

10GBASE-LRM XFP 1310nm 2km DOM Transceiver

XFP-10GLRM-31



Application

- 10GBASE-LR/LW Ethernet
- SONET OC-192 /SDH STM-64
- 1200-SM-LL-L 10G Fibre Channel
- Other optical links

Features

- Support multi protocol from 9.95Gb/s to 11.3Gb/s
- Hot pluggable 30 pin connector
- Compliant with XFP MSA
- Transmission distance of 2km over Single mode fiber
- 1310nm FP laser transmitter.
- Duplex LC connector
- 2-wire interface for management and diagnostic monitor
- XFI electrical interface with AC coupling
- Single power supply voltages : +3.3V
- Temperature range 0°C to 70°C
- Power dissipation: <1.5W
- RoHS Compliant Part

Description

FS XFP-10GLRM-31 Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. They comply with 10-Gigabit Ethernet 10GBASE-LR /LW per IEEE 802.3ae and 10G Fibre Channel 1200-SM-LL-L. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T_{ST}	-40	+85	°C
Case Operating Temperature	T_C	0	+70	°C
Supply Voltage	V_{CC3}	-0.5	+4.0	V

II. Electrical Characteristics (Condition: $T_{OP} = T_C$)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage	V_{CC3}	3.13		3.45	V	
Supply Current	I_{CC3}			450	mA	
Module total power	P			1.5	W	
Transmitter						
Input differential impedance	R_{in}		100		Ω	1
Differential data input swing	$V_{in,pp}$	150		820	mV	
Transmit Disable Voltage	V_D	2.0		V_{CC}	V	
Transmit Enable Voltage	V_{EN}	GND		GND+ 0.8	V	
Transmit Disable Assert Time	T_{off}			100	ms	
Tx Enable Assert Time	T_{on}			100	ms	

Receiver

Differential data output swing	$V_{out,pp}$	300	500	850	mV	
Data output rise time	t_r			35	ps	2
Data output fall time	t_f			35	ps	2
LOS Fault	$V_{LOS\ fault}$	$V_{CC} - 0.5$		$V_{CC_{HOST}}$	V	3
LOS Normal	$V_{LOS\ norm}$	GND		GND+0.5	V	3
Power Supply Rejection	PSR		See Note 4 below			4

Note (1): After internal AC coupling.

Note (2): 20 – 80 %

Note (3): 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.

Note (4): Per Section 2.7.1. in the XFP MSA Specification.

III. Optical Characteristics ($T_{OP} = T_c$)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
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Transmitter

Operating Data Rate	BR	9.95		11.3	Gb/s	
Bit Error Rate	BER			10-12		
Launch Power	P_{out}	-8.2		0.5	dBm	1
Optical Wavelength	λ	1260	1310	1355	nm	
Optical Extinction Ratio	ER	3.5			dB	
RMS Spectral Width	λ_{RMS}			4	nm	
Sidemode Supression ratio	SSRmin	30			dB	
Rise/Fall Time (20%~80%)	T_r/T_f			35	ps	

Average Launch power of OFF Transmitter	P_{OFF}			-30	dBm	
Tx Jitter	T_{Xj}	Compliant with each standard requirements				
Optical Eye Mask		IEEE802.3ae				2
Receiver						
Operating Data Rate	BR	9.95		11.3	Gb/s	
Receiver Sensitivity	Sen			-12.6	dBm	2
Maximum Input Power	P_{MAX}	0			dBm	2
Optical Center Wavelength	λ_C	1260		1600	nm	
Receiver Reflectance	Rrx			-12	dB	
LOS De-Assert	LOS_D			-13	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis	LOS_H	0.5		5	dB	

Note (1): The optical power is launched into SMF.

Note (2): Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps BER<10⁻¹².

