

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:

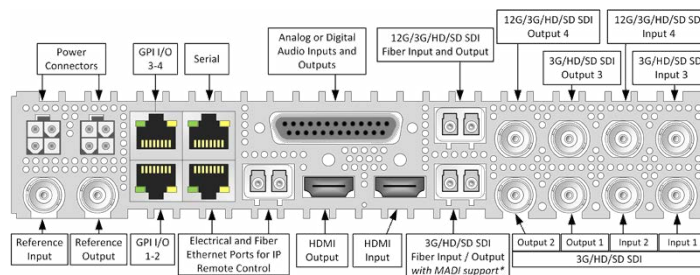
- SDI 3G: ~3Gbit/s
- SDI 1.5G: ~1.5Gbit/s
- MADI: ~3Gbit/s (transmitted embedded in 3G SDI)

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

Examples of transportable Content:

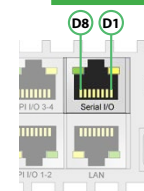
- 4x 3G SDI HD / 4x GPI
- 6x 1.5G SDI HD / 4x analog or digital audio signals / 4x GPI
- 3x 3G SDI HD / 1x 1.5G HD / 4x analog ordigital audio signals / 4x GPI

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.



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	



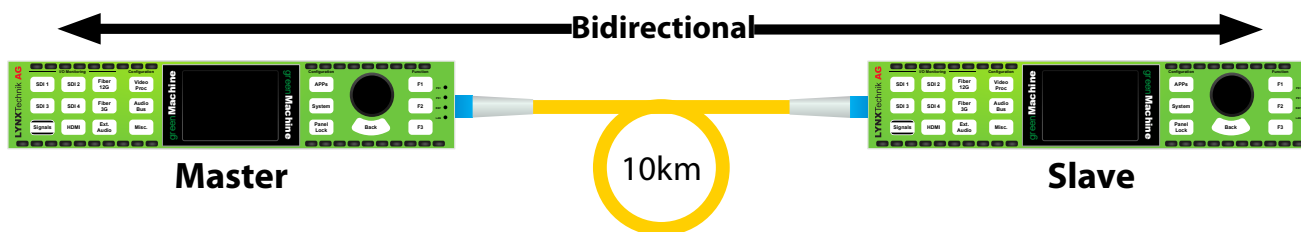
Features

- 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 wavelenghts
- 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

