10GBASE-BX SFP+ 1330nmTX/1270nmRX 60km DOM Transceiver

SFP-10G-BX60

Features

- Operating data rate up to 11.3Gbps
- Two types:
- A: 1270nm DFB Transmitter/ 1330nm Receiver
  B: 1330nm DFB Transmitter/ 1270nm Receiver
- Power budget 21dB at least
- Single 3.3V Power supply and TTL Logic Interface
- LC Connector Interface
- Hot Pluggable
- Power Dissipation < 1.5W
- Commercial Temperature Range: 0~+70℃
- Compliant with SFP+ MSA Specification SFF-8431
- Built-in digital diagnostic functions, including optical power monitoring
- Compliant with IEEE 802.3ae 10GBASE-ER
- Compliant with IEEE 802.3ae 10GBASE-EW

Application

- 10GBASE-ER at 10.3125Gbps
- 10GBASE-EW at 9.953Gbps
- OBSAI rates 6.144 Gb/s, 3.072 Gb/s, 1.536 Gb/s, 0.768Gb/s
- CPRI rates 9.830 Gb/s,7.373Gb/s, 6.144 Gb/s, 4.915 Gb/s, 2.458 Gb/s, 1.229 Gb/s, 0.614Gb/s
- Other Optical Links

Description

The SFP-10G-BX60 series single mode transceiver is small form factor plug module for duplex optical data communications such as 10GBASE-LR/LW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The SFP-10G-BX60 module is designed for single mode fiber and operates at nominal wavelength of 1270nm; SFP-10G-BX60 module is designed for single mode fiber and operates at a nominal wavelength of 1330nm. The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

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}			60	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	° C
Supply	V_{CC}	-0.5	3.6	V

III. Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter						
CML Inputs (Differential)	Vin	150		1200	mVpp	AC coupled inputs
Input Impedance (Differential)	Zin	85	100	115	ohms	Rin > 100 kohms @ DC z
Tx_DISABLE Input Voltage - High		2		Vcc+0.3	V	
Tx_DISABLE Input Voltage - Low		0		0.8	V	
Tx_FAULT Output Voltage - High		2		Vcc+0.3	V	Io = 400μA; Host Vcc
Tx_FAULT Output Voltage - Low		0		0.5	V	Io = -4.0mA
Receiver						
CML Outputs (Differential)	Vout	350		700	mVpp	AC coupled inputs
Output Impedance (Differential)	Zout	85	100	115	ohms	
Rx_LOS Output Voltage - High		2			V	Io = 400μA; Host Vcc
Rx_LOS Output Voltage - Low		0		0.8	V	Io = -4.0mA
MOD_DEF (2:0)	VoH	2.5		Vcc+0.3	V	With Serial ID
	VoL	0		0.5	V	

IV. Optical Characteristics

(1270nm DFB & PIN/TIA)

