DCR attachment.
Converted ESCC spec 3001/038 draft 2A for review.
.....
S.Thacker 17/05/2012



# CAPACITORS, FIXED, MULTIPLE LAYER, CERAMIC DIELECTRIC, TYPE II

# BASED ON TYPES CNC53, CNC54, CNC55, CNC56, CNC57, CNC58 AND CNC65

## ESCC Detail Specification No. 3001/038

DRAFT

| | |
|---|---|
| Issue 2 Draft A | May 2012 |

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| DCR No. | CHANGE DESCRIPTION |
|---|---|
| TBD | Specification updated to incorporate editorial and technical 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. 3001.

### 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: 300103801126KC

- Detail Specification Reference: 3001038
- Component Type Variant Number: 01 (as required)
- Characteristic code: Capacitance Value (12µF): 126 (as required)
- Characteristic code: Capacitance Tolerance (±10%): K (as required)
- Rating code: Rated Voltage (50V): C (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 $C_n$ (pF) | Code |
|---|---|
| XX $10^4$ | XX4 |
| XX $10^5$ | XX5 |
| XX $10^6$ | XX6 |
| XX $10^7$ | XX7 |

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

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

(c) Rated Voltage expressed by the following codes:

| Rated Voltage (V) | Code Letter |
|---|---|
| 50 | C |
| 100 | E |
| 200 | G |
| 500 | L |

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 | Package Details Note 1 | | | | | Capacitance Range $C_n$ (µF) Note 4 | | | | Weight Max (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Type Note 2 | Lead Type | Lead Finish Note 3 | No. of Leads | Dim. H Max (mm) | Rated Voltage $U_R$ = 50V | Rated Voltage $U_R$ = 100V | Rated Voltage $U_R$ = 200V | Rated Voltage $U_R$ = 500V | |
| 01 | CNC53NE | N | A10 | 6 | 4 | 1.8 to 3.3 | 1 to 2.7 | 0.27 to 0.68 | 0.1 to 0.22 | 2 |
| | | | | | 8 | 3.9 to 6.8 | 3.3 to 5.6 | 0.82 to 1.2 | 0.27 to 0.47 | 3.5 |
| | | | | | 12 | 8.2 to 10 | 6.8 to 8.2 | 1.5 to 1.8 | 0.56 to 0.68 | 5 |
| | | | | | 16 | 12 | 10 | 2.2 to 2.7 | 0.82 to 1 | 6.5 |
| 02 | CNC54NE | N | A10 | 8 | 4 | 3.3 to 5.6 | 1.8 to 3.9 | 0.47 to 1 | 0.22 to 0.39 | 3 |
| | | | | | 8 | 6.8 to 10 | 4.7 to 8.2 | 1.2 to 2.2 | 0.47 to 0.82 | 5.5 |
| | | | | | 12 | 12 to 15 | 10 to 12 | 2.7 to 3.3 | 1 to 1.2 | 8.5 |
| | | | | | 16 | 18 to 22 | 15 | 3.9 | 1.5 | 11 |
| 03 | CNC55NE | N | A10 | 10 | 4 | 6.8 to 10 | 2.7 to 8.2 | 1 to 2.2 | 0.33 to 0.82 | 4.5 |
| | | | | | 8 | 12 to 22 | 10 to 15 | 2.7 to 4.7 | 1 to 1.8 | 9 |
| | | | | | 12 | 27 to 33 | 18 to 22 | 5.6 to 6.8 | 2.2 to 2.7 | 13.5 |
| | | | | | 16 | 39 | 27 to 33 | 8.2 to 10 | 3.3 | 18 |
| 04 | CNC56NE | N | A10 | 14 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |
| 05 | CNC57NE | N | A10 | 28 | 4 | 15 to 22 | 12 to 18 | 2.2 to 3.9 | 0.82 to 1.5 | 7.5 |
| | | | | | 8 | 27 to 47 | 22 to 39 | 4.7 to 8.2 | 1.8 to 3.3 | 15 |
| | | | | | 12 | 56 to 68 | 47 to 56 | 10 to 12 | 3.9 to 4.7 | 22.5 |
| | | | | | 16 | 82 | 68 | 15 | 5.6 | 30 |
| 06 | CNC58NE | N | A10 | 28 | 4 | 39 to 47 | 33 to 39 | 8.2 to 10 | 2.7 to 4.7 | 15 |
| | | | | | 8 | 56 to 100 | 47 to 82 | 12 to 22 | 5.6 to 10 | 30 |
| | | | | | 12 | 120 to 150 | 100 to 120 | 27 to 33 | 12 to 15 | 45 |
| | | | | | 16 | 180 | 150 | 39 | 18 | 60 |

