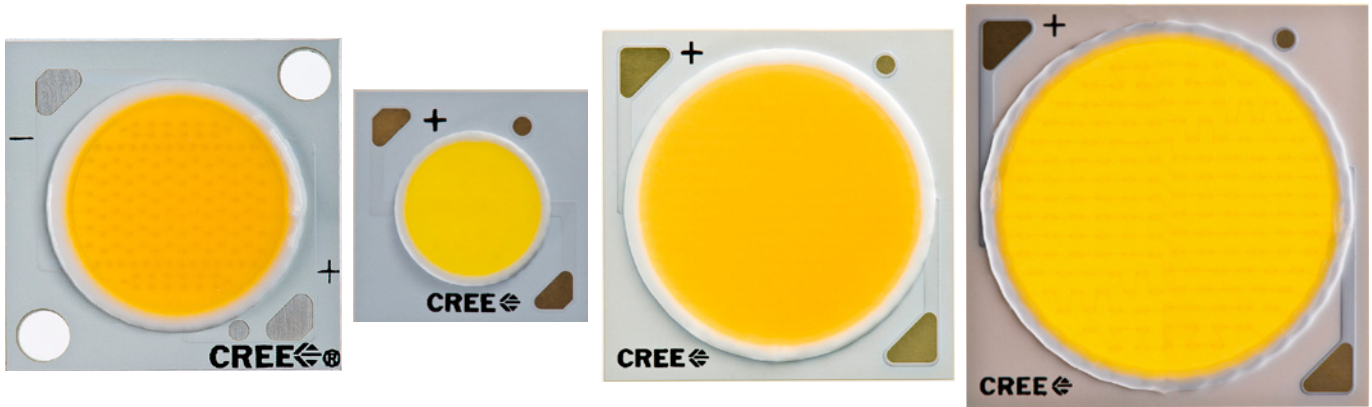


Cree® XLamp® CXA Family LEDs



INTRODUCTION

This application note applies to XLamp CXA family LEDs, which have order codes in the following format:

CXAXXXX-XXXX-XXXXXXXXXX

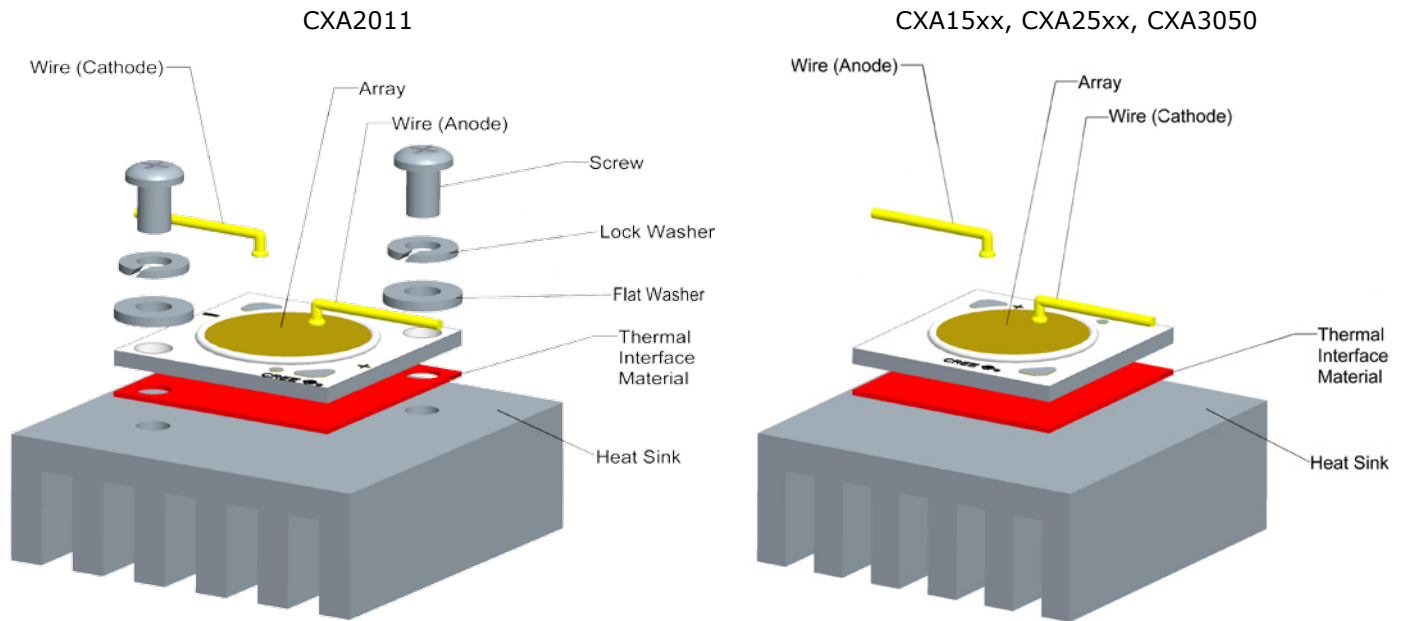
This application note explains how XLamp CXA family LEDs and assemblies containing these LEDs should be handled during manufacturing. Please read this entire document to understand how to properly handle XLamp CXA family LEDs.

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HANDLING XLAMP CXA FAMILY LEDs

In general, CXA family LEDs are attached directly to a heat sink and discrete wires are used to deliver power to the LED, as illustrated below.



