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**X50™**

## Entry-Level Frame Synchronizer and Converter



### [\*\*X50 on Broadcast Engineering TV\*\*](#)

Harris continues to set the standard for innovative, top-performing processors with the introduction of the X50™ entry-level frame synchronizer and converter. This best-in-class, single-channel platform delivers the exceptional quality and functionality that have come to define the popular and award-winning Harris series of 1RU processors, which also includes the X85™ and X75™.

The 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 sync/converter effectively and reliably supports standard-definition and high-definition formats, as well as optional 3 Gb/s 1080p Level A and Level B processing, for hybrid television and production systems. With easy-to-use controls, the X50 comes standard with a myriad of features, including color correction, closed caption/teletext capabilities, control and monitoring via a built-in Web server, Active Format Description (AFD) support, two fully controllable Aspect Ratio Converters and 16-channel embedded audio processing. Available options include a fiber input and output plug-in.

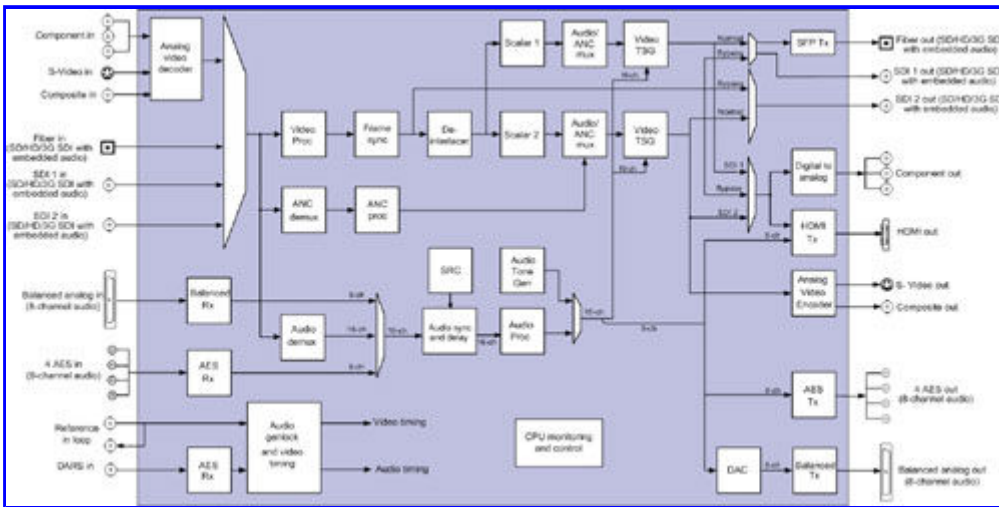
The powerful, affordable and energy-efficient X50 processor can easily be incorporated into the workflow of any broadcast environment — from small stations and OB vans to production studios and networks.

### **FEATURES**

- Frame sync/delay, proc amp, noise reduction, clipping, color correction
- Advanced motion detection for up/down/cross/aspect ratio conversion
- Two switchable auto-sensing SD/HD/3 Gb/s inputs
- Up/down/cross/aspect ratio conversion with two simultaneous, independent output formats
- Two aspect ratio converters with full control over H/V size and position
- Audio de-embed/embed, sync, gain, invert, delay with 16 channels (four groups) processing - PCM and non-PCM (Dolby® Digital, Dolby® E) passthrough
- Video Interfaces:
  - Analog composite
  - Analog component (SD and HD)
  - Auto-sensing SDI for .27/1.5 Gb/s, 3 Gb/s optional
  - EDH/CRC error monitoring and insertion
  - HDMI output for video and audio
- Audio Interfaces:
  - Eight-channel analog audio
  - Four groups embedded audio
  - Four AES (75 ohm) 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
- Control and Monitoring:
  - 100/100 Ethernet connectivity
  - SNMP

- Built-in Web server
- Local control panel
- CCS™-compliant for use with:
  - X85™/X75™ control panels
  - NUCLEUS™ network control panels
  - CCS Navigator™ software
  - Four GPI inputs and outputs
- Optional fiber input and output
- Optional 3 Gb/s
- Built-in video test and audio tone generators
- Redundant power supply
- Free future code update for logo generator/inserter and I-Wings side bar insertion, as well as SD memory card for presets, graphics storage, firmware updates

