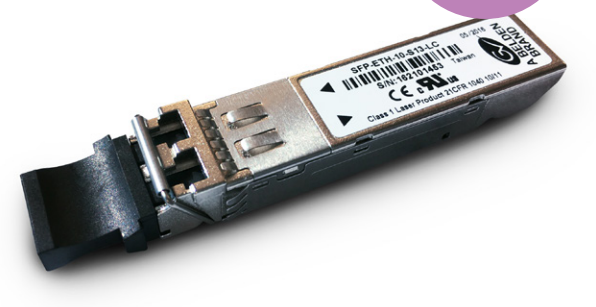
DATASHEET



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

For Densité Frames and Grass Valley/Telecast Standalone Fiber Product

The Small Form-factor Pluggable (SFP) optical module cartridges are small, hot-pluggable devices used to provide Ethernet fiber connectivity to IP-based products from either a Densité frame or standalone fiber products. Multimode fiber links can be used for links of a few hundred meters, while single-mode fiber links can be used at distances up to 10 kilometer and over (dependent on SFP type) without degrading signal quality.

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

TABLE OF CONTENTS

SFP-ETH-10-RT-W13-LC **2**
1310 nm / 1.25 Gb/s Single Mode SFP Transceiver

SFP-ETH-10-RT-W15-LC **4**
1310 nm / 1.25 Gb/s Single Mode SFP Transceiver

SFP-ETH-10-S13-LC **6**
1310 nm / 1.25 Gb/s Single Mode SFP Transceiver

SFP-ETH-RT-M85-LC **8**
850 nm / 1.25 Gb/s Multimode SFP Transceiver

SFP-ETH10G-RT-M85-LC **10**
850 nm / 10.3 Gb/s Multimode SFP Transceiver

SFP-ETH10G-RT-S13-LC **12**
1310 nm / 10.3 Gb/s Single Mode SFP Transceiver

SFP-ETH10G-RT-C*XX*-LC **14**
CWDM / 10.3 Gb/s Single Mode SFP Transceiver

SFP-ETH10G-RT-W27-LC **16**
WDM / 10.3 Gb/s Single Mode SFP Transceiver

SFP-ETH10G-RT-W33-LC **18**
WDM / 10.3 Gb/s Single Mode SFP Transceiver

Global Services **20**

SFP-ETH-10-RT-W13-LC

1-Fiber 1310 nm / 1.25 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH-10-RT-W13-LC is a single mode optical transceiver that supports signals up to 1.25 Gb/s for bidirectional serial data communications such as 1000BASE-BX10. It is equipped with Simplex LC connectors.

KEY FEATURES

- 1-Fiber Bidirectional Transceiver
- SFP MSA Compliant
- 1.25 Gb/s:
  – 1000BASE-BX10 compliant
- 1310 nm Multiple Quantum Well LD Transmitter
- 1550 nm receiver
- Link distance up to 10 km at 1.25 Gb/s
- RoHS-6 compliant
- Hot pluggable
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

Transmitter Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Optical Transmit Power	Po	-9	—	-3	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Output Center Wavelength	λ	1260	1310	1360	nm	
Output Spectrum Width	$\Delta\lambda$	—	—	2.5	nm	RMS (σ)
Extinction Ratio	E_R	9	—	—	dB	
Optical Rise Time	t_r			260	ps	20% to 80% values
Optical Fall Time	t_f			260	ps	20% to 80% values
Relative Intensity Noise	RIN			-120	dB/Hz	
Electrical						
Data Input Current – Low	I_{IL}	-350			µA	
Data Input Current – High	I_{IH}			350	µA	
Differential Input Voltage	V_{IH} - V_{IL}	0.5		2.4	V	Peak-to-peak
TX Disable Input Voltage – Low	$V_{TDIS, L}$	0		0.5	V	There is an internal 4.7 kΩ to 10 kΩ pull-up resistor to VccTX
TX Disable Input Voltage – High	$V_{TDIS, H}$	2.0		Vcc	V	
TX Disable Assert Time	T_{ASSERT}			10	µs	
TX Disable De-assert Time	$T_{DEASSERT}$			1	ms	
TX Fault Output Voltage – Low	T_{FaultL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
TX Fault Output Voltage – High	T_{FaultH}	2.0		Vcc+0.3	V	

SPECIFICATIONS (CONT.)

