DOCUMENT CHANGE REQUEST

DCR number 339	Changes required for: General	Originator: S Thacker
Date: 2007/06/19	Date sent: 2007/06/19	Organisation: ESA/ESTEC
Status: IMPLEMENTED		

Title:	Resistors Fixed Chip Thick Film Based on Type CHP		
Number:	4001/026	Issue:	1

Other documents affected:

Page:

see below & attached

Paragraph:

see below & attached

Original wording:

Proposed wording:

See also attached mark-up for details.

Page 7 Table 1(a)
For Variant 05 correct the Critical Resistance value to be "112.5kohm" (was "112kohm")

Page 7 Table 1(b)
For Rated dissipation:
- correct Variant 03 style to be "1206" (was "1216")
- correct the Maximum ratings Units to be in "mW" (was in "W") e.g. Variant 01 to be "100mW" (was "0.1W")

For Insulation Voltage amend the symbol to be "UI" (was "Ui")

Page 8 Figure 1
Amend figure so that the "0" is positioned against the Y-axis (=0%)(no minimum value is specified for the X-axis)

Page 12 Para 4.5.3
Correct the example to read "400102601B (was "4001xxx01B")

Correct the Detail specification reference to be "4001026" (was "4001xxx")

DOCUMENT CHANGE REQUEST

DCR number 339	Changes required for: General	Originator: S Thacker
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Status: IMPLEMENTED		

Page 15 Table 6
Correct No.5 Voltage Proof Conditions to read "UI" (was "Ui")

Complete No.6 Solderability Test Methods and Conditions to read "Para. 9.9 Procedure I" (was "Para. 9.9")

Page 16 Table 6
Amend No.11 Climatic Sequence so that the "Insulation Resistance" inspection follows "Resistance Change" rather than being before it.

Page 17 Table 6 Notes
Correct note 3 to read "UI" (was "Ui").

Amend notes 4, 5, 6, 7 to remove the inner set of redundant parentheses for each limit value equation.
e.g. Note 4 to be " +/-(0.5 + 0.05ohm x 100/Rn)% " (was " +/-(0.5 + (0.05ohm x 100/Rn))% "

Justification:

All changes are editorial amendments only done for the purposes of correction, consistency and clarification.

Attachments:

DCR339att.pdf, DCR_Attachment_for_4001026.pdf, null

Modifications:

N/A

Approval signature:



Date signed:

2007-06-19

MARK-up for DCR

S.T

European Space Components Coordination

Pages 1 to 18

RESISTOR, FIXED, CHIP, THICK FILM

BASED ON TYPE CHP

ESCC Detail Specification No. 4001/026

Issue 1 2 Draft A	~~January~~ June 2007

Document Custodian: European Space Agency - see https://escies.org

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DCR No.	CHANGE DESCRIPTION
	Specification reissued to incorporate editorial changes per DCR.

See Helgo for No.

Variant	Style (Note 1)	Resistance Range R_n (Note 2)		Tolerance (± %) (Note 2)	Temperature Coefficient TC ($\pm 10^{-6}$/°C) (Note 2)	Critical Resistance (kΩ)	Weight max (g)
		Min (Ω)	Max (MΩ)				
05	2512	1	10	1, 2, 5	100, 200	112 → 112.5	0.042

NOTES:

1. See Figure 2
2.

Resistance (Ω)	Value Series	Available Tolerance (±%)	Available Temperature Coefficient ($\pm 10^{-6}$/°C)
$1 \leq R_n < 10$	Any value in the resistance range to 3 significant figures	2, 5	200
$10 \leq R_n < 1M$		1, 2, 5	100, 200
$R_n \geq 1M$		2, 5	200

