LUXEON XR-5050 SQR

Assembly and Handling Information

Introduction

This application brief covers the assembly and handling guidelines for the LUXEON XR-5050 SQR 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:

L213–VVZZ0CCMDD001		
Where:		
V V	–	designates nominal ANSI CCT (22=2200K, 27=2700K, 30=3000K, 40=4000K)
Z Z	–	designates minimum CRI (70=70CRI, 80=80CRI)
C C	–	designates number of emitters (8=8 emitters, 12=12 emitters, 16=16 emitters)
D D	–	designates internal Lumileds program code
0 1	–	designates internal Lumileds program code

Therefore, a LUXEON XR-5050 SQR 3000K 80CRI with 12 emitters, will have the following part number:

L 2 1 3 – 3 0 8 0 0 1 2 M R H 0 0 1

In the remainder of this document the term “LED module” can also refers to any LUXEON XR-5050 SQR product.

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1. Product Description

LUXEON XR-5050 SQR 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 8, 12 or 16 LUXEON 5050 Square 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-5050 SQR 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 3 (labeled as T_c in the drawing).

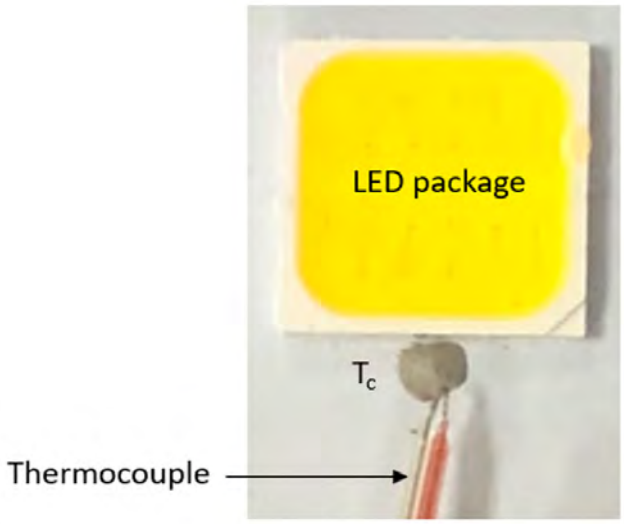


Figure 1: An example of a representative setup of thermocouple (TC) wire attachment via thermal adhesive at the T_c location.

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 cures.

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

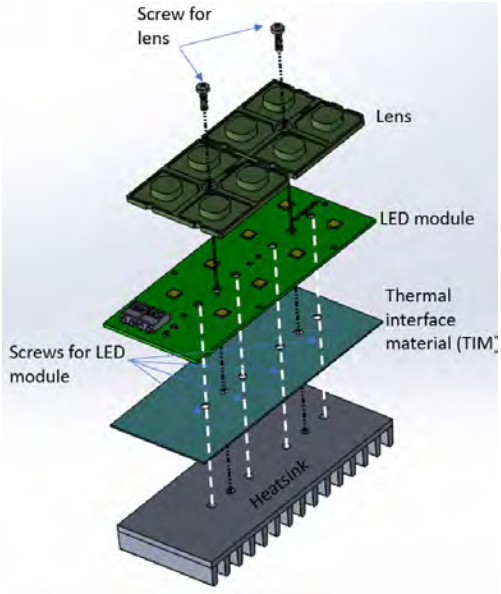


Figure 2: A typical LED module assembly with heatsink, TIM, lens and screws.

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 www.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 air-tight 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: T_c locations, board and lens mounting screw/guiding holes for all LUXEON XR-5050 SQR configurations.

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 4.4 as both the lens and board mounting screw holes. If possible, keep the torque within the range specified in 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

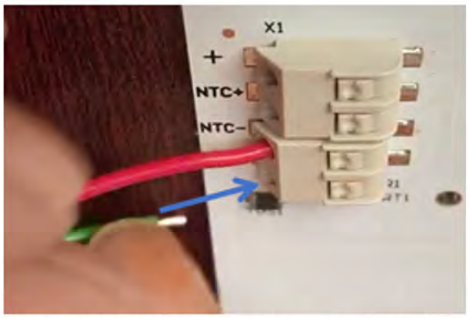
Lumileds has qualified several types of cable connectors to be used in LUXEON XR-5050 SQR. The general operation requires inserting cables into the connector holes and removing cable via a push/release tool.

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.

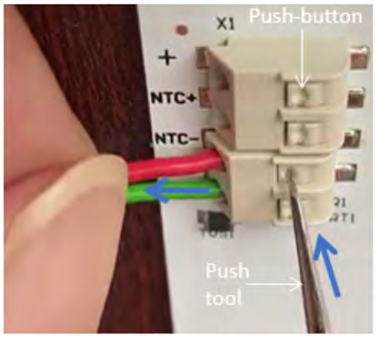
5.3 Procedure for Inserting and Removing Cable.

