Finisar

Product Specification

2 Gigabit RoHS Compliant Long-Wavelength 2x5 Pin SFF Transceiver

FTLF1319F1xTL

PRODUCT FEATURES

- Up to 2.125Gb/s bi-directional data links
- Standard 2x5 pin SFF footprint (MSA compliant)
- 1310nm Fabry-Perot laser transmitter
- Duplex LC connector
- RoHS compliant and Lead Free
- 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
- Industrial operating temperature range: -40°C to 85°C

APPLICATIONS

- 1.25 Gb/s 1000Base-LX Ethernet
- Dual Rate 1.063 / 2.125 Gb/s Fibre Channel

Finisar's FTLF1319F1xTL Small Form Factor (SFF) transceivers comply with the 2x5 standard package defined by the Small Form Factor Multi-Sourcing Agreement (MSA)[1]. They are simultaneously compatible with Gigabit Ethernet as specified in IEEE Draft P802.3z/D5.0[2] and Fibre Channel FC-PH, PH2, PH3[3] and FC-PI-2 10.0[4]. They are RoHS compliant and lead-free per Directive 2002/95/EC[5] and Finisar Appl. Note AN-2038.

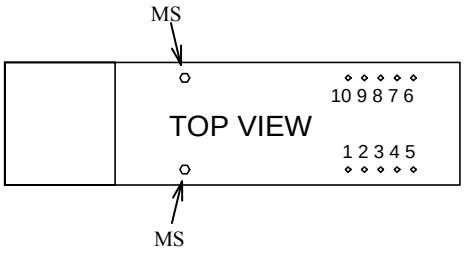
PRODUCT SELECTION

FTLF1319F1xTL

x		
	G	2 Grounding Pins, Short EMI shield
	M	6 Grounding Pins, Short EMI shield
	K	2 Grounding Pins, Long EMI shield
	H	6 Grounding Pins, Long EMI shield

I. Pin Descriptions

Pin	Symbol	Name/Description	Logic Family
MS	MS	Mounting Studs are for mechanical attachment. **Chassis ground is internally isolated from circuit ground.** Connection to chassis ground is recommended.	NA
1	V_{EER}	Receiver Ground (Common with Transmitter Ground)	NA
2	V_{CCR}	Receiver Power Supply	NA
3	SD	Signal Detect. Logic 1 indicates normal operation.	LVTTL
4	RD-	Receiver Inverted DATA out. AC Coupled.	See Rx spec.
5	RD+	Receiver Non-inverted DATA out. AC Coupled	See Rx spec.
6	V_{CCT}	Transmitter Power Supply	NA
7	V_{EET}	Transmitter Ground (Common with Receiver Ground)	NA
8	T_{DIS}	Transmitter Disable	LVTTL
9	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	See Tx spec
10	TD-	Transmitter Inverted DATA in. AC Coupled.	See Tx spec.



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_A	-40		85	°C	
Relative Humidity	RH	0		85	%	1
Lead Soldering Temperature/Time				260/10	°C/s	

Notes:
1. Non condensing.

III. Electrical Characteristics (T_A = -40 to 85 °C, V_{CC} = 3.0 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.00		3.60	V	
Supply Current	Icc			300	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	300		800	mV	3
Data output rise time	t_r		100	175	ps	4
Data output fall time	t_f		100	175	ps	4
Signal Detect Normal	$V_{SD\ norm}$	Vcc – 0.5		Vcc	V	5
Signal Detect Fault	$V_{SD\ fault}$	Vee		Vee+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6
Deterministic Jitter Contribution (p-p)	RX ΔDJ			50	ps	7
Total Jitter Contribution (p-p)	RX ΔTJ			120	ps	8

Notes:

1. AC coupled.
2. Or open circuit.
3. Into 100 Ω differential termination.
4. 20 – 80 %
5. Signal detect is LVTTL. Logic 1 indicates normal operation; logic 0 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.
7. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and ΔDJ.
8. If measured with TJ-free data input signal. In actual application, output TJ will be given by:

$$TJ_{OUT} = DJ_{IN} + \Delta DJ + \sqrt{(TJ_{IN} - DJ_{IN})^2 + (\Delta TJ - \Delta DJ)^2}$$

