DCR attachment.
Converted ESCC spec 3001/037 draft 2B for review.
.....
S.Thacker 17/05/2012

CAPACITORS, FIXED, MULTIPLE LAYER, CERAMIC DIELECTRIC, TYPE II

BASED ON TYPES CNC31, CNC32, CNC33 AND CNC34

ESCC Detail Specification No. 3001/037

DRAFT

Issue 2 Draft B	May 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. 3001.

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: 300103701225KA

- Detail Specification Reference: 3001037
- Component Type Variant Number: 01 (as required)
- Characteristic code: Capacitance Value (2.2µF): 225 (as required)
- Characteristic code: Capacitance Tolerance (±10%): K (as required)
- Rating code: Rated Voltage (25V): 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
XX 10^5	XX5
XX 10^6	XX6

(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 (V)	Code Letter
16	X
25	A

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	Package Details Note 1					Capacitance Range C_n (µF) Note 4		Weight Max (g)
	Type Note 2	Lead Type	Lead Finish Note 3	No. of Leads	Dim. H Max (mm)	Rated Voltage U_R = 16V	Rated Voltage U_R = 25V	
01	CNC31NE	N	A10	4	2.5 4.8 7	2.2 to 3.9 4.7 to 6.8 8.2 to 12	1.2 to 2.2 2.7 to 4.7 5.6 to 6.8	0.4 0.8 1.2
02	CNC32NE	N	A10	6	2.5 4.8 7	2.7 to 4.7 5.6 to 10 12 to 15	1.8 to 3.3 3.9 to 5.6 6.8 to 10	0.5 1 2
03	CNC33NE	N	A10	6	2.5 4.8 7 9.5	4.7 to 8.2 10 to 15 18 to 22 27 to 33	3.3 to 5.6 6.8 to 10 12 to 15 18 to 22	1 2 3 4
04	CNC34NE	N	A10	8	2.5 4.8 7 9.5	8.2 to 15 18 to 27 33 to 47 56 to 68	5.6 to 10 12 to 18 22 to 27 33 to 39	2 4 6 8
05	CNC31PE	P	A10	4	2.5 4.8 7	2.2 to 3.9 4.7 to 6.8 8.2 to 12	1.2 to 2.2 2.7 to 4.7 5.6 to 6.8	0.4 0.8 1.2
06	CNC32PE	P	A10	6	2.5 4.8 7	2.7 to 4.7 5.6 to 10 12 to 15	1.8 to 3.3 3.9 to 5.6 6.8 to 10	0.5 1 2
07	CNC33PE	P	A10	6	2.5 4.8 7 9.5	4.7 to 8.2 10 to 15 18 to 22 27 to 33	3.3 to 5.6 6.8 to 10 12 to 15 18 to 22	1 2 3 4
08	CNC34PE	P	A10	8	2.5 4.8 7 9.5	8.2 to 15 18 to 27 33 to 47 56 to 68	5.6 to 10 12 to 18 22 to 27 33 to 39	2 4 6 8
09	CNC31PLE	PL	A10	4	2.5 4.8 7	2.2 to 3.9 4.7 to 6.8 8.2 to 12	1.2 to 2.2 2.7 to 4.7 5.6 to 6.8	0.4 0.8 1.2
10	CNC32PLE	PL	A10	6	2.5 4.8 7	2.7 to 4.7 5.6 to 10 12 to 15	1.8 to 3.3 3.9 to 5.6 6.8 to 10	0.5 1 2

Variant Number	Package Details Note 1					Capacitance Range C_n (µF) Note 4		Weight Max (g)
	Type Note 2	Lead Type	Lead Finish Note 3	No. of Leads	Dim. H Max (mm)	Rated Voltage U_R = 16V	Rated Voltage U_R = 25V	
11	CNC33PLE	PL	A10	6	2.5 4.8 7 9.5	4.7 to 8.2 10 to 15 18 to 22 27 to 33	3.3 to 5.6 6.8 to 10 12 to 15 18 to 22	1 2 3 4
12	CNC34PLE	PL	A10	8	2.5 4.8 7 9.5	8.2 to 15 18 to 27 33 to 47 56 to 68	5.6 to 10 12 to 18 22 to 27 33 to 39	2 4 6 8
13	CNC31LE	L	A10	4	2.5 4.8 7	2.2 to 3.9 4.7 to 6.8 8.2 to 12	1.2 to 2.2 2.7 to 4.7 5.6 to 6.8	0.4 0.8 1.2
14	CNC32LE	L	A10	6	2.5 4.8 7	2.7 to 4.7 5.6 to 10 12 to 15	1.8 to 3.3 3.9 to 5.6 6.8 to 10	0.5 1 2
15	CNC33LE	L	A10	6	2.5 4.8 7 9.5	4.7 to 8.2 10 to 15 18 to 22 27 to 33	3.3 to 5.6 6.8 to 10 12 to 15 18 to 22	1 2 3 4
16	CNC34LE	L	A10	8	2.5 4.8 7 9.5	8.2 to 15 18 to 27 33 to 47 56 to 68	5.6 to 10 12 to 18 22 to 27 33 to 39	2 4 6 8

