

# SEL-1UHD3-x-S

Selenio UHD Up and Down Converter, Frame Sync and Sony IP Live Module



Imagine Communications' Selenio™ Media Convergence Platform offers video conversion modules, enabling the integration of UHD-1 into an HD (High Definition) workflow or HD into a UHD-1 workflow.

The Selenio UHD Up and Down Converter, Frame Sync and Sony IP Live Modules are one-channel video conversion processors. Available as either an up converter processor, or a down converter processor, the addition of a software license option enables the addition of the other functions — offering more flexibility in any system design — or a UHD frame synchronizer, using quad link SDI.

The Selenio UHD up and down conversion modules feature 10-bit motion-adaptive processing to ensure that video conversion maintains the high quality for scaling, de-interlacing/interlacing and color (gamut) processing. The Selenio UHD up and down conversion modules also support the handling of embedded audio. When incorporated in the high-density Selenio MCP platform, this module is ideally suited for media companies as they roll out UHD TV to their customers.

As the transition to IP takes place, the SEL-1UHD3-SIPL-S module enables the addition of UHD-1/4K into the live production workflow, using Sony's Networked Media Interface (NMI) for fixed and mobile facilities. It is an HD and UHD-1 gateway module for use in hybrid single and quad-link SDI and 10GbE infrastructures using the IP Live mezzanine video format. Processing includes HD to UHD-1 and UHD-1 to HD video conversion with pass through, IP Live encoding/decoding, video and audio processing controls, and synchronization for non-synchronous signals.

## Features

### SEL-1UHD3-U-S UHD Up Conversion

- Single channel 3G/HD/SD-SDI input
- UHD-1 Quad Link UHD-1 output
- Quad link UHD pass through mode
- 10 bit, motion adaptive de-interlacing and scaling
- 2SI two sample interleave or SQD square division output selectable
- Level A or Level/B-DL for 1080p 3 Gb/s SDI links
- Built-in frame sync with embedded audio processing
- Color space conversion from rec. 709/601 to rec. 2020
- Closed Caption and Teletext (OP-47) VANC support from HD to UHD
- Optional SELOPT-UHD3-SK-D software license adds the UHD-1 down conversion mode
- Optional SELOPT-UHD3-SK-FS software license adds the UHD-1 frame sync mode

### SEL-1UHD3-D-S UHD Down Conversion

- Single channel Quad Link UHD-1 input

- 3G/HD/SD-SDI output
- 10 bit, motion adaptive scaling and interlacing
- 2SI two sample interleave or SQD square division input selectable
- Level A or Level/B-DL for 1080p 3 Gb/s SDI links
- Built-in frame sync with embedded audio processing
- Color space conversion from rec. 2020 to rec. 709/601
- Closed Caption and Teletext (OP-47) VANC support from UHD to HD
- Optional SELOPT-UHD3-SK-U software license adds UHD-1 up conversion mode
- Optional SELOPT-UHD3-SK-FS software license adds UHD-1 frame sync mode

#### SEL-1UHD3-FS-S UHD Frame Sync

- Single channel Quad Link UHD-1 frame sync with embedded audio processing
- 2SI two sample interleave to/from SQD square division re-mapping
- Level A or Level B-DL for 1080p 3 Gb/s SDI links
- Optional SELOPT-UHD3-SK-U software license adds the UHD-1 up conversion mode
- Optional SELOPT-UHD3-SK-D software license adds the UHD-1 down conversion mode

#### SEL-1UHD3-SIPL-S UHD Sony IP Live Compression with Up/Down Conversion and Frame Sync

- UHD low latency, visually lossless mezzanine video compression
- 2SI two sample interleave and SQD square division video formats supported Note: Sony IP Live Sub-module only processes 2SI
- Sony IP Live UHD encoding/decoding with SQD <-> 2SI remapping as required
- UHD up conversion with Sony IP Live encoding
- Sony IP Live decoding with UHD down conversion
- Input detection for frame sync and up conversion modes
- Video and audio synchronization
- Color space conversion between rec. 709/601 and rec. 2020

## Details

When UHD-1 is an uncompressed video signal, a quad link baseband SDI interconnection is used with four 3 Gb/s SDI connections for a resultant speed (bandwidth) of 12 Gb/s. The input to the up converter and output from the down converter is a single link baseband SDI connection with video formatted as HD (or SD) for connection into existing HD (or SD) devices.

There are several types of UHD-1 interfaces: Level A, Level B-DL (Dual Link), SQD (Square Division) quad-split and 2SI (Two Stream Interleave). All these various interfaces can be detected at the input of the down converter and selected by the user as required at the output for the up converter.

