

80km Tunable XFP Optical Transceiver

Features

- XFP MSA Rev 4.5 Compliant
- Support 9.95Gb/s to 11.1Gb/s
- Tunability over full C-band 50GHz ITU-T wavelengths (SFF-8477 Control)
- 80km 50GHZ tunable laser
- Adaptive Receiver Decision Threshold Control for improved OSNR range
- High performance APD photodiode receiver
- Duplex LC fiber connector
- Compliant with XFP Electrical and Mechanical MSA INF-8077
- Digital diagnostics and alarm reporting
- -5°C to 70°C Operating Case Temperature
- Power Dissipation 3.5W Maximum
- ROHS6 Compliant(lead free)

Applications

- 10G Fiber Channel&10G Ethernet
- SONET OC-192&SDH STM64
- Ethernet Switch or IP Router Interconnect
- DWDM Networks

Description

Newnets Tunable XFP Optical transceiver is designed for use in high speed serial link up to 80km with single fiber at data rates from 9.95Gbps to 11.1Gbps. The transceiver is fully tunable over the entire C-Band and supports ITU-T wavelengths with 50GHZ channel spacing.

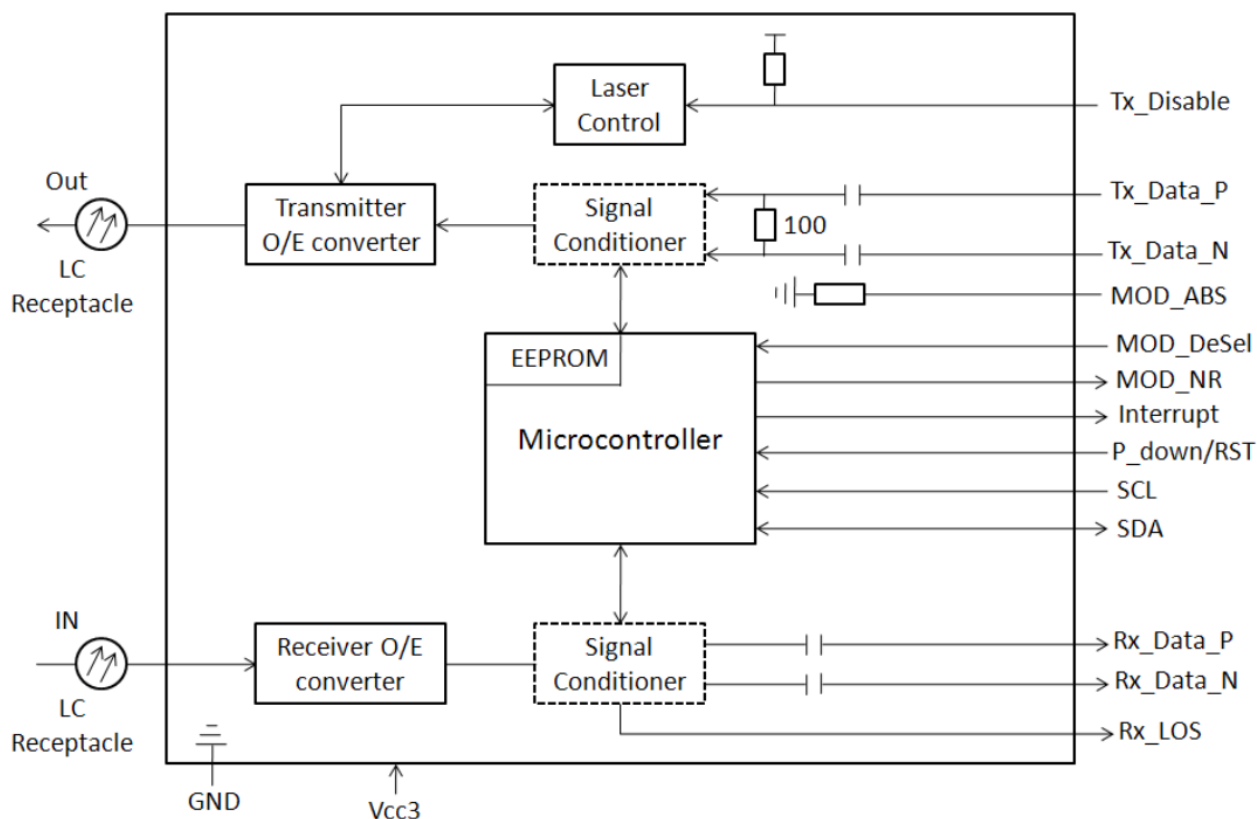
This XFP transceiver conforms to XFP multisource agreement (MSA). It supports 10G BASE-ZR/ZW applications along with DWDM SONET OC-192/SDH STM64 applications for Ethernet Switch, IP Router Interconnect or SONET/SDH optical interfaces and 10G Fiber Channel. Digital Optical Monitoring interfaces are available via a 2-wire serial interface





