EXXELIA

Technical Department

n° : 573.00.390

ind. : G

date : 10/2022

Exxelia detail specification of films capacitors, fixed, surface mount, DC self-healing, non-inductive, polyethylene terephtalate dielectric based on type PM94 S

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1. Documentation change notice

Indice	Date	Page	Item
A	01/00		first issue
B	05/03	1 - 2	Change notice
		3 - 4	List of contents
		7	75V range added
		11	400V range : last value amended
		12 - 13 - 14 15	Variants PM94NS and PM94PS added
		16 and following	
		21	Page renumbered
		22	Para 4.5.2 component identification amended (new variants added)
		25 - 26	Para 4.5.3.3 : 75V code letter added
		1 - 2	Capacitance change at +125°C amended (typing error)
C	09/04	6 to 11	Change notice
		15	”max” of dimension h deleted
			Physical dimension figure amended
		1 - 2	
D	09/05	8	Change notice
		22	130V range added
			§ 4.5.3.3 : 130V code letter added
		1 - 2	Change notice
E	10/07	9	Table 1 (a) value added 6.8µF – 200V
		1 - 2	Change notice - Index revision of pages suppression
F	05/11	10 - 11	Capacitance range extended to lower values
		25	Chart III sampling amended in order to be similar to the ESCC detail specification
G	10/22	all	total rewriting versus / evolution of the ESCC 3006 from i.2 to i.3

2. General

2.1. Scope

This specification details the ratings, physical and electrical characteristics, and test and inspection data for the component type variants and/or the Component Type Variants and 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.

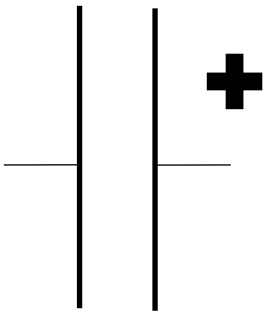
2.2. Applicable documents

The following document forms part of this specification and shall be read in conjunction with it:
- ESCC Basic Specification 23500 - Lead Materials and Finishes
- ESCC Basic Specification 21700 - General Requirements for the Marking of ESCC Components
- ESCC Generic Specification 3006 - Capacitors, fixed, film dielectric

2.3. Terms, definitions, Abbreviations, symbols and units

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification 21300 shall apply.

2.4. Functional diagram



These capacitors are not polarised ; however, marking includes the voltage polarity symbol on the top of the body which should be respected in use. This symbol + indicates the row of terminals which should be connected to the highest potential.

2.5. Maximum ratings

Table 1 - Maximum ratings

Characteristic		Symbol	Limit rating		Unit	Comment
Rated Voltage d.c		U_R	/	U_R	Vdc	
Operating temperature range		Tamb	- 55	+ 125	°C	
Storage temperature range		Tamb	- 55	+ 125	°C	
Maximum effective current		I_{RA}	see table 2a to 2g		A	
Maximum soldering temperature		TL	vapour phase 215 ± 3 iron soldering 260		°C	see Note 1
Minimum soldering distance (see Note 2)	var PM94S		1	2	mm	case immersion depth
	var PM94NS, PS		1	-	mm	connexions immersed up from the body

Note :

