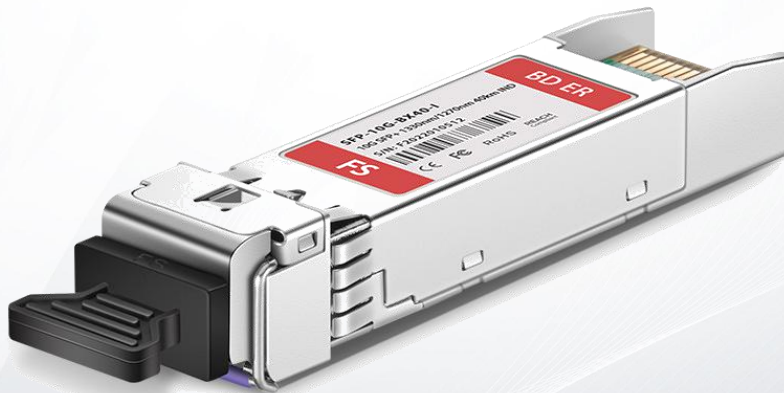


10GBASE-BX SFP+

1330nmTX/1270nmRX 40km Industrial

DOM Transceiver

SFP-10G-BX40-I



Application

- 10G Ethernet
- 10GBASE-LR/LW
- Data Center
- OBSAI Rates 3.072 Gb/s, 6.144Gb/s
- CPRI Rates 2.4576 Gb/s, 4.9152Gb/s, 6.144Gb/s, 9.8304 Gb/s

Standards

- Compliant with IEEE 802.3ae
- Compliant with SFF-8431 Rev 4
- Compliant with SFF-8432
- Compliant with SFF-8472 Rev 10

Features

- Maximum Power Consumption 1W
- Operating Data Rate Up to 10.3Gbps
- Transmission Distance Up to 40km
- Industrial Temperature Range: -40~ +85°C
- Single 3.3V±5% Power Supply
- LC Single Connector
- Hot Pluggable SFP+ MSA Compliant
- Digital Diagnostic Monitoring(DOM) Supported
- Class 1 Laser Safety

Description

FS's SFP+ transceiver supports up to 40km link lengths over OS2 SMF via an LC simplex connector. This transceiver is compliant with IEEE 802.3ae, SFP+ MSA, SFF-8472, SFF-8431 and SFF-8432 standards. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters.

The SFP-10G-BX40-I is for industrial operating temperature range and can work in harsh industrial environments. It is suitable for 10G Ethernet, OBSAI, CPRI and Data Center applications.

Products Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature Range	T_S	-40	85	°C
Supply Voltage	V_{CC}	-0.3	4.0	V
Relative Humidity	RH	5	95	%

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature Range	T_{OPR}	-40		85	°C
Power Supply Voltage	V_{CC}	3.14	3.3	3.46	V
Bit Rate	BR	2.5		10.3	Gb/s
Bit Error Ratio	BER			10^{-12}	
Max. Supported Link Length	L			40	km

III. Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Data Rate		2.5	10.3	11.3	Gbps	
Transmission Distance	L			40	km	
Center Wavelength	λ_c	1260	1270	1280	nm	
		1320	1330	1340		
Spectral Width(-20dB)	$\Delta\lambda_{rms}$			1	nm	1
SMSR		30			dB	
Optical Output Power	P_O	1		5	dBm	2
Average Launch Power of OFF Transmitter	P_{OFF}			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	R_{IN}			-128	dB/Hz	
Optical Output Eye	Compliant with IEEE802.3ae					
Receiver						
Data Rate		2.5		10.3	Gbps	
Center Wavelength	λ_c	1320	1330	1340	nm	
		1260	1270	1280		
Receiver Sensitivity	R_{SEN}			-15	dBm	3

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Receiver Overload		0.5			dBm	3
Receiver Reflectance	R_{REFL}			-12	dB	
LOS	Optical Assert	LOS_A	-30		dBm	
	Optical Dessert	LOS_D		-18	dBm	
LOS Hysteresis		0.5		6	dB	

NOTE 1: Spectral width has to be defined over -20dB.

