1.0/2.3 DIN TO UMCC Radio Frequency Coaxial Cable Assembly and Connectors

1. SCOPE

The 1.0/2.3 DIN TO UMCC Radio Frequency Coaxial Cable Assembly is designed to meet the rising performance needs of Wireless Communications Systems and Mobile Antenna Radio Systems and Remote measuring equipment.
This specification gives an overview of all relevant specifications or requirements related to 1.0/2.3 DIN to UMCC Radio Frequency Coaxial Cable Assembly and Connectors.

1.1. Content

This specification covers performance, tests and quality requirements for TE Connectivity (TE) 1.0/2.3 DIN TO UMCC RF coaxial cable assembly and connectors of nominal characteristic impedance 50 ohms

1.2. Qualification

All components for the cable assembly, connectors, over-mold and cable were subject to their individual design objectives and were qualified accordingly.
This document addresses the total cable assembly and plug
When tests are performed on the subject product line, procedures specified in table 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Connectivity (TE) Documents

- TEC-109-201: Component heat resistance to lead-free reflow soldering.
- 108-2231: Ultraminiature Coax Connector(UMCC) and Cable Assemblies
- 108-1983: 1.0/2.3 DIN Push-Pull RF Coax Cable Assemblies
- 114-32201: Application Specifications as required
- 501-160133: Qualification Test Report (1.0/2.3 DIN TO UMCC Radio Frequency Coaxial Cable Assembly)
- 109–197: Test Specification (TE Test Specification vs EIA and IEC Test Methods)

2.2. Industry Document

EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
IEC 60169-1: Radio-frequency connectors. Part 1: General requirements and measuring methods
IEC 60169-29: Radio-frequency connectors - Part 29: Sectional specification - Miniature radio frequency coaxial connectors model screw, snap-on, push-pull or quick-lock, slide-in (rack and panel applications) - Characteristic impedance 50 Ω (type 1,0/2,3) - 50 Ω and 75 Ω applications
IEC 60966-1: Radio-frequency and coaxial cable assemblies-Part 1: General specification-General requirements and test methods
ISO 21207: Corrosion tests in artificial atmospheres -- Accelerated corrosion tests involving alternate exposure to corrosion-promoting gases, neutral salt-spray and drying
IPC-A-620: Requirements and Acceptance for Cable and Wire Harness

1.0/2.3 Bulkhead to UMCC RF Coaxial Cable Assembly and Connectors

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 Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

Working Voltage:	30 VAC RMS at sea level
Temperature Range:	-45℃ to 85 ℃
Characteristic Impedance:	50 ohms Nominal
Frequency Range:	DC to 6 GHz

3.4. Component Description

Connector ① use Ultraminiature Coax Connector, and **Connector** ③ use 1.0/2.3 Miniature Coax Connector, Both connector is Snap type, Quick installation for all needs with guaranteed low loss values, Future proof due to smallest form factor , ④ is cable, ③ is Heat shrink tube

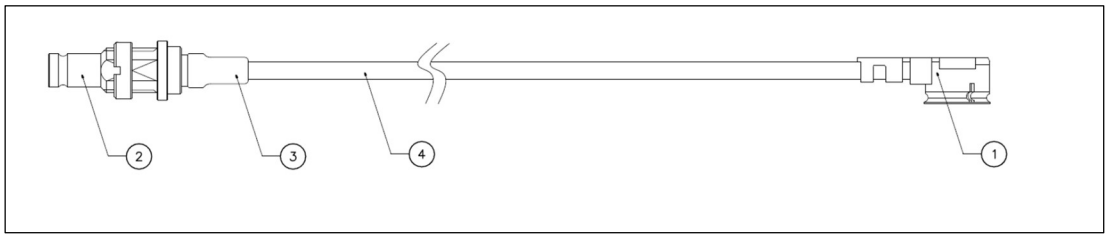


Figure 1

3.5. Performance and Test Description

Products is designed to meet the electrical, mechanical and environmental performance requirements specified in table 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.6. Test Requirements and Procedures Summary (table 1)

Test Description	Requirement	Procedure
Initial examination of product. (Included Visual inspection)	Meets requirements of product drawing.	EIA-364-18/IEC 61169-1/ IEC 60966-1/IPC-A-620 Visual and dimensional inspection per product drawing.
Final examination of product. (Included Visual inspection)	Meets visual requirements.	EIA-364-18/IEC 61169-1/ IEC 60966-1/IPC-A-620 Visual inspection.

