Experience Better Sound in Linux with the Asus Xonar DX Sound Card

January 13, 2017

So, you have finally constructed your ultimate tower of silicon greatness featuring quad SLI, NVMe storage, 4TB SSD data, 4K monitors, the latest multi-core CPU, maxed out RAM, and…*what*? You're *still* using motherboard audio? You poor thing. Let's fix that.

This article looks at the Asus Xonar DX PCIe sound card (https://www.amazon.com/gp/product/B00198DM2K/ref=as_li_ss_tl?ie=UTF8&psc=1&linkCode=ll1&tag=delightlylinux-20&linkId=2c1e1bf81e601eb145549b6d8b6a6fd3) running in Linux and compares it with existing motherboard audio featuring the ALC1150, which is found on most higher-end motherboards these days.

Is there a difference in sound quality between a dedicated sound card and motherboard audio? Here are my tests and opinions from using the two myself.

Note: Nobody sponsors this. Any links to Amazon are affiliate links to help readers locate the parts easily and to help cover the time spent researching and writing this article.

"Isn't Motherboard Audio Good Enough?"

Let's answer this question first and get it out of the way since there are many debates arguing whether or not a dedicated sound card is worth the cost.

Modern motherboards now include onboard audio processing that rivals or exceeds dedicated sounds of the past. These boards usually use the ALC1150 or the newer ALC1220. So, why bother investing in a separate sound card if the existing sound is "good enough."

It depends upon what you want to do and the kind of audio hardware you have. As for myself, here are my reasons:

Improved signal-to-noise ratio (SNR). This is most important. I can hear background noise and hiss from the motherboard audio (ALC1150 and ALC892) when the volume is turned up, and it is *annoying*. Even though the ALC1150 produces less noise than the ALC892, the noise is still there.

True 24-bit @ 192kHz audio playback. While it is true that 192kHz is overkill and human hearing is rarely over 22050Hz, cards that are capable of achieving this tend to offer higher quality sound. (You can tell by the price.) Certainly, the ALC1150 and ALC892 both allow 24-bit @ 192kHz, but they do so in a noisy way. What is more important for me is the 24-bit bit depth since that usually results in less signal noise being introduced into the audio signal – especially if the source is 24-bit. I tend to listen using 24-bit @ 48000Hz or 96000Hz, which sounds excellent on my system. Of course, the source material plays a major role, but having hardware that natively supports it is vital.

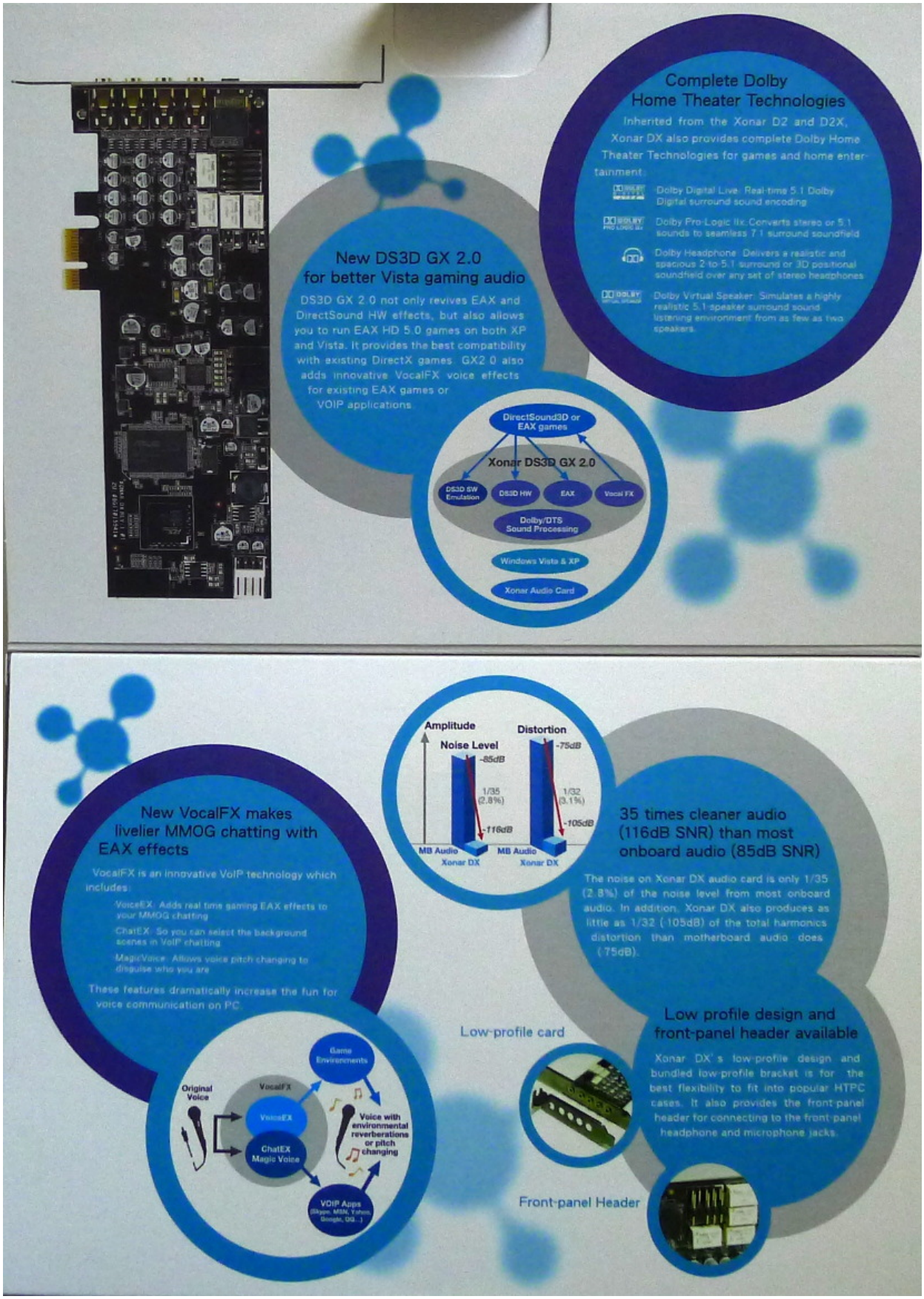
Higher-Quality Audio Hardware Exposes Flaws. The better the audio gear, the more it will expose any flaws in the playback chain from source material to the ears. I use a dedicated external amplifier and a quality (Translation: multi-digit expensive) set of headphones/speakers when listening to computer audio. ALC1150 sounds okay, but it sounds flat and something always feels missing to me. And again, it is noisy. The noise is slight, but it is noticeable and irritating over time.

The Asus Xonar DX

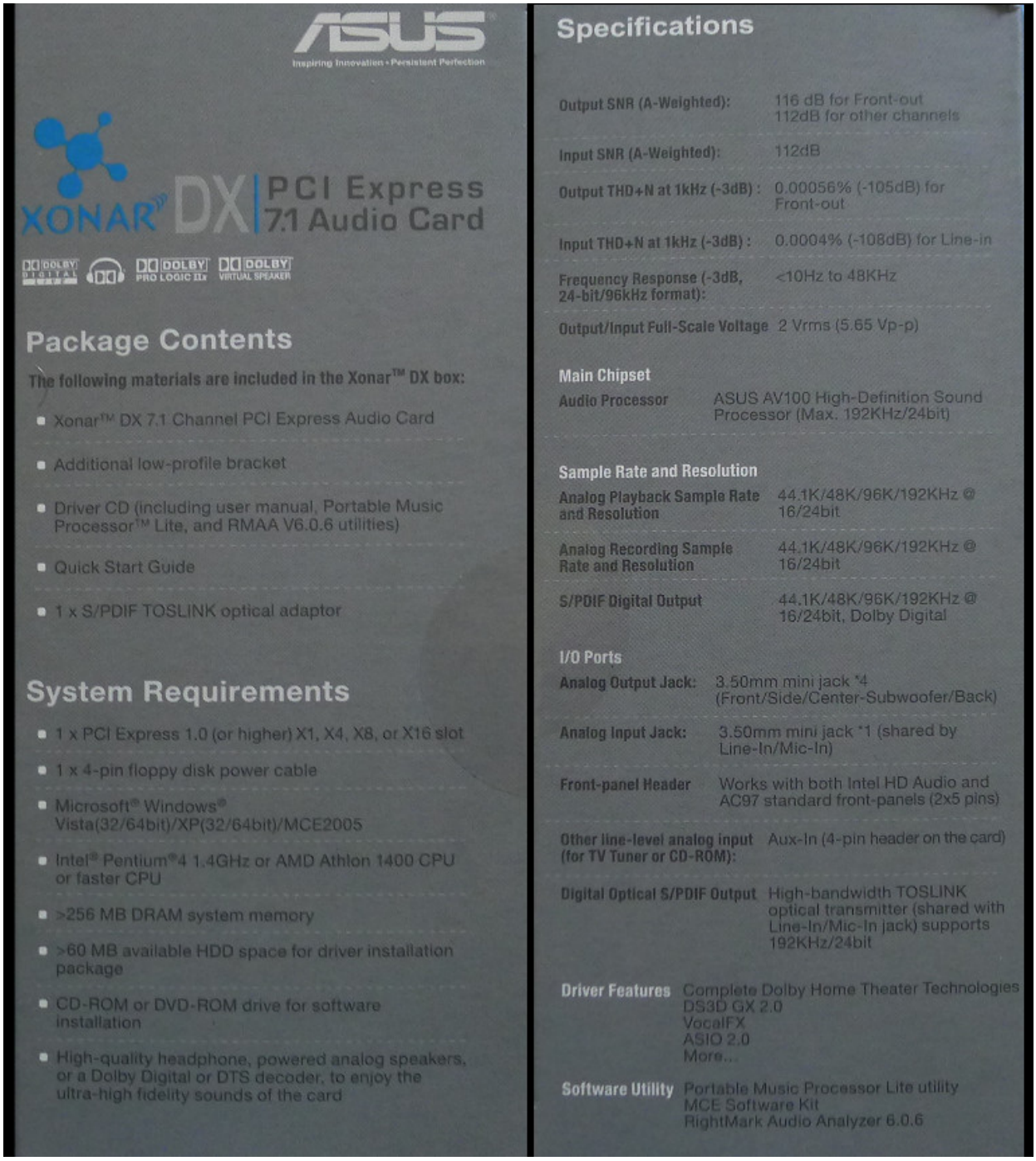
After looking around, I settled on the Asus Xonar DX for its 116dB SNR during playback. Plus, reviews rave about its stellar sound quality. It is also 100% compatible with Linux out of the box, so I had to try it. After using it for myself, I can say that this is a winner and one of the best sound cards that I have ever used.

