DATASHEET

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, 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 GV Orbit compatibility provides an all-inclusive remote configuration, control and monitoring solution
- Comprehensive SNMP support allows easy integration with third-party Network Management Systems

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) 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
- GV Orbit control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: input loss and reference loss

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 50/59p1080 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

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: 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

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

Specifications (cont.)

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

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	✕	✕	✕	✕	✔	✔	✔	✔

Digital Audio Output (Balanced)

Connector/format: 25-way D-type

Level: 3 Vp-p typical into 110Ω

Standard: AES3

Analog Audio Input (Balanced)

Connector/format: Screw Terminals (ST)

Analog input impedance: 10 kΩ

Frequency response: 20 Hz to 20 kHz (±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 (±0.1 dB)

Output level: Adjustable +12 dBu to +24 dBu in 1 dB steps

Output impedance: ~25Ω

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 Rx

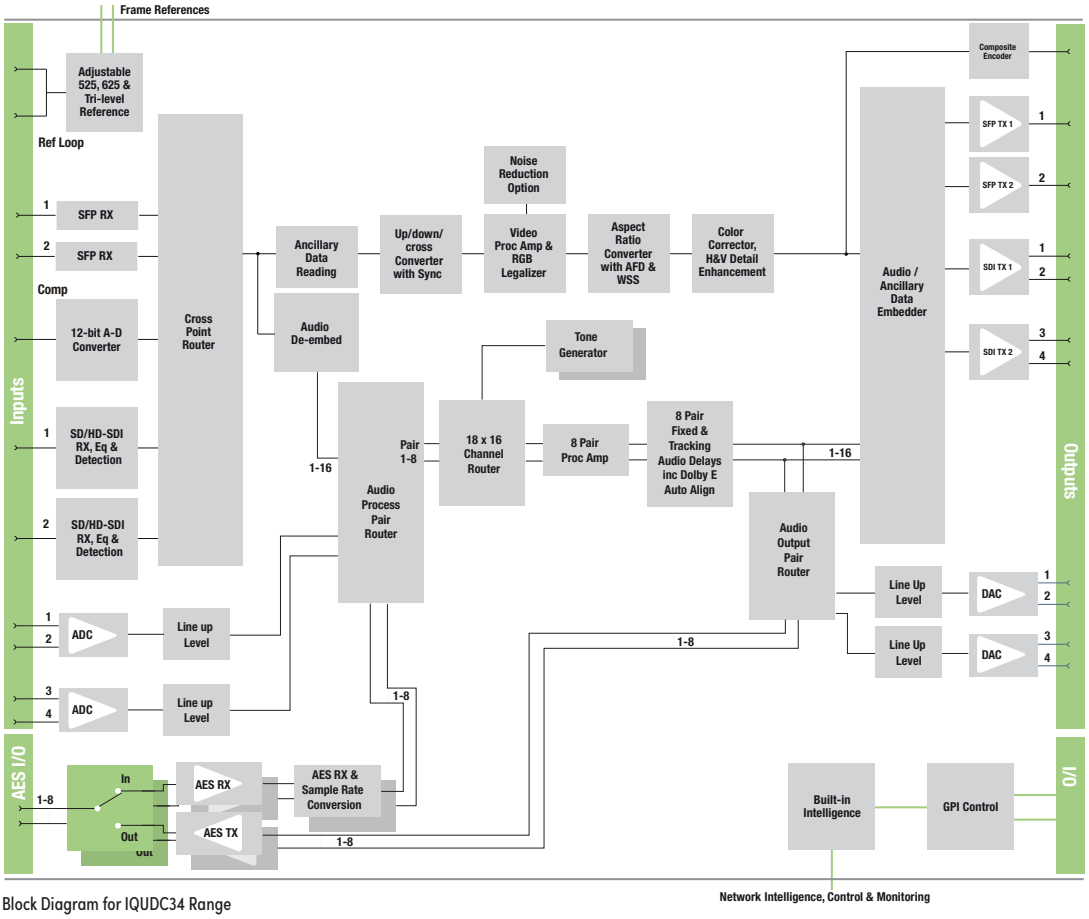
Input wavelength range: Min. 1260 nm, Max. 1620 nm

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)

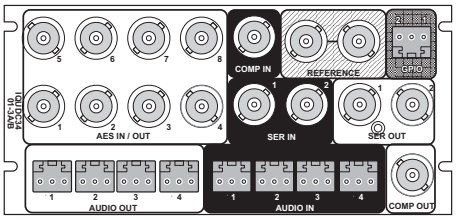


Block Diagram for IQUDC34 Range

Ordering

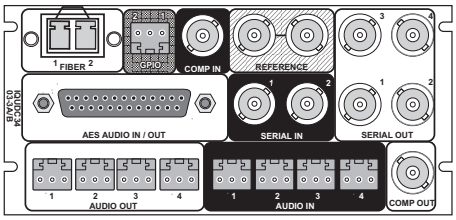
IQUDC3401-3B3

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



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-MC

Software option to upgrade with motion compensated frame rate conversion

IQOPTM-LC

Software option to upgrade with linear frame rate conversion

SFP Options

FC1-13T1

Single 1310 nm fiber Tx

FC1-13T2

Dual 1310 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.

DS-PUB-3-0820A-EN