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**CAPACITORS, FIXED, CHIPS, RECONSTITUTED  
MICA, HIGH VOLTAGE**

**BASED ON TYPE HT86PS**

**ESCC Detail Specification No. 3006/022**

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## 1 **GENERAL**

### 1.1 **SCOPE**

This specification details the ratings, physical and electrical characteristics, test and inspection data for Capacitors, Fixed, Reconstituted Mica, High Voltage, premoulded for encapsulation, based on Type HT86PS. It shall be read in conjunction with ESCC Generic Specification No. 3006, the requirements of which are supplemented herein.

### 1.2 **RANGE OF COMPONENTS**

The range of components 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 as scheduled in Table 1(b).

### 1.4 **PARAMETER DERATING INFORMATION (FIGURE 1)**

Not applicable

### 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 form part of this specification and shall be read in conjunction with it:

- (a) ESCC Generic Specification No. 3006 for Capacitors, Fixed, Metallised Plastic Dielectric, Hermetically Sealed in Metal Cases.
- (b) IEC 270; Partial Discharge Measurements.

## 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 symbol is used:

$V_T$  = Test Voltage.

**TABLE 1(a) – RANGE OF COMPONENTS**

(1) Item No.	(2) Capacitance Value C (pF)	(3) Tolerance (± %)	(4) Rated Voltage U <sub>R</sub> (V)	(5) Dimensions (mm)				(6) Weight (g)
				L ±1	h ±1	e ±1	ØW +10% -0.05	
01	33000	10, 20	1500	35	10	4	1	4
02	39000	10	1500	35	12	6	1	6.5
03	47000	10, 20	1500	35	12	6	1	6.5
04	56000	10	1500	35	16	6	1	8.5
05	68000	10, 20	1500	35	16	6	1	8.5
06	82000	10	1500	35	24	6	1	12.5
07	100000	10, 20	1500	35	24	6	1	12.5
08	120000	10	1500	35	30	8	1	20
09	150000	10, 20	1500	35	30	8	1	20
10	180000	10	1500	35	40	8	1	26.5
11	220000	10, 20	1500	35	40	8	1	26.5
12	270000	10	1500	61	24	8	1	28
13	330000	10, 20	1500	61	24	8	1	28
14	390000	10	1500	61	38	8	1	44
15	470000	10, 20	1500	61	38	8	1	44
16	560000	10	1500	79	45	8	1.2	67
17	820000	10, 20	1500	79	45	8	1.2	67
18	1000000	10	1500	79	47	10	1.2	85
19	1200000	10, 20	1500	79	47	10	1.2	85
20	1500000	10	1500	105	47	10	1.2	115
21	1800000	10, 20	1500	105	47	10	1.2	115
22	2200000	10	1500	105	50	14	1.2	175
23	15000	10, 20	2500	25	12	4	1	4
24	22000	10, 20	2500	35	10	4	1	4
25	27000	10	2500	35	12	6	1	6.5
26	33000	10, 20	2500	35	12	6	1	6.5
27	39000	10	2500	35	16	6	1	8.5
28	47000	10, 20	2500	35	16	6	1	8.5
29	56000	10	2500	35	24	6	1	12.5
30	68000	10, 20	2500	35	24	6	1	12.5
31	82000	10	2500	35	30	8	1	20
32	100000	10, 20	2500	35	30	8	1	20
33	120000	10	2500	35	40	8	1	26.5
34	150000	10, 20	2500	35	40	8	1	26.5
35	180000	10	2500	61	38	8	1	28
36	220000	10, 20	2500	61	38	8	1	28
37	270000	10	2500	61	45	8	1	44
38	330000	10, 20	2500	61	45	8	1	44

