CAPACITORS, FIXED, TANTALUM,

SOLID ELECTROLYTE,

BASED ON TYPE CSR23

ESCC Detail Specification No. 3002/001

ISSUE 1

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Pages 1 to 21

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space components
coordination group

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Issue 3	April 1994		
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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 2 and incorporates all modifications defined in Revision 'A' to Issue 2 and the changes introduced in the following DCR's:-		
		Cover page		None
		DCN		None
		Para. 2.	: MIL-STD-1276 deleted	21025
		Table 1(a)	: Column headings clarified and numbered	22872
			: Second D/F column deleted	22872
			: For Type No. 825KJ, weight corrected	23603
		Table 1(b)	: "Type No." column deleted	22872
			: No. 1, "Note 1" added to Remarks column	22872
			: No. 2, Symbol amended, Remarks deleted and "T_{amb}" added	22872
			: No. 4, Symbol amended and "Note 2" added to Remarks column	22872
		Figure 1	: Title amended and undertitle added	22872
		Figure 2	: Imperial dimensions deleted	23603
		Para. 4.2.3	: Text amended	22872
		Para. 4.2.4	: Title amended	22872
		Para. 4.3.1	: Text amended	22872
		Para. 4.3.3	: Title amended	22872
			: First sentence amended	22872
			: Last sentence deleted	22872
		Para. 4.4.2	: Title amended	21025
			: Text rewritten	21025
		Para. 4.5.1	: Second alinea amended	23603
			: Last alinea amended	22872/ 23603
		Para. 4.5.2	: Type Variant added	21021
			: Note added	22872
		Para. 4.5.3	: "Numerical" replaced by "Capacitance"	22872
			: "(d)" deleted in toto	23603
			: Tolerance and Rated Voltage values added	22872
		Para. 4.5.3.1	: "Numerical" replaced by "Capacitance"	22872
		Para. 4.5.3.2	: "Numerical" replaced by "Capacitance"	22872
		Para. 4.5.3.3	: Column heading amended and "V" added to values	23603
		Para. 4.5.3.4	: "(see Figure 2)" added	22872
		Para. 4.7	: Title amended	22872
		Para. 4.7.1	: Second sentence amended	22872
			: Third sentence amended	22872
		Para. 4.7.3	: New paragraph added	22872
		Table 2	: Table restructured and Notes amended/added	22872
		Table 3	: Table restructured and Notes 2 to 5 added	22872
		Figure 4	: Entry added	22872
		Table 4	: Table restructured and Notes renumbered and amended	22872
		Table 5	: Renumbered to "5(a)"	22872
			: Condition amended	22872
			: Note amended	22872
		Table 5(b)	: Added from Table 7	22872
		Figure 5	: Entry added	22872
		Para. 4.8	: Title amended	22872
		Paras. 4.8.1 to 4.8.3	: Title and first sentence amended	23223

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		Para. 4.8.1	: Table 2 amended to Table 6	23223
		Para. 4.8.2	: New sentence added	23603
		Para. 4.8.4	: In second sentence, "7" amended to "5(b)"	22872
		Para. 4.8.5	: Entry added	22872
		Table 6	: Title, format and contents amended	22872
			: No. 5, Visual Examination after tests added	23603
			: No. 12, "D.C. Leakage" deleted in toto	23603
		Table 7	: Deleted in toto	22872
		Appendix 'A'	: Title and format amended	22872
'A'	Sept. '95	P1. Cover page		None
		P2A. DCN		None
		P11. Figure 2	: Case Size C, dimension Fmax corrected	221289
		P19. Table 6	: Measurement identities added	221289
		P20. Table 6	: Measurement identities added	221289
			: No. 12, D.C. Leakage Current added	221289
			: No. 14, "Capacitance" corrected to "Capacitance Change" and Limits amended	221289

TABLE OF CONTENTS

Page

TABLES

FIGURES

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 Capacitors, Fixed, Tantalum, Solid Electrolyte, based on Type CSR23. It shall be read in conjunction with ESA/SCC Generic Specification No. 3002, the requirements of which are supplemented herein.

