# USB DAC

## **UNISON** RESEARCH

#### 1. Using the USB input

The USB input uses a D/A converter capable of converting PCM signals up to 384kHz and DSD up to 5.6448MHz, which includes all audio formats and sampling frequencies available today.

To use the input, the user needs to connect the USB-dac to a computer with Windows, OSX (Mac) or Linux operating system and follow the instructions below. Even some Android-based devices with certain players are able to work with a USB device without the need for an additional driver (user space mode), and some iPads and iPhone provided with the Camera Connection Kit can also drive this input. If using small portable devices, we recommend checking the current capability of their USB port, as it must fulfil the USB input requirement (300mA).

## 1-1 .Using the USB input. with a Windows-based computer

Supported versions are Windows 7 and later. When using the *USB dac* with a computer that has a Windows operating system, it is necessary to install a driver, which can be downloaded from www.unisonresearch.com Please note that the driver is the same as that used for the USB input on the SH, Triode 25 amplifier and other Unison Research products. If your computer has already been connected to one of these products, then the driver is already installed and you can skip this procedure.

#### **Installing Windows driver**

Before proceeding with the installation, switch the amplifier on and connect it to the computer using a USB cable.

To start the driver installation, double-click on the executable (.exe) file downloaded from Unison Research website *www.unisonresearch.com*. Once started, depending on the operating system version, the user could be asked to confirm the permission for the program to modify the system. Give confirmation. Once this operation, when required, is performed, the window in Figure 1 will appear.



Figure 1

Follow the instructions shown in the window and click the "Next" button to launch installation. At first, the installation program will check that the **USB** *input*. is connected to the computer. Whenever the connection is not made or when the computer doesn't recognize the input, the window shown in Figure 2 will appear.



Figure 2

Should this happen, connect the USB input to the computer or disconnect and reconnect it to allow the USB controller to properly recognize it. Then, click the "Next" button.

Once the installation program has confirmed the presence of the USB DAC input on the USB bus, the window shown in Figure 3 appears.

]	Setup	_ 🗆 💙
License Agreement Please review the licen	ise terms before installing USB Audio 2.0 Stere	o Driver v2.23.0.
Press Page Down to se	ee the rest of the agreement.	
End User Licence Agre	eement	^
BY ACCESSING, USING AGREE TO BE BOUND DO NOT ATTEMPT TO 1. Agreement This is an agreement ( office at 107 Cheapsic are entering into this J	G, INSTALLING OR DOWNLOADING the XMOS : BY THE FOLLOWING TERMS. IF YOU DO NOT / DOWNLOAD, ACCESS OR USE THE XMOS Soft ("Agreement") between You and XMOS Limited de, London, EC2V 6DN hereinafter referred to Agreement on behalf of another legal entity su	Software, YOU AGREE TO THESE, tware. having its registered as "XMOS". If you tch as a company,
If you accept the term agreement to install US	is of the agreement, click the check box below. SB Audio 2.0 Stereo Driver v2.23.0. Click Next of the License Agreement	You must accept the to continue.

Figure 3

The user must accept the license agreement terms by clicking on the checkbox in the lower left of the window, as shown in Figure 3, then click the "Next" button. The window shown in Figure 4 will appear, in which the user may, if necessary, indicate a path for driver installation.

끸	Setup	- 🗆 ×
Choose Install Location Choose the folder in which to in	nstall USB Audio 2.0 Stereo Driver v2	2.23.0.
Setup will install USB Audio 2.0 different folder, click Browse a	Stereo Driver v2.23.0 in the followin nd select another folder. Click Install	ig folder. To install in a to start the installation.
Destination Folder		
C:\Program Files\XMOS\US	BAudioStDriver_302D	Browse
Space required: 2.3MB Space available: 789.4GB		

Figure 4

Once the installation path is chosen or confirmed, the user needs to click the "Install" button to proceed with the driver and ancillary components installation. The window shown in Figure 5 will appear, in which a progress bar will show the installation's progress.

Setup	_ 🗆 🗙
Installing Please wait while USB Audio 2.0 Stereo Driver v2.23.0 is being installed.	
This may take some time to complete. Please wait	
Preparation.	
Preparing installation. This may take some time to complete. Please wait	
< Back Next	> Cancel

Figure 5

When the process has finished the window will announce the installation has completed, as shown in Figure 6.

