

## 1x12G-SDI & 4x3G-SDI Up/Down/Cross Converter



### Description

The greenMachine UPXD package is a broadcast-quality video processing unit that has a single channel up/down/cross converter with a frame synchronizer supporting a single formats up to 4K UHD (3840 x 2160) or four independent signals up to 3G-SDI.

It includes full audio processing capabilities, scalars for the spatial conversion of the video signals including versatile region of interest (ROI) selection, and high-performance deinterlacer. It also supports 4x3G (2SI Quad link) or 12G-SDI (single link) inputs and outputs for 4K UHD signals. With 2SI quad-link <-> single link conversion, signals can be interchanged in between the single link and 2SI quad links.

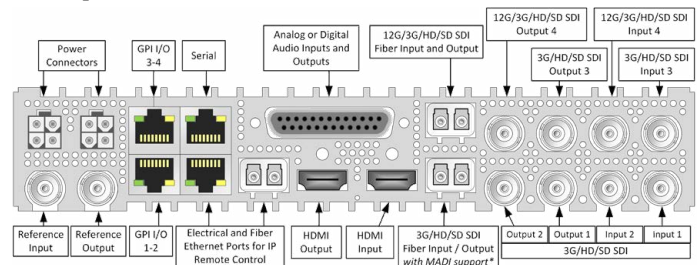
The greenMachine UPXD package comes with a fully-featured local control interface with LCD which displays image previews and audio level meters of the processed video paths in addition to the graphical user interface called LynxCentraal. It is also supported by the Nova controller which enables the module to be remotely controlled and monitored via third party master control software.



### Functions

<b>4K/3G Scaler:</b>	Spatial converter with 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.
<b>4x 3G Scaler:</b>	
<b>Deinterlacer:</b>	Deinterlacers on channel 1 and 2 for SD and HD
<b>Motion adaptive filtering:</b>	Allows deinterlacer to create a sequence of output frames at the same rate as the sequence of input fields eliminating feathering or flickering artefacts.
<b>3G-SDI level A/B:</b>	Automatic detection of 3G level A/B Dual link conversion 3G level A <-> 3G level B (3G level A acc. to SMPTE ST425-1/4:2:2, 10Bit)
<b>Frame Synchronizer:</b>	Dynamic synchronization of SDI sources. Embedded audio matched to the video processing delay
<b>Metadata Management:</b>	Manages embedded metadata: SMPTE 2020, AFD, WSS, SMPTE 2031 Time code, Closed captions, and Teletext
<b>Video Adjustment:</b>	Adjust saturation, gain black and hue, blanking interval deletion and aperture correction. Apply horizontal flip and YCrCb headroom clipping
<b>Color correction:</b>	Adjust gain, offset, lift, and gamma for Red, Green, and Blue (RGB). Adjust gain and offset adjustments for Cyan, Magenta, Yellow, and White (CMYW)
<b>Embedder/De-embedder:</b>	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).
<b>Audio Processing:</b>	Gain adjustment, 1kHz test tone, mute, inversion, stereo to monomix on each mono audio channel silence and overload monitoring
<b>Dolby E<sup>®</sup> decoder:</b>	2x Dolby E <sup>®</sup> decoder for all 8 channels in a stream. Dolby <sup>®</sup> metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.
<b>MADI in/out:</b>	Full MADI support, if equipped with optional MADI SFP
<b>Basic Audio &amp; Video Test Generator</b>	Basic audio & video test signal generator with static video test patterns. Can be configured to output a test pattern on TRS errors with Frame Synchronizer
<b>Timing</b>	Individual video and audio (AES and MADI) delay Maximum video delay per channel is 30 frames Maximum audio delay is 1.3 sec per AES audio channel
<b>LynxCentraal</b>	New control software for automation, remote control and status monitoring
<b>Remote Control</b>	Full SNMP v2 and LYNX IP remote control protocol functionality Enables CustomControl features

