Vivid™ E9
4D Expert option

Product Description

The Vivid E9 is our leadership cardiovascular ultrasound system designed for cardiac 4D imaging, with the additional capabilities of 2D adult, pediatric, fetal/obstetrics, peripheral vascular, abdominal, transcranial, small organ, musculoskeletal, and transesophageal applications.

System Architecture

Accelerated Volume Architecture, GE's exclusive, patented, beamforming technology; provides eight times the power of traditional ultrasound systems with increased volume size for full volume single beat 4D acquisition. Using both coherent and harmonic image processing, the system provides computational power, ease of imaging, workflow flexibility and product upgradeability. The Vivid E9 excels in the following areas:

Exceptional Image Quality is created through the use of Accelerated Volume Architecture, Ultra Definition Clarity, Ultra Definition Speckle Reduce, Real Time High Def and advanced D-Series transducers.

Ease of Use features make the Vivid E9 one of the most productive cardiovascular ultrasound systems – including Single Beat 4D, 4D Views, Advanced 4D User Toolbox, Advanced 4D User Quantification Package, 4D Stress Echo, 4D Auto LVQ, AFI Productivity Package, and Scan Assist Pro.

Ergonomics include highly portable user adaptable design with electronically adjustable height and keyboard, articulating LCD arm and lightweight transducers combining to make it one of the most ergonomic cardiovascular ultrasound systems available.

True Scan Raw Data is GE's innovative technology that allows for advanced processing on archived images by applying many of the same scan controls and advanced quantitative tools available during the original exam.

General Specifications

Dimensions and Weight

- Width: 544 mm, 21 3/4"
- Depth: 844 mm, 33 1/4"
- Height: 1150 mm – 1350 mm, 45 3/8" – 53 1/8"
- Weight: 140 kg, 308 lbs

Electrical Power

- Nominal input voltage: 100-230 VAC, 50/60 Hz
- Rated power consumption: 1100 W

Console Design

- Five active probe ports
- ECG port
- Integrated HDD
- Multiple USB ports
- Integrated DVD-R multi drive
- On-board DVR recorder (optional)
- On-board storage for thermal printer
- Integrated speakers with sub-woofer for premium sound
- Integrated locking mechanism that provides rolling lock and caster swivel lock
- Integrated cable management
- Removable air filters
- Front and rear handles
- Side storage trays

User Interface

Operator Keyboard

- Floating keyboard electronically adjustable in three dimensions
  - Height
  - Rotation
  - Extension
- Drawer type, backlit, a/n keyboard
- Support for international (European) keyboard character sets (ISO 8859)
- Ergonomic hard key layout
- Interactive back lighting
- Integrated recording keys of up to three devices
- Integrated gel holders
- User configurable probe holders

Touch Screen

- 10.4" high-resolution, color, touch, LCD Screen
- Interactive dynamic software menu
- Backlight adjustment

LCD Monitor

- 17" High-Definition (HD) LCD
- 16.7 million simultaneous colors available
- Flicker free
- LCD translation (independent of console):
  - 350 mm horizontal bidirectional
  - Swivel to any viewing direction
- Fold down and rotation lock mechanism for transportation
- Horizontal viewing angle of more than 170°
- Resolution: 1280 x 1024
- Brightness, contrast, tint and backlight adjustments
- Optional 19" High Definition (HD) LCD

System Overview

Applications

- Cardiac
- Contrast (optional)
- Abdominal
- Peripheral Vascular
- Fetal/Obstetrics
- Pediatric
- Neonatal Cephalic
- Small Organ (includes breast, testes, thyroid)
- Adult Cephalic
- Musculoskeletal Conventional
- Intra Operative
- Transcranial
- Urology/Prostrate
- Rodent (optional)
- Transesophageal

Operating Modes

- 2D tissue
- 4D tissue
- 2D color flow
- 4D color flow
- 2D angio flow
- Color M-mode
- Tissue velocity M-mode
- Continuous wave Doppler
- Tissue M-mode
- Pulsed wave Doppler
- Anatomical M-mode
- Curved anatomical M-mode
- Tissue velocity imaging
- Tissue tracking
- Tissue synchronization imaging
- Strain imaging
- Strain rate imaging
- Tissue velocity Doppler
- Blood flow imaging
- Blood flow angio flow imaging
- B-flow
- 2D Stress (optional)
- AFI Automated Function Imaging (optional)
- Bi-plane (4D option)
- Tri-plane (4D option)
- Bi- and Tri-plane with color (4D option)
- Coded phase inversion and power modulation contrast imaging
- Compound imaging
- Extended field-of-view (LOGIQView)
- 4D Full Volume Scanning – Single beat and Multi beat (4D option)
- 4D Stress (4D option)
- 4D Strain Imaging (optional)

Scanning Methods

- Electronic sector
- Electronic volume
- Electronic convex
- Electronic linear
- CW pencil

Transducer Types

- Sector phased array
- Convex array
- Linear array
- Single crystal matrix array
- 2D matrix array

Optional 4D Feature

- Single, dual or multiple cycle volume acquisition
- Single or multiple cycle color volume acquisition
- Biplane acquisition
- Tri-plane acquisition
- Multi-dimensional (Bi-plane/Tri-plane) color acquisition
- Dynamic multi-slice views
- Live multi-slice views
- 4D stress
- Multi-dimensional stress
- Auto crop
- Flip crop
- View crop
  - Dynamic View Crop
  - Measurement on Render
- Stereo vision
- Depth color render
- Automated 4D left ventricular quantification
  - Automatic LV Alignment
  - 4D Strain
  - 4D LV Mass

Peripheral Options

- Console protective cover
- Internal peripherals
  - Digital video recording board enables burning video to DVD recorder (optional)
  - Direct Streaming DVR
  - DVD recorder for data storage and video playback
  - B/W video printer with control from system (optional)

- External peripherals
  - Network printers
  - Ink-jet printer
  - Color laser printer
  - Color video printer with control from system
  - 2 GB memory stick
  - USB hard drive – total disk size 2TB (2 x 1TB SATA II hard drive)
  - Usable disk size 1TB (drives are mirror for data redundancy)
- External outputs
  - DVI-I
  - Audio stereo out
  - Ethernet – 10 Mbps, 100 Mbps, 1 Gbps
  - Multiple USB 2.0 ports

