

Animal testing

Solutions for ABR/BAER & OAE

with high frequency option

for animal research &

veterinary applications



from budget friendly to comprehensive solutions

IHS offers a variety of hardware platforms and software applications for Auditory Evoked Potentials (AEP) and Otoacoustic Emissions (OAE) for auditory screening, clinical evaluation, and research in animals.

For veterinarians looking for a comprehensive diagnostic evaluation, our Aria platform with SmartEP can be used to record single channel Auditory Brainstem Responses (ABR) and SmartDPOAE or SmartTrOAE for the acquisition of Otoacoustic Emissions.

For more comprehensive diagnostic evaluation, our Duet platform with SmartEP can be used to record Auditory Brainstem Responses (ABR) up to 16kHz using high frequency insert earphones. For researchers recording ABR and DPOAE responses at up to 40kHz, we are pleased to offer High Frequency Options for both SmartEP and SmartDPOAE on our flagship Duet platform.

PetScreener

- Click ABR/BAER
- Toneburst ABR/BAER
- Automated Response/No-Response

SmartOAE

- Diagnostic DPOAE & TEOAE
- High Frequency DPOAE up to 32 kHz

SmartEP

- Diagnostic ABR/BAER
- Click ABR/BAER
- Toneburst ABR/BAER
- High Frequency testing at up to 40 kHz

SmartEP-ASSR

- Screening & Diagnostic ASSR
- Click, Toneburst or chirp ASSR
- High Frequency testing up to 32 kHz



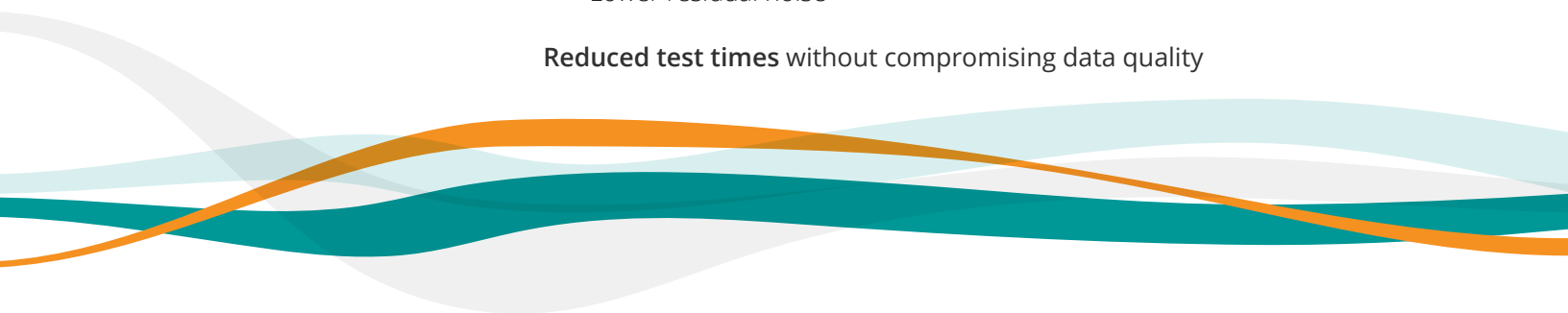
stellar performance

Over 40 years of engineering design experience, combined with unsurpassed expertise in evoked responses, have culminated in the **next generation bio-amplifier** bringing you **superior data quality** for evoked potentials and otoacoustic emissions.

Repeatable, reliable data you can count on

- High definition responses
- Cleaner, more robust responses
- Increased signal-to-noise ratio (SNR)
- Lower residual noise

Reduced test times without compromising data quality



choose the device
best suited to your needs

Aria

- One AEP channel
- One OAE channel
- ABR/BAER up to 40 kHz
- DPOAE up to 16 kHz
- Internal bio-amplifier
- Selectable High and Low Pass Filters
- USB powered (1.5 A)
- Cables with quick disconnect



Duet

- Two AEP channels
- Up to two OAE channels
- ABR/BAER up to 16 kHz using ER-2 inserts
- ABR/BAER up to 40 kHz using HFTs
- DPOAE up to 32 kHz
- Internal bio-amplifier
- Selectable High and Low Pass Filters
- Internal power supply
- USB connection for data transfer



