greenMachine® Datasheet

UPXD

Up/Down/Cross Converter

packages:
GMPT UPXD
licenses:
GMC-4KUPXD
GMC-3GUPXD

~~callisto+~~
✓ titan

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



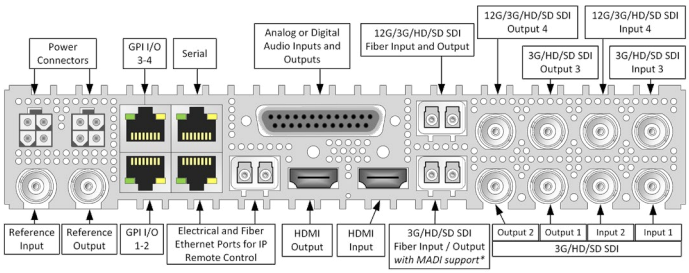
Description

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 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 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.

Backpannel



Functions

12G/3G Scaler:	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.
4x 3G Scaler:	
Deinterlacer:	Deinterlacers on channel 1 and 2 for SD and HD
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-SDI level A/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)
Frame Synchronizer:	Dynamic synchronization of SDI sources. Embedded audio matched to the video processing delay
Metadata Management:	Manages embedded metadata: SMPTE 2020, AFD, WSS, SMPTE 2031 Time code, Closed captions, and Teletext
Video Adjustment:	Adjust saturation, gain black and hue, blanking interval deletion and aperture correction. Apply horizontal flip and YCrCb headroom clipping
Color correction:	Adjust gain, offset, lift, and gamma for Red, Green, and Blue (RGB). Adjust gain and offset adjustments for Cyan, Magenta, Yellow, and White (CMYW)
Embedder/De-embedder:	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:	Gain adjustment, 1kHz test tone, mute, inversion, stereo to mono-mix on each mono audio channel silence and overload monitoring
Dolby E® decoder:	2x Dolby E® decoder for all 8 channels in a stream. Dolby® metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.
MADI in/out:	Full MADI support, if equipped with optional MADI SFP
Basic Audio & Video Test Generator	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
Timing	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
LynxCentraal	Control software for automation, remote control and monitoring
Remote Control	Full SNMP v2 and LYNX IP remote control protocol functionality Enables CustomControl features

Technical Specifications

In/Output Conversion Characteristics (for 4KUPXD)

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

In/Output Conversion Characteristics (for 3GUPXD)

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

Conversion Details

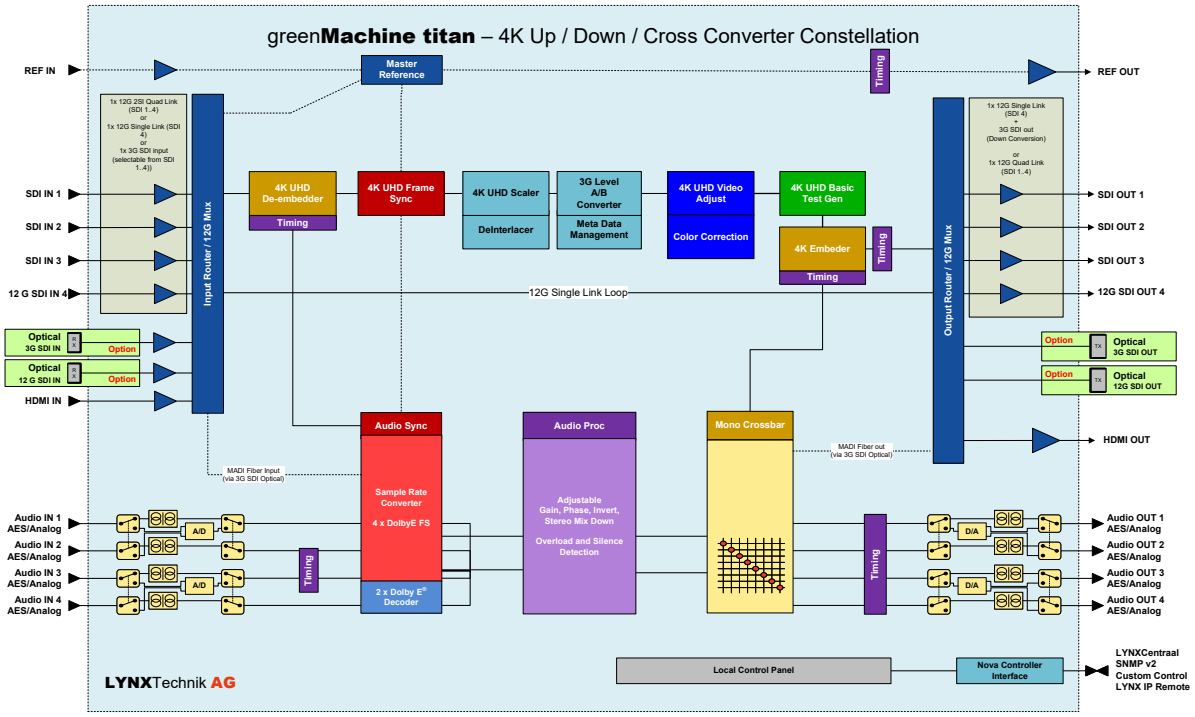
Conversion Modes	• Pill Box / Letter Box • Center Cut • 14:9 Conversion	• Stretch to Fill • Custom ROI
Cropping Aspect Ratios	16:9 / 4:3 / custom ROI	

