

# Lepton IV Series High Performance Diode Lasers

For many users, a simple turnkey laser system is optimal so that you can concentrate on your experiment and not the laser itself. Having a diode laser with very high beam quality, narrow linewidth and high stability is what one expects of any laser system. Our Lepton IV Series of diode lasers provides an affordable alternative to more costly gas or solid state lasers.



All you do is plug it in and turn it on. No additional heat sinks or power supplies are required. Output is adjustable from zero to full output power. All safety are incorporated for a fully certified system.

Accessories include beam expanders, focusing optics, filters, polarizers, beam splitters, etc. Adapter plates and rings are available to mount the laser with common optical mounts found in any lab.

OEM versions of these lasers are available with full control of all laser parameters.

## Features

- 375nm to 1600nm
- Circular Gaussian beam
- Narrow linewidths
- Variable output power
- TE cooled for high stability
- Many accessories
- Certified turnkey system

## Specifications

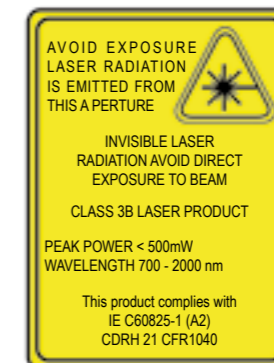
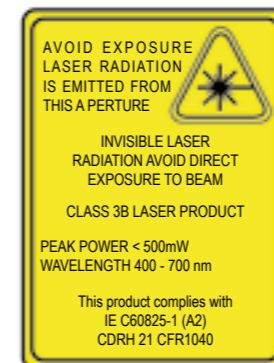
<b>Beam diameter</b>	3-4mm
<b>Beam divergence</b>	<0.7mrad
<b>Pointing stability</b>	<30μmrad
<b>Wavefront error</b>	<1/10 wave
<b>Optical power</b>	Adjustable
<b>Power stability</b>	<1% for λ > 600nm 2% for λ < 500nm
<b>Power requirements</b>	90-125 VAC, 190-250 VAC, 47-63 Hz.
<b>Connections</b>	Interlock BNC Laser monitor BNC Modulation BNC (optional)
<b>Operating temperature</b>	15°C (or dew point) to 30°C
<b>Storage temperature</b>	0°C to 50°C
<b>Compliance</b>	CDRH 21CFR 1040.10 certified as applicable and compliant to IEC 60825-1.2

All lasers are temperature controlled for high stability.. All lasers operate in a single transverse mode and most operate in a single longitudinal mode.

## Ordering Information

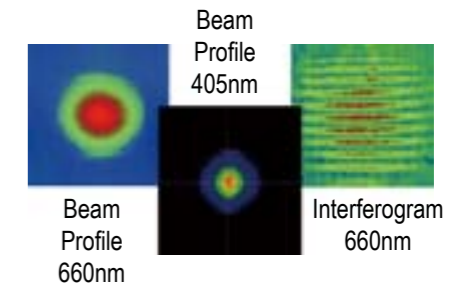
Model #	Description
L4 375M-15-TE/ESYS	375±5nm, 15mW
L4 405M-15-TE/ESYS	405±6nm, 15mW
L4 405M-45-TE/ESYS	405±6nm, 45mW
L4 405M-85-TE/ESYS	405±6nm, 85mW
L4 445M-40-TE/ESYS	445±5nm, 40mW
L4 473M-15-TE/ESYS	473±5nm, 15mW
L4 488M-15-TE/ESYS	488±5nm, 15mW
L4 635S-12-TE/ESYS	635±5nm, 12mW
L4 638S-25-TE/ESYS	638±5nm, 25mW
L4 640S-32-TE/ESYS	640±5nm, 32mW
L4 642S-48-TE/ESYS	642±5nm, 48mW
L4 642S-64-TE/ESYS	642±5nm, 64mW
L4 642S-120-TE/ESYS	642±5nm, 120mW
L4 660S-40-TE/ESYS	658±5nm, 40mW
L4 660S-90-TE/ESYS	658±5nm, 90mW
L4 705S-32-TE/ESYS	705±10nm, 32mW
L4 730S-32-TE/ESYS	730±10nm, 32mW
L4 785S-95-TE/ESYS	784±4nm, 95mW
L4 810S-40-TE/ESYS	810±4nm, 40mW
L4 810S-115-TE/ESYS	810±4nm, 115mW
L4 830S-40-TE/ESYS	830±5nm, 40mW
L4 830S-115-TE/ESYS	830±10nm, 115mW
L4 850S-40-TE/ESYS	852±4nm, 40mW
L4 850S-115-TE/ESYS	852±4nm, 115mW
L4 980M-160-TE/ESYS	980±5nm, 160mW
L4 1064M-70-TE/ESYS	1064±5nm, 70mW
L4 1064M-140-TE/ESYS	1064±5nm, 140mW
L4 1310D-3-TE/ESYS	1310±10nm, 3mW
L4 1550D-3-TE/ESYS	1550±10nm, 3mW

Please call for other wavelength or DFB lasers.



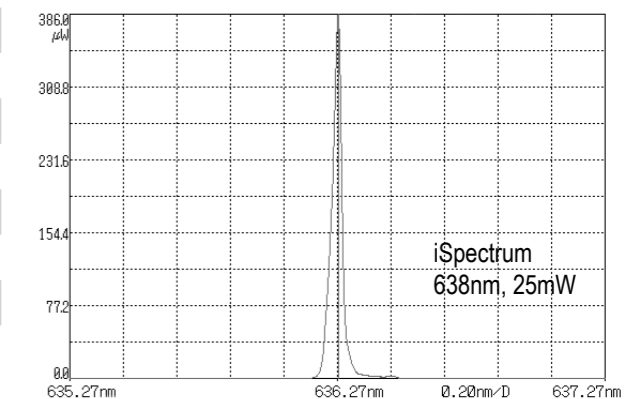
Label is illustrated here to comply with 21 CFR1040.10 as applicable under the radiations for health and safety act of 1986.

Specifications subject to change without notice.



## Applications

- Fluorescence excitation
- Raman spectroscopy
- Ophthalmology
- Confocal microscopes
- Optical tweezers
- Cytometry
- Material analysis
- Photo plotting
- Interferometry
- High resolutions scanning



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# Optical Accessories for Lepton IV Series

Many times one would like to expand a diode laser beam or focus it down to micron or submicron spot sizes. Other times one needs to control the polarization, attenuate the beam or combine/separate wavelengths.

We have designed a series of beam expanders with large input aperture and expansions of ~3X, 4X and 8X.

We also have singlet lenses in a range of focal lengths and coated for diode laser operating wavelengths. They can be used for focusing and for OEM users, fit in the aperture of the Lepton IV laser head. They are an inexpensive way to generate a small spot in a compact package.

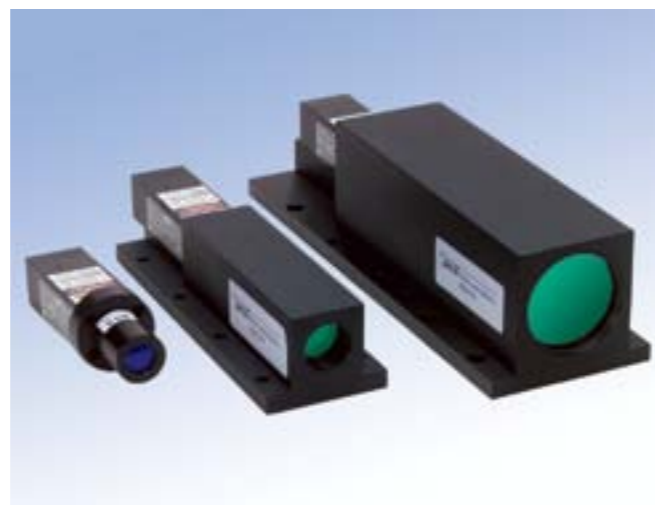
For micron to submicron spots we offer standard and long working distance objectives. Long working distance objectives give plenty of room for other optics or probes to be inserted between objective and sample. Since our diode laser are diffraction limited with high output powers, they generate very high power densities at the focused spot.

Optical isolators are sometimes required to prevent back-reflections from upsetting or destroying a diode laser. They are available for many of the wavelengths.

Many other optical elements such as attenuators, linear, circular and radial polarizers, waveplates are available.

## Features

- Designed for diode lasers
- Coated for diode laser wavelength regions
- Small sizes for diode usage

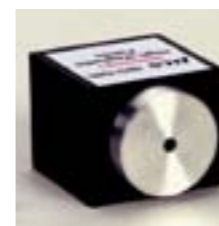


## Optical Accessories

### Beam Expanders

Model #	Description
EX3-λ	2.7X expansion
EX4-λ	4.1X expansion
EX8-λ	7.6X expansion

λ = VIS for 375nm to 600nm  
 λ = NIR for 600nm to 1000nm  
 λ = IR for 1000nm to 1700nm



### Optical Isolators

Model #	Description
ISOVIS	Isolator for red (635-700nm) lasers
ISONIR	Isolator for NIR (700-900nm) lasers
ISOY	Isolator for YAG (980-1064nm) lasers
ISOIR	Isolator for IR (1310-1550nm) lasers



### Mounting Adapters

Model #	Description
L4RING	Ring adapter to mount onto 2" mounts.
L4PLATE	Plate adapter that gives 1" optical axis height.



