Spring 2020
V 3.9

greenMachine®

multiple purpose processor

LYNXTechnik AG | Broadcast Television Equipment

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greenMachine®

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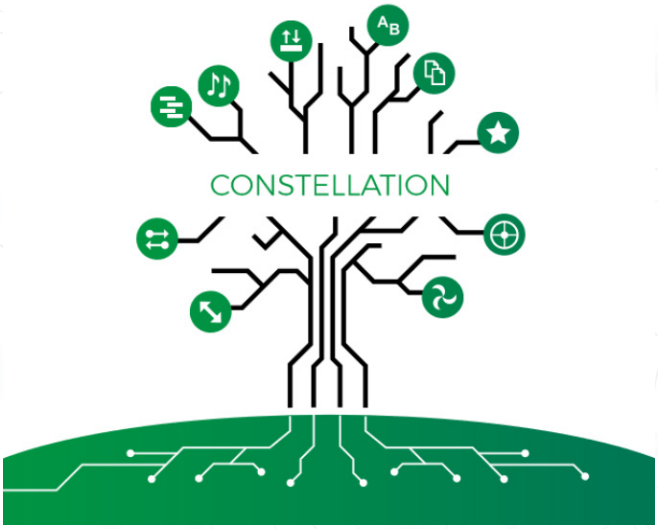
Introduction

greenMachine®

About the greenMachine



greenMachine is a multiple award-winning multi-purpose processing platform that offers many configurations in the form of constellations. Rather than being a fixed application specific box, greenMachine is a combination of general purpose hardware and constellation (pre-defined set of functionalities/ features) for reprogrammable functioniality and powerful control software.
The recently released callisto+ platform supports a two channel in and output via up to 3G SDI, as well as HDMI in- and outputs , extensive audio capabilities, as well as video adjustments. For video signals of up to 12G the greenMachine Titan offers a wide range of unique functionalities- while keeping the same form factor as the callisto+ platform.

Constellations

A constellation is a template or package of features which when deployed on a greenMachine, reconfigures that machine to have those features. Any greenMachine can be custom configured by the user using one of the pre-defined constellations, available on LYNX sales network. greenMachine is not limited to one constellation but allows switching between multiple licensed constellations to configure the machine for many different applications in the workflow.
The following constellations are currently available on greenMachine:

HDR Evie+: A patented real-time segmented frame-by-frame broadcast-quality HDR to SDR converter, with frame sync supporting formats up to 4K UHD (3840x2160).

HDR Evie: An award-winning fully featured broadcast quality real-time frame by frame HDR to SDR converter, with frame sync.

HDR Static: A broadcast quality HDR to SDR, SDR to HDR or cross-standard HDR to HDR converter, with a frame sync and up/down/cross converters supporting formats up tp 4K UHD (3840x2160).

4KUPXD: A broadcast quality up/down/cross converter with frame sync and scaler supporting formats up to 4K UHD.

3GUPXD: A broadcast quality dual 3G up/down/cross converter and dual Scaler with frame sync supporting formats up to 3G-SDI (1920x1080).

2CUPXD: A slimmer version of 3GUPXD exclusively for the callisto+ platform. It is a dual channel up/down/cross converter with frame sync and extensive audio and 3G SDI video adjustment capabilities.

BIDI Transport: A cost-effective bidirectional transport solution that allows transportation of video, audio, Ethernet, and GPI efficiently across two greenMachine Titan hardware devices.

Testor: A video and audio test signal generator supporting 12G (4K UHD), 3G , HD, SD-SDI formats with standard static and dynamic video test patterns with added flexibility that allows users to upload their own user-defined signal patterns.

QuadFS: A fully featured frame synchronizer for formats up to 3Gbit/s SDI with scaler.

Note: *greenMachine comes with an extensive audio processing capabilities. Check the cutsheet of a constellation for more details*.

Constellation Tools

greenMachine®

Included Tools	HDR Evie+	HDR Static		4K UPXD	3G UPXD	2C UPXD	4FS
		Two modes					
	4K UHD Channel Mode	Quad 3G Channel Mode	4K UHD Channel Mode				Quad 3G Channel Mode
4K UHD /3G Scaler	–	✓	✓	✓	✓ Only 3G	✓ Only 3G	✓
Deinterlacer	–	✓ Only on Channel 1&2	✓	✓	✓ Only on Channel 1&2	✓	–
Frame Sync	✓	✓	✓	✓	✓	✓	✓
3G Level A/B	–	✓	✓	✓	✓	✓	✓
Embedding /Deembedding	✓	✓		✓	✓	✓	✓
Basic Audio & Video Test Generator	✓	✓	✓	✓	✓	✓	✓
Audio Processing	✓	✓		✓	✓	✓	✓
Dolby E® Decoder	–	✓		✓	✓	✓	✓
MADI In/Out	–	✓		✓	✓	✓	✓
MetaData Management	✓	✓		✓	✓	✓	✓
Video Adjustments	✓	✓	✓	✓	✓	✓	✓
Color Correction	✓ Gain and offset only	✓	✓	✓	✓	✓	✓
Nova Controller	✓	✓		✓	✓	✓	✓
Timing	✓	✓		✓	✓	✓	✓
HDR ► SDR Conversion	✓	✓	✓	–	–	–	–
SDR ► HDR Conversion	–	✓	✓	–	–	–	–

Note: *Find the information related to BIDI Transport & Testor Constellation later in this document.*

Live HDR Down-Conversion

One of the main goals of broadcasters and content providers is to create an immersive experience for the viewers, giving them the feeling of being part of the viewing content. The 4K standard has now been around for some time providing a high number of pixels on 4K televisions, as well as providing 4K content. Although, watching 4K content on a 4K television may not give the viewer a truly immersive experience. A large number of pixels does not determine the picture quality; color, contrast and brightness are critical too.

One key component for an immersive viewing experience is HDR - High Dynamic Range, something quite different from resolution. By preserving details in the highlights and shadows simultaneously, HDR creates a visual sensation which is close to what the human eye would capture in real scenes. In other words, HDR expands the range between white and black where brighter areas are captured and corrected without causing overexposure and yet providing detailed images. Simultaneously, darker areas are made darker without causing underexposure, yet providing most details. HDR provides much more visually satisfying pictures than simply having more pixels on the screen.

HDR is going to provide a massive change in the viewing experience for home entertainment, which will receive the same color grading experience similar to that in the cinema environment. It will not be long, due to its demand, when Broadcasters will soon adopt HDR to provide content so that viewers will enjoy an enhanced viewing experience.

Some major streaming services such as Netflix and Amazon have rolled out support for the HDR technology. HDR is end-to-end technology which means that at each step from creation to distribution to the displays, the entire workflow needs to be HDR compatible. This means that not all consumers will have an appropriate display in the near future to experience HDR content. Those without HDR screens are left with a very washed out picture.. One way to solve this problem is by converting HDR content to SDR content yet keeping the best possible picture quality on the SDR screens. One way to achieve this is by using static HDR to SDR conversion which keeps the parameters for brightness, contrast and color constant throughout the production. There are HDR to SDR solutions for the post-production market, but not many options for real-time applications.

A real-time static HDR to SDR conversion works perfectly fine for the Studio environment or in an environment where the lighting conditions are predictable. However, for an outdoor environment where the lighting conditions are dynamically changing, a static HDR to SDR conversion may cause an over or under exposure. This brings us to the latest innovative process of dynamic HDR to SDR conversion for real-time content. Dynamic HDR to SDR conversion alters parameters for brightness, contrast and color dynamically for each frame in real-time to produce a vibrant and realistic image for viewers.

LYNX Technik AG was awarded a **TVB Europe BEST OF SHOW** award at IBC and a **Product of the Year** award at NAB show in 2019 for its world's first real-time frame-by-frame HDR to SDR conversion solution - HDR Evie™.

GMPT - HDREVIE+

greenMachine® Package

greenMachine titan - HDR EVIE+ HDR > SDR Converter

The greenMachine approach is unique. The hardware itself is a powerful general purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations) Each constellation includes a combination of processing functions to perform high level processing including FS, UPXD, HDR etc.

greenMachine titan

The greenMachine HDR EVIE+ Package consist of the greenMachine titan HW and the HDR EVIE constellation.

Below you can find some basic information about the greenMachine titan.

For more information about the greenMachine titan please visit:

www.lynx-technik.com

Description

The greenMachine HDR Evie+ (Enhanced Video Image Engine), 1RU half 19" rackmount, is a real-time segmented frame-by-frame broadcast-quality High Dynamic Range (HDR) to Standard Dynamic Range (SDR) converter, with frame sync supporting formats up to 4K UHD (3840x2160).

It is the world's first system that uses the advanced algorithm for sectional dynamic tone mapping which automatically analyzes different sections of an image in HDR stream and applies optimal corrections on a frame by frame basis in real-time.

This unique capability is unlike any other solution today and is the perfect real-time production tool for sports or any live broadcast event needing high-quality real-time HDR to SDR conversions. HDR EVIE+ fits best in the single native HDR workflow reducing cost on equipment and manual operations.

HDR EVIE+ provides 1x 4K/UHD processing channel supporting down-conversion from HDR transfer characteristics to SDR through appropriate sectional dynamic tone mapping. It also supports Wide Color Gamut (WCG) needs of broadcasters, and professional AV live events requirement.

HDR Evie+ package also includes HDR Static configuration for Static HDR <> SDR conversions, which performs static tone mapping to realize UP/Down/Cross conversions between HDR and SDR, suited best for the studios or the environments where the light conditions do not change dynamically.

Functions

Sectional Dynamic HDR Down-Conversion

Input Transfer Characteristics	PQ ST-2084, PQ BT-2100, HLG, Sony SLog3, Arri LogC, Red Log3G10, BMD Film, Panasonic V-Log, Canon C-Log2
Output Transfer Characteristics	Standard Dynamic Range (SDR)

Colorimetry Supported

Input Colorimetry	BT.2020, BT.709, Sony S-Gamut, ACES, DCI-P3, Panasonic V-Gamut, BMD Film, Canon Cinema Gamut, Arri Alexa, Red Wide Gamut
Output Colorimetry	BT.2020, BT. 709

Input / Output Data Range

- Full range : Video signal representation (10bits) in full range of values from 0 to 1023 decimal (according to ITU BT 2100)
- Narrow range : Traditional video signal (10 bits) representation from 64 to 940 decimal values

Dynamic Processing

- *Local Dynamic to Global Dynamic Ratio engine* allows a user to mix sectional tone mapping and global tone mapping proportionally
- *Global Dynamic to Static Ratio engine* allows a user to mix dynamic tone mapping and static tone mapping proportionally
- *Dynamic adaptation speed engine* (frame-by-frame) allows a user to adjust tone mapping calculation speed to get smooth and consistent viewing impression
- *Automated Scene Detection engine* allows a user to adjust the parameter that detects a scene change for automated adjustment of image brightness levels
- User-adjustable *target brightness*, *contrast,* and *saturationw*

GMPT - HDREVIE+

greenMachine® Package

Included Features

HDR > SDR Conversion
Allows for dynamic HDR to SDR, conversions. Supports Gamma, PQ, HLG and SLog3. Supported Color spaces: Rec.709 and Rec. 2020.

Frame Synchronizer
The Frame synchronizer utilises an external Ref. with a robust “flywheel” function for synchronization of SDI sources up to 4K UHD. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.

Embedding / De-embedding
A high-quality multi-format audio embedder and de-embedder which can access all audio channels in the input SDI channel(s), shuffle and embed them in to the output(s). It can also embed DolbyE™ signals which in conjunction with the Frame Synchronizer will always maintain the guardband. It is also possible to incorporate separate AES and/or analogue audio inputs and outputs.

Basic Audio & Video Test Generator
The test generator is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.

Audio Processing
Each mono audio channel has gain adjustment, mute, inversion and stereo to mono mix-down. In addition, each mono channel has silence and overload monitoring as well as a 1 kHz test signal.

MetaData Management
The MetaData function manages the embedded metadata of the video signals. Time Code, Closed Captions and Teletext can be monitored and/or converted.