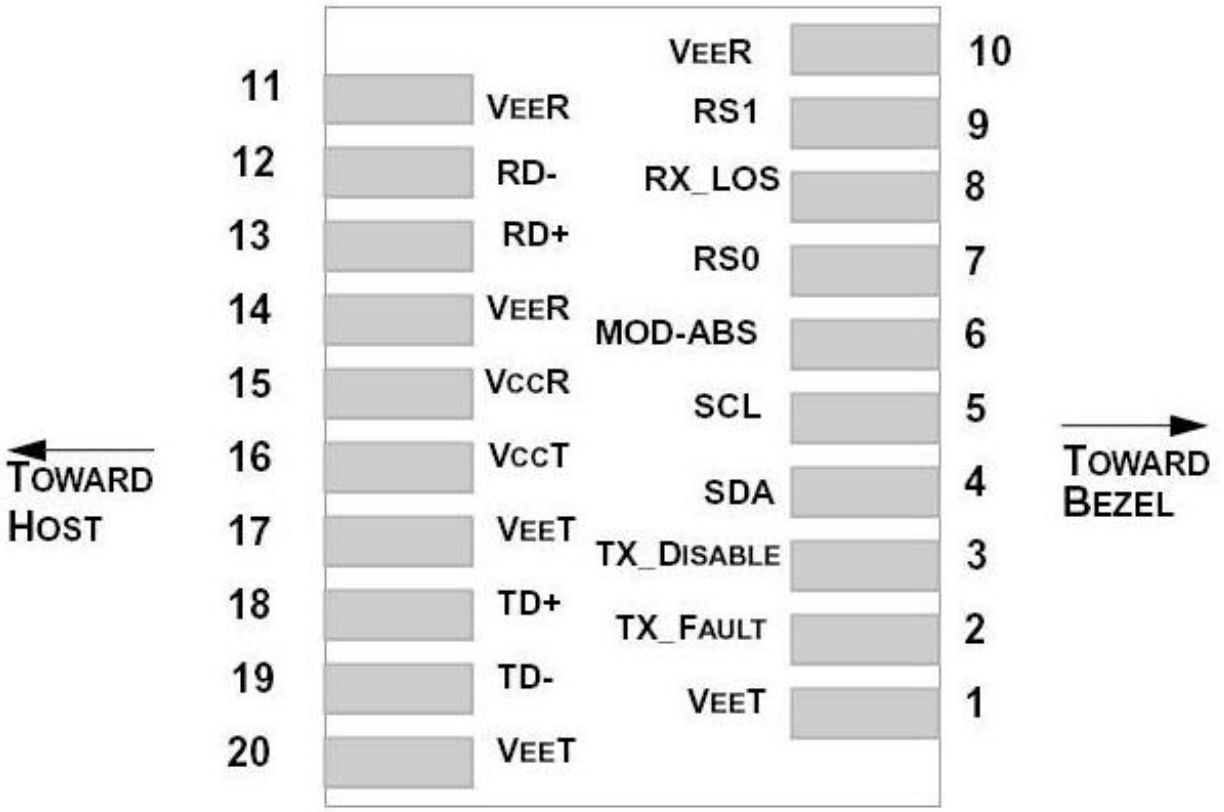
Parameter	Symbol	Min.	Typical	Max.	Unit
Power Budget		21			dB
Data Rate		0.6	10.3125	11.3	Gbps
Transmitter					
Centre Wavelength	λ_C	1260	1270	1280	nm
Spectral Width (-20Db)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*1	$P_{out,\ AVG}$	1		6	dBm
Extinction Ratio	ER	3.5			dB
Average Power of OFF Transmitter				-30	dBm
Relative Intensity Noise	RIN			-128	dB/Hz
TX Disable Assert Time	t_off			10	us
Receiver					
Centre Wavelength	λ_C	1320		1340	nm
Sensitivity*2	P_{IN}			-20	dBm
Receiver Overload	P_{MAX}	-6			dBm
LOS De-Assert	LOS_D			-21	dBm
LOS Assert	LOS_A	-30			dBm

(1330nm DFB & PIN/TIA)

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Budget		21			dB
Data Rate		0.6	10.3125	11.3	Gbps
Transmitter					
Centre Wavelength	λ_C	1320	1330	1340	nm
Spectral Width (-20Db)	Δλ			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*1	$P_{out, AVG}$	1		0	dBm
Extinction Ratio	ER	3.5			dB
Average Power of OFF Transmitter				-30	dBm
Relative Intensity Noise	RIN			-128	dB/Hz
TX Disable Assert Time	t_off			10	us
Receiver					
Centre Wavelength	λ_C	1260		1280	nm
Sensitivity*2	P_{IN}			-20	dBm
Receiver Overload	P_{MAX}	-6			dBm
LOS De-Assert	LOS_D			-21	dBm
LOS Assert	LOS_A	-30			dBm

Notes
1. Output is coupled into a 9/125um SMF.
2. Measured with worst ER, BER less than1E-12 and PRBS 231-1 at 10.3125Gbps.