Receiver Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Sensitivity	Sens			-20	dBm	Measured at 2^7-1 PRBS at BER 1E-12
Maximum Input Power	Pin	-3			dBm	
Signal Detect – Asserted	Pa	—	—	-20	dBm	Transition: low to high
Signal Detect – De-Asserted	Pd	-31	—	—	dBm	Transition: high to low
Signal detect – Hysteresis		1.0	—		dB	
Wavelength of Operation		1480	—	1580	nm	At least 30 dB optical isolation for the wavelength 1260 to 1360 nm
Electrical						
Differential Output Voltage	V_{OH} –V_{OL}	0.6		2.0	V	
Output LOS Voltage – Low	V_{OL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
Output LOS Voltage – High	V_{OH}	2.0		Vcc+0.3	V	

ORDERING

Part number	Bit Rate (Gb/s)	1000 BASE	Distance (km)	Tx (nm)	Rx (nm)	Package	Temp. (°C)	Tx Power (dBm)	Rx Sens. (dBm)	RoHS Compliant
SFP-ETH-10-RT-W13-LC	1.25	BX10	10	1310	1550	SFP with DMI	0 to 70	-9 to -3	-20	Yes

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

SFP-ETH-10-RT-W15-LC

1310 nm / 1.25 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH-10-RT-W15-LC is a single mode optical transceiver that supports signals up to 1.25 Gb/s for bidirectional serial data communications such as 1000BASE-BX10. It is equipped with Simplex LC connectors.

KEY FEATURES

- 1-Fiber Bidirectional Transceiver
- SFP MSA compliant
- 1.25 Gb/s:
  – 1000BASE-BX10 compliant
- 1550 nm DFB LD Transmitter
- 1310 nm receiver
- Link distance up to 10 km at 1.25 Gb/s
- RoHS compliant
- Hot pluggable
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

Transmitter Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Optical Transmit Power	Po	-9	—	-3	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Output Center Wavelength	λ	1480		1580	nm	
Output Spectrum Width	Δ λ	—	—	1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	E_R	9	—	—	dB	
Optical Rise Time	t_r			260	ps	20% to 80% values
Optical Fall Time	t_f			260	ps	20% to 80% values
Relative Intensity Noise	RIN			-120	dB/Hz	
Electrical						
Data Input Current – Low	I_{IL}	-350			µA	
Data Input Current – High	I_{IH}			350	µA	
Differential Input Voltage	V_{IH} -V_{IL}	0.5		2.4	V	Peak-to-peak
TX Disable Input Voltage – Low	$V_{TDIS, L}$	0		0.5	V	There is an internal 4.7 kΩ to 10 kΩ pull-up resistor to VccTX
TX Disable Input Voltage – High	$V_{TDIS, H}$	2.0		Vcc	V	
TX Disable Assert Time	T_{ASSERT}			10	µs	
TX Disable De-assert Time	$T_{DEASSERT}$			1	ms	
TX Fault Output Voltage – Low	T_{FaultL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
TX Fault Output Voltage – High	T_{FaultH}	2.0		Vcc+0.3	V	

SPECIFICATIONS (CONT.)

