



RESISTORS, FIXED, FILM
NON-HERMETICALLY SEALED
BASED ON TYPE RNC 65
ESCC Detail Specification No. 4001/003

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.



europaean space agency
agence spatiale européenne

Pages 1 to 20

RESISTORS, FIXED, FILM

NON-HERMETICALLY SEALED

BASED ON TYPE RNC 65

ESA/SCC Detail Specification No. 4001/003



space components
coordination group

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 4	May 1996	<i>P. Monmoussier</i>	<i>A. J. ...</i>
Revision 'A'	January 1998	<i>Sam Mitchell</i>	<i>A. J. ...</i>
Revision 'B'	April 1999	<i>Sam Mitchell</i>	<i>A. J. ...</i>



DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 3 and incorporates the changes agreed in the following DCR's:-		
		Cover Page		None
		DCN		None
		Para. 3	: Text extended	23788
		Table 1(b)	: Min./Max. columns deleted	221348
			: No. 1, in Remarks, "Note 1" added and Remarks deleted	221348
			: Items 2 and 3 renumbered as "6" and "5" respectively and subsequent items renumbered	221348
			: Old No. 5, in Remarks, "Note 2" added and Remarks deleted	221348
			: Old No. 7, in Remarks, "Note 3" added and Remarks deleted	221348
			: Note 1 added	221348
			: Notes 2 and 3 added	221348
		Figure 2	: "Ø" added to B and D symbols	23788
		Para. 4.2.2	: Rewritten	23788
		Para. 4.2.4	: Title amended	23788
			: Deviation added	221348
		Para. 4.3.3	: Requirements clarified	23788
		Para. 4.4.2	: Title amended	23788
		Para. 4.5.1	: Rewritten	23788
		Para. 4.5.2	: Type Variant entry added	21021
			: "(See Note)" added to Type Variant entry	23788
			: Note added	23788
		Para. 4.5.3.1	: "(a)" heading and "(b)" paragraph deleted. Sentence added	23788
		Para. 4.5.3.2	: "(a)" heading and "(b)" paragraph deleted. Sentence added	23788
		Para. 4.6.1	: Second sentence extended	23788
		Para. 4.6.2	: Second sentence deleted	23788
		Tables 2 and 3	: 4th column heading and text amended	23788
		Table 3	: Tests renumbered	23788
			: Existing Note deleted and new Note added	23788
		Table 4	: Test numbered as "1" and Symbol corrected	23788
			: Delta Value in Note moved to Change Limits column	23788
		Table 5	: Nos. 1 and 4 deleted and subsequent tests renumbered	23788
			: Old No. 2, Characteristic amended	23788
			: Old No. 3, Symbol amended	23788
		Para's 4.8 to 4.8.3	: Rewritten	23788
		Table 6	: Rewritten and expanded	221348
'A'	Jan. '98	P1. Cover Page	: Page count increased by 1	None
		P2. DCN		None
		P4. T of C	: Appendix 'A' added	221417
		P19.	: Appendix 'A' added with new page	221417
'B'	Apr. '99	P1. Cover Page	: Page count increased by 1	None
		P2. DCN		None
		P4. T of C	: Appendix 'B' entry added	23907
		P20.	: Appendix 'B' added with new page	23907



 	ESA/SCC Detail Specification No. 4001/003		PAGE 3 ISSUE 4
---	--	--	-------------------

