DVxpress™-MX25, -MX50, and -MXT50 Mixed-Format Codecs for Non-Linear Editing, Video Server, and VTR Applications

DVxpress

OVERVIEW: MIXED-FORMAT TECHNOLOGY HAS ARRIVED

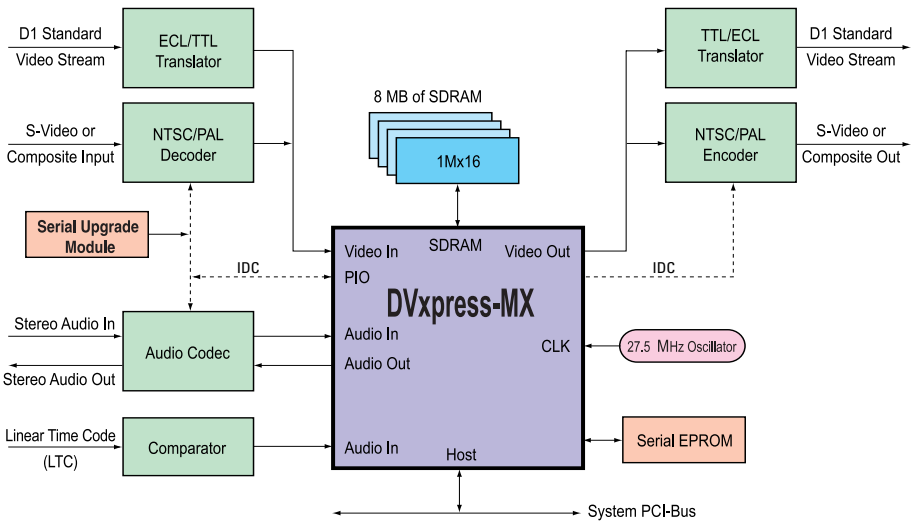
The world of video production is being dramatically impacted by digital technology. Video acquisition and recording has seen improvements in image quality and device size with the introduction of the DV format. At the same time, the MPEG format has enabled improved distribution options such as direct broadcast satellite and DVD.

Non-linear editing (NLE) systems and video servers, which initially utilized proprietary compression schemes like motion JPEG, are now migrating to open standards like DV and MPEG. However, these two standards lack compatibility, which prohibits the efficient exchange of compressed video data from acquisition to distribution systems. It is therefore necessary for these systems to employ mixed-format technology to support both DV and MPEG standards.

In the past, mixed-format solutions required the use of several chips for encoding and decoding of video in various formats, audio capture, and special-effects processing. In addition, glue logic was required to link these components together, making such mixed-format solutions expensive and difficult to deploy. No single-chip solutions combining DV and MPEG formats have existed – until now.

DVXPRESS™-MX IS THE INTEGRATED SOLUTION

The DVxpress-MX family of codecs (DVxpress-MX25, DVxpress-MX50, and DVxpress-MXT50) offers the world's first line of single-chip, mixed-format solutions. With DVxpress-MX codecs, MPEG and DV compression/decompression, mixed-format editing, and DV/MPEG transcoding are efficient, single-chip capabilities. These innovative codecs provide an all-digital, seamless bridge for the transfer of video content from acquisition to editing to distribution.



The DVxpress™-MX Single-Chip Codec Architecture with Glueless Interfaces to PCI, SDRAM, and Video In/Out

FEATURES:

- Mixed-format editing
- Transcoding
- Frame accuracy
- Multiple-stream decoding
- Real-time special effects
- Dual-stream output
- RGB picture I/O
- Serial upgrade module (SUM)
- Flexible bit rate control
- PerfectView® encoding algorithm

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DVxpress™-MX25, DVxpress-MX50, and DVxpress-MXT50

MIXED-FORMAT EDITING

The mixed-format capability of DVxpress-MX enables any combination of MPEG and DV streams to be edited side-by-side in real-time. A stream of MPEG can be edited with a stream of DV, two streams of MPEG can be edited together, or two streams of DV can be edited simultaneously. DVxpress-MX codecs handle all DV and MPEG formats transparently, without the need to stop or reset between different stream types.

TRANSCODING

DVxpress-MX codecs uniquely support DV/MPEG transcoding, or format conversion. The transcoding operation enables content acquired in DV to be converted to MPEG for satellite or DVD distribution, or MPEG content converted to DV for print-to-tape. DVxpress-MX transcoding is performed entirely in the digital domain, ensuring preservation of image quality throughout the process.

