



APREL

Laboratories

SAR & HAC Instruments for Wireless • Consulting • Research • Standards • Compliance • Training



MiNi-HAC Hearing Aid Compatibility Test System

MiNi-HAC™ Wireless Hearing Aid Compatibility Bench Measurement Tool for FCC HAC Compliance (ANSI / IEEE C63.19) and Development



APREL Laboratories is a pioneer in the area of Hearing Aid Compatibility, and the MiNi-HAC™ brings APREL's three decades of experience 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 MiNi-HAC™.

APREL Laboratories MiNi-HAC™ is the first portable and storable commercial compliance Hearing Aid Compatibility (HAC) bench measurement system. MiNi-HAC™ 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 system 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, MiNi-HAC™ is designed to be portable and reliable with a true "out-of-the-box" system setup. When not in use, the system can be folded up and stowed within a small area of the laboratory or development site.

MiNi-HAC™ is an affordable and easy to use system 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

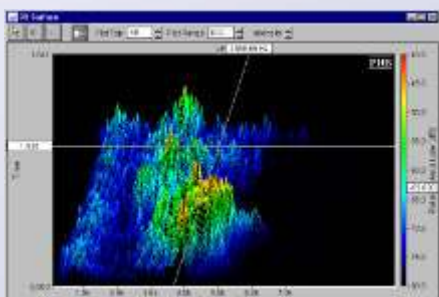
- 3 Software platform (MiNi-HAC™ V1.0.0.), based on industry-recognized test methodologies and FCC-mandated test standards (ANSI/IEEE C63.19 2007) used for HAC RF certification
- 3 Software includes features for advanced audio band testing, signal generation and FFT analysis
- 3 Automated X,Y,Z precision probe movement system
- 3 Full graphic package for visualization and manipulation of measured fields
- 3 3D E-Field HAC probe with two standard frequency calibrations
- 3 3D H-Field HAC probe with two standard frequency calibrations
- 3 Two standard frequency validation dipoles
- 3 Active Twin-Axis T-Coil probe calibrated up to 10 kHz
- 3 Device Positioner
- 3 Communications and Control Expander with integrated DAQ-PAQ and emergency stop mechanism
- 3 Audio Daq-Paq with built in amplifier for T-Coil calibration (requires an additional Helmholtz Coil and software upgrade)
- 3 Catalyst-5 laboratory-grade robot with 5 degrees of freedom
- 3 Catalyst C500C controller running on an industry standard Pentium based platform and cabling
- 3 Cabinetry-grade integrated storable wooden stand/support
- 3 Bench area of system under 6 square feet
- 3 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 (MiNi-HAC™) 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.
Communications and Control Expander	The DAQ-PAQ and emergency stop detection unit are mounted directly onto joint 5 to allow easy integration and removal (no angular interface) ADC (DAQ-PAQ) 16 Bit Amplifier range 4 μV to 250 mV
System Safety	Emergency stop feature to prevent damage to equipment and for safety purposes
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 ? 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 APREL 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)

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