



10G XFP DWDM Tunable Transceiver

Hot Pluggable, Duplex LC, 50GHz DWDM ILMZ, SMF 80KM, DDM

Part Number: FXFP-H7-DTU-80D



Overview

FXFP-H7-DTU-80D Small Form Factor Pluggable XFP transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. The high performance DWDM C-band tunable cooled InP integrated Laser Mach-Zehnder (ILMZ) transmitter and high sensitivity APD receiver provide superior performance for 10GBASE-ZR/ZW, 10G Fiber Channel and SONET/SDH applications up to SMF 80km optical links.

Applications

- 10GBASE-ZR/ZW Ethernet @10.3125G
- Fiber Channel 1200-SM-LL-L 10GFC @10.51875G
- SONET OC-192 & SDH STM-64 @9.953G
- CPRI Option #8 @10.1376G
- OTN OTU2 @10.7G, OTU2e @11.09G, OTU2f @11.32G
- 10G DWDM Networks

Features

- Compliant with IEEE802.3ae 10GBASE-ZR/ZW
- Compliant with CPRI Option 8
- Compliant with INF-8077i XFP MSA
- Data Rate 9.953Gb/s to 11.32Gb/s
- Hot Pluggable XFP footprint
- 50GHz ITU Grid channel spacing with integrated wavelength locker
- Monolithically integrated full C-band DWDM tunable transmitter
- APD receiver
- Duplex LC connector
- No Reference Clock required
- 2-wire interface for management and diagnostic monitor
- Dual +3.3V and 5.0V power supply
- Link distance 80km over SM fiber
- Maximum Power consumption 3.5W
- RoHS Compliant



Laser Safety

- This is a Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Caution: Use of control or adjustments or performance of procedure other than those specified herein may result in hazardous radiation exposure.

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Storage Relative Humidity	RH	5	95	%
Supply Voltage 3.3V	V _{CC3}	-0.5	+4.0	V
Supply Voltage 5.0V	V _{CC5}	-0.5	+6.0	V

Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temperature	T _{OP}	0	-	+70	°C
Supply Voltage 3.3V	V _{CC3}	+3.13	+3.3	+3.47	V
Supply Voltage 5.0V	V _{CC5}	+4.75	+5.0	+5.25	
Supply Current (V _{CC3})	I _{CC3}	-	-	500	mA
Supply Current (V _{CC5})	I _{CC5}	-	-	250	mA
Power Consumption	P			3.5	W

Transmitter Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, V_{CC5} = 4.75V to 5.25V, T_{OP} = 0 °C to 70 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.953	10.3125	11.32	Gb/s	
Optical Launch Power	P _o	0		+5	dBm	1
Wavelength Range		1529.55		1561.83	nm	
Optical Center Wavelength	λ _c	λ _c -0.05	λ _c	λ _c +0.05	nm	
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
Center Wavelength Spacing			50		GHz	3
Spectral Width (-20dB)	Δλ			0.4	nm	



Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	8.2			dB	
Dispersion Penalty	DP			3	dB	
Optical Eye Mask		IEEE802.3ae				
Relative Intensity Noise	RIN			-130	dB/Hz	
Differential Data Input Swing	V _{IN}	150		820	mV	
Tx Disable Input Voltage-Low (Tx ON)	TDISV _L	GND		0.8	V	
Tx Disable Input Voltage-High (Tx OFF)	TDISV _H	2.0		V _{CC3}	V	
Tx Fault Output Voltage-Low (Tx Normal)	TFLT _V _L	GND		0.8	V	
Tx Fault Output Voltage-High (Tx Fault)	TFLT _V _H	2.0		V _{CC3}	V	

Note1: The optical power is launched into a 9/125μm single mode fiber.

Note2: The *f*_c test condition is reflect power to transmitter lower than -27dBm.

Note3: Corresponds to approximately 0.4nm.

