

# Voluson E10 BT15

## Data Sheet

### Product description

The Voluson\* E10 BT15 is an advanced imaging platform that combines extraordinary image quality with our superb volume ultrasound technology.

### Highlights

- High Resolution LCD LED Display 23" inches
- Advanced 4D
- Radiance System Architecture
- HD*live*\* Silhouette
- HD*live*\* Flow
- Advanced VCI
- SonoBiometry
- SonoAVC\**follicle*
- SonoVCAD\**heart*
- SonoVCAD\**labor*
- Advanced STIC
- *e*STIC
- Advanced Fetal Echo
- Steerable CW
- Bi-Plane Mode
- Anatomical M-Mode
- Wide Sector
- Scan Assistant
- SonoNT\*
- SonoIT\*
- Elastography
- Elastography Analysis
- Elastography Ratio Measurement
- B-Flow\*
- SonoRender*Live*\*
- Electronic Matrix Array Volume Technology
- High Performance Transvaginal Probe
- Electrical Height Adjustment
- Floating User Interface
- On Board Archive including Preview and Pre-selection



## General Specifications

### Dimensions and weight

Height (minimum)	1310 mm (51.6 in)
Adjustable	with electrical motor
Width	580 mm (22.8 in)
Depth	930 mm (36.6 in)
Weight (no Peripherals)	147 kg (324.1 lbs.)

### Power supply

Voltage	100 – 240 VAC
Frequency	50/60 Hz (+/-2%)
Power	Max. 800 VA Including all options
Thermal Output	2730 BTU/h

### Console design

3 Active Probe Ports	3 plus 1 non – imaging port
Integrated HDD	500 GB
Operating System: Microsoft Windows 7 Embedded	
Integrated DVD+R(W)/CD-R(W) drive	
On-board storage for Peripherals	
Wheels	Wheel diameter 150 mm
Integrated cable management	
Front and rear handles	
Probe port illumination	

## User Interface

### Operator keyboard

Floating Keyboard:
Rotation: adjustable +/- 38° from center
Height adjustable + 195 mm
Full-sized, backlit alphanumeric keyboard
Ergonomic hard key layout
Interactive back-lighting
Integrated recording keys for remote control of up to 4 Peripherals or DICOM® devices, one dedicated DVD recording key

### Touch screen

12.1 in High Resolution color LCD screen
Multi touch interactive dynamic software menu
Brightness adjustable

### Monitor

23 in High Res LCD LED Display with DVI interface
Resolution FHD 1920 x 1080 pixel
High brightness with 300 cd/m <sup>2</sup>
Tilt/Rotate Adjustable Monitor
Tilt angle: +40°/-90°
Hor. rotate Angle: +/- 90°
Digital brightness and contrast adjustment. Five default settings available: Extra Dark, Dark-, Semi Dark-, Light-, Extra Light Room

## System Overview

### Exam types

Abdominal
Obstetrical and Fetal Echo
Gynecological
Small Parts and Breast
Vascular
Pediatrics
Transrectal
Cardiology
Cephalic
Musculoskeletal (MSK)

### Operating modes

Brightness Mode (B-Mode) (2D)
Bi-Plane Mode
Motion Mode – M-Mode (conventional M-Mode)
Anatomical M-Mode (AMM)
Pulsed wave Doppler (PW) with HPRF
Continuous Wave Doppler imaging (CW)
Color Flow Doppler mode (CFM)
Power Doppler Mode (PD)
High Definition Power Doppler (HD-Flow*)
Tissue Doppler mode (TD)
B-Flow (BF)
Elastography
Combination modes: M/CF, M/HD-Flow, M/TD
Extended View (XTD View)
Volume Mode (3D/4D):
• 3D Static
• 4D Real Time
• VCI-A
• VCI-OmniView
• Spatio-Temporal Image Correlation (STIC)
• eSTIC
• 4D Biopsy

### Scanning methods

Electronic Sector
Electronic Convex
Electronic Linear
Mechanic Volume Sweep
Electronic Volume Sweep

## System Overview (cont.)

### Transducer types

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Sector Array
Convex Array
Microconvex Array
Linear Array
Active Matrix Convex Array (1.25, 1.5D)
Active Matrix linear Array (1.5D)
Volume probes 4D:
• Convex Array
• Microconvex Array
• Active Matrix Convex Array (1.25, 1.5, 2D)
• Active Matrix linear Array (1.5D)
• Linear Array

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### System standard features

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Innovative user interface with high resolution 12.1 in LCD touch panel
B-Mode
M-Mode
PW-Doppler
CFM (Color Flow Doppler Mode)
Automatic Tissue Optimization
Coded Harmonic Imaging with Pulse Inversion Technology
Coded Excitation (CE)
HD-Flow & Power Doppler Mode
B-Flow
Tissue Doppler
XTD
SRI II (Speckle Reduction Imaging)
HD <i>live</i> Silhouette
HD <i>live</i> Flow
CrossXBeam <sup>CRI*</sup> (Compound Resolution Imaging)
ECI (Elevation Compound Imaging)
SonoNT
SonoIT
SonoBiometry
SonoRender <i>Live</i>
Scan Assistant
DICOM 3.0 Connectivity
Static 3D Mode:
• 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
• B + B-Flow
Focus and Frequency Composite (FFC)
High Resolution Zoom (HD Zoom)
Pan Zoom
Steering
Virtual Convex
Wide Sector
Beta-View
Patient information database

