

MoleculUS™

Ultrasound & Photoacoustic Imaging System



Applications

Molecular Imaging
Co-Registered Multimodal Imaging
Tissue Engineering & Regeneration
Therapeutic Monitoring
Functional Tumor Monitoring
Perfusion & Doppler Imaging
Quantitative Vascular Analysis

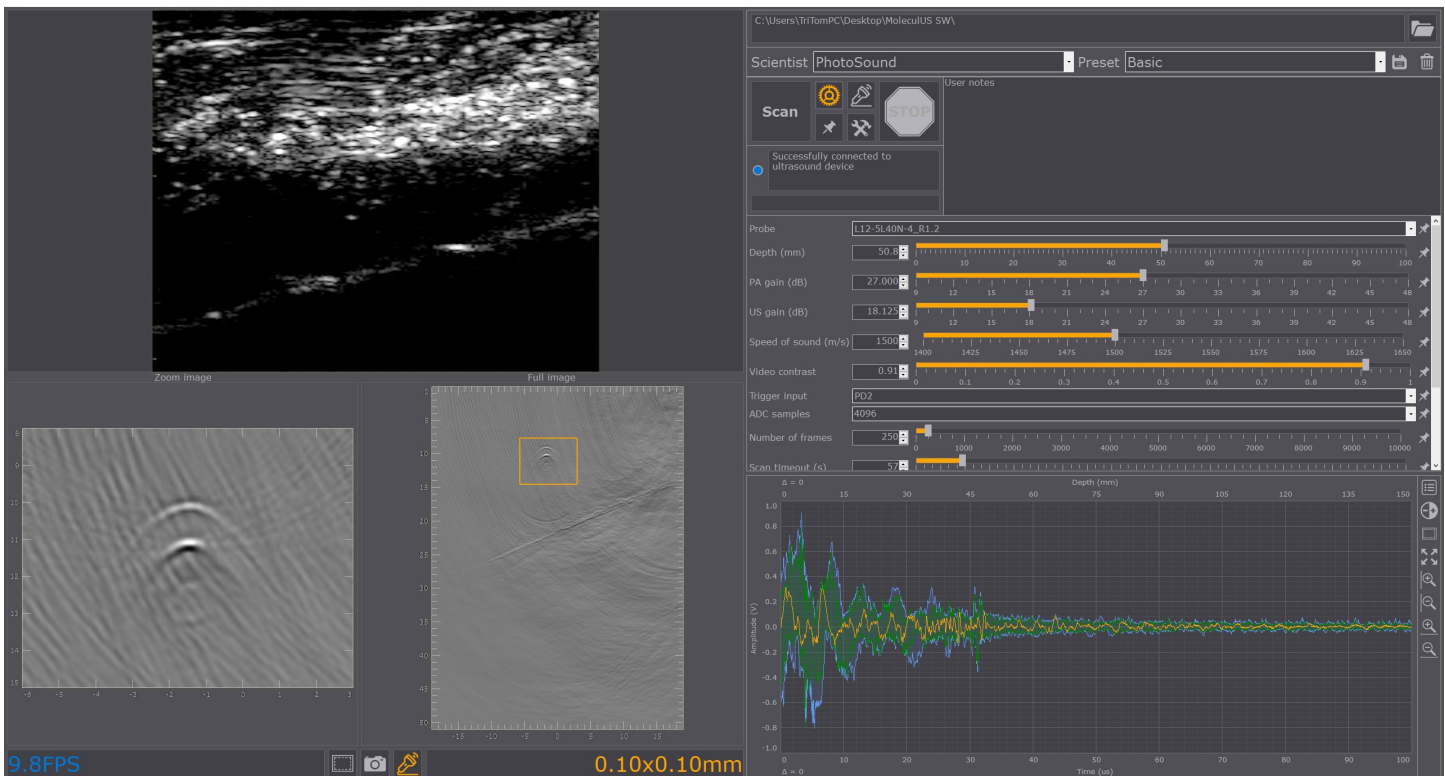
The **MoleculUS™** is a dual-modality ultrasound and photoacoustic data acquisition unit that allows the simultaneous collection of ultrasound and photoacoustic channels sharing the same probe elements. The analog signal path of MoleculUS is split into PA and US paths. PA and US modes operate sequentially in time with support for US preview mode and continuous on-fly multiplexing between modes.

REAL-TIME IMAGING

PhotoSound Technologies, Inc. and Telemed, UAB are proud to announce their first jointly developed product. MolecuUS™ combines photoacoustics, PhotoSound's core competence, with the ultrasound core competence of Telemed.

