SONOACE X4

Technical Specification

Version 2.00

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see it all
MEDISON

The summit of evolution - X4 premium Doppler system

Technical Specification

SONOACE X4

1 SYSTEM FEATURES

The system provides multipurpose applications including abdominal, vascular, small parts, obstetrics, gynecology, urology, pediatrics and cardiology etc. The system provides high quality of image resolution and sensitivity in all scanning modes including B/D/M mode. The system supports probes of convex, linear, endo-cavity. The system supports DICOM 3.0 and can be easily connected to PACS networking.

2 SYSTEM OVERVIEW

The configuration of X4 is as follows,

Module	Description
Ultrasound module	Ultrasound Engine Modules: Beamformer, DSP, DSC, Video Manager, PC Carrier, 2Probe Select Assembly, Mother board, ECG
CPU module	Main host CPU: CPU card including Geode processor, max. 128MB main memory, VGA/LAN/USB/ Sound functions, and Interfacing function to Ultrasound module
Key module	Key Input part:Key Interface, Key Matrix, Trackball unit
Rear module	System Input/Output part
Software module	Main control, Measurements, DB engine, SonoView Lite, 3Dview, etc.
Mechanical Design / Enclosure module	Wheel base, Rack, Housing, Chassis, etc.
Power supply module	APM(AC Power Module), DPM(DC Power Module)
Monitor module	12" Monitor

3 MAIN FEATURE LISTS

- 864 Channel Digital Beamforming with:
  - » Dynamic Focus
  - » Dynamic Aperture
  - » Dynamic Apodization
  - » The shape of the acoustic spectrum
- Synthetic Aperture Control
- Full Spectrum Imaging
- Motion mode (M-mode)
- Pulsed wave (PW) spectral Doppler
- Tissue Harmonic Imaging
- Extreme High Dynamic Range (150dB)
- Trapezoidal Imaging
- Combined modes
  - » 2D/M, 2D/PWD
- Cine for 512 frames and Loop Review for 4096 lines
- 12" monitor with non-interlaced display
- Integrated 3D Imaging Package
- Freehand 3D
- 3D Multi Planar Imaging
- 2 Active Probe Ports
- QuickScan
- DICOM 3.0 compatible Image filing: SonoView II
- SonoView Lite Image management
- Integrated CD R/W drive
- Various Measurement Packages
- Applications
  - » General, Obstetrics, Fetal Heart, Gynecology, Urology, Breast, Small Parts,
  - » Renal, Vascular, Pediatric, Abdomen, Musculoskeletal,
  - » Cardiology, Neonatal
- Peripheral output device support
- Language support: English, Italian, French, Spanish, German, Chinese, Russian
- HPRF
- Post Gain Control

4 SCANHEADS

- Curved Array: C3-7ED, C3-7EP, C2-5ET, C4-9/10ED, C2-4ES, EC4-9/10ED, EC4-9ES
- Linear Array: HL5-9ED, L5-9EC, L5-9EE, HL5-12ED

4.1 C3-7ED

- Application: Abdomen, OB, GYN, Fetal Heart, Renal
- Number of element: 128
- Center frequency: 3.5MHz
- Convex of radius: 50mm
- FOV: 70°
- Doppler TX frequency: 4.1MHz
- Harmonic frequency: 5.2MHz

- Biopsy guide available

4.2 C2-5ET

- Application: Abdomen, OB, GYN, Fetal Heart, Renal
- Number of element: 128
- Center frequency: 3.5MHz
- Convex of radius: 40mm
- FOV: 76°
- Doppler TX frequency: 3.1MHz
- Harmonic frequency: 5.0MHz
- Biopsy guide available

4.3 C4-9/10ED

- Application: Neonatal, Pediatric, Vascular
- Number of element: 128
- Center frequency: 6.5MHz
- Convex of radius: 10mm
- FOV: 150°
- Doppler TX frequency: 6.2MHz

