



Getting started using your new air-cooled LED module

Table of Contents

Safety	2
Description of LED Module	3
Specifications.....	4
Operating Instructions.....	5
LM2X-DM	5
LM2X-DMHP	6
LM2X-DMHP-RGB	7
LMS-XXX.....	8
Modular Option	9
Typical Waveforms	10
400-nm	10
460-nm	10
RGB.....	10
Maintenance	11
Accessories.....	13
Dimensions.....	15
Export Disclaimer.....	17

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Made in
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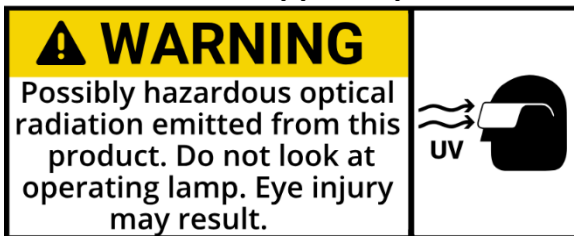


Revision Date: 6/17/2020

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 though 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 lenses 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 LED module is usually purchased with one of the two drive modules available. Module options are DC/long-pulse, high-power/long-pulse where the unit is overdriven but limited to 5% duty cycle or a dual driver which can operate in either mode.

The LM2X module consists of a LED module and one of two drive modules. The LM2X-DM drive module has a three-position locking switch for changing from continuous to DC pulsed operation. The center position is off condition. The DC pulsed operation allows the operator to turn on the LED with a TTL signal at the BNC connector. This drive module uses a 48 VDC power supply.

The LM2X high power pulsed module has the same front LED module, but the LM2X-DMHP drive module is a high power pulser that uses a 48 VDC power supply. The LM2X high power pulsed illuminator is capable of generating light output that is five (5) times greater peak intensity than the continuous-output module. To achieve that output level the duty factor must be limited to 5%, and the maximum pulse width must be 1 ms or less. The LM2X has a built-in safety circuit to protect the illuminator if these limits are exceeded. This module has one BNC to facilitate pulsing.

The LM2X-DMHP-RGB series has the same duty-factor and pulse-width limitations as the LM2X-DMHP-XXX module but operates at three output wavelengths (red, green and blue). Each color is

independently controlled with a TTL input signal. The RGB drive module also has the safety circuit for duty-factor protection.

A schlieren and shadowgraph LED module contains both drivers with a toggle switch to change between the two modes of operation.

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

Specifications

LM2X-DM-XXX

Output power	~5 W (optical)
Input	48VDC, 2.5A
Stability	~0.1 % per hour after warm-up
Maximum duty cycle	100%
Rise time (10% - 90%)	< 5- μ s
Fall time (90% - 10%)	~ 250- μ s
Operating temperature range	-10°C to 60°C
Wavelength	400-nm and 460-nm (Standard)
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

LM2X-DMHP-XXX

Output power	>1.1 W (optical)
Input	48VDC, 2.5A
Stability	~0.1 % per hour after warm-up
Maximum duty cycle	5%
Rise time (10% - 90%)	< 200 ns
Fall time (90% - 10%)	~ 100 ns
Maximum Pulse Width	1 ms
Operating temperature range	-10°C to 60°C
Wavelength	400-nm and 460-nm (Standard)
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

LM2X-DMHP-RGB

Output power	2.0 W
Input	48VDC, 2.5A @ 120VAC
Stability	~0.1 % per hour after warm-up
Maximum duty cycle	5%
Rise time (10% - 90%)	< 200-ns
Fall time (90% - 10%)	< 100-ns
Operating temperature range	-10°C to 60°C
Wavelength	460-nm, 520-nm, 630-nm
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

LMS-XXX

Output power	~2-3 W
Input	48VDC, 2.5A @ 120VAC
Stability	~0.1 % per hour after warm-up
Maximum duty cycle	5%
Rise time (10% - 90%)	< 200-ns
Fall time (90% - 10%)	< 100-ns
Operating temperature range	-10°C to 60°C
Wavelength	User Specified
FWHM	+/- 18-nm
Warranty	12-months
ECCN	EAR99

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.

