

LUXEON XR-7070

Assembly and Handling Information

Introduction



This application brief covers the assembly and handling guidelines for the LUXEON XR-7070 LED modules. Proper assembly and handling as outlined in this document ensures optimum and long lasting performance of this product.

Scope

The assembly and handling guidelines in this application brief apply to the following products with this nomenclature.

L 2 2 4 - A A B B 0 C C M D D 0 1 0

Where:

A A	-	designates nominal ANSI CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K)
B B	-	designates minimum CRI (70=70CRI and 80=80CRI)
C C	-	designates number of emitters (04=4 emitters)
D D	-	designates internal Lumileds program code.
1 0	-	designates internal Lumileds program code.

Therefore, a LUXEON XR-7070 3000K 80CRI with 4 emitters, will have the following part number:

L 2 2 4 - 3 0 8 0 0 4 M L U 0 1 0

In the remainder of this document the term “LED module” can also refer to any LUXEON XR-7070 product

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1. Product Description

LUXEON XR-7070 products are LED modules optimized for lighting applications requiring high efficacy LED arrays mounted on a rigid and thermally conductive substrate. These versatile building blocks feature 4 LUXEON 7070 LEDs on a MCPCB substrate, electrical connectors, and are designed for ease of system integration, faster time to market, and use with industry standard optics. LUXEON XR-7070 is a complete solution when used in combination with standard third party optics and heatsinks.

2. Temperature (T_c or t_c) Measurement

The location of T_c , also known as t_c , for each LED module is shown in Figure 1 (labeled as T_c in the drawing).

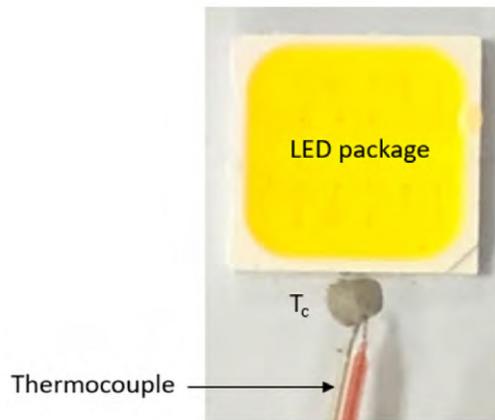


Figure 1. An example of a representative setup of thermocouple (TC) wire attachment via thermal adhesive at the T_c location.

Shown in Figure 1 is a thermocouple (TC) wire size of AWG 40. Smaller diameter TC wire is preferred as this has less thermal mass (more accurate temperature reading) and can be secured such that no portion of the bare TC wire is exposed to direct optical radiation from the LEDs. Dispense a small amount of thermal conductive epoxy such as a two-part Artic Silver® Thermal Adhesive and let it cure.

3. Handling and Storage

Do not stack LED modules on top of each other or place the LED module emitting area onto any surfaces. Doing so may inadvertently damage the top surface of the LED package.

As with any other ESD sensitive components, standard ESD precaution should be adhered to.

4. Mechanical Assembly

4.1 General Description

A typical representative of a LED module assembly consists of a suitably rated heatsink, thermal interface material (TIM), lens for beam shaping (optics) and screws.

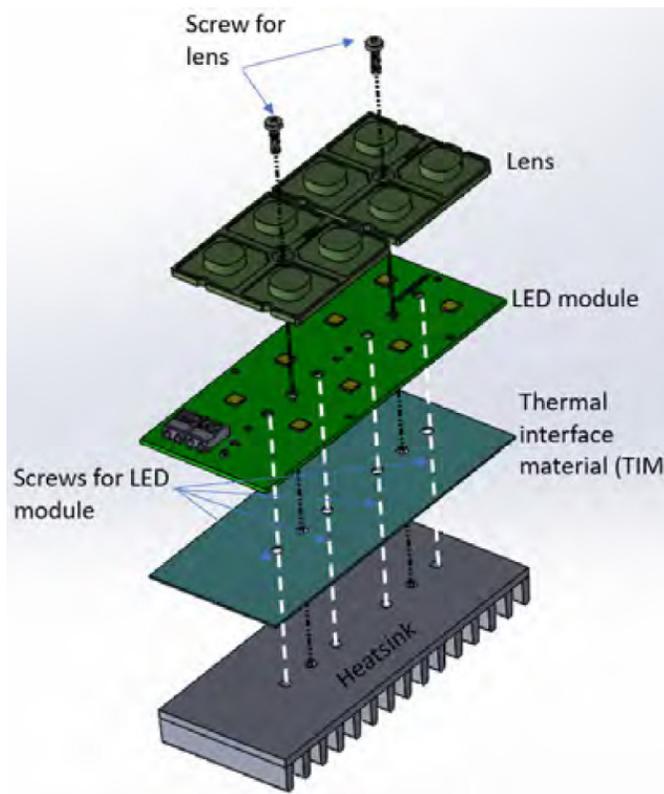


Figure 2. A typical representative of a LED module assembly with heatsink, TIM, lens and screws.