### Backpanel



### Technical Specifications

#### In/Output Conversion Characteristics (for 4KUPXD)

<b>Input Resolution Characteristics</b>	<b>12G-SDI Single Link</b>	3840 x 2160p 50 / 59.94 / 60Hz		
	<b>12G-SDI Quad Link 2SI Level A</b>	3840 x 2160p 50 / 59.94 / 60Hz		
	<b>3G-SDI Level A/B</b>	1080p 50 / 59.94 / 60Hz		
	<b>HDTV</b>	1080p	1080i	1080psf
<b>Output Resolution Characteristics</b>	23.98 / 24 / 25 50 / 59.94 / 23.98 / 24 / 29.97 / 30Hz 60Hz 25Hz			
	720p 23.98 / 24 / 25 / 29.97 / 30 / 50 / 59.94 / 60Hz			
	<b>SDTV</b> 625 / 50Hz 525 / 59.94Hz			

#### In/Output Conversion Characteristics (for 3GUPXD)

<b>Input Resolution Characteristics</b>	<b>3G-SDI Level A/B</b>	1080p 50 / 59.94 / 60Hz		
	<b>HDTV</b>	1080p	1080i	1080psf
<b>Output Resolution Characteristics</b>	23.98 / 24 / 25 50 / 59.94 / 23.98 / 24 / 29.97 / 30Hz 60Hz 25Hz			
	720p 23.98 / 24 / 25 / 29.97 / 30 / 50 / 59.94 / 60Hz			
	<b>SDTV</b> 625 / 50Hz 525 / 59.94Hz			

#### Conversion Details

<b>Conversion Modes</b>	<ul style="list-style-type: none"> <li>• Pill Box / Letter Box</li> <li>• Center Cut</li> <li>• 14:9 Conversion</li> </ul>	<ul style="list-style-type: none"> <li>• Stretch to Fill</li> <li>• Custom ROI</li> </ul>
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#### Cropping Aspect Ratios

16:9 / 4:3 / custom ROI

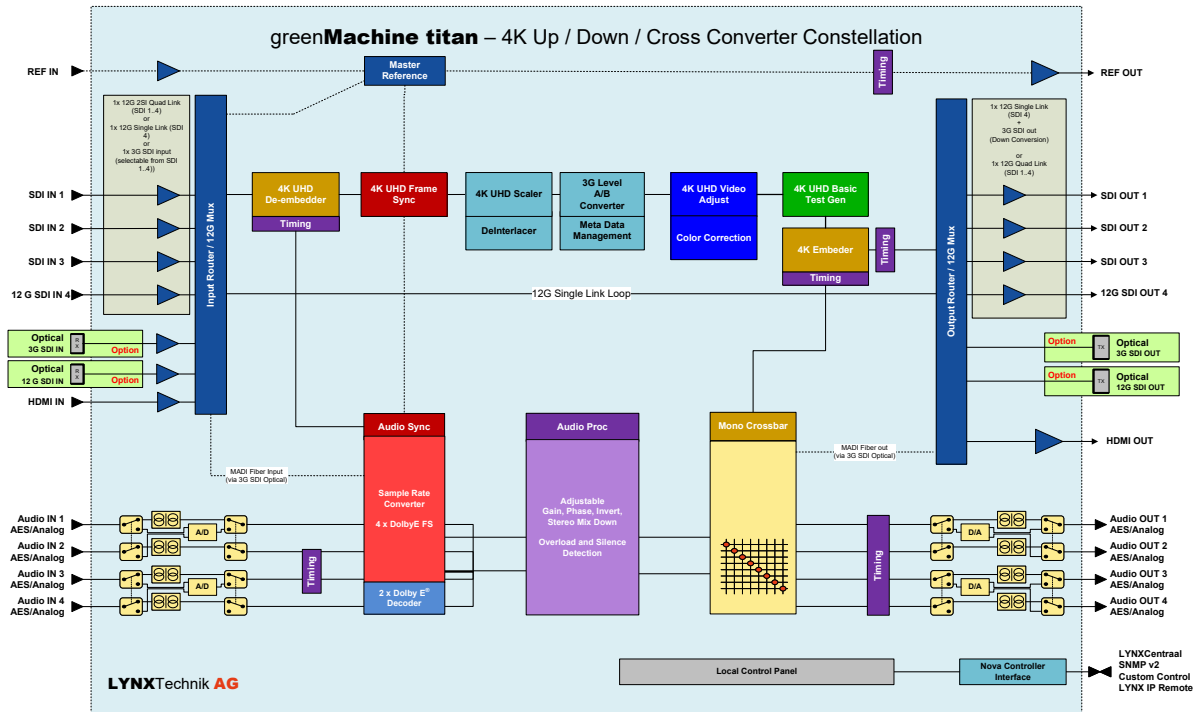
#### Operation Mode

- 12G-SDI 4K UHD single channel configuration (4KUPXD)
- 3G-SDI HD quad channel configuration (3GUPXD)

