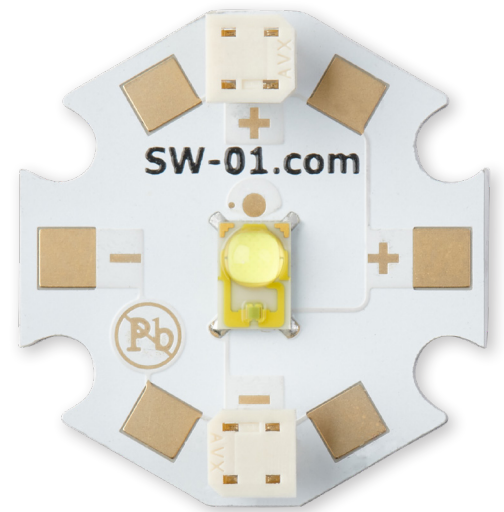


The SABER² SW-01 series of high-power LED modules features a single Rebel LED soldered to a 20 mm x 1.6 mm thick, high-performance, COFAN USA Pillar aluminum MCPCB.

Modules are built using COFAN USA's advanced Super Pillar aluminum MCPCB for optimal heat dissipation. This patented technology significantly lowers the LED junction temperature, enhancing LED longevity, brightness, and reliability.

Wire connections to the module can be made using optional AVX 9176-800 series solderless IDC connectors or soldered using standard bench-top soldering tools. The IDC connectors are 100% compatible with a variety of secondary optics from different manufacturers.



Module shown with optional connectors

SPECIFICATIONS	Base Type	1.6 mm COFAN USA Pillar Aluminum
	Thermal Performance¹ 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 Temperature²	120°C
	Overall Dimensions (mm)	20.8d x 3.88h (max height without IDC connectors)
	Optional Connectors	AVX 9176-800 Low Profile IDC (22, 24 or 26AWG)
	Weight	1.5g

FEATURES

- COFAN USA Pillar¹ direct thermal path technology
- Optional, one-step IDC connections that are compatible with most secondary optics and do not require special installation tools
- Available with your choice of any Rebel LED currently produced by Lumileds.
- Available with binned LEDs³
- RoHS compliant
- PB free
- No minimum order requirements

BENEFITS

- High-performance Pillar technology minimizes cooling requirements, increases lumens output, and extends LED life.
- AVX IDC connectors make the creation of robust wire-to-board connections a simple one-step process
- Production quantity binning provides consistent color and brightness³
- The 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 8.
 2. For maximum life, the board temperature must be kept below this value.
 3. Minimum order quantities apply.

WIRE CONNECTIONS

Connecting wires can be hand-soldered directly to the module or pressed into place using two optional, low-profile [AVX 9176-800](#) IDC wire-to-board connectors.

These industrial-grade connectors include an integrated cap that precisely holds and guides the wire while it is pressed into the contact, creating a gas-tight, cold-welded connection. The connectors are designed for single use. Wires cannot be removed after they are pressed into place.

Connectors for 22, 24, or 26 AWG solid or stranded wire can be specified when the module is ordered. The connector can accommodate a maximum wire insulation diameter of 1.40 mm.

When the wire is pressed into place, the overall height of the connector is 2.55 mm, which minimizes interference with the light output of the LED and allows it to be used with many secondary optic holders.

To use IDC connectors, insert the wire into the cap so that the wire extends beyond the face of the connector to help position the punch-down tool. (Image 3) Wires do not need to be stripped.

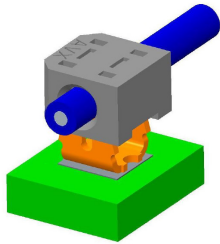


Image 3

Ensure that the LED module is firmly supported on a solid, flat surface. Using the supplied press-down tool¹ (image 2) with a multi-bit driver, press the cap down until it reaches the stop. When pressed into place, the gap between the bottom of the cap and the PCB should not be greater than 0.05 mm. (Image 5)

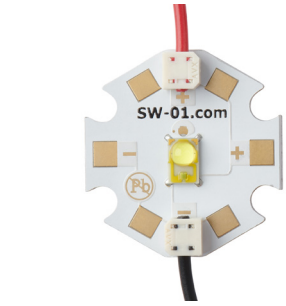


Image 1

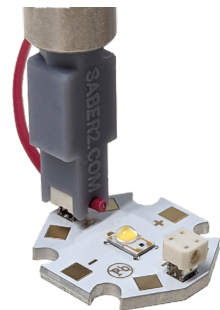


Image 2

The insertion force will be approximately 80N (18 lbf) depending on the wire gauge, conductor strands, and insulation material.

