

Technical Description

PRELIMINARY VERSION V1.00



Extreme Power in a Compact Design

SONOACE X6



Extreme Power in a Compact Design

MEDISON's SONOACE X6 is an impressive new compact ultrasound system providing maximum value and quality across a wide range of applications.

The slender ergonomic design is built upon innovative digital beam forming process in combination with a variety of advanced imaging functions to meet the acceptance of the most sophisticated of ultrasound users.



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/C/CW mode. The system supports probes of convex, linear, phased array, endo-cavity. The system supports DICOM 3.0 and can be easily connected to PACS networking.

2 SYSTEM OVERVIEW

The configuration of SONOACE X6 is as follows,

Module	Description
Ultrasound module	Ultrasound Engine Modules: CW, Front-End (Beam-former), Back-End (DSP, DSC, Video Manager), PSA (Probe Select Assembly), Mother board
CPU module	Main host CPU: CPU card including Geode processor, 512MB main memory, DVI/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, 3D view, etc.
Mechanical Design / Enclosure module	four wheel swivel, Rack, Housing, Chassis, etc.
Power supply module	APM (AC Power Module), DPM (DC Power Module)
Monitor module	15" LCD Monitor

- 1152 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)
- Color motion mode(Color M-mode)
- Pulsed wave (PW) spectral Doppler
- Color Doppler (C-mode)
- Power Doppler (PD-mode)
- Continuous Doppler (CW-mode)
- Tissue Harmonic Imaging
- Extreme High Dynamic Range
- Trapezoidal Imaging
- Combined modes
 - » 2D/M, 2D/PWD, 2D/Color Doppler, 2D/PD, 2D/CW
- Cine for 511 frames
- 15" monitor with non-interlaced display
- Integrated 3D Imaging Package
- Freehand 3D
- 3D Multi Planar Imaging
- 3 Active Probe Ports(Optional)
- 2D QuickScan™
- DICOM 3.0 compatible Image filing: SonoView pro
- SonoView Image management
- Integrated DVD 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, Chinese and Russian
- HPRF
- Post Gain Control
- Stand by mode

- Curved Array: C3-7EP, C4-9/10ED, NEV4-9ES, NER4-9ES,
- Linear Array: HL5-12ED, L5-12/50EP
- Phased Array: P2-4AH

4.1 C3-7EP

- Application: Abdomen, OB, GYN, Fetal Heart, Renal, General

- Number of element: 128
- Center frequency: 3.5MHz
- Convex of radius: 50mm
- FOV: 70°
- Doppler TX frequency: 3.85MHz
- Harmonic frequency: 2.4MHz
- Biopsy guide available

4.2 C4-9/10ED

- Application: Neonatal, Pediatric, Vascular, General
- Number of element: 128
- Center frequency: 6.5MHz
- Convex of radius: 10mm
- FOV: 150.34°
- Doppler TX frequency: 6.2MHz

4.3 NEV4-9ES

- Application: OB, Gynecology, Urology, General
- Number of element: 128
- Center frequency: 6.5MHz
- Convex of radius: 10mm
- FOV: 150.34°
- Doppler TX frequency: 5.6MHz
- Biopsy guide available

4.4 NER4-9ES

- Application: OB, Gynecology, Urology, General
- Number of element: 128
- Center frequency: 6.5MHz
- Convex of radius: 10mm
- FOV: 150.34°
- Doppler TX frequency: 5.6MHz
- Biopsy guide available

4.5 HL5-12ED

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

4.6 L5-12/50EP

- Application: Small part, Breast, Vascular, Musculoskeletal, General
- Number of element: 128
- Center frequency: 7.5MHz

- FOV: 50mm
- Doppler TX frequency: 6.16MHz
- Steered angle: 5°
- Trapezoidal imaging
- Biopsy guide available

4.7 P2-4AH

- Application: Cardiac, Abdomen, Pediatric, General
- Number of element: 64
- Center frequency: 3.0MHz
- FOV: 19.2mm
- Doppler TX frequency: 2.7MHz
- Harmonic frequency: 2.1MHz

5 SYSTEM PLATFORM EXTENSIONS

- 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
- 3 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

