

Single Frequency / Single Longitudinal Mode Laser

CNI offers single longitudinal mode (SLM) lasers with min. spectral linewidth **<0.00001nm**, the wavelength is available from **360-1550nm**. The laser type is divided by Diode-pumped Solid State Laser series MSL-III/S/FN/FW/R from low to high power, and Fiber Laser series FL-xxx-SF.

Most of CNI SLM lasers are in CW version, but Q-switched SLM laser at 532nm and 1064nm are also available. Water cooled method will be considered if higher power and stability are required.

1.Catalog

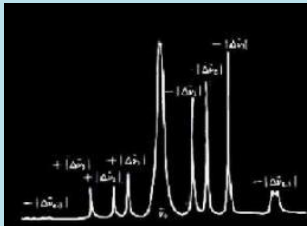
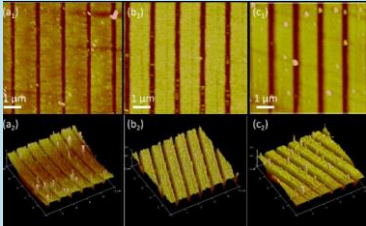
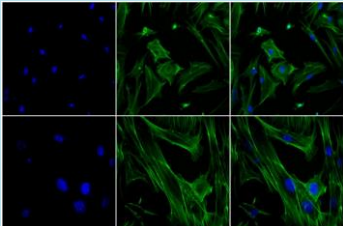
Wavelength (nm)	Model	Output power (mW)	Features	Data sheets
360	MSL-FN-360	1~50		PDF
457	MSL-FN-457	1~350		PDF
	MSL-RA-457	350~1000	Water cooled	PDF
	MSL-W-457	1000~2000	Water cooled	PDF
473	MSL-FN-473	1~100		PDF
515	MSL-F-515	1~20		PDF
523.5	MSL-III-523.5	1~50		PDF
	MSL-FN-523.5	50~100		PDF
526.5	MSL-III-526.5	1~20		PDF
	MSL-FN-526.5	20~100		PDF
530	MSL-S-530	1~50	Good seal IP67	PDF
	MSL-DS-530	1~50	Electronic Integrated	PDF
532	MSL-III-532	1~100		PDF
	MSL-S-532	1~100	Good seal IP67	PDF
	MSL-DS-532	1~100	Electronic Integrated	PDF
	MSL-FN-532	100~400		PDF
	MSL-F-532	400~1000		PDF
	MSL-RA-532	1000~2000	Water cooled	PDF
	MSL-R-532	2~10 W	Water cooled	PDF
	MSL-AO-532	1~10uJ@1Hz~1kHz, 10ns	Q-switched	PDF
543	MSL-FN-543	1~100		PDF
556	MSL-FN-556	1~100		PDF
561	MSL-FN-561	1~80		PDF

577	MSL-F-577	1~300		PDF
588	MSL-FN-588	1~200		PDF
589	MSL-F-589	1~200		PDF
	MSL-RA-589	200~500	Water cooled	PDF
607	MSL-FN-607	1~100		PDF
639	MSL-FN-639	1~300		PDF
656.5	MSL-FN-656.5	1~50		PDF
660	MSL-FN-660	1~20		PDF
671	MSL-FN-671	1~500		PDF
	MSL-R-671	500~800	Water cooled	PDF
	MSL-RA-671	800~1000	Water cooled	PDF
	MSL-W-671	1000~2500	Water cooled	PDF
721	MSL-FN-721	1~100		PDF
914	MSL-FN-914	1~100		PDF
946	MSL-FN-946	1~50		PDF
1030	MSL-FN-1030	1~20		PDF
1047	MSL-U-1047	1~500	Ultra compact	PDF
	MSL-FN-1047	500~800		PDF
1053	MSL-FN-1053	1~200		PDF
1064	MSL-S-1064	1~200	Good seal IP67	PDF
	MSL-III-1064	200~1000		PDF
	MSL-R-1064	1~10 W	Water cooled	PDF
	MSL-AO-1064	1~200uJ@1Hz~1kHz, 25ns	Q-switched	PDF
	FL-1064-SF	1~500		PDF
1112	MSL-FN-1112	1~20		PDF
1122	MSL-FN-1122	1~80		PDF
1313	MSL-FN-1313	1~500		PDF
1319	MSL-FN-1319	1~50		PDF
1342	MSL-III-1342	1~200		PDF
	MSL-R-1342	1~5 W	Water cooled	PDF
1550	FL-1550-SF	1~1000		