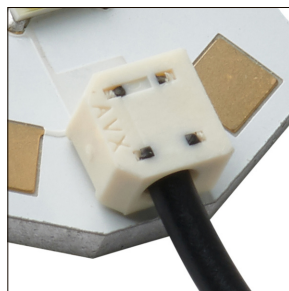


Image 4

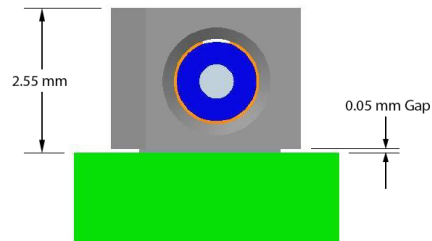


Image 5

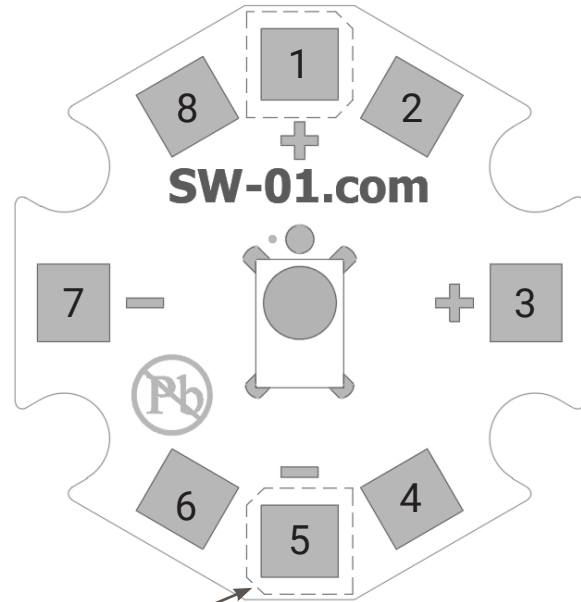
Always ensure that the bottom of the LED module is firmly supported on a flat surface while pressing the wire into place.

1. While any flat-surfaced tool can be used to press the wire cap into place, the press-down tool that we supply ensures that the tool does not accidentally slip off the top of the cap, potentially damaging the LED.

WIRE CONNECTIONS

The optional AVX IDC connectors are soldered to pads 1(+) and 5(-) to provide maximum secondary optic compatibility.

PAD No	LED Connection
1	Anode (+)
2	Anode
3	Anode
4	Anode
5	Cathode (-)
6	Cathode
7	Cathode
8	Cathode



Outline of IDC connector

Image 6

SECONDARY OPTICS

The SABER² SW-01 has been designed to accommodate a variety of optics and holders from major optics manufacturers.

Manufacturer	Part Series	Part Type	IDC Compatible	Notes
Carclo	104	Holder	Yes	Holder will fit Carclo 101, 102, and 103 series of optics.
	102	Holder	No	Holder will fit Carclo 101, 102, and 103 series of optics.
Fraen	FLP	Holder & Optic	No	
Khatod	KEPL	Holder & Optic	Yes	
Dialight	OPC1	Reflector	Yes	

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

MOUNTING & COOLING

The SW-01 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 8) 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.

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.



image 7

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.

MECHANICAL FASTENERS WITH THERMAL PASTE

Mechanical fasteners and thermal paste are generally not recommended for SABER² LED modules. However, if your application requires that the LED module is mechanically fastened to the heatsink, then ensure that the fasteners are insulated from any nearby connecting pads and that they are carefully tightened to avoid twisting or bending the aluminum base. Even a slight distortion of the base can cause solder joint cracking, which will lead to reduced thermal efficiency and electrical problems.

LED DRIVERS

The choice of LED 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 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 describe 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 7 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 9 & 10. 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**

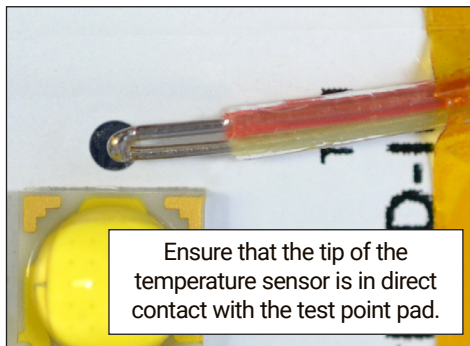


Image 9

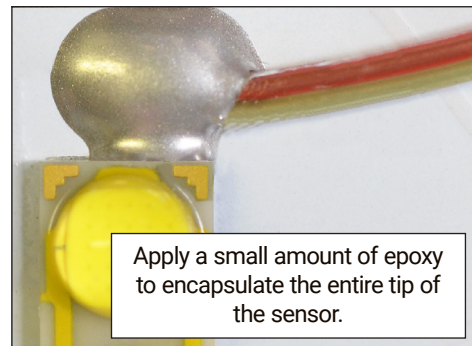


Image 10

on page 7.

