european space agency
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FIXED COAXIAL LOADS, 0 - 18GHz

ESA/SCC Detail Specification No. 3403/004

space components
coordination group

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		SCCG Chairman	ESA Director General or his Deputy
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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
'A'	Aug. '89	P1. Cover page		None
		P2. DCN		None
		P3. Table of Contents	: Para. 1.2 Title amended	22343
		P4. Table 1(a) & 1(b)	: Title amended	22343
		P5. Para. 1.2	: Paragraph added and subsequent paragraphs renumbered	22343
		P6. Table 1(a)	: Added	22343
		Table 1	: Title renumbered to "1(b)"	22343
		P11. Para. 4.5.2	: Reference to type variant added	22343
			: Deletion of plating identification because of DCR 22343	None
		This document has been transferred from hardcopy to electronic format. The content is unchanged but minor differences in presentation exist.		

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APPENDICES (Applicable to specific Manufacturers only)

None.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for 0 - 18 GHz Coaxial Loads.

It shall be read in conjunction with ESA/SCC Generic Specification No. 3403, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic component covered by this specification are given in Table 1(a).

1.3 MAXIMUM RATINGS

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

1.4 PARAMETER DERATING INFORMATION

The derating information applicable to the loads specified herein is given in Figure 1.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the loads specified herein are shown in Figure 2.

2. APPLICABLE DOCUMENTS

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

(a) ESA/SCC Generic Specification No. 3403, Attenuators and Loads, RF, Fixed, Coaxial.

(b) MIL-STD-202, Test Methods for Electronic and Electrical Component Parts.

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 No. 21300 shall apply.

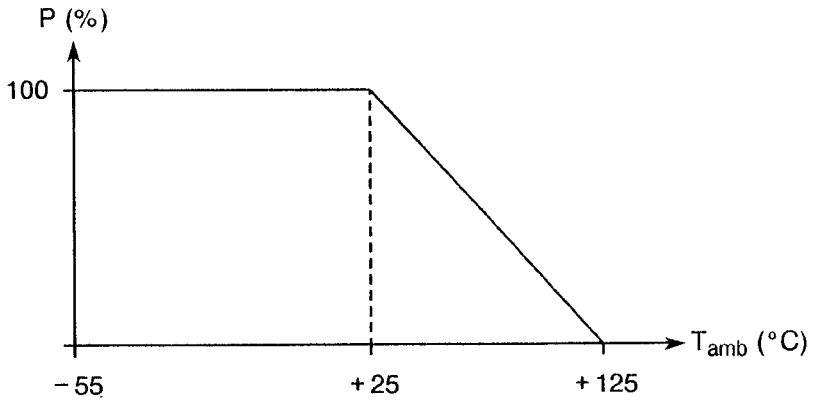
TABLE 1(a) - TYPE VARIANTS

Variant	Body Plating/Material	Para. Ref.
01	Gold plate, copper underplate	4.4.1
02	Gold plate, nickel underplate	4.4.2
03	Amagnetic stainless steel	4.4.3

TABLE 1(b) - MAXIMUM RATINGS

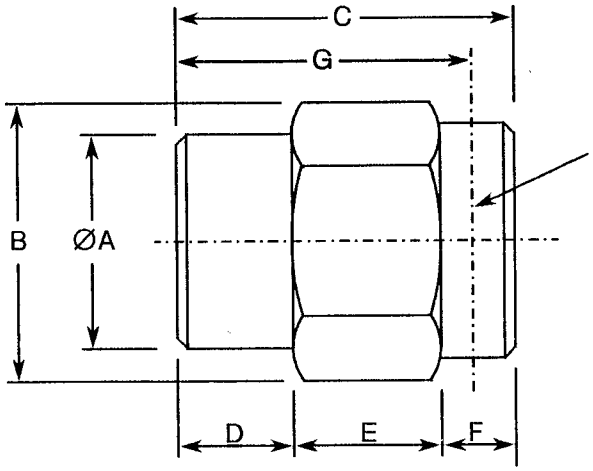
No.	Characteristics	Symbol	Maximum Ratings	Unit	Remarks
1	Input Power	P_{in}	Recommended : 1.0 Rated : 2.0	W	Load mounted on square flange SMA connector
2	Peak Power	P_p	200	W	For 1.0µs
3	Operating Temperature Range	T_{op}	−55 to +125	°C	T_{amb}
4	Storage Temperature Range	T_{stg}	−55 to +125	°C	
5	Frequency Range	f	0 to 18	GHz	
6	Impedance	Z	50 ± 2	Ω	
7	RF Leakage	-	− [80 dB − F (GHz)]	dB	

FIGURE 1 - PARAMETER DERATING INFORMATION



Power Derating versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



SYMBOL	MILLIMETRES	
	MIN.	MAX.
ØA	6.2	6.4
B	7.8	8.0
C	-	12.0
D	-	3.5
E	-	5.9
F	-	2.6
G	-	10.5

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	Spec. and Test Method	Test Conditions	Limits		Unit
					Min.	Max.	
1	VSWR	-	ESA/SCC Gen. Spec. No. 3403	Para. 9.6.1 Up to 15GHz	-	1.05 + 0.0125 F(GHz)	-
				15 - 18 GHz	-	1.3	
2	Resistance	-	ESA/SCC Gen. Spec. No. 3403	Para. 9.6.2	48	52	Ω

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	Characteristics	Symbol	Spec. and Test Method	Test Conditions	Limits		Unit
					Min.	Max.	
1	Resistance Drift (1)	-	ESA/SCC Gen. Spec. No. 3403	Para. 9.6.2 Meas. points: −55 and +125°C	-	3.10^{-4}	Ω/Ω/°C

NOTES

1. Measurement to be made on 2 samples only. If 1 failure occurs, the complete lot shall be measured.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the loads specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 3403 for Fixed R.F. Attenuators and Loads. 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, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and 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)

None.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) R.F. Leakage Test: Shall be performed.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the components specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight

The maximum weight of the components specified herein shall be 3.5 grammes.

