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1x12G-SDI & 4x3G-SDI Static HDR/ SDR Converter

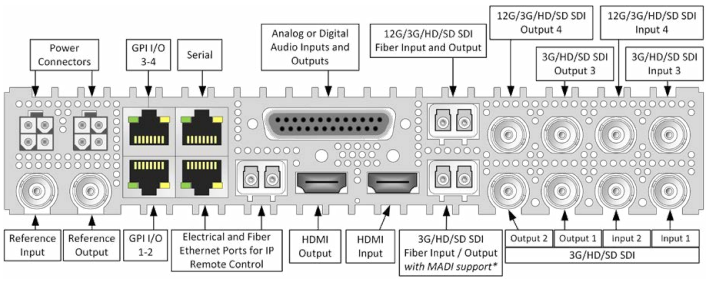
Description

The greenMachine HDR Static, 1 RU half 19" rackmount, is a real-time broadcast-quality HDR to SDR, SDR to HDR or cross-standards HDR to HDR converter with frame sync supporting formats up to 4K UHD (3840x2160). HDR Static applies color and contrast parameters equally throughout a specific piece of content, i.e. an average brightness/color range is determined across an entire program.

HDR Static greenMachine processor has an advanced algorithm that overcomes the issues arising from "**round-tripping**" SDR>HDR>SDR. The SDR signal at the production end and the distribution end of the round trip are visually identical making the whole SDR>HDR>SDR conversion process transparent. Supporting 4 x 3G or 1x 4K/UHD processing channel, HDR Static provides up, down and cross-conversions in HDR and SDR curves through appropriate static tone mapping.

It also supports **Wide Color Gamut** (WCG) needs of broadcasters, and professional AV live events requirement. HDR Static is most suitable for the environments outdoor/indoor where the light conditions does not change dynamically.
For dynamically changing lighting conditions, check greenMachine HDR Evie.

Backpannel



Technical Specifications

Static HDR ◄► SDR Conversion

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

Colorimetry Supported

HDR Colorimetry	BT.2020, BT.709, Sony S-Gamut, ACES, DCI-P3, Panasonic V-Gamut, BMD Film, Canon Cinema Gamut, Arri Alexa, Red Wide Gamut
SDR Colorimetry	W. 2020, BT. 709, Auto

Operation Modes

- 4k UHD single channel configuration
- 3G HD quad channel configuration

Color Processing

- RGB gain, lift, offset and gamma adjustments
- CMYW gain and offset adjustments