Operation Mode

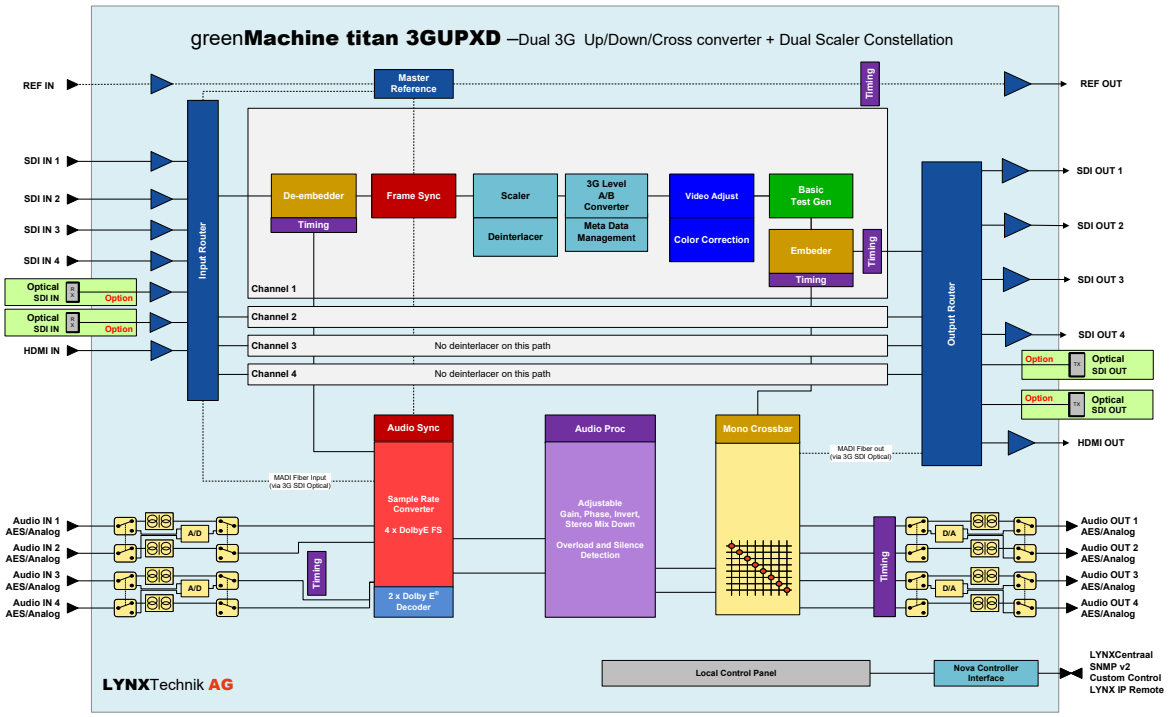
- 12G-SDI UHD single channel configuration (4KUPXD)
- 3G-SDI HD quad channel configuration (3GUPXD)

Functional Diagram

12G-SDI Single Channel Mode (4KUPXD)



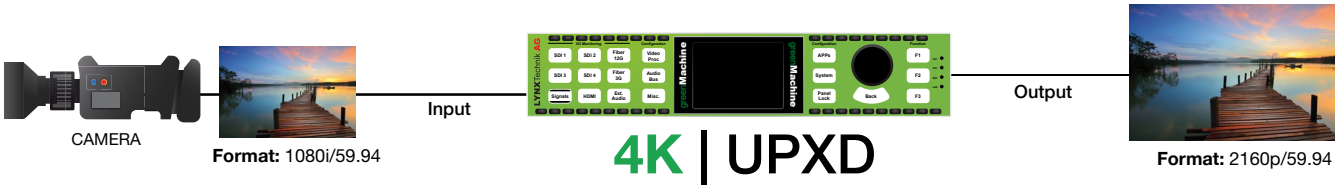
3G-SDI Quad Channel Mode (3GUPXD)