(https://delightlylinux.files.wordpress.com/2017/01/xonar1.jpg)

Box Front. The Xonar DX is a 7.1 sound card that fits in a PCIe x1/x4/x8/x16 slot.



(https://delightlylinux.files.wordpress.com/2017/01/xonar2.jpg)
The box flap opens to reveal more information.



(https://delightlylinux.files.wordpress.com/2017/01/xonar3.jpg)

Side box photos. Despite no mention of Linux, the Xonar DX works well in Linux. I used this card in Linux Mint 18.1 with kernel 4.8.16-generic, and operation was excellent. Many features are included, so this card is capable of more than stereo audio.

Notice that the output SNR is 116dB for the front left/right stereo channel and 112dB for everything else. Since I only use front stereo, this is not an issue for me. However, 112dB is still quite good since anything over 100dB is considered to be fairly noise-free. I have used 108dB SNR sound cards in the past, and I was pleased with the result. Therefore, 112-116dB must be better.

(https://delightlylinux.files.wordpress.com/2017/01/xonar4.jpg)
Inside the box, we find the Xonar DX itself in addition to a 3.5mm to RCA stereo cord, an SPDIF optical adapter (not shown), driver installation CD-ROM for Windows, and plenty of paper written in multiple languages.

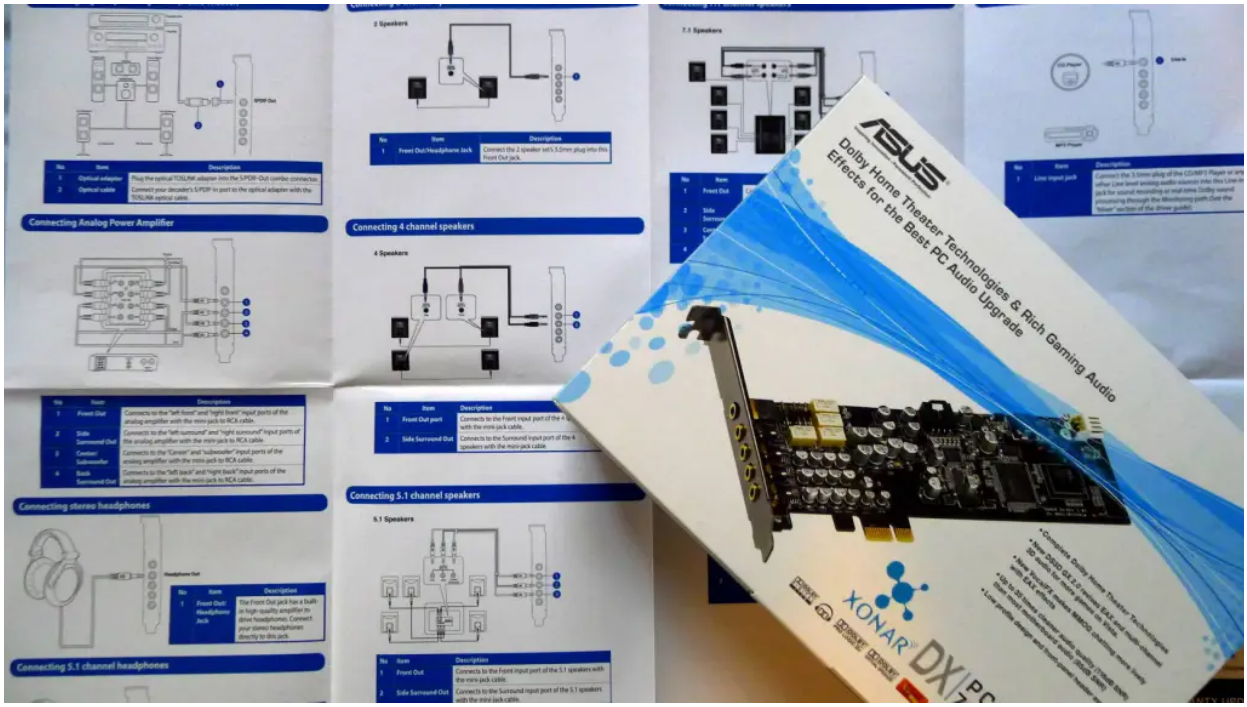
(https://delightlylinux.files.wordpress.com/2017/01/xonar5.jpg)
The Xonar DX card itself. This is a PCIe card that will work in any free PCIe 3.0 or PCIe 2.0 slot. Jumpers for front panel/CD-ROM/and SPDIF exist in case you want to connect other audio devices to it. Do you see the white power connector in the upper right-hand corner of the card? The Xonar DX requires external power from a floppy connector. This is a good-looking card with its tidy arrangement of components on a black PCB.

(https://delightlylinux.files.wordpress.com/2017/01/xonar6.jpg)

Bracket view. Five gold-plated 3.5mm connectors provide audio input and output. Note the leftmost 3.5mm jack labeled “SPDIF Out.” The Xonar DX supports optical audio output, and a small optical adapter (included) plugs into this jack in order to provide optical digital output to an external receiver. The same jack doubles as Line/Microphone input for recording.

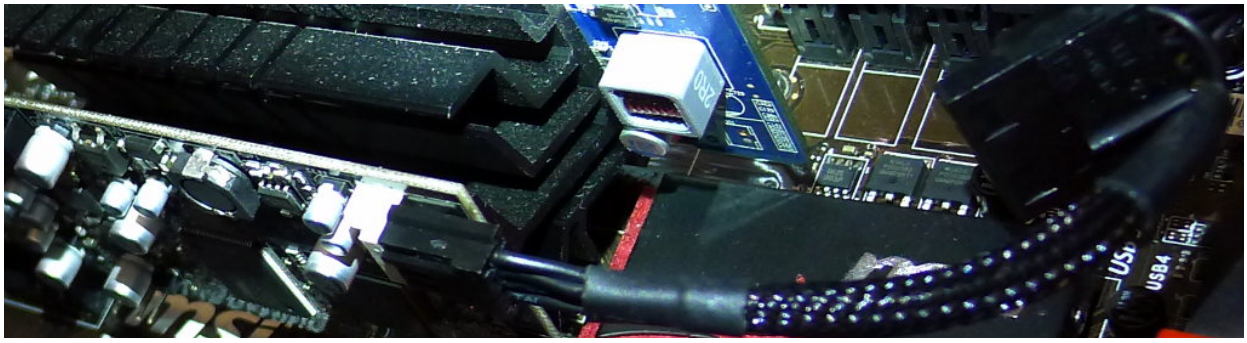
(https://delightlylinux.files.wordpress.com/2017/01/xonar7.jpg)

The full-height bracket shown here can be replaced with a half-height bracket (included) to accommodate smaller cases.



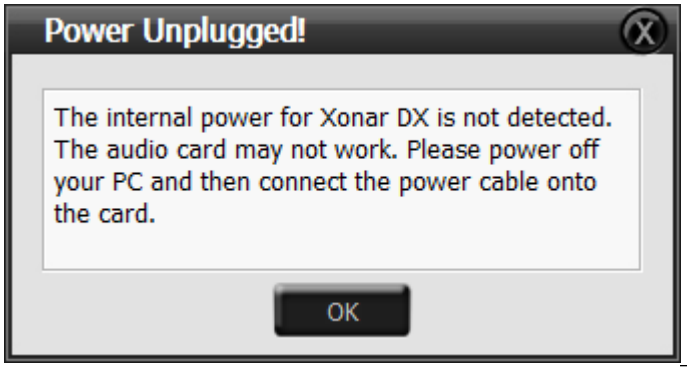
(https://delightlylinux.files.wordpress.com/2017/01/xonar8.jpg)

A pictorial diagram illustrates the various speaker configurations. Besides 7.1 speaker arrangements, other combinations are possible. In Linux Mint 18.1 (**System Settings > Sound > Output > Output profile**), you can choose what kind of speaker arrangement you wish. Make sure that the software setting matches the connected speaker configuration.



(https://delightlylinux.files.wordpress.com/2017/01/xonar9.jpg)

Xonar DX installed in a system. A floppy power connector is required. The floppy connector is keyed, so there is no danger of connecting it incorrectly. Any standard 4-pin molex to floppy adapter will work.



