Datasheet

10GBASE-BX SFP+ 1330nmTX/1270nmRX 80km DOM Transceiver

SFP-10G-BX80

Features

- Supports 9.95Gb/s to 11.3Gb/s bit rates
- Hot-pluggable SFP+ footprint
- Single LC for Bi-directional Transmission
- Maximum link length of 80km
- Built-in 1270/1330 WDM Filter
- Uncooled 1270nm or 1330nm CWDM DFB Laser
- Power dissipation <1.5W
- No Reference Clock required
- Built-in digital diagnostic functions, including optical power monitoring
- Temperature range 0° C to 70° C
- Very low EMI and excellent ESD protection
- RoHS Compliant Part

Application

- 10GBASE-LR/LW Ethernet
- SONET OC-192 / SDH
- 10G Fiber Channel

Description

FS.COM BD-10G-23/32 Bi-directional 10Gb/s (SFP+) transceivers are compliant with the current SFP+ Multi-Source Agreement (MSA) Specification. They comply with 10GBASE-LR/LW Ethernet, SONET OC-192 / SDH and 10G Fibre Channel 1200-SM-LL-L. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the SFP+ MSA.

Product Specifications

I. General Product Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Bit Rate	BR		10.3125	11.3168	Gb/s
Max.Supported Link Length	L_{max}			80	km

II. Absolute Maximum Ratings

Exceeding any one of these values may destroy the device permanently.

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	℃
Supply Voltage	V_{CC}	-0.5	4	V
Relative Humidity	RH	0	85	%

III. Recommended Operating Environment

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T_C	-5		+70	℃
Supply Voltage	$V_{CCT, R}$	+3.135		+3.465	V
Supply Current	I_{CC}			450	mA
Power Dissipation	P_D			1.5	W

IV. Electrical Characteristics (TOP = 0 to 70℃, VCC = 3.135 to 3.465 Volts)

Parameter		Symbol	Min	Typ	Max	Unit	Note
Transmitter							
Differential input voltage swing			180		700	mVpp	1
Input Differential Impedance		Zin	80	100	120	Ω	
Transmit Disable Input	H	V_{IH}	2.0		Vcc+0.3	V	
	L	V_{IL}	0		0.8	V	
Transmit Enable Output	H	V_{OH}	2.4		Vcc+0.3	V	
	L	V_{OL}	0		0.4	V	2
Receiver							
Differential output voltage swing			300		850	mVpp	3
LOS Output	H	V_{OH}	2.4		Vcc+0.3	V	2
	L	V_{OL}	0	100	0.4	V	
Output Differential Impedance		Zon	80		120	Ω	

Notes:

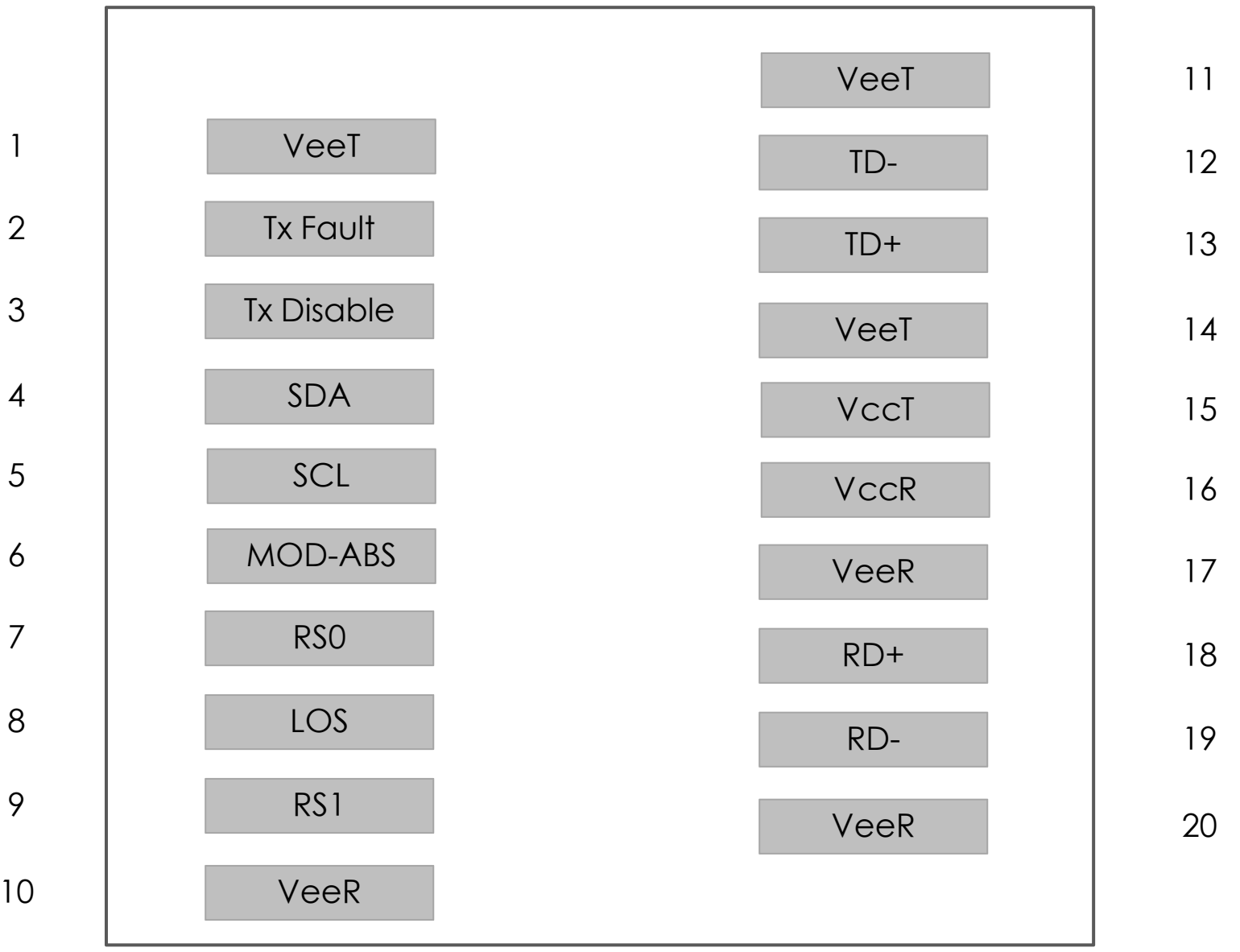
1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
2. Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
3. RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

IV. Optical Characteristics (TOP = 0 to 70℃, VCC = 3.135 to 3.465 Volts)

Parameter		Symbol	Min	Typ	Max	Unit	Ref.
Transmitter							
Bit Rate		BR	9.9		11.3	Gb/s	
Optical Wavelength	FT5960D-2733	λ	1260	1270	1280	nm	
	FT5960D-3327		1320	1330	1340		
Average output power		Po	+1		+5	dBm	
Optical Extinction Ratio		ER	3.5			dB	
Spectral width		Δλ			1	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Optical Eye Mask			Compliant with IEEE802.3ae				
Receiver							
Bit Rate		BR	9.9		11.3	Gb/s	
Optical Wavelength	FT5960D-2733	λ	1320	1330	1340	nm	
	FT5960D-3327		1260	1270	1280		
Receiver Sensitivity		Sen			-23	dBm	1
Maximum Input Power		P_{MAX}	-7			dBm	
LOS De-Assert		LOS_D			-24	dBm	
LOS Assert		LOS_A	-40			dBm	
LOS Hysteresis		LOS_H	0.5		4	dB	

Note:
1. Measured with a PRBS of 2 -1 at 1 x 10 BER and 3.5 dB extinction ratio.