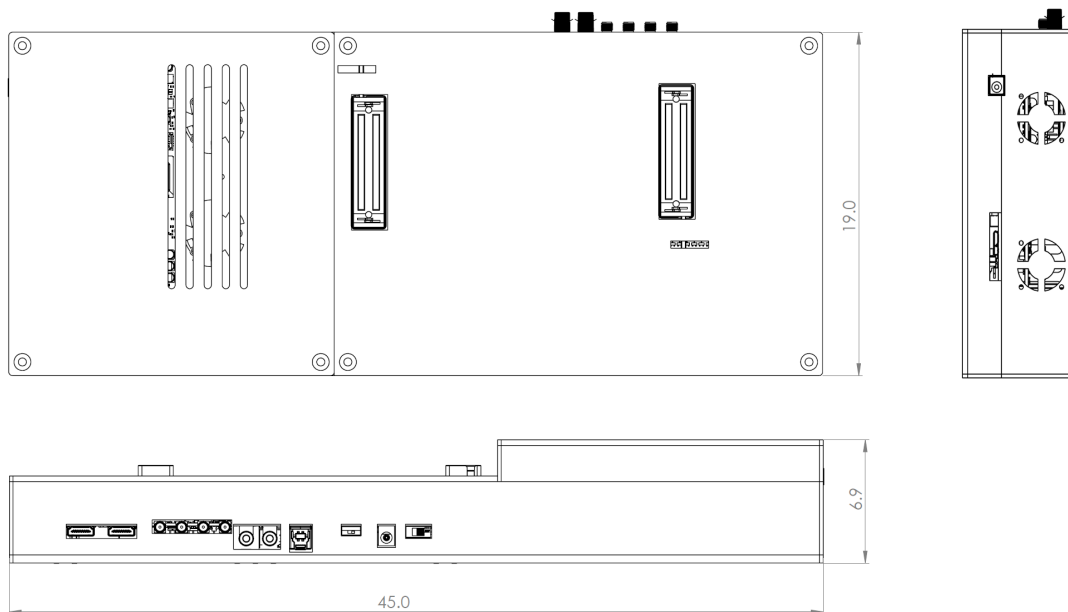
The system features up to 256 photoacoustic channels of data acquisition where 128 channels can be switched between the ultrasonic beamformer and photoacoustic acquisition. The system collects photoacoustic signals while being optically triggered by the laser source and performs ultrasound imaging in between laser pulses.

The available US imaging modes are B(2D), M, Color Doppler, Pulsed Wave Doppler. Raw Frequency (RF) data can be accessed in both modalities. The system comes with a software development kit (SDK) that allows customization of the device software and graphical user interface. A choice of linear, micro-convex, and endo-cavity probes are available as add-ons. The system is compatible with custom probes that have been appropriately configured. Standalone control software based on MATLAB® and backend SDK written in C++ compatible with many frontend languages such as LabView, MATLAB® and Python™. Photoacoustic and ultrasound signals can be collected, reconstructed and interleaved to create co-registered images in real-time.



Development build of standalone USPA software interface. Using the MolecuUS™, real-time ultrasound & photoacoustic images are generated during the scan of a cylindrical contrast agent embedded in a tissue-mimicking phantom.

SPECIFICATIONS



Maximum Ultrasound Intensity

720 mW/cm², in compliance with requirements of the standard IEC 60601-2-37.

Maximum Ultrasound Power

2.16 W

USPA Channels ⁽¹⁾

128

PA Mode Programmable Gain ⁽²⁾

49 to 88 dB

Ultrasound Frequency ⁽³⁾

1 to 18 MHz

Sampling Rate

40 MSPS

PA Mode Input Impedance

2.2 MΩ (PA-only) / 40 kΩ (US+PA)

US Input Impedance

50 Ω

Input Connector ⁽⁴⁾

Cannon QLC-260

Available US Modes

B(2D), M, Color Doppler, Pulsed Wave Doppler

Max Laser Repetition Rate

50 Hz

(1) Configuration with extra 128-channels for PA mode only is available (increases housing size)

(2) Measured with 50Ω load (actual gain depends on probe capacitance)

(3) See list of available US probes or ask about third-party probe compatibility and optimization

(4) Additional connector for extra 128-channels for PA mode only (128-channels per connector)

