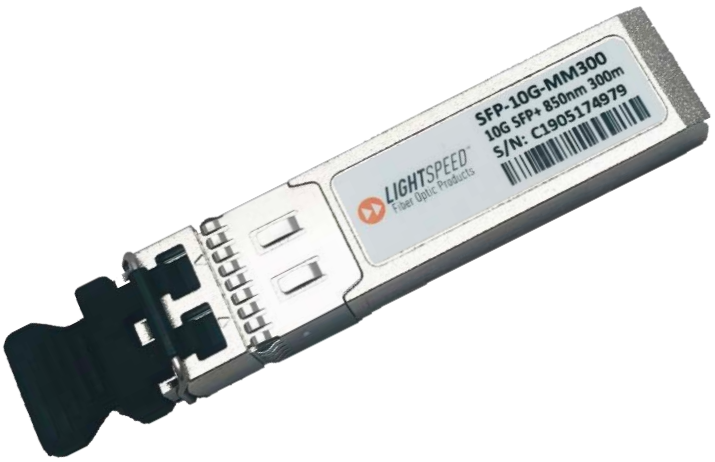
10GBASE-SR SFP+ 850nm 300m DOM Transceiver

SFP-10G-MM300



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)
- Industrial temperature range -40° C to 85° C
- Single 3.3Vpower supply
- Maximum link length of 400m on
- 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	Vcc	-0.5		4.0	V	
Storage Temperature	T_S	-40		85	° C	
Case Operating Temperature	T_A	-40		85	° C	
Relative Humidity	RH	0		85	%	1

Notes:

1. Non-condensing..

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

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage	Vcc	3.14		3.46	V	
Supply Current	Icc			289	mA	

Transmitter						
Input differential impedance	R_{in}		100		Ω	1
Differential data input swing	Vin,pp	180		700	mV	
Transmit Disable Voltage	V_D	2		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Receiver						
Differential data output swing	Vout,pp	300		850	mV	2,6
Output rise time and fall time	t_r	28			ps	3
LOS asserted	$V_{LOS\ fault}$	2		Vcc_{HOST}	V	4
LOS de-asserted	$V_{LOS\ norm}$	Vee		Vee+0.8	V	4
Power Supply Noise Tolerance	VccT/VccR		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 70 ℃, VCC = 3.14 to 3.46 V)

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Transmitter (Tx)						
Optical Modulation Amplitude (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	Tx_j	Per IEEE 802.3ae requirements				
Encircled Flux	<4.5μm <19μm	86		30	%	3
Relative Intensity Noise	$RIN_{12}OMA$			-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	ºC	
Internally measured transceiver supply voltage	$DD_{Voltage}$	-100		100	mV	
Measured TX bias current	DD_{Bias}	-10		10	%	1
Measured TX output power	$DD_{Tx\text{-}Power}$	-2		2	dB	
Measured RX received average optical power	$DD_{Rx\text{-}Power}$	-2		2	dB	

Parameter	Symbol	Min	Typ.	Max	Units	Ref.
Dynamic Range for Rated Accuracy						
Internally measured transceiver temperature	DD_{Temp}	-40		85	°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	$DD_{Tx\text{-}Power}$	-9		-2.5	dBm	
Measured RX received average optical power	$DD_{Rx\text{-}Power}$	-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	$DD_{Tx\text{-}Power}$	-10		-3	dBm	
Measured RX received average optical power	$DD_{Rx\text{-}Powe}$	-22		0	dBm	

Notes:

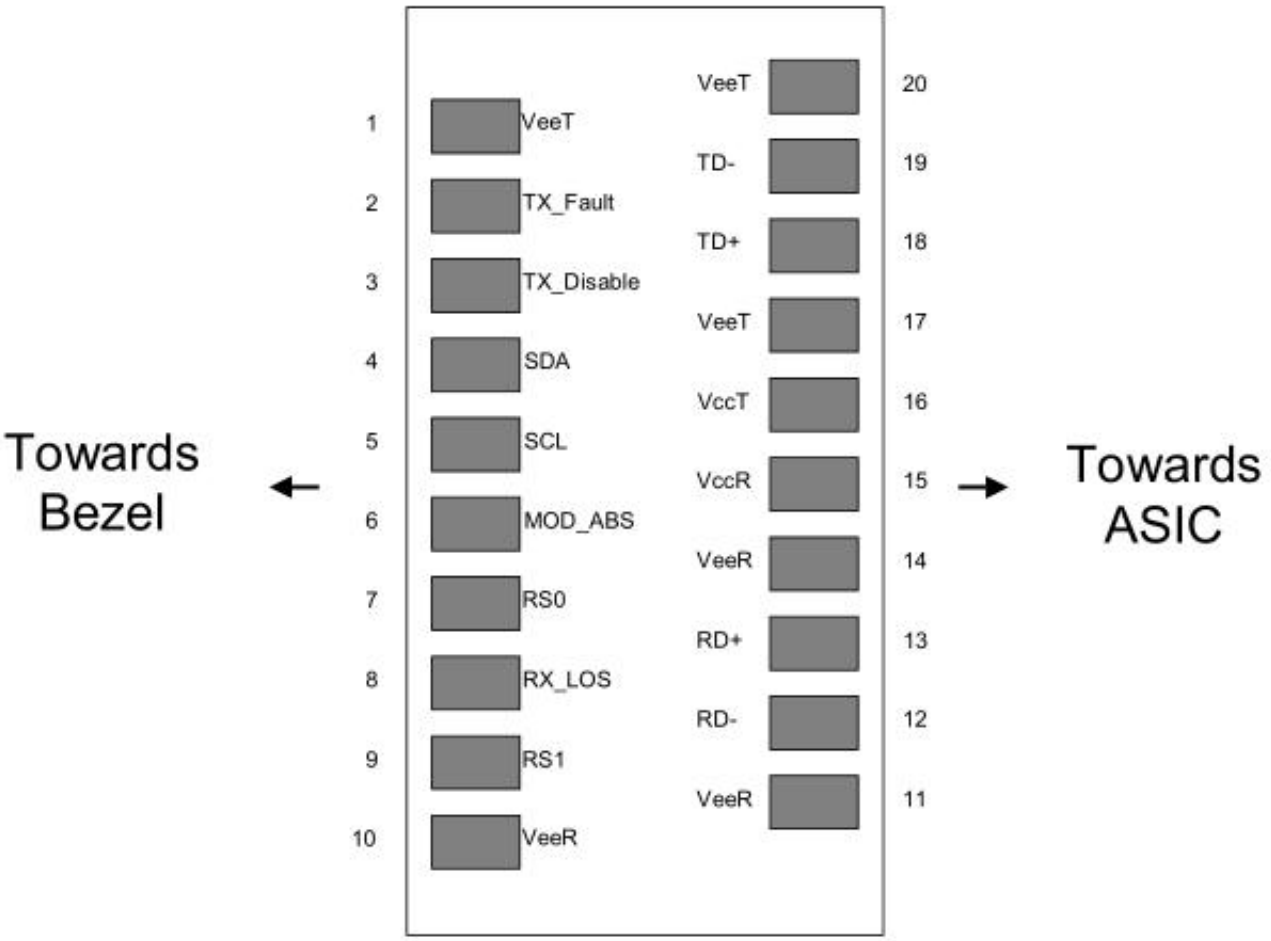
1. Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser.