Display Modes

- Live and stored display format: Full size and split screen, both with thumbnails, for still and cine
- Review image format: 4 x 3 and thumbnails for still and cine
- Simultaneous capability
  - B+ PW/CW
  - B + CFM/TVI + PW
  - B + CFM + CW
  - B + CFM/Angio/TVI/SRI/TT/SI/TSI
  - B + M/AMM/CAMM
  - B+ CFM/Angio/TVI/SRI/TT/SI/TSI + M/AMM/CAMM
  - Real-time duplex or triplex mode
  - Compound + M/CFM/PW
  - 4D + CFM
  - B + Bi-plane
  - B + Bi-plane + CFM/TVI/SRI/TT/SI/TSI/AMM/CAMM
  - B + Tri-plane
  - B + Tri-plane + CFM/TVI/SRI/TT/SI/TSI/AMM/CAMM
  - B + color split screen (simultaneous mode)
- Selectable alternating modes
  - B or compound + PW
  - B + CW
  - B or compound + CFM/PW
  - B + CFM + CW
- Multi-image (split/quad screen)
  - Live and/or frozen
  - Independent cine playback
- Timeline display
  - Independent B (or compound) + PW/CW/M display
  - Display formats
- Top/bottom selectable format
- Side/side selectable format
- 4D display
  - 2 + 1 slice and render view
  - Quad view (3 slice and render)
  - Single render view
  - Slice-only view
  - Dynamic Multi Slice
  - Live Multi Slice
  - Bi-plane side/side view
  - Tri-plane view (quad including geometry viewer)
  - Crop view (three orthogonal slice + render)
  - Apical slice view (Three 60 degrees view + render)
  - Cine rotate render view

Display Annotation

- Patient name: First, last and middle
- Patient ID
- Age, sex and birth date
- Hospital name
- Date format: Two types selectable
  - MM/DD/YY, DD/MM/YY
- Time format: Two types selectable
  - 24 hours, 12 hours
- Gestational age from LMP/EDD/GA
- Probe name
- Map names
- Probe orientation
- Depth scale marker
- Focal zone markers
- Image depth
- Zoom depth
- B-mode
  - Gain
  - Dynamic range
  - Imaging frequency
  - Frame averaging
  - Gray map
  - SRI
  - UD clarity
- M-mode
  - Gain
  - Dynamic range
  - Time scale
- Doppler mode
  - Gain
  - Angle
  - Sample volume size and position
  - Wall filter
  - Velocity and/or frequency scale
  - Spectrum inversion
- Time scale
  - PRF
  - Doppler frequency
- Color flow Doppler mode
  - Frame rate
  - Frame averaging
  - Sample volume size
  - Color scale
  - Power
  - Color baseline
  - Color threshold marker
  - Color gain
  - PDI
- Spectrum inversion
- Doppler
- Acoustic frame rate
- CINE gage, image number/frame number
- Bodymarks: Multiple human and animal types
- Application name
- Measurement results
- Operator message
- Displayed acoustic output
  - TIS: Thermal Index Soft Tissue
  - TIC: Thermal Index Cranial (Bone)
  - TIB: Thermal Index Bone
- MI: Mechanical Index
- Power output in dB
- Biopsy guide line and zone

- Heart rate
- Trackball-driven annotation arrows
- Active mode display
- Stress protocol parameters
- Parameter annotation follow ASE standard
- Free text with word library
- 4D slice intersection markers
- 4D gauge
- 4D viewing angle arrows
- 4D geometry viewer
- 4D number of cycles

General System Parameters

System Setup

- Pre-programmable categories
- User programmable preset capability
- Factory default preset data
- Languages: English, French, German, Spanish, Italian, Portuguese, Swedish, Danish, Dutch, Norwegian, Japanese, Chinese, Polish, Finnish, Greek, Russian, Hungarian, Slovak, Romanian, Czech, Latvian, Lithuanian, Turkish, Estonian, Korean, Serbian, Bulgarian, Croatian
- User defined annotations
- Body patterns
- Customized comment home position

Comprehensive User Manual Available on Board

Available through touch panel Utility page. User Manual and Service Manual are included on CD with each system. A printed manual is available upon request.

CINE Memory/Image Memory

- 210 MB of cine memory
- Selectable cine sequence for cine review
- Measurements/calculations and annotations on cine playback
- Scrolling timeline memory
- Dual-image cine display
- Quad-image cine display
- CINE gauge and cine image number display
- CINE review loop
- CINE review speed

Image Storage

- 4D virtual store for efficient 4D image management
- On-board database of patient information from past exams
- Storage formats:
  - DICOM – compressed/uncompressed, single/multi-frame, with/without raw data
  - Export JPEG, MPEG, AVI and VolDicom (optional) formats
- Storage devices:
  - USB memory stick: 2 GB
  - CD-RW storage: 700 MB
  - DVD storage: -R (4.7 GB)
  - Hard drive image storage: ~160 GB
- Compare old images with current exam
- Reload of archived data sets

EchoPAC/Patient Archive

- Integrated EchoPAC™adds connectivity and image analysis capability to Vivid E9
- Instant access to ultrasound raw data provided by the system
- Advanced post-processing analysis
- Three user levels help organizing data security requirements
  - E-signoff compatibility, with clear indications in patient management screens and report screen that a report was signed off, and by whom and at what time. The signed off report and exam cannot be changed. The "Diagnosing Physician" field is automatically assigned to the user that did the sign-off.

Image and Data Management

- Exceptional workflow with instant access data management
- DICOM-SR Standard structured reporting mechanism
- Next generation of DICOM Image Format: Raw image DICOM incorporates raw image data information with its data management flexibility into the image communication standard DICOM
- 2D, CFM or TVI data at maximum frame rate may be reviewed by scrolling or by running cine loops (can contain more than 1,000 images for imaging modes)
- Image clipboard for stamp-size storage and review of stored images and loops
- Built-in patient archive with images/loops, patient information, measurements and reports
- Structured findings report tools support efficient text entries with direct editing of findings text, usability improvements, new configuration options and conclusion section
- User can enter normal values which are then compared to actual measurements
- Configurable HTML-based report function
- Report templates can be customized on board
- ASE-based default text modules (English), user customizable
- Internal archive data can be exported to removable image storage through DICOM media
- Internal hard disk – for storing programs, application defaults, ultrasound images and patient archive
- All data storage is based on ultrasound raw data, allowing to change gain, baseline, color maps, sweep speeds, etc., for recalled images and loops
- DICOM media – read/write images on DICOM format
- Alphanumeric data can be exported in MS Excel compatible format

- JPEG export for still frames
- AVI and MPEG export for cineloops
- Specialized file format "Save As" feature to allow data import into TomTec freestanding workstation
- eVue/MPEGvue
  - Allows interactive viewing of images, loops or full exams from remote location
  - Using MPEGvue, exams may be stored onto removable media or on remote networked system together with integrated MPEGvue player for viewing on standard PC
  - Smart email feature allows transparent transmission of images via email using resident outlook email client

Scanning Parameters

- Digital beamformer
- Displayed imaging depth: 0 – 30 cm
- Minimum depth of field: 0 – 2 cm (zoom) (probe dependent)
- Maximum depth of field: 0 – 30 cm (probe dependent)
- Continuous dynamic receive focus/continuous dynamic receive aperture
- Adjustable dynamic range
- Image reverse: Right/left
- Image rotation of 0,° 180°

Tissue Imaging

General

- Variable transmit frequencies for resolution/penetration optimization
- Display zoom with zoom area control
- High-Resolution (HR) Zoom – concentrates all image acquisition power into selected Region of Interest (ROI)
- Variable contour filtering – for edge enhancement
- Depth range up to 30 cm – probe specific
- Selectable grayscale parameters: Gain, reject, DDP, clarity, dynamic range and compress – can be adjusted in live, digital replay and image clipboard recall
- Automatically calculated TGC curves reduces operator interaction
- Automatically calculated lateral gain

