10Gb/s DWDM Tunable XFP C17-C61 50GHz 80km Optical Transceiver

Features

- Hot pluggable XFP footprint
- Multi-Protocol,supports 9.95Gb/s to 11.3Gb/s bit rates
- Monolithically integrated full C-band tunable transmitter
- 50GHz ITU channel spacing with integrated wavelength locker
- C-band-tunable Laser and high performance APD receiver
- Maximum link length of 80km
- Full Duplex LC connector
- Supports Line-side and XFI loopback
- No Reference Clock required
- Digital diagnostic monitoring support
- Standard bail release mechanism
- Power dissipation＜3.5W
- Commercial operating temperature: 0°C to 70°C
- RoHS compliant and lead free

Applications

- DWDM 10GBASE-ZR/ZW 10Gb/s Ethernet
- DWDM 10Gb/s Fiber Channel
- DWDM SONET OC-192&SDH STM-64
- Wide, local, and storage area networks

Compliance

- IEEE 802.3ae 10GBASE-ZR
- XFP MSA

Description

The XFP-10G-DW80C is a high performance integrated fiber optic transceiver that provides a high-speed serial link at signaling rates from 9.95Gb/s to 11.35Gb/s. It is complies with the 10 Gigabit small form factor pluggable(XFP) multi-source agreement MSA Specification(INF-8077i) and Tunable XFP for ITU Frequency Grid Applications(SFF-8477). The tunable XFP module complies with the ITU-T G.698.1 standard with 50 GHz channel spacing for SONET OC-192, SDH STM-64, DWDM 10GBASE-ZR Ethernet, and DWDM 10G Fiber Channel applications.

The tunable XFP transceiver integrates the receiver and transmit path on one module. On the transmit side, the 10Gbps serial data stream is recovered, retimed, and passed to a modulator driver. The modulator driver biases and modulates a C-band tunable integrated laser Mach-Zehnder (ILMZ), enabling data transmission over single-mode fiber through an industry-standard LC connector. On the receiver side, the 10Gbps data stream is recovered from an APD/ trans-impedance amplifier, re-timed, and passed to an output driver. This tunable XFP module features a hot-pluggable XFI-compliant electrical interface.

The 10G tunable XFP transceiver provides a full C-band window covering 1528nm to 1566nm for DWDM optical networks,which meets the need of rapid increase in the volume of communications traffic from telecom carrier and operator. The tunable DWDM XFP module can replace the fixed DWDM channel XFP transceivers that are currently used,while reduce the large stock since all wavelengths can now be covered with one transceiver module.

Wavelength Guide Pin Descriptions

Table1-Wavelength Guide Pin Descriptions

Channel Number	Frequency(THZ)	Wavelength(nm)	Channel Number	Frequency(THZ)	Wavelength(nm)
1	191.75	1563.45	45	193.95	1545.72
2	191.8	1563.05	46	194	1545.32
3	191.85	1562.64	47	194.05	1544.92
4	191.9	1562.23	48	194.1	1544.53
5	191.95	1561.83	49	194.15	1544.13
6	192	1561.42	50	194.2	1543.73
7	192.05	1561.01	51	194.25	1543.33
8	192.1	1560.61	52	194.3	1542.94
9	192.15	1560.20	53	194.35	1542.54
10	192.2	1559.79	54	194.4	1542.14
11	192.25	1559.39	55	194.45	1541.75
12	192.3	1558.98	56	194.5	1541.35
13	192.35	1558.58	57	194.55	1540.95
14	192.4	1558.17	58	194.6	1540.56
15	192.45	1557.77	59	194.65	1540.16
16	192.5	1557.36	60	194.7	1539.77
17	192.55	1556.96	61	194.75	1539.37
18	192.6	1556.55	62	194.8	1538.98

19	192.65	1556.15	63	194.85	1538.58
20	192.7	1555.75	64	194.9	1538.19
21	192.75	1555.34	65	194.95	1537.79
22	192.8	1554.94	66	195	1537.40
23	192.85	1554.54	67	195.05	1537.00
24	192.9	1554.13	68	195.1	1536.61
25	192.95	1553.73	69	195.15	1536.22
26	193	1553.33	70	195.2	1535.82
27	193.05	1552.93	71	195.25	1535.43
28	193.1	1552.52	72	195.3	1535.04
29	193.15	1552.12	73	195.35	1534.64
30	193.2	1551.72	74	195.4	1534.25
31	193.25	1551.32	75	195.45	1533.86
32	193.3	1550.92	76	195.5	1533.47
33	193.35	1550.52	77	195.55	1533.07
34	193.4	1550.12	78	195.6	1532.68
35	193.45	1549.72	79	195.65	1532.29
36	193.5	1549.32	80	195.7	1531.90
37	193.55	1548.91	81	195.75	1531.51
38	193.6	1548.51	82	195.8	1531.12
39	193.65	1548.11	83	195.85	1530.72
40	193.7	1547.72	84	195.9	1530.33
41	193.75	1547.32	85	195.95	1529.94
42	193.8	1546.92	86	196	1529.55
43	193.85	1546.52	87	196.05	1529.16
44	193.9	1546.12	88	196.1	1528.77