4.4 C2-4ES

- Application: Abdomen, Cardiac
- Number of element: 128
- Center frequency: 3.0MHz
- Convex of radius: 20mm
- FOV: 120°
- Doppler TX frequency: 3.1MHz
- Harmonic frequency: 5.0MHz

4.5 EC4-9/10ED

- Application: OB, Gynecology, Urology
- Number of element: 128
- Center frequency: 6.5MHz
- Convex of radius: 10mm
- FOV: 150°
- Doppler TX frequency: 6.2MHz
- Biopsy guide available

4.6 EC4-9ES

- Application: OB, Gynecology, Urology
- Number of element: 128
- Center frequency: 6.5MHz
- Convex of radius: 10mm
- FOV: 150°
- Doppler TX frequency: 6.2MHz
- Biopsy guide available

4.7 HL5-9ED

- Application: Small part, Breast, Vascular, Musculoskeletal
- Number of element: 128
- Center frequency: 7.5MHz
- FOV: 40mm
- Doppler TX frequency: 6.8MHz
- Steered angle: 15°
- Trapezoidal imaging
- Biopsy guide available

4.8 L5-9EC

- Application: Small part, Breast, Vascular, Musculoskeletal
- Number of element: 128
- Center frequency: 7.5MHz
- FOV: 40mm
- Doppler TX frequency: 6.8MHz
- Steered angle: 15°
- Trapezoidal imaging
- Biopsy guide available

4.9 L5-9EE

- Application: Small part, Breast, Vascular, Musculoskeletal
- Number of element: 128
- Center frequency: 7.5MHz
- FOV: 50mm
- Doppler TX frequency: 6.8MHz
- Steered angle: 15°
- Trapezoidal imaging
- Biopsy guide available

4.10 C3-7EP

- Application: Abdomen, OB, GYN, Fetal Heart, Renal
- Number of element: 128
- Center frequency: 3.5MHz
- Convex of radius: 50mm
- FOV: 70°
- Doppler TX frequency: 4.1MHz
- Harmonic frequency: 5.2MHz
- Biopsy guide available

4.11 HL5-12ED

- Application: Small part, Breast, Vascular, Musculoskeletal
- Number of element: 128
- Center frequency: 7.5MHz
- FOV: 40mm
- Doppler TX frequency: 4.1MHz
- Harmonic frequency:5.2 MHz
- Biopsy guide available

5 SYSTEM PLATFORM EXTENSIONS

- 3 active probe ports(optional)
- Low frequency linear probe
- Dedicate urology probe

6 DETAIL SYSTEM SPECIFICATIONS

6.1 Applications

- Abdominal
- Obstetrical
- Neonatal Cephalic
- Peripheral vascular
- Gynecological and fertility
- Infertility
- Small parts (breast, thyroid, parathyroid, penis, testes)
- Renal
- Breast
- Musculoskeletal
- Pediatric
- Prostate
- Trans-Rectal
- Trans-Vaginal
- Adult Cardiology
- Pediatric Cardiology
- Vascular

6.2 ERGONOMICS

- Compact size and high maneuverability for portable examinations
- Tilt and swivel monitor
- 2 active transducer ports for simultaneous transducer connection
- Lighting of the keyboard controls
- High quality stereo audio speaker system
- Input and output connections on the rear panel
- Front compartment for storage of accessories
- Front and rear handles
- Attachable key panel
- 4 Wheel swivel

6.3 CONTROL PANEL

- Dedicated keyboard controls
- Central home position controls
- Shortcuts for many functions
- Functional grouping of keys
- Positive feedback on control actuation
- Indicator lights identify activated keys
- Lighting of control panel labels
- Peripherals controlled through the system keyboard
- 2-button footswitch

- Audio volume control
- On access to system power On/Off button

6.4 MONITOR

- 12" high resolution non-interlaced BW monitor
- Resolution: 640x480
- Brightness control with quick return to a pre-set calibrated level
- Contrast control with quick return to a pre-set calibrated level
- High brightness & contrast

