



APx585 8-channel
audio analyzer

APx586 16-channel
audio analyzer



Faster, easier multichannel test from the leaders in audio test & measurement

The APx is a dedicated multichannel audio analyzer that combines a next generation user interface with AP's legendary commitment to performance. It's the perfect audio analyzer for R&D and production test users who need speed and ease-of-use.

The APx is designed specifically for power amp and CD/DVD/MP3 player manufacturers for use in R&D and production test, with multiple channels, Dolby®/ DTS® confidence testing, multitone analyzer, input regulation, and CEA-2006 measurements.

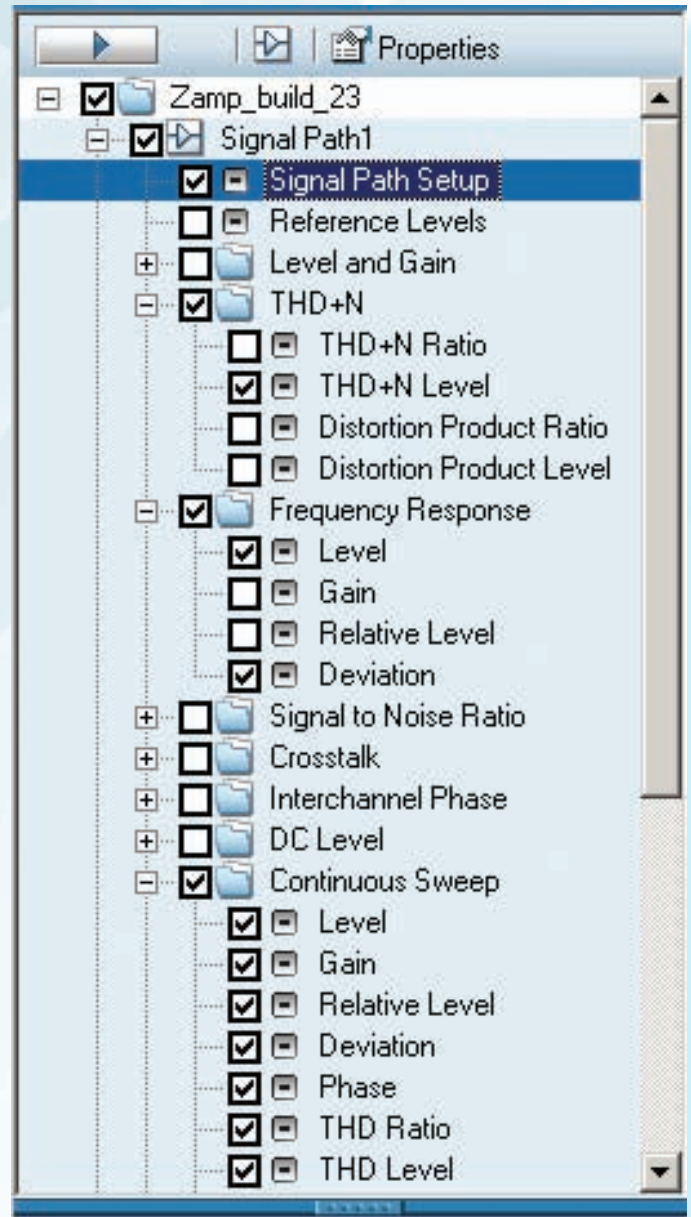
The state of the art in multichannel audio test

When AP's engineers began designing the APx Series, they saw that a new platform was needed to maintain the innovation curve defined by the System One in 1985 and the System Two in 1995.

The new architecture had to have a modern, context-sensitive interface so users could get to the measurements and settings they needed with a mouse click. It had to take advantage of today's computing power, allowing more measurements to be calculated from a single acquisition and permitting easy upgrades of features via online software updates. It had to be flexible enough to serve the needs of R&D and production test users without compromising performance.

Above all it had to be easy to use and faster than anything in the market.

The result is the APx500 Series.



▲ The Measurement Navigator: point and click to select a single measurement or to run multiple measurements in a sequence



Accredited calibration to ISO 17025 standard

Every APx is calibrated before it leaves the factory, so you know your measurements are accurate and your instrument meets the most stringent Quality System Requirements in the industry.

Audio Precision is accredited by A2LA, the American Association for Laboratory Accreditation, to perform calibrations at our Calibration Lab in Beaverton, Oregon.

