



## TiF-50. Ti:Sapphire Femtosecond Solid-State Oscillator

- Wavelength range as broad as 725-970 nm
- Pulse duration <50 fs
- Output power >1 W
- Thermostabilized monolithic sealed body
- Motorized USB wavelength tuning
- Mode-lock starter
- Built-in spectrometer/power meter (optional)
- Tunable fs/CW switchable regimes (optional)
- Active power locking (optional)



The TiF-50ST-F6 femtosecond Ti:Sapphire laser with an integrated 6W pump source

### Product overview

The TiF-50 laser system offers a balanced approach: less than 50-fs pulse duration over a broad tuning range. The unit is a flexible tool suitable for numerous applications and can really be a workhorse for many different projects going on simultaneously.

The system can be supplied as a stand-alone version for pumping with an external pump laser or as a version with an industry-standard pump laser intergrated on site or at our factory. However, the dimensions of the Ti:S laser head are the same for either version, the stand-alone version may later be fitted with an integrated pump laser at minimum additional cost. The acceptable pump laser power for the TiF-50 is up to 8 W. See tuning curves for output power vs. wavelength dependence.

There are three pre-designed factory supply packages:

- the 'Manual' factory package includes a push-button non-automatic electric starter and allows manual tuning of the wavelength and pulse duration setting by using micrometer screws placed on the walls of the laser box.

- the 'Basic' factory package includes a simple USB motorized wavelength tuning slit and a push-button non-automatic electric starter.

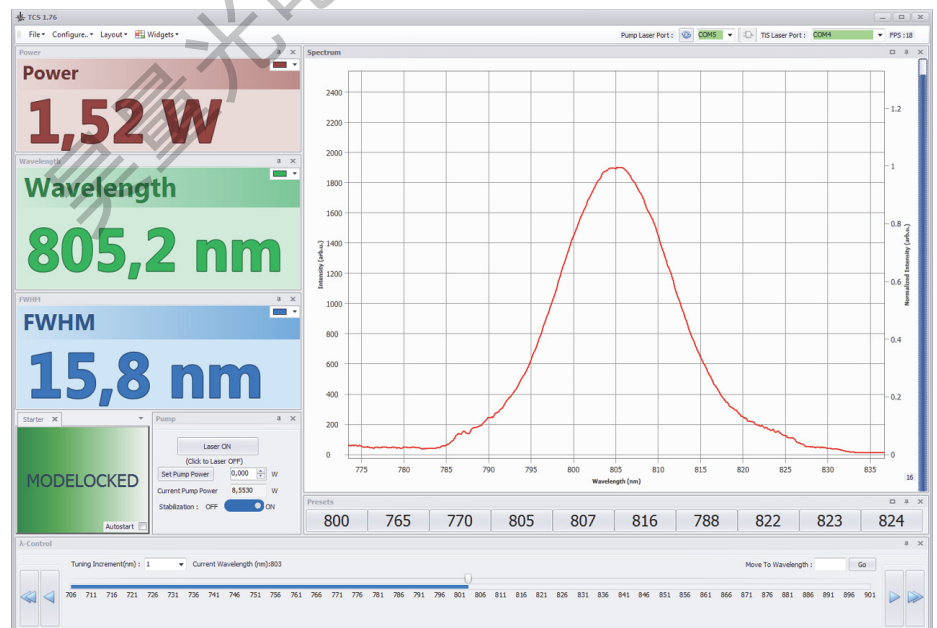
Wavelength tuning and calibration with this package is done via step number information in basic Windows software.

- the 'Auto' factory package includes built-in spectrometer and power meter, single-touch wavelength tuning with presets, configurable widget software, active power lock function and automatic mode-lock start and monitoring. With this package the system boasts exceptional long-term stability and longer uninterrupted runtime.

The system can also be equipped with an optional birefringent filter and optional etalons providing narrowband tunable CW regime over the whole tuning range.

An external prism pair or a tunable pulse compressor (the APC Kit or APC Pro units) for dispersion pre-compensation is also available.

The monolithic thermostabilized body of the TiF-50 provides excellent passive stability of the output radiation parameters.