Receiver Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, V_{CC5} = 4.75V to 5.25V, T_{OP} = 0 °C to 70 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.953	10.3125	11.32	Gb/s	
Receiver Sensitivity	SEN			-23	dBm	1
Maximum Receive Power	P _{RX-MAX}	-7			dBm	1
Optical Center Wavelength	λ _c	1260		1620	nm	
LOS De-Assert	LOS _D			-24	dBm	
LOS Assert	LOS _A	-34			dBm	
LOS Hysteresis	LOS _{HY}	0.5		5	dB	
Differential Data Output Swing	V _{OUT}	300		850	mV	
Receiver LOS Signal Output Voltage-Low	LOS _V _L	GND		0.5	V	
Receiver LOS Signal Output Voltage-High	LOS _V _H	V _{CC3} -0.5		V _{CC3}	V	

Note1: Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps BER<10⁻¹².



Pin Assignment

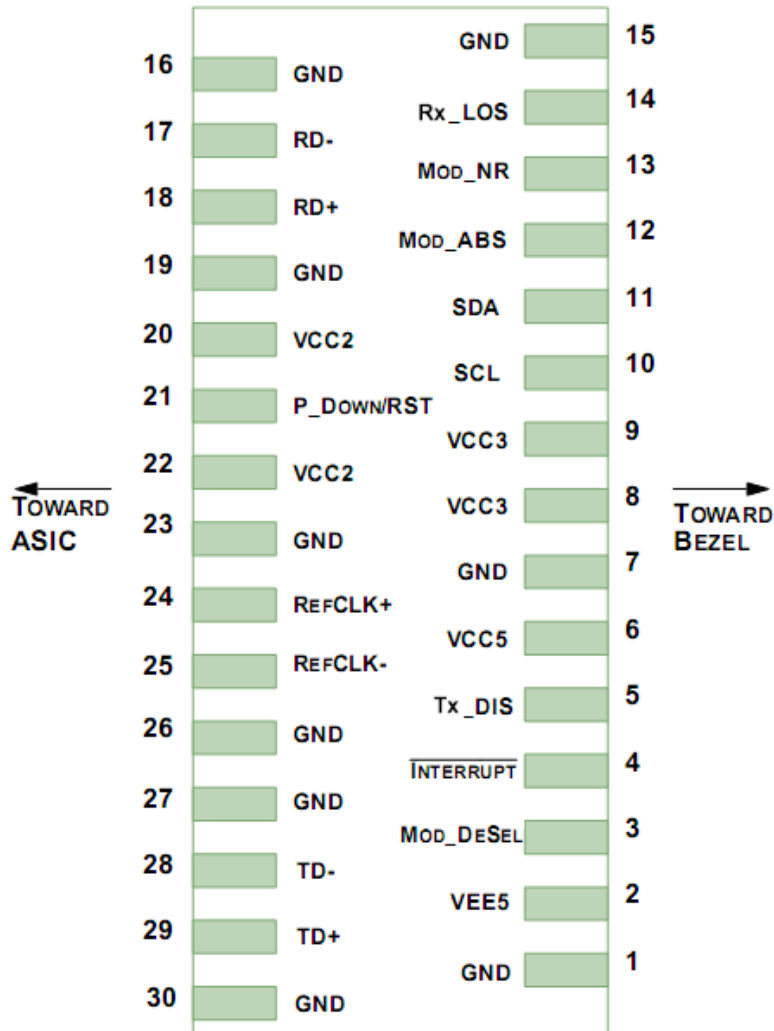


Diagram of Host Board Connector Block Pin



Pin Description

Pin	Name	Function / Description
1	GND	Module Ground
2	VEE5	Optional -5.2V Power Supply (Not required)
3	MOD-DESEL	Module De-select; When held low allows the module to, respond to 2-wire serial interface commands
4	$\overline{\text{INTERPUPT}}$	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface
5	TX_DIS	Transmitter Disable; Transmitter laser source turned off
6	VCC5	+5V Power Supply
7	GND	Module Ground
8	VCC3	+3.3V Power Supply
9	VCC3	+3.3V Power Supply
10	SCL	Serial 2-wire interface clock
11	SDA	Serial 2-wire interface data line
12	MOD_ABS	Module Absent; Indicates module is not present. Grounded in the module
13	MOD_NR	Module Not Ready; Indicating Module Operational Fault
14	RX_LOS	Receiver Loss of Signal indicator
15	GND	Module Ground
16	GND	Module Ground
17	RD-	Receiver inverted data output
18	RD+	Receiver non-inverted data output
19	GND	Module Ground
20	VCC2	+1.8V Power Supply (Not required)
21	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
24	REFCLK+	Reference Clock non-inverted input, AC coupled on the host board (Not required)
25	REFCLK-	Reference Clock inverted input, AC coupled on the host board (Not required)