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Advanced 4D	
Advanced STIC:	
Basic STIC	STIC <i>flow</i>
STIC M-Mode	SonoVCAD™ <i>heart</i>
Anatomical M-Mode (AMM)	
Image Archive on hard drive	
3D/4D data compression (lossy/lossless)	
Inversion	
Real-time automatic Doppler calculations	
Measurement and Calculations including Worksheets/Report for:	
• OB	• Small Parts
• GYN	• Transrectal
• Vascular	• Pediatrics
• Cardio	• Cephalic
• Abdominal	• Musculoskeletal (MSK)
Multigestational Calculations	

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### System options

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VOCAL II
Advanced VCI (Volume Contrast Imaging)
SonoVCAD* <i>labor</i>
Elastography
SonoAVC
eM6C Activation
• Real Time 4D Mode:
- B Mode only
- B + Power Doppler Mode
- B + CFM Doppler Mode
- B + HD-Flow Mode
• VCI-A
• eSTIC
V-SRI
CW Mode
Steerable CW (probe dependent)
Integrated Software DVR
• Digital recording
• One drive for data export and recording
• DVD Formats: DVD+R, -R, +RW, -RW for recording, DVD and CD support for data export
• USB support: FAT32 compatibility

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### Peripheral options

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Integrated printers:
• B&W thermal printer
• Color thermal printer
External Color desktop printer & connection kits
ECG Digital Module
Foot Switch, with programmable functionality

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## System Overview (cont.)

### Display modes

Simultaneous capability in combination with SRI and/or CRI:

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

Real-time Triplex Mode:

- B/CFM/PW
- B/PD/PW
- B/HD-Flow/PW

Selectable alternating Modes:

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

Multi-image (split, quad):

- Live and/or frozen
- Live Bi-Plane
- 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 simultan: B+B/CFM or B+B/PD or B+B/HD-Flow
- Split: B+PW or M or CW
- Split: Frame Review/XTD-View
- Quad: B+B+B+B or BF or 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
- TUI: 1x1, 1x2, 2x2, 3x2, 3x3, 3x4, 4x4
- Segmentation: quad (A/B/C/Segm. Object), single (Segm. Object)
- Split: TUI Overview+1 slice
- Zoom Read/Write (with or without overview image)

Image Size:

- Standard format
- XL format

Colorized Image:

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

Time line display:

- Independent Dual B/PW Display
- Display Formats: Top/Bottom selectable format (Size ½:1/2; 1/3:2/3; 2/3:1/3)

### Display annotation

Patient Name:

- Last: max 62 characters
- First: max 62 characters
- Middle: max 62 characters

ID: max 32 characters

Secondary patient ID (Citizen Service Number)

Accession #: max 16 characters

Hospital Name: max 30 Characters

Sonographer (up to 5 characters are displayed depending on font size)

Gestational age (OB) or LMP (GYN)

Birth date

Date: 3 Types selectable:

- MM/DD/YYYY
- DD/MM/YYYY
- YYYY/MM/DD

Time: 2 types selectable:

- 24 hours
- 12 hours

Probe Name

Application Name

Gray Scale bar

Depth Scale

Focal Zone Marker

Frame Rate

Zoom Start/Depth

B-Mode:

- User Preset
- Receiver Frequency
- Gain
- Dynamic Control
- Gray Map
- Edge Enhance
- Persistence
- SRI, CRI
- Probe Orientation

M-Mode/AMM –Mode:

- Gain
- Dynamic control
- Edge Enhance
- Reject
- M-Cursor, AMM-Cursor
- Time Scale

Doppler Mode:

- Acoustic Power
- Gain
- Angle
- Sample Volume Depth and Width
- Wall Motion Filter
- Doppler Frequency
- Velocity or Frequency Scale
- Spectrum Inversion
- Time Scale
- PRF
- HPRF

Color Flow Imaging modes (CFM, PD, TD, HD-Flow):

- Acoustic Power
- Color Gain
- Color Balance
- Color Balance Marker
- Quality
- Wall Motion Filter
- PRF
- Color Map
- Color Scale: kHz, cm/s, m/s
- Power and Symmetrical Velocity Imaging
- Color Velocity Range
- Spectrum Inversion
- Orientation Markers

## System Overview (cont.)

### Display annotation (cont.)

3D/4D Mode:

- 3D/4D Sub Program
- Threshold
- Quality
- Volume Box Angle
- Mix
- Acquisition Mode
- Compression
- TUI: slice distance (0.5-10mm)
- TUI: slice position in overview image
- SonoVCAD $heart$
- STIC acquisition time
- Calculated heart rate for STIC and  $e$ STIC only

Elastography Mode:

- Acoustic Output
- Tx Frequency
- Transparency
- Velocity Range
- Elasto Map
- Persistence
- Line Density

TGC Curve

Cine Frame Number

Recorder Status

Body Pattern: 117 types organized in 10 anatomical groups

Measurement Results

Displayed Acoustic Output:

- TIS: Thermal Index Soft Tissue
- TIC: Thermal Index Cranial (Bone)
- TIB: Thermal Index Bone
- MI: Mechanical Index

Predefined Biopsy Guide Line

ECG Line

Trackball function (Trackball and Trackball buttons)

GE Logo

Zoom overview image (zoom box position)

## System parameters

### System setup

User Programmable Preset Capability, User program etc.

Languages: English, French, German, Spanish, Italian, Danish, Dutch, Finnish, Norwegian, Swedish, Russian, Japanese, Simplified Chinese, Polish

EUM Languages: English, German, Spanish, Italian, French, Russian

Free programmable Scan assistant lists including Add, Delete, Edit and Reorder of checklist items

Up to 800 Programmable Annotations organized in 10 anatomical groups

Four programmable Px buttons for documentation preferences like Save, DICOM Send, Print, Check, Cine length, jpeg, etc.

