



**CAPACITORS, FIXED, RECONSTITUTED MICA,  
HIGH VOLTAGE**

**BASED ON TYPE HT86PS**

**ESCC Detail Specification No. 3006/022**

|         |            |
|---------|------------|
| Issue 6 | April 2023 |
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| DCR No.                                     | CHANGE DESCRIPTION                                    |
|---|---|
| <a href="#">1521</a> , <a href="#">1522</a> | 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. [3006](#).
- (b) IEC Publication No. 60270, High-voltage test techniques – Partial discharge measurements

### 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 RANGE OF COMPONENTS

#### 1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 300602201222MH

- Detail Specification Reference: 3006022
- Component Type Variant Number: 01 (See Note 1)
- Characteristic code: Capacitance Value (2200pF): 222 (as required)
- Characteristic code: Capacitance Tolerance ( $\pm 20\%$ ): M (as required)
- Rating code: Rated Voltage (10000V): H (as required)

#### NOTES:

1. Marking of the Component Type Variant Number is mandatory. No further reference to type variant number is made in this specification.

#### 1.4.1.2 *Characteristics and Ratings Codes*

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

- (a) Capacitance Value, C, expressed by means of the following codes in accordance with ESCC Basic Specification No. [21700](#). The unit quantity shall be picofarads (pF).

| Capacitance Value C (pF) | Code |
|--------------------------|------|
| XX10 <sup>1</sup>        | XX1  |
| XX10 <sup>2</sup>        | XX2  |
| XX10 <sup>3</sup>        | XX3  |
| XX10 <sup>4</sup>        | XX4  |
| XX10 <sup>5</sup>        | XX5  |

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

| Tolerance<br>(± %) | Code<br>Letter |
|--------------------|----------------|
| 10                 | K              |
| 20                 | M              |

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

| Rated Voltage $U_R$<br>(V) | Code<br>Letter |
|----------------------------|----------------|
| 1500                       | C              |
| 2500                       | D              |
| 3500                       | E              |
| 5000                       | F              |
| 7500                       | G              |
| 10000                      | H              |
| 12500                      | J              |
| 15000                      | K              |
| 20000                      | L              |

#### 1.4.2 Range of Components

The range of components applicable to this specification are as follows:

| Capacitance<br>Value<br>(C)<br>(pF) | Capacitance<br>Tolerance<br>(± %) | Rated<br>Voltage<br>( $U_R$ )<br>Max<br>(V) | Dimensions (mm)<br>(See Para. 1.6) |           |           |                     | Lead<br>Material<br>&<br>Finish<br>(Note 1) | Weight<br>Max<br>(g) |
|-------------------------------------|-----------------------------------|---|------------------------------------|-----------|-----------|---------------------|---|----------------------|
|                                     |                                   |   | L<br>(±1)                          | h<br>(±1) | e<br>(±1) | ØW<br>(+10%, -0.05) |   |                      |
| 33000                               | 10, 20                            | 1500  | 35                                 | 10        | 4         | 1                   | A3 or A4                                    | 4                    |
| 39000                               | 10                                | 1500  | 35                                 | 12        | 6         | 1                   | A3 or A4                                    | 6.5                  |
| 47000                               | 10, 20                            | 1500  | 35                                 | 12        | 6         | 1                   | A3 or A4                                    | 6.5                  |
| 56000                               | 10                                | 1500  | 35                                 | 16        | 6         | 1                   | A3 or A4                                    | 8.5                  |
| 68000                               | 10, 20                            | 1500  | 35                                 | 16        | 6         | 1                   | A3 or A4                                    | 8.5                  |
| 82000                               | 10                                | 1500  | 35                                 | 24        | 6         | 1                   | A3 or A4                                    | 12.5                 |
| 100000                              | 10, 20                            | 1500  | 35                                 | 24        | 6         | 1                   | A3 or A4                                    | 12.5                 |
| 120000                              | 10                                | 1500  | 35                                 | 30        | 8         | 1                   | A3 or A4                                    | 20                   |
| 150000                              | 10, 20                            | 1500  | 35                                 | 30        | 8         | 1                   | A3 or A4                                    | 20                   |
| 180000                              | 10                                | 1500  | 35                                 | 40        | 8         | 1                   | A3 or A4                                    | 26.5                 |
| 220000                              | 10, 20                            | 1500  | 35                                 | 40        | 8         | 1                   | A3 or A4                                    | 26.5                 |
| 270000                              | 10                                | 1500  | 61                                 | 24        | 8         | 1                   | A3 or A4                                    | 28                   |
| 330000                              | 10, 20                            | 1500  | 61                                 | 24        | 8         | 1                   | A3 or A4                                    | 28                   |
| 390000                              | 10                                | 1500  | 61                                 | 38        | 8         | 1                   | A3 or A4                                    | 44                   |
| 470000                              | 10, 20                            | 1500  | 61                                 | 38        | 8         | 1                   | A3 or A4                                    | 44                   |

