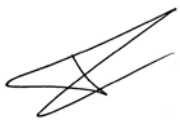
Titre / Title

RF ATTENUATORS COAXIAL DC – 22 GHz

DETAIL SPECIFICATION

Rédigé par / Written by	**Responsabilité / Responsibility**	**Date**	**Signature**
S. POIZAT	Space Project Manager	16/08/2016	
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DOCUMENTATION CHANGE NOTICE

REVISION OR ISSUE	DATE	CHANGE
1/- 1/A 1 / B	March 8th, 2013 April 25th, 2013 August 16th, 2016	Initial issue: Updated Table 1 for flatness: xxdB/1GHz instead of xxdB/0.5GHz Updated note 3 of Table 2 and replace “Attenuation drift” by “Temperature coefficient of attenuation” in Table 6, climatic sequence

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. SCOPE

This Detail Technical Sheet details the ratings and electrical characteristics for RF Attenuators, Coaxial 0-30 dB, 0 -22 GHz

2. APPLICABLE DOCUMENT

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

RAD-GEN-ATCH-002: 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*

Var. N°	Attenuation	Maximum Input Power	Attenuation tolerance Vs frequency		Flatness	VSWR
	dB	W	0 < F ≤ 18 GHz dB (±)	18 < F ≤ 22 GHz dB (±)	dB	
01	0 (DC shunt)	10	0.3	0.4		
02	0.5	10	0.3	0.4		
03	1	7	0.3	0.4		
04	1.5	5.5	0.3	0.4		
05	2	4.5	0.3	0.4		
-----	----------		----------	----------		
06	2.5	4	0.3	0.4	F ≤ 13 GHz	
07	3	3.5	0.3	0.4	0.05 dB/1	
08	3.5	3.5	0.3	0.4	GHz	
09	4	3	0.3	0.4		
10	4.5	3	0.3	0.4		0 < F ≤ 18.4 GHz
11	5	2.5	0.3	0.4		< 1.20
12	5.5	2.5	0.3	0.4		
13	6	2.5	0.3	0.4		
14	6.5	2.5	0.3	0.4		
-------	----------		----------	----------	F > 13 GHz	
15	7	2	0.4	0.5	0.07 dB/1	
16	7.5	2	0.4	0.5	GHz	
17	8	2	0.4	0.5		
18	8.5	2	0.4	0.5		18.4 < F < 22GHz
19	9	2	0.4	0.5		< 1.25
20	9.5	2	0.4	0.5		
21	10	2	0.4	0.5		
-------	----------		----------	----------	----------	
22	11	2	0.5	0.6		
23	12	2	0.5	0.6		
24	13	2	0.5	0.6		
25	14	2	0.5	0.6	F ≤ 13 GHz	
-------	----------		----------	----------	0.07 dB/1	
26	15	2	0.5	0.6	GHz	
27	16	2	0.5	0.6		
28	17	2	0.5	0.6		
29	18	2	0.5	0.6	F > 13 GHz	
30	19	2	0.5	0.6	0.1 dB/1 GHz	
31	20	2	0.5	0.6		

