



RF Multi-Coaxial Connector and Cable Assembly

1. INTRODUCTION

1.1 Purpose

Testing was performed on the TE Connectivity (TE) RF Multi-Coaxial Solution Connector, This connector is designed include one straddle PCB connector and one cable side connector, and achieves the application as ATE (Auto Test Equipment) market, Multi-channels connection with one connector between PCB and Cable side. This test plan is base on the 108-160468.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the RF Multi-Coaxial Solution Connector. Testing was performed at the Engineering Assurance Product Test Laboratory between September 5, 2022 and November 5, 2022. The test file numbers for the testing are TP-22-01229 and TP-22-01982. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3 Conclusion

RF Multi-Coaxial Solution Connector conformed to the electrical, mechanical and environmental performance requirements of Product Specification 108-160468.

1.4 Product Description

The TE Connectivity (TE) RF Multi-Coaxial Solution Connector and Cable Assembly are designed include one straddle PCB connector and one cable side connector, and achieves the application as ATE (Auto Test Equipment) market, Multi-channels connection with one connector between PCB and Cable side.

1.5 Test Specimens

Table 1 – Test Specimens

Test Group	Part Number	Description	Qty
1	2081996-1	MULTI-CHANNEL RF CONNECTOR 64 CHANNELS	4
	2016668-7	MASSIVE RF CA,64CHANNELS	2
2	2081996-1	MULTI-CHANNEL RF CONNECTOR 64 CHANNELS	2
	2016668-7	MASSIVE RF CA,64CHANNELS	1
3	2081996-1	MULTI-CHANNEL RF CONNECTOR 64 CHANNELS	2
	2016668-7	MASSIVE RF CA,64CHANNELS	1
4	2081996-1	MULTI-CHANNEL RF CONNECTOR 64 CHANNELS	2
	2016668-7	MASSIVE RF CA,64CHANNELS	1
5	2081996-1	MULTI-CHANNEL RF CONNECTOR 64 CHANNELS	2
	2016668-7	MASSIVE RF CA,64CHANNELS	1

1.6 Test Sequence

Test or Examination	Test Method	Test Group				
		1	2	3	4	5
		Test Sequences				
Visual Inspection	ECIA EIA-364-18B-2007	1,7,10	1,6	1,6	1,5	1,3
Contact Resistance	ECIA EIA-364-06C-2006	2,8,11	2,5	2,5	2,4	
Insulation Resistance	ECIA EIA-364-21F-2020	3,14				
Withstanding Voltage	ECIA EIA-364-20F-2019	4,15				
Mechanical Endurance	IEC 61169-1:2013 sub-clause 9.3.15 Mate and un-mate specimens for 30/150/300 cycles at a rate of 12 cycles per minute.	6,9,12				
Mating force		5,13				
Sinus Vibration	ECIA EIA-364-28F-2011 Subject mated connectors to (10-55-10) Hz frequency range traversed in 1 minute 20 sweep each axel and 40m/s ² amplitude for 2h 100 mA applied electrical load. Requirement: No electrical discontinuity greater than 1 μ s, no physical damage occurred.		3			
Mechanical shock	ECIA EIA-364-27C-2011 Accelerated Velocity: 10 g; Waveform: Half-sin wave; Duration: 11 milliseconds. Number of drops: 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops. Requirement: No electrical discontinuity greater than 1 μ s, no physical damage occurred.		4			
Thermal Shock	Subject mated specimens to 10 cycles of thermal shock with each cycle consisting of 30 minutes dwells at -25 and 105 °C. The transition time between cold and hot temperatures is less than 5 minutes. Requirement: No evidence of physical damage is visible.			3		
Temperature humidity cycle	ECIA EIA-364-31F-2019 Mated specimens were exposed to 10 cycles of humidity temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25°C and 65°C twice while maintaining high humidity.			4		
Temperature life	125°C, 250h				3	
Salt Spray / MFG	ECIA EIA-364-26C-2014 Cond.B					2

