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Hybrid Headphone Amplifier

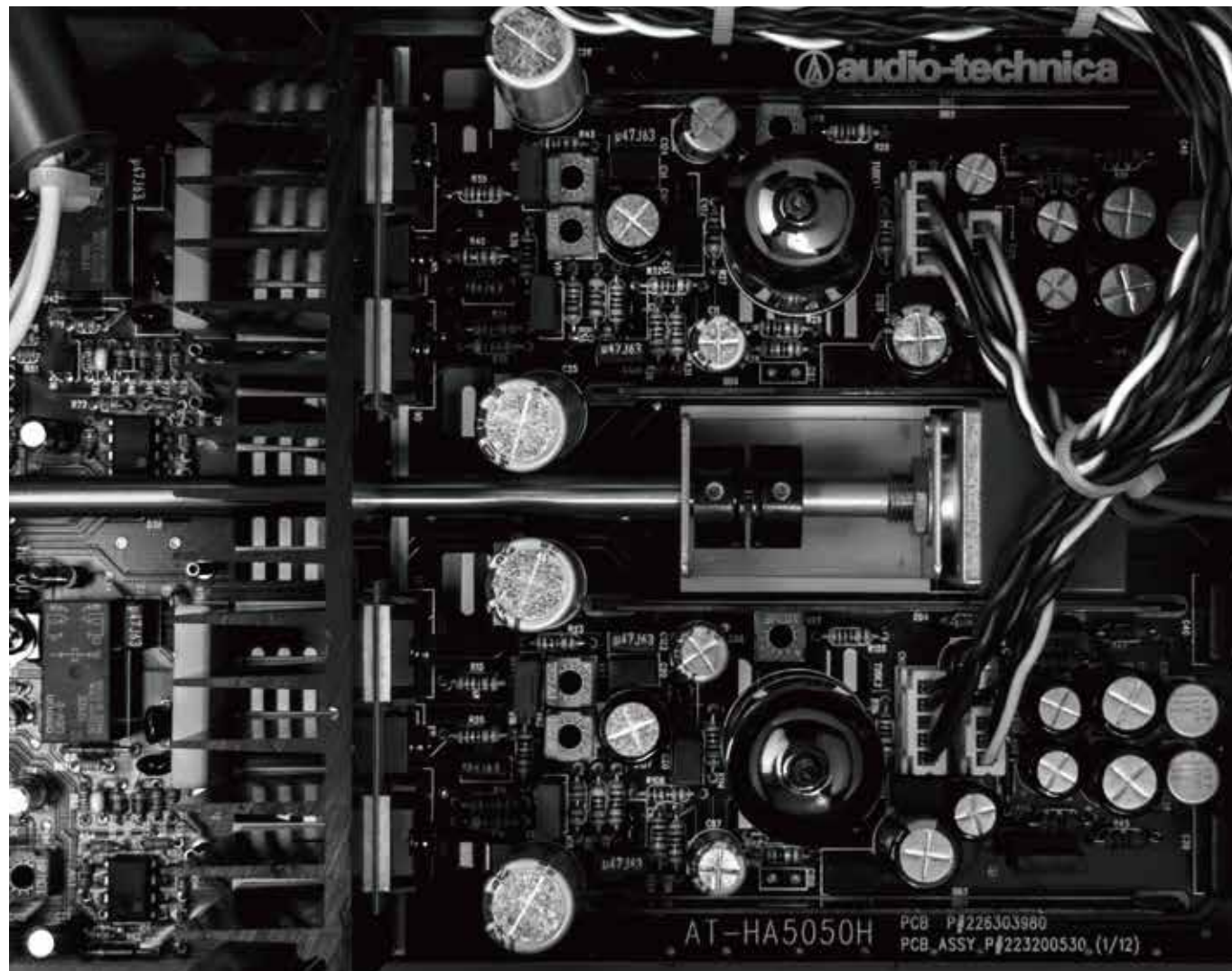
AT-HA5050H



Made in Japan

Hybrid Headphone Amplifier

AT-HA5050H



Main circuit board of AT-HA5050H

Design Concept

AT-HA5050H is a reference headphone amplifier that is designed to work with any headphones, not just those from Audio-Technica. We understand that all headphones have a distinct sound signature and can perform very differently when paired with an amp.

