

Electronics

Product Specification 108-1975 01Oct03 Rev A EC 0990-1166-03

SPEEDPAC* I/O Connector

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the SPEEDPAC* I/O connector design for InfiniBand application.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 22Apr03. The Qualification Test Report number for this testing is 501-559. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

- 2.1. Tyco Electronics Documents
 - 109-197: AMP Test Specifications vs EIA and IEC Test Methods
 - 114-13029: Application Specification
 - 501-559: Qualification Test Report
- 2.2. Commercial Standards
 - EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
 - IEC 60512: Electromechanical Components For Electronic Equipment; Basic Testing
 Procedures and Measuring Methods Part 1: General
 - IEC 61076: Connectors For Electronic Equipment; Part 4-115: Backplane Connector For InfiniBand Equipment

3. **REQUIREMENTS**

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

- 3.3. Ratings
 - Voltage:
 - High-speed: 100 volts rms (within the same pair, and pair to ground)
 - Low-speed: 300 volts rms (contact to contact, and contact to ground)
 - Current:
 - High-speed: 0.5 ampere per contact pair at 70°C (all contacts loaded)
 - Low-speed: 2.5 amperes per contact pair at 70°C (all contacts loaded)
 - Temperature: -40 to 100°C
 - •. Differential Impedance: 100 ± 10 ohms at 100 ps risetime in the connector
- 3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per IEC 60068-1.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure		
Visual examination.	There shall be no defects that would impair normal operation.	IEC 60512, Test 1A.		
	ELECTRICAL			
Termination resistance.	 High speed contacts: 30 milliohms maximum initial. ΔR 20 milliohms maximum. Low speed contacts: 15 milliohms maximum initial. ΔR 10 milliohms maximum. Ground frame: 250 milliohms maximum initial. ΔR 25 milliohms maximum. 	IEC 60512-2-1, Test 2A. Mated. See Figure 3.		
Insulation resistance.	12000 megohms minimum.	IEC 60512-3-1, Test 3A, Method B. Mated, 100 volts DC.		
Voltage proof.	No breakdown or flashover. See Figures 4 and 5.	IEC 60512-4-1, Test 4A. Mated and unmated. See Figure 6.		
Transmission line reflections in the time domain.	Average impedance: 100 ± 5 ohms. Peak values: 100 ± 10 ohms.	IEC 60512-25-1, Test 23D.		

Figure 1 (cont)

Test Description	Requirement	Procedure		
Crosstalk ratio.	Near end and far end crosstalk between facing pairs, <1%; between adjacent pairs, <1.5%; and between one quiet pair and five surrounding driven pairs, <3%.	IEC 60512-25-1, Test 25A Method A Time Domain. Specimen environment impedance: 100 ohms differential. Measured step risetime (10 - 90%) throughout the connector 100 ps maximum. Adjacent lines terminated at both ends.		
Attenuation.	Differential attenuation < 5% at 1.25 GHz.	IEC 60512-25-2, Test 25B. Specimen environment impedance: 100 ohms differential. Adjacent lines terminated at both ends.		
	MECHANICAL			
Gage supporting force.	Gage shall maintain its position in the connector.	Insert test gage to maximum dept and tap gently to verify free movement.		
Engaging and separating forces.	Engaging force: 30 N for 4X; 75 N for 12X. Separating force: 30 N for 4X; 75 N for 12X.	IEC 60512-13-1, Test 13A. 10 mm per second maximum.		
Vibration, sinusoidal.	See Note.	IEC 60512-6-4, Test 6D. Mated. See Figure 7.		
Mechanical shock.	See Note.	IEC 60512-6-3, Test 6C. Mated. See Figure 7.		
Mechanical operation.	250 mating cycles. See Note.	IEC 60512-9-1, Test 9A. 10 mm per second maximum, rest 5 seconds. Unmated.		
Static load transverse (connector retention).	The gap between the fixed connector housing and the surface of the backplane shall not exceed 0.2 mm after releasing the lateral load.	IEC 60512-8-1, Test 8A, Static Load Transverse. The load shall be applied laterally on the fixed connector housing, 25 mm away from the backplane surface. A force of 100 N shall be applied once from the left and once from the right side of the fixed connector.		
Static load axial (paddle guard retention).	The axial displacement of the paddle guard on the card paddle shall not exceed 0.2 mm after releasing the axial load.	IEC 60512-8-2, Test 8B, Static Load Axial. Axial load on the paddle-guard, in the middle of the tip of the guard. 250 N in the mating direction and 100 N in the unmating direction.		

