iFi Audio xDSD Portable DAC/Amp Review

Carlo Lo Raso October 15, 2018

iFi Audio has developed a deep portfolio of audio products and accessories, many of which are focused on the personal audio space. The xDSD is their recent addition to this category that offers an enviable list of desirable features for the audiophile-on-the-go.

iFi Audio xDSD – Top view

Highlights

Introduction

iFi Audio xDSD – 3/4 view

As a company, iFi Audio has cultivated a devoted following of users that have found favor with their "out-of-the-box" thinking. They are a subsidiary of high-end UK audio company Abbingdon Music Research (AMR) which has been around since 2006. IFi itself was founded in 2012. The company is headquartered in Southport, UK with manufacturing facilities located in mainland China. Their product offerings focus mostly on the personal audio space, with items such as headphone amps and DACs, but also include a retro-infused integrated amp, a phono preamp, speakers, power and USB noise suppression gear and more. A number of their products also combine both tubes and solid-state components in their designs which may broaden the customer appeal. That combined with not your average run-of-the-mill aesthetics, certainly helps iFi's gear stand out from the crowd. The product that is occupying our attention for this review, the xDSD DAC/Amp, is very much in line with what iFi seems to specialize in: smaller form-factor gear that packs a lot of features and performance for the price. Let's go into a little more detail, shall we?

IFI AUDIO DAC/AMP SPECIFICATIONS

Design:

2 channel portable DAC with headphone amplifier stage.

DAC Chipset:

Burr Brown DSD 1793.

Inputs:

(1) USB Type-A, (1) combination mini-optical/coaxial S/PDIF, Wireless Bluetooth using either SBC, AAC or AptX Codecs.

Outputs:

(1) 3.5mm Analog Stereo Line Out, (1) 3.5mm combination Stereo and Balanced Headphone Out.

Sample Rates:

Up to 32-bit/384 kHz PCM and DSD256 with MQA support via USB. Up to 24-bit/192 kHz PCM via S/PDIF.
*Note that with a different available firmware, up to 32-bit/768 kHz PCM and DSD512 decoding can be unlocked via USB but MQA decoding will disappear.

Headphone Power Output:

500mW @ 16 ohms, 270mW @ 50 ohms, 48mW @ 300 ohms 24mW @ 600 ohms.

Line Output Level:

2.1 V @ 0 dbFS

Battery Capacity:

3.8 Volts/2200mAh.

Accessories:

USB 3.0 Type A long extension cable, USB Type A to Type B dongle, USB Type A to Type B short extension cable, TOSLINK to mini S/PDIF adapter, (2) rubber bands, Velcro adhesive strips, Velvet carry bag.

Colors:

Polished Aluminum

Dimensions:

95mm L x 66.5mm W x 19mm H

SECRETS Tags:

DAC, Portable, Headphone Amp, USB, Heaphone Amp Review 2018

Design

Fi Audio xDSD – Box
iFi Audio xDSD – With Shanling M0 DAP

Design-wise the iFi Audio xDSD is a very unique looking piece of kit. Not much larger than a standard deck of playing cards, the casing is made mostly of an aluminum/magnesium alloy with the back portion made from high-impact black plastic. The alloy portion is finished in a highly polished gun-metal look which is definitely eye-catching but it's also a fingerprint magnet, so be prepared to have a micro-fiber cloth at the ready. The xDSD has an array of five scalloped grooves running the length of the casing, on the top and the bottom. Besides adding to the aesthetics and the tactile experience, these grooves are sized just right for most fingertips and provide an excellent gripping surface to handle the xDSD and help avoid any unhappy accidents. Oh, and I almost forgot to mention the four little rubber feet that keep the xDSD from sliding around your desktop whilst sitting flat.

