



**CAPACITORS, LEADLESS SURFACE MOUNTED,
ORGANIC POLYMER TANTALUM, SOLID ELECTROLYTE,
ENCLOSED ANODE CONNECTION**

BASED ON TYPE T584

ESCC Detail Specification No. 3012/007

| | |
|---------|---------------|
| Issue 1 | November 2018 |
|---------|---------------|



LEGAL DISCLAIMER AND COPYRIGHT

European Space Agency, Copyright © 2018. 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 | COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS | 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 | 11 |
| 4.1 | GENERAL | 11 |
| 4.2 | DEVIATIONS FROM GENERIC SPECIFICATION | 11 |
| 4.2.1 | Deviations from Special In-Process Controls | 11 |
| 4.2.2 | Deviations from Final Production Tests - Chart II | 11 |
| 4.2.3 | Deviations from Burn-in and Electrical Measurements - Chart III | 11 |
| 4.2.4 | Deviations from Qualification Tests - Chart IV | 11 |
| 4.2.5 | Deviations from Lot Acceptance Tests - Chart V | 11 |
| 4.3 | MECHANICAL REQUIREMENTS | 11 |
| 4.3.1 | Dimension Check | 11 |
| 4.3.2 | Weight | 11 |
| 4.4 | MATERIALS AND FINISHES | 12 |
| 4.4.1 | Terminal Material and Finish | 12 |
| 4.5 | MARKING | 12 |
| 4.5.1 | General | 12 |
| 4.5.2 | Polarity Identification | 12 |
| 4.5.3 | The ESCC Component Number | 12 |
| 4.5.3.1 | Characteristics and Ratings Codes | 13 |
| 4.5.4 | Traceability Information | 13 |
| 4.6 | ELECTRICAL MEASUREMENTS | 13 |
| 4.6.1 | Electrical Measurements at Room Temperature | 13 |
| 4.6.2 | Electrical Measurements at High and Low Temperatures | 13 |
| 4.6.3 | Circuits for Electrical Measurements (Figure 4) | 13 |
| 4.7 | BURN-IN TESTS | 14 |
| 4.7.1 | Parameter Drift Values | 14 |
| 4.7.2 | Conditions for Burn-in | 14 |
| 4.7.3 | Electrical Circuit for Burn-in (Figure 5) | 14 |



| | | |
|-------|--|----|
| 4.8 | ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION NO. 3012) | 16 |
| 4.8.1 | Measurements and Inspections on Completion of Environmental Tests | 16 |
| 4.8.2 | Measurements and Inspections at Intermediate Points During Endurance Tests | 16 |
| 4.8.3 | Measurements and Inspections on Completion of Endurance Tests | 16 |
| 4.8.4 | Conditions for Operating Life (Part of Endurance Testing) | 16 |
| 4.8.5 | Electrical Circuit for Operating Life Tests (Figure 5) | 16 |
| | APPENDIX A | 19 |

1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Capacitors, Leadless Surface Mounted, Organic Polymer Tantalum, Solid Electrolyte, Enclosed Anode Connection, based on Type T584. It shall be read in conjunction with ESCC Generic Specification No. 3012, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

The variants and the range of components covered by this specification are 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 components specified herein, are as 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. 3012 for Capacitors, Leadless Surface Mounted, Tantalum, Solid Electrolyte, Enclosed Anode Connection.
- (b) IPC/JEDEC J-STD-020, Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices.

