



10G XFP-ER Transceiver

Hot Pluggable, Duplex LC, 1550nm EML-LD, Single Mode, 40KM, DDM

Part number: FXFP-H7-S15-40D



Overview:

FXFP-H7-S15-40D Small Form Factor 10Gb/s XFP transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. The high performance cooled 1550nm EML transmitter & high sensitivity PIN receiver provide superior performance for 10GBase-ER/EW, SONET OC192/ SDH STM64 and 10G Fiber Channel applications up to 40km optical links.

Applications:

- 10GBASE-ER/EW Ethernet
- 10G Fiber Channel
- SONET OC-192 & SDH STM-64 @9.953Gbps
- OC192 over FEC @10.709Gbps
- 10GbE over G.709 @11.09Gbps

Features:

- Compliant with IEEE802.3ae 10GBase-ER/EW standard
- Compliant with SONET OC192 IR2/ IR3 standard
- Compliant with SDH STM64 S64.2b/ S64.3b standard
- Compliant with 10G Fiber Channel
- Compliant with XFP MSA INF-8077i
- Support 9.95Gb/s to 11.3Gb/s multi-rates
- Hot-pluggable XFP footprint
- Cooled 1550nm EML Laser
- Duplex LC connector
- No Reference Clock required
- Single +3.3V power supply
- Built-in digital diagnostic function
- Link length for 40km over SM fiber
- Low power consumption (<1.8W)
- RoHS compliant

Absolute Maximum Ratings :

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



Recommended Operating Conditions :

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temperature (FXFP-H7-S15-40D)	T _{OP}	0	-	+70	°C
Case Operating Temperature (FXFP-H7-S15-40Di)	T _{OP}	-40	-	+85	°C
Supply Voltage	V _{cc}	+3.13	+3.3	+3.47	V
Supply Current	I _{cc}			540	mA
Module Total Power	P			1.8	W

Transmitter Electro-optical Characteristics :

V_{cc}= 3.13V to 3.47V, T_{OP} = 0 °C to 70 °C(FXFP-H7-S15-40D); T_{OP} = -40 °C to 85 °C(FXFP-H7-S15-40Di)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.95	10.3125	11.3	Gb/s	
Bit Error Rate	BER			10 ⁻¹²		
Maximum Launch Power	P _{MAX}	-1		+2	dBm	1
Optical Wavelength	λ	1530	1550	1565	nm	
Optical Extinction Ratio	ER	8.2			dB	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Dispersion Penalty	DP			2	dB	
Optical Eye Mask		IEEE802.3ae				2
Relative Intensity Noise	RIN			-130	dB/Hz	
Input differential impedance	R _{in}	90	100	110	Ω	3
Differential data input voltage	V _{DIFF}	180		950	mV	
Transmit Disable Voltage	V _{dis}	2.0		V _{cc}	V	
Transmit Enable Voltage	V _{en}	GND		GND+0.8	V	
Transmit Disable Assert Time	T _{X_off}			10	us	
Transmit Enable Assert Time	T _{X_on}			2	ms	

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

Note2: Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps BER<10⁻¹²

Note3: After internal AC coupling



Receiver Electro-optical Characteristics :

$V_{CC} = 3.13V$ to $3.47V$, $T_{OP} = 0^{\circ}C$ to $70^{\circ}C$ (FXFP-H7-S15-40D); $T_{OP} = -40^{\circ}C$ to $85^{\circ}C$ (FXFP-H7-S15-40Di)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.95	10.3125	11.3	Gb/s	
Receiver Sensitivity	P_{IN_min}			-16	dBm	1
Receiver Sensitivity (OMA) @10.3Gb/s	P_{IN_sen}			-14.1	dBm	1
Stressed Receiver Sensitivity (OMA)	P_{IN_str}			-11.3	dBm	1
Maximum Input Power	P_{IN_max}			+0.5	dBm	1
Optical Center Wavelength	λ_c	1260		1600	nm	
Receiver Reflectance	Rrf			-27	dB	
LOS De-Assert	LOS _D			-17	dBm	
LOS Assert	LOS _A	-26			dBm	
LOS Hysteresis	LOS _{HY}	0.5		4	dB	
Differential data output voltage	Vout,pp	400	600	800	mV	
LOS Fault	VLOS _{fault}	Vcc-0.5		VccHOST	V	2
LOS Normal	VLOS _{norm}	GND		GND+0.8	V	2
LOS De-Assert Time (On to Off)	T _{D_LOS}			100	μs	
LOS Assert Time (Off to On)	T _{A_LOS}			100	μs	

Note1: Measured with a PRBS $2^{31}-1$ test pattern @10.3125Gbps BER< 10^{-12}

Note2: 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.



