Audio precision

AUDIO TEST SOLUTIONS 2021

APx500 Audio Test Software
A versatile, powerful audio test experience

APx B Series & APx Flex Audio Analyzers
The state of the art in audio test

APx Digital I/O Options
Versatility in digital interfaces

Analog, Digital, and Acoustic Test
Comprehensive audio measurement capabilities

Perceptual Audio Test
Options for intelligibility and quality evaluation

Accessories
Expansions for measurement systems

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COMPANY PROFILE

AUDIO PRECISION (AP) is a recognized world leader in electronic audio and electro-acoustic test instrumentation. Since 1984, AP's analyzers have helped engineers to design and manufacture innovative solutions ranging from semiconductor devices to consumer, automotive, and professional audio products.

Ongoing innovation has been a key theme for the organization since its founding and the APx B Series audio analyzers represent the state of the art in audio test, with models and options to suit every need from R&D to high-speed production test. Industry-leading analog performance, flexible software with a multi-mode UI, and a wide range of digital I/O and software options make APx the most powerful and versatile series of instruments available. And on the topic of software, the introduction of the cost-effective APx500 Flex audio analyzer now allows users to pair APx audio measurement software with ASIO-capable third-party audio interfaces. In addition to market-leading measurement software and a robust line of analyzers, AP also offers an array of test accessories and options for perceptual audio testing.

Headquartered in Beaverton, Oregon, AP products can be found all over the world. With global partners and representatives providing technical support, service and calibration, along with exceptional customer service, AP is dedicated to collaborating with engineers and technicians on every continent.

AP is part of Axiometrix Solutions, a leading test solutions provider comprised of globally-recognized brands. *www.axiometrixsolutions.com*

APx500 AUDIO TEST SOFTWARE

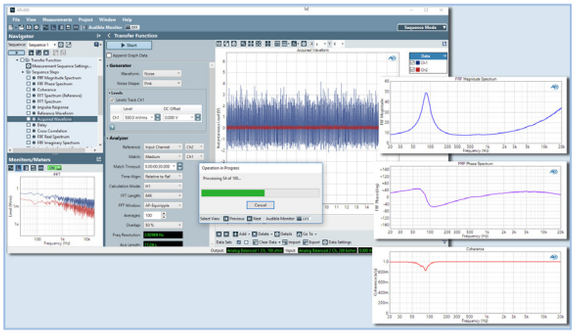
A VERSATILE, POWERFUL AUDIO TEST EXPERIENCE

As an expertly designed platform, APx500 audio measurement software provides market-leading flexibility, scalability and usability, whether paired with an APx B Series audio analyzer or with an ASIO-capable audio interface and APx500 Flex. This high-performance software offers two easy-to-use modes, Sequence Mode and Bench Mode

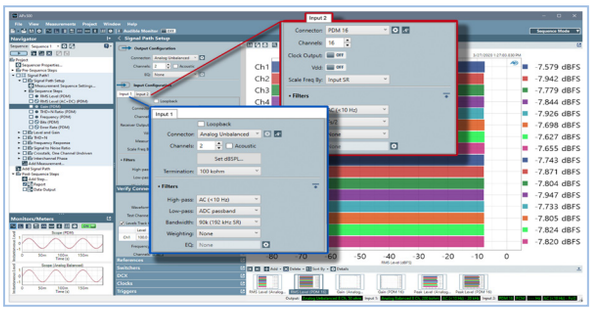
CODE-FREE AUTOMATION & COMPLETE API

APx500 Measurement Software is the most advanced audio measurement interface available. Complex procedures that include user prompts, limits, and calls to external applications can be created directly in the GUI, saving time and money while ensuring painless updates over time, as no development is required.

Create custom interfaces and application-to-application automation using the comprehensive APx API for integration in VB.NET, C#.NET, MATLAB, and LabVIEW development environments. Projects and automation can be shared with other APx units anywhere in the world.



Example test results—impedance magnitude, phase and coherence—of a loudspeaker tested using a noise signal with the APx500 software's transfer function measurement capability (v5.0 or later).