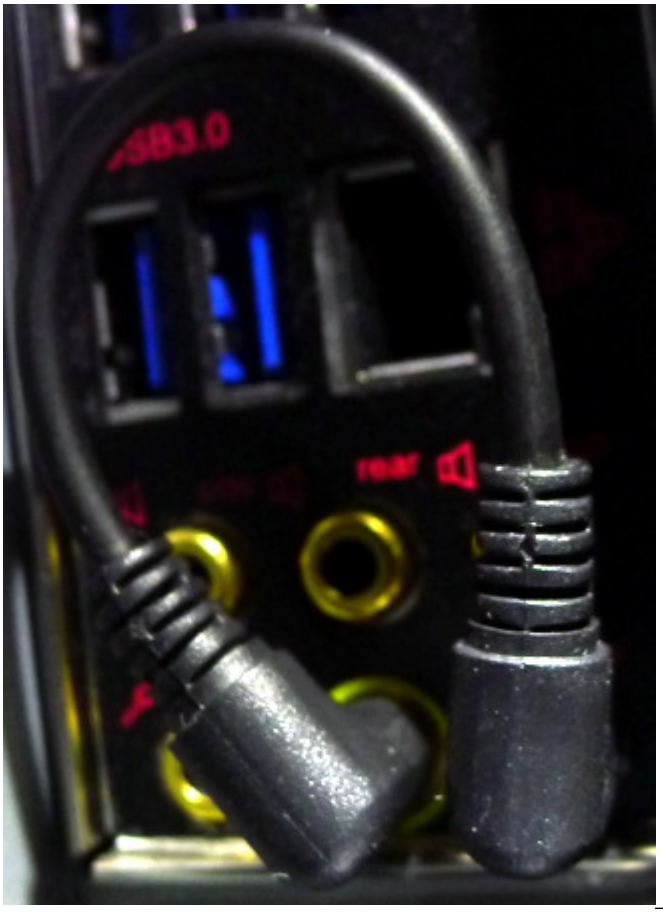
(https://delightlylinux.files.wordpress.com/2017/01/xonar10.png)

In Windows 7, this warning message will appear if the floppy power connector is not connected to the Xonar DX. It is easy to forget to connect the external power to the card no matter how many times you might read the instruction manual instructing you to do so. Do not worry if you forget it since the card will not be damaged. The Xonar DX simply will not work.

RMAA Test

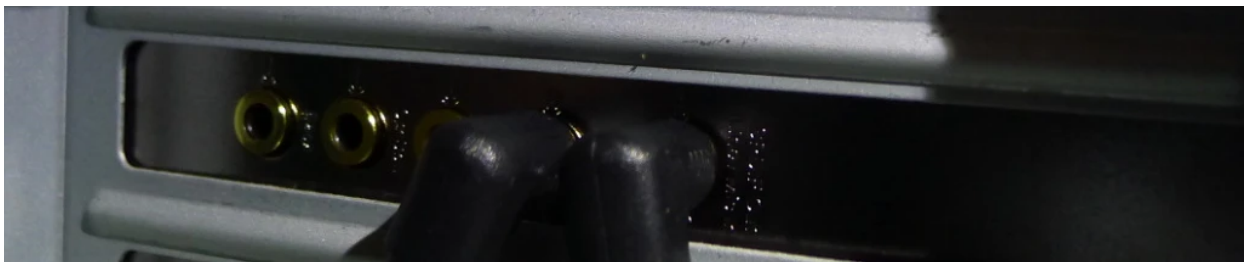
RightMark Audio Analyzer (RMAA) is a free sound card testing program for Windows that tests and reports on a number of sound characteristics. The driver CD-ROM includes version 6.0.6, but I downloaded the latest 6.4.1 version from the RightMark web site (http://audio.rightmark.org/products/rmaa.shtml).

However, RMAA requires Windows, so I installed the card in a Windows 7 system first. Windows 7 requires drivers. It does not detect and use the card automatically like Linux does. So, I downloaded the latest Xonar DX 7.0.8.1821 drivers from the Asus web site. After rebooting Windows 7 (that part never seems to change), the Xonar DX was ready for use.



(https://delightlylinux.files.wordpress.com/2017/01/xonar11.jpg)

To establish a baseline, I tested the motherboard ALC1150 audio first. RMAA requires that the line out be connected to the line/mic in. I used the smallest 3.5mm patch cord I could find to reduce potential noise/EMI introduction. Nothing exciting or heavy-duty, but it does the task. You must also adjust the input/output levels through the Windows software mixer to get the settings just right for testing. RMAA tells you when the levels are satisfactory and you can begin the test.



(https://delightlylinux.files.wordpress.com/2017/01/xonar12.jpg)

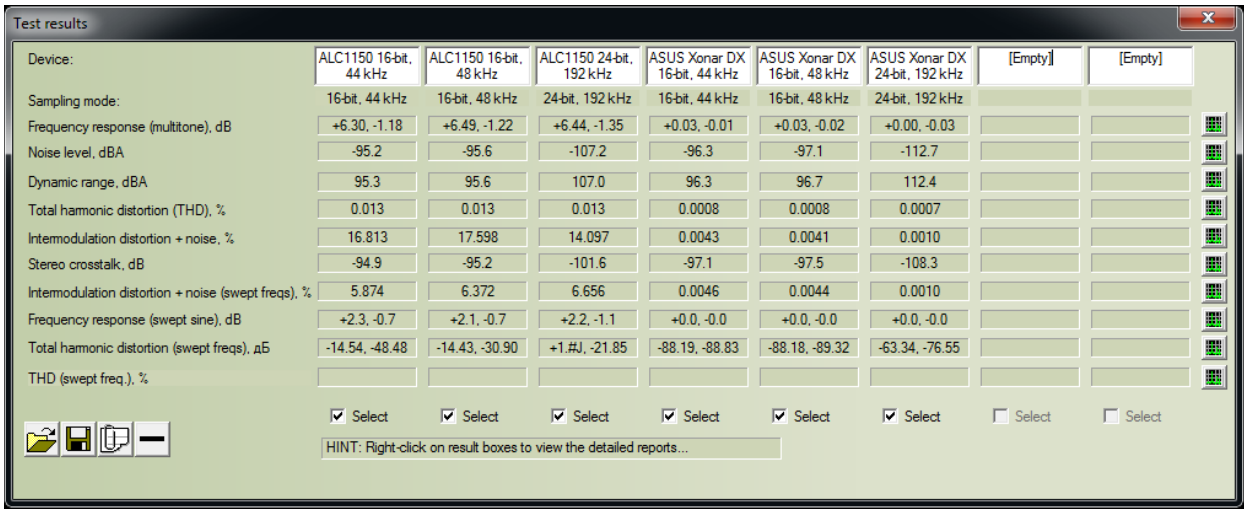
Using the same system with the same patch cable, I tested the Xonar DX (shown here) using the same method. I kept all software settings as similar as possible.

Test Results

Three test were important to me:

- 16-bit @ 44.1kHz
- 16-bit @ 48kHz
- 24-bit @ 192kHz

Each card was tested three times at these bit depths and sampling rates in order to test the signal-to-noise ratio, which varies according to the bit depth and sampling rate.



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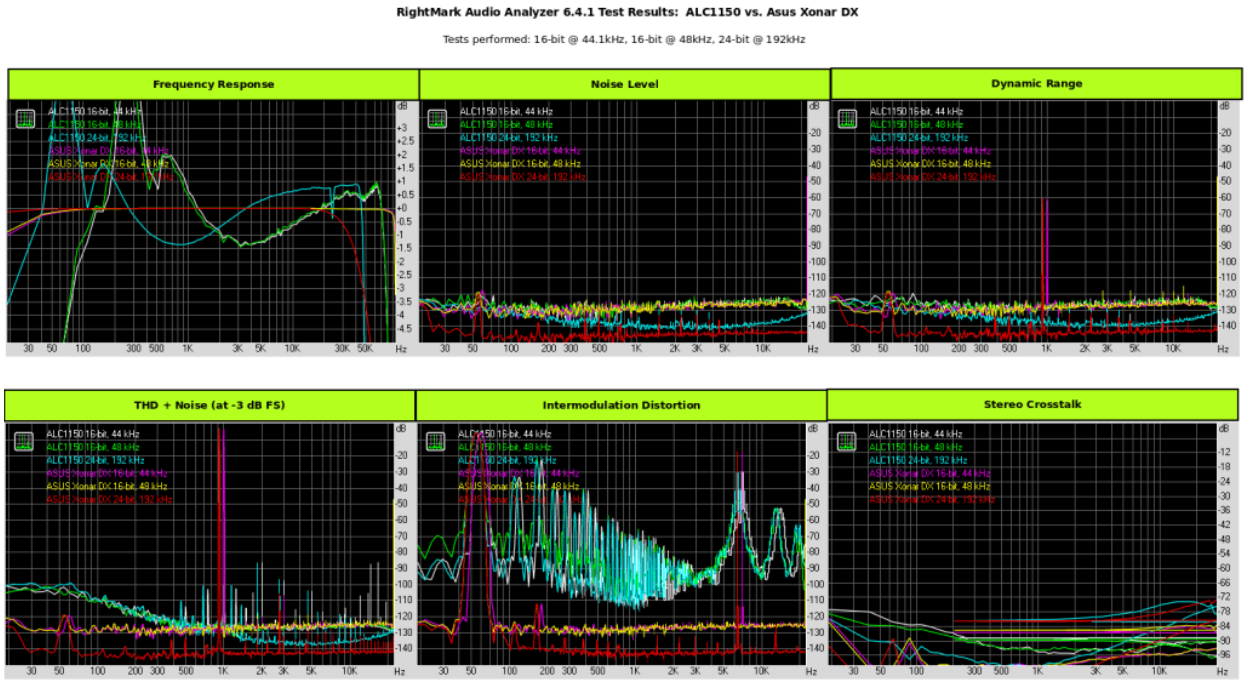
RightMark Audio Analyzer 6.4.1 Test Results: ALC1150 vs. Xonar DX.



(https://delightlylinux.files.wordpress.com/2017/01/test_results.png)
RMAA produces convenient graphs for visual comparison. In general, flatter lines and lower positions in the graphs are better.

In all tests, the Xonar DX beats the ALC1150. No question. The Xonar DX produces superior audio over

the motherboard's ALC1150.

What is most telling is the 24-bit, 192kHz result in every test. Especially visible in the Noise Level test, the Xonar DX at 24-bit/192kHz playback has the least amount of noise. This is great! The ALC1150 comes close, but its results are curved, meaning more noise appears at certain frequencies.

