

Fiber Laser Based Chirped Pulse Amplification System



Applications

- Medical therapeutic surgery
- Nanoscience
- Materials precision machining
- Biomedical instrumentation
- Terahertz radiation
- Nonlinear optical studies

Features

- Up to 10 μ J pulse energy
- Wavelength available at 1.55 μ m or 1.0 μ m
- Linearly polarized output
- Maintenance free
- Light weight and compact
- Cost effective
- Fiber-based architecture

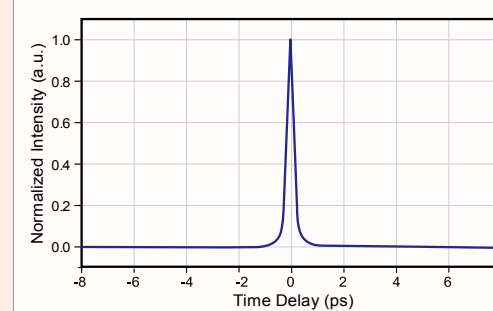


The fiber laser based chirped pulse amplification system (FLCPA) starts with a passively mode-locked seed fiber laser. The short pulse is time stretched by frequency (chirped) for lower intensity amplification through a high power fiber amplifier stage. Up to 10 μ J of short pulse energy is delivered into free space. The wavelength can be selected in C-band or 1.0 μ m band. The typical pulse width is 500 fs. The repetition rate can be adjusted up to 1500 kHz, depending on pulse energy. An RF synchronization output is provided as a trigger signal. This fiber laser based FLCPA is lightweight, compact, and maintenance free, offering a reliable cost-effective alternative to Ti: Sapphire laser amplifiers. FLCPA is especially well suited for industrial and medical applications where cost of ownership over the life time of the laser is important.

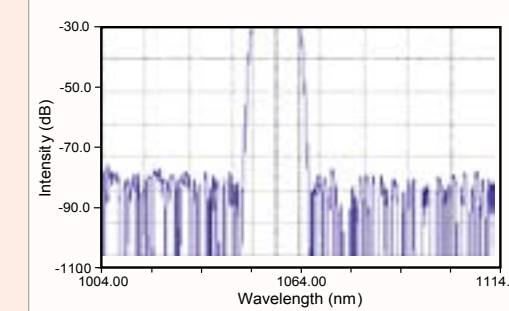
Technical Specifications

Model Number	FLCPA-01C	FLCPA-02C	FLCPA-01U	FLCPA-02U	FLCPA-03U
Pulse Width (ps)*	<0.5	<0.7	<0.5	<0.7	<0.7
Central Wavelength (nm)	1545 ~ 1555 (selectable)		1030 ~ 1065 (selectable)		1030
Repetition Rate (kHz)	Up to 1500	Up to 500	Up to 1500	Up to 500	Up to 200
Pulse Energy (μ J)	1	3	1	3	10
Polarization Extinction Ratio	20 dB (typical)				
Output Beam (mm)	Free space, diameter 3 (typical), M2<1.2				
Operating Temp ($^{\circ}$ C)	10 ~ 35				
Operating Voltage (VAC)	85 ~ 264				

* A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.
Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Traces Corresponding to a Pulse Width of 0.7 ps



Optical Spectrum Corresponding to a Pulse Width of 0.7 ps

C-band Femtosecond Fiber Laser Bench Top



Applications

- Telecommunication components characterization
- Optical high speed sampling
- Terahertz radiation
- Optical switching
- Materials characterization
- Optical metrology

Features

- Wavelength tunable from 1535 to 1560 nm
- Pulse width selectable from 0.1 to 15 ps
- Pulse width tunability
- Near transform-limited output
- Minimal pulse pedestal
- Low timing jitter
- RF synchronization output
- Turnkey operation



The C-band bench top femtosecond fiber laser (FPL) is a passively mode-locked fiber laser that utilizes a saturable absorber to deliver excellent stability and reliability, with turnkey operation. Along with a portable design, the FPL series offers user-friendly front panel control knobs for flexible adjustment of wavelength, pulse width, and output power. Both tunable (throughout the C-band) and fixed wavelength versions are available. The pulse width is factory selectable from 0.1 to 15 ps, with near transform-limited pulse shape and a better than 20 dB pedestal. The timing jitter is as low as 60 fs. The repetition rate can be specified from 10 to 100 MHz with either a polarization-maintaining (PM) or non-PM fiber output. With up to 20 mW output power, the FPL series is the most economical solution for applications requiring low power, such as seeding amplifier systems. An RF synchronization output is provided as a trigger signal.

Technical Specifications

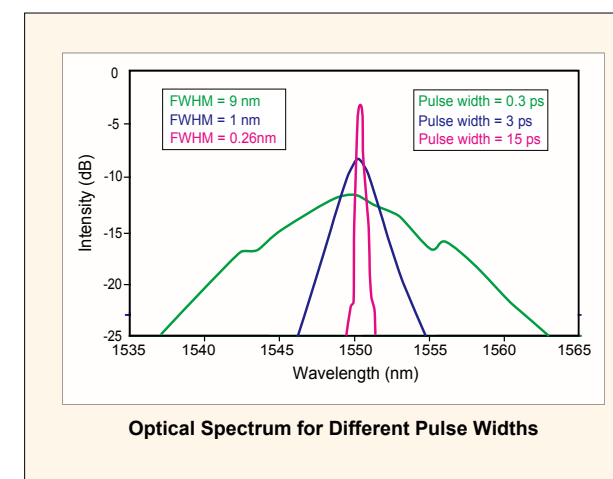
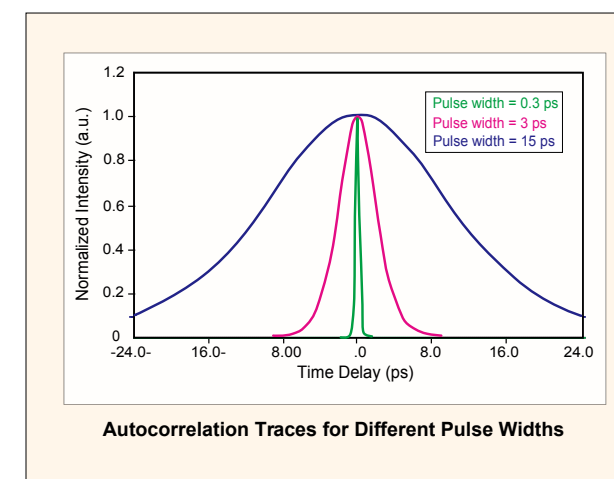
Model Number	FPL-01CAF	FPL-02CAT	FPL-03CCF	FPL-03CCCFPM
Pulse Width (ps)*	0.5	0.5	0.1	0.1
Wavelength (nm)	1550	1535 ~ 1560 (tunable)	1550	
Repetition Rate (MHz)**	20			
Peak Output Power (W)	100	400	10K	5K
Average Power (mW)	>1	>4	20	10
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)			
Spectral Width (nm)	5.0		30 ~ 40	
Fiber Type	SMF-28***			Panda PM
Polarization Extinction Ratio (dB)	Not applicable			>20
Operating Temp (°C)	10 ~ 35			
Operating Voltage (VAC)	85 ~ 264			
Dimensions (cm)	34(w) x 42(d) x 9(h)			

* Up to 15 ps pulse width available; once selected it is tunable by adjusting pump current. A sech² pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** Other repetition rates within 10 to 100 MHz are available; specifications may change at different repetition rates.

*** PM fiber is an option.

Due to our continuous improvement program, specifications are subject to change without notice



C-band Femtosecond Fiber Laser Module



Applications

- OEM integration
- Telecommunication components characterization
- Optical high speed sampling
- Terahertz radiation
- Optical switching
- Materials characterization
- Optical metrology

Features

- Small footprint and ruggedized design
- Wavelength selectable from 1535 to 1565 nm
- Pulse width selectable from 0.1 to 15 ps
- Pulse width tunability
- Near transform-limited output
- Minimal pulse pedestal
- Low timing jitter
- RF synchronization output



The C-band femtosecond fiber laser module (FPL-M) is the most compact of commercially available passively mode-locked fiber lasers. The FPL-M series features a robust architecture that is insensitive to shock and vibration, and provides exceptional stability and reliability for demanding OEM applications. Advanced engineering design and consistent manufacturing process ensure the highest quality standards for OEM volume production.

The wavelength can be selected throughout the C-band. The pulse width is factory selectable from 0.1 to 15 ps, with near transform-limited pulse shape and a better than 20 dB pedestal. The timing jitter is as low as 60 fs. The repetition rate can be specified from 10 to 50 MHz with either a polarization-maintaining (PM) or non-PM fiber output. With up to 20 mW output power, the FPL series is the most economical solution for applications requiring low power, such as seeding amplifier systems. An RF synchronization output is provided as a trigger signal. The FPL-M series can be used either as a stand-alone laser source with a 5 VDC power supply or separate driver, or for integration as an OEM module.

Technical Specifications

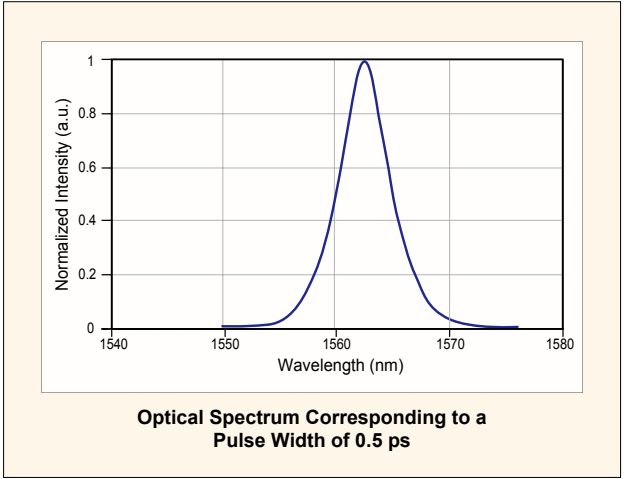
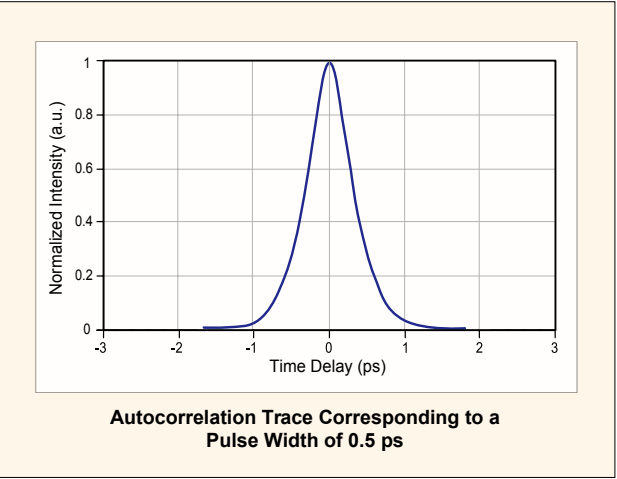
Model Number	FPL-M2CFF	FPL-M3CFF	FPL-M3CFFPM
Pulse Width (ps)*	0.3 ~ 5 (selectable)	0.1 ~ 1 (selectable)	0.1 ~ 1 (selectable)
Wavelength (nm)	1535 ~ 1565 (selectable)		
Repetition Rate (MHz)**	20		
Peak Output Power (W)	300 (typical)	10 K (at pulse width 0.1)	5 K (at pulse width 0.1)
Average Output Power (mW)	4 (typical)	20 (typical)	10 (typical)
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)		
Spectral Width (nm)	5 (typical @ 0.5 ps)	25 (typical @ 0.1 ps)	25 (typical @ 0.1 ps)
Fiber Type	SMF***	SMF***	Panda PM
Polarization Extinction Ratio (dB)	Not applicable	Not applicable	>20
Operating Temp (°C)	10 ~ 35		
Operating Voltage (VDC)	4.5 ~ 5.5		
Dimensions (cm)	9.5(w) x 12.7(d) x 2.0(h)	9.5(w) x 12.7(d) x 4.0(h)	

* Up to 15 ps pulse width available; once selected it is tunable by adjusting pump current. A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** Other repetition rates within 10 to 50 MHz are available, specifications may change at different repetition rates.

*** PM fiber is an option.

Due to our continuous improvement program, specifications are subject to change without notice.



1 μm Femtosecond Fiber Laser Bench Top



Applications

- Biomedical instrumentation
- Optical high speed sampling
- Terahertz radiation
- Optical switching
- Materials characterization
- Optical metrology

Features

- Wavelength tunable from 1030 to 1065 nm
- Pulse width selectable from 0.4 to 10 ps
- Pulse width tunability
- Near transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Long term reliability
- RF synchronization output
- Turnkey operation



The 1 μm bench top femtosecond fiber laser (FPL) series is a passively mode-locked fiber laser that utilizes a saturable absorber to deliver excellent stability and reliability with turnkey operation. Along with a portable design, this Mendocino laser offers user-friendly front panel control knobs for flexible adjustment of wavelength, pulse width, and output power. Both tunable (from 1030 to 1065 nm) and fixed wavelength versions are available. The pulse width is factory selectable from 0.4 to 10 ps with near transform-limited pulse shape. The timing jitter is as low as 60 fs. The repetition rate can be specified from 10 to 50 MHz. With up to 20 mW output power, the FPL series is the most economical solution for applications requiring low power, such as seeding amplifier systems. An RF synchronization output is provided as a trigger signal.

