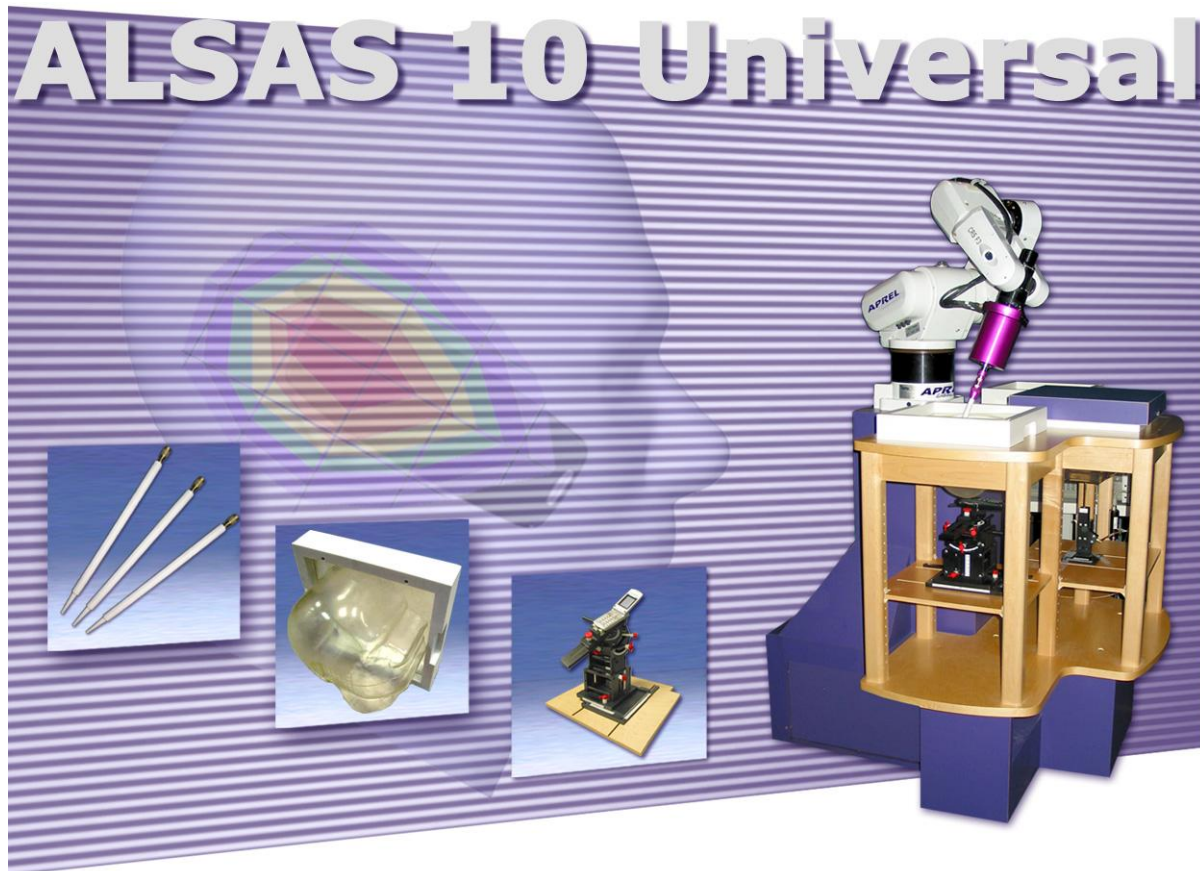




ALSAS 10 Universal



Technical Specification
2011

Standard ALSAS 10 Universal SAR & HAC (software)

ALSAS-10U System



APREL Laboratories ALSAS-10U is fully optimized for the dosimetric evaluation of a broad range of wireless transceivers and antennas. Developed in line with the latest methodologies it is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209 Part 1 & 2 (*draft*), CENELEC (EN50361), ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller.

ALSAS-10U has been developed with a strong focus on application development with custom modular software/hardware for the broadest range of wireless testing, including dosimetry research and measurements in various Phantoms – SAM Phantom, UniPhantom™ Universal Phantom, Universal Flat Phantom and others. Free space E-Field measurements of mobile devices and base station antennas can also be executed using ALSAS. With the current ALSAS configuration, several phantoms and setups can be arranged around the system – and since the phantoms are designed to be light and easy to move for interchanging between test frequencies compliance test times are improved.

ALSAS-10U is designed to cover the frequency range from 30MHz to 6GHz as per the IEC 62209 Part II (*draft*) standard. There is no limiting factor to the operating RF carrier frequency range for the ALSAS-10U system other than the phantoms chosen for testing. The ALSAS-10U has been designed to be modular and phantoms are integrated onto the Universal Workstation™ so as to allow for complete flexibility of the measurement process. This unique design allows for a fully flexible system which can be built around the exact needs of the user.

- ALSAS-10U can calculate multi-spot SAR and perform multi-cube analysis automatically.
- The scanning interpolation, and extrapolation methods conform to international standards.
- Probe tilt is included so as to meet IEEE 1528 and IEC 62209 Part 1 & 2 (*draft*) standards requirements.
- Average test Time – one complete single scan (not pre-scan) is less than 12 minutes for a standard area and 36mm cube volume.

Miniature E-Field Probe ALS-E-020S



The APREL Laboratories E-Field probe utilizes an orthogonally triangular sensor arrangement.

E-Field Probes have been characterized from 30MHz to 6GHz with the probe diameter scientifically verified for use at frequencies above 3GHz eliminating the need for separate probe types.