Figure 1 (cont)

Test Description	Requirement	Procedure		
Polarizing method.	The polarizing features on the fixed connector housing and on the paddle guard shall withstand an engagement force of 250 N without damage that would impair normal operation.	IEC 60512-13-5, Test 13E. The card shall be aligned to the slot in the fixed connector after a 180 degree rotation. 10 mm per second maximum.		
Flammability	< 10 seconds maximum burn time after removal of flame.	IEC 60512-13-9, Test 20A. Apply flame for 10 seconds and remove.		
Mate and unmate.	1 mating/unmating cycle. See Note.	IEC 60512-9-1, Test 9A.		
	ENVIRONMENTAL			
Thermal shock.	See Note.	EIA-364-32. Subject specimens to 5 cycles between -40 and 100°C.		
Dry heat.	See Note.	Subject 2 mated and 2 unmated specimens to 100°C for 16 hours.		
Damp heat cycling.	See Note.	Subject 2 mated and 2 unmated specimens to 6 cycles (6 days) between 25 and 40°C at high humidity.		
Drying.	See Note.	Subject unmated specimens to 55°C for 1 hour.		
Cold.	See Note.	Subject 2 mated and 2 unmated specimens to -40°C for 2 hours.		
Mixed flowing gas.	See Note.	EIA-364-65, Class IIIA. Subject mated specimens to environmental Class IIIA for 21 days.		
Damp heat, steady state.	See Note.	100°C steady state, 21 day duration, no electrical load, polarizing voltage 60 volts DC, followed by drying for 1 hour at 55°C unmated.		
Electrical load and temperature.	See Note.	Subject mated specimens to 70°C for 1000 hours. Energize differential pairs at 0.25 amperes and low speed contacts at 2.5 amperes.		
Temperature life.	See Note.	Subject mated specimens to 100°C for 1000 hours.		

Figure 1 (cont)

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Test Description	Requirement	Procedure	
Dust.	See Note.	IEC 61076-4-115.	

NOTE

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

- Test			Test Groups (a)						
l est Phase	or	Specification	A	В	С	D	E	F	G
i nase	Examination	120 00012	Test Sequence (b)						
P1	Visual examination	1a and 1b	1,9,12,16,28	1,12,14,22	1,14	1,16	1	1,16	1
P4	Termination resistance	2a	4,8,11,25	4,9,15,17	4,11	4,9	4	4,8,10,12,14	4,11
P5	Insulation resistance	3a	5,14,18,23	5,10,18	5,9	5,10	5	5	5,9
P6	Voltage proof	4a	6,15,24	6,11,19	6,10	6,11	6	6	6,10
G2	Transmission line reflections in the time domain	23d							12
G3	Crosstalk ratio	25a							13
G4	Attenuation	25b							14
P2	Gage supporting force		2,27	2,21	2,13	2,15	2	2	2
P3	Engaging and separating	13a	3,26	3,8,20	3,12	3,12	3	3,15	3
A1	Vibration, sinusoidal	6d	7						
A2	Mechanical shock	6c	10						
B1	Mechanical operation (durability)	9a		7,16		7			7
D4	Static load transverse (connector retention)	8a				13	8		
	Static load axial (paddle guard retention)	8b				14	9		
E1	Polarizing method	13c					7		
E5	Flammability	20a					10		
Fs	Mate and unmate	9a						9,11,13	
A3	Thermal shock		13						
A4.1	Dry heat		17						
A4.2	Damp heat cycling		19,21						
	Drying		22		8				
A4.3	Cold		20						
B2	Mixed flowing gas			13					
C1	Damp heat, steady state				7				8
D2	Electrical load and temperature					8a			
	Temperature life					8b			
F1	Dust							7	

NOTE (a)

(a) See paragraph 4.1.A.(b) Numbers indicate sequence in which tests are performed.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

- 4.1. Qualification Testing
 - A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall each consist of a minimum of 5 specimens.

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B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.



Figure 3 Arrangement for Measurement of Termination Resistance

Contact Type	Peak Impulse Voltage	Overvoltage Category	Pollution Degree
High speed signal to signal	800 V	I	1
High speed signal to ground	800 V	I	1
Low speed signal to signal	1500 V	Ш	2 (inside fixed connector)
Low speed signal to ground	1500 V	II	2 (inside fixed connector)

Figure 4 Voltage Proof: Rated Impulse Voltages

Contact Type	Insulation Voltage	Pollution Degree
High speed signal to signal	125 V	1 (inside fixed connector)
High speed signal to ground	125 V	1 (inside fixed connector)
Low speed signal to signal	320 V	2
Low speed signal to ground	320 V	2

Figure 5 Voltage Proof: Rated Insulation Voltages



Figure 6 Wiring Arrangement for Voltage Proof and Polarization Voltage



Figure 7 Fixture for Dynamic Stress Tests