



2-INCH, AIR-COOLED LED MODULES

User Manual

Version 2.1

Getting started using your new air-cooled LED module

ISSI
INNOVATIVE SCIENTIFIC SOLUTIONS, INC

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For questions or comments, please contact ISSI

Innovative Scientific Solutions, Incorporated
 7610 McEwen Road
 Dayton, OH 45459

Ph.: (937) 630-3012
 Fax: (937) 630-3015
 Tech Support: support@innssi.com
 Sales: issi-sales@innssi.com
 Website: innssi.com/led



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1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this device near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.



8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
9. Use only the supplied power cord. Consult manufacturer for replacement if lost or damaged.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Refer all servicing to manufacturer. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
13. This apparatus shall not be exposed to dripping or splashing, and no object filled with liquids, such as vases or beer glasses, shall be placed on the apparatus.
14. Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
15. Wear appropriate safety glasses at all times. ISSI recommends UVEX SCT Orange lenses. Safety glasses utilizing these lenses block near 100% of the damaging retinal blue light. The LM3X series of LED Illuminators have a high optical output power. The light they produce is in the blue to UV wavelength which in substantial amounts can be very damaging to the eye. It is thought that severe exposure may lead to age related macular degeneration (AMD), and possible blindness. Wear appropriate safety glasses at all times during use. ISSI recommends UVEX SCT Orange lenses. Safety glasses utilizing these lens block near 100% of the damaging retinal blue light.



16. This apparatus has been designed with Class-I construction and must be connected to a mains socket outlet with a protective earthing connection (the third grounding prong).



17. This apparatus has been equipped with an all-pole, rocker-style AC mains power switch. This switch is located on the front panel and should remain readily accessible to the user.

18. NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference **will** not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Changes or modifications to this device not expressly approved by Innovative Scientific Solutions,

Inc. could void the user's authority to operate the equipment under FCC rules.

19. This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION — *Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le règlement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.*

20. Exposure to extremely high noise levels may cause permanent hearing loss. Individuals vary considerably in susceptibility to noise-induced hearing loss, but nearly everyone **will** lose some hearing if exposed to sufficiently intense noise for a period of time. The U.S. Government's Occupational Safety and Health Administration (OSHA) has specified the permissible noise level exposures shown in the following chart.

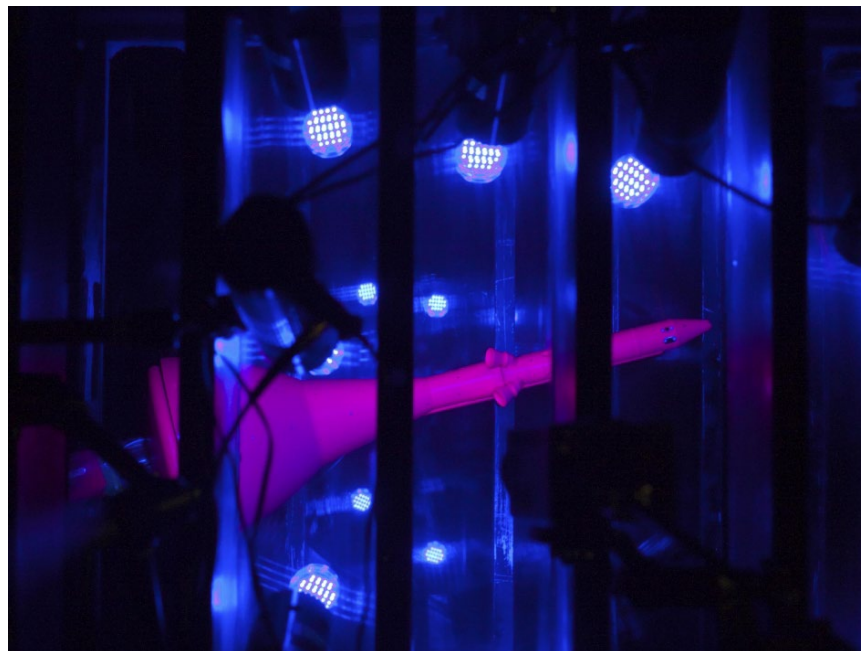
According to OSHA, any exposure in excess of these permissible limits could result in some hearing loss. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels use hearing protectors while the equipment is in operation. Ear plugs or protectors in the ear canals or over the ears must be worn when operating the equipment in order to prevent permanent hearing loss if exposure is in excess of the limits.

Description of LED Modules

The Series LM2X module is a very compact, high-output device that is capable of operating in a constant-light-output mode (DC) or gated on and off by an external signal with either DC levels or high-power level with reduced duty factors.



The light distribution from LED modules is approximately Gaussian for distances greater than 18-inches [45-cm] from the source.