| Capacitance Value (C) (pF) | Capacitance Tolerance (± %) | Rated Voltage (U <sub>R</sub> ) Max (V) | Dimensions (mm) (See Para. 1.6) |        |        |                  | Lead Material & Finish (Note 1) | Weight Max (g) |
|----------------------------|-----------------------------|---|---------------------------------|--------|--------|------------------|---------------------------------|----------------|
|                            |                             |   | L (±1)                          | h (±1) | e (±1) | ØW (+10%, -0.05) |                                 |                |
| 560000                     | 10                          | 1500                                    | 79                              | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 820000                     | 10, 20                      | 1500                                    | 79                              | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 1000000                    | 10                          | 1500                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 1200000                    | 10, 20                      | 1500                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 1500000                    | 10                          | 1500                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 1800000                    | 10, 20                      | 1500                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 2200000                    | 10                          | 1500                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 15000                      | 10, 20                      | 2500                                    | 25                              | 12     | 4      | 1                | A3 or A4                        | 4              |
| 22000                      | 10, 20                      | 2500                                    | 35                              | 10     | 4      | 1                | A3 or A4                        | 4              |
| 27000                      | 10                          | 2500                                    | 35                              | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 33000                      | 10, 20                      | 2500                                    | 35                              | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 39000                      | 10                          | 2500                                    | 35                              | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 47000                      | 10, 20                      | 2500                                    | 35                              | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 56000                      | 10                          | 2500                                    | 35                              | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 68000                      | 10, 20                      | 2500                                    | 35                              | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 82000                      | 10                          | 2500                                    | 35                              | 30     | 8      | 1                | A3 or A4                        | 20             |
| 100000                     | 10, 20                      | 2500                                    | 35                              | 30     | 8      | 1                | A3 or A4                        | 20             |
| 120000                     | 10                          | 2500                                    | 35                              | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 150000                     | 10, 20                      | 2500                                    | 35                              | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 180000                     | 10                          | 2500                                    | 61                              | 38     | 8      | 1                | A3 or A4                        | 28             |
| 220000                     | 10, 20                      | 2500                                    | 61                              | 38     | 8      | 1                | A3 or A4                        | 28             |
| 270000                     | 10                          | 2500                                    | 61                              | 45     | 8      | 1                | A3 or A4                        | 44             |
| 330000                     | 10, 20                      | 2500                                    | 61                              | 45     | 8      | 1                | A3 or A4                        | 44             |
| 390000                     | 10                          | 2500                                    | 79                              | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 470000                     | 10, 20                      | 2500                                    | 79                              | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 560000                     | 10                          | 2500                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 680000                     | 10, 20                      | 2500                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 820000                     | 10                          | 2500                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 1000000                    | 10, 20                      | 2500                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 1200000                    | 10                          | 2500                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 1500000                    | 10, 20                      | 2500                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 15000                      | 10, 20                      | 3500                                    | 35                              | 10     | 4      | 1                | A3 or A4                        | 4              |
| 18000                      | 10                          | 3500                                    | 35                              | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 22000                      | 10, 20                      | 3500                                    | 35                              | 12     | 6      | 1                | A3 or A4                        | 6.5            |

| Capacitance Value (C) (pF) | Capacitance Tolerance (± %) | Rated Voltage (U <sub>R</sub> ) Max (V) | Dimensions (mm)<br>(See Para. 1.6) |        |        |                  | Lead Material & Finish (Note 1) | Weight Max (g) |
|----------------------------|-----------------------------|---|------------------------------------|--------|--------|------------------|---------------------------------|----------------|
|                            |                             |   | L (±1)                             | h (±1) | e (±1) | ØW (+10%, -0.05) |                                 |                |
| 27000                      | 10                          | 3500                                    | 35                                 | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 33000                      | 10, 20                      | 3500                                    | 35                                 | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 39000                      | 10                          | 3500                                    | 35                                 | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 47000                      | 10, 20                      | 3500                                    | 35                                 | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 56000                      | 10                          | 3500                                    | 35                                 | 30     | 8      | 1                | A3 or A4                        | 20             |
| 68000                      | 10, 20                      | 3500                                    | 35                                 | 30     | 8      | 1                | A3 or A4                        | 20             |
| 82000                      | 10                          | 3500                                    | 35                                 | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 100000                     | 10, 20                      | 3500                                    | 35                                 | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 120000                     | 10                          | 3500                                    | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 150000                     | 10, 20                      | 3500                                    | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 180000                     | 10                          | 3500                                    | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 220000                     | 10, 20                      | 3500                                    | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 270000                     | 10                          | 3500                                    | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 330000                     | 10, 20                      | 3500                                    | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 390000                     | 10                          | 3500                                    | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 470000                     | 10, 20                      | 3500                                    | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 560000                     | 10                          | 3500                                    | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 680000                     | 10, 20                      | 3500                                    | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 820000                     | 10                          | 3500                                    | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 1000000                    | 10, 20                      | 3500                                    | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 6800                       | 10, 20                      | 5000                                    | 35                                 | 10     | 4      | 1                | A3 or A4                        | 4              |
| 8200                       | 10                          | 5000                                    | 35                                 | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 10000                      | 10, 20                      | 5000                                    | 35                                 | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 12000                      | 10                          | 5000                                    | 35                                 | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 15000                      | 10, 20                      | 5000                                    | 35                                 | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 18000                      | 10                          | 5000                                    | 35                                 | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 22000                      | 10, 20                      | 5000                                    | 35                                 | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 27000                      | 10                          | 5000                                    | 35                                 | 30     | 8      | 1                | A3 or A4                        | 20             |
| 33000                      | 10, 20                      | 5000                                    | 35                                 | 30     | 8      | 1                | A3 or A4                        | 20             |
| 39000                      | 10                          | 5000                                    | 35                                 | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 47000                      | 10, 20                      | 5000                                    | 35                                 | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 56000                      | 10                          | 5000                                    | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 68000                      | 10, 20                      | 5000                                    | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 82000                      | 10                          | 5000                                    | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |



| Capacitance Value (C) (pF) | Capacitance Tolerance (± %) | Rated Voltage (U <sub>R</sub> ) Max (V) | Dimensions (mm) (See Para. 1.6) |        |        |                  | Lead Material & Finish (Note 1) | Weight Max (g) |
|----------------------------|-----------------------------|---|---------------------------------|--------|--------|------------------|---------------------------------|----------------|
|                            |                             |   | L (±1)                          | h (±1) | e (±1) | ∅W (+10%, -0.05) |                                 |                |
| 100000                     | 10, 20                      | 5000                                    | 61                              | 38     | 8      | 1                | A3 or A4                        | 44             |
| 120000                     | 10                          | 5000                                    | 79                              | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 150000                     | 10, 20                      | 5000                                    | 79                              | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 180000                     | 10                          | 5000                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 220000                     | 10, 20                      | 5000                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 270000                     | 10                          | 5000                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 330000                     | 10, 20                      | 5000                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 390000                     | 10                          | 5000                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 470000                     | 10, 20                      | 5000                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 2200                       | 10, 20                      | 7500                                    | 35                              | 10     | 4      | 1                | A3 or A4                        | 4              |
| 2700                       | 10                          | 7500                                    | 35                              | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 3300                       | 10, 20                      | 7500                                    | 35                              | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 3900                       | 10                          | 7500                                    | 35                              | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 4700                       | 10, 20                      | 7500                                    | 35                              | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 5600                       | 10                          | 7500                                    | 35                              | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 6800                       | 10, 20                      | 7500                                    | 35                              | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 8200                       | 10                          | 7500                                    | 35                              | 30     | 8      | 1                | A3 or A4                        | 20             |
| 10000                      | 10, 20                      | 7500                                    | 35                              | 30     | 8      | 1                | A3 or A4                        | 20             |
| 12000                      | 10                          | 7500                                    | 35                              | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 15000                      | 10, 20                      | 7500                                    | 35                              | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 18000                      | 10                          | 7500                                    | 61                              | 24     | 8      | 1                | A3 or A4                        | 28             |
| 22000                      | 10, 20                      | 7500                                    | 61                              | 24     | 8      | 1                | A3 or A4                        | 28             |
| 27000                      | 10                          | 7500                                    | 61                              | 38     | 8      | 1                | A3 or A4                        | 44             |
| 33000                      | 10, 20                      | 7500                                    | 61                              | 38     | 8      | 1                | A3 or A4                        | 44             |
| 39000                      | 10                          | 7500                                    | 61                              | 45     | 8      | 1                | A3 or A4                        | 52             |
| 47000                      | 10, 20                      | 7500                                    | 61                              | 45     | 8      | 1                | A3 or A4                        | 52             |
| 56000                      | 10                          | 7500                                    | 79                              | 47     | 8      | 1.2              | A3 or A4                        | 67             |
| 68000                      | 10, 20                      | 7500                                    | 79                              | 47     | 8      | 1.2              | A3 or A4                        | 67             |
| 82000                      | 10                          | 7500                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 100000                     | 10, 20                      | 7500                                    | 79                              | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 120000                     | 10                          | 7500                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 150000                     | 10, 20                      | 7500                                    | 105                             | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 180000                     | 10                          | 7500                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 220000                     | 10, 20                      | 7500                                    | 105                             | 50     | 14     | 1.2              | A3 or A4                        | 175            |