1.2 RANGE OF COMPONENTS

The range of capacitors covered by this specification is scheduled 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 capacitors specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

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

1.5 PHYSICAL DIMENSIONS

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

1.6 FUNCTIONAL DIAGRAM

The functional diagram for the capacitors specified herein is shown in Figure 3.

2. APPLICABLE DOCUMENTS

The following documents for part of this specification and shall be read in conjunction with it:-

(a) ESA/SCC Generic Specification No. 3002 for Capacitors, Fixed, Tantalum, Solid Electrolyte.

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.

TABLE 1(a) - RANGE OF COMPONENTS

(1) Type No.	(2) Rated Voltage (U_R) (V)	(3) Capacitance Value (C) (µF)	(4) Tolerance (±%)	(5) I_L at +25°C (µA)	(6) I_L at +85°C (µA)	(7) I_L at +125°C (µA)	(8) Dissipation Factor (−55°C to +125°C) (%)	Surge Voltage (V)		(11) Case Size	(12) Max. Weight (for info only) (g)
								(9) At +85°C	(10) At +125°C		
106KA	6.0	10	10	0.9	9.0	11	6.0	8.0	5.0	A	0.8
106MA	6.0	10	20	0.9	9.0	11	6.0	8.0	5.0	A	0.8
126KA	6.0	12	10	1.0	10	12.5	6.0	8.0	5.0	A	0.8
107KA	6.0	100	10	6.0	60	75	8.0	8.0	5.0	B	2.1
107MA	6.0	100	20	6.0	60	75	8.0	8.0	5.0	B	2.1
337KA	6.0	330	10	15	150	188	8.0	8.0	5.0	C	7.3
337MA	6.0	330	20	15	150	188	8.0	8.0	5.0	C	7.3
397KA	6.0	390	10	15	150	188	10	8.0	5.0	C	7.3
477KA	6.0	470	10	15	150	188	10	8.0	5.0	C	7.3
477MA	6.0	470	20	15	150	188	10	8.0	5.0	C	7.3
687KA	6.0	680	10	20	200	250	10	8.0	5.0	D	12.5
687MA	6.0	680	20	20	200	250	10	8.0	5.0	D	12.5
827KA	6.0	820	10	20	200	250	10	8.0	5.0	D	12.5
108KA	6.0	1000	10	30	300	375	10	8.0	5.0	D	12.5
108MA	6.0	1000	20	30	300	375	10	8.0	5.0	D	12.5
685KD	10	6.8	10	1.0	10	12.5	6.0	13	9.0	A	0.8
685MD	10	6.8	20	1.0	10	12.5	6.0	13	9.0	A	0.8
825KD	10	8.2	10	1.2	12	15	6.0	13	9.0	A	0.8
476KD	10	47	10	5.0	50	63	6.0	13	9.0	B	2.1
476MD	10	47	20	5.0	50	63	6.0	13	9.0	B	2.1
566KD	10	56	10	6.0	60	75	6.0	13	9.0	B	2.1

TABLE 1(a) - RANGE OF COMPONENTS (CONT'D)