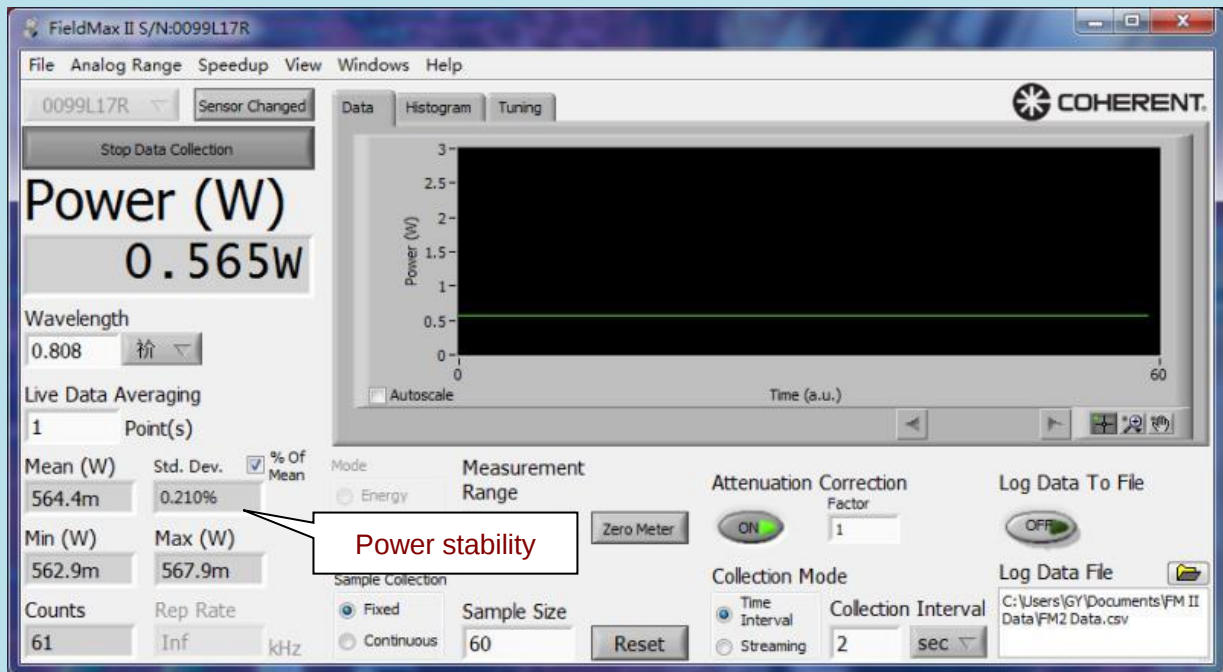
3. Physical Pictures

		
MSL-S	MSL-III	MSL-DS-532
		
MSL-U	MSL-FN	FL-xxx-SF

4. Applications:

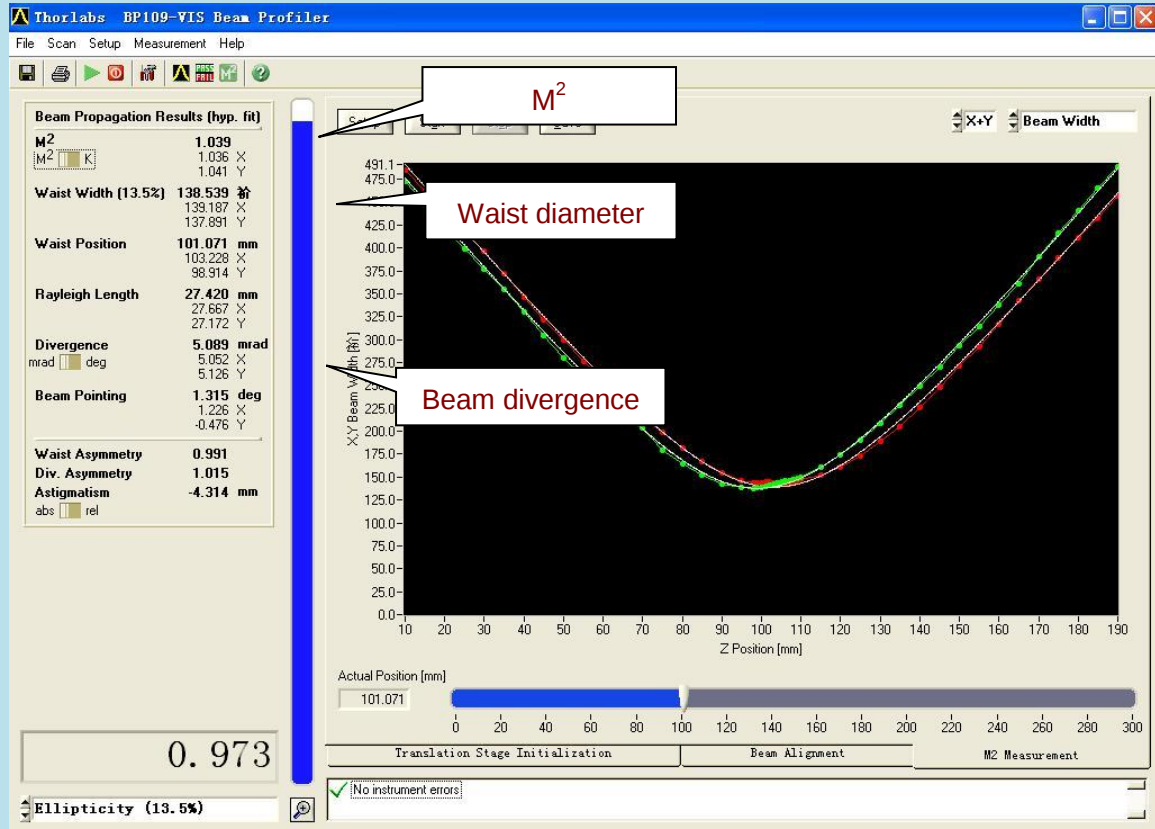
			