Receiver Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Sensitivity	Sens			-20	dBm	Measured at 2^7-1 PRBS at BER 1E-12 @1300 nm
Maximum Input Power	Pin	-3			dBm	
Signal Detect – Asserted	Pa	—	—	-20	dBm	Transition: low to high
Signal Detect – De-Asserted	Pd	-31	—	—	dBm	Transition: high to low
Signal detect – Hysteresis		1.0	—		dB	
Wavelength of Operation		1260	—	1360	nm	At least 30 dB optical isolation for the wavelength 1480 to 1580 nm
Optical Return Loss	ORL	14			dB	
Electrical						
Differential Output Voltage	$V_{OH} – V_{OL}$	0.6		2.0	V	
Output LOS Voltage – Low	V_{OL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
Output LOS Voltage – High	V_{OH}	2.0		Vcc+0.3	V	

ORDERING

Part number	Bit Rate (Gb/s)	1000 BASE	Distance (km)	Wavelength (nm)	Package	Temp. (°C)	Tx Power (dBm)	Rx Sens. (dBm)	RoHS Compliant
SFP-ETH-10-RT-W15-LC	1.25	BX10	10	1550 DFB	SFP with DMI	0 to 70	-9 to -3	-20	Yes

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

SFP-ETH-10-S13-LC

1310 nm / 1.25 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH-10-S13-LC is a single mode optical transceiver that supports signals up to 1.25 Gb/s for bidirectional serial data communications such as 1000BASE-LX. It is equipped with Duplex LC connectors.

KEY FEATURES

- SFP MSA compliant
- 1.25 Gb/s:
  – 1000BASE-LX compliant
- 1310 nm Multiple Quantum Well LD Transmitter
- Link distance up to 10 km at 1.25 Gb/s
- RoHS compliant
- Hot pluggable
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

Transmitter Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Optical Transmit Power	Po	-9.5	—	-3	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Output Center Wavelength	λ	1270	1310	1350	nm	
Output Spectrum Width	Δ λ	—	—	2.5	nm	RMS (σ)
Extinction Ratio	E_R	9	—	—	dB	
Optical Rise Time	t_r			260	ps	20% to 80% values
Optical Fall Time	t_f			260	ps	20% to 80% values
Relative Intensity Noise	RIN			-120	dB/Hz	
Electrical						
Data Input Current – Low	I_{IL}	-350			µA	
Data Input Current – High	I_{IH}			350	µA	
Differential Input Voltage	V_{IH} -V_{IL}	0.5		2.4	V	Peak-to-peak
TX Disable Input Voltage – Low	$V_{TDIS, L}$	0		0.5	V	There is an internal 4.7 kΩ to 10 kΩ pull-up resistor to VccTX
TX Disable Input Voltage – High	$V_{TDIS, H}$	2.0		Vcc	V	
TX Disable Assert Time	T_{ASSERT}			10	µs	
TX Disable De-assert Time	$T_{DEASSERT}$			1	ms	
TX Fault Output Voltage – Low	T_{FaultL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
TX Fault Output Voltage – High	T_{FaultH}	2.0		Vcc+0.3	V	

SPECIFICATIONS (CONT.)

Receiver Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Sensitivity	Sens			-21	dBm	Measured at 2^7-1 PRBS at BER 1E-12 @1300 nm
Maximum Input Power	Pin	-3			dBm	
Signal Detect – Asserted	Pa	—	—	-21	dBm	Transition: low to high
Signal Detect – De-Asserted	Pd	-31	—	—	dBm	Transition: high to low
Signal detect – Hysteresis		1.0	—		dB	
Wavelength of Operation		1100	—	1600	nm	
Electrical						
Differential Output Voltage	$V_{OH} - V_{OL}$	0.6		2.0	V	
Output LOS Voltage – Low	V_{OL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
Output LOS Voltage – High	V_{OH}	2.0		Vcc+0.3	V	

ORDERING

Part number	Bit Rate (Gb/s)	1000 BASE	Distance (km)	Wavelength (nm)	Package	Temp. (°C)	Tx Power (dBm)	Rx Sens. (dBm)	RoHS Compliant
SFP-ETH-10-S13-LC	1.25	LX	10	1310	SFP with DMI	-10 to 85	-9.5 to -3	-21	Yes

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

SFP-ETH-RT-M85-LC

850 nm / 1.25 Gb/s Multimode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH-RT-M85-LC is a multimode optical transceiver that supports signals up to 1.25 Gb/s for bidirectional serial data communications such as 1000BASE-SX. It is equipped with Duplex LC connectors.