Technical Specifications

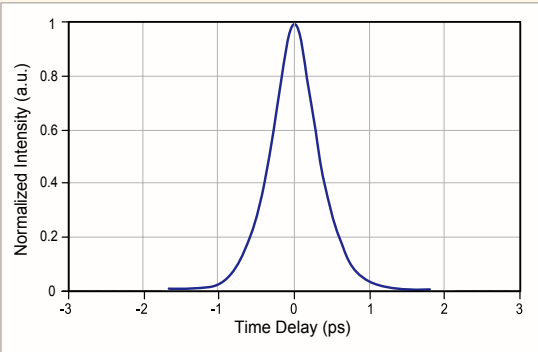
Model Number	FPL-01UFF	FPL-01UFT	FPL-02UFF	FPL-02UFT
Pulse Width (ps)*	0.4 ~ 10 (selectable)		0.8 ~ 10 (selectable)***	
Wavelength (nm)	1030 ~ 1065 (selectable)	1040 ~ 1065 (tunable) [†]	1030 ~ 1065 (selectable)	1040 ~ 1065 (tunable) [†]
Repetition Rate (MHz)**	40			
Average Output Power (mW)	0.5 (1 typical)	0.2 ~ 1 (wavelength dependent)	>10 (20 typical)	
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)			
Spectral Width (nm)	2 ~ 4		8 ~ 15	
Polarization Extinction Ratio (dB)	>20			
Operating Temp (°C)	10 ~ 35			
Operating Voltage (VAC)	85 ~ 264			
Dimension (cm)	34(w) x 42(d) x 9(h)			

* Once pulse width is selected, it is tunable by adjusting pump current. A Gaussian pulse shape (convolution factor of 0.7) is used to determine the pulse width for the second harmonic autocorrelation trace.

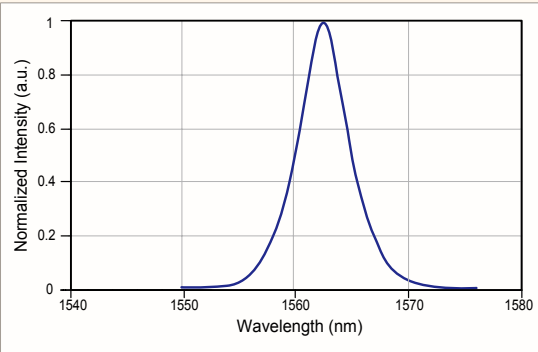
** Other repetition rates within 10 to 50 MHz are available; specifications may change at different repetition rates.

*** Compressible by end user to 0.2 ps for output pulses longer than 4 ps.
† 1030 ~ 1065 nm (typical tuning available).

Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Trace Corresponding to a Pulse Width of 0.5 ps



Optical Spectrum Corresponding to a Pulse Width of 0.5 ps

1 μm Femtosecond Fiber Laser Module



Applications

- OEM integration
- Biomedical instrumentation
- Optical high speed sampling
- Terahertz radiation
- Optical switching
- Materials characterization
- Optical metrology

Features

- Small footprint and ruggedized design
- Wavelength selectable from 1030 to 1065 nm
- Pulse width selectable from 0.4 to 10 ps
- Pulse width tunability
- Near transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Long term reliability
- RF synchronization output
- Cost effective
- Fiber-based architecture



The 1 μm femtosecond fiber laser module (FPL-M) is the most compact commercially available passively modelocked fiber laser. The FPL-M series features a robust architecture that is insensitive to shock and vibration and provides exceptional stability and reliability for demanding OEM applications. Advanced engineering design and consistent manufacturing process ensure the highest quality standards for OEM volume production. The wavelength can be selected from 1030 to 1065 nm. The pulse width is factory selectable from 0.4 to 10 ps, with near transform-limited pulse shape. The timing jitter is as low as 60 fs. The repetition rate can be specified from 10 to 50 MHz. With up to 20 mW output power, the FPL-M series is the most economical solution for applications requiring low power, such as seeding amplifier systems. An RF synchronization output is provided as a trigger signal. The FPL-M series can be used either as a stand-alone laser source with a 5 VDC power supply or a separate driver, or for integration as an OEM module.

Technical Specifications

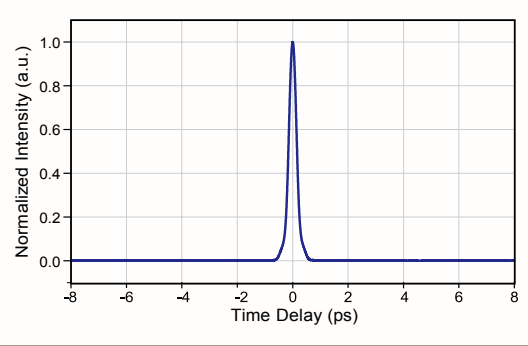
Model Number	FPL-M1UFF	FPL-M2UFF
Pulse Width (ps)*	0.4 ~ 10 (selectable)	0.8 ~ 10 (selectable) ***
Central Wavelength (nm)	1030 ~ 1065 (selectable)	
Repetition Rate (MHz)**	40	
Average Output Power (mW)	>0.5 (1 typical)	>10 (20 typical)
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)	
Polarization Extinction Ratio (dB)	>20	
Spectral Width (nm)	5 ~ 20	
Operating Temp (°C)	10 ~ 35	
Operating Voltage (VDC)	4.5 ~ 5.5	
Dimensions (cm)	9.5(w) x 12.7(d) x 2.0(h)	9.5(w) x 12.7(d) x 4.0(h)

* Once pulse width is selected, it is tunable by adjusting pump current. A Gaussian pulse shape (convolution factor of 0.7) is used to determine the pulse width for the second harmonic autocorrelation trace.

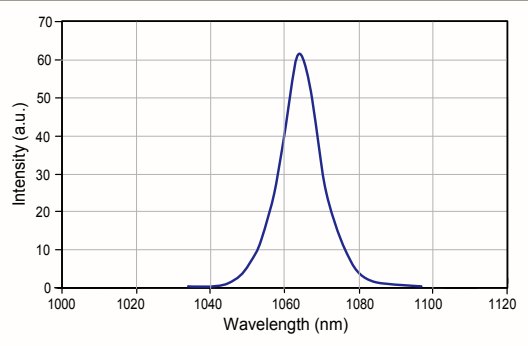
** Other repetition rates within 10 to 50 MHz are available; specifications may change at different repetition rates.

*** Compressible by end user to 0.2 ps for output pulses longer than 4 ps.

Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Trace Corresponding to a Pulse Width of 0.27 ps



Optical Spectrum Corresponding to a Pulse Width of 0.27 ps

1 μm Sub-watt Femtosecond Fiber Laser Module



Applications

- OEM integration
- Biomedical instrumentation
- Terahertz radiation
- Materials characterization
- Micro machining and materials processing

Features

- Small footprint and ruggedized design
- Wavelength selectable from 1030 to 1065 nm
- Pulse width selectable from 6 to 200 ps
- Pulse width tunability
- Linearly polarized output
- Minimal pulse pedestal
- Long term reliability
- RF synchronization output



The 1 μm sub-watt femtosecond fiber laser module (FPL-M3U) is the most compact of commercially available, passively mode-locked fiber laser with output power of a few hundreds of mW. This FPL-03U series features a robust architecture that is insensitive to shock and vibration and provides exceptional stability and reliability for demanding OEM applications. Advanced engineering design and consistent manufacturing process ensure the highest quality standards for OEM volume production. The wavelength can be selected or tuned from 1030 to 1065 nm. The pulse width is factory selectable from 6 to 200 ps. The timing jitter is as low as 60 fs. The repetition rate can be specified from 10 to 50 MHz. With up to 400 mW output power, the FPL-03U series is the most economical solution for medium power applications, such as seeding high power amplifiers. An RF synchronization output is provided as a trigger signal. The FPL-M3U series can be used either as a stand-alone laser source with a 5 VDC power supply or separate driver, or for integration as an OEM module.

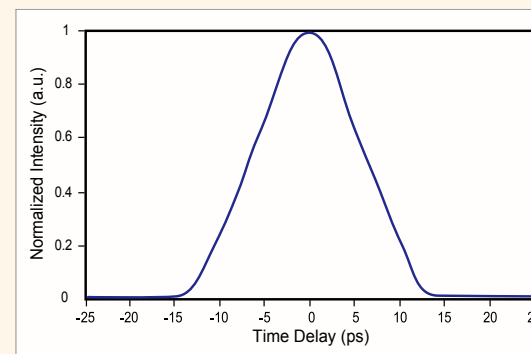
Technical Specifications

Model Number	FPL-03UFF0
Pulse Width (ps)	>6*
Wavelength (nm)	1030 ~ 1065 (s electable)
Repetition Rate (MHz)**	40
Average Output Power (mW)	400 (typical)
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)
Spectral Width (nm)	30 ~ 40
Termination	Collimated beam in free space or fiber
Polarization Extinction Ratio (dB)	>20
Operating Temp ($^{\circ}\text{C}$)	10 ~ 35
Operating Voltage (VDC)	4.5 ~ 5.5
Dimension (cm)	20(w) x 13(d) x 4(h)

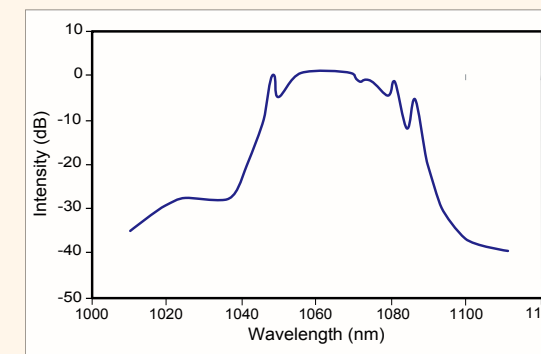
* Compressible to 0.15 ps. Pulse widths within 6 to 200 ps are available. A Gaussian pulse shape (convolution factor of 0.7) is used to determine the pulse width for the second harmonic autocorrelation trace.

** Other repetition rates within 10 to 50 MHz are available.

Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Trace Corresponding to a Chirped Pulse Width of 10 ps



Optical Spectrum Corresponding to a Chirped Pulse Width of 10 ps

High Power Femtosecond Fiber Laser Bench Top



Applications

- Seeding of ultra high output power lasers
- Biomedical instrumentation
- Terahertz radiation
- Nonlinear optical studies
- Micro machining and material processing

Features

- Average output power up to 5 W
- Wavelength at 1.0 μm or 1.55 μm
- Pulse width 0.3 or 0.5 ps
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- RF synchronization output
- Turnkey operation



The high power femtosecond fiber laser bench top (FPL-05) is a passively mode-locked fiber laser that utilizes a saturable absorber to deliver excellent stability and reliability with turnkey operation. Along with a portable design, this FPL series offers user-friendly front panel control knobs for flexible adjustment of wavelength, pulse width and output power. The wavelength can be selected at 1.0 μm or 1.55 μm . The pulse width can be 0.3 or 0.5 ps with timing jitter as low as 60 fs. The repetition rate can be specified from 10 to 50 MHz with output power levels up to 5 W. An RF synchronization output is provided as a trigger signal.

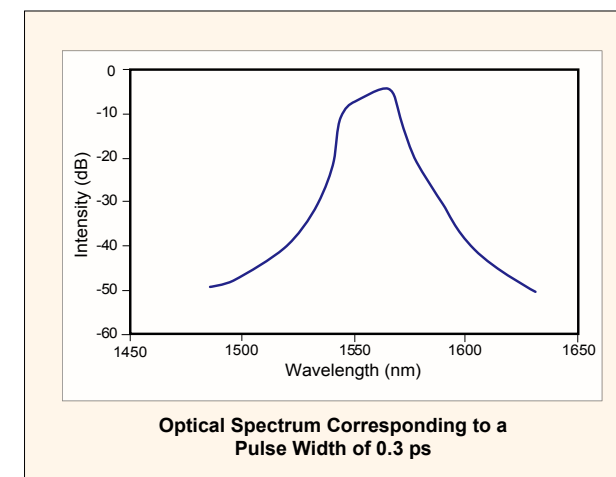
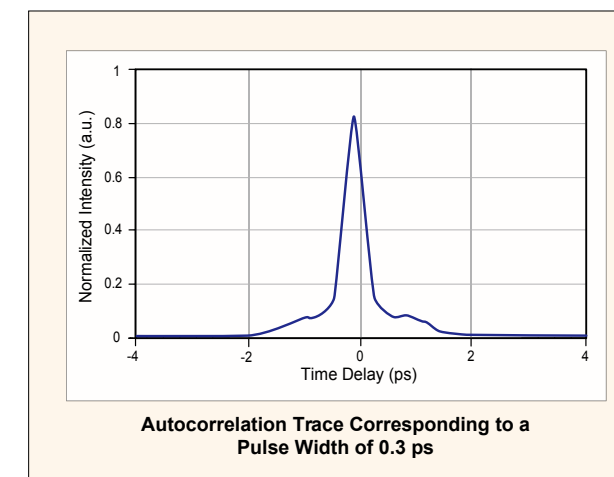
Technical Specifications

Model Number	FPL-05C	FPL-05U
Pulse Width (ps)*	0.3	0.5
Central Wavelength (μm)	1.55	1.0
Repetition Rate (MHz)**	20	
Average Power (W)	>1	1 ~ 5 (selectable)
Timing Jitter (fs)	60	
Output Beam (mm)	Free space, diameter 3 (typical), M2<1.2	
Operating Temp ($^{\circ}\text{C}$)	10 ~ 35	
Operating Voltage (VAC)	85 ~ 264	
Dimension (cm)	Fiber Laser	48(w) x 42(d) x 9(h)
	Compressor	48(w) x 42(d) x 9(h)

* A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** Other repetition rates within 10 to 50 MHz are available; Specifications may change at different repetition rates.

Due to our continuous improvement program, specifications are subject to change without notice.



