

Bi-directional Fiber Transport Solution



Description

The greenMachine BiDi is a multi-signal bi-directional transport solution that allows transportation of video, audio, and GPI efficiently across two greenMachine Titan hardware devices.

BiDi operates with two simple principles:

1. Signals transported need to add up to max. 11.88Gbit/s (12G).
2. Signals are limited to physically available connectors

The reference signal is the exception, as it's imbedded in SDI video transmitted.

Examples of transmission datarates:

- SDI 3G: ~3Gbit/s
- SDI 1.5G: ~1.5Gbit/s
- MADI: ~3Gbit/s (transmitted embedded in 3G SDI)

For additional ethernet transport a separat ethernet fiber needs to connect both devices.

Examples of transportable Content:

- 4x 3G SDI HD / 4x GPI
- 6x 1.5G SDI HD / 4x analog or digital audio signals / 4x GPI
- 3x 3G SDI HD / 1x 1.5G HD / 4x analog ordigital audio signals / 4x GPI

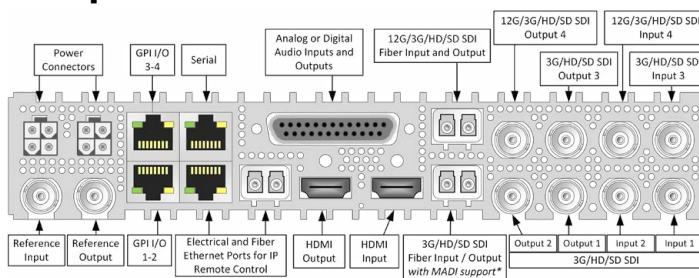
The greenMachine titan hardware comes with a fully featured local control interface with an LCD which displays image previews and audio level meters of the processed video paths in addition to the graphical user interface.

Functions

- Transport SDI, HDMI, Optical, Audio, Serial, and GPI through multi-signal, bi-directional, optical 12G SDI SFP output
- Audio in- and outputs switchable between analog and digital
- 2 SFPs transceiver for bidirectional transport included
- Optional CWDM SFPs available for SDI, MADI, Ethernet and more for all standard 18 wavelengths
- Reference output timed and embedded across machines
- Full remote control using LynxCentraal
- Full SNMPv2 support for third party master control
- Extensive monitoring features: image preview, audio level meter and more



Backpanel



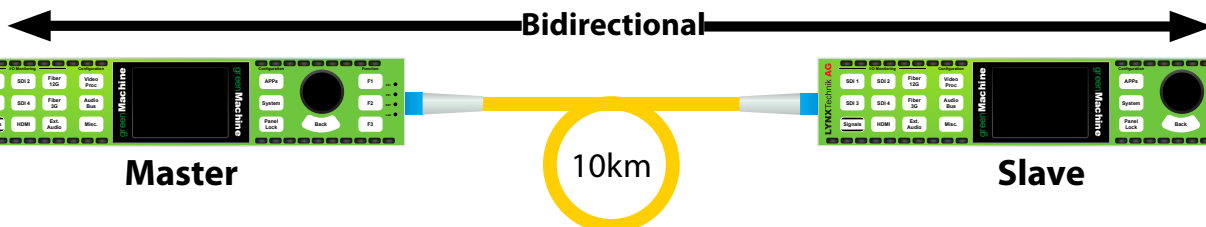
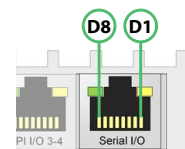
Technical Specifications