Make APx part of your manufacturing test plan

With an APx as part of your production test plan, units tested per hour can skyrocket, and you connect Engineering and Production like never before — no matter where the factory is located.

- Multichannel & DSP measurement techniques cut test time per unit dramatically
- 500-function API to integrate the APx into an existing test environment, then dump results to a database for batch analysis
- Share reports and project files between Engineering & Production for instant test setup & troubleshooting
- Easy learning curve for production staff

A complete testing solution for power amplifiers...

APx is the only audio analyzer designed to serve the needs of multichannel power amp manufacturers with features no other test solution can offer.

CEA-2006 & EIA/CEA-490-A measurements Measure continuous maximum output and peak maximum output automatically, view power spectrum graphs with a regulated frequency sweep and take other measurements as specified by the CEA-2006 and EIA/CEA-490-A standards.

Convenient automation & new features Determine the optimum reference output level for your device under test using automatic regulation. Find the level of the signal generator either at the point of lowest THD+N or your target value of THD+N, such as 1%. The APx software includes a new multitone analyzer, a Measurement Recorder for repeated stress tests over time, and an expanded list of high pass and low pass filters.

Multichannel switch mode (Class D) amplifiers The APx581 is a separate 8-channel passive low-pass filter designed to minimize switching amplifier carrier components while passing a broad audio spectrum. This filter provides the signal preconditioning necessary to measure switching amplifier outputs accurately.



◀ APx581
8-channel
switching
amplifier filter

... and for DVD/CD/MP3 players

Testing playback-only devices

Many of today's most popular audio players lack any input. To test these devices, APx uses a set of reference signals that can be played back in multiple formats. Included with APx are a test signal audio CD and DVD and a waveform generator to create .WAVs of any signal at any resolution. APx will tell you which signal to use for each test or you can use your own. If you're automating a test sequence, you can tell the operator which signals to use via a custom text prompt or image for each step of the test.

Dolby / DTS Confidence Testing

Evaluate readiness for Dolby/ DTS certification quickly and easily before committing time and resources to the official certification procedure. APx configures itself for all the required tests in the Dolby or DTS Certification Requirement using the Dolby Autotest 2.0 DVD or the DTS test DVD. All you have to do is follow the on-screen prompts, then compare your results to the Certification Requirement. Results are ready for export in the format specified by Dolby or DTS.



The features you need for more productive audio test

APx was designed from the ground up to make audio test faster and more productive.

From super-fast measurements to rich graphical reports and shareable project files, everything you need to test audio is available at the click of a mouse.

