DVxcel™ Codecs for Video Peripheral Applications

DVxcel

OVERVIEW

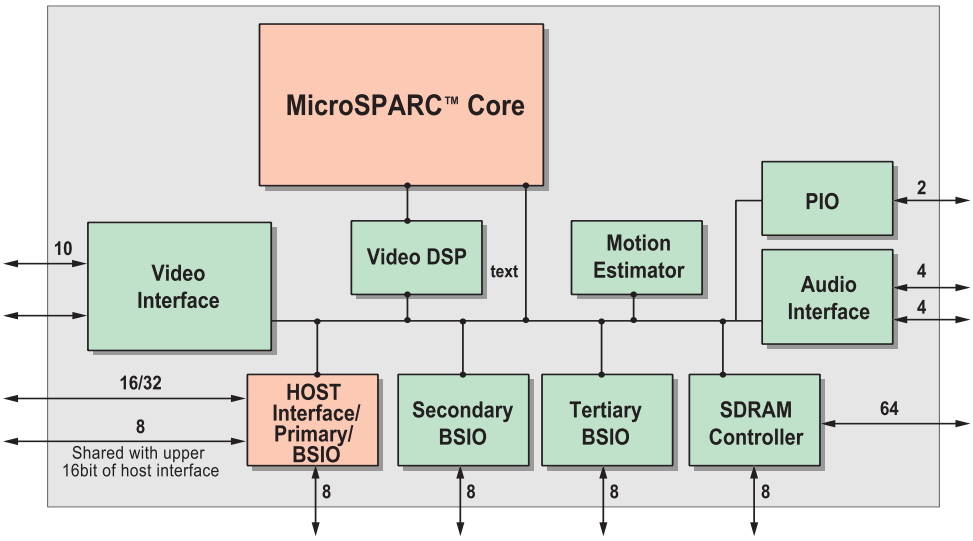
The DVxcel™-LE, DVxcel™-VC and DVxcel™-DT are the latest offerings in the DVx family of products. DVxcel-LE is designed to enable very low-cost video peripherals, based on MPEG-1 and MPEG-2 compression standards for archiving and web-streaming applications. The DVxcel-VC, a single-chip MPEG-2 codec capable of encoding and decoding video simultaneously, is targeted at the emerging time-shift and digital video recording (DVR) applications. The DVxcel-DT includes the same functionality and features as the DVxcel-VC, with additional support for DV encode and decode as well as transcoding from DV to MPEG-2; features that are critical for enabling new video editing applications. All support both NTSC and PAL formats.

Based on LSI Logic's fourth-generation video processor architecture, these devices are optimized, both in hardware design and functionality, for high-quality, low-cost video-centric consumer applications. Using LSI Logic's proven PerfectView® encoding algorithm, this product family delivers the highest quality video encoding with the lowest bit rate of any consumer-based solution.

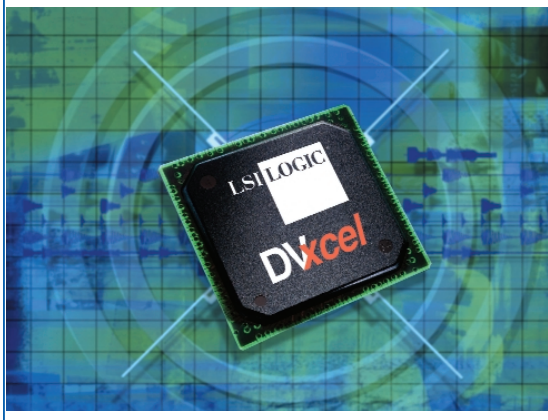
TARGET APPLICATIONS

Web Sharing

Today an extensive amount of multimedia content is available on the Web. As digital subscriber line (DSL) and cable modems become more popular, the need for high-quality, low bit rate video is increasing. The DVxcel's sophisticated MPEG-1 and -2 compression algorithms provide superior quality and can accommodate bit rates as low as 384 Kbps. Video compression is critical for Web sharing and distribution where file size is important.