(1) Item No.	(2) Capacitance Value C (pF)	(3) Tolerance (± %)	(4) Rated Voltage U <sub>R</sub> (V)	(5) Dimensions (mm)				(6) Weight (g)
				L ±1	h ±1	e ±1	ØW +10% -0.05	
39	390000	10	2500	79	45	8	1.2	67
40	470000	10, 20	2500	79	45	8	1.2	67
41	560000	10	2500	79	47	10	1.2	85
42	680000	10, 20	2500	79	47	10	1.2	85
43	820000	10	2500	105	47	10	1.2	115
44	1000000	10, 20	2500	105	47	10	1.2	115
45	1200000	10	2500	105	50	14	1.2	175
46	1500000	10, 20	2500	105	50	14	1.2	175
47	15000	10, 20	3500	35	10	4	1	4
48	18000	10	3500	35	12	6	1	6.5
49	22000	10, 20	3500	35	12	6	1	6.5
50	27000	10	3500	35	16	6	1	8.5
51	33000	10, 20	3500	35	16	6	1	8.5
52	39000	10	3500	35	24	6	1	12.5
53	47000	10, 20	3500	35	24	6	1	12.5
54	56000	10	3500	35	30	8	1	20
55	68000	10, 20	3500	35	30	8	1	20
56	82000	10	3500	35	40	8	1	26.5
57	100000	10, 20	3500	35	40	8	1	26.5
58	120000	10	3500	61	24	8	1	28
59	150000	10, 20	3500	61	24	8	1	28
60	180000	10	3500	61	38	8	1	44
61	220000	10, 20	3500	61	38	8	1	44
62	270000	10	3500	79	45	8	1.2	67
63	330000	10, 20	3500	79	45	8	1.2	67
64	390000	10	3500	79	47	10	1.2	85
65	470000	10, 20	3500	79	47	10	1.2	85
66	560000	10	3500	105	47	10	1.2	115
67	680000	10, 20	3500	105	47	10	1.2	115
68	820000	10	3500	105	50	14	1.2	175
69	1000000	10, 20	3500	105	50	14	1.2	175
70	6800	10, 20	5000	35	10	4	1	4
71	8200	10	5000	35	12	6	1	6.5
72	10000	10, 20	5000	35	12	6	1	6.5
73	12000	10	5000	35	16	6	1	8.5
74	15000	10, 20	5000	35	16	6	1	8.5
75	18000	10	5000	35	24	6	1	12.5
76	22000	10, 20	5000	35	24	6	1	12.5
77	27000	10	5000	35	30	8	1	20



(1) Item No.	(2) Capacitance Value C (pF)	(3) Tolerance (± %)	(4) Rated Voltage U <sub>R</sub> (V)	(5) Dimensions (mm)				(6) Weight (g)
				L ±1	h ±1	e ±1	ØW +10% -0.05	
78	33000	10, 20	5000	35	30	8	1	20
79	39000	10	5000	35	40	8	1	26.5
80	47000	10, 20	5000	35	40	8	1	26.5
81	56000	10	5000	61	24	8	1	28
82	68000	10, 20	5000	61	24	8	1	28
83	82000	10	5000	61	38	8	1	44
84	100000	10, 20	5000	61	38	8	1	44
85	120000	10	5000	79	45	8	1.2	67
86	150000	10, 20	5000	79	45	8	1.2	67
87	180000	10	5000	79	47	10	1.2	85
88	220000	10, 20	5000	79	47	10	1.2	85
89	270000	10	5000	105	47	10	1.2	115
90	330000	10, 20	5000	105	47	10	1.2	115
91	390000	10	5000	105	50	14	1.2	175
92	470000	10, 20	5000	105	50	14	1.2	175
93	2200	10, 20	7500	35	10	4	1	4
94	2700	10	7500	35	12	6	1	6.5
95	3300	10, 20	7500	35	12	6	1	6.5
96	3900	10	7500	35	16	6	1	8.5
97	4700	10, 20	7500	35	16	6	1	8.5
98	5600	10	7500	35	24	6	1	12.5
99	6800	10, 20	7500	35	24	6	1	12.5
100	8200	10	7500	35	30	8	1	20
101	10000	10, 20	7500	35	30	8	1	20
102	12000	10	7500	35	40	8	1	26.5
103	15000	10, 20	7500	35	40	8	1	26.5
104	18000	10	7500	61	24	8	1	28
105	22000	10, 20	7500	61	24	8	1	28
106	27000	10	7500	61	38	8	1	44
107	33000	10, 20	7500	61	38	8	1	44
108	39000	10	7500	61	45	8	1	52
109	47000	10, 20	7500	61	45	8	1	52
110	56000	10	7500	79	47	8	1.2	67
111	68000	10, 20	7500	79	47	8	1.2	67
112	82000	10	7500	79	47	10	1.2	85
113	100000	10, 20	7500	79	47	10	1.2	85
114	120000	10	7500	105	47	10	1.2	115
115	150000	10, 20	7500	105	47	10	1.2	115
116	180000	10	7500	105	50	14	1.2	175