The isotropic E-Field probe used by APREL Laboratories, has been fully calibrated and assessed for isotropicity and sensitivity in both air and tissue, including boundary effect within a controlled ISO-IEC 17025 accredited laboratory.

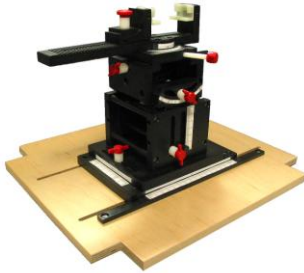
SAR is assessed with the calibrated probe which can be positioned at a user defined or default height(s) of 2.4 or 4mm from phantom surfaces so as to minimize any resultant boundary effect due to the probe being in close proximity to the phantom surface and provides improved measurement uncertainty at higher frequencies.

A new 2.8mm probe is now available for use at higher frequencies allowing for smaller scan resolutions and greater measurement point density.

Compliant Standards	IEEE 1528, IEC 62209 Part 1 & 2 (<i>draft</i>)
Frequency Range	30 MHz ~ 6 GHz
Sensitivity	Better than $0.8 \mu\text{V}/(\text{V}/\text{m})^2$
Dynamic Range SAR	0.001 W/kg to 100 W/kg
Isotropic Response Axial	Typically $\pm 0.1\text{dB}$
Hemispherical isotropy	$\pm 0.3 \text{ dB}$ or better
Linearity	$\pm 0.2 \text{ dB}$ or better
Probe Tip Radius	User selectable all $< 5 \text{ mm}$
Sensor Offset	$1.56 (\pm 0.02 \text{ mm})$
Probe Length	290 mm
Video Bandwidth	@ 500 Hz: 1 dB @ 1K Hz: 3 dB
Boundary Effect	Less than 2% for distances greater than 2.4 mm
Material	Ertalyte™
Connector	6 Pin Bayonet

Custom and smaller Probes are available on request

Universal Device Positioner ALS-H-E-SET-2



The APREL Laboratories Universal Device Positioner has been developed so as to allow complete freedom of movement of a DUT. Developed to hold the DUT in the equivalent of free space to avoid additional loading attributable to the material used in the construction of the positioner so as to reduce measurement uncertainty.

Positioner has a built-in 15 degree feature used for fast and accurate touch to tilt movement.

The APREL device positioner can hold in-place devices such as handsets, smart phones, Clam shell phones, PDA's and small size tablet PC's.

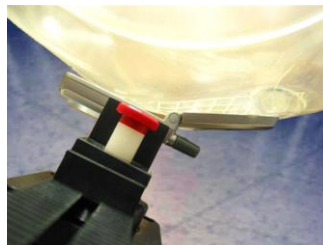
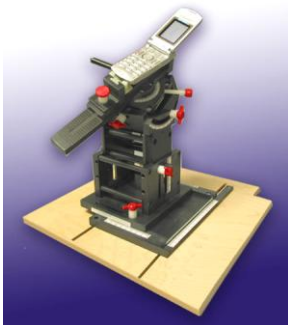
The device positioner can be used for HAC testing (Hearing Aid Compatibility).

When used with the Universal Work Station and its adjustable shelves, the positioner

Compliant Standards	IEEE 1528, IEC 62209 Part 1 & 2 (<i>draft</i>)
Dielectric constant	Less than 5.0
Loss Tangent	Less than 0.05
Number of Axis	6 axis freedom of movement (8 when utilized with ALSAS-10U Workstation)
Translation Along MB Line	± 76.2 mm
Translation Along NF Line	± 38.1 mm
Translation Along Z Axis	± 25.4 mm (expandable up to 500 mm)
Rotation Around MB Line (yaw)	±10°
Rotation Around NF (pitch)	± 30°
Line Rotation (roll)	360° full circle
Maximum Grip Range	0 mm to 150 mm
Material	Resistant to DGBE and all other tissue stimulant materials as listed in IEEE 1528 Annex C.1.
Tilt Movement	Full movement with built-in 15° gauge

provides 8 degrees of motion, and does not require the user to crouch or sit on the floor (a stool or chair can be used) when positioning the DUT against a phantom.

Optional additional clamping mechanisms are available to pre-mount the test device (useful for QA testing)



6 Axis Articulated Robot ALS-F3



ALSAS-10U utilizes a six axis articulated robot, which is controlled using a Pentium based real-time movement controller. The movement kinematics engine utilizes proprietary (Thermo CRS) interpolation and extrapolation algorithms, which allow full freedom of movement for each of the six joints within the working envelope.

The accuracy of the probe tip positioning over the measurement area is better than 0.05 mm.

The robot is capable of moving the probe to angles greater than 30° .

Robot positioning repeatability should only be used as a reference when a process has been developed for repeated point to point detection. This value is not relevant to SAR

Robot/Controller Manufacturer	Thermo CRS
Power Supply	Single phase 110-220 60Hz with applicable country kit
Number of Axis	Six independently controlled axis
Positioning Resolution	0.05mm (repeatability)
Controller Type	Pentium based CROSS system
Robot Reach	710 mm
Repeatability	0.05mm or better
Probe protection	Built in "emergency stop"
Communication	RS232 and LAN compatible

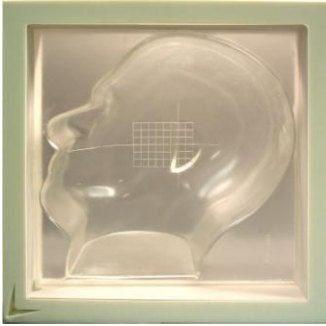
measurements as it is not expected that a user would measure the exact same condition** more than 100 times (as per the robotic manufacturers standard for determining the positional repeatability).