V. Pin Description



Pin Num.	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	4
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	VeeR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	1
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	1
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 I C 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)

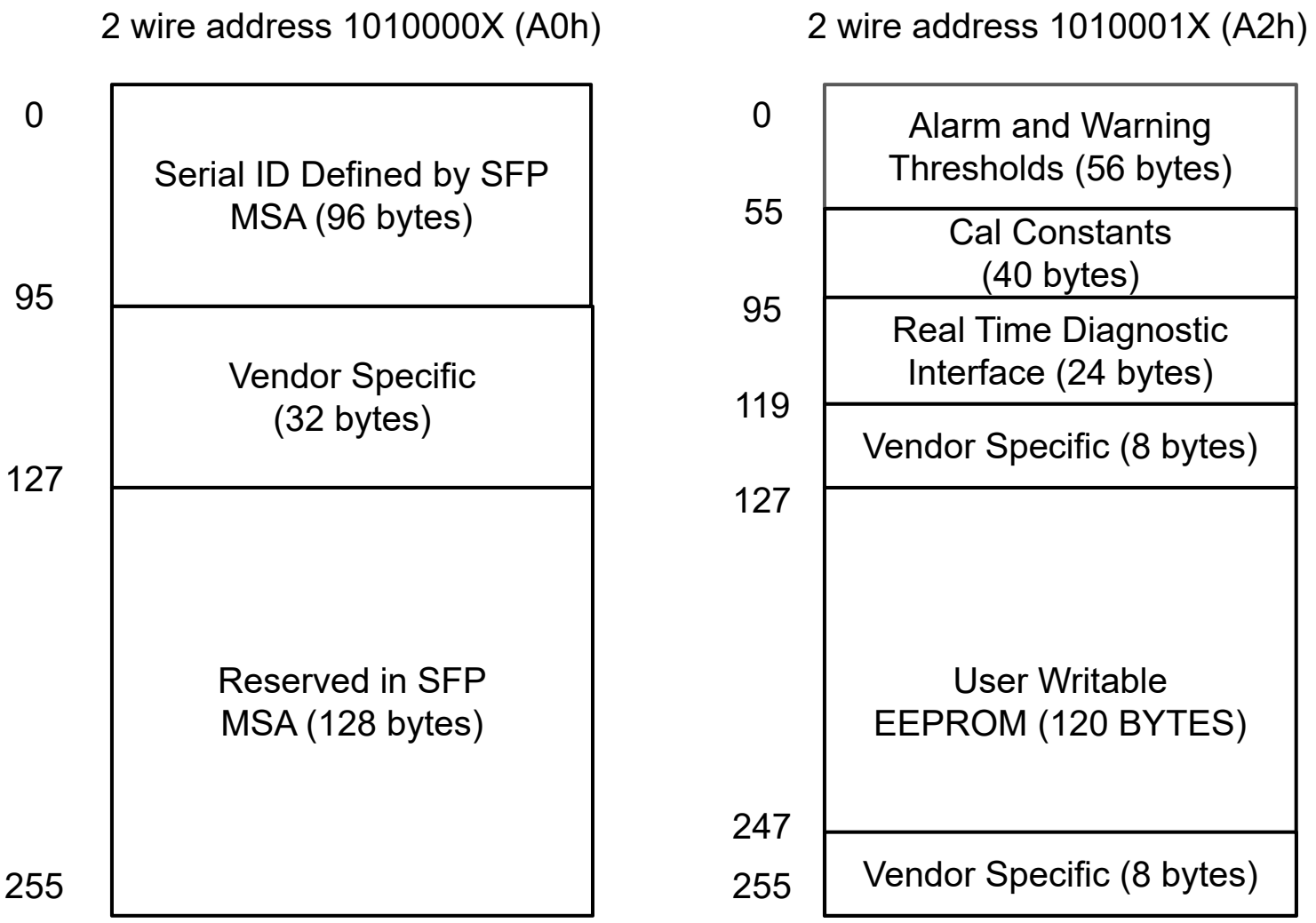


Table 2 - EEPROM Serial ID Memory Contents (A0h)

