



**CAPACITORS, FIXED, METALLISED  
POLYCARBONATE DIELECTRIC, HERMETICALLY  
SEALED**

**BASED ON TYPE CKM 111**

**ESCC Detail Specification No. 3006/007**

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DCR No.	CHANGE DESCRIPTION
<a href="#">1521</a> , <a href="#">1522</a>	Specification updated to incorporate changes per DCR.

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**1 GENERAL**

**1.1 SCOPE**

This specification details the ratings, physical and electrical characteristics, and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

**1.2 APPLICABLE DOCUMENTS**

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

- (a) ESCC Generic Specification No. [3006](#).
- (b) [MIL-STD-1276](#), Leads for Electronic Component Parts.

**1.3 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.

**1.4 THE ESCC COMPONENT NUMBER AND RANGE OF COMPONENTS**

**1.4.1 The ESCC Component Number**

The ESCC Component Number shall be constituted as follows:

Example: 3006007012212FD

- Detail Specification Reference: 3006007
- Component Type Variant Number: 01 (See Note 1)
- Characteristic code: Capacitance Value (0.0221µF): 2212 (as required)
- Characteristic code: Capacitance Tolerance (±1%): F (as required)
- Rating code: Rated Voltage (63V): D (as required)

**NOTES:**

1. Marking of the Component Type Variant Number is mandatory. No further reference to type variant number is made in this specification.

**1.4.1.2 Characteristics and Ratings Codes**

Characteristics and ratings to be codified as part of the ESCC Component Number shall be as follows:

- (a) Capacitance Value, C, expressed by means of the following codes in accordance with ESCC Basic Specification No. [21700](#). The unit quantity shall be picofarad (pF).

Capacitance Value C (pF)	Code
XX.X	XXRX
XXX	XXX0
XXX 10 <sup>1</sup>	XXX1
XXX 10 <sup>2</sup>	XXX2
XXX 10 <sup>3</sup>	XXX3
XXX 10 <sup>4</sup>	XXX4
XXX 10 <sup>5</sup>	XXX5

Capacitance Value C (pF)	Code
XXX 10 <sup>6</sup>	XXX6
XXX 10 <sup>7</sup>	XXX7

- (b) Capacitance Tolerance expressed by the following codes in accordance with ESCC Basic Specification No. 21700:

Tolerance (±)	Code Letter
1%	F
2%	G

- (c) Rated Voltage, U<sub>R</sub>, expressed by the following codes:

Rated Voltage U <sub>R</sub> (V)	Code Letter
63	D
160	F
250	H
400	K

1.4.2 Range of Components

The range of components applicable to this specification are as follows:

Range of Capacitance Values (C) (µF) (Note 1)	DC Rated Voltage (U <sub>R</sub> ) Max (Vdc)	AC Rated Voltage (U <sub>A</sub> ) Max (Vrms)	Dimensions (mm) (See Para. 1.6)			Weight Max (g)
			L Max	ØD Max	ØW (+10%, -5%)	
0.0261 to 0.0536	63	40	19	6.4	0.6	1.8
0.0549 to 0.115	63	40	19	8.4	0.6	3
0.118 to 0.255	63	40	23.5	8.4	0.8	3.6
0.261 to 0.536	63	40	23.5	11	0.8	5.4
0.549 to 1.15	63	40	23.5	13.2	0.8	6.24
1.18 to 2.55	63	40	36	13.2	1	8.76
2.61 to 3.74	63	40	36	14.8	1	9.84
3.83 to 5.36	63	40	36	17	1	10.8
0.0118 to 0.0255	160	100	19	6.4	0.6	1.8
0.0261 to 0.0536	160	100	19	8.4	0.6	3
0.0549 to 0.115	160	100	23.5	8.4	0.8	3.6
0.118 to 0.255	160	100	23.5	11	0.8	5.4
0.261 to 0.536	160	100	23.5	13.2	0.8	6.24
0.549 to 1.15	160	100	36	13.2	1	8.76

