GUSTARD

DAC-X16

## High-performance Audio DAC
User's Manual

GUSTARD

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X16
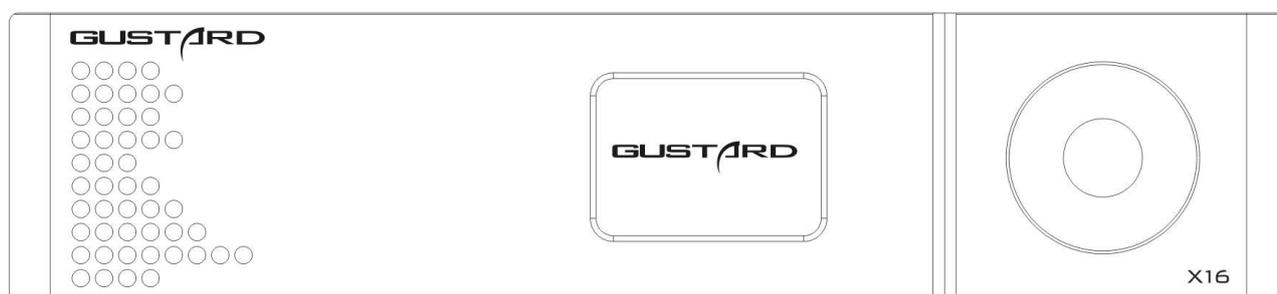
Functions and features

- Use two ESS company ES9068AS digital-to-analog conversion chips

- USB uses XMOS's xCORE-200 series 16-core XU216 processor, supports native DSD and 32-bit PCM

- Use 2 American ACCUSILICON femtosecond crystal oscillators as the global master clock

- The digital processing system uses Intel's ALTERA's large high-speed CPLD logic array chip

- USB supports MQA full expansion decoding. COAX/AES/OPT/IIS supports MQA hardware rendering. Automatically recognize and render the MQA digital stream after the first level is expanded

- Highly recognizable white light OLED display, simple user interface, full-function remote control

- High-quality toroidal transformer, multiple sets of linear voltage regulators, and TI high-current ultra-low noise LDO chips used in key parts

- OPA1612A high-performance operational amplifier composes analog circuit

- VISHAY MELF high-precision low-temperature drift resistance is used in the key part of the analog circuit part

Table of Contents

Front panel

**Screen**   **Turntable**   **Function button**
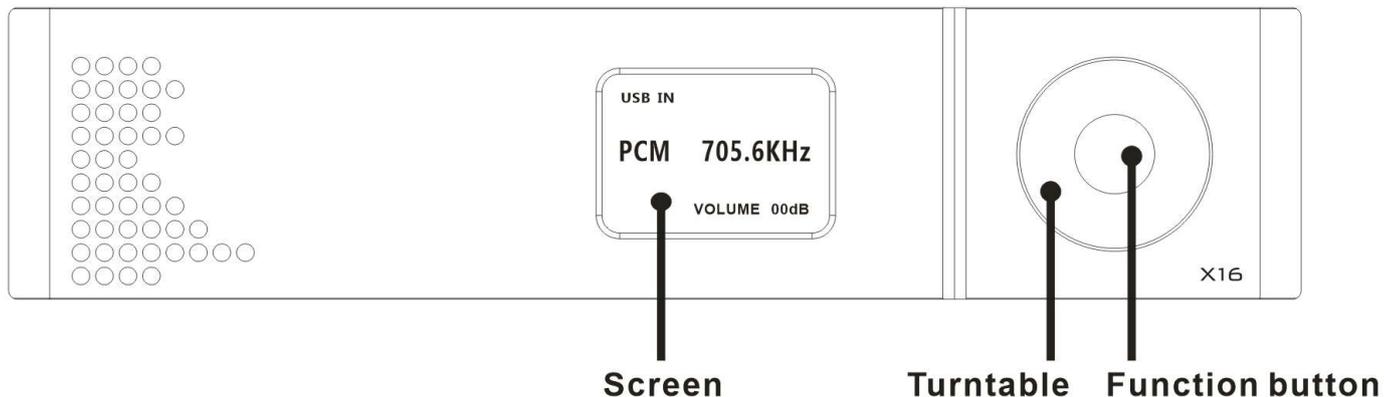
1. The screen will display the current input channel, encoding format and sample rate, volume and other status.
2. Turntable can adjust digital volume attenuation; or adjust each menu option in the menu state.
3. Function button, short press to cycle through digital input channels, switch items in the menu; long press to enter or exit the menu.

