



Page 1 of 28

**CAPACITORS, FIXED, SELF-HEALING, NON-INDUCTIVE,
POLYETHYLENE TEREPHTALATE DIELECTRIC,
NON-HERMETICALLY SEALED**

BASED ON TYPE PM948S, PM948NS

ESCC Detail Specification No. 3006/026

Issue 1	January 2016
---------	--------------



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

LEGAL DISCLAIMER AND COPYRIGHT

European Space Agency, Copyright © 2016. All rights reserved.

The European Space Agency disclaims any liability or responsibility, to any person or entity, with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the use and application of this ESCC publication.

This publication, without the prior permission of the European Space Agency and provided that it is not used for a commercial purpose, may be:

- copied in whole, in any medium, without alteration or modification.
- copied in part, in any medium, provided that the ESCC document identification, comprising the ESCC symbol, document number and document issue, is removed.

DOCUMENTATION CHANGE NOTICE

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

DCR No.	CHANGE DESCRIPTION

TABLE OF CONTENTS

1	GENERAL	6
1.1	SCOPE	6
1.2	RANGE OF COMPONENTS AND CASE SIZE VARIANTS	6
1.3	MAXIMUM RATINGS	6
1.4	PARAMETER DERATING INFORMATION	6
1.5	PHYSICAL DIMENSIONS	6
1.6	FUNCTIONAL DIAGRAM	6
2	APPLICABLE DOCUMENTS	6
3	TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS	6
4	REQUIREMENTS	20
4.1	GENERAL	20
4.2	DEVIATIONS FROM GENERIC SPECIFICATION	21
4.2.1	Deviations from Special In-Process Controls	21
4.2.2	Deviations from Final Production Tests (Chart II)	21
4.2.3	Deviations from Burn-in and Electrical Measurements (Chart III)	21
4.2.4	Deviations from Qualification Tests (Chart IV)	21
4.2.5	Deviations from Lot Acceptance Tests (Chart V)	22
4.3	MECHANICAL REQUIREMENTS	22
4.3.1	Dimension Check	22
4.3.2	Weight	22
4.3.3	Robustness of Terminations	22
4.4	MATERIALS AND FINISHES	22
4.4.1	Case	22
4.4.2	Lead Material and Finish	22
4.5	MARKING	23
4.5.1	General	23
4.5.2	The ESCC Component Number	23
4.5.2.1	Characteristics and Ratings Codes	23
4.5.3	Traceability Information	24
4.6	ELECTRICAL MEASUREMENTS	24
4.6.1	Electrical Measurements at Room Temperature	24
4.6.2	Electrical Measurements at High and Low Temperatures	24
4.7	BURN-IN TESTS	24
4.7.1	Parameter Drift Values	24
4.7.2	Conditions for Burn-in	24



4.8	ENVIRONMENTAL AND ENDURANCE TESTS (CHART IV AND V OF ESCC GENERIC SPECIFICATION NO. 3006)	26
4.8.1	Measurements and Inspections on Completion of Environmental Tests	26
4.8.2	Measurements and Inspections at Intermediate Points during Endurance Tests	26
4.8.3	Measurements and Inspections on Completion of Endurance Tests	26
4.8.4	Conditions for Operating Life Tests (Part of Endurance Testing)	26

1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Capacitors, Fixed, Self-Healing, Non-inductive, Polyethylene Terephthalate Dielectric, Non-hermetically Sealed, based on Type PM948S, PM948NS. It shall be read in conjunction with ESCC Generic Specification No. 3006, the requirements of which are supplemented herein.

1.2 RANGE OF COMPONENTS AND CASE SIZE VARIANTS

The range of capacitors and case size variants covered by this specification are scheduled 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

The parameter derating information applicable to the capacitors specified herein, is shown in Figure 1.

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.

2 APPLICABLE DOCUMENTS

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

- (a) ESCC Generic Specification No. 3006 for Capacitors, Fixed, Film Dielectric.
- (b) IEC Publication No. 60068-2-58, Environmental Testing.

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.

TABLE 1(a) – RANGE OF COMPONENTS AND CASE SIZE VARIANTS

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
50	01	05	2.2	1.3	1	6
50	01	05	2.7	1.6	1	6
50	01	05	3.3	1.9	1	6
50	01	05	3.9	2.3	1.3	8
50	01	05	4.7	2.8	1.3	8
50	02	06	4.7	1.4	1.6	6
50	01	05	5.6	3.3	1.7	10
50	02	06	5.6	1.7	1.6	6
50	01	05	6.8	4.1	1.7	10
50	02	06	6.8	2.1	1.6	6
50	03	07	6.8	1.9	2.2	6
50	01	05	8.2	4.9	2	12
50	02	06	8.2	2.5	2.1	8
50	03	07	8.2	2.3	2.2	6
50	01	05	10	6	2	12
50	02	06	10	3.1	2.1	8
50	03	07	10	2.9	2.2	6
50	04	08	10	2.6	2.7	6
50	02	06	12	3.7	2.1	8
50	03	07	12	3.4	2.2	6
50	04	08	12	3.1	2.7	6
50	02	06	15	4.6	2.6	10
50	03	07	15	4.3	3	8
50	04	08	15	3.9	2.7	6
50	03	07	18	5.2	3	8
50	04	08	18	4.6	3.6	8
50	03	07	22	6.3	3.7	10
50	04	08	22	5.7	3.6	8
50	03	07	27	7.8	4.7	12
50	04	08	27	7	4.6	10
50	03	07	33	9.5	5.2	14
50	04	08	33	8.5	5.5	12
50	04	08	39	1	6.8	15
50	04	08	47	12.2	6.8	15

