



**CAPACITORS, FIXED, CHIPS, HIGH VOLTAGE  
(1 TO 3KV), CERAMIC DIELECTRIC, TYPE II**

**BASED ON TYPES 1812 AND 1825**

**ESCC Detail Specification No. 3009/034**

|         |               |
|---------|---------------|
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**DOCUMENTATION CHANGE NOTICE**

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| DCR No. | CHANGE DESCRIPTION                                    |
|---------|-------------------------------------------------------|
| 1028    | Specification updated to incorporate changes per DCR. |

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## 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. [3009](#).

### 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: 300903401102

- Detail Specification Reference: 3009034
- Component Type Variant Number: 01 (as required)
- Characteristic code: Capacitance Value (1000pF): 102 (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 $C_n$<br>(pF) | Code |
|---------------------------------|------|
| XX 10 <sup>1</sup>              | XX1  |
| XX 10 <sup>2</sup>              | XX2  |
| XX 10 <sup>3</sup>              | XX3  |

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 | Style (Note 1) | Capacitance Range (pF) (Note 2) | Tolerance ( $\pm$ %) | Rated Voltage $U_R$ (V) | Termination Finish | Weight Max (g) |
|----------------|----------------|---------------------------------|----------------------|-------------------------|--------------------|----------------|
| 01             | 1812           | 3900 to 22000                   | 10                   | 1000                    | No finish          | 0.3            |
| 02             | 1812           | 3900 to 22000                   | 20                   | 1000                    | No finish          | 0.3            |
| 03             | 1812           | 1500 to 1800                    | 10                   | 2000                    | No finish          | 0.3            |
| 04             | 1812           | 1500 to 1800                    | 20                   | 2000                    | No finish          | 0.3            |
| 05             | 1812           | 820 to 1000                     | 10                   | 3000                    | No finish          | 0.3            |
| 06             | 1812           | 820 to 1000                     | 20                   | 3000                    | No finish          | 0.3            |
| 07             | 1825           | 27000 to 5600                   | 10                   | 1000                    | No finish          | 0.6            |
| 08             | 1825           | 27000 to 5600                   | 20                   | 1000                    | No finish          | 0.6            |
| 09             | 1825           | 2200 to 6800                    | 10                   | 2000                    | No finish          | 0.6            |
| 10             | 1825           | 2200 to 6800                    | 20                   | 2000                    | No finish          | 0.6            |
| 11             | 1825           | 820 to 3900                     | 10                   | 3000                    | No finish          | 0.6            |
| 12             | 1825           | 820 to 3900                     | 20                   | 3000                    | No finish          | 0.6            |
| 13             | 1812           | 3900 to 22000                   | 10                   | 1000                    | Sn62 solder dip    | 0.3            |
| 14             | 1812           | 3900 to 22000                   | 20                   | 1000                    | Sn62 solder dip    | 0.3            |
| 15             | 1812           | 1500 to 1800                    | 10                   | 2000                    | Sn62 solder dip    | 0.3            |
| 16             | 1812           | 1500 to 1800                    | 20                   | 2000                    | Sn62 solder dip    | 0.3            |
| 17             | 1812           | 820 to 1000                     | 10                   | 3000                    | Sn62 solder dip    | 0.3            |
| 18             | 1812           | 820 to 1000                     | 20                   | 3000                    | Sn62 solder dip    | 0.3            |
| 19             | 1825           | 27000 to 5600                   | 10                   | 1000                    | Sn62 solder dip    | 0.6            |
| 20             | 1825           | 27000 to 5600                   | 20                   | 1000                    | Sn62 solder dip    | 0.6            |
| 21             | 1825           | 2200 to 6800                    | 10                   | 2000                    | Sn62 solder dip    | 0.6            |
| 22             | 1825           | 2200 to 6800                    | 20                   | 2000                    | Sn62 solder dip    | 0.6            |
| 23             | 1825           | 820 to 3900                     | 10                   | 3000                    | Sn62 solder dip    | 0.6            |
| 24             | 1825           | 820 to 3900                     | 20                   | 3000                    | Sn62 solder dip    | 0.6            |

**NOTES:**

1. See Para. 1.6.
2. Available capacitance values are as follows:
  - Value series: E12

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

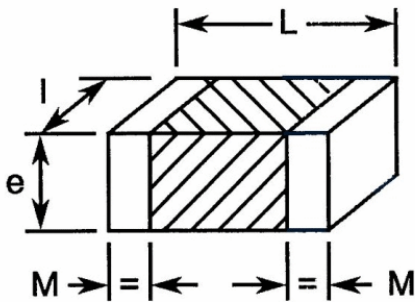
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

| Characteristics             | Symbols   | Maximum Ratings  | Units | Remarks                     |
|-----------------------------|-----------|------------------|-------|-----------------------------|
| Rated Voltage               | $U_R$     | 1000, 2000, 3000 | 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 Para. 1.4.2.
2. Duration 5 seconds maximum.

