



Advanced Laser Technologies

# Ultrafast Fiber Lasers

## LightWire series

### FPS200

1064 nm, 200 mW, 50 nJ  
10 ps, 25 kHz – 50 MHz

3

### FFS100CHI

1030 nm, 50 mW, 8 nm, 7 ps, 50 MHz  
chirped pulse compressible down to <200 fs

6

### FFS200

1064 nm, 200 mW, 5 nJ, <140 fs, 50 MHz

6



2024

Rev#  
240115

# LightWire

## SERIES

The LightWire fiber lasers feature turn-key operation, monolithic design and require no maintenance making it a preferred alternative to the solid state counterparts in the industrial settings and multidisciplinary research laboratories. Different versions, featuring femtosecond and picosecond pulse durations are available.

LightWire FPS and FFS series fiber lasers are dedicated for seeding solid state (for e.g. Nd:YAG, Yb:YAG, Yb:KGW) amplifiers. Compact, cost efficient FPS series models deliver sub-10 ps pulses at 1064 nm wavelength with the average output power up to 200 mW and pulse energy up to 50 nJ. They feature narrow close to bandwidth limited spectrum and low pulse amplitude noise. Wavelength tunability ensures that seed pulses are always spectrally overlapped with the amplification spectrum of laser amplifier. FFS series models are specially designed for femtosecond CPA systems. Ekspla offers FFS lasers either with femtosecond pulse duration directly from fiber, or with chirped pulses.

Broad up to 15 nm spectral bandwidth enables amplification of pulses with <300 fs compressed duration. Special feature of FFS lasers is customizable chirp profile to match compressor design of the CPA system. LightWire FPS and FFS series lasers are dedicated for researchers and OEM integrators, who require small, convenient and maintenance free sources with bandwidth limited picosecond pulses, broadband pulses compressible down to <200 fs or sub-140 fs femtosecond pulses. Widely tunable pulse repetition rate 25 kHz – 50 MHz makes it an excellent choice for non-linear microscopy, time-resolved spectroscopy, terahertz spectroscopy, ultrafast metrology applications.

### SPECIFICATIONS FOR STANDARD LASER CONFIGURATIONS

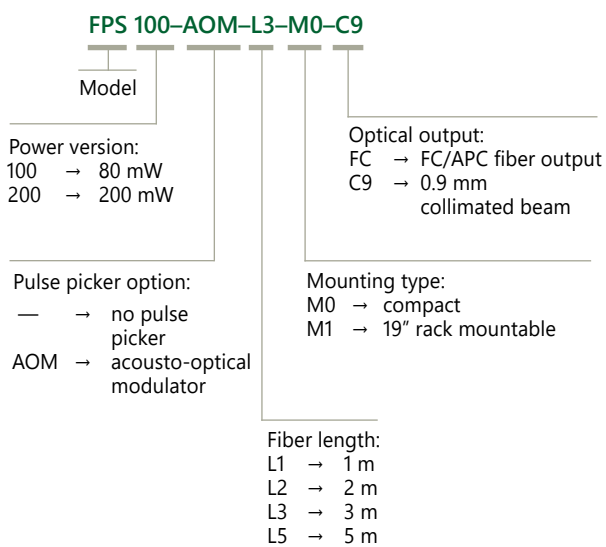
Not all output specifications may be available simultaneously. Please refer to the catalog page for exact specifications and available options.

Model	Central wavelength	Pulse duration	Output power	Pulse energy	Repetition rate	Page
<b>FPS100</b>	1064 nm tunable $\pm 0.2$ nm	7 $\pm$ 1 ps	80 mW	1.6 nJ	25 kHz – 50 MHz	3
<b>FPS200</b>	1064 nm tunable $\pm 0.2$ nm	10 $\pm$ 1 ps	200 mW	50 nJ	25 kHz – 50 MHz	3
<b>FFS100CHI</b>	1030 nm	Up to 30 ps (linearly chirped or custom chirp profile), compressible down to < 200 fs	50 mW	1 nJ	25 kHz – 50 MHz	6
<b>FFS200CHI</b>	1030 nm	> 50 ps (custom chirp profile), compressible down to < 250 fs	200 mW	250 nJ	100 kHz – 50 MHz	6
<b>FFS200</b>	1064 nm	<140 fs	200 mW	5 nJ	25 kHz – 50 MHz	6

