

## Interference Suppression Film Capacitor - Class X2 Radial MKT 310 V<sub>AC</sub> - High Stability Grade


**FEATURES**

- 15 mm to 37.5 mm lead pitch
- Internal series construction
- AEC-Q200 qualified for C ≤ 470 nF
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT

**APPLICATIONS**

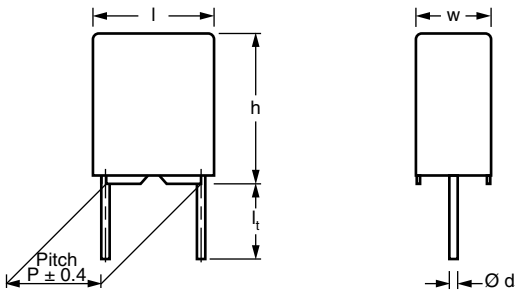
High stability grade for continuous across the line X2 applications.

See also application note: [www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)

| QUICK REFERENCE DATA                       |  |
|--|--|
| Capacitance range (E12 series)             | 0.01 μF to 2.2 μF<br>(preferred values acc. to E6)   |
| Capacitance tolerance                      | ± 10 %, ± 20 % (± 5 % on request)  |
| Rated AC voltage                           | 310 V <sub>AC</sub> ; 50 Hz to 60 Hz   |
| Permissible DC voltage                     | 800 V <sub>DC</sub> at 85 °C<br>630 V <sub>DC</sub> at 110 °C  |
| Climatic testing class acc. to IEC 60068-1 | 40/110/56/C  |
| Maximum application temperature            | 110 °C   |
| Reference standards                        | IEC 60384-14 and EN 60384-14<br>IEC 60065 pass. flamm. class C<br>CSA-E384-14<br>UL 60384-14   |
| Dielectric                                 | Polyester film   |
| Electrodes                                 | Metallized   |
| Construction                               | Series construction<br>  |
| Encapsulation                              | Plastic case, epoxy resin sealed, flame retardant UL-class 94 V-0  |
| Leads                                      | Tinned wire  |
| Marking                                    | C-value; tolerance; rated voltage; sub-class; manufacturer's type;<br>code for dielectric material; manufacturer location, year and week;<br>manufacturer's logo or name; safety approvals |

**Note**

- For more detailed data and test requirements, contact [rfi@vishay.com](mailto:rfi@vishay.com)

| DIMENSIONS in millimeters  |
|--|
|  |

**COMPOSITION OF CATALOG NUMBER**


Example: F17724152215 means 0.15  $\mu$ F,  $\pm$  20 %; standard pitch 22.5 mm; lead length 15 mm - 1 mm;  
 F17724152265 means 0.15  $\mu$ F,  $\pm$  20 %; reduced pitch 15.0 mm; lead length 15 mm - 1 mm

**Notes**

- For detailed tape specifications refer to packaging information [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)
- <sup>(1)</sup> Taped on reel pitch  $\geq$  27.5 mm is not available
- <sup>(2)</sup> Same capacitance values  $\geq$  0.15  $\mu$ F are available in two different pitch sizes and dimensions

| SPECIFIC REFERENCE DATA  |                                    |
|--|------------------------------------|
| DESCRIPTION  | VALUE                              |
| Rated AC voltage ( $U_{RAC}$ )   | 310 V                              |
| Permissible DC voltage ( $U_{RDC}$ )   | 630 V                              |
| Tangent of loss angle  | $\leq 100 \times 10^{-4}$ at 1 kHz |
| Rated voltage pulse slope at $(dU/dt)_R$ 435 $V_{DC}$  | 100 V/ $\mu$ s                     |
| R between leads, for $C \leq 0.33 \mu$ F at 100 V; 1 min   | $> 15\,000 \text{ M}\Omega$        |
| RC between leads, $C > 0.33 \mu$ F at 100 V; 1 min   | $> 5000 \text{ s}$                 |
| R between leads and case; 100 V; 1 min   | $> 30\,000 \text{ M}\Omega$        |
| Withstanding (DC) voltage (cut off current 10 mA) <sup>(1)</sup> ; rise time $\leq 1000 \text{ V/s}$ |                                    |
| $C \leq 0.47 \mu$ F  | 2200 V; for 1 min                  |
| $C > 0.47 \mu$ F   | 2150 V; for 1 min                  |
| Withstanding (AC) voltage between leads and case   | 2120 V; 1 min                      |
| Maximum application temperature  | 110 °C                             |