- 15" high resolution non-interlaced color monitor
- Resolution: 1024x768 x 24bit
- 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 Flash Memory, DVD RW
- 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:
 - o Distance between calipers for each pair
 - o 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/Pulse Inversion Harmonic

6.25 M MODE

- Dynamic range: 50~170dB, 1dB steps
- Reject level: 1~32steps
- Sweep speed: 120/180/240/300Hz, 4steps
- M edge enhancement: 13steps(-3~9)
- M colorization: 8chroma map
- M-color flow mode

6.26 SPECTRAL DOPPLER MODE(PW)

- Gray scale map: 5maps
- PW wall filter: 4steps(Low, Middle1, Middle2, High)
- PW sweep speed: 60/120/180/240/300/360Hz, 6steps
- Sample volume length: 0.5~15.0mm(0.5mm steps)
- PRF: 1~23KHz
- Velocity scale range(depending on probe frequency)
 - » 0° Max. zero shift range: 7.5cm/s ~ 1.72m/s
 - » 60° Max. zero shift range: 15cm/s ~ 3.45m/s
- Spectrum Inversion
- Doppler Auto Trace

6.27 COLOR DOPPLER MODE

- Color map: 8maps
- CD wall filter: 4steps(Low, Middle1, Middle2, High)
- Velocity scale range(depending on probe): 4.0cm/s ~ 4.0m/s
- PRF: 600Hz ~ 12KHz
- Frame Rate: 2~30 frames/sec
- Ensemble:8 ~ 31, step size 1
- CD spectrum inversion
- Color display mode
 - » Velocity
 - » Power
 - » Variance
 - » Velocity + Variance
- Real-time triplex mode: B+CD/PW in any depth
- Maximum steerable angle +/- 25°

6.28 POWER DOPPLER MODE

- Color map: 8maps
- Velocity scale range(depending on probe): 2.4cm/s ~ 3.325m/s
- PRF: 600Hz~12KHz
- Ensemble:8 ~ 31, step size 1
- PD wall filter: 4steps(Low, Middle1, Middle2, High)

6.29 CW DOPPLER MODE

- Gray scale map: 8maps(1~8)

- CW wall filter: 4steps(Low, Middle1, Middle2, High)
- CW sweep speed: 120/180/240/300Hz
- PRF: 1.5KHz~43KHz
- Spectrum Inversion
- Doppler Auto Trace

7 ULTRASOUND WORKSTATION

- Geode processor
- Hard drive: 80 GB
- RAM size:512MB
- 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 measurements	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 Campbell, Hadlock, Hadlock1, Hadlock2, Hadlock3, Hadlock4, Hansmann, Merz, Osaka, Shepard, Tokyo1, Tokyo2, Shinozuka 1, Shinozuka
	FW Hadlock, Osaka, Tokyo, Doubilet, Brenner, Williams -Growth
	GS GA Table Hansmann, Hellman, Korean, Nyberg, Tokyo Growth Table None
	CRL GA Table Hadlock, Hansmann, Korean, Nelson, Osaka, Robinson, Tokyo, Rempen Growth Table Hansmann, Korean, Osaka, Tokyo, ASUM(SCW)