Table 2 - Test Sequences

NOTE

- (a) See paragraph 4.1.A
(b) Numbers indicate sequence in which tests were performed

1.7 Environmental Conditions

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

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

2. SUMMARY OF TESTING

2.1 Initial Examination of Product – Test Groups 1, 2, 3, 4, 5

A Certificate of Conformance stating that all specimens submitted for testing were representative of normal production lots and met the requirements of the applicable product drawing was provided. 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, 3, 4

All LLCR measurements of center contacts met the maximum requirements of 50 milliohms initial and a maximum of 30.0 milliohms change in resistance (delta) final. All outer contact measurements met the maximum requirements of 50 milliohms initial and a maximum of 30.0 milliohms change in resistance (delta) final.

2.3 Insulation Resistance – Test Group 1

Insulation resistance measurements on all specimens were greater than the 500 Megohms minimum resistance requirement both initially and finally.

2.4 Withstanding Voltage – Test Group 1

There was no dielectric breakdown or flashover.

2.5 Durability – Test Group 1

No evidence of physical damage detrimental to product performance was visible as a result of mating and unmating the specimens 300 times.

2.6 Mating Force – Test Group 1

All specimens can meet the requirement of mating force, and no physical damage was found.

2.7 Vibration – Test Group 2

No apparent physical damage or discontinuities of one microsecond or greater occurred during the vibration testing.

2.8 Mechanical Shock – Test Group 2

No apparent physical damage or discontinuities of one microsecond or greater occurred during the mechanical shock testing.

2.9 Thermal shock – Test Group 3

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

2.10 Temperature humidity cycle – Test Group 3

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

2.11 Temperature life – Test Group 4

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

2.12 Salt Spray – Test Group 5

No corrosion was found after test.

2.13 Final Examination – Test Groups 1, 2, 3, 4, 5

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

3. TEST METHODS

3.1 Initial Visual Examination

A Certificate of Conformance was issued stating that all specimens have been produced, inspected, and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production parts. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed. Testing was performed in accordance with Test Specification EIA-364-18B.

3.2 Low Level Contact Resistance

Low level contact resistance measurements at low level current were made using a four terminal measuring technique. The test current was maintained at 30 milliamperes maximum with a 1 volt maximum open circuit voltage. Testing was performed in accordance with Test Specification EIA-364-06C. See Figures 1 and 2 for typical setups.

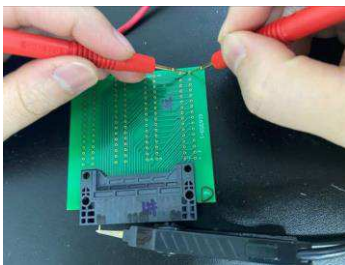


Figure 1 – Typical LLCR Setup, Center Contact

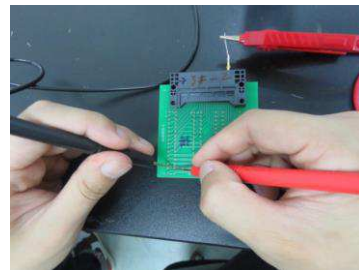


Figure 2 – Typical LLCR Setup, Outer Contact

3.3 Insulation Resistance

Insulation resistance was measured between the center contact and ground shield of mated unmounted specimens. A test voltage of 500 volts DC was applied for two minutes before the resistance was measured. Testing was performed in accordance with Test Specification EIA-364-21F.

3.4 Withstanding Voltage

A test potential of definition volts AC was applied between the center conductor and outer shell of unmated and unmounted jack specimens. The potentials were applied for one minute and then returned to zero. Testing was performed in accordance with Test Specification EIA-364-20F.