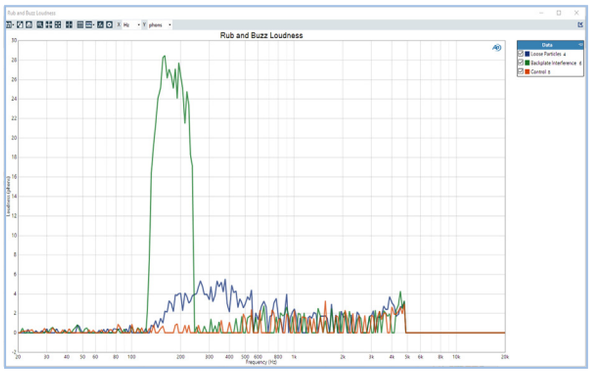


An illustration of the simultaneous multi-input capability of APx500 software, in this case an example application of 16 digital mics as the DUTs on Input 2 and an analog measurement mic as the reference on Input 1 (v6.0 or later).

SHARING PROJECTS & REPORTING RESULTS

All settings for a test are saved in a single project file, making it easy to replicate test setups between R&D and production facilities anywhere in the world. Project files are compatible with all APx instruments and each project is self-contained, so there's never any worry about dependencies or broken links. Users can even embed waveform files and images within a project file.

For customers, contract manufacturers or management, APx automatically generates rich graphic reports, with highlighted pass / fail limits and options to export as PDF, HTML, Excel, CSV, RTF or MATLAB files.



APx500 software (v6.1 or later) offers the broadest set of rub & buzz defect detection methodologies available to speaker designers and manufacturers: Rub & Buzz, SoneTrac, High-Order Harmonic Distortion (HOHD) and Rub & Buzz Loudness (shown above).

APx500 AUDIO ANALYZERS

APx audio analyzers represent the state of the art in audio test, with models and options to suit every need from R&D to high-speed production test. Industry-leading analog performance, flexible software with a multi-mode UI, and a wide range of digital I/O and software options make APx audio analyzers the most powerful and versatile series of instruments we've ever produced.

APx555B HIGH-PERFORMANCE, MODULAR 2-CHANNEL AUDIO ANALYZER

The APx555B is the highest performance and most versatile audio analyzer available.

APx58x B SERIES MODULAR ANALYZERS

Ideal for multichannel devices, the APx58xB offers 2 or 8 analog output and 8 or 16 analog input channels with support for all APx digital options.

APx52x B SERIES MODULAR 2- AND 4-CHANNEL PERFORMANCE ANALYZERS

The APx52xB is a flexible, performance-oriented 2- or 4-channel analyzer with support for high-performance analog options and all APx digital options.

HEARING INSTRUMENT AUDIO ANALYZER

The APx511B offers the specific measurements and I/O required for hearing instrument production test, including IEC60118-7 and ANSI S3.22.

APx515B 2-CHANNEL AUDIO ANALYZER

The APx515B offers analog and digital audio test in a small package,

APx517B ACOUSTIC ANALYZER

The APx517B is an integrated acoustic test system, complete with audio analyzer, power amplifier, and microphone power supply, along with an array of digital interface options.

APx500 FLEX AUDIO ANALYZER

The APx500 Flex Audio Analyzer is a cost-effective solution for production test, enabling the use of APx500 measurement software with ASIO-capable third-party audio interfaces.

APx517B ACOUSTIC ANALYZER | FEATURES

The APx517 B Series acoustic audio analyzer is specifically designed, configured, and priced to meet production-line needs. It is ideal for the testing of speakers, microphones, headphones, headsets, and devices with integrated speakers or microphones. With the APx517B, manufacturers can deploy an integrated system that brings the renowned quality, reliability, and robustness of Audio Precision's lab-oriented analyzers to their manufacturing lines.

The APx517B maintains the APx Series' tradition of flexibility and configurability. In its base configuration, APx517B is a ready-to-go system for measuring analog speakers, microphones, headphones, or headsets. For digital devices, APx517B has a module slot for the addition of a single digital interface module, such as Bluetooth, PDM or HDMI. On the software side, the base configuration provides a core set of measurements and functionality to allow out-of-the-box, fundamental test of acoustic devices. Additional advanced measurement options are available, either as individual options or as part of APx500 Flex Packs (see below).