IV. Pin Assignment

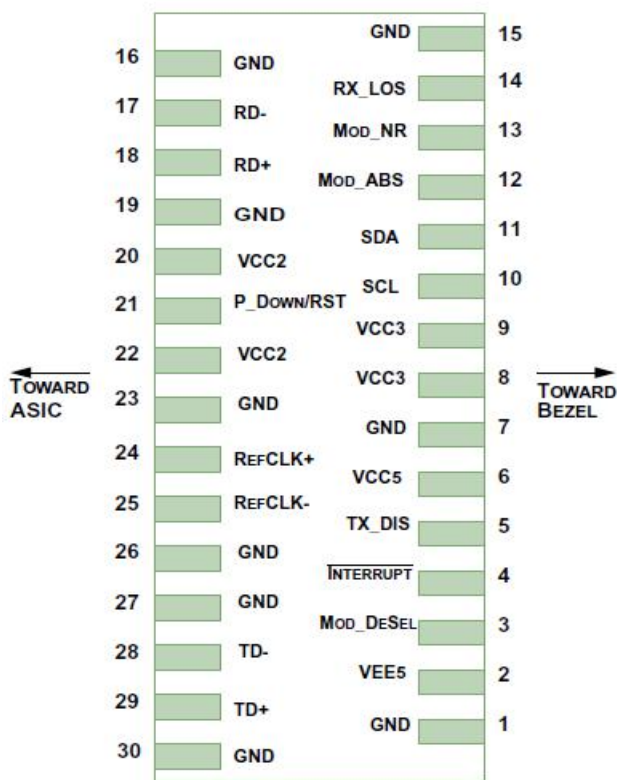


Diagram of Host Board Connector Block Pin Numbers and Name

V. Pin Description

Pin NO.	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional -5.2 Power Supply – Not required	
3	LVTTTL-I	Mod-Desel	Module De-select; When held low allows the module to, respond to 2-wire serial interface commands	
4	LVTTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTTL-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

Note (1): Module circuit ground is isolated from module chassis ground within the module.

Note (2): Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

Note (3): A Reference Clock input is not required .

VI. Digital Diagnostic Functions

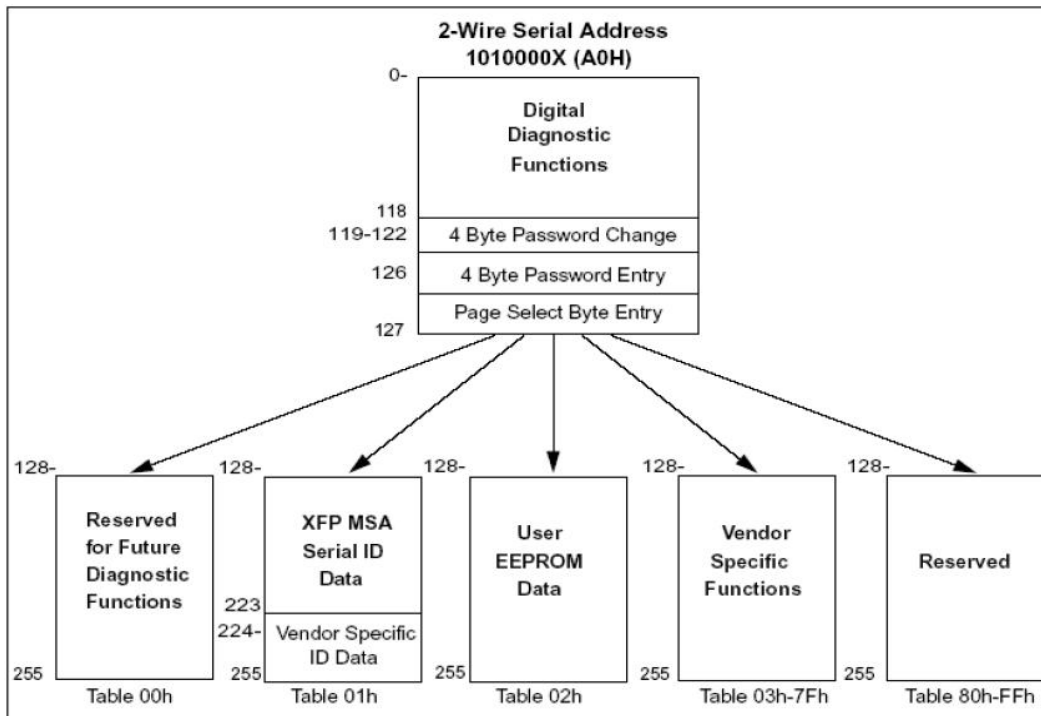
As defined by the XFP MSA , FS's XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