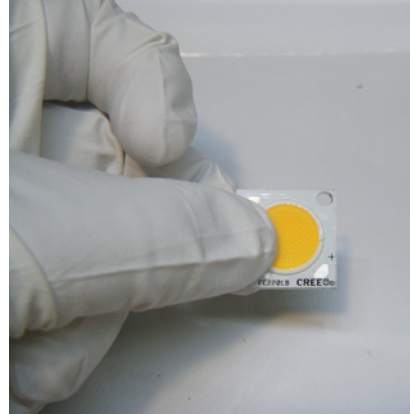
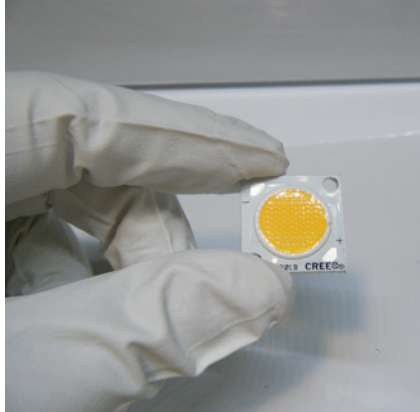
Cree recommends the following at all times when handling XLamp CXA family LEDs or assemblies containing XLamp CXA family LEDs:

- Avoid putting mechanical stress on the LED.
- Never touch the optical surface with fingers or sharp objects. The LED surface could be soiled or damaged, which could affect the optical performance of the LED
- Cree recommends always handling CXA family LEDs with appropriate ESD grounding.
- Cree recommends handling CXA family LEDs wearing powderless latex gloves.

Manual Handling

Do not touch the lens with fingers. Do not push on the lens.

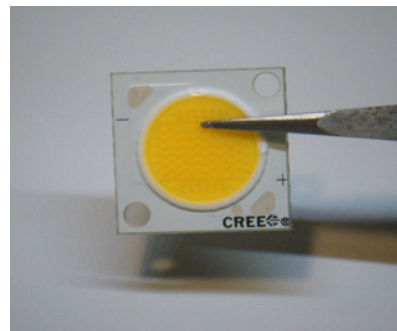
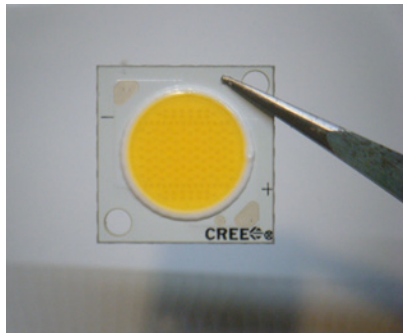
✓
CORRECT



⊘
WRONG

When using tweezers to handle XLamp CXA family LEDs, do not touch the lens with the tweezers.