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Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage 1	Vcc3	-0.5	4	V
Supply Voltage 2	Vcc5	-0.5	6	V
Supply Voltage 3	Vcc2	-0.5	2	V
Storage Temperature	Tst	-40	85	°C
Case Operating Temperature	Top	-5	70	°C

Operating Conditions

Parameter	Symbol	Min	Typical	Max
Supply Voltage 1	Vcc3	3.13	3.3	3.47
Supply Current 1	Icc3	-	-	750
Supply Voltage 2	Vcc5	4.75	5	5.25
Supply Current 2	Icc5	-	-	500
Supply Voltage 3	Vcc2	1.71	1.8	1.89
Supply Current 3	Icc2	-	-	1000
Module Power Dissipation	Pm	-	-	3.5

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Transmitter Specifications-Optical

Parameter	Symbol	Min.	Type.	Max.	Unit	Note
Operating Data Rate	-	9.95	10.3125	11.1	Gb/s	-
Center Wavelength	λ	1528.38	-	1565.50	nm	ITU-T
Side Mode Suppression Ratio	SMSR	30	-	-	dB	-
Wavelength Stability after Startup	$\Delta\lambda_{EOL}$	λ_i-25	-	λ_i+25	pm	
Average Optical Output Power	Po	-1	-	+3	dBm	1
Extinction Ratio	Er	9.0	-	-	dB	-
Differential data Inputs swing	Vinpp	120	-	820	mV	2
Output Power after Disabled	-	-	-	-30	dBm	-
Output Eye Diagram	Compliant with ITU-T and IEEE recommendation MASK					

Receiver Specifications-Optical

Parameter	Symbol	Min.	Type.	Max.	Unit	Note
Operating Data Rate	-	9.95	10.3125	11.1	Gb/s	-
DWDM Wavelength Range	-	1528.38	-	1565.50	nm	
Channel Spacing	fspacing	50			GHz	
Sensitivity@9.95 to 10.3Gbps	Sen1			-24	dBm	1
Sensitivity@11.1Gbps	Sen1			-23	dBm	1
Saturation	Ps	-7	-	-	dBm	1
Optical path penalty@9.95Gbps 1600ps/nm	OPP1			2	dB	1, 3
Optical path penalty@10.7Gbps 1600ps/nm	OPP2			3	dB	1,3
Optical path penalty@11.1Gbps 1450ps/nm	OPP3			3	dB	1,3
LOS Asserted	-	-37	-	-	dBm	High level: Alarm
LOS De-Asserted	-	-	-	-30	dBm	
LOS Hysteresis	-	0.5	-	-	dB	

Notes

1. Measured at PRBS 2³¹-1, NRZ, BER≤10⁻¹²
2. Internally AC coupled
3. With optimized CDR decision threshold

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Transmitter Specifications-Electrical

Parameter	Symbol	Min	Typical	Max	Unit	Note
Input differential impedance	R _{in}	-	100	-	Ω	1
Differential data input swing	V _{in-pp}	120	-	820	mV	
Transmit Disable Voltage	V _D	2.0	-	V _{CC} +0.3	V	
Transmit Enable Voltage	V _{En}	0	-	0.8	V	

Receiver Specifications-Electrical

Parameter	Symbol	Min	Typical	Max	Unit	Note
Output differential impedance	R _{out}	-	100	-	Ω	
Differential data output swing	V _{out-pp}	-	-	850	mV	
Rise/Fall time	T _r /T _f			40	ps	2
Loss of signal-Asserted	V _{OH}	2	-	V _{CC} +0.3	V	
Loss of signal-Negated	V _{OL}	GND	-	GND+0.5	V	

Notes

1. After internally AC coupled
2. 20%-80%

DDM Alarm Thresholds and I2C Locations

All Alarm Thresholds for OTN XFP are configured at the manufacturer and cannot be configured through the I2C interface (i.e. thresholds are not provisionable). Alarm thresholds for each DDM parameter are located in the following registers.

