OTI-612
Dual Audio/Telephony Codec

The OTI-612 is the world's first AC '97-compliant dual codec that consists of a high-fidelity audio codec and a 56Kbps-compatible modem codec. A single AC-Link connection allows both audio and telephony data to be sent to the codec for processing, enabling an AC '97-compliant digital controller, such as the OTI-611, to form the audio/communications hub in a personal computer.

Audio Codec Features

The OTI-612 implements all of the standard audio codec features called for in the AC '97 Codec Specification plus two optional features: tone control (bass and treble boost/cut) and a headphone amplifier. Register settings in the OTI-612 control these features and are accessed by the AC '97-compliant digital controller via the AC-Link interface. The codec features 128x oversampling sigma/delta converters and a dynamic range greater than 90 dB. The audio performance of the OTI-612 meets or exceeds all requirements for PC '97 and AC '97 codec specifications.

Modem Codec Features

The OTI-612 implements all of the standard modem codec features called for in the AC '97 specification plus three vendor-specific optional features. These additional features include a solid state circuit side Data Access Arrangement (DAA) support for connection to telephone lines, and configurable DAA design options. Register settings in the OTI-612 control these features, and are accessed by the AC '97-compliant digital controller via the AC-Link interface.
Special Features

The OTI-612 offers many features that are designed to reduce component count and cost as well as minimize the on-board space requirements of a hardware audio/modem system implementation. An example of this is the innovative tone control circuit in the OTI-612, which requires only four external capacitors instead of the usual six.

The headphone amplifier is capable of directly driving headphones with impedance values as low as 32 ohms, reducing the need for a separate, external operational amplifier and associated components.

The DAA interface in the OTI-612 has built-in solid state circuit sile DAA support to work with a Krypton Isolation, Inc. (Krypton) solid state DAA, greatly reducing the space required to build DAA functions.

Three flexible DAA configurations are available: solid state DAA support, direct connection to a 600W isolation transformer, or use with a hybrid-type operational amplifier (to implement more traditional DAA designs).

Package/Process

- 64-pin PQFP package
- AC '97-compliant pinout
- 0.6μ double-metal/double-poly CMOS

System Bus Interface

- 5-pin digital serial interface (AC '97) analog inputs

Codec Inputs

CD/DVD
- Analog CD/DVD-ROM Redbook audio with internal connections to Codec mixer. High-quality pseudo-differential CD input, no external input buffer required.

Mono Microphone
- Choice of desktop or headset microphone, with programmable gain

Speakerphone
- Use of system microphone & speakers for telephony, DSVD, and video conferencing

Stereo Line-Level Input
- Analog external line level source from consumer audio, video camera, etc.

Video
- TV tuner or video capture card with internal connections to codec mixer

AUX/Synth
- Analog FM synthesizer, wavetable synthesizer, or other internal source

System Audio
- Digital PCM input and output for business, games, and multimedia
OTI-612 Product Brief
Technical Specifications

Codec Analog Output Specifications

Full-Scale Output Voltage
Line Output: 1.0 Vrms
Headphone Output: (32Ω load resistance, -3dB gain) 1.41 Vrms typical

Analog S/N
CD to LINE_OUT: = 90dB minimum
Other to LINE_OUT: = 90dB typical

Total Harmonic Distortion
Line Output: output level = 0dB, 0.02%
(0dB = 1Vrms) (0dB gain, 20-KHz BW, 48-KHz sample frequency)
= -85dB
Headphone Output: Output level = -3dB,
(0dB = 1Vrms) 32Ω load 0.1%, -60dB capable of driving headphone loads down to 32Ω impedance

Audio Digital-to-Analog Converters

Resolution: 18 bits
Dynamic Range S/N: RMS output level with 1-KHz full-scale input, “A weighted”
= 93dB, typical
Total Harmonic Distortion (THD):
= -80dB, 0.02% THD
Signal-to-Intermodulation Distortion (CCIF Method):
= -80dB
DAC Crosstalk Between Input Channels:
= -80dB

Modem Analog-to-Digital Converters

Resolution: 18 bits
Dynamic Range (SNR): RMS output level with 1-KHz full-scale input bandwidth
= 90dB
S/THD+N (SNDR):
= 85dB
Modem Bandwidth: Fs/2 (Fs = 7.2 KHz, 8 KHz, 8.229 KHz, 8.4 KHz, 9.6 KHz, 10.287 KHz, 12 KHz)
Total Harmonic Distortion (THD):
= -85dB, 0.006% THD
Signal-to-Intermodulation Distortion (CCIF Method):
= -80dB
ADC Crosstalk Between Input Channels:
= -80dB
Modem Digital-to-Analog Converters

Resolution: 18 bits
Dynamic Range S/N: RMS output level with 1-kHz full-scale input, "A" weighted
= 96dB, typical
Total Harmonic Distortion (THD):
= -85dB, 0.006% THD
Signal-to-Intermodulation Distortion (CCIF Method):
= -80dB
DAC Crosstalk Between Input Channels:
= -80dB

Output Analog Amplifiers and Attenuators

Output Attenuation, Gain Step Size
Bass Control: 1.5dB
Treble Control: 1.5dB
Master Volume: 1.5dB
Master Volume Mono: 1.5dB
Headphone: 1.5dB
Mono Volume: 1.5dB

Output Attenuation, Gain Range
Bass Control: -10.5dB to +10.5dB
Treble Control: -10.5dB to +10.5dB
Master Volume: -45dB to 0dB
Master Volume Mono: -45dB to 0dB
Headphone: -45dB to 0dB
Mono Volume: -45dB to 0dB

Analog Mixer Specifications

Audio Output Frequency Response:
20 Hz to 19.2 KHz
Modem Frequency Response:
20 Hz to 5.4 KHz
Line Input:
1.0 Vrms
Mic Inputs
(with +20dB boost on):
0.1Vrms
(with boost off):
1.0 Vrms
Modem Input:
0.38 Vpp
Input Impedance (all audio inputs):
30 KΩ (typical)
Modern Input Impedance:
100 KΩ minimum
Input Capacitance (all inputs):
15pF

Minimum System Requirements

- AC '97-compliant digital controller with audio and telephony functions (such as Oak Technology's OTI-611 TelAudi3D™)
- TelAudi3D requirements:
  - 166-MHz Pentium CPU
  - 32MB system memory
  - 256KB cache
  - Windows 95 or higher; or Windows NT 4.0 or higher

Software and Manufacturing Support

Oak Technology offers comprehensive software support packages for Oak multimedia devices. The OTI-611/612 evaluation package comes with Windows 95 and NT accelerated audio drivers for use with those operating systems. In addition, Oak supplies complete manufacturing reference designs for the OTI-611/612.