KEY FEATURES

- SFP MSA Compliant
- 1.25 Gb/s:
  – 1000BASE-SX compliant
- 850 nm VCSEL Transmitter
- Link distances:
  – 300m for 62.5/125 mm multimode fiber
  – 550m for 50/125 mm multimode fiber
- RoHS-6 compliant
- Hot pluggable
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

Transmitter Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Optical Transmit Power	Po	-9	—	-3	dBm	Output power is power coupled into a 50/125 µm multimode fiber
Output Center Wavelength	λ	830		860	nm	
Output Spectrum Width	$\Delta\lambda$	—	—	0.85	nm	RMS (σ)
Extinction Ratio	E_R	9	—	—	dB	
Optical Rise Time	t_r			260	ps	20% to 80% values
Optical Fall Time	t_f			260	ps	20% to 80% values
Relative Intensity Noise	RIN			-117	dB/Hz	
Electrical						
Data Input Current – Low	I_{IL}	-350			µA	
Data Input Current – High	I_{IH}			350	µA	
Differential Input Voltage	V_{IH} - V_{IL}	0.5		2.4	V	Peak-to-peak
TX Disable Input Voltage – Low	$V_{TDIS, L}$	0		0.5	V	There is an internal 4.7 kΩ to 10 kΩ pull-up resistor to VccTX
TX Disable Input Voltage – High	$V_{TDIS, H}$	2.0		Vcc	V	
TX Disable Assert Time	T_{ASSERT}			10	µs	
TX Disable De-assert Time	$T_{DEASSERT}$			1	ms	
TX Fault Output Voltage – Low	T_{FaultL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
TX Fault Output Voltage – High	T_{FaultH}	2.0		Vcc+0.3	V	

SPECIFICATIONS

Receiver Specifications (-10°C < Tc < 85°C, 3.1V < Vcc < 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical						
Sensitivity	Sens			-17	dBm	Measured at 2^7-1 PRBS at BER 1E-12
Maximum Input Power	Pin	-3			dBm	
Signal Detect – Asserted	Pa	—	—	-17	dBm	Transition: low to high
Signal Detect – De-Asserted	Pd	-30	—	—	dBm	Transition: high to low
Signal Detect – Hysteresis		1.0	—		dB	
Wavelength of Operation		700	—	900	nm	
Electrical						
Differential Output Voltage	$V_{OH} - V_{OL}$	0.6		2.0	V	
Output LOS Voltage – Low	V_{OL}	0		0.5	V	Open collector compatible, 4.7 kΩ to 10 kΩ pull-up to Vcc (Host Supply Voltage)
Output LOS Voltage – High	V_{OH}	2.0		Vcc+0.3	V	

ORDERING

Part number	Bit Rate (Gb/s)	1000 BASE	Distance (m)	Wavelength (nm)	Package	Temp. (°C)	Tx Power (dBm)	Rx Sens. (dBm)	RoHS Compliant
SFP-ETH-RT-M85-LC	1.25	SX	300 / 550*	850 VCSEL	SFP with DMI	-10 to 85	-9 to -3	-17	Yes

* 300 meter for 62.5/125 mm MM fiber; 550 meter for 50/125 mm MM Fiber.

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

SFP-ETH10G-RT-M85-LC

850 nm / 10.3 Gb/s Multimode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH10G-RT-M85-LC is a multimode optical transceiver that supports signals up to 10.5 Gb/s for bidirectional serial data communications such as 10GBASE-SR and 10GBASE-SW. It is equipped with Duplex LC connectors.

