



**CAPACITORS, FIXED, CERAMIC DIELECTRIC,
TYPE II**

BASED ON TYPE TCN83E

ESCC Detail Specification No. 3001/027

DRAFT

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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
TBA	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: 300102701476KC

- Detail Specification Reference: 3001027
- Component Type Variant Number: 01 (see Note 1)
- Characteristic code: Capacitance Value (47 μ F): 476 (as required)
- Characteristic code: Capacitance Tolerance (\pm 10%): K (as required)
- Rating code: Rated Voltage (50V): C (as required)

NOTES

1. Marking of the 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) 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 ⁵	XX5
XX 10 ⁶	XX6

- (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
250	H
400	K

1.4.2 Range of Components

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

Capacitance Value (µF)	Capacitance Tolerance (± %)	Rated Voltage (U _R) (Vdc)	Case Size (Note 1)	Weight Max (g)
5.6	10	50	A	10
6.8	10, 20	50	A	10
8.2	10	50	A	10
10	10, 20	50	A	10
12	10	50	A	10
15	10, 20	50	A	10
18	10	50	B	12
22	10, 20	50	B	12
27	10	50	C	18
33	10, 20	50	C	18
39	10	50	D	35
47	10, 20	50	D	35
1.8	10	100	A	10
2.2	10, 20	100	A	10
2.7	10	100	A	10
3.3	10, 20	100	A	10
3.9	10	100	A	10
4.7	10, 20	100	A	10
5.6	10	100	B	12
6.8	10, 20	100	B	12
8.2	10	100	B	12
10	10, 20	100	C	18
12	10	100	C	18
15	10, 20	100	C	18
18	10	100	D	35
22	10, 20	100	D	35

Capacitance Value (μF)	Capacitance Tolerance (± %)	Rated Voltage (U _R) (Vdc)	Case Size (Note 1)	Weight Max (g)
27	10	100	E	50
33	10, 20	100	E	50
1	10, 20	250	A	10
1.2	10	250	A	10
1.5	10, 20	250	A	10
1.8	10	250	B	12
2.2	10, 20	250	B	12
2.7	10	250	C	18
3.3	10, 20	250	C	18
3.9	10	250	D	35
4.7	10, 20	250	D	35
5.6	10	250	D	35
6.8	10, 20	250	D	35
8.2	10	250	E	50
10	10, 20	250	E	50
1	10, 20	400	A	10
1.2	10	400	B	12
1.5	10, 20	400	B	12
1.8	10	400	C	18
2.2	10, 20	400	C	18
2.7	10	400	D	35
3.3	10, 20	400	D	35
3.9	10	400	D	35
4.7	10, 20	400	E	50
5.6	10	400	E	50
6.8	10, 20	400	E	50

NOTES:

1. See Physical Dimensions.

1.5 MAXIMUM RATINGS

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

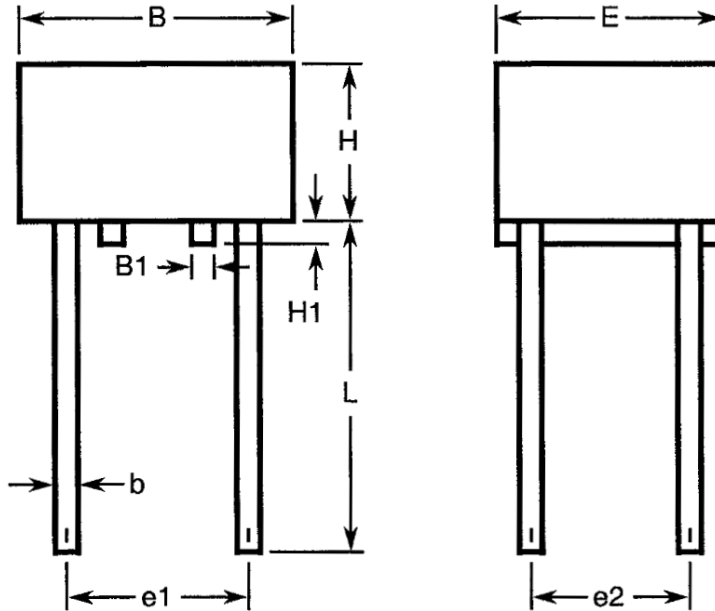
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Rated Voltage	U _R	50, 100, 250, 400	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:

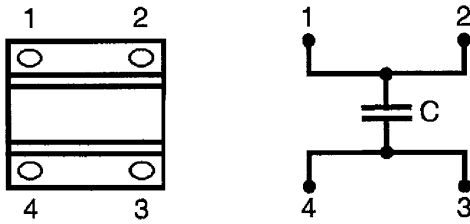
1. As required; See Range of Components.
2. Duration 5 seconds maximum at a distance of $\geq 1.5\text{mm}$ from the case and the same lead shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS



Symbol	Dimensions (mm)		Notes
	Min	Max	
b	0.95	1.1	
B	21.5	22.5	
B1	1	3	
e1	17.3	18.3	
e2	9.66	10.66	
E	18.5	19.5	
H	-	6.5	Case size: A
	-	8	Case size: B
	-	12.5	Case size: C
	-	20	Case size: D
	-	30	Case size: E
H1	0.2	0.6	
L	30	-	

1.7 FUNCTIONAL DIAGRAM



NOTES:

1. These capacitors have 4 terminals connected 2 by 2.

1.8 MATERIALS AND FINISHES

1.8.1 Case

As a minimum, a thermo-setting resin moulding shall ensure the protection of the capacitors.

1.8.2 Terminals

The lead material and finish shall be in accordance with type A3 or A4 in accordance with the requirements of ESCC Basic Specification No. 23500.

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) Climatic Test Sequence: Voltage Proof (Body Insulation) is not applicable.
- (b) Damp Heat Steady State: Voltage Proof (Body Insulation) is not applicable.

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

- Applicable tests: Ua1 (tensile) and Ub Method 1 (bending) only.
- Applied force:
 - Ua1: 20N
 - Ub: 10N
- Duration: 10s
- After each test, the capacitors shall be examined for evidence of breaking or loosening of terminals.

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

Characteristics	Symbols	Test Method and Conditions	Tolerance (\pm %)	Limits		Units
				Min	Max	
Capacitance (Note 1)	C_A	ESCC No. 3001	10	$0.9C_n$	$1.1C_n$	μF
			20	$0.8C_n$	$1.2C_n$	
Tangent of Loss Angle	$tg\delta$	ESCC No. 3001	All	-	250×10^{-4}	-
Insulation Resistance (Dielectric)	R_{ID}	ESCC No. 3001	All	1000	-	$M\Omega \cdot \mu F$
Insulation Resistance (Body Insulation)	R_{IB}	ESCC No. 3001 Note 2	All	1000	-	$M\Omega \cdot \mu F$
Voltage Proof (Dielectric)	VP_D	ESCC No. 3001	All	$2.5U_R$	-	V

NOTES:

1. Capacitance limits may be adjusted to take into account capacitance ageing, as specified in the Generic Specification.
2. 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 For $V_T = U_R = 50V$ For $V_T = U_R = 100V$ For $V_T = U_R = 250V$ For $V_T = U_R = 400V$	-20 -30 -30 -40 -50	+20 +20 +20 +20 +20	%

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.

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 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 Change in Capacitance Tangent of Loss Angle	C_A $\Delta C_A / C_A$ $tg\delta$	-10 -	+10 250×10^{-4}	% -
Resistance to Soldering Heat Initial Measurements	Capacitance	C_A	Note 1		
Final Measurements	Capacitance Change in Capacitance Insulation Resistance (Dielectric) Insulation Resistance (Body Insulation)	C_A $\Delta C_A / C_A$ R_{ID} R_{IB}	-10 1000 1000	+20 - -	% $M\Omega \cdot \mu F$ $M\Omega \cdot \mu F$