Widget-based software screenshot for the TiF family of lasers with integrated spectrometer ("Auto" package)

Possible applications of the TiF Series lasers:

- Multiphoton microscopy • Seed oscillator for amplifier systems • Terahertz generation • "Pump-probe" spectroscopy •
- Material processing • Optical coherent tomography • Semiconductor Device Characterization • Fundamental Research



**AVESTA**

LASERS AND OPTICAL SYSTEMS



## Standard models and available pump laser power

Pump laser power	TiF-50ST (standard wavelength range)		TiF-50LW (extended IR range)	
	Wavelength tuning	Output power	Wavelength tuning	Output power
3 W	740-860 nm	>300 mW at 800 nm	n/a	n/a
4 W	740-870 nm	>450 mW at 800 nm	n/a	n/a
5 W	735-875 nm	>600 mW at 800 nm	830-950 nm	>150 mW at 950 nm
6 W	725-880 nm	>800 mW at 800 nm	830-960 nm	>150 mW at 960 nm
8 W	730-885 nm	>1 W at 800 nm	830-970 nm	>150 mW at 970 nm

It is possible to combine both ranges in a single laser system, please enquire for details.

## General optical specifications

Output pulse duration <sup>1)</sup>	<50 fs
Spectrum width <sup>1)</sup> (FWHM)	>17 nm
Pulse repetition rate (fixed)	80±10 MHz
Pump laser	integrated or stand-alone DPSS 500...550 nm low-noise laser (up to 8 W)
Beam mode	TEM <sub>00</sub> (M <sup>2</sup> <1.2)
Beam diameter (at 1/e <sup>2</sup> )	<2 mm
Output polarization	linear, horizontal, PER >20 dB
Beam divergence	<1 mrad
Long-term stability <sup>2)</sup>	<0.2% rms
Noise <sup>3)</sup>	<0.1% rms

## Physical dimensions (L × W × H)

Laser head dimensions	516 × 350 × 118 mm (including integrated pump laser)
Pump laser control unit dimensions	353 × 360 × 119 mm
Closed-loop chiller dimensions	430 × 340 × 190 mm

## Environmental and utility specifications

Operating temperature	15-30 °C
Relative humidity	<60%, non-condensing
Voltage	single-phase; 100-240 VAC; 50/60 Hz
Power consumption	<2 kW

 Available configuration packages<sup>4)</sup>

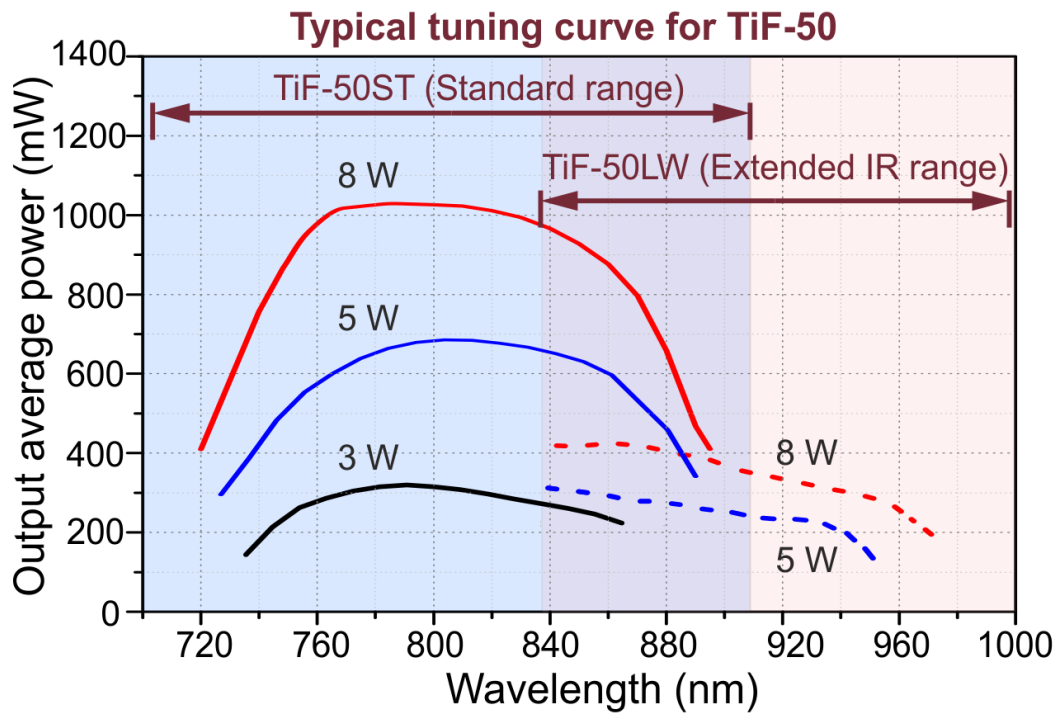
Thermally stabilized monolithic body	included in any package
Pulse train SMA output with mode-lock LED	included in any package
'Auto' factory package	<ul style="list-style-type: none"> <li>- built-in spectrometer</li> <li>- single-touch wavelength tuning w. presets</li> <li>- built-in power meter</li> <li>- active output power stability locking</li> <li>- Windows software with configurable widgets</li> <li>- automatic mode-lock start and monitoring</li> </ul> PC requirements: USB 2.0 port, Windows 10
'Basic' factory package (default)	<ul style="list-style-type: none"> <li>- push-button starter</li> <li>- USB 2.0 wavelength tuning via step-motor slit (via step number information and calibration)</li> </ul> PC requirements: USB 2.0 port, Windows 10
'Manual' factory package	<ul style="list-style-type: none"> <li>- push-button starter</li> <li>- manual wavelength tuning slit</li> </ul>

