

TECHNICAL SPECIFICATIONS OF HIGH END ULTRASOUND (FOR RADIOLOGY)

General Description of Ultrasound System:

1. A premium ultrasound system of the highest performance class is required for advanced fine diagnostic imaging and research. Technology for dynamic transmission focusing, at least four imaging pin-less transducer connections as well as a high-resolution viewing Medical/Clinical grade monitor in BARCO / EIZO/ LG/ equivalent technology and a touch panel for easy operation must be included in the basic device.
2. A full portfolio of high-performance transducers supporting superb image quality. Imaging even at high penetration depths up to 55 cm must be meaningful using appropriate technology.
3. Advanced applications such as Contrast Enhanced Ultrasound (CEUS), Shear wave Elastography, ultrasound derived fat fraction (UDFF) and image fusion must be possible and can be retrofitted if necessary. Of particular importance is the contrast medium capability should be available on Convex, Linear & TV transducers as well as the possibility of being able to operate shear wave elastography with selected convex, linear & TV/TR transducers to support precise lesion detection and characterization and to potentially reduce the need for invasive procedures.
4. **Hard Drive:** The system supports up to 1 TB of local storage capacity.
5. **QWERTY Keyboard:** The system supports a retractable / physical keyboard on the console.
6. **Touch Display:** The system supports an integrated LCD touch display with min. of 12.0" screen.
7. **Transducer Ports:** The system supports minimum 4 active transducer ports.
8. **Monitor:** Full high-definition video display 22-inch or above diagonal widescreen with BARCO / EIZO / LG/ equivalent technology with 1,920 x 1,080 pixels resolution.
9. **Beamformer Technology:** The system shall utilize a new generation all-digital beamformer technology which enables parallel quad / pixel beam processing of the RF signal data in the time and amplitude domains.
10. **Processing Channels:** The system supports more than 11,000,000 channels.
11. **System Imaging Frequency range:** The system supports imaging frequency range from 1.0 – 21 MHz.
12. **Dynamic range:** The system shall provide a dynamic range of at least 380 dB.
13. **System Imaging Depth:** The system supports a maximum imaging depth of 55 cm.
14. **Virtual Format Imaging:** The system supports image steering left/right and trapezoid image format.
15. **Magnification:** The system supports digital magnification with up to 20X times.
16. **Magnification Modes:** The system supports magnification in frozen, cine, or real time imaging.

17. **Anatomical M-mode:** The system supports anatomical M-mode in live and cine.
18. **Color Flow Optimization:** The system supports up to 3-5 anatomy based and flow state optimizations.
19. **Auto Flash Artifact Suppression:** The system can detect and prevent color motion artifacts to reduce noise, while at the same time enhances color sensitivity for improved image quality, reduced variability between users and improved workflow.
20. **Directional Power Doppler:** The system supports directional Power Doppler.
21. **Power Doppler flow states – Anatomy:** The system supports anatomic specific user-selectable directional Power Doppler flow states.
22. **Pulse Repetition Frequency in PW-mode:** The system supports PRF scale range of at least 100 to 25,000 Hz.
23. **High Pulse Repetition Frequency PW Doppler:** The system supports HPRF PW Doppler scale range of at least 500 to 35,000 Hz.
24. **Doppler Automated Optimization Function:** Optimizes multiple parameters including baseline, scale (PRF), wall filter and gain automatically on freeze or on demand (user configurable).
25. **Transmit Frequency in CW-mode:** The system supports user-selectable transmit frequencies from 1.8 to 5.0 MHz.
26. **Steerable Continuous Wave (SCW) Doppler:** The system supports steerable continuous wave Doppler with Phased Array.
27. **Angle Correction PW/CW:** The system supports Angle correction 0 – 89°.
28. **2D-mode Display:** The system supports Small, Medium & large image modes, Live Dual, Dual and seamless dual screen formats from live imaging. Dual screen is also available on freeze. The system also supports independent cine of Live Dual on freeze.
29. **Color/Power-mode Display:** The system supports 2D/C-mode and Live Dual 2D-2D/C-mode.
30. **Live Dual in 2D-mode:** The system supports side-by-side in real-time.
31. **Transducer Scan Formats:** The system supports Curved, Micro-Convex, Linear, Vector, Endo cavity and Volume-Endo cavity transducers.
32. **Contrast resolution:** The system supports a method for reducing speckles and enhances contrast to provide a realistic tissue presentation and patient-specific processing that adapts to differences in tissue.
33. The system supports dynamic persistence or a similar technology to reduce B-Mode noise and improve image quality.
34. **Auto Flash Artifact Suppression:** The system can detect and prevent color motion artifacts to reduce noise, while at the same time enhances color sensitivity for improved image quality, reduced variability between users and improved workflow.
35. **Compound Imaging:** The system supports 2D image optimization technique for enhanced viewing of tissue differences by detection of subtle lesions and enhanced tissue differentiation.