**Note**

- See "Voltage Proof Test for Metalized Film Capacitors": [www.vishay.com/doc?28169](http://www.vishay.com/doc?28169)



| <b>ELECTRICAL DATA AND ORDERING INFORMATION</b> |   |                             |   |  |  |   |
|---|---|-----------------------------|---|--|--|---|
| <b>U<sub>RAC</sub></b><br><b>(V)</b>            | <b>CAP.</b><br><b>(μF)</b>                                | <b>PITCH</b><br><b>(mm)</b> | <b>DIMENSIONS</b><br><b>w x h x l</b><br><b>MAX. (mm)</b> | <b>MASS <sup>(3)</sup></b><br><b>(g)</b> | <b>SPQ</b><br><b>(pieces)</b><br><b>SHORT LEAD</b> | <b>ORDERING CODE</b><br><b>BULK</b><br><b>LEAD LENGTH</b><br><b>6 mm - 1 mm <sup>(1)(2)</sup></b> |
| 310   | <b>d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 10 %</b> |                             |   |  |  |   |
|   | 0.010   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723102000  |
|   | 0.012   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723122000  |
|   | 0.015   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723152000  |
|   | 0.018   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723182000  |
|   | 0.022   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723222000  |
|   | 0.027   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723272000  |
|   | 0.033   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723332000  |
|   | 0.039   | 15                          | 6.0 x 12.0 x 17.5   | 2.0                                      | 500  | F17723392000  |
|   | 0.047   | 15                          | 6.0 x 12.0 x 17.5   | 2.0                                      | 500  | F17723472000  |
|   | 0.056   | 15                          | 6.0 x 12.0 x 17.5   | 2.0                                      | 500  | F17723562000  |
|   | <b>d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 %</b> |                             |   |  |  |   |
|   | 0.068   | 15                          | 7.0 x 13.5 x 17.5   | 2.4                                      | 450  | F17723682000  |
|   | 0.082   | 15                          | 8.5 x 15.0 x 17.5   | 2.7                                      | 300  | F17723822000  |
|   | 0.10  | 15                          | 8.5 x 15.0 x 17.5   | 2.7                                      | 325  | F17724102000  |
|   | 0.12  | 15                          | 8.5 x 15.0 x 17.5   | 2.7                                      | 300  | F17724122000  |
|   | 0.15  | 15                          | 8.5 x 15.0 x 17.5   | 2.7                                      | 300  | F17724152160  |
|   | 0.15  | 22.5                        | 7.0 x 16.5 x 26.0   | 4.1                                      | 235  | F17724152000  |
|   | 0.18  | 22.5                        | 7.0 x 16.5 x 26.0   | 4.1                                      | 235  | F17724182000  |
|   | 0.22  | 15                          | 10.0 x 16.5 x 17.5  | 3.0                                      | 235  | F17724222160  |
|   | 0.22  | 22.5                        | 8.5 x 16.5 x 26.5   | 4.6                                      | 200  | F17724222000  |
|   | 0.27  | 22.5                        | 10.0 x 19.5 x 26.0  | 6.7                                      | 170  | F17724272000  |
|   | 0.33  | 15                          | 13.5 x 22.5 x 18.0  | 5.5                                      | 185  | F17724332160  |
|   | 0.33  | 22.5                        | 10.0 x 19.5 x 26.0  | 6.7                                      | 170  | F17724332000  |
|   | 0.39  | 27.5                        | 11.0 x 21.0 x 31.0  | 9.1                                      | 125  | F17724392000  |
|   | 0.47  | 22.5                        | 12.0 x 22.0 x 26.0  | 13.0                                     | 110  | F17724472160  |
|   | 0.47  | 27.5                        | 11.0 x 21.0 x 31.0  | 9.1                                      | 125  | F17724472000  |
|   | 0.56  | 27.5                        | 11.0 x 21.0 x 31.0  | 9.1                                      | 125  | F17724562000  |
|   | 0.68  | 22.5                        | 15.5 x 26.5 x 26.5  | 13.5                                     | 110  | F17724682160  |
|   | 0.68  | 27.5                        | 13.0 x 23.0 x 31.0  | 12.9                                     | 110  | F17724682000  |
|   | 0.82  | 27.5                        | 13.0 x 23.0 x 31.0  | 12.9                                     | 110  | F17724822000  |
|   | 1.0   | 22.5                        | 15.5 x 26.5 x 26.5  | 13.5                                     | 110  | F17725102160  |
|   | 1.0   | 27.5                        | 15.0 x 25.0 x 31.5  | 15.0                                     | 100  | F17725102000  |
|   | 1.2   | 37.5                        | 14.5 x 24.5 x 41.5  | 18.9                                     | 80   | F17725122000  |
|   | 1.5   | 27.5                        | 18.0 x 28.0 x 31.0  | 19.0                                     | 85   | F17725152160  |
|   | 1.5   | 37.5                        | 15.5 x 28.5 x 41.5  | 24.0                                     | 70   | F17725152000  |
|   | 1.8   | 37.5                        | 15.5 x 28.5 x 41.5  | 24.0                                     | 70   | F17725182000  |
|   | 2.2   | 27.5                        | 21.0 x 31.0 x 31.0  | 28.0                                     | 70   | F17725222160  |
|   | 2.2   | 37.5                        | 18.0 x 32.5 x 41.5  | 31.6                                     | 60   | F17725222000  |
|   | <b>d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 20 %</b> |                             |   |  |  |   |
|   | 0.010   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723102200  |
|   | 0.015   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723152200  |
|   | 0.022   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723222200  |
|   | 0.033   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723332200  |
|   | 0.047   | 15                          | 5.0 x 11.0 x 17.5   | 1.4                                      | 750  | F17723472200  |
| 0.068   | 15  | 6.0 x 12.0 x 17.5           | 2.0   | 600                                      | F17723682200                                       |   |
| 0.10  | 15  | 6.0 x 12.0 x 17.5           | 2.0   | 600                                      | F17724102200                                       |   |