✓
CORRECT

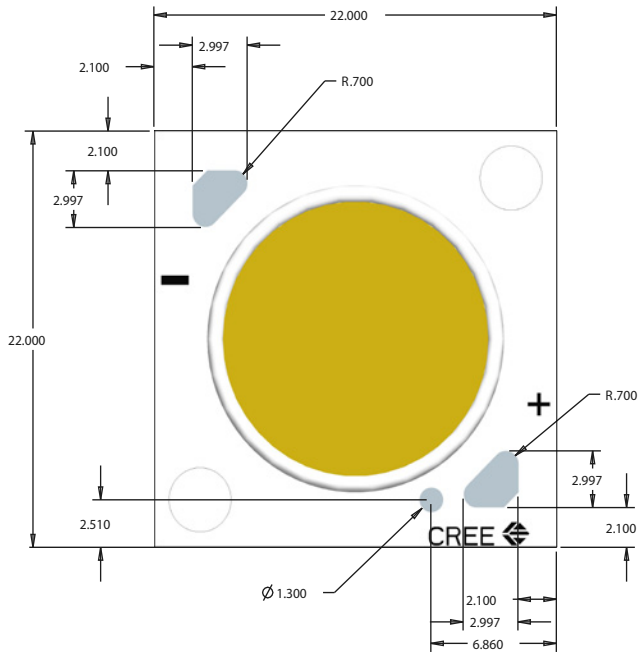


⊘
WRONG

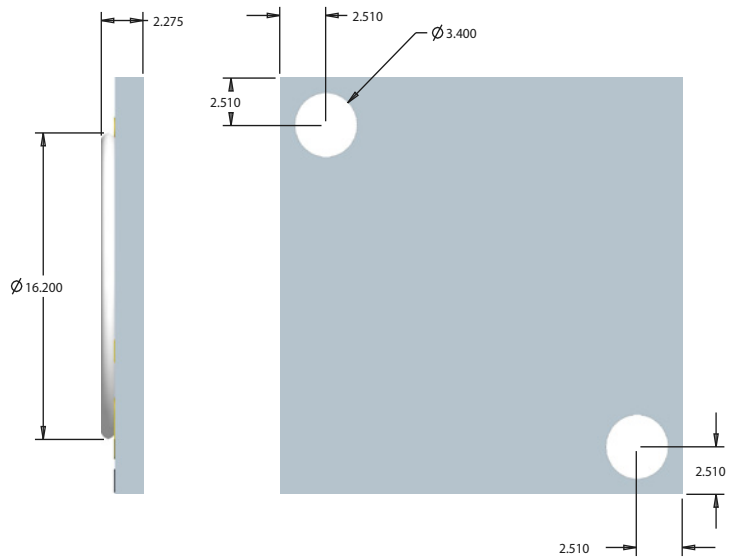
HEAT SINK, LAYOUT, THERMAL INTERFACE

In order to insure effective thermal management for CXA family LEDs, Cree recommends the CXA family LED be attached to an appropriately sized heat sink, depending on drive voltage, current and intended operating environment. Attachment is most often accomplished by inserting a pad of thermal interface material (TIM), thermally conductive epoxy, or thermal grease between the CXA family LED and heat sink. For best thermal results, the TIM thickness should be kept to a minimum while assuring there are no voids. For CXA15xx, CXA25xx and CXA3050 LEDs, a reflective TIM or other backing should be used; light output and efficiency may be slightly less if a very dark TIM is used. The following diagrams show mechanical information for the CXA family packages.

CXA2011



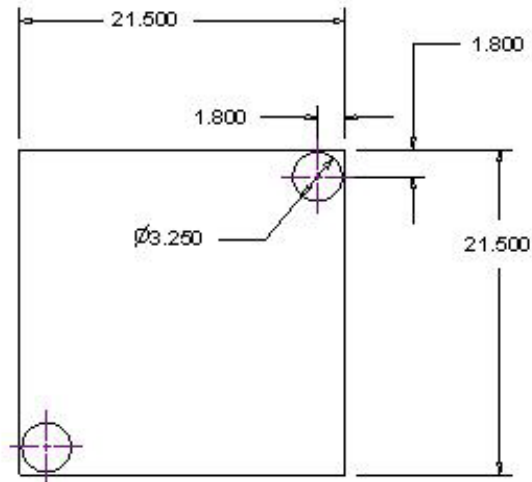
Recommended MCPCB Pad



Recommended Thermal Interface Material Stencil Pattern

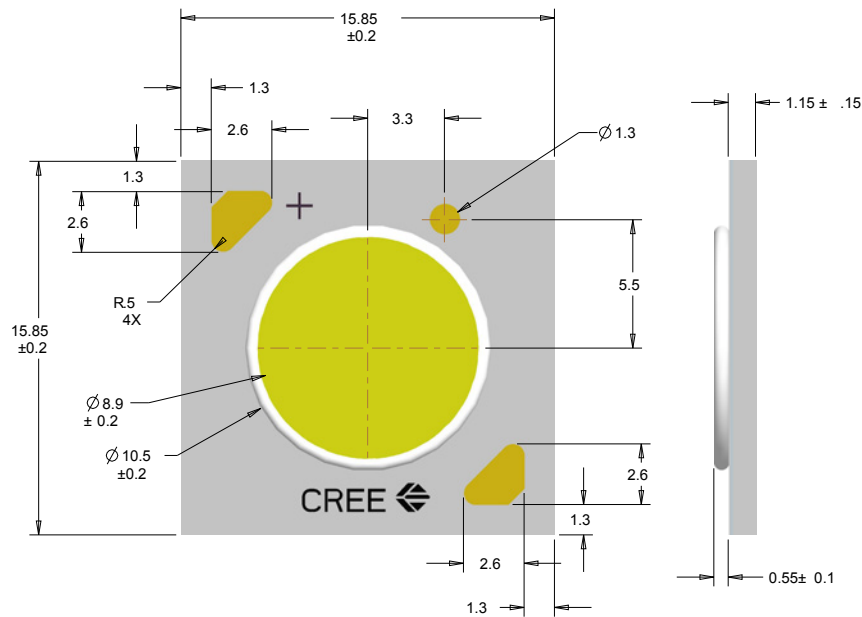
All measurements are ± 0.13 mm unless otherwise indicated.

Depending on the characteristics of the TIM, the stencil pattern for the materials is shown below.



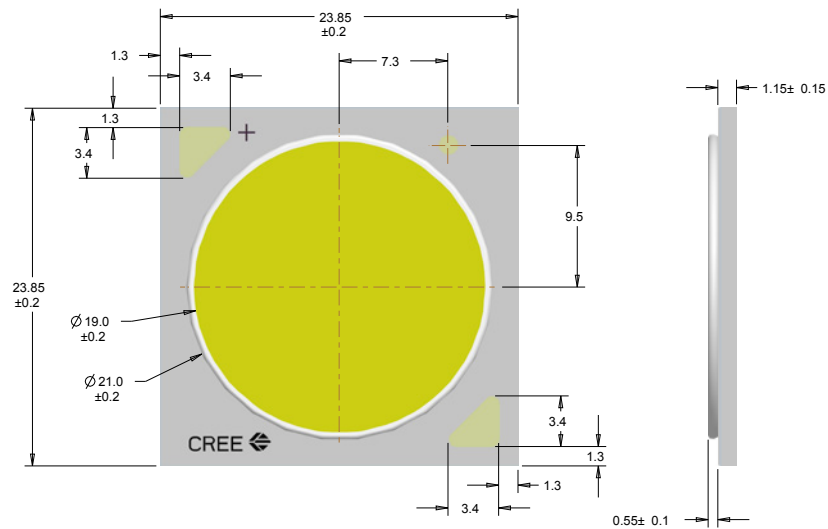
CXA2011 LEDs and thermal interface materials are secured either by the pair of diagonally opposite screw holes or by the use of an LED holder (see the section on LED Connectors). When using the screw holes to secure CXA2011 LEDs, Cree recommends #4 (/40) or M2.5 screws. Excessive torque may result in damage to the LED array. Factors that determine the appropriate screw torque are the thickness, size and type of thermal interface material and the planarity of these materials as well as that of the heat sink. Refer to the illustration on page 2 for the proper mounting method. The amount of torque that can safely be applied to mounting screws is approximately 45 newton-centimeters (4 inch-pounds). Representative vendors of thermal interface materials include 3M, GrafTech, Laird, Lord and others. To prevent loosening of screws during vibration or thermal cycles, Cree recommends non-conductive lock washers or self-locking fasteners. Cree DOES NOT RECOMMEND the use of chemical thread lockers to secure CXA2011 LEDs as several of these compounds have been shown to be chemically incompatible with LEDs.

