

DCN24RPC - Digital Crossover with 2 inputs and 4 outputs

Manual & Modu Box Assembly Guide

Features

- High performance Burr-Brown converters
- 24bit resolution
- 96kHz sampling frequency
- 180 IIR filters
- 60mS total delay option
- Latency 1ms
- XOverWizard II
- Optical isolated USB interface
- 4 layer high performance PCB
- Onboard linear PSU 230Vac / 115Vac

Applications

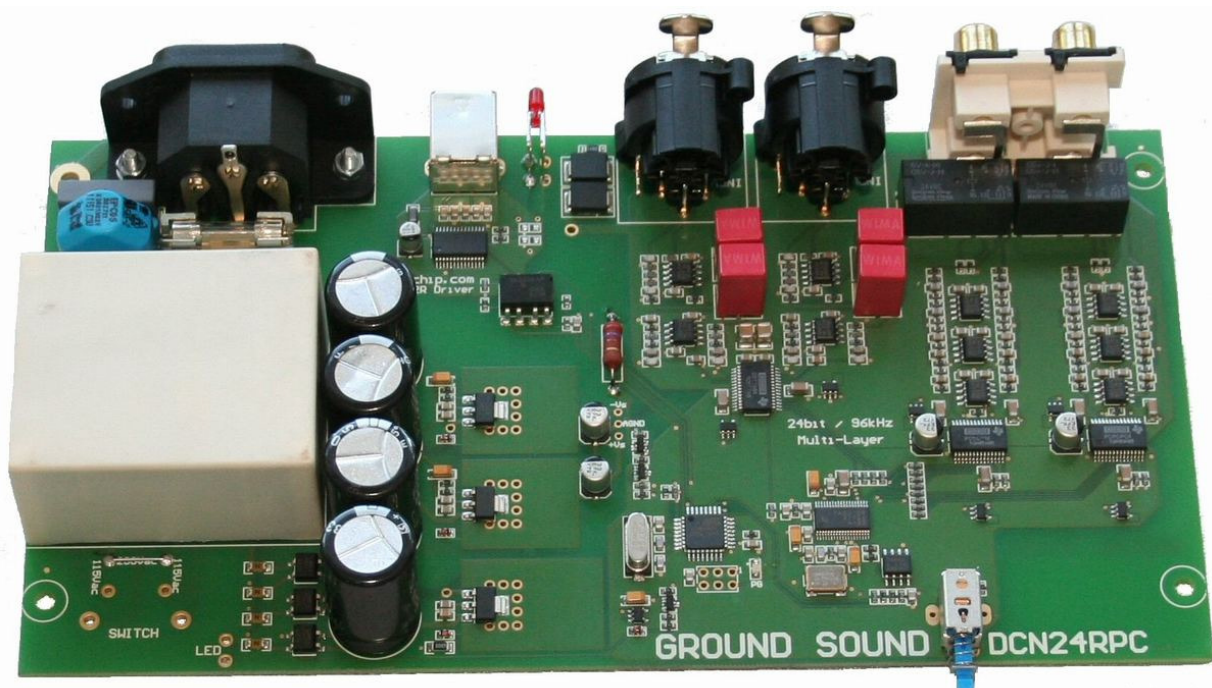
- Active Amplification Systems
- High End Stereo setup
- Supreme Surround Sound Systems

Description

DCN24RPC is a high performance digital crossover filter with equalization and delay. It features 2 balanced analogue inputs and 4 single-ended analogue outputs. The usage of very high performance Burr-Brown converters gives DCN24RPC crystal clear sound and very low noise floor. The signal processor will be configured as 4 output channels of 40 IIR each and 2 input channels with additional 10 IIR filters for filtering and equalization.

DCN24RPC has a switch for selection of two presets with the 2 x 10 IIR filters in the input processing block.