4.2 Heatsink

A typical heatsink is made on a good conducting material like aluminum with metal fins to dissipate heat. Some important heatsink characteristics are:

1. Must be suitably chosen such that the T_c temperature must not exceed the maximum datasheet limit under the desired maximum operating condition of the end product application.
2. The contacting surface of the heatsink to the bottom of the LED module board must be flat, free from burrs, particles or any foreign contamination.
3. Have the desired mounting holes for the screws (type M3 screws). To locate the mounting holes, download the 3D STEP files which are available from the lumileds.com website.

4.3 Thermal Interface Material (TIM)

The use of TIM material is highly recommended due to microscopic roughness of the contact surfaces on the heatsink to the bottom of LED module board.

Some considerations when choosing and using TIM are:

1. Pump out – some TIMs, especially liquid/grease TIM, will move out of the thermal path during extreme temperature excursions and create voids in the thermal path.
2. Out-gassing of unwanted volatile organic (VOC) compound especially when the LED module is operated in an airtight enclosure. See section 6.
3. Applying correct contact pressure per TIM manufacturer recommendation to achieve optimum thermal conductivity performance while not exceeding max torque as described in section 4.4.

4.4 Board Mounting Screws

To secure the board to the heatsink, use M3 size screw and apply a torque between 0.5 to 1.0 Nm at the suggested locations as shown in Figure 3.

Before mounting, inspect that the contact surfaces on both LED module and heatsink surfaces are clean and free of any particles.

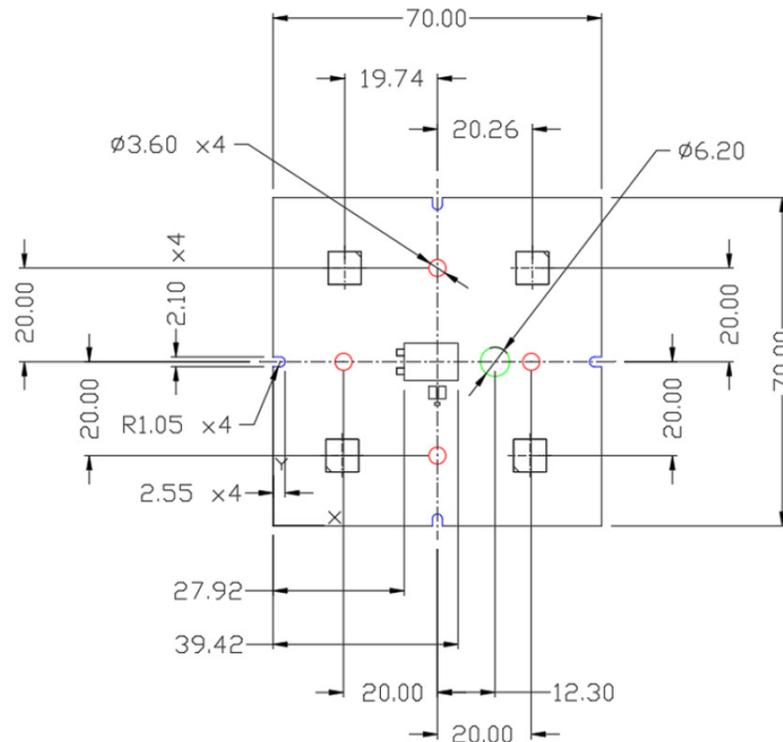


Figure 3. Board mounting screw holes (red circles), optional lens alignment holes (blue semicircle) and a large hole (green circle) for routing power cables through the board.

4.5 Lens

To mount the lens (custom or off-the-shelf optics), follow the lens manufacturer assembly guidelines. Depending on the lens design, it may be necessary to use some of the board mounting screw holes as described in section 4.4 as both the lens and board mounting screw holes. If possible, keep the torque within the range specified in section 4.4. Higher screw torque may damage or warp the underlying board and increase board thermal contact resistance.

5. Inserting and Removing Cable from Connectors

5.1 Type of Cable Connectors

Lumileds has qualified several types of cable connectors to be used in LED modules such as LUXEON XR-7070. The general operation requires inserting cables into the connector holes and removing cable via a push/release tool.

