ISONIC 3505

AdvancedNDT

Superior Performance Portable Smart All-In-One Ultrasonic Flaw Detector and Recorder with A-, B-, CB-Scan, and TOFD Functionality

- A-Scan
- TOFD
- SRUT GW - Short Range Guided Wave
- True-to-Geometry Flaw Detection B-Scan
- Thickness B-Scan
- Interface echo
- Encoded Raster Scanning (C-Scan and 3D)
  - Mechanics Free
  - Mechanized – Contact and Immersion (IUT)
  - Automatic – Contact and Immersion (IUT)
- VAUT - Video Aided UT
- GPS and RFID data embedding
- Intuitive User Interface
- UT over IP: Remote Control, Observation of the Indications, Data Acquisition through LAN, Internet, Intranet, etc
- and much more...

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

Ultrasonic Pulsing / Receiving and A-Scan

- Versatile Pulser with the Booster of the Rising and Falling Edges of the Initial Pulse and the Automatic Adaptive Damping
- Switchable Pulsing Modes:
  - Spike Pulse
  - Unipolar Square Wave Initial Pulse with boosted rising and falling edges and guaranteed mark level stability and active damping
  - Bipolar Square Wave Initial Pulse with boosted rising and falling edges and guaranteed mark level stability and active damping
    - Smoothly Tunable Amplitude (14 Levels)
    - Smoothly Tunable Duration
    - 10 Grades of Automatic Adaptive Active Damping
- Wide Band 140 dB Dynamic Range Never-Saturated Receiver
- Digitizing of the Originally Received Signals over Entire 140 dB Dynamic Range Independently on Gain and Rectification Settings
- - 30 ... + 110 dB Global Analogue Gain
- Signal Presentation
  - Rectified A-Scan (Full / Positive / Negative Half Wave)
  - RF A-Scan - No Time Base Limit
  - Logarithmic Scale A-Scan
  - Simultaneous Frequency Domain (FFT) + Time Domain Signal Presentation
  - Artificial Intelligence (AI) A-Scan
- Comprehensive Signal Filtering: 32-Taps FIR Band Pass Digital Filter with Smoothly Controllable Lower and Upper Frequency Limits

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

Ultrasonic Pulsing / Receiving and A-Scan

- 2 Independent Gates (A, B)
  - Independent on the Global Analogue Gain **Gain per Gate A** setting covering the whole range of Gain manipulation (-30 … + 110 dB Analogue Gain)
  - Independent on the Global Analogue Gain **Gain per Gate B** setting covering the whole range of Gain manipulation (-30 … + 110 dB Analogue Gain)
- DAC / DGS / TCG
  - Theoretical DAC (dB / mm /// dB / inch)
  - Experimental DAC (reflector by reflector echo height measurement) - DAC creating procedure supported by Artificial Intelligence (AI)
  - Unlimitedly Expandable DGS Probes Database
  - Intuitive DGS Calibration
- Interface Echo A-Scan start (Additional IE Gate)
- Built-In Incremental Encoder Interface
- Triggering Output Terminal for the External Devices - Sync Out
- Triggering Input Terminal for the External Devices – Sync In

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

Thickness B-Scan

- Dual and Single Element Probes
- Encoded / Time Based Recording and Imaging
- DAC / DGS / TCG Normalization for Flaw Detection Scans
- 100% Raw Data Capturing
- Gain per Gate manipulation (- 30 ... + 110 dB) for the desired Region of Interest (ROI) on the Recorded A-Scan
- Comprehensive Postrpocessing for All Types of non TOFD Line Scanning Records as Above Including:
  - Recovery and Evaluation of Captured A-Scans
  - Off-Line Global Gain Manipulation (- 30 ... + 110 dB)
  - Off-Line Gain per Gate Manipulation (- 30 ... + 110 dB) for 2 Independent Gates
  - Defects Sizing
  - Automatic creating of inspection reports - hard copy / PDF File