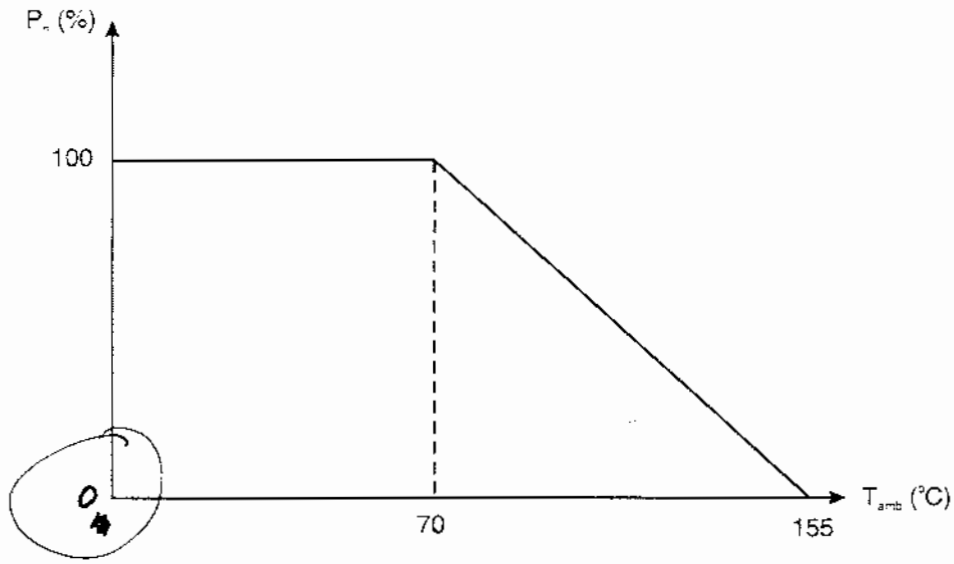
Table 1(b) - MAXIMUM RATINGS

No.	Characteristics	Variant	Style	Symbol	Maximum Rating	Unit	Remarks
1	Rated Dissipation	01 02 03 04 05	0603 0805 ~~1216~~ 1206 2010 2512	P_n	~~0.1~~ 100 ~~0.2~~ 200 ~~0.25~~ 250 ~~0.5~~ 500 ~~0.8~~ 800	~~W~~ mW	Note 1
2	Limiting Element Voltage	01 02 03 04 05	0603 0805 1206 2010 2512	U_L	50 100 200 300 300	V	-
3	Rated Voltage	All	All	U_R	$\sqrt{(P_n \times R_n)}$	V	Note 2
4	Insulation Voltage	01 02 03 04 05	0603 0805 1206 2010 2512	~~U_i~~ U_I	100 200 300 300 300	V	-
5	Operating Temperature Range	All	All	T_{op}	-55 to +155	°C	T_{amb}
6	Storage Temperature Range	All	All	T_{stg}	-55 to +155	°C	-
7	Soldering Temperature	All	All	T_{sol}	+260	°C	Note 3

NOTES:

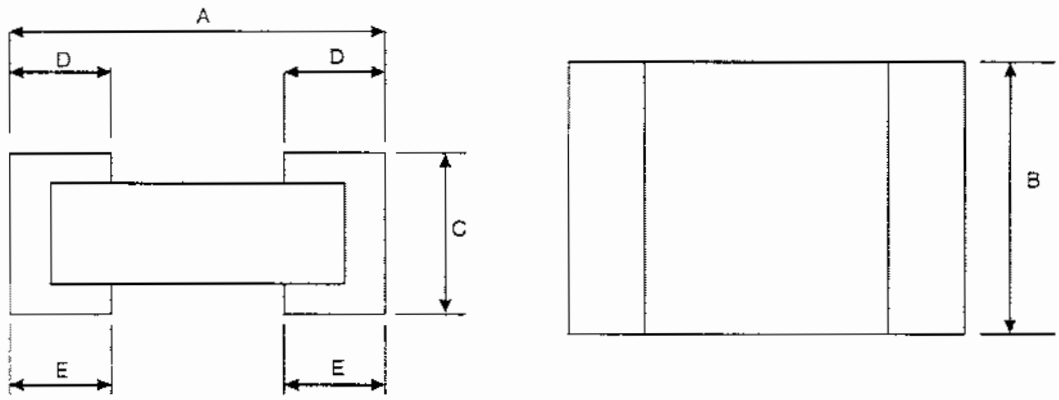
1. At $T_{amb} \leq +70°C$. For derating at $T_{amb} > +70°C$, see Figure 1.
2. Shall never exceed Limiting Element Voltage. R_n = rated resistance.
3. Duration 10 seconds maximum.

