GE Healthcare

Vivid E95

Version 206

Datasheet

Product Description[1]

The Vivid™ E95 combines the proven breadth, quality, and performance of the Vivid product line with a new and innovative software image processing platform: cSound™ The Vivid E95 is GE Healthcare (GEHC) cardiovascular ultrasound's leadership scanner.

The system is designed to excel in adult 2D and 4D cardiac imaging, as well as in the following clinical application areas: Fetal/Obstetrics, Abdominal (including renal, GYN), Thoracic/Pleural, Pediatric, Small Organ (breast, testes, thyroid), Neonatal Cephalic, Adult Cephalic, Cardiac (adult and pediatric), Peripheral Vascular, Musculo-skeletal Conventional, Musculoskeletal Superficial, Urology (including prostate), Transesophageal, Transvaginal, Transrectal, Interventional Guidance (including Biopsy, Vascular Access), Intra-cardiac, Intra-luminal and Intraoperative (vascular).

Vivid E95 is delivered with 23.8" high-resolution, high-contrast HDU monitor or a 22" high-resolution, high-contrast OLED monitor for optimal spatial and dynamic resolution.

System Architecture

GE Healthcare (GEHC)'s exclusive, programmable, and flexible software beamforming technology, cSound, provides exceptional image quality and power compared to conventional hardware-based beamforming technology. cSound offers a software beamformer that adaptively corrects for ultrasound wave distortions caused by inhomogeneities of the speed of sound naturally present in the patient body (optional cSound Adapt), True Confocal Imaging without the limitation of focal zones or sacrifice of frame rate and spatial resolution, in addition to Adaptive Contrast Enhancement (ACE). In 4D, cSound delivers high spatial resolution at large volume sizes in full volume single-beat and multi-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 E95 is designed to excel in the following areas:

Exceptional image quality is enabled by the cSound platform taking advantage of advanced software image reconstruction and state of the art graphics computer technology. The Vivid E95 combines innovative software beamforming with image processing techniques such as auto-gain adjustments (CTO), spatial filtering (UD clarity and UD speckle reduce), and temporal filtering (DDP) to deliver excellent cardiovascular ultrasound image quality.

Probe technology – The XDclear™ series of probes are designed to help deliver powerful and efficient sound waves, with high bandwidth and efficiency. XDclear probe technology provides impressive deep penetration and high sensitivity while maintaining high spatial resolution. The combination of Single Crystal, Acoustic Amplifier and Cool Stack technologies is the core technology of the XDclear series of probes.

Ease of Use features make Vivid E95 an extremely productive 4D and 2D cardiovascular ultrasound system. Ease of use in 4D imaging is accomplished with a number of GE Healthcare (GEHC) innovations, including Single Beat 4D, 4D visualization and navigation toolbox including FlexiSlice, FlexiViews, 4D Markers, FlexiLight, CT Fusion Live, View-X and 4D Stress Echo, advanced 4D chamber and valve quantification packages including 4D Auto LVQ, 4D Strain, 4D Auto RVQ, 4D Auto LAQ, 4D Auto MVQ, 4D Auto TVQ and 4D Auto AVQ.

Ease of use for the operator in 2D imaging is provided by the cSound technology

[1] *The 4D option is an enabler for all other 4D related features and options mentioned throughout the document, some of which are included with the 4D option, and others which are purchasable options. 4D is an option which in some countries may be included with the Vivid E95 offered for sale.*

delivering auto optimized excellent image quality with minimal manipulation along with automated tools like Auto EF 3.0 (also for DICOM) with AI-based View Recognition, Easy AutoEF, AFI 3.0 (also for DICOM) with AI-based View Recognition, AFI LA, Easy AFI LV, AFI RV, AFI Stress, Scan Assist Pro, QuickApps, Cardiac Auto Doppler, Myocardial Work, Blood Speckle Imaging, AI Auto Measure (Spectrum Recognition and Auto Measure – 2D).

Ergonomic features include a highly portable user-adaptable design with electronic adjustable height and keyboard, articulating and height adjustable monitor, and lightweight transducers combining to make the Vivid E95 an ergonomic-friendly cardiovascular ultrasound system.

The cSound platform takes GE Healthcare (GEHC)'s **Raw Data** to a new level. For image processing and reconstruction, the Vivid E95 utilizes more than 100 times the data compared to its predecessor.

Additionally, the Vivid E95 uses an innovative data format technology that allows for advanced processing on archived images by applying many of the same scan controls and **advanced quantitative tools** as are available during the original exam.

General Specifications

Dimensions and Weight

- Width: 527 mm (min) / 564 mm (max)

  (20.7" min / 22.2" max)

  (OLED and HDU monitor versions respectively)
- Depth: 844 mm (33.2 inch)
- Height: 1392 mm – 1714 mm (54.8 inch – 67.5 inch)

  (up/down mechanism + monitor arm)
- Weight: 120 kg ± 10% (264 lbs ± 10%)

Electrical Power

- Nominal input voltage: 100-240 VAC, 50/60 Hz
- Typical power consumption: 500 W @ default cardiac preset with M5Sc
- Rated power consumption: 700 W

Operating System

- Windows® 10

Console Design

- Five active probe ports
- ECG port
- Integrated HDD
- Multiple USB ports (front/back)
- Integrated DVD-R multi drive (optional)
- On-board storage for B/W thermal printer
- Integrated speakers for premium sound
- Integrated locking mechanism that provides rolling lock and caster swivel lock
- Integrated cable management
- Easily accessible removable air filters for cleaning
- Front and rear handles
- Side storage trays
- Rear storage trays/baskets
- Hand rest

Eco Friendly Design

- Vivid E95 offers an inverted B&W background printing, helping to prevent waste of ink and paper
- eDelivery remote software update solution helps decrease use of hardware drivers and decrease our service field engineers carbon emission footprint.

User Interface

Operator Keyboard

- Floating keyboard adjustable in three dimensions:
  - Height
  - Rotation
  - Extension
- The control panel of the system can move freely in all directions; the vertical displacement of the panel is driven by a motor; the control buttons are located near the handles
- Touch keyboard with support for characters in 12 languages
- Drawer type, lit, A/N keyboard
- Support for European keyboard character sets (ISO 8859)
- Ergonomic hard key layout
- Interactive back lighting
- Integrated gel holders
- User-configurable probe holders
- Easy-to-learn user interface
- Dedicated rotary for overall gain for 2D-mode
- Dedicated gain rotary for M-mode, CFM or Doppler controlled by active mode
- Image manager on the touch screen for quick review of image clipboard contents and easy export of images and loops to DICOM® servers or media

Touch Screen

- 12.1" ultra-high-resolution, wide-screen format, color, multi-touch LCD screen
- Interactive user-configurable dynamic software menu
- Backlight adjustment
- Display of live ultrasound images on the touch screen (Image View)

Monitor

- 23.8" high-resolution, high-contrast HDU (LED) monitor or a 22" high-resolution, high-contrast OLED monitor for optimal spatial and dynamic resolution
- 256 shades of gray and 16.7 million simultaneous colors available
- Articulated monitor arm
- Monitor translation (independent of console):
  - 350 mm horizontal bidirectional
  - 150 mm vertical height adjustment
  - Swivel to any viewing direction
- Fold down and rotation lock mechanism for transportation
- Horizontal viewing angle wider than 170° with OLED monitor and 90° with HDU monitor
- Resolution: 1920 x 1080 px
- Manual digital brightness and contrast adjustment for optimal viewing in different ambient light conditions
- Tint and backlight adjustments

