

10GBASE-SR SFP+ 850nm 100m DOM Transceiver

SFP-10GSL-85



Application

- 10GBASE-SR/SW 10G Ethernet
- 1200-Mx-SN-I 10G Fibre Channel

Features

- Hot-pluggable SFP+ footprint
- Supports 9.95 to 10.5 Gb/s bit rates
- Power dissipation < 1W
- RoHS-6 compliant (lead-free)
- Commercial temperature range 0° C to 70° C
- Single 3.3V power supply
- Up to 300m Transmission on MMF
- 4700 MHZ-km OM4 MMF
- Heated 850nm VCSEL laser
- Receiver limiting electrical interface
- Duplex LC connector
- Built-in digital diagnostic functions

Description

10Gb/s SFP+ transceivers are designed for use in 10-Gigabit Ethernet links over multimode fiber. They are compliant with SFF-8431, SFF-8432, IEEE 802.3ae 10GBASE-SR/SW and 10G Fibre Channel 1200-Mx-SN-I. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The transceiver is a “limiting module”, i.e., it employs a limiting receiver. Host board designers using an EDC PHY IC should follow the IC manufacturer’s recommended settings for interoperating the host-board EDC PHY with a limiting receiver SFP+ module. The optical transceivers are compliant per the RoHS Directive 2011/65/EU.

Product Specifications

I.General Specifications

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Bit Rate	BR	9.95		10.5	Gb/s	1
Bit Error Ratio	BER			10 ⁻¹²		2

Maximum Supported Distances

Fiber Type	850nm OFL Bandwidth						
62.5µm	160 MHz-km	Lmax			26	m	
	OM1 200 MHz-km				33		
50µm	400 MHz-km	Lmax			66	m	
	OM2 500 MHz-km				82		
	OM3 2000 MHz-km				300		
	OM4 4700 MHz-km				400		

- Notes:
- 1. 10GBASE-SR/SW.
 - 2. Tested with a 2 31 – 1 PRBS.

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Maximum Supply Voltage	V _{CC}	-0.5		4.0	V	
Storage Temperature	T _S	-40		85	° C	
Case Operating Temperature	T _A	0		70	° C	
Relative Humidity	RH	0		85	%	1

Notes:

1.Non-condensing..

III. Electrical Characteristics (TOP= 0 to 70 ° C,VCC = 3.14 to 3.46Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage	V _{CC}	3.14		3.46	V	
Supply Current	I _{CC}			289	mA	

Transmitter

Input differential impedance	R _{in}		100		Ω	1
Differential data input swing	V _{in,pp}	180		700	mV	
Transmit Disable Voltage	V _D	2		V _{CC}	V	
Transmit Enable Voltage	V _{EN}	V _{EE}		V _{EE} +0.8	V	

Receiver

Differential data output swing	V _{out,pp}	300		850	mV	2,6
Output rise time and fall time	t _r	28			ps	3
LOS asserted	V _{LOSfault}	2		V _{CCHOST}	V	4
LOS de-asserted	V _{LOSnorm}	V _{EE}		V _{EE} +0.8	V	4
Power Supply Noise Tolerance	V _{CC} T/V _{CC} R		Per SFF-8431 Rev 4.1		mVpp	5

Notes:

- 1.Connected directly to TX data input pins.AC coupling from pins into laser driver IC.
- 2.Into 100Ω differential termination.
- 3.20 – 80 % . Measured with Module Compliance Test Board and OMA test pattern.Use of four 1’ s and four 0’ s in sequence in the PRBS^9 is an acceptable alternative. SFF-8431 Rev 4.1.
- 4.LOS is an open collector output.Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.
- 5.Testing methodology per SFF-8431.Rev 4.1
- 6.The FTLX8573D3BTL is a “limiting module” ,i.e.,it employs a limiting receiver.Host board designers using an EDC PHY IC should follow the IC manufacturer’ s recommended settings for interoperating the host-board EDC PHY with a limiting receiver SFP+ module.