Data Address	Length (Byte)	Name of length	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-LR
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.COM
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: “BD-10G-23” or “BD-10G-32” (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.COM 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.COM specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

VII. Digital Diagnostic Monitor Characteristics

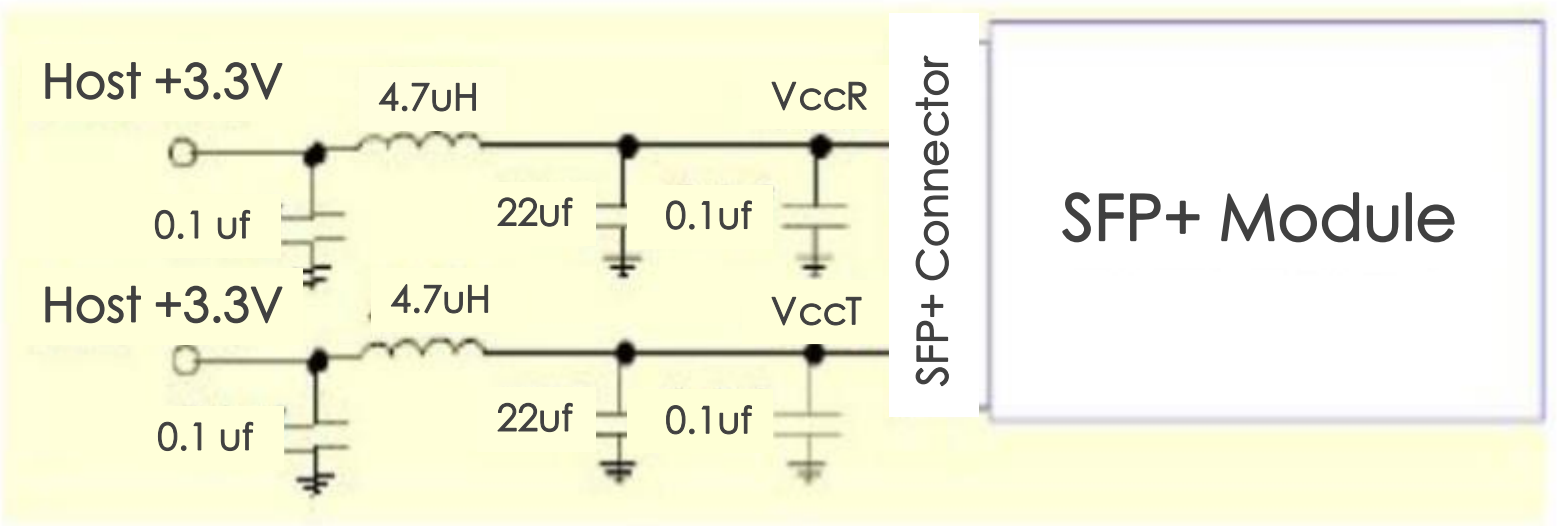
Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	℃
98-99	VCC3 Internal Supply Voltage	±3.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dBm
104-105	Rx Input Power	±3.0	dBm