5.2 Wire Preparation

Any suitable wire size of AWG24 to AWG18 can be used. Strip length (expose copper wire with cable sheath removed) should be between 7mm to 9mm.

5.3 Procedure for Inserting and Removing Cable

1. Connector #1

Tool needed: a push tool as shown in Figure 4 where the tip fits nicely onto the dimple of the push-button.

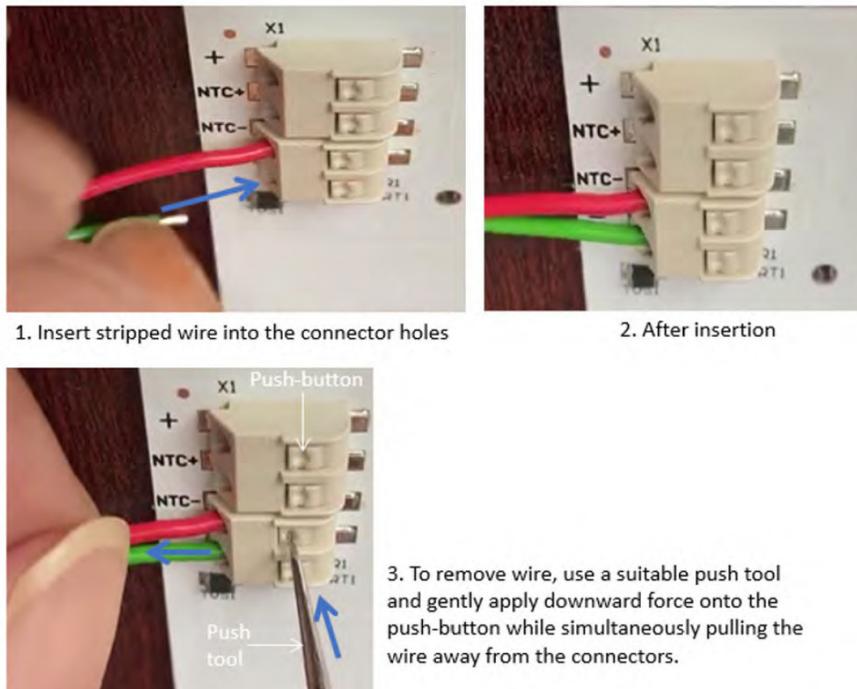


Figure 4. Illustration on inserting and removing wire for connector #1 on a representative Lumileds LED module.

2. Connector #2

Tool needed: a push tool as shown in Figure 5 where the tip of the tool can fit nicely into the opening of the connector.

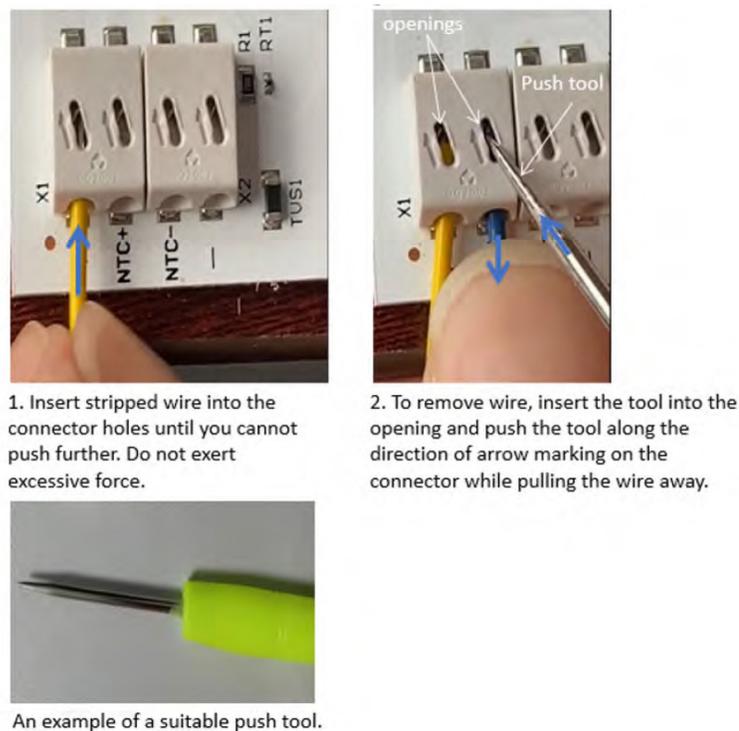


Figure 5. Illustration on inserting and removing wire for connector #2 on a representative Lumileds LED module.

3. Connector #3

Tool needed: a push tool or equivalent tool as shown in Figure 6.

