

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 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 (RTLL) 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, 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 (Look-Up Table) options provide 33 cube LUT mapping between 10-bit RGB and HDR color spaces.

3D LUTS Option (**+3D-LUT-BBC**)- Licensed product developed by the BBC, provides BBC 3D LUT as optional SDR-to-HDR and HDR-to-SDR profiles.

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

Logo Insertion Option (**+LOGO-4K, +LOGO**) - Provides file-based insertion for branding local or destination branding/ID requirements.

Dolby® / Linear Acoustic® DSP Audio Options (**+DSP**) (See Ordering Information for details)

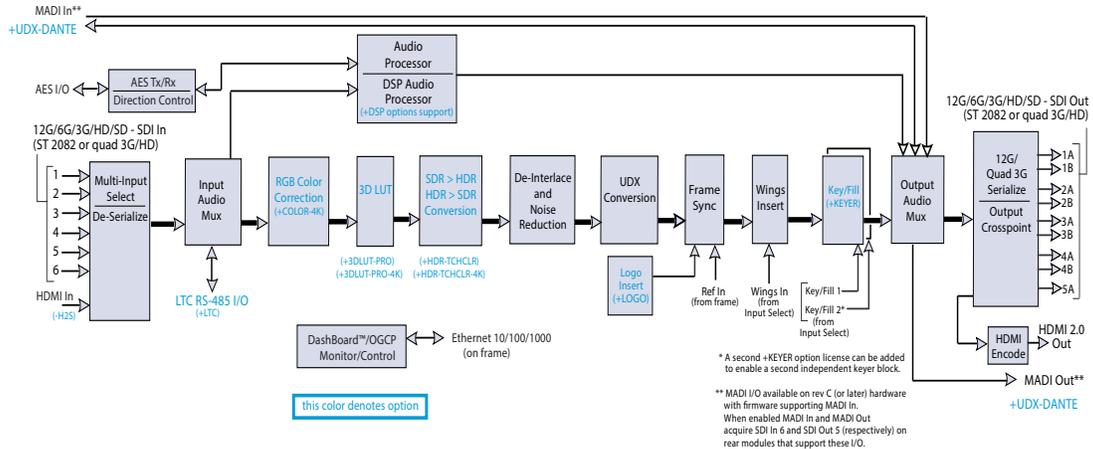
Color Correction Options (**+COLOR-4K, +COLOR**) - Provides full RGB color corrector (offset, gain, gamma) with extended YCbCr proc controls with white hard clip, white soft clip, black hard clip, and saturation clip.

Key/Fill Keyer Option (**+KEYER-4K, +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.)

Dante Option (**+UDX-DANTE-16x16**) 16x16 Dante 16 channel input 16 channel output option (Cannot be used simultaneously with +HDR-TCHCLR and +LOGO).

-H2S Option - Adds daughter card supporting externally-accessible HDMI input

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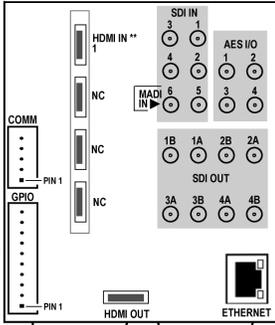
COMM PINOUTS

- 1 - GND
- 2 - *COM A_TX2 / 422(+)
- 3 - *COM A_TX1 / 422(-)
- 4 - *COM A_RX2 / 422(+)
- 5 - *COM A_RX1 / 422(-)

GPIO PINOUTS

- 1 - GPO OUT 2
- 2 - GPO OUT 1
- 3 - GPO CMN
- 4 - GND
- 5 - GPI IN 6
- 6 - GPI IN 5
- 7 - GPI IN 4
- 8 - GPI IN 3
- 9 - GPI IN 2
- 10 - GPI IN 1

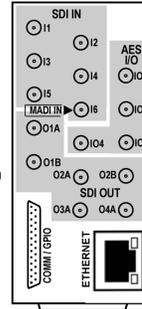
*Port can be GUI-configured as two RS-232 ports (Tx and Rx), or as RS-422 port.
 **HDMI IN port only present in conjunction with option -H2S. Although multiple ports may be present, only HDMI IN 1 is active.