DCN24RPC:



Construction

DCN24RPC has dual high performance AD and DA converters from Burr-Brown (TI). It features 2 balanced analogue inputs and 4 single-ended outputs. The sampling rate is 96kHz and the resolution is 24bits, which surpasses the CD standard of 44,1kHz and 16bit. The processing is based upon IIR filters (Infinite Impulse Response) giving low latency and good audio qualities. The internal processing operates with 76bit resolution to avoid processing overflow and maximize the linear range in the digital domain. A microprocessor takes care of the “household” like boot, mute, and PC communication. DCN24RPC will normally boot from an internal program without a PC connection. The PC only has to be connected during initial setup and future update of parameters. The onboard linear power supply features a 10VA transformer and 4 large quality storage capacitors (Panasonic) for the 4 separate voltages; Vdd, Vcc and +/-Vs. The power supply also features a mains filter for suppression of disturbances. The layout features a lot of decoupling and individual local regulators for the A/D converter and the two D/A converters = NO compromises. The muting of the output is performed with high quality relays from Omron and ensures pop/click-free power ON and OFF. The USB communication interface between PC and DCN24RPC is optically isolated to avoid hum and noise from the PC.

Connections:

The analogue inputs (A & B) are supplied with Neutrik female balanced XLR connectors. The XLR connectors are configured according to the standard (1: ground - 2: non inverted - 3: inverted).

The analogue outputs (1, 2, 3, 4) are single-ended RCA connectors (shield: ground - center: hot).

The PC-interface is a standard USB B connector. PC to DCN24RPC connection requires a normal USB cable with type A male to type B male. There are two red LEDs just beside the USB connector on the Back Panel which indicates communication.

The Mains connector is a standard IEC 230Vac type with Mains ground connected to chassis.

Preset switch:

The preset switch that sits on the front side of the PCB selects between Preset 1 and Preset 2, which is set up in the XOverWizard II software. When the switch is not pushed (out) Preset 1 is active and when the switch is pushed (in) Preset 2 is active.

USB interface

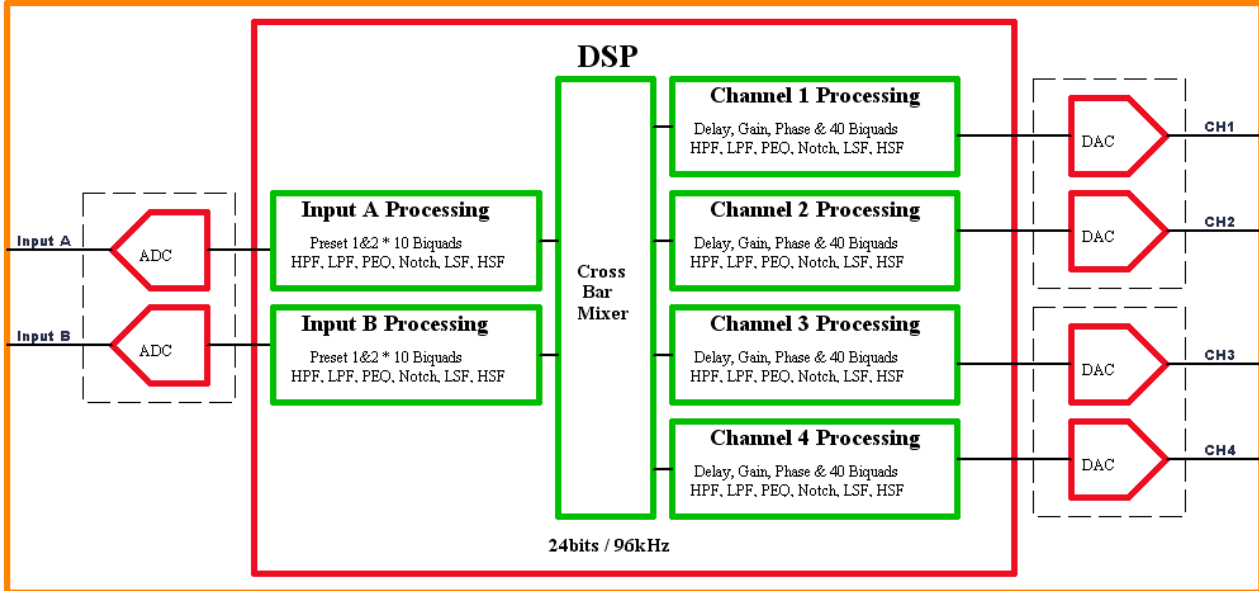
DCN24RPC communicates through an on board USB interface circuit which requires installation of a driver on the connected PC. If the driver isn't installed automatically the driver can be downloaded and installed manually from the chip manufacturer's homepage: www.ftdichip.com or <http://www.groundsound.com/CDM2.04.16.WHQL.Certified.zip> (Windows OS).

