“You Can’t Judge A DVD By The Cover”

After finishing the design of our TRINITY® DAC I was looking for DVD-Audio discs with 192kHz/24bits recordings on, because we can bypass the digital filters, if the data stream has a sampling frequency of 192kHz.
I had already tested the dual mono interface with a computer generated data stream and all the parameters were excellent as described in the brochure, but to see no overshoots or pre-ringing on a scope is one thing and to listen music with no digital processing is a other story.

First, it is very hard to find information about the content on a DVD-Audio. The music industry calls every format different from the CD standard as “Advanced Resolution”.
No information about the bit length or sampling rate on the cover or on there websites.
Thank God, I found a review about the Chicago 2 DVD-Audio on the following website:
http://www.highfidelityreview.com/reviews/review.asp?reviewnumber=15726928

If you click on the cover image you get a large front cover image and the choice to see the large rear cover image. Here you can read under disc content:
“Advanced Resolution Stereo (192kHz/24bit)”

I own the CD and to compare the CD sound with the non-digital processed DVD-Audio sound was a real challenge. So I ordered this disc, even if Nicholas D. Satullo has written:
“ I listened extensively to the both the 5.1 and two-channel high-resolution tracks. In every case, I found the two-channel track to be of nearly or equal fidelity to the 5.1 track, but even though it boasts the stellar and underused resolution of 192kHz 24-bit, never found it any better.”

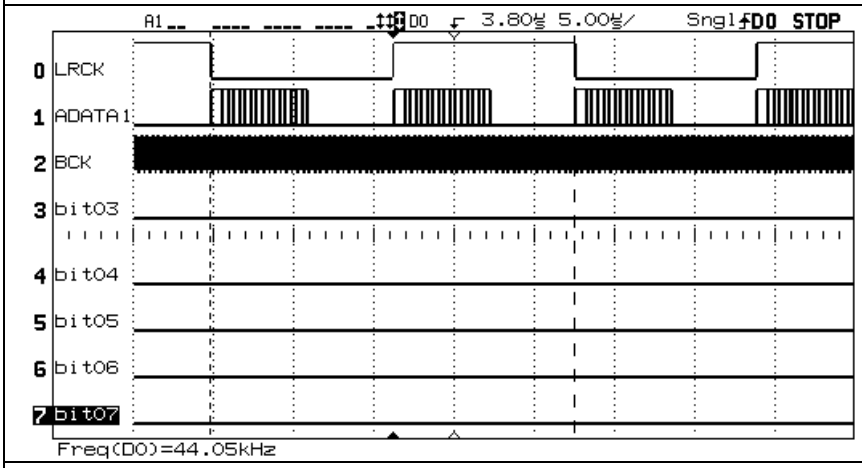
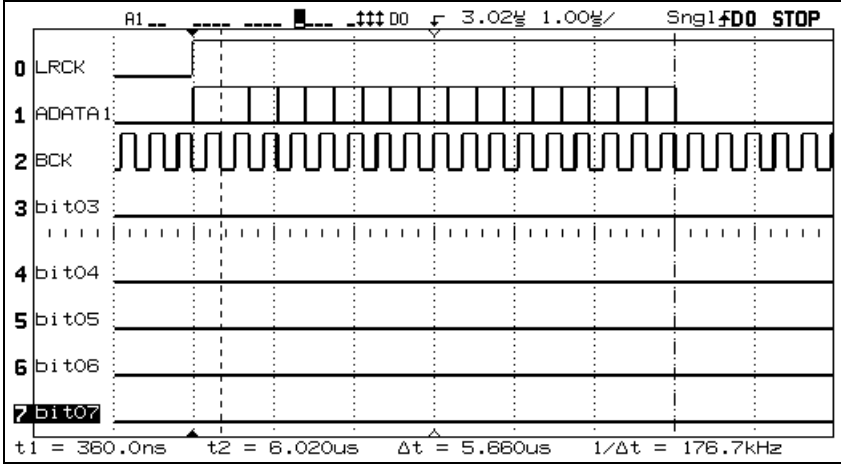
The second problem was to get the data stream of 192kHz/24bit out of a DVD-Audio player. No commercial player has such an interface.
I bought different service manuals of DVD-Audio players looking for a connector, were I could get the pure data stream. I decided to buy the Toshiba SD-500E.

The main processor board is connected via a 26pin flat cable with audio board. This is a good place to lock for the right signals.