LM2X-DM-400 LEDs at NASA Ames Unitary Wind Tunnel

Specifications

LM2X-DM-XXX

AC Power Input (Using Supplied Wall Adapter)	100-240 V, 50-60Hz
DC Input	48VDC, 2.5A
Optical Output Power	~5 W
Stability	~0.1 % per hour after warm-up
Rise time (10% - 90%)	< 5- μ s
Fall time (90% - 10%)	~ 250- μ s
Operating temperature range	-10°C to 60°C
Wavelength (Standard)	*400-nm and 460-nm
Duty Cycle	100% (DC)
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

LM2X-DMHP-RGB

AC Power Input (Using Supplied Wall Adapter)	100-240 V, 50-60Hz
DC Input	48VDC, 2.5A @ 120VAC
Optical Output Power	2.0 W
Stability	~0.1 % per hour after warm-up
Rise time (10% - 90%)	< 200-ns
Fall time (90% - 10%)	< 100-ns
Operating temperature range	-10°C to 60°C
Wavelength (Standard)	460-nm, 520-nm, 630-nm
Duty Cycle	5% (Maximum)
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

LMS-XXX

AC Power Input (Using Supplied Wall Adapter)	100-240 V, 50-60Hz
DC Input	24VDC, 6.6A @ 120VAC
Optical Output Power	~1.5 W (DC) (Optical)
Stability	~0.1 % per hour after warmup
Wavelength (Standard)	*400-nm, 460-nm
Operating Temperature	-10-60 °C
Rise Time	< 200-ns
Fall Time	< 100-ns
Duty Cycle	100% (DC)
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

*Note: For all LED modules, custom wavelengths are available. XXX denotes wavelength in nanometers.

Operating Instructions

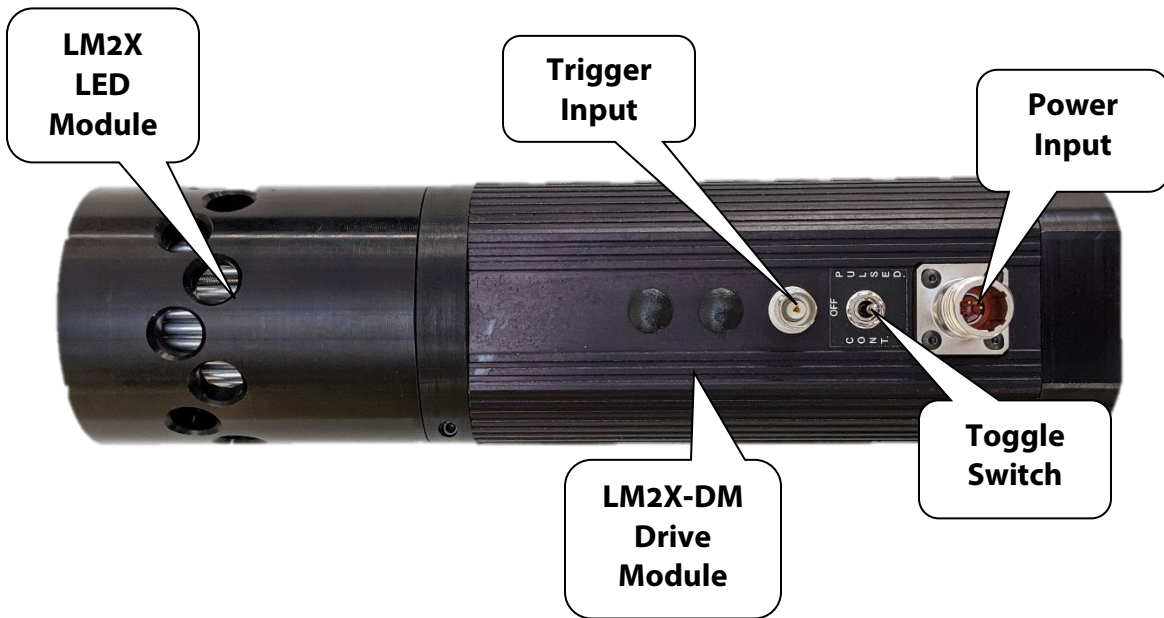
Each ISSI LED module is designed to be quick to set up and easy to use. The LED comes with ready to use out of the box. There are several available accessories that can be purchased with the LED.

Series LM2X-DM-XXX

Continuous LED System: **LM2X-DM-XXX** (LED head with DC/long pulse driver)

****Note:** "-XXX" denotes wavelength for LED heads.

The drive module has of one three position switch on the rear housing. This switch is in the off position when it is perpendicular to the housing. To actuate the switch, lift and move to either side depending on which mode of operation you wish to use. One position is the continuous dc output mode and the other position is the pulsed dc mode which requires a +5 vdc level to be introduced into the BNC connector next to the switch. Once the switch is in the correct position it will fall into a locked position when released. To move the switch, it needs to be pulled up to release the locking mechanism before moving to the new position.



Series LM2X-DMHP-RGB

This illuminator has a different front module to accommodate a different type of LED having outputs at three distinct wavelengths. The driver module has been modified from the standard driver to allow three individual trigger inputs. The three LEDs can be triggered in any order in relation to each other with a TTL (+5 vdc) input signal.

This illuminator also has the safety circuit installed to protect the LEDs from excessive duty factor and/or pulse width. Because of the type of LEDs that are employed, this unit has a minimum pulse width of 140 ns. The three BNC connectors are marked with the corresponding LED color.