FIGURE 1- PARAMETER DERATING INFORMATION



Rated Dissipation versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



Variant	Style	Dimensions (mm)							
		A		B		C		D, E	
		Min	Max	Min	Max	Min	Max	Min	Max
01	0603	1.36	1.68	0.72	0.98	0.38	0.53	0.25	0.51
02	0805	1.75	2.07	1.14	1.4	0.38	0.53	0.25	0.51
03	1206	2.89	3.21	1.47	1.73	0.38	0.53	0.25	0.51
04	2010	4.92	5.24	2.41	2.67	0.5	0.63	0.25	0.64
05	2512	6.19	6.51	2.93	3.32	0.5	0.63	0.25	0.64

4.5.3 ESCC Component Number

The ESCC Component Number shall be constituted and marked as follows:

Example : 4001026 01B

- Detail Specification Reference : 4001026
- Component Type Variant Number : 01 (as required)
- 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, measurements shall be performed at T_{amb}=+22±3°C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3.

The distribution of the sample shall be as follows:

- 1/3 with lowest resistance value
- 1/3 with highest resistance value
- 1/3 with 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 as specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at T_{amb}=+22±3°C. The parameter drift values (Δ) applicable to the parameters scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit values 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 ESCC Generic Specification No. 4001. The conditions for Burn-in shall be as specified in Table 5 of this specification.

After 168 (+12 -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 marking shall still be legible.

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 (Note 1)	Test Methods 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	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements After a recovery period of 1-2 hrs					
			Visual Examination	No evidence of damage and marking legible	-	-		-
			Chart II Resistance	Table 2 item 1	R_A	Table 2 Item 1		Ω
			Chart IV Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 4		%
02	Seal Test (Hermetically Sealed only)	Para. 9.3	Not applicable	-	-	-	-	-
03	Insulation Resistance (Insulated only)	Para. 9.6	Final Measurements Insulation Resistance	Para. 9.6.2 of ESCC 4001 (Note 2)	R_i	1000	-	MΩ
04	Temperature Coefficient	Para. 9.7 Procedure I	Temperature Coefficient	Para. 9.5.1 of ESCC 4001	TC	-100 -200	+100 +200	10^{-6}/°C
05	Voltage Proof	Para. 9.8.2	During test	1.4 x U_T for 60 ± 5 sec. Note 3	-	-	-	-
			Visual Examination	No breakdown or flashover	-	-	-	-
06	Solderability	Para. 9.9 Procedure I	Initial Measurements Resistance	After Drying Table 2 item 1	R_A	Record Values		Ω
			Final Measurements 24 ± 4hrs after soldering					
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
07	Robustness of Terminations	Para. 9.10.2	-	After Mounting				
		Adhesion	Initial Measurements Resistance	Table 2 item 1	R_A	Record Values		Ω
			Final Measurements Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
			Visual Examination	No damage, lifting, cracking or dry joints	-	-	-	-
		Bend Strength of End Plate Facing	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements Board in bent position					
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
			Visual Examination	No damage, lifting, cracking or dry joints	-	-	-	-

No.	ESCC Generic Spec. No. 4001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
08	Resistance to Soldering Heat	Para. 9.11 Procedure I	Initial Measurements Resistance Final Measurements	After Drying Table 2 Item 1	R_A	Record Values		Ω
			Visual Examination	No evidence of damage and marking legible	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 4		%
09	Rapid Change of Temperature	Para. 9.12	Initial Measurements Resistance Final Measurements	Table 2 item 1 After a recovery period of 1-2 hrs	R_A	Record Values		Ω
			Visual Examination	No evidence of damage	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
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	After Drying Table 2 Item 1 Following completion of DC load test and after a recovery period of 1-2 hrs	R_A	Record Values		Ω
			Visual Examination	No evidence of damage and marking legible	-	-	-	-
			Insulation Resistance	Para. 9.6 of ESCC 4001, Note 2	R_i	1000	-	MΩ
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
12	Operating Life	Para. 9.15 Chart IV	Initial Measurements Resistance Intermediate Measurements (1000 hrs)	Table 2 Item 1 After a recovery period of 1-2 hrs	R_A	Record Values		Ω
			Visual Examination	No evidence of damage	-	-	-	-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
			Final Measurements (2000 hrs) Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-	-	-
			Resistance Change	Table 2, Item 1	$\Delta R_A/R_A$	Note 7		%
			Insulation Resistance	Para. 9.6 of ESCC 4001, Note 2	R_i	1000	-	MΩ