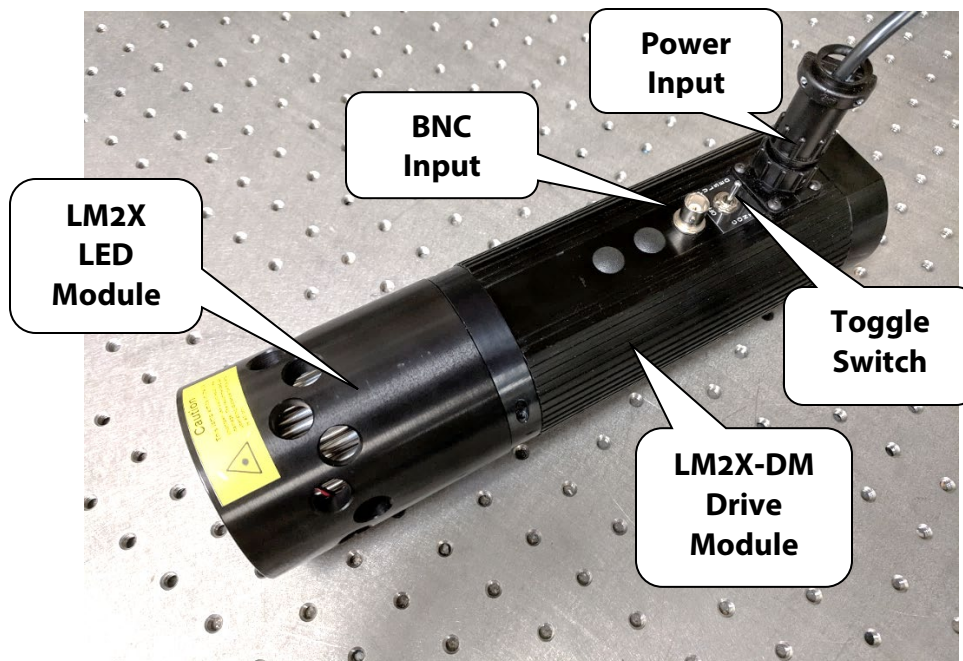
LM2X-DM-XXX

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.

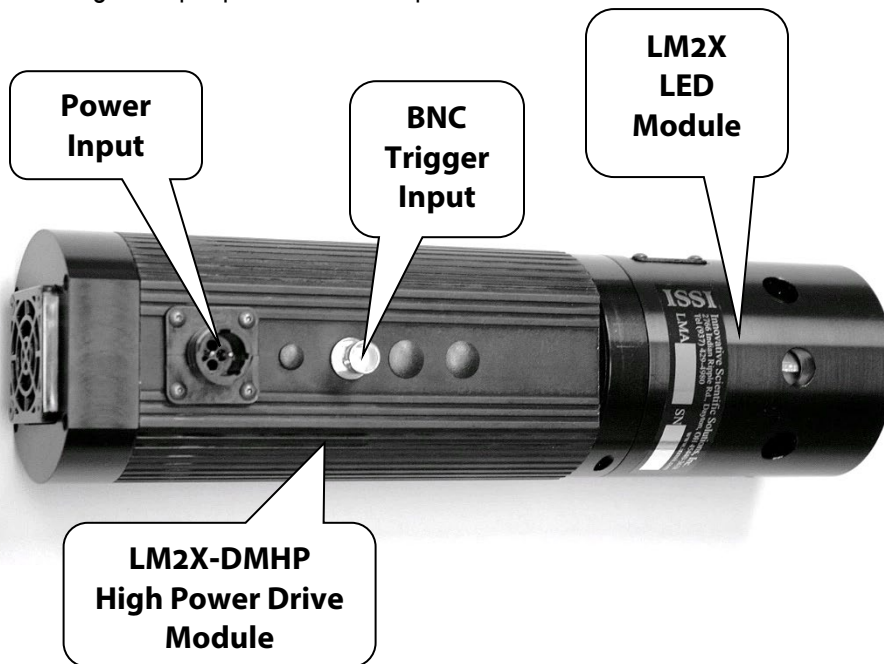




LM2X-DMHP-XXX

The LM2X-DMHP uses a power supply that is 48VDC, 2.5A input. The plugs for the two driver modules are keyed such that the power supplies are not interchangeable.

The high power pulsed has only one BNC connector, which is used to apply the TTL (5 vdc) signal to the illuminator. The output occurs with a +5 vdc pulse application. The drive module has a built-in safety circuit to prevent the user from exceeding the 5% duty factor and to limit the maximum pulse width to about 1.0 milliseconds. The LED illuminator will cease to produce light output if either of these limitations is exceeded. Once the limit has been reached, the safety circuit is tripped; this circuit can be reset by reducing the input pulse width or repetition rate.



