



## TEMA. Yb-doped Solid-State Femtosecond Oscillator

- High average power up to 7 W at 1050 nm
- Short pulse duration <70 fs
- Highly stable (monolithic thermally stabilized body)
- Self-starting of mode-locking
- Optional OPO extension available for extended wavelength coverage
- TEMA-Duo version with a built-in SHG
- 15-fs pulse compressor option



TEMA-150 laser system comprising an optical head and control unit.

### Product overview

The TEMA laser based on an Yb-doped crystal radiates at around 1- $\mu$ m wavelength with high average power, enabling the user to enjoy high power ratings at over-micron wavelengths. This design features an integrated pump diode module for greater system stability and turn-key operation. The monolithic thermally stabilized body of the laser ensures maximum rigidity, while self-starting design provides for easy “plug-and-play” operation.

Three basic models differ in pulse duration and output average power:

- the **TEMA-70** features the shortest pulse duration of the series with widest spectrum width;
- the **TEMA-100** offers a perfect balance between output pulse duration and average optical power;
- the **TEMA-150** outputs the highest average power of the series, and is quite suitable for power-demanding applications, such as e.g. harmonic wavelength conversion and OPO pumping applications.

As for wavelength conversion options, the TEMA laser system is also used as a pump source for optical parametric generators (OPOs), that allow generation of ultrafast pulsed radiation from VIS into the IR and MIR regions. See our TOPOL series of OPO systems for more details.

The system might also be equipped with external harmonic generators of the AG series. Also note that a dedicated TEMA-DUO system with a compact built-in SHG module provides high-power fs radiation at 525 nm.

An optional pulse compressor also enables 15-fs pulse width generation with the TEMA system. Please enquire for further details about this option.



Possible applications of the TEMA laser:

- Generation of terahertz radiation
- Two-photon polymerization
- Seed oscillator for amplifiers
- Multi-photon excitation microscopy
- Pump-probe spectroscopy
- Supercontinuum generation
- Time-resolved spectroscopy
- Optical coherent tomography

The TEMA-100 system integrated in a high-power THz time-domain spectrometer setup by Tydex. More details can be found at <http://www.tydexoptics.com/>



