

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. It is a flexible solution for applications that require an exchange of multiple signals consisting of video, audio, and GPIs, on two single-fiber links over long distances. The ethernet control information can be transported over a single fiber link over bidirectional SFPs.

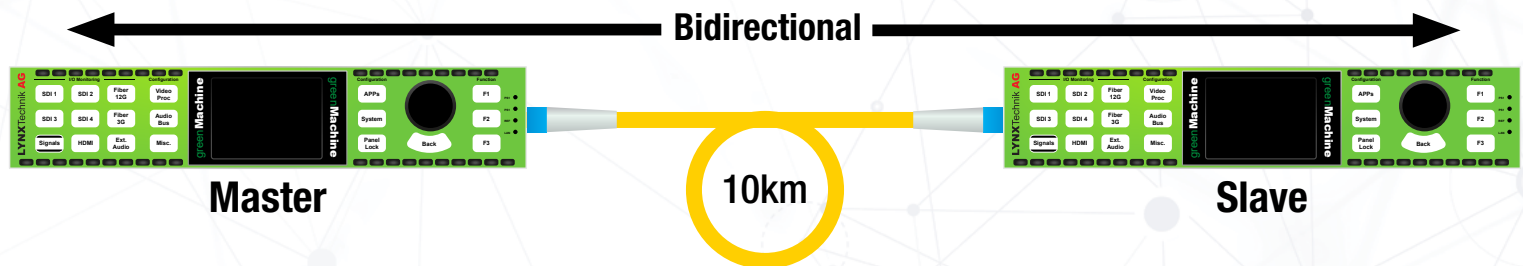
A Master/Slave model of communication is used between the two greenMachine Titan hardware devices where one machine will act as a Master device while the other will be a Slave. The greenMachine BiDi can transport one of the options below in both directions simultaneously:

1. 6xHD signals (1.485Gbit/s) with four external analog/digital audio signals and four GPIs
2. 4x 3G signal with four GPIs (two groups of embedded audio)
3. 3x3G signal, 1x HD signal, four external analog/digital audio signals and four GPIs

The signal options given can be mixed proportionally up to 12Gbit/s throughput. The reference of one of the two greenMachines (aka the Master) is also transmitted to the other greenMachine (aka the Slave) and can be used in the remote location to synchronize cameras, as an example.

A 1Gbit ethernet transport link provides easy control of the two greenMachine via greenGUI software. For the signal transport to occur which consists of video, audio, and GPIs, the two greenMachine Titans need to be connected via two single-mode fiber cables over transceiver SFPs. For the ethernet control signal transmission, one single-mode fiber cable is required over bidirectional SFPs.