One-click measurements & automated sequences

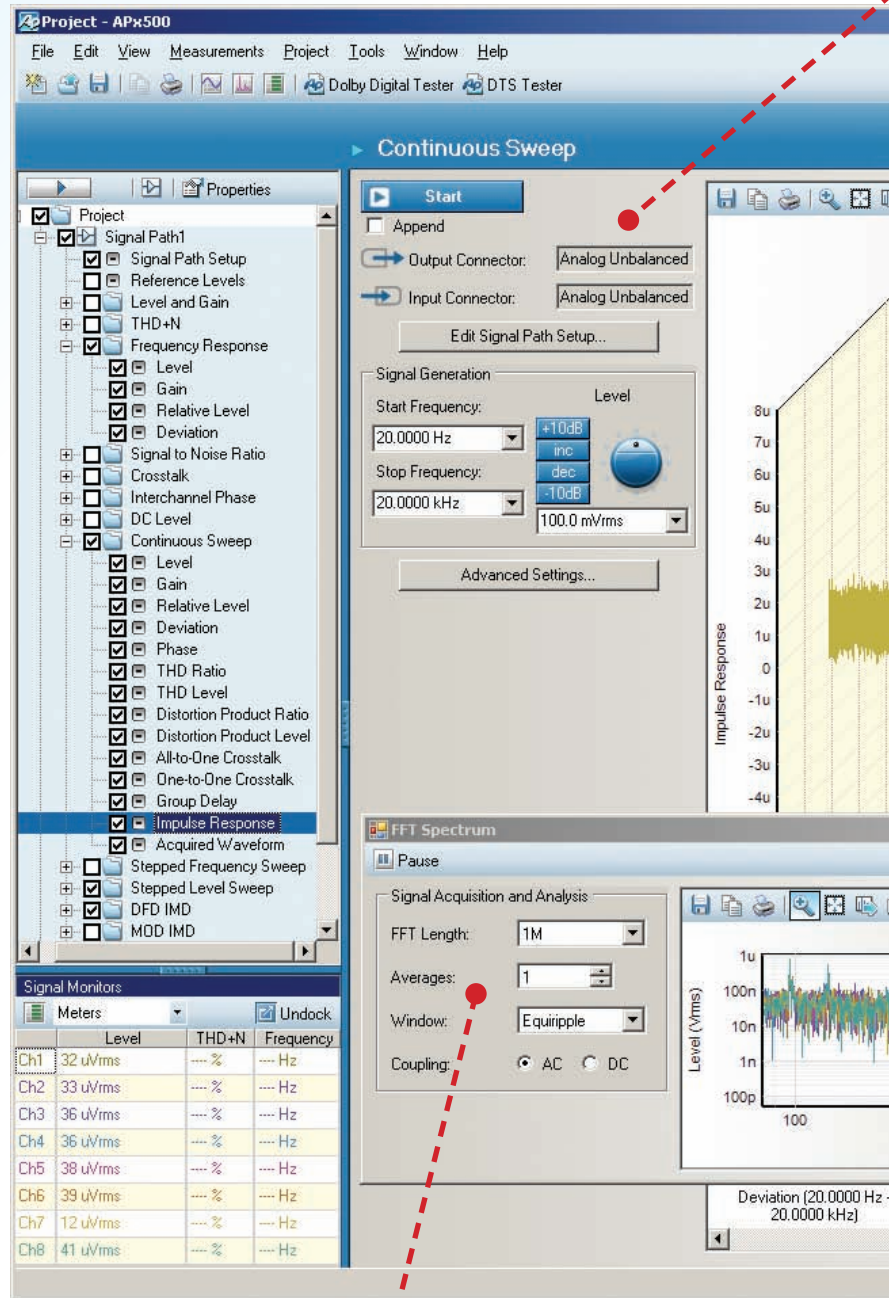
- Use the Measurement Navigator to select a measurement, or select multiple measurements to create an automated sequence.
- Define limits or edit settings, then click “Start” to run the tests.
- Analyze the results on screen: select different views, change units, zoom in with your mouse, adjust limits, or cut and paste data into other applications.
- Measure Level, SNR, THD+N, Frequency Response, Burst, Phase, Distortion, Noise, Crosstalk, Phase, all with a mouse click.

Multichannel, real-time signal monitors

- FFT spectrum view up to one million points.
- Real-time oscilloscope view with THD+N residuals.
- Level, THD+N and frequency meter readings.
- Monitors update continuously even while the APx performs other measurements.
- Undock monitor, zoom, copy to clipboard, change units, all in real time.

Programming API

- More than 80 Objects including over 500 functions are provided, supporting programmatic tasks such as loading and running a sequence, and returning results to a remote database.
- Microsoft .NET interface supports over 50 programming languages.



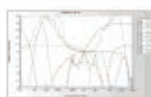
FFT up to million points, updated in real time on all channels.



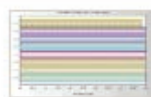
Level



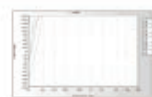
Gain



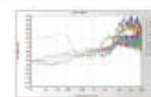
Relative Level



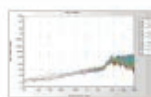
Deviation (20.0000 Hz - 20.0000 kHz)



