

# InSight® X3+™ and InSight X3™

Widely Tunable Femtosecond Lasers  
For Multiphoton Imaging

**mks** | Spectra-Physics

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 high powers across the tuning range for brighter signals and increased imaging depths. The InSight X3+ and InSight X3 lasers are field proven with the largest installed base in the market. As a result, researchers have generated more than 1,000 peer-reviewed publications.

The InSight platform is designed for advanced multiphoton microscopy in neuroscience, immunology, and other biological sciences. Based on patented technology<sup>1</sup>, InSight features a broad, gap free tuning curve that spans 680 nm to 1300 nm; nearly doubling the wavelength coverage of legacy Ti:Sapphire lasers. The InSight tuning curve peaks 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+ provides higher powers at the longest wavelengths between 1280–1300 nm for excitation of far red fluorophores.

With Spectra-Physics' integrated and patented DeepSee™ dispersion pre-compensation module, short femtosecond pulses are optimally delivered through the microscope to provide 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 simultaneous imaging of various fluorescence proteins, genetically encoded calcium indicators, second and third harmonic generation, and advanced imaging techniques such as CARS and SRS.

## The InSight Advantage

- Field proven with the largest installed base in the market
- High reliability with >1,000 peer-reviewed publications
- Broad tuning range (680–1300 nm) for maximum flexibility
- Highest peak power for maximum fluorescence
- Dual output at 1045 nm with optional precompensation
- Short pulses using integrated DeepSee™ precompensation



## Applications

- Multiphoton Imaging
- Stimulated Raman spectroscopy (SRS)
- Optogenetics
- Non-linear spectroscopy
- Coherent anti-stokes Raman Spectroscopy (CARS)

## InSight X3+ and InSight X3 Specifications<sup>1, 8</sup>

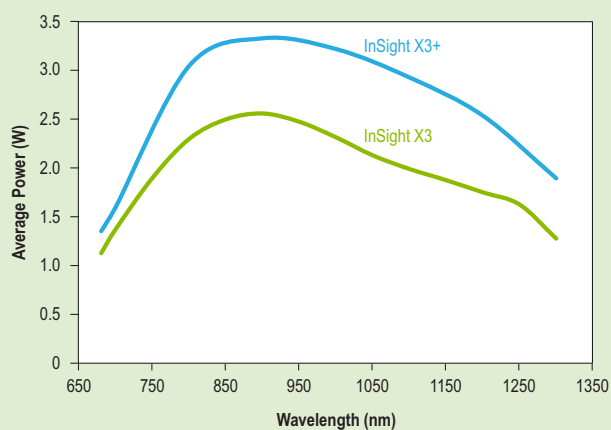
Output Characteristic	InSight X3+		InSight X3	
	Main Output	Dual Output	Main Output	Dual Output
Tunable Range	680–1300 nm	1045 nm (fixed)	680–1300 nm	1045 nm (fixed)
Average Power	>1.5 W at 700 nm >2.4 W at 800 nm >3.0 W at 900 nm >2.7 W at 1000 nm >2.4 W at 1100 nm >2.1 W at 1200 nm >1.5 W at 1300 nm	>3.5 W	>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
Pulse Width <sup>2, 3</sup>	<120 fs	<170 fs	<120 fs	<200 fs
Noise <sup>2, 4</sup>	<0.5 %	<0.25 %	<0.5 %	<0.5 %
Precompensation Dispersion Range	680 nm: -12,000 fs <sup>2</sup> to -40,000 fs <sup>2</sup> 800 nm: 0 fs <sup>2</sup> to -25,000 fs <sup>2</sup> 1050 nm: 0 fs <sup>2</sup> to -10,000 fs <sup>2</sup> 1300 nm: -3,000 fs <sup>2</sup> to -8,000 fs <sup>2</sup>	“Optional: -14,000 fs <sup>2</sup> fixed”	680 nm: -12,000 fs <sup>2</sup> to -40,000 fs <sup>2</sup> 800 nm: 0 fs <sup>2</sup> to -25,000 fs <sup>2</sup> 1050 nm: 0 fs <sup>2</sup> to -10,000 fs <sup>2</sup> 1300 nm: -3,000 fs <sup>2</sup> to -8,000 fs <sup>2</sup>	“Optional: -14,000 fs <sup>2</sup> fixed”
Repetition Rate	80 MHz ±0.5			
Spatial Mode <sup>2</sup>	TEM <sub>00</sub> M <sup>2</sup> <1.2			
Beam Diameter(1/e <sup>2</sup> ) <sup>2</sup>	1.1 ±0.2 mm			
Beam Divergence, full angle <sup>2</sup>	<1.5 mrad			
Beam Roundness <sup>2</sup>	0.8–1.2			
Beam Astigmatism <sup>2</sup>	<20 %			
Beam Pointing Stability <sup>5</sup>	<350 μrad			
Tuning Speed <sup>6</sup>	>50 nm/sec			
Stability <sup>7</sup>	<±1 %			
Polarization <sup>2</sup>	>500:1 horizontal			
<b>Environmental Requirements</b>				
Altitude	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			