Pin Assignment :

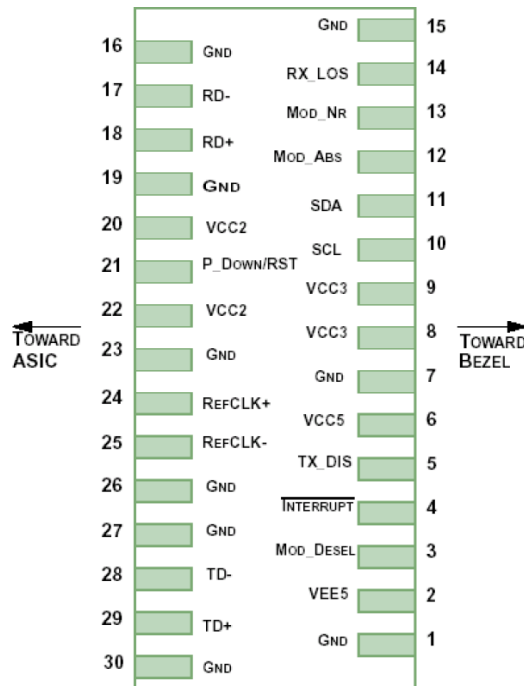


Diagram of Host Board Connector Block Pin Numbers and Name

Pin Description :

Pin	Logic	Name	Function / Description
1		GND	Module Ground
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	<u>Interrupt</u>	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off
6		VCC5	+5 Power Supply
7		GND	Module Ground
8		VCC3	+3.3V Power Supply
9		VCC3	+3.3V Power Supply
10	LVTTL-I	SCL	Serial 2-wire interface clock



11	LVTTL-I/O	SDA	Serial 2-wire interface data line
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.
13	LVTTL-O	Mod_NR	Module Not Ready;
14	LVTTL-O	RX_LOS	Receiver Loss of Signal indicator
15		GND	Module Ground
16		GND	Module Ground
17	CML-O	RD-	Receiver inverted data output
18	CML-O	RD+	Receiver non-inverted data output
19		GND	Module Ground
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
22			Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.
23		VCC2	+1.8V Power Supply – Not required
24		GND	Module Ground
25	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required
26	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board – Not required
27		GND	Module Ground
28		GND	Module Ground
29	CML-I	TD-	Transmitter inverted data input
30	CML-I	TD+	Transmitter non-inverted data input

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:

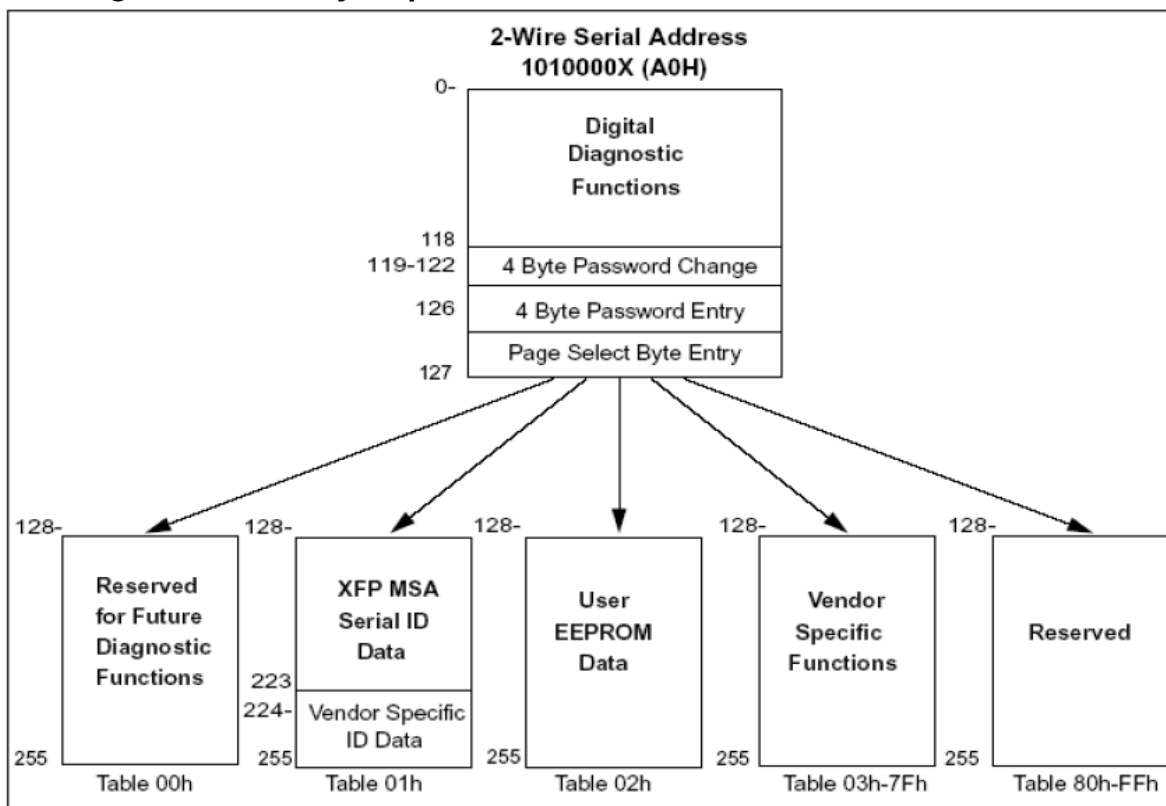
- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

