

# Selenio X50™

## Intelligent Frame Synchronizer and Converter



Imagine Communications continues to set the standard for innovative, top-performing processors - the Selenio X50™ intelligent frame synchronizer and converter. This best-in-class, single-channel input with two processed outputs delivers the exceptional quality and functionality that have come to define the popular and award-winning Imagine Communications series of 1RU processors, which also includes the Selenio X85™.

The Selenio X50 is compact and cost-effective, yet feature-rich, offering an array of analog and digital baseband video and audio processing capabilities. This 1RU frame synchronizer/converter effectively and reliably supports standard-definition and high-definition formats, including built-in 3 Gb/s 1080p Level A and Level B-DL processing and 3DTV capabilities for hybrid television and production systems. With easy-to-use controls, the Selenio X50 comes standard with a myriad of features, including color correction, closed caption/teletext capabilities, control and monitoring via a built-in Silverlight web server, active format description (AFD) support, two fully controllable aspect ratio converters and 24-channel internal audio processing. Available options include CWDM fiber input and output (transceiver) plug-ins, Dolby® Digital and Dolby® E codecs, DTS Neural Surround™ Up/Down Mix, Multimerge and DTS Neural Loudness Control options.

The unique Rules Engine capability puts custom video and audio signal management into the hands of the user so that specially modified code does not need to be uploaded. Any video and/or audio input scenario can be detected with the user determining processing required for the output.

The powerful, affordable and energy-efficient Selenio X50 processor can easily be incorporated into the workflow of any broadcast environment — from small stations and OB vans to production studios and networks. Frame sync, proc amp and color correction capability for all 1080p/psf production formats (23.98, 24, 25, 29.97, 30) is now available with a basic frame rate converter that can be used either for graphics, or as a low-cost backup for linear or motion-compensated frame rate conversion in a critical path

## Features

- Intelligent frame sync/delay, proc amp, noise reduction, clipping and color correction
- Rules Engine for custom signal flow management
- Line sync and time base corrector (TBC) and “lock to input” modes
- 3DTV-capable
  - Left/right eye to frame compatible side/side, top/bottom output
  - Frame compatible side/side, top/bottom input to left/right eye output
- Advanced 3D adaptive 10-bit motion detection for up/down/cross/aspect ratio conversion
- Two switchable auto-sensing 3G/HD/SD inputs
- Up/down/cross/aspect ratio conversion with two simultaneous, independent output formats
- Noise reduction (mosquito), sharpness and texture controls
- Two aspect ratio converters with full control over H/V size and position
- Audio de-embed/embed, sync, gain, invert and delay with 16 channels (four groups) processing
  - PCM and non-PCM (Dolby® Digital, Dolby® E) passthrough
  - Options for Dolby® Digital, Dolby® E decode and encode (up to 2 Dolby decoders or encoders)
  - Options for DTS Neural Upmix, Downmix, Multimerge and DTS Neural Loudness Control
- Video Interfaces:
  - Analog composite
    - 3D adaptive comb filter 12-bit color decoder
  - Analog component
    - YPrPb input and output (HD and SD)
    - RGB output
  - Auto-sensing for SD-SDI, HD-SDI, 3G-SDI
  - EDH/CRC error monitoring and insertion
  - HDMI output for video
- Audio Interfaces:
  - Eight-channel analog audio
  - Four groups embedded audio
  - Four AES (75 ohms) inputs
- Data and Metadata:
  - CC (CEA608/708) and Teletext (OP47)
  - Audio metadata VANC embed/de-embed, generator, serial input/output
  - AFD/Wide Screen Signaling (WSS)/VI
  - Pass one DID/SDID when converting video

- Control and Monitoring:
  - 100/100 Ethernet connectivity
  - SNMP
  - Built-in web server
  - Local control panel
- CCS™-compliant for use with Magellan CCS™ software:
  - Selenio X85 control panels
  - Magellan™ network control panels
  - Magellan CCS software
  - Four GPI inputs and outputs
- Optional fiber input and output
- 3 Gb/s and 3DTV
- Built-in video test and audio tone generators
- Redundant power supply
- Logo generator/insertter
- I-Wings side bar insertion when up converting
- SD memory card for presets
- Optional MAGELLAN and X85-RCP remote panels for control and monitoring

## Specifications

Specifications and designs are subject to change without notice.