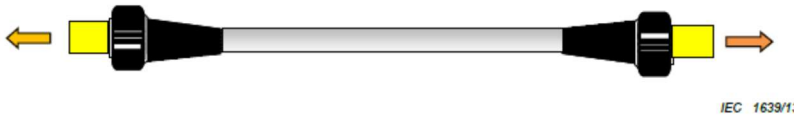
Test Description	Requirement	Procedure
ELECTRICAL		
Low Level Contact Resistance (LLCR) for cable assembly	Center contact (between 1.0/2.3 to UMCC and cable): 194 milliohms maximum initial. 205 milliohms maximum after test Outer Contact (between 1.0/2.3 to UMCC and cable): 27.5 milliohms maximum initial 37.5 milliohms after test	EIA-364-23/ IEC 61169-1. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. See Figure 7
Insulation resistance. (Cable Assemblies)	500 mega-ohms minimum(initial) 200 mega-ohms minimum(after test)	EIA-364-21B/ IEC 61169-1. 100 volts DC, 2 minutes hold. Test between adjacent contacts.
Dielectric withstanding voltage. (Cable Assemblies)	200V at sea level	EIA-364-20B, Condition I Requested volts AC(rms) at sea level. One minutes hold with no breakdown or flashover
Impedance	50+/-5 ohm	EIA-364-108
Insertion loss	0.1 x √ f +Cable attenuation Max See Detail product drawing	IEC 60966-1 Requested all attenuation in figure 4
VSWR/Return Loss	1.30 max. DC~1000MHz 1.50 max. 1GHz~4GHz 2.00 max. 4GHz~6GHz	EIA-364-108/IEC 60966-1 Time domain gated around specimen under test in figure 4
MECHANICAL		
Mechanical compatibility	The dimensions of the mating face shall be in accordance with the mating face drawings prescribed in the specification.	IEC 61169-29/IEC 61169-1 Use compatibility gauges
Center contact captivation force	The permanent displacement of the center contact with regarding to the connector body shall not exceed the value	IEC 61169-1/IEC 61169-29 Free connectors be fit with an appropriate cable
Engagement and Separation force	DIN 1.0/2.3 -Engagement: ≤25N -Separation:3~25N UMCC -Engagement: ≤10N -Separation: ≥2N (perpendicular)	EIA-364-13, Method A IEC 61169-1/IEC 61169-54 The sliding speed during the engagement and disengagement of the connectors should be 0.1m/s Measure torque necessary to mate samples.
Reseating	No evidence of physical damage	Manually unmate/mate the interconnect system once
Durability	Shall meet visual requirements, show no physical damage	EIA-364-9 Mate and unmate specimens for 20cycles at a maximum rate of 500 cycles per hour (for UMCC)
		IEC61169-29 Mate and unmate specimens for 500cycles at a maximum rate of 500 cycles per hour (for 1.0/2.3)

Test Description	Requirement	Procedure
Cable pulling (Cable assembly)	Neither the dielectric nor the sheath shall have moved in relation to the cable outlet of the connectors	IEC 61169-1/IEC 61169-29 The force shall be applied between the two connectors along the common axis of the cable and cable outlets for a period of 60s min in figure 2
Cable torsion (Cable assembly)	Cable shall neither slip nor rotate in relation to the connectors	IEC 61169-1/IEC61169-29 An axial torque apply to the cable free end for a duration of 60s min in figure 3
Cable bending (Cable assembly)	No visible deterioration of the connector to cable junction	IEC 61169-1/IEC 61169-29 Applied a mass on cable free end for a period of 60s min in figure 5
Strength of coupling mechanism	No damage shall occur and the coupling mechanism shall not fail for 1.0/2.3 connector	IEC 61169-1/IEC 61169-29 An axial tensile force shall be applied smoothly to mated connector pairs the coupling
Vibration, random	No discontinuities of 1 microsecond or longer duration	EIA-364-28D, Condition VII, letter D. Subject mated specimens to 3.10G's rms between 20-500Hz,Test time to be 15 minutes on each of three mutually perpendicular axes in figure 3 (for 1.0/2.3)
		EIA-364-28D, Condition VII, letter D. Subject mated specimens to 6G's rms between 10-100-10Hz,Test time to be 35 minutes on each of three mutually perpendicular axes in figure 3 (for UMCC)
Mechanical Shock	No discontinuities of 1 microsecond or longer duration	EIA-364-27,Method H, Condition A Subject mated specimens to 30G's half-sine shock pulses of 11miliseconds duration, 3 shocks in each direction applied along 3 mutually perpendicular planes,18total shocks (for 1.0/2.3)
		EIA-364-27,Method H, Condition A Subject mated specimens to 75G's half-sine shock pulses of 11miliseconds duration, 3 shocks in each direction applied along 3 mutually perpendicular planes,18total shocks (for UMCC)
Drop test on board-Horizontal	No evidence of physical damage, and pass E-test	keep samples on board and horizontal drop from 600mm heigth
Drop test on board-Veritcal	No evidence of physical damage, and pass E-test	keep samples on board and vertical drop from 600mm heigth
ENVIRONMENTAL		