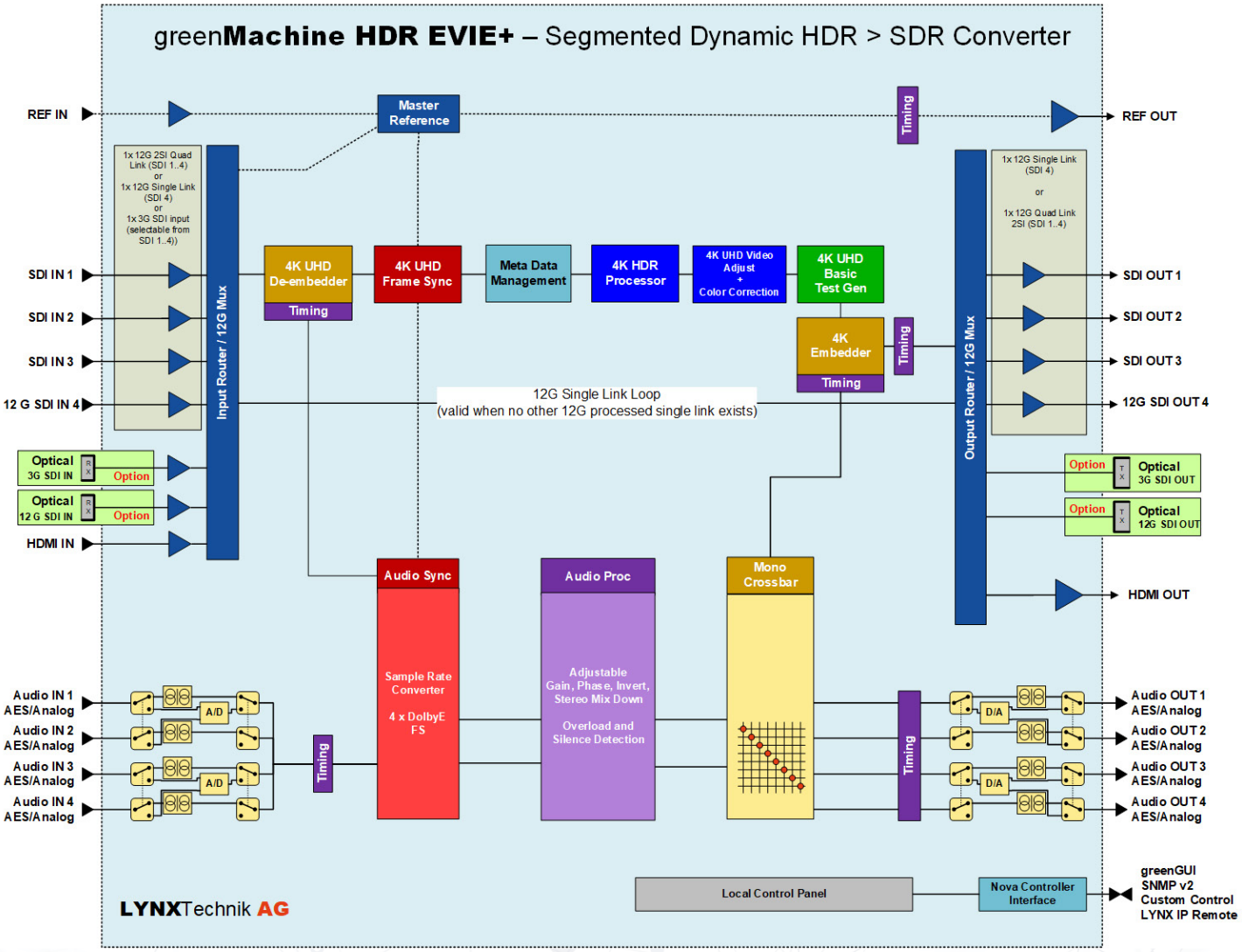
Video Adjustments
Video Adjustments include saturation, gain, black and hue adjustments, blanking interval deletion, and more.

Color Correction
This feature provides gain and offset adjustment for:
Red, Green, Blue, Cyan, Magenta, Yellow and White (CMYW).
This makes it the ideal tool to correct the color balance of monitors for example.

Timing
Each video and AES audio channel can be individually delayed. The available video delay per channel is 30 frames, the available audio delay is 1.3 seconds per AES audio channel.

Nova Controller (included in basic GM hardware)
This adds full SNMP v2 as well as LYNX IP remote control protocol. Mini-Nova also includes CustomControl which enables the user to design customized control panels for a computer or an iPad, giving simplified direct access to user selected parameters. CustomControl is particularly useful in live environments where instant access to a regularly used set of parameters is required without the distraction or risk of accessing all the system settings.

Functional Diagram Single 4K UHD Channel



in cooperation with:

Hochschule RheinMain
University of Applied Sciences
Wiesbaden Rüsselsheim

LOEWE
Exzellente Forschung für Hessens Zukunft

HESSEN
Hessisches Ministerium für Wissenschaft und Kunst

GMPT-HDRST

greenMachine® Package

greenMachine titan - HDR STATIC HDR ⇔ SDR Converter

The greenMachine approach is unique. The hardware itself is a powerful general-purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations) Each constellation includes a combination of processing functions to perform high level processing including FS, UPXD, HDR etc.

The greenMachine HDR <> SDR Converter Package consist of the greenMachine titan HW and the HDR STATIC constellation.

Below you can find some basic information about the greenMachine titan.

For more information about the greenMachine titan please visit:

www.lynx-technik.com

Description

The greenMachine HDR STATIC Constellation is a fully featured broadcast quality HDR to SDR, SDR to HDR or cross standard HDR to HDR converter, with a frame sync and up/down/cross converters supporting formats up to 4K UHD (3840x2160). The HDR STATIC applies colour and contrast parameters equally throughout a specific piece of content, i.e. an average brightness/color range is determined across an entire program.

The HDR STATIC Constellation must be used on the greenMachine titan 4-channel HW platform. It provides either a single 12G 4K-UHD processing channel, or four independent processing channels for SDI signals up to 1080p 3Gbit/s.

Modern image sensors offer significantly wider dynamic color ranges than classic TV devices can reproduce. The color ranges are defined as High Dynamic Range (HDR) and Standard Dynamic Range (SDR). SDR describes the older dynamic range in SD and HD-TV standards. With HDR there are completely new possibilities for broadcast and AV productions to provide an increased dynamic range for the viewer, including brighter highlights and more details in the dark areas of the image resulting in more brilliant and realistic images. One of the major challenges when introducing HDR with its tremendous image enhancements is to maintain good backward compatibility with existing SDR displays and receivers.
The greenMachine HDR-STATIC Constellation is a powerful tool for handling dynamic ranges and color gamuts, presenting viewers with more dynamic images than previously seen, even without an up-to-date HDR display. It provides conversion functionality, simultaneously combining it with a static (real time) tone mapping algorithm. This application allows the user to carry out up-, down- and cross-conversions between common input and output curves including Gamma, PQ, HLG and slog3 and conversions between full and narrow ranges through appropriate static tone mapping. Conversion between color spaces including Rec. 709 and Rec. 2020 are also possible.

The Custom LUT feature allows users to upload up to 20 user LUTs to obtain the desired contrast, color, saturation, black and white levels.

This greenMachine HDR STATIC constellation also includes spatial Up, Down and Cross conversions up to 4K UHD, audio processing and shuffling, color correction, timing adjustment, Meta Data processing and the Nova controller which enables the greenMachine to be remotely controlled and monitored via third party master control software. CustomControl is also included providing simplified customised screen panels offering direct access to user selected parameters.

GMPT-HDRST

greenMachine® Package

Included Features

HDR <> SDR Conversion
Allows for HDR to SDR, SDR to HDR and HDR to HDR conversions. Supports Gamma, PQ, HLG and SLog3. [**Supported Color spaces: Rec.709 and Rec. 2020.**] It also allows users to upload and store up to 20 3D LUTs in 33-points .cube file format

4K UHD / 3G Scaler
The Scaler is a high-quality spatial converter with powerful Region of Interest (ROI) selection and scaling.

DeInterlacer
The De-Interlacer will perform broadcast quality deinterlacing for incoming interlaced SD and HD video formats and applies motion adaptive filtering resulting in superb image quality. In Quad 3G mode, HDR Static provides de-interlacers on first two processing channels.

Frame Synchronizer
The Frame synchronizer utilises an external Ref. with a robust “flywheel” function for synchronization of SDI sources up to 4K UHD. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.

3G Level A/B
This provides automatic detection of 3G-SDI level A or Level B inputs and can convert a 3G Level A input signal (acc. to SMPTE ST425-1/4:2:2, 10 Bit) into a 3G Level B Dual Link output signal, or vice versa.

Embedding / De-embedding
A high quality multi-format audio embedder and de-embedder which can access all audio channels in the input SDI channel(s), shuffle and embed them in to the output(s). It can also embed DolbyE™ signals which in conjunction with the Frame Synchronizer will always maintain the guard band. It is also possible to incorporate separate AES and/or analogue audio inputs and outputs.

Basic Audio & Video Test Generator
The test generator is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.

Audio Processing
Each mono audio channel has gain adjustment, mute, inversion and stereo to mono mix-down. In addition, each mono channel has silence and overload monitoring as well as a 1 kHz test signal.

MetaData Management
The MetaData function manages the embedded metadata of the video signals. Time Code, Closed Captions and Teletext can be monitored and/or converted.

Video Adjustments
Video Adjustments include saturation, gain, black and hue adjustments, blanking interval deletion, and more.

Color Correction
This feature provides gain, lift, gamma and offset adjustment for Red, Green, and Blue (RGB). It also provides gain and offset adjustments for Cyan, Magenta, Yellow and White (CMYW).
This makes it the ideal tool to correct the color balance of monitors for example.

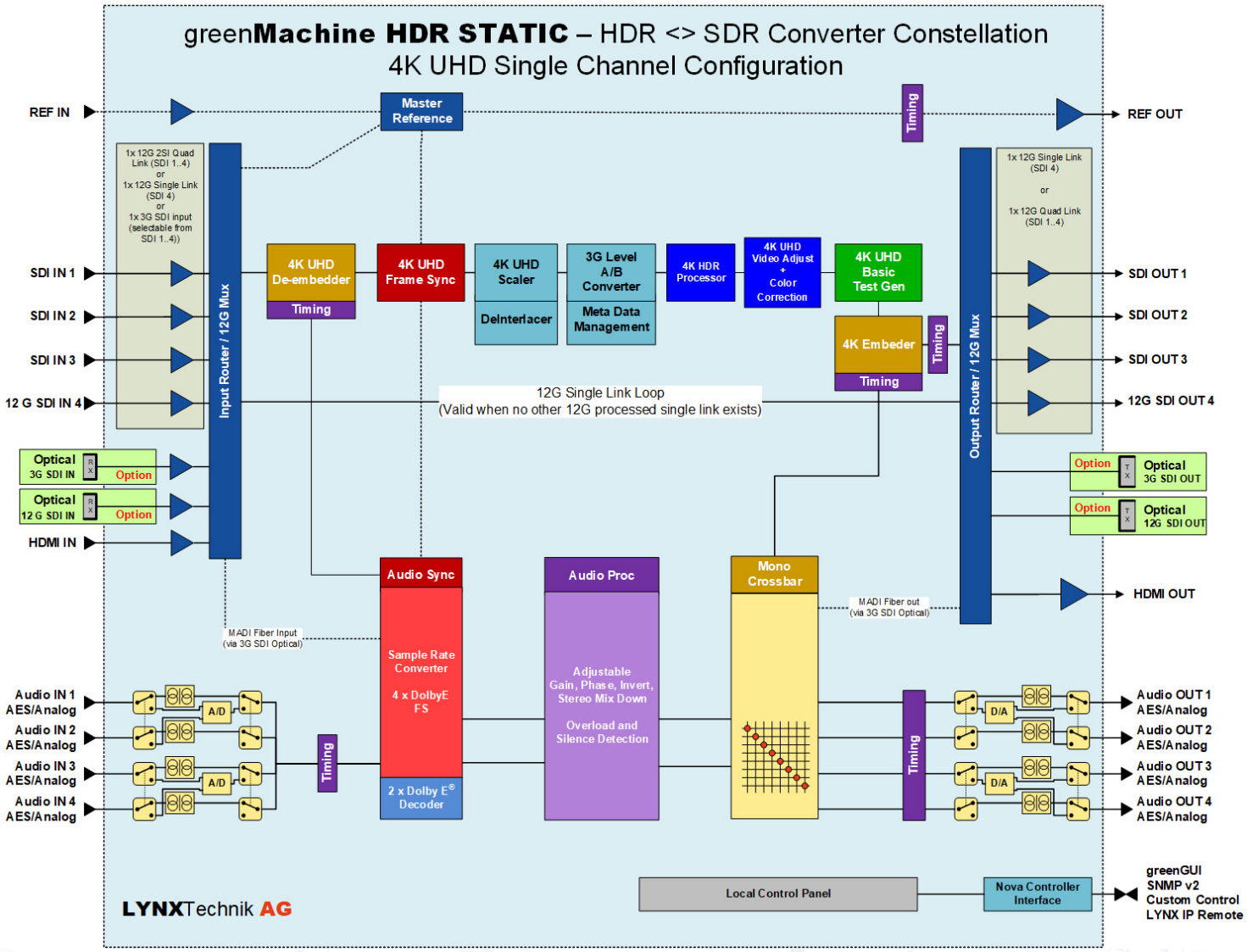
Timing
Each video and AES audio channel can be individually delayed. The available video delay per channel is 30 frames, the available audio delay is 1.3 seconds per AES audio channel.

