



# Digital Broadcast High-Definition TV Decoder with PVR Support

CX2417x

Conexant's portfolio includes a comprehensive suite of semiconductor solutions for broadband communications and the digital home. Conexant's CX2417x High-Definition TV (HDTV) decoder features all the major elements required to implement the core system and decoder electronics of a high-performance personal video recorder (PVR)-enabled HDTV STB deployed in digital satellite, cable, or terrestrial TV networks.

The CX2417x family features an MPEG-2 MP@HL video decoder, 32-bit RISC CPU, high-definition and standard definition video/graphics display controllers. The multi-format audio decoder supports MPEG-1, MPEG-2, Dolby® Digital, MPEG-4 AAC, and aacPlus™.

PVR functionality is supported by three dual-stream transport processors (up to six baseband TS interfaces), fully integrated serial and parallel advanced technology attachment (ATA) interfaces for hard disk drive (HDD) connectivity, and 3DES/AES ciphering engines for encryption of data to the HDD. This functionality enables end users to simultaneously watch and record separate programs, or record a program while watching one previously recorded. NDS XTV™/RASP™ technology is also supported in the hardware.

The CX2417x also features an impressive array of I/O features, including dual USB 2.0 host controller, PCI bus, and HomePlug® connectivity via a high-speed UART.

For a complete HDTV hardware design, the only additional components required are a tuner, demodulator, modem codec, audio DACs, double data rate (DDR)-synchronous dynamic random access memory (SDRAM), and flash memory ICs. This high level of integration enables a low-cost system bill of materials and allows the flexibility of supporting different modulation and compression technologies with a low cost, highly featured MPEG solution. The CX2417x decoders can be used in conjunction with Conexant's CX24118 satellite tuner and advanced modulation demodulators such as the CX24116 DVB-S2 demodulator or the CX24114 8PSK demodulator, providing a cost-effective STB semiconductor system solution for MPEG-2 and MPEG-4 advanced video coding (AVC/H.264) HDTV broadcast receivers.



## Distinguishing Features

- DVB/DIRECTV® compliant back-end HDTV decoder for worldwide markets
- XTV PVR with serial ATA interface
- Primary HDTV display with simultaneous down-converted NTSC/PAL SDTV output
- High-performance 32-bit 250 MIPS ARM920 CPU with Linux and Windows® CE-compatible MMU
- Glueless interface to MPEG-4 (AVC/H.264) co-processor
- Multi-format audio decoder supports MPEG-2, Dolby Digital Plus, MPEG-4 AAC, and aacPlus
- Advanced security features including secure boot software authentication, IC personalization via OTP memory, and 3DES/AES ciphering engines
- HDMI transmitter with high-bandwidth digital content protection (HDCP) support
- High performance de-interlacer with 480i or 1080i to 480p/720p conversion

