GE Healthcare

Vivid S70N

Version 206

Datasheet

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Product Description

The Vivid™ S70N combines the proven breadth, quality and performance of the Vivid product line with a new and innovative software image processing platform: cSound™ The Vivid S70N is GE Healthcare (GEHC) cardiovascular ultrasound's high-end scanner.

The cSound architecture benefits all Vivid S70N probes and applications. The Vivid S70N supports the following applications: 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, Musculo-skeletal Superficial, Urology (including prostate), Transvaginal Transesophageal, , Transrectal, Intracardiac and Intra-luminal, Interventional Guidance (including Biopsy, Vascular Access), and Intraoperative (vascular).

System Architecture

GE Healthcare's exclusive, programmable, and flexible software beamforming technology, cSound, provides exceptional image quality and power compared to conventional hardware-based beam forming technology. In 2D, cSound offers true confocal imaging without the limitation of focal zones or sacrifice of frame rate and spatial resolution. In 4D, cSound delivers volume sizes suited for full volume single-beat and multi-beat 4D acquisition (optional). Using both coherent and harmonic image processing, the system provides computational power, ease of imaging, workflow flexibility and product upgradeability.

The Vivid S70N excels in the following areas:

Exceptional image quality on the Vivid S70N is created through the use of True Confocal Imaging. The technique is enabled by the cSound platform taking advantage of advanced software image reconstruction and state-of-the-art graphics computer technology. The Vivid S70N combines Ultra Definition Clarity filtering, elevation compound imaging (considering a wider slice for 2D imaging) with the 6VT-D probe and 4Vc-D probe, HD Imaging (balanced resolution, penetration and image uniformity), virtual convex (wider field-of-view in the far field) for the linear probes and virtual apex (larger field-of-view) for the FPA probes.

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 S70N an extremely productive 2D and 4D cardiovascular ultrasound system.

The combination of the touch screen control with conventional (tactile) buttons provides intuitive controls, helping the operator maintain focus on the patient and the ultrasound images during the exam. The touch screen can also provide alpha-numeric (A/N) keyboard entry or a dedicated A/N keyboard option can be purchased.

Ease of use for the operator in 2D imaging is provided by the cSound technology delivering auto optimized excellent image quality with little manipulation along with automated tools like 2D AutoEF 3.0 with AI-based View Recognition, Easy AutoEF, AFI 3.0 Productivity Package with AI-based View Recognition, AFI for RV, AFI for LA, Easy AFI LV, Cardiac Auto Doppler with AI Auto Measure – Spectrum Recognition, AI Auto Measure – 2D, and Scan Assist Pro.

Ease of use in 4D imaging is accomplished with a number of GEHC innovations, including Single Beat 4D, 4D visualization and navigation toolbox including FlexiSlice, FlexiViews, 4D Markers, View-X and advanced 4D chamber and value quantification packages including 4D Auto LVQ, 4D Auto RVQ, 4D Auto MVQ, 4D Auto AVQ.

Ergonomic features include the "Flex Fit" mechanism enabling continuous pivoting height adjustment of the control panel, allowing the user to adjust distance to the control panel while providing the adequate legroom for standing or sitting positions. In addition, the articulating monitor arm (horizontal and vertical), and lightweight transducers combine to make the Vivid S70N an extremely ergonomic-friendly cardio- vascular ultrasound system.

Portability – The Vivid S70N's compact size and light weight, combined with a fold-down monitor, enables easy transportation and promotes scanning at the patient site. The battery option provides a transportation mode that keeps the system ready to scan within a few seconds of being connected to a power outlet.

The cSound platform takes GE Healthcare's **Raw Data** to a new level. For image processing and reconstruction, the Vivid S70N utilizes more than 100 times the data compared to the Vivid S6.