36. **Auto Image Optimization (2D-mode):** The system optimizes the overall field-of-view (FOV) image brightness uniformity by changing the depth gain compensation and overall gain. Supports 2D-mode(s) optimization in real time or from freeze.
37. **Auto Image Optimization (PW-mode):** The system optimizes the overall field-of-view (FOV) image brightness uniformity by changing the depth gain compensation and overall gain. Supports PW-mode optimization in real time or from freeze.
38. **Auto Image Optimization (Continuous):** The system continuously applies the Auto Image Optimization to a 2D-mode image while live scanning.
39. **Modality Compare:** The system images and volumes from other modalities like Computed Topography (CT), Magnetic Resonance Imaging (MRI), Mammography and Ultrasound into the ultrasound system for simultaneous viewing alongside the real-time ultrasound image.
40. **Panoramic Imaging:** The system supports grayscale and power Doppler panoramic imaging that allow acquisition and display of images up to 60 cm in length.
41. **Contrast Agent Imaging:** The system supports a mode dedicated to contrast agent imaging with all the transducers.
42. The system supports Flash Sequencing, the ability to program and execute a sequence of acquisition events in a single keystroke including timed burst, Peak hold, timed clip acquisition and freeze post sequence.
43. **Strain Imaging:** The system supports a qualitative representation of relative tissue stiffness for the region of interest. Strain Ratio provides a quantifiable method to compare the relative stiffness of tissue within two user-selectable regions of interest.
44. **Tissue Shear Velocity (2D SWE):** The system supports the ability to qualitatively depict shear velocity for a selected region of interest on a 2D image and provides quantitative measurements of shear velocity (V_s) and elasticity (E) for selected points within the region of interest.
45. **Auto Tissue Shear Velocity:** The system supports the ability to automatically measure up to 10-12 valid tissue shear velocity (V_s) and elasticity (E) measurements
46. **Ultrasound Liver Fat Quantification:** The system supports the ability to determining hepatic steatosis, a similar clinical utility to MRI-PDF (Magnetic Resonance Imaging Proton Density Fat Fraction).
47. **Fusion Imaging:** The system supports Fusion imaging that aligns reference data from Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) with a real-time ultrasound.
48. **Needle Tracking with Fusion Imaging:** The system supports the necessary components to track and plan biopsy and ablation procedures with magnetic position sensing and motion tracking.
A quality indicator displays the signal strength of the needle tracking sensor and magnetic field.
49. **Vascular Enhancement:** The system supports a real-time, adaptive, pixel-by-pixel vascular analysis to reduce noise within macro- and microvascular structures, provide clearer vessel

wall definition with improved tissue boundary detection, and enhance tissue contrast resolution.

50. **Auto Doppler:** The system supports a workflow automation tools by updating the imaging parameters including color box position and steering angle, PW gate position, steering angle, and angle correction.
51. **Automatic OB Measurements:** The system supports automatic measurement of fetal structures required for fetal biometry CRL, BPD, HC, AC, FL, HL and OFD.
52. **3D-mode:** The system supports acquiring three-dimensional images with maximized resolution for assessing structures.
53. **3D acquisition technique:** The system supports user-adjustable region of interest and volume of interest during setup (ROI/VOI), for size, position and curve (VOI only) and position.
54. **3D Multi Slice function:** The system supports Multi Slice function to allow the user to select range, slice spacing and display format for viewing each slice in review.
55. **4D-mode:** The system provides acquiring and simultaneous viewing of three-dimensional images in real-time for assessing motion.
56. **4D Rendering:** The system supports rendering methods: surface, surface of varying opacity, maximum intensity projection, minimum intensity projection, translucent lighting.