### Lenses

Model #	Description
FF25-λ	F = 25.4mm
FF50-λ	F = 50.8mm
FF75-λ	F = 75.6mm
FF100-λ	F = 100mm
FF150-λ	F = 150mm
FF200-λ	F = 200mm
FF300-λ	F = 300mm
FF500-λ	F = 500mm

λ = VIS for 375nm to 600nm  
 λ = NIR for 600nm to 1000nm  
 λ = IR for 1000nm to 1700nm



### Objectives: Infinity corrected, long working distance (M.Plant APO) 400nm to 1600nm

Model #	Description
OBJ5XLWD	WD=36.1mm, F=40.0mm
OBJ10XLWD	WD=38.9mm, F=20.0mm
OBJ20XLWD	WD=22.2mm, F=10.0mm
OBJ50XLWD	WD=18.3mm, F=4.0mm
L4OBJ	Objective adapter

Thread is 0.796" dia. x 36 TPI.

# DFB Lasers

## Features

- 760nm to 1060nm
- Built-in grating
- ~2MHz linewidths
- Highly stable
- Certified turnkey systems
- Flexible OEM systems

## Applications

- Interferometry
- Raman Spectroscopy
- Fluorescence excitation
- Absorption



DFB lasers have a grating built into the structure of the laser itself. This results in a laser with very narrow line width and a very small spread in wavelengths. This minimizes mode hops allowing the laser to operate for days without a mode hop. All lasers are temperature controlled for high stability and low noise.

Turnkey laser systems are simple to use and come complete with controller. No external heat sinks or power supplies are required.

OEM systems have full control of the laser's output and temperature setting from the onboard pots or they can be adjusted by an external voltage source. Their small size and low voltage requirements fit easily into any system enclosure.

## Specifications

<b>Wavelengths</b>	760nm to 1060nm
<b>Wavelength tolerance</b>	± 1nm
<b>Spectral width</b>	2MHz typical, 10MHz max.
<b>Output power</b>	40mW to 115mW
<b>Power stability</b>	<0.5% over 24 hours
<b>Operating temperature range</b>	15°C to 30°C
<b>Storage temperature range</b>	0°C to 60°C



## Turnkey System

<b>Optical power</b>	Adjustable up to max. output
<b>Power requirements</b>	90-125 VAC, 190-250 VAC, 47-63Hz
<b>Connectors</b>	BNC interlock BNC current monitor BNC modulation (optional)
<b>Certification</b>	CDRH certified and IEC60825 compliant

## OEM System

<b>Optical power</b>	Adjustable with multi turn pot or external voltage adjustment
<b>DL current limit</b>	Adjustable (Preset at factory)
<b>DL monitor pins</b>	Laser current Laser photodiode
<b>DL enable pins</b>	Yes
<b>Temperature</b>	Adjustable, 15-30 °C
<b>TEC current limits</b>	Adjustable up to ± 2 Amps
<b>TEC monitor pins</b>	Temperature set point and Actual temperature
<b>Voltage requirements</b>	5 to 12 volts DC fixed
<b>Current requirements</b>	1.5-2 Amps surge free and no spikes.

\* Optional beam sizes available.



## Ordering Information

OEM System		
Model #	λ	Output power
L4 760D-32-TE/OSYS	760.5 ±1nm	32mW
L4 780D-40-TE/OSYS	780 ±1nm	40mW
L4 852D-115-TE/OSYS	852 ±1nm	115mW
L4 976D-115-TE/OSYS	976 ±1nm	115mW
L4 1060D-115-TE/OSYS	1060 ±1nm	115mW
Turnkey System		
L4 760D-32/ESYS	760.5 ±1nm	32 mW
L4 780D-40/ESYS	780 ±1nm	40 mW
L4 852D-115/ESYS	852 ±1nm	115 mW
L4 976D-115/ESYS	976 ±1nm	115 mW
L4 1060D-115/ESYS	1060 ±1nm	115 mW

Other wavelengths for gas sensing or absorption are available. Please call for more information.



Labels are illustrated here to comply with 21 CFR 1040.10 as applicable under the radiations for health and safety act of 1986 and compliant with IEC 60825-1.2.



# Fiber Coupled Diode Lasers

## Features

- Singlemode or PM fiber
- 375nm to 1550nm
- Narrow linewidth
- Higher output powers
- Temperature stabilized
- High stability
- Collimator options
- OEM version



The SRT-F OEM Series of fiber coupled lasers are temperature controlled to provide a highly stable laser with excellent beam quality. A range of discrete wavelengths are available from 375nm to 1550nm.

Lasers are coupled to singlemode or polarization maintaining fiber with high output powers from the fiber end. The laser body contains the laser, thermistor, TE cooler, heat sink and coupling optics in a compact package. Drive electronics are separate from the laser head making for a more compact device.

Two choices of fiber coupled lasers are available. One with a spectral bandwidth of <2nm and the other with a spectral bandwidth <0.1nm. Please call for details.

Output can be collimated with our FC Series of fiber collimators with adjustable focus. They are available with apertures from 3mm to 45mm. Please see the Fiber Collimator data sheet.

These lasers are excellent choices for Confocal Microscopy, fluorescence microscopy, ophthalmology, evanescent wave microscopy, interferometry, precision alignment, wafer inspection, holography, remote sensing and many other applications.

## Specifications

<b>Wavelengths</b>	375nm to 1550nm
<b>Wavelength tolerance</b>	±10nm or less for most
<b>Spectral width</b>	<1nm or <0.1nm
<b>Output powers</b>	6 to 70mW
<b>Power stability</b>	<1% for most
<b>Fiber</b>	Singlemode or polarization maintaining
<b>Fiber jacket</b>	3mm standard, others by request
<b>Termination</b>	FC/UPC or FC/APC
<b>Power requirements</b>	5 VDC, 1.5-2 Amps 6 VDC, 1.5-2 Amps for λ<500nm
<b>Operating temp. range</b>	15°C (or dew point) to 30°C
<b>Storage temp. range</b>	-10-80°C

## Available Wavelengths and Output Powers from Singlemode fiber.

Wavelength	Power
375nm	6mW
405nm	6mW, 20mW, 40mW
445nm	18mW
473nm	6mW
635nm	6mW
640nm	2mW, 24mW,
642nm	32mW, 60mW
660nm	20mW, 45mW
705nm	16mW
730nm	16mW
755nm	16mW
761nm	16mW DFB
780nm	32mW DFB
785nm	45mW
810nm	20mW, 40mW, 60mW
830nm	20mW, 40mW, 60mW, 70mW
850nm	20mW, 40mW, 60mW
852nm	40mW DFB
860nm	40mW DFB
905nm	35mW
975nm	100mW
976nm	60mW DFB
1060nm	40mW DFB
1064nm	70mW
1310nm	2mW DFB
1550nm	2mW DFB

## Options

Polarization maintaining fiber and multimode fiber for all the wavelengths is also available. Various connectors and jackets options are available. An optional mounting plate can be used to mount the laser to optical tables or stages with 1" hole spacing.

A series of Fiber Collimators to generate 1.6mm to 45mm beams sizes snap onto the end of the pigtailed laser to give a very well corrected, highly collimated beam.

Fiber splitters or combiners are also available to split the output power or combine various wavelengths. Coupling to multimode fiber for higher power throughput is also available.

Please call about other wavelengths, output powers and laser types. We can customize many of these lasers for users requirements.



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# Low Cost Violet Diode Lasers



OEM System

A new lower cost mid power violet laser is now available that has a diffraction limited beam. It is designed for OEM uses where a few mW's is all one needs.

It has the same beam characteristics as all of our other Lepton IV diffraction limited lasers. With integration of focusing optics one can generate micron to submicron spot sizes with large working distance. An example is using a 10X LWD objective to generate approximately a 5mm spot at almost a 40mm distance. Power density is 81kW /cm<sup>2</sup> for a 5mm spot versus 12kW /cm<sup>2</sup> for a 1 Watt laser from a 100mm core fiber (100mm spot). The long working distance leaves plenty of room to insert probes in or near the optical path and sample.

Besides the 15mW laser we also have higher output 405nm lasers with the similar characteristics.



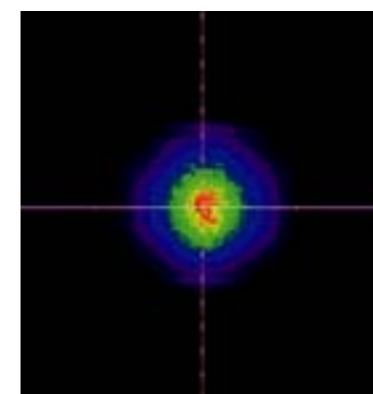
Turnkey System

## Specifications

Wavelength	405+/-6 nm
Spectral width	<1 nm FWHM
Power	15 to 100 mW typical
Power stability	~ 2% over 24 hrs.
Beam diameter	3.5 mm or 1.5 mm
Beam divergence	<0.8 mrad, <1.1mrad
Optical power	Adjustable up to max. output
<b>OEM Version</b>	
DL current limit	Adjustable (Preset at factory)
DL monitor pins	Laser current Photodiode current
DL enable pins	Switch
Temperature	Adjustable, 15-35 °C
TEC current limits	Seperate low and high currents
TEC monitor pins	Temperature set point Actual temperature
Voltage requirements	8 VDC minimum, 12 VDC max.
Current requirements (drivers combined)	1.5-2 Amps surge free with no spikes
<b>Turnkey Version</b>	
Power requirements:	90-125 VAC, 190-250 VAC, 47- 63 Hz.
Connections:	Interlock BNC Laser monitor BNC Modulation BNC (optional)
Operating temperature	15°C (or dew point) to 30°C
Storage temperature	0°C to 50°C
Compliance	CDRH 21CFR 1040.10 certified as applicable and compliant to IEC 60825-1.2

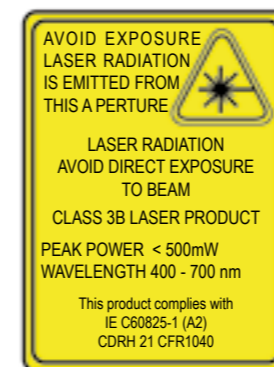
## Features

- 405nm, 15mW output
- Other outputs to 100mW
- 3.5mm or 1.5mm circular beam
- OEM or turnkey certified systems
- Low cost



Beam profile for 3.5mm beam.

