

# 10GBASE-ER/EW and OC-192/STM-64 IR-2 XFP 1550nm 40km DOM Transceiver

XFP-10GER-55



## Application

- 10GBASE-ER/EW Ethernet
- SONET OC-192/SDH STM-64
- 40km 10G FC
- 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 40km over single mode fiber
- Cooled EML laser transmitter.
- Duplex LC connector
- 2-wire interface for management and diagnostic monitor
- XFI electrical interface with AC coupling
- Power supply voltages : +3.3V, +5V
- Temperature range 0° C to 70° C
- Power dissipation: <3W
- RoHS Compliant Part

## Description

FS' XFP-10GER-55 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 and high sensitivity PIN receiver provide superior performance for SONET/SDH and Ethernet applications up to 40km optical links.

## Product Specifications

### I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Storage Temperature	$T_{ST}$	-40		+85	°C	
Operating Temperature	$T_{OP}$	0		+70	°C	
Supply Voltage	$V_{CC3}$	-0.5		+4.0	V	
Supply Voltage 2	$V_{CC5}$	-0.5		+6.0	V	

### II. Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage 1	$V_{CC5}$	4.75		5.25	V	
Supply Voltage 2	$V_{CC3}$	3.13		3.45	V	
Supply Current – Vcc5 supply	$I_{CC5}$			170	mA	
Supply Current – Vcc3 supply	$I_{CC3}$			500	mA	
Module total power	P			3	W	
<b>Transmitter</b>						
Input differential impedance	$R_{in}$		100		$\Omega$	1
Differential data input swing	$V_{in,pp}$	120		820	mV	

<b>Transmit Disable Voltage</b>	VD	2.0		V <sub>cc</sub>	V	
<b>Transmit Enable Voltage</b>	VEN	GND		GND+ 0.8	V	
<b>Transmit Disable Assert Time</b>	T <sub>off</sub>			100	ms	
<b>Tx Enable Assert Time</b>	T <sub>on</sub>			100	ms	

### Receiver

<b>Differential data output swing</b>	V <sub>out,pp</sub>	340		850	mV	
<b>Data output rise time</b>	t <sub>r</sub>			35	ps	2
<b>Data output fall time</b>	t <sub>f</sub>			35	ps	2
<b>LOS Fault</b>	VLOS fault	V <sub>cc</sub> – 0.5		V <sub>cc</sub> HOST	V	3
<b>LOS Normal</b>	VLOS norm	GND		GND+0.4	V	3
<b>Power Supply Rejection</b>	PSR		See Note 4 below			4

#### Notes:

1. After internal AC coupling.
2. 20 – 80 %
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.
4. Per Section 2.7.1. in the XFP MSA Specification.

### III. Optical Characteristics

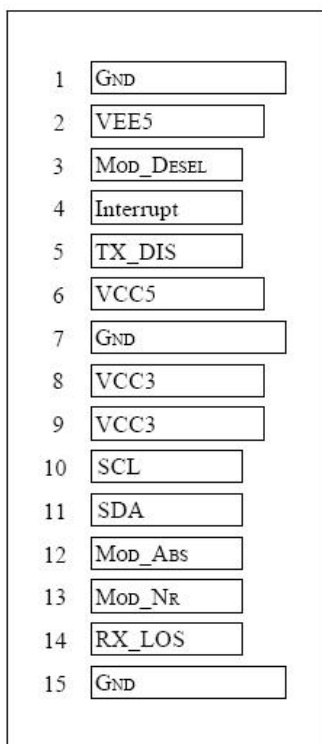
Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
<b>Transmitter</b>						
<b>Operating Data Rate</b>	B	9.95		11.3	Gb/s	
<b>Bit Error Rate</b>	BER			10 <sup>-12</sup>		
<b>Output Power</b>	P <sub>o</sub>	-1		+4	dBm	1