NOTE 2: Minimum output optical level is at end of life.

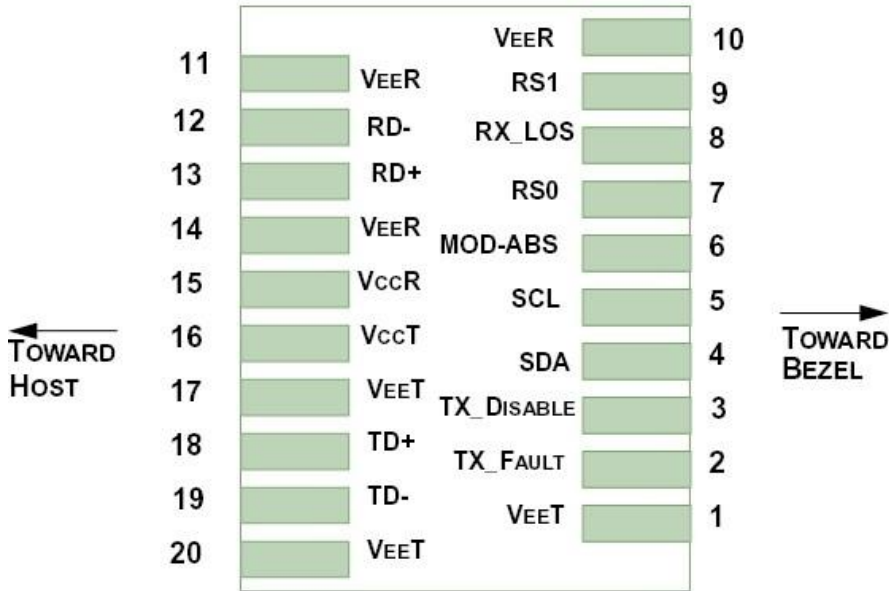
NOTE 3: Sensitivity for PRBS $2^{31}-1$ and BER better than or equal to 10^{-12} .

IV. Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V_{CC}	3.14	3.3	3.46	V	
Supply Current	I_{CC}			290	mA	
Power Consumption	P_C			1.0	W	
Transmitter (Module Input, TP1)						
Input Differential Impedance	R_{IN}	80	100	120	Ω	1
Differential Data Input Swing	V_{IN}	180		700	mV _{P-P}	
Transmit Disable Voltage	V_{DIS}	2		V_{CCHOST}	V	
Transmit Enable Voltage	V_{EN}	$V_{EE}-0.3$		$V_{EE}+0.4$	V	
Transmit Fault Assert Voltage	V_{FA}	2		V_{CCHOST}	V	
Transmit Fault De-Assert Voltage	V_{FDA}	V_{EE}		$V_{EE}+0.4$	V	
Receiver						
Differential Data Output Swing	V_{OD}	450	600	850	mV _{P-P}	
Output Rise Time	t_{RISE}	28			ps	
Output Fall Time	t_{FALL}	28			ps	
LOS Fault	V_{LOSFT}	2		V_{CCHOST}	V	
LOS Normal	V_{LOSNR}	V_{EE}		$V_{EE}+0.8$	V	

NOTE 1: Differential between TD+ / TD-.