These tests also illustrate why I wanted 24-bit: Noise levels are lower at a higher bit depth, and 24-bit @ 192kHz produces good results in the noise level area. I did not test other sampling rates using 24-bits.

The ALC1150 has a hard time competing with a dedicated Xonar DX sound card. The ALC1150 results are close, but not good enough.

How is the Windows Sound?

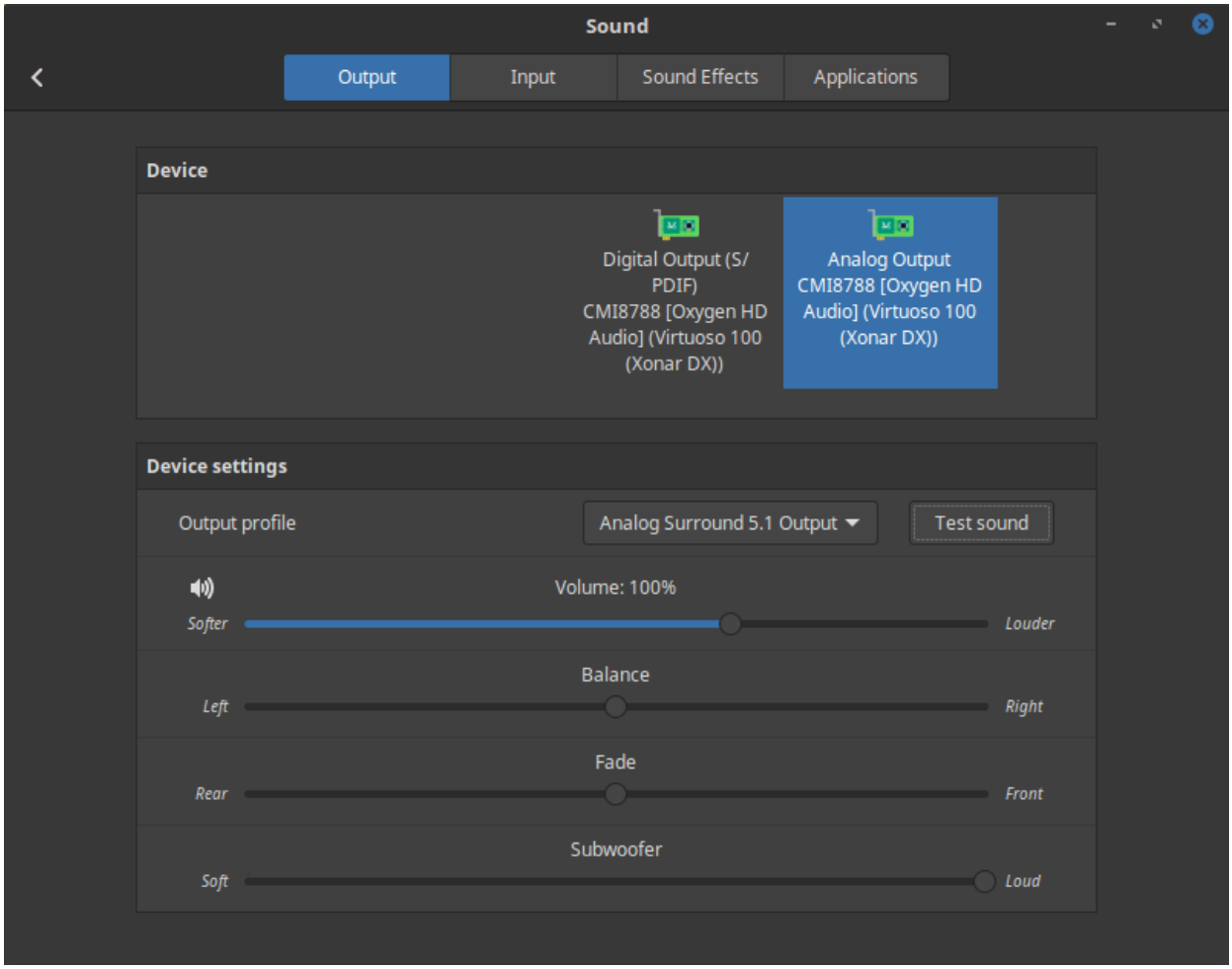
I tested the sound card in Windows by playing various music files and trying a few games. All sound produced by the Xonar DX in Windows was crystal clear without any background noise. I used an external, noise-free amplifier, so I did not plug headphones directly into the audio ports.

The Xonar DX drivers include system software containing equalization and special effect settings. I did not use these. My purpose requires noise-free stereo audio, so I ignored the gimmicks of 7.1 audio and bathroom reverberation.

Linux Usage

Now, it was time to use the Xonar DX for its intended purpose: high-quality sound in Linux Mint 18.1.

Summary: The Xonar DX is 100% compatible with Linux. Simply install it in the system and boot. *Easy!* Separate driver download and installation was not required during my usage.



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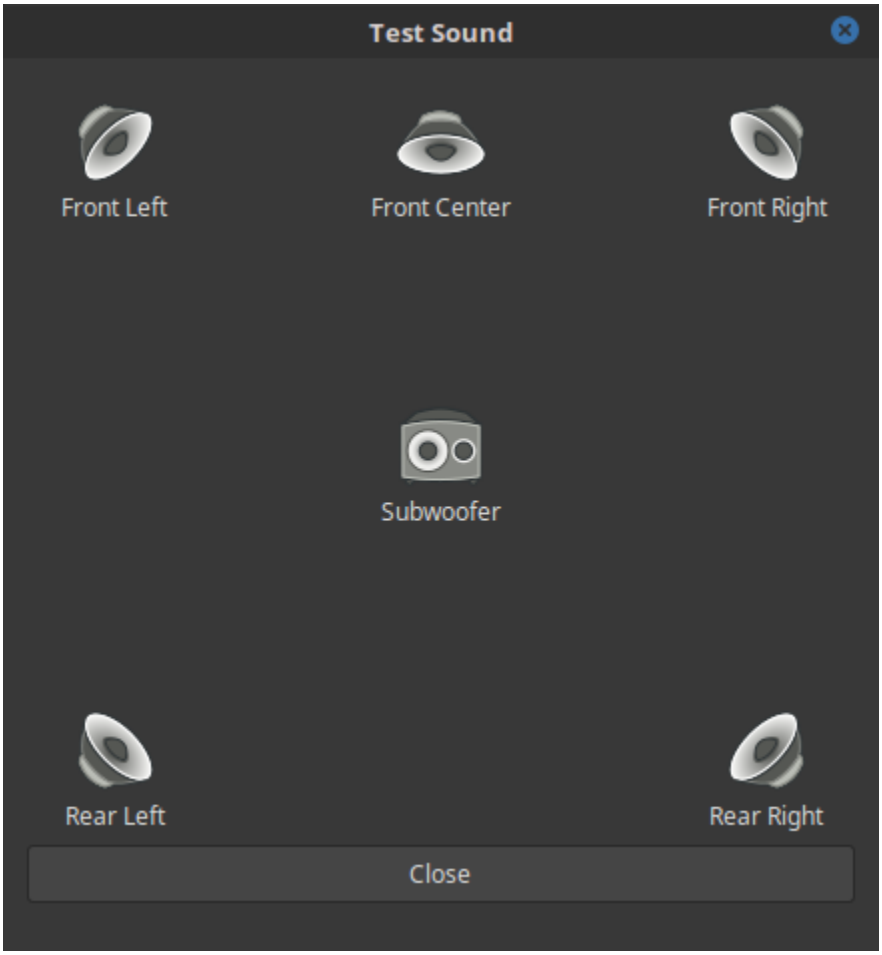
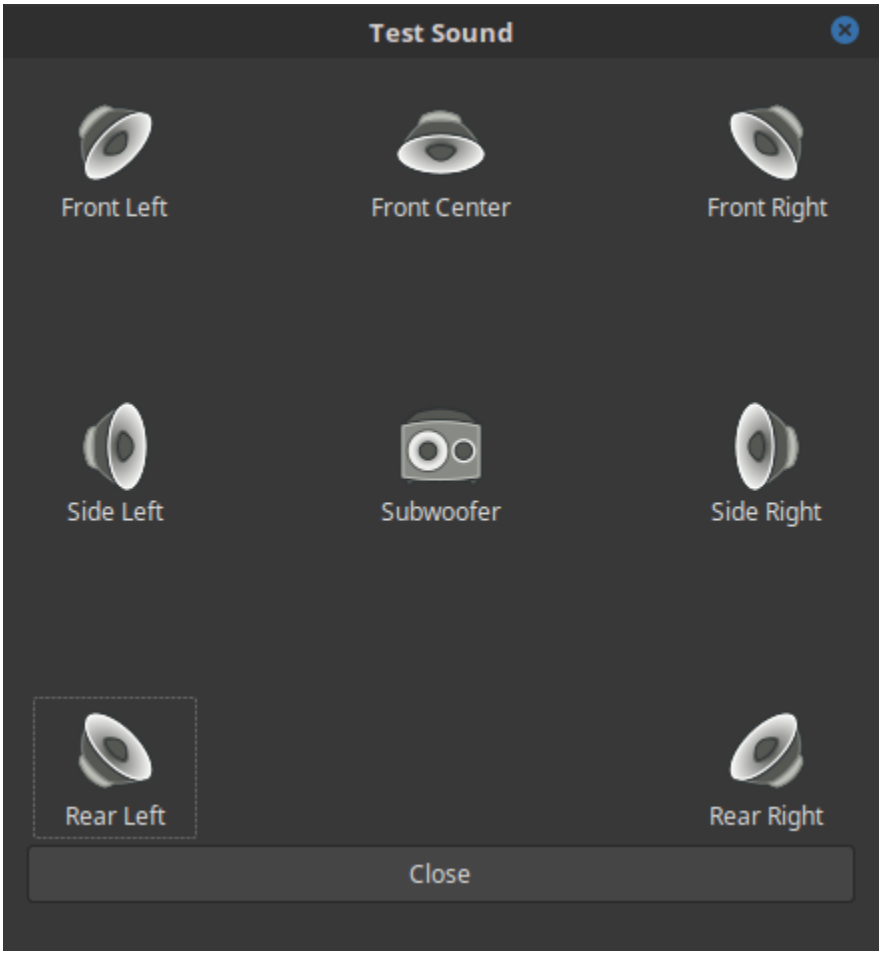
Linux Mint 18.1 Sound dialog in the **System Settings** automatically finds the Asus Xonar DX, which appears as "**Analog Output CMI8788 [Oxygen HD Audio] (Virtuoso 100 (Xonar DX))**" for the analog output. The Digital Output, if chosen, switches the card into optical output mode.

