The OTI-8215 is a highly integrated, single-chip set-top box (STB)/DTV solution.

Description
The OTI-8215 is a highly integrated STB system processor with real-time MPEG-2 A/V decoding aimed at digital cable, satellite and terrestrial television markets. It performs MPEG-2 A/V decompression as well as demultiplexing of MPEG system level compressed data streams. The OTI-8215 is fully compliant with ISO MPEG-2 bit streams and supports main profile/main level decoding (MP@ML).

Integration of Key Digital STB Features
The integration of a RISC processor, NTSC/PAL video encoders, PLLs and common interface electronics allow the OTI-8215 to cost-effectively address specific applications within consumer and entertainment communications markets (cable, satellite, terrestrial). The OTI-8215 integrates a 100-MHz MicroSPARC RISC core that manages all of the internal traffic routing on the OTI-8215 as well as decoding of picture headers and handling A/V synchronization. It may also function as the main processor in the STB or handle communications with an external host microprocessor. An on-board NTSC/PAL encoder (with SCART-compliant output) provides crisp, clear display of images on standard televisions. The OTI-8215 accepts and encodes TTX or CC data streams. A CCIR656 digital output is used to drive a secondary video encoder or digital television. Dual on-board DVB common interface ports allow the OTI-8215 to be used with external conditional access modules (CAMs) in applications requiring conditional access.
Enhanced Video and Graphics Display

The OTI-8215 features six independent display surfaces, enabling a wide range of on-screen video and graphics combinations. The primary video surface displays decoded MPEG-2 video. This surface can be arbitrarily sized and scaled using a sophisticated, multi-tap filter algorithm. A background graphics plane enables simple color screens to be programmed. The GO display surface can support 16, 256 and 65,536 colors. In 16- and 256-color modes the GO can have up to 256 levels of alpha-blending, enabling simultaneous display of interactive graphics with full-motion video. The display planes are used for system-level displays and highlights/shadow control that simplifies electronic program guide (EPG) generation and navigation. A hardware cursor is also included. Anti-flutter circuitry ensures sharp and stable image display, eliminating flickering that occurs when displaying text and graphics.

Integrated Host Processor

- 100-MHz MicroSPARC RISC core
- 4K data cache
- 2K instruction cache
- 64-bit internal memory architecture
- Dedicated MPEG-2 A/V processing units with DMA engines

MPEG Stream Demultiplexor

- Decodes MPEG-2 program and transport streams
- Performs start code and sync-byte scanning and detection

Decoder Formats Supported

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

Video Encoder

Encoder Formats Supported

- NTSC up to 720x480 @ 30 Hz
- PAL up to 720x576 @ 25 Hz
- SCART-compatible output

Video Scaling

- NTSC-to-PAL, PAL-to-NTSC reformatting
- 16:9 to 4:3 Letterbox
- 16:9 to 4:3 Pan & Scan
- 16:9 to 14:9
- Supports wide-screen signalling (WSS)

Output Modes

- SCART-compatible output, including digital video output
- Component video output (YQbQ)
- S-video output
- Simultaneous output of composite, SCART and s-video
OTI-8215 Product Brief

Technical Specifications Cont'd.

**Package/Process**
- 208-pin PQFP
- 0.3µ quad-layer metal process, 3.3V and 5V tolerant

**VBI Support**
- VBI/TTX/CC insertion at internal encoder
- VBI/TTX interface to external video encoder

**Special Features**
- Flutter reduction circuit for OSD graphics
- Optional Macrovision-ready (7.1)

**Integrated PLLs**
- 4-18 MHz audio clock
- 80-100 MHz system clock

**Display Surfaces**
- GO (Graphics Overlay)
  - 16 and 256 indexed color mode (8bpp), with 16 levels of transparency (CLUT has YO/Ob 4:4:4 values)
  - 65,536-color mode (16bpp) in YO/Ob 4:2:2 format
  - Still picture (generated from video) in YO/Ob 4:2:2 format
  - Arbitrary display window position and size
  - 2x zoom (horizontal, vertical) and filtering

- Cursor Plane
  - Hardware cursor
  - Arbitrary cursor size up to full screen
  - 2 bits per pixel
  - Transparency on/off

- Graphics Highlight
  - Color index shift for fast, easy menu highlighting
  - ColorShift1 (shadow effects)
  - ColorShift2 (highlight effects)

- Background Color
  - Solid color in YO/Ob format

- Video Border Color
  - Solid color in YO/Ob format

- Primary Video Surface
  - YO/Ob 4:2:0 format
  - Scaling up to 4x zoom or 1/4x reduction

**Memory Interfaces**

**SDRAM Interface**
- Width: 32 bits
- Speed: programmable up to 100 MHz
- Capacity: 32-64 Mbits, using two or four 1Mx16 devices, a single 1Mx32

**ROM/Flash Interface**
- Width: 8 bits
- Speed: 120ns
- Capacity: 128KB-4MB

**System Interfaces**

**MPEG Stream Input**
- 8-bit parallel and serial interfaces, support industry-standard demodulators including Oak’s OTI-7000, OTI-8511 QPSK and OTI-8515 integrated QPSK

**Microprocessor Interface**
- 8-/16-bit parallel host interface
- Intel and Motorola

**Common Interface**
- Compliant with DVB-CA standard (EN 50221)
- Type: 2x PCM/QA
- Supports conditional access/decryption modules that conform to the common interface specification

**Audio Interface**
- I²S out (audio DAC) supporting 16- and 18-bit stereo formats
- S/P DIF (IEC-958) output supporting 16-24 bit format, 2 to 5.1 channel and up to 96 KHz sample output rate

**Peripheral Interface**
- Industry-standard serial interface
- Programmable I/O ports (8-16)
- UART
- IR remote control input interface

**Video Interface**
- S-video out
- Composite-video out
- QQRF656 digital video output for external video encoder
Detailed Block Diagram