AMPX.PICO-532/100/1
FIBER LASER

APPLICATIONS

RAMAN SPECTROSCOPY

MICROMACHINING

MATERIAL PROCESSING

PORTABLE DEVICES

KEY FEATURES

- Central wavelength 532 nm
- 50 or 100 ps pulse duration
- Up to 1.5 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 controlled via Ethernet, RS232, USB
- Compact and portable package

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SPECIFICATIONS

PARAMETER		MIN	TYP	MAX	UNITS
OPTICAL PARAMETER					
Output average power		0.8	1	1.5	W
Repetition rate			1		MHz
Pulse energy		0.1	1	1.5	µJ
Pulse duration	@3 dB (FWHM)	50	100	130	ps
	90% of energy	100	210	260	
Central wavelength		510	532	540	nm
Spectral bandwidth	@3 dB (FWHM)	0.05	0.1	0.11	nm
	@10 dB (FW10%M)	0.08	0.15	0.3	
State of polarization			Linear		
Extinction ratio		20		40	dB
Signal to CW background		-60	-70		dB
Beam ellipticity (ISO 11146-1)			95		%
Beam diameter			0.8	2	mm
Beam quality parameter M^2		1	1.06	1.2	
STABILITY					
Short term power stability (RMS) (1)			0.5	1.5	%
Long term power stability (RMS) (2)			1.4	2.5	%
Pulse energy stability (RMS) (3)				6.8	%
Pulse duration stability (RMS) (3)				8.6	%
Spectral width change @ 1, 3 and 10 dB			≤ 6		pm
Center wavelength maximum shift (4)			≤ 6		pm
Peak wavelength maximum shift (4)			≤ 12		pm
Pointing stability range (4)			0.39	1	arcmin
ENVIRONMENTAL CONDITIONS					
Operating temperature range		15		30	°C
Storage temperature range		5		45	°C
Humidity		15		75	%
MECHANICAL					
Size (L × W × H)		324 × 324 × 166			mm
Weight		16.5			kg

(1) RMS value for 1 minute over 12 hours after warm-up at operational power level

(2) RMS value over 12 hours after warm-up

(3) over 10^7 pulses after warm-up

(4) over 2.5 hours after warm-up time

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Due to continuous product development the specifications in this document are subject to change without notice.

DESCRIPTION

We offer a portable green laser with a choice of 50 or 100 ps / 90 pm / 1 µJ pulse duration and a 1 MHz repetition rate. 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 a deliberate solution to strike a balance between high-power, high-energy pulse sources and the size constraints 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.

Elegant and convenient OEM design enables quick integration of the laser source with existing device solutions. Advanced electronics provide a flexible synchronization scheme, allowing for electrical external synchronization or optical synchronization at the residual IR output. The close proximity of optical outputs ensures minimal synchronization delay, meeting most customer requirements for tailoring laser performance to specific industrial and portable solutions using various connection interfaces. The user interface allows for user-friendly management of repetition rate, as well as instant signal power or pulse control.

PERFORMANCE

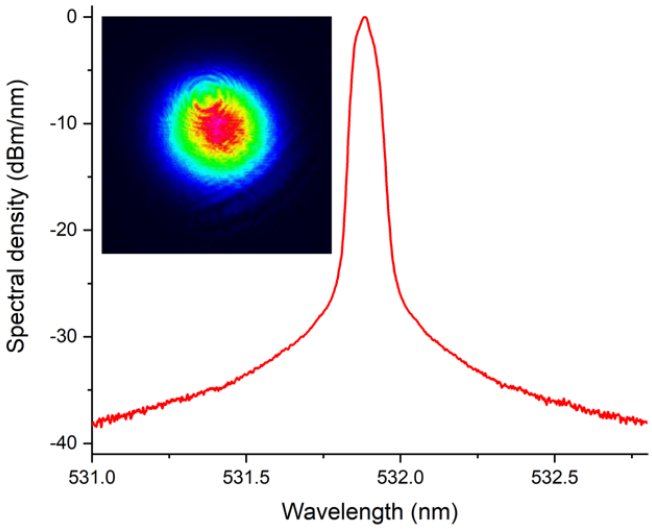

Figure 1. Laser emission spectrum at 1 W average output power and 1 MHz repetition rate. Insert: Beam profile at 10 cm from output aperture.

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Application

Time resolved Raman spectroscopy analysis is based on ultrafast light scattering response of material resulted in a small wavelength shift. This is a versatile technique, which provides a large number of analysis facilities employing in mining, biology, medicine and industry to determine chemical composition, flaw detection, and inhomogeneity. This series of devices was aimed at fulfilling the Raman spectroscopy (Fig. 2) purposes having high photon energy (preferable visible radiation), narrow optical bandwidth and simultaneously, a relatively high peak power [1]. The device series allowed to operate with 100 kHz – 20 MHz repetition rate with maximum pulse energy of 12 µJ.

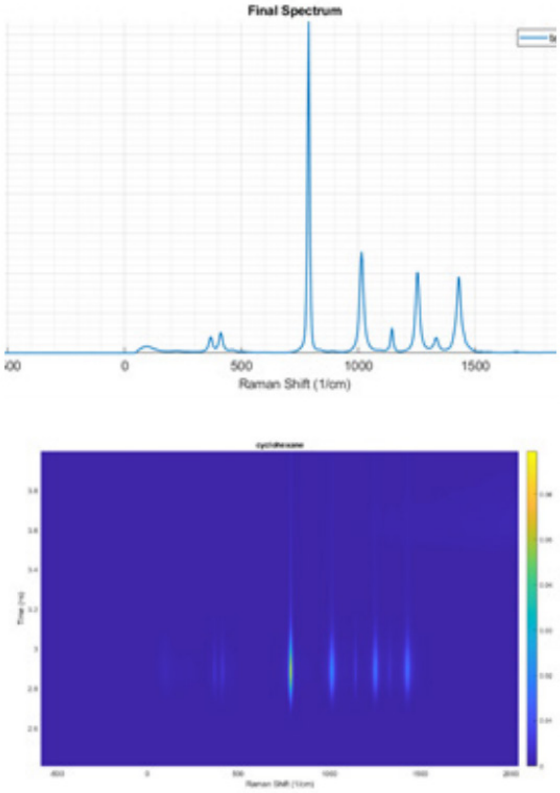

Figure 2. Raman shift measurements by cyclohexane molecule with Ampliconyx's laser @ 532 nm.

REFERENCES

[1] Lipiäinen T., Pessi J., Movahedi P., Koivistoinen J., Kurki, L., Tenhunen M. and Strachan, C. J., "Time-Gated Raman Spectroscopy for Quantitative Determination of Solid-State Forms of Fluorescent Pharmaceuticals", Analytical Chemistry, 90(7), 4832–4839 (2018).

[2] Ustimchik V., Fedotov A., Rissanen J., Noronen T., Gumenyuk R., Chamorovskii Yu., Filippov V., "Green picosecond narrow-linewidth tapered fiber laser system", Proc. SPIE 11260, Fiber Lasers XVII: Technology and Systems, 112601Y (21 February 2020); doi: 10.1117/12.2546003

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