RM20-9904-A-HDBNC

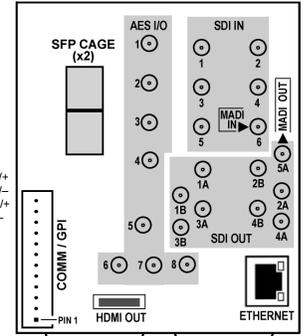
- 13 - COMM_RX2(422+)
- 12 - GND
- 11 - *COMM_A_TX2(422+)
- 10 - GND
- 9 - GPO 2
- 8 - GND
- 7 - GPI_IN 3
- 6 - GPI_IN 1
- 5 - GPO COM
- 4 - NC
- 3 - GND
- 2 - NC
- 1 - GPI IN 5

- 25 - COMM_A_RX1(422-)
- 24 - GND
- 23 - COMM_A_TX1(422-)
- 22 - GND
- 21 - GPO 1
- 20 - GPI_IN 4
- 19 - GPI_IN 2
- 18 - GND
- 17 - NC
- 16 - NC
- 15 - NC
- 14 - GPI IN 6



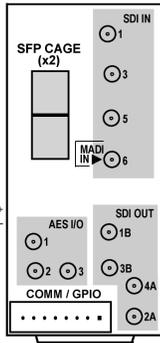
RM20-9904-D-HDBNC

- 12 - COMM A TX2/+
- 11 - COMM A TX1/-
- 10 - COMM A RX2/+
- 9 - COMM A RX1/-
- 8 - GND
- 7 - GND
- 6 - GPI IN 6
- 5 - GPI IN 5
- 4 - GPI IN 4
- 3 - GPI IN 3
- 2 - GPI IN 2
- 1 - GPI IN 1



RM20-9904-F-HDBNC

Note: Mates to card in odd slot.



- GPIO/COMM
 - 1 - COMM A TX2/+
 - 2 - COMM A TX1/-
 - 3 - GPI IN 1
 - 4 - GPI IN 2
 - 5 - GND
 - 6 - GPO COM
 - 7 - GPO OUT 1
 - 8 - GPO OUT 2
- Note: Pin 1 is in illustration.

RM20-9904-G-HDBNC

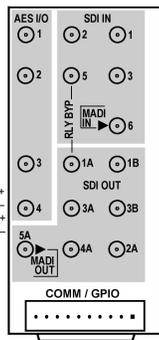
Note: Due to the alignment of the 9904 card and the -D rear module, the combination of the card and rear module will consume the adjacent odd frame slot in addition to the even slot occupied by the card.

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.

Note: (8) AES ports supported on card hardware rev -E and later. Earlier card versions support (4) AES ports (max).

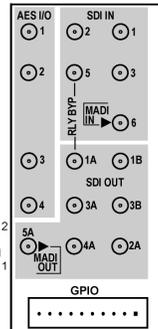
Note: MADI I/O is available on rev C (or later) hardware with firmware supporting MADI I/O. When enabled MADI In and MADI Out acquire SDI IN 6 and SDI OUT 5 (respectively) on rear modules that support these I/O. Rear modules that support MADI I/O show the MADI port locations that are SDI IN 6 and SDI OUT 5 alternates (as shown in illustrations above).

Note: 9904-UDX-4K-DSP model does not support SFP ports. SFPs are not supported nor present when using rear modules that show SFP presence in rear module illustrations here.



- GPIO/COMM
 - 1 - COMM A TX2/+
 - 2 - COMM A TX1/-
 - 3 - COMM A RX2/+
 - 4 - COMM A RX1/-
 - 5 - GND
 - 6 - GPO COM
 - 7 - GPO OUT 1
 - 8 - GPI IN 3
 - 9 - GPI IN 2
 - 10 - GPI IN 1
- Note: Pin 1 is in illustration.

RM20-9904-H-HDBNC



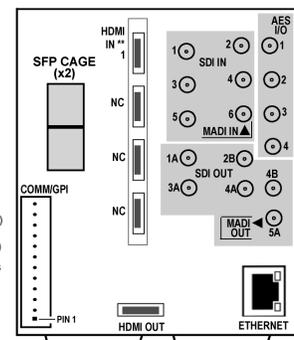
- GPIO
 - 1 - GPI IN 6
 - 2 - GPI IN 5
 - 3 - GPI IN 4
 - 4 - GPO OUT 2
 - 5 - GND
 - 6 - GPO COM
 - 7 - GPO OUT 1
 - 8 - GPI IN 3
 - 9 - GPI IN 2
 - 10 - GPI IN 1
- Note: Pin 1 is in illustration.

