



# matrox RT.X2™

Professional realtime native HDV and DV editing

Product Guide **March 2006**



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## Overview

If you're a professional video editor concerned about getting the most from Adobe Premiere Pro and Adobe Production Studio, you need Matrox RT.X2. It's ideal for corporate communicators, event videographers, project studios, educational facilities and digital filmmakers. Designed primarily for realtime native HDV and DV editing, Matrox RT.X2 also provides a high-quality MPEG-2 4:2:2 I-frame codec so you can capture other HD and SD formats using RT.X2's analog inputs and mix all types of footage on the timeline in real time. No matter what your desired workflow, Matrox RT.X2 delivers maximum realtime productivity. No other platform gives you so many ways to get the job done in record time.

Bundled with Adobe Premiere Pro, Matrox RT.X2 goes far beyond the capabilities of software-only editing and systems that combine Adobe Premiere Pro and a simple I/O card.

With Matrox RT.X2 you get:

- Many more realtime layers of video and graphics in HD and SD
- More effects in real time including color correction, chroma/luma keying, speed changes, blur/glow/soft focus, and much more
- Broadcast-quality, realtime 3D effects with soft edges and realistic shadows
- Capture from analog sources to compressed MPEG-2 4:2:2 I-frame HD and SD
- Realtime mixing of HD codecs and SD codecs on the same timeline
- Realtime mixed-format multi-cam
- Accelerated export to DVD, all multimedia formats including Flash Video, and Adobe Clip Notes
- Audio VU meters on capture
- Full-resolution HD monitoring on an inexpensive flat panel display via independent DVI output

Should you choose to upgrade to Adobe Production Studio, you'll be happy to know that Matrox RT.X2 lets you work seamlessly with the other Adobe applications, fully supporting Adobe Dynamic Link and providing WYSIWYG video output support for Adobe After Effects and Photoshop, as well as other industry-leading animation and compositing packages.

Matrox RT.X2 is based on the award-winning Matrox Axio architecture that incorporates Matrox Power of X and Flex technologies to leverage CPU and GPU power. You get a high-performance, future-proof HDV and SD editing environment while joining the ranks of well over 200,000 users worldwide who currently enjoy the amazing value, stable reliability, and superior productivity of Matrox-based realtime nonlinear editing systems.



## Key features

- Realtime multi-layer workflows that combine HD and SD material from analog and digital sources
- Realtime Matrox Flex CPU effects – color correction, speed changes, chroma/luma keying and many more
- Realtime and accelerated Matrox Flex GPU effects – 2D/3D DVE, blur/glow/soft focus, shine and many more
- Native HDV and MPEG-2 4:2:2 I-frame HD editing
- Native DV, DVCAM, DVCPRO, and MPEG-2 4:2:2 I-frame SD editing
- Realtime mixing of HD codecs and SD codecs on any timeline
- Realtime mixed-format multi-cam
- Realtime high-quality hardware downscaling for SD output from an HD timeline
- Accelerated export to DVD, multimedia formats including Flash Video, and Adobe Clip Notes
- WYSIWYG for Adobe After Effects and Photoshop, Autodesk Combustion and 3ds Max, eyeon Fusion, and NewTek LightWave 3D with dynamic Alt+Tab switching
- Composite, Y/C, HD/SD analog component input and output
- Full-resolution HD monitoring on an inexpensive flat panel display via independent DVI output
- Includes Adobe Premiere Pro

## Scalable system design

Your particular workflow requirements and budget will determine the specific components you should choose when designing your Matrox RT.X2 editing system. If your budget allows, you can combine a top-of-the-line computer system, the fastest GPU, and the largest, most robust storage subsystem to get the absolute maximum number of realtime layers and effects, in all cases. If your budget is more modest, there are many tradeoffs you can make to design an editing system that will give you maximum performance to do exactly what you need to do on a daily basis.

