

MENHIR-1550 SERIES

Menhir Photonics femtosecond laser sources are based on robust and well-engineered designs, offering an excellent reliability with the low-noise performance from soliton mode-locking. Robust, 24/7 operation, user-friendly and self-starting, the MENHIR-1550 series has been made to facilitate OEM integration and enable customers applications.

Key Features

- Ultra low-noise
- Transform-limited pulses
- Hermetically sealed laser
- Compact industrial design
- User-friendly
- 24/7 operation
- All-in-one system

Main Applications

- Optical communication
- Precision microwave
- THz generation
- Amplifier seeder
- Timing distribution
- Frequency comb
- A/D Converter

Key Specifications

- Wavelength: 1560 nm
- Repetition rate: up to 2.5 GHz
- Clean soliton pulses: < 200 fs

Options

- Repetition rate stabilization
- Customized repetition rate
- OEM version



Front View



Rear View

Specifications

Parameters	MENHIR-1550 (Oscillator, no amplifier)	MENHIR-1550+ (With amplifier)
Average power	> 50 mW	up to 2 W
Peak power	> 0.1 kW	up to 4 kW
Pulse energy	> 0.05 nJ	up to 1 nJ
Repetition rate	Standard - 250, 500 MHz, 1, 1.25, 2 or 2.5 GHz Custom design - 200 MHz to 2.5 GHz*	
Center wavelength	1560 nm +/- 10 nm	
Spectral bandwidth	> 12.5 nm (at 3 dB)	
Pulse width	< 200 fs, Transform-limited	
Optical output port	Fiber output (PM FC/APC), Free-space	
Beam quality	TEM ₀₀ , M ² < 1.05	
Polarization	Linear (PER > 23 dB, > 200:1)	
Amplitude noise	< 0.1% RMS (24 h)	
Timing jitter	< 30 fs [1 kHz-10 MHz]	

*Please inquire for your specific repetition rate

General

Power supply	5 VDC / 2 A **	24 VDC / 2 A **
Power consumption	< 10 W	< 50 W
Cooling	Passively air-cooled	
Warm-up time	< 10 s (Cold start)	
Laser head size/Weight	240 x 160 x 89 mm ³ / 5 kg	
Control unit	No control unit required, All-in-one system	
Operating temperature	+5°C to +45°C	
Storage temperature	-10°C to +60°C	
Relative humidity	< 80% (Non-condensing)	
Analog interface	e.g. Power Mod., Alarm, Interlock, Trigger, Status	
Digital interface	USB, RS232, ETHERNET, CAN	

**Power supply for 100 or 240 VAC can be provided as option

Custom modifications are available - Please inquire

Specifications are subject to change without notice - June 2019



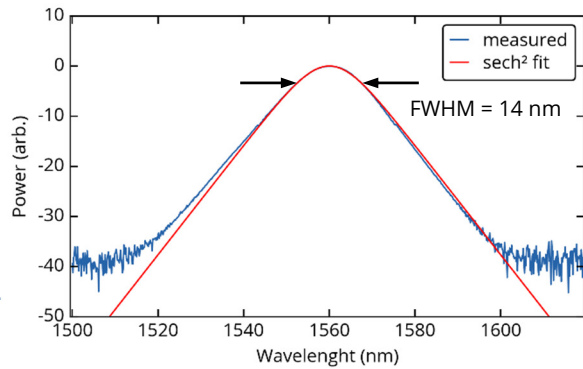
MENHIR-1550 SERIES - 250 MHz

The MENHIR-1550-SERIES is the first industrial-grade femtosecond laser operating around 1550 nm with GHz repetition-rate and ultra-low noise performances. In this document, you can find the full characterization of the same MENHIR-1550 operating at 250 MHz. The laser performance, the noise characteristics as well as the reliability of this laser were tested.

Key Laser Parameters

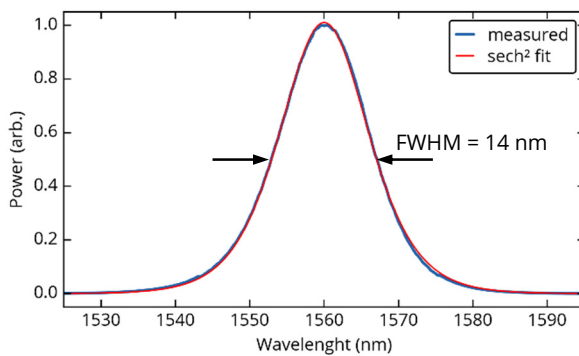
- $f_{\text{rep}} = 250.0 \text{ MHz}$
- $< 200 \text{ fs}$ (supported)
- Power $> 100 \text{ mW}$
- Bandwidth $> 12.5 \text{ nm}$
- $\lambda_0 = 1560 \text{ nm}$
- Sech² shape spectrum
- Clean soliton pulse
- TEM₀₀ - M₂ < 1.05

Optical spectrum (log scale)