We wanted to make headphones perform at their best, while also letting the user choose the sound they like. So we have provided different output choices that can easily alter the sonic characteristics and performance of the headphones.

Unlike previously released headphone amplifiers, the suffix “H” in the model name signifies that AT-HA5050H is a Hybrid amplifier that employs a pair of tubes at the preamp stage and transistors at the power amp stage.



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Why Hybrid?

Employing tubes in the preamp adds warmth and depth to the music, while its bipolar transistors provide distortion-free Class A amplification that is powerful enough to drive any headphones, irrespective of their impedance level.

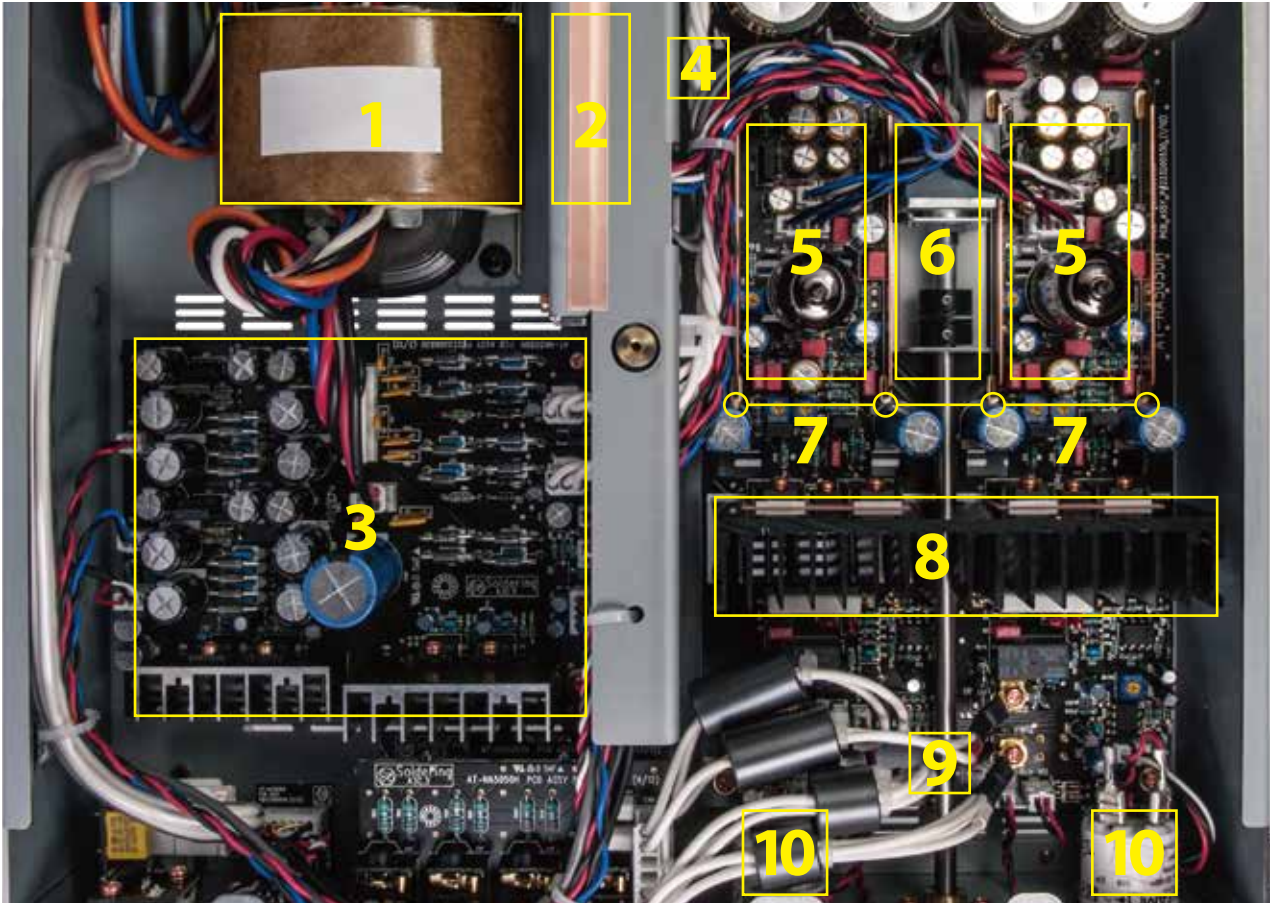


Power indicator



Power switch

Electrical Circuit



1 Customized R-Core Power Transformer

The power transformer has been customized and repeatedly fine-tuned to enable the hybrid tube headphone amplifier to best exhibit its characteristics.

2 Digital Circuit Section

USB I/F circuit and DAC are placed inside the shielded case to eliminate any interference that can cause noise in the vacuum tubes. The shielded case also blocks electromagnetic noise from the power transformer.

3 Power Supply Circuit

Input power is rectified by fast recovery diodes. Each part of the amplifier is individually regulated and powered.

4 OFC Power Cable

OFC power cable is used to ensure clean delivery of power supply.

5 Preamplifier Stage

A pair of E88CC vacuum tubes is used to achieve a warm, mellow sound with reverberation.

6 Volume Control

The volume control is placed in the center of the signal path, and it is connected by a shaft to the volume knob. This design makes the circuit more stable and balanced.

7 Power Bus Bar

The use of power bus bars strengthens the power supply to deliver enough power for a rich low frequency.