VI. Pin Description

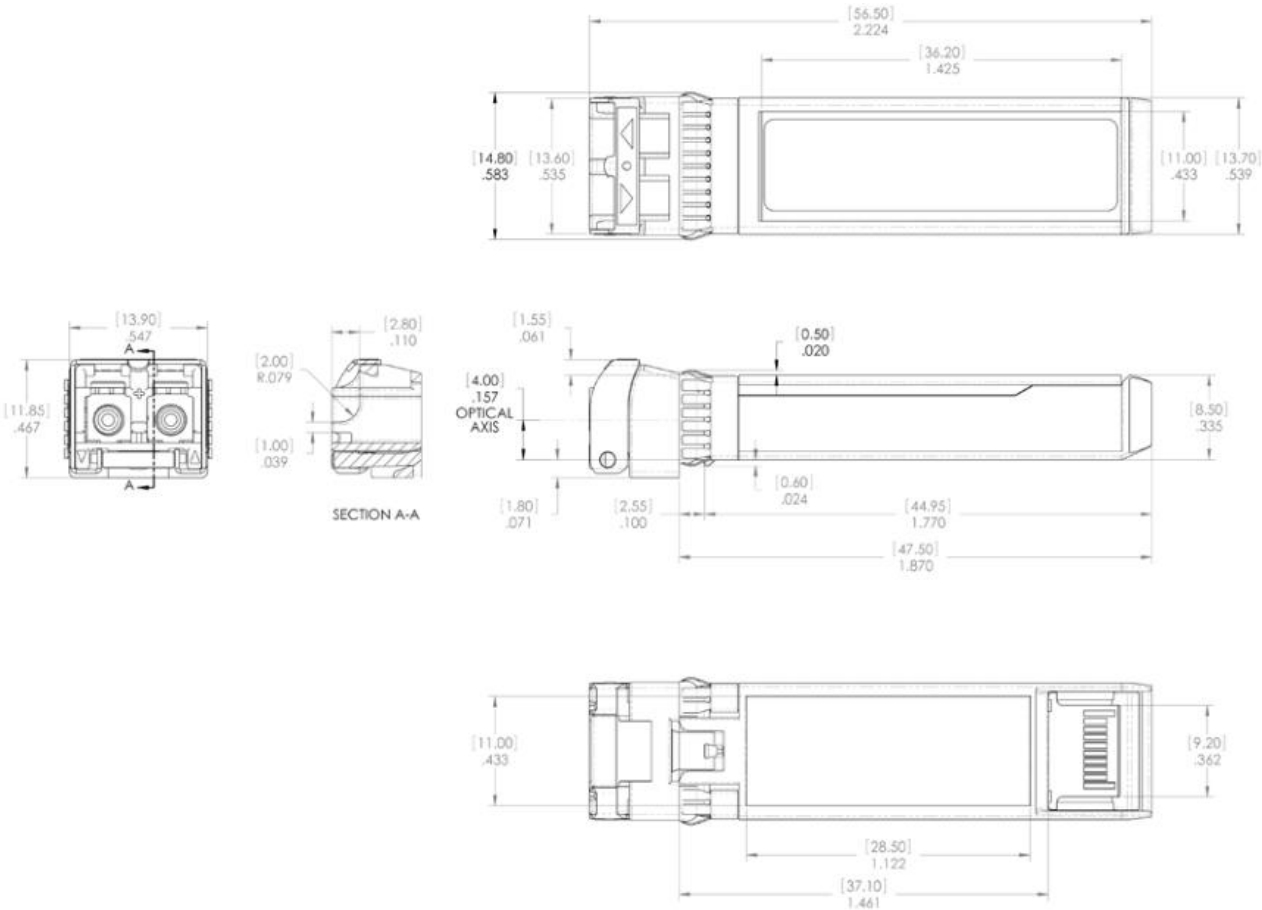
Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground(Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. 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:

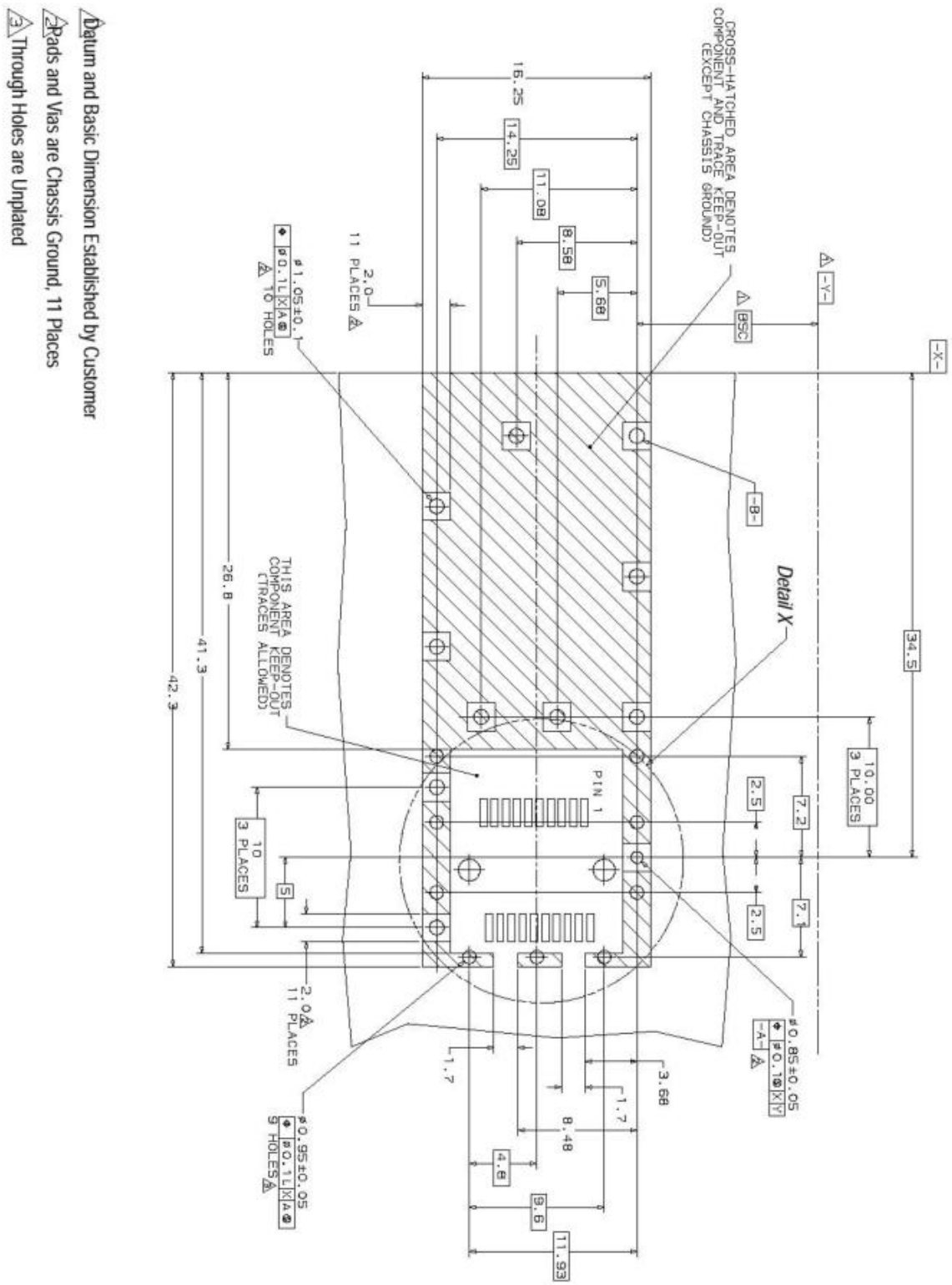
1. Circuit ground is internally isolated from chassis ground.
2. T FAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault 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.