4. MAXIMUM RATINGS

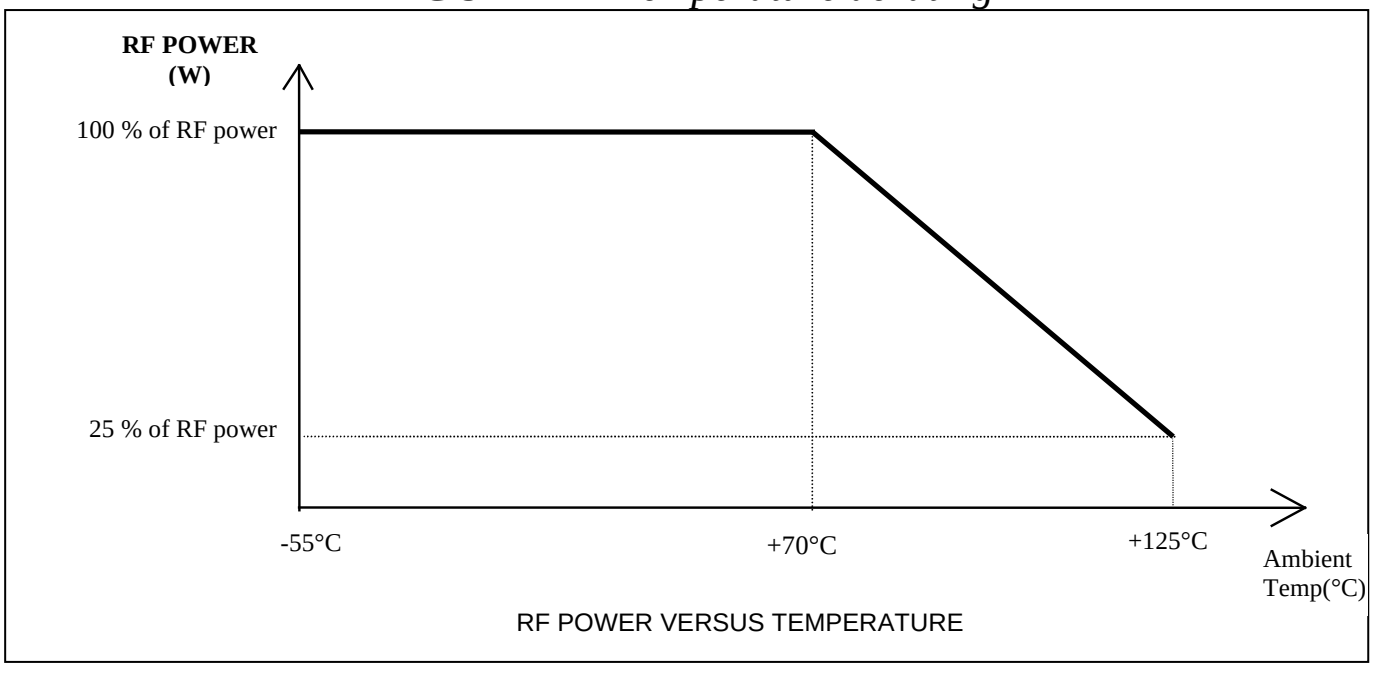
Maximum Ratings of the basic type covered by the relevant Generic Specification are given Table 2.

Table 2: *Maximum ratings*

N°	Characteristics	Symbol	Maximum Rating		Unit	Comment
			Min	Max		
1	RF Power dissipation (1)	P	-	2	W(2)	-
2	Peak Power (at 25°C) (3)	Pp	-	100	W	-
3	Operating Temperature Range	T_{op}	-55	+125	°C	-
4	Storage Temperature Range	T_{stg}	-55	+125	°C	-
5	Frequency Range	F	0	22	GHz	-
6	Impedance	Z	47.5	52.5	Ω	-
7	DC impedance		4	10	KΩ	between coaxial line and body
8	RF Leakage	E	-85	-	dBi	-
9	Coupling Nut Torque	Tq	80	120	N.cm	-
10	Glitches		0	0.05	dB	

NOTES: (1) See Table 1 for RF input Power value vs attenuation
(2) See Figure 1.
(3) Duration 1µs, 1% duty cycle

FIGURE 1 – *Temperature derating*



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 five points of frequency:
4GHz – 8GHz – 12.4 GHz – 18GHz and 22 GHz.

6. CONNECTORS REPEATABILTY:

The test shall be performed according to the following conditions:

- Attenuation shall be recorded at three points of frequency : 4GHz – 12.4GHz and 22GHz
- Ten complete engagements and separations shall be performed, both end separately
- Attenuators shall be rotated through the full 360° with an increment of approximately 36° for each engagement.
- Attenuation drift value : ±0.05 dB
- Side thrust is not permitted during the test
- Cleaning of connetcors or reshaping of contacts was not permitted during the sequence

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 perfromed 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	Attenuation Drift	ΔAtt	As per Table 1	±0.10 or ±1 (1)	dB %

NOTES: (1) Whichever is greater, % of nominal attenuation

Table 4: *Conditions for Operating Life testing*

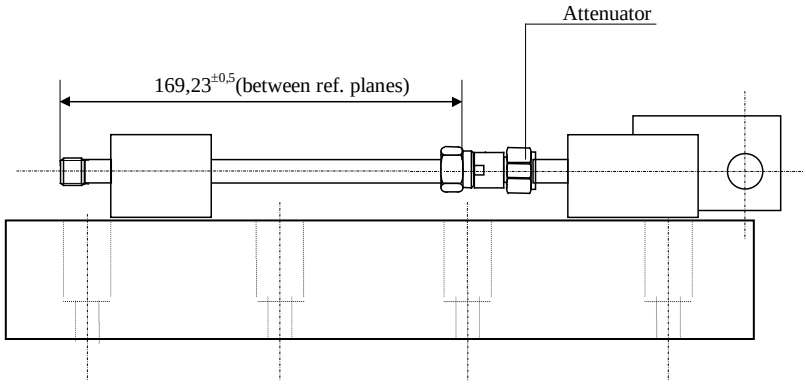
N°	Characteristics	Symbol	Limits	Unit	Note
1	RF Power	P_{in}	See Table 1	W	
2	Frequency	F	DC(1) or 10 or 18 10 or 18	GHz GHz	For attenuation ≥ 1dB For attenuation < 1dB
3	Ambient Temperature	T_{amb}	+25	°C	-

NOTES: (1) The response of the attenuation is flat over the frequency bandwidth.
The dissipated power at DC or in frequency is the same.