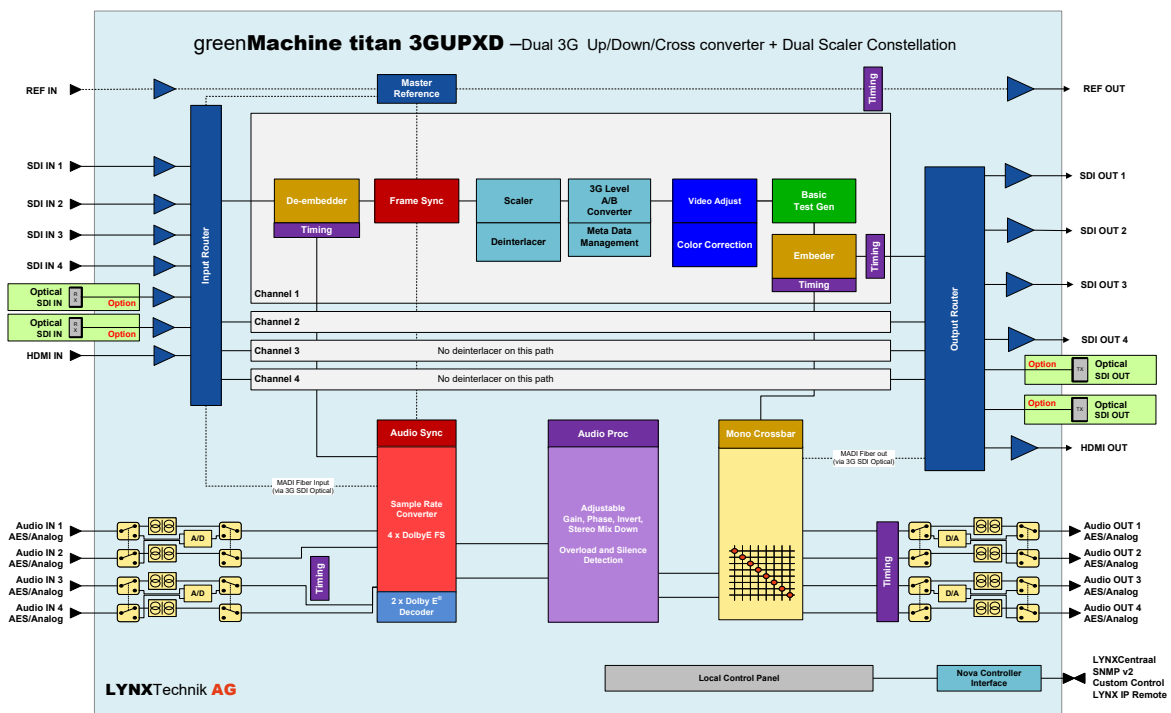


### Functional Diagram

#### 12G-SDI Single Channel Mode (4KUPXD)



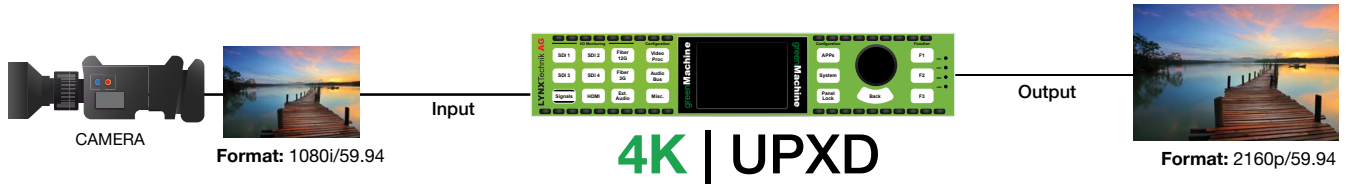
#### 3G-SDI Quad Channel Mode (3GUPXD)