Threshold Value Register	Latched Alarm	Threshold Size (Bytes)	Name
02-03	80.7	2	Transceiver Temp High Alarm
04-05	80.6	2	Transceiver Temp Low Alarm
06-07	82.7	2	Transceiver Temp High Warning
08-09	82.6	2	Transceiver Temp Low Warning
10-17	N/A	8	Reserved
18-19	80.3	2	Laser Bias Current High Alarm
20-21	80.2	2	Laser Bias Current Low Alarm
22-23	82.3	2	Laser Bias Current High Warning
24-25	82.2	2	Laser Bias Current Low Warning
26-27	80.1	2	Laser Output Power High Alarm
28-29	80.0	2	Laser Output Power Low Alarm
30-31	82.1	2	Laser Output Power High Warning
32-33	82.0	2	Laser Output Power Low

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			Warning
34-35	81.7	2	Receive Optical Power High Alarm
36-37	81.6	2	Receive Optical Power Low Alarm
38-39	83.7	2	Receive Optical Power High Warning
40-41	83.6	2	Receive Optical Power Low Warning
N/A	86.7	N/A	5V High Alarm
	86.6		5V Low Alarm
	86.5		3.3V High Alarm
	86.4		3.3V Low Alarm
	86.3		1.8V High Alarm
	86.2		1.8V Low Alarm
	86.1		-5V High Alarm (Not Used)
	86.0		-5V Low Alarm (Not Used)
	87.7		5V High Warning
	87.6		5V Low Warning
	87.5		3.3V High Warning
	87.4		3.3V Low Warning
	87.3		1.8V High Warning
	87.2		1.8V Low Warning
	87.1		-5V High Warning (Not Used)
	87.0		-5V Low Warning (Not Used)

Pin Description

Pin No	Name	Logic	Function	Notes
1	GND	Electrical Ground	1	
2	VEE5	Optional -5.2V power Supply (Not used)		
3	Mod_DeSel	LVTTL-I	Module De-select; When held low allows module to respond to 2-wire serial interface	
4	Interrupt	LVTTL-O	Interrupt; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	Tx_DIS	LVTTL-I	Transmitter Disable; Turns off transmitter laser output	
6	VCC5		+5V Power Supply	
7	GND		Module Ground	1
8	VCC3		+3.3V Power Supply	
9	VCC3		+3.3V Power Supply	
10	SCL	LVTTL-I/O	2-Wire Serial Interface Clock	2
11	SDA	LVTTL-I/O	2-Wire Serial Interface Data Line	2
12	Mod_Abs	LVTTL-O	Indicates Module is not present. Grounded in the Module	2
13	Mod_NR	LVTTL-O	Module Not Ready; Indicating Module	2

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			Operational Fault	
14	RX_LOS	LVTTTL-O	Receiver Loss Of Signal Indicator	2
15	GND		Module Ground	1
16	GND		Module Ground	1
17	RD-	CML-O	Receiver Inverted Data Output	
18	RD+	CML-O	Receiver Non-Inverted Data Output	
19	GND		Module Ground	1
20	VCC2	+1.8V Power Supply		
21	P_Down/RST	LVTTTL-I	Power down; When high, requires the module to limit power consumption. 2-Wire serial interface must be functional in the low power mode.	
22	VCC2		+1.8V Power Supply	
23	GND		Module Ground	1
24	RefCLK+	PECL-I	Reference Clock Non-Inverted Input, AC coupled on the host board	
25	RefCLK-	PECL-I	Reference Clock Inverted Input, AC coupled on the host board	
26	GND	Module Ground	1	
27	GND	Module Ground	1	
28	TD-	CML-I	Transmitter Inverted Data Input	
29	TD+	CML-I	Transmitter Non-Inverted Data Input	
30	GND	Module Ground	1	