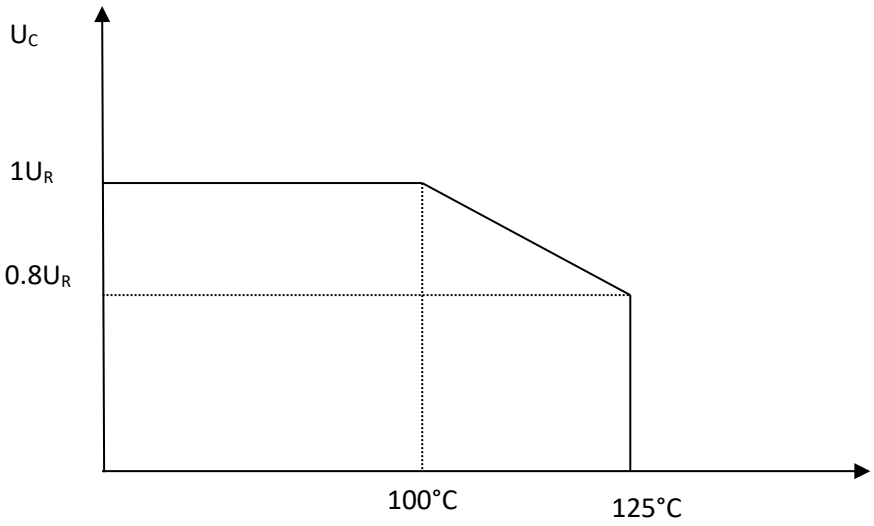
1. this component is designed for surface mounting.

Soldering conditions conform to standard CECC 00802 class B whose main characteristics are as follow:

- soldering:
  - process : vapour phase
    - temperature: 215 ± 3°C max with preheating phase at 130°C max,
    - duration: 20 to 40 sec max.
  - process: iron soldering
    - temperature max. 260°C,
    - duration: 5 sec max.

2.6. Parameter derating information

Figure 1 - Parameter derating



2.7. Range of components definition

Range of capacitors covered by this specification is scheduled below in Table 2a.

Table 2a - Range of components

Ur (V)	Cr (µF) Note 1	Available in variant	h (mm)	Ira max (A)	Weight (g)
50	2.2	01	6	1.3	1.0
	2.7	01	6	1.6	1.0
	3.3	01	6	1.9	1.0
	3.9	01	8	2.3	1.3
	4.7	01	8	2.8	1.3
		02	6	1.4	1.6
	5.6	01	10	3.3	1.7
		02	6	1.7	1.6
	6.8	01	10	4.1	1.7
		02	6	2.1	1.6
		03	6	1.9	2.2
	8.2	01	12	4.9	1.9
		02	8	2.5	2.1
		03	6	2.3	2.2
	10	01	12	6.0	2
		02	8	3.1	2.1
		03	6	2.9	2.2
		04	6	2.6	2.7
	12	02	8	3.7	2.1
		03	6	3.4	2.2
		04	6	3.1	2.7
	15	02	10	4.6	2.6
		03	8	4.3	3
		04	6	3.9	2.7
	18	03	8	5.2	3
		04	8	4.6	3.6
	22	03	10	6.3	3.7
		04	8	5.7	3.6
	27	03	12	7.8	4.7
		04	10	7	4.6
	33	03	14	9.5	5.2
		04	12	8.5	5.5
	39	04	15	10	6.8
	47	04	15	12.2	6.8

Note :

1. available in E6 (tolerance 20%) and E12 (tolerance 10%) series.

Table 2b - Range of components

Ur (V)	Cr (µF) Note 1	Available in variant	h (mm)	Ira max (A)	Weight (g)
63	1.5	01	6	1.7	1
	1.8	01	6	2.1	1
	2.2	01	8	2.3	1.3
	2.7	01	10	3.1	1.7
	3.3	01	10	3.8	1.7
		02	6	1.9	1.6
	3.9	01	12	4.9	1.9
		02	6	2.3	1.6
	4.7	01	12	6	2
		02	8	2.8	2.1
		03	6	2.6	2.2
	5.6	02	10	3.3	2.6
		03	6	3.1	2.2
	6.8	03	8	3.7	3
		04	6	3.4	2.7
	8.2	03	8	4.5	3
		04	8	4	3.6
	10	03	10	5.5	3.7
		04	8	4.9	3.6
	12	03	12	6.6	4.7
		04	10	5.9	4.6
	15	03	14	8.3	5.2
		04	12	7.4	5.5
	18	04	15	8.9	6.8
	22	04	15	10.9	6.8
75	20	04	15	8.9	6.8

Note :

1. available in E6 (tolerance 20%) and E12 (tolerance 10%) series.

