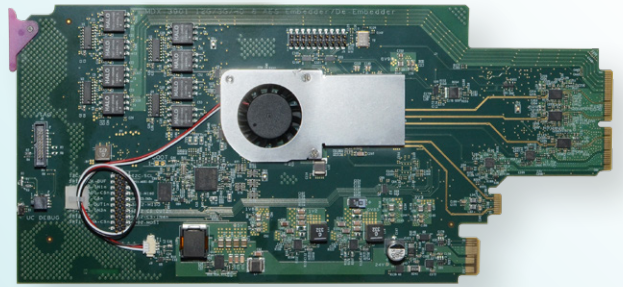


# DENSITÉ MDX-3901

## 12G/3G/HD 16 Audio Channel AES/MADI Embedder/De-embedder



Audio embedding or de-embedding for 12G/Quad Link 3G/3G/HD SDI signals.

The MDX-3901 from Grass Valley® is an advanced, high-quality audio processor, which can embed up to 16 audio channels from a selection between eight discrete AES and/or one MADI signal into 12G/Quad Link 3G/3G/HD SDI signals or de-embed up to 16 audio channels into eight AES and one MADI signal from a 12G/Quad Link 3G/3G/HD SDI signals.

When configured as an embedder, each AES input can accept different sample rates, or even asynchronous audio, and will be resampled at 48 kHz by a sample rate converter, which can be manually or automatically disabled in the presence of non-PCM audio. The MADI input supports a 64-channel payload at the industry standard 48 kHz sampling rate synchronized to the SDI signal. The MDX-3901 embedder can simultaneously

process up to 16 channels of audio selected from 80 channels inputs – 16 from AES and 64 from MADI. Functions include channel shuffling, mixing and probing. Each channel can be delayed independently to correct any lip sync issues. All 16 audio channels can be mixed and shuffled to provide 16 channels for embedding in the SDI video output. A single-link video input will be distributed to outputs 1 & 2. When genlocked to the external reference input or through the frame reference using the internal URS signal, the MDX-3901 can handle video hot switches at the input without losing sync at the output. In the absence of a video input, the card can still output synchronous video and embed the discrete AES/MADI audio. The MDX-3901 can also embed linear timecode (LTC) as ancillary timecode (ATC) in 12G/Quad Link 3G/3G/HD.

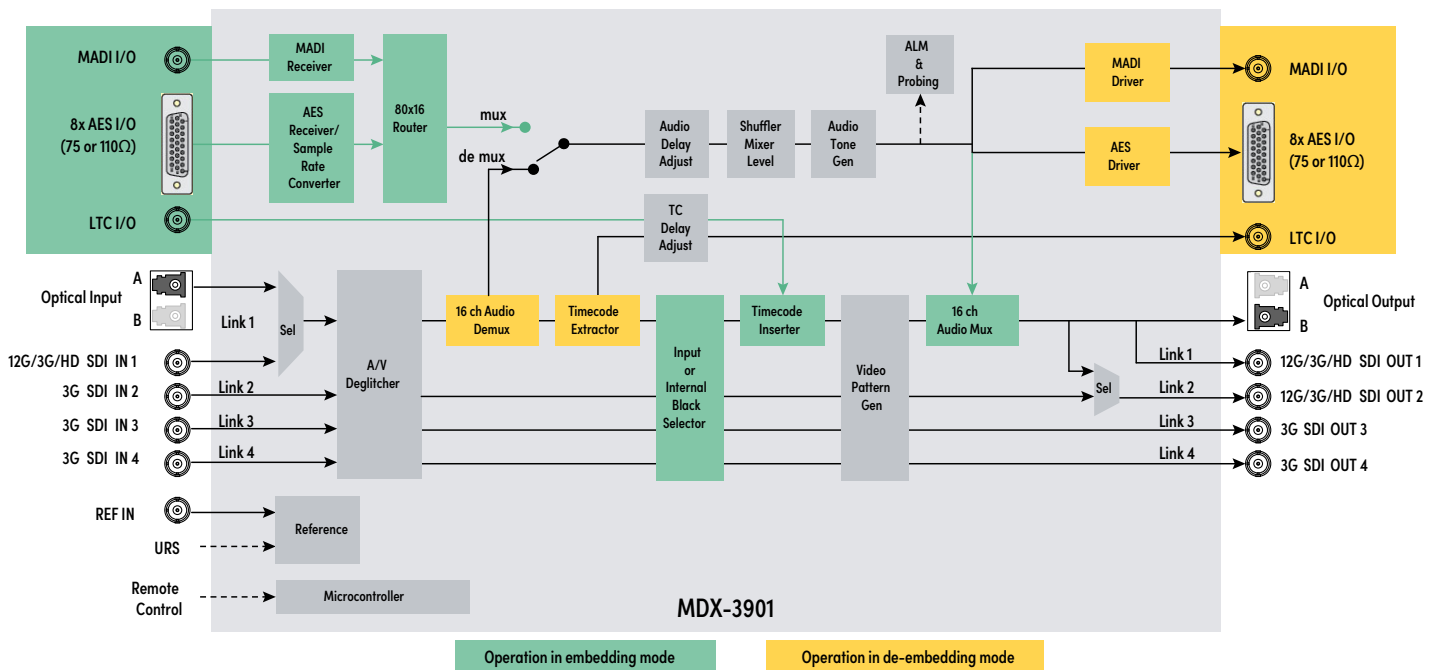
When configured as a de-embedder, the MDX-3901 can simultaneously process up to 16 channels of audio from the embedded SDI input. Functions include channel shuffling, mixing and probing. Each channel can be delayed independently to correct any lip sync issues. All audio channels can be mixed and shuffled to provide 16 channels on the discrete AES outputs and on the first 16 channels of the MADI output. A single link video input will be distributed to outputs 1 & 2. When genlocked to the external reference input or through the frame reference using the internal URS signal, the MDX-3901 can handle video hot switches at the input without losing sync at the output. The MDX-3901 can de-embed ancillary timecode (ATC) in 12G/Quad Link 3G/3G/HD and provides a linear timecode output (LTC).