8 Power Amplifier Stage

The pair of Toshiba bipolar power transistors provides strong, driving power and high-quality sound.

9 OFC Headphone Cable

OFC cable is used to deliver an impactful and detailed sound.

10 VU Meters

Sifam meters are used for their high reliability.



Component Selection

- Power Transformer

We understand that the power supply is one of the most important factors affecting overall amplifier performance. So we have a custom-made R-Core transformer inside AT-HA5050H to counter spikes and instability in the power line.

- Power Bus Bar

To further optimize power supply in the amplifier, each part of the amplifier is fed by individual power supply units with fast recovery diodes and regulating circulatory. Power bars and larger diameter ground wires are employed to ensure more than enough current is supplied to each part.

- DAC

The DAC of AT-HA5050H is also state-of-the-art. It is optimized to be compatible with formats up to PCM 32 bit/384 kHz and DSD128 through USB with selectable Asynchronous and Adaptive modes. Special measures have also been taken to improve performance at the USB input by reducing jitter.

Connect the AT-HA5050H to a CD player through SPDIF coaxial. It also has two analog inputs, with RCA jacks for unbalanced input, and XLR sockets for balanced input.

- Lundahl Input Transformers

In balanced inputs, AT-HA5050H employs high-quality Lundahl input transformers for the best sound quality possible.

- Tubes, Transistors, Capacitors

AT-HA5050H uses a pair of E88CC tubes made by JJ Electronic, valued for their sound quality and longevity.

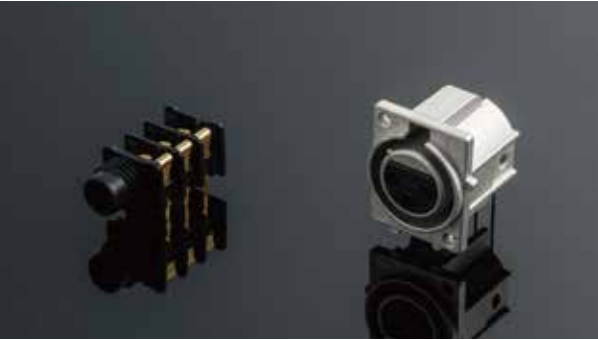
The matched bipolar transistors are made by Toshiba. Both component types are carefully selected and paired for their electrical characteristics and noise performance before amplifier is assembled.