**Condition specified above with respect to SAR measurements would reflect a process executed on a DUT which has been defined, characterized, setup and measured repeatedly without any changes to the setup condition for more than 100 times.

NOTE:

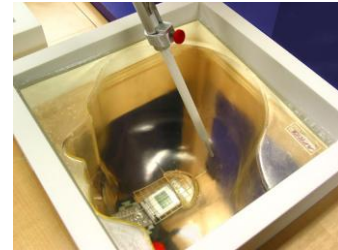
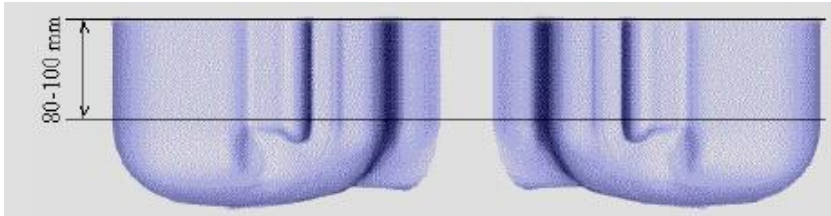
The most important factor is not the robot repeatability itself, but the probe mounting and surface detection system. Every measurement point for compliance (eg. FCC) processes must be dynamically detected using a PMDPS.

APREL SAM Phantoms ALS-P-SAM-L / ALS-P-SAM-R



The APREL Laboratories SAM phantoms have been designed so as to aid repeatability and positioning for any DUT. Developed using the IEEE SAM CAD file they are fully compliant with the requirements for IEEE 1528, IEC 62209 Part 1 and 2 (*draft*) and FCC Supplement C. Both the left and right SAM phantoms are sagittally cut and can be interchangeable on the Universal Workstation. The phantoms are transparent and include the IEEE 1528 grid with visible NF and MB lines. The phantom is surrounded by an Acrylic Polymer Blend frame, which adds additional support and load bearing characteristics.

support and load bearing characteristics.

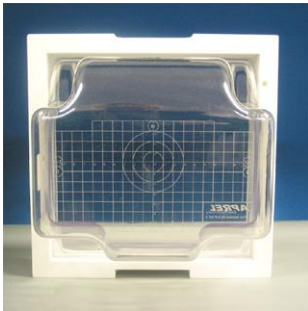


Compliant Standards	IEEE-1528, IEC 62209 Part 1 & 2 (<i>draft</i>)
SAM	In accordance with the IEEE 1528 standard
Material	Composite urethane which allows for the device to be viewed through the phantom, resistant to DGBE
Phantom Shell Shape Tolerance	Fully calibrated to be better than ± 0.2 mm
Frame Material	Corian [®]
Tissue Simulation Volume	7 liter with 15.0 ± 0.5 cm tissue
Thickness	2 mm ± 0.2 mm 6 mm ± 0.2 mm at NF/MB intersection
Loss Tangent	<0.05
Relative Permittivity	<5
Resistant to Solvents	Resistant to all solvents used for tissue manufacturing detailed in IEEE 1528
Load Deflection	<1mm with sugar water compositions
Manufacturing Process	Injection Molded
Phantom Weight	Less than 10kg when filled with 15cm of simulation tissue

APREL Universal Phantom ALS-P-UP-1



The APREL Laboratories Universal Phantom has been developed as an engineering tool for both compliance and development. It is used on the ALSAS 10U as a system validation phantom and can be integrated freely onto other SAR measurement systems. The unique design allows repeatable measurements for all devices, including handsets, PDA units, laptop computers, and validation dipoles. The APREL Laboratories Universal Phantom has been fully validated both experimentally from 800MHz to 6GHz and numerically using Remcom XFDTD numerical software.



The shell thickness is 2 mm overall, with a 4 mm spacer located at the NF/MB intersection providing an overall thickness of 6mm in line with the requirements of international standards. The design allows for fast and accurate SAR measurements, of handsets, by allowing the conservative SAR to be evaluated at one frequency/channel commensurate with both left and right experiments in one measurement. The phantom is surrounded by an Acrylic Polymer Blend frame, which adds additional support and load bearing characteristics.

Compliant Standards	IEEE-1528, IEC 62209 Part 1 & 2 (<i>draft</i>), CENELEC, and others
Manufacturing Process	Injection molded
Material	Vivac
Phantom Shell Shape Tolerance	Less than ± 0.2 mm
Frame Material	Corian [®]
Tissue Simulation Volume	8 liter with 15.0 ± 0.5 cm tissue
Thickness	2mm ± 0.2 mm 6mm at NF/MB intersection
Loss Tangent	<0.05
Relative Permittivity	<5
Resistant to Solvents	Resistant to all solvents detailed in IEEE 1528
Load Deflection	<1mm with heaviest tissue (sugar water compositions)
Dimensions	Length 220mm x breadth 170mm
Phantom Weight	Less than 10kg when filled with 15cm of simulation tissue

Additional Phantom Specification Details

Phantoms have been designed for easy transportation, storage and maintenance. The Universal Work Station™ allows for fast change over of phantoms which speeds up the measurement process by over 2hours per frequency change when compared to twin phantoms.

