



10G XFP LR Transceiver

Hot Pluggable, Duplex LC, 1310nm DFB, SMF 10KM, DDM, I-Temp

Part Number: FXFP-H7-S13-10Di



Overview

FXFP-H7-S13-10Di Small Form Factor 10Gb/s XFP transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. The high performance uncooled 1310nm DFB transmitter & high sensitivity PIN receiver provide superior performance for 10GBASE-LR/LW and other 10G applications up to 10km optical links in Industrial Temperature range.

Applications

- 10GBASE-LR/LW Ethernet @10.3125G
- Fiber Channel 1200-SM-LC-L 10GFC @10.51875G
- SONET OC-192 & SDH STM-64 @9.953G
- CPRI Option #7 @9.83G, #8 @10.1376G
- OTN OTU2 @10.7G, OTU2e @11.09G, OTU2f @11.32G

Features

- Compliant with IEEE802.3ae 10GBASE-LR/LW
- Compatible with SONET OC192 SR-1 / SDH STM64 I64.1
- Compliant with Fiber Channel 1200-SM-LL-L
- Compliant with XFP MSA INF-8077i
- Support 9.95Gb/s to 11.32Gb/s multi-rates
- Hot-pluggable XFP footprint
- 1310nm DFB transmitter and PIN receiver
- Duplex LC connector
- No Reference Clock required
- 2-wire interface for management and diagnostic monitor compliant with SFF-8472
- Single +3.3V power supply
- Link distance 10km over SM fiber
- Operating Temperature -40~+85°C
- Maximum Power consumption 1.7W
- 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
Relative Humidity	RH	5	85	%
Supply Voltage	V _{CC}	-0.5	+3.6	V

Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temperature	T _{OP}	-40	-	+85	°C
Supply Voltage	V _{CC}	+3.13	+3.3	+3.47	V
Supply Current	I _{CC}			500	mA
Module Total Power	P			1.7	W

Transmitter Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = -40 °C to +85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.95	10.3125	11.32	Gb/s	
Optical Launch Power	P _o	-6		+0.5	dBm	1
Optical Center Wavelength	λ _c	1270	1310	1350	nm	
Optical Extinction Ratio	ER	3.5			dB	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Eye Mask	IEEE802.3ae					2
Relative Intensity Noise	RIN			-128	dB/Hz	
Input Differential Impedance	R _{IN}	90	100	110	Ω	3
Data Input Differential Voltage	V _{IN}	180		950	mV	
TX Disable Input Voltage-Low (TX ON)	TDISV _L	GND		0.8		
TX Disable Input Voltage-High (TX OFF)	TDISV _H	2.0		V _{CC}		
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 _{CC}	V	

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} = -40 °C to +85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	9.95	10.3125	11.32	Gb/s	
Receiver Sensitivity	SEN			-14.5	dBm	1
Maximum Receive Power	P _{RX-MAX}	+0.5			dBm	1
Optical Center Wavelength	λ_c	1260		1600	nm	
LOS De-Assert	LOS _D			-15.5	dBm	
LOS Assert	LOS _A	-26			dBm	
LOS Hysteresis	LOS _{HY}	0.5		4	dB	
Data Output Differential Voltage	V _{OUT}	400	600	800	mV	
Receiver LOS Signal Output Voltage-Low	LOS _{V_L}	GND		0.8	V	2
Receiver LOS Signal Output Voltage-High	LOS _{V_H}	2.0		V _{CC}	V	2

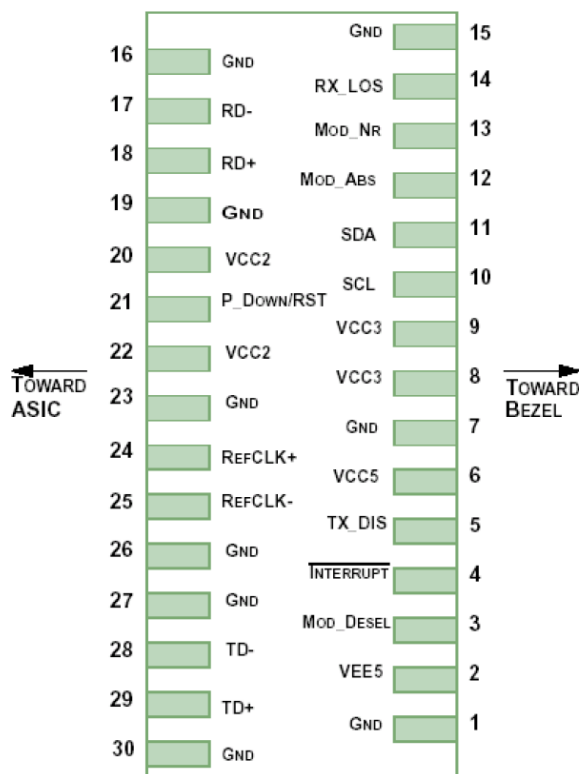
Note1: Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps BER<10⁻¹²