Matrox RT.X2 relies on the power of your CPU to perform Matrox Flex CPU effects and to decode and encode compressed video streams such as HDV and DV. It relies on the power of the GPU (Graphics Processing Unit) in your system to process Matrox Flex GPU effects. Note that what we refer to here as a GPU has various other names that may be more familiar to you, such as display card, graphics card, or VGA adapter. The type and size of storage you require depends largely on the video formats you are using and the number of hours of video you need to maintain online. Understanding your various options in each category will help you design the most economical system for your needs.

We continuously validate computers, motherboards, display cards, and storage subsystems and provide guidelines to enable you to make an informed choice as you choose the components for your own Matrox RT.X2 editing system or work with your Matrox RT.X2 dealer to specify a turnkey system.

Please visit the support section of our website for up-to-date information.

## Realtime multi-layer workflows in HD and SD

Designed primarily for realtime native HDV and DV editing, Matrox RT.X also provides a high-quality MPEG-2 4:2:2 I-frame codec so you can capture other HD and SD formats using RT.X2's analog inputs, and mix all types of footage on the timeline in real time. No matter what your desired workflow, Matrox RT.X2 delivers maximum productivity.

### Highest quality realtime effects

Matrox RT.X2 is designed to overcome the limitations of software-only editing by providing performance- and quality-optimized effects processing. Built on Matrox Power of X and Flex technologies, Matrox RT.X2 leverages CPU and GPU power to provide a tightly integrated, high performance editing environment for Adobe Premiere Pro. Matrox RT.X2's broadcast quality effects are fully keyframeable and feature a high level of control for detailed work. Each effect has a series of parameters that can be fine tuned to get just the look you want. To save time you can use the preconfigured effects presets or create and save your own presets.

### Most realtime video/graphics layers

Many editing systems compromise quality or effects refinement and complexity to increase the number of layers, whereas Matrox RT.X2 always delivers maximum realtime quality. Timelines with more layers and/or effects than can be processed in realtime can still benefit from hardware-accelerated previews. Matrox RT.X2 always plays back the timeline at the best possible quality and if necessary, gracefully reduces the frame rate. You always get in-context feedback as you work.

The number of layers that can be processed in real time depends on your system CPU and GPU as well as the characteristics of your workflow – the video resolution you are working with, the frame rate, the codec, and the number and complexity of effects. System selection guidelines and lists of computers, motherboards, and GPUs validated for use with RT.X2 are posted in the support section of the Matrox website.

### Realtime native HDV editing workflow

Matrox RT.X2 provides the flexibility you need to get the most from your HDV editing experience.

#### *Capture*

You can transfer native HDV footage over 1394 to your RT.X2 system. Other HD footage with the same resolution and frame rate can be captured from analog HD sources using RT.X2's high-quality MPEG-2 4:2:2 I-frame codec.

#### *Edit*

On a reasonably performing system, you can expect to edit at least two HD video layers with color correction plus multiple graphics layers in real time.

Native HDV material can be mixed in real time on your HD timeline with MPEG-2 I-frame clips. You can also place SD clips on your HD timeline and RT.X2 will upscale them in real time so you can mix NTSC material into a 1080i at 29.97 fps timeline or PAL material into a 1080i at 25 fps timeline.

#### *Monitor*

Matrox RT.X2 provides full-resolution HD monitoring on an inexpensive flat panel display via its independent DVI output. You won't need to buy expensive HD monitoring equipment or the video-to-DVI converter required for monitoring with some I/O cards. In fact, RT.X2 provides better HD video definition, with pixel-to-pixel mapping on a flat panel (1920 x 1200), than you will get on a more expensive professional HD monitor which is typically limited to approximately 800 lines of resolution.

#### *Deliver*

When your edits are complete, you can record your project directly to tape using RT.X2's analog component HD output or export to HDV for playback over 1394.