Base Configuration

- File Analysis
- Sequence Mode
- Input Signal Monitors
- Level & Gain
- Frequency
- THD+N
- Loudspeaker Production Test (incl. Rub & Buzz)
- Stepped Frequency Sweep
- Pass/Fail Measurement
- Signal Acquisition Measurement

FLEX PACK 2

- Crosstalk
- Crosstalk Sweeps
- DC Level
- DC Level Sweeps
- DUT Delay
- Frequency Response
- Interchannel Phase
- Level Ratio
- Measurement Recorder
- Noise
- Noise Recorder
- Q-Peak Noise
- SNR
- SINAD
- Stepped Level Sweep

FLEX PACK 3

- Continuous Sweep
- Digital Error Rate
- Dynamic Range
- IMD
- IMD Frequency Sweep
- IMD Level Sweep
- Input Sample Rate
- Maximum Output
- Maximum Output (CEA-2006)
- Multitone Analyzer
- Regulated Frequency Sweep
- Signal Analyzer

FLEX PACK 4

- Acoustic Response
- Bandpass Frequency Sweep
- Bandpass Level
- Bandpass Level Sweep
- Cumulative Spectral Decay
- Impedance/Thiele-Small
- Modulated Noise
- Polar Plots
- Transfer Function

AUDIO ANALYZER SELECTION GUIDE

	ANALOG I/O	DIGITAL I/O	BEST SUITED FOR APPLICATIONS REQUIRING
APx555B	2/2	4 module slots	▪ Highest analog performance available ▪ A variety of digital I/O options
APx586B	16/8	2 module slots	▪ Up to 16 analog input (acquisition) channels ▪ A variety of digital I/O options
APX585B	8/8	4 module slots	▪ Up to 8 analog input (acquisition) channels ▪ A variety of digital I/O options
AP582B	8/2	4 module slots	▪ Up to 8 analog input (acquisition) channels ▪ A variety of digital I/O options
APx526B	4/2	2 module slots	▪ High analog performance ▪ Up to 4 analog input (acquisition) channels ▪ A variety of digital I/O options
AP525B	2/2	2 module slots	▪ High analog performance ▪ A variety of digital I/O options
APx517B	2/1 PWR 2HP	1 module slot	▪ Headphone, speaker or microphone test ▪ Fast configuration & setup ▪ A variety of digital I/O options
APx515B	2/2	Fixed SPDIF, TOSLINK, AES3	▪ Low-cost hardware ▪ Small form factor
APx511B	1/2	n/a	▪ Hearing aid / instrument testing ▪ IEC60118-7 and ANSI S3.22 standard tests
APx500 Flex	Via 3rd Party Audio Interface	n/a	▪ Very low cost ▪ Analog only testing ▪ User provided hardware

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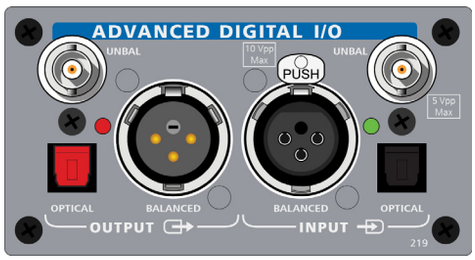
APx DIGITAL I/O OPTIONS

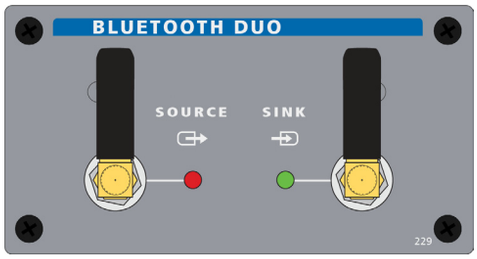
ADVANCED DIGITAL I/O



Advanced Capabilities for AES/SPDIF/TOSLINK

The APx ADIO module enables the generation of advanced impairments for sophisticated test of devices via AES/SPDIF/TOSLINK. It also includes the Advanced Master Clock (AMC) module, which handles input and output clock signals for synchronizing an APx with external equipment (or vice versa). AMC also provides jitter generation and measurement functionality for jitter-enabled I/O modules such as ADIO, PDM and DSIO.