Absolute Maximum Ratings

Table2-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Maximum Supply Voltage 1	Vcc3	-0.5		4.0	V	
Maximum Supply Voltage 2	Vcc5	-0.5		6.0	V	
Storage Temperature	TS	-40		85	°C	
Case Operating Temperature	Tcase	0		70	°C	

Electrical Characteristics

Table3-Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage – 1.8V supply	Vcc2	1.71		1.89	V	
Supply Voltage – 3.3V supply	Vcc3	3.13		3.47	V	

Supply Current – 1.8V supply	Icc2			180	mA	
Supply Current – 3.3V supply	Icc3			680	mA	
Module total power	P			2.5	W	1
Transmitter						
Input differential impedance	Rin		100		Ω	2
Differential data input swing	Vin,pp	120		820	mV	
Transmit Disable Voltage	V_D	2.0		Vcc	V	
Transmit Enable Voltage	VEN	GND		GND+ 0.8	V	
Receiver						
Differential data output swing	Vout,pp	340	650	850	mV	3
LOS Fault	VLOS fault	Vcc – 0.5		Vcc HOST	V	4
LOS Normal	VLOS norm	GND		GND+0.5	V	4

Notes:

[1] Maximum total power value is specified across the full temperature and voltage range.

[2] After internal AC coupling.

[3] Into 100 ohms differential termination.

[4] Loss Of Signal is open collector to be pulled up with a 4.7k–10kohm resistor to 3.15–3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Table4-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter						
Average Optical Power	Pf	-1		2	dBm	
Wavelength range		1528.38		1568.77	nm	
Optical Wavelength	λ c	λ c -0.05		λ c +0.05	nm	
Center Wavelength Spacing			50		GHz	1
Frequency stability (BOL)		*f*c–1.5		*f*c +1.5	GHz	2
Frequency stability (EOL)		*f*c–2.5		*f*c +2.5	GHz	2
Side mode Suppression ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	9			dB	
Transmitter and Dispersion Penalty	TDP			3	dB	
Average Launch power of OFF transmitter	POFF			-30	dBm	
Receiver						
Rx Sensitivity	RSENS			-24	dBm	Back to back ,3
				-21	dBm	Fiber(-300 to1450ps/nm)
Input Saturation Power (Overload)	Psat	-7			dBm	

Wavelength Range	λ C	1260		1600	nm	
Receiver Reflectance	Rrx			-27	dB	
LOS De-Assert	LOSD			-27	dBm	
LOS Assert	LOSA	-37			dBm	
LOS Hysteresis		0.5			dB	

Notes:

[1] Corresponds to approximately 0.4 nm.

[2] f_c refer to Page 2 the Frequency row of OXD10G-TD80DCR Wavelength Guide Table, and test condition is reflect power to transmitter lower than -27dBm.

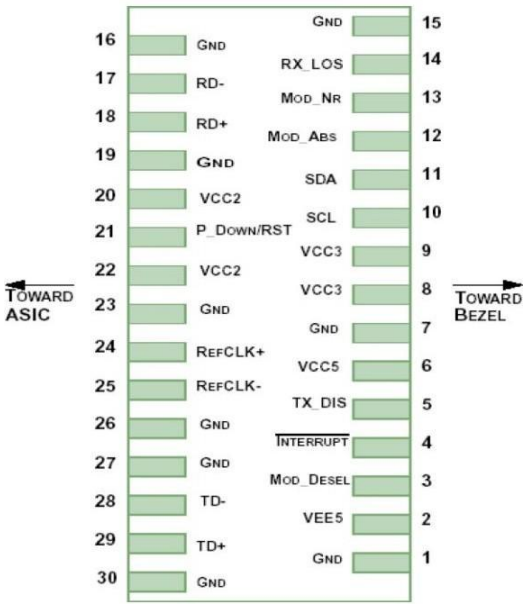
[3] Measured with worst ER; BER<10-12 with 10.3Gbps,231 – 1 PRBS.

Timing Parameters

Table5-Timing Parameters

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Time to initialize cooled module	Tstart_up			20	S	
Channel Switch time	T channel Sw			200	ms	Any channel to any

Pin Assignment



Pin Function Definitions

Table6-Pin Function Definitions

Pin Number	Logic	Symbol	Name/Description	Notes
1		GND	Module Ground	1
2		VEE5	Optional –5.2 Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-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	LVTTL-I	SCL	Serial 2-wire interface clock	2
11	LVTTL-I/O	SDA	Serial 2-wire interface data line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module	2
13	LVTTL-O	Mod_NR	Module Not Ready	2
14	LVTTL-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 – Not required	
21	LVTTL-I	P_Down/RST	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 – Not required	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board –Not required	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 3.15Vand 3.6V.