When HD (or SD) content is up converted to UHD-1, the color volume will be ITU rec. 709 (ITU rec. 601 for SD) so as not to alter the original content. When UHD content is down converted to HD/SD, the color volume will be limited to ITU rec. 709 (ITU rec. 601 for SD).

The user has video proc amp, color correction, clipping and aspect ratio controls and an integrated frame sync with timing controls, offering the capability to time the up converted video output to other UHD sources in production or master control switchers, or time the down converted output to other HD/SD sources in production or master control switchers.

Not only is video converted and processed as required, but embedded audio can be processed with user control for audio level and lip sync corrections (audio gain, invert, delay).

## Specifications

### 3G/HD/SD-SDI VIDEO INPUT

Number of inputs	4
Standard	1080p (SMPTE 424M) 3G HD-SDI * 1080i/p (SMPTE 292M) HD-SDI 720p (SMPTE 296M) HD-SDI 525/625 component (SMPTE 259M-C, 270 Mb/s) SD-SDI
Frame Rate	1080i/p/psf: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 Hz 720p: 50, 59.94, 60 Hz 525/625
Connector	(High-Density) HD-BNC
Impedance	75 ohms
Return loss	>15 dB to 1485 MHz >10 dB from 1485 to 2790 MHz
Equalization	3G: Adaptive cable equalization for up to 459 ft (140 m), typical, of Belden 1694A coaxial cable; 328 ft (100 m), typical HD: Adaptive cable equalization for up to 656 ft (200 m) typical, of Belden 1694A coaxial cable; 524 ft (160 m), typical SD: Adaptive cable equalization for up to 984 ft (300 m) typical, of Belden 8281 coaxial cable; 1,312 ft (400 m), typical, of 1694A Belden 1694A coaxial cable

\* Support for SMPTE 372M Level B (1080p50/59/60DL)

The SEL-1UHD3-D-S uses an extended 3G-reach equalization. When combined with Belden 8281 coaxial cable, a pathological pattern, and a non-SMPTE424 (6.1.7)-compliant signal with excessive output amplitude excursions, the source equalization may be reduced to between 200 and 300 m for SD-SDI signals. This condition typically only occurs with older SD-SDI equipment having a 1 $\mu$ F capacitor on the output. All recent and multi-rate SD/HD/3G-SDI equipment is compliant with the standard (having at least a 4.7 $\mu$ F capacitor on the output), and can achieve 300 m with 8281 cable and pathological pattern.

### 3G/HD/SD-SDI VIDEO OUTPUT

Number of outputs	4
Standard	1080p (SMPTE 424M) 3G HD-SDI 1080i/p (SMPTE 292M) HD-SDI 720p (SMPTE 296M) HD-SDI 525/625 component (SMPTE 259M-C, 270 Mb/s) SD-SDI
Frame Rate	1080i/p/psf: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 Hz 720p: 50, 59.94, 60 Hz 525/625
Connector	(High-Density) HD-BNC
Impedance	75 ohms
Return loss	>15 dB to 1485 MHz >10 dB from 1485 to 2790 MHz
Signal level	800 mV $\pm$ 10%
DC offset	0.0V $\pm$ 0.5 V
Rise and Fall Time	3G: <135 ps HD-SDI: <270 ps SD-SDI: 400 to 1500 ps
Overshoot	<10%
Jitter	Timing jitter: 3G HD-SDI: <2 UI pk-to-pk (>10 Hz) HD-SDI: <1 UI pk-to-pk (>10 Hz) SD-SDI: <0.2 UI pk-to-pk (>10 Hz) Alignment jitter: 3G HD-SDI: <0.3 UI pk-to-pk (>100 Hz) HD-SDI: <0.2 UI pk-to-pk (>100 Hz) SD-SDI: <0.2 UI pk-to-pk (>1 kHz)

### GPI INPUTS AND OUTPUTS

Connector	Samtec TFM-110-01-L-D-RE1-WT 20 pin connector
Number of inputs/outputs	6 (configurable GPI)
Logic Level	+5V TTL

### RS-232/422/485

Number of Rx Ports	1 RS-422/485 or RS-232
Number of Tx Ports	1 RS-422/485 or RS-232
Standard Electrical specification	EIA-232-C, EIA-422-B, EIA-485-A, RS-232/422/485 switchable from user control, RS-422 termination through jumpers

## OP+SFP+TRSM+10G SINGLE MODE OPTICAL TRANSCEIVER

### Transmitter

Parameter	Minimum	Typical	Maximum	Unit	Notes
Laser OMA Output Power	-5.2			dBm	1
Laser Mean Output Power	-8.2		+0.5	dBm	1
Laser Off Power			-30	dBm	1
Extinction Ratio	3.5			dB	1
Transmitter and Dispersion Penalty (TDP)			3.2	dB	1
Center Wavelength	1260		1355	nm	1
Optical Return Loss Tolerance			12	dB	1