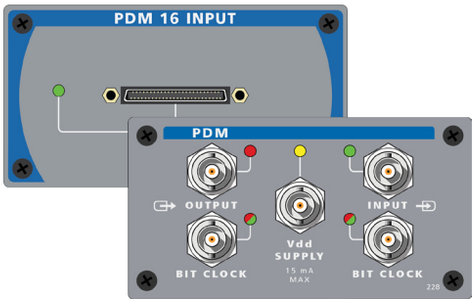
BLUETOOTH WIRELESS



Integrated BLUETOOTH® Wireless Technology

APx's Bluetooth Duo module provides dedicated source and sink radios, higher RF power, and improved RF shielding, with all Bluetooth controls integrated into the APx analyzer software. The module supports A2DP, HFP, HSP, and AVRCP profiles, with codec support for SBC, AAC, aptX, aptX-LL, aptX-HD, CVSD, and wideband speech (mSBC). (For earlier generations of APx analyzers, AP's legacy Bluetooth module is still available when pre-4.5 software versions are required).

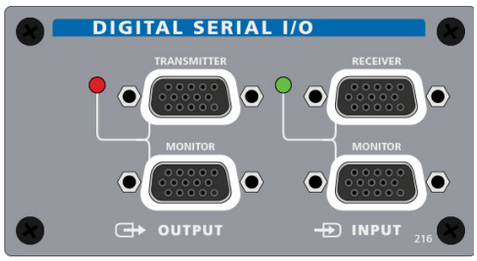
PDM



Complete PDM Analysis for MEMS Mics, Mic Arrays & Smart Devices

APx B Series analyzers offer powerful PDM options to engineers evaluating audio devices that have a PDM output. The PDM 16 module provides sample-accurate inter-channel phase information for up to 16 channels and supports anechoic chamber test setups with an acoustically silent remote pod. The PDM module, while limited to 2 channels, offers variable DC voltage, variable sample rate, PSR (power supply rejection) measurement and jitter measurement for testing devices' full operating parameters.

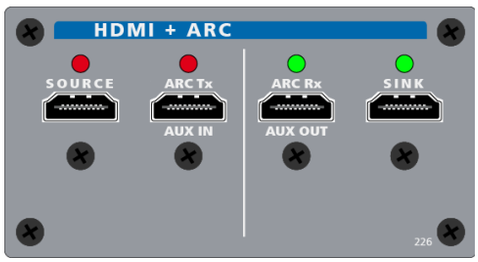
DIGITAL SERIAL



Multichannel Chip-Level Connectivity

Digital serial capability is essential in R&D for evaluating designs at the circuit board level. The Digital Serial I/O (DSIO) option provides a direct multichannel connection to chip-level interfaces such as I2S, TDM, and other popular serial interface formats including left-justified, right-justified, and DSP.

