

FS



The Power to Convert and Deliver

FS



The Power to Convert

With support for all broadcast video formats, the FS family simplifies the integration of disparate video and audio formats with comprehensive analog and digital I/O, extensive up, down, cross-conversion and frame synchronization.

AJA's FS family of frame synchronizing converters delivers power and flexibility for a range of raster and frame rates from SD to 4K/UltraHD. Align mismatched signal types to house reference, process and convert video and audio, and even up, down, cross-convert to 4K/UltraHD to establish a consistent format for postproduction or broadcast.

AJA's FS family offers the full power of our hardware conversion expertise in compact 1RU rack units that offer unrivaled flexibility.

Delivering AJA's industry standard up, down, cross-conversion technology for the highest quality images, FS units are ideal for high density applications such as mobile trucks and packed machine rooms, replacing multiple hardware units in a single rack space with up to four channels of 2K/HD/SD or one channel of 4K/UltraHD/2K/HD/SD processing in a single 1RU frame.

The widest range of conversion possibilities makes them perfect for aligning disparate sources to a common format, integrating legacy signals into higher resolution workflows or handling whatever the production environment might throw at you.

Easy to use and fully networkable via built-in 10/100/1000 Ethernet ports, FS converters can be quickly integrated into a facility and configured by any computer on the network via a standard web browser. FS units also accept automation control from external GPI commands, for additional integration options.

With flexible I/O support, FS converters are ideal for use with legacy equipment as well as the latest digital and fiber optic video and MADI audio connections.

Built to the exacting standards of all AJA hardware, FS frame synchronizers are backed by our world class support network, five year international warranty and advanced exchange service.



Digital and Analog I/O Flexibility

FS frame synchronizers are loaded with comprehensive I/O for converting between the widest range of analog and digital signals. Perfect for use in all broadcast and postproduction environments, FS units are engineered to provide the maximum flexibility of input and output connections for any situation with advanced audio extraction, routing and embedding all in a single device.

FS products that support optional SDI Fiber and BNC SFP modules can be simply configured at www.aja.com/config ensuring you choose the right options for the job at hand.



AJA Hardware Conversion Technology

AJA's hardware conversion technology ensures the highest image quality for your productions. Key conversion features include:

- 4K/UltraHD up, down, cross-conversion to and from 2K/HD/SD
- HD/SD up, down-conversion
- SD/SD aspect ratio conversion
- HD/HD cross-conversion (720p/1080i with simultaneous down-converted SDI output)
- Closed Captioning conversion (CEA-608/CEA-708 standards)
- AFD conversion or pass through (user selectable)

Note: Not all conversions are available on all models. See individual product specifications for details.



Remote Configuration and Control

FS units are network ready and support SNMP monitoring and web-based remote control. Units can be connected to any Ethernet network via the built-in 10/100/1000 Ethernet port, allowing control and configuration of multiple FS units from any web browser on a connected computer. Configurations can be saved and applied to multiple units, ensuring consistency and quick configuration in large installs. To integrate smoothly with the existing automation of a facility, external GPI commands can be received to trigger a variety of functions, from freezing an input source to switching between saved presets and more.



FS Family of Frame Synchronizers and Converters

FS4



pg. 5

4-Ch 2K/HD/SD or 1-Ch 4K/UltraHD Frame Sync and Up, Down, Cross-Converter

4-Channel 2K/HD/SD or 1-Channel 4K/UltraHD frame synchronizer and up, down, cross-converter to and from 2K/HD/SD. AJA's flagship frame synchronizer and converter offers incredible versatility and connectivity with a wealth of digital and optional 12G-SDI Fiber LC and 12G-SDI BNC SFP connectivity in a 1RU frame.

FS3



pg. 11

HD/SD Frame Sync with 4K Up-Conversion

1-Channel high quality digital HD/SD to 4K/UltraHD up-converter and frame synchronizer with 3G-SDI and optional fiber inputs and outputs capability, supporting up to 3 x simultaneous 4K/UltraHD outputs from a single source.

FS2



pg. 16

2-Ch HD/SD Frame Sync and Up, Down, Cross-Converter

2-Channel HD/SD frame synchronizer and up, down, cross-converter. FS2 can do the work of two separate devices or combine both processors together for maximum flexibility.

FS1-X



pg. 21

HD/SD Frame Sync and Up, Down, Cross-Converter

1-Channel HD/SD advanced frame synchronizer and converter with MADI audio and motion adaptive linear Frame Rate Converter for digital and analog pipelines.

FS4



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FS4 offers two modes for comprehensive conversion and signal processing.

Single channel mode provides a full suite of 4K/UltraHD processing and up, down, cross-conversion to and from 2K, HD or SD.

Four channel mode offers 4 x 2K/HD/SD channels of simultaneous conversion and processing, all within an elegant 1RU chassis for multi-channel high density delivery.

The Ultimate 4K Toolbox

4-Channel 2K/HD/SD or 1-Channel 4K/UltraHD frame synchronizer and up, down, cross-converter

Bulletproof reliability. Incredible conversion power.

FS4 is your real world answer for conversions of any resolution, built to AJA's high quality and reliability standards.

4K/UltraHD delivery, processing and synchronization is fast becoming the next standard, and FS4 gets you there with a wealth of digital video connectivity including Quad 1.5G, Dual 3G, Quad 3G over 3G-SDI and 12Gb/6Gb over optional 12G-SDI BNC and 12G-SDI LC Fiber SFP modules.

In single channel mode, FS4 will up scale your HD or SD materials to 4K/UltraHD and back, with a huge array of audio channels over Fiber, 3G-SDI, AES, and MADI for an incredible 272 x 208 matrix of audio possibilities.

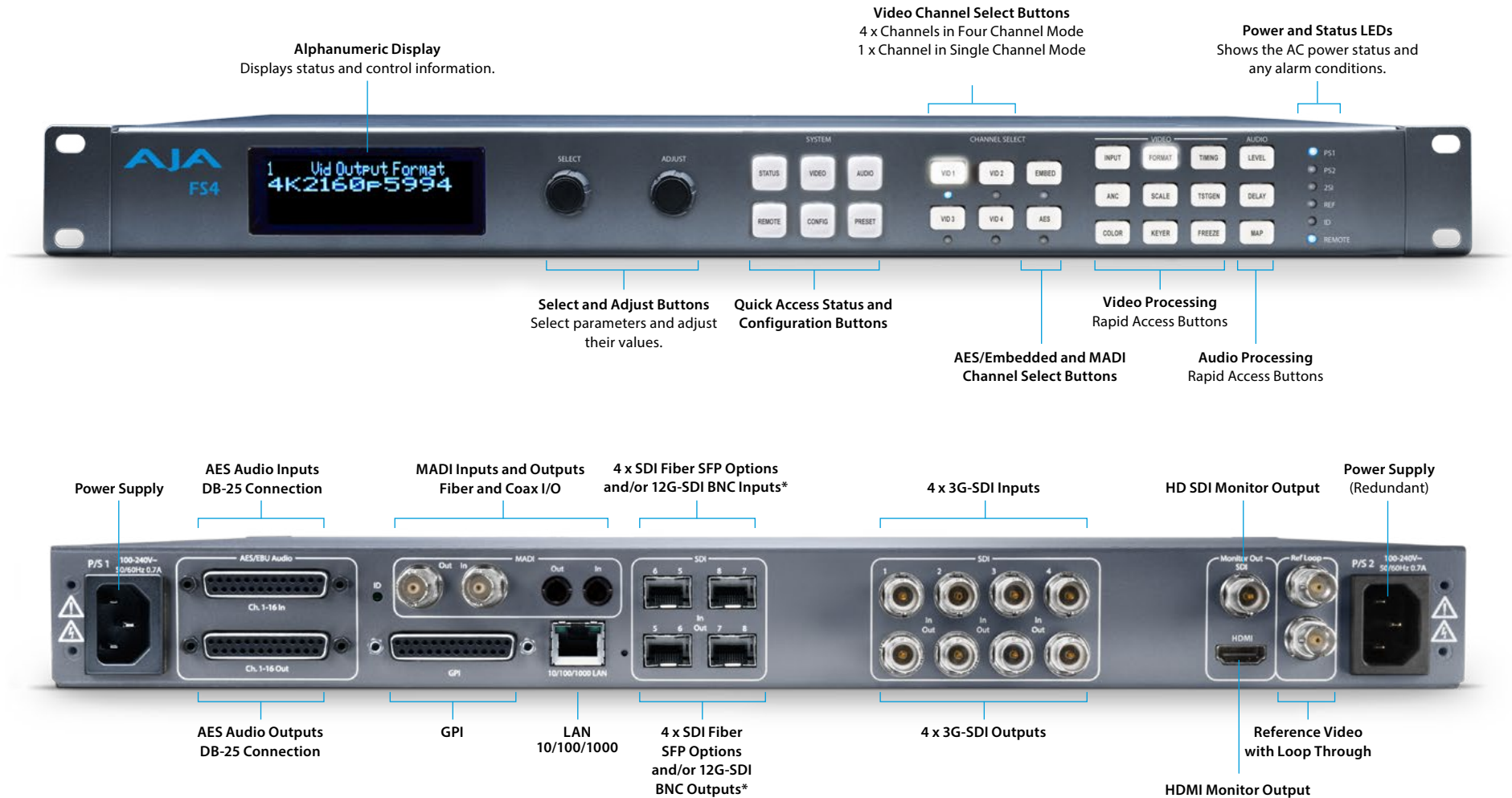
Welcome to four channel mode.

In four channel mode FS4 provides incredibly powerful multi-channel conversion with up to four channels of simultaneous processing for 2K/HD and SD signals. New thinking requires a new layout and FS4's front panel has been redesigned to simplify and speed your access to the product's wealth of features. The panel has also been designed to provide straightforward operation in single channel or four channel mode. In four channel mode, all four VIDx buttons under Channel Select are lit up. In single channel mode, only VID1 is lit and VID2-4 are off.

