CAPACITOR FILTERS, C-TYPE, FEEDTHROUGH, ELECTROMAGNETIC INTERFERENCE SUPPRESSION, NON-HERMETICALLY SEALED, BASED ON TYPE SFC040

ESCC Detail Specification No. 3008/032

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'A'	Apr. '97	P1. Cover page	None
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		P9. Para. 4.2.4 : Deviation "(d)" added	221384
		Para. 4.2.5 : Deviation "(c)" added	221384
		P18. Table 6 : No. 13, Insertion Loss deleted	221384

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APPENDICES (Applicable to specific Manufacturers only)

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a Capacitor Filter, C-Type, Feedthrough, Electromagnetic Interference Suppression, Non-Hermetically Sealed, based on Type SFC040. It shall be read in conjunction with ESA/SCC Generic Specification No. 3008, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

Variants of the basic type capacitor filters and the range of components 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 capacitor filters specified herein, are as scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

The parameter derating information applicable to the capacitor filters specified herein, is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

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

1.6 FUNCTIONAL DIAGRAM

The functional diagram, showing lead identification, of the capacitor filters 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. 3008 for Capacitors and Capacitor Filters, Feedthrough.

(b) MIL-STD-202, Test Methods for Electronic and Electrical Component Parts.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply. In addition, the following abbreviations are used:-

V_T = Test Voltage.

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

(1) Variant (Notes 1 and 2)	(2) Rated Voltage U_R (V)		(3) Capacitance Range C	(4) Voltage Proof VP	(5) Voltage Drop V_{dr}	(6) d.c. Resistance Rs	(7) Rated Current I_R
	(a) −55°C/ +85°C	(b) +85°C/ +125°C	(pF) (±20%) (E6 Series)	(V)	(V)	(mΩ)	(A)
01, 04, 07, 10	50	25	470 to 22 000	125	0.1	10	10
02, 05, 08, 11	100	75	470 to 6 800	250	0.1	10	10
03, 06, 09, 12	200	150	470 to 2 200	500	0.1	10	10

NOTES

1. See Insertion Loss requirements in the following Table.
2. See the Table below and Figure 2 for physical characteristics.

VARIANT	CASE THREAD E	INPUT TERMINAL
01 to 03	U : 8-32 UNC	Straight
04 to 06	U : 8-32 UNC	Button
07 to 09	I : M4×0.70	Straight
10 to 12	I : M4×0.70	Button

INSERTION LOSS VALUES ACCORDING TO THE CAPACITANCE VALUE

(8) Capacitance (pF) (E6 Series)	(9) Insertion Loss (I_L) (dB)			
	10MHz	100MHz	1.0GHz	10GHz
470	-	14	34	54
680	-	17	37	57
1 000	-	21	41	61
1 500	-	24	44	64
2 200	-	27	48	68
3 300	11	31	52	70
4 700	14	34	54	70
6 800	17	37	57	70
10 000	21	41	61	70
15 000	25	45	65	70
22 000	28	48	68	70

