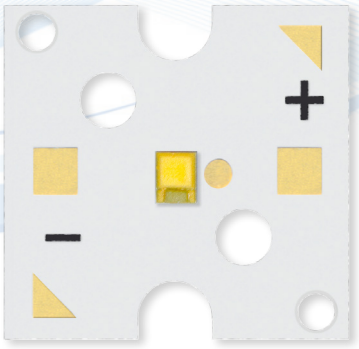
SZ-01 Saber Z1 - LUXEON™ Z LED Module

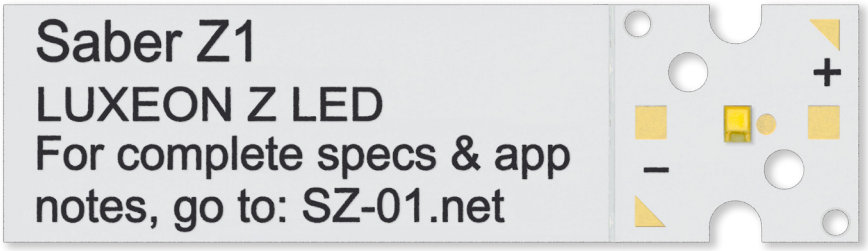
lead-free RoHS compliant

The Saber Z1 LED module features a single LUXEON™ Z LED soldered to a **10mm (0.4”) square aluminum board**.



This ready-to-use LED offers both easy handling and a small size that can be worked with standard bench top tools and hand soldering techniques. This opens up new opportunities for Makers, R&D, MRO and low & medium volume OEM manufacturers to use the super small series of LUXEON™ Z LEDs without the need for specialized pick and place equipment or reflow soldering.

The Saber Z1 features a thermally efficient, 1.6mm (0.063”) thick MCPCB aluminum base with temperature test point, and is available with any color LUXEON™ Z LED, including a selection of UV wavelengths.



The Saber Z1 is provided as part of a **Carrier Tab**. The tab is v-scored so that the LED module can be easily separated from the carrier.

The carrier tab makes it easier to handle the Saber Z1 during transport, storage and module, minimizing the risk of damage to the LED emitting surface.

Features

- **Small footprint** is both easy to handle plus accommodates tight locations.
- Designed to accurately position the secondary optic over the LED.
- Available in all colors, including a selection of UV wavelengths.
- Shipped as part of an easy to handle carrier tab.
- Can be mounted with thermal tape or thermally conductive epoxy
- **RoHS compliant**
- **Pb free** reflow soldered

Benefits

- Create densely packed LED designs
- Does not require special tools or assembly processes
- Opens up new design possibilities
- Provides precise positioning of secondary optics

Module Specifications

Parameter	Value
Base Type	1.6mm MCPCB Aluminum
Thermal Performance $R\theta_{C-B}$ From the LED thermal pad to the bottom of the aluminium base	2 °C/W
Pad Finish	Immersion Gold
Solder Mask Color	White
Solder Paste	AIM NC-258 No-Clean, Lead-Free
Max Operating Temperature (Aluminum Base)[1]	120°C
Overall Dimensions (mm)	10L x 10W x 2.56H (The height is dependent on LED type. See drawing for details.)
Weight	1.5g (Not including the carrier tab)

1. For maximum life, the aluminum board temperature must be kept below this value.
For LED specifications, please refer to the Philips Lumileds Rebel LED datasheet.

Power Drivers

The choice of power driver will depend on the Rebel LED that is mounted to the base, desired lumens output, the number of LEDs being powered, the input voltage source, and the drive current. For help with selecting and using LED power drivers, visit our online support center at www.luxeonstar.com/support.

We offer a complete selection of compatible low and high voltage current regulating drivers on our website at www.luxeonstar.com/drivers.

Secondary Optics

The Saber Z1 has been specifically designed to precisely position the following optics over the LUXEON™ Z LED:

- Carclo - 10mm Square Optics
- Ledil - Larisa Square & Lisa2 Round Optics
- Khatod - 9.9mm & 16mm Round Optics For Luxeon Z

For more information about all of optics currently available on our website, please go to: www.luxeonstar.com/optics.