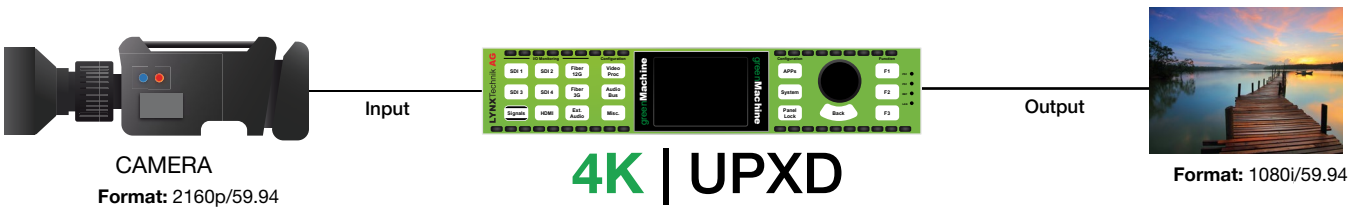
Example Workflow

4KUPXD Workflow

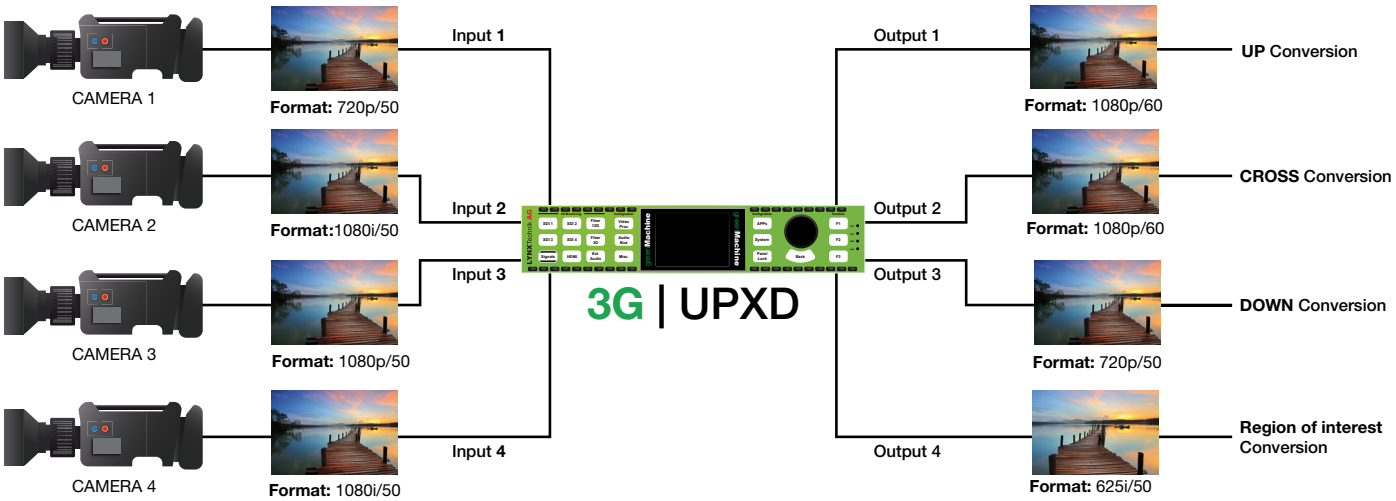
Example 1: 3G-SDI to 12G-SDI up-conversion



Example 2: 12G-SDI to 3G-SDI down-conversion



3GUPXD Quad Workflow



4 processing channels operating independently from each other.

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Hardware Specifications

BNC Connection

SDI Inputs	4x 3G-SDI video on 75 Ohm BNC connector (SMPTE 259M, 292M, 424M) with automatic video format and standard detection	
	Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
	Automatic cable EQ (Belden 1694A):	340m @ 270Mbit/s, 150m @ 1.5Gbit/s, 110m @ 3Gbit/s
12G-SDI Input*	1x 12G-SDI video on 75 Ohm BNC connector [Input 4] (SMPTE 259M, 292M, 424M, 2082) with automatic video format and standard detection	
	Return Loss:	>4dB to 12GHz
SDI Output	4x 3G-SDI video on 75 Ohm BNC connector (SMPTE 259m, 292M, 424M)	
	Timing jitter:	< 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 3Gbit/s
	Alignment jitter:	< 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 3Gbit/s
	Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
12G-SDI Output*	1x 12G-SDI video on 75 Ohm BNC connector [Output 4] (SMPTE 259M, 292M, 424M, 2082)	
	Return Loss:	>4dB to 12GHz
Reference Input	• 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 • Analog bi-level (SDTV) or tri-level (HDTV), cross lock capability	