<b>Optical Wavelength</b>	$\lambda$	1530	1550	1565	nm	
<b>Optical Extinction Ratio</b>	ER	8.2			dB	
<b>Spectral Width</b>	$\Delta\lambda$			1	nm	
<b>Sidemode Supression ratio</b>	SSRmin	30			dB	
<b>Rise/Fall Time (20%~80%)</b>	Tr/Tf			35	ps	
<b>Average Launch power of OFF Transmitter</b>	POFF			-30	dBm	
<b>Tx Jitter</b>	Txj	Compliant with each standard requirements				
<b>Optical Eye Mask</b>		IEEE802.3ae				2
<b>Receiver</b>						
<b>Operating Date Rate</b>	B	9.95		11.3	Gb/s	
<b>Receiver Sensitivity@9.95Gb/s</b>	R			-16	dBm	2
<b>Maximum Input Power</b>	PMAX	-3			dBm	2
<b>Optical Center Wavelength</b>	$\lambda_c$	1260		1600	nm	
<b>Receiver Reflectance</b>	Rrx			-27	dB	
<b>LOS De-Assert</b>	LOS <sub>D</sub>			-17	dBm	
<b>LOS Assert</b>	LOS <sub>A</sub>	-30			dBm	
<b>LOS Hysteresis</b>		0.5		5	dB	

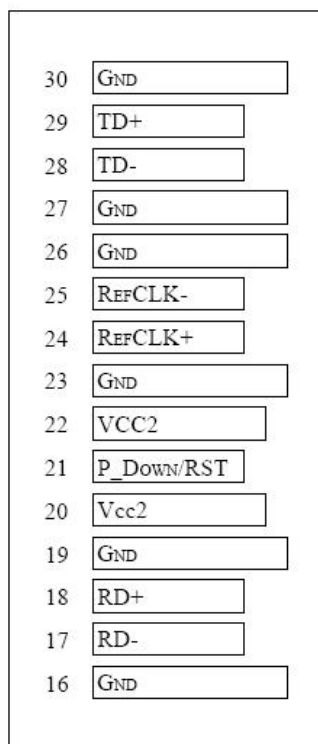
**Notes:**

1. The optical power is launched into SMF.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps BER<10<sup>-12</sup>.

### IV. Pin Description



Bottom of Board  
(As view through top of board)



Top of Board

**Diagram of Host Board Connector Block Pin Numbers and Name**

Pin	Symbol	Name/Description	Notes
1	GND	Module Ground	1
2	VEE5	Optional -5.2 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	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	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	SCL	Serial 2-wire interface clock	2
11	SDA	Serial 2-wire interface data line	2
12	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	Mod_NR	Module Not Ready;	2
14	RX_LOS	Receiver Loss of Signal indicator	2
15	GND	Module Ground	1
16	GND	Module Ground	1
17	RD-	Receiver inverted data output	
18	RD+	Receiver non-inverted data output	
19	GND	Module Ground	1
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	1
24	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	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	TD-	Transmitter inverted data input	
29	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.
2. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required .