Range of Capacitance Values (C) ( $\mu$ F) (Note 1)	DC Rated Voltage ( $U_R$ ) Max (Vdc)	AC Rated Voltage ( $U_A$ ) Max (Vrms)	Dimensions (mm) (See Para. 1.6)			Weight Max (g)
			L Max	$\varnothing$ D Max	$\varnothing$ W (+10%, -5%)	
0.00374 to 0.00825	250	160	16	6.4	0.6	1.8
0.00845 to 0.0115	250	160	19	6.4	0.6	1.8
0.0118 to 0.0255	250	160	19	8.4	0.6	3
0.0261 to 0.0536	250	160	23.5	8.4	0.8	3.6
0.0549 to 0.115	250	160	23.5	11	0.8	5.4
0.118 to 0.221	250	160	23.5	13.2	0.8	6.24
0.226 to 0.511	250	160	36	13.2	1	8.76
0.001 to 0.00365	400	200	16	6.4	0.6	1.8
0.00374 to 0.00536	400	200	19	6.4	0.6	1.8
0.00549 to 0.0115	400	200	19	8.4	0.6	3
0.0118 to 0.0255	400	200	23.5	8.4	0.8	3.6
0.0261 to 0.0536	400	200	23.5	11	0.8	5.4
0.0549 to 0.115	400	200	23.5	13.2	0.8	6.24
0.118 to 0.255	400	200	36	13.2	1	8.76

**NOTES:**

- Two Capacitance Tolerances are available:
  - $\pm 2\%$  for E48 Series Capacitance Values
  - $\pm 1\%$  for E96 Series Capacitance Values

1.5 **MAXIMUM RATINGS**

The maximum ratings shall not be exceeded at any time during use or storage.

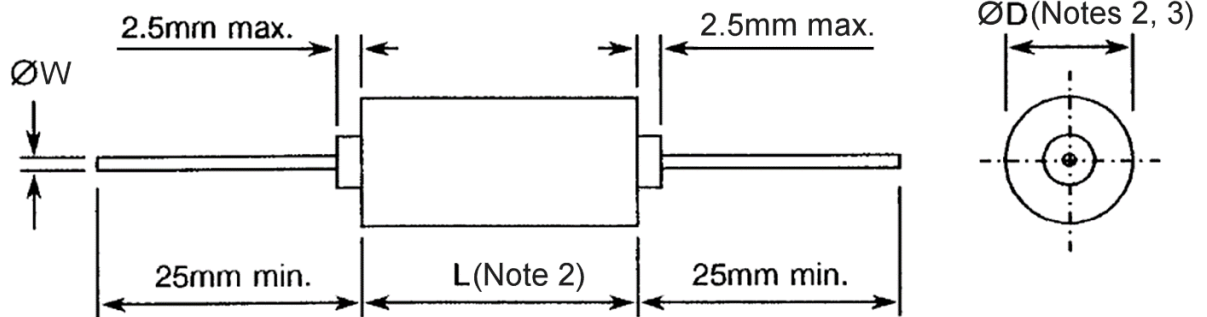
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
DC Rated Voltage	$U_R$	63, 160, 250, 400	Vdc	Notes 1, 2
AC Rated Voltage	$U_A$	See Para. 1.4.2	Vrms	Frequencies up to 50Hz
Operating Temperature Range	$T_{op}$	-55 to +125	$^{\circ}$ C	$T_{amb}$
Storage Temperature Range	$T_{stg}$	-55 to +125	$^{\circ}$ C	
Soldering Temperature	$T_{sol}$	+235	$^{\circ}$ C	Note 3

**NOTES:**

- As required; See Para. 1.4.2.
- At  $T_{amb} \leq +100^{\circ}$ C. For  $T_{amb} > +100^{\circ}$ C, derate linearly to 50%  $U_R$  at  $T_{amb} = +125^{\circ}$ C.
- Duration 5 seconds maximum at 6mm from the device body and the same terminal shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS



**NOTES:**

1. The limits of Dimensions  $\text{ØD}$ ,  $L$  and  $\text{ØW}$  are defined in Para. 1.4.2.
2. Including the insulating sleeve.
3. At any cross-section through  $\text{ØD}$ , the maximum thickness of the sleeve shall not exceed twice the minimum thickness of the sleeve.