No.	ESCC Generic Spec. No. 4001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
		Para. 9.15 Chart V	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements (1000 hrs) Visual Examination	After a recovery period of 1 -2 hrs No evidence of damage	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
			Insulation Resistance	Para. 9.6 of ESCC 4001, Note 2	R_i	1000	-	MΩ
13	High Temperature Storage	Para. 9.16	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Intermediate Measurements (1000 hrs) Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
			Final Measurements (2000 hrs) Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-	-	-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 7		%
			Insulation Resistance	Para. 9.6 of ESCC 4001, Note 2	R_i	1000	-	MΩ
14	Permanence of Marking	Para. 9.19	-	-	-	-	-	-

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.
4. $\Delta R_A/R_A$ limit : $\pm(0.5 + 0.05\Omega \times 100/R_n)\%$ ← $\pm(0.5 + 0.05\Omega \times 100/R_n)\%$
5. $\Delta R_A/R_A$ limit : $\pm(0.25 + 0.05\Omega \times 100/R_n)\%$ ← $\pm(0.25 + 0.05\Omega \times 100/R_n)\%$
6. $\Delta R_A/R_A$ limit : $\pm(1 + 0.05\Omega \times 100/R_n)\%$ ← $\pm(1 + 0.05\Omega \times 100/R_n)\%$
7. $\Delta R_A/R_A$ limit : $\pm(1.5 + (0.05\Omega \times 100/R_n))\%$ ← $\pm(1.5 + 0.05\Omega \times 100/R_n)\%$

MARK-up for DCR 339

S.T

European Space Components Coordination

Pages 1 to 18

RESISTOR, FIXED, CHIP, THICK FILM

BASED ON TYPE CHP

ESCC Detail Specification No. 4001/026

June

Issue 1 2 Draft A	~~January~~ 2007

esa

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DCR No.	CHANGE DESCRIPTION
	Specification reissued to incorporate editorial changes per DCR.

See Helgo W No (339)

Variant	Style (Note 1)	Resistance Range R_n (Note 2)		Tolerance (± %) (Note 2)	Temperature Coefficient TC ($\pm 10^{-6}$/°C) (Note 2)	Critical Resistance (kΩ)	Weight max (g)
		Min (Ω)	Max (MΩ)				
05	2512	1	10	1, 2, 5	100, 200	112 → 112.5	0.042

NOTES:

1. See Figure 2
2.

Resistance (Ω)	Value Series	Available Tolerance (±%)	Available Temperature Coefficient ($\pm 10^{-6}$/°C)
$1 \leq R_n < 10$	Any value in the resistance range to 3 significant figures	2, 5	200
$10 \leq R_n < 1M$		1, 2, 5	100, 200
$R_n \geq 1M$		2, 5	200