Function	Description	
YS	GA Table	None
	Growth Table	None
BPD	GA Table	Campbell,Chitty(o-i),Chitty(o-o),Hadlock, Hansmann,Jeanty,Korean,Kurtz,Merz,Osaka,Sabbagha, Tokyo,Bessis
	Growth Table	Chitty(o-i),Chitty(o-o),Hadlock,Hansmann,Korean, Merz,Osaka,Tokyo,ASUM(SCW),CFEF
OFD	GA Table	Hansmann,Korean,Merz
	Growth Table	Hansmann,Korean,ASUM(SCW),Merz
HC	GA Table	Campbell,Chitty(m),Chitty(d),Hadlock,Hansmann, Korean,Merz
	Growth Table	Chitty(m),Chitty(d),Hadlock,Hansmann,Korean, Merz,CFEF,ASUM(SCW)
APD	GA Table	Hansmann,Bessis
	Growth Table	Hansmann
TAD	GA Table	None
	Growth Table	CFEF
MAD	GA Table	Eik-NesSH
	Growth Table	Eik-NesSH
AC	GA Table	Campbell,Hadlock,Hansmann,Korean,Merz,Tokyo
	Growth Table	Campbell,Chitty(m),Chitty(d),Hadlock,Hansmann, Jeanty,Korean,Merz,Tokyo,ASUM(SCW),CFEF
FTA	GA Table	Osaka
	Growth Table	Osaka
FL	GA Table	Campbell,Chitty,Hadlock,Hansmann,Hohler, Jeanty,Korean,Merz,Osaka,Tokyo,Bessis
	Growth Table	Campbell,Chitty,Hadlock,Hansmann,Jeanty, Korean,Merz,Osaka,Tokyo,ASUM(SCW),CFEF
SL	GA Table	None
	Growth Table	None
TTD	GA Table	Hansmann
	Growth Table	Hansmann
APTD	GA Table	Hansmann
	Growth Table	Hansmann
APTDx	GA Table	Shinozuka
TTD	Growth Table	Shinozuka
HUM	GA Table	Jeanty,Korean,Merz,Osaka
	Growth Table	Jeanty,Korean,Merz,Osaka,ASUM(SCW)
ULNA	GA Table	Jeanty
	Growth Table	Jeanty,Merz
TIB	GA Table	Jeanty,Merz
	Growth Table	Jeanty,Merz
RAD	GA Table	None
	Growth Table	Merz
FIB	GA Table	None
	Growth Table	None

Function	Description
CLAV	GA Table Yarkoni
	Growth Table Yarkoni
LV	GA Table Tokyo
	Growth Table None
CEREB	GA Table Chitty,Hill
	Growth Table Goldstein
OOD	GA Table Jeanty
	Growth Table None
IOD	GA Table None
	Growth Table None
FOOT	GA Table None
	Growth Table None
EAR	GA Table None
	Growth Table None
CM	GA Table None
	Growth Table None
NF	GA Table None
	Growth Table None
NT	GA Table None
	Growth Table None
MP	GA Table None
	Growth Table None
LVent	GA Table None
	Growth Table 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 'Æresult 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

Function	Description
	ICA/CCA Ratio A/B Ratio Vertebral [B/Doppler] HR [M/Doppler] Comment
Fetal Echo	2D Echo [B] 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
Report	Open Line Transfer : Only for English Windows Export Function : Save Report Content to Excel / Text Format Print : Print Contents to Local Printer

9 DOCUMENTATION CAPABILITIES

- On-board printing device control
- SonoView
- DICOM 3.0

10 OPTIONAL DEVICES

Device	Description
Video Cassette Recorder (VCR)	VCR-NTSC + R-3002b?Mitsubishi HS-MD3000US VCR-PAL + R-3002b Mitsubishi HS-MD3000EA
BW Video Page Printer	Sony UP-897MD Mitsubishi P93
Color Video Page Printer	Sony UP-21MD
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 Lite Fujitsu DynaMO 1300U2B or later version

Device	Description
External USB Flash	Backup for Sonoview Lite Imation iFLASH USB 2.0 1GB Imation USB Swing Blue 1G
InkJet Printer	Printing for measurement report or Sonoview Lite HP DeskJet 5650 HP DeskJet 5940 HP DeskJet 6540 HP DeskJet 6840 HP DeskJet 6940 HP DeskJet 6980 HP LaserJet 1320 HP LaserJet 2420 HP Color LaserJet 3600 HP OfficeJet J5780 HP LaserJet P2015
ECG Module	

11 PERIPHERAL SIGNALS

Signal	In/Out	Description
DVI	O	1 port
S-VHS	O	
VHS	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)
BW Printer remote control	O	1 port
Audio R/L	O	RCA Type
MIC	I	1 port
LAN (10/100 BASE-T) port		1 port
USB 2.0 port		4 ports
ECG		1 port
Foot Switch		1 port

12 POWER AND PHYSICAL SPECIFICATIONS

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

- Ambient temperature: 10°C - 40°C (50°F - 104°F)
- Relative humidity: Up to 90% non-condensing
- Height: 1380mm (With monitor)
- Width: 450mm
- Depth: 700mm
- Weight : 63kg (approx.)

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

Phone: +82-2-2194-1216

Fax: +82-2-2194-1129

E-mail : maddoong@medison.com