1) - when tuned to 800 nm central wavelength;

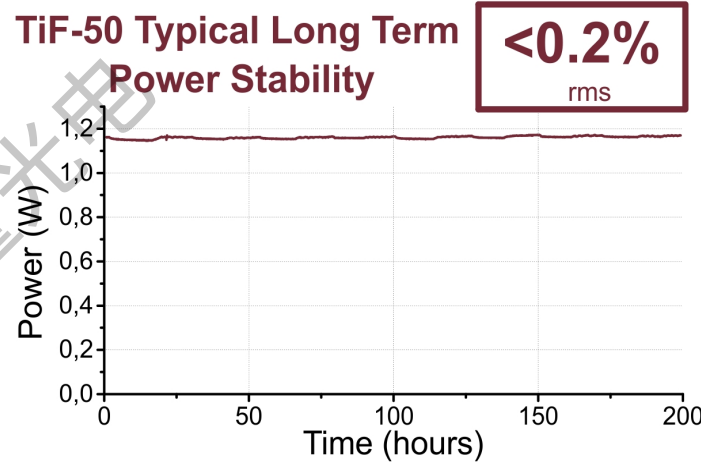
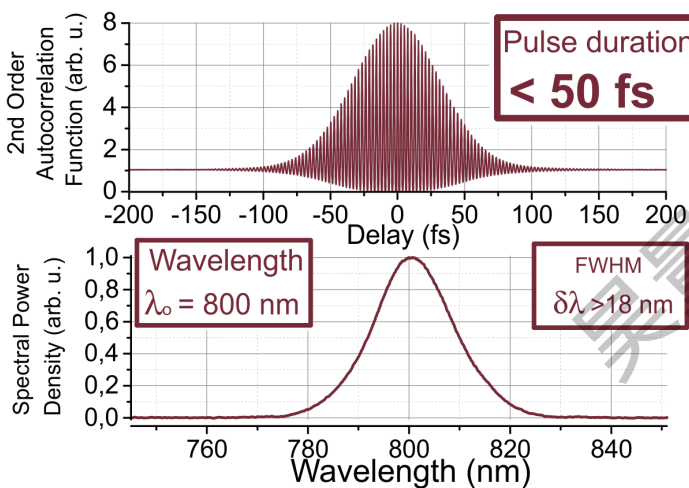
2) - after 30 min warm-up with cold start, during 12-hour continuous operation under equal room temperature conditions using recommended stabilized closed-loop chiller with proper capacity and recommended low-noise on-board integrated highly stable pump laser with active power locking;

3) - measured from 10 Hz to 10 MHz;

4) - please select one of the packages for your system; certain features may be tailored or combined differently according to specific customer requirements.

