SAS/PCIE 4.0 (U.2/U.3) RECEPTACLE CONNECTOR SFF-8639 TYPE

1. INTRODUCTION

1.1 Purpose

Testing was performed on the TE connectivity (TE) SAS/PCIE 4.0 (U.2/U.3) Vertical Receptacle Connectors

To determine their conformance to the requirements of Product Specification 108-60136 Revision A.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the SAS/PCIE 4.0 (U.2/U.3) Vertical Receptacle Connectors. Testing was performed at the Engineering Assurance Product Testing Laboratory Between Dec 27, 2019 and Dec 21, 2020. The test files number are TP-19-03603 and TP-20-02851.

These documentations are on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3 Conclusion

SAS/PCIE 4.0 (U.2/U.3) Vertical Receptacle Connectors listed in paragraph 1.5, conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-60136, Revision A.

1.4 Test Specimens

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

Quantity	Part Number	Description
30PCS	2357099-2	SAS/PCIE 4.0 (U.2/U.3) Vertical Receptacle Connectors
16 PCS	PSAS4M3130061TR	SAS Plug Connector Assembly
16 PCS	60-1951740-2 (plug)	Printed Circuit Board (PCB)
30 PCS	60-1951740-2 (receptacle)	

Figure 1

1.5 Environmental Conditions

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

- Temperature: 15 to 35℃
- Relative Humidity: 20% to 80%

1.6 Qualification Test Sequence

Test Item	Test Group(a)							
	1	2	3	4	5	6	7	8
	Test Sequence (a)							
Examination of Product	1,11	1,10	1,10	1,10	1,9	1,3	1,3	1,3
LLCR	3,9	2,5,7,9	2,5,7,9	2,5,7,9				
Insulation Resistance					2,7			
DWV					3,8			
Temperature Rise						2		
Solderability								2
Resistance to Soldering Heat							2	
Mating Force	2,8							
Un-mating force	4,10							
Durability (preconditioning)		3	3	3	4			
Durability	5							
Vibration	6							
Mechanical Shock	7							
Reseating		8	8	8				
Temperature & Humidity		6			6			
Temperature Life				4				
Thermal Shock		4			5			
Mixed Flowing Gas			4					
Thermal Disturbance			6					
Thermal Cycling				6				

NOTE:

a) *See Paragraph 1.4*

b) *Numbers indicate sequence in which tests are performed*

2. SUMMARY OF TESTING

2.1 Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance (C of C) was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2 Low Level Contact Resistance (LLCR) - Test Groups 1, 2, 3, 4, 5 and 10

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a change in resistance (ΔR) of less than 15 milliohms after testing.

2.3 Insulation Resistance - Test Group 6

All insulation resistance measurements were greater than 1000 megaohms.

2.4 Dielectric Withstanding Voltage- Test Group 6

No dielectric breakdown or flashover occurred.

2.5 Temperature Rise - Test Group 7

All temperature rise measurements were not exceed 30℃.

2.6 Connector Solderability - Test Group 9

Specimens exhibited a continuous solder coating, free from defects, over more than 95% of the critical surface areas defined as the underside of the lead and the sides, up to 1 times the lead thickness.

2.7 Resistance to Soldering Heat - Test Group 8

Housings were free from blisters, deformation, and warpage or melting.

2.8 Mating Force - Test Group 1

All mating force measurements were less than 59 N for SFF-8639 type receptacle connectors when mate plug connectors.

2.9 Unmating Force - Test Group 1

All unmating force measurements were bigger 6 N for SFF-8639 type receptacle connectors when unmate plug connectors.

Durability (preconditioning) - Test Group 2, 3, 4, 5 and 6

No physical damage occurred as a result of mating and unmating the specimens 50 times.

2.10 Durability - Test Group 1

No physical damage occurred as a result of mating and unmating the specimens 500 times.

2.11 Random Vibration - Test Group 1

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

2.12 Mechanical Shock - Test Group 1

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

2.13 Reseating - Test Groups 2, 3, 4 and 5

No physical damage occurred as a result of unmuting and mating the specimens 3 times.

2.14 Humidity/temperature Cycling - Test Groups 2 and 6

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

2.15 Temperature Life - Test Groups 4

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

2.16 Thermal Shock - Test Group 2 and 6

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

2.17 Mixed Flowing Gas - Test Group 3

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

2.18 Thermal Disturbance - Test Groups 3 and 5

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

2.19 Thermal Cycling- Test Groups 4

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

2.20 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 C of C 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 LLCR

LLCR 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 mated specimens. A test voltage of 500 volts DC was applied for 1 minutes before the resistance was measured.

3.4 Dielectric Withstanding Voltage

A test potential of 500 volts AC was applied between adjacent contacts of mated specimens. This potential was applied for 1 minute and then returned to zero.

3.5 Temperature Rise

Wire contact P1, P2, P8 & P9 in parallel for power. Wire contact P4, P5, P6, P10 & P12 in parallel for return. Apply 6 Amp total DC current to parallel contacts P1, P2, P8 & P9 and return from parallel contact P4, P5, P6, P10 & P12.

3.6 Connector Solderability

Solder Temp: 245±2℃, Immersion Duration: 5s Max

3.7 Resistance to Soldering Heat

Pre-Heat: 150℃ ~ 200℃, 60~180seconds, Heat within 5℃ of Peak: 20~40 seconds, Peak Temp: 260℃ max

3.8 Mating Force

Mate connector assemblies at a rate of 25.4 mm per minute.

3.9 Unmating Force

Un-mate connector assemblies at a rate of 25.4 mm per minute.

3.10 Durability (preconditioning)

Manually mate and un-mate connector assemblies for 50 cycles

3.11 Durability

Mate and un-mate connector assemblies for 500 cycles

3.12 Random 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 Power Spectral Density (PSD) was flat at 0.02 G2/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.

3.13 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 planes for a total of 18 shocks. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.14 Reseating

Specimens were unmated and mated 3 times.

3.15 Temperature & Humidity

Mated specimens between 40℃ with 90-95% relative humidity, 96 hours.

3.16 Temperature Life

Specimens mated to blank transceivers were exposed to a temperature of 85℃ for 500 hours.

Specimens were preconditioned with 20 durability cycles.

3.17 Thermal Shock

Mated specimens were subjected to 10 cycles of thermal shock with each cycle consisting of 30 minute dwell at -55℃ and 85℃ with 1 minute transition be tween temperatures.

3.18 Mixed Flowing Gas

Expose half of the unmated samples for 10 days and then mated for 4 additional days. The other half of the samples are exposed mated for full 14 day test period.

3.19 Thermal Disturbance

Subject mated connector assemblies to 10 cycles between 15±3℃ and 85±3℃, minimum of 2℃ ramp per minute. Dwell time should insure that the contacts reach the extremes, no less than 5 minutes.

3.20 Thermal Cycling

Subject mated connector assemblies to 500 cycles between 15±3℃ and 85±3℃, minimum of 2℃ ramp per minute. Dwell time should insure that the contacts reach the extremes, no less than 5 minutes.

3.21 Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.