Nova Controller (included in basic GM hardware)
This adds full SNMP v2 as well as LYNX IP remote control protocol. Mini-Nova also includes CustomControl which enables the user to design customized control panels for a computer or an iPad, giving simplified direct access to user selected parameters. CustomControl is particularly useful in live environments where instant access to a regularly used set of parameters is required without the distraction or risk of accessing all the system settings.

MADI In/Out
This provides a MADI input and output. All incoming MADI signals are routed to the internal audio crossbar. The outgoing MADI signal can be completely re-arranged in the internal audio crossbar.

Dolby E® Decoder
Two Dolby E® Decoder can be used to decode all 8 audio channels contained in a Dolby E® stream. The Dolby® metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.

Functional Diagram Single 4K UHD Channel

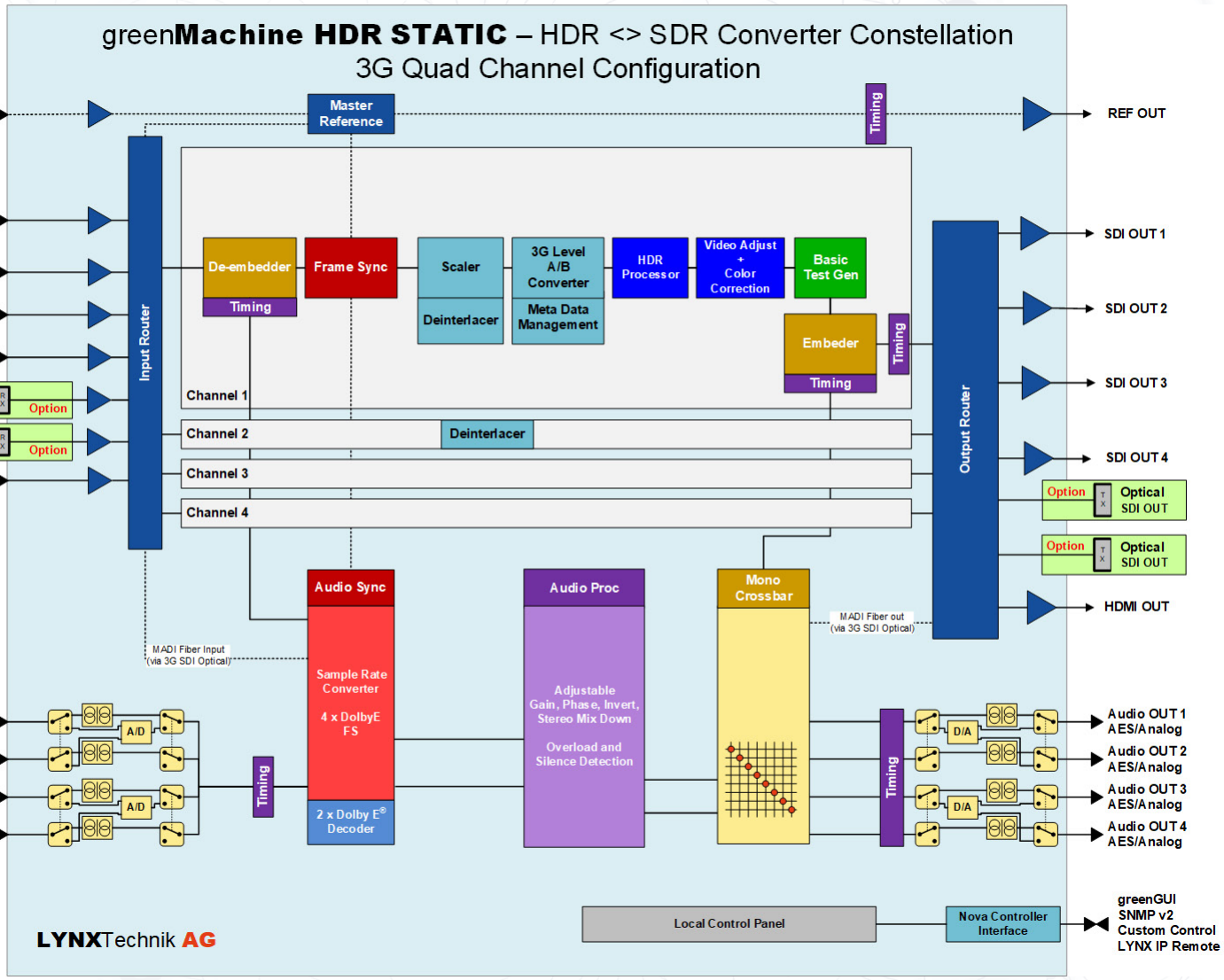


The greenMachine HDR STATIC - HDR <> SDR Converter Constellation consists of two individual Configurations. One for a single 12G 4K-UHD processing channel, the other for four independent 3G processing channels of SDI signals up to 3Gbit/s configuration.

When deploying this constellation, the user will be asked what configuration (4K UHD or 4x3G) he would like to deploy. The user can deploy the constellation via the greenMachine front panel or within the greenGUI running on a network connected PC or MAC.

The NOVA controller is already included in the basic GM hardware.

Functional Diagram Quad 3G Channel



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in cooperation with:

Hochschule RheinMain
University of Applied Sciences
Wiesbaden Rüsselsheim

LOEWE
Exzellente Forschung für Hessens Zukunft

HESSEN
Hessisches Ministerium für Wissenschaft und Kunst

GMPT - TESTOR

greenMachine® Package

greenMachine titan - TESTOR Audio & Video Test Generator

The greenMachine approach is unique. The hardware itself is a powerful general-purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations) Each constellation includes a combination of processing functions to perform high level processing including FS, UPXD, HDR etc.

greenMachine titan

The greenMachine TESTOR Package consist of the greenMachine titan HW and the Testor constellation.

Below you can find some basic information about the greenMachine titan.

For more information about the greenMachine titan please visit:

www.lynx-technik.com

Description

LYNX Technik has long been recognized for its feature-rich and user-friendly multi-format test signal generators through its "Testor" series. The greenMachine Testor constellation is the company's latest offering of test signal generators and is available for the greenMachine titan hardware and greenGUI software platform. greenMachine Testor is an ideal trouble-shooting A/V tool for technicians and engineers working in the field, in-studio applications and for line-up tasks in master control rooms. Anywhere there is an A/V testing, designing, repairing and troubleshooting environment, the greenMachine Testor will be useful.

The greenMachine Testor constellation is a video and audio test signal generator that comes pre-configured for the greenMachine titan platform. It supports 12G (4K UHD), 3G, HD, SD-SDI formats and when operating in UHD mode, the Testor constellation can provide a single channel test generator. For 3G video formats (and below) the Testor constellation offers four independent test generators. To summarize the two options, it is currently offered in two configurations:

1. Single Channel 4K/UHD (up to 3840 x 2160p) - 12Gbit/s SDI and quad link (2SI)
2. Four independent channels up to 3G SDI

Standard static and dynamic video test signals and patterns are included, and for added flexibility, users can upload their own user-defined signal patterns. Logos and text can also be added to the test signals, which is very useful for example for channel identification. The included collection of patterns supports all video standards up to 4K/UHD. User-defined pattern uploads can be resampled for other standards. The Testor constellation also offers test signals for various **HDR standards (PQ, HLG, SLog3**).
Plus, the full collection of test signals can be shared with all greenMachine devices in a network (greenUniverse).

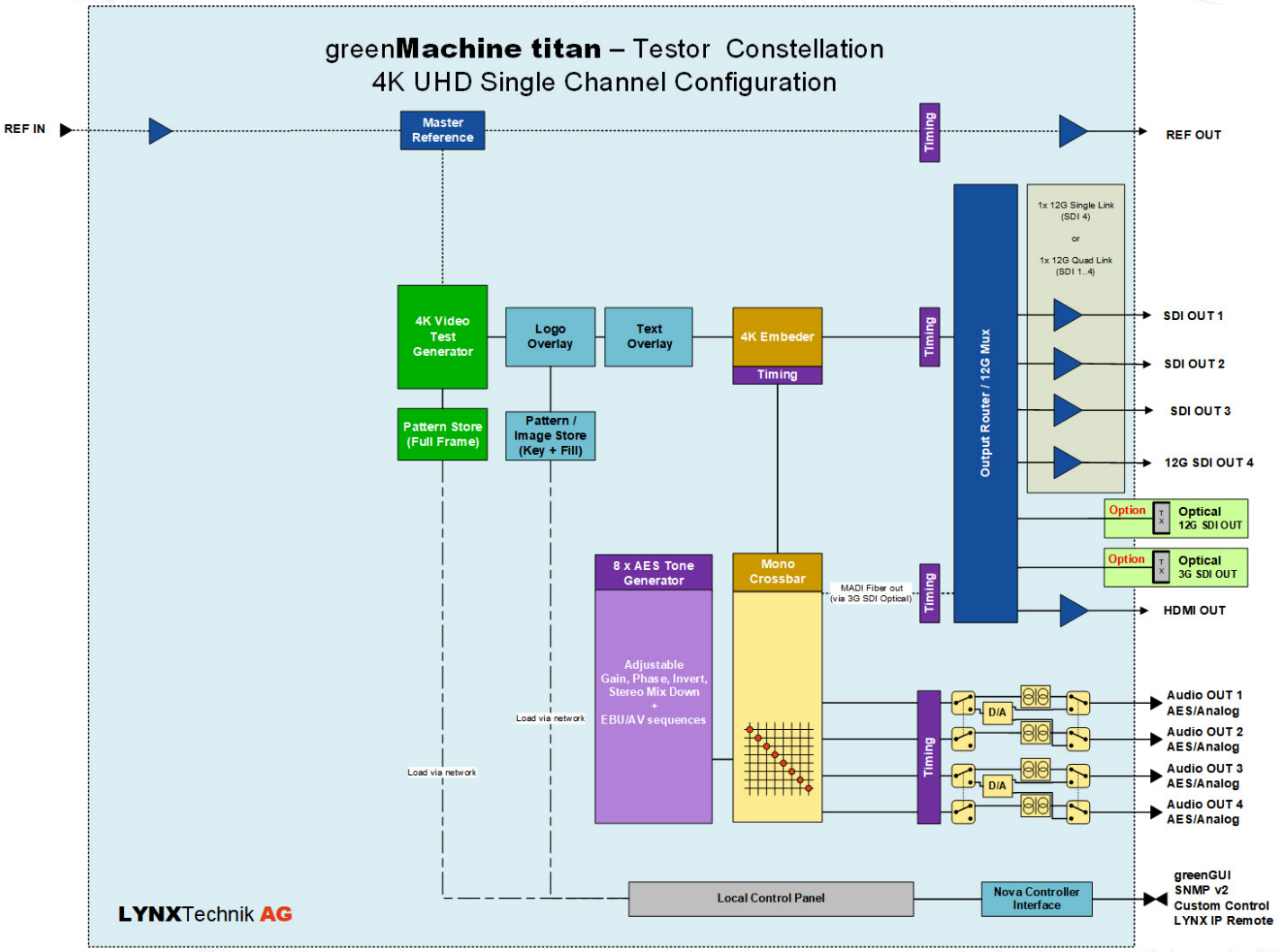
The integrated graphics editor provides a tool for users to place images & logos, add text, and even add user-defined signal patterns and graphics. All items can be moved and edited simply with a computer mouse.
The greenGUI software provides users with a true, advanced preview interface (including zoom) to check test signals in the GUI, control the outputs, format the settings, and manage customer-defined image and test pattern uploads. greenGUI software is free of charge and can be downloaded from: https://www.lynx-technik.com/support/download-area/greengui-software/

The greenMachine Testor also includes a 16-channel audio test generator with adjustable level, phase, frequency, mix-down and an EBU/AV sequence. All the audio measures are embedded into the SDI video or output to the external audio outputs of greenMachine. Through the audio crossbar all audio generator channels can be individually assigned to the embedder inputs and the external audio outputs (AES or analog).
The timing of the audio and the video test signals including the output reference signal (Bi-level SD or Tri-Level HD) can be individually set in relation to an attached input reference signal.