| Capacitance Value (C) (pF) | Capacitance Tolerance (± %) | Rated Voltage (U <sub>R</sub> ) Max (V) | Dimensions (mm)<br>(See Para. 1.6) |        |        |                  | Lead Material & Finish (Note 1) | Weight Max (g) |
|----------------------------|-----------------------------|---|------------------------------------|--------|--------|------------------|---------------------------------|----------------|
|                            |                             |   | L (±1)                             | h (±1) | e (±1) | ØW (+10%, -0.05) |                                 |                |
| 1000                       | 10, 20                      | 10000                                   | 35                                 | 10     | 4      | 1                | A3 or A4                        | 4              |
| 1200                       | 10                          | 10000                                   | 35                                 | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 1500                       | 10, 20                      | 10000                                   | 35                                 | 12     | 6      | 1                | A3 or A4                        | 6.5            |
| 1800                       | 10                          | 10000                                   | 35                                 | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 2200                       | 10, 20                      | 10000                                   | 35                                 | 16     | 6      | 1                | A3 or A4                        | 8.5            |
| 2700                       | 10                          | 10000                                   | 35                                 | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 3300                       | 10, 20                      | 10000                                   | 35                                 | 24     | 6      | 1                | A3 or A4                        | 12.5           |
| 3900                       | 10                          | 10000                                   | 35                                 | 30     | 8      | 1                | A3 or A4                        | 20             |
| 4700                       | 10, 20                      | 10000                                   | 35                                 | 30     | 8      | 1                | A3 or A4                        | 20             |
| 5600                       | 10                          | 10000                                   | 35                                 | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 6800                       | 10, 20                      | 10000                                   | 35                                 | 40     | 8      | 1                | A3 or A4                        | 26.5           |
| 8200                       | 10                          | 10000                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 10000                      | 10, 20                      | 10000                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 12000                      | 10                          | 10000                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 15000                      | 10, 20                      | 10000                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 18000                      | 10                          | 10000                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |
| 22000                      | 10, 20                      | 10000                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |
| 27000                      | 10                          | 10000                                   | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 33000                      | 10, 20                      | 10000                                   | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 39000                      | 10                          | 10000                                   | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 47000                      | 10, 20                      | 10000                                   | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 56000                      | 10                          | 10000                                   | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 68000                      | 10, 20                      | 10000                                   | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 82000                      | 10                          | 10000                                   | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 100000                     | 10, 20                      | 10000                                   | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 3300                       | 10, 20                      | 12500                                   | 61                                 | 20     | 4      | 1                | A3 or A4                        | 14             |
| 3900                       | 10                          | 12500                                   | 61                                 | 22     | 6      | 1                | A3 or A4                        | 21             |
| 4700                       | 10, 20                      | 12500                                   | 61                                 | 22     | 6      | 1                | A3 or A4                        | 21             |
| 5600                       | 10                          | 12500                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 6800                       | 10, 20                      | 12500                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 8200                       | 10                          | 12500                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 10000                      | 10, 20                      | 12500                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 12000                      | 10                          | 12500                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |
| 15000                      | 10, 20                      | 12500                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |

| Capacitance Value (C) (pF) | Capacitance Tolerance (± %) | Rated Voltage (U <sub>R</sub> ) Max (V) | Dimensions (mm)<br>(See Para. 1.6) |        |        |                  | Lead Material & Finish (Note 1) | Weight Max (g) |
|----------------------------|-----------------------------|---|------------------------------------|--------|--------|------------------|---------------------------------|----------------|
|                            |                             |   | L (±1)                             | h (±1) | e (±1) | ØW (+10%, -0.05) |                                 |                |
| 18000                      | 10                          | 12500                                   | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 22000                      | 10, 20                      | 12500                                   | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 27000                      | 10                          | 12500                                   | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 33000                      | 10, 20                      | 12500                                   | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 39000                      | 10                          | 12500                                   | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 47000                      | 10, 20                      | 12500                                   | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 56000                      | 10                          | 12500                                   | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 68000                      | 10, 20                      | 12500                                   | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 1500                       | 10, 20                      | 15000                                   | 61                                 | 20     | 4      | 1                | A3 or A4                        | 14             |
| 1800                       | 10                          | 15000                                   | 61                                 | 22     | 6      | 1                | A3 or A4                        | 21             |
| 2200                       | 10, 20                      | 15000                                   | 61                                 | 22     | 6      | 1                | A3 or A4                        | 21             |
| 2700                       | 10                          | 15000                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 3300                       | 10, 20                      | 15000                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 3900                       | 10                          | 15000                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 4700                       | 10, 20                      | 15000                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 5600                       | 10                          | 15000                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |
| 6800                       | 10, 20                      | 15000                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |
| 8200                       | 10                          | 15000                                   | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 10000                      | 10, 20                      | 15000                                   | 79                                 | 45     | 8      | 1.2              | A3 or A4                        | 67             |
| 12000                      | 10                          | 15000                                   | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 15000                      | 10, 20                      | 15000                                   | 79                                 | 47     | 10     | 1.2              | A3 or A4                        | 85             |
| 18000                      | 10                          | 15000                                   | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 22000                      | 10, 20                      | 15000                                   | 105                                | 47     | 10     | 1.2              | A3 or A4                        | 115            |
| 27000                      | 10                          | 15000                                   | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 33000                      | 10, 20                      | 15000                                   | 105                                | 50     | 14     | 1.2              | A3 or A4                        | 175            |
| 680                        | 10, 20                      | 20000                                   | 61                                 | 20     | 4      | 1                | A3 or A4                        | 14             |
| 820                        | 10                          | 20000                                   | 61                                 | 22     | 6      | 1                | A3 or A4                        | 21             |
| 1000                       | 10, 20                      | 20000                                   | 61                                 | 22     | 6      | 1                | A3 or A4                        | 21             |
| 1200                       | 10                          | 20000                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 1500                       | 10, 20                      | 20000                                   | 61                                 | 24     | 8      | 1                | A3 or A4                        | 28             |
| 1800                       | 10                          | 20000                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 2200                       | 10, 20                      | 20000                                   | 61                                 | 38     | 8      | 1                | A3 or A4                        | 44             |
| 2700                       | 10                          | 20000                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |
| 3300                       | 10, 20                      | 20000                                   | 61                                 | 45     | 8      | 1                | A3 or A4                        | 52             |