NOTES:

1. See Physical Dimensions.
2. For Variants 01 to 04 the body shall be coated with varnish. Variants 05 to 16 are classified as non-insulated.
3. The lead finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.
4. 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	16, 25	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

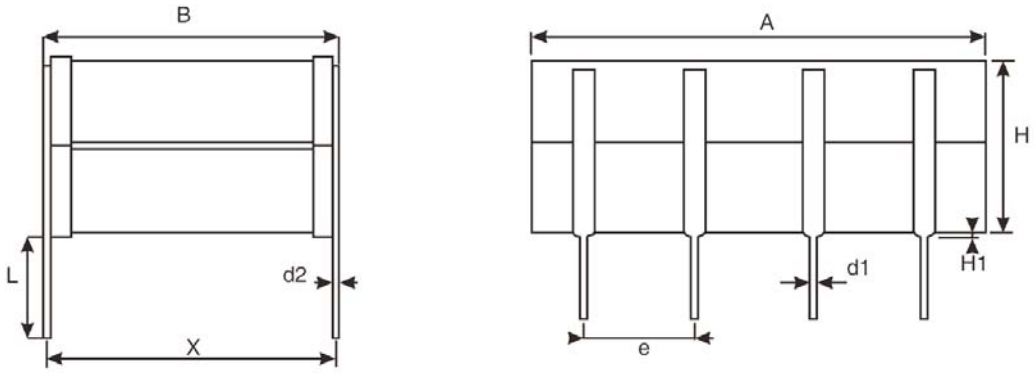
NOTES:

1. As required; See Component Type Variants and Range of Components.
2. Duration 10 seconds maximum and the same lead shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS

1.6.1 Variants 01 to 04 (lead type N)

(Variant 04 shown for illustrative purposes)



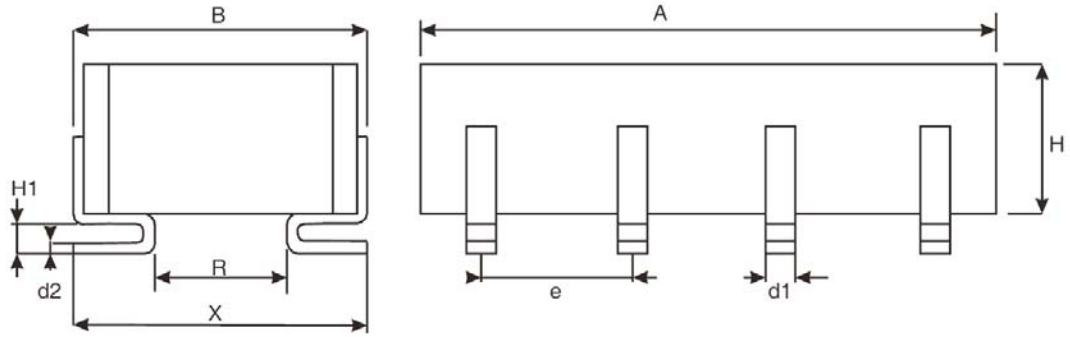
Variant Number	No. of Leads	Dimensions (mm)												
		A Max	B Max	d1 Note 1		d2 Note 1		e Note 1		H Max	H1 Max Note 1	L Min Note 1	X Note 1	
				Min	Max	Min	Max	Min	Max				Min	Max
01	4	6	7.5	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	2.05	7.5	4.58	5.58
02	6	8	8	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	2.05	7.5	7.12	8.12
03	6	9.2	10	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	2.05	7.5	7.12	8.12
04	8	12	12.5	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	2.05	7.5	9.66	10.66

NOTES:

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.6.2 Variants 05 to 08 (lead type P)

(Variant 08 shown for illustrative purposes)