2D Mode

- Sector tilt and width control
- Frame rate in excess of 1000 fps, depending on probe, settings and applications
- Coded octave imaging with coded phase inversion – 3rd generation harmonic tissue imaging providing improved lateral and contrast resolution over conventional imaging. Features help reduce noise, improve wall definition, and axial resolution, making it well suited for a wide variety of patient groups
- Confocal imaging – allows for multiple transmit focal zones over range of view and a high vector density, probes dependent
- Automatic tissue optimization – single keystroke optimizes immediately and automatically different gray scale settings adjusted for the real time image
- UD Clarity and UD Speckle reduce imaging – an advanced image processing technique to remove speckle in real time examining the relative difference between neighboring pixel values and determining whether the grayscale variations have a sharp difference, follow a trend, or are random in nature
- HD Imaging – real time simultaneous acquisition at dual frequencies compounded to reduce speckle and noise while enhancing resolution and contrast
- Variable image width – a reduction either increases frame rate or increases the number of focal zones while maintaining the frame rate – application dependent
- Multiple-angle compound imaging – multiple co-planar images from different angles combined into a single image in real time improving border definition, contrast resolution, and reducing angular dependence of border or edge
- LOGIQView – provides the ability to construct and view a static 2D image with wider field-of-view of a given transducer. This allows viewing and measurements of anatomy that is larger than what would fit in a single image
- L/R and up/down invert, in live, digital replay or image clipboard recall
- Digital replay for retrospective review or automatic looping of images, allowing for adjustment of parameters such as gain, reject, anatomical M-mode, persistence and replay speed
- Data dependent processing performs temporal processing which reduces random noise but leaves motion of significant tissue structures largely unaffected – can be adjusted even |in digital replay
- 256 shades of gray
- Colorized 2D-mode, user selectable in real-time, digital replay
- Optimized strain presets for further 2D strain analysis on EchoPAC Dimension workstation (separate research option)

4D Mode

- Flexi-Volumes with customizable acquisition for volume size, volume rate or resolution
- Single beat 4D scanning with real-time volume rendering display
- Multi beat 4D scanning for higher resolution scanning
- Adjustable volume sizes for both single and multi beat scanning
- Adjustable volume shape control
- Pre-defined volume sizes for quick volume setup
- Adjustable number of cycles for multi beat scanning

- 4D scanning supporting variable octave and fundamental frequencies
- Variable frame rate settings available
- Volume optimize control for volume rendering transparency and quality setting
- Flip crop available for changing 4D view direction 180 degrees with mirrored crop volume
- Dynamic Multi Slice enables positioning of the MultiSlice short-axis cutplanes at same anatomical position throughout the heart cycle
- Live Multi Slice layouts available during live 4D acquisition
- View-crop setting for toggle control of view plane vs. crop plane
- Stereo vision in 4D
- Wide range of depth color rendering maps
- Toggle of left or right elevation tilt with corresponding change of crop and view directions

Multi-Dimensional Mode

- Bi-plane scanning – Two independent simultaneous scan planes where one of them can be rotated and tilted freely
- Tri-plane – Three independent simultaneous scan planes that can be rotated freely
- Both Bi-plane and Tri-plane scanning is possible in all color Doppler modes

M-mode

- Trackball steers M-mode line available with all imaging probes – max steering angle is probe dependent
- Simultaneous real-time 2D- and M-mode
- M-mode PRF 1 kHz – image data acquired is combined to give high-quality recording regardless of display scroll speed
- Digital replay for retrospective review of spectral data
- Several top-bottom formats, side-by-side format and time-motion only format – can be adjusted in live or digital replay
- Selectable horizontal scroll speed: 1, 2, 3, 4, 6, 8, 12, 16 seconds across display
- Horizontal scroll can be adjusted in live or digital replay

Anatomical M-mode

- M-mode cursor can be adjusted at any plane
- Curved anatomical M-mode – free (curved) drawing of M-mode generated from the cursor independent from the axial plane
- Can be activated from live, digital replay or image clipboard recall
- Anatomical color and tissue velocity M-mode
- M & A capability

Color Doppler Imaging

General

- Steerable color Doppler available with all imaging probes – max steering angle is probe dependent
- Trackball-controlled ROI
- Removal of color map from the tissue during digital replay
- Digital replay for retrospective review of color or color M-mode data allowing for adjustment of parameters such as encoding principle, color priority and color gain even on stored data
- PRF settings – user selectable
- Advanced regression wall filter gives efficient suppression of wall clutter
- For each encoding principle, multiple color maps can be selected in live and digital replay – variance maps available
- More than 65,000 simultaneous colors processed, providing a smooth display two-dimensional color maps containing a multitude of color hues
- Simultaneous display of grayscale 2D and 2D with color flow
- Color invert – user selectable in live and digital replay
- Variable color baseline – user selectable in live and digital replay
- Multivariate color priority function gives reliable delineation of disturbed flows even across bright areas of the 2D-mode image
- Color Doppler frequency can be changed independently from 2D

Color Flow Imaging

- TruSpeed imaging allows either ultra-high frame rate or increased lateral resolution
- Expert Imaging Color Flow (with 4D option) uses the processing power of more parallel beamforming to enhance color flow with increased resolution and better image quality
- Very high digital signal processing power, maintaining high frame rates with large ROI's even for very low PRF settings
- Frame Rate in excess of 150 fps, depending on probe and settings
- Variable ROI size in width and depth
- User-selectable radial and lateral averaging to help reduce statistical uncertainty in the color velocity and variance estimates
- Data Dependent Processing (DDP) performs temporal processing and display smoothing to help reduce possibility for loss of transient events of hemodynamic significance
- Digital replay for retrospective review or automatic looping of color images, allowing for adjustment of parameters such as DDP, encoding principle, baseline shift, color maps, color priority and color gain even on frozen/recalled data
- Application-dependent, multi-variate motion discriminator reduces flash artifacts
- Dedicated coronary flow application

4D Color Doppler Imaging

- Single-beat 4D color flow scanning
- Volume size control to change the size of the color ROI
- Multi-beat 4D color flow scanning using ECG stitching for increased volume rate
- Pre-defined volume sizes for quick volume setup
- Adjustable number of cycles for multi beat scanning
- Variable volume rate settings available
- Flip crop available for changing 4D view direction 180 degrees with mirrored crop volume
- View-crop setting for toggle control of view plane vs. crop plane
- Stereo vision in 4D color
- Tissue transparency control
- Flow transparency control

Multi-Dimensional Color Mode

- Bi-plane and Tri-plane scanning with all color Doppler and tissue velocity modes

Color Angio

- Angle-independent mode for visualization of small vessels with increased sensitivity compared to standard color flow

