

Voluson S6 BT12

Extraordinary vision: Signature Series

Product Description

The **Voluson* S6** offers the right mix of capabilities for enhancing your productivity through extraordinary 2D image quality, volume imaging capabilities, automation tools, easy-to-learn workflow, all combined in an innovative ergonomic design.

Highlights

- Lightweight and portable
- High Resolution Flat Panel Display 19"
- Real-Time 4D
- 3D Multiplanar Display
- 3D Power Doppler
- Automatic Optimization (AO)
- CrossXBeam^{CR1*} (CRI)
- Advanced VCI with Single View
- SonoAVC**follicle*
- SonoNT
- SonoRenderStart
- Scan Assistant
- Anatomical M-Mode
- On Board Archive including Preview and Pre-selection



General specifications

Dimensions and weight

Height: Adjustable	Min: 975 mm (38.4 in)
	Max. 1725 mm (67.9 in)
Width	620 mm (24.4 in)
Depth	850 mm (33.4 in)
Weight (no Peripherals)	198lb/90kg

Electrical power

Voltage	100-120VAC, 220 – 240VAC
Frequency	50/60 Hz

Console design

3 Active Probe Ports
1 Parking Port
Integrated HD (500 GB)
3 USB Ports for External Peripherals
2 USB Ports for On-board Peripherals
RJ45 LAN Port
1 HDMI Out Port
1 AUDIO Out Port

User interface

Operator keyboard

Backlit alphanumeric keyboard
Ergonomic hard key layout
Interactive back-lighting
Programmable print/store/export keys for printing, archiving and exporting

Monitor

High-Resolution 19-inch TFT LCD Screen
Resolution 1280 x 1024
Image size: 960 x 720
High brightness with 220 cd/m ² typical
Digital brightness and contrast adjustment
Brightness/Contrast/Dim Brightness Control

System overview

Applications

Obstetrics
Gynecology
Abdominal
Small-Parts
Vascular
Pediatrics
Cardiology
Urology
Musculoskeletal (MSK)

Operating modes

B-Mode (2D)
M-Mode (conventional M-Mode)
AMM (Anatomical M-Mode)
PW Doppler with high PRF (PW)
High PRF Doppler Mode
Color Flow Doppler Mode (CFM)
Power Doppler Mode (PD)
HD-Flow* Doppler Mode (HD-Flow)
Tissue Doppler Mode (TD)
M-Mode Flow Modes (M/CF, M/HD-Flow, M/TD)
Volume Mode (3D/4D):
• 3D Static
• 4D Real Time
• Advanced VCI-SingleView
Extended View (XTD View)

Scanning Methods

Electronic Convex
Electronic Linear
Mechanic Volume Sweep

Transducer Types

Convex Array
Linear Array
Phased Array
Volume probes '4D':
• Convex Array
• Microconvex Array

System overview *(cont.)*

System Standard Features

3D/4D Mode	
Innovative user interface with onscreen menus	
HD-Flow	
Automatic Tissue Optimization	
Coded Excitation (CE)	
Coded Harmonic Imaging with Pulse Inversion Technology	
Tissue Doppler	
Advanced SRI (Speckle Reduction Imaging)	
CrossXBeam ^{CR1} (Compound Resolution Imaging)	
Scan Assistant	
B Mode only	
B + Power Doppler Mode	
B + CFM Doppler Mode	
B + HD-Flow Mode	
B + CRI	
B + CRI + CFM	
B + CRI + PD	
B + CRI + HD-Flow	
Focus & Frequency Composite (FFC)	
High Resolution Zoom	
Pan Zoom	
SonoRenderStart	
Steering	
Virtual Convex	
Wide Angle on endovaginal probes	
Beta-View	
Patient information database	
Image Archive on hard drive	
3D/4D data compression (lossy/lossless)	
Real-time automatic Doppler calcs	
Measurement & Calculations including Worksheets/Report for:	
• OB	• GYN
• Vascular	• Cardio
• Abdominal	• Small-Parts
• Urology	• Pediatrics
• Musculoskeletal	• Neurology

System Options

3D/4D Advanced
Advanced VCI with SingleView (Volume Contrast Imaging)
4D View PC Software
DICOM 3
XTD
Anatomical M-mode
SonoVCADlabor

Peripheral Options

Integrated Printers:

- B/W Printer
- Color Printer
- DVD Recorder

Bluetooth Line Printer

ECG Digital Module

Foot Switch with programmable functionality

Display Modes

Simultaneous Capability

- B + PW
- B + CFM, B + PD, B + TD, B + HD-Flow
- B + M, B + AMM
- B + CRI
- B + SRI + CRI
- B + SRI/4D + SRI
- B + CRI + SRI/3D + CRI + SRI
- B + SRI/4D + SRI
- B/B + SRI
- B/CFM + SRI
- B/PD + CRI
- B/PD + CRI + SRI
- B/HD-Flow + SRI
- B/CFM/PW
- B/HD-Flow/PW
- B/M/CFM
- B/M/TD
- B/AMM/HD-Flow
- B + 3D, B + 4D
- B + SRI
- BF + SRI
- B + CRI/3D + CRI
- B + CRI/4D + CRI
- B + CRI + SRI/4D + CRI + SRI
- B/CFM + CRI
- B/CFM + CRI + SRI
- B/PD + SRI
- B/HD-Flow + CRI
- B/HD-Flow + CRI + SRI
- B/PD/PW
- B/TD/PW
- B/M/HD-Flow
- B/AMM/CFM
- B/AMM/TD

Real-time Triplex Mode

Selectable alternating modes

- B + PW
- B/PD + PW
- B + CFM or PD or HD-Flow
- B/TD + PW
- B/CFM + PW
- B/HD-Flow + PW

Multi-image (split, quad)

- Live and/or frozen
- Split: B + B, B/CFM + B/CFM or B/PD + B/PD or B/TD + B/TD or B/HD-Flow + B/HD-Flow or BF + BF
- Split simultaneous: B + B/CFM or B + B/PD or B + B/HD-Flow
- Split: B + PW or M
- Split: Frame Review/XTD-View
- Quad: B + B + B + B or BF, B/CFM + B/CFM + B/CFM + B/CFM or B/PD or B/TD or B/HD-Flow
- Independent Cine playback
- Quad: A + B + C + 3D or 4D
- Segmentation: quad (A/B/C/Segm. Object), single (Segm. Object)