Rear panel
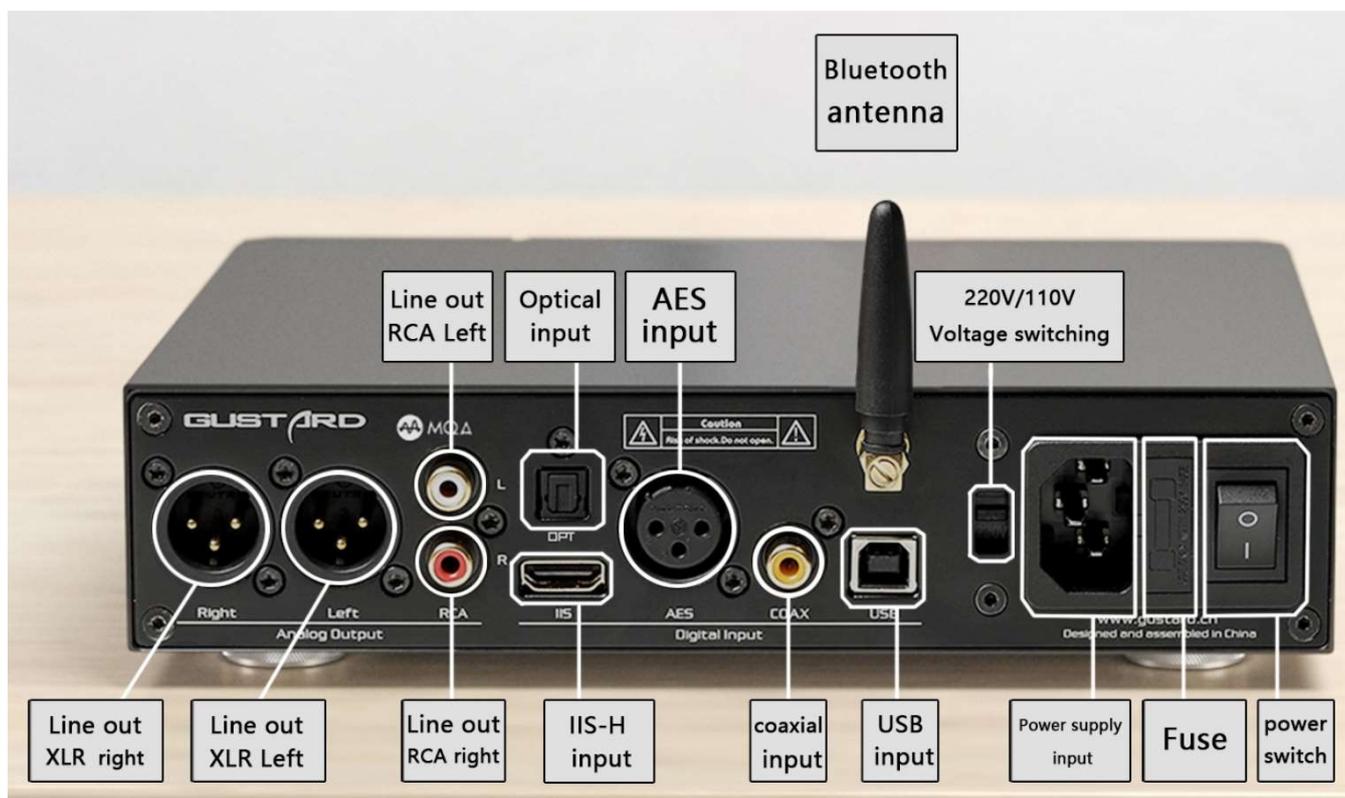
Display and menu

1. The DAC-X16 uses an OLED screen for real-time status display and functional operation. The following graphic shows the status of the main page of the screen.
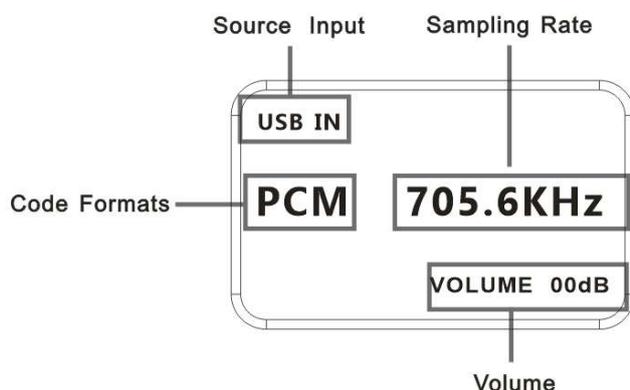
2. Digital input channel selection:
   The DAC-X16 has a total of 6 input channels. In the display state of the main page, short press the function button, you can select the current input channel in the order of COAX——AES——OPT——USB——IIS——BT.
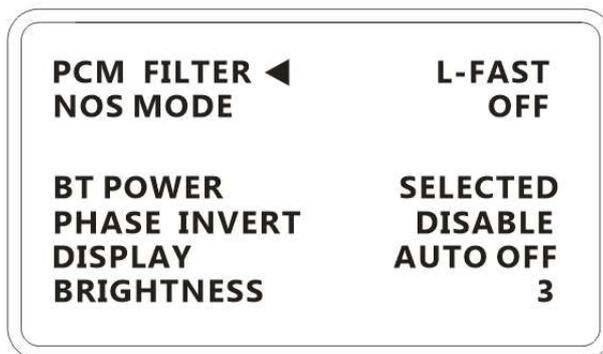
3. VOLUME:
   When the screen is the main page, you can directly adjust the digital volume attenuation function of the DAC-X16 by operating Turntable. Rotate counterclockwise to attenuate the volume and clockwise to increase the volume. The volume can be attenuated from 00dB to -90dB for a total of 90 digital volume positions.

4. Settings menu:
   In the home screen state, press and hold the function button to enter the setting menu. In this state, short-press the function button to cycle through the menu items to be modified. Turntable is used to adjust the currently selected menu option. When the screen is in the setting menu, long-press the menu key again to return to the main page. The menu is switched by the movement of the arrow, in order:

   —PCM Filter
   —NOS MODE

   —Bluetooth power control
   —Phase invert
   —Display control
   —Brightness

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┌─────────────────────────────────────┐
│                                     │
│   PCM FILTER ◄        L-FAST        │
│   NOS MODE              OFF         │
│                                     │
│   BT POWER          SELECTED        │
│   PHASE INVERT       DISABLE        │
│   DISPLAY           AUTO OFF        │
│   BRIGHTNESS             3          │
│                                     │
└─────────────────────────────────────┘
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5. Menu items' functions:

   The following is a detailed introduction of each menu item:

a. PCM FILTER:
   DAC-X16 has 3 types of PCM digital filters. Turning Turntable clockwise will select L-FAST——
   —M-SLOW——H-FAST in the following order. Rotate Turntable counterclockwise to reverse the
   cycle. L-FAST is a linear phase fast roll-off filter, it is the most common type of digital
   filter. It is the most accurate and neutral acoustically. M-SLOW is a minimum phase slow
   roll-off filter. It has smooth signal out-of-band attenuation characteristics, and because
   of its in-band attenuation characteristics, it will soften the sound; H-FAST is a Hybird
   fast roll-off filter. The length of the front and rear ringing is different, and the front
   ringing is shorter and more consistent. The sounding principle of musical instruments.

   X16 defaults to L-FAST digital filtering.

b. NOS MODE
   DAC-X16 has NOS, when this option is ON. Pass through the internal 8 times oversampling
   filter, and send the original samples to the modulator. This option is suitable for playing
   original mastering files with high sampling rate above CD format. It is also suitable to use
   the signal after the software player upsampler.

c. BT POWER
   Bluetooth power control, X16 high-definition Bluetooth module can only be turned on when the
   Bluetooth channel is selected. Option "SELECTED" Bluetooth can only be connected when the
   current input channel is Bluetooth.. Option "ALWAYS" will always enable Bluetooth connection.
   The Bluetooth name of DAC-X16 is GUSTARD BT.

d. PHASE INVERT (Analog output phase inverting switch):
   This function has two options: DISABLE (RCA positive phase output - XLR American standard)
   and ENABLE (RCA inverted output - XLR Japanese / European standard) optional.
   When this function is DISABLEd, the RCA output of the DAC-X16 is positive phase, and the XLR
   balanced output is the American standard polarity output, which is 1 ground, 2 hot, and 3
   cold.
   When this function is ENABLEd, not only the RCA output is the inverting output, but the XLR
   balanced output will be the Japanese/European standard polarity output, which is 1 ground,
   2 cold, and 3 hot.

e. DISPLAY (display control):
    "ALWAYS" means that the screen is always on and displays various states.
   "AUTO OFF" automatically turns off the screen. If there is no operation, the screen will
    automatically turn off after 10 seconds.
    Any operation of the fuselage and remote control will wake up the screen. If there is a new
    change in the current playback sampling rate, it will also wake up the screen.

f. BRIGHTNESS (Screen brightness):
    This menu item adjusts the brightness of the OLED screen, and a total of 8 screen brightness
    levels can be adjusted.

IR Remote control
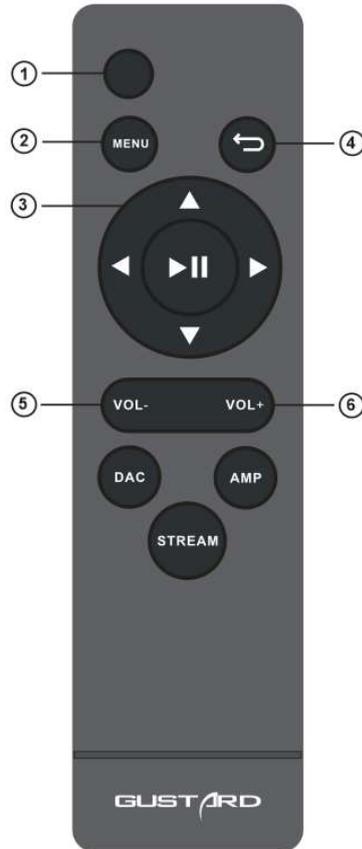
* DAC-X16 uses the new remote control, please press and hold the DAC key for more than 3 seconds to enter the DAC operation mode.

① Mute button: In the non-mute state, press this button once, the DAC-X16 will be muted; press this button again to unmute.

② Menu button: Press this button once to enter the setup menu of the DAC-X16, press this button again to exit the setting menu.

③ D-pad and OK button: After entering the setting menu of the DAC-X16, use the up/down of the D-pad to switch the function to be adjusted, and adjust the options by left/right. Press OK to confirm the result and return to the main page.

④ Back button: Returns to the main page state.

⑤ Volume minus button: When the DAC-X16 is in the main page state, press this button to decrease the volume.

⑥ Volume plus button: When the DAC-X16 is in the main page state, press this button to increase the volume.

Note: ● The operating distance varies depending on the angle. ● If there is something between the remote control and the IR sensor, it may not operate normally. ● If the remote control will not be used for a long time (one month or longer), remove the battery. ● If the battery Leaking, please thoroughly clean all the residues in the battery compartment and install new batteries. ● When using other devices controlled by infrared rays, using this remote control may operate these devices by mistake.

Windows driver installation

＊The unit's accessories contain a CD containing the GUSTARD USB Audio driver.
This driver can also be downloaded from our official website http://www.gustard.cn

＊This driver supports Windows 7 (SP1 and newer); Windows 8; Windows 10

1. For users who use a desktop PC to connect to the DAC-X16, it is recommended to use the native USB2.0 interface. It is also highly recommended to use the USB port on the back of the chassis. Because the USB port on the rear panel of the chassis is directly connected to the motherboard. The USB port on the front of the chassis is connected to the motherboard with an extension cable, which has a certain negative effect on high-speed signals.

