Technical Specifications

Scintica:

TriTom – *Premium Edition*

Small Animal Whole Body Photoacoustic Fluorescence Tomography (PAFT)

Specifications

PhotoAcoustic (PA) Imaging Channel		
Type	3D	*High-resolution deep tissue molecular, physiological, and anatomical imaging, subcutaneous & skin imaging*
Spatial resolution	160µm x 160µm 160µm x 470µm	*Transverse anatomical planes* *Sagittal and coronal anatomical planes*
Molecular imaging sensitivity	100nM ICG	*In blood plasma, multispecies molecular unmixing, CNR 1.7*
PA excitation range	460 - 1320nm	
Detection points per scan	> 69,000	*Single scan, 360 deg azimuthal rotation*
Detector configuration	Curve-linear array	*Cylindrical focusing*
Detector central frequency	6MHz ± 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 0.5m of water between 10 and 40°C, EM shielded, protected from impact of laser light*	
PA signal digitizer	LEGION ADC	*12-bit, 40MHz sampling rate, programmable amplifier 46-91dB*

Fluorescence (FL) Imaging Channel		
Type	3D or real-time 2D	*Molecular imaging, co-registered with PA Imaging Channel & visible-light image of the test subject* *Real-time 2D imaging in coronal, sagittal or any intermediate view at 20 fps*
Spatial resolution	70µm x 125µm	*At a skin level of a live test subject*
FL excitation range	460 - 800 nm	
Excitation linewidth	< 1nm	*Tuning step - 1nm, equivalent to employing 340 extremely narrow-band excitation filters*
Emission filter set	8 filters covering emission range between 510nm and 995nm, 2 additional filter slots available	
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	19.5µm	
Max frame rate	40 fps	
Dynamic range	86dB	
Quantum efficiency	95% @ 600nm	*30% - 95% in 400 - 900nm spectral range*
Readout noise	1.2 e-	*Low readout noise for high frame rate applications*
Dark current	< 0.008 e-/pixel	*For 50ms 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 or 11, 1440p or higher resolution monitor, keyboard, 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;* 2D Image (video): *FL/Vis - raw, mat, png, tif (mp4)*	

Image Acquisition Unit		
Single scan time	36s	*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 size of a single-scan 3D image	30mm x 30mm x 30mm	
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; 10mm positioning steps, 40mm total positioning range, 70mm total imaging range*	
***In vivo* imaging subjects**	*Mice, rats (< 200g); any fur should be shaved/depilated from the studied section of the body before imaging procedure*	
Max weight of the test subject	0.5kg	
Coupling medium	DI water	*Subject is submerged under anesthesia during the scan, degassing enabled*
Environment temperature control	20-40 ± 0.5°C	*Controlled heating and circulation of the coupling liquid*
Test subject monitoring	*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)	78cm x 35cm x 70cm	*55cm x 35cm footprint*
Power requirements	208-240V 4A or 120V 8A, 50/60Hz	

Laser Excitation Unit		
Tunable wavelength range	650 - 1320nm & 460 - 649nm	
Pulse repetition frequency	20Hz	
Pulse Energy	> 130mJ @ 700nm > 10mJ @ 500nm	*Before fiber bundle transmission*
High-energy excitation @ 1064 nm	> 350mJ	
Energy meter	*Real-time automatic pulse energy measurements*	
Fast wavelength switching (FWS)	*Change to any wavelength between 650 - 1320nm or 460 - 649nm every 50ms*	
Chassis type	Mobile	*Rolled on wheels, positioned on the floor next to the Image Acquisition Unit*
Dimensions (L x W x H)	68cm x 44cm x 89cm	
Power requirements	208 or 240 VAC, single phase 50/60 Hz, < 1.5kVA	

Excitation Fiberoptic Bundle	
Transmission	> 70%
Excitation spot, axial size	30mm
Length	2m

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 50µl cuvettes containing liquid samples, quick setup*	
Microcuvettes	*Cylindrical PTFE cuvettes, 0.8 mm ID, 50µm wall thickness, for making ≤ 50µl samples*	
Containers for coupling liquid	*Used to fill and drain the Image Acquisition Unit with coupling liquid*	