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**RESISTORS, FIXED, CHIPS, THIN FILM
BASED ON TYPE P HR**

ESCC Detail Specification No. 4001/023

**ISSUE 2
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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
42, 43, 52	Specification updated to incorporate editorial and technical changes per DCRs.

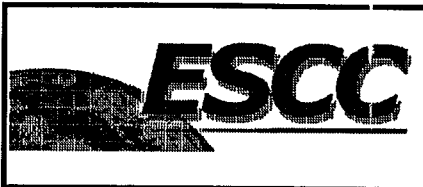



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APPENDICES (Applicable to specific Manufacturers only)

None.



1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Resistors, Fixed, Chips, Thin Film, based on Type P HR. It shall be read in conjunction with ESCC 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) ESCC 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 ESCC 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 (±%) (Note 2)	Temperature Coefficient (10 ⁻⁶ /°C) (Note 3)	Weight (g)
		MIN. (Ω)	MAX. (MΩ)			
01	0603	50	0.2	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.003
02	0805	50	0.25	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.004
03	1206	50	1.0	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.01
04	2010	50	3.0	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.03
05	0603	50	0.2	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.003
06	0805	50	0.25	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.004
07	1206	50	1.0	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.01
08	2010	50	3.0	0.01, 0.02, 0.05 and 0.1	±10, ±25	0.03

NOTES

1.

Style	Critical Resistance (kΩ)
0603	12.25
0805	45
1206	40
2010	45

2.

Resistance (Ω)	Available Tolerances (±%)	Series
50 ≤ R < 100	0.05 and 0.1	Any value in the resistance range
100 ≤ R < 250	0.02, 0.05 and 0.1	
R ≥ 250	0.01, 0.02, 0.05 and 0.1	

3. Resistors with a Temperature Coefficient = ±5.0.10⁻⁶/°C over the temperature range T_{amb} = -22°C to T_{amb} = +70°C are also available.

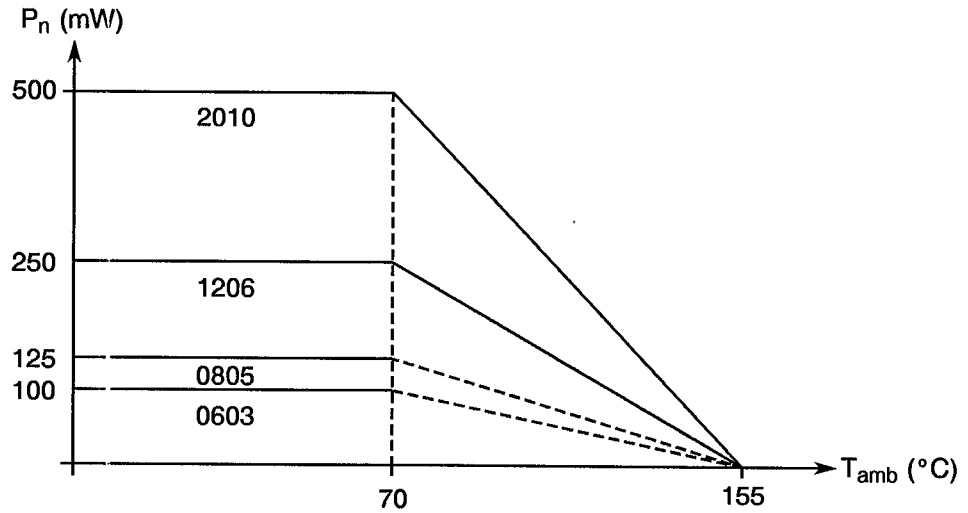
TABLE 1(b) - MAXIMUM RATINGS

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	°C	T _{amb}
6	Storage Temperature Range		T _{stg}	-55 to +155	°C	-
7	Soldering Temperature		T _{sol}	+260	°C	Note 3

NOTES

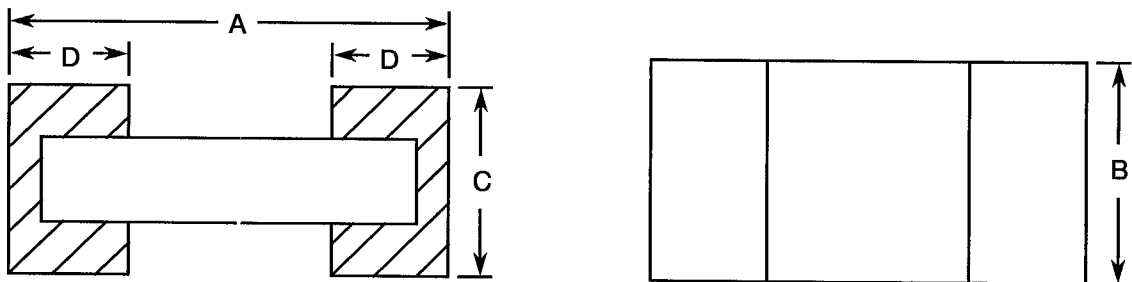
- At T_{amb} ≤ +70°C. For derating at T_{amb} > +70°C, see Figure 1.
- Shall never exceed Limiting Element Voltage.
- Duration 10 seconds maximum.

FIGURE 1 - PARAMETER DERATING INFORMATION



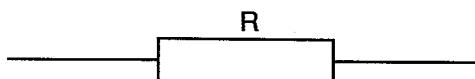
Rated Dissipation versus Temperature

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 ESCC 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 ESCC 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 ± 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 ESCC 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 shall be performed according to IEC 60115-1, clause 4.33, with the following conditions:-

Number of bends : 10.

Deflection : 1mm for style 2010, 2mm for all other styles.