Zoom Read/Write (with or without overview image)

Colorized Image

- Colorized B
- Colorized PW
- Colorized M
- Colorized 3D

Time line display

- Independent Dual B/PW Display
- Display Formats
- Top/Bottom selectable format (Size: 1/2:1/2; 1/3:2/3; 2/3:1/3)
- Left/Right format (Size: 1/2:1/2)

Display Annotation

Patient Name:
<ul style="list-style-type: none">• Last: max 32 characters• First: max 15 characters• Middle: max 15 characters
ID: max 32 characters
Secondary patient ID (Citizen Service Number)
Accession #: max 16 characters
Hospital Name: 30 characters
Sonographer (up to 5 characters are displayed depending on font size)
Gestational age (OB) or LMP (Gyn)
Birth date (selectable)
Date: 3 Types selectable
<ul style="list-style-type: none">• MM/DD/YYYY• DD.MM.YYYY• YYYY/MM/DD
Time: 2 types selectable
<ul style="list-style-type: none">• 24 hours• 12 hours
Probe Name
Application Name
Gray Scale bar
Depth Scale
Focal Zone marker
Frame Rate
Zoom Start/Depth
B-Mode
<ul style="list-style-type: none">• User program• Receiver Frequency• Dynamic Contrast• Edge Enhance• SRI, CRI• Depth Scale Marker• Acoustic Power• Gain• Gray Map• Persistence• Focal Zone Markers• Probe Orientation
M-Mode/ AMM-Mode
<ul style="list-style-type: none">• Gain• Edge Enhance• M-Cursor, AMM-Cursor• Dynamic Contrast• Reject• Time Scale
Doppler Mode
<ul style="list-style-type: none">• Acoustic Power• Angle• Velocity or Frequency Scale• Time Scale• HPRF• Sample Volume Depth and Width• Gain• Wall Motion Filter• Spectrum Inversion• PRF• Doppler Frequency
Color Flow Imaging Mode (CFM, PD, TD, HD-Flow)
<ul style="list-style-type: none">• Acoustic Power• Color Balance• Quality• PRF• Color Scale: kHz, cm/s, m/s Power and Symmetrical Velocity Imaging• Spectrum Inversion• Color Gain• Color Balance Marker• Wall Motion Filter• Color Map

3D/4D Mode
<ul style="list-style-type: none">• 3D/4D Sub Program• Quality• Mix• Compression• VCAD Heart• Threshold• Volume Box Angle• Acquisition Mode• Orientation Markers
TGC Curve
Cine Frame Number
Recorder Status
Body Pattern: 130 types organized in 10 anatomical groups
Measurement Results
Displayed Acoustic Output
<ul style="list-style-type: none">• TIS: Thermal Index Soft Tissue• TIC: Thermal Index Cranial (Bone)• TIB: Thermal Index Bone• MI: Mechanical Index
Power Output
Biopsy Guide Line
ECG Line
Trackball function
Zoom overview image (zoom box position)
GE Logo

System Parameters

System Setup

Pre-programmable categories date format
User Programmable Preset Capability, User program, etc.
Languages: English, French, German, Spanish, Italian, Norwegian, Dutch, Finnish, Swedish, Danish, Chinese, Japanese, Russian
EUM Languages: English, German, Spanish, Italian, French, Russian
Up to 400 Programmable Annotations organized in 10 anatomical groups
Programmable Scan assistant lists including Add, Delete, Edit and Reorder of checklist items
Four programmable Px buttons for documentation preferences like Save, DICOM Send, Print, Check, Cine length etc.
Several user configurable functions:
<ul style="list-style-type: none">• Clinic Name• Display (TGC curve, Screen Lock, Screensaver, Auto Scan Stop, Beeper, 3D/4D Screen Controls)• Trackball speed• Dim function• Zoom: Overview window• Patient Info display• Title bar settings• Start Exam & End Exam Configuration

Measure Setup

M&A Setup including Add, Delete, Edit and Reorder of measure items

Application Setup including several parameters of Measurement, Doppler Trace and Calculation presets

Global Setup including several parameters of Measurement, Cursor and Result window presets

Biopsy Setup

User programmable needle guidelines

Pre-Processing

Write Zoom up to 8x

B/M-Mode

- Gain
- Dynamic Range
- Transmission Focus Position
- Transmission Frequency
- Persistence Control
- Reject
- M-Cursor position
- TGC
- Acoustic Output
- Transmission Focus Number
- Edge Enhancement
- Line Density Control
- Sweep Speed

PW-Mode

- Gain
- Acoustic Output
- PRF
- Sample Volume Gate
- Velocity Scale
- Dynamic Range
- Transmission Frequency
- Wall Motion Filter
- Length, Depth, Pos
- Sweep Speed

Color Flow Mode (CFM, PD, TD, HD-Flow)

- Acoustic Output
- Wall Motion Filter
- Ensemble
- Frequency
- Line Filter
- Artifact Suppression
- PRF
- Line density
- Smooth (Rise and Fall)
- Balance
- Quality

Post-Processing

Read Zoom: 0.8x - 3.4x Zoom (with HD-Zoom functionality up to 22x Zoom)

B-Mode

- 2D Gain
- Gray Map
- SRI II (Speckle Reduction Imaging)
- Dynamic Contrast
- Colorized B

M-Mode

- Gray Map
- Display Format
- Colorized M
- Sweep Speed

PW Mode

- Gray Map
- Angle Correction
- Scale (KHz, m/s, cm/s)
- Invert
- Base Line Shift
- Colorized D
- Trace
- Sweep Speed

Color Flow Imaging Modes (CFM, PD, TD, HD-Flow)

- Color Map
- Scale (CFM and HD-Flow)
- Display Mode (V, V-T, T, P, P-T) (CFM only)
- Display Threshold
- Baseline

Image Processing and Presentation

Digital Beamformer

System processing channel counts up to 226,626 by configuration

Minimum Depth of Field: 0 - 1 cm (Zoom, probe dependent)

Maximum Depth of Field: 0 - 36 cm (probe dependent)

Transmission Focus 1-5 Focus Points selectable (probe and application dependent)