IV. Optical Characteristics (T_A = -40 to 85 °C, V_{CC} = 3.0 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	P_{OUT}	-9.5		-3	dBm	1
Optical Wavelength	λ	1270		1355	nm	2
Spectral Width	σ			3	nm	2
Optical Modulation Amplitude	OMA	174			μW	2,3
Optical Rise/Fall Time	t_r/ t_f		100	160	ps	4
RIN				-120	dB/Hz	
Deterministic Jitter Contribution	TX ΔDJ		20	56.5	ps	5
Total Jitter Contribution	TX ΔTJ		<65	119	ps	6
Extinction Ratio	ER	9				
Receiver						
Receiver Sensitivity = 1.06 Gb/s	Rx_{SENS}			-22	dBm	7, 8
Receiver Sensitivity = 2.125 Gb/s	Rx_{SENS}			-21	dBm	7, 8
Receiver Sensitivity = 1.25 Gb/s	Rx_{SENS}			-22	dBm	7, 8
Stressed RX sens. =1.0625 Gb/s		0.055			mW	
Stressed RX sens. =2.125 Gb/s		0.096			mW	
Stressed RX sens. =1.25 Gb/s			-18	-14.5	dBm	
Average Received Power	Rx_{MAX}			0	dBm	
Receiver Elec. 3 dB cutoff freq.				1500	MHz	
Optical Center Wavelength	$λ_C$	1270		1600	nm	
Return Loss		12			dB	
Signal Detect Assert	P_A		-23	-19	dBm	
Signal Detect De-Assert	P_D	-30	-25		dBm	
Signal Detect Hysteresis	P_A - P_D	0.5			dB	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Also specificied to meet curves in FC-PI-2 10.0 Figures 18 and 19, which allow trade-off between wavelength, spectral width and OMA.
3. Equivalent extinction ratio specification for Fibre Channel. Allows smaller ER at higher average power.
4. Unfiltered, 20-80%. Complies with IEEE 802.3 (Gig. E), FC 1x and 2x eye mask when filtered.
5. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and ΔDJ.
6. If measured with TJ-free data input signal. In actual application, output TJ will be given by:

$$TJ_{OUT} = DJ_{IN} + \Delta DJ + \sqrt{(TJ_{IN} - DJ_{IN})^2 + (\Delta TJ - \Delta DJ)^2}$$

7. Measured with conformance signals defined in FC-PI-2 10.0 specifications.
8. Measured with PRBS 2^7-1 at 10^{-12} BER.

V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Data Rate	BR		1.0625, 1.25, 2.125		Gb/sec	1
Bit Error Rate	BER			10^{-12}		2
Max. Supported Link Length on 9/125µm SMF @ 2x Fibre Channel	L_{MAX1}		10		km	3
Max. Supported Link Length on 9/125µm SMF @ Gigabit Ethernet	L_{MAX1}		10		km	4

Notes:
1. Gigabit Ethernet and 1x, 2x Fibre Channel compatible, per IEEE 802.3 and FC-PI-2 10.0, respectively. Typical maximum data rate extends to 2.5Gb/s.
2. Tested with PRBS 2^7-1 test pattern.
3. Dispersion limited per FC-PI-2 10.0
4. Attenuation of 0.55 dB/km is used for the link length calculations. Distances are indicative only. Please refer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specific conditions in your application.

VI. Environmental Specifications

Finisar SFF transceivers have an extended operating temperature range from –40°C to +85°C case temperature.

