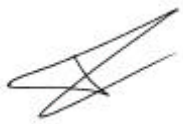
Titre / Title
HIGH RELIABILITY **RF COAXIAL CONNECTORS** **SMA TYPE, 50 OHMS** **(FEMALE CONTACT)**

Rédigé par / Written by	**Responsabilité / Responsibility**	**Date**	**Signature**
S. POIZAT	Space Project Manager	27/04/07	
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DOCUMENTATION CHANGE NOTICE

REVISION OR ISSUE	DATE	CHANGE
1 -	28/02/03	Creation – Replacement of specification RAD-C-2612/002 issue 3
1 A	02/07/03	Minor modifications of presentation
1 B	15/11/04	Table 6 item 17 (soldering) mating / unmating 2 Ncm ⟶ 24 Ncm
1 C	25/04/05	Added 4 new references in table 7 and changed the Power Handling category for reference R125605040X, R125609000X and R125609100X: Cat III instead of Cat II.
1 D	19/05/05	Added the reference R125225700X in Table 7
1 E	30/05/05	Added the reference R125614061X in Table 7
1 F	21/06/05	Added the reference R125612140X in Table 7
1 G	19/12/05	Added the reference R125403001X in Table 7
1 H	06/06/06	Added the reference R125462001X andR125609130X in Table 7
1 J	25/09/06	Added the reference R125460000X in Table 7
2 -	27/04/07	Table 7 replaced by the detail specification RAD-LIS-CONN-001

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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical an electrical characteristics, test and inspection data for RF Coaxial connectors, Type SMA, 50 Ohms (Female contact). It shall be read in conjunction with RADIALL Generic Specification RAD-GEN-CONN-001, the requirements of which are supplemented herein.

1.2 TYPE VARIANTS

For each type variant, the full electrical and physical characteristics are given in individual technical data sheet.

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the connectors specified herein, are as scheduled in Table 1(b).

1.4 POWER DERATING INFORMATION (FIGURE 1)

The power derating information applicable to the connectors specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the connectors specified herein are shown in Figure 2(a) and technical data sheet.

1.6 STANDARD TEST CONNECTOR INTERFACE

Whenever gauges are required for mating with the connectors under test, their physical dimensions shall be in accordance with those specified in Figure 3.

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Table 1 (a) – TYPE VARIANTS

(See RADIALL technical data sheets)

Table 1 (b)- MAXIMUM RATINGS

N°	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Power	P	See figures 1 (a) and 1 (b)	W	For information
2	Nominal impedance	Z	50	Ω	-
3	Frequency Range	f	See technical data sheet	GHz	-
4	Dielectric Withstanding Voltage at ambient pressure	V_{dw}	See technical data sheet	Vrms	At sea level
5	Dielectric Withstanding Voltage at low pressure	V_{lp}	10% of V_{dw}	Vrms	At 44 mb
6	Rated Operating Voltage	V_{op}	50% of V_{dw}	Vrms	
7	Corona Level	V_{co}	8,5% of V_{dw}	Vrms	-
8	Operating Temperature Range	T_{op}	See technical data sheet	°C	-
9	Storage Temperature Range	T_{stg}	As per Operating Temperature Range	°C	-

