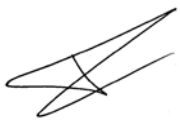
Titre / Title

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

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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		
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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		
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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

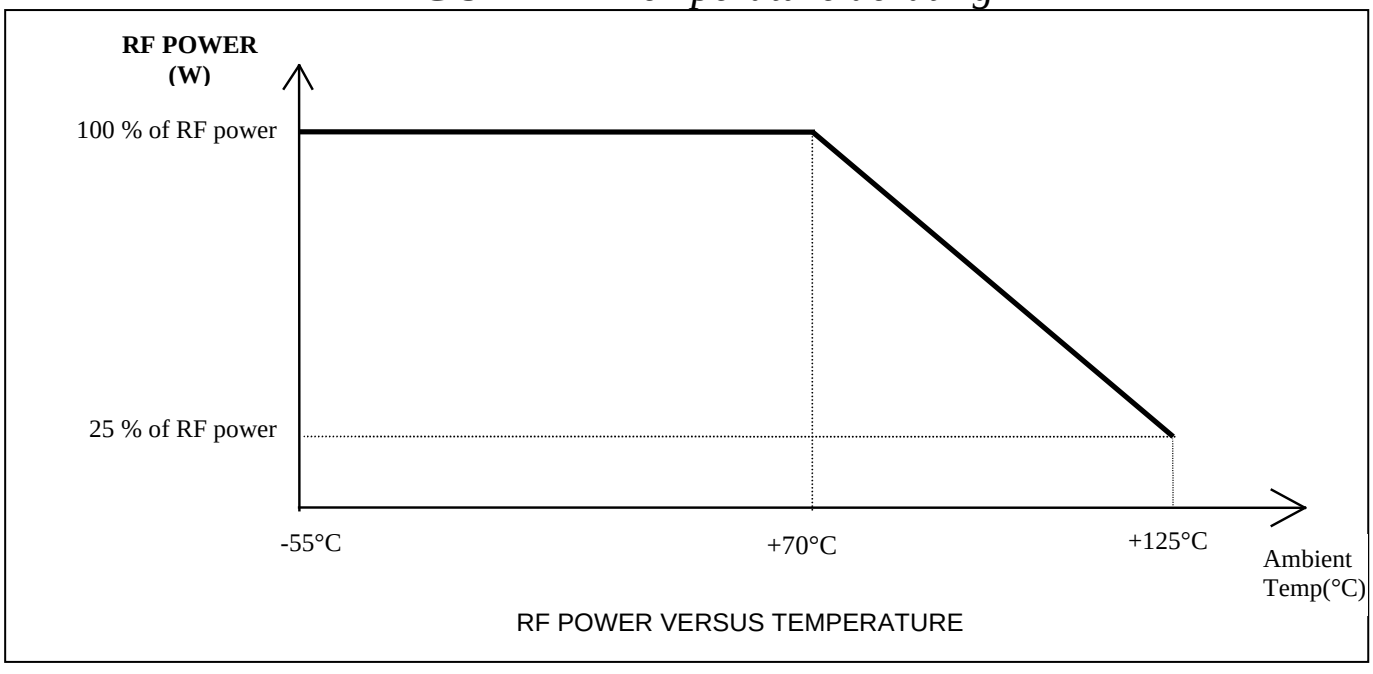
Maximum Ratings of the basic type covered by the relevant Generic Specification are given Table 2.