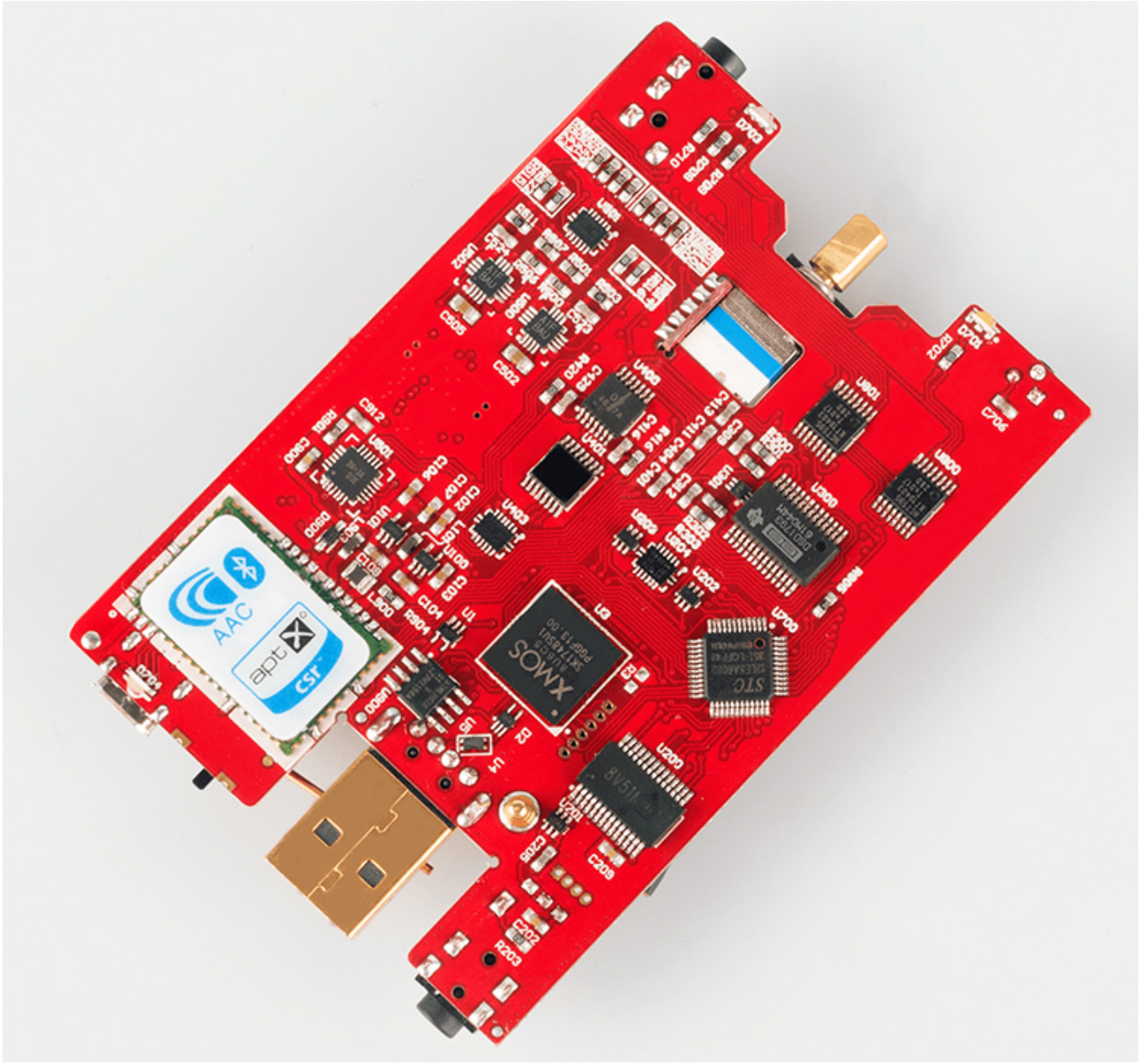
iFi Audio xDSD – Front View

The front face of the unit is laid out with the 3.5mm headphone jack on the far left. This connector accepts both standard and balanced headphone connections along with doing double duty as the line-out jack when the appropriate output mode is selected. Next, we have two stacked micro-LEDs to the right of the jack. The upper light indicates the sampling rate of the incoming signal and changes color depending on the rate (i.e.: Green = 44 – 96 kHz PCM, Cyan = DSD64 – 128, etc.) The lower light behaves the same, but changes color based on the input setting (Blue = Bluetooth, Green = USB or S/PDIF input). Next to these is the analog volume control dial. When raising or lowering the volume with a signal present, the center of the volume control changes color to help visually indicate how loud the volume is. Blue indicates the lowest volume level progressing through five color changes to red which is the loudest. White light here indicates the unit is in line-out mode where the volume control is bypassed, and no light indicates muting. Pushing this dial also turns the xDSD on and off. Pushing

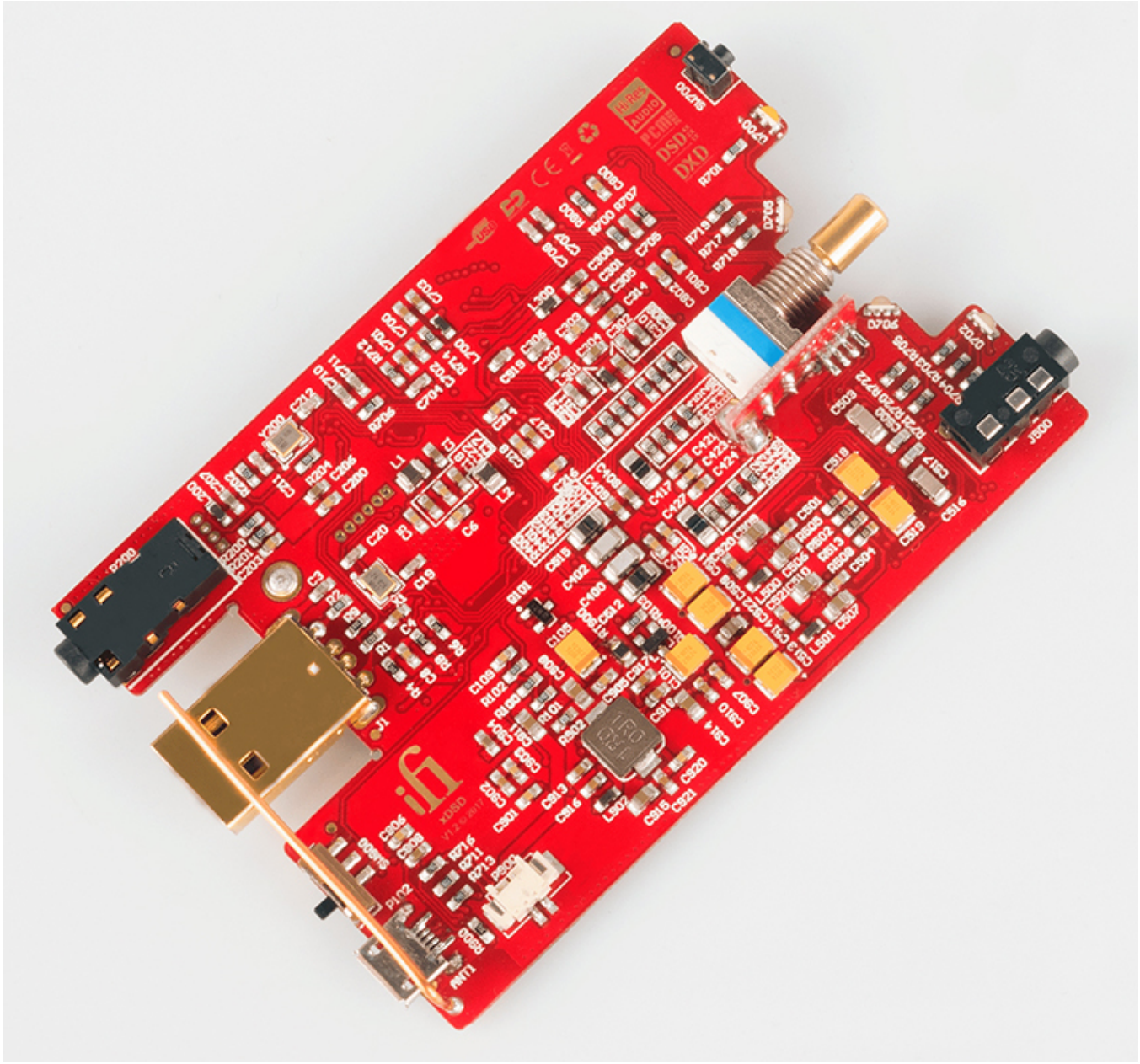
and holding this dial changes the input mode between Bluetooth and USB-S/PDIF. To the right of this dial are two more stacked, white LEDs. The top one shows when the “3D+” audio processing (an analog headphone cross-feed circuit) is active and the bottom one indicates when the “xBASS+” analog bass boost processing is active. To the right there is a small black button that toggles through the aforementioned processing modes. These modes can be used individually, in tandem or be completely disabled. This button, when used together with the ON/OFF switch can toggle the output mode between headphones and line-out mode.

