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Pages 1 to 17

RESISTORS, FIXED, CHIPS, THIN FILM

BASED ON TYPE P HR

ESA/SCC Detail Specification No. 4001/023



**space components
coordination group**

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		SCCG Chairman	ESA Director General or his Deputy
Issue 1	July 1999		
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**DOCUMENTATION CHANGE NOTICE**

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
'A'	Jul. '01	P1. Cover page P2. DCN P8. Para. 4.2.3 P12. Table 4	: Deviation added : "Change Limits" amended	None None 221631 221632
'B'	June '02	P1. Cover page P2. DCN P6. Table 1(a) P10. Para. 4.5.2.2 P12. Table 2	: Variants 01 to 08 inclusive 0.1% tolerance added to each variant : Tolerance 0.1% and Code Letter 'B' added to Table : Tolerance 0.1% and corresponding limits added to Table	None None 221671 221671 221671
'C'	Sept. '02	P1. Cover page P2. DCN P6. Table 1(a) P12. Table 2 P16. Table 6	: In Note 2, "and 0.1" added to each line : For 0.1 Tolerance, max Limit corrected to "1.001" : Item 12, Chart IV: Resistance Change after 2000 hours corrected to " \pm (0.15 ...)" : Item 12, Chart V: Resistance Change after 1000 hours corrected to " \pm (0.1 ...)"	None None 23958 23959 23956 23956





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APPENDICES (Applicable to specific Manufacturers only)
None.

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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Resistors, Fixed, Chips, Thin Film, based on Type P HR. It shall be read in conjunction with ESA/SCC Generic Specification No. 4001, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

The component type variants and range of resistors 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 resistors specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

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

1.5 PHYSICAL DIMENSIONS

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

1.6 FUNCTIONAL DIAGRAM

The functional diagram for the resistors 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. 4001, Resistors, Fixed, Film.

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. In addition, the following symbols are used:-

- V_T = Test Voltage.
- TC = Temperature Coefficient.



TABLE 1(a) - TYPE VARIANTS AND RANGE OF COMPONENTS

Variant	Style	Resistance Range (Note 1)		Tolerance (\pm %) (Note 2)	Temperature Coefficient ($10^{-6}/^{\circ}\text{C}$) (Note 3)	Weight (g)
		MIN. (Ω)	MAX. (M Ω)			
01	0603	50	0.2	0.01, 0.02, 0.05 and 0.1	± 10	0.003
02	0805	50	0.25	0.01, 0.02, 0.05 and 0.1	± 10	0.004
03	1206	50	1.0	0.01, 0.02, 0.05 and 0.1	± 10	0.01
04	2010	50	3.0	0.01, 0.02, 0.05 and 0.1	± 10	0.03
05	0603	50	0.2	0.01, 0.02, 0.05 and 0.1	± 10	0.003
06	0805	50	0.25	0.01, 0.02, 0.05 and 0.1	± 10	0.004
07	1206	50	1.0	0.01, 0.02, 0.05 and 0.1	± 10	0.01
08	2010	50	3.0	0.01, 0.02, 0.05 and 0.1	± 10	0.03

