

Dual-Rate 1000BASE-SX and 10GBASE-SR SFP+ 850nm 300m DOM Transceiver

SFP-10GSR-85



Application

- 1000BASE-SX 1G Ethernet
- 10GBASE-SR/SW 10G Ethernet

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
- Maximum link length of 400m on OM4 MMF
- Uncooled 850nm VCSEL laser
- Receiver limiting electrical interface
- Duplex LC connector
- Built-in digital diagnostic functions

Description

The 1G/10G Dual-Rate SFP+ transceivers are designed for use in 1-Gigabit and 10-Gigabit Ethernet links over multimode fiber. They are compliant with SFF-8431, IEEE 802.3-2012 10G-SR/SW and 1000BASE-SX.

Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF- 8472. The FTLX8574D3BCV 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 interoperability with an SFP+ limiting module. This product is for applications specifically designed for 10G SFP+ ports and 1G/10G SFP+ ports and not native 1G SFP ports. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

Product Specifications

I.General Specifications

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Bit Rate (RS0 = LOW)	BR		1.25		Gb/s	1
Bit Rate (RS0 = HIGH)	BR	9.95	10.3		Gb/s	2

Parameter		Symbol	Max. Supported Distance		Units
Distance			@ 1G	@ 10G	
Fiber Type	850nm OFL Bandwidth				
62.5m	160 MHz-km	Lmax	220	26	m
	OM1 200 MHz-km		275	33	
50m	400 MHz-km	Lmax	500	66	m
	OM2 500 MHz-km		550	82	
	OM3 2000 MHz-km		>550	300	
	OM4 4700 MHz-km		>550	400	

Notes:

1.1000BASE-SX. Tested with a 27-1 PRBS. See Section I, Note 5 for RS0 conditions for 1.25Gb/s operation.

2.10GBASE-SR/SW. Tested with a 231 -1 PRBS. See Section I, Note 5 for RS0 conditions for 10.3 Gb/s operation.

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 _{OP}	0		70	° C	
Relative Humidity	RH	0		85	%	1

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

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage	V _{CC}	3.14	3.30	3.46	V	
Supply Current	I _{CC}		200	285	mA	
Transmitter						
Input differential impedance	R _{in}		100		Ω	1
Differential data input swing	V _{in,pp}	180		700	mV	2
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	3
Output rise time and fall time	T _r , T _f	28			ps	4
LOS asserted	V _{LOS fault}	2		V _{CCHOST}	V	5
LOS de-asserted	V _{LOS norm}	V _{EE}		V _{EE} +0.8	V	5
Power Supply Noise Tolerance	V _{CC1} /V _{CCR}		Per SFF-8431 Rev 4.1		mVpp	6

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Voltage swing for 1G operation is equivalent to voltage swing in 10G operation (SFF-8431 Rev 4.1).
3. Into 100Ω differential termination.
4. 20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative.
5. 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. Maximum pull-up voltage is 5.5V.
6. Testing methodology per SFF-8431. Rev 4.1.

IV. Optical Characteristics for RS0 = HIGH (10G Operation)
(TOP = 0 to 70 ° C, VCC3 = 3.14 to 3.46 Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Transmitter						
Average Launch Power	P_{AVE}	-9.5		-1	dBm	1
Optical Wavelength	λ	840	850	860	nm	2
Rise-Fall Time	T_{rise}/T_{fall}			0.26	ns	3
RMS Spectral Width	$\Delta\lambda_{rms}$			0.45	dB	
Optical Extinction Ratio	ER	9			dB	
Average Launch power of OFF transmitter	P_{OFF}			-30	dBm	
Tx Jitter	T_{xj}	Per IEEE 802.3-2012 Table 38-10				
Relative Intensity Noise	RIN_{12OMA}			-117	dB/Hz	
Coupled Power Ratio	CPR	9			dB	

Receiver

	λ_C	840		860	nm	2
Receiver Sensitivity	R_{SENS}	-17			dBm	
Stressed Receiver Sensitivity 50 μm MMF	$SRS_{50\mu m}$			-13.5	dBm	4
Stressed Receiver Sensitivity 62.5 μm MMF	$SRS_{62\mu m}$			-12.5	dBm	4
Maximum Input Power	P_{MAX}	+0.5			dBm	
Return Loss	R_{rx}	12			dB	
Receive electrical 3dB upper cutoff frequency				1500	MHz	2
LOS De-Assert	LOS_D			-18	dBm	
LOS Assert	LOS_A	-30	-23		dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Max is equivalent to 10G max spec.
2. This product has not been designed to support 780-nm laser operation.
3. 20%-80%.
4. Per IEEE 802.3-2012. 9dB extinction ratio transmitter.