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

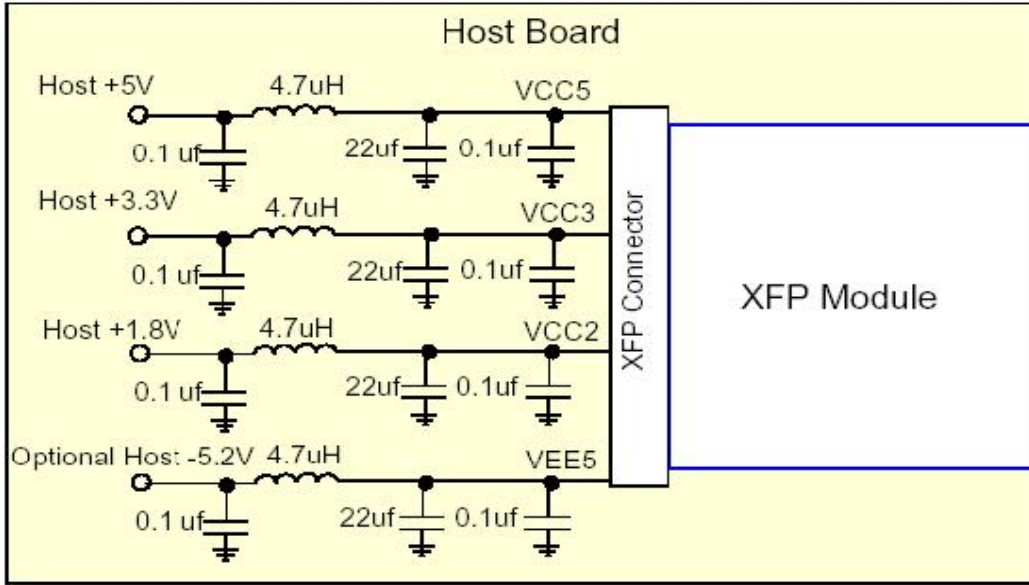
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