NOTES

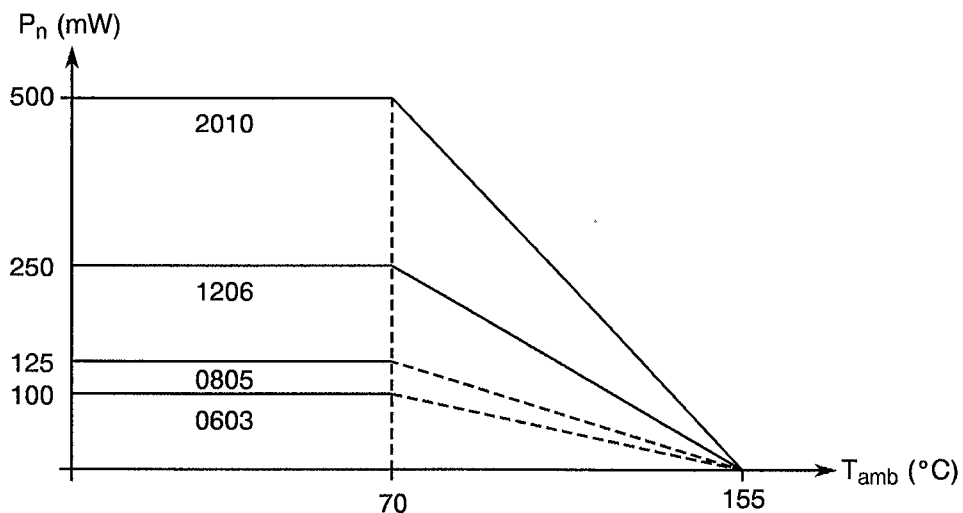
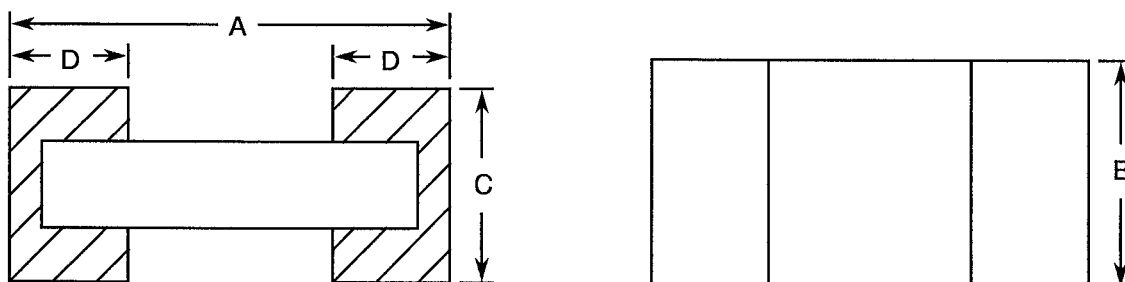
- | Style | Critical Resistance (k Ω) |
|-------|-----------------------------------|
| 0603 | 12.25 |
| 0805 | 45 |
| 1206 | 40 |
| 2010 | 45 |
- | Resistance (Ω) | Available Tolerances (\pm %) | Series |
|-------------------------|---------------------------------|-----------------------------------|
| $50 \geq R \leq 100$ | 0.05 and 0.1 | Any value in the resistance range |
| $100 > R \leq 250$ | 0.02, 0.05 and 0.1 | |
| $R > 250$ | 0.01, 0.02, 0.05 and 0.1 | |
- Resistors with a Temperature Coefficient = $\pm 5.0 \cdot 10^{-6}/^{\circ}\text{C}$ over the temperature range $T_{\text{amb}} = 22^{\circ}\text{C}$ to $T_{\text{amb}} = +70^{\circ}\text{C}$ are also available.

TABLE 1(b) - MAXIMUM RATINGS

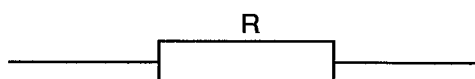
No.	Characteristics	Style	Symbol	Limits	Unit	Remarks
1	Rated Dissipation	0603 0805 1206 2010	P_n	0.1 0.125 0.25 0.5	W	Note 1
2	Limiting Element Voltage	0603 0805 1206 2010	U_L	35 75 100 150	V	-
3	Rated Voltage		U_R	$\sqrt{P_n \times R_n}$	V	Note 2
4	Insulation Voltage	0603 0805 1206 2010	U_i	70 150 200 300	V _{rms}	-
5	Operating Temperature Range		T_{op}	-55 to +155	$^{\circ}\text{C}$	T_{amb}
6	Storage Temperature Range		T_{stg}	-55 to +155	$^{\circ}\text{C}$	-
7	Soldering Temperature		T_{sol}	+260	$^{\circ}\text{C}$	Note 3

NOTES

- At $T_{\text{amb}} \leq +70^{\circ}\text{C}$. For derating at $T_{\text{amb}} > +70^{\circ}\text{C}$, see Figure 1.
- Shall never exceed Limiting Element Voltage.
- Duration 10 seconds maximum.

