CAPACITORS, FIXED, CHIPS,

CERAMIC DIELECTRIC, TYPE II,

BASED ON TYPE 1206

ESCC Detail Specification No. 3009/023

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space components
coordination group

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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 2 and incorporates all modifications defined in Revisions 'A', 'B', 'C' and 'D' to Issue 2 and the following DCR's:-		
		Cover page		None
		DCN		None
		Table 3	: In Test Conditions column, "U_e" changed to "V_T" in four places	23943

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APPENDICES (Applicable to specific Manufacturers only)

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Capacitors, Fixed, Chips, Ceramic Dielectric, Type II, Based on Type 1206. It shall be read in conjunction with ESA/SCC Generic Specification No. 3009, the requirements of which are supplemented herein.

1.2 RANGE OF COMPONENTS

The range of capacitors covered by this specification is given in Table 1(a).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the capacitors specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION (FIGURE 1)

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the capacitors specified herein are shown in Figure 2.

1.6 FUNCTIONAL DIAGRAM

The functional diagram of the capacitors specified herein is shown in Figure 3.

TABLE 1(a) - RANGE OF COMPONENTS

CAPACITANCE RANGE (pF)	TOLERANCE (±) (%)	VALUES SERIES	RATED VOLTAGE (U_R) (V)
100 to 2700	5.0	E 24	400
100 to 2700	10	E 12	400
100 to 3300	20	E 6	400
470 to 10000	5.0	E 24	200
470 to 10000	10	E 12	200
470 to 10000	20	E 6	200
1000 to 22000	5.0	E 24	100
1000 to 22000	10	E 12	100
1000 to 22000	20	E 6	100
1000 to 56000	5.0	E 24	50
1000 to 56000	10	E 12	50
1000 to 68000	20	E 6	50
1000 to 220000	5.0	E 24	25
1000 to 220000	10	E 12	25
1000 to 220000	20	E 6	25

NOTES

1. As specified in Para. 4.4.1 and Figure 2, these ranges are available in 6 variants.

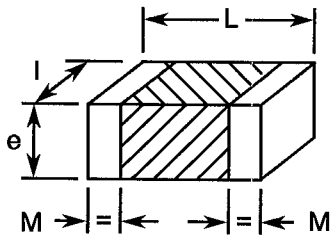
TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	LIMITS		UNIT	REMARKS
			MIN.	MAX.		
1	Rated Voltage	U_R	See Table 1(a)		V	-
2	Operating Temperature Range	T_{amb}	−55	+125	°C	Without derating
3	Storage Temperature Range	T_{stg}	−55	+125	°C	-
4	Maximum Soldering Temperature	T_{sol}	-	+260	°C	Soldering time: t: <10 sec.

FIGURE 1 - PARAMETER DERATING INFORMATION

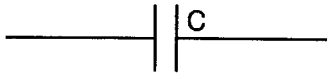
Not applicable.

FIGURE 2 - PHYSICAL DIMENSIONS



SYMBOL	DIMENSIONS (mm)			
	VARIANTS 01, 03, 06		VARIANTS 02, 04, 05	
	MIN.	MAX.	MIN.	MAX.
L	2.8	3.6	2.8	4.1
l	1.3	1.9	1.3	2.4
e	-	2.3	-	2.3
M	0.2	0.75	0.2	0.75

FIGURE 3 - FUNCTIONAL DIAGRAM



2. APPLICABLE DOCUMENTS

The following document forms part of this specification and shall be read in conjunction with it:-

(a) ESA/SCC Generic Specification No. 3009, Capacitors, Fixed, Chips, Ceramic Dielectric, Types I and II.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply. In addition, the following symbols are used:

TCC = Temperature Characteristic.
V_T = Test Voltage.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the capacitors specified herein are stated in this specification and ESA/SCC Generic Specification No. 3009, Capacitors, Fixed, Chips, Ceramic Dielectric, Types I and II. Deviations from the Generic Specification, applicable to this specification only, are listed in Para 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

None.

4.2.2 Deviations from Final Production Tests (Chart II)

None.

4.2.3 Deviations from Burn-in Tests (Chart III)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

None.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the capacitors specified herein shall be verified in accordance with the requirements set out in Para 9.3 of ESA/SCC Generic Specification No. 3009 and shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the capacitors specified herein shall be 0.15 grammes.

4.3.3 Adhesion

The requirements for adhesion are specified in Para 9.5 of ESA/SCC Generic Specification No. 3009.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the capacitors specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Terminations

- Variant 01: The capacitors shall be terminated with AgPd pads.
- Variant 02: The capacitors shall be terminated with AgPd with solder coating, 62 Sn, 36 Pb, 2.0 Ag %, +188°C.
- Variant 03: The capacitors shall be terminated with AgPdPt pads.
- Variant 04: The capacitors shall be terminated with AgPdPt with solder coating, 62 Sn, 36 Pb, 2.0 Ag %, +188°C.
- Variant 05: The capacitors shall be terminated with Ag, Ni barrier with solder coating, 62 Sn, 36Pb, 2.0 Ag %, +188°C.
- Variant 06: The capacitors shall be terminated with Ag, Ni barrier with coating tin-lead, near eutectic, minimum 10% lead.