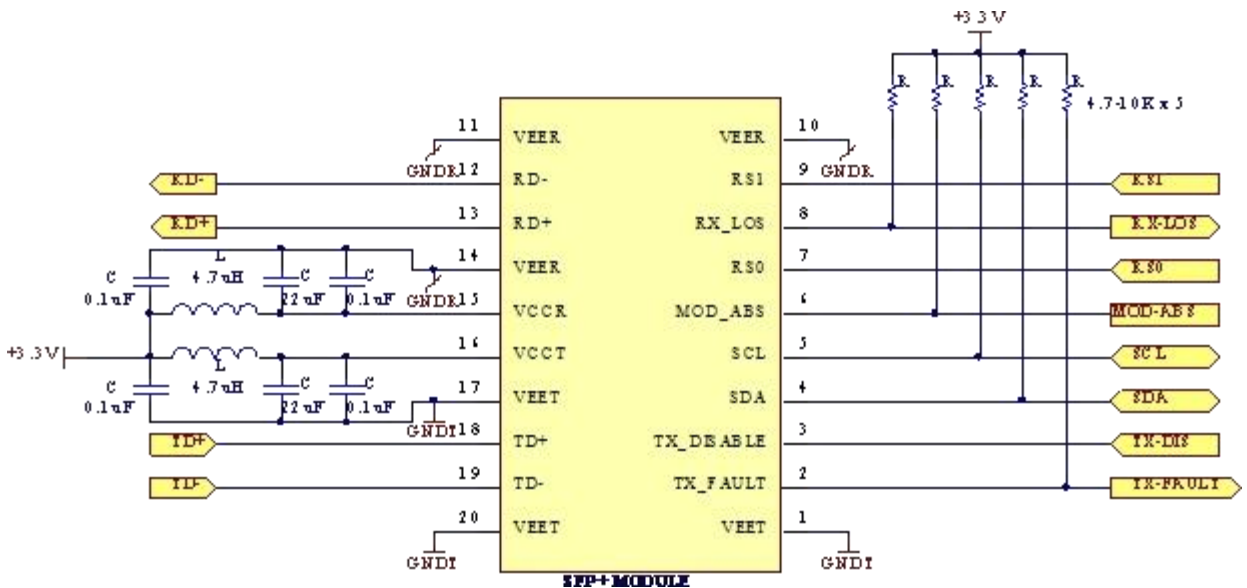
V. Pin Description



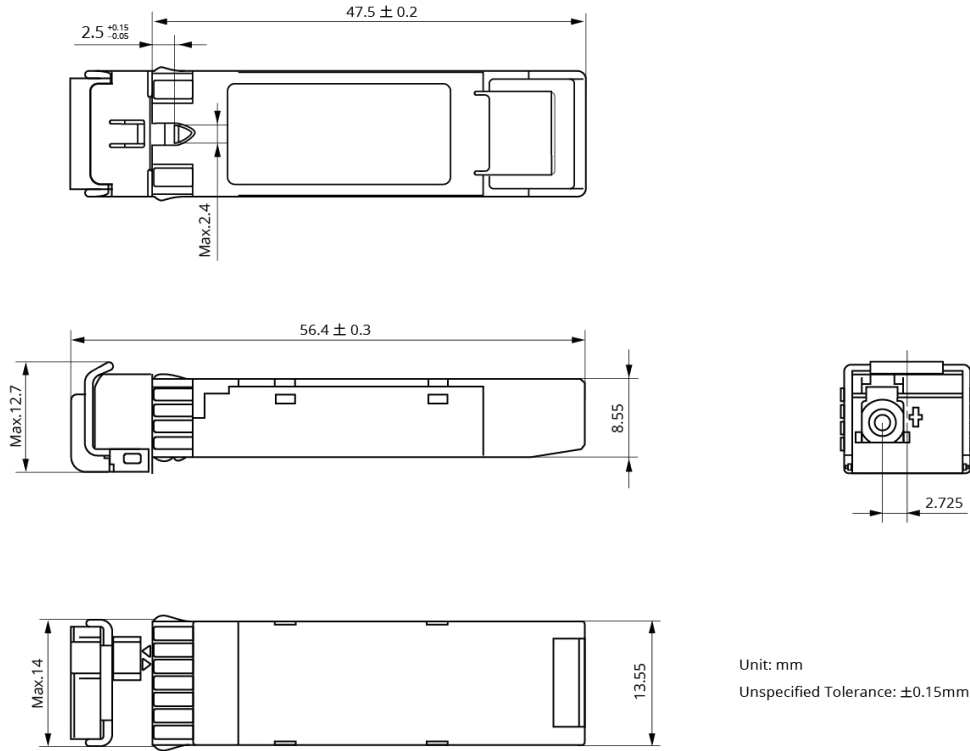
Pin Number	Symbol	Name	Description
1, 17, 20	VeeT	Transmitter Signal Ground	These pins should be connected to signal ground on the host board.
2	TX Fault	Transmitter Fault Out (OC)	Logic "1" Output = Laser Fault (Laser off before t_fault) Logic "0" Output = Normal Operation This pin is open collector compatible, and should be pulled up to Host V _{cc} with a 10kΩ resistor.
3	TX Disable	Transmitter Disable In (LVTTTL)	Logic "1" Input (or no connection) = Laser off Logic "0" Input = Laser on. This pin is internally pulled up to V _{ccT} with a 10 kΩ resistor.
4	SDA	Module Definition Identifiers	Serial ID with SFF 8472 Diagnostics Module Definition pins should be pulled up to Host V _{cc} with 10 kΩ resistors.
5	SCL		
6	MOD-ABS		
7	RS0	Receiver Rate Select (LVTTTL)	These pins have an internal 33kΩ pull-down to ground. A signal on either of these pins will not affect module performance.
9	RS1	Transmitter Rate Select (LVTTTL)	
8	LOS	Loss of Signal Out (OC)	Sufficient optical signal for potential BER < 1x10 ⁻¹² = Logic "0" Insufficient optical signal for potential BER < 1x10 ⁻¹² = Logic "1" This pin is open collector compatible, and should be pulled up to Host V _{cc} with a 10kΩ resistor.