PetScreener

The ideal tool for recording BAER in the veterinary clinic

PetScreener is an easy-to-use hearing screening system for pets designed with the veterinary clinic in mind. Available on all platforms.

simplified interface

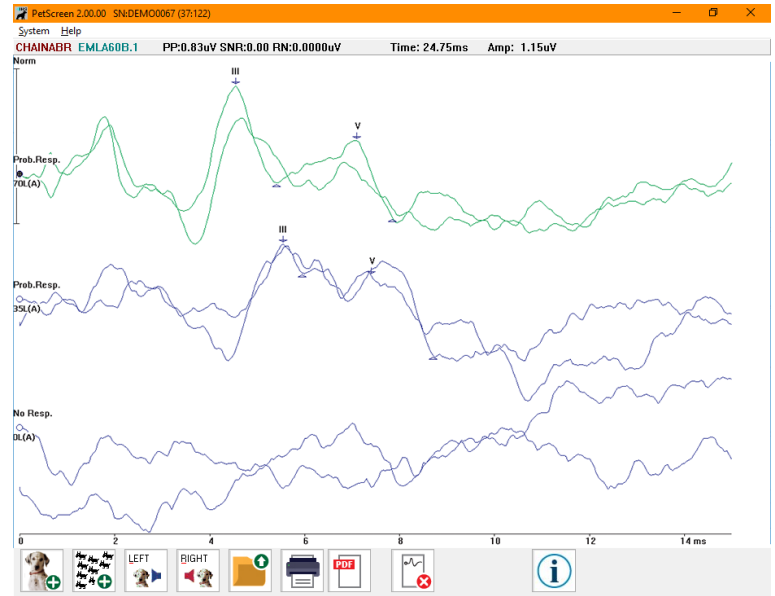
- Save time and acquire recordings quickly, right out of the box
- All necessary parameters are preprogrammed, just enter the pet's information and start
- Quick access from streamlined control panel
- On-screen display of impedance and ongoing EEG for quick assessment of testing conditions
- Easily mark waveforms using predefined peak labels, or create your own custom labels

various stimulation options

- Select from Clicks, 500 Hz, 1000 Hz, 2000 Hz or 4000 Hz stimulus signals
- Present in standard or chained-stimuli modes
- Output in dB SPL

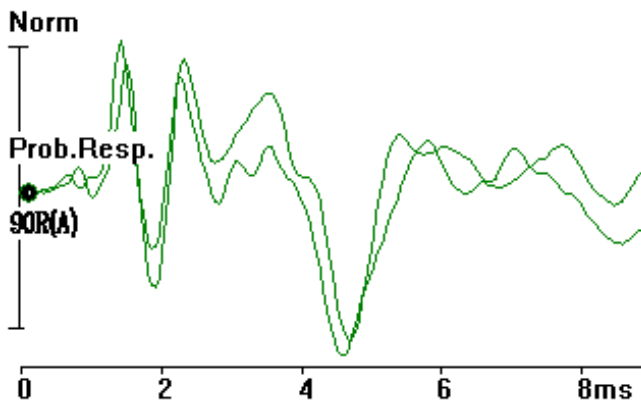
automatic response assessment

- The software labels recordings automatically with Probable Response or No-response indication as they are acquired, based on advanced detection algorithms
- Response indications can be reclassified, if desired, by the expert user



vet-friendly features

- Patient demographics with owner contact information as well as pet name and breed
- Modifiable template list of breeds
- Manage your patients easily and keep organized records of previous tests
- Available on the 1 channel, USB powered portable Aria for a cost-effective and mobile solution
- Solid stainless steel sub-dermal electrodes with ultra sharp tip for low penetration resistance and low-noise, resulting in clear and reliable responses



customizable protocols

- Fast setup of screening protocols for different frequencies and intensities
- Save protocol files for future use, and load them whenever necessary
- Choose intensities, number of sweeps, stimulus type, stimulator, and rate



