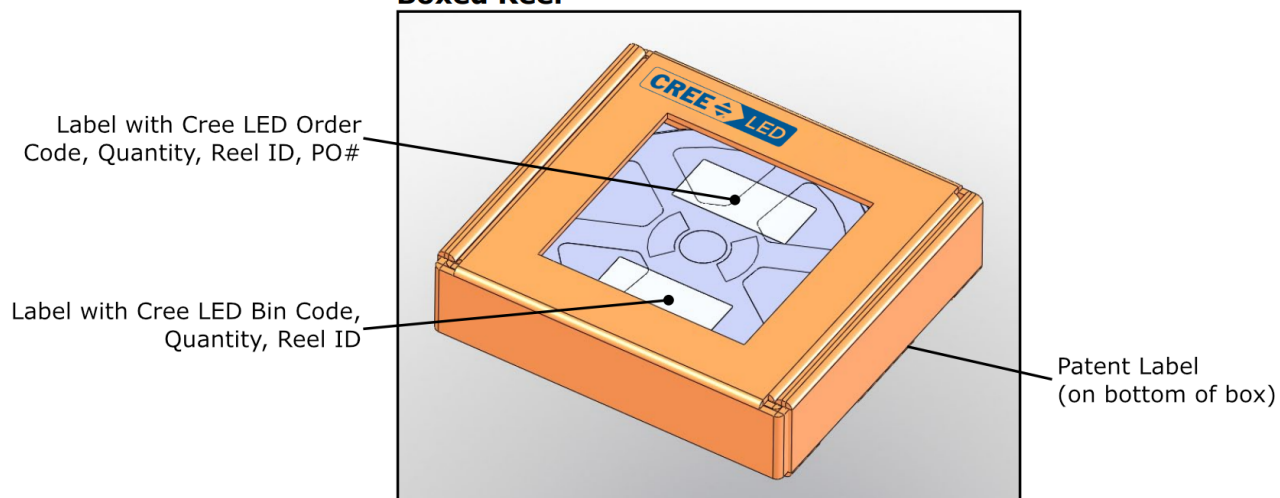
Packaged Reel



Label with Cree LED Order Code, Quantity, Reel ID, PO#

Label with Cree LED Bin Code, Quantity, Reel ID

Boxed Reel



Patent Label
(on bottom of box)