Product information

AI-503

USB DAC/Integrated Amplifier

Integrated amplifier with Bluetooth function and a dual mono USB DAC (supports formats up to 11.2MHz DSD) for the high-resolution digital audio player age

■ Main features

- USB DAC with a dual-mono configuration that supports resolutions up to 11.2MHz DSD and 384kHz/32bit PCM
- Bluetooth® receiver supports LDAC™/Qualcomm® aptX™ for high quality wireless audio quality
- Dedicated headphone amp with discrete, push-pull circuit
- Headphone jack supports 3.5mm 4-pole separate ground connection
- Combined stereo mini/optical digital jack on front panel, convenient for connecting digital audio players
- Pre-amp section provides fully balanced transmission and uses TEAC-QVCS high-precision volume control circuit
- High-output Class-D power amplifier (made by ICEpower a/s)
- Switchable filter types, including 4 PCM and 2 DSD digital filters
- Pre-out jacks can be connected to both power amplifiers and active speakers
- Two pairs of analog RCA inputs, as well as USB, optical and coaxial digital inputs (one each) on back panel
- Dual analog level meters with adjustable brightness

Brand	TEAC	
Series	Reference 503	
Model	AI-503-S	AI-503-B
Color	Silver	Black
Main unit size (W × H × D)/weight	290 × 81.2 × 264 mm/3.7 kg (11 1/2" × 3 1/4" × 10 1/2" / 8 1/4 lb)	
Packaging size/weight	444 × 193 × 345 mm/5.1 kg (17 1/2" × 7 5/8" × 13 5/8" / 11 1/4 lb)	

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■ Overview

The AI-503 is an integrated amp and USB DAC that supports inputs up to 11.2MHz DSD and 384kHz/32-bit PCM. The DAC/preamp, which is the heart of the unit, follows the same design concept of our UD-503 and adopts a dual-mono circuit design that is fully balanced. Separate VERITA AK4490 D/A converters - made by Asahi Kasei Microdevices Corporation - are used for the left and right channels. In addition to a USB digital input (for Windows/Mac computers), optical/coaxial digital input and RCA analog input, we have also enabled high-resolution wireless audio listening by including a LDAC-compatible Bluetooth® receiver. Furthermore, with a combined 3.5mm optical digital/stereo mini jack on the front panel, the unit supports wired, as well as wireless, input from DAPs.

The power amplifier uses a Class-D power amplifier (made by ICEpower a/s) that guarantees high resolution during the playback of delicate signals as well as high linearity at high volumes. This unit can power both compact bookshelf speakers (for desktop applications) and large floorstanding speakers. The pre-amp section uses a fully-balanced TEAC-QVCS high-precision volume control circuit with a 4-circuit construction. By maintaining detail levels at all resolutions, the AI-503 creates a very realistic soundstage, along with a high signal-to-noise ratio and excellent sense of space. By connecting an external power amplifier to the fitted pre-out jacks, you can upgrade performance and create an even more capable audio system. The headphone amp section uses a discrete TEAC-HCLD circuit, with a push-pull arrangement, allowing it to drive even high-impedance headphones with ease. The two-stage High/Low gain switch enables optimal volume setting for everything from low-impedance in-ear monitors to high-impedance (600Ω) on-ear headphones. Furthermore, the inclusion of a 3.5mm headphone jack, one that supports a 4-pole separate ground connection, allows excellent channel separation, even when using balanced-type headphones or earphones.

DAC/preamp with dual mono structure

■ High-performance VERITA AK4490 DACs support 11.2MHz DSD and 384kHz/32-bit PCM

For the DAC chips, the key to high-performance digital audio, we used the highly-regarded VERITA AK4490* DACs, made by Asahi Kasei Microdevices Corporation. Along with native playback of 11.2MHz DSD signals through direct processing, a wide range of high-resolution audio sources (including 384kHz/32-bit PCM digital input) are supported. These DACs enable the reproduction of the finely etched detail and outstanding sense of stereo placement that are the hallmarks of quality high-definition high-resolution audio sources.

