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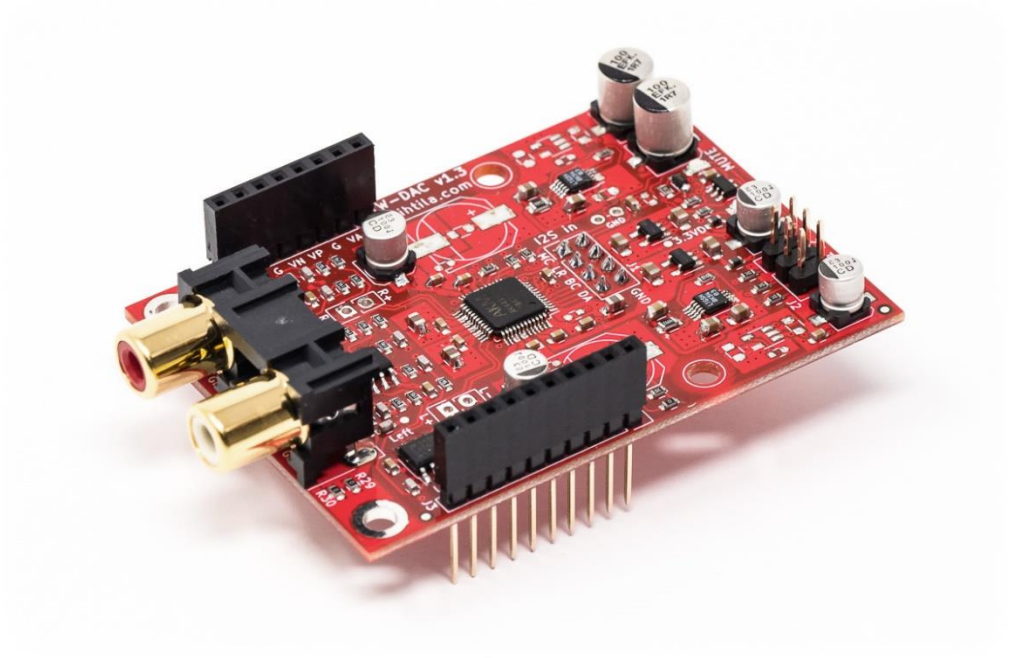
W-DAC 4493 DA-Converter

Very high performance audio DA-converter



AUDIO PERFORMANCE

- Up to 768 kHz / 32 bit audio
- 121 dBA dynamic range / SNR
- -115 dB THD+N (-1 dBFS, 1 kHz)
- -121 dB THD (-2 dBFS, 1 kHz)
- -125 dB crosstalk (10 kHz)

Typical values. Measurement BW is 20 kHz and sample rate 48 kHz.

0 dBFS = 2 Vrms output level.

FEATURES

- Unbalanced (RCA) output
  - Balanced (XLR) addon available
- I2S input
  - W-DAC is I2S Slave
  - Flexible clocking support
- Six digital filter options
- No configuration needed
- Comprehensive measurement results

APPLICATIONS

- Very high performance DAC in Hifi system
- Use in DIY DAC system:
  - In Wee DAC system with additional baseboards and addons
  - With any compatible I2S source such as S/PDIF or USB module

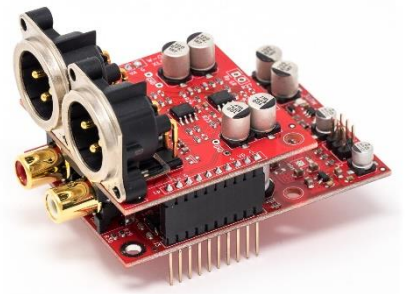
W-DAC 4493 is a very high performance audio DA-converter suitable for the most demanding DIY DAC setups. Despite compact size and humble looks, performance figures are impressive reaching 121 dBA dynamic range, -115 dB THD+N, and -121 dB THD.

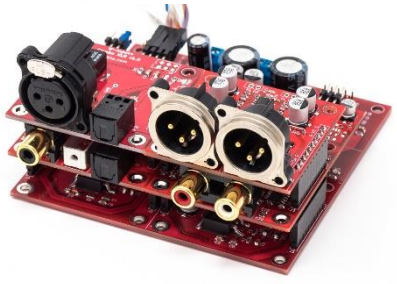
Input to DAC is I2S, W-DAC being I2S Slave.