## OP+SFP+TRMM+10G MULTI MODE OPTICAL TRANSCEIVER

### Transmitter

Parameter	Minimum	Typical	Maximum	Unit	Notes
Laser OMA Output Power	-4.3			dBm	1
Laser Mean Output Power			-1.0	dBm	1
Laser Off Power			-30	dBm	1
Extinction Ratio	3.0			dB	1
Transmitter and Dispersion Penalty (TDP)			3.9	dB	1
Center Wavelength	840		860	nm	1
Optical Return Loss Tolerance			12	dB	1

## Ordering Information

SEL-1UHD3-FS-S	Single channel Quad Link UHD-1 frame sync with embedded audio processing, includes front and single back module with four HD-BNC input connectors, four HD-BNC output connectors, GPI and serial data port, optional SELOPT-UHD3-SK-U software license adds the UHD-1 up conversion mode, optional SELOPT-UHD3-SK-D software license adds the UHD-1 down conversion mode
SEL-1UHD3-U-S	Single channel 3G/HD/SD-SDI to UHD-1 Quad Link UHD-1 up conversion with embedded audio processing, includes front and single back module with four HD-BNC input connectors, four HD-BNC output connectors, GPI and serial data port, optional SELOPT-UHD3-SK-D software license adds the UHD-1 down conversion mode, optional SELOPT-UHD3-SK-FS software license adds the UHD-1 frame sync mode
SEL-1UHD3-D-S	Single channel Quad Link UHD-1 to 3G/HD/SD-SDI down conversion with embedded audio processing, includes front and single back module with four HD-BNC input connectors, four HD-BNC output connectors, GPI and serial data port, optional SELOPT-UHD3-SK-U software license adds UHD-1 up conversion mode, optional SELOPT-UHD3-SK-FS software license adds UHD-1 frame sync mode
SEL-1UHD3-SIPL-S	Single channel Quad Link UHD-1 to/from 3G/HD/SD-SDI down/up conversion and frame sync with embedded audio processing, and Sony Networked Media Interface (NMI) for mezzanine compression over IP, includes front and single back module with four HD-BNC input connectors, four HD-BNC output connectors, and two SFP+ interfaces

## SOFTWARE LICENSE OPTION

SELOPT-UHD3-SK-D	Software license to add the UHD-1 down conversion mode to the SEL-1UHD3-U-S and SEL-1UHD3-FS-S
SELOPT-UHD3-SK-FS	Software license to add the UHD-1 frame sync mode to the SEL-1UHD3-U-S and SEL-1UHD3-D-S
SELOPT-UHD3-SK-U	Software license to add the UHD-1 up conversion mode to the SEL-1UHD3-D-S and SEL-1UHD3-FS-S

## ACCESSORIES

SELOPTCAB-HD-BNC-V	HD-BNC Plug to BNC Jack Adaptor Cable for Video (12" / 0.3m)
SELOPT-TOOL-CABLE	HD-BNC Cable Insertion and Extraction Tool

