

# IQMCC30

## 3G/HD/SD-SDI Motion Compensated Frame Rate Converter

The IQMCC30 provides multirate frame rate and format conversion for 3 Gb/s SDI, and HD-SDI digital video signals.

Using high-quality motion compensated image processing the IQMCC30 from Grass Valley delivers high-quality conversion in a compact and affordable modular form factor ideal for broadcasters, news agencies, and content providers needing to deliver premium content to domestic and international audiences.

IQMCC30 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, SMPTE ST 2020 Dolby, closed captions and teletext captions, can also be passed through the module or processed according to the required output standard.

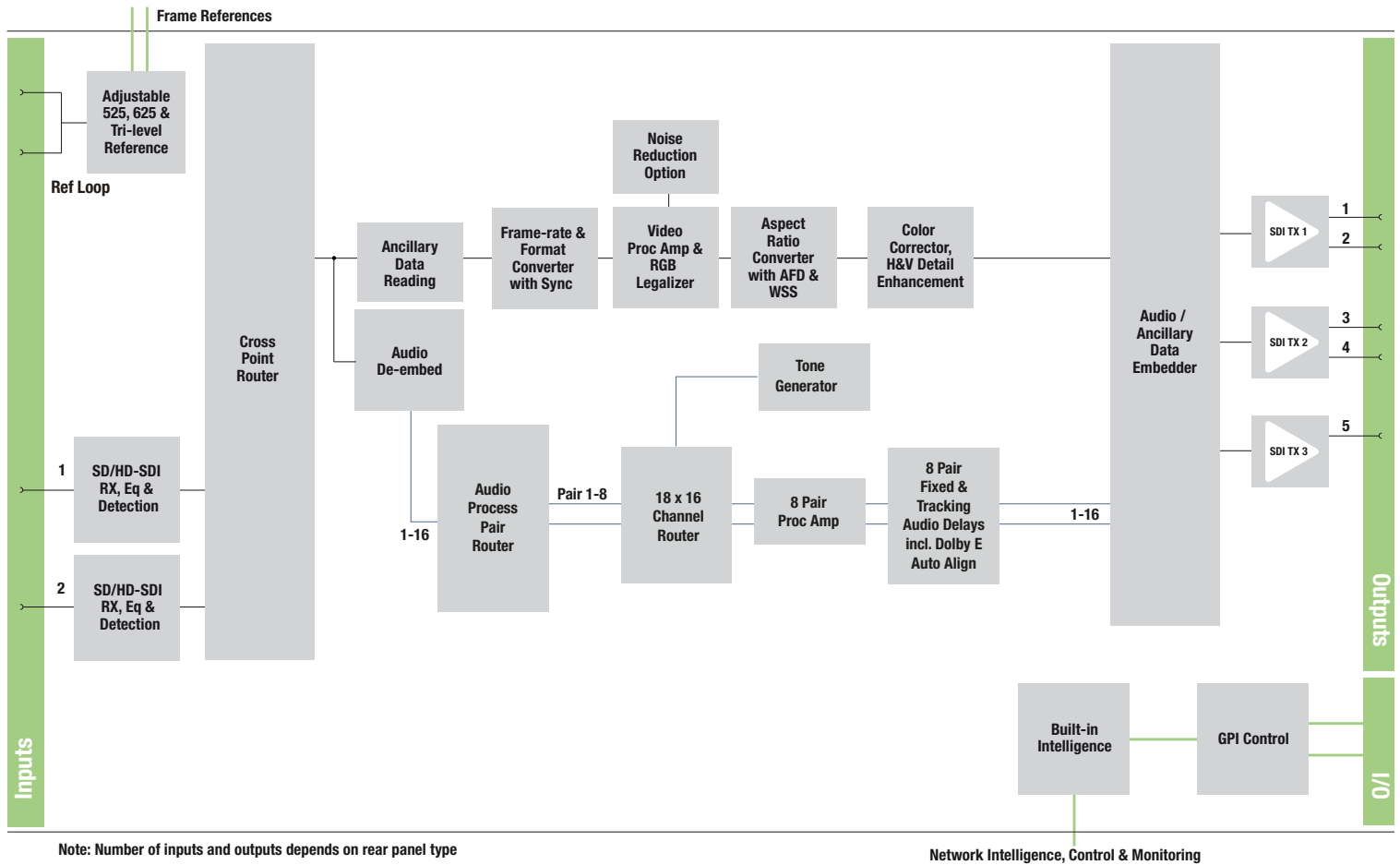
To allow the module to be further tailored to system requirements, software options are available to provide noise reduction.