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



Host PCB XFP Pad Assignment

Pin Description

Pin	Logic	Name	Function / Description
1		GND	Module Ground
2		VEE5	Optional -5.2V 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
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	+5V Power Supply – Not required
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 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	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board – Not required
26		GND	Module Ground
27		GND	Module Ground
28	CML-I	TD-	Transmitter inverted data input
29	CML-I	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

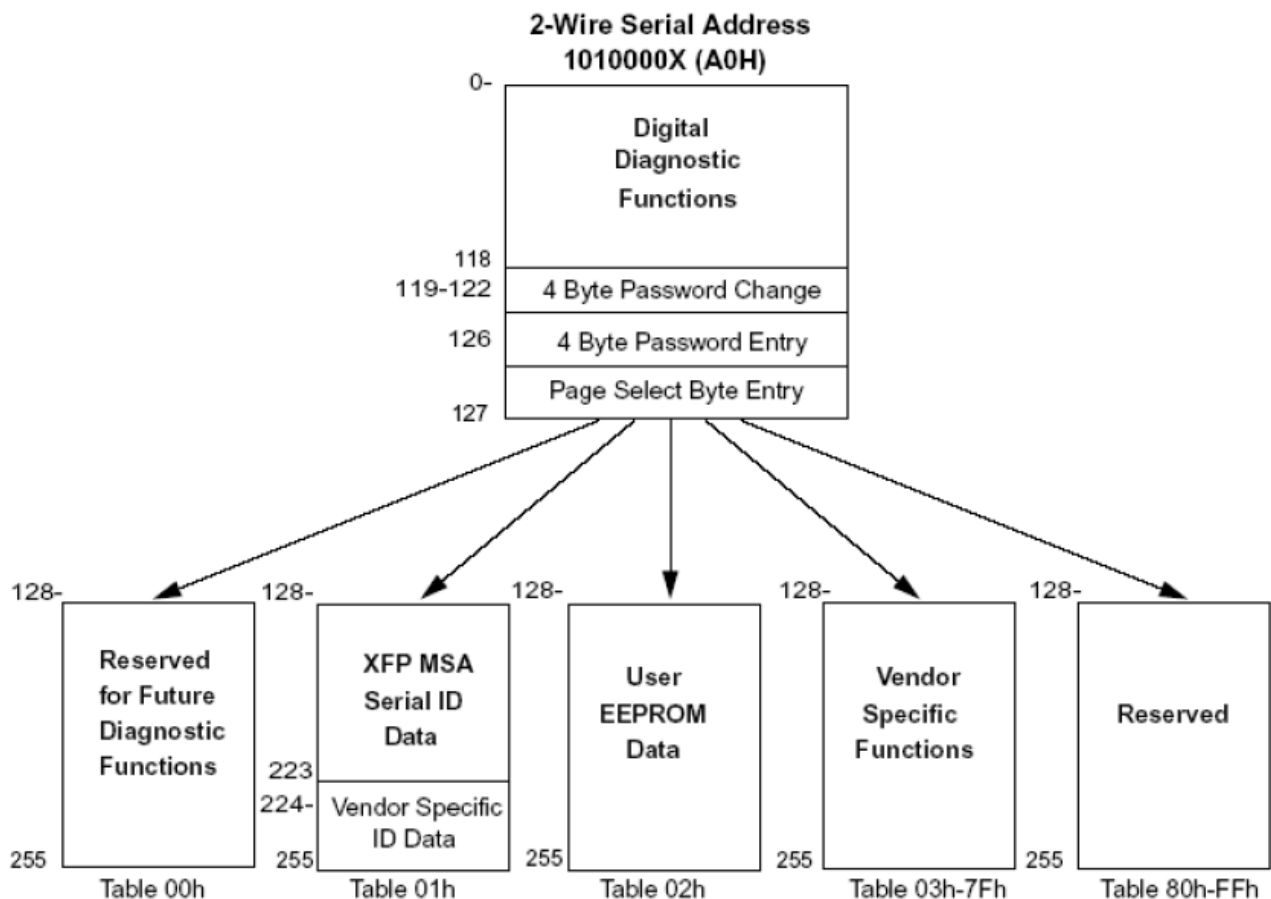


It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

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. 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.

