

# 10GBASE-BX SFP+ 1550nmTX/1490nmRX 80km DOM Transceiver

SFP-10G-BX80



## Application

- 10GBASE-ZR/ZW Ethernet
- SONET OC-192 / SDH
- 10G Fibre channel

## Features

- Supports 9.95 to 11.3Gb/s bit rates
- Hot-Pluggable
- Single LC for Bi-directional Transmission
- cooled EML transmitter, APD photo-detector
- SMF links up to 80km
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface
- Power Supply :+3.3V
- Power consumption<2.5W
- Temperature Range: 0-70° C
- RoHS compliant

## Description

FS's SFP-10G-BX80 is a very compact 10Gb/s optical transceiver module for serial optical communication applications at 10Gb/s. The SFP-10G-BX80 converts a 10Gb/s serial electrical data stream to 10Gb/s optical output signal and a 10Gb/s optical input signal to 10Gb/s serial electrical data streams. The high speed 10Gb/s electrical interface is fully compliant with SFI specification.

The high performance 1490/1550nm 1550/1490nm cooled EML transmitter and high sensitivity APD receiver provide superior performance for Ethernet applications at up to 80km links.

The SFP+ Module compliants with SFF-8431, SFF-8432 and IEEE 802.3ae 10GBASE-ZR. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The fully SFP compliant form factor provides hot plug-ability, easy optical port upgrades and low EMI emission.

## I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
<b>Storage Temperature</b>	TS	0		+70	° C	
<b>Case Operating Temperature</b>	TA	-40		+85	° C	
<b>Maximum Supply Voltage</b>	Vcc	-0.5		4	V	
<b>Relative Humidity</b>	RH	0		85	%	

## II. Optical Characteristics (TOP = 0 to 70°C, VCC = 3.3 ± 5% Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
<b>Transmitter (per Lane)</b>						
<b>Center Wavelength</b>	SFP-10G-BX80	$\lambda_t$	1550		nm	
	SFP-10G-BX80	$\lambda_t$	1490		nm	
<b>Spectral Width</b>	$\Delta\lambda$			0.3	nm	
<b>Average Optical Power</b>	Pavg	0		+5	dBm	1
<b>Optical Power OMA</b>	Poma	-2.1			dBm	
<b>Laser Off Power</b>	Poff			-30	dBm	
<b>Extinction Ratio</b>	ER	8.2			dB	
<b>Transmitter Dispersion Penalty</b>	TDP			3.0	dB	2
<b>Relative Intensity Noise</b>	Rin			-128	dB/Hz	3
<b>Optical Return Loss Tolerance</b>		21			dB	

Receiver

Center Wavelength	SFP-10G-BX80	$\lambda_r$		1490		nm	
	SFP-10G-BX80	$\lambda_r$		1550		nm	
Receiver Sensitivity		Sen			-22	dBm	4
Los Assert		LOSA	-34		-	dBm	
Los Dessert		LOSD			-24	dBm	
Los Hysteresis		LOSH	0.5			dB	
Overload		Sat	-7			dBm	5
Receiver Reflectance		Rrx			-26	dB	

Notes:

1.Average power figures are informative only, per IEEE802.3ae.

2.TWDP figure requires the host board to be SFF-8431compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3ae.

3.12dB reflection.

4.Conditions of stressed receiver tests per IEEE802.3ae. CSRS testing requires the host board to be SFF-8431 compliant.

5.Receiver overload specified in OMA and under the worst comprehensive stressed condition.