FIGURE 1 - PARAMETER DERATING INFORMATION

Rated Dissipation versus Temperature
FIGURE 2 - PHYSICAL DIMENSIONS


STYLE	MILLIMETRES							
	A		B		C		D	
	Min	Max	Min	Max	Min	Max	Min	Max
0603	1.39	2.16	0.62	1.01	0.25	1.02	0.25	0.51
0805	1.78	2.55	1.14	1.53	0.25	1.02	0.25	0.51
1206	2.87	3.64	1.47	1.86	0.25	1.02	0.25	0.51
2010	4.95	5.72	2.41	2.80	0.25	1.02	0.35	0.85

FIGURE 3 - FUNCTIONAL DIAGRAM




4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the resistors specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 4001. 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)

(a) Para. 9.1, Overload: The test conditions shall be:-

Voltage: $\sqrt{6.25 P_n \times R_n}$ or $2U_L$, whichever is less.

Duration: 2 seconds.

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

For $\pm 0.01\%$ and $\pm 0.02\%$ tolerances, components with a resistance outside the limits of Table 2, after burn-in, but remaining within a $\pm 0.03\%$ tolerance shall be rejected, but not counted for PDA.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.1, Overload: Test conditions as Para. 4.2.2(a).

(b) Para. 9.13, Vibration: Not applicable.

(c) Para. 9.19, Permanence of Marking: Not applicable.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.13, Vibration: Not applicable.

(b) Para. 9.19, Permanence of Marking: Not applicable.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the resistors specified herein shall be verified in accordance with the requirements set out in Para. 9.4 of ESA/SCC Generic Specification No. 4001 and shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the resistors specified herein shall be as given in Table 1(a).

4.3.3 Robustness of Terminations

The requirements for robustness of terminations are specified in Para. 9.10.2 of ESA/SCC Generic Specification No. 4001. The test conditions shall be as follows:-

Number of bends : 10.

Deflection : 1.0mm for 2010 case style.
2.0mm for other case style.

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 Case

The alumina substrate shall be covered with a suitable inorganic coating.

4.4.2 Terminations

Variants 01 to 04

The lead material shall be Type 'E' with Type '4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500 (see Table 1(a) for Type Variants).

Variants 05 to 08

The lead material shall be Type 'E' with Type '7' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500 (see Table 1(a) for Type Variants).

4.4.3 Films

Films shall be uniformly deposited. They shall be free from blisters, thin spots, areas inadequately bonded to the core, discoloured spots or other blemishes likely to cause flaking.

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. 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 each component in its primary package.

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

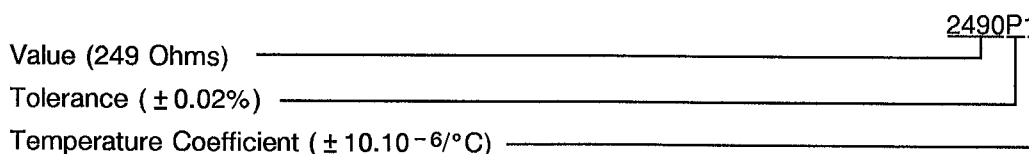
- (a) Electrical Characteristics and Ratings.
- (b) The SCC Component Number.
- (c) Traceability Information.

4.5.2 Electrical Characteristics and Ratings

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

- (a) Resistance value.
- (b) Tolerance.
- (c) Temperature coefficient.

The information shall be constituted and marked as follows:



4.5.2.1 Resistance Values

Resistance values shall be expressed by means of the following codes. The unit quantity for marking shall be Ohms (Ω).