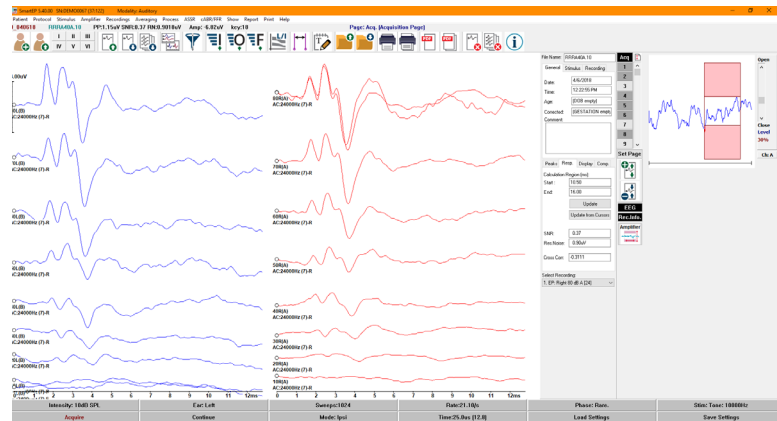
SmartEP

The ideal clinical tool for recording diagnostic ABR in humans and animals.

SmartEP is a highly advanced, full featured diagnostic evoked potential system. Designed with the audiology clinic in mind, it has been used to record brainstem evoked auditory responses in pets, service animals, and laboratory animals.

user friendly interface simplifies acquisition

- Improved tool-bar and button design for fast access to key features
- Easy access to all parameters from a simplified control panel and streamlined menus
- Quickly load your own or preset protocols
- Automated impedance checking with on-screen display
- Easily view ongoing EEG display for quick assessment of patient state during testing
- Great variety of options allow you to perform the tests the way you want
- Choose from a variety of stimuli, or generate or import your own custom stimuli
- Display or hide a subtle vertical grid or horizontal baseline



streamlined workflow

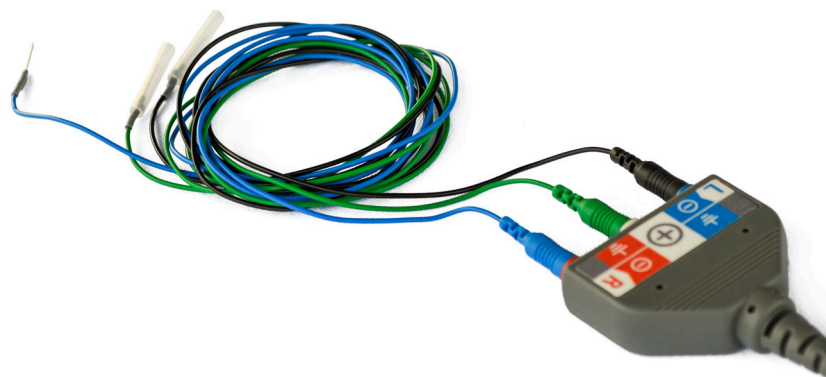
- Easily mark waveforms using over thirty predefined peak labels, or create your own custom labels. Easily adjust them using a mouse or keyboard
- View latencies and amplitudes of peaks directly on waveforms and in newly embedded recording information panel
- Automatically arrange recordings by intensity, acquisition order, or rate
- Quickly resize the waveforms using the zoom in/out buttons

smart features

- Latency-Intensity graphs displaying normative data ranges are automatically generated from marked waveforms
- Quickly add, subtract, invert, time shift, or cross-correlate recordings
- Split-sweep view to easily and conveniently visualize single recording repeatability
- Multi-page display and reports with customizable page labels
- View recordings from multiple sessions on the same page
- Create grand averages from multiple sessions or multiple patients on the same page
- Easy PDF report generation
- Auto-save reports on when exiting the program
- Export recordings to ASCII text files

advanced options

- Trigger-in/out options
- SmartVEMP for vestibular evoked myogenic potentials
- Advanced Auditory Research Module for Frequency Following Responses (FFR)
- Continuous Acquisition Module
- Low-current electrical stimulator for electrically evoked ABR animal research
- Visual Evoked Potential LED stimulator for animal research
- Pattern electroretinogram (PERG) software and visual stimulator for animal research (by Jorvec Corp.)