Multi-channel density in a 1RU chassis. Space, energy and power preserved.

FS4

Connections

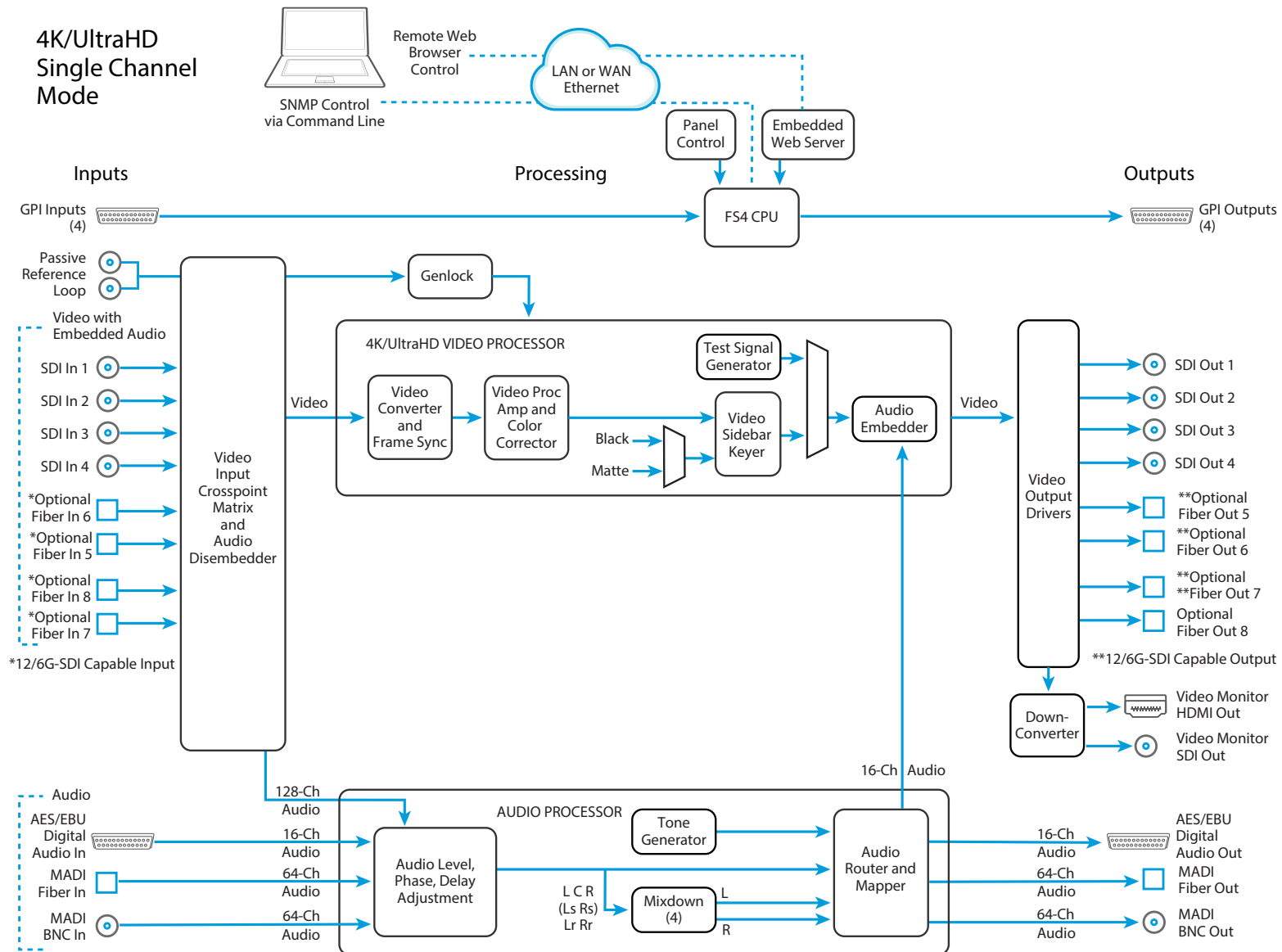


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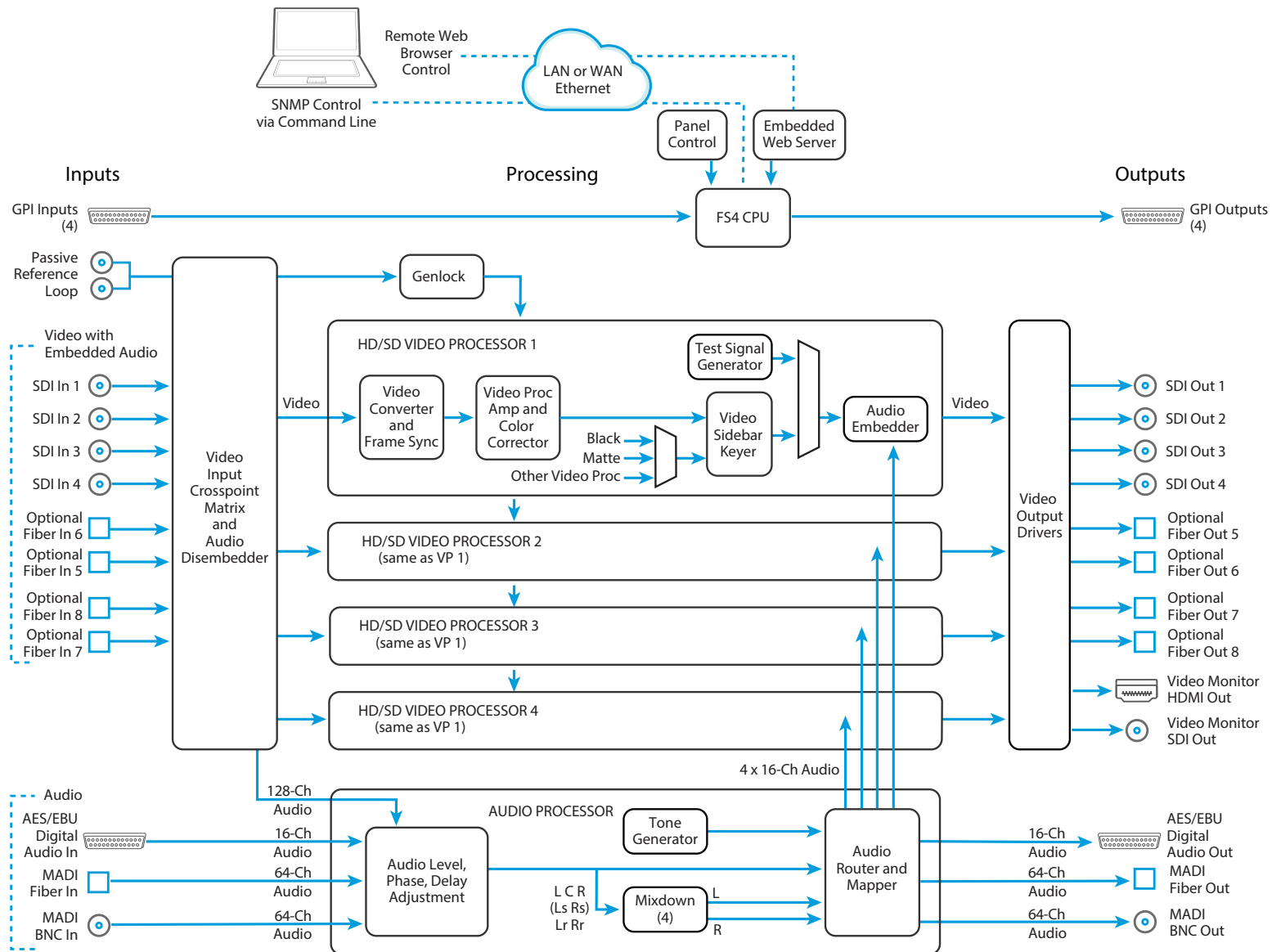
For full product specifications visit www.aja.com/products/FS4/#techspecs

Single Channel Mode



FS4

Four Channel Mode



Tech Specs

Modes of Operation

- Four Independent 2K, HD, or SD Video Processors
- One 4K, UltraHD, 2K, HD, or SD Video Processor

Video Formats

- (4K) 4096 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- (UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- (2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- (HD) 1920 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- (HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 30
- (HD) 1920 x 1080i 50, 59.94, 60
- (HD) 1280 x 720p 50, 59.94, 60
- (SD) 625i 50
- (SD) 525i 59.94
- YCbCr, 4:2:2, 10-bit

Video Input Digital

- 4 x 3G-SDI inputs, 4 x BNC
- 4 x 3G-SDI inputs, 4 x Fiber or HD-BNC (optional SFP modules)
 - SFP fiber modules, 3G-SDI, dual LC, single LC, or single SC, SMPTE-297
 - SFP fiber module, 12G/6G-SDI, dual LC, SMPTE-297
 - SFP coax module, 12G/6G-SDI, dual HD-BNC
- 12G/6G/3G/HD/SD, SMPTE-259/292/424/2081/2082
 - Single Link 12G/6G-SDI (with optional SFP module)
 - Quad Link 3G-SDI Level A or B-DL (4 x 3G), SMPTE-425-5
 - Dual Link 3G-SDI Level B-DS (2 x 3G), SMPTE-425-3
 - Single Link 3G-SDI Level A, B-DL, or B-DS, SMPTE 425
 - Quad Link HD-SDI (4 x 1.5G)
 - Dual Link HD-SDI (2 x 1.5G), SMPTE-372
 - Single Link HD/SD
- Quadrant (Square Division) or 2SI (Two Sample Interleave) 4K/UltraHD input pixel mapping
- 8 x 1 selector feeds video processor(s)