Input / Output Data Range

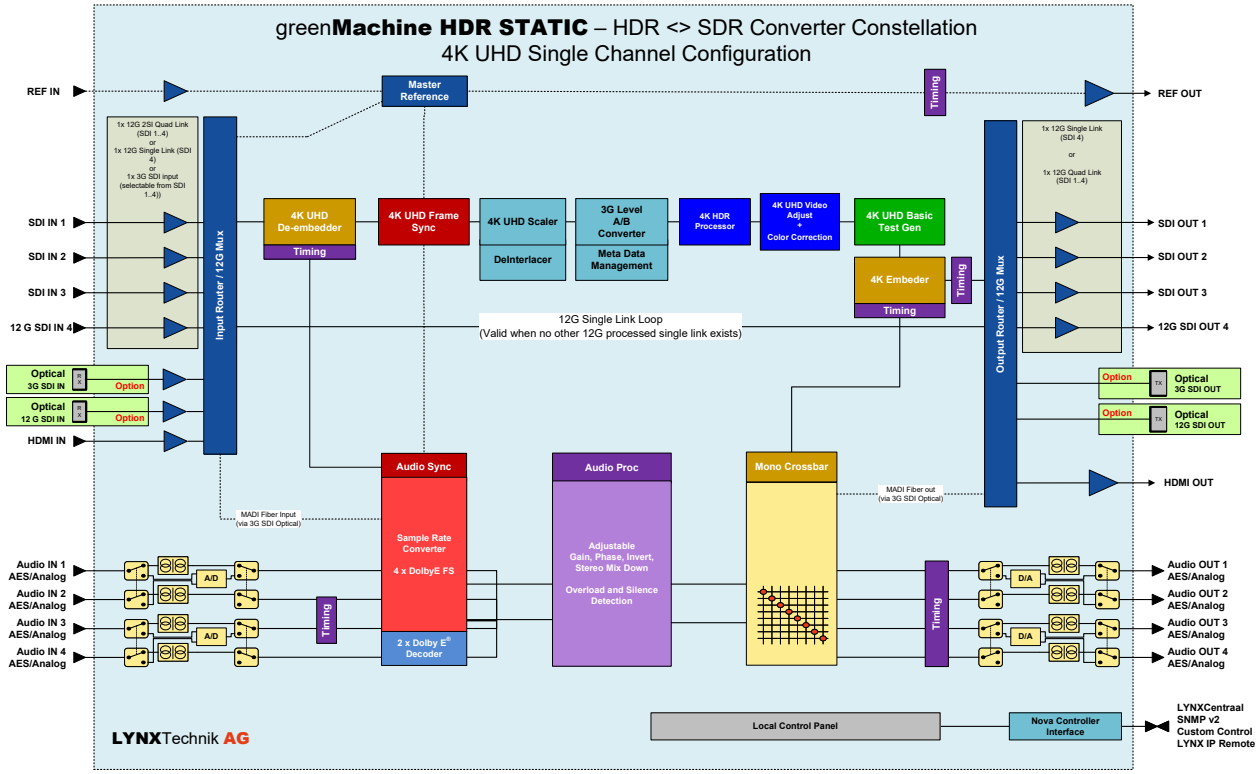
- Full range : Video signal representation (10bits) in full range of values from 0 to 1023 decimal (according to ITU BT 2100)
- Narrow range : Traditional video signal (10 bits) representation from 64 to 940 decimal values

Functions

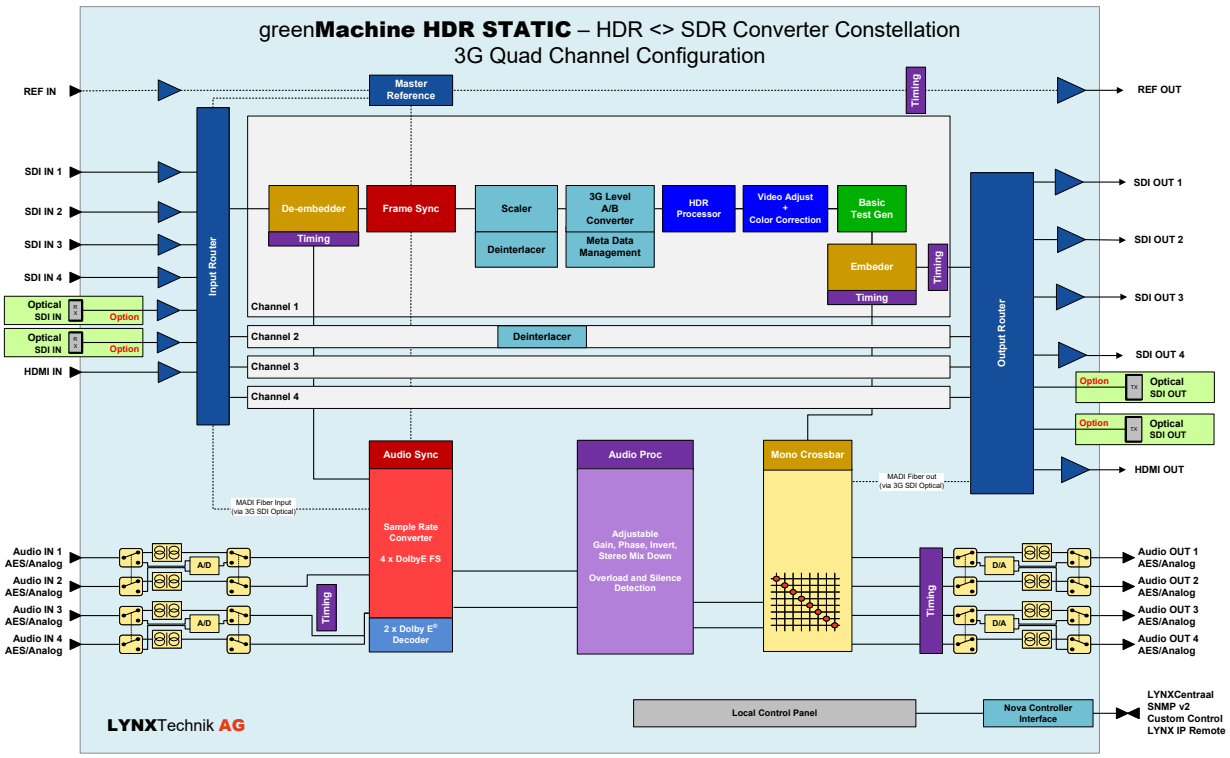
- Frame Synchronizer
- 4K UHD / 3G Scaler
- Deinterlacer: 1x 4K mode and 4x deinterlacers (with motion adaptive filtering on the first two channels) in 4x3G
- Up to 20 user defined LUTs in 33-points .cube format
- DolbyE® Audio Embedding /De-embedding
- Basic Audio & Video Test Generator
- Audio Processing with gain adjustment, mute, inversion, and stereo to mono mix-down
- Two Dolby E® Decoder for decoding 8 audio channels in a Dolby E® stream
- MADI input and output
- MetaData Management
- Video Adjustment include saturation, gain, black and hue adjustment
- Color correction
- Timing with available video and audio delay per channels is 30 frames and 1.3 seconds respectively
- Nova controller with full SNMP v2 support and custom control

