



**R.F. COILS, FIXED,  
BASED ON TYPE S150  
ESCC Detail Specification No. 3201/006**

**ISSUE 1  
October 2002**



	ESCC Detail Specification		PAGE ii ISSUE 1
---	---------------------------	--	--------------------

### **LEGAL DISCLAIMER AND COPYRIGHT**

European Space Agency, Copyright © 2002. All rights reserved.

The European Space Agency disclaims any liability or responsibility, to any person or entity, with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the use and application of this ESCC publication.

This publication, without the prior permission of the European Space Agency and provided that it is not used for a commercial purpose, may be:

- copied in whole in any medium without alteration or modification.
- copied in part, in any medium, provided that the ESCC document identification, comprising the ESCC symbol, document number and document issue, is removed.



**european space agency  
agence spatiale européenne**

Pages 1 to 16

**R.F. COILS, FIXED,**

**BASED ON TYPE S150**

**ESA/SCC Detail Specification No. 3201/006**

**SCC**

**space components  
coordination group**

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 2	December 1995		
Revision 'A'	November 1998		



**TABLE OF CONTENTS**

	<u>Page</u>
<b>1. <u>GENERAL</u></b>	<b>5</b>
1.1 Scope	5
1.2 Type Variants	5
1.3 Maximum Ratings	5
1.4 Parameter Derating Information	5
1.5 Physical Dimensions	5
1.6 Functional Diagram	5
<b>2. <u>APPLICABLE DOCUMENTS</u></b>	<b>5</b>
<b>3. <u>TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS</u></b>	<b>5</b>
<b>4. <u>REQUIREMENTS</u></b>	<b>8</b>
4.1 General	8
4.2 Deviations from Generic Specification	8
4.2.1 Deviations from Special In-process Controls	8
4.2.2 Deviations from Final Production Tests	8
4.2.3 Deviations from Burn-in and Electrical Measurements	8
4.2.4 Deviations from Qualification Tests	8
4.2.5 Deviations from Lot Acceptance Tests	8
4.3 Mechanical Requirements	8
4.3.1 Dimension Check	8
4.3.2 Weight	8
4.3.3 Terminal Strength	9
4.4 Materials and Finishes	9
4.4.1 Case	9
4.4.2 Lead Material and Finish	9
4.5 Marking	9
4.5.1 General	9
4.5.2 The SCC Component Number	9
4.5.3 Electrical Characteristics and Ratings	10
4.5.4 Traceability Information	10
4.6 Electrical Measurements	10
4.6.1 Electrical Measurements at Room Temperature	10
4.6.2 Electrical Measurements at High and Low Temperatures	10
4.6.3 Circuits for Electrical Measurements	10
4.7 Burn-in Tests	11
4.7.1 Parameter Drift Values	11
4.7.2 Conditions for Burn-in	11
4.7.3 Electrical Circuits for Burn-in	11
4.8 Environmental and Endurance Tests	14
4.8.1 Measurements and Inspections on Completion of Environmental Tests	14
4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests	14
4.8.3 Measurements and Inspections on Completion of Endurance Tests	14
4.8.4 Conditions for Operating Life Test	14
4.8.5 Electrical Circuits for Operating Life Test	14



**TABLES**

	<u>Page</u>
1(a) Type Variants	6
1(b) Maximum Ratings	6
2 Electrical Measurements at Room Temperature	12
3 Electrical Measurements at High and Low Temperatures	N/A
4 Parameter Drift Values	13
5 Conditions for Burn-in and Operating Life Tests	13
6 Measurements and Inspections on Completion of Environmental Tests and at Intermediate Points and on Completion of Endurance Testing	15

**FIGURES**

1 Parameter Derating Information	6
2 Physical Dimensions	7
3 Functional Diagram	7
4 Circuits for Electrical Measurements	N/A
5 Electrical Circuit for Burn-in and Operating Life Tests	N/A

**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 R.F. Coils, Fixed, based on Type S150. It shall be read in conjunction with ESA/SCC Generic Specification No. 3201, the requirements of which are supplemented herein.

**1.2 TYPE VARIANTS**

Variants of the basic coils specified herein, which are also 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 coils specified herein are scheduled in Table 1(b).

**1.4 PARAMETER DERATING INFORMATION**

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

**1.5 PHYSICAL DIMENSIONS**

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

**1.6 FUNCTIONAL DIAGRAM**

The functional diagram for the coils specified herein is shown in Figure 3.