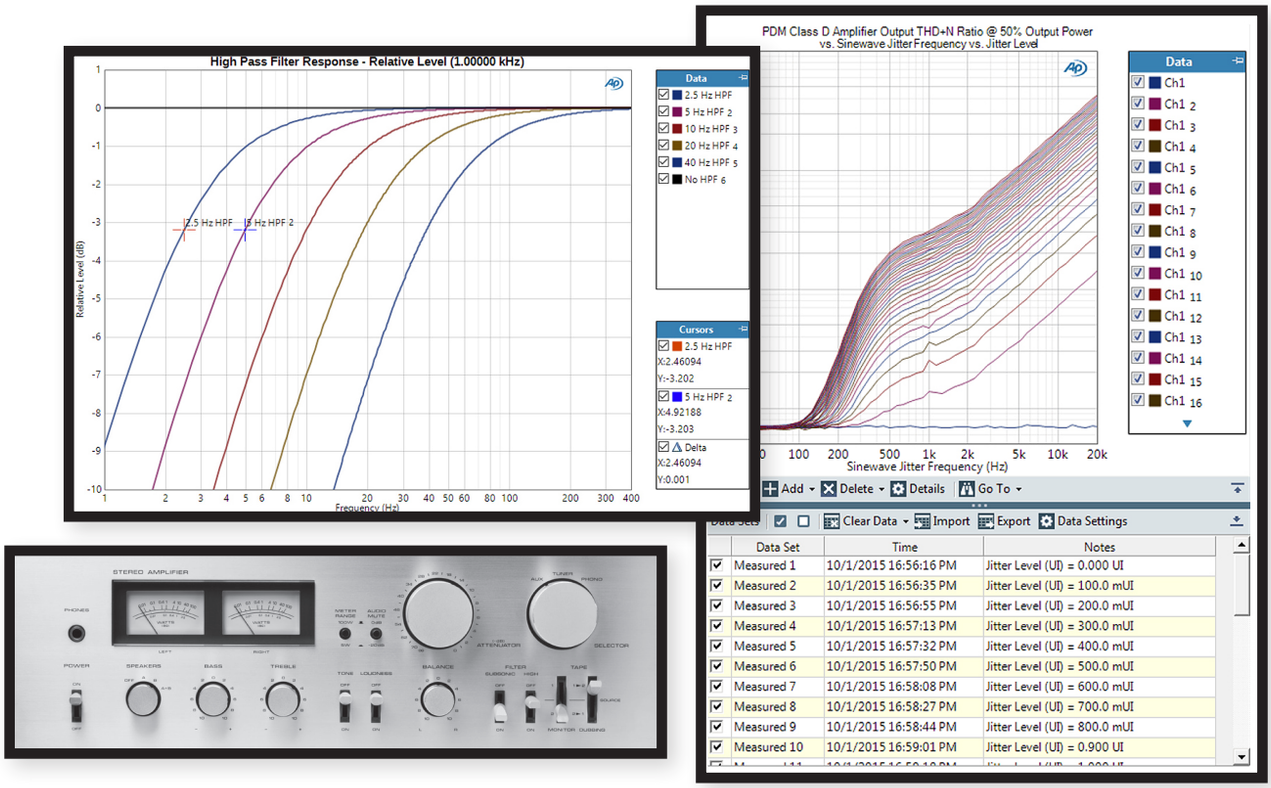
HDMI + ARC



Systematic Test for HDMI+ARC

The APx HDMI option allows engineers to measure HDMI audio format compatibility on devices such as surround sound receivers, set-top boxes, smartphones, tablets, TVs, and DVD or Blu-ray Disc™ players. APx can stream both lossless and compressed formats from pre-encoded audio test files, making it easy to troubleshoot component compatibility and issues related to downsampling, downmixing, or transcoding.

ANALOG & DIGITAL AUDIO TEST



From chip-level devices to complete systems, the range of products requiring some form of audio test, whether analog, digital or both, continues to expand in our technology-oriented world. Yet there are a few factors that make audio signals and their measurement unique.