Matrox RT.X2 also downscales HD projects to broadcast-quality NTSC and PAL with proper conversion of the HD color space to the SD color space. You can print your HD edit to SD tape in real time or create a DVD master. You can also use this feature to preview your HD projects on an inexpensive SD monitor.

### Capture in HD, edit in SD for maximum realtime performance

If your goal is to deliver in SD, yet you want to take advantage of the superior image quality offered by your HDV camera, another way to work with HDV material on your RT.X2 is to capture HDV over 1394 then edit in SD using the original HDV clips. You maintain the quality of your original footage, yet benefit from maximum realtime performance during the editing process, similar to what you will experience when editing in native DV. When your edits are complete, you can output straight to SD. When you view the SD master you will see no significant difference in quality compared to a project that is edited in native HDV then downscaled to SD.

If you need an HD or HDV master, you can open the same SD project in an HD timeline. No recapturing is necessary.

## Realtime native DV editing workflow

RT.X2 provides amazing realtime editing performance in DV. On a reasonably performing system, you can expect to edit at least five native DV video layers plus six graphics layers and effects in real time.

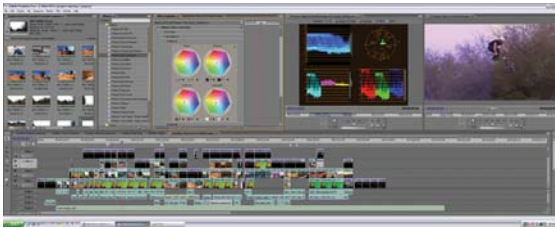
Other SD clips captured from analog SD sources with the same resolution and frame rate can be mixed on your SD timeline in real time.

When the need arises, HD clips captured with RT.X2 can also be placed on your SD timeline. RT.X2 will downscale them so you can mix 1080i at 29.97 fps material into an NTSC timeline or 1080i at 25 fps material into a PAL timeline in real time.

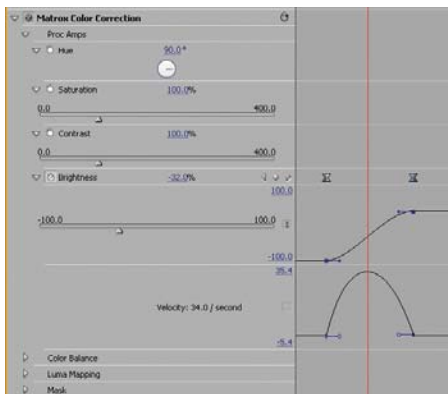
## Realtime Flex CPU effects

Matrox RT.X2 relies on the power of your CPU to perform a variety of realtime and accelerated effects.

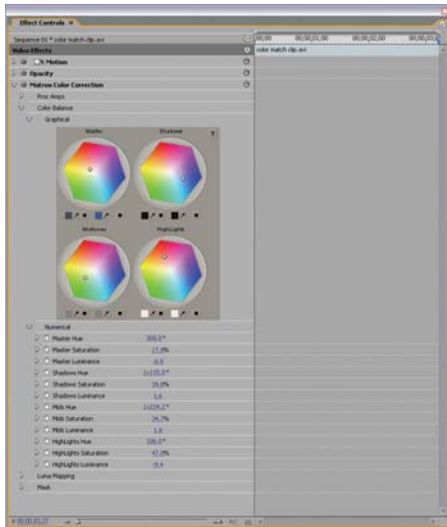
- **Realtime primary color correction** — Primary color correction is a critically important effect for all productions, whether to achieve continuity when cutting between shots, ensure broadcast safe levels, or establish and emphasize a “look”. The primary color corrector provides basic proc amp control; three-way color correction complete with master, shadows, midtones and highlights control; and input/output level control.