Supported SDI Formats

SDTV	525 / 59.94Hz 625 / 50Hz		
HDTV	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
3G-SDI Level A/B	1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz		
12G-SDI* Single Link	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz		
12G-SDI* Quad Link 2SI Level A (4 x 3G)	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz		

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

Optical Connection (optional SFP required)

Fiber I/O	• 1x 3G-SDI SFP Transceiver (SMPTE 297M - 2006) • 1x 12G-SDI SFP Transceiver (SMPTE 292M, 424M , 2082) • no SD SDI (270MBit) and no 6G-SDI**
Optical Ethernet	IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1Gbit/s (125 MB/s)

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

AV Connection

HDMI	• 1x Input 10 bit HDMI 1.4b • 1x Output 10 bit HDMI 1.4b

Audio Connection

Audio I/O	4x input and 4x output on D-Sub 25 female connector
Analog I/O	input impedance >10k Ohm Output Impedance 150 Ohm
	Analog I/O full scale level: selectable 12, 15, 18, 20, 22, 24 dBu
Digital	AES3 balanced transformer isolated; Digital output level: 4V peak to peak nom
MADI	64 channel MADI supported on selected constellations (optional MADI SFP reqired for this)

Technical Information

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

Network Connection

Ethernet (LAN)	1x 10/100/1000 BaseT RJ45 Connector
GPI I/O	• 4x general purpose inputs (RJ45 Connector) • 4x general purpose outputs (RJ45 Connector)
Serial Data	EIA/ETA RS232C / RS422 /RS 485 (selectable through LynxCentraal) - RJ45 connector ESD protection for up to 16kV

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



Ordering Information

greenMachine Package			
Includes	**GM 6840:**	greenMachine titan Processors	
	GMC-4KUPXD:	greenMachine titan - UHD 12G-SDI UPXD converter with FS and Audio processor. Constellation Licence	
	GMC-3GUPXD:	greenMachine titan - 4 Channel 3G-SDI Dual UPXD converter + Dual Scaler, FS and Audio processor. Constellation Licence	
	RFR 6000	Rack Frame for 1 or 2 greenMachines (without power supplies)	
	2x RPS A100:	Primary and Redundant Power Supplies with Region Specific Power Cord	
GMPT UPXD (N/EU/US/UK)	12G Up/Down/Cross-converter + Frame Synchronizer 3G Up/Down/Cross Converter + Frame Synchonizer + 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		**EAN:** 4250479929333
License Only (no hardware included)			
GMC-4KUPXD	greenMachine titan - UHD 12G-SDI UPXD converter with FS and Audio processor. Constellation Licence (No Hardware)		4250479326064
GMC-3GUPXD	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 UHD or Quad 3G mode including HDR test patterns
- *GMC-4KUPXD*: UHD 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		
OH-TX-1 LC/SC/ST	3G-SDI Fiber TX SFP - LC/SC/ST - 1310nm	-8 ... -3 dBm		
OH-TX-12G-LC	12G-SDI Fiber TX SFP - LC - 1310nm	-5 dBm		
SDI Video Fiber Receiver		**Sensitivity**		
OH-RX-1 LC/SC/ST	3G-SDI Fiber RX SFP - LC/SC/ST - 1270-1610nm	-18 dBm (SD/1.5G/3G)		
OH-RX-12G-LC	12G-SDI Fiber RX SFP - LC - 1270 - 1610nm	-10 dBm (12G),	-14 dBm (3G)	-16 dBm (1.5G)
OH-RX-8-LC	3G-SDI Fiber RX SFP (High Sense) - LC - 1270-1610nm	-26 dBm (SD/1.5G/3G)		
3G SDI Video Fiber Transceiver		**Power**	**Sensitivity**	
OH-TR-1-LC	3G-SDI Fiber Transceiver, Singlemode - LC - 1310nm	-8 ... +3 dBm	-16 dBm (SD/1.5G/3G)	
CWDM SDI Video Transceiver (TR)		**Power**	**Sensitivity**	
OH-TR-4-XXXX-LC	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)	
OH-TR-8-XXXX-LC	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.