

Small Form-factor Pluggable (SFP) Optical Module Cartridges (Video)

For Densité Frames, Standard NVISION 8500 Series Routers and LUMO Cards

The Small Form-factor Pluggable (SFP) optical module cartridges for video are small, hot-pluggable devices used to provide fiber connectivity to 3G/HD/SD SDI products from either a Densité frame (they can be used with any video card that has a rear module with an “F” name suffix (i.e., HDA-193N-DRP-F), irrelevant of which Densité frame is hosting the card), standard (not hybrid) NVISION 8500 Series routers and LUMO cards. By using single-mode

fiber instead of coaxial cables, these interfaces can be used over much longer distances without degrading signal quality, which is very useful when carrying 3G signals.

All SFP optical module cartridges for video that are available from Grass Valley are RoHS compliant.

CONTENTS

SFP-R-LC 2	SFP-T-S13-LC 8
Single channel optical receiver cartridge with simplex LC	Single channel 1310 nm optical transmitter cartridge with simplex LC
SFP-RR-LC 4	SFP-TT-S13S13-LC 10
Dual channel optical receiver cartridge with duplex LC	Dual channel 1310 nm optical transmitter cartridge with duplex LC
SFP-RT-S13-LC 6	Global Services 12
1310 nm optical transceiver cartridge with duplex LC	

SFP-R-LC

Single Channel Optical Receiver Cartridge with Simplex LC

Small form-factor pluggable (SFP) optical module video cartridge for Densité frames, standard NVISION 8500 Series routers and LUMO cards.

The SFP-R-LC is a single channel single mode optical receiver that supports signals up to 3 Gb/s as per SMPTE ST 259, SMPTE ST 292 and SMPTE ST 424, including SDI pathological test patterns described in SMPTE engineering guideline SMPTE EG 34 and SMPTE recommended practices SMPTE RP 178 and SMPTE RP 198.

KEY FEATURES

- SMPTE ST 297:2006 compatible
- 3G/HD/SD SDI:
 - SMPTE ST 424, SMPTE ST 292
 - SMPTE ST 259-ABCD compliant
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Single receiver with simplex LC
- RoHS-6 compliant
- Hot pluggable

SPECIFICATIONS

Receiver Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Wavelength of Operation		1260	—	1620	nm	
Sensitivity for SMPTE ST 424 2.97 Gb/s	Sen			-21	dBm	Pathological
Overload		0			dBm	
Signal Detect — Asserted	Pa	—	—	-21	dBm	Transition: low to high
Signal Detect — De-asserted	Pd	-29	—	—	dBm	Transition: high to low
Signal Detect — Hysteresis		1	—	6	dB	
Optical Return Loss			-27		dB	
Electrical						
CML Output (Differential)		550	660	850	mVp-p	AC coupled output
Optical Rise Time / Fall Time	tr / tf			135	ps	SMPTE ST 424, 20% to 80%, unfiltered
				270	ps	SMPTE ST 292, 20% to 80%, unfiltered
				1.5	ps	SMPTE ST 259, 20% to 80%, unfiltered
Output LOS Voltage — Low	V _{OL}	0		0.5	V	I _{OL} = -1.6mA, 1 TTL unit load
Output LOS Voltage — High	V _{OH}	2.5		Vcc+0.3	V	I _{OH} = 40mA, 1 TTL unit load
SCL, SDA	V _{OH}	2.5		Vcc+0.3	V	
	V _{OL}	0		0.5	V	
Absolute Maximum Ratings — Exposure to absolute maximum rating conditions for extended periods may affect device reliability.						
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	-20		85	°C	
Power Supply Voltage	Vcc	0		4	V	
ESD Tolerance on All Pins				1	KV HBM	
Relative Humidity	—	5		95	% RH	Non-condensing

Receiver Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Recommended Operating Conditions						
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Operating Case Temperature	Tc	0		70	°C	
Baud Rate		<50		3000	Mb/s	
Power Supply Current	Icc		120	160	mA	

ORDERING

Part Number	Type	Maximum Bit Rate (Mb/s)	RX1		RX2		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Sen. (dBm)	λ (nm)	Sen. (dBm)			
SFP-R-LC	1-RX	3000	1260/1620	-21			LC SFP with DMI	0 to 70	Yes

Note: Only connections with patch cords with PC or UPC connectors are supported.