(1) Type No.	(2) Rated Voltage (U_R) (V)	(3) Capacitance Value (C) (µF)	(4) Tolerance (±%)	(5) I_L at +25°C (µA)	(6) I_L at +85°C (µA)	(7) I_L at +125°C (µA)	(8) Dissipation Factor (−55°C to +125°C) (%)	Surge Voltage (V)		(11) Case Size	(12) Max. Weight (for info only) (g)
								(9) At +85°C	(10) At +125°C		
686KD	10	68	10	7.0	70	88	6.0	13	9.0	B	2.1
686MD	10	68	20	7.0	70	88	6.0	13	9.0	B	2.1
826KD	10	82	10	8.0	80	100	6.0	13	9.0	B	2.1
227KD	10	220	10	15	150	188	8.0	13	9.0	C	7.3
227MD	10	220	20	15	150	188	8.0	13	9.0	C	7.3
277KD	10	270	10	15	150	188	8.0	13	9.0	C	7.3
397KD	10	390	10	20	200	250	10	13	9.0	D	12.5
477KD	10	470	10	20	200	250	10	13	9.0	D	12.5
477MD	10	470	20	20	200	250	10	13	9.0	D	12.5
567KD	10	560	10	30	300	375	10	13	9.0	D	12.5
475KE	15	4.7	10	1.0	10	12.5	4.0	20	12	A	0.8
475ME	15	4.7	20	1.0	10	12.5	4.0	20	12	A	0.8
565KE	15	5.6	10	1.3	13	16.5	4.0	20	12	A	0.8
336KE	15	33	10	6.0	60	75	6.0	20	12	B	2.1
336ME	15	33	20	6.0	60	75	6.0	20	12	B	2.1
396KE	15	39	10	6.0	60	75	6.0	20	12	B	2.1
157KE	15	150	10	15	150	188	8.0	20	12	C	7.3
157ME	15	150	20	15	150	188	8.0	20	12	C	7.3
187KE	15	180	10	15	150	188	8.0	20	12	C	7.3
227KE	15	220	10	20	200	250	8.0	20	12	D	12.5
227ME	15	220	20	20	200	250	8.0	20	12	D	12.5
277KE	15	270	10	20	200	250	8.0	20	12	D	12.5
337KE	15	330	10	20	200	250	8.0	20	12	D	12.5
337ME	15	330	20	20	200	250	8.0	20	12	D	12.5

TABLE 1(a) - RANGE OF COMPONENTS (CONT'D)

(1) Type No.	(2) Rated Voltage (U_R) (V)	(3) Capacitance Value (C) (µF)	(4) Tolerance (±%)	(5) I_L at +25°C (µA)	(6) I_L at +85°C (µA)	(7) I_L at +125°C (µA)	(8) Dissipation Factor (−55°C to +125°C) (%)	Surge Voltage (V)		(11) Case Size	(12) Max. Weight (for info only) (g)
								(9) At +85°C	(10) At +125°C		
275KF	20	2.7	10	0.8	8.0	10	4.0	26	16	A	0.8
335KF	20	3.3	10	1.0	10	12.5	4.0	26	16	A	0.8
335MF	20	3.3	20	1.0	10	12.5	4.0	26	16	A	0.8
395KF	20	3.9	10	1.2	12	15	4.0	26	16	A	0.8
186KF	20	18	10	4.0	40	50	6.0	26	16	B	2.1
226KF	20	22	10	4.0	40	50	6.0	26	16	B	2.1
226MF	20	22	20	4.0	40	50	6.0	26	16	B	2.1
276KF	20	27	10	5.0	50	63	6.0	26	16	B	2.1
566KF	20	56	10	9.0	90	110	6.0	26	16	C	7.3
686KF	20	68	10	10	100	125	6.0	26	16	C	7.3
686MF	20	68	20	10	100	125	6.0	26	16	C	7.3
826KF	20	82	10	10	100	125	6.0	26	16	C	7.3
107KF	20	100	10	15	150	188	6.0	26	16	C	7.3
107MF	20	100	20	15	150	188	6.0	26	16	C	7.3
127KF	20	120	10	15	150	188	6.0	26	16	C	7.3
157KF	20	150	10	20	200	250	8.0	26	16	D	12.5
157MF	20	150	20	20	200	250	8.0	26	16	D	12.5
187KF	20	180	10	20	200	250	8.0	26	16	D	12.5
185KJ	35	1.8	10	1.0	10	12.5	4.0	46	28	A	0.8
825KJ	35	8.2	10	3.5	35	44	6.0	46	28	B	2.1
106KJ	35	10	10	4.0	40	50	6.0	46	28	B	2.1
106MJ	35	10	20	4.0	40	50	6.0	46	28	B	2.1
336KJ	35	33	10	10	100	125	6.0	46	28	C	7.3
336MJ	35	33	20	10	100	125	6.0	46	28	C	7.3

TABLE 1(a) - RANGE OF COMPONENTS (CONT'D)