Several user configurable functions:

- Clinic Name
- Display (TGC curve, Screen Lock, Screensaver, Auto Scan Stop, Beeper, 3D/4D Screen Controls)
- Trackball speed
- Zoom Overview window
- Title bar settings
- Start Exam and End Exam configuration
- Dim function
- Patient Info display

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

PW-Mode:

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

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

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

## Post-processing

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

B-Mode:

- 2D Gain
- Dyn. Contr.
- Gray Map
- Edge Enhance
- Colorized B
- SRI II (Speckle Reduction Imaging)

M-Mode:

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

PW Mode:

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

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

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

## System Overview (cont.)

### Post-processing (cont.)

B-Flow

- Gray map
- Colorized B-Flow
- Advanced SRI (Speckle Reduction Imaging)
- Dyn. Contr.

### Image processing and presentation

Digital Beamformer

46,454,089 system processing channel technology

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 274 dB 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: 512MB: up to 10 min (depending on B-image size and FPS); typical: about 3 min/4000 images (with curved array: 15cm depth, angle 81°, 22 FPS)
- M-Mode: 32MB: up to 20 min motion time (depending on sweep and depth)
- Dop.-Mode: 32MB: up to 10 min motion time (depending on sweep speed)

Cine operation:

- Manual: image by image
- Auto run: speed: 25 to 200% of real-time rate, play repeat mode: forward-forward, forward-backward-forward

### Image/volume storage (archive)

Standard and fully anonymized archive available

Image to data stored as:

- Raw Data file (proprietary format)
- DICOM file (Single-or Multi-Frame)

Volume file stored as:

- Raw Data file (proprietary format)
- DICOM file
- 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).

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 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, email

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: about 450 GB

### Connectivity

Ethernet network connection

USB for USB devices

DICOM support:

- Verify
- Print
- Store
- Modality Worklist
- 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	Probe dependent
Gain range	+15 to -15 dB
Gray scale values	8 bit
SRI	6 steps (0-5)
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 255
Enhance	6 steps 0, 1, 2, 3, 4, 5
Gray maps	21 (18 basic maps and 3 User-defined maps)
Tint maps	8
Dynamic	12 different dynamic curves C1 – C12
Display Modes	B, XTD
Screen Formats:	
• 2D Imaging: Single (B), Dual (B+B), Quad (B+B+B+B)	
• XTD View: Single (XTD), Dual (B+XTD)	

### M-Mode

Working Modes	M (conventional M- Mode) AMM (Anatomical M-Mode)
Power control range	1-100
Gain range	+15 to -15 dB
M sweep speeds:	
• 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:	
• Dynamic range: 1 to 12	• Gray maps: 18
• Reject: 0 to 255	• Tint maps: 8
• Enhance: 0 to 5	
Display Modes:	
• 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	
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
MCFM Color Maps	8 maps
CFM Gain	+/-15 dB range, 0,1 dB steps
CFM Velocity Scale Range	PRF: 150Hz to 20,5kHz
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)	• T (Turbulence)
• V-T (Velocity + Turbulence)	• P-T (Power + Turbulence)
• V-P (Velocity + Power)	
Real –time Triplex Mode	B + M + MCFM in any depth

### Spectral Doppler Mode (PW, CW)

Operating Modes	PW (Pulsed Wave Doppler, Single Gate), Steerable CW (Continuous Wave Doppler)
Transmit Frequencies	PW-Doppler: 1.75..18 MHz CW-Doppler: 1.75..16 MHz
Pulse Repetition Frequency (PRF)	PW-Doppler: 0.9..22 kHz CW-Doppler: 1.3..40.0 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	+15 to -25 dB (PW) +15 to -15 dB (CW)
WMF (wall motion filter)	PW: 30...500 Hz, CW: 30..1000 Hz
Zero line shift	± PRF/2, ± 8 steps
Spectrum Analyzer	FFT (Fast Fourier Transformation), max. 256 channels, 256 amplitude levels

## Scanning Parameters (cont.)

### Spectral Doppler Mode (PW, CW) (cont.)

PW sweep speeds	Simplex (26.44/13.22/8.81/6.61/4.40/2.94 cm/s), Duplex/ Triplex (6.61/4.40/2.94 cm/s)
Review (memory times)	>60 s(32MB)
Measurable flow velocities:	
<ul style="list-style-type: none"> <li>• PW: 1cm/s – 8m/s (<math>\alpha=0^\circ</math>, 2.0MHz, max. zero shift) 1cm/s – 16m/s (<math>\alpha=60^\circ</math>, 2.0MHz, max. zero shift)</li> <li>• CW: 1cm/s – 11.60m/s (<math>\alpha=0^\circ</math>, 2.0MHz, max. zero shift) 1cm/s-23.20m/s (<math>\alpha=60^\circ</math>, 2.0MHz, max. zero shift)</li> </ul>	
Signal processing: Dynamic range: 15 steps (10 to 40), Gray maps: 18 basic curves and 3 User-defined (pre, post) Tint maps: 8	
Scale display	Vert.: kHz, cm/s, m/s (selectable), Hor.: 1s marker (big), ½ s marker (small)
Screen Formats	2D/D: up/down (horizontal): three different sub formats 30/70, 50/50, 70/30% left/right (vertical): 50/50%
Display Formats	2D/D (duplex update, simultaneous); 2D+CFM/D, 2D+HD-Flow/D, 2D+PD/D, 2D+TD/D (triplex update, CW or 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)
Display Modes:	
<ul style="list-style-type: none"> <li>• Simultaneous dual mode: 2D/2D+CFM</li> <li>• Triplex mode: 2D+CFM/PW, 2D/M+MCFM</li> <li>• Volume Mode: 3D+CFM</li> </ul>	
Color coding:	
<ul style="list-style-type: none"> <li>• Steps: 65536 color steps</li> <li>• Display modes: V-T (velocity + turbulence), V (velocity), V-P (velocity + power), T (turbulence), P-T (power + turbulence)</li> </ul>	
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:	7 steps (low1, low2, mid1, mid2, high1, high2, max)
Smoothing Filter	12 steps rising time, 12 steps falling time