Additionally, the Vivid S70N uses the proven Raw 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: 54 cm, 21.4"
- Depth: 76 cm, 30.2"
- Height: 132 cm – 167 cm, 52.0" – 65.7"
- Minimum height with folded screen: 118 cm, 46"
- Weight: <73 kg, 161 lbs

Electrical Power

- Nominal input voltage: 100-240 VAC, 50/60 Hz
- Rated power consumption: 500 VA

Operating System

- Windows® 10

Uninterruptible Power Supply (optional)

- Battery backup for standby
- In case of power failure or accidental shutdown, when power is restored within less than 20 minutes, the system automatically turns on instantly, maintaining exact system state prior to shutdown
- For longer power interrupts periods, system automatically saves data and changes into "Standby" state

Console Design

- Five active probe ports
- ECG port
- Integrated 1TB 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
- Four swivel wheels – three wheels brakes, one wheel direction lock
- Integrated cable management
- Easily accessible removable air filters for cleaning
- Front and rear handles
- Rear storage trays/baskets
- Hand rest

Eco Friendly Design

- Vivid S70N 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

- Ergonomic Flex Fit design with left/right swivel and up/down arm-mobility of keyboard and
- Monitor permitting both physiological sitting or standing operation
- Touch keyboard with support for characters in 12 languages
- Drawer type A/N keyboard (optional)
- Physical keyboard support for international characters in 7 languages (optional)
- Ergonomic hard key layout
- Interactive backlighting of application-specific push buttons – adjustable back-light intensity
- Integrated gel holders
- Easy-to-learn user interface with intelligent keyboard
- 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 remote archives or media

Touch Screen

- 12" ultra-high-resolution, wide screen format, color, multi-touch LCD screen
- Interactive user-configurable dynamic software menu
- Touch-panel control of 8 TGC sliders
- Touch-panel controls content can be set to routine or extended usage
- Display of live ultrasound images on the touch screen (Image View)

LCD Monitor

- 22" wide screen, High-Definition (HD), flicker-free LCD display
- 256 shades of gray and 16.7 million simultaneous colors available
- Articulated monitor arm
- LCD 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 of more than 170°
- Resolution: 1920 x 1080 pixels
- Contrast Ratio 1,000:1
- Manual backlight and digital brightness and contrast adjustment for excellent

viewing in different ambient light conditions
- Tint adjustments
- Separate adjustment for external monitor brightness/contrast
- Adaptive video formats and resolution for external monitor
- Selection for screen area output to external monitor
- Streaming (optional) sends the image information as digital video stream over ethernet in real-time to clients

System Overview

Probe Presets

- Cardiac
- Stress (optional)
- Abdominal
- Peripheral vascular
- Fetal heart
- Pediatrics
- Neonatal cephalic
- Adult cephalic
- Small parts
- Thyroid
- Musculoskeletal
- Urology
- Transesophageal
- OB/GYN
- Intracardiac
- Intraoperative
- Coronary (part of QuickApps)
- LV Contrast (accessed through QuickApps)
- Advanced Contrast (optional)
- Vascular/Abdominal Contrast (optional)
- Nerves
- Lungs

Operating Modes

- 2D tissue
- 4D tissue (optional)
- 2D color flow
- 4D color flow (optional)
- 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
- B-flow
- 2D stress (optional)
- Strain Elastography
- AFI Automated Function Imaging (optional)
- AutoEF (optional)
- 2D virtual apex imaging
- Bi-plane
- Tri-plane
- Bi- and Tri-plane with color
- Coded phase inversion
- Compound imaging
- Extended field-of-view (LOGIQ™ View)
- 4D TEE full-volume scanning – single beat and multi beat (optional)

Scanning Methods

- Electronic sector
- Electronic volume (optional)
- Electronic convex
- Electronic linear
- CW pencil

Transducer Types

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

Bi-plane/Tri-plane Features

- Bi-plane acquisition includes tilt and rotate
- Tri-plane acquisition
- Multi-dimensional (bi-plane/tri-plane) Color and TVI acquisition
- QuickRotate/Rotate

4D Features

(available with 4D probes 6VT-D and 4D ICE and the 4D option)

- Single, dual or multiple cycle volume acquisition
- FlexiSlice with depth mode
- 2 Click crop
- Flip crop
- View crop
- Dynamic view crop
- Dual crop
- FlexiZoom
- Laser lines
- Depth color render
- Automated 4D left ventricular quantification (LV volume and EF)
- FlexiViews
- Dynamic multi-slice views
- Live multi-slice views
- Dynamic crop
- Measurement on render