Raman	Holography	Interference/ Lithography	Biomedical/ Fluorescence

5. Testing Data of Parameters & Testing Tools

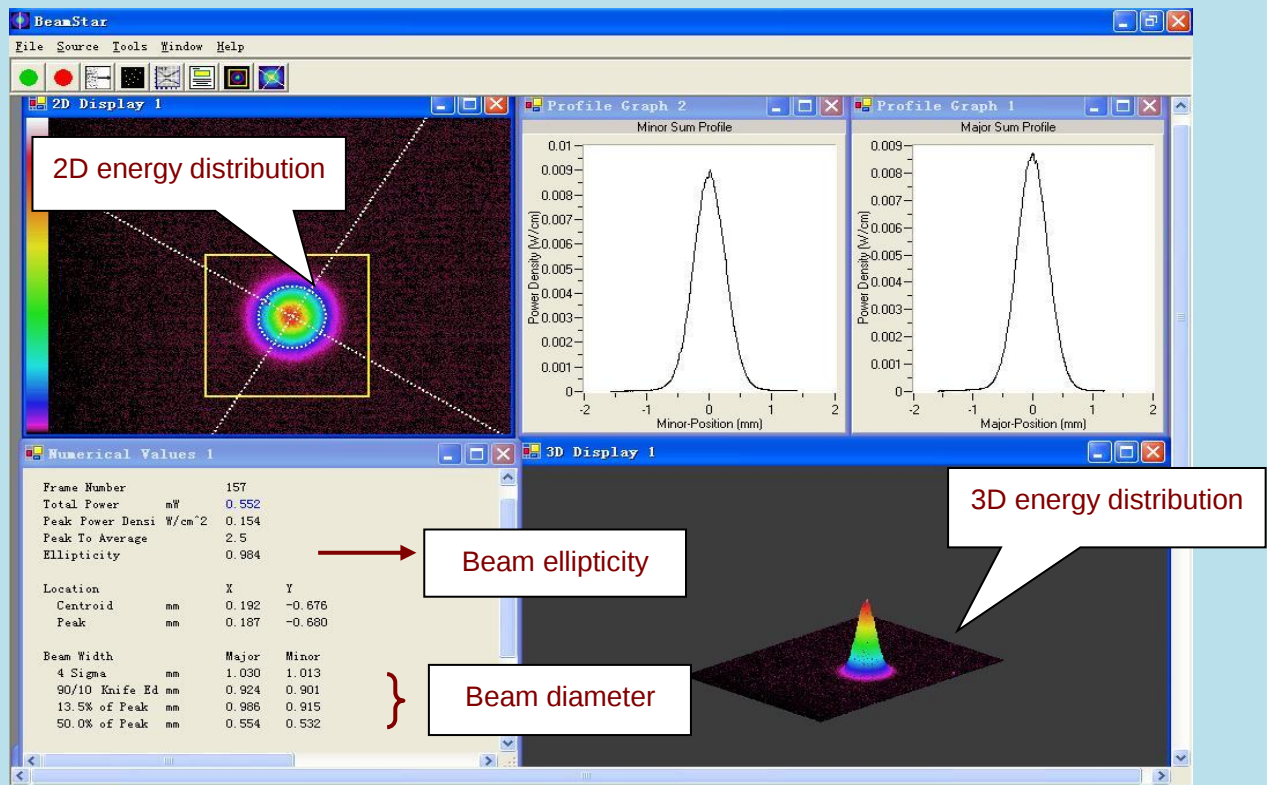


