10GBASE-BX SFP+ 1550nmTX/1490nmRX 100km DOM Transceiver Module

SFP-10G-BX100

Features

- Up to 11.3Gb/s Data Links
- 1550nm EML Laser and APD Receiver for SFP-BX100-10G-D
- Up to 100KM on 9/125μm SMF
- Hot-pluggable SFP+ Footprint
- BIDI LC Optical Connector
- RoHS-10 Compliant and Lead-free
- Single +3.3V Power Supply
- Compliant with SFF+MSA and SFF-8472
- Support Digital Monitoring Interface
- Metal Enclosure, for Lower EMI
- Meet ESD Requirements, Resist 8KV Direct Contact Voltage
- Case Operating Temperature: Commercial: 0 ~ +70℃

Application

- 10GBASE-ZR/ZW & 10G Ethernet
- SDH STM64
- Other Optical Links

Description

The SFP-BX100-10G SFP+ transceiver is designed for use in 10-Gigabit Ethernet links up to 100km over single mode fiber. The module consists of CWDM EML Laser, APD and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

They provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP+ MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

Product Specifications

I. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Unit	Min.	Max.
Storage Temperature	T_S	℃	-40	85
Relative Humidity	RH	%	5	95
Max Supported Link Length	TH_d	dBm	0	

II. Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Unit	Min.	Typical	Max.
Operating Case Temperature Range	T_C	℃	0		70
Power Supply Voltage	V_{CC}	V	3.135	3.3	3.465
Bit Rate	BR	Gb/s			10.3125
Bit Error Ratio	BER				10^{-12}
Max Supported Link Length	L	Km			100

Control Input Voltage High		V	2		Vcc
Control Input Voltage Low		V	0		0.8

III. Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Unit	Min	Typ	Max	Note
Transmitter						
Center Wavelength	λ	nm	1540	1550	1560	
Side Mode Suppression Ratio	SMSR	dB	30			
Optical Spectral Width	Δλ	nm			1	
Average Optical Power	P_{AVG}	dBm	0		6	
Extinction Ratio	ER	dB	8.2			
Transmitter OFF Output Power	P_{OFF}	dBm			-40	
Transmitter and Dispersion Penalty	TDP	dB			3.0	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ	nm	1480	1490	1500	
Receiver Sensitivity (Average Power)	RSENSE	dBm			-25	1
Input Saturation Power (overload)	Psat	dBm			-8	

Parameter	Symbol	Unit	Min	Typ	Max	Note
LOS Assert	LOS_A	dBm	-35			
LOS De-Assert	LOS_D	dBm			-26	
LOS Hysteresis		dB	0.5			

Notes:

1. Measured with Light Source 1490nm @1550nm, ER=8.2dB; BER =<10^{-12} @10.3125Gbps, PRBS=2^{31-1} NRZ.

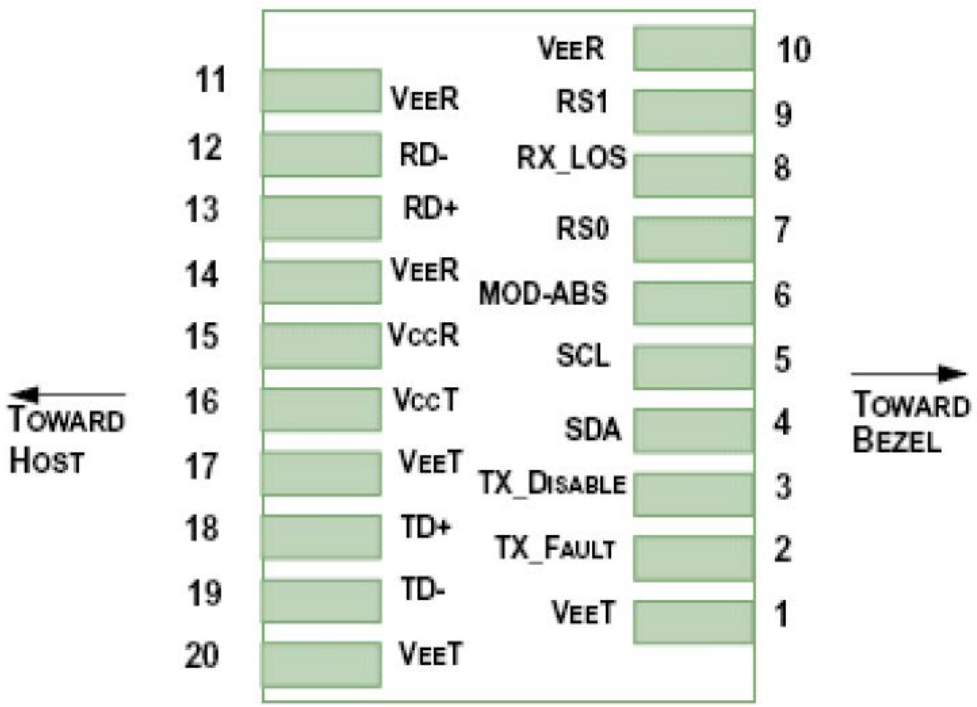
IV. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Unit	Min.	Typical	Max.	Notes
Supply Current	I_{CC}	mA			520	
Power Consumption	Por	W			1.8	
Transmitter						
Single-ended Input Voltage Tolerance	V_{CC}	V	-0.3		4.0	
AC Common Mode Input Voltage Tolerance (RMS)		mV	15			
Differential Input Voltage Swing	Vin,pp	mVpp	180		820	
Differential Input Impedance	Zin	Ohm	90	100	110	1
Transmit Disable Assert Time		us			10	
Transmit Disable Voltage	V_{dis}	V	Vcc-1.3		Vcc	
Transmit Enable Voltage	V_{en}	V	Vee		Vee+0.8	2