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

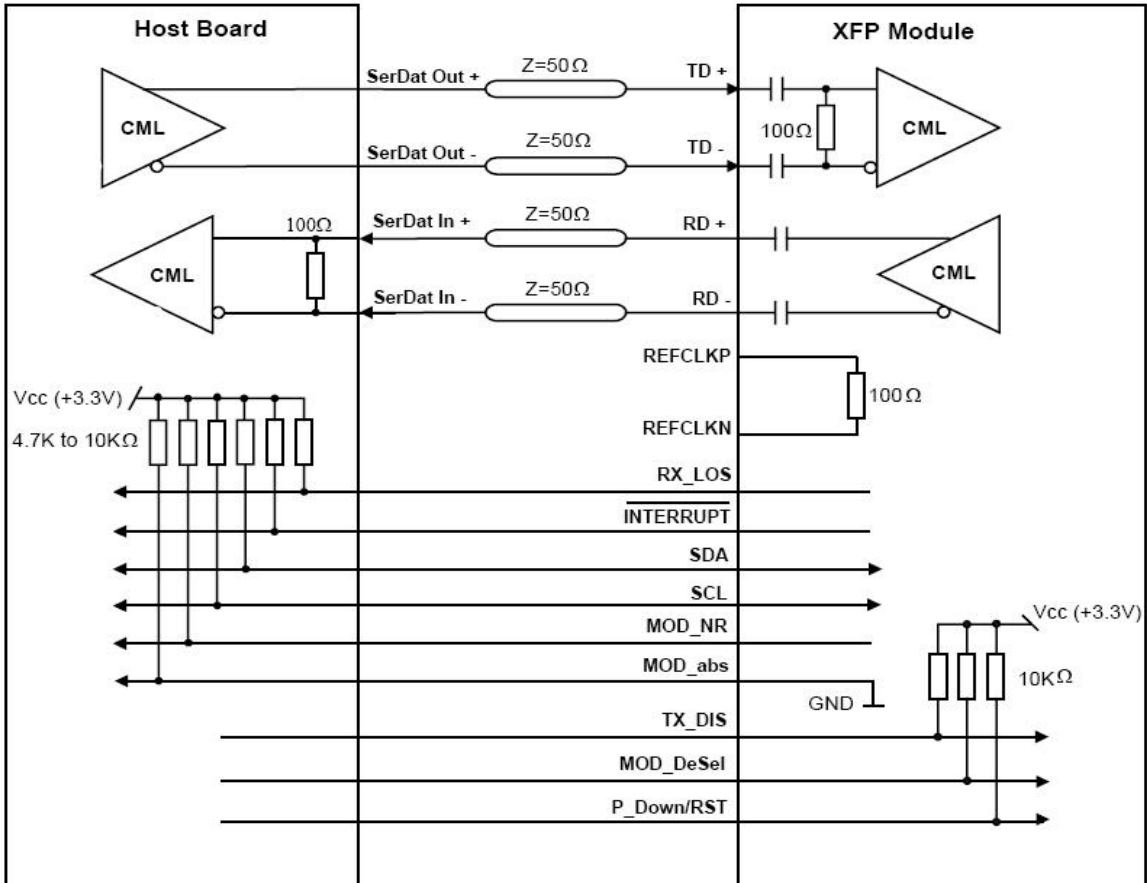
For more detailed information including memory map definitions, please see the XFP MSA Specification.