## InSight X3+ and InSight X3 Specifications<sup>1, 8</sup>

	InSight X3+	InSight X3
<b>Electrical Requirements</b>		
Power Supply	100-120 V~/200-240 V~, 50/60 Hz	
Chiller	100-200 V~, 50/60 HzC	
Total System Power Consumption	<1500 W	
Communication Interface	RS-232, USB, PC required	
Sync Signal	SMA	

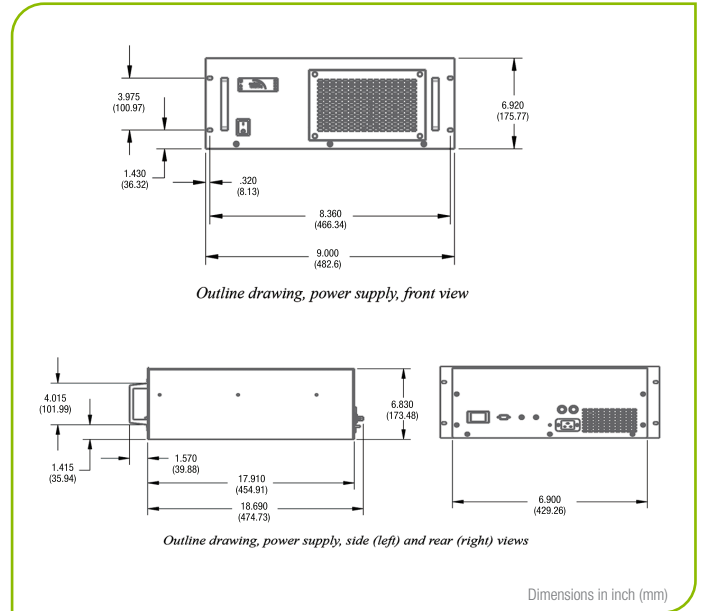
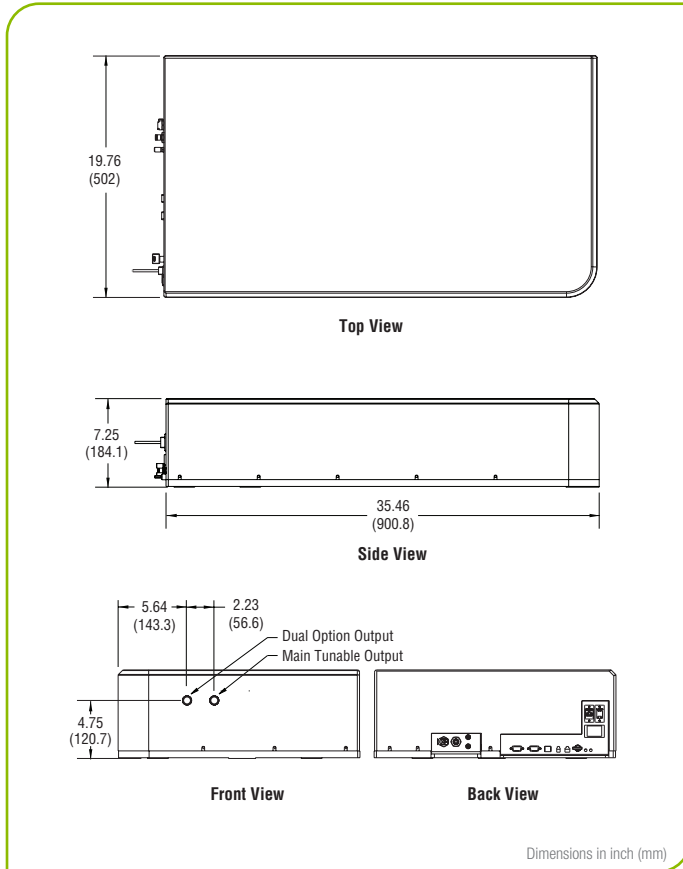
1. Due to our continuous improvement program, specifications may change without notice.
2. Specification applies to 900 nm (tunable) output.
3. A sech<sup>2</sup> pulse shape is used to determine the pulse width as measured with a Newport PulseScout® autocorrelator.
4. Specification represents rms noise measured in a 10 Hz to 10 MHz bandwidth.
5. Maximum deviation across the entire tuning range and precompensation dispersion range.
6. Averaged over entire tuning range.
7. Percent power drift in any 2-hour period with less than  $\pm 1^\circ\text{C}$  temperature change after a 1-hour warm up.
8. 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.

Typical InSight Tuning Curves<sup>1</sup>



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

## InSight X3+ and InSight X3 Dimensional Drawing



## InSight X3+ and InSight X3 Power Supply Dimensions

## InSight X3+ and InSight X3 Laser Head Dimensions