Parameter	Symbol	Unit	Min.	Typical	Max.	Notes
			Receiver			
Differential Output Voltage Swing	Vout,pp	mVpp	350		850	
Differential Output Impedance	Zout	Ohm	90	100	110	3
Data Output Rise/Fall Time	Tr/Tf	ps	..			4
LOS Assert Voltage	VlosH	V	Vcc-1.3		Vcc	5
LOS De-assert Voltage	VlosL	V	V_{ee}		V_{ee} +0.8	5
Power Supply Rejection	PSR	mVpp	100			6

V. Pin Assignment and Pin Description



Pin	Symbol	Name/Description	Notes
1	VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault.	2
3	TX Disable	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	
10	VeeR	Receiver Ground (Common with Transmitter Ground)	1
11	VeeR	Receiver Ground (Common with Transmitter Ground)	1
12	...	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VeeR	Receiver Ground (Common with Transmitter Ground)	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	

19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VeeT	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Measured with Light source 1490nm @1550nm, ER=8.2dB; BER =<10-12 @10.3125Gbps, PRBS=231-1 NRZ.
2. TFAULT is an open collector/drain output, which should be pulled up with a 4.7kÙ-10kÙ resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
4. Should be pulled up with 4.7kÙ-10kÙ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7kÙ-10kÙ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

VII. Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Unit	Min.	Max.	Notes
Temperature Monitor Absolute Error	DMI_ Temp	℃	-3	3	Over operating temp
Supply Voltage Monitor Absolute Error	DMI _VCC	V	-0.1	0.1	Full operating range
RX Power Monitor Absolute Error	DMI_RX	dB	-3	3	
Bias Current Monitor	DMI_ bias	mA	-10%	10%	
TX Power Monitor Absolute Error	DMI_TX	dB	-3	3	

