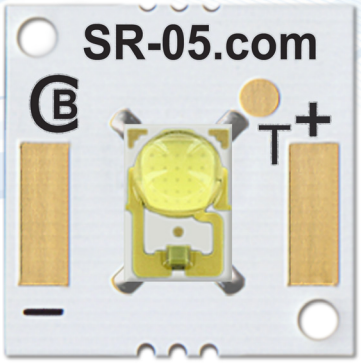
SR-05 Rebel 10mm Square LED Assembly

lead-free RoHS compliant

Overview



The SR-05 high brightness LED lighting assembly features a single Rebel LED soldered to our 10mm Square CoolBase. The FR4 CoolBase features a highly efficient thermal design that matches or outperforms* standard aluminium MCPCB bases.

The FR4 CoolBase is fully electrically isolated so that thermal interface materials do not need to be electrically insulative. The square design is currently one of the smallest LED assemblies available, and is compatible with the full line of Carclo 104 10mm optics.

Connections to the base can be soldered using standard bench top tools and hand soldering techniques, making it easy to integrate into fixtures or for use in OEM/MRO applications.

SR-05 Square assemblies can be ordered directly from our website at www.luxeonstar.com/sr-05.

Features:

- Drop-in replacement for standard 10mm MCPCB Rebel Square LEDs
- Super efficient base design that matches or outperforms aluminium MCPCB bases
- Available with all currently produced Rebel LEDs
- RoHS compliant
- Pb free reflow soldered
- Extremely low thermal resistance
- Can be mounted with thermal tape

Construction

The base of this assembly uses a specially designed 0.8mm, thermally conductive FR4 PCB that provides an unprecedented thermal conductivity rate of 1.5°C/W, which directly translates into:

- **Longer LED life**
- **Better color stability**
- **Reduced cooling requirements**

Assembly Specifications

Parameter	Value
Base Type	0.8mm FR4 PCB
Base Thermal Performance (Not including LED)	1.5°C/W
Finishing	Immersion Gold
Solder Mask Color	White
Solder Paste	AIM NC-258 No-Clean, Lead-Free
Max Operating Temperature (FR4 Base)[1]	95°C
Overall Dimensions (mm)	10L x 10W x 2.7H
Weight	0.3g

1. For maximum life, the FR4 board temperature must be kept below this value.
* Results will vary depending on the quality of the dielectric material used in the MCPCB base.

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Power Drivers

The choice of power driver will depend on the Rebel LED that is mounted to the base, the number of LEDs being powered, the input voltage source and drive current. We offer a complete selection of compatible low and high voltage current regulated drivers on our website.

Secondary Optics

The SR-08 assembly has been specifically designed to accommodate all of the Carclo 104 series of quad optics including:

- Carclo 10417 - 17.7° Optic
- Carclo 10412 - 18.4° Optic
- Carclo 10413 - 29.8° Optic
- Carclo 10414 - 39.2° Optic
- Carclo 10415 - 46° x 16° Optic

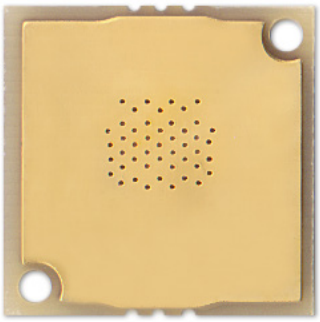
Complete details about the Carclo 104 series of optics can be found on our website at: www.luxeonstar.com/sr-05-optics.

Mounting & Cooling

Use of this assembly requires careful attention to mounting and cooling to ensure that the junction temperature of the LED is kept well below the maximum rating as specified in the LED documentation published by Philips Lumileds.

For optimal cooling, we recommend that the assembly be mounted to a suitable heat sink (aluminum or copper) that is exposed to open air using a thermal interface material such as our pre-cut thermal adhesive tape or Arctic Silver™ Thermal Adhesive. The bottom of the LED assembly is electrically neutral, so it is not necessary to electrically isolate the LED base from the cooling surface.

You need to confirm that the assembly is being adequately cooled by testing the temperature of the LED as described in the Measuring LED Junction Temperature section of this document.



Bottom View

Failure to ensure that the LED junction temperature is kept below it's maximum temperature rating will result in poor color rendering, early degradation of light output, and premature LED failure!

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Measuring LED Junction Temperature

The junction temperature of the LED must be tested to be sure it is being adequately cooled.

To make testing easy, the SR-05 assembly includes a temperature test point that can be used to determine the LED junction temperature using the following procedure.

Required Tools

- Digital Multimeter
- Temperature measurement meter
- Thermocouple or thermistor with kapton tape and/or thermal adhesive epoxy

  - or -
- Hand held temperature measurement probe with a tip that is smaller than the temperature test pad on the LED assembly.