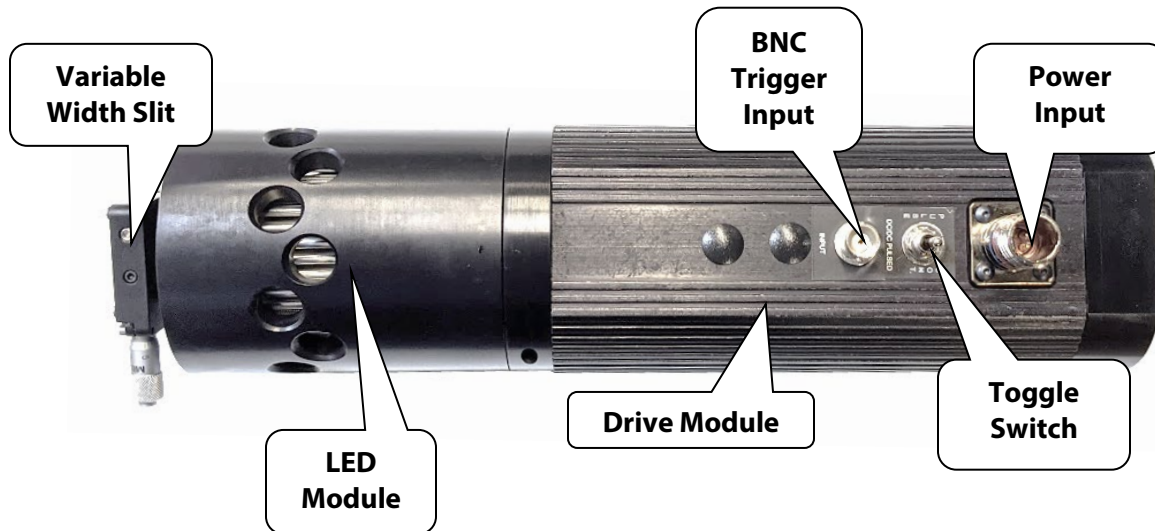


Series LMS-XXX

The Series LMS-XXX module is a compact, high-output device for schlieren and shadowgraph photography. It is capable of operating in a constant-light-output mode (DC) or gated on and off by an external signal.

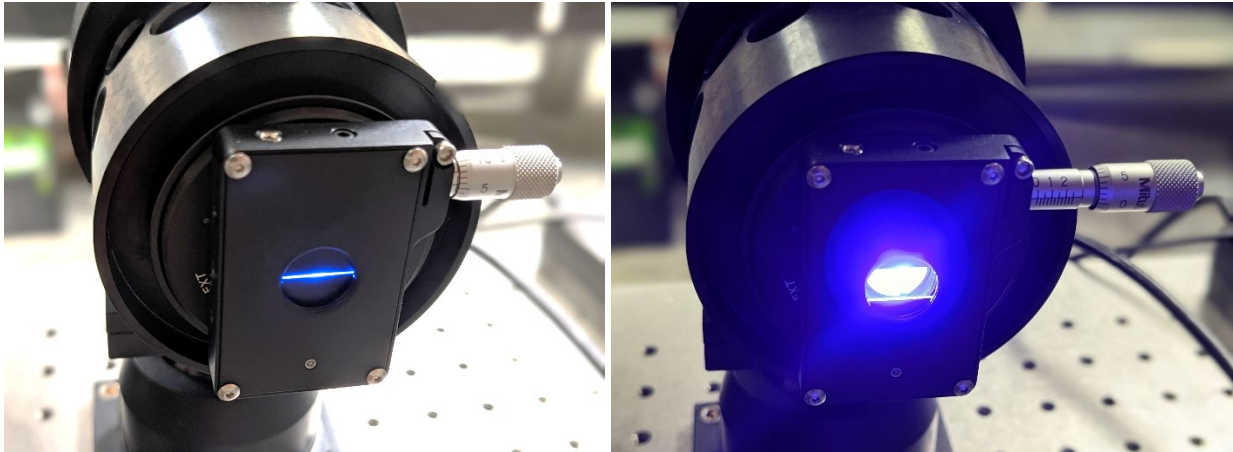


The LMS-XXX consists of a lamp body and associated power supply (24 VDC).