- Separate adjustment for external monitor brightness/contrast
- Separate selection for resolution and screen area output to external monitor

System Overview

Probe Presets

- Cardiac
- Stress (incl. Exercise, QStress and LVO Stress) (optional)
- Abdominal (incl. renal)
- Vascular (incl. carotid, LEA, LEV, UEA, UEV, aorto-Iliac)
- Fetal heart
- Pediatric
- Neonatal
- Neonatal head
- Small parts
- Thyroid
- Breast
- Musculoskeletal conventional
- Musculoskeletal superficial
- Intraoperative (vascular)
- Transcranial
- Scrotal
- Urology (incl. pelvic)
- Transesophageal
- OB/GYN
- Coronary (part of QuickApps)
- Vascular Contrast (optional)[2]
- Contrast Low MI (optional)[2]
- LVO contrast (part of QuickApps)
- LVO Stress
- Lungs

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 Speckle Imaging (BSI) (optional)
- Blood Flow Angio Flow Imaging
- B-flow
- 2D Stress (optional)
- 2D Virtual Apex Imaging
- Strain Elastography
- Bi-plane
- Tri-plane
- Bi- and Tri-plane with color
- Coded Phase Inversion and Power Modulation Contrast Imaging
- Compound Imaging
- Extended Field-of-view (LOGIQ™ View)
- 4D Full Volume Scanning – Single-beat and Multi-beat
- 4D Stress

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

4D Features Standard with 4D SW option

- Single, dual, or multiple cycle volume acquisition
- Bi-plane acquisition includes tilt and rotate, and bi-plane
- Tri-plane acquisition
- Multi-dimensional (bi-plane/tri-plane) color acquisition
- Dynamic multi-slice views
- Live multi-slice views
- FlexiSlice with depth mode
- 4D stress
- Multi-dimensional stress
- QuickRotate/Rotate
- Auto crop
- 2-click crop
- Flip crop
- View crop
- Dynamic view crop
- Dual crop
- Measurement on render
- FlexiZoom
- Stereo vision
- Laser Lines
- Depth color render
- Automatic LV alignment
- 4D virtual apex
- Automated 4D left ventricular quantification (LV volume and EF)
- FlexiViews
- 4Vc enable and 4V enable

Optional 4D Features

- 4D Auto AVQ: Automated 4D aortic annulus quantification (dimension, area, circumference)
- 4D strain and 4D LV Mass
- FlexiLight
- HDlive™
- HD color
- 4D Auto MVQ
- 4D Auto RVQ

[2] *GE Healthcare (GEHC)'s Vivid scanner 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. The Contrast Low MI and Vascular/Abdominal Contrast options are not available in USA.*

- 4D Auto LAQ
- 4D Auto TVQ
- View-X
- CT Fusion Live
- 4D Markers

Peripheral Options

- Console protective cover

Internal peripherals

- USB B/W" video printer with control from system (optional)

External peripherals (optional)

- Direct streaming DVR (Sony® HVO-550MD)
- Network printers
  - USB inkjet printer
  - Color laser printer
  - Color video printer with control from system
- 16 GB encrypted memory stick
- Three-pedal configurable footswitch
- Optical isolation cable – DVI 104 fiber optic extender, required to connect the external monitors to the scanner

External outputs

- DVI-D and display port
- Ethernet – 10 Mbps, 100 Mbps, 1 Gbps
- Multiple USB 3.0 ports

Display Modes

- Live and stored display format: Extra-large, full size and split screen, both with thumbnails, for still and cine
- Instant-review screen displays 12 simultaneous loops/images for a quick study review
- Selectable display configuration of duplex and triplex modes: side-by-side or top-bottom during live, digital replay and clipboard image recall
- Single, dual, and quad-screen view
- Simultaneous capability
  - 2D+ PW/CW
  - 2D + CFM/TVI + PW
  - 2D + CFM + CW
  - 2D + CFM/Angio/TVI/SRI/TT/SI/TSI
  - 2D + M/AMM/CAMM
  - 2D+ CFM/Angio/TVI/SRI/TT/SI/TSI + M/AMM/CAMM
  - Real-time duplex or triplex mode
  - Compound + M/CFM/PW
  - 4D + CFM
  - 2D + bi-plane
  - 2D + bi-plane + CFM/TVI/SRI/TT/SI/TSI/AMM/CAMM
  - 2D + tri-plane
  - 2D + tri-plane + CFM/TVI/SRI/TT/SI/TSI/AMM/CAMM
  - 2D + color split screen (simultaneous mode)
- Real-time dual view 2D + 2D and color/power angio
- Selectable alternating modes
  - 2D or Compound + PW
  - 2D + CW
  - 2D or Compound + CFM/PW
  - 2D + CFM + CW
- Multi-image (split/quad screen)
  - Live and/or frozen
  - Independent cine playback
- Timeline display
  - Independent 2D (or Compound) + PW/CW/M display
  - A choice of display formats with various sizes of 2D + PW/CW/M
- Top/bottom selectable format
- Side/side selectable format
- 4D display
  - Two + one slice and render view
  - Quad view (three-slice and render)
  - Single render view
  - Slice-only view
  - Dynamic multi-slice
  - Live multi-slice
  - FlexiSlice (live and replay) with several layout selections
  - 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
  - Bi-plane prepare (two-slice + render)

Display Annotation

- Patient name: First, last and middle
- Patient ID
- Additional 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
- Image depth
- Zoom depth
- B-mode
  - Gain
  - Imaging frequency
  - Frame averaging
  - Texture
- M-mode
  - Gain
  - Frequency
  - 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
  - Sample volume size
  - Color scale
  - Power
  - Color baseline
  - Color threshold marker
  - Color gain

- Spectrum inversion
- Acoustic frame rate
- CINE gauge, image number/frame number
- Bodymarks: Multiple human anatomical structures
- Application/preset 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 guideline and zone
- Heart rate
- Trackball-driven annotation arrows
- Active mode display
- Stress protocol parameters
- Parameter annotation follows ASE standard
- Free text with word library
- 4D slice intersection markers
- 4D gauge
- 4D viewing angle arrows
- 4D geometry viewer
- 4D number of cycles
- Scan plane position indicator and probe temperature are displayed with all TEE probes
- Image orientation marker

General System Parameters

System Setup

- Pre-programmable M&A and annotation categories
- User-programmable preset capability with administrator preset protection
- QuickApps: Factory and user programmable sub-preset feature that keeps 2D and geometry settings while adapting color flow or contrast parameters
- Factory default preset data, protected against modification
- User-defined annotations
- Body patterns
- Customized comment home position