Optional 4D Features

- 4D Auto MVQ
- 4D Auto AVQ
- 4D Auto RVQ
- HD Color
- 4D Markers
- View-X

Peripheral Options

Internal peripherals

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

External peripherals

- Network printers
  - Color laser printer
  - Color video printer with control from system
- Encrypted USB memory stick
- Three-pedal configurable footswitch

External outputs

- DVI-D

- Ethernet – 10 Mbps, 100 Mbps, 1 Gbps electrically isolated
- Multiple USB 2.0 ports, one of them isolated

Accessories (optional)

- Interface cable for external ECG and external respiratory
- ECG adapter for DIN-type pediatrics electrode leads
- Cable storage box

Display Modes

- Live and stored display format: 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 (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
  - 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)
- 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

  (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
  - Two + one slice and render view
  - Quad view (three slice and render)
  - Single render view
  - Slice-only view
  - Live multi-slice
  - FlexiSlice (live and replay)
  - Bi-plane side/side view
  - Tri-plane view (quad including geometry viewer)
  - Crop view (three orthogonal slice + render)
  - Apical slice view (three 60° 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
- Focal zone markers
- Image depth
- Zoom depth
- B-mode
  - Gain
  - Imaging frequency
  - Frame averaging
- 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 indicator, 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

  (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
- 4D gauge

  (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
- 4D markers
- 4D viewing angle arrows

  (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
- 4D geometry viewer

  (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
- 4D number of cycles

  (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
- 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
- Different user presets per probe/application may be stored for quick access
- User programmable preset capability with administrator preset protection
- QuickApps: Factory and user programmable sub-preset feature that keeps 2D and geometry settings while allowing different color flow or contrast parameters
- System frequency: 1 – 25 MHz
- Factory default preset data, protected against modification
- User Interface languages: English, LA Spanish, French, German, Italian, Portuguese (European and Brazilian), Russian, Swedish, Norwegian, Danish, Dutch, Finnish
- User-defined annotations
- Body patterns
- Customized comment home position

CINE Memory/Image Memory

- 1 GB of cine memory stores up to 800 s (175,000 frames) in 2D Color mode and up to 4,000 s in PW Doppler, depending on probe and settings
- 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 (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses) for efficient 4D image management
- On-board database of patient information from past exams
- Compare old images with current exam
- Reload of archived data sets
- 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 or uncompressed, single/multi-frame, with/without raw data, storage via clipboard and/or seamlessly directly to destination device
  - Transfer/“Save As” JPEG, MPEG, AVI and VolDicom (Optional with 4D probes 6VT-D and 4D and respective software licenses), DICOM, Raw DICOM formats
- Storage devices:
  - USB memory stick
  - CD-RW storage: 700 MB
  - DVD storage: -R (4.7 GB)
  - Mobile hard drive storage: 0.5 TB
- 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
- Option to automatically activate body mark on freeze
- Easy selection of body marks from touch screen
- Easy selection of body marks for dual-screen layout

Text Annotations

- Easy selection of text annotations from touch screen
- Option to automatically activate annotation on freeze

Connectivity and DICOM

- Ethernet network connection
- USB Wireless network connection kit (optional)
- DICOM
  - Verify
  - Print
  - Store
  - Modality worklist
  - Storage commitment
  - Modality Performed Procedure Step (MPPS)
  - DICOM spooler
  - DICOM Query/Retrieve
  - DICOM media exchange
- Support of two patient IDs in DICOM
- Separate DICOM SR and image storage destinations
- Simultaneous transfer of DICOM to multiple destinations
- Structured reporting – compatible with adult cardiac, pediatric, vascular and abdominal
- InSite™ ExC capability for remote service/access
- Streaming (optional) sends the image information as digital video stream over Ethernet in real-time to clients
- 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 – configurable per mode and with the AI-based View Recognition in addition per view
- 2D, CFM or TVI data at maximum frame rate may be reviewed by scrolling or by running cine loops (cine memory can contain up to 175,000 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
- DICOM-SR Standard structured reporting mechanism
- Structured findings report tools help support efficient text entries with direct editing of findings text, usability enhancements, various 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
- Reports can be printed, stored to archive and exported in PDF, CHM (Compiled HTML) and TXT format
- 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
- DICOM viewer embedded on media (optional and selectable in Config)
- Alphanumeric data can be exported in Microsoft® Excel® compatible 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 (Optional with 4D probes 6VT-D and 4D ICE and respective software licenses)
- Ability to transfer Systole Only for stress echo loops to PACS
- Selectable raw data transfer to PACS including AI-based View Recognition for automatic view labelling