VIDEO INPUTS	
<b>3G/HD/SD-SDI</b>	
Number of Inputs	2
Standard	3 Gb/s: SMPTE 424M (2.97, 2.97/1.001 Gb/s) SMPTE 425 Level A, Level B-DL (YCrCb, 4:2:2, 10-bit with 16 channels of embedded audio) HD: SMPTE 292M (1.485, 1.485/1.001 Gb/s) SD: SMPTE 259M-C (270 Mb/s, 525/625 component video)
Connector	BNC (IEC 169-8)
Impedance	75 ohms
Return Loss	>10 dB, typical, from 5 to 2970 MHz >15 dB, typical, from 5 to 1485 MHz >15 dB, typical, from 5 to 270 MHz
Equalization	3 Gb/s: adaptive cable equalization for up to 164 ft (50 m), typical, of Belden 1694A coaxial cable HD: adaptive cable equalization for up to 492 ft (150 m), typical, of Belden 1694A coaxial cable SD: >23 dB Belden 8281 coaxial cable

FIBER INPUT SPECIFICATIONS (OP+SFP+TR13P MODULE)				
Item	Minimum	Typical	Maximum	Note*
Number of LC connector inputs			1	
Input wavelength	1260 nm		1620 nm	
Optical power monitor accuracy	-2 dB	0	2 dB	
Sensitivity at 270 Mb/s (SMPTE 259M)	-	-22 dBm	-20 dBm	Pathological
Sensitivity at 1.5 Gb/s (SMPTE 292M)	-	-22 dBm	-19 dBm	Pathological
Sensitivity at 3 Gb/s (SMPTE 424M)	-	-19 dBm	-18 dBm	Pathological
Overload	0 dBm			BER = 1E-12 against SDI matrix check field signals for video applications. BER = 1E-12 against PRBS 223-1 for datacom applications

S-VIDEO	
Standard	NTSC, PAL-B, PAL-M
Connector	4-pin DIN

**ANALOG COMPOSITE**

Standard	NTSC (SMPTE 170M), PAL-B (ITU 624-2), PAL-M, PAL-I
Connector	BNC (IEC 169-8)
Input Level	1 V pk-pk
Impedance	75 ohms
Return Loss	>40 dB, 0.1 to 6 MHz
Common Mode Range	5 V
CMRR	60 dB @ 50/60 Hz, 5 V pk-pk
Processing	3D adaptive comb filter, 12-bit

**COMPONENT**

Format	Betacam/SMPTE
Connector	BNC (IEC 169-8)
Input Level	1 V pk-pk
Impedance	75 ohms
Return Loss	>40 dB, 1 kHz to 6 MHz

**GENLOCK**

Connector	BNC (IEC 169-8)
Impedance	75 ohms
Return Loss	>40 dB, typical to 6 MHz >35 dB, typical to 30 MHz
Common Mode Range	5.5 V pk-pk
CMRR	60 dB @ 60Hz, 5 V pk-pk
Input Level	1 V pk-pk -5.0 to +6.0 dB for NTSC/PAL-B $\pm$ 300 mV -3.5 to +6.0 dB for tri-level sync: 1080i: 59.94/50 1080p: 29.97/25
Signal Type	NTSC/PAL-B analog composite $\pm$ 300 mV tri-level sync
Standard	SMPTE 170M (NTSC) ITU-R BT.470-6 (PAL-B) SMPTE 274M (1080i, 1080p)

**VIDEO OUTPUTS****3G/HD/SD-SDI**

Number of Outputs	2
Standard	3 Gb/s: SMPTE 424M (2.97, 2.97/1.001 Gb/s), SMPTE 425 Level A, Level B-DL (YCrCb, 4:2:2, 10-bit with 16 channels of embedded audio) SMPTE 352 VPID HD: SMPTE 292M, SMPTE (1.485, 1.485/1.001 Gb/s), SMPTE 352 VPID SD: SMPTE 259M-C (270 Mb/s, 525/625 component video)
Connector	BNC (IEC 169-8)
Impedance	75 ohms
Return Loss	>10 dB, typical, from 5 to 2970 MHz >15 dB, typical, from 5 to 1485 MHz >20 dB, typical, from 5 to 270 MHz
Signal Level	800 mV $\pm$ 10%
DC Offset	0 $\pm$ 0.5 V
Rise and Fall Time	3 Gb/s: <135 ps (20% to 80%) HD: <270 ps (20% to 80%) SD: 400 to 1500 ps (20% to 80%)
Overshoot	<10% of amplitude (all outputs terminated)
Jitter	Timing: 3 Gb/s: <2 UI pk-pk HD: <1 UI pk-pk SD: <0.2 UI pk-pk Alignment: 3 Gb/s: <0.3 UI pk-pk HD: <0.2 UI pk-pk SD: <0.2 UI pk-pk