Phase



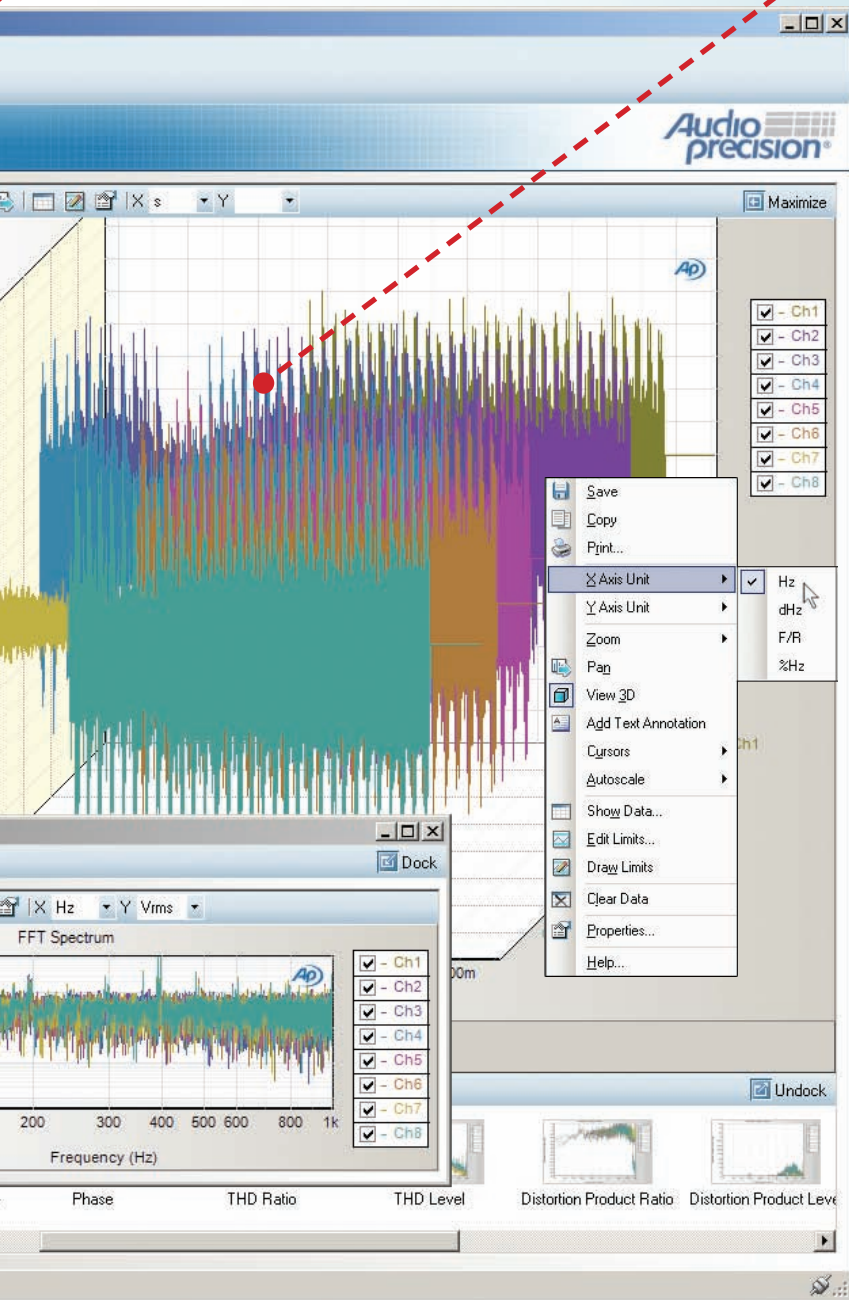
THD Ratio



THD Level

Context-sensitive setup only show the settings relevant to the current measurement. Defaults set to industry-standard values.

Automatic graphing in 2D or 3D. Updated in real time. Zoom in, change units anytime, view channels separately or together. Copy and paste to export to other applications.



Save your projects: same setup every time, everywhere

- Save sequences, settings, limits, and signal paths in one small project file.
- Guarantees the exact test setup on all APx instruments so you can recreate test environments for any engineering or production group anywhere in the world.

Integrated reports for sharing results

- Automatically generate easy-to-understand reports displaying measurements, limit failure, and test setup in rich color graphs and data tables.
- Customize reports with your logo and save as a PDF for easy emailing or as HTML, Excel, Rich Text Format or plain text for further analysis.

Faster test than ever before

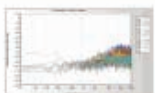
- AP's patent-pending "continuous sweep" DSP technique calculates 14 measurements in 7 seconds from a single logarithmic sweep, then graphs results of each measurement for review in the Measurement Selector.
- Use the new Multitone Analyzer for faster measurements on playback-only or closed-loop tests.

Multiple channel configurations

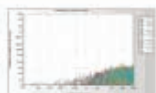
- 8 or 16 input channels and 8 output channels depending on your needs.
- Upgrade from 8 to 16 anytime.
- Measure true one-to-many or many-to-one multichannel crosstalk.

The Measurement Selector displays filmstrip thumbnails of all the different views available for any one measurement.

Undock



Distortion Product Ratio



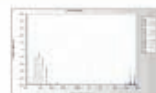
Distortion Product Level



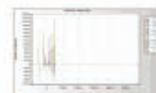
All-to-One Crosstalk



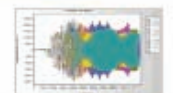
One-to-One Crosstalk



Group Delay



Impulse Response



Acquired Waveform

APx585/586 multichannel audio analyzer with APx500 v2.0 measurement software

Unless otherwise noted, all specifications are valid only with sine or stepped-sine measurement techniques using default settings. To obtain similar results using the continuous sweep measurement technique, the overall sweep time must be ≥ 2.5 seconds.