We have also used high-grade Nichicon electrolytic capacitors and WIMA polyester capacitors for the best sound quality.



- VU Meter

To add to the analog feel of having tubes in AT-HA5050H, we have also included VU meters made by Sifam.



- Headphone Jack & XLR Receptacle

Neutrik 6.3mm headphone socket has been used for reliable connection between the plug and jack. XLR receptacle made by ITT Cannon is used for stable performance.

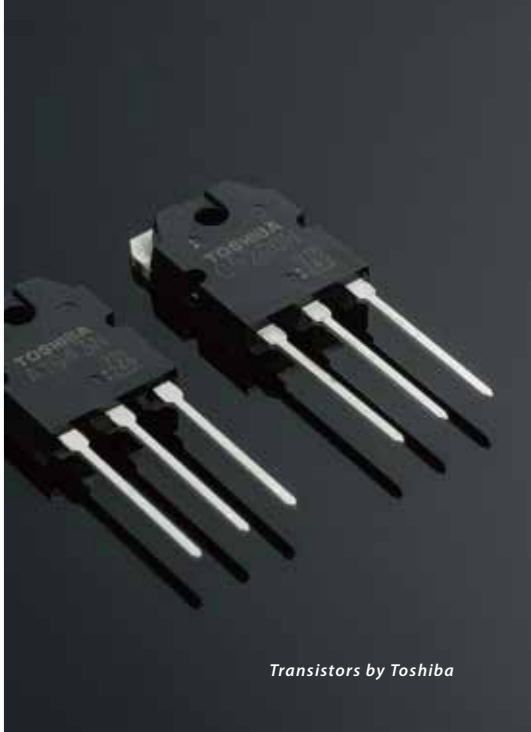


- Vacuum Tubes Testing

Before assembling the amplifier, the vacuum tubes undergo a burn-in process for approximately 100 hours, then they are paired for their noise performance. In AT-HA5050H, only the pairs with the lowest noise are used.