Output power and Power stability (tested by Coherent Laser Power Meter)

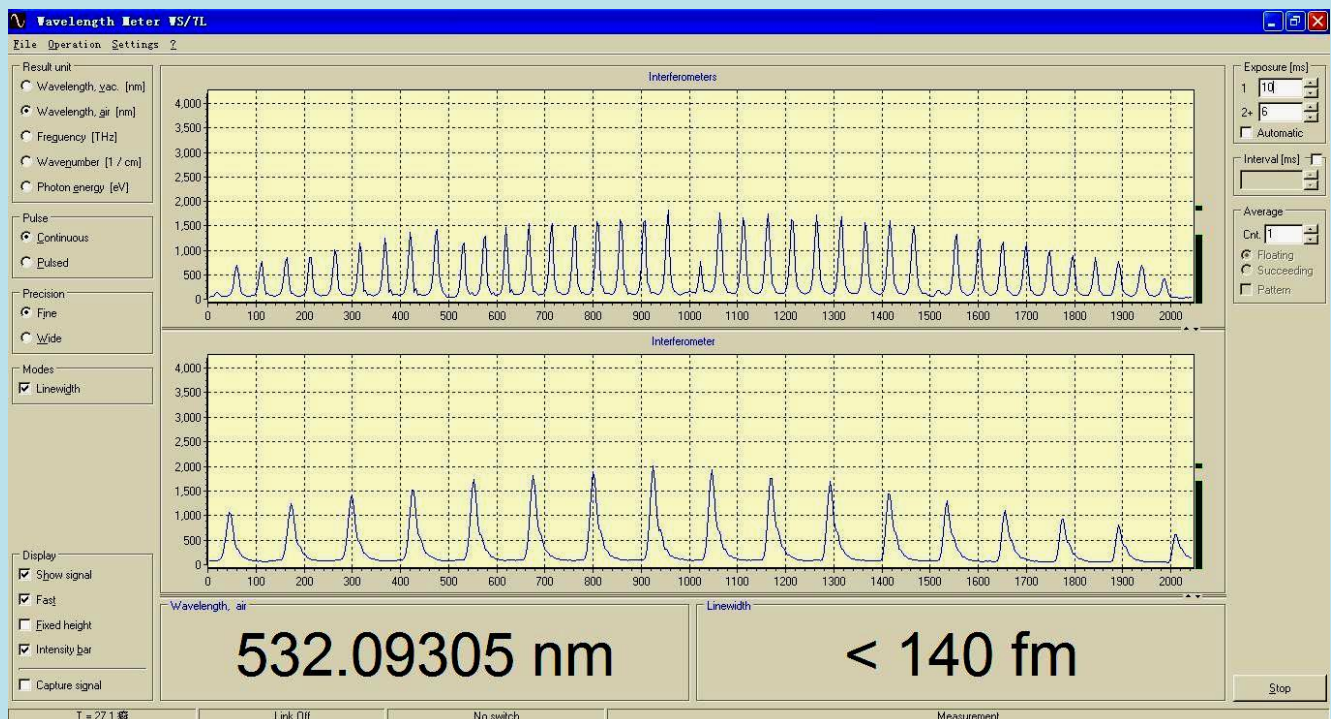
Note: The regular power stability is tested over 4 hours and indicated in RMS value.



