CAPACITORS, FIXED, CHIPS, CERAMIC DIELECTRIC, TYPE I

BASED ON TYPE 0402

ESCC Detail Specification No. 3009/042

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DCR No.	CHANGE DESCRIPTION
1840	Specification upissued 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. 3009.

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 COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 3009042031000KA

- Detail Specification Reference: 3009042
- Component Type Variant Number: 03 (as required)
- Characteristic code: Capacitance Value (100pF): 1000 (as required)
- Characteristic code: Capacitance Tolerance (±10%): K (as required)
- Rating code: Rated Voltage (25V): A (as required)

1.4.1.1 Characteristics and Ratings Codes

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

(a) Rated Capacitance Value, C_n, 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_n (pF)	Code
X.XX	XCXX
XX.X	XXCX
XXX	XXX0

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

Tolerance (±)	Code Letter	Remark
0.25pF	C	
0.5pF	D	
1pF	F	For $C_n < 10$pF
1%	F	For $C_n \geq 10$pF
2%	G	
5%	J	
10%	K	

(c) Rated Voltage, U_R, expressed by the following codes:

Rated Voltage U_R (V)	Code Letter
10	Y
16	X
25	A
50	C

1.4.2 Component Type Variants and Range of Components

The component type variants and range of components applicable to this specification are as follows:

Variant Number	Style	Capacitance Range, Tolerance, Rated Voltage	Terminal Material and Finish		Weight Max (g)
			End Terminations	Termination Finish	
03	0402	See Note 1	Ag/Pd/Pt	No finish (Note 2)	0.1
06	0402	See Note 1	Ag + Ni barrier	Sn/Pb plating (Note 3)	0.1
08	0402	See Note 1	Ag + Ni barrier	Au plating (Note 2)	0.1

NOTES:

1. Available rated voltages, capacitance values and tolerances are as follows:

Rated Voltage U_R (V)	Capacitance Range C_n (pF)	
	Min	Max
50	1	100
25	1	100
16	1	120
10	1	330

Available Capacitance values for each Rated Voltage are as defined by the E12 to E96 series; however, any capacitance value within each specified capacitance range may be available on request.

Capacitance tolerances available are:

- for C_n < 10pf: 0.25pF, 0.5pF
- for $C_n \geq$ 10pf: 1% 2% 5% 10%

2. Variants 03 and 08 are not suitable for solder assembly methods. They shall be assembled using glue or wire bond techniques

3. Sn/Pb plating with tin content of 50% minimum and 97% maximum, remainder lead.

1.5 MAXIMUM RATINGS

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

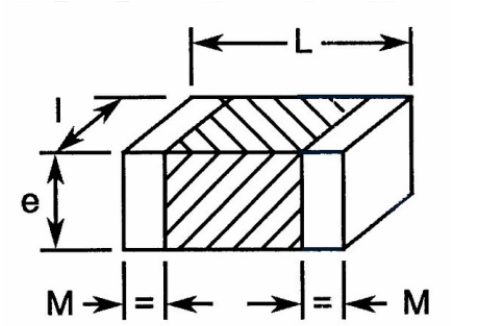
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Rated Voltage	U_R	10, 16, 25, 50	V	Note 1
Operating Temperature Range	T_{op}	-55 to +125	°C	Without derating. T_{amb}
Storage Temperature Range	T_{stg}	-55 to +125	°C	
Soldering Temperature	T_{sol}	+260	°C	Note 2

NOTES:

1. As required; See Para. 1.4.2.
2. Duration 10 seconds maximum.

1.6 PHYSICAL DIMENSIONS



Symbols	Dimensions (mm)	
	Min	Max
L	0.9	1.1
l	0.4	0.6
e	-	0.6
M	0.1	0.3

1.7 FUNCTIONAL DIAGRAM



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

2.1.1.1 Deviations from Qualification and Periodic Tests - Chart F4

(a) Solderability: not applicable to Variants 03 and 08.

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 or its primary package 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 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

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

2.3.1 Room Temperature Electrical Measurements

The measurements shall be performed at T_{amb} = +22 ±3°C.