Video Output Digital

- 4 X 3G-SDI outputs, 4 x BNC
- 4 x 3G-SDI outputs, 4 x fiber or HD-BNC (optional SFP modules)
 - SFP fiber modules, 3G-SDI, Dual LC, Dual LC CWDM, Single LC, or Single SC, SMPTE-297
 - SFP fiber module, 12G/6G-SDI, dual LC, SMPTE-297
 - SFP coax module, 12G/6G-SDI, dual HD-BNC
- 12G/6G/3G/HD/SD, SMPTE-259/292/424/2081/2082
 - Single Link 12G/6G-SDI (with optional SFP module)
 - Quad Link 3G-SDI Level A or B-DL (4 x 3G), SMPTE-425-5
 - Dual Link 3G-SDI Level B-DS (2 x 3G), SMPTE-425-3
 - Single Link 3G-SDI Level A, B-DL, or B-DS, SMPTE 425
 - Quad Link HD-SDI (4 x 1.5G)
 - Dual Link HD-SDI (2 x 1.5G), SMPTE-372
 - Single Link HD/SD
- Quadrant (Square Division) or 2SI (Two Sample Interleave) 4K/UltraHD output pixel mapping

Monitor Output Digital

- 1 x BNC, 1 x 3G-SDI output
 - 3G-SDI/HD/SD, SMPTE-259/292/424, 10-bits
- 1 x HDMI, 1 x HD output
 - 2K/HD/SD, HDMI v1.4a
- Monitored Video Processor output (video and audio) is simultaneously output on both connectors
- 4K/UltraHD down-converted to 2K/HD
- Crop control on HDMI output

Video Processing

- Motion adaptive deinterlacer
- Proc amp controls
- Color corrector
- Legalizer
- Frame rate conversion/film cadence removal/insertion (3:2, 1:2, 2:1, 2:3)
- Adjustable delay 0-6 frames with H and V timing controls
- Closed Captioning conversion (CEA-608/CEA-708)
- AFD input detection, down-convert control, and output pass through or overwrite
- Freeze (manual or on input signal loss) to black or last good frame
- Matte generator for background fill
- Video test generator

Format Conversion

- Convert any supported input format to any supported output format, within the same frame rate family. These three families are:
 - 59.94, 29.97, 23.98
 - 50, 25
 - 60, 30, 24

Scaling

- Supported in 2K/HD/SD formats
 - Zoom in and out
 - Reposition
 - Region of Interest (ROI)

Up-Conversion

- Hardware 10-bit
- **Zoom 14:9:** results in a 4:3 image zoomed slightly to fill a 14:9 image with black side bars
- **Zoom Letterbox:** results in image zoomed to fill fullscreen
- **Zoom Wide:** results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting will introduce a small aspect ratio change

Down-Conversion

- Hardware 10-bit
- **Anamorphic:** fullscreen
- **Letterbox:** image is reduced with black top and bottom added to image area with the aspect ratio preserved
- **Crop:** image is cropped to fit video output format

Aspect Ratio Conversion for SD to SD

- **Letterbox:** Transforms SD anamorphic material to a letterboxed image
- **H Crop:** Produces a horizontally stretched effect on the image; transforms anamorphic SD to full frame
- **SD Pillarbox:** Produces an image in the center of the screen with black borders on the left and right sides and an anamorphized image in the center
- **V Crop:** Transforms SD letterbox material to an anamorphic image

Audio Input Digital

- 48 kHz sample rate
- 8 x SDI embedded inputs (16-Channels each)
 - 128-Channels, 24-bit (20-bit SD), SMPTE-272/299
- 8 x balanced AES inputs (16-Channels), 1 x DB-25
 - 16-Channels, 24-bit, AES-3
- 2 x MAD1 inputs (64-Channels each), 1 BNC, 1 x ST Fiber
 - 128-Channels, 24-bit, AES-10

[Click here](#)

For full product specifications visit www.aja.com/products/FS4/#techspecs

(Tech Specs are Continued on Next Page)

FS4

Tech Specs *(Continued)*

Audio Output Digital

- 48 kHz sample rate
- 1 x SDI embedded output per Video Processor (16-Channels each)
 - 16-Channels (in single Video Processor mode), 24-bit (20-bit SD), SMPTE-272/299
 - 64-Channels (in four Video Processor mode), 24-bit (20-bit SD), SMPTE-272/299
- 8 x balanced AES outputs (16-Channels), 1 x DB-25
 - 16-Channels, 24-bit, AES-3
- 2 x MADI outputs (64-Channels each), 1 BNC, 1 x ST Fiber
 - 128-Channels, 24-bit, AES-10

Audio Processing

- 277 x 208 mono audio matrix, route 1 to 1, 1 to many
 - Inputs: 128 embedded, 16 AES, 128 MADI, 2 stereo mixdowns, 3 tone generator
 - Outputs (Four Channel mode): 16 AES, 128 MADI, 64 embedded
 - Outputs (Single Channel mode): 16 AES, 128 MADI, 16 embedded
- Input adjustment controls for each channel
 - Gain +18 to -18 dB in 0.5 dB steps
 - Phase invert
- Input adjustment controls for each channel pair
 - Delay -16ms to +1sec in 20.8 us steps
- Two independent 5.1 or 7.1 to stereo mixdown processors with gain adjust
- High quality Sample Rate Conversion on all audio inputs
- SRC bypass for non-PCM audio (e.g. Dolby E, AC-3, etc)
- Audio tone generator (mute, 400 Hz, 1 kHz)

Reference Input

- External, 2 x BNC
 - Looping, nonterminating
 - Blackburst or tri-level sync

Genlock

- Lock to External Reference
- Lock to SDI input 1 thru 8
- Free run based on Temperature Compensated Crystal Oscillator

Network Interface

- 1 x RJ-45, 10/100/1000 Ethernet
- Embedded web server for remote control
- SNMP

User Interface

- Display
- Keypad with status LEDs
- Two rotary/push knobs
- Comprehensive alarm indicators

Presets

- Each mode supports 40 Presets

GPI

- 1 x 25-pin D-Connector
 - Four optically isolated GPI inputs
 - Four optically isolated GPO outputs

Size (w x d x h)

- 17.5" x 16" x 1.75" (1RU)
(444.5mm x 406.5mm x 44.45mm)

Weight

- 7.9 lb (3.6 kg)

Power

- 100-240 VAC 50/60 Hz (Dual, redundant power supplies), 55W typical; 70W max.

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

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FS3



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The FS3 is AJA's first FS product with a 4K/UltraHD up-converter. Within its compact 1RU chassis, FS3 integrates an array of video and audio processing designed to solve tough signal conversion challenges.

Perfect for Transitioning to 4K

HD/SD Frame Sync and Converter with 4K/UltraHD Up-Conversion

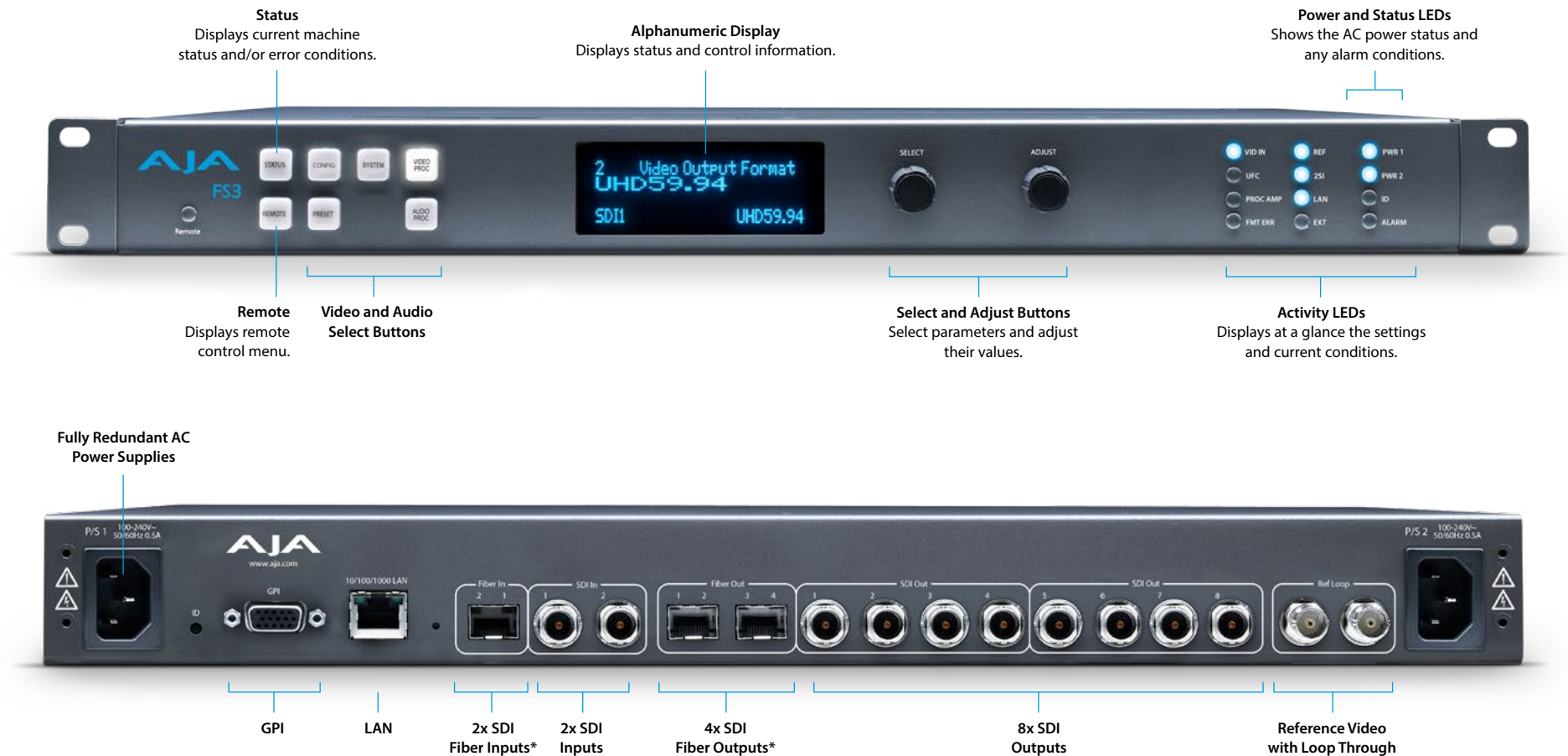
Moving to 4K is never an instant change. Legacy signals and archival material need to be integrated into the 4K environment. FS3 is a HD/SD frame synchronizer combined with high quality 4K/UltraHD up-conversion technology. Seamlessly integrate HD and SD signals into 4K/UltraHD workflows or operate as a standard 3G-SDI, HD and SD up, down, cross synchronizer. AJA's adaptive scaling algorithms, paired with our well-known conversion technology ensures your up-converted images will have the maximum quality possible. Input HD or SD resolution via BNC or fiber and send HD, SD or up-converted 4K/UltraHD to multiple BNC and fiber outputs simultaneously. Utilizing AJA's remarkable conversion algorithms, FS3 supports up-conversion to 4K or UltraHD video carried on quad 3G-SDI BNCs, dual 3G-SDI BNCs, or optional fiber LC SFP outputs. Both Quadrant (Square Division) and 2SI (Two Sample Interleave) output formats are supported.