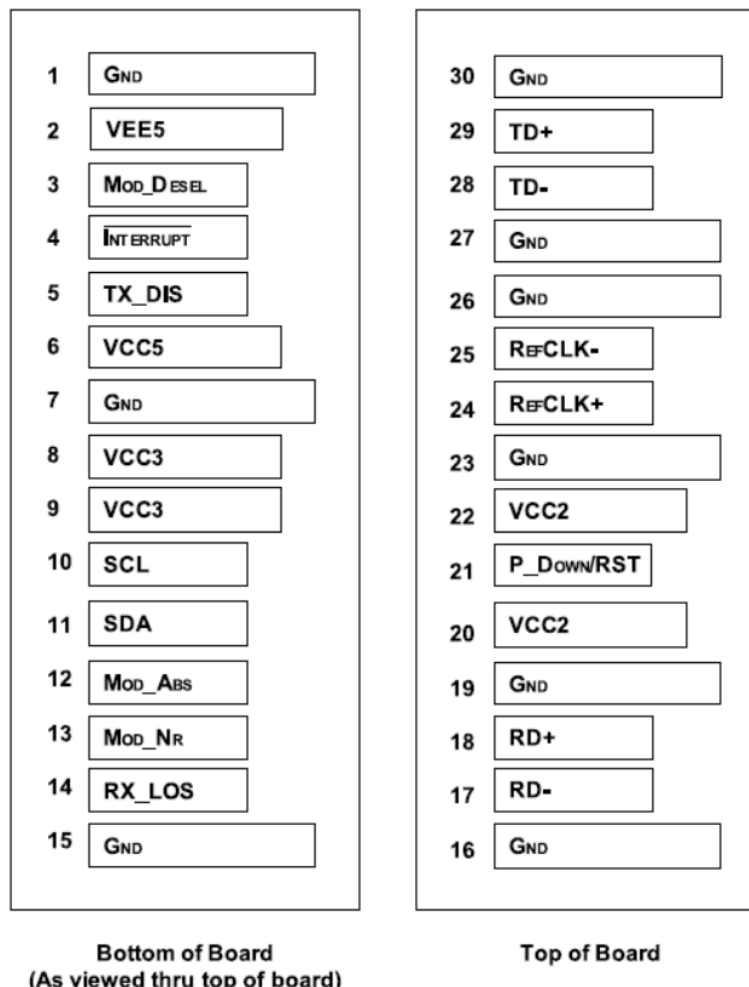
Notes:

1. Module ground pins (GND) are isolated from the module case and chassis ground within the module.
 2. Shall be pulled up with 4.7K-10K ohms to a voltage between 3.15V and 3.45V on the host board.
- The XFP PCB host electrical connections are shown in the figure below.



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Supported Wavelengths

The following table provides correlation of the ITU-T DWDM wavelength and frequency as it relates to ID.

Frequency	Wavelength	ID
196.15	1528.38	61.5
196.10	1528.77	61
196.05	1529.16	60.5
196.00	1529.55	60
195.95	1529.94	59.5
195.90	1530.33	59
195.85	1530.72	58.5
195.80	1531.12	58
195.75	1531.51	57.5
195.70	1531.90	57
195.65	1532.29	56.5

Frequency	Wavelength	ID
195.60	1532.68	56
195.55	1533.07	55.5
195.50	1533.47	55
195.45	1533.86	54.5
195.40	1534.25	54
195.35	1534.64	53.5
195.30	1535.04	53
195.25	1535.43	52.5
195.20	1535.82	52

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195.15	1536.22	51.5
195.10	1536.61	51
Frequency	Wavelength	ID
195.05	1537.00	50.5
195.00	1537.40	50
194.95	1537.79	49.5
194.90	1538.19	49
194.85	1538.58	48.5
194.80	1538.98	48
194.75	1539.37	47.5
194.70	1539.77	47
194.65	1540.16	46.5
194.60	1540.56	46
194.55	1540.95	45.5
194.50	1541.35	45
194.45	1541.75	44.5
194.40	1542.14	44
194.35	1542.54	43.5
194.30	1542.94	43
194.25	1543.33	42.5
194.20	1543.73	42
194.15	1544.13	41.5
194.10	1544.53	41
194.05	1544.92	40.5
194.00	1545.32	40
193.95	1545.72	39.5
193.90	1546.12	39
193.85	1546.52	38.5
193.80	1546.92	38
193.75	1547.32	37.5
193.70	1547.72	37
193.65	1548.11	36.5
193.60	1548.51	36
193.55	1548.91	35.5
193.50	1549.32	35
193.45	1549.72	34.5
193.40	1550.12	34
193.35	1550.52	33.5
193.30	1550.92	33
193.25	1551.32	32.5
193.20	1551.72	32
193.15	1552.12	31.5
193.10	1552.52	31
193.05	1552.93	30.5
193.00	1553.33	30
192.95	1553.73	29.5
192.90	1554.13	29

Frequency	Wavelength	ID
192.85	1554.54	28.5
192.80	1554.94	28
192.75	1555.34	27.5
192.70	1555.75	27
192.65	1556.15	26.5
192.60	1556.55	26
192.55	1556.96	25.5
192.50	1557.36	25
192.45	1557.77	24.5
192.40	1558.17	24
192.35	1558.58	23.5
192.30	1558.98	23

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192.25	1559.39	22.5
192.20	1559.79	22
192.15	1560.20	21.5
192.10	1560.61	21
192.05	1561.01	20.5
192.00	1561.42	20
191.95	1561.83	19.5
191.90	1562.23	19
191.85	1562.64	18.5
191.80	1563.05	18
191.75	1563.45	17.5
191.70	1563.86	17
191.65	1564.27	16.5
191.60	1564.68	16
191.55	1565.09	15.5
191.50	1565.50	15