



FAROUDJA

Delivering Better Images with Faroudja® Technology

Introduction

Faroudja, a division of Genesis Microchip, is known worldwide as one of the leading companies for video processing technology, delivering images from standard video sources that offer superior detail, color and motion for large screen theaters. Their patented technologies are also successfully applied to the needs of today's sophisticated home theaters.

Properly designed high-performance home theater systems must deliver superior image quality from all sources. To this end, the JVC DLA-HD2K projector package includes a full-featured digital video processor that satisfies this requirement by taking any video source and using patented Faroudja technology, converting it to a high-performance digital 1080p signal optimized for the projector.

Faroudja Technology at Work

All video sources are converted to a progressive format using Faroudja's patented 3:2 pull-down and Directional Correlational Deinterlacing (DCDi[®]) technology.

Also known as film mode detection, 3:2 pull down is an industry-standard technology invented/patented by Faroudja in 1989 that detects the original frames of film within the video stream and reconstructs an accurate image, yielding the full vertical resolution of an image free of motion artifacts. DCDi is a video mode algorithm designed for video-based material that is used to upconvert standard definition (SD) material (480i, what we have on conventional TVs) to enhanced definition quality (480p). The combined technologies produce improved edge detail and motion tracking without the introduction of smearing or jagged edges caused by interpolation.

Figure 1 shows how 3:2 pull down monitors the incoming signal and detects the 3:2 pattern created when 24 frames per second (24fps) film is converted to 30-frame video. Each video frame is split into two fields. The first film frame is converted to three fields; the next film frame is converted to two fields. At the end of a second, 24 has been converted to 30. Faroudja's 3:2 detection "locks on" to this pattern and uses it to recreate the original film frame. In the process, the 480i interlaced signal is converted to a 480p progressive frame, which greatly improves detail and offers a more "film-like" image.