Characteristics	Symbols	Test Method and Conditions	Tolerance (±)	Limits		Units
				Min	Max	
Capacitance	C_A	ESCC No. 3009				pF
			0.25pF	C_n -0.25	C_n +0.25	
			0.5pF	C_n -0.5	C_n +0.5	
			1pF	C_n -1	C_n +1	
			1%	$0.99C_n$	$1.01C_n$	
			2%	$0.98C_n$	$1.02C_n$	
			5%	$0.95C_n$	$1.05C_n$	
			10%	$0.9C_n$	$1.1C_n$	
Tangent of Loss Angle	tgδ	ESCC No. 3009	All			
		For C_n < 50pF		-	Note 1	
		For C_n ≥ 50pF		-	15×10^{-4}	-
Insulation Resistance	R_I	ESCC No. 3009	All	100	-	GΩ
Voltage Proof	VP	ESCC No. 3009	All	$2.5U_R$	-	V

NOTES:

1. For C_n < 50pF, tgδ < 1.5 x (150/C_n + 7) $\times 10^{-4}$, where the unit quantity for C_n is in pF.

2.3.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Insulation Resistance	R_I	ESCC No. 3009 T_{amb} = +125 ±2°C Note 2	10	-	GΩ
Temperature Coefficient	TC	ESCC No. 3009 T_{amb} = -55°C ±2°C, +20°C ±2°C, +125°C ±2°C Note 3			10^{-6}/°C
		For C_n > 20pF	-30	+30	
		For C_n ≤ 20pF	Note 4		

NOTES:

1. The measurements shall be performed on a sample of 5 components from each manufacturing lot with 0 failures allowed. In the event of any failure a 100% inspection may be performed.
2. Guaranteed but not tested during Chart F3 of the Generic Specification; only tested in Temperature Characterisation during Chart F4 of the Generic Specification.
3. In the case of a 100% inspection, a 1% total percent defective is allowed.
4. Temperature Coefficient is not specified for C_n ≤ 20pF due to test equipment limitations.

2.4 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. 2.3.1 Room Temperature Electrical Measurements.

Test Reference per ESCC No. 3009	Characteristics	Symbols	Limits		Units
			Min	Max	
Mounting					
Final Measurements	Capacitance	C_A	Record Values		
	Tangent of Loss Angle	tgδ	Note 1		
	Insulation Resistance	R_I	100	-	GΩ
Rapid Change of Temperature					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1	+1	pF or
			-1	+1	% (3)
	Tangent of Loss Angle	tgδ	-	Note 4	
Steady State Humidity (85/85)					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements (1000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1	+1	pF or
			-2	+2	% (3)
	Tangent of Loss Angle	tgδ	-	Note 4	
	Insulation Resistance (Note 5)	R_I	10	-	GΩ
Operating Life					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Intermediate Measurements (1000 hours) (Note 6)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1	+1	pF or
			-3	+3	% (3)
	Insulation Resistance	R_I	10	-	GΩ
Final Measurements (1000 or 2000 hours) (Note 7)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1	+1	pF or
			-3	+3	% (3)
	Tangent of Loss Angle	tgδ	Note 4		
	Insulation Resistance	R_I	10	-	GΩ
	Voltage Proof	VP	$2.5U_R$	-	V

Test Reference per ESCC No. 3009	Characteristics	Symbols	Limits		Units
			Min	Max	
Temperature Characterisation	Insulation Resistance at T_{amb} = +125 ±2°C	R_I	Note 8		
	Temperature Coefficient	TC	Note 8		
Robustness of Terminations Final Measurements	Capacitance	C_A	Note 1		

NOTES:

1. As specified in Para. 2.3.1 Room Temperature Electrical Measurements.
2. Capacitance values recorded during Mounting may be used as initial measurements.
3. Whichever is greater.
4. Twice the value specified in Para. 2.3.1 Room Temperature Electrical Measurements.
5. Test conditions for Insulation Resistance shall be as specified in Steady State Humidity in the ESCC Generic Specification.
6. Intermediate measurements are optional at the Manufacturer's discretion.
7. 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.
8. As specified in Para. 2.3.2 High and Low Temperatures Electrical Measurements.

2.5 BURN-IN

The requirements for Burn-in are specified in the ESCC Generic Specification. The following conditions shall also apply:

- After Burn-in, the components shall be removed from the chamber and allowed to cool under normal atmospheric conditions for recovery for 24 hours minimum.

APPENDIX A

AGREED DEVIATIONS FOR EXXELIA TECHNOLOGIES (F)

Items Affected	Description of Deviations
Para. 2.1.1 Deviations from the Generic Specification: Screening Tests - Chart F3	Burn-in: Due to the use of components of varying designs to cover the available range of components as listed in REP005 (ESCC QPL), for any particular component, the Applied Voltage for Burn-in shall be as specified in the PID as agreed with the ESCC Executive, with a minimum value of 2 times the Rated Voltage (DC).