

# IQMDA40

## 4K UHD SDI Downconverter & Distribution Amplifier

The IQMDA40 is a 4K UHD quad- or single-link high-quality downconverter and distribution amplifier able to distribute a 12G SDI input to three outputs, while converting it for HD/SD simulcast or monitoring applications.

The IQMDA40 from Grass Valley also includes a 12G/quad-link SDI 4K UHD frame synchronizer and processing for the downconverted channels with powerful picture enhancement tools. High Dynamic Range and Wide Color Gamut support allows S-Log3, HLG or PQ 4K UHD feeds to be integrated into an SDR workflow.

A variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signaling, video processor and legalizer are also included.

Audio handling includes channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE ST 2020 Dolby®, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

### Why should you choose this module?

- 4K UHD/HD input flexibility allows distribution of HD-SDI signals or distribution and downconversion of 4K UHD-SDI signals without the need for separate hardware
- Extremely compact solution for downconversion of 4K UHD picture sources for simulcast applications, or monitoring on inexpensive HD equipment
- Conversion between 12G 4K UHD single link to 3G quad link output mode (2SI or square division format selection)
- 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

- High-quality downconversion for 12G-SDI quad-link 4K video inputs with conversion aperture control
- 12G single-link to 3G quad-link output mode with 2SI or square division format selection (also applies to quad-link inputs for SQD <> 2SI translation)
- Frame synchronizer with HD tri-sync/SD bi-level reference input, and input loss detection with default output of black/pattern
- Aspect ratio conversion including preset ARC maps relative to conversion modes, pan, tilt and size input crop adjustments
- Aspect ratio control (signaling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE ST 2016)
- Video proc features include: gain, offset, hue, horizontal and vertical picture enhancement and RGB gamut legalization
- Wide color gamut support with BT2020 and BT709 color space conversion including manual and automatic operation
- High Dynamic Range support including scene-referred and display-referred conversions for SDR & HDR (PQ, HLG, S-Log3) mapping to SDR
- 3D user LUT loading with full support for BBC type I, II & III 1.5 version LUTs
- Metadata support — Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, SMPTE ST 2020 handling, VITC or SMPTE ST 12 timecode translation and SID passing including an ancillary data bridge to allow transfer of up to seven different ANC packet types around the converter
- Processing for 16 channels of embedded audio present on the incoming SDI stream with audio proc features including: channel routing, gain, invert, channel delay and internal tone generator
- 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
- Integrated fiber I/O support via SFP module
- Built-in test pattern generator and 16 user configurable memories
- GV Orbit control and monitoring compatible
- RollTrack triggers available for detected module states including input loss

**SPECIFICATIONS****Inputs & Outputs**

SDI bidirectional inputs/outputs:

- 4 (12G/3G/1.5G/SMPTE ST 270)
- 4 (3G/1.5G/SMPTE ST 270)

Input cable length:

- Up to 44m Belden 1694A @ 12 Gb/s
- Up to 150m Belden 1694A @ 3 Gb/s
- Up to 180m Belden 1694A @ 1.5 Gb/s
- >350m Belden 1694A @ 270 Mb/s

Standards:

- SD: 525, 625, 270 Mb/s SD-SDI SMPTE ST 259
- HD: 720 50/59.94/60p, 1080 25/29/30i, 1.5 Gb/s HD-SDI SMPTE ST 292/SMPTE ST 299
- 3G: 1080/2160 (quad) 50/59.94/60p, 3 Gb/s HD-SDI, SMPTE ST 425 level A, dual-link level B
- 12G: 2160 50/59.94/60p (2SI) (input on BNC 1 only), 12 Gb/s UHD-4K SDI, SMPTE ST 2082-10

UHDTV1 video interfaces:

- Square division (4x 1.5 Gb/s links) for ≤30 fps
- Square division (4x 3 Gb/s links) for > 30 fps
- Sample interleaved SMPTE ST 425-3 (2x 3 Gb/s links) for ≤30 fps
- Sample interleaved SMPTE ST 425-5 (4x 3 Gb/s links) for > 30 fps

Analog reference:

- 1x analog reference
- Black (HD tri-level and SD bi-level) and blackburst (SD bi-level) selectable from IQH3B frame reference connections or external BNC

**Fiber Signal Input**

Inputs: Up to 2

Optical: 12 Gb/s UHD-SDI, 3 Gb/s HD-SDI, 1.485 Gb/s HD-SDI or 270 Mb/s SD-SDI

Connector/format: LC singlemode

Standard: SMPTE ST 297-2006

**Fiber Signal Output**

Outputs: Up to 2

Optical: 12 Gb/s UHD-SDI, 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

**Video Functions**

Input source select: SD/HD/4K UHD-SL BNC1, SD/HD BNC5, UHD-QL, SFP1

Input 4K UHD interface: Auto, 2SI, SDQ

Output format: 1080p, 1080i, 720p, 625i, 525i

3G output format: Level A/B

Output UHD Interface: 2SI, SQD

Sample Interleaved PID: 4K UHD, 3G/HD

Output 4K UHD ANC embed: Link 1, all links

Output legalization: Off, 700 mV, 721 mV, 735 mV, 746 mV

Colorimetry: Auto, BT709, BT2020

Upconvert SDR to SDR color conversion gamma: 2.0,2.4: 2.0, 2.4

**HDR Processing**

HDR bypass support

Internal HDR processing:

- Conversion type: Scene referred/display referred
- Downconvert SDR/HDR modes: SDR, HLG, PQ, S-Log3
- Clipping: Hard/soft
- PQ level: 1K, 2K, 4K, 10K

External HDR processing:

- User LUT (33-cube 3D LUTs) loading support (32 entries), with full BBC Type I, II & III LUT support

**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

**Enhancement**

Filter: Vertical and horizontal filters with preset normal, narrow or wide settings

Nonlinear enhancer:

- Frequency band selection: med, high
- Six preset enhancement modes

Color corrector:

- RGB lift: +200 to -200 mV in 0.8 mV steps
- RGB gain: +6.0 to -6.0 dB in 0.2 mV steps

**Manual or Automatic ARC**

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

Auto zoom: On/Off

Manual zoom: Zoom ±20%

Safe area marker: Off, 16:9, 4:3

Manual controls: Size, aspect, pan, tilt

Wide range of ARC presets including 702 sample line mode

**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/shuffle with audio phase inversion

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"

**Audio Shuffle Controls**

Input channel 1-16: Disembed 1-16

Output channels 1-16: Processed channels 1-16, tone, silence

Invert phase: Channels 1-16

**Channel Level Controls**

Channel 1 to 16 gain: +18 dB to -18 dB in 0.1 dB steps

Channel 1 to 16 manual delay: -40 to +200 ms in 1 ms steps

Global manual delay: -40 to +200 ms in 1 ms steps

**Tone**

Frequency: 100 Hz to 10 kHz in 100 Hz steps

**Metadata**

Closed caption CEA608 <> CEA708

WST/SMPTE RDD08/SMPTE ST 2031 conversion

SMPTE ST 2020 embed/de-embed

**System**

Default output: Black, Mute

Test patterns: Off, black, ramp, bars

Ancillary data bridge to allow transfer of up to seven different ANC packet types around the converter

**Genlock Selection:** Frame A, frame B, external, input, freerun

Timing: Horizontal and vertical adjustment

**Timecode Source:** LTC, VITC Processing: Follow input, generate

Timecode loss: Freeze, freerun

**Other Controls**

Logging:

- Input 1-4 name, type, state
- Genlock state
- Output standard

RollTrack Index: Up to 32 RollTrack destinations

RollTrack Sources: unused, input present, input loss, 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, temperature

**Communications**

Remote control via HTML5 web interface, GV Orbit and SNMP

**General Specifications**

**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

**Input standard:**

(Auto detect) 525, 625

720 50/59.94/60p

1080 50/59.94/60i

1080 50/59.94/60p (levels A and B)

720/1080/2160 23/24/25/29.97/30p

1080 23/24/25/29.97/30 PsF, with film detection and processing

2160 50/59.94/60p (levels A and B)

**Output standard:**

525, 625

720 50/59.94/60p

1080 50/59.94/60i

1080 50/59.94/60p (levels A and B)

720/1080/2160 23/24/25/29.97/30p

1080 23/24/25/29.97 PsF, with film detection and processing

2160 50/59.94/60p (levels A and B)

**Power Consumption**

Module power consumption:

17 PR Max.

18 PR Max. with SFP fitted

**IQMDA40 INTERFACE OPERATION**

Note: The I/O is mode dependent.

- Inputs shown in **BLUE**
- Processed outputs shown in **GREEN**
- Loop output shown in **ORANGE**

**Mode 1 – SD/HD/3G up/down/crossconversion**

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2		BNC 1 Loop Output					
BNC 3		BNC 1 Loop Output					
BNC 4		BNC 1 Loop Output					
BNC 5							
BNC 6							
BNC 7							
BNC 8							
SFP 1 (Rx)							
SFP 1 (Tx)		BNC 1 Loop Output					
SFP 2 (Tx)		BNC 1 Loop Output					

**Mode 2 – 4K UHD-QL to SD/HD/3G**

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2							
BNC 3							
BNC 4							
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