Self-contained DICOM Viewer (optional)

- Exams can be transferred to CD/DVD or USB media with an integrated GE Healthcare Ultrasound DICOM Viewer
- The GE Healthcare Ultrasound DICOM Viewer allows to open and display still images and cine loops from media on a standard PC, without installing any application on the host PC

Tricefy® Uplink (optional)[1]

- Can serve as long-term archive
- Can be used to share complete examinations with colleagues for information or collaboration
- Can be used to share images with patients

App Launchpad[1]

- Allows launching licensed applications ("Apps")
- Only validated and released apps are supported
- 3rd-party apps can be purchased and downloaded through an AppStore on a GE Healthcare website and then become available in the Launchpad

Raw Data Streaming (optional)

- Sends the image information as digital video stream over ethernet in real-time to clients
- Allows video transmission over long distances
- Supports 2D and 4D data for both tissue mode and color-flow mode
- Provides raw data images with metadata enabling clients to visualize (render), modify and process the Vivid S70N images through their own apps

Remote viewing (optional)

- Network based streaming of the screen of the Vivid console to a web-browser on a remote device (PC, MAC or pad)

User Manual Available on Board

Available through touch-panel utility page. User manual and service manual are included on a USB memory device

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

with each system. A printed user manual is provided for countries where required.

Scanning Parameters

- Infinite 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
- Adjustable dynamic range, infinite upper level
- 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)
- Automatically calculated TGC curves help reduce operator interaction
- Automatically calculated lateral gain

2D Mode

- Sector tilt and width control
- Frame rate in excess of 3,000 fps, depending on probe, settings and applications
- Coded octave imaging with coded phase inversion – GE Healthcare 3rd generation harmonic tissue imaging providing enhanced lateral and contrast resolution as compared to previous generation GE Healthcare products. Features help reduce noise, help 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
- 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
- Multiple-angle Compound Imaging – multiple co-planar images from different angles combined into a single image in real-time to help enhance border definition, contrast resolution, and reducing angular dependence of border or edge as compared to no-compound imaging
- Elevation compounding on 4D probes
- LOGIQ View: Provides the ability to construct and view a static 2D image with wider field-of-view (FOV) of a given transducer. This allows viewing and measurements of anatomy larger than what would fit in a single image
- Virtual convex allows a wider field-of-view in the depth to enhance image quality on linear probes
- Virtual apex provides a wider field-of-view with phased array 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 bi-plane 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 (optional)

- 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
- Coherent volume processing with motion compensation for seamless and artifact-free 4D and 2D slices
- 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 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
- 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
- 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 M-mode 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 scanners
- 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 700 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 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
- 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 to visualize tissue behind the flow
- HD color to enhance the perception of 4D color when visualized on a 2D monitor by the addition of shadowing and specular reflection techniques; ability to see turbulent velocity components inside the flow volume by the use of transparency control
- Seamless transition from 2D color to 4D color keeping ROI size and position

Color Angio

- Angle-independent, power Doppler mode for visualization of slow flow vessels with enhanced sensitivity compared to standard color flow of previous GE Healthcare products

Color M-mode

- Variable ROI length and position – user-selectable
- User-selectable radial averaging to help reduce statistical uncertainty in 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-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-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 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, 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 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
- 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

CW Doppler

- Highly sensitive steerable CW available with all phased array probes

Contrast Imaging

LV Contrast (accessed through QuickApps)

- Enables contrast applications intended for imaging of the left ventricle
- LV contrast (M5Sc-D, 3Sc-RS, 6VT-D and 6Tc-RS probes) enhances delineation of the LV border in combination with ultrasound contrast agents. The implementation of GE Healthcare's Coded Phase Inversion (CPI) provides high- resolution detection of contrast in the LV cavity and excellent suppression of myocardial tissue signals
- LVO stress (M5Sc-D probe) 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)[2]