Mounting & Cooling

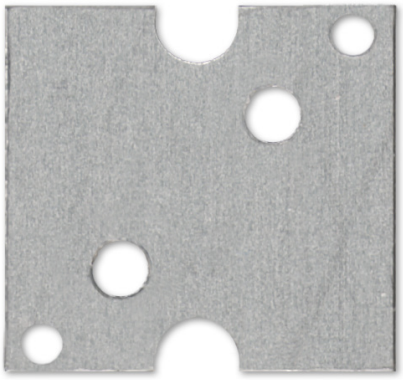
Use of this module requires careful attention to mounting and cooling to ensure that the junction temperature of the LED is kept well below the maximum rating as specified in the LED documentation published by Philips Lumileds.

For optimal cooling, we recommend that the module be mounted to a suitable finned heat sink (aluminum or copper) that is exposed to open air. The module can be mounted to the heat sink in one of two ways:

- pressure sensitive, thermally conductive tape
- thermally conductive adhesive

The bottom of the LED module is electrically neutral, so it is not necessary to electrically isolate the base from the cooling surface.

Once mounted, you need to confirm that the module 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

LED Mounting Using Pressure Sensitive Thermal Tape

Pressure sensitive thermal tape such as our pre-cut Bond-Ply© 100 tape makes it easy to fasten the base directly to a heat sink without the need for screws, clip mounts, or fasteners. However in order to ensure a sound thermal bond, it is very important that the tape be used correctly. This includes:

- Ensuring that all mating surfaces are clean, totally flat and free of voids
- Sizing and positioning the tape so that all mating surfaces are covered
- Applying a minimum of 10 PSI of even pressure between the LED and heat sink for at least 30 seconds

Applying even pressure to bond the LED module to the heat sink can be difficult due to the small size of the module and the need to avoid touching or applying any pressure to the LED optic. To overcome this problem, we include a thermal press with our pre-cut thermal tape. This press has been specifically designed to allow you to apply even, constant pressure to the module and heat sink, without touching the LED itself. A video that demonstrates how to properly apply pressure sensitive thermal tape and use a thermal press is available at www.luxeonstar.com/using-thermal-tape.

If pressure sensitive thermal tape is used correctly, there is no need to use any additional mechanical fasteners.

LED Mounting Using Thermally Conductive Adhesive

Thermally conductive adhesive such as Arctic Silver™ Thermal Adhesive requires a bit more effort to use than thermal tape, but offers a permanent bond, wider operating temperature range, and higher reliability, especially in environments where the module will be subjected to mechanical shock and vibration.

To create a thermally efficient and reliable bond:

- Ensure that all mating surfaces are clean and free of any grease or oil
- Use just enough epoxy to create as thin a bond line as possible
- Apply as much pressure as possible between the LED and heat sink for at least 30 seconds, and then maintain pressure using a clamp or weight until the epoxy has set

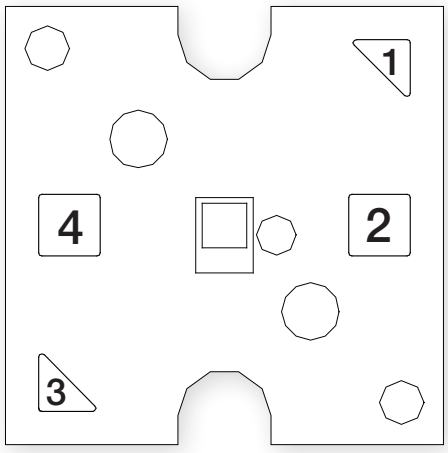
Like our thermal tape, we include a thermal press with every order of the Arctic Silver Thermal Adhesive to make it easier to create a sound bond. A video that demonstrates how to properly use the Arctic Silver Thermal Adhesive and a thermal press is available at www.luxeonstar.com/using-arctic-silver.