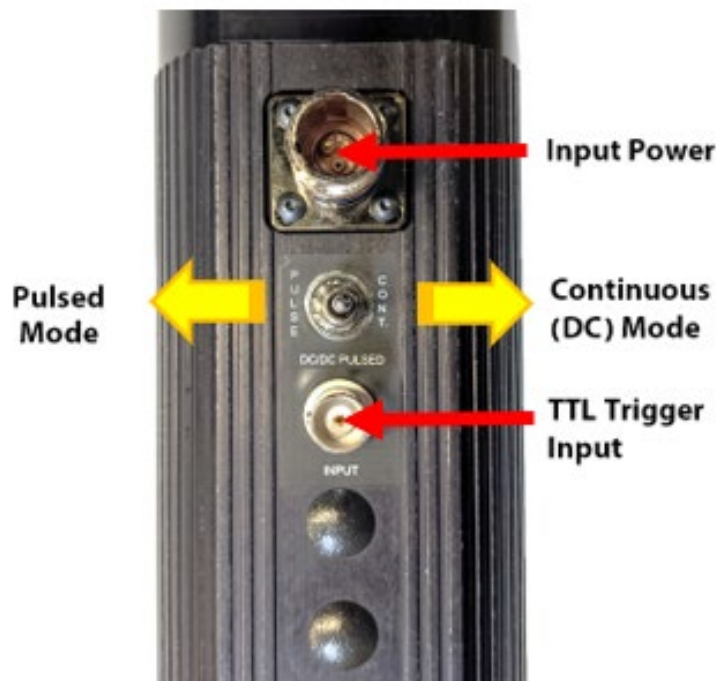


The LMS-XXX has one BNC input to control the timing and pulse width of the output from an external pulse generator. The pulsed LED operation is controlled by applying a TTL voltage to the external BNC(s) on the module.

A variable width adjustable slit is used to adjust the output light down to a narrow slit.



The LED can be operated in DC or pulsed mode. In the neutral position there will be no output from the LED. In the PULSE position, the output will mimic the TTL input to the BNC (same repetition rate and pulse width). In CONT, the LED will remain on continuously with or without any connection to the INPUT.



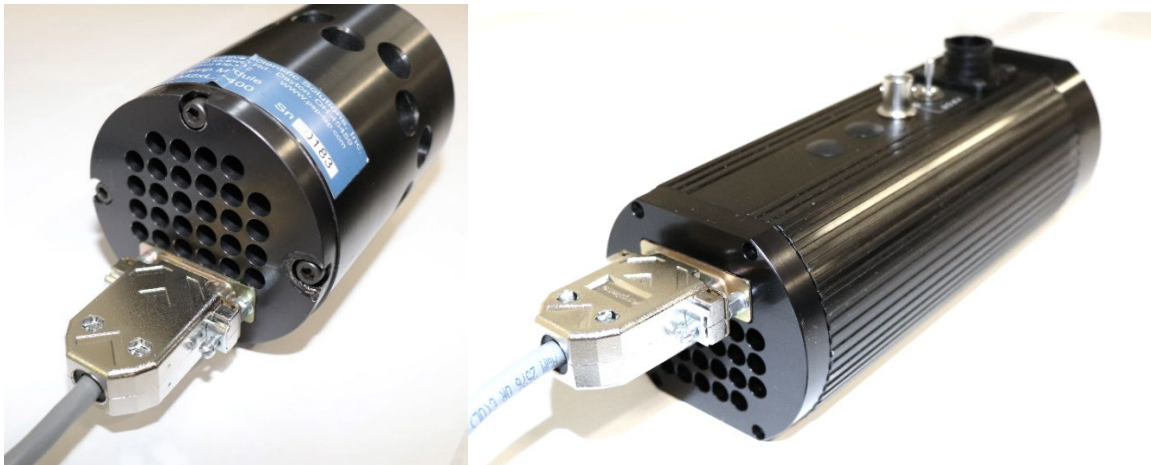
For the PULSE mode, a BNC cable must be connected to the INPUT BNC connection. This input should be a 5 VDC TTL level input. The lamp has a built-in safety circuit to automatically shut down the drive circuits if the LED temperature gets too high. There is no limit to the duty factor of this mode of operation.