Series LM2X-DMHP-RGB

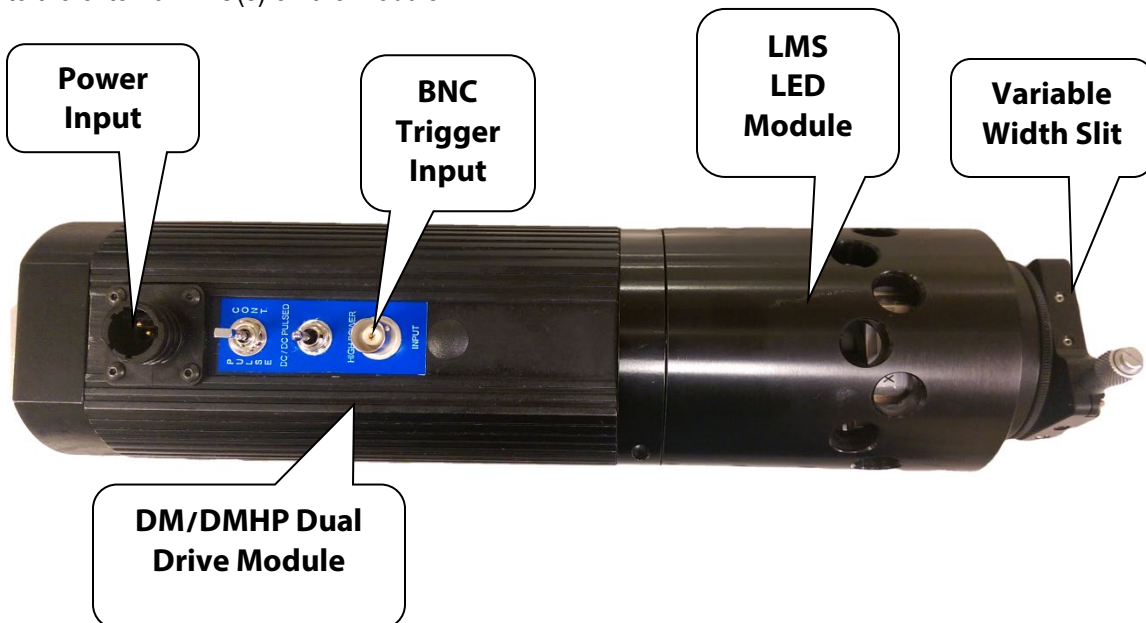
This illuminator has a different front module to accommodate a different type of LED having outputs at three distinct wavelengths. The driver module has been modified from the standard driver to allow three individual trigger inputs. The three LEDs can be triggered in any order in relation to each other 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 nsec. The three BNC connectors are marked with the corresponding LED color.

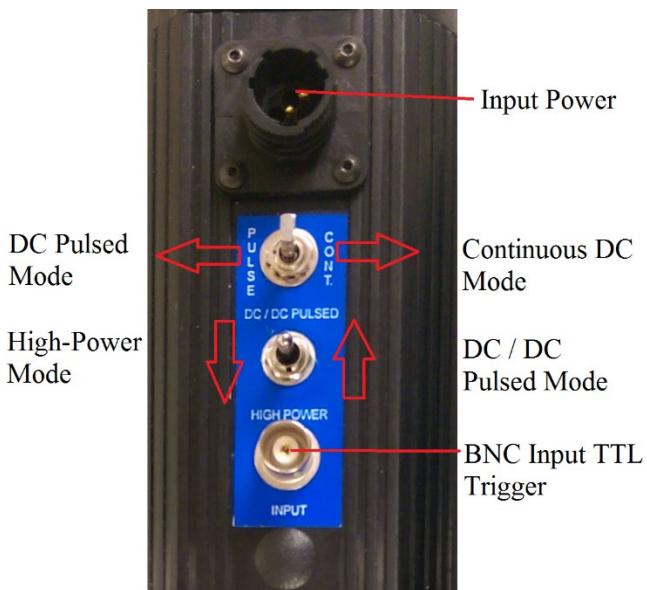


LMS-XXX

The LMS-XXX LED is a 2-inch, air-cooled LED light source used for schlieren and shadowgraph applications. 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.



The LED can be operated in DC/long-pulse mode or in short-pulse/high-power mode by moving the toggle switch to the desired drive mode. Short-pulse/high-power mode is duty cycle limited to 5% using the DMHP driver.

