CAPACITORS, FIXED, BUTTON,

CERAMIC DIELECTRIC, TYPE I,

BASED ON TYPE CFC 908

ESCC Detail Specification No. 3009/013

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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 4 and incorporates all modifications defined in Revision 'A' to Issue 4 and the following DCR's:-		
		Cover Page		None
		DCN		None
		Table 1(b)	: No. 2, TC deleted and subsequent tests renumbered	221069
		Figure 2	: Drawings and Table amended	23680
		Para. 3	: Text added	23680
		Para. 4.3.3	: New paragraph added	23680
		Para. 4.7	: Title amended	221069
		Table 2	: No. 4, Symbol corrected	23680
		Table 3	: Nos. 1, 2, 3, renumbered to "3", "5(i)", "5(ii)" respectively and Notes transfered from Characteristics column to Remarks column	221069
			: In new 5(i) and 5(ii), Para. reference changed to "9.11"	221124
		Table 5	: No. 2, Test Voltage increased to "$2.0U_R$"	221069
		Para. 4.8	: Title amended	23680
		Paras 4.8.1/2/3	: First sentence amended	23680
		Table 6	: Rewritten	221069/ 221124/ 23680
'A'	Apr. '96	P1. Cover Page	: Page count amended	23795
		P2. DCN		None
		P16. Table 6	: Contents amended	23795
		P17. Table 6	: Page added	23795

TABLE OF CONTENTS

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Capacitors, Fixed, Button, Ceramic Dielectric, Type I, based on Type CFC 908. 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 as 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 for 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)
	%	pF		
100 to 1000	10	-	E 12	160

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. (Note 1)

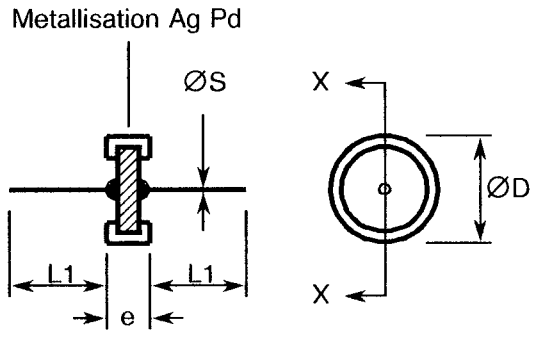
NOTES

1. The leads shall be soldered at a distance not less than 3.0mm from the component.

FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

FIGURE 2 - PHYSICAL DIMENSIONS



SECTION X-X

SYMBOL	MILLIMETRES		CAPACITANCE VALUE
	MIN.	MAX.	
ØD	7.60	8.20	-
L1	20.00	-	-
ØS	0.50	0.70	-
e	- - -	1.60 2.20 2.50	100 - 560 pF 680 - 820 pF 1000 pF

FIGURE 3 - FUNCTIONAL DIAGRAM

2. APPLICABLE DOCUMENTS

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

(a) ESA/SCC Generic Specification No. 3009 for 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:-

V_T = Test Voltage.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the capacitors specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 3009 for 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 Specifications 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 and Electrical Measurements (Chart III)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para's. 9.4.1.3 and 9.4.1.4, "Insulation Resistance" and "Voltage Proof": Measured between periphery and centre lead.

Subgroup I

After "Adhesion" is performed on the peripheral contact, the following tests shall be applied to the leads:

- Robustness of Terminations

  The capacitors shall be subjected to Tests 'Ua1' and 'Uc2' of IEC Publication No. 68-2-21.

- Final Examination

  After each of the tests, the capacitors shall be visually examined. There shall be no evidence of damage.

Subgroup VI

Para. 9.6, "Solderability", shall be amended as follows:-

"The peripheral contact shall be immersed to a depth of 1.0mm and the capacitor shall then be rotated until the whole of the edge of the peripheral contact has been immersed."

For the leads, the following shall be applied:-

9.6.1 Procedure

The leads shall be subjected to Test 'Ta' of IEC Publication No. 68-2-20 using either Method 1 (Solder Bath) or Method 3 (Solder Globule).

9.6.2 Final Examination

When the test procedures have been carried out, the capacitors shall be visually examined. The dipped surface shall be covered with a smooth and bright solder coating with no more than small amounts of scattered imperfections such as pin-holes or unwetted or de-wetted areas. These imperfections shall not be concentrated in one area and there shall be no evidence of damage.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para's. 9.4.1.3 and 9.4.1.4, "Insulation Resistance" and "Voltage Proof": Measured between periphery and centre lead.

Level 1

After "Adhesion" is performed on the peripheral contact, the following tests shall be applied to the leads:

- Robustness of Terminations

  The capacitors shall be subjected to Tests 'Ua1' and 'Uc2' of IEC Publication No. 68-2-21.

- Final Examination

  After each of the tests, the capacitors shall be visually examined. There shall be no evidence of damage.

Level 3

Para. 9.6, "Solderability", shall be amended as follows:-

"The peripheral contact shall be immersed to a depth of 1.0mm and the capacitor shall then be rotated until the whole of the edge of the peripheral contact has been immersed."

For the leads, the following shall be applied:-

9.6.1 Procedure

The leads shall be subjected to Test 'Ta' of IEC Publication No. 68-2-20 using either Method 1 (Solder Bath) or Method 3 (Solder Globule).

9.6.2 Final Examination

When the test procedures have been carried out, the capacitors shall be visually examined. The dipped surface shall be covered with a smooth and bright solder coating with no more than small amounts of scattered imperfections such as pin-holes or unwetted or de-wetted areas. These imperfections shall not be concentrated in one area and there shall be no evidence of damage.