Ordering Information

greenMachine Titan Hardware and Testor License		
GMPT TESTOR EU	4K UHD or 4 x 3G SDI Audio & Video Test Signal Generator (H/W & License)	EAN: 4250479326262
GMPT TESTOR UK	4K UHD or 4 x 3G SDI Audio & Video Test Signal Generator (H/W & License)	EAN: 4250479326279
GMPT TESTOR US	4K UHD or 4 x 3G SDI Audio & Video Test Signal Generator (H/W & License)	EAN: 4250479326286
Testor License Only		
GMC-TESTOR-titan	greenMachine titan Testor constellation (License only- includes no hardware)	EAN: 4250479326101

Functional Diagram Single 4K UHD Channel

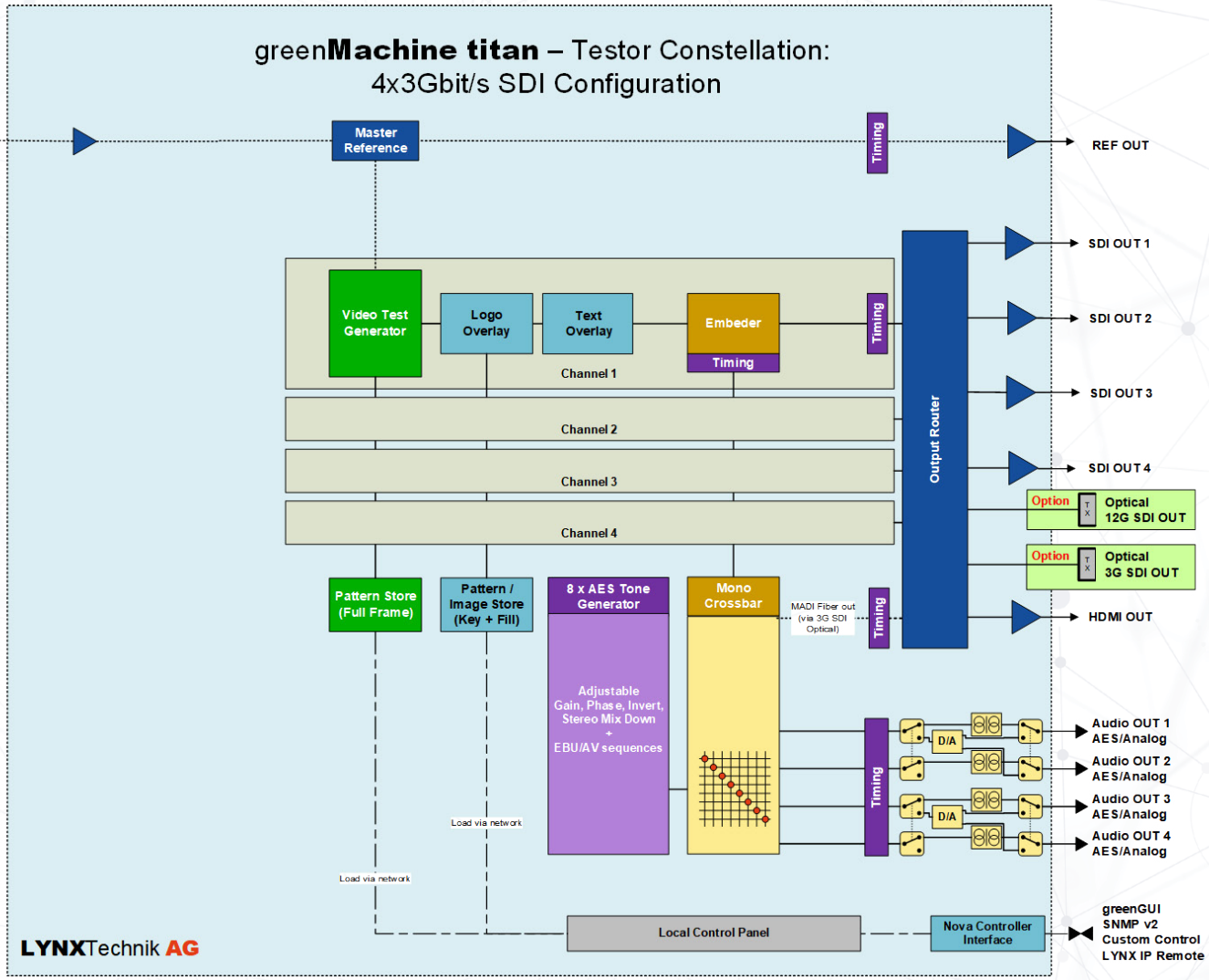


The greenMachine TESTOR Constellation consists of two individual configurations. One for a single 12G 4K-UHD processing channel, the other for four independent 3G processing channels of SDI signals up to 3Gbit/s configuration.

When deploying this constellation, the user will be asked what configuration (4K UHD or 4x3G) he would like to deploy. The user can deploy the constellation via the greenMachine front panel or within the greenGUI running on a network connected PC or MAC.

The NOVA controller is already included in the basic GM hardware.

Functional Diagram Quad 3G Channel



greenMachine titan- 4K UPXD 4K UHD Up/Down/Cross Converter

The greenMachine approach is unique. The hardware itself is a powerful general-purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations) Each constellation includes a combination of processing functions to perform high level processing including FS, UPXD, HDR etc.

greenMachine titan

The greenMachine 4K UPXD Package consist of the greenMachine titan HW and the 4K UPXD constellation.

Below you can find some basic information about the greenMachine titan.

For more information about the greenMachine titan please visit:

www.lynx-technik.com

Description

The greenMachine 4K Up/Down/Cross Converter Constellation is a fully featured broadcast quality up/down/cross converter supporting formats up to 4k UHD (3840x2160). This constellation can be used on the greenMachine titan HW platform.

This constellation is designed for applications that require dependable broadcast quality up/down/cross conversion and frame synchronization with full audio processing capability. The converter includes powerful scaling capabilities that allow a versatile Region of Interest (ROI) selection.
The included 3G Level A/B and 3G Deinterlacer makes the greenMachine titan compatible with either SDI standard up to 3G (Level A or Level B).

The module also supports 4x3G SDI (2SI Quad Link) or 12G SDI (Single Link) input and outputs for 4K UHD signals.
With the 2SI Quad-Link<>Single-Link Conversion signals can be interchanged in between the single link and 2SI quad link.

The extensive audio processing capability de-embeds all audio as well as providing support for one MADI input and output and four external audio inputs or outputs which individually can be configured to be analog (balanced) or digital (AES) interfaces. Multiple internal crossbars allow for extensive audio shuffling including the MADI streams. It also provides two Dolby E® decoders, Dolby E® synchronization, full audio processing as well as multiple adjustable user delays for audio and video.

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.

This greenMachine 4k UPXD constellation is also supported by the Nova controller which enables the module to be remotely controlled and monitored via third party master control software.

GMPT-4K UPXD

greenMachine® Package

Included Features

4K UHD / 3G Scaler
The Scaler is a high-quality spatial converter with powerful Region of Interest (ROI) selection and scaling.

DeInterlacer (only in 4K UHD mode)
The De-Interlacer will perform broadcast quality deinterlacing for incoming interlaced SD and HD video formats and applies motion adaptive filtering resulting in superb image quality.

Frame Synchronizer
The Frame synchronizer utilises an external Ref. with a robust "flywheel" function for synchronization of SDI sources up to 4K UHD. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.

3G Level A/B
This provides automatic detection of 3G-SDI level A or Level B inputs and can convert a 3G Level A input signal (acc. to SMPTE ST425-1/4:2:2, 10 Bit) into a 3G Level B Dual Link output signal, or vice versa.

Embedding / De-embedding
A high-quality multi-format audio embedder and de-embedder which can access all audio channels in the input SDI channel(s), shuffle and embed them in to the output(s). It can also embed DolbyE™ signals which in conjunction with the Frame Synchronizer will always maintain the guard band. It is also possible to incorporate separate AES and/or analogue audio inputs and outputs.

Basic Audio & Video Test Generator
The test generator is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.

Audio Processing
Each mono audio channel has gain adjustment, mute, inversion and stereo to mono mix-down. In addition, each mono channel has silence and overload monitoring as well as a 1 kHz test signal.

Dolby E® Decoder
Two Dolby E® Decoder can be used to decode all 8 audio channels contained in a Dolby E® stream. The Dolby® metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.

MADI In/Out
This provides a MADI input and output. All incoming MADI signals are routed to the internal audio crossbar. The outgoing MADI signal can be completely re-arranged in the internal audio crossbar.

MetaData Management
The MetaData function manages the embedded metadata of the video signals. Time Code, Closed Captions and Teletext can be monitored and/or converted.

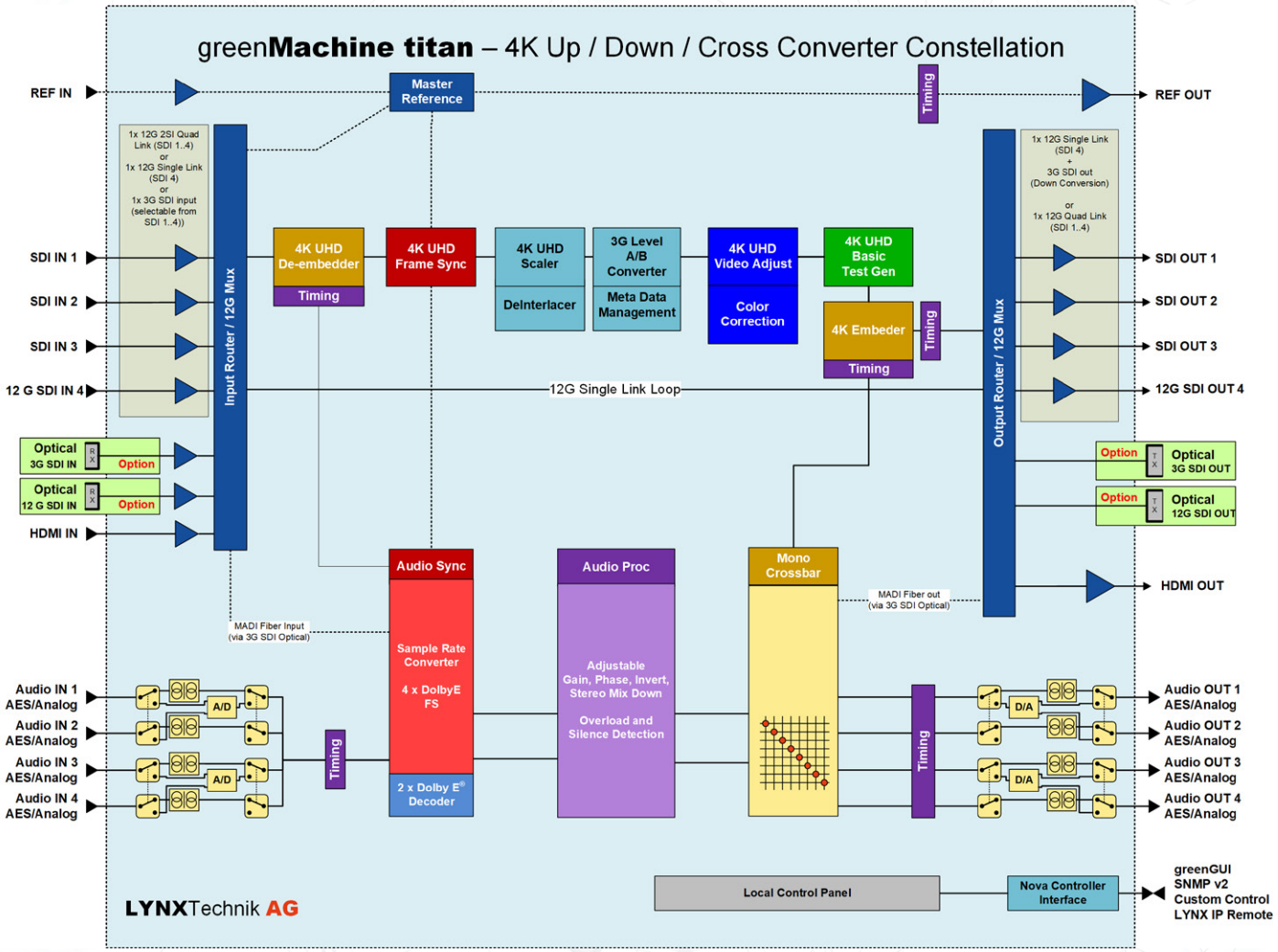
Video Adjustments
Video Adjustments include saturation, gain, black and hue adjustments, blanking interval deletion, and more.

Color Correction
This feature provides gain, lift, gamma and offset adjustment for Red, Green, and Blue (RGB). It also provides gain and offset adjustments for Cyan, Magenta, Yellow and White (CMYW). This makes it the ideal tool to correct the color balance of monitors for example.

Timing
Each video and AES audio channel can be individually delayed. The available video delay per channel is 30 frames, the available audio delay is 1.3 seconds per AES audio channel.

Nova Controller (included in basic GM Hardware)
This adds full SNMP v2 as well as LYNX IP remote control protocol. Mini-Nova also includes CustomControl which enables the user to design customized control panels for a computer or an iPad, giving simplified direct access to user selected parameters. CustomControl is particularly useful in live environments where instant access to a regularly used set of parameters is required without the distraction or risk of accessing all the system settings.