Focal Zone position, up to 7 steps

Continuous Dynamic Receive Focus / Continuous Dynamic Receive Aperture

256 shades of gray

16.8 Million Colors 24 bit

Up to 261dB Processing Dynamic Range

Image Reverse: Right/Left, Rotation: 0°, 180°

Cine Features

Cine Features:

- Dual/Quad Image CINE Display
- CINE Gauge and CINE Image number display
- CINE Review Loop
- Selectable CINE Sequence for CINE Review (by Start Frame and End Frame)
- Side Change in dual CINE Mode
- Measurements/Calculations & Annotations on CINE

Length:

- 2D: 140MB: up to 3 mins and up to 7,000 frames (depending on B-image size and FPS); typical: about 1min./1000 images (with curved array: 15cm depth, angle 81°, 22 FPS)
- M-Mode: 32MB: up to 20 min motion time (depending on sweep speed and depth)
- Dop.- Mode: 32MB: up to 10 min motion time (depending on sweep speed)

Cine operation:

- Manual: image by image
- Auto run: speed: 6 to 400% of real-time rate, play repeat mode: forward-forward, forward-backward-forward

Image/Volume Storage

Image data stored as:

- Raw Data file (proprietary format)
- DICOM file (Single- or Multiframe)

Volume file stored as

- Raw Data file (proprietary format)
- Size: typically: 0.8 - 5MB (depending on probe and adjusted volume size)

Compression

- 2D: JPEG, Lossless, high, mid, low
- 3D/4D: Lossy and lossless compression available. Typical compression rates are 50% with lossless compression, 15% with lossy compression but maximum quality and 5% with lossy compression and reduced quality (approximate values).

Image/Volume Storage *(cont.)*

Review: Review of current Exam and archived data sets (Single Images and Cine Clips). View Format: Raw data, DICOM data.
Display Formats: 1x1, 2x2, 3x3

Reload:

- Reload of current/ archived data sets: 2D Raw Data (incl. Color Doppler, Spectral Doppler and M-Mode). 3D Raw Data (Single Volume incl. Calc. Cines). 4D Raw Data (Volume Cine)

Export as

- Bitmap files: BMP, TIFF, JPEG
- Raw files: RAW (2D), VOL (Volume data), 4DV (RAW, VOL incl. Patient data)
- Sequence of Bitmaps: BMP, AVI, MOV
- DICOM Files: DCM, DICOM Files with DICOMDIR
- 3D Raw Data: conversion to Cartesian format possible

AVI Codec: MPEG4, MS Video 1, FullFrames

Export to: DVD+ R(W), CD-R(W), Network, USB devices

Export Anonymous function: yes, available for following image types: AVI, MOV, BMP, TIFF, JPEG

Backup function to: DVD+ R(W) / CD-R(W), Network, USB devices

Repro function: Settings recall (e.g. Geometry, Gain, Colormap, etc.) from a stored or reloaded picture

Exam History: direct access to images from previous exams; direct access to Measure Reports images from previous exams; Image compare window on screen to compare images from previous exams with current exam image

Hard Drive Data Storage size: approximately 430 GB

Connectivity

Ethernet network connection

WLAN network connection

2 USB Ports for hard disks/memory sticks

1 USB Port for FootSwitch/Printer

DICOM support (option)

- Verify
- Print
- Store
- Modality Work list
- Structured Reporting
- Storage Commitment
- MPPS (modality performed procedure step)
- Media Exchange
- Off network / mobile storage queue
- Query/Retrieve

Scanning Parameters

B-Mode

B Acoustic Power	1-100%
Scan Angle	changed in 5° (probe dependent)
Frequency range	1-18 Mhz (Depending on the probe, 3 steps high, mid, low)
Frame rate	>740 fps (depending on probe and application)
GAIN range	+15 to -15 dB
Gray scale values	8 bit
SRI	6 steps (1-6)
CRI	8 steps (1-8)
CRI filter	4 steps: off, low, mid, high
CE	On/Off (Probe dependent)
FFC	On/Off (Probe dependent)
Persistence filter	8 steps (pre)
Line filter	3 steps (pre) off, low (12,5/75/12,5%), high (25/50/25%)
Line Density	3 steps (pre) low, norm, high
Reject	51 steps (pre) from 0 to 225
Enhance	6 steps (pre) 0, 1, 2, 3, 4, 5
Gray maps	21 (18 basic maps and 3 User-defined maps)
Tint maps	15
Dynamic	12 different dynamic curves C1 – C12
Display Modes	B, XTD
Screen Formats	<ul style="list-style-type: none">• 2D Imaging: Single (B), Dual (B+B), Quad (B+B+B+B)• XTD View: Single (XTD), Dual (B+XTD)
Working Modes	M (conventional M-Mode), AMM (Anatomical M-Mode)
Frequency range	1-18 Mhz (Depending on the probe, 3 steps high, mid, low)
M Acoustic Power	1-100%
M Gain	±15 dB range, 1 dB steps
M sweep speeds	<ul style="list-style-type: none">• 900 / 450 / 300 / 225 / 150 / 100 pixels/sec;• 26.44 / 13.22 / 8.81 / 6.61 / 4.40 / 2.94 cm/s in relation to system monitor
Review (memory times)	>60 s (32MB)
Signal processing M:	<ul style="list-style-type: none">• Dynamic range: 1 to 12• Enhance: 0 to 5• Tint maps: 15• Reject: 0 to 255• Gray maps: 18
Display Modes	<ul style="list-style-type: none">• M: 2D + M, 2D + M/CFM, 2D + M/HD-Flow, 2D + M/PD, 2D + M/TD• AMM: 2D + AMM, 2D/CFM + AMM/CFM, 2D/HD-Flow + AMM/HD-Flow, 2D/TD + AMM/TD

Scanning Parameters *(cont.)*

M-Mode

Screen Formats (window arrangement)

- 2D + M and 2D + AMM: up/down (horizontal): three different sub formats 30/70, 50/50, 70/30% left/right (vertical): 50/50%
- 2D + AMM + AMM: left/rt-up/rt-down: 50/25/25%