L-band Femtosecond Fiber Laser



Applications

- OEM integration
- Optical high speed sampling
- Optical switching
- Optical metrology

Features

- Small footprint and ruggedized design
- Wavelength selectable from 1566 to 1587 nm
- Pulse width selectable from 0.3 to 1.2 ps
- Pulse width tunability
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- RF synchronization output



The L-band femtosecond fiber laser module (FPL-M1L) is the most compact of commercially available, passively mode-locked fiber lasers. The FPL-M1L laser features a robust architecture that is insensitive to shock and vibration and provides exceptional stability and reliability for demanding OEM applications. Advanced engineering design and consistent manufacturing process ensure the highest quality standards for OEM volume production. The wavelength can be selected from 1566 to 1587 nm. The pulse width is factory selectable from 0.3 to 1.2 ps, with near transform-limited pulse shape and a better than -20 dB pedestal. The timing jitter is as low as 60 fs. The repetition rate can be specified at more than 10 MHz. An RF synchronization output is provided as a trigger signal. The FPL-M1L series can be either used as a stand-alone laser source with a 5 VDC power supply or a separate driver, or for integration as an OEM module. FPL-01L bench top series is also available.

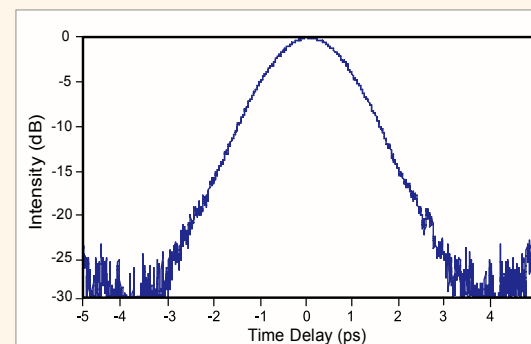
Technical Specifications

Model Number	FPL-01L-FF	FPL-M1L-FF
Pulse Width (ps)*	0.3 ~ 1.2 (selectable)	
Wavelength (nm)	1566 ~ 1587 (selectable)	
Repetition Rate (MHz)**	~ 10	
Average Output Power (mW)	>0.2	
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)	
Fiber Type	Panda PM	
Polarization Extinction Ratio (dB)	>20	
Spectral Width (nm)	2.5 (typical when pulse width is 1.0 ps)	
Operating Temp (°C)	15 ~ 30	
Operating Voltage (V)	85 ~ 264 AC	4.5 ~ 5.5 DC
Dimensions (cm)	34(w) x 42(d) x 9(h)	15.2(w) x 12.6(d) x 2.0(h)

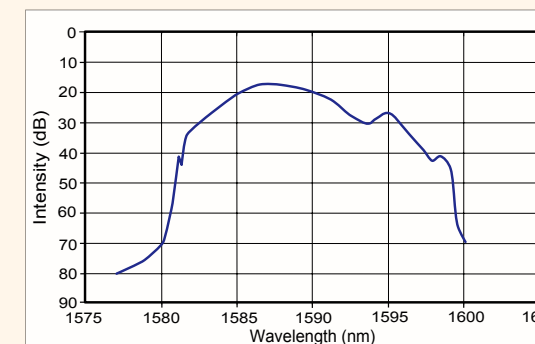
* A sech² pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** Other repetition rates are also available; specifications may change at different repetition rates.

Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Trace Corresponding to a Pulse Width of 1.0 ps



Optical Spectrum Corresponding to a Pulse Width of 1.0 ps

780 nm Femtosecond Fiber Laser Bench Top



Driver not shown.

Applications

- Biophotonics
- Terahertz radiation
- Seeding Ti:sapphire amplifiers
- Materials characterization
- Optical metrology
- Multiphoton imaging microscope

Features

- Wavelength tunable from 765 to 780 nm
- Pulse widths as short as 0.1 ps
- Near transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- RF synchronization output
- Turnkey operation



The 780 nm bench top femtosecond fiber laser (FPL) is a second harmonic generation (SHG) product of a passively mode-locked fiber laser in C-band. It has excellent stability, reliability and turnkey operation. Along with a portable design, this FPL series offers user-friendly front panel control knobs for flexible adjustment of wavelength, pulse width and output power. The wavelength can be tuned from 765 to 780 nm range. The pulse width is as low as 0.1 ps with near transform-limited pulse shape and a better than -20 dB pedestal. The timing jitter is as low as 60 fs. The repetition rate can be specified from 10 to 50 MHz with a polarization-maintaining (PM) output. With up to 50 mW output power, the FPL series is a versatile optical source. Both free space output and fiber-coupled output are available for the convenience of end users. It can be separated as a C-band seed laser module and a SHG module, or integrated into one box. An RF synchronization output is provided as a trigger signal.

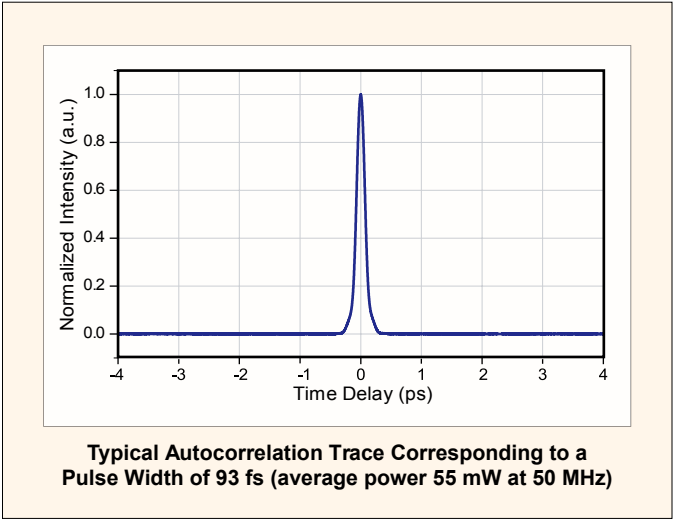
Technical Specifications

Model Number	FPL-03RFF0	FPL-02RFF1	FPL-02RFT0	FPL-02RFT1
Pulse Width (ps)*	0.1	0.5	0.1	0.5
Output	Free Space	Fiber Coupled	Free Space	Fiber Coupled
Wavelength (nm)	780		765 ~ 780 (tunable)	
Repetition Rate (MHz)**	20			
Peak Output Power (W)	5 K	500	1.2 K	300
Average Output Power (mW)	>50 @ 40 MHz	>6 @ 40 MHz	>6 @ 20 MHz	>2 @ 20 MHz
Timing Jitter (fs)	60 (carrier offset 100 Hz ~ 1 MHz)			
Spectral Width (nm)	7 (typical)	10 (typical)	7 (typical)	10 (typical)
Operating Temp (°C)	10 ~ 35			
Operating Voltage (VAC)	85 ~ 264			
Dimensions (cm)	Head: 13(w) x 11(d) x 3(h)		Driver: 34(w) x 42(d) x 9(h)	

* A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** Other repetition rates are also available.

Due to our continuous improvement program, specifications are subject to change without notice.



10 GHz Picosecond Fiber Laser



Applications

- Optical clock for 10, 20, 40, 80, 160 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Repetition rate continuously tunable from 5 to 11 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width selectable from 1.2 to 10 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter



The C-band 10 GHz picosecond fiber laser (PSL-10) is an actively mode-locked fiber laser with repetition rates from 5 to 11 GHz. This laser provides a stable and reliable optical clock with turnkey operation. Along with a portable design, the PSL-10 series offers user-friendly front panel control knobs for flexible adjustment of wavelength and output power. The wavelength can be tuned throughout the C-band. The pulse width is factory selectable from 1.2 to 10 ps, with transform-limited spectral width and better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

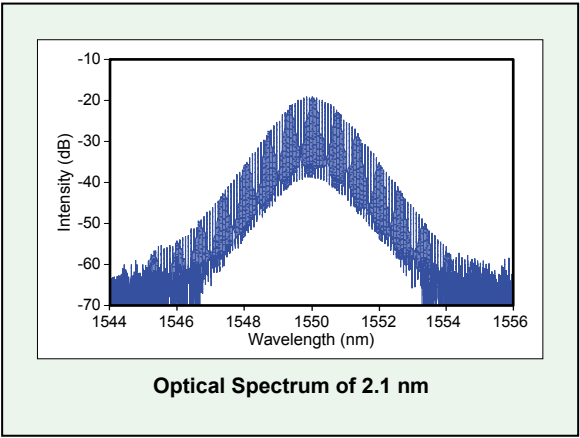
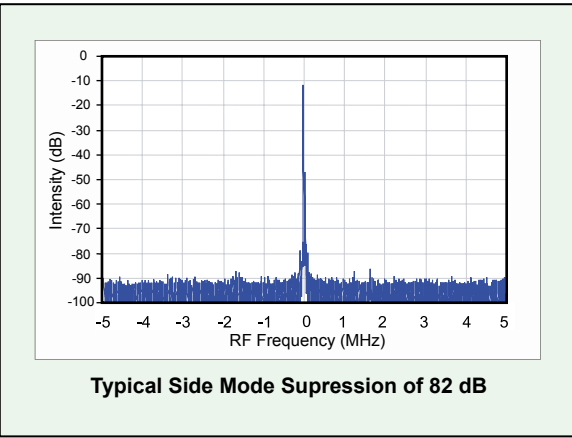
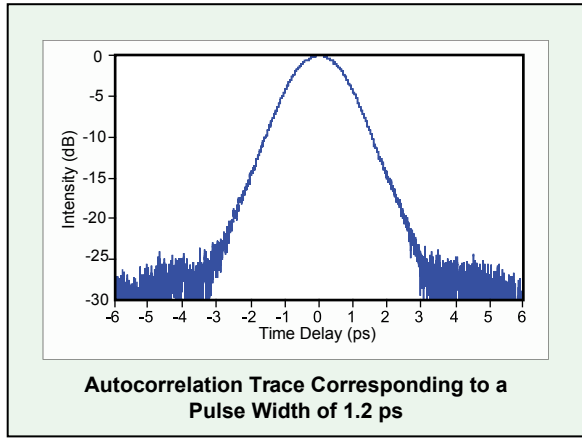
Technical Specifications

Model Number	PSL-10-TT
Pulse Width (ps)*	1.5 ~ 10 (tunable)
Output Wavelength (nm)**	1530 ~ 1565 (tunable)
Repetition Rate (GHz)	5 ~ 11 (tunable)
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)
Amplitude Noise (%)	<1
Output Power at 10 GHz (mW)	>20
Operating Temp (°C)	15 ~ 30
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	48(w) x 42(d) x 9(h)

* A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



10 GHz Picosecond Fiber Laser - Tunable Pulse Width



Applications

- Optical clock for 10, 20, 40, 80, 160 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Automatic mode-locking
- Repetition rate continuously tunable from 5 to 11 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width tunable from 1.5 to 10 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- Turn key operation
- Remote performance monitoring



The C-band 10 GHz picosecond fiber laser (PSL-10-TT) is an actively mode-locked fiber laser with repetition rate from 5 to 11 GHz that provides a stable and reliable optical clock with turnkey operation. Along with a portable design, the PSL-10-TT laser offers user-friendly front panel control knobs for flexible adjustment of wavelength, pulse width and output power. The wavelength can be tuned throughout the C-band. The pulse width can be tuned from 1.5 to 10 ps, with transform-limited spectral width and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need of an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

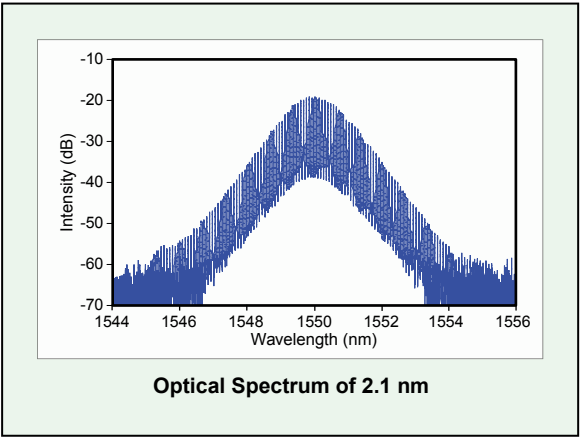
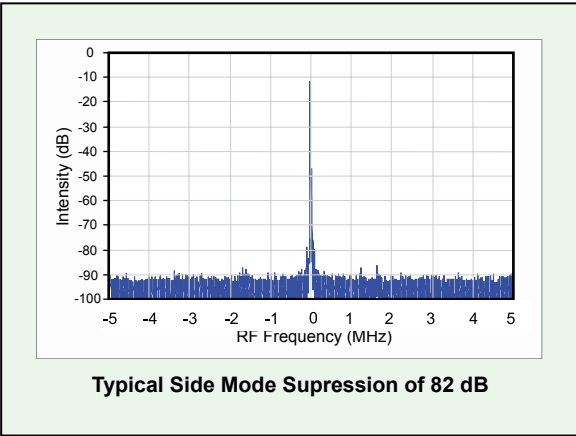
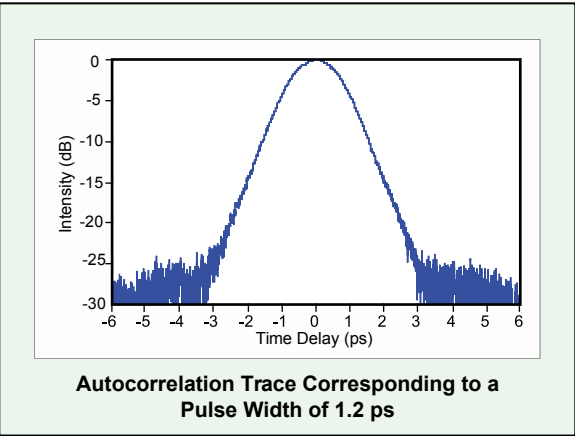
Technical Specifications

Model Number	PSL-10-TT
Pulse Width (ps)*	1.5 ~ 10 (tunable)
Output Wavelength (nm)**	1530 ~ 1565 (tunable)
Repetition Rate (GHz)	5 ~ 11 (tunable)
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)
Amplitude Noise (%)	<1
Output Power at 10 GHz (mW)	>20
Operating Temp (°C)	15 ~ 30
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	48(w) x 42(d) x 9(h)

* A sech^2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



10 GHz Picosecond Fiber Laser - Auto Mode-locking



Applications

- Optical clock for 10, 20, 40, 80, 160 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Automatic mode-locking
- Repetition rate continuously tunable from 5 to 11 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width tunable from 1.5 to 10 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- Turn key operation
- Remote performance monitoring



The C-band 10 GHz picosecond fiber laser (PSL-10-AUTO) is an actively mode-locked fiber laser with automatic mode-locking function, which is achieved by a built-in computer with proprietary software design. It provides a stable and reliable optical clock with turnkey operation. A front panel switch allows the selection of either automatic mode-locking (by computer) or manual mode-locking. Other user-friendly front panel control knobs offer flexible adjustment of wavelength, pulse width and output power. The wavelength can be tuned throughout the C-band. The pulse width can be tuned from 1.5 to 10 ps, with transform-limited spectral width and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m wavelength emission are also available.