Specially customized power transformer



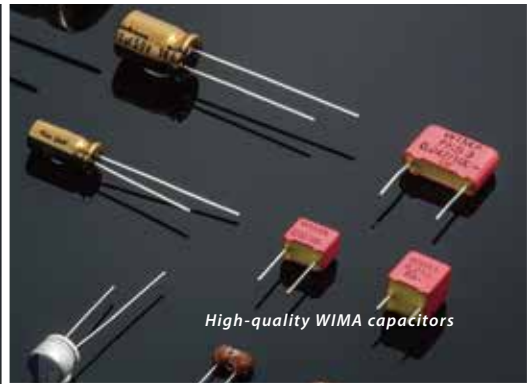
Transistors by Toshiba



DAC Board



High-quality power bus bar



High-quality WIMA capacitors



E88CC by JJ



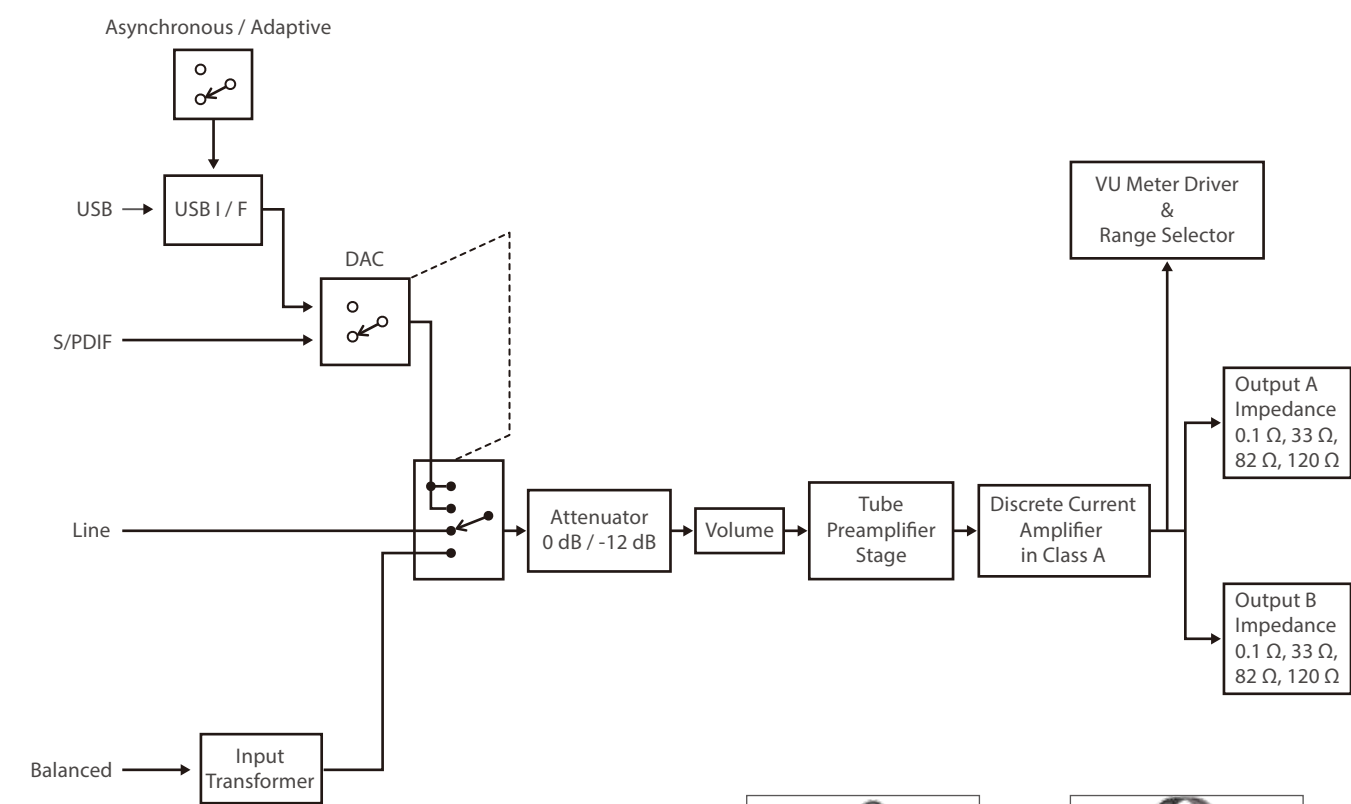
High-quality Lundahl input transformers



High-grade Nichicon electrolytic capacitors



Block Diagram



ATH-W1000Z (43Ω)



ATH-R70x (470Ω)

Pairing

We understand that an amplifier’s output characteristics, particularly when paired with different headphones, can be easily affected by the output impedance that is used. This is why the AT-HA5050H gives you the choice of which output impedance to use.

As output impedance can easily affect an amplifier’s output characteristics and its ability to pair with different headphones, the AT-HA5050H includes a variety of sockets with different output impedance to allow you to choose the optimal output to match your specific needs. This configuration allows for a superior noise performance when compared with that provided by the use of a selector switch.

For example, when using ATH-R70x (470Ω), plugging into the 120Ω output will result in richer low frequency when compared to other output impedances. If two headphones of significantly different impedance,

such as ATH-W1000Z (43 Ω) and ATH-R70x (470 Ω), are used at the same time, you can obtain similar output volume levels by plugging the higher impedance headphones into the lower output impedance jack, and the lower impedance headphones into the higher output impedance jack.