**Part Number** CX2417x

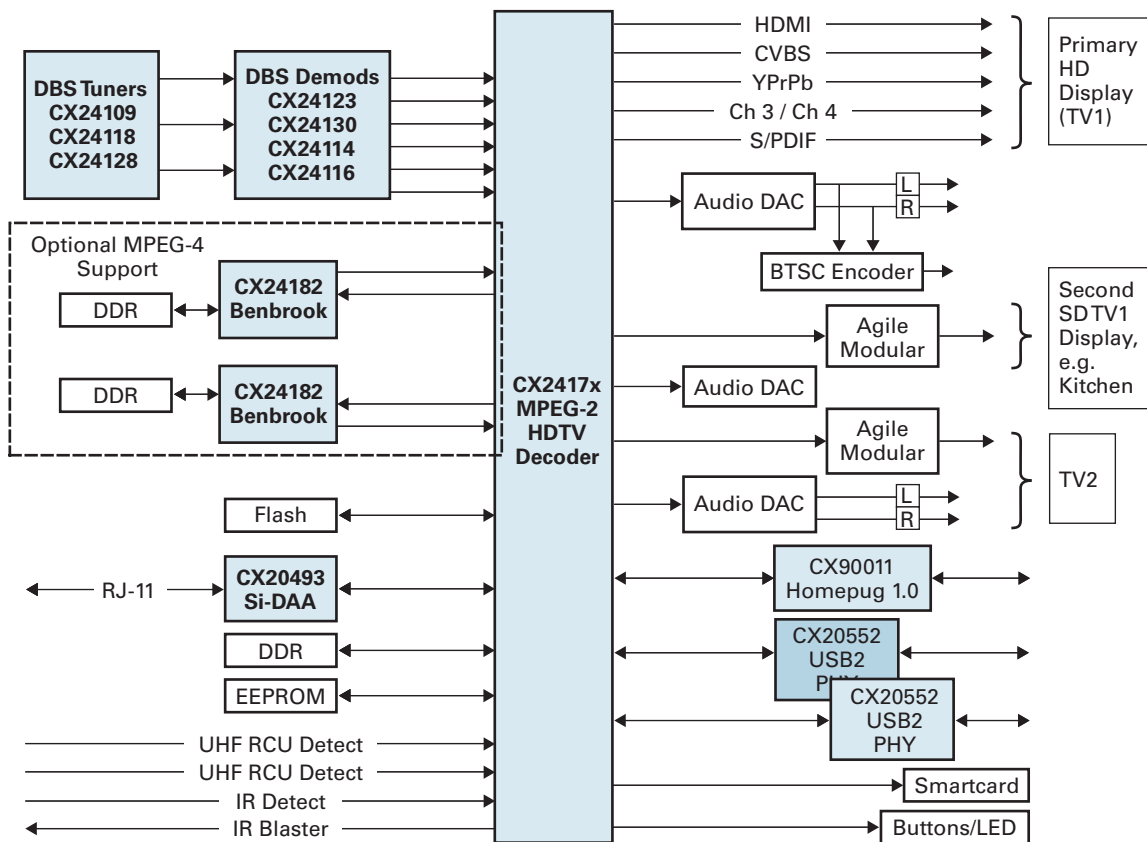
**Description** Digital Broadcast High Definition TV Decoder with PVR Support



The ARM926 CPU in the CX2417x provides up to 250 Dhrystone 2.1 MIPS and enables complex, feature-rich middleware platforms, such as OpenTV® and MediaHighway™ to be adopted by broadcasters. The advanced CPU platform delivers performance that can be deployed by STB manufacturers in a variety of ways, including improved interactive application loading and EPG scrolling performance, hardware feature differentiation via multimedia host signal processing and scalability to Linux®-based software platforms via memory management unit (MMU) hardware support. A telco return channel can be supported via a direct access arrangement (DAA) interface to a V.22-V.92 hardware or software modem, or via PCI interface to a DSL, Ethernet or wireless broadband modem.

### Advanced Security Features

The CX2417x incorporates an advanced security technologies that greatly enhances the ability of broadcasters to protect their service against piracy. Using an advanced on-chip one-time-programmable (OTP) memory technology, Conexant offers broadcasters the ability to personalize individual STBs via the system IC with unique serial numbers and encryption keys. This allows the broadcaster to secure transactions between the STB Smart Card and the System IC. The CX2417x also includes embedded cryptographic technology to allow secure authentication of the STB system software that is loaded into the flash memory.



**CX2417x System Diagram**

The CX2417x includes integrated security keys for NagraVision® (Level H6), NDS (NDS SB-T004), and Conax advanced security IC serialization, and supports advanced security requirements for DIRECTV and EchoStar® satellite networks.

**Full-Featured Development Platform**

The CX2417x IC family is integrated into a fully engineered interactive TV STB reference development system that implements third-party interactive middleware/real-time operating system (RTOS) platforms and provides a complete set of STB low-level drivers based on Nucleus+ OS. A mature and robust hardware abstraction layer is assured by re-use of core driver libraries developed over three generations of production MPEG ICs. The STB development platform hardware is designed with a flexible architecture that supports multiple front end tuner/demodulator daughter boards.

