

DVXPLORE CODEC

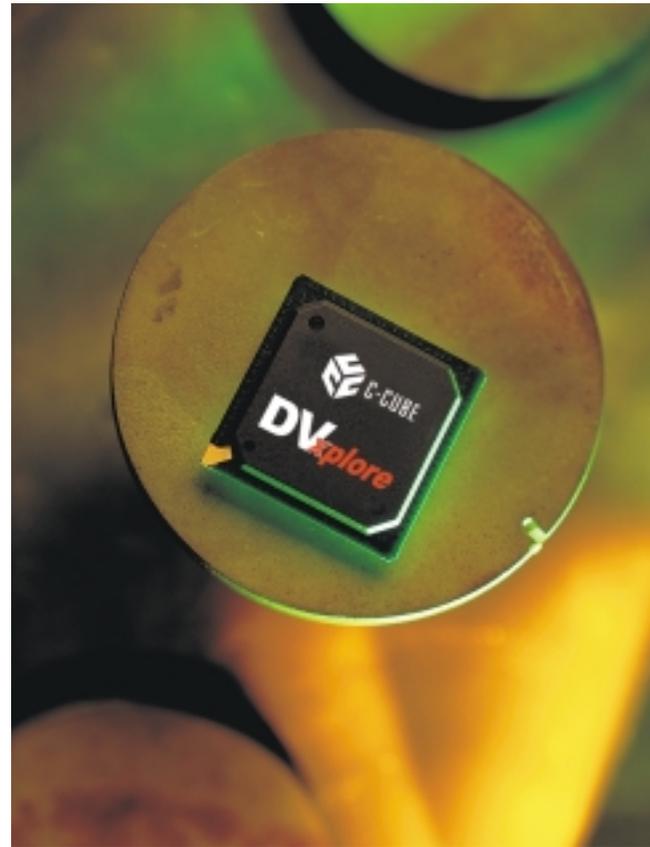
DVD-QUALITY VIDEO RECORDING AND PLAYBACK FOR CONSUMER PCs

KEY FEATURES

The DVxplore™ codec from C-Cube Microsystems is the industry's first single-chip MPEG-2 and DV consumer codec, delivering DVD-quality video recording and playback for consumer applications. The DVxplore codec enables exciting new content creation and PC/TV applications for the home, based on DVD-quality video recording.

For the first time, PC manufacturers can offer consumers DVD-quality video recording and frame-accurate MPEG-2 editing, turning PCs into complete DVD recording and content creation stations. Manufacturers can incorporate sophisticated digital video recording features, such as automatic television program recording using an electronic program guide (EPG), into consumer PC/TV products. Digital recorder applications can provide time-shifting capabilities such as instant replays of broadcast programs. As a result, manufacturers and applications developers can use the codec to establish DVD-quality (MPEG-2) video as a standard data type on consumer PC and PC/TV platforms.

The DVxplore codec leverages C-Cube's highly flexible DVx video compression and decompression architecture to provide an unprecedented range of capabilities that aren't limited to a single video format. PC users can acquire video from analog, DV, or MPEG sources and edit it with frame accuracy to create MPEG-2 videos that play back on any MPEG-2 or DVD decoder. Employing MPEG-2 compression, users can extend recording time tenfold compared to Motion JPEG (M-JPEG) or DV solutions. They can also use the codec to address low-bandwidth applications such as MPEG-1 video for websites and email.



SIX KEY FUNCTIONS ON ONE CHIP

The versatile DVxplore codec provides these six key functions:

- **MPEG-2 Encoding:** PCs can record DVD-quality video using C-Cube's advanced, highly reliable PerfectView™ encoding algorithm.
- **Dual-Stream MPEG-2 Decoding:** Two MPEG-2 data streams can be decoded simultaneously to provide frame-accurate editing of MPEG-2 video. Hardware rendering of special effects (fades, wipes, or dissolves) enables real-time preview of the edited video.
- **Realtime DV to MPEG-2 Transcoding:** Users can convert digital video from consumer DV camcorders to MPEG-2 video, enabling playback on any MPEG-2 or DVD decoder. The all digital conversion process delivers DVD quality while minimizing the storage requirements for captured video.



- **DVD Decoding:** Hardware DVD video decoding provides the highest video quality with minimal host CPU requirements. The DVxplore codec performs full decoding of CSS-encrypted MPEG-2 video and subpicture streams.
- **MPEG-1 Encoding:** Users can take advantage of MPEG-1 video capture for low-bandwidth Internet and intranet video applications such as live “webcams,” video clips on websites, and video email attachments.
- **Single Stream DV Codec:** The DVxplore codec also allows users to capture and edit video in native DV format.