**The AK4490 is a member of the Asahi Kasei Microdevices Corporation Audio4pro™ family brand of products developed for professional audio devices and high-end digital audio applications.*

■ Dual-mono configuration supports fully-balanced transmission

As well as helping deliver class-leading levels of power, the sophisticated dual-mono configuration also extends to the D/A converter and the preamp.

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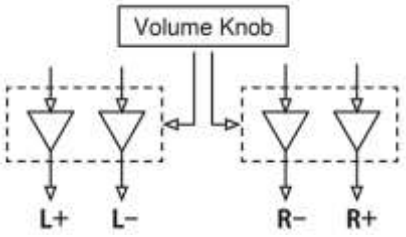
The dual-mono layout incorporates two completely independent mono circuits for the left and right channels. Starting with the high-performance VERITA AK4490 D/A converters, this arrangement provides outstanding isolation between the two channels. The suppression of interference between the left and right channels is particularly important when it comes to headphone listening.

■ Pre-amp section provides fully balanced transmission and uses TEAC-QVCS high-precision volume control circuit

For the preamp circuit, we have utilized the TEAC-QVCS (Quad Volume Control System), an ingenious circuit with a fully-balanced design. It allows balanced processing of the audio signal at every stage, from immediately after digital-to-analog conversion until the signal reaches the volume amplifier.



Control signals, transmitted from the volume knob, simultaneously adjust the variable-gain amplifier-type volume controls of four independent circuits – providing a positive and negative for both the left and right channels. Using this system, the unnecessary manipulation of audio signals is eliminated, and the left/right and positive/negative independence of the audio signals is preserved until a point immediately before the power amplifier, achieving a clear sound quality with outstanding channel separation. (This process only applies to balanced analog inputs).

What's more, "gang errors" (level discrepancies between left and right channels at low volumes), which can be a particular issue during headphone listening, have been completely eliminated, so you can enjoy accurate audio even when using low-impedance in-ear monitors.

■ Pre-outs can be connected to both power amplifiers and active speakers

The AI-503 can also be used as a high-quality preamp. As the volume from the RCA output jacks can be varied, you can achieve a seriously upgraded audio system simply by connecting a power amplifier to the pre-out jacks. In addition, the unit has a pair of analog RCA input jacks, so you can also connect an analog turntable with a built-in phono EQ amplifier, such as a TN-350 or TN-570, a cassette deck, or other analog equipment.

■ Built-in 44.1kHz and 48kHz clocks

The AI-503 supports asynchronous transfer mode when connected by USB, allowing it to control PCM and DSD signals by synchronising them with its own clock (generated by a high-precision crystal oscillator) rather than synchronising with a computer clock signal that is invariably unstable and noisy. Two dedicated internal clocks (running at 44.1kHz and 48kHz) are built in. By clocking signals that are a multiple of the clock frequencies to an audio-grade, high-precision crystal oscillator, featuring inherently low phase noise, the damaging effects of jitter on audio quality can be largely suppressed and the audio source can be reproduced more faithfully.

■ Filter types include 4 PCM and 2 DSD digital filters

Filter types include 4 PCM and an 'off' mode , as well as 2 DSD digital filters. You can use the remote control to set the optimal filter, according to the input file format and type of music. You can also change the filter during music playback so that you can fine-tune the audio quality.

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PCM filters
- FIR SHARP: FIR filter with a steep roll-off, used to sharply cut signals outside the audio band
- FIR SLOW: FIR filter with a slow roll-off, used to gently cut signals outside the audio band
- SDLY SHARP: Short delay filter with a steep roll-off, used to sharply cut signals outside the audio band
- SDLY SLOW: Short delay filter with a slow roll-off, used to gently cut signals outside the audio band

DSD filters: CUTOFF at 50kHz, CUTOFF at 150kHz

Note: When receiving signals at 352.8 kHz or 384 kHz, the digital filter will be disabled during playback regardless of this setting.