**Common Platform for Satellite, Cable, and Terrestrial**

STB manufacturers increasingly look to leverage a common hardware platform that can be reused over various broadband networks, including satellite, cable, terrestrial, DSL, and Ethernet IP networks. Conexant’s CX2417x ICs can serve as a common back-end platform that easily interfaces to a variety of broadband front ends, including QPSK, 8-PSK, DVB-S2, QAM, OFDM, 8-VSB, ADSL/VDSL, 802.3, 802.11a/b/g, or IEEE 1394 through either transport stream or PCI interface. This provides a flexible STB solution that can be targeted to a variety of broadband operators while minimizing hardware/software development costs. The CX2417x is also fully compatible with a MPEG-4 (AVC/H.264) compliant co-processor to provide bandwidth-efficient, advanced-compression bitstream decoding.

The company’s broad portfolio of semiconductor products also includes client-side DSL and cable modem solutions, home network processors, broadcast video encoders and decoders, digital STB components and systems solutions, and dial-up modems. In addition to its IEEE 802.11a/b/g-compliant WLAN chipsets, software, and reference designs, Conexant offers a suite of networking components that includes solutions for applications based on HomePlug® and HomePNA™. Additional products include a complete line of asymmetric and symmetric DSL central office solutions, which are used by service providers worldwide to deliver broadband data, voice, and video over copper telephone lines.

The CX2417x includes optional license-based features optional as designated by the dash numbers.

Table 2 - CX2417x Dash Number Options								
CX24170/1/2/3-mnz								
Dash Number:	-0nz	-1nz	-2nz	-3nz	-4nz	-5nz	-6nz	-7nz
Macrovision		✓		✓		✓		✓
Dolby Digital			✓	✓			✓	✓
HDCP/HDMI					✓	✓	✓	✓

- m = optional feature combinations (0 thru 7)
- n = die revision (e.g. n=1 for die rev A, 2 for die rev B etc.)
- z = security configuration (A thru Z)



## CX2417x Product Features

- High-performance 32-bit 295 MIPS ARM920 CPU with Linux/Windows CE compatible MMU
- 333MHz 32-bit DDR unified memory controller
- MPEG-2 DIRECTV transport stream demultiplexing
- Three multi-standard dual stream transport processors with DES, AES and Multi-II descrambling
- Transport stream I/O controller supports up to six baseband TS interfaces
- MPEG-2 MP@HL video decoder
- Multi-plane video/graphics display controller
- Primary display supports HD 1080i and 720p picture output with six-plane compositing
- Secondary display supports 720x576 picture output with six-plane compositing
- Supports constrained HDTV image output on YPrPb
- Supports video plane re-sizing for format conversion, picture-in-picture, or picture-in-graphics
- High-performance de-interlacing supports 480i to 480p/720p and 1080i to 480p/720p conversions
- Multi-format audio decoder supports MPEG-1, MPEG-2, Dolby Digital, Dolby Digital Plus, MPEG-4 AAC, and aacPlus
- Two-channel Pro Logic<sup>®</sup> encoded Dolby Digital output via I2S
- Advanced 2D graphics rendering engine for alphabl, bitblt, textblt, line draw, and color expansion acceleration
- HDTV and SDTV encoders with seven 10-bit video DACs
- Macrovision<sup>®</sup> 7.x copy protection
- Glueless interface to MPEG-4 (AVC/H.264) co-processor
- Advanced security features including secure boot SW authentication, IC personalization via OTP memory, and 3DES/AES ciphering engines
- Integrated DIRECTV security
- HDMI transmitter with HDCP support
- NDS Videoguard<sup>®</sup> conditional access hardware support
- Dual USB2.0 host controllers
- NDS XTV and RASPPVR support
- Parallel and serial ATA interfaces for HDD attachment
- Three Smart Card ports
- 32-bit 33 MHz PCI controller
- CCIR656 YCrCb digital video input and output ports
- Multiple I2S, SPI, GPIO, UARTs
- SmartDAA<sup>®</sup> interface to V.92 software modem
- OpenCable CableCARD<sup>™</sup> interface
- DVB-common interface (CI) support
- 2 ultra-high frequency (UHF) remote inputs
- Infrared (IR) input/output

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