

The SABER² SW-05 series of high power LED modules features a single Rebel LED soldered to a 10 mm square COFAN Super Pillar aluminum board for optimal heat dissipation. This patented technology significantly lowers the LED junction temperature, enhancing LED longevity, brightness, and reliability.

The square design is currently one of the smallest Rebel LED modules available, and is compatible with the full line of Carclo 104 10 mm optics.

Wire connections can be soldered to the SW-05 using standard bench top tools and hand soldering techniques, making it easy to use this LED for R&D, OEM, and MRO applications.

A slightly larger [solderless LED module](#) is available.



SPECIFICATIONS	Base Type	0.8 mm COFAN USA Pillar Aluminum
	Thermal Performance ¹ R _{θC-B}	0.39 °C/W
	Pad Finish	Immersion Gold, ENIG
	Solder Mask Color	White
	Solder Paste	AIM NC258-M8 Lead-Free, No-Clean
	Max Operating Temperature ²	120°C
	Overall Dimensions (mm)	9.9 Square x 2.87h
	Weight	1.5g

FEATURES

- COFAN USA Pillar² direct thermal path technology
- Available with your choice of any Rebel LED currently produced by Lumileds.
- Available with binned LEDs³
- RoHS/REACH compliant
- PB free
- No minimum order requirements

BENEFITS

- High-performance Pillar technology minimizes cooling requirements, increases lumens output and extends LED life
- Production quantity binning provides consistent color and brightness
- Cost-effective design delivers a low-cost option in both small and large quantities
- No minimum order requirements mean fast, low-cost prototyping

- Specialty lighting
- Microscope illumination
- Inspection lighting
- Flashlights
- Task Lamps
- Spot lighting
- Recreational lighting (dive lights, bicycle lights, light sabers, etc.)
- Fiber optic illuminators

APPLICATIONS

1. See the thermal model on page 7.
 2. For maximum life, the board temperature must be kept below this value.
 3. Minimum order quantities apply.

WIRE CONNECTIONS

PAD No	LED Connection
1	Anode
2	Cathode

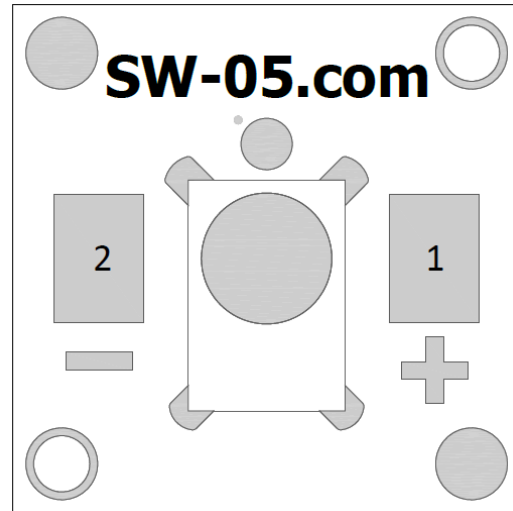


Image 1

SECONDARY OPTICS

The SW-05 has been designed to accommodate the Carclo 104 series of optics including:

- [Carclo 10417](#) - 17.7°
- [Carclo 10412](#) - 18.4°
- [Carclo 10413](#) - 29.8°
- [Carclo 10414](#) - 39.2°
- [Carclo 10415](#) - 46° x 16° Elliptical

More information about all of these optics is available on our website at: luxeonstar.com/optics.

MOUNTING & COOLING

The SW-05 LED module requires careful attention to mounting and cooling to ensure that the LED junction temperatures are kept well below the maximum rating as specified in the LED documentation published by Lumileds.

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

- [Pressure-sensitive, thermally conductive tape](#)
- [Thermally conductive adhesive](#)

Always ensure the module is adequately cooled by testing the LED junction temperature using the method described in the Measuring LED Junction Temperature section on page 6 of this document.

Mechanical fasteners are not recommended.

BASE CONDUCTIVITY

The bottom of the LED module is electrically neutral, so it is unnecessary to electrically isolate the base from the cooling surface.



Bottom View

MOUNTING USING PRESSURE SENSITIVE THERMAL TAPE

Pressure-sensitive thermal tape such as [Bond-Ply[®] 100](#) makes it easy to fasten the base directly to a heat sink without the need for screws, clip mounts, or fasteners. However, to ensure a sound thermal bond, it is essential that the tape is 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 20 PSI of even pressure between the LED module and heat sink for at least 10 seconds

Applying even pressure to bond the LED module to the heat sink can be challenging due to the small size of the module and the need to avoid touching or applying any pressure to the LED optic. To address this, an assembly press tool (image 2) designed to apply even, constant pressure to the module and heat sink without touching the LED(s) is supplied at no charge when thermal tape is ordered for this module.



image 2

Refer to the [Bond-Ply Application Note](#) for more details about using thermal tape.

