OTI-257

MPEG-1 Audio/Video Decoder

product features

- Decodes MPEG-1 system layer bit streams at SIF resolution in real time
- Provides on-chip MPEG-1 system layer audio/video demultiplexing and synchronization
- Provides CD-ROM decoding with both ECC and EDC schemes
- Horizontal and vertical interpolation with vertical chrominance filtering and frame interpolation
- Supports VCD2.0, VCD1.1, CD-DA, and other CD formats
- Provides Oak's VIDSCAN™ interactive menu with simultaneous motion, video, and audio playback
- Integrated 32-bit Multimedia RISC Architecture (MRA)
- Integrated multi-standard TV encoder (NTSC/PAL) with composite- and S-video output:
  - 720x480 @ 30 fps (N.I.)
  - 720x240 @ 60 fps (NTSC)
  - 768x240 @ 60/50 fps (CD-I)
  - 720x288 @ 50 fps (PAL)
- Integrated full-screen, 64-color OSD for multilingual display
- Integrated full-featured Karaoke playback functions:
  - Vocal changer
  - Vocal harmony
  - Auto vocal fader
  - Music vocal fader
 - Music key control with eight quarter-node adjustments in up and down shifts

Based on Oak's Multimedia RISC Architecture (MRA), the OTI-257 is the most integrated MPEG-1 system decoder for VideoCD (VCD) players. The OTI-257 is fully VCD2.0 compatible and is integrated with all of the key features to provide the lowest cost VCD player solution in the marketplace.

The OTI-257 is a single chip solution targeted for the VCD market. It integrates MPEG-1 audio/video decoding, industry-standard CD-ROM decoding, and programmable multi-standard TV encoding. In addition, the OTI-257 has complete Karaoke functions with a full-screen, on-screen display (OSD); glueless interface to CD-DSP; and a host processor. Support for CD-DSPs and common host buses, like Intel and Motorola, is provided to increase design flexibility and reduce design complexity.

VCD manufacturers can now build a complete VCD Karaoke player with the OTI-257, 4 Mbits of DRAM, and a microcontroller. The OTI-257 reduces overall system cost and manufacturing issues due to a low component count.
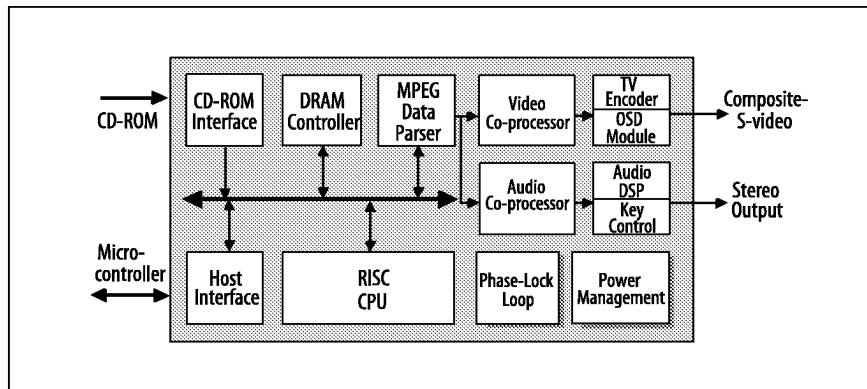
OTI-257 Block Diagram

product
features (cont'd)

- Integrated DSP supporting high-fidelity sound effects:
  - Echo effect, echo and crosstalk cancellation
  - Stereo emulation from mono input
  - 3D and stereo enhancement
  - Programmable sound effects: hall, live, stadium, and user-defined special effects
  - Vocal reverb
- Auto scaling for NTSC/PAL TVs
- Internal Phase-Lock Loop (PLL)
- Supports 8-bit host interfaces
- Direct interface to host, CD-DSPs, DACs, and DRAMs
- Power management
- 100-pin PQFP package for easy assembly
- Utilizes 0.35μm process for higher system integration
- Operates in 3.3v for less power consumption
- Firmware compatible with Oak's existing MPEG-1 products
- Flexible interface for low-cost, effective VCD system solutions

Architectural Overview

The OTI-257 can be programmed to receive MPEG-1 system, MPEG video, MPEG audio-data streams, or CD-DA data. System and multimedia data streams are parsed using the 32-bit multimedia RISC engine. For MPEG data, the RISC engine distributes the parsed audio/video data to the corresponding co-processors for direct decoding. Programmed with user preferences, the decoded video data is output in TV standard signals. Additionally, the decoded audio data can be played with different sound effects. For CD-DA data, the RISC engine operates in pass-through mode and transfers data directly to the audio unit.