Output Impedance (Ohms)			
120	82	33	0.1
More	← Bass		
	Dynamic Range →		
	Control →		
	Headroom →		
	Power Output →		
			More



Larger diameter ground wires



High-grade capacitors

USB Compatibility List

AT-HA5050H Asynchronous PCM384 / DSD128			Windows 7	Windows 8 / 8.1
ASIO	PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz, 352.8 kHz, 384 kHz	16-32	16-32
	DSD	DoP64 176.4 kHz	24-32	24-32
		DoP128 352.8 kHz	24-32	24-32
		Native64 88.2 kHz	32	32
		Native128 176.4 kHz	Incompatible *1	Incompatible *1
WASAPI	PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz, 352.8 kHz, 384 kHz	16-32	16-32
	DSD	DoP64 176.4 kHz	24-32	24-32
		DoP128 352.8 kHz	24-32	24-32
		Native64 88.2 kHz	Incompatible	Incompatible
		Native128 176.4 kHz	Incompatible	Incompatible
Direct Sound	PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz	16-32	16-32
	DSD	Incompatible	Incompatible	Incompatible

AT-HA5050H Adaptive PCM192			Windows 7	Windows 8 / 8.1
ASIO	PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz	16-32	16-32
	DSD	DoP64 176.4 kHz	Incompatible	Incompatible
		DoP128 352.8 kHz	Incompatible	Incompatible
		Native64 88.2 kHz	Incompatible *3	Incompatible *3
		Native128 176.4 kHz	Incompatible *3	Incompatible *3
WASAPI	PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz	16-32	16-32
	DSD	DoP64 176.4 kHz	Incompatible	Incompatible
		DoP128 352.8 kHz	Incompatible	Incompatible
		Native64 88.2 kHz	Incompatible	Incompatible
		Native128 176.4 kHz	Incompatible	Incompatible
Direct Sound	PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz	16-32	16-32
	DSD	Incompatible	Incompatible	Incompatible

AT-HA5050H Asynchronous PCM384 / DSD128		MAC OS
PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz, 352.8 kHz, 384 kHz	16-32
DSD	DoP64 176.4 kHz	24-32 *2
	DoP128 352.8 kHz	24-32 *2
	Native64 88.2 kHz	Incompatible
	Native128 176.4 kHz	Incompatible

AT-HA5050H Adaptive PCM192		MAC OS
PCM	32 kHz, 44.1 kHz, 48 kHz 88.2 kHz, 96 kHz, 176.4 kHz 192 kHz	16-32
DSD	DoP64 176.4 kHz	Incompatible
	DoP128 352.8 kHz	Incompatible
	Native64 88.2 kHz	Incompatible
	Native128 176.4 kHz	Incompatible

* 1 If you play accidentally, a loud distorted sound will be emitted.

* 2 When 16 bit is selected, playback will start without any sound being heard.