CXA15xx



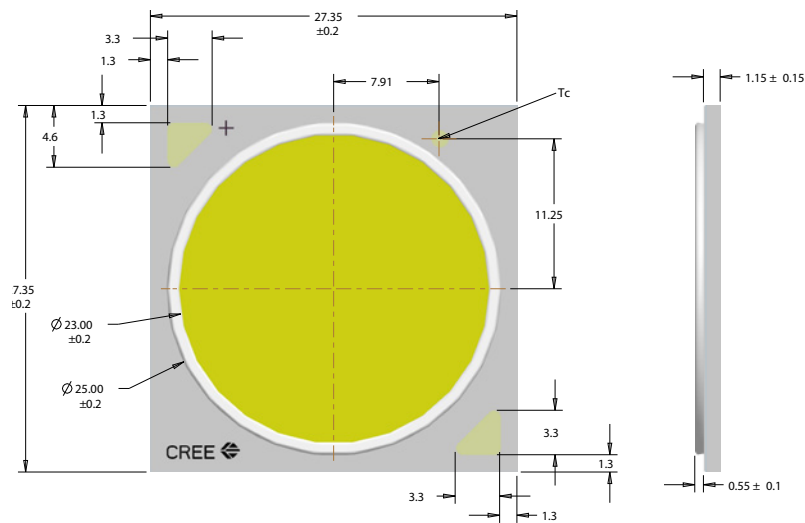
CXA15xx LEDs and thermal interface materials can be secured by the use of epoxy or an LED holder. (See the section on LED Connectors.) CXA15xx LEDs and thermal interface materials can also be secured by the structure of the lamp or luminaire.

CXA25xx



CXA25xx LEDs and thermal interface materials can be secured by the use of epoxy or an LED holder. (See the section on LED Connectors.) CXA25xx LEDs and thermal interface materials can also be secured by the structure of the lamp or luminaire.

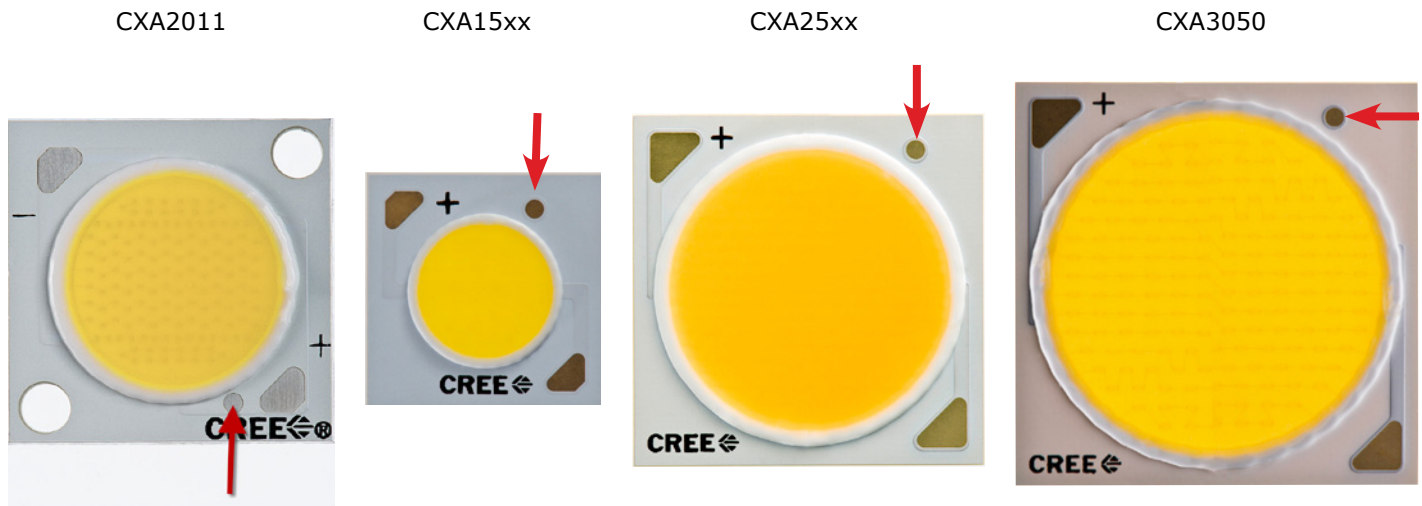
CXA3050



CXA3050 LEDs and thermal interface materials can be secured by the use of epoxy or an LED holder. (See the section on LED Connectors.) CXA3050 LEDs and thermal interface materials can also be secured by the structure of the lamp or luminaire.