V. Pin Description



Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	2, Module disables on high or open
4	SDA	Module Definition 2	3	2-wire Serial Interface Data Line.
5	SCL	Module Definition 1	3	2-wire Serial Interface Clock.
6	MOD_ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTL).	3	Rate Select 0, optionally controls SFP+ module receiver. This pin ispulled low to VeeT with a >30K resistor..
8	LOS	Loss of Signal	3	Note 4

9	RS1	TX Rate Select (LVTTL).	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VeeR	Receiver Power	2	3.3V ± 5%, 7
16	VccT	Transmitter Power	2	3.3V ± 5%, 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes :

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K – 10 KΩ resistor. Its states are:
   Low (0 – 0.8V): Transmitter on
   (>0.8, < 2.0V): Undefined
   High (2.0 – 3.465V): Transmitter Disabled
   Open: Transmitter Disabled

3. Module Absent, connected to VeeT or VeeR in the module.

4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT/R+0.3V. When high, this output indicates the received optical power is below the worst- case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.

6. RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 350 and 700 Mv differential (175 – 350 Mv single ended) when properly terminated.

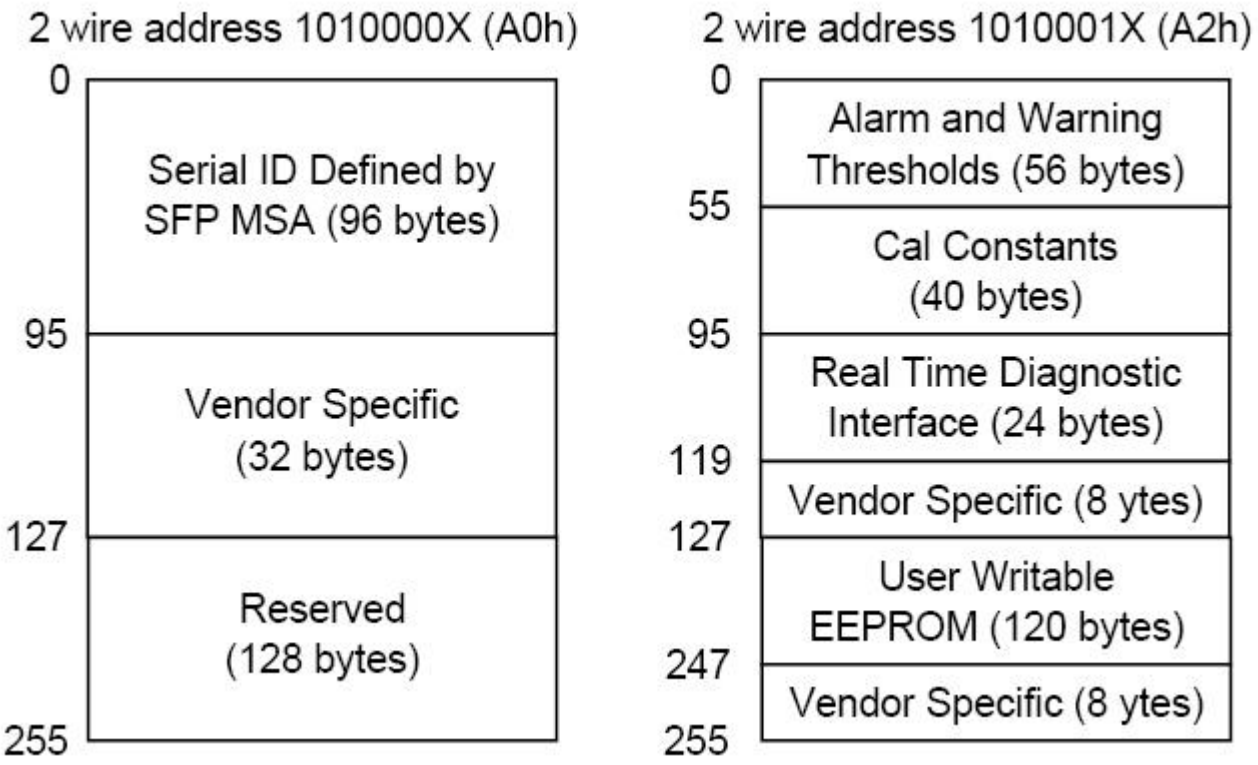
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 300Ma. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP+ transceiver module will result in an inrush current of no more than 30Ma greater than the steady state value. VccR and VccT may be internally connected within the SFP+ transceiver module.

8. TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 150 – 1200 Mv (75 – 600Mv single-ended).

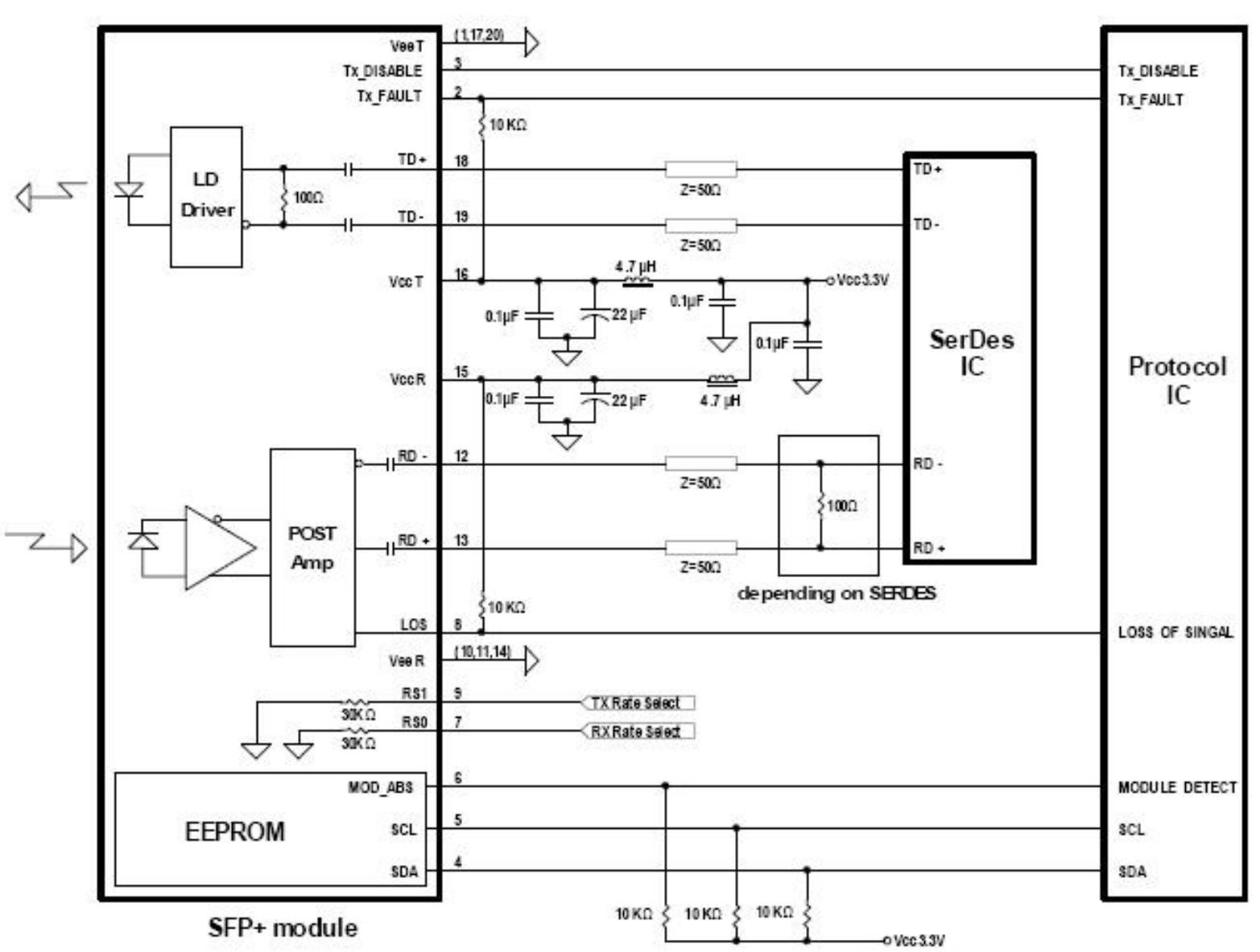
EEPROM :

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not writing protected within the SFP+ transceiver. The negative edge clocks data from the SFP+ transceiver. The serial data signal (SDA) 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.