Pin	Name	Description
13	LRCK	Left-Right-Clock
14	BCK	Bit Clock
15	ADATA1	Audio Data stereo front channel AD1852

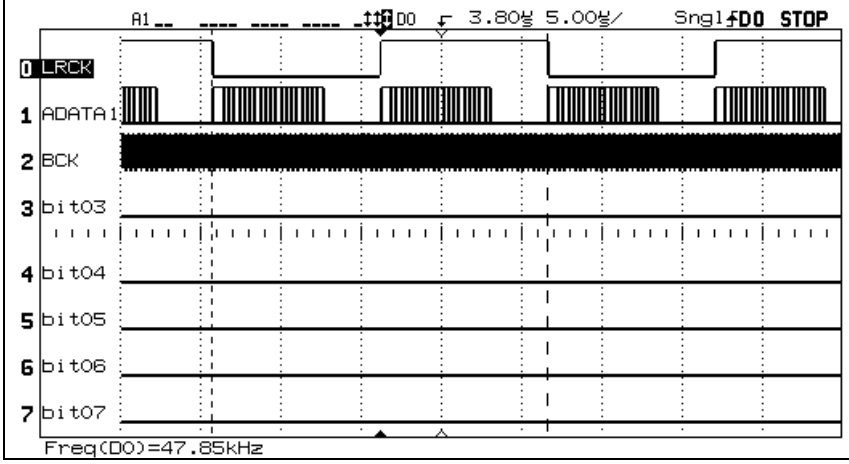
22	X4FS	Master clock select on the AD1852

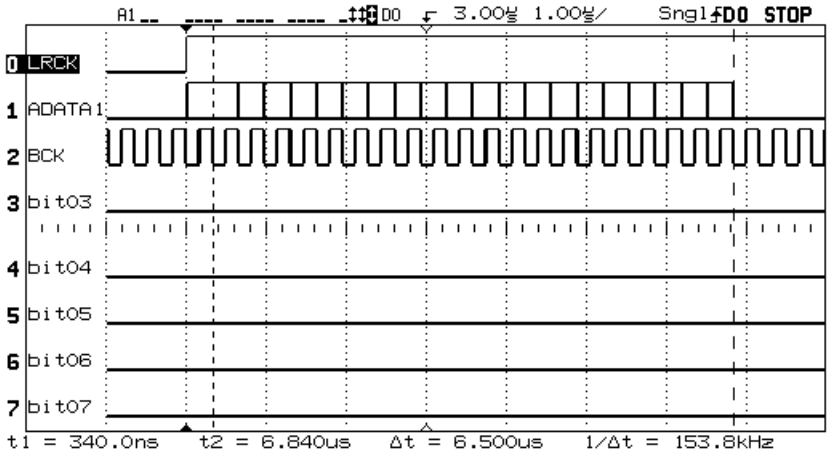
Playing a CD and monitoring these pins with a logic analyser gives you the following pictures:

CBS RECORDS CD-1	
	Sampling frequency 44.1kHz
	Word length 16bit (I2S format)

Every thing is ok.
The LRCK signal shows the expected sampling rate of 44.1kHz and the word length is 16 bit.

Playing the above mentioned DVD-Audio from CHICAGO, choosing the advance resolution track in the audio set-up menu and monitoring the same pins gives you these pictures:

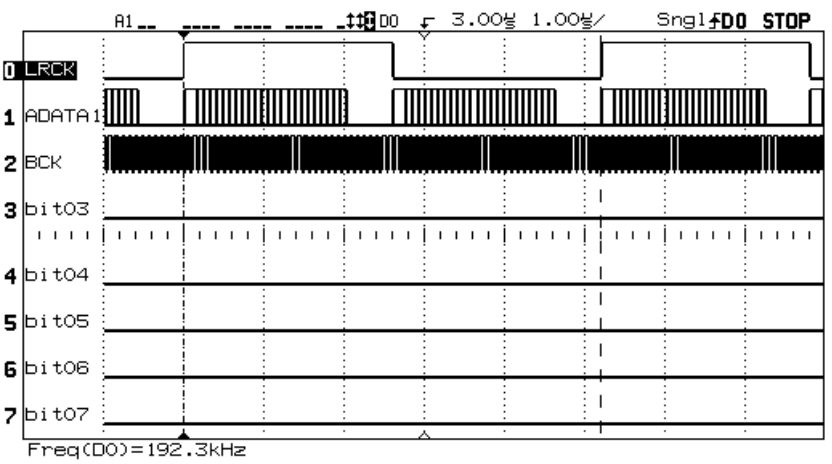
CHICAGO DVD-Audio Advanced Resolution Stereo Track	
	Sampling frequency 48kHz