Singular Signal Transport

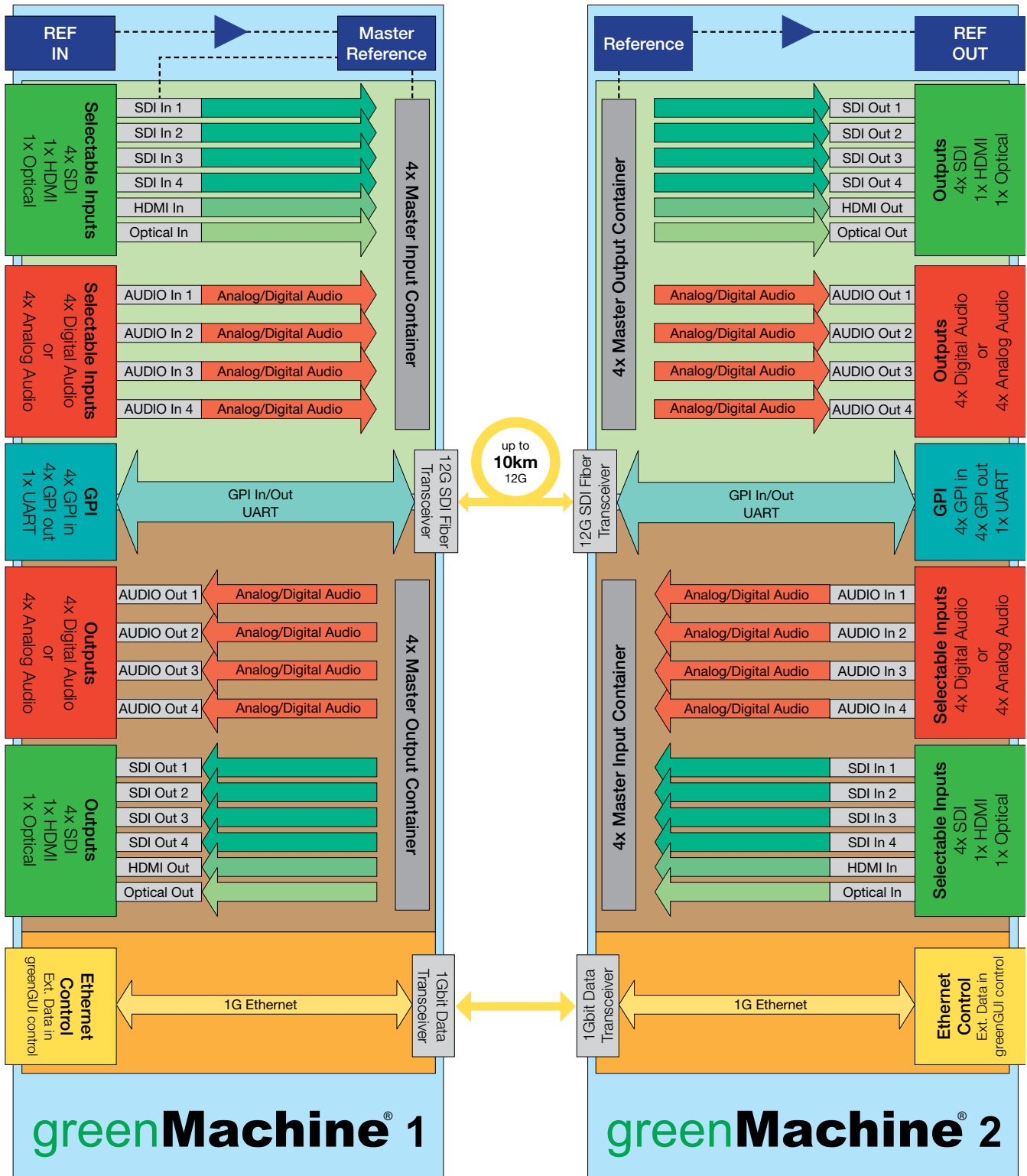
- 4x 3G SDI (electrical or optical)
- 1x HDMI
- 4x Audio transport in both directions
- 1x MADI via optical SFP port (3G)
- 4x GPIO (Free due to low datarate)
- 1x Serial I/O (UART)
- 1x 1Gbit/s Ethernet transport (only with optional fiber connection)

UART Pinout

Pin	D8	D7	D6	D5	D4	D3	D2	D1	
Uncrossed	NC	GND	TX (out)	RTS (out)	RX (in)	CTS (in)	NC	NC	RS-232
Crossed	GND	NC	RX (in)	CTS (in)	TX (out)	RTS (out)	GND	GND	
Uncrossed	GND	NC	TX_A (+)	RX_A (+)	RX_B (-)	TX_B (-)	GND	GND	RS-422
Crossed	NC	GND	RX_A (+)	TX_A (+)	TX_B (-)	RX_B (-)	NC	NC	



Functional Diagram



Hardware Specifications

BNC Connection

SDI Inputs	4x 3G-SDI video on 75 Ohm BNC connector (SMPTE 259M, 292M, 424M) with automatic video format and standard detection
Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
Automatic cable EQ (Belden 1694A):	340m @ 270Mbit/s, 150m @ 1.5Gbit/s, 110m @ 3Gbit/s
12G-SDI Input*	1x 12G-SDI video on 75 Ohm BNC connector [Input 4] (SMPTE 259M, 292M, 424M, 2082) with automatic video format and standard detection
Return Loss:	>4dB to 12GHz
SDI Output	4x 3G-SDI video on 75 Ohm BNC connector (SMPTE 259m, 292M, 424M)
Timing jitter:	< 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 3Gbit/s
Alignment jitter:	< 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 3Gbit/s
Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
12G-SDI Output*	1x 12G-SDI video on 75 Ohm BNC connector [Output 4] (SMPTE 259M, 292M, 424M, 2082)
Return Loss:	>4dB to 12GHz
Reference Input	<ul style="list-style-type: none"> 1x analog video reference on 75 Ohm BNC connector Analog bi-level (SDTV) or tri-level (HDTV) auto detect
Reference Output	<ul style="list-style-type: none"> 1x analog video reference on 75 Ohm BNC connector Analog bi-level (SDTV) or tri-level (HDTV), cross lock capability