| Capacitance Value (C) (pF) | Capacitance Tolerance ( $\pm$ %) | Rated Voltage ( $U_R$ ) Max (V) | Dimensions (mm) (See Para. 1.6) |               |               |                               | Lead Material & Finish (Note 1) | Weight Max (g) |
|----------------------------|----------------------------------|---------------------------------|---------------------------------|---------------|---------------|-------------------------------|---------------------------------|----------------|
|                            |                                  |                                 | L ( $\pm 1$ )                   | h ( $\pm 1$ ) | e ( $\pm 1$ ) | $\varnothing W$ (+10%, -0.05) |                                 |                |
| 3900                       | 10                               | 20000                           | 79                              | 45            | 8             | 1.2                           | A3 or A4                        | 67             |
| 4700                       | 10, 20                           | 20000                           | 79                              | 45            | 8             | 1.2                           | A3 or A4                        | 67             |
| 5600                       | 10                               | 20000                           | 79                              | 47            | 10            | 1.2                           | A3 or A4                        | 85             |
| 6800                       | 10, 20                           | 20000                           | 79                              | 47            | 10            | 1.2                           | A3 or A4                        | 85             |
| 8200                       | 10                               | 20000                           | 105                             | 47            | 10            | 1.2                           | A3 or A4                        | 115            |
| 10000                      | 10, 20                           | 20000                           | 105                             | 47            | 10            | 1.2                           | A3 or A4                        | 115            |
| 12000                      | 10                               | 20000                           | 105                             | 50            | 14            | 1.2                           | A3 or A4                        | 175            |
| 15000                      | 10, 20                           | 20000                           | 105                             | 50            | 14            | 1.2                           | A3 or A4                        | 175            |

**NOTES:**

- Lead material and finishes shall be in accordance with the requirements of ESCC Basic Specification No. 23500.

1.5 **MAXIMUM RATINGS**

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

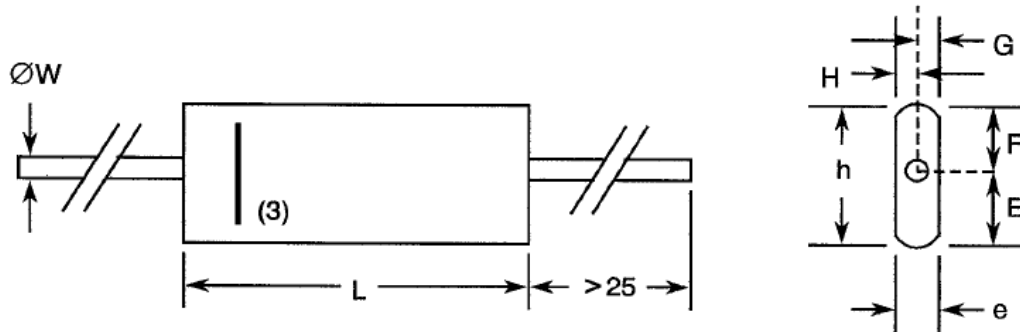
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

