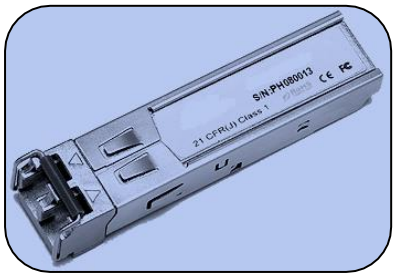
XTS318-20LY

8.5Gb/s SFP+ Fibre Channel Optical Transceiver



Product Highlights

- Up to 8.5Gb/s bi-directional data links
- Hot Pluggable SFP+ footprint
- 1310nm DFB laser transmitter, PIN photo-detector
- Transmission distance up to 2km/10km/20km o 9/125 µm SMF
- Digital Status monitoring Interface
- Duplex LC connector
- Metal enclosure for lower EMI
- Single 3.3V power supply
- Operating case temperature: 0 to 70℃
- RoHS compliant (lead free)
- Compliant with FC-PI-4 800-Mx-SN-I, SFF-8431, SFF-8432 and SFF-8472

Applications

- Tri Rate 2.125/4.25/8.5Gbs Fiber Channel

Product description

XenOpt XTS318-20LY SFP+ transceivers are designed for using in Fibre Channel links up to 8.5Gb/s data rate over multimode fibre and compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI.

Pin definition

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in Figure 2 and contact definitions are given in Table 2.

SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 3 and the contact sequence order listed in Table 2.