Specifications subject to change without notice.



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## Ordering Information

### OEM System

Model #	Description
<b>Diffraction Limited System</b>	
405M-15-TE/OSYS	15mW, 3.5mm beam
405M-45-TE/OSYS	45mW, 3.5mm beam
405M-85-TE/OSYS	85mW, 3.5mm beam

### Economical System

405M-15B-TE/OSYS	15mW, 1.5mm beam
405M-45B-TE/OSYS	45mW, 1.5mm beam
405M-85B-TE/OSYS	85mW, 1.5mm beam

### Low Cost System

405M-15/OSYS	Diffraction limited, 3.5mm beam
405M-45/OSYS	Diffraction limited, 3.5mm beam
405M-15B/OSYS	15mW, 1.5mm beam
405M-45B/OSYS	45mW, 1.5mm beam

### Turnkey System

Model #	Description
<b>Diffraction Limited System</b>	
405M-15-TE/ESYS	15mW, 3.5mm beam
405M-45-TE/ESYS	45mW, 3.5mm beam
405M-85-TE/ESYS	85mW, 3.5mm beam
<b>Economical System</b>	
405M-16B-TE/ESYS	16mW, 1.5mm beam
405M-45B-TE/ESYS	45mW, 1.5mm beam
405M-85B-TE/ESYS	85mW, 1.5mm beam

# Fermion I Series

## Singlemode Fiber Coupled Lasers

### Features

- 405nm to 1600nm
- Higher output powers
- Singlemode fiber
- Narrow linewidths
- High stability
- Variable output
- Modulation to 2 MHz
- Temperature stabilized
- Many accessories
- Certified Turnkey System



The Fermion I Series of Turnkey Fiber Coupled Lasers are designed to make using lasers easy and convenient. You just plug it in and turn it on. No additional power supplies or heat sinks are needed.

These systems typically have 10-180mW output from the end of singlemode fiber. All lasers are temperature controlled for high stability and low noise. A range of discrete wavelengths cover the span from 405nm to 1600nm.

Internally the lasers are coupled to singlemode fiber for that particular wavelength. This gives a spatially filtered output beam with a smooth Gaussian profile. Most lasers oscillate in a single longitudinal mode or narrow spectral line. Laser can run in CW or pulsed mode from zero to full output using the front panel knob or an external voltage source. A one meter length of fiber patch cord is included.

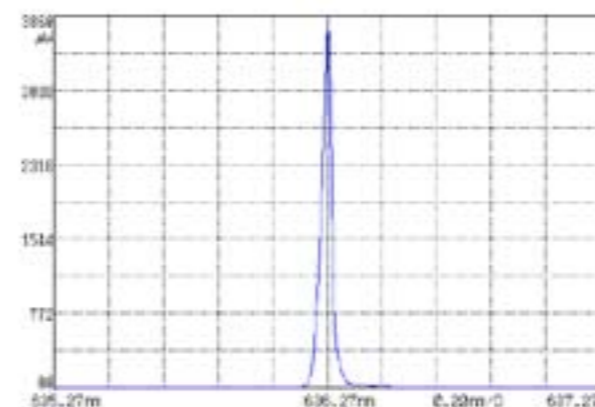
Output of the fiber can be collimated using our Fiber Collimators. They are available in different beam sizes with adjustable focus. Output is diffraction limited with low wavefront error. Please see the Fiber Collimator Series.

Applications include confocal microscopy, ophthalmology, fluorescence excitation, evanescent wave microscopy, interferometry, precision alignment and material analysis.

### Specifications

<b>Wavelengths</b>	405nm to 1600nm
<b>Wavelength tolerance</b>	+/-1 to +/-10nm
<b>Spectral width</b>	<0.1nm for $\lambda > 600\text{nm}$ <1nm for $\lambda < 500\text{nm}$
<b>Output power</b>	10mW to 180mW
<b>Power stability</b>	<1% for most
<b>Internal fiber</b>	single mode for wavelength
<b>Interlock</b>	BNC - shorting
<b>Laser monitor</b>	BNC - voltage output
<b>Modulation</b>	BNC - voltage input
<b>Fiber connection</b>	FC/APC for most
<b>Power requirements</b>	90-125 VAC, 190-250 VAC, 47-63 Hz
<b>Operating temperature</b>	15 to 30° C non condensing
<b>Storage temperature</b>	0 to 50° C
<b>Compliance</b>	CDRH 21 CFR 1040.10 certified system and IEC 60825-1.2 compliant for end users

### Optical Characteristics



Spectral width <0.1nm for 638nm, 12mW laser

### Ordering Information

Model #	Description
FI1 405M-35/FC	405 + 5nm, 35mW
FI1 445M-16/FC	445 + 5nm, 16mW
FI1 638S-12/APC	638 + 5nm, 12mW
FI1 640S-25/APC	640 + 5nm, 25mW
FI1 642S-60/APC	642 + 5nm, 60mW
FI1 660S-50/APC	658+ 5nm, 50mW
FI1 785S-40/APC	784+ 4nm, 40mW
FI1 830S-60/APC	830 + 10nm, 60mW
FI1 980N-150/APC*	980 + 0.5nm, 150mW
FI1 1064N-150/APC*	1064 + 0.5nm, 150mW
FI1 1550D-20/FC*	1550 + 3nm, 20mW

\* New products.

Listed are the most popular wavelengths and power levels. Many other wavelengths are also available. DFB lasers at 760nm, 852nm, 976nm, 1060nm, 1064nm and 1529 -1611 ITU wavelengths are available.

PM and higher power multimode fiber versions are also available. See our Fermion II and Fermion III Series Options include fiber collimators, fiber splitters and wavelength combiners.



Specifications subject to change without notice.

Labels are illustrated here to comply with 21 CFR 1040.10 as applicable.



# Fermion III Series

## Higher Power Fiber Coupled Lasers

### Features

- 375nm to 1064nm
- Narrow linewidths
- up to 490mW
- 100µm core fiber
- High stability
- Variable output
- Modulation to 1MHz
- Temperature stabilized
- Many accessories
- Certified Turnkey System



### Specifications

<b>Wavelengths</b>	375nm to 1550nm
<b>Wavelength tolerance</b>	± 0.5nm and ± 5nm
<b>Spectral width</b>	<0.2nm and <3nm
<b>Output power</b>	15mW to 490mW
<b>Internal fiber</b>	100µm core
<b>Back panel</b>	BNC, interlock BNC, laser monitor
<b>Front panel</b>	FC, laser output BNC, modulation or remote input
<b>Power requirements</b>	90-125 VAC, 190-250 VAC, 47-63Hz
<b>Operating temperature range</b>	15 to 30°C (non condensing)
<b>Storage temperature range</b>	0 to 60°C
<b>Compliance</b>	CDR 21 CFR 1040.10 certified system and IEC 60825-1.2 compliant for end users.

The Fermion III Series of Turnkey Fiber Coupled Lasers are designed to make using lasers easy and convenient. All lasers are coupled to 100µm core fiber for a consistent beam.

A range of discrete wavelengths cover the span from 375nm to 1064nm. There are two categories of lasers, ones with <3nm linewidth and the others with <0.2nm linewidth.

Output power is adjustable using the knob or an external voltage source. The laser can run in CW or pulsed mode. Standard connection uses an FC connector. All lasers come with a 1 meter length of detachable fiber.

These lasers are excellent choices for microscopy, fluorescence excitation, disease diagnostics, Raman spectroscopy, cytometry, particle analysis, material analysis and many other applications.

Accessories include fiber collimators, larger core fibers and fiber splitters.

### Ordering Information

(all lasers are temperature controlled)

Linewidth < 0.2nm typical		
Model #	Wavelength	Power
FI3 785N-490/APC	785 ± 0.5nm	490 mW
FI3 1064N-150/APC	1064 ± 0.5nm	150 mW

Linewidth < 3nm		
Model #	Wavelength	Power
FI3 375M-15/FC	375 ± 5nm	15 mW
FI3 405M-80/FC	405 ± 6nm	80 mW
FI3 408M-120/FC	405 ± 5nm	120 mW
FI3 445M-300/FC	445 ± 5nm	300 mW
FI3 488M-15/FC	488 ± 5nm	15 mW
FI3 635M-200/FC	635 ± 5nm	200 mW
FI3 670M-300/FC	670 ± 10nm	300 mW
FI3 808M-490/FC	808 ± 5nm	490 mW
FI3 976M-490/FC	976 ± 5nm	490 mW
FI3 1064M-490/FC	1064 ± 5nm	490 mW

### Options

#### Collimators

A series of Fiber Collimators to generate 5mm to 45mm beams sizes snap onto the end of the fiber to give a very well collimated beam. Collimators have adjustable focus so you can generate different spot sizes. Collimators are available with FC or SMA receptacles.

