■ Outline and Features of HUD-DX1

Equipped with both simple yet sensuous design and Hi-Fi audio capabilities matching the highest parts specifications for playing DSD and DXD formats (recently spotlighted high-quality sound formats), HUD-DX1 has been finally developed after a long while to achieve the objective of offering top-class Hi-Fi sound and user convenience, as well as various connections and the best functionalities using a large amount of high-quality audio components and based on extraordinary PCB circuit design technologies of AUDINST. HUD-DX1 allows its users to enjoy high-level Hi-Fi sound world by supporting replay of high-quality DSD sound source (2.8/5.6MHz) in native mode using USB bus power alone, DXD sound source (352.8/384kHz), another high-quality sound format, as well as optical input (24bit 192kHz) and MQS (Mastering Quality Sound, 96~192kHz), Hi-Fi sound source, without any loss rendered in studio recording specification. HUD-DX1 also allows its users to enjoy sounds with even higher output and high-quality sound when additionally connecting to the adaptor provided together. HUD-DX1 also supports the connection with smart devices that support USB Audio. Finally, it also maximizes user convenience and power efficiency as it supports automatic power ON/OFF and power saving mode function when used with USB input.

■ Playback of Native DSD

Equipped with the newest USB 2.0 high speed audio controller from XMOS and ES9018K2M, a high performance DAC from ESS, it supports playback of Native DSD (DSD64 / DSD128) as it plays back sounds in excellent definition and Hi-Fi audio quality.

■ Additionally supports playback of 32-bit/384 kHz DXD sound source and optical input

Since HUD-DX1 is designed to support not only the playback of DXD sounds in 24-bit/352.8 kHz format, but also to support optical input functions that are not supported by products from other companies. It allows users to convert a maximum 24-bit/192 kHz PCM digital signal into a high quality analog sound output and play it back.

■ Top class OPAMP and high performance headphone amp

Adopting the MUSES series OPAMP, a top class one specifically designed for Hi-Fi audio products by NJRC, HUD-DX1 uses MUSE8920 for its I/V converter and filter circuits for excellent matching in sound quality and optimum constitution that realizes high performance and high fidelity audio with top class sound balance and very low distortion, as well as ultra-low noise. Also equipped with TPA6120A2, a high fidelity headphone amplifier from TI, it easily operates a headphone under 300 Ω in factory default mode and allows users to enjoy sounds with enough volume, even when using a 600 Ω high impedance headphone by removing jumper caps (JP1, JP2) set for headphone output gain. The high quality analog audio signals generated through the core circuits in the high-end specification and the multiple top class analog audio components are vividly delivered to the speaker and headphone to offer top class Hi-Fi sound environment.

■ Equipped with high performance, low noise LDO regulator and inverter circuits in the power supply stage.

To operate a high performance dual power source type OPAMP, it is required to supply positive and negative voltage at the same time.
By supplying both voltages equally to the OPAMP circuit through the high performance inverter circuit after rectifying the power supplied via the USB port or an adaptor through an LDO regulator and low-ESR capacitor to obtain stable power of good quality with no noise, the rich and dense top class analog signals that can be achieved by a hi-end device can be generated.

■ Protection circuit operates on adaptor connection or disconnection

For this product, it is normal to connect to the USB port after making a connection to the adaptor. Since it has an embedded protection circuit, the device still operates even when the connections have been made in the wrong order. It is normal to hear a crushed noise temporarily when you connect or disconnect the adaptor during use since the noise is generated when the protection circuit starts to operate.

■ Automatic power ON/OFF and power saving functions

To maximize user convenience and power efficiency, the power of this product is designed to be automatically on or off when the computer power is on or off, or when entering or releasing from the power saving mode in the case of using USB power.

■ Supports USB bus power

This product can be operated under most computing environments using USB power without connecting the adaptor. But the adaptor has to be used when using power from bus power USB hub, notebook, low power computer that have unstable power from the USB port. Make sure to use the adaptor when using an iPad or a smartphone. To use a headphone with high impedance over 150 Ω, you have to use the adaptor to obtain the maximum output.

■ Adopts genuine Thesycon driver

We adopted the driver from Thesycon, a German system software development company, by licensing to offer 100% functionality of high sound quality of Native DSD and stable audio playback. The Thesycon driver can be downloaded from the data center of the AUDINST homepage. Users can download it to an Internet-capable computer.