(1) Item No.	(2) Capacitance Value C (pF)	(3) Tolerance (± %)	(4) Rated Voltage U <sub>R</sub> (V)	(5) Dimensions (mm)				(6) Weight (g)
				L ±1	h ±1	e ±1	ØW +10% -0.05	
117	220000	10, 20	7500	105	50	14	1.2	175
118	1000	10, 20	10000	35	10	4	1	4
119	1200	10	10000	35	12	6	1	6.5
120	1500	10, 20	10000	35	12	6	1	6.5
121	1800	10	10000	35	16	6	1	8.5
122	2200	10, 20	10000	35	16	6	1	8.5
123	2700	10	10000	35	24	6	1	12.5
124	3300	10, 20	10000	35	24	6	1	12.5
125	3900	10	10000	35	30	8	1	20
126	4700	10, 20	10000	35	30	8	1	20
127	5600	10	10000	35	40	8	1	26.5
128	6800	10, 20	10000	35	40	8	1	26.5
129	8200	10	10000	61	24	8	1	28
130	10000	10, 20	10000	61	24	8	1	28
131	12000	10	10000	61	38	8	1	44
132	15000	10, 20	10000	61	38	8	1	44
133	18000	10	10000	61	45	8	1	52
134	22000	10, 20	10000	61	45	8	1	52
135	27000	10	10000	79	45	8	1.2	67
136	33000	10, 20	10000	79	45	8	1.2	67
137	39000	10	10000	79	47	10	1.2	85
138	47000	10, 20	10000	79	47	10	1.2	85
139	56000	10	10000	105	47	10	1.2	115
140	68000	10, 20	10000	105	47	10	1.2	115
141	82000	10	10000	105	50	14	1.2	175
142	100000	10, 20	10000	105	50	14	1.2	175
143	3300	10, 20	12500	61	20	4	1	14
144	3900	10	12500	61	22	6	1	21
145	4700	10, 20	12500	61	22	6	1	21
146	5600	10	12500	61	24	8	1	28
147	6800	10, 20	12500	61	24	8	1	28
148	8200	10	12500	61	38	8	1	44
149	10000	10, 20	12500	61	38	8	1	44
150	12000	10	12500	61	45	8	1	52
151	15000	10, 20	12500	61	45	8	1	52
152	18000	10	12500	79	45	8	1.2	67
153	22000	10, 20	12500	79	45	8	1.2	67
154	27000	10	12500	79	47	10	1.2	85
155	33000	10, 20	12500	79	47	10	1.2	85

(1) Item No.	(2) Capacitance Value C (pF)	(3) Tolerance (± %)	(4) Rated Voltage U <sub>R</sub> (V)	(5) Dimensions (mm)				(6) Weight (g)
				L ±1	h ±1	e ±1	∅W +10% -0.05	
156	39000	10	12500	105	47	10	1.2	115
157	47000	10, 20	12500	105	47	10	1.2	115
158	56000	10	12500	105	50	14	1.2	175
160	68000	10, 20	12500	105	50	14	1.2	175
161	1500	10, 20	15000	61	20	4	1	14
162	1800	10	15000	61	22	6	1	21
163	2200	10, 20	15000	61	22	6	1	21
164	2700	10	15000	61	24	8	1	28
165	3300	10, 20	15000	61	24	8	1	28
166	3900	10	15000	61	38	8	1	44
167	4700	10, 20	15000	61	38	8	1	44
168	5600	10	15000	61	45	8	1	52
169	6800	10, 20	15000	61	45	8	1	52
170	8200	10	15000	79	45	8	1.2	67
171	10000	10, 20	15000	79	45	8	1.2	67
172	12000	10	15000	79	47	10	1.2	85
173	15000	10, 20	15000	79	47	10	1.2	85
174	18000	10	15000	105	47	10	1.2	115
175	22000	10, 20	15000	105	47	10	1.2	115
176	27000	10	15000	105	50	14	1.2	175
177	33000	10, 20	15000	105	50	14	1.2	175
178	680	10, 20	20000	61	20	4	1	14
179	820	10	20000	61	22	6	1	21
180	1000	10, 20	20000	61	22	6	1	21
181	1200	10	20000	61	24	8	1	28
182	1500	10, 20	20000	61	24	8	1	28
183	1800	10	20000	61	38	8	1	44
184	2200	10, 20	20000	61	38	8	1	44
185	2700	10	20000	61	45	8	1	52
186	3300	10, 20	20000	61	45	8	1	52
187	3900	10	20000	79	45	8	1.2	67
188	4700	10, 20	20000	79	45	8	1.2	67
189	5600	10	20000	79	47	10	1.2	85
190	6800	10, 20	20000	79	47	10	1.2	85
191	8200	10	20000	105	47	10	1.2	115
192	10000	10, 20	20000	105	47	10	1.2	115
193	12000	10	20000	105	50	14	1.2	175
194	15000	10, 20	20000	105	50	14	1.2	175