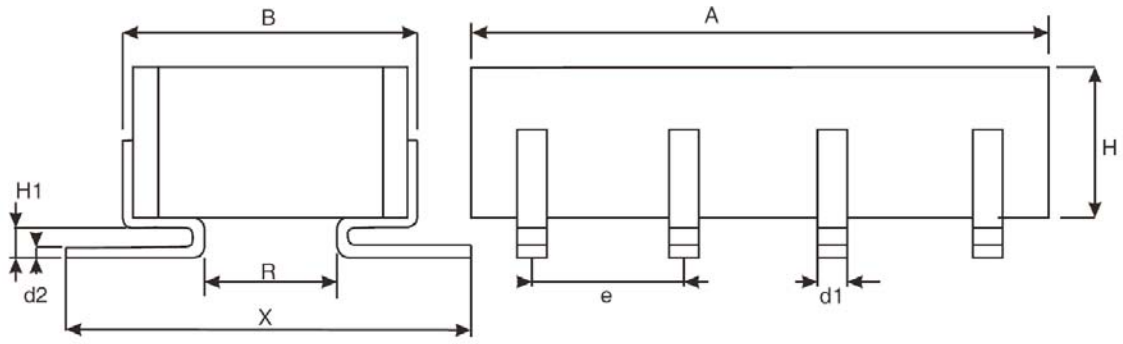
Variant Number	No. of Leads	Dimensions (mm)													
		A Max	B Max	d1 Note 1		d2 Note 1		e Note 1		H Max	H1 Note 1		R Min Note 1	X Note 1	
				Min	Max	Min	Max	Min	Max		Min	Max		Min	Max
05	4	6	7.5	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	2.5	5.5	7.5
06	6	8	8	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	2.5	6	8
07	6	9.2	10	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	3.5	8	10
08	8	12	12.5	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	5	9.5	12.5

NOTES:

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.6.3 Variants 09 to 12 (lead type PL)

(Variant 12 shown for illustrative purposes)



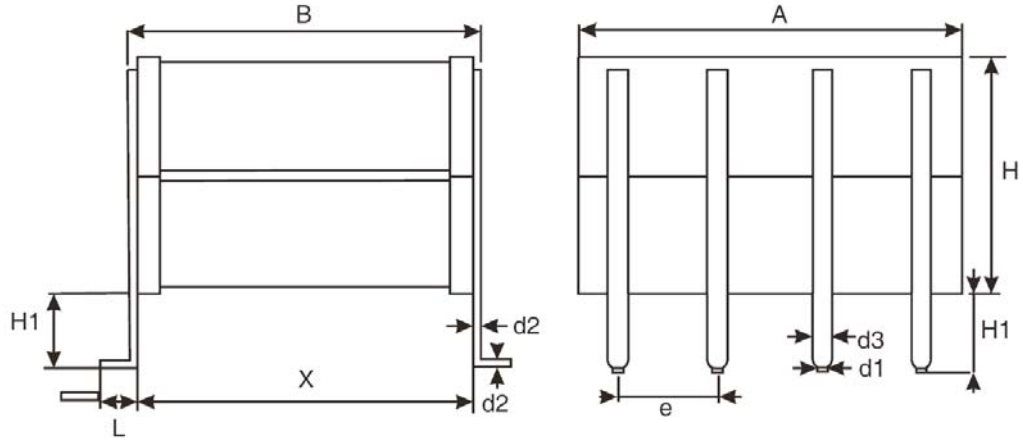
Variant Number	No. of Leads	Dimensions (mm)													
		A Max	B Max	d1 Note 1		d2 Note 1		e Note 1		H Max	H1 Note 1		R Min Note 1	X Note 1	
				Min	Max	Min	Max	Min	Max		Min	Max		Min	Max
09	4	6	7.5	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	2.5	9.5	13.5
10	6	8	8	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	2.5	10	14
11	6	9.2	10	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	3.5	12	16
12	8	12	12.5	0.4	0.6	0.2	0.3	2.49	2.59	Note 2	1.1	1.6	5	13.5	18.5

NOTES:

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.6.4 Variants 13 to 16 (lead type L)

(Variant 16 shown for illustrative purposes)



Variant Number	No. of Leads	Dimensions (mm)																
		A Max	B Max	d1 Note 1		d2 Note 1		d3 Note 1		e Note 1		H Max	H1 Note 1		L Note 1		X Note 1	
				Min	Max	Min	Max	Min	Max	Min	Max		Min	Max	Min	Max	Min	Max
13	4	6	7.5	0.4	0.6	0.2	0.3	0.9	1.1	2.49	2.59	Note 2	2	3	2	3	5	7
14	6	8	8	0.4	0.6	0.2	0.3	0.9	1.1	2.49	2.59	Note 2	2	3	2	3	5.5	7.5
15	6	9.2	10	0.4	0.6	0.2	0.3	0.9	1.1	2.49	2.59	Note 2	2	3	2	3	7.5	9.5
16	8	12	12.5	0.4	0.6	0.2	0.3	0.9	1.1	2.49	2.59	Note 2	2	3	2	3	10	12

NOTES:

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.7 FUNCTIONAL DIAGRAM

NOTES:

1. All leads on each side of the component are connected to the same capacitor terminal.

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) Robustness of Terminations and Resistance to Soldering Heat: Resistance to Soldering Heat shall be performed prior to Robustness of Terminations.
(b) Resistance to Soldering Heat and Solderability:
- For Variants 01 to 04: Immersion depth shall be between 2mm and 2.5mm from the body.
- For Variants 05 to 16: Only the part of the leads designed to be soldered shall be tested.

