



# LINDEMANN.

high fidelity excellence

## USB-DAC 24/192 (XMOS)



Designed and manufactured in Germany, the Lindemann USB-DAC 24/192 breathes new life into any digital front end with a truly seductive blend of resolution and musicality. The USB-DAC offers three digital inputs (USB 2.0, Optical Toslink, and Coaxial-RCA). Each input supports playback of files up to 24Bit/192kHz (44.1, 48, 88.2, 96, 176.4, 192kHz).

Within its extruded, lightweight aluminum case lies a circuit board with discrete microcircuitry, featuring carefully selected chipsets, digital filters and an ultra-stable master clock. The higher level of performance was accomplished by incorporating several "trickle-down" technologies found in their 825 HD DAC/Transport, like the XMOS-DSP 24/192 asynchronous USB interface. The USB section utilizes the USB 2.0 solution from XMOS featuring state-of-the-art oscillators (2 separate oscillators for the multiples of 44.1 and 48kHz), jitter reduction at  $\leq 50$  pico seconds, minimum phase digital filter with apodizing behavior, proprietary up-sampling and filtering technology and the same DAC module. Mac OS X at or above 10.6.4 supports USB Class 2.0 without driver installation, but Windows does not. So the required driver is supplied, on the CD that's included, to support frequencies higher than 96 kHz (for Windows 32 and 64 bit OS).

Norbert Lindemann chose an output stage from Analog Devices (ADA4927) that offers a level of performance not typically found at this price point. It's has an analog output stage that is fully balanced, with a high bandwidth spanning 200 MHz. In addition, the internal chipset designs have an optimal voltage that is limited to  $\pm 5$  V; therefore, the optimized output voltage is only 1.4 Vrms for 0 dBFS. As a result, the USB-DAC's output will be lower than most of the competitors that use standard operational amplifiers. This, however, does not mean that the USB-DAC has less definition

to offer. In fact, the output voltage from the DAC module is amplified less, therefore, eliminating most of the potential static noises. So all one has to do is increase the volume level by +4 to +6 dB to experience the same listening level. Music will sound natural and just plain right.

Perhaps it's a bit cliché to say it, but the USB-DAC does offer analog like qualities that's highly addictive. What accounts for this sonic signature is the internal DAC chip from Wolfson (WM8742) along with advanced digital filtering techniques. Instead of the usual linear phase filter, an acoustically optimized minimum phase filter with "apodizing" characteristics has been used instead. This type of filter allows artifacts in the time domain (also in the recording) to be effectively suppressed, and then a new time-corrected, natural transient response is generated, allowing the USB-DAC to deliver a smooth, relaxed and rich musical signal - all at an affordable price.

**"Right off the bat, it was obvious the USB-DAC 24/192 was a special DAC. No matter what the source, I heard a smooth, analog like resolution with tons of dynamics and texture."**

ANDRE MARK, POSITIVE FEEDBACK ISSUE 59

To ensure proper timing of the music on each input, the USB-DAC uses three separate clocks. One for the USB (asynchronous), one for 44.1kHz based sources and another for 48kHz based sources. This means the USB-DAC provides proper 24/192 clocking for USB based sources (very important), but also for other high-resolution sources such as upsampled CD (88.2kHz, 176.4kHz, etc) as well as the more computer based audio signals such as 96kHz and 192kHz. Although clocks rarely get anyone excited, this is great news for those who value truly high-resolution recordings. Rather than having to reclock the data as so many other DACs do, this USB-DAC is able to read the native sample rate and output it as it was intended. The master clock offers outstanding technical performance with jitter characteristics lower than 2.5ps, which puts this unit in a league with other components costing 4 to 6 times more. The result is a smoother, richer and more flowing sonic presentation -- an unexpected delight at this price point.

## Required Operating Systems

Minimum requirements for playing music with your Lindemann USB-DAC:

PC or notebook including Intel Core 2 @ 1.6GHz or AMD equivalent processor with at least 1GB RAM. USB 2.0 interface.

A professional and certified driver, licensed to Lindemann, is contained on the CD supplied with the USB-DAC 24/192.

### PC

Windows XP (incl. SP3)  
Windows Vista (32 & 64-bit incl. SP2)  
Windows 7 (32 & 64-bit)

### Mac

Apple OS X 10.6.4 (Snow Leopard) or higher



## USB-DAC Specifications

---

Digital inputs	USB-B / TOSLINK / COAX
Supported sample-rates TOS/COAX	32 / 44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz
Supported sample-rates USB	44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz
Resolution	16 or 24 bit
Output	Analog
Output voltage	1.4 V @ 0 dBFS
Output impedance	100 $\Omega$
S/N (A-weighted)	-108 dB
THD (0 dBFS)	< 0.02 %
THD (-10 dBFS)	< 0.001 %
Dynamic range	120 dB
Frequency response	1Hz-22kHz (-3dB)
Dimensions	4.7" x 1.77" x 5.2" (120 x 45 x 133mm)
Weight	14 oz (395 g)
Power consumption	5V/500 mA maximum