White paper on the DAC501-4ch and DAC502-4ch variants of our DAC501 / DAC502 units.

The DAC501 / DAC502 (or DAC50x in short) are extremely versatile and pleasantly sounding D/A Converters. They are available for close to 6 years now and still going strong.

In our ongoing journey to achieve a live-like music reproduction we now introduce the Mark II versions, called the DAC501-4ch and DAC502-4ch. Our residential audio engineer, Joschka Weiss, says in comparison to the former DAC section the -4ch version “achieves another level of sonic performance”.

Read more about the -4ch below.



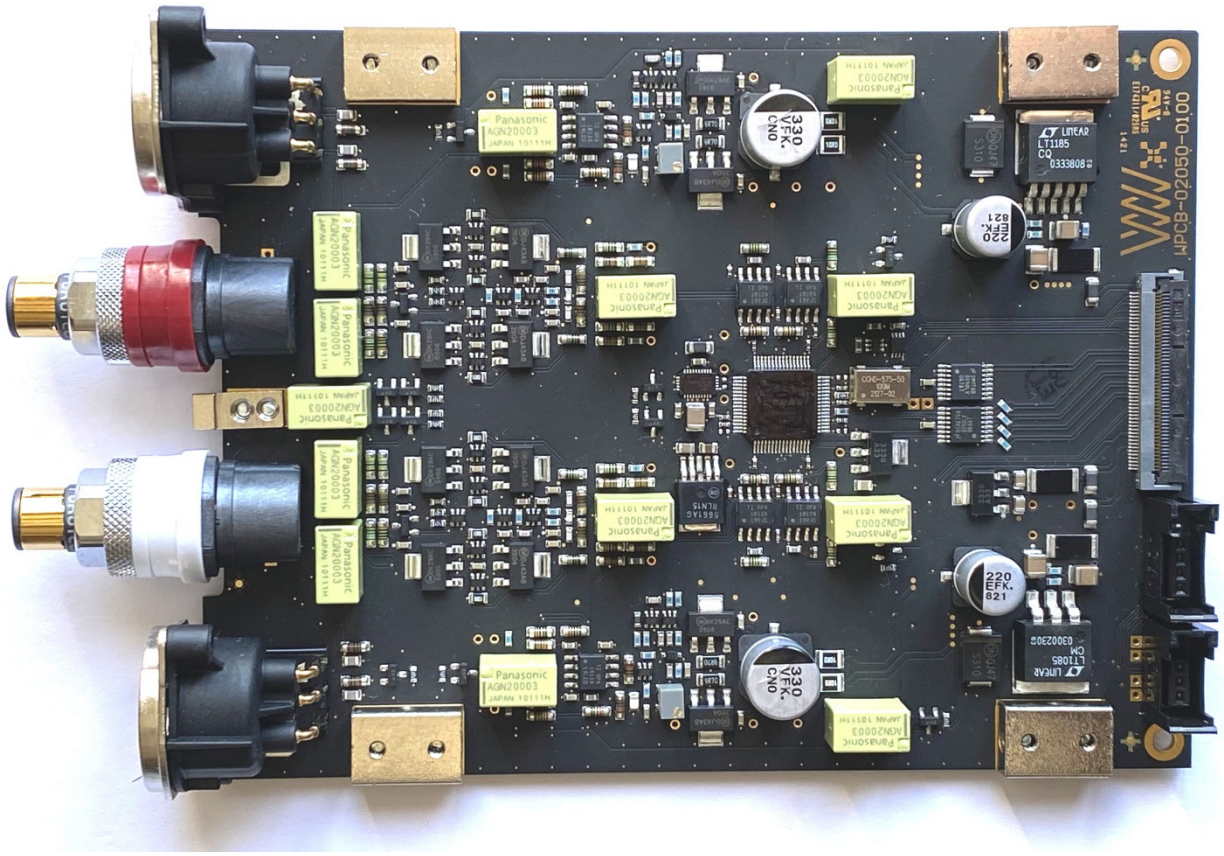
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>> What is the purpose of the -4ch versions?

The -4ch versions use one of the latest DAC chips with stellar technical specifications. So the -4ch versions make for an enhanced 2 channel DAC, with the same features as the DAC501 / DAC502 units sport. The sonic characteristics of the -4ch versions are on a higher level with incredible transparency and openness. Both line output stages and headphone output stages are built with discrete electronics similar to the standard DAC50x.

All standard DAC50x units can be upgraded with the -4ch version. It is a new analog section module to be installed in the unit plus a new software needs to be loaded. It is our goal to keep our equipment upgradeable for long-term securing of your investment. The standard DAC501 / DAC502 units we continue to manufacture.

In addition the -4ch versions will be capable to play 4 channels simultaneously once we introduce the necessary software. This also with the goal to get a more live – like reproduction at home and to accommodate for the upcoming 3D Audio productions in a high-end HiFi setup where a very limited number of available speaker channels often is a matter of fact. This will be the future of high-end audio reproduction.



>> What 4 channel applications are planned?

Here is a list of 4 – channel features we have in mind. There is no guarantee that we will implement all of them, though. We would be pleased to get information from you about what 4 channel features you would like to see.
The audio sources for the setups mentioned below can be two or more channels. The input channels are automatically rendered such that they fit the format of the four outputs.

- 2 channel front speakers, 2 channel rear speakers for surround playback.
  This setup adds another pair of speakers at the back for an enveloping sound.

- 2 channel front speakers, 2 channel front speakers at a different angle.
  A very interesting setup for a more enveloping sound. Based on a design by the Swiss audio company “Pawel Acoustics”.