TABLE OF CONTENTS

		<u>Page</u>
1.	<u>GENERAL</u>	5
1.1	Scope	5
1.2	Range of Components	5
1.3	Maximum Ratings	5
1.4	Parameter Derating Information	5
1.5	Physical Dimensions	5
1.6	Functional Diagram	5
2.	<u>APPLICABLE DOCUMENTS</u>	5
3.	<u>TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS</u>	5
4.	<u>REQUIREMENTS</u>	8
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	9
4.3.3	Robustness of Terminations	9
4.4	Materials and Finishes	9
4.4.1	Case	9
4.4.2	Lead Material and Finish	9
4.4.3	Films	9
4.5	Marking	9
4.5.1	General	9
4.5.2	The SCC Component Number	10
4.5.3	Electrical Characteristics and Ratings	10
4.5.4	Traceability Information	11
4.6	Electrical Measurements	11
4.6.1	Electrical Measurements at Room Temperature	11
4.6.2	Electrical Measurements at High and Low Temperatures	11
4.6.3	Circuits for Electrical Measurements	11
4.7	Burn-in Tests	12
4.7.1	Parameter Drift Values	12
4.7.2	Conditions for Burn-in	12
4.7.3	Electrical Circuit for Burn-in	12
4.8	Environmental and Endurance Tests	15
4.8.1	Measurements and Inspections on Completion of Environmental Tests	15
4.8.2	Measurements and Inspections at Intermediate Points during Endurance Tests	15
4.8.3	Measurements and Inspections on Completion of Endurance Tests	15
4.8.4	Conditions for Operating Life Tests	15
4.8.5	Electrical Circuit for Operating Life Tests	15
4.8.6	Conditions for High Temperature Storage Test	15



TABLES

	<u>Page</u>
1(a) Range of Components	6
1(b) Maximum Ratings	6
2 Electrical Measurements at Room Temperature	13
3 Electrical Measurements at High and Low Temperatures	13
4 Parameter Drift Values	13
5 Conditions for Burn-in and Operating Life Tests	14
6 Measurements and Inspections on Completion of Environmental Tests and at Intermediate Points and on Completion of Endurance Testing	16

FIGURES

1 Parameter Derating Information	7
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	14

APPENDICES (Applicable to specific Manufacturers only)

'A' Agreed Deviations for Sfernice (F)	19
'B' Agreed Deviations for Vishay Draloric (D)	20

**1. GENERAL****1.1 SCOPE**

This specification details the ratings, physical and electrical characteristics, test and inspection data for Resistors, Fixed, Film, Non-hermetically Sealed, based on Type RNC 65. It shall be read in conjunction with ESA/SCC Generic Specification No. 4001, the requirements of which are supplemented herein.

1.2 RANGE OF COMPONENTS

The range of resistors covered by this specification is 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 as 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) - RANGE OF COMPONENTS**

No.	Resistance Range (Note 1)		Tolerance (±%)	Value Series	Temperature Coefficient (± 10 ⁻⁶ /°C)
	MIN. (Ω)	MAX. (MΩ)			
01	1.0	8.06	0.5	E96	50
02	1.0	8.06	1.0	E96	50
03	10	8.06	0.5	E96	25
04	10	8.06	1.0	E96	25

NOTES

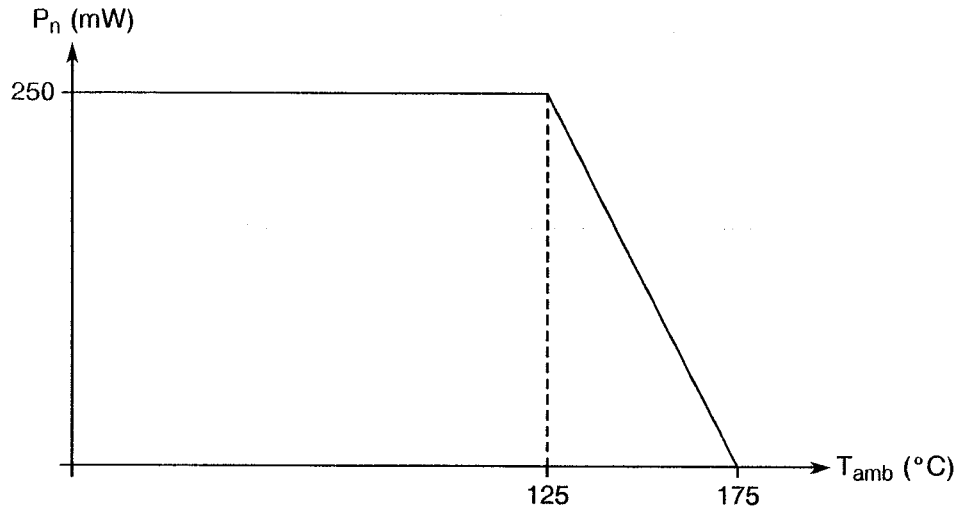
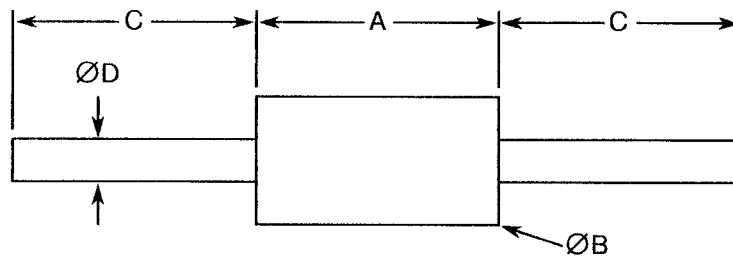
1. Critical resistance = 360 000Ω.