1.6 PHYSICAL DIMENSIONS



| Symbols | Dimensions (mm)                 |      |                                 |      |                                 |      |                                 |      |
|---------|---------------------------------|------|---------------------------------|------|---------------------------------|------|---------------------------------|------|
|         | Style 1812<br>Variants 01 to 06 |      | Style 1825<br>Variants 07 to 12 |      | Style 1812<br>Variants 13 to 18 |      | Style 1825<br>Variants 19 to 24 |      |
|         | Min                             | Max  | Min                             | Max  | Min                             | Max  | Min                             | Max  |
| L       | 4.2                             | 5    | 4.2                             | 5    | 4.2                             | 5.5  | 4.2                             | 5.5  |
| l       | 2.8                             | 3.6  | 5.67                            | 6.67 | 2.8                             | 4.1  | 5.67                            | 7.17 |
| e       | -                               | 3    | -                               | 3.3  | -                               | 3.5  | -                               | 3.8  |
| M       | 0.25                            | 0.75 | 0.25                            | 0.75 | 0.25                            | 0.75 | 0.25                            | 0.75 |

1.7 FUNCTIONAL DIAGRAM



1.8 MATERIALS AND FINISHES

The components shall be terminated with metallised pads. The termination finish shall be as specified in Para. 1.4.2.

## 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) Steady State Humidity (85/85): not applicable and shall be replaced in Chart F4 Subgroup 1 of the Generic Specification by a Damp Heat Steady State test as follows:

Components mounted in accordance with Para. 8.6 of ESCC No. 3009 shall be subjected to Test Cab of IEC Publication No. 60068-2-78. The following details shall apply:

- Test Conditions:
  - (a) Temperature:  $40 \pm 2^{\circ}\text{C}$
  - (b) Relative humidity:  $93 \pm 3\%$
  - (c) Duration: 56 days
  - (d) Bias during test: Unless otherwise specified, no bias shall be applied.
- Data Points:

Prior to the test, Capacitance shall be measured as specified in Para. 2.4 Intermediate and End-Point Electrical Measurements.

On completion of testing, the components shall be subjected to standard atmospheric conditions for recovery for 6 to 24 hours.

After recovery, the components shall be visually examined. There shall be no evidence of damage. Capacitance, Change in Capacitance, Tangent of Loss Angle and Insulation Resistance shall be measured as specified in Para. 2.4 Intermediate and End-Point Electrical Measurements. Change in Capacitance shall be related to the initial measurements.

### 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 or its primary package shall be:

- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number (see Para. 1.4.1).
- (c) Traceability information.



2.3 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

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

2.3.1 Room Temperature Electrical Measurements

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

| Characteristics       | Symbols    | Test Method and Conditions                                                   | Tolerance ( $\pm$ %) | Limits               |                      | Units                     |
|-----------------------|------------|------------------------------------------------------------------------------|----------------------|----------------------|----------------------|---------------------------|
|                       |            |                                                                              |                      | Min                  | Max                  |                           |
| Capacitance (Note 1)  | $C_A$      | ESCC No. 3009                                                                | 10<br>20             | $0.9C_n$<br>$0.8C_n$ | $1.1C_n$<br>$1.2C_n$ | pF                        |
| Tangent of Loss Angle | $tg\delta$ | ESCC No. 3009                                                                | All                  | -                    | $250 \times 10^{-4}$ | -                         |
| Insulation Resistance | $R_i$      | ESCC No. 3009<br>For $C_n \leq 10000\text{pF}$<br>For $C_n > 10000\text{pF}$ | All                  | 100<br>1000          | -<br>-               | $G\Omega$<br>$G\Omega.nF$ |
| Voltage Proof         | VP         | ESCC No. 3009<br>For $U_R < 1250\text{V}$<br>For $U_R > 1250\text{V}$        | All                  | $1.5U_R$<br>$1.3U_R$ | -<br>-               | V                         |

**NOTES**

1. Capacitance limits may be adjusted to take into account capacitance ageing, as specified in the Generic Specification.

2.3.2 High and Low Temperatures Electrical Measurements

| Characteristics            | Symbols | Test Method and Conditions (Note 1)                                                                                                                                                         | Limits     |            | Units                     |
|----------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|---------------------------|
|                            |         |                                                                                                                                                                                             | Min        | Max        |                           |
| Insulation Resistance      | $R_i$   | ESCC No. 3009<br>$T_{amb} = +125 \pm 2^{\circ}\text{C}$<br>Note 2<br>For $C_n \leq 10000\text{pF}$<br>For $C_n > 10000\text{pF}$                                                            | 10<br>100  | -<br>-     | $G\Omega$<br>$G\Omega.nF$ |
| Temperature Characteristic | TC      | ESCC No. 3009<br>$T_{amb} = -55 \pm 2^{\circ}\text{C}, +20 \pm 2^{\circ}\text{C}, +125 \pm 2^{\circ}\text{C}$<br>Note 3<br>For $V_T = \text{no voltage applied}$<br>For $V_T = 500\text{V}$ | -20<br>-50 | +20<br>+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. Guaranteed but not tested during Chart F3 of the Generic Specification; only tested in Temperature Characterisation during Chart F4 of the Generic Specification.
3. In the case of a 100% inspection, a 1% total percent defective is allowed.