M2 testing (tested by M²-Meter)



Beam Profile (tested by Beam profiler analyzer)



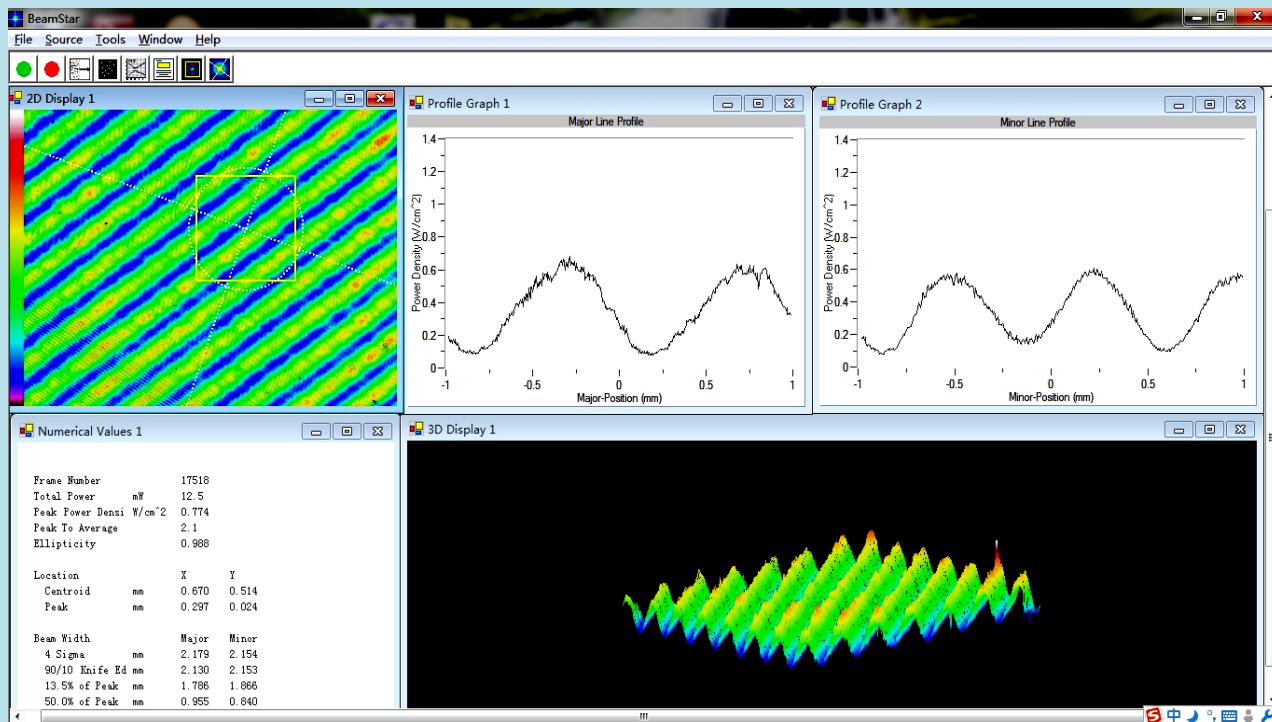
Spectral linewidth (tested by Wavemeter)

Detailed information about Wavemeter:

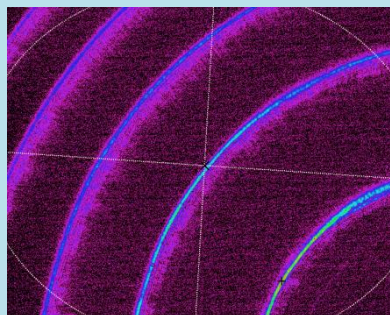
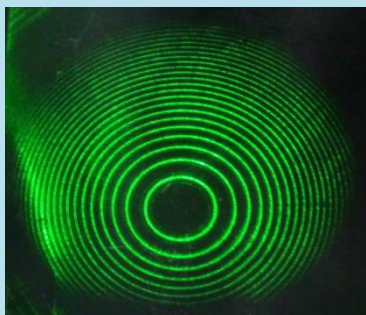
Resolution 10MHz (e.g.: 0.0095pm@532nm = 9.5fm)