CINE Memory/Image Memory

- 8 GB of RAM (1.0 GB used for cine memory)
  - >1400 seconds of data storage in 2D
  - >7700 seconds of data storage in Doppler
- 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
- User-selectable ECG and time gated acquisition available on touch panel during live
- User-selectable prospective or retrospective capture in config
- Storage formats:
  - DICOM compressed/uncompressed, single/multi-frame, with/without raw data, storage via clipboard and/or seamlessly directly to destination device
  - Transfer/ “Save As” JPEG, MPEG, AVI, DICOM, Raw DICOM and VolDicom formats
- Storage devices:
  - USB memory stick: 16 GB
  - CD-RW storage: 700 MB
  - DVD storage: -R (4.7 GB)
  - 1 TB SSD hard drive with 769 GB image storage
- Compare old images with current exam
- Reload of archived data sets
- Activation control of USB devices (for security)

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

Connectivity and DICOM

- USB wireless network interface kit (optional)
- Ethernet network connection
- DICOM 3.0
  - Verify
  - Print
  - Store
  - Modality worklist
  - Storage commitment
  - Modality Performed Procedure Step (MPPS)
  - Media exchange
  - DICOM spooler
  - DICOM query/retrieve
- Structured reporting – compatible with adult cardiac, pediatric, and vascular
- Media store of structured reporting
- InSite™ ExC capability for remote service/access
- Support of two patients’ IDs in DICOM
- Separate DICOM SR and image storage destinations
- Simultaneous transfer of DICOM to multiple destinations
- Support for multimodality DICOM import and review (with CT Fusion Live option)
- DICOM PDF Read
- DICOM / TLS (encryption)
- DICOM Implicit Encoding support

Patient Archive

EchoPAC™/Patient Archive

- Integrated EchoPAC functionality adds connectivity and image analysis capability to scanner

- Data format fully compatible with offline EchoPAC review/reporting stations of same or newer vintage
- 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 3.0 support – see DICOM conformance statement for details
- Support for transfer of the proprietary raw data files within the DICOM standard. With the use of the AI-based View Recognition this can be automated
- 2D, CFM or TVI data at maximum frame rate may be reviewed by scrolling or by running cine loops (can contain more than 900,000 [M5Sc, minimum width/depth, zoom] frames 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
- DICOM-SR Standard structured reporting mechanism
- 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 SSD 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
- DICOM viewer embedded on media (optional and selectable in Config)
- Alphanumeric data can be exported in XML format
- JPEG export ("Save As") for still frames
- AVI and MPEG export ("Save As") for cineloops
- Specialized file format "Save As" VolDICOM feature to allow data import into TomTec Research Arena free-standing workstation
- Ability to transfer Systole Only in stress to PACS
- Selectable raw data transfer to PACS including AI-based View Recognition for automatic view labelling

Tricefy® Uplink (optional)[3]

- Tricefy is a Cloud service
- Can serve as long-term archive
- Can be used to share complete examinations with colleagues for information exchange and for consultation
- Can be used to send images to patients

App Launchpad[3]

- The App Launchpad is a tab available on the Archive screen – when selected, various applications ("Apps") can be launched
- Only validated and released Apps are supported
- 3rd-party Apps can be purchased through an AppStore on a GE Healthcare (GEHC) website
- Consult with a GE Healthcare (GEHC) representative for more details

Raw Data Streaming (optional)

- Provides streaming of raw data out to 3rd-party devices designed to process this data

Remote Viewing (optional)

- Network based streaming of the screen of the Vivid console to a web-browser on a remote device connected to the same network

User Manual Available on Board

Available through touch-panel utility page when installed from below mentioned USB device. User manual and service manual are included on a USB memory device with each system. A printed user manual can be provided for those countries where this is required.

- User manual languages: English, French, German, Spanish, Italian, Portuguese (European and Brazilian), Swedish, Danish, Dutch, Norwegian, Japanese, Chinese, Polish, Finnish, Greek, Russian, Hungarian, Slovak, Romanian, Czech, Latvian, Lithuanian, Turkish, Estonian, Korean, Serbian, Bulgarian, Croatian, Indonesian, Kazakh, Ukraine

Scanning Parameters

- Unlimited number of effective channels
- Minimum field-of-view range (depth): 0–2 cm (zoom) (probe dependent)
- Maximum field-of-view range (depth): 0–50 cm (probe dependent)
- Width range: 10 – 120 degrees
- Continuous dynamic receive focus/continuous dynamic receive aperture
- Continuous dynamic transmit focus (True Confocal Imaging)
- Adjustable dynamic range, unlimited upper level

[3] *Tricefy Uplink and App Launchpad may not be available in all countries and regions. Consult with a GE Healthcare (GEHC) representative for more details.*

- 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 50 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 (probe dependent)
- Eight TGC (Time Gain Compensation) sliders for manual setting of gain by depth
- Automatically calculated TGC curves reduce operator interaction
- Automatically calculated lateral gain

2D Mode

- Sector tilt and width control
- Frame rate in excess of 6500 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 fundamental imaging. Features help reduce noise, improve wall definition, and axial resolution, making it well suited for a wide variety of patient groups
- True Confocal Imaging (TCI) – ultra narrow focused two-way beam profile throughout the field-of-view, maintaining frame rate, no zone stitching, no multi-line acquisition artifacts and enhanced dynamic contrast resolution throughout field-of-view compared to conventional focal imaging
- cSound Adapt (optional) - image reconstruction technique that adaptively corrects for ultrasound wave distortions caused by inhomogeneities of the speed of sound naturally present in the patient body due to muscle, fat, cartilage, and bone
- Adaptive Contrast Enhancement (ACE) – emphasizing echoes from real structures while reducing noise/haze, resulting in enhanced signal-to-noise ratio
- Automatic tissue optimization – single keystroke optimizes immediately automatically and dynamically different grayscale settings with the goal of signal independent uniform gain and contrast distribution
- UD Clarity and UD Speckle Reduction Imaging – an advanced image processing technique to help reduce 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 help reduce speckle and noise while enhancing resolution and contrast
- Texture imaging – a QuickApp that enhanced structures within the muscle through an edge detection type of ACE algorithm (***Note:*** *Do not use texture imaging if AFI or Auto EF will be used.*)
- Hybrid filter – spatial filter that makes borders and structure smooth (built in, no user control}
- Multiple-angle Compound Imaging – multiple co-planar images from different angles combined into a single image in real-time to help enhance border definition and contrast resolution, as well as reduce angular dependence of border or edge as compared to no-compound imaging
- Virtual convex allows a wider FOV and aims to enhance image quality on linear probes in particular
- Elevation compounding (built in, no user control – 4D probes only)
- LOGIQ view – 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
- Virtual apex provides a wider field-of-view with phased array and TEE probes, effective at certain imaging views where a wide near field is preferred
- 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 (DDP) performs temporal processing which helps reduce 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

Multi-Dimensional Mode

- Bi-plane scanning – two independent simultaneous scan planes where one of them can be rotated and tilted freely
- Bi-plane prepare mode for ease of obtaining biplane views from 4D render data sets
- 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