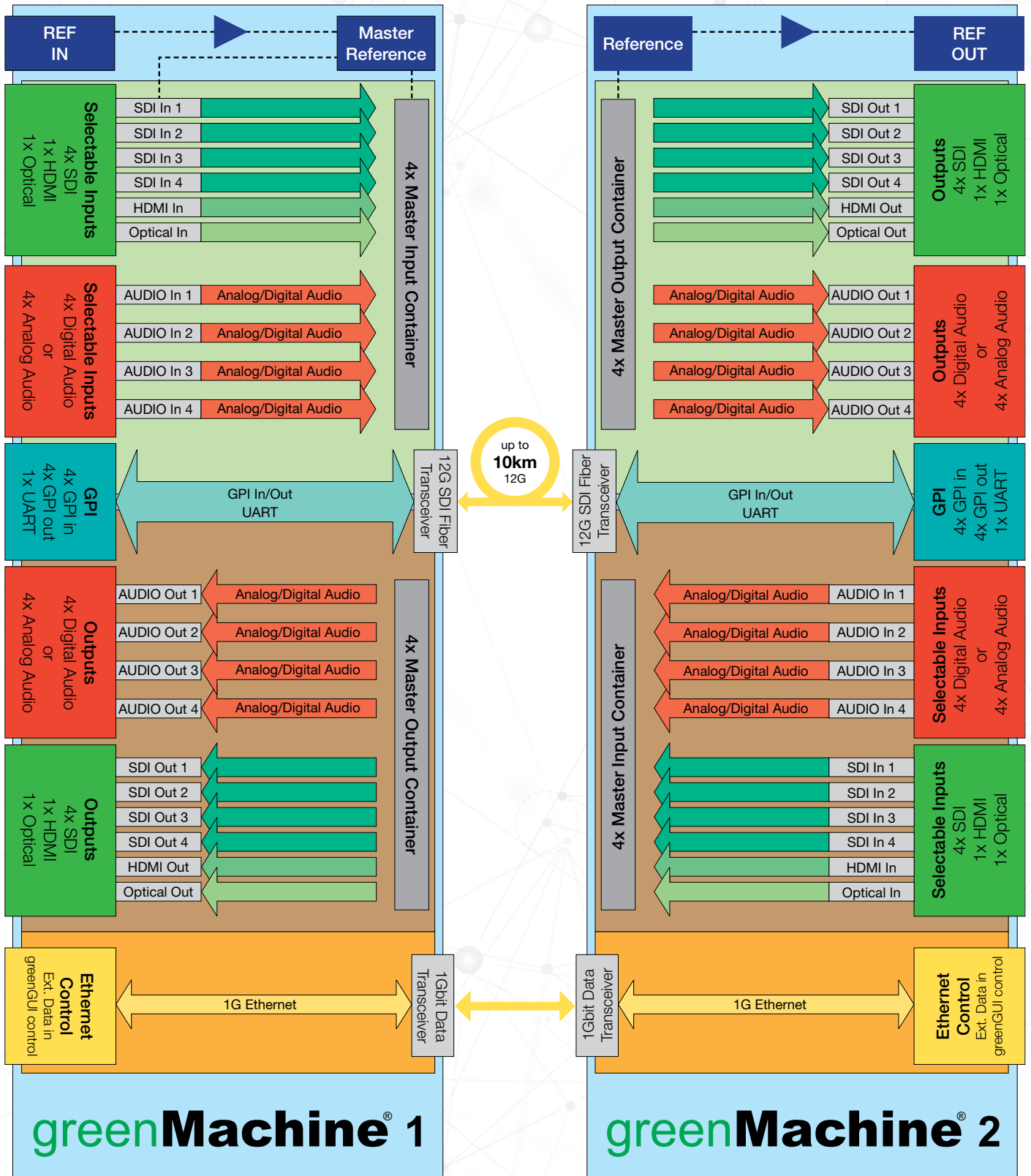
The greenMachine titan hardware comes with a fully featured local control interface with an LCD which displays image previews and audio level meters of the processed video paths in addition to the graphical user interface.



Features

- Multi-signal bidirectional transport solution through bi-directional 12G SDI channel
- SDI, HDMI and optical inputs and outputs
- 4x Audio transport in both directions
- 4x GPIO in both directions
- 1x Serial I/O (UART)
- 1x 1Gbit Ethernet transport
- 4 Audio inputs and outputs switchable between analog and digital
- 1x MADi via optical (3G)
- Included transceivers and bidirectional SFP modules for full signal transport
- Timed reference output
- Integrated local control panel for configuration and monitoring
- Extensive monitoring features such as image previews and audio level meters available on the local control panel and control software
- Full remote control using greenGUI control software CustomControl Panels
- Full SNMP v2 support
- Optional video and ethernet CWDM fiber I/O with all 18 wavelengths selectable
- Optional redundant power protection
- Optional 19" rack frame

