Verasonics®

The leader in Research Ultrasound™

The Vantage 256™, Vantage 128™, Vantage 64 *LE*™ & Vantage 64™ Systems

A Revolutionary Approach to Ultrasound System Architecture

Verasonics has developed a revolutionary ultrasound system architecture for phased arrays and conventional UT channels that provides researchers and developers a unique, flexible platform for ultrasound innovation across many applications. The Vantage Research Ultrasound Platform uses proprietary hardware and software technologies to provide direct access to raw acoustic data. These design features make the system extremely capable in NDT/NDE product and algorithm development, as well as geophysical and geotechnical, medical ultrasound R&D, and educational disciplines.

Unparalleled Flexibility and Speed

The Vantage System is designed to provide the researcher/developer with broad flexibility in defining each of the system's functional components, using a familiar and powerful software interface based on the MATLAB® programming environment. In fact, a single researcher can conceive, implement, and evaluate a new approach to nondestructive testing using the Vantage System. From integration of a custom transducer array to defining a new data acquisition scheme, or implementation of user-defined and real-time data analysis algorithms, the researcher can develop their own NDT system prototype and evaluate it under laboratory or test-floor conditions with unprecedented speed.

Verasonics' Unique Technology Advantages

The Vantage Systems are comprised of 3 fundamental components:

- The Vantage Data Acquisition system, with state-of-the-art hardware and unparalleled performance, available in several different configurations with optional features.
- The Host Controller purchased through Verasonics. This powerful computer is equipped with a PCI express adapter card, the MATLAB application, and other libraries and utilities pre-installed by Verasonics.
- The Verasonics data acquisition and processing software (SW) package, including application-level SW in MATLAB and compiled C, hardware abstraction layer and driver-level SW, installation and self-test utilities to verify full hardware system performance. Also included is an expanding suite of example application programs.

Together these provide:

- An open, software-based research ultrasound platform
- Data acquisition into local memory limited only by acoustic travel time: (max PRF available *over 100,000 frames/second).*
- Extremely rapid RF signal data transfer to host computer over PCI express.

- Highly parallelized software beamforming using proprietary Pixel Oriented Processing
- Fully programmable transmit beams: unlimited Focal Laws with 4 ns delay resolution
- Fully Dynamic Receive Focusing with 1/64th wavelength accuracy
- Very high frame rate imaging using plane waves or other unfocussed transmit beams
- Programmable hardware triggers (both input and output) for synchronizing with external devices
- Familiar MATLAB scripting environment for development of custom user algorithms, graphical interfaces and real-time analysis and display
- Thoroughly documented, flexible and easy-to-use programming API
- Additional software tools to facilitate control script development, analysis, and debugging
- Rapid integration of custom transducers
- A large set of example control scripts (programs) for various transducers and applications, including plane wave imaging, conventional line mode imaging, nonlinear ultrasound using pulse inversion, coded excitation, and many others. These can be modified or replaced by the user to create novel algorithms
- Real-time system simulator for offline development and re-processing of previously acquired data.

Key System Specifications of the Vantage Plaform for Research in Materials Sciences and NDT/NDE

	LF Low Frequency	**SF** Standard Frequency	**HF** High Frequency
Transmitters			
Waveform	Tristate (per channel programmable)		
Time Resolution	4 ns (Pulse Width and Delay resolution)		
Pulse Width (min-max)	12 ns – 10 µs	12 ns – 700 ns	12 ns – 700 ns
Focal Delays (per ch)	0 - 45.5 µs (4 ns resolution)		
Frequency Band (MHz)	0.05 – 1.5	0.5 – 20	2 – 42
Voltage	3 to 190 V (0.1 V steps)		
Current (max per ch)	2 A (peak) / 0.4 A (rms)		
Transmit Options			
Arbitrary Waveform	Arbitrary Waveform (independent on each channel)		
Extended Transmit	Extended Transmit bursts (long, high energy pulses)		
Receivers			
Frequency Band (MHz)	0.050 – 1.5	0.5 - 27	1 – 50
Gain (fixed)	24 to 54 dB (6 dB steps)		
Gain (time varying)	0 to -40 dB		
Input Impedance (Ω)	50 – 3000	110 – 3000	110 – 3000
HP Filter (MHz)	0.010 - 0.200	0.050 - 0.250	1 – 20
LP Filter (MHz) (3rd order)	5, 10, 15, 20, 30	5, 10, 15, 20, 30	5, 10, 15, 20, 30, 35, 50
Noise Figure (dB)	1.5 - 3.0 (depending on gain and input impedance)		
Digitizers			
ADC Resolution	14 bits		
Sampling Rate (MHz)	10 - 62.5		
Interleaved Rate (MHz)	125		
Filters	23-Tap and 41-tap FIR filters		
Accumulator	Over 1000 acquisitions, with offset subtraction		
Numerical Gain	-4.00 to +4.00 (for channel calibration)		
Memory (*per channel*)	64 MB (32 MSamples)		
Data Transfer Rate	6.6 GB/s (over 8 lanes PCIe 3.0)		
External Connectivity and Synchronization			
UTA Modules	**Dual 160 pin Hypertronics† connectors** 32 standard UT channels (LEMO 00)		
	260 pin ZIF connector (single for 64- & 128-ch systems, dual for 256-ch systems)		
	408 contact transducer connector (128-ch and 256-ch systems, high frequency transducers)		
Input Triggers	2 channels (BNC; LVCMOS; TTL compatible)		
Output Trigger	1 channel (BNC; LVCMOS; TTL compatible)		
Master Clock	250 MHz (HDMI connector)		
External Sync Module	Synchronize up to 2048 channels (± 2 ns accuracy)		
Computer			
Host Controller	Multi-core computer configured and provided with system purchase		
OS	Windows® operating system		
MATLAB® Programming	MATLAB® with Signal Processing Toolbox installed and configured (MATLAB® *user license not included*)		

Safety Certifications

- IEC 61010-1 3rd Edition (2010) and EN 61010-1:2010 3rd Edition
- UL 61010-1: 2012 and CAN/CSA-22.2 No. 61010-1-12

Power Requirements and Physical Dimension

- 100V-240V (50-60 Hz)
- Size (Data Acquisition System) L-49cm (+10cm clearance) W-28cm x H-48cm
- Size (Host Controller) L-42cm x W-18cm x H-47cm
- Total weight of all components: approx. 35-44 Kg depending on configuration

Patent References

U.S: 8,287,456, 8,824,743 and 9,028,411
CA: 2604649
CN: ZL200680020886.X, ZL201310053509.8
KR: 10-1316796
JP: 5511892, 5689315
DE, DK, FR, GB, IT, NL, EP: 2303131

Notes:

Maximum display frame rates may be limited by MATLAB® display software.
*Transmit and Receive performance may be limited at frequency extremes
†Labeled "Hypertac"; Hypertronics is now part of Smiths Connectors.

Contact

Verasonics Inc.
Email: info@verasonics.com
Telephone: 425.998.9836
Fax: 425.629.9014
www.verasonics.com

12016 115th Ave NE
Kirkland, WA 98034 USA