Modular, Nano RF Connector System

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Modular, Dual Density, Blind Mate, RF Connector System. This system combines a high performance, broad bandwidth multi-position, RF, coaxial interconnect in customer configurable platforms such as specified in the VITA 67.0, 67.1 and 67.2 documents.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line has been completed. The Qualification Test Report number was issued upon successful qualification testing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

- 408-163016: Instruction Sheet
- 501-134076: Qualification Test Report

2.2. Industry Documents

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- VITA 67.0: Coaxial Interconnect on VPX
- VITA 67.1: Coaxial Interconnect, 3U, 8 Position SMPM Configuration
- VITA 67.2: Coaxial Interconnect, 6U, 16 Position SMPM Configuration

2.3. Government Document

MIL-STD-810: Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests

2.4. Reference Documents

- 109-197 Test Specification (TE Test Specification vs EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

3.2. Ratings

Voltage	Current	Temperature
200 VAC	1.0 A DC	-65°C to +120°C

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Initial examination of product	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional (C of C). Inspection per product drawing.
Final examination of product	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Low level contact resistance (LLCR)	Center contact ≤ 8.0 milliohms initial. Outer contact ≤ 2.0 milliohms initial Delta ≤ 8.0 milliohms final	EIA-364-23 Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. Wire bulk removed.
Insulation resistance	10,000 megohms minimum initial 5,000 megohms minimum final	EIA-364-21 500 volts DC, 2-minute hold Test between center and outer contact of mated specimen.
Dielectric withstanding voltage	One minute hold with no breakdown or flash over. 5 milliamperes maximum leakage current	EIA-364-20 Method D, Condition I. 325 volts rms at sea level. Test between center and outer contact of mated specimen.
Voltage standing wave ratio (VSWR)	1.4:1 max to 40GHz (both .047 and .086) .047 cable: 1.5:1 max from 40 to 67 GHz .086 cable: 1.5 max from 40 to 50 GHz	EIA-364-108 Measure VSWR from 1.0 to 67 GHz
Isolation	≥ 90 dB from 27 to 40 GHz ≥ 100 dB from 3 to 27 GHz ≥ 120 dB from 30 MHz to 3 GHz ≥ 140 dB from 3 to 30 MHz	EIA-364-90, Method B
Power handling	1.5 maximum VSWR at 30 MHz to 1 GHz and 30 dBm. 1.5 maximum VSWR at 1 GHz to 40 GHZ and 20 dBm.	EIA-364-108. Measure VSWR at maximum operating temperature of (105°C) at each frequency band and power. Specimens must soak for 1 hour at maximum temperature prior to VSWR measurement.

<table>
<tr><td>Insertion loss</td><td>≤ 0.12 sqrt f (GHz) dB maximum</td><td>EIA-364-101, Method A.
Measure insertion loss from 1.0 to 40 GHz</td></tr>
<tr><td>Frequency response</td><td>≤ 1.5 dB from 2.0 MHz to 40 GHz</td><td>To be extracted from insertion loss data.</td></tr>
<tr><td colspan="3">MECHANICAL</td></tr>
<tr><td>Mating force</td><td>11.25 N maximum per contact.</td><td>EIA-364-13.
Measure force necessary to mate specimens at a maximum rate of 12.7 mm per minute.</td></tr>
<tr><td>Unmating force</td><td>1.4 N minimum per contact</td><td>EIA-364-13.
Measure force necessary to unmate specimens at a maximum rate of 12.7 mm per minute.</td></tr>
<tr><td>Durability</td><td>See Note.</td><td>EIA-364-9.
Mate and unmate specimens for 500 cycles at a maximum rate of 600 cycles per hour.</td></tr>
<tr><td>Vibration Test 1</td><td>No discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.
See Note</td><td>
<table>
<tr><th>Frequency (Hz)</th><th>PSD (g^2/Hz)</th></tr>
<tr><td>5</td><td>0.002</td></tr>
<tr><td>15</td><td>0.04</td></tr>
<tr><td>150</td><td>0.04</td></tr>
<tr><td>300</td><td>0.1</td></tr>
<tr><td>1000</td><td>0.1</td></tr>
<tr><td>2000</td><td>0.025</td></tr>
<tr><td>g_{rms}</td><td>11.7 g_{rms}</td></tr>
</table>
One hour in each of three mutually perpendicular axes (total 3 hours.)
</td></tr>
</table>

