Synapse

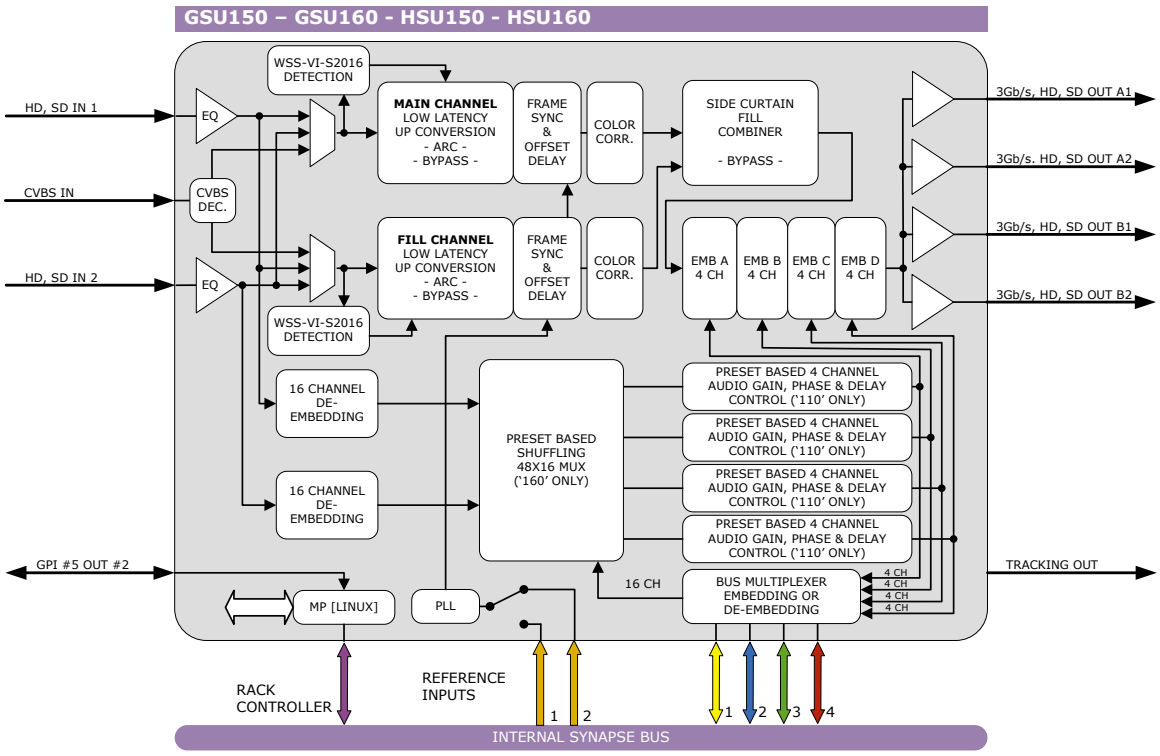
GSU150/160
HSU150/160

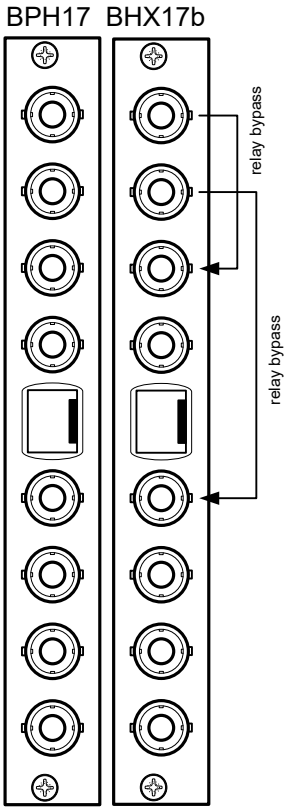
3Gb/s, HD, SD up converter/synchronizer with side curtain and optional audio shuffler

A Synapse® product

MASTER Card | 3 TRIPLE RATE Gb/s, HD, SD | Powered by LINUX | AFD ready S2016

Block schematic & I/O panel





HD, SD INPUT 1
HD, SD INPUT 2
3Gb/s, HD, SD OUTPUT 1
3Gb/s, HD, SD OUTPUT 2
GPI INPUT/OUTPUT, TRACKING OUT
3Gb/s, HD, SD OUTPUT 3
3Gb/s, HD, SD OUTPUT 4
CVBS INPUT

Features

The GSU150/160 and HSU150/160 are *low latency* up, down, cross converters with 16 channel audio transparency. The powerful audio matrix multiplexer can transport audio from the embedded domain to the Synapse bus and vice versa.