VI. Mechanical Dimensions

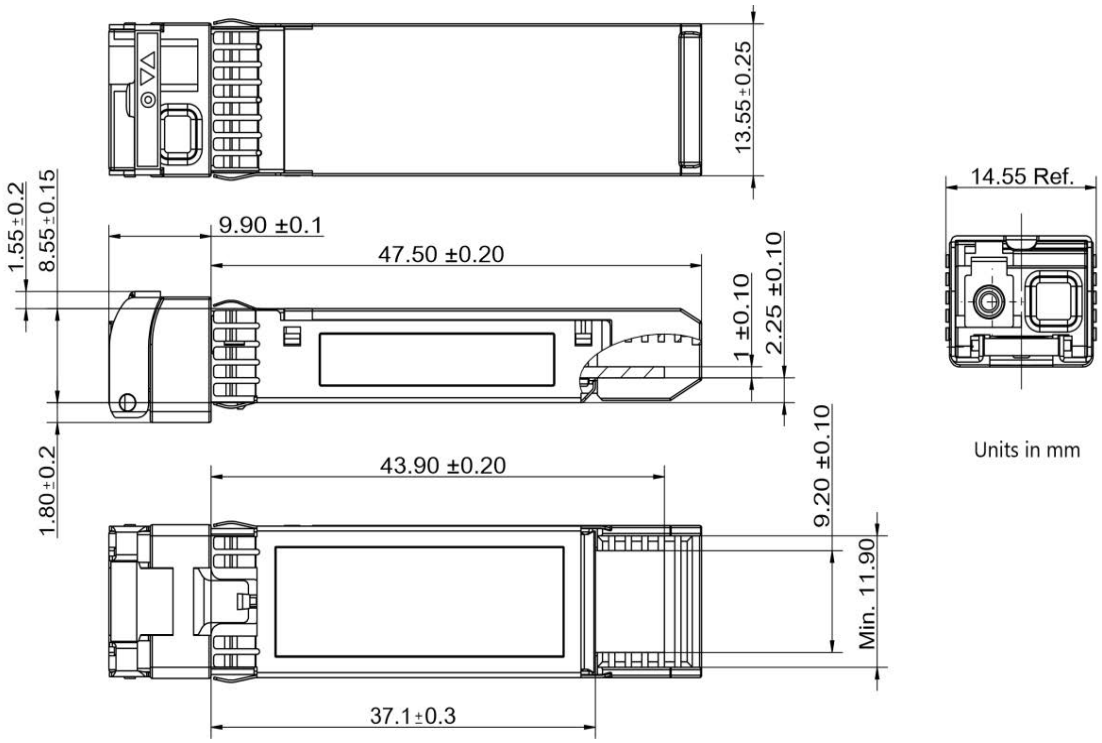


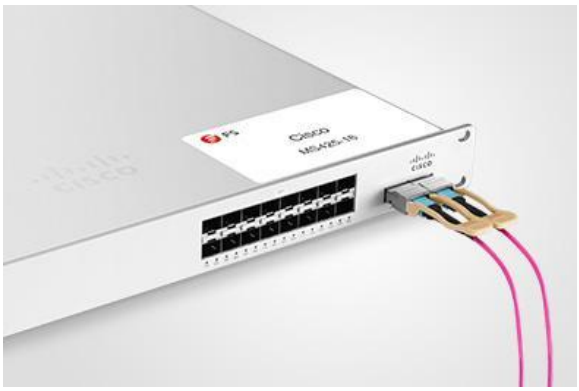
Figure1. Mechanical Outline

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

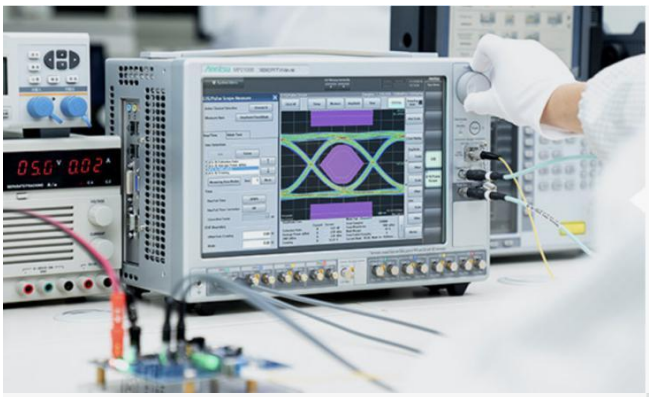
Force⑩tm S60-44T

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

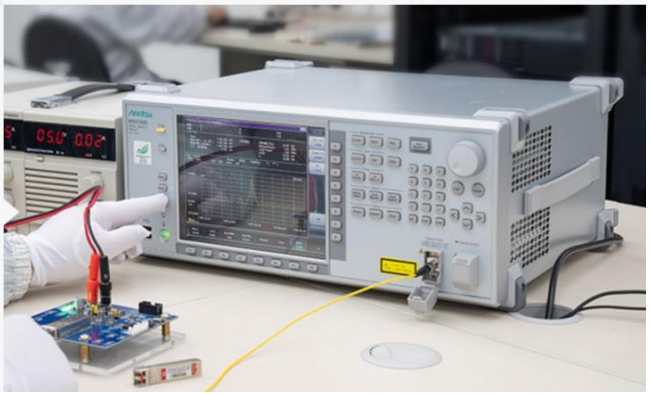
Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- 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, D
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

Order Information

Part Number	Description
SFP- 10G-BX60-I	SFP+, BIDI, 10GBase, 1270TX/ 1330nmRX, SMF, 60km, LC, Industrial, DOM
SFP- 10G-BX60-I	SFP+, BIDI, 10GBase, 1330TX/ 1270nmRX, SMF, 60km, LC, Industrial, DOM
SFP- 10G-BX80-I	SFP+, BIDI, 10GBase, 1490TX/ 1550nmRX, SMF, 80km, LC, Industrial, DOM
SFP- 10G-BX80-I	SFP+, BIDI, 10GBase, 1550TX/ 1490nmRX, SMF, 80km, LC, Industrial, DOM

Note:

10G SFP+ 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.