| Variant Number | Package Details Note 1 | | | | | Capacitance Range $C_n$ (µF) Note 4 | | | | Weight Max (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Type Note 2 | Lead Type | Lead Finish Note 3 | No. of Leads | Dim. H Max (mm) | Rated Voltage $U_R$ = 50V | Rated Voltage $U_R$ = 100V | Rated Voltage $U_R$ = 200V | Rated Voltage $U_R$ = 500V | |
| 07 | CNC65NE | N | A10 | 12 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |
| 08 | CNC53PE | P | A10 | 6 | 4 | 1.8 to 3.3 | 1 to 2.7 | 0.27 to 0.68 | 0.1 to 0.22 | 2 |
| | | | | | 8 | 3.9 to 6.8 | 3.3 to 5.6 | 0.82 to 1.2 | 0.27 to 0.47 | 3.5 |
| | | | | | 12 | 8.2 to 10 | 6.8 to 8.2 | 1.5 to 1.8 | 0.56 to 0.68 | 5 |
| | | | | | 16 | 12 | 10 | 2.2 to 2.7 | 0.82 to 1 | 6.5 |
| 09 | CNC54PE | P | A10 | 8 | 4 | 3.3 to 5.6 | 1.8 to 3.9 | 0.47 to 1 | 0.22 to 0.39 | 3 |
| | | | | | 8 | 6.8 to 10 | 4.7 to 8.2 | 1.2 to 2.2 | 0.47 to 0.82 | 5.5 |
| | | | | | 12 | 12 to 15 | 10 to 12 | 2.7 to 3.3 | 1 to 1.2 | 8.5 |
| | | | | | 16 | 18 to 22 | 15 | 3.9 | 1.5 | 11 |
| 10 | CNC55PE | P | A10 | 10 | 4 | 6.8 to 10 | 2.7 to 8.2 | 1 to 2.2 | 0.33 to 0.82 | 4.5 |
| | | | | | 8 | 12 to 22 | 10 to 15 | 2.7 to 4.7 | 1 to 1.8 | 9 |
| | | | | | 12 | 27 to 33 | 18 to 22 | 5.6 to 6.8 | 2.2 to 2.7 | 13.5 |
| | | | | | 16 | 39 | 27 to 33 | 8.2 to 10 | 3.3 | 18 |
| 11 | CNC56PE | P | A10 | 14 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |
| 12 | CNC57PE | P | A10 | 28 | 4 | 15 to 22 | 12 to 18 | 2.2 to 3.9 | 0.82 to 1.5 | 7.5 |
| | | | | | 8 | 27 to 47 | 22 to 39 | 4.7 to 8.2 | 1.8 to 3.3 | 15 |
| | | | | | 12 | 56 to 68 | 47 to 56 | 10 to 12 | 3.9 to 4.7 | 22.5 |
| | | | | | 16 | 82 | 68 | 15 | 5.6 | 30 |
| 13 | CNC58PE | P | A10 | 28 | 4 | 39 to 47 | 33 to 39 | 8.2 to 10 | 2.7 to 4.7 | 15 |
| | | | | | 8 | 56 to 100 | 47 to 82 | 12 to 22 | 5.6 to 10 | 30 |
| | | | | | 12 | 120 to 150 | 100 to 120 | 27 to 33 | 12 to 15 | 45 |
| | | | | | 16 | 180 | 150 | 39 | 18 | 60 |
| 14 | CNC65PE | P | A10 | 12 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |
| 15 | CNC53PLE | PL | A10 | 6 | 4 | 1.8 to 3.3 | 1 to 2.7 | 0.27 to 0.68 | 0.1 to 0.22 | 2 |
| | | | | | 8 | 3.9 to 6.8 | 3.3 to 5.6 | 0.82 to 1.2 | 0.27 to 0.47 | 3.5 |
| | | | | | 12 | 8.2 to 10 | 6.8 to 8.2 | 1.5 to 1.8 | 0.56 to 0.68 | 5 |
| | | | | | 16 | 12 | 10 | 2.2 to 2.7 | 0.82 to 1 | 6.5 |
| 16 | CNC54PLE | PL | A10 | 8 | 4 | 3.3 to 5.6 | 1.8 to 3.9 | 0.47 to 1 | 0.22 to 0.39 | 3 |
| | | | | | 8 | 6.8 to 10 | 4.7 to 8.2 | 1.2 to 2.2 | 0.47 to 0.82 | 5.5 |
| | | | | | 12 | 12 to 15 | 10 to 12 | 2.7 to 3.3 | 1 to 1.2 | 8.5 |
| | | | | | 16 | 18 to 22 | 15 | 3.9 | 1.5 | 11 |
| 17 | CNC55PLE | PL | A10 | 10 | 4 | 6.8 to 10 | 2.7 to 8.2 | 1 to 2.2 | 0.33 to 0.82 | 4.5 |
| | | | | | 8 | 12 to 22 | 10 to 15 | 2.7 to 4.7 | 1 to 1.8 | 9 |
| | | | | | 12 | 27 to 33 | 18 to 22 | 5.6 to 6.8 | 2.2 to 2.7 | 13.5 |
| | | | | | 16 | 39 | 27 to 33 | 8.2 to 10 | 3.3 | 18 |
| 18 | CNC56PLE | PL | A10 | 14 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |

| Variant Number | Package Details Note 1 | | | | | Capacitance Range $C_n$ (µF) Note 4 | | | | Weight Max (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Type Note 2 | Lead Type | Lead Finish Note 3 | No. of Leads | Dim. H Max (mm) | Rated Voltage $U_R$ = 50V | Rated Voltage $U_R$ = 100V | Rated Voltage $U_R$ = 200V | Rated Voltage $U_R$ = 500V | |
| 19 | CNC57PLE | PL | A10 | 28 | 4 | 15 to 22 | 12 to 18 | 2.2 to 3.9 | 0.82 to 1.5 | 7.5 |
| | | | | | 8 | 27 to 47 | 22 to 39 | 4.7 to 8.2 | 1.8 to 3.3 | 15 |
| | | | | | 12 | 56 to 68 | 47 to 56 | 10 to 12 | 3.9 to 4.7 | 22.5 |
| | | | | | 16 | 82 | 68 | 15 | 5.6 | 30 |
| 20 | CNC58PLE | PL | A10 | 28 | 4 | 39 to 47 | 33 to 39 | 8.2 to 10 | 2.7 to 4.7 | 15 |
| | | | | | 8 | 56 to 100 | 47 to 82 | 12 to 22 | 5.6 to 10 | 30 |
| | | | | | 12 | 120 to 150 | 100 to 120 | 27 to 33 | 12 to 15 | 45 |
| | | | | | 16 | 180 | 150 | 39 | 18 | 60 |
| 21 | CNC65PLE | PL | A10 | 12 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |
| 22 | CNC53LE | L | A10 | 6 | 4 | 1.8 to 3.3 | 1 to 2.7 | 0.27 to 0.68 | 0.1 to 0.22 | 2 |
| | | | | | 8 | 3.9 to 6.8 | 3.3 to 5.6 | 0.82 to 1.2 | 0.27 to 0.47 | 3.5 |
| | | | | | 12 | 8.2 to 10 | 6.8 to 8.2 | 1.5 to 1.8 | 0.56 to 0.68 | 5 |
| | | | | | 16 | 12 | 10 | 2.2 to 2.7 | 0.82 to 1 | 6.5 |
| 23 | CNC54LE | L | A10 | 8 | 4 | 3.3 to 5.6 | 1.8 to 3.9 | 0.47 to 1 | 0.22 to 0.39 | 3 |
| | | | | | 8 | 6.8 to 10 | 4.7 to 8.2 | 1.2 to 2.2 | 0.47 to 0.82 | 5.5 |
| | | | | | 12 | 12 to 15 | 10 to 12 | 2.7 to 3.3 | 1 to 1.2 | 8.5 |
| | | | | | 16 | 18 to 22 | 15 | 3.9 | 1.5 | 11 |
| 24 | CNC55LE | L | A10 | 10 | 4 | 6.8 to 10 | 2.7 to 8.2 | 1 to 2.2 | 0.33 to 0.82 | 4.5 |
| | | | | | 8 | 12 to 22 | 10 to 15 | 2.7 to 4.7 | 1 to 1.8 | 9 |
| | | | | | 12 | 27 to 33 | 18 to 22 | 5.6 to 6.8 | 2.2 to 2.7 | 13.5 |
| | | | | | 16 | 39 | 27 to 33 | 8.2 to 10 | 3.3 | 18 |
| 25 | CNC56LE | L | A10 | 14 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |
| 26 | CNC57LE | L | A10 | 28 | 4 | 15 to 22 | 12 to 18 | 2.2 to 3.9 | 0.82 to 1.5 | 7.5 |
| | | | | | 8 | 27 to 47 | 22 to 39 | 4.7 to 8.2 | 1.8 to 3.3 | 15 |
| | | | | | 12 | 56 to 68 | 47 to 56 | 10 to 12 | 3.9 to 4.7 | 22.5 |
| | | | | | 16 | 82 | 68 | 15 | 5.6 | 30 |
| 27 | CNC58LE | L | A10 | 28 | 4 | 39 to 47 | 33 to 39 | 8.2 to 10 | 2.7 to 4.7 | 15 |
| | | | | | 8 | 56 to 100 | 47 to 82 | 12 to 22 | 5.6 to 10 | 30 |
| | | | | | 12 | 120 to 150 | 100 to 120 | 27 to 33 | 12 to 15 | 45 |
| | | | | | 16 | 180 | 150 | 39 | 18 | 60 |
| 28 | CNC65LE | L | A10 | 12 | 4 | 10 to 18 | 4.7 to 15 | 1.8 to 3.9 | 0.47 to 1.5 | 6.5 |
| | | | | | 8 | 22 to 39 | 18 to 27 | 4.7 to 6.8 | 1.8 to 3.3 | 13 |
| | | | | | 12 | 47 to 56 | 33 to 39 | 8.2 to 10 | 3.9 to 4.7 | 19.5 |
| | | | | | 16 | 68 | 47 | 12 | 5.6 | 26 |