KEY FEATURES

- SFP+ MSA compliant
- 10.5 Gb/s:
  – 10GBASE-SR compliant
  – 10GBASE-SW compliant
- Link distance at 10.3 Gb/s:
  – 300m links with OM3 MMF
  – 82m links with OM2 MMF
  – 33m links with OM1 MMF
- RoHS-6 compliant
- Hot pluggable
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

Specifications (0°C < Tc < 70°C, 3.14V < Vcc < 3.46V)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter Optical Specifications						
Average Launch Power	Po, Avg	-7.3		-1.0	dBm	Output power is power coupled into a 50/125 µm multimode fiber
Optical Modulation Amplitude	Po, OMA	*			mW	* Trade-offs between center wavelength, spectral width, and minimum OMA based on IEEE 802.3ae Table 52-8 are used
Output Center Wavelength	λ c	840	850	860	nm	
Output Spectrum Width	s l			0.45	nm	RMS (σ)
Transmitter Dispersion Penalty	TDP			3.9	dB	
Relative Intensity Noise	RIN			-128	dB/Hz	12 dB reflection
Receiver Optical Specifications						
Receiver Sensitivity	Sens1			-9.9	dBm	Measured with worst ER; BER < 10^{-12} and PRBS 2^{31}-1
Stress Sensitivity in OMA	Sens2		—	180	µWp-p	ISI=3.5 dB. Measured with worst ER; BER < 10^{-12} and PRBS 2^{31}-1
Receiver Overload	P_{MAX}	-1	—		dBm	
LOS – De-asserted	LOS_D	—	—	-9.9	dBm	Transition: low to high
LOS – Asserted	LOS_A	-25	—	—	dBm	Transition: high to low
Wavelength of Operation	λ c	840	850	860	nm	
Optical Return Loss	ORL			-12	dB	

SPECIFICATIONS (CONT.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Characteristics						
High-Speed Signal (CML) Interface Specification						
Input Data Rate			10.3125	10.5	Gb/s	
Differential Input Impedance	R_{in}		100		Ω	
Differential Data Input Amplitude		150		1200	mVp-p	Internally AC coupled
Output Data Rate			10.3125	10.5	Gb/s	
Differential Output Impedance	R_{out}		100		Ω	
Differential Data Output Amplitude		350	600	700	mVp-p	Internally AC coupled
Low-Speed Signal (LVTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

ORDERING

Part number	Bit Rate (Gb/s)	10GBASE	Distance (m)	Wavelength (nm)	Package	Temp. (°C)	RoHS Compliant
SFP-ETH10G-RT-M85-LC	10.3	SR / SW	300 / 82 / 33*	850 VCSEL	SFP+ with DMI	0 to 70	Yes

* 300m for OM3 MMF, 82m for OM2 MMF and 33m for OM1 MMF. Note: Only connections with patch cords with PC or UPC connectors are supported.

SFP-ETH10G-RT-S13-LC

1310 nm / 10.3 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH10G-RT-S13-LC is a single mode optical transceiver that supports signals up to 10.5 Gb/s for bidirectional serial data communications such as 10GBASE-LR and 10GBASE-LW. It is equipped with Duplex LC connectors.

KEY FEATURES

- SFP+ MSA compliant
- 10.5 Gb/s:
  – 10GBASE-LR compliant
  – 10GBASE-LW compliant
- 1310 nm DFB LD Transmitter
- Link distance up to 10 km at 10.3 Gb/s
- RoHS-6 compliant
- Hot pluggable
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

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

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter Optical Specifications						
Average Launch Power	Po, Avg	-8		0.5	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Optical Modulation Amplitude	Po, OMA	-5.2			dBm	
Output Center Wavelength	$\Delta\lambda$	1270	1310	1355	nm	
Output Spectrum Width	$\sigma\lambda$			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.5				
Relative Intensity Noise	RIN			-128	dB/Hz	
Average launch Power of OFF Transmitter				-30	dBm	
Receiver Optical Specifications						
Receiver Sensitivity	Sens1			-14.4	dBm	Measured with worst ER; BER < 10^{-12} and PRBS 2^{31}-1 at 10.3125 Gb/s average received power
Sensitivity in OMA	Sens1			-12.6	dBm	Measured with worst ER; BER < 10^{-12} and PRBS 2^{31}-1 at 10.3125 Gb/s
Stress Sensitivity in OMA	Sens2		—	-10.3	dBm	Per IEEE 802.3ae. Equivalent to -13.3 dBm average power at Infinite ER
Receiver Overload	P_{MAX}	0.5	—		dBm	
LOS – De-asserted	LOS_D			-16	dBm	Transition: low to high
LOS – Asserted	LOS_A	-28			dBm	Transition: high to low
Wavelength of Operation	λc	1260	—	1565	nm	
Optical Return Loss	ORL			-12	dB	