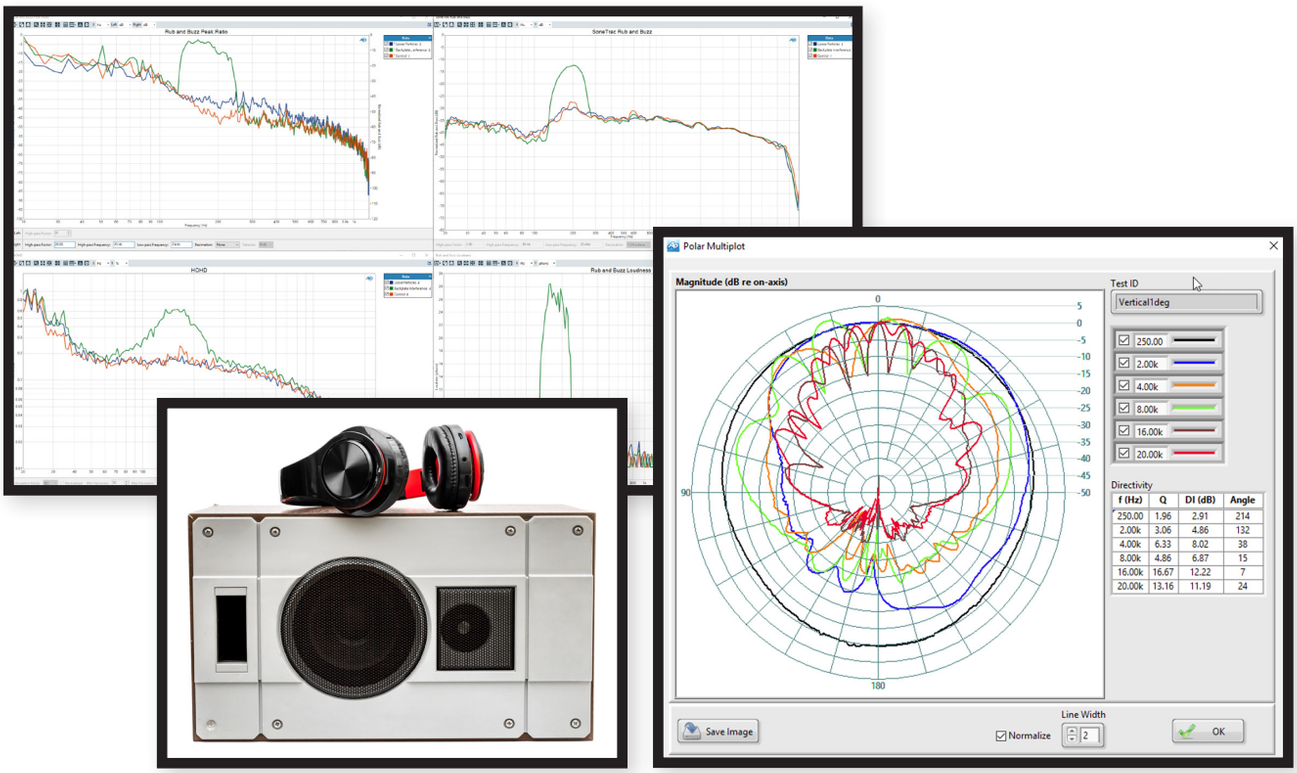
First, while the bandwidth of the human ear is limited (generally to 20 kHz) the minimum frequency people can detect is 20 Hz or lower. That is 10 octaves of frequency range. Practically speaking, a modern audio analyzer is asked to measure the DC offset of power amplifiers while observing the noise shaping and spurious out-of-band products emanating from Class-D chips and delta-sigma converters. Fortunately, Audio Precision analyzers offer industry-leading performance and can resolve from DC to over 1 MHz with 1 Hz resolution.

Second, while covering a very large frequency span, the total amplitude range of audio signals is also very large. A modern audio analyzer needs to observe the output of everything from state-of-the-art D/A converters with noise measured in single digit µV to power amplifiers with 200 V outputs. Additionally, while measuring a 200 Vrms sine wave, the system must still be able to resolve the amplitude of harmonic products that may be 60-100 dB lower in amplitude than the fundamental. The APx555B has a self-noise of less than 1 µV and a maximum input level of 300 Vrms, a range of 170 dB.

Adding to the capabilities of our APx analyzers is the widest array of digital interface options available. Every interface option is fully integrated into our software, eliminating uncertainty and enabling faster test setup, while our test software provides unique measurement views and results that are trusted everywhere.

For specialized applications, APx offers jitter measurement, external triggering, and clock synchronization via the Advanced Master Clock (AMC) module (standard on the APx555B and optional for the APx52x and APx58x B Series analyzers). The APx ASIO interface supports the measurement of Dante™-enabled devices, Automotive Audio Bus® (A2B) audio testing, and the use of APx500 audio measurement software with third-party audio interfaces and APx500 Flex.

