AMPX-PICO-1040/50/10 IR PICOSECOND FIBER LASER

APPLICATIONS

RAMAN SPECTROSCOPY

Illustration exemplary

KEY FEATURES

- Central wavelength 1040 nm
- 50 ps pulse duration
- Up to 20 µJ pulse energy
- Tunable repetition rate
- High spectral and intensity stability
- Ultra-narrow spectral linewidth
- Portable. Low sensitivity to environmental conditions
- Full-fiber IR amplification scheme
- PC controller via USB
- Compact and portable package

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NEW FRONTIER IN ULTRAFAST LASER PERFORMANCE.

SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNITS
OPTICAL PARAMETER				
Average output power	10	12		W
Repetition rate	0.5	Tunable	75	MHz
Max pulse energy	20	24		µJ
Pulse duration @ 3 dB (FWHM)	38	50	64	ps
Central wavelength	1038	1040	1042	nm
Spectral bandwidth @ 3 dB (FWHM)	58[1]	150	250	pm
State of polarization		Linear		
Extinction ratio	20	30		dB
Beam ellipticity (ISO 11146-1)	90	95		%
Beam diameter	1	4	6	mm
Beam quality parameter M^2	1	1.2	1.4	
STABILITY				
Short term power stability (RMS) [2]		0.5	1.5	%
Long term power stability (RMS) [3]		1.5	2.5	%
Pulse energy stability (RMS) [4]		7		%
Pulse duration stability (RMS) [4]		9		%
Spectral width change @ 1, 3 and 10 dB		12		pm
Center wavelength maximum shift [5]		12		pm
Peak wavelength maximum shift [5]		24		pm
Pointing stability range [5]		0.5	1	arcmin
ENVIRONMENTAL CONDITIONS				
Operating temperature range	15		30	°C
Storage temperature range	5		45	°C
Humidity	15		75	%
MECHANICAL				
Size (L × W × H)	520 × 418 × 245			mm
Weight	42			kg

[1] Value for 10 W average output power and a repetition rate of 0.5 MHz

[2] RMS value for 1 minute over 12 hours after warm-up at operational power level

[3] RMS value over 12 hours after warm-up

[4] over 10^7 pulses after warm-up

[5] over 2.5 hours after warm-up time

DESCRIPTION

We offer a portable IR laser with pulse duration of 50 ps, a narrow linewidth of 150 pm and a pulse energy of up to 20 µJ, with tunable repetition rate from 0.5 to 75 MHz. This series of devices is specifically designed to cater to applications requiring high temporal and spectral resolution in the middle power range. The compact design of the laser is deliberate solution to strike balance between high-power, high-energy pulse sources and the size constaints imposed by portable devices. Our patented tapered double-clad fiber technology, employed in the fiber approach, offers several significant competitive advantages, including minimal spectral line broadening, compact design, vibration insensitivity, and operation in a wide range of environmental conditions.

The existance of a USB interface, as well as electrical and optical sync-signals, the level and shape of which does not depend on the output power, gives the user the opportunity to easily integrate our laser into their own system. The close proximity of optical outputs ensures minimal synchronization delay, meeting most customer requirements for tailoring laser performance to specific industrial and portable solutions. The software allows for user-friendly management of the repetition rate or average output power.

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PERFORMANCE

Application

Time resolved Raman spectroscopy analysis is based on ultrafast light scattering response of material resulted in a small wavelength shift. This is a versitile technique, which provides a large number of analysis facilities employing in mining, biology, medicine and industy to determine chemical composition, flaw detection, and inhomogeneity. This series of devices was aimed at fulfilling the Raman spectroscopy purposes having narrow optical bandwidth (Fig. 1) and simultaneously, a relatively high peak power [1]. The device series allowed to operate with 0.5 MHz — 75 MHz repetition rate with maximum pulse energy of 20 μJ.

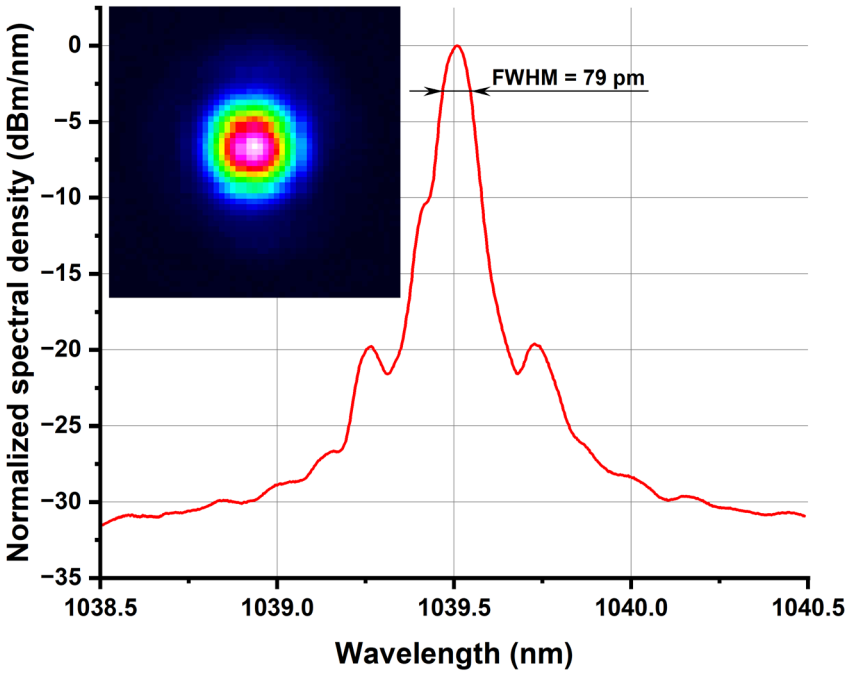

Figure 1. Laser emission spectrum at 10 W average output power and 5 MHz repetition rate. Insert: near field beam profile.

REFERENCES

[1] V. Ustimchik, Y. Chamorovskii, and V. Filippov, "High average power (500W/50ps) and high peak power (3.2 MW/50ps) picosecond pulsed MOPA system with tapered double-clad ytterbium fiber," Fiber Lasers XIX: Technology and Systems. SPIE 11981, 194–200 (2022).

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