SPECIFICATIONS (CONT.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Characteristics						
High-Speed Signal (CML) Interface Specification						
Input Data Rate			10.3125	10.5	Gb/s	
Differential Input Impedance	R_{in}		100		Ω	
Differential Data Input Amplitude		150		1200	mVp-p	Internally AC coupled
Output Data Rate			10.3125	10.5	Gb/s	
Differential Output Impedance	R_{out}		100		Ω	
Differential Data Output Amplitude		400	600	700	mVp-p	Internally AC coupled
Low-Speed Signal (LVTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

ORDERING

Part number	Type	Bit Rate (Gb/s)	10GBASE	Distance (km)	Wavelength (nm)	Package	Temp. (°C)	RoHS Compliant
SFP-ETH10G-RT-S13-LC	1-TX+ 1-RX	10.3	LR / LW	10	1310 DFB	SFP+ with DMI	0 to 70	Yes

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

SFP-ETH10G-RT-C*XX*-LC

CWDM / 10.3 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH10G-RT-C*XX*-LC is a single mode optical transceiver that supports signals up to 10.5 Gb/s for bidirectional serial data communications such as 10GBASE-LR. It is equipped with Duplex LC connectors.

KEY FEATURES

- SFP+ MSA compliant
- 10.5 Gb/s:
  – 10GBASE-LR compliant
- Uncooled 18-wavelength CWDM DFB laser transmitter
- RoHS-6 compliant
- Hot pluggable
- 11 dB minimum power budget
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

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

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter Optical Specifications						
Average Launch Power	Po, AVG	-3	—	1	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Output Center Wavelength	λ	λc - 6.5	λc	λc + 6.5	nm	ITU-T G.694.2 CWDM wavelength from 1271 nm to 1611 nm, each step 20 nm
Output Spectrum Width	Δ λ	—		1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Average Launch Power of OFF transmitter				-30	dBm	
Receiver Optical Specifications						
Sensitivity				-14.4	dBm	Measured with average power; BER < 10^{-12} and PRBS 2^{31}-1
Receiver Overload	P_{MAX}	0.5			dBm	
LOS – De-Asserted	LOS_D	—	—	-16	dBm	Transition: low to high
LOS – Asserted	LOS_A	-28	—	—	dBm	Transition: high to low
Wavelength of Operation	λ c	1260	—	1620	nm	

SPECIFICATIONS (CONT.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Characteristics						
High-Speed Signal (CML) Interface Specification						
Input Data Rate			10.3125		Gb/s	
TX Clock Tolerance				±100	ppm	Clock tolerance for 9.95 Gb/s, 10.3125 Gb/s and 10.5187 Gb/s
Differential Input Impedance	R_{in}		100		Ω	
Differential Data Input Amplitude		150		1200	mVp-p	Internally AC coupled
Output Data Rate			10.3125		Gb/s	
RX Clock Tolerance				±100	ppm	Clock tolerance for 9.95 Gb/s, 10.3125 Gb/s and 10.5187 Gb/s
Differential Output Impedance	R_{out}		100		Ω	
Differential Data Output Amplitude		350	600	700	mVp-p	Internally AC coupled
Low-Speed Signal (LVTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

ORDERING

Part number	Bit Rate (Gb/s)	10GBASE	Wavelength (nm)	Package	Temp. (°C)	RoHS Compliant
SFP-ETH10G-RT-C*XX*-LC	10.3	LR	CWDM*	SFP+ with DMI	0 to 70	Yes

*CWDM: 18 Wavelengths from 1271 nm to 1611 nm, each step 20 nm (0 to 70°C).