Table 2c - Range of components

Ur (V)	Cr (µF) Note 1	Available in variant	h (mm)	Ira max (A)	Weight (g)
100	0.56	01	6	0.8	1
	0.68	01	6	1	1
	0.82	01	6	1.1	1
	1	01	6	1.8	1
	1.2	01	8	1.8	1.3
	1.5	01	8	2.2	1.3
		02	6	1.1	1.6
	1.8	01	10	2.7	1.7
		02	6	1.4	1.6
	2.2	01	12	3.5	1.9
		02	6	1.7	1.6
		03	6	1.6	2.2
	2.7	02	8	2.1	2.1
		03	6	1.9	2.2
	3.3	02	10	2.5	2.6
		03	6	2.4	2.2
		04	6	2.1	2.7
	3.9	03	8	2.8	3
		04	6	2.5	2.7
	4.7	03	8	3.4	3
		04	8	3	3.6
	5.6	03	10	4	3.7
		04	8	3.6	3.6
	6.8	03	12	4.9	4.7
		04	10	4.3	4.6
	8.2	03	14	5.9	5.2
		04	10	5.2	4.6
	10	04	12	6.4	5.5
	12	04	15	7.7	6.8
130	12	04	15	5	6.8

Note :

1. available in E6 (tolerance 20%) and E12 (tolerance 10%) series.

Table 2d - Range of components

Ur (V)	Cr (µF) Note 1	Available in variant	h (mm)	Ira max (A)	Weight (g)
200	0.33	01	6	0.6	1
	0.39	01	6	0.8	1
	0.47	01	6	1	1
	0.56	01	8	1.1	1.3
	0.68	01	8	1.4	1.3
	0.82	01	10	1.7	1.7
		02	6	0.8	1.6
	1	01	12	2.1	1.9
		02	6	1	1.6
	1.2	02	8	1.2	2.1
		03	6	1.1	2.2
	1.5	02	8	1.5	2.1
		03	6	1.4	2.2
	1.8	02	10	1.8	2.6
		03	8	1.7	3
		04	6	1.6	2.7
	2.2	03	8	2.1	3
		04	6	2	2.7
	2.7	03	10	2.6	3.7
		04	8	2.4	3.6
	3.3	03	10	3.2	3.7
		04	10	3	4.6
	3.9	03	12	3.8	4.7
		04	10	3.5	4.6
	4.7	03	14	4.6	5.2
		04	12	4.3	5.5
	5.6	04	15	5.1	6.8
	6.8	04	17	6.2	7.8

Note :

1. available in E6 (tolerance 20%) and E12 (tolerance 10%) series.

Table 2e - Range of components

Ur (V)	Cr (µF) Note 1	Available in variant	h (mm)	Ira max (A)	Weight (g)
250	0.12	01	6	0.6	1
	0.15	01	6	0.6	1
	0.18	01	6	0.6	1
	0.22	01	6	0.8	1
	0.27	01	6	1	1
	0.33	01	6	1.2	1
	0.39	01	8	1.4	1.3
	0.47	01	8	1.7	1.3
		02	6	0.8	1.6
	0.56	01	10	2	1.7
		02	6	0.9	1.6
	0.68	01	12	2.4	1.9
		02	6	1.1	1.6
	0.82	02	8	1.3	2.1
	1	02	8	1.6	2.1
		03	6	1.5	2.2
		04	6	1.3	2.7
	1.2	02	10	2	2.6
		03	8	1.8	3
		04	6	1.6	2.7
	1.5	02	10	2.5	2.6
		03	8	2.3	3
		04	6	2	2.7
	1.8	03	10	2.7	3.7
		04	8	2.4	3.6
	2.2	03	10	3.4	3.7
		04	8	3	3.6
	2.7	03	12	4.1	4.7
		04	10	3.6	4.6
	3.3	03	14	5	5.2
		04	10	4.4	4.6
	3.9	04	12	5.3	5.5
	4.7	04	15	6.3	6.8

Note :

1. available in E6 (tolerance 20%) and E12 (tolerance 10%) series.