Test Procedure

1. Enter the LED Typical Thermal Resistance Junction to Thermal Pad (°C/W) $R\theta_{J\text{-}C}$ value from the Rebel LED datasheet into box **B** in the formula on page 5 of this document.
2. Ideally the temperature should be tested with the LED assembly mounted in the location where it will be operated.

   If the assembly will be in a difficult to reach location, then you will need to attach a thermocouple or thermistor to the assembly using kapton tape or Arctic Silver™ Thermal Adhesive epoxy so that the tip of the sensor is in direct contact with the temperature measurement point as shown in image 1. Be sure to allow the adhesive to fully cure and cool before testing. If the assembly is easily accessible, then you can use a hand held temperature probe to measure the test point temperature.

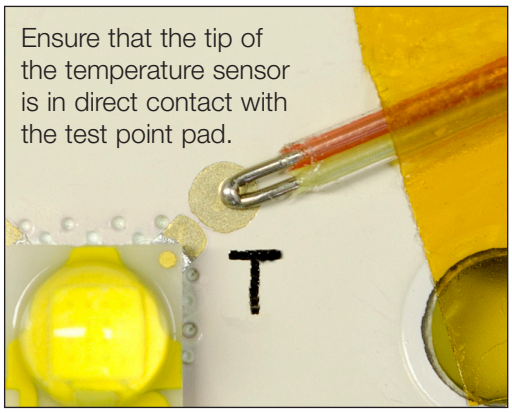

Image 1

Image 2

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3. If you are measuring the temperature with a hand held probe, hold the probe onto the temperature test point for at least 1 minute after the LED assembly has reached its stable operating temperature. (Image 3) Applying a small amount of OMEGATHERM© 201 High Thermal Conductivity Paste, or heat sink thermal grease to the pad and probe tip will help to ensure you get an accurate reading. (Image 4)

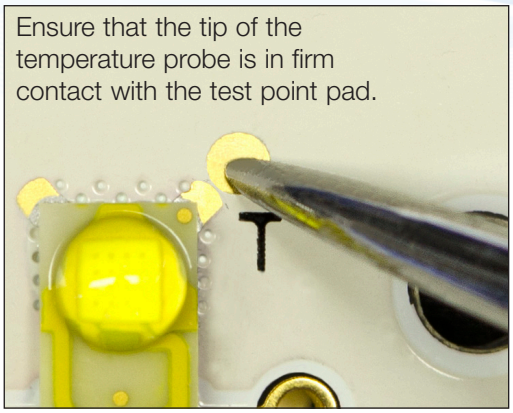

Image 3

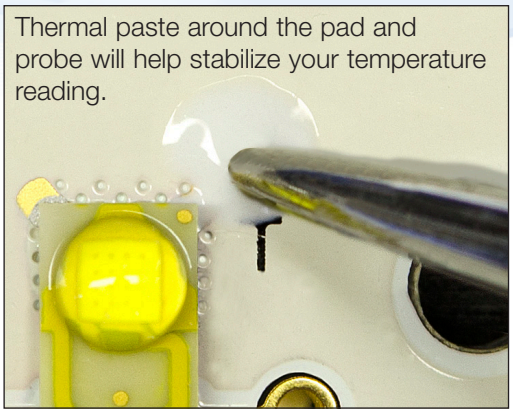

Image 4

4. Power up the LED assembly and allow the temperature to stabilize for at least 5 minutes.
5. After the temperature measurement has stabilized, note the test point temperature and enter it in box **A** on page 5.
6. Measure the voltage across the LED you are testing (image 5) and note it in box **C**.

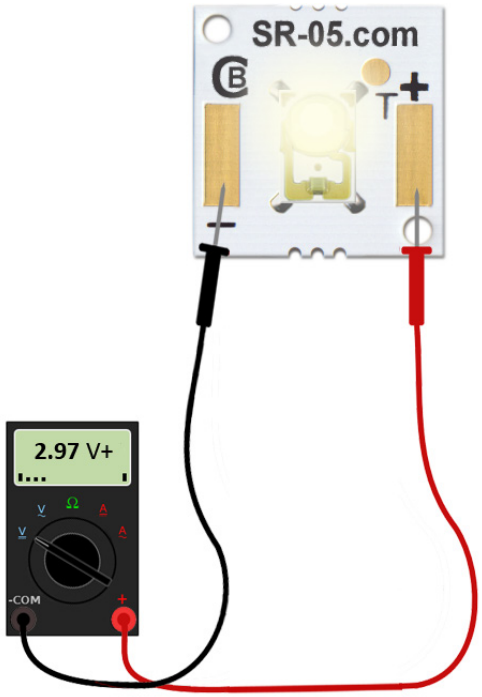

Image 5

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7. Enter the current you are powering the LED at in box **D**.
8. Evaluate the completed formula to determine the junction temperature of the LED.