Functional Diagram



greenMachine titan - 3G UPXD

Dual 3G Up/Down/Cross Converter + Dual Scaler

The greenMachine approach is unique. The hardware itself is a powerful general purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations). Each constellation includes a combination of processing functions to perform high level processing including FS, UPXD, HDR etc.

greenMachine titan

The greenMachine Dual 3G UP/Down/Crossconverter + Dual Scaler Constellation is for deployment on the greenMachine titan HW platform.
Below you can find some basic information about the greenMachine titan.

For more information about the greenMachine titan please visit:

www.lynx-technik.com

Description

The UPXD 3G constellation is a broadcast quality video processing unit having quad channel up/down/cross converter with frame synchronizer supporting formats up to 3G-SDI (1920 x 1080) per channel. This constellation is designed for applications that require dependable broadcast quality up/down/cross conversion and frame synchronization with full audio processing capability. The included scalers allow for spatial conversions of the video signals including a versatile Region of Interest (ROI) selection. High-performance deinterlacers are also provided for two of the processing channels for the conversion of interlaced video signals.

A bi-level SD reference signal, as well as a tri-level HD reference signal, can be used to synchronize the video signals. A timed reference output (SD or HD) is also provided. Input for processing and the output, both can be BNC, Fiber or HDMI. Multiple additional processing features allow for adjustments of the video content: gain, hue, etc. A basic test pattern generator is also available per channel providing the most common line & fill patterns like color bars, pathological test patterns, full filed colors, etc.

The extensive audio processing capability de-embeds all audio as well as providing support for one MADI input and output and four external audio inputs or outputs which individually can be configured to be analog (balanced) or digital (AES) interfaces. Multiple internal crossbars allow for extensive audio shuffling including the MADI streams. It also provides two Dolby E® decoders, Dolby E® synchronization, full audio processing as well as multiple adjustable user delays for audio and video.
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.

This greenMachine 3GUPXD constellation is also supported by the Nova controller which enables the module to be remotely controlled and monitored via third party master control software.

GMPT-3G UPXD

greenMachine® Package

Included Features

3G Scaler
The Scaler is a high quality spatial converter with powerful Region of Interest (ROI) selection and scaling.

DeInterlacer (only on channel 1 and channel 2)
The De-Interlacer will perform broadcast quality deinterlacing for incoming interlaced SD and HD video formats and applies motion adaptive filtering resulting in superb image quality.

Frame Synchronizer
The Frame synchronizer utilises an external Ref. with a robust "flywheel" function for synchronization of SDI sources up to 3G-SDI. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.

3G Level A/B
This provides automatic detection of 3G-SDI level A or Level B inputs and can convert a 3G Level A input signal (acc. to SMPTE ST425-1/4:2:2, 10 Bit) into a 3G Level B Dual Link output signal, or vice versa.

Embedding / De-embedding
A high quality multi-format audio embedder and de-embedder which can access all audio channels in the input SDI channel(s), shuffle and embed them in to the output(s). It can also embed DolbyE™ signals which in conjunction with the Frame Synchronizer will always maintain the guardband. It is also possible to incorporate separate AES and/or analogue audio inputs and outputs.

Basic Audio & Video Test Generator
The test generator is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.

Audio Processing
Each mono audio channel has gain adjustment, mute, inversion and stereo to mono mix-down. In addition, each mono channel has silence and overload monitoring as well as a 1 kHz test signal.

Dolby E® Decoder
Two Dolby E® Decoder can be used to decode all 8 audio channels contained in a Dolby E® stream. The Dolby® metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.

MADI In/Out
This provides a MADI input and output. All incoming MADI signals are routed to teh internal audio crossbar. The outgoing MADI signal can be completely re-arranged in teh internal audio crossbar.

MetaData Management
The MetaData function manages the embedded metadata of the video signals. Time Code, Closed Captions and Teletext can be monitored and/or converted.

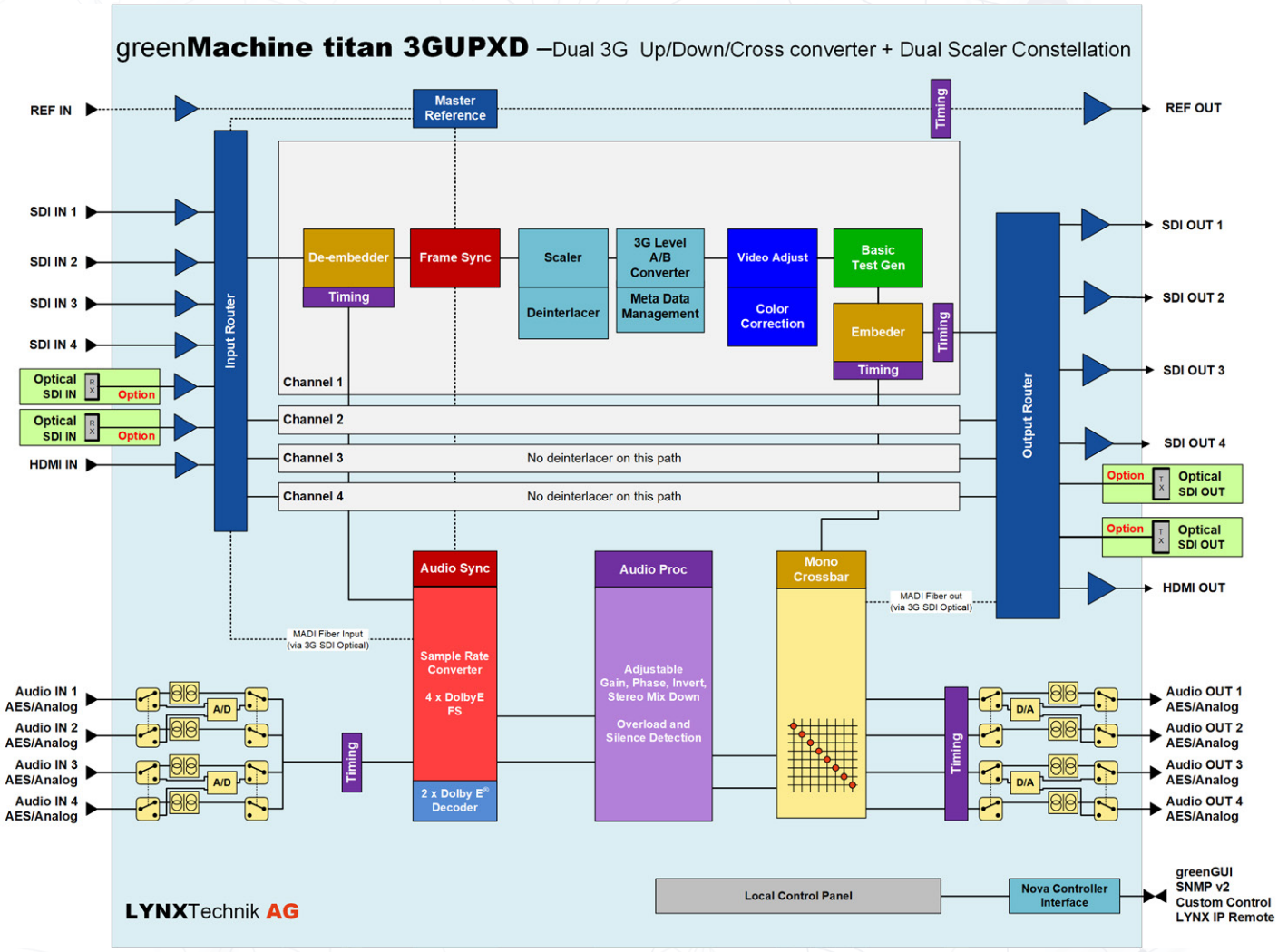
Video Adjustments
Video Adjustments include saturation, gain, black and hue adjustments, blanking interval deletion, and more.

Color Correction
This feature provides gain, lift, gamma and offset adjustment for Red, Green, and Blue (RGB).
It also provides gain and offset adjustments for Cyan, Magenta, Yellow and White (CMYW).
This makes it the ideal tool to correct the color balance of monitors for example.

Timing
Each video and AES audio channel can be individually delayed. The available video delay per channel is 30 frames, the available audio delay is 1.3 seconds per AES audio channel.

Nova Controller (included in basic GM Hardware)
This adds full SNMP v2 as well as LYNX IP remote control protocol. Mini-Nova also includes CustomControl which enables the user to design customized control panels for a computer or an iPad, giving simplified direct access to user selected parameters. CustomControl is particularly useful in live environments where instant access to a regularly used set of parameters is required without the distraction or risk of accessing all the system settings.

Functional Diagram



GMPC-2C UPXD

greenMachine® Package

Description

The greenMachine 2CUPXD is a broadcast-quality video processing unit that has a dual-channel up/down/cross converter with frame synchronizer supporting formats up to 3G-SDI (1920 x 1080) per channel. It includes full audio processing capabilities, scalars for the spatial conversion of the video signals including a versatile region of interest (ROI) selection and high-performance deinterlacers on the two processing channels.
A greenMachine callisto+ with the 2CUPXD constellation deployed also provides four processing channels with independent **audio embedder & de-embedder**, **audio processing**, **Dolby E® decoding**, **color correction** and many more features. It comes with a fully-featured local control interface with LCD which displays image previews and audio level meters of the processed video paths in addition to the graphical user interface called greenGUI. It is also supported by the Nova controller which enables the module to be remotely controlled and monitored via third party master control software.

Features

Processing Channels:	Two independent 3G channels (2x3G)
3G Scaler:	A spatial converter with a powerful region of interest (ROI) selection and scaling. The conversion modes supported are: Pillar box/Letterbox, Center cut, 14:9 conversion, Stretch to fill, and Custom ROI.
Deinterlacer:	Deinterlacers on channel 1 and channel 2 performing broadcast-quality deinterlacing on SD and HD video formats.
Motion adaptive filtering:	Motion adaptive filtering allows deinterlacer to create a sequence of output frames at the same rate as the sequence of input fields eliminating feathering or flickering artefacts.
3G level A/B:	It provides automatic detection of 3G level A/B and allows 3G level A <> 3G level B dual-link conversion. (3G level A acc. to SMPTE ST425-1/4:2:2, 10Bit)
Frame Synchronizer:	One of the best synchronizers in the industry utilizing the external reference with a robust “flywheel” function for the synchronization of SDI sources. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.
Metadata Management:	This functionality manages the embedded metadata in the video signals. Time code, Closed captions, and Teletext can be monitored and/or converted.
Video Adjustment:	It includes saturation, gain black and hue adjustments, blanking interval deletion and aperture correction. It also provides a horizontal flip and YCrCb headroom clipping functionality.
Color correction:	It allows adjustments in gain, offset, lift, and gamma for Red, Green, and Blue (RGB). It also provides gain and offset adjustments for Cyan, Magenta, Yellow, and White (CMYW).

Embedder/De-embedder:	A multi-format audio embedder and de-embedder provide access to all the channels in the input SDI and allow shuffling and embedding them to the output(s).
Audio Processing:	It provides gain adjustment, mute, inversion, and stereo to mono-mix on each mono audio channel including silence and overload monitoring. It has a 1khz test signal as well.
Dolby E® decoder:	Two Dolby E® decoders can be used to decode all 8 channels contain in a Dolby E® stream. The Dolby® metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.
MADI in/out:	This constellation fully supports MADI, if the greenMachine is equipped with an optionally available MADI SFP. All incoming and outgoing MADI signals have internal audio processing and are connected to the internal audio matrix and can be rearranged.
Basic Audio & Video Test Generator	The test generator is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.
Timing	Each video and audio (AES and MADI) channel can be individually delayed. The available video delay per channel is 30 frames and the audio delay is 1.3 second per AES audio channel.
greenGUI	greenGUI is a control software that provides remote control and status monitoring and event (error) reporting for all the greenMachines installed on a network.
Nova Controller	Adds full SNMP v2 along with LYNX IP remote control protocol functionality to the system. It enables CustomControl feature that allows users to design customized control panels for a computer, giving specific simplified user-specific controls.

greenMachine titan - 4FS 4x3Gbit/s Framesynchronizer

The greenMachine approach is unique. The hardware itself is a powerful general-purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations) Each constellation includes a combination of processing functions to perform high level processing including FS, UPXD, HDR etc.

greenMachine titan

The greenMachine Quad Framesynchronizer Package consist of the greenMachine titan HW and the Quad Frame Synchronizer constellation.

Below you can find some basic information about the greenMachine titan.

For more information about the greenMachine titan please visit:

www.lynx-technik.com

Description

The greenMachine 4x3Gbit/s Framesynchronizer Constellation is a fully featured video frame synchronizer for formats up to 3Gbit/s SDI. This constellation can be used on the greenMachine titan HW platform.

This constellation is designed for applications that require dependable broadcast quality frame synchronization with full audio processing capability. The included scaler allows for spatial conversions of the video signal including a versatile Region of Interest (ROI) selection.
A bi-level SD reference signal as well as a tri-level HD reference signal can be used to synchronize the video signals.
A timed reference output (SD or HD) is also provided.