Table 2f - Range of components

Ur (V)	Cr (µF) Note 1	Available in variant	h (mm)	Ira max (A)	Weight (g)
400	0.082	01	6	0.6	1
	0.1	01	6	0.8	1
	0.15	01	8	1.2	1.3
	0.22	01	10	1.7	1.7
		02	6	0.8	1.6
	0.27	02	6	1	1.6
	0.33	02	8	1.2	2.1
	0.39	02	8	1.4	2.1
	0.47	02	10	1.7	2.6
		03	6	1.6	2.2
	0.56	03	8	1.9	3
	0.68	03	8	2.3	3
		04	6	2	2.7
	0.82	03	10	2.8	3.7
		04	8	2.5	3.6
	1	03	12	3.4	4.7
		04	10	3	4.6
	1.2	03	14	4	5.2
		04	10	3.6	4.6
	1.5	04	12	4.5	5.5
	1.8	04	15	5.4	6.8

Note :

1. available in E6 (tolerance 20%) and E12 (tolerance 10%) series.

2.8. Physical dimensions, terminal, and variants definition

Figure 2a - Physical dimensions (in mm)

variants 01 to 04 with PM94S type

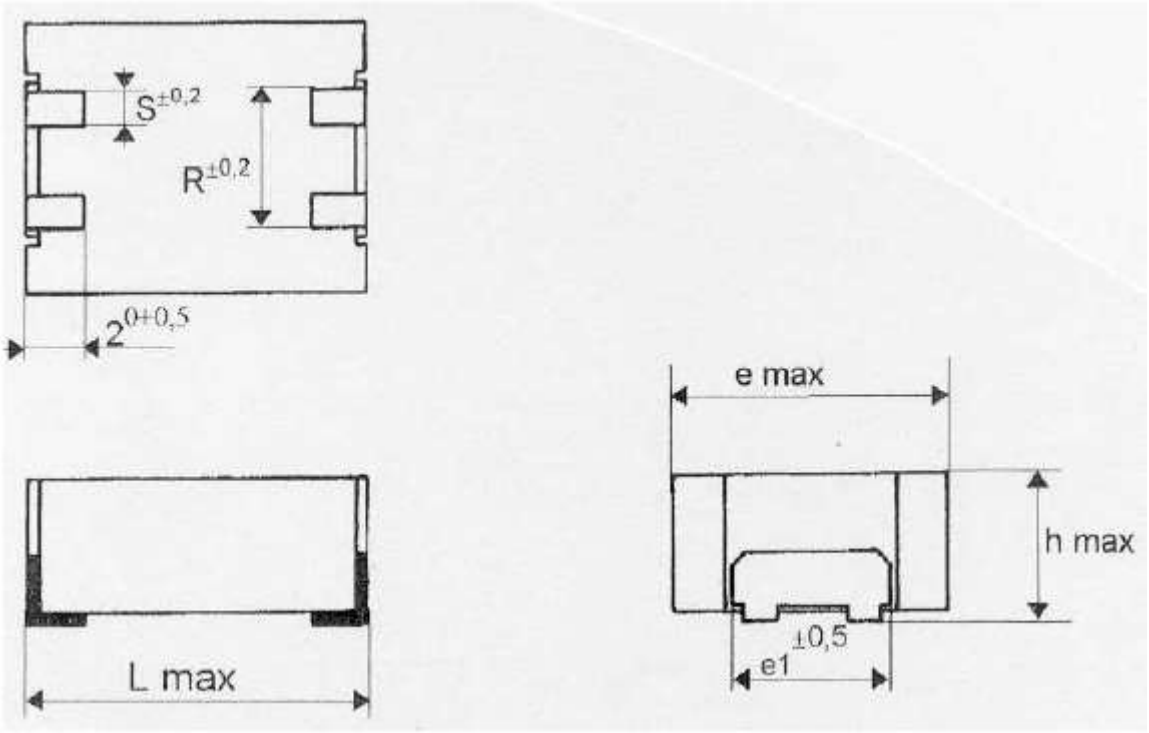


Table 3a - Dimensions (mm)