Note: All receiver channels (R) are wideband, responding to wavelengths ranging from 1260 to 1620 nm, compatible with standard 1310 nm and CWDM wavelengths, except for the receiver from the WDM Series.

SFP-RR-LC

Dual Channel Optical Receiver Cartridge with Duplex LC

Small form-factor pluggable (SFP) optical module video cartridge for Densité frames, standard NVISION 8500 Series routers and LUMO cards.

The SFP-RR-LC is a dual channel single mode optical receiver that supports signals up to 3 Gb/s as per SMPTE ST 259, SMPTE ST 292 and SMPTE ST 424, including SDI pathological test patterns described in SMPTE engineering guideline SMPTE EG 34 and SMPTE recommended practices SMPTE RP 178 and SMPTE RP 198.

KEY FEATURES

- SMPTE ST 297:2006 compatible
- 3G/HD/SD SDI:
 - SMPTE ST 424, SMPTE ST 292
 - SMPTE ST 259-ABCD compliant
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Dual receiver with duplex LC
- RoHS-6 compliant
- Hot pluggable

SPECIFICATIONS

Receiver Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Wavelength of Operation		1260	—	1620	nm	
Sensitivity for SMPTE ST 424 2.97 Gb/s	Sen			-21	dBm	Pathological
Overload		0			dBm	
Signal Detect — Asserted	Pa	—	—	-21	dBm	Transition: low to high
Signal Detect — De-asserted	Pd	-29	—	—	dBm	Transition: high to low
Signal Detect — Hysteresis		1			dB	
Optical Return Loss			-27		dB	
Electrical						
CML Output (Differential)		550	660	850	mVp-p	AC coupled output
Optical Rise Time / Fall Time	tr / tf			135	ps	SMPTE ST 424, 20% to 80%, unfiltered
				270	ps	SMPTE ST 292, 20% to 80%, unfiltered
				1.5	ps	SMPTE ST 259, 20% to 80%, unfiltered
Output LOS Voltage — Low	V _{OL}	0		0.5	V	I _{OL} = -1.6mA, 1 TTL unit load
Output LOS Voltage — High	V _{OH}	2.5		Vcc+0.3	V	I _{OH} = 40mA, 1 TTL unit load
SCL, SDA	V _{OH}	2.5		Vcc+0.3	V	
	V _{OL}	0		0.5	V	
Absolute Maximum Ratings — Exposure to absolute maximum rating conditions for extended periods may affect device reliability						
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	0		70	°C	
Power Supply Voltage	Vcc	0		4	V	
ESD Tolerance on All Pins				1	KV HBM	
Relative Humidity	—	5		95	% RH	Non-condensing

Receiver Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Recommended Operating Conditions						
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Operating Case Temperature	Tc	0		70	°C	
Baud Rate		<50		3000	Mb/s	
Power Supply Current	Icc		150	200	mA	

ORDERING

Part Number	Type	Maximum Bit Rate (Mb/s)	RX1		RX2		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Sen. (dBm)	λ (nm)	Sen. (dBm)			
SFP-RR-LC	2-RX	3000	1260/1620	-21	1260/1620	-21	LC SFP with DMI	0 to 70	Yes

Note: Only connections with patch cords with PC or UPC connectors are supported.

Note: All receiver channels (R) are wideband, responding to wavelengths ranging from 1260 to 1620 nm, compatible with standard 1310 nm and CWDM wavelengths, except for the receiver from the WDM Series.

SFP-RT-S13-LC

1310 nm Optical Transceiver Cartridge with Duplex LC

Small form-factor pluggable (SFP) optical module video cartridge for Densité frames, standard NVISION 8500 Series routers and LUMO cards.

The SFP-RT-S13-LC is a single mode optical transceiver that supports signals up to 3 Gb/s as per SMPTE ST 259, SMPTE ST 292 and SMPTE ST 424, including SDI pathological test patterns described in SMPTE engineering guideline SMPTE EG 34 and SMPTE recommended practices SMPTE RP 178 and SMPTE RP 198.

