Titre / Title

RF LOADS FIXED COAXIAL DC – 40 GHz

DETAIL SPECIFICATION

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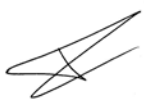
S. POIZAT	Space Project Manager	10/12/2015	
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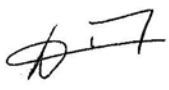
Approuvée par / Approved by C. DAVENEL	Space Quality Manager	10/12/2015	

DOCUMENTATION CHANGE NOTICE

REVISION OR ISSUE	DATE	CHANGE
1 / -	09/03/06	Initial edition
1 / A	29/06/06	Added table 6 and figure 2
1 / B	19/09/08	Added new frequency for operating life in table 4.
2 / -	25/11/08	Added interchangeability for SMA2.9 series
2 / A	29/01/09	Correction of RF leakage performance in table 6 to be coherence with RF leakage requirement on table 2. Correction of frequency markers in climatic sequence (4GHz instead of 2GHz)
2 / B	05/03/09	Correction in table 6: climatic sequence: Resistance drift in temperature is performed in DC test instead of on frequencies test. Added paragraph 5.1
2 / C	11/04/11	Changes specification for connectors: ESCC3402 instead of MIL-PRF-39012 in §8.1 and 8.2
3 / -	04/10/12	Updated to improve the VSWR limit between DC to 22GHz and the RF Leakage
3 / A	06/06/14	Updated to correct the RF leakage value in Table 6: -90dBi instead of -60dBi, and write -90dBi in column “max” instead of “min” in Table 2
3 / B	22/09/14	Corrected the Peak Power max value: 50W instead of 100W
3 / C	10/12/15	Updated with the modifications of SMA2.9 interface dimensions to be compliant with MIL STD 348B

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. SCOPE

This Detail Technical Sheet details the ratings and electrical characteristics for RF Load Fixed, 0 -40 GHz

2. APPLICABLE DOCUMENT

The following documents shall be read in conjunction with this specification:

RAD-GEN-ATCH-001:General Specification : Attenuators and Loads RF Fixed Coaxial

3. TYPE VARIANT

Variant of the basic type covered by the relevant Generic Specification are given Table 1.

Table 1: *Type variants*

	VARIANT	VSWR	VSWR
		0 ≤ F ≤ 22 GHz	22 ≤ F ≤ 31.5 GHz
Male	301	1.15	1.30
Female	302	1.15	1.30

4. MAXIMUM RATINGS

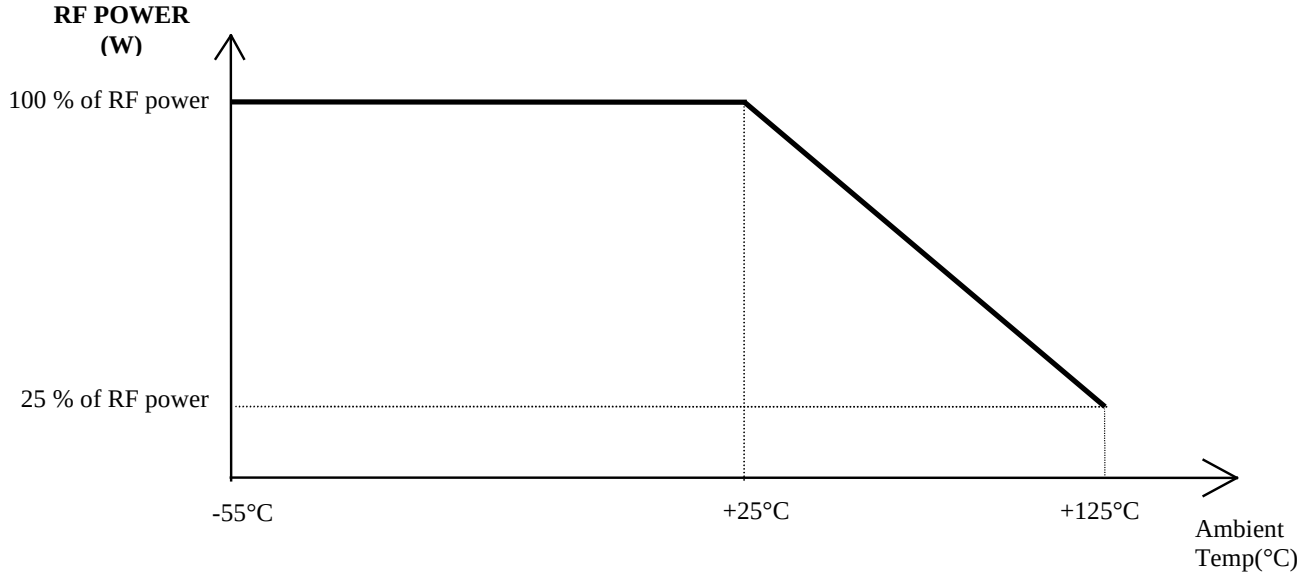
Maximum Ratings of the basic type covered by the relevant Generic Specification are given Table 2.