■ Uses high purity multiple TCXOs and oscillators for the clock generator in the USB controller and D/A converter.
■ Adopts a high performance Alps potentiometer and finest aluminum knob for the front volume dial.
■ Adopts premium film capacitor from WIMA on the low-pass filter stage.
■ Adopts a total of 8 dedicated regulators and many high performance low-ESRs and tantalum capacitors in major parts to supply stable and high quality power.
■ Adopts high performance solid capacitors with super low-ESR and high ripple current in DAC power supply stage.

■ **Adopts first-class metal film resistors from Vishay-Dale that are used for high-end audio devices.**
■ **Equipped with DDC function that is used to output USB digital audio signals to S/PDIF (optical TX).**
■ **Equipped with anti-POP circuits to eliminate unnecessary noises generated when powering ON/OFF.**
■ **Supports ASIO and WASAPI outputs and DirectSound that shares Window Mixer.**

■ Key Features

- **Interface 1** : USB 2.0 High Speed (Max 32bit/384kHz)
  Resolution/Sampling rate : 16/24/32bit, 44.1/48.0/88.2/96.0/176.4/192.0/352.8/384.0kHz
- **Interface 2** : S/PDIF Optical on TOS-LINK (Max 24bit/192kHz)
  Resolution/Sampling rate : 16/24bit, 44.1/48.0/88.2/96.0/176.4/192.0kHz
- **D/A Converter** : ES9018K2M(32bit/384kHz, 127dB DNR, Flagship Segment)
- **Headphone Out** : Stereo phone & Stereo mini 4-pole jack (16~600Ω)
- **Line Out** : Unbalanced RCA
- **Digital Out (S/PDIF)** : Optical (Max 24bit/192kHz)
- **OPAMP** : MUSES8920E(SMDx2), MUSES8920(DIPx2)
- **Headphone Amplifier** : TPA6120A2(SMD)
- **Operating System** : Windows 7 / 8 / 8.1 / 10, Mac OS X
- **Dimensions (mm) / Weight(g)** : 104(W) x 120(D) x 34(H) / 300g
- **Power Supply** : USB Bus Power or DC Adapter(12~15V)

■ Package Contents

- HUD-DX1 main body
- USB cable (USB A to B Type, 1.5M)
- User's Manual (including warranty card)
- 4 spikes for fixing (to attach the main body to the floor)
- L-wrench (to attach and detach the volume knob)
- Power adaptor (DC 12V~15V)

※ RCA cable and program/driver installation CD are not provided with the product. The above product content is subject to change for the improvement of the product's functionalities.
※ The driver for Windows can be downloaded from the data center of the AUDINST website. Users can download it to a computer.

■ Minimum and Recommended System Specifications

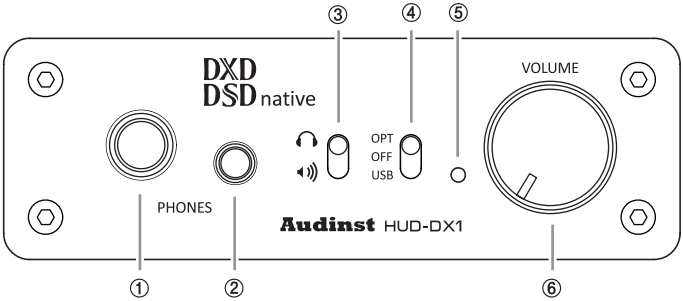
• Intel dual-core CPU or better, or equivalent AMD CPU (quad-core CPU recommended)
• 2GB or more system memory (4GB or more recommended)
• Motherboard / laptop equipped with a USB2.0 or USB 3.0 port
• Install OS in a latest type HDD that offers a fast transmission speed (SSD recommended)
• Microsoft Windows 7 / 8 / 8.1 / 10 (64bit recommended)
• Amplifier and speaker or 2 channel active speaker / headphone / earphone
• Receiver amplifier with optical input (Not required. Applicable when using PCM optical output)

To fully utilize the performance of HUD-DX1's USB audio, the specification of the system such as desktop PC or laptop has to be at a certain level. The level doesn't have to be high necessarily but should not be too low.