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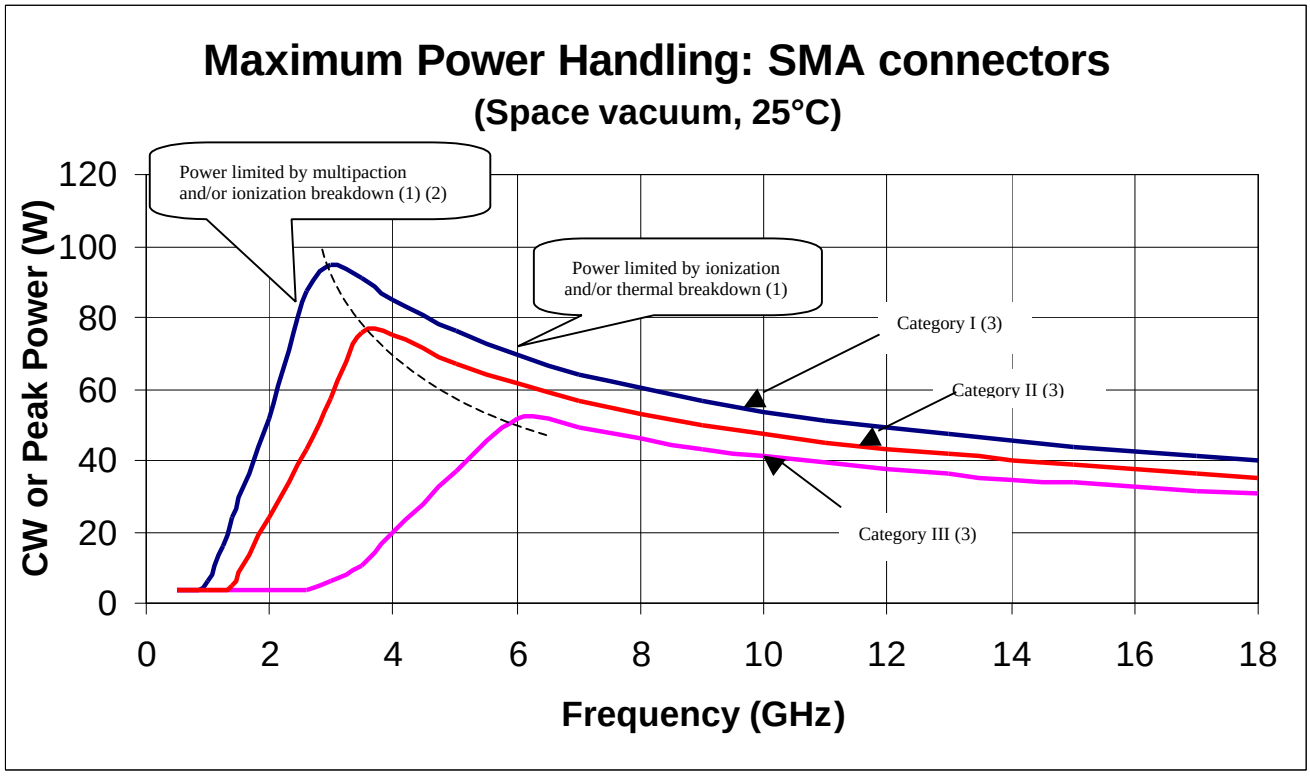
FIGURE 1- POWER DERATING INFORMATION

FIGURE 1(a) POWER VERSUS FREQUENCY



Notes:
1: Load VSWR is better than 1,30:1
2: The part of the curve limited by multipaction takes into account a 6 dB margin as recommended by ESA
3: See Table 7 to know applicability of power handling categories to the different part numbers