Analog audio output is single-ended RCA but can be expanded with balanced XLR addon board.

W-DAC is part of Wee DAC system. Various baseboards are available for power breakout or complete regulated power supplies. W-DAC can also be paired with W-Input S/PDIF receiver. Another pairing option is a compatible USB to I2S module, or for that matter any compatible I2S source.

Below are photos of W-DAC with W-Output XLR balanced addon, and in more extensive Wee DAC system. See nihtila.com for more information.





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HARDWARE DETAILS

- AKM AK4493EQ DAC
- LM4562 opamps
- LT3042 LDOs
- 4-layer PCB
- C0G capacitors and thin film 0.5 % resistors in signal path
- Supply decoupling optimised by measurements
- Design and performance evaluated by comprehensive measurements

SYSTEM REQUIREMENTS

- I2S source; must be I2S Master
  - Data, Bit clock, Word clock
  - Master clock
  - 3.3 V logic level
- Three supplies:
  - 5 V digital, 14 mA
  - +15 V analog, 70 mA
  - -15 V analog, 32 mA
- For easy system integration use Wee DAC baseboards and addon boards

INFORMATION AND CONTACT

- http://nihtila.com for general up to date information and shop
- Youtube for videos
- Follow Twitter (@nihtilacom)
- Contact (http://nihtila.com/contact/)

DOCUMENT VERSION

v1.3B.0 (02/2020) for board v1.3B

Configuration and settings

W-DAC uses AK4493 in HW-mode so no configuration is required. As long as valid I2S signal comes in, audio is played back.

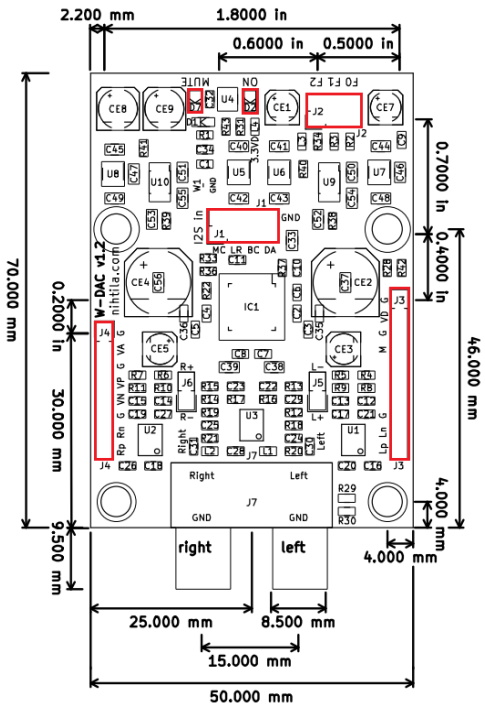
User can select one of the six digital low-pass filters with J2, shown in table below. Refer to AK4493 datasheet or nihtila.com for more filter details.

There are onboard LEDs for power On and Mute.

Maximum output signal (0 dBFS) level is 2 Vrms. There are extra resistor placeholders on bottom side to lower gain if required.

There are also resistors to change clock mode and data bit depth. Otherwise settings are fixed.

Note that W-DAC output does not have mute circuit. Therefore, there may be a pop at power-up. It is recommended to have a mute or delay circuit in power amplifier to prevent loud pop in speakers.



J1 is I2S input with following signals:

- MC – Master clock
- LR – Word clock
- BC – Bit clock
- DA – Data

W-DAC is flexible with clocking but refer to AK4493 datasheet or ask if in doubt.

Digital filter selection on J2 (SD = “Short Delay”).

F2	F1	F0	Filter roll-off type
open	open	open	SD Sharp (default)
open	open	close	Sharp
open	close	open	SD Slow
open	close	close	Slow
close	don’t care	open	Low Dispersion SD
close		close	Super Slow

Supplies and pins on edge connector J4.

J4 Pin	Description
G	Ground
VA	Analog supply, not used in this board
VP	Analog positive supply, +15 V
VN	Analog negative supply, -15 V
Rn	Right negative (used by addon boards)
Rp	Right positive (used by addon boards)

Supplies and pins on edge connector J3.

J3 Pin	Description
G	Ground
VD	Digital supply, 5 V
M	Mute signal (used by other boards)
Ln	Left negative (used by addon boards)
Lp	Left positive (used by addon boards)