European Space Components Coordination

CAPACITORS, FIXED, CHIPS, CERAMIC DIELECTRIC, TYPE I N2200, HIGH VOLTAGE 200V TO 5000V

BASED ON TYPES C479S TO C483S

ESCC Detail Specification No. 3009/044

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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
1460	Specification upissued to incorporate changes per DCR.

TABLE OF CONTENTS

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: 300904401332KX

- Detail Specification Reference: 3009044
- Component Type Variant Number: 01 (as required)
- Characteristic code: Capacitance Value (3.3nF): 332 (as required)
- Characteristic code: Capacitance Tolerance (±10%): K (as required)
- Rating code: Rated Voltage (1500V): X (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
XX	XX0
XX 10^1	XX1
XX 10^2	XX2
XX 10^3	XX3
XX 10^4	XX4
XX 10^5	XX5

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

Tolerance (± %)	Code Letter
10	K
20	M

(c) Rated Voltage expressed by the following codes:

Rated Voltage U_R (V)	Code Letter
200	G
500	L
1000	M
1500	X
2000	P
3000	R
4000	S
5000	T

1.4.2 <u>Component Type Variants and Range of Components</u>

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

Variant Number	Style (Based on Type) (Note 1)	Rated Voltage U_R (V)	Capacitance Range C_n (pF) (Note 2)	Weight Max (g)
01	1812 (C479S)	200	120 to 120000	0.6
		500	56 to 27000	
		1000	47 to 6800	
		1500	33 to 3300	
		2000	33 to 1800	
		3000	27 to 680	
		4000	27 to 390	
02	2220 (C480S)	200	1500 to 330000	0.8
		500	180 to 56000	
		1000	68 to 12000	
		1500	68 to 6800	
		2000	47 to 3900	
		3000	39 to 1800	
		4000	33 to 820	
		5000	33 to 560	

Variant Number	Style (Based on Type) (Note 1)	Rated Voltage U_R (V)	Capacitance Range C_n (pF) (Note 2)	Weight Max (g)
03	2825 (C481S)	200	2200 to 390000	1.6
		500	270 to 82000	
		1000	120 to 22000	
		2000	82 to 5600	
		3000	68 to 2200	
		4000	56 to 1200	
		5000	56 to 820	
04	3333 (C482S)	200	5600 to 680000	2.5
		500	470 to 150000	
		1000	270 to 39000	
		2000	150 to 10000	
		3000	120 to 4700	
		4000	82 to 2200	
		5000	82 to 1500	
05	4040 (C483S)	200	10000 to 1200000	3.5
		500	680 to 270000	
		1000	470 to 82000	
		2000	390 to 22000	
		3000	330 to 10000	
		4000	270 to 5600	
		5000	220 to 3300	

NOTES:

1. See Para. 1.6
2. Available capacitance values and tolerances are as follows:
   - Tolerance: ±10%; value series: E12
   - Tolerance: ±20%; value series: E6

1.5 MAXIMUM RATINGS

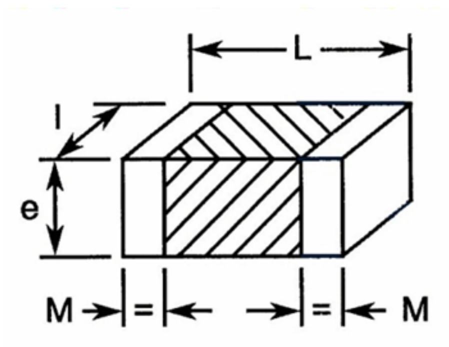
The maximum ratings shall not be exceeded at any time during use or storage.

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	200, 500, 1000, 1500, 2000, 3000, 4000, 5000	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 5 seconds maximum.

1.6 PHYSICAL DIMENSIONS



Symbols	Dimensions (mm)									
	Variant 01 (Style 1812)		Variant 02 (Style 2220)		Variant 03 (Style 2825)		Variant 04 (Style 3333)		Variant 05 (Style 4040)	
	Min	Max	Min	Min	Max	Max	Min	Max	Min	Max
L	4	5	5.2	6.2	6.5	7.5	7.9	8.9	9.16	11.16
l	2.7	3.7	4.5	5.5	5.85	6.85	7.9	8.9	9.16	11.16
e	-	3.5	-	3.8	-	4	-	4	-	4
M	0.1	1.1	0.2	1.2	0.5	1.5	0.5	1.5	1	2

1.7 FUNCTIONAL DIAGRAM

1.8 MATERIALS AND FINISHES

The components shall be terminated with metallised pads. The termination finish shall be SnPb plating (tin content 50% minimum and 97% maximum, remainder lead) over a flexible overlayer with a Ni barrier.

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 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 f = 1kHz	10 20	$0.9C_n$ $0.8C_n$	$1.1C_n$ $1.2C_n$	pF
Tangent of Loss Angle	tgδ	ESCC No. 3009 f = 1kHz	All		15×10^{-4}	-
Insulation Resistance	R_I	ESCC No. 3009 $C_n \leq$ 25000pF C_n > 25000pF	All	20 500	- -	GΩ GΩ.nF
Voltage Proof	VP	ESCC No. 3009 For U_R < 500V For U_R = 500V For 500V < $U_R \leq$ 1250V For U_R > 1250V	All	$2.5U_R$ $2U_R$ $1.5U_R$ $1.3U_R$	- - - -	V

2.3.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Insulation Resistance	R_{ID}	ESCC No. 3009 T_{amb} = +125 ±2°C Note 2 $C_n \leq$ 25000pF C_n > 25000pF	2 50	- -	GΩ GΩ.nF
Temperature Coefficient	TC	ESCC No. 3009 T_{amb} = -55 ±2°C, +20 ±2°C, +125 ±2°C Note 3	-2700	-1700	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	-	20 x10^{-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	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	-	Note 3	-
Steady State Humidity					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements (1000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	-	Note 3	
	Insulation Resistance (Note 4):				
	For $C_n \leq$ 25000pF	R_I	2	-	GΩ
	For C_n > 25000pF	R_I	50	-	GΩ.nF

Test Reference per ESCC No. 3009	Characteristics	Symbols	Limits Min	Limits Max	Units
Operating Life					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Intermediate Measurements (1000 hours) (Note 5)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Insulation Resistance:				
	For $C_n \leq 25000pF$	R_I	2	-	GΩ
	For $C_n > 25000pF$	R_I	50	-	GΩ.nF
Final Measurements (1000 or 2000 hours) (Note 6)	Capacitance	C_A	Note 1, 2		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	-	Note 3	
	Insulation Resistance:				
	For $C_n \leq 25000pF$	R_I	2	-	GΩ
	For $C_n > 25000pF$	R_I	50	-	GΩ.nF
	Voltage Proof	VP	Note 1		
Temperature Characterisation	Insulation Resistance at T_{amb} = +125 ±2°C	R_I	Note 7		
	Temperature Coefficient	TC	Note 7		
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. Twice the limit specified in Para. 2.3.1 Room Temperature Electrical Measurements.
4. Test conditions for Insulation Resistance shall be as specified in Steady State Humidity in the ESCC Generic Specification.
5. Intermediate measurements are optional at the Manufacturer's discretion.
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.
7. 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.