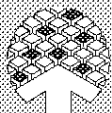# OTI-612

Dual Audio/Telephony Codec

product
features

OTI-612 Audio Highlights:

- 18-bit stereo full-duplex audio codec with fixed 22.05-KHz, 44.1-KHz, and 48-KHz sampling rates
- AC '97-compliant digital serial interface and 64-pin package
- Integrated headphone amplifier capable of supporting 32W stereo headphones
- Stereo sigma/delta converters with 128x oversampling
- Built-in tone controls for bass and treble with +/- 10.5dB boost/cut
- Four analog line-level stereo inputs for LINE IN, CD, VIDEO, and AUX, plus four analog mono inputs
- Stereo line level output
- Mono microphone input switchable from two external sources
- >90dB dynamic range
- THD+N = 85dB

OTI-612 Modem Audio Highlights:

- Mono output for speakerphone (or down line phone)
- V.34bis and 56K modem codec (ADC and DAC)
- AC '97 rev.2 compliant
- Configurable DAA support: 600W transformer load and Krypton DAA modem interface or direct 600W transformer drive
- Krypton transmit/receive
- Multiple sample rates (7)
- Gain and attenuation on the receive and transmit on the modem side
- Built-in 2-wire or 4-wire duplexer DAA
- Power management support
- Two analog line-level mono inputs for speakerphone (or down line phone) and PC BEEP

OAK TECHNOLOGY

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 90dB. 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.
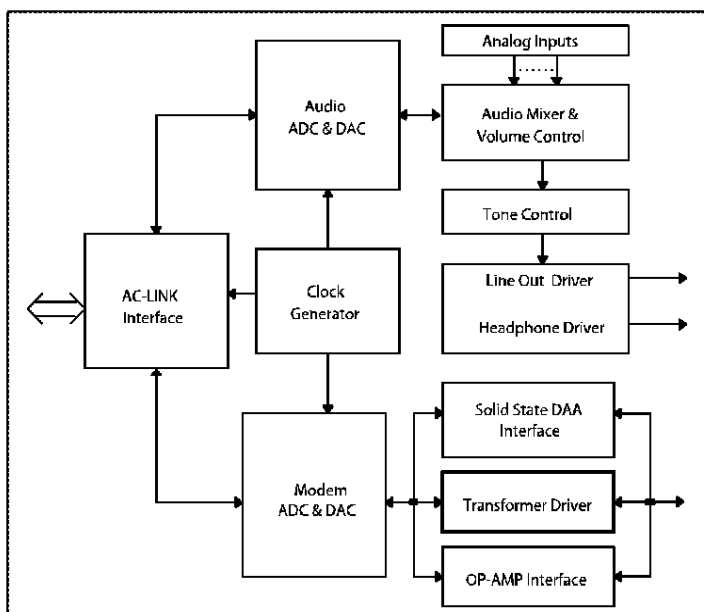
OTI-612 Block Diagram

OTI-612 Product Brief
Technical Specifications
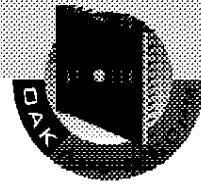
Special Features

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 side 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
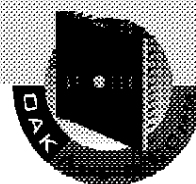
AUX/Synth

* 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

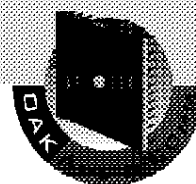## Audio Analog-to-Digital Converters

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
ADC Crosstalk Between Input Channels:	= -80dB

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

OTI-612 Product Brief
Technical Specifications

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):	0.1 Vrms
(with boost off):	1.0 Vrms
Modem Input	0.38 Vpp

Input Impedance (all audio inputs):

30 KΩ (typical)

Modem 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 TelAudia3D™)
- TelAudia3D 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.