Modular, High Density, RF Backplane Connector System with Compliant Pin Termination

1. INTRODUCTION

1.1. Purpose

Testing was performed on the TE Connectivity (TE) Modular, High Density, RF Backplane Connector System with Compliant Pin Termination backplane modules to determine their conformance to the requirements of Product Specification 108-2443-1 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Modular, High Density, RF Backplane Connector System with Compliant Pin Termination. Testing was performed at Harrisburg Electrical Components Test Laboratory between July 23 and September 4, 2014. This documentation is on file at and available from the Harrisburg Electrical Components Test Laboratory under EA20140395T.

1.3. Conclusion

The Modular, High Density, RF Backplane Connector System with Compliant Pin Terminations listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2443-1 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:

Test Group	Quantity	Part Number	Rev	Description
1	5	1996318-1	E	SMPM Straight Plug Receptacle (M) PCB Mount, EON Termination Smooth Bore (a)
	5	1996390-1	G	SMPM, Float Mount, Cable Jack (mating part not under test)
	1	1996705-3	M	8 Position PCB Mount, RF Module, Daughter Card (mating part not under test)
2	5	1996318-1	E	SMPM Straight Plug Receptacle (M) PCB Mount, EON Termination Smooth Bore (a)
	5	1996390-1	G	SMPM, Float Mount, Cable Jack (mating part not under test)
	1	1996705-3	M	8 Position PCB Mount, RF Module, Daughter Card (mating part not under test)
3	6	1996318-1	E	SMPM Straight Plug Receptacle (M) PCB Mount, EON Termination Smooth Bore (a)
	6	1996390-1	G	SMPM, Float Mount, Cable Jack (mating part not under test)
	1	1996705-3	M	8 Position PCB Mount, RF Module, Daughter Card (mating part not under test)

NOTE
Straight plug receptacle with compliant pin terminations was mounted to PCB part number 60-1824480-1 Rev. A.

Figure 1

1.5. Environmental Conditions

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

- Temperature: 15 to 35°C
- Relative Humidity: 20 to 80%

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Initial Examination of Product	1	1	1
Low Level Contact Resistance (LLCR)	2,4	2,4	
Vibration, ClassV3			2
Mechanical Shock, Class OS2			3
Durability	3		
Thermal Shock (non-operating)		3	
Final Examination of Product	5	5	4

NOTE

(a) See paragraph 1.4.

(b) Numbers indicate sequence in which tests were performed.

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. 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. LLCR - Test Groups 1 and 2

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 8 milliohms initially for center contacts, less than 2 milliohms initially for outer contacts, and had a change in resistance (ΔR) of less than 5 milliohms after testing.

Test Group	Number of Data Points	Contact Description	Condition	Low Level Contact Resistance			
				Min	Max	Avg	Stdev
1	5	Center	Initial	2.40	2.64	2.57	0.10
			Final (ΔR)	-0.06	0.20	0.08	0.11
2	5	Center	Initial	2.34	2.46	2.40	0.05
			Final (ΔR)	-0.04	0.23	0.13	0.11

Table 3 – LLCR, Center Contact (data in milliohms)

NOTE
Center contact, equivalent wire length bulk resistance of 15.00 milliohms was subtracted from all initial cabled data.

Test Group	Number of Data Points	Contact Description	Condition	Low Level Contact Resistance			
				Min	Max	Avg	Stdev
1	5	Outer	Initial	0.87	1.09	0.96	0.08
			Final (ΔR)	-0.09	0.29	0.12	0.14
2	5	Outer	Initial	0.77	1.05	0.95	0.11
			Final (ΔR)	0.11	0.39	0.23	0.11

Table 4 – LLCR, Outer Contact (data in milliohms)

NOTE
Outer contact, equivalent wire length bulk resistance of 3.79 milliohms was subtracted from all initial cabled data.

2.3. Vibration, Class V3 - Test Group 3

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

2.4. Mechanical Shock, Class OS2 - Test Group 3

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

2.5. Durability - Test Group 1

No evidence of physical damage was visible as a result of mating and unmating the specimens 500 times.

2.6. Thermal Shock (non-operating) - Test Group 2

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

2.7. 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. 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. Equivalent wire length bulk resistance was subtracted from initial center and outer cabled contact measurements.

3.3. Vibration, Class V3

Mated specimens were subjected to a random vibration test. The parameters of this test condition were specified by a random vibration spectrum with excitation frequency bounds of 5 and 2000 Hz. The Power Spectral Density (PSD) at 5 Hz was 0.005 G^2/Hz. The spectrum sloped up at 3 dB per octave to a PSD of 0.1 G^2/Hz at 100 Hz. The spectrum remained flat at 0.1 G^2/Hz from 100 to 1000 Hz. The spectrum sloped down at 6 dB per octave to a PSD of 0.025 G^2/Hz at the upper bound frequency of 2000 Hz. The root-mean square amplitude of the excitation was 12.0 GRMS. Specimens were subjected to this test for 1 hour in each of the 3 mutually perpendicular axes for a total test time of 3 hours per specimen. Cables on the specimens were secured to the vibrating surface no more than 25.4 mm from the module. Specimens were monitored for discontinuities of 10 nanoseconds or greater using an energizing current of 100 milliamperes.

3.4. Mechanical Shock, Class OS2

Mated specimens were subjected to a saw-tooth waveform with an acceleration amplitude of 40 gravity units (g's peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular axes for a total of 18 shocks. Cables on the specimens were secured to the vibrating surface no more than 25.4 mm from the module. Specimens were monitored for discontinuities of 10 nanoseconds or greater using an energizing current of 100 milliamperes.

3.5. Durability

Specimens were mated and unmated 500 times at a maximum rate of 300 cycles per hour.

3.6. Thermal Shock (non-operating)

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 2 hour dwells at -55 and 125°C. The transition between temperatures was less than one minute. Specimens were held in the mated position by using vibration fixtures.

3.7. Final Examination of Product

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