**TABLE 1(b) – MAXIMUM RATINGS**

No.	Characteristics	Symbol	Limit Ratings	Unit	Remarks
1	Rated Voltage	$U_R$	See Table 1(a)	Vdc	
2	Ripple Voltage Peak to Peak (Note 1)	$U_{Rip}$	0.2 $U_R$ 0.15 $U_R$ 0.04 $U_R$ 0.01 $U_R$	Vpp	At 50Hz At 100Hz At 1000Hz At 10000Hz
3	Operating Air Pressure Range	$P_{op}$	Less than $10^{-3}$ or greater than 750	mbar	Note 2
4	Operating Temperature Range	$T_{amb}$	-55 to +125	°C	Without derating
5	Storage Temperature Range	$T_{stg}$	-55 to +125	°C	
6	Soldering Temperature	$T_{sol}$	+260	°C	Note 3

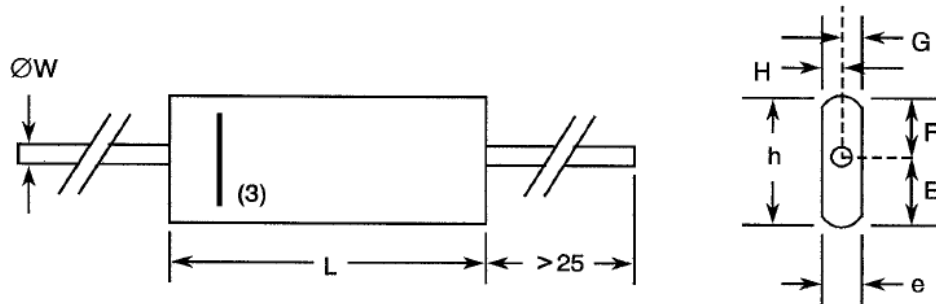
**NOTES:**

1. Ripple voltage plus applied DC voltage shall never exceed  $U_R$ .
2. Capacitors are designed for dielectric fluid use or encapsulation.
3. Duration 5 seconds maximum at 4.0mm from the device body and the same terminal shall not be resoldered until 3 minutes have passed.

**FIGURE 1 – PARAMETER DERATING INFORMATION**

Not applicable.

**FIGURE 2 – PHYSICAL DIMENSIONS**



**NOTES**

1. For dimension  $L$ ,  $h$ ,  $e$ ,  $\varnothing W$ : see Table 1(a).
2. Dimensions  $E$ ,  $F$ ,  $G$ ,  $H$  < 2mm.
3. This heavy line indicates the external electrode which shall be connected to the lowest potential.

**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 ESCC Generic Specification No. 3006 for Capacitors, Fixed, Film Dielectric. 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. 9.2, Seal Test: Not applicable.
- (b) Para. 9.3, Rapid Change of Temperature: As per Para. 9.3 except that the duration of exposure at each temperature extreme shall be 3 hours and the transfer time between extremes shall be 1 hour  $\pm$ 5 minutes.

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

None.

#### 4.2.4 Deviations from Qualification Tests (Chart IV)

- (a) Para. 9.2, Seal Test: Not applicable.
- (b) Para. 9.3, Rapid Change of Temperature: As per Para. 9.3 except that the duration of exposure at each temperature extreme shall be 3 hours and the transfer time between extremes shall be 1 hour  $\pm$ 5 minutes.
- (c) Para. 9.12, Vibration:
  - Para. 9.12.2: DC potential shall not be applied.
  - Para. 9.12.3, Measurements during Vibration: Not applicable.
- (d) Paras. 9.13.1, Shock and 9.13.2, Bump:
  - Para. 9.13.x.2: DC potential shall not be applied.
  - Para. 9.13.x.3, Measurements during Shock or Bump: Not applicable.
- (e) Para. 9.14, Climatic Sequence:
  - Para. 9.14.5, Low Air Pressure: As per Para. 9.14.5 except:
    - Pressure: Below  $10^{-5}$  mbar
    - Temperature: +50 (+5 -0) $^{\circ}$ C
    - Rated Voltage: Applied during the last 5 minutes of the 1.0 hour period
    - Duration: 1.0 hours
  - Para. 9.14.3 and 9.14.6, Damp Heat Accelerated:
    - Test condition: +55 $^{\circ}$ C; Variant 2
    - The applied voltage shall be 100V instead of  $U_R$
  - Para. 9.14.7: Partial Discharge (AC) measurements shall be performed as specified in Table 6 of this specification at  $V_{rms} = 10\% U_R$ .