■ High-capacity toroidal-core power transformers

Efficient toroidal-core power transformers that can supply stable power are used. They are specifically designed to suppress magnetic flux leakage and prevent electromagnetically-induced noise, so can provide current that is always pure and stable.

Input connectors that support various sources

■ USB/coaxial/optical digital inputs

The USB input supports resolutions up to 11.2MHz DSD and 384kHz/32-bit PCM. "DSD native playback" in which DSD is converted directly to analog without first being converted to PCM is also supported. TEAC HR Audio Player, a free music playback software specifically written for TEAC products, supports ASIO 2.1 and DoP (DSD over PCM) formats, allowing native playback of 11.2MHz DSD audio sources on Windows as well as Mac computers. Optical and coaxial digital inputs support resolutions up to 192kHz/24-bit.

■ Bluetooth® receiver that supports LDAC

The onboard Bluetooth® receiver supports LDAC* and aptX™ as well as AAC and other wireless transmission of high-quality audio. You can easily enjoy your music by wirelessly transmitting audio from your smartphone or tablet.

**LDAC is an audio coding technology developed by Sony that enables the transmission of High-Resolution (Hi-Res) Audio content, even over a Bluetooth connection. Unlike other Bluetooth compatible coding technologies such as SBC, it operates without any down-conversion of the Hi-Res Audio content*1, and allows approximately three times more data*2 than those other technologies to be transmitted over a Bluetooth wireless network with unprecedented sound quality, by means of efficient coding and optimized packetization.*

[1]excluding DSD format contents

[2]in comparison with SBC (Subband Coding) when the bitrate of 990kbps (96/48kHz) or 909kbps (88.2/44.1kHz) is selected

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■ Front digital input, perfect for use with digital audio players and other portable devices

The front digital input jack is a convenient way of connecting digital audio players with optical digital and analog outputs. You can enjoy your favorite music already on your portable device through speakers or through headphones, using the high-quality audio headphone amp.

Power amplifier from ICEpower a/s

■ Class-D power amplifier made by ICEpower a/s

In order to deliver high-quality audio performance, we have incorporated a well-regarded high-output power amplifier made by ICEpower a/s. This guarantees high-resolution playback of delicate signals as well as excellent linearity at high output levels.

It is the use of a compact and high-efficiency Class-D power amplifier that has enabled the inclusion of a dual-mono circuit configuration in the DACs, highly beneficial to digital audio, in a small form-factor with dimensions about the size of a single A4 page.

ICEpower® is a registered trademark of Bang & Olufsen ICEpower a/s.

Headphone amp with a discrete, push-pull circuit

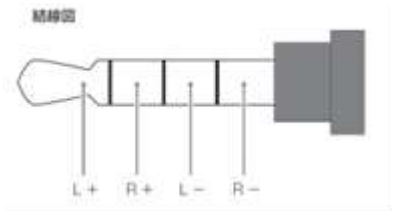
■ TEAC-HCLD circuit with discrete, push-pull circuit

The dedicated headphone amp employs Class AB operation, a discrete push-pull circuit and op amp. We have applied all the expertise we gained during the development of the UD-503 to give this model a circuit design that suppresses the occurrence of noise while maintaining the wide operational range of a Class-A amplifier. The fine details and nuances of music, captured in high-resolution audio sources, are conveyed in an untainted way.

■ Headphone amp stage uses a design with completely separate left and right grounding

The AI-503 headphone output uses a circuit design with completely separated grounding for left and right channels from the amp to the final 4-pole type jack. By completely separating the grounding of the left and right channels from the amplifier, channel separation is greatly increased and a much more transparent soundstage achieved.

Note: Earphones and headphones with 3-pole plugs can also be used, but to benefit from separate left/right ground drive, you should use earphones or headphones with 4-pole plugs. The pin assignments are as shown in the illustration below.