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

Flaw Detection B-Scan

- Angle and Straight Beam Probes
- True-To-Geometry Volume Corrected Imaging
- Encoded / Time Based Recording and Imaging
- DAC / DGS / TCG Normalization for Flaw Detection Scans
- 100% Raw Data Capturing
- Gain per Gate manipulation (- 30 ... + 110 dB) for the desired Region of Interest (ROI) on the Recorded A-Scan
- Comprehensive Postrpocessing for All Types of non TOFD Line Scanning Records as Above Including:
  - Recovery and Evaluation of Captured A-Scans
  - Off-Line Global Gain Manipulation (- 30 ... + 110 dB)
  - Off-Line Gain per Gate Manipulation (- 30 ... + 110 dB) for 2 Independent Gates
  - Off-Line DAC / DGS Normalization of the Recorded Images / DAC / DGS Evaluation
  - Numerous Filtering / Reject Options (by Geometry / Position / By Amplitude / dB-to-DAC / etc)
  - Defects Sizing and Echo-Dynamic Pattern Recognition
  - Automatic creating of inspection reports - hard copy / PDF File

the new standard in the UT instrumentation

SONOTRON NDT
www.sonotronndt.com

ISONIC 3505

HR B-Scan (High Resolution Flaw Detection B-Scan)

- Straight Beam Dual and Single Element Probes
- Encoded / Time Based Recording and Imaging
- DAC / DGS / TCG Normalization for Flaw Detection Scans
- 100% Raw Data Capturing
- Gain per Gate manipulation (- 30 ... + 110 dB) for the desired Region of Interest (ROI) on the Recorded A-Scan
- Comprehensive Postrpocessing for All Types of non TOFD Line Scanning Records as Above Including:
  - Recovery and Evaluation of Captured A-Scans
  - Off-Line Global Gain Manipulation (- 30 ... + 110 dB)
  - Off-Line Gain per Gate Manipulation (- 30 ... + 110 dB) for 2 Independent Gates
  - Off-Line DAC / DGS Normalization of the Recorded Images / DAC / DGS Evaluation
  - Numerous Filtering / Reject Options (by Geometry / Position / By Amplitude / dB-to-DAC / etc)
  - Defects Sizing and Echo-Dynamic Pattern Recognition
  - Automatic creating of inspection reports - hard copy / PDF File

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

TOFD and CHIME

- TOFD and CHIME Probes
- Encoded / Time Based Recording and Imaging
- Real Time Lateral Wave Amplitude Stabilizer
- Gain per Gate Manipulation (- 30...+ 110 dB) for the Desired Regions of Interest (ROI) on the TOFD A-Scan
- All Functional TOFD Postrpocessing:
  - Recovery and Evaluation of Captured A-Scans
  - Off-Line Global Gain Manipulation (- 30 ... + 110 dB)
  - Off-Line Gain per Gate Manipulation (- 30 ... + 110 dB) for 2 Independent Gates
  - Off-Line lateral Wave Amplitude Stabilizer for Creating TOFD Map
  - Parabolic Cursors
  - SAFT
  - Defects Sizing
    - Depth / Height
    - Position Along the Fusion Line / Length
  - Linearization
  - Straightening
  - Removal Lateral Wave for Increasing Near Surface Detection Ability
  - Rectification
  - Zooming Desired Segments of TOFD Map
  - Automatic creating of inspection reports - hard copy / PDF File

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

CB-Scan

- Horizontal Plane View CB-Scan for Shear, Surface, and Guided Waves Inspections
- Encoded / Time Based Recording and Imaging
- DAC / DGS / TCG Normalization for Flaw Detection Scans
- 100% Raw Data Capturing
- Gain per Gate manipulation (- 30 ... + 110 dB) for the desired Region of Interest (ROI) on the Recorded A-Scan
- Comprehensive Postrpocessing for All Types of non TOFD Line Scanning Records as Above Including:
  - Recovery and Evaluation of Captured A-Scans
  - Off-Line Global Gain Manipulation (- 30 ... + 110 dB)
  - Off-Line Gain per Gate Manipulation (- 30 ... + 110 dB) for 2 Independent Gates
  - Off-Line DAC / DGS Normalization of the Recorded Images / DAC / DGS Evaluation
  - Numerous Filtering / Reject Options (by Geometry / Position / By Amplitude / dB-to-DAC / etc)
  - Defects Sizing and Echo-Dynamic Pattern Recognition
  - Automatic creating of inspection reports - hard copy / PDF File