To smoothly play back DSD 2.8 / 5.6 MHz and DXD 352.8 / 384 kHz format massive/high quality sound source, you have to install it to a USB port that supports USB 2.0 High Speed (480 Mbps) which provides wide bandwidth for transmission and steady transmission speed. Therefore, to utilize the maximum specification of HUD-DX1 (32-bit 384 kHz) fully, the system has to support at least USB 2.0 High Speed (480 Mbps). If your system does not support USB 2.0 High Speed (480 Mbps), you can install a USB 2.0 expansion card (or USB 3.0 expansion card) into the PCI slot or PCI-Express slot.

If the system's memory is not large enough, the system uses a certain area of the HDD as the replacement memory space. In this case, if the OS is installed in an older type HDD with slower transmission speed in a PC with less than the minimal specifications, the system will be overloaded during use and the streaming of the USB audio signals will not be processed normally. The sound output can be interrupted or noises can be generated when playing back massive high quality sound sources in DSD 2.8 / 5.6 MHz or DXD 352.8 / 384 kHz format. Therefore, we recommend our users to use a system with enough system memory and a SATA HDD with fast transfer speed (or SSD), if possible.

※ A passive speaker with no amplifier has to be connected to the amplifier before use.
※ If PCM optical output function is not used, the receiver amplifier is not required.



①&② Headphone/Earphone Output (6.35Ø Stereo Phone Jack / 3.5Ø Stereo Mini Jack)
• Plug in a headphone or earphone with 6.35 Ø or 3.5Ø jack.
※ When connecting a headphone, connect it after minimizing the volume, if possible. Beware that there is a risk of malfunction if you connect a device other than a headphone.

③ Output Selection Switch (briefly "Output Switch", Output Toggle Switch)
• Select an output you want. Push the switch up to use a headphone and push it down to use the line out.

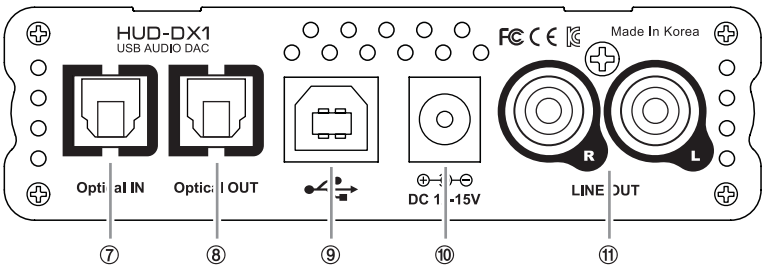
④ Input selection and off switch (briefly "Input switch", Input toggle & off switch)
• Select an input or stop operation. Push the input switch up to use "Optical" and push it down to use "USB." If you set the product to OFF, sound output will be stopped and the indicator lamp will turn off in about 5 seconds.
※ If you turn off the input switch, the system operation will be switched to maximum power saving mode, but the USB connection will be maintained as it is.

⑤ Active Indicator
• Select an output. Push the switch up to use a headphone and push it down to use line out.

LED Color	Red	Orange	Green	Off
Mode	DSD	DXD	PCM	Power Off
Sample rate	2.8 / 5.6MHz	352.8 / 384kHz	44.1~192kHz	–

⑥ Potentiometer
• This volume knob is used to adjust the output level of the headphone or line out.
※ Due to the characteristics of analog volume, it is good to set the knob to over 25% (9 o'clock direction) at least.
※ If you use USB power, we recommend you to connect to an adaptor when using a headphone with high impedance (over about 150 Ω) after setting the Windows volume to the maximum. Otherwise, output sound starts to distort if the volume knob is set to beyond the two o'clock direction.

주의 CAUTION
When connecting a headphone, connect it after minimizing the volume, if possible. Beware that there is a risk of product malfunction if you connect a device other than an earphone or headphone.



⑦ Optical IN (S/PDIF Optical Input, Pink Shutter)

• This port is used to connect an audio device with optical output (CDP, DDC, etc.) using an optical cable to input PCM signals. Sample rates supported: 44.1, 48.0, 88.2, 96.0, 176.4, 192.0 kHz

※ Since HUD-DX1 is not a decoder, users cannot use Dolby Digital or non-PCM signals in DTS format as input.

⑧ Optical OUT (S/PDIF output, Grey Shutter)

• This port is used for PCM signal output. Connect a receiver amplifier with optical input function to the product using an optical cable.