Modular Option

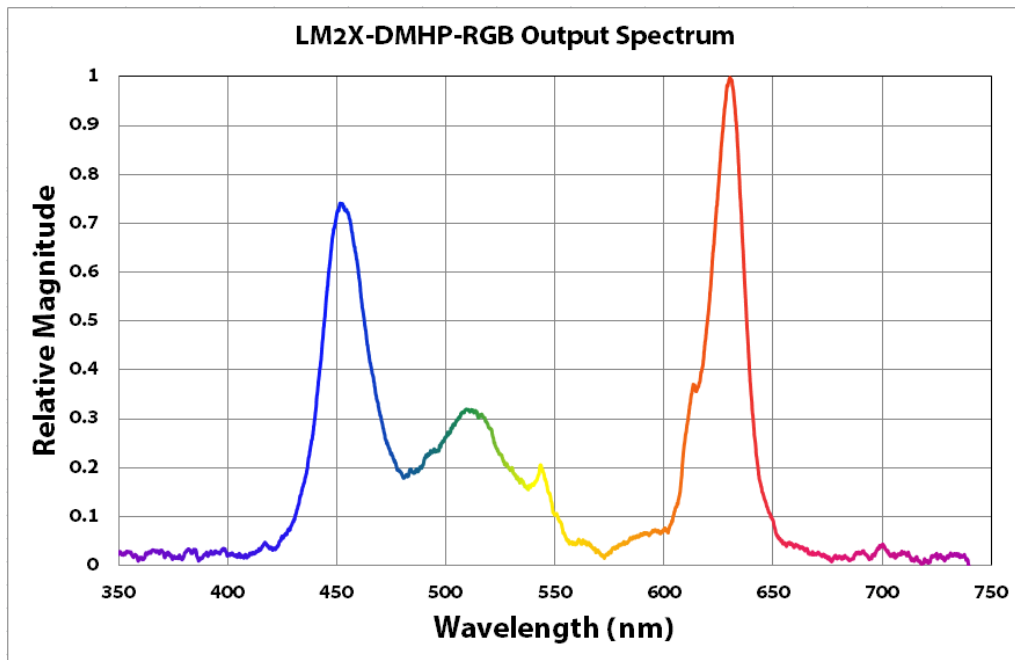
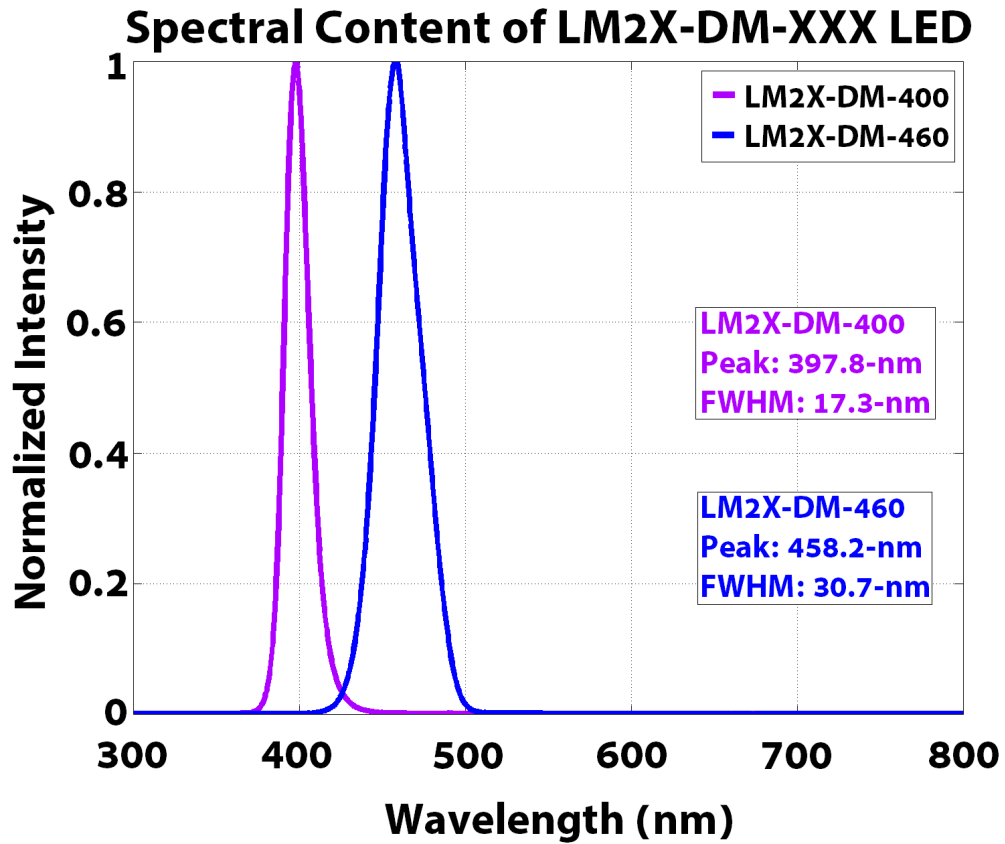
For applications where space is limited, the LM2X LED module can be made with a separated head and driver section with power umbilical to connect the two pieces.



The modification includes end caps for the head and driver with 15 pin mil spec d-sub connector and 1 meter cable for power and trigger input.