## SELENIO MCP3 FRAMES, CONTROLLER(S), POWER SUPPLY(S)

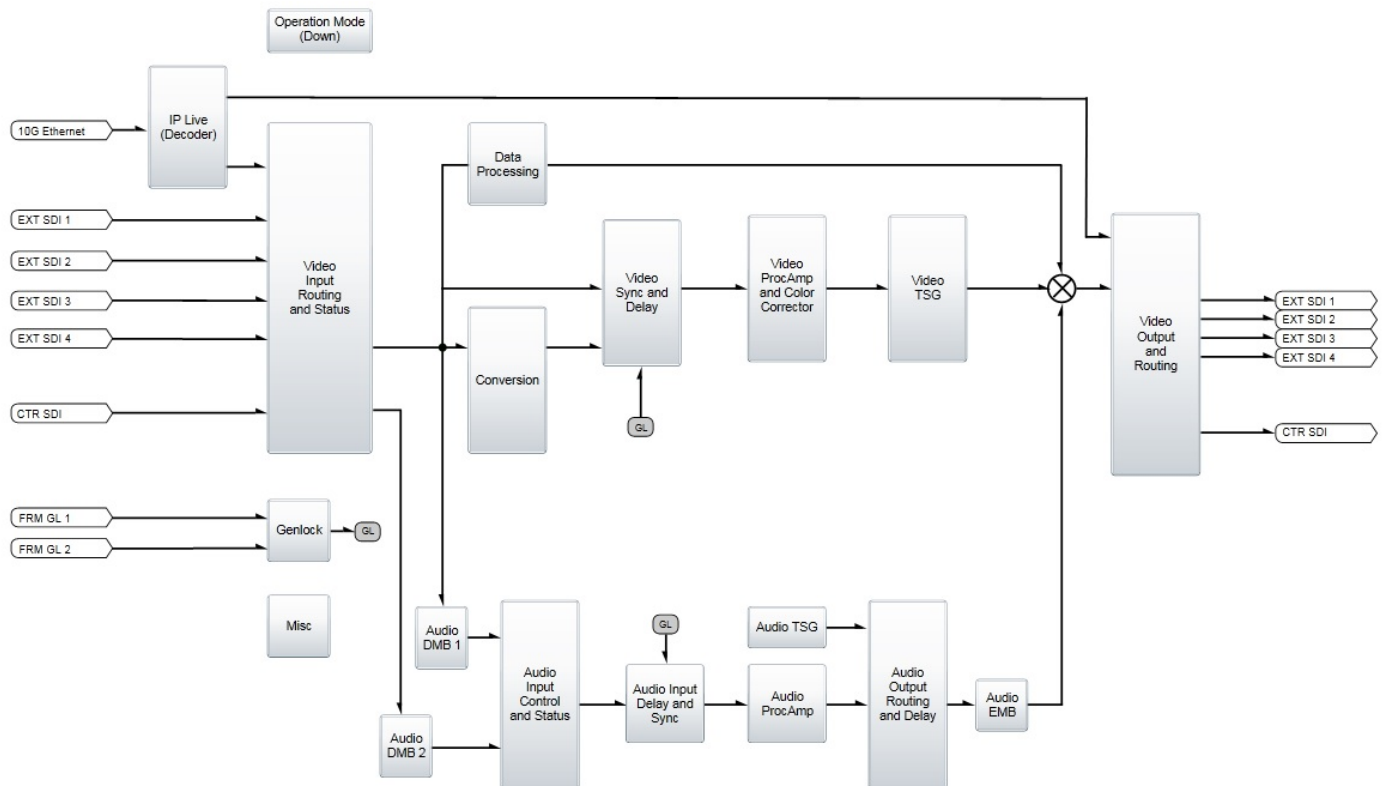
SEL-FR3-AC-RR	Selenio 3RU Frame: one AC PSU, two external reference looping BNC inputs, one controller (one RJ45 for control / monitoring, one RJ45 for data (video IP sub module required)), no control panel
SEL-FR3-AC-RR-R	Selenio 3RU Frame: two AC PSU, two external reference looping BNC inputs, two controllers (each one RJ45 for control / monitoring, each one RJ45 for data (video IP sub module required)), no control panel
SEL-FR3-AC-RR-IP-R	Selenio 3RU Frame: two AC PSU, two external reference looping BNC inputs, two controllers (each one RJ45 for control / monitoring, each one RJ45 for data (video IP sub module included)), includes control panel