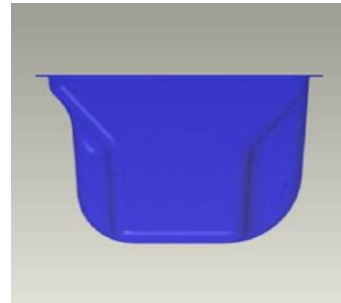
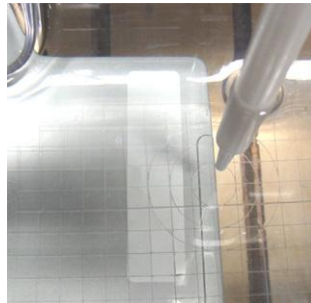
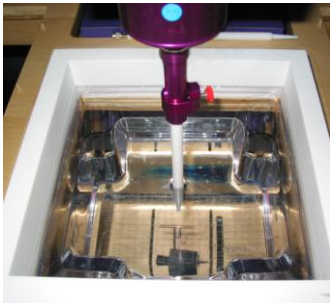
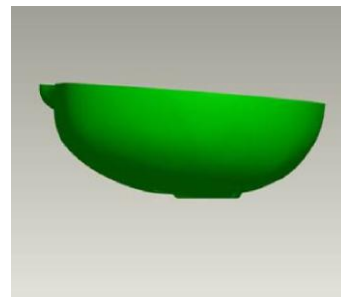
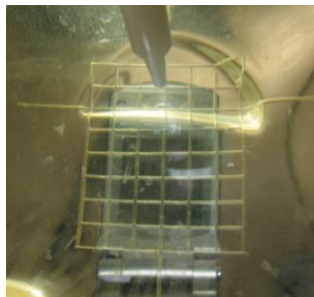
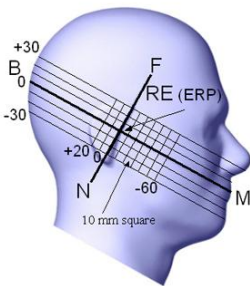
Potential time saving of 1 day per 5 day week and over 52 days per year,

Time savings based on the following figures,

1 day = 10hours

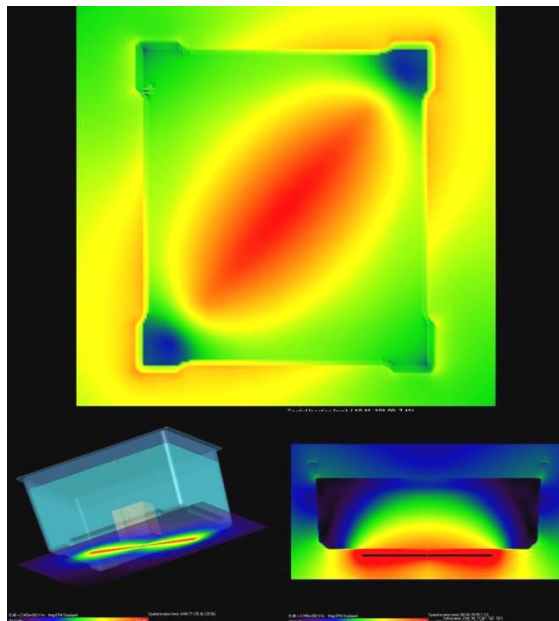
1 week = 50 hours

2 frequencies per day (1 change) = 2hours saving



Additional Phantom Specification Details

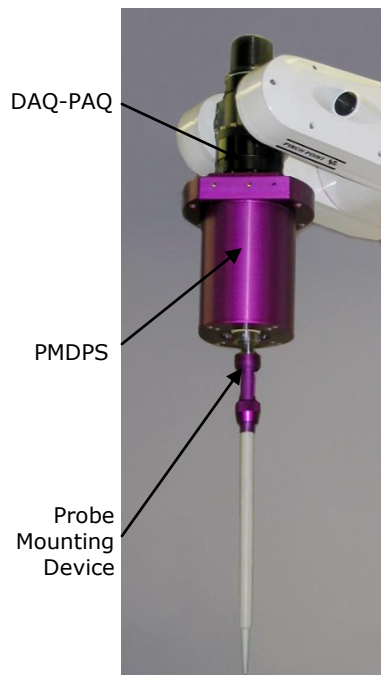
- Clear Phantoms for improved positioning of DUT and measurement repeatability provides overall improvement to uncertainty of the SAR measurement.
- Overall phantom shell thickness uncertainty is +/- 0.2mm
- Lower volume phantoms need less than 7l of tissue for SAR measurements.
- Corian™ frames with built-in spout for easier tissue evacuation.
- Permanent IEEE 1528 and IEC 62209 positioning reference markings included on phantom for better positioning accuracy, repeatability and improvement to uncertainty of the SAR measurement (see images on next page).
- Permanent IEEE 1528 and IEC 62209 NF and MB markings on phantom (see images on next page).
- Additional markings are included on phantoms to improve DUT positioning and accuracy.
- Universal Phantom™ for use in validation, body, and head SAR evaluations. The Universal Phantom™ speeds up the measurement process by allowing for left and right measurements to be made in one measurement step (less than 10 minutes for complete process).
- Weight of SAM and Universal Phantom™ when filled is less than 10 kg.
- After test completion phantoms and tissue can be placed in storage box until next use.



ALS-Uni-Large (30MHz-6GHz) Supports IEC 62209 Part 2 (draft)

When testing below 300MHz it is recommend that an order be placed for the optional larger phantom which allows for testing from 30MHz to 800MHz in line with IEC 62209 Part 2 (draft) requirements.

DAQ-PAQ (Analog to Digital Electronics) ALS-DAQ-PAQ-3 Boundary Detection Unit ALS-PMDPS-3



ALSAS 10U incorporates a fully calibrated DAQ-PAQ (analog to digital conversion system) which has a 4 channel input stage, combined with the integrated amplifier module. The input signal is amplified accordingly so as to offer a dynamic range from 4 μV to 330 mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor utilizing proprietary algorithms. Improvements to measurement speed are improved by sending processed data down to the main computational module.