Absolute accuracy 60MHz (10-15fm)

The test wavelength can guarantee the accuracy of 5 digits after the decimal point (e.g.: 532.09305nm)

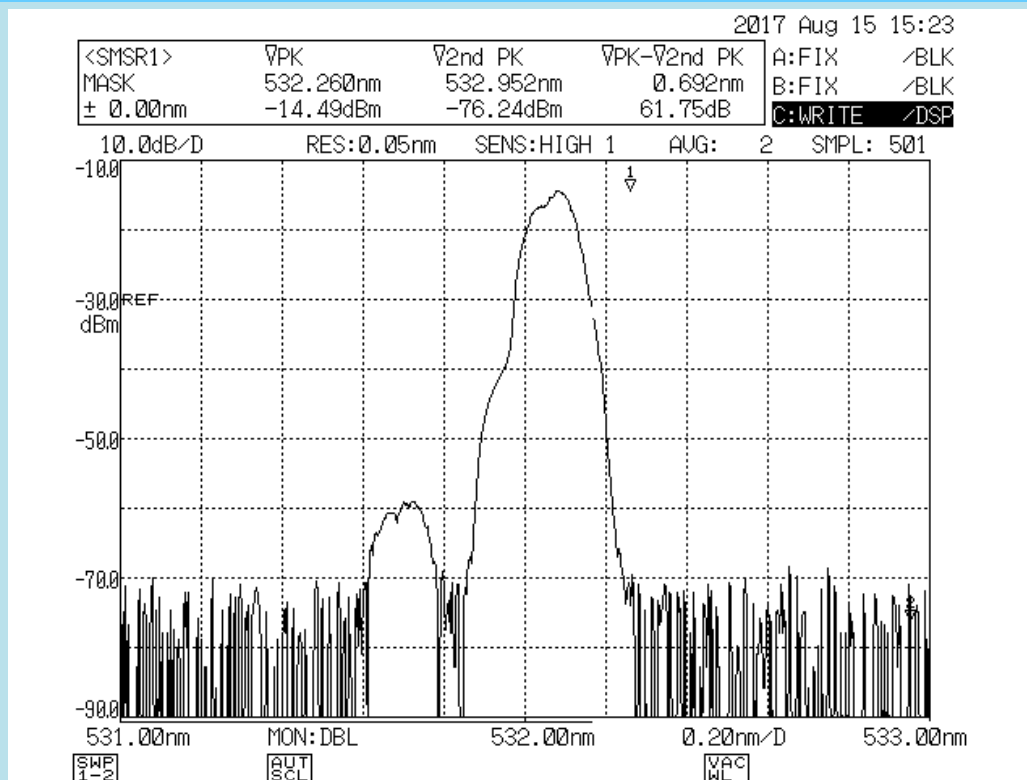


Coherence fringe contrast (tested by laser profile analyzer)



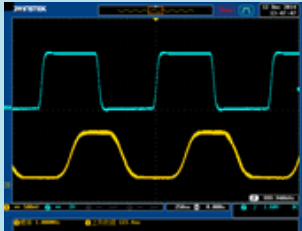
Interference ring

Note: Coherence length is measured by Michelson interferometer.



