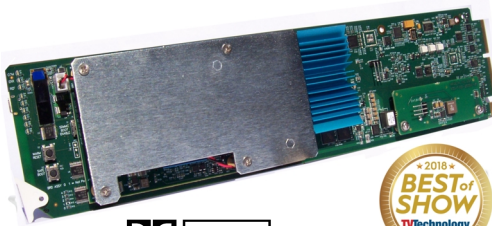


# 9904-UDX-4K-DSP • 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with DSP Advanced Audio Processing



The Cobalt® **9904-UDX-4K-DSP 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with DSP Advanced Audio Processing** is Cobalt's next generation of advanced scaler/frame sync for the openGear® platform.

The 9904-UDX-4K-DSP upconverts 12G/6G/3G/HD/SD to either UHD1 3840x2160 Square Division Multiplex (SDM) or Two-Sample Interleave (2SI) quad 3G-SDI based formats, or can output ST 2082 12G-SDI for single-wire 4K transport. With both 12G-SDI and quad 3G-SDI inputs, the 9904-UDX-4K can downconvert 12G and quad UHD. The 9904-UDX-4K provides an HDMI 2.0 output for economical 4K video monitoring. The 9904-UDX-4K-DSP offers numerous options, including SDR-to-HDR conversion and color correction.

The 9904-UDX-4K-DSP offers a DSP-based platform that supports multiple advanced audio DSP options, including Dolby® Real-Time Loudness Leveling automatic loudness processing, Dolby® E/D/D+ encode/decode, and Linear Acoustic® UPMAX™ automatic upmixing. Embedded audio and metadata are properly delayed and re-embedded to match any video processing delay, with full adjustment available for audio/video offset.

The high-density openGear® design allows for up to five 9904-UDX-4K-DSP cards to be installed in one 2RU openGear® frame. Card control/monitoring is available via Dashboard user interface, integrated HTML5 web interface, or Cobalt's RESTful-based Reflex protocol.

## FEATURES

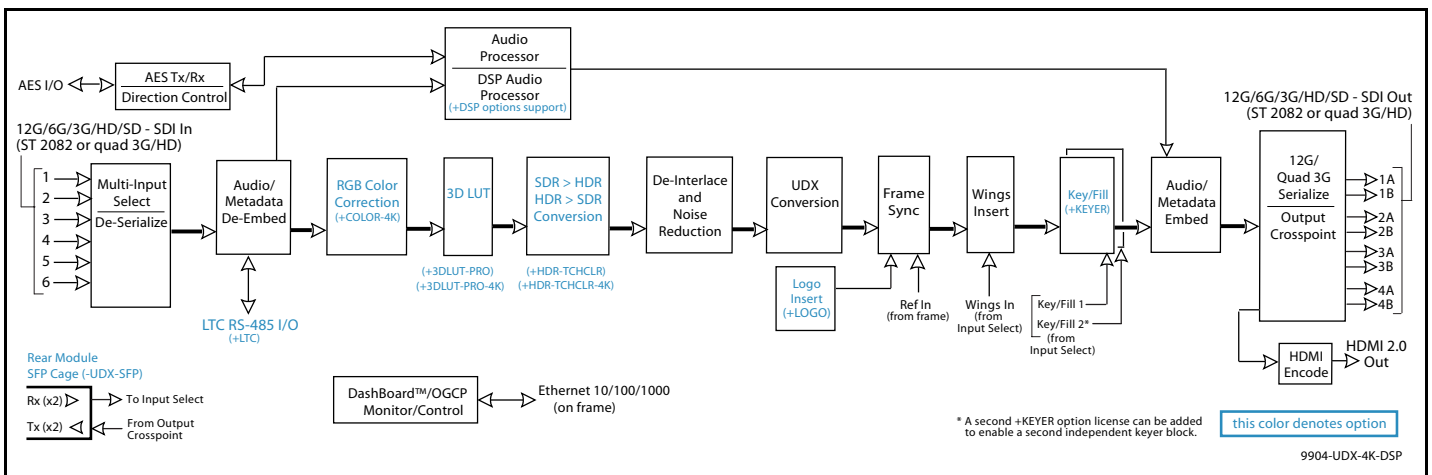
- High-density openGear comprehensive UHD UDX solution
- Supports all popular formats: 480i, 576i, 720p, 1080i, 1080pSF, 1080p
- Full up/down conversion between HD/3G, ST 2082 12G-SDI single-wire, and SDQS/2SI quad 3G-SDI based formats, with ST 2082 12G-SDI single-wire and quad 3G UHD available at both input and output
- Supports Square Division Multiplex (SDM) and Two-Sample Interleave (2SI) quad UHD formats
- 12G-SDI and quad 3G frame sync and user delay
- DSP-based platform supports multiple audio DSP options, with multiple instances available using allocatable license "credits"

