



Technical Specification

V1.00

1 SYSTEM FEATURES

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

2 SYSTEM OVERVIEW

The configuration of **SA R3** is as follows,

Module	Description
Ultrasound module	Ultrasound Engine Modules: Front-End (Beam-former), Back-End (DSP, DSC, Video Manager), PSA (Probe Select Assembly), Peripheral I/O interface.
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
Software module	Main control, Measurements, DB engine, SonoView Lite, 3D view, etc.
Mechanical Design	Housing, Chassis, etc.
Power supply module	90~120V / 200~240V 50 / 60Hz, Free Voltage
Monitor module	15" LCD Monitor

3 MAIN FEATURES

- Real time 2D gray – scanned imaging with multi-beam receiving
- Digital Beamforming with:
 - Dynamic Focus
 - Dynamic Aperture
 - Dynamic Apodization
- 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)

- Tissue Harmonic Imaging
- Pulse Inversion Harmonic Imaging
- Extreme High Dynamic Range
- Trapezoidal Imaging
- Combined modes
 - 2D/M, 2D/PWD, 2D/CD, 2D/PD, 2D/CD/PW, 2D/PD/PW, 2D/CD/Color M
- Cine for 511 frames
- 15" monitor with non-interlaced display
- Freehand 3D
- 3D Multi Planar Imaging
- 2 Active Probe Ports (Optional)
- QuickScan™
- DICOM 3.0 compatible Image filing : SonoView pro
- SonoView Image management
- Various Measurement Packages
- Applications
 - General, Abdomen, Obstetrics, Fetal Heart, Gynecology, Renal, Urology, Breast, Small Parts
 - Vascular, Pediatric, MSK, Cardiac, Neonatal
- HPRF
- Standby mode (Hibernation mode)
- Post Gain Control
- Peripheral output device support
- Language support : English, Italian, French, Spanish, Chinese and Russian

4 SCANHEADS

- Curved Array: CN2-8, C2-4/20, CN4-9, EC4-9
- Linear Array : LN5-12/40, L5-12/60
- Linear Array for large animal : LV5-12/60, LV2-5/180
- Safety Class : BF

4.1. CN2-8

- Application: Abdomen, OB, Gynecology, Renal, Fetal Heart
- Center frequency: 3.5MHz
- Radius of curvature: 60mm
- FOV: 60°
- Biopsy guide available
- Veterinary supported: Abdomen, OB

4.2. C2-4/20

- Application: Abdomen, Cardiac
- Center frequency: 3.0MHz
- Radius of curvature: 20mm
- FOV: 90°
- Veterinary supported: Abdomen, Cardiac

4.3. CN4-9

- Application: Neonatal, Pediatric, Vascular
- Center frequency: 6.5MHz
- Radius of curvature: 10mm
- FOV: 150°
- Veterinary supported: Abdomen, OB, Cardiac

4.4. EC4-9

- Application: OB, Gynecology, Urology
- Center frequency : 6.5MHz
- Radius of curvature: 10mm
- FOV: 150°
- Biopsy guide available

4.5. LN5-12/40

- Application: Small Part, Breast, Vascular, MSK
- Center frequency: 7.5MHz
- FOV: 40mm
- Steered angle
- Trapezoidal imaging
- Biopsy guide available
- Veterinary supported: Abdomen, MSK

4.6. L5-12/60

- Application: Small Part, Breast, Vascular, MSK
- Center frequency: 7.5MHz
- FOV: 60mm
- Steered angle
- Trapezoidal imaging
- Biopsy guide available
- Veterinary supported: Abdomen, MSK

4.7. LV5-12/60

- Application: OB, MSK
- Center frequency: 7.5MHz
- FOV: 60mm
- Steered angle
- Trapezoidal imaging
- Veterinary supported: OB, MSK

4.8. LV2-5/180

- Application: MSK
- Center frequency: 3.5MHz
- FOV: 180mm
- Trapezoidal imaging
- Veterinary supported : MSK

Biopsy guide supported: CN2-8, EC4-9, LN5-12/40, L5-12/60

5 DETAIL SYSTEM SPECIFICATION

5.1 Applications

- General
- Abdomen
- Obstetrics
- Fetal Heart
- Gynecology
- Renal
- Urology
- Breast
- Small Parts
- Vascular
- Pediatric
- MSK
- Cardiac
- Neonatal

5.2 ERGONOMICS

- Compact size and high maneuverability for portable examinations
- 2 active transducer ports for simultaneous transducer connection (optional)

- Lighting of the keyboard controls
- High quality stereo audio speaker system
- Input and output connections on the rear panel
- Attachable key panel
- 4 swivel wheels cart with front handle and printer shelf (optional)

5.3 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 Freeze key
- Peripherals controlled through the system keyboard
- 2-button footswitch
- Audio volume control
- On access to system power On/Off button
- Backlight QWERTY KBD