Table 2: *Maximum ratings*

N°	Characteristics	Symbol	Maximum Rating		Unit
			Min	Max	
1	RF Power	P	-	0.5	W (1)
2	Peak Power (at 25°C) (2)	Pp	-	50	W
3	Operating Temperature Range	T_{op}	-55	+125	°C
4	Storage Temperature Range	T_{stg}	-55	+125	°C
5	Frequency Range	F	0	40	GHz
6	Impedance	Z	47.5	52.5	Ohms
7	RF Leakage (3)	E	-	-90	dBi
8	Coupling Nut Torque	Tq	80	120	N.cm

NOTES:
(1) See Figure 1.
(2) Duration 1µs, cyclic rate 1m
(3) Between DC to 31.5GHz only.

FIGURE 1 – *Parameter Derating Information*



RF POWER VERSUS TEMPERATURE

5. ELECTRICAL MEASUREMENTS

The parameters to be measured at room temperature are scheduled in Table 1. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ± 3 °C.
The measurement shall be performed with six points of frequency :
4GHz – 8GHz – 12.4 GHz – 18GHz - 22 GHz and 31.5GHz

5.1. HIGH AND LOW TEMPERATURE ELECTRICAL MEASUREMENTS

Characteristics	Symbol	Test Method and Conditions	Maximum Rating		Unit
		(Note 1)	Min	Max	
Temperature coefficient of Resistance	TC_R	Test current <50mA DC to 2 KHz max	-	3 x 10^{-4}	Ω/Ω/°C

Note 1: Measurements shall be performed during LAT or Qualification test

6. CONNECTORS REPEATABILTY:

Not applicable for loads.

7. OPERATING LIFE

7.1. PARAMETER DRIFT VALUES

The parameter drift values applicable to burn-in are specified in Table 3 of this specification. Unless otherwise stated, measurements shall be performed at T_{amb} = +22 ± 3 °C. The parameter drift value (Δ) applicable to the parameters scheduled, shall not be exceeded. In additional to these drift value requirements for a given parameter, the appropriate limit value specified in Table 1 shall not be exceeded.

7.2. CONDITIONS FOR OPERATING LIFE

The condition for Operating life are given in Table 4. After test, a visual inspection shall be performed and no damage shall be appeared.

Table 3: *Parameter drift values for Operating Life*

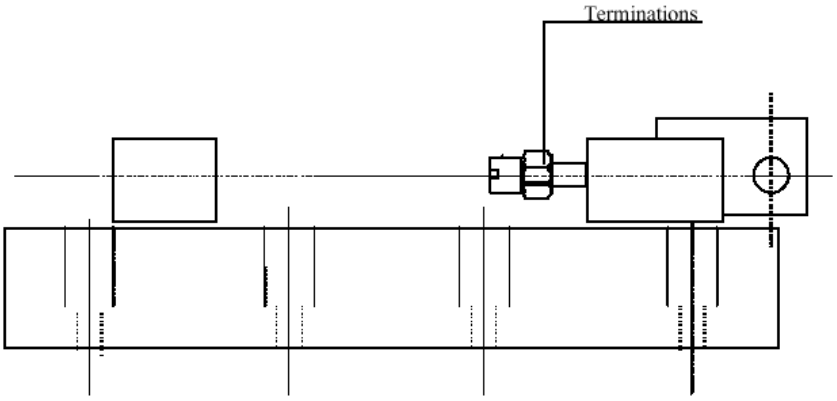
N°	Characteristics	Symbol	Test condition	Limits	Unit
1	Resistance change	ΔR	As per Table 1	250	mΩ
2	VSWR change	$\frac{\Delta VSWR}{VSWR}$	As per Table 1	±2	%