M-Color Flow Mode

Acoustic MCFM Power	1-100%
Frequency range	1-18 Mhz (Depending on the probe, 3 steps high, mid, low)
MCFM Color Maps	8 maps
CFM Gain	±16 dB range, 1 dB steps
CFM Velocity Scale Range	PRF: 150 Hz to 13 kHz
Wall Motion Filter	8 – 3000 Hz
Ensemble (color shots per line)	8-16, step size 1
Gentle color filter	
Smooth filter:	
• Rise: 12 steps	• Fall: 12 steps
CFM Spectrum Inversion	
CFM Baseline Shift	17 steps
Pre-settable and independently adjustable B-, M and MCFM Gain	
CFM Threshold	1 – 255 steps
Balance	25 – 225, step size 5
Artifact suppression	On/Off
Color Display Mode:	
• V (Velocity)	
• V-T (Velocity + Turbulence)	
• V-P (Velocity + Power)	
• T (Turbulence)	
• P-T (Power + Turbulence)	
Real-time Triplex Mode:	
• B + M + MCFM in any depth	

Spectral Doppler Mode (PW)

Operating Modes	
• PW (Pulsed Wave Doppler, Single Gate)	
Frequency range	1.75-16 Mhz (Depending on the probe, 3 steps high, mid, low)
Pulse Repetition Frequency (PRF)	
• PW-Doppler: 0.9 ...22.0 kHz	
Sample Volume (Doppler Gate):	
• Length: 0.7, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15 mm	
• Position: 5 mm to B-scan end	
• Angle correction: - 85° ... 0° ... + 85°	
Power control range	1 - 100%
Gain range	PW +15 to -25 dB
WMF (wall motion filter)	PW: 30...500 Hz
Zero line shift	±PRF/2, ±8 steps
Spectrum Analyzer	FFT (Fast Fourier Transformation), max. 256 channels, 255-256 amplitude levels

PW sweep speeds:

- Simplex (26.44 / 13.22 / 8.81 / 6.61 / 4.40 / 2.94 cm/s)
- Duplex/Triplex (8.81 / 6.61 / 4.40 / 2.94 cm/s)

Review (memory times)	>60 s (32MB)
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Measurable flow velocities:

- PW: 1cm/s – 8m/s ($\alpha = 0^\circ$, 2.0 MHz, max. zero shift)
- 1cm/s – 16m/s ($\alpha = 60^\circ$, 2.0 MHz, max. zero shift)

Signal processing:

- Dynamic range: 15 steps (10 to 40)
- Gray maps: 18 basic curves and 3 User-defined (pre, post)
- Tint maps: 5

Scale display:

- Vert.: kHz, cm/s, m/s (selectable)
- Hor.: 1s marker (big), ½s marker (small)

Screen Formats:

- 2D/D: up/down (horizontal): three different sub formats 40/60, 50/50, 60/40% left/right (vertical): 50/50%. D: pencil probes only

Display Formats:

- 2D/D (duplex update, simultaneous); 2D+CFM/D, 2D+HD-Flow/D, 2D+PD/D, 2D+TD/D (triplex update, PW). 2D+CFM/PW, 2D+PD/PW, 2D+HDFlow/PW, 2D+TD/PW, (triplex simultaneous, PW only)

Audio-Modes	Stereo (both directions separately in both channels)
Audio Volume	Adjustable, control digipots

Color Doppler Mode

Screen Formats	2D+CFM (Single, Dual, Quad)
Frequency range	1-16 Mhz (Depending on the probe, 3 steps high, mid, low)
Display Modes:	
• Simultaneous dual mode: 2D/2D+CFM	
• Triplex mode: 2D+CFM/PW, 2D/M+MCFM	
• Volume Mode: 3D+CFM	
Color coding:	
• Steps: 65536 color steps	
Display modes	
• V-T (velocity + turbulence)	• V (velocity)
• V-P (velocity + power)	• T (turbulence)
• P-T (power + turbulence)	
Depth range:	
• Axial: 0 to B scan range	• Lateral: 0 to B scan range
Baseline shift	17 steps (independent from spectral Doppler)
Inversion of color direction	Yes
Wall Motion Filter	8 steps (low1, low2, mid1, mid2, high1, high2, max1, max2)
Smoothing Filter	
• 12 steps rise time	• 12 steps fall time
Gain control	+15 dB to -15 dB, 0.2 dB step
Line Density (color line density)	10 steps
Ensemble (color shots per line)	
• CFM: 7 to 31	• MCFM: 8 to 16
Flow Resolution	4 steps (low, mid1, mid2, high)

Scanning Parameters *(cont.)*

Color Doppler Mode *(cont.)*

Pulse repetition frequency	<ul style="list-style-type: none"> CFM: 150 Hz to 20.5 kHz MCFM: 150 Hz to 20.5 kHz
Color Map	8 different color codes for each probe
Balance	From 25 to 225
Max. meas. velocity	4.23 m/sec
Min. meas. velocity	0.3 cm/sec
Scale	kHz, cm/s, m/s
Automatic moving tissue suppression	Yes

Power Doppler Mode (PD)

Screen Formats	2D+PD (Single, Dual, Quad)
Frequency range	1-16 Mhz (Depending on the probe, 3 steps high, mid, low)
Display Modes:	<ul style="list-style-type: none"> Simultaneous dual mode: 2D/2D+PD Triplex mode: 2D+PD/PW Volume Mode: 3D+PD
PD coding	256 color steps
PD window size	<ul style="list-style-type: none"> Lateral: maximum to minimum B mode scan angle Axial: B-scan range
Display mode	P (power)
Wall motion Filter	8 steps (low1, low2, mid1, mid2, high1, high2, max1, max2)
Smoothing Filter	<ul style="list-style-type: none"> Rise edge: 12 steps Fall edge: 12 steps
Gain control	+15 dB to -15 dB, 0.2 dB steps
PD Ensemble	7 to 31
PD Line Density	10 steps
Pulse repetition frequency	150 Hz to 20.5 kHz
PD Map	8 different color codes for each probe
Flow Resolution	4 steps (low, mid1, mid2, high)
Balance	From 25 to 225 in 41 steps
Artefact suppression	Yes