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) – COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

| Variant Number | Case Code (Style) (Note 1) | Capacitance Values C_n (μ F) (Note 2) | Rated Voltage U_R (V) | Maximum Equivalent Series Resistance ESR ($m\Omega$) | Weight Max (g) |
|----------------|----------------------------|--|-------------------------|--|----------------|
| 01 | X (7343-43) | 220 | 10 | 10, 12, 15 | 0.5 |
| | | 330 | 6.3 | 10, 12 | |
| | | | 10 | 10, 12, 15 | |
| | | 470 | 6.3 | 10, 12 | |

NOTES:

1. See Figure 2.
2. The following Capacitance Tolerance is available:
 - $\pm 20\%$ (M)

TABLE 1(b) - MAXIMUM RATINGS

| No. | Characteristics | Symbols | Maximum Ratings | Units | Remarks |
|-----|-----------------------------|--------------|------------------|------------------|---|
| 1 | Rated Voltage | U_R | See Table 1(a) | V | Note 1, See Figure 1(a) |
| 2 | Surge Voltage | U_S | $1.3 \times U_R$ | V | $T_{amb} \leq +85^\circ\text{C}$ |
| 3 | Category Voltage | U_C | $0.9 \times U_R$ | V | See Figure 1(a) |
| 4 | Ripple Current | I_{ripple} | See Note 2 | A | $f = 100\text{kHz}$, Note 2, See Figure 1(b) |
| 5 | Operating Temperature Range | T_{op} | -55 to +105 | $^\circ\text{C}$ | T_{amb} |
| 6 | Rated Temperature | T_R | +85 | $^\circ\text{C}$ | |
| 7 | Upper Category Temperature | T_C | +105 | $^\circ\text{C}$ | |
| 8 | Storage Temperature Range | T_{stg} | -55 to +105 | $^\circ\text{C}$ | Note 3 |
| 9 | Soldering Temperature | T_{sol} | +235 | $^\circ\text{C}$ | Notes 3, 4 |

NOTES:

- At $T_{amb} \leq +85^\circ\text{C}$. For derating at $T_{amb} > +85^\circ\text{C}$, derate linearly to U_C at $T_{amb} = +105^\circ\text{C}$.
- Maximum I_{ripple} , which depends on C_n , U_R , and ESR, shall be as follows at $T_{amb} \leq +45^\circ\text{C}$; derate linearly to $0.7I_{ripple}$ at $T_{amb} = +85^\circ\text{C}$ and to $0.47I_{ripple}$ at $T_{amb} = +105^\circ\text{C}$.

| Capacitance C_n (μF) | Rated Voltage U_R (V) | Maximum Equivalent Series Resistance ESR ($\text{m}\Omega$) | Maximum Ripple Current I_{ripple} (A) |
|--|----------------------------|---|---|
| 220 | 10 | 10 | 5.196 |
| 220 | 10 | 12 | 4.743 |
| 220 | 10 | 15 | 4.243 |
| 330 | 6.3 | 10 | 5.196 |
| 330 | 6.3 | 12 | 4.743 |
| 330 | 10 | 10 | 5.196 |
| 330 | 10 | 12 | 4.743 |
| 330 | 10 | 15 | 4.243 |
| 470 | 6.3 | 10 | 5.196 |
| 470 | 6.3 | 12 | 4.743 |

- These components are classified as Moisture Sensitivity Level 3 in accordance with J-STD-020. Components shall be delivered in moisture barrier bags with a desiccant and moisture indicator card. Components should be stored still contained within the moisture barrier bags in a non-condensating atmospheric environment of $T_{amb} \leq +40^\circ\text{C}$ and relative humidity $\text{RH} \leq 90\%$.
These components have a floor life of 168 hours at $T_{amb} \leq +30^\circ\text{C}$ and $\text{RH} \leq 60\%$.
- Duration 20 seconds maximum for reflow soldering.