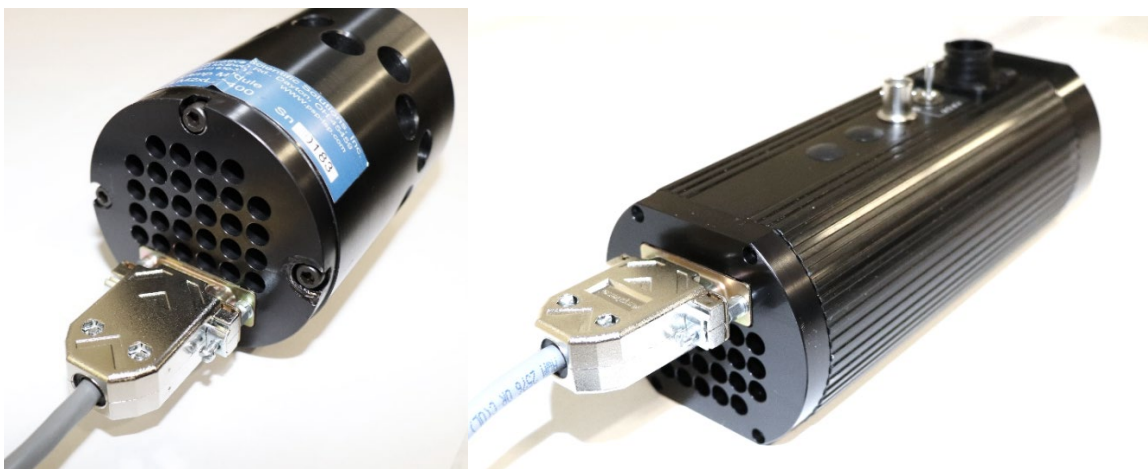


Modular Option

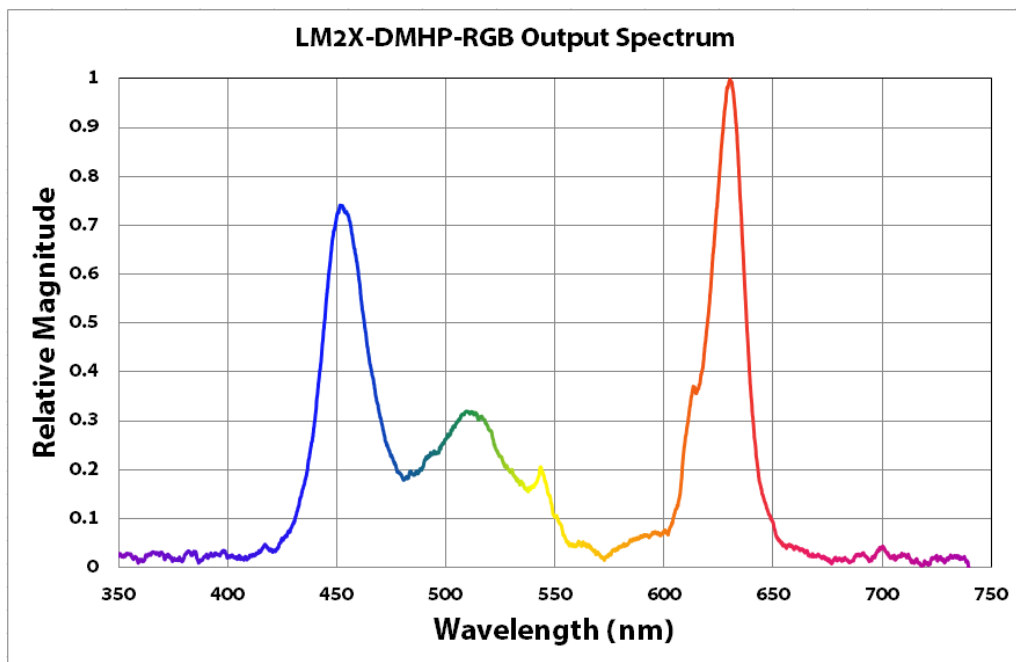
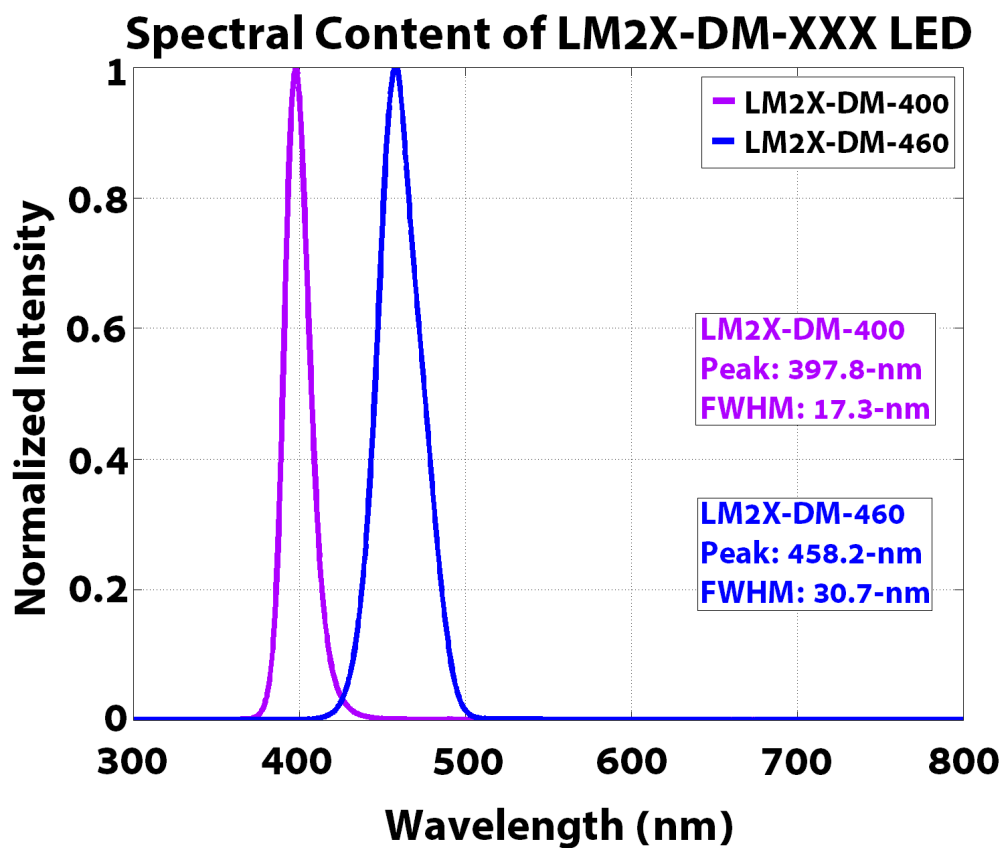
For applications where space is limited, the LM2X LED module can be made with a separated head and driver section with power umbilical to connect the two pieces.