IV. Optical Characteristics (TOP = 0 to °C,VCC = 3.14 to 3.46V)

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Transmitter (Tx)						
Optical Modulation Amplitude (OMA)			-1.5		dBm	1
Average Launch Power	P _{Ave}	-7.3		-1	dBm	2
Optical Wavelength	λ	840	850	860	nm	1
RMS Spectral Width	Δλ _{rms}			0.45	dB	1
Optical Extinction Ratio	ER	3.0	5.5		dB	
Transmitter and Dispersion Penalty	TDP			3.9	dB	
Average Launch power of OFF transmitter	P _{OFF}			-30	dBm	
Tx Jitter	Tx _j	Per IEEE 802.3ae requirements				
Encircled Flux	<4.5μm			30	%	3
	<19μm	86				
Relative Intensity Noise	RIN _{12OMA}			-128	dB/Hz	

Receiver (Rx)						
Receiver Sensitivity (OMA) @ 10.3Gb/s	R _{SENS1}			-11.1	dBm	4
Stressed Receiver Sensitivity (OMA) @ 10.3Gb/s	R _{SENS2}			-7.5	dBm	5
Maximum Input Power	P _{MAX}	+0.5			dBm	
Wavelength Range	λ _C	840		860	nm	
Receiver Reflectance	LOS _D			-12	dB	
LOS De-Assert	LOS _A			-14	dBm	
LOS Assert	LOS _A	-30	-23		dBm	
LOS Hysteresis		0.5			dB	

Notes:

- 1. Per Tradeoff Table 52.8, IEEE 802.3ae 2005
- 2. Average Power figures are informative only, per IEEE802.3ae.
- 3. Measured into Type A1a (50/125 μm multimode) fiber per ANSI/TIA/EIA-455-203-2.
- 4. Measured with worst ER; BER<10⁻¹²; 231 – 1 PRBS.
- 5. Per IEEE 802.3ae.

V.Digital Diagnostic Specifications

The transceiver can be used in host systems that require either internally or externally calibrated digital diagnostics.

Parameter	Symbol	Min	Typ.	Max	Units	Ref.
Accuracy						
Internally measured transceiver temperature	DD _{Temp}	-3		3	°C	
Internally measured transceiver supply voltage	DD _{Voltage}	-100		100	mV	
Measured TX bias current	DD _{Bias}	-10		10	%	1
Measured TX output power	DD _{TxPower}	-2		2	dB	
Measured RX received average optical power	DD _{RxPower}	-2		2	dB	

Parameter	Symbol	Min	Typ.	Max	Units	Ref.
Dynamic Range for Rated Accuracy						
Internally measured transceiver temperature	DD _{Temp}	0		70	°C	
Internally measured transceiver supply voltage	DD _{Voltage}	3.14		3.46	V	
Measured TX bias current	DD _{Bias}	0		20	mA	
Measured TX output power	DD _{Tx-Power}	-9		-2.5	dBm	
Measured RX received average optical power	DD _{Rx-Power}	-20		0	dBm	
Max Reporting Range						
Internally measured transceiver temperature	DD _{Temp}	-40		125	°C	
Internally measured transceiver supply voltage	DD _{Voltage}	2.8		4.0	V	
Measured TX bias current	DD _{Bias}	0		20	mA	
Measured TX output power	DD _{Tx-Power}	-10		-3	dBm	
Measured RX received average optical power	DD _{Rx-Powe}	-22		0	dBm	

Notes:

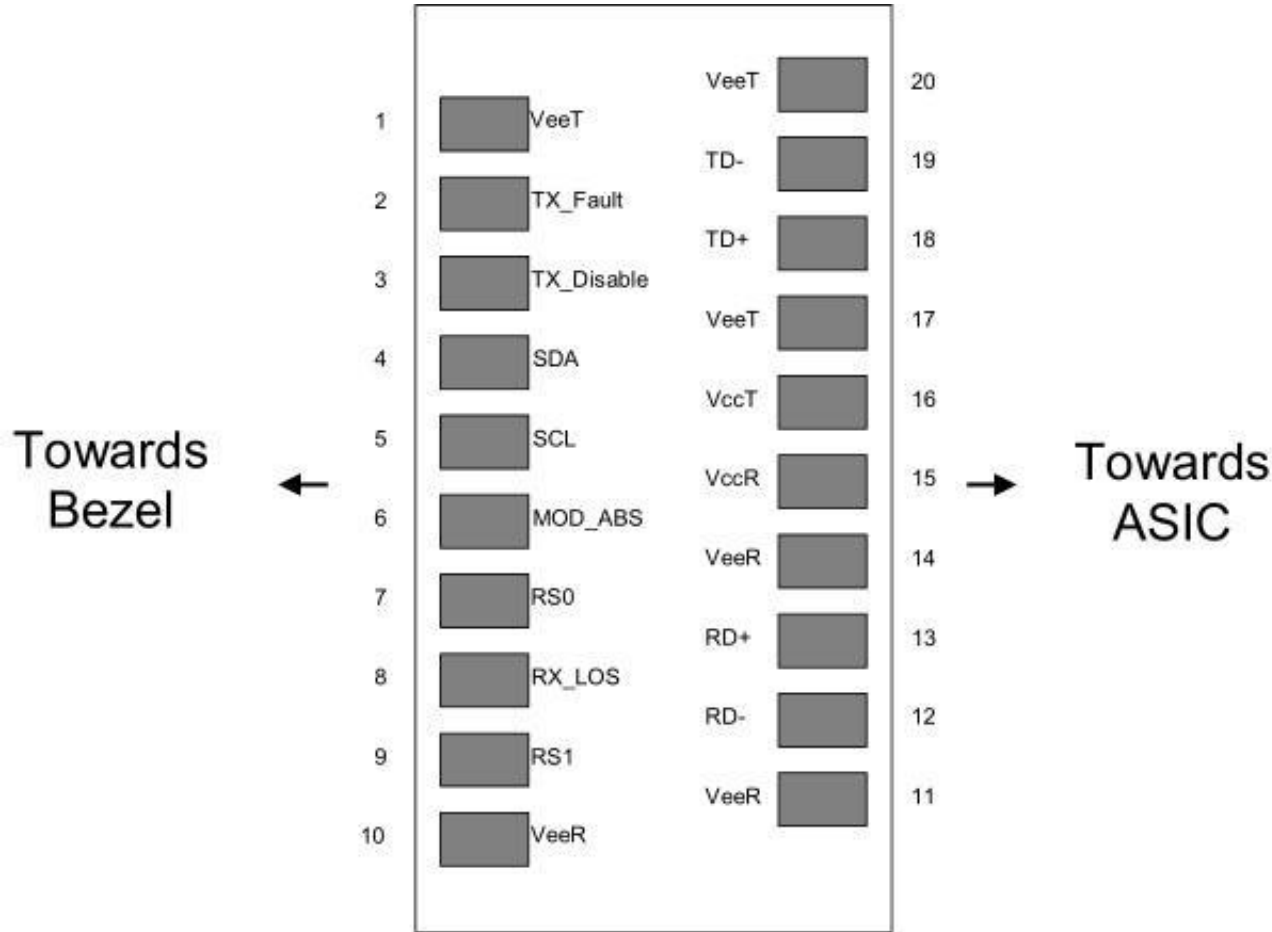
1.Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser.