The GSU160 or HSU160 add a full audio shuffler and audio proc-amp with gain and phase control.
The GSU150/160 is compatible with 270Mb/s, 1.5Gb/s and 3Gb/s for full 1080p/50 or 1080p/59.94 use.

The HSU150/160 are compatible with SD-SDI (270Mb/s) and HD-SDI (1.5Gb/s) and can be future upgraded to 3Gb/s compatibility

- 3 inputs: 2 SDI and 1 composite.
- Configurable output function (Straight, Crosses, A only or B only)
- Low latency conversion process (as low as 1 field in controlled timing environment)
- Compatible with the following input and output formats (auto selecting). One standard can be chosen for both outputs simultaneously:
  - 1080p/59.94 (2GU only)
  - 1080p/50 (2GU only)
  - 1080i/59.94
  - 1080i/50
  - 1080p/23.98
  - 1080psf/23.98
  - 720p/59.94
  - 720p/50
  - 720p/23.98
  - SD525
  - SD625
- Two individual conversion paths. The inputs can be different standards SD or HD and unlocked to the single output format.
- Frame sync with output phase control in Frames, Lines and pixels with respect to reference. Delay setting are stored per output format for a constant latency operation.
- 30 frames (1080i/p), 60 frames (720p) or 125 frames (SD) delay offset per channel
- ARC modes contain:
  - Anamorphic
  - Center Cut
  - V-Zoom
  - LBox-16:9
  - LBox-14:9
  - PBox-4:3
  - PBox-14:9
  - Variable H and V (50—200%)
- 16 Free individual programmable presets banks for:
  - Up converter ARC A and B
  - Transparent ARC A and B
  - VI/WSS/S2016 insertion A and B
  - Embedder shuffling/Gain/Phase (-160 only)
- 5 GPI inputs assignable to various preset banks
- Individual color corrector (RGB and total gain, RGB and total black) for video path A and B
- Transparent for 16 channels of embedded audio, 8 per output for straight and cross mode, 16 channels per output for other modes.
- Embedded domain cross input audio shuffling, gain and phase control (GSU-HSU160 only)
- Embedding and de-embedding through synapse bus
- Video proc-amp (Y and C control)
- Hue control for NTSC inputs
- Locks to Tri-level, Bi-level or SDI input
- Timecode cross conversion
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)

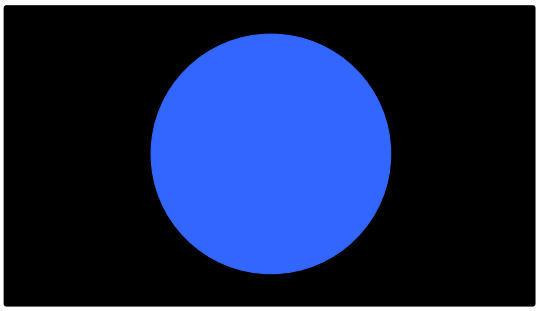
Complementary cards:

- DAC20, DAS24, DIO48, ADC20, ADC24, DIO24

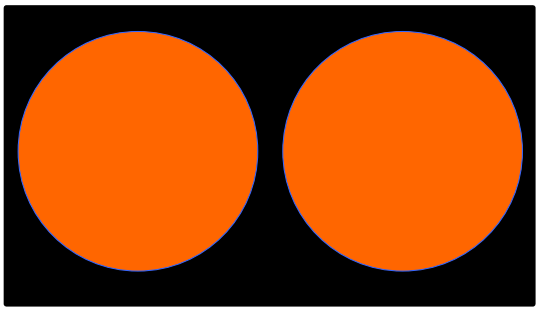
Output configurations explained

The output stage of the GSU/HSU-150/150 can be configured in multiple ways.
In the straight and crossed mode the card acts a dual channel device. The audio transparency is then reduced to 8 channel (2 groups) per video output. In A or B only the card is full 16 channel transparent. The additional side curtain, mix and side by side mode are explained below.