(c) Vibration: Prior to Vibration, the samples shall be mounted and glued on to a suitable substrate in order to avoid any stress. The samples shall be maintained on the substrate for all subsequent tests in the subgroup test sequence.

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 ROBUSTNESS OF TERMINATIONS

The leads of these devices are classified as rigid. The test conditions for Robustness of Terminations shall be as specified in the ESCC Generic Specification and as follows:

For Variants 01 to 04:
- Applicable test: Ua1 (tensile) only.
- Leads tested: a minimum of one randomly selected lead on each side of the component.
- Applied force: 5N

For Variants 05 to 16:
- Applicable test: Ue3 (shear) only.
- Pushing force: 10N for 10s

2.4 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical measurements shall be performed at room, high and low temperatures.

2.4.1 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. 3001				µF
			10	$0.9C_n$	$1.1C_n$	
			20	$0.8C_n$	$1.2C_n$	
Tangent of Loss Angle	tgδ	ESCC No. 3001	All	-	25×10^{-3}	-
Insulation Resistance (Dielectric)	R_{ID}	ESCC No. 3001	All	1000	-	MΩ.µF
Insulation Resistance (Body Insulation)	R_{IB}	ESCC No. 3001 Variants 01 to 04 only Note 1	All	1000	-	MΩ.µF
Voltage Proof (Dielectric)	VP_D	ESCC No. 3001	All	$2.5U_R$	-	V
Voltage Proof (Body Insulation)	VP_B	ESCC No. 3001 Variants 01 to 04 only Note 1	All	$2.5U_R$	-	V

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. In the case of a 100% inspection, a 1% total percent defective is allowed.

2.4.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Temperature Characteristic	TC	ESCC No. 3001 Note 2			%
		For V_T = no voltage applied	-20	+20	
		For $V_T = U_R$	-50	+30	

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.

2.5 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. 3001	Characteristics	Symbols	Limits		Units
			Min	Max	
Rapid Change of Temperature					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-15	+15	%
	Tangent of Loss Angle	tgδ	Note 1		
Resistance to Soldering Heat					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-15	+15	%
	Insulation Resistance (Dielectric)	R_{ID}	Note 1		
	Insulation Resistance (Body Insulation)(Note 2)	R_{IB}	Note 1		
Climatic Test Sequence					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	Note 1		
	Insulation Resistance (Dielectric)	R_{ID}	30	-	MΩ.μF
	Insulation Resistance (Body Insulation)(Note 2)	R_{IB}	30	-	MΩ.μF
	Voltage Proof (Body Insulation)(Note 2)	VP_B	Note 1		
Damp Heat Steady State					
Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	Note 1		
	Insulation Resistance (Dielectric)	R_{ID}	30	-	MΩ.μF
	Insulation Resistance (Body Insulation)(Note 2)	R_{IB}	30	-	MΩ.μF
	Voltage Proof (Body Insulation)(Note 2)	VP_B	Note 1		

Test Reference per ESCC No. 3001	Characteristics	Symbols	Limits		Units
			Min	Max	
Operating Life					
Initial Measurements	Capacitance	C_A	Note 1		
Intermediate Measurements (1000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-15	+15	%
	Insulation Resistance (Dielectric)	R_{ID}	100	-	MΩ.μF
	Insulation Resistance (Body Insulation)(Note 2)	R_{IB}	100	-	MΩ.μF
Final Measurements (2000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-20	+20	%
	Tangent of Loss Angle	tgδ	Note 1		
	Insulation Resistance (Dielectric)	R_{ID}	100	-	MΩ.μF
	Insulation Resistance (Body Insulation)(Note 2)	R_{IB}	100	-	MΩ.μF
	Voltage Proof (Dielectric)	VP_D	Note 1		
	Voltage Proof (Body Insulation)(Note 2)	VP_B	Note 1		
Capacitance-Temperature Characteristics	Temperature Characteristic	TC	Note 3		

NOTES:

1. As specified in Room Temperature Electrical Measurements.
2. Variants 01 to 04 only.
3. As specified in High and Low Temperatures Electrical Measurements.

2.6 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 EUROFARAD (F)

Items Affected	Description of Deviations
Deviations from Generic Specification: Special In-Process Controls (Chart F2)	Robustness of Terminations shall not be performed