Audio Connection

Audio I/O	4x input and 4x output on Sub-D 25 female connector
Analog I/O	input impedance >10k Ohm Output Impedance 150 Ohm
	Analog I/O full scale level: selectable 12, 15, 18, 20, 22, 24 dBu

Technical Information

Power	12V DC @ 45W nominal (supports 7 - 24VDC input range) 2x power connections for redundant power supply
Mechanical	W: 218mm (1/2 19"), H: 44mm (1.75"), D: 225mm (8.86") - incl. connectors Weight: 1.4kg (3.09lb)
Ambient	Temperature: 5°C to 40°C (41°F to 104°F) maintaining specification Humidity: 90% maximum, non-condensing

Supported SDI Formats

SDTV	525 / 59.94Hz 625 / 50Hz																					
HDTV	<table border="0"> <tr> <td>1080i / 50Hz</td> <td>1080p / 30Hz</td> <td>720p / 29.97Hz</td> </tr> <tr> <td>1080i / 59.94Hz</td> <td>1080psf / 23.98Hz</td> <td>720p / 30Hz</td> </tr> <tr> <td>1080i / 60Hz</td> <td>1080psf / 24Hz</td> <td>720p / 50Hz</td> </tr> <tr> <td>1080p / 23.98Hz</td> <td>1080psf / 25Hz</td> <td>720p / 59.94Hz</td> </tr> <tr> <td>1080p / 24Hz</td> <td>720p / 23.98 Hz</td> <td>720p / 60Hz</td> </tr> <tr> <td>1080p / 25Hz</td> <td>720p / 24Hz</td> <td></td> </tr> <tr> <td>1080p / 29.97Hz</td> <td>720p / 25Hz</td> <td></td> </tr> </table>	1080i / 50Hz	1080p / 30Hz	720p / 29.97Hz	1080i / 59.94Hz	1080psf / 23.98Hz	720p / 30Hz	1080i / 60Hz	1080psf / 24Hz	720p / 50Hz	1080p / 23.98Hz	1080psf / 25Hz	720p / 59.94Hz	1080p / 24Hz	720p / 23.98 Hz	720p / 60Hz	1080p / 25Hz	720p / 24Hz		1080p / 29.97Hz	720p / 25Hz	
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3G-SDI Level A/B	1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz																					
12G-SDI* Single Link	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz																					
12G-SDI* Quad Link 2SI Level A (4 x 3G)	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz																					

*NOTE: 12G-SDI operations not supported on 3G-SDI constellations and constellation modes (i.e. 3G-SDI quad channel configuration)

Optical Connection (optional SFP required)

Optical SDI I/O	<ul style="list-style-type: none"> 1x 3G-SDI SFP Transceiver (SMPTE 297M - 2006) 1x 12G-SDI SFP Transceiver (SMPTE 292M, 424M, 2082) no SD SDI (270MBit) and no 6G-SDI**
Optical Ethernet	IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1Gbit/s (125 MB/s)

**NOTE: 12G-SDI SFPs can be used with 3G constellation and constellation modes, but only support 3G-SDI signals

AV Connection

HDMI	<ul style="list-style-type: none"> 1x Input 10 bit HDMI 1.4b 1x Output 10 bit HDMI 1.4b
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Digital	AES3 balanced transformer isolated; Digital output level: 4V peak to peak nom
MADI	64 channel MADI supported on selected constellations (optional MADI SFP required for this)

Network Connection

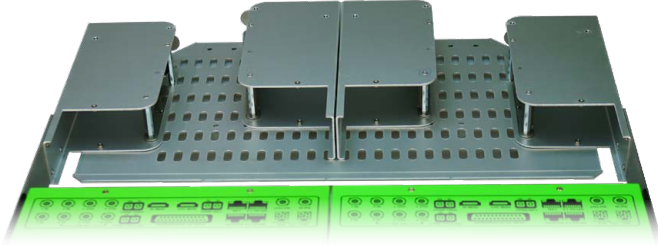
Ethernet (LAN)	1x 10/100/1000 BaseT RJ45 Connector
GPI I/O	<ul style="list-style-type: none"> 4x general purpose inputs (RJ45 Connector) 4x general purpose outputs (RJ45 Connector)
Serial Data	EIA/ETA RS232C / RS422 / RS 485 (selectable through LynxCentraal) - RJ45 connector ESD protection for up to 16kV



Options

RXT 6001 19" Rack Extension for RFR 6000

The RXT 6001 is a compact and flexible rack extension for RFR 6000. It can be setup to hold up to four RPS A100 power supplies with optimized airflow surfaces.