VI. Pin Description

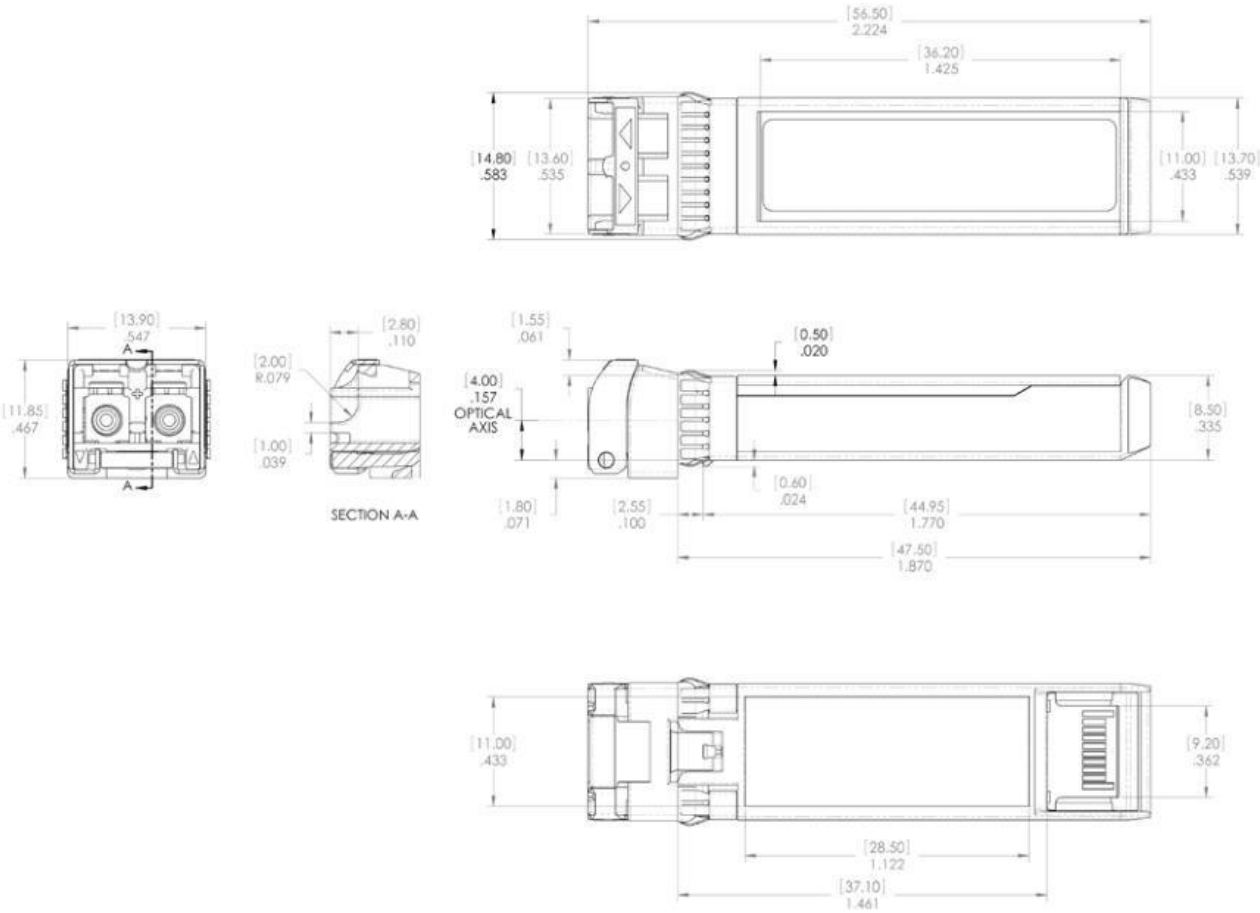
Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground(Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault	2
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	RS1	No connection required	
10	V _{EER}	Receiver Ground(Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground(Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled.	
13	RD+	Receiver Non-inverted DATA out. AC Coupled.	
14	V _{EER}	Receiver Ground(Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	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	V _{EET}	Transmitter Ground(Common with Receiver Ground)	1

Notes:

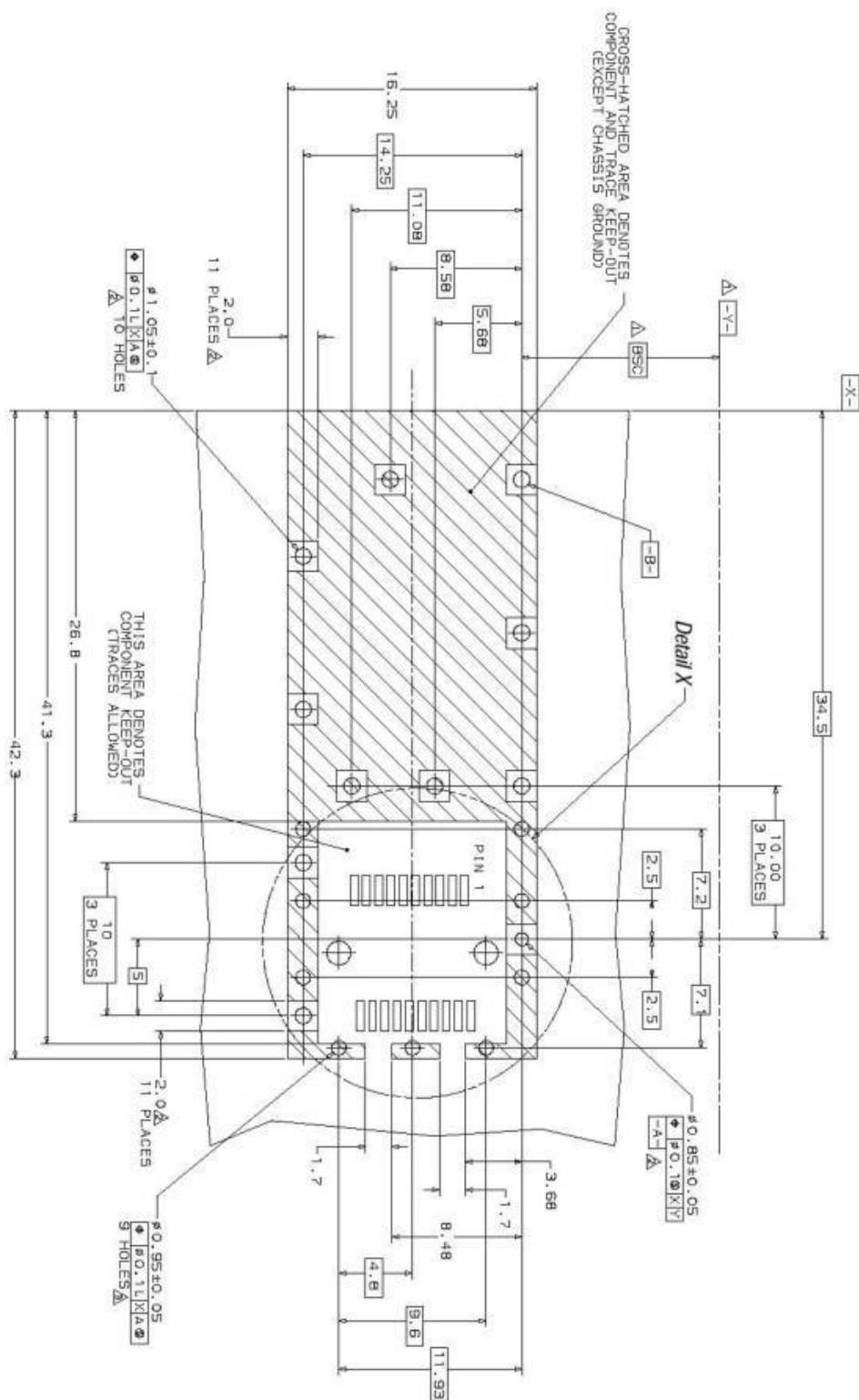
- 1. Circuit ground is internally isolated from chassis ground.
- 2. T_FAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter 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 T_DIS >2.0V or open, enabled on T_DIS <0.8V.
- 4. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- 5. LOS is open collector output. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



