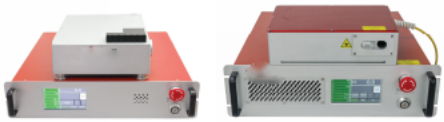
Ultra-Low Noise Fiber Laser



The product description

Single Frequency Fiber laser with low Relative Intensity Noise (RIN) have wide application in quantum optics, pumping lasers, lidar, coherent optical communications, high-precision optical sensing, optical measurement, and precision spectroscopy. For example, the laser for trapping atoms in optical lattice demands not only high output power, but also low RIN to reduce the resonance between the lattice and atoms and low frequency noise (FN) to reduce the spatial vibration, which is quite important for the atoms lifetime in the lattice. In the atomic interferometer and atomic clock application, high power laser could lead to more atoms, uniform interaction area and high measurement SNR.

Fig. 1, Schematic of the low noise fiber laser.
*The doubler module is equipped with SHG model, for example, LN-YFA-D 及 LN-EFA-D

Erbium group offers high power low noise 1064 nm and 1550 nm fiber laser with low FN and low RIN seed + low noise fiber amplifier shown in Fig. 1. In Fig. 2, the amplifier will not introduce the extra frequency noise and the linewidth broadening is measured to be less than 1 Hz. The RIN of the amplifier is ultra-low(RIN<-140 dBc/Hz (>5 kHz), RIN integration from 10 Hz-10 MHz <0.03%). Also, the wavelength could extend to be 1020- 1120 nm for Ytterbium-doped fiber amplifier and 1530-1596 nm for Er-doped fiber amplifier. With stable single pass frequency doubling module, the low noise fiber laser wavelength could extend to be 510-556 nm and 765-798 nm . In the process of frequency doubling, the linewidth of the laser is doubled, and the intensity noise (RIN) is only increased by 6 dB, thus inheriting the low noise characteristics of the fundamental frequency light.

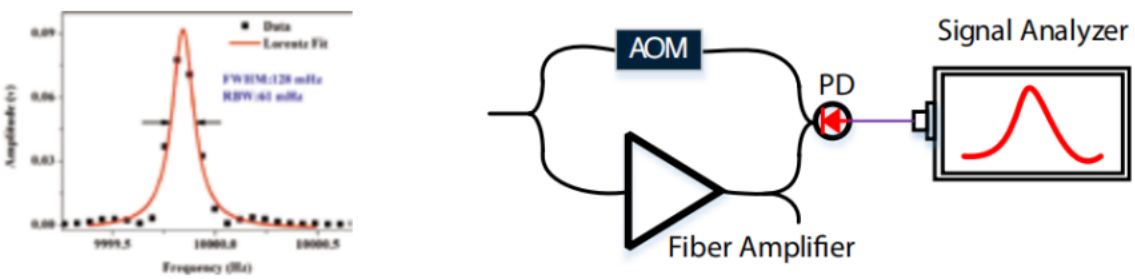


Fig. 2, Linewidth broadening test and result

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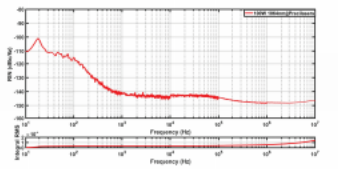
PreciLasers offers a high-power (up to 130 W), low intensity noise, narrow linewidth highly-reliable 1064 nm fiber laser solution for the optical lattice application.



Typical relative intensity noise power density spectrum (RIN) * of 90 W LN-YFA-1064

Key Features:

- Low Intensity Noise (-140 dBc/Hz @100 kHz)
- Narrow Linewidth(<10 kHz)
- Good Beam quality (M^2 <1.2)
- High Output Power (up to 100 W)
- Operation in harsh conditions
- Full Protection System

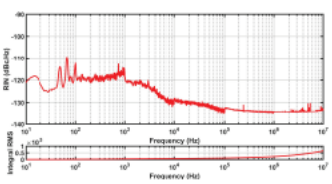
Applications:

- Optica Lattice
- Optical Tweezers
- Optical Traps
- Pump laser for OPO

Technical indicators

Model	LN-YFA-1064-130	LN-YFA-1064-100	LN-YFA-1064-50
Central Wavelength[1], nm	1064	1064	1064
Linewidth, kHz	< 10	< 10	< 10
Tuning Range,GHz	10	10	10
Power afterISO, W	>130	>100	>50
RIN	RIN: -140 dBc/Hz (100 kHz) RMS Integration: <0.0(10Hz-10 MHz)	RIN: -140 dBc/Hz (100 kHz) RMS Integration: <0.0(10Hz-10 MHz	RIN: -140 dBc/Hz (100 kHz) RMS Integration: <0.0(10Hz-10 MHz
Beam Quality	TEM_{oo} , M^2 <1.15	TEM_{oo} , M^2 <1.15	TEM_{oo} , M^2 <1.15
Polarization	Linearly Polarized , > 300: 1	Linearly Polarized , > 300: 1	Linearly Polarized , > 300: 1
P-P, RMS Power Stability	<0.5 %@3hrs	<0.5 %@3hrs	<0.5 %@3hrs
Cooling	Water Cooling	Water Cooling	Air Cooling/Water Cooling
Output Connector	Space (300*240 mm²)	Space (300*240 mm²)	Fiber
1: Wavelength could be selected from 1020-1112nm			

With single pass and resonant cavity SHG module, low noise 532 nm laser could be generated with output power up to 30 W, which has been applied in optical lattice application.



Typical 10 W 532 nm laser RIN spectrum

Key Features:

- Narrow Linewidth<20 kHz

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- Low Intensity Noise (-130 dBc/ Hz @ 100 kHz)
- High Power (up to 30W @ LNYFA-SHG)
- Good Beam Quality (M^2 <1.2)
- Linearly Polarize
- Active Power Stability

Applications:

- Optica Lattice
- Optical Tweezers
- Pump laser for Ti: Sapphir laser

Technical indicators

Model	LN-YFA-D-532-10(Single Pass SHG)	LN-YFA-D-532-30(Resonant Cavity SHG)
Central Wavelength[1], nm	532	532
Linewidth, kHz	< 20	< 20
Tuning Range,GHz	20	20
Output Power, W	10	30
RIN	RIN: -130 dBc/Hz (100 kHz) RMS Integration: <0.05(10Hz-10 MHz)	RIN: -130 dBc/Hz (100 kHz) RMS Integration: <0.05(10Hz-10 MHz)
Beam Quality	TEM_{oo} , M^2 <1.2	TEM_{oo} , M^2 <1.1
Polarization	Linearly Polarized , > 100: 1	Linearly Polarized , > 100: 1
P-P, RMS Power Stability	<0.5 %@3hrs	<0.5 %@3hrs
Cooling	Air Cooling/Water Cooling	Air Cooling/Water Cooling
1 Central Wavelength could be selected from 510-540 nm		

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