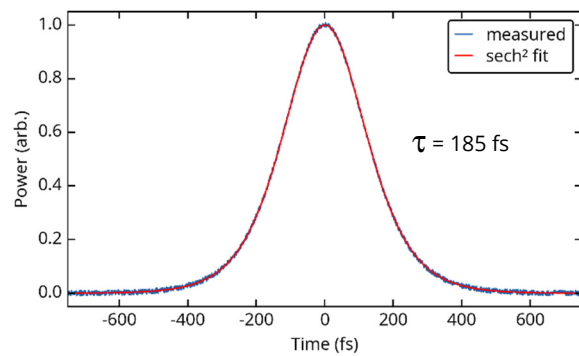


Laser Parameters

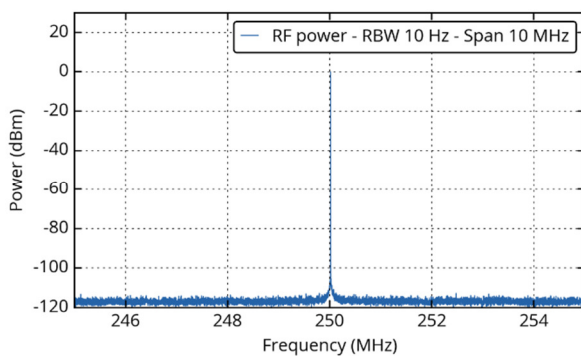
Optical spectrum (linear scale)



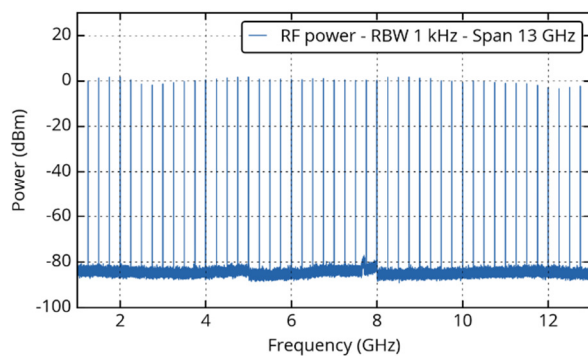
Autocorrelator trace



RF spectrum (zoom on f_{rep})

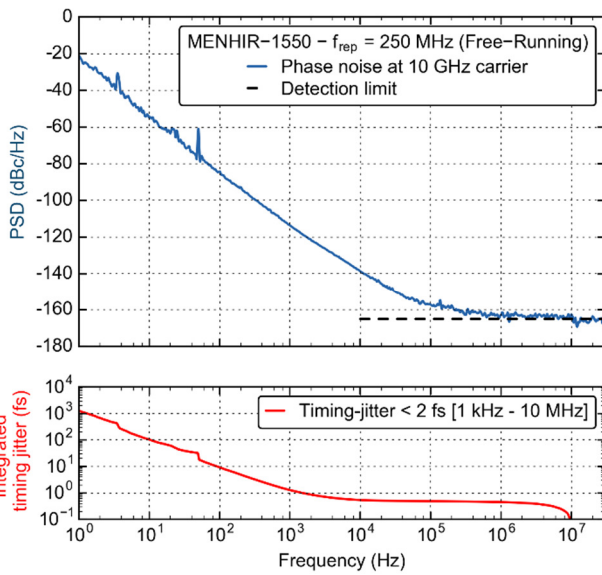


RF spectrum (large span)

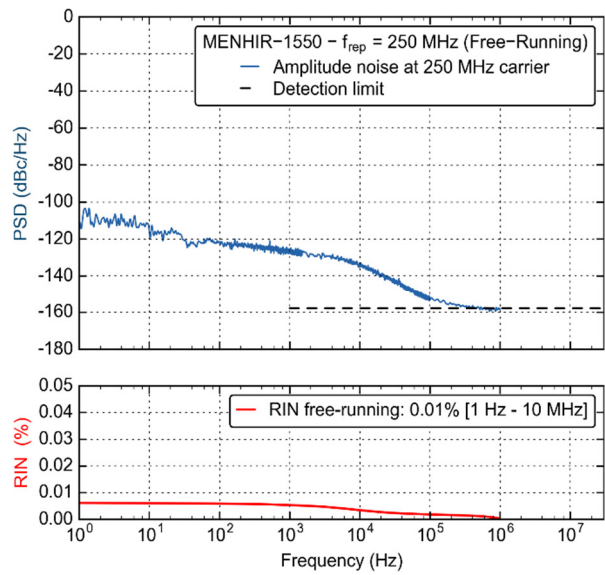


Noise Characterization (free-running)

Phase noise



Amplitude noise

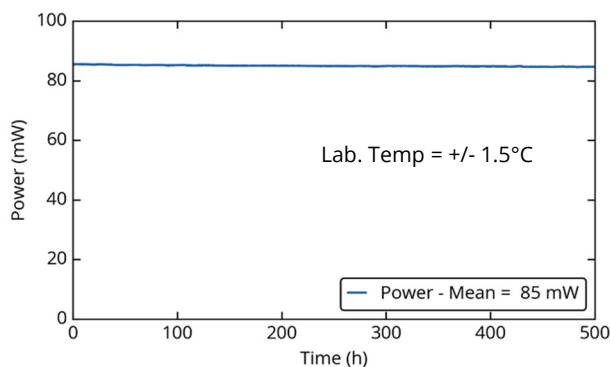


The phase noise of the laser was measured on the 40th harmonic at 10.0 GHz.

f_c : offset from fundamental harmonic	Phase noise (dBc/Hz)		Timing-jitter [f_c - 10 MHz]	Amplitude noise RMS [f_c - 10 MHz]
	250 MHz carrier	10 GHz carrier		
10 kHz	< - 160	< - 140	< 1 fs	< 0.01 %
1 kHz	< - 140	< - 110	< 2 fs	< 0.01 %
100 Hz	< - 110	< - 80	< 10 fs	< 0.01 %
1 Hz	< - 50	< - 20	< 1.5 ps	< 0.02 %

Reliability (free-running) and options

500 h long-term test



Fast actuator for f_{rep} tuning