RM20-9904-J-HDBNC

COMM/GPI PINOUTS

- 1 - GPI IN 1
- 2 - GPI IN 2
- 3 - GPI IN 3
- 4 - GPI IN 4
- 5 - GPI IN 5
- 6 - GPI IN 6
- 7 - GND
- 8 - GND
- 9 - *COM A_RX1 / 422(-)
- 10 - *COM A_RX2 / 422(+)
- 11 - *COM A_TX1 / 422(-)
- 12 - *COM A_TX2 / 422(+)

*Port can be GUI-configured as two RS-232 ports (Tx and Rx), or as RS-422 port.
 **HDMI IN port only present in conjunction with option -H2S. Although multiple ports may be present, only HDMI IN 1 is active.



RM20-9904-K-HDBNC

Note: 12G signals over relay bypass path stipulates maximum cable length not to exceed 10m for total of both input and output cable lengths.



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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

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 (max); 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.

MADI Audio Inputs/Outputs

(2) 75Ω coaxial ports (max)
Note: Not all rear modules support full MADI I/O. MADI I/O is a function of Rear Module used and is available only on card with on rev C (or later) hardware with firmware supporting MADI I/O. See Rear Module illustrations for specific information.

HDMI Output

HDMI 2.0 Output; type A standard connector

HDMI Input (Option -H2S only)

HDMI 2.0 Input; mini 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"

Frame Loading (Max. recommended number of 9904 cards supported per Frame Model)

- OG3 Frame: (5) cards
- HPF-9000 Frame: (5) cards
- oGx Frame: (7) cards

Note: In all cases, it is recommended to leave a 1RU gap above the frame and set frame Network Controller Card to run the frame cooling fans at full (max.) speed.

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ORDERING INFORMATION

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

Rear Modules:

Note: • MADI I/O is available on rev C (or later) hardware with firmware supporting MADI I/O. When enabled MADI In and MADI Out acquire SDI In 6 and SDI Out 5 (respectively) on rear modules that support these I/O. Rear modules that support MADI I/O show the MADI port locations that are SDI IN 6 and SDI OUT 5 alternatives. Rear modules that support MADI are identified below as **MADI Compatible**.

• 9904-UDX-4K-DSP model does not support SFP ports. SFPs are not supported nor present when using rear modules that show SFP presence on this card model.

RM20-9904-A-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 **MADI Compatible**. (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 **MADI Compatible**. (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 **MADI Compatible**. (All coaxial connectors HD-BNC.)

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 **MADI Compatible**. (All coaxial connectors HD-BNC.) (**Note:** Mates to card in odd frame slot.)

RM20-9904-H-HDBNC 20-Slot Frame Rear I/O Module (Standard-Width) (5) 12G/6G/3G/HD/SD/SD-SDI Inputs, (7) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs (one 3G/HD/SDI Output with relay bypass failover), (4) AES I/O, GPIO/COMM **MADI Compatible**. (All coaxial connectors HD-BNC.) (**Note:** Mates to card in odd frame slot.)

RM20-9904-J-HDBNC 20-Slot Frame Rear I/O Module (Standard-Width) (5) 12G/6G/3G/HD/SD/SD-SDI Inputs, (7) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs (one 3G/HD/SDI Output with relay bypass failover), (4) AES I/O, GPIO **MADI Compatible**. (All coaxial connectors HD-BNC.) (**Note:** Mates to card in odd frame slot.)

RM20-9904-K-HDBNC 20-Slot Frame Rear I/O Module (Double-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (6) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (4) AES I/O, COMM/GPI, HDMI 2.0 Output (type A standard connector), (1) HDMI 2.0 Input (mini connector) (when used in conjunction with option -H2S), 100/1000 BaseT Ethernet Port **MADI Compatible**. (All coaxial connectors HD-BNC.)

Options:

Note: • Options denoted as “+” are **software-based** options which are available on new product when ordered or can be customer field-installed as a software upload upgrade.
• Options or ordering line items denoted as “-” are **hardware-based** options/items. These options are available as factory-installed only on new product, or product returned to Cobalt for factory installation.

+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 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

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

ORDERING INFORMATION (cont.)

+KEYER-4K 4K Key/Fill Keyer (Alpha) Option (Additional second option license enables a second independent keyer block.)

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

+LOGO-4K 4K Logo Insertion Option

+LOGO Logo Insertion Option

+LTC Audio LTC I/O Option

+UDX-DANTE-16x16 16x16 Dante 16 channel input 16 channel output option (Cannot be used simultaneously with +HDR-TCHCLR and +LOGO).

+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

-H2S Adds daughter card supporting externally-accessible HDMI input port; orderable as new option. **Note:** To support HDMI input option -H2S, this option is required in addition to card fitted with rear module (such as RM20-9904-B-HDBNC) that allows access to the daughter card-located HDMI input connector.