## V. Digital Diagnostic Functions

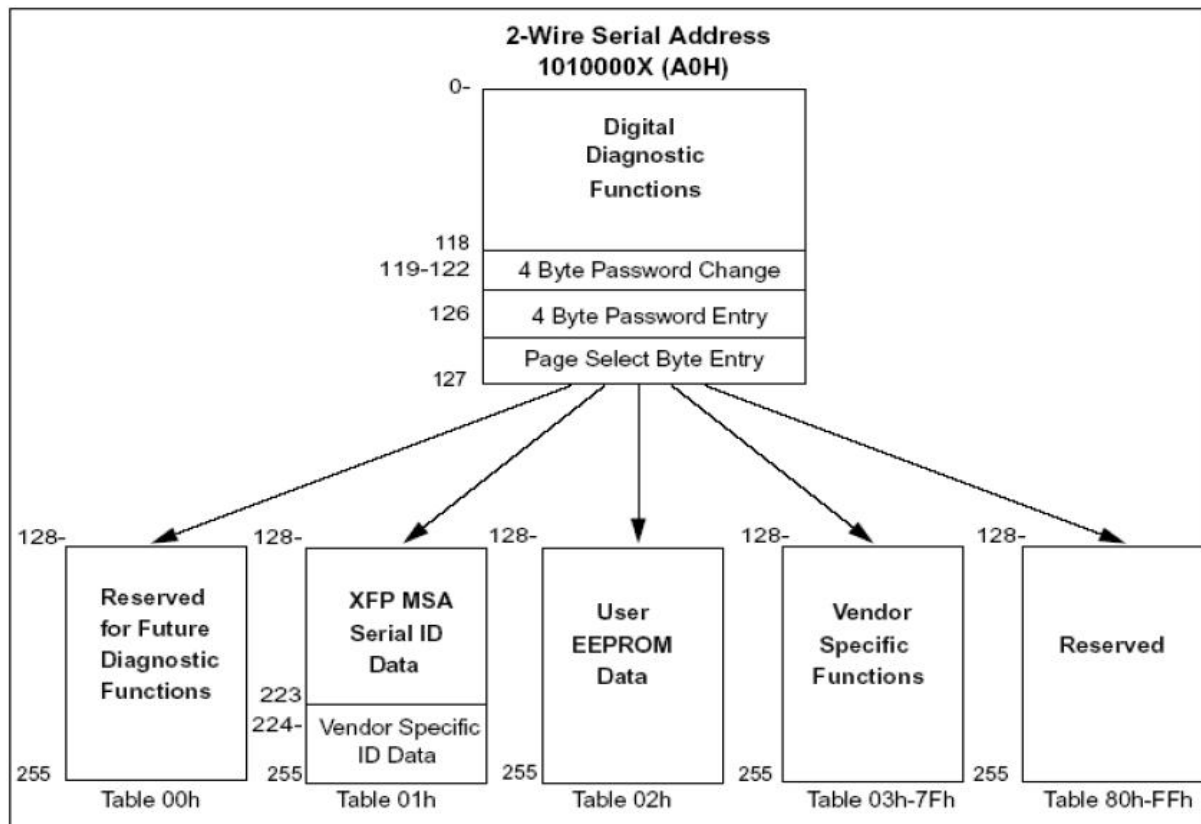
As defined by the XFP MSA 1, FS's XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

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

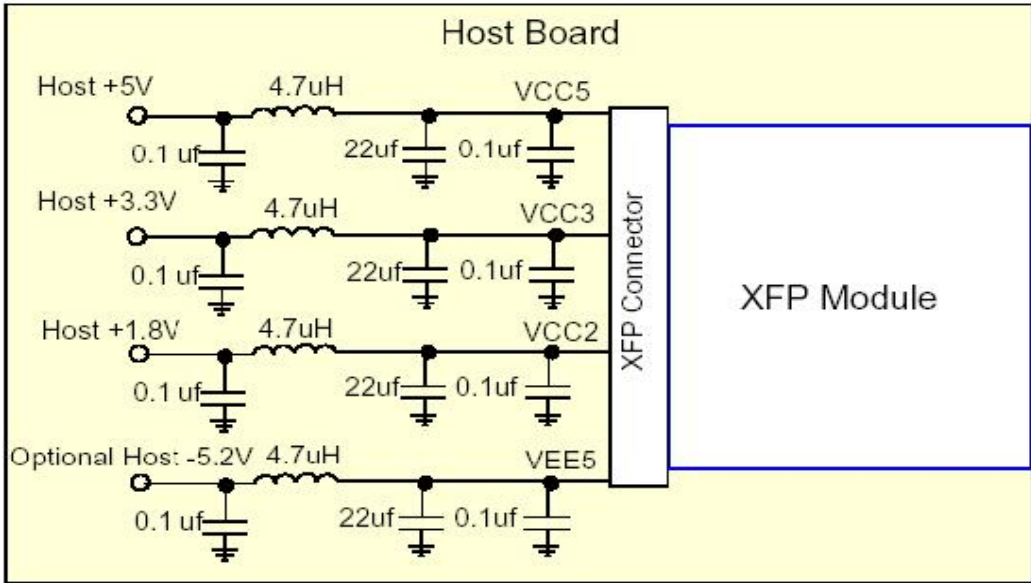
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

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.