HD-Flow

Screen Formats	2D+HDF (Single, Dual, Quad)
Frequency range	1-16 Mhz (Depending on the probe, 3 steps high, mid, low)
Display Modes:	<ul style="list-style-type: none"> Simultaneous dual mode: 2D/2D+HDF Triplex mode: 2D+HDF/PW; 2D/M+MHDF Volume Mode: 3D+HDF
HD-Flow Coding Steps	256 color steps
HD-Flow window size:	<ul style="list-style-type: none"> Lateral: maximal to minimal B mode scan angle Axial: B-scan range
Display mode	P (power)

Wall Motion Filter	8 steps (low1, low2, mid1, mid2, high1, high2, max1, max2)
Smoothing Filter	<ul style="list-style-type: none"> 12 steps rise edge 12 steps fall edge
Gain Control	+15 dB to -15 dB, 0.2 dB steps
HD-Flow Ensemble	7 to 31
HD-Flow Line Density	10 steps
Pulse Repetition Frequency	150 Hz to 20.5 KHz
HD-Flow Map	8 different color codes for each probe)
Flow Resolution	4 steps (low, mid1, mid2, high)
Balance	From 25 to 225
Artefact suppression	Yes

Tissue Doppler Mode (TD)

Screen Formats	2D+TD (Single, Dual, Quad)
Display Modes	<ul style="list-style-type: none"> Simultaneous dual mode: 2D/2D + TD Triplex mode: 2D + TD/PW, 2D/M + MTD
TD coding steps	65536 color steps
Depth range:	<ul style="list-style-type: none"> Axial: 0 to B-scan range Lateral: 0 to B-scan-range
Zero line shift	17 steps
Inversion of color direction	Yes
Smoothing Filter:	<ul style="list-style-type: none"> 12 steps rise time 12 steps fall time
Gain control	+15 dB to -15 dB, 0.2 dB steps
Line Density (color line density)	10 steps
Ensemble (color shots per line)	3 to 31
Flow Resolution	4 steps (low, mid1, mid2, high)
Pulse repetition frequency	150 Hz to 20.5 kHz
TD Map	4 different color codes for each probe
Frequency range:	<ul style="list-style-type: none"> 1 to 16 MHz depending on the probe Adjustable in 3 steps (low, mid, high)
Balance	From 25 to 225
Max. meas. velocity	4.23 m/sec
Min. meas. velocity	0.3 cm/sec
Display Mode	V (velocity)
Scale	kHz, cm/s, m/s

Volume Scan Module

Vol. scan size: max. 64 MB for gray volumes; max. 90 MB for color volumes; The required memory space depends on scan parameters (VOL-box size and quality (low, mid1, mid2, high1, high2, max). Typical: 0.8-5 MB
Lines/2D-image: max. 1024 (typ. 80 to 350)
2D-images/volume: Up to 4096 (Acquisition Mode dependent)

Volume Scan Module *(cont.)*

VOL-Frames/sec.: max. 40; The frame rate depends on scan parameters: VOL-Box size, quality and probe.

4D Volume Cine: up to 128 volumes

Display of sectional plane images: synchronous with control setting, arbitrary movement in volume, monitored position in volume.

Rotation: 360°, 1° or 3° increments (X-, Y- and Z-axis)

Magnification: adjustable from 0.3 to a factor of 4.00

Acquisition Modes:

3D Static:

- 3D (2D incl. CRI)
- 3D/PD (incl. CRI)
- 3D/CFM (incl. CRI)
- 3D/HD-Flow incl. CRI)
- 4D Real Time
- 4D Biopsy
- VCI-SingleView
- SingleView

Visualization Modes:

- 3D Rendering (diverse surface and intensity projection modes)
- SonoRenderStart
- Sectional Planes
- Multiplanar
- SingleView (optional), actual – and projected view (Option)
- Niche
- SonoVCADlabor
- Volume Analyses
- SonoAVC*follicle* (Sono Automated Volume Count)
- Advanced VCI (Volume Contrast Imaging)

Render Modes:

- Surface texture
- Surface Smooth
- Surface Skin and Smooth
- Max-, min- and X-ray (average intensity projection)
- Gradient
- Inversion
- Glass Body
- Mix Mode of two Render Modes

Display graphics:

- Rotation axis, center point;
- ROI box, 3D Frame;
- Optional display of onscreen controls (rotation, translation)

Gray maps: Slices: 21 (18 basic curves and 3 User-defined (pre, post) 3D Image: one general map adjustable with bright (1-100) & contrast (1-100)

Tint maps: Slices: 15; 3D Image: 15

Depth render maps: 3

Frequency range: 1-18Mhz (Depending on the probe, 3 steps high, mid, low)

Scanning Features

Coded Excitation (CE)

Availability depends on probe

Coded Harmonic Imaging (CHI)

Harmonic Imaging

Available on all probes

Focus Frequency Composite - (FFC)

Availability depends on probe

Compound Resolution Imaging (CRI)

Available on all probes except the 3Sc

Speckle Reduction Imaging

Available on all probes

Virtual Convex

Available on all linear probes

Wide Sector

Available on the following probes:

- E8C-RS
- RIC5-9W-RS

Measurements Tool

Generic Measurements

Distance

- Distance (Point to Point)
- 2D Trace (Trace Length)
- Stenosis (% Dist)
- Distance (Line to Line)
- 2D Trace (Point Length)

Area/Circumference

- Ellipse
- Trace (Point)
- Area (2 Dist.)
- Trace (Line)
- Stenosis (% Area)

Volume: following Methods:

- 1 Distance
- 1 Dist. + Ellipse
- Multiplane - Planimetric Volume (3D only)
- 1 Ellipse
- 3 Distance

Angle:

- Angle (3 Point)
- Angle (2 Line)

M-Mode

- Distance (Point to Point)
- Slope
- Stenosis (% Dist)
- Time
- HR

Measurements Tool

Generic Measurements

Doppler Mode

- Auto & Manual Trace:
 - PS (Peak Systole) - ED (End Diastole)
 - MD (Min. Diastole) - PS/ED (Ratio)
 - PI (Pulsatility Index) - RI (Resistance Index)
- TAm_{ax} (Time avg. max. Velocity)
- TAm_{ean} (Time avg. mean Velocity)
- VTI (Velocity Time Integral)
- Ductus venosus: S, D, a, PI, PLI, PVIV
- Heart Rate
- Single Measurements:
 - Velocity - Acceleration
 - RI - PI
 - PS/ED - Time
 - HR