Pin assignments : Tip(L+), Ring(R+), Ring(L-), Sleeve(R-)

■ 2-stage gain switching function

The headphone amp output has a 2-stage gain-switching function. This enables optimal volume setting according to the impedance and efficiency of the connected headphones, using everything from low-impedance in-ear monitors to high-impedance 600Ω headphones.

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Enclosure designed with great attention to detail

■ Dual analog level meters convey audio pulsations

Analog level meters are built into the front of the unit. These meters, which move in response to signal levels, emphasise the role of the unit as a piece of audio equipment and will reinforce the sense that the room it's located in is a place for listening to music. In addition to a dimmer function with four levels (bright, normal, dim, off) that allows you to adjust the brightness to match the lighting of the room, you can also turn off the operation of the level meters completely.

■ User interface designed with a focus on making operation enjoyable

We pay great attention to each and every control, including an aluminum volume knob with firm torque and toggle switches that provide a sense of satisfying certainty in operation. The dedicated remote controller, which is topped with aluminum alloy, exudes class. We also focused on the operation of the unit itself and so the remote control can be used to adjust volume in steps as small as 0.5 dB.

■ All-metal enclosure provides both vibration resistance and a stylish appearance in an A4-sized footprint that can be easily accomodated

Since the enclosure is completely made of metal panelwork, which is resistant to external noise, the infiltration of electromagnetic noise generated by computers and other equipment is well-suppressed. This creates an electrically 'clean' internal environment with little noise, even in outside environments that offer difficult conditions for audio equipment. The metal chassis also has 8mm-thick aluminum panels on both ends. These features prevent twisting and bending, resulting in a strong and stable body structure. In addition, its footprint, which is the size of an A4 page*, allows it to be placed on tables, sideboards and in other small spaces.

**Not including jacks, knobs and other protruding parts*

Software

■ Free TEAC HR Audio Player application supports 11.2MHz DSD playback on both Windows and Mac computers

TEAC HR Audio Player, which is free music playback software written specifically for TEAC products, allows native playback of 11.2MHz DSD, 384kHz PCM and other high-resolution music files. Since there is no need to make complex settings on a computer (Windows/Mac), the basic set-up required to use the AI-503 with computer audio playback is simple. Even those who are not very good with computers can get up and running quickly using this app.

Note: When using this unit with a Windows computer, you must install the dedicated driver on that computer before connecting the AI-503 to it by USB.

■ List of features

- DAC with a dual-mono configuration that supports resolutions up to 11.2MHz DSD and 384kHz/32bit PCM
- Separate VERITA AK4490 D/A converters made by Asahi Kasei Microdevices Corporation used on left and right channels
- Bluetooth® receiver that supports LDAC/Qualcomm® aptX™ (as well as AAC and SBC)
- Filter type can be switched, choosing from 2 DSD digital filters, as well as 4 PCM filters and off mode
- Two built-in high-precision dedicated clocks for 44.1kHz and 48kHz signals and their multiples (enabled during

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USB asynchronous transmission)

- TEAC-QVCS high-precision volume control circuit with fully-balanced structure
- High-output Class-D power amplifier (made by ICEpower a/s)
- Headphone amp with discrete, push-pull circuit and a maximum output of 280mW+280mW (TEAC-HCLD circuit)
- Ground connection supported by 3.5mm 4-pole stereo headphone jack (combined with regular 3.5mm stereo mini type)
- High-capacity toroidal-core power transformers
- Pair of RCA analog input jacks
- Volume-controlled pair of RCA analog output (pre-out) jacks
- USB/coaxial/optical digital inputs (one each on back panel)
- Combined round optical digital/3.5mm stereo mini jack (on front panel)
- Dual analog level meters with adjustable brightness
- Low-energy consumption design and automatic power-saving function
- All-metal enclosure provides both vibration resistance and a stylish appearance in an A4-page-sized footprint that can fit on a desk
- Dedicated remote control included
- IEC inlet
- Compliant with RoHS