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*

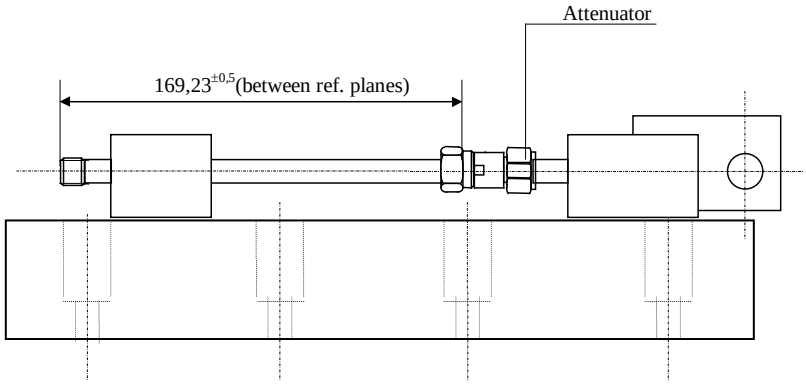
N°	Characteristics	Symbol	Limits	Unit	Note
1	RF Power	P_{in}	See Table 1	W	
2	Frequency	F	DC(1) or 10 or 18 10 or 18	GHz GHz	For attenuation ≥ 1dB For attenuation < 1dB
3	Ambient Temperature	T_{amb}	+25	°C	-

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.

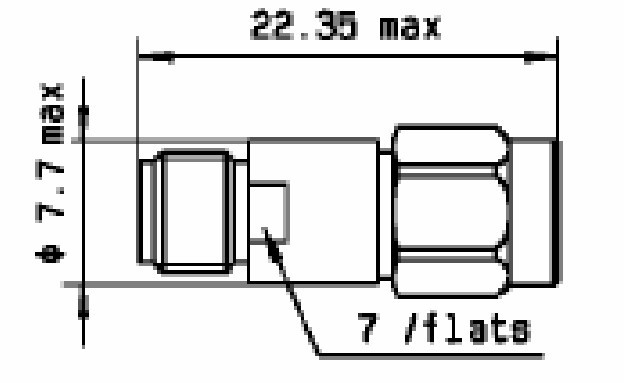
FIGURE 2 – *Circuit for electrical measurement*