FS3 syncs to analog, HD tri-level sync, SD Blackburst or to the incoming SDI signal. FS3 also provides integer frame rate conversion (3:2, 1:2, 2:1). Included are all the industry proven features provided in AJA frame synchronizers, such as full Video Proc Amp and RGB color correction, region of interest scaling, extensive audio controls and routing, web UI control, GPI triggers and more.

The growth of 5.1 and 7.1 audio has further increased the number of audio channels that must be managed in a production. FS3 accepts embedded SDI audio on all four SDI inputs (two coax and two optional fiber), and has an internal 64 x 64 audio matrix that allows routing of all embedded audio channels. Besides audio level, phase, and delay controls, FS3 also provides for 5.1 and 7.1 mixdown to stereo.

FS3

Connections

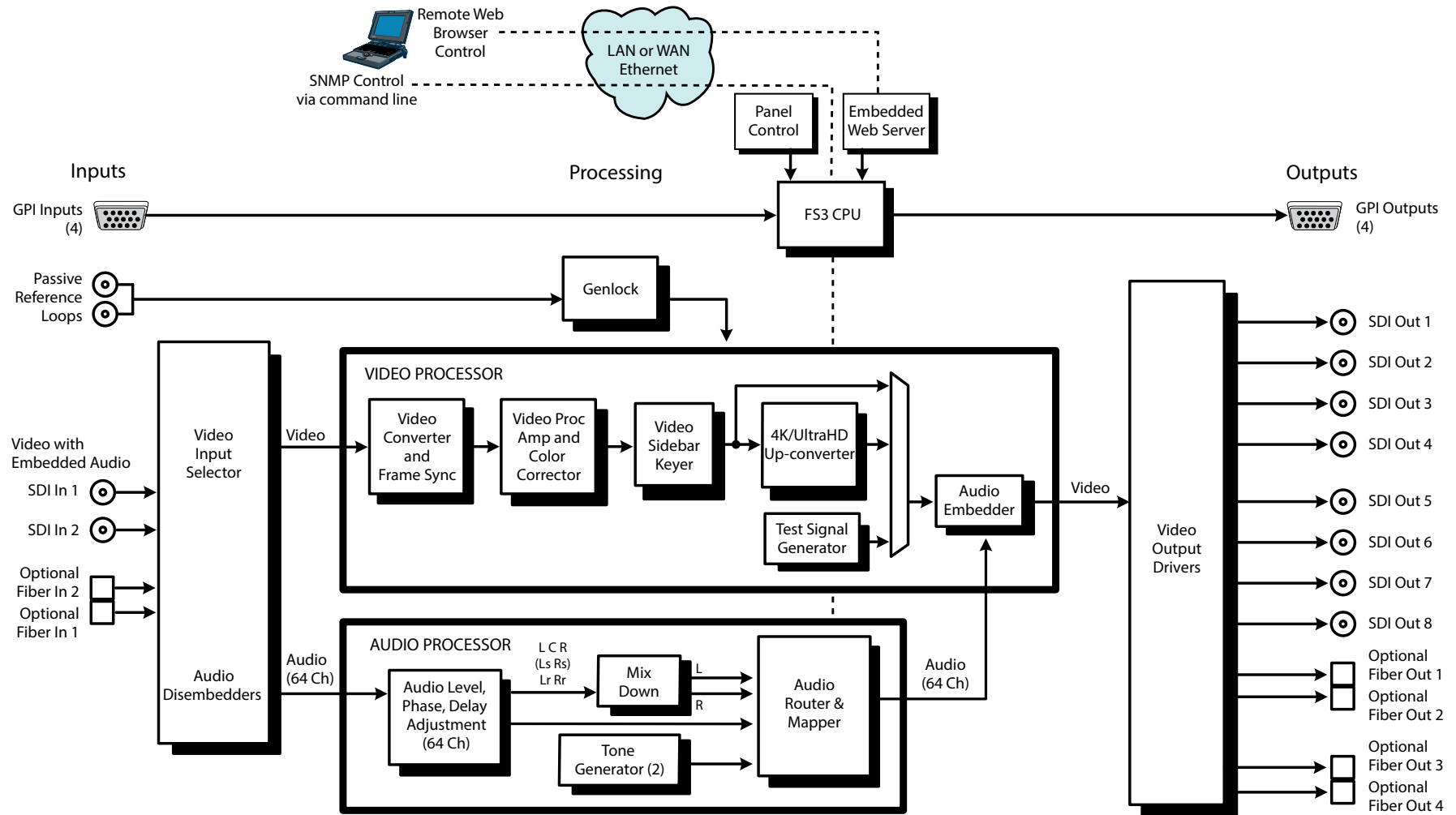


**Optional*

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For full product specifications visit www.aja.com/products/FS3/#techspecs

Architecture



Tech Specs

Video Input Digital

- Four 3G-SDI inputs, 2 BNC and up to 2 fiber (optional)
- 4x1 selector feeds video processor
- 3G-SDI/HD/SD, SMPTE-259/292/424, 8 or 10-bits
 - 3G-SDI Level A, Level B-DL, or Level B-DS
 - Dual Link HD-SDI (2x1.5G), SMPTE -372
 - Single Link 3G-SDI/HD/SD
- Fiber SDI, SMPTE-297, 8 or 10-bits (optional)
 - Dual Channel LC connector modules
 - Single Channel LC connector modules
 - Single Channel SC connector modules
- Formats and frame rates
 - (2K) 2048 x 1080p 23.98, 24, 25, 29.97, 50, 59.94
 - (HD) 1920 x 1080p 23.98, 24, 25, 29.97, 50, 59.94
 - (HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 50, 59.94
 - (HD) 1920 x 1080i 50, 59.94
 - (HD) 1280 x 720p 50, 59.94
 - (SD) 625i 50
 - (SD) 525i 59.94
 - YCbCr, 4:2:2, 10-bit

Video Output Digital

- Twelve 3G-SDI outputs, 8 BNC and up to 4 fiber (optional)
- Video processor feeds all outputs
- 3G-SDI/HD/SD, SMPTE-259/292/424, 8 or 10-bits
 - Quadrant (Square Division) or 2SI (Two Sample Interleave) 4K/UltraHD pixel mapping
 - 3G-SDI Level A, Level B-DL, or Level B-DS
 - Quad 3G-SDI for 4K/UltraHD p50/59.94 (3 copies on Quad SDI)
 - Dual 3G-SDI for 4K/UltraHD p23.98/24/25/29.97 (6 copies on Dual SDI)
 - Single Link 3G-SDI/HD/SD (12 copies on single SDI)
- Fiber SDI, SMPTE-297, 8 or 10-bits (optional)
 - Dual Channel LC connector modules
 - Single Channel LC connector modules
 - Single Channel SC connector modules
- Formats and frame rates:
 - (4K) 4096 x 2160p 23.98, 24, 25, 29.97, 50, 59.94
 - (UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 50, 59.94
 - (2K) 2048 x 1080p 23.98, 24, 25, 29.97, 50, 59.94
 - (HD) 1920 x 1080p 23.98, 24, 25, 29.97, 50, 59.94
 - (HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 50, 59.94
 - (HD) 1920 x 1080i 50, 59.94
 - (HD) 1280 x 720p 50, 59.94
 - (SD) 625i 50
 - (SD) 525i 59.94
 - YCbCr, 4:2:2, 10-bit

Audio Input Digital

- 64-Channels via four 16-Channel audio disembedders (1 disembedder per SDI input)
- 3G-SDI/HD/SD, SMPTE-272/299
- 20-bit SD, 24-bit 3G/HD, 48 kHz sample rate
- Drop/repeat sample rate conversion to match output reference

Audio Output Digital

- 64-Channels via four 16-Channel audio embedders
- 3G-SDI/HD/SD, SMPTE-272/299
- 20-bit SD, 24-bit 3G/HD, 48 kHz sample rate
- 64 x 64 mono audio matrix

Video Processing

- Proc amp controls
- Color corrector
- Legalizer
- Frame rate conversion (3:2, 1:2, 2:1)
- Delay 0-6 frames with H and V controls
- Closed Captioning conversion (CEA-608/CEA-708)
- AFD input detection, down-convert control, and output pass through or overwrite
- Freeze (manual or on input signal loss) to black or last good frame
- Matte generator for background fill
- Video test generator
- Nominal video delay
 - 4K/UltraHD, 3 frames (LFR), 6 frames (HFR)
 - HD/SD, 2 frames (LFR), 4 frames (HFR)

Format Conversion

Convert any supported input HD/SD format to any supported 4K/UltraHD/HD/SD output format, as long as the input and output frame rates are of the same frame rate family. These three families are:

- 59.94, 29.97, 23.98
- 50, 25
- 24

Scaling

- Zoom in and out
- Reposition
- Region of Interest

Up-Conversion

- SD/HD/2K to UltraHD/4K
- SD to 2K/HD
- Hardware 10-bit
- **Zoom 14:9:** results in a 4:3 image zoomed slightly to fill a 14:9 image with black side bars
- **Zoom Letterbox:** results in image zoomed to fill full screen
- **Zoom Wide:** results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting will introduce a small aspect ratio change

Down-Conversion

- HD/2K to SD
- Hardware 10-bit
- **Anamorphic:** fullscreen
- **Letterbox:** image is reduced with black top and bottom added to image area with the aspect ratio preserved
- **Crop:** image is cropped to fit new screen size

Aspect Ratio Conversion

- **Letterbox:** This transforms SD anamorphic material to a letterboxed image
- **H Crop:** Will produce a horizontally stretched effect on the image; transforms anamorphic SD to full frame
- **SD Pillarbox:** Will produce an image in the center of the screen with black borders on the left and right sides and an anamorphized image in the center
- **V Crop:** Will transform SD letterbox material to an anamorphic image

Audio Processing

- 64 x 64 mono audio matrix, route 1 to 1, 1 to many
- Independent controls for each channel
 - Gain +18 to -18 dB in 0.5 dB steps
 - Delay -16ms to 256 ms in 20.8 us steps
 - Phase invert
- 5.1 or 7.1 to stereo mixdown with gain adjust
- Audio test generator

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For full product specifications visit www.aja.com/products/FS3/#techspecs

(Tech Specs are Continued on Next Page)

Tech Specs *(Continued)*

Timecode

- SDI RP188 via SDI BNC

Reference Input

- Blackburst or tri-level sync
- Looping, nonterminating

Network Interface

- 10/100/1000 Ethernet (RJ-45)
- Embedded web server for remote control

Machine Control

- GPI in/out, 15-pin D-connector
- RS-422, Sony 9-pin protocol (reserved for future use)
 - Pinout is as follows:

1	GND	9	GPI OUT 2
2	GPI IN 1	10	GPI I/O GND 3
3	GPI IN 2	11	GPI I/O GND 4
4	GPI IN 3	12	GPI OUT 3
5	GPI I/O GND 1	13	GPI OUT 4
6	GPI I/O GND 2	14	NC
7	GPI IN 4	15	GND
8	GPI OUT 1		

Size (w x d x h)

- 17.5" x 16" x 1.75" 1RU (444.5mm x 406.5mm x 44.45mm)

Weight

- 7.9 lb (3.6 kg)

Power

- 100-240 VAC 50/60 Hz (Dual, redundant power supplies), 55W typical; 80W max.

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

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FS2



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With Dual Channel conversion and frame synchronizing in a slim 1RU space, FS2 can do the work of two separate devices or combine both processors together for maximum flexibility.

A World of Conversion Possibilities

Double your conversion capacity and still have room to spare.

Offering huge flexibility and the power to adapt to meet the needs of rapidly changing environments, FS2 offers unprecedented conversion and frame synchronization power in a 1RU space.

Capable of simultaneously working with two independent streams of 3G/HD/SD 10-bit broadcast quality video and two independent groups of multi-channel analog or digital audio, each FS2 video channel supports virtually any input or output: analog component or composite, 3G-SDI, Dual Link (1.485 Gb), fiber and HDMI I/O. A fiber I/O option allows fiber cable runs of up to 10 kilometers to be connected directly to the FS2 without the need for separate fiber to SDI conversion. Each video processing channel can be individually cropped and resized using AJA's image scaling technology for the best possible quality when incorporating nonstandard image sizes.

FS2 can be used as two separate frame synchronizers/format converters, or the two channels can be linked with the internal FS2 keyer to do the work of three or more devices - for example HD sidebar keying where both the video and background graphics are up-converted and combined.

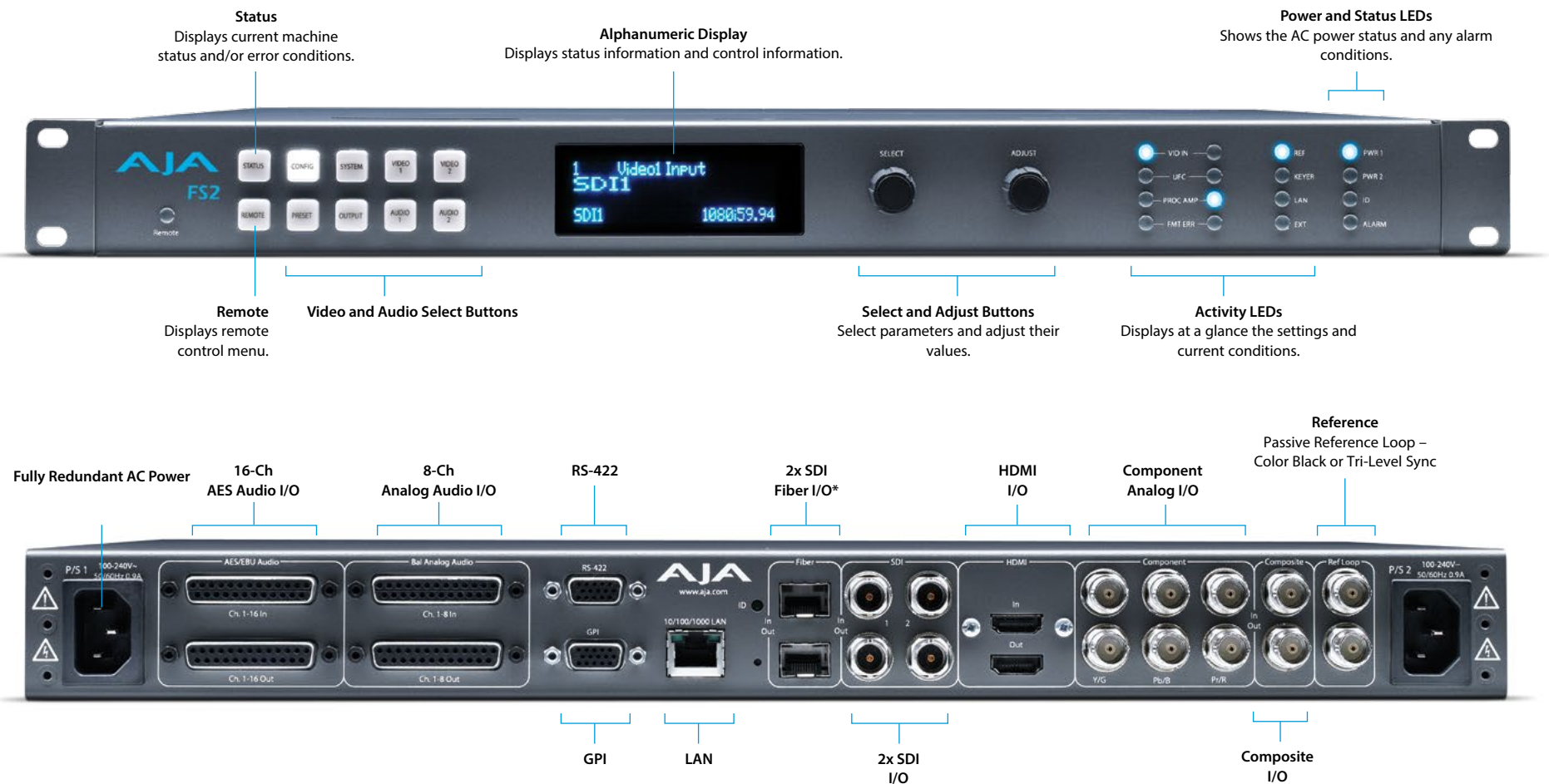
FS2 can up or down-convert between 3G HD, SD and HD (1080p50/60), and cross-convert between HD formats including 3G HD. Additionally, FS2 has full input and output signal routing, allowing any I/O port to be assigned to either processing channel.

For audio, FS2 has two audio processors, each supporting 16-Channel AES/EBU digital audio, 16-Channel embedded audio, and 8-Channel balanced analog audio with a variety of controls for maximum flexibility. The output of each processor can be embedded in its respective video processor output (SDI, fiber, or HDMI), or sent to the AES or balanced outputs. For 3G and Dual Link inputs, the audio processors can have access to all 32 channels.

FS2 supports Closed Captioning and the conversion of Closed Captioning between HD and SD formats - including full conversion between CEA-608 and CEA-708 caption standards.