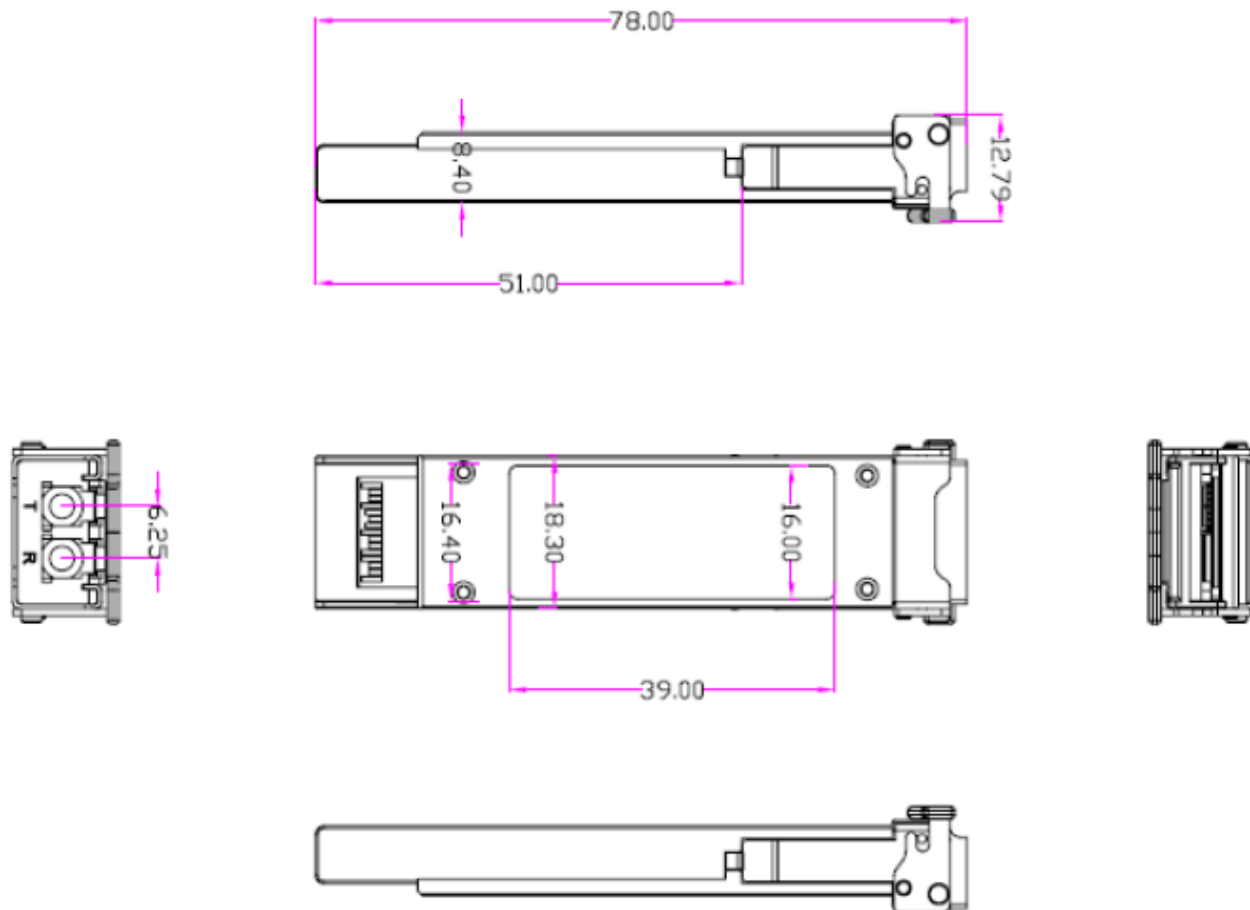
For more detailed information including memory map definitions, please see the XFP MSA Specification.

Digital Diagnostic Memory Map





Mechanical Dimensions



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

Ordering Information

Part No.	Tx	Rx	Link	DDM	Temp.
FXFP-H7-S13-10Di	1310nm	1260nm ~ 1620nm	SMF 10km	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.