Numerical Value	Code
XX.X	XXRX
XXX	XXX0
XXX10 ¹	XXX1
XXX10 ²	XXX2
XXX10 ³	XXX3
XXX10 ⁴	XXX4

For values of 100 Ω and above, the first 3 digits (X) represent significant figures and the last digit specifies the number of zeros to follow.

When values of less than 100 Ω are required, the letter 'R' is used to indicate the decimal point. When the letter is used, all successive digits represent significant figures.

4.5.2.2 Tolerance

The tolerance on resistance values shall be indicated by the code letters specified hereafter.

Tolerance ($\pm\%$)	Code Letter
0.01	L
0.02	P
0.05	W
0.1	B

4.5.2.3 Temperature Coefficient

The temperature coefficient shall be indicated by the numerical codes specified hereafter.

Digit	Temperature Coefficient ($\pm 10^{-6}/^{\circ}\text{C}$)
0	5.0
1	10


4.5.3 The SCC Component Number

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

Detail Specification Number _____ 400102301B
 Type Variant (see Table 1(a)) _____
 Testing Level (B or C, as applicable) _____

4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

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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 distribution of the sample shall be as follows:

- 1/3 with the lowest resistance value,
- 1/3 with the highest resistance value,
- 1/3 with the median resistance value or the critical resistance value if procured, of the procured range.

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 (Δ) applicable to the parameters scheduled, shall not be exceeded. In addition to these drift value requirements, the appropriate limit value specified in Table 2 for a given parameter 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. 4001. The conditions for burn-in shall be as specified in Table 5 of this specification.

After 168(+24 – 0) hours, the resistors shall be removed from the chamber and allowed to cool under normal atmospheric conditions for a minimum of 4 hours. They shall then be visually examined. There shall be no evidence of damage and the marking shall still be legible.

4.7.3 Electrical Circuit for Burn-in

The circuit for use in performing the burn-in test is shown in Figure 5 of this specification.



TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESA/SCC 4001 Test Method	Test Conditions	Tolerance ($\pm\%$)	Limits		Unit
						Min.	Max.	
1	Resistance	R_A	Para. 9.5.1	Para. 9.5.1	0.01	0.9999 Rn	1.0001 Rn	Ω
					0.02	0.9998 Rn	1.0002 Rn	
					0.05	0.9995 Rn	1.0005 Rn	
					0.1	0.9990 Rn	1.001 Rn	

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	Characteristics	Symbol	ESA/SCC 4001 Test Method	Test Conditions (Note 1)	Limits		Unit
					Min.	Max.	
2	Resistance Change between $-55(+3-0)^\circ\text{C}$ and $+22\pm 3^\circ\text{C}$	$\frac{\Delta R}{R}$	Para. 9.5.1	Para. 9.5.1	-0.077	+0.077	%
3	Resistance Change between $+155(+0-3)^\circ\text{C}$ and $+22\pm 3^\circ\text{C}$	$\frac{\Delta R}{R}$	Para. 9.5.1	Para. 9.5.1	-0.133	+0.133	%
4	Resistance Change between $+70(+0-3)^\circ\text{C}$ and $+22\pm 3^\circ\text{C}$	$\frac{\Delta R}{R}$	Para. 9.5.1	Para. 9.5.1 (TC = $5.0.10^{-6}/^\circ\text{C}$)	-0.024	+0.024	%

NOTES

- The measurements shall be performed on a sample basis in accordance with Special Inspection Level S-3, Table IIA, AQL = 1.0% of IEC Publication No. 410 on the total production lot. In addition, see Para. 4.6 for distribution of the sample.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

Not applicable.

