Synapse

GSU150/160

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

GSU150 – GSU160 - HSU150 - HSU160

BPH17   BHX17b

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
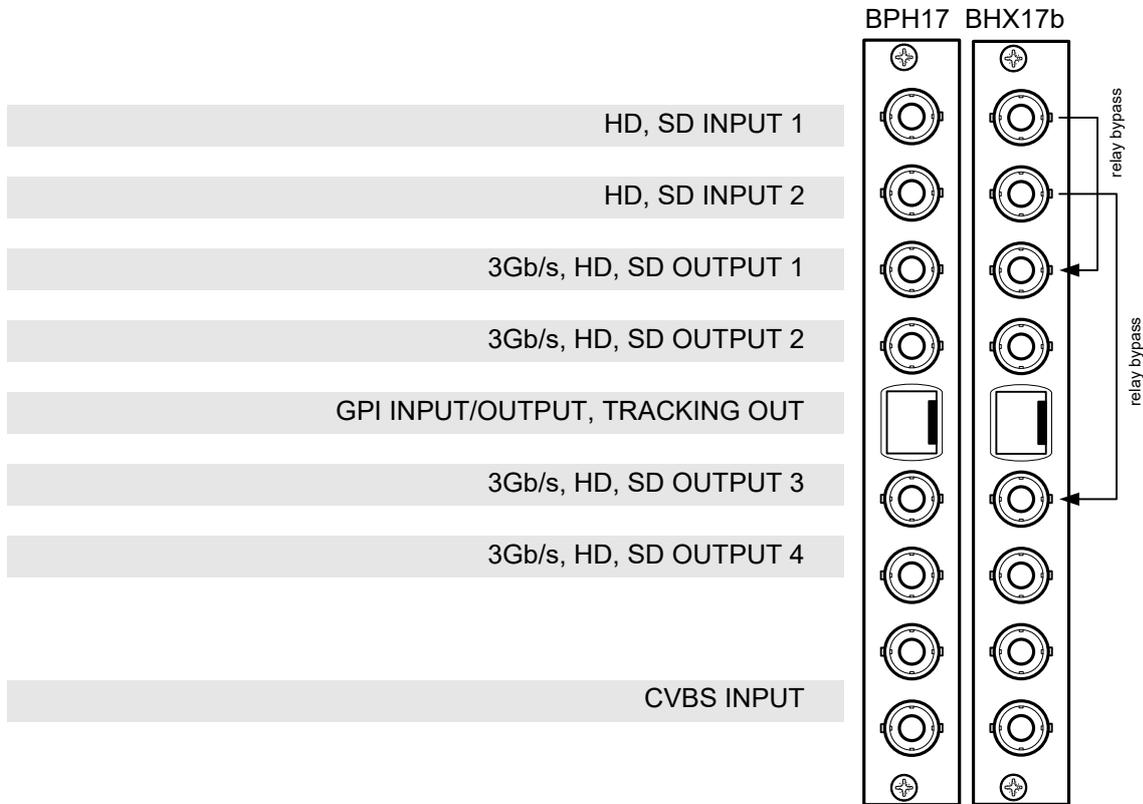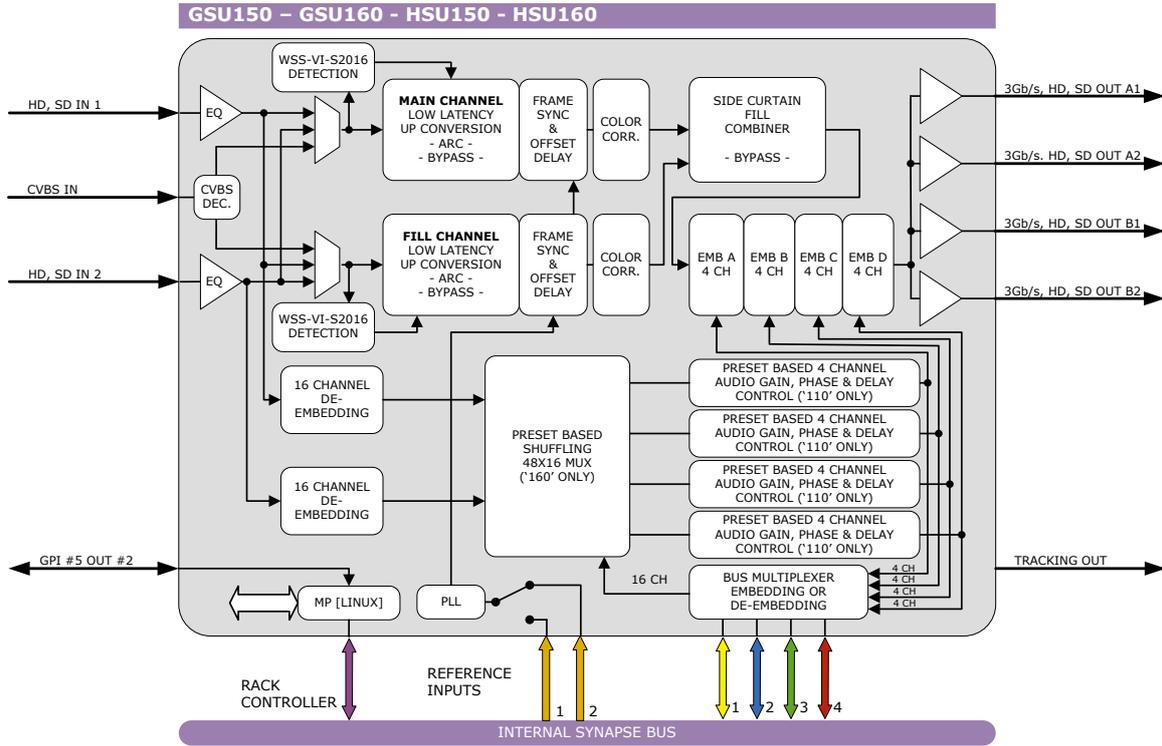
Features