VII. Recommended Circuit

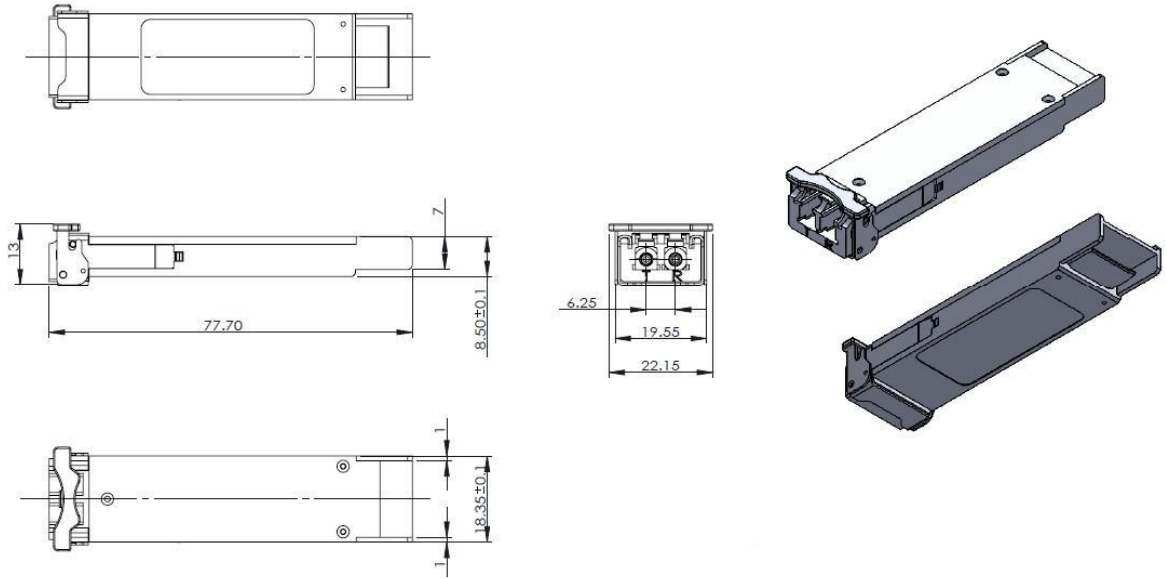


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

VIII. Mechanical Dimensions



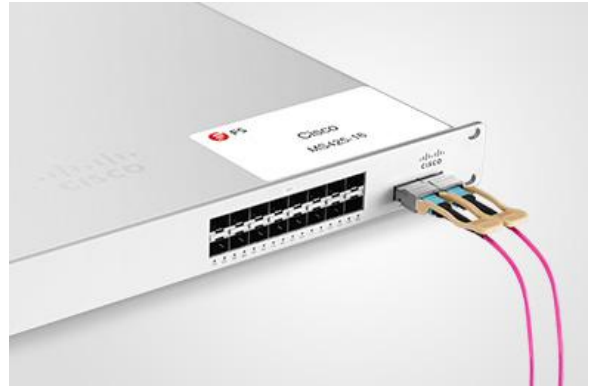
Test Center

I. Compatibility Testing

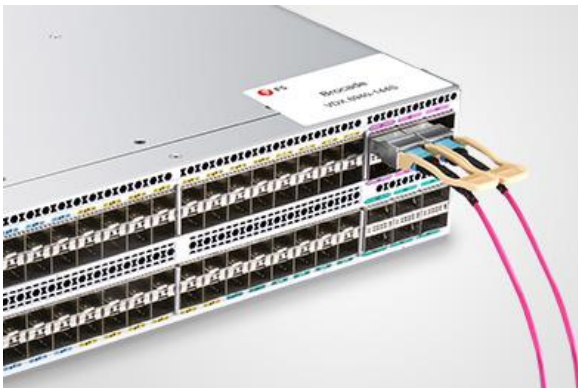
Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.



Cisco Catalyst C9500-24Y4C



Cisco MS425-16



Brocade VDX 6940-144S



Dell EMC Networking Z9100-ON



Force¹⁰ S60-44T

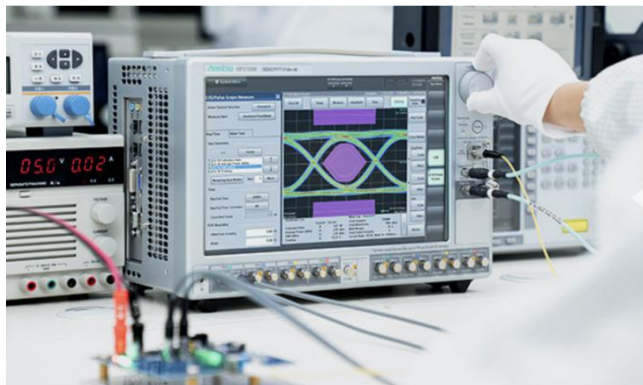


HUAWEI S6720-30L-HI-24S

Above is part of our test bed network equipment. For more information, please click the [Test Bed PDF](#). It will be updated in real time as we expand our portfolio.

II. Performance Testing

Each fiber optical transceiver has been fully tested in FS Assured Program equipped with world's most advanced analytical equipment to ensure that our transceivers work perfectly on your device.



1. TX/RX Single Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator the input and output signal quality.

- Eye Pattern Measurements: Jitter, Mask Margin, etc
- Average Output Power
- OMA
- Extinction Ratio
- Receiver Sensitivity
- BER Curve

2. Reliability and Stability Testing

Subject the transceivers to dramatic in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0°C to 70°C
- Extended: -5°C to 85°C
- Industrial: -40°C to 85°C



3. Transfer Rate and Protocol Testing

Test the actual transfer data rate and the transmission ability under different protocols with Networks Master Pro.

- Ethernet
- Fiber Channel
- SDH/SONET
- CPRI

4. Optical Spectrum Evaluation

Evaluate various important parameters with the Optical Spectrum Analyzer to meet the industry standards.

- Center Wavelength, Level
- OSNR
- SMSR
- Spectrum Width



Order Information

Part Number	Description
XFP-10GLRM-31	10GBASE-LRM XFP 1310nm 2km DOM Transceiver



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