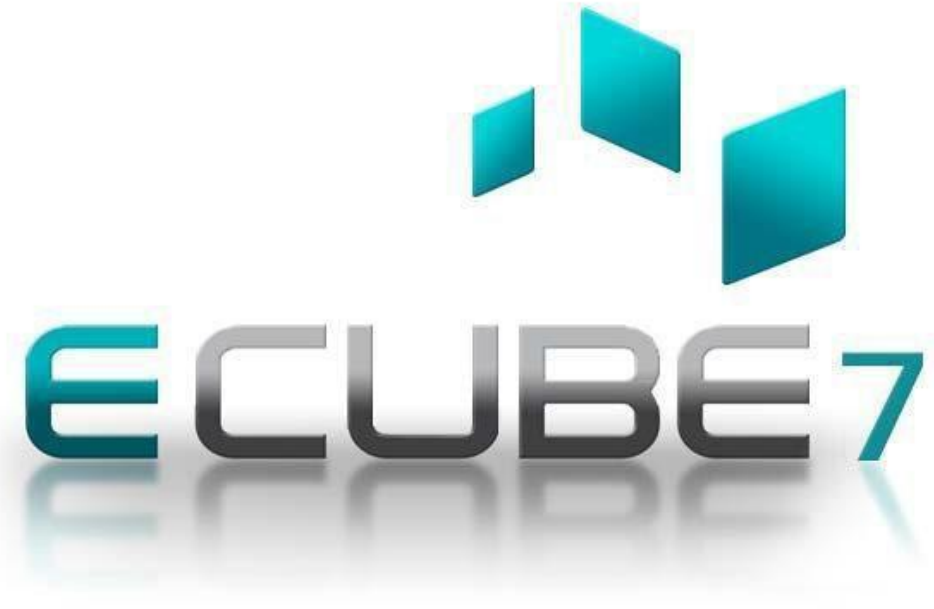

TECHNICAL SPECIFICATION

Version 3.0

ALPINION
MEDICAL SYSTEMS

15 Nov 2013

E CUBE 7

SYSTEM SPECIFICATION

Featuring ALPINION's core imaging technologies, the E-CUBE 7 delivers user superior image quality without case dependency.

E^3
E cubed

ERGONOMIC DESIGN
EFFICIENT WORKFLOW
EXTREME ACCURACY

01 SYSTEM INTRODUCTION

PHYSICAL DIMENSIONS

- Weight: 57kg
- Height: 1355 (short) / 1425 (tall) mm (minimum-monitor folded: 1070mm(S), 1140mm (T))
- Width: 509mm
- Depth: 670mm

MONITOR

- 18.5" Wide LED
- Brightness, contrast adjustment (OSD button)
- IPS (In plane switching) technology
- Monitor tilt (Monitor ARM)
  - > 15 degree up, 90 degree down
  - > ±135 degree swivel
- Integrated stereo speakers
- Display size: 1366 X 768
- Recording area: 880 X 660

Monitor ARM

- Adjustable Tilt/Swivel
- Safety space for protecting of hands during monitor folding operation

TRANSDUCER CONNECTOR

- 3 active Transducer ports (Optional High density array port: 3rd port)

CONTROL PANEL

- Back-lit Alphanumeric keyboard
- Alphanumeric QWERTY keyboard
- 8 steps TGC (Time Gain Compensation) keys
- 5 Soft keys
- 2 User define keys
- 14 Power preset keys
- On/Off task light and back-lit illumination of control panel

CONSOLE DESIGN AND USER INTERFACE

- 3 active Transducer ports
- Integrated HDD (Capacity: over 500GB)
- Integrated DVD-R/W Drive
- On-board Storage for Peripherals
  - > B/W Printer, Color Printer or DVD recorder
- Control panel Fixed Type
- 3 Transducer holders, detachable for cleaning and washing
- Air Filters
- Front Handle
- Wheel-lock Mechanism
  - > Front-wheel & Back-wheel: Total Lock
- 6 USB ports: Front side (2 ea), Back side (4 ea)
- Thumbnail images on-screen
- On-line Help key