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. 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.

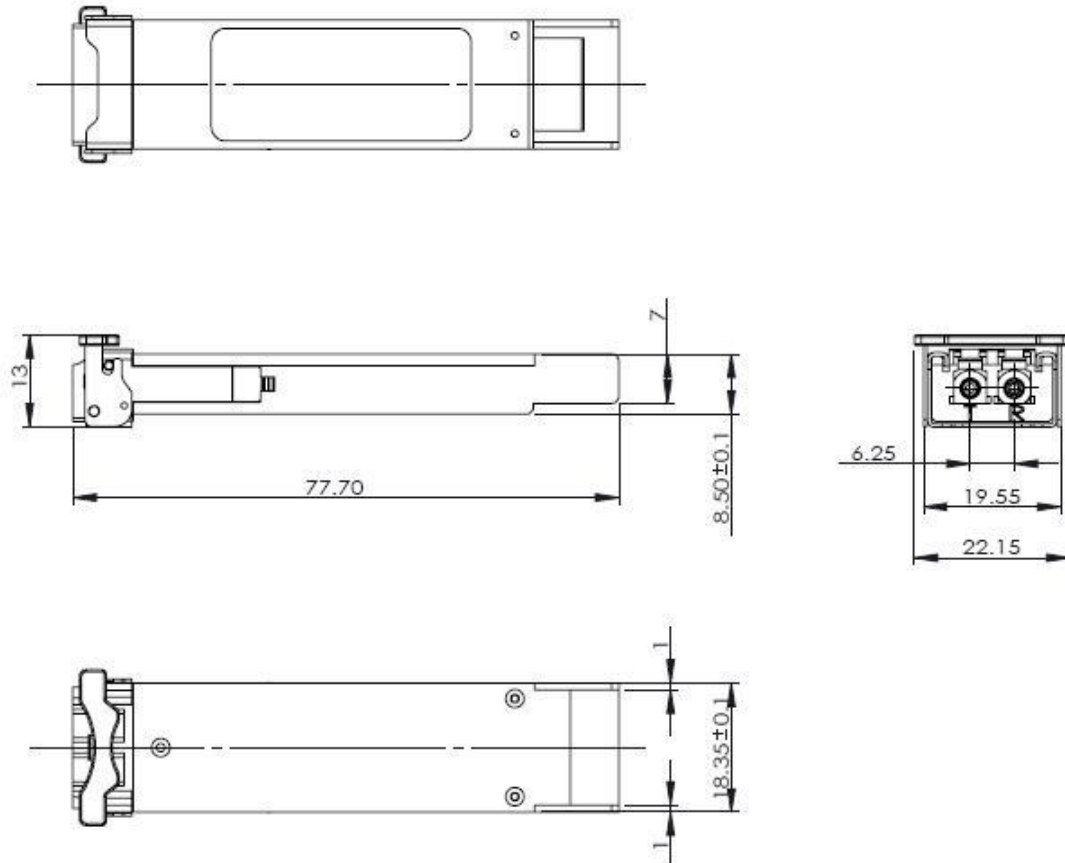
For more detailed information including memory map definitions, please see the XFP MSA Specification.

Digital Diagnostic Memory Map





Mechanical Dimensions :



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

Ordering Information :

Part No.	TX	Link	DDM	Temp.
FXFP-H7-S15-40D	1550nm	40km	Yes	0~70°C
FXFP-H7-S15-40Di	1550nm	40km	Yes	-40~85°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.