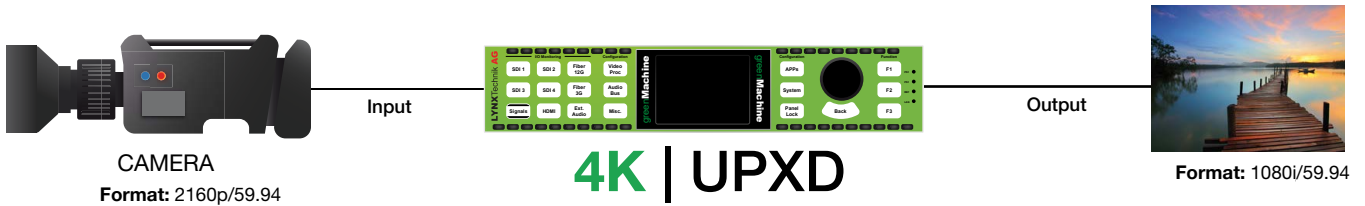
### Example Workflow

#### 4KUPXD Workflow

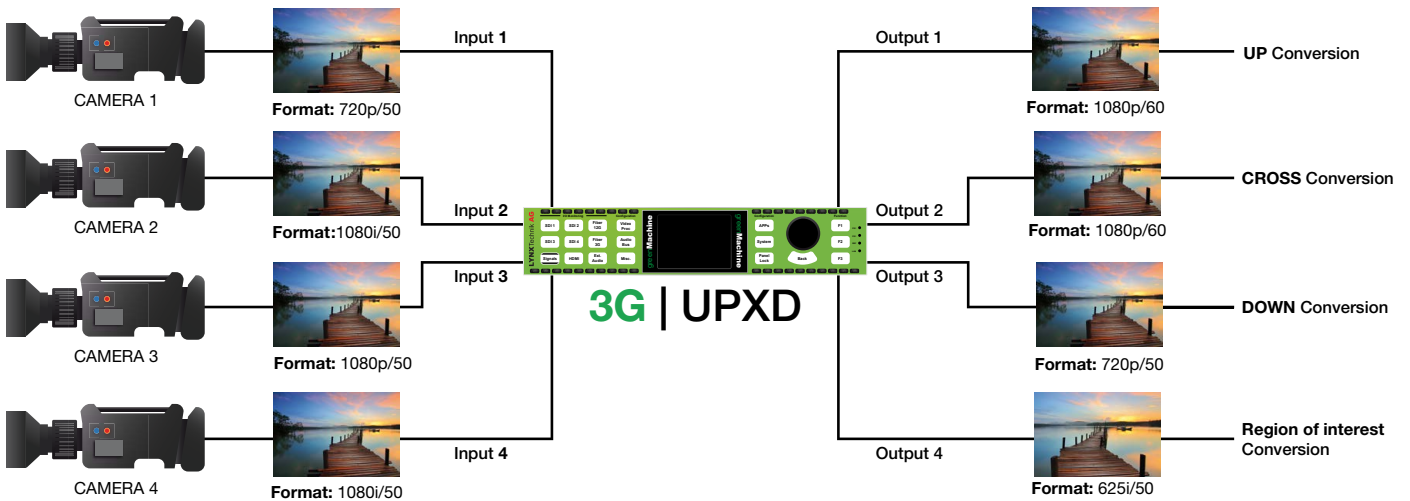
**Example 1:** HD-SDI to 4K-SDI up-conversion



**Example 2:** 4K-SDI to HD-SDI down-conversion



#### 3GUPXD Quad Workflow



4 processing channels operating independently from each other.



## Hardware Specifications

### BNC Connection

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

### Audio Connection

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

### Technical Information

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

### Supported SDI Formats

<b>SDTV</b>	525 / 59.94Hz 625 / 50Hz		
<b>HDTV</b>	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 / 23.98 Hz 720p / 24Hz 720p / 25Hz	720p / 29.97Hz 720p / 30Hz 720p / 50Hz 720p / 59.94Hz 720p / 60Hz
<b>3G-SDI Level A/B</b>	1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz		
<b>12G-SDI* Single Link</b>	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz		
<b>12G-SDI* Quad Link 2SI Level A (4 x 3G)</b>	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz		

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

### Optical Connection (optional SFP required)

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

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

### AV Connection

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

### Network Connection

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



### Options

#### RXT 6001 19" Rack Extension for RFR 6000

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



RXT 6001 installed in RFR 6000

#### ABS Case for greenMachine

The transport case is perfect to keep your greenMachine®, cables and documents organized and in one place, while also protecting it from environmental influences. With its study design, our ABS Case is the ideal partner to transport your greenMachine® whenever it is not wired in a rack, standalone or any other system you can think of.