Functional Diagram

12G-SDI Single Channel Mode

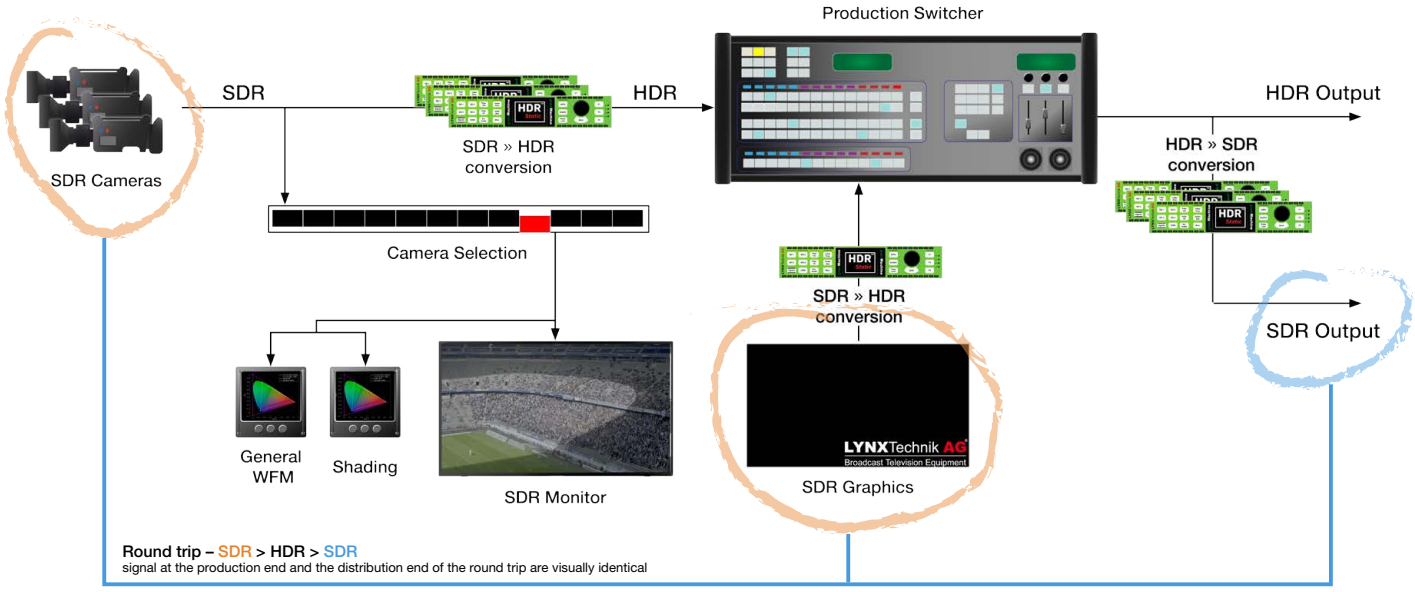


3G-SDI Quad Channel Mode

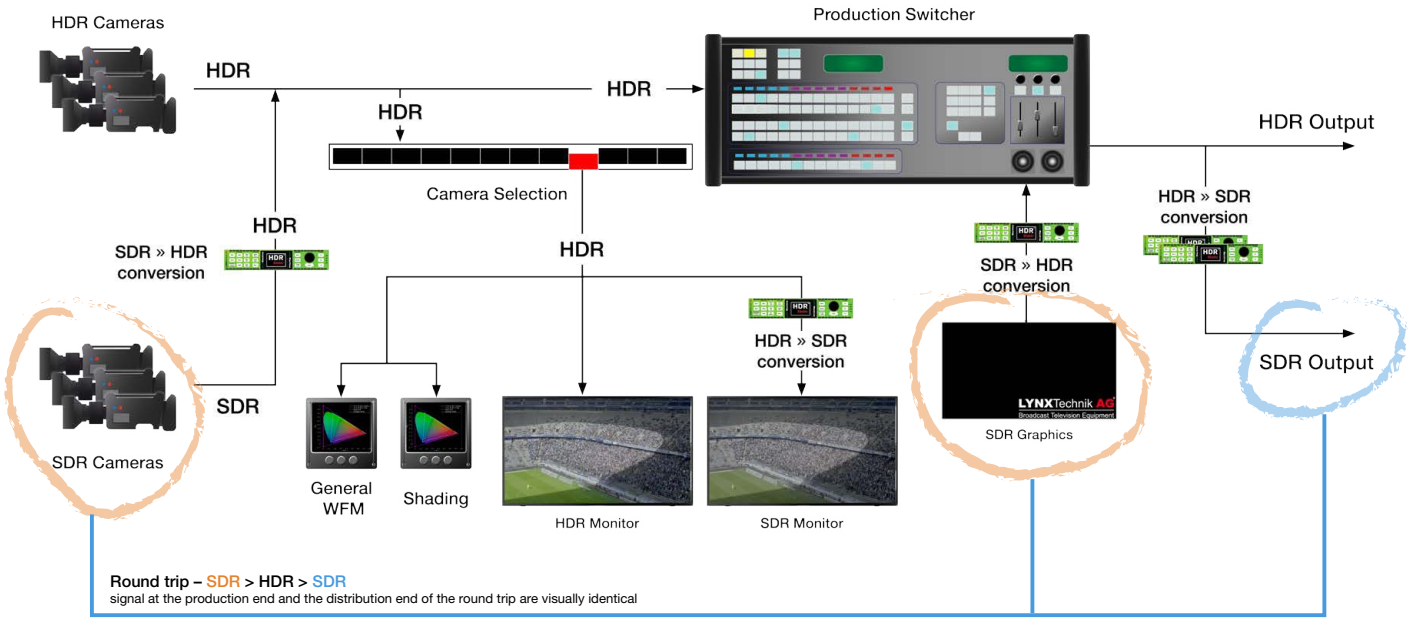


Example Applications

Example 1: Live outside broadcast with SDR Cameras (SDR▶HDR▶SDR roundtrip)



Example 2: Live outside broadcast with mixed HDR and SDR Cameras (SDR▶HDR▶SDR roundtrip)



The roundtrip conversion via greenMachine HDR Static will provide the SDR image which is visually identical to the SDR camera image and SDR graphics, making it a transparent conversion process.

greenMachine®

HDR Static

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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)

Optical SDI 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 Sub-D 25 female connector
Analog I/O	input impedance >10k Ohm Output Impedance 150 Ohm
	Analog I/O full scale level: selectable 12, 15, 18, 20, 22, 24 dBu
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

Options

RXT 6001 19" Rack Extension for RFR 6000

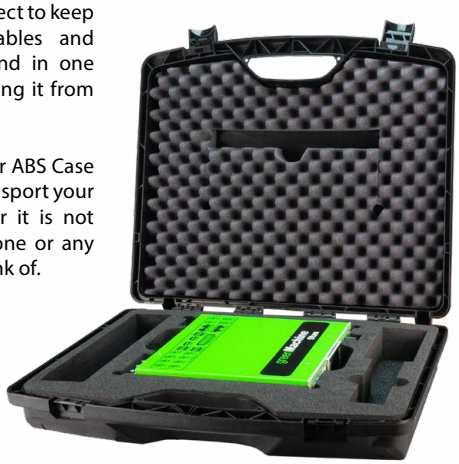
The RXT 6001 is a compact and flexible rack extension for RFR 6000. It can be setup to hold up to four RPS A100 power supplies with optimized airflow surfaces.