Calmar is the first and only vendor that offers automatic mode-locking features. The automatic mode-locking feature is especially advantageous for users not familiar with the operational requirements of actively modelocked fiber lasers. This feature enables industrial and OEM applications. Once the required parameters such as wavelength, pulse width and repetition rate are set by end users, the laser itself will execute mode locking automatically. The remote control software ensures ease of use via readily accessible graphical controls viewable on the computer monitor.

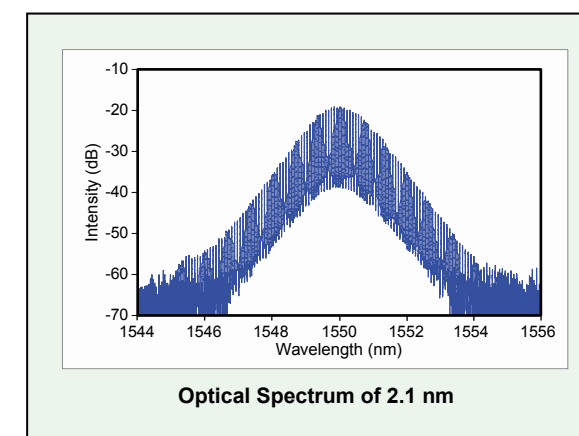
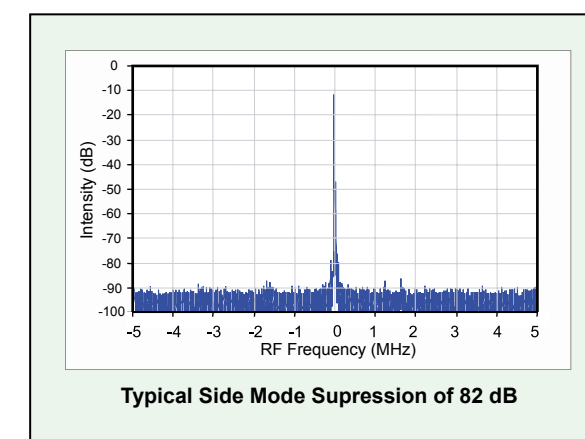
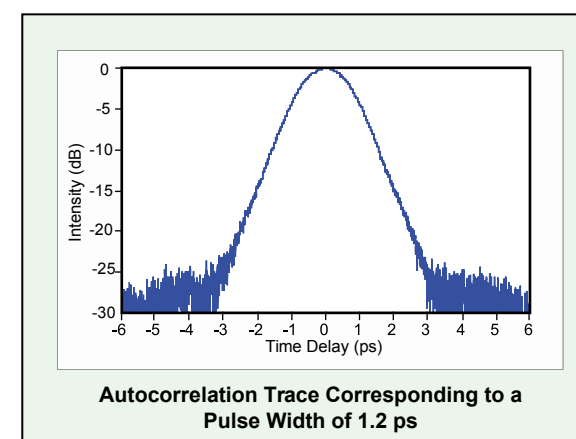
Technical Specifications

Model Number	PSL-10-AUTO
Pulse Width (ps)*	1.5 ~ 10 (tunable)
Output Wavelength (nm)**	1530 ~ 1565 (tunable)
Repetition Rate (GHz)	5 ~ 11 (tunable)
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)
Amplitude Noise (%)	<1
Output Power at 10 GHz (mW)	>20
Operating Temp (°C)	15 ~ 30
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	48(w) x 42(d) x 9(h)

* A sech² pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



25 GHz Picosecond Fiber Laser



Applications

- 100 GHz Ethernet
- Optical clock for 25, 50, 100, 200 GHz OTDM system
- Transmission network characterization
- Spectral comb
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Repetition rate continuously tunable from 22 to 28 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width selectable from 1.5 to 10 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- Optional automatic mode-locking



The C-band 25 GHz picosecond fiber laser (PSL-25) is an actively mode-locked fiber laser with repetition rate from 22 to 28 GHz that provides a stable and reliable optical clock with turnkey operation, specially designed for 100 GHz Ethernet applications. A 100 GHz pulse rate is achieved by using the PSL-25 in conjunction with Calmar's Bit Rate Multiplier (BRM-T4). Along with a portable design, the PSL-25 series offers user-friendly front panel control knobs for flexible adjustment of wavelength and output power. The wavelength can be tuned throughout the C-band. The pulse width is factory selectable from 1.5 to 10 ps, with transform-limited spectral width and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

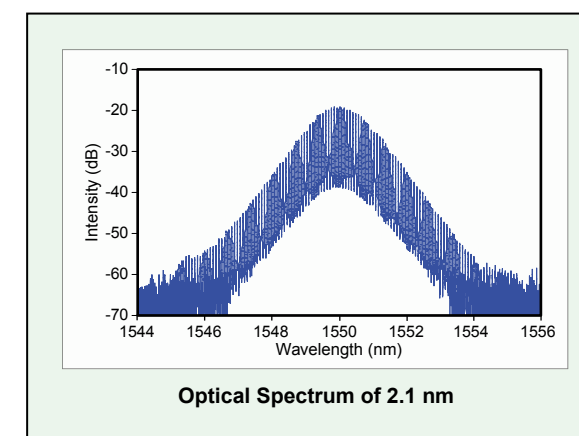
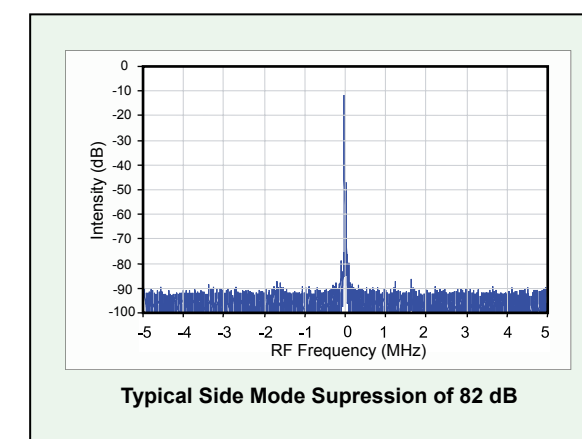
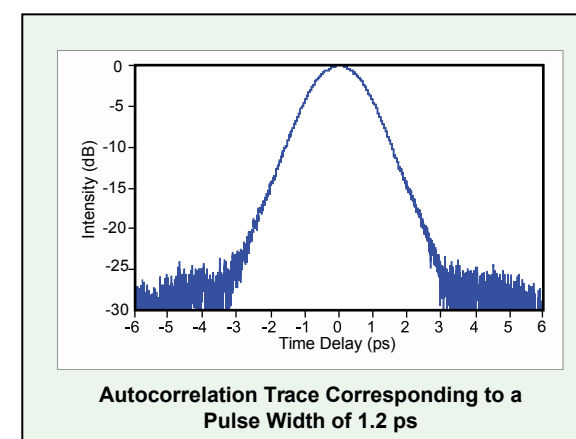
Technical Specifications

Model Number	PSL-25-1T	PSL-25-2T
Pulse Width (ps)*	<1.5	<2.0
Output Wavelength (nm)**	1530 ~ 1565 (tunable)	
Repetition Rate (GHz)	22 ~ 28 (tunable)	
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)	
Amplitude Noise (%)	<1	
Output Power (mW)	>20	
Operating Temp (°C)	15 ~ 30	
Operating Voltage (VAC)	85 ~ 264	
Dimensions (cm)	48(w) x 42(d) x 9(h)	

* A sech² pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



40 GHz Picosecond Fiber Laser



Applications

- Optical clock for 40, 80, 160, 320 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Repetition rate continuously tunable from 38 to 42 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width selectable from 1 to 5 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter



The C-band 40 GHz picosecond fiber laser (PSL-40) is an actively mode-locked fiber laser with repetition rate from 38 to 42 GHz that provides a stable and reliable optical clock with turnkey operation. Along with a portable design, the PSL-40 series offers user-friendly front panel control knobs for flexible adjustment of wavelength and output power. The wavelength can be tuned throughout the C-band. The pulse width is factory selectable from 0.8 to 5 ps, with transform-limited spectral width and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

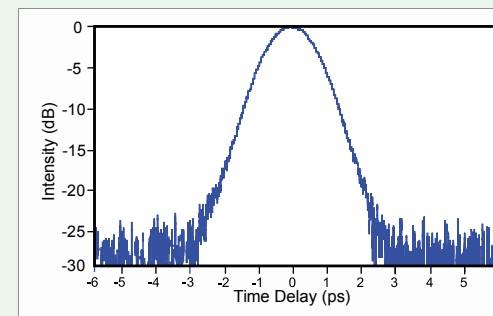
Technical Specifications

Model Number	PSL-40-1T	PSL-40-2T
Pulse Width (ps)*	<1.0	<2.0
Output Wavelength (nm)**	1530 ~ 1565 (tunable)	
Repetition Rate (GHz)	38 ~ 42 (tunable)	
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)	
Amplitude Noise (%)	<1	
Output Power (mW)	>20	
Operating Temp (°C)	15 ~ 30	
Operating Voltage (VAC)	85 ~ 264	
Dimensions (cm)	48(w) x 42(d) x 9(h)	

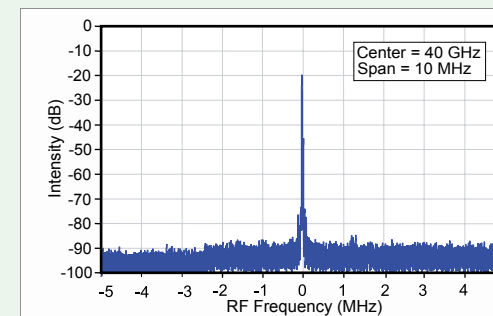
* Pulse width is selectable within 0.8 to 5 ps. A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

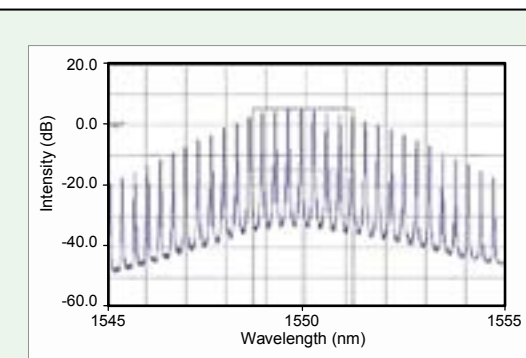
Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Trace Corresponding to a Pulse Width of 0.8 ps



Typical Side Mode Suppression of 72 dB



Optical Spectrum of 3.4 nm

40 GHz Picosecond Fiber Laser - Tunable Pulse Width



Applications

- Optical clock for 40, 80, 160, 320 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Repetition rate continuously tunable from 38 to 42 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width tunable from 0.8 to 5 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter



The C-band 40 GHz picosecond fiber laser (PSL-40-TT) is an actively mode-locked fiber laser with a repetition rate from 38 to 42 GHz that provides a stable and reliable optical clock with turnkey operation. Along with a portable design, the PSL-40-TT series offers user-friendly front panel control knobs for flexible adjustment of wavelength, pulse width and output power. The wavelength can be tuned throughout the C-band. The pulse width can be tuned from 0.8 to 5 ps, with transform-limited spectral width and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

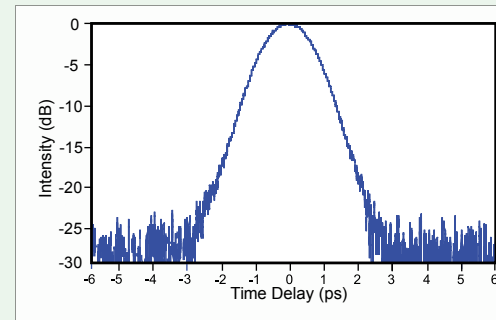
Technical Specifications

Model Number	PSL-40-TT
Pulse Width (ps)*	0.8 ~ 5 (tunable)
Output Wavelength (nm)**	1530 ~ 1565 (tunable)
Repetition Rate (GHz)	38 ~ 42 (tunable)
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)
Amplitude Noise (%)	<1
Output Power (mW)	>20
Operating Temp (°C)	15 ~ 30
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	48(w) x 42(d) x 9(h)

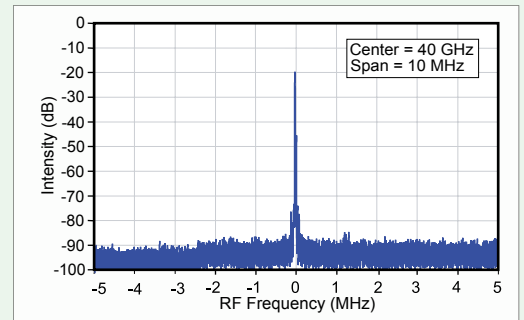
* A sech² pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

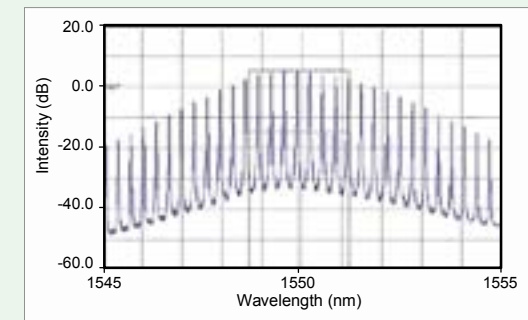
Due to our continuous improvement program, specifications are subject to change without notice.