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.



1. Insert stripped wire into the connector holes

2. After insertion

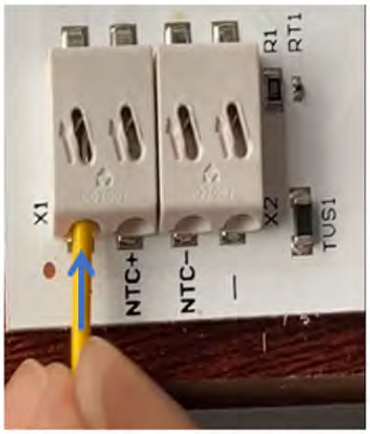


3. To remove wire, use a suitable push tool and gently apply downward force onto the push-button while simultaneously pulling the wire away from the connectors.

Figure 4: Inserting and removing wire for connector #1.

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.



1. Insert stripped wire into the connector holes until you cannot push further. Do not exert excessive force.

2. To remove wire, insert the tool into the opening and push the tool along the direction of arrow marking on the connector while pulling the wire away.

An example of a suitable push tool.

Figure 5: Inserting and removing wire for connector #2.

3. Connector #3
   Tool needed: a push tool or equivalent tool as shown in Figure 6.

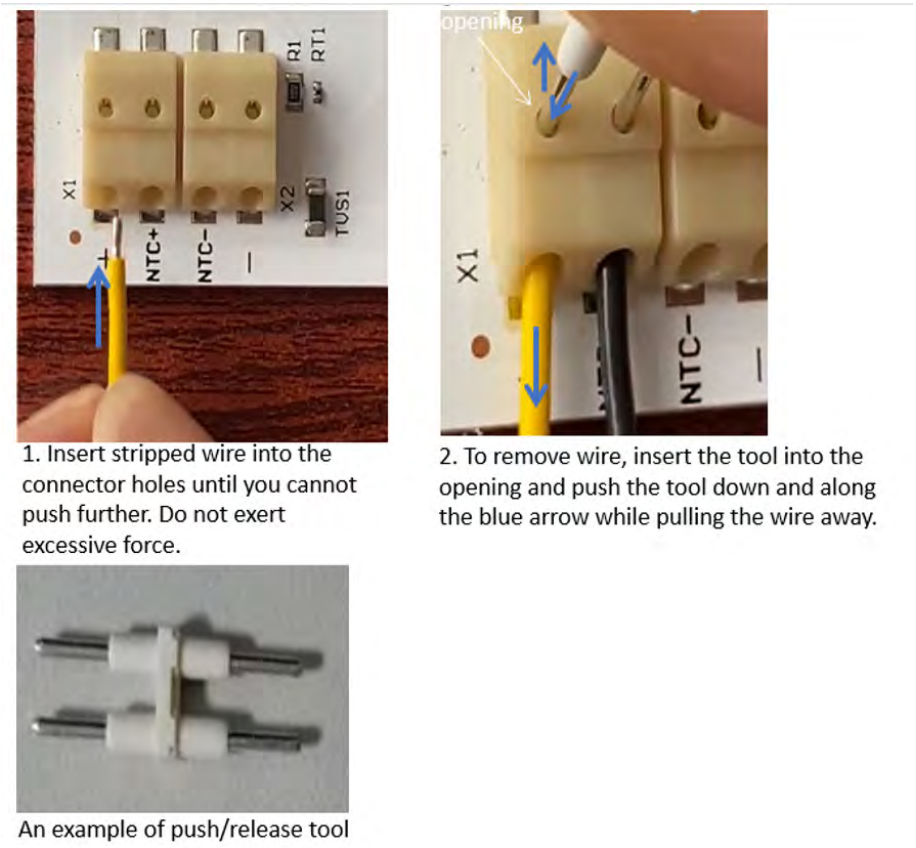


Figure 6: Inserting and removing wire from connector #3.

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 "AB174 LUXEON 5050 Application Brief" which is available at www.lumileds.com.

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***) is classified as risk group 1 (RG1) at drive current of 700mA and below. Above LED module current of 700 mA, the LED module is classified as RG2 with threshold illuminance, E_{thr} of 1154 lx.

Additional information: According to IEC TR 62778, the blue light hazard result of this LED module can also be derived (worst case) from the LED package test report. The LED package used in LUXEON XR-5050 SQR is assembled with LUXEON 5050 (Square LES) 6V. A 700mA LED module current is equivalent to 350mA LED package current.

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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