

SNS XFP-DWLR08-xx 10 Gbps DWDM Multi-Rate XFP Transceivers, Single-Mode 80Km



Highlights

- DWDM XFP MSA transceiver
- Multi-Rate: 9.95Gbps to 11.3Gb/s
- C-band wavelengths on the 100GHz DWDM ITU grid wavelengths
- Protocols:
 - 10 Gbps Ethernet
 - 10 Gbps Ethernet with FEC
 - 10 Gbps Fibre Channel
 - SONET OC-192
 - SDH STM-64
- No reference clock required
- Single-Mode fiber
- Dual Fiber (Tx/Rx)
- 40Km to 80km on SMF
- Low power consumption <3.5W
- Duplex LC connector
- Digital Diagnostics
- Hot-swap

Overview

Optical SNS DWDM XFP is a high performance transceiver compliant with 10G Small Form-Factor Pluggable (XFP) Multi-Source Agreement (MSA), supporting data-rate of 9.95Gbps to 11.3Gb/s - 10 Gbps Ethernet, 10 Gbps Fibre Channel, SONET OC-192, and SDH STM-64. Transmission distance 40k Km up to 80km on SMF. The transceiver consists two sections: the transmitter section incorporates a cooled EML laser. And the receiver section consists of a APD photodiode integrated with a TIA and MCU control unit. Transmitter and receiver are separate within a wide temperature range of -5°C to 70°C and offers optimum heat dissipation and excellent electromagnetic shielding thus enabling high port densities for Fibre Channel per FC-P1-2 Rev. 10.0. and compatible with Gigabit Ethernet as specified in IEEE Std 802.3. 1GbE systems. The DWDM SFP transceiver provides an enhanced monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage and laser temperature.

Specifications

Data Rates:	9.95Gbps to 11.3Gb/s
Wavelength Tx	λ_c DWDM wavelength
Tx Power	-1 ~ +3 dBm
Tx Dispersion Penalty	2 dB
Tx Disable	Yes
Wavelength Range (SOL)	λ_c-25 : λ_c+25 nm
Rx Sensitivity 9.95Gb/s	-24 dBm
Rx Sensitivity 10.7Gb/s	-23 dBm
Maximum Input Power	-7 dB
Operating Temperature Range	-5 to 70°C
Power Consumption	< 3.5 Watts