Test mounting for Operating life:

The DUT (attenuator under test) shall be mounted directly on the Hybrid coupler without SR cable between the coupler and the DUT.

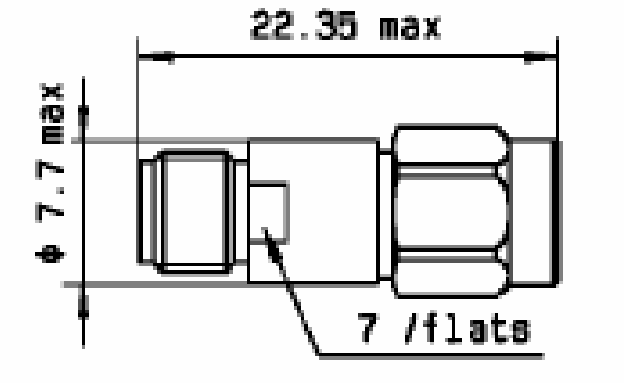
FIGURE 2 – *Circuit for electrical measurement*



Schematic for Vibration and Shock or Bump test

8. MECHANICAL DIMENSION

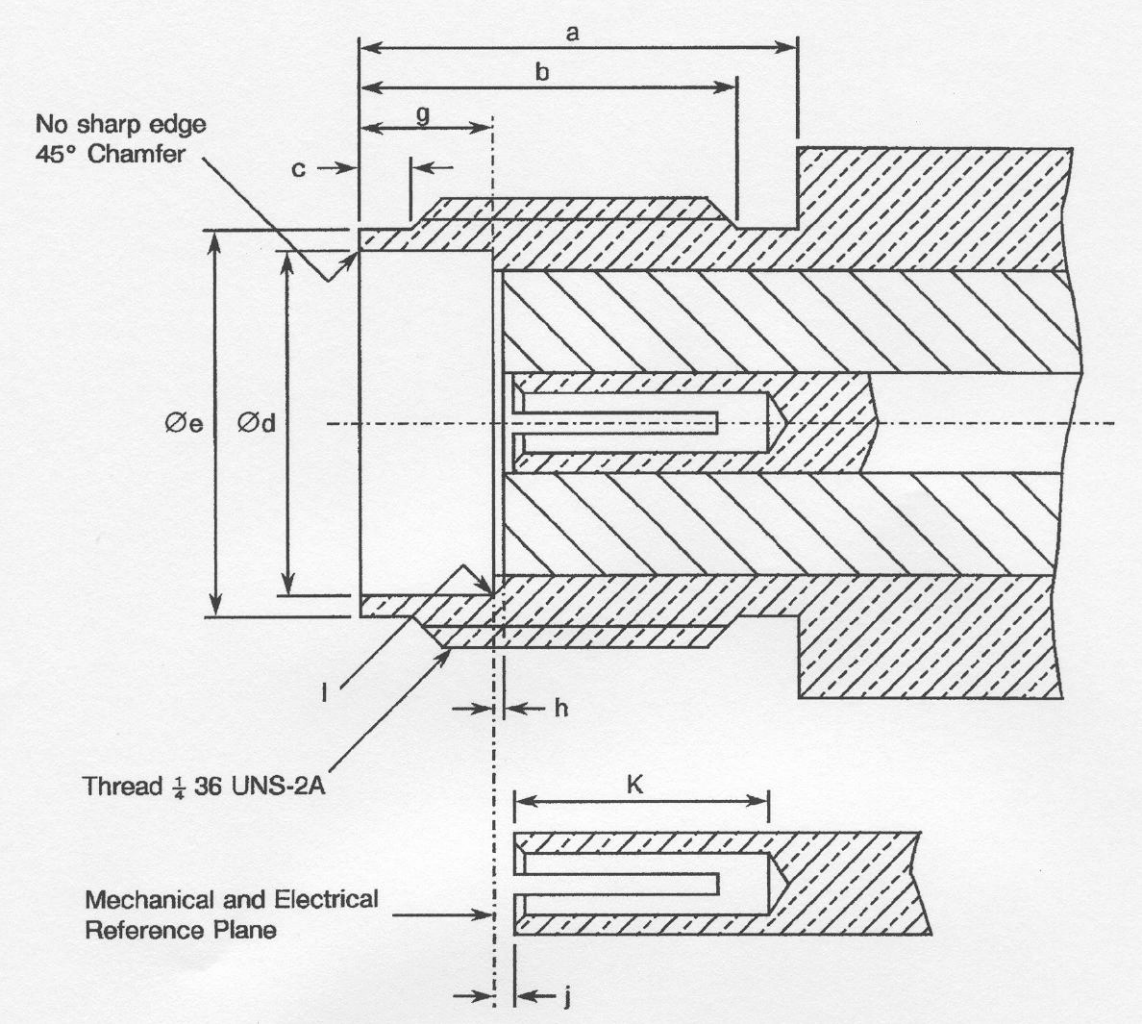
8.1. DIMENSION FOR VARIANTS 01 TO 31



Connectors: SMA male/Female per ESCC3402
Weight: ≤ 5 grams