6.5 DISPLAYED LEVELS OF GRAY AND COLOR

- 256 shades of gray, 8 bits

6.6 SCAN FORMATS

- Linear Array
- Curved Array
- High Resolution Zoom

6.7 ACOUSTIC OUTPUT MANAGEMENT

- User selectable, transducer and scanning mode dependent
- Dedicated Output Display on the system monitor display of output acoustic power level, as well as thermal and mechanical indices:
- PWR - Output Power level. Range: From 10 % of maximum output, output level is increased by 5% in each step.
- MI - Mechanical Index
  - » TIC - Thermal Index, Bone at Surface
  - » TIB - Thermal Index, Bone at Focus
  - » TIS - Thermal Index, Soft Tissue

6.8 DATA FIELD DISPLAY

- Date, Time, Transducer in use
- Frequency range in operation (2-D)
- Image depth
- Setting name
- Frame rate (Hz)
- Imaging Cine frame number
- Dynamic range (dB) in 2-D
- Enhance setting in 2-D
- Persistence in 2-D
- Postprocessing in 2-D
- Gain settings: 2-D
- Time Gain Compensation curve (TGC)
- Transmit focus location
- Age/birth

6.9 PATIENT REPORT PAGE

- Customizable patient and physician information for each study

6.10 BODY MARKERS

- Body markers organized in many anatomical groups
- Adjustable position, rotation and size of the body marker and transducer indicator on the screen

6.11 IMAGE ANNOTATIONS

- Factory pre-set standard annotation terms
- Adjustable Annotation Arrow
- Screen annotation capability through alphanumeric keyboard

6.12 APPLICATION AND SETTING FUNCTIONS

- The Application and Settings function
- Dedicated Application key
- Dedicated Settings key
- Settings-specific programs
- Direct access to Settings and Applications during the examination
- Default Program set-up for each Category
- Backup storage and retrieval of the Programs and Applications through a CD R/W, USB MO, USB Flash Memory
- Factory pre-set Programs and Applications protected from alteration and deletion

6.13 TRANSMIT FOCAL ZONE ENHANCEMENT

- User-selectable position and number of Transmit Focal Zone settings through a toggle switch

6.14 DISPLAY DYNAMIC RANGE

- User selectable in 1 dB increments

6.15 FRAME RATE

- Max. above 169FPS

6.16 INVERT OPTIONS

- Up/down
- Right/left

6.17 DEPTH SELECTION

- Range: from 2 to 30 cm

6.18 TIME GAIN COMPENSATION

- Eight slide-pot controls
- Reassigned on HRZ, Depth and U/D Invert adjustments

6.19 IMAGE PROCESSING PARAMETERS

- 2D Gain
- Edge Enhance
- Persistence
- 2D Filter
- Dynamic Range
  - » High dynamic --> "soft gray" image
  - » Low dynamic --> "hard gray" image

- Reject
  - » Reject range max.: 31
  - » Reject range min.: 0
  - » step with: 1
- Pen(etration)/Gen(eral)/Res(olution) optimized setting

6.20 HIGH RESOLUTION ZOOM

- Read/Write Zoom

6.21 CALIPERS AND GENEAL MEASUREMENTS

- 4 pairs of 2-D calipers available. Screen display:
  - » Distance between calipers for each pair
  - » Manual tracing in 2D distance
- Ellipse function: Up to 4 pairs of calipers
  - » Distance between calipers
  - » Ellipse circumference
  - » Ellipse area
- Trace function. Displays:
  - » Trace circumference
  - » Traced area
- Minimum distance between calipers:
  - » Transducer type, depth and HRZ box setting dependent

6.22 IMAGE CINE MEMORY

- Available in all modes
- Imaging Cine, for real-time acquisition and review of 2-D
- After freezing immediate scrolling through Cine memory with the Track ball
- Number of frames or seconds of information in Cine memory depends on:
  - » Mode in use
  - » Image adjustment
  - » Amount of information displayed (2-D image size, etc)
  - » memory allocated for Cine
- Measurement and calculation capability