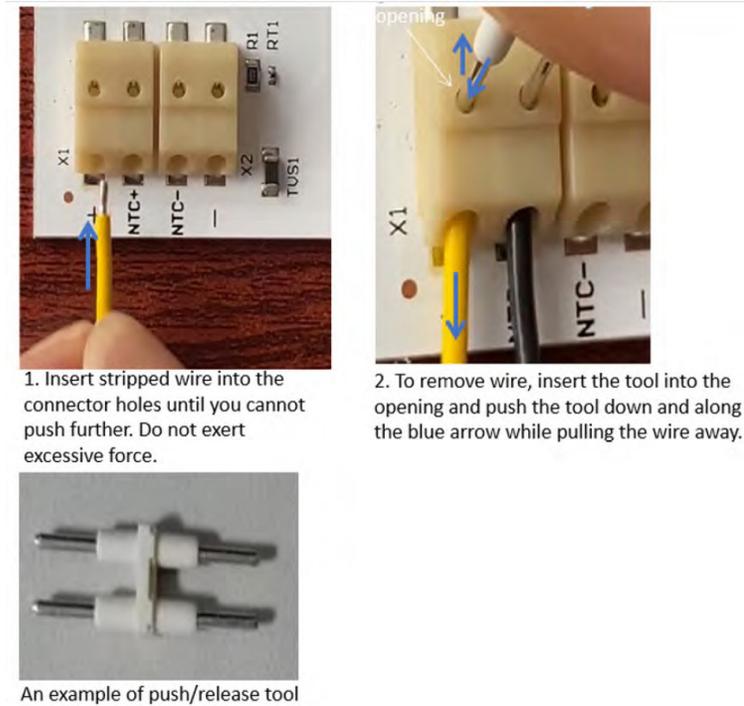


Figure 6. Illustration on inserting and removing wire from connector #3 on a representative 7Lumileds LED module.

6. Chemical Compatibility

When assembling LED module using any material that might outgas volatile organic compounds (VOC), care should be taken to understand its effect on the LED module long term performance in the end product application especially when the LED module is in an air-tight enclosure. Examples of materials that may outgas during elevated operating temperature includes thermal grease, adhesives, gasket, conformal coatings, solvent residue from cleaning, to name a few. For more details, see document "AB164 LUXEON 7070 Application Brief" which is available from the lumileds.com website.

7. Photobiological Safety Test (Blue Light Hazard)

For nominal CCT up to and including 6500K, the LED module according to IEC TR 62778 (*Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires*) can be classified as either risk group 1 (RG1) or risk group 2 (RG2) at drive currents shown in table 1 and table 2 below.

According to IEC TR 62778, the blue light hazard result classification of this LED module can also be derived (worst case) from the LED package test report. The LED package used in LUXEON XR-7070 is assembled with LUXEON 7070 LED package. LUXEON XR-7070 has 4 LED packages connected in series, therefore the drive current in LUXEON XR-7070 is similar to a single LUXEON 7070 LED package.

Table 1. Threshold drive current for RG1-RG2 boundary limit for LUXEON XR-7070.

PART NUMBER	THRESHOLD DRIVE CURRENT (mA)	NOMINAL CCT		
		≤3000K	≤4000K	≤6500K
L224-AABB004MLU010	1200	RG2	RG2	RG2
	1100	RG1 unlimited	RG2	RG2
	650	RG1 unlimited	RG1 unlimited	RG2
	330	RG1 unlimited	RG1 unlimited	RG1 unlimited

Table 2. Illuminance threshold, E_{thr} (lx).

PART NUMBER	THRESHOLD DRIVE CURRENT (mA)	NOMINAL CCT		
		≤3000K	≤4000K	≤6500K
L224-AABB004MLU010	1200	2310 lx	1828 lx	839 lx
	1100	n/a	1828 lx	839 lx
	650	n/a	n/a	839 lx
	330	n/a	n/a	n/a

where:

AA - designates nominal ANSI CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K)

BB - designates minimum CRI (70=70CRI and 80=80CRI)

8. Electrical Isolation and Safety

LUXEON XR-7070 (single) module has been evaluated and meeting the minimum electrical spacings & dielectric voltage withstand test per UL 8750 and also the electric strength & creepage/clearance per IEC 62031.

A single LUXEON XR-7070 module has been tested to meet SELV basic insulation. For other than SELV operation with basic insulation, the module has been tested with max working voltage of 52VDC.

When multiple modules are interconnected in an end product (luminaire), electric strength insulation and creepage/clearance shall be evaluated according to end product requirements.



About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world better, safer, more beautiful—with light.

To learn more about our lighting solutions, visit lumileds.com.



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