VideoCD Features

For consumer electronics applications such as VCD players, the OTI-257 is 100% VCD2.0 compatible. Its firmware and microcode support features like VIDSCAN and high-resolution still pictures. VIDSCAN is an interactive menu that allows users to simultaneously preview up to 16 tracks on a standard VCD while enjoying full audio playback. High-resolution still pictures can be utilized for slide show presentations as well as graphical chapter identification. All popular CD encoding formats are supported. Full-screen OSD is also supported, providing the user with an array of text and graphics to be overlaid for full interaction. To further reduce overall system cost, the OTI-257 includes a high-quality, multi-standard TV encoder and a full-featured Karaoke module. Both integrations eliminate the need for an external TV encoder and Karaoke chip to support a full-featured Karaoke VCD player.
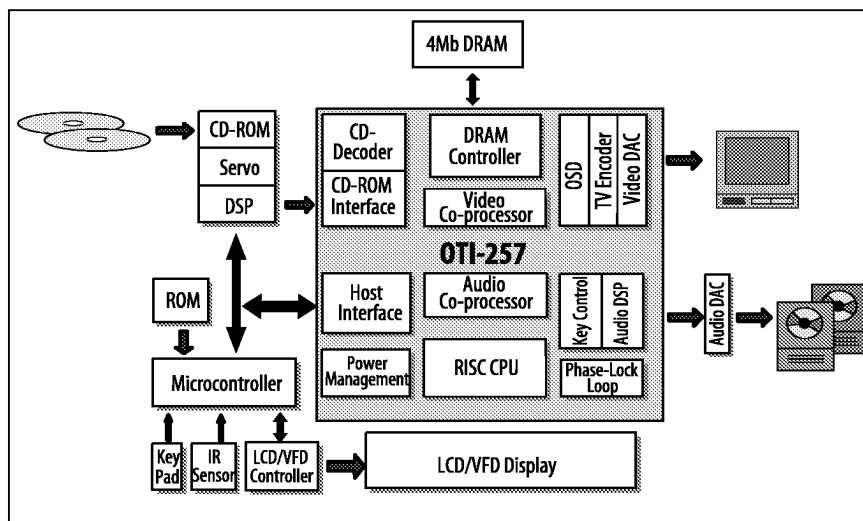
VideoCD Player Architecture

OTI-257
Interfaces

Host Interface

The Host Bus Interface Unit (HBIU) directly communicates with the 8-bit ISA or 8-bit microcontroller bus for system control and data flow operations. The HBIU performs chip initialization, delivers compressed MPEG-1 data, reports internal operational status, and generates a system interrupt. The OTI-257's internal registers, counters, memory, and DRAM are accessible through the HBIU.

DRAM Interface

The primary function of the DRAM controller is DRAM address generation. The DRAM controller consists of a sophisticated memory access request mechanism to ensure sufficient DRAM bandwidth. The OTI-257's DRAM interface can support up to 2MB of DRAM data address. Only 4 Mbits (512 KB) of DRAM are required to decode MPEG-1 bit streams and display high-resolution still pictures.

