CAPACITORS, FIXED, CHIPS, CERAMIC DIELECTRIC, TYPE I N2200

BASED ON TYPES 0603 TO 1210

ESCC Detail Specification No. 3009/045

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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
1460	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. 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: 3009045011001KE

- Detail Specification Reference: 3009045
- Component Type Variant Number: 01 (as required)
- Characteristic code: Capacitance Value (1000pF): 1001 (as required)
- Characteristic code: Capacitance Tolerance (±10%): K (as required)
- Rating code: Rated Voltage (100V): 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
XXX	XXX0
XXX 10^1	XXX1
XXX 10^2	XXX2

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

Tolerance (±)	Code Letter
5%	J
10%	K
20%	M

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

Rated Voltage U_R (V)	Code Letter
100	E
200	G
500	L
1000	M

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	
01	0603	See Note 1	Ag/Pd/Pt	No finish (Note 2)	0.15
02	0603	See Note 1	Ag + Ni barrier	Sn/Pb plating (Note 3)	0.15
03	0603	See Note 1	Ag + Ni barrier	Au plating (Note 2)	0.15
04	0603	See Note 1	Ag + Ag polymer + Ni barrier	Sn/Pb plating (Note 3)	0.15
05	0603	See Note 1	Ag + Ag polymer + Ni barrier	Au plating (Note 2)	0.15
06	0805	See Note 1	Ag/Pd/Pt	No finish (Note 2)	0.15
07	0805	See Note 1	Ag + Ni barrier	Sn/Pb plating (Note 3)	0.15
08	0805	See Note 1	Ag + Ni barrier	Au plating (Note 2)	0.15
09	0805	See Note 1	Ag + Ag polymer + Ni barrier	Sn/Pb plating (Note 3)	0.15
10	0805	See Note 1	Ag + Ag polymer + Ni barrier	Au plating (Note 2)	0.15
11	1206	See Note 1	Ag/Pd/Pt	No finish (Note 2)	0.15
12	1206	See Note 1	Ag + Ni barrier	Sn/Pb plating (Note 3)	0.15
13	1206	See Note 1	Ag + Ni barrier	Au plating (Note 2)	0.15
14	1206	See Note 1	Ag + Ag polymer + Ni barrier	Sn/Pb plating (Note 3)	0.15
15	1206	See Note 1	Ag + Ag polymer + Ni barrier	Au plating (Note 2)	0.15
16	1210	See Note 1	Ag/Pd/Pt	No finish (Note 2)	0.15
17	1210	See Note 1	Ag + Ni barrier	Sn/Pb plating (Note 3)	0.15
18	1210	See Note 1	Ag + Ni barrier	Au plating (Note 2)	0.15
19	1210	See Note 1	Ag + Ag polymer + Ni barrier	Sn/Pb plating (Note 3)	0.15
20	1210	See Note 1	Ag + Ag polymer + Ni barrier	Au plating (Note 2)	0.15

NOTES:

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

Variant Number (Style)	Capacitance Range C_n (pF)		Tolerance (Value Series) (± %)	Rated Voltage U_R (V)
	Min	Max		
01 to 05 (0603)	100	1000	5 (E24) 10 (E12) 20 (E6)	200
	1200	4700		100
06 to 10 (0805)	100	330		1000
	390	820		500
	1000	3300		200
	3900	12000		100
11 to 15 (1206)	100	1200		1000
	1500	2700		500
	3300	10000		200
	12000	39000		100
16 to 20 (1210)	100	2200		1000
	2700	5600		500
	6800	22000		200
	27000	68000		100

Any capacitance value within the capacitance range specified for each rated voltage may be available on request.