2. Please connect the DAC-X16 to the computer with the USB cable, then turn on the power of the DAC-X16. The computer will prompt you to find new hardware and try to set the device. If you don't see this prompt, please try to replace other USB ports or manually restart DAC-X16.
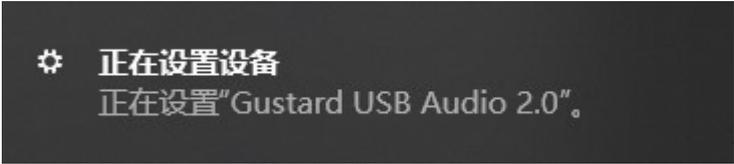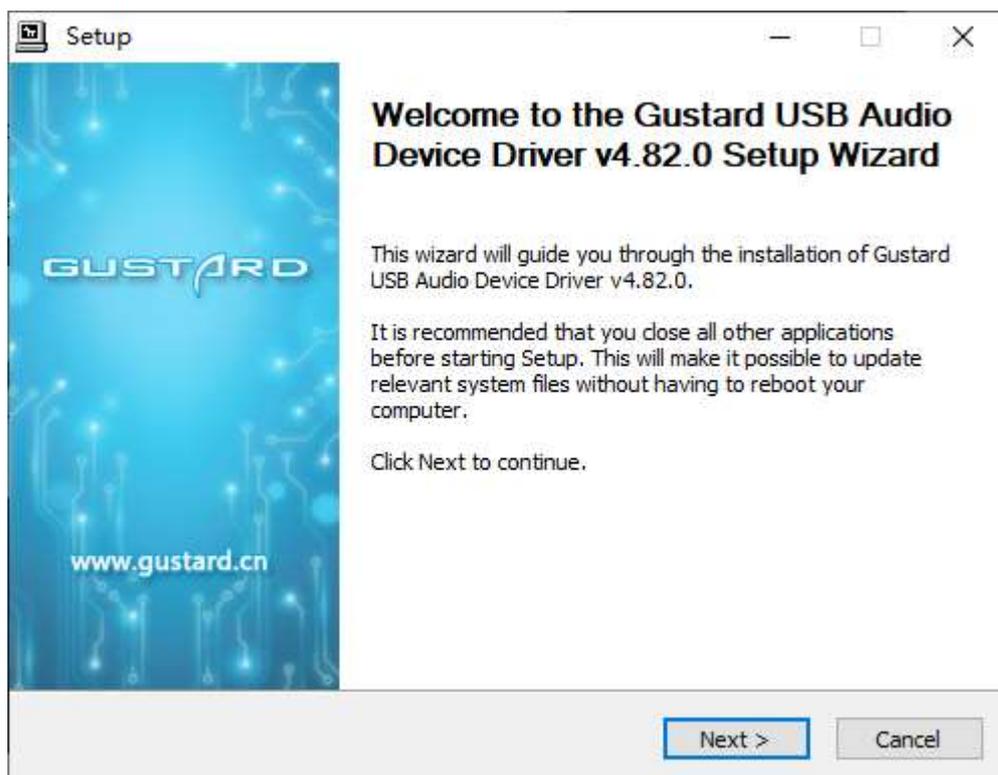
3. Open the CD and double-click to run the Gustard_USBAudio_v1A_2018-10-15_setup.exe program.
If the "User Account Control" window appears, click "Yes".
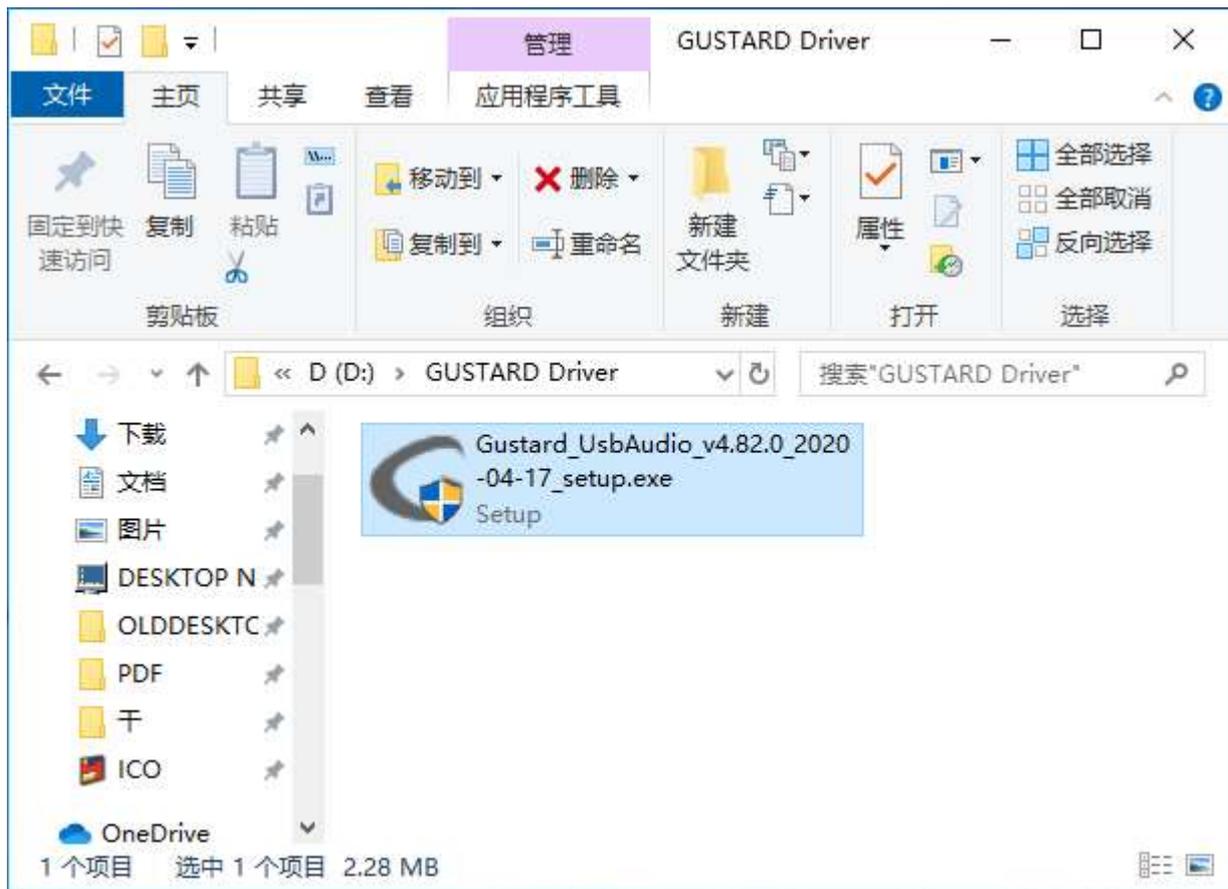
4. Click the next or install button as prompted.

5. When the installer checks the device, if there is a red text prompt: Setup requires that the device is..., please restart the GUSTARD DAC-X16 or re-plug the USB cable.
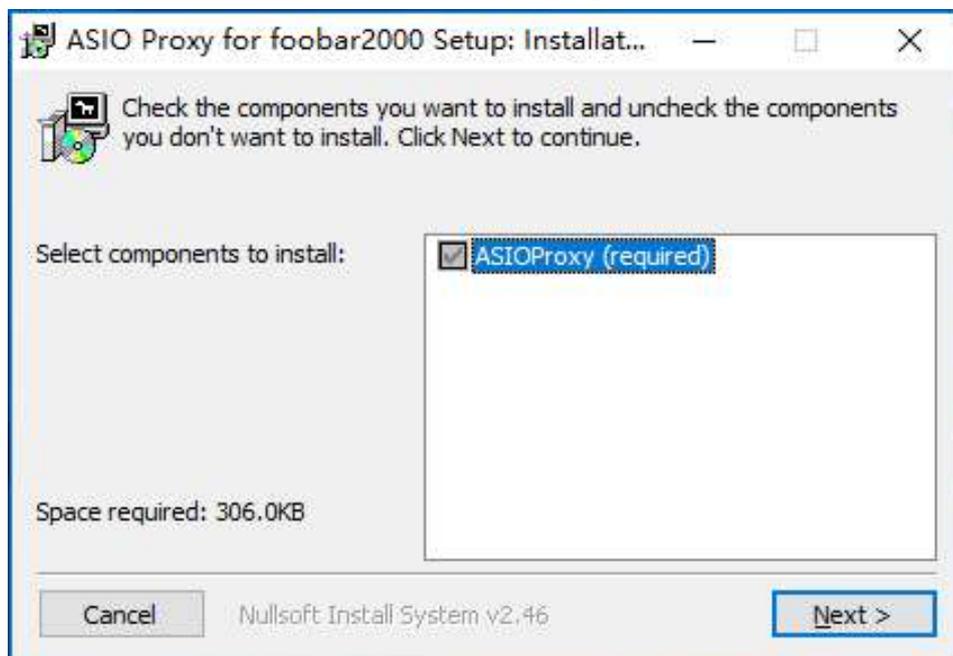