3.5 Vibration

The test specimens were subjected to a high frequency vibration test as stated in accordance with specification EIA-364-28F. See Figure 3 below for vibration setup photographs

The parameters of this test condition are a simple harmonic motion having an amplitude of either 0.66 mm double amplitude (maximum total excursion) or 20 gravity unit (g's peak) whichever is less.

The vibration frequency was varied logarithmically between the approximate limits of 10 to 55 Hertz (Hz). The entire frequency range of 10 to 55 Hz and return to 10 Hz was traversed in approximately 10 minutes. This cycle was performed 10 times in all three mutually perpendicular axes (total of 30 times), so that the motion was applied for a total period of approximately 2 hours.

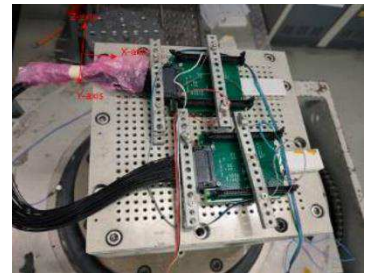


Figure - 3

The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

3.6 Mechanical Shock

The test specimens were subjected to a mechanical shock test as stated in TE Connectivity Specification 108-160468, in accordance with specification EIA-364-27C. See Figures 4 below for shock setup photographs

The parameters of this test condition are a half-sine waveform with an acceleration amplitude of 10 gravity units (g's peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular axes of the test specimens, for a total of eighteen shocks.

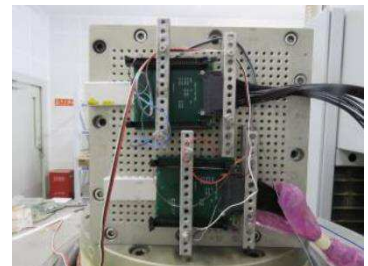


Figure - 4

The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

3.7 Durability

Specimens were mated and unmated by hand 300 times at a maximum rate of 12 cycles per minute in accordance with EIA-364-9D.

3.8 Thermal Shock

Mated specimens were subjected to 10 cycles of thermal shock with each cycle consisting of 30 minute dwells at -25 and 105°C. The transition between temperatures was less than 5 minute.

3.9 Temperature humidity cycle

Mated specimens were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25°C and 65°C twice while maintaining high humidity. Testing was conducted in accordance with EIA-364-31F.

3.10 Temperature life

Edit test procedure according to test method and run high temperature chamber.

Test Condition: Temperature: 125 °C Test duration: 250 h.

3.11 Salt Spray

Unmated specimens were exposed for 48 hours to a 5% salt solution with EIA-364-26C.

3.12 Final Examination

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

Appendix

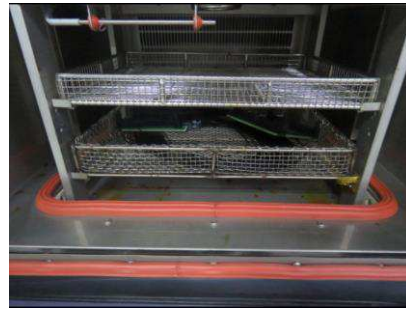
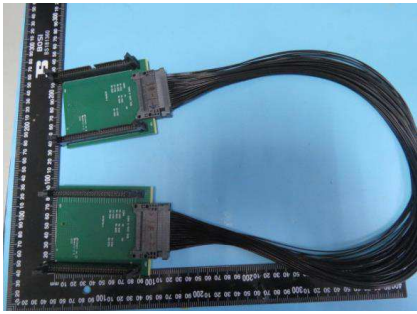
1.1 Initial LLCR:

Specimen ID	Initial			
	Small terminal		Big terminal	
	2-1	2-2	2-1	2-2
A1	11.39	8.89	11.42	12.42
A2	10.35	14.35	10.35	9.35
A7	11.31	13.81	8.34	13.34
A8	9.51	14.51	8.80	9.30
A9	11.62	15.12	8.95	10.45
A10	10.70	11.70	10.87	9.87
A15	11.37	12.37	9.32	8.32
A16	18.21	10.71	9.54	11.04
B1	13.87	10.87	9.69	9.19
B2	9.13	10.13	9.06	9.06
B7	9.55	14.05	8.07	8.57
B8	9.91	10.91	8.89	8.39
B9	19.86	8.36	8.09	8.59
B10	20.42	14.42	8.32	8.32
B15	11.94	7.44	9.41	8.41
B16	11.55	8.55	7.62	8.12
C1	13.40	11.40	7.96	6.96
C2	12.08	11.08	6.74	6.24
C7	13.08	12.58	5.79	5.79
C8	14.39	11.39	7.33	7.33
C9	13.38	11.88	6.69	6.69
C10	15.93	13.43	5.86	6.36
C15	23.53	13.03	5.30	6.80
C16	13.50	9.00	10.31	9.81
D1	16.20	17.70	6.27	8.77
D2	13.62	14.62	6.99	7.49
D7	15.96	16.46	8.11	7.61
D8	16.06	16.56	8.38	8.38
D9	15.38	16.38	9.00	8.50
D10	16.21	16.21	8.65	8.65
D15	15.64	16.64	7.53	9.03
D16	18.15	15.15	8.23	10.73
Max.	23.53	17.70	11.42	13.34
Min.	9.13	7.44	5.30	5.79
Avg.	13.98	12.80	8.31	8.68
Std.	3.48	2.78	1.47	1.69

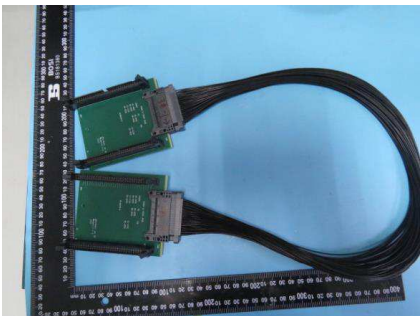
1.2 LLCR after Vibration test:

Specimen ID	After Vibration Test			
	Small terminal		Big terminal	
	2-1	2-2	2-1	2-2
A1	12.92	14.75	11.70	14.21
A2	17.08	14.50	10.58	12.00
A7	12.72	11.88	11.27	10.42
A8	11.06	11.76	10.81	12.42
A9	11.91	15.27	11.31	10.37
A10	13.97	13.75	11.36	10.06
A15	14.50	16.79	11.86	10.57
A16	15.30	15.98	12.98	13.27
B1	10.12	11.32	10.14	11.90
B2	10.00	9.75	10.17	11.90
B7	10.19	10.21	10.08	14.54
B8	10.88	10.92	10.76	9.77
B9	10.87	13.23	11.82	12.80
B10	10.34	11.11	10.37	10.71
B15	11.29	10.82	11.96	10.82
B16	11.13	11.11	11.80	10.76
C1	14.67	16.03	9.15	8.50
C2	12.26	14.95	9.45	8.65
C7	16.03	17.63	8.51	7.92
C8	15.71	14.90	9.56	13.41
C9	13.90	15.36	8.60	11.11
C10	13.78	16.59	8.22	7.94
C15	11.94	12.94	8.12	10.45
C16	10.17	13.01	11.90	12.49
D1	16.51	20.21	12.38	14.75
D2	17.23	21.85	9.18	9.71
D7	15.48	23.09	13.88	12.69
D8	20.23	18.07	10.04	11.71
D9	17.72	18.90	9.83	11.82
D10	19.13	17.23	9.40	10.64
D15	18.99	20.37	7.95	12.08
D16	17.81	17.06	9.04	9.85
Max.	20.23	23.09	13.88	14.75
Min.	10.00	9.75	7.95	7.92
Avg.	13.93	15.04	10.44	11.26
Std.	3.05	3.50	1.49	1.78