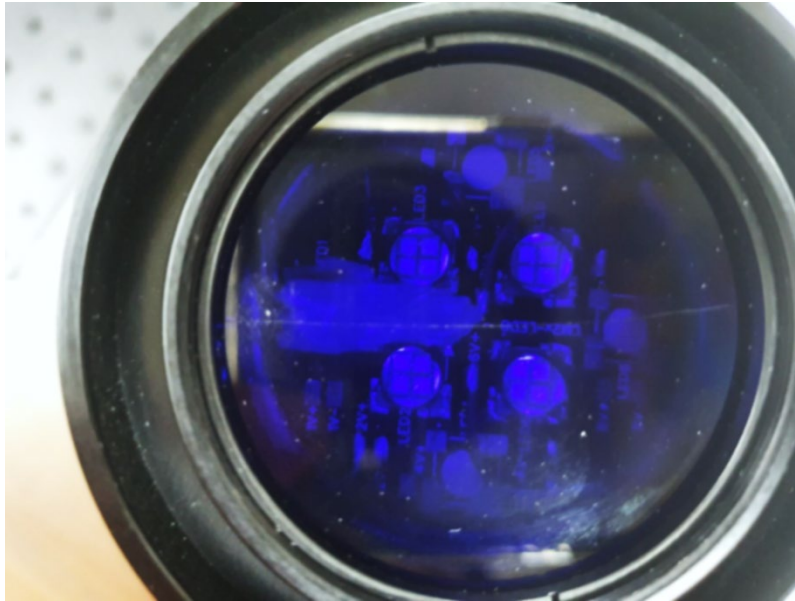


Typical Waveforms

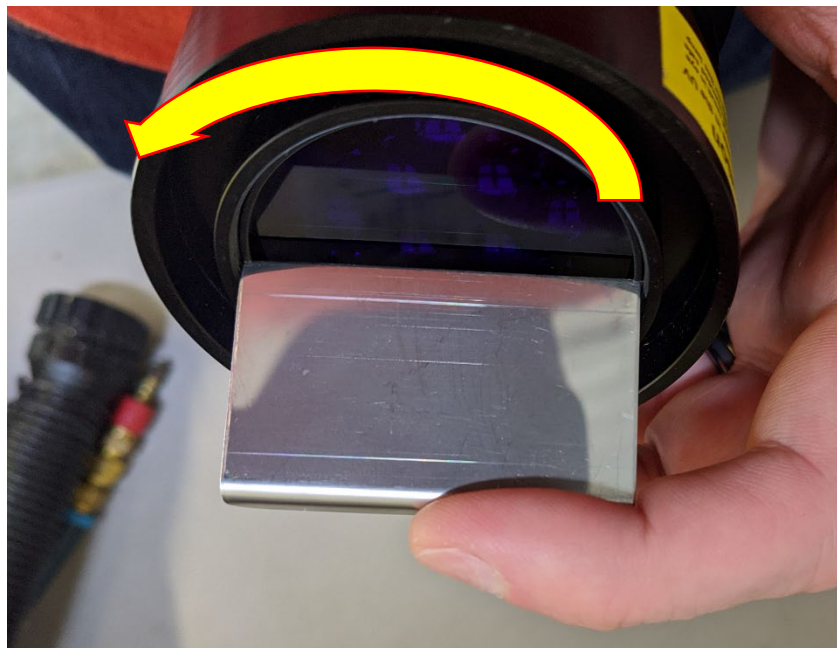


Maintenance

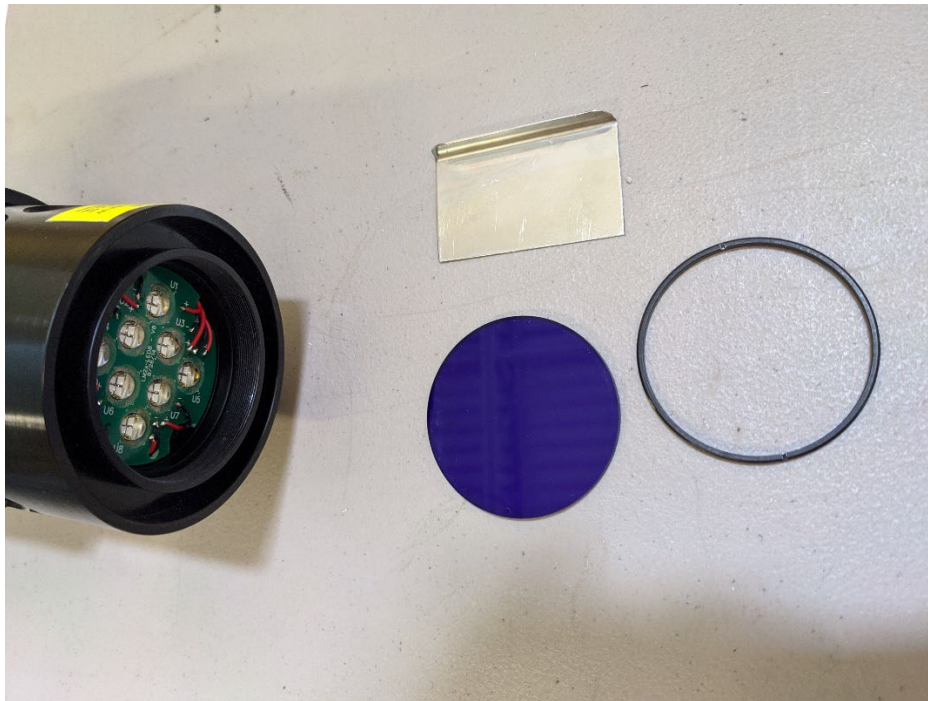
In the case of a broken glass filter, it can be removed and easily replaced with a new one.



Using the provided spanner wrench tool, the damaged filter can be removed from the filter housing. Turn the wrench counter-clockwise as shown below to remove the filter.



A small retaining ring holds the glass filter in place. The spanner wrench removes this ring and then the filter can be removed. Once the old filter has been removed, carefully place a new one in the filter housing and reattach the retaining ring using the spanner wrench and turning clockwise until tight.



Accessories

A 48VDC, 2.5A power supply is included with each LED module. The power supply includes the power cable with mating locking connector for the LED module.