[3] A Reference Clock input is not required by the XFP 80km tunable. If present, it will be ignored.

Digital Diagnostic Functions

As defined by the XFP MSA, The tunable XFP 80km transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

a. Transceiver temperature

b. Laser bias current

c. Transmitted optical power

d. Received optical power

e. Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

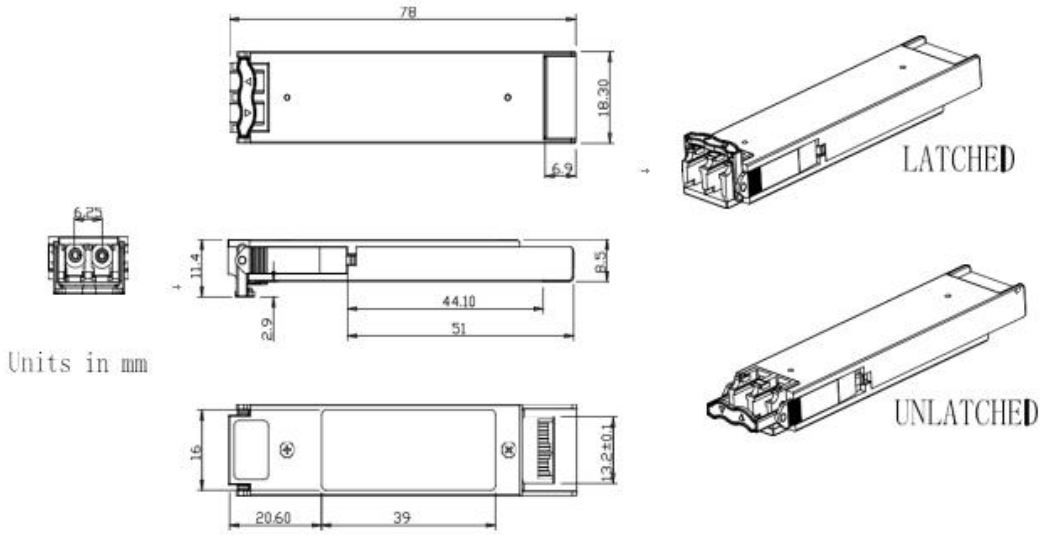
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver.

The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.

For more detailed information including memory map definitions, please see the XFP MSA Specification.