DVxcel™ Internal Block Diagram



FEATURES:

- Flexible 16/32-bit host interface
- Host DMA target or primary 8-bit HW I/O ports for bitstream data transfers
- Secondary 8-bit hardware port for bitstream
- Tertiary 8-bit hardware port for bitstream transfer
- 8/10-bit ITU-656 video input port
- 8-bit ITU-656/601 video output port (not available with DVxcel-LE)
- Serial audio interface for audio capture and playback

All the DVxcel devices utilize special hardware to implement the following algorithmic functions:

- Video compression pre-processing
- Motion estimation and compensation
- DCTs and IDCTs
- Variable-length encoding and decoding
- High-quality video scaling and composting

LSI LOGIC®

The Communications Company™

DVxcel™–LE, DVxcel-VC and DVxcel-DT for Video Peripheral Applications

DVXCEL-LE FEATURES:

- 208 PQFP
- MPEG-1 encode: 384 Kbps to 4 Mbps
- Resolution: SIF
- MPEG-2 encode: 1.8 Mbps to 10 Mbps
- Resolution: 720, 704, 544, 480, 352
- VBR and CBR support

DVxcel-LE is in a PQFP package to support low-cost PCB manufacturing. With its high-quality compression and low bit rate, it allows even POTs connected PCs to stream audio and video content. The DVxcel-LE enables video streaming and video mail applications for both narrowband (POTs) as well as broadband (cable, DSL) connections.

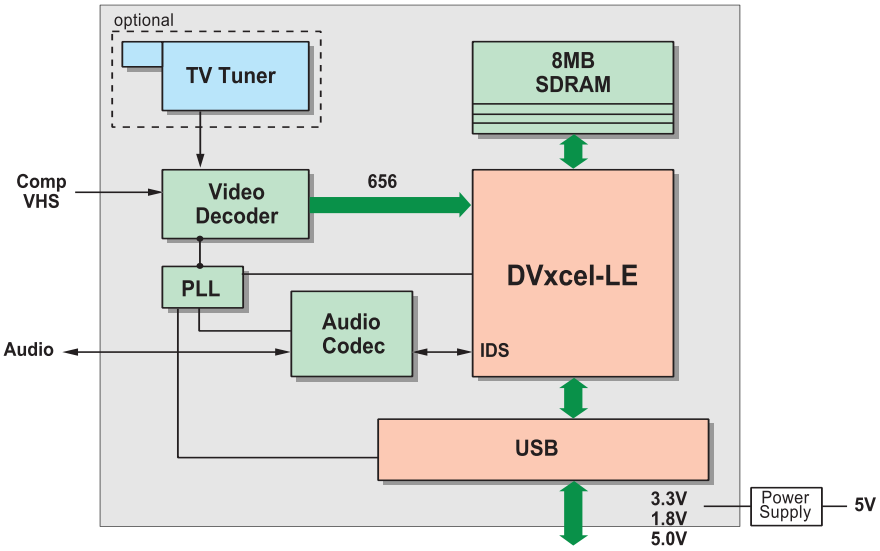
DVXCEL-VC FEATURES:

- 308 BGA
- MPEG-1 encode: 384 Kbps to 4 Mpbs
- Resolution: SIF
- MPEG-2 codec (up to full resolution)
- TV Out
- MPEG-2 encode: 1.8 Mbps to 10 Mbps
- Resolution: 720, 704, 544, 480, 352
- VBR and CBR support

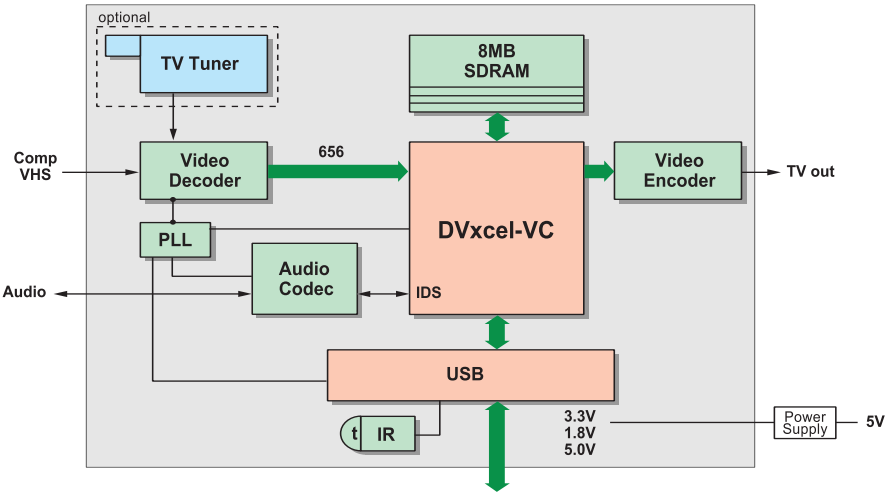
The DVxcel-VC is a single-chip codec solution for time-shift applications. It provides the ability to pause, fast-forward, rewind and instant-replay live broadcast television. In addition, its decode functionality enables users to store content on VHS tape.