iFi Audio xDSD – Back View

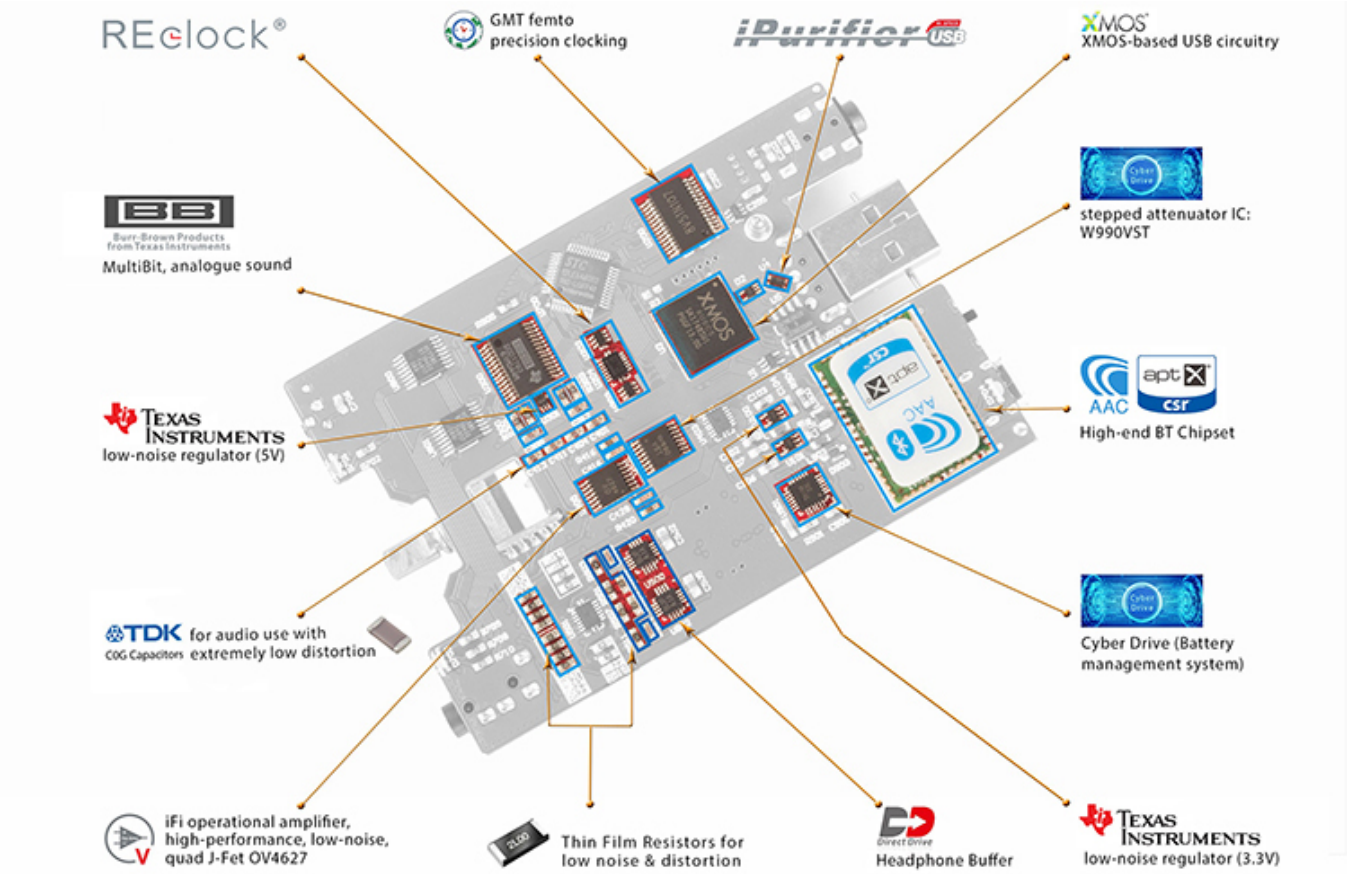
Looking at the backside of the xDSD, we have the mini-S/PDIF line input jack on the far left; the USB input jack follows that. Next to the USB is a slide switch that selects between two digital filters, labelled “Measure” and “Listen”. Lastly, we have the micro USB charging jack with a micro LED underneath to indicate charge level.



iFi Audio xDSD – PCB Bottom



iFi Audio xDSD – PCB Top



iFi Audio xDSD – Feature Details

The little xDSD will decode up to 24-bit/192 kHz PCM via the S/PDIF input and pretty much every conceivable PCM and DSD rate via its USB input. There are two firmware choices that are available to use with the xDSD. Version 5.30 allows MQA decoding to be done, which can be confirmed when the front sampling LED lights up in magenta, while version 5.20 drops MQA but adds 32-bit/ 768 kHz PCM and DSD512 decoding. The debate regarding MQA is an ongoing one that I won't get into here but I find it nice that iFi offers you this choice!

The iFi Audio xDSD uses a Burr Brown (now Texas Instruments) DSD1793 stereo DAC chipset. Originally released in 2003, the engineering notes confirm the chipset to have a typical SNR of 113db with a worst-case SNR of 110dB along with a worst-case THD+N of 0.003% in a typical installation.

The xDSD has a built-in rechargeable battery rated at 3.8V/2200mAh. I would leave it to charge overnight with a typical 5V/1A USB charger. On a full charge, I regularly got about 6 hours of mixed use from the xDSD

before it ran dry.

Well then, specifications are lovely but let's see how the iFi Audio xDSD stacks up in real world use.

Setup

For this review, the connected components consisted of: my Apple iPhone 6S Plus, a Shanling M0 portable DAP, a Microsoft Surface 3 Pro tablet running J. River Media Center 24 software, the optical output of my OPPO BD-105D Universal Player and a variety of different headphones that I will mention throughout various points in the review. A custom Windows audio driver can be downloaded from iFi's website that allows ASIO operation when the xDSD is used with a Windows computer. No additional driver is necessary for Macintosh computers.

In Use

iFi Audio xDSD – With Shanling M0 DAP

From the moment I unboxed it and held it in my hands, I immediately knew that I liked the look and feel of the iFi Audio xDSD. It just feels good to manipulate and the size and weight of it are pretty much spot on for its purpose. The controls are easy to access and intelligently laid out making ease-of-use also very good. Bluetooth pairing with both my iPhone and my Shanling DAP was easy and straightforward (iPhone used the AAC codec while the Shanling connected via AptX) and the connection stayed solid with no drop outs.

The cables and accessories provided with the xDSD were good and are particularly suited if one was going to use this device with a computer or in a compact desktop system. It would be cool however if iFi also included both an iOS and Android compatible OTG cable set in the package. I expect most people who purchase this unit will do so to augment a portable device so including these two small cables would mean the xDSD could be used

with smartphones or DAPs to play bit-for-bit High Res music right out of the box. That being said, having my phone in one pocket connected via Bluetooth to the xDSD in the other was a convenient and decent sounding setup if you are content with near CD quality sound as the final output.

So, the all-important question, obviously, is how does the xDSD sound? By and large, very good. It is perhaps not the most neutral sounding portable DAC/Amp that I have ever heard but I think many people will enjoy the sound that they are able to get from the xDSD with most types of headphones. Now, I'm going to need to qualify that statement because this is where my personal bias as a reviewer comes into play. On various audio forums and in their own product literature, iFi Audio makes no bones about targeting a more "analog sound" in their components. They make free use of tubes in some of their items and have said that they favor using older generation DAC chips in products like the xDSD because they feel that they sound better, or more "analog" as the case may be. As a reviewer, I have no problem with this. iFi is being very transparent and upfront in telling consumers what they are after and why they make the design choices that they do. When someone says to me that they are after a more "analog" sound they typically mean a warmer reproduction, similar to vacuum tubes. Personally, when it comes to DACs, I favor transparency, accuracy and fidelity. That's just my personal preference. Some may consider that to mean that I enjoy a more "clinical" or "digital" sound but I've never bought into that categorization. It is simply what appeals to my ear.

Now that you know all that, where does that leave us with the xDSD? Well, it is quite pleasing to listen to and the sound quality it puts out has a certain warmness to it that I can see a lot of people really liking. When I subjectively compare the xDSD to the sound of my OPPO HA-2SE, the OPPO comes across as cleaner and more neutral to my ears. This may have more to do with the tuning of the analog output stage more than the actual DAC chipset itself. When I used the xDSD as a stand-alone DAC, with the separate line-out jack attached to my reference system, the same sound signature translated through to my speakers. I find this sound

characteristic less objectionable over headphones but it's not something I personally care to hear in my main system. It's just a matter of taste.

