

### PhotoAcoustic (PA) Imaging Channel

<b>Type</b>	3D	<i>High-resolution deep tissue molecular, physiological, and anatomical imaging, subcutaneous &amp; skin imaging</i>
<b>Spatial resolution</b>	160 μm x 160 μm 160 μm x 470 μm	<i>Transverse anatomical planes Sagittal and coronal anatomical planes</i>
<b>Molecular imaging sensitivity</b>	100 nM ICG	<i>In blood plasma, multispecies molecular unmixing, CNR 1.7</i>
<b>PA excitation range</b>	532 nm & 650 - 1300 (2300) nm	<i>Extension to 2300 nm with an optional OPO idler</i>
<b>Detection points per scan</b>	> 34,500 (> 69,000)	<i>Single scan, 360 deg azimuthal rotation (with optional 20 Hz upgrade of the Laser Excitation Unit)</i>
<b>Detector configuration</b>	Curve-linear array	<i>Cylindrical focusing</i>
<b>Detector central frequency</b>	6 MHz ± 10%	<i>T/R measurements, optimized sensitivity in receive mode</i>
<b>Detector bandwidth @ -6 dB</b>	≥ 55%	<i>T/R measurements</i>
<b>Number of array elements</b>	96	<i>Wide-angle 3D imaging transducers</i>
<b>Detector working environment</b>	<i>Continuous immersion under 0.5 m of water between 10 and 40°C, EM shielded, protected from impact of laser light</i>	
<b>PA signal digitizer</b>	LEGION ADC	<i>12-bit, 256 parallel channels, up to 400 Hz frame rate, 40 MHz sampling rate, programmable amplifier 46-91 dB</i>

### Fluorescence (FL) Imaging Channel

<b>Type</b>	3D or real-time 2D	<i>Molecular imaging, co-registered with PA Imaging Channel &amp; visible image of the test subject</i>
<b>Spatial resolution</b>	70 μm x 125 μm	<i>At a skin level of a live test subject</i>
<b>FL excitation range</b>	532 nm, 650 - 850 nm (standard)	
<b>Excitation linewidth</b>	< 1 nm	<i>Tuning step - 1 nm, equivalent to employing 200 extremely narrow-band excitation filters</i>
<b>Emission filter set</b>	5 filters covering emission range between 550 nm and 860 nm, 1 blocked, 1 open (11 total filter slots available)	
<b>Optical filter wheel</b>	Programmatically controlled filter positioning	
<b>Detector type</b>	FSI sCMOS	<i>Air-cooled scientific camera</i>
<b>Bit depth</b>	16-bit	
<b>Number of pixels</b>	2048 x 2040	
<b>Pixel resolution</b>	19.5 μm	
<b>Max frame rate</b>	35 Hz	
<b>Dynamic range</b>	85 dB	
<b>Quantum efficiency</b>	80% @ 600 nm	<i>20% - 80% in 400 - 950 nm spectral range</i>
<b>Readout noise</b>	2.0 e-	<i>Low readout noise for high frame rate applications</i>
<b>Dark current</b>	<0.04 e-	<i>For 100 ms or shorter exposures</i>

### Control Station (typical specs are provided, subject to change without notice)

<b>Form Factor</b>	Desktop	<i>MidTower or Mini ITX case</i>
<b>Configuration</b>	High-performance Nvidia GPU, high-performance SSD, MS Windows 10, two monitors, keyboard, mouse	
<b>Imaging Software</b>	TriTom Imaging Suite - <i>for data acquisition, image reconstruction, and molecular imaging</i> 3D Slicer - <i>for visualization &amp; image analysis</i>	
<b>Data formats</b>	Scan data: <i>raw, mat</i> ; 3D Image: <i>PA/FL - mat, vtk, Vis—N/A</i>	

Image Acquisition Unit		
<b>Single scan time</b>	36 s	360 deg azimuthal rotation, 360 (720) data frames
<b>Scan types</b>	Continuous azimuthal rotation or reverse scans ( $\leq 360$ deg), time-limited by 10 min	
<b>Excitation sequence</b>	Single wavelength; Linear or custom wavelength sweep; Popular spectral unmixing pre-sets for molecular, physiological and anatomical imaging	
<b>Max volume of a 3D image</b>	30 x 30 x 30 mm <sup>3</sup> (50 x 50 x 50 mm <sup>3</sup> for an optional larger excitation spot)	
<b>Whole body imaging</b>	Enabled as a stack of 3D volumes, manual axial positioning of the test subject for optimized single-scan imaging of head/neck, chest, or abdomen regions, 10 mm positioning steps, 40 mm total positioning range, 70 (90) mm total imaging range	
<b>In vivo imaging subjects</b>	Mice, rats (<200 g); any fur should be shaved/depilated from the studied section of the body before imaging procedure	
<b>Max weight of the test subject</b>	0.5 kg	
<b>Coupling liquid</b>	DI water	Subject is submerged under anesthesia during the scan, degassing available
<b>Environment temperature control</b>	20-40 $\pm$ 0.5 °C	Controlled heating and circulation of the coupling liquid
<b>Test subject monitoring</b>	Continuous visual monitoring with a camera	
<b>Laser safety</b>	Light-tight imaging chamber, laser interlocks, no eye protection required	
<b>Chassis type</b>	Benchtop	
<b>Dimensions (L x W x H)</b>	79 cm x 35 cm x 69 cm	
<b>Power requirements</b>	208-240 V, 4A or 120 V, 8A, 50/60 Hz	

Laser Excitation Unit		
<b>Tunable wavelength range</b>	532 nm & 650 - 1300 nm	Option: Vis-NIR II, dual-range FWS (650 - 1300 nm & 1065 - 2300 nm)
<b>Pulse repetition frequency</b>	10 (20) Hz	Optional upgrade to 20 Hz
<b>Pulse Energy</b>	> 180 mJ @ 700 nm > 20 mJ @ 532 nm	For a 20 Hz PRF option, max pulse energy 160 mJ @ 700 nm
<b>Energy meter</b>	Real-time automatic pulse energy measurements	
<b>Fast wavelength switching (FWS)</b>	Change to any wavelength between 650 - 1300 nm every 100 (50) ms	
<b>Chassis type</b>	Mobile	Rolled on wheels, positioned on the floor next to the Image Acquisition Unit
<b>Dimensions (L x W x H)</b>	68 cm x 44 cm x 89 cm	
<b>Power requirements</b>	208 or 240 VAC, single phase 50/60 Hz, < 1.5 kVA	

Excitation Fiberoptic Bundle		
<b>Transmission</b>	> 70%	
<b>Excitation spot, axial size</b>	30 mm (50 mm)	Standard (optional)
<b>Length</b>	2 m	

Accessories		
<b>Gas Anesthesia System</b>	Mice and small rats	Includes animal induction chamber
<b>Mouse restrainer</b>	B-type optimized for imaging abdominal region and legs of a live mouse H-type optimized for imaging thoracic region, head and neck of a live mouse	
<b>Microcuvette holder</b>	An accessory for scanning up to ten 50 $\mu$ l cuvettes containing liquid samples, quick setup	
<b>Microcuvettes</b>	Cylindrical PTFE cuvettes, 0.8 mm ID, 50 $\mu$ m wall thickness, for making $\leq 50$ $\mu$ l samples	
<b>Containers for coupling liquid</b>	Used to fill and drain the Image Acquisition Unit with coupling liquid	