OTI-8211

MPEG-2 Decoder for Digital Television Systems

The OTI-8211 is a highly integrated, single-chip real-time decoder for video and audio decompression as well as demultiplexing of MPEG system level compressed data streams.

The OTI-8211 is fully compliant with ISO MPEG-2 bit streams and specifications. It is designed to satisfy specific applications within the consumer, entertainment communications (cable, telecom, satellite), and computer markets. These include digital set-top box applications.

product features

- Operates on ISO 11172 (MPEG-1) and ISO 13818 (MPEG-2) bit streams
- Single-chip solution, decodes MPEG-1 and MPEG-2 audio, video, and system bit streams
- Decodes transport and program stream
- Full CCIR601 resolution:
  720x480 @ 30 Hz (NTSC)
  720x576 @ 25 Hz (PAL)
- 55-Mbps max. system stream data rate — serial and parallel input
- 15-Mbps max. compressed video data rate
- Bit serial and parallel input capabilities for compressed data
- Supports ISA, Intel, and Motorola bus interfaces
- On-chip DRAM controller
- Error detection and concealment
- Supports 16 PIDs + PCR PID
- Can accept PES as input data
- 16- and 18-bit PCM stereo audio outputs
- 8- and 16-bit digital YUV video outputs
- Internal 4-bit per pixel graphics overlay with zoom; 16-color palette; and 5 levels of transparency
- Programmable horizontal pixel resampling
- Programmable cropping and positioning of full-motion video and graphics overlay
- Supports Pan & Scan
- Picture-in-picture support
- Glueless interface to industry-standard video encoders, audio DACs, and DRAM devices
- 27-MHz STC clock frequency

Functional Review

The OTI-8211 processes ISO 11172 (MPEG-1) and ISO 13818 (MPEG-2) bit streams. It demultiplexes, decompresses, and synchronizes audio and video and produces digital data output ready for D/A conversion.

The OTI-8211 works with common external host microprocessors. It interfaces directly to the processor bus and supports DMA operations for compressed data transfers from the host memory. ISA, Intel, and Motorola bus types are supported. Compressed data can also be delivered for decompression via bit serial and parallel input. After decompression, video is merged with graphics overlay and sent with audio to external D/A converters. The OTI-8211 connects directly to a wide variety of industry-standard audio DACs and video encoders.

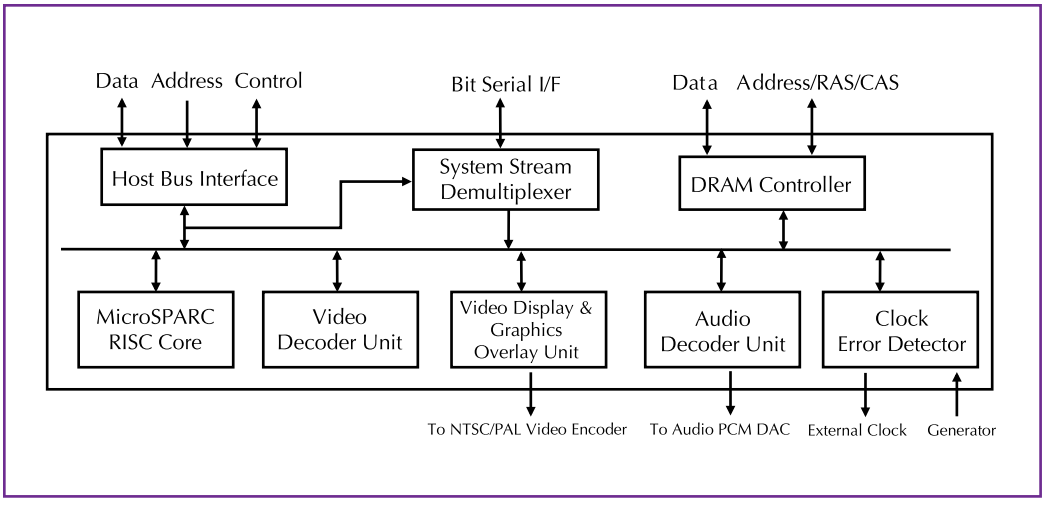

Figure 1: Block Diagram

OAK TECHNOLOGY

Functional Review Cont'd.

The OTI-8211 utilizes the MicroSPARC RISC core developed by Sun Microsystems. The RISC core performs decoding of less frequently occurring syntax layers such as picture headers, performs audio/video synchronization, and communicates with the host microprocessor.

The software interface is provided through the MPEG Device Interface (MDI). Oak Technology provides the MDI as a library of C functions that execute on the host microprocessor.