KEY FEATURES AND BENEFITS

DVD-QUALITY VIDEO

The DVxplore codec delivers MPEG-2 video to consumer PCs, allowing full-screen DVD-quality video recording and playback at consumer prices. The codec runs downloadable microcode that lets it operate as both a DVD-quality digital video recorder (encoding) and player (decoding). C-Cube's patented PerfectView encoding algorithm produces superior images using a number of techniques—including multilayer motion estimation, variable bit-rate encoding, inverse telecine, and optimal bit allocation—that work together to improve encoding efficiency and picture quality.

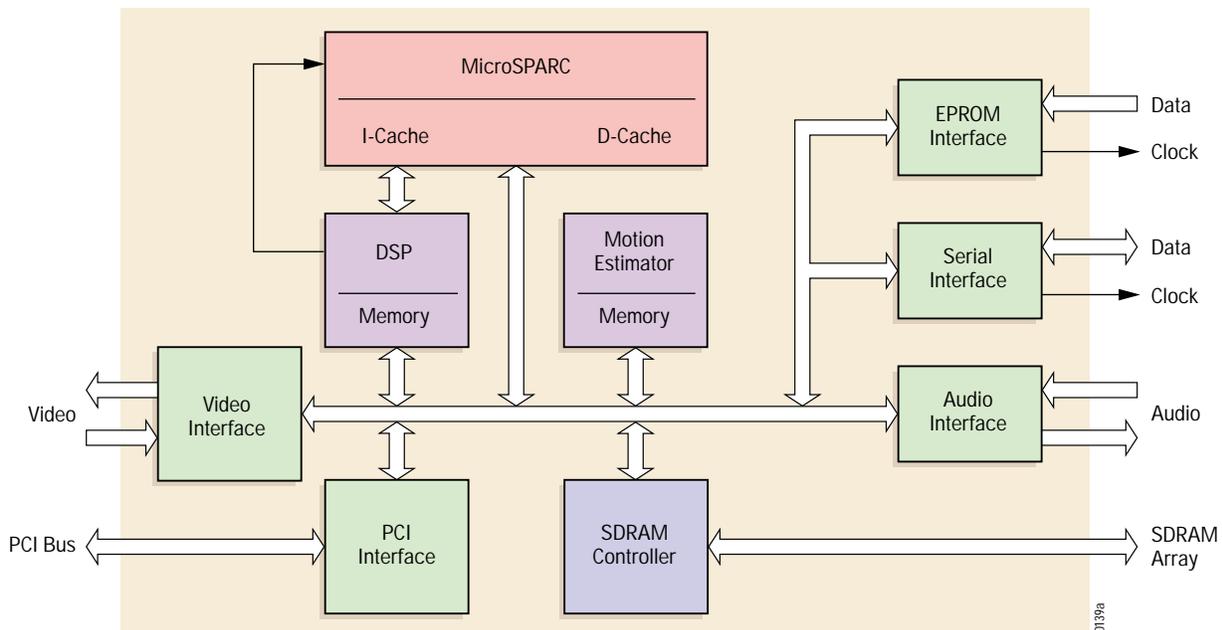
In conjunction with a software AC-3 decoder running on the host processor, The DVxplore codec provides C-Cube's market-tested DVD playback feature set: MPEG-2 decoding, subpicture decoding, PCM audio, A/V synchronization, and SecureView™ CSS copy protection.

CONSUMER VIDEO EDITING

With the DVxplore codec, personal video content creators get WYSIWYG (“what you see is what you get”) simplicity. Hardware acceleration for dual-stream decoding and video postprocessing lets users perform seamless MPEG editing in realtime using C-Cube's revolutionary FAME™ (Frame Accurate MPEG Editing) technology. FAME allows users to implement special effects on the fly, and accomplish A/B roll transitions across frames such as fades and dissolves. Because the DVxplore codec records and edits the video in MPEG-2 format, all files can easily be stored on an ATAPI hard disk.

DV VIDEO CAPTURE AND TRANSCODING

The DVxplore codec is a forward-looking solution that supports DV-format digital camcorders as well as conventional analog camcorders. This feature is especially desirable as consumers increasingly turn to digital video cameras and consumer PCs come equipped with an IEEE 1394 “Firewire” interface. The DV to MPEG-2 transcoding capability creates video files that are playable on any MPEG-2 or DVD decoder. Transcoding also saves disk space by increasing compression 5 to 10 times.



DVxplore System Block Diagram



Personal Content Creation with DVxplore

INTERNET-READY VIDEOS

The codec's MPEG encoding capability creates MPEG-1 videos that are perfect for low-bandwidth Internet and intranet applications. For example, users can go beyond banners and still photos to create video content for a website, including live "webcam" images. They can also use video email software to add life to their mail attachments.