Pin Number	Symbol	Name	Description
10, 11, 14	VeeR	Receiver Signal Ground	These pins should be connected to signal ground on the host board.
12	RD-	Receiver Negative DATA Out (CML)	Light on = Logic "0" Output Receiver DATA output is internally AC coupled and series terminated with a 50Ω resistor.
13	RD+	Receiver Positive DATA Out (CML)	Light on = Logic "1" Output Receiver DATA output is internally AC coupled and series terminated with a 50Ω resistor.
15	VccR	Receiver Power Supply	This pin should be connected to a filtered +3.3V power supply on the host board. Recommended power supply filter.
16	VccT	Transmitter Power Supply	This pin should be connected to a filtered +3.3V power supply on the host board. Recommended power supply filter.
18	TD+	Transmitter Positive DATA In(CML)	Logic "1" Input = Light on Transmitter DATA inputs are internally AC coupled and terminated with a differential 100Ω resistor.
19	TD-	Transmitter Negative DATA In(CML)	Logic "0" Input = Light on Transmitter DATA inputs are internally AC coupled and terminated with a differential 100Ω resistor.

VI. Typical Application Circuit



VII. Diagram Mechanical Drawing



VIII. Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.4	Class1 (>1KV) for high speed I/O pins Class 1 (> 2KV) for all other pins
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	Variation of IEC 61000-4-2	The BIDI SFP+ modules meet ESD requirements given in EN61000-4-2, criterion B test specification such that units are subjected to 15kV air discharges during operation and 8kV direct contact discharges to the case
Electromagnetic Interference (EMI)	CISPR22 ITE Class B EN55022 Class B	Compliant with standards
Immunity	IEC61000-4-3 Class 2 EN55024	Typically show no measurable effect from a 3V/m field swept from 80 to 1000MHz applied to the transceiver without a chassis enclosure.
RoHS Compliance		Less than 1000 ppm of cadmium, lead, mercury, hexavalent chromium, polybrominated biphenyls, and polybrominated biphenyl ethers