### III.Electrical Characteristics(TOP = 0 to 70°C, VCC =3.135 to 3.465 Volts )

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
<b>Supply Voltage</b>	Vcc	3.135		3.465	V	

**Supply Current**      Icc      700      mA

<b>Power Consumption</b>	P			2.5	W	
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#### Transmitter Section

<b>Input differential impedance</b>	Rin		100		Ω	1
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**Tx Input Single Ended DC Voltage Tolerance (Ref VeeT)**      V      -0.3      4      V

<b>Differential input voltage swing</b>	Vin,pp	180		700	mV	2
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**Transmit Disable Voltage**      VD      2      Vcc      V      3

<b>Transmit Enable Voltage</b>	VEN	Vee		Vee+0.8	V	
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#### Receiver Section

<b>Single Ended Output Voltage Tolerance</b>	V	-0.3		4	V	
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**Rx Output Diff Voltage**      Vo      300      850      mV

<b>Rx Output Rise and Fall Time</b>	Tr/Tf	30			ps	4
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**LOS Fault**      VLOS fault      2      VccHOST      V      5

<b>LOS Normal</b>	VLOS norm	Vee		Vee+0.8	V	5
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#### Notes:

1.Connected directly to TX data input pins. AC coupling from pins into laser driver IC.

2.Per SFF-8431 Rev 3.0

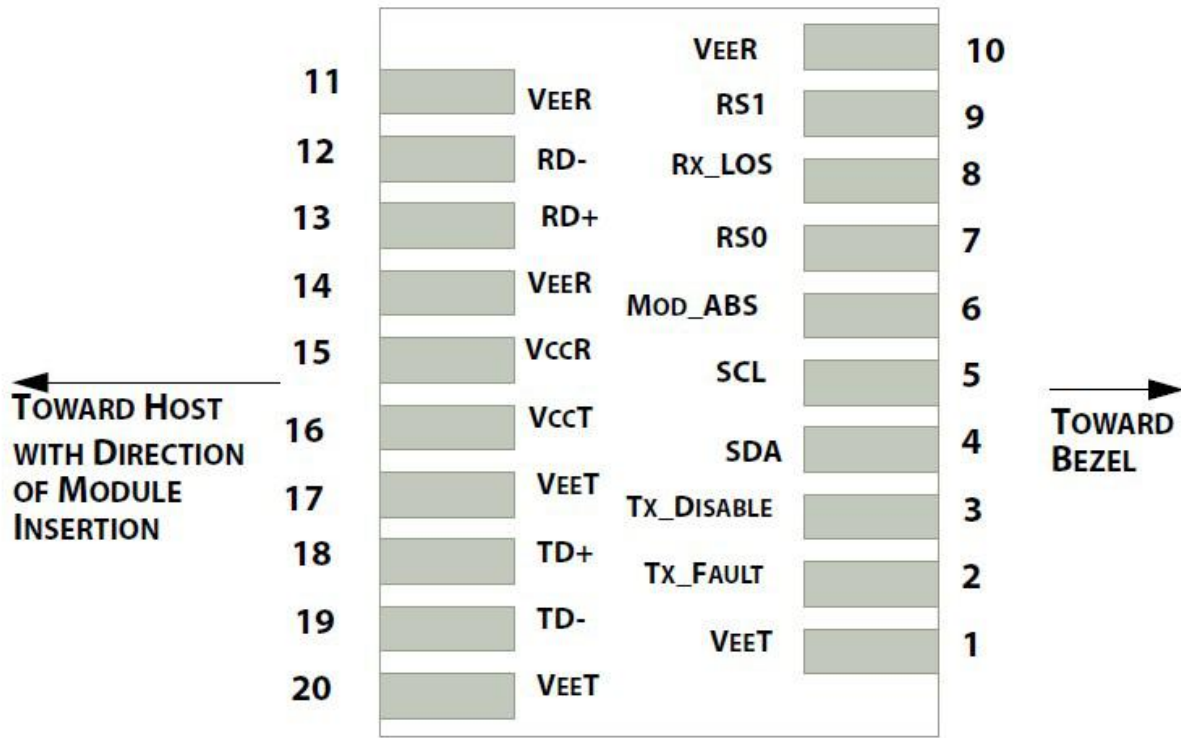
3.Into 100 ohms differential termination.