- Dolby encoding/decoding, Dolby Real-Time Loudness Leveling (RTL) loudness leveling with full parametric control setup, and Linear Acoustic UPMAX™ upmixing DSP audio options available
- Supports Cobalt's Reflex (JSON) Protocols
- Full embedded audio processing with user delay offset and AES I/O
- Noise Reduction and Detail Enhancement provide image quality optimization
- Remote control/monitoring via Dashboard™ software, OGCP-9000 remote control panels, HTML5 web interface, or Cobalt's RESTful-based Reflex protocol
- Hot-swappable
- Five year warranty

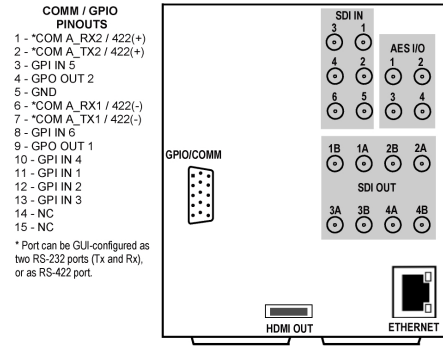
## OPTIONS

- SDR/HDR Conversion Options (+HDR-TCHCLR-4K, +HDR-TCHCLR)** – Provides real-time intelligent HDR conversion powered by Technicolor®. Contains SDR-to-HDR, HDR-to-SDR, and HDR-to-HDR conversion with dynamic metadata creation. Technicolor toolkits include SL-HDR encode, SL-HDR decode, and ITM Intelligent Tone Management.
- 3D LUT Options (+3DLUT-PRO-4K, +3DLUT-PRO)** – 3D LUT (Lookup Table) options provide 33 cube LUT mapping between 10-bit RGB and HDR color spaces.
- 3D LUT Cube Presets Option (+3D-LUT-BBC)**– Licensed product developed by the BBC, provides the BBC 3D LUT CUBE presets as optional SDR-to-HDR and HDR-to-SDR profiles.
- Logo Insertion Option (+LOGO)** – Provides file-based insertion for branding local or destination branding/ID requirements.

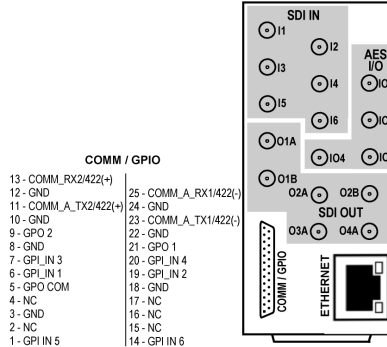
- Dolby® / Linear Acoustic® DSP Audio Options (+DSP)**
- Color Correction Options (+COLOR-4K, +COLOR)** – Provides full RGB color corrector (offset, gain, gamma) with extended YCbCr proc controls with white hard clip, white soft clip, black hard clip, and saturation clip.
- Key/Fill Keyer Option (+KEYER)** – Provides keying using SDI inputs for key and fill signals. Alpha Threshold mode allows full-color key/fill using low-cost PC-based graphics host where the same signal provides a shared key/fill input. (A second +KEYER option license can be added to enable a second independent keyer block.)
- Audio LTC I/O Option (+LTC)**



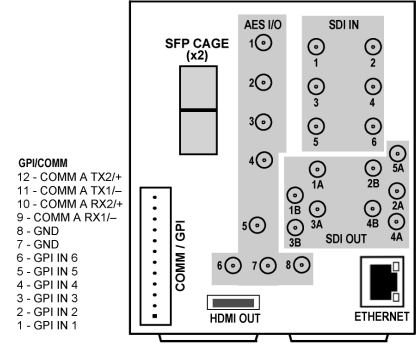
**9904-UDX-4K-DSP • 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with DSP Advanced Audio Processing**



RM20-9904-B-HDBNC



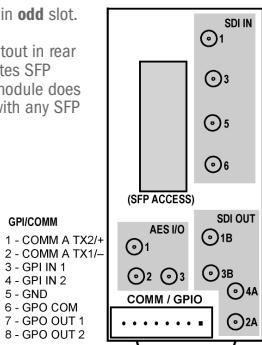
RM20-9904-D-HDBNC



RM20-9904-F-HDBNC

**Note:** Mates to card in **odd** slot.

**Note:** SFP Access cutout in rear module accommodates SFP option(s). This rear module does not come standard with any SFP functionality.



RM20-9904-G-HDBNC

**Note:** Due to the alignment of the 9904 card and the -D rear module, the combination of the card and rear module will consume the adjacent odd frame slot in addition to the even slot occupied by the card.

**Note:** This rear module cannot be installed in frame slots 19/20 location. The 9904-UDX card, when installation is attempted, will clash/interfere with the frame network controller card.