Functional Diagram



Hardware Specifications

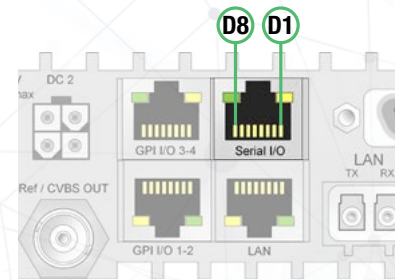
| | | | |
|-------------------------------|--|------------------------------------|---|
| SDI Inputs | 3x 3G SDI video on 75 Ohm BNC connector (SMPTE, 292M, 424M, 259M) with automatic video format and standard detection | Ethernet (LAN) | 1x 10/100/1000 BaseT RJ45 Connector |
| | Return Loss: >15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz | Optical Ethernet (Optional) | IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1 Gbit/s (125 MB/s) |
| | Automatic cable EQ (Belden 1694A): 340m@270Mbit/s, 150m@1.5Gbit/s, 110m@2.97Gbit/s | GPI I/O | • 4x general purpose inputs (RJ45 Connector) • 4x general purpose outputs (RJ45 Connector) |
| 12G SDI Input | 1x 12G SDI video on 75 Ohm BNC connector (SMPTE 292M, 424M, 259M, 2081, 2082) with automatic video format and standard detection | Reference Input | • 1x analog video reference on 75 Ohm BNC connector • Analog bi-level (SDTV) or tri-level (HDTV) auto detect |
| | Return Loss: same as 3G SDI; >7dB to 6GHz; >4dB to 12GHz | Reference Output | • 1x analog video reference on 75 Ohm BNC connector • Analog bi-level (SDTV) or ri-level (HDTV), cross lock capability |
| SDI Output | 3x SDI video on 75 Ohm BNC connector (SMPTE, 292M, 424M, 259M) | Serial Data | EIA/ETA RS232C / RS422 /RS 485 (selectable through greenGUI) - RJ45 connector ESD protection for up to 16kV |
| | Timing jitter: < 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 2.97Gbit/s | Audio I/O | 4x input and 4x output on Sub-D 25 female connector Analog: input impedance >10k Ohm, Output Impedance 150 Ohm Analog I/O full scale level: selectable 12, 15, 18, 20, 22, 24 dBu Digital: AES3 balanced transformer isolated; Digital output level: 4V peak to peak nom 64 channel MADI supported on selected constellations (optional MADI SFP required for this) |
| | Alignment jitter: < 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 2.97Gbit/s | Power | 12VDC @ 45W nominal (supports 7 - 24VDC input range) 2x power connections for redundant power supply |
| | Return Loss: >15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz | Mechanical | W: 218mm (1/2 19"), H: 44mm (1.75"), D: 225mm (8.86") - including connectors. Weight: 1.4kg (3.09lb) |
| 12G SDI Output | 1x 12G SDI video on 75 Ohm BNC connector (SMPTE 292M, 424M, 259M, 2081, 2082) | Ambient | Temperature: 5°C to 40°C (41°F to 104°F) maintaining specification Humidity: 90% maximum, non-condensing |
| | Return Loss: same as 3G SDI; >7dB to 6GHz; >4dB to 12GHz | | |
| HDMI | • 1x Input 10 bit HDMI 1.4b • 1x Output 10 bit HDMI 1.4b | | |
| Optical I/O (Optional) | • 1x 3G SDI SFP Transceiver (SMPTE 297M - 2006) • 1x 12G SDI SFP Transceiver (SMPTE 292M, 424M , 2081 2082) - no SD SDI (270Mbit) | | |

Note: In external reference mode, the output timing may deviate for certain standards or video combination.

UART Pinout

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

Note: Pinout in table is pinout of RJ-45 greenMachine serial port. Pinout can be changed between Uncrossed and Crossed in the greenGUI.



Supported SDI Formats

| | | | |
|---|--|---|---|
| HDTV Formats | 1080i / 50Hz 1080i / 59.94Hz 1080i / 60Hz 1080p / 25Hz 1080p / 29.97Hz | 1080p / 30Hz 1080psf / 25Hz 720p / 25Hz | 720p / 29.97Hz 720p / 30Hz 720p / 50Hz 720p / 59.94Hz 720p / 60Hz |
| 3GBit/s Formats Level A and B | 1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz | | |
| 12GBit/s Formats Quad Link 2SI Level A and B (4 x 3Gbit/s) | 3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz | | |

Other Broadcast Applications

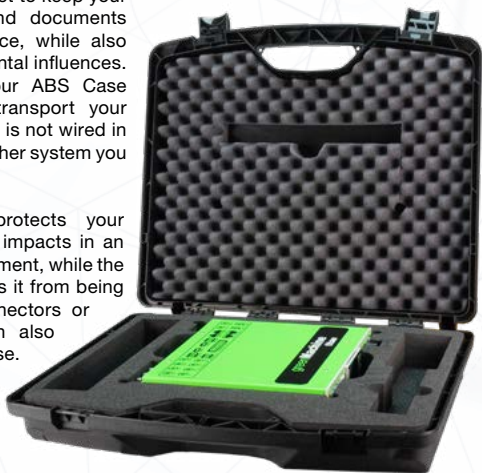
- **GMC-HDR-EVIE:** Dynamic HDR > SDR converter
- **GMC-HDR-Static:** Static HDR <> SDR converter
- **GMC-TESTOR:** Audio & Video Test signal generator in 4K UHD or Quad 3G mode including HDR test patterns
- **GMC-3GUPXD:** 3G Up/down/cross converter
- **GMC-4KUPXD:** 4K Up/down/cross converter
- **GMC-Quad3G-FS:** 4x3Gbit/s Frame Synchronizer

*The greenMachine hardware can be configured for a different broadcast application independent of BIDI Transport via the purchase of perpetual licenses and application deployment on the greenMachine.