CASE TEMPERATURE (T_c) MEASUREMENT POINT

XLamp CXA family LED case temperature (T_c) can be measured at the designated case temperature measurement point, adjacent to the anode or plus (+) solder pad. This measurement point is shown in the pictures below. Cree recommends attaching the thermocouple with conductive epoxy.



NOTES ON SOLDERING XLAMP CXA FAMILY LEDS

XLamp CXA family LEDs are designed for wire-attach soldering. Cree recommends the use of a temperature controlled soldering iron with solder tip on the order of 1.8 mm (0.07"). Cree engineers have had success using temperature-controlled soldering equipment held at 300 °C (572 °F) for the CXA2011 LED and at 250 °C (482 °F) for the CXA15xx, CXA25xx and CXA3050 LEDs and working with a variety of lead-free solders. Cree makes no specific soldering recommendations because there are so many variables in the system of heat sink, LED, solder and solder gun. After soldering, allow XLamp CXA family LEDs to return to room temperature before subsequent handling. Premature handling of the device could result in damage to the solder joints.

Cree recommends that CXA family LEDs not be exposed to temperatures higher than 350 °C (662 °F).

Observe the following practices when soldering wire connections directly to CXA family LEDs.

1. Apply solder tinning to the contact pad of the CXA family LED and uniformly cover the contact pad with solder.
2. Properly solder tin wires before soldering them to a CXA family LED.
3. Ensure wires soldered to an CXA family LED have sufficient strain relief to avoid pulling up a solder pad on the LED.

Take caution when soldering and handling CXA family LEDs to avoid damaging the LEDs. Excessive heat applied for an extended time period to the wire and the contact pad can damage the contact pad on the CXA family LED and potentially melt the insulation on the wires. Solder reworking should be kept to a minimum because of the potential for solder-pad

lifting and damage to the LED with multiple applications of high heat from a soldering iron. Additionally, repetitive soldering introduces potential for solder flux to build up around the solder pads, which can cause long-term degradation if not properly removed.

✓
CORRECT



Solder Paste Type

Cree strongly recommends using “no clean” solder paste with XLamp CXA family LEDs so that cleaning the PCB after soldering is not required. Cree uses Kester r276 solder paste internally.¹

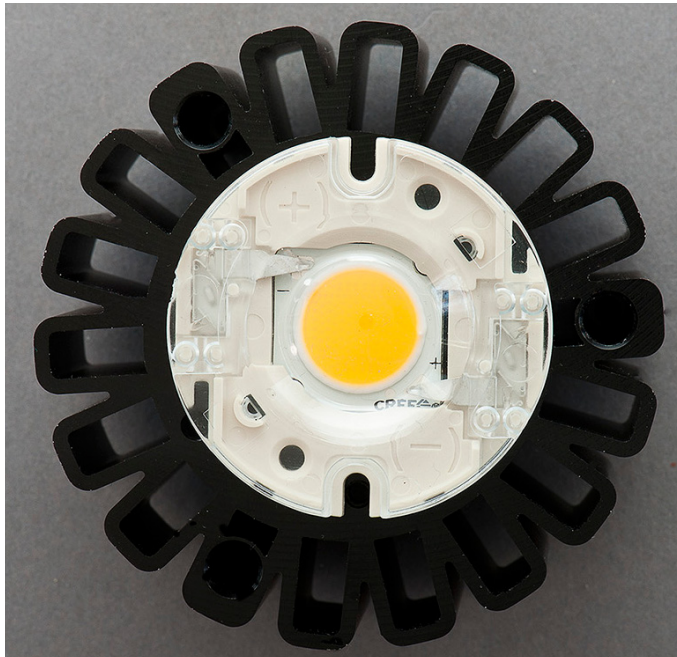
Cree recommends the following solder paste compositions: SnAgCu (tin/silver/copper) and SnAg (tin/silver).

¹ kester.com/Portals/0/documents/Electronic-Assembly-Materials.pdf

NOTES ON CXA FAMILY LED CONNECTORS

A number of manufacturing firms have developed or are developing connectors to simplify the mechanical and electrical attachment of CXA family LEDs. For example, Molex² and TE Connectivity³ have developed connectors for CXA family LEDs. For additional information, contact the connector manufacturer.

CXA2011 with Molex LED Array Holder⁴



CXA1507 with TE Connectivity 1-piece scalable connector



If CXA family LEDs are to be attached with wired leads, the horizontal and vertical pull force of the attached solder leads should not exceed 1000 g.

² www.molex.com

³ www.te.com/en/home.html

⁴ www.molex.com/molex/products/datasheet.jsp?part=active/1802200000_SOLID_STATE_LIGHTI.xml&channel=Products

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's Chemical Compatibility Application Note.⁵ The video at www.youtube.com/watch?v=t24bf9D_1SA illustrates the process Cree has developed for testing the compatibility of chemicals and materials with LEDs. You should also consult your regional Cree Field Applications Engineer.