All the above Variants are suitable for reflow soldering.

N.B.
Variant 06 is the preferred termination finish for the specified chip size (see Figure 2).

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following subparagraphs.

These components being too small to accommodate the marking as specified hereafter, the marking information in full shall accompany each component in its primary package. Such marking shall comprise:-

(a) The SCC Component Number.

(b) Characteristics and Ratings.

(c) Traceability Information.

4.5.2 The SCC Component Number

The SCC component number shall be constituted and marked as follows:

300902301B

Detail Specification Number

Type Variant (see Para. 4.4.1 and Figure 2)

Testing Level (B or C, as applicable)

4.5.3 Electrical Characteristics and Ratings

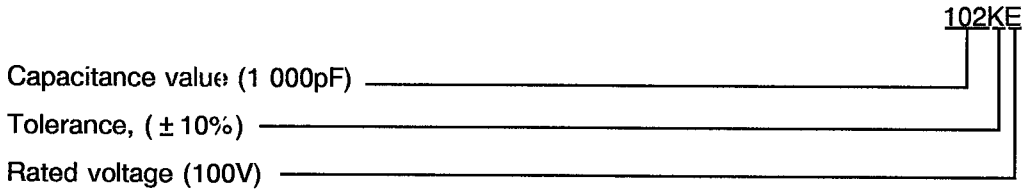
The electrical characteristics and ratings to be marked in the following order of precedence are:-

(a) Capacitance Value.

(b) Tolerance.

(c) Rated Voltage.

The information shall be constituted and marked as follows:-



4.5.3.1 Capacitance Values

The capacitance values shall be expressed by means of the following codes. The unit quantity for marking shall be picofarads (pF).

CAPACITANCE VALUE	CODE
$XX10^2$	XX2
$XX10^3$	XX3
$XX10^4$	XX4

4.5.3.2 Tolerances

The tolerances on capacitance values shall be indicated by the code letters specified hereafter.

TOLERANCE (%)	CODE LETTER
±5.0	J
±10	K
±20	M

4.5.3.3 Rated Voltage

The rated voltages shall be indicated by the code letters specified hereafter.

RATED VOLTAGE (U_R) (V)	CODE LETTER
25	A
50	C
100	E
200	G
400	K

4.5.4 Traceability Information

Traceability information shall be marked in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

(a) Manufacturing date code.

(b) Manufacturer's name.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured at room temperature are scheduled in Table 2. Unless otherwise specified, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3.

4.6.3 Circuit for Electrical Measurements

A circuit for use in performing the electrical measurements listed in Table 2 of this specification is shown in ESA/SCC Generic Specification No. 3009.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Value

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise specified, measurements shall be performed at T_{amb} = +22 ± 3 °C.

The parameter drift value (Δ) applicable to the parameter scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit values specified in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in

The requirements for burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 3009. The conditions for burn-in shall be as specified in Table 5 of this specification.

On completion of burn-in, a recovery period of 24 ± 2 hours is necessary before performance of the end-measurements.

4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3009 TEST CONDITIONS	LIMITS		UNIT
				MIN.	MAX.	
1	Capacitance	C	Para. 9.4.1.1	−5.0 −10 −20	+5.0 +10 +20	% (1)
2	Tangent of Loss Angle	$T_{g\delta}$	Para. 9.4.1.2	-	250	10^{-4}
3	Insulation Resistance	R_i	Para. 9.4.1.3	100 (2)	-	GΩ
4	Voltage Proof	VP	Para. 9.4.1.4	$2.5U_R$	-	V

NOTES

1. The capacitance limits before burn-in are −5.0 and +20%.
2. For C equal to, or less than, 10 000pF.

   For C greater than 10 000pF, R_i x C = 1 000 seconds minimum.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3009 TEST CONDITIONS	LIMITS		UNIT	REMARKS
				MIN.	MAX.		
3	Insulation Resistance at +125 ±3 °C	R_i	Para 9.4.1.3	10 000	-	MΩ	Notes 1, 2 and 4
5(i)	Temperature Characteristic ΔC/C = f(T)	TCC	Para 9.12 V_T = 0 V_T = U_R	 -20 -30	 +20 +20	%	5 parts for each capacitance value Notes 2 and 5
5(ii)	Temperature Characteristic ΔC/C = f(T)	TCC	Para 9.12 V_T = 0 V_T = U_R	 -20 -30	 +20 +20	%	5 parts for each dielectric lot Notes 3 and 5

NOTES

1. Single sample. Inspection level S3; AQL = 2.5%.
2. Applicable to Level 'B' only.
3. Applicable to Level 'C' only.
4. For C equal to, or less than, 10 000pF;

   For C greater than 10 000pF, R_i x C = 100 seconds minimum.
5. If 1 failure out of 5 parts, then test 100%.