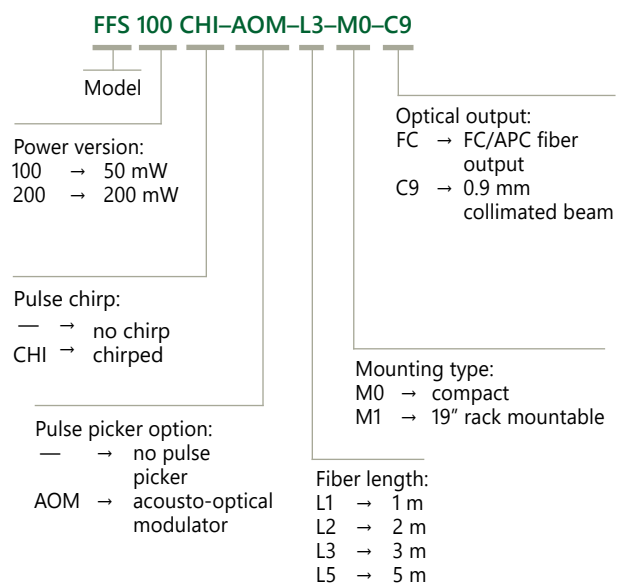
TABLE REPRESENTING PULSE CONTROL TECHNOLOGY IMPLEMENTED IN VARIOUS FIBER LASER MODELS AND MODIFICATIONS

Model	Oscillator + amplifier	Oscillator + amplifier + frequency divider
FPS100	■	
FPS100-AOM		■
FPS200		■
FFS100CHI	■	
FFS100CHI-AOM		■
FFS200CHI		■
FFS200	■	
FFS200-AOM		■

ORDERING INFORMATION FOR FPS AND FFS SERIES



Note:  
For FPS200 model  
maximal fiber length is 3 m.



Note:  
For FFS200CHI model  
maximal fiber length is 3 m.  
For FFS200 model  
maximal fiber length is 2 m.

# LightWire FPS series

Compact  
Fiber Seeders for  
Picosecond Lasers



## FEATURES

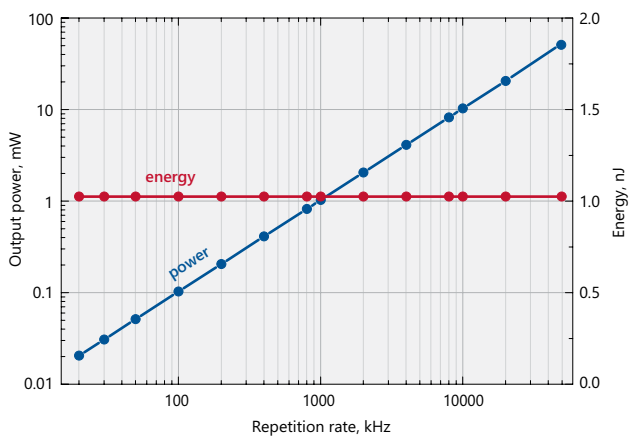
- ▶ Pulse energy >50 nJ at repetition rate <1 MHz
- ▶ Sub-10 ps pulse duration
- ▶ Close to Fourier-transform limited spectral bandwidth
- ▶ Integrated fiber pulse picker for flexible repetition rate control (25 kHz – 50 MHz, burst mode available)
- ▶ PLL option (please inquire sales@ekspla.com)
- ▶ Other wavelengths available on request

