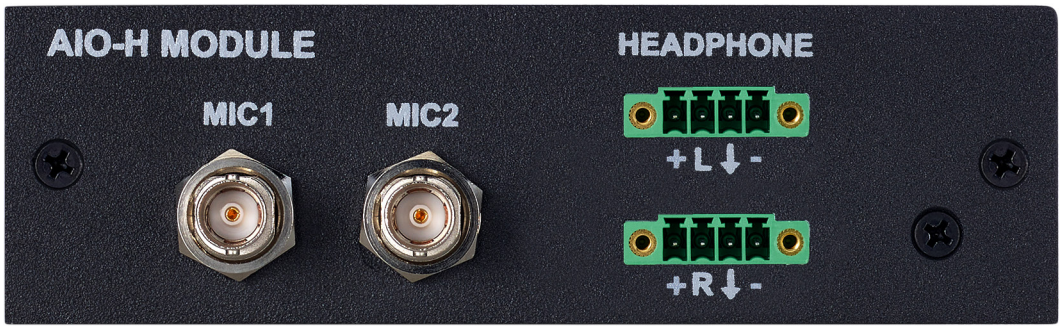
ECHO
TEST + MEASUREMENT

Headphone Test Module

option for

AIO Test System

The Headphone Test Module (AIO-H) is designed for making advanced acoustic and impedance measurements of a device under test (DUT)—typically wired headphones, headsets, earbuds, and hearing protection devices. AIO-H is a configuration option for the AIO Test System and requires the AIO chassis to operate.



HARDWARE FEATURES:

- **Two mic/line inputs**
- **CCP/IEPE/ICP microphone power**
- **TEDS reader for microphone data**
- **Two single-ended headphone outputs**
- **Internal impedance sense resistor**
- **Additional inputs for voltage and current monitoring**

KEY APPLICATIONS:

- **Headphones & earbuds**
- **Mobile devices**

MIC/LINE INPUTS:

Two low-noise inputs accommodate a very wide range of input voltages, from dynamic microphones to line-level inputs. Features include adjustable gain, constant current power, and TEDS readers.

HEADPHONE OUTPUTS:

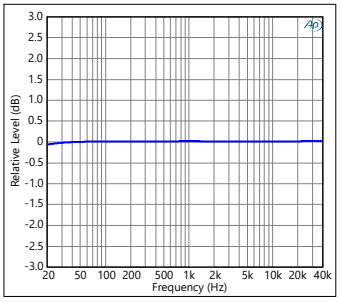
Two high-quality single-ended outputs optimized for driving headphones and earbuds.

IMPEDANCE MEASUREMENT:

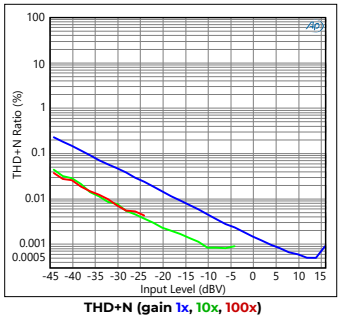
Two additional inputs are used to measure load impedance via the remote voltage sense terminals and internal sense resistors. These inputs appear as additional audio input channels and can be switched to measure either output channel via the AIO control panel, or the command-line or API interfaces.

PERFORMANCE GRAPHS:

Mic/Line Inputs

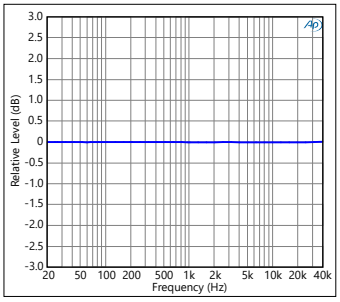


Frequency Response

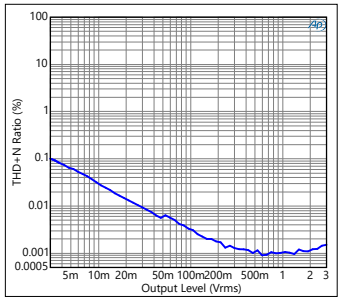


THD+N (gain 1x, 10x, 100x)

Heaphone Outputs



Frequency Response



THD+N

The Echo AIO ™ is a modular audio test platform ideally suited for high-volume production-line testing and QA/QC verification. The AIO combines the functionality of multiple standalone devices into a single, integrated unit, making test stations both more reliable and less expensive.

HEADPHONE MODULE COMMON CONFIGURATIONS: (Other configurations may be available—check with your dealer.)