4. Measure the forward voltage of the LED while at the stabilized temperature (Image 11) 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.

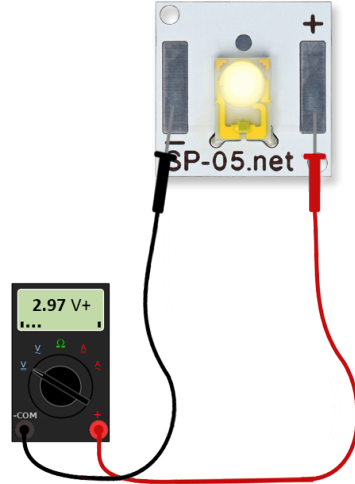


Image 11

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

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 $^{\circ}\text{C}$

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 12 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

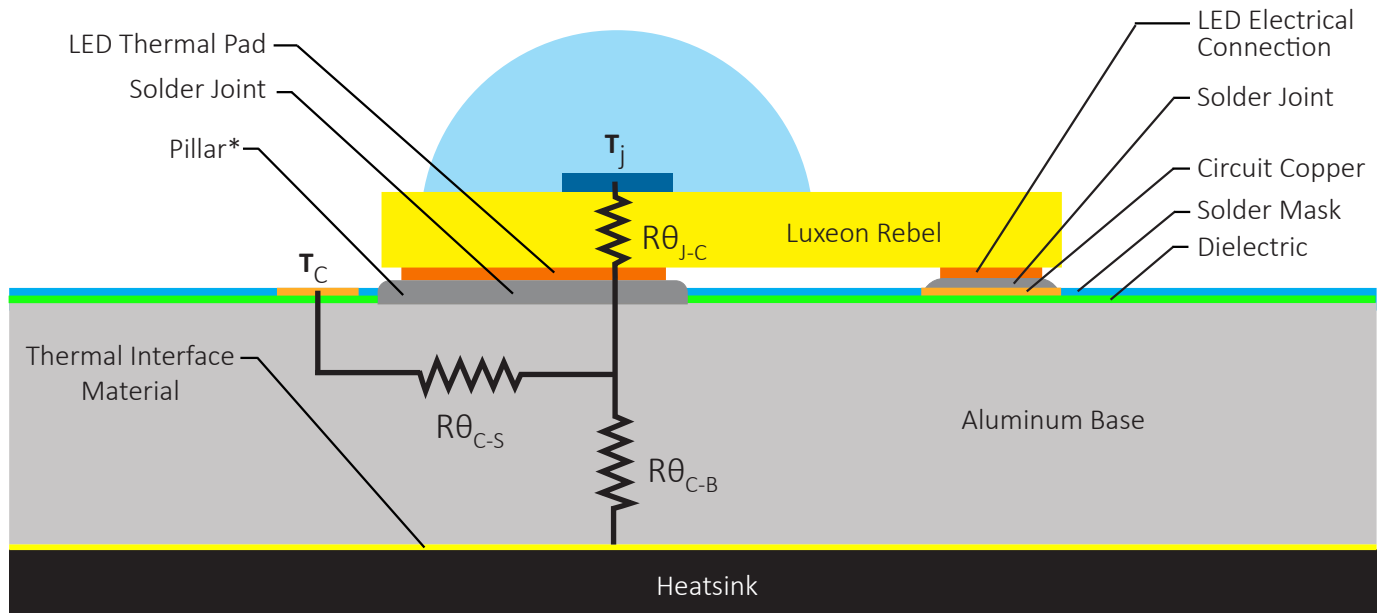
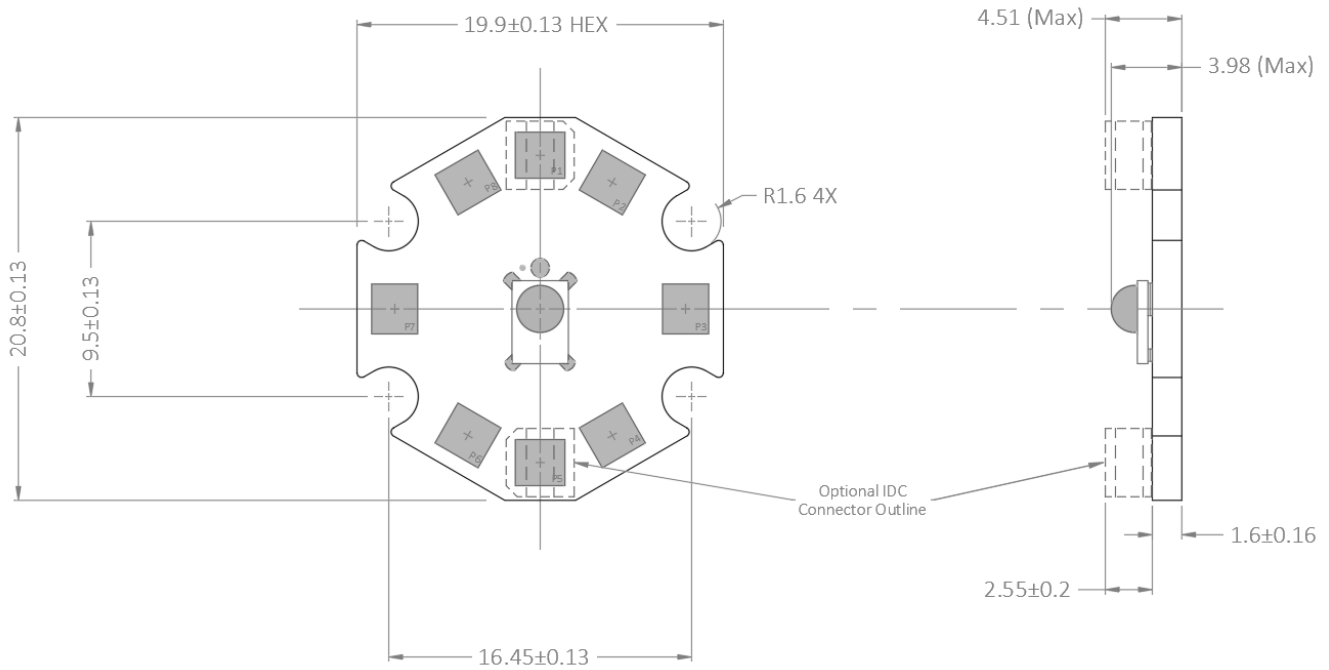