(1) Type No.	(2) Rated Voltage (U_R) (V)	(3) Capacitance Value (C) (µF)	(4) Tolerance (±%)	(5) I_L at +25°C (µA)	(6) I_L at +85°C (µA)	(7) I_L at +125°C (µA)	(8) Dissipation Factor (−55°C to +125°C) (%)	Surge Voltage (V)		(11) Case Size	(12) Max. Weight (for info only) (g)
								(9) At +85°C	(10) At +125°C		
396KJ	35	39	10	10	100	125	6.0	46	28	C	7.3
476KJ	35	47	10	10	100	125	6.0	46	28	C	7.3
476MJ	35	47	20	10	100	125	6.0	46	28	C	7.3
566KJ	35	56	10	15	150	188	6.0	46	28	D	12.5
686KJ	35	68	10	15	150	188	6.0	46	28	D	12.5
686MJ	35	68	20	15	150	188	6.0	46	28	D	12.5
125KL	50	1.2	10	0.9	9.0	11	4.0	65	40	A	0.8
155KL	50	1.5	10	1.2	12	15	4.0	65	40	A	0.8
155ML	50	1.5	20	1.2	12	15	4.0	65	40	A	0.8
565KL	50	5.6	10	4.5	45	56	4.0	65	40	B	2.1
685KL	50	6.8	10	4.5	45	56	6.0	65	40	B	2.1
685ML	50	6.8	20	4.5	45	56	6.0	65	40	B	2.1
226KL	50	22	10	10	100	125	6.0	65	40	C	7.3
226ML	50	22	20	10	100	125	6.0	65	40	C	7.3
276KL	50	27	10	10	100	125	6.0	65	40	C	7.3
336KL	50	33	10	10	100	125	6.0	65	40	D	12.5
336ML	50	33	20	10	100	125	6.0	65	40	D	12.5
396KL	50	39	10	10	100	125	6.0	65	40	D	12.5

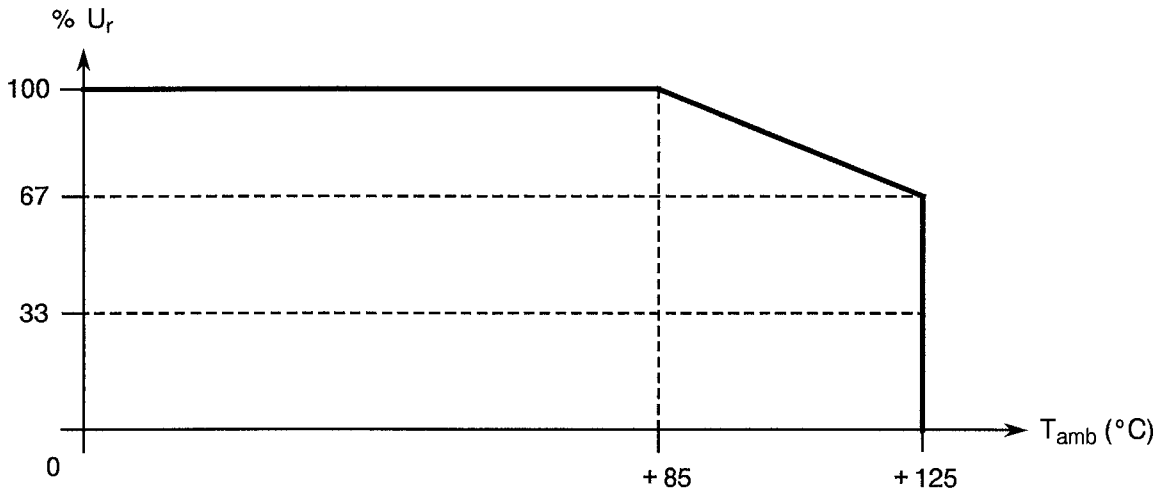
TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Rated Voltage	U_R	See Table 1(a)	V	Note 1
2	Operating Temperature Range	T_{op}	−55 to +125	°C	T_{amb}
3	Storage Temperature Range	T_{stg}	−55 to +125	°C	-
4	Maximum Soldering Temperature	T_{sol}	+240	°C	Soldering time: $t_s \leq 5$ seconds (Note 2)