FIGURE 1(b) POWER VERSUS TEMPERATURE

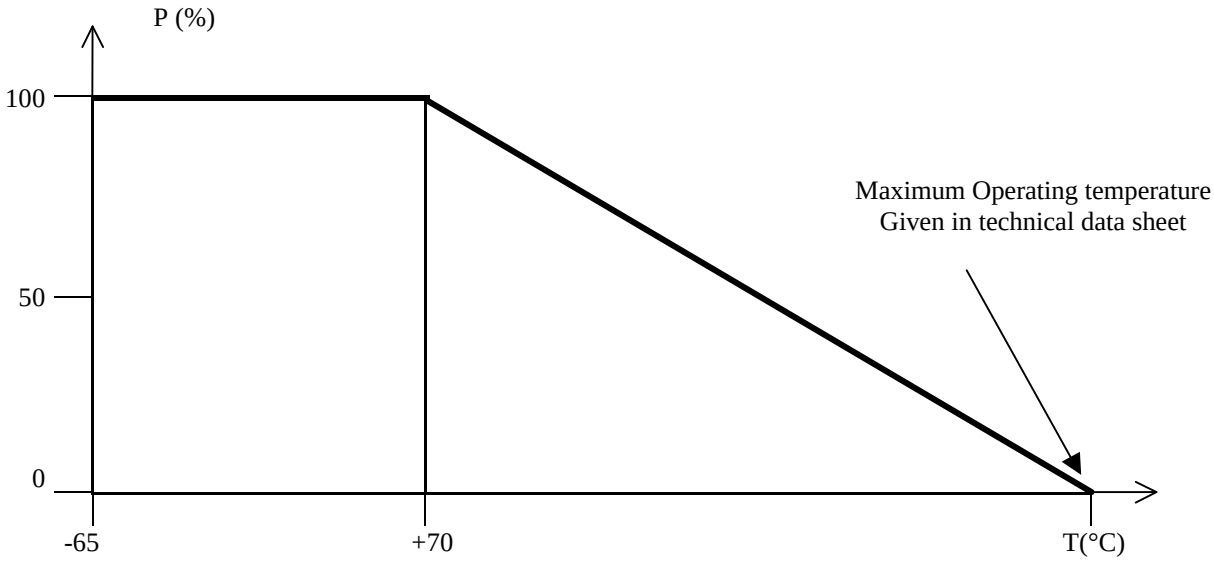


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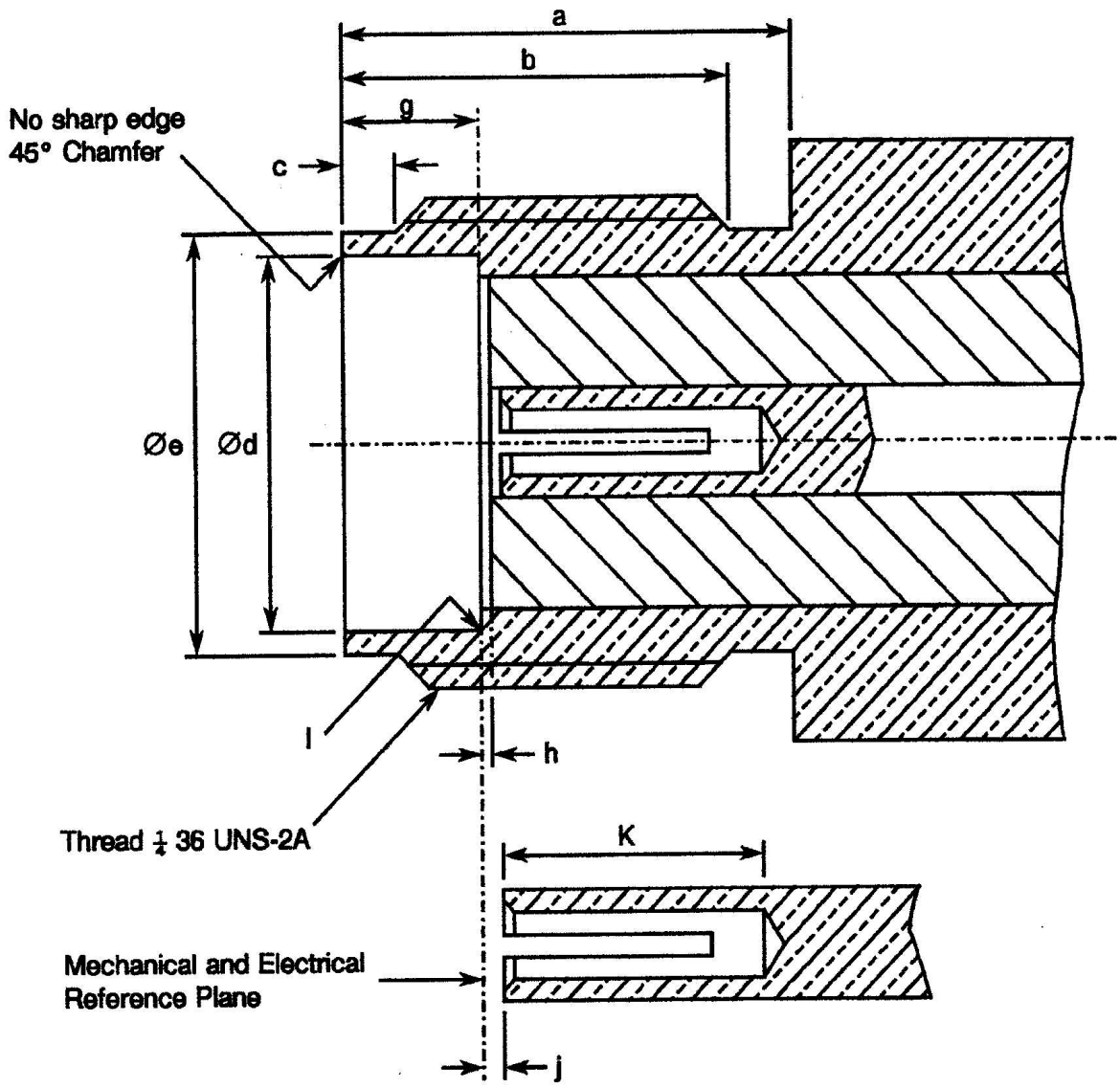