**FIBER OUTPUT SPECIFICATIONS (OP+SFP+TR13P MODULE)**

Item	Minimum	Typical	Maximum	Note*
Number of LC connector outputs			1	
Standards	3 Gb/s: SMPTE 424M HD: SMPTE 292M SD: SMPTE 259M			
Peak wavelength	1280 nm	1310 nm	1340 nm	Measured at 25° C
Spectrum width (RMS)		1.5 nm	3 nm	
Average output power	-7 dBm		0 dBm	
Optical rise/fall time (3 Gb/s HD-SDI)		105/120 ps	165/180 ps	
Extinction ratio	5 dB	7 dB		
Jitter		<110 ps	180 ps	SD-SDI pathological
	<60 ps	100 ps	1.5 Gb/s SDI pathological	
	<45 ps	70 ps	3 Gb/s HD-SDI pathological	
Laser safety level	Class 1			

**HDMI**

Number of Outputs	1
Standards	525, 625, 1080i/59.94, 1080i/50, 1080p/23.98/50/59.94, 720p/59.94, 720p/50
Connector	HDMI
Compliance	HDMI 1.3

S-VIDEO	
Standard	NTSC, PAL-B, PAL-M
Connector	4-pin DIN
COMPOSITE	
Standard	NTSC, PAL-B, PAL-M, PAL-I
Connector	BNC (IEC 169-8)
Quantization	12 bits
Impedance	75 ohms
Return Loss	>40 dB, 0.1 to 6 MHz
Frequency Response	-1.6 dB at 6 MHz
DC Offset	<0.5 mV
Differential Gain	<0.5%
Differential Phase	<0.5°
Y/C Delay	<10 ns (NTSC) <23.1 ns (PAL)
Y/C Gain	<1%, typical
Transient Response	<0.5% K Factor
SNR	>63 dB, 0.1 to 6 MHz

COMPONENT	
Format	Betacam/SMPTE/RGB
Connector	BNC (IEC 169-8)
Quantization	12 bits
Impedance	75 ohms
Return Loss	>40 dB, 1 kHz to 6 MHz
Frequency Response	Y: $\pm 0.5$ dB to 5.5 MHz Pb/Pr: -3.27 dB to 3 MHz
DC Offset	<0.0 $\pm 5$ mV
Relative Delay	< $\pm 10$ ns
SNR	>63 dB, typical, luma ramp

AUDIO INPUTS	
AES/DARS	
Number of Inputs	4 AES, 1 DARS
Standard	AES3, SMPTE 276M
Type	Unbalanced, AC coupled
Connector	1.0/2.3 DIN
Sensitivity	<100 mV
Impedance	75 ohms
Return Loss	>25 dB, 0.1 to 6 MHz
Input Audio Rate	16 to 96 kHz
Channel Status and User Bit	Maintained, but professional mode, 48 kHz

ANALOG	
Number of Inputs	8 mono channels
Type	Balanced
Connector	DB-25, Tascam-style cable snake for balanced 8-channel audio
Input Audio Level	28 to 12 dBu (adjustable in .5 dB increments)
Input Impedance	High-impedance or 600 ohms, jumper selectable
CMRR	>80 dB @ 60 Hz, typical

## AUDIO OUTPUTS

AES	
Number of Outputs	4
Standard	AES3, SMPTE 276M
Type	Unbalanced, AC coupled
Connector	1.0/2.3 DIN
Signal Level	1 V $\pm$ 10% (pk-pk)
Impedance	75 ohms
Return Loss	>25 dB, 0.1 to 6 MHz
Jitter	<20 ns
DC Offset	0.0 $\pm$ 50 mV
Rise and Fall Time	30 to 44 ns (10% to 90%)
Audio Rate	48 kHz
Bits	24, 20 or 16
Channel Status and User Bit	Maintained, but professional mode, 48 kHz