When pressure-sensitive thermal tape is applied correctly, there is no need to use additional mechanical fasteners.

MOUNTING USING THERMALLY CONDUCTIVE ADHESIVE

Thermally conductive adhesive such as [Arctic Silver™](#) requires 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 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 luxeonstar.com/using-arctic-silver.

POWER DRIVERS

The choice of power driver will depend on the Rebel LED that is mounted to the base, the 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 luxeonstar.com/powering-leds.

We offer a complete selection of compatible current regulating drivers on our website at luxeonstar.com/drivers.

MEASURING THE LED JUNCTION TEMPERATURE

The following steps describes how to determine the junction temperature of the LED to ensure it is adequately cooled.

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 ($^{\circ}\text{C}/\text{W}$) $R\theta_{J-C}$ value from the Rebel LED datasheet into box **B** of 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 is difficult to reach, then a thermocouple or thermistor will need to be attached 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 3 & 4. Allow the adhesive to cure before testing.

3. After the temperature measurement has stabilized, note the test point temperature and enter it in box **A** on page 6.

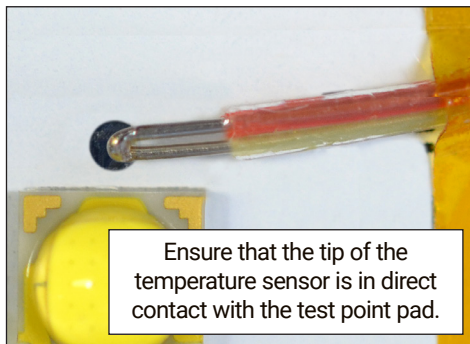


Image 3

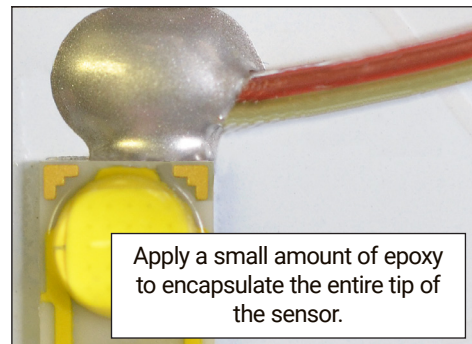


Image 4

4. Measure the forward voltage of the LED while at the stabilized temperature (Image 5) and note it in box **C**.
5. Enter the current, that the LED will be powered at in box **D**.
6. Evaluate the completed formula to determine the junction temperature of the LED.

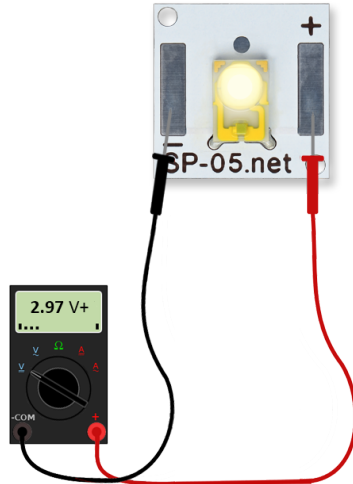


Image 5

$$\boxed{A} + (0.5 + \boxed{B}) \times (\boxed{C} \times \boxed{D}) = \boxed{}^*$$

Test Point T_c $R\theta_{C-S}$ $R\theta_{J-C}$ LED Forward Voltage V_f LED Forward Current I_f LED Junction Temperature $^{\circ}C$

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

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

* For maximum LED life, color stability, and reliability, the calculated junction temperature must always be below the maximum LED junction temperature published in the Lumileds datasheet for Rebel LEDs.

THERMAL MODEL

Image 6 is a cross-section of a typical SABER² LED module that illustrates how the LED is attached to the 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_C)
- $R\theta_{C-B}$ is the thermal resistance from the LED thermal pad to the bottom of the module