🖻 Setup – 🛛	×
Installation Complete Setup was completed successfully.	2
Execute: regsvr32 /s "C:\Program Files\XMOS\USBAudioStDriver_302D\xmosusbaudi. Execute: regsvr32 /s "C:\Program Files\XMOS\USBAudioStDriver_302D\xmosusbaudi. Create shortcut: C:\ProgramData\Microsoft\Windows\Start Menu\Programs\XMOS\U. Preinstalling drivers. This may take some time to complete. Please wait	
Preinstallation was successful. Click Next to continue.	
	~
< Back Next > Ca	ancel

Figure 6

Click the "Next" button to proceed. The window shown in Figure 7 will appear. Click "Finish" to terminate the installation program.

	Setup	_ 🗆 ×
	Completing the USB Stereo Driver v2.23.0	Audio 2.0 ) Setup Wizard
USB Audio 2.0 stereo driver	Click Finish to complete the i	nstallation.
The ultimate in USB Audio		
	< <u>B</u> ack	Finish

Figure 7

#### Uninstalling the Windows driver

It may be necessary, for certain reasons, to uninstall the driver. The uninstall process can be started in two ways: by opening the applications installation utility and selecting the driver for uninstall, or by accessing the driver folder and starting the uninstall program. Either way, the window shown in figure 8 will appear.



#### Figure 8

Click the "Uninstall" button to launch the driver uninstall process. The window shown in Figure 9 will appear, in which a progress bar will show the uninstall progress.



Figure 9

Once completed, the window shown in Figure 10 will announce the successful uninstall.

ninstallation Complete		S
Jninstall was completed successfully.		Ð
Completed		
Delete file: C:\Program Files\XMOS\USE	BaudioStDriver, 302D\custom.ini	~
Delete file: C:\Program Files\XMOS\USE	AudioStDriver 302D\xmosusbaudiost302	D cp
Delete file: C:\Program Files\XMOS\USE	3AudioStDriver_302D\xmosusbaudiost302	D_df
Delete file: C:\Program Files\XMOS\USE	3AudioStDriver_302D\xmosusbaudiost302	D_df
Delete file: C:\Program Files\XMOS\USE	3AudioStDriver_302D\xmosusbaudiost302	D_cp
Delete file: C:\Program Files\XMOS\USE	3AudioStDriver_302D\uninstall.exe	
Delete file: C:\Program Files\XMOS\USE	3AudioStDriver_302D\setup.ini	
Delete file: C:\Program Files\XMOS\USE	3AudioStDriver_302D\setup.bmp	
Remove folder: C:\Program Files\XMOS	\USBAudioStDriver_302D\	
Completed		~

Figure 10

Click the "Next" button to proceed. The window shown in Figure 11 will appear. Click "Finish" to terminate the uninstall program.



Figure 11

### Configuring Windows to use the USB-DAC as the predefined output peripheral

Some players, such as Windows Media Player, use the system predefined audio peripheral to playback audio. Some streaming services (which rely on a web browser) also do the same. In these cases, it is necessary to choose the *Usb-dac* as your predefined audio peripheral. To do that, you need to access the Sound configuration utility in the Control Panel. A window with various tabs will appear. Select the "Playback" tab to access the list of available output peripherals. Select "XMOS USB Audio" as the predefined device, as shown in Figure 12. From that moment on all sounds made or handled by Windows (including the ones from the browser and from players relying on the system to deliver audio) will be sent to the *Usb Dac*.

Riproduzione	Registrazione	Suoni	Comunicazioni	
Desmadifie			n dise esitive di sine	a duniana
selezionarlo	dall'elenco se	guente:	in dispositivo di ripr	oduzione,
	Altoparlanti Baaltak High	Dafiniti	an Audia	
	Non collegate	0	JII Addio	
$\cap$	Cuffie	Definiti		
<b>C</b> .	Non collegate	) )	UT AUDIO	
	Realtek Digita	I Outpu	it 👔	
	Pronto	Definitio	on Audio	
	Realtek HDM	Output		
	Realtek High Pronto	Definitio	on Audio	
	Altoparlanti			I
	Dispositivo p	idio redefinit	0	
Providence and				
Configur	а		Pr <u>e</u> definito	✓ <u>P</u> roprietà

Figure 12

Windows systems, in a similar way to OSX (see later section), resample all signals to make their sampling frequency the same as the value chosen in the Audio utility. To choose the output sampling frequency, access the properties of the selected peripheral (in this case, the *Xmos USB Audio*) and show the advanced properties, as shown in Figure 13.

