Finisar

Product Specification

Long-Wavelength Pluggable SFP Transceiver

FTRJ-1319-7D

PRODUCT FEATURES

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- 1310nm Fabry-Perot laser transmitter
- Duplex LC connector
- Very low jitter
- Up to 10 km on 9/125µm SMF
- Metal enclosure, for lower EMI
- Single 3.3V power supply
- Low power dissipation <700mW
- Extended operating temperature range: -10°C to 70°C



APPLICATIONS

- 1.25Gb/s 1000Base-LX Ethernet
- 1.0625Gb/s Fibre Channel

Finisar's FTRJ-1319-7D Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA)[1]. They comply with Gigabit Ethernet as specified in IEEE Std 802.3[2] and Fibre Channel FC-PH, PH2, PH3[3]and FC-PI 10.0[4]. Digital diagnostics functions are available via an SPI serial bus.

PRODUCT SELECTION

FTRJ-1319-xD

x=7: LC connector; bail extraction

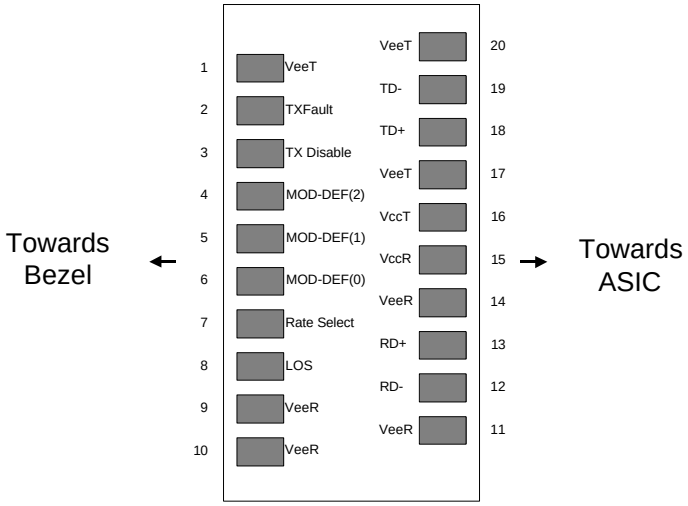
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I. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault. Not supported.	
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
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. 100 ohm termination between TD+ and TD-, AC Coupled thereafter.	
19	TD-	Transmitter Inverted DATA in. See TD+	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. **Circuit ground is internally isolated from chassis ground.**
2. Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. Finisar 2x receiver achieves simultaneous 1x and 2x operation without active control.
5. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



Pinout of Connector Block on Host Board

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		5.0	V	
Storage Temperature	T_S	-40		85	°C	
Case Operating Temperature	T_{OP}	-10		70	°C	

III. Electrical Characteristics (T_{OP} = -10 to 70 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.00		3.60	V	
Supply Current	Icc			240	mA	
Transmitter						
Input differential impedance	R_{in}		100		Ω	1
Single ended data input swing	Vin,pp	250		1200	mV	
Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	2
Transmit Disable Assert Time				10	us	
Receiver						
Single ended data output swing	Vout,pp	200		800	mV	3
Data output rise time	t_r		120	350	ps	4
Data output fall time	t_f		120	350	ps	4
LOS Fault	$V_{LOS\ fault}$	Vcc – 0.5		Vcc_{HOST}	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6

Notes:
1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100 Ω differential termination.
4. 20 – 80 %
5. Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

IV. Optical Characteristics (T_{OP} = -10 to 70 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Pwr: 9/125 SMF	P_{OUT}	-9.5		-3	dBm	1
Optical Wavelength	λ	1275		1350	nm	2
Spectral Width	σ			2	nm	2
Optical Extinction Ratio	ER	9			dB	3
Optical Rise/Fall Time	t_r/ t_f			260	ps	4
Relative Intensity Noise	RIN			-120	dB/Hz	
Transmitter Jitter (peak to peak)			60	100	ps	5
Receiver						
Average sensitivity	P_{IN}		-25	-20.5	dBm	6
Maximum input power	P_{MAX}	-3			dBm	
Optical Center Wavelength	λ_C	1270		1600	nm	
LOS De-Assert	LOS_D		-23.5	-19	dBm	
LOS Assert	LOS_A	-30	-26		dBm	
LOS Hysteresis		0.5			dB	
Receiver Jitter Generation (peak to peak)			60	100	ps	7

Notes:
1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Meets curves in FC-PI 10.0, Figure 18, which allow trade-off between wavelength, spectral width and OMA.
3. With a 1.25Gb/s 8B/10B signal pattern.
4. Unfiltered, 20-80%. Complies with FC 1x eye mask when filtered.
5. Typical peak-to-peak jitter (=6*RMS width of Jitter).
6. As measured with 9dB extinction ratio.
7. Jitter added by receiver.

