Densité 3+
XIP-3901-UDC-IF

Dual-channel 4K UHD SDI-IP Hybrid Format Converter with HDR and Audio Processing Application for the XIP-3901

XIP-3901-UDC-IF incoming feed processing application for the software-defined platform Densité 3+ XIP-3901.

The XIP-3901-UDC-IF application from Grass Valley is a dual-channel 4K UHD broadcast-quality format converter with optional HDR and audio processor supporting a hybrid SDI/IP environment.

The XIP-3901-UDC-IF provides frame synchronization and video processing functions to perform up/down/crossconversion needed to maintain the chosen output format, irrespective of whether the input is HD 720p, 1080i, 1080p or UHD 2160p. High-quality up/down/crossconversion is performed at both 50 and 59.94 Hz, based on multiple sophisticated processing technologies. These include detail enhancement, pixel-based de-interlacing, and advanced motion adaptive de-interlacing and anti-ringing. In addition, a set of video processing functions provide operators control of proc amp adjustment, signal enhancement, color correction and legalization of both paths.

Both processing channels on the XIP-3901-UDC-IF can be genlocked to an external reference or to the frame reference internal URS signals. In the absence of a valid video input, the video output signal will freeze on the last good frame. Each processing channel is able to delay 12G/3G/HD embedded audio and metadata to maintain synchronization with the video and offers a frame buffer which allows an additional delay increase up to 6 frames/fields.

In a hybrid SDI-IP environment, the XIP-3901-UDC-IF dual 25 GbE I/O supports the SMPTE ST 2110 suite of standards and JT-NM TR-1001-1 technical recommendation for easy integration in a broadcast network environment.

The optional HDR processor, XIP-3901-UDC-HDR, allows conversion between SDR and HDR formats and wide color gamut BT.709 and BT.2020, supporting HLG (ITU-R BT.2100), PQ (ITU-R BT.2100), and S-Log3/S-Gamut3 formats. In addition to Grass Valley LUTs, you can select BBC LUTs v1.4 or you can choose your own custom LUTs compliant to Adobe cube file v1.0 for fully flexible HDR processing. The HDR processor operates in full 10-bit video with the ability to pass sub-blacks and super-whites in SMPTE Narrow video signals and the support of SMPTE Full in PQ and S-Log3 signals.

Four output streams of SMPTE ST 2110-30/31 audio conforming to Level A and Level C are supported per video channel. The XIP-3901-UDC-AUD option adds four audio input streams with advanced processing control for a total of 256 channels of audio with automatic delay to keep lip sync — with audio level, delay, up- and down-mixing and shuffling for additional flexibility.

The XIP-3901-UDC-IF can be configured, controlled and monitored by Grass Valley’s GV Orbit, taking advantage of many features and functions specifically crafted to make IP easy. It can also be configured and controlled from iControl systems.
Densité 3+ XIP-3901-UDC-IF Dual-channel 4K UHD SDI-IP Hybrid Format Converter with HDR & Audio Processing

**KEY FEATURES**

- Independent dual-channel 4K UHD broadcast-quality up/down/cross video processor
- 12G 2160p, 3G 1080p and HD 1080/720p SDI inputs and outputs
- Integrated frame synchronizer with additional video delay programmable to 6 frames
- Audio/video deglitcher to handle video hot switch at the input
- Video proc including: gain, offset, hue, horizontal and vertical picture enhancement during downconversion, RGB color corrector and gamut legalization
- External reference or dual URS frame reference supported
- Embedded audio and metadata delay and synchronization
- IP output available on dual 25 GigE media network interfaces:
  - SMPTST 2110-20/21 video outputs with associated SMPTST 2110-40 metadata streams
  - Four SMPTST 2110-30/31 Level A, B, C audio stream outputs per processing channel
  - SMPTST 2059-1/2 PTP with BMCA
  - Media interfaces supports AOC cable, Short and Long Reach fiber
  - Both FEC74 (CL74 Fire Code) and FEC108 (Reed Solomon IEEE) Forward Error Correction are supported
- XIP-3901-UDC-HDR option provides HDR conversion supporting both Wide Color Gamut BT.709/ BT.2020 and High Dynamic Range: HLG, PQ and S-Log3
  - Agile HDR conversion based on input signal colorimetry
  - Choice between Grass Valley conversions algorithms, BBC HLG LUT v1.4 and user defined 3D-LUT support
  - All processing operates in full 10-bit video signals with ability to pass sub-blacks and super-whites in SMPT narrow video
  - ITU R BT 2111 HLG/PQ color bar test patterns
- XIP-3901-UDC-AUD option adds four SMPTE ST 2110-30/31 audio input streams per processing channel, and provides 256 channels audio processors with level, delay, up/down mixing and 2:1 mixer/shuffling
- GV Orbit for configuration, control and monitoring
- Individual XIP-3901 applications licensed, purchased as needed
- Rapid switching between XIP-3901 applications
- The XIP-3901-UDC-IF is also supported by the ATP-2000 Touch Panel with GV Orbit Dynamic Orchestration where all video processing parameters of both paths can be controlled from a touch panel interface

Based on the proven Densité modular framework, the flexible, space-efficient XIP-3901 agile processing platform can accommodate a gradual adoption of different production elements into 1080p and 4K UHD broadcasting workflows — and it enables dual HDR/SDR production — all while protecting your investment in installed equipment. With flexibility to configure up to 12 XIP-3901 dual-channel processing applications per Densité 3+ FR4 frame, the Densité platform scales to a market-leading density of 24 4K UHD processors with HDR conversions in a 4 RU frame. This means space and cost-efficient scaling today and tomorrow.