Gain Control	+15 dB to -15 dB, 0.2 dB steps
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)
Pulse repetition frequency	CFM: 150 Hz to 20.5 kHz MCFM: 150 Hz to 20.5 kHz
Color Map	8 different color codes for each probe
Frequency range	1 to 18 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
Scale	kHz, cm/s, m/s
Automatic moving tissue suppression	Yes

### Power Doppler Mode (PD)

Screen Formats	2D+PD (Single, Dual, Quad)
Display Modes:	
<ul style="list-style-type: none"> <li>• Simultaneous dual mode: 2D/2D+PD</li> <li>• Triplex mode: 2D+PD/PW</li> <li>• Volume Mode: 3D+PD</li> </ul>	
PD coding	256 color steps
PD window size	Lateral: maximum to minimum B mode scan angle Axial: B-scan range
Display mode	P (power)
Wall motion Filter	7 steps (low1, low2, mid1, mid2, high1, high2, max)
Smoothing Filter	Rising edge: 12 steps Falling 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
Frequency range	1 to 18 MHz depending on the probe, adjustable in 3 steps (low, mid, high)
Flow Resolution	4 steps (low, mid1, mid2, high)
Balance	From 25 to 225 in 41 steps
Artifact suppression	Yes



## Scanning Parameters (cont.)

### HD-Flow

Screen Formats	2D+HDF (Single, Dual, Quad)
Display Modes:	<ul style="list-style-type: none"> <li>• Simultaneous dual mode: 2D/2D+HDF</li> <li>• Triplex mode: 2D+HDF/PW; 2D/M+MHDF</li> <li>• Volume mode: 3D+HDF</li> </ul>
HD-Flow Coding Steps	256 color steps
HD-Flow window size: lateral	Maximal to minimal B mode scan angle; axial: B-scan range
Display mode	P (power)
Wall Motion Filter	7 steps (low1, low2, mid1, mid2, high1, high2, max)
Smoothing Filter	12 steps rising edge 12 steps falling 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
Frequency Range	1 to 18 MHz depending on the probe adjustable in three steps (low, mid, high)
Flow Resolution	4 steps (low, mid1, mid2, high)
Balance	From 25 to 225
Artifact suppression	Yes

### Tissue Doppler Mode (TD)

Screen Formats	2D+TD (Single, Dual, Quad)
Display Modes	Simultaneous dual mode: 2D/2D+TD; Triplex mode: 2D+TD/PW, 2D/M+MTD;
TD coding steps	65536 color steps
Depth range	Axial: 0 to B-scan range Lateral: 0 to B-scan-range
Zero line shift	17 steps
Inversion of color direction	Yes
Smoothing Filter	12 steps rising time, 12 steps falling 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	1 to 18 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)

VOL-Frames/sec.: max. 359 (typ. 7-12); The frame rate depends on scan parameters: VOL-box size, quality and probe

4D Volume Cine: up to 400 volumes, up to 512 mb

Display of sectional plane images: synchronous with control seeing, 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 B-Flow
  - 3D/HD-flow incl. CRI
  -
- 4D:
  - 4D Real Time
  - 4D Biopsy
  - VCI-A
  - VCI-OmniView
  - STIC
  - eSTIC

• STIC:

- Fetal Cardio
- STIC Angio: B/Power Doppler (incl. CRI)
- STIC CFM: B/Color Doppler (incl. CRI)
- STIC HD-Flow: B/HD-Flow (incl. CRI)
- STIC B-Flow
- STIC TD

• eSTIC (eM6C probe only):

- STIC B (Fetal Cardio)
- STIC CFM (B/Color Doppler)
- STIC PD (B/Power Doppler)
- STIC B/HD-Flow
- STIC B/TD (B/Tissue Doppler)

Visualization Modes:

- Render
  - 3D/4D Rendering (diverse surface and intensity projection modes)
  - SonoRender*Live*
- Sectional Planes
  - Multiplanar
  - OmniView, actual and projected view
  - Niche
  - SonoVCAD*labor*
- TUI (Tomographic Ultrasound Imaging) (overview image+parallel slices)
  - TUI Standard
  - SonoVCAD*heart*

## Scanning Parameters (cont.)

### Volume Scan Module (cont.)

Visualization Modes:

- Volume Analysis
  - VOCAL: semi-auto/ manual segmentation tool (segmentation using touch screen), (3D Static only) + Threshold Volume: measure volume below and above a threshold
  - SonoAVC*follicle* (Sono Automated Volume Count)
  - SonoAVC*generic*
- VCI (Volume Contrast Imaging)
- Free moveable Light source around following 3D Objects:
  - 3D Rendered Image
  - VOCAL object
  - SonoAVC object

Render Modes:

- HD*live* Silhouette
- HD*live* Flow
- Color
- Mix Mode of two render modes
- Surface Texture
- Surface Smooth
- Surface Enhanced
- Transparency modes: max- min- and X-ray
- Gradient Light
- Inversion
- Glass Body
- Light

Display graphics:

- Rotation axis, center point
- ROI box, 3D Frame
- Temporary 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 (-50 to +50) & contrast (-50 to +50))

Tint maps: Slices: 8; 3D image: 8

Depth render maps: 3

### BF (B-Flow)

Screen Formats	Single (BF), Dual (BF+BF), Quad (BF+BF+BF+BF)
Display Modes	BF, Update: BF/PW
Acc. Power range	1 – 100
Scan angle	Taken from 2D
Gain range	+15 to -15 dB
Gray scale values	8 bit
SRI	Taken from 2D
Persistence filter	8 steps (pre)
S./PRI	1.00, 1.50, 2.00, 3.00, 4.00, 5.00
Quality	3 steps (pre) low, norm, high
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
Accumulation	Off, 0.20, 0.35, 0.50, 0.75, 1.00, 1.50, Infinite
Background	0, 1, 2

### Elastography

Acoustic Power range: 1 – 100

Tx Frequency: 3 (penet/norm/resol)

Transparency: 51 steps (0,5, 10, ...255)

Soft Compress:

- Range: 0-9
- Step Size: 1

Hard Compress

- Range: 0-9
- Step Size: 1

PRF: 10, 15, 25, 40, 60, 85 Hz

Elasto Maps: 8

Persistence:

- Range: 1-9
- Step Size: 1

Line Dens.:

- Range: 1-2

Filter Axial:

- Range: 1-9
- Step Size: 1

Filter Lateral:

- Range: 1-21
- Step Size: 2

Window Length:

- Range: 8-25
- Step Size: 1

Screen Formats:

- Single (2D/Elasto)
- Dual (2D/Elasto+2D/Elasto)
- Quad (2D/Elasto+2D/Elasto+2D/Elasto+2D/Elasto)

Elastography Analysis

Elastography Ratio Measurement

## Scanning Parameters (cont.)

### Bi-Plane Mode (available on eM6C only)

Acc. Power range	1 – 100
Scan angle	B-Mode angle: 75° Bi-Plane angle: 90°
Gain range	+15 to -15 dB
Gray scale values	8 bit
SRI	6 steps (0-5)
CE	On/Off
FFC	On/Off
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 255
Enhance:	6 steps 0, 1, 2, 3, 4, 5
Gray maps:	21 (18 basic & 3 User-defined maps)
Tint maps:	8
Dynamic:	12 different dynamic curves C1–C12

## Scanning Features

### Coded Excitation (CE)

Available on the following probes:

- RIC5-9-D
- 11L-D
- C4-8-D
- RIC6-12-D
- RM6C
- eM6C
- ML6-15-D
- RAB6-D

### Coded Harmonic Imaging

Available on all probes

### Focus Frequency Composite (FFC)

Available on the following probes:

- 4C-D
- RIC5-9-D
- RAB2-5-D
- IC5-9-D
- RIC6-12-D
- RM6C
- C4-8-D
- 9L-D
- eM6C
- RAB6-D
- C1-5-D

### Compound Resolution Imaging (CRI)

Available on all probes, except:

- S4-10-D
- 3Sp-D

### Speckle Reduction Imaging (SRI II)

Available on all probes

### Speckle Reduction Imaging (V-SRI)

- RIC5-9-D
- RIC6-12-D
- RM6C
- eM6C
- RAB6-D
- RAB2-5-D

### Virtual Convex

- S4-10-D
- 9L-D
- 11L-D
- ML6-15-D

### Wide Sector

- 4C-D
- RIC5-9-D
- RAB2-5-D
- RIC6-12-D
- C4-8-D
- eM6C
- RM6C
- RAB6-D
- C4-8-D
- IC5-9-D
- C1-5-D

## Measurements Tool

### Generic measurements

- Distance:
- Distance (Point to Point)
  - Distance (Line to Line)
  - 2D Trace (Trace Length)
  - 2D Trace (Point Length)
  - Stenosis (% Dist.)
  - Ratio D1/D2

- Area/Circumference:
- Ellipse
  - Trace (Line)
  - Trace (Point)
  - Stenosis (%Area)
  - Area (2 Dist.)
  - Ratio A1/A2

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

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

- M-Mode:
- Distance (Point to Point)
  - Time
  - Slope
  - Vessel Diam.
  - HR
  - Stenosis (% Dist.)
  - IMT
  - Stenosis Diam.

### PW Doppler Mode:

- Auto & Manual Trace:
  - PS (Peak Systole)
  - ED (End Diastole)
  - MD (Mid. Diastole)
  - PS/ED (Ratio)
  - PI (Pulsatility Index)
  - RI (Resistance Index)
- Vol. Flow
- PGmax, PGmean
- TAmx (Time avg. max. Velocity)
- TAmx (Time avg. mean Velocity)
- VTI (Velocity Time Integral)
- Heart Rate

### Single Measurements:

- Velocity
- Time
- PI
- PS/ED
- RI
- PS
- Acceleration
- HR
- ED

### 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)
Dorsal Penile Artery (right/left)
Vessel
Summary Reports

### Small part breast calculations

Lesion 1-5 (right/left)
Summary Reports

## Measurements Tool (cont.)

### Obstetrics calculations

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Fetal Biometry
Early Gestation
Fetal Long Bones
Fetal Cranium
NT Method: SonoNT/Manual
AFI
Uterus
Ovary right/left
Umbilical Vein
Placenta Volume
Ductus venosus: S, D, a, PI, PLI, PVIV
Doppler measurements: Ductus Art., Ductus Ven., Ao, Carotid, MCA, Celiac Artery, Superior Mesenteric Artery, Umbilical Art., Umbilical Vein, FHR, Uterine Art.
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

