

Integrated Mixed-Signal Solutions

## PRODUCT BRIEF

# STAC9750/51

Value-Line Two-Channel AC'97 Codecs with Headphone Drive and SPDIF Output

### OVERVIEW

Value-Line Stereo AC'97 codecs with headphone drive and SPDIF outputs.

### FEATURES

- Full duplex stereo 18-bit ADCs and 20-bit DACs
- AC'97 Rev 2.2-compliant
- High performance  $\Sigma\Delta$  technology
- SPDIF output
- Crystal elimination circuit
- Headphone amplifier
- Independent sample rates for ADC & DACs (hardware SRCs)
- 20 or 30 dB microphone boost capability
- 90 dB SNR LINE-LINE
- 5-Wire AC-Link protocol compliance
- Digital-Ready architecture
- General purpose I/O
- +3.3V (STAC9751) and +5V (STAC9750) analog power supply options
- Pin compatible with STAC9700/21/56/66
- SigmaTel Surround (SS3D) Stereo Enhancement
- Energy saving dynamic power modes

### DESCRIPTION

SigmaTel's STAC9750/51 are general purpose 18-bit ADCs and 20-bit DACs, full duplex, audio codecs conforming to the analog component specification of AC'97 (Audio Codec 97 Component Specification Rev. 2.2). The STAC9750/51 incorporate SigmaTel's proprietary  $\Sigma\Delta$  technology to achieve a DAC SNR in excess of 89dB. The DACs, ADCs, and mixer are integrated with analog I/Os, which include four analog line-level stereo inputs, two analog line-level mono inputs, two stereo outputs, and one mono output channel. The STAC9750/51 include digital input/output capability for support of modern PC systems with an output that supports the SPDIF format. The STAC9750/51 is a standard 2-channel stereo codec. With SigmaTel's headphone drive capability, headphones can be driven with no external amplifier. The STAC9750/51 may be used as a secondary codec, with the STAC9700/21/44/56/08/84/66 as the primary, in a multiple codec configuration conforming to the AC'97 Rev. 2.2 specification. This configuration can provide true six-channel, AC-3 playback required for DVD applications. The STAC9750/51 communicates via the five-wire AC-Link to any digital component of AC'97 providing flexibility in the audio system design. Packaged in an AC'97 compliant 48-pin TQFP, the STAC9750/51 can be placed on the motherboard, daughter boards, PCI, AMR, CNR, or ACR cards.



### ORDERING INFORMATION

Part Number	Package	Temp Range	Supply Range
STAC9750T	48-pin TQFP 7mm x 7mm x 1.4mm	0° C to +70° C	DVdd = 3.3V, AVdd = 5.0V
STAC9751T	48-pin TQFP 7mm x 7mm x 1.4mm	0° C to +70° C	DVdd = 3.3V, AVdd = 3.3V



## DESCRIPTION (CONTINUED)

The STAC9750/51 block diagram is illustrated on page 3. It provides variable sample rate Digital-to-Analog (DA) and Analog-to-Digital (AD) conversion, mixing, and analog processing. Supported audio sample rates include 48 kHz, 44.1 kHz, 32 kHz, 22.05 kHz, 16 kHz, 11.025 kHz, and 8 kHz; additional rates are supported in the STAC9750/51 soft audio drivers. The digital interface communicates with the AC'97 controller via the five-wire AC-Link and contains the 64-word by 16-bit registers. The two DACs convert the digital stereo PCM-out content to audio. The MIXER block combines the PCM\_OUT with any analog sources, to drive the LINE\_OUT and HP\_OUT outputs. The MONO\_OUT delivers either mic only, or a mono mix of sources from the MIXER. The stereo variable sample rate ADC's provide record capability for any mix of mono or stereo sources, and deliver a digital stereo PCM-in signal back to the AC-Link. The microphone input and mono input can be recorded simultaneously, thus allowing for an all digital output in support of the digital ready initiative. All ADC's operate at 18-bit resolution and DAC's at 20-bit resolution. For a digital ready record path, the microphone is connected to the left channel ADC while the mono output of the stereo mixer is connected to right channel ADC. Make sure the microphone input is not connected to the stereo mixer when in this mode.

The STAC9750/51 supports General Purpose Input/Output (GPIO), as well as SPDIF output. These digital I/O options provide for a number of advance architectural implementations, with volume controls and digital mixing capabilities built directly into the codec.