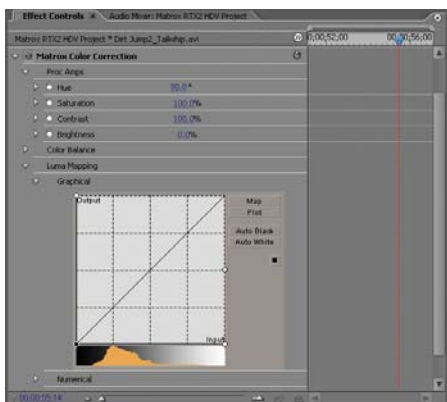
**Realtime proc amp controls** — Matrox RT.X2 lets you easily adjust four proc amp controls – hue, saturation, brightness, and contrast. Hue adjusts the tint of the colors in the image, saturation adjusts the vividness, contrast adjusts the difference in luminance between the lightest and darkest areas of the image, and brightness adjusts the level of black. You can also use these controls to create special effects, such as black and white, in real time.



**Realtime color match and color balance** — Colors can be corrected using nine parameters related to the black (shadow), midtone, and white (highlight) levels of your clips. You can easily match colors or balance blacks, whites, and grays against a reference shot in one simple step.



**Realtime input/output level control** — Using the histogram display and level controls, luminance levels can be remapped to maximize the dynamic range of a clip. For example, bright areas can be made brighter and dark areas can be made darker. Five parameters are available – black, white, and gamma levels on the input; and black and white levels on the output. Auto white and auto black controls are also provided.

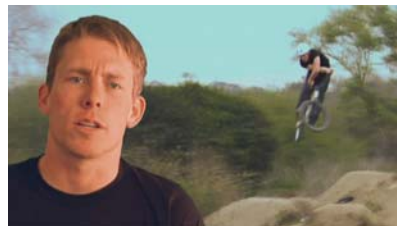


- **Realtime secondary color correction** — The secondary color corrector is an advanced tool used for fine-tuning or dramatic effects creation. It offers all the controls found in the primary color correction filter with the added capability of limiting the effect to a specific range of pixels. Pixel selection can be done using color and/or brightness. Using the simple garbage matte tool, you can also limit the effect to a specific region. The pixel selection can also be inverted.

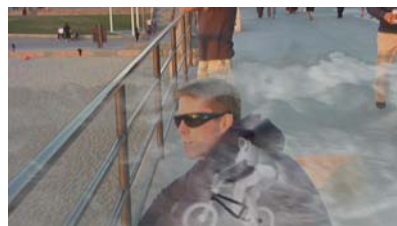
The secondary color corrector can be used, for example, to change the color of a dress, deepen the background sky color, or to achieve an effect similar to the film *Schindler's List* where only one object or person remains in color while the rest of the image becomes black and white.



- **Realtime chroma and luma keying** — Matrox RT.X2 provides one of the finest realtime chroma keyers in the industry. It makes clean blue- and green-screen keys easy to achieve, even with DV and HDV material shot in less than optimal lighting conditions. It upsamples your video to 4:4:4 resolution and uses advanced noise reduction algorithms to ensure superior results. The auto key button intelligently adjusts the key with soft edges, spill removal, and shadow preservation. If needed, you can further refine the key with manual controls. The Matrox RT.X2 chroma keyer lets you key on any color, not just blue and green. It also lets you invert the selection and display the matte being generated to fine tune the key.



The realtime luma keyer gives you low clip, low gain, high clip, high gain, and transparency controls.

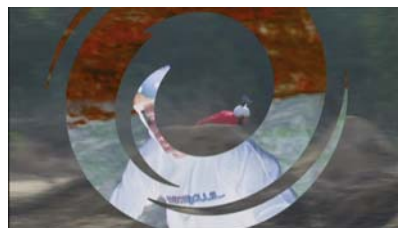


- **Realtime speed changes** — You can use speed changes to emphasize special moments, extend the duration of shots to match voiceover timing, or enhance the feeling of dramatic shots. Matrox RT.X2 lets you apply smooth slow and fast motion with field or frame blending.