FS2

Connections

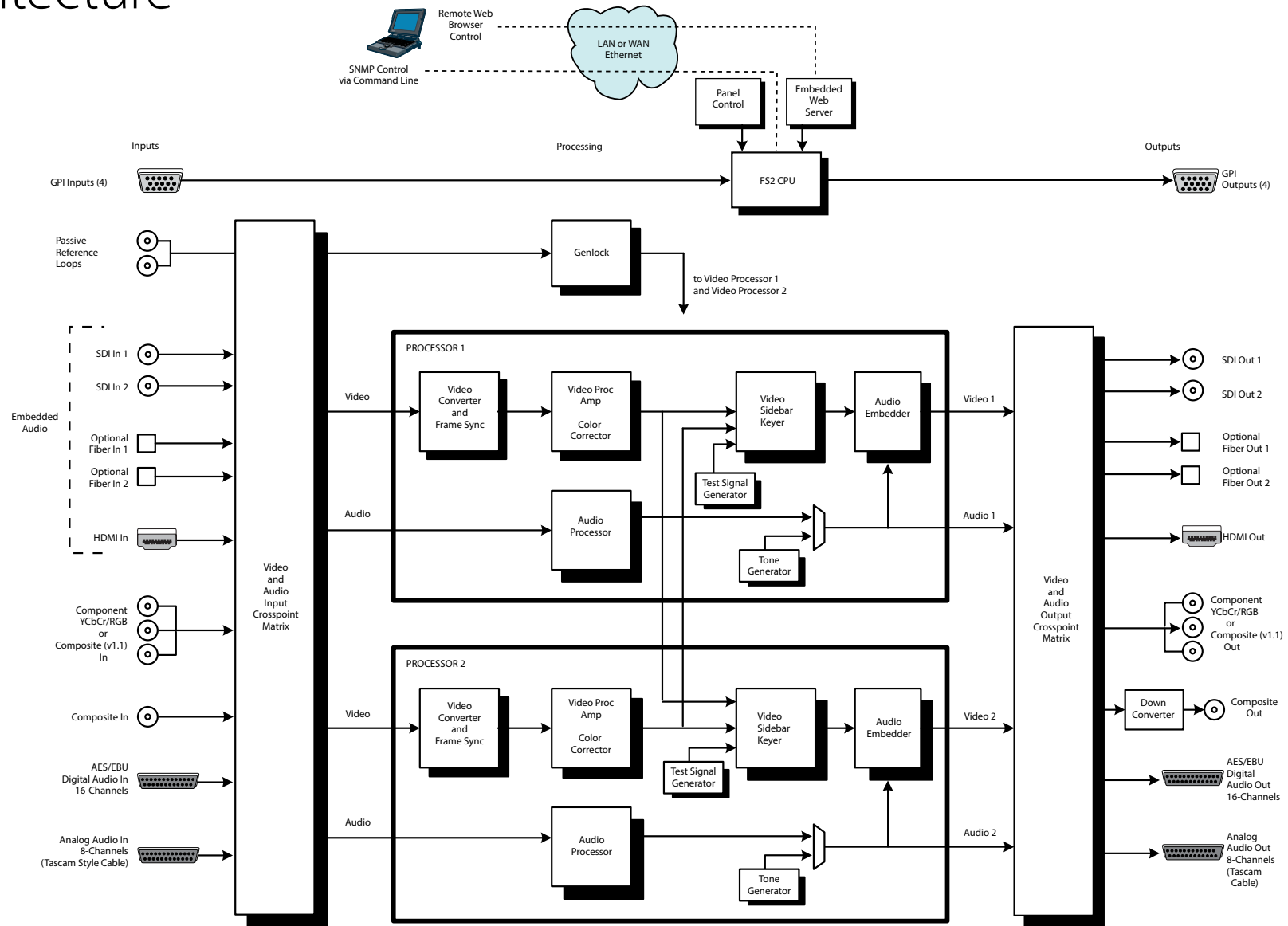


*Optional

[Click here](http://www.aja.com/products/fs2/#techspecs)

For the most recent product specifications visit www.aja.com/products/fs2/#techspecs

Architecture



Tech Specs

Video Formats

- (2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- (HD) 1920 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- (HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 30
- (HD) 1920 x 1080i 25, 29.97, 30
- (HD) 1280 x 720p 50, 59.94, 60
- (SD) 625i 25
- (SD) 525i 29.97

Input	Possible Outputs		
525i59.94	525i59.94	720p59.94	1080i59.94
720p59.94	25i59.94	720p59.94	1080i59.94
1080i59.94	525i59.94	720p59.94	1080i59.94
1080pSF23.98	1080pSF23.98	1080i59.94	525i59.94
625i50	625i50	1080i50	720p50
720p50	625i50	1080i50	720p50
1080i50	625i50	1080i50	720p50
1080pSF24	1080pSF24	1080i60	
1080i60	1080i60	720p60	
720p60	720p60	1080i60	

Notes:

*In the case of 1080PsF 23.98 input - and when 1080i 59.94 (or 525i) is selected as an output format, the FS2 automatically does 3:2 pulldown to get the correct frame rate. Similarly, in the case of 1080pSF/24 input, FS2 automatically does 3:2 pulldown to get the correct frame rate.

** When passing 24 or 60 frame rate video, output is high definition.

Video Input Digital

- Dual 3G-SDI, SMPTE-259/292/424, 8 or 10-bits
- Dual Fiber 3G-SDI, SMPTE-297, 8 or 10-bits (optional)
- Dual Channel LC connector module
- Single Channel LC connector module
- Single Channel SC connector module
- Single Link 4:2:2 (1 x BNC each)
- HDMI v1.3 30 bits/pixel, RGB or YUV, 2.25 Gbps, SD, HD, 1080p 50/6060

Video Input Analog

- HD component YPbPr, SMPTE-274 (3 x BNC)
- 12-bit A/D, 2 x oversampling
- SD Component (3 x BNC)
- SMPTE/EBU N10, Betacam 525 line, Betacam 525J
- 12-bit A/D, 4 x oversampling
- +/- .25 dB to 5.5 MHz Y frequency response
- +/- .25 dB to 2.5 MHz C frequency response
- .5% 2T pulse response
- <2 ns Y/C delay inequity
- SD Composite
- 12-bit A/D, 4 x oversampling

Video Output Digital

- Dual SD/HD/3G SDI, SMPTE-259/292/424, 8 or 10-bits
- Dual Fiber 3G-SDI, SMPTE-297, 8 or 10-bits (optional)
- Dual Channel LC connector modules
- Single Channel LC connector module
- Single Channel SC connector module
- Single Link 4:2:2 (1 x BNC each)
- HDMI v1.3 30 bits/pixel, RGB or YUV, 2.25 Gbps, SD, HD, 1080p 50/60

Video Output Analog

- HD component YPbPr, SMPTE-274 (3 x BNC)
- 12-bit D/A, 2 x oversampling
- SD Component (3 x BNC)
- SMPTE/EBU N10, Betacam 525 line, Betacam 525J
- 12-bit D/A, 4 x oversampling
- +/- .25 dB to 5.5 MHz Y frequency response
- +/- .25 dB to 2.5 MHz C frequency response
- .5% 2T pulse response
- <2 ns Y/C delay inequity
- SD Composite
- 12-bit D/A, 4 x oversampling

Audio Input Digital

- 16-Channel, 24-bit SMPTE-272/299 SDI embedded audio, 48 kHz sample rate, synchronous
- 16-Channel, 24-bit AES/EBU audio, 48 kHz sample rate, synchronous or nonsynchronous, internal sample rate conversion (8 x XLR via 25-pin breakout cable)

Audio Input Analog

- 8-Channel, 24-bit A/D analog audio, 48 kHz sample rate, balanced (8 x XLR via 25-pin breakout cable)
- +12dBu, +15dBu, +18dBu, +24dBu (Full Scale Digital)
- +/- 0.2db 20 to 20 kHz frequency response

Audio Output Digital

- 16-Channel, 24-bit SMPTE-272/299 SDI embedded audio, 48 kHz sample rate, synchronous
- 16-Channel, 24-bit AES/EBU audio, 48 kHz sample rate, synchronous or nonsynchronous, internal sample rate conversion (8 x XLR via 25-pin breakout cable)

Audio Output Analog

- 8-Channel, 24-bit A/D analog audio, 48 kHz sample rate, balanced (8 x XLR via 25-pin breakout cable)
- +12dBu, +15dBu, +18dBu, +24dBu (Full Scale Digital)
- +/- 0.2db 20 to 20 kHz frequency response

Up-Conversion

- **Hardware:** 10-bit
- **Anamorphic:** fullscreen
- **Pillarbox 4:3:** results in a 4:3 image in center of screen with black sidebars
- **Zoom 14:9:** results in a 4:3 image zoomed slightly to fill a 14:9 image with black side bars
- **Zoom Letterbox:** results in image zoomed to fill full screen
- **Zoom Wide:** results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting can introduce a small aspect ratio change

Down-Conversion

- **Hardware:** 10-bit
- **Anamorphic:** fullscreen
- **Letterbox:** image is reduced with black top and bottom added to image area with the aspect ratio preserved
- **Crop:** image is cropped to fit new screen size

Cross-Conversion

- Hardware 10-bit
- 1080i to 720p
- 720p to 1080i
- 720p to 1080PsF

SD to SD Aspect Ratio Conversion

- **Letterbox:** This transforms SD anamorphic material to a letterboxed image
- **H Crop:** Will produce a horizontally stretched effect on the image; transforms anamorphic SD to full frame
- **SD Pillarbox:** Will produce an image in the center of the screen with black borders on the left and right sides and an anamorphized image in the center
- **V Crop:** Will transform SD letterbox material to an anamorphic image

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(Tech Specs are Continued on Next Page)

Tech Specs *(Continued)*

Timecode

- SDI RP188 via SDI BNC
- Reference input
- Analog Color Black (1V) or Composite Sync (2 or 4V)
- Looping, nonterminating

Reference Input

- External, 2 x BNC
- Looping, nonterminating
- Blackburst or tri-level sync

Network Interface

- 10/100 Ethernet (RJ-45)
- Embedded web server for remote control
- VTECS™ protocol for Remote Control Panel

User Interface

- Alphanumeric display, with dedicated buttons/knobs

Machine Control

- GPI in/out, 15-pin D-connector
 - Pinout is as follows:

1	GND	9	GPI OUT 2
2	GPI IN 1	10	GPI I/O GND 3
3	GPI IN 2	11	GPI I/O GND 4
4	GPI IN 3	12	GPI OUT 3
5	GPI I/O GND 1	13	GPI OUT 4
6	GPI I/O GND 2	14	NC
7	GPI IN 4	15	GND
8	GPI OUT 1		

Size (w x d x h)

- 17.25" x 14.5" x 1.75" 1RU (438.1mm x 368.3mm x 44.4mm)

Weight

- 7.9 lb (3.6 kg)

Power

- 100-240 VAC 50/60 Hz, (Dual, redundant power supplies), 55W typical; 80W max.

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

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FS1-X



\$3,495 US MSRP*

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FS1-X with the optional Frame Rate Converter allows unprecedented conversion quality between disparate formats. The addition of 64-Channel MADI audio I/O integrates FS1-X into the most modern workflows while preserving valuable rack space.

Problem Solved

Universal Frame Sync and Conversion

Matching up and synchronizing disparate video and audio formats is a critical part of any broadcast, mobile or postproduction environment. Within its compact 1RU chassis, FS1-X integrates an amazing array of video and audio connectivity and processing. Featuring a flexible architecture, FS1-X simultaneously works with 3G-SDI 10-bit broadcast quality video and incorporates embedded audio, AES, MADI, and analog audio.