KEY FEATURES

- SMPTE ST 297:2006 compatible
- 3G/HD/SD SDI:
 - SMPTE ST 424, SMPTE ST 292
 - SMPTE ST 259-ABCD compliant
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Single transmitter with simplex LC
- Single receiver with simplex LC
- RoHS-6 compliant
- Hot pluggable

SPECIFICATIONS

Transmitter Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Optical Transmit Power	P _o	-5	-2	0	dBm	Output power is power coupled into a 9/125 mm single mode fiber
Output Center Wavelength	λ	1290	1310	1330	nm	At 25°C
Output Spectrum Width	Δλ	—	1.5	3	nm	RMS (σ)
Extinction Ratio	ER	5	7.5		dB	
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Rise Time / Fall Time	tr / tf			135	ps	SMPTE ST 424, 0% to 80%, unfiltered
				270	ps	SMPTE ST 292, 0% to 80%, unfiltered
				800	ps	SMPTE ST 344, 0% to 80%, unfiltered
				1.5	ns	SMPTE ST 259, 0% to 80%, unfiltered
Electrical						
Differential Input Voltage	V _{IH} - V _{IL}	200		1200	mVp-p	AC Coupled Input
Disable Input Voltage — Low	V _{TDIS,L}	0		0.8	V	TX Output Enabled
Disable Input Voltage — High	V _{TDIS,H}	2.0		Vcc+0.3	V	TX Output Disabled
Output TX_Fault — Low	V _{OL}	0		0.5	V	
Disable TX_Fault — High	V _{OH}	2.5		Vcc+0.3	V	
SCL, SDA	V _{OH}	2.5		Vcc+0.3	V	
	V _{OL}	0		0.5	V	

Receiver Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Wavelength of Operation		1260	—	1620	nm	
Sensitivity for SMPTE ST 424 2.97 Gb/s	Sen			-21	dBm	Pathological
Overload		-3			dBm	
Signal Detect — Asserted	Pa	—	—	-22	dBm	Transition: low to high
Absolute Maximum Ratings — Exposure to absolute maximum rating conditions for extended periods may affect device reliability						
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	-20		85	°C	
Power Supply Voltage	Vcc	0		4	V	
ESD Tolerance on All Pins				1	KV HBM	
Relative Humidity	—	5		95	% RH	Non-condensing
Recommended Operating Conditions						
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Operating Case Temperature	Tc	0		70	°C	
Baud Rate		<50		3000	Mb/s	
Power Supply Current	Icc		200	300	mA	

ORDERING

Part Number	Type	Maximum Bit Rate (Mb/s)	TX		RX		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Power (dBm)	λ (nm)	Sen. (dBm)			
SFP-RT-S13-LC	1-TX+1-RX	3000	1310	-5 to 0	1260/1620	-21	LC SFP with DMI	0 to 70	Yes
Related Products			RX1		RX2				
SFP-RR-LC	2-RX	3000	1260/1620	-21	1260/1620	-21	LC SFP with DMI	0 to 70	Yes
SFP-R-LC	1-RX	3000	1260/1620	-21			LC SFP with DMI	0 to 70	Yes

Note: Only connections with patch cords with PC or UPC connectors are supported.

Note: All receiver channels (R) are wideband, responding to wavelengths ranging from 1260 to 1620 nm, compatible with standard 1310 nm and CWDM wavelengths, except for the receiver from the WDM Series.

SFP-T-S13-LC

Single Channel 1310 nm Optical Transmitter Cartridge with Simplex LC

Small form-factor pluggable (SFP) optical module video cartridge for Densité frames, standard NVISION 8500 Series routers and LUMO cards.

The SFP-T-S13-LC is a single channel single mode optical transmitter that supports signals up to 3 Gb/s as per SMPTE ST 259, SMPTE ST 292 and SMPTE ST 424, including SDI pathological test patterns described in SMPTE engineering guideline SMPTE EG 34 and SMPTE recommended practices SMPTE RP 178 and SMPTE RP 198. The unit uses a Fabry-Perot 1310 nm laser transmitter.

KEY FEATURES

- SMPTE ST 297:2006 compatible
- 3G/HD/SD SDI:
 - SMPTE ST 424, SMPTE ST 292
 - SMPTE ST 259-ABCD compliant
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Single transmitter with simplex LC
- RoHS-6 compliant
- Hot pluggable