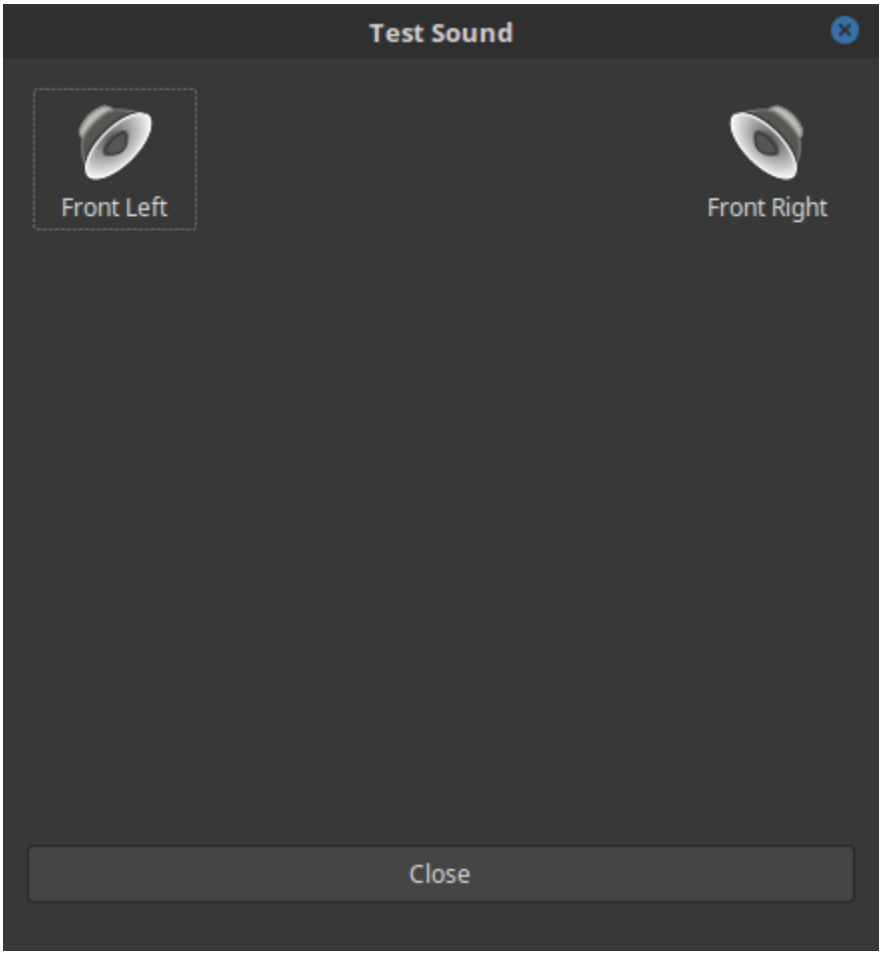
Output profile sets the speaker configuration for the card and determines which volume controls will have an effect. Shown here is the 5.1 arrangement. Simply select the profile you want from the dropdown list.



(https://delightlylinux.files.wordpress.com/2017/01/xonar14.png)
5.1 surround speaker test in Linux. This is useful for checking that the speakers are connected properly to their associated channels.



(https://delightlylinux.files.wordpress.com/2017/01/xonar15.png)
7.1 speaker arrangement in Linux Mint 18.1.



(https://delightlylinux.files.wordpress.com/2017/01/xonar16.png)
2.0 stereo.

Listening. What Does it Sound Like?

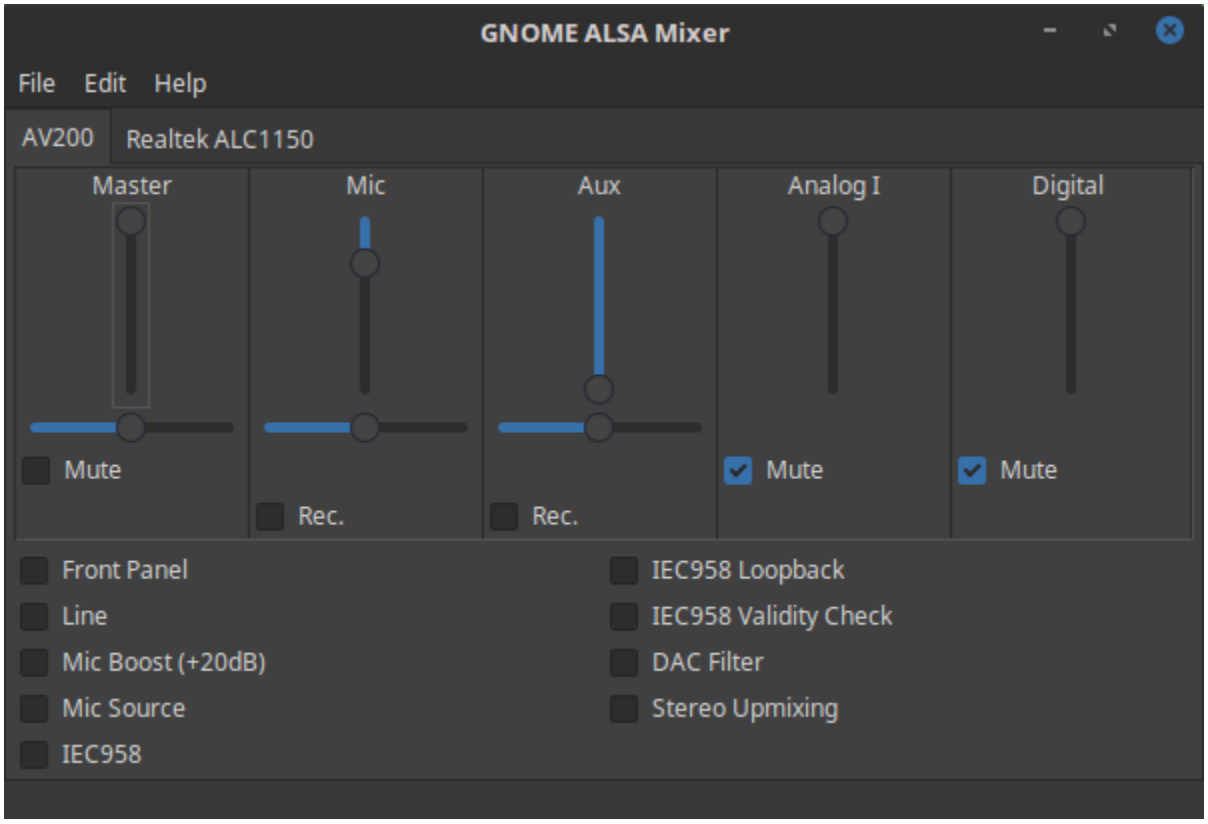
Too Quiet

Benchmarks are fine, but the main test is how does it sound? The first time I played music with the Xonar DX, I was disappointed. For some reason, the volume output was too weak, yet the onboard ALC1150 audio was much louder at the same volume level. I had to turn the external amplifier up way, way high in order to hear anything. *What? Why?*

It turns out that this is not a fault of the card, but a Linux issue. However, the solution is simple to bring out the Xonar's true potential.

We need to use a different mixer, so install **GNOME ALSA Mixer**. The built-in Linux Mint volume controls do not control the Xonar DX adequately.

```
sudo apt-get install gnome-alsamixer
```



(https://delightlylinux.files.wordpress.com/2017/01/xonar17.png)

Open GNOME ALSA Mixer, select the AV200 tab, which controls the Xonar DX, and set the **Master** volume to 100%. The Xonar DX will now output sound at full blast.

Crystal Clear Sound

Coming from the ALC1150, the upgrade was not as drastically apparent as I thought it would be, but after playing various tracks recorded in different bit depths and sample rates, I began to notice finer details that I has missed before.

Cleaner Audio

The most obvious and most important feature for me was the cleaner audio signal. Whether plugging in high-quality headphones directly to the Xonar DX front output or through an external amplifier, I could not hear any noise. With all volume and amplifier volume turned up to max, all I could hear was silence. Pure, clear silence. There was no noise or hissing in the slightest. (Be careful not to play any sound when doing this.)

With and without an audio isolator, the sound was clear when connected in this way.

Using an Audio Isolator

When connecting a computer to an external audio amplifier or other audio gear, use an audio isolator between the computer and the first input of your audio equipment. This eliminates any form of hum, hiss, or noise that could ruin an otherwise good signal.

The Mpow Ground Loop Noise Isolator (https://www.amazon.com/gp/product/B019393MV2/ref=as_li_ss_tl?ie=UTF8&psc=1&linkCode=ll1&tag=delightlylinux-20&linkId=cf1d8de17e2639e4fb1f98df397938b8) works wonders for eliminating noise and producing a clean signal. It's inexpensive, and the filtered signal sounds as good as the original.