**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. 3201 for R.F. Coils, Fixed.
- (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**

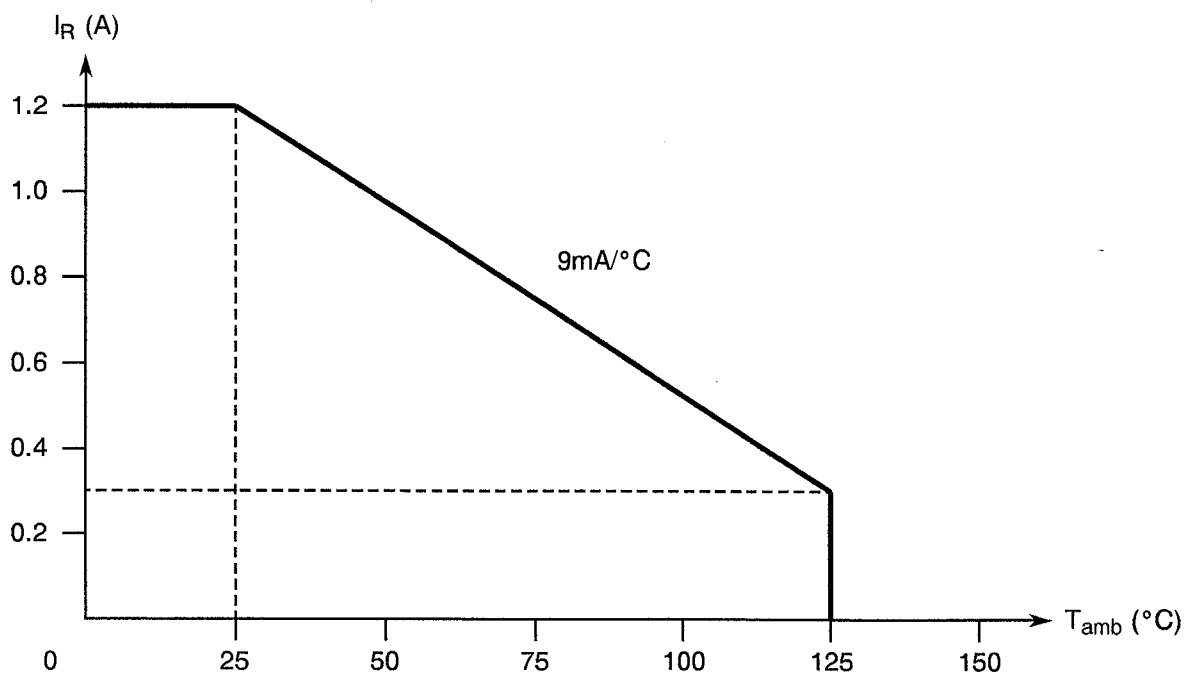
(1) Variant	(2) Inductance L (nH)	(3) Tolerance ±%	(4) Q Min. Q	(5) Test Frequency $f_t$ (MHz)	(6) Min. Self-Resonant Frequency $f_r$ (GHz)	(7) Max. D.C. Resistance $R_{dc}$ ( $\Omega$ )	(8) Rated D.C. Current $I_R$ (A)	(9) Core Material
01	17.5	10	60	200	2.5	0.1	1.2	Air

**TABLE 1(b) - MAXIMUM RATINGS**

No.	Characteristics	Symbol	Maximum Ratings	Unit	Remarks
1	Rated D.C. Current	$I_R$	1.2	A	Note 1
2	Dielectric Withstanding Voltage	DWV	700	Vac	
3	Operating Temperature Range	$T_{op}$	-55 to +125	$^{\circ}\text{C}$	$T_{amb}$
4	Storage Temperature Range	$T_{stg}$	-65 to +150	$^{\circ}\text{C}$	
5	Soldering Temperature	$T_{sol}$	+260	$^{\circ}\text{C}$	Note 2