V.Optical Characteristics for RS0 = HIGH (10G Operation)

(TOP = 0 to 70 °C, VCC3 = 3.14 to 3.46 Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.	
Transmitter							
Optical Modulation Amplitude (OMA)	P_{OMA}		-1.5		dBm	1	
Average Launch Power	P_{AVE}	-5		-1	dBm	2	
Optical Wavelength	λ	840	850	860	nm	1	
RMS Spectral Width	$\Delta\lambda_{rms}$			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	T_{xj}	Per IEEE 802.3-2012 requirements					
Encircled Flux	<4.5m			30	%	3	
	<19m	86			%	3	
Relative Intensity Noise	RIN_{12OMA}			-128			
Receiver							
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	R_{rx}			-12	dB		
LOS De-Assert	LOS_D			-14	dBm		
LOS Assert	LOS_A	-30			dBm		
LOS Hysteresis		0.5			dB		

Notes:

1. Per Tradeoff Table 52.8, IEEE 802.3-2012
2. Average Power figures are informative only, per IEEE802.3-2012.
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 802.3-2012.

VI. Digital Diagnostic Specifications

Dual-Rate 1000BASE-SX and 10GBASE-SR SFP+ transceivers 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	$\Delta DD_{Temperature}$	-3		3	°C	
Internally measured transceiver supply voltage	$\Delta DD_{Voltage}$	-100		100	%	
Measured TX bias current	ΔDD_{Bias}	-10		10	%	1
Measured TX output power	$\Delta DD_{Tx-Power}$	-2		2	dB	
Measured RX received average optical power	$\Delta DD_{Rx-Power}$	-2		2	dB	

Parameter	Symbol	Min	Typ.	Max	Units	Ref.
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Dynamic Range for Rated Accuracy

Internally measured transceiver temperature	$DD_{Temperature}$	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	$DD_{Temperature}$	-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		-1	dBm	
Measured RX received average optical power	$DD_{Rx-Powe}$	-22		0	dBm	

Note:

Accuracy of measured Tx bias current is 10% of the actual bias current from the laser driver to the laser.