Schematic for Vibration and Shock or Bump test

8. MECHANICAL DIMENSION

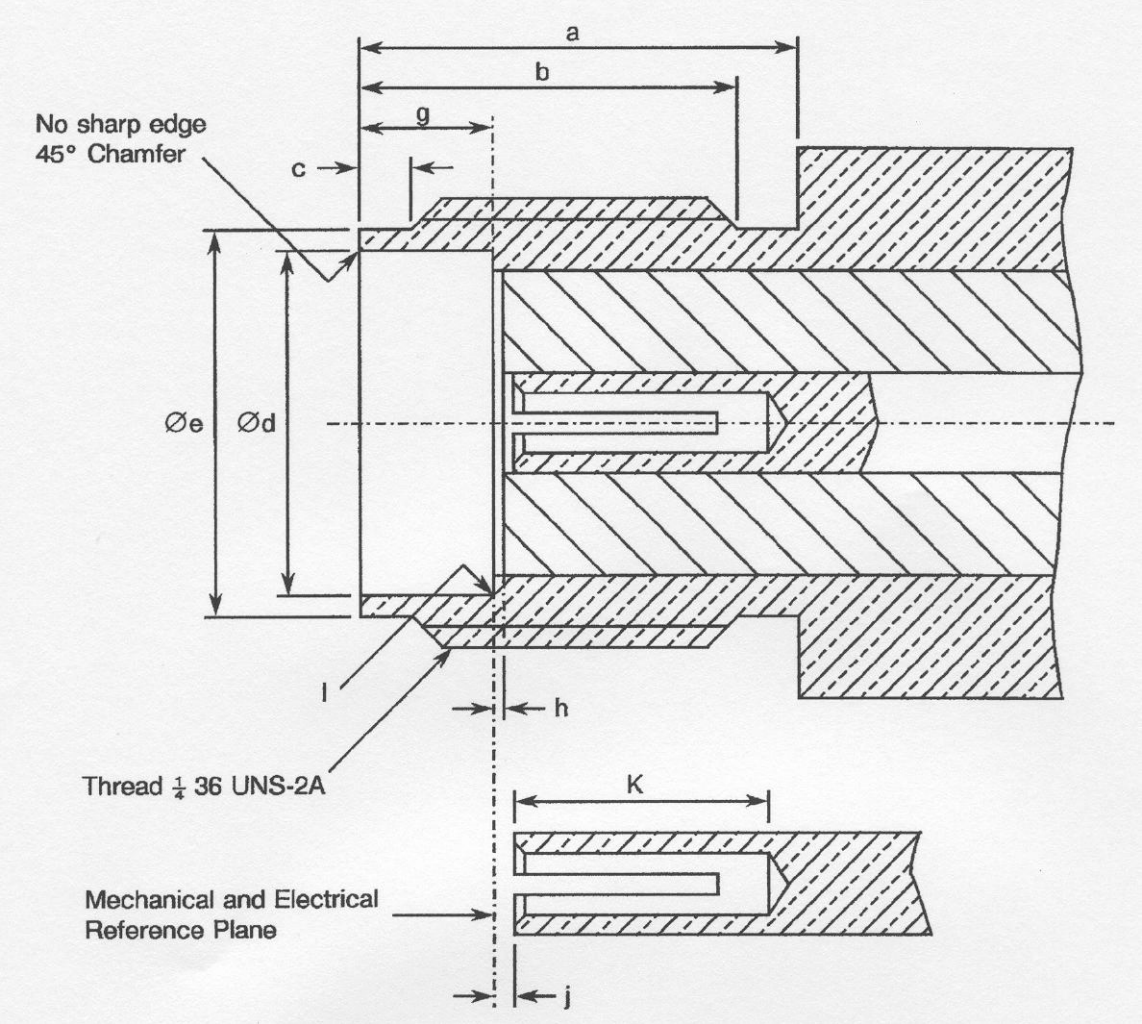
8.1. DIMENSION FOR VARIANTS 01 TO 31



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

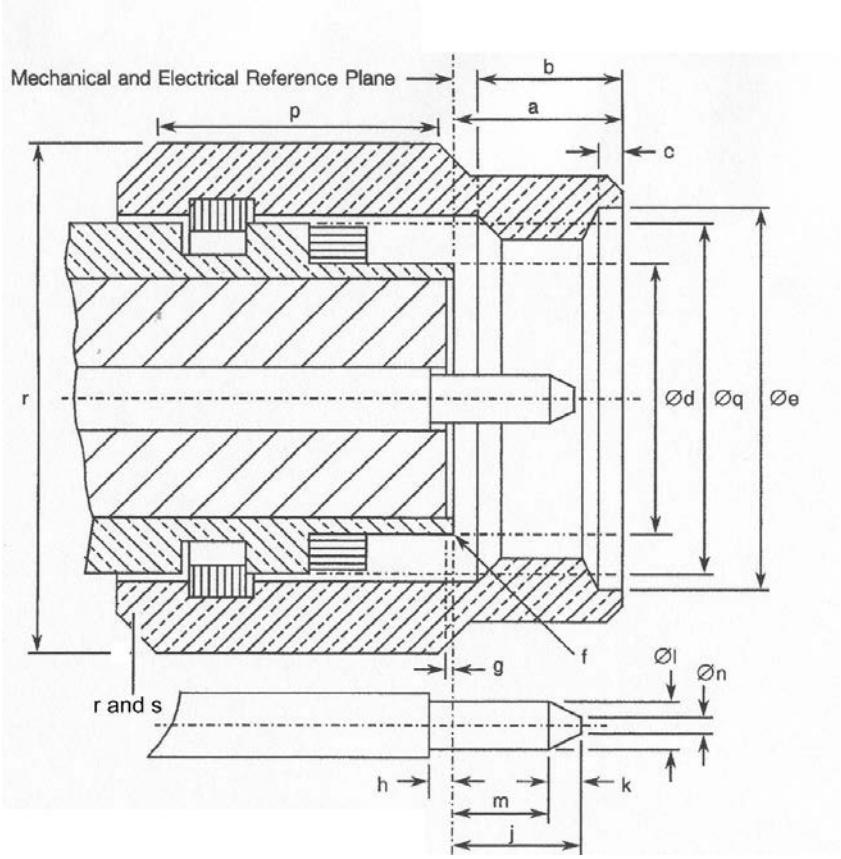
8.2. INTERCHANGEABILITY FOR SMA

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.