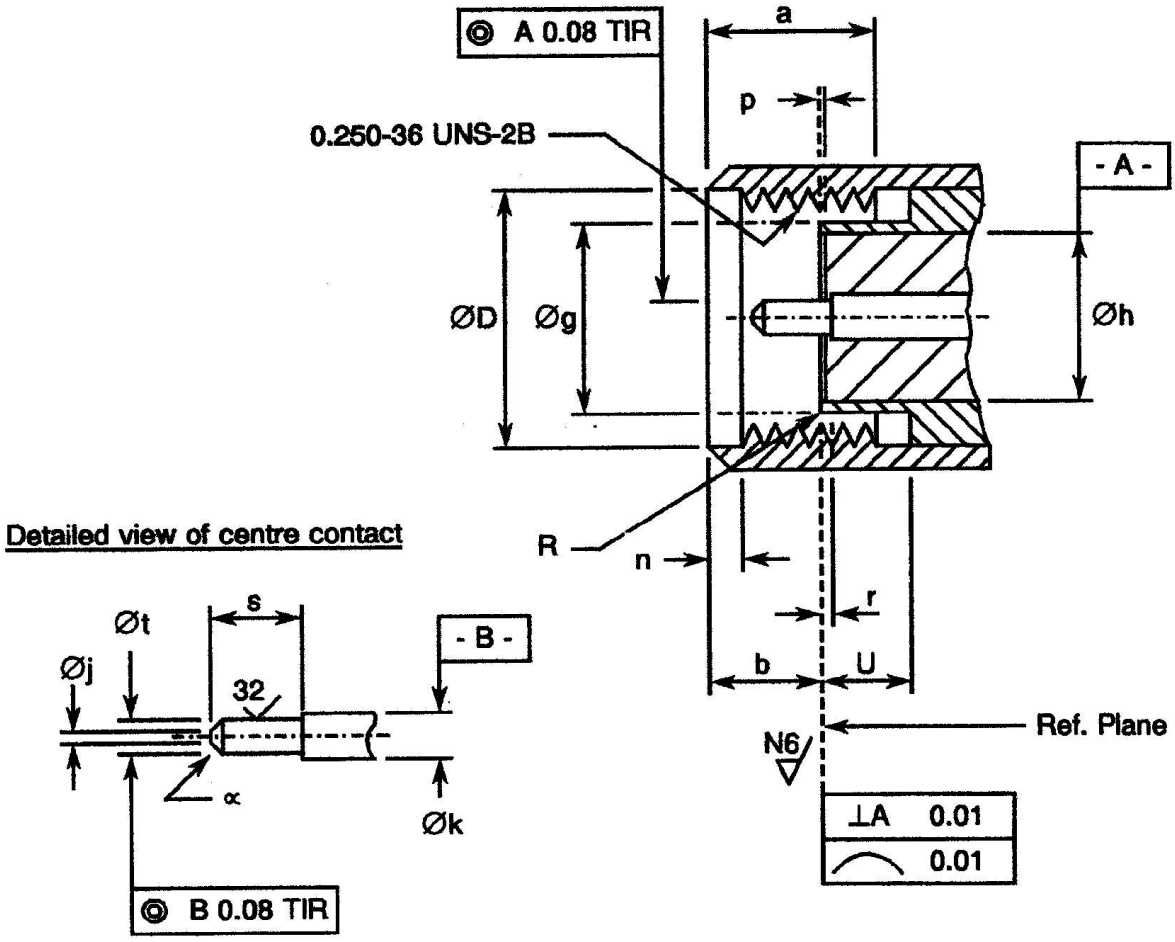
FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a) CONNECTOR INTERFACE - FEMALE CONTACT



