ADC AK5572 AD-Converter

Very high performance audio AD-converter

AUDIO PERFORMANCE

- Up to 768 kHz / 32 bit audio
- 121 dBA dynamic range / SNR
  - 124 dBA in mono mode
- -113 dB THD+N (-1 dBFS, 1 kHz)
- -117 dB THD (-8 dBFS, 1 kHz)
- -130 dB crosstalk (10 kHz)

*Typical values. Measurement BW is 20 kHz and sample rate 192 kHz.*

0 dBFS = 3.6 Vrms differential.

FEATURES

- Balanced (differential) input
- Stereo or mono operation
- I2S output
  - Master or Slave
  - Flexible clocking options
- HW configurable but supports I2C
- Four digital filter options
- XLR connectors can be fitted on board edge or wired out
- AC or DC coupled inputs
- Comprehensive measurement results

APPLICATIONS

- High performance ADC in Hifi system
- Sound and music recording
- Audio measurement instrument
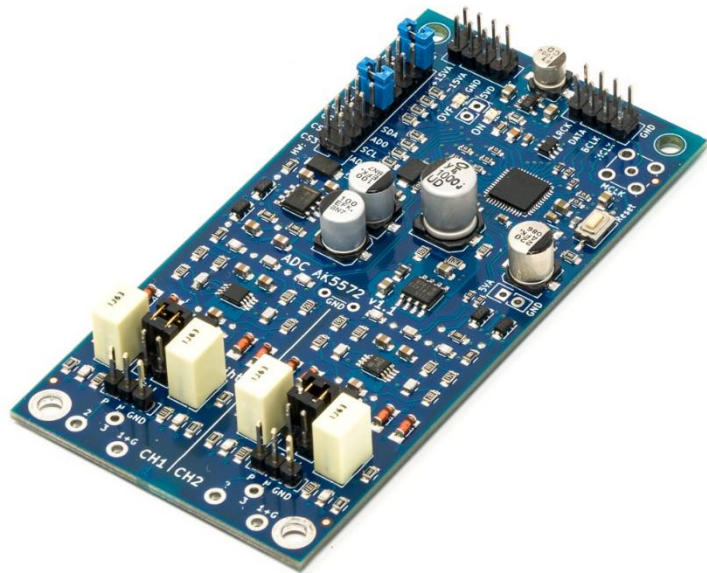
ADC AK5572 is a very high performance audio AD-converter suitable for sound recording applications or high end audio setups. Alternatively, using this ADC in a DIY audio analyser system one can build a very capable setup when paired with a suitable PC software.

Audio performance is high enough not to be ashamed beside any AD-converter. The board is not very picky in terms of power supply but it must be relatively clean to obtain the high performance figures.

Flexible configuration options are provided by simple jumper links. Remaining configuration bits are accessible with 0 Ω resistors. I2C access can be enabled for programming with Arduino or similar.

There is an LED for power and overflow which flashes if input clips.

Basic input protection with diode clamps is provided. More robust protection is recommended for measurement instrument applications. Recording application may require gain control circuit.

Input connections (Ch1 and Ch2):

- P – signal positive
- N – signal negative (also for unbalanced input)
- GND – XLR pin 1 or chassis

Output connections:

- MCLK – Master clock, 24.576 MHz recommended (input)
- LRCK – Word clock (input / output)
- BCLK – Bit clock (input / output)
- DATA – Audio data (output)

HARDWARE DETAILS

- AKM AK5572 ADC
- OPA1632 differential opamps
- LM4562 buffers
- 4-layer PCB
- Film and C0G caps in signal path
- Thin film 0.5 % resistors in signal path
- Low noise and low distortion design
- SMB and 50 Ω termination option for Master Clock input
- Design and performance evaluated by comprehensive measurements

SYSTEM REQUIREMENTS

- 24.576 MHz Master Clock
- Master or Slave I2S input device
- 3.3 V logic level
- Three supplies:
  - 5 V digital, 15 mA
  - +15 V analog, 90 mA
  - -15 V analog, 70 mA
- Decent (passive) cooling; board gets warm

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

v1.1.0 (02/2020) for board v1.1

Configuration and settings

There are four digital low-pass filter options selectable by two jumper links. More details on these filters are on nihtila.com and AK5572 datasheet.

Inputs can be AC or DC coupled with J8/J9 dual jumper link; coupling does not affect audio performance. In addition, the ADC has internal digital high-pass filter to remove offset caused by input circuit and the ADC IC itself. It is recommended to keep this HPF enabled.

Jumpers CS0-CS3 configure clocks. See full table in AK5572 datasheet and summary table below. Sample rate depends on MCLK; 24.576 MHz is recommended and also assumed here.

Master clock (MCLK) can be brought to PCM pinheader J4, or optional SMB connector J5 and 50 Ω resistor R11 can be populated.

ADC can be set to I2C mode by changing configuration resistors. Then CS0-CS3 pins become I2C signals. Instructions are on PCB bottom side.

Reset button should be pressed after changing any settings.

Digital low-pass filter selection on J6.

SD	Slo	Filter roll-off type
open	open	Sharp (default)
open	close	Slow
close	open	Short Delay Sharp
close	close	Short Delay Slow

Sample rate when I2S Master and 24.576 MHz MCLK. When I2S Slave, keep all open for Auto.

192 kHz sample rate is recommended.

CS3	CS2	CS1	CS0	Sample rate
open	close	close	open	768 kHz
open	close	close	close	384 kHz
close	close	close	close	192 kHz
close	close	open	open	96 kHz
close	open	open	close	48 kHz

Other jumper links (default in **bold**)

Jumper	Open	Close
HPF	Digital HPF disabled	**HPF enabled**
32b	**24-bit I2S data**	32-bit I2S data
Sla	ADC is I2S Master	**I2S Slave**
J8 DC	**Input 1 AC coupled**	DC coupled
J9 DC	**Input 2 AC coupled**	DC coupled