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

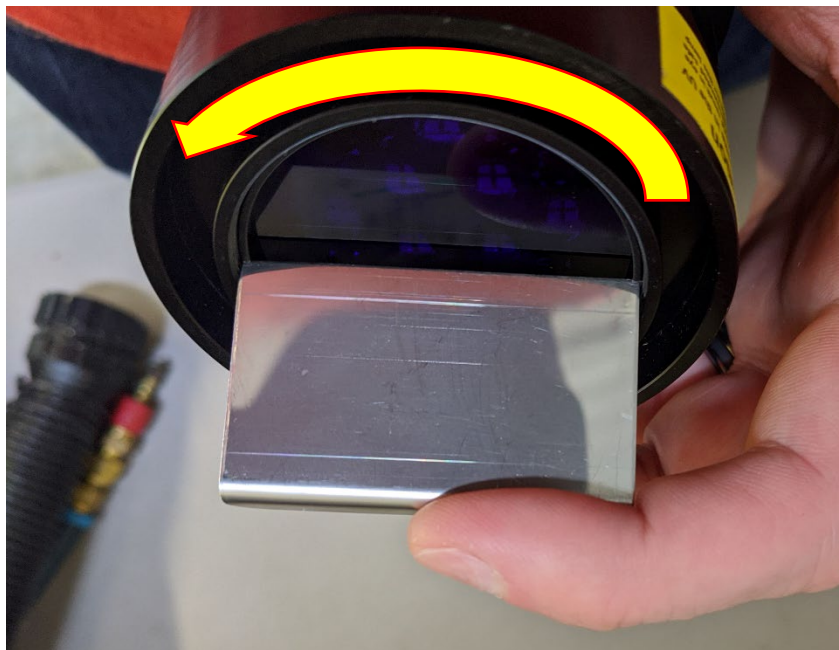


Maintenance

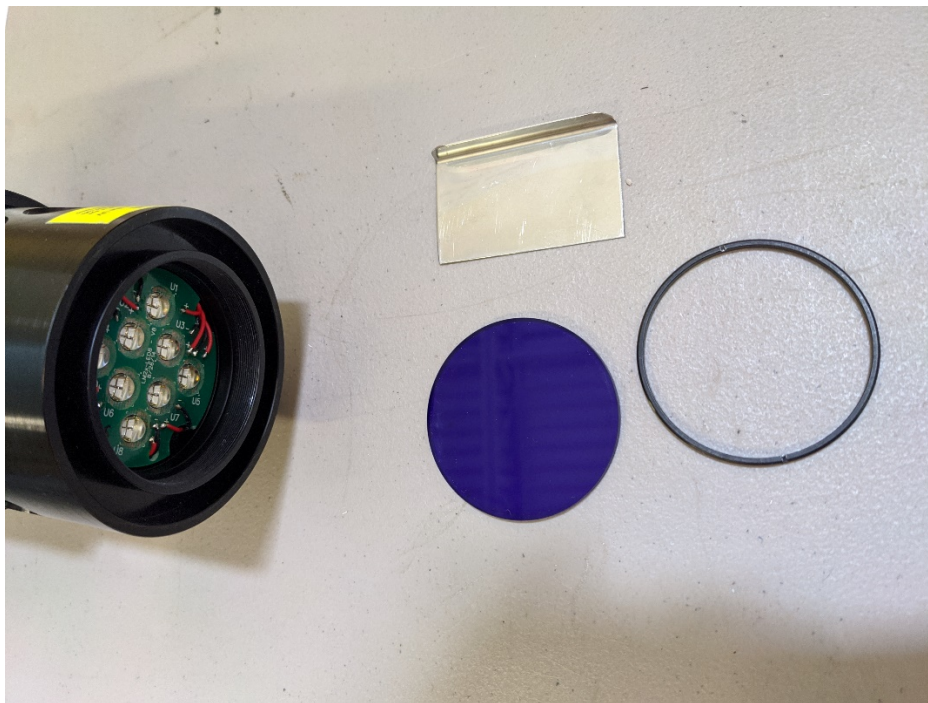
In the case of a broken glass filter, it can be removed and easily replaced with a new one.



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.