| <b>ELECTRICAL DATA AND ORDERING INFORMATION</b>           |                            |                             |   |  |  |   |
|---|----------------------------|-----------------------------|---|--|--|---|
| <b>U<sub>RAC</sub></b><br><b>(V)</b>                      | <b>CAP.</b><br><b>(μF)</b> | <b>PITCH</b><br><b>(mm)</b> | <b>DIMENSIONS</b><br><b>w x h x l</b><br><b>MAX. (mm)</b> | <b>MASS</b> <sup>(3)</sup><br><b>(g)</b> | <b>SPQ</b><br><b>(pieces)</b><br><b>SHORT LEAD</b> | <b>ORDERING CODE</b><br><b>BULK</b><br><b>LEAD LENGTH</b><br><b>6 mm - 1 mm</b> <sup>(1)(2)</sup> |
| <b>d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 %</b> |                            |                             |   |  |  |   |
| 310   | 0.15                       | 15                          | 8.5 x 15.0 x 17.5   | 2.7                                      | 325  | F17724152260  |
|   | 0.15                       | 22.5                        | 6.0 x 15.5 x 26.0   | 3.3                                      | 260  | F17724152200  |
|   | 0.22                       | 15                          | 10.0 x 16.5 x 17.5  | 4.5                                      | 300  | F17724222260  |
|   | 0.22                       | 22.5                        | 7.0 x 16.5 x 26.0   | 4.1                                      | 235  | F17724222200  |
|   | 0.33                       | 15                          | 13.5 x 22.5 x 18.0  | 5.5                                      | 185  | F17724332260  |
|   | 0.33                       | 22.5                        | 8.5 x 18.0 x 26.0   | 5.3                                      | 190  | F17724332200  |
|   | 0.47                       | 22.5                        | 10.0 x 19.5 x 26.0  | 6.7                                      | 170  | F17724472260  |
|   | 0.47                       | 27.5                        | 9.0 x 19.0 x 31.5   | 6.8                                      | 160  | F17724472200  |
|   | 0.68                       | 22.5                        | 12.0 x 22.0 x 26.0  | 13.4                                     | 110  | F17724682260  |
|   | 0.68                       | 27.5                        | 11.0 x 21.0 x 31.0  | 12.9                                     | 125  | F17724682200  |
|   | 1.0                        | 22.5                        | 15.5 x 26.5 x 26.5  | 13.5                                     | 110  | F17725102260  |
|   | 1.0                        | 27.5                        | 15.0 x 25.0 x 31.5  | 15.0                                     | 100  | F17725102200  |
|   | 1.5                        | 27.5                        | 18.0 x 28.0 x 31.5  | 19.0                                     | 85   | F17725152260  |
|   | 1.5                        | 37.5                        | 14.5 x 24.5 x 41.5  | 18.9                                     | 80   | F17725152200  |
|   | 2.2                        | 27.5                        | 21.0 x 31.0 x 31.0  | 28.0                                     | 70   | F17725222260  |
| 2.2   | 37.5                       | 15.5 x 28.5 x 41.5          | 24.0  | 70                                       | F17725222200                                       |   |