ACOUSTIC TEST



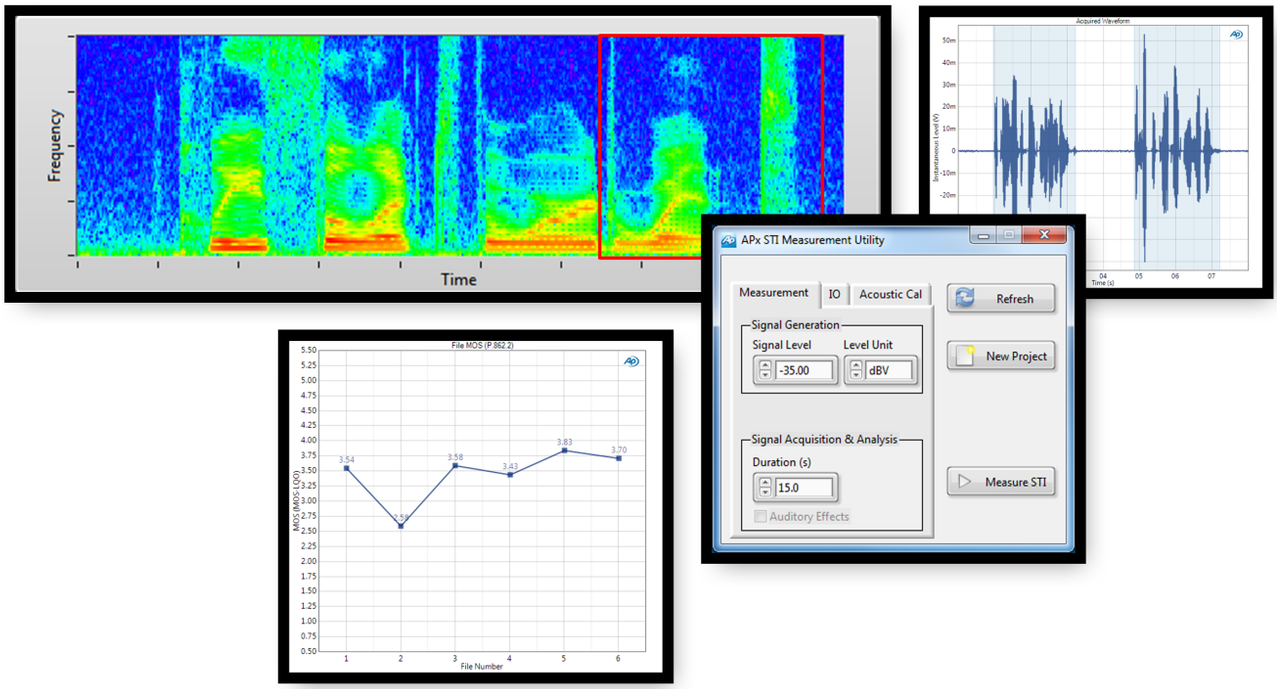
APx audio analyzers and software are the preferred choice for designing and testing soundbars, pro-audio powered speakers, smartphones, hands-free devices, and other products that integrate electronics, loudspeakers, and microphones. For the production test of speaker drivers—as well as finished loudspeakers, headphones, headsets, and microphones—manufacturers need look no further than the APx517B acoustic analyzer or APx500 Flex audio analyzer. These systems are purpose-built for manufacturing line test of acoustic products, whether using analog interfaces only (APx500 Flex) or both digital and analog (APx517B).

As a software platform, APx500 audio measurement software provides a comprehensive solution for acoustic testing, allowing designers, manufacturing test technicians, and QA engineers to test electro-acoustic products end-to-end. Key capabilities such as Transfer Function (using speech, music, or noise signals to assess the complex frequency response, coherence, and impulse response of a device) and Multi-Input (providing simultaneous measurement on analog and digital signals) are complemented by a variety of electro-acoustic software options. Additionally, APx software offers the broadest set of methodologies available for detecting rub and buzz defects: Rub & Buzz, SoneTrac, High-Order Harmonic Distortion (HOHD), and Rub & Buzz Loudness.

AP's waterfall and polar plots provide powerful visualization tools for understanding electro-acoustic behavior. The APx Waterfall Plot Utility creates three-dimensional graphs that display multiple curves of data that can represent changes over time or frequency. Spectrum or Cumulative Spectral Decay (CSD) views are available, with variable FFT length, number of slices and samples per shift.

Finally, measurements, results, reports and automation can be easily shared across APx analyzers, allowing designers and production engineers (or OEMs and their contract manufacturers) to collaborate and ensure quality, even when separated by great distances.