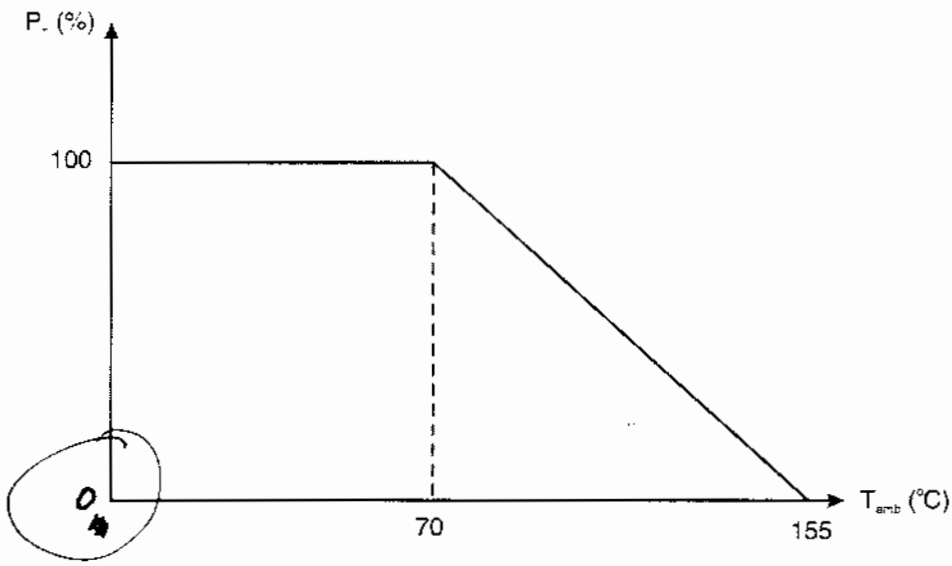
Table 1(b) - MAXIMUM RATINGS

No.	Characteristics	Variant	Style	Symbol	Maximum Rating	Unit	Remarks
1	Rated Dissipation	01 02 03 04 05	0603 0805 ~~1216~~ 1206 2010 2512	P_n	~~0.1~~ 100 ~~0.2~~ 200 ~~0.25~~ 250 ~~0.5~~ 500 ~~0.8~~ 800	~~W~~ mW	Note 1
2	Limiting Element Voltage	01 02 03 04 05	0603 0805 1206 2010 2512	U_L	50 100 200 300 300	V	-
3	Rated Voltage	All	All	U_R	$\sqrt{(P_n \times R_n)}$	V	Note 2
4	Insulation Voltage	01 02 03 04 05	0603 0805 1206 2010 2512	~~U_i~~ U_I	100 200 300 300 300	V	-
5	Operating Temperature Range	All	All	T_{op}	-55 to +155	°C	T_{amb}
6	Storage Temperature Range	All	All	T_{stg}	-55 to +155	°C	-
7	Soldering Temperature	All	All	T_{sol}	+260	°C	Note 3

NOTES:

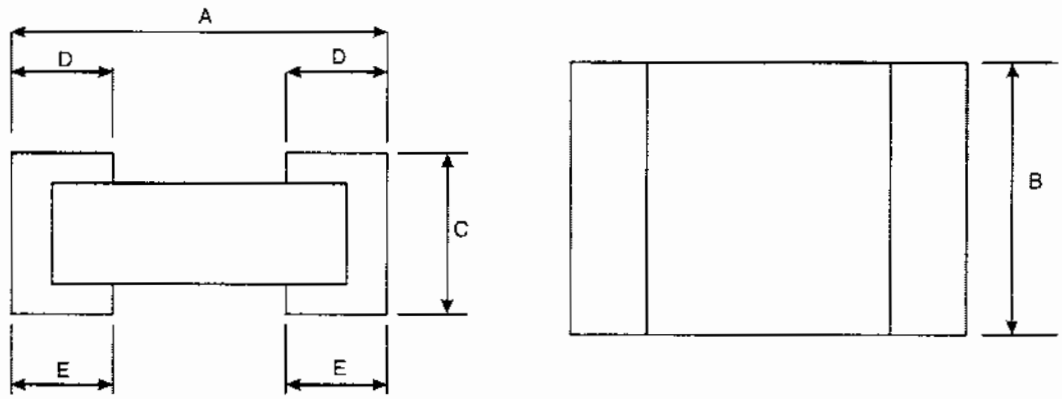
1. At $T_{amb} \leq +70°C$. For derating at $T_{amb} > +70°C$, see Figure 1.
2. Shall never exceed Limiting Element Voltage. R_n = rated resistance.
3. Duration 10 seconds maximum.

FIGURE 1- PARAMETER DERATING INFORMATION



Rated Dissipation versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



Variant	Style	Dimensions (mm)							
		A		B		C		D, E	
		Min	Max	Min	Max	Min	Max	Min	Max
01	0603	1.36	1.68	0.72	0.98	0.38	0.53	0.25	0.51
02	0805	1.75	2.07	1.14	1.4	0.38	0.53	0.25	0.51
03	1206	2.89	3.21	1.47	1.73	0.38	0.53	0.25	0.51
04	2010	4.92	5.24	2.41	2.67	0.5	0.63	0.25	0.64
05	2512	6.19	6.51	2.93	3.32	0.5	0.63	0.25	0.64

4.5.3 ESCC Component Number

The ESCC Component Number shall be constituted and marked as follows:

Example : 4001026 01B

- Detail Specification Reference : 4001026
- Component Type Variant Number : 01 (as required)
- 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, measurements shall be performed at T_{amb}=+22±3°C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3.

The distribution of the sample shall be as follows:

- 1/3 with lowest resistance value
- 1/3 with highest resistance value
- 1/3 with 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 as specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at T_{amb}=+22±3°C. The parameter drift values (Δ) applicable to the parameters scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit values 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 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 marking shall still be legible.