Figure 1 (Cont)

<table>
<tr>
<td>Vibration Test 2</td>
<td>No discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.
See Note</td>
<td>
<table>
<tr><th>Frequency (Hz)</th><th>PSD (g^2/Hz)</th></tr>
<tr><td>5</td><td>0.004</td></tr>
<tr><td>15</td><td>0.08</td></tr>
<tr><td>150</td><td>0.08</td></tr>
<tr><td>300</td><td>0.2</td></tr>
<tr><td>1000</td><td>0.2</td></tr>
<tr><td>2000</td><td>0.05</td></tr>
<tr><td>g_{rms}</td><td>16.5 g_{rms}</td></tr>
</table>
One hour in each of three mutually perpendicular axes (total 3 hours.)
</td>
</tr>
<tr>
<td>Vibration Test 3</td>
<td>No discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.
See Note</td>
<td>
<table>
<tr><th>Frequency (Hz)</th><th>PSD (g^2/Hz)</th></tr>
<tr><td>5</td><td>0.004</td></tr>
<tr><td>15</td><td>0.08</td></tr>
<tr><td>150</td><td>0.08</td></tr>
<tr><td>300</td><td>0.2</td></tr>
<tr><td>1000</td><td>0.2</td></tr>
<tr><td>2000</td><td>0.05</td></tr>
<tr><td>g_{rms}</td><td>16.5 g_{rms}</td></tr>
</table>
Twelve hours in the Z-axis (c) only (total 12 hours.)
</td>
</tr>
<tr>
<td>Mechanical shock, Class OS2</td>
<td>No discontinuities of 1 millisecond or greater using an energizing current of 100 milliamperes.</td>
<td>MIL-STD-810, Method 516 Procedure I.
Saw tooth wave form with an acceleration amplitude of 40 gravity units (g's peak) and a duration of 11 milliseconds. Three shock each direction for a total of 18 shocks.</td>
</tr>
</table>

Figure 1 (Cont)

ENVIRONMENTAL

Thermal shock (non-operating)	See Note.	EIA-364-32. Subject mated specimens to 5 cycles between -55°C and 125°C with 30-minute dwells at temperature extremes and 1-minute maximum transition between temperatures.
Temperature / humidity cycling	See Note.	MIL-STD-810, Method 507, Procedure II, 10 cycles.
Operating temperature	-55°C to 120°C. VSWR measurements at -55°C, -40°C, 22°C, 105°C and 120°C	EIA-364-108.

Figure 1 (End)

NOTE
Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in figure 2.

3.4. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)						
	1	2	3	4	5	6	7
	TEST SEQUENCE (b)						
Initial examination of product	1	1	1	1	1	1	1
Mating force	2						
Unmating force	14						
Low level contact resistance	3,5,7,9,11,13						
Insulation resistance		2,6					
Dielectric withstanding voltage		3,7					
Durability – 500 cycles (100 cycle intervals)	4,6,8,10,12						
Vibration test 1			2				2
Vibration test 2			3				3
Vibration test 3			4(c)				4(c)
Mechanical shock, Class OS2			5				5
Humidity / Temp Cycling		5					
Thermal shock (non-operating)		4					
Operating temperature						2	
Voltage standing wave ratio (VSWR)				2			6
Isolation				5			
Power handling					2		
Insertion loss				3			
Frequency response				4			
Final examination of product	15	8	6	6	3	3	7

NOTE

(a) See Paragraph 4.1.A.

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

(c) The Z-axis is defined as the axis perpendicular to the contact mating axis in the vertical direction.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1 Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheet and shall be selected at random from current production. Test groups 1, 2, 3 and 7 shall consist of a minimum of 3 specimens each. Test groups 4, 5, and 6 shall consist of 8 specimens each. Test groups 1,2,3 and 7 are module level test groups. Test groups 4, 5 and 6 are contact level test groups.

B. Test Sequence

Qualification inspection shall be verified by testing as specified in figure 2.

4.2 Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, produce assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3 Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test set up or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4 Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

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