## APPLICATIONS

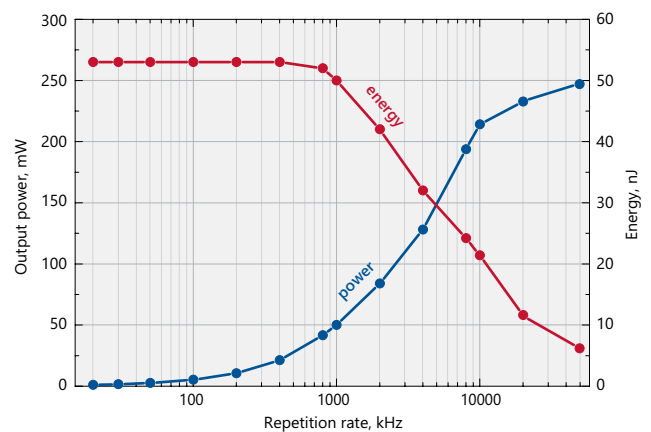
- ▶ Seeding solid state amplifiers

LightWire FPS series fiber lasers are dedicated for seeding solid state Nd:YAG amplifiers. Compact, cost efficient FPS series models deliver sub-10 ps pulses at 1064 nm wavelength with the average output power up to 200 mW and pulse

energy up to 50 nJ. They feature narrow close to bandwidth limited spectrum and low pulse amplitude noise. Wavelength tunability ensures that seed pulses are always spectrally overlapped with the amplification spectrum of laser amplifier.



Typical dependence of average power (blue curve) and pulse energy (red curve) on the repetition rate for FPS100-AOM laser



Typical dependence of average power (blue curve) and pulse energy (red curve) on the repetition rate for FPS200 laser

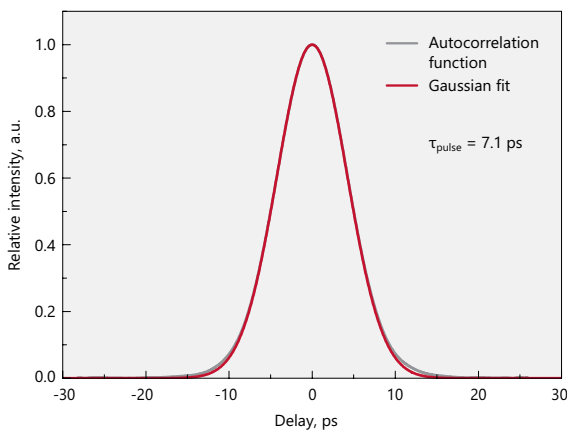
**SPECIFICATIONS <sup>1)</sup>**

Model	FPS100	FPS200
Central wavelength <sup>2)</sup>	1064 nm; tunable $\pm 0.2$ nm	
Pulse duration	$7 \pm 1$ ps	$10 \pm 1$ ps
Spectral bandwidth <sup>3)</sup>	$0.4 \pm 0.1$ nm	$0.25 \pm 0.05$ nm
Oscillator pulse repetition rate <sup>4)</sup>	$50 \pm 2$ MHz	
Pulse repetition rate with pulse picker <sup>5)</sup>	25 kHz – 50 MHz (PRR = $PRR_{osc} / N$ , $N = 1, 4, 5, \dots, 2000$ )	
Output power (without/with pulse picker)	$> 80$ mW / $> 40$ mW	$> 200$ mW at 50 MHz $> 40$ mW at 1 MHz $> 5$ mW at 100 kHz
Pulse energy (without/with pulse picker)	$> 1.6$ nJ / $> 0.8$ nJ	$> 50$ nJ at repetition rates $< 200$ kHz
Polarization	linear, $> 100:1$ extinction	
Optical output	FC/APC connector or collimator with mounting flange (optional)	collimator & isolator node <sup>6)</sup>
Output fiber length	up to 5 m	up to 3 m
Collimated beam diameter	$0.9 \pm 0.1$ mm	
Beam height	NA	38 mm
Beam quality	$M^2 < 1.1$	
Pulse train monitoring	photodiode output for oscillator train, TTL synch pulse for laser output (when pulse picker included)	
Dimensions of collimator (D $\times$ L)	$\varnothing 33 \times 11.76$ mm	
Control interface	CAN (USB, RS232, LAN optional)	
Power supply (AC/DC adapter included)	100–240 V, 50–60 Hz AC	
Power consumption	maximal 230 W (typical 60 W)	
Operating conditions	10–30 °C, humidity – not condensing	