NOTES

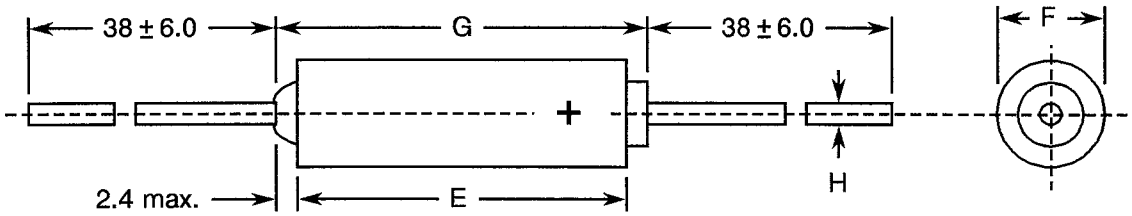
1. At $T_{amb} \leq +85°C$. For derating at $T_{amb} > +85°C$, see Figure 1.
2. 3.0mm from body on negative side and 3.0mm from eyelet on positive side.

FIGURE 1 - PARAMETER DERATING INFORMATION



Rated Voltage versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS

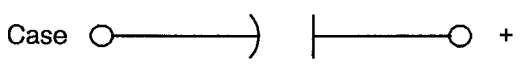


CASE SIZE	SYMBOL	MILLIMETRES	
		MIN	MAX
A	E	6.48	8.05
	F	3.05	3.84
	G	-	10.7
	H	0.46	0.56
B	E	11.25	12.8
	F	4.32	5.11
	G	-	15.5
	H	0.461	0.56
C	E	16.6	18.2
	F	6.96	7.75
	G	-	20.9
	H	0.58	0.69
D	E	19.2	20.8
	F	8.53	9.32
	G	-	23.4
	H	0.58	0.69

NOTES

1. The case insulation shall extend 0.4mm minimum beyond each end of the capacitor body. If a shrink-fitted insulation is used, it shall lap over the ends of the capacitor body.

FIGURE 3 - FUNCTIONAL DIAGRAM



4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the capacitors specified herein are stated in this specification and ESA/SCC Generic Specification No. 3002 for Capacitors, Fixed, Tantalum, Solid Electrolyte. 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)

None.

4.2.3 Deviations from Burn-in Tests (Chart III)

(a) Para. 9.7.3, "Electrical Measurements at High and Low Temperatures": Shall be made on a sampling basis as specified in Para. 4.6.2 of this specification.

4.2.4 Deviations from Qualification Tests (Chart IV)

None.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the capacitors specified herein shall be verified in accordance with the requirements set out in Para. 9.4 of ESA/SCC Generic Specification No. 3002 and they shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

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

4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 3002.

The test conditions shall be as follows:-

(a) Pull Force: 14 Newtons

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 capacitors 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

Metal, corrosion-resistant, hermetically sealed.

4.4.2 Lead Material and Finish

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

4.3.3 Sleeving

Sleeving shall be of a non-fungus nutrient material (cardboard shall not be used). The material shall not soften, creep or shrink to the extent that it causes any part of the cylindrical case to become uncovered at any test temperature specified herein. At any cross-section, the maximum thickness of the sleeving shall not exceed twice the minimum thickness of the sleeves.

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 as 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) Polarity.

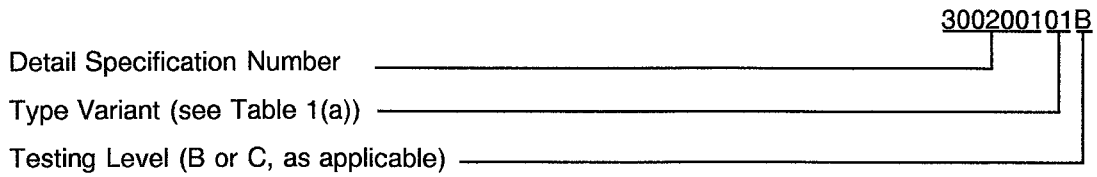
(b) The SCC Component Number.