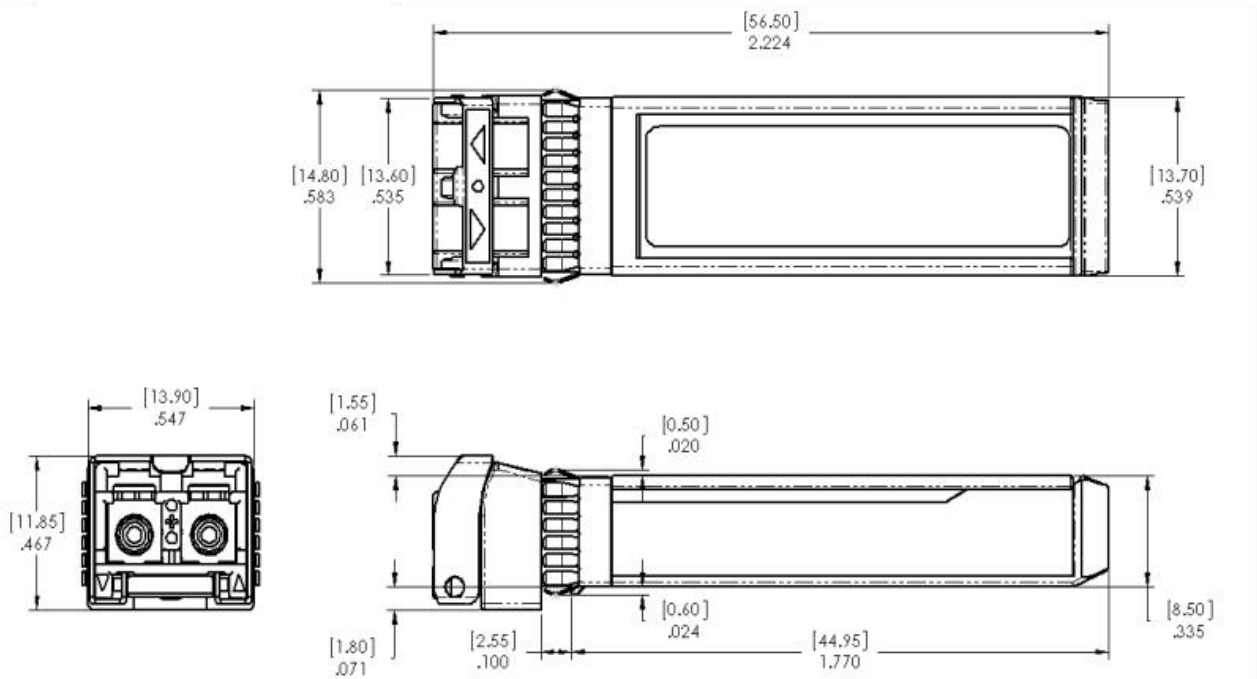
VII. Pin Description

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter 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	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	2
7	RS0	Rate Select 0.	4
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	RS1	Rate Select 1.	4
10	V_{EER}	Receiver Ground	1
11	V_{EER}	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled.	
13	RD+	Receiver Non-inverted DATA out. AC Coupled.	
14	V_{EER}	Receiver Ground	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground	1

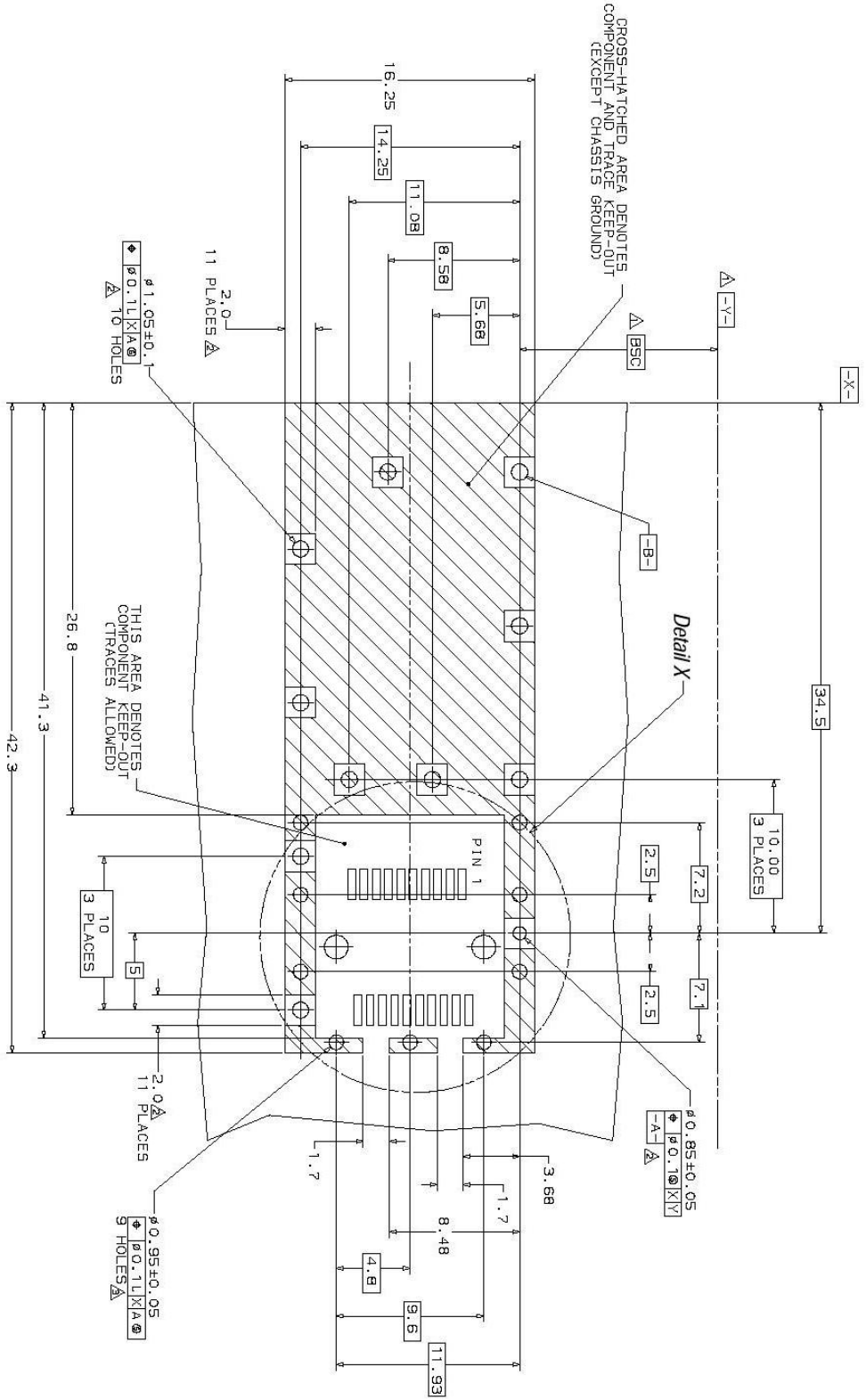
Notes:

1. Circuit ground is internally isolated from chassis ground.
2. TFAULT 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 TDIS >2.0V or open, enabled on TDIS <0.8V.
4. Internally pulled down per SFF-8431 Rev 2.0. See Sec. X for the logic table to use for the internal CDRs locking modes.
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.