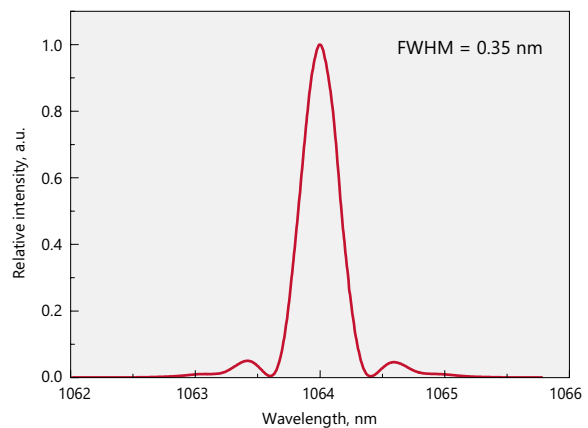
- <sup>1)</sup> Due to continuous improvement all specifications are subject to change without notice.
- <sup>2)</sup> Other wavelengths available on request.
- <sup>3)</sup> Custom spectral bandwidth and pulse duration on request.
- <sup>4)</sup> Custom pulse repetition rates up to 70 MHz available, please inquire.
- <sup>5)</sup> Pulse picker is an option for FPS100 model. It supports external gating. FPS200 includes internal pulse picker.
- <sup>6)</sup> FPS200 model is provided with collimator & isolator node with dimensions 138 $\times$ 66.6 $\times$ 52 mm.



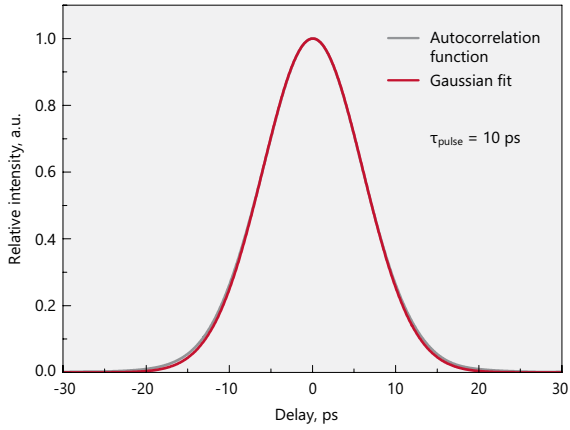
**PERFORMANCE**



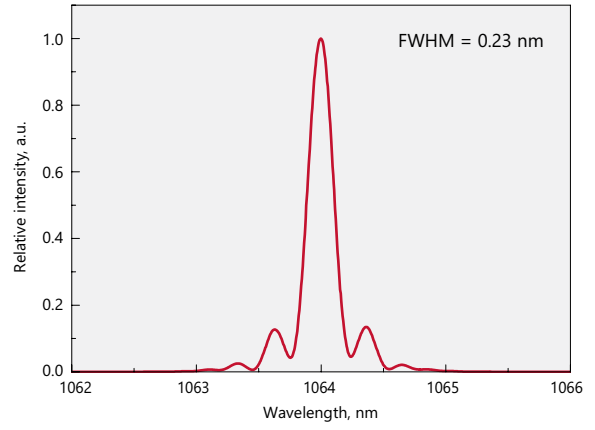
Typical autocorrelation curve of FPS100 laser