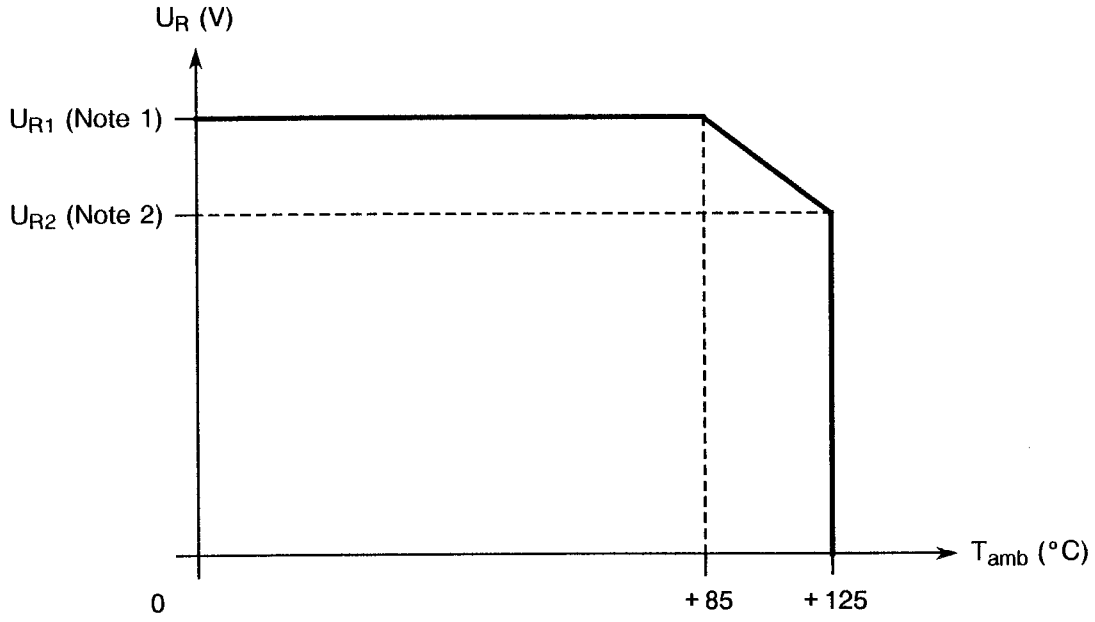
TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristic	Symbol	Maximum Ratings	Unit	Remarks
1	Rated d.c. Voltage	U_R	See Table 1(a) Column 2	V	Notes 1 and 2
2	Voltage Drop	V_{dr}	100	mV	
3	d.c. Resistance	Rs	10	mΩ	
4	Rated Current	I_R	10	A	Note 3
5	Torque	T_{qe}	0.4	Nm	
6	Operating Temperature Range	T_{op}	−55 to +125	°C	T_{amb}
7	Storage Temperature Range	T_{stg}	−55 to +125	°C	
8	Soldering Temperature	T_{sol}	+260	°C	Note 4

NOTES

1. At $T_{amb} \leq +85°C$. For derating at $T_{amb} > +85°C$, see Figure 1.
2. The addition of d.c. applied voltage and ripple voltage shall never exceed the rated d.c. voltage.
3. d.c. and low frequency.
4. Duration 10 seconds maximum at a distance of not less than 2.0mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed.

FIGURE 1 - PARAMETER DERATING INFORMATION

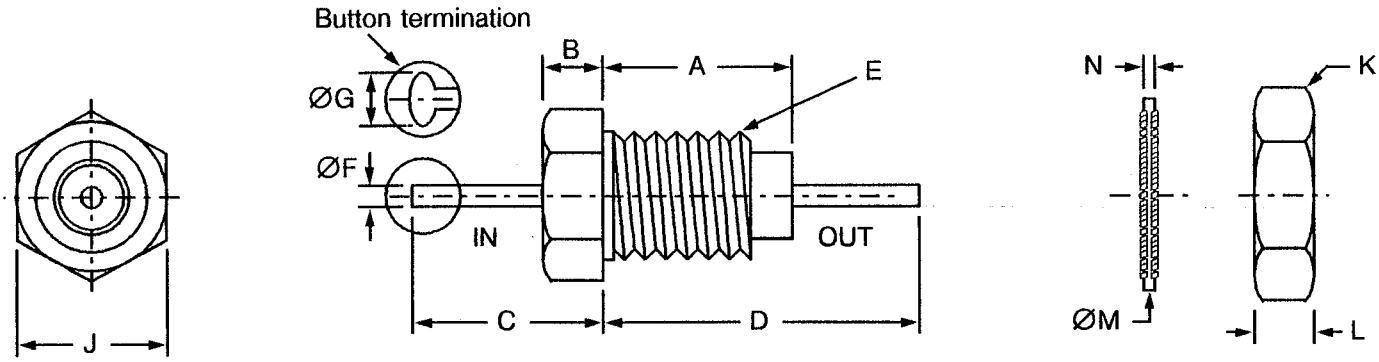


Rated Voltage versus Temperature

NOTES

1. See U_{R1} Voltage value for each variant on Table 1(a), Column 2(a).
2. See U_{R2} Voltage value for each variant on Table 1(a), Column 2(b).