The onboard USB interface acts as a COM port and will be specified as a COM number in the XOverWizardII. USB communication LEDs indicate transmitting TX and receiving RX. The COM port number will be assigned by the Windows OS and has to be between 1-9. If the assigned COM port number is higher than 9 you have to change the assigned number to a number within 1-9 in the Device Manager/COM ports/Properties/Advanced.

Setup possibilities

DCN24RPC features 2 input channels and 4 outputs which make it possible to configure some different setups: Mono 2-way, mono 3-way, mono 4-way, stereo 2-way and 2 channel EQ / room correction. The most likely setup is mono 4-way or stereo 2-way.

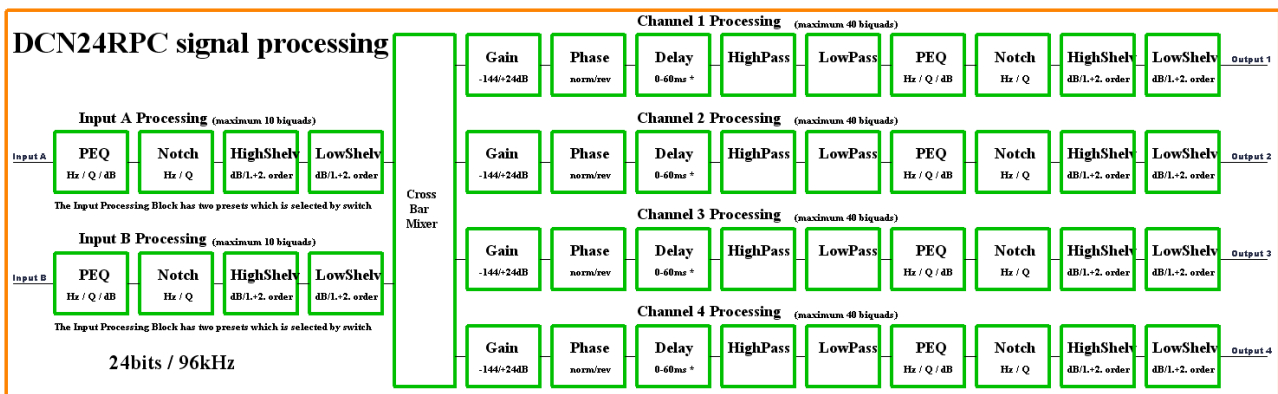
DCN24RPC signal processing



The above figure shows how the DSP of DCN24RPC is setup in software processing blocks

Software:

The XOverWizard II software is a graphical tool to manipulate with input, outputs, gain, crossover frequencies, crossover slopes, equalization and delay. The software has a very significant feature: The ability to import a text file containing measured driver data of frequency, sound pressure level and phase. With these data the XOverWizard II software are able to display frequency response and more, while design are in progress. Compared to this method the “old” trial and error method seems obsolete. The software comes in two versions: A standard version as described above and an advanced version which include measurement system and optimizer. See more details at the XOverWizard II page. The **XOverWizard II** is required to program DCN24RPC which requires buying the USB dongle-key separately / bundled with the module. You can download XOverWizard II software here: <http://www.groundsound.com/technical.php>



Specifications:

Bit Resolution: 24bit	Sample Rate: 96kHz
Total Processing Power: 180 biquads	Audio Processor Precision: 76bit
Signal to Noise Ratio: >110dB	Frequency response: 5-48kHz (-3dB)
Max. input voltage: 12Vpp - 0dB	Max. output voltage: 14Vpp - 0dB
Input impedance, balanced: 10 kΩ	Output impedance: 100Ω
Latency input-output about 1ms	Optical isolated USB interface
230Vac mains supply - optionally 115Vac	Power Consumption: 10Watt
Overall dimensions (WxHxD): 232 x 50 x 155mm	Weight: app. 450g (1200g incl. Modu Box)

Note:

Please note that the DCN24RPC in normal configuration do not have unity gain.
The gain is approximately 1,5dB in the analogue section with 0dB gain in the digital domain (total sum of the software setup).