SYMBOL	MILIMETERS		NOTES
	MIN.	MAX.	
a	5.54	-	
b	4.32	-	
c	0.38	1.14	
Φd	4.597	4.67	
Φe	5.28	5.49	
g	1.88	1.98	
h	0.00	0.20	
j	0.00	0.25	
k	2.92	-	
l	-	0.04	Radius

FIGURE 3 - STANDARD TEST CONNECTOR INTERFACE –MALE CONTACT



SYMBOL			NOTES
	MIN.	MAX.	
a	3.71	4.32	
b	2.59	3.35	
ΦD	6.48	6.73	
Φg	4.34	4.59	
Φh	4.10	4.13	
Φj	-	0.38	Flat
Φk	1.27	1.29	
n	0.64	1.14	
p	0.00	0.05	Insert recess
r	0.00	0.08	Contact recessed
R	-	0.08	
S	2.03	2.29	
Φt	0.90	0.93	
U	2.03	-	
α	-	-	45 ±3° Chamfer

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2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it :

(a) RADIALL Generic Specification RAD-GEN-CONN-001 for RF Coaxial Connectors.
(b) MIL G.45204 Gold plating, Electrodeposited.
(c) MIL PRF. 39012 Connectors Coaxial RF General Specification for.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic specification N° 21300 shall apply.
In addition the following shall apply:

V_{dw} Dielectric Withstanding Voltage at ambient pressure (sea level)
V_{lp} Dielectric Withstanding Voltage at low pressure (44 mb)
V_{co} Corona Level Voltage
R_i Insulation Resistance
I_L Leakage Current

4. REQUIREMENTS

4.1 GENERAL

The complete requirement for procurement of the connectors specified herein are stated in this specification and RADIALL Generic Specification RAD-GEN-CONN-001 Deviations from the Generic Specification applicable to this specification only, are listed in Para.4.2.

Deviations from the applicable Generic Specification and this Detail Specification do not affect the components' reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-Process Controls
None.

4.2.2 Deviations from Final production Tests (Chart II)
The tests "Change of temperature", "Insulation Resistance", "Voltage proof" are not applicable for variants delivered with unmounted contact and insulator.

4.2.3 Deviations from Qualification Tests (Chart IV)
None.

4.2.4 Deviations from Lot Acceptance Tests (Chart V)
None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check
The dimensions of the connectors specified herein shall be verified in accordance with the requirements set out in Para.9.25 of RADIALL Generic Specification RAD-GEN-CONN-001 and shall conform to those shown in Figures 2(a) and in technical data sheet.

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4.3.2 Weight

The maximum weight of the connectors specified herein shall be as specified in technical data sheet.

4.3.3 Coupling Proof Torque

The requirements for testing of the coupling proof torque are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001. The applied torque shall be 170N.cm.

4.3.4 Cable Retention Force

The requirements for testing of the cable retention force are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001. The technical data sheet specifies the values for axial loads. Torque shall be applied as follows :

4.3.4.1 Flexible Cables

Flexible cables shall be rotated 180° in both directions.
Rotational movement shall be applied at 15 cm from the connector.

4.3.4.2 Semi-rigid Cables

The torque value shall be as follows :

RG 405/U : 11.28N.cm.
RG 402/U : 38.85N.cm.
RG 401/U : 38.85N.cm.

4.3.5 Mating and Unmating Forces

The applicable measurement requirements are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001. The maximum torque during mating and unmating shall not exceed 24N.cm.