INTELLIGENT TV APPLICATIONS

With a DVxplore codec on board, PC/TV products have the power to deliver a wide range of video recording and interactive viewing options. For instance, viewers can:

- Automatically record TV shows by selecting items on an electronic program guide
- Use time-shifting features such as realtime rewind, pause, and fast-forward to manipulate live broadcasts
- Simultaneously access the Internet while recording or viewing a program
- Interact with broadcast TV programs and conduct searches in the same way they can interact with a program on a DVD disc
- Make use of an application that monitors closed-caption material in the Vertical Blanking Interval (VBI) for key words that will automatically trigger recording

EXTENDED RECORDING TIME

DVxplore variable bit-rate (VBR) technology lets users record hours of DVD-quality video on DVD-RAM, PC hard disks, or other media. For example, users can store up to one hour of video per gigabyte of storage capacity. This makes high-quality video recording economical and practical on consumer PCs.

CONVERGENCE TECHNOLOGY FOR THE HOME

The DVxplore codec may be used in DVD-RAM bundles and upgrade kits that provide a complete content creation upgrade. In addition, PC and set-top hybrids will be able to offer DVD-quality video recording, authoring, and storage in one box.

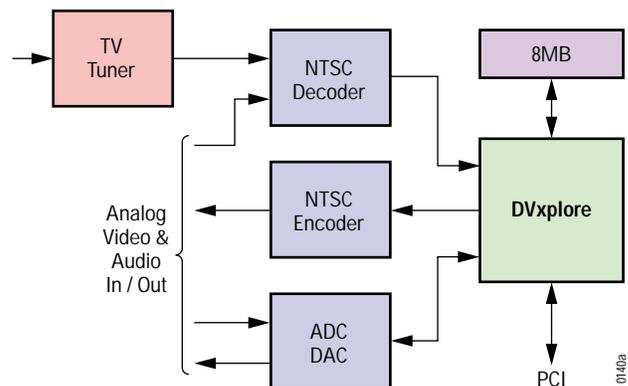
EASY PC INTEGRATION

The DVxplore codec's PCI bus interface allows easy integration with PCs. It takes advantage of bus mastering to minimize CPU utilization and maximize bus throughput. The codec also supports output of uncompressed video to a dedicated PC video port for display on the PC's monitor. The highly compressed MPEG video streams (2 to 10 Mbps) created by the codec can easily be transferred to and from standard PC ATAPI hard disk drives, eliminating the need for expensive SCSI hard disk drives.

TARGET APPLICATIONS

The DVxplore codec makes it possible to record, edit, author, and archive DVD-quality video on the PC. It enables a wide range of end-user applications, including:

- Intelligent TV applications with high-quality smart-recording
- Digital VCRs with timeshifting
- Consumer video editing
- DVD playback
- Personal content creation
- Internet/intranet video creation
- Video email



DVxplore SYSTEM BLOCK DIAGRAM

SPECIFICATIONS

	Mode	Video Rate	Video	Audio Rate	Total	Capacity (Minutes)		
		(Mb/s)	Resolution	(kbps)		8 GB	CD/R	DVD
Datarate	MPEG-2 Extended Play	2	352x480	224	16.68	360	39	156
Comparison	MPEG-2 Long Play	4	720x480	224	31.68	189	21	82
	MPEG-2 Short Play	6	720x480	224	46.68	129	14	56
	MPEG-1	1.15	352x240	192	10.07	596	65	258
	DV25	25	720x480	768	193.26	31	3	13

Video	MPEG-2	DV25	MPEG-1
Encoded Bit-rate Range	2 to 10 Mbps	25 Mbps	64 Kbps to 2 Mbps
GOP Options	I-only, I, B, P	I-only	I, B, P
Video Input Resolution	Horizontal 720, 352 Vertical NTSC 480, PAL 576	Horizontal 720 Vertical NTSC 480, PAL 576	Horizontal 352, 176 Vertical NTSC 240, 112, PAL 288, 144
Motion Search Ranges	Horizontal ±202 pels; Vertical ±62		Horizontal ±166 pels; Vertical ±70
Frame Rates	NTSC 29.97 Hz PAL 25 Hz Film 23.976 Hz	NTSC 29.97 Hz PAL 25 Hz N/A	NTSC 29.97 Hz PAL 25 Hz Film 23.976 Hz

Electrical		
Video I/O Interface	CCIR-656	
Audio I/O Interface	I ² S (up to 8 channels)	
Host Interface	PCI Rev. 2.1	
Test Interface	IEEE 1149.1 (JTAG)	
Input Voltage	3.3 V (5 V I/O Tolerance)	
System Voltage	1.9 V	
Power Consumption	2 W	
System Clock	110 MHz	
Package	308-pin BGA	



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