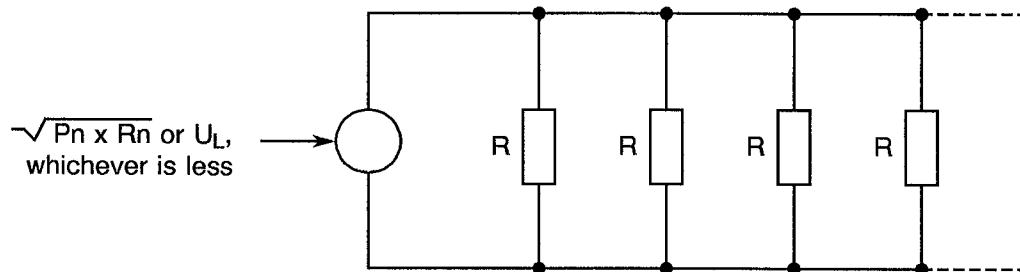
TABLE 4 - PARAMETER DRIFT VALUES



No.	Characteristics	Symbol	Spec. and/or Test Method	Test Conditions	Change Limits (Δ)	Unit
1	Resistance Change	$\frac{\Delta R_A}{R_A}$	As per Table 2	As per Table 2	± 0.02	%

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

No.	Characteristics	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	$+70 \pm 5$	$^{\circ}\text{C}$
2	Test Voltage	V_T	$\sqrt{P_n \times R_n}$ or U_L , whichever is less	V

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



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4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION No. 4001)

The resistors shall be mounted as prescribed in ESA/SCC Generic Specification No. 4001, Para. 9.20. The substrate material shall be alumina.

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 as scheduled in Table 6 of this specification. 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 testing are as scheduled in Table 6 of this specification. 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. 4001. 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

The electrical circuit for use in performing the operating life tests is shown in Figure 5 of this specification.

4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 4001. The conditions for high temperature storage shall be $T_{amb} = +155(+0 - 5) \text{ }^\circ\text{C}$.



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. 4001		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Overload	Para. 9.1 and Paras 4.2.2 and 4.2.4 of this spec.	Initial Measurements Chart IV Resistance Final Measurements Visual Examination Chart II Resistance Chart IV Resistance Change	Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage and marking legible Table 2 Item 1 Table 2 Item 1	R _A - R _A ΔR _A /R _A	Record Values - Table 2 Item 1 ± (0.05 + 0.05Ω × 100) R _n	- - %	
02	Seal Test (Hermetically Sealed only)	Para. 9.3	Not applicable					
03	Insulation Resistance (Insulated only)	Para. 9.6	Final Measurements Insulation Resistance	Para. 9.6.1 of ESA/SCC 4001 (2)	R _i	1000	-	MΩ
04	Temperature Coefficient	Para. 9.7 Procedure I	Temperature Coefficient	Para. 9.5.1 of ESA/SCC 4001	TC	- 10 (3)	+ 10 (3)	10 ⁻⁶ /°C
05	Voltage Proof	Para. 9.8	During Test Visual Examination	1.4 × U _i (4) for 60 ± 5 sec No breakdown or flashover	-	-	-	-
06	Solderability	Para. 9.9 Procedure I	Initial Measurements Resistance Final Measurements Resistance Change	After Drying Table 2 Item 1 24 ± 4 hrs after soldering Table 2 Item 1	R _A ΔR _A /R _A	Record Values ± (0.05 + 0.05Ω × 100) R _n	-	%
07	Robustness of Terminations	Para. 9.10.1 Adhesion	Initial Measurements Resistance	After Mounting	-	-	-	-
			Final Measurements Resistance Change	Table 2 Item 1	R _A	Record Values	-	
			Visual Examination	Table 2 Item 1	ΔR _A /R _A	± (0.05 + 0.05Ω × 100) R _n	%	
			No damage, lifting, cracking or dry joints	-	-	-	-	
Bend Strength of End Plate Facing	Initial Measurements Resistance	Table 2 Item 1	R _A	Record Values	-			
	Final Measurements Resistance Change	Table 2 Item 1 Board in bent position	ΔR _A /R _A	± (0.05 + 0.05Ω × 100) R _n	%			
	Visual Examination	Table 2 Item 1	-	-	-			
	No damage, lifting, cracking or dry joints	-	-	-	-			
08	Resistance to Soldering Heat	Para. 9.11 Procedure I	Initial Measurements Resistance Final Measurements Visual Examination Resistance Change	After Drying Table 2 Item 1 No evidence of damage and marking legible After 24 ± 4 hours Table 2 Item 1	R _A - ΔR _A /R _A	Record Values - ± (0.05 + 0.05Ω × 100) R _n	- - %	

NOTES: See Page 17.