Value for -C*XX*	Central Wavelength (nm)			Clasp Color Code	Value for -C*XX*	Central Wavelength (nm)			Clasp Color Code
	Min.	Typ.	Max.			Min.	Typ.	Max.	
-C27	1264.5	1271	1277.5	Light Purple	**-C45**	1444.5	1451	1457.5	Yellow Orange
-C29	1284.5	1291	1297.5	Sky Blue	**-C47**	1464.5	1471	1477.5	Gray
-C31	1304.5	1311	1317.5	Yellow Green	**-C49**	1484.5	1491	1497.5	Violet
-C33	1324.5	1331	1337.5	Yellow Ocher	**-C51**	1504.5	1511	1517.5	Blue
-C35	1344.5	1351	1357.5	Pink	**-C53**	1524.5	1531	1537.5	Green
-C37	1364.5	1371	1377.5	Beige	**-C55**	1544.5	1551	1557.5	Yellow
-C39	1384.5	1391	1397.5	White	**-C57**	1564.5	1571	1577.5	Orange
-C41	1404.5	1411	1417.5	Silver	**-C59**	1584.5	1591	1597.5	Red
-C43	1424.5	1431	1437.5	Black	**-C61**	1604.5	1611	1617.5	Brown

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

CWDM units are only available on special request. Lead time is usually 6 to 8 weeks ARO.

SFP-ETH10G-RT-W27-LC

1-Fiber WDM / 10.3 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH10G-RT-W27-LC is a single mode optical transceiver that supports signals up to 10.5 Gb/s for bidirectional serial data communications over a single fiber. It is equipped with Simplex LC connectors.

KEY FEATURES

- 1-fiber bidirectional transceiver
- SFP+ MSA compliant
- 10GBASE-BX compliant
- 10.5 Gb/s:
  – 1270 nm multiple quantum well LD transmitter
- RoHS-6 compliant
- Hot pluggable
- Link distance up to 10 km at 10.3 Gb/s
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

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

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter Optical Specifications						
Average Launch Power	Po, AVG	-5	—	0	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Output Center Wavelength	λ c	1260	1270	1280	nm	
Output Spectrum Width	σ λ			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Average Launch Power of OFF Transmitter				-30	dBm	
Receiver Optical Specifications						
Sensitivity at 10.3 Gb/s				-14	dBm	Measured with average power; BER < 10^{-12} and PRBS 2^{31}-1
Receiver Overload	P_{MAX}	0.5	—		dBm	
LOS – De-Asserted	LOS_D	—	—	-16	dBm	Transition: low to high
LOS – Asserted	LOS_A	-26	—	—	dBm	Transition: high to low
Wavelength of Operation	λ c	1320		1340	nm	At least 30 dB optical isolation for the wavelength 1260 to 1280 nm

SPECIFICATIONS (CONT.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Characteristics						
High-Speed Signal (CML) Interface Specification						
Input Data Rate			10.3125		Gb/s	
Differential Input Impedance	R_{in}		100		Ω	
Differential Data Input Amplitude		150		1000	mVp-p	Internally AC coupled
Output Data Rate			10.3125		Gb/s	
Differential Output Impedance	R_{out}		100		Ω	
Differential Data Output Amplitude		350	600	700	mVp-p	Internally AC coupled
Low-Speed Signal (LVTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

ORDERING

Part number	Bit Rate (Gb/s)	Distance (km)	TX (nm)	RX (nm)	Package	Temp. (°C)	RoHS Compliant
SFP-ETH10G-RT-W27-LC	10.3	10	1270 DFB	1330	SFP+ with DMI	0 to 70	Yes

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

WDM units are only available on special request. Lead time is usually 6 to 8 weeks ARO.