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 high-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
- FlexiZoom for easy 4D visualization of structures of interest
- 4D scanning supporting variable octave and fundamental frequencies
- HD*live Imaging* – acquisition and visualization providing enhanced display of anatomical structures using advanced shadowing techniques in combination with depth illuminating colors (optional)
- FlexiLight – provides a type of visualization intended to enhance depth perception of 3D objects on a 2D monitor by use of advanced shadowing, reflection and shading algorithms in combination with depth rendering techniques; it allows positioning a light source behind the rendered tissue with the purpose of offering a photorealistic back light illumination; visualization is available both in live and replay modes and in multiple color maps
- 4D clarity – user-selectable intelligent spatial filtering algorithm for noise reduction and smoothing both in 4D and in extracted 2D slices
- Coherent volume processing with motion compensation for seamless and artifact-free 4D and 2D slices
- Variable frame rate settings available
- High volume rate button on 4Vc-D offering 45 fps at 90° and 16 cm depth
- Up to 1000 volume rate in 4D TTE
- Up to 750 volume rate in 4D TEE
- Volume optimize control for volume rendering transparency and quality setting
- Flip crop available for changing 4D view direction 180° with mirrored crop volume
- Dynamic multi-slice enables positioning of the multi-slice, short-axis cut planes at same anatomical position throughout the heart cycle
- Live multi-slice layouts available during live 4D acquisition
- FlexiSlice for interactive slicing, cropping and navigation designed to provide the user with a flexible, yet intuitive way of extracting 2D slices from 4D data sets; several layouts available depending on use case
- View-crop setting for toggle control of view plane vs. crop plane
- 2-click crop for quick and easy extraction of standard and non- standard views for visualization of 4D structures seen during or after the examination
- Dual crop for fast and efficient visualization of complex structures from both sides at the same time
- Stereo vision in 4D
- Laser lines to help improve the visual linkage between the 4D rendered view and the 2D slices
- Wide range of depth color rendering maps
- QuickRotate and Rotate for a flexible and easily accessible way of obtaining the desired single- or multi-plane, two-dimensional views
- 4D virtual apex enabling wider near field-of-view
- FlexiViews offer instant access to predefined (factory or user created) 4D views during live mode

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
- Multi-variate color priority function gives 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

- The cSound platform with its parallel beamformer architecture allows a combination of ultra-high frame rate and increased lateral resolution compared to previous generation GE Healthcare (GEHC) scanners
- Ultra-high digital signal processing power, maintaining high frame rates with large ROI's even for very low PRF settings
- Frame rate in excess of 450 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 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 helps reduce flash artifacts
- Dedicated coronary flow application
- Multiple-angle compound imaging in 2D mode is maintained while in color Doppler mode

Multi-Dimensional Color Mode

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

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
- 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
- HD Color – enhances the perception of 4D color when visualized on a 2D monitor by addition of shadowing and specular reflection techniques; in addition, it offers the ability to see turbulent velocity components inside the flow volume by use of transparency control
- Stereo vision in 4D color
- Tissue transparency control
- Flow transparency control
- Seamless transition from 2D color to 4D color keeping ROI size and position
- Up to 150 volumes per second with 4D TTE
- Up to 190 volumes per second with 4D TEE

Color Angio

- Angle-independent mode for visualization of small vessels with increased sensitivity compare to standard color flow of previous GE Healthcare (GEHC) products

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 Healthcare (GEHC)-patented, any plane color M-mode display derived from color Doppler cine loop
- 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 Healthcare (GEHC)-patented techniques to boost blood echoes, and to help 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 Speckle Imaging (optional)

- Combines color Doppler with grayscale speckle imaging
- Reduces the aliasing experienced with regular color flow
- Visualizes blood flow patterns by a graphical representation of the trajectories of the blood cells
- Available for specific probes only
- Simple quantification tools available – Distance, Area, Time
- Export of the velocity fields available (for access to file format, contact GE Healthcare (GEHC))

Blood Flow Angio Imaging

- Combines angio with grayscale speckle imaging

Strain Elastography

- Visualization of relative tissue stiffness

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 enhanced 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 color Doppler modes in duplex or triplex modes
- Very fast and flexible spectrum analysis with an equivalent DFT rate of 0.2 msec
- Automatic Spectrum Optimization (ASO) provides a single push, automatic, real-time optimization of PW or CW spectrum scale and baseline display
- 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
- Automatic or adjustable velocity scale (depending on probe and setting)
- 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
- Auto Doppler angle
- 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 high 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
- PRF ranges from 900 to 15,500 Hz

CW Doppler

- Highly sensitive steerable CW available with all phased array and TEE probes
- PRF ranges from 900 to 60,000 Hz

Contrast Imaging

LV Contrast (included as a Preset or as a QuickApps)

- Enables contrast applications intended for imaging of the left ventricle
- LV contrast (4Vc-D, 4V-D, M5Sc-D, 6VT-D) enhances delineation of ultrasound contrast agents. The user can choose between two types of transmit techniques controlled by the Frequency rotary: Power Modulation and Pulse Inversion, each with different characteristics that may affect imaging performance depending on the type of microbubbles being used. A high MI Flash feature is available to rapidly destruct bubbles. Other controls are also available for image acquisition optimization. Imaging can be performed in live or with ECG triggering. If needed, the contrast intensity can be quantified using the QAnalysis package. Furthermore, tri-plane imaging with 4V-D/4Vc-D using LV contrast enables acquisition of three simultaneous apical views within one cardiac cycle
- LVO stress (M5Sc-D, 4V-D, 4Vc-D) provides enhanced delineation of the LV border when contrast is used as part of an exercise stress exam, preserving an adequately long continuous capture buffer length

Contrast Low MI (optional)[4]

Contrast Low MI imaging is enabled by the Advanced Contrast option. Contrast Low MI is a preset that enables real-time continuous imaging of microbubbles using a low enough MI to generate return signals from the bubbles without destroying them. The user can choose between two types of transmit techniques controlled by the Frequency rotary: Power Modulation and Pulse Inversion, each with different characteristics that may affect imaging performance depending on the type of microbubbles being used.

- A high MI Flash feature is available to rapidly destruct bubbles. Other controls are also available for image acquisition optimization.
- Imaging can be performed in live or with ECG triggering.
- The contrast intensity can be quantified using the QAnalysis package.
- The option may not be available in all countries.

Vascular/Abdominal Contrast (optional)[4]

Vascular contrast – enables contrast applications intended for vascular

[4] *GE Healthcare (GEHC)'s Vivid scanner 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. The Contrast Low MI and Vascular/Abdominal Contrast options are not available in USA.*

(9L-D) and abdominal (C1-6-D) contrast imaging. The option may not be available in all countries.

- Vascular contrast (9L-D) – coded phase inversion enables excellent detection and resolution of vascular contrast 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 help 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

- 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 in apical views
- Efficient segment specific TSI time measurements
- Immediate bulls-eye report
- Automatic calculated TSI synchrony indexes
- TSI surface mapping
- LV synchronization report template
- CRT programming protocol

Strain/Strain Rate Mode

- Tissue deformation (strain) and rate of deformation (strain rate) are 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)

Physiological Traces

- Integrated three-lead ECG module
- Automatic QRS complex detection
- External ECG lead input
- Up to three traces display simultaneously
- Internally generated respiratory trace using ECG leads
- ECG trigger
- ECG lead selection
- High-resolution display of the following traces: ECG, respiration, phono, and pressure/AUX
- Adjustable ECG QRS markers

Automatic Optimization

- Auto – dynamic optimization of B-mode image to improve contrast resolution, TGC and grayscale (soft or sharp, user-selectable)
- Auto-Spectral Optimize (ASO) – dynamic adjustments of baseline, and PRF (on live image) and angle correction

Protocol Features

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, LOGIQ View, Zoom, Depth, Scale and Baseline
- On-line or off-line protocol editor
- Image acquisition according to predefined protocol templates
- Various factory protocol templates
- User-configurable protocol templates

Pre-Post Compare

- Labelling of measurements and images acquired in different stages of an exam or procedure, allowing to compare measurements pre and post procedure.