※ AC3/DTS pass-through function is not supported.

※ The optical output function of this product is only for playing back USB signals. It does not support “optical repeater” function for the output of digital signals input received through optical input port to the optical output port using a bypass.

※ When playing back Native DSD sounds, it does not support PCM digital sound output. To use PCM digital output when playing back DSD sound source, do it in PCM mode.

※ When playing back 352.8 / 384 kHz DXD sound source in ASIO or WASAPI mode, you cannot use optical output function.

If you resample it, you can use the optical output function. Ex) 352.8kHz → 176.4kHz / 384kHz → 192kHz

⑨ USB Port

• This port is used to connect HUD-DX1 and the PC (with USB 2.0 high speed) using the USB A to B cable provided together.

⑩ Power Jack (DC Jack)

• This is used to connect the DC 12 – 15V power adaptor.

※ Make sure to connect the power adaptor to use the product when using a system such as a laptop or netbook that has insecure USB power as well as other portable devices and when using the optical input only.

⑪ RCA Line Out

• This is used to connect to the speaker using the RCA cable.

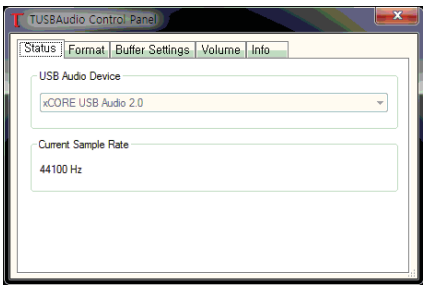
※ Make sure to connect a speaker with no amplifier (passive type) to the amplifier.

주의 CAUTION

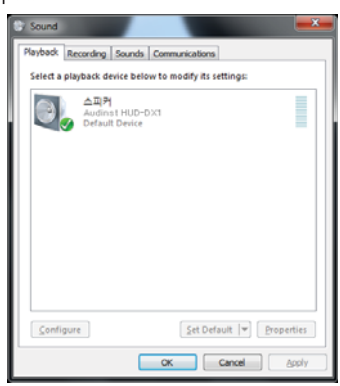
Use a cable that matches with the specification when connecting the cable. Using a cable that does not match with the specification may cause a connection problem or device malfunction.

■ Product Installation [Windows 7 / 8 / 8.1 / 10]

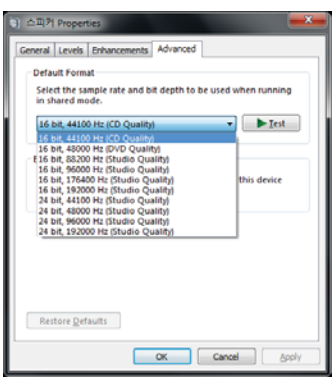
To use the USB audio playback function of HUD-DX1, users have to install necessary driver. To proceed with installation of TUSBAudio, connect HUD-DX1 to the USB port of a PC, download the licensed Thesycon driver from the AUDINST homepage and run it.



When driver installation is completed, you can find [Speaker AUDINST HUD-DX1] registered by going to Control Panel → Sound → Playback. Now, you can use the product for sound output.



▲ Setting of playback sound output



▲ Setting of bit quality and sampling speed

※ When you use a receiver amplifier with optical input function, you can use PCM digital output via optical output port on HUD-DX1.

※ To play back Native DSD sounds, make sure to download the licensed Thesycon driver registered in the data center on AUDINST homepage and install it. If you install a driver other than the driver provided by AUDINST such as “XMOS USB Audio Driver”, Native DSD playback will not be supported. If you install an evaluation version of the driver, beware that a beep alarm will be sounded off every 5 minutes when playing back sounds.

※ Windows XP, which is no longer supported by Microsoft, will not be supported. (Even though the old version driver can be installed under Windows XP, we do not recommend using that driver.)

■ How to Play Native DSD Sounds

To play back 2.8/5.6 MHz DSD sound source under Windows 7 / 8 / 8.1 / 10, you have to install software that supports the playback of DSD sounds such as foobar2000 and JRiver Media Center.

Go to AUDINST website → FAQ to see detailed instructions for the settings required for Native DSD playback.

