PhotoSound®
Imaging and Data Acquisition Solutions

TriTom Premium Edition

Specifications
2022

PhotoAcoustic (PA) Imaging Channel		
Type	3D	*High-resolution deep tissue molecular, physiological, and anatomical imaging, subcutaneous & skin imaging*
Spatial resolution	160 µm x 160 µm 160 µm x 470 µm	*Transverse anatomical planes* *Sagittal and coronal anatomical planes*
Molecular imaging sensitivity	100 nM ICG	*In blood plasma, multispecies molecular unmixing, CNR 1.7*
PA excitation range	460 - 1300 (2300) nm	*Extension to 2300 nm with an optional OPO idler*
Detection points per scan	> 69,000	*Single scan, 360 deg azimuthal rotation*
Detector configuration	Curve-linear array	*Cylindrical focusing*
Detector central frequency	6 MHz ± 10%	*T/R measurements, optimized sensitivity in receive mode*
Detector bandwidth @ -6 dB	≥ 55%	T/R measurements
Number of array elements	96	*Wide-angle 3D imaging transducers*
Detector working environment	*Continuous immersion under 0.5 m of water between 10 and 40°C, EM shielded, protected from impact of laser light*	
PA signal digitizer	LEGION ADC	*12-bit, 256 parallel channels, up to 400 Hz frame rate, 40 MHz sampling rate, programmable amplifier 46-91 dB*

Fluorescence (FL) Imaging Channel		
Type	3D or real-time 2D	*Molecular imaging, co-registered with PA Imaging Channel & visible image of the test subject*
Spatial resolution	70 µm x 125 µm	*At a skin level of a live test subject*
FL excitation range	460 - 850 nm (standard)	
Excitation linewidth	< 0.5 nm	*Tuning step - 1 nm, equivalent to employing 390 extremely narrow-band excitation filters*
Emission filter set	9 filters covering emission range between 483 nm and 860 nm, 1 blocked, 1 open	
Optical filter wheel	Programmatically controlled filter positioning	
Detector type	Back-illuminated sCMOS	*High sensitivity cooled scientific camera*
Bit depth	16-bit	
Number of pixels	2048 x 2048	
Pixel resolution	19.5 µm	
Max frame rate	40 Hz	
Dynamic range	86 dB	
Quantum efficiency	95% @ 600 nm	*20% - 95% in 200 - 950 nm spectral range*
Readout noise	1.2 e-	*Low readout noise for high frame rate applications*
Dark current	<0.01 e-	*For 50 ms or shorter exposures*

Control Station (typical specs are provided, subject to change without notice)		
Form Factor	Desktop	*MidTower or Mini ITX case*
Configuration	High-performance Nvidia GPU, high-performance SSD, MS Windows 10, two monitors, key-board, mouse	
Imaging Software	TriTom Imaging Suite - *for data acquisition, image reconstruction, and molecular imaging* 3D Slicer - *for visualization & image analysis*	
Data formats	Scan data: *raw, mat;* 3D Image: *PA/FL - mat, vtk, Vis—N/A*	

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

Laser Excitation Unit		
Tunable wavelength range	650 - 1300 (2300) nm & 460 - 659 nm	
Pulse repetition frequency	20 Hz	
Pulse Energy	> 130 mJ @ 700 nm > 10 mJ @ 500 nm	*Before fiber bundle transmission*
High-energy excitation @ 1064 nm	> 350 mJ	
Energy meter	*Real-time automatic pulse energy measurements*	
Fast wavelength switching	*Change to any wavelength between 650 - 1300 nm every 50 ms*	
Chassis type	Mobile	*Rolled on wheels, positioned on the floor next to the Image Acquisition Unit*
Dimensions (L x W x H)	68 cm x 44 cm x 89 cm	
Power requirements	208 or 240 VAC, single phase 50/60 Hz, < 1.5 kVA	

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

Accessories		
Gas Anesthesia System	Mice and small rats	*Includes animal induction chamber*
Mouse restrainer	*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*	
Microcuvette holder	*An accessory for scanning up to ten 50 µl cuvettes containing liquid samples, quick setup*	
Microcuvettes	*Cylindrical PTFE cuvettes, 0.8 mm ID, 50 µm wall thickness, for making ≤50 µl samples*	
Containers for coupling liquid	*Used to fill and drain the Image Acquisition Unit with coupling liquid*	

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