**NOTES**

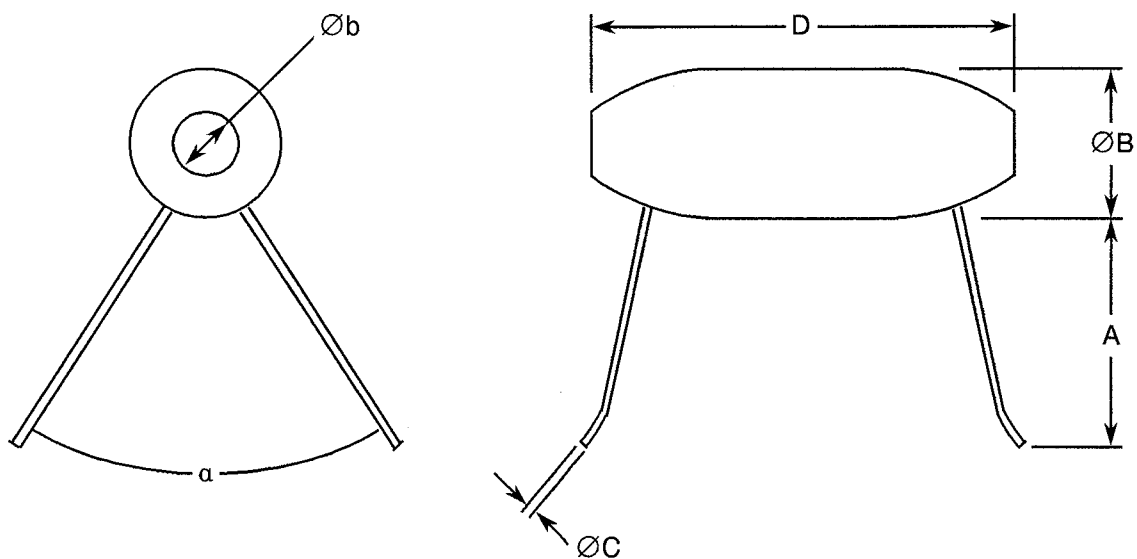
- At  $T_{amb} \leq +25^{\circ}\text{C}$ . For derating at  $T_{amb} > +25^{\circ}\text{C}$ , see Figure 1.
- Duration 5 seconds maximum at a distance of not less than 6.0mm from the case.

**FIGURE 1 - PARAMETER DERATING INFORMATION**Current Rating versus Temperature





**FIGURE 2 - PHYSICAL DIMENSIONS**



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	12.70	-
$\varnothing b$	0.787	0.889
$\varnothing B$	1.397	2.54
$\varnothing C$	0.127	0.508
D	2.54	5.08
$\alpha$	0°	180°

**FIGURE 3 - FUNCTIONAL DIAGRAM**





#### 4. REQUIREMENTS

##### 4.1 GENERAL

The complete requirements for procurement of the coils specified herein are stated in this specification and ESA/SCC Generic Specification No. 3201 for R.F. Coils, Fixed. 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)

(a) Para. 9.3.3, Electrical Measurements at High and Low Temperatures: Shall not be performed.

###### 4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.13, Permanence of Marking: Shall not be performed.

(b) Para. 9.18, Moisture Resistance: Polarisation - for steps 1 to 6, a polarising voltage of 400Vdc shall be applied.

###### 4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.3.3, Electrical Measurements at High and Low Temperatures: Shall not be performed.

(b) Para. 9.13, Permanence of Marking: Shall not be performed.

(c) Para. 9.18, Moisture Resistance: Polarisation - for steps 1 to 6, a polarising voltage of 400Vdc shall be applied.

##### 4.3 MECHANICAL REQUIREMENTS

###### 4.3.1 Dimension Check

The dimensions of the coils specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESA/SCC Generic Specification No. 3201 and they shall conform to those shown in Figure 2 of this specification.

###### 4.3.2 Weight

The maximum weight of the coils specified herein shall be 0.2 grammes.



#### 4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Para. 9.12 of ESA/SCC Generic Specification No. 3201.

#### 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 coils 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 Case

As a minimum, a resin moulding shall ensure the coil protection.

##### 4.4.2 Lead Material and Finish

The lead material shall be Type 'A' with Type '3' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

#### 4.5 MARKING

##### 4.5.1 General

The marking of components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence, shall be as follows:-

- (a) The SCC Component Number.
- (b) Electrical Characteristics and Ratings.
- (c) Traceability Information.

##### 4.5.2 The SCC Component Number

The SCC Component Number shall be constituted and marked as follows:-

320100601B

Detail Specification Number \_\_\_\_\_

Type Variant \_\_\_\_\_

Testing Level (B or C, as applicable) \_\_\_\_\_

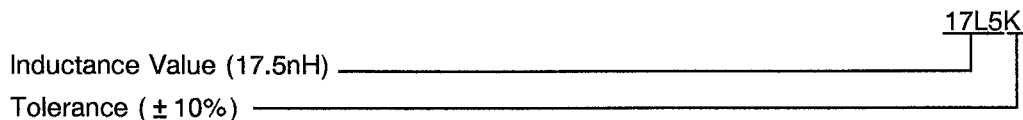


4.5.3 Electrical Characteristics and Ratings

The electrical characteristics and ratings to be marked in the following order of precedence are:-

- (a) Inductance Value.
- (b) Tolerance.