6. The figure below shows the screen for successfully installing the driver. Click Finish to complete the installation.
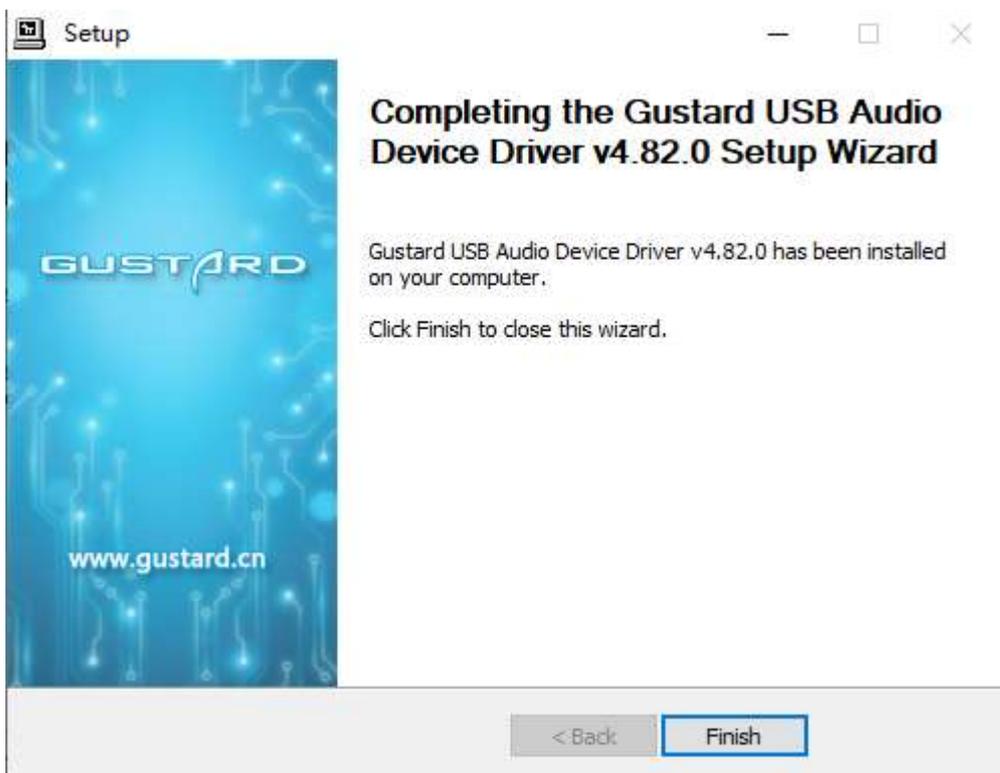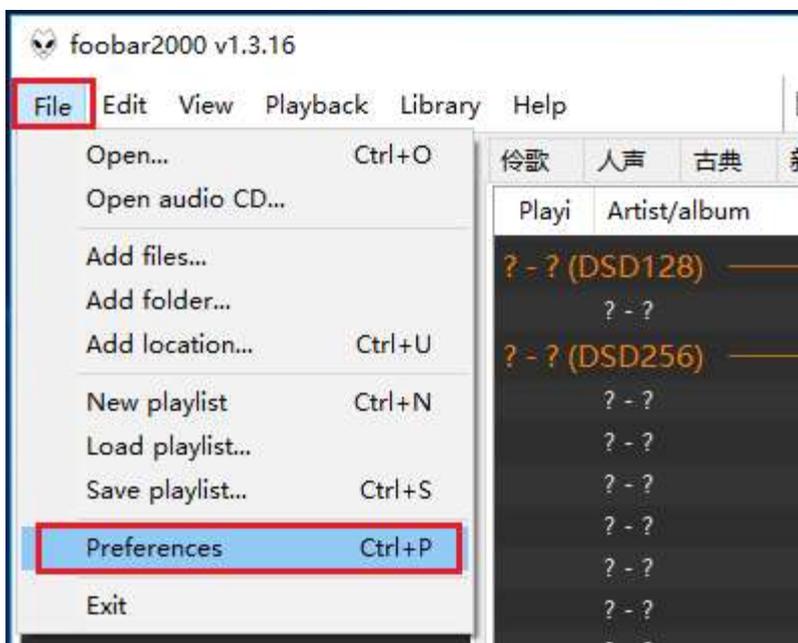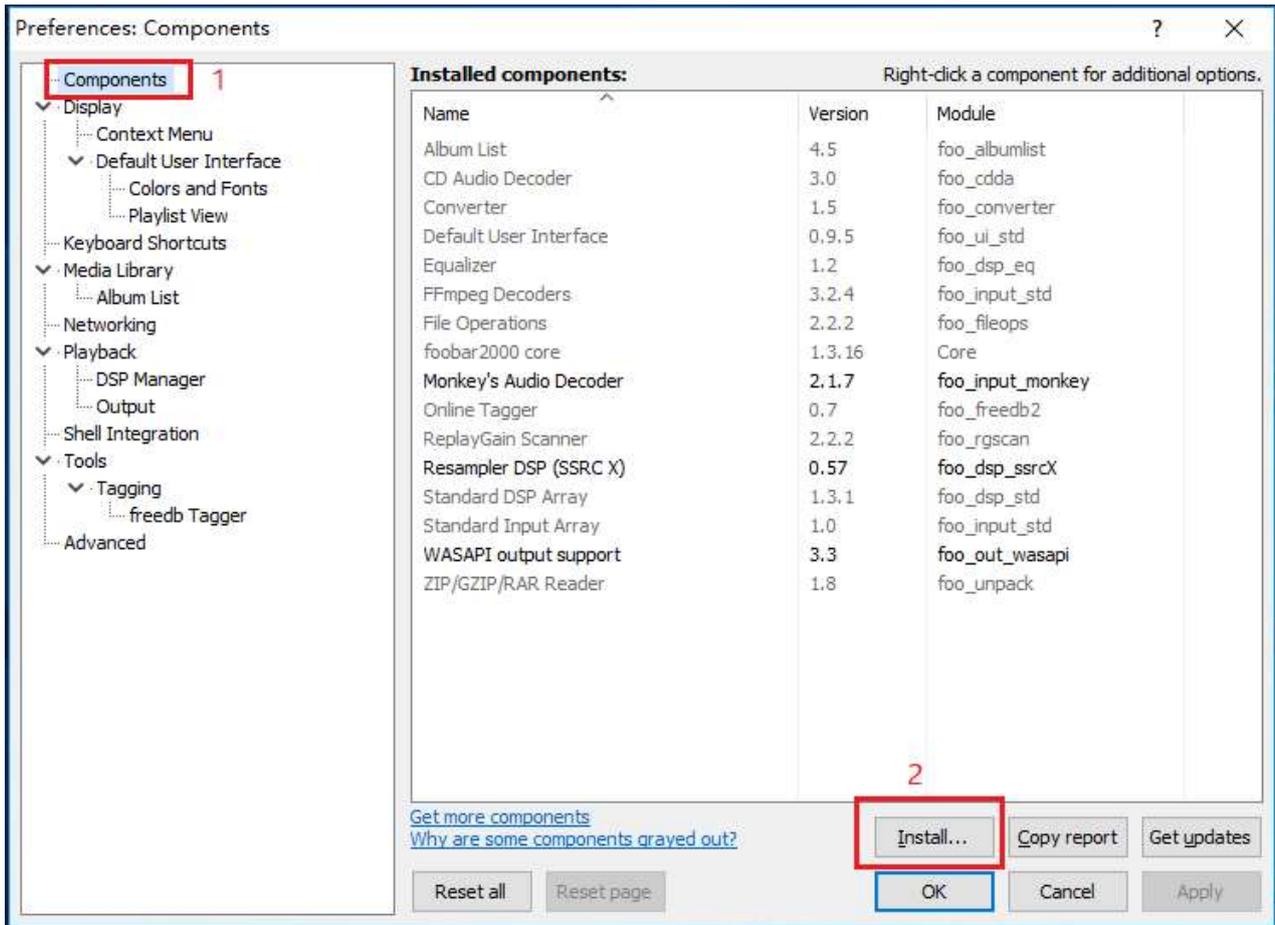
DSD playback settings using foobar2000