PMDPS is used to hold a probe and to detect complex boundary locations (curved and flat surfaces) during a SAR or HAC assessment process. It utilizes relative movements of internal components to trigger integrated micro-sensor mechanisms in order to detect boundary(s) and consequently position the probe at the specified distance relative to a boundary in order to achieve accurate and repeatable measurements.

Also included is an e-stop feature which will shut down the ALSAS-10U system if there is any malfunction of the arm (due to power outages), erratic motions (due to operator error), or hard collision (phantom, DUT, or any solid surface). The ALSAS-10U PMDPS controls the distance between phantom and center of the probe sensors and allows for improved positioning accuracy of the robot arm.

All surface detection methods are controlled by a proprietary algorithm which dynamically compensates for every detection point, and allows for a 20-30% improvement to surface detection speeds. By eliminating optical detection sensors uncertainty is further reduced by integrating micro detection sensors which can determine movements of less than 1 μm .

Amplifier Range	4 μ V to 330 mV
ADC	16 Bit optically isolated
Built-in E-Stop Feature	Emergency Stop feature to prevent damage of equipment and for user safety purposes
Field Integration	Local Co-Processor utilizing proprietary integration algorithms
SAR Dynamic Range	0.001 W/kg -100 W/kg _a
Ambient Noise	Below 0.001 W/kg measured with probe in tissue
LED Indication	Boundary detection and DAQ-PAQ State
Number of Input Channels	4 in total 3 dedicated and 1 spare for future upgrades (when and if needed)
Communication	Optically isolated packet data via RS232
Robot Arm Integration	DAQ-PAQ and Boundary Detection Unit are mounted directly onto joint 6 of the F3 arm utilizing joint 6 tool (ISO Standard M8 Mounting Plate) to allow easy integration and removal (no angular interface)
Supply	DC supply powered by an isolated external supply unit (no battery required)
LED Indicators	Probe status (amplifier on) and boundary detection

Additional PMDPS Specification Details

Accuracy of Positioning:	Better than 10 μ m at 6GHz.
SAR Uncertainty:	Better than 0.01 W/kg SAR at 6Gz.
Detection Mechanism:	2 x 360° Stage Axial and Lateral Detection at 6GHz.
Emergency Stop:	4 Stage 360° Axial and Lateral Detection at 6GHz.
Probe Mounting:	6 Pin Bayonet for Fast Probe Change.
Calibration:	Every PMDPS is Calibrated to 0.01 W/kg SAR at 6GHz.
Reliability Expectations:	Better Than 10,000,000 Cycles.

NOTE:

Measurement uncertainty attributable to probe positioning utilizing the PMDPS is greater with an increase to the RF carrier frequency. Uncertainty values documented above are the worst case. Consequently, for RF carrier frequencies below 6GHz, all uncertainties will be lower than those given above.

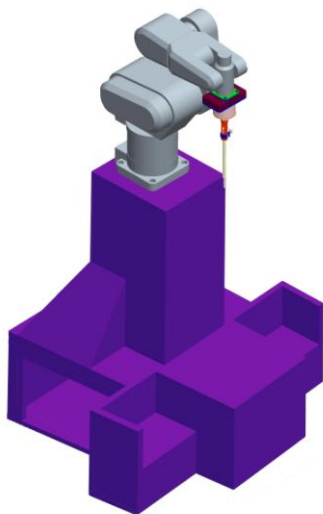
ALSAS Universal Workstation ALS-UWS



ALSAS workstation was developed with a strong engineering focus taking into consideration customer and client needs, and the necessity to have an integrated system which will allow for flexibility and fast adaptability ergonomically designed for ease of use. The Workstation form is stable, robust in structure, and flexible, so that users can do calibration, test and measurements. Workstation users can locate different types of phantoms with one set up, which significantly speeds up the measurement and assessment process. The Universal Workstation can be changed to allow for measurements from 30MHz up to 6GHz by integrating the various phantom types available to users.

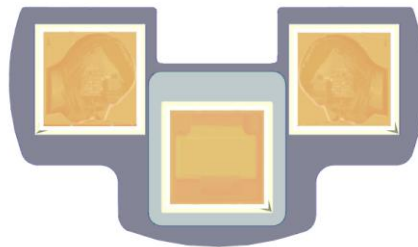
This functionality and flexibility gives a tremendous advantage to users of the ALSAS-10U system compared to competitors' systems. Phantoms can be configured on the workstation as 2 SAM (left and right) with a Uni-Phantom or the optional phantoms which are available to support international standard (IEC 62209 Part 1 & 2 *(draft)*). Additionally the centre portion of the workstation can be removed for HAC, and other user defined measurements.

The workstation system has a modular structure which can be easily adapted to specific customer requirements and needs. The maple stand can be removed from the main robot stand to incorporate other phantoms and setup scenarios. Phantoms are self contained modular units easily removable and swappable, and require the least amount of tissue compared to other types available.

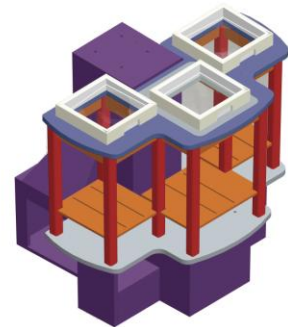


Workstation
without wooden part (rendering)

The workstation has been constructed entirely out of composite wood clad in Arborite™ and Canadian maple, with all metallic fasteners kept at a compliant distance from the Device under test.