A drop-down menu will allow for choosing the desired sampling frequency between 44.1kHz and 192kHz (the latter being the highest sampling frequency which Windows can handle). Please note that an ASIOcompatible player is needed when the user wants to use the USB input with sampling frequencies higher than 192kHz, as Windows is unable to handle such high sampling frequencies.

Generale	Livelli	Caratteristiche avanzate	Avanzate	
Forma Selez bit da	ito pred ionare la a utilizza	efinito a frequenza di campiona are nell'esecuzione in mo	mento e la pro dalità condivi	ofondità in sa.
16 b	it, 44100	) Hz (Qualità CD)	~	▶ Pr <u>o</u> va
Moda	lità esclu	usiva		
∎ Co	onsenti a el dispos	alle applicazioni di assun ;itivo	nere il controll	o esclusivo
✓ At	tribuisci	i priorità ad applicazioni	in modalità es	clusiva
At Bipri	stina pr	priorità ad applicazioni	in modalità es	clusiva
Ripri	tribuisci stina p <u>r</u>	i priorità ad applicazioni edefinite	in modalità es	clusiva

Figure 13

#### **Configuring a player in Windows: FooBar 2000**

FooBar (<u>www.foobar2000.org</u>) is a free software that's able to operate with all the modes that are compatible with the *USB input*.: Direct Sound, Kernel Streaming, WASAPI and ASIO. The installation of the program is beyond this manual's scope: we'll explain how to configure it to operate in ASIO mode, which is the optimum solution to use with the USB input.

Foobar offers ASIO support through the installation of a specific DLL. It must be downloaded from the "Components" section of FooBar, website, from the following link: http://www.foobar2000.org/components/view/foo\_out\_asio.

NOTE: unlike many other FooBar DLL's, which are contained in a zip file and therefore must be manually extracted and copied into the "Components" subfolder inside the FooBar main folder, the ASIO file which is downloaded from FooBar website is an auto-installing program which automatically installs the DLL in the correct folder, without any user action. You just need to double-click on the

#### downloaded file.

Once this operation is done, the user can launch FooBar and access the Preferences window by clicking the CTRL+P keys combination, or by the specific "File" menu item. Then, select the "output" item, which will show an "ASIO" sub-item: the windows shown in figure 14 will appear.

Components     Departments     Department	SUSB Audio 2.0 ST 302D v gth  1160 ms setting too low buffer length may cause some visualization effects to stop working. mmat format:  Dither Tormat:  Dither Tormat: Dithe

Figure 14

Select "ASIO: XMOS USB ASIO 2.0 ST302D" in the drop-down menu called "Device". FooBar is already capable of using the *USB* input as an output device in ASIO mode to playback bit-perfect PCM audio up to 384kHz and 32 bits.

It's now necessary to setup FooBar to playback DSD files. For this you need to install another DL for SACD compatibility, which can be downloaded from the Sourceforge website at the following link: http://sourceforge.net/projects/sacddecoder/files/latest/download.

The zip archive contains two executable files, both to be used: one to install the component for SACD ISO files compatibility and one proxy file to send DSD to compatible audio devices through their ASIO compatible driver. One such device is the *USB input*.

After manually installing the DLL and the proxy, two ASIO objects will appear in the "ASIO" section of "Output" (Figure 15): the Unison driver and the proxy ("foo\_dsd\_asio"). Double-click on "foo\_dsd\_asio" to make the configuration window appear. Set the parameters as shown in Figure 15. FooBar is now ready to send DSD streams from DSD files to the **USB** 

input.