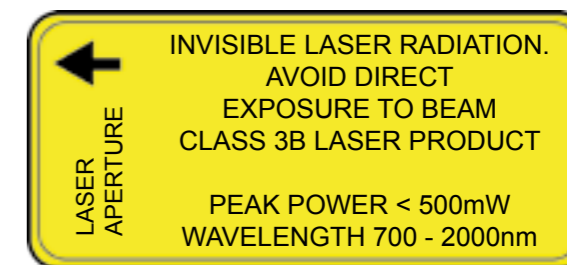
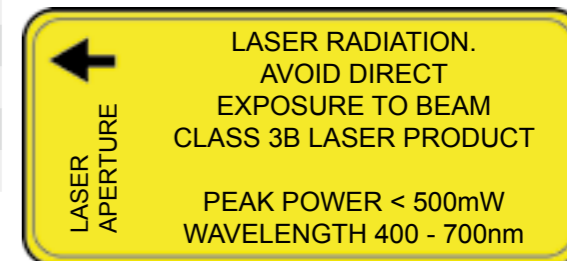
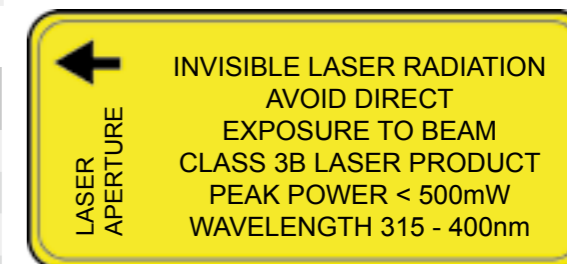
#### Fiber Splitters/Combiners

Fiber splitters or combiners are also available to split the output power or combine various wavelengths.

#### Custom

We can customize a laser system for OEM users.

Specifications subject to change without notice.



Labels are illustrated here to comply with 21 CFR 1040.10 as applicable under the radiations for health and safety act of 1986. Complies with IEC60825-1.2.

# 488nm Diode Laser

## Features

- 488nm, 15mW output
- Circular diffraction limited beam

## Applications

- Confocal microscopy
- Flow cytometry
- Fluorescence excitation
- DNA sequencing
- TIRF



A new 488nm diode laser is now available in the Lepton IV Series of diode laser. This is a direct diode laser, no pumping.

Output is a diffraction limited 4 mm circular beam with Gaussian profile. It is available as a complete turnkey system where you just plug in and turn on Output power can be adjusted either from the front panel knob or be driven by an external voltage source.

An OEM version shown above is also available for integration into instrumentation. Output power and temperature can be controlled by an on-board pot or by an external voltage source.

Accessories include beam expanders, focusing optical assemblies, filters and mounting options.

## Ordering Information

Turnkey System	
Model #	Description
L4 488M-15-TE/ESYS	4mm beam
L4 488M-15B-TE/ESYS	2mm beam

OEM System	
Model #	Description
L4 488M-15-TE/OSYS	4mm beam
L4 488M-15B-TE/2mm/OSYS	2mm beam

Accessorie	
Model #	Description
L4RING	Ring adapter to mount laser to any 2 inch optical mount
L4PLATE	Plate adapter that gives a 1 inch optical axis height.



Turnkey System

## Specifications

<b>Wavelength</b>	488+/-5 nm
<b>Spectral width</b>	<1 nm FWHM typical
<b>Power</b>	15 mW typical
<b>Power stability</b>	~ 2% over 8 hrs.
<b>Beam diameter</b>	3-4 mm standard 2 mm optional
<b>Back divergence</b>	<0.8 mrad
<b>Turnkey System</b>	
<b>Power requirements</b>	90-125 VAC, 190-250 VAC, 47-63 Hz.
<b>Connections</b>	Interlock BNC Laser monitor BNC Modulation BNC (optional)
<b>Operating temperature</b>	15oC (or dew point) to 30oC
<b>Storage temperature</b>	0°C to 50°C
<b>Compliance</b>	CDRH 21CFR 1040.10 certified as applicable and compliant to IEC 60825-1.2
<b>OEM System</b>	
<b>Optical power</b>	Adjustable up to max. output
<b>DL current limit</b>	Adjustable (Preset at factory)
<b>DL monitor pins</b>	Laser current Photodiode current
<b>DL enable pins</b>	Switch
<b>Temperature</b>	Adjustable, 15 (or dew point) to 35 °C
<b>TEC current limits</b>	Seperate low and high current limits
<b>TEC monitor pins</b>	Temperature set point Actual temperature
<b>Voltage requirements</b>	8 VDC minimum, 12 VDC max.
<b>Current requirements (drivers combined)</b>	1.5-2 Amps surge free with no spikes



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Complies with IEC60825-1.2.



# Diode Lasers for Raman Spectroscopy

## Features

- 785nm to 1064nm, Singlemode devices
- 95-450mW output
- Linewidth <0.1nm
- 2mm circular beam or fiber coupled
- CW and pulsed modes
- Wavelength tuning by temperature
- OEM versions or Turnkey systems
- External voltage control
- Low power requirements



Lepton IV-TE OEM version



Lepton IV-TE Laboratory version

For many Raman spectroscopy applications, about 100mW in a small beam is all that is needed to do the job. To date this has only been satisfied by higher power (300-500MW) multimode lasers with linewidths of 0.5nm or greater.

Our lasers are designed to give diffraction limited output with narrow linewidth and high stability. They are a very affordable alternative to other lasers for Raman which are more expensive.

The laser is designed from the Lepton IV Series which has a very small body and ample mounting holes compared to other lasers for Raman. Output is a 2mm circular, Gaussian beam with options for a 4mm or 6mm for Raman confocal microscopy. They also last much longer, operate at lower power and can be pulsed for certain applications. A fiber coupled version with higher output powers is also available.

Laser versions are available for OEM integration or laboratory use.

Excellent source for confocal microscopes, Raman spectroscopy, scanning, optical tweezers, tissue analysis, etc.

## Specifications

<b>Wavelength tolerance</b>	± 4nm standard, ± 2nm at additional cost
<b>Beam size</b>	1-2mm circular, options for 4mm for microscopy applications
<b>Beam divergence</b>	<1.1mrad
<b>Focused spot sizes</b>	microns to sub micron
<b>Power stability</b>	<0.5% typical, 1% max. 24 hours

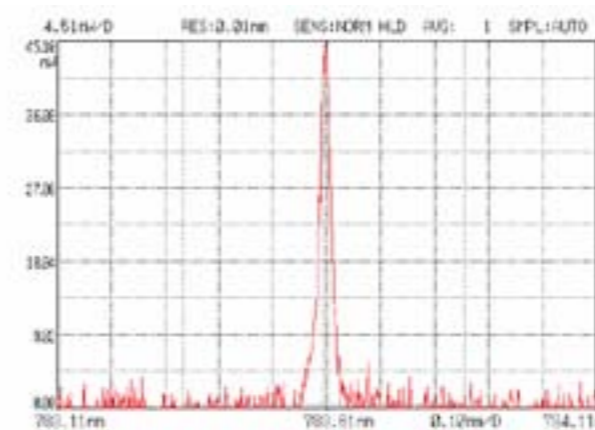
## Ordering Information

Turnkey System			
Model #	Center Wavelength	Tolerance	Output power
L4 638S-25-TE/ESYS	638nm	± 4nm	25mW
L4 660S-40-TE/ESYS	658nm	± 4nm	40mW
L4 660S-95-TE/ESYS	658nm	± 4nm	90mW
L4 785S-95-TE/ESYS	784nm	± 4nm	95mW
FI3 785N-450-TE/APC	785nm	± 0.5nm	450mW
FI1 1064N-150-TE/APC	1064nm	± 0.1nm	150mW

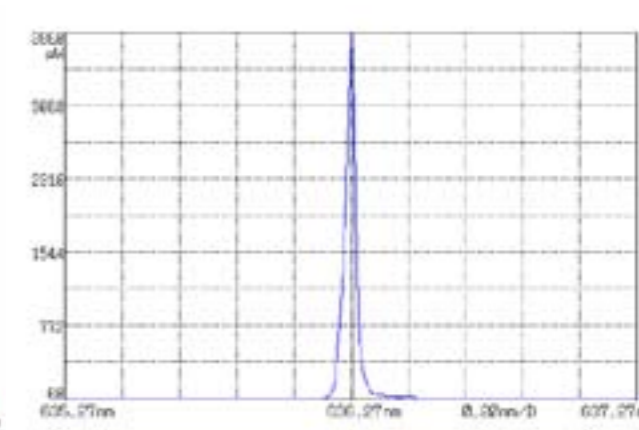
OEM System (wavelength tunable)			
Model #	Center Wavelength	Tolerance	Output power
L4 638S-25-TE/OSYS	638nm	± 4nm	25mW
L4 660S-40-TE/OSYS	658nm	± 4nm	40mW
L4 660S-95-TE/OSYS	658nm	± 4nm	90mW
L4 785S-95-TE/OSYS	784nm	± 4nm	95mW

Please call for other wavelengths or power levels.

Typical Spectrum 785nm, 95mW



Typical Spectrum of 638nm, 25mW



# Diode Lasers for Cytometry

## Features

- T405nm, 488nm, 640nm, 660nm
- Circular Gaussian beams
- Highly stable
- Research systems just plug in and turn on.
- OEM versions have full control of many parameters.



Our diode lasers for cytometry applications have a circular Gaussian beams just like any gas or solid state laser. Therefore the same optical components and techniques can be used as with gas or solid state lasers to focus or reshape the beam.

Optically the lasers are diffraction limited, so you never need to worry if the laser is causing some spurious phenomena. Focusing optics can be integrated into the laser module making for a very compact laser head.

The main advantage of these laser systems is the low power requirements, longer life and small size compared to gas and solid state lasers.

We offer a turnkey system for initial research phase. Users can then migrate to the OEM version with all the same optical characteristics as the research unit but with more versatility in laser control.