ANALOG GENERATOR

Number of Channels

8, independent amplitude control
(DAC sample rate = 192 ks/s.)

Waveforms

Sine, continuously swept-sine, IMD test signals
(SMPTE, MOD, DFD)

Sine Characteristics

Frequency Range
5 Hz to 80.1 kHz
Frequency Resolution
Typically <50 μ Hz
Flatness (1 kHz ref)
10 Hz to 20 kHz,
 ± 0.008 dB (Typically <0.003 dB.)
20 kHz to 50 kHz, ± 0.030 dB
50 kHz to 80 kHz, ± 0.10 dB
Residual THD+N (1,2)
30 Hz–20 kHz
 $\leq (-103$ dB + 1.4 μ V)
20 Hz–30 Hz
 $\leq (-102$ dB + 1.4 μ V)

IMD Test Signals

SMPTE & MOD

LF Tone Range
40 Hz to 1 kHz
HF Tone Range
2 kHz to 20 kHz
(HF tone must be $\geq 6 \cdot$ LF tone.)

Mix Ratio

4:1 or 1:1 (LF:HF)
(MOD also permits 10:1 mix ratio.)

Residual IMD (1)

$\leq 0.0025\%$ [–92 dB], (d2+d3) for MOD

DFD

Tone Pair Mean Range
2.5 kHz to 20 kHz
($F_{\text{mean}} = (F_1 + F_2)/2$.)
Tone Pair Difference Range
80 Hz to 2.0 kHz
($F_{\text{diff}} = |F_2 - F_1|$; F_{mean} must be $\geq 6 \cdot F_{\text{diff}}$.)
Residual IMD (1)
 $\leq 0.0010\%$ [–100 dB], (d2+d3)

Frequency Accuracy

$\pm 0.0003\%$ [3 PPM]

Amplitude Range (all Waveforms)

Balanced

<1 μ Vrms to 14.40 Vrms,
[2.8 μ Vpp to 40.72 Vpp]
[–117.8 dBu to +25.38 dBu]
(Will drive 600 Ω load to +24.0 dBm)

Unbalanced

<1 μ Vrms to 7.20 Vrms
[2.8 μ Vpp to 20.36 Vpp]
[–117.8 dBu to +19.36 dBu]

Amplitude Accuracy (1 kHz)

+15° C to +30° C
 ± 0.03 dB [$\pm 0.35\%$]
0° C to +45° C
 ± 0.05 dB [$\pm 0.58\%$]

Source Resistance (Rs)

Balanced

100 Ω , ± 1 Ω , grounded

Unbalanced

50 Ω , ± 1 Ω , semi-floating
(± 0.3 Vpk max, BNC shield to gnd.)

Max Output Current

Typically >30 mA peak per channel,
sum of all outputs must be ≤ 180 mA

Crosstalk (1)

Balanced

$\leq (-100$ dB + 1 μ V) to 20 kHz
(With AP cable PN 4150.0001.)

Unbalanced

$\leq (-115$ dB + 1 μ V) to 20 kHz

Residual DC Offset

$\pm (0.25\%$ of Vrms setting + 250 μ V)

ANALOG ANALYZER

Number of Channels

APx585

8, independently auto-ranging
(ADC sample rate = 192 ks/s.)

APx586

16, independently auto-ranging
(ADC sample rate = 96 ks/s when >8 channels
are active; 192 ks/s if 8 or fewer are active.)

Input Ranges

0.32 Vrms to 100 Vrms, 10 dB steps;
 ≈ 10 –15% over-range in each range
(Maximum rated input is 110 Vrms,
or ± 155 Vpk (dc + peak ac).)

Input Impedance

Balanced

100 k Ω || ≈ 200 pF, each side to gnd

Unbalanced

100 k Ω || ≈ 200 pF, to BNC shield
(± 0.5 Vpk max, BNC shield to gnd.)

Input Coupling

DC, all ranges (Input bias current is typically 0.3 μ A.)