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
63	01	05	1	1.4	1	6
63	01	05	1.2	1.5	1	6
63	01	05	1.5	1.9	1	6
63	01	05	1.8	2	1	6
63	01	05	2.2	2.5	1.3	8
63	02	06	2.2	1.7	1.6	6
63	01	05	2.7	2.9	1.3	8
63	02	06	2.7	1.8	1.6	6
63	01	05	3.3	3.3	1.7	10
63	02	06	3.3	2.2	1.6	6
63	03	07	3.3	2.2	2.2	6
63	01	05	3.9	3.5	1.7	10
63	02	06	3.9	2.3	1.6	6
63	03	07	3.9	2.4	2.2	6
63	01	05	4.7	3.9	2	12
63	02	06	4.7	2.7	2.2	8
63	03	07	4.7	2.9	2.2	6
63	04	08	4.7	2.6	2.7	6
63	01	05	5.6	4.1	2	12
63	02	06	5.6	3	2.1	8
63	03	07	5.6	3.4	2.2	6
63	04	08	5.6	3.1	2.7	6
63	02	06	6.8	3.4	2.6	10
63	03	07	6.8	3.8	3	8
63	04	08	6.8	3.7	2.7	6
63	02	06	8.2	3.6	2.6	10
63	03	07	8.2	4.1	3	8
63	04	08	8.2	4.1	3.6	8
63	03	07	10	4.7	3.7	10
63	04	08	10	4.4	3.6	8
63	03	07	12	5	3.7	10
63	04	08	12	5	4.6	10
63	03	07	15	5.6	4.7	12
63	04	08	15	5.4	4.6	10
63	03	07	18	6.2	5.2	14
63	04	08	18	6	5.5	12
63	03	07	22	6.9	6.3	17
63	04	08	22	6.6	6.8	15
63	04	08	27	7.4	7.8	17

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
100	01	05	0.56	1	1	6
100	01	05	0.68	1.2	1	6
100	01	05	0.82	1.5	1	6
100	01	05	1	1.8	1	6
100	01	05	1.2	2.1	1.3	8
100	01	05	1.5	2.2	1.3	8
100	02	06	1.5	1.2	1.6	6
100	01	05	1.8	2.3	1.3	8
100	02	06	1.8	1.4	1.6	6
100	01	05	2.2	2.8	1.7	10
100	02	06	2.2	1.7	1.6	6
100	01	05	2.7	3.4	1.7	10
100	02	06	2.7	1.8	1.6	6
100	03	07	2.7	1.9	2.2	6
100	01	05	3.3	3.8	2	12
100	02	06	3.3	2.5	2.1	8
100	03	07	3.3	2.3	2.2	6
100	02	06	3.9	2.9	2.1	8
100	03	07	3.9	2.4	2.2	6
100	04	08	3.9	2.5	2.7	6
100	02	06	4.7	3.3	2.6	10
100	03	07	4.7	3.4	3	8
100	04	08	4.7	3	2.7	6
100	02	06	5.6	3.4	2.6	10
100	03	07	5.6	3.8	3	8
100	04	08	5.6	3.6	3.6	8
100	03	07	6.8	4.3	3.7	10
100	04	08	6.8	4.1	3.6	8
100	03	07	8.2	4.6	3.7	10
100	04	08	8.2	4.4	3.6	8
100	03	07	10	5.2	4.7	12
100	04	08	10	5	4.6	10
100	03	07	12	5.8	5.2	14
100	04	08	12	5.5	5.5	12
100	03	07	15	6.3	6.3	17
100	04	08	15	5.7	5.5	12
100	04	08	18	6.4	6.8	15
100	04	08	22	7	7.8	17

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
170	01	05	0.33	0.8	1	6
170	01	05	0.39	1	1	6
170	01	05	0.47	1.2	1	6
170	01	05	0.56	1.4	1	6
170	01	05	0.68	1.7	1.3	8
170	01	05	0.82	2.1	1.3	8
170	02	06	0.82	1.1	1.6	6
170	01	05	1	2.5	1.7	10
170	02	06	1	1.3	1.6	6
170	01	05	1.2	2.8	1.7	10
170	02	06	1.2	1.4	1.6	6
170	01	05	1.5	3.3	2	12
170	02	06	1.5	1.7	1.6	6
170	03	07	1.5	1.6	2.2	6
170	01	05	1.8	3.8	2	12
170	02	06	1.8	2	2.1	8
170	03	07	1.8	1.9	2.2	6
170	02	06	2.2	2.5	2.1	8
170	03	07	2.2	2.3	2.2	6
170	04	08	2.2	2	2.7	6
170	02	06	2.7	3	2.6	10
170	03	07	2.7	2.8	3	8
170	04	08	2.7	2.5	2.7	6
170	02	06	3.3	3.2	2.6	10
170	03	07	3.3	3.3	3	8
170	04	08	3.3	3	3.6	8
170	03	07	3.9	3.7	3.7	10
170	04	08	3.9	3.5	3.6	8
170	03	07	4.7	4	3.7	10
170	04	08	4.7	4	4.6	10
170	03	07	5.6	4.5	4.7	12
170	04	08	5.6	4.2	4.6	10
170	03	07	6.8	5	5.2	14
170	04	08	6.8	4.8	5.5	12
170	03	07	8.2	5.7	6.3	17
170	04	08	8.2	5.1	5.5	12
170	04	08	10	5.8	6.8	15
170	04	08	12	6.2	7.8	15