High Frequency Options

High Frequency add-on module for SmartEP, SmartEP-ASSR, and SmartDPOAE

Researchers have used our High Frequency Option, speakers, and microphones to record AEP and DPOAE on a wide range of animals including dogs, mice, guinea pigs, rats, gerbils, and chinchillas.

transducer options

We are pleased to offer the following transducers on the Duet and Aria hardware platforms:

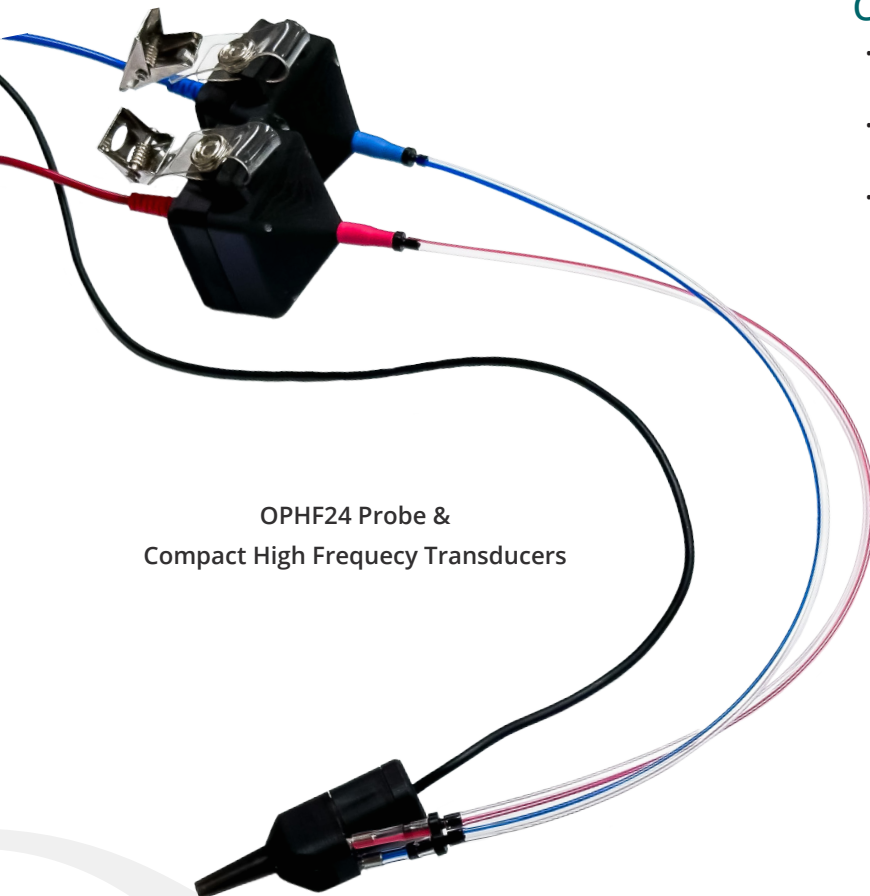
- ER-2 insert earphones for click and tone stimulus output of up to 16kHz
- IHS Compact High Frequency Transducers, allowing clicks, and tone stimuli of up to 40kHz.
- High Frequency OAE Probe (OPHF24) can be coupled to ER-2 inserts for DPOAE up to 16kHz or to Compact High Frequency Transducers for DPOAE using stimuli up to 32kHz for Duet or 16 kHz with the Aria. Features a removable tip for cleaning or replacing.
- High Frequency Animal Probe OPAN24; a compact probe for use with small animals, combining the OPHF24 microphone and two built-in High Frequency Animal Speakers into a single device; includes a positioning rod for ease of placement. Use stimuli up to 32kHz for Duet or 16 kHz with the Aria. Optional adjustable support base available.
- Sound field amplifier option for the Duet.



ER2 Insert Earphones

calibration in animal ears

- Calibration utility facilitates in-ear calibration for each species using the OAE Probe
- Modifiable SPL calibration table can be saved for each species and easily loaded before testing
- Create custom hearing level correction per species using electrophysiological hearing thresholds