Case variant Note 1	L max	e max	e1 +/- 0,5	R +/- 0,2	S +/- 0,2
1	10,7	10,7	6	5	1,5
2	15,5	11,5	6	5	1,5
3	16,5	15,5	8	7	2,0
4	18,5	17,0	8	7	2,0

Note :

1. dimensions h : see table 2a to 2f

Figure 2b - Physical dimensions (in mm)

variants 01 to 04 with PM94NS type

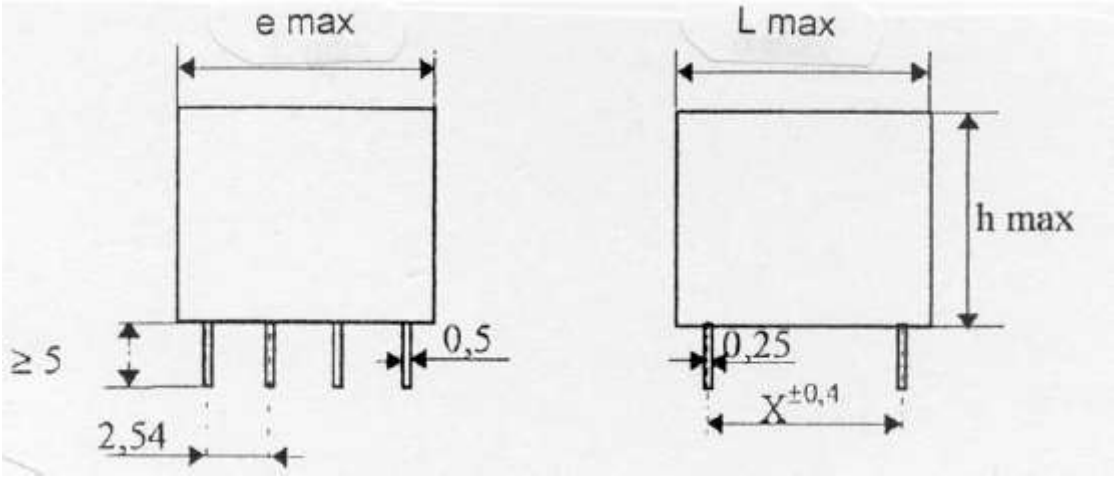


Table 3b - Dimensions (mm)

Case variant Note 1	L max	e max	X +/- 0,4	Output nbr per line
1	10,7	10,7	8,25	4
2	15,5	11,5	14,00	4
3	16,5	15,5	14,00	5
4	18,5	17,0	15,24	6

Note :

1. dimensions h : see table 2a to 2f

Figure 2c - Physical dimensions (in mm)

variants 1 to 4 with PM94PS type

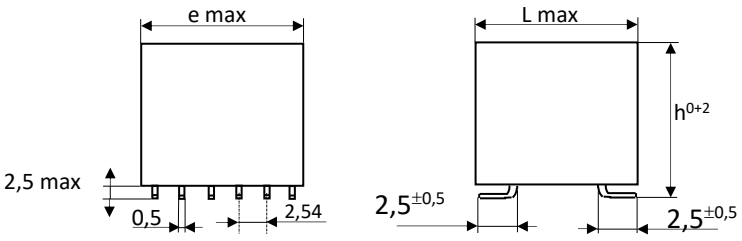


Table 3c - Dimensions (mm)

Case variant Note 1	L max	e max	Output nbr per line
1	10,7	10,7	4
2	15,5	11,5	4
3	16,5	15,5	5
4	18,5	17,0	6

Note :

1. dimensions h : see table 2a to 2f

2.9. Material and finishes

Materials and finishes shall be as specified herein. Where a defined 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.