Recommended Chemicals

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

- Water
- Isopropyl alcohol (IPA)

Chemicals Tested as Harmful

In general, subject to the specifics in Cree's Chemical Compatibility Application Note, Cree has found certain chemicals to be harmful to XLamp CXA family LEDs. Cree recommends not using these chemicals anywhere in an LED system containing XLamp CXA family 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)

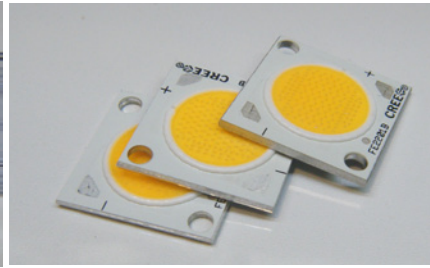
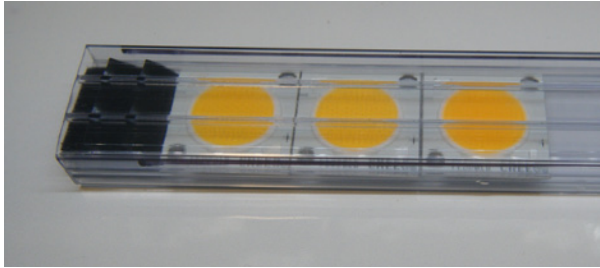
⁵ www.cree.com/products/pdf/XLamp_Chemical_Comp.pdf

HANDLING

Do not stack assemblies containing XLamp CXA family LEDs so that anything rests on the LED lens. Force applied to the LED lens may result in the lens being damaged. Assemblies containing XLamp CXA family LEDs should be stacked in a way to allow at least 2-cm clearance above the LED.

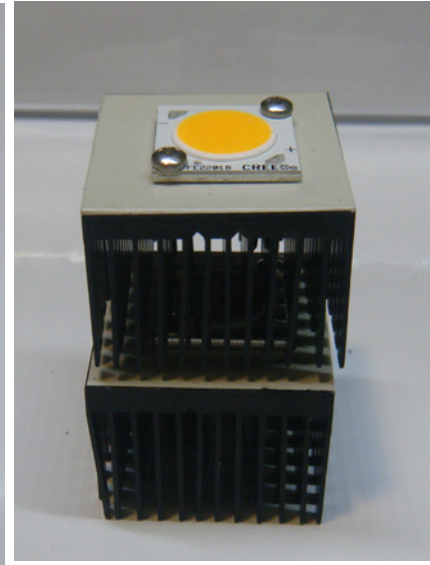
Do not use bubble wrap directly on top of the XLamp CXA family LEDs. Force transferred through the bubble wrap can potentially damage the LED.