FIGURE 2 - PHYSICAL DIMENSIONS

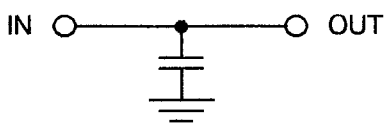


Symbol	Millimetres		Notes
	Min.	Max.	
A	6.90	7.10	
B	2.40	2.60	
C	10.00	12.00	Variants 01 to 03, 07 to 09
	7.00	9.00	Variants 04 to 06, 10 to 12
D	17.00	19.00	Variants 01 to 03, 07 to 09
	21.00	23.00	Variants 04 to 06, 10 to 12
E	See Table 1(a)		Thread
ØF	0.72	0.88	1, 2
ØG	1.00	-	3
J	-	5.00	
K	-	6.00	Across flats
L	-	2.50	
ØM	-	6.40	4
N	-	0.40	4

NOTES

1. Lead finish shall commence not more than 1.5mm from encapsulant.
2. The terminals are defined as rigid.
3. Applicable only to Variants 04 to 06 and 10 to 12.
4. Internal fan lockwasher.

FIGURE 3 - FUNCTIONAL DIAGRAM



4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the components specified herein are stated in this specification and ESA/SCC Generic Specification No. 3008 for Capacitors and Capacitor Filters, Feedthrough. Deviations from the Generic Specification, applicable to this specification only, are detailed 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. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

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

(a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

(b) Para. 9.12, Accelerated Damp Heat: Shall not be performed.

(c) Para. 9.15, Immersion: Shall not be performed.

(d) Para. 9.19, Operating Life: At intermediate and final measurements, Insertion Loss shall not be performed.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

(b) Para. 9.15, Immersion: Shall not be performed.

(c) Para. 9.19, Operating Life: At intermediate and final measurements, Insertion Loss shall not be performed.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the components specified herein shall be verified in accordance with the requirements set out in Para. 9.5 of ESA/SCC Generic Specification No. 3008 and they shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the components specified herein shall be 2.0 grammes.

4.3.3 Robustness of Terminations

The requirements for the robustness of terminations tests are specified in Section 9 of ESA/SCC Generic Specification No. 3008. The leads are defined as "Rigid".

- Test Ua1, Tensile: The load shall be 10N.

4.3.4 Solderability

The requirements for solderability testing are specified in Section 9 of ESA/SCC Generic Specification No. 3008.

Test Method 1 shall apply and a thermal screen of 1.6mm may be used. The terminal shall be immersed up to 2.0mm from the body.

4.3.5 Seal Test

Not applicable.

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 case shall be silver plated brass and with potting encapsulant sealing the filter element.

4.4.2 Lead Material and Finish

The lead material shall be Type 'A' with Type '10' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

4.4.3 Accessories

Nut : As per Figure 2, brass, silver-plated.

Lock-Washer : As per Figure 2, bronze, silver-plated.

4.5 MARKING

4.5.1 General

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

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

(a) Lead Identification.

(b) The SCC Component Number.

(c) Electrical Characteristics and Ratings.

(d) Traceability Information.

4.5.2 Lead Identification

Not applicable.

4.5.3 The SCC Component Number

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

300803201B

Detail Specification Number

Type Variant (see Table 1(a))

Testing Level (B or C, as applicable)

4.5.4 Electrical Characteristics and Ratings

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

(a) Capacitance Value.

(b) Tolerance.

(c) Rated Voltage.

The information shall be constituted and marked as follows:-

682ME

Capacitance Value (6800pF)

Tolerance (±20%)

Rated Voltage (100V)

4.5.4.1 Capacitance Values

The capacitance values shall be expressed by means of the following codes. The unit quantity for marking shall be picofarads (pF).

Capacitance Value (pF)	Code
$XX10^1$	XX1
$XX10^2$	XX2
$XX10^3$	XX3

4.5.4.2 Tolerance

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

Tolerance (±%)	Code Letter
20	M

4.5.4.3 Rated Voltage

The rated voltage shall be indicated by the code letters specified hereafter.

Rated Voltage (U_R) (V)	Code Letter
50	C
100	E
200	G

4.5.5 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, 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 at high and low temperatures are scheduled in Table 3. Measurements shall be performed at $T_{amb} = 125(+0-5)$ °C and $-55(+5-0)$ °C respectively.

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 $T_{amb} = +22 \pm 3$ °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 ESA/SCC Generic Specification No. 3008. The conditions for burn-in shall be as specified in Table 5(a) of this specification.