Table 4: *Conditions for Operating Life testing*

N°	Characteristics	Symbol	Limits	Unit	Note
1	RF Power	P_{in}	0.5	W	-
2	Frequency	F	DC(1) or 10 or 18	GHz	-
3	Ambient Temperature	T_{amb}	+25	°C	-

NOTES: (1) The dissipated power at DC or in frequency is the same.

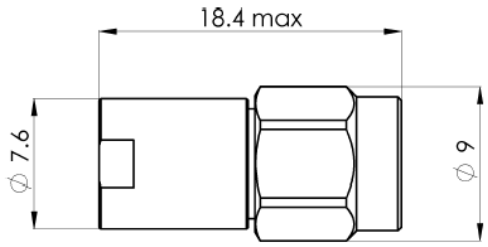
FIGURE 2 – *Circuit for electrical measurement*



Schematic for Vibration and Shock or Bump test

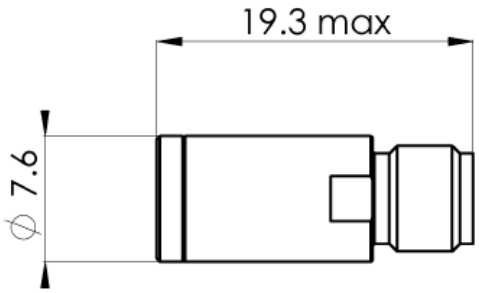
8. MECHANICAL DIMENSION

8.1. DIMENSION FOR VARIANT 301



General Tolerance : ± 0.5 mm
Connectors: SMA2.9 male/Female per ESCC3402
Weight: ≤ 5.5 grams