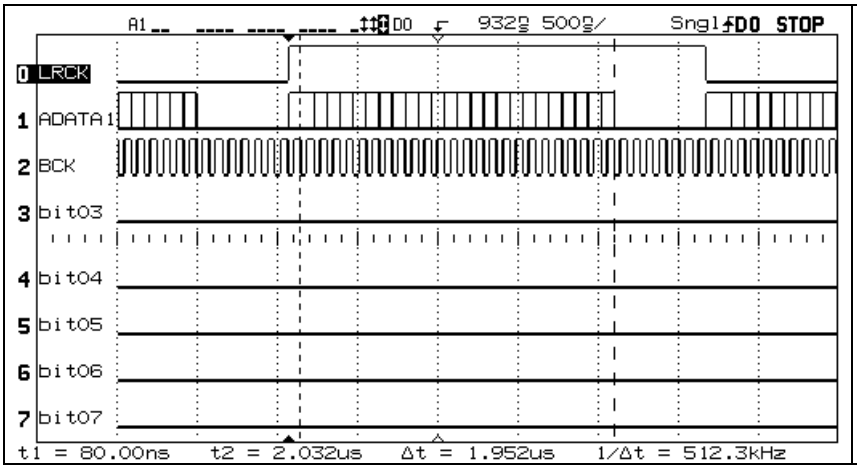
	Word length 20bit (I2S format)

What the hell is this?
LRCK signal shows a sampling rate of 48kHz and the word length is 20bits.
In fact I had expected a sampling rate of 192kHz and a word length of 24bits as described on the rear cover. I checked every other pin on this connector, but there was no 192kHz signal.
What is wrong?
With the select key “AUDIO” on the remote control you can toggle between the surround and the stereo track. The TV Screen shows for the advanced resolution stereo track:
Audio: 2 PPCM 2CH; L, R 96kHz/24bit; Audio output: PCM
There is no 192kHz/24bit recording on this DVD-Audio.
But that is not enough; the ZORAN chip set reduces the 96kHz/24bit audio data stream to 48kHz/20bit. This data stream goes in the AD1852, which is doing a regular over-sampling before converting the data stream to the analog domain. That means I have much more digital signal processing in the whole playback chain for DVD-Audio than for CD!!!

At the end of the day I decided to buy the Professional Test DVDs from “Rhode & Schwarz“ (http://www.rsd.de/). Excerpt from the R&S brochure:
In line with this standard, the audio DVD (DVD 3) contains PCM coded audio files in different formats (e.g. 192 kHz/ 24 bit stereo and 48 kHz/24 bit 5.1 multichannel).
That sounds good, but you can buy only the whole set of 5 DVDs for roughly 500Euro!!!

Playing this Test DVD gives you the following pictures:

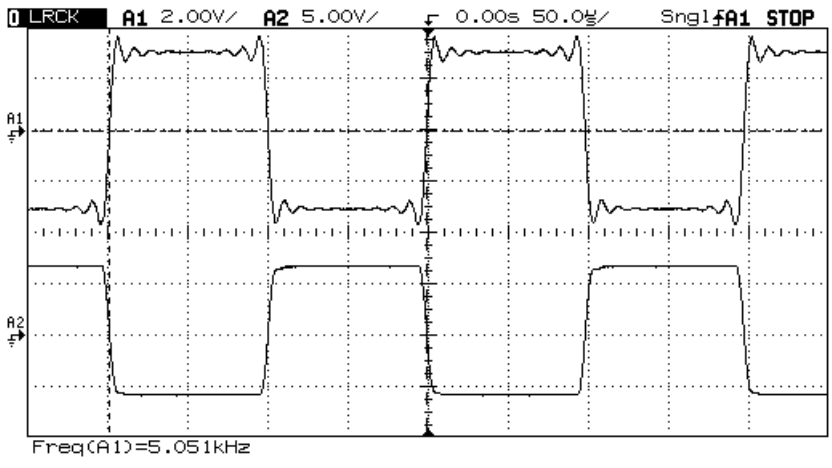
R&S Professional TEST DVD Vol.3 1kHz 192kHz/24 bit	
	Sampling frequency 192kHz

	Word length 24bit (I2S format)

Every thing is ok. The sampling rate is 192kHz and the word length is 24bits.
That means the Toshiba SD-500E can only playback 192kHz data streams in the right manner.
All other DVD-Audio formats are down-sampled in frequency and word length.
I don't know if this happens to other DVD player as well, but this Toshiba player is definitely not the best choice to review a DVD-Audio or judge between the formats.

The design of an interface, which parts this ADATA1 stream in a left and right SPDIF data stream with 96kHz/24bit, (Dual Mono) was a no-brainer.
Now we could connect the DVD-Audio player to our TRINITY®-DAC.

Testing the interface between the DVD player and TRINITY®-DAC.

R&S Professional TEST DVD Vol.3 (192kHz sample frequency/38 = 5.052kHz) at 0dBFS	
	Channel A1 shows the output signal of the Toshiba SD-500E at the RCA rear connector. Channel A2 shows the output signal of our TRINITY®-DAC in Dual Mono Mode with no digital filter in the data path.

No digital filter, no ringing!
A picture says more than 1000 words or better that picture says more than 1000 words.

www.gte-audio.de
info@gte-audio.de