1. Open the folder foobar2000_DSD_0.7.X, double-click to run ASIOProxyInstall-0.7.2.exe, and then click next or install to complete the installation.
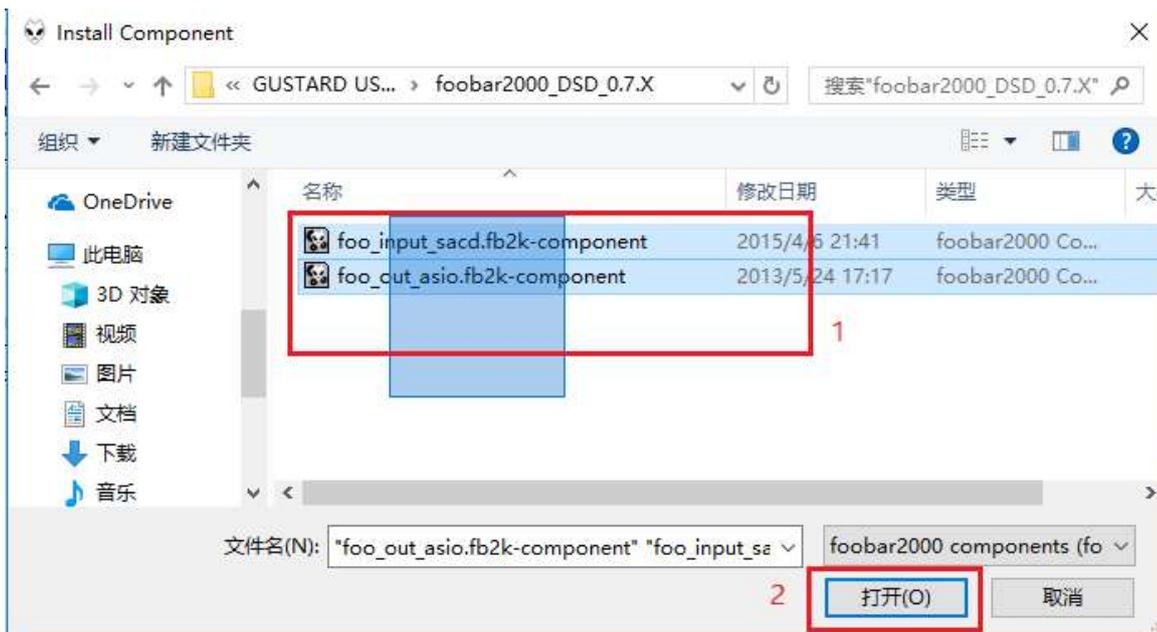

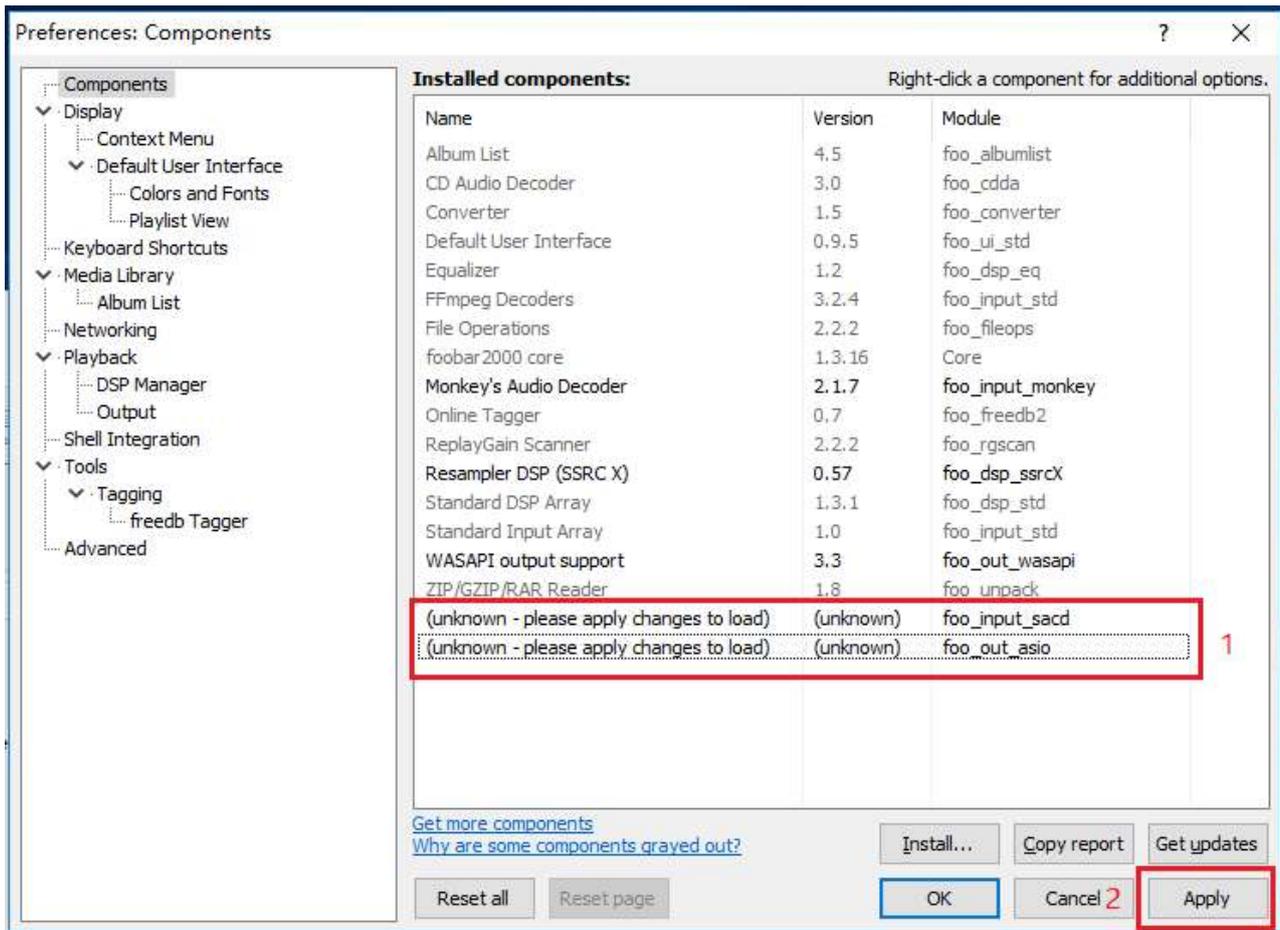2. Run Foobar2000. Click File -> Preferences.

3. Click on "Components" on the left and click on "Install" on the bottom right.

Use the mouse to select two files at the same time, or press Ctrl to select two files at the same time. Then click "Open".
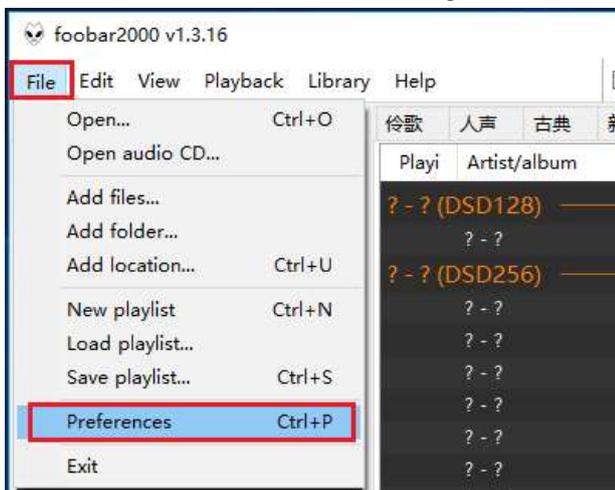
Two rows of component information will be added to the component list, followed by "Apply".
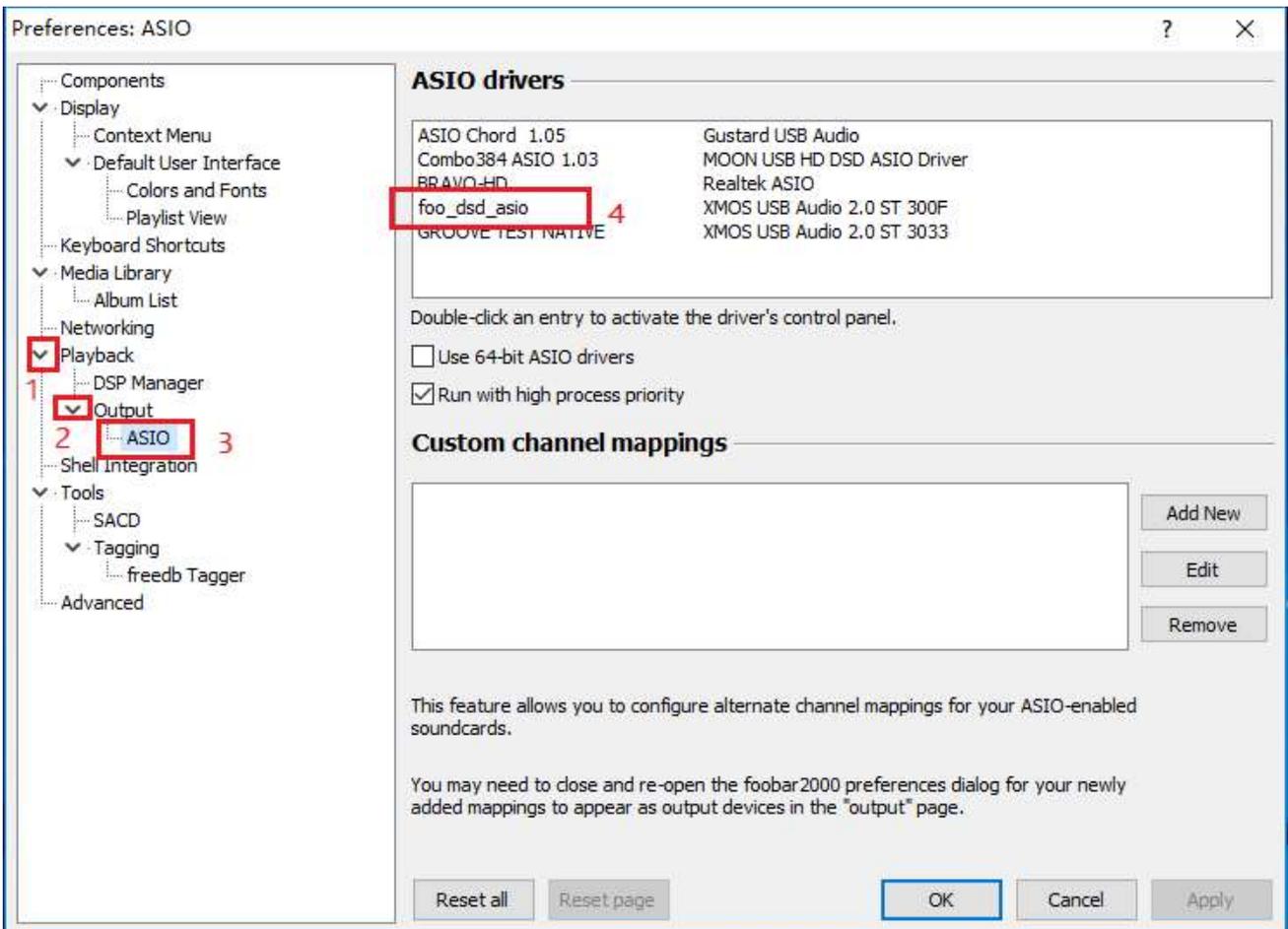