## Key Features

- 12G/Quad Link 3G/3G/HD SDI inputs/outputs
- Supports 3 Gb/s level A (mapping 1) and level B
- Audio/video de-glitcher to handle video hot switch at the input
- Automatic detection of input video loss and switchover to local black or color bar for continuous audio/video output synchronization in embedder mode only
- Flexible HD/SD reference using the internal URS frame reference or a dedicated reference input
- Support of one SFP+ cage for SDI fiber I/O on selected rears:
  - 12G SFP and 3G SFP R, T, RT and TT models available
- LTC I/O embedding/de-embedding into/from ATC
- 8 AES3-id 75Ω, or AES3 110Ω, I/Os
- MADI I/O using dedicated connector
- 16 audio channels embedder/de-embedder
- 16 channels internal audio processing
- Full audio shuffling and mixing on a channel basis.
- Two slots rear (BNC connectors) in Densité 3 or 3+ frames
- One slot rear (HD-BNC connectors) available in Densité 3+ frames

Fiber connectivity is offered with certain rear modules, making it ideal for longer cable lengths. The MDX-3901 provides user configurable fiber optic transceiver for bidirectional conversion of 12G, 3G and HD-SDI signals to 1310 nm optical signals. Ideal for mixed coax and fiber workflows, the MDX-3901 allows users to configure the inputs and outputs to match their infrastructure needs.

Based on the proven Densité® modular framework of over 100 functional cards, the MDX-3901 provides a space-efficient audio embedding/de-embedding solution for 4K UHD production with the flexibility to configure up to 24 MDX-3901 modules per Densité 3+ FR4 frame. The MDX-3901 can be configured and monitored by the proven GV Orbit® Network Orchestration system.



# Specifications

## SDI (Inputs/Outputs)

**Physical:** 8 BNC or HD-BNC connectors: 4 in, 4 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 (on in 1 and outs 1 & 2)

### Supported Formats:

- HD: SMPTE ST 274: 1080i59.94, 1080i50
- HD: SMPTE ST 296: 720p59.94, 720p50
- 3G: SMPTE ST 425 level A (mapping 1), level B dual link: 1080p59.94, 1080p50
- 4K UHD: Quad Link 3 Gb/s SMPTE ST 425-5: 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: 145m (475 ft.) at 2.970 Gb/s