transmitted optical power, received optical power and transceiver supply voltage

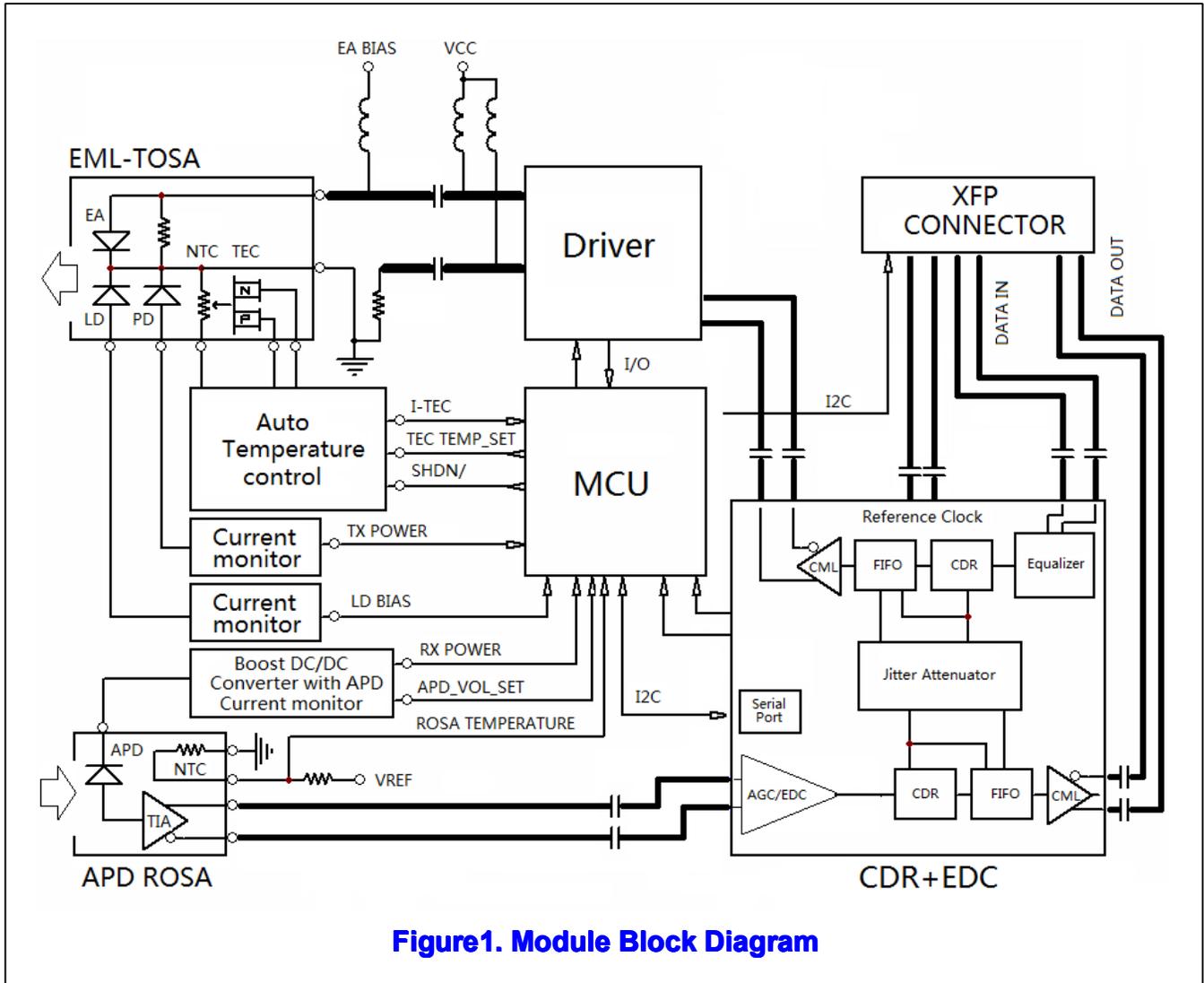


Figure1. Module Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage 1	Vcc3	-0.5	4.0	V
Supply Voltage 2	Vcc5	-0.5	6.0	V
Supply Voltage 3	Vcc2	-0.5	2	V
Storage Temperature	Tst	-40	85	°C
Case Operating Temperature	Top	-5	70	°C

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage 1	Vcc3	3.13	3.3	3.47	V
Supply current 1	Icc3	-	-	750	mA
Supply Voltage 2	Vcc5	4.75	5	5.25	V
Supply current 2	Icc5	-	-	500	mA
Supply Voltage 3	Vcc2	1.71	1.8	1.89	V
Supply current 3	Icc2	-	-	750	mA
Operating Case temperature	Tca	-5	-	70	°C
Module Power Dissipation	Pm	-	-	3.5	W

Transmitter Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Center Wavelength-Start of Life [1]	λ_c	$\lambda_c - 25$	λ_c	$\lambda_c + 25$	pm
Center Wavelength-End of life [1]	λ_c	$\lambda_c - 100$	λ_c	$\lambda_c + 100$	pm
Optical Transmit Power	Po	-1	-	+3	dBm
Optical Transmit Power (disabled)	PTX_DIS	-	-	-30	dBm
Extinction Ratio	ER	9	-	-	dB
Jitter Generation(P-P)	JG P-P	-	-	0.1	UI
Jitter Generation(RMS)	JG RMS	-	-	0.01	UI
Spectral Width (-20dB)	$\Delta \lambda_{20}$	-	-	0.3	nm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Dispersion penalty(2400ps/nm) [2]	DP	-	-	2	dB
Relative Intensity Noise	RIN	-	-	-130	dB/Hz
Eye Mask	Compliant with ITU-T G.691 STM-64 eye mask				

Note:

1. Wavelength stability is achieved within 60 seconds (max) of power up.
2. BER=10⁻¹²; PRBS 2³¹-1@9.95Gbps

Transmitter Specifications – Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Input differential impedance	Rim	-	100	-	Ω
Differential data Input	VtxDIFF	120	-	850	mV
Transmit Disable Voltage	VD	2.0	-	Vcc3+0.3	V
Transmit Enable Voltage	Ven	0	-	+0.8	V
Transmit Disable Assert Time	Vn	-	-	10	us