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
200	01	05	0.22	0.7	1	6
200	01	05	0.27	0.8	1	6
200	01	05	0.33	1	1	6
200	01	05	0.39	1.1	1	6
200	01	05	0.47	1.5	1.3	8
200	01	05	0.56	1.6	1.3	8
200	02	06	0.56	0.8	1.6	6
200	01	05	0.68	2.1	1.7	10
200	02	06	0.68	1	1.6	6
200	01	05	0.82	2.5	1.7	10
200	02	06	0.82	1.2	1.6	6
200	01	05	1	3.1	2	12
200	02	06	1	1.3	1.6	6
200	03	07	1	1.3	2.2	6
200	01	05	1.2	3.2	2	12
200	02	06	1.2	1.7	2.1	8
200	03	07	1.2	1.6	2.2	6
200	02	06	1.5	2	2.1	8
200	03	07	1.5	1.8	2.2	6
200	04	08	1.5	1.8	2.7	6
200	02	06	1.8	2.6	2.6	10
200	03	07	1.8	2.4	3	8
200	04	08	1.8	2	2.7	6
200	02	06	2.2	3	2.6	10
200	03	07	2.2	2.9	3	8
200	04	08	2.2	2.6	3.6	8
200	03	07	2.7	3	3.7	8
200	04	08	2.7	3.2	3.6	8
200	03	07	3.3	3.8	3.7	10
200	04	08	3.3	3.9	4.6	10
200	03	07	3.9	4.2	4.7	12
200	04	08	3.9	4	4.6	10
200	03	07	4.7	5	5.2	14
200	04	08	4.7	4.7	5.5	12
200	03	07	5.6	5.4	6.3	17
200	04	08	5.6	5.4	6.8	15
200	04	08	6.8	5.5	6.8	15
200	04	08	8.2	6.2	7.8	17

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
250	01	05	0.18	0.7	1	6
250	01	05	0.22	0.9	1	6
250	01	05	0.27	1.1	1	6
250	01	05	0.33	1.3	1	6
250	01	05	0.39	1.6	1.3	8
250	01	05	0.47	1.9	1.3	8
250	02	06	0.47	0.8	1.6	6
250	01	05	0.56	2.2	1.7	10
250	02	06	0.56	1	1.6	6
250	01	05	0.68	2.6	1.7	10
250	02	06	0.68	1.2	1.6	6
250	01	05	0.82	2.9	2	12
250	02	06	0.82	1.4	1.6	6
250	03	07	0.82	1.3	2.2	6
250	01	05	1	3.1	2	12
250	02	06	1	1.7	2.1	8
250	03	07	1	1.6	2.2	6
250	02	06	1.2	2.1	2.1	8
250	03	07	1.2	1.9	2.2	6
250	04	08	1.2	1.7	2.7	6
250	02	06	1.5	2.6	2.6	10
250	03	07	1.5	2.4	3	8
250	04	08	1.5	2.1	2.7	6
250	02	06	1.8	2.9	2.6	10
250	03	07	1.8	2.9	3	8
250	04	08	1.8	2.6	3.6	8
250	03	07	2.2	3.2	3	8
250	04	08	2.2	3.1	3.6	8
250	03	07	2.7	3.7	3.7	10
250	04	08	2.7	3.6	4.6	10
250	03	07	3.3	4.2	4.7	12
250	04	08	3.3	3.9	4.6	10
250	03	07	3.9	4.6	5.2	14
250	04	08	3.9	4.4	5.5	12
250	03	07	4.7	5.3	6.3	17
250	04	08	4.7	5	6.8	15
250	04	08	5.6	5.3	6.8	15
250	04	08	6.8	5.9	7.8	17

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
400	01	05	0.068	0.4	1	6
400	01	05	0.082	0.5	1	6
400	01	05	0.1	0.6	1	6
400	01	05	0.12	0.7	1	6
400	01	05	0.15	0.8	1	6
400	01	05	0.18	1	1.3	8
400	02	06	0.18	0.5	1.6	6
400	01	05	0.22	1.2	1.3	8
400	02	06	0.22	0.6	1.6	6
400	01	05	0.27	1.5	1.7	10
400	02	06	0.27	0.7	1.6	6
400	01	05	0.33	1.9	2	12
400	02	06	0.33	0.9	1.6	6
400	03	07	0.33	0.9	2.2	6
400	01	05	0.39	2.2	2	12
400	02	06	0.39	1	2.1	8
400	03	07	0.39	1	2.2	6
400	02	06	0.47	1.2	2.1	8
400	03	07	0.47	1.1	2.2	6
400	04	08	0.47	1	2.7	6
400	02	06	0.56	1.5	2.6	10
400	03	07	0.56	1.4	3	8
400	04	08	0.56	1.5	2.7	10
400	02	06	0.68	1.8	2.6	10
400	03	07	0.68	1.6	3	8
400	04	08	0.68	1.6	3.6	8
400	03	07	0.82	2	3	8
400	04	08	0.82	1.8	3.6	8
400	03	07	1	2.4	3.7	10
400	04	08	1	2.1	4.6	10
400	03	07	1.2	2.9	3.7	10
400	04	08	1.2	2.6	4.6	10
400	03	07	1.5	3.6	5.2	14
400	04	08	1.5	3.2	5.5	12
400	03	07	1.8	3.8	5.2	14
400	04	08	1.8	3.6	5.5	12
400	03	07	2.2	4.2	6.3	17
400	04	08	2.2	4.2	6.8	15
400	04	08	2.7	4.7	7.8	17