• **AUDINST website**: www.AUDINST.com/kr/faq

● **foobar2000**: A free software that supports DSD playback

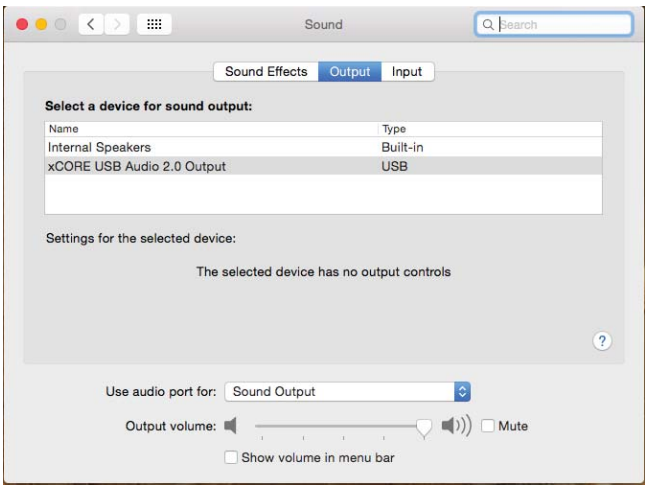
• foobar2000 website: www.foobar2000.org You can download a newest version of foobar2000 player and additional component file for DSD playback free of charge.

● **JRiver Media Center**: This software is known to have excellent functionalities among music players supporting DSD playback.

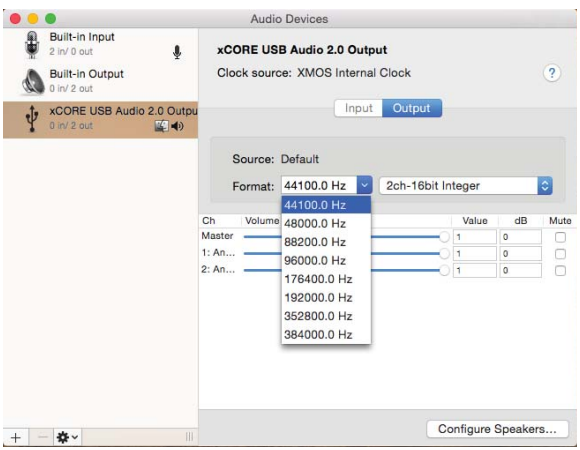
• **JRiver website**: You can download the newest version of the JRiver Media Center player from www.jriver.com. Please note that you also can use the trial version (30-day evaluation version) and buy the software later.

■ Product Installation [Mac OS X]

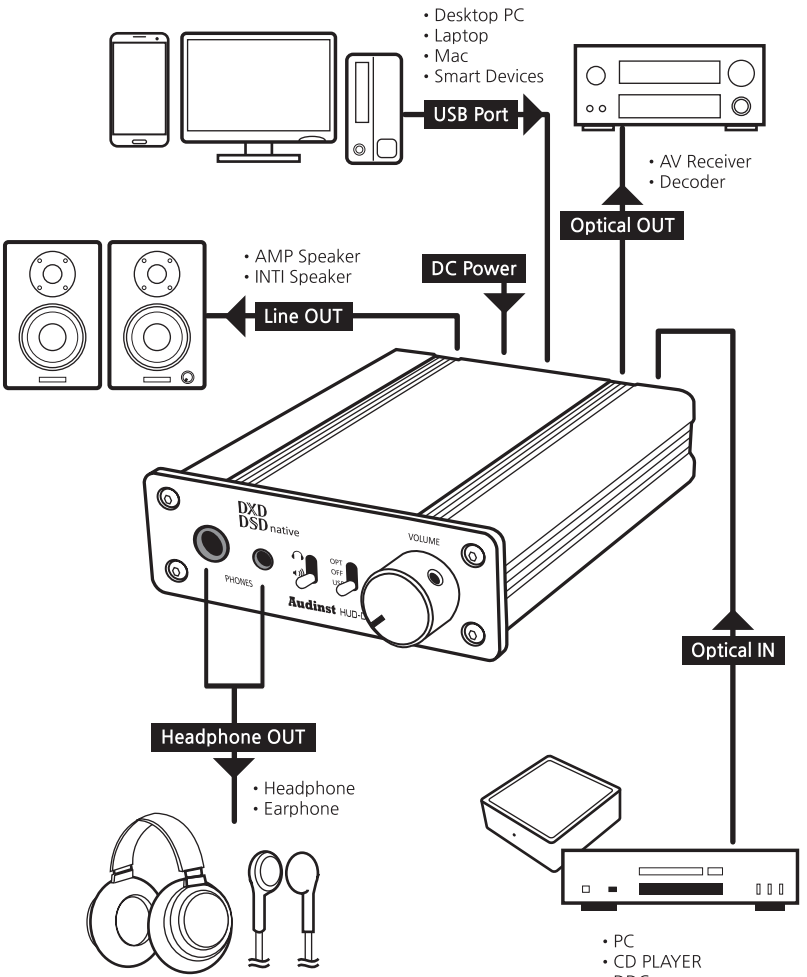
You do not need install a driver. Connect to a USB port in the PC. The USB audio device will be recognized automatically and ready to be used. You can find that HUD-DX1 has been automatically registered by going to System Environment Setup → Sound.



