

# IQUPC32

## 3G/HD/SD-SDI Upconverter with AES I/O

The IQUPC32 provides upconversion and AES embedding and de-embedding for HD/SD-SDI signals.

Using high-quality motion adaptive de-interlacing and flexible scaling technology the IQUPC32 from Grass Valley is a broadcast-quality conversion module able to handle a wide variety of common applications such as upconversion for SD content repurposing on HD channels.

The IQUPC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signaling. Audio handling includes eight user-configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

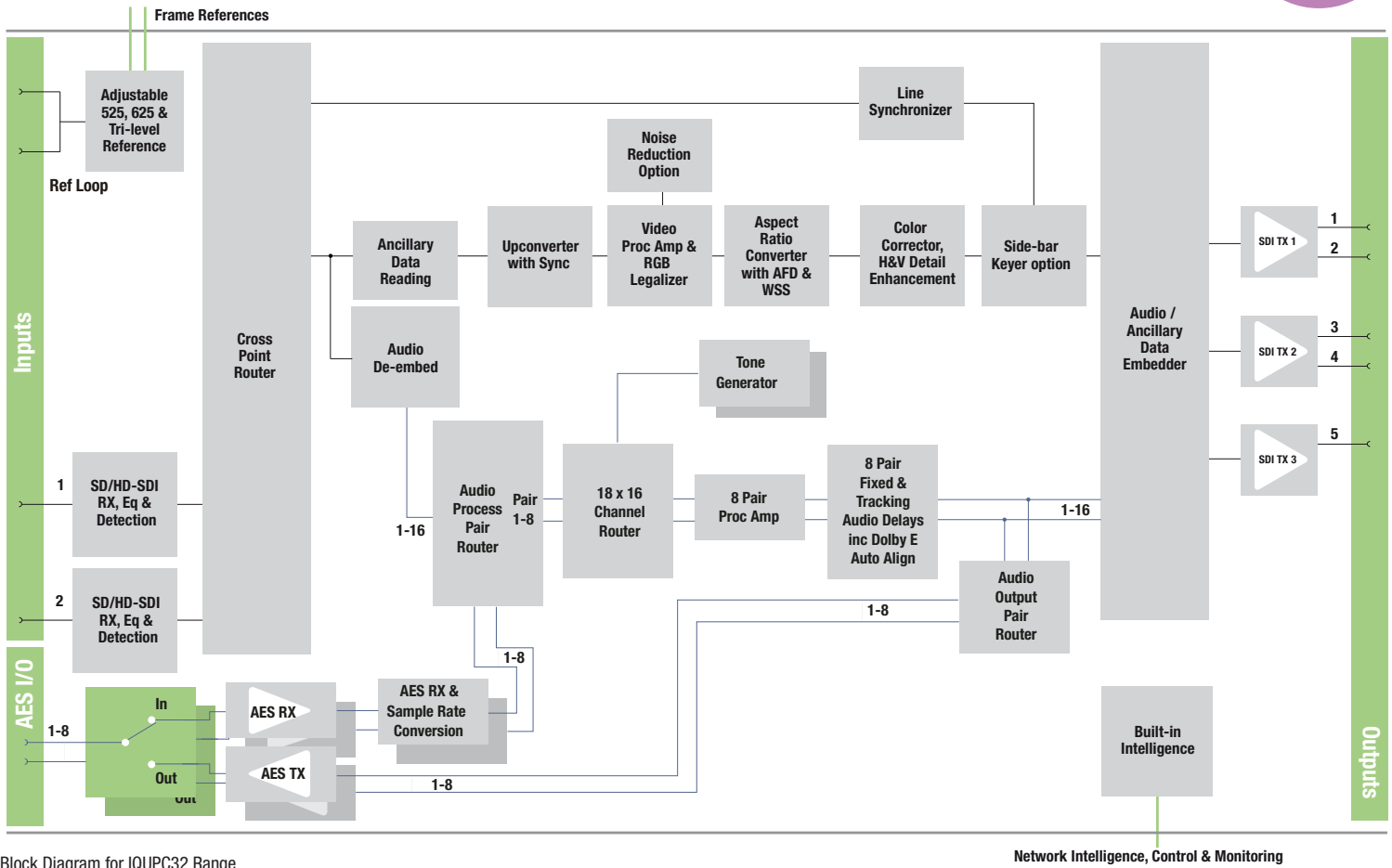
To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion and side-bar keying.

