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iFi audio iDefender+ & iSilencer+

USB

The late 90s heralded a new era of data transfer when all of the serial communication transmission of data standard ports such as - RS-232, DE-9, DB25, PS/2 were gradually replaced by USB protocol. USB owes its universal success to the ability to chain all kinds of devices, power them, provide them with a relatively high data transfer speed, backward compatibility as well as due to its affordable implementation. However, even though USB protocol continues to develop, since it was designed as a general-purpose system, therefore, it does not offer you the best solution for your audio set-up.

What is wrong with the USB-signal for audio devices?

It must be understood that USB audio devices have much more demanding requirements for USB hardware and software layers than any other USB devices, such as printers, hard drives or flash drives.

Further, USB Audio Class 2 devices (2 Channels@32Bit/768khz) have even greater requirements due to the much higher throughput at high sample rates compared to USB Audio Class 1 devices (2 channels@24Bit/96kHz). They must run at a much higher speed even if only streaming lowly CD standard signals. The key issue is that USB Audio Class devices use 'Isochronous' transfers while other devices use 'Bulk/Burst mode' transfers.

What is isochronous mode?

"A sequence of events is isochronous if the events occur regularly, or at equal time intervals."

Source Wikipedia - https://en.wikipedia.org/wiki/Isochronous

The isochronous mode is used for media streaming because it guarantees bandwidth on the USB by scheduling one transfer per available frame. By comparison, Bulk or Burst transfers make use of 'leftover' bandwidth and may be 'choked off' if higher priority isochronous data transfers saturate the USB.

The isochronous transfer mode uses error checking but includes no re-transmission in case of Cyclic Redundancy Check (CRC) errors. Electrical noise on USB signals causes CRC errors and thus data loss, as does poor signal integrity. These lead to many potential causes of symptoms like audio signal distortion, artefacts (clicks/pops/crackling), and latency. It means that in order to reach the full potential of a USB audio device, the USB signal quality has to be excellent, and no CRC errors occur.

Note: Do not confuse 'asynchronous USB' with 'Isochronous,' an asynchronous USB system still uses isochronous mode to transfer audio.

How to improve it?

In the audiophile realm, we aim to reach as pure a digital stream from the PC to the speakers as possible. Given the issues and limitations designed into USB audio, it should come as no surprise that USB devices may be created that are found to improve the sound quality. iSilencer and iDefender address all of the issues mentioned above.

What is iSilencer?

The iFi audio iSilencer3.0 adapter is a device that eliminates interference in the audio signal generated by the USB port of a computer/music server/etc. It could be described as a USB filter that also reduces jitter, a phenomenon leading to the irregular delivery of data packets and resulting in cold and aggressive audio restitution. It plugs into any standard USB port on your device and removes noise from the signal as it passes through to the DAC. It can also act as a filter between a playback machine and an external hard drive where a music library is stored.

These are the extraordinary, iFi-designed technologies used in iSilencer:

1. Active Noise Cancellation® technology
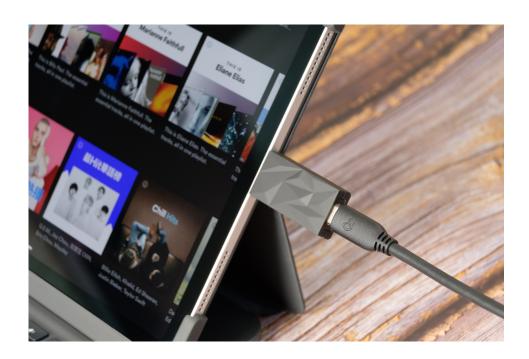2. Reduce jitter + packet errors

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3. REbalance® the USB signal
4. USB3.0 technology for optimal transfer

Active Noise Cancellation (ANC) reduces unwanted sound by the addition of a second sound wave specifically designed to cancel out the first. This basically results in no sound at all as it reaches unwanted sound even at the lowest frequencies. Passive noise cancellation is done by means of insulating filters and works best on the middle to high frequencies.

Lastly, it can be plugged into any empty USB port reducing the EMI. EMI is a type of interference caused by errant and unwanted electromagnetic waves that are received and amplified by an audio system. Using multiple iSilencers (and therefore the inbuilt ANC circuit) will double the noise reduction each time the number of units is doubled.

The New iSilencer+

iFi audio decided to improve on the previous generation of iSilencer. The all-new iSilencer+ is reinforced with the additional low ESR Tantalum capacitors for input and output filtering. It leads to 100% increase in input filtering capacitance and 84% increase in output filtering capacitance. In order to reduce the jitter even further, iSilencer+ offers the new gold-plated USB-C premium connectors.

iDefender

The iDefender3.0 plugs into your computer USB port and auto-detects if there is more than one earth and will 'intelligently' disconnect the computer earth for a cleaner sound. It eliminates ground loops that keep the DAC from functioning properly and compromise the transparency of the restitution.

On top of saving your computer from the unwanted earth, if your DAC is USB powered, iDefender3.0 can block the computer's power supply and replace it by an external power supply. Injecting clean power will ensure you get the maximum out of your USB audio. It significantly reduces the system noise floor and makes for better dynamic contrast, warmth and resolution.

The New iDefender+

Similarly to iSilencer3.0, our highly skilled R&D team found a way to improve on iDefender3.0. The new low ESR Tantalum capacitors for noise filtering, together with the new gold-plated USB-C premium connectors, allow for the 10-fold increase in filtering capacitance.

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About iFi

iFi audio is part of AGL and is headquartered in Southport, UK. It owns the hifi brand Abbingdon Music Research (AMR). They respectively design and manufacture portable and desktop 'ultra-fidelity' audio products and high-end audio 'home-based' components. The combined in-house hardware and software development team enables iFi audio and AMR to bring to market advanced audio products.