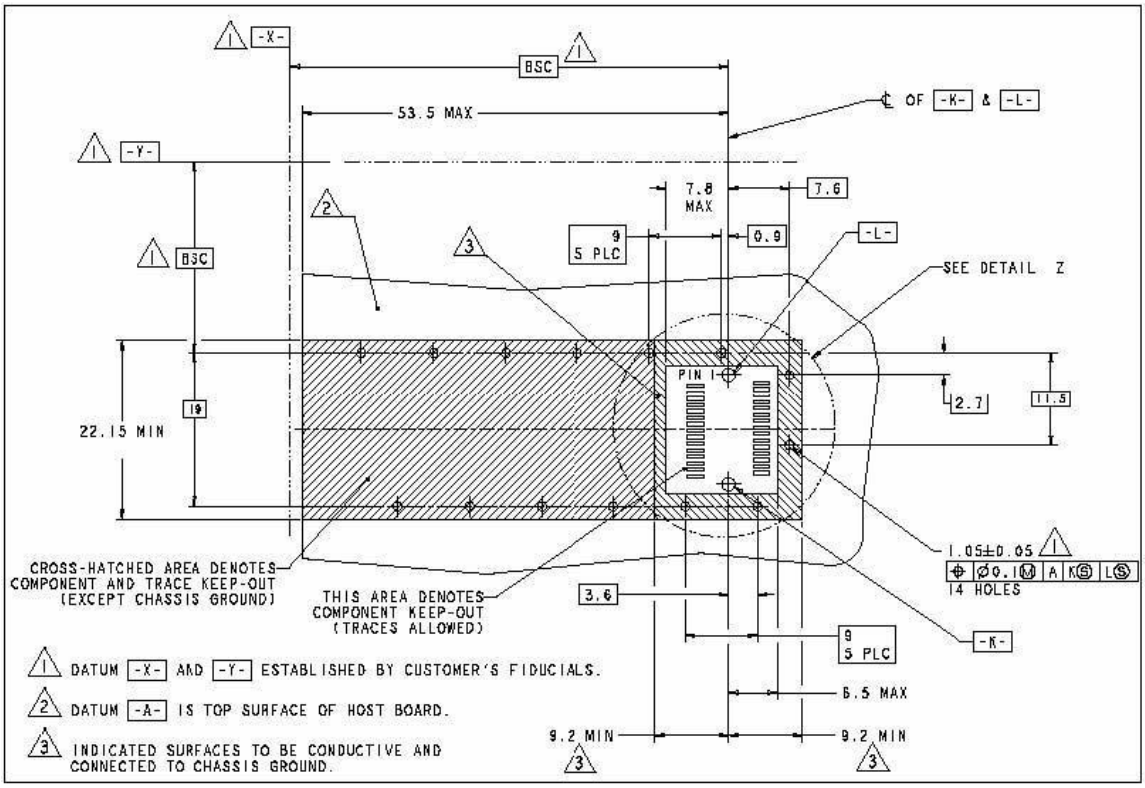
Mechanical Specifications

The XFP transceivers are compliant with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).

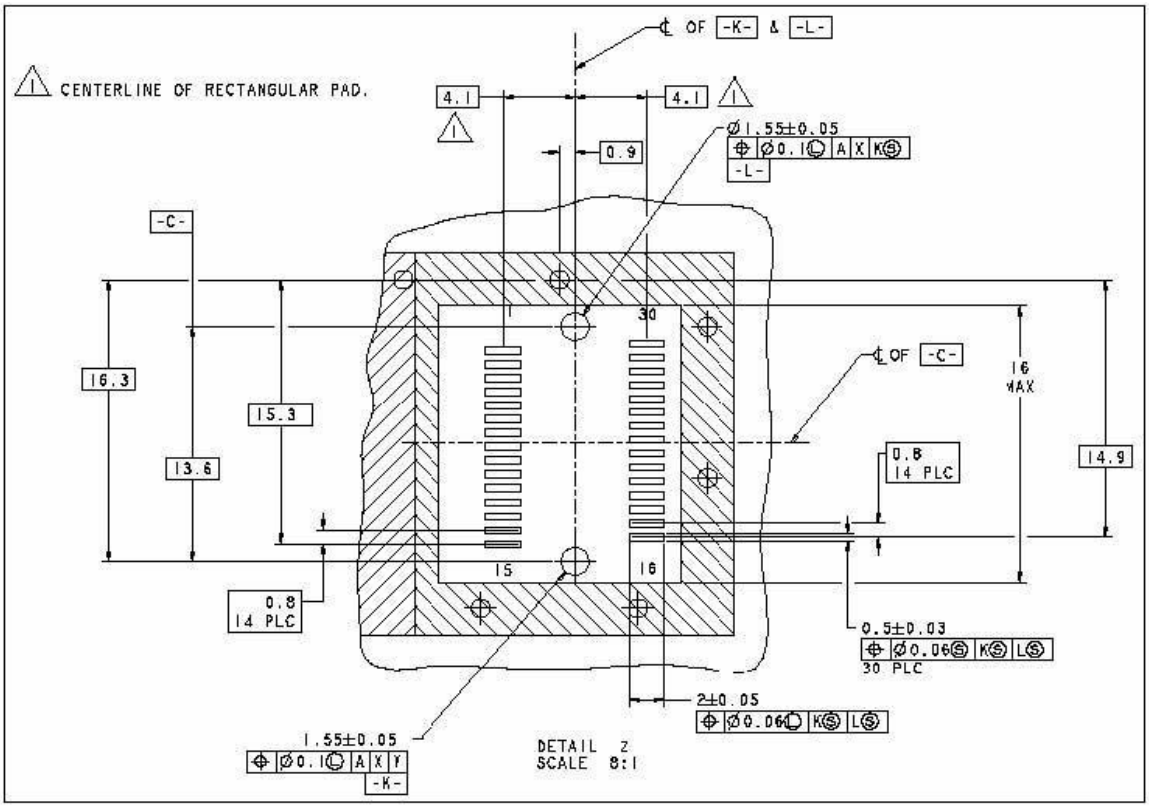


XFP Transceiver (dimensions are in mm)

PCB Layout and Bezel Recommendations



XFP Host Board Mechanical Layout (dimensions are in mm)



XFP Detail Host Board Mechanical Layout (dimensions are in mm)

Ordering information

Table7-Ordering information

Part number	Description
XFP-10G-DW80C	10Gb/s Tunable XFP Transceiver, DWDM 50GHZ, 88 Channel, 80km, LC, DDM, 0~70°C

Warnings

Process plug

The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles.It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.

Handling Precautions

The transceiver optics is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety

The transceiver optics is a Class 1 laser product per international standard IEC 60825-1. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Further Information:

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Disclaimer

1. We are committed to continuous product improvement and feature upgrades, and the contents contained in this manual are subject to change without notice.

2. Nothing herein should be construed as constituting an additional warranty.

3. NADDOD assumes no responsibility for the use or reliability of equipment or software not provided by NADDOD.