(c) Electrical Characteristics and Ratings.

(d) Traceability Information.

4.5.2 The SCC Component Number

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



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

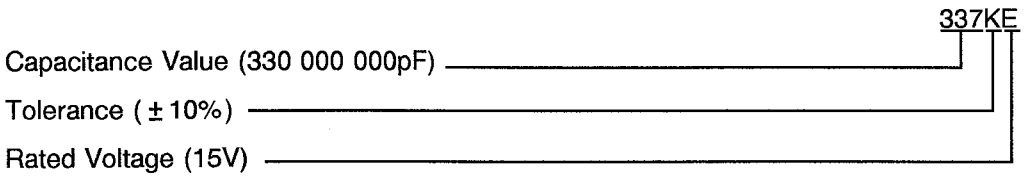
The electrical characteristics and ratings to be marked in the following order of precedence are:-

(a) Capacitance Value.

(b) Tolerance.

(d) Rated Voltage.

The information shall be constituted and marked as follows:-



4.5.3.1 Capacitance Values

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

Capacitance Value	Code
XX10[1]	XX1
XX10[2]	XX2
XX10[3]	XX3
XX10[4]	XX4
XX10[5]	XX5
XX10[6]	XX6
XX10[7]	XX7
XX10[8]	XX8

4.5.3.2 Tolerances

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

Tolerance (%)	Code Letter
±10	K
±20	M

4.5.3.3 Rated Voltage

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

Rated Voltage (U_R)	Code Letter
6.0V	A
10V	D
15V	E
20V	F
35V	J
50V	L

4.5.3.4 Polarity

Polarity shall be defined by a '+' on that end of the body of a capacitor where the positive lead protrudes (see Figure 2).

4.5.4 Traceability Information

Traceability information shall be marked in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

(a) Manufacturing Date Code.

(b) Serial Number.

(c) Manufacturer's Name.

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 at high and low temperatures are scheduled in Table 3. The AQL shall be 2.5% for each capacitance value. Each capacitance value shall be considered as constituting a complete lot. For qualification or lot acceptance testing, the sample size shall be as specified in ESA/SCC Generic Specification No. 3002.

4.6.3 Circuits for Electrical Measurements

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 for a given parameter, the appropriate limit value 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. 3002. The conditions for burn-in shall be as specified in Table 5 of this specification.

On completion of burn-in, a recovery period of 24 ± 2 hours is necessary before performance of the end-measurements.

The power supply source shall be capable of 30 Amperes minimum and shall be applied without series resistors to the capacitors under test.

4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESA/SCC 3002 Test Method	Test Conditions	Limits		Unit
					Min.	Max.	
1	Capacitance	C	Para. 9.7.1.1	f = 120 ± 5.0 Hz $V_p \leq 2.2V$ $V_m \leq 1.0Vrms$	Note 1		µF
2	D.C. Leakage	I_L	Para. 9.7.1.2	$V_m = U_R \pm 2.0\%$ $R_s = 1.0k\Omega$	Note 2		µA
3	Dissipation Factor	DF	Para. 9.7.1.3	f = 120 ± 5.0 Hz	Note 3		%

NOTES

1. See Column 3 and 4 of Table 1(a). Allowable change after surge voltage test = ± 2.0% of initial value.
2. See Column 5 of Table 1(a).
3. See Column 8 of Table 1(a).