26	GND	Module Ground
27	GND	Module Ground
28	TD-	Transmitter inverted data input
29	TD+	Transmitter non-inverted data input
30	GND	Module Ground

Note1: Module circuit ground is isolated from module chassis ground within the module.

Note2: Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

Note3: A Reference Clock input is not required.

Digital Diagnostic Functions

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

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

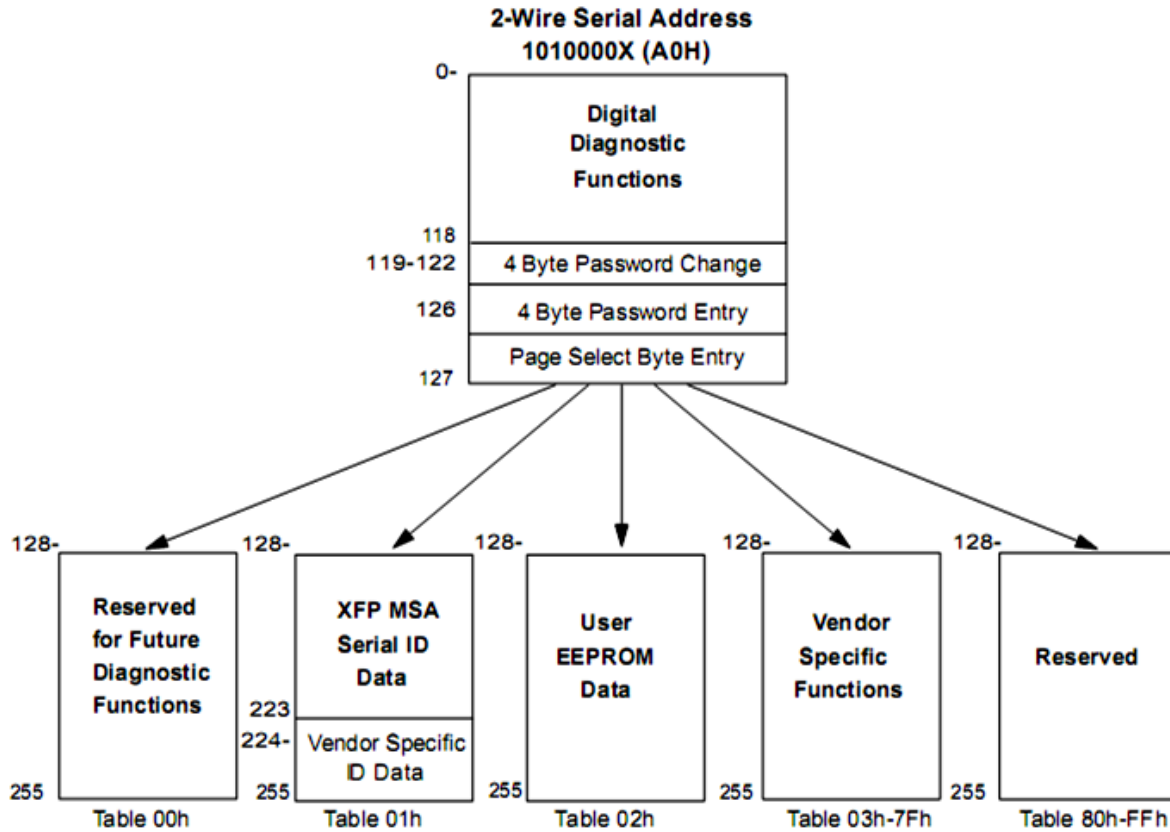
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Controller (DDC) 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.