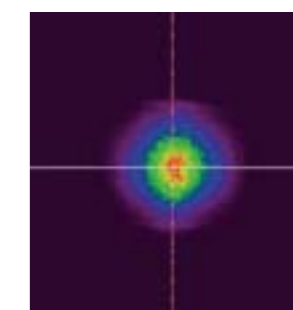
We offer many compatible optical assemblies for focusing or beam shaping depending on the requirements. Some of these can be integrated into the laser head making for a small, compact unit.

## Specifications

<b>Wavelength</b>	405 nm, 488 nm, 638 nm, 642 nm, 660 nm
<b>Wavelength tolerance</b>	±5 nm
<b>Spectral width</b>	1 nm and < 0.1 nm
<b>Beam diameter*</b>	3.5 mm or 1.5mm
<b>Beam divergence</b>	<0.7 mrad
<b>Wavefront error</b>	<1/10 wave
<b>Output power stability</b>	(24 hours) : ~2% for λ <500nm <1% for λ >600nm

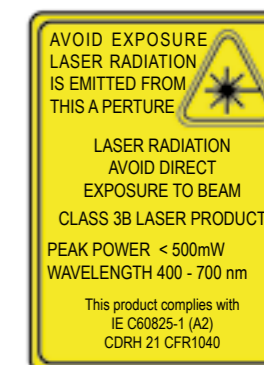


Turnkey System	
<b>Optical power</b>	Adjustable up to max. output
<b>Power requirements</b>	90-125 VAC, 190-250 VAC, 47-63Hz
<b>Connectors</b>	BNC interlock BNC current monitor BNC modulation (optional)
<b>Certification</b>	CDRH certified and IEC60825 compliant
OEM System	
<b>Optical power</b>	Adjustable up to max. output
<b>DL current limit</b>	Adjustable (Preset at factory)
<b>DL monitor pins</b>	Laser current Laser photodiode
<b>DL enable pins</b>	Yes
<b>Temperature</b>	Adjustable, 15-30 °C
<b>TEC current limits</b>	Adjustable up to ± 2 Amps
<b>TEC monitor pins</b>	Temperature set point Actual temperature
<b>Voltage requirements</b>	5 to 12 volts DC fixed
<b>Current requirements</b>	1.5-2 Amps surge free and no spikes.



Typical Beam Profile  
405 nm, 45 mW

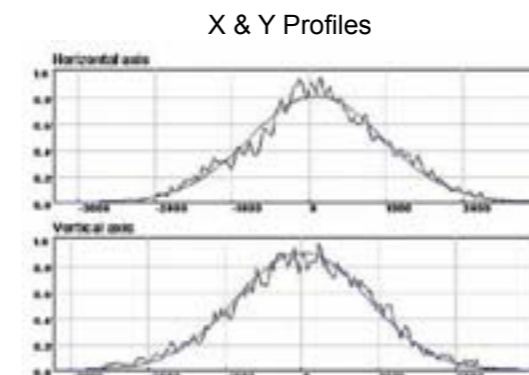
Beam diameter  
3.4 mm @ 1/e<sup>2</sup> points  
1.9 mm at FWHM



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## Ordering Information

OEM System for integration into instruments		Turnkey System for Research	
L4 405M-15-TE/OSYS	L4 638S-25-TE/OSYS	L4 405M-15-TE/ESYS	L4 638S-25-TE/ESYS
L4 405M-45-TE/OSYS	L4 642S-48-TE/OSYS	L4 405M-45-TE/ESYS	L4 642S-48-TE/ESYS
L4 405M-85-TE/OSYS	L4 642S-120-TE/OSYS	L4 405M-85-TE/ESYS	L4 642S-120-TE/ESYS
L4 488M-15-TE/OSYS	L4 660S-40-TE/OSYS	L4 488M-15-TE/ESYS	L4 660S-40-TE/ESYS
	L4 660S-95-TE/OSYS		L4 660S-95-TE/ESYS



## Options

Other wavelengths, integrated optics, filters, beam splitters, and mounting hardware.

# Pseudo Collimated ~100µm Beams

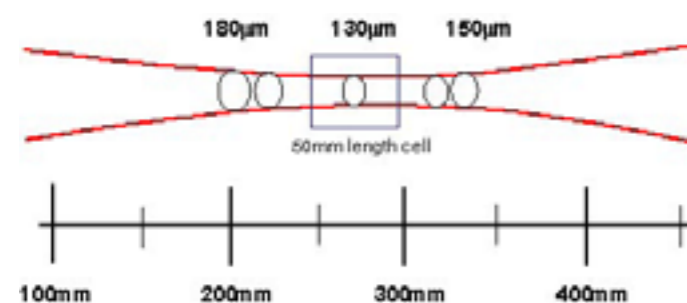


Small micron size beams that are nearly collimated are ideal for many applications such as in spectroscopy and particle sizing where you need to have a beam that is nearly the same size throughout the cell. Since a truly 100mm collimated beam is very difficult to manufacture with diode lasers the next best thing is a Pseudo Collimated Beam. In this method a diode laser beam is nearly collimated over a long enough distance (i.e. it has a large depth of focus).

The Lepton II or IV Series are ideal for achieving these small micron size beams. The example shows a beam which is about 180mm in diameter at a distance of 250mm with about 50mm of nearly collimated beam.

### Typical beam size versus distance are:

Distance	Pseudo Collimated Beam Size
50mm	~38µm
100mm	~77µm
150mm	~110µm
250mm	~180µm



Appropriate optics are incorporated into the Lepton II or IV housing to generate these beam sizes without increasing the housing size. Check out our list of wavelengths and power levels for Lepton II and Lepton IV Series. Call or email us with your requirements for Beam Size, Distance from laser and application so that we can assemble the correct laser.

# Micron Size Spots with Long Working Distance



### Features

- Circular, Gaussian Beams
- Astigmatic free
- Micron to Submicron Spot Sizes
- Large Working Distance
- 375nm to 1600nm
- Turnkey and OEM versions

In many applications, such as in fluorescence excitation, printing, photoplotting, detector pixel analysis, one needs to generate small micron size spots with long working distance.

We offer a series of lenses that when combined with our Lepton IV Series of diode lasers, generate micron size spots with long working distance. The optics are integrated onto the Lepton IV housing making a small compact package. Output powers of the Lepton IV Series are 100mW or more at various wavelengths which are then focused to a 1 to 10 micron spot size. This yields very high power densities at the focused spot. This means you will get higher signal to ratios.

### Typical examples are listed.

Distance	Spot Size
25.4mm	6.5µm
50.8mm	13µm
76.2mm	19.4µm
100mm	25.4µm
150mm	38µm
250mm	63.5µm
500mm	127µm

We also have long working distance objectives (WD=38mm, 22mm) that can mount onto the Lepton IV laser and generate micron size spots.

With the right choice of beam size, lens focal length and type of lens, we can generate just the right spot at the distance you need for your application.



# Lepton IV OEM Series



## Features

- 375-1600nm Singlemode lasers
- Circular Gaussian beam
- Narrow linewidth
- High stability
- Variable output power
- Variable temperature
- TE cooled for high stability
- Full range of accessories
- Replace Dye, Ti-Sapphire, Argon's and Kryptons

## Specifications

Beam diameter	3-4mm standard
Beam divergence	<0.7mrad
Pointing stability	<25μrad
Wavefront error	<1/10 wave
Optical power	Adjustable 0 to full power
Power stability (24 hours)	<1% λ>600nm, typically <0.3% ~2% λ<500nm
Laser driver	5-12 VDC, DL current plus 100mA
Laser TEC	5-12 VDC, 1.5 Amps
Operating temperature	15 to 30oC (above dew point)
Storage temperature	-10 to 60oC
1-2mm or 6mm beams sizes also available.	

These lasers are designed to give diffraction limited output with narrow linewidth and high stability. They are a very affordable alternative to gas and solid lasers, last much longer, have high output powers singlemode, operate at low voltages and are much more compact.

Output power can be adjusted from zero to full output using the potentiometer or an external voltage. Temperature can be adjust slightly to tune the wavelength a little with a pot or external voltage. Monitoring pins can monitor the laser current, photodiode current, set temperature and actual temperature. An enable pin can be used to turn on the laser and temperature controller. Laser housing has ample mounting holes

Accessories include beam expanders, focusing optics, filters, waveplates, polarizers, etc.

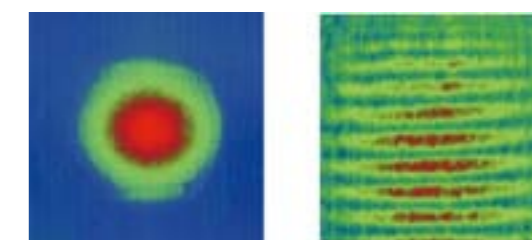
These lasers have been used in NIR spectroscopy, interferometry, ophthalmology, confocal microscopes, Raman spectroscopy, fluorescence excitation, optical tweezers, cytology, material analysis, photoplotting, probing, particle analysis, high resolution scanning and critical alignment.