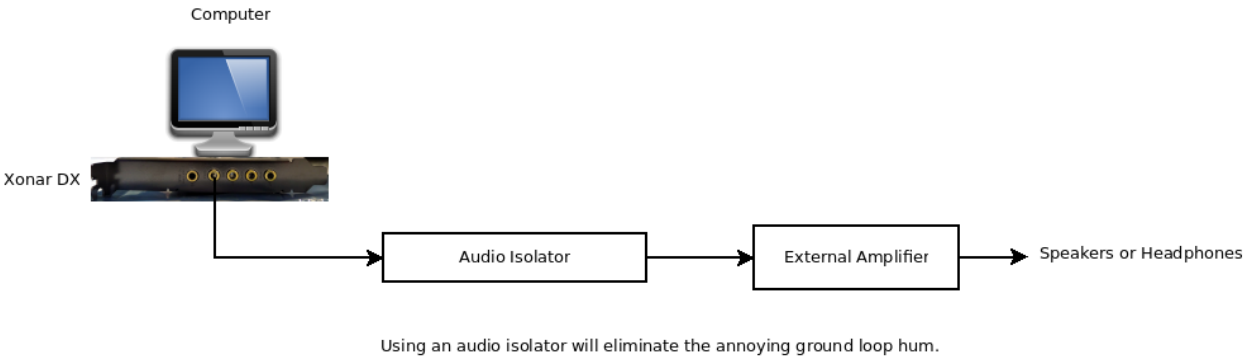
(https://delightlylinux.files.wordpress.com/2017/01/io1.jpg)
The Mpow audio isolator protects against the dreaded "ground loop hum."

(https://delightlylinux.files.wordpress.com/2017/01/io2.jpg)

It's a small device that requires NO power. Each end contains one stereo 3.5mm jack. Just plug a cable into each end, and it prevents hum and noise. Just make sure to place the isolator itself away from the computer or else it can pick up and reintroduce electrical noise into the audio signal.

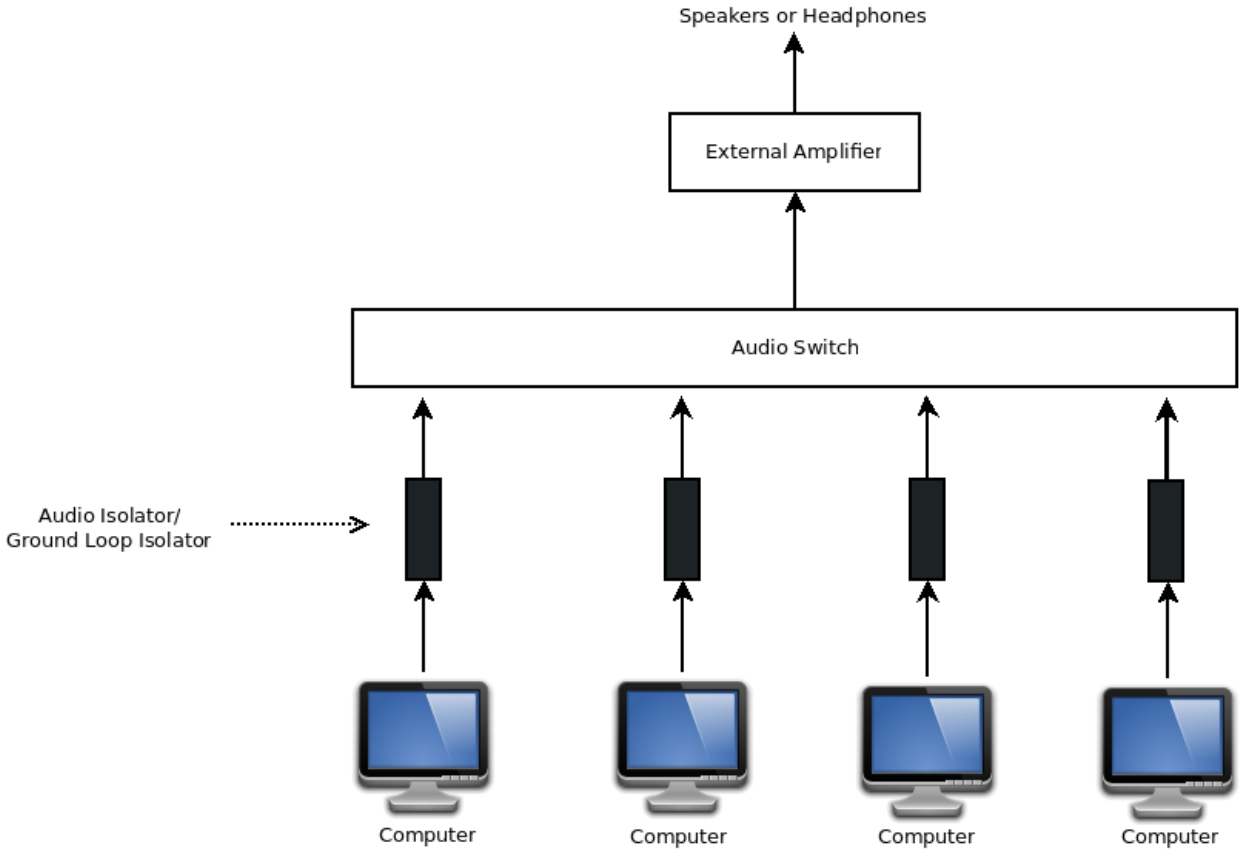
If connecting the audio outputs from multiple computers to an external receiver, use a separate audio isolator for each computer.

An audio isolator only applies to analog audio, not coaxial or optical digital.



(https://delightlylinux.files.wordpress.com/2017/01/io3.png)

Simply connect the audio isolator in series between the computer's audio output and the amplifier/receiver input.



(https://delightlylinux.files.wordpress.com/2017/01/io4.png)
When connecting audio from multiple computers, each audio output from each computer must have its own audio isolator to ensure hum-free sound.

PulseAudio and ALSA – Play back a file's native encoding.

"Hey, this is too easy. Can we use the command line?"

Yes. In fact, I had to perform a few customizations myself to get the Linux software to talk to the sound card in the way I wanted it to. No, there was nothing flawed with the card. It's just that Linux Mint 18.1 uses PulseAudio by default, which is good. I could leave it at that and be happy, but the card is capable of so much more.

The issue involves PulseAudio: No matter what music is being played, PluseAudio resamples the music to 16-bit @ 44100/48000Hz. Do you have a 24-bit FLAC file at 96kHz? Too bad. PulseAudio does not allow the file to be played at that rate even though the Xonar DX hardware is capable of it. PulseAudio resamples it to 16-bit, 48kHz and then sends it to the card. The Xonar DX is essentially playing a 16-bit, 48kHz file.

Observing the Current Playback Specs

We can see this in action with a few commands. First, get a list of current sound cards in the system.

```
cat /proc/asound/cards
```

You should see something like this:

```
0 [DX             ]: AV200 - Xonar DX
Asus Virtuoso 100 at 0xb000, irq 17
```

This means that the Xonar is named **card0**. If you have multiple cards in your system, then it might be card1 or card2. (This is why it is a good idea to disable the onboard audio in BIOS.) Remember **card0** or whatever it is for your system since we will need it later.

Another way to obtain the card id is with **aplay**.

```
aplay -l
```

You should see more details:

```
**** List of PLAYBACK Hardware Devices ****
card 0: DX [Xonar DX], device 0: Multichannel [Multichannel]
Subdevices: 1/1
Subdevice #0: subdevice #0
card 0: DX [Xonar DX], device 1: Digital [Digital]
Subdevices: 1/1
Subdevice #0: subdevice #0
```

card0 is the Xonar DX. We see two details for the same **card0**: one for **analog** and one for the optical **digital** output. They are treated as separate playback devices. One or the other is used at a time.

Watching the Xonar's Current Playback Info

Armed with the knowledge that **card0** is the Xonar DX (for this example), open a new terminal and enter,

```
watch -n1 cat /proc/asound/card0/pcm0p/sub0/hw_params
```

If no sound is playing, is should read "closed." This is normal. Now, play a music file using any audio

player you like. Music from a browser (YouTube, for example) will also work. The information updates each second to see kind of playback the Xonar DX is performing at the hardware level.

Playing different kinds of files will change the details.

By default, you should see something like this if playing a 16-bit, 44.1kHz, 320kbps MP3 file:

```
access: RW_INTERLEAVED
format: S16_LE
subformat: STD
channels: 2
rate: 44100 (44100/1)
period_size: 2736
buffer_size: 11024
```

Shown here is 16-bit 44kHz playback. If playing a 24-bit 96kHz FLAC, you might see the same but with a 48000Hz rate. This is because of PulseAudio's resampling.

Deciphering the Bit Depth

hw_params does not always specify the bit depth exactly as 16-bit, 24-bit, or 32-bit. We must use **access** and **format** to figure it out.