HARD DISK DRIVE

- Internal 385 GB hard disk drive for patient database management

ELECTRICAL POWER

- Voltage: 100 - 120V, 220 - 240V
- Frequency: 50/60Hz
- Power: Max. 600 VA with Built-in and On-Board Peripherals

SYSTEM ON/OFF AND RESPONSE TIME

- Boot up time: 120 sec
- Shutdown time: 30 sec
- Response time: 0.5 sec (B-mode --> Duplex mode), 1.0 sec (B-mode --> Triplex mode)

LANGUAGE SUPPORT

- English
- German
- French
- Spanish
- Italian
- Russian

- Brazilian

02 SYSTEM OVERVIEW

APPLICATIONS

- Abdominal
- Obstetrical
- Gynecological
- Cardiac
- Vascular
- Urological
- Small Parts and Superficial
- Pediatric and Neonatal
- Transcranial
- Emergency Medicine

OPERATING MODES

- B-mode
- M-mode
- Pulsed Wave (PW) Doppler mode
- Continuous Wave (CW) Doppler mode
- Color Flow (CF) mode
- Power Doppler (CF) mode
- Anatomical M-mode
- THI (Tissue Harmonic Imaging, PI/FTHI)
- Beam Steering
- Directional Power Doppler mode
- SRI (Speckle Reduction Imaging)
- FSRI (Full Speckle Reduction Imaging)
- Spatial compounding
- Frequency compounding
- Auto IMT
- Auto traces PW
- Panoramic B/CF
- Xpeed on 2D / CF/PW
- 3D/4D Volume mode

DISPLAY MODES

- Duplex mode
  - > PW Doppler mode (B/PW)
  - > CW Doppler mode (B/PW)
  - > Color Flow mode (B/CFM)
  - > Power Doppler mode (B/PDI)
  - > Motion mode (B/M)
  - > Directional Power Doppler mode
- Real Time Triplex mode (B /CFM/PW, B/CFM/CW, B/PDI/PW, B/PDI/CW)
- Zoom: Write/ Read/Pan (Write zoom up to 8x)
- Colorized Image (B, M, PW, CW)
- Virtual Convex
  - > Left/Right steer

  > Trapezoid Imaging
- Full Screen
- Quad Screen Display
- Time Line Display
  > Independent Dual B/PW Display
  > Display Formats
    - Vertical: 1/2, 1/3, 2/3
    - Horizontal: 1/2, 1/3, 2/3
  > Full: Time Line Only (PW / M)
- Maximum Depth: 30cm

DISPLAY ANNOTATION

- Institution/Hospital Name: 25 Characters
- Date: 3 types selectable
  > YYYY/MM/DD, MM/DD/YYYY, DD/MM/YYYY
- Time: 2 types selectable
  > 24 hours, 12 hours
- Operator Identification
- Patient Name: First, last, middle name
- Patient Identification: 64 Characters
- Gestational Age form
  > LMP/EDC/GA
- Acoustic power output
  > MI (Mechanical Index)
  > TIS (Thermal Index Soft Tissue)
  > TIC (Thermal Index Cranial (Bone))
  > TIB (Thermal Index Bone)
- System Status (real-time or frozen)
- Transducer Directional Marker
- Image Preview: Thumbnails
- Gray/Color Bar
- Cine Gauge
- Measurement Summary Window
- Measurement Results Window: pre-settable display location
- Transducer Type
- Application Name
- Imaging Parameters by mode (current mode highlighted)
  > B mode
    - Imaging Frequency
    - Dynamic Range
    - Rejection
    - Virtual
    - Angle Steer
    - Gray Map
    - Colorize
    - Up/Down
    - Power Output
    - SRI
    - FSRI
    - Persist
    - Spatial Compounding

- Line Density
- Frequency Compounding

> M mode
- Anatomical M-mode
- Dynamic Range
- Rejection
- AMM Angle
- Sweep Speed
- Gray Map
- Colorize
- Full Screen M mode
- Power Output

> Color Flow mode
- Doppler Frequency
- PRF
- Angle Steer
- Baseline
- Invert
- Wall Filter
- Persist
- Color Map
- Threshold
- Power Output
- Ensemble
- Line Density
- Smooth

> Power Doppler mode
- Doppler Frequency
- PRF
- Angle Steer
- Wall Filter
- Persist
- Color Map
- Threshold
- Power Output
- Ensemble
- Line Density
- Smooth