In terms of headphone drive capability, the iFi Audio xDSD did quite well with most of the headphones and IEMs that I paired with it. My NuForce Primo 8 IEMs which are adept at picking up power supply or other noise in headphone amps, sounded excellent through the xDSD with no other sound beyond musical content being relayed. The xDSD paired well with my OPPO PM-3 headphones, the Blue Lola, my AKG K242-HD headphones and the HiFiMAN RE2000 IEMs. None of these choices are overly difficult to drive and the xDSD amplifier section kept a thorough grip on all of them with a variety of musical content. My two more demanding headphones, the HiFiMAN HE1000v2 and the Beyerdynamic DT880 PRO 250 ohm sounded decent with the xDSD but I found myself just about maxing out the volume with both of these cans. The bass also did not sound as controlled as it could have been on these needier headphones. My OPPO HA-2SE, using its High-Gain setting had no issues driving the same two demanding headphones and they both sounded exceptional at a half turn of the volume knob. I found this situation surprising as, on paper, the xDSD's headphone amp puts out more maximum power at 16, 32 and 300 ohms than the OPPO is specified to. The OPPO has a slightly larger battery capacity but I don't know if this would play a part in the difference that I heard. Perhaps iFi's recently announced xCAN portable headphone amp, which was previewed at Munich High End and has a similar form factor to the xDSD, will be the more suitable choice for more difficult to drive headphones.

The xDSD sports two analog processing enhancements which are "3D+" and "X-BASS+". The former is essentially a cross-feed circuit that aims to simulate the sound of listening to speakers, over your headphones, and the latter is a bass-boost circuit. The effects of these two modes, which can be used either individually or in tandem, will vary depending on the headphones used. I found the effects subtle but most noticeable with open backed cans and, at their best, they seemed to work as advertised. I typically am not a fan of such embellishments and I usually left them off

for my critical listening, save for one particular situation. I have a pair of V-Moda Crossfade M-100 headphones that I don't use that often. They sound decent enough, but I find the additional spaciousness that they are tuned to provide to be more of a distraction in normal music listening. When I sampled them with the iFi xDSD, I experimented with the "3D+" processing and found that it made the sound of the M-100s much more to my liking. It significantly cleaned up the imaging making music sound more natural while still retaining a sense of openness. It was a dramatic enough improvement that that I didn't want to listen to the V-Modas without the xDSD and "3D+". What an unexpected and welcome surprise that the M-100s and the xDSD became a regular pairing that I would choose to listen to throughout the review!

When switching between the two digital filter selections marked "Measure" and "Listen", I heard absolutely no difference in any of the content that I listened to. Whether listening though headphones or connected to my system via the line output, I could not discern any change in the music I was hearing. So, I just left the filter in Listen mode and pressed on.

Both the USB and S/PDIF inputs worked just fine when I used the xDSD in my reference system as a DAC. I measured the output at the line out jack with a voltmeter and it registered at 2.1 volts which is plenty of output to drive just about any modern preamp out there. Using the USB input, the iFi xDSD played just about every format and bit depth that I could throw at it with no hiccups, this included 768 kHz PCM, with the right firmware. The highest bitrate DSD files I have are in DSD128 (5.6 MHz) and the xDSD played them natively without an issue. When connected to my Surface tablet and with using the up-mixing feature in J. River Media Center, I was able to play DSD256 (11.2 MHz) bitrates successfully as well. I was not able to get DSD512 (22.6 MHz) bitrates to work without a fair amount of stuttering during playback. I do not have any MQA encoded files, so I did not test that capability.

Some of my playlist selections that I found particularly enjoyable in my time with the iFi Audio xDSD were:

Joe Bonamassa *"Live from The Royal Albert Hall"*

Joe Bonamassa, Sloe Gin, Live from The Royal Albert Hall, Provogue Records, 16/44.1 FLAC. A great live recording and this track in particular has a ton of atmosphere and presence. I particularly enjoyed listening to this when I paired the xDSD with my AKG K242 HD headphones. To me, the sound signature of the xDSD mated really well with these cans as I have found them to sound a little on the bright side.

IFi's little DAC/Amp smoothed them right out allowing me to really get into Bonamassa's searing guitar work without wincing. The xDSD had more than enough power to keep good control over these headphones as the bass lines sounded nice and punchy. The soundstage was well sized, giving a good impression of the acoustics and space in The Royal Albert Hall.

Freddie King *"King of the Blues"*

Freddie King, Ain't No Sunshine, King of the Blues, EMI, 16/44.1 FLAC. Keeping with the blues theme, this was the song that came up on my shuffled playlist when I first tried the V-Moda Crossfade M-100 headphones with the xDSD. The guitar solo in this song is, in fact, three separate Freddie King solos but each is assigned to its own channel, Left, Center and Right.

While listening normally, the parts sounded distinct but seemed merged more towards the center of the image. When I engaged the "3D+" processing, the guitar parts separated and became much more distinct in their respective channels. The difference this processing made with these headphones was somewhat startling, but much appreciated. The rest of the song maintained that fantastic imaging, sounding big, bold and fun with really good clarity.

Latin Jazz Trio *"Mujaka"*

Latin Jazz Trio, Mujaka, AIX Records, 24/96 FLAC. Another one of Mark Waldrep's outstanding High-Resolution recordings. This track stood out

best when the xDSD was paired with my mainstay OPPO PM-3 headphones. The OPPOs proved to be an easy load for this little DAC/amp and it kept the planar drivers busy reproducing the delicious dynamics and great transients from all the percussion instruments.

That warm sound from the xDSD also melded well with the lovely clean-sounding piano work. The great ringing decay from the notes was still all there, just with a slightly different flavor to it. Plenty of power from the xDSD to relay the right weight from those lower register piano notes and congas too.