### Ordering Information

greenMachine Package			
Includes	<b>GM 6840:</b>	greenMachine titan Processors	
	<b>GMC-4KUPXD:</b>	greenMachine titan - 4k UHD 12G-SDI UPXD converter with FS and Audio processor. Constellation Licence	
	<b>GMC-3GUPXD:</b>	greenMachine titan - 4 Channel 3G-SDI Dual UPXD converter + Dual Scaler, FS and Audio processor. Constellation Licence	
	<b>RFR 6000</b>	Rack Frame for 1 or 2 greenMachines (without power supplies)	
	<b>2x RPS A100:</b>	Primary and Redundant Power Supplies with Region Specific Power Cord	
<b>RBO A025</b>	D-Sub 25 Audio Adapter PCB screw terminal		
<b>GMPT UPXD (N/EU/US/UK)</b>	4K Up/Down/Cross-converter + Frame Synchronizer		<b>EAN:</b> 4250479929333
	3G Up/Down/Cross Converter + Frame Synchronizer + Dual Scaler (Hardware & License)		
	Power plug Variants (please specify when ordering)		
	GMPT UPXD N	Power supply without Plug	
	GMPT UPXD EU	Power Supply with EU Plug	
GMPT UPXD US	Power Supply with US Plug		
GMPT UPXD UK	Power Supply with UK Plug		
License Only (no hardware included)			
<b>GMC-4KUPXD</b>	greenMachine titan - 4k UHD 12G-SDI UPXD converter with FS and Audio processor. Constellation Licence (No Hardware)	4250479326064	
<b>GMC-3GUPXD</b>	greenMachine titan - 4 Channel 3G-SDI Dual UPXD converter + Dual Scaler, FS and Audio processor. Constellation Licence. (No Hardware)	4250479326521	

#### 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-BiDi-Transport:** Bi-directional Transport

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

For greenMachine the following regulatory and safety standards apply:

**CE:** EN 55103-1/1996, EN 55103-2/1996, EN 60950-1/2006

Following the provisions of 2004/108/EC and 2006/95/EC directives.

**FCC:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15, Subpart B of the FCC Rules.

The RPS A100 power supply (EA11011D-1200) complies with the following safety standards:

**UL/cUL 62368-1, TUV EN 62368-1, CB IEC 62368-1, FCC, CE, BSMI, PSE, RCM, IRAM**



### SFP Fiber Options

SDI Video Fiber Transmitter		Power	
<b>OH-TX-1 LC/SC/ST</b>	3G-SDI Fiber TX SFP - LC/SC/ST - 1310nm	-8 ... -3 dBm	
<b>OH-TX-12G-LC</b>	12G-SDI Fiber TX SFP - LC - 1310nm	-5 dBm	
SDI Video Fiber Receiver		Sensitivity	
<b>OH-RX-1 LC/SC/ST</b>	3G-SDI Fiber RX SFP - LC/SC/ST - 1270-1610nm	-18 dBm (SD/1.5G/3G)	
<b>OH-RX-12G-LC</b>	12G-SDI Fiber RX SFP - LC - 1270 - 1610nm	-10 dBm (12G), -14 dBm (3G), -16 dBm (1.5G)	
<b>OH-RX-8-LC</b>	3G-SDI Fiber RX SFP (High Sense) - LC - 1270-1610nm	-26 dBm (SD/1.5G/3G)	
3G SDI Video Fiber Transceiver		Power	Sensitivity
<b>OH-TR-1-LC</b>	3G-SDI Fiber Transceiver, Singlemode - LC - 1310nm	-8 ... +3 dBm	-16 dBm (SD/1.5G/3G)
CWDM SDI Video Transceiver (TR)		Power	Sensitivity
<b>OH-TR-4-XXXX-LC</b>	3G-SDI Fiber Transceiver, Singlemode CWDM capable - 40km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-4 ... +2 dBm	-20 dBm (SD/1.5G/3G)
<b>OH-TR-8-XXXX-LC</b>	3G-SDI Fiber Transceiver, Singlemode CWDM capable - 80km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	+1 ... +5 dBm	-26 ... -28 dBm (SD/1.5G/3G)

\* 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.

GMPT-UPXD\_Rev1.1 Specifications subject to change