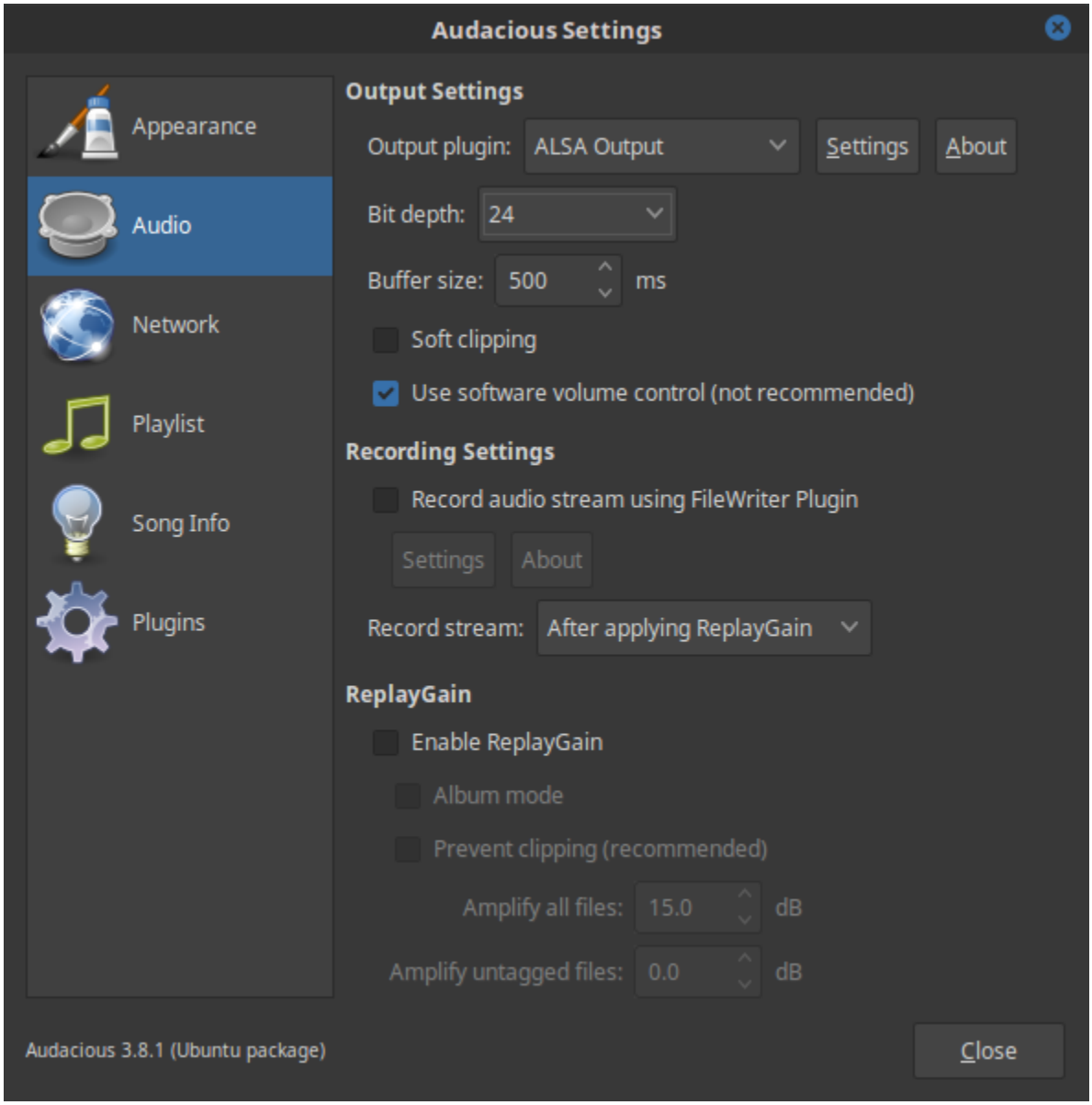
```
Bit Depth
----------------------------------------
Floating Point  MMAP_INTERLEAVED
                S32_LE

32-bit          RW_INTERLEAVED
                S32_LE

24-bit          MMAP_INTERLEAVED
                S32_LE

16-bit          RW_INTERLEAVED
                S16_LE
```

(S32_LE means signed 32-bit, little-endian. S16_LE means signed 16-bit, little-endian.)

These values were obtained by experimenting with the Audacious player. In Audacious, **Output > Audio Settings > Audio** lets you change the bit depth and output plugin as the music plays. This information is updated in real time.

Notice that Floating Point and 24-bit have the same values? How do we know which is which? As it is,

we cannot. The best guess is to manually set the bit depth to 24-bit in Audacious to know for certain.



(https://delightlylinux.files.wordpress.com/2017/01/xonar18.png)

The Audio settings in Audacious let you choose PulseAudio or ALSA. In the bit depth dropdown menu, we can select Automatic, Floating Point, 32-bit, 24-bit, or 16-bit to force a certain playback bit depth. I cannot tell much of a difference among them since the quality is good no matter which is chosen. It is almost impossible to distinguish among them when the source material is 16-bit.

Why ALSA?

Did you notice that, in Audacious under **Output Settings** in the image above, the output plugin was set to **ALSA Output**?

One of my goals was to play a music file directly in the format that it was encoded in without resampling. For example, a 24-bit, 96kHz FLAC should play as a 24-bit, 96kHz audio file without resampling down to 16-bit @ 48kHz. A 24-bit, 192kHz WAV should play as a 24-bit, 192kHz file, not a resampled 16-bit, 44.1kHz file, which is what happens in software when lesser cards are used.

To achieve this, we must set the output device as ALSA (Advanced Linux Sound Architecture). PulseAudio can be forced into a specific bit depth and rate, but it will play all files at the same rate, upsampling or downsampling as needed. Using ALSA, the bit depth and rate will change depending upon the file.

Set Up ALSA

ALSA should work directly, but if it does not, open **/etc/asound.conf** for editing.

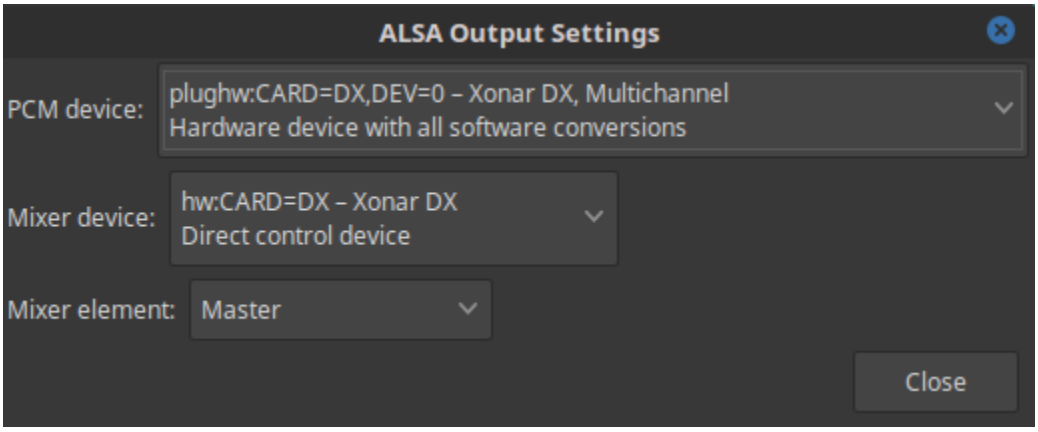
```
sudo gedit /etc/asound.conf
```

This file will probably be empty, so add these lines to set the default ALSA device as the Xonar DX.

```
pcm.!default {
    type hw
    card 0
}

ctl.!default {
    type hw
    card 0
}
```

Remember **card0**? Here is another place where we must use it. Replace **card 0** (include the space) with whatever number your sound card is. Personally, I reboot after doing this (yes, rebooting is a bad Windows habit).

If Audacious is still not playing through the Xonar DX, then you might need to manually specify the playback device in the **Settings** of **Output plugin** when ALSA Output is selected.



(https://delightlylinux.files.wordpress.com/2017/01/xonar19.png)

Set the Xonar DX for the PCM device. Many devices will appear, so trial and error is needed. For me, the selection shown here worked the best.

Different audio players (SMplayer, VLC) might need separate configurations. This is not necessary if you plan to use PulseAudio to handle everything automatically, but for my goal, this was a necessary step to get files to play in the formats they were encoded in.

The Result Was Worth the Effort

Playing a 24-bit, 96kHz WAV

```
access: MMAP_INTERLEAVED
format: S32_LE
subformat: STD
channels: 2
rate: 96000 (96000/1)
period_size: 5952
buffer_size: 24000
```

Playing a 24-bit, 192kHz FLAC

```
access: MMAP_INTERLEAVED
format: S32_LE
subformat: STD
channels: 2
rate: 192000 (192000/1)
period_size: 11904
buffer_size: 48000
```

Playing a 24-bit, 88200Hz FLAC

```
access: MMAP_INTERLEAVED
format: S32_LE
subformat: STD
channels: 2
rate: 88200 (88200/1)
period_size: 5468
buffer_size: 22052
```

Playing a 16-bit, 44.1kHz WAV

```
access: MMAP_INTERLEAVED
format: S32_LE (*See note)
subformat: STD
channels: 2
rate: 44100 (44100/1)
period_size: 2736
buffer_size: 11024
```

***Note:** This is a 16-bit file, but it is being reported as 24-bit playback. This is likely due to my editing of other configuration files.

In each case, the Xonar DX played the music file without resampling to a different rate.

No Volume Adjustment or Crammed at One End

"Okay, I switched to ALSA to do this, but now my keyboard volume control no longer works."

This is a side effect of the ALSA system. If your keyboard has a volume control on it, you will find that it no longer adjusts the volume as it did with PulseAudio. All of the volume seems to be "squished together" in the low end of the volume slider, making volume adjustment impossible.

This can be fixed in ALSA's configuration, but it involved more work than I wanted to do, so I employed an easier workaround. The audio player's volume control works fine, so I set that a little below maximum and then used an external amplifier to adjust the volume.

If software-based volume control is important (or from a multimedia keyboard), PulseAudio is the easier solution. However, you will return to the resampling issue.

Use a Constant Rate with PulseAudio

PulseAudio involves less hassle than ALSA, and the volume control works as it should. By default, PulseAudio plays everything at its default rate of 44.1kHz and downsamples anything higher to 48kHz.

We can force PulseAudio to play at a specific bit depth and rate.

Open PulseAudio's config file.

```
sudo gedit /etc/pulse/daemon.conf
```

By default, everything is commented out (**;** or **#** comments a line). Three items are relevant:

```
; default-sample-format = s16le
; default-sample-rate = 44100
; alternate-sample-rate = 48000
```

This is why PulseAudio defaults to 16-bit, 44.1kHz when playing 44.1kHz MP3's and defaults to 48kHz when playing 192kHz FLACs. By changing these values, we can force PulseAudio to use a specific bit depth and rate for everything.

```
default-sample-format = s24le
default-sample-rate = 192000
```

(s24le means 24-bit bit depth. s32le would be 32-bit. s16le is 16-bit.)