V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Data Rate	BR		1.0625 1.25		Gb/sec	1
Bit Error Rate	BER			10^{-12}		2
Max. Supported Link Length on 9/125µm SMF	L	10	20		km	

Notes:
1. Fibre Channel and IEEE 802.3 (Gigabit Ethernet) compatible. Typical maximum data rate extends to 1.5Gb/s.
2. 1.25Gb/s with PRBS 2^7-1.

VI. Environmental Specifications

Finisar 1310nm SFP transceivers have an extended operating temperature range from –10°C to +70°C case temperature.

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T_{op}	-10		70	°C	
Storage Temperature	T_{sto}	-40		85	°C	

VII. Regulatory Compliance

Finisar 1310nm SFP transceivers are Class 1 Laser Products. They are certified per the following standards:

Feature	Agency	Standard	Certificate Number
Laser Eye Safety	FDA/CDRH	FDA 21(J) CFR	9210176-17
Laser Eye Safety	TÜV	EN 60950 EN 60825-1 EN 60825-2	R2179338.01
Electrical Safety	UL/CSA	CLASS 3862.07 CLASS 3862.87	CSA 1034405

Copies of the referenced certificates are available at Finisar Corporation upon request.

VIII. Digital Diagnostic Functions

Finisar FTRJ-1319-7D SFP transceivers support the 2-wire serial communication protocol as defined in the SFP MSA[1]. It is very closely related to the E^2PROM defined in the GBIC standard, with the same electrical specifications.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, Finisar SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

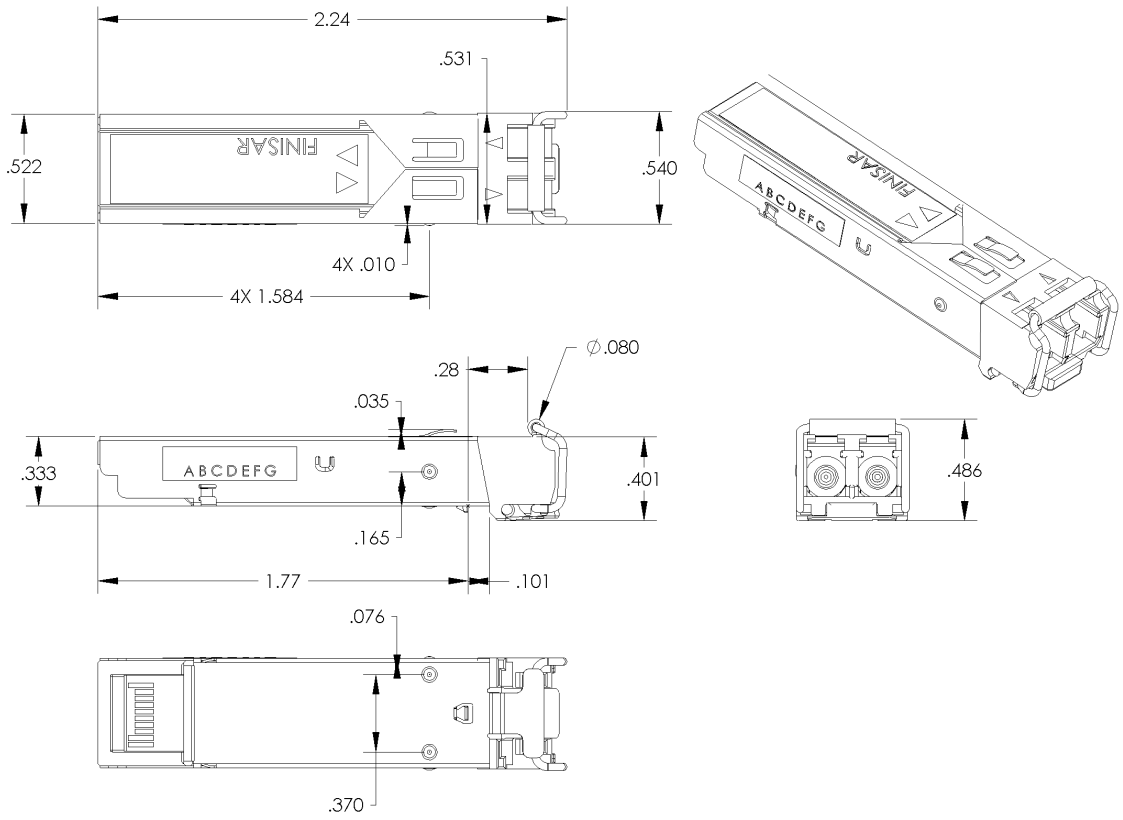
The SFP MSA defines a 256-byte memory map in E^2PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement. The complete interface is described in Finisar Application Note AN-2030: "Digital Diagnostics Monitoring Interface for SFP Optical Transceivers".