✓
CORRECT



⊘
WRONG

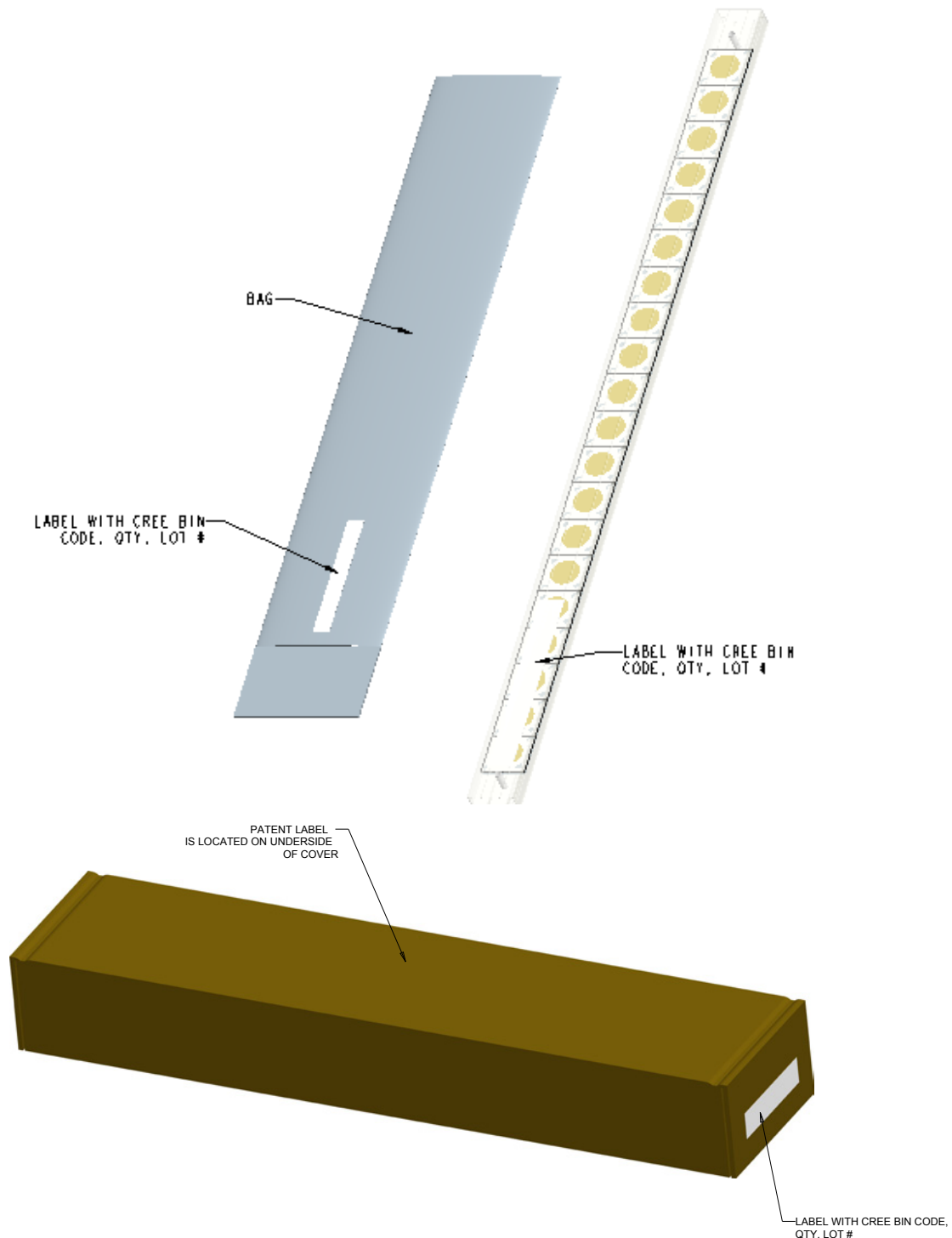
✓
CORRECT



⊘
WRONG

PACKAGING

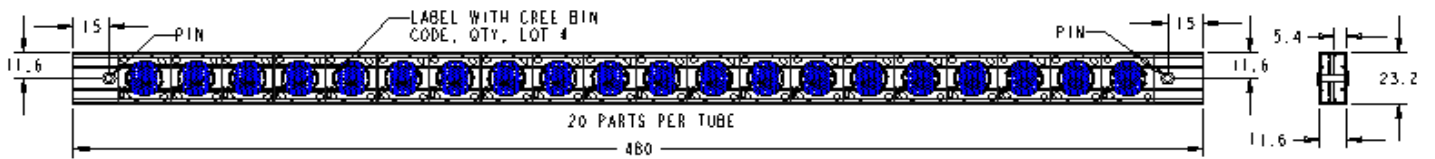
Cree CXA2011, CXA15xx, CXA2520 and CXA2530 LEDs are packaged in tubes of 20, which are then combined in boxes of 5 tubes, or 100 LEDs. Boxes of 100 LEDs are of the same performance bin.



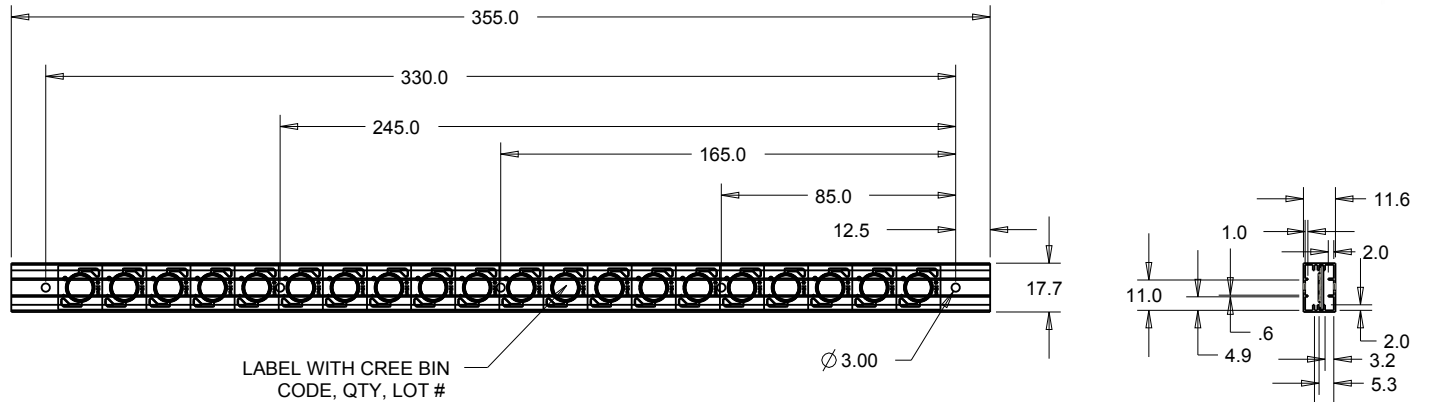
PACKAGING - CONTINUED

Dimensions are in mm.
 Tolerances unless otherwise specified:
 .x ± .10
 .xx ± .03
 .xxx ± .010
 x° ± 1°