### Cable length (Belden 4794R cable):

- 12G: 50m (164 ft.) at 11.88 Gb/s

### Return loss:

- >15 dB up to 1.5 GHz
- >10 dB from 1.5 GHz to 3 GHz
- >4 dB up to 11.88 Gb/s

### Jitter:

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

## Audio Input or Output (8)

### Sampling freq.:

- Input: 32 to 53 kHz
- Output: 48 kHz

### Quantization:

- Input: up to 24 bits
- Output: 24 bits

### AES3:

- Input Level: 0.3 to 7 Vp-p
- Output Level: 3.5 Vp-p
- Impedance: 110Ω balanced

### AES3-1d:

- Input Level: 0.3 to 2 Vp-p
- Output Level: 1.0 Vp-p
- Impedance: 75Ω

**Return loss:** 15 dB at 6 MHz

## MADI (Input or Output)

**Signal (1):** AES10

**Connector:** BNC or HD-BNC

**Impedance:** 75Ω

**Level:** 0.6V

## LTC (Input or Output)

**Signal (1):** SMPTE ST 12

**Connector:** BNC or HD-BNC

**Impedance:** <10 kΩ unbalanced

**Input Level:** 0.3 to 5 Vp-p

**Output Level:** 3 Vp-p

## Reference Input

**Signal (1):** SMPTE ST 170/SMPTE ST 318/ITU 624-4 blackburst

## Optical

**Signal:** Refer to SFP module specifications.

## Video Processing Performance

**Signal path:** 10 bits

### Processing delay:

- Deglitcher OFF: <1.1 line or all format except 3G Level B
- Deglitcher ON: <1.6 line or all format except 3G Level B

## Audio Processing Performance

**Quantization:** 24 bits

**Sampling:** 48 kHz, synchronous

### Audio latency:

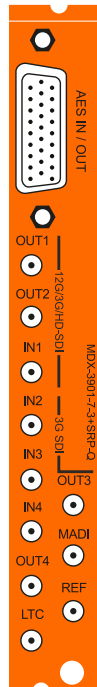
- Embedder: 2.27 ms w/SRC, 1.27 ms SRC off
- De-embedder: 1.83 ms