**NOTES:**

1. See Physical Dimensions and Functional Diagram.
2. For Variants 01 to 07 the body shall be coated with varnish. Variants 08 to 28 are classified as non-insulated.
3. The lead finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.
4. Available capacitance values and tolerances are as follows:
   - Tolerance: ±10%; value series: E12
   - Tolerance: ±20%; value series: E6

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.

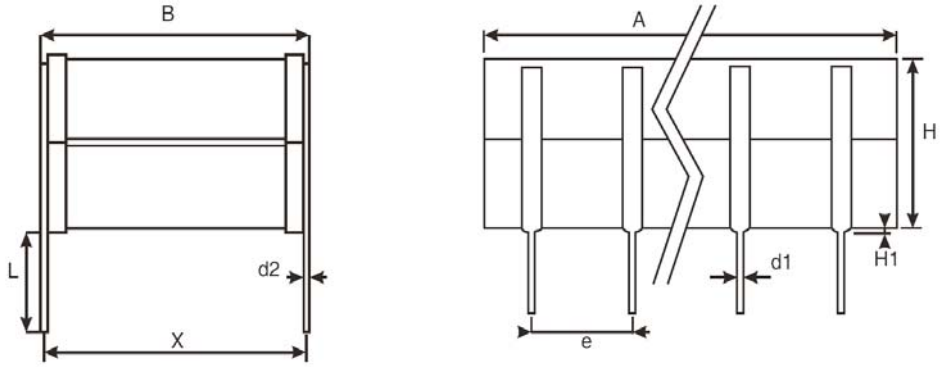
| Characteristics | Symbols | Maximum Ratings | Units | Remarks |
|---|---|---|---|---|
| Rated Voltage | $U_R$ | 50, 100, 200, 500 | V | Note 1 |
| Operating Temperature Range | $T_{op}$ | -55 to +125 | °C | Without derating. $T_{amb}$ |
| Storage Temperature Range | $T_{stg}$ | -55 to +125 | °C | |
| Soldering Temperature | $T_{sol}$ | +260 | °C | Note 2 |

