



Synapse

UXU500/510

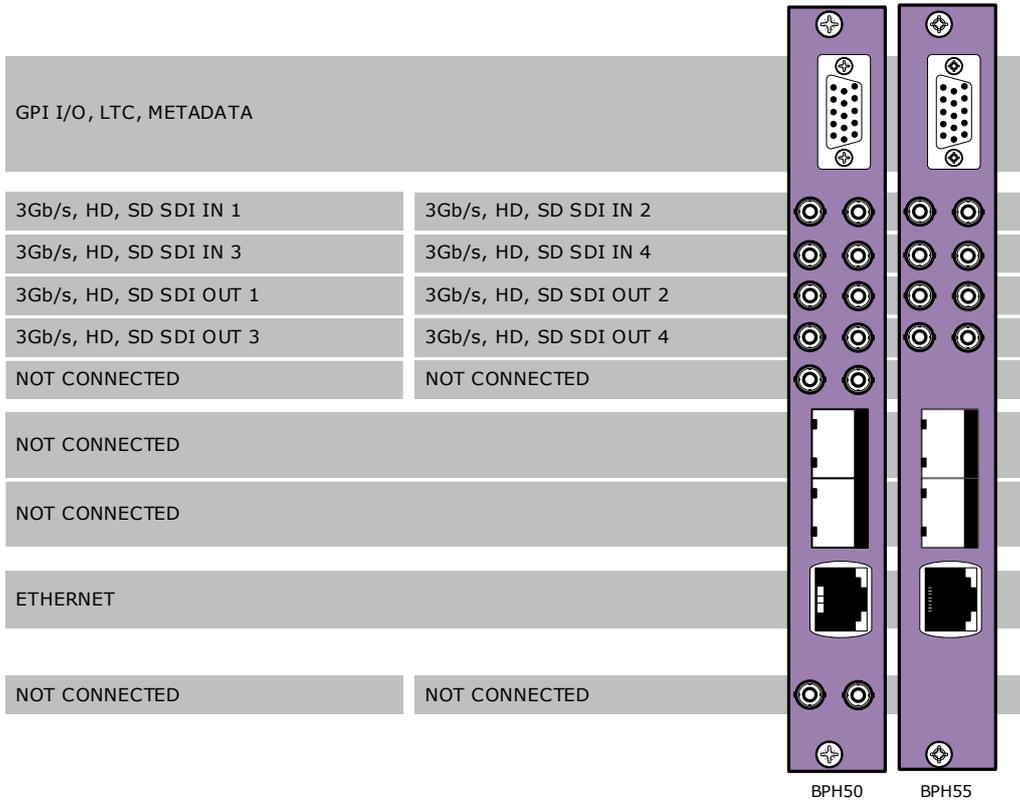
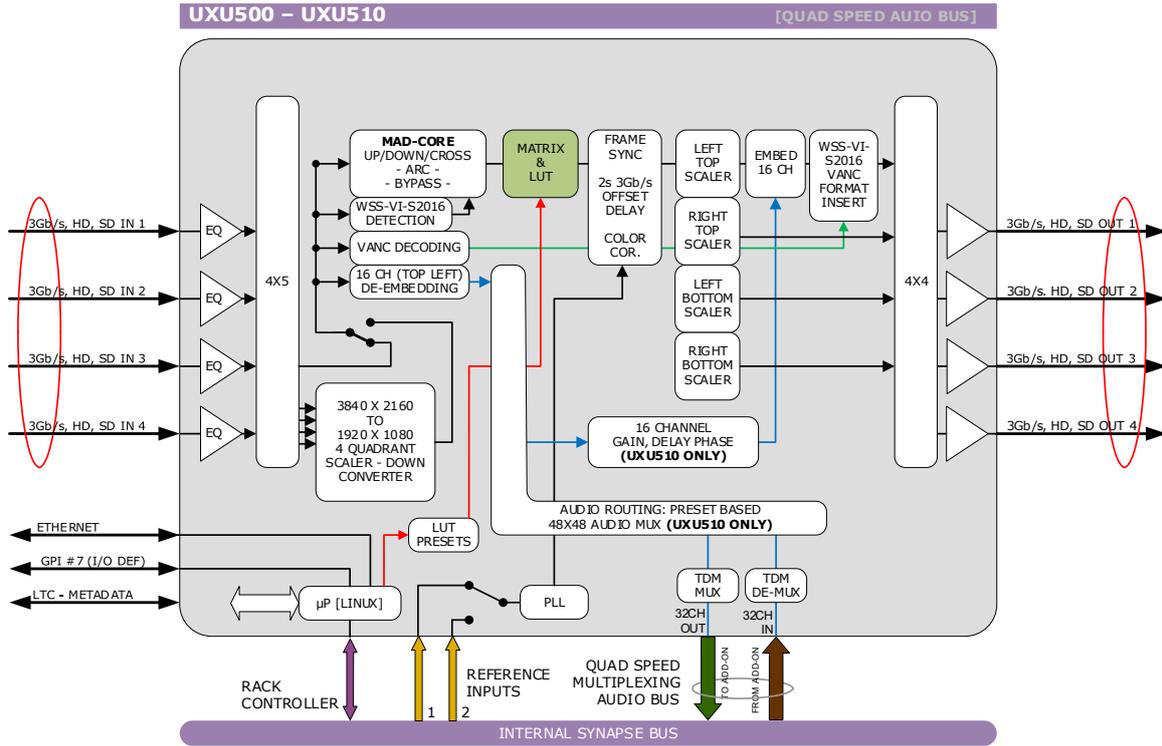
4K (UHD) up/down/cross converter with LUT based HDR converter and with optional audio shuffler