Video Archiving

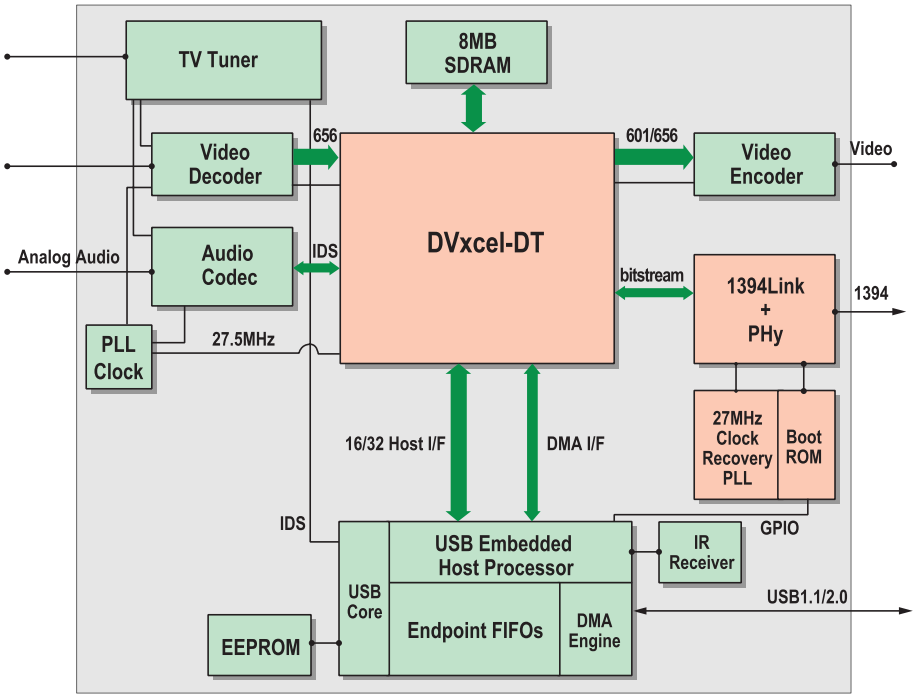
Video archiving is a process of converting analog tapes (8mm and VHS) to other digital storage devices such as DV tape and DVDs. Users can capture both video and audio from a camcorder or a VCR, using either MPEG-1 or MPEG-2 hardware-based compression, and send it to a PC via the USB connection. There, the content can be authored and formatted for CD-R, CD-RW, VCD and DVDs. DV content can also be recompressed to be stored on DVDs. This process is called DV to MPEG transcoding. With DVxcel's ability to perform DV to MPEG



DVxcel™-LE Video Peripheral (encode only) System Block Diagram



DVxcel™-VC Video Peripheral (codec) System Block Diagram



DVxcel™-DT Video Peripheral (transcoder) System Block Diagram

transcoding in real time, the storage requirement on your PC decreases six fold. It also eliminates the need to convert the digital content back to analog during authoring. DVxcel also addresses the large installed base of analog VCRs with its unique ability to take edited content from the PC and convert it back to VHS tape for distribution.

Time-Shifting

DVxcel-DT and DVxcel-VC supply full encode and decode (codec) functionality. For those users who would like to view TV programming on a PC, by utilizing the hard disk drive (HDD) as a storage medium, the encode capabilities of the DVxcel product family can offer compelling features for applications such as DVRs. More importantly, the DVxcel-VC and DVxcel-DT will provide users the ability to view this stored content on their TV using the hardware decode functionality. Not only can users play back the content on the TV but they also have the ability to stop, start, pause, rewind and even skip commercials. This is called time-shifting. While the recording may be linear, the play back can be selected from anywhere from start of the program to a point of live broadcast.

