General Handling and Soldering Notes for XNova COB Arrays

1.0 Introduction

This document contains general guidelines for handling, storing, soldering, and assembly of XNova COB arrays. The devices are robust and do not require extreme protective measures in handling or assembly. However there are a number of practices that should be followed to avoid inadvertent damage to the device. Failure to follow these practices can result in the destruction of the device as well as latent damage which may drastically shorten the life of the LED array.

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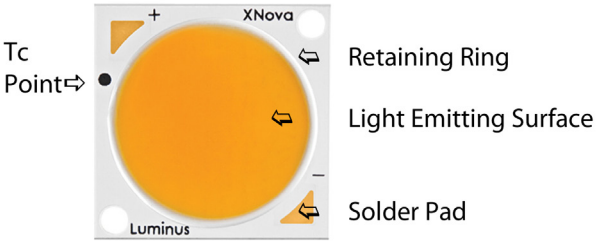

Fig.1 XNova COB

2.0 General Handling

- Devices should be lifted or carried with tweezers on two adjacent corners. Tweezers should be rounded and free of sharp edges. Avoid contacting the solder pads, yellow resin light emitting surface (LES) area or surrounding retaining ring (See Figures 1-6.)

- The yellow resin LES area is slightly sticky and may attract dirt, fibers or other particles. If a particle becomes stuck to the LES the potential exists for the particle to heat up in operation and damage the device. If a particle becomes stuck to the yellow resin material it can be removed using a small amount of isopropyl alcohol and the gentle application of a cotton swab.

- Do not store or stack anything on top of XNova COB arrays unless they are secure in their packaging. Small amounts of pressure on the yellow resin LES area can cause permanent damage to the device.

- XNova COBs may be lifted, placed or carried by hand provided all handling guidelines are observed. Assemblers handling the devices should wear finger cots or latex gloves to minimize risk of damage.

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Fig.2 Correct Handling

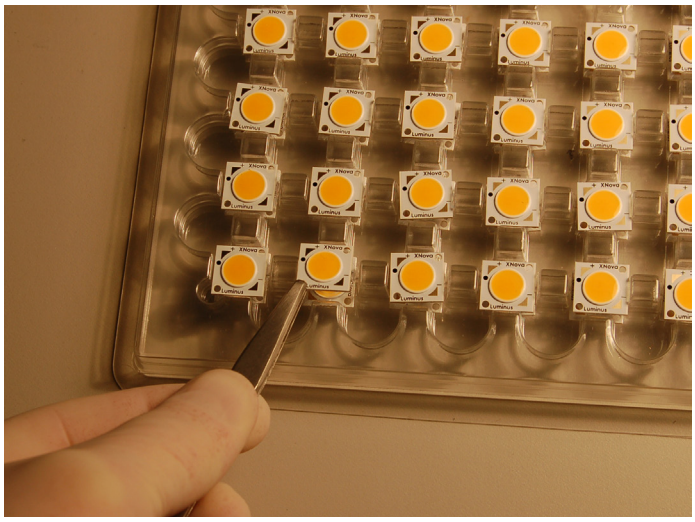

Fig.3 Correct Handling

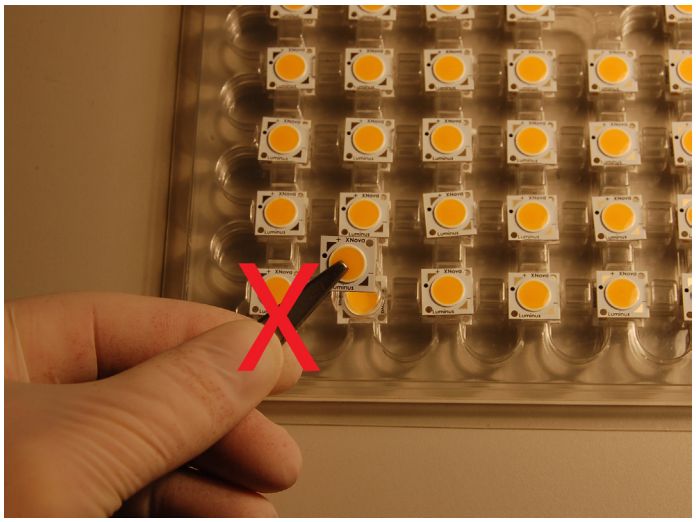

Fig.4 Incorrect Handling

Fig.5 Incorrect Handling

2.1 Chemical Compatibility

Certain common chemicals can cause damage to XNova devices if they come into contact or in some cases are stored or placed nearby. For example the yellow resin material can act as a getter and absorb hydrocarbons from the environment which degrades the performance and longevity of the device. Below is a partial list of chemicals which can potentially cause damage to XNova COB arrays.