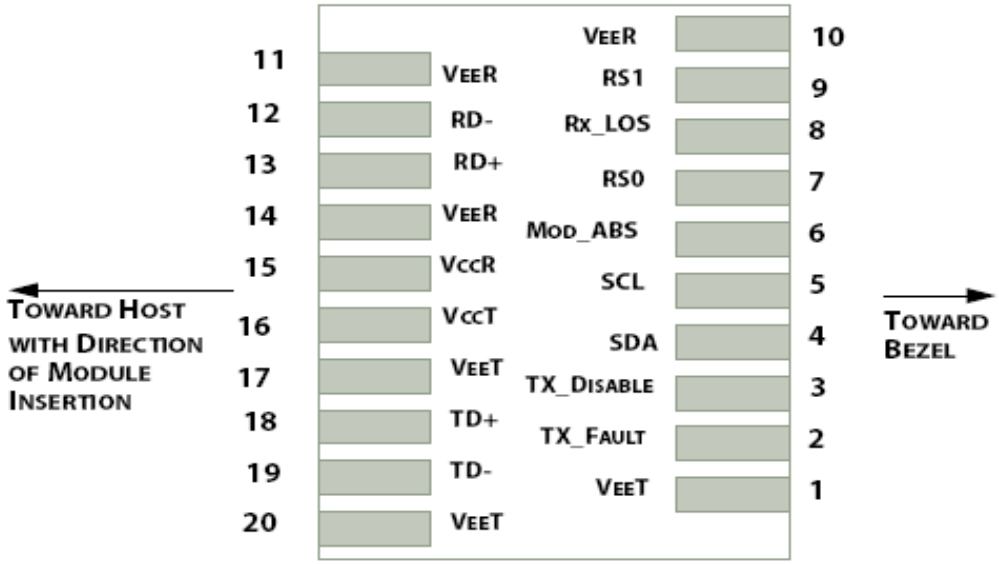


Figure 1: Interface to Host PCB

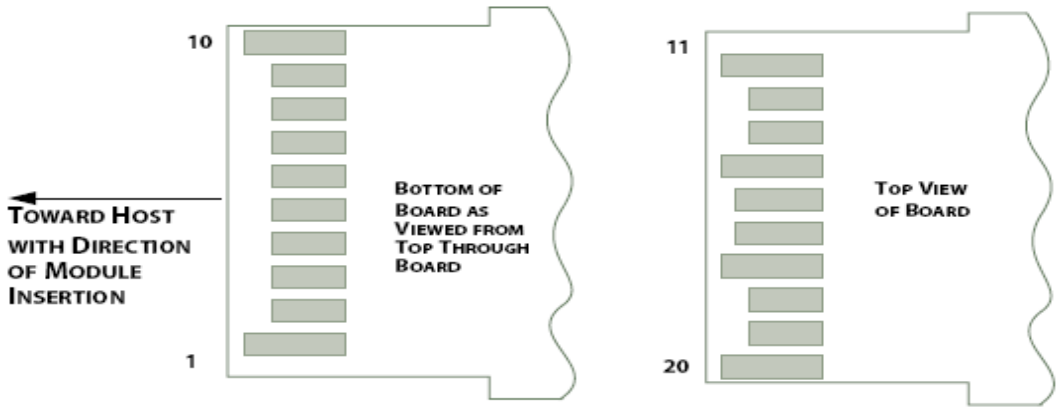


Figure 2: Module Contact Assignment

PIN	Logic	Signal Name	Power Sequence Order	Description
1		VeeT	1st	Module Transmitter Ground
2	LVTTL-O	TX_Fault	3rd	Module Transmitter Fault
3	LVTTL-I	TX_Disable	3rd	Transmitter Disable; Turns off transmitter laser output
4	LVTTL-O	SDA	3rd	Modulation Definition 2 (INF-8074i) – Two wires serial Interface Data Line
5	LVTTL-O	SDL	3rd	Modulation Definition 1 (INF-8074i) – Two wires serial Interface Clock Line
6		Mod_ABS	3rd	Modulation Absent, connected to VeeT or VeeR in the module.
7	LVTTL-I	RS0	3rd	Rate Select 0: optionally controls SFP+ module receiver. When high output signalling rate > 4,25 GBd and when low input signalling rate ≤ 4,25 GBd
8	LVTTL-O	Rx_LOS	3rd	Receiver Loss of Signal Indication (In FC designed as Rx_LOS and in Ethernet designed as Signal Detect)
9	LVTTL-I	RS1	3rd	Rate Select 1: optionally controls SFP+ module transmitter. When high output signalling rate > 4,25 GBd and when low input signalling rate ≤ 4,25 GBd
10		VeeR	1st	Module Receiver Signal Ground
11		VeeR	1st	Module Receiver Signal Ground
12	CML-O	RD-	3rd	Inverse Receiver Data Out
13	CML-O	RD+	3rd	Receiver Data Out
14		VeeR	1st	Module Receiver Signal Ground
15		VccR	2nd	Module Receiver Power – 3.3V±5%
16		VccT	2nd	Module Transmitter Power – 3.3V±5%
17		VeeT	1st	Module Transmitter Signal Ground
18	CML-I	TD+	3rd	Transmitter Data Input

PIN	Logic	Signal Name	Power Sequence Order	Description
19	CML-I	TD-	3rd	Inverse Transmitter Data Input
20		VeeT	1st	Transmitter Signal Ground

Table 2: SFP+ Module PIN Definition

Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	0	+3.8	V
Storage Temperature	Tc	-40	+85	°C
Operating Case Temperature	Tc	0	+70	°C
Relative Humidity	RH	5	95	%

Operating Conditions

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	V_{CC}	3.135	3.300	3.465	V
Operating Case Temperature	T_C	0	25	70	°C

Low Speed Characteristics

Parameter	Symbol	Min	Typical	Max	Unit
Power Consumption				1,2	W
TX_Fault,RX_LOS	VOL	0		0.4	V
	VOH	Host_Vcc-		Host_Vcc+0.3	V
TX_DIS	VIL	-0.3		0.8	V
	VIH	2.0		V_{CC}T+0.3	V
RS0,RS1	VIL	-0.3		0.8	V
	VIH	2.0		V_{CC}T+0.3	V

Electrical characteristics
Transmitter

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Nominal Data Rate		VID	2.125	8.5	8.5	Gbd
Reference Differential Input Impedance		Zd		100		Ω
Input AC Common Mode Input Voltage				0	25	mV (RMS)
Differential Input Voltage Swing		VID	150		900	mV
Differential Input S-parameter	0.01-3.9 GHz	SDD11			-10	dB
	3.9-8.5 GHz		Note1		Note1	
Differential to Common Mode Conversion Note 2	0.01-8.5 GHz	SCD11			-10	dB
Data Dependant Jitter		DDJ			0.1	UI(p-p)
Total Jitter		TJ			0.28	UI(P-P)
Uncorrelated Jitter		UJ			0.023	RMS

Notes:

1) Differential Return Loss given by equation SDD11(dB) = -8+13.33 Log10(f/5.5), with f in GHz
2) Common mode reference impedance is 25Ω. Differential to common mode conversion relates to generation of EMI 3. Or open circuit.