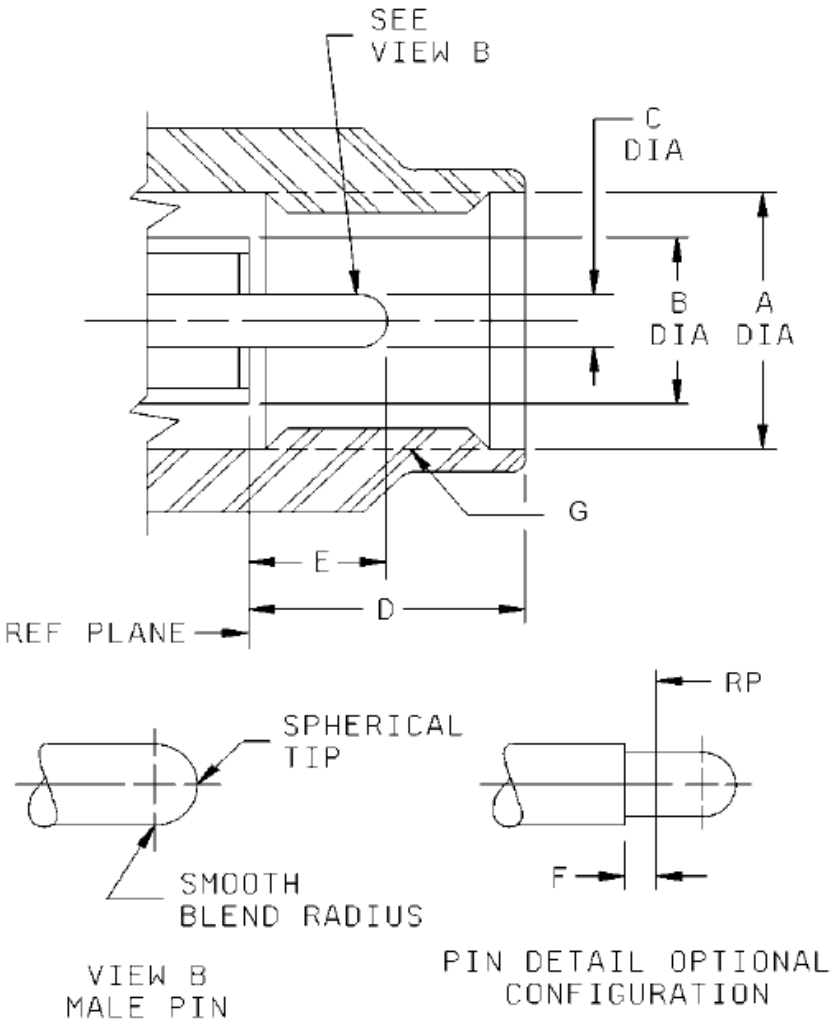
8.2. DIMENSION FOR VARIANT 302



General Tolerance : ± 0.5 mm
Connectors: SMA2.9 male/Female per ESCC3402
Weight: ≤ 5.5 grams

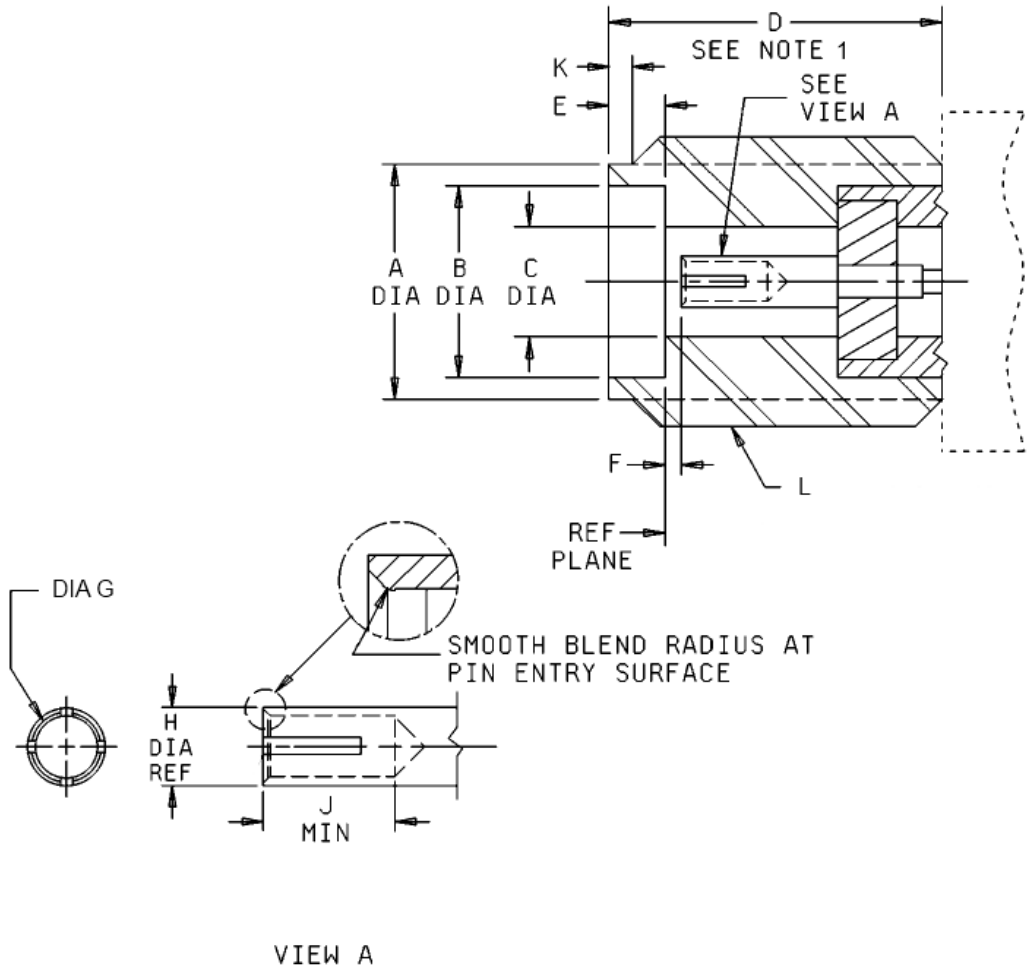
8.3. INTERCHANGEABILITY FOR SMA 2.9 SERIES