A Synapse® product



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Block schematic & I/O panel



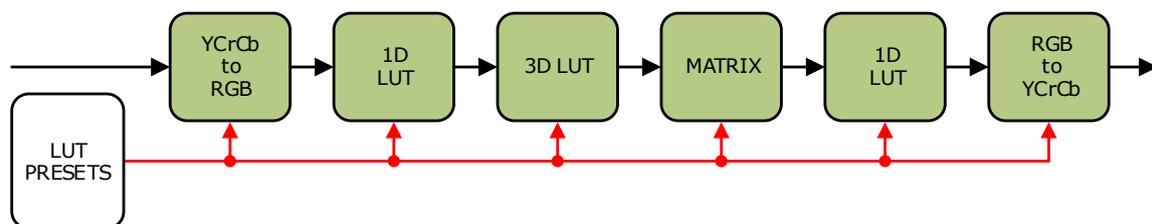
Features

The UXU500/510 is a high end UHD up/down/cross converter. With high quality de-interlacers, and extensively computer optimized scaling and filter algorithms, the new 500 series up/down/cross converters ensure the absolute best quality video conversion from any format to any format within the same framerate. The card allows you to simulcast any output standard in any format from any source standard.

The embedded audio is carried over to the SD, HD, FHD and UHD domain. The appropriate aspect ratio can be applied by control of VI, WSS and GPI inputs by use of 16 presets per output that can store the aspect ratio conversions.

Also included is a 4K 4 wire interface. The UXU500 and UXU510 can up and down convert to and from 4k (3840x2160) over 4 SDI wires.

The difference between the GXG500/510 and UXU500/510 is the addition of a LUT based color space and dynamic range conversion (HDR). The LUT can be stored on 16 presets and selected on the fly. The unit is compatible with standard LUT tables in both 1D as well as 3D format



This topology shows the capability to perform three methods, fully preset based, across modes:

1. YCrCb to RGB > 1D LUT > RGB to YCrCb
2. YCrCb to RGB > 3D LUT > RGB to YCrCb
3. YCrCb to RGB > 1D LUT > Matrix > 1D LUT > RGB to YCrCb

Beside a high quality up/down/cross converter and HDR converter, this module also has very powerful cross-input audio shufflers and proc-amps (510 only). Any of the 48 audio source channels (16 from SDI 1, and 32 from the quad speed audio bus) can be routed to any of the 48 output channels (16 to SDI output 1 and 32 to the quad speed audio bus).

- LUT based Color space and Dynamic range conversion.
- 16 LUT presets for standard LUT tables (.cube, .alut)
- Compatible with 1D and 3D LUTs
- Side by Side split screen mode with slider for evaluation of LUT
- LUT bypass mode
- Compatible with ITU-R BT709 and ITU-R BT.2020 I/O (conversion matrix from YCrCb to RGB and back)
- Industry highest quality de-interlacing algorithm
- 4 SDI inputs
- Medium latency conversion process (2 frames)
- Compatible with the following input (auto selecting) and output formats (only one output standard can be chosen for both outputs simultaneously)
 - 1080p/59.94
 - 720p/59.94
 - 1080p/50
 - 720p/50
 - 1080i/59.94
 - SD525
 - 1080i/50
 - SD625
 - 1080p/29.97
 - 2160/50 UHD
 - 1080p/25
 - 2160/59.94 UHD
- 3Gb/s signals level A and level B compatible (also 4k I/O)
- Frame sync with auto-phaser and control in Frames, Lines and pixels with respect to reference. Delay setting are stored per output format for a constant latency operation.
 - 25 Frames delay offset (per channel) for all 1080 formats
 - 25 Frames delay offset (per channel) for all 720 standards
 - 25 Frames delay offset (per channel) for all SD standards
- All ARC modes contain Anamorphic, Center Cut, V-Zoom, LBox-16:9, LBox-14:9, PBox-4:3, PBox-14:9 and Variable H and V (50-200%)
- 16 free individual programmable preset banks with settings for:
 - Down conversion