Transducer Technology:

Transducer Types: The system supports high density Phased Array, Curved Array and Linear Array transducers.

Single Crystal Technology: The latest generation single-crystal piezoelectric designs offer wider bandwidths for better harmonic imaging and axial resolution. This allows greater sensitivity for deeper penetration and clearer imaging.

1. **CONVEX Transducer:** Frequency range: 1.5 – 5.0 MHz
2. **CONVEX Transducer:** Frequency range: 3 – 7.0 MHz
3. **CONVEX 3D/4D Transducer:** Frequency range: 2 – 6.5 MHz
4. **LINEAR Transducer:** Frequency range: 4 – 9 MHz
5. **LINEAR Transducer:** Frequency range: 6 – 15 MHz
6. **LINEAR Hockey Stick Transducer:** Frequency range: 6 – 18 MHz
7. **Endo Cavity Transducer:** Frequency range: 5 – 8 MHz
8. **Endo Cavity 3D/4D Transducer:** Frequency range: 5 – 9 MHz

CINEReview:

The system supports a maximum Cine Memory up to 80,000 frames or 300 sec / 1GB in space which should include 2D and cine clip up to 30 sec in Doppler mode.

Post-Processing in Freeze and CINE:

The system shall provide post-processing functions in 2D mode-, Color-, Doppler- and M-mode.

Study Types:

The system shall provide factory-supplied exam and transducer dependent imaging presets. Optimized for each application to provide consistency, reliability and increased productivity. All applications include body markers, text and annotation labels.

The system shall provide One-touch registration | the system identifies new procedure descriptions and saves the configuration for future workflow efficiency.

Workflow Protocols:

The system shall provide a dedicated control for workflow protocols e.g., Activate, Pause, Resume and Advance with increasing efficiency and decreasing user keystrokes.

Automated Trace Measurement:

The system shall perform automated trace measurements with area, maximum diameter by using a border detection algorithm on a user-defined region of interest.

Data Storage and Review:

The system shall support data storage and review of completed ultrasound studies, including static images, dynamic clips, measurements, calculations, and reports.

Clip Capture:

The system shall provide a prospective and retrospective clip capture capability.

Exported Image Formats

The system shall export images in RTF, PDF, TIFF, JPG and DICOM format.

Exported Video formats

The system exports images in AVI and DICOM Multi frame format.

USB Ports

The system supports USB 3.0 ports (front/rear) and supports export to USB flash drive.

Virtual Workstation

Enables users access to PACS, RIS and Cloud PACS directly from the ultrasound system.

WLAN Network Connections

The system supports integrated adapter for Wireless Network (WLAN) capability.

Network standard:

- 802.11a
- 802.11b
- 802.11ac
- 802.11g
- 802.11n

Frequency bandwidth:

- 2.4 GHz
- 5 GHz

DICOM Modality Worklist

The system supports query and direct download of the patient worklist schedule from the Hospital/Radiology Information System (HIS/RIS).

DICOM Modality Performed Procedure Step

The system supports automatic exchange of Modality Performed Procedure Step information with the Hospital/ Radiology Information System (HIS/RIS).

Gel Warmer

The system shall have integrated gel warmer.

Design Standards

The system shall comply with any of the design standards or equivalent body

- ANSI/AAMI ES 60601-1
- CSA C22.2 No. 601.1
- EN 60601-1 and IEC 60601-1
- EN 60601-1-2 and IEC 60601-1-2 (Class A)
- EN 60601-1-6 and IEC 60601-1-6
- EN 60601-2-18 and IEC 60601-2-18
- EN 60601-2-37 and IEC 60601-2-37
- EN 62304 and IEC 62304
- EN 62366 and IEC 62366
- EN ISO 14971 and ISO 14971.

Others

The system should be BIS /USFDA /European CE certified.

Online UPS with 30 minutes back up is to be provided by the bidder.

Printers: System should be supplied with one B/W thermal and one High Density Laser Color Printer along with 8 sets of black cartridges and 8 sets of color cartridges.

On site training of two weeks to be provided followed by another two weeks for advanced application training.

Comprehensive warranty for 5year for the complete system including all accessories supplied with the main equipment . Quote comprehensive maintenance contract (CAMC) for complete system including all accessories supplied with the main equipment for additional 5years after expiry of warranty of 5 years.