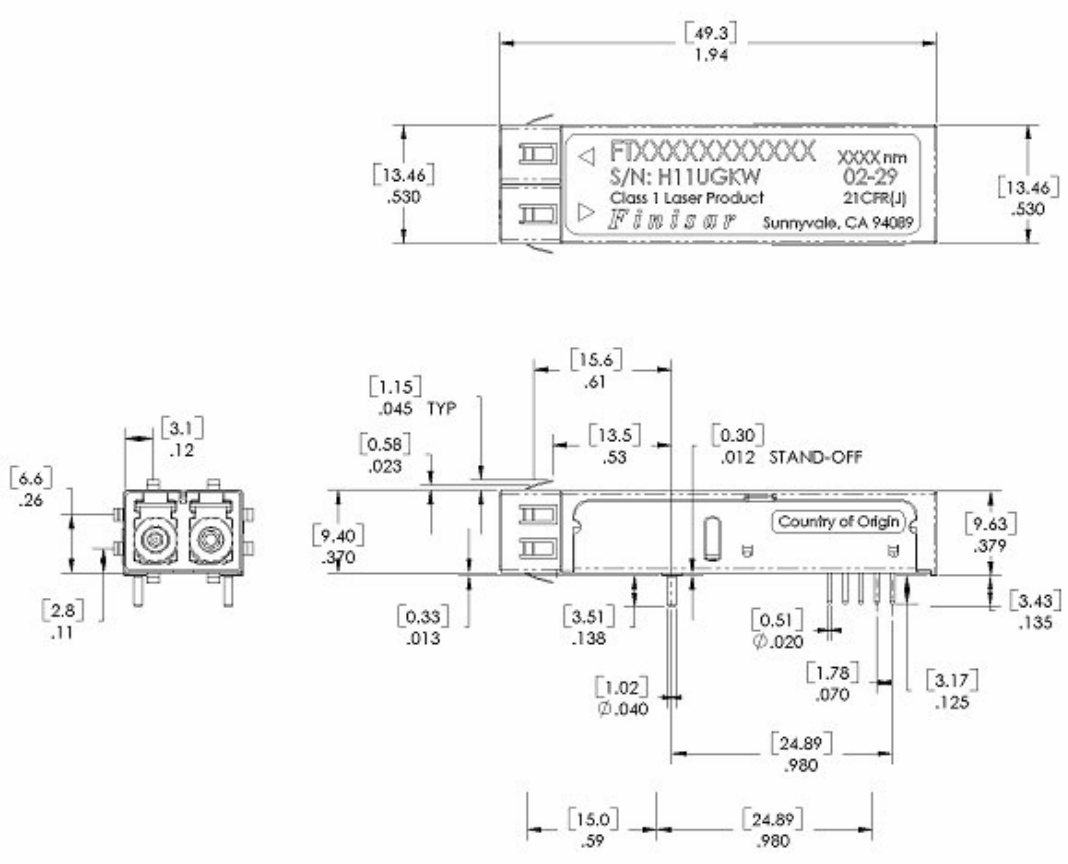
Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T_{op}	-40		85	°C	
Storage Temperature	T_{sto}	-40		85	°C	

VII. Regulatory Compliance

Finisar transceivers are Class 1 Laser Products and comply with US FDA regulations. These products are certified by TÜV and CSA to meet the Class 1 eye safety requirements of EN (IEC) 60825 and the electrical safety requirements of EN (IEC) 60950. Copies of certificates are available at Finisar Corporation upon request.

VIII. Mechanical Specifications

Finisar's Small Form Factor (SFF) transceivers comply with the standard dimensions defined by the Small Form Factor Multi-Sourcing Agreement (MSA).



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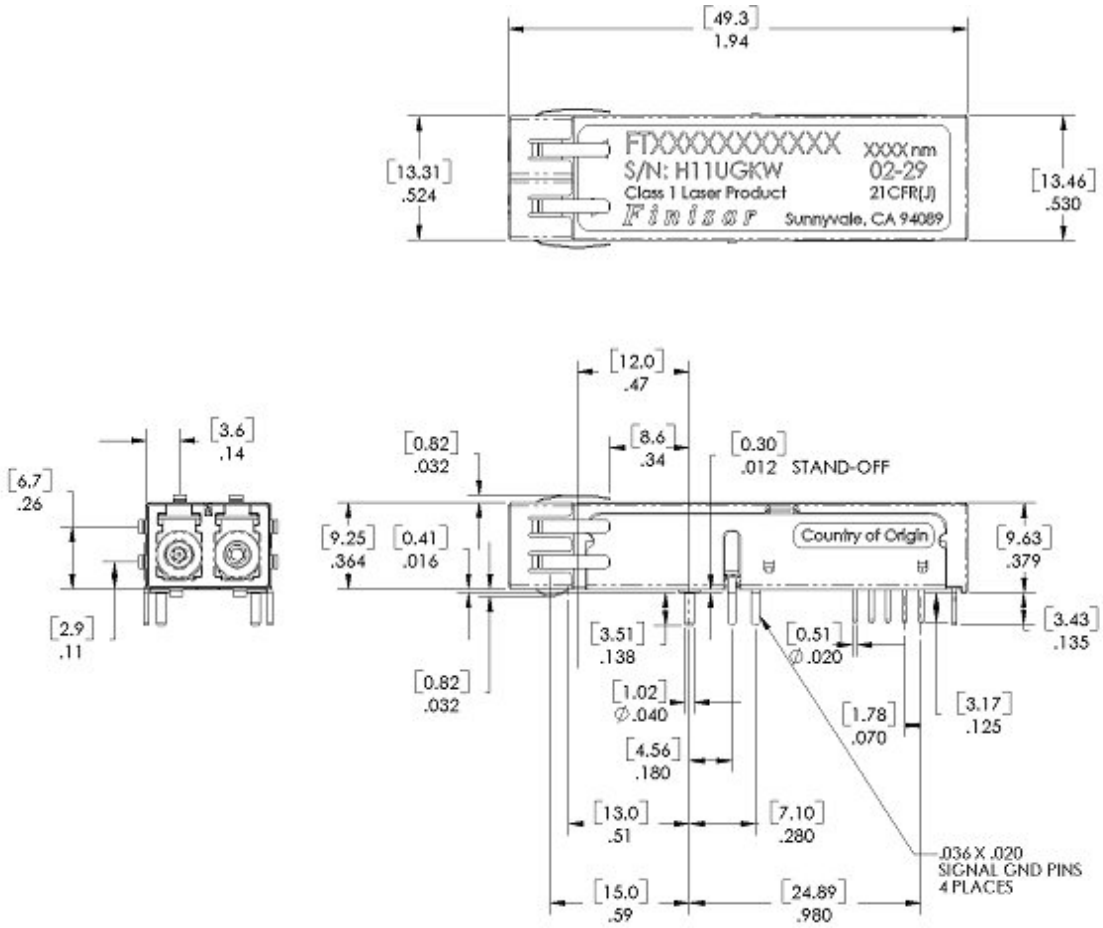