Typical spectrum from FPS100 laser

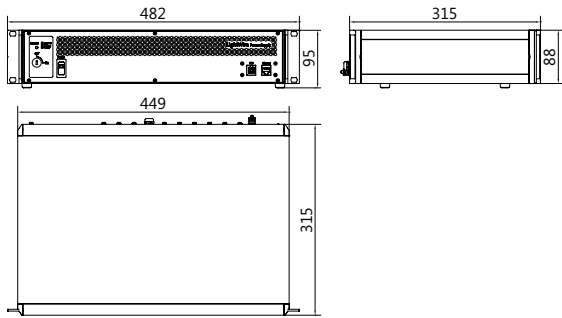


Typical autocorrelation curve of FPS200 laser

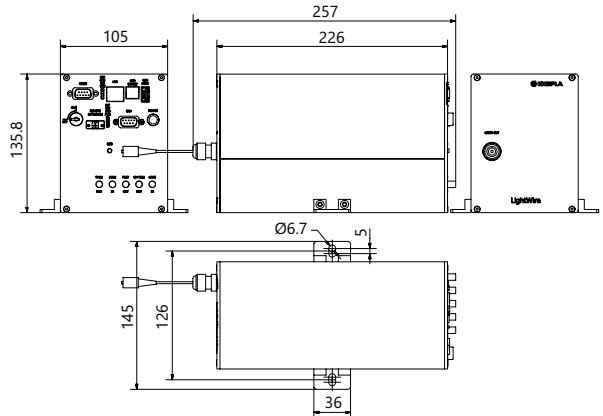


Typical spectrum from FPS200 laser

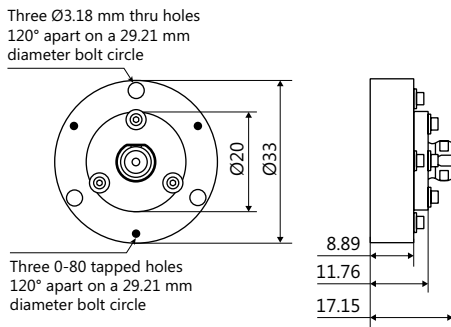
DRAWINGS



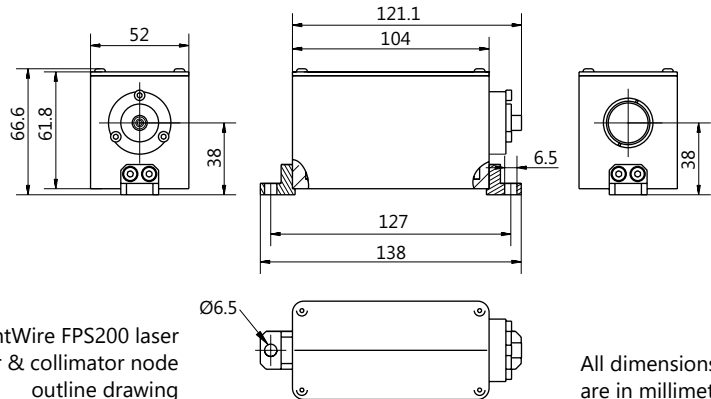
LightWire FPS series control unit outline drawing (19" rack mountable version)



LightWire FPS series "Compact" version drawing. Example only. Actual dimensions depends on a selected laser configuration and options. Please enquire



LightWire FPS100 laser collimator flange outline drawing for beam diameters 0.9 mm



LightWire FPS200 laser isolator & collimator node outline drawing

All dimensions are in millimetres.

# LightWire FFS series

Compact  
Fiber Seeders for  
Femtosecond Lasers



## FEATURES

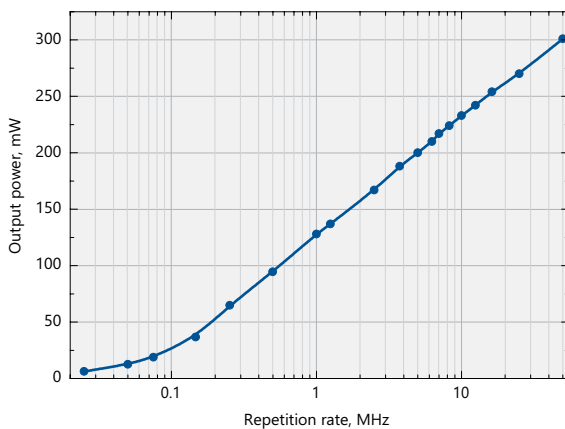
- ▶ Pulse energy > **250 nJ** at repetition rate < 200 kHz (for FFS200CHI)
- ▶ Compressed or chirped broadband pulses
- ▶ Pulses compressible down to < **200 fs** (for FFS100CHI) and < **250 fs** (for FFS200CHI)
- ▶ Pulse duration < **140 fs** (for FFS200)
- ▶ PLL option (please inquire sales@ekspla.com)
- ▶ Other wavelengths available on request

LightWire FFS series fiber lasers are dedicated for seeding solid state femtosecond Yb:YAG, Yb:KGW, Yb:CALGO based CPA systems. Ekspla offers FFS lasers either with femtosecond pulse duration directly from fiber, or with chirped pulses.