- (f) Para.9.16, Operating Life:  
Para.9.16(c): The applied voltage shall be  $1.15U_R$ .  
Para.9.16(e): Partial Discharge (AC) measurements shall be performed as specified in Table 6 of this specification.

#### 4.2.5 Deviations from Lot Acceptance Tests (Chart V)

- (a) Para. 9.2, Seal Test: Not applicable.  
(b) Para. 9.3, Rapid Change of Temperature: As per Para. 9.3 except that the duration of exposure at each temperature extreme shall be 3 hours and the transfer time between extremes shall be 1 hour  $\pm$ 5 minutes.  
(c) Para. 9.12, Vibration:  
Para. 9.12.2: DC potential shall not be applied.  
Para. 9.12.3, Measurements during Vibration: Not applicable.  
(d) Paras. 9.13.1, Shock and 9.13.2, Bump:  
Para. 9.13.x.2: DC potential shall not be applied.  
Para. 9.13.x.3, Measurements during Shock or Bump: Not applicable.  
(e) Para. 9.14, Climatic Sequence:  
Para. 9.14.3 and 9.14.6, Damp Heat Accelerated:  
  - Test condition:  $+55^{\circ}\text{C}$ ; Variant 2
  - The applied voltage shall be 100V instead of  $U_R$Para. 9.14.7: Partial Discharge (AC) measurements shall be performed as specified in Table 6 of this specification at  $V_{\text{rms}}=10\% U_R$ .  
(f) Para.9.16, Operating Life:  
Para.9.16(c): The applied voltage shall be  $1.15U_R$ .  
Para.9.16(e): Partial Discharge (AC) measurements shall be performed as specified in Table 6 of this specification.

### 4.3 MECHANICAL REQUIREMENTS

#### 4.3.1 Dimension Check

The dimensions of the capacitors specified herein shall be checked. They shall conform to those shown in Figure 2 and Table 1(a).

#### 4.3.2 Weight

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

#### 4.3.3 Robustness of Termination

The requirements for robustness of terminations testing are specified in Section 9 of ESCC Generic Specification No. 3006. The test conditions shall be as follows:

Test Condition:	$U_a$ , Tensile	Test Condition:	Torsion
Applied Force:	20 Newtons		2 successive rotations of $180^{\circ}$ (half of terminations)
Duration:	$10 \pm 1$ seconds	Test Condition:	Bending.
			2 consecutive bends (other half of terminations)

After these tests, the capacitors shall be examined for evidence of breaking or loosening of terminals.

### 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

Epoxy resin in accordance with Para. 4.5 of ESCC Generic Specification No. 3006.

#### 4.4.2 Lead Material and Finish

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

### 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 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 ESCC Component Number.
- (c) Electrical Characteristics and Ratings.
- (d) Traceability Information.

#### 4.5.2 Lead Identification

Lead identification shall be marked on the component as shown in Figure 2.

#### 4.5.3 The ESCC Component Number

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

Example: 300602201B

- Detail Specification Number: 3006022
- Type Variant (see Note): 01
- Testing level (B or C, as applicable): B

#### **N.B.**

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

#### 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:

Example: 222MH

- Capacitance Value (2200pF): 222
- Tolerance ( $\pm 20\%$ ): M
- Rated Voltage (10kV): H

#### 4.5.4.1 *Capacitance Values*

The capacitance values shall be coded as follows. The unit quantity for marking shall be picofarads.

