

# Hepatus Diagnostic Ultrasound System

## Performance Specifications

### System Overview

#### Functions

The system is intended to provide VITE (Visual Transient Elastography) to estimate the liver stiffness, as well as ultrasound coefficient of attenuation LiSA (Liver Ultra-Sound Attenuation) to evaluate the liver steatosis with quantitative results.

The VITE and LiSA can be used as an aid to diagnosis and monitoring of adult patients with liver disease, as part of an overall assessment of liver.

#### Application

Abdomen

### Physical Specification

#### Dimensions and Weight

Height:	1300±15 mm
Width:	584±15 mm
Depth:	710±15 mm
Weight:	approx. 57.5±5 kg

#### Transducer Types

Curved array transducer  
ViTE transducer

**Probe Ports:** 2 active universal probe ports

#### Standard Features

B-Mode  
M-Mode  
Color Doppler Imaging  
Power Doppler Imaging and Directional PDI  
Pulsed Wave Doppler  
Zoom/iZoom (Full Screen Zoom)  
Post processing function  
256 GB SSD  
Built-in wireless adapter  
4 USB 3.0 ports  
Touch Gestures  
iStorage  
MedTouch  
iScanHelper

#### Optional Features

DICOM  
iNeedle™ (Needle Visualization Enhancement)  
iWorks  
DVR module  
McAfee  
iVocal                    Support voice recognition function by inputting system-recognizable voice commands through microphone

Authorization software for ultrasound measurement

ViTE License A  
ViTE License B  
ViTE License Free

Built-in battery

Replaceable and rechargeable lithium battery  
Light indicator  
Full battery lasts more than 22 hours in standby mode  
Empty battery recharged to full in less than 4 hours

Continuous work time: more than 2 hours  
Lithium-Ion Battery Pack 14.8V, 5800mAh (single battery)

#### Language Support

Software: English

#### Built-in Wireless Adapter

Encryption: WPA-PSK, WPA2-PSK  
Max transfer speed: 300 Mbps  
Protocols:  
802.11b: 11,5.5,2,1 Mbps  
802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps  
802.11n: Up to 300 Mbps

#### Electrical Power

Voltage: 100-240 V~  
Frequency: 50/60 Hz  
Input current: 4.4-2.5 A  
Power input: 3.5 A

#### Operating Environment

Ambient temperature: 0-40 °C  
Relative humidity: 30%-85% (no condensation)  
Atmospheric pressure: 700 hPa-1060 hPa

#### Storage & Transportation Environment

Ambient temperature: -20-55 °C  
Relative humidity: 20%-95% (no condensation)  
Atmospheric pressure: 700 hPa-1060 hPa

#### Imaging Modes

Visual Transient Elastography (ViTE)  
B-Mode  
THI and PSH™ (Phase Shift Harmonic Imaging)  
M-Mode/ Color M-mode  
Color Doppler Imaging  
Power Doppler Imaging/Directional PDI  
Pulsed Wave Doppler

#### User Interface

##### Monitor

15-inch high resolution color LED monitor  
Resolution: 768\*1024  
Viewing angle: 85°left/right; 85°up/down  
Digital on-screen display of brightness and contrast controls  
Frame rate (Hz): 60 Hz

##### System Boot-up

Boot-up from complete shut-down in about 34 sec  
Shut-down in about 6.5 sec  
Restore from standby mode: about 6 sec

##### Screen Lock

Lock the screen for 10 seconds for cleaning and disinfecting the main unit.

##### Comments

Supports text input and arrow  
Support freehand marking on touch screen  
Covers various applications  
User customizable

##### Body Mark

144 body marks for versatile application



#### Numbers of Exam Mode Presets

7 system exam modes (unlimited number for user-defined ones)

#### Positioning

Real time 2D ultrasound for ROI position, and adjustable.  
Sample volume ≥6 cm<sup>3</sup>

#### Quality Control

Probe pressure index  
Indicate the proper probe pressure during the exam.  
Motion stability index  
Ensure the respiratory stability

#### Data Acquisition

Data acquisition Mode  
C-scan (Continuous Acquisition): The number of measurements can be set to (1, 5, 10, 15) for each group and all results will be recorded.  
Q-Scan Acquisition: Automatically acquire 10 valid measurements, and delete invalid results.  
At least 3 type of method to start the data acquisition.

