

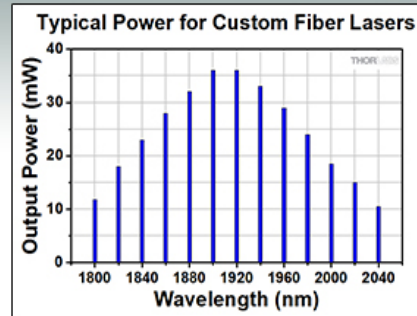
LFLTM - AUG 23, 2018

Item # LFLTM was discontinued on August 23, 2018. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

- ▶ Single Mode, Thulium-Doped, CW Fiber Laser
- ▶ >30 mW Output Power at 1900 nm Emission Wavelength
- ▶ Custom Fiber Lasers Available



LFLTM



Custom Fiber Lasers with Wavelengths from 1800 nm to 2040 nm are Available



OVERVIEW

Features

- CW Laser in the Thulium Emission Band
 - 1900 nm Emission Wavelength
 - <0.2 nm Instantaneous Linewidth (RMS)
 - Custom Versions Available at Discrete Wavelengths from 1800 to 2040 nm
- Adjustable Output Power
- Single Mode Fiber Output
- Intuitive Turnkey Operation Through Panel Interface or Remote USB Commands
- FC/APC Bulkhead

The LFLTM Benchtop Laser is a Fabry-Perot fiber laser source featuring single mode output and simple operation for test and measurement applications. The fiber laser is constructed using a thulium-doped (Tm) fiber as the gain medium and two fiber Bragg gratings to select the laser wavelength. The LFLTM has an emission wavelength of 1900 nm with an output power >30 mW and an RMS spectral width of <0.2 nm.

Tm-doped fiber can also support other emission wavelengths from 1800 to 2040 nm. Custom fiber lasers with different emission wavelengths are available upon request by contacting Tech Support. The graph below shows the typical output power for a sample of possible custom emission wavelengths.

The laser output is accessible via a fiber connector bulkhead that is compatible with 2.0 mm narrow key FC/APC connectors. An integrated isolator at the output minimizes the impact of back reflections on the laser cavity. For best results, use a fiber patch cable with SM2000 fiber (e.g., Item # P3-2000-FC-2) to connect the output of the laser

Single Channel Benchtop Laser Sources Selection Guide

Spectrum	Wavelength	TEC	Laser Type	Cavity Type	Output Fiber Type
Visible	405 - 675 nm	No	Semiconductor	Fabry Perot	SM, MM, or PM
	405 - 685 nm	Yes	Semiconductor	Fabry Perot	SM
NIR	785 - 1550 nm	No	Semiconductor	Fabry Perot	SM or PM
	705 - 2000 nm	Yes	Semiconductor	Fabry Perot	SM
	1310 - 1550 nm	Yes	Semiconductor	DFB	SM
	1800 - 2040 nm	N/A	Fiber Laser	Fabry Perot	SM
MIR	2.7 μ m	N/A	Fiber Laser	Fabry Perot	SM

Other Fiber-Coupled Laser Sources

LFLTM Key Specifications^a

Item #	Min	Typical	Max
Emission Wavelength	1898 nm	1900 nm	1902 nm
Instantaneous Linewidth (RMS)	-	-	200 pm
Drive Current	-	-	450 mA
Output Power at Max Drive Current ^b	30 mW	-	40 mW
Polarization	Random		
Power Stability (Ambient Temperature ± 2 °C)	< $\pm 2\%$ over 24 Hours (After 15 min Warm-Up)		
Relative Intensity Noise (RMS, 10 Hz - 1 MHz) ^c	<0.5%		
Output Fiber Type	SM2000		
Output Fiber Mode Field Diameter	13 \pm 1 μ m @ 1996 nm		
Output Fiber Fiber NA	0.11		
Output Fiber Connector	2.0 mm Narrow Key FC/APC		

- Complete specifications may be found on the Specs tab.
- The output power is specified for emission at 1900 nm and measured with SM2000 delivery fiber.
- Multiple longitudinal modes exist within the linewidth of the laser that are separated by more than 100 MHz. The beating between these modes can create additional noise at

source to other fiber-coupled devices or free-space optics.

frequencies >100 MHz.

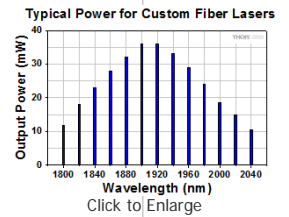
An LCD display allows the user to view the parameters for the fiber laser. The user can adjust the drive current of the pump laser to control the fiber laser output power; each laser is shipped with test data that shows output power scaling as a function of the pump drive current. A USB interface allows control of the laser source through a command line interface. Please see the *Software* tab for Windows drivers. Each laser source also includes a universal power supply rated for 100 to 240 VAC without the need for selecting the voltage.

The LFLTM includes a microcontroller to fully control the pump laser current, temperature, and monitor the system for fault conditions. To prevent damage, the microcontroller will disable the output if the analog input exceeds the system limits.