The window shown below will pop up and click "OK". Then Foobar2000 will restart.



4. Click File -> Preferences again.

5. Expand Playback - Output - ASIO, and double-click foo_dsd_asio.

6. In the "foo_dsd_asio v0.7.2" window. Select "Gustard USB Audio" from the drop-down menu of the first line ASIO Driver.
Select "ASIO Native" from the drop-down menu in the second line of the DSD Playback Method.
For other settings, please make the same selection according to the red box in the figure. Then click the X in the upper right corner to exit.
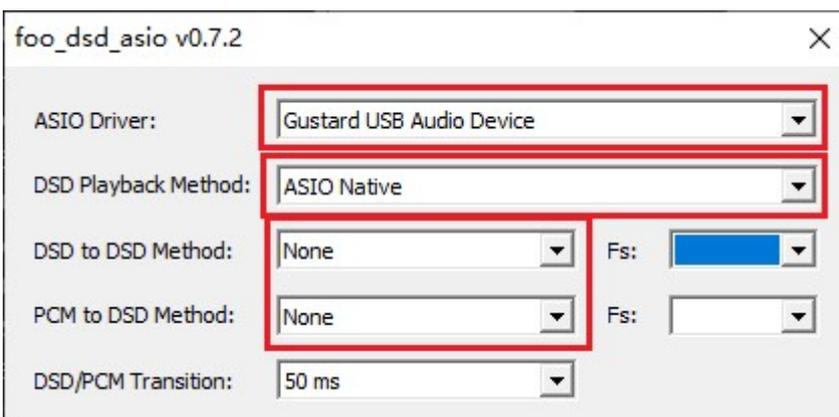
7. Click "Output" on the left, then select "ASIO:foo_dsd_asio" from the drop-down menu for "Device" on the right.
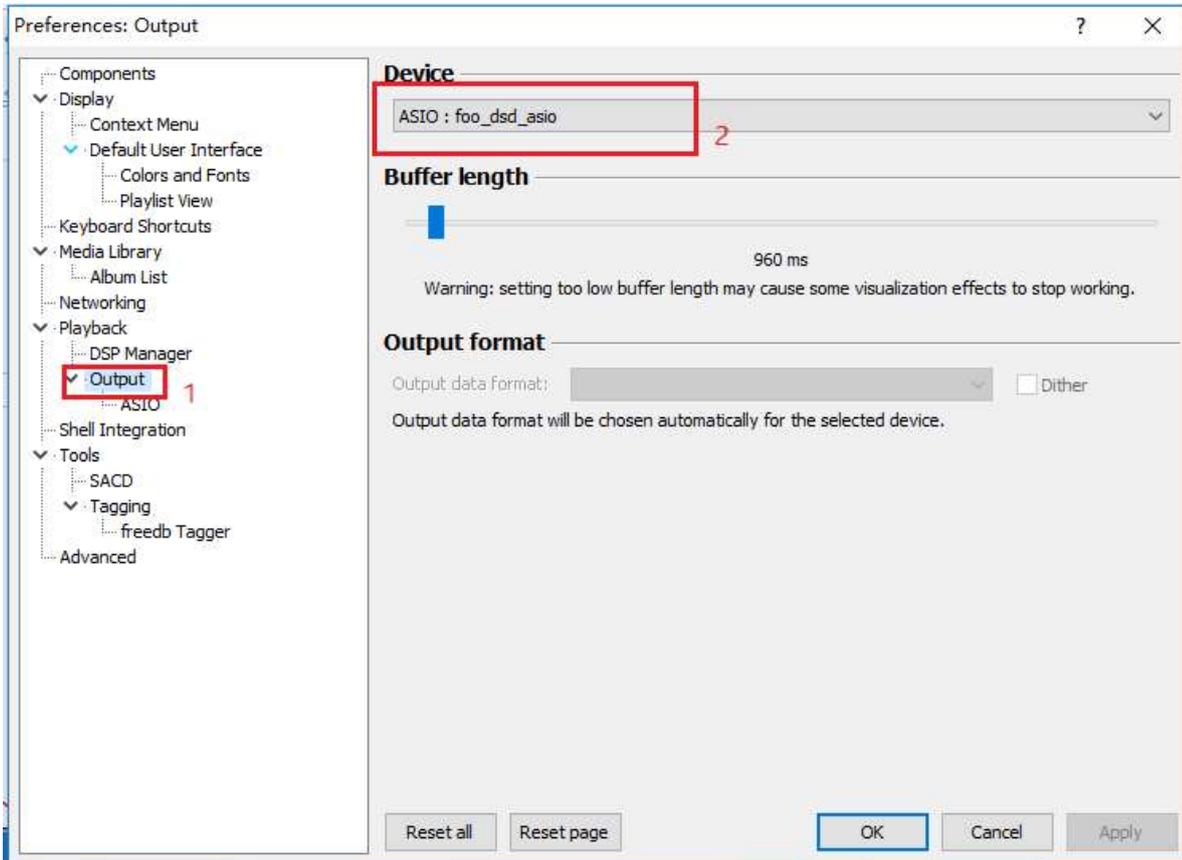