| Characteristics                       | Symbols   | Maximum Ratings   | Units           | Remarks  |
|---------------------------------------|-----------|---|-----------------|--|
| Rated Voltage                         | $U_R$     | 1500, 2500, 3500, 5000, 7500, 10000, 12500, 15000, 20000                        | V               | Note 1   |
| Ripple Voltage, peak-to-peak (Note 2) | $U_{Rip}$ | 0.2 $\times U_R$<br>0.15 $\times U_R$<br>0.04 $\times U_R$<br>0.01 $\times U_R$ | V <sub>pp</sub> | At 50Hz<br>At 100Hz<br>At 1000Hz<br>At 10000Hz |
| Operating Air Pressure Range          | $P_{op}$  | Less than 0.1 or greater than 75000   | Pa              | Note 3   |
| Operating Temperature Range           | $T_{op}$  | -55 to +125   | $^{\circ}C$     | Without derating. $T_{amb}$                    |
| Storage Temperature Range             | $T_{stg}$ | -55 to +125   | $^{\circ}C$     |  |
| Soldering Temperature                 | $T_{sol}$ | +235  | $^{\circ}C$     | Note 4   |

**NOTES:**

- As required; See Para. 1.4.2.
- Ripple voltage plus applied DC voltage shall never exceed  $U_R$ .
- Components are designed for dielectric fluid use or encapsulation.
- Duration 5 seconds maximum at 4mm from the device body and the same terminal shall not be resoldered until 3 minutes have elapsed.

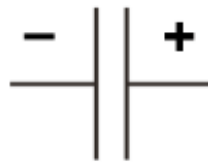
1.6 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION



**NOTES:**

1. The limits of Dimensions L, h, e and ØW are defined in Para. 1.4.2.
2. The difference between dimensions E and F shall be < 2mm. The difference between dimensions G and H shall be < 1mm.
3. Terminal identification: A voltage polarity “-” symbol shall be marked on the body to indicate the lead which should be connected to the lowest potential.

1.7 FUNCTIONAL DIAGRAM



**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 Screening Tests – Chart F3*

- (a) Rapid Change of Temperature:
  - Test Condition (d), Exposure time (each cycle, each temperature): 3 hours minimum.
  - Test Condition (e), Transition time: 1 hour ±5 minutes.

### 2.1.1.2 Deviations from Qualification and Periodic Tests – Chart F4

- (a) Rapid Change of Temperature:
  - Test Condition (d), Exposure time (each cycle, each temperature): 3 hours minimum.
  - Test Condition (e), Transition time: 1 hour  $\pm$ 5 minutes.
- (b) Vibration:
  - Test Condition (c), Applied voltage: no voltage shall be applied.
  - Data Points: no monitoring during the last cycle.
- (c) Shock:
  - Test Condition (d), Applied voltage: no voltage shall be applied.
  - Data Points: no monitoring during the last cycle.
- (d) Climatic Sequence (Damp Heat, Accelerated, First Cycle and Damp Heat, Accelerated, Remaining Cycles): the applied voltage shall be 100V.
- (e) Climatic Sequence (Low Air Pressure): For Qualification Testing only, Low Air Pressure shall be performed under the following conditions:
  - 1 hour minimum at  $1 \times 10^{-5}$  mbar maximum.
  - Temperature: +50 (+5 -0) $^{\circ}$ C
  - Applied voltage:  $1.25 \times U_R$  applied for the last 5 minutes of the period of low pressure.
- (f) Operating Life:
  - Test Condition (c), Applied voltage:  $1.15 \times U_R$ .

## 2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. [21700](#) and as follows.

The information to be marked on the component shall be:

- (a) Terminal Identification (see Para. 1.6).
- (b) The ESCC qualified components symbol (for ESCC qualified components only).
- (c) The ESCC Component Number (see Para. 1.4.1).
- (d) Traceability information.

## 2.3 ROBUSTNESS OF TERMINATIONS

The test conditions for Robustness of Terminations shall be as specified in the ESCC Generic Specification and as follows:

- Test Ua1 (tensile):
  - Applied force: 20N
  - Duration: 10  $\pm$ 1s
- Test Uc Method 1, Severity 2 (torsion, 2 successive rotations of 180 $^{\circ}$ )
- Test Ub Method 1 (bending, 2 consecutive bends):
  - Applied force: 10N

The number of terminals to be tested is as follows: All terminals for test Ua1; one-half of the terminals for test Uc Method 1, Severity 2; the remaining terminals for test Ub Method 1.