SPECIFICATIONS

Transmitter Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	Po	-5	-2	0	dBm	Output power is power coupled into a 9/125 mm single mode fiber
Output Center Wavelength	λ	1290	1310	1330	nm	At 25°C
Output Spectrum Width	DI	—	1.5	3	nm	RMS (σ)
Extinction Ratio	ER	5	7.5		dB	
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Rise Time / Fall Time	tr / tf			135	ps	SMPTE ST 424, 20% to 80%, unfiltered
				270	ps	SMPTE ST 292, 20% to 80%, unfiltered
				1.5	ns	SMPTE ST 259, 20% to 80%, unfiltered
Electrical						
Differential Input Voltage	V _{IH} - V _{IL}	200		1200	mVp-p	AC Coupled Input
Disable Input Voltage — Low	V _{TDIS,L}	0		0.8	V	TX Output Enabled
Disable Input Voltage — High	V _{TDIS,H}	2.0		Vcc+0.3	V	TX Output Disabled
SCL, SDA	V _{OH}	2.5		Vcc+0.3	V	
	V _{OL}	0		0.5	V	
Absolute Maximum Ratings — Exposure to absolute maximum rating conditions for extended periods may affect device reliability						
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	-20		85	°C	
Power Supply Voltage	Vcc	0		4	V	
ESD Tolerance on All Pins				1	KV HBM	
Relative Humidity	—	5		95	% RH	non-condensing
Recommended Operating Conditions						
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Operating Case Temperature	Tc	0		70	°C	
Baud Rate		<50		3000	Mb/s	
Power Supply Current	Icc		130	180	mA	

ORDERING

Part Number	Type	Maximum Bit Rate (Mb/s)	TX		RX		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Power (dBm)	λ (nm)	Sen. (dBm)			
SFP-T-S13-LC	1-TX	3000	1310	-5 to 0			LC SFP with DMI	0 to 70	Yes
Related Products									
SFP-RR-LC	2-RX	3000			1260/1620	-21	LC SFP with DMI	0 to 70	Yes
SFP-TT-S13S13-LC	2-TX	3000	1310	-5 to 0			LC SFP with DMI	0 to 70	Yes
SFP-R-LC	1-RX	3000			1260/1620	-21	LC SFP with DMI	0 to 70	Yes
SFP-RT-S13-LC	1-TX+1-RX	3000	1310	-5 to 0	1260/1620	-21	LC SFP with DMI	0 to 70	Yes

Note: Only connections with patch cords with PC or UPC connectors are supported.

SFP-TT-S13S13-LC

Dual Channel 1310 nm Optical Transmitter Cartridge with Duplex LC

Small form-factor pluggable (SFP) optical module video cartridge for Densité frames, standard NVISION 8500 Series routers and LUMO cards.

The SFP-TT-S13S13-LC is a dual channel single mode optical transmitter that supports signals up to 3 Gb/s as per SMPTE ST 259, SMPTE ST 292 and SMPTE ST 424, including SDI pathological test patterns described in SMPTE engineering guideline SMPTE EG 34 and SMPTE recommended practices SMPTE RP 178 and SMPTE RP 198. The unit includes two independent Fabry-Perot 1310 nm laser transmitters.

KEY FEATURES

- SMPTE ST 297:2006 compatible
- 3G/HD/SD SDI:
 - SMPTE ST 424, SMPTE ST 292
 - SMPTE ST 259-ABCD compliant
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Dual transmitter with duplex LC
- RoHS-6 compliant
- Hot pluggable

SPECIFICATIONS

Transmitter Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Optical Transmit Power	Po	-5	-2	0	dBm	Output power is power coupled into a 9/125 mm single mode fiber
Output Center Wavelength	λ	1290	1310	1330	nm	At 25°C
Output Spectrum Width	DI	—	1.5	3	nm	RMS (σ)
Extinction Ratio	ER	5	7.5		dB	
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Rise Time / Fall Time	tr / tf			135	ps	SMPTE ST 424, 20% to 80%, unfiltered
				270	ps	SMPTE ST 292, 20% to 80%, unfiltered
				1.5	ns	SMPTE ST 259, 20% to 80%, unfiltered
Electrical						
Differential Input Voltage	V _{IH} - V _{IL}	200		1200	mVp-p	AC Coupled Input
Disable Input Voltage — Low	V _{TDIS,L}	0		0.8	V	TX Output Enabled
Disable Input Voltage — High	V _{TDIS,H}	2.0		Vcc+0.3	V	TX Output Disabled
SCL, SDA	V _{OH}	2.5		Vcc+0.3	V	
	V _{OL}	0		0.5	V	
Absolute Maximum Ratings — Exposure to absolute maximum rating conditions for extended periods may affect device reliability						
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	-20		85	°C	
Power Supply Voltage	Vcc	0		4	V	
ESD Tolerance on All Pins				1	KV HBM	
Relative Humidity	—	5		95	% RH	Non-condensing

