

InSight X3+ and InSight X3

Widely Tunable Ultrafast Lasers For Multiphoton Imaging



The InSight® X3+™ and InSight X3™ are built on Spectra-Physics' industry leading InSight platform designed for maximum performance and reliability. The InSight X3+ delivers 50% greater power across the tuning range for deeper imaging and more complex experiments. The InSight X3+ and InSight X3 lasers are built on the proven InSight platform with hundreds of peer-reviewed publications, the largest installed base in the market, and demonstrated high reliability. The InSight platform is specifically designed for advanced multiphoton microscopy in neuroscience, immunology, and other biological sciences.

Based on patented technology¹, InSight features a broad 680 nm to 1300 nm continuous, gap free, tuning curve from a single beam with nearly double the tuning range of legacy Ti:Sapphire lasers. The InSight is designed with the peak of the tuning curve centered in the 900 to 1100 nm region to excite the most common green and red fluorophores including GFP, RFP, GCaMP, jRGECO, and mCherry. The InSight X3+ additionally provides the highest powers at the longest wavelengths of 1280–1300 nm for excitation of far red fluorophores such as Alexa-680.

The InSight Advantage

- High power across entire tuning range with the industry's highest power at the multiphoton imaging wavelengths between 900 and 1300 nm
- Field proven with the largest installed base in the market, hundreds of peer-reviewed publications and demonstrated high reliability
- Broad tuning range (680–1300 nm) for maximum flexibility
- Dual output at 1045 nm with optional pre-compensation for simultaneous two color excitation
- Short pulse width and highest peak power for maximum fluorescence
- Integrated DeepSee dispersion pre-compensation to deliver short pulses to the sample
- Ideal beam characteristics optimized for multiphoton imaging



Applications

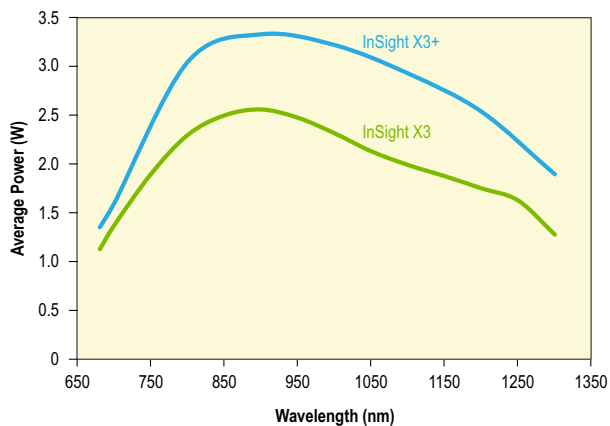
- Multiphoton microscopy
- Two-Photon Excited Fluorescence (TPEF)
- Multimodal imaging
 - Coherent anti-stokes Raman Spectroscopy (CARS)
 - Stimulated Raman spectroscopy (SRS)
 - Second harmonic generation (SHG)
 - Third harmonic generation (THG)
- Optogenetics
- Non-linear spectroscopy
- Time-resolved photoluminescence
- Optical computed tomography
- Terahertz imaging
- Semiconductor metrology

InSight X3+ and InSight X3

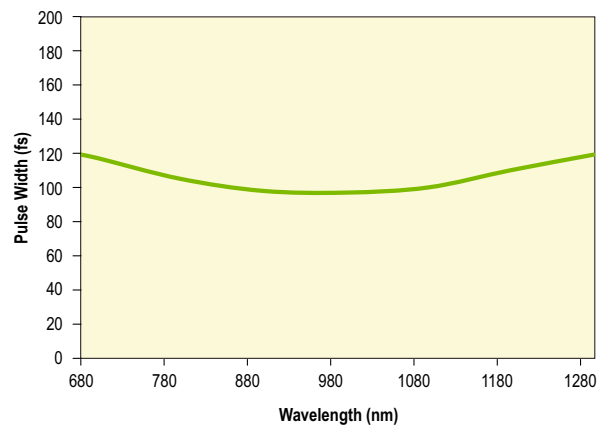
With Spectra-Physics' integrated and patented DeepSee™, the industry standard dispersion pre-compensation module, the short femtosecond pulses are optimally delivered through a microscope to the sample providing maximum fluorescence and penetration depth. The InSight has exceptional beam pointing stability, beam quality, output power stability and noise, with fast wavelength tuning.

When equipped with the fixed 1045 nm dual beam option, the InSight platform fully supports the diverse needs of multimodal imaging. The two synchronized output beams enable easy simultaneous imaging of various fluorescence proteins, genetically encoded calcium indicators, second and third harmonic generation, and advanced imaging techniques such as CARS and SRS. For these advanced techniques the InSight can be combined with the Newport Timing and Recombination Unit (TRU), or the Spectral Focusing Timing and Recombination Unit (SF-TRU).

Typical InSight Tuning Curves*



Typical InSight X3+ and InSight X3 Pulse Width*



* Typically measured performance; not a guaranteed or warranted specification.