Calculations

Abdomen Calculations

Liver

Gallbladder

Pancreas

Spleen

Kidney (right/left)

Renal Artery (right/left)

Aorta (Proximal, Mid, Distal)

Portal Vein

Vessel

Bladder Volume

Summary Reports

Small Part Default Calculations

Thyroid (right/left)

Testicle (right/left)

Vessel

Summary Reports

Small Part Breast Calculations

Lesion 1-5 (right/left)

Summary Reports

Obstetrics Calculations

Fetal Biometry

Early Gestation

Fetal Long Bones

NBL (Nasal Bone Length)

Fetal Cranium
NT Method: SonoNT

AFI

Uterus

Ovary

Fetal Doppler measurements (Ductus Art., Ductus Ven., Ao, Carotid, MCA, Celiac Artery, Superior Mesenteric Artery, Umbilical Art., Umbilical Vein, Uterine Art., Umbilical Vein, FHR, Atrial FHR)

Gestational Age Calculation

Gestational Growth Calculation

Fractional limb Volume

Fetal Weight (FW) Estimation

Fetal Trend Graph

Multi-Gestational Calculation & Fetal Compare

Calculation and Ratios

Fetal Qualitative Description (Anatomical survey)

Fetal Environmental Description (Biophysical profile)

Summary Reports

Obstetrics Fetal Echo

4-Chamber-view

Thorax

Outflow Tract, Aortic arch

Venous

Tricuspid valve

Mitral Valve

Aortic Valve

Main Pulmonary Artery

Pulmonary Valve

Aorta, Ductus Art.

Umbilical Vein, Ductus Ven.

FHR

Atrial FHR

LVOT

RVOT

Pulmonary Veins

Carotid

Summary Reports

Obstetrics Z-Scores

Calculation of Z-Scores for:

- Long Axis
- Short Axis
- 4 Chambers
- Aortic Arch
- Obl. Short axis
- Summary Reports

Cardiology

2D Mode:

- LV Simpson (Single & Bi-Plane)
- Volume (Area Length)
- LV-Mass (Epi & Endo Area, LV Length)
- LV (RVD, IVS, LVD, LVPW)
- LVOT Diameter
- RVOT Diameter
- MV (Dist A, Dist B, Area)
- TV (Diameter)
- AV/LA (Aortic Valve/Left Atrium)
- PV (Diameter)

M-Mode:

- LV (IVS, LVD, LVPW, RVD)
- AV/LA (Ao Root Diam, LA Diam, AV Cusp Sep., Ao Root Ampl)
- MV (D-E, E-F Slope, A-C Interval, EPSS)
- HR (Heart Rate), Atrial HR

D-Mode:

- MV (Mitral Valve)
- AV (Aortic Valve), TV (Tricuspid Valve)
- PV (Pulmonary Valve)
- LVOT & RVOT Doppler (Left & Right Ventricle Outflow Tract)
- Pulmonic Veins
- PAP (Pulmonary Artery Pressure measurement)
- HR (Heart Rate)

C-Mode:

- PISA
- Tei-Index

Others:

- Diast. Vol (Bi)
- Syst.Vol.(Bi)
- Stroke Volume
- Volume Flow
- Cardiac Output
- Ejection Fraction
- Fractional Fract.
- Shortening
- Myocardial Thickness
- LA/Ao Ratio
- E/A Peak
- Peak Gradient Acceleration
- Mean Gradient
- Mean Gradient Acceleration
- VTI
- TVA
- PG
- PHT
- MVA
- AVA
- ERO
- CVP (Cardio Vascular Profile) Score

Summary Reports

Urology

Bladder

Prostate

Left/Right Testicle

Left/Right Kidney

Left/Right Renal Artery

Left/Right Dorsal Penile Artery

Vessel

Summary Reports incl. PSAD, PPSA(1), PPSA(2) calculation

Vascular

Left/Right CCA (Common Carotid Artery)

Left/Right ICA (Internal Carotid Artery)

Left/Right ECA (External Carotid Artery)

Left/Right Vertebral Artery

Left/Right Subclav.

Left/Right Bulb

Vessels

Summary Reports

Gynecology

Uterus

Right/Left Ovary

Right/Left Follicle

Fibroid

Endometrial thickness (Dist, Double Dist.)

Cervix Length

Left/Right Ovarian Artery

Left/Right Uterine Artery

Vessels

Pelvic Floor

FHR

Summary Reports

Pediatrics

Left/Right Hip Joint

Pericallosal Artery

Summary Report

Neurology

Left/Right ACA (Anterior Cerebral Artery)

Left/Right MCA (Middle Cerebral Artery)

Left/Right PCA (Posterior Cerebral Artery)

Basilar Artery

A-Com. A (Anterior Com. Artery)

P-Com. A (Posterior Com. Artery)

Left/Right CCA (Common Carotid Artery)

Left/Right ICA (Internal Carotid Artery)

Left/Right Vertebral Artery

Vessels

Summary Reports

OB Tables

Age Tables:

- AC: ASUM, CFEF, Hadlock_82, Hadlock_84, Hansmann, Hobbins, Jeanty, JSUM, Kurmanavicius, Merz, Nicolaides, Shinozuka, Siriraj, Tokyo
- AD: Persson
- APAD: Merz
- APTD: Hansmann
- APTDxTTD: Shinozuka, Tokyo
- BOD: Jeanty
- BPD: ASUM, ASUM (old), Campbell, CFEF, Chitty (outer-outer) (outer-inner), Chitty, Hadlock_82, Hadlock_84, Hansmann, Hobbins, Jeanty, Johnsen, JSUM, Kurmanavicius, Kurtz, Persson, Merz, Nicolaides, OSAKA, Rempen, Sabbagha, Shinozuka, Siriraj, Tokyo, Verburg (outer-outer)
- CLAV: YARKONI
- CRL: ASUM, ASUM(old), DAYA, Hadlock, Hansmann, JSUM, Persson, Nelson, OSAKA, Rempen, Robinson, Shinozuka, Tokyo, Verburg
- EFW: Hadlock, JSUM 2001, Osaka, Shinozuka, Tokyo
- FL: ASUM, ASUM_OLD, CFEF, Chitty, Hadlock_82, Hadlock_84, Hansmann, Hobbins, Hohler, Jeanty, JSUM, Kurmanavicius, Persson, Merz, Nicolaides, O'Brien, OSAKA, Shinozuka, Siriraj, Tokyo, WARDA
- FTA: OSAKA
- FIB: Jeanty
- GS: Hansmann, Hellman, Holländer, Rempen, Tokyo
- HC: ASUM, CFEF, Chitty, Hadlock_82, Hadlock_84, Hansmann, Jeanty, Johnsen, Kurmanavicius, Merz, Nicolaides, Siriraj
- HL: ASUM, Hobbins, Jeanty, Merz, OSAKA
- LV: Tokyo
- MAD: EIK-NES, Kurmanavicius
- OFD: ASUM, Chitty, Hansmann, Jeanty, Kurmanavicius, Merz, Nicolaides
- RAD: Jeanty, Merz
- TIB: Jeanty, Merz
- TAD: CFEF, Merz, Chitty, Goldstein, HILL, Hobbins, Nicolaides, Hansmann
- ULNA: Jeanty, Merz