Input for processing can be BNC, Fiber or HDMI. Output can also be BNC, Fiber or HDMI (optional fiber SFPs ordered seperately).

Multiple additional processing features allows for adjustments of the video content, e.g. gain, hue etc.
A basic test pattern generator is also available per channel providing the most common line & full field patterns like color bars, pathological test pattern, full field colors etc.

The extensive audio processing capability de-embeds all audio as well as providing support for one MADI input and output and four external audio inputs or outputs which individually can be configured to be analog (balanced) or digital (AES) interfaces. Multiple internal crossbars allow for extensive audio shuffling including the MADI streams. It also provides two Dolby E® decoders, Dolby E® synchronization, full audio processing as well as multiple adjustable user delays for audio and video.

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.

This greenMachine 4k UPXD constellation also includes the Nova controller which enables the module to be remotely controlled and monitored via third party master control software.

GMPT-4FS

greenMachine® Package

Included Features

3G Scaler
The Scaler is a high-quality spatial converter with powerful Region of Interest (ROI) selection and scaling. One scaler per video channel is provided.

Frame Synchronizer
The Frame synchronizer utilises an external Ref. with a robust “flywheel” function for synchronization of SDI sources up to 3G SDI. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.

3G Level A/B
This provides automatic detection of 3G-SDI level A or Level B inputs and can convert a 3G Level A input signal (acc. to SMPTE ST425-1/4:2:2, 10 Bit) into a 3G Level B Dual Link output signal, or vice versa.

Embedding / De-embedding
Four high quality multi-format audio embedder and de-embedders which can access all audio channels in the input SDI channel(s), shuffle and embed them in to the output(s). It can also embed DolbyE™ signals which in conjunction with the Frame Synchronizer will always maintain the guard band. It is also possible to incorporate separate AES and/or analogue audio inputs and outputs.

Basic Audio & Video Test Generator
The test generator (one per video channel) is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.

Audio Processing
Each mono audio channel has gain adjustment, mute, inversion and stereo to mono mix-down. In addition, each mono channel has silence and overload monitoring as well as a 1 kHz test signal.

Dolby E® Decoder
Two Dolby E® Decoder can be used to decode all 8 audio channels contained in a Dolby E® stream. The Dolby® metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.

MADI In/Out
This provides a MADI input and output. All incoming MADI signals are routed to the internal audio crossbar. The outgoing MADI signal can be completely re-arranged in the internal audio crossbar.

MetaData Management
The MetaData function manages the embedded metadata of the video signals. Time Code, Closed Captions and Teletext can be monitored and/or converted.

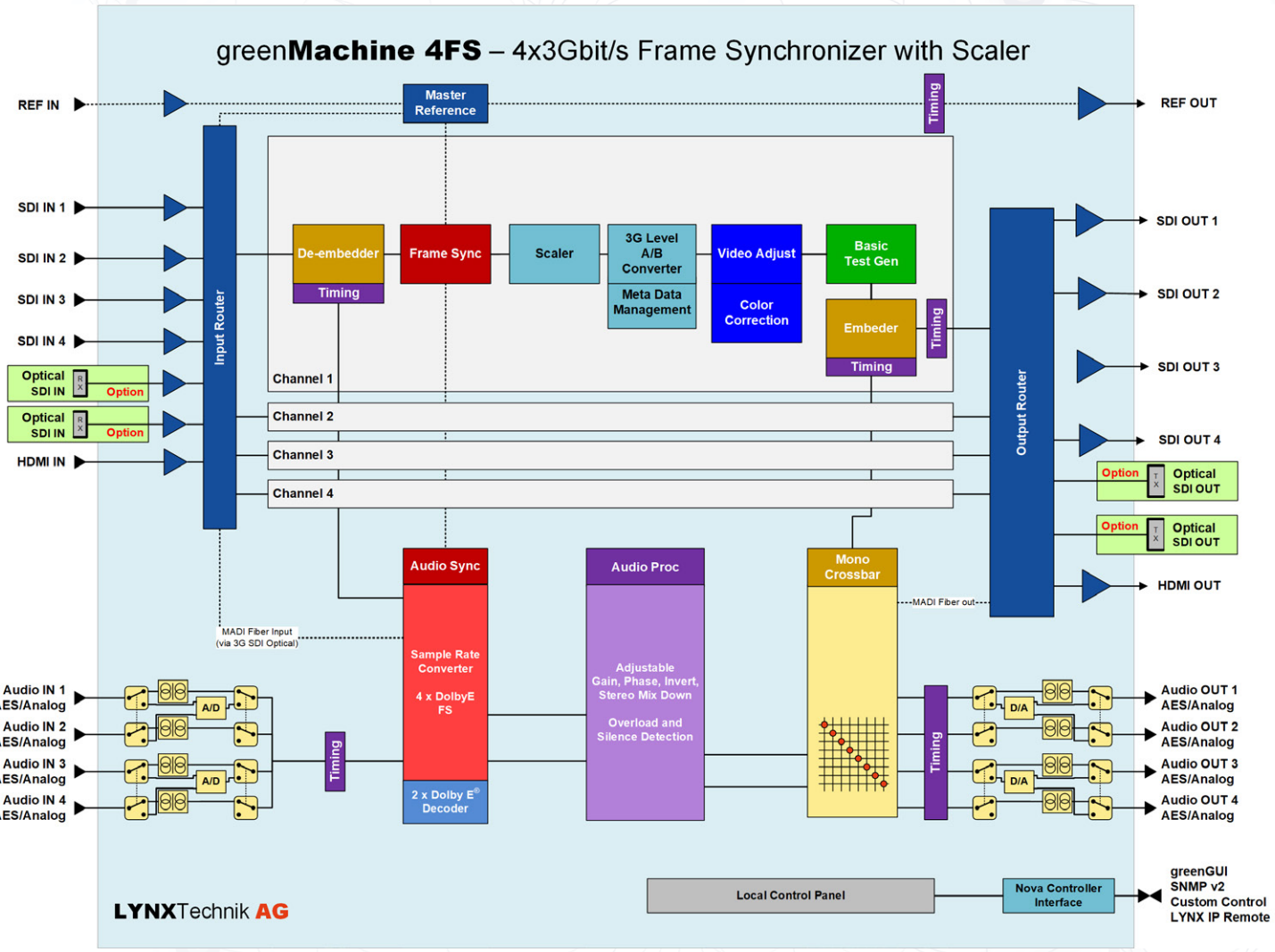
Video Adjustments
Video Adjustments include saturation, gain, black and hue adjustments, blanking interval deletion, and more.

Color Correction
This feature provides gain, lift, gamma and offset adjustment for Red, Green, and Blue (RGB).It also provides gain and offset adjustments for Cyan, Magenta, Yellow and White (CMYW). This makes it the ideal tool to correct the color balance of monitors for example.

Timing
Each video and AES audio channel can be individually delayed. The available video delay per channel is 30 frames, the available audio delay is 1.3 seconds per AES audio channel.

Nova Controller (included in basic GM hardware)
This adds full SNMP v2 as well as LYNX IP remote control protocol. Mini-Nova also includes CustomControl which enables the user to design customized control panels for a computer or an iPad, giving simplified direct access to user selected parameters. CustomControl is particularly useful in live environments where instant access to a regularly used set of parameters is required without the distraction or risk of accessing all the system settings.

Functional Diagram



GMPT-BIDI Transport

greenMachine® Package

Bi-directional Transport for greenMachine® titan

Description

The BIDI Transport constellation is a cost-effective bidirectional transport solution that allows transportation of video, audio, Ethernet, 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 distance. 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.

Six HD signals (1.485Gbit/s) or four 3G signals (2.97Gbit/s),One 12G Signal (12 Gbit/s), or combination of signals up to 12Gbit/s, 4 external analog or digital Audio Signals and four GPIs can be transported via the fiber ports in both directions, simultaneously. 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.

Get the full story at **www.green-machine.com**

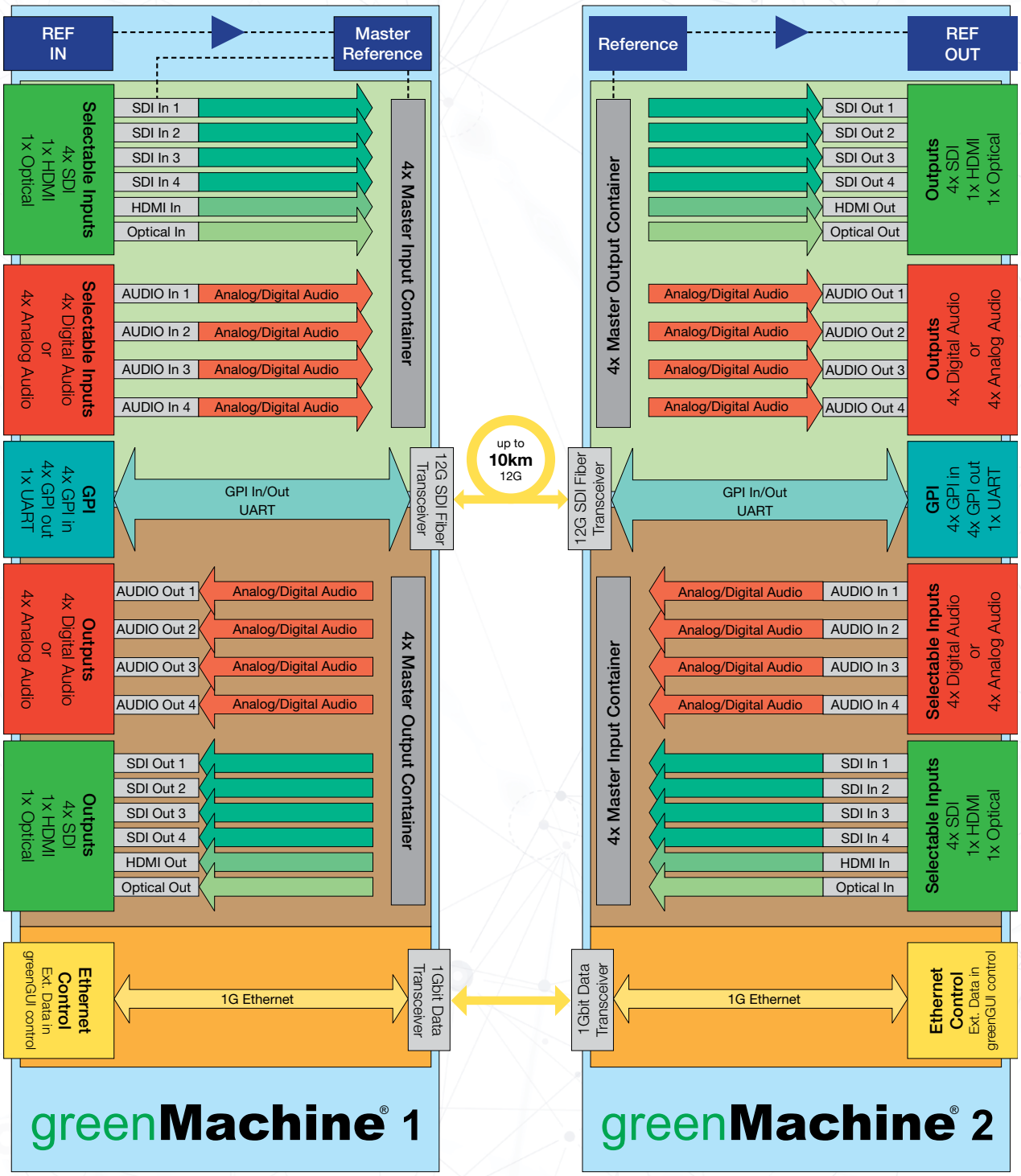
Features

- 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

GMPT-BIDI Transport

greenMachine® Package

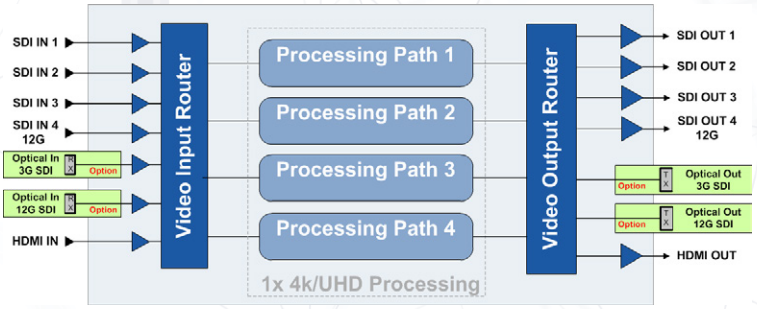
Included Features



For more details and to see the complete portfolio of greenMachine constellations, please visit:
www.green-machine.com

GM 6840

greenMachine® titan



Description

The greenMachine approach is unique. The hardware itself is a powerful general-purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations), i.e. FS, UPXD, HDR etc. The user can select and licence just the constellation, or multiple constellations required at the point of order and can switch between these licenced constellations at any time. Additionally, they may purchase licences for additional constellations in the future. As all constellations are pre-installed, un-licensed constellations can be deployed for testing and proof of system concept but will show watermarks at the outputs.