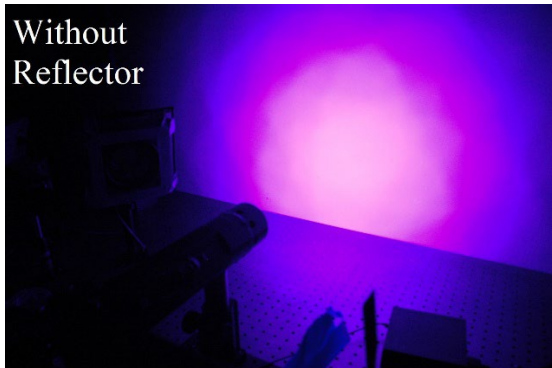
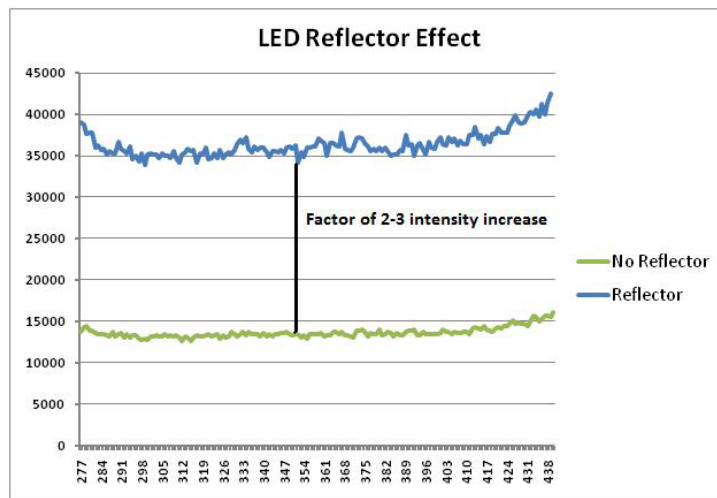


LM2X-PS

In areas where more light is needed on a surface, the parabolic reflector and diffuser can be used on any LM2 series LED to narrow the output angle from 120-degrees down to 40-degrees. This reflector also uses a diffuser for a more uniform output from the LED module. The reflector and diffuser is simply screwed onto the front of the filter housing of the LED module.



The addition of the parabolic reflector and diffuser gives a factor of 2-3 increase in peak output power at the center point.

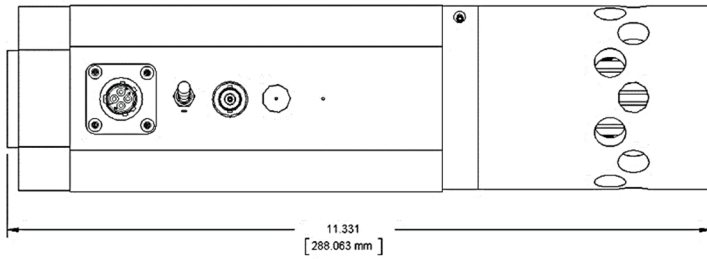


The above graphic shows the effect of the parabolic reflector and diffuser on an LM2X-DM-400 module.

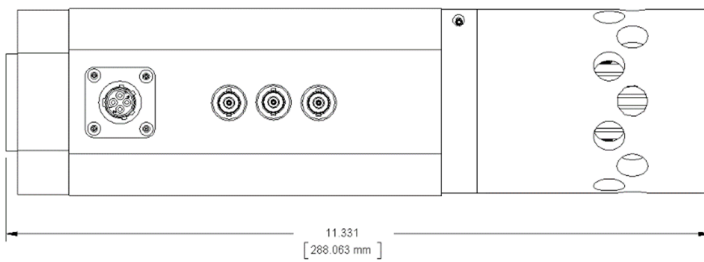
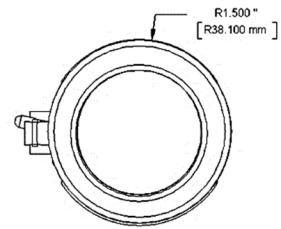
The LM2X-CL mounting clamp can be used to provide a more secure mount and to give more flexibility of mounting. This aluminum clamp is made to fit the module housing and grips it with rubber rings to hold it in place in high-vibration environments.



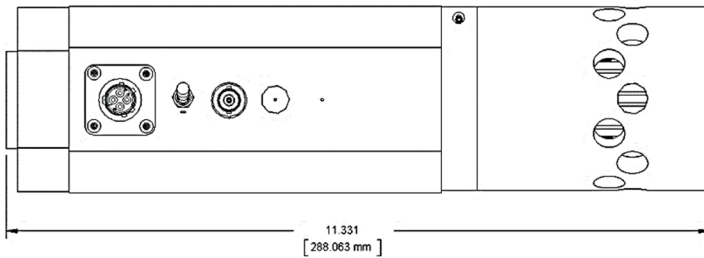
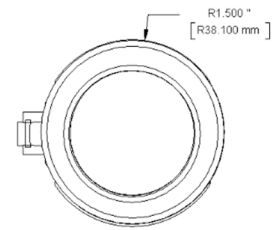
Dimensions