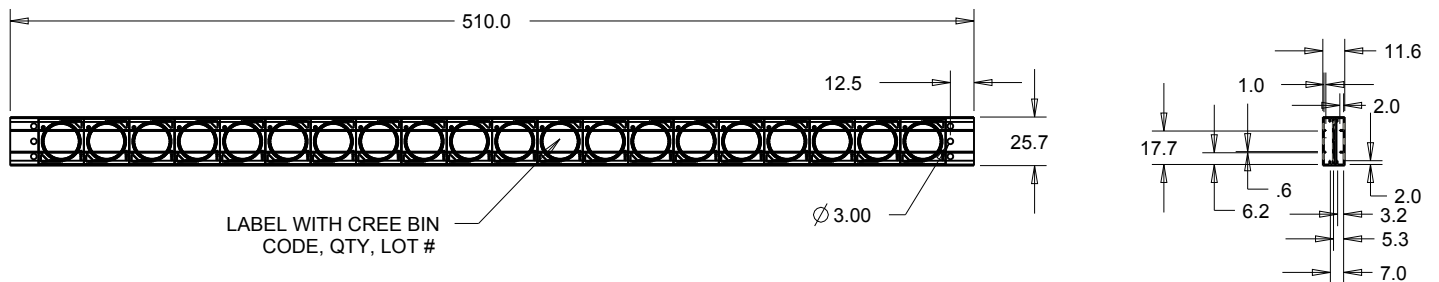
CXA2011



CXA15xx

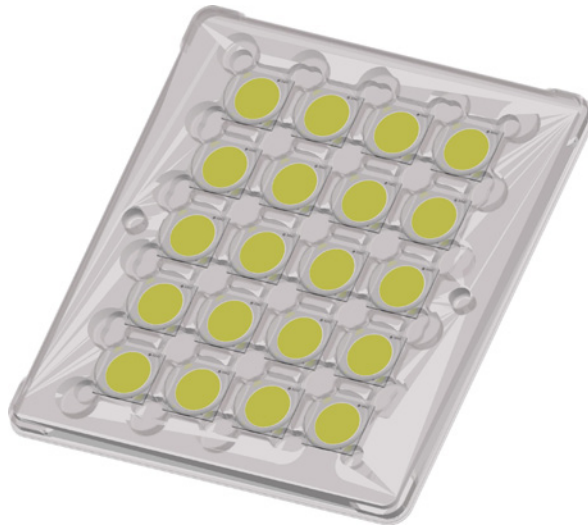


CXA2520 & CXA2530

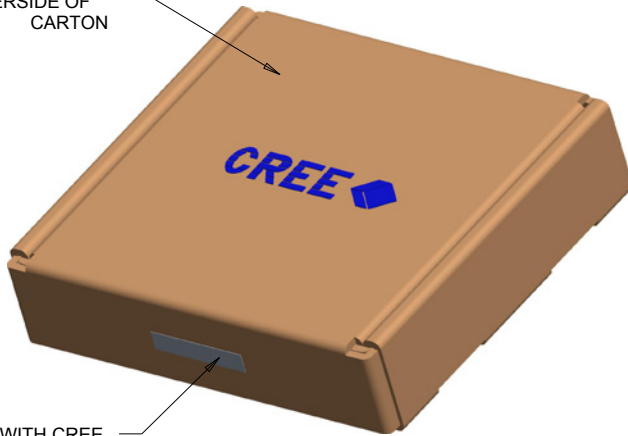


PACKAGING - CONTINUED

Cree CXA2540 and CXA3050 LEDs are packaged in trays of 20, which are then combined in boxes of 5 trays, or 100 LEDs. Boxes of 100 LEDs are of the same performance bin.

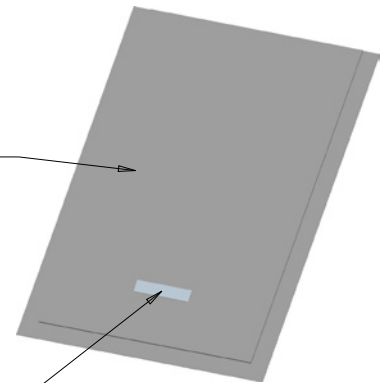


PATENT LABEL
IS LOCATED ON UNDERSIDE OF
CARTON



LABEL WITH CREE
BIN CODE, QTY, LOT#

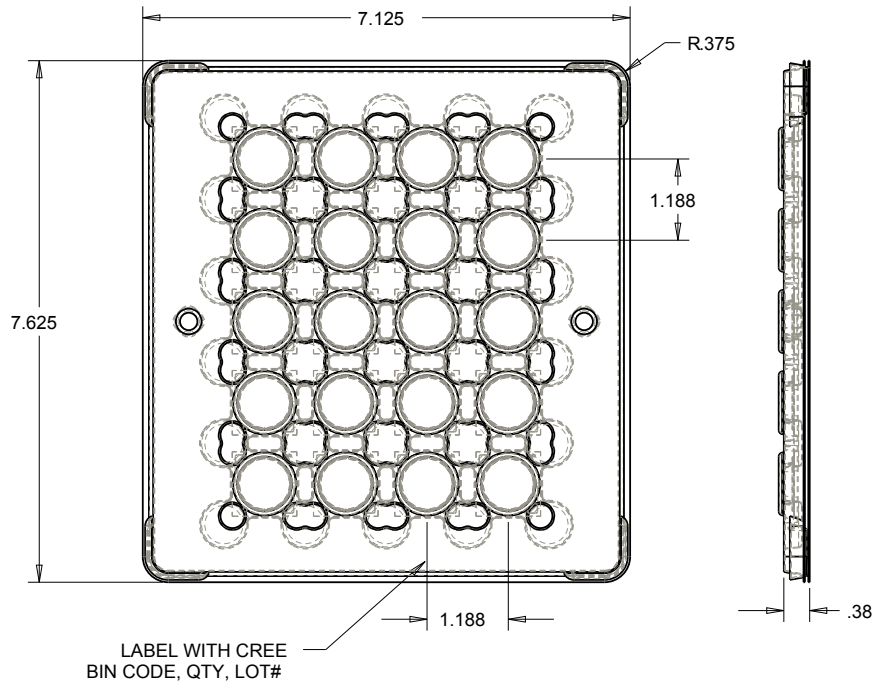
BAG



LABEL WITH CREE
BIN CODE, QTY, LOT#

PACKAGING - CONTINUED

CXA2540



Dimensions are in inches.

Tolerances:

- .x ± .1
- .xx ± .05
- .xxx ± .005
- x° ± 1°

CXA3050