2.4 **ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES**

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

2.4.1 **Room Temperature Electrical Measurements**

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

| Characteristics                        | Symbols           | Test Method and Conditions   | Limits                       |                     | Units       |
|--|-------------------|--|------------------------------|---------------------|-------------|
|  |                   |  | Min                          | Max                 |             |
| Capacitance                            | C                 | ESCC No. 3006  | Note 1                       | Note 2              | pF          |
| Tangent of Loss Angle                  | $\text{tg}\delta$ | ESCC No. 3006<br>$V_T = 1\text{V}$<br>Test Frequency = 1kHz                | -                            | $50 \times 10^{-4}$ | -           |
| Insulation Resistance, Dielectric      | $R_I$             | ESCC No. 3006<br>For $C \leq 220000\text{pF}$<br>For $C > 220000\text{pF}$ | 25<br>5000                   | -<br>-              | GΩ<br>GΩ.nF |
| Insulation Resistance, Body Insulation | $R_{IB}$          | ESCC No. 3006  | 25                           | -                   | GΩ          |
| Voltage Proof, Terminal-to-Terminal    | VP                | ESCC No. 3006<br>(Note 3)  | $1.6 \times U_R$<br>(Note 4) | -                   | V           |
| Voltage Proof, Terminal-to-Case        | $VP_B$            | ESCC No. 3006<br>(Note 3)  | $1.6 \times U_R$<br>(Note 4) | -                   | V           |
| Partial Discharge (AC)                 | QAC               | IEC 60270<br><br>$V_{rms} = 5\%U_R$<br>$V_{rms} = 10\%U_R$<br>(Note 5)     | -<br>-                       | 0<br>1000           | pC<br>pC    |

**NOTES:**

1. Capacitance Value of the component minus the applicable Tolerance (see Para. 1.4.2).
2. Capacitance Value of the component plus the applicable Tolerance (see Para. 1.4.2).
3. Voltage application time: 5s.
4. For the applicable Rated Voltage ( $U_R$ ) see Para. 1.4.2.
5. Partial Discharge shall be measured at two different levels of voltage. For the applicable Rated Voltage ( $U_R$ ) see Para. 1.4.2.

2.4.2 High and Low Temperatures Electrical Measurements

| Characteristics                   | Symbols      | Test Method and Conditions (Note 1)                                   | Limits         |                 | Units                     |
|-----------------------------------|--------------|---|----------------|-----------------|---------------------------|
|                                   |              |   | Min            | Max             |                           |
| Temperature Coefficient           | $\Delta C/C$ | ESCC No. 3006<br>$T_{amb} = -55 (+3 -0)^{\circ}C$                     | -3<br>(Note 2) | -               | %                         |
|                                   |              | $T_{amb} = +125 (+0 -5)^{\circ}C$                                     | -              | +10<br>(Note 2) | %                         |
| Insulation Resistance, Dielectric | $R_i$        | ESCC No. 3006<br>$T_{amb} = +125 (+0 -5)^{\circ}C$                    |                |                 |                           |
|                                   |              | For $C \leq 220000pF$<br>For $C > 220000pF$                           | 250<br>50      | -<br>-          | $M\Omega$<br>$G\Omega.nF$ |
| Leakage Current                   | $I_L$        | $T_{amb} = +125 (+0 -5)^{\circ}C$<br>$V_T = 1 \times U_R$<br>(Note 3) | -              | Note 4          | nA                        |

**NOTES:**

1. The measurements shall be performed on a sample of 6 components from each manufacturing lot with 0 failures allowed. In the event of any failure a 100% inspection may be performed.
2. The Temperature Coefficient limits are with respect to the capacitance at  $+22 \pm 2^{\circ}C$  (reference point temperature).
3. For the applicable Rated Voltage ( $U_R$ ) see Para. 1.4.2.
4. The maximum Leakage Current limit, in nA, is:  $U_R$  (in V)  $\times$  C (in pF) / 100000.

2.5 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. 2.4.1, Room Temperature Electrical Measurements.

| Test Reference per ESCC No. 3006   | Characteristics                              | Symbols      | Limits |     | Units        |
|--|--|--------------|--------|-----|--------------|
|  |  |              | Min    | Max |              |
| Resistance to Soldering Heat<br>Initial Measurements<br>Final Measurements | Capacitance                                  | C            | Note 1 |     | pF           |
|  | Capacitance                                  | C            | Note 1 |     | pF           |
|  | Change in Capacitance                        | $\Delta C/C$ | -1     | +1  | %            |
|  | Insulation Resistance (Terminal-to-Terminal) | $R_i$        | Note 1 | -   | $G\Omega$    |
|  |  |              | Note 1 | -   | $G\Omega.nF$ |
| Tangent of Loss Angle  | $tg\delta$                                   | -            | Note 1 | -   |              |
| Temperature Coefficient  | Temperature Coefficient (Note 2)             | $\Delta C/C$ | Note 3 |     | %            |