- **Realtime transitions** — Matrox RT.X2 supports standard dissolves, SMPTE wipes, and organic wipes with soft edges and color borders.



- **Realtime track matte** — The realtime track matte effect lets you superimpose one clip onto another using an animated matte, sometimes called a traveling matte, to determine how the two clips are composited (keyed). You can use a grayscale video or graphics clip as your matte, or use a graphics clip or graphics sequence with an alpha channel as your matte. When using a grayscale clip as your matte, areas of black in the matte create transparent areas in your foreground clip, areas of white create opaque areas that prevent the underlying clip from showing through, and gray areas create semi-transparent areas in your foreground clip.



- **Realtime move & scale** — This effect lets you apply multiple 2D DVEs simultaneously in real time to easily set up picture-in-picture effects. You can also use the move & scale effect to animate multiple titles in real time.
- **Realtime SD clip upscaling in an HD timeline** — This effect is enabled by right-clicking on an SD clip in an HD timeline and selecting “scale to frame size”. It provides realtime playback of SD clips upscaled to HD to let you mix NTSC material into a 1080i at 29.97 fps timeline or PAL material into a 1080i at 25 fps timeline.
- **Realtime HD clip downscaling in an SD timeline** — This effect is enabled by right-clicking on an HD clip in an SD timeline and selecting “scale to frame size”. It provides realtime playback of HD clips downscaled to SD to let you mix 1080i at 29.97 fps material into an NTSC timeline or 1080i at 25 fps material into a PAL timeline.
- **Native Adobe Premiere Pro effects** — Some of Adobe Premiere Pro’s most popular native effects such as Opacity, Crop, Dip to Black, Black and White, Dissolve, and Additive Dissolve can be used in real time on Matrox RT.X2 in SD. These effects are accelerated in HD.

## Realtime Flex GPU effects

Using the power of your system GPU, Matrox RT.X2 lets you create a wide variety broadcast-quality 2D and 3D digital video effects.

- **Realtime Adobe Motion effect** — Matrox RT.X2 overwrites the Adobe Premiere Pro fixed Motion effect (position, scale and rotation) so it becomes realtime.
- **Realtime advanced 2D/3D DVE** — Matrox RT.X2 lets you position your clips anywhere in 3D space while adding soft edges and rounded borders with color gradients in real time.



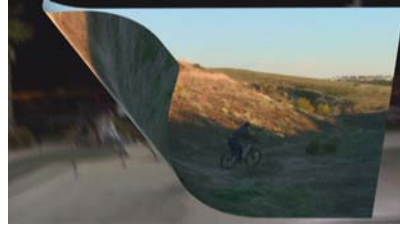
- **Realtime shadow** — Matrox RT.X2 lets you project a realistic shadow from any source containing key information such as DVEs, titles, and keyed video. You can tint the shadow and position, scale, and rotate it to match the angle of the surface on which it is cast. Applying blur to the shadow can simulate the realistic look of diffused light being projected on the source.



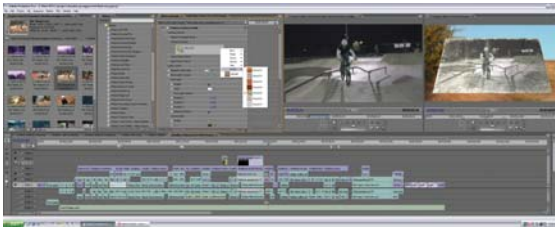
- **Realtime blur/glow/soft focus** — The blur/glow/soft focus effect lets you simulate camera defocus and create unique effects in real time.



- **Realtime page curl** — Matrox RT.X2 page curls are true 3D with full-motion video on the reverse side and realistic highlights. Page curls on graphics let you create great looking text effects. You control the position, rotation, scaling, and zooming of page curls in 3D space. You also have control over the softness of the edges.



- **Realtime surface finish** — The surface finish effect gives metal, brick, wood, or granite textures to your video clips and titles with color spot lighting.