2.4 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

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

Unless otherwise specified the test methods and test conditions shall be as per the corresponding test defined in Para. 2.3.1 Room Temperature Electrical Measurements.

| Test Reference per ESCC<br>No. 3009                 | Characteristics                                                                                                                          | Symbols                                                   | Limits                                                   |     | Units                 |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----|-----------------------|
|                                                     |                                                                                                                                          |                                                           | Min                                                      | Max |                       |
| Mounting<br>Final Measurements                      | Capacitance<br>Tangent of Loss Angle<br>Insulation Resistance                                                                            | $C_A$<br>$tg\delta$<br>$R_I$                              | Record Values<br>-   $250 \times 10^{-4}$<br>Note 1      |     | -                     |
| Rapid Change of Temperature<br>Initial Measurements | Capacitance                                                                                                                              | $C_A$                                                     | Notes 1, 2                                               |     |                       |
| Final Measurements                                  | Capacitance<br>Change in Capacitance<br>Tangent of Loss Angle                                                                            | $C_A$<br>$\Delta C_A/C_A$<br>$tg\delta$                   | -10   +10<br>-   $500 \times 10^{-4}$                    |     | %<br>-                |
| Damp Heat Steady State<br>Initial Measurements      | Capacitance                                                                                                                              | $C_A$                                                     | Note 1                                                   |     |                       |
| Final Measurements                                  | Capacitance<br>Change in Capacitance<br>Tangent of Loss Angle<br>Insulation Resistance:<br>For $C_n \leq 10000pF$<br>For $C_n > 10000pF$ | $C_A$<br>$\Delta C_A/C_A$<br>$tg\delta$<br>$R_I$<br>$R_I$ | -10   +10<br>-   $500 \times 10^{-4}$<br>3   -<br>30   - |     | %<br>-<br>GΩ<br>GΩ.nF |

| Test Reference per ESCC<br>No. 3009                 | Characteristics                                                  | Symbols          | Limits     |                      | Units        |
|-----------------------------------------------------|------------------------------------------------------------------|------------------|------------|----------------------|--------------|
|                                                     |                                                                  |                  | Min        | Max                  |              |
| Operating Life                                      |                                                                  |                  |            |                      |              |
| Initial Measurements                                | Capacitance                                                      | $C_A$            | Notes 1, 2 |                      |              |
| Intermediate Measurements<br>(1000 hours) (Note 3)  | Capacitance                                                      | $C_A$            | Note 1     |                      |              |
|                                                     | Change in Capacitance                                            | $\Delta C_A/C_A$ | -15        | +15                  | %            |
|                                                     | Insulation Resistance:<br>For $C_n \leq 10000\text{pF}$          | $R_I$            | 10         | -                    | $G\Omega$    |
|                                                     | For $C_n > 10000\text{pF}$                                       | $R_I$            | 100        | -                    | $G\Omega.nF$ |
| Final Measurements<br>(1000 or 2000 hours) (Note 4) | Capacitance                                                      | $C_A$            | Note 1     |                      |              |
|                                                     | Change in Capacitance                                            | $\Delta C_A/C_A$ | -15        | +15                  | %            |
|                                                     | Tangent of Loss Angle                                            | $tg\delta$       | -          | $500 \times 10^{-4}$ | -            |
|                                                     | Insulation Resistance:<br>For $C_n \leq 10000\text{pF}$          | $R_I$            | 10         | -                    | $G\Omega$    |
|                                                     | For $C_n > 10000\text{pF}$                                       | $R_I$            | 100        | -                    | $G\Omega.nF$ |
|                                                     | Voltage Proof                                                    | VP               | Note 1     |                      |              |
| Temperature Characterisation                        | Insulation Resistance at<br>$T_{amb} = +125 \pm 2^\circ\text{C}$ | $R_I$            | Note 5     |                      |              |
|                                                     | Temperature Characteristic                                       | TC               | Note 5     |                      |              |
| Robustness of Terminations                          |                                                                  |                  |            |                      |              |
| Final Measurements                                  | Capacitance                                                      | $C_A$            | Note 1     |                      |              |

**NOTES:**

- As specified in Para. 2.3.1 Room Temperature Electrical Measurements.
- Capacitance values recorded during Mounting may be used as initial measurements.
- Intermediate measurements are optional at the Manufacturer's discretion.
- 1000 hours is applicable to Periodic Testing for extension of qualification. 2000 hours is applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.
- As specified in Para. 2.3.2 High and Low Temperatures Electrical Measurements.

**2.5 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 hours minimum.

**APPENDIX A**  
**AGREED DEVIATIONS FOR AVX LTD (GB)**

| Items Affected                                                                                      | Description of Deviations                                                           |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Para. 2.1.1 Deviations from the Generic Specification:<br>Special In-Process Controls -<br>Chart F2 | Microsection Inspection: may be performed using AVX inspection document as per PID. |