Duration : $5s \pm 1s$.



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 subs rate 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 ESCC 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 ESCC 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 ESCC 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 ESCC 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:

Value (249 Ohms) _____ 2490P1
Tolerance ($\pm 0.02\%$) _____
Temperature Coefficient ($\pm 10.10^{-6}/^{\circ}\text{C}$) _____

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
2	25

4.5.3 The ESCC Component Number

Each component shall bear the ESCC 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 ESCC 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 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 ESCC 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.

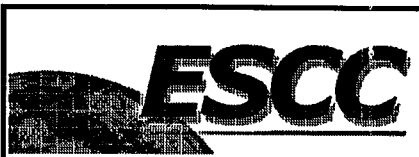


TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESCC 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	ESCC 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 TC = $\pm 10.10^{-6}/^\circ\text{C}$ TC = $\pm 25.10^{-6}/^\circ\text{C}$	-0.077 -0.193	+0.077 +0.193	%
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 TC = $\pm 10.10^{-6}/^\circ\text{C}$ TC = $\pm 25.10^{-6}/^\circ\text{C}$	-0.133 -0.333	+0.133 +0.333	%
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 = $\pm 5.0.10^{-6}/^\circ\text{C}$	-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.

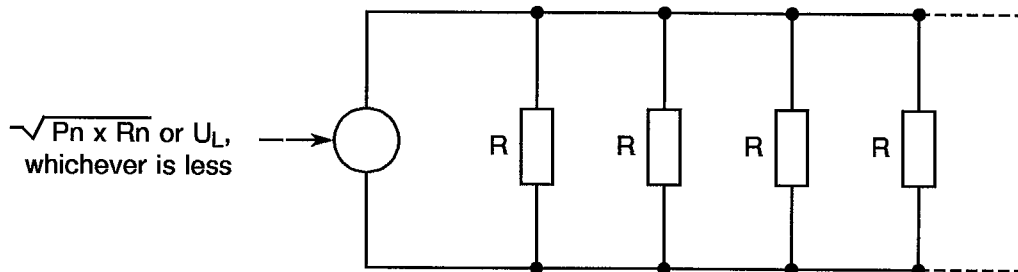
TABLE 4 - PARAMETER DRIFT VALUES

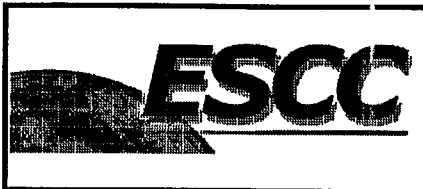
No.	Characteristics	Symbol	Spec. and/or Test Method	Test Conditions	Change Limits (Δ)	Unit
1	Resistance Change	$\frac{\Delta R_A}{R_A}$	As per Table 2	As per Table 2	± 0.02	%

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





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

The resistors shall be mounted as prescribed in ESCC 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 $T_{amb} = +22 \pm 3$ °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 ESCC 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 ESCC Generic Specification No. 4001. The conditions for high temperature storage shall be $T_{amb} = +155(+0 \dots 5)$ °C.



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

NO.	ESCC 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 + $\frac{0.05\Omega \times 100}{R_n}$)	-	%
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 ESCC 4001 (2)	R _i	1000	-	MΩ
04	Temperature Coefficient	Para. 9.7 Procedure I	Temperature Coefficient	Para. 9.5.1 of ESCC 4001	TC	(3)	(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 + $\frac{0.05\Omega \times 100}{R_n}$)	-	%
07	Robustness of Terminations	Para. 9.10.1 Adhesion	Initial Measurements Resistance Final Measurements Resistance Change	After Mounting Table 2 Item 1 Table 2 Item 1	- R _A ΔR _A /R _A	- Record Values ± (0.05 + $\frac{0.05\Omega \times 100}{R_n}$)	-	%
			Visual Examination	No damage, lifting, cracking or dry joints	-	-	-	
		Bend Strength of End Plate Facing	Initial Measurements Resistance Final Measurements Resistance Change	Table 2 Item 1 Board in bent position Table 2 Item 1	R _A ΔR _A /R _A	Record Values ± (0.05 + $\frac{0.05\Omega \times 100}{R_n}$)	-	-
			Visual Examination	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 + $\frac{0.05\Omega \times 100}{R_n}$)	-	%

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.	ESCC 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 DC load test and after a recovery period of 1-2 hrs No evidence of damage and marking legible Para. 9.6.1 of ESCC 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 After a recovery period of 1-2 hrs	R _A	Record Values		
Intermediate Measurements (1000 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 ESCC 4001 (2)	R _i	1000	-	MΩ		
	Para. 9.15 Chart V	Initial Measurements Resistance	Table 2 Item 1 After a recovery period of 1-2 hrs	R _A	Record Values			
Final Measurements (1000 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 ESCC 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.	ESCC 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	Table 2 Item 1	-	-	-			
			(1000 hrs)	No evidence of damage						
			Visual Examination	Table 2 Item 1	ΔR _A /R _A	± (0.1 + $\frac{0.05\Omega \times 100}{R_n}$)				%
			Resistance Change	Table 2 Item 1						
Final Measurements	Table 2 Item 1	-	-	-						
(2000 hrs)	After a recovery period of 1-2 hrs									
Visual Examination	Table 2 Item 1	ΔR _A /R _A	± (0.15 + $\frac{0.05\Omega \times 100}{R_n}$)			%				
Resistance Change	Table 2 Item 1									
Insulation Resistance	Para. 9.6.1 of ESCC 4001 (2)	R _i	1000	-			MΩ			
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 per Table 1(a).
4. For value of U_i, see Table 1(b) Item 4.