Receiver

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Nominal Data Rate		VID	2.125	8.5	8.5	Gbd
Reference Differential Input Impedance		Zd		100		Ω
Termination Mismatch		ΔZd			5	%
Output AC Common Mode Input Voltage					15	mV (RMS)
Output Rise and Fall time	20% to 80%	tRH, tFH			35	ps
Differential Input Voltage Swing	Zload=100ohm	VOD	350		800	mV
Differential Input S-parameter	0.01-3.9GHz	SDD22			-10	dB
	3.9-8.5GHz		Note1		Note1	
Differential to Common Mode Conversion Note2	0.01-6.5GHz	SCCD22			-7	dB
Differential to Common Mode Conversion Note2	6.5-8.5GHz	SCCD22			-3	dB
Data Dependant Jitter		DDJ			0.42	UI(p-p)
Total Jitter		TJ			0.71	UI(P-P)

Notes:

1) Return Loss given by equation Sxx22(dB) = -8+13.33 Log10(f/5.5), with f in GHz
2) Common mode reference impedance is 25Ω. Common mode return loss helps absorb reflection and noise improving EMI

General Specifications

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Data Rate	DR		1.0625 2.125 4.25 8.5		Gb/sec	
Fiber Length on 9/125um SMF	L			20	km	1
				20	km	2
				20	km	3
				20	km	4

Notes:

1) At 1.0625 Gb/s Fibre Channel data rate.
2) At 2.125 Gb/s Fibre Channel data rate.
3) At 4.25 Gb/s Fibre Channel data rate.
4) At 8.5 Gb/s Fibre Channel data rate

Optical characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Center Wavelength	λt	1284	1310	1345	nm	
RMS spectral width	Pm	-	-	1	nm	
Average Optical Power	Pavg	-9.0	-	-1	dBm	2
Extinction Ratio	ER	3.5	-	-	dB	3,4,5,6
Relative Intensity Noise	Rin			-128	dB/Hz	
Receiver						
Center Wavelength	λr	1260	-	1360	nm	
Receiver Sensitivity	Psens	-	-	-14.4	dBm	3
	Psens			-18	dBm	4
	Psens			-23	dBm	5
	Psens			-25	dBm	6
LOS Assert	Los	-30	-		dBm	
LOS De-assert				-19		
Overload	Pin	-	-	-1.0	dBm	3
Receiver Reflectance		-	-	-12	dB	

Notes:

1. The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.
2.The optical power is launched into MMF
3.Measured with a PRBS 2 7-1 test pattern @8.5Gbps,BER≤10-12 2km/10km/20km
4.Measured with a PRBS 2 7-1 test pattern @4.25Gbps,BER≤10-12 2km/10km/20km.
5.Measured with a PRES 2 7-1 test pattern @2.125Gbps,BER≤10-12 2km/10km/20km.
6. Measured with a PRES 2 7-1 test pattern @1.0625Gbps,BER≤10-12 2km/10km/20km..

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev9.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

Parameter	Symbol	Min.	Max	Unit	Notes
Accuracy					
Transceiver Temperature	DMI_Temp	-3	+3	degC	Over operating temp
TX Output optical power	DMI_TX	-3	+3	dB	
RX Input optical power	DMI_RX	-3	+3	dB	-3dBm to -12dBm
Transceiver Supply voltage	DMI_VCC	-0.08	+0.08	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	
Dynamic Range Accuracy					
Transceiver Temperature	DMI_Temp	-5	70	degC	
TX Output optical power	DMI_TX	-9	-1	dBm	
RX Input optical power	DMI_RX	-18	0	dBm	
Transceiver Supply voltage	DMI_VCC	3.0	3.6	V	
Bias current monitor	DMI_Ibias	0	16	mA	

Control and status I/O timing characteristics

Timing characteristics of control and status I/O are included in Table 8, which is also defined in SFF-8431.