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
500	01	05	0.033	0.3	1	6
500	01	05	0.039	0.4	1	6
500	01	05	0.047	0.5	1	6
500	01	05	0.056	0.6	1	6
500	01	05	0.068	0.7	1	6
500	01	05	0.082	0.8	1.3	8
500	01	05	0.1	1	1.3	8
500	01	05	0.12	1.2	1.7	10
500	02	06	0.12	0.4	1.6	6
500	01	05	0.15	1.5	1.7	10
500	02	06	0.15	0.5	1.6	6
500	01	05	0.18	1.8	2	12
500	02	06	0.18	0.6	1.6	6
500	02	06	0.22	0.8	1.6	6
500	03	07	0.22	0.8	2.2	6
500	02	06	0.27	0.9	2.1	8
500	03	07	0.27	1	2.2	6
500	04	08	0.27	0.8	2.7	6
500	02	06	0.33	1.1	2.1	8
500	03	07	0.33	1.2	3	8
500	04	08	0.33	1	2.7	6
500	02	06	0.39	1.4	2.6	10
500	03	07	0.39	1.4	3	8
500	04	08	0.39	1.2	2.7	6
500	02	06	0.47	1.6	2.6	10
500	03	07	0.47	1.7	3	8
500	04	08	0.47	1.5	3.6	8
500	03	07	0.56	2	3.7	10
500	04	08	0.56	1.7	3.6	8
500	03	07	0.68	2.4	3.7	10
500	04	08	0.68	2.1	3.6	8
500	03	07	0.82	2.9	4.7	12
500	04	08	0.82	2.6	4.6	10
500	03	07	1	3.4	5.2	14
500	04	08	1	3.1	5.5	12
500	03	07	1.2	3.9	6.3	17
500	04	08	1.2	3.7	6.8	15
500	04	08	1.5	4.1	6.8	15
500	04	08	1.8	4.6	7.8	17

DC Rated Voltage U_R (V) (Note 1)	Case Size Variants (Note 1)		Capacitance Value C (μ F) (Note 2)	AC Current I_{RA} (Arms) Max	Weight (g) Max	Dimension B (mm) Max
	Type PM948S	Type PM948NS				
630	01	05	0.022	0.3	1	6
630	01	05	0.027	0.3	1	6
630	01	05	0.033	0.4	1	6
630	01	05	0.039	0.5	1	6
630	01	05	0.047	0.6	1.3	8
630	01	05	0.056	0.7	1.3	8
630	01	05	0.068	0.8	1.7	10
630	02	06	0.068	0.4	1.6	6
630	01	05	0.082	1	1.7	10
630	02	06	0.082	0.5	1.6	6
630	01	05	0.1	1	1.7	10
630	02	06	0.1	0.6	1.6	6
630	01	05	0.12	1.5	2	12
630	02	06	0.12	0.6	1.6	6
630	03	07	0.12	0.5	2.2	6
630	02	06	0.15	0.7	2.1	8
630	03	07	0.15	0.7	2.2	6
630	02	06	0.18	0.9	2.1	8
630	03	07	0.18	0.8	2.2	6
630	04	08	0.18	0.7	2.7	6
630	02	06	0.22	1.1	2.6	10
630	03	07	0.22	1	3	8
630	04	08	0.22	0.9	2.7	6
630	02	06	0.27	1.3	2.6	10
630	03	07	0.27	1.2	3	8
630	04	08	0.27	1.1	3.6	8
630	03	07	0.33	1.5	3	8
630	04	08	0.33	1.3	3.6	8
630	03	07	0.39	1.8	3.7	10
630	04	08	0.39	1.5	4.6	10
630	03	07	0.47	2.1	4.7	12
630	04	08	0.47	1.8	4.6	10
630	03	07	0.56	2.5	4.7	12
630	04	08	0.56	2.2	5.5	12
630	03	07	0.68	3.1	6.3	17
630	04	08	0.68	2.7	5.5	12
630	04	08	0.82	3.2	6.8	15
630	04	08	1	3.7	6.8	15
630	04	08	1.2	4.1	7.8	17

NOTES

- Case Size Variants are shown in Figures 2(a) and 2(b). The allowable voltage variation for each combination of Case Size Variant and DC Rated Voltage is shown below.

ALLOWABLE VOLTAGE VARIATION dV/dt (V/μs)

Case Size Variants	DC Rated Voltage U_R								
	50V	63V	100V	170V	200V	250V	400V	500V	630V
01, 05	50	70	80	130	140	150	230	370	440
02, 06	30	40	40	60	60	70	100	130	170
03, 07	20	30	40	50	60	70	100	130	160
04, 08	15	30	30	50	50	60	90	120	140

- Tolerance on Capacitance Value = $\pm 10\%$. All E6 Series Capacitance Values are also available with $\pm 20\%$ tolerance.

TABLE 1(b) – MAXIMUM RATINGS

No.	Characteristics	Symbol	Maximum Ratings		Unit	Remarks
			Min	Max		
1	DC Rated Voltage	U_R	-	See Table 1(a)	V	$-55^\circ\text{C} < T_{op} \leq +100^\circ\text{C}$
2	DC Category Voltage	U_C	-	See Note 1	V	Over T_{op}
3	AC Current	I_{RA}	-	See Table 1(a)	Arms	Note 2
4	Operating Temperature Range	T_{op}	-55	+125	$^\circ\text{C}$	T_{amb}
5	Storage Temperature Range	T_{stg}	-55	+125	$^\circ\text{C}$	
6	Soldering Temperature Case Size Variants 01 to 04 Case Size Variants 05 to 08	T_{sol}	Vapour phase: +215 Soldering iron: +260		$^\circ\text{C}$	Note 3 Note 4
7	Soldering Distance (Note 5) Case Size Variants 01 to 04 Case Size Variants 05 to 08	-	1 1	2 -	mm	Case immersion depth Distance of immersion from the body

NOTES

- When T_{op} is between -55°C (T_{amb}) and $+100^\circ\text{C}$ (T_{amb}), the DC Category Voltage is also the DC Rated Voltage. The DC Category Voltage when $T_{op} > +100^\circ\text{C}$ (T_{amb}) but $\leq +125^\circ\text{C}$ (T_{amb}) is shown in Figure 1(a).
- The AC Ripple Current ($f = 300\text{kHz}$) derating is shown in Figure 1(b).
- For reflow (vapour phase) soldering: Duration: 20 seconds minimum, 40 seconds maximum following a preheating phase at $\leq +130^\circ\text{C}$.
- Duration 5 seconds maximum.
- Distances are applicable to Paras. 9.10 and 9.11 of ESCC Generic Specification No. 3006.