APx PERCEPTUAL AUDIO TEST



APx500 MEASUREMENT SOFTWARE supports several innovative and popular perceptual audio tests used for evaluating speech quality or intelligibility. From testing mobile phones to VoIP networks to hands free devices, software options PESQ, POLQA, STI and ABC-MRT support designers' needs for perceptional audio analysis.

PESQ

Low-Bandwidth Speech Quality

PESQ is an enhanced perceptual measurement for voice quality in telecommunications. It is licensed from OPTICOM GmbH and forms the basis of ITU-T Recommendation P.862. PESQ is specifically designed for testing voice quality on low bandwidth devices, like mobile phones and smartphones. MOS results from PESQ can achieve a very high correlation with results obtainable using human subjects.

POLQA

Wide Band Speech Quality

POLQA is licensed from OPTICOM as a successor to PESQ (above), and specifically targets changes in the communications landscape with support for HD Voice, 3G, 4G/LTE and VoIP technologies. Like PESQ, POLQA delivers results with a very high correlation to tests with human subjects. Unlike PESQ, POLQA handles variations including wide band audio, acoustic transducers, DSP and level.

STI

Speech Intelligibility (Noise-Based)

Using the APx STI measurement enables developers to verify the STI performance of their designs with AP's industry-leading instrumentation. Once the option is installed, the STIPA measurement can be easily incorporated into any measurement sequence. Additionally, the option includes a Speech Level measurement that conforms to Annex J of IEC 60268-16, for proper adjustment of the STIPA signal level.

ABC-MRT

Speech Intelligibility (Voice-Based)

The APX-SW-ABC-MRT option provides a convenient, automated method for measuring speech intelligibility that is proven to be highly correlated with subjective Modified Rhyme Test (MRT). As an objective estimate of speech intelligibility, it is fully integrated with APx B Series analyzers, including the test sequencer, limits and reporting, up to 16 acquisition channels and access to a wide variety of audio interfaces.

ACCESSORIES

SWITCHING AMPLIFIER MEASUREMENT FILTERS

Audio Precision switching amplifier measurement filters are designed to be inserted between the device under test and analyzer input, to reduce out-of-band switching signal components before measurement.

AUX-0100 Eight-channel passive low-pass filter, 20 Hz to 20 kHz passband.

AUX-0025 Two-channel passive filter, 20 Hz to 20 kHz passband.

AUX-0040 Two-channel passive filter, 20 Hz to 40 kHz passband.

AUDIO SWITCHERS

SWR-2755B Audio Precision offers three models of the SWR-2755B audio switchers, which expand the input and output capabilities of Audio Precision two-channel audio analyzers.

APx1701B

The APx1701B transducer test interface integrates instrument-grade amplifiers and microphone power supplies for designers and production test engineers seeking clear insight into the behavior of their loudspeaker, headphone, and microphone designs. Its functions are integrated with APx500 measurement software and a connected APx analyzer.

SOFTWARE LICENSING & HARDWARE WARRANTY

Software Licensing and Maintenance

New instruments include a license for the current release of APx500 software, plus one year of software maintenance, licensing that instrument for the next major release (e.g. version 7.0) of APx500 software. This also includes any minor releases (e.g., version 7.x) that occur between major versions. For users wishing to license an existing analyzer for the most current release, software upgrades are available for purchase. Additionally, software maintenance subscriptions are available to license analyzers for multiple major releases. These subscriptions provide a distinct discount relative to purchasing individual software upgrades as major releases occur.

When purchasing a new analyzer, extended software license options are also available, with SW-EXT-3 and SW-EXT-5 licensing the instrument for the next three or next five major releases respectively.

Warranty Information

Audio Precision is proud to offer a limited three-year warranty on its new products. Upgrades, used equipment, and cables have a one-year warranty. Service is warranted for 90 days.

When purchasing a new analyzer, the EWP2 option extends the hardware warranty an additional two years, for a total warranty period of five years.Any instrument covered under a valid Audio Precision new product warranty—where the damage is not caused by owner misuse or abuse—is repaired free of charge. If the repair is made within a year of purchase, the unit will also receive an Accredited Calibration (Service B). If the unit is more than one year old, calibration is not included automatically, though it can be ordered at an extra charge.

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