TABLE 1(b) - MAXIMUM RATINGS

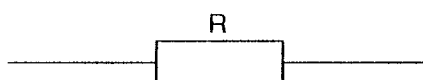
No.	Characteristics	Symbol	Limits	Unit	Remarks
1	Rated Dissipation	P _n	0.25	W	Note 1
2	Limiting Element Voltage	U _L	300	V	-
3	Rated Voltage	U _R	$\sqrt{0.25 R_n}$	V	Note 2
4	Insulation Voltage	U _i	900	V _{rms}	-
5	Operating Temperature Range	T _{op}	- 55 to + 175	°C	T _{amb}
6	Storage Temperature Range	T _{stg}	- 65 to + 175	°C	-
7	Soldering Temperature	T _{sol}	+ 260	°C	Note 3

NOTES

1. At T_{amb} ≤ + 125°C. For derating at T_{amb} > + 125°C, see Figure 1.
2. Shall never exceed Limiting Element Voltage.
3. Duration 10 seconds maximum at a distance of not less than 1.6mm from the device body

FIGURE 1 - PARAMETER DERATING INFORMATION

Rated Dissipation versus Temperature
FIGURE 2 - PHYSICAL DIMENSIONS


SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	13.49	16.67
ØB	3.99	6.35
C	25.00	-
ØD	0.59	0.69

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: $\sqrt{1.0 R_n}$ or 600V, whichever is less.

Duration: 1 hour.

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

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

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

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

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 1.3 grammes.

4.3.3 Robustness of Terminations

The requirements and test conditions for robustness of terminations are specified in Section 9 of ESA/SCC Generic Specification No. 4001. The test conditions shall be as follows:-

Test U_{a1} : Tensile.

Applied Force: 10 N.

Duration: 10 ± 1.0 seconds.

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

As a minimum, the resistance element shall be protected by a suitable resin coating.

4.4.2 Lead Material and Finish

The lead material shall be Type 'A' with Type '3 or 4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

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 or non-uniform ribbons when spiralled (helixed). Where used, spiralling shall occupy at least 70% of the actual length of the resistance element.

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) The SCC Component Number.
- (b) Electrical Characteristics and Ratings.
- (c) 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:

Detail Specification Number _____ 400100301B
 Type Variant (see Note) _____
 Testing Level (B or C, as applicable) _____

N.B.

Marking of the Type Variant Number is mandatory. No further reference to type variants is made in this specification.

4.5.3 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:

Value (250 Ohms) _____ 2500D2
 Tolerance ($\pm 0.5\%$) _____
 Temperature Coefficient ($\pm 25 \cdot 10^{-6}/^{\circ}\text{C}$) _____

4.5.3.1 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
X.XX	XRXX
XX.X	XXRX
XXX	XXX0
XXX10 ¹	XXX1
XXX10 ²	XXX2
XXX10 ³	XXX3
XXX10 ⁴	XXX4

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

Where more practicable, resistance values may be expressed using the colour code specified in the Table of Para. 5.9.4 of ESA/SCC Basic Specification No. 21700.



4.5.3.2 Tolerance

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

Tolerance ($\pm\%$)	Code Letter
0.5	D
1.0	F

In the case where the colour code is used for resistance values, the appropriate colour for tolerance shall be used, as shown in the colour code Table referenced in Para. 4.5.3.1 of this specification.