Options

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 sturdy 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.



The hard shell case protects your greenMachine® from most impacts in an average, busy work environment, while the inner foam coating prevents it from being scratched by cables, connectors or other equipment that can also be stored inside the case.

The foam pocket inside the top lid of the case is ideal for storing quick reference guide, notes or any documentation.

RPS A100 - AC to DC Power Supply 12V/8A

The RPS A100 AC to DC Desktop power supply unit provides 100 watts of continuous output power. The power supply is equipped with IEC320-C14 AC inlet.



Plugs are available for regions EU, US and UK as well as an option without a power plug (N). When ordering just add the region shorthand at the end of the module name.

Fiber Options

| Basic 3G SDI Video Fiber Transmitter & Receiver | | Power / Sensitivity | |
|--|--|---------------------|--------|
| OH-TX-1-LC/ST/SC | SDI Fiber TX SFP - LC/SC or ST - 1310nm | -5dBm | |
| OH-RX-1-LC/ST/SC | SDI Fiber RX SFP - LC/SC or ST - 1270 - 1610nm | -16dBm | |
| 3G SDI Video Fiber Transceiver | | Power / Sensitivity | |
| OH-TR-1-LC | SDI Fiber Transceiver, Singlemode - LC - 1310nm | -5dBm | -18dBm |
| OH-TR-0-850-MM | SDI Fiber Transceiver, Multimode - LC - 850nm | -5dBm | -15dBm |
| CWDM SDI Video Fiber Transceiver (TR) (12G variants support 1.5G/3G/6G and 12G SDI) | | Power / Sensitivity | |
| OH-TR-4-XXXX-LC XXXX = Wavelength | SDI Fiber Transceiver, Singlemode - CWDM capable - 40km* - LC 18 wavelengths acc. to ITU T G692.2: 1270nm through 1610nm. | -1dBm | -20dBm |
| Basic Ethernet Fiber Transceiver | | Power / Sensitivity | |
| OH-TR-51-LC | Ethernet Fiber Transceiver, Singlemode - 10km* - LC - 1310nm | -3dBm | -21dBm |
| CWDM Ethernet Fiber Transceiver | | Power / Sensitivity | |
| OH-TR-54-XXXX-LC XXXX = Wavelength | Ethernet Fiber Transceiver, Singlemode - CWDM capable - 40km* - LC 18 wavelengths acc. to ITU T G692.2 1270nm through 1610nm. | 0dBm | -21dBm |

* 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.

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 greenMachine is ideally suited for standalone applications but this powerful processing platform reaches its full potential when used within a system design. 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.



RXT 6001 installed in RFR 6000

Ordering Information

| greenMachine Package | | |
|------------------------------|--|---|
| Includes | 2x GM 6840: | greenMachine titan Processors |
| | 2x RPS A100: | Primary Power Supplies with Region Specific Power Cord |
| | 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 GMC-BiDi-Transport: | Bi-Directional Transport Constellation Licence |
| GMPT BIDI (N/EU/US/UK) | Multi Signal Bi-Directional Transport Solution (H/W & Licenses) 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 |
| BIDI Transport License Only | | |
| GMC-BiDi-Transport | greenMachine titan constellation: Bi-directional Transport (License only- includes no hardware) | EAN: 4250479326088 |
| Accessories and Power Supply | | |
| RFR 6000 | 1 RU 19" Rack Mount Chassis | EAN: 4250479324466 |
| RXT 6001 | 19" Rack Frame Extension for RFR 6000 | EAN: 4250479326507 |
| RPS A100 (N/EU/US/UK) | AC to DC Desktop Power Supply Module 12V/8A (with None / EU / US / UK plug) | EAN: 4250479327955 |

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_Rev2.2 - Specifications subject to change