8. Then click on Tools -> SACD and select "DSD" from the drop-down menu in the Output Mode on the right. Finally click "OK" below to complete the setup.
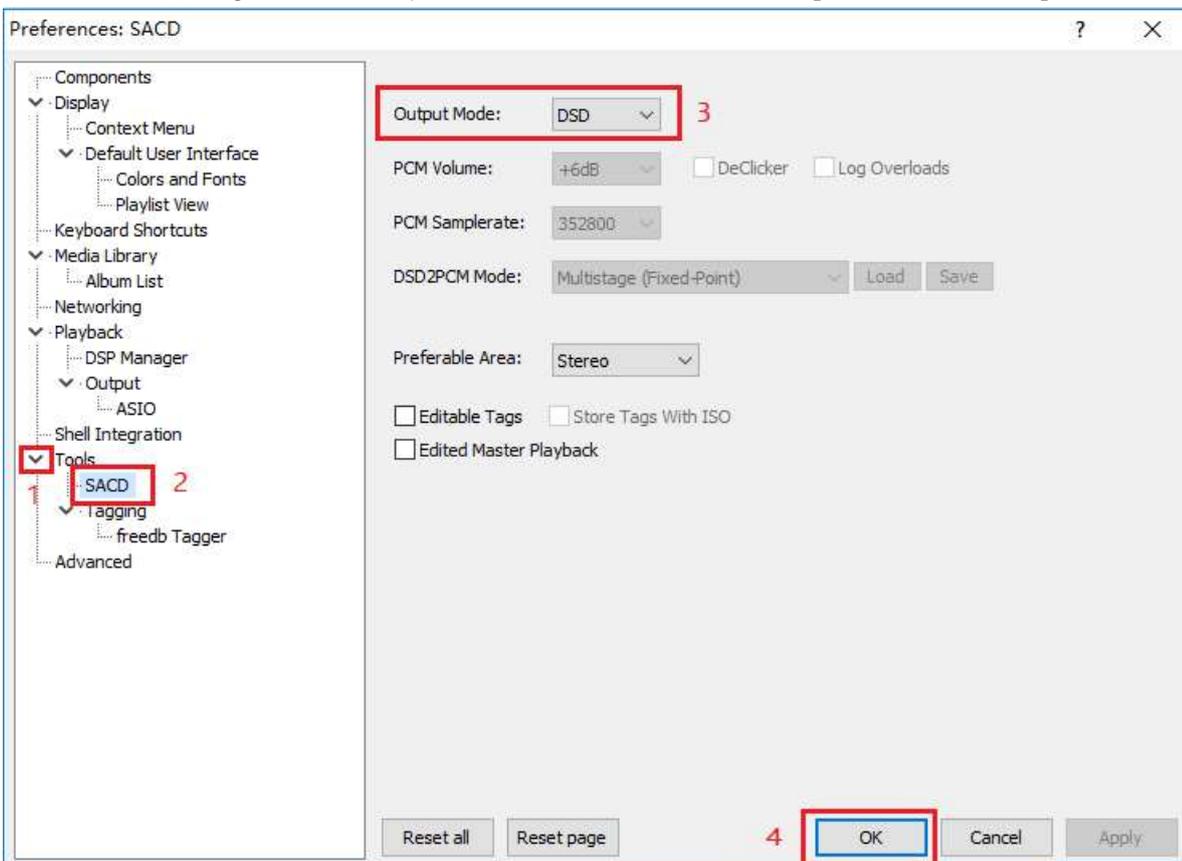
DSD playback troubleshooting for Foobar2000

1. Q: Why does my foobar2000 preference window play (Playback) -> Output (Output) does not show ASIO?

   A: Because you don't have the ASIO component installed. Drag the foo_out_asio.fb2k-component file from the foobar2000_DSD_0.7.X folder to the space in the box to the right of the component option in the preference window of foobar2000, then click the "Apply" button in the lower right corner. Click OK in the Restart foobar2000 dialog that pops up at this time. After restarting foobar2000, you can find the ASIO option.
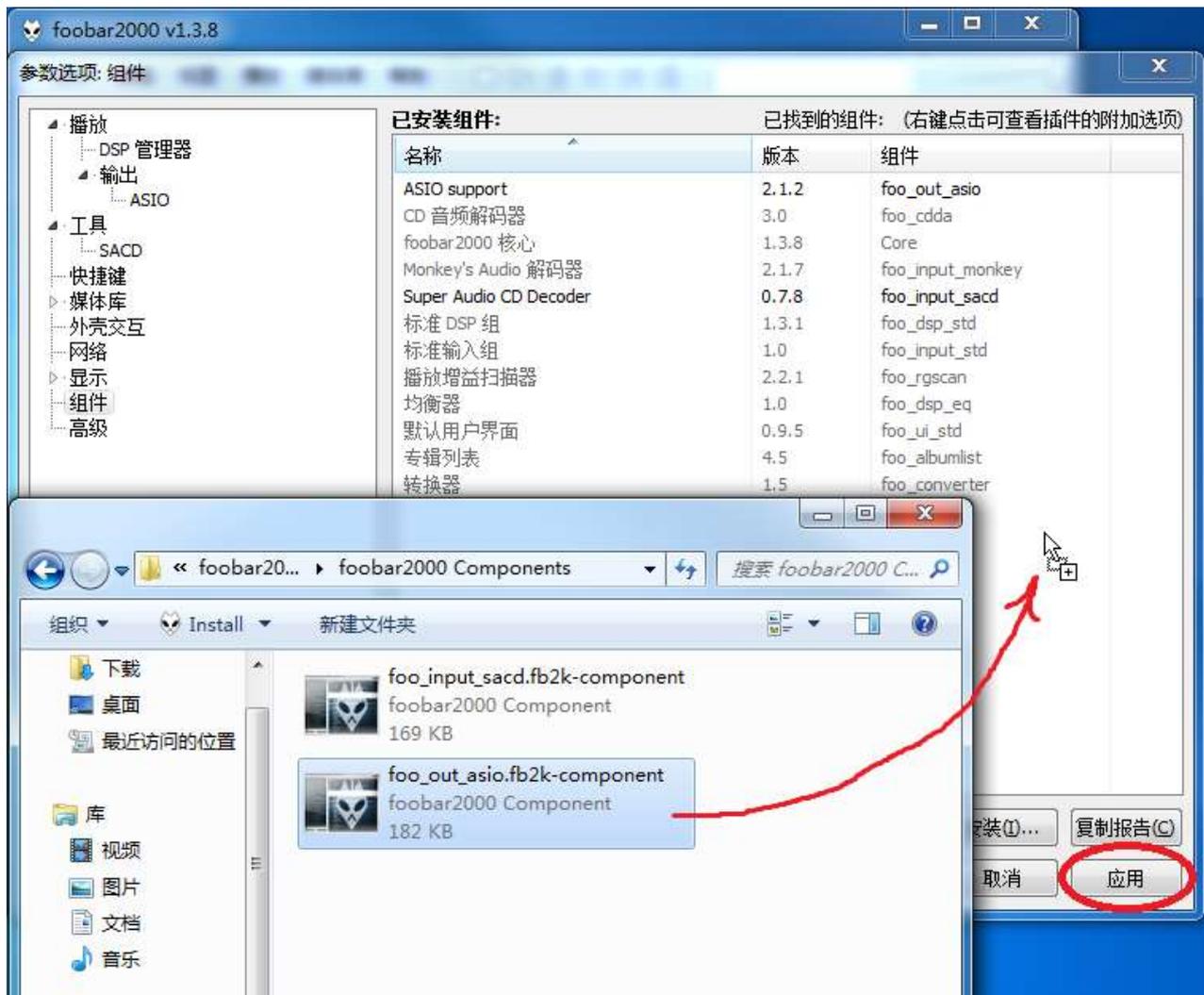
2. Q: Why is there no SACD in the tool options in my foobar2000's preference window?