4.5.3.3 Temperature Coefficient

The Temperature Coefficient shall be indicated by the numerical codes specified hereafter.

Digit	Temperature Coefficient ($\pm 10^{-6}/^{\circ}\text{C}$)
2	25
3	50

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.

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 $T_{\text{amb}} = +22 \pm 3^{\circ}\text{C}$.

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.

The resistors shall be tested with a d.c. voltage or a full-wave rectified a.c. voltage, provided the ripple does not exceed 5.0%.

A voltage of 300V or $\sqrt{0.25 R_n}$, whichever is smaller, shall be applied in cycles of 90 minutes "on" and 30 minutes "off" throughout the test.

The resistors shall be connected by their terminations to suitable clips on a rack of insulating material. They shall be so arranged that the temperature of any one resistor does not appreciably influence the temperature of any other resistor. There shall be no undue draught over the resistors. 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 (±%)	Limits		Unit
						Min.	Max.	
1	Resistance	R _A	Para. 9.5.1	Para. 9.5.1	0.5	0.995 R _n	1.005 R _n	Ω
					1.0	0.990 R _n	1.010 R _n	

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) °C and +22 ± 3 °C	$\frac{\Delta R}{R}$	Para. 9.5.1	Para. 9.5.1 ± 25 10 ⁻⁶ /°C ± 50 10 ⁻⁶ /°C	-0.2 -0.4	+0.2 +0.4	%
2(ii) 3	Resistance Change between +175(+0-3) °C and +22 ± 3 °C	$\frac{\Delta R}{R}$	Para. 9.5.1	Para. 9.5.1 ± 25 10 ⁻⁶ /°C ± 50 10 ⁻⁶ /°C	-0.4 -0.8	+0.4 +0.8	%

NOTES

- The measurement shall be performed on a sample basis in accordance with General Inspection Level II, Table IIA, AQL = 0.65% of IEC Publication No. 410 on the total production lot. In addition, see Para. 4.6.2 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	± 0.25 or (1) ± 0.05	% Ω

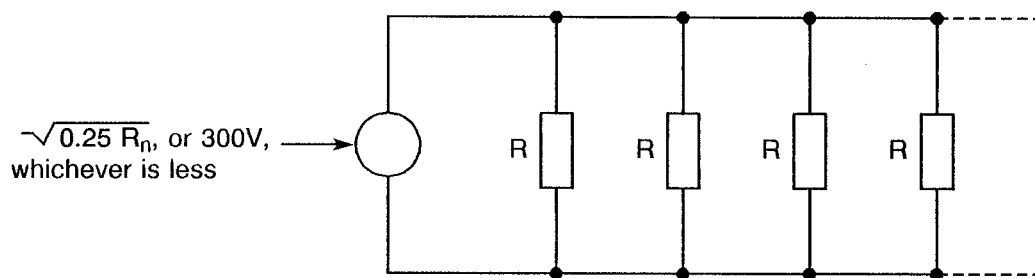
NOTES


- Whichever is greater.

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

No.	Characteristics	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	$+ 125 \pm 3$	$^{\circ}\text{C}$
2	Test Voltage	V_T	$\sim \sqrt{0.25 R_n}$, or 300V, whichever is less	V

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



	<p style="text-align: center;">ESA/SCC Detail Specification No. 4001/003</p>	<p style="text-align: right;">PAGE 15 ISSUE 4</p>
---	--	---

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

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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = +22 \pm 3$ °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 and Para. 4.7.2 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 $T_{amb} = +175(+0-5)$ °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 $\Delta R_A/R_A$	Record Values - Table 2 Item 1 $\pm (0.25 + \frac{0.05\Omega \times 100}{R_n})$	- - %	
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	-	M Ω
04	Temperature Coefficient	Para. 9.7 Procedure I	Temperature Coefficient	Para. 9.5.1 of ESA/SCC 4001	TC	-25 -50	+25 +50	10 ⁻⁶ / °C
05	Voltage Proof	Para. 9.8	During Test Visual Examination	1.4 × U _i (3) 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 $\Delta R_A/R_A$	Record Values $\pm (0.1 + \frac{0.01\Omega \times 100}{R_n})$	-	%
07	Robustness of Terminations	Para. 9.10.1	Initial Measurements Resistance Final Measurements Resistance Change Visual Examination	Table 2 Item 1 Table 2 Item 1 No evidence of damage	R_A $\Delta R_A/R_A$ -	Record Values $\pm (0.25 + \frac{0.05\Omega \times 100}{R_n})$ -	-	%
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 - $\Delta R_A/R_A$	Record Values $\pm (0.1 + \frac{0.01\Omega \times 100}{R_n})$	-	%
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 - $\Delta R_A/R_A$	Record Values $\pm (0.25 + \frac{0.05\Omega \times 100}{R_n})$	-	%