I also add this line for better audio quality, but it might consume more CPU time on lesser machines:

```
resample-method = src-sinc-best-quality
```

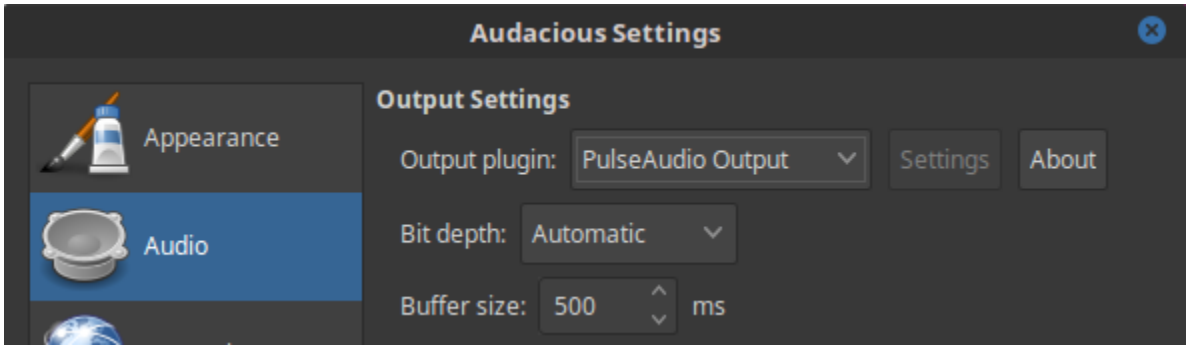
The default is,

```
; resample-method = speex-float-1
```

Save **daemon.con**f and restart pulseaudio by first killing its process and then starting it again. Make sure that no audio is playing when you do this. The **watch** output should read "closed" for best results.

```
pulseaudio -k
pulseaudio
```

In Audacious, you will need to change the Output plugin to PulseAudio or else ALSA will still be in effect.



(https://delightlylinux.files.wordpress.com/2017/01/xonar20.png)
Audacious will use PulseAudio during playback.

Observing the output, we see the 24-bit 96kHz settings specified in **/etc/pulse/daemon.conf**.

```
access: MMAP_INTERLEAVED
format: S32_LE
subformat: STD
channels: 2
rate: 96000 (96000/1)
period_size: 131072
buffer_size: 131072
```

No matter what the original file encoding might be, it will always be upconverted/upsampled or downconverted/downsampled to 24-bit, 96kHz. For example, a 16-bit, 44.1kHz MP3 will be upconverted to 24-bit, 96kHz.

This does not mean that the original MP3 file will magically sound better. In fact, it will sound the same as before. You cannot exceed the quality of the source. Whether you like the result or not depends upon your tastes, so have fun experimenting!

Other Questions and Answers

"Should I disable the motherboard's sound card?"

The Xonar documentation recommends disabling the onboard audio in BIOS. It does not matter. The Xonar DX will work in Linux whether onboard audio is enabled or not. Only the sound device chosen in the Sound dialog will be used. I recommend disabling the onboard audio in BIOS so it no longer appears as part of the usable Linux sound devices either in the GUI dialogs of the at the command line. It makes management easier by not having to wade through different sound card details.

"Why does the onboard audio sound louder than the Xonar DX? I'm disappointed!"

This happened to me as well. The ALC1150 produced louder sound output than the Xonar DX. Increasing the Linux sound mixer had no effect. We need to install the GNOME ALSA Mixer to set the card to a higher output level.

```
sudo apt-get install gnome-alsamixer
```

Or install it using Synaptic. In the AV200 tab, set the Master volume to max. The Linux mixer can then be used to adjust the audio volume.

"How does the Xonar DX compare to ALC892?"

No comparison. The Xonar DX is leagues superior. I performed listening tests with a system containing the ALC892 on the motherboard. The ALC892 produces a significant amount of noise even when nothing is playing. Low volume levels are okay, but any volume level above low-mid range makes background hiss appear.

Worse yet, when the volume is set at 100% on an external amplifier connected to and ALC892 system, every mouse movement creates digital noise, beeps, and buzzes that I can hear plainly through headphones and speakers. Moving a window? *Beep. Beep. Blimp!* Bumped the mouse cursor? *Beep. Beep. di-gi-di-gi-beep!* This is incredibly annoying.

The ALC1150 does not produce this bizarre interference effect, but there is still slight a hiss at high levels. The Xonar DX remains perfectly silent at 100% amplifier levels without introducing any noise. No hiss. No beeping. Nothing.

"I use cheap earphones. Will the Xonar DX help me?"

No. If you are using low-quality, El-Cheapo earbuds/earphones/speakers or a low-end amplifier that introduces noise into the audio signal, then a Xonar DX will not help you if you are already using the ALC1150. Your existing onboard audio should be enough.

In fact, when testing low-end earphones, there is almost no audio difference between the ALC1150 and the Xonar DX because the audio gear is the limiting factor. If your onboard sound is produced by the ALC892 or something similar, then you will benefit from the Xonar DX simply because it produces a cleaner signal with hardly any noise and it features better resistance to EMI in the audio signal.

If you are using high-quality headphones, such as the Sennheiser HD 800 (https://www.amazon.com/Sennheiser-800-Reference-Dynamic-Headphone/dp/B001OTZ8DA/ref=as_li_ss_tl?ie=UTF8&qid=1484334921&sr=8-1&keywords=sennheiser+hd+800&linkCode=ll1&tag=delightlylinux-20&linkId=bbde7bc2e8523ced5ff21ad3a09d82e9) or the midrange AKG K712 Pro (https://www.amazon.com/AKG-Over-Ear-Mastering-Reference-Headphones/dp/B00E4WXWBE/ref=as_li_ss_tl?ie=UTF8&qid=1484335180&sr=8-1&keywords=akg+k712&linkCode=ll1&tag=delightlylinux-20&linkId=0e53ac1d4dd12fa8ac4289d975b0e887), then **YES**, you *will* hear a difference. However, the difference might not be as distinct as you might think. The source material also matters.

"Describe the ALC892, ALC1150, and Xonar DX hiss."

With a noise-free amplifier connected to the line output of each sound device, I listened for hiss and any other form of noise. The amplifier did not introduce any noise into the audio signal. Pure silence at 100% volume.

ALC892 – Terrible. Loud hiss and background noise combined with digital jitter beeps from computer activity.

ALC1150 – Better than the ALC892, but not as good as the Xonar DX. Slight hiss was heard at full volume. For normal listening levels, this is negligible and music sounds fine. Those with better audio equipment will hear it, but those with lesser, El-Cheapo audio gear will wonder what the fuss is about.

Xonar DX – Pure silence. No noise whatsoever.

"Does Linux include special effects software and a custom management interface for the Xonar DX?"

Not that I can find. The Windows software has features for reverberation, for example, and an equalizer, but not in Linux. Linux sees a plain sound card. If software exists that performs the equivalent of what is available on Windows, then I have yet to locate it.

For me, this is fine since I never use software special effects feature anyway. They seem more like a gimmick than a practical solution. I value the card itself, and it delivers where it counts.

Special effects filters can be implemented in audio players, such as Audacious and VLC, or in external audio equipment, so this is not an issue.

Forcing the card to operate at a certain bit depth, for example, will require the editing of a few files.

"Where Can I Find High Resolution Audio Files?"

24-bit, 192kHz WAV and FLAC files exist as well as other encodings, and a number are in the public domain free for download.

http://www.2l.no/hires/index.html (http://www.2l.no/hires/index.html) is one site that offers free high resolution audio files for testing and sampling. These are reportedly true high-resolution recordings, not upsampled files.

The point to keep in mind is that just because a file is touted as "24-bit, 96kHz" does not mean that it was recorded directly as a 24-bit, 96kHz master. Files can be reconverted, upsampled, or processed, so double check the source.

Having 24-bit, 192kHz files does not guarantee better-sounding music, but, hey, if you have a quality sound card that can handle them, why not use them?

"Which sounds better: FLAC or MP3?"

By MP3, let us assume a 320kbps, 44.1kHz, 16-bit stereo file. Anything lower is definitely ugly to the ears and FLAC wins.

This unresolved debate continues today, and it depends upon who you ask. Personally, FLAC files sound slightly better, and I can hear a difference when using quality audio equipment. MP3s sound flat and dull by comparison – as if part of the color has been bled out.

Of course, this assumes that both were made from the same source and that both are playing back on the same hardware. However, the differences are most apparent when performing side-by-side comparisons. If hearing a music file by itself, it would be difficult to say for certain, *"Oh! That is a FLAC file!"* or *"Yes, I recognize an MP3 anywhere!"*

If using cheapie headphones, then no. Neither FLAC nor MP3 sounds better. Cheap earphones/earbuds produce cheap sound.

Whether playing FLAC or MP3 or any other format, the sound is excellent on the Xonar DX.

"Do I need a ground loop isolator for digital output?"

No. An audio isolator is for analog audio output, such as left/right stereo. A digital output, coaxial or optical, is not subject to interference the same way as an analog signal.

Conclusion

Simply put, this is the best sound card that I have used. It meets all of my goals perfectly with noise-free audio and 24-bit, 192kHz playback. I could not be happier! The Xonar DX has been around for a few years, but it continues to reign as a champion middle-range sound card.

Describing a sound card through written text and pictures is tricky. Sure, we can perform audio tests and show graphs, but the final decision is by how well it sounds and how well it plays with Linux.

In the case of the Xonar DX, both are met with stellar results. This is worthwhile upgrade over motherboard audio and a superb addition to a Linux system.

hardware , linux , Linux Mint , sound