The greenMachine titan platform provides for simultaneous processing of up to four individual SD/HD/3G SDI signals or a single 4k/UHD SDI signal.

Supported SDI Formats

SDTV Formats	525 / 59.94Hz 625 / 50Hz		
HDTV Formats	1080i / 50Hz 1080i / 59.94Hz 1080i / 60Hz 1080p / 23.98Hz 1080p / 24Hz 1080p / 25Hz 1080p / 29.97Hz	1080p / 30Hz 1080psf / 23.98Hz 1080psf / 24Hz 1080psf / 25Hz 720p / 23.98Hz 720p / 24Hz 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 Single Link	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 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		

Features

- 4x 3G or 1x 4K/UHD general purpose A/V processing appliance
- Internal input and output signal routers
- Compatible with all available greenMachine constellations
- Integrated control panel with color display for live image monitoring, audio level meters, status indication and menu driven control interface
- Small footprint: 1RU high x half 19” rack width
- 3x electrical SD/HD/3G SDI inputs. Level A and Level B DL
- 3x electrical SD/HD/3G SDI outputs. Level A and Level B DL
- 1x electrical SD/HD/3G/12G SDI Input. 12G Single Link / Quad Link 2SI Level A / BDL
- 1x electrical SD/HD/3G/12G SDI Output. 12G Single Link / Quad Link 2SI Level A /BDL
- 1x 4k/UHD HDMI input (1.4b) and 1x 4k/UHD HDMI output (1.4b): 4K 50/59.94/60Hz signals will be displayed in 4:2:0 color subsampling
- 1x Analog reference input and output (bi-level or tri-level sync)
- 1x Electrical LAN I/O connection
- 4x Balanced analog audio or digital AES Audio inputs
- 4x Balanced analog audio or digital AES Audio outputs
- 4x GPI inputs and 4x GPI outputs
- 1x Optional SDI fiber I/O (basic fiber or CWDM): SD/HD/3G
- 1x Optional 12G SDI fiber I/O (basic fiber or CWDM): HD up to 12G
- 1x Optional Ethernet LAN fiber connection (basic or CWDM)
- Optional 56/64 channel MADI on optical 3G available on selected constellations
- Full SNMP V2 support

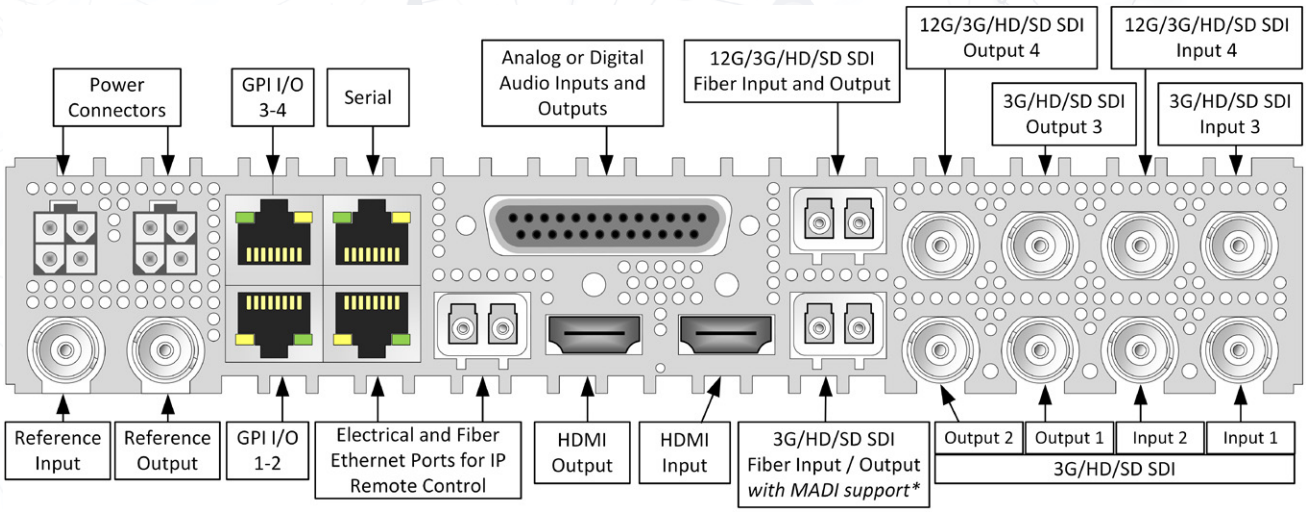
Ordering Information

greenMachine Titan Hardware		
GM 6840-1 EU	greenMachine titan EU	EAN: 4250479325050
GM 6840-1 UK	greenMachine titan UK	EAN: 4250479325067
GM 6840-1 US	greenMachine titan US	EAN: 4250479325074

GM 6840

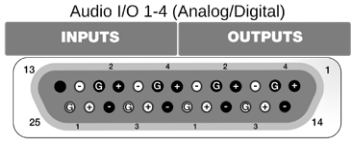
greenMachine® titan

Connections



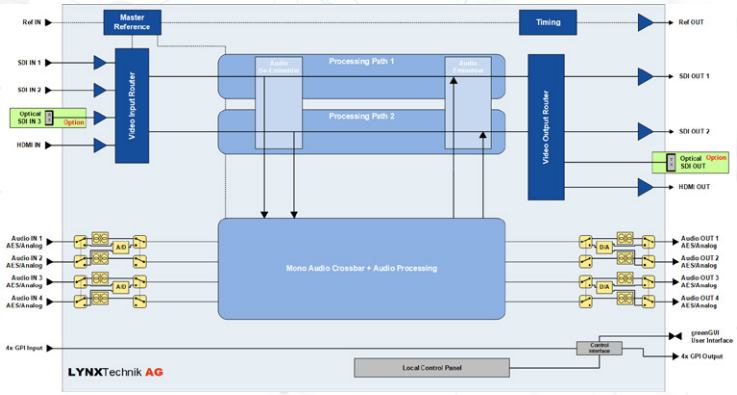
Specifications

SDI Inputs	3x 3G SDI video on 75 Ohm BNC connector - SMPTE, 292M, 424M, 259M 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@2.97Gbit/s
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 Return Loss: same as 3G SDI; >7dB to 6GHz; >4dB to 12GHz
HDMI Input / Output	1x 10 bit HDMI 4K/UHD 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)
Ethernet (LAN)	1x 10/100/1000 BaseT RJ45 Connector
Optical Ethernet (Optional)	IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1 Gbit/s (125 MB/s)
GPI I/O	4x general purpose inputs + 4x general purpose outputs - RJ45 Connectors
Reference Input	1x analog video reference on 75 Ohm BNC connector
	Analog bi-level (SDTV) or tri-level (HDTV) auto detect
SDI Output	3x SDI video on 75 Ohm BNC connector (SMPTE, 292M, 424M, 259M)
	Timing jitter: < 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 2.97Gbit/s
	Alignment jitter: < 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 2.97Gbit/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 292M, 424M, 259M, 2081, 2082 Return Loss: same as 3G SDI; >7dB to 6GHz; >4dB to 12GHz
Serial Data	EIA/ETA RS232C / RS422 /RS 485 (selectable through greenGUI) - RJ45 connector ESD protection for up to 16kV
Reference Output	1x analog video reference on 75 Ohm BNC connector
	Analog bi-level (SDTV) or ri-level (HDTV), cross lock capability
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
	Audio I/O 1-4 (Analog/Digital) 
	56/64 channels MADI supported for selected constellations
Power	12VDC @ 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

GM 6825

greenMachine® callisto+



Description

The greenMachine callisto+ platform provides for simultaneous processing of up to two individual SD/HD/3G SDI signals. The hardware itself is a powerful general-purpose audio and video processing appliance that can perform many different functions using one of the available greenMachine configurations (constellations), i.e. 2CUPXD.
The user can select and license just the constellation, or multiple constellations required at the point of order and can switch between these licensed constellations at any time. Additionally, they may purchase licenses for additional constellations in the future. As all constellations are pre-installed, unlicensed constellations can be deployed for testing and proof of system concept but will show watermarks at the outputs.

Fiber SFP options are available for one SD/HD/3G SDI input and output. The Nova controller (full remote control) is included in the basic framework.

Constellation

GMC-2CUPXD	**2 Channel 3G SDI Up/Down/Cross Converter** A broadcast quality 3G SDI Up/Down/Cross converter that provides a multitude of conversion and scaling possibilities. The powerful input cropping functionality enables a full Region of Interest (ROI) selection and in addition, the output image size can be adjusted...

Supported SDI Formats

SDTV Formats	525 / 59.94Hz 625 / 50Hz		
HDTV Formats	1080i / 50Hz 1080i / 59.94Hz 1080i / 60Hz 1080p / 23.98Hz 1080p / 24Hz 1080p / 25Hz 1080p / 29.97Hz	1080p / 30Hz 1080psf / 23.98Hz 1080psf / 24Hz 1080psf / 25Hz 720p / 23.98Hz 720p / 24Hz 720p / 25Hz	720p / 29.97Hz 720p / 30Hz 720p / 50Hz 720p / 59.94Hz 720p / 60Hz
3GBit/s Formats Level A	1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz		

Features

- 2x 3G general purpose A/V processing appliance
- Internal input and output signal routers
- Compatible with available greenMachine callisto+ constellations
- Integrated control panel with color display for live image monitoring, audio level meters, status indication and menu driven control interface
- Small footprint: 1RU high x half 19” rack width
- 2x electrical SD/HD/3G SDI inputs. Level A and Level B DL
- 2x electrical SD/HD/3G SDI outputs. Level A and Level B DL
- 1x HDMI input (1.4b) and 1x HDMI output (1.4b) up to 3G
- 1x Analog reference input and output (bi-level or tri-level sync)
- 1x Electrical LAN I/O connection
- 4x Balanced analog audio or digital AES Audio inputs
- 4x Balanced analog audio or digital AES Audio outputs
- 4x GPI inputs and 4x GPI outputs
- 1x Optional SDI fiber I/O (basic fiber or CWDM): SD/HD/3G
- 1x Optional Ethernet LAN fiber connection (basic or CWDM)
- Optional redundant power protection
- Optional 19” rack frame
- Nova controller included: Full remote control using greenGUI control software
- Full SNMP V2 support

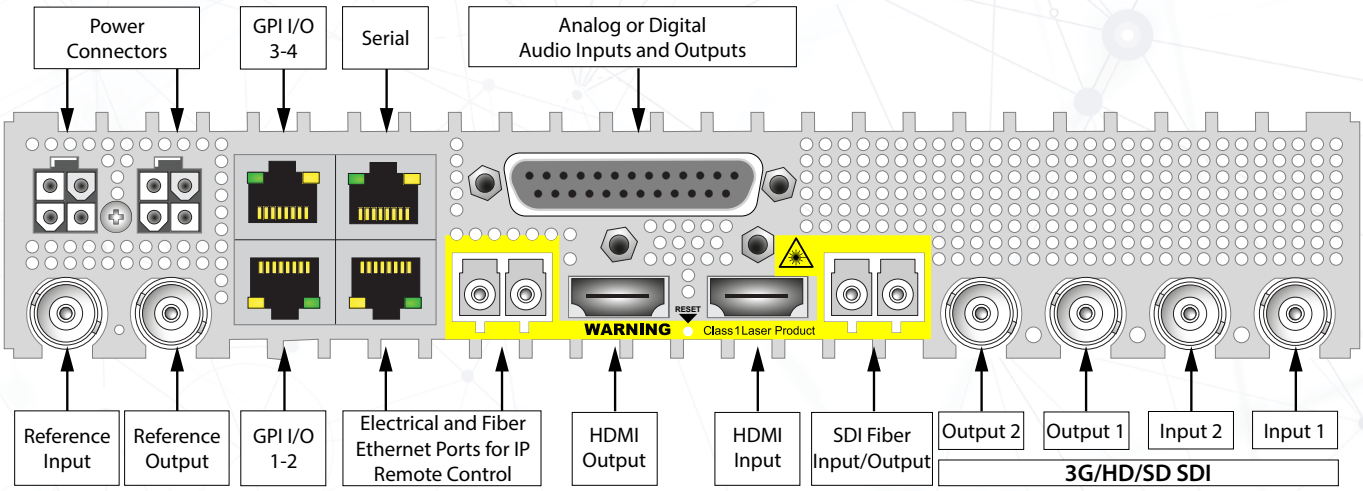
Ordering Information

greenMachine callisto+ Hardware		
GM 6825 EU	greenMachine callisto+ EU (H/W)	EAN: 4250479328501
GM 6825 UK	greenMachine callisto+ UK (H/W)	EAN: 4250479328518
GM 6825 US	greenMachine callisto+ US (H/W)	EAN: 4250479328525
greenMachine callisto+ Constellation License		
GMC-2CUPXD	greenMachine callisto+ 2CUPXD constellation: Dual Channel 3G Up/Down/Cross Converter (License only- includes no hardware)	EAN: 4250479328136