ASIO drivers  A		Preferences: ASIO	?
For John         Media Lbray         Methodia Lbray         Networking         PosP Manager         - Output         - Astoo         - Astoo         Shell Integration         Do Tools         DSD Playback Method:         Do De Marker 0x05/0xFA         Do Do Do De Method:         None         Fs:         DSD/PCM Transition:         10 ms         This feature allows you to configure alternate channel mappings for your newly added mappings to appear as output devices in the "output" page.	Components	ASIO drivers	
PoSP Manager OUtput Store Sto	<ul> <li>Keyboard Shortcuts</li> <li>Media Library</li> <li>Networking</li> </ul>	foo_dsd_asio XMOS USB Audio 2.0 ST 302D	
ASIO Driver: MMOS USB Audo 2.0 5T 3020     Double     ASIO Driver: MMOS USB Audo 2.0 5T 3020     Do Dab     DSD Playback Method: DoP Marker 0x05/0xFA     DSD D5D to DSD Method: None ▼ Fs: DSD64 ▼     DSD PCM transition: 10 ms ▼     This feature allows you to configure alternate channel mappings for your ASIO enabled     soundcards.     You may need to dose and re-open the foobar 2000 preferences dalog for your newly     added mappings to appear as output devices in the "output" page.	DSP Manager	foo_dsd_asio v0.7.1.2	×
Advanced       D5D Playback Method:       DoP Marker 0x05/0xFA         Run       D5D Playback Method:       None       Fs:       DSD64         MUSB/       PCM to DSD Method:       None       Fs:       DSD64       DSD/PCM Transition:       10 ms       Remo         This feature allows you to configure alternate channel mappings for your ASIO-enabled soundcards.       You may need to close and re-open the foobar 2000 preferences dialog for your newly added mappings to appear as output devices in the "output" page.	ASIO Shell Integration	Double ASIO Driver: XMOS USB Audio 2.0 ST 302D	••
Cust       DSD to DSD Method:       None       Fs:       DSD64          MUSB/       PCM to DSD Method:       None       Fs:       DSD64          DSD/PCM Transition:       10 ms       Fs:       DSD64          This feature allows you to configure alternate channel mappings for your ASIO-enabled soundcards.       Remo         You may need to close and re-open the foobar 2000 preferences dialog for your newly added mappings to appear as output devices in the "output" page.	▷ - Tools Advanced	Run     DSD Playback Method: DoP Marker 0x05/0xFA	•
MUSB/       PCM to DSD Method:       None       ▼       Fs:       DSD64       ▼         DSD/PCM Transition:       10 ms       ▼       Fs:       DSD64       ▼         This feature allows you to configure alternate channel mappings for your ASIO-enabled soundcards.       Remove the foobar 2000 preferences dailog for your newly added mappings to appear as output devices in the "output" page.		Custo DSD to DSD Method: None Fs: DSD64	
DSD/PCM Transition: 10 ms  Remove the foot and the foot a		MUSB/ PCM to DSD Method: None  Fs: DSD64	F 💌 🙀
Remove This feature allows you to configure alternate channel mappings for your ASIO-enabled soundcards. You may need to close and re-open the foobar 2000 preferences dialog for your newly added mappings to appear as output devices in the "output" page.		DSD/PCM Transition: 10 ms	
This feature allows you to configure alternate channel mappings for your ASIO-enabled soundcards. You may need to close and re-open the foobar 2000 preferences dialog for your newly added mappings to appear as output devices in the "output" page.			Remove
		This feature allows you to configure alternate channel mappings for your ASIO-enable soundcards. You may need to close and re-open the foobar2000 preferences dialog for your newl added mappings to appear as output devices in the "output" page.	ed ly

Figure 15

For best operation of the player with DSD files, it is advisable to setup the SACD tool as shown in figure 16.

#### Figure 16

It is necessary to select the DSD proxy as the output device to listen to DSD files, as indicated in Figure 17.

	Preferences: Output ?
Components Display Keyboard Shortcuts Media Library Networking DSP Manager Output SAIO Shell Integration Tools SACO Advanced	Device         ASID : foo_dsd_asio         Buffer length         S0 ms         Warning: setting too low buffer length may cause some visualization effects to stop working.         Output format         Output data format:         Output data format will be chosen automatically for the selected device.
	Reset all Reset page OK Cancel Apply

Figure 17

#### Configuring a player in Windows: JRiver Media Center

JRiver Media Center (<u>www.jriver.com</u>) is a commercial player, therefore is a closed solution and is provided with all necessary features to support the various audio transfer modes and audio formats.