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. 4001		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
09	Rapid Change of Temperature	Para. 9.12	Initial Measurements Resistance Final Measurements Visual Examination Resistance Change	Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage Table 2 Item 1	R _A - ΔR _A /R _A	Record Values - ± (0.05 + $\frac{0.05\Omega \times 100}{R_n}$)	- - %	
10	Vibration	Para. 9.13 and Paras 4.2.4 and 4.2.5 of this spec.	Not applicable					
11	Climatic Sequence	Para. 9.14 Procedure I	Initial Measurements Resistance Final Measurements Visual Examination Insulation Resistance Resistance Change	After Drying Table 2 Item 1 Following completion of D.C. load test and after a recovery period of 1-2 hrs No evidence of damage and marking legible Para. 9.6.1 of ESA/SCC 4001 (2) Table 2 Item 1	R _A - R _i ΔR _A /R _A	Record Values - 1000 ± (0.1 + $\frac{0.05\Omega \times 100}{R_n}$)	- - MΩ %	
12	Operating Life	Para. 9.15 Chart IV	Initial Measurements Resistance	Table 2 Item 1	R _A	Record Values		
Intermediate Measurements (1000 hrs)			After a recovery period of 1-2 hrs					
Visual Examination			No evidence of damage	-	-	-		
Resistance Change			Table 2 Item 1	ΔR _A /R _A	± (0.1 + $\frac{0.05\Omega \times 100}{R_n}$)	%		
Final Measurements (2000 hrs)		After a recovery period of 1-2 hrs						
Visual Examination		No evidence of damage	-	-	-			
Resistance Change		Table 2 Item 1	ΔR _A /R _A	± (0.15 + $\frac{0.05\Omega \times 100}{R_n}$)	%			
Insulation Resistance		Para. 9.6.1 of ESA/SCC 4001 (2)	R _i	1000	-	MΩ		
	Para. 9.15 Chart V	Initial Measurements Resistance	Table 2 Item 1	R _A	Record Values			
Final Measurements (1000 hrs)		After a recovery period of 1-2 hrs						
Visual Examination		No evidence of damage	-	-	-			
Resistance Change		Table 2 Item 1	ΔR _A /R _A	± (0.1 + $\frac{0.05\Omega \times 100}{R_n}$)	%			
Insulation Resistance	Para. 9.6.1 of ESA/SCC 4001 (2)	R _i	1000	-	MΩ			

NOTES: See Page 17.



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. 4001		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT	
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.		
13	High Temperature Storage	Para. 9.16	Initial Measurements	Table 2 Item 1	R_A	Record Values			
			Resistance	After a recovery period of 1-2 hrs					
			Intermediate Measurements						
			(1000 hrs)						
			Visual Examination	No evidence of damage	-	-	-	-	-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	$\pm (0.1 + \frac{0.05\Omega \times 100}{R_n})$		%	
		Final Measurements	After a recovery period of 1-2 hrs						
		(2000 hrs)							
		Visual Examination	No evidence of damage	-	-	-	-		
		Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	$\pm (0.15 + \frac{0.05\Omega \times 100}{R_n})$		%		
		Insulation Resistance	Para. 9.6.1 of ESA/SCC 4001 (2)	R_i	1000	-	M Ω		
14	Permanence of Marking	Para. 9.19 and Paras 4.2.4 and 4.2.5 of this spec.	Not applicable						

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. Test Voltage: $V_T = 100V$.
3. $TC = \pm 5.0 \cdot 10^{-6}/^{\circ}C$ (see Note 3 to Table 1(a)).
4. For value of U_i , see Table 1(b) Item 4.