Growth Tables:

- AC: ASUM, CFEF, Chitty, Hadlock, Hansmann, Jacot-Uillarmod, Jeanty, JSUM, Kurmanavicius, Lessoway, Merz, Nicolaides, Shinozuka, Siriraj, Tokyo, Verburg
 - AD: Persson
 - AFI: Moore
 - Aorta Vmax: Rizzo
 - APTDxTTD: Shinozuka, Tokyo
 - BOD: Jeanty
 - BPD: ASUM, Campbell, CFEF, Chitty, Hadlock, Hansmann, Jacot-Uillarmod, Jeanty, JSUM, Kurmanavicius, Lessoway, Persson, Merz, Nicolaides, OSAKA, Sabbagha, Shinozuka, Siriraj, Tokyo, Verburg
 - CLAV: YARKONI
 - CM: Nicolaides
-

- CRL: ASUM, Hadlock, Hansmann, JSUM, Persson, OSAKA, Robinson, Shinozuka, Tokyo
- DV PI, DV PLI, DV PVIV, DV S/a: Baschat
- EFW: Brenner, Doubilet, Hadlock, Hansmann, Hansmann(86), Hobbins/Persutte, JSUM 2001, Persson, Osaka, , Shinozuka, Tokyo, Williams, Yarkoni (Twins) , Ananth (Twins, Monochorionic), Ananth (Twins Dichorionic)
- FL: ASUM, CFEF, Chitty, Chitty, Hadlock, Hansmann, Jacot-Uillarmod, Jeanty, JSUM, Kurmanavicius, Lessoway, Persson, Merz, Nicolaides, O'Brien, OSAKA, Shinozuka, Siriraj, Tokyo, Verburg, WARDA
- FTA: OSAKA
- FIB: Chitty, Jeanty, Siriraj
- Foot: Chitty
- GS: Hellman, Rempen, Tokyo
- HC: ASUM, CFEF, Chitty, Hadlock, Hansmann, Jacot-Uillarmod, Jeanty, Kurmanavicius, Lessoway, Merz, Nicolaides, Siriraj, Verburg
- HL: ASUM, Chitty, Jeanty, Merz, OSAKA, Siriraj
- LV: Tokyo
- MCA PI, RI: JSUM, Bahlman
- MCA PV: Mari
- MAD: EIK-NES, Kurmanavicius
- MV E/A: HARADA
- NBL: BUNDUKI, SONEK
- OFD: ASUM, Chitty, Hansmann, Jeanty, Kurmanavicius, Merz, Nicolaides
- MainPA Vmax: Rizzo
- RAD: Chitty, Jeanty, Merz, Siriraj
- TAD: CFEF, JACOT-GUILLARMOD, Merz,
- TCD: Goldstein, HILL, JACOT-GUILLARMOD, Nicolaides, Verburg
- TIB: Chitty, Jeanty, Merz, Siriraj
- TTD: Hansmann
- TV E/A: HARADA
- ULNA: Chitty, Jeanty, Merz, Siriraj
- UmbArt PI: JSUM, Merz
- UmbArt RI: JSUM, Merz, Kurmanavicius
- Fractional Limb Avol/Tvol: Lee

Fetal weight Estimation (EFW)

- Campbell (AC)
 - Hadlock (AC, BPD)
 - Hadlock 1 (AC, FL)
 - EFW
 - Hadlock 2 (BPD, AC, FL)
 - Hadlock 3 (HC, AC, FL)
 - Hadlock 4 (BPD, HC, AC, FL)
 - Hansmann (BPD, TTD)
 - Merz (AC, BPD)
 - Osaka (BPD, FTA, FL)
 - Persson (BPD, MAD, FL)
 - Persson 2
 - Schild (HC, AC, FL)
 - Shepard (AC, BPD)
 - Shinozuka 1 (BPD, APTD, TTD, FL)
 - Shinozuka 2 (BPD, FL, AC)
 - Shinozuka 3 (BPD, APTD, TTD, LV)
 - Tokyo (BPD, APTD, TTD, FL)
-

Fetal ratios

CI (BPD/OFD) (Hadlock)
FL/AC (Hadlock)
FL/BPD (Hohler)
FL/HC (Hadlock)
HC/AC (Campbell)
Va/Hem (Nicolaides)
Va/Hem (Hansmann)
Vp/Hem (Nicolaides)

Probes

RAB4-8-RS

Applications	Abdomen, Obstetrics, Gynecology, Urology, Pediatric
Maximum Band Width (-20 dB)	2 – 8 MHz
Number of Elements	192
Convex Radius	46.0 mm
Volume Sweep Radius	22.6 mm
FOV	70° (B), 85° x 70° (Volume scan)
Depth	Max 26 cm
Foot Print	63.6 x 37.8 mm
Center Frequency	4.4 MHz
Doppler Tx. Frequency.	4.00, 3.45, 3.03 MHz
Harm. Tx. Frequency	3.03, 2.78, 2.56 MHz
Biopsy Guide Available	<ul style="list-style-type: none">• PEC 74, Single-Angle, Reusable• PEC 78, single angle, disposal with reusable bracket