5.4 MONITOR

- 15" LCD high resolution non-interlaced color monitor
- Resolution: 1024x768
- High brightness & contrast

5.5 DISPLAYED LEVELS OF GRAY AND COLOR

- 256 shades of color and gray, 8bits

5.6 SCAN FORMATS

- Linear Array
- Curved Array
- High Resolution Zoom

5.7 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

5.8 DATA FIELD DISPLAY

- Date, Time, Transducer in use
- Frequency range in operation
- Image depth and depth marker
- Setting name
- Frame rate (Hz)
- Imaging Cine frame number
- Dynamic range (dB)
- Enhance setting
- Persistence
- Post gain
- Gain settings
- Time Gain Compensation curve (TGC)
- Transmit focus location
- Age/birthday
- Sector orientation
- Gray scale bar

5.9 PATIENT REPORT PAGE

- Customizable patient and physician information for each study

5.10 BODY MARKERS

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

5.11 IMAGE ANNOTATIONS

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

5.12 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 external DVD-RW, CD-RW and USB Flash Memory
- Factory pre-set Programs and Applications protected from alteration and deletion

5.13 TRANSMIT FOCAL ZONE ENHANCEMENT

- User-selectable position and number of transmit focal zone settings through a toggle switch

5.14 DISPLAY DYNAMIC RANGE

- User selectable in 2dB increments

5.15 FRAME RATE

- Max. above 280 FPS

5.16 INVERT OPTIONS

- Up/down
- Right/left

5.17 DEPTH SELECTION

- Range: from 2 to 30 cm

5.18 TIME GAIN COMPENSATION

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

5.19 IMAGE PROCESSING PARAMETERS

- 2D Gain
- Edge Enhance (10 steps)
- Persistence
- Real time 2D Filter
- Dynamic Range (up to 180dB)
 - High dynamic --> "soft gray" image
 - Low dynamic --> "hard gray" image
- Reject level

- Reject range max.: 32
- Reject range min.: 1
- step with: 1
- Pen(etration) / Gen(eral) / Res(olution) optimized setting

5.20 HIGH RESOLUTION ZOOM

Read / Write Zoom

5.21 CALIPERS AND GENERAL MEASUREMENTS

- 8 pairs of 2D and 3D calipers available :
 - 2D distance between calipers for each pair
 - 2D manual tracing distance between calipers for each pair
 - 2D Ellipse (Area)
 - 2D manual tracking distance and auto area calculation
 - 2D Hip Joint (Angle)
 - 3D auto volume by 3 distance
 - 3D auto volume by 1 distance
 - 3D auto volume by 1 distance + Ellipse
- Minimum distance between calipers:
 - Transducer type, depth and HRZ box setting dependent

5.22 IMAGE CINE MEMORY

- Available in all modes
- Imaging Cine, for real-time acquisition and review of 2D
- 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 (2D image size, etc)
 - memory allocated for Cine
- Measurement and calculation capability

5.23 2D mode

Read zoom / write zoom

5.24 Harmonic mode

Tissue Harmonic Imaging / Pulse Inversion Harmonic

5.25 M mode

- Dynamic range: 50~180dB, 2dB steps
- Reject level: 1~32, 32 steps
- Sweep speed: 120/180/240/300Hz, 4steps
- M edge enhancement: 0 ~ 9, 10 steps
- M colorization: 8 chroma map
- M-color flow mode

5.26 Spectral Doppler mode (PW)

- Gray scale map: 5 maps
- PW wall filter: 4 steps (Low, Middle1, Middle2, High)
- PW sweep speed: 120/180/240/300, 4 steps
- Sample volume length: 0.5 ~ 15mm
- PRF: 1 ~ 23KHz
- Velocity scale range (depending on probe frequency)
- Velocity range: 2.0cm/sec ~ 4.0m/sec
- Spectrum Inversion

5.27 Color Doppler mode

- Color map: 8 maps
- CD wall filter: 4steps (Low, Middle1, Middle2, High)
- Velocity scale range (depending on probe): 4.0cm/s ~ 4.0m/s
- PRF: 600Hz~12KHz
- 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 +/-15°

5.28 Power Doppler mode

- Color map: 8 maps
- Velocity scale range (depending on probe): 4cm/s ~ 4.0m/s
- PRF: 600Hz~12KHz
- Ensemble: 8 ~ 31, step size 1

- PD wall filter: 4steps (Low, Middle1, Middle2, High)

6 ULTRASOUND PC MODULE

- Geode processor
- Hard drive: 160 GB (SATA type)
- RAM size:512MB
- DVD-RW, USB, LAN capability
- Stored Format: BMP, JPEG, TIF, DICOM
- Exported Format: BMP, JPEG