the new standard in the UT instrumentation

SONOTRON NDT

www.sonotronndt.com

ISONIC 3505

Raster Scanning

- Straight Beam Compression Wave Flaw Detection / Corrosion Mapping through XY-scanning
- Versatile encoded scanning
  - Mechanics-free manual
  - Mechanized – Contact and Immersion (IUT)
  - Automatic – Contact and Immersion (IUT)
- Contact or Immersion
- Thickness (Distance) or Amplitude C-Scan (Top View)
- Thickness profile or flaw detection End and Side Views
- Curvature correction
- SRUT Guided Wave inspection through XYβ-scanning
- DAC / DGS / TCG Normalization for the Flaw Detection Imaging
- 100% Raw Data Capturing
- Gain per Gate manipulation (- 30 ... + 110 dB) for the desired Region of Interest (ROI) on the Recorded A-Scan
- Comprehensive Postrpocessing for All Types of non TOFD Line Scanning Records as Above Including:
  - Recovery and Evaluation of the Captured A-Scans
  - Off-Line Global Gain Manipulation (- 30 ... + 110 dB)
  - Off-Line Gain per Gate Manipulation (- 30 ... + 110 dB) for 2 Independent Gates
  - 3D Viewing
  - Off-Line DAC / DGS Normalization of the Recorded Images / DAC / DGS Evaluation
  - Numerous Filtering / Reject Options (by Geometry / Position / By Amplitude / dB-to-DAC / etc)
  - Defects Sizing and Echo-Dynamic Pattern Recognition
  - Automatic creating of inspection reports - hard copy / PDF File

the new standard in the UT instrumentation

SONOTRON NDT
www.sonotronndt.com

ISONIC 3505

Compliance

- ASME Section I – Rules for Construction of Power Boilers
- ASME Section VIII, Division 1 – Rules for Construction of Pressure Vessels
- ASME Section VIII, Division 2 – Rules for Construction of Pressure Vessels. Alternative Rules
- ASME Section VIII Article KE-3 – Examination of Welds and Acceptance Criteria
- ASME Code Case 2235 Rev 13 – Use of Ultrasonic Examination in Lieu of Radiography
- Non-Destructive Examination of Welded Joints – Ultrasonic Examination of Welded Joints. – British and European Standard BS EN 1714:1998
- Non-Destructive Examination of Welds – Ultrasonic Examination – Characterization of Indications in Welds. – British and European Standard BS EN 1713:1998
- Calibration and Setting-Up of the Ultrasonic Time of Flight Diffraction (TOFD) Technique for the Detection, Location and Sizing of Flaws. – British Standard BS 7706:1993
- WI 00121377, Welding – Use Of Time-Of-Flight Diffraction Technique (TOFD) For Testing Of Welds. – European Committee for Standardization – Document # CEN/TC 121/SC 5/WG 2 N 146, issued Feb, 12, 2003
- ASTM E 2373 – 04 – Standard Practice for Use of the Ultrasonic Time of Flight Diffraction (TOFD) Technique
- Non-Destructive Testing – Ultrasonic Examination – Part 5: Characterization and Sizing of Discontinuities. – British and European Standard BS EN 583-5:2001
- Non-Destructive Testing – Ultrasonic Examination – Part 2: Sensitivity and Range Setting. – British and European Standard BS EN 583-2:2001
- Manufacture and Testing of Pressure Vessels. Non-Destructive Testing of Welded Joints. Minimum Requirement for Non-Destructive Testing Methods – Appendix 1 to AD-Merkblatt HP5/3 (Germany).– Edition July 1989

the new standard in the UT instrumentation

SONOTRON NDT
www.sonotronndt.com

ISONIC 3505

VAUT: Video Aided UT

VAUT (**V**ideo **A**ided **UT**) technology is the standard feature of **ISONIC 3505** that provides displaying of the live image of the probe manipulated over the material and the corresponding UT data simultaneously: this concentrates most of the operator's attention on the instrument screen whilst scanning manually. Every single A-Scan obtained in the corresponding static probe position may be stored into a file comprising the UT data along with the embedded photo representing the test piece and the probe placement. Every record comprising a sequence of A-Scans, for example TOFD map, C-Scan, and the may be stored into a file comprising the UT data and video of the scanning process