OPHF24 Probe &
Compact High Frequency Transducers

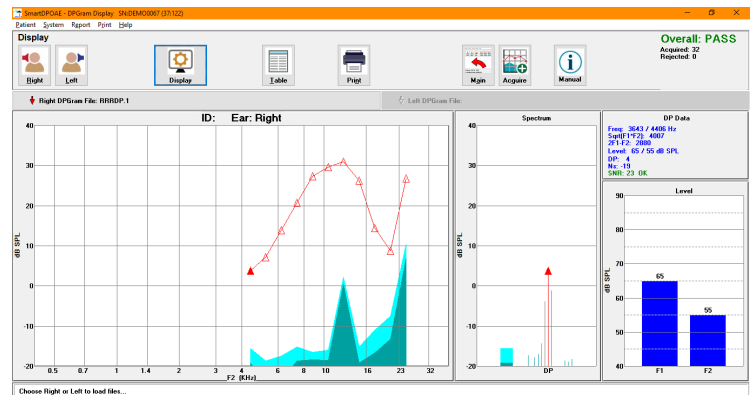
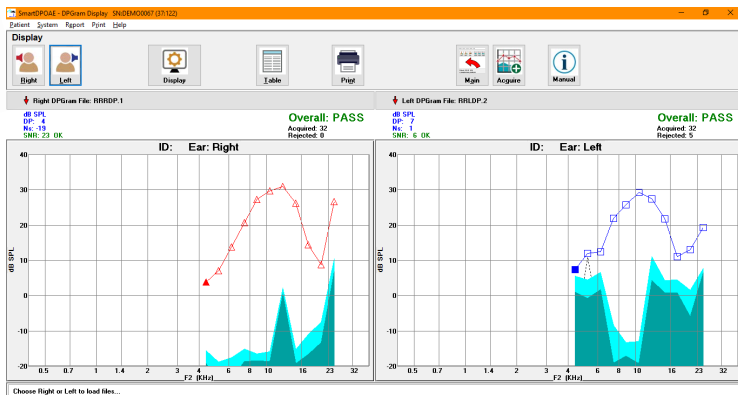


OPAN24 Probe

SmartDPOAE

Screening and diagnostic distortion product otoacoustic emissions.

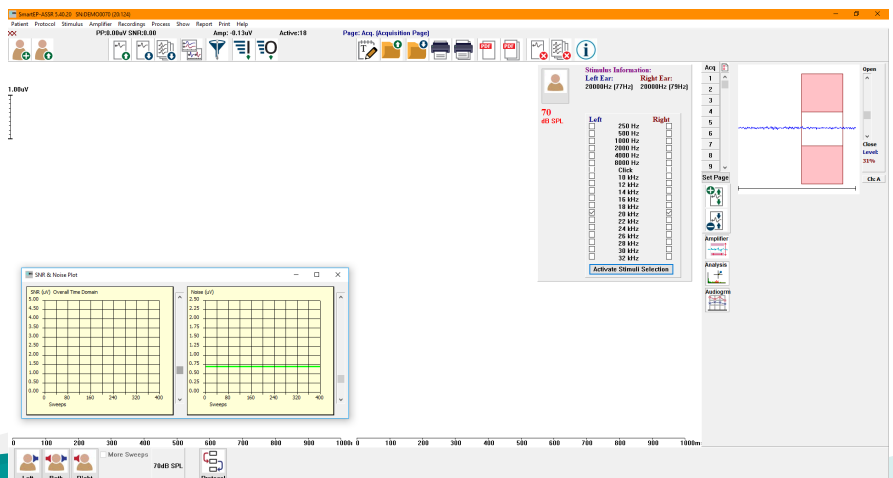
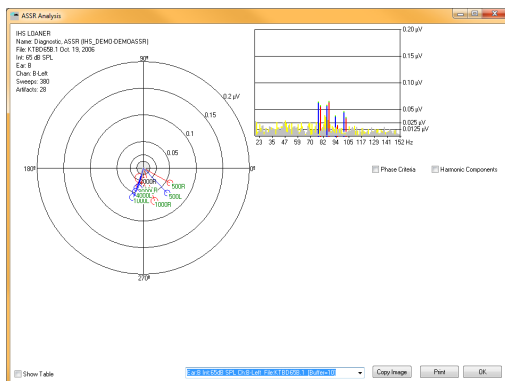
- Fast and easy setup with up to 41 frequencies per ear in a single test sequence
- Automatic probe-fit check and in-ear calibration for increased accuracy
- Easy-to-interpret colorful DPgrams and detailed information for each frequency tested
- Clear Pass or Refer indications based on user-selected passing criteria
- User-customizable display of normative ranges on the DPgram facilitates response analysis
- High frequency option
- Built-in scripting feature allows you to define sequences of frequencies and intensities for automated data collection
- Optional graphical display of noise standard deviation for improved interpretation