The GSU150/160 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 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, DAC24, 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.
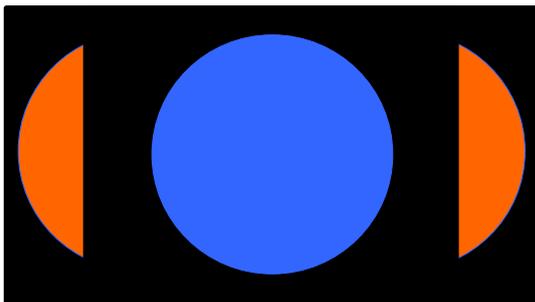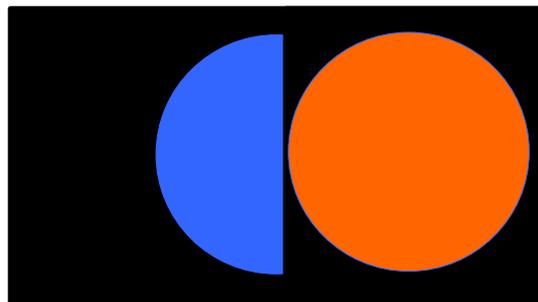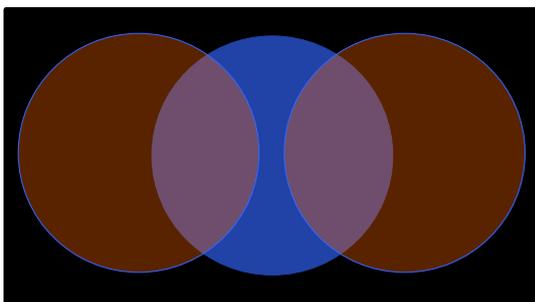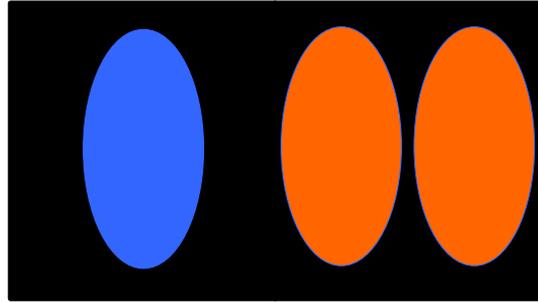
INPUT 1
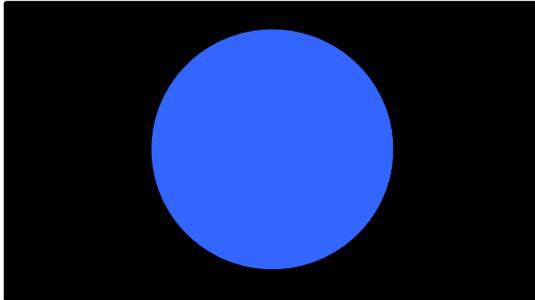
INPUT 2
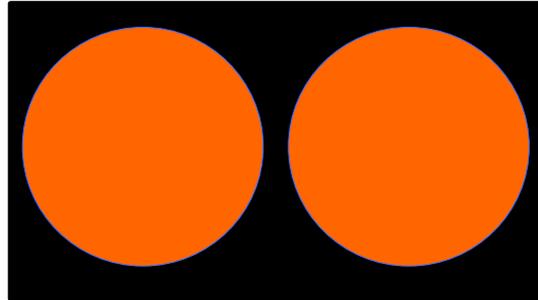
SIDE CURTAIN 1

SIDE CURTAIN 2

MIX

SIDE BY SIDE (3D)

Conversion abilities

The GSU150/160 cards are able to convert the following video formats:

CONVERSION		1080psf23.97	1080p23.97	1080p50	1080p59.94	1080i59.94	1080i50	720p59.94	720p50	720p23.98	480i59.94(525)	576i50(625)
						Output						
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

Applications

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

Ordering information

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

Standard I/O:
- **BPH17-PANEL:** I/O-panel for GSU150/160

Relay bypass I/O:
- **BHX17b-PANEL:** I/O-panel for GSU150/160 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