There is a small retaining ring that holds the 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.

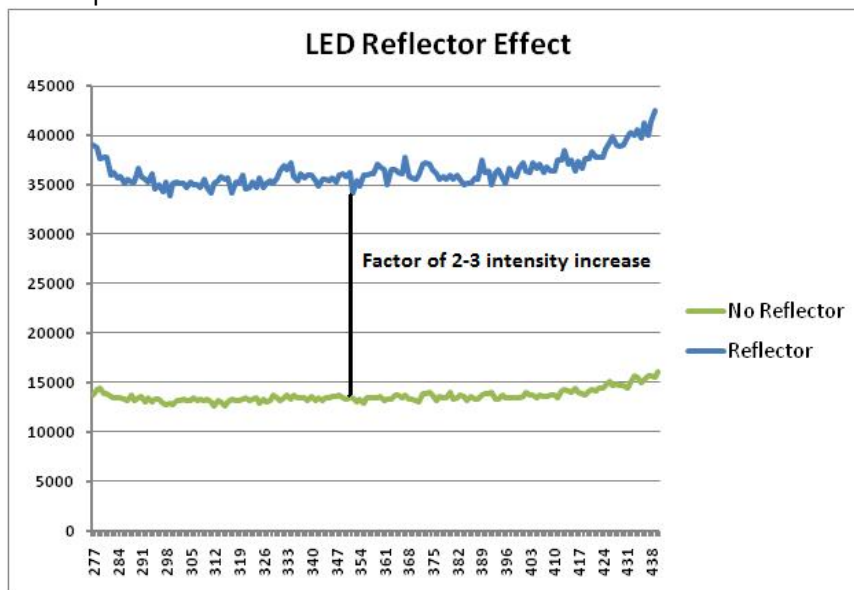


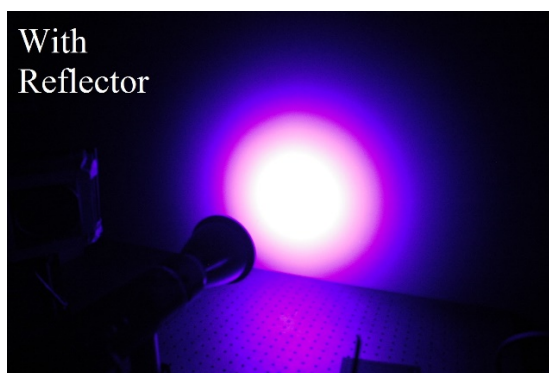
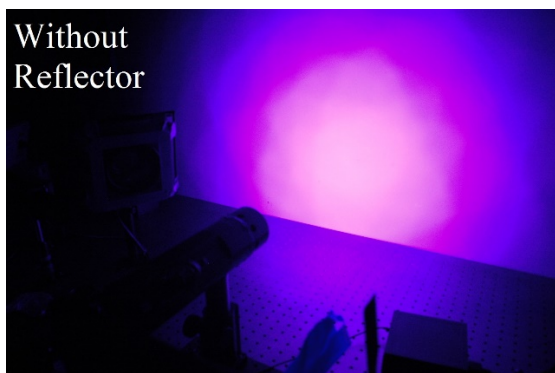
Accessories

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.