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E^2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) 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.

For more information, please see the SFP MSA documentation[1] or Finisar Application Note AN-2030.

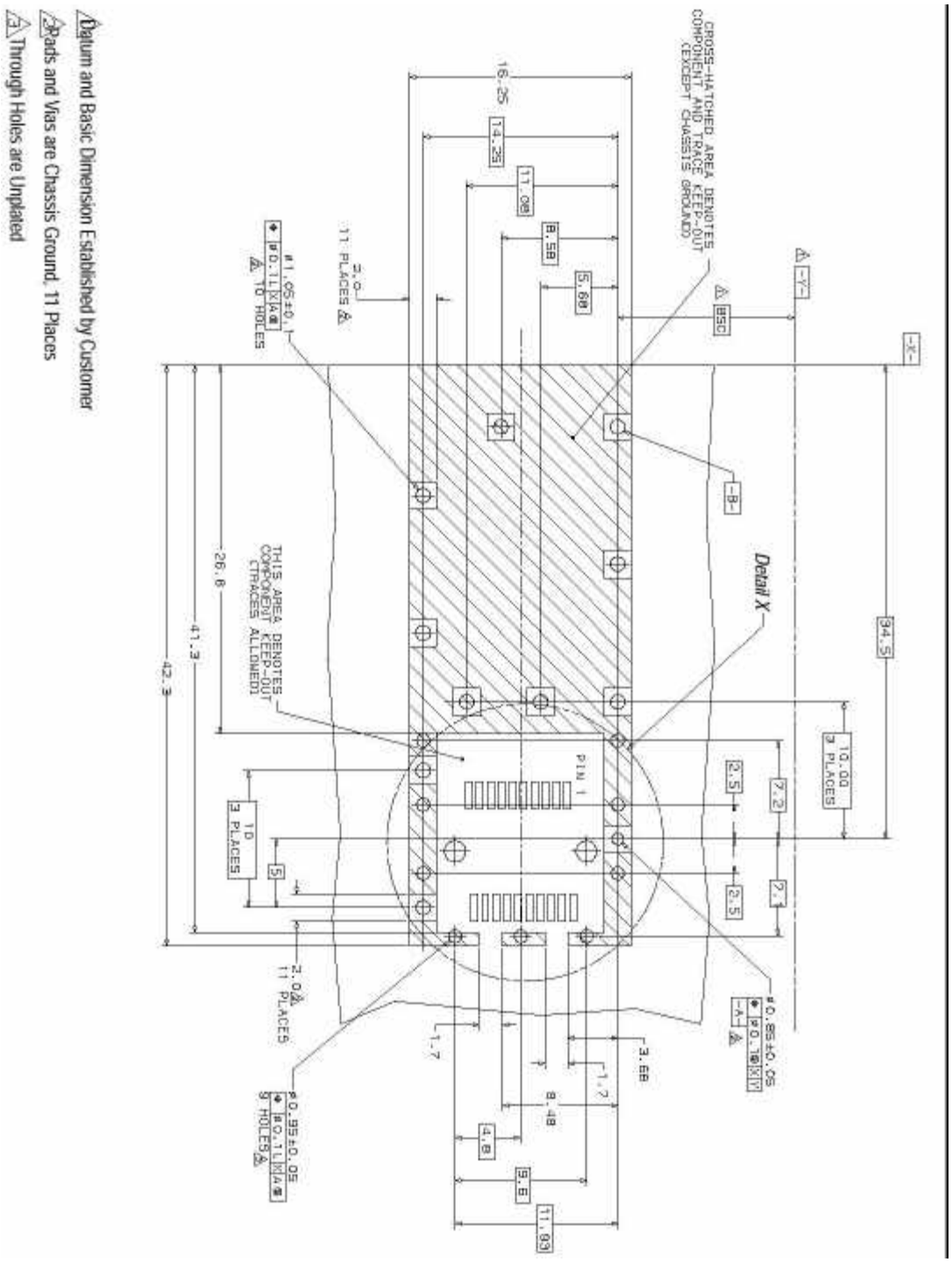
IX. Mechanical Specifications

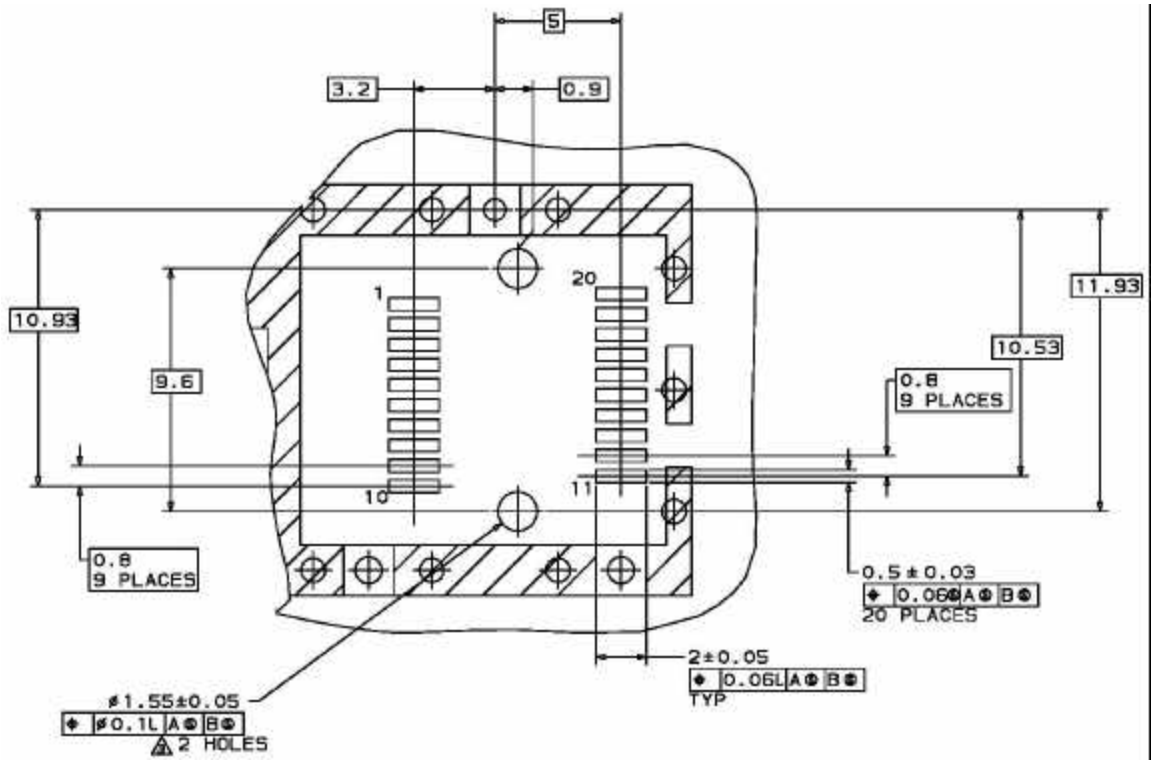
Finisar's Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the the SFP Multi-Sourcing Agreement (MSA)[1].