FIGURE 1 – PARAMETER DERATING INFORMATION

FIGURE 1(a) – RATED VOLTAGE VERSUS AMBIENT TEMPERATURE

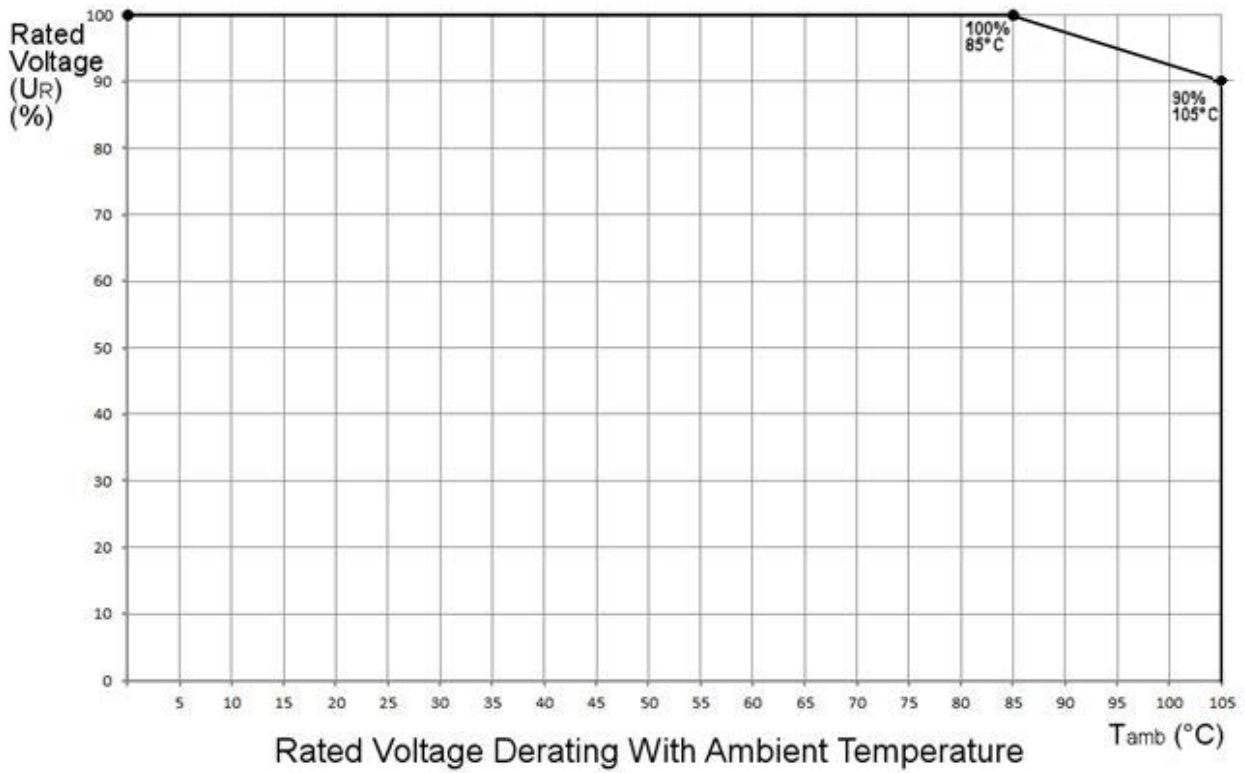


FIGURE 1(b) – MAXIMUM RIPPLE CURRENT VERSUS AMBIENT TEMPERATURE

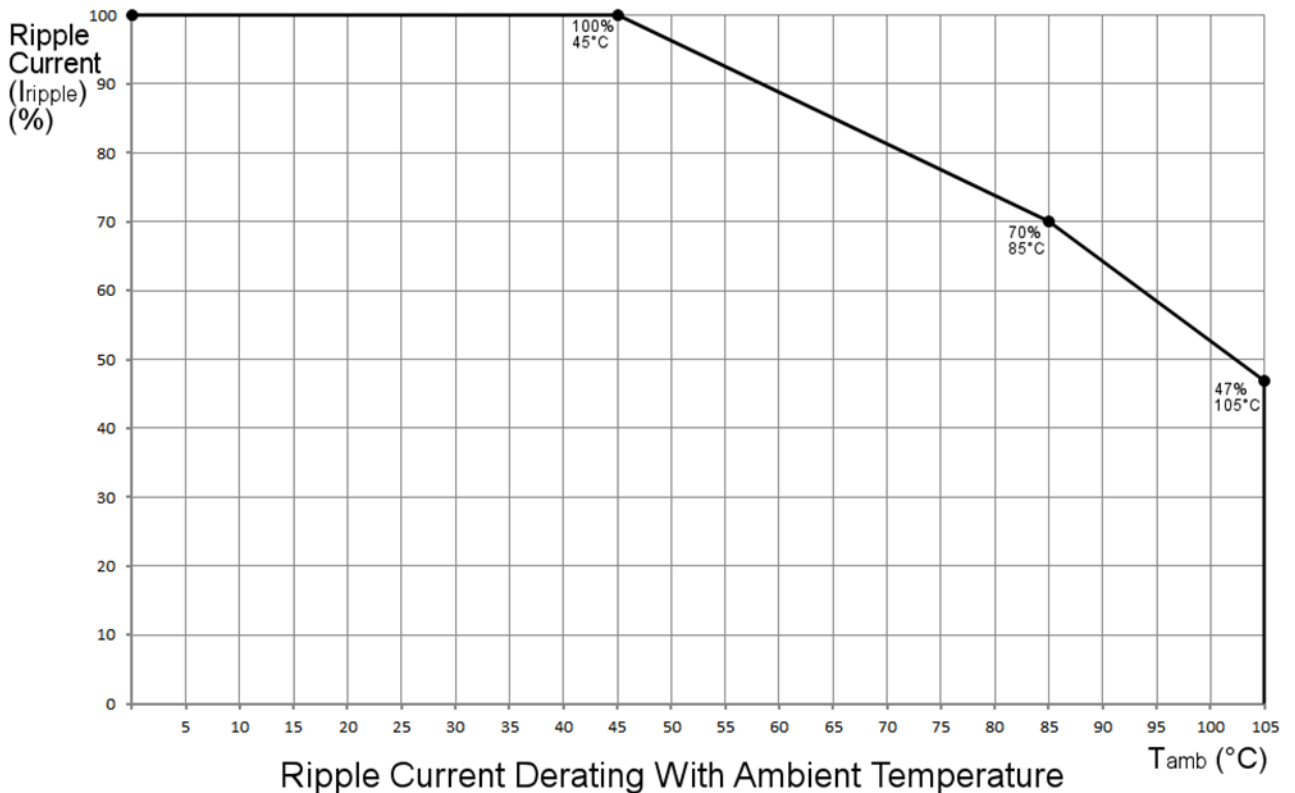
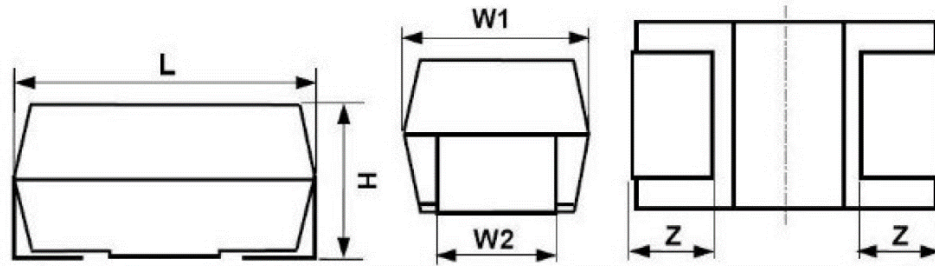
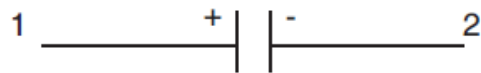


FIGURE 2 - PHYSICAL DIMENSIONS



| Variant Number | Case Code | Dimensions (mm) | | | | | | | | | |
|----------------|-----------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | L | | H | | W1 | | W2 | | Z | |
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| 01 | X | 7 | 7.6 | 3.8 | 4.4 | 4 | 4.6 | 2.3 | 2.5 | 1 | 1.6 |

FIGURE 3 - FUNCTIONAL DIAGRAM



Terminal 1: Anode

Terminal 2: Cathode

4 REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the components specified herein are stated in this specification and ESCC Generic Specification No. 3012. Deviations from the Generic Specification, applicable to this specification only, are detailed in Para. 4.2.