For added safety, there is an interlock located on the rear panel that must be shorted in order for the output to be enabled. This can easily be configured to be triggered by lab doors to disable the fiber laser in unsafe conditions. The power switch is a key-lock system to prevent accidental or unwanted use. An enable button must be set to activate the unit with a green LED indicator to easily determine its current state. There is a 3-second delay before the fiber laser turns on, and the user is warned by the rapidly blinking LED.

Custom Fiber Lasers

Thorlabs can produce custom fiber lasers with any emission wavelength from 1800 nm to 2040 nm with a <0.2 nm instantaneous linewidth. Thulium-doped fiber lasers use fiber Bragg gratings for wavelength selection. Custom wavelengths indicated in the graph to the right are available with a 5 day lead time; other custom wavelengths have a typical lead time of approximately 8 weeks. Please contact Tech Support for details.



Custom fiber lasers with wavelengths from 1800 nm to 2040 nm are available. [Click here to contact Tech Support.](#)



S P E C S

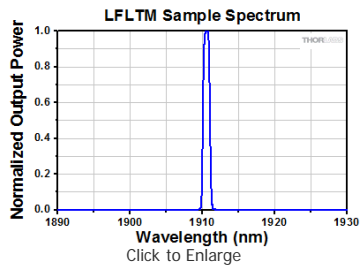
Item #	LFLTM		
	Min	Typical	Max
Emission Wavelength	1898 nm	1900 nm	1902 nm
Instantaneous Linewidth (RMS)	-	-	200 pm
Drive Current	-	-	450 mA
Output Power at Maximum Drive Current ^a	30 mW	-	40 mW
Polarization	Random		
Power Stability (Ambient Temperature ± 2 °C)	< $\pm 2\%$ Over 24 Hours (After 15 min Warm Up)		
Relative Intensity Noise (RMS, 10 Hz - 1 MHz) ^b	<0.5%		
Output Fiber Type	SM2000		
Output Fiber Mode Field Diameter	13 \pm 1 μ m @ 1996 nm		
Output Fiber NA	0.11		
Output Fiber Connector	2.0 mm Narrow Key FC/APC		

- The output power is specified for emission at 1900 nm measured with SM2000 delivery fiber.
- Multiple longitudinal modes exist within the linewidth of the laser that are separated by more than 100 MHz. The beating between these modes can create additional noise at frequencies >100 MHz.

General Specifications	
AC Input	100 - 240 VAC, 50 - 60 Hz
Input Power	20 VA (Max)
Fuse Ratings	500 mA
Fuse Type	IEC60127-2/III (250 VA, Slow Blow Type "T")
Fuse Size	5 mm x 20 mm
Dimensions (W x H x D)	5.77" x 11.43" x 2.60" (146.5 mm x 290.3 mm x 65.9 mm)
Weight	1.96 kg (4.32 lbs) 4.13 kg (9.1 lbs) Shipping Weight
Operating Temperature	15 to 35 °C
Storage Temperature	0 to 50 °C
Connections and Controls	
Interface Control	Optical Encoder with Pushbutton
Enable Select	Keypad Switch Enable with LED Indicator
Power On	Key Switch
Display	LCD, 16x2, Alphanumeric Characters
Input Power Connection	IEC Connector

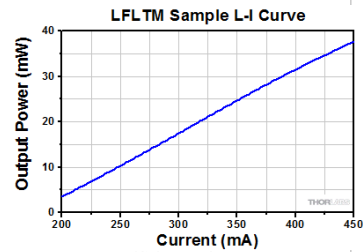
Interlock	2.5 mm Mono Phono Jack
Communications	
Communications Port	USB 2.0 Compatible
Com Connection	USB Type B Connector
Required Cable	2 m USB Type A to Type B Cable (Replacement Item # USB-A-79)

GRAPHS



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The laser spectrum is measured with a resolution bandwidth of 0.05 nm. Multiple longitudinal modes exist within the linewidth of the laser that are separated by more than 100 MHz. The spectrum of each individual laser source is measured and included in the individualized data sheet that ships with each laser.

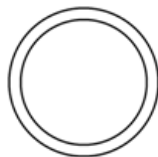


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This L-I curve provides an example of how the output power varies with the pump current, which is adjustable via the knob on the front panel of each source. The L-I curve is also included in the individualized data sheet that ships with each laser.

PIN DIAGRAM

Remote Interlock Input
2.5 mm Mono Phono Jack



Terminals must be shorted either by included plug or user device, i.e. external switch, for laser mode "ON" to be enabled.

USB
USB Type B



Computer Interface

SOFTWARE

LFL Drivers

Version 2.12.18

Includes drivers required to control our LFL laser sources in a command-line Windows® environment.

Part Number	Description	Price	Availability
LFLTM	Tm-Doped Fiber Laser, 1900 nm, >30 mW, Single Mode, FC/APC	\$0.00	Lead Time