**AVESTA**  
LASERS AND OPTICAL SYSTEMS

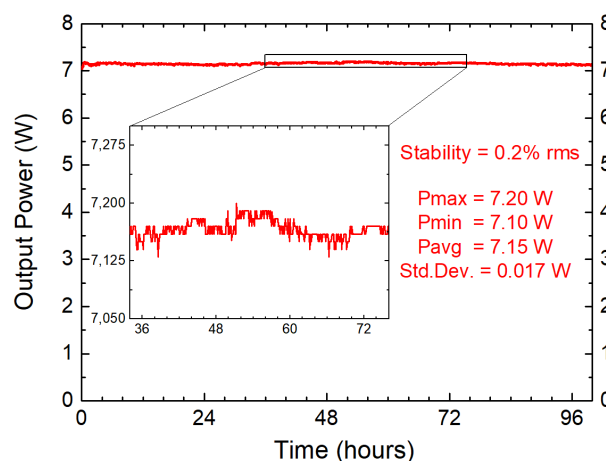


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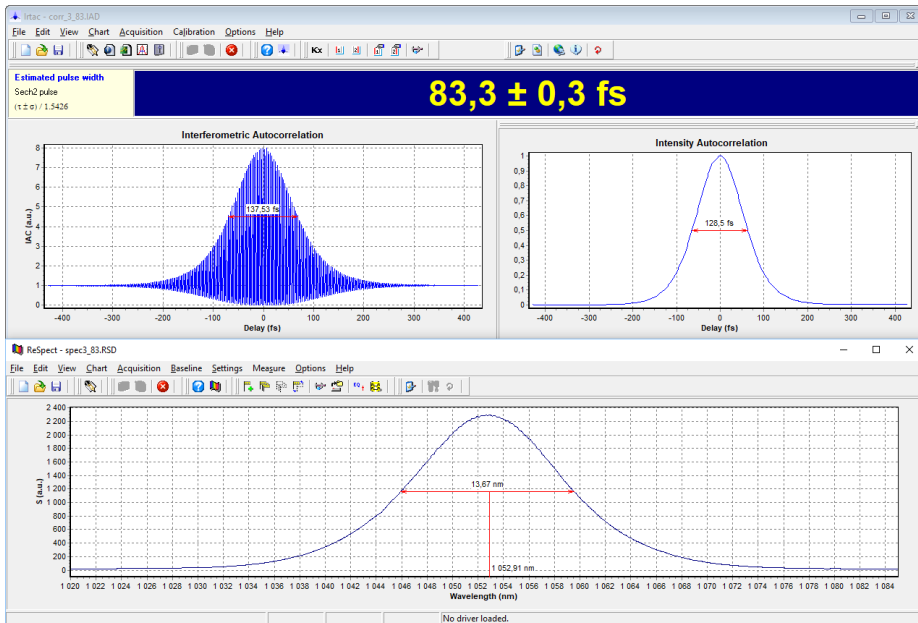
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	TEMA-70	TEMA-100	TEMA-150
Output average power	>2 W	>5 W	>7 W
Output pulse duration <sup>1)</sup>	<70 fs	<100 fs	<150 fs
Spectrum width (FWHM)	>16 nm	>12 nm	>7.5 nm
Pulse energy	>28 nJ	>70 nJ	>100 nJ
Peak power	>400 kW	>700 kW	>660 kW
Central wavelength (fixed)	1050±5 nm		
Pulse repetition rate (fixed)	80±2 MHz		
Beam mode	TEM <sub>00</sub>		
M <sup>2</sup>	<1.15		
Beam diameter (at 1/e <sup>2</sup> )	1±0.2 mm		
Output polarization	linear, horizontal		
Beam divergence	<1.8±0.3 mrad		
Beam asymmetry	<15%		
Beam astigmatism	<15%		
Long-term stability <sup>2)</sup>	<0.3% rms		
Cold start warm-up time	<20 min		
<b>Cooling requirements</b>			
Laser head	closed-loop chiller included		
Power supply	air-cooled		
<b>Physical dimensions (L × W × H)</b>			
Laser head dimensions	412 × 190 × 93 mm		
Laser control unit dimensions	290 × 200 × 80 mm		
Closed-loop chiller dimensions	430 × 340 × 190 mm		
Umbilical length	1.8 m		
<b>Environmental and utility specifications</b>			
Operating temperature	18-28 °C		
Relative humidity	<60%, non-condensing		
Voltage	single-phase; 100-240 VAC; 50/60 Hz		
Power consumption	<1 kW		

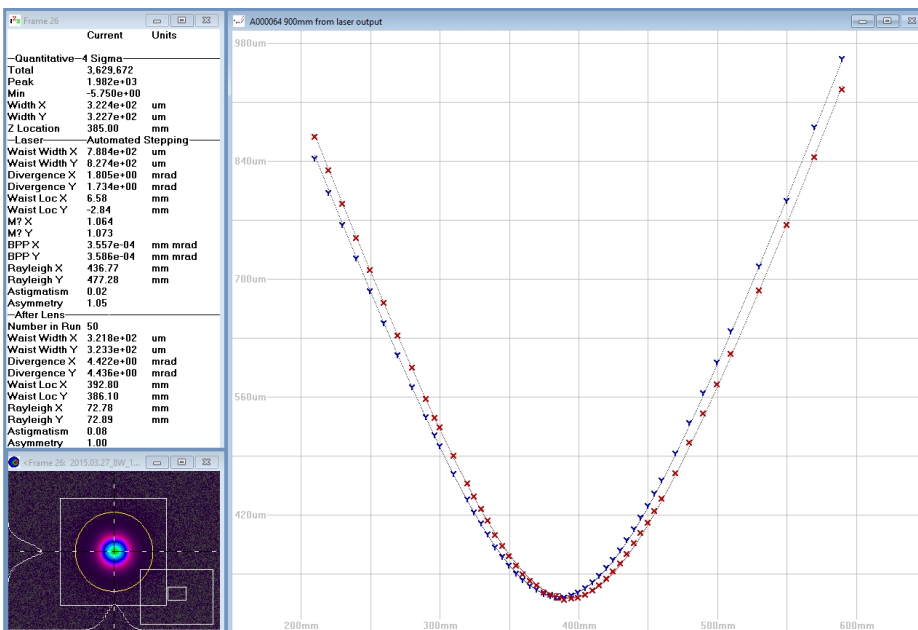
1) -  $\text{sech}^2$  pulse shape is used to determine the pulse duration, measured with the AA-20DD interferometric autocorrelator (Avesta);  
 2) - after 30 min warm-up with cold start, during 12-hour continuous operation under equal room temperature conditions using recommended stabilized closed-loop chiller with proper capacity.



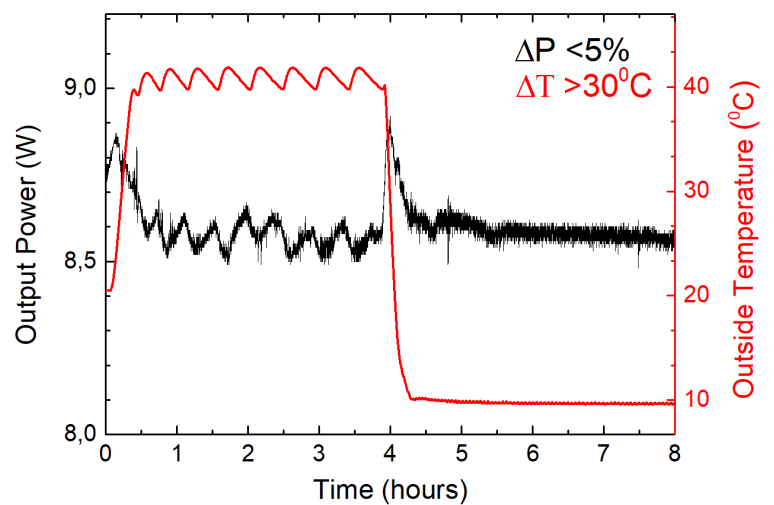
Long-term power stability testing of the TEMA-150 system (<0.2% rms) over 96 hours uninterrupted operation