2. Variants 01, 03, 05, 06, 08, 10, 11, 13, 15, 16, 18, 20 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.

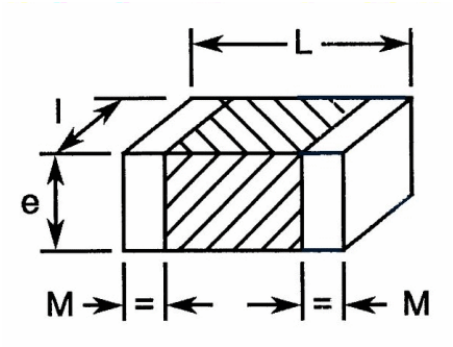
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Rated Voltage	U_R	100, 200, 500, 1000	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)							
	Variants 01, 02, 03, 04, 05		Variants 06, 07, 08, 09, 10		Variants 11, 12, 13, 14, 15		Variants 16, 17, 18, 19, 20	
	Style 0603		Style 0805		Style 1206		Style 1210	
	Min	Max	Min	Max	Min	Max	Min	Max
L	1.45	1.75	1.7	2.3	2.95	3.45	2.8	3.6
l	0.65	0.95	1.05	1.45	1.45	1.75	2.2	2.8
e	-	1	-	1.3	-	1.6	-	1.8
M	0.1	0.5	0.1	0.75	0.2	0.75	0.2	1

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 01, 03, 05, 06, 08, 10, 11, 13, 15, 16, 18, 20.

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
			5	$0.95C_n$	$1.05C_n$	
			10	$0.9C_n$	$1.1C_n$	
			20	$0.8C_n$	$1.2C_n$	
Tangent of Loss Angle	tgδ	ESCC No. 3009	All	-	15×10^{-4}	-
Insulation Resistance	R_I	ESCC No. 3009	All			
		For $C_n \leq 25000$pF		20	-	GΩ
		For $C_n > 25000$pF		500	-	GΩ.nF
Voltage Proof	VP	ESCC No. 3009	All			V
		For $U_R < 500$V		$2.5U_R$	-	
		For $U_R = 500$V		$2U_R$	-	
		For $U_R > 500$V		$1.5U_R$	-	

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			
		For $C_n \leq 25000pF$	2	-	GΩ
		For $C_n > 25000pF$	50	-	GΩ.nF
Temperature Coefficient	TC	ESCC No. 3009 T_{amb} = -55 ±2°C, +20 ±2°C, +125 ±2°C Note 3	-2700	+2700	10^{-6}/°C

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.

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	-	15×10^{-4}	-
	Insulation Resistance	R_I	Note 1		
Rapid Change of Temperature					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-3	+3	%
	Tangent of Loss Angle	tgδ	-	30×10^{-4}	-

Test Reference per ESCC No. 3009	Characteristics	Symbols	Limits		Units
			Min	Max	
Steady State Humidity (85/85)					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements (1000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-3	+3	%
	Tangent of Loss Angle	tgδ	-	30×10^{-4}	-
	Insulation Resistance (Note 3):				
	For $C_n \leq 25000$pF	R_I	2	-	GΩ
	For $C_n > 25000$pF	R_I	50	-	GΩ.nF
Operating Life					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Intermediate Measurements (1000 hours) (Note 4)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-3	+3	%
	Insulation Resistance:				
	For $C_n \leq 25000$pF	R_I	2	-	GΩ
	For $C_n > 25000$pF	R_I	50	-	GΩ.nF
Final Measurements (1000 or 2000 hours) (Note 5)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-3	+3	%
	Tangent of Loss Angle	tgδ	-	30×10^{-4}	-
	Insulation Resistance:				
	For $C_n \leq 25000$pF	R_I	2	-	GΩ
	For $C_n > 25000$pF	R_I	50	-	GΩ.nF
	Voltage Proof	VP	Note 1		V
Temperature Characterisation	Insulation Resistance at T_{amb} = +125 ±2°C	R_I	Note 6		
	Temperature Coefficient	TC	Note 6		
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. Test conditions for Insulation Resistance shall be as specified in Steady State Humidity in the ESCC Generic Specification.
4. Intermediate measurements are optional at the Manufacturer's discretion.
5. 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.
6. 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.