## ANALOG

Number of Inputs	8 mono channels
Type	Balanced
Connector	DB-25, Tascam-style cable snake for balanced 8-channel audio
Output Audio Level	28 to 16 dBu (adjustable in 2 dB increments)
Output Impedance	66 ohms
Frequency Response	0.15 dB, 20 Hz to 20 kHz
THD	$\geq$ 80 dB, 20 Hz 20 kHz
SNR	>100 dB typical
Crosstalk	>90 dB, 20 Hz to 20 kHz, typical
Linearity	<1.0 dB (-80 to +20 dBu), typical

## CONNECTORS AND I/O

GPI (General Purpose Interface)	
Connector	DB-9
Number of Inputs	4
Number of Outputs	4

RS-422	
Standard	RS-422
Connector	DB-9

LAN	
Connector	RJ45
Type	10/100Base-T Ethernet

WEIGHT AND DIMENSION MEASUREMENTS	
Weight	8.45 lbs (3.83 kg) (excluding rack and cable supports)
Height	1.72 in. (4.37 cm)
Width	17.47 in. (44.4 cm); 17.60 in. (44.7 cm) with rear supports (excluding mounting ears)
Depth	21.25 in. (54 cm) (including front controls and rear BNC connectors)

POWER AND TEMPERATURE	
Power Consumption	100 to 240 VAC, 47 to 63 Hz, 75 W
Electrical Requirements	100 to 240 VAC at 47 to 63 Hz, 3 amps max
Ambient Temperature	41° to 95° F (5° to 35° C) with a relative humidity of 10 to 90% (non-condensing)