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Chambers
Thorax
Aorta/LVOT
Pulmonary/RVOT
Venous
FHR
Tricuspid valve
Mitral Valve
Aortic
Pulmonary
LPA
RPA
Ductus Art.
Cardiac Output
LT TEI
RT TEI
Ductus Ven.
Umbilical Vein
Pulmonary Veins
Summary Reports

### Obstetrics Z-scores

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Calculation of Z-scores for:	
• Long Axis	• Obl. Short axis
• Aortic Arch	• 4 Chambers
• Short Axis	• Summary Reports

### Cardiology calculations

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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	
PW-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)	
• TEI-Index	
C-Mode:	
• PISA	
Others:	
• Diast. Vol (Bi)	• Mean Gradient
• Syst. Vol. (Bi)	• Mean Gradient
• Stroke Volume	• Acceleration
• Volume Flow	• VTI
• Cardiac Output	• TVA
• Ejection Fraction	• PG
• Fractional Shortening	• PHT
• Myocardial Thickness	• MVA
• LA/Ao Ratio	• AVA
• E/A Peak	• ERO
• Peak Gradient	• CVP (Cardio Vascular
• Acceleration	• Profile) Score
Summary Reports	

### Transrectal calculations

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

## Measurements Tool (cont.)

### Vascular

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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

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### Gynecology

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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

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### Pediatrics

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Left/Right Hip Joint
Pericallosal Artery
Summary Report

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### Cephalic

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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

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### OB Tables

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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

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- BPD: ASUM, ASUM (old), Campbell, CFEF, Chitty (outer-outer) (outer-inner), Eik-Nes, Hadlock\_82, Hadlock\_84, Hansmann, Hobbins, Jeanty, Johnsen, JSUM, Kurmanavicius, Kurtz, Leung, McLennanPersson, Merz, Nicolaides, OSAKA, Rempen, Sabbagha, Shinozuka, Siriraj, Tokyo, Verburg
  - CEREB: Chitty, Goldstein, HILL, Hobbins, Nicolaides, Verburg
  - CLAV: YARKONI
  - CRL: ASUM, DAYA, Eik-Nes, Hadlock, Hansmann, JSUM, McLennan, Persson, Nelson, OSAKA, Rempen, Robinson, Robinson\_BMUS, Sahota, Shinozuka, Tokyo, Verburg
  - FL: ASUM, CFEF, Chitty, Eik-Nes, Hadlock\_82, Hadlock\_84, Hansmann, Hobbins, Hohler, Jeanty, JSUM, Kurmanavicius, Leung, Persson, Merz, Nicolaides, O'Brien, OSAKA, Shinozuka, Siriraj, Tokyo, WARDA, Johnsen
  - FTA: OSAKA
  - FIB: Jeanty
  - GS: Hansmann, Hellman, Holländer, Rempen, Tokyo
  - HC: ASUM, CFEF, Chitty, Hadlock\_82, Hadlock\_84, Hansmann, Jeanty, Kurmanavicius, Leung, Merz, Nicolaides, Siriraj, Johnsen
  - HL: ASUM, Hobbins, Jeanty, Merz, OSAKA
  - LV: Tokyo
  - MAD: Eik-Nes, eSnurra, Kurmanavicius
  - OFD: ASUM, Chitty, Hansmann, Jeanty, Kurmanavicius, Merz, Nicolaides
  - RAD: Jeanty, Merz
  - TIB: Jeanty Merz
  - TAD: CFEF, Merz
  - TTD: Hansmann
  - ULNA: Jeanty, Merz

### Growth Tables:

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- AC: ASUM, CFEF, Chitty, Hadlock, Hansmann, Jacot-Guillarmod, Jeanty, JSUM, Lai\_Yeo, Kurmanavicius, Lessoway, Leung, Merz, Nicolaides, Shinozuka, Siriraj, Tokyo, Verburg, Johnsen, Medvedev
  - AD: Persson
  - AFI: Moore
  - Aorta: Vmax: Rizzo
  - APAD: Merz
  - APTD: Hansmann
  - APTDxTTD: Shinozuka\_SD
  - AxT: Shinozuka, Tokyo
  - BOD: Jeanty
  - BPD: ASUM, Campbell, CFEF, Chitty, Eik-Nes, Hadlock, Hansmann, Jacot-Guillarmod, Jeanty, JSUM, Kurmanavicius, Lai\_Yeo, Lessoway, Leung, Persson, McLenna, Merz, Nicolaides, OSAKA, Sabbagha, Shinozuka, Siriraj, Tokyo, Verburg, Medvedev
  - CLAV: YARKONI
  - CM: Nicolaides
  - CRL: ASUM, Hadlock, Hansmann, JSUM, McLennan, Persson, OSAKA, Robinson, Robinson 1993, Shinozuka, Tokyo, Pexters, Medveev
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## Measurements Tool (cont.)