**NOTES:**

1. As required; See Component Type Variants and Range of Components.
2. Duration 10 seconds maximum and the same lead shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS

1.6.1 Variants 01 to 07 (lead type N)

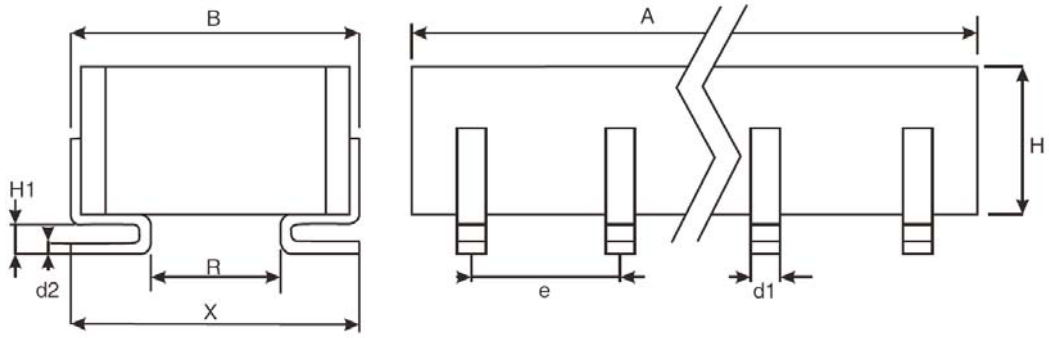



| Variant Number | No. of Leads | Dimensions (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A Max | B Max | d1 Note 1 | | d2 Note 1 | | e Note 1 | | H Max | H1 Max Note 1 | L Min Note 1 | X Note 1 | |
| | | | | Min | Max | Min | Max | Min | Max | | | | Min | Max |
| 01 | 6 | 8.7 | 9.2 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 7.7 | 8.7 |
| 02 | 8 | 10.7 | 10.7 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 9.66 | 10.66 |
| 03 | 10 | 13.6 | 14.9 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 13.5 | 14.5 |
| 04 | 14 | 21.6 | 16.8 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 14.74 | 15.74 |
| 05 | 28 | 38.2 | 12 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 9.66 | 10.66 |
| 06 | 28 | 40.6 | 24 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 19.82 | 20.82 |
| 07 | 12 | 16.6 | 21.6 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 2.05 | 7.5 | 19.82 | 20.82 |

**NOTES:**

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.6.2 Variants 08 to 14 (lead type P)