Common Mode Rejection (Bal)

320 mV, 1 V, 3.2 V ranges
 ≥ 80 dB, 5 Hz to 5 kHz;
 ≥ 70 dB, 5 kHz to 20 kHz
10 V and 32 V ranges
 ≥ 50 dB, 5 Hz to 20 kHz
100 V range
 ≥ 45 dB, 5 Hz to 20 kHz

Input Related Crosstalk (1)

Balanced

$\leq (-100$ dB + 1 μ V) to 20 kHz
(With AP cable PN 4150.0001.)

Unbalanced

$\leq (-115$ dB + 1 μ V) to 20 kHz

Level (Amplitude) Measurement

Range

<1 μ Vrms to 110 Vrms
[–118 dBu to +43.0 dBu]

Accuracy (1 kHz)

+15° C to +30° C
 ± 0.03 dB [$\pm 0.35\%$]
0° C to +45° C
 ± 0.05 dB [$\pm 0.58\%$]

Flatness (1 kHz ref)

10 Hz to 20 kHz, ± 0.008 dB
(Typically <0.003 dB.)
20 kHz to 50 kHz, ± 0.030 dB
50 kHz to 80 kHz, ± 0.10 dB

Residual Noise (inputs shorted)

≤ 1.3 μ Vrms, 20 kHz BW
(Typically <8.0 nV/root-Hz at 1 kHz.)

Phase Measurement

Range

± 180 deg

Accuracy

± 1 deg, 5 Hz to 5 kHz;
 ± 2 deg, 5 kHz to 20 kHz;
 ± 5 deg, 20 kHz to 50 kHz

THD+N Measurement

Fundamental Range

5 Hz to 80 kHz

Measurement Range

0 to 100%

Accuracy

± 0.3 dB

Residual THD+N (1,2)

30 Hz–20 kHz
 $\leq (-103$ dB + 1.4 μ V)
20 Hz–30 Hz
 $\leq (-102$ dB + 1.4 μ V)

Notch Tuning

Auto for meters, gen-track for graphs

Level & THD+N Response

Weighting

High-pass (20,30,50,70,100,200,300 or 400 Hz),
A-wtd, CCIR-2k, CCITT, C-message, or None

Bandwidth (BW)

3 kHz, 8 kHz, 15 kHz, 20 kHz, 22 kHz, 30 kHz,
40 kHz, 50 kHz, 80 kHz, or None

(Filter selection limited by sample rate. All selections except
"None" exceed AES17 recommendations for roll-off and
stop-band attenuation.)

SMPTE IMD Measurement

Test Signal Compatibility

Any combination of 40 Hz–1 kHz (LF) and
2 kHz–20 kHz (HF), mixed in any ratio from
1:1 to 10:1 (LF:HF) (HF tone must be $\geq 6 \cdot$ LF tone.)

IMD Measured

Amplitude modulation products of HF tone within
40 Hz to 500 Hz

Measurement Range

0 to 20%

Accuracy

± 0.5 dB

Residual IMD (1)

$\leq 0.0025\%$ [–92 dB]
(Vin must be ≥ 100 mV.)

MOD IMD Measurement

Test Signal Compatibility

Any combination of 40 Hz–1 kHz (LF) and 2 kHz–20
kHz (HF), mixed in any ratio from 1:1 to 10:1 (LF:HF)
(HF tone must be $\geq 6 \cdot$ LF tone.)

IMD Measured

d2, d3, d2+d3, or d2+d3+d4+d5

Measurement Range

0 to 20%

Accuracy

± 0.5 dB

Residual IMD (1)

$\leq 0.0025\%$ [–92 dB], (d2+d3)
(Vin must be ≥ 100 mV.)

DFD IMD Measurement

Test Signal Compatibility

Any two-tone combination with mean frequency of
2.5 kHz–20 kHz and a difference frequency of 80
Hz–2.0 kHz (F_{mean} must be $\geq 6 \cdot F_{\text{diff}}$.)

IMD Measured

d2, d3, d2+d3, or d2+d3+d4+d5

Measurement Range

0 to 20%

-- PRELIMINARY SPECIFICATION --

Accuracy
±0.5 dB
Residual IMD (1)
≤ 0.0010% [−100 dB], (d2+d3)
(Vin must be ≥ 100 mV.)

DC Voltage Measurement

Ranges
0.32 V to 100 V, 10 dB steps; ≈50–55% over-range
in each range (Maximum rated input is ±155 volts
(dc + peak ac).)
Accuracy
0.32 V range
±(0.8% reading + 600 μV)
1 V–100 V ranges
±(0.8% reading + 0.1% range)
Normal Mode Rejection
(Typically >90 dB, 20 Hz to 20 kHz.)