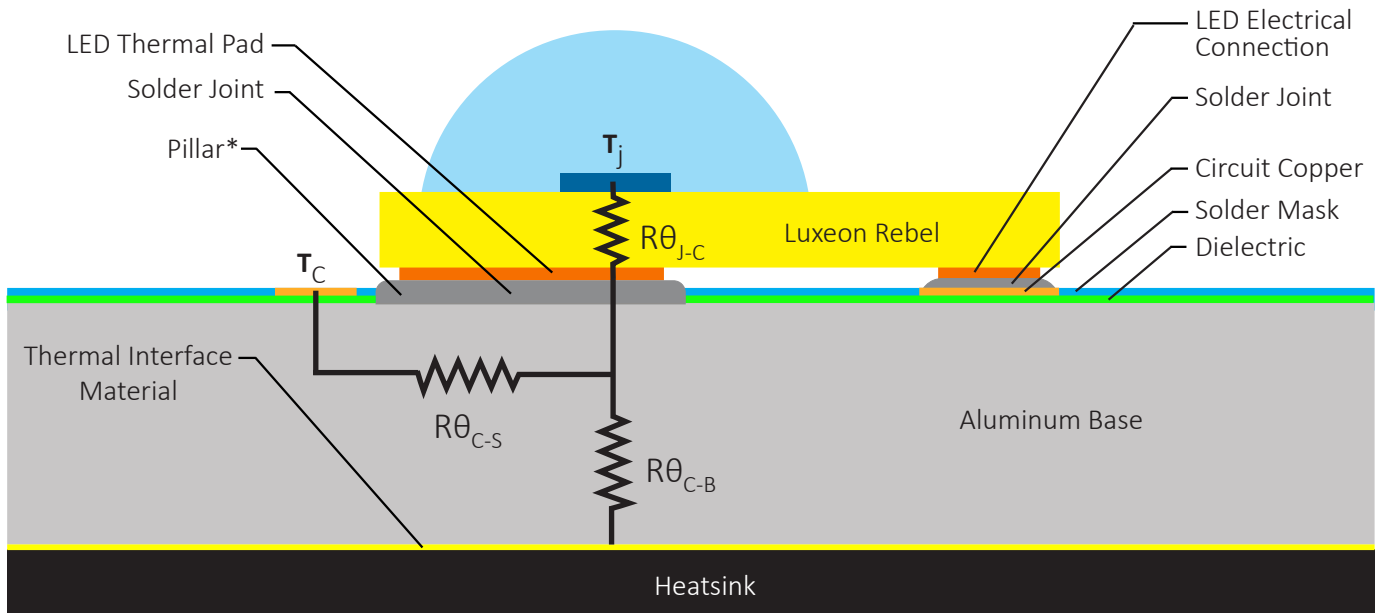
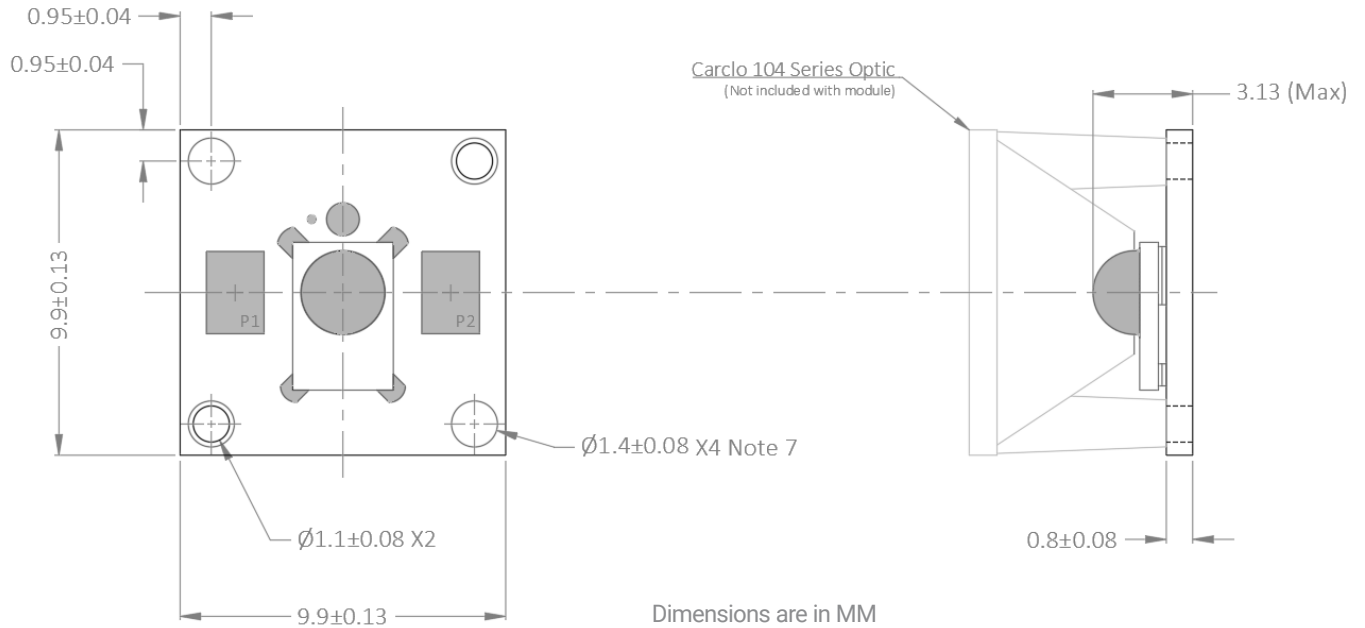


Image 6

*** PILLAR**

Pillar aluminum technology eliminates the dielectric layer and provides a solderable surface on the aluminum base, removing a significant barrier of thermal resistance between the LED and heatsink.

