

# XCode™ 2111 Product Brief



XCode™- 2111 is the industry's first PCI MPEG encoder/transcoder/security integrated circuit (IC). It has the following highlights:

- Supports worldwide content protection
- Transport stream I/O for ATSC, DVB, and ISDB support
- 3 D1 or 1 HD MPEG1/2/4 transcodes/transrates in up to 8X realtime
- Single D1 MPEG2/4 (ASP, SP) encode capable
- Mirror encode – single 656 stream can generate two streams with same content at different formats
- Pixel-based motion adaptive 3D comb-filter *and* temporal/spatial filter
- Multi/Single CableCard™ data and control I/F, Smart Card interface
- Decryption: Multi2/DVB/DES
- PCI v2.3 interface

## Summary of Features

### MPEGPerfection™ Encoding

- ◆ MPEG2 (up to ML@MP)
  - 525/60 NTSC up to 720 x 480 @ 30fps
  - 625/50 PAL up to 720 x 576 @ 25fps
- ◆ MPEG4 up to D1 (with PSP™, iPOD™, DivX™ remux)
  - ASP (L0 – L5)
  - SP (L0 – L3)
- ◆ VBR or CBR encoding up to 15 Mbps
- ◆ Programmable GOP structure
- ◆ Variable frame rate control
- ◆ Field/frame motion estimation
  - ± 300 pixel window
- ◆ Half pel accuracy
- ◆ 4:2:2 to 4:2:0 conversion
- ◆ Intelligent sharpness control
- ◆ Inverse telecine (3:2 pulldown)
- ◆ Scene change detection

### Digital Video Filtering

- ◆ Pixel-based motion-adaptive 3D comb filter
- ◆ Pixel-based temporal/spatial filter
- ◆ Image edge rectification

### Audio Encoding/Transcoding

- ◆ Programmable audio block:
  - AC3, AAC, MP3, MPEG-1 Layer II, G.726, PCM encoding and transcoding
- ◆ Sampling rates: 32, 44.1, 48, 96 kHz
  - Compressed bit rates up to 448 kbits/sec

### TurboMPEG™ Transcoding/Transrating

- ◆ Format conversion of multiple streams:
  - MPEG2 HD to MPEG2 SD
  - MPEG2 HD to MPEG4 (ASP, SP)
- ◆ Bit-rate reduction of multiple streams:
  - 27 Mbps → 128 Kbps
- ◆ Resolution reduction of streams:
  - HDTV → SDTV → CIF → QCIF
  - HDTV → HDTV
- ◆ High-speed video processing up to 8X real-time

### Stream Formats Supported (In/Out)

- ◆ Elementary Stream (ES), Packetized Elementary Stream (PES), Program Stream, Transport Stream (TS), DVD-VR Program Streams
- ◆ YUV in/out stream support (uncompressed)

### Technology

- ◆ Efficient low power design
- ◆ 0.13µm CMOS technology

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## Interfaces

- ◆ Transport stream (2 serial or 2 parallel) inputs
- ◆ 16/32 bit DDR SDRAM memory controller:
  - Supports 512 Mb, 256 Mb, 128 Mb, 64 Mb DRAM densities
  - Supports 16, 32 bit wide memory parts
- ◆ PCI v2.3 32 bit 33 MHz bus interface
- ◆ I<sup>2</sup>C – master and master/slave
- ◆ 8/10 bit CCIR 656 input, I<sup>2</sup>S input
- ◆ Transport stream output with remultiplexer
- ◆ SPI EEPROM interface for self-boot

- ◆ JTAG interface port
- ◆ General Purpose I/O

## Security Features

- ◆ Supports capture and decryption of ATSC, DVB, and ISDB protected standards
- ◆ Multi / Single CableCard™ interface and data block
- ◆ MS DRM support, Real Networks DRM
- ◆ Smart Card Interfaces for Conditional Access
- ◆ Supports worldwide content protection

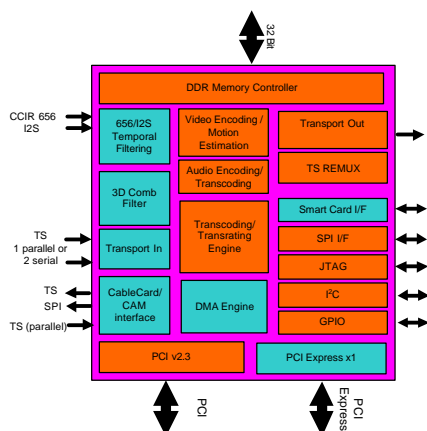
## Typical Applications

- ◆ OCUR, PBDA, and ISDB-T TV Tuner Boards
- ◆ Hybrid analog/digital TV tuner boards
- ◆ Residential Gateways
- ◆ Personal Video Recorders (PVRs)
- ◆ DVD recorders
- ◆ Set-Top Boxes

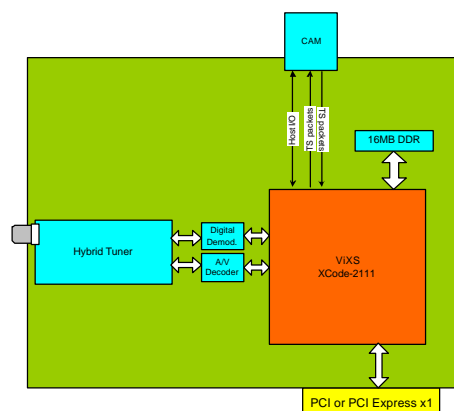
## Core Technologies

- ◆ MPEGPerfection™ technology redefines low-bitrate compression giving DVD quality encoding at 1.5Mbps - less than a third of DVD video bitrates
- ◆ TurboMPEG™ technology allows users to convert formats, resolution, and frame rates of pre-compressed video, up to 8X faster than real-time, to fit video to any viewing device

## XCode™ 2111 Block Diagram



## CA based Hybrid PCI/PCIe Card



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