

Intel® AC97 Compliant **AD1819 SoundPort** CODEC

The AD1819 offers superior price/performance for AC97 motherboard and PCI card designs.

The device includes Phat Stereo™ 3D speaker enhancement and professional-quality, 92 dB signal-to-noise ratio – 4 times better than typical desktop configurations and 16 times better than today's portable PCs.



INTEL AC97 COMPLIANCE

Full-duplex, 48kHz stereo I/O

ACLink TDM serial interface

Guaranteed interoperability with DC97-compliant controllers

Power management modes

Small-footprint, 48-pin TQFP package

MICROSOFT PC 97 COMPLIANCE

Supports all codec requirements for Entertainment PC class audio designs

Independent record and playback sample rates

92 dB SNR playback and mixing

PROFESSIONAL-QUALITY, 3D AUDIO

Data Directed Scrambling™ (D²S) technology delivers 92+ dB audio fidelity and freedom from spurious idle tones

Continuous Time Oversampling™ technology for enhanced motherboard noise immunity

Phat Stereo 3D speaker enhancement

HOME THEATER CONFIGURATIONS

Daisy chain TDM mode supports up to three codecs on one ACLink bus for 5.1 speaker home theater designs

SIMPLIFIES DC97 DESIGNS

Supports sample rates from 5.5kHz to 48kHz with 1Hz resolution

On-chip hardware volume control

AD1819 IS THE MAINSTREAM CODEC OF CHOICE FOR:

DC97 audio solutions vendors developing 5.1 speaker designs or wishing to simplify and cost reduce their controllers' sample-rate-conversion blocks

PC system OEMs, VARs and integrators seeking to differentiate AC97-compliant systems with professional-quality audio and *Phat Stereo* 3D speaker enhancement

OEM motherboard and sound card manufacturers looking for the lowest-cost, highest quality AC97 codec and designed – in interoperability with DC97 controllers



PRODUCT SPECIFICATIONS

General

AC '97-compliant analog I/O component
Operation from +5 V supply
48-pin TQFP package

Analog Codec

Stereo, 16-bit audio codec
Full-duplex record and playback
Programmable sample rates from 5.5 to 48kHz

Audio Quality

Analog Mixer

Signal-to-noise ratio
CD to LINE OUT 90 dB
All others to LINE OUT 90 dB

Data Converters

	Playback (PC-D-A)	Record (A-D-PC)
Signal-to-noise ratio	92 dB	85 dB
Total harmonic distortion	0.01%	0.02%
Intermodulation distortion	90 dB	85 dB

Filters

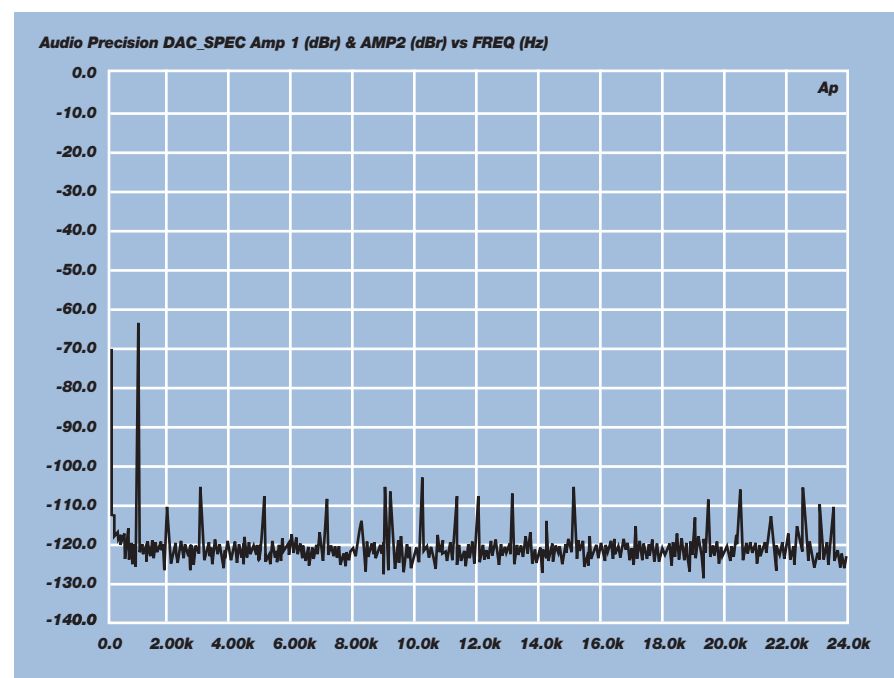
	Passband	Stopband
-3 dB frequency response	0.4 x Fs	0.6 x Fs
Audio passband ripple	0.09 dB	
Audio stopband rejection		74 dB

Audio System Hardware

Phat Stereo 3D speaker enhancement
High-quality differential CD input
Stereo line level output
Monaural output for speakerphone
Four analog line-level stereo inputs: LINE, CD, VIDEO and AUX
Two analog line-level monaural inputs: PC BEEP and speakerphone
Monaural microphone input switchable from two external sources

Playback Record

(PC-D-A) (A-D-PC)



The AD1819 delivers excellent dynamic range and better than 92 dB SNR during playback, with low-level distortion artifacts below -100 dB. The noise floor remains dominated by residual in-band quantization noise after the Data Directed Scrambling process, rather than idle tones that plague conventional sigma delta codecs.

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TECHNOLOGY

Data Directed Scrambling

We use the term Data Directed Scrambling (D2S) to describe a new oversampling technology which delivers professional-quality audio to mass-market consumer appliances and multimedia PCs.

The AD1819 uses D2S to play .WAV, MIDI, AC-3, and PCM audio streams with better than 90dB signal-to-noise ratio. Using D2S the device is able to maintain a spectrally pure, "white" noise floor which is more pleasing to the human ear. D2S also enhances the AD1819's immunity to noise sources on the PC motherboard and within the PC enclosure. Conventional sigma delta converters in PC sound codecs use 1-bit D/A converters (ie: switches), combined with gross oversampling and high-order noise shapers to achieve 80dB+ fidelity. One-bit structures offer inherent linearity, so they circumvent distortion or noise artifacts that would arise due to component mismatches in the D/A block. High-order modulators spectrally shape their quantization noise, placing it at frequencies beyond the auditory response of the human ear. After filtering, you get CD-quality, 16-bit performance from a 1-bit D/A.

One-bit designs have their drawbacks. First, the mathematics of high-order noise shapers give rise to spurious "idle tones" which are objectionable to the human ear. "Colored" noise sources can make a 16-bit sound codec sound worse than a device with lower SNR, yet dominated by a white noise floor. Secondly, 1-bit designs are sensitive to system noise or jitter on the master clock. Sampling precision in time determines the overall quality of the D/A conversion process.

Data Directed Scrambling uses multibit D/A structures instead of the conventional 1-bit technique to circumvent historical drawbacks of sigma delta designs. The D2S process actually shapes the spectral characteristics of noise and distortion caused by component mismatches in the D/A conversion process. Along with the quantization noise, these artifacts are pushed to frequencies beyond the auditory response of the human ear, then filtered.

The AD1819 uses a 4-bit D/A structure and D2S to enhance noise immunity on motherboards and in PC enclosures and suppress idle tones below the quantization noise floor of the device. The result is an audibly pleasing, professional-quality rendering of PC sound tracks from sources including DVD movies, Dolby Digital AC-3 tracks and studio-quality MIDI music synthesizers.



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Printed in the U.S.A. H3079-5-597