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 0.7 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 (Periphery)

The capacitors shall be terminated with metallised pads suitable for reflow soldering.

4.4.2 Leads

The lead material shall be Type 'A' with Type '3 or 4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500. At any cross-section, the maximum thickness of the sheath shall not exceed twice the minimum thickness of the sheath.

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 paragraphs.

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:-

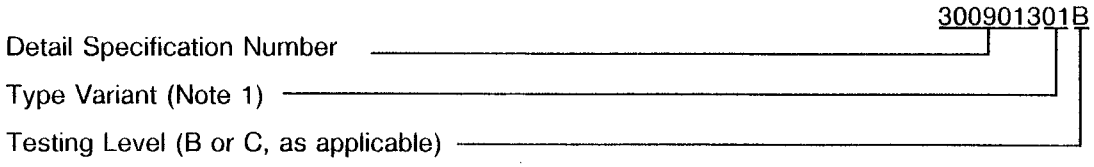
(a) The SCC Component Number.

(b) Characteristics and Ratings.

(c) Traceability Information.

4.5.2 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:



NOTES

1. Marking of the Type Variant is mandatory. No further reference to Type Variants is made in this specification.

4.5.3 Electrical Characteristics and Ratings

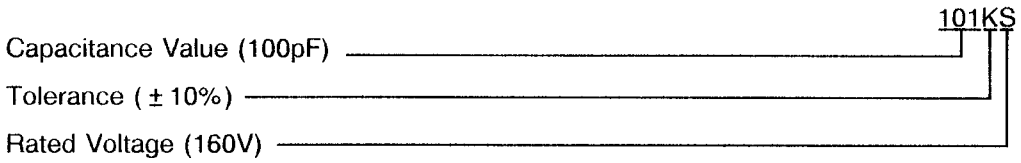
The electrical characteristics and ratings to be marked in the following order of precedence are:-

(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[1]	XX1
XX10[2]	XX2

4.5.3.2 Tolerances

The tolerance on capacitance values shall be indicated by the code letter specified hereafter.

TOLERANCE (%)	CODE LETTER
± 10	K

4.5.3.3 Rated Voltage

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

RATED VOLTAGE (U_R) (V)	CODE LETTER
160	S

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, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °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 Circuits 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 Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift values (Δ) applicable to the scheduled parameters shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value 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 Circuits 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	See Table 1(a)		-
2	Tangent of Loss Angle	$T_{g\delta}$	Para. 9.4.1.2	-	15	10^{-4}
3	Insulation Resistance	R_i	Para. 9.4.1.3	100	-	GΩ
4	Voltage Proof	VP	Para. 9.4.1.4	$2.5U_R$	-	V

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 and 2
5(i)	Temperature Coefficient	TC	Para. 9.11 Between −55 and +20 ± 2°C Between +20 ± 2 and +125°C	 −30 −30	 +30 +30	10^{-6}/°C	5 parts for each capacitance value. Notes 2 and 4
5(ii)	Temperature Coefficient	TC	Para. 9.11 Between +20 ± 2 and +125°C	 −30	 +30	10^{-6}/°C	5 parts for each dielectric lot. Notes 3 and 4

NOTES

1. Single sample; Inspection Level S3; AQL = 2.5%.
2. Applicable to Level 'B' only.
3. Applicable to Level 'C' only.
4. If 1 failure out of 5 parts, then test 100%.

   1.0% rejects maximum allowed in case of 100% testing.

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	± 0.5 or (1) ± 1.0	pF %

NOTES
1. Whichever is the greater.

FIGURE 4 - TEST CIRCUITS

Not applicable.

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, the measurements shall be performed at $T_{amb} = +22 \pm 3°C$.

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, the measurements shall be performed at $T_{amb} = +22 \pm 3°C$.

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 scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3°C$.

4.8.4 Conditions for Operating Life Tests (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 for the Burn-in test.

4.8.5 Electrical Circuits for Operating Life Tests (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	$\frac{\Delta C}{C}$	-1.0 -1.0	+1.0 +1.0	pF or % (2)
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(3)	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	$\frac{\Delta C}{C}$	-1.0 -2.0	+1.0 +2.0	pF or % (2)
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(3)	10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	10	-	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	$\frac{\Delta C}{C}$	-1.0 -2.0	+1.0 +2.0	pF or % (2)
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(3)	10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	10	-	GΩ

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. Whichever is the greater.
3. Twice the values specified in Table 2 of this specification.

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 1 hour min				
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−1.0 −3.0	+1.0 +3.0	pF or % (2)
			Insulation Resistance	Table 2 Item 3	R_i	10	-	GΩ
			Final Measurements	Recovery period 24 ± 2 hours				
			Capacitance Change	Table 2 Item 1	$\frac{\Delta C}{C}$	−1.0 −3.0	+1.0 +3.0	pF or % (2)
			Tangent of Loss Angle	Table 2 Item 2	$T_{g\delta}$	-	(3)	10^{-4}
			Insulation Resistance	Table 2 Item 3	R_i	10	-	GΩ
			Voltage Proof	Table 2 Item 4	VP	Table 2 Item 4		V
			Visual Examination	No damage	-	-	-	-
08	Temperature Coefficient	Para. 9.11	Capacitance Changes	Table 3 Item 5(i) or 5(ii)	TC	Table 3 Item 5(i) or 5(ii)		10^{-6}/°C

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. Whichever is the greater.
3. Twice the values specified in Table 2 of this specification.