A: Because you don't have the SACD component installed. Drag the foo_input_sacd.fb2k-component file from the foobar2000_DSD_0.7.X folder to the space in the box to the right of the component option in the preference window of foobar2000, then click the "Apply" button in the lower right corner. Click OK in the Restart foobar2000 dialog that pops up at this time. After restarting foobar2000, you can find the ASIO option.
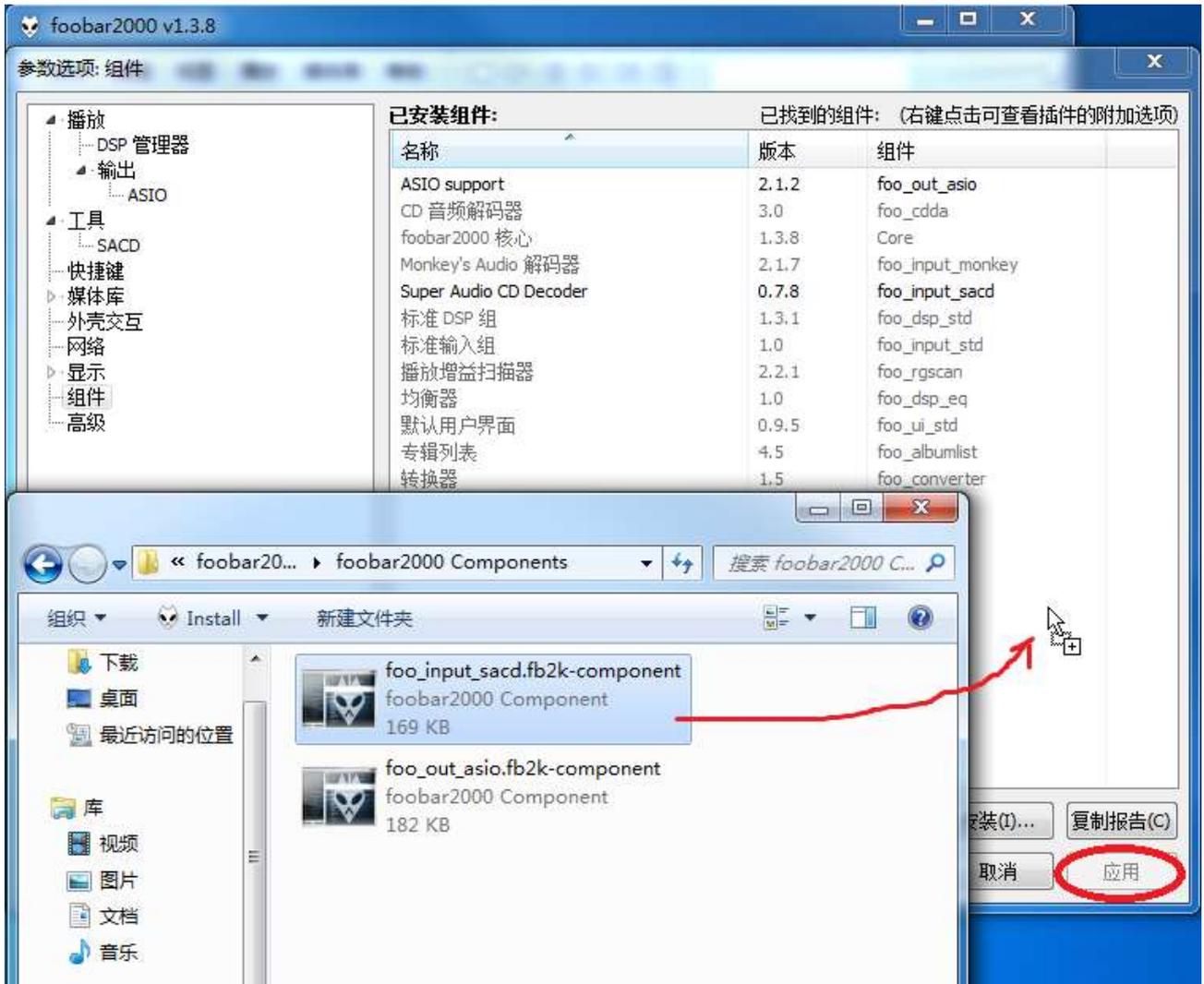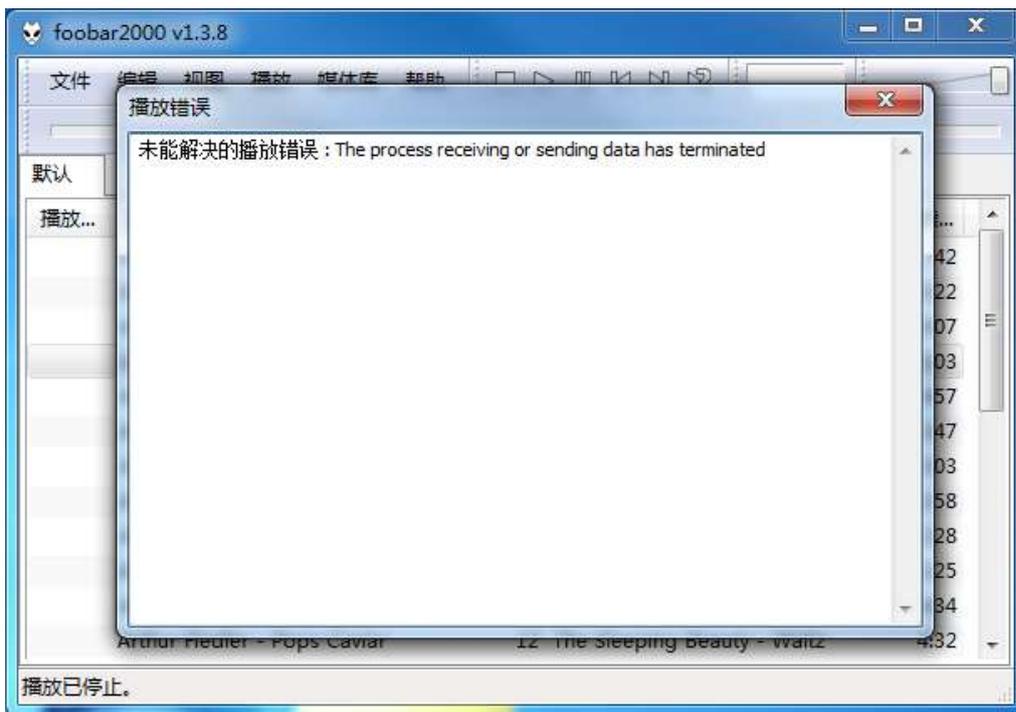
3. Q: I have installed the above two Foobar2000 components. Why do I see an error window like the one below when I play the DSD file?

A: Because the version of your ASIOProxy conflicts with the version of the SACD decoding component. The correct version is shown below, all of which are 0.7.X.

Some users use the old version of foobar2000, and its SACD decoding component stays in the 0.6.X version. If the ASIOProxyInstall-0.7.2.exe program is installed, the version of the foo_dsd_asio window is 0.7.2. This creates a conflict with the SACD decoding component.

There are two solutions.
One is to update the version of the SACD component, and the installation method is consistent with the solution to the second problem. However, some versions of the foobar2000 component are locked and cannot be replaced. Please reinstall the new version of the official original Foobar2000 to solve the problem.
Second, if you are not willing to reinstall foobar2000, you can install the old version of ASIOProxy, such as ASIOProxyInstall-0.6.5.exe. Google search ASIOProxyInstall-0.6.5.exe to find the download link, which can also solve the problem.

Product specifications

Sample rate supported by digital input channels:

COAX : PCM 16-24bit/44.1-192kHz; DSD DOP64
AES : PCM 16-24bit/44.1-192kHz; DSD DOP64
OPT : PCM 16-24bit/44.1-192kHz; DSD DOP64
USB : PCM 16-32bit/44.1-768kHz; DSD DOP64-DOP256; NATIVE DSD: DSD64-DSD512
IIS : PCM 16-32bit/44.1-768kHz; DSD DOP64-DOP256; NATIVE DSD: DSD64-DSD512
BT Bluetooth 5.0 : PCM LDAC, AAC, SBC, APTX, APTX LL, APTX HD and other high frequency
encoding, LDAC can achieve 24B / 96K high code transmission

*USB input supported operating system: WIN7 SP1/WIN8/WIN10 32-64bit; macOS; Linux

Analog output performance:

Amplitude frequency response: 20-20kHz /+-0.08 dB
DNR: >126dB
Crosstalk: -130dB @ 1kHz
THD+N: <0.00010% 1kHz
IMD: <0.0004% @-1dBFs

RCA Output level: 2Vrms (VOLUME 00dB)
Output impedance 100 ohms

XLR Output level: 4Vrms (VOLUME 00dB)
Output impedance 300 ohms

Other specifications:

AC Power supply: AC 115V/230V 50/60Hz
Power consumption: <15W
Dimensions: Width 220mm * Height 50mm * Depth 170mm (Excluding protrusions)
Weight: 2.5Kg (including packaging)

Product Warranty:

You will enjoy the 2-year free warranty and lifetime maintenance after the date purchasing GUSTARD's DAC-X16 product.

* The manufacturer bears only the freights from Chinese mainland. Part of the freight and tax generated from overseas will be solved by the user with the dealer negotiation.

Free Warranty Service

GUSTARD DAC-X16 from the purchasing date in the free warranty period, the user uses the product in normal, and the product fails due to component quality or manufacturing problems.

Beyond the Warranty Service

Belonging to one of the following circumstances, products are no longer provided warranty service.
a. Products from the date of purchase has exceeded a predetermined warranty period.
b. Model, barcodes and purchase date do not match the actual product and warranty card.
c. Without GUSTARD technician permission, unauthorized modifications to the circuit, components or self-repaired product.
d. Damaging caused by irresistible natural forces.
e. Beyond the permitted use of environmental damage.
f. Damaging due to incorrect use or improper storage. Including but not limited to: the voltage is too high to burn the circuits or components; Bumping and resulting in damaging the shell or internal; damaging due to water, oil, liquid and excessive dust; product oxidation or corrosion, etc.
g. Beyond the warranty period, such as an individual component damage, appearance due to human damage, firmware modifications lead to unable to work by unauthorized users. GUSTARD commits to take reasonable maintenance fees (except large area components or circuit board burned beyond repair). Freight and maintenance costs, material costs are required the user to bear.