Color M-mode

- Variable ROI length and position – user selectable
- User-selectable radial averaging to help reduce statistical uncertainty in the color velocity and variance estimates
- Selectable horizontal scroll speed: 1, 2, 3, 4, 6, 8, 12, 16 seconds across display – can be adjusted during live, digital replay or image clipboard recall
- Real-time 2D image while in color M-mode
- Same controls and functions available as in standard 2D color Doppler

Anatomical Color M-mode

- GE-patented, any plane color M-mode display derived from color Doppler cine loop
- Also applicable to tissue velocity Imaging
- M & A capability

B-flow

- B-flow is a digital imaging technique that provides real-time visualization of vascular hemodynamics by directly visualizing blood reflectors and presenting this information in a grayscale display
- Use of GE-patented techniques to boost blood echoes, and to preferentially suppress non-moving tissue signals
- B-flow is available for most vascular and shared service applications

Blood Flow Imaging

- Combines color Doppler with grayscale speckle imaging
- Helps improve delineation of blood flow without bleeding into tissue or vessel wall

Blood Flow Angio Imaging

- Combines angio with grayscale speckle imaging

Tissue Velocity Imaging

Tissue Velocity Imaging Mode

- Myocardial Doppler imaging with color overlay on tissue image
- Tissue Doppler data can be acquired in background during regular 2D imaging
- The velocity of myocardial segments after entire heart cycle can be displayed in one single image
- Tissue color overlay can be removed to show just the 2D image, still retaining the tissue velocity information
- Quantitative profiles for TVI, tissue tracking, strain and strain rate can be derived
- Time markers for valve events derived from any TM mode simplify understanding of signals in velocity traces or curved anatomical M-mode

Tissue Tracking Mode

- Real-time display of the time integral of TVI for quantitative display of myocardial systolic displacement
- Myocardial displacement is calculated and displayed as a color-coded overlay on the grayscale and M-mode image – different colors represent different displacement ranges

Tissue Synchronization Imaging Mode
(Option, enabled by Advanced QScan)

- Parametric imaging which gives information about synchronicity of myocardial motion
- Myocardial segments colored according to time to peak velocity, green for early and red for late peak
- Waveform trace available to obtain quantitative time to peak measurement from TSI Image
- Available in live scanning as well as an offline calculation derived from tissue Doppler data
- Additional features in combination with multi-dimensional imaging option
- Simultaneous acquisition of Tri-plane TSI images covering all standard segments in apical views
- Efficient segment specific TSI time measurements
- Immediate bull's eye report
- Automatic calculated TSI synchrony indexes
- TSI surface mapping
- LV synchronization report template
- CRT programming protocol

Strain/Strain Rate Mode
(Option, enabled by Advanced QScan)

- Tissue deformation and rate of deformation are calculated and displayed as real-time, color-coded overlay on the 2D image
- Tissue deformation (strain) is calculated and displayed as real-time, color-coded overlay on the 2D Image

- Cine compound calculates and displays cineloops generated from a temporal averaging of multiple consecutive heart cycles
- Anatomical M-mode and curved anatomical M-mode displays (SI and SRI)

Spectral Doppler

General

- Operates in PW, HPRF and CW modes
- Trackball steerable Doppler available with all imaging probes – max steering angle is probe dependent
- Selectable Doppler frequency for better optimization
- High-quality, real-time duplex or triplex operation in all Doppler modes, CW and PW, and for all velocity settings
- Frame rate control for optimized use of acquisition power between spectrum, 2D and dolor Doppler modes in duplex or triplex modes
- Very fast and flexible spectrum analysis with an equivalent DFT rate of 0.2 ms
- Dynamic gain compensation for display of flows with varying signal strengths over the cardiac cycle to help improve ease of use
- Dynamic reject gives consistent suppression of background – user selectable in real-time, digital replay or image clipboard recall
- Digital replay for retrospective review of spectral Doppler data
- Several top-bottom formats, side-by-side format and time motion only format – can be adjusted in live or digital replay
- Selectable horizontal scroll speed: 1, 2, 3, 4, 6, 8, 12, 16 seconds across display – can be adjusted in live or digital replay
- Adjustable spectral Doppler display parameters: Gain, reject, compress, color maps – can be adjusted in live or digital replay
- User-adjustable baseline shift – in live, digital replay and image clipboard recall
- Adjustable velocity scale
- Wall filters with range 10-2000 Hz (velocity scale dependent)
- Angle correction with automatic adjustment of velocity scale – in live, digital replay and image clipboard recall
- Stereo speakers mounted in the front panel
- Display annotations of frequency, mode, scales, Nyquist limit, wall filter setting, angle correction, acoustic power indices
- Compound in duplex

PW / HPRF Doppler

- Automatic HPRF Doppler maintains its sensitivity even for shallow depths and with the highest PRF's
- Digital velocity tracking Doppler employs processing in range and time for high-quality spectral displays
- Adjustable sample volume size of 1-16 mm (probe dependent)
- Maximum sample volume depth 30 cm

CW Doppler

- Highly sensitive steerable CW available with all phased array probes
- Tissue Velocity Doppler

Contrast Imaging (optional)

LVO Contrast* – Enables contrast applications intended for imaging of the left ventricle:

- LV contrast (4V-D, M5S-D) enhances delineation of the LV border in combination with ultrasound contrast agents. The new implementation of GE's Coded Phase Inversion (CPI) provides high-resolution detection of contrast in the LV cavity and excellent suppression of myocardial tissue signals. Furthermore, Tri-plane imaging with 4V-D using LV contrast enables acquisition of three simultaneous apical views within one cardiac cycle.
- LVO stress (M5S-D)

** Schering developed harmonic imaging for supporting contrast agent imaging*

Vascular Contrast** – Enables contrast applications intended for vascular contrast imaging:

- Vascular Contrast (9L-D) – Coded phase inversion enables excellent detection and resolution of vascular contrast imaging

*** GE Healthcare's Vivid E9 is designed for compatibility with commercially available contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is approved for use. Advanced contrast features are only enabled on systems for delivery in countries or regions where the agents are approved for use or for investigational or research use.*

Physiological Traces

- Up to three traces display simultaneously
- ECG trigger
- ECG lead selection
- High-resolution display of the following traces: ECG, respiration, phono, and pressure/AUX
- Adjustable ECG QRS markers

Automatic Optimization

- Optimize B-mode image to improve contrast resolution
- Auto-spectral optimize – adjustments baseline, PRF (on live image) and angle correction

Measurement and Analysis (M&A)

- Personalized measurement protocols allow individual set and order of M & A items
- Measurements can be labeled seamlessly by using protocols or post assignments
- Measurements assignable to protocol capability
- Parameter annotation follow ASE standard
- Seamless data storage and report creation
- User-assignable parameters

- Comprehensive set of cardiac measurements and calculations to help assess dimensions, flow properties and other functional parameters of the heart
- Comprehensive set of shared service measurements and calculations covering vascular, abdominal, obstetrics and other application areas
- Configuration package to set up a customized set and sequence of measurements to use, defining user-defined measurements and changing settings for the factory defined measurements
- Stress echo support allowing wall motion scoring and automatic stress level labeling of measurements
- Support for measuring on DVR recordings and DICOM images
- Automatic Doppler trace functionality for use in non-cardiac applications in both live and replay
- Worksheet for review, edit and deletion of performed measurements
- Reporting support allowing a configurable set of measurements to be shown in the exam report
- DICOM SR export of measurement data

