

# IQUDC11

## 3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer and Analog Interfacing

The IQUDC11 provides multi-format conversion for both analog video and digital SDI signals.

Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC11 is a broadcast quality conversion module that includes 12-bit composite decoding and a component video ADC to allow legacy analog video standards to be repurposed along with their associated analog audio which can be embedded into the resulting SDI stream.

To allow the module to be further tailored to system requirements a series of software options is available to provide color correction for video, and advanced audio processing features such as stereo to 5.1 upmixing and loudness processing, using industry recognised technology from Linear Acoustic.

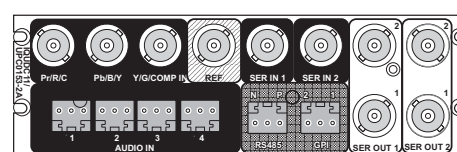
### Features

- High quality selectable up, down and cross conversion for 3G/HD/SD-SDI and analog video inputs
- SD/HD component ADC with support for SMPTE 274M (1080i) or SMPTE 296M (720p) in HD, and SMPTE /EBU N10, MII, or BetaCam in SD
- 12-bit 3D PAL/NTSC composite decoding
- Dual SDI inputs with auto switching on pre-defined input errors
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference input, input loss detection and 12 frames of video delay
- Standards supported: 3G-SDI to SMPTE 424M/425M level A compatible, HD-SDI to SMPTE292M/274M/296M, SD-SDI to SMPTE259M-C
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- In-built test pattern generator and 2 x 16 character caption generator
- vProcessed and relocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Multiplex analog audio onto 3G/HD/SD-SDI video streams with channel-level control
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, synchronizer wrap/drop processing and eight internal tone generators
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 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: PCM/non-PCM audio, input loss/freeze and reference loss

### Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with Snell or third party network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### IQUDC1153-2A

Up, down and cross converter with analog inputs. 2 SDI inputs, 1 composite/component input, 4 analog audio inputs, reference input, 4 selectable main or bypassed SDI outputs, 2 GPI/Os

IQUDC1153-2A3 Includes 3G-SDI functionality

IQUDC11-3G Software upgrade for 3G-SDI operation

### Software Options

IQOPTA-LOUD51 Software option to add Linear Acoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Acoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Acoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

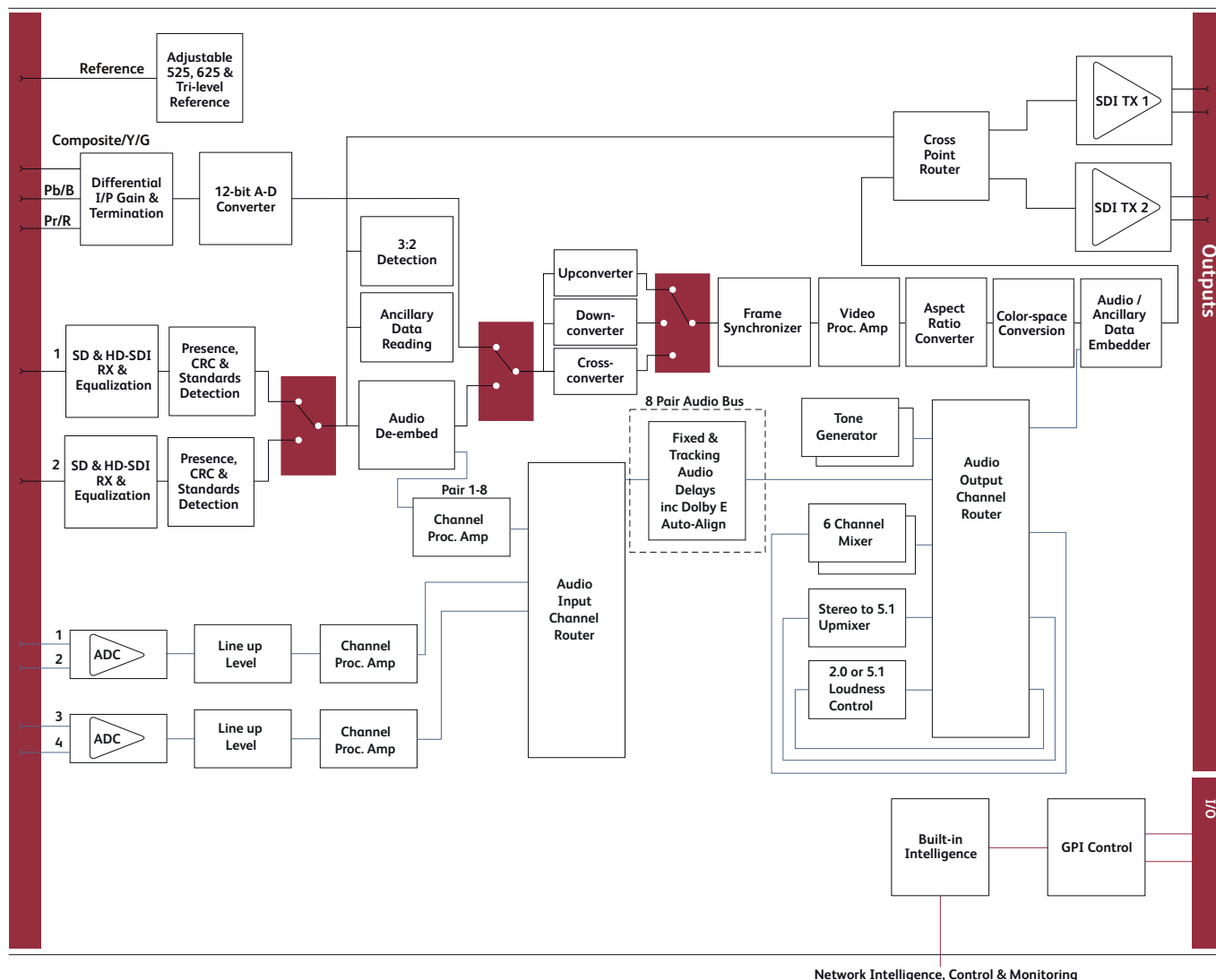
For more details on enclosure types please refer to Frames & Hardware section.