DVXCEL-DT FEATURES:

- 308 BGA
- MPEG-1 encode: 384 Kbps to 4 Mpbs
- Resolution: SIF
- MPEG-2 codec (up to full resolution)
- TV Out
- MPEG-2 encode: 1.8 Mbps to 10 Mbps
- Resolution: 720, 704, 544, 480, 352
- VBR and CBR support
- DV25 encode
- DV25 decode
- DV to MPEG transcoding

While enabling all of the applications of the DVxcel-LE and DVxcel-VC, the DVxcel-DT has the unique ability to provide DV to MPEG transcoding. This feature enables users to capture audio/video content directly from their DV camcorder to store, edit or view on their PC or TV.

DVxcel™–LE, DVxcel-VC and DVxcel-DT for Video Peripheral Applications

	DVxcel-LE – Encoder	DVxcel-VC – Codec	DVxcel-DT – Transcoder
Standard	NTSC, PAL, ITU-R BT.656	NTSC, PAL, ITU-R BT.656	NTSC, PAL, ITU-R BT.656
Input	10-bit	10-bit	10-bit
Output	N/A	ITU656 CCIR601@27 MHz	ITU656, CCIR601@27 MHz
MPEG-1 Encoding	VBR, CBR	VBR, CBR	VBR, CBR
Resolution	Horizontal: 480, 352, 320	Horizontal: 480, 352, 320	Horizontal: 480, 352, 320
GOP Structure	I,IP, IBP	I,IP, IBP	I,IP, IBP
Bit Rate	384 Kbps-4 Mbps	384 Kbps-4 Mbps	384 Kbps-4 Mbps
MPEG-2 Encoding	ML@MP, VBR and CBR	ML@MP, VBR and CBR	ML@MP, VBR and CBR
Resolution	Horizontal:720, 704, 544, 480, 352 Vertical: 480 (NTSC), 576 (PAL)	Horizontal:720, 704, 544, 480, 352 Vertical: 480 (NTSC), 576 (PAL)	Horizontal:720, 704, 544, 480, 352 Vertical: 480 (NTSC), 576 (PAL)
GOP Structure	I, IP, IBP	I, IP, IBP	I, IP, IBP
Bit Rate	1.8 - 10 Mbps	1.8 - 10 Mbps	1.8 - 10 Mbps
Multiplexing	Program stream (multiplexing of video elementary with audio elementary)	Program stream (multiplexing of video elementary with audio elementary)	Program stream (multiplexing of video elementary with audio elementary)
		codec (up to 544H. Res)	codec (up to 544H. Res)
Ports	4 stereo inputs, 4 stereo outputs	4 stereo inputs 4 stereo outputs	4 stereo inputs 4 stereo outputs
Interface	I2S and other serial interfaces	I2S and other serial interfaces	I2S and other serial interfaces
Format	16-, 24- or 32-bit at 32, 44.1 or 48 KHz	16-, 24- or 32-bit at 32, 44.1 or 48 KHz	16-, 24- or 32-bit at 32, 44.1 or 48 KHz
Host Interface	Flexible host interface with I-Mode, M-Mode, WAIT, and DTACK	Flexible host interface with I-Mode, M-Mode, WAIT, and DTACK	Flexible host interface with I-Mode, M-Mode, WAIT, and DTACK
Access Transfer	16- or 32-bit PIO; 16- or 32-bit Target DMA; three 8-bit hardware controlled bitstream ports	16- or 32-bit PIO; 16- or 32-bit Target DMA; three 8-bit hardware controlled bitstream ports	16- or 32-bit PIO; 16- or 32-bit Target DMA; three 8-bit hardware controlled bitstream ports
Memory	8 Mbytes of SDRAM	8 Mbytes of SDRAM	8 Mbytes of SDRAM
Input Voltages	3.3V pads and 2.0 core	3.3V pads and 2.0 core	3.3V pads and 2.0 core
System Clock	100 MHz	110 MHz	110 MHz
Packaging	208-pin QFP	308-pin BGA	308-pin BGA
Operating Power	<1.8 W @ VDDQ=2.0V typical	<1.8 W @ VDDQ=2.0V typical	<1.8 W @ VDDQ=2.0V typical
Encode/Decode			DV25, DVCam, DVCpro
Resolution			720, 4:1:1, 4:2:0, (NTSC/PAL)
Bit Rate			25 Mbps
Transcode			DV –> MPEG (Realtime)

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