Intima Media Thickness (IMT) Measurements (optional)

- Automated measurement of IMT rather than the conventional way of measuring the IMT manually
- Results representative of a region rather than a single point of a vessel wall
- Reduction of examination time by improving the procedure in measuring the IMT

4D Auto LVQ, 4D LV Mass and 4D Strain

- Automated measurement of LV volume and EF from volumetric data
- Automated identification of LV long-axis and standard views
- Automated initialization of measurement ROI
- Validation of detected boundaries
- LV volume waveform for entire cardiac cycle
- ED and ES automatically selected from volume waveform (max/min)
- Approval of final results
- Editing by point and click
- Fully integrated in M&A system

Quantitative Analysis Package (Q-Analysis)

- Traces for velocity or derived parameters (strain rate, strain, displacement) inside defined regions of interest as function of time
- Contrast analysis with traces for grayscale intensity or angio power inside defined regions of interest as function of time, including post processing ECG trigging and curve fitting for wash in/wash out analysis
- Curved anatomical M-mode display allowing an M-mode along an arbitrary curve in a 2D image

Automated Function Imaging (AFI)

- Parametric imaging tool which gives quantitative data for global and segmental wall motion
- Allows complete assessment at a glance by combining three longitudinal views into one comprehensive bulls-eye view
- Integrated into M&A package with specialized report templates
- 2D strain based data moves into clinical practice
- Simplified workflow with adaptive ROI, quick tips and combined display of traces from all segments

Automated Ejection-Fraction Calc

- Automated EF measurement tool based on 2D-speckle tracking algorithm
- Integrated into M&A package with worksheet summary

Generic Measurements

- BSA (Body Surface Area)
- MaxPG (Maximum Pressure Gradient)
- MeanPG (Mean Pressure Gradient)
- % Stenosis (Stenosis Ratio)
- PI (Pulsatility Index)
- RI (Resistivity Index)
- HR (Heart Rate) – beats/minute
- A/B Ratio (Velocities Ratio)
- TAMAX (Time Averaged Maximum Velocity) – Trace Method is Peak or manual
- TAMIN (Time Averaged Minimum Velocity) – Trace method is Floor
- TAMEAN (Time Averaged Mean Velocity) – Trace method is Mean
- Volume

Vascular Calculations

- RT ECA (Right External Carotid Artery Velocity)
- RT CCA (Right Common Carotid Artery Velocity)
- RT BIFURC (Right Carotid Bifurcation Velocity)
- RT ICA (Right Internal Carotid Artery Velocity)
- RT ICA/CCA (Right Internal Carotid Artery Velocity/Common Carotid Artery Velocity Ratio)
- LT ECA, LT CCA, LT BIFURC, LT ICA, LT ICA/CCA (Same as above, for Left Carotid Artery)
- A/B Ratio (Velocities Ratio)
- % Stenosis (Stenosis Ratio)
- S/D Ratio (Systolic Velocity/Diastolic Velocities Ratio)
- PI (Pulsatility Index)
- RI (Resistivity Index)
- HR (Heart Rate) – beats/minute

Cardiac Measurements

- %FS (LV Fractional Shortening)
- %IVS Thck (IVS Fractional Shortening)
- %LVPW Thck (LV Posterior Wall Fractional Shortening)
- Ao Arch Diam (Aortic Arch Diameter)
- Ao asc (Ascending Aortic Diameter)

- Ao Desc Diam (Descending Aortic Diameter)
- Ao Isthmus (Aortic Isthmus)
- Ao Root Diam (Aortic Root Diameter)
- AR ERO (PISA: Regurgitant Orifice Area)
- AR Flow (PISA: Regurgitant Flow)
- AR PHT (AV Insuf. Pressure Half Time)
- AR Rad (PISA: Radius of Aliased Point)
- AR RF (Regurgitant Fraction over the Aortic Valve)
- AR RV (PISA: Regurgitant Volume Flow)
- AR Vel (PISA: Aliased Velocity)
- AR Vmax (Aortic Insuf. Peak Velocity)
- AR VTI (Aortic Insuf. Velocity Time Integral)
- ARed max PG (Aortic Insuf. End-Diastole Pressure Gradient)
- ARed Vmax (Aortic Insuf. End-Diastolic Velocity)
- AV Acc Slope (Aortic Valve Flow Acceleration)
- AV Acc Time (Aortic Valve Acceleration Time)
- AV AccT/ET (AV Acceleration to Ejection Time Ratio)
- AV EOA I [VTI] (Aortic Valve Effective Orifice Area Index by Continuity Equation VTI)
- AV EOA I Vmax (Aortic Valve Effective Orifice Area Index by Continuity Equation Peak V)
- AV CO (Cardiac Output by Aortic Flow)
- AV Cusp (Aortic Valve Cusp Separation, 2D)
- AV Dec Time (Aortic Valve Deceleration Time)
- AV Diam (Aortic Diameter, 2D)
- AV max PG (Aortic Valve Peak Pressure Gradient)
- AV mean PG (Aortic Valve Mean Pressure Gradient)
- AV SV (Stroke Volume by Aortic Flow)
- AV Vmax (Aortic Valve Peak Velocity)
- AV Vmean (AV Mean Velocity)
- AV VTI (Aortic Valve Velocity Time Integral)
- AVA [Vmax] (AV Area by Continuity Equation by Peak V)
- AVA [VTI] (AV Area by Continuity Equation VTI)
- AVA Planimetry (Aortic Valve Area)
- AVET (Aortic Valve Ejection Time)
- CO [Teich] (Cardiac Output, M-mode, Teicholtz)
- D-E Excursion (MV Anterior Leaflet Excursion)
- EDV [Cube] (Left Ventricle Volume, Diastolic, 2D, Cubic)
- EF [A-L A2C] (Ejection Fraction 2CH, Single Plane, Area-Length)
- E-F Slope (Mitral Valve E-F Slope)
- EPSS (E-Point-to-Septum Separation, M-mode)
- ERO (Effective Regurgitant Orifice)
- ESV [Cube] (Left Ventricle Volume, Systolic, 2D, Cubic)
- HR (Heart Rate, 2D, Teicholtz)
- IVC (Inferior Vena Cava)
- IVCT (Isovolumic Contraction Time)
- IVRT (Isovolumic Relaxation Time)
- IVSd (Interventricular Septum Thickness, Diastolic, 2D)
- VSs (Interventricular Septum Thickness, Systolic, 2D)
- LA Diam (Left Atrium Diameter, 2D)
- LA Major (Left Atrium Major)
- LA Minor (Left Atrium Minor)
- LA/Ao (LA Diameter to AoRoot Diameter Ratio, 2D)
- LAEDV [A-L] (LA End Diastolic Volume, Area-Length)
- LAEDV Index [A-L] (LA End Diastolic Volume Index, Area-Length)
- LAESV [A-L] (LA End Systolic Volume, Area-Length)
- LAESV Index [A-L] (LA End Systolic Volume Index, Area-Length)
- LIMP (Left Index of Myocardial Performance)
- LVA [s] (Left Ventricular Area, Systolic, 2CH)
- LVAd [A2C] (Left Ventricular Area, Diastolic, 2CH)
- LVAd [sax] (LV area, SAX, Diastolic)
- LVAend [d] (LV Endocardial Area, SAX)
- LVAepi [d] (LV Epicardial Area, SAX)
- LVAs [A4C] (Left Ventricular Area, Systolic, 4CH)
- LVAs [sax] (LV area, SAX, Systolic)
- LVd Mass (LV Mass, Diastolic, 2D)
- LVd Mass (LV Mass, Diastolic, M-mode)
- LVd Mass Index (LV Mass Index, Diastolic, 2D)
- LVEDV [A-L A2C] (LV Volume, Diastolic, 2CH, Area-Length)
- LVESV [A-L A2C] (LV Volume, Systolic, 2CH, Area-Length)
- LVET (Left Ventricle Ejection Time)
- LVIDd (LV Internal Dimension, Diastolic, 2D)
- LVIDs (LV Internal Dimension, Systolic, 2D)
- LVLd [apical] (Left Ventricular Length, Diastolic, 2D)
- LVLs [apical] (Left Ventricular Length, Systolic, 2D)
- LVOT Area (Left Ventricle Outflow Tract Area)
- LVOT CO (Cardiac Output by Aortic Flow)
- LVOT Diam (Left Ventricular Outflow Tract Diameter)
- LVOT max PG (LVOT Peak Pressure Gradient)
- LVOT mean PG (LVOT Mean Pressure Gradient)
- LVOT SI (Stroke Volume Index by Aortic Flow)
- LVOT SV (Stroke Volume by Aortic Flow)
- LVOT Vmax (LVOT Peak Velocity)
- LVOT Vmean (LVOT Mean Velocity)
- LVOT VTI (LVOT Velocity Time Integral)
- LVPWd (Left Ventricular Posterior Wall Thickness, Diastolic, 2D)
- LVPWs (Left Ventricular Posterior Wall Thickness, Systolic, 2D)