Utilizing AJA's remarkable conversion algorithms, FS1-X supports up, down and cross-conversion between SD and HD signals for the highest quality output possible. Additionally, the factory installed motion adaptive Frame Rate Converter (FRC) option enables high quality conversions between different frame rate families for virtually unlimited international standards support.

The growth of 5.1 and 7.1 audio has increased the number of audio channels that must be managed in a production. The MADI standard provides a convenient way to transport huge numbers of audio channels along a single cable, simplifying the cabling demands for broadcasters, mobile trucks and production. FS1-X supports both fiber and coax

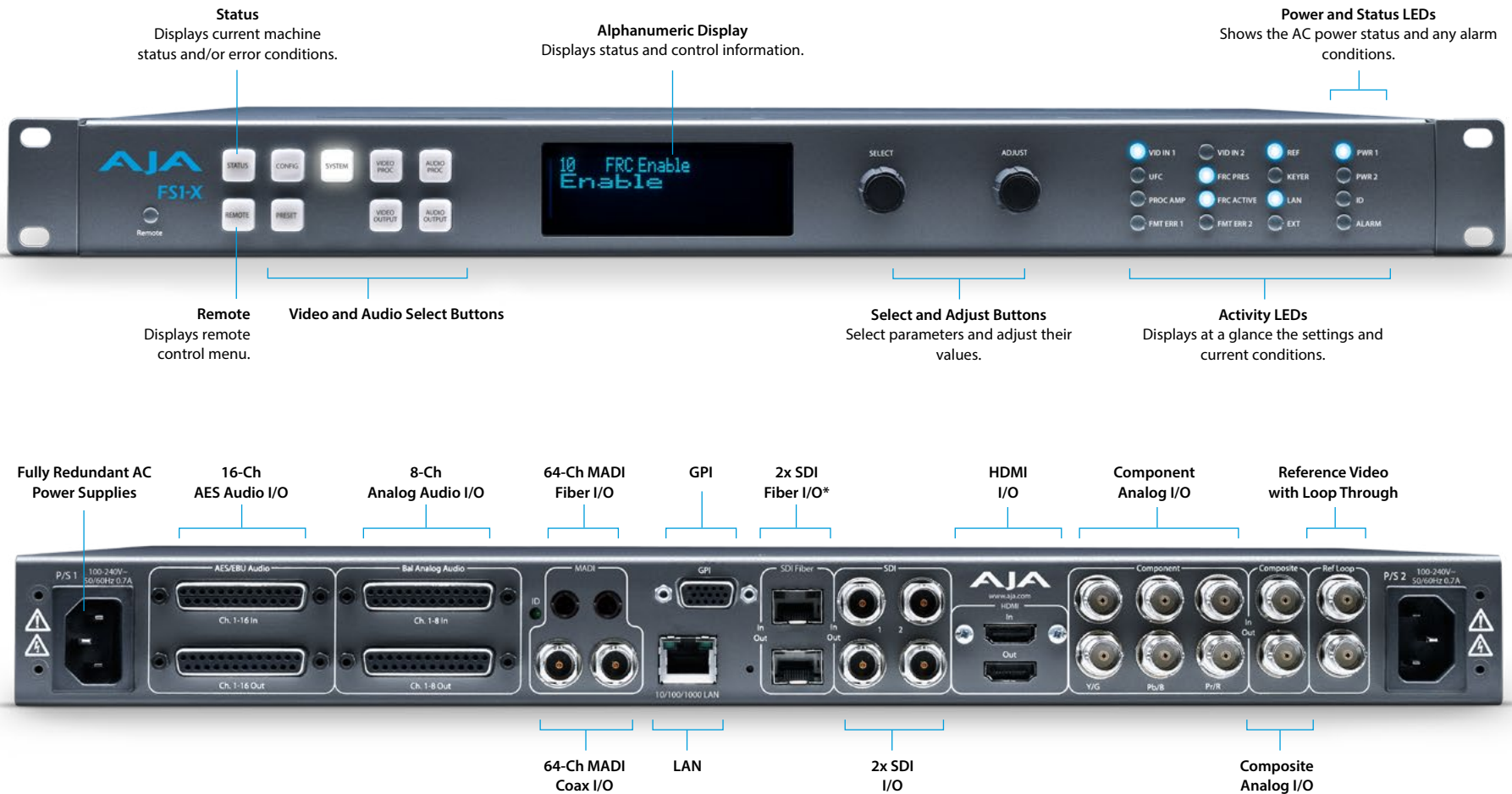
64-Channel MADI input and output. An internal 224 x 224 audio matrix allows full routing of MADI and all audio coming from SDI, fiber, AES and analog sources for an incredible amount of audio processing capability in a single box.

FS1-X features a unique keyer configuration, allowing incoming signals to be combined in powerful ways. A common example is sidebar keying, where incoming video is converted from SD to HD but rather than stretching the 4:3 aspect ratio to fit in a 16:9 frame, a second signal is used to fill the sides of the 16:9 frame. This allows channel identification or other imagery to be placed in that area rather than having black bars on either side. The robust AFD features of FS1-X ensure that the aspect ratio of the outgoing signal is properly identified for downstream devices.

FS1-X supports Closed Captioning and the conversion of Closed Captioning between SD and HD formats - including full conversion between CEA-608 and CEA-708 caption standards.

FS1-X

Connections



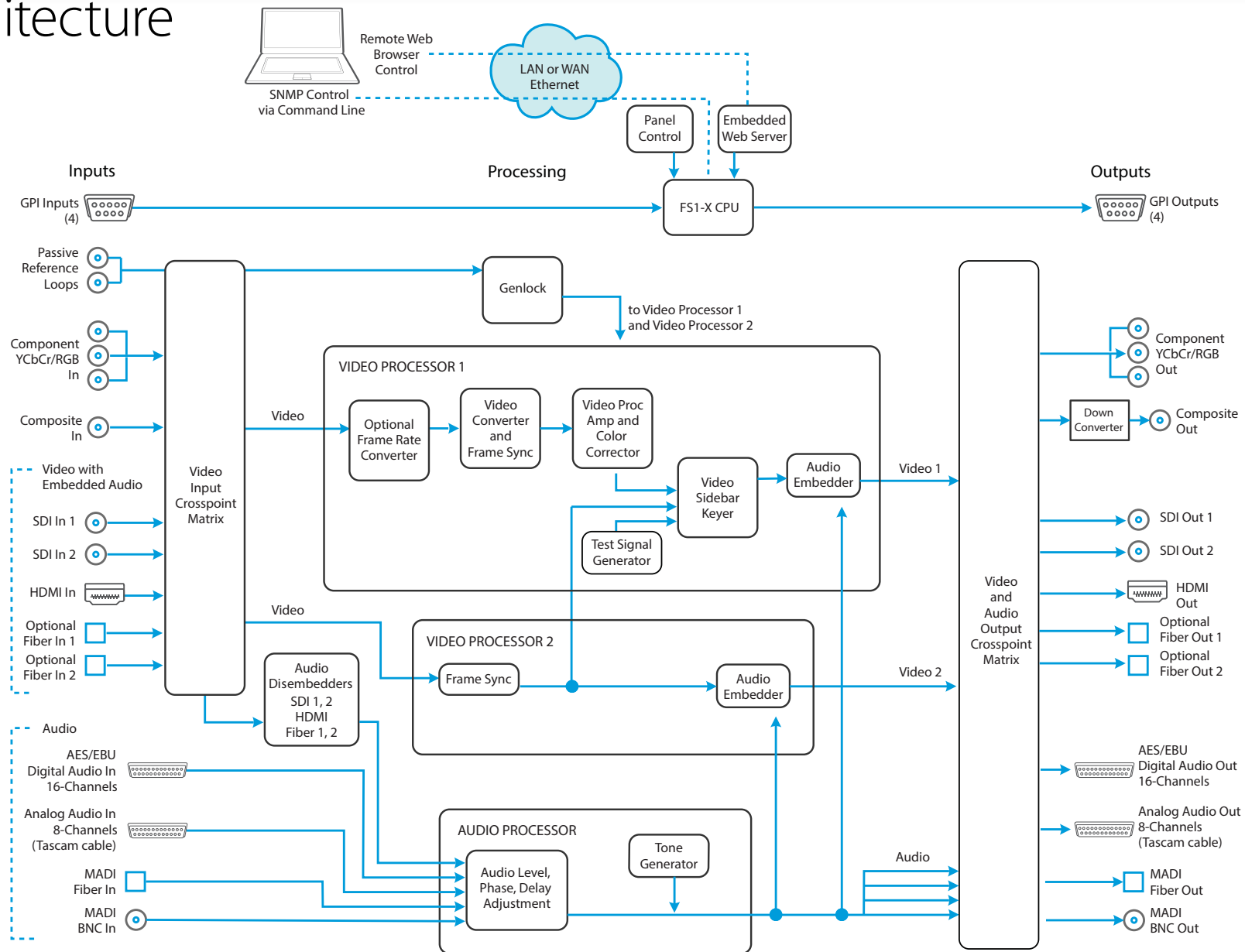
**Optional*

[Click here](http://www.aja.com/products/fs1-x/#techspecs)

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FS1-X

Architecture



FS1-X

Tech Specs

Video Input/Output Formats

The FS1-X supports a wide variety of video formats and connectors, as listed below.