SFP-ETH10G-RT-W33-LC

1-Fiber WDM / 10.3 Gb/s Single Mode SFP Transceiver

Small form-factor pluggable (SFP) optical module cartridge for Densité frames and Grass Valley/Telecast standalone fiber products.

The SFP-ETH10G-RT-W27-LC is a single mode optical transceiver that supports signals up to 10.5 Gb/s for bidirectional serial data communications over a single fiber. It is equipped with Simplex LC connectors.

KEY FEATURES

- 1-fiber bidirectional transceiver
- SFP+ MSA compliant
- 10GBASE-BX compliant
- 10.5 Gb/s:
  – 1330 nm multiple quantum well LD transmitter
- RoHS-6 compliant
- Hot pluggable
- Link distance up to 10 km at 10.3 Gb/s
- Diagnostic Monitoring Interface (DMI)

SPECIFICATIONS

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

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter Optical Specifications						
Average Launch Power	Po, AVG	-5	—	0	dBm	Output power is power coupled into a 9/125 µm single mode fiber
Output Center Wavelength	λ c	1320	1330	1340	nm	
Output Spectrum Width	σ λ			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Average Launch Power of OFF transmitter				-30	dBm	
Receiver Optical Specifications						
Sensitivity at 10.3 Gb/s				-14	dBm	Measured with average power; BER < 10^{-12} and PRBS 2^{31}-1
Receiver Overload	P_{MAX}	0.5	—		dBm	
LOS – De-Asserted	LOS_D	—	—	-16	dBm	Transition: low to high
LOS – Asserted	LOS_A	-26	—	—	dBm	Transition: high to low
Wavelength of Operation	λ c	1260		1280	nm	At least 30 dB optical isolation for the wavelength 1320 to 1340 nm

SPECIFICATIONS (CONT.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Characteristics						
High-Speed Signal (CML) Interface Specification						
Input Data Rate			10.3125		Gb/s	
Differential Input Impedance	R_{in}		100		Ω	
Differential Data Input Amplitude		150		1000	mVp-p	Internally AC coupled
Output Data Rate			10.3125		Gb/s	
Differential Output Impedance	R_{out}		100		Ω	
Differential Data Output Amplitude		350	600	700	mVp-p	Internally AC coupled
Low-Speed Signal (LVTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

ORDERING

Part number	Bit Rate (Gb/s)	Distance (km)	TX (nm)	RX (nm)	Package	Temp. (°C)	RoHS Compliant
SFP-ETH10G-RT-W33-LC	10.3	10	1330 DFB	1270	SFP+ with DMI	0 to 70	Yes

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

WDM units are only available on special request. Lead time is usually 6 to 8 weeks ARO.

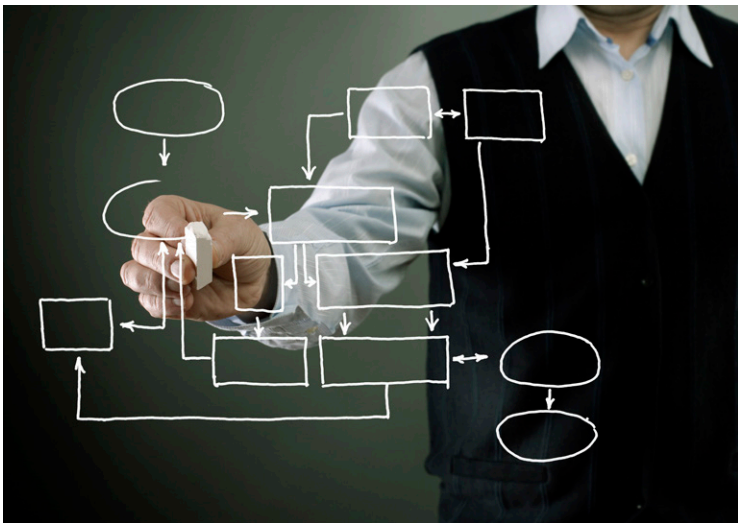
Global Services

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:

- Unequalled 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