GM 6825

greenMachine® callisto+

Connections



Specifications

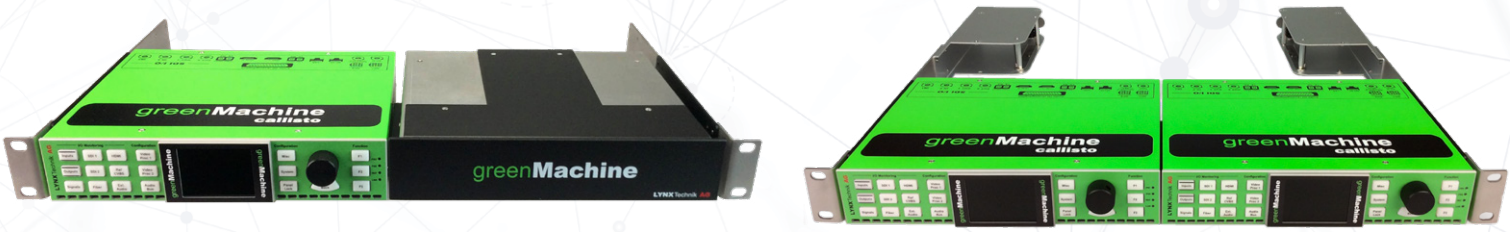
SDI Inputs	2x 3G SDI video on 75 Ohm BNC connector - SMPTE, 292M, 424M, 259M with automatic video format and standard detection	
	Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
	Automatic cable EQ (Belden 1694A):	340m@270Mbit/s, 150m@1.5Gbit/s, 110m@2.97Gbit/s
SDI Output	Analog bi-level (SDTV) or ri-level (HDTV), cross lock capability	
	Timing jitter:	< 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 2.97Gbit/s
	Alignment jitter:	< 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 2.97Gbit/s
	Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
HDMI	• 1x Input 10 bit HDMI 1.4b (up to 3G) • 1x Output 10 bit HDMI 1.4b (up to 3G)	
Ethernet (LAN)	1x 10/100/1000 BaseT RJ45 Connector	
Optical I/O (Optional)	1x 3G SDI SFP Transceiver (SMPTE 297M - 2006)	
Optical Ethernet (Optional)	IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1 Gbit/s (125 MB/s)	

GPI I/O	• 4x general purpose inputs (RJ45 Connector) • 4x general purpose outputs (RJ45 Connector)
Reference Input	• 1x analog video reference on 75 Ohm BNC connector • Analog bi-level (SDTV) or tri-level (HDTV) auto detect
Reference Output	• 1x analog video reference on 75 Ohm BNC connector
Serial Data	EIA/ETA RS232C / RS422 /RS 485 (selectable through greenGUI) - RJ45 connector ESD protection for up to 16kV
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)
Power	12VDC @ 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: 1.28kg (2.82lb)
Ambient	Temperature: 5°C to 40°C (41°F to 104°F) maintaining specification
	Humidity: 90% maximum, non-condensing

RFR 6000

greenMachine® Rack Frame

19” Rack Frame for 1 or 2 greenMachines



Single and Twin greenMachines setup

Description

The greenMachines are ideally suited for standalone applications but these powerful processing platforms reach their full potential when used within a system design.

The RFR 6000 is a compact and flexible rack mounting solution. It can be setup to hold up to two greenMachines. Regardless which setup, the RFR 6000 also provides an innovative mounting solution for two RPS A100 power supplies.

Specifications

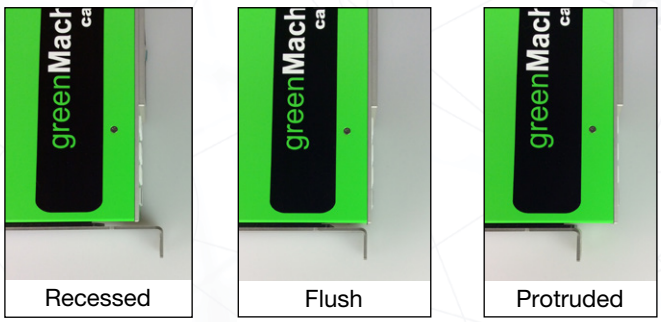
Height	1RU
Width	19” rack mount
Depth Single Module	29.7cm (11.69“)
Depth Two Modules	44.7cm (17.59“)
Weight	1.5 kg (3.31 Lbs)
Model #	RFR 6000 - (EAN# 4250479324466)
Includes	RFR 6000 rack frame, Phillips screwdriver and quick reference guide.

Features

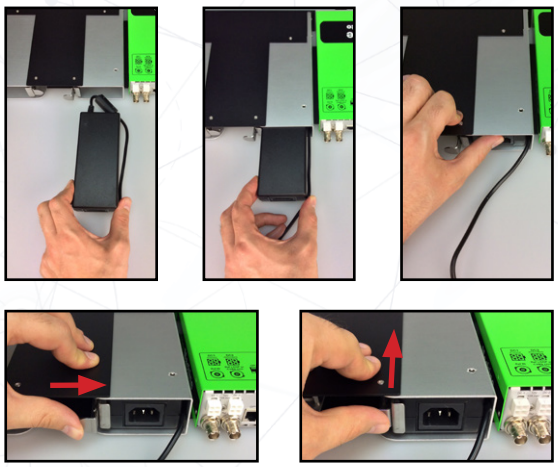
- Compact 1 RU design
- Accommodates one or two greenMachines
- Innovative mounting for up to two RPS6120 power supplies
- Rack position adjustable to Recessed, Flush or Protruded

Ordering Information

RFR 6000 Ordering Number		
RFR 6000	1 RU 19” Rack Mount Chassis	EAN: 4250479324466



Adjustable mounting position



Power supply mounting

RXT 6001

greenMachine® Rack Frame

19” Rack Frame extension for RFR 6000

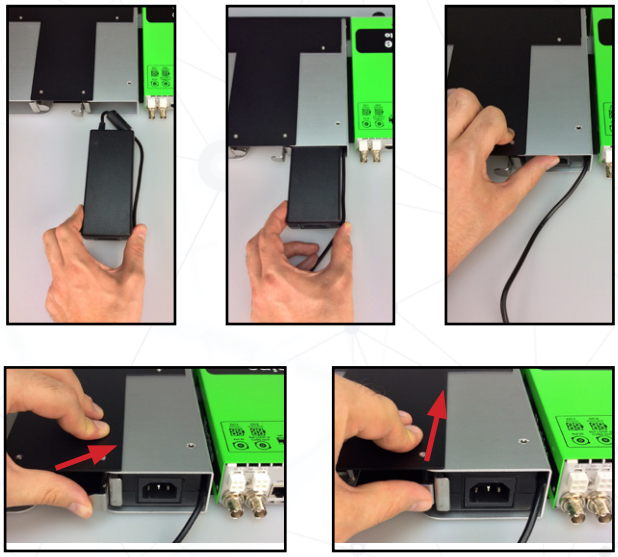
Description

The greenMachine is ideally suited for standalone applications but this powerful processing platform reach 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.

Features

- Compact 1 RU design
- Accomodates four power supplies for 2 greenMachines
- Innovative mounting for up to four RPS A100 power supplies
- Power cases position adjustable on the rack frame



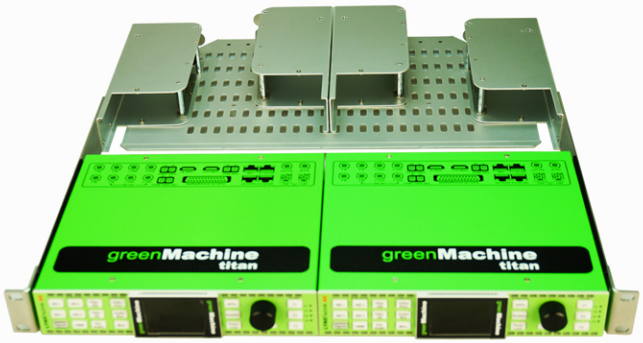
Power supply mounting

Specifications

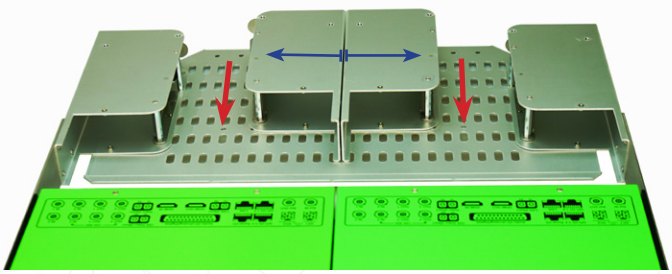
Height	1RU
Width	19” rack mount
Depth	23.3cm (9.17“)
Weight	0.82 kg (1.8 Lbs)
Model #	RXT 6001 - (EAN# 4250479326507)
Includes	RXT 6001 rack frame extension, Quick reference guide, Warranty card.

Ordering Information

RXT 6001 Ordering Information		
RXT 6001	19” Rack Frame Extension for RFR 6000	EAN: 4250479326507



Two greenMachines setup



Adjustable mounting position

AC to DC Power Supply

Features

- Wide Operating Voltage 100 to 240 VAC,50 to 60 Hz
- 100W Output Power
- Active Power Factor Correction (PFC) function
- Energy efficiency level VI or CoC Tier II
- LED indicator for Power on

Description

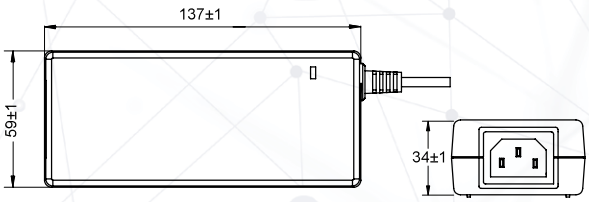
The RPS A100 AC to DC Desktop power supply unit provides 100 watts of continuous output power. The power supply is equipped with IEC320-C14 AC inlet.
This power supply can be used for greenMachine.

RPS A100

Specifications

Electrical Characteristics		
Output	DC Voltage	12V
	Rated Current	8.33A
	Current Range	0~8.33A
	Rated Power (max.)	100 W
	Ripple & Noise (max)	240mVp-p
	Line Regulation	±1.0%
	Load Regulation	±5.0%
Input	Voltage Range	100~240VAC
	Frequency Range	50~60Hz
	Input Current	≤2.0A
	Inrush Current (max.)	60A/100VAC 120A/230VAC
	Hold Up Time	≥8.3ms
	Turn On Time	≤3s
Protection	Short Circuit Protection	Auto Recovery
	Over Voltage Protection	Latch-Off
	Over Current Protection	Auto Recovery
	Over Temperature Protection	Latch-Off
Environment	Operating Temperature	0 to 40°C
	Storage Temperature	-20 to 85°C
	Operating Humidity	10% to 90%
	Storage Humidity	5% to 95%
Others	Case Size	137L x 59W x34H (mm)
	AC inlet	C14
	Weight	450g
Safety	Safety Standards	UL/cUL 62368-1, TUV EN 62368-1, CB IEC 62368-1, FCC, CE, BSMI, PSE, RCM, IRAM

Connector	Pin Assignment	
	1	GND
	2	NC
	3	NC
	4	+12V



Note:
1. Measurements are in mm
2. Net weight: approx. 450g

Ordering Information

RPS A100 Ordering Information		
RPS A100	AC to DC Desktop Power Supply Module 12V/8A	EAN: 4250479327955

Ordering Code	Description
RPS A100 N	Power Supply without Power Cord
RPS A100 EU	Power Supply with Power Cord
RPS A100 UK	Power Supply with Power Cord
RPS A100 US	Power Supply with Power Cord

Notes

Notes

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

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European Headquarters
LYNX Technik AG
Brunnenweg 3
D-64331 Weiterstadt
Germany

Phone: + 49 (0) 6150 1817 0
Fax: + 49 (0) 6150 1817 100
Email: info@lynx-technik.com

APAC Headquarters
LYNX Technik Pte Ltd
114 Lavender Street
#05-92 CTHub2
Singapore 338729

Phone: + 65 6702 5277
Fax: + 65 6385 5221
Email: infoasia@lynx-technik.com

USA Headquarters
LYNX Technik USA
26366 Ruether Ave
Santa Clarita, CA 91350
USA

Phone: (661) 251 8600
Fax: (661) 251 8088
Email: infousa@lynx-technik.com

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