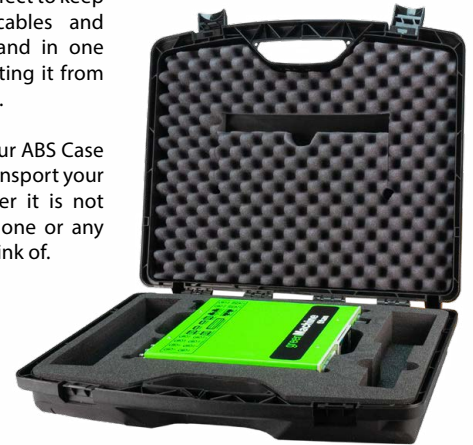


RXT 6001 installed in RFR 6000

ABS Case for greenMachine

The transport case is perfect to keep your greenMachine®, cables and documents organized and in one place, while also protecting it from environmental influences.

With its study design, our ABS Case is the ideal partner to transport your greenMachine® whenever it is not wired in a rack, standalone or any other system you can think of.



Ordering Information

greenMachine Package		
Includes	GM 6840:	greenMachine titan Processors
	2x GMC-BiDi-Transport:	greenMachine titan - Multi Signal Audio/Video/Data Bi-Directional Transport System Licence
	SFPs:	12G: 1x OH-BD-12G-1270-LC, 1x OH-BD-12G-1330-LC, Ethernet: 1x OH-BD-51-1310-LC, 1x OH-BD-51-1550-LC
	2x RFR 6000	Rack Frame for 1 or 2 greenMachines (without power supplies)
	4x RPS A100:	Primary and Redundant Power Supplies with Region Specific Power Cord
	2x RBO A025	D-Sub 25 Audio Adapter PCB screw terminal
GMPT BIDI (N/EU/US/UK)	greenMachine titan - Multi Signal Audio/Video/Data Bi-Directional Transport System (2x greenMachines) Power plug Variants (please specify when ordering) GMPT BIDI N Power supply without Plug GMPT BIDI EU Power Supply with EU Plug GMPT BIDI US Power Supply with US Plug GMPT BIDI UK Power Supply with UK Plug	EAN: 4250479327917
License Only (no hardware included)		
GMC-BiDi-Transport	greenMachine titan - Multi Signal Audio/Video/Data Bi-Directional Transport System Licence (No Hardware)	4250479326088

More broadcast applications:

- GMC-TESTOR: Audio & Video Test signal generator in 4K UHD or Quad 3G mode including HDR test patterns
- GMC-4KUPXD: 4K Up/down/cross converter
- GMC-HDREvie+: Segmented, Dynamic HDR>SDR converter
- GMC-4FS: 4x3Gbit/s Frame Synchronizer
- GMC-3GUPXD: Dual 3G Up/down/cross converter and Dual scaler

The greenMachine hardware can be configured for a different broadcast application by re-deploying a different application called "constellation". These perpetual licenses are and application deployment on the greenMachine.

For greenMachine the following regulatory and safety standards apply:

- CE:** EN 55103-1/1996, EN 55103-2 /1996, EN 60950-1/2006 Following the provisions of 2004/108/EC and 2006/95/EC directives.
- FCC:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15, Subpart B of the FCC Rules.

The RPS A100 power supply (EA11011D-1200) complies with the following safety standards:
UL/cUL 62368-1, TUV EN 62368-1, CB IEC 62368-1, FCC, CE, BSMI, PSE, RCM, IRAM



SFP Fiber Options

12G SDI Video Fiber Transmitter		Power		
OH-TX-12G-LC	12G-SDI Fiber TX SFP - LC - 10km* - 1310nm	-5 dBm		
12G SDI Video Fiber Receiver		Sensitivity		
OH-RX-12G-LC	12G-SDI Fiber RX SFP - LC - 10km* - 1270-1610nm	-10 dBm (12G)	-14 dBm (3G)	-16 dBm (1.5G)
12G SDI Video Fiber Transceiver		Power		Sensitivity
OH-TR-12G-LC	12G-SDI Fiber Transceiver, Singlemode - 10km* - LC - 1310nm	-5/+0.5 dBm	-10 dBm (12G)	-14 dBm (3G/1.5G)
CWDM SDI Video Transceiver (TR)		Power		Sensitivity
OH-TR-4-XXXX-LC XXXX = Wavelength	3G-SDI Fiber Transceiver, Singlemode CWDM capable - 40km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-4 ... +2 dBm	-20 dBm (3G/1.5G/SD)	
OH-TR-12G-XXXX-LC XXXX = Wavelength	12G-SDI Fiber Transceiver, Singlemode CWDM capable - 10km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-2/+3 dBm	-10 dBm (12G)	-14 dBm (3G/1.5G)

* Distance is an approximation. Actual distances achieved can be longer or shorter depending on the type of fiber cable and accumulated optical losses in the fiber link. Determine link losses and perform optical budget calculations to ensure correct operation.

More SFP options are available.