Numerical Value	Code
$XX10^1$	XX1
$XX10^2$	XX2
$XX10^3$	XX3
$XX10^4$	XX4
$XX10^5$	XX5

#### 4.5.4.2 *Tolerances*

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

Tolerance ( $\pm \%$ )	Code Letter
10	K
20	M

#### 4.5.4.3 *Rated Voltage*

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

Rated Voltage (kV)	Code Letter
1.5	C
2.5	D
3.5	E
5	F
7.5	G
10	H
12.5	J
15	K
20	L

#### 4.5.5 Traceability Information

Traceability information shall be marked 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  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

##### 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.

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 ESCC Generic Specification No. 3006.

##### 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  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ . The parameter drift values ( $\Delta$ ) 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 ESCC Generic Specification No. 3006. The conditions for burn-in shall be as specified in Table 5 of this specification.

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

##### 4.7.3 Electrical Circuits for Burn-in (Figure 5)

Not applicable.

**TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE**

No.	Characteristics	Symbol	ESCC 3006 Test Method	Test Condition	Limits		Unit
					Min	Max	
1	Capacitance	C	Para. 9.6.1.2	Para. 9.6.1.2	See Table 1(a) (Note 1)		μF
2	Tangent of Loss Angle	Tgδ	Para. 9.6.1.3	V <sub>T</sub> =1.0V Test Frequency = 1kHz	-	50	10 <sup>-4</sup>
3	Insulation Resistance Terminal to Terminal	R <sub>i</sub>	Para. 9.6.1.4	Para. 9.6.1.4 C ≤ 0.22μF C > 0.22μF	25 5000	- -	GΩ sec
4	Insulation Resistance Terminal to Case	R <sub>iB</sub>	Para. 9.6.1.4		25	-	GΩ
5	Voltage Proof Terminal to Terminal	VP	Para. 9.6.1.1	Para. 9.6.1.1	1.6U <sub>R</sub> (2) (3)	-	V
6	Voltage Proof Terminals to Case	VP <sub>B</sub>	Para. 9.6.1.1		1.6U <sub>R</sub> (2) (3)	-	V
7	Partial Discharge (AC)	QAC	IEC 270	Notes 2 and 4 V <sub>rms</sub> = 5% U <sub>R</sub> V <sub>rms</sub> = 10% U <sub>R</sub>		0 1000	pC

**NOTES**

- ± ordered tolerance.
- For U<sub>R</sub>, see Column 4 of Table 1(a).
- Duration 1 minute during Final Production Tests only, 5 seconds for all subsequent measurements.
- Partial discharge to be measured at two different levels of voltage.

**TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES**

No.	Characteristics	Symbol	ESCC 3006 Test Method	Test Condition (Note 1)	Limits		Unit
					Min	Max	
1(a)	Capacitance Change	ΔC/C	Para. 9.6.1.2	Para. 9.6.1.2 T <sub>amb</sub> = -55 (+3 -0)°C	-3 (2)	-	%
1(b)	Capacitance Change	ΔC/C	Para. 9.6.1.2	Para. 9.6.1.2 T <sub>amb</sub> = +125 (+0 -5)°C	-	+10 (2)	%
3	Insulation Resistance Terminal to Terminal	R <sub>i</sub>	Para. 9.6.1.4	Para. 9.6.1.4 T <sub>amb</sub> = +125 (+0 -5)°C C ≤ 0.22μF C > 0.22μF	250 50	- -	MΩ sec
8	Leakage Current	I <sub>L</sub>	-	T <sub>amb</sub> = +125 (+0 -5)°C V <sub>T</sub> = U <sub>R</sub> (3)	-	Note 4	(nA)

**NOTES**

- These measurements shall be performed on a sample basis (see Para. 7.4.2 of ESCC Generic Specification No. 3006), AQL = 2.5%.
- Related to value recorded at T<sub>amb</sub> = +22°C.

3. For  $U_R$ , see Column 4 of Table 1(a).
4. Limit is  $I_L$  (nA) <  $U_R$  (V) x C (nF) / 100.

**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 ( $\Delta$ )	Unit
1	Capacitance Change	$\Delta C/C$	As per Table 2	As per Table 2	$\pm 3$	%

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

No.	Characteristic	Symbol	Condition (1)	Unit
1	Ambient Temperature	$T_{amb}$	+125 (+0 -5)	°C
2	Test Voltage	$V_T$	1.15 $U_R$ (Note 2)	V

**NOTES**

1. Series resistor during burn-in: 1.0M $\Omega$ .
2. For  $U_R$ , see Column 4 of Table 1(a).

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

Not applicable.