   1% rejects maximum allowed in case of 100% testing.

FIGURE 4 - TEST CIRCUITS

Not applicable.

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
1	Capacitance Change	$\frac{\Delta C}{C}$	ESA/SCC Gen. Spec. 3009	Para's. 9.4.2 and 9.4.1.1	± 15	%

TABLE 5 - CONDITIONS FOR BURN-IN AND OPERATING LIFE TESTS

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+ 125	°C
2	Test Voltage	V_T	$2.0U_R$	V

FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN AND OPERATING LIFE TESTS

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION No. 3009)

4.8.1 Measurements and Inspections on Completion of Environmental Tests

The parameters to be measured and inspections to be performed on completion of environmental tests are scheduled in Table 6. Unless otherwise stated, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests

The parameters to be measured and inspections to be performed at intermediate points during endurance tests are scheduled in Table 6. Unless otherwise stated, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured and inspections to be performed on completion of endurance tests are as scheduled in Table 6. Unless otherwise specified, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.4 Conditions for Operating Life Test (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 3009. The conditions for operating life testing shall be as specified in Table 5 of this specification for the burn-in test.

4.8.5 Electrical Circuit for Operating Life Test (Figure 5)

Not applicable.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING

NO.	ESA/SCC GENERIC SPECIFICATION NO. 3009		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Mounting	Para. 9.15	**Final Examination**					
			Terminals	Good Tinning	-	-	-	-
			Final Measurements					
			Capacitance	Table 2 Item 1	C	Record Values		pF
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	Table 2 Item 2		10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	Table 2 Item 3		GΩ
02	Adhesion	Para. 9.5	**Final Examination**					
			Visual Examination	Damage or loosening	-	-	-	-
			Capacitance	Table 2 Item 1	C	Table 2 Item 1		pF
03	Solderability	Para. 9.6	**Final Examination**					
			Visual Examination	Para. 9.6	-	-	-	-
04	Rapid Change of Temperature	Para. 9.7	**Initial Measurements**					
			Capacitance	Table 2 Item 1	C	Item 01 Value		pF
			Final Measurements	Recovery period 24 ± 2 hours				
			Visual Examination	No damage	-	-	-	-
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−10	+10	%
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(2)	10^{-4}
05	Climatic Test Sequence	Para. 9.8	**Initial Measurements**					
			Capacitance	Table 2 Item 1	C	Item 01 Value		pF
			Final Measurements	Recovery Period 1 -24 hrs				
			Visual Inspection	Para. 9.8.7	-	-	-	-
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−10	+10	%
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(2)	10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	3.0(3)	-	GΩ
06	Damp Heat Steady State	Para. 9.9	**Initial Measurements**					
			Capacitance	Table 2 Item 1	C	Item 01 Value		pF
			Final Measurements	Recovery Period 6 - 24 hrs				
			Visual Examination	No damage	-	-	-	-
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−10	+10	%
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(2)	10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	3.0(3)	-	GΩ

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. Twice the values specified in Table 2 of this specification.
3. Or 30 seconds for C > 10 000pF.
4. Or 100 seconds for C > 10 000pF.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING (CONT'D)

NO.	ESA/SCC GENERIC SPECIFICATION NO. 3009		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
07	Operating Life	Para. 9.10	**Initial Measurements**					
			Capacitance	Table 2 Item 1	C	Item 01 Value		pF
			Intermediate Measurements to be performed at 1000 hrs (Chart IV)	Recovery period 24 ± 2 hours				
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−15	+15	%
			Insulation Resistance	Table 2 Item 3	R_i	10 (4)	-	GΩ
			Final Measurements	Recovery period 24 ± 2 hours				
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−15	+15	%
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(2)	10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	10 (4)	-	GΩ
			Voltage Proof	Table 2 Item 4	VP	Table 2 Item 4		V
			Visual Examination	No damage	-	-	-	-
08	Temperature Characteristic	Para. 9.12	Capacitance Changes	Table 3 Item 5(i) or 5(ii)	TCC	Table 3 Item 5(i) or 5(ii)		%

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. Twice the values specified in Table 2 of this specification.
3. Or 30 seconds for C > 10 000pF.
4. Or 100 seconds for C > 10 000pF.

APPENDIX 'A'

AGREED DEVIATIONS FOR VITRAMON LTD. (UK)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 4.2.1	Microsectioning may be performed using Vitramon document QCN-020 (Issue as per P.I.D.).