Amber Rubarth *"Novocaine"*

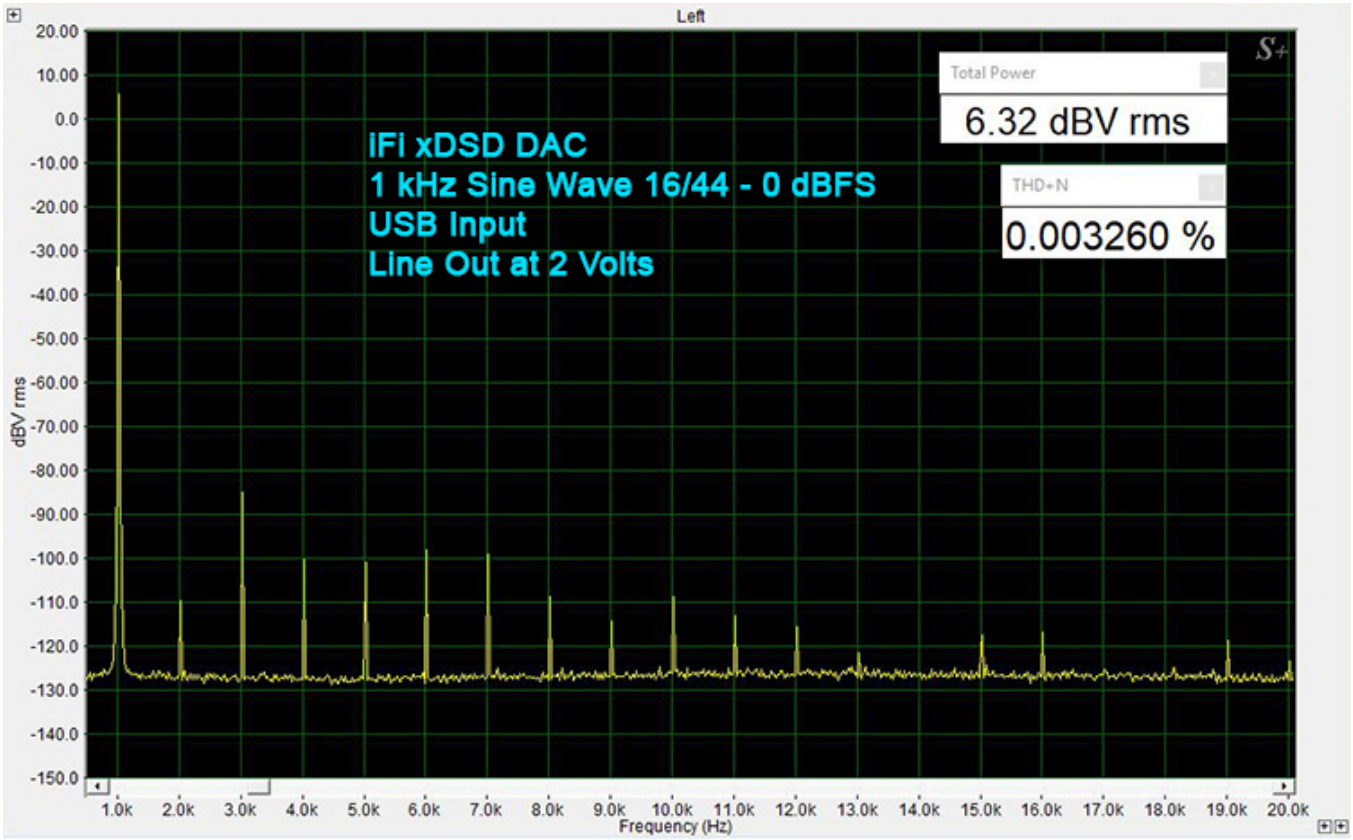
Amber Rubarth, Novocaine, Sessions from the 17th Ward, Chesky Records, 32/768 kHz PCM. Back to the V-Moda headphones with this track and it proved to be an excellent combo with this binaural recording. At various points, violins, the cajon box playing and stand-up bass all appeared to come from well outside the headphone boundaries. All this was happening while Rubarth's vocals and acoustic guitar were imaged dead center.

As before, engaging the "3D+" processing seemed to bring everything into tighter focus. Still a great big soundstage but all the elements were placed much more precisely. Add that, along with the fact that the little xDSD was playing this audio file, via USB, natively at 768 kHz PCM without missing a beat and you've got yourself a good sounding and capable little box.

On The Bench

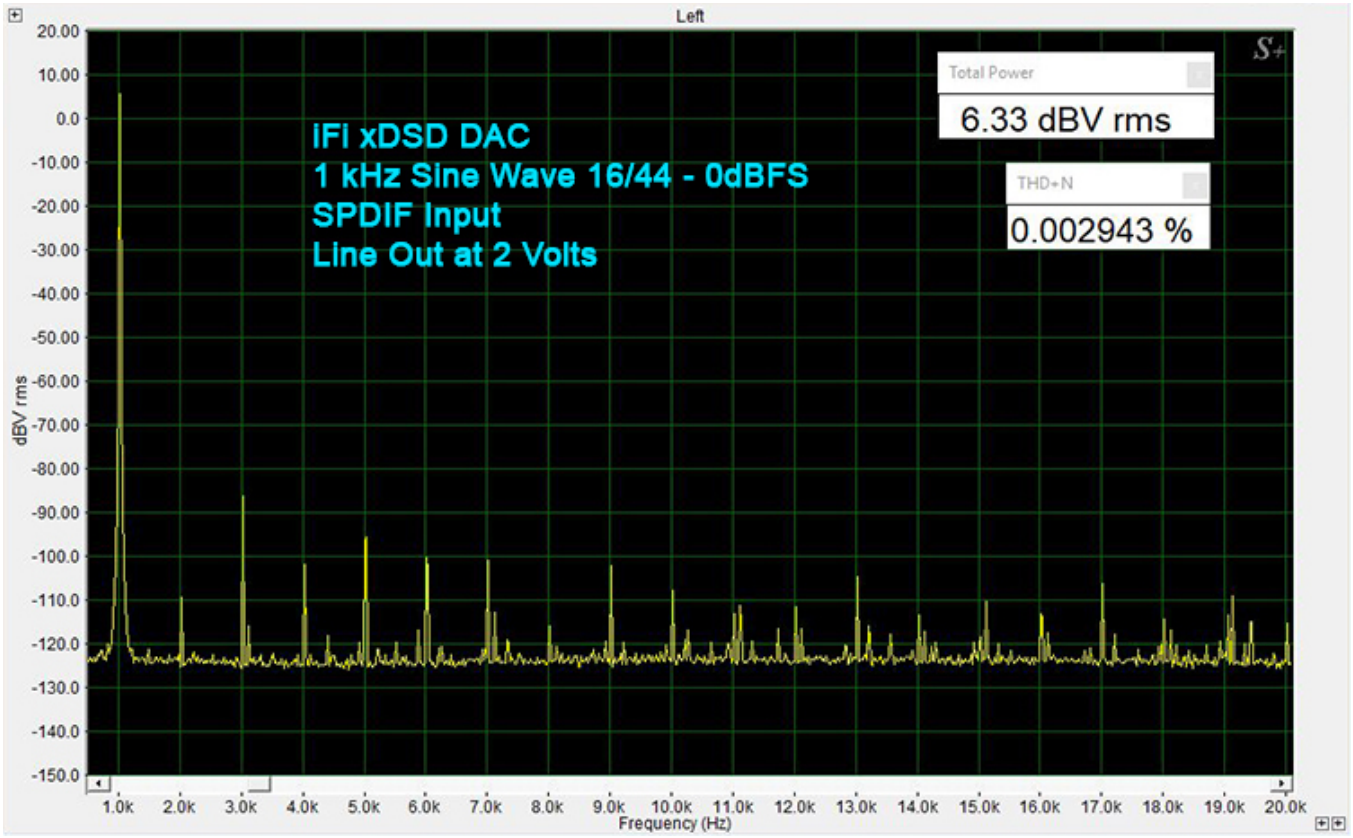
Benchmark audio tests were conducted on the S/PDIF and USB digital inputs of the iFi xDSD DAC/amp. Various custom digital test tones were sent through the xDSD using an OPPO BDP-105D and a Microsoft Surface PRO 3 as the source. The xDSD was set to Line Out mode (bypassing the headphone amp section) and the output was measured with SpectraPLUS audio measurement software via a LYNX TWO B professional sound card. A 1kHz 0dB test tone measured with a voltmeter at the analog output

produced exactly 2.1 Volts. Switching between the two digital filter settings on the xDSD produced no noticeable change in any of the measurements shown. Measurements were done with both firmware sets and there were no notable differences in the results. The measurements shown are from using firmware version 5.20.