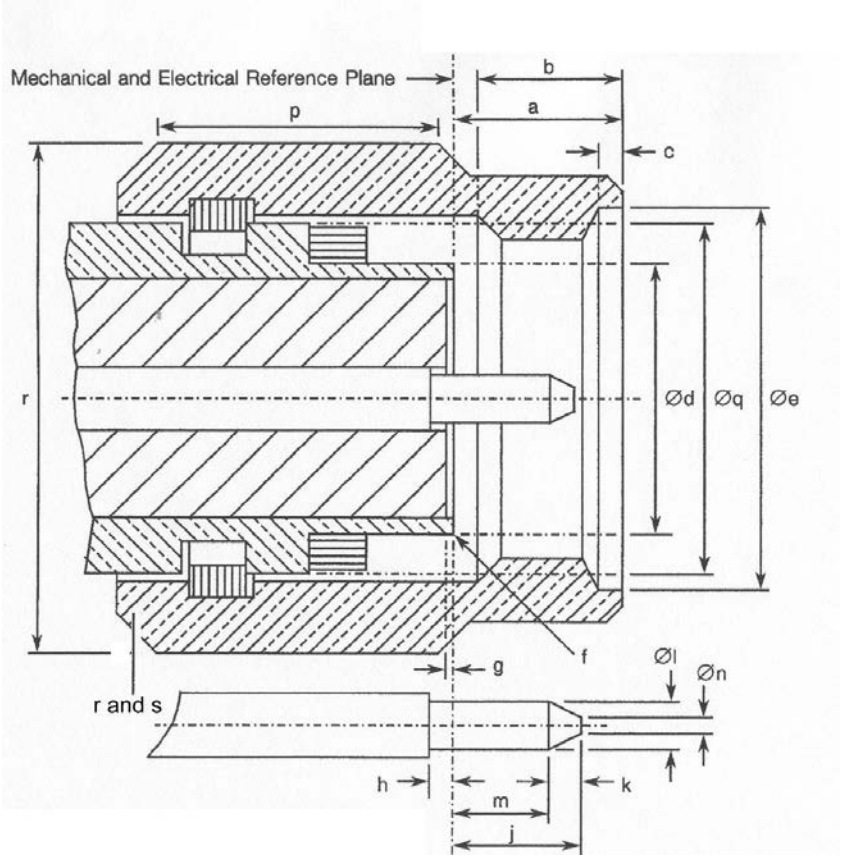
8.2. INTERCHANGEABILITY FOR SMA

8.2.1. SMA jack



Symbol	Millimetres min	max	notes
a	5.54		
b	4.32		
c	0.38	1.14	
∅d	4.597	4.67	
∅e	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

8.2.2. SMA plug



Symbol	Millimetres min	max	notes
a		3.43	
b	2.54		
c	0.38	1.14	
∅d		0.4592	
∅e	6.35		
f		008	Radius or 45° Chamfer
g	0.00	0.20	
h	0.00	0.25	
j		2.54	
k	0.38		
∅l	0.90	9.94	
m	1.27		
∅n		0.38	
p	3.17		
∅q			N/A
r	7.84	8.00	Hexagonal on flat
s		9.20	

