

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.

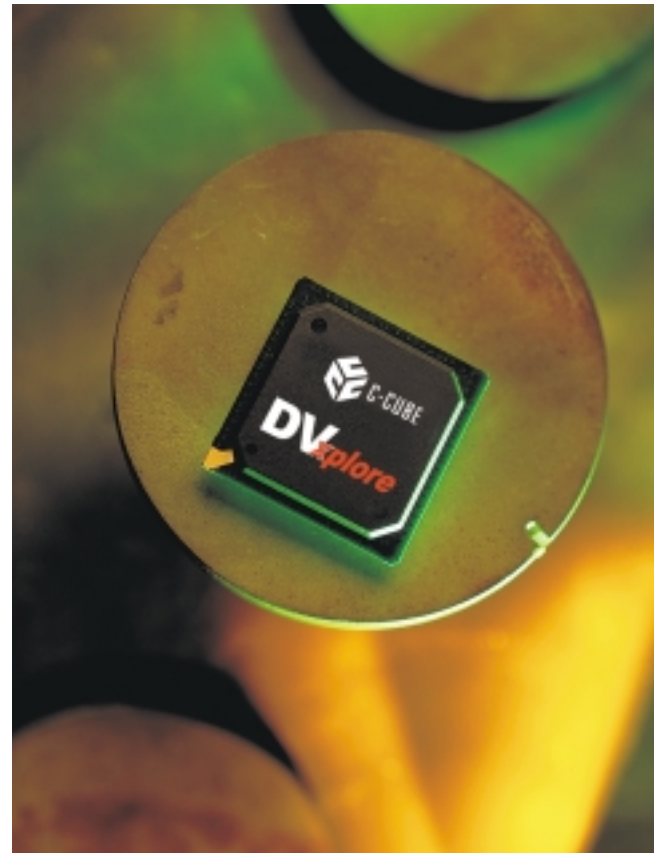
For the first time, PC manufacturers can offer consumers DVD-quality video recording and frame-accurate MPEG-2 editing, turning PCs into complete DVD recording and content creation stations. Manufacturers can incorporate sophisticated digital video recording features, such as automatic television program 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.

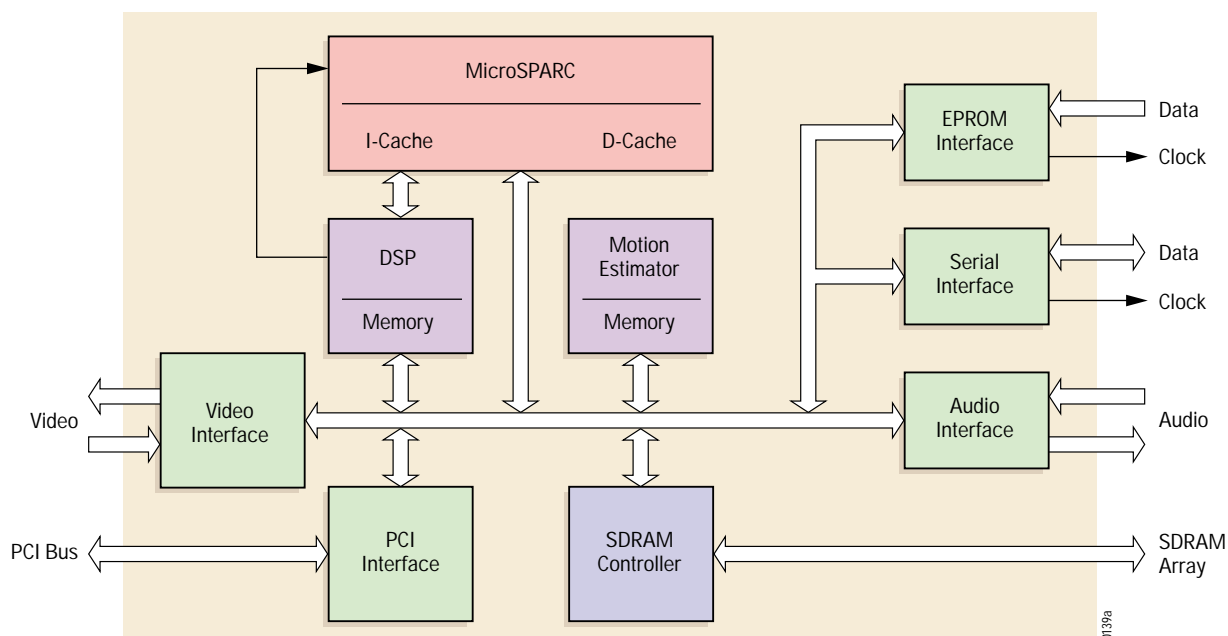
In conjunction with a software AC-3 decoder running on the host processor, The DVxplore codec provides C-Cube's market-tested DVD playback feature set: MPEG-2 decoding, subpicture decoding, PCM audio, A/V synchronization, and SecureView™ CSS copy protection.

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.