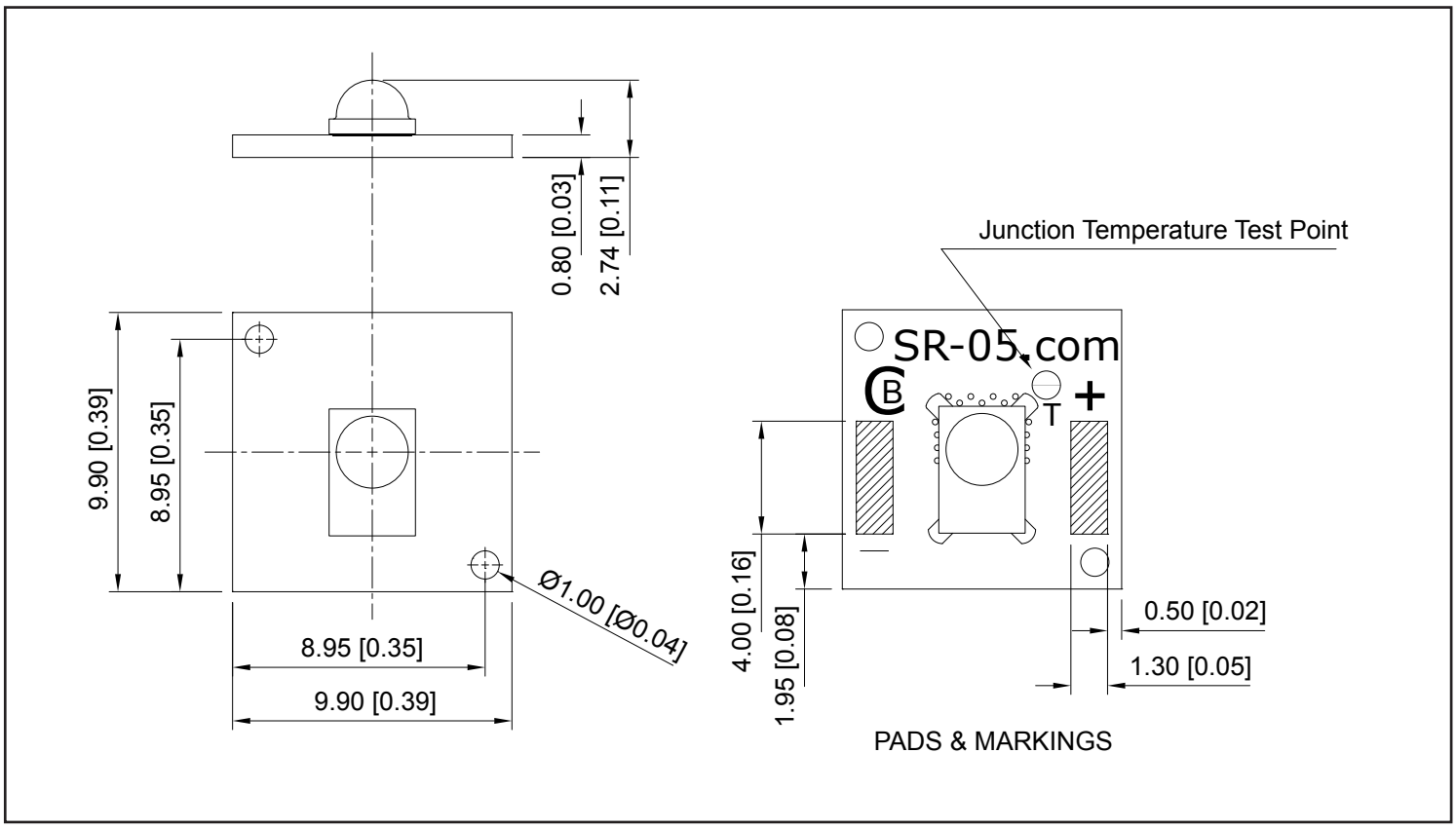
$$\boxed{A} + (1.5 + \boxed{B}) \times (\boxed{C} \times \boxed{D}) = \boxed{}^{*}$$

A	B	C	D	
Test Point Temperature °C	$\Psi_{J\text{-}S}$ °C/W	$R\theta_{J\text{-}C}$	LED Forward Voltage V_f	LED Forward Current I_f	LED Junction Temperature °C

* For maximum LED life, color stability and reliability, the calculated junction temperature must always be at or below the temperature shown in the Max Rec1 Junction Temp °C column of the specification table on page 6 of this document.

More information about this junction measurement technique can be found in the LUXEON LED Thermal Measurement Application Brief (AB33) published by Philips Lumileds.

Assembly Drawing



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Safety:

The LED mounted onto this assembly will produce a highly intense point of light. Do not stare directly at the LED for any length of time.

Restricted Use:

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