**SPECIFICATIONS**

**12G/6G/3G/HD/SD-SDI Input/Outputs**

(6) 75Ω inputs (max)

(8) 75Ω outputs (max)

SDI Formats Supported: SMPTE ST2082-1,10, 424M, 292M, SMPTE 259M-C. All inputs/outputs 12G compliant and SDQS/2SI quad 3G compliant.

Return Loss:

> 15 dB up to 1.485 GHz

> 10 dB up to 3 GHz

> 7 dB up to 6 GHz

> 5 dB up to 12 GHz

Input Cable Length:

45m Belden 1694A cable at 11.88 Gbps

120m Belden 1694A cable at 2.97 Gbps

240m Belden 1694A cable at 1.485 Gbps

400m Belden 1694A cable at 270 Mbps

Output Signal Level: 800 mV ± 10%

DC Offset: 0 V ± 50 mV

Rise and Fall Time @ 11.88 Gbps: < 45 ps

Alignment Jitter (12G/3G/HD/SD): < 0.3/0.3/0.2/0.2 UI

**Frame Sync Audio/Video Delay**

Max offset: 20 frames

Latency (min): 1 frame

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## SPECIFICATIONS (cont.)

### User Audio Delay Offset from Video

Bulk delay control: -33 msec to +3000 msec.  
Per-channel delay controls: -800 msec to +800 msec

### AES Audio Inputs/Outputs

(8) AES-3id 75Ω coaxial ports; port direction assignable as inputs or outputs in groups of 4 ports.  
**Note:** Hardware rev -E and later has 8 AES ports; earlier versions have 4 port max.

### HDMI Output

HDMI 2.0 Output; type A standard connector

### GPIO

6 GPI (max); 2 GPO (max)  
**Note:** GPIO max capacity is a function of Rear Module used. See Rear Module illustrations for specific information.

### Frame Reference Input

(2) reference from frame bus. SMPTE 170M/318M "Black Burst", SMPTE 274M/296M "Tri-Level"

## ORDERING INFORMATION

**9904-UDX-4K-DSP** 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with DSP Advanced Audio Processing

**RM20-9904-B-HDBNC** 20-Slot Frame Rear I/O Module (Double-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (8) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (4) AES I/O (User Selectable), GPIO/COMM, HDMI 2.0 Output (type A standard connector), 100/1000 BaseT Ethernet Port (All coaxial connectors HD-BNC.)

**RM20-9904-D-HDBNC** 20-Slot Frame Rear I/O Module (Standard-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (6) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (4) AES I/O, GPIO/COMM, 100/1000 BaseT Ethernet Port (All coaxial connectors HD-BNC.)

**RM20-9904-F-HDBNC** 20-Slot Frame Rear I/O Module (Double-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (9) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (8) AES I/O, GPI/COMM, HDMI 2.0 Output (type A standard connector), 100/1000 BaseT Ethernet Port (All coaxial connectors HD-BNC.)

**Note:** 9904-UDX-4K-DSP model does not support SFP ports. SFPs are not supported nor present when using this rear module on this card model.

**RM20-9904-G-HDBNC** 20-Slot Frame Rear I/O Module (Standard-Width) (4) 12G/6G/3G/HD/SD/SD-SDI Inputs, (4) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (3) AES I/O, GPIO/COMM (All coaxial connectors HD-BNC.) (**Note:** Mates to card in odd frame slot.)

### Options:

**+HDR-TCHCLR-4K** 4K SDR/HDR Conversion Option (This option includes SL-HDR encode, SL-HDR decode, and ITM Intelligent Tone Management.)

**+HDR-TCHCLR** SDR/HDR Conversion Option (This option includes SL-HDR encode, SL-HDR decode, and ITM Intelligent Tone Management.)

**+3DLUT-PRO-4K** 3D LUT 4K Option

**+3DLUT-PRO** 3D LUT Option

**+3D-LUT-BBC** BBC 3DLUT CUBE Option (Requires +3D-LUT-PRO or +3D-LUT-PRO-4K option to also be present to support this option)

**+COLOR-4K** 4K Color Correction Option

**+COLOR** Color Correction Option

**+KEYER** Key/Fill Keyer (Alpha) Option (Additional second option license enables a second independent keyer block.)

**+LOGO** Logo Insertion Option

**+LTC** Audio LTC I/O Option

**+DSP-RTLL-5.1** Dolby® Real-Time Loudness Leveling 5.1-Channel Surround Sound Loudness Processor

**+DSP-RTLL-2.0** Dolby® Real-Time Loudness Leveling 2.0-Channel Stereo Loudness Processor

**+DSP-ENCD-5.1** Dolby® Digital / Digital Plus 5.1 Encoder

**+DSP-ENCD-2.0** Dolby® Digital / Digital Plus 2.0 Encoder

**+DSP-DEC** Dolby® E / Dolby® Digital / Dolby® Digital Plus Decoder

**+DSP-UPMIX-LA** Linear Acoustic UPMAX™ 2.0-to-5.1 Upmixer