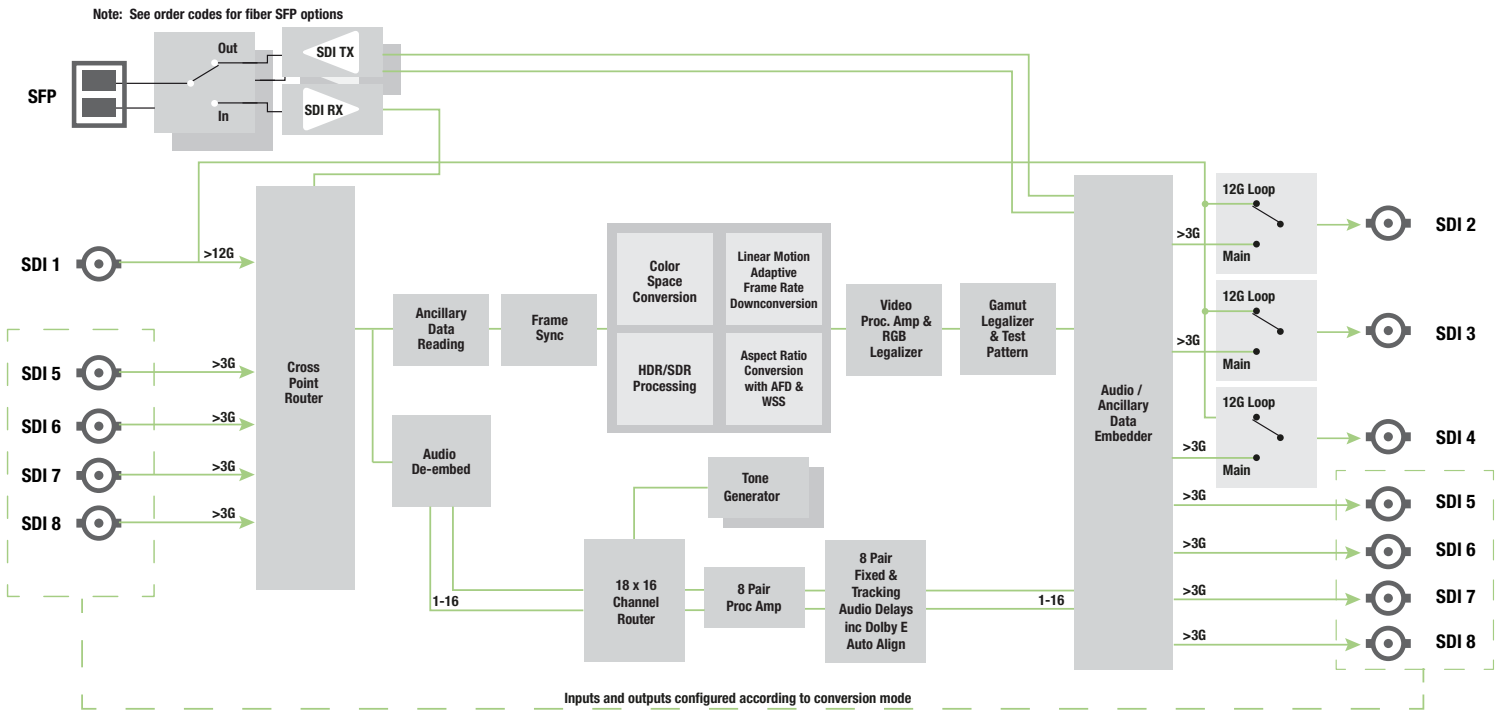
**Mode 3 – 4K UHD-SL to SD/HD/3G**

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2				BNC 1 Loop Output			
BNC 3				BNC 1 Loop Output			
BNC 4				BNC 1 Loop Output			
BNC 5							
BNC 6							
BNC 7							
BNC 8							
SFP 1 (Rx)							
SFP 1 (Tx)				BNC 1 Loop Output			
SFP 2 (Tx)				BNC 1 Loop Output			

**IQMDA40 INTERFACE OPERATION (CONT.)**

**Mode 4 – 4K UHD-SL to 4K UHD-QL**

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1				BNC 1 Loop Output			
BNC 2				BNC 1 Loop Output			
BNC 3				BNC 1 Loop Output			
BNC 4				BNC 1 Loop Output			
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)				BNC 1 Loop Output			
SFP 1 (Tx)				BNC 1 Loop Output			
SFP 2 (Tx)				BNC 1 Loop Output			



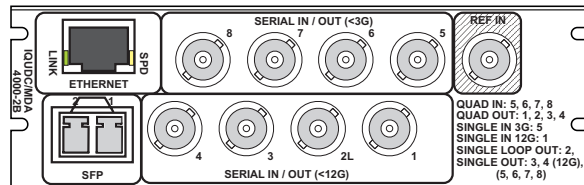
Block Diagram for IQMDA40 Range.

**ORDERING**

**IQMDA4000-2B4**

4K UHD downconverter and DA with HDR support for 12G/QL-SDI signals. SDI input and output configurations based on processing mode selection, external or frame reference, single 12G capable fiber Tx/Rx

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



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