VIII. Regulatory Compliance

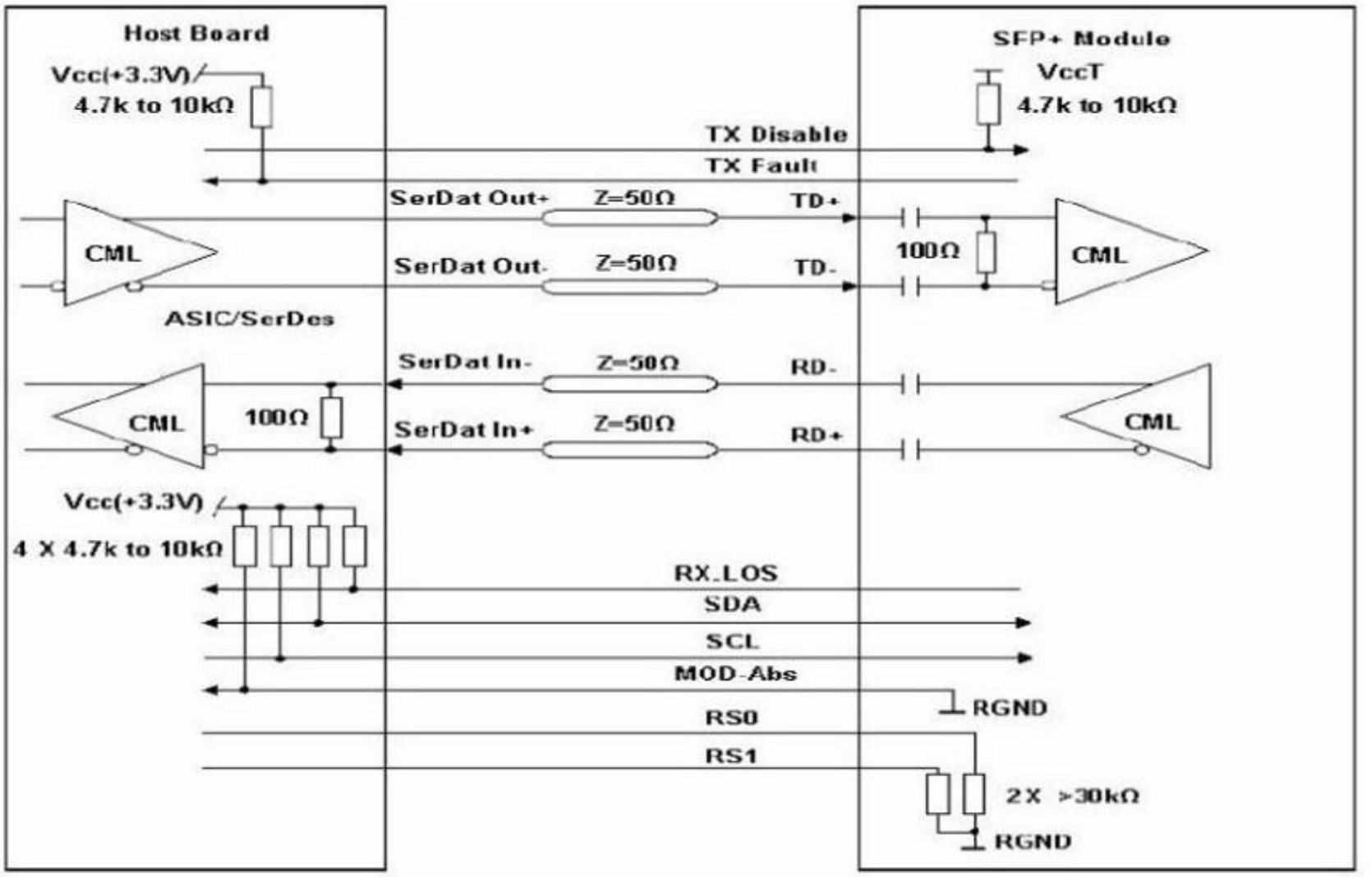
The SFP-10G-BX80 complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Single LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