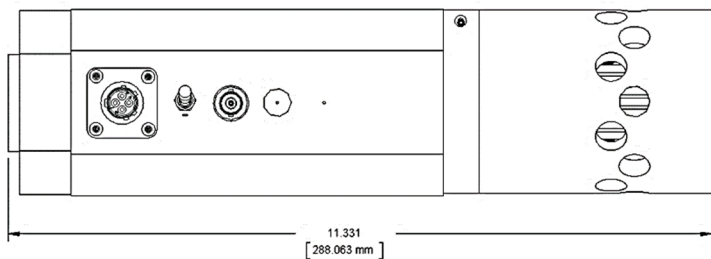


The above graphic shows the effect of the parabolic reflector and diffuser on an LM2X-DM-400 module.

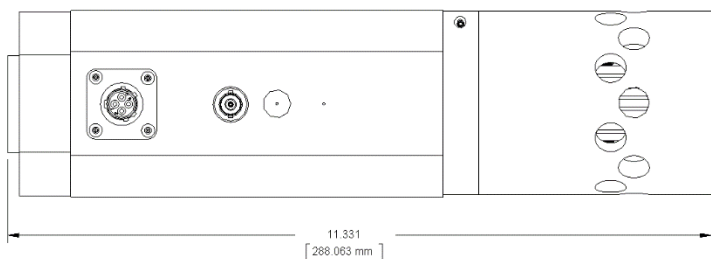
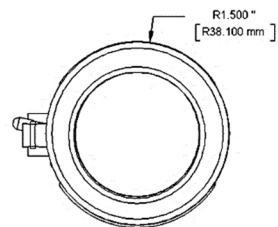
The LM2X-CL mounting clamp can be used to provide a more secure mount and to give more flexibility of mounting. This aluminum clamp is made to fit the module housing and grips it with rubber rings to hold it in place in high-vibration environments.



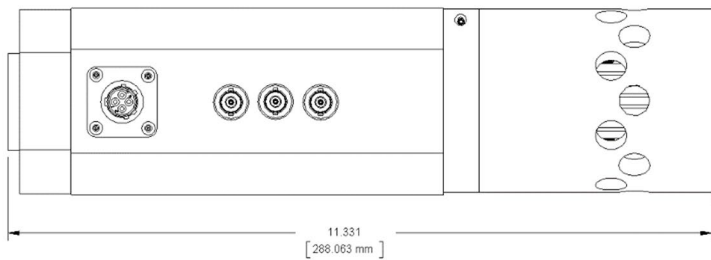
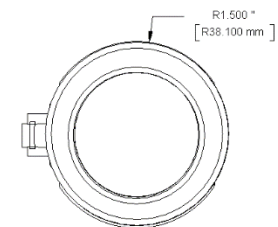
Dimensions



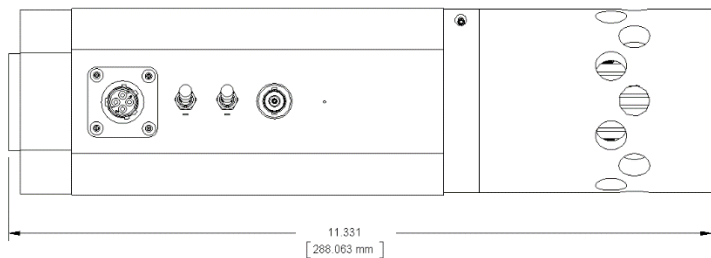
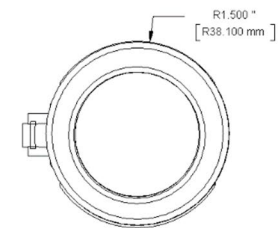
LM2X-DM-XXX



