CAPACITORS, FIXED, METALLISED POLYCARBONATE DIELECTRIC, HERMETICALLY SEALED

BASED ON TYPE CKM 111

ESCC Detail Specification No. 3006/007

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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
1393	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 10^1	XXX1
XXX 10^2	XXX2
XXX 10^3	XXX3
XXX 10^4	XXX4
XXX 10^5	XXX5

Capacitance Value C (pF)	Code
XXX 10^6	XXX6
XXX 10^7	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_R, expressed by the following codes:

Rated Voltage U_R (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_R) Max (Vdc)	AC Rated Voltage (U_A) 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) (µF) (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	ØD Max	ØW (+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:

1. Two Capacitance Tolerances are available:
   - ±2% for E48 Series Capacitance Values
   - ±1% for E96 Series Capacitance Values

1.5 MAXIMUM RATINGS

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

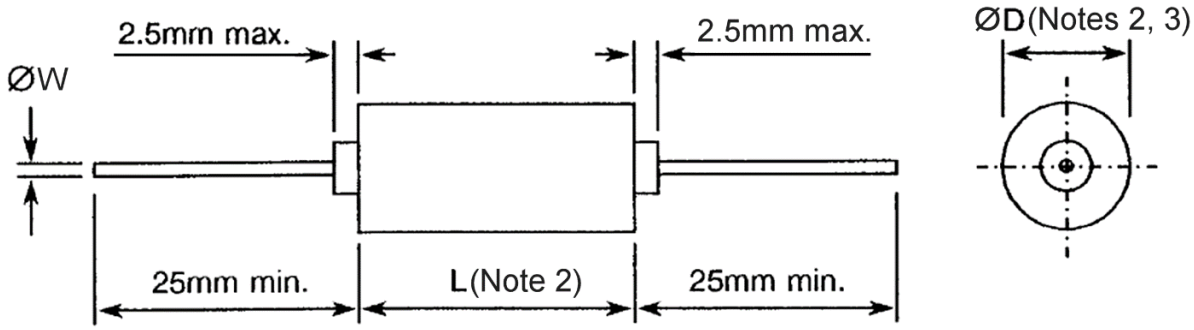
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

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	°C	T_{amb}
Storage Temperature Range	T_{stg}	-55 to +125	°C	
Soldering Temperature	T_{sol}	+260	°C	Note 3

NOTES:

1. As required; See Para. 1.4.2.
2. At $T_{amb} \leq +100°C$. For $T_{amb} > +100°C$, derate linearly to 50% U_R at $T_{amb} = +125°C$.
3. 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 ØD, L and ØW are defined in Para. 1.4.2.
2. Including the insulating sleeve.
3. At any cross-section through 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 Ua, 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_{amb} = +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_T = 1V Test Frequency = 1kHz For C ≤ 1µF For C > 1µF	 - -	 20×10^{-4} 15×10^{-4}	 - -
Insulation Resistance, Dielectric	R_I	ESCC No. 3006 For C ≤ 220000pF For C > 220000pF	 50 10	 - -	 GΩ GΩ.µF
Voltage Proof, Terminal-to-Terminal	VP	ESCC No. 3006	$1.6\times U_R$ (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_R) 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	ΔC/C	ESCC No. 3006			
		T_{amb} = -55 ±3°C	-3 (Note 2)	-	%
		T_{amb} = +125 ±3°C	-2 (Note 2)	+1 (Note 2)	%
Insulation Resistance, Dielectric	R_I	ESCC No. 3006 T_{amb} = +125 (+0 -5)°C			
		For C ≤ 220000pF	500	-	MΩ
		For C > 220000pF	100	-	MΩ.µF

NOTES:

1. 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.
2. The Temperature Coefficient limits are with respect to the capacitance at +22 ±2°C (reference point temperature).

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°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	Capacitance	C	Note 1		pF
Final Measurements	Capacitance	C	Note 1		pF
	Change in Capacitance	ΔC/C	-0.25	+0.25	%
	Insulation Resistance, Dielectric	R_I			
	For C ≤ 220000pF		30	-	GΩ
	For C > 220000pF		10	-	GΩ.µF
	Tangent of Loss Angle	tgδ			-
	For C ≤ 1µF		-	Note 1	
	For C > 1µF		-	30×10^{-4}	
Temperature Coefficient	Temperature Coefficient (Note 3)	ΔC/C	Note 4		%

Test Reference per ESCC No. 3006	Characteristics	Symbols	Limits		Units
			Min	Max	
Rapid Change of Temperature					
Initial Measurements	Capacitance	C	Note 1		pF
Final Measurements	Capacitance	C	Note 1		pF
	Change in Capacitance	ΔC/C	-0.5	+0.5	%
	Tangent of Loss Angle	tgδ			-
	For C ≤ 1µF		-	Note 1	
	For C > 1µF		-	Note 1	
Climatic Sequence					
Initial Measurements	Capacitance	C	Note 1		pF
Final Measurements	Capacitance	C	Note 1		pF
	Change in Capacitance	ΔC/C	-0.5	+0.5	%
	Tangent of Loss Angle	tgδ			-
	For C ≤ 1µF		-	Note 1	
	For C > 1µF		-	Note 1	
	Voltage Proof, Terminal-to-Terminal	VP	$1\times U_R$ (Note 5)	-	V
	Insulation Resistance, Dielectric	R_I			
	For C ≤ 220000pF		Note 2	-	GΩ
	For C > 220000pF		Note 2	-	GΩ.µF
Operating Life					
Initial Measurements	Capacitance	C	Note 1		pF
Intermediate Measurements (1000 hours)	Capacitance	C	Note 1		pF
	Change in Capacitance	ΔC/C	-2	+2	%
Final Measurements (1000 or 2000 hours) (Note 6)	Capacitance	C	Note 1		pF
	Change in Capacitance	ΔC/C	-2	+2	%
	Tangent of Loss Angle	tgδ			-
	For C ≤ 1µF		-	Note 1	
	For C > 1µF		-	Note 1	
	Insulation Resistance, Dielectric	R_I			
	For C ≤ 220000pF		40	-	GΩ
	For C > 220000pF		8	-	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_R) 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	All procurement lots shall have 100% Serialisation carried out at any point during Chart F3 testing prior to the performance of High and Low Temperatures Electrical Measurements.
	If a particular lot is required to undergo testing in accordance with Chart F4, then the Temperature Coefficient measurements, made during High and Low Temperatures Electrical Measurements on a sample of 6 randomly-selected serialised capacitors, shall be Read-and-Record measurements. See "Deviations from Qualification and Periodic Tests – Chart F4" below.
Para. 2.1.1, Deviations from the Generic Specification: Deviations from Qualification and Periodic Tests – Chart F4	The Temperature Coefficient testing specified in Subgroup 2B of Chart F4 may not be performed. In instances when Temperature Coefficient testing per Subgroup 2B of Chart F4 is not performed, the Read-and-Record measurements data obtained during High and Low Temperature Electrical Measurements (part of Chart F3, Screening Tests) shall be submitted instead.