You can change the sampling format and bit quality in the Audio MIDI Setting as illustrated below:



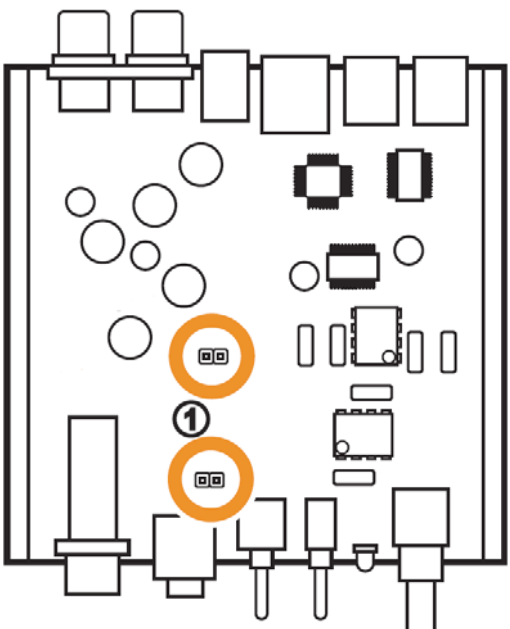
■ Hook-Up Application



※ **Please refer to our website for the method of connecting to a smart device.**

■ Headphone Output Gain Jumper Setting (JP1, JP2)

HUD-DX1 allows users to change the output gain for a headphone based on its impedance. The factory default setting is that both JP1 and JP2 are capped. If you remove the caps of the two jumpers which represent the right and left channels respectively, the headphone's output gain will be increased by 1.5 times.



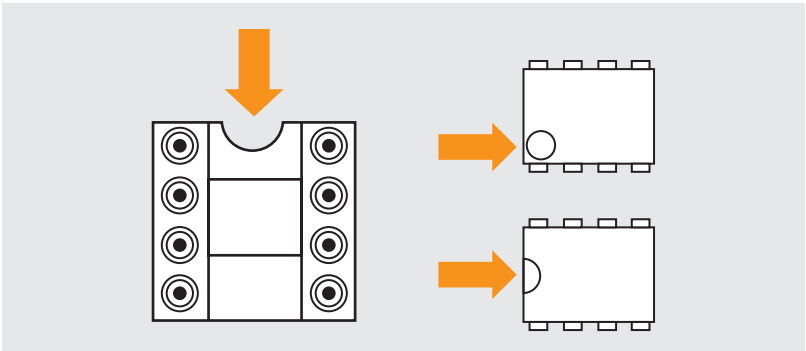
Default setting (About 16~300Ω)
The factory default setting is that both JP1 and JP2 are capped.

High impedance setting (About 300~600Ω)
To use a headphone with high impedance, remove all the jumper caps.

As HUD-DX1 is equipped with a replaceable socket type MUSE8920 from NJRC, a dedicated Hi-Fi audio OPAMP series product, you can replace the OPAMP according to your musical taste.

■ How to replace the OPAMP

1. After removing the volume knob using the L-wrench provided by default, remove the 4 screws on the rear panel.
2. Detach the PCB from the case by slightly pulling out the RCA terminal.
3. After taking out the existing OPAMP from the socket, install the new OPAMP such that the OPAMP is aligned with the groove of the socket as shown below.



• You have to pay close attention to the directions when replacing the OPAMP. If the product is damaged or has a functional problem due to the installation of an incorrect type of OPAMP or incorrect installation, such as installation in the reverse direction or in wrong way, the product will not be eligible for the free warranty service within the warranty period.