Workstation.
Top view (rendering)

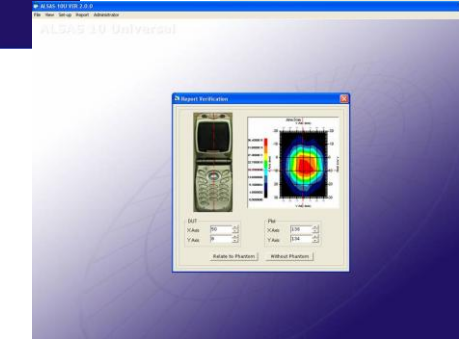
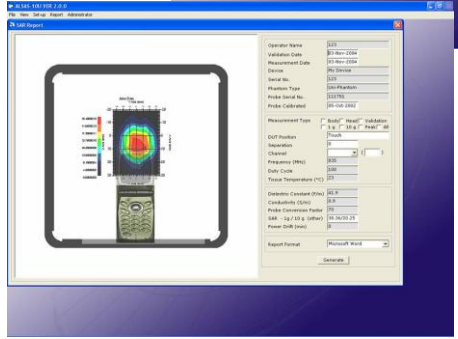
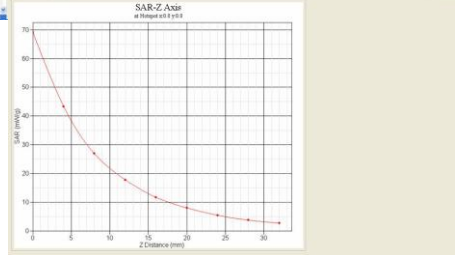
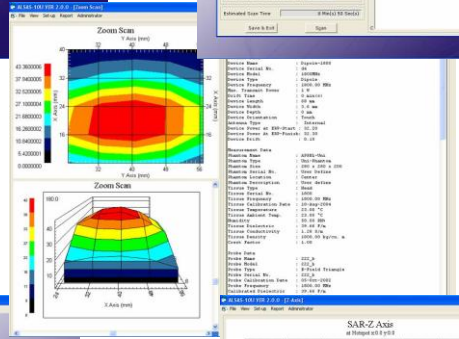
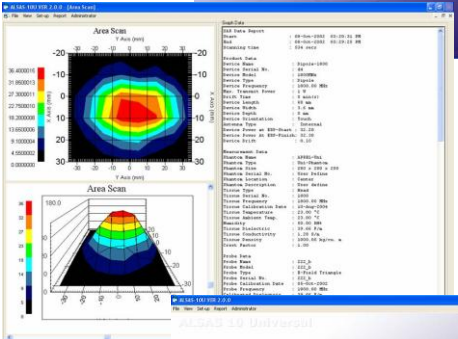
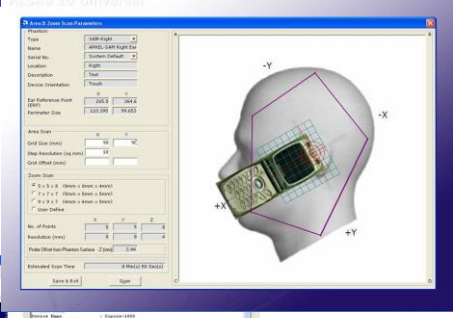
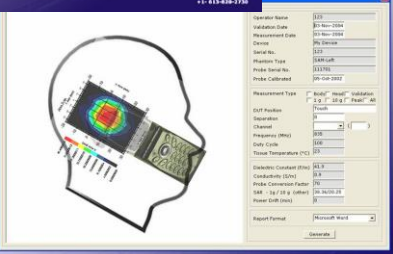
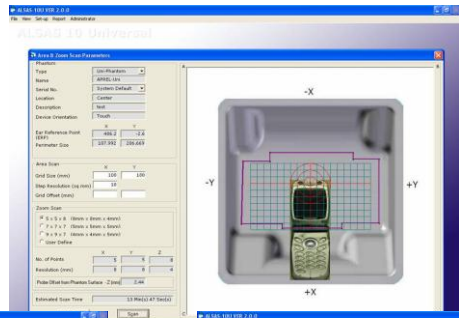
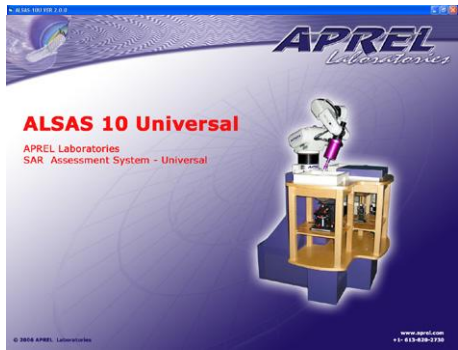


Workstation
without robot (rendering)

ALSAS-10U Test Software

Test Software	
Field Measurements	Support of E- H-field, HAC measurements including T-Coil, temperature probes; Single and continuous measurement modes; Output in μV , V/m, A/m, mW/g; Multiple measurement profiles (measurement time, sample time); including graded mesh for high density zoom scans Data logging to ASCII-files;
Field Scans	Measurement in lines, planes, curved surfaces (tilt), volumes in free space or restricted volumes (phantoms); Cube measurements with surface extrapolation and spatial SAR evaluation for 1g, 10g and/or arbitrary mass; Time measurements (source power drift); Probe rotation measurements (isotropy); Export of field scans to ASCII;
Visualization	3D isoline distribution; Device and phantom visualization in 2D graphics with measurement data overlaid; Freely configurable output graphic formats with automatic title and legend generation; New Numerical Feature with Remcom Inc XFDTD Enabling direct comparison of experimental and numerical results (Fall 2006);
Compliance Testing	Probe alignment normal to surface during entire scan (includes tilt); Automatic detection of all maxima; Around 10 min test time (or better) per device position; No user interaction needed during measurement (coarse scan, evaluation of cube maxima search, fine cube measurements and device power drift assessment); C63.19 HAC testing for E-H-Field and T-Coil.
System Validation	Predefined system validation procedure (compliant with IEEE/CENELEC/IEC guidelines 2006); Additional checks, such as surface detection, probe isotropy, etc.
Report Generation	Reports generated in MS-Word, and txt formats for easy importation into compliance/design reports. Reports can include Jpeg images for the device (imported via main software) with contour plots overlaid and information can be adjusted in real-time.