IX. Recommend Circuit Schematic

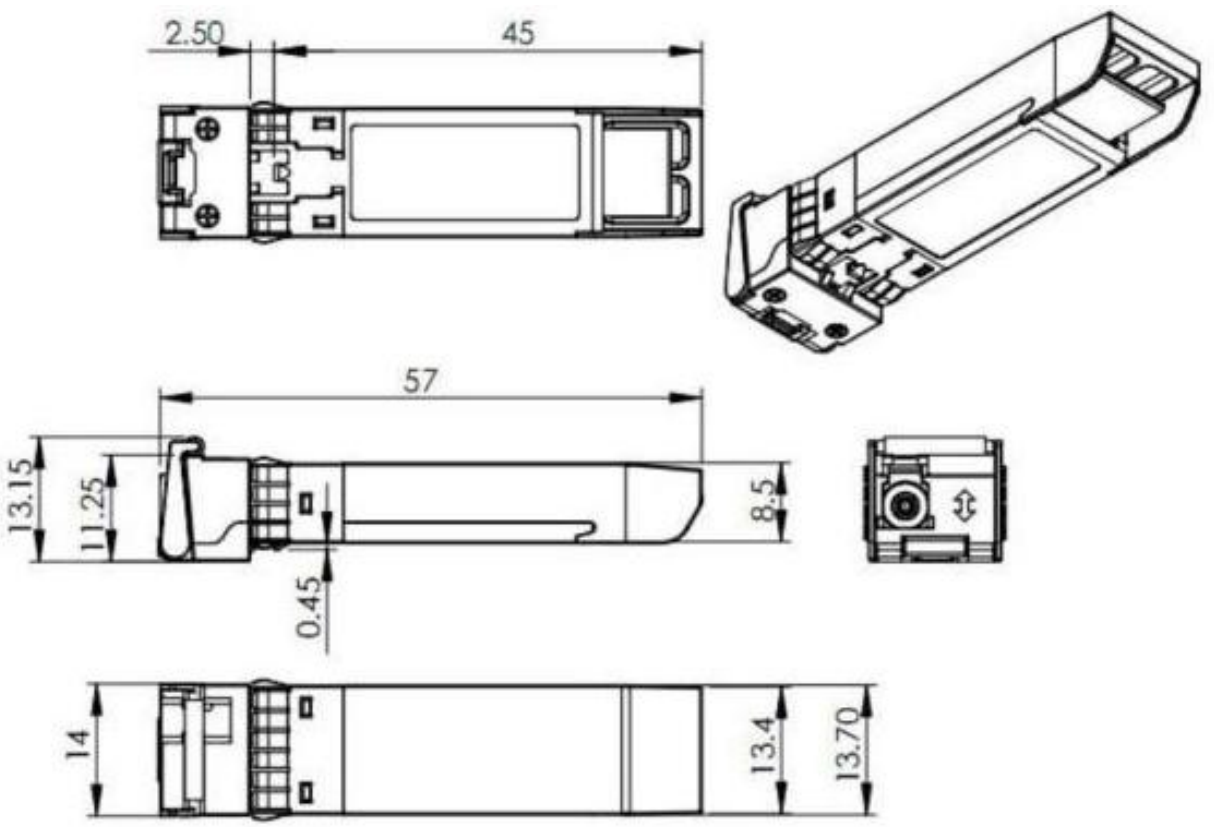


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

X. Mechanical Specifications



Test Center

Only when quality and 100% compatibility is verified and proved do our modules enter the market. This depends on FS.COM's test center which is supported by a variety of mainstream original brand switches and professional staff. We are proud of this test center and believe all of these devices worth the investments, because it brings the best to our customers.

The original switches could be found nowhere but at FS.COM's test center, eg: Juniper MX960 & EX 4300 series, Cisco Nexus 9396PX & Cisco ASR 9000 Series, HP 5900 Series & HP 5406R ZL2 V3(J9996A), Arista 7050S-64, Brocade ICX7750-26Q & ICX6610-48, Avaya VSP 7000 MDA 2, etc.