Model	Inner Module	Outer Module	Mic/Line Inputs	Line Outputs	Headphone Outputs	Amp Outputs	Impedance	Digital	5VDC & Battery Simulator	GPIO	PTH
AIO-AH	AIO-A	AIO-H	6		2		1				
AIO-H1	AIO-H		2		2		1				
AIO-H2	AIO-H	AIO-H	4		4		2				

SPECIFICATIONS:

Microphone / Line Inputs	
Input impedance:	1 MΩ
Input coupling:	AC
Input gain:	1x, 10x, and 100x
Voltage, full scale (1x gain):	8.75 Vpk (+15.8 dBV)
Voltage, maximum:	±15 Vpk
Frequency response:	±0.01 dB (10 Hz – 22 kHz) (48k SR) ±0.01 dB (10 Hz – 44 kHz) (96k SR) ±1 dB (10 Hz – 86 kHz) (192k SR)
Input bandwidth (-3 dB @ 192k SR):	94 kHz
Dynamic range (20 kHz BW):	112 dB
THD+N (1x gain, 20 kHz BW):	< -105 dB (20 Hz – 20 kHz)
Noise, residual:	17 µV
IMD (SMPTE 4:1 @ full scale):	-95 dB
Crosstalk:	< -122 dB (20 Hz – 20 kHz)
Phase error:	< ±0.1° @ 20 kHz
Constant current supply:	CCP/IEPE/ICP, 4 mA
TEDS reader:	IEEE 1451.4 Class 1

Headphone Outputs	
Output impedance:	350 mΩ
Output coupling:	DC
Load, minimum:	16 Ω
Voltage, maximum:	3 Vrms (+9.5 dBV) (≥ 32 Ω load)
Current, maximum:	125 mA
DC offset, range:	±4.24 VDC (≥ 32 Ω load) ±2.8 VDC (16 Ω load)
DC offset, residual:	< ±6 mV
Power output (20 Hz – 20 kHz, all channels driven):	281 mW @ < 0.0016% THD+N (32 Ω) 250 mW @ < 0.0019% THD+N (16 Ω)
Frequency response:	±0.01 dB (10 Hz – 21 kHz) (48k SR) ±0.01 dB (10 Hz – 43 kHz) (96k SR) ±1 dB (10 Hz – 75 kHz) (192k SR)
Output bandwidth (-3 dB @ 192k SR):	89 kHz
Dynamic range (20 kHz BW):	120 dB
Noise, residual:	2.8 µV
IMD (SMPTE 4:1):	< -82 dB (> 375 µW)
Crosstalk:	< -119 dB (20 Hz – 20 kHz)
Phase error:	< ±0.1° @ 20 kHz
Impedance measurement accuracy:	≤ 1% (20 Hz – 20 kHz)

General	
Power:	90 – 264 VAC, 50/60 Hz, 60 W
Dimensions:	17.5” (44.4 cm) x 8.75” (22.2 cm) x 1.75” (4.4 cm)
Weight:	42.5 lbs (19.3 kg)

AIO Test System (See system datasheet for more details)

Shown: AIO-H2 rear view with two **H** headphone test modules.

FEATURES:

- **High accuracy**
- **Cost effective**
- **Silent—no fan!**
- **Standard USB 2.0 audio class interface**
- **Wide test & measurement software compatibility**
- **Runs on Windows (10 or later) or macOS**
- **ASIO, WASAPI, & Core Audio protocols**

CONTROL PANEL SOFTWARE:

Provides comprehensive level monitoring and control over hardware settings, including transducer power, TEDS data, gain, TDM format, and calibration. Command-line and API access to settings is also available.

TEST & MEASUREMENT SOFTWARE:

Choose from a wide variety of third-party test and measurement software, including APx500 Flex, ARTA, LabVIEW, and MATLAB. The AIO system works just like a standard sound card for Windows, Mac, or Linux.

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MODULE OPTIONS: (See individual datasheets for details and configurations)

A **Acoustic:** Four mic/line inputs with CCP, TEDS; two 10 W class-D amplifier outputs.

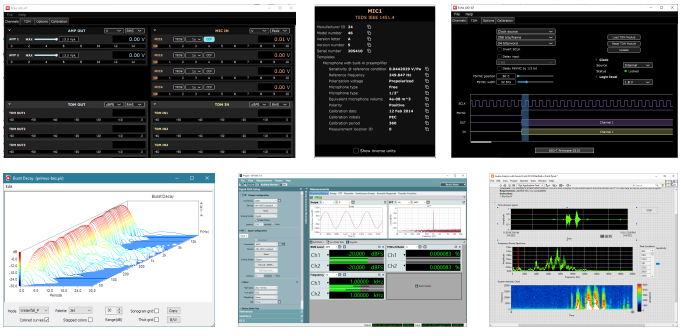
C **Combo:** GPIO; 5 VDC fixed supply; 5 VDC battery simulator; Pressure, temperature, and humidity sensor.

H **Headphone:** Four mic/line inputs with CCP, TEDS; two headphone/earbud outputs with impedance measurement.

L **Line Level:** Four mic/line inputs with CCP, TEDS; two balanced line-level outputs.

S **Speaker:** Two mic/line inputs with CCP, TEDS; two 10 W class-D amplifier outputs; built-in speaker impedance measurement.

T **TDM:** Digital TDM, up to 10 channels, 24 or 32 bit samples.



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