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)[2]

Vascular contrast – enables contrast applications intended for vascular (9L-D) and abdominal (C1-5-D and 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
- Frame rate in excess of 1220 fps, depending on probe and settings
- 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
- 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
- Additional features in combination with multi-dimensional imaging option
- Simultaneous acquisition of Tri-plane TSI images covering all standard segments in apical views

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

[2] *GE Healthcare'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.*

- 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
- Internally generated respiratory trace using ECG leads
- ECG lead selection
- Adjustable ECG QRS markers

Automatic Optimization

- Dynamic optimization of B-mode image to help improve contrast resolution, gain, TGC and grayscale (soft or sharp, user-selectable)
- Automatic Spectrum Optimization (ASO) provides a single press, automatic, real-time optimization of PW or CW spectrum scale, and baseline display

Protocol Features

Scan Assist Pro

- Customizable automations that assist the user through each step of the scan
- Helps enhance consistency and reduce keystrokes
- Ultrasound image, anatomical picture, step by step training through a pre-defined protocol
- 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)
- Cardiac resynchronization therapy programming protocols
  (available with the Advanced QScan option)

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
- 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

Cardiac Resynchronization Therapy (CRT) Programming Protocols

- CRT protocols require Stress and Advanced QScan
- 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.)

CARTO® 3 Interface (optional)

- The system can interface with the CARTO 3 EP navigation system and the SOUNDSTAR® ultrasound catheters manufactured by Biosense Webster, Inc
- The interface will allow the Vivid S70N system to send images to the CARTO3 EP system over a video cable
- The Vivid S70N is able to send ultrasound scaling parameters to the CARTO 3 EP system via a peer-to-peer LAN connection

Visualization and Navigation Tools

(with 4D probes 6VT-D and 4D ICE, together with the 4D option)

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 (with 4D option) 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 color hue changes according to distance into the image
- Wide selection of different render maps

Stereo Render

- Volume visualization by stereoscopic display, requires red/cyan stereoscopic glasses for StereoVision

Multi-slice

- Simultaneous display of 5, 6, 7, 9 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 (with 4D option) and replay

FlexiSlice

- Simultaneous display of three independent random slices through the 4D volume (tissue and color)
- Four different layouts available (default, bi-plane, 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 option enables placement 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, change size, choose color and delete the markers

View-X (optional)

- Interface between a cath system and the Vivid scanner, such that cath x-ray image can be shown on the Vivid scanner screen, together with the ultrasound image (picture-in-picture)

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 adult and pediatric 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
- Stress echo is directly accessible from the system control panel with a dedicated button
- Support for measuring on DICOM images
- AI-based Cardiac Auto 2D Measurement (optional) enables semi-automated quantification of the most common distance measurements performed on parasternal LAX 2D images with minimum user guidance
- Cardiac Auto Doppler automatically provides Doppler measurement results for the most common parameters, with minimal user guidance
- AI-based Spectrum Recognition (optional) enables automated recognition of the most common Doppler spectra and automatically starts the Auto Doppler measurement (where available), or opens the according manual measurement
- Automatic Doppler trace functionality for use in non-cardiac applications in both live and replay
- Worksheet allows user to review, edit and delete performed measurements
- Reporting support allowing a configurable set of measurements to be shown in the exam report
- DICOM SR export of measurement data

Automated Function Imaging (AFI 3.0) (optional)

- Third generation parametric imaging tool which gives quantitative data for global and segmental strain
- Allows comprehensive assessment at a glance by combining three apical 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
- Automatic labeling of views during acquisition enabled by an AI-based algorithm called View Recognition is used to simplify the AFI workflow eliminating the need to pick views
- Simplified and flexible workflow with fully automated ROI tracing (if configured), adaptive ROI width and combined display of traces from all segments

- User-selectable endo or full wall global strain values displayed
- Random sequence of analysis of the three views supported
- Ability to exit tool after one or two views completed ("Easy AFI," only global strain supported)
- Applicable to transthoracic and to TEE 2D data
- Integrated AutoEF calculation
- Can process GE Healthcare raw data and DICOM data from Vivid systems
- Can process DICOM data from other vendors' ultrasound system

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.

