Nano Pitch I/O Pluggable Connector Receptacle

1. INTRODUCTION

1.1. Purpose

Testing was performed on the TE Connectivity (TE) Nano Pitch I/O Pluggable Connector Receptacle to determine their conformance to the requirements of Product Specification 108-60118 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Nano Pitch I/O Pluggable Connector Receptacle. Testing was performed at the SHA Engineering Assurance Product Testing Laboratory from 20Dec 2017 to 09Jan 2018, and from 30Mar 2018 to 10May 2018. The test file numbers for the testing is TP-17-03003, TP-18-00766. These documentations are on file and available from the SHA Engineering Assurance Product Testing Laboratory

1.3. Conclusion

The Nano Pitch I/O Pluggable Connector Receptacle listed in paragraph 1.5, conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-60118 Revision A.

1.4. Product Description

TE Connectivity (TE) Nano Pitch I/O Pluggable Connector Receptacle are designed to meet requirements for applications such as networking, computer, and telecommunications equipment.

1.5. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,5,6,7,8,9	45	2312148-1 2308578-1	Nano Pitch 80ckt vertical type receptacle Nano Pitch 42ckt R/A type receptacle
4	6	2312741-1 2308578-1	Nano Pitch 42ckt vertical type receptacle Nano Pitch 42ckt R/A type receptacle

Figure 1

1.6. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

- Temperature: 15 to 35°C
- Relative Humidity: 25 to 75%

1.7. Qualification 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					
Unmating 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			

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. They were inspected and accepted by the Quality Assurance Department.

2.2. Low Level Contact Resistance - Test Groups 1, 2, 3, 4, 5 and 9

All contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a change in resistance (ΔR) of less than 20 milliohms after testing.

2.3. Insulation Resistance - Test Group 5

All insulation resistance measurements were greater than 100 megohms.

2.4. Withstanding Voltage - Test Group 5

No disruptive discharge, no leakage current in excess of 5mA for 1 minutes hold.

2.5. Vibration, Random - Test Group 3

No discontinuities longer than 1 microsecond were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

2.6. Mechanical shock - Test Group 3

No discontinuities longer than 1 microsecond were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.7. Durability (Precondition). - Test Group 1,2,3

No physical damage occurred as a result of mating and un-mating the specimens 50 cycles.

2.8. Durability - Test Group 4,5

No physical damage occurred as a result of mating and un-mating the specimens 250 cycles.

2.9. Wire Flex - Test Group 9

No physical damage occurred as a result of Wire Flex test.

2.10. Solderability - Test Group 6

All of test specimens got more than 95% coverage.

2.11. Mating Force - Test Group 7

All mating force measurements were less than 40 N [9 lbf].

2.12. Un-mating Force - Test Group 7

All un-mating force measurements were less than 25 N [5.62 lbf].

2.13. X Axis Load (Side)- Test Group 8
Open circuit detected at loading force 42.2N Min and 1.20mm Min displacement

2.14. Y Axis Load (Toward Latch)- Test Group 8

Open circuit detected at loading force 42.2N Min and 1.20mm Min displacement

2.15. Plug Pullout Force (Right Angle)- Test Group 8

All Pullout Force (Right Angle) is larger than 30N.

2.16. Plug Pullout Force (Axial)- Test Group 8

All Pullout Force (Axial) is larger than 30N.

2.17. Reseating - Test Group 1,2,4

No physical damage occurred as a result of reseating 3 cycles.

2.18. Thermal Shock - Test Groups 2

No evidence of physical damage was visible as a result of thermal shock testing.

2.19. Humidity/temperature Cycling - Test Groups 2

No evidence of physical damage was visible as a result of humidity/temperature cycling.

2.20. Temperature life (precondition1) - Test Groups 3,4

No evidence of physical damage was visible as a result of Temperature life (precondition1) testing.

2.21. Temperature life - Test Groups 1

No evidence of physical damage was visible as a result of Temperature life testing.

2.22. Mixed Flowing Gas - Test Group 4

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.23. Thermal disturbance - Test Group 4

No evidence of physical damage was visible as a result of thermal disturbance

2.24 Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Initial Examination of Product

A Certificate of Conformance was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

3.2. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of unmated specimens that were not electrically connected. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.4. Withstanding Voltage

A test potential of 300 volts DC RMS was applied between adjacent contacts for 1 minute. The test voltage was raised from zero to the specified value as uniformly as possible, at a rate of approximately 500 volts (AC or DC) per second

3.5. Vibration

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The spectrum remained flat at 0.02 G^2/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.6. Mechanical shock

Mated specimens were subjected to a mechanical shock test having a half-sine waveform of 30 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular or greater using a current of 100 milliamperes DC.

3.7. Durability (Precondition).

Specimens were mated and unmated 50 times at a maximum rate of 500 cycles per hour.

3.8. Durability.

Specimens were mated and unmated 250 times at a maximum rate of 600 cycles per hour.

3.9. Wire Flex.

EIA 364-21 test condition II with Tension = 26 N. Flex cables 180° for 20 cycles.

3.10. Solderability.

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

3.11. Mating Force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 25.4 mm per minute.

3.12. Un-mating Force

The force required to un-mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 25.4 mm per minute.

3.13. X Axis Load (Side)

Mate plug to connector and apply side load on plug until open circuit. Fixture setup for mated plug X 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.

3.14. Y Axis Load (Toward Latch)

Mate plug to connector and apply side load on plug until open circuit. Fixture setup for mated plug 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.

3.15. Plug Pullout Force (Right Angle)

Mate plug to connector and apply a right angle pullout force on the wire at a rate of 25 mm per min.

3.16. Plug Pullout Force (Axial)

Mate plug to connector and apply an axial pullout force on the wire at a rate of 25 mm per min.

3.17. Reseating

Manually unplug & plug the connector, 3 cycles.

3.18. Thermal Shock

10 cycles between -55°C and 85°C with 30 minutes in each temperature extreme. Max. rate of temperature change 5°C/min.

3.19. Humidity/temperature Cycling

Mated specimens were exposed between 25º ± 3ºC at 80% RH and 65 º± 3 ºC at 50% RH for 24 cycles. Ramp times should be 0.5 hour and dwell should be 1.0 hour.

3.20. Temperature life (precondition1)

Mated specimens were exposed to a temperature of 105±2°C for 36 hours.

3.21. Temperature life

Mated specimens were exposed to a temperature of 90±2°C for 240 hours.

3.22. Mixed Flowing Gas
Mated specimens were exposed for 14 days to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30℃ and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, H_2S at 10 ppb and SO_2 at 100 ppb. Specimens were placed for 336h.

3.23. Thermal disturbance
Cycle connectors 10 times between 15º± 3ºC and 85 º± 3 ºC. 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.

3.24. Final Examination of Product

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.