

LUXEON XR-5050 HE

Assembly and Handling Information

Introduction



This application brief covers the assembly and handling guidelines for the LUXEON XR-5050 HE 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 5 - A A B B 0 C C M D D 0 1 0

Where:

A A	-	designates nominal ANSI CCT (22=2200K, 27=2700K, 30=3000K, 40=4000K, 50=5000K, 57=5700K)
B B	-	designates minimum CRI (70=70CRI, 80=80CRI and 90=90CRI)
C C	-	designates number of emitters (24=24 emitters)
D D	-	designates internal Lumileds program code.
1 0	-	designates internal Lumileds program code.

Therefore, a LUXEON XR-5050 HE 4000K 80CRI with 24 emitters, will have the following part number:

L 2 2 5 - 4 0 8 0 0 2 4 M L U 0 1 0

In the remainder of this document the term "LED module" can also refer to any LUXEON XR-5050 HE product.

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1. Product Description

LUXEON XR-5050 HE 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 24 LUXEON 5050 HE 6V 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 HE 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).

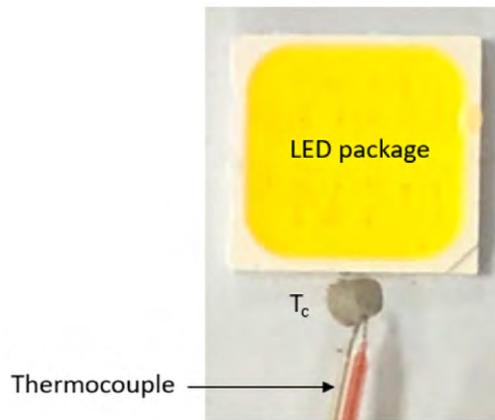


Figure 1. An example of a representative setup of thermocouple (TC) wire attachment via thermal adhesive at the T_c location.

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

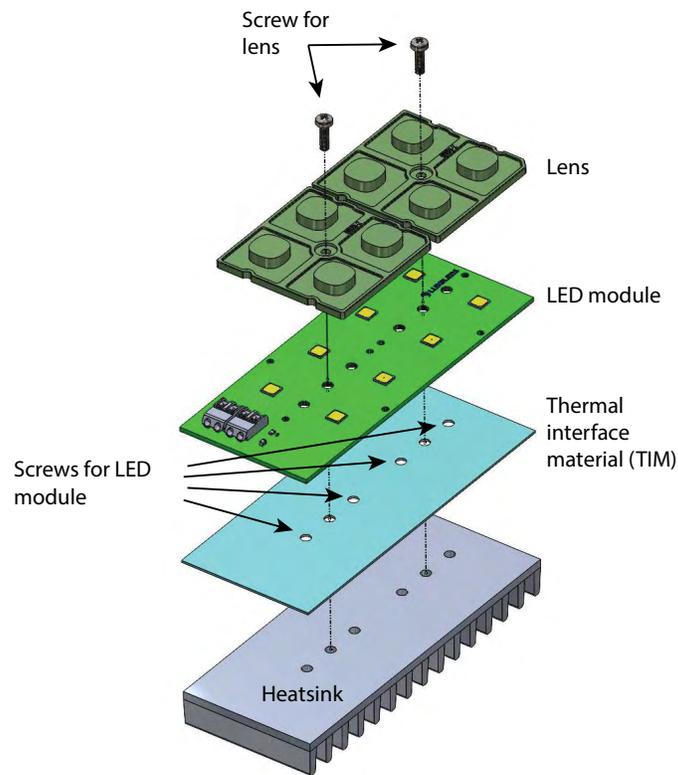


Figure 2. A typical LED module assembly with heatsink, TIM, lens and screws.

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 (countersunk screws of type M3). 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 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 countersunk screws of type M3 as recommended in Figure 3 and apply a torque between 0.5 to 1.0 Nm at the suggested locations as shown in Figure 4. Please note that the torque range provided is just for initial setup reference, further optimization may be required.

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

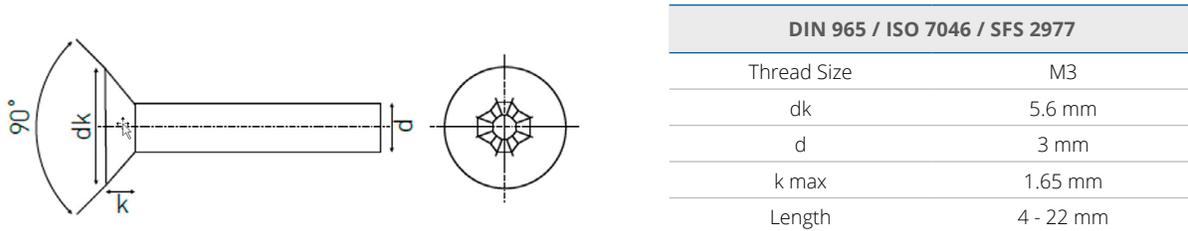


Figure 3. Countersunk screws of type M3.