FIGURE 1 - PARAMETER DERATING INFORMATION

FIGURE 1(a) – CATEGORY VOLTAGE VERSUS AMBIENT TEMPERATURE

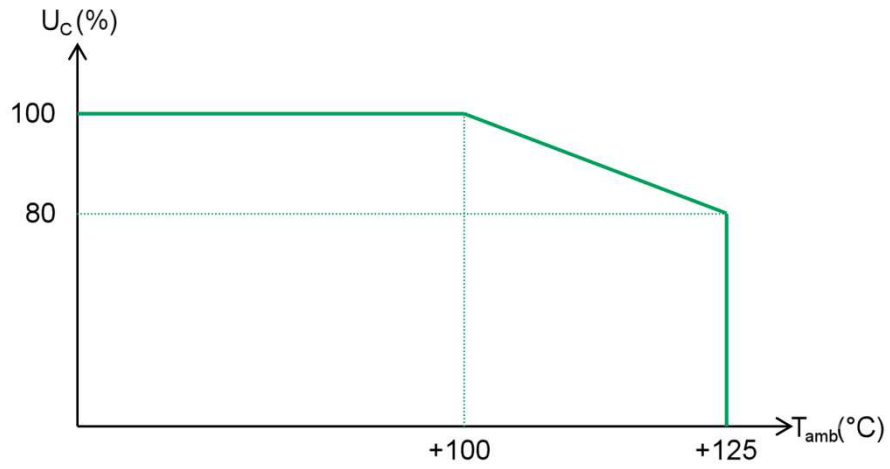


FIGURE 1(b) – AC RIPPLE CURRENT VERSUS AMBIENT TEMPERATURE

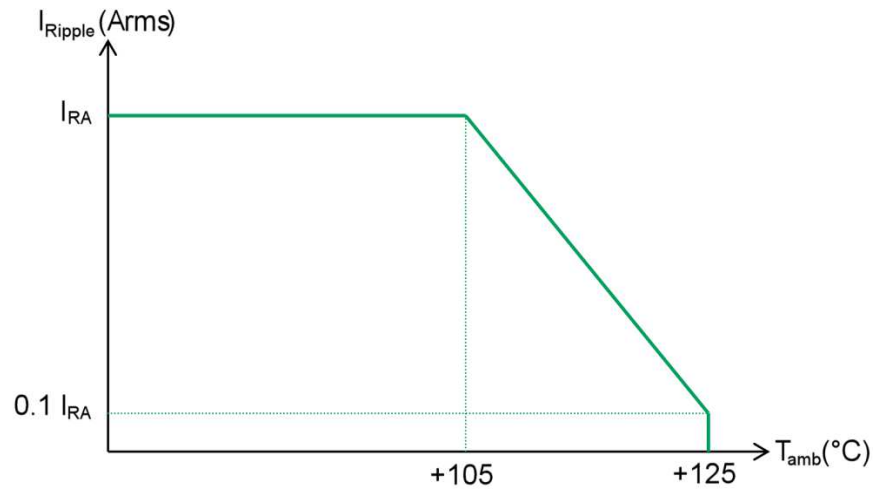
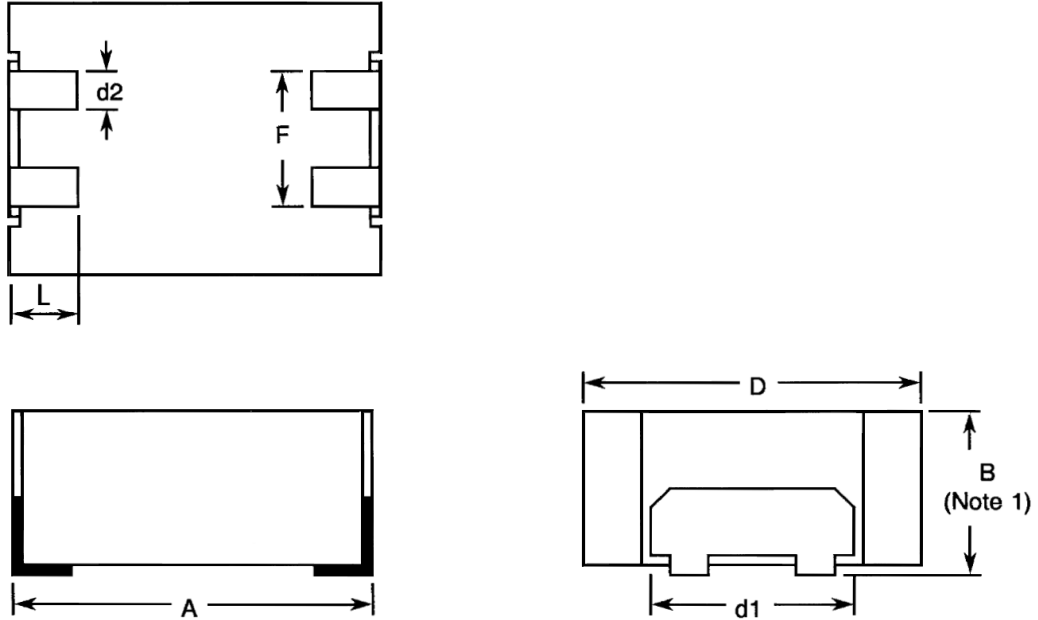


FIGURE 2 – PHYSICAL DIMENSIONS

FIGURE 2(a) – CASE SIZE VARIANTS 01 TO 04 (TYPE PM948S)

(all dimensions are in millimetres)