Stress Echo (optional)

Supported Protocol Examinations

- 2D pharmacological stress echo
- 2D bicycle stress echo
- 2D continuous capture stress echo (treadmill stress echo)
- AFI Stress protocols (separate option) – acquire standard apical 2D views and quantify wall motion (longitudinal segmental and global strain) at all stress levels (***Note:*** *AFI and Stress options required separately.)*
- Multi-plane stress echo
- 4D stress echo
- Combined 4D/multi-plane and continuous capture stress echo
- Cardiac resynchronization therapy programming protocols

Protocol Examinations Features (enabled with stress option)

- Wall motion scoring: Analysis by wall motion in individual myocardial segments

- 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 Scanner or EchoPAC when the entire recording is stored to file

Wall Motion Scoring

- As part of the measurement and analysis package one can access a wall motion assessment module, providing analysis/scoring of individual myocardial segments
- For use with all stress modalities

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

AFI Stress Echo

- Single or tri-plane acquisition of standard 2D apical views
- Analysis with dedicated AFI stress analysis tool
- Provides longitudinal strain values per segment, as well as globally
- 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
- Simplified workflow with adaptive ROI, quick tips, and combined display of traces from all segments

Cardiac Resynchronization Therapy (CRT) Programming Protocols

- CRT protocols require Stress option
- 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.)

Visualization and Navigation 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
- Wide selection of different render maps

Stereo Render

- Volume visualization by stereoscopic display necessitates the use of red/cyan glasses for conventional Stereovision

Multi-slice

- Simultaneous display of 5, 7, 8 or 12 slices extracted from the 4D volume data (tissue and/or color)
- Combination of short-axis and long-axis standard views
- Available in live and replay

FlexiSlice

- Simultaneous display of independent random slices through the 4D volume (tissue and color)
- Four different layouts available (default, biplane, LAX, SAX)
- Ability to add distances for quantification purposes
- Ability to rotate the view direction of the volume rendering independently of the slice orientations.

FlexiViews

- Provides instant access to predefined (factory or user created) 4D views during live mode
- May provide more consistent data while reducing scanning time

4D Markers (optional)

- 4D markers enable placements of markers/annotations into a 4D ultrasound volume data set

- The markers are named and keep their position relative to the 4D data set
- Ability to individually edit, move, resize, select color, and remove markers

CT Fusion Live (optional)

CT Fusion Live provides display of co-aligned 4D ultrasound and CT data both in live and in replay. CT data in DICOM format can be imported into the Vivid scanner via USB stick or DICOM Query/Retrieve, and will, after an alignment workflow, show the same image from CT and from live or stored 4D ultrasound displayed side by side. The feature allows simultaneous navigation of 4D ultrasound and CT data. CT is also used to relate 4D ultrasound images to X-ray fluoroscopy orientation.

CT Fusion Live data can be stored and recalled and can also be moved/copied using the usual Transfer feature.

View-X (optional)

- View-X offers an interface between a cath system and the Vivid scanner, such that the cath x-ray image can be shown as a picture-in-picture window on the Vivid scanner

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 follows 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
- AI Auto Measure 2D – the AI based Auto Measure 2D feature enables automated quantification of the most common distance measurements performed on parasternal LAX 2D images; minimal user guidance is required, but manual editing capabilities are supported
- AI Auto Measure Spectrum Recognition – The AI based Spectrum Recognition feature enables automated recognition of the most common Doppler spectra and automatically starts the Auto Doppler measurement (where available). For those measurements not supported by Auto Doppler, the feature enables opening of the appropriate measurement folder for the recognized spectrum
- Cardiac Auto Doppler automatically provides Doppler measurement results for the most common parameters, with minimal user guidance

Automated Function Imaging (AFI 3.0) (optional)

- Third generation parametric imaging tool which gives quantitative data for global and segmental strain
- User-selectable endo or full wall global strain values displayed
- Allows comprehensive assessment at a glance by combining three longitudinal views into one comprehensive bulls-eye view
- Random sequence of analysis of the three apical views supported
- Ability to exit tool after one or two views completed
- Integrated into M&A package with specialized report templates
- Simplified workflow with fully automated ROI tracing (if configured), quick tips and combined display of traces from all segments
- ROI width editable by user
- **Peak Strain Dispersion** (PSD) (included in AFI and 2D Strain [EchoPAC]). Index, as well as bullseye displaying variability in time to peak longitudinal strain. The index is the standard deviation from the average (of all segments) over the whole heart cycle, while the bulls-eye displays the PSD in a color scheme where green color indicates normal contraction with a peak at or around AVC, blue color indicates early contraction and yellow to red indicates late contraction
- Support for display of Ejection Fraction (EF) as part of this tool
- On-scanner automatic labelling of views during acquisition enabled by an intelligent algorithm called View Recognition, is used to simplify the AFI workflow eliminating the need to pick views
- AFI 3.0 supports analysis of DICOM images from 3rd-party scanners, in addition to analysis of Vivid raw data images

Easy AFI LV (optional)

- Automated one-click AFI LV analysis. Our AI-based Auto ROI detection algorithm allows users to complete the AFI workflow with no manual interaction apart from initiating the measurement tool and approving the results

AFI Stress

- Dedicated protocol and workflow integrating AFI as part of a stress exam (pharmacological, as well as exercise) – see Stress Echo (optional) section

AFI RV (optional)

- AFI RV is an automated parametric tool giving quantitative data for right ventricular longitudinal Global Strain, Free Wall Strain and Segmental Strain derived from raw data images of the apical 4-chamber RV focused view (TTE)
- In addition, the Tricuspid Annular Plane Systolic Excursion (TAPSE) is provided
- The 3-point click method is used for ROI selection.
- The tool supports ROI editing of both endo- and epicardial borders as well as selectable full wall/endocardial strain calculation
- Combined display of traces from all segments

AFI LA (optional)

- Parametric tool giving quantitative data from GE Healthcare (GEHC) raw data images for left atrial longitudinal global strain as well as LA volumes and Emptying Fraction derived from the apical 4-chamber and 2-chamber views (TTE)
- The 3-point click method is used for ROI selection
- Full wall tracking is utilized

Myocardial Work (optional)

- Builds upon the results from AFI
- After adding the external blood cuff pressure and event timing for each AV/MV valve opening/closure a strain pressure curve, a work index and a work efficiency percentage is produced

Automated Ejection-Fraction Calculation (Auto EF 3.0) (optional)

- Third generation automated 2D EF measurement tool based upon a 2D-speckle tracking algorithm
- Compared to the original version ROI editing is enhanced
- The tool is integrated into the M&A package with specialized report templates
- On-scanner automatic labeling of views during acquisition enabled by an intelligent algorithm called View Recognition, is used to simplify the Auto EF workflow eliminating the need to pick views
- Auto EF 3.0 supports analysis of DICOM images from 3rd-party scanners, in addition to analysis of Vivid raw data images

Easy AutoEF (optional)

- Automated one-click Ejection Fraction (EF) measurement. Our AI-based Auto ROI detection algorithm allows users to complete the Ejection Fraction (EF) measurement on loops acquired with or without ECG signal, and with no manual interaction apart from initiating the measurement tool and approving the results.