7 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 table list	Biometry	FW	Campbell,Hadlock,Hadlock1,Hadlock2,Hadlock3,Hadlock4, Hansmann,Merz,Osaka,Shepard,Tokyo1,Tokyo2,Shinozuka1, Shinozuka2	
		FW- Growth	Hadlock, Osaka, Tokyo, Doubilet, Brenner, Williams	
		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)
		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
	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
	<p>Mid Cereb Artery : RI Growth Table – Shinozuka</p> <p>Mid Cereb Artery : Growth Table – Shinozuka</p> <p>Umbilical Artery : RI Growth Table – Shinozuka</p> <p>Umbilical Artery : PI Growth Table – Shinozuka</p> <p>HC/AC Ratio Growth Table - Campbell</p> <p>Trend function : Display trend graph with independent Growth table and trend data table</p> <p>Display Deviation : SD ratio is displayed at the ‘result value’ area.</p> <p>Report function : save to Sonoview Lite,</p>		
Gynecology measures	<p>Uterus</p> <p>Cervix</p> <p>Left Ovary</p> <p>Right Ovary</p> <p>Cyst</p> <p>Mass</p> <p>Left Follicles</p> <p>Right Follicles</p> <p>Left Ovarian Artery</p> <p>Right Ovarian Artery</p> <p>Abnormalities of the uterus</p> <p>Environment (Observation)</p> <p>Comment</p>		
Cardiology measures	<p>Simpson</p> <p>Vol. A/L</p> <p>2D Measure</p> <p>LV Mass</p>		

	<p>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</p>
Fetal Echo	<p>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</p>
Report	<p>Open Line Transfer : Only for English Windows Export Function : Save Report Content to Excel / Text Format Print : Print Contents to Local Printer</p>

8 DOCUMENTATION CAPABILITIES

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

Device	Description
BW Video Page Printer	Sony UP-897MD Sony UP-D897 (USB interface) Mitsubishi P-91 Mitsubishi P-93W
Color Video Page Printer	Sony UP-20 Sony UP-21MD Sony UP-D23MD (USB interface)
External Monitor	Recommended Specification - Display type: LCD Monitor - Resolution: 1024x768 - Input signal: DVI (or with DVI to RGB gender)
Foot Switch	2-pedal medical foot control (USB interface) Switch functions among the following items. Left: Dual, Freeze, Update, Store Right: Dual, Freeze, Update, Store
External USB MO Drive	Backup for Sonoview Lite Fujitsu DynaMO 1300U2B or later version
External USB Flash	Backup for Sonoview Lite Imation iFLASH USB 2.0 1GB Imation USB Swing Blue 1G
CD-RW	Backup for Sonoview Lite MyBox(External USB Case) + LG CDRW 52x LiteOn LTR-52327SX CD-RW LiteON CD-RW/DVD-ROM (SOHC-5232KX) LiteON CD-RW (SOHR-5239SX)
InkJet Printer	Printing for measurement report or Sonoview Lite HP DeskJet 5650 HP DeskJet 5940 HP DeskJet 6540 HP DeskJet 6940 HP DeskJet 6980 HP LaserJet 1320

	HP LaserJet 2420
	HP LaserJet P2015
	HP Color LaserJet 3600
	HP OfficeJet J5780
	HP OfficeJetProK 550
ECG Module	NA

10 PERIPHERAL SIGNAL

Signal	In/Out	Description
DVI	O	1 port
S-VHS	O	1 port
VHS	O	NA
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	1 port
MIC	I	NA
LAN (10/100 BASE-T)		1 port
USB 2.0		3 ports
ECG		NA
Foot Switch	I	USB interface

11 SAFETY REQUIREMENTS

- IEC/EN 60601-1 Medical Electrical Equipment, Part1, General Requirements for safety.
- IEC/EN 60601-1-1 Safety requirements for medical electrical system.
- IEC/EN 60601-1-2 Electromagnetic compatibility-Requirements and tests.
- IEC/EN 60601-1-4 / ISO 14971 Programable electrical medical system
- IEC/EN 60601-2-37 Particular requirements for the safety
- IEC 61157 Declaration of acoustic output parameters.
- EN/ISO 10993-1 Biological evaluation of medical devices.

- UL 60601-1 Medical Electrical Equipment, Part1, General Requirements for safety.
- CAN/CSA22.2,601.1 Medical Electrical Equipment, Part1, General Requirements for Safety
- AIUM/NEMA UD-2 Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment
- AIUM/NEMA UD-3 Standards for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment.

12 POWER AND PHYSICAL SPECIFICATIONS

- Power consumption : 90W
- Heat dissipation : 490 BTU/h
- Size: 375mm x 402mm x 188mm(H x W x D)
- Weight: 8.5kg (approx)
- 90-120V/50~60Hz
- 200-240V/50~60Hz

13 OPERATION ENVIRONMENT

- Ambient temperature: 10°C–35°C (50°F–104°F)
- Relative humidity: Up to 90% non-condensing

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

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