4.20%~80%

5.LOS is an open collector output. Should be pulled up with 4.7k – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

IV. Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



V. Pin Assignment

Pin	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s; when low, input data rate <=4.5Gb/s	

8	LOS	Receiver Loss of Signal Indication	4
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	1

#### Notes:

- 1.The module ground pins shall be isolated from the module case.
- 2.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.
- 3.This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
- 4.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

VI. SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

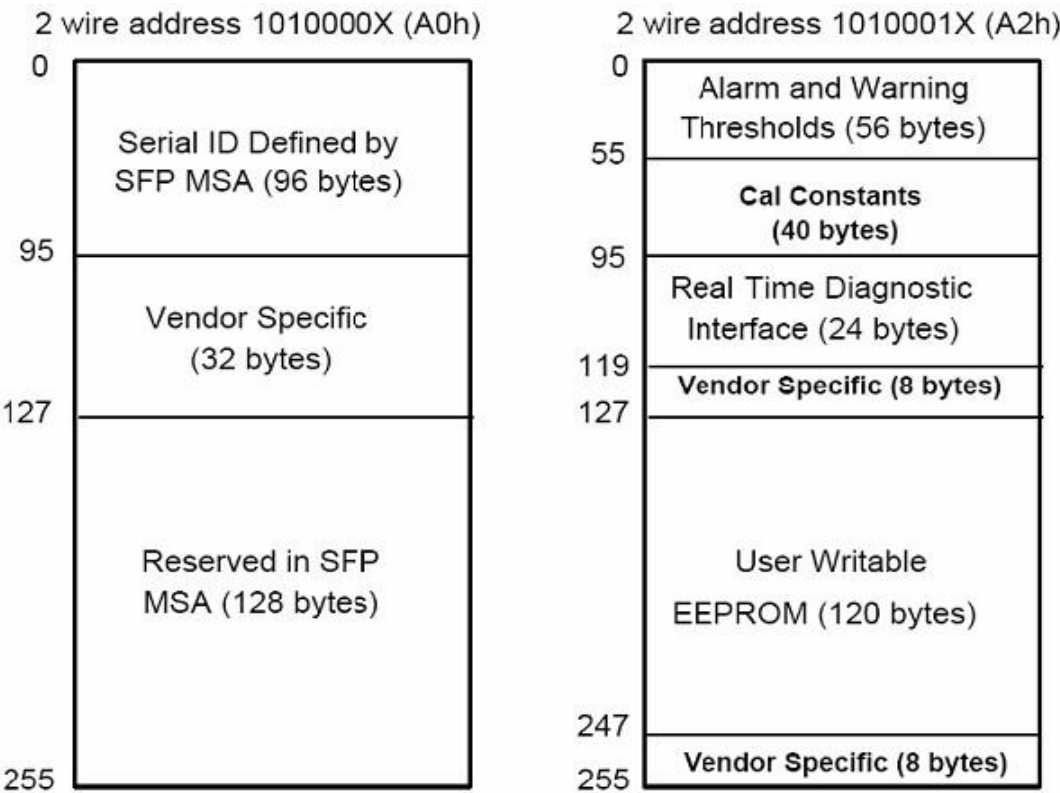


Table 2 - EEPROM Serial ID Memory Contents (A0h)

Data Address	Length(Byte)	Name ofLength	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	10G Base-ZR
11	1	Encoding	64B/66B
12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: FS
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: " SFP-10G-BX80" (ASCII)