DIGITAL I/O

DIGITAL OUTPUT RELATED:

Formats

Electrical
SPDIF-EIAJ per IEC60958, 0.5 Vpp (±10%)
into 75 Ω (Output R is nominally 75 Ω.)
Optical
Toslink® (TOTX-142L.)

Sample Rate Range

22 kHz to 192 kHz

Sample Rate Accuracy

±0.0003% [3 PPM]

Channel Status Bits

Full implementation per IEC60958, automatically set,
common to all channels

User Bits & Validity Flag

Set to 0, all channels

Residual Jitter

Electrical
Typically <1 ns
Optical
Typically <2 ns

Waveforms

Sine, continuously swept sine, IMD test signals
(SMPTE, MOD, and DFD) (8–24 bit word width,
triangular PDF dither.)

Sine Characteristics

Frequency Range
5 Hz to 0.499 • SR
Flatness
Typically <0.0005 dB
Harmonics & Spurious Products
Typically <−160 dB

IMD Test Signals

SMPTE & MOD

LF Tone Range
40 Hz to 1 kHz
HF Tone Range
2 kHz to (0.499 • SR) or 20 kHz,
whichever is lower
(HF tone must be ≥ 6 • LF tone.)
Mix Ratio
4:1 or 1:1 (LF:HF)
(MOD also permits 10:1 mix ratio)

Residual IMD (1)
Typically <−136 dB, 4:1

DFD

Tone Pair Mean Range
2.5 kHz to (0.499 • SR − Fmean / 2) or 20 kHz,
whichever is lower (Fmean = (F1 + F2)/2.)
Tone Pair Difference Range
80 Hz to 2.0 kHz
(Fdiff = |F2-F1|; Fmean must be ≥ 6 • Fdiff.)
Residual IMD (1)
Typically <−148 dB

DIGITAL INPUT RELATED:

Formats

Electrical
SPDIF-EIAJ per IEC60958 (unbal).
Input R is selectable 75 Ω or >1.5 kΩ
Optical
Toslink® (TORX-142L.)

Sample Rate Range

22 kHz to 192 kHz

EMBEDDED INPUT SIGNAL RELATED:

Level (Amplitude) Measurement

Measurement Range
<−120 dBFS to +3 dBFS
Accuracy (1 kHz)
Typically <0.001 dB
Flatness
Typically <0.001 dB

Residual Noise

Typically
<−140 dBFS, 20 kHz BW

Phase Measurement

Measurement Range
±180 deg, 5 Hz to 0.499 • SR
Accuracy
Typically <0.001 deg

THD+N Measurement

Fundamental Range
5 Hz to 0.499 • SR
Measurement Range
0 to 100%
Accuracy
±0.5 dB
(Exclude band from 0.70–1.40 Fo.)

Residual THD+N, (1,2)

Typically <−140 dBFS
Notch Tuning Modes
Auto for meters, gen-track for graphs

Level & THD+N Filters

Weighting
High-pass (20,30,50,70,100,200,300 or 400 Hz),
A-wtd, CCIR-2k, CCITT, C-message, or None
Bandwidth (BW)
3 kHz, 8 kHz, 15 kHz, 20 kHz, 22 kHz, 30 kHz,
40 kHz, 50 kHz, 80 kHz, or None

(Filter selection limited by sample rate. All selections except
"None" exceed AES17 recommendations for roll-off and stop-
band attenuation.)

SMPTE IMD Measurement

Test Signal Compatibility
Any combination of 40 Hz–1 kHz (LF) and 2 kHz–
0.45 • SR (HF), mixed in any ratio from 1:1 to 10:1
(LF:HF) (HF tone must be ≥ 6 • LF tone.)
IMD Measured
Amplitude modulation products of HF tone within 40
Hz to 500 Hz
Measurement Range
0 to 20%
Accuracy
±0.5 dB
Residual IMD (1)
Typically <−136 dBFS, 4:1

MOD IMD Measurement

Test Signal Compatibility
Any combination of 40 Hz–1 kHz (LF)
and 2 kHz–0.45 • SR (HF), mixed in any ratio from
1:1 to 10:1 (LF:HF)
(HF tone must be ≥ 6 • LF tone.)
IMD Measured
d2, d3, d2+d3, or d2+d3+d4+d5
Measurement Range
0 to 20%
Accuracy
±0.5 dB
Residual IMD (1)
Typically <−136 dBFS, 4:1