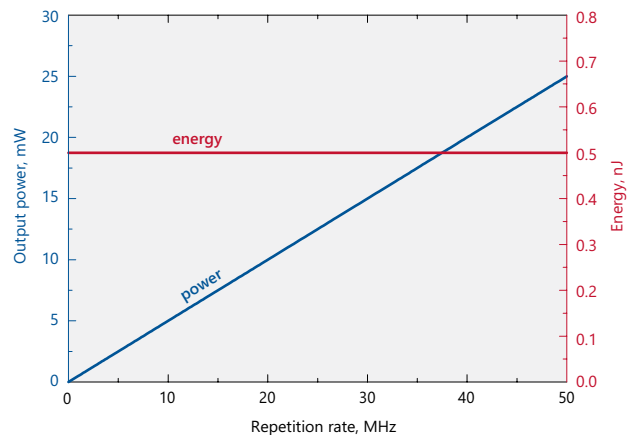
Broad up to 15 nm spectral bandwidth enables amplification of pulses with < 200 fs compressed duration. Special feature of FFS200CHI laser is customizable chirp profile to match compressor design of the CPA system.

## APPLICATIONS

- ▶ Seeding femtosecond CPA systems
- ▶ Ultrafast spectroscopy
- ▶ Time-domain terahertz spectroscopy



Typical dependence of average power on the repetition rate for FFS200CHI laser



Typical dependence of average power (blue curve) and pulse energy (red curve) on the repetition rate for FFS100CHI-AOM laser

SPECIFICATIONS <sup>1)</sup>

Model	FFS100CHI	FFS200CHI	FFS200
Central wavelength <sup>2)</sup>	1030 ± 1 nm		1064 nm
Typical spectral bandwidth (at FWHM)	up to 15 nm		> 20 nm
Pulse duration	Up to 30 ps, compressible down to < 200 fs	> 50 ps, compressible down to < 250 fs	< 140 fs
Chirp profile	linear, custom <sup>3)</sup>		NA
Oscillator pulse repetition rate	50 ± 2 MHz		
Pulse repetition rate with pulse picker <sup>4)</sup>	25 kHz – 50 MHz (PRR = PRR <sub>osc</sub> / N, N = 1, 5, 6, ..., 2000)	100 kHz – 50 MHz (PRR = PRR <sub>osc</sub> / N, N = 1, 5, 6, ..., 500)	25 kHz – 50 MHz (PRR = PRR <sub>osc</sub> / N, N = 1, 5, 6, ..., 2000)
Output power (without/with pulse picker)	> 50 mW / > 25 mW	> 200 mW at 50 MHz > 100 mW at 1 MHz > 25 mW at 100 kHz	> 200 mW / > 100 mW
Pulse energy (without/with pulse picker)	> 1 nJ / > 0.5 nJ	> 250 nJ at repetition rates < 200 kHz	> 5 nJ / > 2.5 nJ
Polarization	linear, > 100:1 extinction		linear, > 10:1 extinction
Optical output	FC/APC connector or collimator with mounting flange (optional)	collimator & isolator node <sup>5)</sup>	FC/PC connector <sup>6)</sup> or collimated beam (optional)
Output fiber length	up to 5 m	up to 3 m	up to 2 m
Beam diameter	0.9 ± 0.1 mm		
Beam height	NA	38 mm	NA
Beam quality	M <sup>2</sup> < 1.1		M <sup>2</sup> < 1.5
Pulse train monitoring	photodiode output for oscillator train, TTL synch pulse for laser output (when pulse picker included)		
Dimensions of collimator (D × L)	Ø33.02 × 11.76 mm		
Control interface	CAN (USB, RS232, LAN optional)		
Power supply (AC/DC adapter included)	100–240 V, 50–60 Hz AC		
Power consumption	maximal 230 W (typical 60 W)		
Operating conditions	10–30 °C, humidity – not condensing		

<sup>1)</sup> Due to continuous improvement all specifications are subject to change without notice.