Wavelengths	Power
375nm	15mW
405nm	15mW, 45mW, 85mW, 100mW
445nm	40mW
473nm	15mW
488nm	15mW
635nm	4mW, 12mW
639-642nm	25mW, 32mW, 48mW, 64mW, 120mW
650nm	4mW
658nm	40mW, 95mW
670nm	8mW
690nm	24mW
705nm	32mW
730nm	32mW
760nm	32mW DFB
785nm	40mW, 95mW
810nm	40mW, 80mW, 115mW
830nm	40mW, 80mW, 115mW, 150mW
852nm	40mW, 80mW, 115mW, 115mW DFB
905nm	70mW
940nm	150mW
975nm	70mW, 100mW, 200mW
976nm	115mW DFB
980nm	100mW, 200mW
1060nm	115mW DFB
1064nm	70mW, 150mW
1310nm	3mW DFB
1550nm	3mW DFB

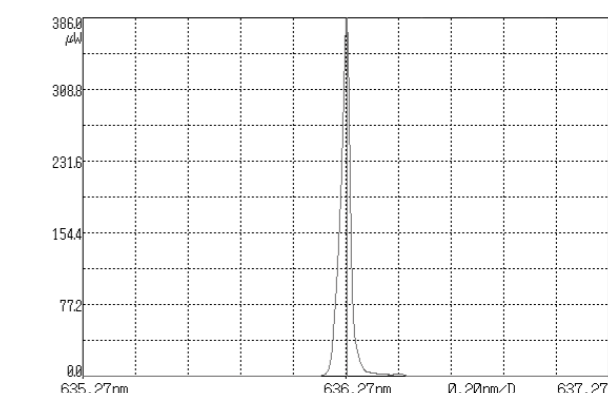
DFB lasers have a built in grating resulting in no mode hops and much narrower linewidth than standard lasers. DFB lasers also available at 763nm, 773nm, 780nm, and 923nm.

Optical elements can be integrated within the body of the laser or attached to the laser to make focused beams, split beams or expanded beams.

Typical Beam Profile Typical Wavefront



Typical Spectrum for most lasers



Narrow linewidths typically <0.1nm.



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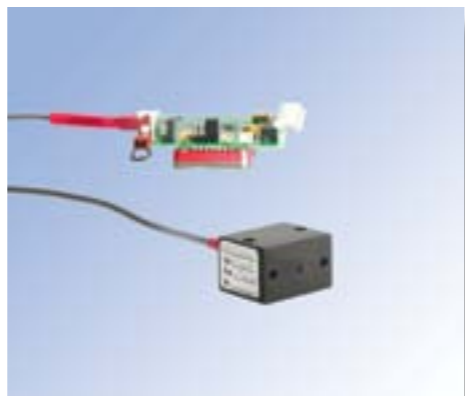
# Pion III Series

## Nearly circular diode lasers

The Pion III Series is a high quality diode laser system designed for OEM applications needing a small laser for instrumentation.

Light output is a highly collimated 2mm nearly circular beam. Laser can be operated in constant current or constant power mode, run in CW or modulated mode and be remotely controlled by applying an external voltage.

There are ample mounting holes on the laser body for bolting down or attaching accessories.



### Ordering Information

Model #	Description
SF 635S-6/OSYS	635 ±5 nm, 6 mW
SF635S-9/OSYS	635 ±5 nm, 9 mW
SF 638S-18/OSYS	638 ±5 nm, 18 mW
SF 640S-25/OSYS	639 ±5 nm, 25 mW
SF 660S-30/OSYS	658 ±5 nm, 30 mW
SF 690S-18/OSYS	690 ±10 nm, 18 mW
SF 705S-24/OSYS	705 ±10 nm, 24 mW
SF 730S-24/OSYS	730 ±10 nm, 24 mW
SF 785S-30/OSYS	785 ±10 nm, 30 mW
SF 784S-30/OSYS	784 ±4 nm, 30 mW
SF 810S-30/OSYS	810 ±4 nm, 30 mW
SF 830S-30/OSYS	830 ±10 nm, 30 mW
SF 850S-30/OSYS	852 ±4 nm, 30 mW
SF 905M-30/OSYS	905 ±5 nm, 30 mW
SF 1064M-30/OSYS	1064 ±5 nm, 30 mW
SF 1310D-2/OSYS	1310 ±5 nm, 2 mW
SF 1550D-2/OSYS	1550 ±5 nm, 2 mW

### Accessories

Model #	Description
LG20	20° fan
LG50	50° fan

Listed are the more popular wavelengths and power levels. Please call or email for your desired laser.

### Specifications

Wavelength	635nm to 1600nm
Output power	6mW to 30mW
Mode	Single transverse, Single longitudinal for most
Beam diameter	2mm x 1.5mm nearly circular
Beam divergence	<1mrad
Polarization ratio	>100:1
Modulation	up to 2MHz
Driver input	5-12 VDC, Laser current + 100mA surge and spike free
External voltage control	0-2VDC

Higher output powers also available.

### Features

- 2mm nearly circular beam
- Low beam divergence
- Small compact package
- Ample mounting holes
- Lower cost laser

### Applications

- Raman spectroscopy
- Interferometry
- Fluorescence excitation
- Alignment
- Aiming beam

Labels are illustrated here to comply with 21 CFR 1040.10 as applicable under the radiations for health and safety act of 1986.



# OEM Diode Laser Drivers

### Features

- 200mA and 2 Amp versions
- All pin configurations
- Constant current and power modes
- Modulation
- Multi turn trimpots for precision setting of current and current limits
- Voltage monitoring
- Enable/Disable pin
- External voltage control of laser output



### Ordering Information

Model #	Description
DBDL200T/S	200mA Driver for T and S type lasers
DBDL2000T/S	2 Amp Driver for T and S type lasers
DBDL200M/Q	200mA Driver for M and Q type lasers
DB2000M/Q	2 Amp Driver for M and Q type lasers
DBKIT	Accessory kit for DBDL Series.
DBHS	Heat sink
DBPAD	Thermal pad
DBFAN5V	5 Volt fan for any of the drivers
DBFAN12V	12 Volt fan for any of the drivers
CABLE3PF3D-T	Cable from 3 pin laser to driver for T type laser
CABLE3PF3D-S	Cable from 3 pin laser to driver for S type laser
CABLE3PF3D-M	Cable from 3 pin laser to driver for M type laser
CABLE3PF3D-Q	Cable from 3 pin laser to driver for Q type laser

Driver with accessory kit is recommended for first time use. Driver comes with mating connectors. Accessory kit contains screwdriver, heat sink, thermal pad and standoffs. Forced air (fan or instrument fan) is required for 1 Amp or greater. Please call or email for other cables or pin configurations.



The DBDL Series of diode laser drivers are designed to provide very high stability to the diode laser. They are compatible with any pin configuration of laser. A single 5 Volt power supply is all that is required.

The board provides common connectors for your laser, power input and monitoring pins. The process is even easier using our laser cables and mating connectors. The driver can be mounted in many different ways within your instrument so that the laser output can be held in a very steady state.

The DBDL Series has current limits to protect the laser, twelve turn trimpots for fine adjustment of laser current and current limit and setting for different monitoring photodiode ranges.

Remote control of the laser is done by a voltage control input. An enable/disable connection is also provided. Laser current or power can be monitored through a separate connection.

The driver, accessory kit and cable provides a complete unit to drive any laser for the first time.

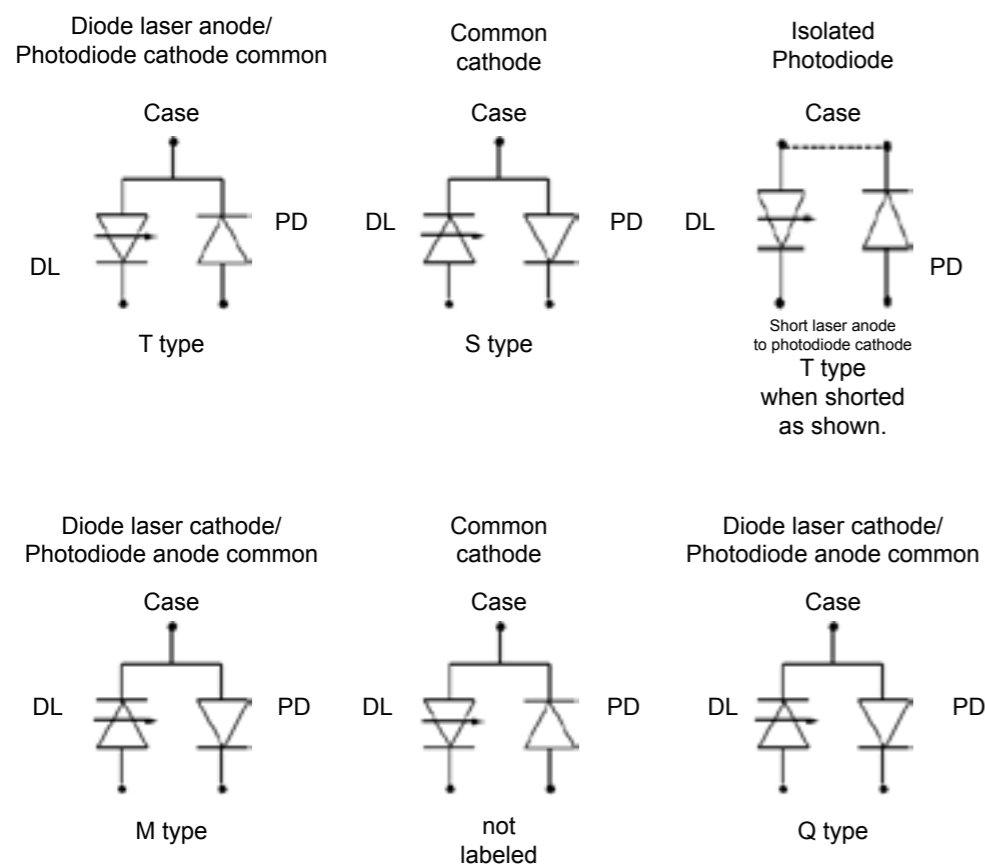
# Thermoelectric Controller

## DBTEC-2A

### Specifications

Parameter	DBDL200T/S or M/Q	DBDL2000T/S or M/Q	Units
<b>Output</b>			
Current	0 to 200	0 to 2000	mA
Compliance Voltage			
@5V	3.6 @ $I_{DL} = 150\text{mA}$	3.5 @ $I_{DL} = 1\text{ Amp}$	Volts
		3.0 @ $I_{DL} = 2\text{ Amp}$	Volts
@12V	10.6 @ $I_{DL} = 150\text{mA}$	10.4 @ $I_{DL} = 1\text{ Amp}$	Volts
		10.1 @ $I_{DL} = 2\text{ Amp}$	Volts
Bandwidth, CC, sine	2	2	MHz
<b>Power Supply</b>			
Voltage	5 to 12	5 to 12	Volts
Current	100 + max. laser current	100 + max. laser current	mA