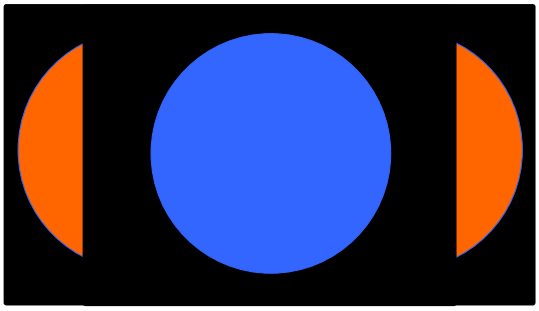
INPUT 1



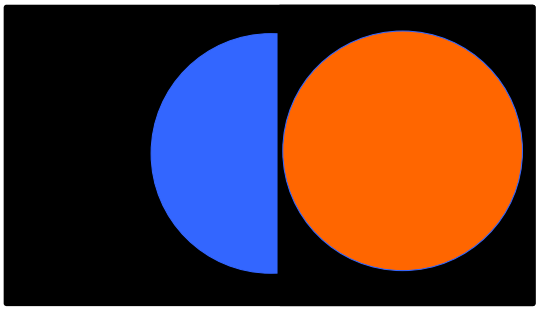
INPUT 2



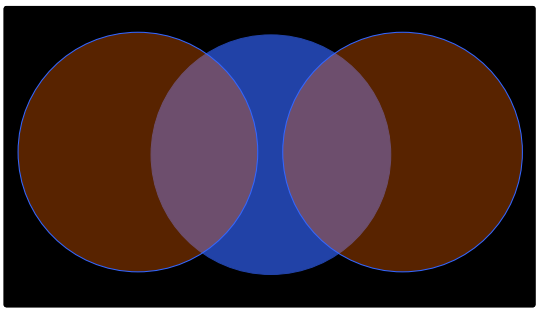
SIDE CURTAIN 1



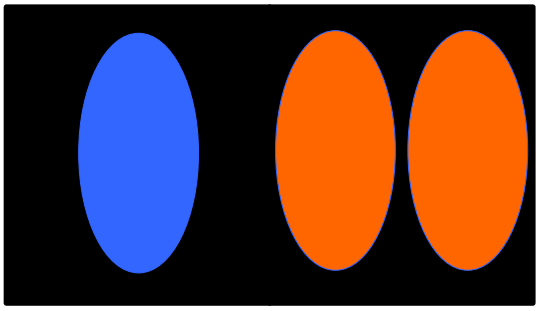
SIDE CURTAIN 2



MIX



SIDE BY SIDE (3D)



Conversion abilities

The G-HSU150/160 cards are able to convert the following video formats:

	CONVERSION	Output										
		1080psf23.97	1080p23.97	1080p50*	1080p59.94*	1080i59.94	1080i50	720p59.94	720p50	720p23.98	480i59.94(525)	576i50(625)
SDI Input	1080psf23.97	x										
	1080p23.97		x									
	1080p50*			x								
	1080p59.94*				x							
	1080i59.94					x						
	1080i50						x					
	720p59.94							x				
	720p50								x			
	720p23.98									x		
	480i59.94(525)	x	x			x		x		x	x	
	576i50(625)			x			x		x			x
CVBS	480i59.94(NTSC)	x	x			x		x		x	x	
	576i50(PAL)			x			x		x			x

* = GSU models only

Applications

- Truck input up converter/synchronizer
- Infra structure up/down/cross conversion
- Up conversion with side-fill/curtain input

Ordering information

Module:

- **GSU150:** 3Gb/s, HD, SD-SDI up converter
- **GSU160:** 3Gb/s, HD, SD-SDI up with audio shuffler proc-amp
- **HSU150:** HD, SD-SDI up converter*
- **HSU160:** HD, SD-SDI up converter with audio shuffler proc-amp*

Standard I/O:

- **BPH17_GSUxxx:** I/O-panel for G-HSU150/160

Relay bypass I/O:

- **BHX17b_GSUxxx:** I/O-panel for G-HSU150/160 with relay bypass

Specifications

Serial Video Input

Standard	SD,HD and 3Gb/s SDI: SMPTE 292M, SMPTE 259M, SMPTE424
Number of Inputs	2
Connector	BNC
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

CVBS Video Input

Standard	PAL (ITU624-4), NTSC (SMPTE 170M)
Encoding	12 bits
Number of Inputs	1
Impedance	75 Ohms
Return Loss	> 35dB up to 10MHz
Frequency Response	< ±0.25dB (100KHz to 4.2MHz)
Differential Gain	< ±0.5% typical
Differential Phase	< ±0.2° typical
Noise Floor	< -57dB RMS (black video, 15KHz to 5MHz)
C/L Gain	< ±0.5%
C/L Delay	< ±9ns
Minimum Delay	3 lines

Serial Video Output

Number of Outputs	4
Connector	BNC
Signal Level	800mV nominal
DC Offset	0V ±0.5V
Rise/Fall Time	135ps nominal
Overshoot	< 10% of amplitude
Return Loss	> 15dB up to 1.5GHz (typ) > 10dB up to 3GHz (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. 450g
Operating Temperature	0 °C to +40 °C
Dimensions	137 x 296 x 20 mm (HxWxD)

Electrical

Voltage	+24V to +30V
Power	<17 Watts