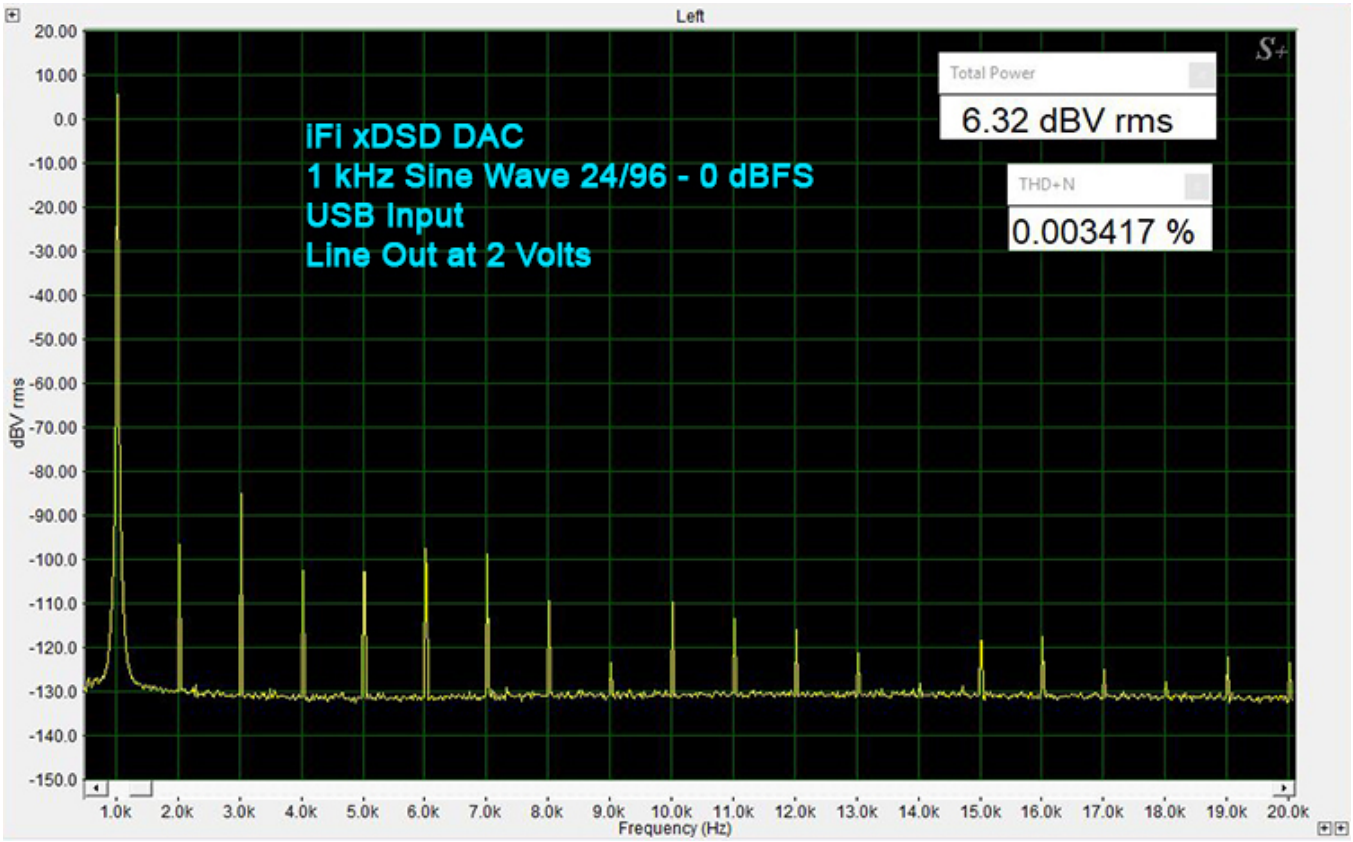
iFi Audio xDSD – 16-bit/44 kHz THD+N, USB

At 16/44, a 1 kHz test tone at 0 dBFS applied to the USB input gives us a THD+N of 0.003260%. We see a number of harmonics throughout the spectrum with the (3 kHz) 3rd order being dominant at 84 dB below 2VRMS.



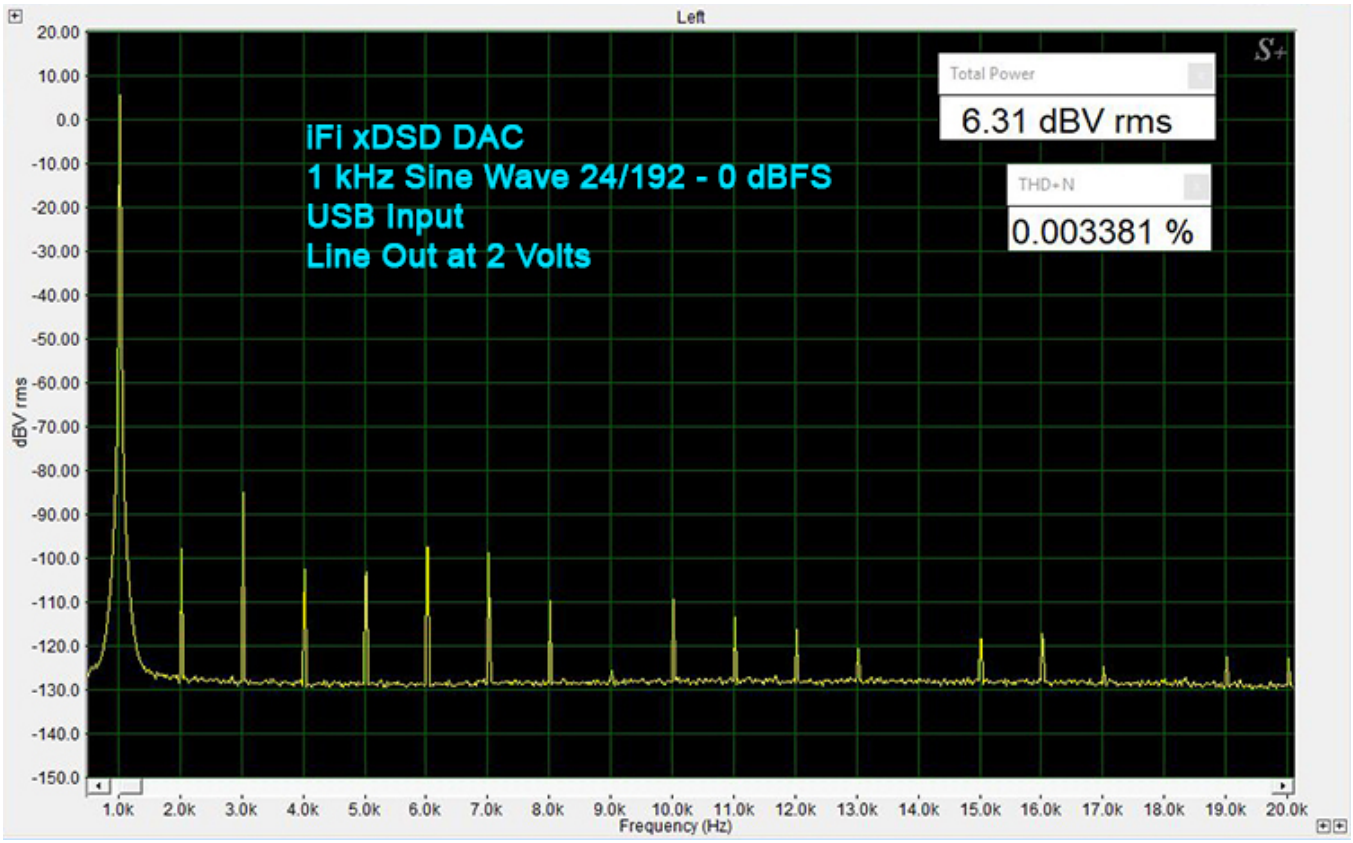
iFi Audio xDSD – 16-bit/44 kHz THD+N, S/PDIF

For comparison, when applying the exact same test signal to the S/PDIF input, we get a slightly lower THD+N of 0.002943% but we pick up a lot of additional noise spurs to go along with an almost identical harmonics structure. The remaining measurements were done with the USB input as that continued to be the cleanest of the two.