VIII. Mechanical Specifications



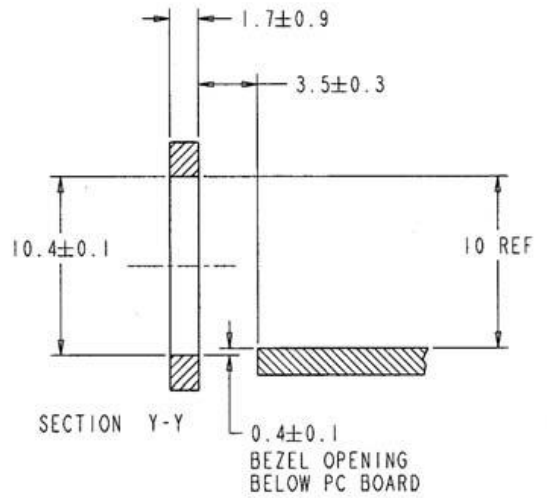
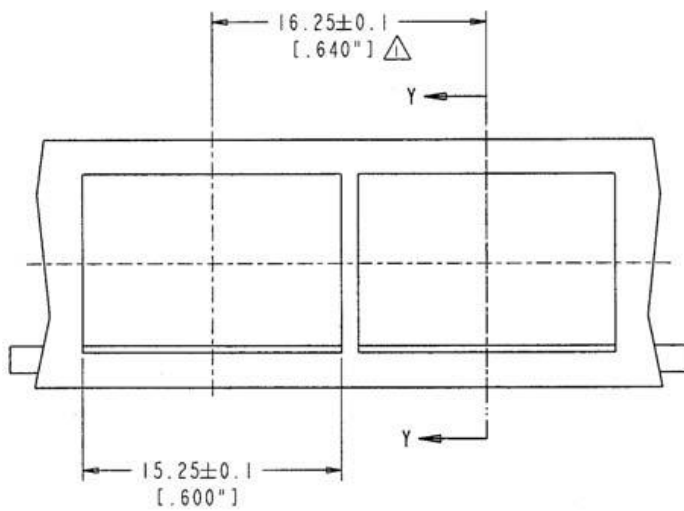
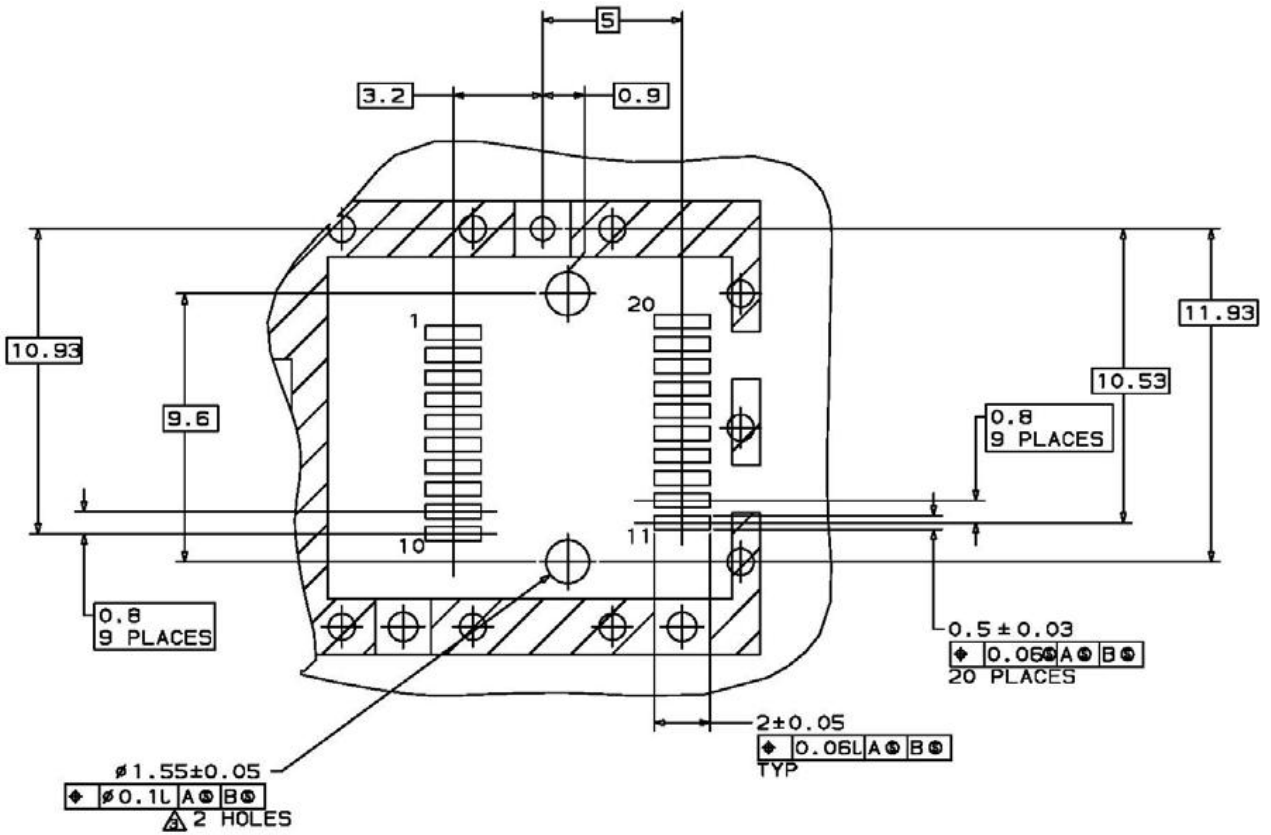
IX. PCB Layout and Bezel Recommendations