> PW mode
- Sample Volume Width
- PRF
- Angle Steer
- Base Line
- Invert
- Doppler Frequency
- Wall Filter
- Angle Correct
- Sweep Speed
- Full Screen PW mode
- Power Output

- Rejection
- Dynamic Range
- Gray Map
- Colorize
- Time Resolution
- Update
- Auto Calculation
- Method
- Direction
- Sensitivity

> CW mode

- PRF
- Baseline
- Inverse
- Doppler Frequency
- Wall Filter
- Angle Correct
- Sweep Speed
- Full Screen CW mode
- Power Output
- Rejection
- Dynamic Range
- Gray Map
- Colorize
- Time Resolution
- Auto Calculation
- Method
- Direction
- Sensitivity

• TGC Curve: On/Off
• Body Pattern: 164 types
• B Scale Markers
• M Scale Markers
> Time/Depth
• Caps Lock: On/Off
• System Message Display
• Trackball Functionality Status Display
• Heart Rate
• Biopsy Guide Line and Zone
• Focal Zone mark

ANNOTATION PACKAGE

• Arrow
> Arrow size: S, M, L, XL
> Rotate Arrow
• Body pattern
• Text
> Font Color: Green, Yellow, White, Orange
> Text size: S, M, L

IMAGE PROCESSING

B MODE

- Gain: 0-90 db (1db increment)
- Imaging Frequency: 3 Selectable Imaging frequencies
- Dynamic Range: Up to 192 dB
- Rejection: 10 steps
- Virtual: ON/OFF
- Angle Steer: 6 steps
- Gray Map: 14 steps (0-13)
- Colorize: 21 steps (0-20)
- Up/Down: ON/OFF
- Power Output: 1-100% (2% increment)
- SRI: ON/OFF
- FSRI: 5 steps
- Persist: 4 steps
- Spatial Compounding: 3 steps
- Line Density: 5 steps
- Frequency Compounding: ON/OFF
- Transmit Focus position: 30 position types
- Multi Focus: Max 8

M MODE

- Anatomical M-mode: On/Off
- Dynamic Range: 30-150 dB
- Rejection: 10 steps
- Sweep Speed: 5 steps
- Gray Map: 14 steps (0-13)
- Colorize: 19 steps (0-18)
- Full Screen M mode: ON/OFF
- Power Output: 1-100% (2% increment)

PW MODE

- SV Gate Width: 13 steps (0.7,1,2,3,4,5,6,7,8,9,10,11,15)
- PRF: 300Hz – 20100Hz (Transducer dependent)
- Angle Steer: 6 steps
- Base Line: 16 steps
- Invert: ON/OFF
- Doppler Frequency: 3 selectable frequencies
- Wall Filter: 9 steps
- Maximum/Minimum Velocity Scales
  - > Max: 52m/sec (Angle/Transducer dependent)
  - > Min: 10cm/sec
- Angle Correct: ±89°, (1° step)
- Sweep Speed: 5 steps
- Full Screen PW mode: ON/OFF
- Power Output: 1-100% (2% increments)
- Rejection: 10 steps
- Dynamic Range: 30-120dB
- Gray Map: 14 steps (0-13)
- Colorize: 19 steps (0-18)

- Time Resolution: 1-7
- Update: Frozen, Live, 2,3,4,8,16s
- Auto Calculation: ON/OFF
- Method: Mean, Max, Both
- Direction: Below, Above, Both
- Sensitivity: 20 steps

CW MODE

- PRF: 500Hz – 78100Hz (Transducer dependent)
- Baseline: 16 steps
- Inverse: ON/OFF
- Doppler Frequency: 2 selectable frequencies
- Wall Filter: 9 steps
- Maximum/Minimum Velocity Scales
  - > Max: 270m/sec (Angle/Transducer dependent)
  - > Min: 10cm/sec
- Angle Correct: ±89°
- Sweep Speed: 5 steps
- Full Screen CW mode: ON/OFF
- Power Output: 0~100%
- Rejection: 10 steps
- Dynamic Range: 30-120dB
- Gray Map: 14 steps (0-13)
- Colorize: 19 steps (0-18)
- Time Resolution: 1-7
- Auto Calculation: ON/OFF
- Method: Mean, Max, Both
- Direction: Below, Above, Both
- Sensitivity: 20 steps