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	Characteristics	Symbol	ESA/SCC 3002 Test Method	Test Conditions	Limits		Unit
					Min.	Max.	
1	Capacitance Change	$\frac{\Delta C}{C}$	Para. 9.7.1.1	f = 120 ± 5.0 Hz $V_p \leq 2.2V$ $V_m \leq 1.0Vrms$ T_{amb} = − 55°C T_{amb} = + 85°C T_{amb} = + 125°C (1)	 − 10 − 8.0 − 12	 + 10 + 8.0 + 12	%
2	D.C. Leakage	I_L	Para. 9.7.1.2	$V_m = U_R \pm 2.0\%$ $R_s = 1.0k\Omega$ T_{amb} = + 85°C T_{amb} = + 125°C (1) (2)	Note 3 Note 4		µA
3	Dissipation Factor	DF	Para. 9.7.1.3	f = 120 ± 5.0 Hz T_{amb} = − 55°C T_{amb} = + 85°C T_{amb} = + 125°C (1)	Note 5		%

NOTES

1. Applicable to Para. 9.15 of ESA/SCC Generic Specification No. 3002.
2. Applicable to Para. 9.18.1 of ESA/SCC Generic Specification No. 3002.
3. See Column 6 of Table 1(a).
4. See Column 7 of Table 1(a).
5. See Column 8 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
1	Capacitance Change	$\frac{\Delta C}{C}$	As per Table 2	As per Table 2	±2.0	%
2	D.C. Leakage	I_L	As per Table 2	As per Table 2	Note 1	µA

NOTES

1. +200% of measured value or +(25% +0.05µA) of limit value, whichever is smaller.
2. Leakage currents ≤0.1µA are considered as 0.1µA value.

TABLE 5(a) - CONDITIONS FOR BURN-IN

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+85 ±3	°C
2	Test Voltage	U_R	Rated voltage (Note 1)	V

NOTES

1. See Column 2 of Table 1(a).

TABLE 5(a) - CONDITIONS FOR OPERATING LIFE TESTS

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+85 ±3 (1)	°C
2	Ambient Temperature	T_{amb}	+125(+0−3) (2)	°C

NOTES

1. The test voltage shall be the rated voltage, see Column 2 of Table 1(a).
2. The test voltage shall be the derated voltage, see Figure 1.

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. 3002)

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 tests are 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 testing are specified in Section 9 of ESA/SCC Generic Specification No. 3002. 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. 3002		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Thermal Shock	Para. 9.2	Thermal Shock	Table 1(b)	-	-	-	-
02	External Visual Inspection	Para. 9.3	Visual Inspection	Para. 9.3 of ESA/SCC 3002		-	-	
03	Seal Test	Para. 9.6	Visual Examination	Evidence of Leakage	-	-	-	-
04	Shock (Specified Pulse)	Para. 9.8 100% U_R	**During Tests**	Intermittent Contact, Arcing, Open or Short Circuits	-	-	-	-
			After Tests Visual Examination	Arcing, Breakdown or Mechanical Damage	-	-	-	-
05	Vibration	Para. 9.9 100% U_R	**During Last Cycle**	Intermittent Operation, Intermittent Contact or Open or Short Circuits	-	-	-	-
			After Tests Visual Examination	Evidence of Mechanical Damage	-	-	-	-
06	Thermal Shock and Immersion	Para. 9.10.1 Before tests, 15 minutes at standard atmospheric conditions Para. 9.10.2	**Initial Measurements** Capacitance	**Within 30 minutes of final immersion**	C	Table 2 Item 1		µF
			Capacitance Change	Table 2, Item 1	$\frac{\Delta C}{C}$	−3.0	+3.0	%
			D.C. Leakage Current	Table 2, Item 2	I_L	Table 2 Item 2		µA
			Dissipation Factor	Table 2, Item 3	DF	Table 2 Item 3		%
			Visual Examination	Corrosion, Mechanical Damage and Marking		-	-	
07	Resistance to Soldering Heat	Para. 9.11	**Initial Measurements** Capacitance	**After 10 minutes minimum**	C	Table 2 Item 1		µF
			Capacitance Change	Table 2, Item 1	$\frac{\Delta C}{C}$	−2.0	+2.0	%
			D.C. Leakage Current	Table 2, Item 2	I_L	Table 2 Item 2		µA
			Dissipation Factor	Table 2, Item 3	DF	Table 2 Item 3		%
08	Solderability	Para. 9.12	Visual Examination	MIL-STD-202 Method 208 Solid Wire Termination Criteria	-	-	-	-
09	Terminal Strength	Para. 9.13 and Para. 4.3.3 of this specification	Visual Examination	Loosening or Damage to Terminals	-	-	-	-

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.