2.9.1. Lead/ terminal material

Raw material: brass,
Plating: Cu/Ag.

2.9.2. Lead / terminal finish

Type 18 or type 4 finish in accordance with requirements of the ESCC Basic Specification 23500.

2.10. Exxelia component number

The component identification is constituted and marked as follow:
PM94XS [ ] WW [ ] XXX [ ] Y [ ] Z

with:
- PM94XS: type with X = [ ], N, or P
- [ ] : space
- WW: variant
- XXX: coded capacitance
- Y: coded tolerance
- Z: coded rated voltage

Table 4 - Coded capacitance

Capacitance (pF)	Code
XX 10^4	XX4
XX 10^5	XX5
XX 10^6	XX6

Table 5 - Coded tolerance

Tolerance (%)	Code
± 10	K
± 20	M

Table 6 - Coded rated voltage

Rated voltage (V)	Code
50	C
63	D
75	P
100	E
130	Y
200	G
250	H
400	K
630	Z

In accordance with requirements of the ESCC Basic Specification 21700.

3. Requirements

3.1. 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.

3.2. Deviation from the generic specification

3.2.1. Deviations from final production tests (Chart F2)

none

3.2.2. Deviations from burn-in and electrical measurements (Chart F3)

Para § 8.4.3. - High and low temperatures electrical measurements :
this test shall be carried out on 6 samples. The parts to be measured shall be mounted on a suitable substrate. As a consequence, this test shall be considered as destructive and the parts so tested cannot be delivered as flight model. Therefore, this test may be performed at the end of the Chart III file and parts rejected during external visual inspection, or radiographic inspection, but electrically acceptable after burn-in, may be used.

3.2.3. Deviations from qualification, environmental and endurance tests (Chart F4)

Para § 8.10 - Robustness of termination:
only the test Ua is applicable.
Frame termination surface mount capacitors shall be mounted on a suitable substrate. After mounting, examination shall be made for good tinning as evidenced by flowing of the solder with wetting of the terminations.
A force of 10 N shall be applied normal to the line joining the terminals and in a plane parallel to the substrate, for a duration of 10 seconds.
For surface mount capacitors, there shall be no evidence of damage or looseling of the components from the substrate.

Para § 8.11 - Resistance to soldering heat:
this test shall be carried out in accordance with IEC Publication N° 60068-2-58, with the following conditions :
- temperature : 215±3°C ;
- immersion time : 40 sec.
- minimum soldering distance immersed: define in table 1.

Para § 8.13 - Operating life:
the applied voltage shall be 1,25 Uc.

Para § 8.14 - Solderability:
shall be carried out in accordance with IEC Publication N° 60068-2-58 with the following conditions:
- temperature : 215±3°C ;
- immersion time : 3 ± 0,3 sec.
- minimum soldering distance immersed: define in table 1.

3.3. Marking

The marking is as follow:
EFD [ ] “Exxelia component number” [ ] XX.XX

with:
- EFD: acronym of Eurofarad
- [ ] : space
- Exxelia component number: see § 2.10
- XX.XX: date code

3.4. Mechanical characteristics requirements

3.4.1. Dimension

Dimensions of the capacitors specified herein shall be checked.
They shall be in accordance with the figures 2a to 2c and the table 3a to 3c and 2a to 2f.

3.4.2. Weight

Maximum weight of capacitors in accordance with the tables 2a to 2f is guaranteed but not tested.

3.4.3. Robustness of terminations

A force of 10 N shall be applied normal to the line joining the terminals and in a plane parallel to the substrate, for a duration of 10 seconds.