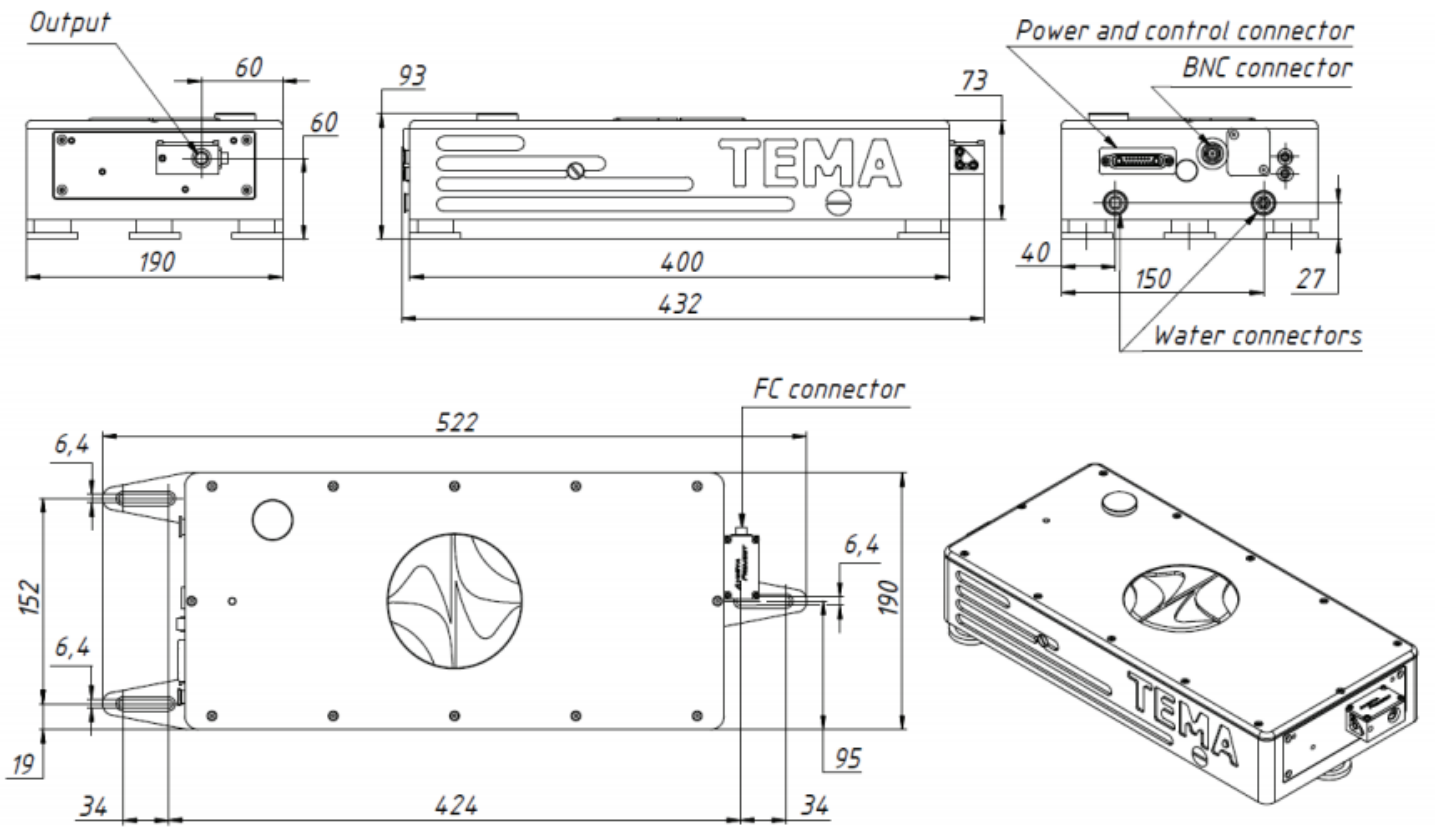
Typical AC traces and spectrum of the TEMA-100 model



Typical M<sup>2</sup> of a TEMA series laser system



Thermal cycling of the TEMA-150 system within 10...40 °C temperature span



Dimensions of a TEMA series laser head in mm