Low Profile Slim SAS Connector Receptacle

1. INTRODUCTION

1.1. Purpose

Testing was performed on the TE Connectivity (TE) Low Profile Slim SAS Connector Receptacle to determine their conformance to the requirements of Product Specification 108-60134 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Low Profile Slim SAS Connector Receptacle. Testing was performed at the SHA Engineering Assurance Product Testing Laboratory from 16Apr 2020 to 16Jul 2020. The test file numbers for the testing is TP-20-00411. These documentations are on file and available from the SHA Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The Low Profile Slim SAS Connector Receptacle listed in paragraph 1.5, conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-60134 Revision A.

1.4. Product Description

TE Connectivity (TE) Low Profile Slim SAS 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
1,2,3,4,5	30	1-2359992-7 60-1951297-1	LPSS 8X (74P) V/T receptacle LPSS 8X (74P) V/T Test PCB
6,7	10	1-2359992-7	LPSS 8X (74P) V/T receptacle

Table 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						
	1	2	3	4	5	6	7
	Test sequence (a)						
Initial examination of product	1	1	1	1	1	1	1
Low Level Contact Resistance	4,6,10	4,7	3,6,9				
Insulation resistance				2,6			
Withstanding voltage				3,7			
Random vibration	7						
Mechanical shock	8						
Durability (Preconditioning)			2				
Durability	5						
Connector Mating Force	3	3					
Connector Un-Mating Force	11	8					
Active Latch Retention Strength					2		
Connector solderability						2	
Resistance to reflow soldering heat							2
Thermal shock				4			
Humidity/temperature cycling				5			
Temperature life		5					
Mixed flowing gas			4				
Thermal cycling			7				
Minute disturbance	2,9	2,6	5,8				
Final examination of product	12	9	10	8	3	3	3

(a) Numbers indicate sequence in which tests are performed

Table 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. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

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

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 10 milliohms after testing.

Table 3 – LLCR Summary Data, LPSS 8X(74P) V/T

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	264	Initial	11.03	15.21	13.70
		After Durability ΔR	-4.12	1.28	-2.02
		After Vibration, mechanical shock ΔR	-1.90	1.75	-0.37
2	264	Initial	11.09	16.29	13.38
		After Temperature life ΔR	-4.75	8.42	2.44
3	264	Initial	9.59	12.94	11.58
		After Mixed Flowing Gas ΔR	-6.80	6.78	2.56
		After Thermal cycling ΔR	0.85	8.88	4.51

NOTE *All values in milliohms.*

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 1000 megohms.

2.4. Dielectric Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Vibration, Random - Test Group 1

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 1

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 3

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

2.8. Durability - Test Group 1

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

2.9. Mating Force - Test Group 1,2

All mating force measurements were less than 40 N for X8.

2.10. Un-mating Force - Test Group 1,2

All un-mating force measurements were more than 3N for X8.

2.11. Active Latch Retention Strength - Test Group 5

All active latch retention strength measurements were more than 50N.

2.12. Solderability - Test Group 6

All of test specimens got more than 95% coverage.

2.13. Resistance to reflow soldering heat - Test Group 7

No evidence of physical damage was visible as a result of resistance to reflow soldering heat.

2.14. Thermal Shock - Test Groups 4

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

2.15. Humidity/temperature Cycling - Test Groups 4

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

2.16. Temperature life - Test Groups 2

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

2.18. Thermal cycling - Test Group 3

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

2.19. Minute Disturbance - Test Group 1,2,3

No evidence of physical damage was visible as a result of mating and unmating the specimens 5 times.

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 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 100 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 50 gravity units (g peack) 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. 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.

3.10. 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.

3.11. Active Latch Retention Strength.

Force was applied in an upward direction at a rate of 25.4mm/min until 60.0 Newtons was achieved then held for 60 seconds and returned to zero.

3.12. Solderability.

IPC/ECA J-STD-002, Test S1. Preheat: 150° to180°C / 60-120 seconds Reflow:230° to 260°C / 30-60 Seconds.

3.13. Resistance to reflow soldering heat.

TEC-109-201 Method-A, Condition-B. Subject SMD connector to 3x reflow curve 260°C peak.

3.14. Thermal Shock

5 cycles between -55°C and 105°C with 30 minutes in each temperature extreme. Max. rate of temperature change 5°C/min.

3.15. Humidity/temperature Cycling

Mated specimens were exposed between 25º ± 3ºC at 80% RH and 65 º± 3 ºC at 50% RH for 10 cycles. Ramp times should be 0.5 hour and dwell should be 1.0 hour.

3.16. Temperature life

Mated specimens were exposed to a temperature of 105±2°C for 1000 hours.

3.17. Mixed Flowing Gas

Mated specimens were exposed for 14 days to a mixed flowing gas Class IIA exposure. One-half of the specimens (receptacle only) unmated for 7 days followed by 7 days mated. The remaining one-half of the specimens mated for 14 days. Class IIA exposure is defined as a temperature of 30°C 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.

3.18. Thermal cycling

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.

3.19. Minute Disturbance

Specimens were mated and unmated 5 times by hand.

3.20. Final Examination of Product

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