### Laser pin configurations



### Features

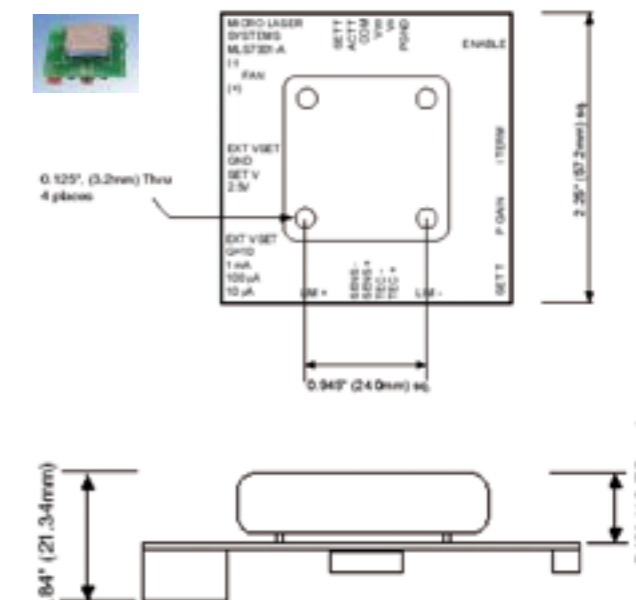
- +/- 2 Amp Output
- Ultra Stable PI Control
- Single Supply Capable
- Voltage Controlled Setpoint
- Adjustable Sensor Bias Current Source
- Adjustable Sensor Gain
- Independent Heat and Cool Current Limits

The DBTEC-2A is designed to control thermoelectric coolers to a high precision. It maintains temperature regulation using an adjustable sensor bias current and error amplifier circuit that operates with thermistors, RTD's, AD590 and LM335 type temperature sensors. The DBTEC- 2A can supply up to 2 Amps of heat and cool current to the thermoelectric from a single power supply.

Two heat sinking options are available for the driver. The first option allows you to mount the TEC driver directly to your instrument chassis or other large heat sink. The second option uses a small heat sink mounted on the TEC driver. Your instrument fan cools the heat sink. An optional small fan can be installed when an instrument fan is not possible. The DBTEC-2A comes standard with the heat sink.

A twenty turn potentiometer is used to set the temperature or you can use a remote potentiometer or voltage source. Adjustable potentiometers are also available to set the high and low current limits. A dipswitch allows the sensor bias current and sensor gain to be optimized for your sensor type. Monitoring pins are available for temperature set point and actual temperature. Resistive heaters can be used by disabling the cooling current output.

### Dimensions





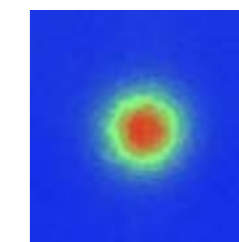
# High Power Fiber Collimator



## Features

- All fused silica design
- Clean Gaussian beam at any distance
- No epoxy in optical path
- Adjustable focus

FC5FS beam profile



Our FC5FS fiber collimator is designed for long distance transmission of high power fiber lasers. An all fused silica design minimizes thermal problems associated with most other types of collimators. It is designed for use with singlemode and polarization maintaining fibers.

Output collimation is adjustable so that you can tune to the exact wavelength of use. Output beam is very well corrected to give a diffraction limited beam with low wavefront error. There is no epoxy in the optical path. Standard FC and FC/APC receptacles are used on the input.

Accessories include adapter designed to mount the fiber collimator onto common optical mounts.

The FC5FS collimator is ideal for free space communications, lidar, remote sensing, interferometry, confocal microscopy and other applications requiring excellent beam quality and low scatter.

## Specifications

	Min.	Typical	Max.
<b>Temperature Control</b>			
Control Loop	P	PI	-
<b>Output</b>			
Output Current:		+2.0 Amps	+2.5 Amps
Compliance Voltage ( $I_{out} = 1$ Amp)	$V_s - 2.2$   Volts	$V_s - 2.0$   Volts	-
Compliance Voltage ( $I_{out} = 2$ Amp)	$V_s - 3.3$   Volts	$V_s - 2.6$   Volts	-
<b>Power Supply</b>			
Voltage, $V_{DD}$	4.5 Volts	-	12 Volts
Current, $V_{DD}$ supply	-	55 mA	-
Voltage, $V_s$	3 Volts	-	12 Volts
Current, $V_s$ supply	20 mA	50 mA	100 mA
<b>Input</b>			
Offset Voltage, Initial	-	1 mV	2 mV
Bias Current	-	20 nA	50 nA
Offset Current	-	2 nA	10 nA
Common Mode Range	0 Volt	-	$V_{DD} - 1.5$ Volt
Input Impedence	-	500 k $\Omega$	-
<b>Thermal</b>			
Heatspreader Temperature Rise	28°C/W	30°C/W	33°C/W
Heatspreader with Heatsink Temperature Rise	18°C/W	21.5°C/W	25°C/W
Heatspreader with Heatsink and Fan Temperature Rise	3.1°C/W	3.4°C/W	3.9°C/W

## Specifications

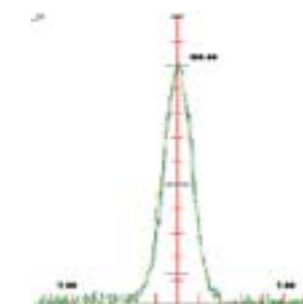
<b>Wavelength range</b>	900nm to 1100nm
<b>Transmission</b>	>97%
<b>Aperture</b>	6mm
<b>Beam size (NA=0.13)</b>	2mm
<b>Wavefront error</b>	<1/10 wave
<b>Collimation</b>	Adjustable with lockdown
<b>Housing</b>	Stainless steel
<b>Receptacles</b>	FC or FC/APC



## Ordering Information

Model #	Description
FC5FS-Y-T	Fiber collimator with FC receptacle
FC5FS-Y-T/A	Fiber collimator with FC/APC receptacle
FC5R-1.0	Ring adapter to mount collimator in optical mounts.

Options for fiber pigtails and fixed collimation. Please call about other beam sizes and requirements.



XY profile

# Fiber Collimators



## Features

- Large apertures
- Clean Gaussian beams at any distance
- Adjustable collimation / focus
- No epoxy in the optical path
- For singlemode, PM fibers or Fiber Lasers
- FC, FC/APC or SMA receptacles
- Usable from 370nm to 1700nm

Our Fiber Collimators are designed specifically for various wavelength singlemode and polarization maintaining fibers. Our unique design ensures you get a clean Gaussian beams at any distance.

We offer various aperture sizes from 5mm to 45mm to accommodate various beam sizes. Output beam is user adjustable so you can optimize collimation to your operating wavelength and lock it down. All collimators have an FC or FC/APC receptacle as standard. The smaller collimators have fine 80 pitch threads for fine focus/collimation adjustment.

Three wavelength regions cover the spectrum from 370nm to 1700nm. All optics have a broadband AR coating.

A series of adapter rings and mounts are available to mount the collimators to common optical mounts, tables and tripods.

Typical applications include lidar, free space communications, interferometry, confocal microscopy, large structure alignment and any application requiring excellent beam quality with low beam divergence.



FC45 mounted on tripod

## Specifications

	FC5	FC10	FC20	FC45
<b>Aperture:</b>	5 mm	10 mm	22 mm	46 mm
<b>Beam size at 1/e<sup>2</sup> points, NA = 0.13, at 635 nm</b>	2 mm	5.4 mm	10.6 mm	32 mm
<b>Beam divergence</b>	< 0.5 mrad	< 0.25 mrad	< 0.1 mrad	< 0.05 mrad
<b>Wavefront error at 1/e<sup>2</sup> points</b>	< 1/10 wave	< 1/10 wave	< 1/10 wave	< 1/10 wave
<b>Receptacle</b>	FC or FC/APC	FC or FC/APC	FC or FC/APC	FC or FC/APC
<b>Collimation:</b>	Adjustable	Adjustable	Adjustable	Adjustable
<b>Locking</b>	yes	yes	yes	yes
<b>Housing material</b>	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
<b>Weight</b>	45 g (1.6 oz.)	85 g (3.0 oz.)	286 g (10.1 oz.)	1.12 kg (2.46 lb.)