COLOR FLOW MODE

- Doppler Frequency: 3 selectable frequencies
- PRF: 300Hz-20,100Hz (Transducer dependent)
- Angle Steer: 6 steps
- Baseline: 40 steps
- Invert: ON/OFF
- Wall Filter: 7 steps
- Persist: 10 steps
- Color Map: 10 steps (0-9)
- Threshold: 0-100%
- Power Output: 1-100%
- Ensemble: 6-16
- Line Density: 2 steps
- Smooth: 10 steps

POWER DOPPLER MODE

- Doppler Frequency: 3 selectable frequencies
- PRF: 300Hz-20,100Hz (Transducer dependent)
- Angle Steer: 6 steps
- Wall Filter: 7 steps

- Persist: 10 steps
- Color Map: 10 steps (0-9)
- Threshold: 0-100%
- Power Output: 1-100%
- Ensemble: 6-16
- Line Density: 2 steps
- Smooth: 10 steps

VOLUME MODE

- Rendering mode
  - > Surface (Gradient/Texture)
  - > Light
  - > MIN IP (Intensity Projection)
  - > MAX IP (Intensity Projection)
  - > X-Ray
- Viewing volume data
  - > 3D/4D (Live and Review)
- MPR + VR
- CUBE CT
- Slices
  - > Multi slice
- Editing volume
  - > Inside & Outside Contour/Box
- Annotating volume data
  - > Comment
  - > Arrow
- Navigation
- Cine
  - > 3D Rotation
  - > 4D Cine Loop

CINELOOP REVIEW

- 3,000 frames CINE memory
- Cine replay speed: 200%, 100%, 50%, 25% (4 types)
- Cine gauge and cine image number display
- Cine review: Frame by frame, Loop
- Start and End Frame Selections for Loop Playback
- Measurement and calculation capability

IMAGE ARCHIVE/CONNECTIVITY

- Preview: displays thumbnail images of the acquired data for the current exam
- E-View: An enlarged preview of the image
- Recalling Images from the Preview
- Image Management
  - > Select All/Unselect All
  - > Permanent Store
- Hard disk drive Image Storage: Min 300GB
- Ethernet Network Connection
- Archiving Format:
  - > Standard DICOM (US/MF)

  > Secondary Capture
- 6 USB ports
- DVD/CD writes and read capabilities
- Export Image Format
  > Bitmap
  > JPEG
  > DICOM
  > WMV
  > AVI (Volume Cine)
- DICOM 3.0 Connectivity
  > DICOM Structured Report
  > DICOM Verification
  > DICOM Storage
  > DICOM Storage Commitment
  > Modality Worklist
  > MPPS
  > Print
- Network Storage

03 MEASUREMENTS/CALCULATIONS

BASIC MEASUREMENTS/CALCULATIONS

B MODE

- Distance
- Ellipse
- Trace
- % Stenosis
- Volume
- Ratio
- Angle
- Histogram

PW MODE

- Velocity
- PI (Pulsatility Index)
- RI (Resistance Index)
- S/D Ratio (Systole/Diastole Ratio)
- A/B Ratio
- PG Mean (Pressure Gradient Mean)
- PG Max (Pressure Gradient Max.)
- Acceleration
- HR (Heart Rate)
- Time (Velocity Time)

M MODE

- Distance
- HR (Heart Rate)
- Slope
- % Stenosis
- Time
- Ratio (% Distance)

B/PW MODE

- Auto & Manual Trace
  - > PS (Peak Systole)
  - > ED (End Diastole)
  - > MD (Minimum Diastole)
  - > PS/ED (Peak Systole/End Diastole)
  - > ED/PS (End Diastole/ Peak Systole)
  - > PI (Pulsatility Index)
  - > RI (Resistance Index)
  - > TAmax (Time avg. max. Velocity)
  - > TAmean (Time avg. mean. Velocity)
  - > VTI (Velocity Time Integral)
  - > HR (Heart Rate)