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. For value of U_i, see Table 1(b) Item 4.

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.	
10	Vibration	Para. 9.13	Initial Measurements Resistance	Table 2 Item 1	R _A	Record Values		
			Final Measurements Visual Examination	No evidence of damage	-	-	-	
			Resistance Change	Table 2 Item 1	ΔR _A /R _A	± (0.25 + $\frac{0.05\Omega \times 100}{R_n}$)		%
11	Climatic Sequence	Para. 9.14 Procedure I	Initial Measurements Resistance	After Drying Table 2 Item 1	R _A	Record Values		
			Final Measurements	Following completion of D.C. load test and after a recovery period of 1-2 hrs	-	-	-	
			Visual Examination	No evidence of damage and marking legible	-	-	-	
			Insulation Resistance	Para. 9.6.1 of ESA/SCC 4001 (2)	R _i	100	-	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	± (0.35 + $\frac{0.05\Omega \times 100}{R_n}$)		%
			Final Measurements (2000 hrs)	After a recovery period of 1-2 hrs	-	-	-	
12	Operating Life	Para. 9.15 Chart V	Visual Examination	No evidence of damage	-	-	-	
			Resistance Change	Table 2 Item 1	ΔR _A /R _A	± (0.5 + $\frac{0.05\Omega \times 100}{R_n}$)		%
			Insulation Resistance	Para. 9.6.1 of ESA/SCC 4001 (2)	R _i	1000	-	MΩ
			Final Measurements (1000 hrs)	After a recovery period of 1-2 hrs	-	-	-	
12	Operating Life	Para. 9.15 Chart V	Visual Examination	No evidence of damage	-	-	-	
			Resistance Change	Table 2 Item 1	ΔR _A /R _A	± (0.35 + $\frac{0.05\Omega \times 100}{R_n}$)		%
			Insulation Resistance	Para. 9.6.1 of ESA/SCC 4001 (2)	R _i	1000	-	MΩ

NOTES: See Page 16.

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 Resistance Intermediate Measurements (1000 hrs) Visual Examination Resistance Change Final Measurements (2000 hrs) Visual Examination Resistance Change Insulation Resistance	Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage Table 2 Item 1 Para. 9.6.1 of ESA/SCC 4001 (2)	R _A - ΔR _A /R _A - ΔR _A /R _A Ri	Record Values - $\pm (0.35 + \frac{0.05\Omega \times 100}{R_n})$ - $\pm (0.5 + \frac{0.05\Omega \times 100}{R_n})$ 1000	- - % - % MΩ	
14	Permanence of Marking	Para. 9.19	-	-	-	-	-	-

NOTES: See Page 16.

	<p>ESA/SCC Detail Specification No. 4001/003</p>	<p>Rev. 'A'</p>	<p>PAGE 19 ISSUE 4</p>
---	--	-----------------	----------------------------

APPENDIX 'A'

Page 1 of 1

AGREED DEVIATIONS FOR SFERNICE (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 4.2.2	Para. 4.4, Marking: The Type Variant defined in Para. 4.5.2 of this specification need not be marked on the component.

**SCC**ESA/SCC Detail Specification
No. 4001/003

Rev. 'B'

PAGE 20

ISSUE 4

APPENDIX 'B'Page 1 of 1**AGREED DEVIATIONS FOR VISHAY DRALORIC (D)**

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 4.2.2	Para. 4.4, Marking: The Type Variant defined in Para. 4.5.2 of this specification need not be marked on the component.