Internal graphics overlay merged with video is also supported, providing simultaneous display of interactive graphics with full-motion video.

The OTI-8211 requires 16 Mbits (24 Mbits for PAL) minimum of dedicated DRAM for decoding and buffering. Standard 4-Mbit DRAM chips may be used via direct connection to the device.

System Configuration

Figure 2 shows the OTI-8211 designed into cable or direct broadcast satellite set-top applications. In order to provide a cost-effective system level implementation and shorten the time to market using standard software development tools, the OTI-8211 is designed for glueless interface with inexpensive 16-bit microprocessors such as the Motorola MC680xx or Intel 80xx.

When using Intel, the system architecture will usually be based on the ISA bus similar to that used in personal computers. The OTI-8211 interfaces directly to the system bus and external DMA Controller. The RF demodulator provides digital bit streams to the compressed data inputs of the OTI-8211. The microprocessor configures the RF demodulator to select the desired channel and configures the OTI-8211 to access the desired programs from that channel.

Optionally, the bit streams from the demodulator can be processed by an external descrambler before being sent to the OTI-8211.

The OTI-8211 digital outputs are connected directly to industry-standard audio DACs and composite video encoders. To support interactive applications, the microprocessor processes input from the remote control and uses the OTI-8211 graphic overlay function to display menus, subtitles, and other interactive elements.

DRAM Interface and Configuration

The DRAM interface generates signals for addressing and controlling up to two banks of local DRAM. Memory configurations supported are 16, 20, 24, and 32 Mbits to allow for different video resolutions, buffering requirements, and graphics overlay resolutions. NTSC applications will typically use 20-Mbit. The memory requirements are primarily dictated by video resolution and format. Generally, three video frames must be stored as part of the decompression process. Refer to specifications for minimum memory requirements for typical video formats and resolutions.

OTI-8211 Product Brief

Technical Specifications

Physical Description

- OTI-8211 MPEG-2 decoder for digital television systems

Package/Process

- 208-pin PQFP
- 0.6µ triple-layer metal process

Processing

- 60 MHz MicroSPARC RISC core with data cache
- Dedicated MPEG-2 audio and video processing units

Decode Formats Supported

- ISO 11172 (MPEG-1)
- ISO 13818 (MPEG-2)
- MPEG-1 and -2 audio
- Decodes full CCIR601 resolution:
  720x480 @ 30 Hz (NTSC)
  720x576 @ 25 Hz (PAL)

On-screen Display (OSD)

- 16-color mode (4 bpp)
- 5 levels of transparency

Memory Interface and Performance

Dram Interface

- Type: EDO or fast page mode
- Speed: 70ns or faster (depending on memory clock)
- Amount: 20-32 Mbits

System Interfaces

Inputs

- Serial interface for MPEG transport stream
- Parallel 8-/16-bit interface

Outputs

- CCIR601 digital video output for interfacing to external video encoder

Microprocessor Interfaces Supported

- 8-/16-bit parallel host interface
- Intel 80xx
- Motorola 680xx

Demodulator Support

- Glueless support for the following Oak demodulators:
  OTI-8511 QPSK demodulator
  OTI-8521 QAM demodulator