## Ordering Information

Model #	Description
FC5-λ-T	6 mm aperture, FC receptacle
FC5-λ-T/A	6 mm aperture, FC/APC receptacle
FC10-λ-T	10 mm aperture, FC receptacle
FC10-λ-T/A	10 mm aperture, FC/APC receptacle
FC20-λ-T	22 mm aperture, FC receptacle
FC20-λ-T/A	22 mm aperture, FC/APC receptacle
FC45-λ-T	45 mm aperture, FC receptacle
FC45-λ-T/A	45 mm aperture, FC/APC receptacle
<b>Accessories</b>	
FC5R-1.0	FC5 adapter for 1 in. optical mounts
FC10R-1.0	FC10 adapter for 1 in. optical mounts
FC20R-2.0	FC20 adapter for 2 in. optical mounts
FC45M	FC45 mount for tables or tripods

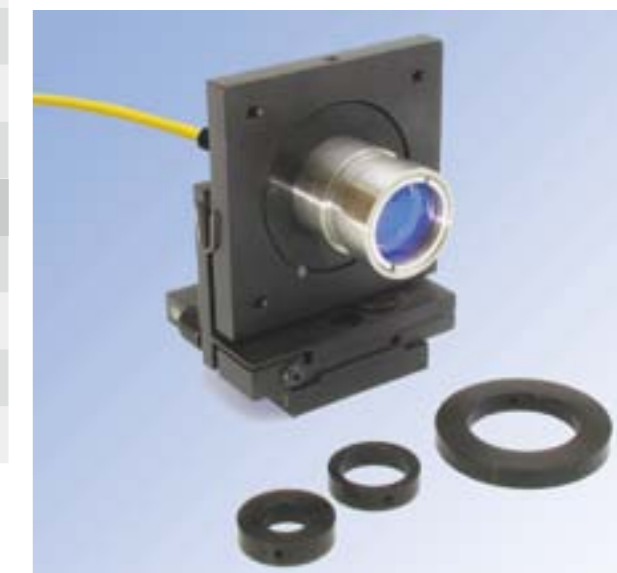
Use -VIS for λ = 370nm to 600nm  
 Use -NIR for λ = 600nm to 1000nm  
 Use -IR for λ = 1000nm to 1700nm

For NIR coating, 1064nm is >90% transmission.  
 For IR coating, 980nm is >90% transmission.

All collimators are stock items.

Specifications subject to change without notice.

Collimators can be made vacuum compatible, non-magnetic, radiation resistant or made for flight or space applications. Special beam sizes or wavelength ranges have also been manufactured.



Ring adapters to mount collimator onto common optical mounts

# Optical Fiber Assemblies

PM, SM and MM

## Features

- 200nm to 1700nm
- High performance assemblies
- Low insertion loss
- Many jacket styles
- Connector options
- Volume quantities for OEM



High performance PM and Singlemode cable assemblies are available from 370nm to 1600nm. Multimode cable assemblies are available with graded or step index profiles.

Fibers are available in standard or radiation resistant type.

Fibers are terminated with common connectors such as FC, FC/APC, SMA and with special connectors or terminations such as AVIM, non-magnetic, or ferrule only.

Fiber jackets range from 900mm to standard 3mm jacket and armored jackets. Radiation resistant and space application jackets are also options.

All cable assemblies are labeled for wavelength or core size. Jackets and boots are color coded for type of fiber and polish end type.

Custom fiber assemblies for space, vacuum, vibration and radiation environments are also manufactured.

To complement our fiber assemblies, we offer a full line of fiber collimators with various beam diameters and fiber coupled lasers from 375nm to 1600nm.

## Singlemode Fiber Assembly Characteristics

Insertion loss	<0.1 dB
Back reflection	<-55 dB

## PM Fiber Assembly Characteristics

Insertion loss	<0.1 dB
Extinction ratio	27 dB or better
Back reflection	<-55 dB

## Jackets Available

900 μm
2 mm
3 mm
Stainless steel sheath

## Connectors Available

FC, FC/APC
SMA
3 mm
SC, SC/APC
LC, LC/APC
MU, MU/APC
ST
AVIM
2.5mm ferrule
1.25mm ferrule

All cables are labeled for wavelength or type fiber. Boots are color coded for standard or angled connection or polarization. Fiber jackets are color coded for fiber type or wavelength depending on jacket type.

Cable assemblies for radiation, space, vacuum and vibration environments are made on a custom basis.

One meter length fibers terminated with FC/UPC or FC/APC connections are usually in stock.

## Singlemode Fibers

Fiber	Useful Range
405 nm	400 - 550 nm
460 nm	460 - 600 nm
630 nm	630 - 830 nm
780 nm	780 - 970 nm
980 nm	980 - 1600 nm
1310/1550 nm	1300 - 1625 nm

## Polarization Maintaining Fibers (Panda type)

Fiber	Useful Range
405 nm	400 - 550 nm
460 nm	460 - 550 nm
630 nm	630 - 780 nm
780 nm	780 - 980 nm
980/1064 nm	980 - 1064 nm
1300 nm	1280 - 1340 nm
1550 nm	1490 - 1620 nm

## Multimode Fibers

Fiber	Useful Range
50 μm core, Graded index	800 - 1350 nm
100 μm core, Graded index	800 - 1350 nm
100 μm core, Step index	180 - 900 nm
100 μm core, Step index	700 - 1900 nm
200 μm core, Step index	180 - 900 nm
200 μm core, Step index	700 - 1900 nm

Larger core sizes also available.



# ZPol

## Radial Polarizer and Z Polarizer

### Features

- Turns any linearly polarized laser to Radially polarized light
- Generates "Z" polarization
- Large aperture for most lasers
- High transmission
- Lower cost

Manufactured by Nanophoton Corp.

The ZPol turns any linear polarized laser into Radial or Azimuthal polarized light. This Radial polarized light can in turn be made to generate Z Polarization, or polarization in the direction of light propagation.

Z Polarization is produced by a combination of ZPol and a high NA lens. The focal spot given by the lens has strong Z polarized light with Radial polarization. No Z Polarization at the focus is obtained when using Azimuthal polarization.

### Specifications

<b>Size</b>	25mm dia. x 5mm thickness
<b>Clear aperture</b>	10mm
<b>Retardation error</b>	$0.5 \pm 0.05 \lambda$ as a waveplate
<b>Optical axis error</b>	$\pm 2$ degrees
<b>Group delay dispersion</b>	$\sim 100\text{-}200 \text{ fs}^2$ $> 100\text{fs}$ negligible
<b>Transmission</b>	98% typically

### Ordering Information

ZPol4-532nm  
 ZPol4-633nm  
 ZPol4-785nm  
 For all other wavelengths  
 ZPol4- $\lambda$   
 Specify  $\lambda$  required.

Specifications subject to change without notice.



Radial Polarizer !  
(Not a circular polarizer)

# Speckle Reducer

### Features

- 250nm - 500nm range and 500nm - 1500nm range
- No moving parts
- Excellent for temporal resolved imaging
- Homogenizes the beam

Produced by Nanophoton Corp.

One of the most annoying aspects of using lasers as an illuminating source is the speckle noise they produce which degrades your image. This is due to the coherence of the laser source.

The SK11™ Speckle Reducer improves image quality by reducing the coherence of the laser. It consists of a fiber bundle with different lengths of fiber. Each fiber length differs by more than the coherence length of the laser.

The SK11 is an excellent source for microscopic illumination. Using monochromatic light eliminates any chromatic aberration. Since the SK11 has no moving parts, there is no vibrational noise either. A scanning system is not required, making it suitable for temporal resolved imaging.

The SK11 also homogenizes any input beam. A Gaussian input profile is transformed into a homogeneous profile.

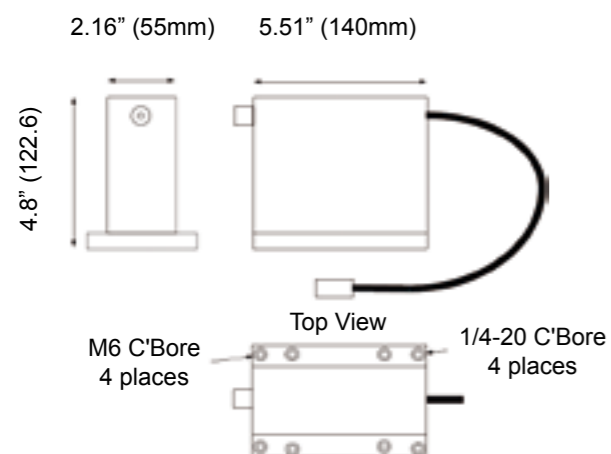
We have many laser wavelengths available from 375nm to 1600nm which can be used with the SK11.

### Specifications

<b>Wavelength ranges</b>	25mm dia. x 5mm thickness 500nm to 1500nm
<b>Entrance pupil</b>	5mm
<b>Exit pupil</b>	5mm
<b>Fiber bundle length</b>	1 meter
<b>Transmission</b>	>50%

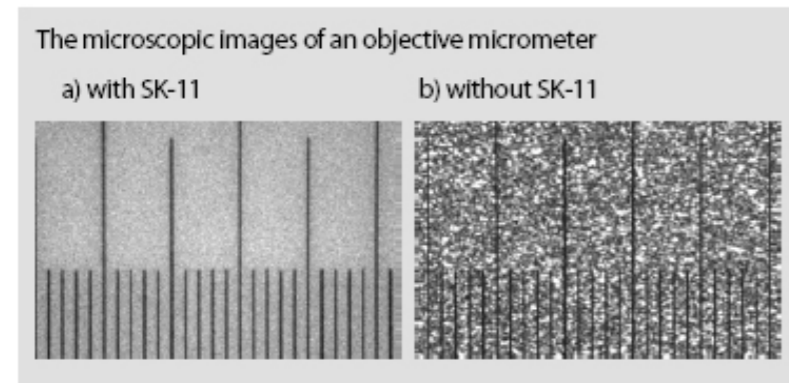


### Dimensions



### Ordering Information

Model #	Description
FC5-λ-T	6 mm aperture, FC receptacle
FC5-λ-T/A	6 mm aperture, FC/APC receptacle



- References:
- Dingel, Kawata, et al., Optik, 94 (1993) 132.
  - Dingel, Kawata, Opt. Commun., 93 (1992) 27.

Specifications subject to change without notice.