Receiver Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Maximum Input Power	RX-overload	-7	-	-	dBm
Input Operating Wavelength	λ	1528	-	1565	nm
Reflectance	Rrx	-	-	-27	dB
Loss of Signal Asserted	LOS_A	-34	-	-	dBm
LOS De-Asserted	LOS_D	-	-	-24	dBm
LOS Hysteresis	LOS_H	0.5	-	-	dB
Receiver Sensitivity					
Data rate (Gb/s)	BER	Dispersion (ps/nm)	Sensitivity back-to-back at OSNR>30dB (dBm)	Power Penalty at OSNR>30dB (dB)	
9.95 ~10.7	1e-12	-500 to 1450	-24	2	
11.1 ~11.3	1e-12	-500 to 2400	-23	2	
OSNR Performance					
Data rate (Gb/s)	BER	Dispersion (ps/nm)	Min OSNR Back-to-back at Power: -7 to -18dBm (dB)	Max OSNR Penalty at Power:-7 to -18dBm (dB)	
9.95 ~10.7	1e-12	-500 to 1450	24	4	
11.1 ~11.3	1e-4	-500 to 1300	16	4	

Receiver Specifications – Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Output differential impedance	Rom	-	100	--	Ω
Differential Output Swing	Vout P-P	350	-	850	mV
Rise/Fall Time [1]	Tr / Tf	24	-	-	ps
Loss of Signal –Asserted	VOH	2	-	Vcc3+0.3-	V
Loss of Signal –Negated	VOL	GND	-	GND+0.5	V

Note:

20%-80%;



C-band λ_c Wavelength Guide

ITU Channel Product Code	Frequency(THz)	Wavelength	ITU Channel Product Code	Frequency(THz)	Wavelength
17	191.7	1563.86	40	194.0	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73
20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.55	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.51	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12			



Pin Descriptions

Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional –5.2 Power Supply – Not required	
3	LVTTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTTL-I	SCL	Serial 2-wire interface clock	2
11	LVTTTL- I/O	SDA	Serial 2-wire interface data line	2
12	LVTTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTTL-O	Mod_NR	Module Not Ready;	2
14	LVTTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply	
21	LVTTTL-I	P_Down/RS T	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board	3
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board	3
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter inverted data input	
29	CML-I	TD+	Transmitter non-inverted data input	
30		GND	Module Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. Reference Clock input is not required.