LABELED MEASUREMENTS/CALCULATIONS

CARDIOLOGY MEASUREMENTS/CALCULATIONS

B mode

- AV/LA (Aortic Valve/Left Atrium): RV, LA & Ao Dm
- PA (Pulmonary artery): PA Dm
- Vena Cava: IVC & SVC Dm
- RV (Right Ventricle): RV Diameter, RV length
- Simpson BP (Simpson Bi-plane): EDV & ESV
- Simpson SP (Simpson Single-plane): EDV&ESV
- Modified Simpson
- Area Length: LVLd, LVLs, LVAd, LVAs
- Teichholz (Left Ventricular Dimensions by Teichholz method):RVAWd, RVDd, Diastole, Systole
- LV Mass (Left Ventricle Mass): Truncated Ellipse & Area-Length method
- LA Vol A-L (Left Atrium Volume by Area-Length method)
- LA Vol /Simp BP (Left Atrium Volume by Simpson method /Biplane)
- RA Vol /A-L (Right Atrium Volume by Area-Length method)
- RA Vol /Simp (Right Atrium Volume by Simpson method /Single)
- MV (Mitral Valve): EPSS, LVOT Dm, MV Area, MV Dm
- AV (Aortic Valve): LVOT Dm, AVA Area
- MR (Mitral Valve - Regurgitant Flow): MR VC Dm, Jet Area
- AR (Aortic Valve - Regurgitant Flow): AR VC Dm, Jet Area
- TR (Tricuspid Valve - Regurgitant Flow): TR VC Dm, RAP
- PV (Pulmonary Valve): PV Dm
- PVe (Pulmonary Vein): PVed Dm, PVes Dm
- PISA AR (Proximal Isovelocity Surface Area of Aortic Regurgitation): Radius, Aliasing Vel
- PISA MR (Proximal Isovelocity Surface Area of Mitral Regurgitation): Radius, Aliasing Vel

M mode

- Teichholz (Left Ventricular Dimensions by Teichholz method): RVAWd, RVDd, Diastole, Systole, LVET, HR
- AV/LA (Aortic Valve/Left Atrium): RV, LA & Ao Dm LVET, LVPEP
- MV (Mitral Valve): CA/CE amp, DE amp/slope, EPSS, EF slope,
- RV (Right Ventricle): RV Dm, RVOT Dm
- PVe (Pulmonary Vein): PVe Dm

Doppler mode

- MV (Mitral Valve): E Dur, A Dur, IVRT, MV E pt, MV A pt, MVA (PHT,VTI,Area), CO, LVIMP, HR
- AV (Aortic Valve): AV VTI, LVOT VTI, AVA (Vmax, Area)
- PV (Pulmonary Valve): PV Vmax, CO
- TV (Tricuspid Valve): TV VTI, TV Vmax, TV E pt, TV A pt, RVIMP
- PVe (Pulmonary Vein): PVs, PVd, PVa
- AR (Aortic Valve - Regurgitant Flow): AI Decel slope, AI PHT, AR VTI
- TR (Tricuspid Valve - Regurgitant Flow): TR VTI, TR VC Dm, RAP
- PR (Pulmonary Valve - Regurgitant Flow): PR VTI, PR V ed
- MR (Mitral Valve - Regurgitant Flow): MR Vmax, dp/dt, MR VC Dm
- PISA AR (Proximal Isovelocity Surface Area of Aortic Regurgitation): AR VTI, Aliasing Vel
- PISA MR (Proximal Isovelocity Surface Area of Mitral Regurgitation): MR VTI, Aliasing Vel
- TDI (Tissue Doppler Imaging)): MV E pt, Ea, Aa, Sa

OBSTETRICS MEASUREMENTS/CALCULATIONS

- Abdominal Circumference (AC)
- Anterior Posterior Thoracic Diameter (APTD)
- Binocular Distance (BOD)
- Biparietal Diameter (BPD)
- Clavicle (CLAV)
- Crown Rump Length (CRL)
- Estimated Fetal Weight (EFW)
- Fibula (FIB)
- Femur Length (FL)
- Fetal Trunk Area (FTA)
- Gestational Sac (GS)
- Head Circumference (HC)
- Humerus
- Middle Abdomen Diameter (MAD)
- Occipital Frontal Diameter (OFD)
- Radius
- Spinal Length (SL)
- Transverse Abdominal Diameter (TAD)
- Transverse Cerebella Diameter (TCD)
- Tibia
- Transverse Thoracic Diameter (TTD)
- Ulna Length (ULNA)
- Multi-Gestational Calculation
  - > Up to 4 fetuses comparison of multiple fetuses data on a graph and a worksheet
- OB Worksheet
- Patient Information
  - > Fetus Number
  - > CUA/AUA Selection
  - > Fetus Position
- Measurement Information