## SMALL FORM-FACTOR PLUGGABLE

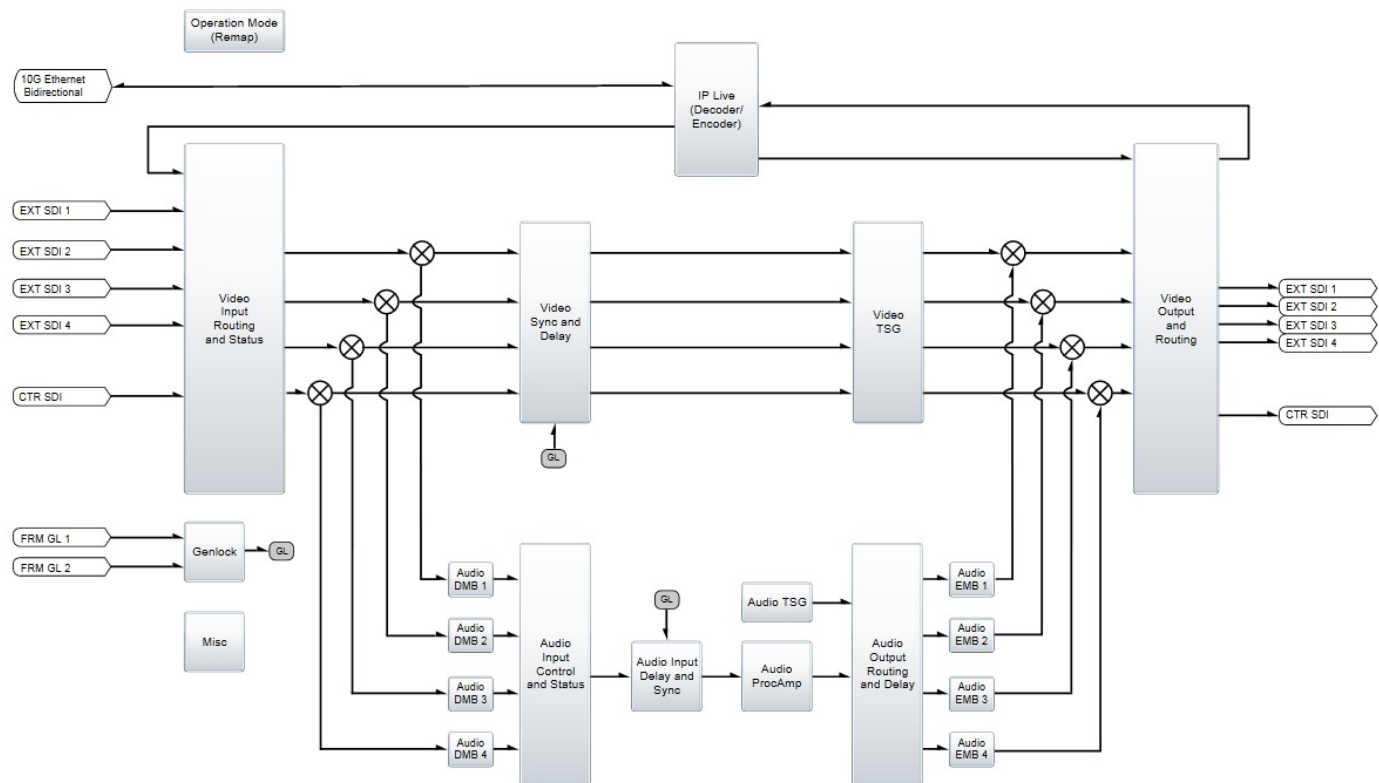
SEL+AOC+10G	10GbE Small Form Factor Pluggable SFP+ transceiver Direct Attach Active Optical Cable, designed for high speed, short range data link.
OP+SFP+TRSM+10G	SFP+ transceiver. 10-Gigabit Ethernet links up to 10km over Single Mode fiber.
OP+SFP+TRMM+10G	10BASE-SR Fiber Enhanced Small Form Factor Pluggable SFP+ transceiver. 10-Gigabit Ethernet links over multimode fiber. Maximum link length of 300m on 2000 MHz-km MMF.



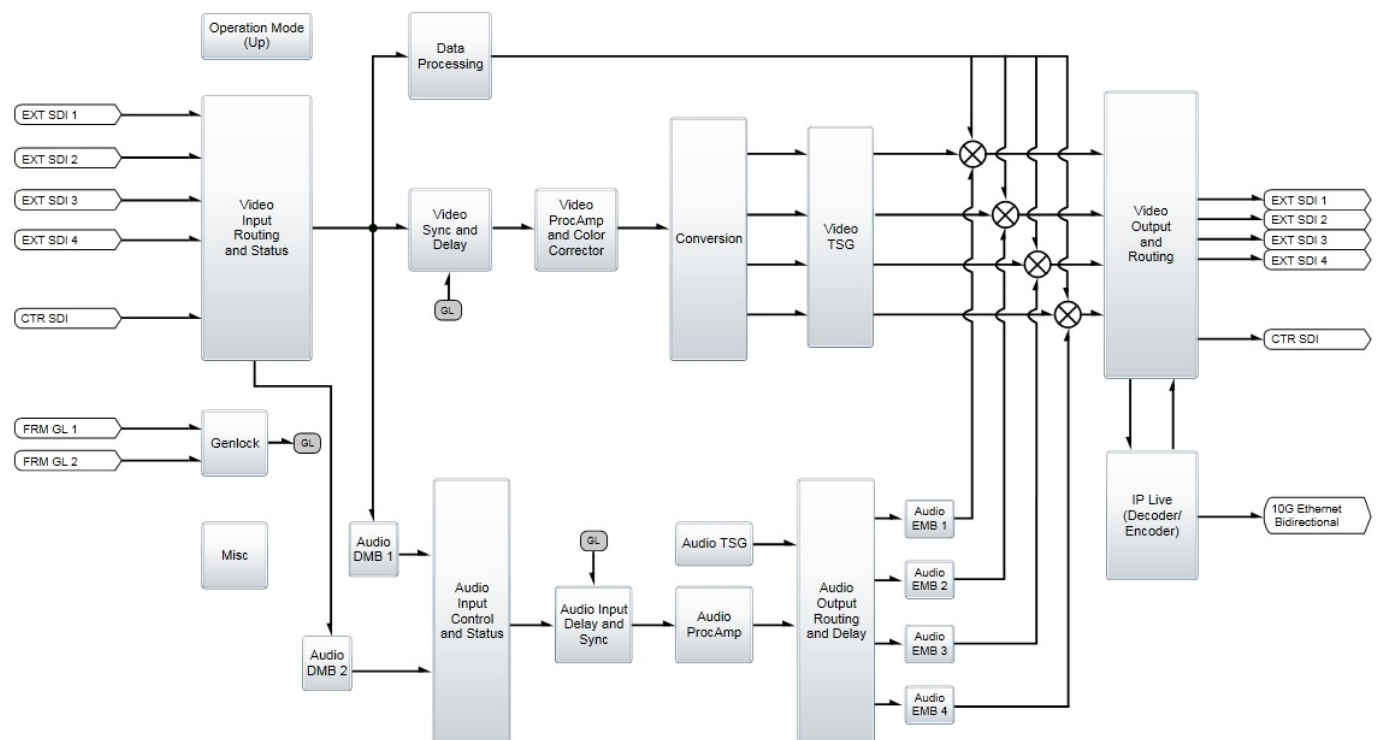
## SEL-1UHD3-Sony IP Live Downconverter Signal Flow