Test Reference per ESCC No. 3001	Characteristics	Symbols	Limits		Units
			Min	Max	
Climatic Test Sequence Initial Measurements Final Measurements	Capacitance	C_A	Note 1		
	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	$tg\delta$	-	250×10^{-4}	-
	Insulation Resistance (Dielectric)	R_{ID}	50	-	$M\Omega \cdot \mu F$
	Insulation Resistance (Body Insulation)	R_{IB}	50	-	$M\Omega \cdot \mu F$
Damp Heat Steady State Initial Measurements Final Measurements	Capacitance	C_A	Note 1		
	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	$tg\delta$	-	250×10^{-4}	-
	Insulation Resistance (Dielectric)	R_{ID}	50	-	$M\Omega \cdot \mu F$
	Insulation Resistance (Body Insulation)	R_{IB}	50	-	$M\Omega \cdot \mu F$
Operating Life Initial Measurements Intermediate Measurements (1000 hours) Final Measurements (2000 hours)	Capacitance	C_A	Note 1		
	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-15	+15	%
	Insulation Resistance (Dielectric)	R_{ID}	250	-	$M\Omega \cdot \mu F$
	Insulation Resistance (Body Insulation)	R_{IB}	250	-	$M\Omega \cdot \mu F$
	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-20	+20	%
	Tangent of Loss Angle	$tg\delta$	-	250×10^{-4}	-
	Insulation Resistance (Dielectric)	R_{ID}	100	-	$M\Omega \cdot \mu F$
	Insulation Resistance (Body Insulation)	R_{IB}	100	-	$M\Omega \cdot \mu F$
Voltage Proof (Dielectric)	VP_D	$2.5U_R$	-	V	
Capacitance-Temperature Characteristics	Temperature Characteristic	TC	Note 2		

NOTES:

1. As specified in Room Temperature Electrical Measurements.
2. 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 hours minimum.

APPENDIX A
AGREED DEVIATIONS FOR EUROFARAD (F)

Items Affected	Description of Deviations																																				
High and Low Temperatures Electrical Measurements	<p>Temperature Characteristic measurement with voltage applied may be performed with applied voltages and limits as follows:</p> <table border="1" data-bbox="523 495 1374 748"> <thead> <tr> <th data-bbox="523 495 707 555">Characteristics</th> <th data-bbox="707 495 826 555">Symbols</th> <th data-bbox="826 495 1126 555">Test Method and Conditions</th> <th colspan="2" data-bbox="1126 495 1305 524">Limits</th> <th data-bbox="1305 495 1374 524">Units</th> </tr> <tr> <td colspan="3"></td> <th data-bbox="1126 524 1214 555">Min</th> <th data-bbox="1214 524 1305 555">Max</th> <td></td> </tr> </thead> <tbody> <tr> <td data-bbox="523 555 707 748">Temperature Characteristic</td> <td data-bbox="707 555 826 748">TC</td> <td data-bbox="826 555 1126 748"> ESCC No. 3001 For $U_R = 50V$: $V_T = 50V$ For $U_R = 100V$: $V_T = 100V$ For $U_R = 250V$: $V_T = 200V$ For $U_R = 400V$: $V_T = 200V$ </td> <td data-bbox="1126 555 1214 748">-30</td> <td data-bbox="1214 555 1305 748">+20</td> <td data-bbox="1305 555 1374 748">%</td> </tr> <tr> <td></td> <td></td> <td></td> <td data-bbox="1126 622 1214 654">-30</td> <td data-bbox="1214 622 1305 654">+20</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td data-bbox="1126 676 1214 707">-35</td> <td data-bbox="1214 676 1305 707">+20</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td data-bbox="1126 730 1214 761">-30</td> <td data-bbox="1214 730 1305 761">+20</td> <td></td> </tr> </tbody> </table>	Characteristics	Symbols	Test Method and Conditions	Limits		Units				Min	Max		Temperature Characteristic	TC	ESCC No. 3001 For $U_R = 50V$: $V_T = 50V$ For $U_R = 100V$: $V_T = 100V$ For $U_R = 250V$: $V_T = 200V$ For $U_R = 400V$: $V_T = 200V$	-30	+20	%				-30	+20					-35	+20					-30	+20	
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