## Ordering Information

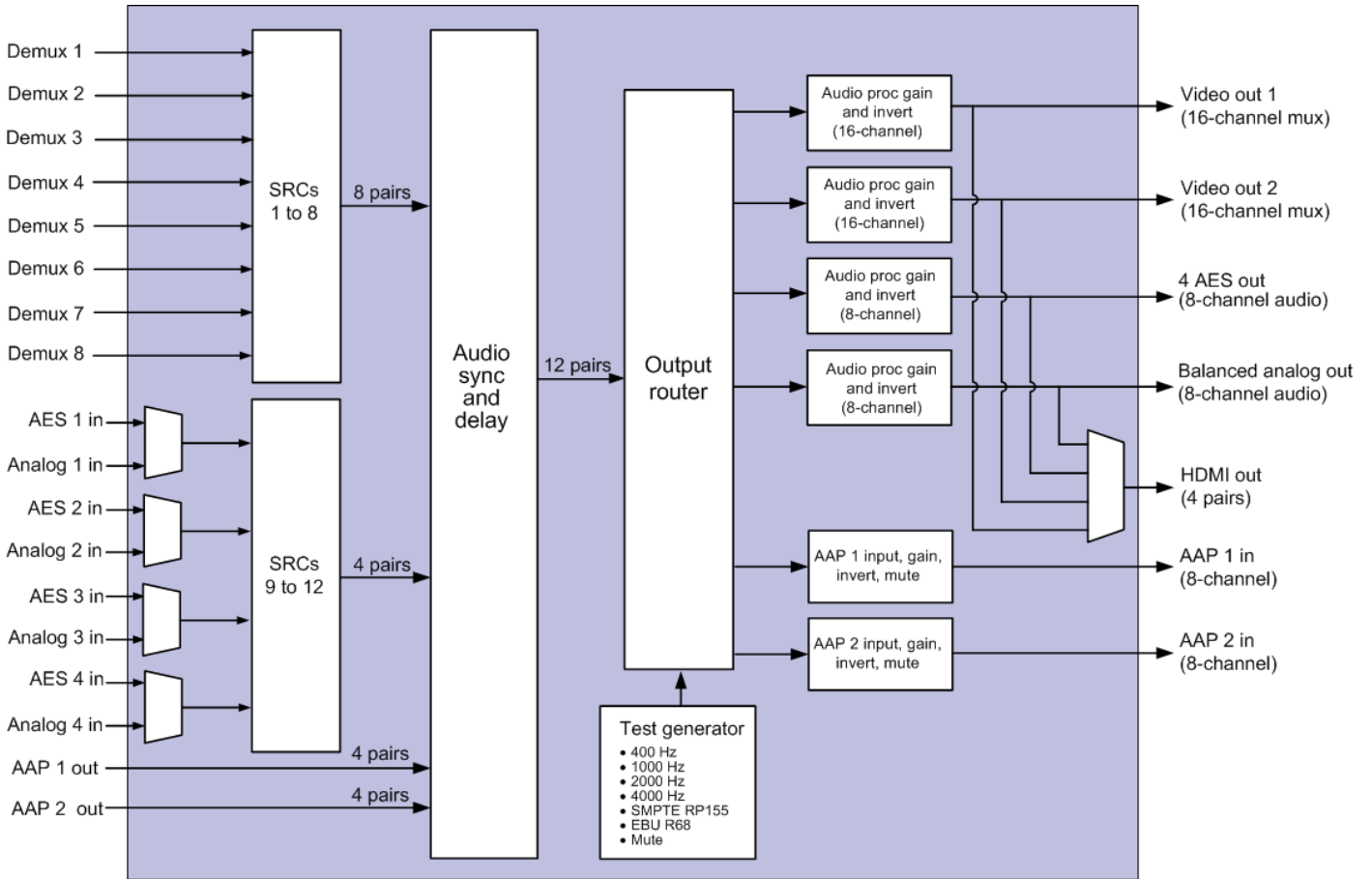
X50-AV-2PS	X50, the powerful, affordable and energy-efficient processor. This 1RU frame sync/converter supports NTSC/PAL, SD and HD formats including 3 Gb/s 1080p Level A and Level B-DL and 3DTV for hybrid television and production systems. The X50 comes standard with color correction, closed caption/teletext capabilities, local control panel plus control and monitoring via a built-in Web server or CCS Navigator, Active Format Description (AFD) support, two fully controllable Aspect Ratio Converters, HDMI monitoring port, dual power supplies and 16-channel embedded audio processing. Available options include CWDM fiber transceivers, Dolby® Digital and Dolby® E codecs, DTS Neural Surround™ Up/Down Mix, Multimerge and DTS Neural Loudness Control
<b>MAGELLAN Panel with OLED Displays, Rotary Control and LCD Pushbuttons (user programmable LCD pushbuttons)</b>	
RCP-24LCD-OLED*	1RU control panel with 24 LCD buttons and OLED display
RCP-48LCD-OLED*	2RU control panel with 48 LCD buttons and OLED display
<b>MAGELLAN Panel with OLED Displays, Rotary Control and Pushbuttons (user prints out legends for the pushbuttons)</b>	
RCP-32PB-OLED*	1RU control panel with one OLED display, one control knob and 32 push buttons
RCP-64PB-OLED*	2RU control panel with two OLED displays, two control knobs and 64 push buttons
<b>Software Key for MAGELLAN Panels*</b>	
RCP-PROCMV-OPT	Software key license that enables control of Harris Broadcast multiviewers and processing devices on Magellan remote control panels (OLED display with LCD programmable push button and OLED display with push button versions only)
<b>AES Interface Cable</b>	
X50OPTCAB-AES	AES interface cable - BNC to 1.0/2.3 DIN for X50

<b>Advanced Audio Options</b>	
X50OPT-ADVAUD	APM (Audio Processing Module) plug-in advanced audio processing for X50-AV-2PS (requires software key license option(s))
X50OPT-SK-DEE	1 Software key license for 1 Dolby® E encoder for X50-AV-2PS
X50OPT-SK-DED	1 Software key license for 1 Dolby® E decoder for X50-AV-2PS
X50OPT-SK-DDE	1 Software key license for 1 Dolby® Digital Pro encoder (5.1 or 2.0) for X50-AV-2PS
X50OPT-SK-DDD	1 Software key license for 1 Dolby® Digital Pro decoder (5.1 or 2.0) for X50-AV-2PS
X50OPT-SK-DTS	1 Software key license for DTS Neural Technologies option (3 software key licenses required for DTS Neural Surround™ UpMix or DownMix or 5.1 DTS Neural Loudness Control, 4 software key licenses required for DTS Neural Surround™ MultiMerge, 1 software key license required for 2.0 DTS Neural Loudness Control)
<b>Optical Fiber Transceiver Options</b>	
OP+SFP+TR13P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1310nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR27P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1270nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR29P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1290nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR31P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1310nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR33P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1330nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR35P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1350nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR37P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1370nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR43P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1430nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR45P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1450nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR47P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1470nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR49P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1490nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR51P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1510nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR53P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1530nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR55P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1550nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR57P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1570nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR59P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1590nm wavelength transceiver with pathological support for baseband video
OP+SFP+TR61P	Small Form Factor (SFP) for Harris Broadcast Fiber Optic Products; 1610nm wavelength transceiver with pathological support for baseband video
<b>Field Service Items</b>	
X50SPR-FAN	Spare/Replacement fan for X50
X50SPR-PSU	Spare/Replacement power supply for X50
X50SPR-SE	Spare/Replacement shaft encoder, knob and cap, shoulder washer for X50
X50SPR-DISP	Spare/Replacement blue OLED display PCB, includes shaft encoder for X50