MECHANICAL DIMENSIONS

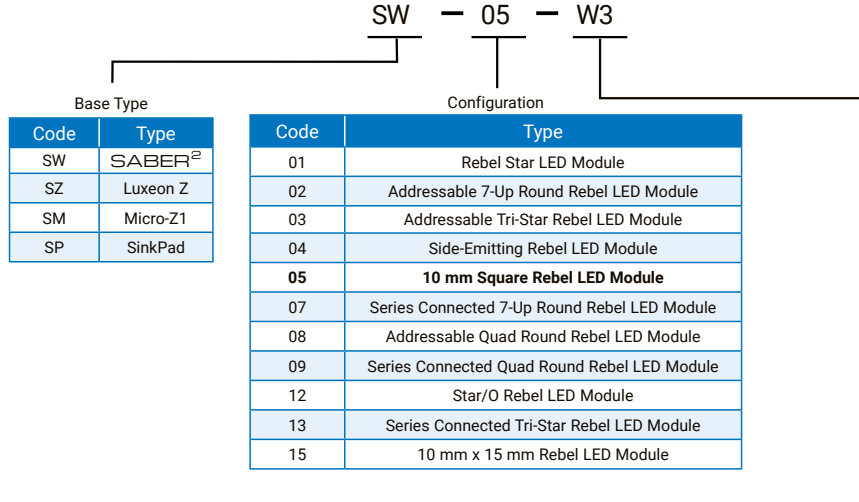


2D Drawing Download: luxeonstar.com/sw-05-drawing.pdf

3D Model Download: luxeonstar.com/sw-05.step

ORDERING INFORMATION

The SW-05 LED module can be ordered directly from luxeonstar.com/sw-05. There is no minimum order requirement, and shipping is available to anywhere in the World.



Color	Color Temperature (K) or Wavelength (nm)	Rebel LED Part Number	Production Code ²
Cool White	6500K	LXML-PWC1-0100	W3
Cool White	6500K	LXML-PWC1-0120	W4
Cool White	5650K	LXML-PWC2	W5
ANSI White	5000K	LX18-P150-3	T9
Neutral White	4100K	LXML-PWN1-0100	N2
Neutral White	4100K	LXML-PWN1-0120	N3
Neutral White	4100K	LXML-PWN2	N4
ANSI White	4000K	LX18-P140-3	T7
ANSI White	3500K	LX18-P135-3	T5
ANSI White	3000K	LX18-P130-3	T3
ANSI White	2700K	LX18-P127-3	T1
Far Red	720nm	LXML-PF01	D4
Deep Red	655nm	LXM3-PD01	D2
Red	627nm	LXM2-PD01-0040	R4
Red	627nm	LXM2-PD01-0050	R5
Red	627nm	LXM2-PD01-0060	D8
Red	627nm	LXM5-PD01	D9
Red	627nm	LXML-PD01-0040	R2
Red-Orange	617nm	LXM2-PH01-0060	E3
Red-Orange	617nm	LXM2-PH01-0070	E4
Red-Orange	617nm	LXM5-PH01	E6
Red-Orange	617nm	LXML-PH01-0050	E2
PC Amber	591nm	LXM2-PL01-0000	A5
Amber	590nm	LXM5-PL01	A8
Amber	590nm	LXML-PL01-0040	A2
Lime	567nm	LXML-PX02-0000	L1
Green	530nm	LXML-PM01-0090	G3
Green	530nm	LXML-PM01-0100	G4
Cyan	505nm	LXML-PE01-0070	C2
Blue	470nm	LXML-PB01-0030	B3
Blue	470nm	LXML-PB01-0040	B4
Royal-Blue	448nm	LXML-PR01-0500	V2
Royal-Blue	448nm	LXML-PR02-A900	V4

2. Do not confuse our production code with the LED bin code. They are not related.

COMPLIANCE:

Current compliance documents (e.g., RoHS, REACH, CMRT, etc.) are available for download from each product page on the luxeonstar.com website.

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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