**Audio delay:** Up to 2.7s (1 ms steps + 0 to 47 samples)

**Tone generator:** -18 dBFS 1 kHz sine wave interrupted on left channel (250 ms) per EBU R49

## Electrical

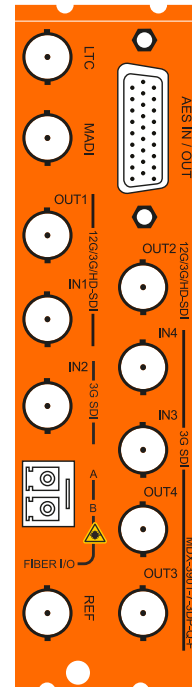
**Power:** 13W max



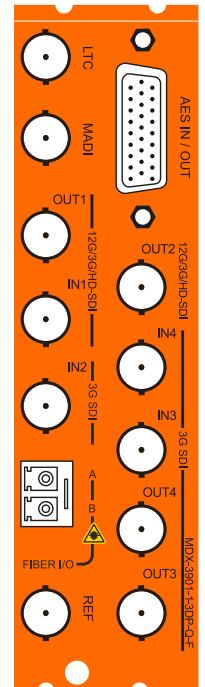
MDX-3901-7-3+SRP-Q



MDX-3901-1-3+SRP-Q



MDX-3901-7-3DP-Q-F



MDX-3901-1-3DP-Q-F

## Ordering

### Densité 3, or Densité 3+ Frame

#### MDX-3901

12G/3G/HD 16-channel AES/MADI Embedder/De-Embedder

#### MDX-3901-7-3DP-Q-F

Double rear panel, 75Ω, BNC and fiber option

#### MDX-3901-1-3DP-Q-F

Double rear panel, 110Ω, BNC and fiber option

#### MDX-3901-7-3+SRP-Q

Single rear panel for Densité 3+ frames, 75Ω, HD-BNC

#### MDX-3901-1-3+SRP-Q

Single rear panel for Densité 3+ frames, 110Ω, HD-BNC

### Fiber Options

#### SFP-U-R-LC

12G Single Rx Fiber with LC/PC

#### SFP-U-RT-S13-LC

12G Dual Rx/Tx Fiber 1310 nm with LC/PC

#### SFP-U-T-S13-LC

12G Single Tx Fiber 1310 nm with LC/PC

#### SFP-U-TT-S13S13-LC

12G Dual Tx Fiber 1310 nm with LC/PC

#### SFP-R-LC

3G Single Rx Fiber with LC/PC

#### SFP-RT-S13-LC

3G Dual Rx/Tx Fiber 1310 nm with LC/PC

#### SFP-T-S13-LC

3G Single Tx Fiber cartridge at 1310 nm with LC/PC

#### SFP-TT-S13S13-LC

3G Dual Tx Fiber 1310 nm with LC/PC

### Hardware Options

#### BOC-DA26-8BNC-1

75Ω digital audio breakout cable

#### NSH26M

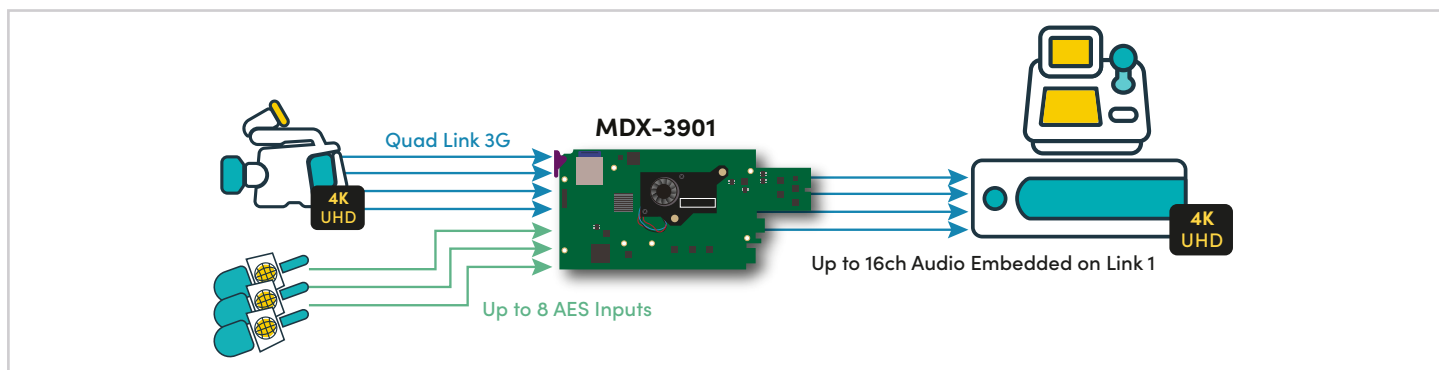
Terminal block adapter for HD-26 connections

### Remote Control

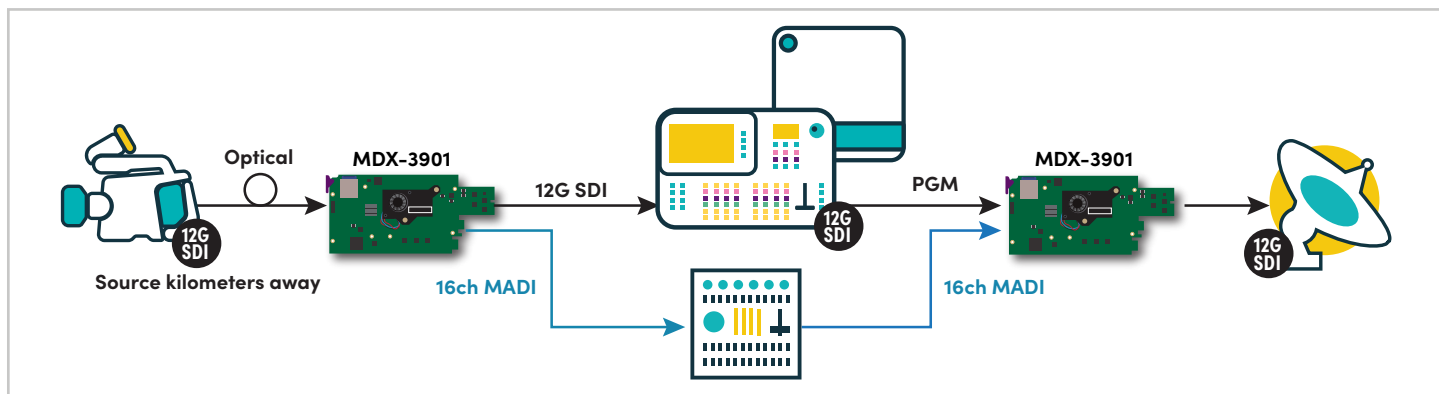
GV Orbit, iControl or iControl Solo (version 7.10 or higher required)

## Typical Applications

### AES embedding application in a Quad Link 4K UHD production:



### MADI De-Embedding & Embedding application in a 12G SDI production environment:



This product may be protected by one or more patents. For further information, please visit: [www.grassvalley.com/patents](http://www.grassvalley.com/patents)

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