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 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. 9.20, Surge Current Test: shall be performed both at high and room temperatures in the sequence as follows:
- i. Surge Current Test in accordance with Para. 9.20 with a test temperature:
 $T_{amb} = +105 (+0 -3)^{\circ}\text{C}$
 - ii. Whilst still at the high test temperature, DC Leakage Current shall be measured in accordance with Table 3 herein ($T_{amb} = +105^{\circ}\text{C}$ only).
 - iii. Surge Current Test in accordance with Para. 9.20 with a test temperature:
 $T_{amb} = +25 \pm 5^{\circ}\text{C}$.

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

None.

4.2.4 Deviations from Qualification Tests - Chart IV

- (a) Para. 9.17.1, Operating Life during Qualification Testing: for the Intermediate Data Points, DC Leakage Current shall be measured at $T_{amb} = +25 \pm 5^{\circ}\text{C}$ as specified in Table 6.

4.2.5 Deviations from Lot Acceptance Tests - Chart V

- (a) Para. 9.17.2, Operating Life during Lot Acceptance Testing: for the Intermediate Data Points, DC Leakage Current shall be measured at $T_{amb} = +25 \pm 5^{\circ}\text{C}$ as specified in Table 6.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the components specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESCC Generic Specification No. 3012 and they shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

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

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 Terminal Material and Finish

Terminal material shall be nickel plated copper alloy, and finish shall be as type 15 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 each component in its primary package.

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

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

4.5.2 Polarity Identification

The anode terminal shall be indicated by a polarity stripe marked on the top surface of the component.

4.5.3 The ESCC Component Number

The ESCC Component Number shall be constituted and marked as follows:

Example: 301200701B337MAE010

- Detail Specification Reference: 3012007
- Component Type Variant Number: 01 (as required)
- Testing Level: B (B or C, as required)
- Characteristic code: Rated Capacitance (330 μ F): 337 (as required)
- Characteristic code: Capacitance Tolerance (\pm 20%): M
- Rating code: Rated Voltage (10V): A (as required)
- Characteristic code: Maximum Equivalent Series Resistance (10m Ω): E010 (as required)

4.5.3.1 *Characteristics and Ratings Codes*

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

- (a) Rated Capacitance, C_n , expressed by the following codes in accordance with ESCC Basic Specification No. 21700. The unit quantity shall be picofarad (pF).

| Capacitance C_n (pF) | Code |
|---------------------------|------|
| XX10 ⁷ | XX7 |

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

| Tolerance (\pm %) | Code |
|----------------------|------|
| 20 | M |

- (c) Rated Voltage expressed by the following codes:

| Rated Voltage U_R (V) | Code |
|----------------------------|------|
| 6.3 | J |
| 10 | A |

- (d) Equivalent Series Resistance maximum value expressed by the following codes. The unit quantity shall be milliohm ($m\Omega$):

| Equivalent Series Resistance ESR ($m\Omega$) | Code |
|---|------|
| XX | E0XX |

4.5.4 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 the measurements shall be performed at $T_{amb} = +25 \pm 5^\circ C$.

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 (Figure 4)

Not applicable.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to Burn-in are as specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb} = +25 \pm 5^{\circ}\text{C}$.