### Why should you choose this module?

- Ideal for international program distribution, TV and video production and content repurposing for internet, TV and Blu-ray distribution
- Low-cost and high-density broadcast quality conversion solution, helping to re-define the economics of broadcast infrastructure
- 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

- Motion compensated SD/HD/3G frame rate conversion
- High-quality up/down/crossconversion, including conversion aperture control and clean cut mode
- Frame synchronizer with HD tri-sync/SD bi-level reference input and input loss detection, and filmic field detection optimizes 3:2, 2:2 picture cadences
- Aspect ratio conversion including preset ARC maps relative to conversion modes, 32 ARC user memories, pan, tilt, 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, luma clipper, horizontal and vertical picture enhancement, and adjustable RGB gamut legalization
- Metadata support — Closed caption passing or processing for CEA608/708 and OP42/OP47/SMPTE ST 2031 WST captions, and VITC or SMPTE ST 12 timecode translation with output line adjustment (VITC)
- Additional processing options, including noise reduction (adaptive spatial and recursive)
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio processing features including: channel routing, gain, invert, delay (including tracking audio delay which seamlessly tracks the video delay) and eight internal tone generators
- 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
- 16x user memories, two GPI/O ports, built-in test pattern generator and 19-character scrolling caption generator
- GV Orbit control and monitoring compatible with standard logging and reporting features, plus RollTrack triggers available for detected module states including: input loss and reference loss



Block Diagram for IQMCC30 Range.

## 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): 525, 625, 720 50/59.94p, 1080 50/59.94i, 1080 50/59.94p (Levels A and B), 720/1080 23/24/25/29p, 1080 23/24/25/29psf

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

#### Video Signal Outputs

SDI outputs: Up to 5

Output standard: 525, 625, 720 50/59.94p, 1080 50/59.94i, 1080 50/59.94p (Levels A and B), 720/1080 23/24/25/29p, 1080 23/24/25/29psf

#### Control Interface

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

### Conversion Functions

Modes:

SD/HD/3 Gb/s Motion Compensated Standards Conversion

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: AFD (SMPTE ST 2016), VI (RP186), WSS (L23) (manual or auto)

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

Manual zoom: Zoom  $\pm 20\%$

Metadata:

Closed caption CE608 <> CE708

Timecode conversions

Teletext subtitles WST/RDD8/SMPTE ST 2031 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

#### Embedded Audio Routing

Processed pair 1-8: Disembed 1-8

Output channels 1-16: 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:  $\pm 10$  line offset in 1 line steps

#### Tone

Frequency: 100 Hz to 10 kHz in 100 Hz steps

**SPECIFICATIONS (CONT.)****Processing Functions**

Ancillary data: Pass/strip

Freeze: On/off

Legalizer: 700 mV, 721 mV, 735 mV, 746 mV, Off

Genlock: Reference lock, input lock (same format), follow input (same frame rate), free run

Memories: 16 user memories

Pattern: Off, black, ramp, bars

Caption: On/off, scrolling

Edit caption: 19 characters available

**Proc amp**

Master Gain: -6 dB to +6 dB (0) in 0.1 dB steps

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: 16x save, recall, rename

Memory naming: User-configurable naming of memories 1 – 16

RollTrack index: Up to 50 RollTrack destinations

RollTrack sources: Input present Ch 1, input loss Ch 1, reference OK &amp; 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

**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: &gt;-15 dB (270 Mb/s, 1.5 Gb/s) &gt;-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

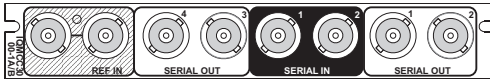
SD – 20-bit synchronous 48 kHz to SMPTE ST 272-A

**Power Consumption**

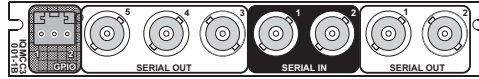
Module power consumption: 17.5 PR max.

**ORDERING****IQMCC3000-1B3**

Motion Compensated Frame Rate Converter. 2 SDI inputs, external reference loop &amp; enclosure reference inputs, 4 SDI outputs

**IQMCC3001-1B3**

Motion Compensated Frame Rate Converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

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

Software option to add noise reduction

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