6.23 2D MODE

- Read zoom/write zoom

6.24 HARMONIC MODE

- Tissue Harmonic Imaging

6.25 M MODE

- Sweep speed : 120Hz, 180Hz, 240Hz, 300Hz

6.27 PW DOPPLER MODE

- Wall filter : 4 teps (factory setup in 64 steps, from 0.04 PRF to 0.272 PRF, -3dB point)
- Maximum PRF : 23kHz
- Minimum PRF : 1kHz
- Sweep speed : 120Hz, 180Hz, 240Hz, 300Hz

7 ULTRASOUND WORKSTATION

- Geode processor
- Hard drive: 80 GB
- RAM size:128MB
- CD-RW, USB, LAN capability

8 MEASUREMENT PACKAGE

Function	Description		
Measurement	2D mode: distance, angle, area, ellipse, circumference, volume		
	PW Spectral Doppler: velocity, pressure, acceleration		
	M mode: time, slope, distance		
OB measures	Fetal Biometry : GS,CRL,YS,BPD,OFD,HC,APD,TAD,MAD,AC,FTA,FL,SL,TTD, APTD,APTDxTTD		
	Fetal Long Bones : HUM,ULNA,TIB,RAD,FIB,CLAV,VERT		
	Fetal Cranium : CEREB,OOD,IOD,CM,NF,Lvent, NT		
	Fetal Others : FOOT,EAR,MP		
	AFI		
	Volume Flow [B/Doppler]		
	Umbilical Artery [Doppler]		
	Mid Cereb Artery [Doppler]		
	Left Uterine Artery [Doppler]		
	Right Uterine Artery [Doppler]		
	Left Fetal Carotids [Doppler]		
	Right Fetal Carotids [Doppler]		
	Fetal Aorta [Doppler]		
	Ductus Venous [Doppler]		
	Fetal HR		
	Ratio : FL/BPD,CI(BPD/OFD),HC/AC,FL/AC,FL/HC,FL/FOOT		
	Observations : Fetal Description ,Fetal Heart, Fetal Brain, Fetal Abdomen, Biophysical Profile, Maternal Survey		
	Comment		
Obstetric Biometry table list	FW	GA	Campbell,Hadlock,Hadlock1,Hadlock2,Hadlock3,Hadlock4, Hansmann,Merz,Osaka,Shepard,Tokyo1,Tokyo2,Shinozuka1, Shinozuka2
		Growth	Hadlock,Osaka,Tokyo,Doubilet,Brenner,Williams
	GS	GA	Hansmann,Hellman,Korean,Nyberg,Tokyo
		Growth	None
	CRL	GA	Hadlock,Hansmann,Korean,Nelson,Osaka, Robinson,Tokyo,Rempen
		Growth	Hansmann,Korean,Osaka,Tokyo,ASUM(SCW)
	YS	GA	None
		Growth	None
	BPD	GA	Campbell,Chitty(o-i),Chitty(o-o),Hadlock,Hansmann,Jeanty, Korean,Kurtz,Merz,Osaka,Sabbagha,Tokyo,Bessis
		Growth	Chitty(o-i),Chitty(o-o),Hadlock,Hansmann,Korean,Merz,Osaka,