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 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 ESCC Generic Specification No. 3012. The conditions for Burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable

TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

| No. | Characteristics | Symbols | ESCC 3012 Test Method | Tolerance | Limits | | Units |
|-----|------------------------------|---------|-------------------------------------|------------|----------|---------------------|------------------|
| | | | | | Min | Max | |
| 1 | Capacitance | C | Para. 9.4.1.1 | $\pm 20\%$ | $0.8C_n$ | $1.2C_n$ | μF |
| 2 | DC Leakage Current | I_L | Para. 9.4.1.2 | $\pm 20\%$ | - | $0.1C_n \times U_R$ | μA |
| 3 | Dissipation Factor | DF | Para. 9.4.1.3 $f = 120\text{Hz}$ | $\pm 20\%$ | - | 10 | % |
| 4 | Equivalent Series Resistance | ESR | Para. 9.4.1.4 | $\pm 20\%$ | - | See Table 1(a) | $\text{m}\Omega$ |

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

| No. | Characteristics | Symbols | ESCC 3012 Test Method | Test Conditions | Limits | | Units |
|-----|--------------------|--------------|-------------------------------------|---|--------|------------------|---------------|
| | | | | | Min | Max | |
| 1 | Capacitance Change | $\Delta C/C$ | Para. 9.4.1.1 | $T_{amb} = -55 (+3 -0)^{\circ}\text{C}$ | - | ± 20 | % (Note 1) |
| | | | | $T_{amb} = +85 \pm 3^{\circ}\text{C}$ | - | ± 20 | |
| | | | | $T_{amb} = +105 (+0 -3)^{\circ}\text{C}$ | - | ± 30 | |
| 2 | DC Leakage Current | I_L | Para. 9.4.1.2 | $T_{amb} = +85 \pm 3^{\circ}\text{C}$ $V = U_R$ | - | $C_n \times U_R$ | μA |
| | | | | $T_{amb} = +105 (+0 -3)^{\circ}\text{C}$ $V = U_C$ | - | $C_n \times U_R$ | |
| 3 | Dissipation Factor | DF | Para. 9.4.1.3 $f = 120\text{Hz}$ | $T_{amb} = -55 (+3 -0)^{\circ}\text{C}$ | - | 10 | % |
| | | | | $T_{amb} = +85 \pm 3^{\circ}\text{C}$ | - | 12 | |
| | | | | $T_{amb} = +105 (+0 -3)^{\circ}\text{C}$ | - | 15 | |

NOTES:

1. Related to the value measured in Table 2 (during Electrical Measurements at Room Temperature in Chart II of Generic Specification No. 3012).

TABLE 4 - PARAMETER DRIFT VALUES

| No. | Characteristics | Symbols | Test Method and Conditions | Change Limits (Δ) | Units |
|-----|---------------------------|--------------|----------------------------|----------------------------|-------|
| 1 | Capacitance Change | $\Delta C/C$ | As per Table 2 | +10, -20 | % |
| 2 | DC Leakage Current Change | ΔI_L | As per Table 2 | +25 (1) | % |

NOTES:

1. Leakage currents < 1 μ A shall be considered as a 1 μ A value.

TABLE 5(a) – CONDITIONS FOR BURN-IN

| No. | Characteristics | Symbols | Conditions | Units |
|-----|---------------------|-----------|-------------|--------------|
| 1 | Ambient Temperature | T_{amb} | +85 (+0 -3) | $^{\circ}$ C |
| 2 | Test Voltage | V_T | U_R | V |

NOTES:

1. After exposure, the components shall be allowed to cool from elevated temperature to $T_{amb} = +25 \pm 5^{\circ}$ C, under normal atmospheric conditions for 1 to 2 hours whilst maintaining the applied voltage. After cooling, the components shall be discharged for a minimum of 5 minutes.

TABLE 5(b) – CONDITIONS FOR OPERATING LIFE

| No. | Characteristics | Symbols | Conditions | Units |
|-----|-----------------------|----------|--------------|--------------|
| 1 | Ambient Temperature 1 | T_1 | +85 (+0 -3) | $^{\circ}$ C |
| 2 | Test Voltage 1 | V_{T1} | U_R | V |
| 3 | Ambient Temperature 2 | T_2 | +105 (+0 -3) | $^{\circ}$ C |
| 4 | Test Voltage 2 | V_{T2} | U_C | V |

NOTES:

1. After each exposure, the components shall be allowed to cool from elevated temperature to $T_{amb} = +25 \pm 5^{\circ}$ C, under normal atmospheric conditions for 1 to 2 hours whilst maintaining the applied voltage. After cooling, the components shall be discharged for a minimum of 5 minutes.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION No. 3012)

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 $T_{amb} = +25 \pm 5^{\circ}C$.