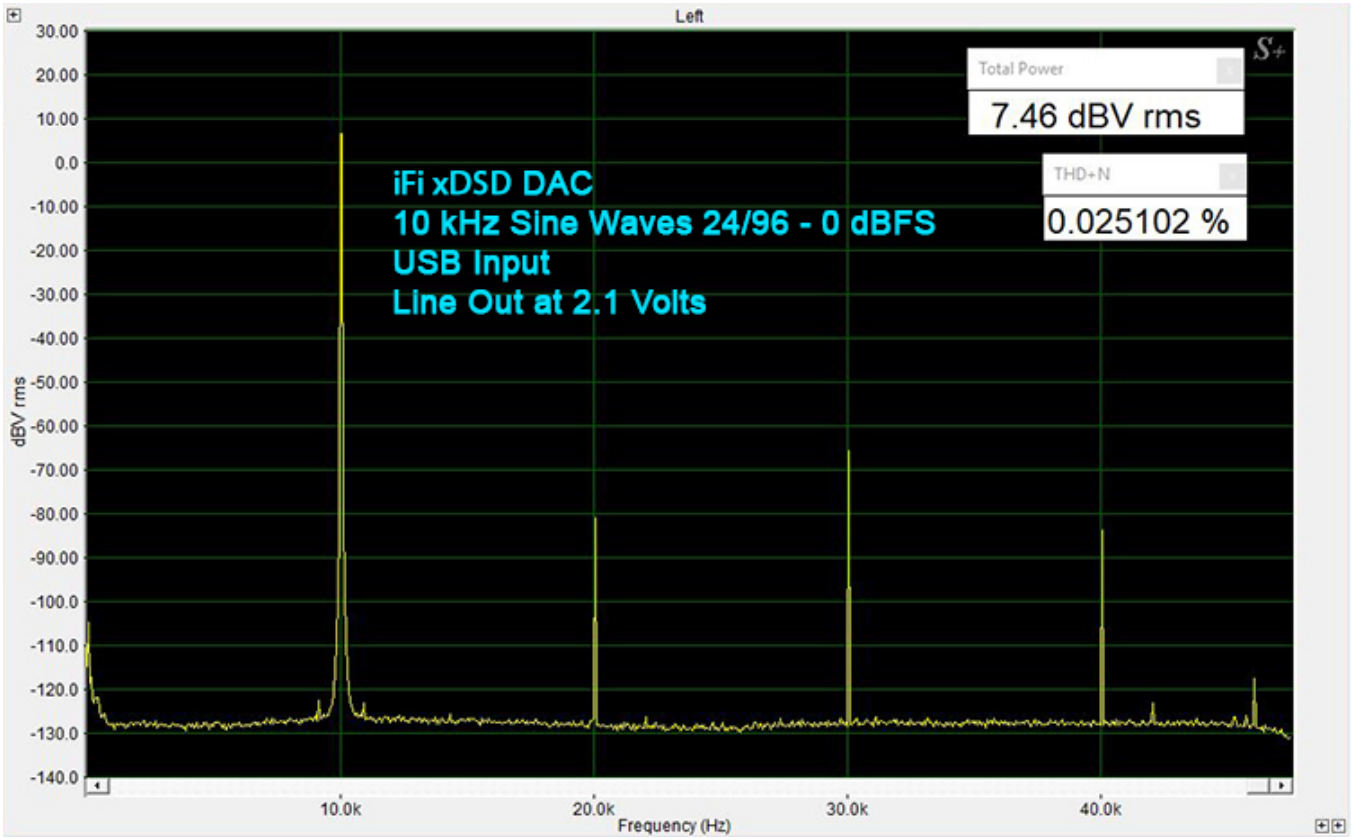
iFi Audio xDSD – 24-bit/96 kHz THD+N, USB

At 24/96, a 1 kHz test tone at 0 dBFS applied to the USB input gives us a THD+N of 0.003417%. We continue to see a number of harmonics throughout the spectrum with the (2 kHz) 2nd order at 96 dB below and the (3 kHz) 3rd order at 84 dB below 2VRMS.



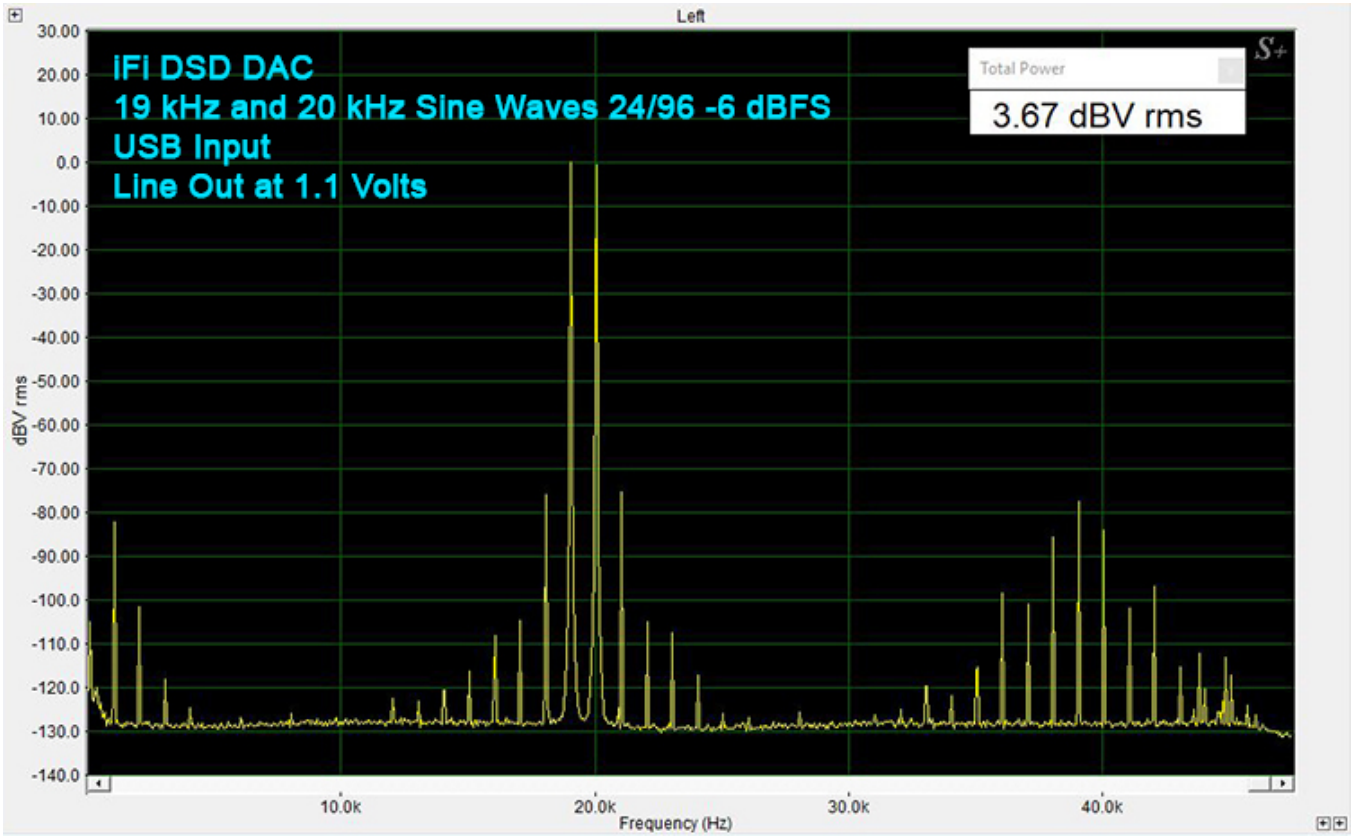
iFi Audio xDSD – 24-bit/192 kHz THD+N, USB