FRAME ACCURACY

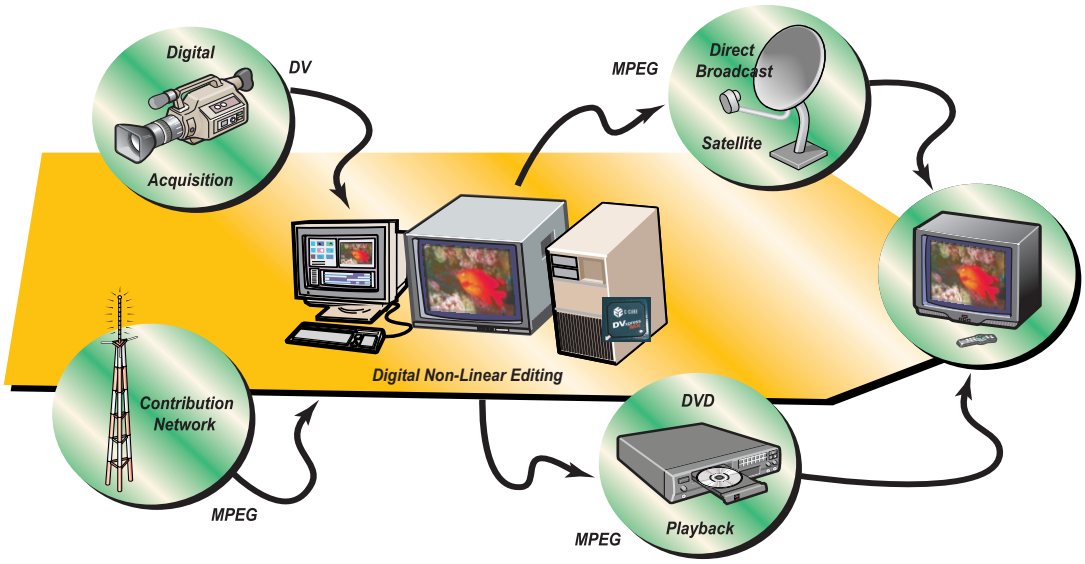
DVxpress-MX codecs employ a combination of high-performance hardware and a timecode-controlled application programming interface (API) to deliver frame-accurate operations on both DV and MPEG streams. For MPEG streams, DVxpress-MX codecs rely on LSI Logic's revolutionary frame-accurate MPEG Editing (FAME™) technology to provide frame-accurate processing regardless of group of pictures (GOP) structure.

MULTIPLE-STREAM DECODING

All members of the DVxpress codec product family have the performance and integration to support multiple-stream decoding. Up to two streams can be decoded simultaneously, with each stream under frame-accurate control. In combination with the mixed-format capability of DVxpress-MX, multiple streams of DV/MPEG video can be queued for playback in true non-linear fashion.

REAL-TIME SPECIAL EFFECTS

DVxpress-MX codecs provide the capability to implement an array of video special effects in real-time. The codecs have an integrated special-effects engine that enables on-the-fly blending – on a pixel-by-pixel basis – of up to two video streams plus four 24-bit colors. A full spectrum of 2D effects, including fades, wipes, and dissolves, can be implemented in real-time.



Acquisition, Transfer, Storage, Editing, and Distribution of Digital Video Can All be Seamlessly Integrated with DVxpress™-MX

ADDITIONAL FEATURES

Dual-Stream Output

For professional applications that require external special-effects hardware, the DVxpress-MX codecs can simultaneously output both streams of the multiple-stream decoding operation. For dual-stream output, the video output bus is clocked at 54 MHz and the streams are field-interleaved.

RGB Picture I/O

DVxpress-MX codecs include the capability to exchange 24-bit RGB bitmap images via the integrated PCI interface. Decoded frames can be transferred to an external host processor for non-real-time rendering operations. In addition, bitmap images can be transferred into DVxpress-MX codecs for MPEG or DV encoding.

Serial Upgrade Module (SUM)

SUM provides field upgradability to solutions using DVxpress-MX. Each SUM contains a unique identifier that can be utilized for authentication purposes when future upgrades are requested by the user.

Flexible Bit Rate Control

DVxpress-MX codecs offer two primary modes of operation for bit rate control: Constant Bit Rate (CBR) and Variable Bit Rate (VBR). CBR settings can be used to lock the bitstream to a specified bit rate for DV and general purpose MPEG encoding. For MPEG-based video tape recorder (VTR) applications, a special CBR mode called CB/G, which achieves a constant number of bytes per GOP for I-Frame encoding, is available on DVxpress-MXT50. In addition, all DVxpress-MX codecs offer VBR settings for MPEG encoding when storage space is limited. In VBR operation, maximum and minimum limits are specified, and the encoder intelligently allocates bits based on scene complexity, which increases the duration of video that can be stored on a fixed-capacity media.

PerfectView Encoding Algorithm

DVxpress-MX codecs deliver the high image quality that your NLE and DDR applications require by utilizing PerfectView, the LSI Logic-patented encoding algorithm technology. PerfectView produces superior MPEG-2 image quality at all bit rates through the use of multi-layer motion estimation, error masking, inverse telecine, and optimal bit allocation.