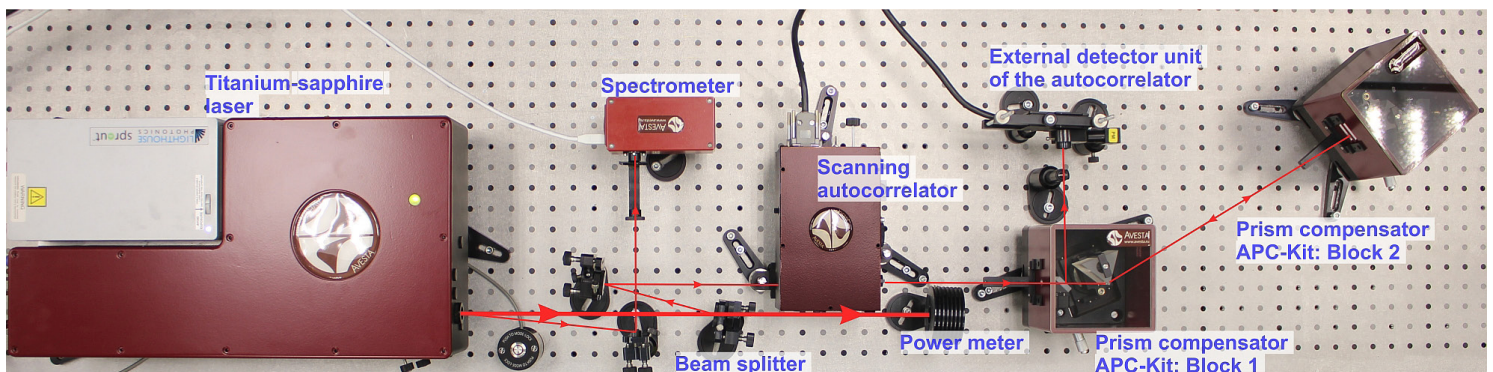


TiF-50 wavelength tuning curves at various pump laser power ratings



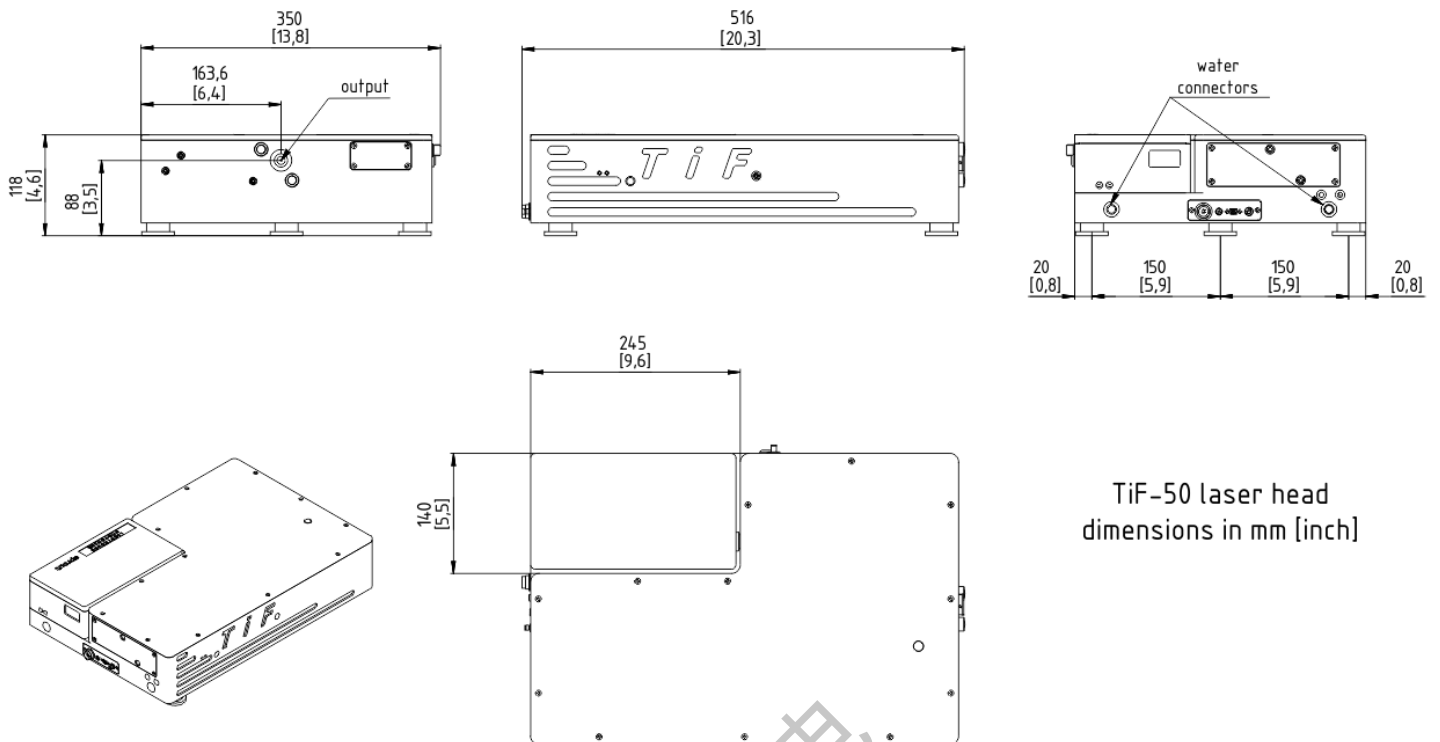
200 hours continuous stability run, acquired using an integrated Lighthouse Photonics Sprout-D-8W, 532 nm pump laser, at an ambient temperature of 22 degrees C and coolant (distilled water) temperature of 20 degrees, with "Basic" package and active power locking turned OFF

Typical AC trace and spectrum of the TiF-50 series at 800 nm



Possible dispersion total control setup for multi-photon microscopy applications with TiF Series laser, APC Kit dispersion compensator and AA-M scanning autocorrelator with an external detector unit

## TiF-50 laser head dimensions



TiF-50 laser head  
dimensions in mm [inch]

*TiF-50 dimensions in mm [inch] with integrated pump laser head*