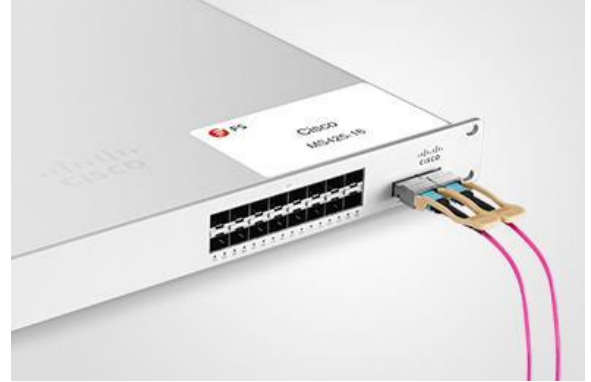
Test Center

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

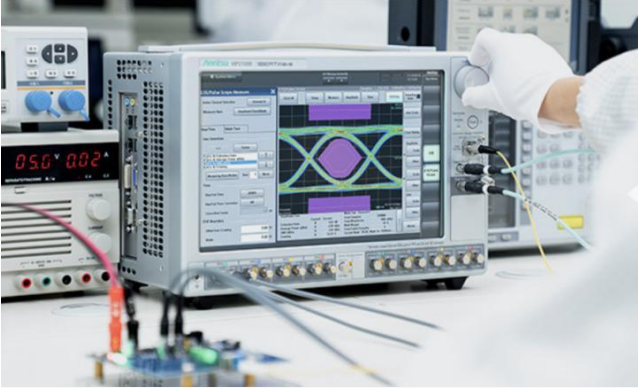


HUAWEI S6720-30L-HI-24S

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 Signal Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator to ensure 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 changes 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 Network Master Pro.

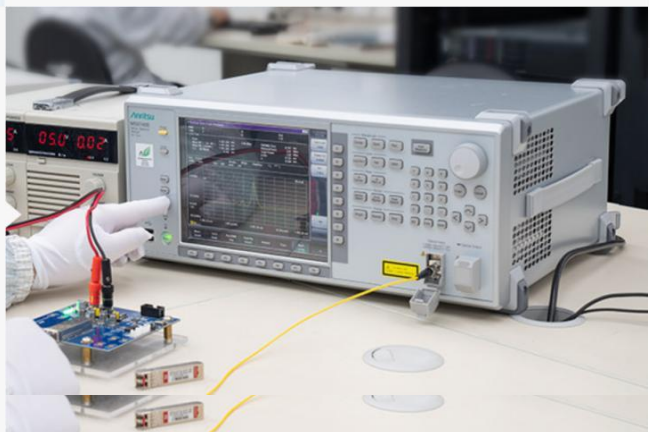
- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI



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, 1270TX/1330nmRX, SMF, 10km, LC, DOM
SFP-10G-BX	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 10km, LC, DOM
SFP-10G-BX	SFP+, BIDI, 10GBase, 1270TX/1330nmRX, SMF, 20km, LC, DOM
SFP-10G-BX	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 20km, LC, DOM
SFP-10G-BX40	SFP+, BIDI, 10GBase, 1270TX/1330nmRX, SMF, 40km, LC, DOM
SFP-10G-BX40	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 40km, LC, DOM
SFP-10G-BX60	SFP+, BIDI, 10GBase, 1270TX/1330nmRX, SMF, 60km, LC, DOM
SFP-10G-BX60	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 60km, LC, DOM
SFP-10G-BX80	SFP+, BIDI, 10GBase, 1490TX/1550nmRX,, SMF, 80km, LC, DOM
SFP-10G-BX80	SFP+, BIDI, 10GBase, 1550TX/1490nmRX, SMF, 80km, LC, DOM
SFP-10G-BX100	SFP+, BIDI, 10GBase, 1490TX/1550nmRX,, SMF, 100km, LC, DOM
SFP-10G-BX100	SFP+, BIDI, 10GBase, 1550TX/1490nmRX, SMF, 100km, LC, DOM
SFP-10G-BX-I	SFP+, BIDI, 10GBase, 1270TX/1330nmRX, SMF, 10km, LC, Industrial, DOM
SFP-10G-BX-I	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 10km, LC, Industrial, DOM
SFP-10G-BX-I	SFP+, BIDI, 10GBase, 1270TX/1330nmRX, SMF, 20km, LC, Industrial, DOM
SFP-10G-BX-I	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 20km, LC, Industrial, DOM
SFP-10G-BX40-I	SFP+, BIDI, 10GBase, 1270TX/1330nmRX, SMF, 40km, LC, Industrial, DOM
SFP-10G-BX40-I	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 40km, LC, Industrial, DOM



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