SDI and Fiber

- The FS1-X has two standard SDI video inputs and outputs, and two optional Fiber video inputs and outputs.
- All SDI video inputs and outputs, including Fiber, are YCbCr 4:2:2 pixel format.
- Fiber connections support 3G-SDI, SMPTE-259/292/296, 8- or 10-bits (optional)
 - Single-channel LC connector modules
 - Single-channel SC connector modules
 - Dual-channel LC connector modules
- 2.97 Gb 3G-SDI Level B (SMPTE 425-B / SMPTE 372)
 - 2K 1080p 50
 - 1080p 50 (SMPTE 274)
- 3G-SDI Level B 2.967 (2.97/1.001) Gb (SMPTE 425-B / SMPTE 372)
 - 2K 1080p 59.94
 - 1080p 59.94 (SMPTE 274)
- 3G-SDI Level A 2.97 Gb (SMPTE 425-A)
 - 2K 1080p 50
 - 1080p 50 (SMPTE 274)
- 3G-SDI Level A 2.967 (2.97/1.001) Gb (SMPTE 425-A)
 - 2K 1080p 59.94
 - 1080p 59.94 (SMPTE 274)
- Dual-link HD-SDI, 2x 1.485Gb (SMPTE 372)
 - 2K 1080p 50
 - 1080p 50
- Dual-link HD-SDI, 2x 1.4835Gb (SMPTE 372)
 - 2K 1080p 59.94
 - 1080p 59.94
- HD-SDI, 1.4835 Gb (SMPTE 292)
 - 2K 1080p 23.98, 29.97
 - 1080p 23.98, 29.97
 - 1080PsF 23.98, 29.97
 - 1080i 59.94
 - 720p 59.94
- SD-SDI, 270Mb (SMPTE 259-C)
 - 625i 50
 - 525i 59.94

HDMI

The HDMI input only accepts SMPTE video formats, and accepts embedded audio. Video input formats are RGB or YCbCr 4:2:2 pixel format for consumer video scan formats. Computer scan rates are not supported.

- 1080p 23.98, 24, 25, 29.97, 50, 59.94
- 1080i 50, 59.94
- 720p 50, 59.94
- 625p 50
- 625i 50
- 525p 59.94
- 525i 59.94

Component HD/SD Analog

The Component Analog Input accepts YCbCr 4:2:2 pixel format, configurable to SMPTE or Betacam levels. If the composite input is used, the component input is not available.

- 1080p 23.98, 24, 25, 29.97
- 1080PsF 23.98, 24, 25, 29.97
- 1080i 59.94
- 720p 50, 59.94
- 625i 50
- 525i 59.94

Composite SD Analog

The FS1-X composite analog video input/output formats are listed below. If the component inputs are used, the composite input is not available.

- 625i 50
- 525i 59.94 (switchable to NTSC 7.5 IRE or 0 IRE setup)

Reference

- 1080p 50 tri-level sync
- 1080i 50, 59.94 tri-level sync
- 720p 50, 59.94 tri-level sync
- 525i 59.94, 625i 50 analog composite
- Genlock available to the current Video Processor 1 Input
- Free run

Formal Exceptions

The following formats are not supported:

- 720p 23.98, 24, 25, 29.97
- All 30, 60 frame rates
- 4:4:4 YCbCr, RGB, or XYZ inputs
- 4:2:2 YCbCr 12-bit inputs

Video Format Alarms

- When incompatible I/O formats are detected, an alarm can be triggered with these results:
- Lights the relevant alarm LED on the front panel (FMT ERROR, 1 or 2)
- Displays an alarm in the browser user interface
- Influences selection of the first-displayed status screen
- Generates an SNMP trap (if configured)
- Triggers a GPI Output (if configured)

Video A/D, D/A Converters

- 12-bits
- 2 x oversampled (HD)
- 4 x oversampled (SD)

Audio Inputs/Outputs

- The FS1-X can accept and route any audio inputs to any audio output.
- 8-Channel balanced analog I/O, DB-25F 25-pin connector (Tascam pinout)
- 16-Channel AES/EBU I/O (BNC), DB-25F 25-pin connector
- 16-Channel SDI/HD-SDI embedded BNC (2)
- 16-Channel SDI/HD-SDI embedded Fiber (2)
- 64-Channel MADI digital audio. BNC
- 64-Channel MADI digital audio. Fiber

Audio Analog Levels

- Analog audio input and output levels, as referenced to full scale digital, can be set to:
- +12dBu (consumer), +15dBu, +18dBu, +24dBu (professional)

Audio Adjustments

- Individual audio channels (or channel pairs) can adjusted for:
- Level: +/- 18 dB
- Phase: Normal or Reverse
- Delay: -128 to +12288 samples (-2.7 ms to +256 ms)

LAN Interfaces

- 10/100/1000 automatic configuration
- Automatic cable crossover (auto MDI-X)
- Embedded web server
- SNMP

GPI Interface

- DB-15F: single connector provides four inputs and four outputs. See Appendix B for a connector pinout and GPI specifications

Size (w x d x h)

- 19" x 16" x 1.75" (1RU) (482.6mm x 405.5mm x 44.4mm)

Weight

- 7.9 lbs (3.6 kg)

Power

- 100-240 VAC 50/60 Hz, (Dual, redundant power supplies), 55W typical, 60W with FRC option; 70W max.

Environment

- Cooled via two internal fans and side vents
- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

Video Format Conversion on Next Page

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FS1-X

Tech Specs *(Continued)*

Video Format Conversion

Standard FS1-X Conversions

The standard FS1-X can convert almost any input format to nearly any output format, as long as the frame rates are of the same frame rate family. The three families are:

- 23.98, 29.97, 59.94
- 25, 50
- 24

NOTE: See "Conversion Exceptions" below

FRC FS1-X Enabled Conversion

When the factory installed Frame Rate Converter (FRC) option is present and active, conversions between different frame rate families are supported. An appropriate genlock reference format will be required.

Supported Conversions, FRC Enabled:

Input Format	Output Format	Genlock Source Formats Supported
525i 59.94	625i 50; 1080i 50	625i 50; 1080i 50
525i 59.94	720p 50; 1080p 25, 50	625i 50; 1080i 50; 720p 50
525i 59.94	1080PsF 25	625i 50; 1080i 50
525i 59.94	2K 1080PsF 25, 50	625i 50; 1080i 50; 720p 50
625i 50	525i 59.94; 1080i 59.94	525i 59.94; 1080i 59.94
625i 50	720p 59.94	525i 59.94; 1080i 59.94; 720p 59.94
625i 50	1080PsF 29.97	525i 59.94; 1080i 59.94
625i 50	1080p 29.97, 59.94; 1080PsF 29.97; 2K 1080p 29.97, 59.94	525i 59.94; 1080i 59.94; 720p 59.94
1080i 50	525i 59.94; 1080i 59.94; 1080PsF 29.97	525i 59.94; 1080i 59.94
1080i 50	720p 59.94; 1080p 29.97, 59.94; 2K 1080p 29.97, 59.94	525i 59.94; 1080i 59.94; 720p 59.94
1080i 59.94	625i 50; 1080i 50; 1080PsF 25	625i 50; 1080i 50
1080i 59.94	720p 50; 1080p 25, 50; 2K 1080p 25, 50	625i 50; 1080i 50; 720p 50
720p 50	1080p 29.97, 59.94; 1080PsF 29.97; 2K 1080p 29.97, 59.94	525i 59.94; 1080i 59.94; 720p 59.94
720p 50	525i 59.94; 1080i 59.94; 1080PsF 29.97	525i 59.94; 1080i 59.94
720p 59.94	625i 50; 1080i 50; 1080PsF 25	625i 50; 1080i 50
720p 59.94	720p 50; 1080p 25, 50; 2K 1080p 25, 50	625i 50; 1080i 50; 720p 50
1080p 50	525i 59.94; 1080i 59.94; 1080PsF 29.97	525i 59.94; 1080i 59.94
1080p 50	1080p 29.97, 59.94; 1080PsF 29.97; 2K 1080p 29.97, 59.94	525i 59.94; 1080i 59.94; 720p 59.94
1080p 59.94	625i 50; 1080i 50; 1080PsF 25	625i 50; 1080i 50
1080p 59.94	720p 50; 1080p 25, 50; 2K 1080p 25, 50	625i 50; 1080i 50; 720p 50
1080PsF 24	625i 50; 1080i 50; 1080PsF 25	625i 50; 1080i 50
1080PsF 24	720p 50; 1080p 25, 50; 2K 1080p 25, 50	625i 50; 1080i 50; 720p 50
1080PsF 24	525i 59.94; 1080i 59.94; 1080PsF 29.97	525i 59.94; 1080i 59.94
1080PsF 24	720p 59.94; 1080p 29.97, 59.94; 2K 1080p 29.97, 59.94	525i 59.94; 1080i 59.94; 720p 59.94
1080PsF 23.98	625i 50; 1080i 50; 1080PsF 25	625i 50; 1080i 50
1080PsF 23.98	720p 50; 1080p 25, 50; 2K 1080p 25, 50	625i 50; 1080i 50; 720p 50
1080PsF 23.98	525i 59.94; 1080i 59.94; 1080PsF 29.97	525i 59.94; 1080i 59.94
1080PsF 23.98	720p 59.94; 1080p 29.97, 59.94; 2K 1080p 29.97, 59.94	525i 59.94; 1080i 59.94; 720p 59.94

Conversion Exceptions

Selecting the following format and frame rate conversions will cause a Video Format alarm.

Non-Supported Conversions

Input Format	Output Format
525i 59.94	1080p 23.98; 1080PsF 23.98
1080i 59.94	1080p 23.98; 1080PsF 23.98
720p 29.97, 59.94	1080p 23.98; 1080PsF 23.98
1080p 29.97; 1080PsF 29.97	1080p 23.98; 1080PsF 23.98
625i 50	1080p 24; 1080PsF 24
1080i 60	1080p 24; 1080PsF 24
720p 30, 60	1080p 24; 1080PsF 24
1080p 30	1080p 24; 1080PsF 24

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Five Year Warranty

AJA Video warrants that FS products will be free from defects in materials and workmanship for a period of five years from the date of purchase.

About AJA Video Systems, Inc.

Since 1993, AJA Video has been a leading manufacturer of video interface and conversion solutions, bringing high quality, cost effective digital video products to the professional, broadcast and postproduction markets.

AJA products are designed and manufactured at our facilities in Grass Valley, California, and sold through an extensive sales channel of resellers and systems integrators around the world. For further information, please see our website at www.aja.com