SmartEP-ASSR

Full-featured screening and diagnostic Auditory Steady State Response

- Provides quick, accurate threshold detection using automated statistical analysis
- Test both ears at the same time
- Stimulus: Clicks, Tones, iChirps, and user-defined
- Frequencies: 250, 500, 1000, 2000, 4000, and 8000 Hz, and high frequencies from 10 kHz to 32 kHz in 2kHz increments.
- Harmonic component analysis for improved threshold detection and reduced test times
- Automated audiogram generation in SPL and HL
- Cost effective add-on to SmartEP



Specifications

Duet

GENERAL SPECIFICATIONS

Evoked Potentials: PetScreener, ECoG, ABR, MLR, LLR, Chained Stimuli ABR, eABR, FFR, cABR, cVEMP, oVEMP, ASSR

Otoacoustic Emissions: DPOAE, TEOAE (CEOAE & TBOAE), SOAE, TEOAE Suppression

TRANSDUCERS

ER-3C Insert Earphones:

Intensity: up to 132 dB SPL

Frequency Range: 125 - 10,000 Hz

Total Harmonic Distortion: <1% @1kHz

ER-2 Insert Earphones:

Intensity: up to 120 dB SPL

Frequency Range: 125 - 16,000 Hz

DD45 Headphones:

Intensity: up to 120 dB SPL

Frequency Range: 125 - 8,000 Hz

Total Harmonic Distortion: <1% @1kHz

DD450 Headphones:

Intensity: up to 120 dB SPL

Frequency Range: 125 - 16,000 Hz

Total Harmonic Distortion: <1% @1kHz

B71 Bone Conductor:

Intensity: up to 69 dB HL (96 dB SPL)

Frequency Range: 250 - 4,000 Hz

Total Harmonic Distortion: <2% @1kHz

B81 Bone Conductor:

Intensity: up to 82 dB HL (109 dB SPL)

Frequency Range: 250 - 8,000 Hz

Total Harmonic Distortion: <1% @1kHz

Compact HF Transducers:

Intensity: up to 110 dB SPL

Frequency Range: 125 - 40,000 Hz

Sound Field:

Amplifier and speakers intensity and frequency range dependent on sound field components

Auxiliary Output channel for ipsilateral masking and stimulus mixing

EP AMPLIFIER

Channels: Full two channel device with 2 inverting and 2 non-inverting inputs. Single channel operation with automatic polarity switching and single channel electrode cable

Gain: 5,000 - 200,000 (adjustable)

High Pass Filter:

0.1 - 300 Hz, (adjustable)

-6 dB/Oct, -24 dB/Oct @ 70 Hz

Low Pass Filter:

30 - 5,000 Hz (adjustable)

-6 dB/Oct, -24 dB/Oct @ 500 Hz

Digital Filters: Finite Impulse Response (FIR/Smoothing), Band Pass, Notch

A/D Converter: 16-bit

Sampling rate: 200 to 40,000 Hz (adjustable)

Artifact Rejection Level: Adjustable: 0-100%, and any region within the analysis time window

Line Frequency Notch Filter:

50 or 60 Hz (-12 dB/Oct)

Common Mode Rejection:

≥ 110 dB @ 1 kHz

≥ 110 dB @ 60/50 Hz, notch filter off

Noise Level: ≤ 0.27 μ V RMS

Input Impedance: > 10 MOhms

Electrode Impedance:

Measuring frequency: 1,000 Hz

Measuring range: 1 - 25 kOhms

OAE PROBE & AMPLIFIER

Sampling Rate: 40 kHz

A/D Converter: 16-bit

Frequency Accuracy:
0.01% from selected

Frequency Range:
125 - 32,000 Hz

POWER REQUIREMENTS

Internal Power Supply:

115-230 VAC, 560-350 mA
30W, 50/60 Hz

PHYSICAL CHARACTERISTICS:

Dimensions:

38.2 x 25 x 4.76 cm (15 x 9.8 x 1.9 in)

Weight: 1.36 Kg (3 lbs)



Specifications

Aria

GENERAL SPECIFICATIONS

Evoked Potentials: PetScreener, ECoG, ABR, MLR, LLR/CAEP, SN10, Chained Stimuli ABR, P300, MMN, cVEMP, oVEMP, ASSR
Otoacoustic Emissions: DPOAE, TEOAE (CEOAE & TBOAE), SOAE