- **Realtime pan & scan** — The realtime pan & scan filter lets you easily convert footage from any aspect ratio to any other. Tracking on-screen action to make accurate judgments is easy because you see the entire source clip and the section of it that will become the final result. For example, DV 16:9 footage is always captured anamorphically and therefore appears vertically stretched when viewed on a 4:3 monitor. To restore the proper aspect ratio, the realtime pan & scan filter lets you letterbox or pan & scan your footage, or use a combination.



- **Realtime mask** — The mask effect lets you choose from dozens of soft-edged cutout shapes for your video clips. You can also create your own masks to meet your specific needs.



- **Realtime mask blur** — The realtime mask blur effect lets you create a “region of interest” by adding a mask and applying blurring to it. You can either create your own custom made mask, or select one of the many pre-created masks included with the effect.



- **Realtime mask mosaic** — The realtime mask mosaic effect lets you create a “region of interest” by adding a mask and applying a mosaic effect to it. You can either create your own custom made mask, or select one of the many pre-created masks included with the effect.



- **Realtime four-corner pin** — The realtime four-corner pin effect lets you anchor each corner of a video or graphics clip onto points in another clip, even if the underlying clip is angled or skewed. This effect is useful if you want to overlay a video clip onto an underlying clip of a television screen, for example.



- **Realtime crystallize** — The crystallize effect lets you choose from many different patterns to make your image or text appear as if it is made of crystals.



- **Realtime lens flare** — The lens flare effect lets you simulate the light refractions caused by shining a bright light into the lens of a camera when taking a photo. You can choose from many different lens flare patterns.



- **Realtime old movie effect** — The old movie effect lets you create an old film look on your clips by adding scratches, flicker, jitter, and grain.



- **Accelerated shine** — Shine is the shimmering light ray effect often seen on TV and film titles. There's no need to buy an expensive plug-in to get this look. With Matrox RT.X2, processing of the shine effect is accelerated in HD and SD.



- **Native Adobe Premiere Pro transitions** — Over 60 of Adobe Premiere Pro's native transition effects can be used in real time on Matrox RT.X2. The effects you've been accustomed to rendering in Premiere Pro can now be played back in real time in SD. They are accelerated in HD.



## Productivity features

Matrox RT.X2 offers tight integration with Adobe Premiere Pro and a variety of productivity features that help you get your work done quickly and efficiently.

### WYSIWYG for compositing and graphics applications

Matrox RT.X2 includes a WYSIWYG (What You See Is What You Get) video output plug-in for Adobe After Effects and Adobe Photoshop that lets you see your work directly on your video monitor. The Adobe Dynamic Link feature is supported so you can work in After Effects, Photoshop, and Premiere Pro simultaneously and Alt+Tab between the applications. The video output will change to show the output of the active application.

The WYSIWYG plug-in also supports Autodesk Combustion and 3ds Max, eyeon Fusion, and NewTek LightWave 3D. This feature lets you ensure proper 4:3 or 16:9 aspect ratio in NTSC or PAL, and check for exact color temperature, safe-title area, and any interlace artifacts that may be present in your images. You can also view the alpha channel of your output on the video monitor to check for defects.

### Voiceover recording in the timeline

The voiceover feature of Premiere Pro is supported to let you record audio directly in the timeline. It is based on ASIO driver technology, which provides low latency. ASIO is a trademark and software of Steinberg Media Technologies GmbH.

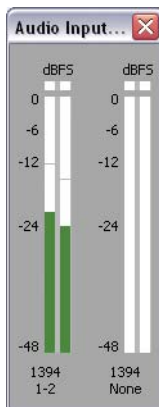


### Surround sound support

Matrox RT.X2 supports the multi-channel 5.1 surround sound mixing feature of Adobe Premiere Pro. Monitoring is done via your sound card.