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 (Note 1)	Test Methods 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	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements After a recovery period of 1-2 hrs					
			Visual Examination	No evidence of damage and marking legible	-	-		-
			Chart II Resistance	Table 2 item 1	R_A	Table 2 Item 1		Ω
			Chart IV Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 4		%
02	Seal Test (Hermetically Sealed only)	Para. 9.3	Not applicable	-	-	-	-	-
03	Insulation Resistance (Insulated only)	Para. 9.6	Final Measurements Insulation Resistance	Para. 9.6.2 of ESCC 4001 (Note 2)	R_i	1000	-	MΩ
04	Temperature Coefficient	Para. 9.7 Procedure I	Temperature Coefficient	Para. 9.5.1 of ESCC 4001	TC	-100 -200	+100 +200	10^{-6}/°C
05	Voltage Proof	Para. 9.8.2	During test	1.4 x U_T for 60 ± 5 sec (Note 3)	-	-	-	-
			Visual Examination	No breakdown or flashover	-	-	-	-
06	Solderability	Para. 9.9 Procedure I	Initial Measurements Resistance	After Drying Table 2 item 1	R_A	Record Values		Ω
			Final Measurements 24 ± 4hrs after soldering					
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
07	Robustness of Terminations	Para. 9.10.2	-	After Mounting				
		Adhesion	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
			Visual Examination	No damage, lifting, cracking or dry joints	-	-	-	-
		Bend Strength of End Plate Facing	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements Board in bent position					
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
			Visual Examination	No damage, lifting, cracking or dry joints	-	-	-	-

No.	ESCC Generic Spec. No. 4001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
08	Resistance to Soldering Heat	Para. 9.11 Procedure I	Initial Measurements Resistance	After Drying Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements Visual Examination	No evidence of damage and marking legible	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 4		%
09	Rapid Change of Temperature	Para. 9.12	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5		%
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	After Drying Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements Visual Examination	Following completion of DC load test and after a recovery period of 1-2 hrs No evidence of damage and marking legible	-	-	-	-
			Insulation Resistance	Para. 9.6 of ESCC 4001 (Note 2)	R_i	1000	-	MΩ
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
12	Operating Life	Para. 9.15 Chart IV	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Intermediate Measurements (1000 hrs) Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-	-	-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
			Final Measurements (2000 hrs) Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-	-	-
			Resistance Change	Table 2, Item 1	$\Delta R_A/R_A$	Note 7		%
			Insulation Resistance	Para. 9.6 of ESCC 4001 (Note 2)	R_i	1000	-	MΩ

No.	ESCC Generic Spec. No. 4001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
		Para. 9.15 Chart V	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Final Measurements (1000 hrs) Visual Examination	After a recovery period of 1 -2 hrs No evidence of damage	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
			Insulation Resistance	Para. 9.6 of ESCC 4001 (Note 2)	R_i	1000	-	MΩ
13	High Temperature Storage	Para. 9.16	Initial Measurements Resistance	Table 2 Item 1	R_A	Record Values		Ω
			Intermediate Measurements (1000 hrs) Visual Examination	~~After a recovery~~ period of 1-2 hrs No evidence of damage	-	-		-
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6		%
			Final Measurements (2000 hrs) Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-	-	-
			Resistance Change	Table 2 ~~Item 1~~	$\Delta R_A/R_A$	Note 7		%
			Insulation Resistance	Para. 9.6 of ESCC 4001 (Note 2)	R_i	1000	-	MΩ
14	Permanence of Marking	Para. 9.19	-	-	-	-	-	-

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.
4. $\Delta R_A/R_A$ limit : ±(0.5 +(0.05Ω x 100/R_n))% ← ±(0·5 + 0·05Ω x 100/R_n)%
5. $\Delta R_A/R_A$ limit : ±(0.25 +(0.05Ω x 100/R_n))% ← ±(0·25 + 0·05Ω x 100/R_n)%
6. $\Delta R_A/R_A$ limit : ±(1 +(0.05Ω x 100/R_n))% ← ±(1 + 0.05Ω x 100/R_n)%
7. $\Delta R_A/R_A$ limit : ±(1.5 +(0.05Ω x 100/R_n))% ← ±(1·5 + 0·05Ω x 100/R_n)%