3.5. Electrical characteristics requirements

3.5.1. Electrical measurements at room temperature

Table 7 - Electrical measurement at Tamb = + 22 ± 3°C

Characteristic	Symbol	Test spec	Test condition	Limit		Unit
				min	max	
Capacitance	C	ESCC 3006	Sub para 8.4.1.1 Test frequency : 1kHz	see table 1(a)		
Insulation Resistance	RI	ESCC 3006	For C ≤ 0.33µF - UR > 100V For C > 0.33µF - UR ≤ 100V For C > 0.33µF - UR > 100V Note 1	7500 1250 2500	- - -	MΩ sec sec
Dissipation Factor Tangent of Loss Angle	Tgδ	ESCC 3006	Sub para 8.4.1.2 Test frequency : 1kHz	-	100.10^{-4}	-
Voltage Proof	UProof	ESCC 3006	Sub para 9.6.1.1	1.6UR	-	Vdc

Note :

1. insulation resistance measurement shall be performed as follow:

- for Ur ≤ 100V: IR measurement under Ur,
- for 100V ≤ Ur: IR measurement under 100V.

3.5.2. Electrical measurements at high and low operating temperature range

Table 8 - Electrical measurement at high and low temperatures

Characteristic	Symbol	Test spec	Test condition	Limit		Unit
				min	max	
Temperature coefficient at - 55 (+3 / -0)°C	ΔC/C	ESCC 3006	Sub para 8.4.1.1 Test frequency : 1kHz	0	- 10 (2)	%
Temperature coefficient at + 125 (+0 / - 3)°C	ΔC/C	ESCC 3006	Sub para 8.4.1.1 Tamb : + 125 (+0 / -3)°C	0	+ 18 (2)	%

Notes :

1. these measurements shall be performed on 6 samples,
   if one failure occurs out of 6 parts, then test 100%,
   1% reject maximum allowed in the case of 100% testing.
2. related to value at 22°C ± 3°C.

3.6. Chart F3 / screening / burn-in at high operating temperature range

Table 9 - Burn-in conditions

Characteristic	Symbol	Test condition	Unit
Ambient temperature	Tamb	+ 125 (+0 / -5)	°C
Test voltage	UT	1.25 Uc (1)	Vdc

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

Note :
1. see figure 1 for value of Uc (Ur at 125°C).

3.7. Chart F4 / LVT / intermediate and final control

Table 10 - Intermediate and final control

Characteristic	Symbol	Measure	Test condition	Limit		Unit
Robustness of termination		External visual inspection				
Resistance to soldering heat	ΔC/C	Capacitance change	8.4.1.1	- 3	+ 3	%
	ΔTgδ	Dissipation Factor change			+50	10-4
Solderability		External Visual Inspection	Solder bath method			
Rapid change of	ΔC/C	Capacitance change	8.4.1.1	- 3	+ 3	%
Temperature	Δ Tgδ	Dissipation Factor change	8.4.1.2	-	table 2	
Vibration		External Visual Inspection				
Bump	ΔC/C	Capacitance change	8.4.1.1	- 5	+ 5	%
Shock	ΔC/C	Capacitance change	8.4.1.1	- 5	+ 5	%
Climatic sequence	ΔC/C	Capacitance change	8.4.1.1	- 3	+ 3	%
	ΔTgδ	Dissipation Factor change	8.4.1.2	-	+ 50	.10-4
	RI	Insulation resistance	8.4.1.3	50 % of table 2	- -	GΩ or sec
High and low temperature Stability	ΔC/C	Capacitance change	8.4.1.1 at -55 (+3/-0)°C	0	- 10	%
	ΔC/C		8.4.1.1 at + 125 (+0/-3)°C	0	+ 18	%
Operating life	ΔC/C	Capacitance change	8.4.1.1	- 5	+ 5	%
	Δ Tgδ	Dissipation Factor change	8.4.1.2	-	+ 50	10-4
	RI	Insulation Resistance	8.4.1.3	50 % of table 2	- -	GΩ or sec

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