4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS

No.	Characteristics	Symbol	ESA/SCC 3008 Test Method	Test Conditions	Limits		Unit
					Min	Max	
1	Voltage Drop	V_{dr}	Para. 9.4.1.5	I_R = 10A	-	0.1	V
2	Voltage Proof	VP	Para. 9.4.1.2	V = 2.5U_R	Note 1	-	V
3	Insulation Resistance	Ri	Para. 9.4.1.3	Para. 9.4.1.3	10^4	-	MΩ

NOTES

1. See Column 4 of Table 1(a).

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS

No.	Characteristics	Symbol	ESA/SCC 3008 Test Method	Test Conditions	Limits		Unit
					Min	Max	
4	Insertion Loss	I_{L1}	Para. 9.4.1.4	f = 10MHz Note 1	Note 2	-	dB
5	Insertion Loss	I_{L2}	Para. 9.4.1.4	f = 100MHz Note 1	Note 2	-	dB
6	Insertion Loss	I_{L3}	Para. 9.4.1.4	f = 1.0GHz Note 1	Note 2	-	dB
7	Insertion Loss	I_{L4}	Para. 9.4.1.4	f = 10GHz Note 3	Note 2	-	dB
8	Capacitance	C	Para. 9.4.1.1	Para. 9.4.1.1	Note 4	-	pF

NOTES

1. Measurements at rated current to be made only during Chart IV testing in Subgroups II or III. Measurements without load current to be made during Charts II, III and V.
2. See Column 9 of Table 1(a).
3. Measurements at this frequency to be made only during Chart IV testing.
4. See Column 3 of Table 1(a).

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	Characteristics	Symbol	ESA/SCC 3008 Test Method	Test Conditions (Note 1)	Limits		Unit
					Min	Max	
3	Insulation Resistance	Ri	Para. 9.4.1.3	Para. 9.4.1.3 Note 2	10^3	-	MΩ
4	Insertion Loss	I_{L1}	Para. 9.4.1.4	f = 10MHz No current.	Note 3	-	dB
5	Insertion Loss	I_{L2}	Para. 9.4.1.4	f = 100MHz No current.	Note 3	-	dB
6	Insertion Loss	I_{L3}	Para. 9.4.1.4	f = 1.0GHz No current.	Note 3	-	dB

NOTES

1. If more than 20 units have to be measured, the measurement shall be performed on a sample basis in accordance with Inspection Level I, Table IIA, AQL = 1.0% of IEC Publication No. 410.
2. Insulation resistance is to be performed only at high temperature.
3. See Column 9 of Table 1(a).

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
8	Capacitance Change	$\frac{\Delta C}{C}$	As per Table 2	As per Table 2	± 10	%

TABLE 5(a) - CONDITIONS FOR BURN-IN TESTS

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+125(+0−3)	°C
2	Test Voltage	V_T	$2 \times U_R$ at +125°C Note 1	V

NOTES
1. Applied between one terminal and the case. See Column 2(b) of Table 1(a) for value of U_R.

TABLE 5(b) - CONDITIONS FOR OPERATING LIFE TESTS

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+125(+0−3)	°C
2	Test Voltage	V_T	$2 \times U_R$ at +125°C Note 1	V
3	Rated Current	I_R	10 Note 2	A

NOTES
1. Applied between one terminal and the case. See Column 2(b) of Table 1(a) for value of U_R.
2. To flow between the terminals.

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

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION No. 3008)

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 scheduled in Table 6. 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. 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 test are specified in Section 9 of ESA/SCC Generic Specification No. 3008. The conditions for operating life testing shall be as specified in Table 5(b) of this specification.

4.8.5 Electrical Circuit for Operating Life Tests (Figure 5)

Not applicable.