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. 3002		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
10	Moisture Resistance	Para. 9.14	**Initial Measurements**					
			Capacitance	Table 2, Item 1	C	Table 2 Item 1		µF
			Final Measurements	**Within 2 to 6 hours**				
			Capacitance Change	Table 2, Item 1	$\frac{\Delta C}{C}$	−2.0	+2.0	%
			D.C. Leakage Current	Table 2, Item 2	I_L	Table 2 Item 2		µA
			Dissipation Factor	Table 2, Item 3	DF	Table 2 Item 3		%
			Visual Examination	Corrosion, Mechanical Damage and Marking	-	-	-	-
11	High and Low Temperature Stability	Para. 9.15	**Initial Measurements**					
			Capacitance	Table 3, Item 1	C	Table 3 Item 1		µF
			Final Measurements					
			Capacitance Change	Table 3, Item 1	$\frac{\Delta C}{C}$	Table 3 Item 1		µF
			D.C. Leakage Current	Table 3, Item 2	I_L	Table 3 Item 2		µA
			Dissipation Factor	Table 3, Item 3	DF	Table 3 Item 3		%
12	Surge Voltage	Para. 9.16 and Table 1(a) of this specification	**Initial Measurements**					
			Capacitance	Table 2, Item 1	C	Table 2 Item 1		µF
			After Final Cycle					
			Capacitance Change	Table 2, Item 1	$\frac{\Delta C}{C}$	−2.0	+2.0	%
			D.C. Leakage Current	Table 2, Item 2	I_L	Table 2 Item 2		µA
			Dissipation Factor	Table 2, Item 3	DF	Table 2 Item 3		%
13	Sleeving	Para. 9.17 Para. 9.17.1 1 minute ± 15 seconds	Voltage Proof Leakage Current	2000V	I_L	-	20	µA
		Para. 9.17.2 1 minute (+15 −0) seconds	Insulation Resistance	500 ± 50V	Ri	10^4	-	MΩ
14	Operating Life	Para. 9.18	**Initial Measurements**					
			Capacitance	Table 2, Item 1	C	Table 2 Item 1		µF
			D.C. Leakage Current	Table 2, Item 2	I_L	Table 2 Item 2		µA
			Dissipation Factor	Table 2, Item 3	DF	Table 2 Item 3		
			Immediate Measurements					
			D.C. Leakage Current	Table 3 Item 2	I_L	Table 3 Item 2		µA
			Final Measurements					
			Capacitance Change	Table 2, Item 1	$\frac{\Delta C}{C}$	−2.0	+2.0	%
			D.C. Leakage Current	Table 2, Item 2	I_L	Table 2 Item 2		µA
			Dissipation Factor	Table 2, Item 3	DF	Table 2 Item 3		%
			Sleeving Voltage Proof Leakage Current	Para. 9.17.1 2000V	I_L	-	20	µA
			Visual Examination	Mechanical Damage	-	-	-	-

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.

APPENDIX 'A'

AGREED DEVIATIONS FOR SPRAGUE (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Paras. 4.2.2, 4.2.3, 4.2.4 and 4.2.5	Para. 9.6 - The seal test shall be performed in accordance with MIL-STD-202, Method 112, Test Condition 'D'
Paras. 4.2.2, 4.2.3, 4.2.4 and 4.2.5	Para. 9.7.1.1 - The capacitance shall be measured at 100 ± 5.0 Hz
Paras. 4.2.2, 4.2.3, 4.2.4 and 4.2.5	Para. 9.7.1.3 - The dissipation factor shall be measured at 100 ± 5.0 Hz, using the correction formula:- DF (120Hz) = DF (100Hz) × 1.2
Paras. 4.2.4 and 4.2.5	Para. 9.14 - The vibration test required during the moisture resistance test and to be performed in accordance with MIL-STD-202, Method 106, shall be omitted.