Options:

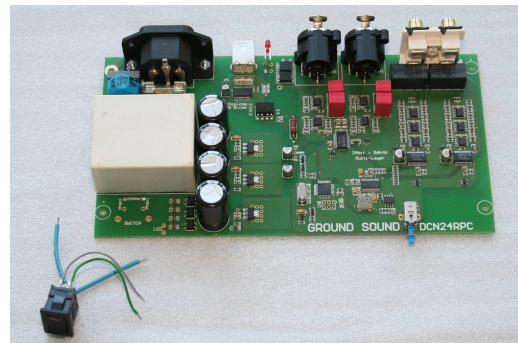
The DCN24RPC can be delivered with other OP-Amplifiers than the standard NE5532 – please see our web site for unity gain-stable dual OP-Amplifier possibilities.

Assembly Guide of DCN24RPC in the HiFi2000 Modu box:



Ground Sound * DCN24RPC includes:

- 1 pc DCN24RPC PCB - tested
- 4 pcs Screws M3 x 20mm black
- 2 pcs Screws M3 x 10mm black round head
- 5 pcs Screws 2,9 x 9mm black
- 4 pcs 3mm Distances 3mm long
- 6 pcs M3 Nuts
- 6 pcs 3mm Spring Washers
- 1 pc Power Switch with short wires

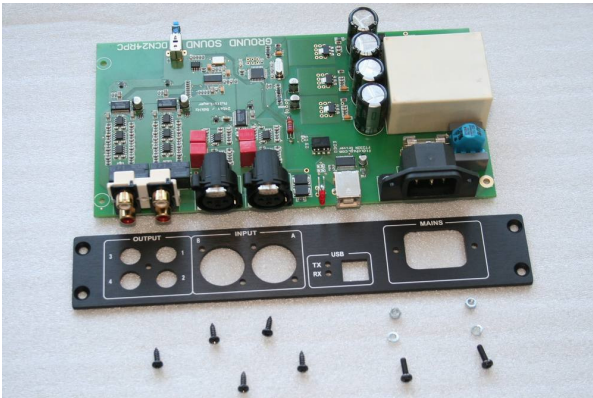


HiFi2000 * DCN24RPC Modu Box kit includes:

- 1 pc 4mm Aluminium front panel
- 1 pc Back Panel with printed text
- 1 pc Bottom Plate
- 1 pc Top Plate
- 2 pcs Sides
- 4 pcs rubber Feet
- 4 pcs Screws M4 x 10mm
- 4 pcs Screws M4 x 10mm black
- 8 pcs Screws M3 x 8mm black
- 8 pcs M3 Nuts



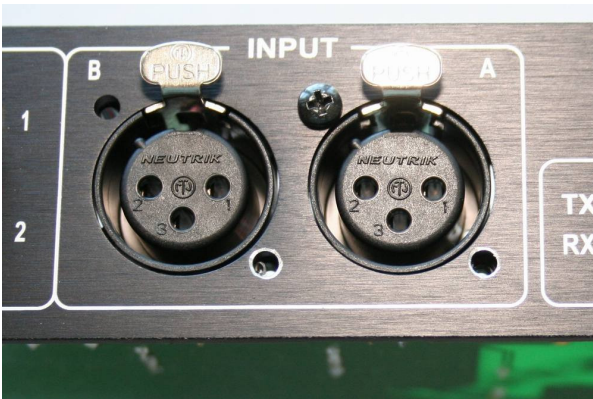
For easy assembly simply look closely at the pictures and read the short text:



Prepare the back panel for assembly on the PCB connectors. Screws 2,9x9 + M3x10mm black round head + M3 Nuts + 3mm Spring Washers.



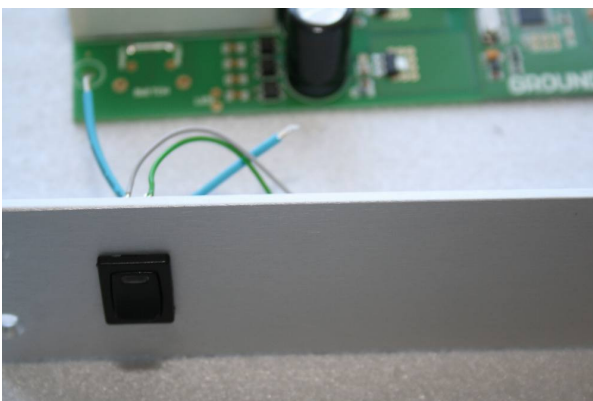
Solder the wire of the power switch into the pads of the DCN24RPC module.
Note: Green wire = LED + & gray = LED -