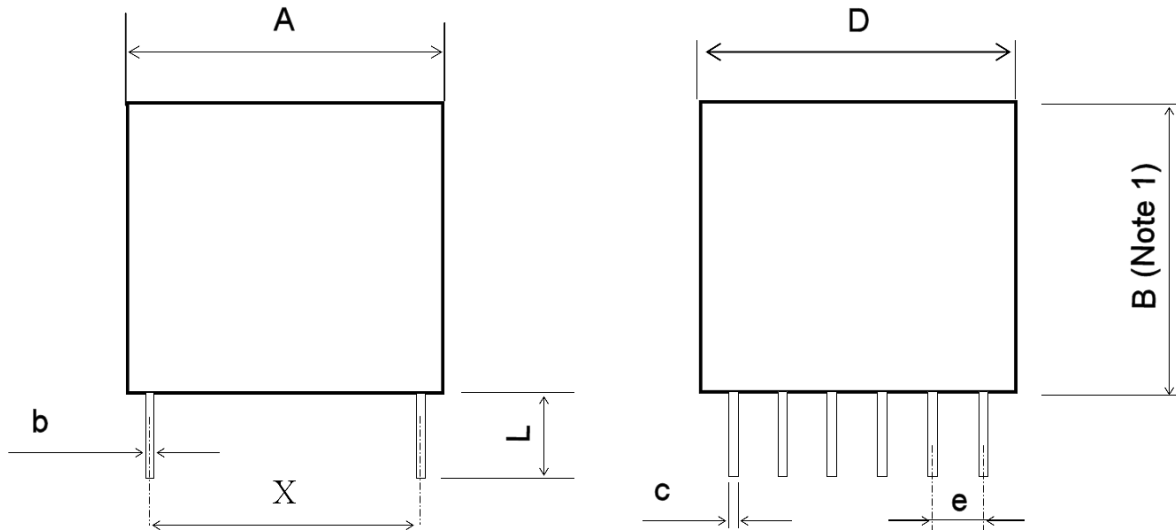
Case Size Variant	A (Max.)	D (Max.)	d1		d2		F		L	
			Min	Max	Min	Max	Min	Max	Min	Max
01	10.7	10.7	5.5	6.5	1.3	1.7	4.8	5.2	1.5	2.5
02	15.5	11.5	5.5	6.5	1.3	1.7	4.8	5.2	1.5	2.5
03	16.5	15.5	7.5	8.5	1.8	2.2	6.8	7.2	1.5	2.5
04	18.5	17	7.5	8.5	1.8	2.2	6.8	7.2	1.5	2.5

NOTES

1. For Dimension B, see Table 1(a).

FIGURE 2(b) – CASE SIZE VARIANTS 05 TO 08 (TYPE PM948NS)

(all dimensions are in millimetres. Case Size Variant 08 shown for illustrative purposes)



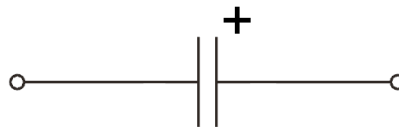
Case Size Variant	A (Max.)	D (Max.)	X		b		c		e		L (Min.)	No. of leads per line
			Min	Max	Min	Max	Min	Max	Min	Max		
05	10.7	10.7	8.21	8.29	0.15	0.35	0.4	0.6	2.34	2.74	5	4
06	15.5	11.5	13.96	14.04	0.15	0.35	0.4	0.6	2.34	2.74	5	4
07	16.5	15.5	13.96	14.04	0.15	0.35	0.4	0.6	2.34	2.74	5	5
08	18.5	17	15.2	15.28	0.15	0.35	0.4	0.6	2.34	2.74	5	6

NOTES

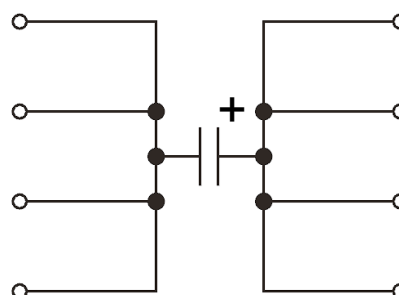
1. For Dimension B, see Table 1(a).

FIGURE 3 - FUNCTIONAL DIAGRAM

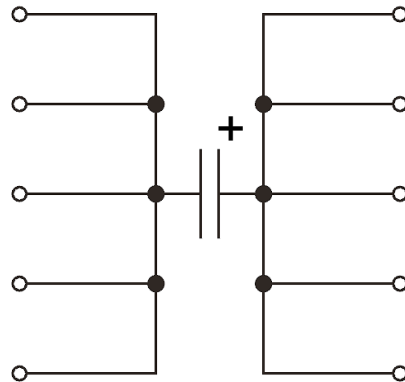
CASE SIZE VARIANTS 01 TO 04



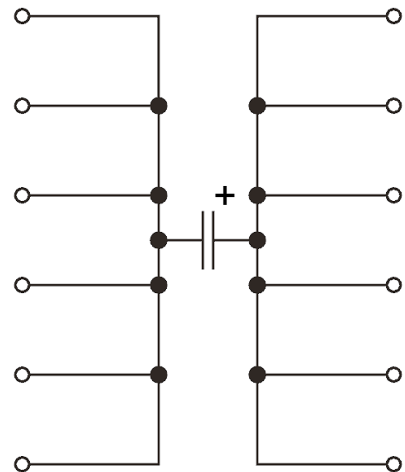
CASE SIZE VARIANTS 05 TO 06



CASE SIZE VARIANT 07



CASE SIZE VARIANT 08



4 REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the capacitors specified herein are stated in this specification and ESCC Generic Specification No. 3006 for Capacitors, Fixed, Film Dielectric. 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 ESCC 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) (a) Para. 9.2, Seal Test: Not applicable

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

- (a) Para. 9.2, Seal Test: Not applicable
- (b) Para. 9.6.3, Electrical Measurement at High and Low Temperature: for Case Size Variants 01 to 04, this test shall be carried out on the number of parts defined in Table 3. 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 models. Therefore, this test may be performed at the end of Chart III and parts rejected during external visual inspection, or radiographic inspection, but electrically acceptable after burn-in, may be used.
- (c) Para. 9.19, Sleeving: Not applicable

4.2.4 Deviations from Qualification Tests (Chart IV)

- (a) Para. 9.2, Seal Test: Not applicable.
- (b) Para. 9.8, Corrosion: Not applicable.
- (c) Para. 9.9, Robustness of Terminations: for the purpose of this test the terminations are described as rigid, only the test U_a is applicable.