**128 channels
Photoacoustic-only
(Optional)**



**128 channels—Dual Modality
Ultrasound and Photoacoustic**



FRONT VIEW

SIDE VIEW

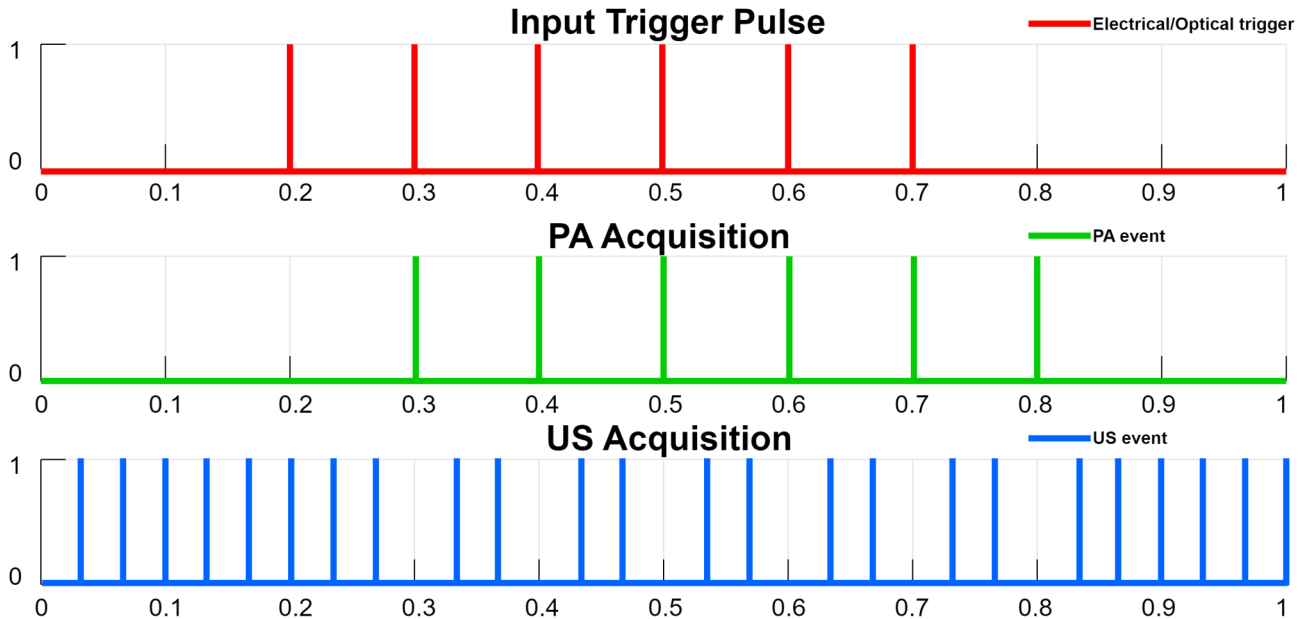
1. Two medical grade **Cannon QLC-260** probe input connectors for both US+PA and PA-only modes
2. Two sets of programmable **electrical trigger inputs and outputs** (isolated SMA connectors). Electrical trigger inputs are configurable for 3.3V or 5V with either 50 Ohm or High-Z input impedance

Two **optical trigger inputs** for connecting patch fibers allow precise triggering from external light source

Additional devices may be triggered using the electrical trigger outputs with independently-adjustable pulse width and delay

3. Two **USB3 ports** for high data transmission. PA and US data are transferred across separate USB cables
4. Two 12VDC 5A (PA mode) and 2.5A (US mode) power connectors (power supplies included)




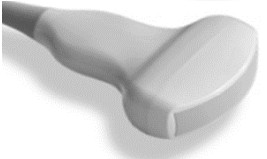
CAPTURE TIMING



Timing diagram of the USPA system. Example with 10 Hz laser, US continuous mode.

OPTIONAL PROBES

A variety of probes are available that offer high resolution convex, linear, phased-array and endo-cavity transducer configurations for applications in veterinary, abdominal, vascular, cardiac, transrectal and transvaginal USPA imaging. The probe is an integral part of MolecuLUS™ as it enables the best USPA image quality.

| | Name | Description | Applications |
|---|-----------|---|---|
|  | L12-5N40 | Linear 128 elements 5.0-12.0MHz 40mm | pediatrics small parts vascular veterinary |
|  | MCV9-5N10 | Convex (end-firing) 128 elements 5.0-9.0 MHz R10mm, FOV 156 deg. | transrectal transvaginal |
|  | P5-1S15 | Phased Array 64 element 1.5-5.0MHz FOV 90 deg. | cardiac abdominal |
|  | C5-2N60 | Convex, 128 element 2.0-5.0MHz R60mm, FOV 60 deg. | abdominal obstetrics pediatrics |



About PhotoSound®

PhotoSound Technologies, Inc. (Houston, Texas USA) develops new imaging products and technologies for life sciences. A 3D imaging platform for in vivo preclinical research and drug discovery (TriTom™) is implemented on patented PhotoAcoustic Fluorescent Tomography (PAFT) technology, which utilizes simultaneous spectrally-selective optical and photoacoustic excitation and detection to create unparalleled volumetric assessment of live organisms, organs, and tissues. A MoleculUS™ system is developed for clinical research that can benefit from co-registered ultrasound and molecular photoacoustic imaging. We also offer a variety of OEM electronic components for multi-channel parallel data acquisition.

All PhotoSound technology solutions are designed and built by experts in biomedical imaging systems, photoacoustics, ultrasound, optics, electronics and tunable lasers. Our employees are committed to provide every customer with the highest quality products and services, short delivery times and competitive pricing. Visit us at www.photosound.com to learn more about our products and proprietary technologies.

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All specifications are subject to change without notice.

MoleculUS™ is classified EAR99 and does not require an export license.



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