## SEL-1UHD3- Sony IP Live Remap Signal Flow

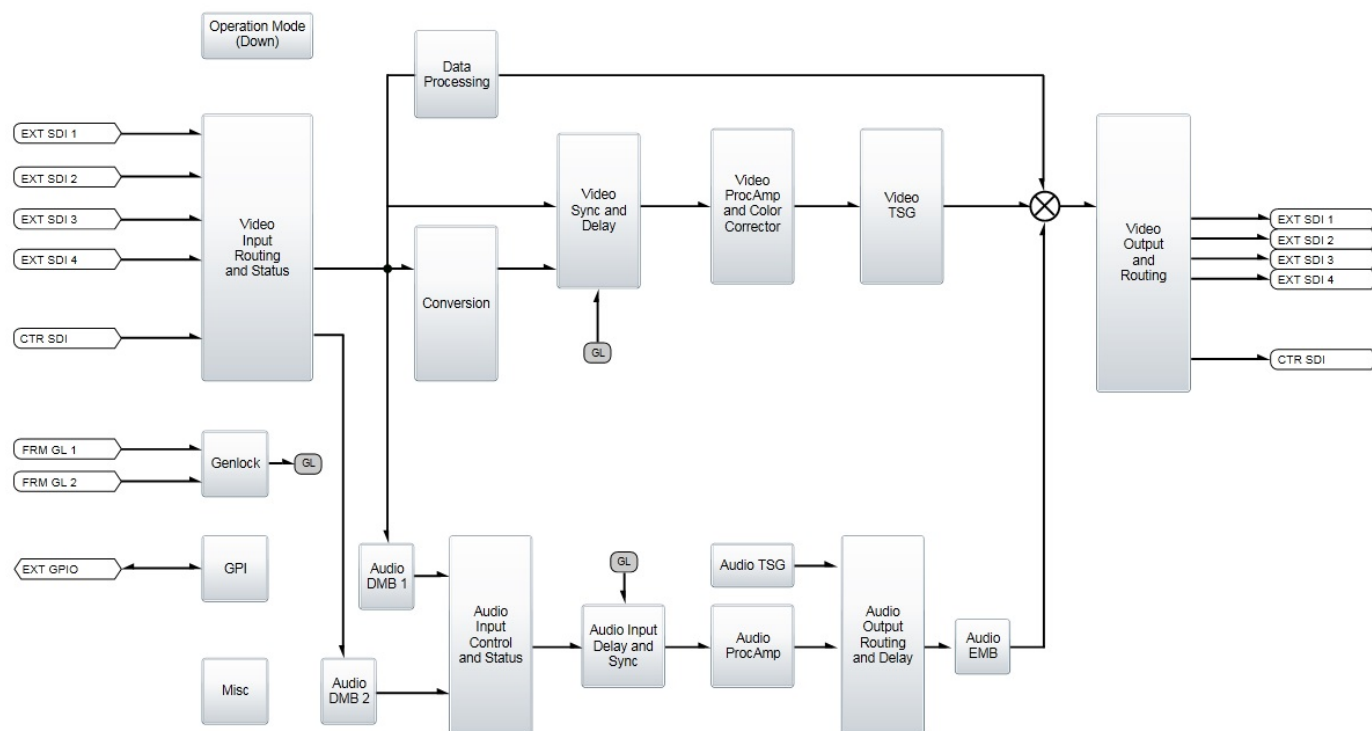


## SEL-1UHD3-Sony IP Live Upconverter Signal Flow

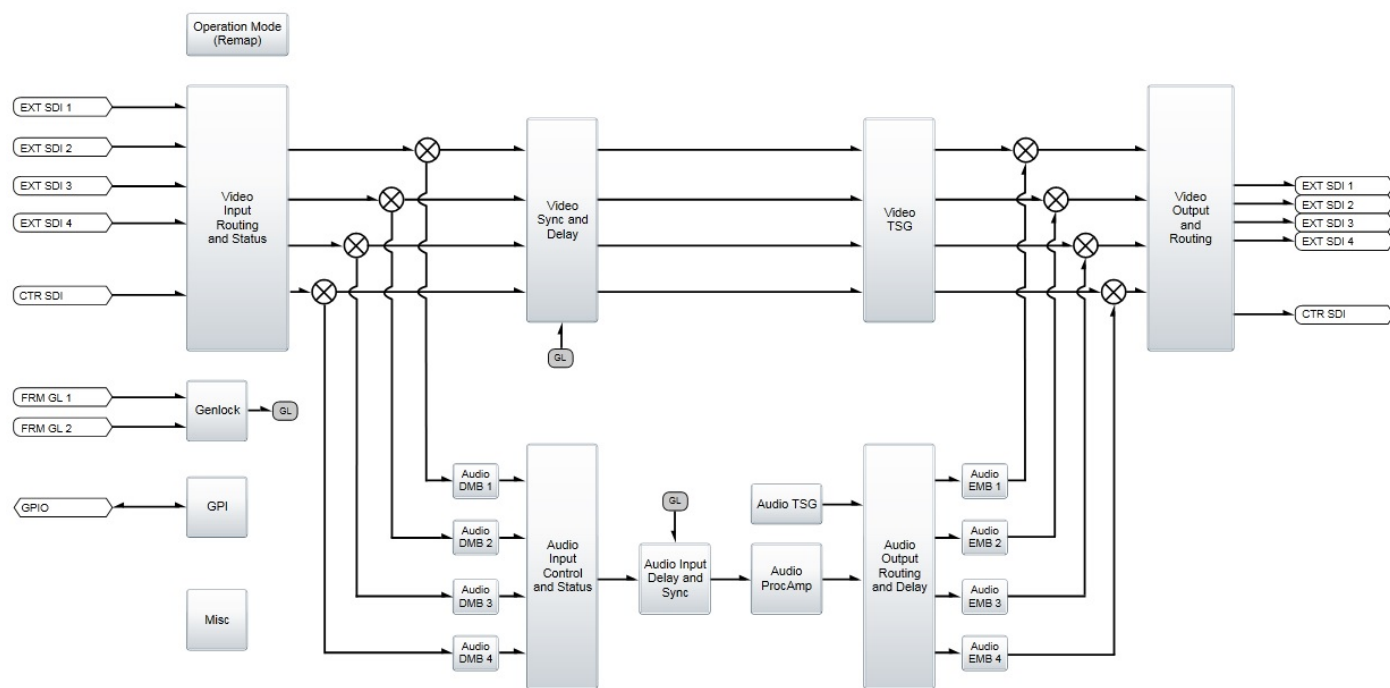