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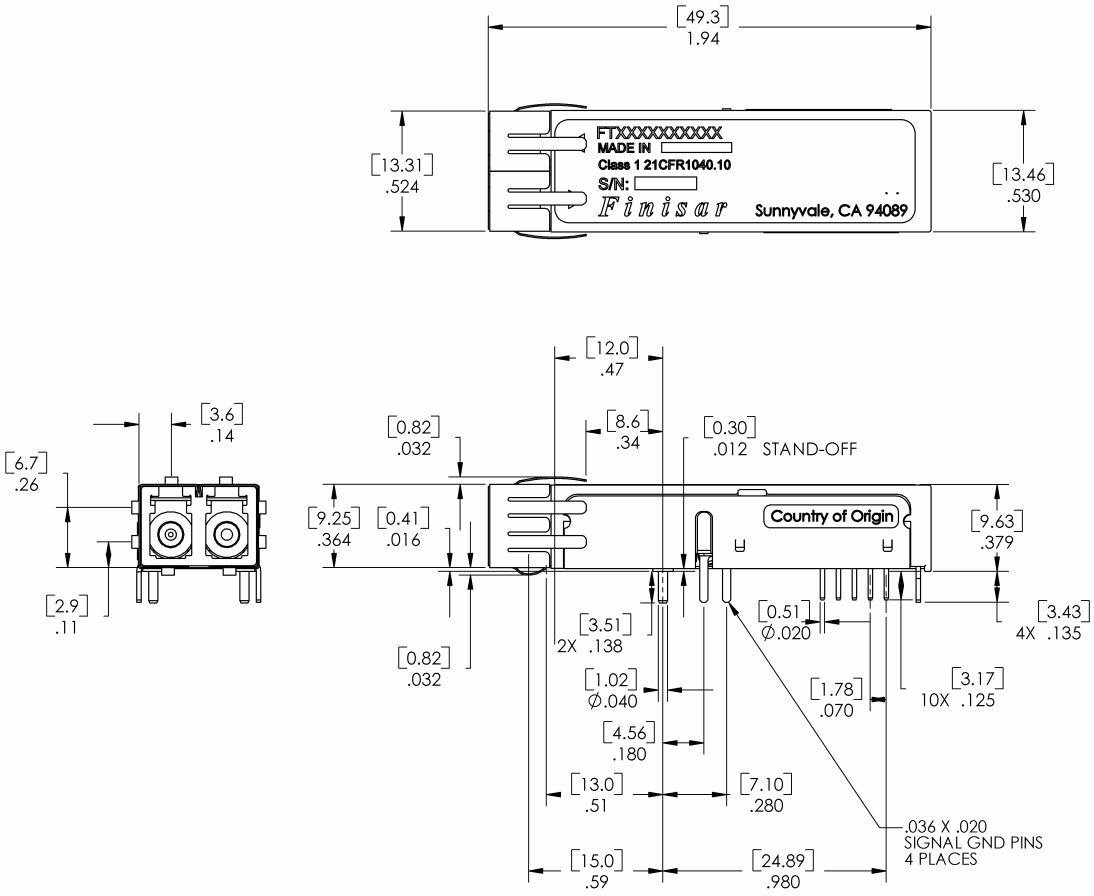