8.3.1. SMA 2.9 jack



Symbol	Millimeters		notes
	min	max	
∅A	6.60	6.70	
∅B	4.54	4.58	
∅C	0.92	0.94	
D	2.63	3.25	
E	1.40	1.65	
F	0.00	0.08	
G	¼ 36 UNS2B		

8.3.2. SMA 2.9 plug



VIEW A

Symbol	Millimeters		notes
	min	max	
∅A	5.30	5.40	
∅B	4.60	4.64	
∅C	2.905	2.945	
D	4.85	5.15	
E	1.88	1.98	
F	0.00	0.08	
∅G	For pin 0.90 to 0.94mm		
∅H	1.26	1.28	
J	2.80	3.20	
K	0.65	0.95	
L	¼ 36 UNS2A		

Note 1: Clearance for mating connector coupling nut

Table 5: *Radiall Part Number*

Variant	Radiall Reference	Designation
301	R4042 80 651	RF fixed load SMA2.9 DC - 40GHz - Male
302	R4042 85 651	RF fixed load SMA2.9 DC - 40GHz - Female

Table 6 : *Measurements and inspections on completion of environment and endurance tests*

N°	Radiall Generic Spec. RAD-GEN-ATCH-001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Test (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
01	Vibration	Para. 13.2.6 and figure 2 of this specification	**Initial measurements** Impedance VSWR **During Last Cycle** Intermittent contact **Final measurement** Visual Examination Resistance change VSWR change	 Table 2 Table 2 >0.5ms No open or short circuits No damage Table 3 Table 3	 Z VSWR - - ΔR ΔVSWR	 Record values Record values - - - –2	 250 +2	 Ω - - - mΩ %
02	Shock or Bump	Para 13.2.7 and figure 2 of this specification	**Initial measurements** Impedance VSWR **Final measurement** Visual Examination Resistance change VSWR change	 Table 2 Table 2 No damage Table 3 Table 3	 Z VSWR - ΔR ΔVSWR	 Record values Record values - - –2	 250 +2	 Ω - - mΩ %
03	Rapid Change of Temperature	Para 13.2.8	**Initial measurements** Impedance VSWR **Final measurement** Visual Examination Resistance change VSWR change	 Table 2 Table 2 After recovery time of 24±2hrs No damage Table 3 Table 3	 Z VSWR - ΔR ΔVSWR	 Record values Record values - - –2	 250 +2	 Ω - - mΩ %
04	Climatic sequence	Para 13.2.9 Dry heat : para 13.2.9.1 Cold heat : para 13.2.9.3	 Resistance drift (2) Resistance drift (2) **Final measurement** Visual Examination Resistance change VSWR change	 At +125°C, At -55°C, After recovery time b etween 1 hr and 24 hrs No damage Table 3 Table 3	 TC_R TC_R - ΔR ΔVSWR	 - -2	 3.10^{-4} 3.10^{-4} 250 +2	 Ω/Ω/°C Ω/Ω/°C - mΩ %
05	Operating Life	Para 13.2.12 and table 3 and 4 of this specification	**Initial measurements** Impedance VSWR **Final measurement** Visual Examination Resistance change VSWR change	 Table 2 Table 2 No damage Table 3 Table 3	 Z VSWR - ΔR ΔVSWR	 Record values Record values - - –2	 250 +2	 Ω - - mΩ %
06	RF leakage	Para 13.2.13	**RF leakage**	Table 2	E	-	-90	dBi
07	Peak power	Para 13.2.14 and table 2 of this specification	**Final measurement** Impedance	 Table 2	 Z	Table 1		
08	Permanence of marking	Para 13.2.16	**Final measurement** Visual Examination	 No corrosion or obliteration of marking	-	-		-

Notes :

(1) The tests in this table refer to either para 11 and 12 and shall be used as applicable

(2) Measurement to be made on 2 samples only.