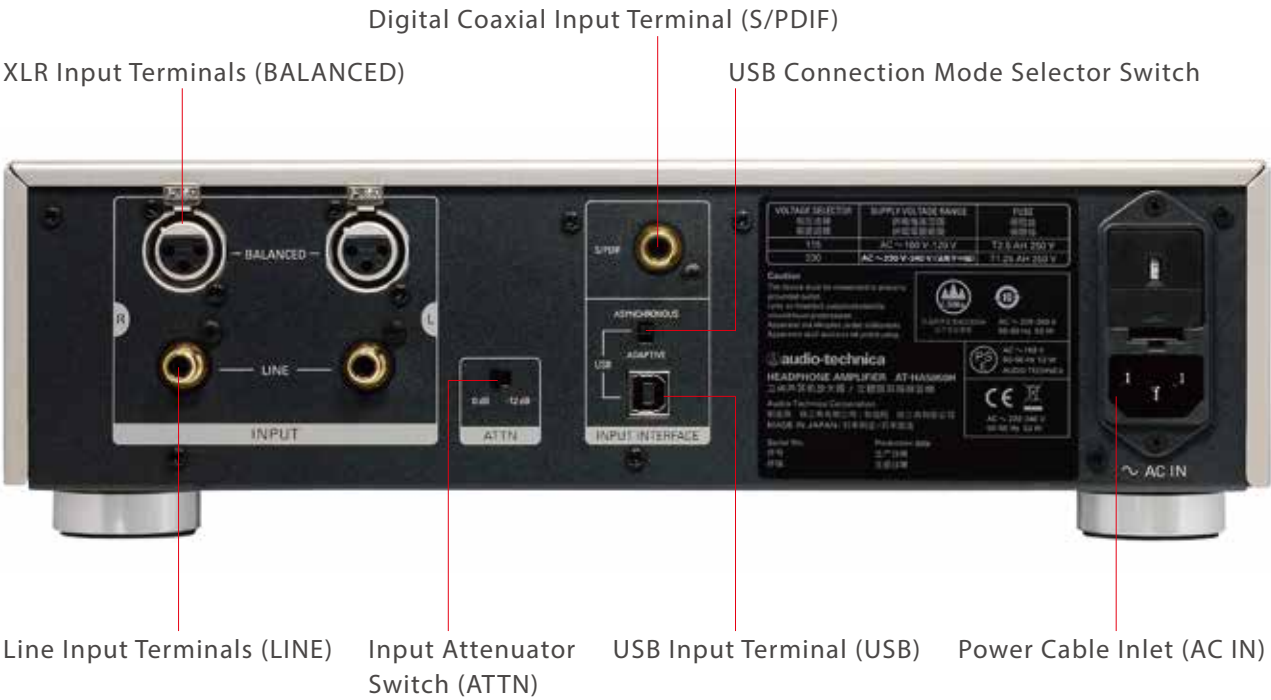
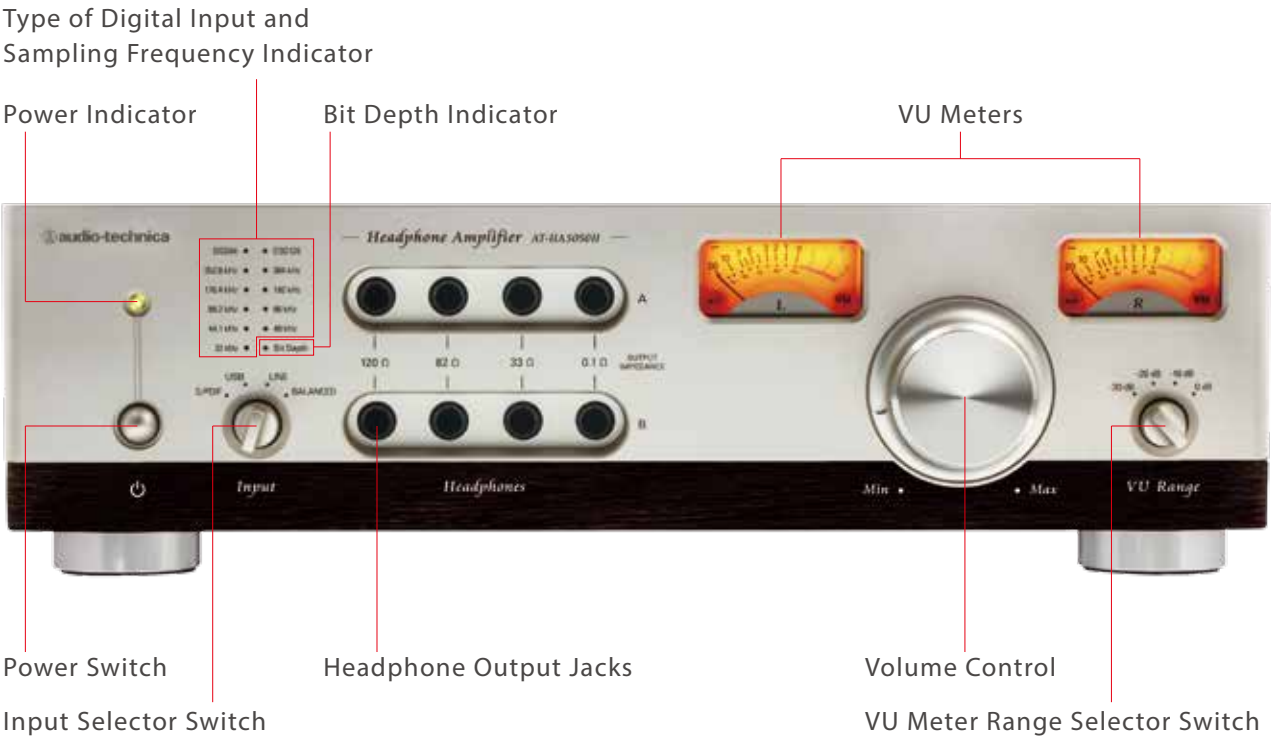
* 3 Playback will start without any sound being heard.