Parameter	Symbol	Min.	Max.	Unit	Conditions
TX_Disable assert time	t_off		100	μs	Rising edge of TX_Disableto fall of output signal below 10% of normal
TX_Disable negate time	t_on		2	ms	Falling edge of TX_Disable to rise of output signal above 90% of normal operation, not during start up of fault recovery.
Time to initialize 2-wire interface	t_2w_start_up		300	ms	From power on or hot plug meeting mechanical dimensions

Parameter	Symbol	Min.	Max.	Unit	Conditions
Time to initialize	t_start_up		300	ms	From power supply meeting mechanical dimensions or hot plug, or Tx_disable negated power up or Tx_Fault recovery, until non-cooled power level I part (or non-cooled power level II part already enabled at power level II for Tx_Fault recovery) is fully operational.
Time to initialize cooled module	t_start_up_cooled		90	s	From power supply meeting mechanical dimensions or hot plug, or Tx_disable negated power up or Tx_Fault recovery, until non-cooled power level I part (or cooled power level II part part during fault recovery) is fully operational.
Time to Power Up to Level II	t_power_leve2		300	ms	From falling edge of stop bit enabling power level II until non-cooled module is fully operational.
Time to Power Down from Level II	t_power_down		300	ms	From falling edge of stop bit disabling power level II until within power level I requirements.
TX_Fault assert	TX_Fault_on		1	ms	From occurrence of fault to assertion of TX_Fault.
TX_Fault assert for cooled module	TX_Fault_on_cooled		50	ms	From occurrence of fault to assertion of TX_Fault.
TX_Fault Reset	t_reset	10		μs	Time TX_Disable must be held high to reset TX_Fault.
RS0, RS1 rate select timing for FC	t_RS0_FC, RS1_FC		500	μs	From assertion till stable output.
RS0, RS1 rate select timing non FC	t_RS0, t_RS1		10	ms	From assertion till stable output.
Rx_LOS assert delay	t_los_on		100	μs	From occurrence of loss of signal to assertion of RX_Los.
Rx_LOS negate delay	t_los_off		100	μs	From occurrence of presence of signal to negation of RX_Los.

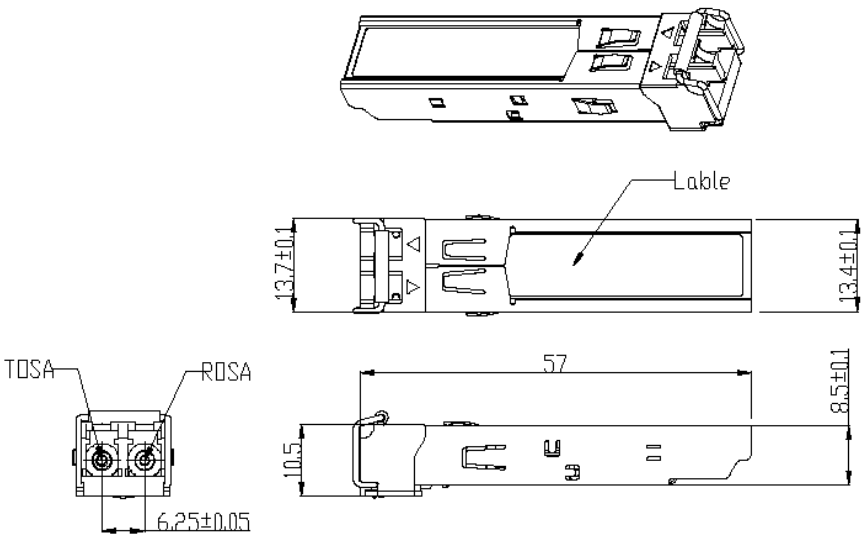


Table 9: Key Mechanical Dimensions

ESD

This transceiver is specified as ESD threshold 2kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

LASER SAFTY

This is a Class 1 Laser Product according to IEC 60825-1:1993:+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

Ordering information

Part Number	Product Description
XTS318-20LY	1310nm, 2.125/4.25/8.5Gbs, SFP+ 20km, 0°C ~ +70°C

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by XenOpt before they become applicable to any particular order or contract. In accordance with the XenOpt policy of continuous improvement specifications may change without notice.

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