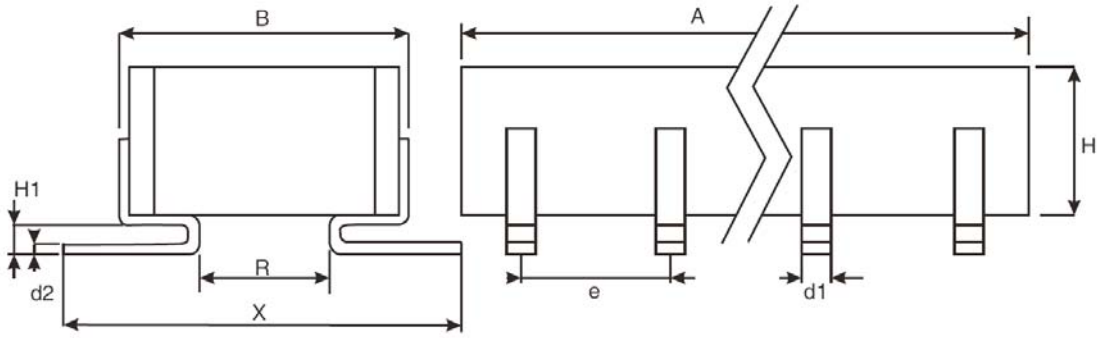



| Variant Number | No. of Leads | Dimensions (mm) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A Max | B Max | d1 Note 1 | | d2 Note 1 | | e Note 1 | | H Max | H1 Note 1 | | R Min Note 1 | X Note 1 | |
| | | | | Min | Max | Min | Max | Min | Max | | Min | Max | | Min | Max |
| 08 | 6 | 8.7 | 9.2 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 3.1 | 7.5 | 9 |
| 09 | 8 | 10.7 | 10.7 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 4 | 9.5 | 12 |
| 10 | 10 | 13.6 | 14.9 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 7.5 | 13.5 | 14.9 |
| 11 | 14 | 21.6 | 16.8 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 10 | 14.5 | 16.8 |
| 12 | 28 | 38.2 | 12 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 5.2 | 10 | 12 |
| 13 | 28 | 40.6 | 24 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 16.1 | 20 | 24 |
| 14 | 12 | 16.6 | 21.6 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 14.8 | 19 | 21.6 |

**NOTES:**

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.6.3 Variants 15 to 21 (lead type PL)

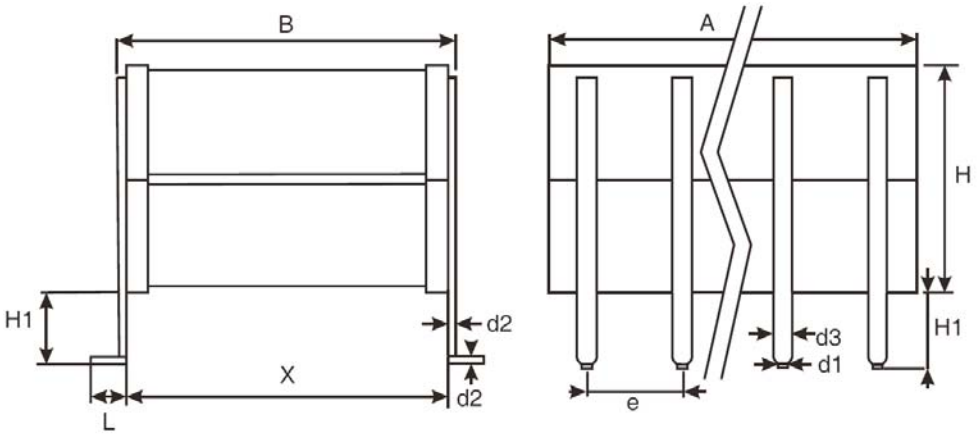



| Variant Number | No. of Leads | Dimensions (mm) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A Max | B Max | d1 Note 1 | | d2 Note 1 | | e Note 1 | | H Max | H1 Note 1 | | R Min Note 1 | X Note 1 | |
| | | | | Min | Max | Min | Max | Min | Max | | Min | Max | | Min | Max |
| 15 | 6 | 8.7 | 9.2 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 3.1 | 11.5 | 15 |
| 16 | 8 | 10.7 | 10.7 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 4 | 13.5 | 18 |
| 17 | 10 | 13.6 | 14.9 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 7.5 | 17.5 | 20.9 |
| 18 | 14 | 21.6 | 16.8 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 10 | 18.5 | 22.8 |
| 19 | 28 | 38.2 | 12 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 5.2 | 14 | 18 |
| 20 | 28 | 40.6 | 24 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 16.1 | 24 | 30 |
| 21 | 12 | 16.6 | 21.6 | 0.4 | 0.6 | 0.2 | 0.3 | 2.49 | 2.59 | Note 2 | 1.1 | 1.6 | 14.8 | 23 | 27.6 |

**NOTES:**

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.6.4 Variants 22 to 28 (lead type L)




| Variant Number | No. of Leads | Dimensions (mm) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A Max | B Max | d1 Note 1 | | d2 Note 1 | | d3 Note 1 | | e Note 1 | | H Max | H1 Note 1 | | L Note 1 | | X Note 1 | |
| | | | | Min | Max | Min | Max | Min | Max | Min | Max | | Min | Max | Min | Max | Min | Max |
| 22 | 6 | 8.7 | 9.2 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 6.7 | 8.7 |
| 23 | 8 | 10.7 | 10.7 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 8.2 | 10 |
| 24 | 10 | 13.6 | 14.9 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 12.4 | 14.4 |
| 25 | 14 | 21.6 | 16.8 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 14.3 | 16.3 |
| 26 | 28 | 38.2 | 12 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 9.5 | 11.5 |
| 27 | 28 | 40.6 | 24 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 21.5 | 23.5 |
| 28 | 12 | 16.6 | 21.6 | 0.4 | 0.6 | 0.2 | 0.3 | 0.9 | 1.1 | 2.49 | 2.59 | Note 2 | 2 | 3 | 2 | 3 | 19.5 | 21.1 |