The embedded photo or video is assigned to the UT data in the file only and it is not openable / reproducible separately. On opening the file the recorded photo / video will be played along with ultrasonic data recoverable for each probe position

If the video camera is fitted into the scanner or encoder frame and focused onto material surface the inspection results file will carry the synchronized **UT** and **VT (Visual Testing)** data providing the **dual modality inspection results obtained in one pass** and comprised together; this increases the global productivity of NDE

VAUT technology also allows **embedding of the GPS- or GLONASS-coordinate and the RFID data of the part under test into the inspection files** provided the appropriate standard gadgets are connected to the instrument at the time of inspection. Along with the photo and / or video the global position and RFID data embedded into the same UT inspection files will improve the operation and reliability of the RBIM (Risk-Based Inspection and Maintenance) databases avoiding the mistaken assigning of the NDT results to the wrongly designated

the new standard in the UT instrumentation

SONOTRON NDT
www.sonotronndt.com

ISONIC 3505

UT over IP

ISONIC 3505 may be controlled remotely from a regular computer running under Win'XP, 7, 8, 10. There is no need in the special software for that purpose, just the same software that runs in the instrument. The instrument and the PC should be connected to the LAN or to the router distributing IPs automatically. Since the connection is established **ISONIC 3505** enters into the slave mode driving the probes and capturing the A-Scans, the hardware measurements, and the encoder data supplying them to the computer, which provides full control of the instrument along with data acquisition, processing, displaying and storage on the local drives

ISONIC 3505

ISONIC 3505 - Technical Data

Number of Channels:	1
Pulsing/Receiving Modes:	Single / Dual
Initial Pulse:	Switchable type: • Spike • Unipolar Square Wave • Bipolar Square Wave
Transition:	≤7.5 ns (10-90% for rising edges / 90-10% for falling edges)
Amplitude:	Smoothly tunable (14 levels): • 10...200 V into 50 Ω for the Spike and Unipolar Pulse • 20...400 Vpp into 50 Ω for the Bipolar Pulse
Damping:	Smoothly Tunable (10 levels) Automatic Adaptive Active Damping
Half Wave Duration:	50…1000 ns controllable in 10 ns step
Analogue Gain:	- 30... + 110 dB controllable in 0.5 dB resolution
Advanced Low Noise Design:	85 µV peak to peak input referred to 80 dB gain / 25 MHz bandwidth
Frequency Band:	0.2 … 25 MHz
A/D Conversion:	32 bit @ 100 MHz Physical Sampling Rate
Digital Filter:	32-Taps FIR band pass with controllable lower and upper frequency limits; non-linear acoustics technique supported
Display Mode - Signal Presentation:	• Rectified A-Scan: Full / Positive / Negative Half Wave • RF A-Scan - No Time Base Limit • Logarithmic Scale A-Scan • Simultaneous Frequency Domain (FFT) + Time Domain (RF) • Artificial Intelligence (AI) A-Scan
Ultrasound Velocity:	300...20000 m/s (11.81…787.4 "/ms) controllable in 1 m/s (0.1 "/ms) resolution
Range (Time Base):	0.5...3000 µs - controllable in 0.01 µs resolution
Display Delay:	- 2.5 ... 1500 µs - controllable in 0.01 µs resolution
Probe Angle:	0…90° controllable in 1° resolution
Probe Delay:	0 ... 100 µs controllable in 0.01µs resolution - expandable
Reject:	0...99 % of screen height controllable in 1% resolution
Gates:	2 Independent gates (**A** and **B** with the **Start / Width** controllable over entire time base in 0.1 mm /// 0.001" resolution
Threshold:	5…95 % of A-Scan height controllable in 1 % resolution