DVXPRESS-MX25: THE PROSUMER SOLUTION

DVxpress-MX25 is a mixed-format codec with support for 25 Mbit/s DV (including DVCPRO) and 4:2:2 MPEG. As an encoder, it provides the outstanding image quality that only LSI Logic can deliver. As a decoder, DVxpress-MX25 manages multiple streams simultaneously and enables real-time special effects and transitions between video streams.

DVXPRESS-MX50: THE PROFESSIONAL'S CHOICE

The DVxpress-MX50 codec achieves the level of performance and quality required for professional-level applications. In addition to offering the features and performance of the DVxpress-MX25, the DVxpress-MX50 includes support for 4:2:2 DV at 50 Mbit/s, including DVCPRO50.

DVXPRESS-MXT50: SPECIALLY TUNED FOR VTR APPLICATIONS

The DVxpress-MXT50 codec is ideal for MPEG-based VTR applications where the bitstream is stored on tape media. It supports a special encoding mode, CB/G, that holds constant the number of bytes per GOP when encoding 4:2:2 MPEG with I-Frame GOP structure. In addition, it is specially tuned to preserve image quality over several encode/decode cycles, and supports MPEG 4:2:2 encoding with IBBP GOP structure for archiving content on video servers.

DVxpress™-MX25, DVxpress-MX50, and DVxpress-MXT50

	DVxpress-MX25	DVxpress-MX50	DVxpress-MXT50
Single-Chip MPEG and DV Codec	Yes	Yes	Yes
4:2:0 / 4:1:1 Chroma Sampling	Yes	Yes	Yes
4:2:2 Chroma Sampling	MPEG Only	Yes	Yes
Multiple-Stream Decoding	Yes	Yes	Yes
DV/MPEG Mixed-Format Decoding	Yes	Yes	Yes
Real-time Effects	Yes	Yes	Yes
Dual-Stream Output	Yes	Yes	Yes
RGB Picture I/O	Yes	Yes	Yes
DV/MPEG Transcoding			
25 Mbps DV to MPEG ML@MP	Realtime	Realtime	Realtime
25 Mbps DV to MPEG ML@422P	Realtime	Realtime	Realtime
50 Mbps DV to MPEG ML@MP		1.5x Realtime	1.5x Realtime
50 Mbps DV to MPEG ML@422P		1.5x Realtime	1.5x Realtime
FAME (Frame-Accurate MPEG Editing)	Yes	Yes	Yes
GOP Structure (MPEG only)	I, IP, IBBP (4:2:0) I, IP, IBP (4:2:2)	I, IP, IBBP (4:2:0) I, IP, IBP (4:2:2)	I, IP, IBBP (4:2:0) I, IP, IBBP (4:2:2)
Bit Rate Range	2-50 Mbps (MPEG) 25 Mbps (DV)	2-50 Mbps (MPEG) 25 or 50 Mbps (DV)	2-50 Mbps (MPEG) 25 or 50 Mbps (DV)
Bit Rate Control			
Constant Bit Rate (CBR)	Yes	Yes	Yes
Constant Byte per GOP (CB/G)			MPEG only
Variable Bit Rate (VBR)	MPEG only	MPEG only	MPEG only
Resolution			
Horizontal	720, 704, 352 (MPEG) 720 (DV)	720, 704, 352 (MPEG) 720 (DV)	720, 704, 352 (MPEG) 720 (DV)
Vertical	NTSC 480, PAL 576 (4:2:0 / 4:1:1) NTSC 512, PAL 608 (4:2:2 MPEG)	NTSC 480, PAL 576 (4:2:0 / 4:1:1) NTSC 512, PAL 608 (4:2:2 MPEG) 480 + Ext. Res. (4:2:2 DV)	NTSC 480, PAL 576 (4:2:0 / 4:1:1) NTSC 512, PAL 608 (4:2:2 MPEG) 480 + Ext. Res. (4:2:2 DV)
Motion Estimation Search Ranges with Half-Pel Accuracy (MPEG only)			
Horizontal	±202 pels	±202 pels	±202 pels
Vertical	±62 pels	±62 pels	±62 pels
Frame Rates			
NTSC	29.97 Hz	29.97 Hz	29.97 Hz
PAL	25 Hz	25 Hz	25 Hz
Film (MPEG only)	23.976 Hz	23.976 Hz	23.976 Hz
Audio Support			
Channels	8 (MPEG) 4 (DV)	8 (MPEG) 4 (DV)	8 (MPEG) 4 (DV)
Format	Uncompressed 16 or 24 bit (MPEG) Uncompressed 12 or 16 bit (DV)	Uncompressed 16 or 24 bit (MPEG) Uncompressed 12 or 16 bit (DV)	Uncompressed 16 or 24 bit (MPEG) Uncompressed 12 or 16 bit (DV)

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