### OB Growth Tables (cont.)

- DV a/S: JSUM
- DV PI: Baschat, JSUM
- DV PLI: Baschat
- DV PVIV: Baschat
- DV S/a: Baschat
- FL: ASUM, CFEF, Chitty, Eik-Nes, Hadlock, Hansmann, Jacot-Guillarmod, Jeanty, JSUM, Kurmanavicius, Lessoway, Lai\_Yeo, Lessoway, Leung, Persson, Merz, Nicolaides, O'Brien, OSAKA, Shinozuka, Siriraj, Tokyo, Verburg, WARDA, Johnsen, Medvedev
- FTA: OSAKA
- FIB: Chitty, Jeanty, JFFSD, Siriraj
- FWg: Alexander
- Foot: Chitty
- GS: Hellman, Nyberg, Rempen, Tokyo
- HC: ASUM, CFEF, Chitty, Hadlock, Hansmann, Jacot-Guillarmod, Jeanty, Kurmanavicius, Lai\_Yeo, Lessoway, Leung, Merz, Nicolaides, Siriraj, Verburg, Johnsen, Medvedev
- HL: ASUM, Chitty, Jeanty, Lai\_Yeo, Merz, JFFSD, OSAKA, Siriraj, Medvedev
- IVC PLI: JSUM
- Lung Area Left/Right: Peralta
- LV: Tokyo
- MCA PI, RI: JSUM, Bahlman
- MCA PV: Mari
- MAD: Eik-Nes, eSnurra, Kurmanavicius
- MV E/A: HARADA
- NBL: BUNDUKI, SONEK, Medvedev
- OFD: ASUM, Chitty, Hansmann, Jeanty, Kurmanavicius, Merz, Nicolaides, Medvedev
- MainPA Vmax: Rizzo
- RAD: Chitty, Jeanty, JFFSD, Merz, Siriraj
- SAG. AP: Malinger
- SAG. CC: Malinger
- TAD: CFEF, Jacot-Guillarmod, Merz
- TC: Chitkara
- TCD: Goldstein, Hill, Jacot-Guillarmod, Nicolaides, Verburg
- TIB: Chitty, Jeanty, JFFSD, Merz, Siriraj
- TTD: Hansmann
- TV E/A: HARADA
- ULNA. Chitty, Jeanty, JFFSD, Merz, Siriraj
- UmbArt PI: JSUM, Merz
- UmbArt RI: JSUM, Merz, Kurmanavicius
- UtArtPI: Merz
- UtArtRI: Merz
- Vermis A: Malinger
- Vermis C: Malinger
- Fractional Limb Avol/Tvol: Lee

### Fetal weight Estimation (EFW)

- Campbell (AC)
- Hadlock (AC, BPD)
- Hadlock 1 (AC, FL)
- Hadlock 2 (BPD, AC, FL)
- Hadlock 3 (HC, AC, FL)
- Hadlock 4 (BPD, HC, AC, FL)
- Hansmann (BPD, TTD)
- Lee (AVOL; AC, AVOL; AC, BDP, AVOL; TVOL; AC, TVOL; AC, BDP, TVOL)
- Merz (AC, BPD)
- Osaka (BPD, FTA, FL)
- Persson (BPD, MAD, FL)
- Persson 2, Schild (HC, AC, FL)
- Shepard (AC, BPD)
- Shinozuka 1 (BPD, ADTP, TTD, FL)
- Shinozuka 2 (BPD, FL, AC)
- Shinozuka 3 (BPD, APTD, TTD, LV)
- Tokyo (BPD, APTD, TTD, FL)

### Gestational Age by EFW

- Hadlock, JSUM 2001, Osaka, Shinozuka, Tokyo

### Fetal Weight Growth FWg

- Alexander, Ananth, Bourgoigne, Brenner, Doubilet, Eik-Nes, Hadlock, Hansmann, Hansmann (86), Hobbins/Persutte, Johnsen, Jsum 2001, Kramer, Persson, Osaka, Shinozuka, Tokyo, Williams, Yarkoni

### 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)

LHR (Peralta)

CVR (Peranteau)

### Probes

#### 4C-D

##### Wide Band Convex Probe

Applications	Abdomen, OB, GYN
Maximum Bandwidth (-20dB)	2-5 MHz
Number of Elements	128
Convex Radius	60.5 mm
FOV	81°
Foot Print	18.3 x 68.7 mm
Depth	Max. 36 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket



## Probes (cont.)

### C1-5-D

Wide Band Convex Probe	
Applications	Abdomen, OB, GYN, Fetal Cardio
Maximum Bandwidth (-20dB)	2-5 MHz
Number of Elements	192
Convex Radius	56.1 mm
FOV	113°
Foot Print	69.3 x 17.2 mm
Depth	Max. 30 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### C4-8-D

Wide Band Convex Probe	
Applications	Abdomen, OB, GYN, Pediatrics, Fetal Cardio
Maximum Bandwidth (-20dB)	2-8 MHz
Number of Elements	192
Convex Radius	39.1 mm
FOV	95°
Foot Print	55.2 x 17.6 mm
Depth	Max. 26 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### IC5-9-D

Wide Band Convex Probe	
Applications	OB, GYN, Transrectal
Maximum Bandwidth (-20dB)	4-9 MHz
Number of Elements	192
Convex Radius	10.8 mm
FOV	179°
Foot Print	21.2 x 17.2 mm
Depth	Max. 16 cm
Biopsy Guide Available	Single-Angle, Reusable and disposable

### 11L-D

Wide Band Linear Probe	
Applications	Small Parts, Pediatrics, MSK, Peripheral Vascular, Breast
Maximum Bandwidth (-20dB)	4-10 MHz
Number of Elements	192
FOV	37.4 mm
Foot Print	46.9 x 14.4 mm
Depth	Max. 11 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### 9L-D

Wide Band Linear Probe	
Applications	Small Parts, Pediatrics, MSK, Peripheral Vascular, OB
Maximum Bandwidth (-20dB)	3-8 MHz
Number of Elements	192
FOV	43 mm (width)
Foot Print	53.0 x 14.1 mm
Depth	Max. 14 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### ML6-15-D