Autocorrelation Trace Corresponding to a Pulse Width of 0.8 ps



Typical Side Mode Suppression of 72 dB



Optical Spectrum of 3.4 nm

40 GHz Picosecond Fiber Laser - Auto Mode-locking



Applications

- Optical clock for 40, 80, 160, 320 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Automatic mode-locking
- Repetition rate continuously tunable from 38 to 42 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width tunable from 1 to 5 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- Turn key operation
- Remote performance monitoring



The C-band 40 GHz picosecond fiber laser (PSL-40-AUTO) is an actively mode-locked fiber laser with automatic mode-locking function, which is achieved by a built-in computer with proprietary software design. It provides a stable and reliable optical clock with turnkey operation. A front panel switch allows the selection of either automatic mode-locking (by computer) or manual mode-locking. Other user-friendly front panel control knobs offer flexible adjustment of wavelength, pulse width, and output power. The wavelength can be tuned throughout the C-band. The pulse width can be tuned from 1 to 5 ps, with transform-limited pulse shape and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

Calmar is the first and only vendor that offers automatic mode-locking features. The automatic mode-locking feature is especially advantageous for users not familiar with the operational requirements of actively modelocked fiber lasers. This feature enables industrial and OEM applications. Once the required parameters such as wavelength, pulse width and repetition rate are set by end users, the laser itself will execute mode locking automatically. The remote control software ensures ease of use via readily accessible graphical controls viewable on the computer monitor.

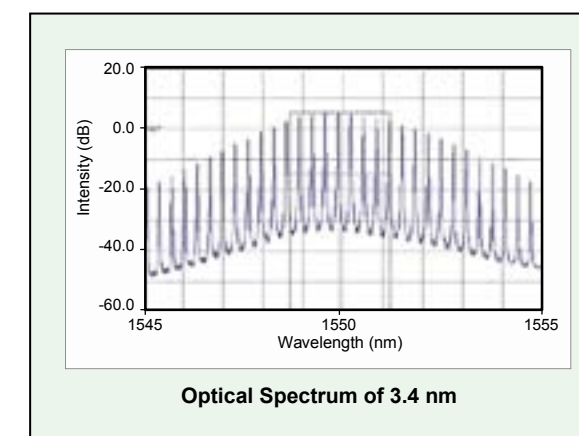
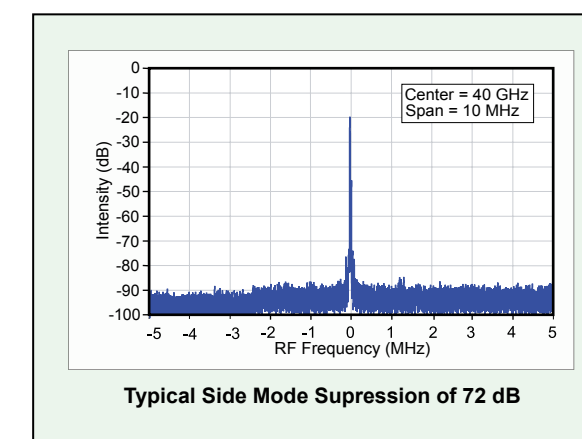
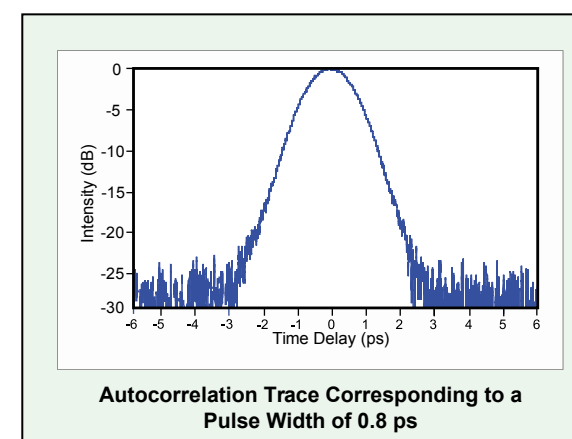
Technical Specifications

Model Number	PSL-40-AUTO
Pulse Width (ps)*	0.8 ~ 5 (tunable)
Output Wavelength (nm)**	1530 ~ 1565 (tunable)
Repetition Rate (GHz)	38 ~ 42 (tunable)
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)
Amplitude Noise (%)	<1
Output Power (mW)	>20
Operating Temp (°C)	15 ~ 30
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	48(w) x 42(d) x 9(h)

* Pulse width is tunable within 1 to 5 ps. A sech2 pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



40 GHz Picosecond Fiber Laser - Auto Mode-locking



Applications

- Optical clock for 40, 80, 160, 320 GHz OTDM system
- Spectral comb
- Transmission network characterization
- High speed O/E conversion
- Optical sampling
- Metrology

Features

- Automatic mode-locking
- Repetition rate continuously tunable from 38 to 42 GHz
- Wavelength tunable from 1530 to 1565 nm
- Pulse width tunable from 1 to 5 ps
- Average output power greater than 20 mW
- Transform-limited output
- Linearly polarized output
- Minimal pulse pedestal
- Low timing jitter
- Turn key operation
- Remote performance monitoring



The C-band 40 GHz picosecond fiber laser (PSL-40-AUTO) is an actively mode-locked fiber laser with automatic mode-locking function, which is achieved by a built-in computer with proprietary software design. It provides a stable and reliable optical clock with turnkey operation. A front panel switch allows the selection of either automatic mode-locking (by computer) or manual mode-locking. Other user-friendly front panel control knobs offer flexible adjustment of wavelength, pulse width, and output power. The wavelength can be tuned throughout the C-band. The pulse width can be tuned from 1 to 5 ps, with transform-limited pulse shape and a better than -20 dB pedestal. The timing jitter is as low as 50 fs and the side mode suppression is better than -75 dB. An output power of greater than 20 mW obviates the need for an additional optical amplification stage. Options for 780 nm or 1 μ m band are also available.

Calmar is the first and only vendor that offers automatic mode-locking features. The automatic mode-locking feature is especially advantageous for users not familiar with the operational requirements of actively modelocked fiber lasers. This feature enables industrial and OEM applications. Once the required parameters such as wavelength, pulse width and repetition rate are set by end users, the laser itself will execute mode locking automatically. The remote control software ensures ease of use via readily accessible graphical controls viewable on the computer monitor.

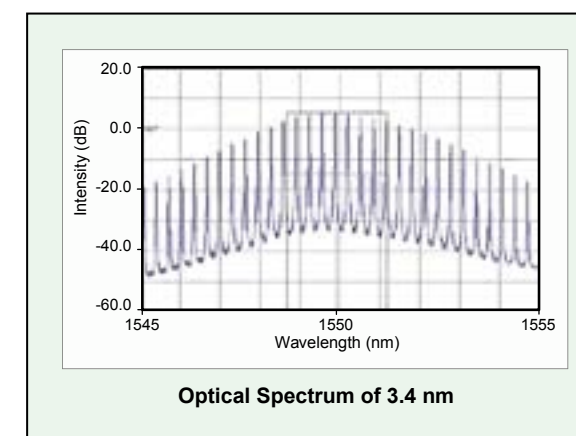
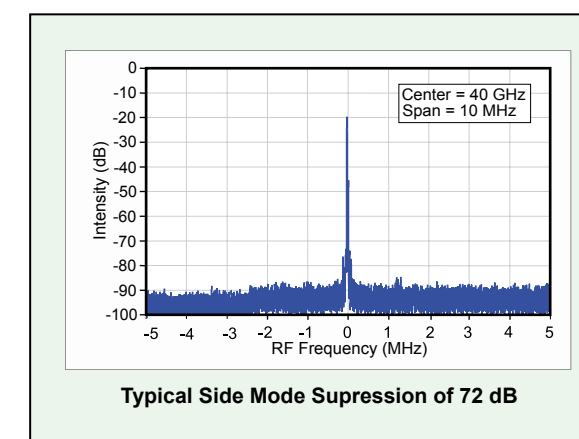
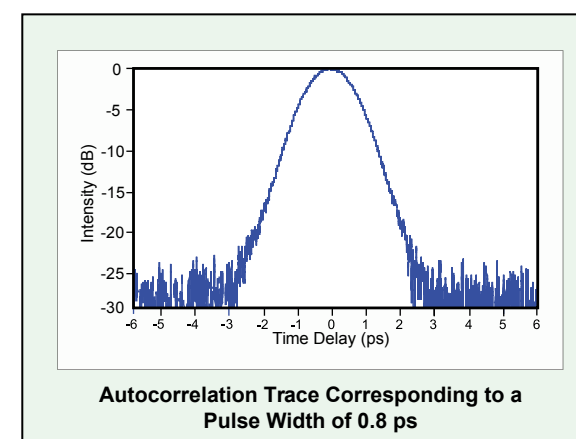
Technical Specifications

Model Number	PSL-40-AUTO
Pulse Width (ps)*	0.8 ~ 5 (tunable)
Output Wavelength (nm)**	1530 ~ 1565 (tunable)
Repetition Rate (GHz)	38 ~ 42 (tunable)
Timing Jitter (fs)	<50 (carrier offset 100 Hz ~ 1 MHz)
Amplitude Noise (%)	<1
Output Power (mW)	>20
Operating Temp (°C)	15 ~ 30
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	48(w) x 42(d) x 9(h)

* Pulse width is tunable within 1 to 5 ps. A sech² pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

** 780 nm or 1 μ m band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



EDFA Bench Top



Applications

- Short pulse amplification
- C-band channel amplification booster, Pre-amp
- Narrow band amplification in access network or CATV network
- DWDM metro network
- Core network

Features

- Nominal gain 25 to 35 dB
- Saturated output power up to 37 dBm
- Wavelength range 1530 to 1565 nm
- Input power range from -25 to 10 dBm
- Low noise figure
- Easy operation
- Long term stability



The Erbium-Doped Fiber Amplifier (AMP) bench top is an optical amplifier system using erbium-doped fiber as the gain medium that provides high gain and a low noise figure. Calmar’s AMP is optimized for short pulse amplification. It offers exceptional stable and reliable performance with turnkey operation. Along with a portable design, AMP provides stable saturated output power up to 37 dBm and noise figure of less than 6 dB. It offers either a polarization-maintaining (PM) or non-PM fiber output. The polarization maintaining EDFA (AMP-PM) ensures the amplified output is linearly polarized and eliminates unwanted polarization effects. An option for an L-band EDFA is also available.

Technical Specifications

High Power EDFA Polarization Maintaining Series

Model Number	AMP-PM-18	AMP-PM-22	AMP-PM-30	AMP-PM-37
Output Power (dBm)*	18	22	30	37
Input Power Range (dBm)	-25 ~ +10	-25 ~ +10	0 ~ 3	0 ~ 3
Wavelength (nm)**	1530 ~ 1565	1530 ~ 1565	1540 ~ 1565	1540 ~ 1565
Typical Noise Figure (dB)	<5.5	<6.0	<6.5	<6.5
Polarization Extinction Ratio (dB)	>20	>20	>17	>17
Operating Temp (°C)	0 ~ 50			
Operating Voltage (VAC)	85 ~ 264			
Dimensions (cm) 3	4(w) x 42(d) x 9(h)		48(w) x 44(d) x 14(h)	

* Other output powers are available.

** L-band is available.

High Power EDFA Series

Model Number	AMP-ST-18	AMP-ST-22	AMP-ST-30	AMP-ST-37
Output Power (dBm)*	18	22	30	37
Input Power Range (dBm)	-25 ~ +10	-25 ~ +10	0 ~ 3	0 ~ 3
Wavelength (nm)**	1530 ~ 1565	1530 ~ 1565	1540 ~ 1565	1540 ~ 1565
Typical Noise Figure (dB)	5.5	5.5	6.0	6.0
Operating Temp (°C)	0 ~ 50			
Operating Voltage (VAC)	85 ~ 264			
Dimension (cm)	34(w) x 42(d) x 9(h)		48(w) x 44(d) x 14(h)	

* Other output powers are available.

** L-band is available.

Due to our continuous improvement program, specifications are subject to change without notice.

EDFA Module



Applications

- OEM integration
- Seed laser amplification
- C-band channel amplification booster, Pre-amp
- Narrow band amplification in access network or CATV network
- DWDM metro network
- Short pulse amplification

Features

- Small footprint and ruggedized design
- Saturated output power 15 to 23 dBm
- Wavelength range 1530 to 1565 nm
- Input power range from -25 to 10 dBm
- Low noise figure
- Easy operation
- Long term stability



The Erbium-Doped Fiber Amplifier (AMP-M) module is a very compact optical amplifier using erbium-doped fiber as the gain medium. Calmar's AMP is optimized for short pulse amplification. It offers high gain and a low noise figure for long term dependable performance. Advanced engineering design and consistent manufacturing process ensure the highest quality standards for OEM volume production. Along with a portable design, it provides stable output power from 15 up to 20 dBm and a low noise figure. It offers either a polarization-maintaining (PM) or non-PM fiber output. The option of a polarization maintaining EDFA (AMP-PM) module ensures the amplified output is linearly polarized and eliminates unwanted polarization effects. Driven by a 5 VDC power supply, the module can be a stand-alone amplifier or an OEM unit for integration into end-user's application systems. An option for an L-band EDFA module is available.