The STAC9750/51 is designed primarily to support stereo (2-speaker) audio. True AC-3 playback can be achieved for 6-speaker applications by taking advantage of the multi-codec option available in the STAC9750/51 to support multiple codecs in an AC'97 architecture. Additionally, the STAC9750/51 provides for a stereo enhancement feature, SigmaTel Surround 3D (SS3D). SS3D provides the listener with several options for improved speaker separation beyond the normal 2/4-speaker arrangements.

Together with the logic component (controller or advanced core logic chip-set) of AC'97, STAC9750/51 can be SoundBlaster® and Windows Sound System® compatible with SigmaTel's WDM driver for WIN 98/2K/ME/XP. SoundBlaster is a registered trademark of Creative Labs. Windows is a registered trademark of Microsoft Corporation.

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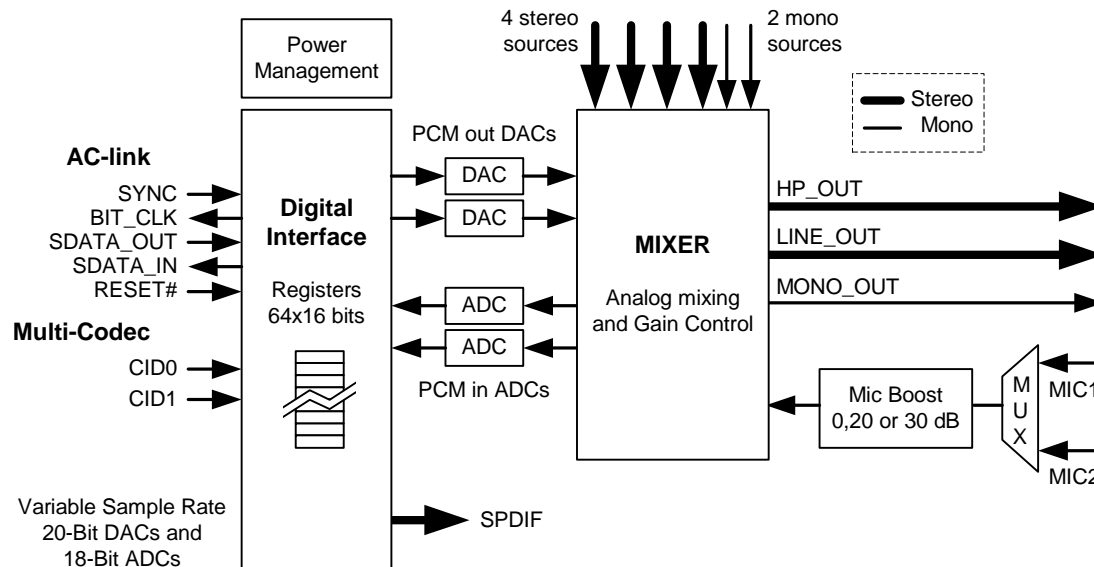
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### STAC9750/51 BLOCK DIAGRAM



### KEY SPECIFICATIONS

- Analog LINE\_OUT SNR: 90 dB
- Digital DAC SNR: 89 dB
- Digital ADC SNR: 85 dB
- Full-scale Total Harmonic Distortion: 0.005%
- Crosstalk between Input Channels: -70 dB
- Spurious Tone Rejection: 100 dB

### RELATED MATERIALS

- Data Sheet
- Reference Designs for MB, CNR, ACR and PCI applications
- Audio Precision Performance Plots