Wide Band Matrix Linear Probe	
Applications	Small Parts, Peripheral Vascular, Pediatrics, MSK, Breast
Maximum Bandwidth (-20dB)	4-13 MHz
Number of Elements	1008
FOV	49.6 mm (width)
Foot Print	60.7 x 16 mm
Depth	Max. 12 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### RAB2-5-D

Wide Band Convex Volume Probe	
Applications	Abdomen, OB, GYN
Maximum Bandwidth (-20dB)	1-5 MHz
Number of Elements	192
Convex Radius	46 mm
Volume Sweep Radius	22.6 mm
FOV	98° (B), 98° x 85° (Volume scan)
Foot Print	63.6 x 38.9 mm
Depth	Max. 30 cm
Biopsy Guide Available	PEC74, Single-Angle, Reusable and disposable

## Probes (cont.)

### RAB6-D

Wide Band Convex Volume Probe	
Applications	Abdomen, OB, GYN, Pediatrics
Maximum Bandwidth (-20dB)	2-8 MHz
Number of Elements	192
Convex Radius	46.8 mm
Volume Sweep Radius	24.11 mm
FOV	90° (B), 90° x 85° (Volume scan)
Foot Print	62.2 x 34.0 mm
Depth	Max. 26 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### RM6C

Wide Band Convex Volume Probe with Active Matrix Array Technology	
Applications	Abdomen, OB, GYN, Pediatrics, Fetal Cardio
Maximum Bandwidth (-20dB)	1-7 MHz
Number of Elements	960
Convex Radius	58.8 mm
Volume Sweep Radius	22.8 mm
FOV	90° (B), 90° x 85° (Volume scan)
Foot Print	64.1 x 40.1 mm
Depth	Max. 26 cm
Biopsy Guide Available	PEC 81, Single-Angle, Reusable

### RIC5-9-D

Wide Band Convex Volume Probe	
Applications	OB, GYN, Transrectal
Maximum Bandwidth (-20dB)	4-9 MHz
Number of Elements	192
Convex Radius	11.6 mm
Volume Sweep Radius	11.6 mm
FOV	179°(B), 179° x 120° (Volume scan)
Foot Print	22.4 x 22.6 mm
Depth	Max. 16 cm
Biopsy Guide Available	PEC63, Single-Angle, Reusable, Disposable, disposable with latex cover

### RIC6-12-D

Wide Band Convex Volume Probe	
Applications	OB, GYN, Transrectal
Maximum Bandwidth (-20dB)	5-13 MHz
Number of Elements	256
Convex Radius	11.6 mm
Volume Sweep Radius	11.6 mm
FOV	195°(B), 195° x 120° (Volume scan)
Foot Print	22.4 (B) x 22.6 (V) mm
Depth	Max. 13 cm
Biopsy Guide Available	PEC63, Single-Angle, Reusable, Disposable, disposable with latex cover

## Probes (cont.)

### 3Sp-D

Wide Band Phased Array Probe	
Applications	Abdominal, Cardiology, OB, Pediatrics, Cephalic
Maximum Bandwidth (-20dB)	1-5 MHz
Number of Elements	64
FOV	90°
Foot Print	23.4 x 20.2 mm
Depth	Max. 24 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

### S4-10-D

Wide Band Phased Array Probe	
Applications	Small Parts, Cardiology, Pediatrics
Maximum Bandwidth (-20dB)	4-9 MHz
Number of Elements	128
FOV	90°
Foot Print	20.0 x 15.0 mm
Depth	Max. 14 cm
Biopsy Guide Available	Not available

### eM6C

Wide Band Convex Volume Probe with Active 2D Electronic Matrix Array Technology	
Applications	Abdomen, OB, GYN, Fetal Cardio
Maximum Bandwidth (-20dB)	1-6 MHz
Number of Elements	8192
Convex Radius	50.3 mm
Volume Angle	90°
FOV	85° (B), 85° x 90° (Volume Scan)
Foot Print	62.2 x 30.4 mm
Depth	Max. 26 cm
Biopsy Guide Available	Multi-Angle, disposable with reusable bracket

## External Inputs and Outputs

Connectivity on rear panel (direct access)

- VGA out
- Network (RJ45)
- Wireless Network interface (USB) (Option)
- USB 2.0 (3x)
- USB 3.0 (3x)
- S-Video Out 1
- HDMI

Connectivity behind rear panel (access after opening):

- DVI-D out
- S-Video Out 1
- Audio Out
  - Left/right
- Audio In
  - Left/right

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- USB 2.0 (3x)
  - RS 232: via USB to RS 232 converter
  - Ext. Device/Remote Connections:
    - Remote BW Printer via USB
    - Remote Color Printer/DVR via USB
    - Remote VCR (RS232)/DVR via USB
    - Remote Printer via Bluetooth connection Kit (Option)
    - Footswitch via USB
    - ECG
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## Safety Conformance

### The Voluson E10 is:

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NRTL certified according UL 60601-1 (TÜVPS)

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

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CB-Test Report by National Certification Body

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

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Conforms to the following standards for safety:

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IEC 60601-1 Electrical Medical Equipment

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IEC 60601-1-2 Electromagnetic compatibility

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IEC 62304 Software Life Cycle Processes

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IEC 62366 Application of usability engineering to medical devices

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EN 60601-2-37 Particular requirements for the safety of ultrasound medical diagnostic and monitoring equipment

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IEC 601157 Declaration of acoustic output

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ISO 10993 Biological evaluation of medical devices

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IEC 62359 Ultrasonic - Field characterization - Test methods for the determination of thermal and mechanical indices related to medical diagnostic ultrasonic fields

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WEEE (Waste Electrical and Electronic Equipment)

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ROHS according to 2011/65/EU

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