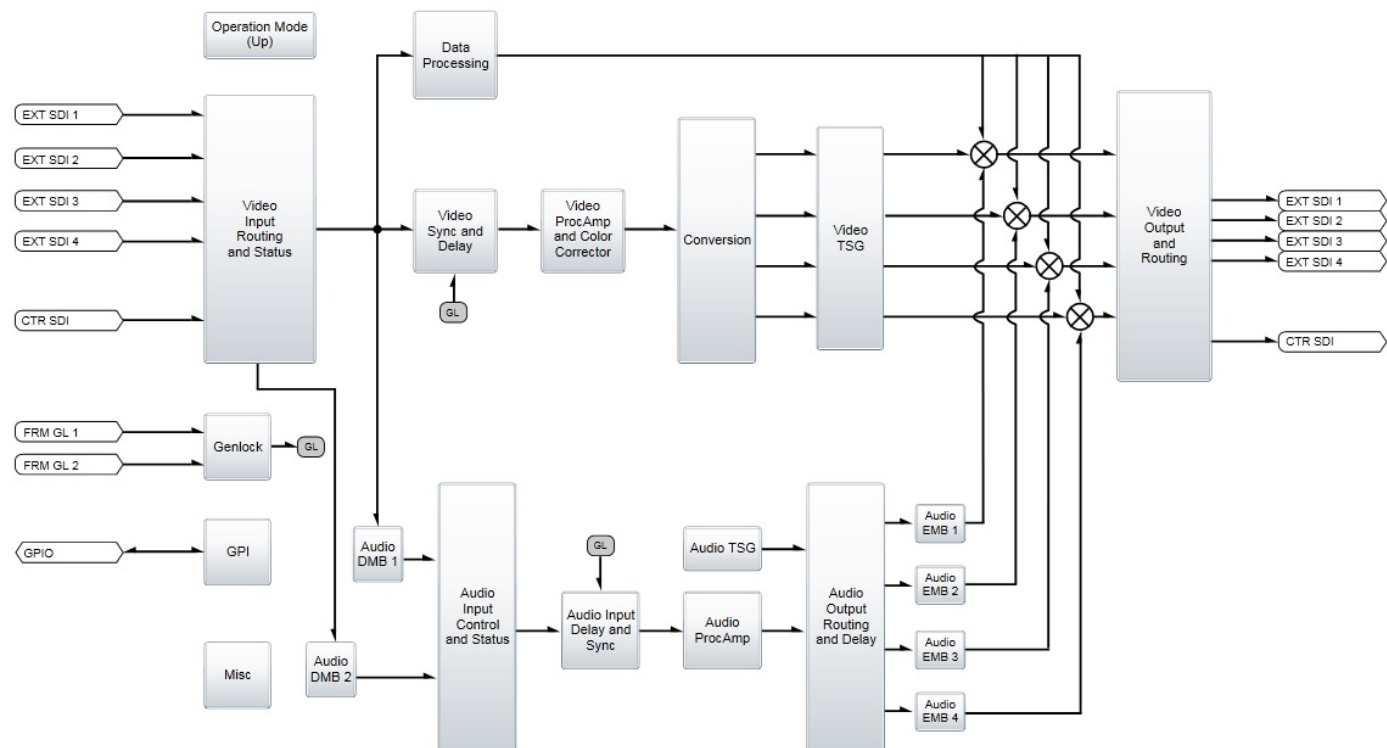
## SEL-1UHD3 Downconverter Signal Flow



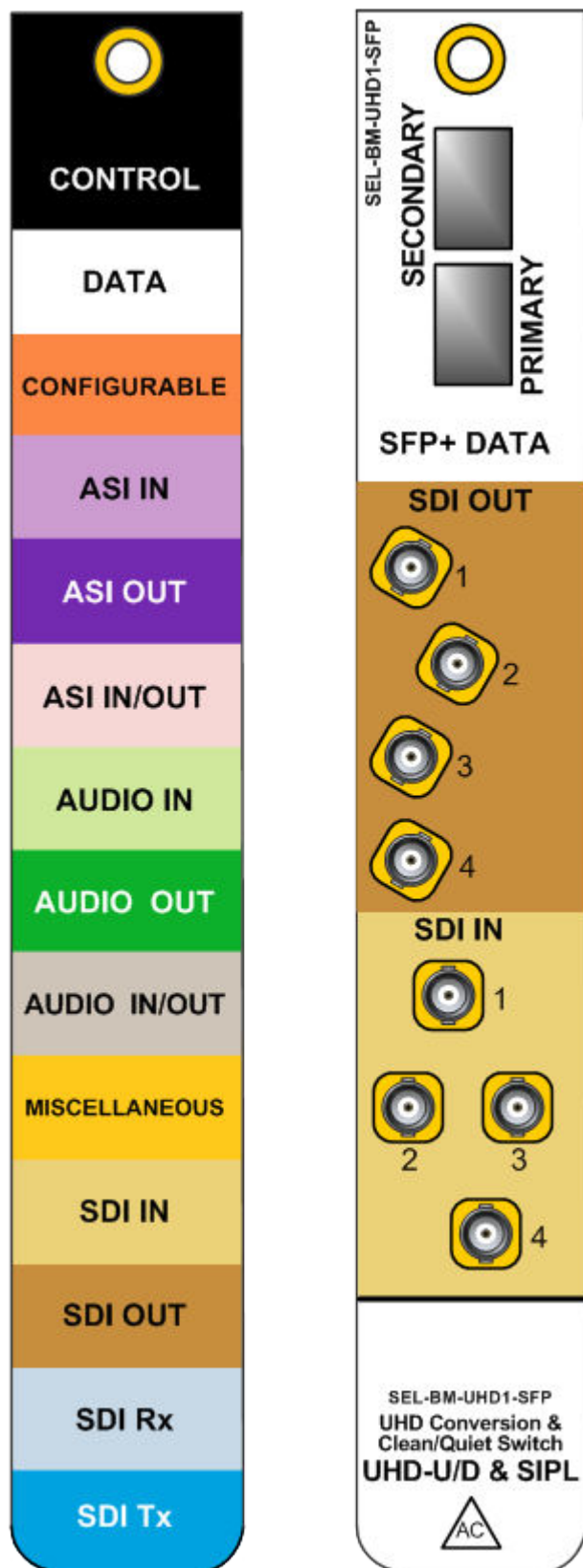
## SEL-1UHD3 Remap Signal Flow



## SEL-1UHD3 Upconverter Signal Flow



# SEL-1UHD3-SIPL-S Back Module and Color Palette



## SEL-1UHD3-(U/D/FS)-S Back Module and Color Palette