4D Chamber Quantification Tools

4D Auto LVQ

- 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)
- Editing by point and click
- User approval of final results
- Fully integrated into M&A system with results in worksheet

4D LV Mass and 4D Strain (optional)

- LV Mass with Sphericity Index (SI)
- 4D Strain with support for the following parameters: Area, longitudinal, circumferential, radial, twist and torsion. All global and/or segmental values are shown in a 16 or 17 segment bullseye
- Retrospective editing available in 4D Strain
- Strain bullseyes and graphs supported in addition to LV surface model with strain color overlay
- 4D Strain export available in HDF format
- User approval of final results
- Fully integrated into M&A system with results in worksheet

4D Auto RVQ (optional)

- GE Healthcare (GEHC)'s fully integrated semi-automatic right ventricular quantification package offers the ability to visualize the right ventricle and include quantitative results into the patient exam

4D Auto LAQ (optional)

- The left atrium quantification tool uses the volume ultrasound data of the Vivid scanner. The semi-automatic surface detecting algorithm helps clinical users get fast, reproducible, and accurate 4D quantification of the left atrium acquired with 4D TTE probes, on adults.

4D Valve Quantification Tools

4D Auto AVQ (optional)

- Automated alignment, segmentation, and measurement of aortic annulus from volumetric data sets
- Editing by point and click
- User approval of final results
- Fully integrated in M&A system with results in worksheet

4D Auto MVQ (optional)

- GE Healthcare (GEHC)'s fully integrated semi-automatic mitral valve quantification package offers the ability to visualize the mitral valve and include quantitative results into the patient exam

4D Auto TVQ (optional)

- 4D Auto TVQ is a measurement tool for the tricuspid valve; the semi-automatic surface detecting algorithm helps clinical users to get fast, reproducible, and accurate 4D visualization and quantification of the tricuspid valve, acquired with TTE, TEE or 4D ICE probes, on adults

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 gray-scale 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
- Sample-area points may be dynamically anchored to move with the tissue when running the cineloop
- Cine Compound displays cineloops generated from a temporal averaging of multiple consecutive heart cycles

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
- Area (Spline)

Cardiac Measurements/Calculations

- %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 EOAI (VTI) (Aortic Valve Effective Orifice Area Index by Continuity Equation VTI)
- AV EOAI 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)
- LAAd (A2C) (Left Atrium Area, Apical 2C)
- 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)
- LAEDV MOD (LA End Diastolic Volume MOD)
- LAESV MOD (LA End Systolic Volume MOD)
- LIMP (Left Index of Myocardial Performance)
- LA (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 Ann 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 Ann 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)
- RAA (d) (Right Atrium Area, 2D, Diastole)
- RAA (s) (Right Atrium Area, 2D, Systole)
- 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 Mean PG (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 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 Reference Manual for the full list of measurements and calculations for all applications.

Z-Scores

- Support for five sets of user-selectable Z score publications[5] covering the most common pediatric dimension measurements

Vascular Measurements/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

Intima Media Thickness (IMT)

- Automatic measurements of carotid artery Intima-Media Thickness (IMT) on any acquired frame
- On-board IMT package facilitates non-interrupted workflow – fully integrated with M&A, worksheet, archiving and reporting functions
- Algorithm provides robust, quick, reliable measurements which can be stored to the on-board archive for review and reporting
- IMT measurement can be made from frozen images or images retrieved from archive
- IMT package supports measurements of different regions of the intima in the carotid vessel (e.g., Lt./Rt./CCA/ICA etc.)
- Frame for IMT measurement can be selected in relation to the ECG waveform

OB/GYN Application Module

- OB package for fetal growth analysis containing more than 100 biometry tables
- Dedicated OB/GYN reports
- Fetal graphical growth charts
- Growth percentiles
- Multi-gestational calculations (up to four)
- Programmable OB tables
- Expanded worksheets
- User-selectable fetal growth parameters based on European, American, or Asian methods charts
- GYN package for ovary and uterus measurements and reporting

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[5] *Michael D. Pettersen, MD; Wei Du, PhD; Mary Ellen Skeens, MS; and Richard A. Humes, MD; Detroit, Michigan; and Andover, Massachusetts. Regression Equations for Calculation of Z Scores of Cardiac Structures in a Large Cohort of Healthy Infants, Children, and Adolescents: An Echocardiographic Study. Journal of the American Society of Echocardiography Pettersen et al. 923 Volume 21 Number 8.*

C Kampmann, C M Wiethoff, A Wenzel, et. al. Normal *Values of M Mode Echocardiographic Measurements of More Than 2000 Healthy Infants and Children in Central Europe. Heart 2000; 83; 667-672.*

M Cantinotti, MD; M Scalese, MS; B Murzi, MD; et. al. Echocardiographic Nomograms for Chamber Diameters and Areas in Caucasian Children. Journal of American Society of Echocardiography December 2014; Volume 27, Issue 12; 1279-1292.e2.

M Cantinotti, MD; M Scalese, MS; B Murzi, MD; et. al. Echocardiographic Nomograms for Ventricular, Valvular and Arterial Dimensions in Caucasian Children with a Special Focus on Neonates, Infants and Toddlers. Journal of American Society of Echocardiography February 2014; Volume 27, Issue 2; 179-191.e2.

Lopez L et. al. Relationship of Echocardiographic Z Scores Adjusted for Body Surface Area to Age, Sex, Race, and Ethnicity. The Pediatric Heart Network Normal Echocardiogram Database. Circ Cardiovasc Imaging. 2017 ov; 10(11). pii: e006979. doi: 10.1161/CIRCIMAGING.117.006979.

BEI Xia, Pediatric Ultrasound Imaging. Beijing: People's Medical Publishing House, 2013 (Second Edition): 173-227 and 261-289.

OB Measurements/Calculations

- Gestational age by:
  - GS (Gestational Sac)
  - CRL (Crown Rump Length)
  - FL (Femur Length)
  - BPD (Biparietal Diameter)
  - AC (Abdominal Circumference)
  - HC (Head Circumference)
  - APTD x TTD (Anterior/Posterior Trunk Diameter by Transverse Trunk Diameter)
  - LV (Length of Vertebra)
  - FTA (Fetal Trunk Cross-sectional Area)
  - HL (Humerus Length)
  - BD (Binocular Distance)
  - FT (Foot Length)
  - OFD (Occipital Frontal Diameter)
  - TAD (Transverse Abdominal Diameter)
  - TCD (Transverse Cerebellum Diameter)
  - THD (Thorax Transverse Diameter)
  - TIB (Tibia Length)
  - ULNA (Ulna Length)
- Estimated Fetal Weight (EFW) by:
  - AC, BPD
  - AC, BPD, FL
  - AC, BPD, FL, HC
  - AC, FL
  - AC, FL, HC
  - AC, HC
  - EFBW
- Calculations and Ratios
  - FL/BPD
  - FL/AC
  - FL/HC
  - HC/AC
  - CI (Cephalic Index)
  - AFI (Amniotic Fluid Index)
  - CTAR (Cardio-Thoracic Area Ratio)
- Measurements/calculations by: ASUM, ASUM 2001, Berkowitz, Bertagnoli, Brenner, Campbell, CFEF, Chitty, Eik-Nes, Ericksen, Goldstein, Hadlock, Hansmann, Hellman, Hill, Hohler, Jeanty, JSUM, Kurtz, Mayden, Mercer, Merz, Moore, Nelson, Osaka University, Paris, Rempen, Robinson, Shepard, Shepard/Warsoff, Tokyo University, Tokyo/Shinozuka, Yarkoni
- Fetal graphical trending
- Growth percentiles
- Multi-gestational calculations (4)
- Fetal qualitative description (anatomical survey)
- Fetal environmental description (biophysical profile)
- Programmable OB tables
- Over 20 selectable OB calculations
- Expanded worksheets