TRANSDUCERS

ER-3C Insert Earphones:
Intensity: up to 132 dB SPL
Frequency Range: 125 - 10,000 Hz
Total Harmonic Distortion: <1% @1kHz

DD45 Headphones:
Intensity: up to 120 dB SPL
Frequency Range: 125 - 8,000 Hz
Total Harmonic Distortion: <1% @1kHz

DD450 Headphones:
Intensity: up to 120 dB SPL
Frequency Range: 125 - 16,000 Hz
Total Harmonic Distortion: <1% @1kHz

B81 Bone Conductor:
Intensity: up to 82 dB HL (109 dB SPL)
Frequency Range: 250 - 8,000 Hz
Total Harmonic Distortion: <1% @1kHz

Compact HF Transducers:
Intensity: up to 110 dB SPL
Frequency Range: 125 - 40,000 Hz

OAE PROBE & AMPLIFIER

Sampling Rate: 40 kHz
A/D Converter: 16-bit
Frequency Accuracy:
0.01% from selected
Frequency Range:
125 - 16,000 Hz

EP AMPLIFIER

Channels: Single channel with automatic polarity switching
Gain: 5,000 - 100,000 (adjustable)
High Pass Filter:
1 - 100 Hz (adjustable), -6 dB/Oct
Low Pass Filter:
30 - 3,000 Hz (Adjustable), -6 dB/Oct
Digital Filters: Finite Impulse Response (FIR/Smoothing), Band Pass, Notch
A/D Converter: 16-bit
Sampling rate: 200 to 40,000 Hz (adjustable)
Artifact Rejection Level: Adjustable: 0-100%, and any region within the analysis time window
Line Frequency Notch Filter:
50 or 60 Hz (-12 dB/Oct)
Common Mode Rejection:
≥ 103 dB @ 500 Hz
≥ 105 dB @ 60/50 Hz, notch filter off
Noise Level: ≤ 0.27 uV RMS
Input Impedance: > 10 MOhms
Electrode Impedance:
Measuring frequency: 1,000 Hz
Measuring range: 1 - 25 kOhms

PHYSICAL CHARACTERISTICS:

Dimensions:
18.5 x 19 x 4 cm (7.3 x 7.5 x 1.57 in)
Weight:
0.45 Kg (1 lbs)

POWER REQUIREMENTS

USB Powered: +5V DC, 1.5 A, 7.5 W (USB 3.1, Power Delivery, or Battery Charging)

General Specs

ENVIRONMENT

Degree of Mobility: Portable Equipment
Location: Indoor use
Temperature:
Operating: 15°C - 35°C (59°F - 95°F)
Transport: -20°C - 50°C (-4°F - 122°F)
Storage: 0°C - 50°C (32°F - 122°F)
Relative humidity: Operating: 15% to 90% at 40 °C non-condensing
Ambient Pressure:
Operating: 78 kPa -104 kPa
Storage: None Specified
Warm-up Time:
None at room/operating temperature

QUALITY SYSTEM

ISO 13485: Manufactured, designed, developed, and marketed under ISO 13485 certified quality systems

STANDARDS COMPLIANCE

Safety and Electromagnetic Compatibility:
IEC 60601-1 Class II, Type BF (Safety)
IEC 60601-1-2 (EMC)
IEC 60601-2-40 (EP)
Electroacoustics - Audiometric Equipment
IEC 60645-7:2009 Type 1
Protection from Fluids:
IPX0 – Ordinary equipment

COMPUTER REQUIREMENTS

Operating System: Windows 10 or 11
Hardware Required: Minimum 8 GB RAM, Minimum 5 GB hard drive space, Mouse or other pointing device,
Ports Required: 1 USB Port (See Aria Power Requirements for additional platform-specific USB port power needs)
Display: 900 pixels minimum vertical resolution, Full HD recommended
Power Supply: Grounded, 3-prong power supply, Compliant with IEC 60950
External Storage:
Removable media, network drive, or secure Internet storage site for data backup (recommended)
Printer:
Software includes PDF printing capabilities, hardware printer optional



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many options, one smart system

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