

# IQUDC34

## 3G/HD/SD-SDI Universal Up/down/crossconverter

Having both analog and digital interfacing along with multirate format conversion for 3G/HD/SD-SDI digital video signals gives the IQUDC34 from Grass Valley a high level of flexibility and ability to handle a wide range of interfacing applications. Whether it's decoding composite signals and embedding the associated analog audio, or receiving HD-SDI and de-embedding to AES or analog audio for monitoring, the IQUDC34 can adapt, and using high-quality motion adaptive de-interlacing and flexible scaling technology ensures that the conversion performance is first class.

The IQUDC34 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 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.

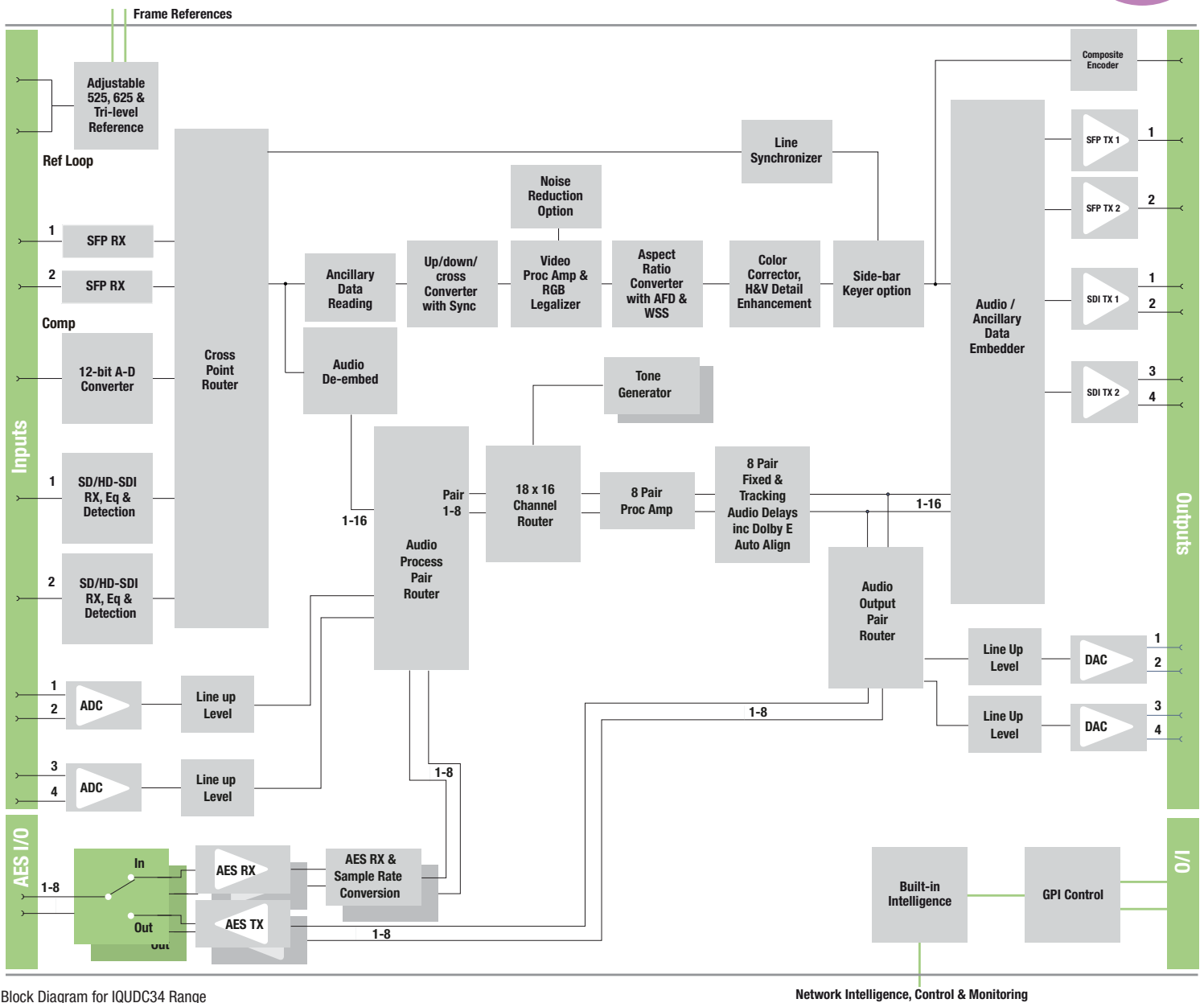
To allow the module to be further tailored to system requirements, software options are available to provide noise reduction, logo insertion and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