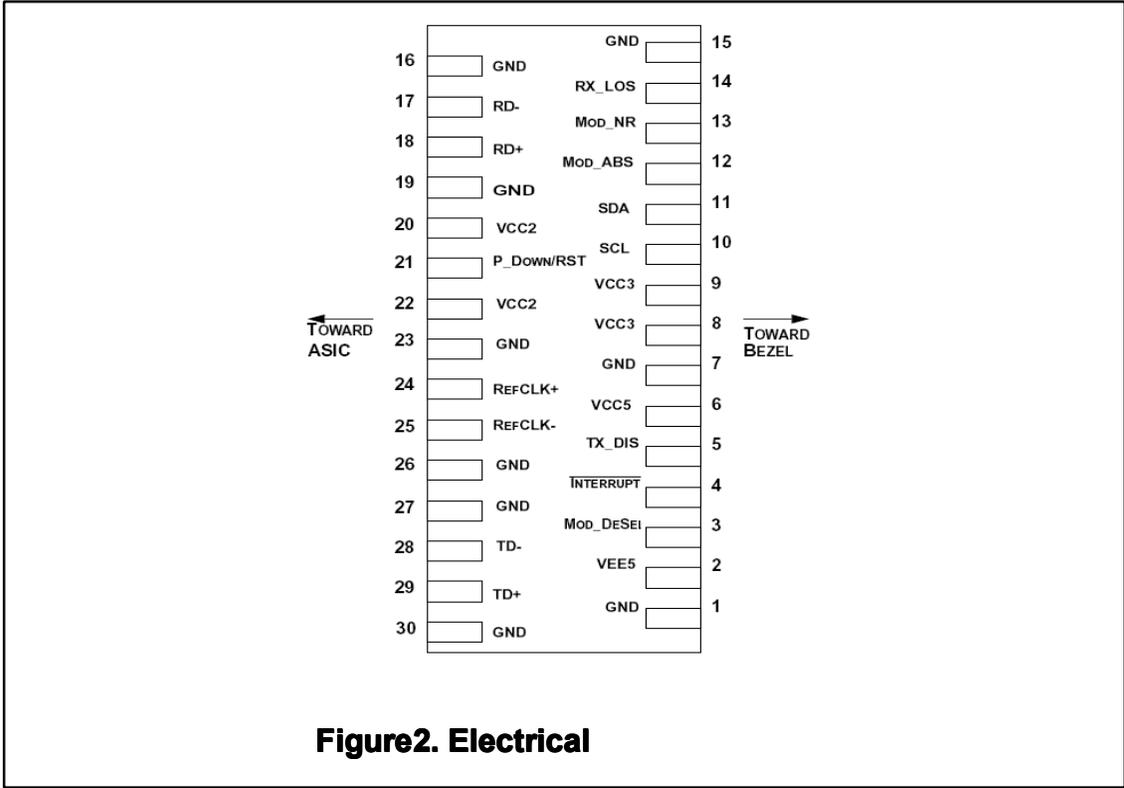


Figure2. Electrical

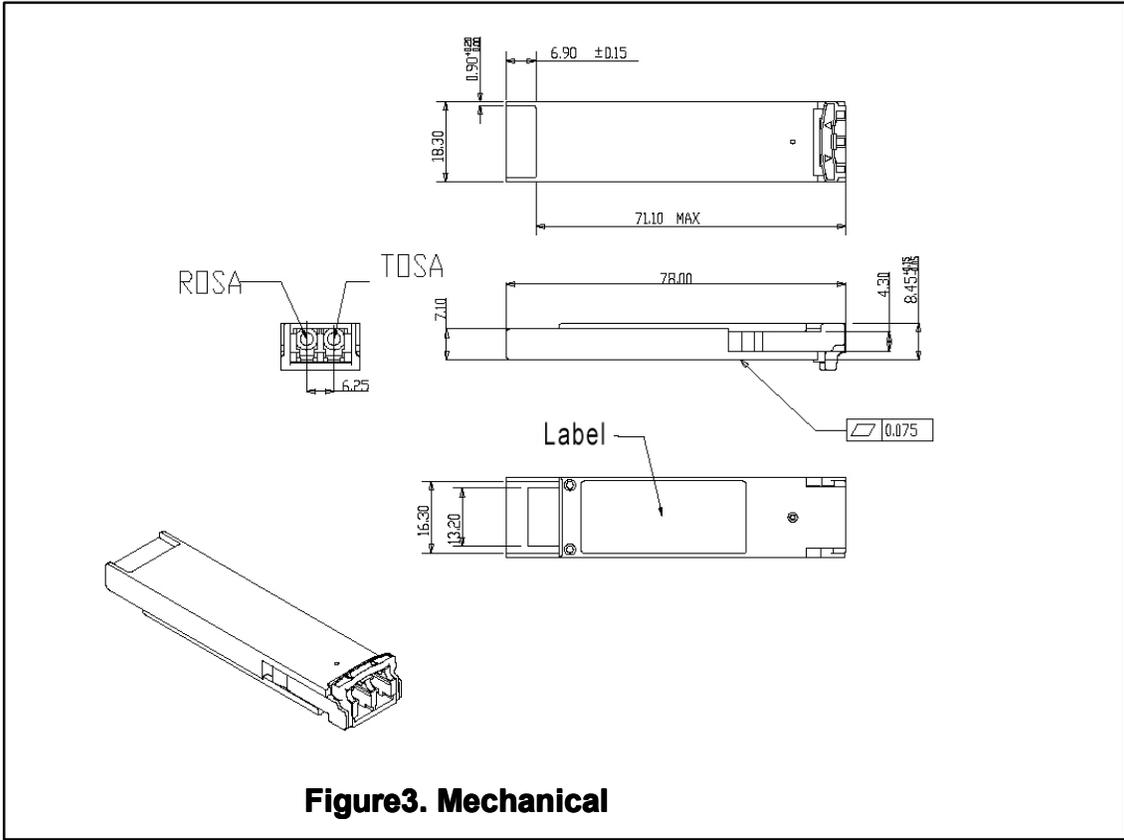


Figure3. Mechanical

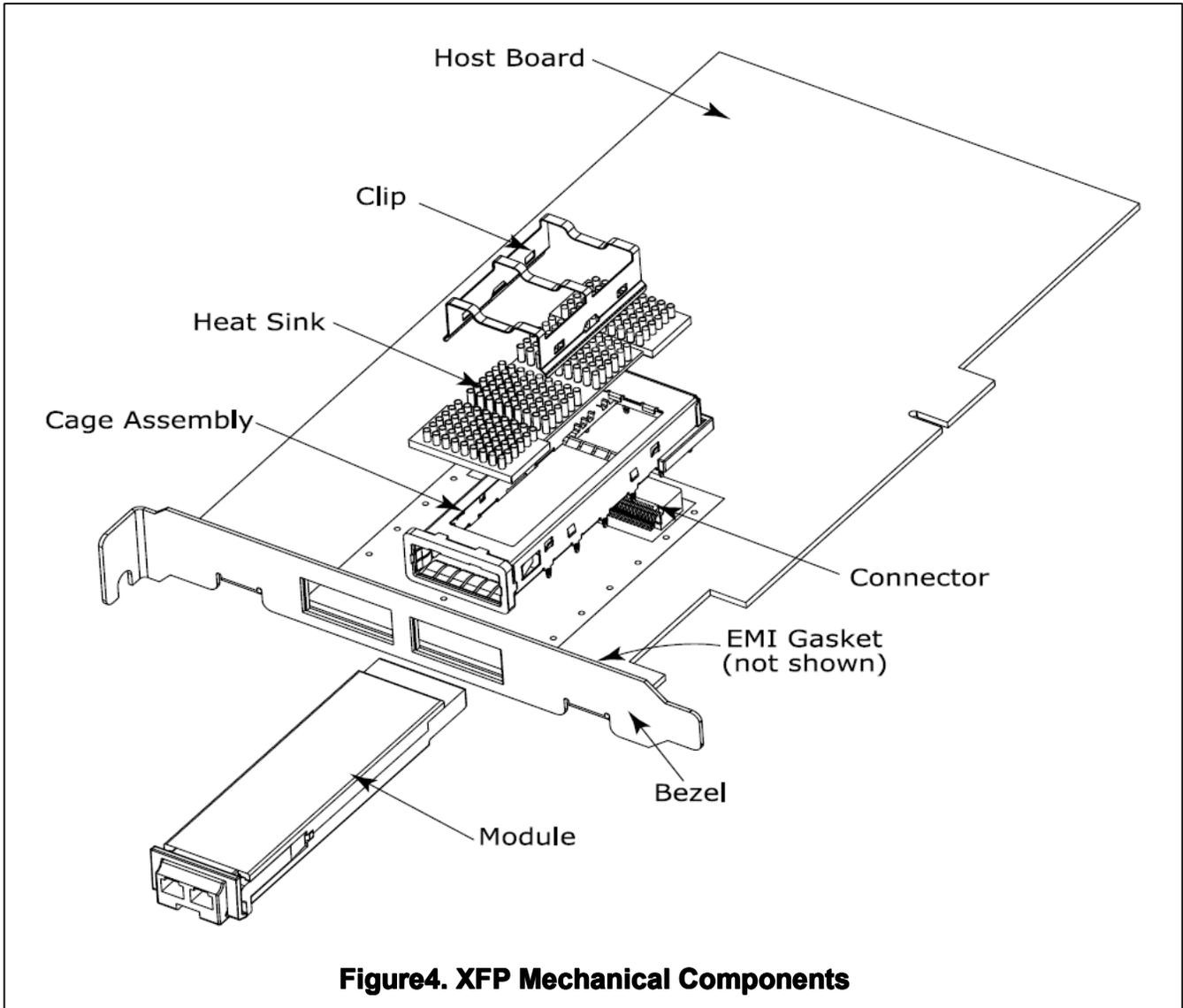


Figure4. XFP Mechanical Components

mechanical components defined:

The module, clip and connector dimensions are constant for all applications. assembly, EMI gasket and heat sink can be designed and/or adjusted for The relatively small form factor of the XFP module combined with an adaptable host system design optimization of module location, heatsink shape/dimension/fins control. The module can be inserted and removed from the cage with the



Regulatory Compliance

XFP transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

Feature	Agency	Standard	Certificate / Comments
Laser Safety	FDA	CDRH 21 CFR 1040 and Laser Notice No. 50	1120288-000
Product Safety	UL	UL and CUL EN60950-2:2007	E347511
Environmental protection	SGS	RoHS Directive 2002/95/EC	GZ1001008706/CHEM
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003 -	WT10093768-D-E-E

Ordering information

Part Number	Product Description
SNS XFP-DWLR08-XX	10 Gbps DWDM Multi-Rate XFP Transceivers, Single-Mode 80Km

XX=17~61 (ITU Channel C-band)

References

1. 10Gigabit Small Form Factor Pluggable Module(XFP) Multi-SourceAgreement (MSA),Rev4.5–August 2005. Documentation is currently available at <http://www.xfpmsa.org>
2. IEEE802.3ae–2002
3. ITU-TG.709/ITU-TG.959.1 <http://www.itu.int>
4. ~~AT~~Telcordia GR-253-CORE

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