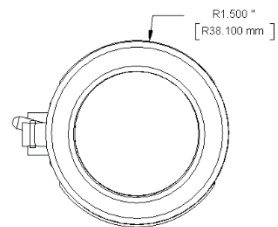
LM2X-DMHP-XXX

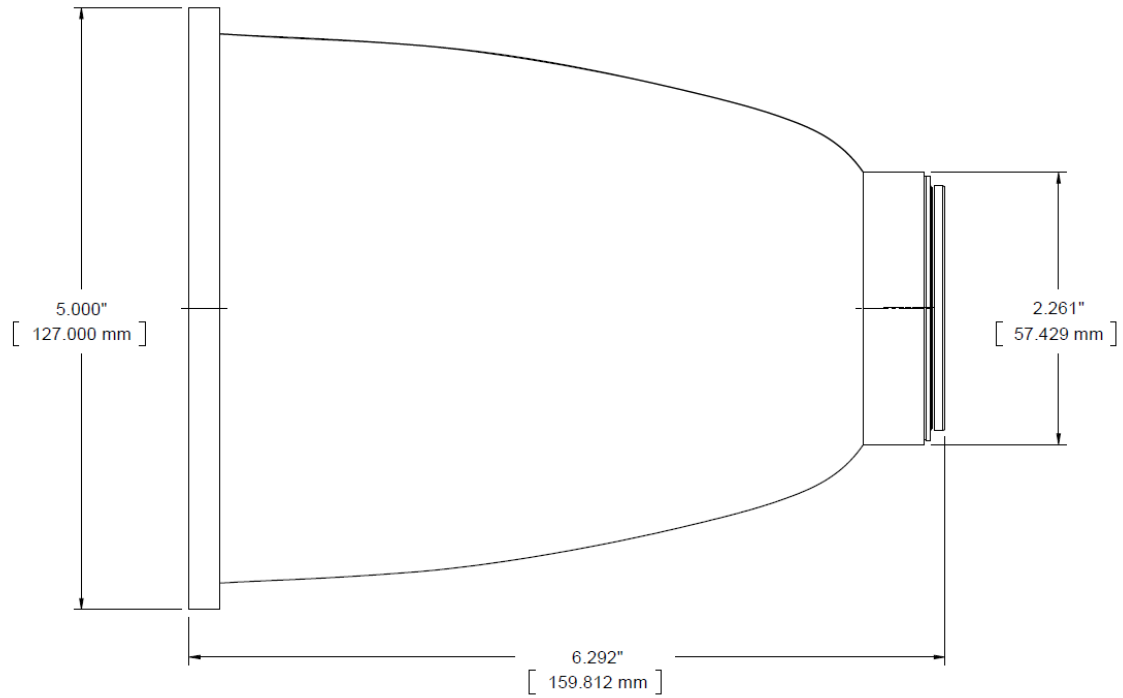


LM2X-DMHP-RGB

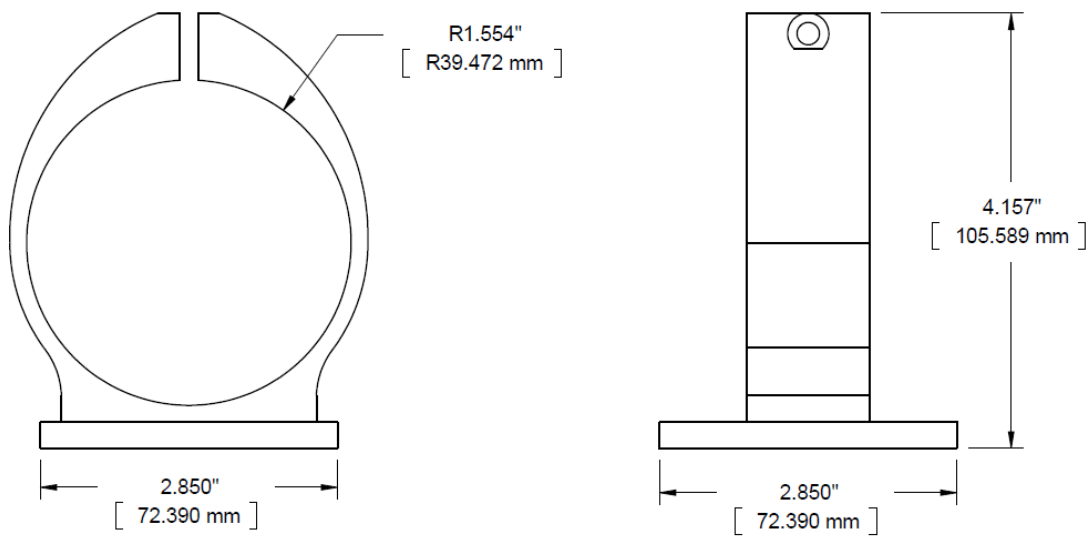


LMS-XXX





Parabolic Reflector and Diffuser



LM2 Series LED Mounting Clamp

Export Disclaimer

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