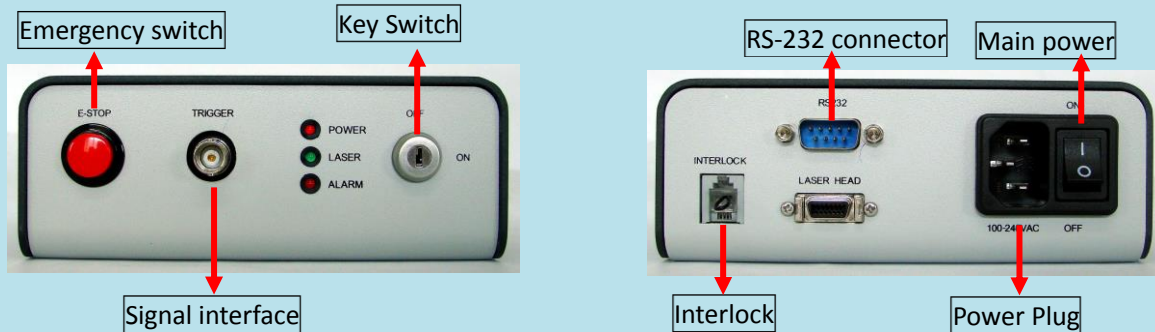
Single-Mode Suppression Ratio (SMSR) (tested spectrum analyzer)

6. Options & Accessories

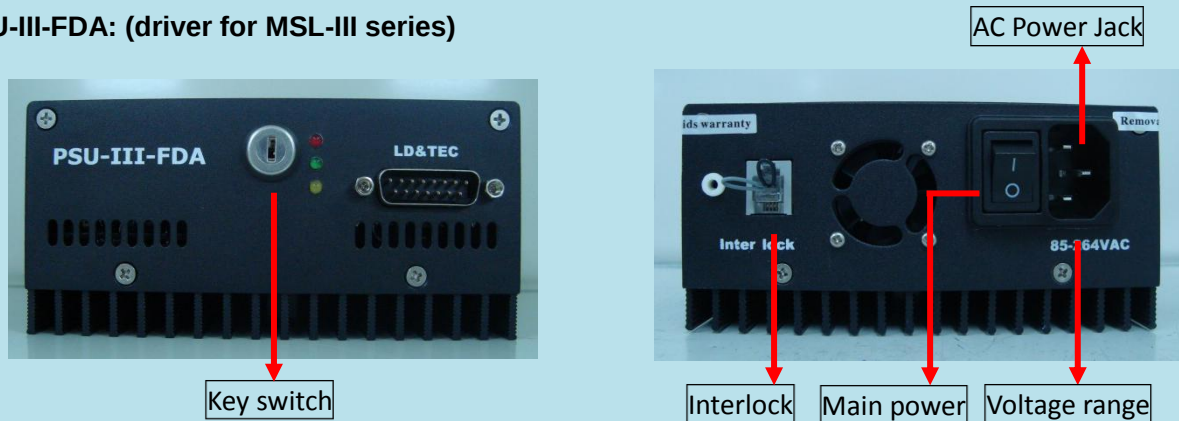
	
Frequency stabilized laser version (with temperature controlled heat sink) (Frequency shift over 8hrs $<\pm 200\text{MHz}/^\circ\text{C}$)	SM, PM, MM fiber coupling
	
External power attenuator (Regular laser has fixed power as default)	Modulation repetition rate up to 1MHz by AOM

7. Function Description of the Laser Power Supply

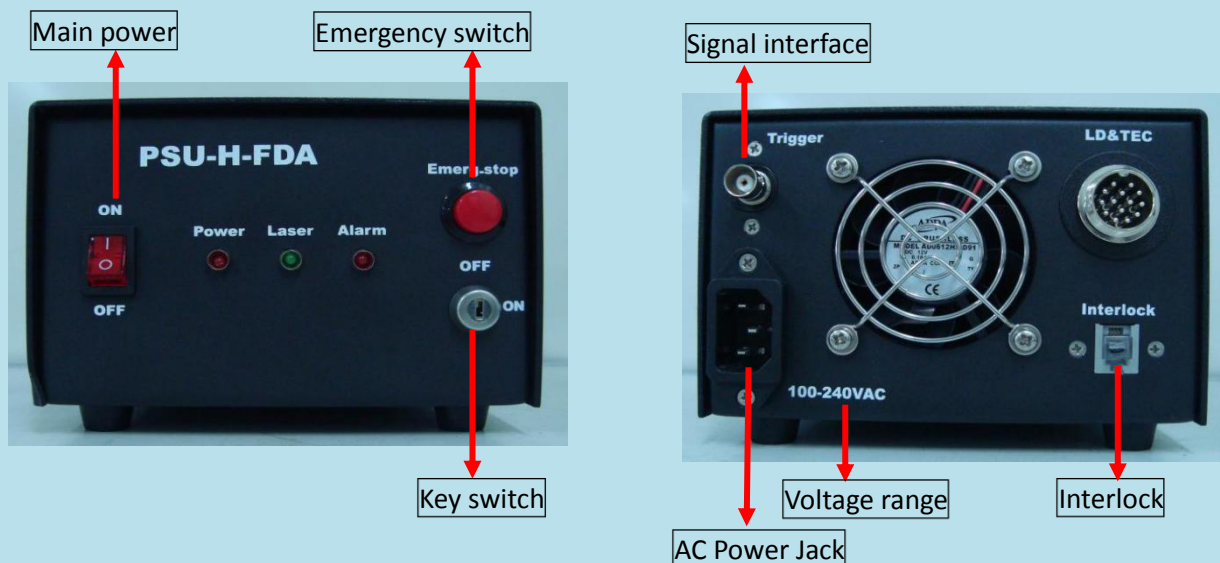
PSU-A-F: (driver for MSL-S series)



