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## **Nano Pitch I/O Pluggable Connector Receptacle**

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### **1. SCOPE**

#### 1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Nano Pitch I/O Pluggable Connector.

#### 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.

### **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. TE Documents

- 109-197: TE Test Specifications vs EIA and IEC Test Methods
- 114-60024 Application Specification.
- 501-60078 Qualification Test Report

#### 2.2. Industry Standard

- EIA 364 Series Electrical Connector Test Procedures Including Environmental Classifications with Test Procedures
- EIA 364-1000 Environmental Test Methodology for Assessing the Performance of Connectors and Sockets Used in Business Office Applications

### **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: 30 Volts AC (RMS)/DC Max.
- Current: 0.5 Amps Max
- Temperature: -40 to 80°C

### 3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Table 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

### 3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
<b>ELECTRICAL</b>		
Low Level Contact resistance	For shield and signal contacts: Baseline (Initial) $\Delta R$ 20 m $\Omega$ maximum change from initial (Baseline)	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation resistance	100 Mohm minimum	EIA-364-21. 500 volts DC, 2 minute hold. Test between adjacent contacts of unmated specimens not electrically connected.
Dielectric Withstanding voltage	One minute hold with No disruptive discharge, no leakage current in excess of 5mA.	EIA-364-20, Condition I; apply a voltage of 300 VDC for 1 minute between adjacent terminals and between adjacent terminals and ground.
<b>MECHANICAL</b>		
Vibration, random	No discontinuities of 1 microsecond or longer duration.	EIA-364-28, Test Condition VII, Condition Letter D. Subject mated specimens to 3.10 G's rms between 20 to 500 Hz. 15 minutes in each of 3 mutually perpendicular planes.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration.	EIA-364-27, Method H. Subject mated specimens to 30 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.

Test Description	Requirement	Procedure
Durability (Precondition).	No evidence of physical damage	EIA-364-9. Mate and unmate specimens with the plug locking tab inoperable for 50 cycles at a maximum rate of 500 cycles per hour.
Durability.	No evidence of physical damage	EIA-364-9. Mate and unmate specimens with the plug locking tab inoperable for 250 cycles at a maximum rate of 600 cycles per hour.
Wire Flex	No physical damage	EIA 364-21 test condition II with Tension = 26 N. Flex cables 180° for 20 cycles.
Solderability	Solderable area shall have a minimum of 95% solder coverage when testing 30 random loose contacts.	EIA-364-52 Category 1, no steam RMA class 1 flux. Immerse in molten solder at 245°C at a rate of 25.4mm per second. Solder Duration: 5 ± 0.5 seconds
Mating force	40 N maximum	EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 25.4 mm per minute.
Un-mating force	25 N maximum	EIA-364-13. Measure force necessary to un-mate specimens at a maximum rate of 25.4 mm per minute.
X Axis Load (Side)	Force (40N Max.) and Displacement (1mm Max.) at open circuit detection or probe failure.	Mate plug to connector and apply load on plug until open circuit.
Y Axis Load (Toward Latch)	Force (40N Max.) and Displacement (1mm Max.) at open circuit detection or probe failure.	Mate plug to connector and apply load on plug until open circuit.
Plug Pullout Force (Right Angle)	30 N minimum	Mate plug to connector and apply a right angle pullout force on the wire at a rate of 25 mm per min.
Plug Pullout Force (Axial)	30 N minimum Force to overcome latch	Mate plug to connector and apply an axial pullout force on the wire at a rate of 25 mm per min.
Reseating	No evidence of physical damage.	Manually unplug & plug the connector, 3 cycles.

## ENVIRONMENTAL

Thermal shock.	See Note.	EIA 364-32, Method A, test condition I. (10 cycles)
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Test Description	Requirement	Procedure
Cyclic humidity/temperature.	See Note.	EIA-364-31 Cycle connectors between 25° ± 3°C at 80% RH and 65 °± 3 °C at 50% RH 24 cycles. Ramp times should be 0.5 hour and dwell should be 1.0 hour
Temperature life (precondition1)	See Note.	EIA-364-17, Method A, Test Condition 3. 240 hours at 90°±2°C (60°C for 5 years)
Temperature life.	See Note.	EIA-364-17 Method A, Test Condition 3, 72 hours at 105°±2°C
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA. Subject mated specimens to environmental Class IIA for 14 days.
Thermal disturbance	See Note.	Cycle connectors 10 times between 15°± 3°C and 85 °± 3 °C. Ramps should be a minimum of 2°C per minute and dwell times should insure that the contacts reach the temperature extremes for a minimum of 5 minutes.

**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 Table 2.*

Table 1 (end)

## 3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)										
	1	2	3	4	5	6	7	8	9		
	Test Sequence (b)										
Initial examination of product	1	1	1	1	1	1	1	1	1		
Low level contact resistance	2,5,7	2,5,7,9	2,5,8	2,5,7,9,11	4,6(e)				2,4		
Insulation resistance					2						
Withstanding voltage					3,7(e)						
Vibration, random			6								
Mechanical shock			7								
Durability (Precondition)	3	3	3								
Durability				3	5						
Wire Flex									3		
Solderability						2					
Mating force							2				
Un-mating force							3				
X Axis Load (Side)								2(c)			
Y Axis Load (Toward Latch)								3(c)			
Plug Pullout Force (Right Angle)								5			
Plug Pullout Force (Axial)								4			
Reseating	6	8		10							
Thermal shock		4									
Cyclic humidity/temperature		6									
Temperature life(Precondition1)			4	4							
Temperature life	4										
Mixed flowing gas				6							
Thermal disturbance				8							
Final examination of product	8	10	9	12	8	3	4	6	5		

**NOTE**

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Fixture setup for mated plug X & Y axis load testing. Probe to be approximately 6mm diameter with a full radius nose. Position the probe 20mm from the face of the PCB and locate at the centerline of the plug. Apply load to plug at a rate of 25mm per minute.
- (d) Expose receptacles unmated for 7 days (168 hours) of the test duration. Mate the receptacle to the same plug used during preconditioning temperature life. Expose mated plug and receptacle for the remainder of the test duration 7 days (168 hours).
- (e) Separate sets of test specimens will be used to access dielectric withstanding voltage and the change in low level contact resistance.

Table 2 (end)

#### 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. Each test groups shall consist of 5 specimens.

###### B. Test Sequence

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

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