- LVs Mass (LV Mass, Systolic, 2D)
- LVs Mass Index (LV Mass Index, Systolic, 2D)
- LAAd [A2C] (Left Atrium Area, Apical 2C)
- MCO (Mitral Valve closure to Opening)
- MP Area (Mitral Valve Prosthesis)
- MR Acc Time (MV Regurg. Flow Acceleration)
- MR ERO (PISA: Regurgitant Orifice Area)
- MR Flow (PISA: Regurgitant Flow)
- MR max PG (Mitral Regurg. Peak Pressure Gradient)
- MR Rad (PISA: Radius of Aliased Point)
- MR RF (Regurgitant fraction over the Mitral Valve)
- MR RV (PISA: Regurgitant Volume Flow)
- MR Vel (PISA: Aliased Velocity)
- MR Vmax (Mitral Regurg. Peak Velocity)
- MR Vmean (Mitral Regurg. Mean Velocity)
- MR VTI (Mitral Regurg. Velocity Time Integral)
- MV A Dur (Mitral Valve A-Wave Duration)
- MV A Velocity (MV Velocity Peak A)
- MV Acc Slope (Mitral Valve Flow Acceleration)
- MV Acc Time (Mitral Valve Acceleration Time)
- MV Acc/Dec Time (MV: Acc.Time/Decel.Time Ratio)
- MV an diam (Mitral Valve Annulus Diameter, 2D)
- MV CO (Cardiac Output by Mitral Flow)
- MV Dec Slope (Mitral Valve Flow Deceleration)
- MV Dec Time (Mitral Valve Deceleration Time)
- MV E Velocity (MV Velocity Peak E)
- MV E/A Ratio (Mitral Valve E-Peak to A-Peak Ratio)
- MV max PG (Mitral Valve Peak Pressure Gradient)
- MV mean PG (Mitral Valve Mean Pressure Gradient)
- MV PHT (Mitral Valve Pressure Half Time)
- MV Reg Frac (Mitral Valve Regurgitant Fraction)
- MV SI (Stroke Volume Index by Mitral Flow)
- MV SV (Stroke Volume by Mitral Flow)
- MV Time to Peak (Mitral Valve Time to Peak)
- MV Vmax (Mitral Valve Peak Velocity)
- MV Vmean (MV Mean Velocity)
- MV VTI (Mitral Valve Velocity Time Integral)
- MVA (Mitral Valve Area)
- MVA By PHT (Mitral Valve Area according to PHT)
- MVA by plan (Mitral Valve Area, 2D)
- MVET (Mitral Valve Ejection Time)
- P Vein A (Pulmonary Vein Velocity Peak A) – reverse
- P Vein A Dur (Pulmonary Vein A-Wave Duration)
- P Vein D (Pulmonary Vein End-Diastolic Peak Velocity)
- P Vein S (Pulmonary Vein Systolic Peak Velocity)
- PAEDP (Pulmonary Artery Diastolic Pressure)
- PE[d] (Pericard Effusion, M-mode)
- PEs (Pericard Effusion, 2D)
- PR max PG (Pulmonic Insuf. Peak Pressure Gradient)
- PR mean PG (Pulmonic Insuf. Mean Pressure Gradient)
- PR PHT (Pulmonic Insuf. Pressure Half Time)
- PR Vmax (Pulmonic Insuf. Peak Velocity)
- PR VTI (Pulmonic Insuf. Velocity Time Integral)
- PRend max PG (Pulmonic Insuf. End-Diastole Pressure Gradient)
- PRend Vmax (Pulmonic Insuf. End-Diastolic Velocity)
- Pulmonic Diam (Pulmonary Artery Diameter, 2D)
- PV Acc Slope (Pulmonic Valve Flow Acceleration)
- PV Acc Time (Pulmonic Valve Acceleration Time)
- PV Acc Time/ET Ratio (PV Acceleration to Ejection Time Ratio)
- PV an diam (Pulmonic Valve Annulus Diameter, 2D)
- PV Ann Area (Pulmonic Valve Area)
- PV CO (Cardiac Output by Pulmonic Flow)
- PV max PG (Pulmonic Valve Peak Pressure Gradient)
- PV mean PG (Pulmonic Valve Mean Pressure Gradient)
- PV SV (Stroke Volume by Pulmonic Flow)
- PV Vmax (Pulmonary Artery Peak Velocity)
- PV Vmean (PV Mean Velocity)
- PV VTI (Pulmonic Valve Velocity Time Integral)
- PVA (VTI) (Pulmonary Artery Velocity Time Integral)
- PVein S/D Ratio (Pulmonary Vein SD Ratio)
- PVET (Pulmonic Valve Ejection Time)
- PVPEP (Pulmonic Valve Pre-Ejection Period)
- PVPEP/ET Ratio (PV Pre-Ejection to Ejection Time Ratio)
- Qp/Qs (Pulmonic-to-Systemic Flow Ratio)
- RA Major (Right Atrium Major, 2D)
- RA Minor (Right Atrium Minor, 2D)
- RAEDV A2C (Right Atrium End Diastolic Volume, Apical 2 chamber)
- RAESV A-L (RA End Systole Volume [A-L])
- RALd (Right Atrium Length, Diastole)