Specifications

Computer requirements		A computer with a USB 2.0 port CPU Intel Core 2 CPU 2.2GHz above or equivalent AMD CPU RAM 32bit OS 2GB or more, 64bit OS 4GB or more		
Compatible OS		Windows 7 Windows 8 Windows 8.1 Mac OS X10.9		
Type		Preamplifier stage: vacuum circuit Power amplifier stage: Class A bipolar transistor amplifier		
Compatible headphone impedance		16 Ω - 600 Ω		
Instantaneous maximum output level		2,000 mW	+	2,000 mW (16 Ω load)
		1,000 mW	+	1,000 mW (32 Ω load)
		500 mW	+	500 mW (64 Ω load)
		62 mW	+	62 mW (600 Ω load)
Rated output (20 Hz to 20 kHz)		125 mW	+	125 mW (16 Ω load)
		62 mW	+	62 mW (32 Ω load)
		31 mW	+	31 mW (64 Ω load)
		3.3 mW	+	3.3 mW (600 Ω load)
Frequency response	Line input	5 Hz - 200 kHz (0, -1 dB at 32 Ω 10 mW output)		
	XLR input	5 Hz - 200 kHz (+0.5, -2 dB at 32 Ω 10 mW output)		
Total harmonic distortion		0.08% or less (20 Hz - 20 kHz at 32 Ω 10 mW output)		
Gain	Line input	14 dB		
	XLR input	13.5 dB		
SN ratio		104 dB (A Weighted)		
Separation between channels		70 dB (1 kHz at 32 Ω)		
Input terminals		Analog	Line input (pin jack) x 2	
			XLR connector x 2	
		Digital	USB (Type B) × Asynchronous mode1 DSD128 (5.6448 MHz), DSD64 (2.8224 MHz): 24 bit - 32 bit PCM 384 kHz, 352.8 kHz, 192 kHz, 176.4 kHz, 96 kHz, 88.2 kHz, 48 kHz, 44.1 kHz, 32 kHz: 16 bit - 32 bit Adaptive mode DSD incompatible PCM 192 kHz, 176.4 kHz, 96 kHz, 88.2 kHz, 48 kHz, 44.1 kHz, 32 kHz: 16 bit - 32 bit	
			Digital coaxial (S/PDIF) × 1 PCM 192 kHz, 176.4 kHz, 96 kHz, 88.2 kHz, 48 kHz, 44.1 kHz, 32 kHz: 16 bit - 24 bit	
Output terminals		Headphone output 6.3 mm standard stereo jack (output impedance 0.1 Ω) × 2 6.3 mm standard stereo jack (output impedance 33 Ω) × 2 6.3 mm standard stereo jack (output impedance 82 Ω) × 2 6.3 mm standard stereo jack (output impedance 120 Ω) × 2		
DA converter	Frequency response	5 Hz - 100 kHz (0, -1.5 dB)		
	Total harmonic distortion	0.0006% or less (20 - 20 kHz)		
	SN ratio	113 dB (A Weighted, 1 Vrms output)		
	Separation between channels	110 dB (20 Hz - 20 kHz)		
Input attenuator		-12 dB		
VU meter		Range 0 dB, -10 dB, -20 dB, -30 dB		
Power supply		AC100 V - 120 V or AC220 V - 240 V 50/60 Hz		
Power consumption		Max 53 W		
Dimensions		H100 × W332 × D327 mm (excluding protruding parts)		
Weight		Approx. 11.0 kg		
Accessories		Power cable		

*Solid Aluminum and Laminated Rosewood Front Panel.



* Windows is a trademark of Microsoft Corporation.