Technical Specifications

Polarization Maintaining EDFA Module Series

Model Number	AMP-PM15M	AMP-PM17M	AMP-PM20M
Output Power (dBm)*	15	17	20
Small Signal Gain (dB)	25	30	35
Input Power Range (dBm)	-25 ~ +10		
Wavelength (nm)**	1530 ~ 1565		
Noise Figure (dB)	<5.0	<5.5	<6.5
Polarization Extinction Ratio (dB)	>20		
Operating Temp (°C)	0 ~ 50		
Operating Voltage (VDC)	4.5 ~ 5.5		
Dimensions (cm)	9.5(w) x 12.7(d) x 2.0(h)		

* Other output powers are available.

** L-band option is available.

Non-Polarization Maintaining EDFA Module Series

Model Number	AMP-ST15M	AMP-ST17M	AMP-ST20M
Output Power (dBm)*	15	17	20
Small Signal Gain (dB)	25	30	35
Input Power Range (dBm)	-25 ~ +10		
Wavelength (nm)**	1530 ~ 1565		
Noise Figure (dB)	<4.5	<5.0	<6.0
Operating Temp (°C)	0 ~ 50		
Operating Voltage (VDC)	4.5 ~ 5.5		
Dimensions (cm)	9.5(w) x 12.7(d) x 2.0(h)		

* Other output powers are available.

** L-band option is available.

Due to our continuous improvement program, specifications are subject to change without notice.

Narrow Spectrum Bandwidth Ultrafast Fiber Laser

– Active Mode-locking



Applications

- Amplifier seeding
- Materials characterization
- Diagnostics in biology and medicine
- Optical sampling
- Lidar

Features

- Narrow spectral width of 0.05 nm
- Repetition rate from 100 MHz to 2 GHz selectable
- Wavelength selectable over C-band or 1 μ m band
- Pulse width tunable from 80 to 100 ps
- Average output power greater than 5 mW
- Linearly polarized output
- Transform-limited output
- Low timing jitter
- Minimal pulse pedestal



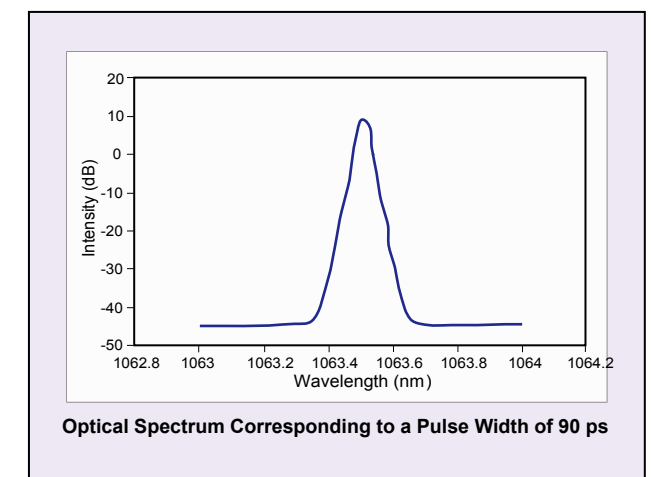
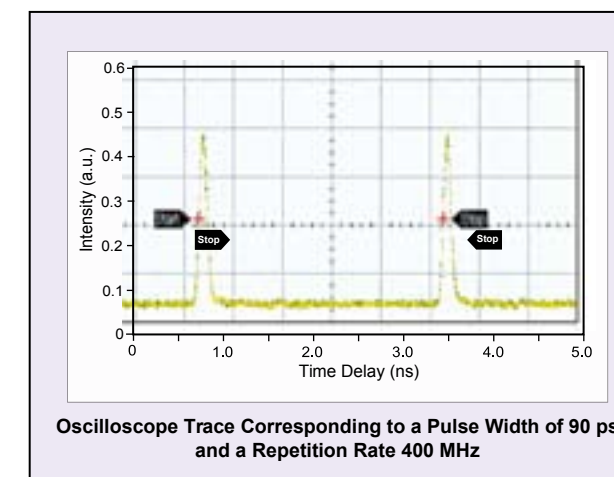
The C-band and 1 μ m band narrow spectrum bandwidth ultrafast fiber lasers (PSLNB) are two actively modelocked fiber lasers with spectral bandwidth of 0.05 nm and 0.04 nm, respectively. The PSLNB series operates from 100 MHz to 2 GHz, selectable in a compact and robust package that delivers stable and reliable laser performance for a variety of applications. The pulse width can be tuned from 80 to 100 ps with transform-limited pulse shape and a better than -20 dB pedestal. The timing jitter is as low as 75 fs and the side mode suppression is better than -75 dB. An option for 780 nm band is available.

Technical Specifications

Model Number	PSLNB-00-CFT	PSLNB-00-UFT
Pulse Width (ps)	80 ~ 100 (tunable)	
Output Wavelength (nm)*	1530 ~ 1565 (selectable)	1020 ~ 1065 (selectable)
Output Spectral Bandwidth (nm)	~0.05	~0.04
Repetition Rate (MHz)	100 ~ 2000 (selectable)	
Timing Jitter (fs)	<75 (carrier offset 100 Hz ~ 1 MHz)	
Amplitude Noise (%)	<1	
Output Power (mW)	>5	
Operating Temp (°C)	15 ~ 30	
Operating Voltage (VAC)	85 ~ 264	
Dimensions (cm)	48(w) x 42(d) x 9(h)	

* 780 nm band is available.

Due to our continuous improvement program, specifications are subject to change without notice.



Narrow Spectrum Bandwidth Ultrafast Fiber Laser

– Passive Mode-locking



Applications

- Amplifier seeding
- Materials characterization
- Diagnostics in biology and medicine
- Optical sampling
- Lidar

Features

- Narrow spectral bandwidth of less than 0.1 nm
- Repetition rate from 10 to 100 MHz
- Wavelength selectable over C-band or 1 μm band
- Pulse width up to 100 ps
- Average output power greater than 5 mW
- Linearly polarized output
- Transform-limited output
- Low timing jitter
- Minimal pulse pedestal



The C-band and 1 μm band narrow spectrum bandwidth ultrafast fiber lasers (FPLNB) are two passively modelocked fiber lasers that utilize saturable absorbers to deliver narrow spectral bandwidth of 0.15 nm and 0.08 nm, respectively. The FPLNB laser has excellent stability and reliability with turnkey operation. The wavelength is factory selectable throughout C-band or 1 μm band. The pulse width can be up to 100 ps with near transformlimited pulse shape and a better than -20 dB pedestal. The timing jitter is as low as 100 fs. The repetition rate can be specified from 10 to 100 MHz with either a polarization-maintaining (PM) or non-PM fiber output. With up to 5 mW output power, the FPLNB series is an ideal narrow bandwidth source for seeding applications. An RF synchronization output is provided as a trigger signal. An option for 780 nm band is available.

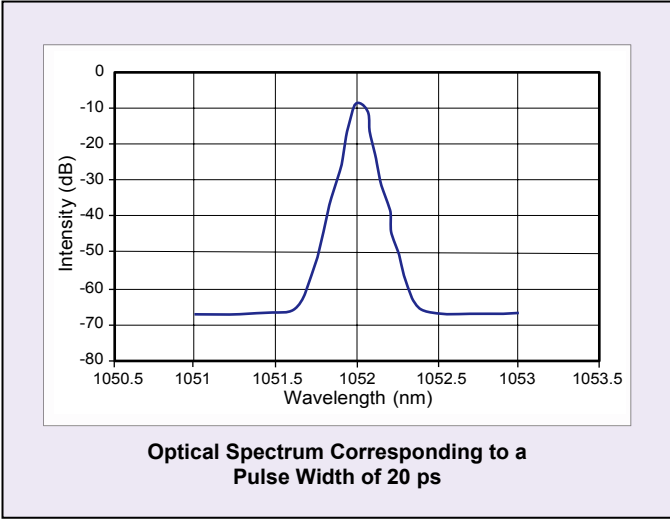
Technical Specifications

Model Number	FPLNB-03-CFT	FPLNB-03-UFT
Pulse Width (ps)	>15 (up to 100 ps)	
Output Wavelength (nm)*	1530 ~ 1565 (selectable)	1030 ~ 1065 (selectable)
Output Spectral Bandwidth (nm)	~ 0.15	~ 0.08
Repetition Rate (MHz)**	20	
Timing Jitter (fs)	<100 (carrier offset 100 Hz ~ 1 MHz)	
Amplitude Noise (%)	<1	
Output Power (mW)	>5	
Operating Temp (°C)	10 ~ 35	
Operating Voltage (VAC)	85 ~ 264	
Dimensions (cm)	34(w) x 42(d) x 9(h)	

* 780 nm band is available.

** Other repetition rates within 10 to 100 MHz are available.

Due to our continuous improvement program, specifications are subject to change without notice.



Bit Rate Multiplier



Applications

- Up to 640 Gb/s OTDM system
- Transmission network characterization

Features

- Passive fiber delay line based technology
- Bit rate multiplication x2, x4, x8 and x16 of the input bit rate
- Operation wavelength range from 1530 to 1565 nm
- Linearly polarized output
- Tunable delay greater than 200 ps
- Amplitude equalization
- Low insertion loss
- Long term stability
- PRBS output



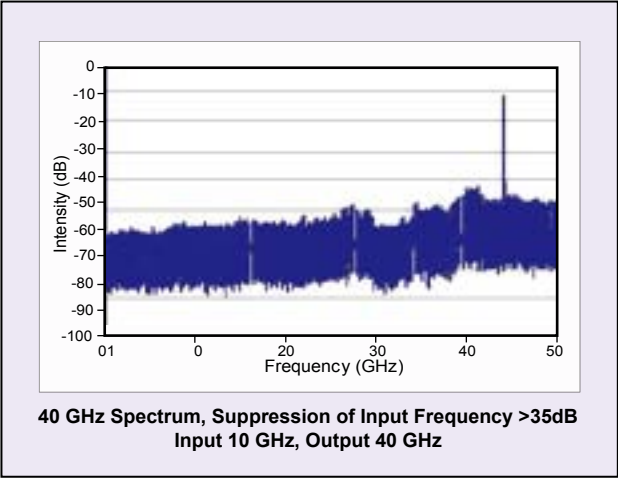
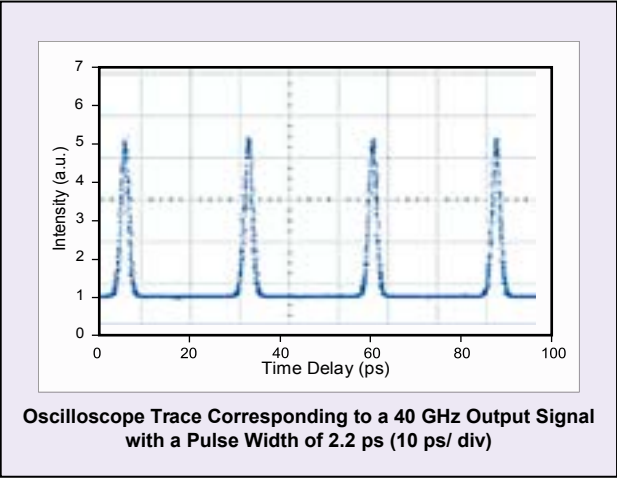
The Bit Rate Multiplier (BRM) is a passive device to increase the repetition rate of an input optical clock by 2, 4, 8, and 16 times. It splits the input pulse into two identical images, and sends them to a Mach-Zehnder interferometer. One leg of the interferometer has variable pulse delay and amplitude equalization, while the other leg has fixed bit pattern delay. Bit pattern delay ensures that the output is a pseudo-random bit sequence (PRBS) when the input signal is PRBS. After recombination, the repetition rate is twice the input rate. By cascading up to four stages, the bit rate can be multiplied 16 fold.

In conjunction with Calmar's picosecond fiber lasers (PSL), pulse streams of 10, 20, 25, 40, 50, 80, 100, 160, 200, 320 GHz and beyond can be generated. With its all PM configuration, neither a pre- nor post-multiplication polarization controller is needed. As a result, all channels get the same linear polarization status automatically. The proprietary design of precise attenuation compensation enables amplitude equalization for all channels. A tunable optical delay of greater than 200 ps provides end users a very wide range of input bit rates. BRM is very easy to operate with laser sources from different vendors and the output after multiplication is very stable. The optional temperature controller further enhances the output stability for different environmental conditions.

Technical Specifications

Model Number	BRM-T-2	BRM-T-4	BRM-T-8	BRM-T-16
Multiplication Factor	2	4	8	16
Wavelength (nm)	1530 ~ 1565			
Polarization Extinction Ratio (dB)	>20			
Input Data Format	$2^7-1 \sim 2^{31}-1$ PRBS			
Output Data Format	2^7-1 PRBS			
Tunable Delay (ps)	>200			
Temp Stability (ppm/°C)	10			
Insertion Loss (dB)	5	10	15	20
Dimensions (cm)	48(w) x 42(d) x 9(h)			

Due to our continuous improvement program, specifications are subject to change without notice.