Automated Function Imaging Right Ventricle (AFI RV) (optional)

- Parametric imaging tool which gives quantitative data for Right Ventricular Longitudinal Global Strain, Free Wall Strain and Segmental Strain derived from the apical 4-chamber RV focused view
- Tricuspid Annular Plane Systolic Excursion (TAPSE) provided
- Simplified and flexible workflow with 3-point click method for ROI selection supports editing of both endo and epicardia borders, and adaptive ROI width
- Combined display of traces from all segments
- User-selectable endo or full wall global strain values displayed

Automated Function Imaging Left Atrium (AFI LA) (optional)

- Parametric tool giving quantitative data from GE Healthcare raw data images for LA Longitudinal Global Wall Strain, LA Volumes and Emptying Fraction
- Single-plane (4-channel or 2-channel) or bi-plane (4-channel or 2-channel) measurement
- Simplified and flexible workflow with 3-point click method for ROI selection and adaptive ROI width
- Full wall tracking

Automated Ejection-Fraction Calculation (AutoEF 3.0) (optional)

- Third generation automated EF measurement tool based on 2D-speckle tracking algorithm and on Simpson
- Automatic labeling of views during acquisition enabled by an AI-based algorithm called View Recognition is used to simplify the AutoEF workflow eliminating the need to pick views
- Calculated Ejection Fraction with or without ECG signals with automated[3] workflow from a frozen image in 2-chamber or 4-chamber view.
- Calculated bi-plane Ejection Fraction with or without ECG signal from recalled images.
- Integrated into M&A package with worksheet summary
- Can process GE Healthcare raw data and DICOM data from Vivid systems
- Can process DICOM data from other vendors' ultrasound system

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 (included with 4D option – used with 4D probes 6VT-D and 4D ICE)

- Fully integrated semi-automated measurement of LV volume and EF from volumetric data
- Automated identification of standard views
- 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 Auto RVQ (optional, requires 4D option to enable – used with 4D probes 6VT-D and 4D ICE)

- Automated measurement of RV volume and EF from volumetric data, with minimal user guidance
- Automated identification of standard views
- Validation of detected boundaries
- RV volume waveform for entire cardiac cycle
- ED and ES automatically selected from volume waveform
- Editing by point and click
- User approval of final results
- Fully integrated into M&A system with results in worksheet

4D Valve Quantification Tools

4D Auto AVQ (optional, requires 4D option to enable – used with 4D probes 6VT-D and 4D ICE)

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

4D Auto MVQ (optional, requires 4D option to enable – used with 4D probes 6VT-D and 4D ICE)

- GE Healthcare's fully integrated semi-automated mitral valve quantification package offers the ability to visualize

[3] *Automated refers to workflow potentially involving no user interaction before approval; users can adjust contours and frame selection during the process.*

the mitral valve and include quantitative results into the patient exam

Quantitative Analysis Package (Q-Analysis)

- Traces for tissue 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
- 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 tissue when running 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 Tool

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)
- E' Avg (Averaged early diastolic mitral valve annular velocity)
- E' Lat (Early diastolic mitral valve lateral annular velocity)
- E' Sept (Early diastolic mitral valve septal annular velocity)
- E/E' Avg (Mitral inflow E velocity to E' Avg ratio)
- E/E' Lat (Mitral inflow E velocity to E' Lat ratio)
- E/E' Sept (Mitral inflow E velocity to E' Sept ratio)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)
- 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 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)
- RV S' (Tricuspid annulus systolic excursion velocity)
- 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 (Biplane) (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)
- TAPSE (Tricuspid Annular Plane Systolic Excursion)
- 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)
- TVA Dur (Tricuspid Valve A-Wave Duration)
- TVA 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 Reference Manual for the full list of measurements and calculations for all applications.