# STAC9750/51

## Value-Line Two-Channel AC'97 Codecs with Headphone Drive and SPDIF



### STAC9750/51 MIXER

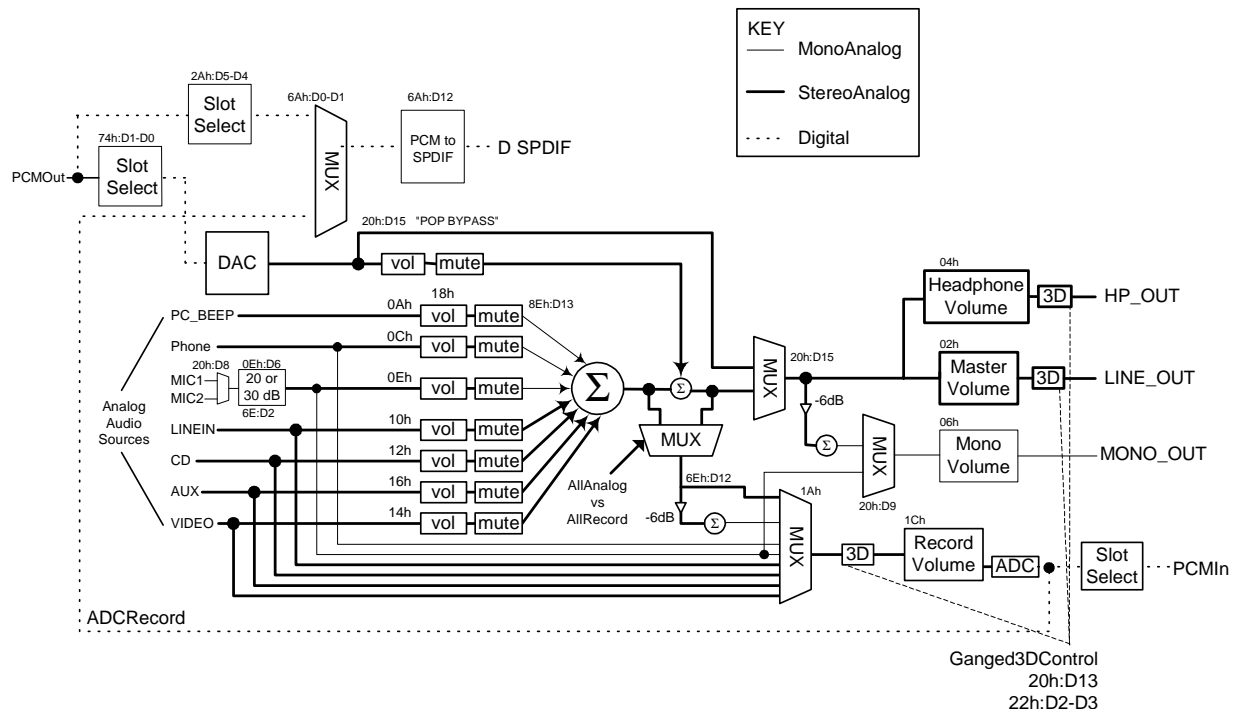


Figure 1. STAC9750 2-Channel Mixer Functional Diagram

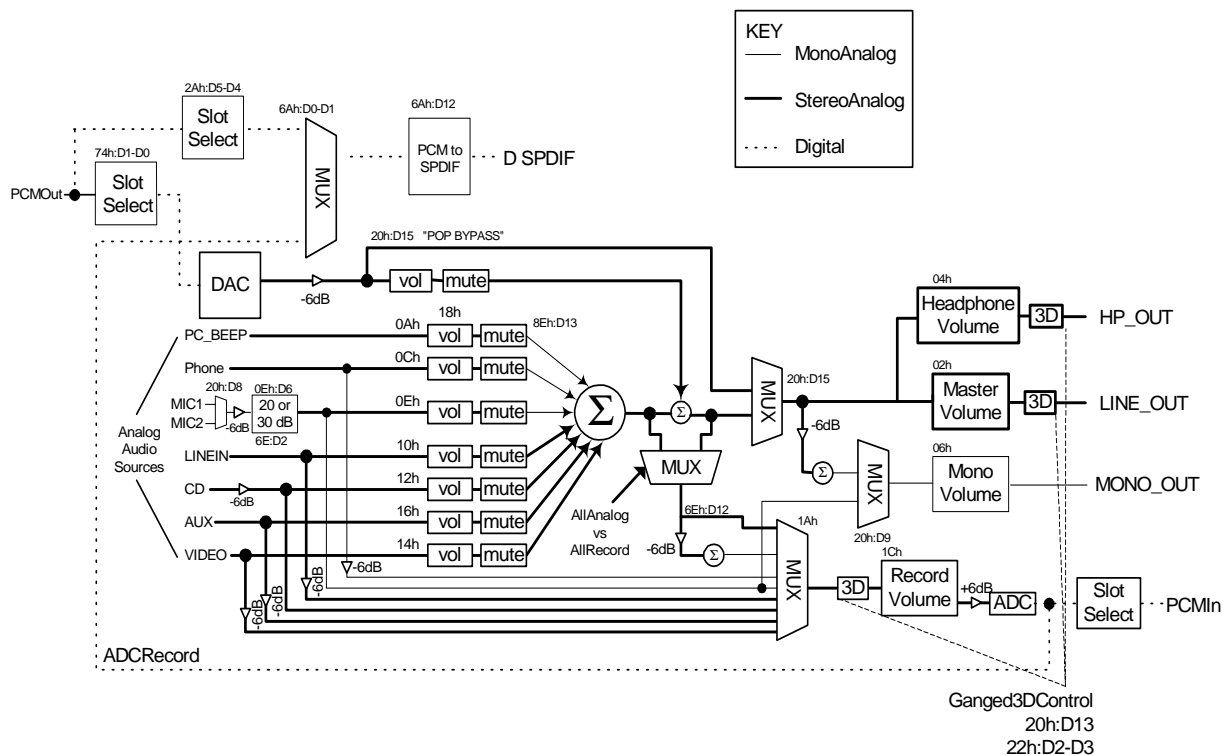


Figure 2. STAC9751 2-Channel Mixer Functional Diagram



