CIRRUS LOGIC®

CS5396
CS5397

120 dB, 96 kHz Audio A/D Converter

The following information is based on technical datasheet:

CS5396/7 DS229PP2 JUL '97

Please contact Cirrus Logic:
Crystal Semiconductor Products Division
for further product information.

CRYSTAL®
PRODUCT INFORMATION

PI229PP3 DEC '98

120 dB, 96 kHz Audio A/D Converter

Features

- 24-Bit Resolution
- Complete CMOS Stereo A/D System
  - Delta-Sigma A/D Converters
  - Digital Anti-Alias Filtering
  - S/H Circuitry and Voltage Reference
- CS5396 - digital filter optimized for audio
- CS5397 - non-aliasing digital filter
- Adjustable System Sampling Rates including 32, 44.1, 48 & 96 kHz
- 120 dB Dynamic Range (A-Weighted)
- Low Noise and Distortion >105 dB THD + N
- Differential Analog Architecture
- Linear Phase Digital Anti-Alias Filtering
- Single +5V Power Supply

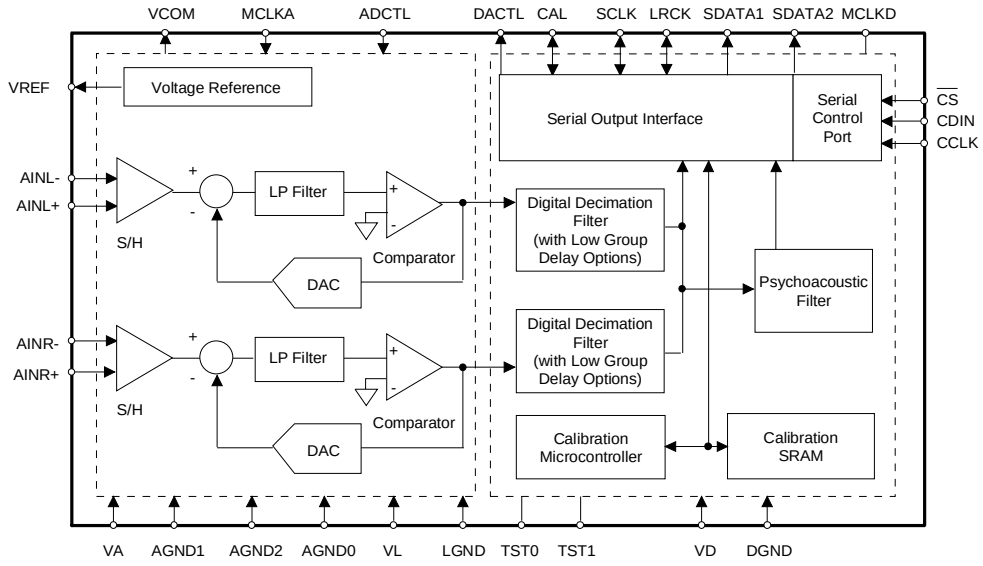
Description

The CS5396 and CS5397 are complete analog-to-digital converters for stereo digital audio systems. They perform sampling, analog-to-digital conversion and anti-alias filtering, generating 24-bit values for both left and right inputs in serial form at sample rates up to 100 kHz per channel.

The CS5396/97 use a patented 7th-order, tri-level delta-sigma modulator followed by digital filtering and decimation, which removes the need for an external anti-alias filter. The ADCs use a differential architecture which provides excellent noise rejection.

The CS5396 has a linear phase filter optimized for audio applications with ±0.005 dB passband ripple and >117 dB stopband rejection. The CS5397 has a non-aliasing filter response with ±0.005 passband ripple and >117 dB stopband attenuation.

The CS5396/97 are targeted for the highest performance professional audio systems requiring wide dynamic range, negligible distortion and low noise.



Overview

The CS5396/97 is a 24-bit, stereo A/D converter designed for stereo digital audio applications. The analog input channels are simultaneously sampled by separate, patented, 7th-order tri-level delta-sigma modulators to sample the analog input signals at either 128 or 64 times the output sample rate of the

device. The resulting serial bit streams are digitally filtered, yielding pairs of 24-bit values at output sample rates of up to 100 kHz. This technique yields nearly ideal conversion performance independent of input frequency and amplitude. The converter does not require difficult-to-design or expensive anti-alias filters and it does not require external sample-and-hold amplifiers or voltage references. Only normal power supply decoupling components, voltage reference bypass capacitors and a single resistor and capacitor on each input for anti-aliasing are required. An on-chip voltage reference provides for a differential input signal range of 4.0 Vpp. The device also contains a high pass filter, implemented digitally after the decimation filter, to completely eliminate any internal offsets in the converter or any offsets present at the input circuitry to the device. Output data is available in serial form, coded as 2's complement 24-bit numbers.

FAQs

1) Why does an audio A/D converter (CS5396) support 96 KHz sample rates when the audio bandwidth has traditionally been up to only 20 KHz?

A: Although audio waveforms can only be heard by humans up to approximately 20 KHz, studies suggest that higher frequency signals affect human perception of sounds in the traditional audio bandwidth.

2) Why do audio applications require an A/D converter with such wide dynamic range? CDs have a maximum dynamic range of less than 100 dB.

A: One target market for the CS5396 is digital mixing consoles. When channels are mixed in a digital console the noise floors add so the resulting dynamic range may be much lower than the dynamic range of a single channel. Therefore designers want to use A/D converters with very wide dynamic range so the final mix still has high dynamic range and excellent sound quality.

Ordering Information

CS5396-KS	28-pin SOIC	-10 - 50°C
CS5397-KS	28-pin SOIC	-10 - 50°C

For further information on Crystal products, please visit our website "www.crystal.com" or call our literature department (800) 888-5016 ext. 3594 or (512) 912-3594 for data sheets and application notes.

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