## Block Diagram



## Back Module



## SPECIFICATIONS Specifications and designs are subject to change without notice

### 3 Gb/s/HD/SD-SDI Input Video

Number of Inputs	2
Standard	3 Gb/s: SMPTE 424M (2.97, 2.97/1.001 Gb/s) Level A, SMPTE 374M Level B for YCrCb, 4:2:2, 10 bit with 16 channels of embedded audio HD: SMPTE 274M, SMPTE 296M (1.485, 1.485/1.001 Gb/s) SD: SMPTE 259M-C (270 Mb/s, 525/625 component video)
Connector	BNC (IEC169-8)
Impedance	75 ohms
Return Loss	>10 dB, typical, from 5 MHz to 2970 MHz >15 dB, typical, from 5 MHz to 1485 MHz >15 dB, typical, from 5 MHz 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

### 3 Gb/s/HD/Fiber Input Video

Number of Inputs	1
Standard	3 Gb/s: SMPTE 424M, SMPTE 374M HD : SMPTE 292M, Mode B operation
Connector	LC
Input Wavelength	3 Gb/s: 1260 to 1610 nm HD: 1200 to 1600 nm
Max Input Power	0 dBm, typical
Sensitivity	3 Gb/s: -18 dBm, typical HD: better than -20 dBm

### S-Video Input

Standard	NTSC, PAL-B, PAL-M
Connector	4-pin DIN
Standard	NTSC (SMPTE 170M), PAL-B (ITU624-2), PAL-M
Connector	BNC (IEC 169-8)
Quantization	Normal mode, non-TBC: 12 bits (NTSC, PAL-B, PAL-M) TBC Mode: 8 bits (all standards)
Input Level	1.0 V pk-pk
Impedance	75 ohms
Return Loss	>40 dB, 0.1 to 6 MHz
Common Mode Range	5.0 V
CMRR	60 dB @ 50/60 Hz, 5 V pk-pk
Setup Level Range	±7.5 IRE
Frequency Response	±0.1 dB, 0.1 MHz to 6 MHz
SNR	62 dB, typical
Y/C Gain Error	<0.1 dB
Y/C Delay Error	<10 ns

### Analog Composite Input

Standard	NTSC (SMPTE170M), PAL-B (ITU624-2), SECAM, PAL-M
Connector	BNC (IEC 169-8)
Quantization	Normal mode, non-TBC: 12 bits (NTSC, PAL-B, PAL-M) 8 bits (SECAM) TBC mode: 8 bits (all standards)
Input level	1.0 V pk-to-pk
Impedance	75 ohms
Return loss	>40 dB, 0.1 MHz to 6 MHz
Common mode range	5.0 V
CMRR	60 dB @ 50/60 Hz, 5 V pk-to-pk
Setup level range	±7.5 IRE
Frequency response	±0.1 dB, 0.1 MHz to 6 MHz
SNR	62 dB, typical
Y/C gain error	<0.1 dB
Y/C delay error	<10 ns

### Component Video Input

Format	Betacam
Connector	BNC (IEC 169-8)
Quantization	Normal mode, non-TBC mode CAV:

	Y: 12 bits, Cb: 10 bits, Cr: 10 bits Normal mode, non-TBC mode S-Video: Luma: 12 bits, Chroma: 10 bits TBC mode: CAV: Not supported, S-Video: 8 bits all
Input Level	1.0 V pk-pk
Impedance	75 ohms
Return Loss	>40 dB, 1 kHz to 6 MHz
Frequency Response	Y: $\pm 0.15$ dB to 5.5 MHz Pb/Pr: $\pm 0.10$ dB to 3.0 MHz
SNR	>60 dB

### Genlock Input

Connector	BNC (IEC169-8)
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

#### 3 Gb/s/HD/SD-SDI Output Video

Number of Outputs	2
Standard	3 Gb/s: SMPTE 424M (2.97, 2.97/1.001 Gb/s) HD: SMPTE 274M, SMPTE 296M (1.485, 1.485/1.001 Gb/s) SD: SMPTE 259M-C (270 Mb/s, 525/625 component video)
Connector	BNC (IEC169-8)
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
Signal Level	800 mV $\pm 10\%$
DC Offset	0.0 $\pm 0.5$ V
Rise and Fall Time	3 Gb/s: <135 ps (20% to 80%) HD: <270 ps (20% to 80%) SD: 750 to 1500 ps (20% to 80%)
Overshoot	<10% of amplitude (all outputs terminated)
Jitter	Timing jitter: 3 Gb/s: <2 UI pk-pk HD: <1 UI pk-pk SD: <0.2 UI pk-pk Alignment jitter: 3 Gb/s: <0.3 UI pk-pk HD: <0.2 UI pk-pk SD: <0.2 UI pk-pk