Transmitter Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Recommended Operating Conditions						
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Operating Case Temperature	Tc	0		70	°C	
Baud Rate		<50		3000	Mb/s	
Power Supply Current	Icc		200	300	mA	

ORDERING

Part Number	Type	Maximum Bit Rate (Mb/s)	TX		RX		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Power (dBm)	λ (nm)	Sen. (dBm)			
SFP-TT-S13S13-LC	2-TX	3000	1310	-5 to 0			LC SFP with DMI	0 to 70	Yes
Related Products									
SFP-RR-LC	2-RX	3000			1260/1620	-21	LC SFP with DMI	0 to 70	Yes
SFP-T-S13-LC	1-TX	3000	1310	-5 to 0			LC SFP with DMI	0 to 70	Yes
SFP-R-LC	1-RX	3000			1260/1620	-21	LC SFP with DMI	0 to 70	Yes
SFP-RT-S13-LC	1-TX+1-RX	3000	1310	-5 to 0	1260/1620	-21	LC SFP with DMI	0 to 70	Yes

Note: Only connections with patch cords with PC or UPC connectors are supported.

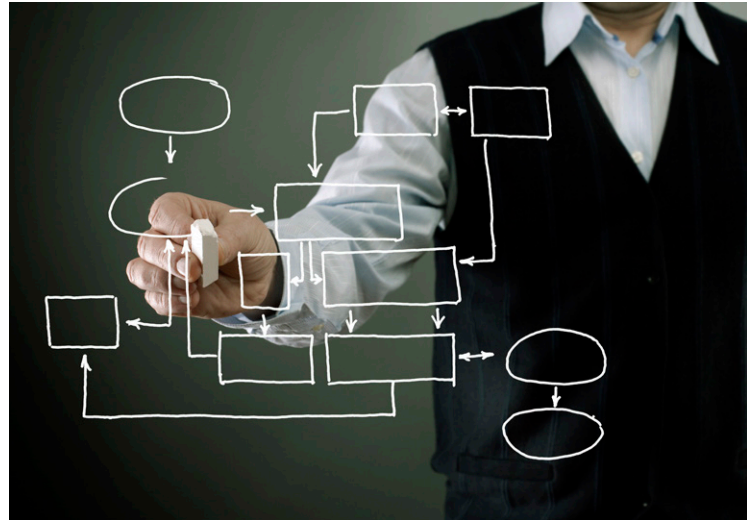
GLOBAL SERVICES

In a world of ever-increasing complexity and system distribution, broadcast producers inside a studio or outside in a vehicle need production control equipment suppliers who can provide industry-leading technical support. Personnel is but one part of the support equation. The other is a business infrastructure capable of deploying and cost-effectively supporting reliable solutions. Grass Valley Global Services has the depth of knowledge, industry experience and technical expertise to achieve this objective. The Global Services portfolio provides everything necessary insure maximum uptime and high velocity problem resolution.

Grass Valley Global Services delivers a comprehensive array of tangible value:

- A global network of field engineers with the experience, knowledge and skill to keep production switchers/vision mixers and associated equipment up to date, operational and optimized
- A worldwide parts distribution system that ensures rapid access to replacement parts
- A team of educators skilled in the nuances of production control and switcher operations
- Technical and operational training, provided on-site at Grass Valley facilities worldwide and online, that maximizes productivity through tailored learning paths
- Comprehensive support agreements that ensure every Grass Valley system remains in peak condition — all while supporting the enterprise's need for financial predictability

Grass Valley Global Services offerings deliver tangible value. The Global Services organization does this by providing the resources to ensure that users get the maximum value from an investment in Grass Valley production switchers — from initial startup through the entire in-service lifespan. Global Services empowers users to meet tactical day-to-day objectives while giving staff more time to focus on strategic business initiatives. A global presence, logistics expertise and world-renowned team of media professionals are here to help the achievement of financial performance objectives by reducing risk while boosting operational efficiencies.



GLOBAL SERVICES PROVIDES:

- Unequaled depth of industry knowledge and technical expertise
- Over 50 years of worldwide experience
- Complete set of services:
 - Strategic advice
 - System architecture
 - Workflow analysis and design
 - Project management
 - Integration and implementation
 - Performance optimization
 - Technical and operational training
 - Educational services
- Address today's challenges and prepare for tomorrow's opportunities

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