RAB2-5-RS

Applications	Abdomen, Obstetrics, Gynecology
Maximum Band Width (-20 dB)	1 – 5 MHz
Number of Elements	192
Convex Radius	46.0 mm
Volume Sweep Radius	22.6 mm
FOV	70° (B), 85° x 70° (Volume scan)
Depth	Max 30 cm
Foot Print	63.6 x 38.9 mm
Center Frequency	3.2 MHz
Doppler Tx. Frequency	3.22, 2.34, 2.32 MHz
Harm. Tx. Frequency	2.13, 2.0 MHz
Biopsy Guide Available	<ul style="list-style-type: none">• PEC 74, Single-Angle, Reusable• PEC 78, single angle, disposal with reusable bracket

RIC5-9W-RS

Applications	Obstetrics, Gynecology, Urology
Band Width (-20 dB)	4 – 9 MHz
Number of Elements	192
Convex Radius	11.6 mm
Volume Sweep Radius	11.6 mm
FOV	146° (B), 146° x 120° (Volume scan)
Wide	179° (B), 179° x 120° (Volume scan)
Depth	Max 16 cm
Foot Print	22.4 x 22.6mm
Center Frequency	6.6 MHz
Doppler Tx. Frequency	6.25, 5.56, 5.00 MHz
Harm. Tx. Frequency	4.17, 4.17, 3.70 MHz
Biopsy Guide Available	PEC 63, Single-Angle, Reusable; disposable biopsy guide.

4C-RS

Applications	Abdominal, Obstetrics, Gynecology
Maximum Band Width (-20 dB)	2 – 5 MHz
Number of Elements	128
Convex Radius	60.0 mm
Volume Sweep Radius	n/a
FOV	58°
Depth	Max 30 cm
Center frequency	3.1 MHz
Doppler Tx. Frequency	3.23, 2.70, 2.27 MHz
Harm. Tx. Frequency	2.38, 2.27, 2.08 MHz
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

AB2-7-RS

Applications	Abdomen, Obstetrics, Gynecology, Urology, Pediatrics
Maximum Band Width (-20 dB)	2 – 8 MHz
Number of Elements	192
Convex Radius	40.0 mm
Volume Sweep Radius	n/a
FOV	80°
Foot Print	58.9 x 23.4 mm
Depth	Max 28 cm
Center Frequency	4.3 MHz
Doppler Tx. Frequency	4.17, 3.33, 2.63 MHz
Harm. Tx. Frequency	2.78, 2.33 MHz
Biopsy Guide Available	PEC71, PEC83, Single-Angle, Reusable

E8C-RS

Applications	Obstetrics, Gynecology, Urology
Maximum Band Width (-20 dB)	4 - 10 MHz
Number of Elements	128
Convex radius	10.7 mm
Volume Sweep Radius	n/a
FOV	123°
Wide	160°
Depth	Max 16 cm
Center Frequency	6.5 MHz
Doppler Tx. Frequency.	6.67, 5.88, 4.76 MHz
Harm. Tx. Frequency	4.55, 4.17, 3.70 MHz
Biopsy Guide Available	Single-Angle, Reusable and Disposable

8C-RS

Applications	Abdominal, Small Parts, Cardiology, Peripheral Vascular, Pediatrics
Maximum Band Width (-20 dB)	4 - 10 MHz
Number of Elements	128
Convex radius	10.7 mm
Volume Sweep Radius	n/a
FOV	123°
Depth	Max 16 cm
Center Frequency	6.5 MHz
Doppler Tx. Frequency.	6.67, 5.88, 4.76 MHz
Harm. Tx. Frequency	4.55, 4.17, 3.70 MHz
Biopsy Guide Available	Single-Angle, Reusable and Disposable

12L-RS

Applications	Small Parts, Obstetrics, Peripheral Vascular, Pediatrics, MSK
Maximum Band Width (-20 dB)	4 - 12 MHz
Number of Elements	192
Volume Sweep Radius	n/a
FOV (Width)	37 mm
Depth	Max 8 cm
Center Frequency	7.7 MHz
Doppler Tx. Frequency	7.14, 6.25, 5.26 MHz
Harm. Tx. Frequency	5.56, 5.00, 4.55 MHz
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

9L-RS

Applications	Abdominal, Small Parts, Obstetrics, Peripheral Vascular, Pediatrics, MSK
Maximum Band Width (-20 dB)	3 - 8 MHz
Number of Elements	192
Volume Sweep Radius	n/a
FOV (Width)	37 mm
Depth	Max 14 cm
Center Frequency	5.3 MHz
Doppler Tx. Frequency	7.14, 6.25, 5.26 MHz
Harm. Tx. Frequency	5.26, 4.55, 3.70 MHz
Biopsy Guide Available	Multi-Angle, Reusable

3Sc-RS

Applications	Abdominal, Cardiology, Obstetrics, Pediatrics
Maximum Band Width (-20 dB)	1 - 4 MHz
Number of Elements	64
Volume Sweep Radius	n/a
FOV (Width)	90°
Depth	Max 24 cm
Center Frequency	2.8 MHz
Doppler Tx. Frequency	2.5, 2.17, 1.85 MHz
Harm. Tx. Frequency	2.0, 1.92 MHz
Biopsy Guide Available	Multi-Angle, Reusable

External Inputs and Outputs

Connectivity:

HDMI Out

Network (RJ45)

External Audio Out

USB (2x in front, 1x in rear)

AC Power Input

Probe connector

Safety Conformance

The Voluson S6 is:

Listed to UL 60601-1 by a Nationally Recognized Test Lab

Certified to CSA 22.2, 60601.1 by an SCC accredited Test Lab

CB-Test report by National Certification Body

CE Marked to Council Directive 93/42/EEC on Medical Devices

Conforms to the following standards for safety:

IEC 60601-1 Electrical medical equipment

IEC 60601-1-1 Electrical medical equipment

IEC 60601-1-2 Electromagnetic compatibility

IEC 60601-1-4 Programmable medical systems

IEC 61157 Declaration of acoustic output

ISO 10993 Biological evaluation of medical devices

NEMA UD3, UD2 Acoustic output display (MI, TIS, TIB, TIC)

IEC 60601-2-37 Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment

IEC60601-1-6 Usability

Please contact your GE Sales Representative for information about availability in your area.

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imagination at work

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