Whenever a test is performed on mated pairs of connectors, the pairs shall be torqued at 80-120N.cm.

4.3.6 Endurance

The applicable test requirements are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001. The test conditions shall be as follows :

(a) Number of cycles : 500 for qualification ; 100 for lot acceptance
(b) Rate : 12 cycles maximum/minute.

4.3.7 Residual Magnetism

Not applicable.
Residual magnetism is not applicable to stainless steel versions, and Beryllium copper Nickel underplate version.

4.3.8 Contact Engagement and Separation Forces

The requirements for these measurements are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001 and apply to female contacts only.

(a) Oversize Pin

Steel test pin diameter	:	0.9525/0.955mm.
Insertion depth	:	0.76/1.14 mm.
Number of insertions	:	3.

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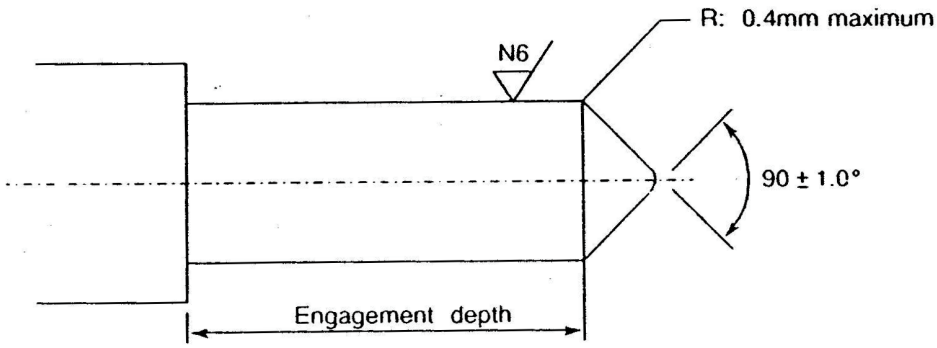
(b) Engagement Force Test (Maximum diameter Test Pin)

Steel test pin diameter	:	0.940/0.942 mm.
Engagement depth	:	1.27/1.91 mm.
Engagement force	:	1360g max.

(c) Separation Force Test (Minimum Diameter Test Pin)

Steel test pin diameter	:	0.902/0.904 mm.
Separation depth	:	1.27/1.91 mm.
Separation force	:	28.4g min.

FIGURE 4 – TEST PIN CONFIGURATION



4.3.9 Contact Retention

The requirements for this test are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001. The test conditions are given in technical data sheet. After testing, the connector interface dimensions shall be within the limits of Figure 2(a).

4.4 MATERIALS AND FINISHES

The material and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the connectors specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Gold-plated Versions

4.4.1.1 Standard types

(a) Shell, Coupling Nut

Material	:	Stainless steel
Underplate	:	Nickel, 2.0 µm minimum
Plating	:	Gold, 0.5 µm minimum, Type II of MIL-G-45204.

(b) Inserts

Material	:	PTFE

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(c) Center contact

Material	:	Beryllium copper or brass
Underplate	:	Nickel, 2 µm min.
Plating	:	Gold 1.27 mini Type II of MIL-G-45204

(d) Gaskets

Material	:	Not applicable

(e) Accessories (ferrule, crimping sleeve and nut) etc…

Material	:	Brass or copper or stainless steel
Underplate	:	Nickel, 2.0 µm minimum
Plating	:	Gold, 0.2 µm minimum Type II of MIL-G-45204

4.4.1.2 Hermetic Types – added permitted material

(a) Shell

Material	:	Iron
Underplate	:	Nickel, 2.0 µm minimum
Plating	:	Gold, 0.5 µm minimum, Type II of MIL-G-45204

(b) Insert

Material	:	Glass

(c) Centre Contact

Material	:	Iron
Underplate	:	Nickel, 2.0 µm minimum
Plating	:	Gold, 1.27 µm minimum, Type II of MIL-G-45204