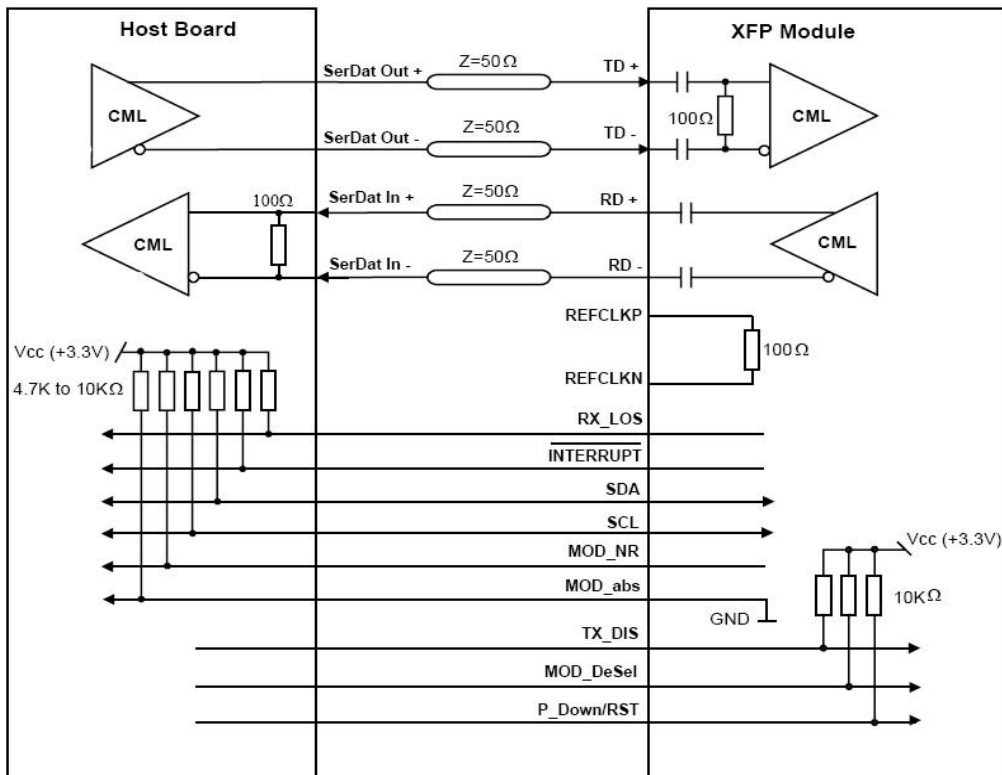
For more detailed information including memory map definitions, please see the XFP MSA Specification.



## VI. Recommended Circuit



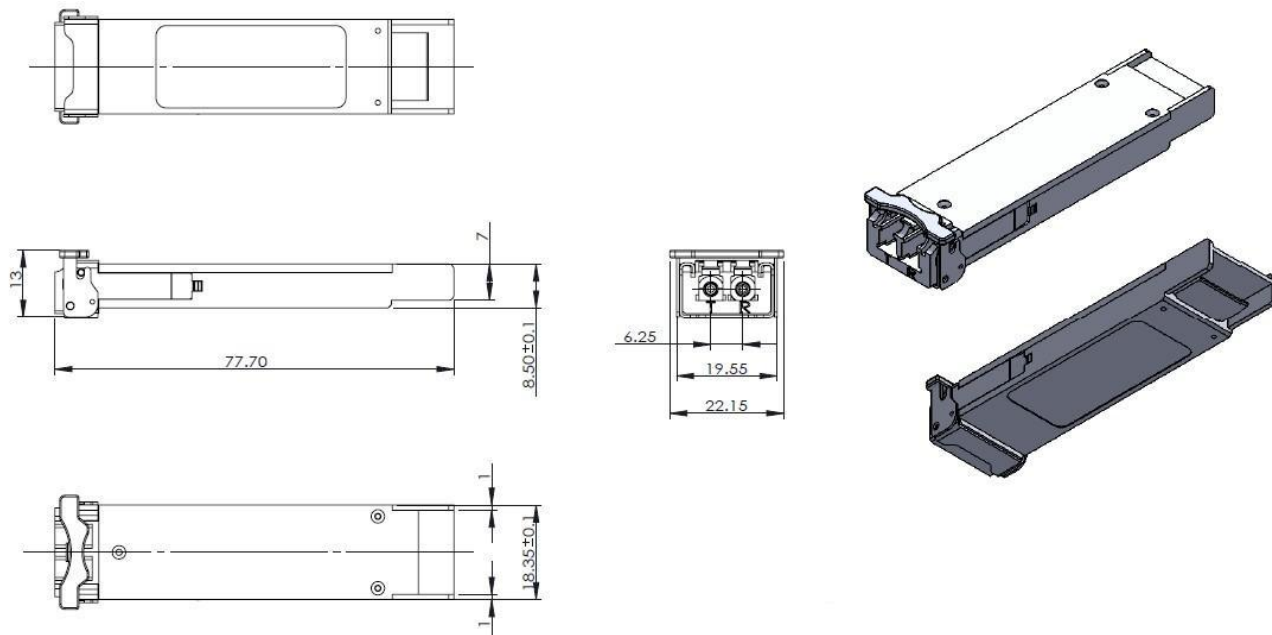
Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit



## VII. Mechanical Dimensions



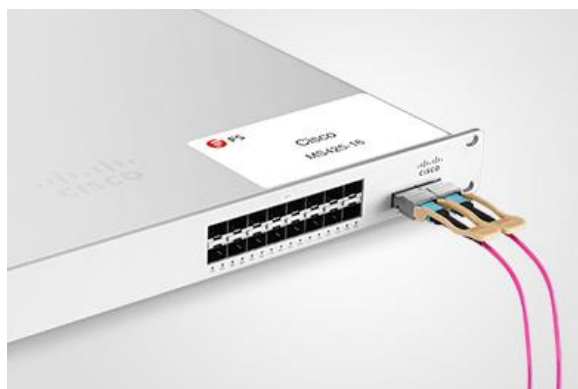
## Test Center

### 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



Force<sup>10</sup> S60-44T

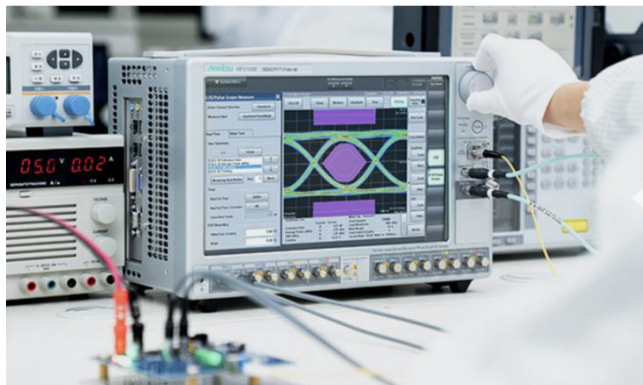


HUAWEI S6720-30L-HI-24S

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 220m DOM Transceiver
XFP-10GSR-85	10GBASE-SR XFP 850nm 300m DOM Transceiver
XFP-10GLRM-31	10GBASE-LRM XFP 1310nm 2km DOM Transceiver
XFP-10GLR-31	10GBASE-LR/LW and OC-192/STM-64 SR-1 XFP 1310nm 10km DOM Transceiver
XFP-10GER-55	10GBASE-ER/EW and OC-192/STM-64 IR-2 XFP 1550nm 40km DOM Transceiver
XFP-10GZR-55	10GBASE-ZR/ZW and OC-192/STM-64 LR-2 XFP 1550nm 80km DOM Transceiver
XFP-10GZRC-55	10-Gigabit Ethernet XFP 1550nm 100km DOM Transceiver
X2-10GSR-31	10GBASE-LRM X2 1310nm 220m DOM Transceiver
X2-10GSR-85	10GBASE-SR X2 850nm 300m DOM Transceiver
X2-10GSR-85	10GBASE-SR X2 850nm 300m DOM Transceiver
X2-10GSR-85	10G Fibre Channel X2 850nm 300m DOM Transceiver
X2-10GLR-31	10GBASE-LR X2 1310nm 10km DOM Transceiver
X2-10GLR-31	10G Fibre Channel X2 1310nm 10km DOM Transceiver
X2-10GER-55	10GBASE-ER X2 1550nm 40km DOM Transceiver
X2-10GER-55	10G Fibre Channel X2 1550nm 40km DOM Transceiver
X2-10GZR-55	10GBASE-ZR X2 1550nm 80km DOM Transceiver

### Note:

10G XFP transceiver module is individually tested on corresponding equipment such as Cisco, Arista, Juniper, Dell, Brocade and other brands, and passes the monitoring of FS.COM intelligent quality control system.



 <https://www.fs.com>



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