GYN Measurements/Calculations

- Right ovary length, width, height
- Left ovary length, width, height
- Uterus length, width, height
- Cervix length, trace
- Ovarian volume
- ENDO (endometrial thickness)
- Ovarian RI
- Uterine RI
- Follicular measurements
- Summary reports

Abdominal Measurements/Calculations

- Splenic index
- Liver volume, mass, cyst
- Pancreas
- CBD
- GB wall, length
- Aorta prox, mid, dist
- Aorta iliac
- Spleen volume
- Bladder, post void bladder volume
- Renal
- Cortex thickness
- Mesenteric (CA, SMA, IMA)

Safety Conformance

The Vivid E95 is built to meet the requirements of:

- IEC60601-2-37
- IEC60601-1
- IEC60601-1-2
- IEC60601-1-6
- IEC 62366
- IEC 62304
- ANSI/AAMI ES60601-1
- CAN/CSA-C22.2 No. 60601-1
- IEC 62359
- Regulation (EU) 2017/745 of the European Parliament and of the Council on Medical Devices (MDR) (CE Mark)
- Directive 2011/65/EU on the restriction of use of certain hazardous substances
- The Vivid E95 ultrasound unit is a Class I device, type CF, according to IEC60601-1
- The Vivid E95 ultrasound unit meets the EMC requirements in EN55011, Class A

Privacy & Security

Virus Protection

To reduce virus vulnerability, Vivid E95 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 E95.

GE Healthcare (GEHC) 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 address serious issues with Vivid E95 will be made available to customers after GE Healthcare (GEHC) verification of those patches.

Whitelisting

- Whitelisting is enabled to prevent non-listed applications from running
- To improve protection against potentially harmful software

User Policies

- Secure and advanced user password and login scheme according to user's password requirements

LDAP

- Users can log in to the system by using the same user credentials as used for domain connected computers

Disc Encryption

- Optional encryption of the scanner's E drive containing patient identifiable data

User Management

- Last login information
- Customer configurable login banner
- Manually invoke screen log (WIN+L)

Microsoft OS Patches

- OS vulnerability patches are distributed as part of regular SW maintenance releases during the life cycle of the product.

Service / Life cycle Offerings

Insite™ Express Connection (ExC)

- Enables Remote Service and Training
- Easy, flexible, and secure connectivity configuration. The "Contact GE Healthcare (GEHC)" on-screen button directly generates a real-time service request to the GE Healthcare (GEHC) online engineering or application specialist. It takes a snapshot (e.g., error logs, setup files) of the system at the time of the service request to enable analysis of problem before customer contact
- Virtual Console Observation (VCO) enables the customer to allow desktop screens to be viewed and controlled remotely over the encrypted tunnel to enable real-time training, device configuration
- Operation of Insite Express Connection is dependent on the infrastructure being available – check with your local GE Healthcare (GEHC) service representative
- File transfer enables the customer (biomed or clinician) to directly transfer system information (e.g., system logs, images, parametric data) to GE Healthcare (GEHC) product engineering teams (no patient data transferred)
- Software reload provides remote application reconstruction and recovery capabilities in the event of system corruption

Smart Service Interface (SSI) (optional)

- A suite of GE Healthcare (GEHC) proprietary service tools, designed for expert Healthcare Technology Management Professionals who want to streamline troubleshooting and diagnostics on their GE Healthcare (GEHC) Vivid systems
- Provides an intelligent visual dashboard with drill-down capability to rapidly assess equipment status and health
- Can drive productivity by quickly isolating specific issues and decreasing overall system downtime
- SSI is available for licensed qualified users; please contact your local sales representative for more information

eDelivery (optional)[6]

- eDelivery facilitates download of software patches for service purpose (e.g., security patches)
- It is also an enabler for the ability to download apps from the AppStore

Digital Expert (optional)[6]

- Enables the user to connect remotely to a GE Healthcare (GEHC) Clinical Specialist to receive application related training and help

Imaging Insights

- Support of Imaging Insights offering by providing system utilization data

Probe Check (optional)[7]

- Automated transducer element check and reporting of potential image quality impacts

[6] *eDelivery and Digital Expert may not be available in all countries and regions. Consult with a GE Healthcare (GEHC) representative for more details.*

[7] *Probe Check is offered as a standard feature in USA to comply with FDA requirements. It may be available in other regions. Consult with a GE Healthcare (GEHC) representative for more details*

Transducers






Name	M5Sc-D	6S-D	12S-D	9L-D	11L-D	L8-18i-D
Catalog#	H44901AE	H45021RR	H45021RT	H40442LM	H40432LN	H40452LL
Description	XDclear™ Single Crystal Active Matrix Phased Array Transducer	Phased Array Transducer	Phased Array Transducer	Linear Array Transducer	Linear Array Transducer	Intraoperative Linear Array Transducer
Number of elements	240	96	96	192	192	168
Foot Print	18 x 27 mm	17 x 24 mm	13 x 18 mm	14 x 53 mm	13 x 47 mm	11 x 35 mm
Max. Bandwidth	1 - 5 MHz	2 - 8 MHz	3 - 12 MHz	2 - 10 MHz	4 - 12 MHz	5 - 18 MHz
Field of View	120°	115°	105°	45 mm	39mm	25mm
Depth of Field	30 cm	16 cm	12 cm	16 cm	8 cm	10 cm
Biopsy Guide Available	Multi-angle disposable with a reusable bracket	N/A	N/A	Multi-angle disposable with a reusable bracket	Multi-angle disposable with a reusable bracket	N/A
Application						
Fetal/Obstetrics	+	+				
Abdominal [1]	+	+	+	+		
Thoracic/Pleural	+	+		+	+	
Pediatric	+	+	+	+	+	+
Small Organ[2]				+	+	+
Neonatal Cephalic		+	+			+
Adult Cephalic	+					
Cardiac[3]	+	+	+			
Peripheral Vascular	+			+	+	+
Musculo-skeletal Conventional				+	+	+
Musculo-skeletal Superficial				+	+	+
Urology[4]	+					
Transesophageal						
Transvaginal						
Transrectal						
Intra-cardiac and Intra-luminal						
Intraoperative (Vascular)						+
Interventional Guidance:						
Tissue Biopsy	+			+	+	+
Vascular Access (IV, PICC)				+	+	

