Verasonics®
The leader in Research Ultrasound™

Vantage™ Volume

Verasonics' Innovative Solutions for Volume Imaging

The Vantage Volume Solution Includes:

- Vantage 256™ research ultrasound system
- UTA 1024-MUX adapter
- Matrix array transducers with 1024 elements in a 4:1 multiplex configuration.

The Vantage system software includes example sequence programs (scripts) for the matrix array when used with a single Vantage system and the 1024-MUX adapter. The 256 channels of the Vantage system can be connected to different subsets of matrix array elements on transmit and receive to obtain synthetic aperture ultrasound data. These data can be processed by the Vantage system software to yield volume image reconstructions.

To obtain larger aperture data from the matrix array, multiple Vantage systems can be synchronized to provide up to 1024 channels of acquisition data. A researcher can start with one Vantage system and later acquire additional systems that can be synchronized to provide a larger number of acquisition channels. Systems with 512, 768, or 1024 channels can be implemented with two, three or four Vantage systems. A four Vantage system configuration can connect directly to each of the 1024 elements in the matrix array, providing full aperture acquisition data.

Other custom combinations of systems and matrix transducers can be configured to accommodate your research and exploration needs. All Vantage systems can be upgraded to support the Vantage Volume products.

Matrix Array Transducers

Verasonics offers researchers and developers leading-edge transducer technology. Now available are the 3 and 8 MHz matrix array transducers, each with 1024 elements in a 32x32 grid laid out in 4 banks of 8x32 and compatible with the Vantage 256 research ultrasound system.

The ability to acquire a volume of data enables:

- Multi-directional characterization of changes in structural properties
- Characterization of changes in blood flow with physiological events
- Improved guidance and monitoring for focused ultrasound therapies
- Data acquisition and processing for 3D displays
- Preservation of feature correlation for moving tissues
- Effective aberration correction methods and more...

Specifications for Vantage Volume Imaging Matrix Array Transducers

	3 MHz	8 MHz
Center Frequency	3.5 MHz	7.5 MHz
Bandwidth	60%	60%
Elements	1024 (32x32)	1024 (32x32)
Pitch	0.3 mm	0.3 mm
Elevation Aperture	12x14mm	12x14mm
Cable Length	Main cable = 1m; sub cables = 1m	Main cable = 1m; sub cables = 1m
Compatibility	Vantage 256	Vantage 256
Verasonics Part #	P01920	P01921

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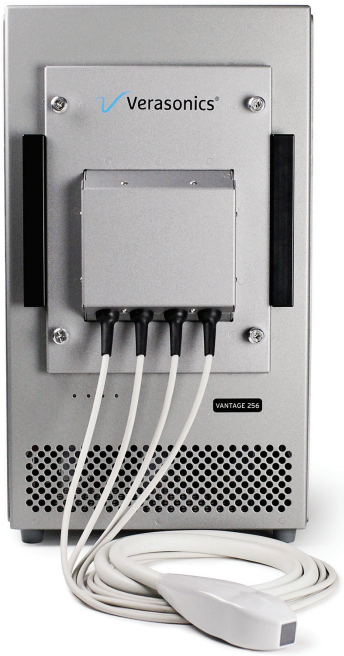
Verasonics UTA 1024-MUX Adapter

Verasonics' Universal Transducer Adapter (UTA) allows Vantage systems to operate matrix array transducers through a unique small format connector. The MUX switch topology allows for switching apertures between transmit and receive and for connecting each channel to up to four elements in parallel (one from each bank), which permits novel types of transmissions using larger apertures (e.g. plane wave).



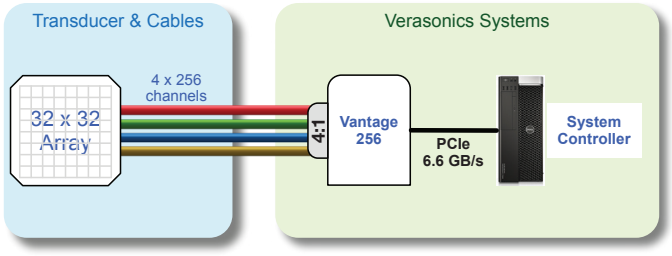
Verasonics Sync Module

One of the challenges in combining multiple systems for research or product development is the synchronization of transmit and receive clocks for each system. Verasonics has developed the Multi-System Synchronization Module that can synchronize up to 8 Vantage systems for a total of 2048 channels. The Multi-System Synchronization Module connects to each Vantage system with HDMI cables and the individual 250 MHz system clocks are synchronized to within 2ns.

The Multi-System Vantage configurations define one system as the primary, with one or more secondary systems. Identical scripts are run on each system and the sequences are synchronized using the input/output triggers. Using high-speed serial modules, raw volume data is transferred from each primary system's host controller to the primary computer at up to 4GB/s. To further accelerate data transfer and reconstruction processing, a pre-transfer beamforming mode can be enabled on each secondary computer. Data from all secondary systems is collected in the primary system computer for final processing and display. Experiments can be simulated using Vantage software before running the scripts on the Vantage hardware and transducer.

Verasonics' Vantage Volume Software

Vantage software for acquisition and reconstruction of 3D imaging is part of the Vantage Volume solution. The Vantage software now includes several example scripts for basic volume imaging such as plane wave imaging (single angle for high frame rate imaging, and multiple angles for improved quality), and "wide beam" (weakly focused beams for high quality imaging). All will use the 1024-element MUX that permits switching apertures between transmit and receive, and connecting up to 4 elements in parallel during transmit to speed up synthetic aperture imaging using special beam patterns.



System Diagram for 3D Imaging System
32x32 Matrix Array — 1024 elements
Vantage 256 system with 4:1 MUX

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