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



Digital Diagnostic Memory Map

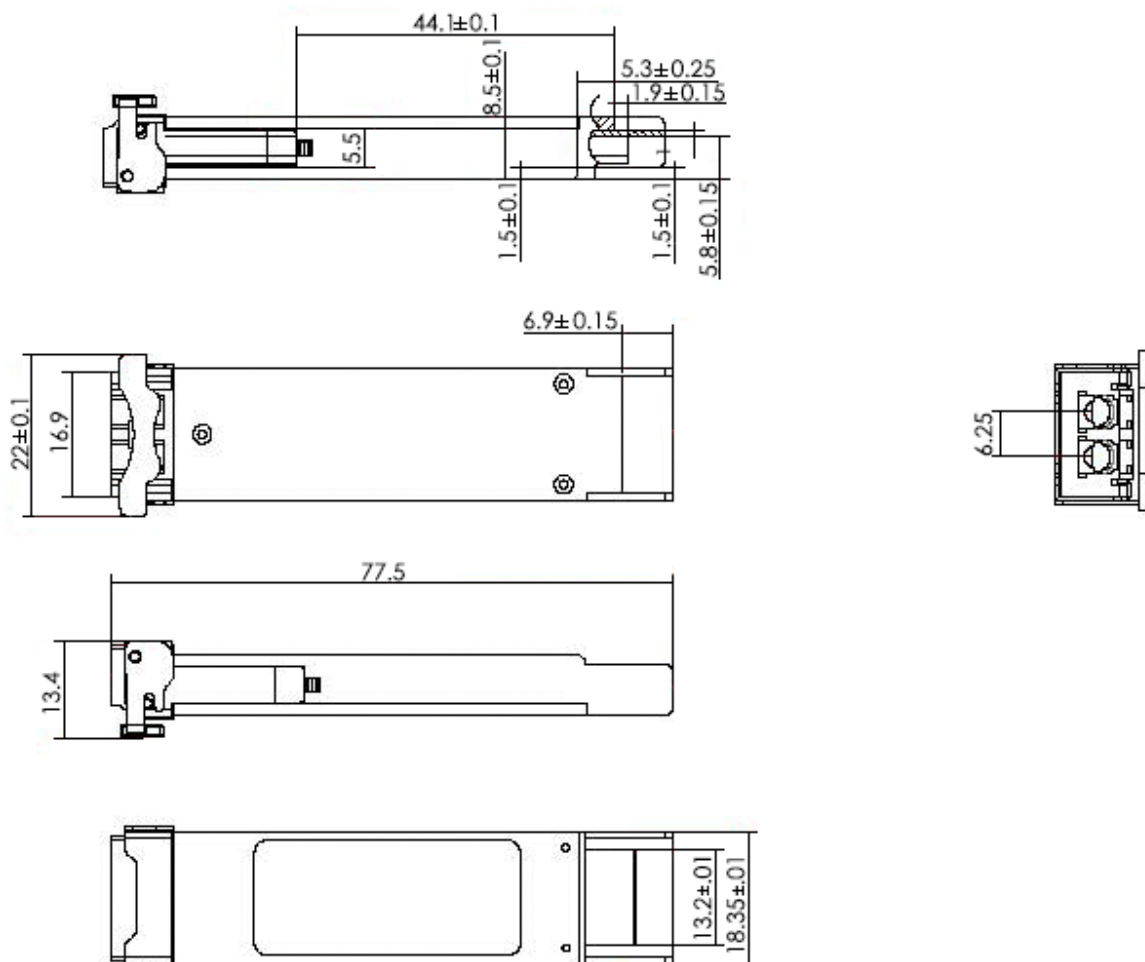


Digital Diagnostic Monitoring Characteristics

Parameter	Accuracy	Unit	Note
Temperature	±3	°C	Internal Calibration
Supply Voltage	±0.1	V	Internal Calibration
Tx Bias Current	±5	mA	Internal Calibration
Tx Output Power	±3	dB	Internal Calibration
Rx Received Optical Power	±3	dB	Internal Calibration



Mechanical Dimensions



(All Dimensions are $\pm 0.20\text{mm}$ Unless Otherwise Specified, Unit: mm)

Ordering Information

Part No.	Tx	Rx	Link	DDM	Temp.
FXFP-H7-DTU-80D	50GHz ITU Grid C-Band DWDM	1260nm ~ 1620nm	SMF 80km	Yes	0~70°C

Note: Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.