**NOTES:**

1. All leads.
2. See Component Type Variants and Range of Components for dimension H.

1.7 FUNCTIONAL DIAGRAM

**NOTES:**

1. All leads on each side of the component are connected to the same capacitor terminal.

## 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) Robustness of Terminations and Resistance to Soldering Heat: Resistance to Soldering Heat shall be performed prior to Robustness of Terminations.
(b) Resistance to Soldering Heat and Solderability:
- For Variants 01 to 07: Immersion depth shall be between 2mm and 2.5mm from the body.
- For Variants 08 to 28: Only the part of the leads designed to be soldered shall be tested.

(c) Vibration: Prior to Vibration, the samples shall be mounted and glued on to a suitable substrate in order to avoid any stress. The samples shall be maintained on the substrate for all subsequent tests in the subgroup test sequence.

### 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) The ESCC qualified components symbol (for ESCC qualified components only).
(b) The ESCC Component Number.
(c) Traceability information.

### 2.3 ROBUSTNESS OF TERMINATIONS

The terminations of these devices are classified as rigid. The test conditions for Robustness of Terminations shall be as specified in the ESCC Generic Specification and as follows:

For Variants 01 to 07:
- Applicable test: Ua1 (tensile) only.
- Terminations tested: a minimum of one randomly selected lead on each side of the component.
- Applied force: 5N

For Variants 08 to 28:
- Applicable test: Ue3 (shear) only.
- Pushing force: 10N for 10s

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±3°C.

| Characteristics | Symbols | Test Method and Conditions | Tolerance (± %) | Limits | | Units |
|---|---|---|---|---|---|---|
| | | | | Min | Max | |
| Capacitance | $C_A$ | ESCC No. 3001 | | | | µF |
| | | | 10 | $0.9C_n$ | $1.1C_n$ | |
| | | | 20 | $0.8C_n$ | $1.2C_n$ | |
| Tangent of Loss Angle | tgδ | ESCC No. 3001 | All | - | $25 \times 10^{-3}$ | - |
| Insulation Resistance (Dielectric) | $R_{ID}$ | ESCC No. 3001 | All | 1000 | - | MΩ.µF |
| Insulation Resistance (Body Insulation) | $R_{IB}$ | ESCC No. 3001 Variants 01 to 07 only Note 1 | All | 1000 | - | MΩ.µF |
| Voltage Proof (Dielectric) | $VP_D$ | ESCC No. 3001 | All | | | V |
| | | $U_R$ < 500V | | $2.5U_R$ | - | |
| | | $U_R$ = 500V | | $2U_R$ | - | |
| Voltage Proof (Body Insulation) | $VP_B$ | ESCC No. 3001 Variants 01 to 07 only Note 1 | All | | | V |
| | | $U_R$ < 500V | | $2.5U_R$ | - | |
| | | $U_R$ = 500V | | $2U_R$ | - | |

**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. In the case of a 100% inspection, a 1% total percent defective is allowed.

2.4.2 High and Low Temperatures Electrical Measurements

| Characteristics | Symbols | Test Method and Conditions (Note 1) | Limits | | Units |
|---|---|---|---|---|---|
| | | | Min | Max | |
| Temperature Characteristic | TC | ESCC No. 3001 Note 2 | | | % |
| | | For $V_T$ = no voltage applied | -20 | +20 | |
| | | For $V_T = U_R$ (Note 3) | -50 | +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. In the case of a 100% inspection, a 1% total percent defective is allowed.
3. $V_T$ = 200V for all $U_R$ = 500V components.

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at $T_{amb}$ = +22±3°C.