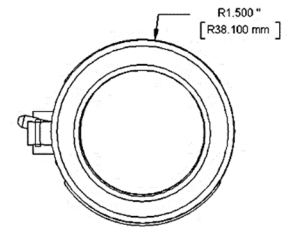
LM2X-DM-XXX

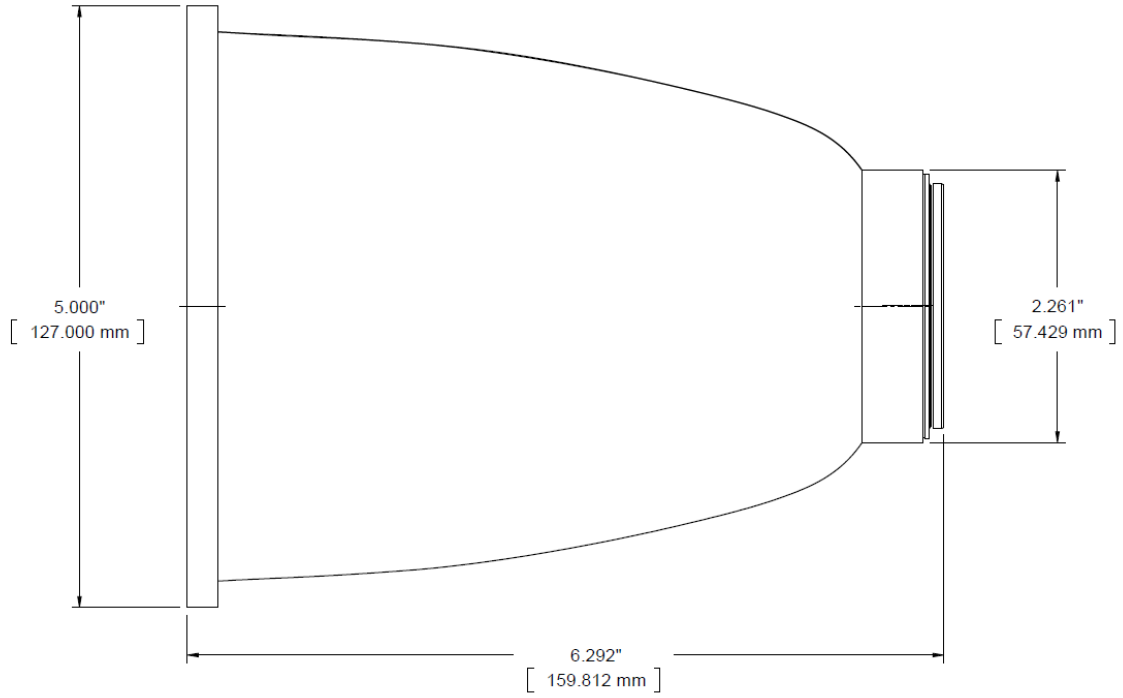


LM2X-DMHP-RGB

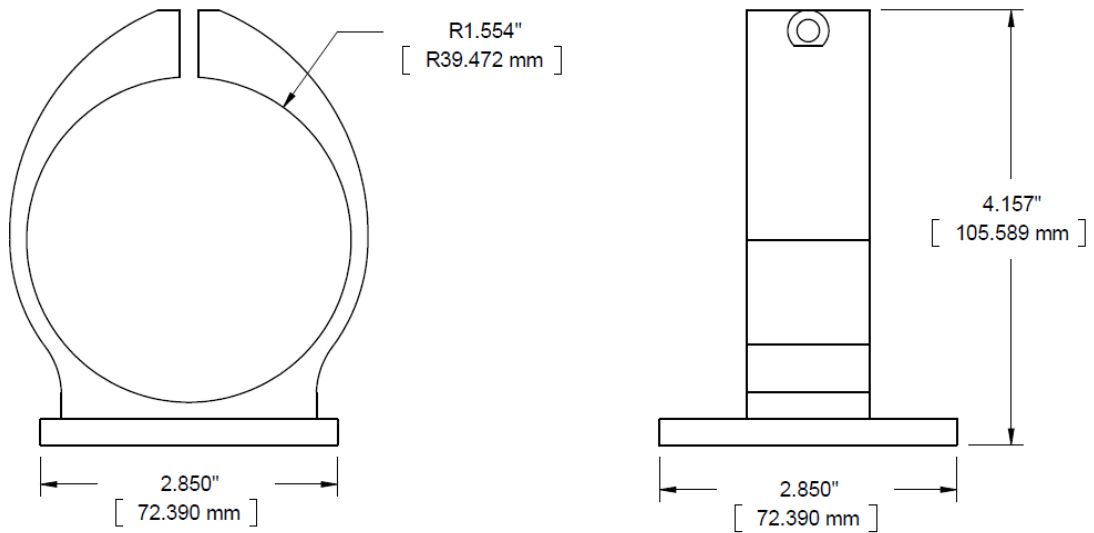


LMS-XXX





Parabolic Reflector and Diffuser



LM2 Series LED Mounting Clamp

Export Disclaimer

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