Function	Description		
			Tokyo,ASUM(SCW),CFEF
	OFD	GA	Hansmann,Korean
		Growth	Hansmann,Korean,ASUM(SCW)
	HC	GA	Campbell,Chitty(m),Chitty(d),Hadlock, Hansmann,Korean,Merz
		Growth	Chitty(m),Chitty(d),Hadlock,Hansmann,Korean, Merz,CFEF,ASUM(SCW)
	APD	GA	Hansmann,Bessis
		Growth	Hansmann
	TAD	GA	None
		Growth	CFEF
	MAD	GA	Eik-NesSH
		Growth	Eik-NesSH
	AC	GA	Campbell,Hadlock,Hansmann,Korean,Merz,Tokyo
		Growth	Campbell,Chitty(m),Chitty(d),Hadlock,Hansmann,Jeanty, Korean,Merz,Tokyo,ASUM(SCW),CFEF
	FTA	GA	Osaka
		Growth	Osaka
	FL	GA	Campbell,Chitty,Hadlock,Hansmann,Hohler, Jeanty,Korean,Merz,Osaka,Tokyo,Bessis
		Growth	Campbell,Chitty,Hadlock,Hansmann,Jeanty, Korean,Merz,Osaka,Tokyo,ASUM(SCW),CFEF
	SL	GA	None
		Growth	None
	TTD	GA	Hansmann
		Growth	Hansmann
	APTD	GA	Hansmann
		Growth	Hansmann
	APTDxTTD	GA	Shinozuka
		Growth	Shinozuka
	HUM	GA	Jeanty,Korean,Merz,Osaka
		Growth	Jeanty,Korean,Merz,Osaka,ASUM(SCW)
	ULNA	GA	Jeanty
		Growth	Jeanty,Merz
	TIB	GA	Jeanty,Merz
		Growth	Jeanty,Merz
	RAD	GA	None
		Growth	Merz
	FIB	GA	None
		Growth	None
	CLAV	GA	Yarkoni
		Growth	Yarkoni
	LV	GA	Tokyo
		Growth	None
	CEREB	GA	Chitty,Hill
		Growth	Goldstein

Function	Description		
	OOD	GA	Jeanty
		Growth	None
	IOD	GA	None
		Growth	None
	FOOT	GA	None
		Growth	None
	EAR	GA	None
		Growth	None
	CM	GA	None
		Growth	None
	NF	GA	None
		Growth	None
	NT	GA	None
		Growth	None
	MP	GA	None
		Growth	None
	LVent	GA	None
		Growth	None
	Mid Cereb Artery : RI Growth Table - Shinozuka Mid Cereb Artery : Growth Table - Shinozuka Umbilical Artery : RI Growth Table - Shinozuka Umbilical Artery : PI Growth Table - Shinozuka HC/AC Ratio Growth Table - Campbell Trend function : Display trend graph with independent Growth table and trend data table Display Deviation : SD ratio is displayed at the 'result value' area. Report function : save to Sonoview Lite,		
Gynecology measures	Uterus Cervix Left Ovary Right Ovary Cyst Mass Left Follicles Right Follicles Left Ovarian Artery Right Ovarian Artery Abnormalities of the uterus Environment (Observation) Comment		
Cardiology measures	Simpson Vol. A/L 2D Measure LV Mass Left Ventricle(M)		

Function	Description
	Ao/LA(B)
	Ao/LA(M)
	Mitral Valve(M)
	LVOT Doppler [B/Doppler]
	Mitral Valve Inflow [Doppler]
	Mitral Valve Regurg [Doppler]
	Aortic Valve Systolic [Doppler]
	Aortic Valve Regurg [Color/Doppler]
	Tricuspid Value Inflow [Doppler]
	Tricuspid Valve Regurg [Doppler]
	Pulmonary Valve Inflow [Doppler]
	Pulmonary Valve Regurg [Color/Doppler]
	Pulmonic Veins [Doppler]
	Qpulm:Qsys [B/Doppler]
	Heart Rate [M/Doppler]
	Comment
Urology	General [Doppler]
	Prostate Volume
	T-Zone Prostate Volume
	Bladder Volume
	Left Kidney Volume
	Right Kidney Volume
	Residual Volume
	Observations : Digital Rectal Exam
	Transrectal US Prostate
	Transrectal US Seminal Vesicles
	Comment
Vascular	Indication
	General
	Volume Flow [B/Doppler]
	Rt. Subclavian / Lt. Subclavian [B/Doppler]
	Rt. Prox CCA / Lt. Prox CCA [B/Doppler]
	Rt. Mid CCA / Lt. Mid CCA [B/Doppler]
	Rt. Distal CCA / Lt. Distal CCA [B/Doppler]
	Rt. Bulb / Lt. Bulb [B/Doppler]
	Rt. Prox ICA / Lt. Prox ICA [B/Doppler]
	Rt. Mid ICA / Lt. Mid ICA [B/Doppler]
	Rt. Distal ICA / Lt. Distal ICA [B/Doppler]
	Rt. ECA / Lt. ECA [B/Doppler]
	Rt. Vertebral / Lt. Vertebral [B/Doppler]
	ICA/CCA Ratio
	A/B Ratio
	Vertebral [B/Doppler]
	HR [M/Doppler]
	Comment
Fetal Echo	2D Echo [B]