| Test Reference per ESCC<br>No. 3006                 | Characteristics   | Symbols         | Limits                     |                     | Units       |
|---|---|-----------------|----------------------------|---------------------|-------------|
|   |   |                 | Min                        | Max                 |             |
| Rapid Change of Temperature<br>Initial Measurements | Capacitance   | C               | Note 1                     |                     | pF          |
|   | Final Measurements  | C               | Note 1                     |                     | pF          |
|   | Change in Capacitance   | $\Delta C/C$    | -1                         | +1                  | %           |
|   | Tangent of Loss Angle   | $tg\delta$      | -                          | $60 \times 10^{-4}$ | -           |
| Climatic Sequence<br>Initial Measurements           | Capacitance   | C               | Note 1                     |                     | pF          |
|   | Final Measurements  | C               | Note 1                     |                     | pF          |
|   | Change in Capacitance   | $\Delta C/C$    | -3                         | +3                  | %           |
|   | Tangent of Loss Angle   | $tg\delta$      | -                          | $60 \times 10^{-4}$ | -           |
|   | Voltage Proof,<br>Terminal-to-Terminal  | VP              | $1 \times U_R$<br>(Note 4) | -                   | V           |
|   | Voltage Proof,<br>Terminal-to-Case  | VP <sub>B</sub> | $1 \times U_R$<br>(Note 4) | -                   | V           |
|   | Insulation Resistance,<br>Dielectric  | R <sub>I</sub>  |                            |                     |             |
|   | For C ≤ 220000pF<br>For C > 220000pF  |                 | Note 5<br>Note 5           | -<br>-              | GΩ<br>GΩ.nF |
|   | Insulation Resistance,<br>Body Insulation   | R <sub>IB</sub> | 5                          | -                   | GΩ          |
|   | Partial Discharge (AC)<br>V <sub>rms</sub> = 10%U <sub>R</sub>  | QAC             | -                          | 2000                | pC          |
| Operating Life<br>Initial Measurements              | Capacitance   | C               | Note 1                     |                     | pF          |
|   | Intermediate Measurements<br>(1000 hours)   | C               | Note 1                     |                     | pF          |
|   | Change in Capacitance   | $\Delta C/C$    | -5                         | +5                  | %           |
|   | Final Measurements<br>(1000 or 2000 hours) (Note 6)   | C               | Note 1                     |                     | pF          |
|   | Change in Capacitance   | $\Delta C/C$    | -5                         | +5                  | %           |
|   | Tangent of Loss Angle   | $tg\delta$      | -                          | $60 \times 10^{-4}$ | -           |
|   | Insulation Resistance,<br>Dielectric  | R <sub>I</sub>  |                            |                     |             |
|   | For C ≤ 220000pF<br>For C > 220000pF  |                 | Note 5<br>Note 5           | -<br>-              | GΩ<br>GΩ.nF |
|   | Insulation Resistance,<br>Body Insulation   | R <sub>IB</sub> | 5                          | -                   | GΩ          |
|   | Partial Discharge (AC)<br>V <sub>rms</sub> = 5%U <sub>R</sub><br>V <sub>rms</sub> = 10%U <sub>R</sub> | QAC             | -<br>-                     | 0<br>2000           | pC          |

**NOTES:**

1. As specified in Para. 2.4.1.
2. The test method and test conditions shall be as specified in Para. 2.4.2.
3. As specified in Para. 2.4.2.
4. For the applicable Rated Voltage ( $U_R$ ) see Para. 1.4.2.
5. 50% of the limit specified in Para. 2.4.1.
6. 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.

## 2.6

**BURN-IN CONDITIONS**

| Characteristics     | Symbols   | Conditions (Note 1)        | Units |
|---------------------|-----------|----------------------------|-------|
| Ambient Temperature | $T_{amb}$ | +125 (+0 -5)               | °C    |
| Test Voltage        | $V_T$     | $1.15 \times U_R$ (Note 2) | V     |

**NOTES:**

1. 1M $\Omega$  resistors shall be connected in series with the components subjected to Burn-in. On completion of Burn-in the components shall be removed from the burn-in chamber and allowed to cool, under normal atmospheric conditions, for recovery for 24  $\pm$ 2 hours.
2. For the applicable Rated Voltage ( $U_R$ ) see Para. 1.4.2.

**APPENDIX 'A'**  
**AGREED DEVIATIONS FOR EXXELIA TECHNOLOGIES (F)**

| Items Affected   | Description of Deviations  |
|--|--|
| Para. 2.1.1.1, Deviations from Screening Tests – Chart F3                  | The optional Room Temperature Electrical Measurements prior to Burn-in shall be performed as specified in Para. 2.4.1 except that, for the Voltage Proof tests (VP, VP <sub>B</sub> ), the voltage application time shall be 60 (+0 -1)s.                                    |
|  | If a particular lot is required to undergo testing in accordance with Chart F4 then the results of the Temperature Coefficient measurements, made during High and Low Temperatures Electrical Measurements on a sample of 6 randomly-selected capacitors, shall be recorded. |
| Para. 2.1.1.2, Deviations from Qualification and Periodic Tests – Chart F4 | The Temperature Coefficient measurements recorded during Screening Tests may be used in lieu of the performance of the Temperature Coefficient test as specified in Subgroup 2B of Chart F4.   |