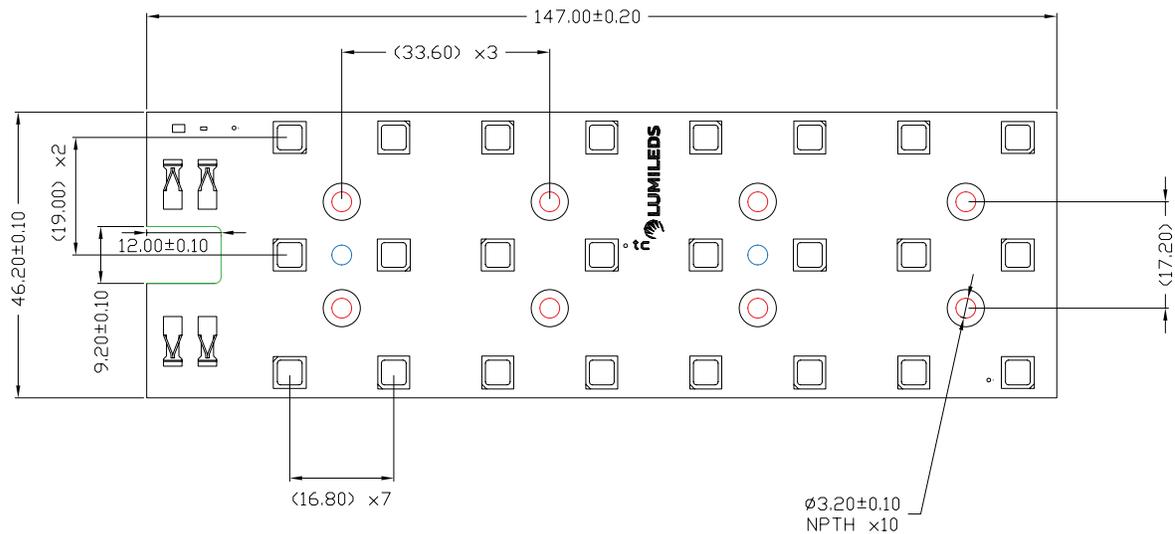


Figure 4. Board mounting screw holes (red circles), optional lens alignment holes (blue circles) and an opening (green) for routing input wires.

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 Wire Preparation

LUXEON XR-5050 HE uses four AVX 70-9296-001-003-006 3mm contacts to accommodate 18AWG to 26AWG wires with a maximum insulation diameter of 2.5mm. Wire insulation strip length is recommended to be 4mm to 5mm.

5.2 Procedure for Inserting Wire

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.



Figure 5. Illustration on inserting wire on a representative Lumileds LED module.

Wires are inserted through the front aperture of the contact. They should be pushed beyond the grips up to the stop face. For smaller wires especially 26AWG stranded wire it may be necessary to use the tool to open the contact slightly when wires are inserted.

Note: When inserting wires, it is expected that the side walls of the contact deflect outwards, this is normal as a function of the wire being inserted into the contact.

5.3 Procedure for Removing Wire

Simultaneously pull and twist wire back and forth, the wire will slowly screw out of the contact.

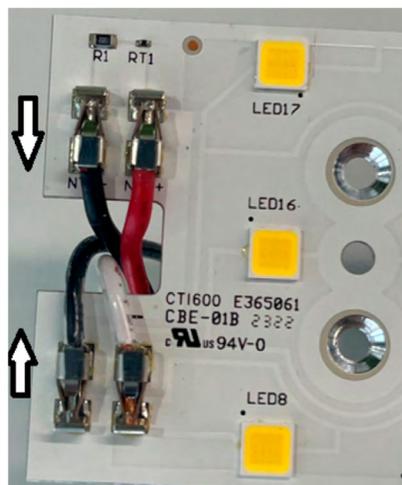


Figure 6. Illustration on removing wire on a representative Lumileds LED module.

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 “AB174 LUXEON 5050 Application Brief” which is available from the lumileds.com website.

7. Photobiological Safety Test (Blue Light Hazard)

For nominal CCT up to and including 5700K, 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-5050 HE is assembled with LUXEON 5050 HE 6V LED package. LUXEON XR-5050 HE has three strings connected in parallel, therefore a 1050mA LED module drive current is equivalent to 350mA LED package current.

Table 1. Threshold drive current for RG1-RG2 boundary limit for LUXEON XR-5050 HE.

	THRESHOLD DRIVE CURRENT (mA)	NOMINAL CCT	
		≤5000K	≤5700K
L225-AABB024MLU010	804	RG1 unlimited	RG1 unlimited
	996	RG1 unlimited	RG2
	1440	RG2	RG2
	2000	RG2	RG2

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

	THRESHOLD DRIVE CURRENT (mA)	NOMINAL CCT	
		≤5000K	≤5700K
L225-AABB024MLU010	804	n/a	n/a
	996	n/a	785 lx
	1440	1023 lx	785 lx
	2000	969 lx	752 lx

Where:

AA - designates nominal ANSI CCT (22=2200K, 27=2700K, 30=3000K, 40=4000K, 50=5000K, 57=5700K)

BB - designates minimum CRI (70=70CRI, 80=80CRI and 80=CRI90)

8. Electrical Isolation and Safety

LUXEON XR-5050 HE (single) module has been evaluated for use in dry and damp locations and meeting the minimum electrical spacings & dielectric voltage withstand test for operation at maximum 300Vdc Working Voltage to Ground per UL 8750.

LUXEON XR-5050 HE (single) module has been evaluated and meeting the electric strength & creepage/clearance requirements per IEC 62031. The insulation between live parts on the LED module and mounting surface or touchable parts when mounted in a luminaire is basic insulation for SELV and other than SELV operation and is evaluated based on the Maximum Working Voltage of 250 Vdc.

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

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



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