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

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## 3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer and Analog Interfacing



Block Diagram for IQUDC1153-2A

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 180m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Analog Video inputs	1 x Composite / YC / YPbPr / GBR
Analog Reference	1 x Analog Reference input Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Balanced analog audio	4 channels (25 Way D-Type)

##### Video Signal Outputs

SDI Outputs	x 4
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##### Control Interface

GPI	2 x Closing contact I/O interface (ST)
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#### Controls

##### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 12 Frames
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

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## 3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer and Analog Interfacing

### Technical Specification cont...

#### Video Controls

Input Select	Input 1, Input 2, Composite, YC, YPbPr, GBR
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Up, Down, Cross Conversion	1080p, 1080i, 720p, SD
Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

#### Aspect Ratio Conversion

Select from 9 standard preset conversions:

- Full Frame
- Box 16:9 top > 16:9
- 4:3 box 14:9 top > 16:9
- Box 16:9 > 16:9
- Box 4:3 > 4:3
- 4:3 > box 16:9
- 16:9 > box 4:3
- 4:3 box 14:9 > 16:9
- 16:9 box 14:9 > 4:3

Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

#### Audio Controls

##### Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

##### Audio In - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Polarity Inv	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

##### Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

##### Audio Routing

Input routing Bus 1-8	Disembed 1-8, Analog 1-2
Output routing embed 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8

##### Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog input Headroom	4dB to 24dB in 1dB steps
Analog input Line Up Level	-20dBu to 20dBu in 1dB steps (with 4dB Headroom setting)

##### Audio Mixers

Mixer Select	1-4, Downmix 1-2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	On/Off
Downmix Configuration	LoRo, 4 level selections

##### Other Controls

GPI input High/Low Select	Input 1-2, Analog, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Analog I/P OK, Analog Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations

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### Technical Specification cont...

RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2, analog), Input Loss (1-2, analog), Output Std, Input selected (1-2, analog), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss
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 user memories
Restart	Software reset of module
Module Information	Reports: Product Name Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
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 Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Analog Audio Input (Balanced)

Analog Input Impedance	10 k ohms
Frequency Response	20 Hz to 20 kHz ( 0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ -1 dBFS
Dynamic range	> 106 dB
Audio delay	Equal to video delay + adjustable offset

### Power Consumption

Module Power Consumption	27W Max
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