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

NO.	ESA/SCC GENERIC SPEC. NO. 3008		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Seal Test (Hermetically Sealed)	Para. 9.6	Not applicable					
02	External Visual Inspection	Para. 9.7 and Paras 4.2.4 and 4.2.5 of this spec.	**Final Measurements** Visual Inspection	ESA/SCC No. 20500	-	-	-	
03	Temperature Rise	Para. 9.9	Temperature Rise	Rated Current (3)	-	-	25	°C
04	Shock	Para. 9.10	**Measurements during Tests** **Final Measurements** Visual Examination Insertion Loss	100% U_R (2) applied No Open or Short Circuits >0.1ms No Mechanical Damage Table 2 Items 4 to 7	- I_L	- Table 2	- -	
05	Vibration	Para. 9.11	**Measurements during Tests** During Last Cycle **Final Measurements** Visual Examination Insertion Loss	Rated Current (3) and 100% U_R (2) applied No Open or Short Circuits >0.1ms No Mechanical Damage Table 2 Items 4 to 7	- - I_L	- - Table 2	- - -	
06	Accelerated Damp Heat	Para. 9.12 and Para. 4.2.4 of this spec.	Not applicable					
07	Low Air Pressure	Para. 9.13	**Measurements during Tests** Voltage Proof Visual Examination **Final Measurements** Visual Examination	During last 5 minutes Table 2 Item 2 No breakdown, flashover, deformation or seepage No breakdown, flashover, deformation or seepage	VP - -	125% U_R (2) - -	- - -	
08	Robustness of Terminations	Para. 9.14 and Para. 4.3.3 of this spec.	**Final Measurements** Visual Examination Voltage Drop	No damage Table 2 Item 1	- V_{dr}	- -	- Table 2	
09	Immersion	Para. 9.15 and Paras 4.2.4 and 4.2.5 of this spec.	Not applicable					
10	Overload	Para. 9.16	 **Final Measurements** Insulation Resistance Voltage Drop Visual Examination	140% of Rated Current (3) for 15 mins min. Table 2 Item 3 Table 2 Item 1 No damage	 Ri V_{dr} -	 Table 2 - -	 - Table 2 -	

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. For U_R, see Column 2(a) of Table 1(a).
3. For I_R, see Column 7 of Table 1(a).
4. Greater than 50% of the value given in Table 2.
5. Greater than 10% of the value given in Table 2.

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. 3008		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
11	Resistance to Soldering Heat	Para. 9.17	**Final Measurements**	After recovery of 1 to 2 hrs				
			Visual Examination	No damage	-	-	-	
			Insulation Resistance	Table 2 Item 3	Ri	Table 2	-	
			Insertion Loss	Table 2 Items 4 to 8	I_L	Table 2	-	
12	Solderability	Para. 9.18 and Para. 4.3.4 of this spec.	**Final Measurements** Visual Examination	IEC No. 68-2-20 Para. 4.6.4, 4.7.4 or 4.9.3	-	-	-	
13	Operating Life	Para. 9.19	**Initial Measurements**					
			Capacitance	Table 2 Item 8	C	Record values		
			During Tests	No Open or Short Circuit	-	-	-	
			Intermediate Measurements					
			Insulation Resistance	Table 3 Item 3 After 24 hrs recovery	Ri	Table 3	-	
			Voltage Proof	Table 2 Item 2	VP	90% U_R (2)	-	
			Insulation Resistance	Table 2 Item 3	Ri	(4)	-	
			Capacitance Change	Table 2 Item 8	ΔC/C	-	Table 4	
			Final Measurements					
			Insulation Resistance	Table 3 Item 3 After 24 hrs recovery	Ri	Table 3	-	
			Voltage Proof	Table 2 Item 2	VP	90% U_R (2)	-	
			Insulation Resistance	Table 2 Item 3	Ri	(4)	-	
			Capacitance Change	Table 2 Item 8	ΔC/C	-	Table 4	
14	Corrosion	Para. 9.20	**Final Measurements** Visual Examination	No corrosion, damage or obliteration of marking	-	-	-	
15	Permanence of Marking	Para. 9.21	**Final Measurements** Visual Examination	No corrosion or obliteration of marking	-	-	-	
16	Damp Heat (Non-hermetically Sealed)	Para. 9.24	**Final Measurements**	After 4 hrs recovery				
			Visual Examination	No cracking or encapsulant separation	-	-	-	
			Insulation Resistance	Table 2 Item 3	Ri	(5)	-	

NOTES: See Page 17.

APPENDIX 'A'

AGREED DEVIATIONS FOR EUROFARAD (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Paras. 4.2.2 and 4.2.3	(a) Para. 9.4.1.5, Voltage Drop: Voltage Drop may be performed as a d.c. Resistance measurement in accordance with MIL-STD-202, Method 303. In this case, the maximum value of d.c. Resistance (Rs) shall be as specified in Column 6 of Table 1(a).