- Up conversion
- Cross Conversion
- Transparent pass through (with ARC function)
- Simultaneous VI, WSS and AFD (S2016) insertion
- Embedder shuffling, gain and phase (any to any (in 510 only)
- audio delay setting
- Multiple GPI inputs/outputs with predefined modes:
 - Mode 1 = 16 (4 bit) preset choice + take and 3 GPI outputs)
 - Mode 2 = 8 presets by single GPI trigger
 - Mode 3 = TBD
 - Mode 4 = TBD
- ARC triggers by VI, WSS, WSS-ext and S2016 (AFD)
- Transparent for 16 channels of embedded audio per video channel
- Embedded domain 48x48 routing to and from the individual in/outputs and Quad Speed Audio Bus (510 only)
- Quad Speed Embedding and de-embedding through synapse bus
- Video proc-amp (Y and C control)
- Color corrector (RGB and total gain, RGB and total black)
- Hue control for 59.94 SDI inputs
- Locks to Tri-level, Bi-level or SDI input 1 or 2
- Full control and status monitoring through the front panel of the SFR08/SFR18 frame and the Ethernet port (ACP)

Complementary cards:

- DIO88, DLA44/43/42/41, DAW77/88/99, DSF66, DDP24/94 or any future Quad Speed Bus ADD-ON card

Conversion capabilities

| CONVERSION | | Output | | | | | | | | | | | | | |
|------------|----------------|------------|---------|------------|---------|------------|---------|------------|---------|-----------|--------|-----------|--------|----------------|-------------|
| | | 2160p59.94 | 2160p50 | 1080p59.94 | 1080p50 | 1080p29.97 | 1080p25 | 1080i59.94 | 1080i50 | 720p59.94 | 720p50 | 720p29.97 | 720p25 | 480i59.94(525) | 576i50(625) |
| SDII Input | 2160p59.94 | | | x | | x | | x | | x | | x | | x | |
| | 2160p50 | | | | x | | x | | x | | x | | x | | x |
| | 1080p59.94 | x | | x | | x | | x | | x | | x | | x | |
| | 1080p50 | | x | | x | | x | | x | | x | | x | | x |
| | 1080p29.97 | x | | x | | x | | x | | x | | x | | x | |
| | 1080p25 | | x | | x | | x | | x | | x | | x | | x |
| | 1080i59.94 | x | | x | | x | | x | | x | | x | | x | |
| | 1080i50 | | x | | x | | x | | x | | x | | x | | x |
| | 720p59.94 | x | | x | | x | | x | | x | | x | | x | |
| | 720p50 | | x | | x | | x | | x | | x | | x | | x |
| | 720p29.97 | x | | x | | x | | x | | x | | x | | x | |
| | 720p25 | | x | | x | | x | | x | | x | | x | | x |
| | 480i59.94(525) | x | | x | | x | | x | | x | | x | | x | |
| | 576i50(625) | | x | | x | | x | | x | | x | | x | | x |

Applications

- LUT based color space and Dynamic Range conversion from UHD to HD and back
- High End Truck dual input frame synchronizer and anything to anything converter
- High End Infrastructure up/down/cross conversion
- High End transmission up/cross conversion
- UHD (4k) up and down conversion from and to any supported video standard in the same frequency

Ordering information

Module:

- **UXU500-I/O:** High End 3Gb/s, HD, SD-SDI up/down/cross converter and HDR+WCG conversion
- **UXU510-I/O:** High End 3Gb/s, HD, SD-SDI up/down/cross converter with full audio shuffling and HDR+WCG conversion

Standard I/O:

- **BPH50-PANEL:** I/O panel for UXU500 and UXU510

Relay bypass I/O:

- **BPH55-PANEL:** I/O panel for UXU500 and UXU510

Specifications

Serial video input

| | |
|-------------------------|---|
| Standard | SD,HD and 3Gb/s SDI: SMPTE 292M, SMPTE 259M, SMPTE424 |
| Number of inputs | 4 (+ up to 4 via SFP cage) |
| Connector | DIN 1.0/2.3 |
| Equalization | Typical maximum equalized length of Belden 1694A cable: 90m at 2.97Gb/s, 120m at 1.485Gb/s, and 250m at 270Mb/s |
| Return loss | > 15dB up to 1.5GHz |

Serial video output

| | |
|--------------------------|----------------------------|
| Number of outputs | 4 (+ up to 4 via SFP cage) |
| Connector | DIN 1.0/2.3 |
| Signal level | 800mV nominal |
| DC offset | 0V \pm 0.5V |
| Rise/Fall time | 135ps nominal |
| Overshoot | < 10% of amplitude |
| Return loss | > 15dB up to 1.5GHz (typ) |
| Wideband jitter | < 0.2UI |

Reference Input through RRC

| | |
|-------------------------|--|
| Number of Inputs | 2 on SFR18, 2 on SFR08 and 1 on SFR04 |
| Tri-level | SMPTE274M, SMPTE296M 600 mVp-p nominal, 75 Ohms terminated through loop |
| Bi-level | PAL Black Burst ITU624-4/SMPTE318, Composite NTSC SMPTE 170M 1Vp-p nominal, 75 Ohms terminated through loop |

Miscellaneous

| | |
|------------------------------|---------------------------|
| Weight | Approx. 550g |
| Operating temperature | 0 °C to +40 °C |
| Dimensions | 137 x 296 x 20 mm (HxWxD) |

Electrical

| | |
|----------------|--------------|
| Voltage | +24V to +30V |
| Power | 24W |