- RALs (RA Length, systole)
- RIMP (Right Index of Myocardial Performance)
- RJA [A4C] (Regurgitant Jet Area)
- RJA/LAA (Regurgitant Jet Area ratio RJA/LAA)
- RV Major (Right Ventricle Major)
- RV Minor (Right Ventricle Minor)
- RVAWd (Right Ventricle Wall Thickness, Diastolic, 2D)
- RVAWs (Right Ventricle Wall Thickness, Systolic, 2D)
- RVET (Right Ventricle Ejection Time)
- RVIDd (Right Ventricle Diameter, Diastolic, 2D)
- RVIDs (Right Ventricle Diameter, Systolic, 2D)
- RVOT Area (Right Ventricle Outflow Tract Area)
- RVOT Diam (RV Output Tract Diameter, 2D)
- RVOT Diam (RV Output Tract Diameter, M-Mode)
- RVOT max PG (RVOT Peak Pressure Gradient)
- RVOT meanPG (RVOT Mean Pressure Gradient)
- RVOT SI (LV Stroke Volume Index by Pulmonic Flow)
- RVOT SV (Stroke Volume by Pulmonic Flow)
- RVOT Vmax (RVOT Peak Velocity)
- RVOT Vmean (RVOT Mean Velocity)
- RVOT VTI (RVOT Velocity Time Integral)
- RVSP (Right Ventricle Systolic Pressure)
- RVWd (Right Ventricle Wall Thickness, Diastolic, M-mode)
- RVWs (Right Ventricle Wall Thickness, Systolic, M-mode)
- RAA [d] (Right Atrium Area, 2D, Diastole)
- RAA [s] (Right Atrium Area, 2D, Systole)
- SI [A-L A2C] (LV Stroke Index, Single Plane, 2CH, Area-Length)
- SI [A-L A4C] (LV Stroke Index, Single Plane, 4CH, Area-Length)
- SI [Bi-plane] (LV Stroke Index, Bi-Plane, MOD)
- SI [bullet] (LV Stroke Index, Bi-Plane, Bullet)
- SI [MOD A2C] (LV Stroke Index, Single Plane, 2CH, MOD)
- SI [MOD A4C] (LV Stroke Index, Single Plane, 4CH, MOD)
- SI [Teich] (LV Stroke Index, Teicholtz, 2D)
- SI [Teich] (LV Stroke Index, Teicholtz, M-mode)
- SV [A-L A2C] (LV Stroke Volume, Single Plane, 2CH, Area-Length)
- SV [A-L A4C] (LV Stroke Volume, Single Plane, 4CH, Area-Length)
- SV [Bi-plane] (LV Stroke Volume, Bi-plane, MOD)
- SV [bullet] (LV Stroke Volume, Bi-plane, Bullet)
- SV [MOD A2C] (LV Stroke Volume, Single-plane, 2CH, MOD) – Simpson
- SV [MOD A4C] (LV Stroke Volume, Single-plane, 4CH, MOD) – Simpson
- SV [Cube] (LV Stroke Volume, 2D, Cubic)
- SV[Cube) (LV Stroke Volume, M-mode, Cubic)
- SV [Teich) (LV Stroke Volume, 2D, Teicholtz)
- SV [Teich] (LV Stroke Volume, M-mode, Teicholtz)
- Systemic Diam (Systemic Vein Diameter, 2D)
- Systemic Vmax (Systemic Vein Peak Velocity)
- Systemic VTI (Systemic Vein Velocity Time Integral)
- TCO (Tricuspid Valve Closure to Opening)
- TR max PG (Tricuspid Regurg. Peak Pressure Gradient)
- TR mean PG (Tricuspid Regurg. Mean Pressure Gradient)
- TR Vmax (Tricuspid Regurg. Peak Velocity)
- TR Vmean (Tricuspid Regurg. Mean Velocity)
- TR VTI (Tricuspid Regurgitation Velocity Time Integral)
- TV A dur (Tricuspid Valve A-Wave Duration)
- TV A Velocity (Tricuspid Valve A Velocity)
- TV Acc Time (Tricuspid Valve Time to Peak)
- TV Ann Area (Tricuspid Valve Area)
- TV ann diam (Tricuspid Valve Annulus Diameter, 2D)
- TV Area (Tricuspid Valve Area, 2D)
- TV CO (Cardiac Output by Tricuspid Flow)
- TV Dec Slope (Tricuspid Valve Flow Deceleration)
- TV E Velocity (Tricuspid Valve E Velocity)
- TV E/A Ratio (Tricuspid Valve E-Peak to A-Peak Ratio)
- TV max PG (Tricuspid Valve Peak Pressure Gradient)
- TV mean PG (Tricuspid Valve Mean Pressure Gradient)
- TV mean PG (Tricuspid Valve Mean Pressure Gradient)
- TV PHT (Tricuspid Valve Pressure Half Time)
- TV SV (Stroke Volume by Tricuspid Flow)
- TV Vmean (TV Mean Velocity)
- TV VTI (Tricuspid Valve Velocity Time Integral)
- VSD max PG (VSD Peak Pressure Gradient)
- VSD Vmax (VSD Peak Velocity)
- Please refer to the user manual for the full list of measurements and calculations for all applications

Annotations

Body Marks

- Body mark icons for location and position of probe
- Easy selection of body marks from touch panel

Text Annotations

- Easy selection of text annotations from touch panel

Scan Assist Pro

- Customizable automations that assist the user through each step of the scan
- Helps enhance consistency and reduce keystrokes
- Supports selection of all modes, all measurements and dual annotations
- Imaging attributes: Octave, Steer, Dual/Quad screen, Compound, LogiqView
- On-line or off-line protocol editor
- Image acquisition according to predefined protocol templates
- Various factory protocol templates
- User configurable protocol templates
- Wall motion scoring: Analysis by wall motion in individual myocardial segments

Supported Protocol Examinations

- 2D pharmacological stress echo
- 2D bicycle stress echo
- 2D continuous capture stress echo (treadmill stress echo)
- Q-Stress protocols (acquire tissue velocity data in background for quantitative analysis)
- Multi-plane stress echo
- 4D stress echo
- Combined 4D/multi-plane and continuous capture stress echo
- Cardiac resynchronization therapy programming protocols

Protocol Examinations May Include

- Show reference: Show a reference image from baseline or previous level during acquisition
- Smart stress: Automatically set up various scanning parameters (for instance geometry, frequency, gain, etc.) according to same projection on previous level
- Scan mode settings: Scan mode may be specified for individual views in the protocol
- Preview of store: Show running loops as preview before storing to the examination