Test Description	Requirement	Procedure
Humidity	No damage, cracks or parts dislocation Initial and after test, the cable assembly can pass LLCR & VSW, insertion loss test	EIA-364-32C, Subject samples 96hours at temperature of 40℃ and humidity of 95%
Temperature cycle	No damage, cracks or parts dislocation Initial and after test, the cable assembly can pass LLCR & VSW, insertion loss test	EIA-364-17B Subject Samples at temperature life: -40℃-→+5℃ to +35℃-→+90℃-→+5℃ to +35℃ Time: 30min-→3min-→30min-→3min (5cycles)
Temperature Cycle	No evidence of physical damage after 1000hours in 105℃	EIA-364-17,method A condition 4
Cyclic Temperature & Humidity	No evidence of physical damage	EIA-364-31,method III, condition B, omitting 7b vibration test
Thermal Shock	-65℃ to +105℃, 25cycles No evidence of physical damage	EIA-364-32,method A condition II
Corrosion test/Salt Spray	No changed in appearance, engagement and separation can be achievable	EIA 364-26B Condition A / ISO 21207, test method A, 5% spray for 48 hours
Mixed Flowing Gas	Mated & Unmated	EIA-364-65, Condition IIA, ½ of samples mated for 336 hours, ½ of samples unmated for 168hours, then mated for final 168hours
Heat shock on board	No evidence of physical damage, and pass E-test	keep samples on board and put in 90° temperature cabinet for 1hours
Flammability rate	VW-1	UL 1581