Mechanical Fasteners Cannot Be Used

The Saber Z1 is not designed to be fastened to the heat sink using mechanical fasteners.

Connections

PAD No	Connection
1	Anode (+)
2	Anode (+)
3	Cathode (-)
4	Cathode



Measuring LED Junction Temperature

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

To make testing easy, the Saber Z1 includes a temperature test point that can be used to determine the LED junction temperature using the following procedure.

For more details, refer to the Thermal Model on page 7 of this document.

Required Tools

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

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 6 of this document.
2. Ideally, the temperature should be tested with the LED module mounted in the location where it will be operated.

   If the module's location will be difficult to reach, then you will need to attach a thermocouple or thermistor to the module 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 Images 1 & 2. Be sure to allow the adhesive to fully cure before testing.

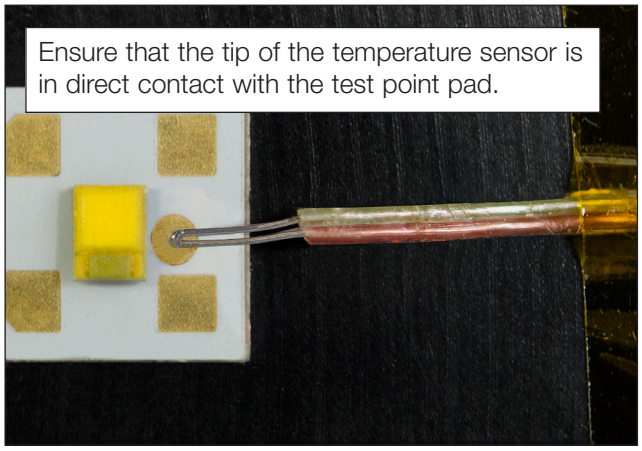


Image 1

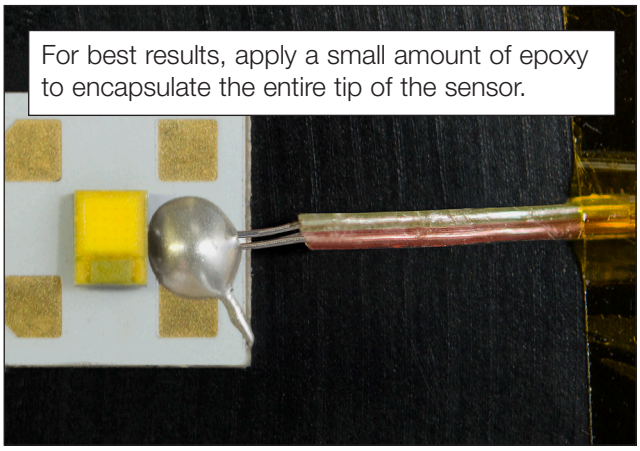


Image 2

3. After the temperature measurement has stabilized, note the test point temperature and enter it in box **A** below.
4. Measure the forward voltage of the LED while at the stabilized temperature (Image 3) and note it in box **C**.
5. Enter the current, which you are using to power the LED, in box **D**.

   Evaluate the completed formula to determine the junction temperature of the LED.

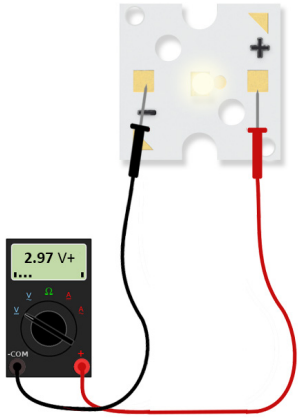


Image 3

$$\boxed{A} + (5 + \boxed{B}) \times (\boxed{C} \times \boxed{D}) = \boxed{}^{*}$$

Test Point T_S Temperature °C	$R\theta_{C\text{-}S}$	$R\theta_{J\text{-}C}$	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 below the maximum LED junction temperature published in the Philips Lumileds datasheet for LUXEON™ Z LEDs.