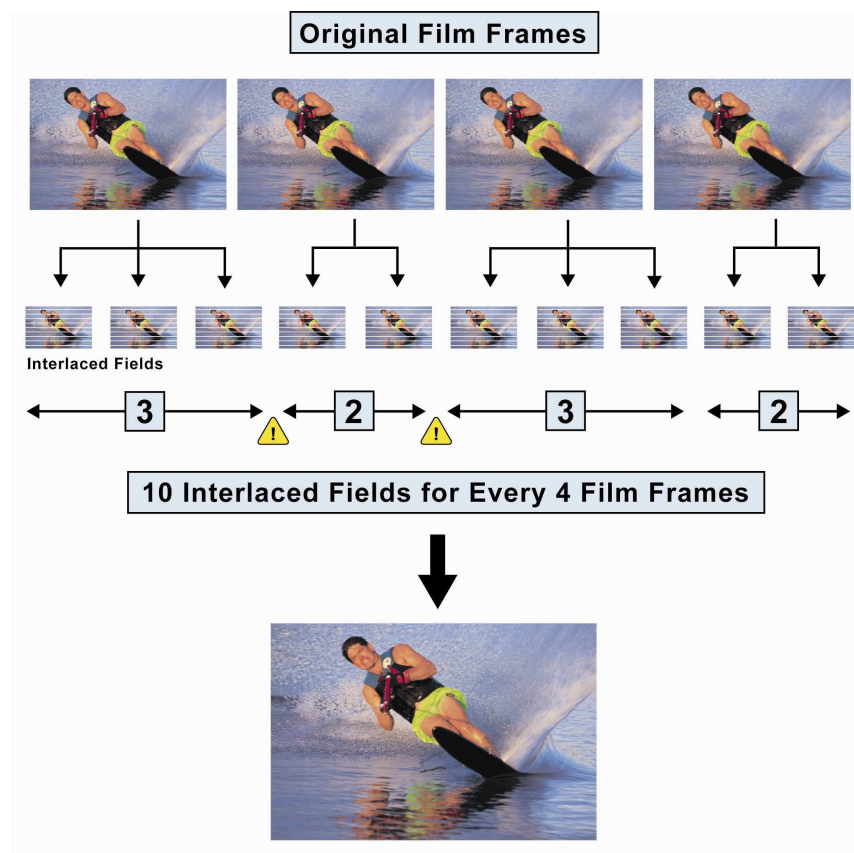


FIGURE 1: Patented Faroudja 3:2 Pull Down Technology

The patented DCDi circuit is a powerful tool for proper processing of edges. DCDi is an active circuit that analyzes the pixels in the image along edges. When the two fields are reassembled, the circuit tracks the diagonal lines in each field and properly realigns them in the new progressive video frame. Figure 2 illustrates how DCDi makes the Stars and Stripes much more dramatic. On the left is the original TV image of a flag blowing in the wind. At the bottom, right, is the image with DCDi turned off. Notice the junctions of the red and white stripes and the visible jagged lines. With DCDi turned on (top, right), the jagged lines are gone, and the junctions between the red and white stripes are smooth.

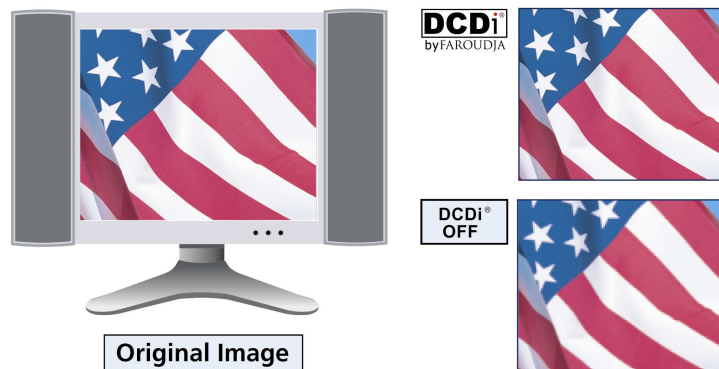


FIGURE 2: Stars and Stripes with DCDi On and Off

Reality dictates that the 3:2 pattern will not always be in the correct sequence resulting in artifacts that distort the image. Edit Detection can recognize this “break” and realign the 3:2 sequence by quickly switching between film and video de-interlacing so the image never breaks up. Edit Detection is also critical for mixed content video where film-based movies are mixed with video-based scenes, such as with music videos.

In the color processing stage, a patented adaptive comb filter and cross-color suppression reduce rainbow and dot crawl artifacts from non-component sources. Dot crawl is seen at the boundaries of contrasting colors, such as blue and yellow, and has the appearance of a moving escalator. Cross-color looks like little rainbows that show up around fine detail as in a chain-link fence. The cross-color suppressor is a popular and highly effective feature for delivering true-color image quality.

Now that the signal is progressive, it is then processed using proprietary horizontal and vertical scaling algorithms to convert the 480p/576p video to 1920x1080p, the native resolution of the DLA-HD2K projector, while maintaining all the high frequency information. The non-linear scaling algorithms can convert 4:3 to 16:9, maintaining the correct aspect ratio in the center of the screen or progressively upscaling the image to fill the screen for a pleasurable viewing experience.

Once converted to 1920x1080p, the video signal goes through additional processing called TrueLife™ Enhancement that uses Faroudja-patented non-linear technology to sharpen the image – improving edge detail and color fidelity – without adding edge ringing or video noise. TrueLife Enhancement emphasizes or expands the “detail” components of an image (features, textures, etc.) to make them stand out against background images; the result is a more 3D or lifelike perception of the image. The circuit offers twelve different horizontal- and vertical-edge fine tuning adjustments (preset at the factory) for both the color and black and white video signal information.

High Definition TV (HDTV) sources also benefit from the video processing technology. Interlaced 1920x1080 HDTV is de-interlaced to 1080p and optimized for the projector to produce a more natural film-like image with improved motion, detail and color reproduction.

Faroudja and JVC

Featuring such highly advanced and patented technologies, the Faroudja video processor becomes the centerpiece to any high quality theater ensuring superior images from any source from the DLA-HD2K projector package.