Image 12

* 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



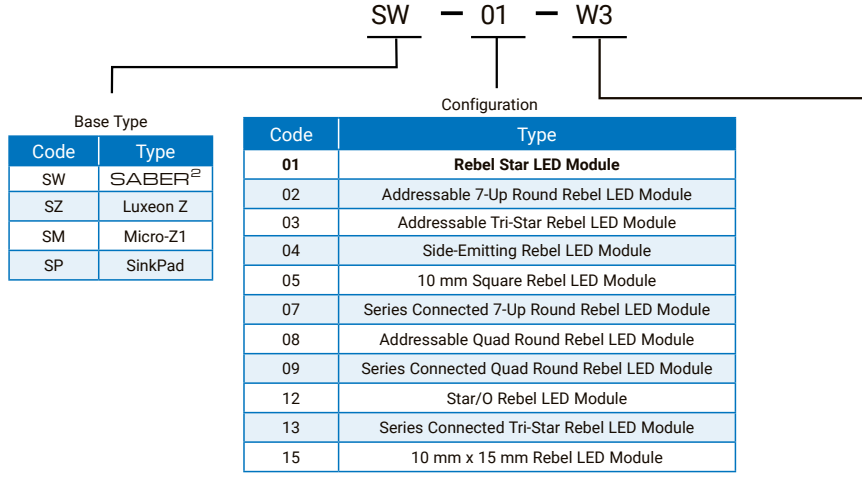
Dimensions are in MM

2D Drawing Download: luxeonstar.com/sw-01-drawing.pdf

3D Model Download: luxeonstar.com/sw-01.step

ORDERING INFORMATION

The SW-01 LED module can be ordered directly from luxeonstar.com/sw-01. There is no minimum order requirement, and shipping is available to anywhere in the World. Optional IDC connectors are specified when the module is ordered.



Color	Color Temperature (K) or Wavelength (nm)	Rebel LED Part Number ¹	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-FX02-0000	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

1. LED availability may change over time. Please see our website for currently available colors.
 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](http://luxeonstar.com).

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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