### VU meters on capture

VU meters on audio/video capture are a unique feature of Matrox RT.X2. They let you see if your audio input is active and also let you monitor and adjust audio levels in order to obtain the optimal signal-to-noise ratio and dynamic range.



### Video preview on capture

RT.X2 lets you see your video on your broadcast monitor while capturing, even in HDV.

### Device control

Matrox RT.X2 supports the Adobe Premiere Pro standard RS-422 and FireWire device control protocols. There is no need to purchase third-party device control software.

### Realtime mixed-format multi-cam

Matrox RT.X2 supports the multi-cam feature of Adobe Premiere Pro 2.0 and goes further to let you view four cameras simultaneously in real time even if the formats are mixed, provided your RT.X2 system has the proper storage and system speed. For example, in a multi-cam sequence you could use one HDV stream and multiple DV streams and switch among them in real time.



### Legacy support for RT.X100 AVI files

Matrox RT.X2 supports playback of legacy RT.X100 AVI files within the editing environment, allowing you to reuse archived footage.

### 24 fps editing in SD

Matrox RT.X2 supports 24 fps editing in SD with pull down and reverse pull down.

### Flexible AVI and WAV file formats

Matrox RT.X2 captures video in Windows-standard AVI and WAV files for complete compatibility with other multimedia applications. Interleaved audio is the industry standard and allows for maximum compatibility with applications that expect the audio to be contained within the AVI file. File management is simplified because there is only one file to keep track of. However, integration with audio workstations and DVD authoring is simplified by using separate WAV audio files.

### Project compatibility with Matrox Axio

Matrox RT.X2 and Matrox Axio projects are compatible. Any RT.X2 timeline can be loaded onto an Axio system. Axio projects created using codecs and resolutions supported by RT.X2 can be loaded onto an RT.X2 system.

### Accelerated export to DVD, all multimedia formats, and Adobe Clip Notes

Matrox RT.X2 significantly accelerates exports to all the formats included in Adobe Premiere Pro.

Adobe Premiere Pro export formats include:

- DVD
- Windows Media for digital cinema, HD DVD, web, and multimedia
- QuickTime
- Real Media
- MPEG-1 for VCD and multimedia
- MPEG-2 for S-VCD, DVD, and HD DVD
- MPEG-4 for streaming
- Flash video (FLV)
- Adobe Clip Notes

# Specifications

## General

Full-length PCIe 1x card  
FCC Class B, CE Mark Class B

## Video features

### *Inputs and outputs*

1394 pass-through  
composite  
Y/C  
SD/HD analog component  
Independent DVI-D output for full-resolution HD monitoring

### *Video standards*

#### SD

ITU-R 601  
525i at 29.97 (NTSC)  
625i at 25 (PAL)  
486p at 23.98

#### HD

1920 x 1080i at 29.97 fps  
1920 x 1080i at 25 fps

### *Internal video processing*

8-bit 4:2:2:4  
720 x 486  
720 x 576  
1440 x 1080

## Realtime video codecs

### *Capture*

HDV 1080i via 1394  
DV, DVCAM, DVCPRO  
MPEG-2 4:2:2 I-frame SD from 10 to 25 Mbps  
MPEG-2 4:2:2 I-frame HD from 50 to 100 Mbps

### *Playback*

HDV 1080i  
DV, DVCAM, DVCPRO  
RT.X100 legacy format  
Matrox Axio offline clips  
MPEG-2 4:2:2 I-frame SD from 10 to 25 Mbps  
MPEG-2 4:2:2 I-frame HD from 50 to 100 Mbps

### *Export*

HDV 1080i print-to-tape  
DV, DVCAM, DVCPRO  
MPEG-2 4:2:2 I-frame SD from 10 to 25 Mbps  
MPEG-2 4:2:2 I-frame HD from 50 to 100 Mbps

## Audio features

16 bit, 48 kHz  
Analog audio I/O dependent on system audio  
Stereo monitoring