Continuing with 24/192, a 1 kHz test tone at 0 dBFS applied to the USB input gives us a THD+N of 0.003381%. A similar level of multiple 2nd and 3rd order harmonics populate the spectrum.



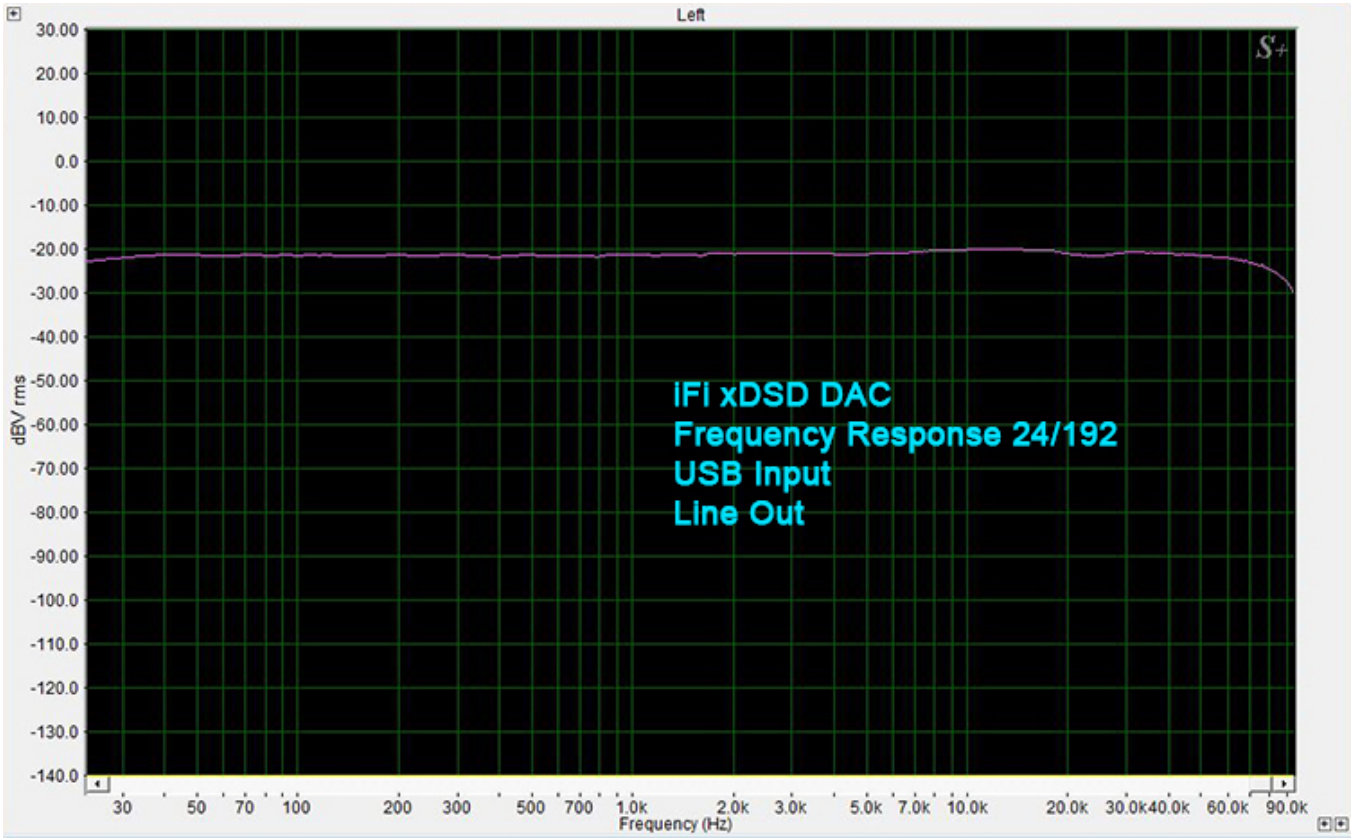
iFi Audio xDSD – 10 kHz THD+N, USB

With a 10 kHz test tone at 0 dBFS applied to the USB input, we see a THD+N of 0.025102%. The (20 kHz) 2nd order harmonic is 81 dB below and the (30 kHz) 3rd order is at 65 dB below 2VRMS.



iFi Audio xDSD – 19 and 20 kHz Combined Test, USB

Here are the results for 19 kHz, 20 kHz combined test frequencies using the USB input. There is a visible B-A peak at 1 kHz about 82 dB below 1.1 VRMS. We see a number of large distortion spurs throughout the spectrum. The second harmonics at 38 kHz and 40 kHz are about 77 and 83 dB below 1.1 VRMS.



iFi Audio xDSD – Frequency Response, USB

I measured the frequency response of the iFi Audio xDSD out to 96 kHz. Through the USB input, the response is flat until we see a very gradual 8 dB roll-off as we approach 90 kHz. The little dip in the response just above 20 kHz is an artifact of my measuring setup.

Conclusions

iFi Audio xDSD – Great music from a tiny setup.

The fine sounding XDSD packs a heck of a lot of audio goodness into its snazzy little chassis.

The iFi Audio xDSD is an admirable little digital “Swiss-Army-Knife” of sorts. It handles a plethora of audio formats and bit-rates and will drive many moderately sensitive headphones quite easily. It’s warm and appealing sound signature will certainly find favor with many a listener who gravitate to that sort of character. The big, lighted analog volume control is handy and, depending on the headphones you use, the two available audio enhancements can be effective. The aesthetics are both functional and eye-catching, looking like nothing else out there. At $399.00 the xDSD competes against a number of other similar products in the personal audio space, and more always seem to be coming as it is such a hot market segment. But, if you want something that looks unique and you enjoy a warmer “tube-y” sound through your headphones, then you

would do well to put the iFi xDSD on you short list to audition.