4.3.3 Coupling Proof Torque

The requirements for testing of the coupling proof torque are specified in Section 9 of ESA/SCC Generic Specification No. 3403. The applied torque shall be 170N.cm.

4.3.4 Engagement and Separation Forces

The applicable measurement requirements are specified in Section 9 of ESA/SCC Generic Specification No. 3403. The maximum torque during engagement and separation shall not exceed 24N/cm. When mated loads are tested, they shall be torqued at 80 - 120 N/cm.

4.3.5 Residual Magnetism

The applicable measurement requirements are specified in Section 9 of ESA/SCC Generic Specification No. 3403.

- Beryllium copper, copper underplate, gold-plated loads: 20 gammas max.
- Beryllium copper, nickel underplate, gold-plated loads: for information, 2000 gammas.
- Stainless steel loads: for information, 2000 gammas.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the components 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 Beryllium Copper, Copper Underplate, Gold-plated Loads

4.4.1.1 Shell, Coupling Nut, Centre Contact

- Beryllium copper, copper underplate 2.5 microns min.
- Gold plating 2.5 microns min., Class 2, Type 2 of MIL-G-45204.
- Baking conditions: +250°C, 30 minutes, Method 108 of MIL-STD-202.

4.4.1.2 Inserts

- PTFE.
- Baking conditions: 10 cycles (−10/+55°C) according to MIL-STD-202.

4.4.2 Beryllium Copper, Nickel Underplate, Gold-plated Loads

4.4.2.1 Shell, Coupling Nut, Centre Contact

- Beryllium Copper.
- Nickel underplate 2.0 microns min.
- Gold plating 2.5 microns min., Class 2, Type 2 of MIL-G-45204.
- Baking conditions: +250°C, 30 minutes, Method 108 of MIL-STD-202.

4.4.2.2 Inserts

- PTFE.
- Baking conditions: 10 cycles (−10/+55°C) according to Method 107 of MIL-STD-202.

4.4.3 Stainless Steel Loads

4.4.3.1 Shell, Coupling Nut

- Amagnetic stainless steel, electro-passivated.

4.4.3.2 Centre Contact

- Beryllium Copper.
- Nickel underplate 2.0 microns min.
- Gold plating 2.5 microns min., Class 2, Type 2 of MIL-G-45204.
- Baking conditions: +250°C, 30 minutes, Method 108 of MIL-STD-202.

4.4.3.3 Inserts

- PTFE.
- Baking conditions: 10 cycles (−10/+55°C) according to Method 107 of MIL-STD-202.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs.

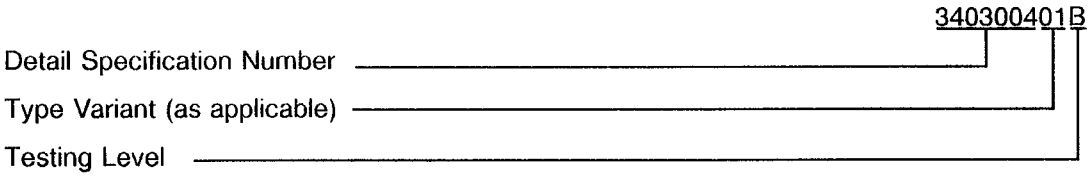
Each component shall be marked in respect of:-

(a) The SCC Component Number.

(b) Traceability Information.

4.5.2 The SCC Component Number

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



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 No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured at room temperature are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured on a sample basis at high and low temperatures are scheduled in Table 3. The number and distribution of the samples shall be as specified in Table 3.

4.6.3 Circuits for Electrical Measurements

Circuits for electrical measurements are given in ESA/SCC Generic Specification No. 3403.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift values (Δ) applicable to the parameters scheduled, shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in

The requirements for burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 3403. The conditions for burn-in shall be as specified in Table 5 of this specification.

On completion of burn-in, a recovery period of 24 ± 2 hours is necessary before performance of the end measurements.

4.7.3 Electrical Circuits for Burn-in

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS

4.8.1 Electrical Measurements on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 6. The measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.2 Electrical Measurements on Completion of Endurance Tests

The parameters to be measured on completion of endurance testing are as scheduled in Table 6. The measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

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

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 3403. The conditions for operating life testing shall be as specified in Table 7 and Figure 5.

TABLE 4 - PARAMETER DRIFT VALUES

No.	Characteristics	Symbol	Limit	Unit
1	Resistance Change	-	250	mΩ
2	VSWR Change	-	2.0	%

TABLE 5 - CONDITIONS FOR BURN-IN

No.	Characteristics	Symbol	Limit	Unit
1	Ambient Temperature	T_{amb}	+125(+0−3)	°C
2	Duration	t	168	Hrs
3	Input Power	P_{in}	-	-

TABLE 6 - ELECTRICAL MEASUREMENTS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS

No.	Characteristics	Test Condition ESA/SCC Gen. Spec. No. 3403	Maximum Change	Unit
1	Change in Resistance after each test	Para. 9.6.1.4	250	mΩ
2	Change in VSWR	Para. 9.6.1.1	2.0	%

TABLE 7 - CONDITIONS FOR OPERATING LIFE TESTING

No.	Characteristics	Symbol	Limit	Unit
1	Input Power	P_{in}	1.0	W
2	Frequency	f	10	GHz
3	Ambient Temperature	T_{amb}	+25	°C

FIGURE 5 - SCHEMATIC FOR OPERATING LIFE TESTING