More information about how to determine the LUXEON™ Z LED junction temperature can be found in the Module and handling information Application Brief (AB105) published by Lumileds.

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!

Thermal Model

Image 4 is a cross section of a typical LUXEON™ Z LED module that illustrates how the LED is attached to the aluminium base and shows the thermal paths between the LED junction, temperature test point and bottom of the LED module.

- $R\theta_{J-C}$ is the thermal resistance from the LED junction (T_j) to the LED thermal pad
- $R\theta_{C-S}$ is the thermal resistance from the LED thermal pad to the temperature test point (T_S)
- $R\theta_{C-B}$ is the thermal resistance from the LED thermal pad to the bottom of the module

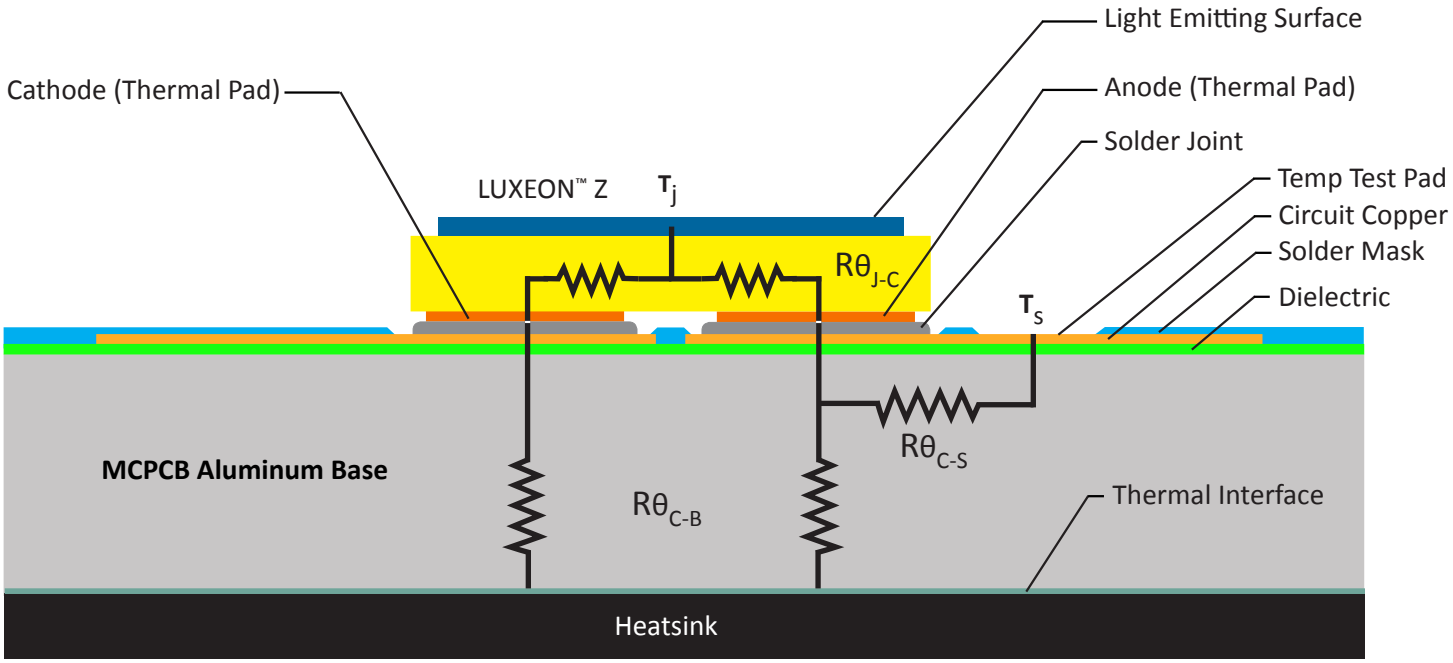
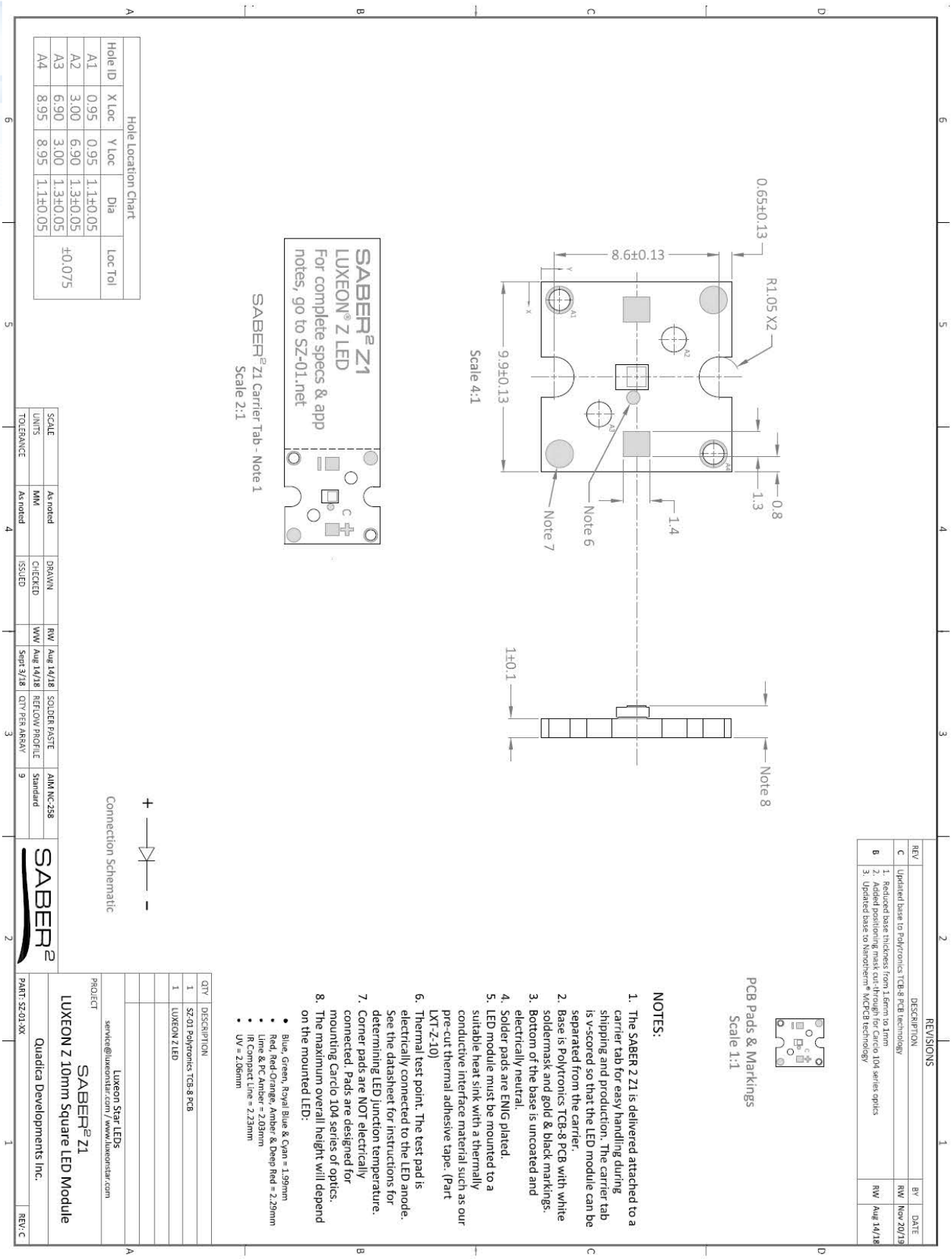


Image 4



You can download the full sized drawing from www.luxeonstar.com/SZ-01-drawing.pdf

Safety:

The LED mounted onto this module 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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www.luxeonstar.com/sz-01.pdf

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