1.7 FUNCTIONAL DIAGRAM



1.8 MATERIALS AND FINISHES

1.8.1 Case

The case shall be made of non-magnetic metal, covered with an insulating sleeve and hermetically sealed with glass beads.

1.8.2 Leads

The leads shall be made of tinned copper in accordance with Composition Type 'C' of [MIL-STD-1276](#). Therefore, these leads may be either electrically welded or soldered. The leads shall be free from non-conductive and foreign materials beyond the maximum specified "clean lead to clean lead" body dimension.

**2 REQUIREMENTS**

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.



2.1.1 Deviations from the Generic Specification  
None.

2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number (see Para. 1.4.1).
- (c) Traceability information.

2.3 ROBUSTNESS OF TERMINATIONS

The test conditions for Robustness of Terminations shall be as specified in the ESCC Generic Specification and as follows:

- Test U<sub>a</sub>, tensile:
  - Applied force (for lead diameters equal to or less than 0.8mm): 10N
  - Applied force (for lead diameters exceeding 0.8mm): 20N
  - Duration: 7.5 ±2.5s

All leads of the components shall be tested.

2.4 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical measurements shall be performed at room, high and low temperatures.

2.4.1 Room Temperature Electrical Measurements

The measurements shall be performed at T<sub>amb</sub> = +22 ±3°C.

Characteristics	Symbols	Test Method and Conditions	Limits		Units
			Min	Max	
Capacitance	C	ESCC No. 3006	Note 1	Note 2	pF
Tangent of Loss Angle	tgδ	ESCC No. 3006 V <sub>T</sub> = 1V Test Frequency = 1kHz For C ≤ 1μF For C > 1μF	- -	20×10 <sup>-4</sup> 15×10 <sup>-4</sup>	- -
Insulation Resistance, Dielectric	R <sub>i</sub>	ESCC No. 3006 For C ≤ 220000pF For C > 220000pF	50 10	- -	GΩ GΩ.μF
Voltage Proof, Terminal-to-Terminal	VP	ESCC No. 3006	1.6×U <sub>R</sub> (Note 3)	-	V

**NOTES:**

1. Capacitance Value of the component minus the applicable Tolerance (see Para. 1.4.2).
2. Capacitance Value of the component plus the applicable Tolerance (see Para. 1.4.2).
3. For the applicable Rated Voltage (U<sub>R</sub>) see Para. 1.4.2.

2.4.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Temperature Coefficient	$\Delta C/C$	ESCC No. 3006 $T_{amb} = -55 \pm 3^{\circ}C$	-3 (Note 2)	-	%
		$T_{amb} = +125 \pm 3^{\circ}C$	-2 (Note 2)	+1 (Note 2)	%
Insulation Resistance, Dielectric	$R_i$	ESCC No. 3006 $T_{amb} = +125 (+0 -5)^{\circ}C$			
		For $C \leq 220000pF$ For $C > 220000pF$	500 100	- -	$M\Omega$ $M\Omega.\mu F$

**NOTES:**

- The measurements shall be performed on a sample of 6 components from each manufacturing lot with 0 failures allowed. In the event of any failure a 100% inspection may be performed.
- The Temperature Coefficient limits are with respect to the capacitance at  $+22 \pm 2^{\circ}C$  (reference point temperature).

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ .

Unless otherwise specified the test methods and test conditions shall be as per the corresponding test defined in Para. 2.4.1, Room Temperature Electrical Measurements.