### Why should you choose this module?

- High-quality upconversion and frame synchronization allows multiformat working and provides integration with HD workflows
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with Grass Valley or third-party network management systems, providing an all-inclusive monitoring and control solution

### KEY FEATURES

- High-quality upconversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD tri-sync/SD bi-level reference input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signaling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE ST 2016)
- Video processing features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support — Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE ST 12 timecode translation, and ancillary data bridge for seven blocks of ANC data passing
- Additional processing options including: noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Eight unbalanced AES audio I/O, available to/from any processed internal pair, and audio processing features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support — Detection of PCM/non-PCM audio to SMPTE ST 337/338, pair routing and Dolby E header re-alignment
- Built-in test pattern generator and 19 character scrolling caption generator
- 16x user memories
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss



Block Diagram for IQUPC32 Range

Network Intelligence, Control & Monitoring

**SPECIFICATIONS**

**Inputs & Outputs**

**Video Signal Inputs**

- SDI inputs: 2x
- Input cable length:
  - Up to 80m Belden 1694A @ 3 Gb/s
  - Up to 120m Belden 1694A @ 1.5 Gb/s
  - 100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mb/s
- Input standard (auto detect):
  - 625(576)/25i, 525(480)/29i
  - 720 50/59p, 1080 50/59i
  - 1080 50/59p level A/B
  - 1080 25/29psf
- Analog reference:
  - 1x analog reference with passive loop-through
  - Black (HD tri-level and SD bi-level) and blackburst (SD bi-level)
  - SD bi-level – RS170A
  - HD tri-level – SMPTE ST 240, SMPTE ST 274

**Video Signal Outputs**

- SDI outputs: Up to 4
- Output standards:
  - 625(576)/25i, 525(480)/29i
  - 720 50/59p, 1080 50/59i
  - 1080 50/59p level A/B

**Audio Signal Inputs/Outputs**

AES/EBU I/O (software selectable): 8 unbalanced (BNC)

**Conversion Functions**

- Modes:
  - Upconversion
  - Aspect ratio conversion synchronization
- Conversion processing:
  - Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
  - Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
  - Aspect ratio conversion (manual or auto): AFD (SMPTE ST 2016), VI (RP186), WSS (L23)
  - SD input format: Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
  - SD output format: Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
- Metadata:
  - Closed caption CE608 <> CE708
  - Timecode conversions
  - Teletext subtitles WST/RDD8 conversion

**Audio Functions**

- Embedded audio:
  - 16-channel embedded audio processing
  - PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
  - Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Embedded audio: Enable/Blank

**Audio Routing**

- Processed pair 1-8: Disembed 1-8, AES 1-8, Analog 1-2
- Embedded Output Channels 1-16: Processed pair 1-8, Tone, Silence
- AES 1-8: Processed pair 1-8, Tone, Silence

**Processed Audio Control**

- Invert phase: Channels 1-16
- Pair 1 to 8 gain L/R: +18 dB to -18 dB in 0.1 dB steps
- Pair 1-8 manual delay: -40 to +200 ms in 1 ms steps
- Global manual delay: -40 to +200 ms in 1 ms steps

**Dolby-E**

Dolby-E auto alignment: ±10 line offset in 1 line steps

**Tone**

Frequency: 100 Hz to 10 kHz in 100 Hz steps

**Processing Functions**

- Ancillary data: Pass/Strip
- Freeze: On/Off
- Legalizer: On/Off
- Genlock: Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
- Memories: 16 user memories
- Pattern: Off, Black, Ramp, Bars
- Caption: On/Off, Scrolling
- Edit caption: 19 characters available

**SPECIFICATIONS**

**Proc amp**

Black level: +100 to -100 mV (0) in 0.8 mV steps  
 Contrast: -6 dB to +6 dB (0) in 0.2 dB steps  
 Saturation: -6 dB to +6 dB (0) in 0.2 dB steps  
 Y gamma: 0.4 to 1.7 (1) in 0.1 steps  
 YC offset: -20 to 20 (0) in 2 Luma pixel steps

Note: Defaults shown in brackets

**Enhancement**

Nonlinear enhancer:

- Frequency band selection: Low, Med, High
- Four preset enhancement modes: Low, Med, High, Super
- Manual enhancement mode with H Gain and H Noise rejection levels

**Conversion Aperture**

Vertical:

- Frequency band selection: Low, Med, High
- Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Horizontal:

- Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
- Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

**Other Controls**

- User memories: 16x Save, Recall, Rename
- Memory naming: User-configurable naming of memories 1 – 16
- RollTrack index: Up to 50 RollTrack destinations
- RollTrack sources: Unused, Input Present (1&2), Input Loss (1&2), Reference OK & Loss
- Information window: Video input status, reference status
- Factory default: Resets all module settings to factory-specified default values and clears memories
- Default settings: Resets all module settings to factory specified defaults but does not clear memories
- Module information: Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

**General Specifications**

Electrical: 3 Gb/s SDI, SMPTE ST 424 1.5 Gb/s HD-SDI, SMPTE ST 292 270 Mb/s SDI, SMPTE ST 259-C  
 Connector/format: BNC/75Ω panel jack on standard IQ connector panel  
 Return loss: >-15 dB (270 Mb/s, 1.5 Gb/s) >-10 dB (3 Gb/s)  
 Output jitter: SD-SDI 0.2 UI (10 Hz) / 0.2 UI (1 kHz), 3G/HD-SDI 1.0 UI (10 Hz) / 0.2 UI (100 kHz)  
 Reference source: External – HD tri-level/SD bi-level/input video syncs  
 Electrical:  
 Black (HD tri-level and SD bi-level) and blackburst (SD bi-level)  
 SD bi-level – RS170A  
 HD tri-level – SMPTE ST 240 and SMPTE ST 274  
 Connector/format: BNC/75Ω panel jack on standard IQ connector panel  
 Embedded audio handling:  
 HD – 24-bit synchronous 48 kHz to SMPTE ST 299  
 SD – 20-bit synchronous 48 kHz to SMPTE ST 272-A

**Digital Audio Input (Unbalanced)**

Connector/format: BNC  
 Sample frequency:  
 PCM: 25 – 96 kHz  
 Non-PCM: 48 kHz  
 Input cable length: >500m of RG59 cable  
 Impedance: 75Ω  
 Standard: AES3id

**Digital Audio Output (Unbalanced)**

Connector/format: BNC  
 Level: 1 Vp-p typical into 75Ω  
 Standard: AES3id

**Power Consumption**

Module power consumption: 13PR (B frames)

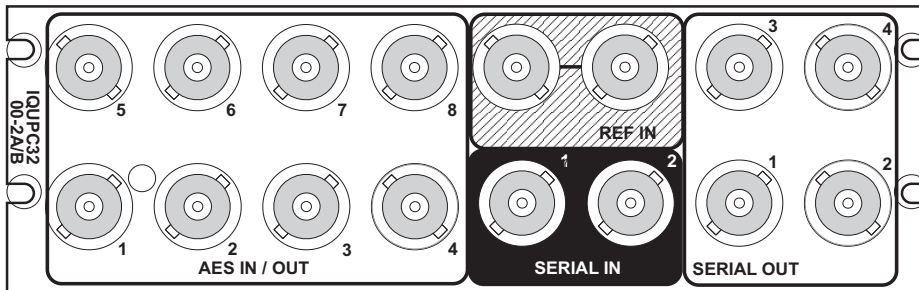
Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓	
	1080i	✗	✗	✗	✗	✗	✗	✗	✗	
59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗	
	1080P	✗	✗	✗	✗	✗	✗	✗	✗	

Format Conversion I/O Grid.

**ORDERING**

**IQUPC3200-2B3**

Upconverter with AES I/O. 2 SDI inputs, external & frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs



For more details on enclosure types please refer to the IQ Modular Enclosures datasheet.

**Software Options**

- IQOPTM-NR**  
Software option to add noise reduction
- IQOPTM-SBK**  
Software option to add side-bar keying
- IQOPTM-LC**  
Software option to upgrade with linear frame rate conversion
- IQOPTM-UDC**  
Software option for upgrade to up/down/crossconversion
- IQOPTM-LOG**  
Software option to add logo insertion

GVB-2-0823A-EN-DS



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