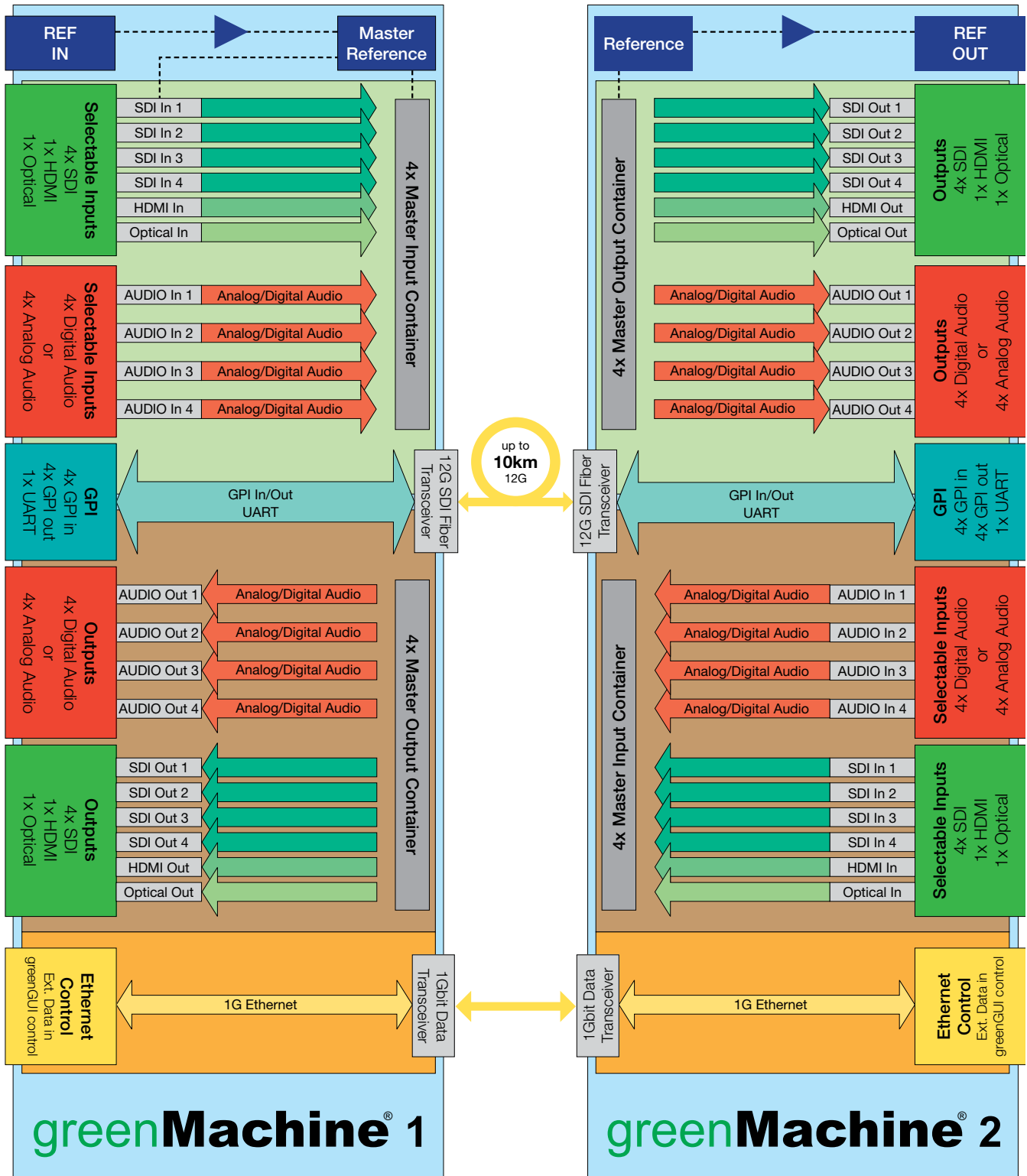
Technical Specifications

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)



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 (SMPTE 259M, 292M, 424M, 2082) with automatic video format and standard detection
Return Loss:	>7dB to 6GHz; >4dB to 12GHz
SDI Output	4x 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 (SMPTE 259M, 292M, 424M, 2082)
Return Loss:	>7dB to 6GHz; >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") - including 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	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
3Gbit/s Level A	1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz
12Gbit/s* Single Link	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz
12Gbit/s* 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 constellations and constellation modes (i.e. 3G 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, 2081 2082) - no SD SDI (270MBit)**
Optical Ethernet	IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1Gbit/s (125 MB/s)

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

AV Connection

HDMI	<ul style="list-style-type: none"> 1x Input 10 bit HDMI 1.4b 1x Output 10 bit HDMI 1.4b
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 Lynx-Centraal) - RJ45 connector ESD protection for up to 16kV



Options

RFR 6000 - 1RU 19" Rack Mount Chassis

Rack mounting hardware which can accommodate one or two greenMachines in 1RU of rack space which also securely mounts the power supplies.

Note: Two power supplies can be mounted onto one RFR 6000. Please see more information in the RFR 6000 quick reference guide.



One greenMachine in Rack Mount

RXT 6001 19" Rack Extension for RFR 6000

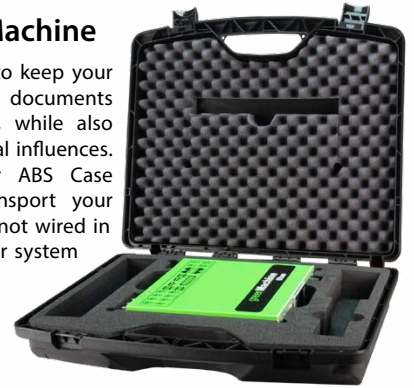
The RXT 6001 is a compact and flexible rack extension for RFR 6000. It can be setup to hold up to four RPS A100 power supplies with optimized airflow surfaces.



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.



SFP Fiber Options

12G SDI Video Fiber Transmitter		Power	
OH-TX-12G-LC	SDI Fiber TX SFP - LC - 10km* - 1310nm	-5dBm	
12G SDI Video Fiber Receiver		Sensitivity	
OH-RX-12G-LC	SDI Fiber RX SFP - LC - 10km* - 1270-1610nm	-10dBm (12G) -14dBm (6G/3G) -16dBm (1.5G)	
12G SDI Video Fiber Transceiver		Power	Sensitivity
OH-TR-12G-LC	SDI Fiber Transceiver, Singlemode - 10km* - LC - 1310nm	-5/+0.5 dBm	-10dBm (12G/6G) -14dBm (3G/1.5G)
CWDM SDI Video Transceiver (TR) (12G variants also support 1.5G/3G/6G SDI)		Power	Sensitivity
OH-TR-12G-XXXX-LC XXXX = Wavelength	SDI Fiber Transceiver, Singlemode CWDM capable - 10km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-2/+3 dBm	-10dBm (12G/6G) -14dBm (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.

Ordering Information

greenMachine Package			
Includes	2x GM 6840:	greenMachine titan Processor Hardware	
	2x RPS A100:	Primary Power Supplies with Region Specific Power Cord	
	2x GMC-BiDi-Transport:	Bidirectional Transport Solution License	
GMPT BIDI (N/EU/US/UK)	Multi Signal Bi-Directional Transport Solution (Hardware & License)		EAN: 4250479327917
	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		
License Only (no hardware included)			
GMC-BIDI-Transport	Dual 3G Up/Down/Cross Converter + Dual Scaler	4250479326088	
Accessories and Power Supply			
RFR 6000	1 RU 19" Rack Mount Chassis	4250479324466	
RXT 6001	19" Rack Frame Extension for RFR 6000	4250479326507	
RPS A100 (N/EU/US/UK)	AC to DC Desktop Power Supply Module 12V/8A (with None / EU / US / UK plug)	4250479327955	

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



GMPT-BIDI Transport_Rev2.5 Specifications subject to change