#### Acquisition Results

##### Measured Value Display

Patient information  
Median value of liver stiffness  
Median value of liver steatosis  
E: Liver stiffness  
LiSA: Liver Ultra-Sound Attenuation  
Inter-Quartile value  
Success rate  
Total number of acquisition results  
Number of valid acquisition results

##### Elastogram

The Elastogram displays the propagation of shear wave. It shows the depth and transmission time of shear wave, and can help to verify the accuracy of acquisition results.

##### Data Edit

Support data curves, and allow to delete the selected result which is not accurate, the statistical results will be updated immediately.

# Hepatus Diagnostic Ultrasound System

## Performance Specifications

### Imaging Parameters

Available on probe LFP5-1s	
ROI:	8 mm x 30 mm - 10 mm x 60 mm, adjustable
C-Scan:	1, 5, 10, 15
Q-Scan:	Automatically capture 10 valid results as one group and delete the invalid result
Elas. Metric:	E, Cs
Elastogram:	EG1, EG2
Display Format:	2D, E, 2D+E
Map:	E1, E2, E3, E4, E5
Display Result:	E + LiSA, E, LiSA
New Batch:	On/Off
Recapture all:	On/Off
M-STB Index:	On/Off
M-STB Sensi.:	0, 1, 2, 3, 4
Filter:	0, 1, 2
LiSA ROI:	On/Off
Probe Control:	On/Off
Tissue stiffness measurement	
Measurement depth range:	20 - 90 mm
Elasticity display range:	1.5 kPa - 75 kPa
Measurement accuracy:	within ±5%
Fat attenuation measurement	
LiSA display range:	90 dB/m - 450 dB/m
Accuracy of LiSA measurement:	Within 20%
Repeatability of LiSA measurement:	Within 5%
2D sampling	
Probe pressure motion stability indicator	
Shear wave frequency:	50Hz

### Transducers

#### VITE Transducer

##### LFP5-1s

Application:	Abdomen
Bandwidth:	1.0-5.7 MHz
Number of elements:	44
FOV (max):	90°
Depth:	4-38 cm
Physical footprint:	22 mm x 21.4 mm
Footprint:	13.6 mm x 12.7 mm
B-mode Frequencies:	1.0~3.2, 1.9~4.6, 2.3~5.7 MHz
Harmonic Frequencies:	3.8, 4.0, 5.0, 6.0 MHz
Doppler Frequencies:	2.0, 2.5, 3.0 MHz
Shear Wave Frequency:	50 Hz
Biopsy Guide:	None

### Curved Array

#### C5-1s

Application:	Abdomen
Bandwidth:	1.0-5.7 MHz
Number of Elements:	128
FOV (max):	61°
Extended FOV:	101°
Convex Radius:	60 mm
Depth:	4-40 cm

Physical Footprint:	76.5 mm x 28 mm
Footprint:	64.9 mm x 16.2 mm
B-mode Frequencies:	1.0~3.2, 1.9~4.6, 2.3~5.7 MHz
Harmonic Frequencies:	3.8, 4.0, 5.0, 6.0 MHz
Doppler Frequencies:	2.0, 2.5, 3.0 MHz
Biopsy Guide:	NGB-022, multi angle, reusable

### Report

Specific report template by application Editable value in report  
Images selectable  
Report content (including hospital information) editable  
Supports graphic and digital report, trend graphic viewing  
Able to Export as PDF/RTF/CSV file

### Exam Storage and Management

#### Exam Storage

256 GB SSD. More than 172GB internal hard drive for patient data storage  
Capable of storing up to approximate 1685561 single frames  
Direct digital storage of single frame and cine 2D, color and Doppler.