Software Images



ALSAS-10U Hearing Aid Compatibility Upgrade Suite for FCC HAC Compliance (ANSI/IEEE C63.19) and Development

APREL Laboratories is a pioneer in the area of Hearing Aid Compatibility, and the ALSAS-10U HAC Upgrade Suite™ brings all of APREL's three decades of experience in HAC into one package. APREL is active in the development of industry-accepted methodologies for HAC measurement and have used this experience in the development of ALSAS-10U HAC Upgrade Suite™.



ALSAS-10U HAC Upgrade Suite™ is ideal as a primary compliance instrument for Hearing Aid Compatibility or as a design/development tool for HAC Audio and near-field E-and H-Field emission evaluation of wireless handsets and hearing aids. The suite is designed for developers, compliance experts, regulators, and researchers.

A fully flexible measurement system that is a true compliance and wireless/antenna designer's tool, ALSAS-10U HAC Upgrade Suite™ is designed to be all you need for Hearing Aid Compatibility testing.

ALSAS-10U HAC Upgrade Suite™ is an affordable and easy to use application for first time and experienced users alike, and for small, medium or large laboratories and manufacturers who need access to complex HAC evaluations of wireless products (handsets, smartphones, cordless, and others). It is an expandable system which can measure devices operating up to 6 GHz and will grow with technological and standards developments.

This product is ideally suitable for use in a fast paced development area where assessments are needed for research & development, compliance and pre compliance. It is easy to deploy, learn and use.

Basic system configuration

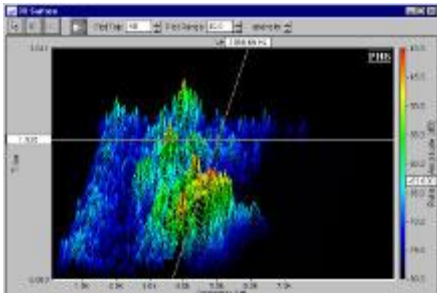
- ✓ Software platform (ALSAS-10U HAC Upgrade Suite™ V1.0.0.), based on industry-recognized test methodologies and FCC-mandated test standards (ANSI/IEEE C63.19 2007) used for HAC RF certification
- ✓ Software includes features for advanced audio band testing, signal generation and FFT analysis
- ✓ Automated X,Y,Z precision probe movement system
- ✓ Full graphic package for visualization and manipulation of measured fields
- ✓ 3D E-Field HAC probe with two standard frequency calibrations
- ✓ 3D H-Field HAC probe with two standard frequency calibrations
- ✓ Two standard frequency validation dipoles
- ✓ Active Twin-Axis T-Coil probe calibrated up to 10 kHz
- ✓ Audio Daq-Paq with built in amplifier for T-Coil calibration (requires an additional Helmholtz Coil and software upgrade)
- ✓ Catalyst-5 laboratory-grade robot with 5 degrees of freedom
- ✓ Optional training and support packages available

Description	Performs HAC testing for wireless communications devices (Wireless Device WD) using software developed for FCC compliance testing (ANSI/IEEE C63.19 2007 methodologies).
Software	User friendly GUI that allows for easy setup and data retrieval Includes signal generator (no additional equipment needed) Full FFT (Fast Furrier Transform) analysis Multiple Octave Settings (user defined or standard) Tone generation (comes with ITU P50)
Applications	RF Emissions Test - Measurements of the near-field electric field and magnetic fields emitted by a WD RF E-Field emissions V/m RF H-Field emissions A/m AF T-Coil tests ABM1 intensity and frequency response ABM2 Fast furrier transform analysis and audio quality
Typical Test Bands	SMR 800, SMR 900, Cellular 850, PCS 1900 Custom bands available on request (VOIP) 700 MHz band available soon
Report Generation	MS Word report generated according to FCC requirements
E-Field Probe	3-D E-Field Probe used for RF emissions testing of a wireless device Typical sensitivity: 1.0 mV / (V/m) Typical isotropy: 0.2 dB
H-Field Probe	3-D H-Field probe used for RF emissions testing of a wireless device Typical sensitivity @ 835 MHz: 200 mv / (A/m) Typical sensitivity @ 1880 MHz: 440 mv / (A/m) Typical isotropy: 0.3 dB
Active Twin-Axis T-Coil Probe	Converts magnetic fields of audio frequencies into AC voltage. Built in preamplifier module which allows for extended dynamic range Designed to sense axial and radial fields Typical frequency range: 100 Hz to 20 kHz Typical sensitivity: -60 dB(A/m) to 20 dB(A/m)
Validation Dipoles	Typical performance is better than -10dB RL for SMR 800 (iDEN) SMR 900 (iDEN) Cellular 850 (GSM, CDMA, WCDMA, TDMA) PCS 1900 (GSM, CDMA2000, WCDMW, CDMA1x, TDMA) Custom dipoles available on request (VOIP) 700 MHz available soon
Magnetic Dipole	Used to calibrate and validate automated methods used for HAC audio band magnetic system testing (ALSAS-10U HAC Upgrade Suite™) Serves as a known source for audio band magnetic fields for system validation and calibration
TMFS™ (Telephone Magnetic Field Simulator)	Can be used as a Telephone Magnetic Field Simulator (TMFS™) for hearing aid design.
Audio DAQ-PAQ and Integrated Power Amplifier	All-in-one box ADC (DAQ-PAQ) 16 Bit Amplifier Range up to 100 dB input Output @ 50 Ω relative to 1 Khz -4 dBV Communications via USB
Field Integration	Local Co-Processor utilizing proprietary integration algorithms
LED Indication	Emergency stop and DAQ-PAQ state
Number of Input Channels	4 in total: 3 dedicated and 1 spare for future upgrades
Communication	Packet data via RS232 and USB
Ambient Noise	20 dB below intended measurement limit
Supply	Robot and controller supplied by 110 or 220 V standard (country specific) supply Communications and control expander supplied by dedicated DC source (no battery required)