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

| Test Reference per ESCC No. 3001 | Characteristics | Symbols | Limits | | Units |
|---|---|---|---|---|---|
| | | | Min | Max | |
| Rapid Change of Temperature | | | | | |
| Initial Measurements | Capacitance | $C_A$ | Note 1 | | |
| Final Measurements | Capacitance | $C_A$ | Note 1 | | |
| | Change in Capacitance | $\Delta C_A/C_A$ | -15 | +15 | % |
| | Tangent of Loss Angle | tgδ | Note 1 | | |
| Resistance to Soldering Heat | | | | | |
| Initial Measurements | Capacitance | $C_A$ | Note 1 | | |
| Final Measurements | Capacitance | $C_A$ | Note 1 | | |
| | Change in Capacitance | $\Delta C_A/C_A$ | -15 | +15 | % |
| | Insulation Resistance (Dielectric) | $R_{ID}$ | Note 1 | | |
| | Insulation Resistance (Body Insulation)(Note 2) | $R_{IB}$ | Note 1 | | |
| Climatic Test Sequence | | | | | |
| Initial Measurements | Capacitance | $C_A$ | Note 1 | | |
| Final Measurements | Capacitance | $C_A$ | Note 1 | | |
| | Change in Capacitance | $\Delta C_A/C_A$ | -10 | +10 | % |
| | Tangent of Loss Angle | tgδ | Note 1 | | |
| | Insulation Resistance (Dielectric) | $R_{ID}$ | 30 | - | MΩ.μF |
| | Insulation Resistance (Body Insulation)(Note 2) | $R_{IB}$ | 30 | - | MΩ.μF |
| | Voltage Proof (Body Insulation)(Note 2) | $VP_B$ | Note 1 | | |
| Damp Heat Steady State | | | | | |
| Initial Measurements | Capacitance | $C_A$ | Note 1 | | |
| Final Measurements | Capacitance | $C_A$ | Note 1 | | |
| | Change in Capacitance | $\Delta C_A/C_A$ | -10 | +10 | % |
| | Tangent of Loss Angle | tgδ | Note 1 | | |
| | Insulation Resistance (Dielectric) | $R_{ID}$ | 30 | - | MΩ.μF |
| | Insulation Resistance (Body Insulation)(Note 2) | $R_{IB}$ | 30 | - | MΩ.μF |
| | Voltage Proof (Body Insulation)(Note 2) | $VP_B$ | Note 1 | | |

| Test Reference per ESCC No. 3001 | Characteristics | Symbols | Limits | | Units |
|---|---|---|---|---|---|
| | | | Min | Max | |
| Operating Life | | | | | |
| Initial Measurements | Capacitance | $C_A$ | Note 1 | | |
| Intermediate Measurements (1000 hours) | Capacitance | $C_A$ | Note 1 | | |
| | Change in Capacitance | $\Delta C_A/C_A$ | -15 | +15 | % |
| | Insulation Resistance (Dielectric) | $R_{ID}$ | 100 | - | MΩ.μF |
| | Insulation Resistance (Body Insulation)(Note 2) | $R_{IB}$ | 100 | - | MΩ.μF |
| Final Measurements (2000 hours) | Capacitance | $C_A$ | Note 1 | | |
| | Change in Capacitance | $\Delta C_A/C_A$ | -20 | +20 | % |
| | Tangent of Loss Angle | tgδ | Note 1 | | |
| | Insulation Resistance (Dielectric) | $R_{ID}$ | 100 | - | MΩ.μF |
| | Insulation Resistance (Body Insulation)(Note 2) | $R_{IB}$ | 100 | - | MΩ.μF |
| | Voltage Proof (Dielectric) | $VP_D$ | Note 1 | | |
| | Voltage Proof (Body Insulation)(Note 2) | $VP_B$ | Note 1 | | |
| Capacitance-Temperature Characteristics | Temperature Characteristic | TC | Note 3 | | |

**NOTES:**

1. As specified in Room Temperature Electrical Measurements.
2. Variants 01 to 07 only.
3. As specified in High and Low Temperatures Electrical Measurements.

2.6 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±2 hours.

## APPENDIX A
## AGREED DEVIATIONS FOR EUROFARAD (F)

| Items Affected | Description of Deviations |
|---|---|
| Deviations from Generic Specification:<br>Special In-Process Controls (Chart F2) | Robustness of Terminations shall not be performed |