ISONIC 3505

Gain per Gate:	• Independent on the Global Analogue Gain **Gain per Gate A** setting covering the whole range of Gain manipulation (-30 ... + 110 dB Analogue Gain) • Independent on the Global Analogue Gain **Gain per Gate B** setting covering the whole range of Gain manipulation (-30 ... + 110 dB Analogue Gain)
DAC / TCG:	• Controllable over Entire 140 dB Dynamic Range / Time Base Manipulation Range • Multi-curve • Slope ≤ 20 dB/μs • Available for the Rectified and RF A-Scans • Theoretical – through Entering dB/mm (dB/") factor • Experimental – (reflector by reflector echo height measurement) / capacity - up to 40 points / DAC creating procedure supported by Artificial Intelligence (AI)
DGS:	• Standard Library for 18 probes / unlimitedly expandable • Intuitive Calibration Procedure
Interface Echo Start:	Standard Feature Implemented through the Separate **IE** Gate
Digital Readout:	• 27 automatic functions • Dual Ultrasound Velocity Measurement Mode for Multi-Layer Structures • Curved Surface / Thickness / Skip correction for angle beam probes • Ultrasound Velocity and Probe Delay Auto-Calibration for the Probes of All Types
Freeze A-Scan:	• Freeze All • Freeze PeakNote: Signal Evaluation, Manipulating of the Global Gain over - 30 ... +110 dB Range, Gates Positions and Gain per Gate over - 30 ... +110 dB Range and Signal Presentation Settings (Display Mode) is Possible for the Frozen A-Scans
Sync In Terminal:	Positive TTL-level Pulse - Standard Feature
Sync Out Terminal:	Positive TTL-level Pulse - Standard Feature
Scanning and Imaging:	• Thickness Profile B-Scan • True-To-Geometry Angle / Skip Corrected Cross-sectional B-Scan • High Resolution B-Scan • Horizontal Plane View CB-Scan • TOFD • Thickness C-Scan - Top-, Side-, End- Views and 3D; slicing and curvature correction included (optional: dual axis coordinate encoder and application SW required) • Flaw Detection C-Scan - Top-, Side-, End- Views and 3D; slicing and curvature correction included (optional: dual axis coordinate encoder and application SW required) • XY?-encoded CB-Scan (optional: dual axis coordinate / probe swiveling angle encoder and application SW required) • Editable Color Palette • DAC / DGC / TCG Normalization of the Images Related to the Amplitude Based Inspections

ISONIC 3505

Standard Length of the Single Line Scanning Record:	50…20000 mm (2"…800"), automatic scrolling
GPS Coordinate:	Obtained and Displayed Automatically Along with UT Data with Use of the External GPS Receiver Connected to Instrument's USB Port
VAUT:	Video Data from One or Two External Cameras Connected to Instrument's USB Port(s) is Displayed Along with UT Data
Data Storage:	• 100% Raw Data Capturing • GPS Coordinate Embedded Into the Data File in Case of GPS Receiver Connected • Photo Embedded Into the Single A-Scan Data File in Case of USB Camera Connected • Video Embedded Into the Scanning Results Data File in Case of USB Camera Connected
Postrpocessing:	• Built-in means for the comprehensive postprocessing in the instrument • ISONIC Office 35 - postprocessing package for the computer running under W'XP, W'7, W'8, W'10

General

PRF:	20...5000 Hz controllable in 1 Hz resolution
On-Board Computer CPU:	Dual Core Intel Atom N2600 CPU 1.6 GHz
RAM:	2 GB
Quasi HDD:	SSD Hard Drive 120 GB
Screen:	Sun readable 8.5” touch screen 800 x 600
Controls:	Sealed keyboard and mouse
Standard Ports:	• 2 x USB (optionally expandable up to 8) • Ethernet • sVGA
Operating System:	W'7PRO
Encoder:	• Single Axis Incremental TTL encoder - Built-In • Multi-Axis (>=2) Incremental TTL Encoder - Optional
Remote Control:	• From an external computer running under W'XP, W'7, W'8, W'10 through Ethernet • No special software required • All calibration and inspection data is stored in the control computer
Ambient Temperature:	• -30°C ... +60°C (operation) • -50°C ... +60°C (storage)

ISONIC 3505

Housing:	• Rugged reinforced plastic case with the stainless steel carrying handle • IP 65 • No air intake • The cooling is not required
Dimensions:	292x295x115 mm (11.50"x11.61"x4.53") - with / without battery inside
Weight:	4,400 kg (9.70 lbs) – with battery 3.750 kg (8.27 lbs) – without battery