The information shall be constituted and marked as follows:-



4.5.3.1 Inductance Values

The inductance values shall be expressed by means of the following codes. The unit quantity for marking shall be in nanohenry's.

Inductance Value	Code
XX.X	XXLX

4.5.3.2 Tolerances

The tolerances on inductance values shall be indicated by the code letters specified hereafter.

Tolerance ( $\pm \%$ )	Code Letter
10	K

4.5.4 Traceability Information

Traceability information shall be marked 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, measurements shall be performed at  $T_{amb} = +22 \pm 3$  °C.

4.6.2 Electrical Measurements at High and Low Temperatures

Not applicable.

4.6.3 Circuits for Electrical Measurements (Figure 4)

Not applicable.



#### 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 ( $\Delta$ ) 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. 3201. The conditions for burn-in shall be as specified in Table 5 of this specification.

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

##### 4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable.



**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE**

No.	Characteristics	Symbol	ESA/SCC 3201 Test Method	Limits		Unit
				Min	Max	
1	Inductance	L	Para. 9.3.1.1 Note 1	Note 2		nH
2	Q Factor	Q	Para. 9.3.1.2	Note 3		-
3	Self-resonant Frequency	$f_r$	Para. 9.3.1.3 Note 4	Note 5		GHz
4	D.C. Resistance	$R_{dc}$	Para. 9.3.1.4	Note 6		$\Omega$

**NOTES**

1. Inductance shall be measured at lead length = 2.54mm.
2. See Columns 2 and 3 of Table 1(a).
3. See Column 4 of Table 1(a).
4. Measurements on a sample basis; 20% of lot or 20 units, whichever is greater (Final Production tests and Burn-in).
5. See Column 6 of Table 1(a).
6. See Column 7 of Table 1(a).

**TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES**

Not applicable.

**FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS**

Not applicable.

**TABLE 4 - PARAMETER DRIFT VALUES**

No.	Characteristics	Symbol	Spec. and/or Test Method	Test Conditions	Change Limits ( $\Delta$ )	Unit
1	Inductance	L	As per Table 2	As per Table 2	$\pm 0.02$ or (1) $\pm 2.0$	nH %
4	D.C. Resistance	R <sub>dc</sub>	As per Table 2	As per Table 2	$\pm 0.02$ or (1) $\pm 10$	$\Omega$ %

**NOTES**

1. Whichever is greater.

**TABLE 5 - CONDITIONS FOR BURN-IN AND OPERATING LIFE TESTS**

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T <sub>amb</sub>	+ 125(+ 0 - 3)	°C
2	Loading and Cycling	-	Para. 9.19 of ESA/SCC 3201	-

**FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN AND OPERATING LIFE TESTS**

Not applicable.



- 4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 3201)
- 4.8.1 Measurements and Inspections on Completion of Environmental Tests  
The parameters to be measured and inspections to be performed on completion of environmental tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +22 \pm 3 \text{ }^\circ\text{C}$ .
- 4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests  
The parameters to be measured and inspections to be performed at intermediate points during endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +22 \pm 3 \text{ }^\circ\text{C}$ .
- 4.8.3 Measurements and Inspections on Completion of Endurance Tests  
The parameters to be measured and inspections to be performed on completion of endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +22 \pm 3 \text{ }^\circ\text{C}$ .
- 4.8.4 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. 3201. The conditions for operating life testing shall be as specified in Table 5 of this specification.
- 4.8.5 Electrical Circuit for Operating Life Tests (Figure 5)  
Not applicable.





**TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING**

NO.	ESA/SCC GENERIC SPEC. NO. 3201		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Thermal Shock	Para. 9.2	Visual Examination	Evidence of damage or loosening of terminals	-	-	-	-
02	Solderability	Para. 9.7	Visual Examination	MIL-STD-202 Method 208 Solid Wire Termination Criteria	-	-	-	-
03	Barometric Pressure	Para. 9.8	<b>During Test</b> Dielectric Withstanding Voltage	While still at low pressure Para. 9.3.1.5 of ESA/SCC 3201 Encapsulated Conformally Coated No breakdown or flashover	DWV	200 80 -	- - -	Vrms Vrms -
04	Temperature Rise	Para. 9.9 and Table 1(a) of this spec at T <sub>amb</sub> = +90°C.	Temperature Rise	<b>Within 30 seconds of removal of power</b> Temperature Change	ΔT	-	15	°C
05	Overload	Para. 9.10 and Table 1(a) of this spec.	<b>After Test</b> Visual Examination  <b>Final Measurements</b> D.C. Resistance Insulation Resistance Dielectric Withstanding Voltage DWV Leakage Current	Evidence of cracked cases, charred windings, distorted or softened insulation or loosening of terminals  <b>After 24 hours</b> Table 2 Item 4 Gen 3201 Para. 9.3.1.6 Gen 3201 Para. 9.3.1.5  200Vrms	-  R <sub>dc</sub> R <sub>i</sub>  I <sub>L</sub>	-  Table 2 Item 4 1.0  -	-  -  1.0	-  Ω GΩ  μA
06	Resistance to Soldering Heat	Para. 9.11	<b>Final Measurements</b> Insulation Resistance  Inductance Q Factor Self-Res. Frequency D.C. Resistance <b>After Test</b> Visual Examination	Para. 9.3.1.6 of ESA/SCC 3201 Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4  Evidence of damage or loosening of terminals	R <sub>i</sub>  L Q f <sub>r</sub> R <sub>dc</sub>  -	100  Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4  -	-  -  -	MΩ  nH - MHz Ω  -
07	Terminal Strength	Para. 9.12	Visual Examination	Winding discontinuity, loosening or rupturing of terminals	-	-	-	-
08	Low Temperature Storage	Para. 9.14 and Table 1(b) of this spec.	Visual Examination	Evidence of cracks or other damage	-	-	-	-
09	Vibration	Para. 9.15	<b>During Test</b> Discontinuity <b>After Test</b> Visual Examination Winding Continuity	Open Circuit  Damage -	-  - -	-  - -	-  - -	-  - -
10	Shock (Specified Pulse)	Para. 9.16	Visual Examination Winding Continuity	Damage -	- -	- -	- -	- -

**NOTES**

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



**TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING (CONT'D)**

NO.	ESA/SCC GENERIC SPEC. NO. 3201		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
11	Immersion	Para. 9.17	<b>Final Measurements</b> Winding Continuity Dielectric Withstanding Voltage Insulation Resistance  <b>After Test</b> Visual Examination	-  Para. 9.3.1.5 of ESA/SCC 3201 Para. 9.3.1.6 of ESA/SCC 3201  Impregnating material, corrosion or other damage	- DWV Ri -	- 630 100 -	- - - -	- Vac MΩ -
12	Moisture Resistance	Para. 9.18 and Paras. 4.2.4 and 4.2.5 of this spec. Before Tests, Thermal Shock, MIL-STD-202, Method 107, Cond 'A'	<b>Final Measurements</b>  Dielectric Withstanding Voltage Insulation Resistance  Inductance Q Factor Self-Res. Frequency DC Resistance <b>After Test</b> Visual Examination	<b>Within 30 mins of removal from 1.5 to 3.5 hr Conditioning</b> Para. 9.3.1.5 of ESA/SCC 3201 Para. 9.3.1.6 of ESA/SCC 3201 <b>Within 1 hr</b> Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4  No evidence of corrosion	DWV Ri L Q f <sub>r</sub> R <sub>dc</sub> -	Table 1(b) Item 2 100 - Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4 - -	Vac MΩ nH - MHz Ω -	
13	Operating Life	Para. 9.19	<b>Initial Measurements</b> Inductance DC Resistance <b>Intermediate Measurements</b> Dielectric Withstanding Voltage Insulation Resistance Inductance Change Q Factor Self-Res. Frequency DC Resistance Change <b>Final Measurements</b> Dielectric Withstanding Voltage Insulation Resistance Inductance Change Q Factor Self-Res. Frequency DC Resistance Change	Table 2 Item 1 Table 2 Item 4 <b>After a recovery period of 30 mins</b> Para. 9.3.1.5 of ESA/SCC 3201 Para. 9.3.1.6 of ESA/SCC 3201 Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4 <b>After a recovery period of 30 mins</b> Para. 9.3.1.5 of ESA/SCC 3201 Para. 9.3.1.6 of ESA/SCC 3201 Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4	L R <sub>dc</sub> DWV Ri ΔL/L Q f <sub>r</sub> ΔR <sub>dc</sub> /R <sub>dc</sub> DWV Ri ΔL/L Q f <sub>r</sub> ΔR <sub>dc</sub> /R <sub>dc</sub>	Table 2 Item 1 Table 2 Item 4 Table 1(b) Item 2 100 - -2.0    +2.0 Table 2 Item 2 Table 2 Item 3 -5.0    +5.0 Table 1(b) Item 2 100 - -2.0    +2.0 Table 2 Item 2 Table 2 Item 3 -5.0    +5.0	nH Ω Vac MΩ % - MHz % Vac MΩ % - MHz %	

**NOTES**

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