### Why should you choose this module?

- Its ability to work with a wide range of analog and digital inputs along with high-quality video conversion and frame synchronization makes the IQUDC34 an ideal interfacing module for mixed analog and digital systems
- 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

- Wide range of I/O including SDI, CVBS, AES audio, analog audio and integrated fiber support via SFP module
- High-quality up/down/crossconversion 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 or motion compensated frame rate conversion
- Eight AES audio I/O, balanced or unbalanced, two pairs of balanced analog audio inputs and outputs all available to/from any processed internal pair, and audio proc. 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 and two GPI/O ports
- 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 IQUDC34 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 video inputs: 1x Composite; PAL, NTSC, NTSC-J, PAL-M, PAL-N, N4.4, SECAM with 12-bit resolution

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

#### Fiber Signal Input

Inputs: Up to 2\*

Optical: 3 Gb/s HD-SDI, 1.485 Gb/s HD-SDI or 270 Mb/s SD-SDI

Connector/format: LC singlemode

Standard: SMPTE ST 297-2 006

#### Video Signal Outputs

SDI outputs: Up to 4

Output standard:

625(576)/25i, 525(480)/29i

720 50/59p, 1080 50/59i

1080 50/59p level A/B

Analog video outputs: 1x Composite; PAL, NTSC, NTSC-J, PAL-M, PAL-N with 12-bit resolution

#### Fiber Signal Output

Optical: 3 Gb/s HD-SDI, 1.485 Gb/s HD-SDI or 270 Mb/s SD-SDI

Connector/format: LC singlemode

Conforms to: SMPTE ST 297-2006

Outputs: Up to 2\*

#### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable):

8 unbalanced (BNC)

8 balanced (25-way D-type)

Balanced analog audio inputs: 4 channels (Screw terminal connectors (ST))

Balanced analog audio outputs: 4 channels (ST)

#### Control Interface

GPI: 2x Closing contact I/O interface (ST) (rear panel dependent)

\* Note: Optical I/O and control dependent on type of SFP module fitted

**SPECIFICATIONS (CONT.)**

**Conversion Functions**

Modes:  
 Up/down/crossconversion  
 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

**Analog Audio**

Output level adjustment: +12 dB to +24 dB (+18)  
 Input headroom: +12 dB to +24 dB (+18)

**Audio Routing**

Processed pair 1-8: Disembled 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  
 Analog 1-2: 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

**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**

GPI input low/high select: Black, Freeze, Pattern, User Memories 1-16  
 GPI output source: Black, Freeze, Pattern  
 User memories: 16 x Save, Recall, Rename  
 Memory naming: User configurable naming of memories 1 – 16  
 RollTrack index: Up to 50 RollTrack destinations  
 Optical logging\*:  
 Tx Laser Bias High Warning  
 Tx Power Low Warning  
 Tx Power High Warning  
 Input 1 (2) Rx Power High Warning  
 Input 1 (2) Rx Power Low Warning  
 Input 1 (2) Rx Power Measurement

RollTrack sources: Unused, Input Present (1&2, CVBS, Fiber 1&2), Input Loss (1&2, CVBS, Fiber 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, Licensed options

**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 Input (Balanced)**

Connector/format: 25-way D-type  
 Sample frequency:  
 PCM: 25 – 96 kHz  
 Non-PCM: 48 kHz  
 Input cable length: >150m of AES3 cable  
 Impedance: 110Ω  
 Standard: AES3

**Digital Audio Output (Unbalanced)**

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

**Digital Audio Output (Balanced)**

Connector/format: 25-way D-type  
 Level: 3 Vp-p typical into 110Ω  
 Standard: AES3

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	×	×	×	×	✓	×	×	×

\* Note: Optical I/O and control dependent on type of SFP module fitted

**SPECIFICATIONS (CONT.)****Analog Audio Input (Balanced)**

Connector/format: Screw Terminals (ST)  
 Analog input impedance: 10 k $\Omega$   
 Frequency response: 20 Hz to 20 kHz ( $\pm$ 0.1 dB)  
 Distortion (THD+N): Better than -97 dB at -1 dBFS/1 kHz  
 Headroom: Adjustable +12 dBu to +24 dBu in 1dB steps