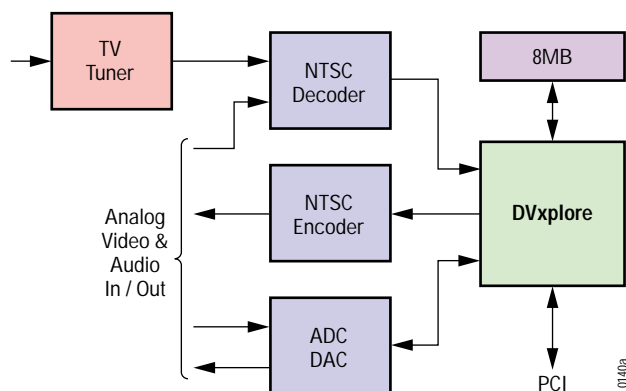
EASY PC INTEGRATION

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:

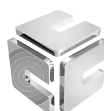
- Intelligent TV applications with high-quality smart-recording
- Digital VCRs with timeshifting
- Consumer video editing
- DVD playback
- Personal content creation
- Internet/intranet video creation
- Video email



DVxplore SYSTEM BLOCK DIAGRAM

SPECIFICATIONS

	Mode	Video Rate	Video	Audio Rate	Total	Capacity (Minutes)		
		(Mb/s)	Resolution	(kbps)	(MB/min)	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						



C-CUBE

C-CUBE SALES OFFICES

NORTHEASTERN U.S.

96 Donegani
Ste. 5024
Pointe Claire
Quebec, Canada H9R 2V4
Phone: 1-514-426-5011
Fax: 1-514-426-7119

SOUTHEASTERN U.S.

3675 Crestwood Pkwy, Ste. 400
Duluth, GA 30096 USA
Phone: 1-770-931-8060
Fax: 1-770-931-8069

EUROPE

Stoner House, London Road
Crawley, West Sussex
United Kingdom RH10 2LJ
Phone: 44-1293-651100
Fax: 44-1293-651119

BEIJING

Room 1101, Jade Palace Hotel
No. 76 Zhichun Road, Haidian District
Beijing, China 100086
Phone: 86-10-626-38296
Fax: 86-10-626-38322

CHENGDU

Lido Plaza 601-602
Da Ke Jia Lane
Chengdu, China 610016
Phone: 86-28-6678831, 6665635
6664211
Fax: 86-28-6678054

HONG KONG

3/F, Unit 301-302
Industrial Tech Centre
72 Tat Chee Ave, Kowloon Tong
Kowloon, Hong Kong
Phone: 852-2192-1789
Fax: 852-2511-6939

JAPAN

Paleana Building 4F
2-2-15 Shin-Yokohama
Kohoku-Ku, Yokohama
Kanagawa 222-0033 Japan
Phone: 81-45-474-7571
Fax: 81-45-474-7570

KOREA

4F, 823-14 Yeoksam-dong
Kangnam-ku
Seoul 135-080 Korea
Phone: 822-561-9011
Fax: 822-561-9021

SINGAPORE

99, Bukit Timah Road
#04-04 Alfa Centre
Singapore 229835
Phone: 65-332-9188
Fax: 65-337-1233

SHANGHAI

Room 1715
No. 819 Nanjing W. Road
Shanghai 200040 PRC
Phone: 86-21-621-57630
Fax: 86-21-621-57629

SHENZHEN

Unit A-F, 27th Floor
Int'l Trade Commercial Building
No. 3005 NanHu Road
Shenzhen, China 518014
Phone: 86-755-519-5166
Fax: 86-755-519-5007

TAIWAN

A2, 13FL, No. 51, Sec. 3
Minsheng E. Road
Taipei, Taiwan
Phone: 886-22-517-4938
Fax: 886-22-517-4937

© C-Cube, 2000. All rights reserved. Printed in USA

Part Number: 90-5160-101

Disclaimer: All data, circuits and designs included in this C-Cube publication (collectively called the "Designs") are provided to you without warranty. C-Cube makes no warranties whatsoever, express or implied, relating to the Design, and expressly excludes any warranty of merchantability, fitness for a particular purpose or non-infringement of any proprietary rights of third parties. C-Cube grants to you, under its own proprietary rights related to the Design, the right to manufacture, have manufactured, distribute and use any products which use C-Cube integrated circuits and which incorporate any part of the Design.

You shall be solely responsible for obtaining all necessary licenses required to use the Design and shall indemnify, defend, and hold C-Cube harmless from any and all liability, loss, costs, damage, judgment or expense (including attorneys' fees and costs) resulting from or arising out of your manufacture, use and sale or your customer's use or resale of products using any part of the Design which results in infringement of any third party patents, copyrights or other proprietary rights. Any use of the Design shall constitute your acceptance of all the above terms and conditions.

C-Cube Microsystems reserves the right to change any products described herein at any time and without notice. C-Cube Microsystems assumes no responsibility or liability arising from the use of the products described herein, except as expressly agreed to in writing by C-Cube Microsystems. The use and purchase of this product do not convey a license under any patent rights, copyrights, trademark rights, or any other intellectual property rights of C-Cube Microsystems. C-Cube and the corporate logo are registered trademarks of C-Cube Microsystems. All other trademarks are the property of their respective owners.