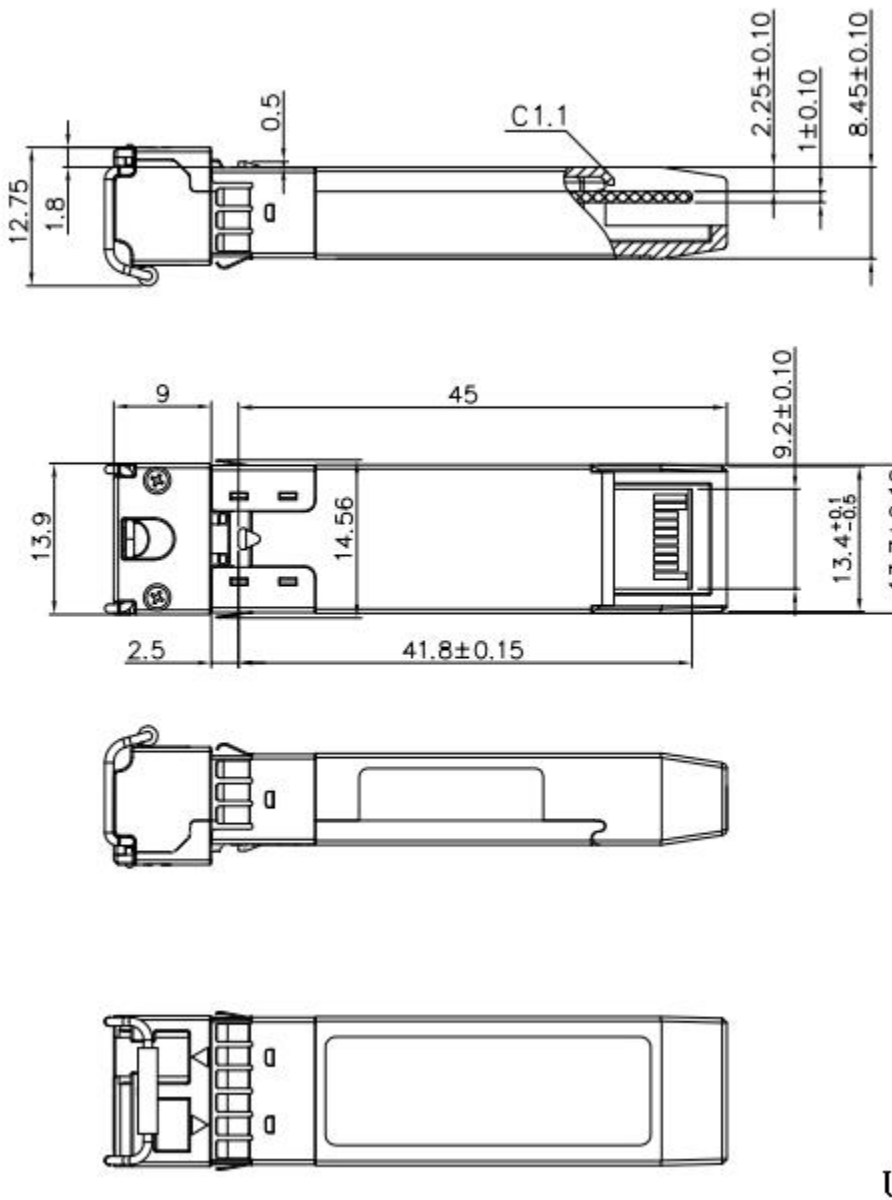
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must beconverted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2h. The digital diagnosticmemory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 10.2.