■ Rear panel

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Specifications

Speaker outputs

Maximum output 60W + 60W
(10% distortion, 1 kHz, 4 Ω)
30W + 30W
(10% distortion, 1 kHz, 8 Ω)

Rated output 43W + 43W
(1% distortion, 1 kHz, 4 Ω)
22W + 22W
(1% distortion, 1 kHz, 8 Ω)

Allowable speaker impedance 4-8 Ω

Total harmonic distortion 0.005% or less
(1 kHz, 8 Ω, 1 W)

S/N ratio 100 dB or more
(analog input, when 8Ω load, rated output, A-weighted)

Frequency response 10 Hz-100 kHz +1/-3 dB
(8Ω, 1W, analog input)

PRE OUT audio outputs

RCA jacks 1 pair (L/R)
- Output impedance 150 Ω
- Frequency response 10 Hz-100 kHz (+1/-3 dB)
(analog input, when 200mVrms output)
- S/N ratio 103 dB or more
(analog input, when 1kHz/2Vrms output, A-weighted)
- Total harmonic distortion 0.005% or less
(analog input, when 1kHz/2Vrms output, 20kHz LPF)

Headphone output

3.5mm 4-pole stereo mini jack 1

Practical maximum output 280 mW + 280 mW
(GAIN set to HIGH, into 32Ω load, 10%)

Compatible impedance range 16-600 Ω

Analog audio inputs

RCA jacks 1 pair (L/R)
- Input impedance 30 kΩ
- Maximum input 2 Vrms

3.5mm stereo mini jack* 1
- Input impedance 22 kΩ
- Maximum input 2 Vrms

Digital audio inputs

COAXIAL digital
- RCA connector 1

OPTICAL digital
- Square (TOSLINK) connector 1
- Round connector* 1
(−24.0 to −14.5 dBm peak)

USB-B port 1
(USB 2.0 standard)

PCM data sampling frequency
- COAXIAL digital
32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz,
96 kHz, 176.4 kHz, 192 kHz
- OPTICAL digital
32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz,
96 kHz, 176.4 kHz, 192 kHz
- USB
44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz,
176.4 kHz, 192 kHz, 352.8 kHz, 384 kHz

Quantization bit depth
- COAXIAL digital/OPTICAL digital 16/24-bit
- USB 16/24/32-bit

DSD data sampling frequency
- COAXIAL digital/OPTICAL digital 2.8 MHz
(supported using 176.4kHz/24-bit DoP transmission)
- USB 2.8/5.6/11.2 MHz

*This is a combined analog (LINE 2) and optical (OPT 2) input connector.

Bluetooth function

Bluetooth version 4.0

Output class Class 2

(approximate transmission distance* 10 m)

Supported profiles A2DP, AVRCP

Supported A2DP codecs SBC, AAC,
Qualcomm® aptX™, LDAC

A2DP content protection SCMS-T

Maximum number of stored pairings 8

*The transmission distance is approximate. The transmission distance could vary depending on the surrounding environment and electromagnetic waves.

Other

Power supply
- Model for Europe. AC 220–240 V (50/60 Hz)
- Model for U.S.A./Canada. AC 120 V (60 Hz)

Power consumption 38 W

Standby power 0.5 W or less (in standby mode)

External dimensions 290 × 81.2 × 264 (mm)
(11 1/2" × 3 1/4" × 10 1/2")
(W × H × D including protrusions)

Weight 3.7 kg (8 1/4 lb)

Operating temperature range +5ºC to +35ºC

Operating humidity range 5% to 85% (no condensation)

Storage temperature range −20ºC to +55ºC

Included accessories

Power cord × 1

Remote control (RC-1328) × 1

Batteries for remote control (AAA) × 2

Owner's manual (this document, including warranty) × 1