#### Exam Management

iStation™ workstation dedicated for patient exam management  
Patient exam query/retrieve  
Support review of current and past exam  
New exam, Activate exam, End exam are available  
Support measurements and calculations on archived exam and images  
Export images as (BMP/JPG/FRM/CIN/TIFF/DCM/AVI format)  
Exam data export in batches: export data in CSV file  
Support backup/send to USB devices (hide patient information); support back up to DVD-RW media  
Support data encryption and transmission encryption

#### Cine Review

Available in all modes  
Frame by frame manual cineloop review or auto playback with variable speed  
Maximum cine memory up to 29606 frames or 385.2 s (M)  
Retrospective and prospective storage are available and length is pre-settable (Prospective: Max. time 480s; Retrospective: Max. time: 120s)

### Connectivity

#### Ethernet Network Connection

Cable connection  
Wireless connection: built-in wireless adaptor

#### DICOM 3.0

DICOM basic  
Verify (SCU, SCP)  
Print  
Store  
Storage Commitment  
Media Exchange

DICOM Worklist (HL7 supported)  
DICOM Query/Retrieve  
DICOM Modality Performed Procedure Step - MPPS

#### iStorage (included in UltraAssist)

Direct network storage tool between ultrasound system and personal computer

#### HIS Query/retrieve

Obtain patient information from HIS server

#### MedTouch

Connect Ultrasound machine to smart devices based on Android and iOS system, such as tablet PC or mobile phone. Remote control of Ultrasound machine, and tutorial software iScanHelper study on smart devices  
Support Android and iOS powered smart devices  
Android 4.0 and above  
iOS 7.0 and above

#### Anti-virus Software

McAfee  
Windows Defender

### Peripheral Devices and Accessories (Option)

#### Black/white Digital Video Printer

MITSUBISHI P95DW-N  
SONY UP-D898MD

#### Black/white Analog Video Printer

SONY UP-X898MD

#### Digital Graph/text Printer

HP OFFICEJET PRO 8100

#### Color Digital Printer

SONY UP-D25MD

#### Footswitch

USB port: 971-SWNOM (2-pedal)  
USB port: 971-SWNOM (3-pedal)

#### Barcode Reader

Laser barcode scanner  
Model: DS4308  
JADAK Barcode reader  
Model: HS-1M and HS-1R (supporting RFID)

#### External DVD R/W Drive

ASUS: SDRW-08D2S-U

#### iVocal Microphone

Model: SAMSON XPD1 Headset, SAMSON XPD1 Presentation, and PYLE PUBMIC43

#### ECG Module

ECG lead port: 6 pin, IEC&AHA, for 3-lead wires

### System Inputs and Outputs

HDMI: 1 port  
ECG connector: 1 port  
USB: 4 USB 3.0 ports  
Ethernet: 1 port

# Hepatus

Diagnostic Ultrasound System

## Performance Specifications

### Ultrasound Extended Function

#### Overview

Echo-enriched Beamforming  
Up to 55296 channels  
Up to 8-beamforming

#### THI and PSH™

Patented PSH™ technology, obtains purer harmonic, better contrast resolution, higher SNR, exceptional high frequency harmonic

#### Color Doppler Imaging

#### Power Doppler Imaging

Support directional power doppler  
Dual Live: On/Off

#### PW

### Safety and Conformance

#### Quality Standards

ISO 9001  
ISO 13485

#### Design Standards

EN 60601-1 and IEC 60601-1  
EN 60601-1-2 and IEC 60601-1-2  
EN 60601-1-6 and IEC 60601-1-6  
EN 60601-2-37 and IEC60601-2-37  
EN 62304 and IEC 62304  
EN 62366 and IEC 62366  
EN ISO 17664 and ISO 17664

#### Mindray North America

800 MacArthur Boulevard  
Mahwah, NJ 07430

Tel: 800.288.2121 Support: 877.913.9663 [www.mindray.com](http://www.mindray.com)