As with FooBar, we won't go through the program installation. Access JRiver options window and select "ASIO" as "Output mode" in "Audio" (figure 18).



Figure 18

Then, open the configuration window of output mode ("Output mode settings") that is obviously devoted to ASIO and select the "XMOS USB ASIO 2.0 ST302D" driver, as shown in figure 19.

Device		Buttering		B
Channel offset: Channel swap:	O     CD ST 3020     C     D     CD ST 3020     C     D     CD Annel offset determines which outputs to use on the selected device. Try different values: (0, 2, 4, etc.) until the audio is routed to the desired output.     None	More Skip Resistant Use large hardwa NOTE: Increasing bu also increases latent act, th take affect)	0,50 seconds ire buffers (recommended to pr iffering makes playback more sk y (the time it takes for pause, se	More Responsive event stutter) tip resistant, but tek, volume, DSP,
Volume ASIO device nar Please select the Volume device:	mes do not always match Windows device names. corresponding Windows device for volume control. (Automatically try to choose at playback time)	Tools Open Driver Contr Play silence on p pause) Device uses only	ol Panel) ause (instead of performing a h most significant 24-bits (Lynx, e	ardware level etc.)

Figure 19

JRiver is now able to handle DSD by the DoP (DSD over PCM) format. From the drop-down menu that shows up clicking on "Bitstreaming" item, select the "Custom…" value, as shown in figure 20.



Figure 20

A window will automatically appear in which the user can manually set the bitstream configuration parameters (figure 21). Set parameters as shown in figure 21.

	Bitstreaming Formats
Dolby Digital (A	[3]
🗹 Dolby Digital Plu	is (E-AC3)
Dolby TrueHD	
DTS	
DTS-HD	
DSD	
DSD over PCM (	DoP)
DoP Format:	DoP 1.0 (0xFA / 0x05)
	OK Cancel

Figure 21

The configuration procedure is almost done, but it's still necessary to tell JRiver not to down-sample data that's streamed with a sampling frequency higher than 192kHz. This feature is usually enabled to correctly drive other DAC's with a lower specification than the *USB-dac*.

Access the "DSP and output" menu item and set the parameter about handling of files with sampling frequency more than 192kHz, as shown in Figure 22.

		DSP Studio	-		- = >	
Output Format Volume Leveling	Output Format Playback stopped or current play	back doesn't support processing			Option	
Equalizer     Parametric Equalizer     Effects	Sound can be output in any form output or high sample rates requ	nat. For example, you can listen to an audio irre a sound card capable of these modes.	CD in 5.1 surrou	nd at 32-bit / 192 kHz. Advanced settings like mu	lti-channel	
Headphones	Sample rate (more info)		Channels (m	nels (more info)		
Tempo & Pitch	Click in the output column to	select a sample rate for each input sample	Channels	Source number of channels	~	
Convolution	rate. Kight-click to set all at o	Output				
Analyzer	Less than 44,100 Hz 44,100 Hz	No change No change	Mixing:		Y	
	48,000 Hz	No change				
	95,000 Hz	No change				
	176,400 Hz 192,000 Hz	No change No change	Subwoofer	more info)		
Processed in order listed (drag to reorder)	Greater than 192,000 Hz	No change	When source has no subwoofer (CD audio, etc.) and 'Channels' selection includes a subwoofer:			
Manage Plug-ins					~	
Clip protection			🗹 Sob			
Peak Level: n/a	Sour	rce: n/a		Internal: n/a	Help	

Figure 22

JRiver configuration is done and you can now listen to PCM files up to 384kHz and DSD files up to DSD128.

#### 1-2. Using the USB input with an Apple computer

The **USB Dac** complies with USB Audio Class 2.0 specifications; therefore it's natively supported by OSX operating systems since version 10.6.8 and doesn't need any drivers. The USB input is recognized by any Apple computer as soon as it's connected to one of its USB ports and is listed amongst the output audio devices as shown in figure 23.