#### 3 Gb/s/HD/SD Fiber Output Video

Number of Outputs	1
Standard	3 Gb/s: SMPTE 424M

	HD: SMPTE 292M, Mode B operation
Connector	LC
Output Wavelength	1310 nm $\pm$ 20 nm
Output Power	-7 dBm, typical
Rise/Fall Time	3 Gb/s: <135 ps, typical HD: <270 ps
Jitter	3 Gb/s: <70 ps pk-to-pk HD: <135 ps pk-to-pk
Laser Safety Level	Class I

## Video Outputs

### HDMI Output

Number of Outputs	1
Standards	1080i/59.94, 1080i/50, 720p/59.94, 720p/50
Connector	HDMI

### S-Video Output

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

### Composite Video Output

Standard	NTSC, PAL-B, SECAM, PAL-M
Connector	BNC (IEC 169-8)
Quantization	12 bits
Impedance	75 ohms
Return Loss	>40 dB, 0.1 to 6 MHz
Frequency Response	$\pm$ 0.1 dB, 0.1 to 6 MHz
DC Offset	<0.0 $\pm$ 5 mV
Differential Gain	<0.5%
Differential Phase	<0.5°
Y/C Delay	<10 ns
Transient Response	<0.5% K Factor
SNR	>63 dB, 0.1 MHz to 6 MHz

### Component Video Output

Format	Betacam
Connector	BNC (IEC 169-8)
Quantization	Y: 12 bits, Cb: 10 bits, Cr: 10 bits
Impedance	75 ohms
Return Loss	>40 dB, 1 kHz to 6 MHz
Frequency Response	Y: $\pm$ 0.1 dB to 5.5 MHz Pb/Pr: $\pm$ 0.1 dB to 3.0 MHz
DC Offset	<0.0 $\pm$ 5 mV
Relative Delay	< $\pm$ 10 ns
SNR	>63 dB

### AES/DARS Input

Number of Inputs	4 x AES, 1 x 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 MHz to 6 MHz
Input Audio Rate	16 to 96 kHz

### **Analog Audio Input**

Number of Inputs	8 mono channels
Type	Balanced
Connector	DB25, Tascam-style cable snake for balanced 8-channel audio
Input Audio Level	28 dBu to 12 dBu (adjustable in 1 dB increments)
Input Impedance	High-impedance or 600 ohms, jumper selectable
CMRR	>80 dB @ 60 Hz, typical
Linearity	<±0.5 dB (to -100 dBFS)
Frequency Response	<±0.05 dB (20 Hz to 20 kHz), typical
THD	>100 dB (@ -1 dBFS, 20 Hz to 20 KHz), typical
SNR	>100 dB

### **AES Output**

Number of Outputs	4
Standard	AES3, SMPTE 276M
Type	Unbalanced, AC coupled
Connector	1.0/2.3 DIN
Signal Level	1.0 V ±10% (pk-to-pk)
Impedance	75 ohms
Return Loss	>25 dB, 0.1 MHz to 6 MHz
Jitter	<± 4 ns, peak value
DC Offset	0.0 ±50 mV
Rise/Fall Time	30 ns 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 Audio Output**

Number of Inputs	8 mono channels
Type	Balanced
Connector	DB25, Tascam-style cable snake for balanced 8-channel audio
Output Audio Level	28 dBu to 16 dBu (adjustable in 2 dB increments)
Output Impedance	66 ohms
Frequency Response	<±0.1 dB @ 0 dBFS (+28 dBu), 20 Hz to 20 kHz, typical
THD	>90 dB @ 1kHz, -1 dBFS = +23 dBu (66 ohms), or -1 dBFS = +17 dBm (600 ohms), typical
SNR	>100 dB @ -60dBFS
Cross Talk	>95 dB, 20 Hz to 20 kHz, typical
Linearity	<±1.0 dB (to -100 dBFS), typical

### **GPI (General Purpose Interface)**

Connector	DB-9
Number of Inputs	4
Number of Outputs	4

### **RS-232/RS-422**

Standard	Electrical specification EIA-232C
Connector	DB-9
232/422 switchable	
422 termination can be selected from the menu	

**LAN**

Connector	RJ-45
Type	10/100 Ethernet

**ORDERING INFORMATION**

X50-AV-2PS	1RU frame sync, converter and processor with audio processing and dual power supplies. For 3 Gb/s capability, the X50OPT-3G software key is required. AES/DARS connections require X50OPT0AES adaptor cables. For fiber connectivity, the OP+SFP+TR13P transceiver is required
X50OPT-3G	3.0 Gb/s input and output option for X50
OP+SFP+TR13P	Small form factor (SFP) for Harris fiber optic modules. 1310nm wavelength transceiver with pathological support for baseband video
X50OPTCAB-AES	AES interface cable - BNC to 1.0/2.3 DIN