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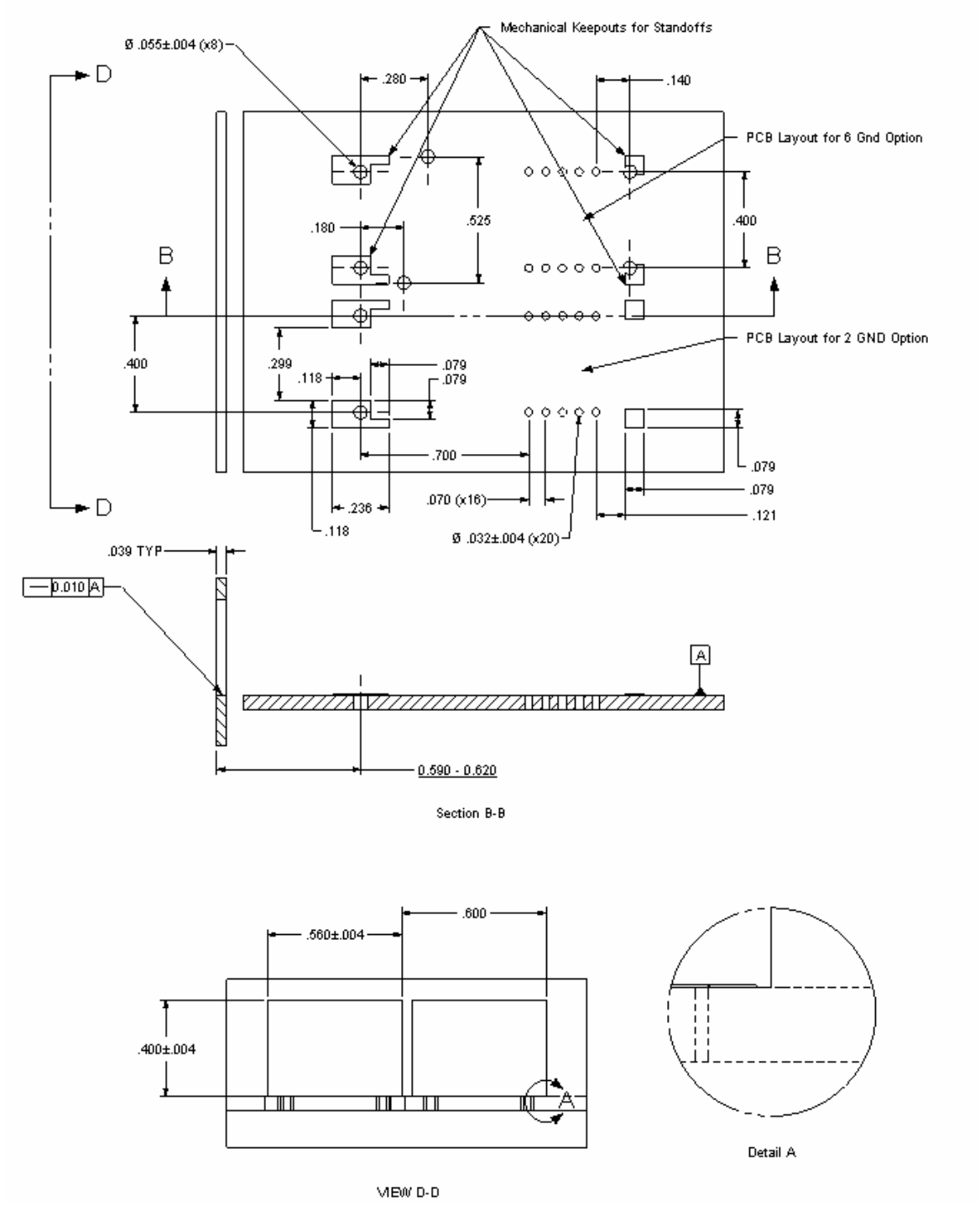
IX. PCB Layout and Bezel Recommendations



Minimum Recommended Pitch is 0.600”

X. References

1. Small Form Factor (SFF) Transceiver Multi-source Agreement (MSA). January 6, 1998.

2. "IEEE Draft P802.3z/D5.0 'Media Access Control (MAC) Parameters, Physical Layer, Repeater and Management Parameters for 1000Mb/s Operation'". IEEE Standards Department, 1998.

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-2 10.0)". American National Standard for Information Systems.

5. Directive 2002/95/EC of the European Council Parliament and of the Council, "on the restriction of the use of certain hazardous substances in electrical and electronic equipment." January 27, 2003.

XI. For More Information

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