**Analog Audio Outputs (Balanced)**

Connector/format: Screw Terminals (ST)  
 Frequency response: 20 Hz to 20 kHz ( $\pm$ 0.1 dB)  
 Output level: Adjustable +12 dBu to +24 dBu in 1 dB steps  
 Output impedance:  $\sim$ 25 $\Omega$   
 THD+N: Better than -97 dB at +23 dBu/1 kHz

**Optical 1310 nm Tx**

Wavelength: 1310 nm  
 Spectral width (FWHM): >1.5 nm (typ.)  
 Output power: 0 to -5 dBm typical (-2 dBm typical)  
 Extinction ratio: >7.5:1 (typ.)  
 Link distance:  
     Up to 30 km @ 270 Mb/s  
     Up to 21 km @ 1.5 Gb/s  
     Up to 10 km @ 3 Gb/s

**Optical 1550 nm Tx**

Wavelength: 1550 nm  
 Spectral width (FWHM): 1 nm  
 Output power: 4 to 0 dBm  
 Extinction ratio: >7.5:1 (typ.)  
 Link distance: Up to 50 km @ 270 Mb/s, 1.5 Gb/s or 3 Gb/s

**Optical Rx**

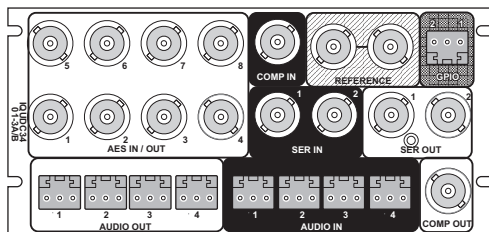
Input wavelength range: Min. 1260 nm, Max. 1620 nm  
 Optical power input range: > -0 dBm, < -20 dBm  
 Link distance: Up to 30 km

**Power Consumption**

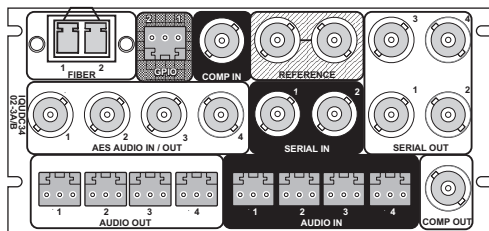
Module power consumption with fiber: 21.5PR (B Frames)

**ORDERING****IQUDC3401-3B3**

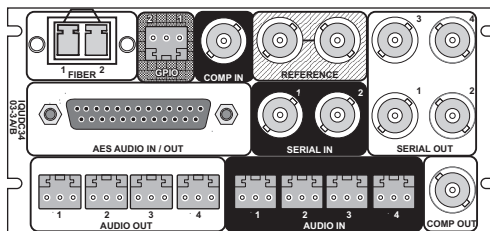
Universal up/down/crossconverter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, external & frame reference inputs, 2 SDI outputs, 1 composite output, 8 unbalanced AES inputs or outputs, 4 analog audio outputs, 2x GPI

**IQUDC3402-3B3**

Universal up/down/crossconverter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, external & frame reference inputs, 4 SDI outputs, 1 composite output, 4 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

**IQUDC3403-3B3**

Universal up/down/crossconverter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, external & frame reference inputs, 4 SDI outputs, 1 composite output, 8 balanced AES inputs or outputs, 4 analog audio outputs, 2x GPI, 1 fiber SFP cage. Includes rear but not SFP module

**Software Options****IQOPTM-NR**

Software option to add noise reduction

**IQOPTM-SBK**

Software option to add side-bar keying

**IQOPTM-MC**

Software option to upgrade with motion compensated frame rate conversion

**IQOPTM-LC**

Software option to upgrade with linear frame rate conversion

**IQOPTM-LOG**

Software option to add logo insertion

**SFP Options****FC1-13T1**

Single 1310 nm fiber Tx

**FC1-13T2**

Dual 1310 nm fiber Tx

**FC1-15T1**

Single 1550 nm fiber Tx

**FC1-15T2**

Dual 1550 nm fiber Tx

**FC1-R1**

Single fiber Rx

**FC1-R2**

Dual fiber Rx

**FC1-13TR**

Fiber transceiver 1310 nm Tx/Rx

**FC1-HDBT2**

HD-BNC dual Tx

**FC1-HDBR2**

HD-BNC dual Rx

Fiber CWDM Tx – Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

GVB-2-0820A-EN-DS



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