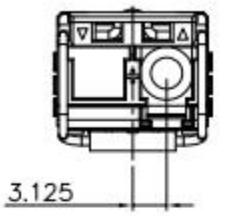


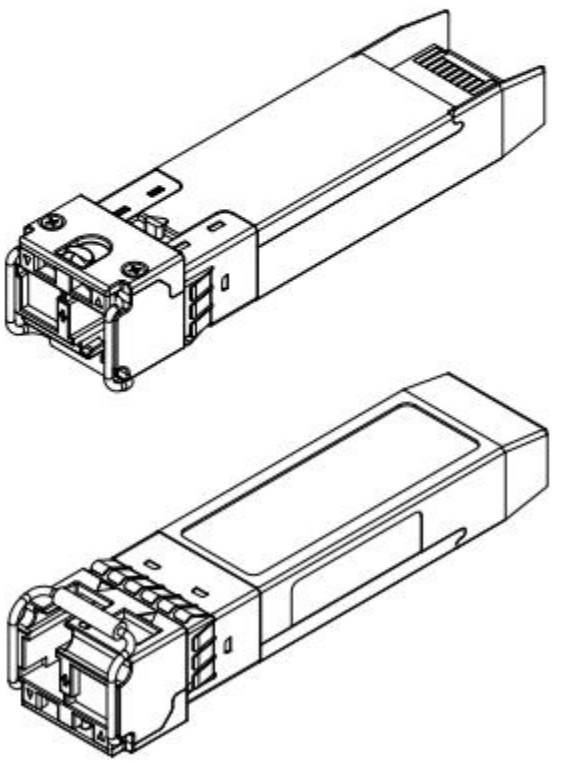
VI. Recommend Circuit Schematic



VII. Mechanical Specifications







Unremarked tolerances±0.2mm

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

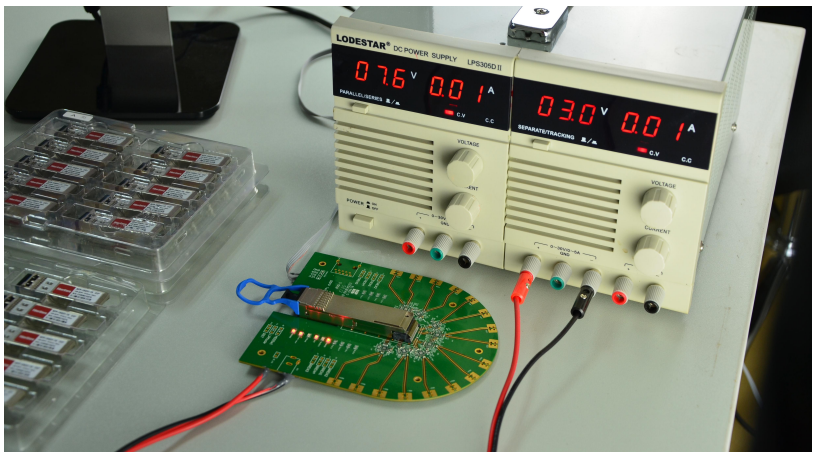
HP 5406R ZL2 V3(J9996A)

AVAYA 7024XLS(7002QQ-MDA)

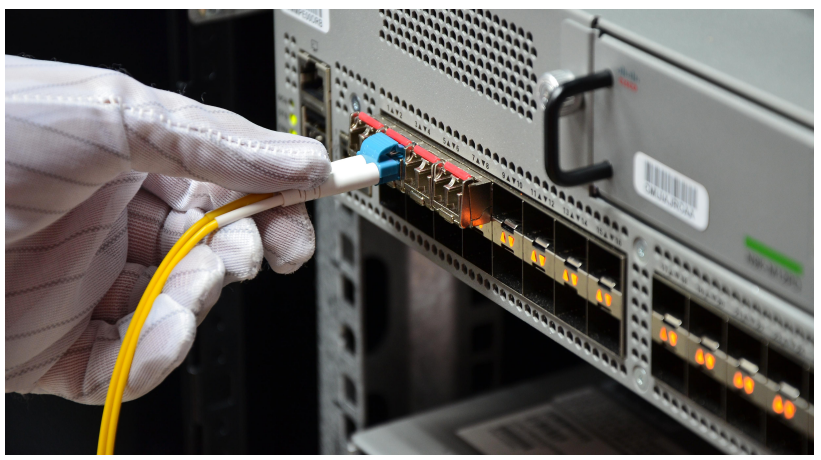
Test Assured Program

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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