REPORT PACKAGE

- Abdomen
- Obstetrics
- Gynecology
- Cardiology
- Vascular
- Urology
- Pediatrics
- Small Parts
- Breast
- MSK
- EM (Emergency Medicine)

TRANSDUCER SPECIFICATION

SC1-6*

- Applications: Abdomen, Renal, OB, Fetal Echo, GYN, Emergency Medicine
- Transducer Type: Convex array (Premium*)
- Frequency Bandwidth: 1.0 - 6.0 MHz
- Convex Radius (mm): 60 mm
- FOV: 60°
- Number of element: 128
- Biopsy kit: Available

*Note: Premium means single crystal as piezoelectric material.

C1-6

- Applications: Abdomen, Renal, OB, Fetal Echo, GYN, Emergency Medicine
- Transducer Type: Convex array
- Frequency Bandwidth: 1.0 - 6.0 MHz
- Convex Radius (mm): 60 mm
- FOV: 60°
- Number of element: 128
- Biopsy kit: Available

C5-8

- Applications: Abdomen, Cardiac, Emergency Medicine
- Transducer Type: Micro Convex array
- Frequency Bandwidth: 5.0 - 8.0 MHz
- Convex Radius (mm): 14 mm
- FOV: 92°
- Number of element: 128
- Biopsy kit: N/A

L3-12H*

- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 12.0 MHz
- Foot Print: 45 mm
- Biopsy kit: Available
- Number of element: 192

Note: H means high density transducer.

L3-12H^{WD}*

- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 12.0 MHz
- Aperture length (mm): 64 mm
- Number of element: 192
- Biopsy kit: N/A

Note: H means high density transducer.

Note: WD means wide foot print transducer.

L3-12

- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 12.0 MHz
- Foot Print: 45 mm
- Number of element: 128
- Biopsy kit: Available

L3-8

- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 8.0 MHz
- Foot Print: 45 mm
- Number of element: 128
- Biopsy kit: Available

L8-17

- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 8.0 - 17.0 MHz
- Foot Print: 32 mm
- Number of element: 128
- Biopsy kit: Available

SP1-5

- Applications: Abdomen, Renal, Cardiac, Emergency Medicine, TCD
- Transducer Type: Phased array (Premium*)
- Frequency Bandwidth: 1.0 - 5.0 MHz
- FOV: 90°
- Number of element: 64
- Biopsy kit: N/A

* Note: Premium means single crystal as piezoelectric material.

SP3-8

- Applications: Abdomen, Renal, Cardiac, Emergency Medicine, TCD
- Transducer Type: Phased array (Premium*)
- Frequency Bandwidth: 3.0 – 8.0 MHz
- FOV: 90°
- Number of element: 64
- Biopsy kit: N/A

VC1-6

- Applications: Abdomen, Renal, OB, Fetal Echo, GYN, Emergency Medicine
- Transducer Type: Volume Convex array
- Frequency Bandwidth: 1.0 - 6.0 MHz
- Convex Radius (mm): 40 mm
- FOV: 79°
- Number of element: 128
- Biopsy kit: N/A

EN3-10

- Applications: OB, Fetal Echo, GYN, Urology, Emergency Medicine
- Transducer Type: Endovaginal/Endocavity
- Frequency Bandwidth: 3.0 - 10.0 MHz
- Convex Radius (mm): 10 mm
- FOV: 145°
- Number of element: 128
- Biopsy kit: Available

E3-10

- Applications: OB, Fetal Echo, GYN, Urology, Emergency Medicine
- Transducer Type: Endovaginal/Endocavity
- Frequency Bandwidth: 3.0 - 10.0 MHz
- Convex Radius (mm): 10 mm
- FOV: 145°
- Number of element: 128
- Biopsy kit: Available

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