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 $T_{amb} = +25 \pm 5^{\circ}C$.

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 $T_{amb} = +25 \pm 5^{\circ}C$.

4.8.4 Conditions for Operating Life (Part of Endurance Testing)

The requirements for Operating Life testing are specified in Section 9 of ESCC Generic Specification No. 3012. The conditions for Operating Life testing shall be as specified in Table 5(b) of this specification.

4.8.5 Electrical Circuit 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. | ESCC Generic Spec. No. 3012 | | Measurements and Inspections | | Symbols | Limits | | Units |
|-----|--|-----------------------------|--|--------------|---------|---------|---------|-----------|
| | Environmental and Endurance Tests (Note 1) | Test Methods and Conditions | Identification | Conditions | | Min | Max | |
| 01 | Mounting | Para. 9.9 | Final Examination Terminals | Good tinning | - | - | - | - |
| | | | Final Measurements Capacitance | Table 2 | C | Table 2 | Table 2 | μF |
| | | | DC Leakage Current | Table 2 | I_L | Table 2 | Table 2 | μA |
| | | | Dissipation Factor | Table 2 | DF | Table 2 | Table 2 | % |
| | | | Equivalent Series Resistance | Table 2 | ESR | Table 2 | Table 2 | $m\Omega$ |

| No. | ESCC Generic Spec. No. 3012 | | Measurements and Inspections | | Symbols | Limits | | Units |
|-----|--|-----------------------------|---|--|---|---|--|-------|
| | Environmental and Endurance Tests (Note 1) | Test Methods and Conditions | Identification | Conditions | | Min | Max | |
| 02 | Rapid Change of Temperature | Para. 9.3.2 | Initial Measurements Capacitance Final Measurements Visual Examination Capacitance Change DC Leakage Current Dissipation Factor Equivalent Series Resistance | Value recorded during Mounting Recovery period of 4h min. No corrosion, no damage or obliteration of marking Table 2 Table 2 Table 2 Table 2 | C - $\Delta C/C$ I_L DF ESR | Table 2 - - -10 +10 Table 2 Table 2 Table 2 | μF - % (2) μA % m Ω | |
| 03 | External Visual Inspection | Para. 9.5 | Final Inspection External Visual Inspection | ESCC No. 20500 | - | - - | - | |
| 04 | Adhesion | Para. 9.10 | Initial Measurements Capacitance Final Measurements Visual Examination Capacitance Change | Value recorded during Mounting No damage or loosing from the substrate Table 2 Item 1 | C - $\Delta C/C$ | Table 2 - - -10 +10 | μF - % (2) | |
| 05 | Vibration | Para. 9.11 | Measurements during test Final Examination Visual Examination | During Last Cycle No intermittent Contact >0.5ms, arcing or open or shorts No damage | - - - | - - - - | - - | |
| 06 | Shock or Bump | Para. 9.12 | Final Examination Visual Examination | No damage | - | - - | - | |
| 07 | Climatic Sequence | Para. 9.13 | Initial Measurements Capacitance Intermediate Measurements DC Leakage Current (at $T_{amb} = +105^{\circ}C$) Final Measurements External Visual Inspection Capacitance Change DC Leakage Current Dissipation Factor Equivalent Series Resistance | Value recorded during Mounting During Dry Heat Table 3 After recovery of 1h to 24h ESCC No. 20500 Table 2 Table 2 Table 2 Table 2 | C I_L - $\Delta C/C$ I_L DF ESR | Table 2 Table 3 - - -5 +5 Table 2 2 x Table 2 2 x Table 2 | μF μA - % (2) μA % m Ω | |