4.4.2 Passivated Stainless Steel Versions (Not applicable for solder version)

(a) Shell, Coupling Nut

Material	:	Amagnetic stainless steel, electro-passivated

(b) Centre Contact

Material	:	Beryllium copper or brass
Underplate	:	Nickel, 2.0 µm minimum
Plating	:	Gold, 1.27 µm minimum, Type II of MIL-G-45204

(c) Inserts

Material	:	PTFE

(d) Gaskets

Material	:	Not applicable

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(e) Accessories

- Crimping or soldering elements

Material : Brass or copper or stainless steel
Underplate : Nickel, 2.0 µm minimum
Adequate coating for good solderability

- Nut

Material : Amagnetic stainless steel, electro-passivated

- Washers

Material : Beryllium copper
Plating : Nickel, 2.0 µm minimum

4.5 MARKING

4.5.1 General

The marking of all delivered to this specification shall be in accordance with the following paragraphs. Each component shall be marked in respect of :

(a) The RADIALL Component Number
(b) Traceability Information

4.5.2 The RADIALL Component Number

Each component shall the RADIALL Component Number which shall be constituted and marked as follows :

RADIALL Reference Number R 125.330.101 X

4.5.3 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification N° 21700.

4.5.4 Marking of Small Components

When it is considered that the component is too small to accomodate the marking as specified above, as much as space permits shall be marked. The order of precedence shall be as follows :

- Traceability information
- RADIALL component number

The marking information in full shall accompany each component in its primary package.

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4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ± 3°C.

4.6.2 Electrical Measurements at High and Low Temperatures (Table 3)

Not applicable.

4.6.3 Circuits for Electrical Measurements

Not applicable.

4.7 BURN-IN TEST (TABLES 4 AND 5)

Not applicable.

Table 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

N°	CHARACTERISTICS	SYMBOL	SPEC.AND/OR TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN	MAX	
1	Insulation Resistance	Ri	RADIALL RAD-GEN-CONN-001 Para. 9.1	500 Vdc	5000	-	MΩ
2	Dielectric Withstanding Voltage Leakage Current	I_1	RADIALL RAD-GEN-CONN-001 Para. 9.2	Per Dielectric Withstanding Voltage in Technical Data Sheet	-	2.0	mA

Table 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES (Not applicable)

Not applicable.

Tables 4 and 5 – BURN-IN TEST (Not applicable)

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS

4.8.1 Measurements and Inspections on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 6 of this specification. Unless otherwise stated, the measurements shall be performed at T_{amb} = +22 ± 3°C.

4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests

Not applicable.

4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured on completion of endurance tests are scheduled in Table 6 of this specification. Unless otherwise stated, the measurements shall be performed at T_{amb} = +22 ± 3°C.

4.8.4 Conditions for Operating Life Tests (Part of Endurance Testing)

Not applicable.

4.8.5 Electrical Circuits for Operating Life Tests

Not applicable.

4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in Section 9 of RADIALL Generic Specification RAD-GEN-CONN-001. The conditions for high temperature storage shall be maximum operating temperature as specified in technical data sheet.

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Table 6 – MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS

No	RADIALL GENERIC SPÉCIFICATION RAD -GEN-CONN- 001		MEASUREMENTS AND INSPECTION		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL & ENDURANCE TEST (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Contact resistance	Para. 9.9	Contact resistance	Centre Contact Shell Hermetic Centre Contact		- - -	3.0 2.0 10	mΩ mΩ mΩ
02	Vibration	Para 9.10	Full Engagement Contact Resistance Visual Examination	Centre Contact .		-	3.0	mΩ
03	Shock or Bump	Para 9.11	Full Engagement Contact Resistance Visual Examination	Centre Contact		-	3.0	mΩ
04	Rapid Change of Temperature	Para 9.12	Contact Resistance Dielect. Withstanding Volt. Leakage Current Visual Examination	Centre Contact Technical Data Sheet	 I_1	- -	3.0 2.0	mΩ mA
05	Climatic sequence	Para 9.13	Dielect. Withstanding Volt. At Low Pressure (44 mb) Insulation Resistance Dielect. Withstanding Volt. Leakage Current External Visual Inspection	Table 1 (b) After Damp Heat (Within 1 to 24 Hrs recovery) : Table 2 Item 1 Technical Data Sheet RAD-GEN-CONN-001 para. 9.8	 R_i I_1	No breakdown or flashover 5000 	 - 2.0	 MΩ mA
06	Cable Retention Force	Para's 9.14 and 4.3.4 of this spec.	Continuity					
07	Coupling Proof Torque	Para 9.4	Interface Dimensions Visual Examination			Figure 2(a)		
08	Marking / Unmating Forces	Para 9.5	Torque	Para. 4.3.5		-	24	N.cm
09	Seal Test	Para 9.7	Hermeticity Leakage External Visual Inspection	If applicable As Applicable RAD-GEN-CONN-001 para. 9.8		- No Bubble	$1*10^{-8}$	Cm^3/s
10	Cabling and Crimping Capability	Para 9.15	Visual Examination Dimension Insulation Resistance Dielect. Withstanding Volt. Leakage Current	RAD-GEN-CONN-001 para. 9.15 RAD-GEN-CONN-001 para. 9.15 Table 2 Item 1 Technical Data sheet	 R_i I_1	 Fig.2(a) & technical data sheet 5000 	 - 2.0	 MΩ mA
11	VSWR or Reflection Coefficient	Para 9.16	VSWR	RAD-GEN-CONN-001 Para. 9.16		Technical Data Sheet		
12	Corona Level	Para 9.17	Corona	RAD-GEN-CONN-001 Para. 9.17		Table 1 (b)		

Notes:

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.

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TABLE 6 – MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS

No	RADIALL GENERIC SPÉCIFICATION RAD -GEN-CONN- 001		MEASUREMENTS AND INSPECTION		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL & ENDURANCE TEST (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
13	Endurance	Para's 9.18 and 4.3.6 of this spec	Mating /Unmating forces	Para. 4.3.5		-	24	N.cm
			Contact resistance	Centre contact		-	4.0	mΩ
				Shell		-	3.0	mΩ
				Hermetic centre Contact		-	12	mΩ
			Visual examination					
14	RF Insertion-Loss	Para.9.19	Insertion Loss	RAD-GEN-CONN-001 Para.9.19		Technical Data Sheet		
15	Corrosion	Para.9.20	Visual examination		No Exposure of Base Metal			
16	Residual Magnetism	Para.9.21	Magnetism					
17	Soldering Proof	Para.9.22	Interface Dimensions			Technical Data Sheet		
			Mating / Unmating Forces	Para.4.3.5		-	24	N.cm
			Insulation resistance	Table 2 Item 1	Ri	5000	-	MΩ
			Dielect. Withstanding Volt.	Technical Data sheet				
			Leakage Current		I_1		2.0	mA
			Contact Resistance	Centre contact		-	3.0	mΩ
				Shell		-	2.0	mΩ
				Hermetic centre Contact		-	10	mΩ
			External Visual Inspection					
18	RF Leakage	Para.9.23	Leakage			Figure 2(b)		
19	High Temperature Storage	Para.9.23 and 4.8.6 of this spec.	Mating / Unmating Forces	Para.4.3.5		-	24	N.cm
			Insulation resistance	Table 2 Item 1	Ri	5000	-	MΩ
			Dielect. Withstanding Volt.	Technical Data sheet				
			Leakage Current		I_1		2.0	mA
			Contact retention	Para 4.3.9		Para. 4.3.9		
			Visual Examination	-		-	-	
			Contact Resistance	Centre contact		-	8.0	mΩ
				Shell		-	7.5	mΩ
				Hermetic centre Contact		-	15	mΩ
			External Visual Inspection	RAD-GEN-CONN-001 Para.9.8		-	-	
20	External Visual Inspection	Para.9.8				-	-	
21	Permanence of Marking	Para.9.27				-	-	

Notes:

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.

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Table 7 - LIST OF PART NUMBERS WITH APPLICABLE POWER HANDLING CATEGORY

See the detail specification RAD-LIS-CONN-001 paragraph 2.

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