CD-DSP Interface

The CD-DSP unit provides direct interface to receive the serial data output from the CD-DSP chip. The data stream coming from the CD-DSP can be CD-DA (audio PCM data), CD-G, CD-ROM, or MPEG-1 (VCD, CD-I, or Karaoke CD). The on-chip interface registers can be programmed to support different input formats so that many different CD-DSP chips can be supported.
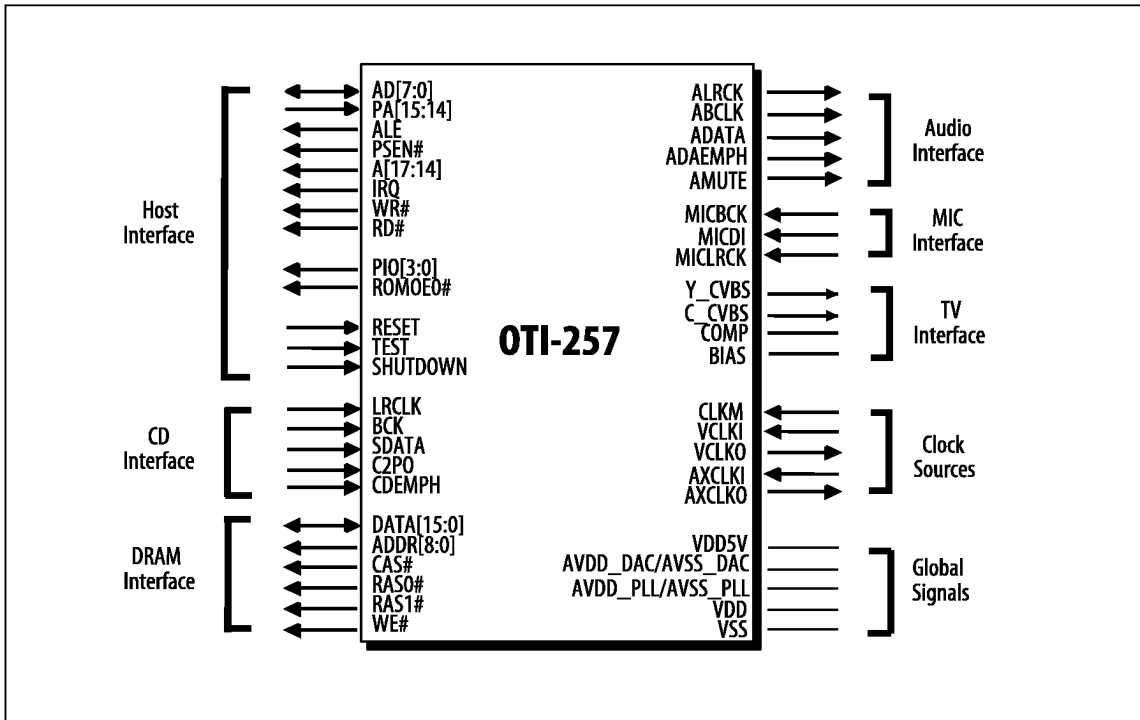
Audio Interface

The OTI-257 provides reconstructed PCM audio samples in serial format directly to external audio digital analog computers (DACs). The audio DAC interface is designed to be programmable so that most of the popular audio DACs can be used. It supports the following sampling frequencies: 32, 44.1, and 48 KHz.

Video Interface

The RISC CPU directs the uncompressed video pixel data to the OTI-257's integrated NTSC/PAL video encoder for video processing. Image quality is flicker-free and sharp due to a horizontal and vertical interpolation scheme that uses multi-tap filters in conjunction with vertical chrominance filtering and frame interpolation. NTSC-to-PAL expansion and PAL-to-NTSC decimation are supported to compensate for the various combinations of data types and output screens. In addition to the rate conversion, the OTI-257 also allows for "on-the-fly" NTSC/PAL mode switching for smooth playback of multi-format discs. To further enhance flexibility, both composite- and S-video outputs are supported.

Host Interface
- AD[7:0]
- PA[15:14]
- ALE
- PSEN#
- A[17:14]
- IRQ
- WR#
- RD#
- PIO[3:0]
- ROMOE0#
- RESET
- TEST
- SHUTDOWN

CD Interface
- LRCLK
- BCK
- SDATA
- C2PO
- CDEMPH

DRAM Interface
- DATA[15:0]
- ADDR[8:0]
- CAS#
- RAS0#
- RAS1#
- WE#

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Audio Interface
- ALRCK
- ABCLK
- ADATA
- ADAEMPH
- AMUTE

MIC Interface
- MICBCK
- MICDI
- MICLRCK

TV Interface
- Y_CVBS
- C_CVBS
- COMP
- BIAS

Clock Sources
- CLKM
- VCLKI
- VCLKO
- AXCLKI
- AXCLKO

Global Signals
- VDD5V
- AVDD_DAC/AVSS_DAC
- AVDD_PLL/AVSS_PLL
- VDD
- VSS

External Interface Signals

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