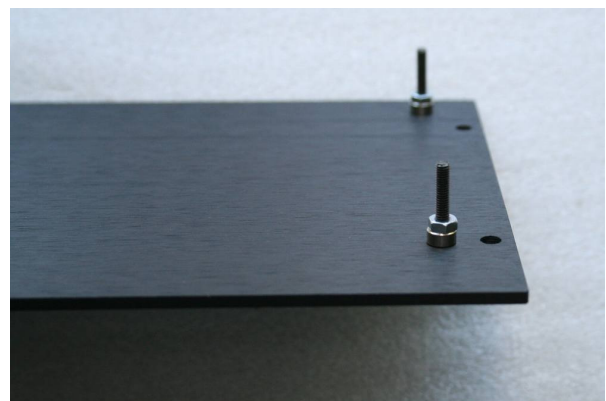
Strip “bare” a small area under the lower screws of the XLR connectors with an 8-10mm HSS drill.
Note: For electric connection of analogue ground to chassis through ground lift.



Prepare bottom plate:
Screws M3 x 20mm black
3mm Distances 3mm long
M3 Nuts



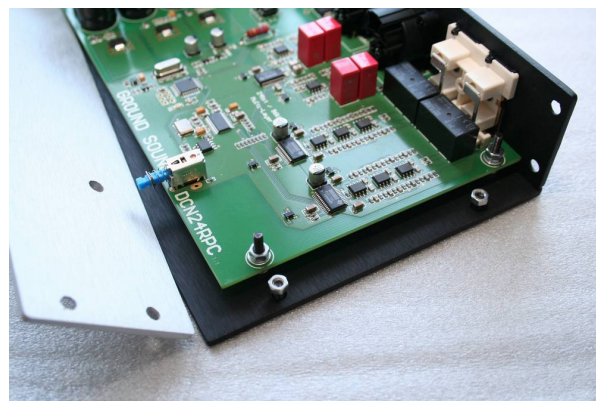
Insert the power switch in the front panel.



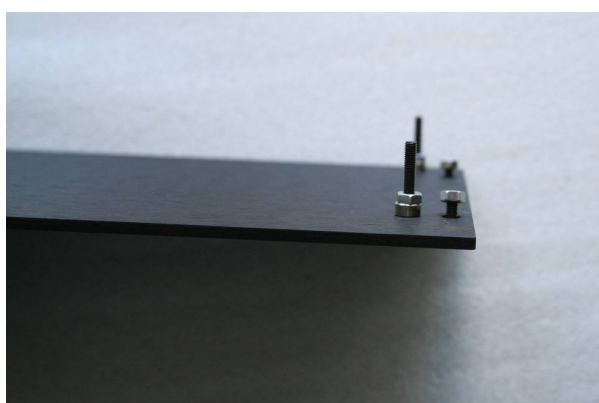
Tighten nuts.



Mount M3x8mm+nuts



Do not tighten nuts



Do not tighten nuts



Prepare Sides



Mount PCB/BackPanel on Bottom Plate
3mm Washer / 3mm Spring Washer / M3 Nuts



Glide Sides onto nuts on Bottom Plate
Glide M3 Nuts into Sides – two in each
Fix the Sides to Back Panel with M4x10mm black
Mount Front Panel to sides with M4x10mm



Nearly there...



Align M3 nuts to holes in top plate
Mount M3x8 screws



Flip over the chassis
Tighten screws between sides and bottom plate



The finished DCN24RPC in Modu Box



Mount Rubber feet
Flip over again and tighten nuts on PCB



This was all and you are ready to plug power cable, signal cables and USB cable.

**The DCN24RPC Digital Crossover is ready for programming a setup with XOverWizard II.
Enjoy the music !**

Remarks and Revision history

Ground Sound reserves the rights to make alterations without prior notice.

Please notice that Ground Sound will not be held responsible for any property damage. It's assumed that the customer is aware of the danger of high voltage and takes the necessary precautions to avoid personal injury and fully understands the consequence of dealing with high voltage.

Revision A: 2013-08-08

Revision B: 2013-10-29