▲ 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

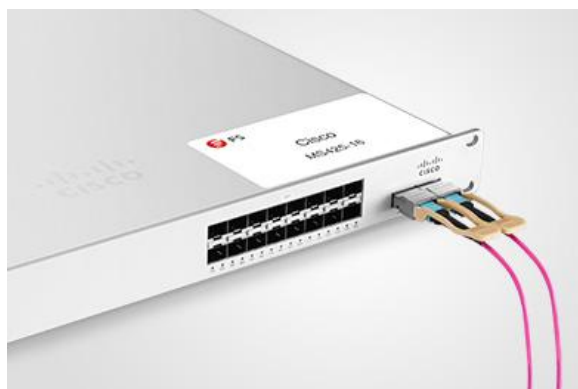
Test Center

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.



Cisco Catalyst C9500-24Y4C



Cisco MS425-16



Brocade VDX 6940-144S



Dell EMC Networking Z9100-ON



Force10 S60-44T

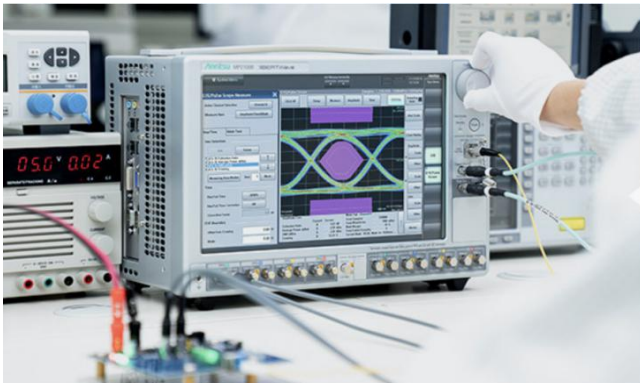


HUAWEI S6720-30L-HI-24S

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 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

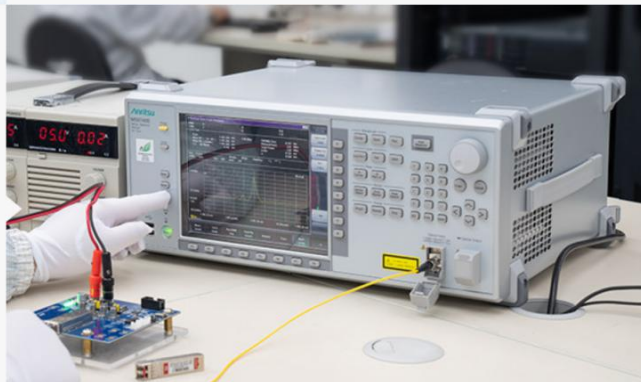
Test the actual transfer data rate and the transmission ability under different protocols with Networks Master Pro.

- 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-10GSR-85	Dual-Rate 1000BASE-SX and 10GBASE-SR SFP+ 850nm 300m DOM Transceiver
SFP-10GLR-31	Dual-Rate 1000BASE-LX and 10GBASE-LR SFP+ 1310nm 10km DOM Transceiver

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.



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