DFD IMD Measurement

Test Signal Compatibility
Any two-tone combination with mean frequency
of 2.5 kHz–0.45 • SR and a difference frequency
of 80 Hz–2.0 kHz
(Fmean must be ≥ 6 • Fdiff.)
IMD Measured
d2, d3, d2+d3, or d2+d3+d4+d5
Measurement Range
0 to 20%
Accuracy
±0.5 dB
Residual IMD (1)
Typically <−148 dBFS

GENERAL/ENVIRONMENTAL

Power Requirements

100–240 Vac ±10% (90–264 Vac), 50–60 Hz, with
safety ground via approved power cord, 160 VA max

Temperature Range

Operating
0° C to +45° C
Storage
−40° C to +75° C

Humidity

90% to +40° C (non-condensing)

Max Operating Altitude

3000 m

Stabilization Time

20 minutes

EMC

Complies with 89/336/EEC, IEC 61326-1:
ELECTRICAL EQUIPMENT FOR MEASUREMENT,
CONTROL AND LABORATORY USE -EMC
REQUIREMENTS - PART 1: GENERAL
REQUIREMENTS, CISPR 11/22 (class B), and FCC
15 sub J (class B). (Emission and immunity levels are
influenced by the shielding performance of interface and signal
cables attached to the instrument. EMC compliance was
demonstrated using Audio Precision cables.)

Dimensions

Width
432 mm (17.0 inches)
Height
129 mm (5.08 inches)
Depth
467 mm (18.4 inches)

Weight

APx585: 11.3 kg (24.8 lbs)
APx586: 11.5 kg (25.3 lbs)

Safety

Complies with:
73/23/EEC, 93/68/EEC, and EN61010-1 2001,
Equipment Class I, Installation Category II, Pollution
Degree 2, Measurement Category I.
CAN/CSA-C22.2 No 1010.1-04, Safety Requirements
for Electrical Equipment for Measurement, Control,
and Laboratory Use, Part 1: General Requirements
(with Amendment 1).
UL Std No 3111-1, Equipment for Measurement
Use; Part I: General Requirements.

Notes to Specifications

- System specification including contributions from both
generator and analyzer. Generator-only and analyzer-only
contributions are typically less.
- 20 kHz measurement bandwidth.
- Source: APx585/6 ES ver 12.



APx585 multichannel audio analyzer

— Winner of —
**Pro Audio Review's
 PAR Excellence Award 2006**
 — and —
**Test & Measurement World's
 Best in Test 2006**

“ Testing was an absolute
 bottle-neck...

Now our APx is running literally
 all day long and we've more than
 halved our test time. We like the
 way it works! ”

— Morris Kessler, President
 Amplifier Technologies, Inc
 Los Angeles, California

APx Key Specifications

BASIC FORMAT

Channels	8 (APx585) or 16 (APx586)
Computer interface	USB 2.0
Dimensions	3U

GENERATOR PERFORMANCE

Sine Frequency Range	5 Hz to 80.1 kHz
Frequency Accuracy	3 ppm
IMD Test Signals	SMPTE, MOD, DFD
Maximum Amplitude (balanced)	14.4 Vrms
Amplitude Accuracy	0.05 dB
Flatness (20 Hz–20 kHz)	0.008 dB
Residual THD+N (20 kHz BW)	-103 dB + 1.4 μ V
Analog Output Configurations	unbalanced & balanced
Digital Output Sampling Rate	22k–192k

ANALYZER PERFORMANCE

Maximum Rated Input Voltage	110 Vrms
Maximum Bandwidth	>90 kHz
Amplitude Accuracy (1 kHz)	0.05 dB
Amplitude Flatness	0.008 dB
Residual Input Noise (20 kHz BW)	1.3 μ V
Residual THD+N (20 kHz BW)	-103 dB + 1.4 μ V
Individual Harmonic Analyzer	d2–d10
FFT Resolution	up to 1 million (1024 K)
IMD Measurement Capability	SMPTE, MOD, DFD
DC Voltage Measurement	\pm 155V

Accessories & order information

APx585	8-channel audio analyzer
APx586	16-channel audio analyzer
APx581	8-channel switch-mode measurement filter
CAB-585	full set of color-coded cables for the APx585
CAB-586	full set of color-coded cables for the APx586

Please contact your local AP Sales Partner for a price quote or demonstration. ap.com/contact/sales



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