1.3 Thermal Shock test picture:



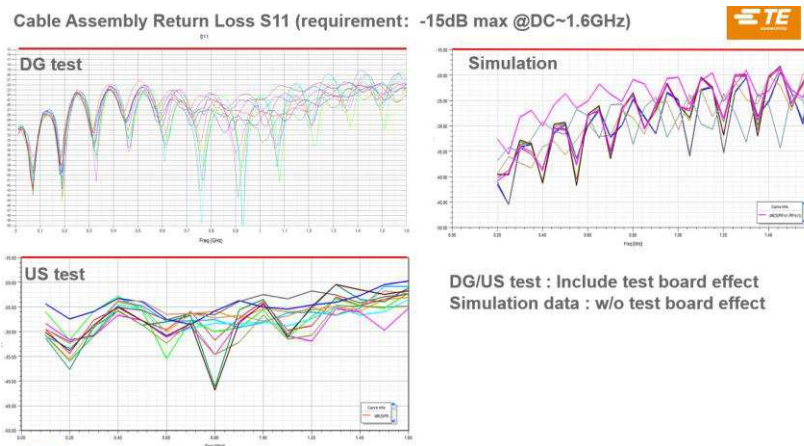
1.4 Humidity and Temperature Cycling test picture:



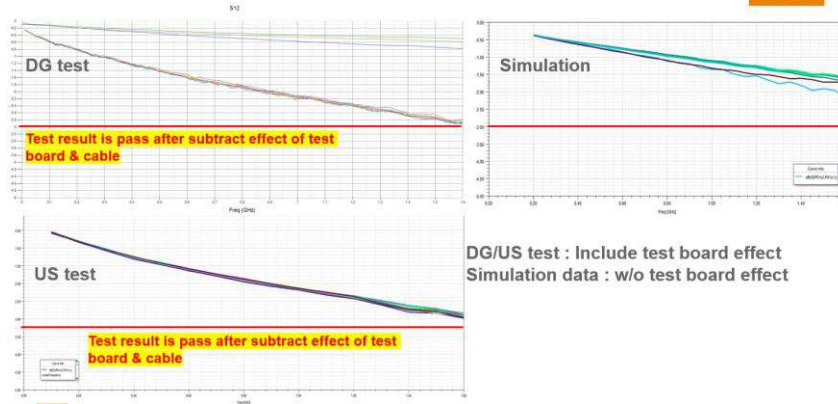
1.5 Salt Spray test picture:



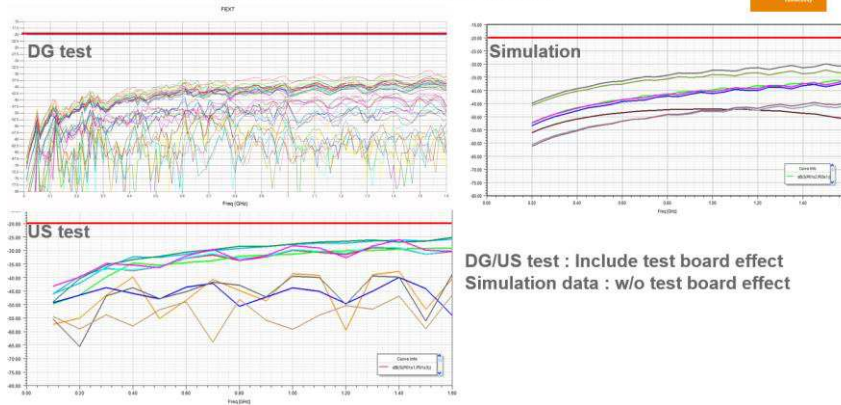
1.6 SI performance test results separately:



Cable Assembly Insertion Loss S12 (requirement: 3dB max @ DC~1.6GHz 1m)



Cable Assembly---FEXT (requirement:-20dB max @DC~1.6GHz)



Cable Assembly---NEXT (requirement:-20dB max @DC~1.6GHz)