<sup>2)</sup> Other wavelengths available on request for FFS100CHI/FFS200CHI.

<sup>3)</sup> Chirp profile will be optimized by Ekspla to match customer compressor design.

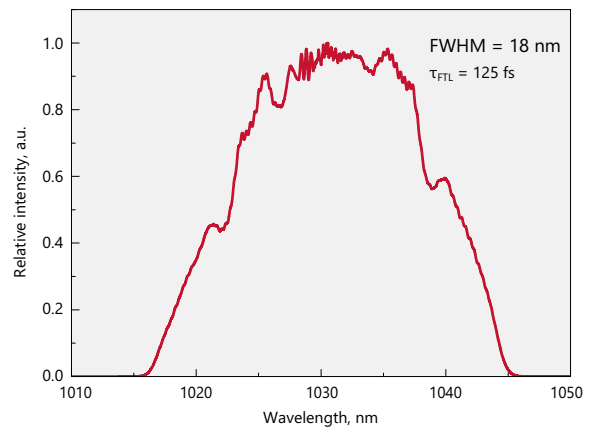
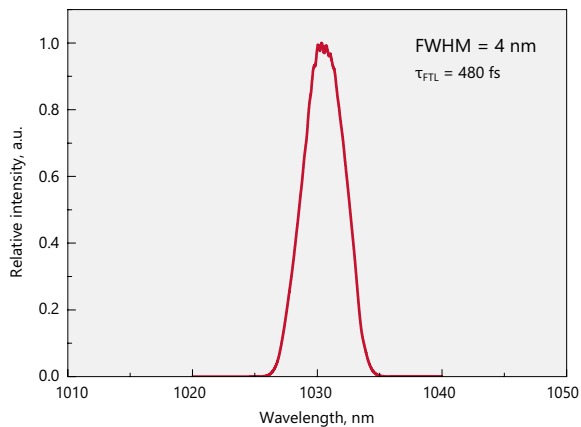
<sup>4)</sup> Pulse picker is an option for FFS100 and FFS200 models. It supports external gating. FFS200CHI includes internal frequency divider, which enables pulse repetition rate reduction but does not support external gating.

<sup>5)</sup> FFS200CHI model is provided with collimator & isolator node with dimensions 138×66.6×52 mm.

<sup>6)</sup> The connector is not suitable to connect with single mode fiber.

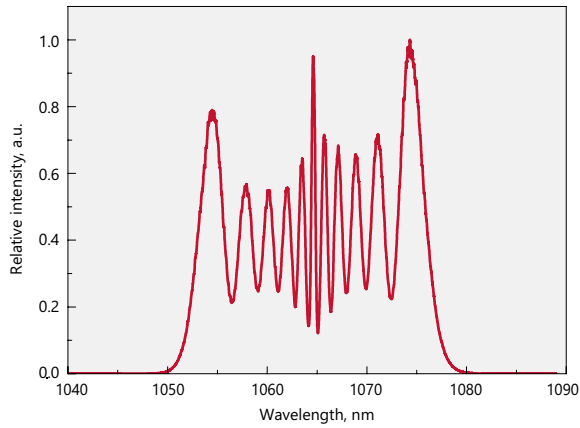


PERFORMANCE

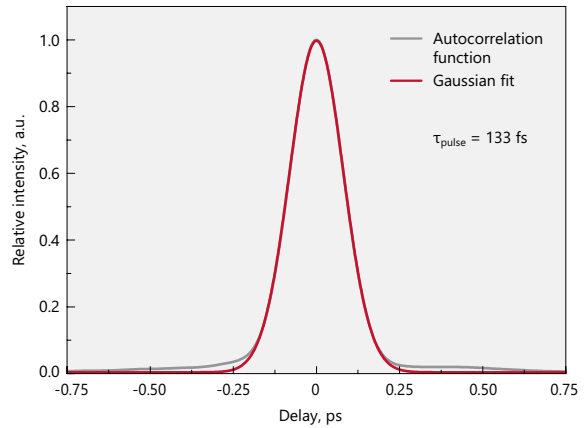


Typical narrowband (FWHM = 4 nm) and broadband (FWHM = 18 nm) spectra from FFS100CHI/FFS200CHI lasers