## PIN DESCRIPTION

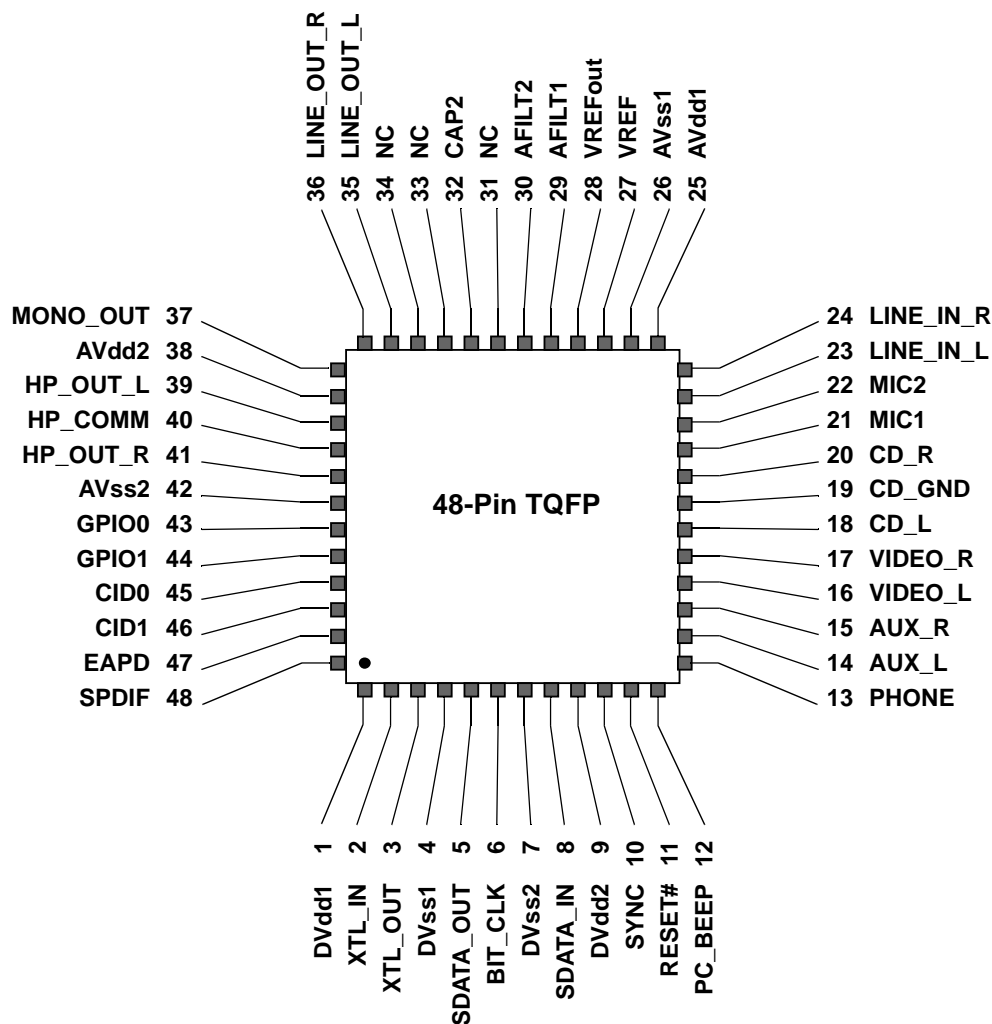


Figure 3. STAC9750/51 Pin Description Drawing

## ADDITIONAL SUPPORT

Additional product and company information can be obtained by going to the SigmaTel website at:  
[www.sigmatel.com](http://www.sigmatel.com)