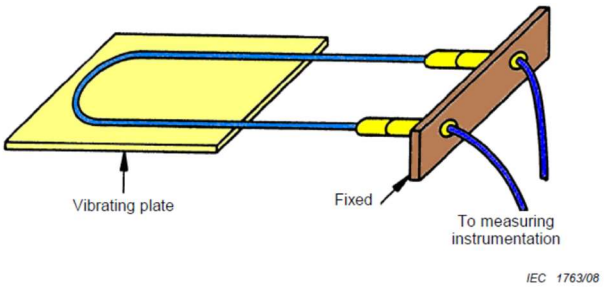
3.7. Additional testing

3.7.1 Cable pulling test (figure 2)

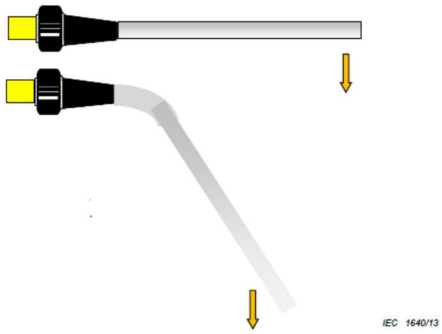


3.7.2 Cable torsion (figure 3)

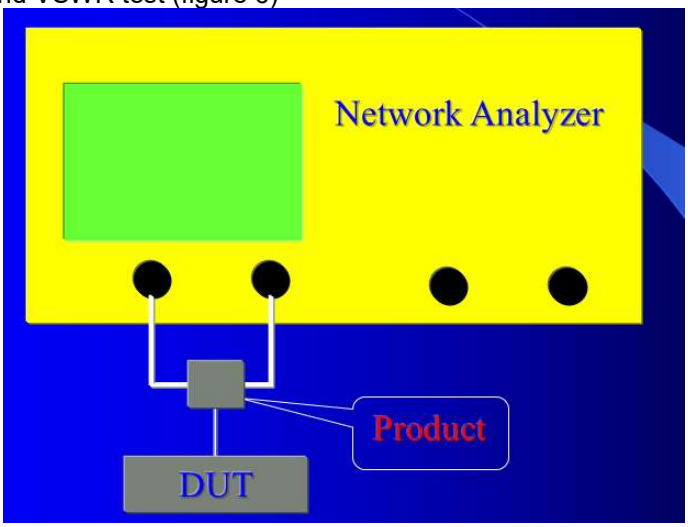
3.7.3 Vibration (figure 4)



3.7.4 Cable bending (figure 5)



3.7.5. Insertion Loss and VSWR test (figure 6)



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 Table 2.*

3.8. Product Qualification and Requalification Test Sequence (Table 2)

Table 2 - Test Sequences

Test or Examination	Test Group *(a)*									
	1	2	3	4	5	6	7	8	9	10
	Test Sequences *(b)*									
Initial Examination of Product	1	1	1	1	1	1	1	1	1	1
Visual inspection	2	2	2	2	2	2	2	2	2	2
Final examination of product	9	11	12	12	8	7	10	13	14	4
Contact resistances (LLCR)	3,6,8	3,6,8,10	3,6,8,10,11	3,6,8,9,11	4,6		3	3		
Dielectric withstanding voltage					3,7		4	4		
Insulation resistance							5	5		
Impedance							6	6		
VSWR							7	7	3,6,9,12	
Insertion loss							8	8	4,7,10,13	
Mechanical compatibility						3				
Center contact captivation force						4				
Engagement and Separation force						5				
Durability	4	4	4	4	5			9		
Cable pulling								12		
Cable torsion								11		
Cable bending								10		
Strength of coupling mechanism						6				
vibration test			7							
Mechanical shock			9							
Reseating	7	9		10						
Mixed Flowing Gas				7						
Corrosion test/Salt Spray							9			
Cyclic Temperature & Humidity test		7								
Temperature life	5									
Temperature life (preconditioning)			5	5						
Thermal Shock		5								
Flammability resistance										3
Drop test on board-Horizontal									5	
Drop test on board-Vertical									11	
Heat shock on tray									8	

NOTE

(a) See paragraph 4.1.A.

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

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be Selected at random from current production. Each test group shall consist of a minimum of 5

Specimens.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 1.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product 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 setup 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 resubmitted.

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.

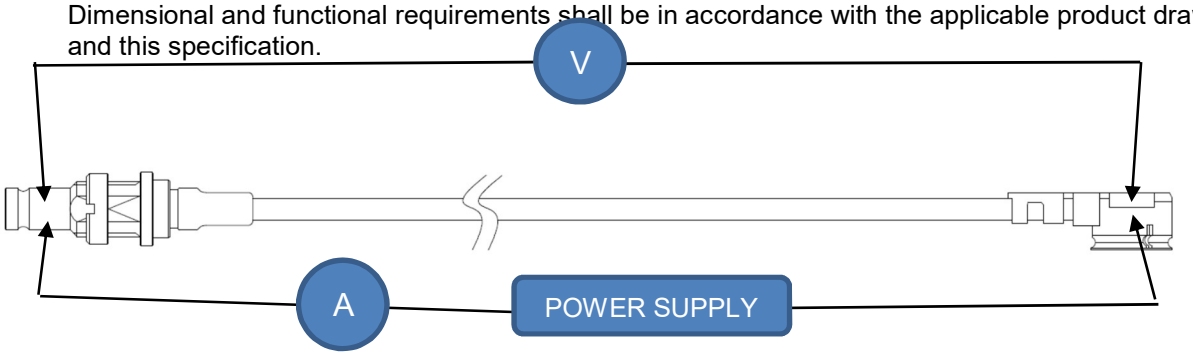


Figure 7
Typical LLCR Measurement Points (cable assembly)

Changed list

REV	DATE (DD-MM-YY)	CATEGORY	ADDITIONS, DELETIONS, CHANGES
1	08-Sep-2018	All	Preliminary version
2	22-Sep-2020	All	Corrected document number
3	28-Sep-2020	All	Added drop and heat on board test