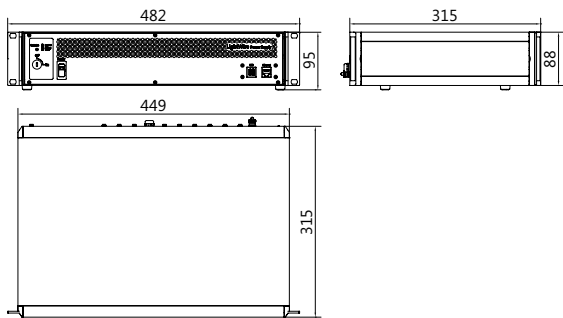


Typical spectrum from FFS200 laser

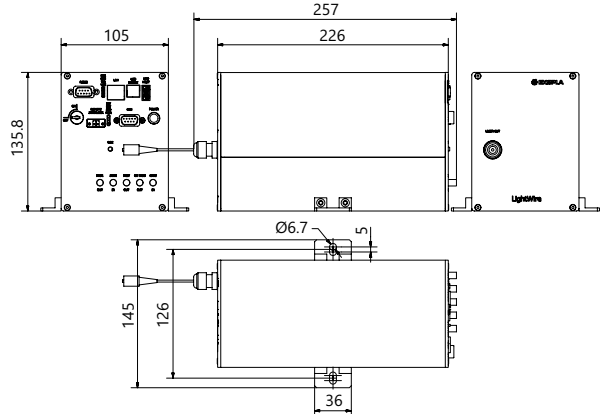


Typical autocorrelation from FFS200 laser

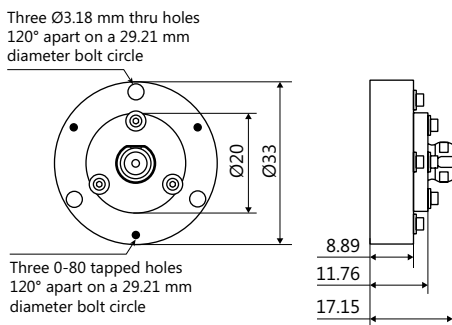
DRAWINGS



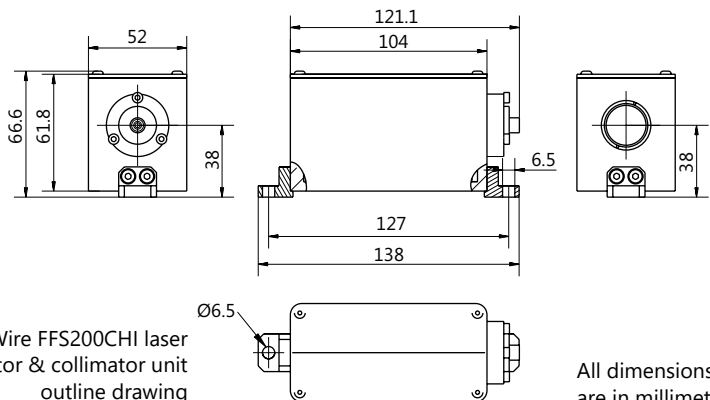
LightWire FFS series control unit outline drawing (19" rack mountable version)



LightWire FFS series "Compact" version drawing. Example only. Actual dimensions depends on a selected laser configuration and options. Please enquire



LightWire FFS100CHI laser collimator flange outline drawing for beam diameters 0.9 mm



LightWire FFS200CHI laser isolator & collimator unit outline drawing


All dimensions are in millimetres.



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