Optional HAC products available for order

- E-Field and H-Field probes (basic system comes with one of each)
- Passive T-Coil probe
- Helmholtz Coil for calibration of T-Coil probe
- T-Coil probe calibration software
- Additional Validation Dipoles
- Custom calibrations
- Custom test protocols
- Training (Seminars, or individual/company training)

Advanced Software Options for Audio Design



- Real-time FFT analysis of live input
- Record, Playback and Post Process WAV files
- Displays: Time Series, Spectrum, Spectrogram, 3-D Surface, Phase
- Full Featured Dual Channel Signal Generator
- High Resolution FFT Analysis up to 1,048,576 pts
- Octave Analysis from 1/1 to 1/96
- 24 bit precision, sampling rates to 200kHz and above (sound card dependent)
- Digital Filtering, Distortion Analysis, Transfer Functions
- Acoustic Tools: RT60, Leq, Delay Finder
- Automation Tools: Macro, DDE, Data Logging
- Amplitude Calibration: V, mV, dBV, dBmV, dBu, SPL or PA (in air or water), psi, or custom units
- Vibration Measurements: Acceleration (G), Velocity (ft/sec, in/sec, mils/sec, mm/sec), Displacement (ft, in, mils, mm)
- Independent Calibration and Scaling: each channel can be scaled and calibrated independently
- Signal Generator: Pink Noise, White Noise, Tone Burst, Noise Burst, 1 kHz Tone, Multiple Tones, Frequency Sweep, Level Sweep, IMD test tones, Pulse, Sawtooth, Triangular, Squarewave, User Defined (from .WAV source). DTMF, Digital Zero
- Utility Measurements: Peak Frequency, Peak Amplitude, Total Power
- Distortion Measurements: THD, THD+N, SNR, IMD
- Acoustic Tools: Reverberation Time (RT-60), Delay Finder, Stereo Phase Scope, Equivalent Noise Level (Leq, LeqT, Lsel, Lpk, Lmax, Lmin, L10, L50, L90)

APREL Laboratories Validation Dipoles ALS-D-Fx-S-2

- APREL have developed a range of dipoles for use in dosimetric (SAR) and near/far field applications.
- Validation dipoles have been designed using the data presented in IEEE-1528, IEC-62209 1&2.
- Dipoles can also be manufactured and tuned to the users own specifications.
- The dipoles should be used in conjunction with the APREL dipole positioning system, UniPhantom, and APREL Universal Phantom Stand.
- All tuned dipoles have a return loss greater than -20 dBm, for dosimetric applications.



Features

- Tuned to specified frequency
- Dimensions harmonized with global standards
- Compatible with all commercially available SAR measurement systems
- Compatible with APREL Phantom stand
- Compatible with APREL Universal Device Positioner
- Conforming to SSI/DRB Standards

Applications

- Product Development
- SAR Near-Field Studies
- Compliance Testing
- Quality Assurance
- System Validation
- Probe Calibration

Compliant Standards	IEEE 1528, IEC 62209 Part 1 & 2 (<i>draft</i>), EN50361
Electrical	Symmetrical Dipole with variable λ /divisor
Frequency range	30 MHz – 6 GHz (User Specified)
Application	Tuned for Dosimetric System Validation
Material	Rigid Coated Brass
Dipole Diameter	1.805 mm From Center (3.6mm)
Calibration	Return Loss, Standing Wave Ratio, Impedance & 1 & 10 g Averages
Length	Dependent on Specification
Return Loss	> -20 dBm
Max Power Input	100 Watt

APREL Laboratories, founded in 1981, is the wireless industry resource for,

- ✓ Specific Absorption Rate (SAR), MPE and RF Safety
- ✓ Acoustics and Hearing Aid Compatibility (HAC)
- ✓ RF and wireless, antennas and shielding
- ✓ EMC measurement systems
- ✓ Over the Air 3D Antenna measurement systems

APREL provides expert services, consulting, training, standards development, compliance/certification, custom systems and research programs, as well as SAR and HAC instrumentation systems to the wireless telecommunications industry and government.

APREL Laboratories employees hold senior and executive positions in multiple international standards organizations, including IEEE and IEC and work closely with international and national regulators.

APREL is a member of Spectrum Sciences Institute, a not-for-profit research and education organization.

To order ALSAS-10™, or any of our other product offerings please contact your local representative (www.aprel.com/representatives) or contact us directly at +1 613 435-8300
APREL Laboratories welcome enquiries from groups looking to represent our products and systems.
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