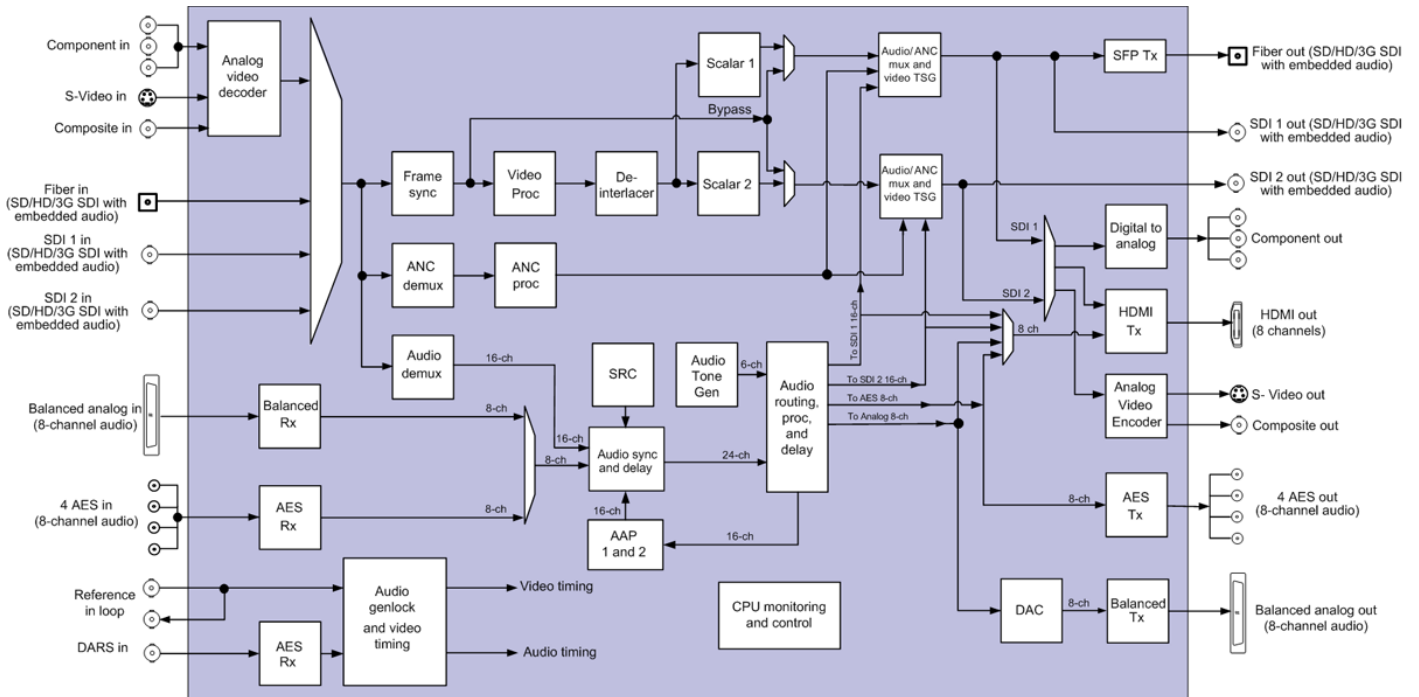




Audio Block Diagram



Video Block Diagram



Rear View