56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62

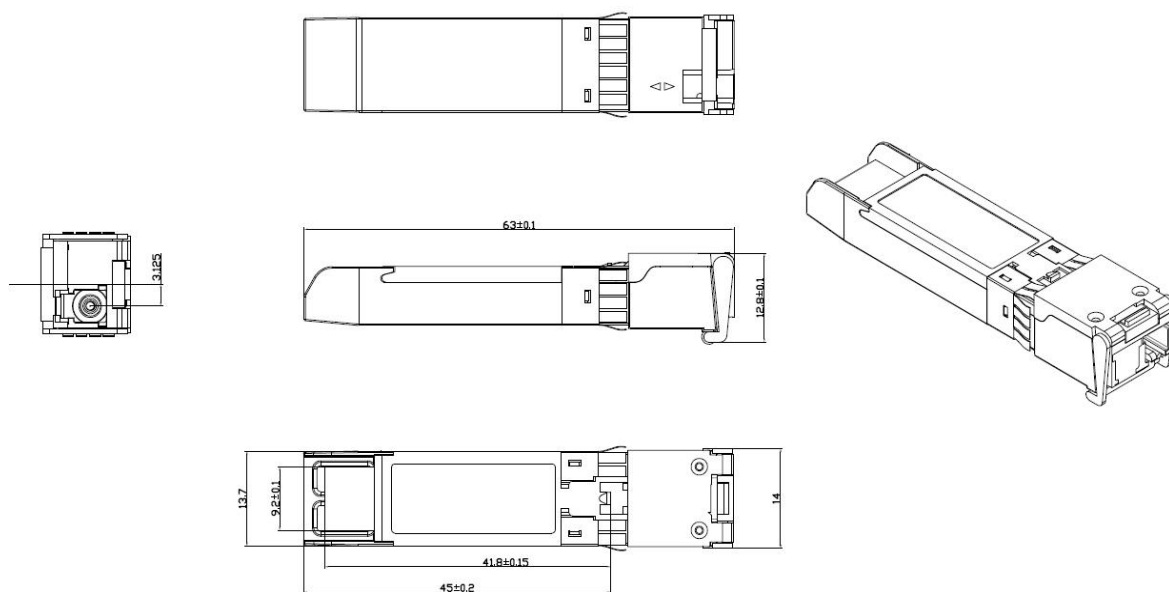
### Extended ID Fields

64-65	2	Option	Indicates which optical SFP signals are implemented(001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	FS's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)

### Vendor Specific ID Fields

96-127	32	Readable	FS specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

## VII. Mechanical Specifications



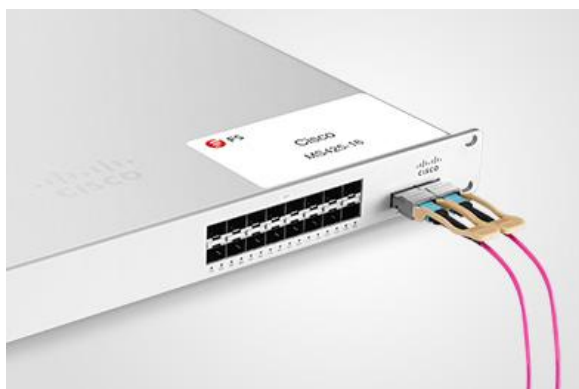
## Test Center

### 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

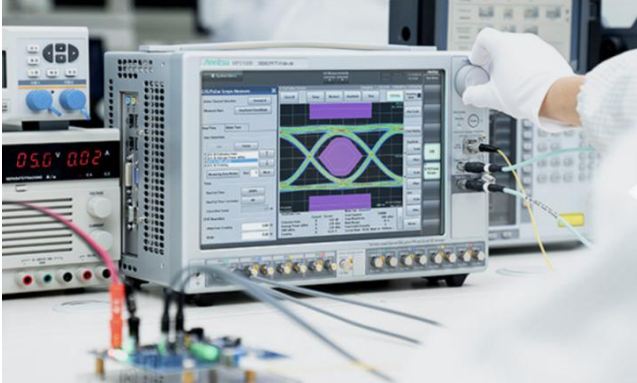


HUAWEI S6720-30L-HI-24S

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
SFP-10G-BX	SFP+, BIDI, 10GBase, 1490nm-TX/1550nm-RX, SMF, 80km, LC, DOM
SFP-10G-BX	SFP+, BIDI, 10GBase,1550nm-TX/1490nm-RX, SMF, 80km, LC, DOM
SFP-10G-BX	SFP+, BIDI, 10GBase,1490nm-TX/1550nm-RX , SMF, 100km, LC, DOM
SFP-10G-BX	SFP+, BIDI, 10GBase,1550nm-TX/1490nm-RX , SMF, 100km, LC, DOM



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