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Common Chemicals Know To Adversely Affect XNova Devices	
Acetates	Ketones
Acetic acid	Liquid hydrocarbons
Acrylates	Phosphoric acid
Aldehydes	Potassium hydroxide
Aldehydes	Siloxanes, fatty acids
Amines	Sodium Hydroxide
Benzene	Sulfur compounds
Cl, F,or Br containing compounds	Sulfuric Acid
Dienes	Toluene
Ethers	Xylenes
Hydrochloric Acid	Nitric Acid

2.2 Electrostatic Discharge (ESD) Protection

XNova COBs can suffer extensive and permanent damage due to electrostatic discharge (ESD) that could potentially occur as a result of shipping, handling, and assembly. The following ESD protection guidelines should be used at all times when working with Xnova COBs.

- Storage: XNova products should be stored in their containers placed inside closed ESD shielding bags.
- Assembly: Individuals handling XNova COBs for the purposes of assembly should be trained in ESD protection practices. Assemblers should maintain constant conductive contact with a path to ground by means of a wrist strap, ankle straps, mat or other ESD protection system.
- Transporting: When transporting the devices from one assembly area to another, ESD shielded carts and carriers should be used.

3.0 Soldering to XNova COBs

Wire Conection

1. Place device on hotplate at 150°C
2. Use a soldering iron set at 300°C
3. Tin the pads with SAC305 flux-core solder wire
4. Strip and tin 22 or 24 AWG wire with SAC305 flux-core solder wire
5. Solder wire to pad while keeping the device on the 150°C hotplate
6. Remove the soldering iron from the device, then let the device sit for several seconds
7. Lift the device off of the hotplate and place it on a surface to cool

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Solder Shielding

- Do not allow any solder to contact the yellow light emitting surface or surrounding retaining ring as this can seriously damage or destroy the device. If there is concern about containing the solder to the solder pads then a solder shield may be used to protect the sensitive areas of the COB. An example of a solder shield design for the CXM-7 is shown below.

Additional Notes

- Do not attach COB to heat sink prior to soldering
- ESD protection is required when soldering or handling COBs
- Avoid contacting yellow light emitting surface of COB

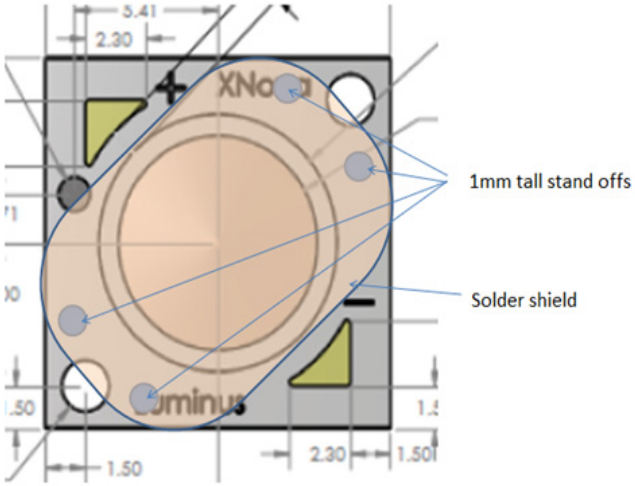

Fig. 6 Solder Shield Design

Solder Shield Dimensions

Figure 6 depicts a potential design solution for a solder shield for CXM-7 devices. While other designs may be more suitable for various applications and assembly environments, this rendering illustrates the two critical aspects for solder shielding. The first being that the solder shield protects both the LES and retaining ring from inadvertent contact with a hot soldering iron. The second critical aspect is that the contact pads are unobscured by the solder shield. For additional support in designing a solder shield for assembly stations contact techsupport@luminus.com

4.0 Thermal Interface and Heatsinking

- The aluminum core board of XNova COB arrays is not by itself sufficient for heat sinking the device. XNova COB arrays should always be operated in conjunction with a means of dissapating enough heat energy so that the device remains within the recommended junction temeratures and operating temperature.
- A thermal interface material (TIM) should be used at all times in conjunction with the heat sink and XNova device. The TIM should maintain continuous contact with the entire back portion of the Al core board and should likewise be in continuous contact with the heat sink. For a list of compatible TIMs see APN-002319 Design Guidelines and Ecosystems for XNova COB Arrays.
- Caution: The front surface and yellow resin LES gets very hot during operation. Nothing should be in contact with this area of the device.