PSU-III-FDA: (driver for MSL-III series)



PSU-H-FDA: (driver for MSL-FN/ F series and MSL-S series IP67 version)



7.1 Emergency switch: When unexpected accident occurs, you can press it down to switch off the laser. You need to reset the main power and key switch to restart the laser.

7.2 Interlock: Pull out the crystal plug or disconnect the short wire on the plug (if there are two short wires, disconnect both of them), laser system will stop working. At this point you must connect the plug or restore short wires, the laser system return to normal working station.

8. Related Articles

■ Holography

1. Three-dimensional holographic photostimulation of the dendritic arbor.
(J. Neural Eng. 8 046002; doi:10.1088/1741-2560/8/4/046002) (CNI-405nm)
2. Two-wavelength exposure enhancement in holographic data storage of spirooxazine-doped polymers.
(Optics Communications Vol. 338, 1 March 2015, Pages 269–276) (CNI-405nm)
3. Depth resolved hyperspectral imaging spectrometer based on structured light illumination and Fourier transform interferometry.
(Biomedical Optics Express, Vol. 5, Issue 10, pp. 3494-3507 (2014)) (CNI-473nm)
4. Optical magnetic imaging of living cells.
(Nature 496, 486–489 (25 April 2013)doi:10.1038/nature12072) (CNI- 532nm)
5. Multi-wavelength laser sensor for intruder detection and discrimination.
(Optics and Lasers in Engineering Vol. 50, Issue 2, Pages 176–181) (CNI-532nm)
6. Optical observation of shock waves and cavitation bubbles in high intensity laser-induced shock processes.
(Applied Optics, Vol. 48, Issue 19, pp. 3671-3680 (2009)) (CNI-532nm)
7. Microscope spectrometer for light scattering investigations.
(Applied Optics, Vol. 49, Issue 22, pp. 4193-4201 (2010)) (CNI-671nm/532nm)

■ Raman spectrum

1. Ultra-high resolution Raman imaging by optically trapped dielectric microsphere.
(Proc. of SPIE Vol. 7033, doi.org/10.1117/12.794692) (CNI laser-532nm)
2. Raman spectroscopy of single nanoparticles in a double-nanohole optical tweezer system.
(IOP Science, 2015 J. Opt. 17 102001, doi:10.1088/2040-8978/17/10/102001) (CNI laser-671nm)
3. Conductive Micropatterns Prepared by Laser-Induced Reduction of Graphene Oxide

(Journal of Photopolymer Science and Technology, DOI: 10.2494/photopolymer.31.447) (CNILaser - 532nm)

4. A Short-Wavelength Raman Optical Activity Spectrometer with Laser Source at 457 nm for the Characterization of Chiral Molecules

(Applied Spectroscopy, 2017, Vol. 71(9) 2211–2217, DOI: 10.1177/0003702817712260) (CNILaser - 457nm)

5. Frequency-resolved Raman for transient thermal probing and thermal diffusivity measurement

(Optics Letters, Vol. 41, No. 1 / January 1 2016, <http://dx.doi.org/10.1364/OL.41.000080>) (CNILaser - 532nm 150mW)