Continuous Capture

- Continuously acquire large amounts of 2D image data, and selection of projection views for analysis afterwards
- The entire continuous capture recording may be kept in memory while it is possible to store new images outside the protocol template, or the entire recording can be stored to file
- Selection of projection views on EchoPAC when the entire recording is stored to file

Multi-plane Stress Echo

- Bi-plane and/or Tri-plane acquisition
- Adjustment of scan-plane angle and tilt during acquisition
- Individual scan-planes shown in analysis – possible to show one scan-plane from each of the stress levels simultaneously

4D Stress Echo

- 4D volume acquisition
- Simultaneous display of three apical and one short-axis projection during acquisition

4D Volume Images Analyzed in Long-Axis or Short-Axis Projections

- Long-axis analysis allow rotating the plane around the main axis
- Short-axis analysis allow translation of the plane along the main axis

Cardiac Resynchronization Therapy (CRT) Programming Protocols

- Tailored acquisition protocol for data needed for programming of AV and VV delays in biventricular pacemakers
- Image acquisition of a set of projection views with various scan mode settings
- Template editor
- User configurable protocol templates
- Configure protocol name, number of levels and views, name of level and views and several other protocol settings (smart stress, show reference, scan mode, preview of store, timer handling, etc.)

4D Analysis Tools

4D Views

- Auto Alignment to define standard orientation of acquired 4D data
- Standard views (such as 4ch, 2ch, LAX, mitral valve and aortic valve) are defined from the standard orientation
- Automatic display of volume renderings and 2D cut planes from standard views

4D Data Cropping

- Flexible tool for standard or dynamic cropping 4D data using up to six different crop planes
- Each crop plane can be moved without any restrictions
- The crop plane positions are visible in both the volume rendering and in the 2D cut plane displays

Depth Render

- Volume visualization where the color hue changes according to the distance into the image

Stereo Render

- Volume visualization by stereoscopic display necessitates the use of stereoscopic glasses

9 Slice/6 Slice

- Simultaneous display of 6 or 9 short-axis slices from the 4D volume data (tissue and color)

12 Slice

- Possible to add three long-axis slices showing the three standard views

Slice View

- Simultaneous display of three independent random slices through the 4D volume (tissue and color)

Safety Conformance

The Vivid E9 is built to meet the requirements of:

- IEC60601-2-37/A1/A2:2005
- IEC60601-2-37:2007
- IEC60601-1/A1/A2:1995
- IEC60601-1:2005
- IEC60601-1-2/A1:2004
- IEC60601-1-2/A1:2007
- IEC60601-1-6:2006
- UL60601-1:2003
- CAN/CSA C22.2 No 601.1-M90
- NEMA UD3:2004
- The European Medical Devices Directive (MDD) 93/42/EEC (CE Mark)
- The Vivid E9 ultrasound unit is a Class I device, type CF, according to Sub-clause 14 of IEC60601-1:1988
- The Vivid E9 ultrasound unit meets the EMC requirements in EN55011/A1/A2:2007 Class A

Virus Protection

- To reduce virus vulnerability Vivid E9 is configured with a minimal set of open ports and with all network services not actively used by the system closed down. This helps to significantly reduce the risk of a virus attack on Vivid E9.
- GE is continuously judging the need for additional actions to reduce vulnerability of equipment; this includes vulnerability scanning of our products and evaluation of new security patches for the 3rd party technology used. Microsoft (and other) security patches that addresses serious issues with Vivid E9 will be made available to customers after GE verification of those patches.

Transducers

M5S-D Active Matrix Single Crystal Phased Array Probe

- Applications: Cardiac, pediatric, abdomen, fetal heart, transcranial, coronary, stress, LVO contrast
- Biopsy guide: Multi-angle disposable with a reusable bracket

4V-D Active Matrix
4D Volume Phased Array Probe

(**Note:** The option "4V Enable" is required to run this probe.)

- Applications: Cardiac, LVO contrast, fetal heart, stress

6S-D Phased Array Probe

- Applications: Pediatric, cardiac, coronary, neonatal head, fetal heart, abdominal

12S-D Phased Array Probe

- Applications: Pediatric, cardiac, coronary, neonatal head, rodent

9L-D Linear Array Probe

- Applications: Vascular, musculoskeletal, thyroid, contrast
- Biopsy guide: Multi-angle disposable with a reusable bracket

11L-D Linear Array Probe

- Applications: Vascular, breast, small parts, musculoskeletal, thyroid, scrotal, rodent
- Biopsy guide: Multi-angle disposable with a reusable bracket

ML6-15-D Linear Array Probe

- Applications: Vascular, breast, small parts, musculoskeletal, thyroid, scrotal, rodent
- Biopsy guide: Multi-angle disposable with a reusable bracket

4C-D Curved Array Probe

- Applications: Abdomen, OB/GYN, urology, vascular, fetal heart
- Biopsy guide: Multi-angle disposable with a reusable bracket

i13l Curved Array Probe

- Applications: Cardiac, mice, rats

P2D Pencil Probe

- Applications: Cardiac

P6D Pencil Probe

- Applications: Vascular

6T TEE Probe

- Applications: Cardiac, coronary

6Tc TEE Probe

- Applications: Cardiac, coronary

9T TEE Probe

- Applications: Pediatric

Hardware support for **4D TEE** Probe

PROBE	FREQUENCY RANGE	CATALOG #
M5S-D (Sector)	1.5 – 4.6 MHz	H45551NH
6S-D (Sector)	2.4 – 8.0 MHz	H45021RR
12S-D (Sector)	4.0 – 12.0 MHz	H45021RT
4V-D (Volume)	1.5 – 4.0 MHz	H4001BT
9L-D (Linear)	2.4 – 10.0 MHz	H40442LM
ML6-15-D (Linear)	4.5 – 15.0 MHz	H40452LG
11L-D (Linear)	4.5 – 12.0 MHz	H40432LN
i13L (Linear)	5.9 – 14.1 MHz	H45511NT
4C-D (Convex)	1.6 – 6.0 MHz	H4001BC
P2D (Pencil)	2.0 MHz	H4830JE
P6D (Pencil)	6.3 MHz	H4830JG
6Tc (TEE)	3.0 – 8.0 MHz	H45551ZD*
9T (TEE)	3.0 – 10.0 MHz	H45521DY

6Tc-RS, 6T-RS and 9T-RS supported via probe adapter.

** Also supports the 6T probe (6T TEE 3.0 – 8.0 MHz).*

February 23, 2011

General Electric Company,
doing business as GE Healthcare.

Healthcare Re-imagined

GE is dedicated to helping you transform healthcare delivery by driving critical breakthroughs in biology and technology. Our expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, and biopharmaceutical manufacturing technologies is enabling healthcare professionals around the world to discover new ways to predict, diagnose and treat disease earlier. We call this model of care "Early Health." The goal: to help clinicians detect disease earlier, access more information and intervene earlier with more targeted treatments, so they can help their patients live their lives to the fullest. Re-think, Re-discover, Re-invent, Re-imagine.

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imagination at work

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