- For Case Size Variants 01 to 04:

Add to Paragraph 9.9.1:

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, as specified in Para. 4.3.3 of this Specification, shall be applied normal to the line joining the terminals and in a plane parallel to the substrate, for a duration of 10 seconds.

Add to paragraph 9.9.2:

For surface mount capacitors, there shall be no evidence of damage or loosening of the components from the substrate.

- For Case Size Variants 05 to 08, the requirements are specified in section 9 of the ESCC Generic Specification No. 3006. The test conditions shall be as follows:

Test Condition: U_{a1} – tensile

Applied force: 10N

Duration: 5 to 10 seconds

- (d) Para. 9.10.2, Resistance to Soldering Heat: This test shall be carried out in accordance with IEC Publication No. 60068-2-58, with the following conditions:

- Temperature: +215 ±3°C
- Immersion Time: 40 seconds
- The terminations shall be immersed to the minimum soldering distance defined in Table 1(b)

- (e) Para. 9.11, Solderability: Shall be carried out in accordance with IEC Publication No. 60068-2-58, with the following conditions:
 - Temperature: $+235 \pm 3^{\circ}\text{C}$
 - Immersion Time: 3 ± 0.3 seconds
 - The terminations shall be immersed to the minimum soldering distance defined in Table 1(b)
- (f) Para. 9.12, Vibration: prior to testing, capacitors shall be mounted on a suitable substrate. The test samples shall be glued and cured prior to soldering to avoid any stress.
- (g) Para. 9.13, Shock or Bump: the test samples shall be mounted as for the vibration test.
- (h) Para. 9.16, Operating Life: For Para. 9.16(c), the applied voltage shall be $1.25 \times U_C$.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

- (a) Para. 9.2, Seal Test: As per Para. 4.2.4(a).
- (b) Para. 9.9, Robustness of Terminations: As per Para. 4.2.4(c).
- (c) Para. 9.10.2, Resistance to Soldering Heat: As per Para. 4.2.4(d).
- (d) Para. 9.11, Solderability: As per Para. 4.2.4(e).
- (e) Para. 9.12, Vibration: As per Para. 4.2.4(f).
- (f) Para. 9.13, Shock or Bump: As per Para. 4.2.4(g).
- (g) Para. 9.15, High and Low Temperature Stability: The parts to be measured shall be selected from the sample tested during Chart III, see Para. 4.2.3(b).
- (h) Para. 9.16, Operating Life: As per Para. 4.2.4(h).

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the capacitors specified herein shall be checked. They shall conform to those shown in Figure 2 and Table 1(a).

4.3.2 Weight

The maximum weight of the capacitors specified herein shall be as specified in Table 1(a).

4.3.3 Robustness of Terminations

Test Condition: 10 Newtons. Deviations from the Generic Specification apply and are given in Para. 4.2.4(c) herein.

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 Case

Thermo-plastic with epoxy resin filler.

4.4.2 Lead Material and Finish

The terminal material shall be silver plated brass with either Type '3' or Type '4' finish in accordance with the requirements of ESCC Basic Specification No. 23500.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence shall be as follows:

- (a) Polarity
- (b) The ESCC qualified components symbol (for ESCC qualified components only)
- (c) The ESCC Component Number
- (d) Traceability Information

4.5.2 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 300602603B155KH

- Detail Specification Reference: 3006026
- Case Size Variant Number (see Table 1(a) and Figure 2): 03 (as applicable)
- Testing level: B (B or C, as required)
- Characteristic code: Capacitance Value (1.5 μ F): 155 (as required)
- Characteristic code: Tolerance (\pm 10%): K (as applicable)
- Rating code: Rated Voltage (250V): H (as required)

4.5.2.1 *Characteristics and Ratings Codes*

Characteristics and ratings to be codified as part of the ESCC Component Number shall be as follows:

- (a) Capacitance value expressed by means of the following codes in accordance with ESCC Basic Specification No. 21700. The unit quantity for marking shall be picofarads (pF).

Capacitance Value (pF)	Code
XX10 ⁴	XX4
XX10 ⁵	XX5
XX10 ⁶	XX6

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

Tolerance (\pm %)	Code Letter
10	K
20	M

(c) Rated Voltage expressed by the following codes:

Rated Voltage (V)	Code Letter
50	C
63	D
100	E
170	F
200	G
250	H
400	K
500	L
630	Z

4.5.3 Traceability Information

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

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, measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}\text{C}$.

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.

4.7 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 $T_{amb} = +22 \pm 3^{\circ}\text{C}$. The parameter drift values (Δ) applicable to the parameters scheduled 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 ESCC Generic Specification No. 3006. The conditions for burn-in shall be as specified in Table 5 of this specification. On completion of burn-in there shall be a recovery period of 24 ± 2 hours before the performance of the end-measurements.

TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESCC 3006 Test Method	Test Conditions	Limits		Unit
					Min	Max	
1	Capacitance	C	Para. 9.6.1.2	Test Frequency: 1kHz	See Table 1(a)		μF
2	Tangent of Loss Angle	Tgδ	Para. 9.6.1.3	Test Frequency: 1kHz	-	100	10 ⁻⁴
3	Insulation Resistance	Ri	Para. 9.6.1.4	Note 1 C ≤ 0.33μF C > 0.33μF; U _R > 100V C > 0.33μF; U _R ≤ 100V	7500 2500 1250	- - -	MΩ sec sec
4	Voltage Proof Terminal to Terminal	VP	Para. 9.6.1.1	Para. 9.6.1.1	1.6xU _R	-	V

NOTES

- The test voltage to be applied during Insulation Resistance shall be as follows:
 - For U_R ≤ 100V, the test voltage shall be U_R.
 - For 100V < U_R < 500V, the test voltage shall be 100V.
 - For U_R ≥ 500V, the test voltage shall be 500V.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	Characteristics	Symbol	ESCC 3006 Test Method	Test Conditions (Note 1)	Limits		Unit
					Min	Max	
1(a)	Capacitance Change	ΔC/C	Para. 9.6.1.2	T _{amb} = -55 (+3 -0)°C Test Frequency: 1kHz	-	-10 (2)	%
1(b)	Capacitance Change	ΔC/C	Para. 9.6.1.2	T _{amb} = +125 (+0 -3)°C Test Frequency: 1kHz	-	+18 (2)	%

NOTES

- These measurements shall be performed on a sample of 6 components. If any samples fail then a 100% test shall be performed. The maximum permissible number of failures in the case of 100% testing is 1% (rounded upwards to the nearest whole number).
- Related to value recorded at T_{amb} = +22°C.

TABLE 4 – PARAMETER DRIFT VALUES

No.	Characteristics	Symbol	Spec. and/or Test Method	Test Conditions	Change Limits (Δ)	Unit
1	Capacitance Change	ΔC/C	As per Table 2	As per Table 2	±3	%

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

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+125 (+0 -5)	°C
2	Test Voltage	V_T	1.25× U_C (Note 1)	V

NOTES:

1. See Figure 1(a) for the applicable value of U_C .

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHART IV AND V OF ESCC GENERIC SPECIFICATION NO. 3006)

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 $T_{amb} = +22 \pm 3^\circ\text{C}$.

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 $T_{amb} = +22 \pm 3^\circ\text{C}$.

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 $T_{amb} = +22 \pm 3^\circ\text{C}$.

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

The requirements for operating life testing are specified in Section 9 of ESCC Generic Specification No. 3006. The conditions for operating life testing shall be as specified in Table 5 for the burn-in test.

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

No.	ESCC Generic Spec. No. 3006		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
01	Seal Test	Para. 9.2 and Paras. 4.2.4 and 4.2.5 of this spec.	Not applicable					
02	Rapid Change of Temperature	Para. 9.3	Initial Measurements Capacitance Final Measurements Visual Examination Capacitance Change Tangent of Loss Angle	Table 2 Item 1 After recovery of 24 ±2 hours No damage Table 2 Item 1 Table 2 Item 2	C - ΔC/C Tgδ	Record Values - -3 -	- +3 Table 2	%
03	Corrosion	Para. 9.8 and Para. 4.2.4 of this spec.	Not applicable					
04	Robustness of Terminations	Para. 9.9 and Paras. 4.2.4, 4.2.5 and 4.3.3 of this spec.	Final Measurements Visual Examination	No damage	-	-	-	
05	Resistance to Soldering Heat	Para. 9.10	Initial Measurements Capacitance Tangent of Loss Angle Final Measurements Insulation Resistance Capacitance Change Tangent of Loss Angle Change	Table 2 Item 1 Table 2 Item 2 After recovery of 1 to 2 hours Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	C Tgδ Ri ΔC/C ΔTgδ	Record Values - Table 2 -3 -	Table 2 - +3 +50	% 10 ⁻⁴
06	Solderability	Para. 9.11 Method 1	Final Measurements Visual Examination	Solder Bath Method IEC No. 60068-2-20 Para. 4.6.4, 4.7.4 or 4.9.3	-	-	-	
07	Vibration	Para. 9.12	Final Measurements Visual Examination	No evidence of damage	-	-	-	
08	Shock or Bump	Para. 9.13	Final Measurements Capacitance Change Visual Examination	Para. 9.6.1.2 No evidence of damage, breakdown, arcing or fractures	ΔC/C -	-5 -	+5 -	%

No.	ESCC Generic Spec. No. 3006		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
09	Climatic Sequence	Para. 9.14	Initial Measurements Capacitance Tangent of Loss Angle Final Measurements Visual Examination Voltage Proof Insulation Resistance Capacitance Change Tangent of Loss Angle Change	Table 2 Item 1 Table 2 Item 2 After Recovery of 24 hrs max No evidence of corrosion Table 2 Item 4 Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	C Tgδ - VP Ri ΔC/C ΔTgδ	Record values - - Table 2 (3) -3 -	Table 2 - - - +3 +50	% 10 ⁻⁴
10	Temperature Coefficient	Para. 9.15	Final Measurements Capacitance Change	ESCC No. 3006 Para. 9.15 Table 3 Item 1(a) Table 3 Item 1(b)	ΔC/C ΔC/C	- -	-10 +18	% %
11	Operating Life	Paras. 9.16, Paras. 4.2.4 and 4.2.5 of this spec.	Initial Measurements Capacitance Tangent of Loss Angle During Tests Intermediate Measurements Capacitance Change Final Measurements Capacitance Change Tangent of Loss Angle Change Insulation Resistance Visual Examination	Table 2 Item 1 Table 2 Item 2 125% U _C (2) After recovery of 24 ±2 hours Table 2 Item 1 After 24 hours recovery Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 No evidence of damage or corrosion	C Tgδ ΔC/C ΔC/C ΔTgδ Ri -	Record Values - -5 -5 - (3) -	Table 2 +5 +5 +50 - -	% % 10 ⁻⁴
12	Permanence of Marking	Para. 9.17	As applicable	No corrosion or obliteration of any marking				

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. For U_C, see Figure 1(a).
3. Greater than 50% of the value given in Table 2.