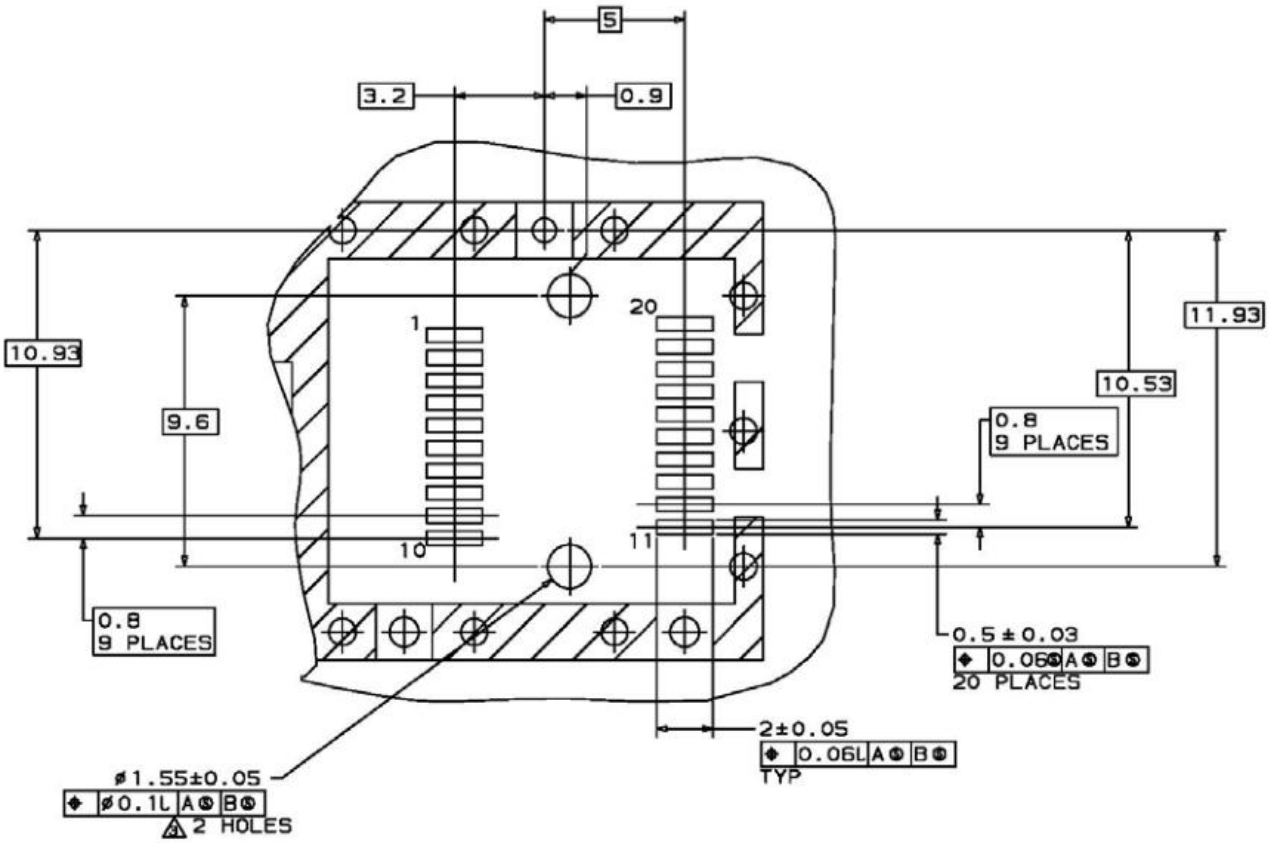


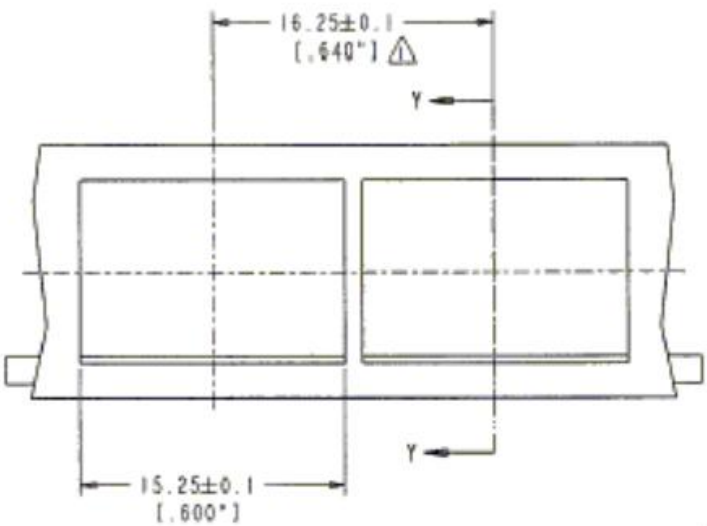
VII. Mechanical Specifications

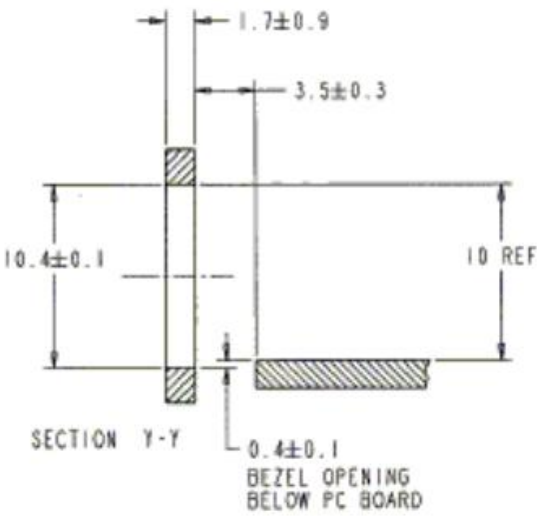


VIII. Host Board SFP+ Connector Recommendations









NOTES:

1. MINIMUN PITCH ILLUSTRATED, ENGLISH DIMENSIONS ARE FOR REFERENCE ONLY
2. NOT RECOMMENDED FOR PCI EXPANSION CARD APPLICATIONS