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-HDR-STATIC-titan	greenMachine titan - HDR STATIC Converter/Processor. 4k UHD 12G-SDI with UPXD or 4x 3G-SDI with Dual UPXD converter + Dual Scaler (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	
	RBO A025	D-Sub 25 Audio Adapter PCB screw terminal	
GMPT HDRS (N/EU/US/UK)	greenMachine titan - HDR STATIC Converter/Processor. 4k UHD 12G-SDI with UPXD or 4x 3G-SDI with Dual UPXD converter + Dual Scaler (Hardware & License) Power plug Variants (please specify when ordering) GMPT HDRS N Power supply without Plug GMPT HDRS EU Power Supply with EU Plug GMPT HDRS US Power Supply with US Plug GMPT HDRS UK Power Supply with UK Plug	**EAN:** 4250479327863	
License Only (no hardware included)			
GMC-HDR-STATIC-titan	greenMachine titan - HDR STATIC Converter/Processor. 4k UHD 12G-SDI with UPXD or 4x 3G-SDI with Dual UPXD converter + Dual Scaler (Constellation Licence)	4250479326118	

More broadcast applications:

- *GMC-TESTOR*: Audio & Video Test signal generator in 4K UHD or Quad 3G mode including HDR test patterns
- *GMC-4KUPXD*: 4K Up/down/cross converter
- *GMC-HDREvie+*: Segmented, Dynamic HDR>SDR converter
- *GMC-4FS*: 4x3Gbit/s Frame Synchronizer
- *GMC-3GUPXD*: Dual 3G Up/down/cross converter and Dual scaler

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

For greenMachine the following regulatory and safety standards apply:

CE: EN 55103-1/1996, EN 55103-2 /1996, EN 60950-1/2006
Following the provisions of 2004/108/EC and 2006/95/EC directives.

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

The RPS A100 power supply (EA11011D-1200) complies with the following safety standards:
UL/cUL 62368-1, TUV EN 62368-1, CB IEC 62368-1, FCC, CE, BSMI, PSE, RCM, IRAM

SFP Fiber Options

12G SDI Video Fiber Transmitter		Power		
OH-TX-12G-LC	12G-SDI Fiber TX SFP - LC - 10km* - 1310nm	-5 dBm		
12G SDI Video Fiber Receiver		**Sensitivity**		
OH-RX-12G-LC	12G-SDI Fiber RX SFP - LC - 10km* - 1270-1610nm	-10 dBm (12G)	-14 dBm (3G)	-16 dBm (1.5G)
12G SDI Video Fiber Transceiver		**Power**	**Sensitivity**	
OH-TR-12G-LC	12G-SDI Fiber Transceiver, Singlemode - 10km* - LC - 1310nm	-5/+0.5 dBm	-10 dBm (12G)	-14 dBm (3G/1.5G)
CWDM SDI Video Transceiver (TR)		**Power**	**Sensitivity**	
OH-TR-4-XXXX-LC **XXXX** = Wavelength	3G-SDI Fiber Transceiver, Singlemode CWDM capable - 40km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-4 ... +2 dBm	-20 dBm (3G/1.5G/SD)	
OH-TR-12G-XXXX-LC **XXXX** = Wavelength	12G-SDI Fiber Transceiver, Singlemode CWDM capable - 10km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-2/+3 dBm	-10 dBm (12G)	-14 dBm (3G/1.5G)

* **Distance is an approximation.** Actual distances achieved can be longer or shorter depending on the type of fiber cable and accumulated optical losses in the fiber link. Determine link losses and perform optical budget calculations to ensure correct operation.
More SFP options are available.