VII. Mechanical Specifications



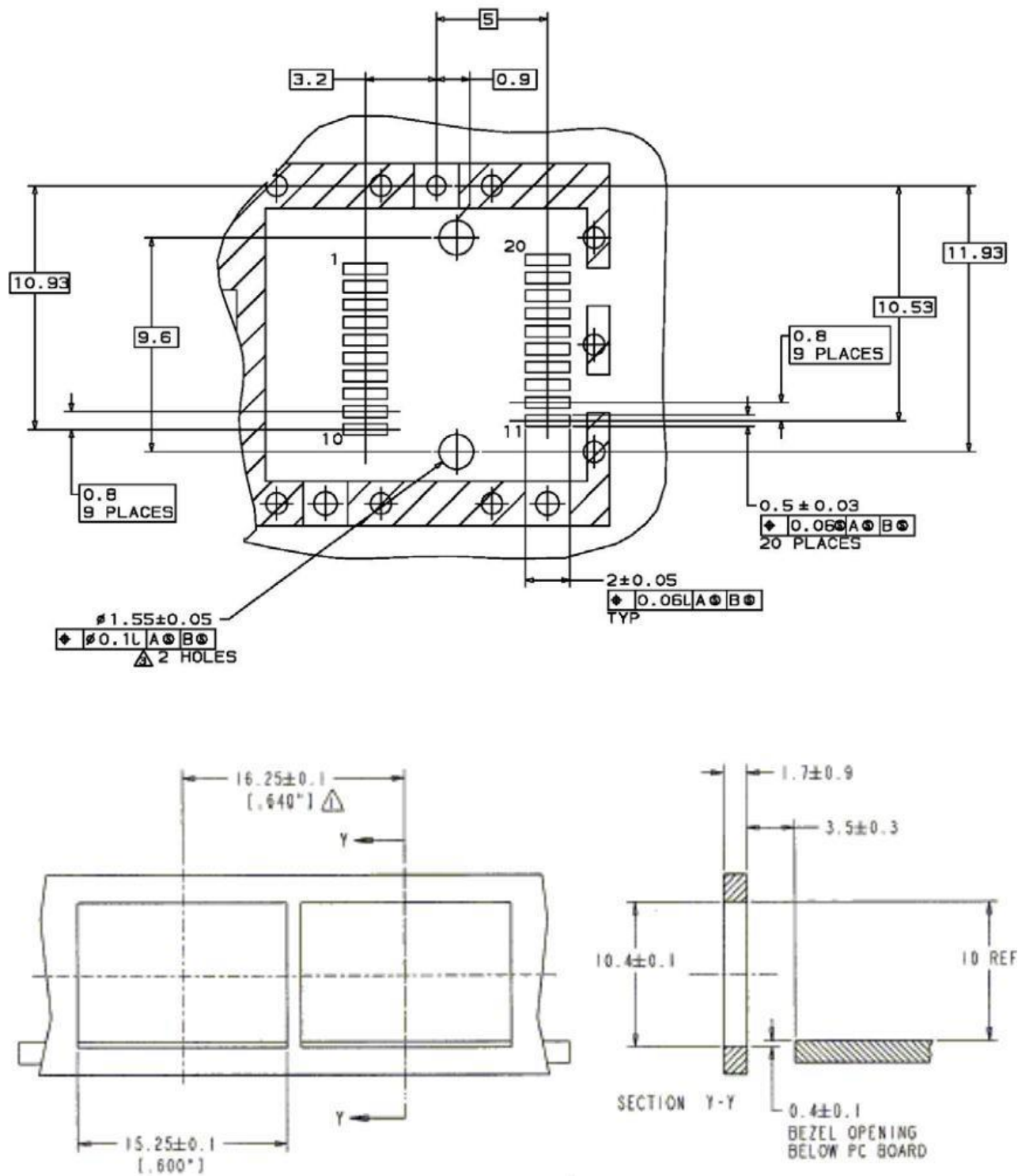
VIII. Host Board SFP+ Connector Recommendations