• Types of OPAMPs that can be used for HUD-DX1: DIP Type & Dual Type (Stereo) OPAMP (SMD type OPAMP can be used after conversion of SMD type to DIP type. Single type OPAMP can be used after conversion of single type to dual type.)

Ex) **OPA627 / OPA637 / LME49710**: Can be used after conversion of single type to dual type.
LME49990: Can be used after conversion of single type to dual type. (Use of an adaptor is recommended.)
AD8620: Can be used after conversion of SMD type to DIP type. (Use of an adaptor is recommended.)
AD8610: Can be used after conversion of SMD single type to DIP dual type. (Use of an adaptor is recommended.)

• The minimum and maximum operating voltages of the OPAMP are shown in the website of the OPAMP's manufacturer. In the case of HUD-DX1, ±12V is applied to the OPAMP circuit when using the adaptor and ±5V is applied when using USB bus power only.
Therefore, make sure that these voltages fall within the range of the minimum and maximum operating voltages of the OPAMP before installing it.

Ex) **MUSE01**: Operating voltages ±9V to ±16V
→ Make sure to use it when connecting to the adaptor power.
MUSES02 / MUSES8820 / MUSES8920: Operating voltages ±3.5V to ±16V
→ They can be used after connecting to the USB power only or to the adaptor.
LME49860: Operating voltages ±2.5V to ±22V
→ It can be used after connecting to the USB power only or to the adaptor.

■ Specifications

Dimensions / Weight	104(mm) x 120(mm) x 34(mm) / 300g	
Headphone Output	Type	6.35mm stereo phone jack 3.5mm stereo mini 4-pole jack
	Max Out Level	±10Vpp@600Ω(when removing the gain Jumper)
	Max Output Power	1.5W @ 32Ω
	Output Impedance	2Ω (Load : 16Ω ~ 600Ω)
Line Output	Type	Unbalanced RCA
	Level	±3.2Vpp max
	Impedance	200Ω
USB Audio	Type	Max 32bit 384kHz, USB 2.0 High-Speed
	OS support	Windows 7 / 8 / 8.1/ 10 Mac OS X Compatible
DSD Playback	Native DSD support	DSD64 (2.8 MHz) DSD128 (5.6 MHz)
DXD Playback	DXD support	DXD 24bit 352.8 kHz ~ 32bit 384 kHz
PCM Playback	Bit depth	16 / 24 / 32-bit
	Sample rate	44.1, 48.0, 88.2, 96.0, 176.4, 192.0 kHz
Digital Input / Output (PCM Only)	Type	S/PDIF Optical on TOS-LINK 44.1~192kHz
	Format	IEC-60958, S/PDIF Compatible
	Sample rate Detection	44.1, 48.0, 88.2, 96.0, 176.4, 192.0 kHz
D/A Converter	Type	32-bit Hyperstream Reference Stereo DAC
	DNR	127dB
	THD+N	-120dB
OPAMP	Operating Voltage	±12V(with DC Adapter), ±5V(USB Bus Power) I/V Converter : MUSES8920E (SMD x 2) Differential Amplifier : MUSES8920 (DIP) Line Out : MUSES8920 (DIP) Headphone Out : TPA6120A2 (SMD)
Power Supply	DC 12V ~ 15V	

Warranty period is 2 years from the date of purchase.

- Receipt of the product tells the date of purchase, and if it is impossible to check the date of purchase from the receipt, the date of purchase is regarded as the same date with that of manufacture.

- Free repair would be accepted only in case of breakdowns during normal use of the product under warranty. Even if the product is under warranty, repair for the product would be charged when the product is damaged by natural disasters(lighting, fire, immersion, and so on), is modified, and is damaged and broken down by user's careless behaviors and faults.

- If the product breaks down under warranty, you can use mail or delivery service in order to get free repair or you can visit our Customer Service Center yourself for free repair.

- For more inquiries and technical supports for the product, please visit Audinst web site to use customer board or contact us for consultation.

- Customer Service Center
  #660 Jooan Sibeom Gongdan, 17-1, Jooan-Dong, Nam-Gu, Incheon, Korea

WebSite : www.audinst.com
E-mail : support@audinst.com

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