Appendix A: 50GHz ITU Grid DWDM Central Wavelength Table

Channel	Wavelength (nm)	Frequency (THZ)	Channel	Wavelength (nm)	Frequency (THZ)
1 (H19)	1561.83	191.95	42 (C40)	1545.32	194.00
2 (C20)	1561.42	192.00	43 (H40)	1544.92	194.05
3 (H20)	1561.01	192.05	44 (C41)	1544.53	194.10
4 (C21)	1560.61	192.10	45 (H41)	1544.13	194.15
5 (H21)	1560.20	192.15	46 (C42)	1543.73	194.20
6 (C22)	1559.79	192.20	47 (H42)	1543.33	194.25
7 (H22)	1559.39	192.25	48 (C43)	1542.94	194.30
8 (C23)	1558.98	192.30	49 (H43)	1542.54	194.35
9 (H23)	1558.58	192.35	50 (C44)	1542.14	194.40
10 (C24)	1558.17	192.40	51 (H44)	1541.75	194.45
11 (H24)	1557.77	192.45	52 (C45)	1541.35	194.50
12 (C25)	1557.36	192.50	53 (H45)	1540.95	194.55
13 (H25)	1556.96	192.55	54 (C46)	1540.56	194.60
14 (C26)	1556.55	192.60	55 (H46)	1540.16	194.65
15 (H26)	1556.15	192.65	56 (C47)	1539.77	194.70
16 (C27)	1555.75	192.70	57 (H47)	1539.37	194.75
17 (H27)	1555.34	192.75	58 (C48)	1538.98	194.80
18 (C28)	1554.94	192.80	59 (H48)	1538.58	194.85
19 (H28)	1554.54	192.85	60 (C49)	1538.19	194.90
20 (C29)	1554.13	192.90	61 (H49)	1537.79	194.95
21 (H29)	1553.73	192.95	62 (C50)	1537.40	195.00
22 (C30)	1553.33	193.00	63 (H50)	1537.00	195.05
23 (H30)	1552.93	193.05	64 (C51)	1536.61	195.10
24 (C31)	1552.52	193.10	65 (H51)	1536.22	195.15
25 (H31)	1552.12	193.15	66 (C52)	1535.82	195.20
26 (C32)	1551.72	193.20	67 (H52)	1535.43	195.25
27 (H32)	1551.32	193.25	68 (C53)	1535.04	195.30
28 (C33)	1550.92	193.30	69 (H53)	1534.64	195.35
29 (H33)	1550.52	193.35	70 (C54)	1534.25	195.40
30 (C34)	1550.12	193.40	71 (H54)	1533.86	195.45
31 (H34)	1549.72	193.45	72 (C55)	1533.47	195.50
32 (C35)	1549.32	193.50	73 (H55)	1533.07	195.55
33 (H35)	1548.91	193.55	74 (C56)	1532.68	195.60
34 (C36)	1548.51	193.60	75 (H56)	1532.29	195.65
35 (H36)	1548.11	193.65	76 (C57)	1531.90	195.70
36 (C37)	1547.72	193.70	77 (H57)	1531.51	195.75
37 (H37)	1547.32	193.75	78 (C58)	1531.12	195.80
38 (C38)	1546.92	193.80	79 (H58)	1530.72	195.85
39 (H38)	1546.52	193.85	80 (C59)	1530.33	195.90
40 (C39)	1546.12	193.90	81 (H59)	1529.94	195.95
41 (H39)	1545.72	193.95	82 (C60)	1529.55	196.00