

IQUDC33

3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O

The IQUDC33 provides two channels of multi-rate format conversion and AES embedding and de-embedding for 3G/HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC33 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC33 includes frame synchronizers, 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 signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus 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.

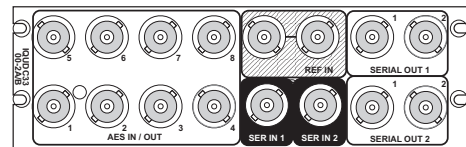
Features

- High quality up, down and cross conversion 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 (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. 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, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, 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 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 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

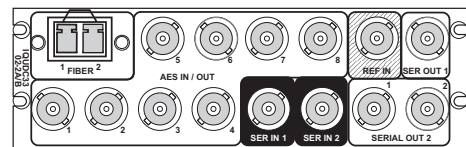
Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion, AES audio interfacing and metadata handling, IQUDC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

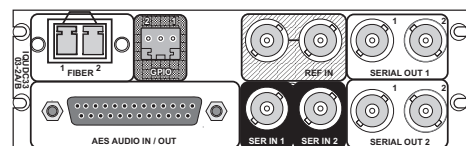
Inputs & Outputs - IQH3A/1A/3B enclosures



IQUDC3300-2A3, IQUDC3300-2B3



IQUDC3302-2A3, IQUDC3302-2B3

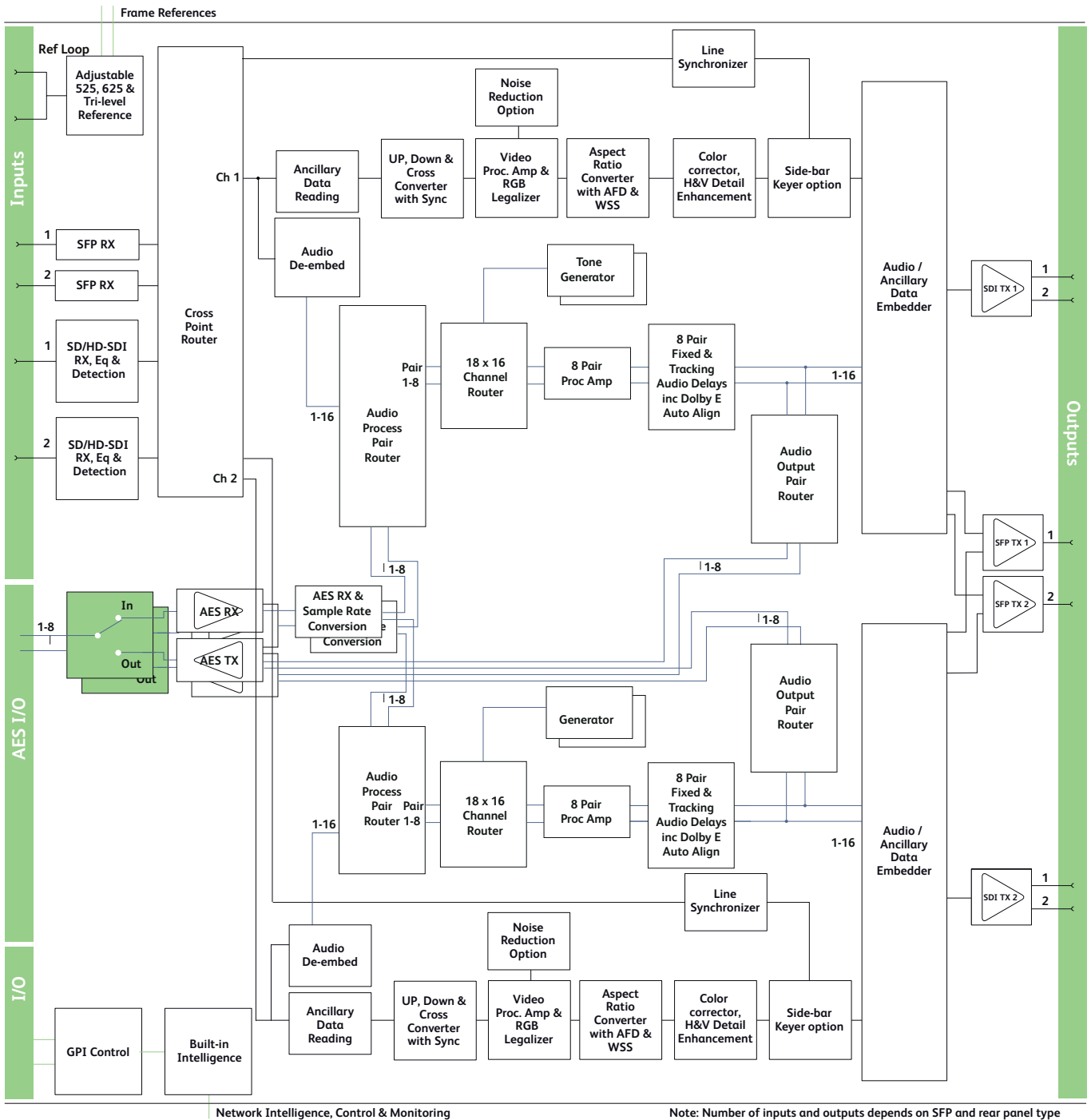


IQUDC3303-2A3, IQUDC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUDC33

3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O



Note: Number of inputs and outputs depends on SFP and rear panel type

Block Diagram for IQUDC33 Range

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 120m Belden 1694A @ 1.5 Gbit/s 100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/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	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

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

Fiber Signal Output

Optical	3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

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

Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	8 Unbalanced (BNC) 8 Balanced (25D Type)
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Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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Conversion Functions (per channel)

Modes	Up, down, and cross conversion 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 2016), VI (RP186), WSS (L23)

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

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 Enable/Blank
Embedded audio	

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

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
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Tone

Frequency	100Hz to 10kHz in 100Hz steps
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Technical Specification cont...

Processing Functions (per channel)

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
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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
Laser Wavelength	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, Fiber 1 & 2), Input Loss (1&2, 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

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

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 @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/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 @ 270Mbit/s, 1.5Gbit/s or 3Gbit/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	
	18W (A frames)
	18PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUDC3300-2B3

Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQUDC3302-2B3

Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3303-2B3

Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQUDC3300-2A3

Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQUDC3302-2A3

Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3303-2A3

Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-2NR - Software option to add noise reduction on both channels

IQOPTM-2SBK - Software option to add side-bar keying on both channels

IQOPTM-2LC - Software option to upgrade with linear frame rate conversion on both channels

IQOPTM-2LOG - Software option to add Logo insertion on both processing channels

*Single channel licenses can also be loaded

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/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.