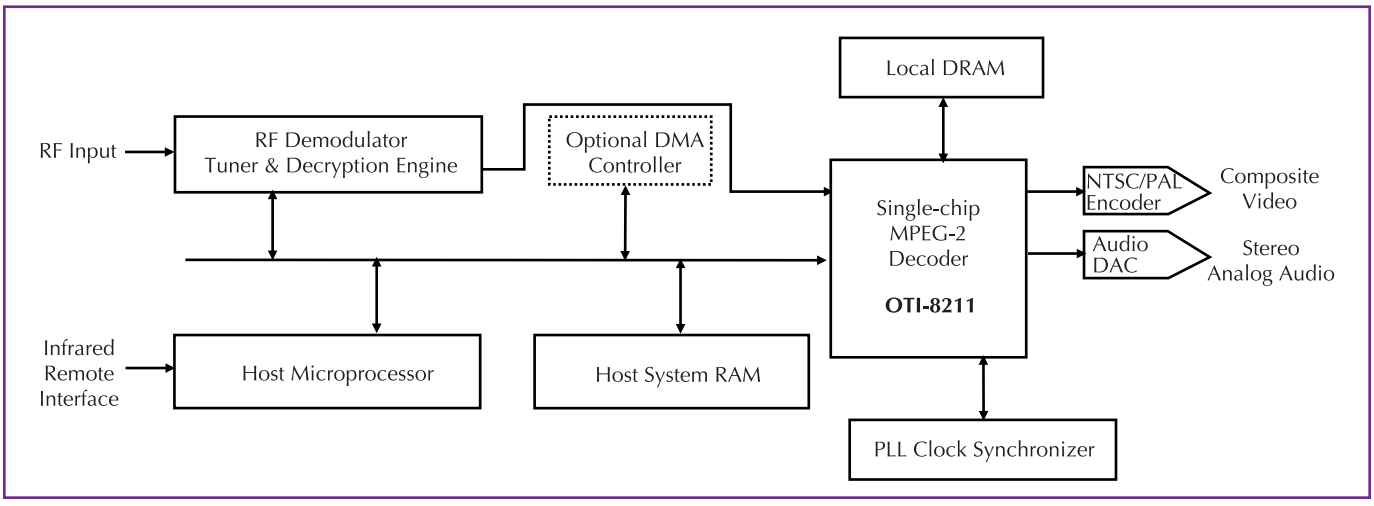

Figure 2: Typical Digital Set-top Box Block Diagram

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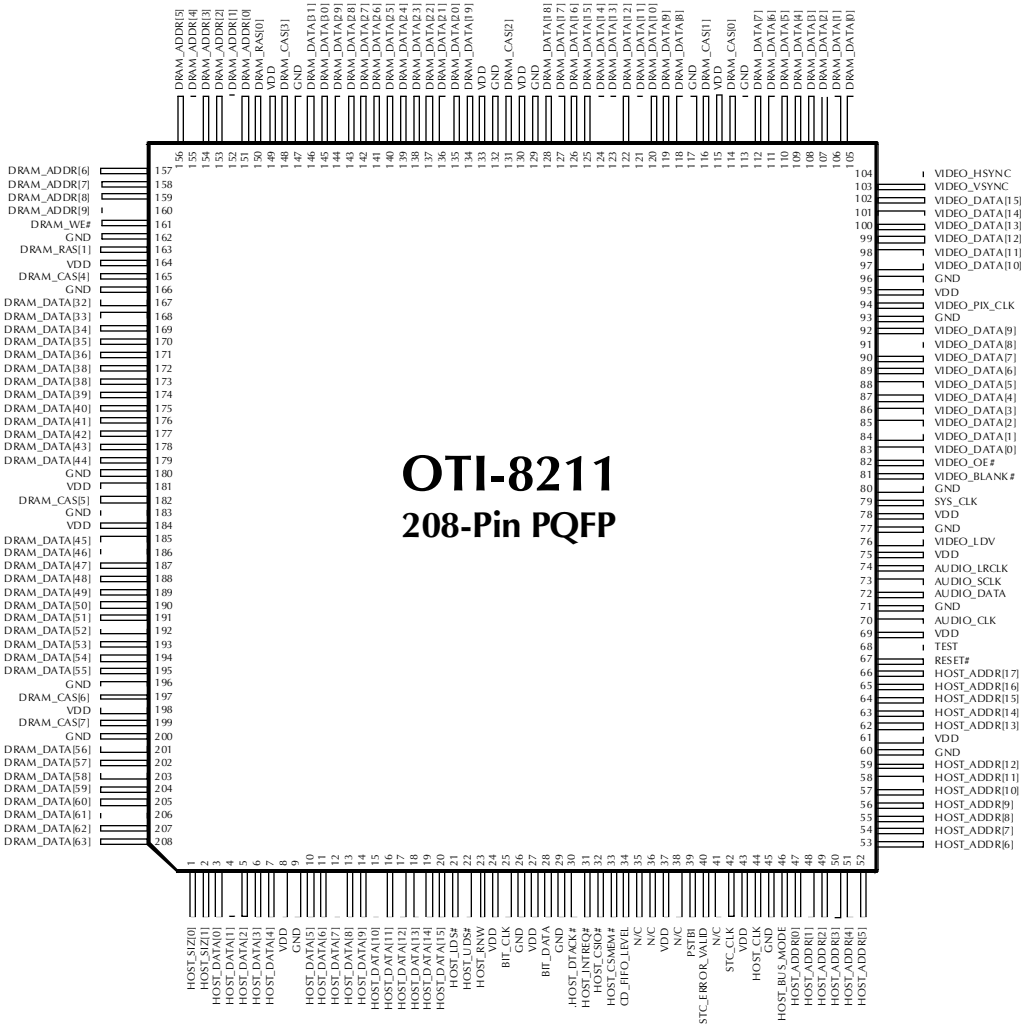

OTI-8211 Pinouts