Pulse Compressor



Applications

- Greater than 80 GHz OTDM system
- Investigation of optical nonlinearities

Features

- Wavelength range from 1545 to 1560 nm
- Pulse compression to 300 fs from 3 ps input pulse
- Post compression output powers higher than 100 mW
- Near transform-limited output
- Pedestal after compression less than 3%
- Post-compression spectral width larger than 9 nm

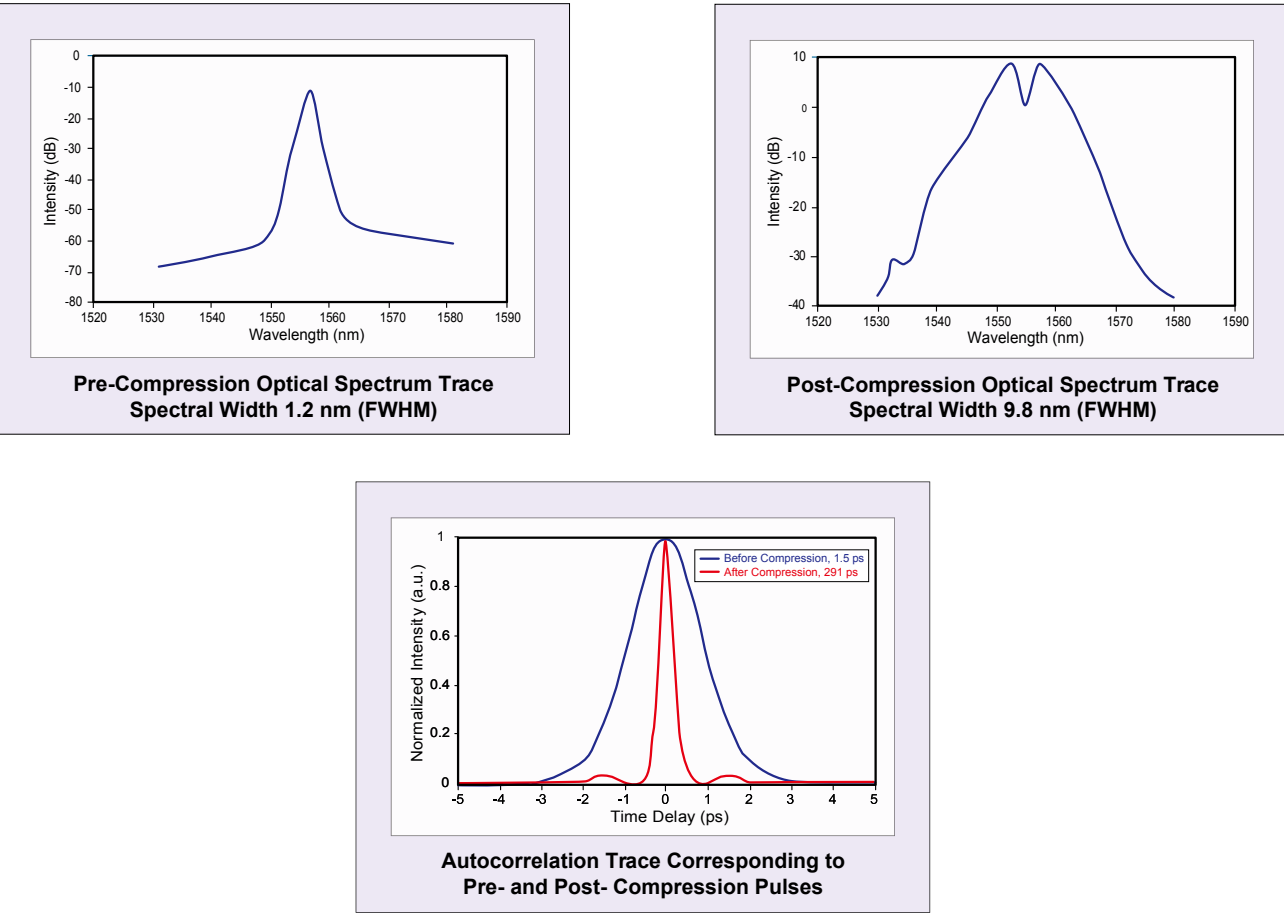


The pulse compressor (PCS) consists of a fiber amplifier unit and a pulse compressor unit. It has excellent stability and reliability with turnkey operation. Along with a portable design, Calmar's advanced simulation software enables us to design PCS according to the end user's laser specification. The pulse width can be compressed from 3 ps to 300 fs with a minimal pedestal. The compressed pulse is near transform-limited or near soliton-like shape. An average output greater than 100 mW is achieved with the built-in amplifier. PCS can also be used as a stand alone Erbium Doped Fiber Amplifier (EDFA) when pulse compression is not required.

Technical Specifications

Model Number	PCS-1	PCS-2
Pulse Width Pre-Compression (ps)	3.0	1.5
Pulse Width Post-Compression (fs)	300	
Input Signal Power (mW)	1 ~ 10	
Input Wavelength Range (nm)	1545 ~ 1560	
Input Repetition Rate Range (GHz)	2 ~ 20	10 ~ 50
Spectral Width (nm)	>9	
Output Power (mW)	100 @ 20 GHz	100 @ 40 GHz
Pedestal (%)	<3	
Operating Temp (°C)	0 ~ 50	
Operating Voltage (VAC)	85 ~ 264	
Dimensions (cm)	34(w) x 42(d) x 9(h)	

Due to our continuous improvement program, specifications are subject to change without notice.



Electrical Pulse Generator



Applications

- Electrical driver for high speed laser diodes
- Characterization of ultrafast electrical instruments
- Stable electrical clock source

Features

- Repetition rate up to 5 GHz
- Pulse Width tunable from 50 to 200 ps
- Output amplitude 0.5 to 7 V
- Added timing jitter less than 2 ps

The ultrafast electrical pulse generator (EPG) series is a range of electrical pulse generators with up to 5 GHz repetition rate. The EPG series offers excellent stability and reliability with turnkey operation. Along with a portable design, EPG-01 offers user-friendly front panel control knobs for flexible adjustment of pulse width and output power. The pulse width is tunable from 60 to 200 ps and the added timing jitter is as low as 2 ps. EPG- 01 offers high pulse amplitude, up to 7 V peak to peak, and is triggered by either a sinusoidal wave or a random impulse.

Technical Specifications

Model Number	EPG-01	
Output Pulse Characteristics		
Output Pulse Width (ps)	60 ~ 200 (tunable)	50 ~ 60 (tunable)
Maximum Output Amplitude (V)	3 (60 ps) ~ 7 (200 ps)	0.5 (50 ps) ~ 3 (60 ps)
Timing Jitter (ps)	<2.0	
Coupling	AC (50 Ω impedance)	
Trigger Input Characteristics		
Repetition Rate (MHz)	10 ~ 2000 (adjustable)	2000 ~ 5000 (adjustable)
Sine Wave Power (dBm)	-3 ~ +3	
Square Wave Voltage (Vp-p)	0.4 ~ 0.9	
Coupling	AC (50 Ω impedance)	
Other Parameters		
Connector	SMA	
Operating Temp (°C)	0 ~ 50	
Operating Voltage (VAC)	85 ~ 264	
Dimensions (cm)	34(w) x 42(d) x 9(h)	

Due to our continuous improvement program, specifications are subject to change without notice.

Supercontinuum Light Source



Applications

- Optical coherence tomography
- Optical spectroscopic measurements
- Bio-sensing
- Telecommunication components characterization
- Optical metrology

Features

- Spectrum range from 500 to 1800 nm
- Uniform spectrum with high power density of 1mW/nm
- Excellent wavelength and power stability
- Maintenance free
- Turnkey operation

The supercontinuum light source SLS is a spectrally broadened passively mode-locked fiber laser. It has excellent stability, reliability and turnkey operation. Along with a portable design, SLS-01 features a super broadband spectral output from 500 to 1800 nm. It provides high power of greater than 1 Watt with a spectral power density of better than 1 mW/nm. The supercontinuum spectral profile holds less than 10 dB uniformity over the entire wavelength band.

Technical Specifications

Model Number	SLS-01
Output Wavelength (nm)	500 ~ 1800
Repetition Rate (MHz)*	20
Spectral Power Density (mW/nm)	≥1.0
Average Output Power (W)	>1
Spectral Width (nm)	>1300
Fiber Type	SMF-28
Operating Temp (°C)	10 ~ 35
Operating Voltage (VAC)	85 ~ 264
Dimensions (cm)	34(w) x 42(d) x 9(h)

* Other repetition rates within 10 to 50 MHz range are available.

Due to our continuous improvement program, specifications are subject to change without notice.



Koheras AdjustiK™ System

Turn-key 19" 2U benchtop box system



- Single frequency fiber laser
- Ultra narrow linewidth and low phasenoise
- Available with KHz frequency modulation (option)

Koheras AdjustiK™ System is a benchtop version of the BasiK™ Module, a single wavelength distributed feedback (DFB) fiber laser system with active wavelength stabilization and thermal wavelength tuning, optionally combined with piezo-electric tuning. The Koheras AdjustiK™ System is available as a turn-key solution with integrated driver electronics and needs only 110/230 V power supply for easy operation, and is ideal as equipment for laboratory work and experimental research. Specifications include up to 200 mW output and wavelengths (e.g. ITU grid) within 1535-1575 nm and 1030-1121 nm.

Key features

- Stable single mode and single polarisation operation
- Burst noise and mode hop free operation
- Ultra narrow linewidth and log coherence length
- Low phase and intensity noise
- Excellent power stability
- High wavelength selectability
- Power and wavelength control via digital interface
- User controlled RIN suppression for E15 version
- Piezo tuning capability (optional)
- PM output (optional)
- Available in a 19" 2U rack system
- Digital user interface

Examples of applications

- Sensor interferometry e.g. oil and gas exploration
- Acoustic sensing for e.g. marine and security applications
- Laser spectroscopy, gas absorption measurement
- LIDAR
- Test and measurement equipment for telecom
- Wavelength references
- Scientific applications

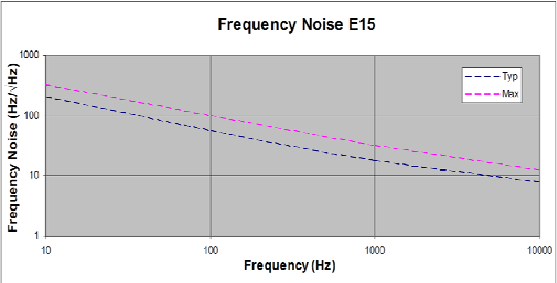
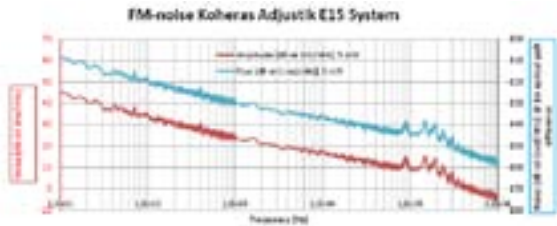
Other specifications

KOHERAS AdjustiK™ Module	E15/C15/Y10
Power supply requirements [VDC]	90-240 VAC, 50-60Hz
Digital interface	USB 2.0
Fiber pigtail length [m]	app. 0.5 m
Connectors	FC/APC
Dimensions (HxWxD) [mm]	104x449x383 (19" - 2U)
Operating temperature range [°C]	15 - 50
Storage temperature range [°C]	-20 - 50

Optical specifications

Koheras AdjustiK™ Module	E ₁₅	C ₁₅	Y ₁₀
Center wavelength [nm] ¹	1535-1575, optionally other	1535-1575, optionally other	1030-1121
Laser emission	CW - single frequency	CW - single frequency	CW - single frequency
Beam quality	M ² < 1.05	M ² < 1.05	M ² < 1.05
Output power [mW] ²	up to 200	up to 200	> 100
Line width (120 μsec) [kHz]	< 1	< 50 (optionally <10)	< 70 (optionally <10)
Frequency stability [MHz] ³	< 10	< 10	< 10
Frequency-noise [Hz/√Hz]	316@10Hz, 100@100Hz, 32@1kHz, 13@10kHz	-	-
Phase-noise [μrad/√Hz] 1m opt. path	5.6@10Hz, 1.8@100Hz, 0.6@1kHz, 0.25@10kHz	-	-
RIN peak [MHz]	app. 0.3	app. 0.9	app. 1.5
RIN level [dBc/Hz]	<-100 @ 1MHz/ <-140 @ 10MHz	<-120 @ 1MHz/ <-140 @ 3MHz ⁴	<-110 @ 1MHz/ <-140 @ 10MHz
Optical S/N [dB] (50 pm res.) ⁵	> 50 (typ. > 55)	> 70 (typ. > 75)	> 65 (typ. > 70)
PM output	Optional	Optional	Optional
Thermal tuning	Standard	Standard	Standard
Thermal tuning range [nm]	- 0.4 / +0.2	- 0.4 / +0.2	- 0.3 / +0.15
Fast Piezo tuning capability ⁵	Optional	Optional	Optional
Piezo-electric tuning range [pm] ⁶	> 16 (0-200 V DC) / > 600 pm* (0-200 V DC)	> 16 (0-200 V DC)	> 9 (0-200 V DC) / >400 pm* (0-200 V DC)
Piezo-electric tuning bandwidth [kHz]	up to 100	up to 100	up to 100
Optical monitor output	Incl (FC/APC)	Incl (FC/APC)	Incl (FC/APC)

1. The center wavelength is selectable within the specified range.
2. Depends on the center wavelength.
3. After 30 min warm-up and ambient temperature variation < 2 °C.
4. Shot-noise limited @ f > 5 MHz, optionally lower.
5. External piezo driver required.
6. All optical specifications are valid up to 10kHz PZT bandwidth.



Koheras BasiK™ Module

Small compact OEM module for industrial systems



- Single frequency fiber laser
- Ultra narrow linewidth and low phasenoise
- Reduced vibration sensitivity
- Ideal for sensor interrogation

Koheras BasiK™ Module is a single frequency distributed feedback (DFB) fiber laser system in a new rugged package with passive vibration reduction, offered as single laser or building block for e.g. multi-channel DWDM systems. Specifications include up to 40 mW output, wavelengths (e.g. ITU grid) within 1535-1575 nm and 1030 -1121 nm, optionally with fast piezo-electric modulation. The BasiK™ Module features ultra-narrow linewidth in the Hz range and exceptionally low frequency and intensity noise superior to other comparable sources. The BasiK™ Module is ideal for coherent sensor applications in oil/gas exploration, perimeter and submarine detection, and wind LIDAR.