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Thermal Interface Materials				
Manufacturer	Part Number	Type	Description	Performance
3M	8805	Arcylic	Thermally conductive adhesive transfer tape	Excellent
3M	5590h	Arcylic	Thermally conductive acrylic interface pad	Good
GrafTech	eGraph HiTherm	Graphite	flexible graphite	Good
GrafTech	eGraph HiTherm	Adhesive	flexible graphite with adhesive	Good
Berquist	Liqui-form 2000	grease	Shear-thinning, conformable	Excellent
Arctic Silver	Arctic Silver 5	Grease	High Density Polysynthetic Silver Thermal Compound	Excellent
Panasonic	PGS	Graphite +Acrylic	Thermal Graphite Sheets	Excellent
Omega	OmegaTHERM	Grease	High Temp Thermally Conductive Paste	Excellent
Rathburn	8805	Graphite+Adhesive	Thermally Conductive Transfer Pad	Good
Rathburn		Graphite + PET	Thermally Conductive Transfer Pad	Good

5.0 Mounting the Device

- Through Holes: Holes are provided through the core board of Xnova COB's for the purpose of using threaded screws to securely mount the device to a heat sink. Refer to table 3.7.4.2 of APN-002319 for a list of the hole diameter, spacing and compatible screw type for each XNova COB.
- Screw Head Type: Only screws that feature a flat surface where the screw head contacts the core board should be used in mounting XNova COBs. Acceptable screw types include pan head, round head, button head and hex head screws. Screw types designed for countersinking such as flat head or oval head should not be used. Screw head sizes should be selected so that no portion of the screw head or washer contacts the solder pad, solder or wire lead. Likewise no portion of the screw head or washer should contact the LES surrounding retaining ring or the LES. (See Figure 7)
- Torque: The correct torque applied to the mounting screws may vary among assemblies and applications. For example systems subject to vibration or thermal cycling may require higher torque than systems that are not required to withstand such conditions. For this reason a range of torque values is provided. Improper torque can cause warping of the core board leading to insufficient contact with the TIM. For best results the torque applied to the screws should be between 0.104 and 0.208 ft•lbs. [0.141 N •m to 0.282 N •m]

Fig. 7 Screw Head Types

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5.1 Solderless Connectors

- XNova products are compatible with a variety of solderless connectors and holder clamps. Refer to table 3.7.4.1 of APN-002319 for a list of parts compatible with XNova COB arrays.
- Solderless connectors and holder clamps must not contact the yellow resin LES or the retaining ring. The aperture of the connector must have a diameter greater than that of the retaining ring.
- Holder clamps should not contact the solder pads or wire leads. Be certain that the connector or holder features channels or spaces to accommodate the solder pads and wire leads without pinching or other types of interference.
- Conductive contacts on solderless connectors should be in firm contact with the solder pads and be held in place securely enough so that the conductivity is always maintained.
- Conductive contacts should only touch the solder pads. Conductive contacts should not be in contact with the core board, LES surrounding retaining ring, or LES.
- Screws used to fasten the solderless connector or clamp holder should be seated with a thread sealant such as Loctite 220 or equivalent in order to prevent loosening due to thermal cycling of the heat sink.
- Solderless connectors and older clamps should not interfere with the thermal path between the core board, TIM, and heat sink.
- Assemblers should make certain that the connector or channel marked positive (+) coincides with the solder pad marked positive (+) on the core board. Likewise, the negative connector (-) or channel marked negative (-) should coincide with the solder pad marked negative (-) on the core board. Failure to insure that the connectors are contacting the proper pole could lead to reverse biasing of the device after assembly.

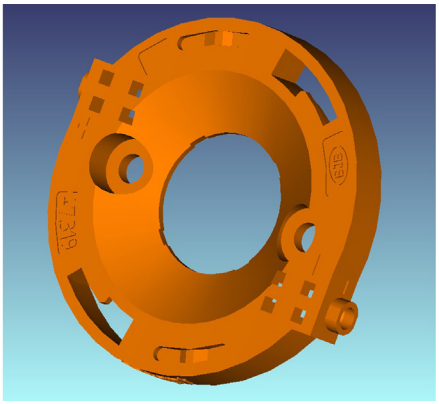

Fig. 8 Solderless Connector

Fig. 9 Secondary Optics

6.0 Reflectors and Other Secondary Optics

- No portion of a reflector or secondary optic should contact the yellow resin LES or retaining ring.
- Reflectors and secondary optics should not interfere with the thermal path between the core board, TIM, and heat sink.
- For more details related to optical performance of XNova COBs with reflectors, diffusers and other secondary optics, refer to application note APN-002319

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