InSight X3+ and InSight X3 Specifications^{1, 11}

Output Characteristic	InSight X3+		InSight X3	
	Main Output	Dual Output	Main Output	Dual Output
Tunable Range	680–1300 nm	1045 nm (fixed)	680–1300 nm	1045 nm (fixed)
Average Power ²	>1.3 W at 700 nm >2.4 W at 800 nm >3.0 W at 900 nm >2.7 W at 1000 nm >2.4 W at 1100 nm >2.1 W at 1200 nm >1.5 W at 1300 nm	>3.5 W at 1045 nm	>1.0 W at 700 nm >1.6 W at 800 nm >2.0 W at 900 nm >1.8 W at 1000 nm >1.6 W at 1100 nm >1.4 W at 1200 nm >1.0 W at 1300 nm	>3.5 W at 1045 nm
Pulse Width ^{3,6}	<120 fs	<170 fs	<120 fs	<200 fs
Noise ^{3, 4, 6}	<0.5 %	<0.25 %	<0.5 %	<0.5 %
Pre-compensation Dispersion Range ²	680 nm: -12,000 fs ² to -40,000 fs ² 800 nm: 0 fs ² to -28,000 fs ² 900 nm: 0 fs ² to -17,000 fs ² 1050 nm: 0 fs ² to -13,000 fs ² 1300 nm: -3,000 fs ² to -11,000 fs ²	"Optional 1045 nm: 15,000 fs ² fixed"	680 nm: -12,000 fs ² to -40,000 fs ² 800 nm: 0 fs ² to -25,000 fs ² 1050 nm: 0 fs ² to -10,000 fs ² 1300 nm: -3,000 fs ² to -8,000 fs ²	"Optional 1045 nm: 15,000 fs ² fixed"
Repetition Rate ⁷	80 MHz ±0.5			
Spatial Mode ³	TEM ₀₀ M ² <1.2			
Beam diameter(1/e ²) ³	1.1 ±0.2 mm			
Beam divergence, full angle ³	<1.5 mrad			
Beam Roundness ³	1.0 ±0.2 mm			
Beam Astigmatism ³	<20 %			
Beam pointing stability ⁹	<350 μrad			
Tuning speed ¹⁰	>50 nm/sec			
Stability ⁵	<±1%			
Polarization ³	>500:1 horizontal			
Environmental Requirements				
Altitude (m)	Up to 2000 M			
Temperature, Operating	20–25 °C			
Relative Humidity, Operating	Maximum 75% non-condensing up to 25°C			
Temperature, Storage	15–35°C			
Relative Humidity, Storage	Maximum 65% for 15–35°C			
Cooled Water Temperature in Closed-loop Chiller	21°C, Typical ⁸			
Electrical Requirements				
Power Supply	100–120 V~/200–240 V~, 50/60 Hz			
Chiller	100–200 V~, 50/60 Hz			
Total System Power Consumption	<1500 W			
Communication Interface	RS-232, USB, PC required			
Sync Signal	SMA			

1. Due to our continuous improvement program, specifications may change without notice.

2. Specifications only apply to the wavelength noted.

3. Specification applies to 900 nm (tunable) or 1045 nm (fixed), respectively.

4. Specification represents rms noise measured in a 10 Hz to 10 MHz bandwidth.

5. Percent power drift in any 2-hour period with less than ±1°C temperature change after a 1-hour warm up.

6. A sech² pulse shape is used to determine the pulse width as measured with a Newport PulseScout® autocorrelator.

7. Tunable and fixed outputs are synchronized.

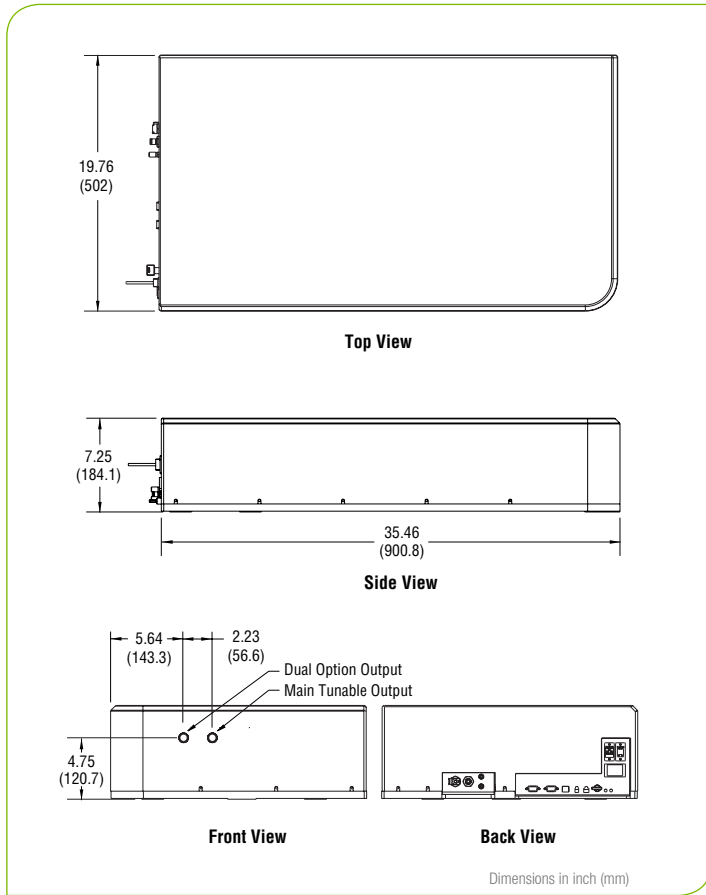
8. Avoid obstructing the air exhaust grills which will result in the recirculation of hot exhaust air. Cooling air enters through the front panel and exits through the rear fan apertures.

9. Maximum deviation across the entire tuning range and pre-compensation dispersion range.

10. Averaged over entire tuning range.

11. InSight X3+ and InSight X3 are Class IV – High-Power Lasers, whose beams are, by definition, safety and fire hazards. Take precautions to prevent exposure to direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage..

InSight X3+ and InSight X3



InSight X3+ and InSight X3 Dimensions