Transducers






Name	ML6-15-D	C1-6-D	C2-9-D	8C*	iC5-9-D	C3-10-D
Catalog#	H40452LG	H40472LT	H40462LN	H40412LJ	H40442LK	H40482LB
Description	Active Matrix Wide Band Linear Array Transducer	XDclear Single Crystal Curved Array Transducer	XDclear Single Crystal Curved Array Transducer	Curved Array Transducer	Tightly Convex Array Transducer	XDclear Single Crystal Tightly Curved Array Transducer
Number of elements	1008	192	192	128	192	192
Foot Print	16 x 61 mm	16 x 70 mm	14 x 51 mm	12 x 22 mm	17 x 21 mm	12 x 22 mm
Max. Bandwidth	4 - 15 MHz	1 - 6 MHz	2 - 9 MHz	4 - 8 MHz	3 - 9 MHz	3 - 10 MHz
Field of View	50 mm	70°	65°	128°	128°	95°
Depth of Field	8 cm	50 cm	30 cm	30 cm	30 cm	14 cm
Biopsy Guide Available	Ultra-ProII™ In-Plane Ultra-sound Needle Guides Multi-Angle	Multi-angle disposable with a reusa-ble bracket	Multi-angle disposable with a reusa-ble bracket	N/A	Single angle, disposable	N/A
Application						
Fetal/Obstetrics		+	+		+	
Abdominal [1]		+	+	+		+
Thoracic/Pleural		+				
Pediatric		+	+	+		+
Small Organ[2]	+					
Neonatal Cephalic						+
Adult Cephalic						
Cardiac[3]						
Peripheral Vascular	+	+	+	+		+
Musculo-skeletal Conventional	+			+		+
Musculo-skeletal Superficial						+
Urology[4]		+	+		+	
Transesophageal						
Transvaginal					+	
Transrectal					+	
Intra-cardiac and Intra-luminal						
Intraoperative (Vascular)						
Interventional Guidance:						
Tissue Biopsy	+	+	+		+	+
Vascular Access (IV, PICC)	+		+		+	+

Transducers



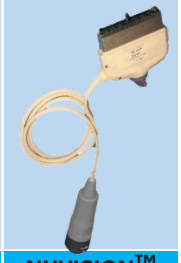



Name	P2D	P6D	4V-D*	4Vc-D	6Vc-D	6VT-D**
Catalog#	H4830JE	H4830JG	H4001BT	H40482LS	H44901AQ	H45581BJ
Description	Pencil Transducer	Pencil Transducer	Active Matrix 4D Volume Phased Array Transducer	XDclear Single Crystal Active Matrix 4D Volume Phased Array Transducer	Active Matrix 4D Volume Phased Array Transducer	TEE Active Matrix 4D Volume Phased Array Transducer
Number of elements	2	2	2640	6000	2500	2500
Foot Print	N/A	N/A	24x21 mm	18x29 mm	16x20 mm	Tip(LxWxH) 45x14x13 mm
Max. Bandwidth	2 MHz	7 MHz	1 - 4 MHz	1 - 6 MHz	2 - 8 MHz	3 - 8 MHz
Field of View	N/A	N/A	90°	90°	115°	90°
Depth of Field	N/A	N/A	30 cm	30 cm	20 cm	20 cm
Biopsy Guide Available	N/A	N/A	N/A	Multi-angle disposable with a reusable bracket	N/A	N/A
Application						
Fetal/Obstetrics			+	+	+	
Abdominal [1]			+	+	+	
Thoracic/Pleural				+	+	
Pediatric			+	+	+	
Small Organ[2]						
Neonatal Cephalic					+	
Adult Cephalic			+	+		
Cardiac[3]	+	+	+	+	+	+
Peripheral Vascular	+	+				
Musculo-skeletal Conventional						
Musculo-skeletal Superficial						
Urology[4]			+	+		
Transesophageal						+
Transvaginal						
Transrectal						
Intra-cardiac and Intra-luminal						
Intraoperative (Vascular)						
Interventional Guidance:						
Tissue Biopsy				+		
Vascular Access (IV, PICC)						

Transducers








Name	6Tc/6Tc-RS***	9T/9T-RS***	9VT-D	10T-D	NUVISION™ Connector Cable ****	NUVISION Ultrasound Catheter ****
Catalog#	H45551ZD H45551ZE	H45531YM	H45581CS	H44901AH	Distributed by Biosence Webster, Inc.	Distributed by Biosence Webster, Inc.
Description	TEE Phased Array Transducer	TEE Phased Array Transducer	TEE Active Matrix 4D Volume Phased Array Transducer	TEE Phased Array Transducer	Connector Cable	Intra Cardiac Active Matrix Phased Array 4D Volume Catheter
Number of elements	64	44	2048	32	N/A	840
Foot Print	Tip(LxWxH) 45x14x12 mm	Tip(LxWxH) 35x11x8 mm	Tip(LxWxH) 35x11x9 mm	Tip(LxWxH) 16x8x6 mm	N/A	10F
Max. Bandwidth	3 - 8 MHz	3 - 10 MHz	3 - 8 MHz	3 - 10 MHz	N/A	4 - 10 MHz
Field of View	90°	90°	90°	90°	N/A	90°
Depth of Field	20 cm	14 cm	18 cm	18 cm	N/A	20 cm
Biopsy Guide Available	N/A	N/A	N/A	N/A	N/A	N/A
Application						
Fetal/Obstetrics						
Abdominal [1]						
Thoracic/Pleural						
Pediatric						
Small Organ[2]						
Neonatal Cephalic						
Adult Cephalic						
Cardiac[3]	+	+	+	+		
Peripheral Vascular						
Musculo-skeletal Conventional						
Musculo-skeletal Superficial						
Urology[4]						
Transesophageal	+	+	+	+		
Transvaginal						
Transrectal						
Intra-cardiac and Intra-luminal						+
Intraoperative (Vascular)						
Interventional Guidance:						
Tissue Biopsy						
Vascular Access (IV, PICC)						

[1] Abdominal including renal, GYN

[2] Small Organ including breast, testes, thyroid

[3] Cardiac including Adult and Pediatric

[4] Urology including prostate

NOTE:

* *4V-D and 8C probes are supported but are not available for sale.*

** *6VT-D with catalog #H45561TA is also supported*

*** *6Tc-RS and 9T-RS are only supported via a legacy probe adapter that is not available for sale anymore.*

**** *Not available in all countries. Please contact Biosence Webster, Inc. for availability.*

Product may not be available in all countries and regions. Full product technical specification is available upon request. Contact a GE Healthcare Representative for more information. Please visit www.gehealthcare.com/promotional-locations.

Data subject to change.

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GE Healthcare is a leading global medical technology and digital solutions innovator. GE Healthcare enables clinicians to make faster, more informed decisions through intelligent devices, diagnostic pharmaceuticals, data analytics, applications and services, supported by its Edison intelligence platform. With over 100 years of healthcare industry experience and around 50,000 employees globally, the company operates at the center of an ecosystem working toward precision health, digitizing healthcare, helping drive productivity and improve outcomes for patients, providers, health systems and researchers around the world. Follow us on Facebook.com, LinkedIn.com, Twitter.com and Insights.com or visit our website www.gehealthcare.com for more information.

GE Healthcare

9900 Innovation Drive Wauwatosa, WI 53226

U.S.A.

www.gehealthcare.com