Table 5: *Radiall Part Number*

Variant	Radiall Reference	Designation
01	R413800600	Attenuator SMA DC - 22GHz 0 dB
02	R413801600	Attenuator SMA DC - 22GHz 0.5 dB
03	R413802600	Attenuator SMA DC - 22GHz 1 dB
04	R413803600	Attenuator SMA DC - 22GHz 1.5 dB
05	R413804600	Attenuator SMA DC - 22GHz 2 dB
06	R413805600	Attenuator SMA DC - 22GHz 2.5 dB
07	R413806600	Attenuator SMA DC - 22GHz 3 dB
08	R413807600	Attenuator SMA DC - 22GHz 3.5 dB
09	R413808600	Attenuator SMA DC - 22GHz 4 dB
10	R413809600	Attenuator SMA DC - 22GHz 4.5 dB
11	R413810600	Attenuator SMA DC - 22GHz 5 dB
12	R413811600	Attenuator SMA DC - 22GHz 5.5 dB
13	R413812600	Attenuator SMA DC - 22GHz 6 dB
14	R413813600	Attenuator SMA DC - 22GHz 6.5 dB
15	R413814600	Attenuator SMA DC - 22GHz 7 dB
16	R413815600	Attenuator SMA DC - 22GHz 7.5 dB
17	R413816600	Attenuator SMA DC - 22GHz 8 dB
18	R413817600	Attenuator SMA DC - 22GHz 8.5 dB
19	R413818600	Attenuator SMA DC - 22GHz 9 dB
20	R413819600	Attenuator SMA DC - 22GHz 9.5 dB
21	R413820600	Attenuator SMA DC - 22GHz 10 dB
22	R413822600	Attenuator SMA DC - 22GHz 11 dB
23	R413824600	Attenuator SMA DC - 22GHz 12 dB
24	R413826600	Attenuator SMA DC - 22GHz 13 dB
25	R413828600	Attenuator SMA DC - 22GHz 14 dB
26	R413830600	Attenuator SMA DC - 22GHz 15 dB
27	R413832600	Attenuator SMA DC - 22GHz 16 dB
28	R413834600	Attenuator SMA DC - 22GHz 17 dB
29	R413836600	Attenuator SMA DC - 22GHz 18 dB
30	R413838600	Attenuator SMA DC - 22GHz 19 dB
31	R413840600	Attenuator SMA DC - 22GHz 20 dB

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

N°	Radiall Generic Spec. RAD-GEN-ATCH-002		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** Attenuation **During Last Cycle** Intermittent contact **Final measurement** Visual Examination Attenuation drift	 Table 1 >0.5ms No open or short circuits No damage Table 1	 Att - - ΔAtt	Record values - - ±0.05 ±0.5		 - - dB or %(2)
02	Shock or Bump	Para 13.2.7 and figure 2 of this specification	**Initial measurements** Attenuation **Final measurement** Visual Examination Attenuation drift	 Table 1 No damage Table 1	 Att - ΔAtt	Record values - ±0.05 ±0.5		 - dB or %(2)
03	Rapid Change of Temperature	Para 13.2.8	**Initial measurements** Attenuation **Final measurement** Visual Examination Attenuation drift	 Table 1 After recovery time of 24±2hrs No damage Table 1	 Att - ΔAtt	Record values - ±0.05 ±0.5		 - dB or %(2)
04	Climatic sequence	Para 13.2.9 Dry heat : para 13.2.9.1 Cold heat : para 13.2.9.3	 Temp coeff of attenaution Temp coeff of attenaution **Final measurement** Visual Examination Attenuation drift	 At +125°C, Freq : 4 –12.4 and 22GHz At -55°C, Freq : 4 –12.4 and 22GHz After recovery time between 1 hr and 24 hrs No damage Table 1	 ΔAtt ΔAtt - ΔAtt	 -0.1 -1.0	 7.10^{-4}(3) 7.10^{-4}(3) +0.1 +1.0	 dB/dB/°C dB/dB/°C dB or %(2)
05	Coupling proof torque	Para 13.2.10	Interface dimensions	Para 13.2.11	-	Figure of para 13.2.11		-
06	Mating and unmating forces	Para 13.2.11	Torque	Para 13.2.11	-	-	24	N.cm
07	Connector Repeatability	Para 6 of this specification	Attenuation drift	Table 1	ΔAtt	±0.05 ±0.5		dB or %(2)
08	Operating Life	Para 13.2.12 and table 3 and 4 of this specification	**Initial measurements** Attenuation **Final measurement** Visual Examination Attenuation drift	 Table 1 No damage Table 1	 Att - ΔAtt	Record values - ±0.10 ±1		 - dB or %(2)
09	RF leakage	Para 13.2.13	**RF leakage**	Para 13.2.13	E	-	-85	DB
10	Peak power	Para 13.2.14 and table 2 of this specification	**Final measurement** Attenuation	 Table 1	 Att	Table 1		
11	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) Whichever is greater

(3) or ±0.1dB whichever is greater.

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