	Effetti sonori Us	scita Ingresso	
Scegli un dispositivo	per l'uscita audio:		
Nome		Tipo	
Auricolari		Porta auricolari	
UNISON USB DAC 1		USB	
Impostazioni per il dis Bila	positivo selezionato: nciamento: Sinistra	Destra	

Figure 23

The user must select the "Unison USB DAC 1" peripheral to send her/his computer's audio to the **USB input**. The OSX operating system allows users to choose the sampling frequency of the audio signal sent to the **USB input**. This can be done through the MIDI Control Panel, as shown in Figure 24. Whichever sample rate you choose will define the exact output to the **USB Dac**, regardless of whether the file can play at a higher resolution.

000		Dispositivi audio			
Microfono integrato 2 Ingresso / 0 uscita Ingresso integrato 2 Ingresso / 0 uscita Uscita integrata Uscita integrata 0 ingresso / 2 uscita	<b>↓</b> ≊ ●	UNISON USB DAC 1 Sorgente clock: UNISON RESEARCH Internal Clock Ingresso Uscita			?
UNISON USB DAC 1 0 ingresso/ 2 uscita		Sorgente: Default Formato: 44100,0 Hz 🔻 2can-16bit Num. interi			÷
		Canale Volume	Valore	dB	Muto
		Master O	1	0	
		1: AnO	1	0	
		2: An	1	0	
		Confi	oura alte	oparlan	ti

Figure 24

A fixed output may not be desirable when listening to a playlist made of files with different sampling frequencies. In this case, a player capable of disabling this system feature must be used. Many such players are available, both free and commercial.

#### Configuring a player in Apple OSX: Audirvana

Audirvana is a latest generation player which allows for listening to DSD files with DSD-compatible devices, such as the *USB input.*. To use Audirvana at its best, set the various options as shown in Figure 25.



Figure 25.

#### 1-3. Connecting to a Linux computer

No driver is needed for a computer provided with the Linux operating system and an ALSA module, as ALSA natively supports USB Audio Class 2.0.

To use the *USB input.* with a computer provided with Linux operating system, it is sufficient to access the audio configuration panel and select the "UNISON USB DAC 1" peripheral in the "Output" section, as shown in figure 26.

Volume di uscita: •	•	· ••)	
	🗌 Escludi audio 🗌 Consen	tire superamento del 100%	
Iscita Ingresso Effetti sonori App	licazioni		
Riproduci suono tramite	Impostazioni per	«Uscita analogica»	
Output digitale (S/PDIF)	Bilanciamento:		
Audio interno		Sinistra	Destra
Uscita analogica Audio interno	Dissolvenza:	0	
Uscita analogica		Retro	Fronte
UNISON USB DAC 1	Subwoofer:	Q	
		Minimo	Massimo

Figure 26

#### **Configuring a player under Linux: Audacious**

Of course, even with Linux, it could be necessary to select the USB DAC 1 as predefined audio output peripheral. As an example, the recommended configuration for Audacious, which is widely used under Linux, is shown. As displayed in Figure 27, the user needs to access Audacious' preferences and select "ALSA output". Then, the user must click on "Preferences", right below the drop-down menu for output selection: the window shown in the lower portion of Figure 27 will appear. Set its various parameters as shown in Figure.

OO Prefere	enze di Audacious	
Audio	Impostazioni di uscita Uscita ALSA	
Rete	Plugin di uscita: Preferenze Informazioni	
<b>Playlist</b>	Profondità di bit: 16 💌	
Info Bra	Dimensione del buffer: 500 – + ms O Clipping leggero	
Plugin	Utilizza controllo volume software (non raccomandato)  Peolay Cain	
	Abilita Replay Gain	
	Modalità album	
	Regola i livelli	
	Amplifica tutti i file: 0,0 - + dB	
	Amplifica i file senza tag: 0,0 - + dB	
Audacious 3.4.3 (Ub	untu package) Chiudi	
😣 🖨 Preferenz	te del plugin di uscita ALSA	
Dispositivo PCM:	hw:CARD=U1,DEV=0 (UNISON USB DAC 1, USB Audio Direct hardware device without any conversions)	•
Dispositivo mixer:	default (Dispositivo mixer predefinito)	v
Elemento mixer:	Master	•
🛛 Aggira interru:	zione per esaurimento risorse	
	Ch	iudi

Figure 27