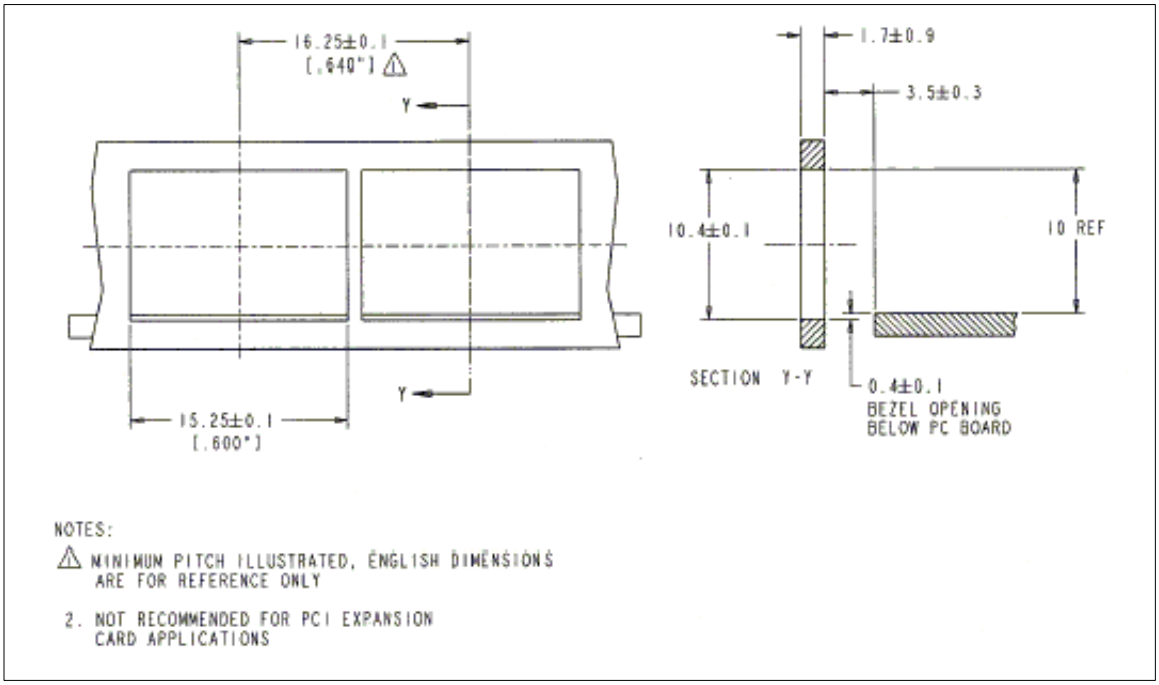


FTRJ-1319-7D (dimensions are in inches)

X. PCB Layout and Bezel Recommendations




5
3.2
0.9
1
20
10
11
10.93
9.6
11.93
10.53
0.8
9 PLACES
0.8
9 PLACES
0.5±0.03
0.06 A B
20 PLACES
2±0.05
0.06 L A B
TYP
ø1.55±0.05
ø0.1 L A B
2 HOLES


16.25±0.1
[.640"]
Y
Y
15.25±0.1
[.600"]
1.7±0.9
3.5±0.3
10.4±0.1
10 REF
SECTION Y-Y
0.4±0.1
BEZEL OPENING
BELOW PC BOARD
NOTES:
MINIMUM PITCH ILLUSTRATED, ENGLISH DIMENSIONS ARE FOR REFERENCE ONLY
2. NOT RECOMMENDED FOR PCI EXPANSION CARD APPLICATIONS

XI. References

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000. Documentation is currently available at Finisar upon request.

2. IEEE Std 802.3, 2000 Edition, Clause 38, PMD Type 1000BASE-LX. IEEE Standards Department, 2000.

3. "Fibre Channel Physical and Signaling Interface (FC-PH, FC-PH2, FC-PH3)". American National Standard for Information Systems.

4. "Fibre Channel Draft Physical Interface Specification (FC-PI 10.0)". American National Standard for Information Systems.

XII. For More Information

Finisar Corporation
1308 Moffett Park Drive
Sunnyvale, CA 94089-1133
Tel. 1-408-548-1000
Fax 1-408-541-6138
sales@finisar.com
www.finisar.com