- 4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHART IV AND V OF ESCC GENERIC SPECIFICATION NO.3006)
- 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  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .
- 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  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .
- 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  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .
- 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. 3006. The conditions for operating life testing shall be as specified in Table 5 for the burn-in test
- 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.	ESCC Generic Spec. No. 3006		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. 9.2	Not applicable					
02	Rapid Change of Temperature	Paras. 9.3.2, 4.2.4 and 4.2.5 of this spec.	<b>Initial Measurements</b> Capacitance  <b>Final Measurements</b> Visual Examination Capacitance Change Tangent of Loss Angle Change	Table 2 Item 1  After recovery of 24 ±2 hours No damage  Table 2 Item 1 Table 2 Item 2	C  - ΔC/C ΔTgδ	Record Values  - -1 -	- +1 +10	%  10 <sup>-4</sup>
03	Corrosion (Hermetically Sealed)	Para. 9.8, Half without sleeving (2)	Not applicable					
04	Robustness of Terminations	Para. 9.9 and Para. 4.3.3 of this spec.	<b>Final Measurements</b> Visual Examination	No damage	-	-	-	
05	Resistance to Soldering Heat	Para. 9.10	<b>Initial Measurements</b> Capacitance  <b>Final Measurements</b> Insulation Resistance Capacitance Change Tangent of Loss Angle	Table 2 Item 1  After recovery of 1 to 2 hrs Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	C  Ri ΔC/C Tgδ	Record Values  Table 2 -1 -	- +1 Table 2	%  %
06	Solderability	Para. 9.11 Method 1	<b>Final Measurements</b> Visual Examination	IEC No. 68-2-20 Para. 4.6.4, 4.7.4 or 4.9.3	-	-	-	
07	Vibration	Paras. 9.12, 4.2.4 and 4.2.5 of this spec.	<b>Final Measurements</b> Visual Examination	No evidence of damage	-	-	-	
08	Shock or Bump	Paras. 9.13, 4.2.4 and 4.2.5 of this spec.	<b>Final Measurements</b> Visual Examination	No evidence of damage, breakdown, arcing or fractures	-	-	-	

No.	ESCC Generic Spec. No. 3006		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
09	Climatic Sequence	Para. 9.14, 4.2.4 and 4.2.5 of this spec.	<b>Initial Measurements</b> Capacitance  <b>Final Measurements</b> Visual Examination Voltage Proof (2) Insulation Resistance (2) Voltage Proof Voltage Proof Insulation Resistance Insulation Resistance Capacitance Change Tangent of Loss Angle Change Partial Discharge (AC)	Table 2 Item 1  After Recovery of 24 hrs max. No evidence of corrosion ESCC No. 3006 Para. 9.6.1.1 ESCC No. 3006 para. 9.6.1.4 Table 2 Item 5 Table 2 Item 6 Table 2 Item 3 Table 2 Item 4 Table 2 Item 1 Table 2 Item 2 Table 2 Item 7	C  - VP <sub>S</sub> Ri <sub>S</sub> VP VP <sub>B</sub> Ri Ri <sub>B</sub> ΔC/C ΔTgδ QAC	Record values  -   - Not applicable Not applicable U <sub>R</sub> (3)   - U <sub>R</sub> (3)   - Note 4   - 5   - -3   +3 -   +10 -   2000	GΩ % 10 <sup>-4</sup> pC	
10	Temperature Coefficient	Para. 9.15	Not applicable					
11	Operating Life	Paras. 9.16, 4.2.4 and 4.2.5 of this spec.	<b>Initial Measurements</b> Capacitance  <b>During Tests</b>  <b>Intermediate Measurements</b> Capacitance Change  <b>Final Measurements</b> Capacitance Change Tangent of Loss Angle Change Insulation Resistance Insulation Resistance Partial Discharge (AC)  Visual Examination	Table 2 Item 1 115% U <sub>R</sub> (3) After recovery of 24 ±2 hours Table 2 Item 1 After 24 hrs recovery Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4 Table 2 Item 7  No evidence of damage or corrosion	C  ΔC/C ΔC/C ΔTgδ Ri Ri <sub>B</sub> QAC  -	Record Values  -5   +5 -5   +5 -   +10 Note 4   - 5   - -   0 -   2000 -   -	% % 10 <sup>-4</sup> GΩ pC pC	
12	Permanence of Marking	Para. 9.17	<b>Final Measurements</b> Visual Examination	No corrosion or obliteration of marking	-	-	-	