Key features

- Stable single mode and single frequency operation
- Burst noise and mode hop free operation
- Ultra narrow linewidth and log coherence length
- Low phase and intensity noise
- High wavelength selectability
- Power and wavelength control via digital interface
- User controlled RIN suppression for E15 version
- Piezo tuning capability (optional)
- PM output (optional)
- Very compact and robust module
- Multi-channel solution
- Low power consumption

Examples of applications

- Sensor interferometry e.g. oil and gas exploration
- Acoustic sensing for e.g. marine and security applications
- Motion and intrusion detection
- Laser spectroscopy, gas absorption measurement
- LIDAR
- Scientific applications

Other specifications

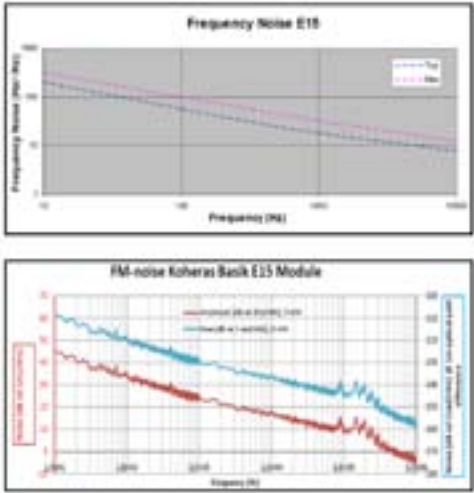
KOHERAS BasiK™ Module	E15/C15/Y10
Power supply requirements [VDC]	12V
Control connector	IDC-16 (Digital PC interface)
Fiber pigtail length [m]	app. 0.5 m
Connectors	FC/APC
Dimensions (HxWxD) [mm]	23x92x240 incl. fins
Operating temperature range [°C]	15 - 50
Storage temperature range [°C]	-20 - 50

Electrical pin-out specifications

Pin 1	Not used
Pin 2	Emission LED
Pin 3	RS485-
Pin 4	RS485+
Pin 5	Interlock Loop + Electrical pin-out specifications
Pin 6	General System Enable
Pin 7	Interlock Loop
Pin 8	Interlock
Pin 9	GND
Pin 10	12VDC

Optical specifications

Koheras BasiK™ Module	E ₁₅	C ₁₅	Y ₁₀
Center wavelength [nm] ¹	1535-1575, optionally other	1535-1575, optionally other	1030-1121
Laser emission	CW - single frequency	CW - single frequency	CW - single frequency
Beam quality	M ² < 1.05	M ² < 1.05	M ² < 1.05
Output power [mW] ²	up to 40	up to 40	> 10
Line width (120 μsec) [kHz]	< 1	< 50 (optionally <10)	< 70 (optionally <10)
Frequency stability [MHz] ³	< 10	< 10	< 10
Frequency-noise [Hz/√Hz]	316@10Hz, 100@100Hz, 32@1kHz, 13@10kHz	-	-
Phase-noise [μrad/√Hz] 1m opt. path	5.6@10Hz, 1.8@100Hz, 0.6@1kHz, 0.25@10kHz	-	-
RIN peak [MHz]	app. 0.3	app. 0.9	app. 1.5
RIN level [dBc/Hz]	<-100 @ 1MHz/ <-140 @ 10MHz	<-120 @ 1MHz/ <-140 @ 3MHz ⁴	<-110 @ 1MHz/ <-140 @ 10MHz
Optical S/N [dB] (50 pm res.)	> 50 (typ. > 55)	> 70 (typ. > 75)	> 65 (typ. > 70)
PM output	Optional	Optional	Optional
Thermal tuning	Standard	Standard	Standard
Thermal tuning range [nm]	- 0.4 / +0.2	- 0.4 / +0.2	- 0.3 / +0.15
Fast Piezo tuning capability ⁵	Optional	Optional	Optional
Piezo-electric tuning range [pm] ⁶	> 16 (0-200 V DC) / > 600 pm (0-200 V DC)	> 16 (0-200 V DC)	> 9 (0-200 V DC)
Piezo-electric tuning bandwidth [kHz]	up to 100	up to 100	up to 100
Optical monitor output	Incl (FC/APC)	Incl (FC/APC)	Incl (FC/APC)



1. The center wavelength is selectable within the specified range.
2. Depends on the center wavelength.
3. After 30 min warm-up and ambient temperature variation < 2 °C.
4. Shot-noise limited @ f > 5 MHz, optionally lower.
5. External piezo driver required.
6. All optical specifications are valid up to 10kHz PZT bandwidth.



Koheras BoostiK™ System

Ultra narrow linewidth fiber laser in 1 μm or 1.5 μm range



- Single frequency fiber laser
- Ultra narrow linewidth and low phase noise
- Turn-key 19" 2U benchtop box system
- Available with KHz frequency modulation (option)

Koheras BoostiK™ is a high power, narrow linewidth single wavelength distributed feedback (DFB) fiber laser system in a compact turn-key design. This fiber laser features a unique narrow linewidth combined with high output power. The product is supplied as a stand-alone unit packed in a 19" rack system including controller electronics. The Koheras BoostiK™ is delivered with a suitable power supply unit ready for operation. It is ideal for laboratory work and experimental research.

Technical specifications

KOHERAS BoostiK™ System	E15/C15/Y10
Power supply requirements [VDC]	90-240 VAC; 50-60Hz
Fiber pigtail length [m]	> 1
Connectors	FC/APC or collimated
Dimensions (HxWxD) [mm]	104x449x383 (19" 2U)
Operating temperature range [°C]	15 - 40
Storage temperature range [°C]	-20 - 50

1. The center wavelength is selectable within the specified range.
2. Depends on the center wavelength.
3. Shot-noise limited > 5 MHz.
4. External piezo driver required.
5. All optical specifications are valid up to 10kHz PZT bandwidth.

Key features

- Stable single mode and single polarisation operation
- Burst noise and mode hop free operation
- Ultra narrow linewidth
- High wavelength selectability
- PM output (optional)
- Compact and reliable stand-alone unit in 19" rack system
- High power output
- Unprecedented low phase and intensity noise
- M2 < 1,05 (single mode fiber output)
- Digital control interface

Examples of applications

- Aerosol backscattering
- LIDAR
- Oil and gas exploration
- Harmonic generation
- Atom trapping
- Scientific applications



Optical specifications

Koheras BoostiK™ System	E ₁₅	C ₁₅	Y ₁₀
Center wavelength [nm] ¹	1535-1575, optionally other	1535-1575, optionally other	1030-1121
Laser emission	CW - single frequency	CW - single frequency	CW - single frequency
Beam quality	M ² < 1.05	M ² < 1.05	M ² < 1.05
Output power [mW] ²	Up to 2 W (optional higher)	Up to 2 W (optional higher)	Up to 5 W
Line width (120 μsec) [kHz]	< 1	< 50 (optionally <10)	< 70 (optionally <10)
Phase-noise [μrad/√Hz] 1m opt. path	<-120 @ 500MHz/ <-110 @ 10Hz	<-100 @ 500MHz/ <-95 @ 10Hz	NA
RIN peak [MHz]	app. 0.3	app. 0.9	app. 1.5
RIN level [dBc/Hz]	<-115 @ 1MHz/ <-140 @ 10MHz	<-120 @ 1MHz/ <-140 @ 3MHz 3	<-115 @ 1MHz/ <-140 @ 10MHz
Optical S/N [dB] (50 pm res.)	> 50 (depending on wavelength)	> 50 (depending on wavelength)	> 50 (depending on wavelength)
PM output	Optional	Optional	Optional
Thermal tuning	Standard	Standard	Standard
Thermal tuning range [nm]	> 0.8	> 0.8	> 0.5
Thermal tuning range (incl. Piezo feature)[nm]	> 0.7	> 0.7	> 0.4
Fast Piezo tuning capability	Optional	Optional	Optional
Piezo-electric tuning range [pm]	> 16 (0-200 V DC)	> 16 (0-200 V DC)	> 9 (0-200 V DC)
Piezo-electric tuning bandwidth [kHz] ⁵	up to 100	up to 100	up to 100
Optical monitor output	Incl. (FC/APC)	Incl. (FC/APC)	Incl. (FC/APC)

Koheras High Power Amplifier



- Single frequency amplifiers
- Power extension to Koheras seed lasers
- Small OEM modules for industrial systems

Koheras Amplifier Modules are designed for amplification of a single frequency CW source and to maintain the low phase noise of the laser source.

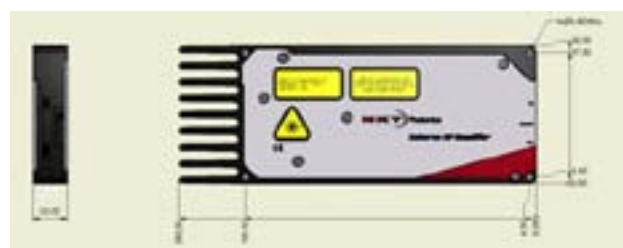
The module is provided in rugged OEM packages with same dimensions as the BasiK™ Module, with output power levels of up to 2 W. The modules are available for operation in the 1.05 - 1,09 μm range and C & L-band.

Key features

- Stable single mode and single polarisation operation
- Burst noise and mode hop free operation
- Ultra narrow linewidth
- High wavelength selectability
- PM output (optional)
- Compact and reliable stand-alone unit in 19" rack system
- High power output
- Unprecedented low phase and intensity noise
- $M^2 < 1,05$ (single mode fiber output)
- Digital control interface

Examples of applications

- Aerosol backscattering
- LIDAR
- Oil and gas exploration
- Harmonic generation
- Atom trapping
- Scientific applications



Optical specifications

Koheras Amplifier Modules	HPA10	HPA15
Wavelength range[nm]	1050-1090	1540-1560
Operation mode	CW - single frequency	CW - single frequency
Beam quality [M^2]	< 1.05 (SMF28)	< 1.05 (SMF28)
Output power [mW]	up to 2000	up to 1000
PM output	Optional	Optional
Minimum input power [mW] ¹	100	100
Input isolation [dB] ²	NA (available on request)	NA (available on request)
Peak-to-Peak power stability [dB] ³	< 0.3	< 0.3
Output isolation [dB]	> 30	NA

1) Or lower (TBD) 2) Not necessary if previous stage is isolated

3) After 30 min. warm-up time.

Other specifications

KOHERAS Amplifier Module	HPA ₁₀ / HPA ₁₅
Power supply requirements [VDC]	12V
Control connector	IDC-16 (Digital PC interface)
Input fiber pigtail length [m]	app. 0.5
Output fiber pigtail length [m]	app. 1.5
Connectors	FC/APC
Dimensions (HxWxD) [mm]	23x92x240 incl. fins
Dimensions (HxWxD) [mm]	23x92x200 excl. fins
Operating temperature range [°C]	15 - 50
Storage temperature range [°C]	-20 - 50

Electrical pin-out specifications

Pin 1	Not used
Pin 2	Emission LED
Pin 3	RS485-
Pin 4	RS485+
Pin 5	Interlock Loop +
Pin 6	General System Enable
Pin 7	Interlock Loop
Pin 8	Interlock
Pin 9	GND
Pin 10-16	12VDC

Koheras Low Power Amplifier

Ultra narrow linewidth fiber laser in 1 μm or 1.5 μm range

- Single frequency amplifiers
- Power extension to Koheras seed lasers
- Small OEM modules for industrial systems

Koheras Amplifier Modules are designed for amplification of single frequency CW sources and to maintain the low phase noise level of the laser source.

The module is provided in rugged OEM packages with same dimensions as the BasiK™ Module, with output power levels up to 100 mW. The modules are available for operation in the

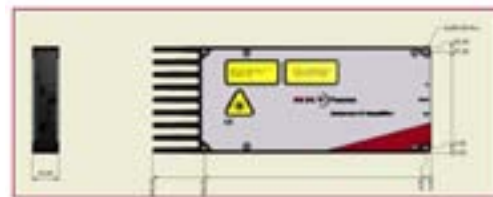
Key features

- Amplification of narrow linewidth kHz sources
- Maintained ultra narrow linewidth and single frequency operation
- No penalty on phase noise performance
- Operation in the C or L-band
- Power control via digital interface
- PM output (optional)
- Very compact and robust module
- Low power consumption
- Fully compatible with Koheras BasiK™ Module



Examples of applications

- Sensor interferometry e.g. oil and gas exploration
- Acoustic sensing for e.g. marine and security applications
- Motion and intrusion detection
- Laser spectroscopy, gas absorption measurement
- LIDAR
- Scientific applications



Optical specifications

Koheras Amplifier Modules	LPA ₁₀	LPA ₁₅
Wavelength range[nm]	1050-1090	1540-1560
Operation mode	CW - single frequency	CW - single frequency
Beam quality [M ²]	< 1.05 (SMF28) <	1.05 (SMF28)
Output power [mW]	up to 100	up to 100
PM output	Optional	Optional
Minimum input power [mW] ¹	10	10
Input isolation [dB] ²	NA (available on request)	NA (available on request)
Peak-to-Peak power stability [dB] ³	< 0.3	< 0.3
Output isolation [dB]	> 30	> 30

1) Or lower (TBD) 2) Not necessary if previous stage is isolated

3) After 30 min. warm-up time.

Other specifications

KOHERAS Amplifier Module	LPA10 / LPA ₁₅
Power supply requirements [VDC]	12V
Control connector	IDC-16 (Digital PC interface)
Input fiber pigtail length [m]	app. 0.5
Output fiber pigtail length [m]	app. 1.5
Connectors	FC/APC
Dimensions (HxWxD) [mm]	23x92x240 incl. fins
Operating temperature range [°C]	15 - 50
Storage temperature range [°C]	-20 - 50

Electrical pin-out specifications

Pin 1	Not used
Pin 2	Emission LED
Pin 3	RS485-
Pin 4	RS485+
Pin 5	Interlock Loop +
Pin 6	General System Enable
Pin 7	Interlock Loop
Pin 8	Interlock
Pin 9	GND
Pin 10-16	12VDC