Test Reference per ESCC No. 3006	Characteristics	Symbols	Limits		Units	
			Min	Max		
Resistance to Soldering Heat Initial Measurements Final Measurements	Capacitance	C	Note 1		pF	
	Capacitance	C	Note 1		pF	
	Change in Capacitance	$\Delta C/C$	-0.25	+0.25	%	
	Insulation Resistance, Dielectric	$R_i$	For $C \leq 220000pF$	30	-	$G\Omega$
			For $C > 220000pF$	10	-	$G\Omega.\mu F$
Tangent of Loss Angle	$tg\delta$	-	Note 1 $30 \times 10^{-4}$	-		
Temperature Coefficient	Temperature Coefficient (Note 3)	$\Delta C/C$	Note 4		%	

Test Reference per ESCC No. 3006	Characteristics	Symbols	Limits		Units
			Min	Max	
Rapid Change of Temperature Initial Measurements Final Measurements	Capacitance	C	Note 1		pF
	Capacitance	C	Note 1		pF
	Change in Capacitance	$\Delta C/C$	-0.5	+0.5	%
	Tangent of Loss Angle For C ≤ 1μF For C > 1μF	tgδ	-	Note 1 Note 1	-
Climatic Sequence Initial Measurements Final Measurements	Capacitance	C	Note 1		pF
	Capacitance	C	Note 1		pF
	Change in Capacitance	$\Delta C/C$	-0.5	+0.5	%
	Tangent of Loss Angle For C ≤ 1μF For C > 1μF	tgδ	-	Note 1 Note 1	-
	Voltage Proof, Terminal-to-Terminal	VP	1×U <sub>R</sub> (Note 5)	-	V
	Insulation Resistance, Dielectric For C ≤ 220000pF For C > 220000pF	R <sub>i</sub>	Note 2 Note 2	- -	GΩ GΩ.μF
Operating Life Initial Measurements Intermediate Measurements (1000 hours) Final Measurements (1000 or 2000 hours) (Note 6)	Capacitance	C	Note 1		pF
	Capacitance	C	Note 1		pF
	Change in Capacitance	$\Delta C/C$	-2	+2	%
	Capacitance	C	Note 1		pF
	Change in Capacitance	$\Delta C/C$	-2	+2	%
	Tangent of Loss Angle For C ≤ 1μF For C > 1μF	tgδ	-	Note 1 Note 1	-
Insulation Resistance, Dielectric For C ≤ 220000pF For C > 220000pF	R <sub>i</sub>	40 8	- -	GΩ GΩ.μF	

**NOTES:**

1. As specified in Para. 2.4.1.
2. 50% of the limit specified in Para. 2.4.1.
3. The test method and test conditions shall be as specified in Para. 2.4.2.
4. As specified in Para. 2.4.2.
5. For the applicable Rated Voltage (U<sub>R</sub>) see Para. 1.4.2.

6. 1000 hours is applicable to Periodic Testing for extension of qualification. 2000 hours is applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.

## 2.6 BURN-IN CONDITIONS

Characteristics	Symbols	Conditions (Note 1)	Units
Ambient Temperature	$T_{amb}$	+125 (+0 -5)	°C
Test Voltage	$V_T$	$0.7 \times U_R$ (Note 2)	V

### **NOTES:**

1. On completion of Burn-in the components shall be removed from the burn-in chamber and allowed to cool, under normal atmospheric conditions, for recovery for 24 ±2 hours.
2. For the applicable Rated Voltage ( $U_R$ ) see Para. 1.4.2.

**APPENDIX 'A'****AGREED DEVIATIONS FOR EXXELIA TECHNOLOGIES (F)**

Items Affected	Description of Deviations
Para. 2.1.1, Deviations from the Generic Specification: Deviations from Screening Tests – Chart F3	If a particular lot is required to undergo testing in accordance with Chart F4 then the results of the Temperature Coefficient measurements, made during High and Low Temperatures Electrical Measurements on a sample of 6 randomly-selected capacitors, shall be recorded.
Para. 2.1.1, Deviations from the Generic Specification: Deviations from Qualification and Periodic Tests – Chart F4	The Temperature Coefficient measurements recorded during Screening Tests may be used in lieu of the performance of the Temperature Coefficient test as specified in Subgroup 2B of Chart F4.