- 2 channel front speakers, 1 channel front center speaker, 1 channel subwoofer.
  In early stereo times there have been made 3 channel recordings with left, right and center channels. The center channel is of great use for a realistic reproduction. The fourth channel can be configured to feed a subwoofer speaker.

- 2 channel front speakers, 2 channel subwoofers.
  For a decent full range system, based on satellites and subwoofers, the use of a stereo instead of a mono subwoofer is advantageous.

- 2 channel front speakers with crosstalk cancellation, 2 channel rear speakers with crosstalk cancellation.
  Crosstalk Cancellation (XTC) means that a pair of speakers becomes kind of a headphone in that the left speaker only reaches the left ear and the right speaker only reaches the right ear – similar to a headphone. This has the effect of generating a huge soundstage in front of the listener with a very life-like reproduction of a life recording. By adding a second pair of XTC speakers at the back an enveloping life-like scenery can be achieved.

- 2 channel headphones type A, 2 channel headphones type B for two persons listening simultaneously with two different headphone models.
  Allows two persons to listen to the same music program each with his/her own set of headphones and signal processing.

Some more “exotic” ideas which need some refinement in the design process:

- 2 channel front speakers, 2 channel front elevated speakers.
  Another way to generate a more live – like sound with a sound stage which extends to the space above the listener. Similar to a concert hall speaker setup.

- 2 channel front speakers, 2 channel headphones for simultaneous listening via speakers and headphones.
  With extremely open headphones it is possible to listen to speakers and headphones simultaneously. This makes for a new listening sensation not experienced before.



- We are considering even more setup variants – let us know what **you** would like to see.

>> What technology is used?

The DAC501-4ch and DAC502-4ch units are based on the following hardware parts:

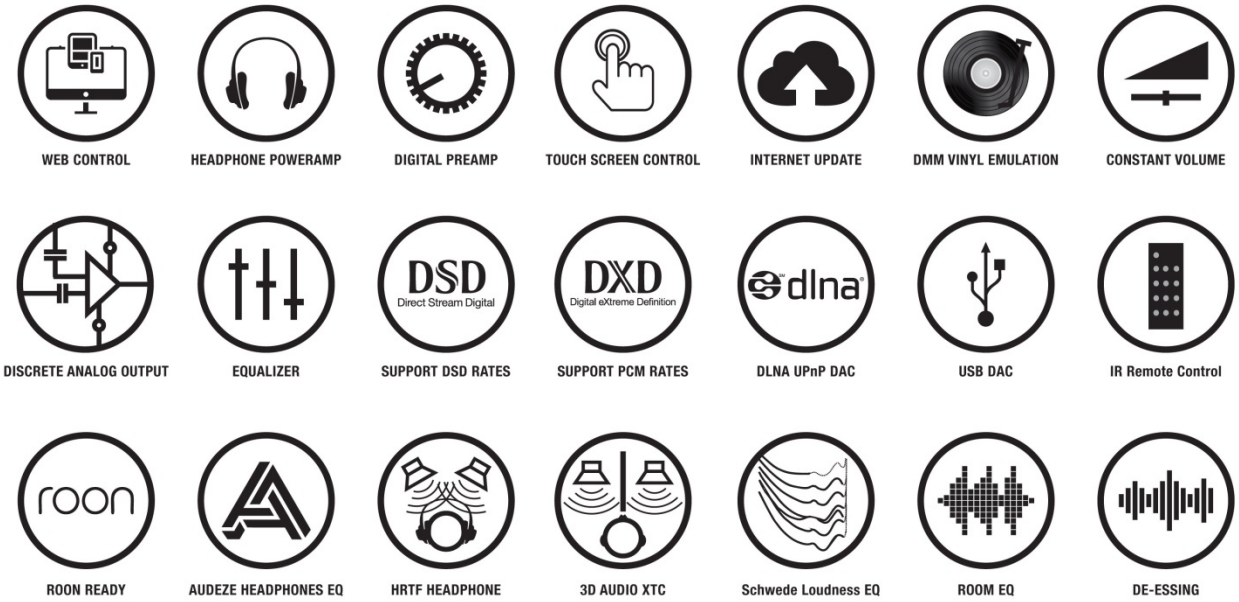
- ARM processor for Network and USB interfacing and general control of the unit
- SHARC Signal Processor chip for various signal processing tasks including sampling frequency conversion and high precision volume control
- Extensive power supply with separate power transformers and many high precision voltage regulators
- Local, very low jitter clock generator for the D/A converter
- State of the art D/A conversion
- Discrete analog sections following the D/A conversion
- Very low impedance outputs
- Analog output level selection to accommodate for amplifiers and headphones

>> Some technical specifications

- Signal to Noise Ratio: Better than 128dB
- Signal to Distortion and Noise Ratio: Better than 115dB
- Linearity: Within a 120dB range less than +-0.2dB deviation from ideal
- Spurious components including harmonics: Less than -120dB
- Crosstalk between channels: Less than -110dB, 20Hz up to 20kHz

>> The team behind the Series 5 units (DAC501, DAC502, DAC501-4ch, DAC502-4ch, DSP501, DSP502):

Daniel Weiss, hardware design
Rolf Anderegg, Isabelle Kernhof, software design
Joschka Weiss, algorithm testing, sonic optimization (crossfeed, DAC section)
Jakob Schiesser, PCB layout and mechanical design
Claude Gugolz, manufacturing
Laurin Eicher, production testing



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