Function	Description
	CTAR [B]
	Fetal M-mode [M]
	Main Pulmonary Artery [D]
	Ductua Arteriosus [D]
	Inferior Vena Cava [D]
	Ductus Venosus [D]
	Ascending Aorta [D]
	Descending Aorta [D]
	Mitral Valve Inflow [D]
	Mitral Valve Regurg [D]
	Tricuspid Valve Inflow [D]
	Tricuspid Valve Regurg [D]
	PLI (Preload Index) [D]
	Fetal Heart
	Environment : 4Chamber,3Vessel,LOT,ROT,AorticArch,CardRhythm
	Comment

9 DOCUMENTATION CAPABILITIES

- On-board printing device control
- Selective printing on two connected printers
- SonoView Lite
- DICOM 3.0

10 OPTIONAL DEVICES

Device	Description
VGA Monitor	
Video Cassette Recorder (VCR)	Remote controllable VCR(such as Panasonic MD830) is not supported.
BW Page Printer	Mitsubishi M90E BW page printer (120V/240V, NTSC/PAL, 3" x 4" format)
Foot Switch	Users are allowed to select their desired Left/Right Foot Switch functions among the following items. Left: Freeze, Update, Print, Store Right: Freeze, Update, Print, Store
External USB MO Drive	Backup for Sonoview - Fujitsu DynaMO 1300U2B or later version - Fujitsu DynaMO 1300U2 Pocket
External USB Flash Memory Stick	Backup for Sonoview Lite - IOMEGA Mini Drive 512MB - SANDISK Cruzer Mini USB Flash Drive 512MB - RiDATAR EZdrive USB2.0 256MB - Imation iFLASH USB 2.0 1GB - Transcend Zet Flash 128MB
InkJet Printer	Printing for measurement report or Sonoview Lite - HP DeskJet 880C

Device	Description
InkJet Printer	- HP DeskJet 895C - HP DeskJet 5550 - HP DeskJet 6122 - HP LaserJet 1200 - HP DeskJet 5650 - HP DeskJet 6540 - HP DeskJet 6840 - HP LaserJet 1320 - HP Business Inkjet 1200dtn
ECG Module	

11 PERIPHERAL SIGNALS

Signal	In/Out	Description
Video	O	NTSC/PAL 1.0Vpp/75ohms/unbalanced (RCA Type)
BW Page Printer	O	Mitsubishi M90E BW page printer (BNC Type) (120V/240V, NTSC/PAL, 3" x 4" format)
Audio R/L	O	RCA Type
VGA	O	1 port
LAN port		1 port
USB port		4 ports
ECG		1 port
Foot Switch		1 port
Print Remote		1 port

12 POWER AND PHYSICAL SPECIFICATIONS

- 100-120V/60Hz
- 200-240V/60Hz

13 OPERATING ENVIRONMENT

- Ambient temperature: 10°C-40°C (50°F-104°F)
- Relative humidity: Up to 90% non-condensing
- Height: 1330mm (With monitor)
- Width: 450mm
- Depth: 700mm
- Weight : 63 kg (approx.)

For more information on specification, please contact Product Marketing Team.

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