| No. | ESCC Generic Spec. No. 3012 Environmental and Endurance Tests (Note 1) | Test Methods and Conditions | Measurements and Inspections | | Symbols | Limits | | Units |
|-----|---|-----------------------------|--|---|---|--------|--|--|
| | | | Identification | Conditions | | Min | Max | |
| 08 | High and Low Temperature Stability | Para. 9.14 | Measurements during test Electrical Measurements | Tables 2 & 3 | | | Tables 2 & 3 | |
| 09 | Surge Voltage | Para. 9.15 | Initial Measurements Capacitance Final Measurements Capacitance Change DC Leakage Current Dissipation Factor Equivalent Series Resistance | Table 2 (Note 3) Table 2 Table 2 Table 2 Table 2 | C $\Delta C/C$ I_L DF ESR | | Table 2 -20 +5 Table 2 Table 2 Table 2 | μF % (2) μA % m Ω |
| 10 | Damp Heat Steady State | Para. 9.16 | Initial Measurements Capacitance Final Measurements Visual Examination Capacitance Change DC Leakage Current Dissipation Factor Equivalent Series Resistance | Value recorded during Mounting After recovery of 1h to 2h No damage Table 2 Table 2 Table 2 Table 2 | C - $\Delta C/C$ I_L DF ESR | | Table 2 - - -5 +35 5 x Table 2 2 x Table 2 2 x Table 2 | μF - % (2) μA % m Ω |
| 11 | Operating Life (250h & 1000h) (1000h & 2000h) | Para. 9.17 | Initial Measurements Capacitance Intermediate Measurements DC Leakage Current (at $T_{amb} = +25^{\circ}C$) Final Measurements Capacitance Change DC Leakage Current Dissipation Factor Equivalent Series Resistance Visual Examination | Value recorded during Mounting After recovery of 1h to 2h Table 2 After recovery of 1h to 2h Table 2 Table 2 Table 2 No damage | C I_L $\Delta C/C$ I_L DF ESR - | | Table 2 1.25 x Table 2 -20 +10 1.25 x Table 2 2 x Table 2 2 x Table 2 | μF μA % (2) μA % m Ω - |
| 12 | Permanence of Marking | Para. 9.18 | Final Examination Visual Examination | ESCC No. 24800 | - | - | - | - |
| 13 | Solderability | Para. 9.19 | Final Examination Visual Examination | ESCC No. 3012 Para. 9.13.3 and no damage | - | - | - | - |

NOTES:

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. Referred to the initial measurement.
3. Value recorded during the previous test may be used, if available.

APPENDIX A
AGREED DEVIATIONS FOR KEMET (P)

| Items Affected | Description of Deviations | | | | | | |
|--|--|----------------------------|------|-----|----|----|-----|
| Para. 4.2.4 Deviations from Qualification Tests – Chart IV | Para. 9.18, Permanence of Marking: Not applicable. | | | | | | |
| Para. 4.2.5 Deviations from Lot Acceptance Tests – Chart V | Para. 9.18, Permanence of Marking: Not applicable. | | | | | | |
| Para. 4.5.3.1(c), Marking of Rated Voltage | <p>Rated Voltage may be marked using the actual numeric value instead of the specified code letter, as follows:</p> <ul style="list-style-type: none"> For case code X: <table border="1" data-bbox="710 683 1082 844"> <thead> <tr> <th data-bbox="710 683 911 757">Rated Voltage U_R (V)</th> <th data-bbox="911 683 1082 757">Code</th> </tr> </thead> <tbody> <tr> <td data-bbox="710 757 911 801">6.3</td> <td data-bbox="911 757 1082 801">6V</td> </tr> <tr> <td data-bbox="710 801 911 844">10</td> <td data-bbox="911 801 1082 844">10V</td> </tr> </tbody> </table> | Rated Voltage U_R (V) | Code | 6.3 | 6V | 10 | 10V |
| Rated Voltage U_R (V) | Code | | | | | | |
| 6.3 | 6V | | | | | | |
| 10 | 10V | | | | | | |