DCR Attachment - Draft specification for review.
.....
Steve Thacker: ESCC Technical Writer - 18/06/2012

CAPACITORS, FIXED, CHIPS, CERAMIC DIELECTRIC,

TYPE I

BASED ON TYPE 0805

ESCC Detail Specification No. 3009/003

DRAFT

Issue 5 Draft A	June 2012

Document Custodian: European Space Agency – see https://escies.org

LEGAL DISCLAIMER AND COPYRIGHT

DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
TBD	Specification updated to incorporate editorial and technical 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: 30090030110C0JE

- Detail Specification Reference: 3009003
- Component Type Variant Number: 01 (as required)
- Characteristic code: Capacitance Value (10pF): 10C0 (as required)
- Characteristic code: Capacitance Tolerance (±5%): J (as required)
- Rating code: Rated Voltage (100V): E (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
XXX 10^1	XXX1

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

Tolerance (±)	Code Letter
0.25pF	C
0.5pF	D
1%	F
2%	G
5%	J
10%	K

(c) Rated Voltage expressed by the following codes:

Rated Voltage (V)	Code Letter
16	X
25	A
50	C
100	E
200	G

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	Dimensions (mm) (Note 2)			Terminal Material and Finish		Weight Max (g)
			L Max	l Max	e Max	End Terminations	Termination Finish	
01	0805	See Note 1	2.3	1.45	1.3	Ag/Pd	No finish	0.1
02	0805	See Note 1	2.8	1.95	1.8	Ag/Pd	Sn62 solder	0.1
03	0805	See Note 1	2.3	1.45	1.3	Ag/Pd/Pt	No finish	0.1
04	0805	See Note 1	2.8	1.95	1.8	Ag/Pd/Pt	Sn62 solder	0.1
05	0805	See Note 1	2.8	1.95	1.3	Ag + Ni barrier	Sn62 solder	0.1
06	0805	See Note 1	2.3	1.45	1.8	Ag + Ni barrier	Sn/Pb coating (Note 3)	0.1

NOTES:

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

Rated Voltage U_R (V)	Capacitance Range C_n (pF)		Tolerance (±)	Value Series
	Min	Max		
200	1	9.1	0.25pF	E24
	1	8.2	0.5pF	E12
	10	681	1%	E96
	10	681	2%	E48
	10	680	5%	E24
	10	680	10%	E12
100	1	9.1	0.25pF	E24
	1	8.2	0.5pF	E12
	10	1780	1%	E96
	10	1780	2%	E48
	10	1800	5%	E24
	10	1800	10%	E12
50	1	9.1	0.25pF	E24
	1	8.2	0.5pF	E12
	10	2670	1%	E96
	10	2610	2%	E48
	10	2700	5%	E24
	10	2700	10%	E12
25	1	9.1	0.25pF	E24
	1	8.2	0.5pF	E12
	10	4640	1%	E96
	10	4640	2%	E48
	10	4700	5%	E24
	10	4700	10%	E12
16	1	9.1	0.25pF	E24
	1	8.2	0.5pF	E12
	10	6810	1%	E96
	10	6810	2%	E48
	10	6800	5%	E24
	10	6800	10%	E12

2. See Physical Dimensions.
3. Sn/Pb coating, near eutectic with minimum 10% Pb.

1.5 MAXIMUM RATINGS

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

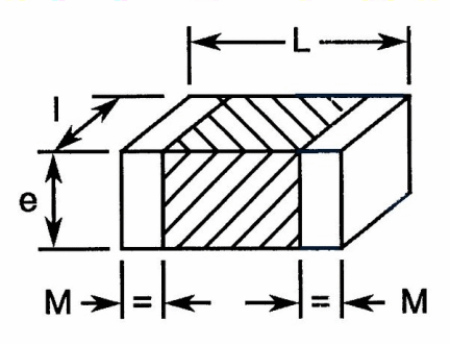
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Rated Voltage	U_R	16, 25, 50, 100, 200	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 Component Type Variants and Range of Components.
2. Duration 10 seconds maximum.

1.6 PHYSICAL DIMENSIONS



Symbols	Dimensions (mm)	
	Min	Max
L	1.7	Note 1
l	1.05	Note 1
e	-	Note 1
M	0.1	0.75

NOTES:

1. See Component Type Variants and Range of Components for dimensions L Max, l Max, e Max.

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

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.
(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	
			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 $C_n \leq 50$pF		-	Note 1	
		For $C_n \geq 50$pF		-	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 $C_n \leq 50$pF, $tg\delta < 1.5 \times (150/C_n + 7) \times 10^{-4}$, 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	
Temperature Coefficient	TC	ESCC No. 3009 Note 2 For C_n > 20pF For C_n ≤ 20pF	 -30 Note 3	 +30	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. In the case of a 100% inspection, a 1% total percent defective is allowed.
3. 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 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	Note 1		
Robustness of Terminations					
Final Measurements	Capacitance	C_A	Note 1		
Climatic Test Sequence					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1 -2	+1 +2	pF or % (Note 3)
	Tangent of Loss Angle	tgδ	-	Note 4	
	Insulation Resistance	R_I	10	-	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	+1 +1	pF or % (Note 3)
	Tangent of Loss Angle	tgδ	-	Note 4	

Test Reference per ESCC No. 3009	Characteristics	Symbols	Limits		Units
			Min	Max	
Damp Heat Steady State					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1 -2	+1 +2	pF or % (Note 3)
	Tangent of Loss Angle	tgδ	-	Note 4	
	Insulation Resistance	R_I	10	-	GΩ
Operating Life					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Intermediate Measurements (1000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1 -3	+1 +3	pF or % (Note 3)
	Insulation Resistance	R_I	10	-	GΩ
Final Measurements (2000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-1 -3	+1 +3	pF or % (Note 3)
	Tangent of Loss Angle	tgδ	-	Note 4	
	Insulation Resistance	R_I	10	-	GΩ
	Voltage Proof	VP	Note 1		
Capacitance-Temperature Characteristics	Temperature Coefficient	TC	Note 5		

NOTES:

1. As specified in 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 Room Temperature Electrical Measurements.
5. As specified in 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±2 hours.

APPENDIX A
AGREED DEVIATIONS FOR AVX/TPC (F)

Items Affected	Description of Deviations
Deviations from Generic Specification: Screening Tests (Chart F3)	High and Low Temperatures Electrical Measurements: Temperature Coefficient may be replaced with data provided by the ceramic material supplier, using AVX/TPC documents 1A-220020BCR**AQ - 1A-220022DCR**AQ (issue as per PID).