Cisco ASR 9000 Series(A9K-MPA-1X40GE)

ARISTA 7050S-64(DCS-7050S-64)

Juniper MX960

Brocade ICX 7750-26Q

Extreme Networks X670V VIM-40G4X

Mellanox M3601Q

Dell N4032F

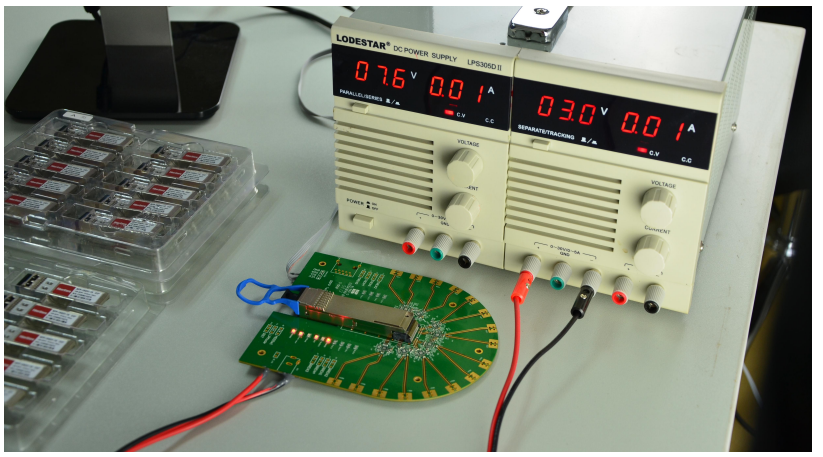
HP 5406R ZL2 V3(J9996A)

AVAYA 7024XLS(7002QQ-MDA)

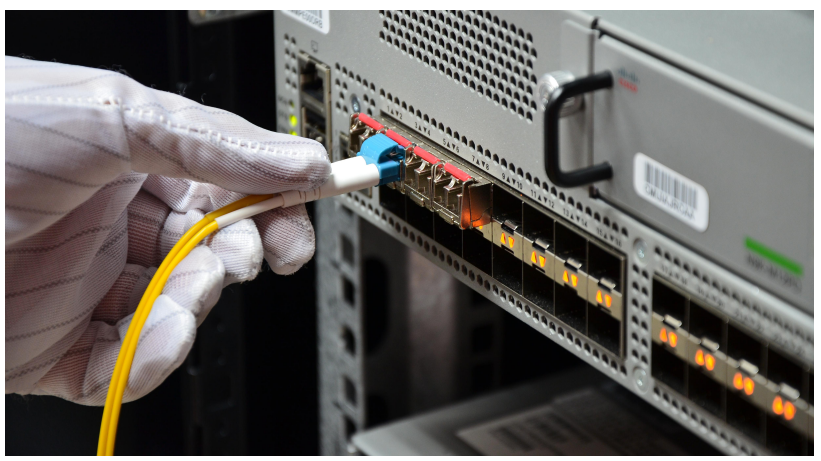
Test Assured Program

FS.COM truly understands the value of compatibility and interoperability to each optics. Every module FS.COM provides must run through programming and an extensive series of platform diagnostic tests to prove its performance and compatibility. In our test center, we care of every detail from staff to facilities—professionally trained staff, advanced test facilities and comprehensive original-brand switches, to ensure our customers to receive the optics with superior quality.

Our smart data system allows effective product management and quality control according to the unique serial number, properly tracing the order, shipment and every part.



Our in-house coding facility programs all of our parts to standard OEM specs for compatibility on all major vendors and systems such as Cisco, Juniper, Brocade, HP, Dell, Arista and so on.



With a comprehensive line of original-brand switches, we can recreate an environment and test each optics in practical application to ensure quality and distance.

The last test assured step to ensure our products to be shipped with perfect package.

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, 1270TX/1330nmRX, SMF, 80km, LC, DOM
SFP-10G-BX80	SFP+, BIDI, 10GBase, 1330TX/1270nmRX, SMF, 80km, LC, DOM

Note:
Every transceiver is individually tested on corresponding equipment, walks through the testing challenges and 100% compatible with Cisco, Arista, Juniper, Dell, Brocade and other brands.

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