All the processing applications delivered on the XIP-3901 platform allow live productions, either from trucks, venues, stadiums or broadcast facilities to make the most of new UHD and HDR formats. Packing lots of audio/video processing power in a small form factor results in savings in terms of space, power and weight.

**XIP-3901-UDC-HDR processing option supported conversions:**

<table>
<thead>
<tr>
<th>GV LUT Conversions</th>
<th>BBC LUTs v1.4</th>
<th>Up to 8 User-defined LUTs</th>
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<tbody>
<tr>
<td>BT.709-&gt;BT.2020</td>
<td>Scene-referred</td>
<td>Adobe cube file v1.0 – 33 cube</td>
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<tr>
<td>BT.709-&gt;HLG BT.2100</td>
<td>Display-referred</td>
<td>BT.709-&gt;BT.2020</td>
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<tr>
<td>BT.709-&gt;PQ ST.2100</td>
<td>HLG BT.2100 P2</td>
<td>Narrow® Full range</td>
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<tr>
<td>S-Log3/S-Gamut3-&gt; BT.2100</td>
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<tr>
<td>S-Log3/S-Gamut3-&gt; PQ BT.2100</td>
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And new ITU R BT.2111 HLG/PQ Color bar test patterns

**Supported input/output video formats:**

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<tr>
<th>SDI and IP Output Format</th>
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<tbody>
<tr>
<td>720p50</td>
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<tr>
<td>720p59.94</td>
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<tr>
<td>1080i60</td>
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<tr>
<td>1080i59.94</td>
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<tr>
<td>2160p50</td>
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<tr>
<td>2160p59.94</td>
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<tr>
<td>720p50</td>
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<tr>
<td>1080i50</td>
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<tr>
<td>1080i59.94</td>
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<tr>
<td>1080p50 A</td>
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<tr>
<td>1080p59.94 A</td>
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<tr>
<td>2160p50</td>
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<tr>
<td>2160p59.94</td>
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**SPECIFICATIONS**

**SDI (Inputs/Outputs)**
- **Physical**: 10 used HD-BNC connectors: 2 in, 8 out
- **SDI standard**:
  - SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)
  - SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)
  - SMPTE ST 2082-1:2015 (in 1 & 5, out 1 & 5)
- **Supported input/output formats**:
  - HD: SMPTE ST 274: 1080i59.94, 1080i50
  - HD: SMPTE ST 296: 720p59.94, 720p50
  - 3G: SMPTE ST 425 level A (mapping 1): 1080p59.94, 1080p50
  - 12G: SMPTE ST 2082-10: 2160p59.94, 2160p50

**Cable length (Belden 1694A)**:
- HD: 250m (820 ft.) at 1.485 Gb/s
- 3G: 150m (492 ft.) at 2.970 Gb/s
- 12G: 55m (180 ft.) at 11.88 Gb/s

**Jitter**:
- HD/SD: <0.2 UI (alignment jitter)
- 3G: <0.3 UI (alignment jitter)
- 12G: <0.3 UI (alignment jitter)

**Reference Input**
- **Physical**: SMPTE ST 170/SMPTE ST 318/ITU 624-4 blackburst

**Ethernet Port for Media**
- **Physical**: Two SFP28 sockets for active optical cable, short- and long-reach fiber
- **Standard**: IEEE 802.3-2008 25 GbE
- **Performance**: Up to 25 Gb of streaming per direction

**Ethernet Port for Control**
- **Physical**: One electrical RJ45 port
- **Standard**: IEEE 802.3 1000 Mb/s

**Video Processing Performance**
- **Signal path**: 10 bits minimum
- **Electrical**
  - **Power**: 60W maximum

**ORDERING**

**Application Software**
- XIP-3901-UDC-IF

**Application Option**
- XIP-3901-UDC-HDR
  - HDR processing option
- XIP-3901-UDC-AUD
  - Audio processing, down/up mix, shuffling option

**Densité 3+ Frame**
- XIP-3901
  - Agile SDI/IP processing platform
- XIP-3901-3+DRP-H
  - Double rear panel for Densité 3+ with HD-BNC

**SFP+ Options**
- One or two SFP+ are needed to run this application with SMPTE ST 2110 IP streams
  - SFP-25G-SR
  - SFP28 25GBASE optical transceiver MMF
  - SFP-25G-LR
  - SFP28 25GBASE optical transceiver SMF

**Remote Control**
- GV Orbit version 1.2, iControl or iControl Solo (version 7.50 or higher required)
Control, Configuration and Monitoring

**Featured Solution: ATP-2000 Touch Panel with GV Orbit Dynamic Orchestration**

The XIP-3901-UDC-IF is also supported by the ATP-2000 Touch Panel with GV Orbit Dynamic Orchestration where all video processing parameters of both paths can be controlled from a touch panel interface.
Typical HDR/SDR Format Conversion Used in Live Production

The XIP-3901 Agile Processing Platform also provides long-term value by protecting a customer’s CAPEX investment in current HD and UHD SDI and now IP infrastructure. The application-based licensing model adapts the XIP-3901 to new workflows with different software applications resulting in a truly virtualized hardware environment.

XIP Application Agility Evolution

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<td>12G/3G/HD Dual-channel Frame-sync/Gearbox &amp; HDR Processing</td>
<td>Dual-channel 4K UHD SMPTE ST 2110 Up/down/crossconverter with HDR &amp; Audio Processing</td>
<td>Dual-channel IP Gearbox Quad-stream 1080p (2SI/SD) to/from Single Stream UHD</td>
<td>Hybrid SDI-IP Dual-channel 4K UHD Incoming Feed with HDR &amp; Audio Processing</td>
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