Z-Scores

- Support for six sets of user-selectable Z score publications[4] 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)
- RT BULB (Right Bulbus Artery), RT VERT (Right Vertebral Artery), RT SUBC (Right Subclavian Artery), RT INN (Right Inn Artery)
- LT BULB, LT VERT, LT SUBC, LT INN
- Stent, pre-stent, post-stent
- 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
- UEV (Upper Extremity Vein velocities): IJV, SUBC, Axill V, BaSV, RV, UV, Ves, Pseudo, AVF, CephV
- UEA (Upper Extremity Artery velocities): Inn, SUBC, Axill, BA, RA, UA, Pseudo, AVF, Ves
- LEV (Lower Extremity Vein velocities): CFV, Saph FemJunc V, PopV, PTV, ATV, FV, GSV Calf, GSV Thigh, GSV Access, LSV, Saph PopJunc
- LEA (Lower Extremity Artery velocities): EIA, SFA, Pop, PTA, Peron, DPA, ATA, CFA, DFALEA
- MCA (Middle Cerebral Artery), ACA (Anterior Cerebral Artery), PCA (Posterior Cerebral Artery), AcomA (Anterior Communicating Artery), PComA (Posterior Communicating Artery), Basilar (Basilar Artery), Ves

[4] *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.

Intima Media Thickness (IMT) Measurements

- 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

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 (four)
- 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 S70N is built to meet the requirements of:

- IEC60601-2-37
- IEC60601-1
- IEC60601-1-2
- IEC62366-1
- IEC60601-1-6
- UL60601-1
- NEMA UD3
- The European Medical Devices Regulation, 2017/745/EC (CE Mark)
- Directive 2011/65/EU on the restriction of use of certain hazardous substances
- The Vivid S70N ultrasound unit is a Class I device, with BF (probes) and CF

(ECG leads) applied parts according to IEC60601-1

- The Vivid S70N ultrasound unit meets the EMC requirements in IEC/EN60601-1-2:2007 Class B

Privacy & Security

Virus Protection

To reduce virus vulnerability, Vivid S70N 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 reduce the risk of a virus attack on Vivid S70N.

GE Healthcare 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 S70N will be made available to customers after GE Healthcare verification of those patches.

Whitelisting

- Prevents 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” on-screen button directly generates a real-time service request to the GE Healthcare 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 and device configuration
- Operation of Insite Express Connection is dependent on the infrastructure being available – check with your local GE Healthcare 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 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 proprietary service tools, designed for expert Healthcare Technology Management Professionals who want to streamline troubleshooting and diagnostics on their GE Healthcare 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)[5]

- 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)[5]

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

Imaging Insights

- Support of Imaging Insights offering by providing system utilization data

Probe Check (optional)[6]

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

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

[6] *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 representative for more details*

Transducers






Name	M5Sc-D	6S-D	12S-D	3Sc-RS	9L-D	11L-D
Catalog#	H44901AE	H45021RR	H45021RT	H45041DL	H40442LM	H40432LN
Description	XDclear™ Active Matrix Single Crystal Phased Array Transducer	Phased Array Transducer	Phased Array Transducer	Phased Array Transducer	Linear Array Transducer	Linear Array Transducer
Number of elements	240	96	96	64	192	192
Foot Print	18 x 27 mm	17 x 24 mm	13 x 18 mm	18 x 24 mm	14 x 53 mm	13 x 47 mm
Max. Bandwidth	1 - 5 MHz	2 - 8 MHz	3 - 12 MHz	1 - 5 MHz	2 - 10 MHz	4 - 12 MHz
Field of View	120°	115°	105°	120°	45 mm	39mm
Depth of Field	36 cm	16 cm	12 cm	36 cm	16 cm	8 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	Multi-angle disposable with a reusable bracket
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[5]	+			+	+	+