Datum and Basic Dimension Established by Customer

△Rads and Vias are Chassis Ground, 11 Places

△ Through Holes are Unplated



NOTES:

△ MINIMUM PITCH ILLUSTRATED, ENGLISH DIMENSIONS ARE FOR REFERENCE ONLY

2. NOT RECOMMENDED FOR PCI EXPANSION CARD APPLICATIONS

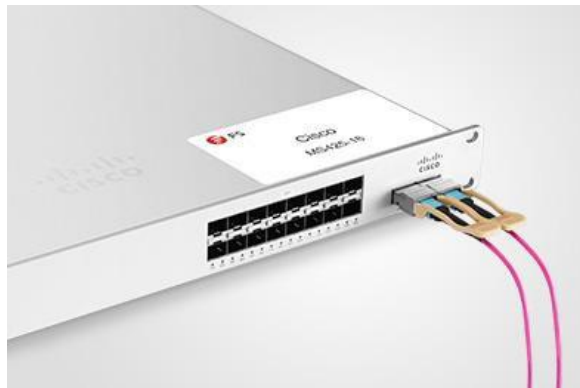
Test Center

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.



CiscoCatalystC9500-24Y4C



Cisco MS425-16



BrocadeVDX6940-144S



DellEMCNetworkingZ9100-ON



Force10S60-44T

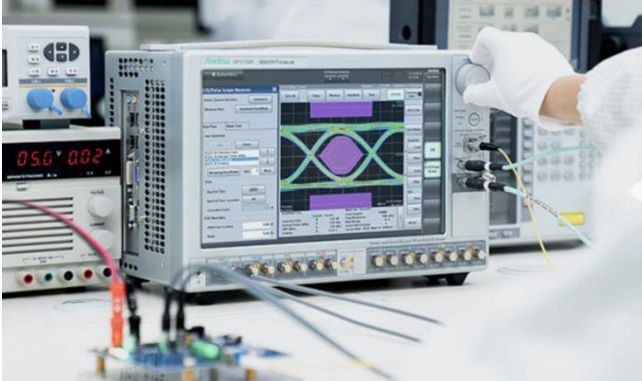


HUAWEIS6720-30L-HI-24S

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-10GSR-85	10GBASE-SR SFP+ 850nm 300m DOM Transceiver
SFP-10GLRM-31	10GBASE-LRM SFP+ 1310nm 220m DOM Transceiver
SFP-10GLR-31	10GBASE-LR SFP+ 1310nm 10km DOM Transceiver
SFP-10GER-55	10GBASE-ER SFP+ 1550nm 40km DOM Transceiver
SFP-10GZR-55	10GBASE-ZR SFP+ 1550nm 80km DOM Transceiver
SFP-10GZRC-55	10GBASE-ZR SFP+ 1550nm 100km DOM Transceiver
SFP-10GMSR-85	Dual-Rate 1000BASE-SX and 10GBASE-SR SFP+ 850nm 300m DOM Transceiver
SFP-10GMLR-31	Dual-Rate 1000BASE-LX and 10GBASE-LR SFP+ 1310nm 10km DOM Transceiver

Notes:

1. 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.