Transducers



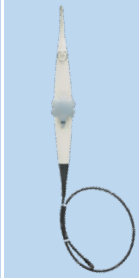



Name	ML6-15-D	L8-18i-D	C1-5-D	C1-6-D	C2-9-D	C3-10-D
Catalog#	H40452LG	H40452LL	H40452LE	H40472LT	H40462LN	H40482LB
Description	Active Matrix Wide Band Linear Array Transducer	Intraoperative Linear Array Transducer	Curved Array Transducer	XDclear Single Crystal Curved Array Transducer	XDclear Single Crystal Curved Array Transducer	XDclear Single Crystal Tightly Curved Array Transducer
Number of elements	1008	168	192	192	192	192
Foot Print	16 x 61 mm	11 x 35 mm	17 x 69 mm	16 x 70 mm	14 x 51 mm	12 x 22 mm
Max. Bandwidth	4 - 15 MHz	5 - 18 MHz	1 - 6 MHz	1 - 6 MHz	2 - 9 MHz	3 - 10 MHz
Field of View	50 mm	25mm	70°	70°	65°	95°
Depth of Field	8 cm	10 cm	50 cm	50 cm	30 cm	14 cm
Biopsy Guide Available	Ultra-ProII™ In-Plane Ultrasound Needle Guides Multi-Angle	N/A	Multi-angle disposable with a reusable bracket	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[5]	+		+	+	+	+

Transducers

Name	iC5-9-D	P2D	P6D	4Vc-D	6VT-D*	6Tc-RS
						
Catalog#	H40442LK	H4830JE	H4830JG	H40482LS	H45581BJ	H45551ZE
Description	Tightly Curved Array Transducer	Pencil Transducer	Pencil Transducer	XDclear Single Crystal Active Matrix 4D Volume Phased Array Transducer	Active Matrix 4D Volume TEE Transducer	TEE Transducer
Number of elements	192	2	2	6000	2500	64
Foot Print	17 x 21 mm	N/A	N/A	18x29 mm	Tip(LxWxH) 45x14x13 mm	Tip(LxWxH) 45x14x12mm
Max. Bandwidth	3 - 9 MHz	2 MHz	7 MHz	1 - 5 MHz	3 - 8 MHz	3 - 8 MHz
Field of View	128°	N/A	N/A	90°	90°	90°
Depth of Field	30 cm	N/A	N/A	36 cm	20 cm	20 cm
Biopsy Guide Available	Single angle, disposable	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[5]	+			+		

Transducers






Name	9T-RS	10T-D	NUVISION™ Connector Cable **	NUVISION Ultrasound Catheter **	ICE Cord-RS	AcuNav8F***
Catalog#	H45531YM	H44901AH	Distributed by Biosence Webster, Inc.	Distributed by Biosence Webster, Inc.	H48952AR	Distributed by Biosence Webster, Inc.
Description	TEE Transducer	TEE Transducer	Connector Cable	Intra Cardiac Active Matrix Phased Array 4D Volume Catheter	Connector Cable	Intra Cardiac Phased Array Catheter
Number of elements	44	32	N/A	840	N/A	64
Foot Print	Tip(LxWxH) 35x11x8 mm	Tip(LxWxH) 16x8x6 mm	N/A	10F	N/A	8 Fr diameter
Max. Bandwidth	3 - 10 MHz	3 - 10 MHz	N/A	4 - 10 MHz	N/A	4 - 12 MHz
Field of View	90°	90°	N/A	90°	N/A	90°
Depth of Field	14 cm	18 cm	N/A	20 cm	N/A	16 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[5]						

Transducers

Name	AcuNav10F***	Sound Star 3D 10F***	Sound Star eco 10F***	Sound Star eco 8F***
Catalog#	Distributed by Biosence Webster, Inc.	Distributed by Biosence Webster, Inc.	Distributed by Biosence Webster, Inc.	Distributed by Biosence Webster, Inc.
Description	Intra Cardiac Phased Array Catheter	Intra Cardiac Phased Array Catheter	Intra Cardiac Phased Array Catheter	Intra Cardiac Phased Array Catheter
Number of elements	64	64	64	64
Foot Print	10 Fr diameter	10 Fr diameter	10 Fr diameter	8 Fr diameter
Max. Bandwidth	4 - 12 MHz	4 - 12 MHz	4 - 12 MHz	4 - 12 MHz
Field of View	90°	90°	90°	90°
Depth of Field	16 cm	16 cm	16 cm	16 cm
Biopsy Guide Available	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[5]				

[1] Abdominal including renal, GYN

[2] Small Organ including breast, testes, thyroid

[3] Cardiac including Adult and Pediatric

[4] Urology including prostate

[5] Interventional Guidance including Biopsy, Vascular Access

NOTE:

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

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

*** *Not available in all countries. Please contact Biosense 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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