**Notes**

- SPQ = Standard Packing Quantity
- For detailed tape specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)
- (1) For further packaging see table "Composition of Catalog Number".
- (2) Further information about packaging quantities with different lead length and/or taped versions, see document "Packing Quantities" [www.vishay.com/doc?27608](http://www.vishay.com/doc?27608)
- (3) Weight for short lead product only

| <b>APPROVALS</b>  |                     |                      |                     |  |
|---|---------------------|----------------------|---------------------|--|
| <b>SAFETY APPROVALS X2</b>  | <b>VOLTAGE</b>      | <b>VALUE</b>         | <b>FILE NUMBERS</b> | <b>LINK</b>  |
| EN 60384-14 (ENEC)<br>(= IEC 60384-14 ed-3)   | 310 V <sub>AC</sub> | 0.01 μF to 2.2 μF X2 | 40005079            | <a href="http://www.vishay.com/doc?28196">www.vishay.com/doc?28196</a> |
| UL 60384-14   | 310 V <sub>AC</sub> | 0.01 μF to 2.2 μF X2 | E354331             | <a href="http://www.vishay.com/doc?28191">www.vishay.com/doc?28191</a> |
| CSA-E 384-14  | 310 V <sub>AC</sub> | 0.01 μF to 2.2 μF X2 | E354331             |  |
| CB test-certificate   | 310 V <sub>AC</sub> | 0.01 μF to 2.2 μF X2 | DE 1-40110/A1       | <a href="http://www.vishay.com/doc?28195">www.vishay.com/doc?28195</a> |
| The ENEC-approval together with the CB-certificate replace all national marks of the following countries (they have already signed the ENEC-agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom. |                     |                      |                     |  |
|   |                     |                      |                     |  |

## MOUNTING

### Normal Use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting in printed-circuit boards by means of automatic insertion machines.

For detailed tape specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139).

### Specific Method of Mounting to Withstand Vibration and Shock

In order to withstand vibration and shock tests, it must be ensured that stand-off pips are in good contact with the printed-circuit board:

- For pitches  $\leq 15$  mm capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

### Space Requirements on Printed Circuit Board

The maximum space for length ( $l_{max.}$ ), width ( $w_{max.}$ ) and height ( $h_{max.}$ ) of film capacitors to take in account on the printed circuit board is shown in the drawings.

- For products with pitch  $\leq 15$  mm,  $\Delta w = \Delta l = 0.3$  mm;  $\Delta h = 0.1$  mm
- For products with  $15$  mm  $<$  pitch  $\leq 27.5$  mm,  $\Delta w = \Delta l = 0.5$  mm;  $\Delta h = 0.1$  mm
- For products with pitch = 37.5 mm,  $\Delta w = \Delta l = 0.7$  mm;  $\Delta h = 0.5$  mm

Eccentricity defined as in drawing. The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.



## SOLDERING CONDITIONS

For general soldering conditions and wave soldering profile, we refer to the application note: "Soldering Guidelines for Film Capacitors": [www.vishay.com/doc?28171](http://www.vishay.com/doc?28171)

### Storage Temperature

$T_{stg} = -25$  °C to  $+35$  °C with RH maximum 75 % without condensation

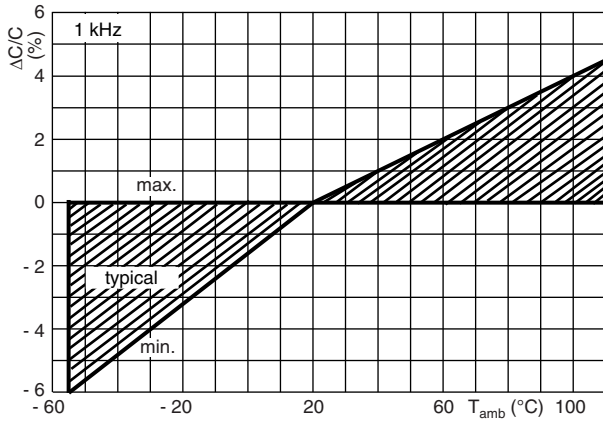
### Ratings and Characteristics Reference Conditions

Unless otherwise specified, all electrical values apply to an ambient temperature of  $23$  °C  $\pm 1$  °C, an atmospheric pressure of 86 kPa to 106 kPa and a relative humidity of  $50$  %  $\pm 2$  %.

For reference testing, a conditioning period shall be applied over  $96$  h  $\pm 4$  h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



CHARACTERISTICS



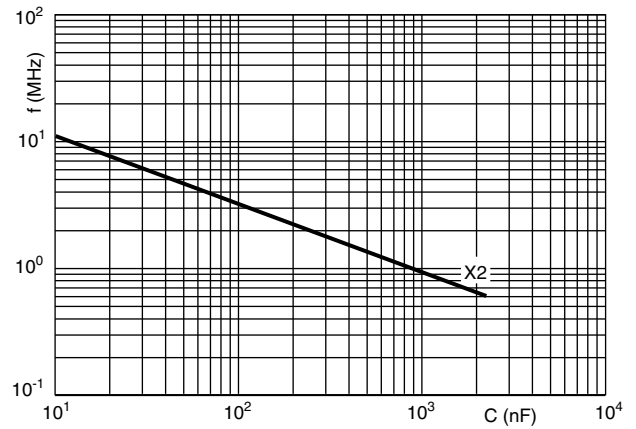
Capacitance as a function of ambient temperature (typical curve)



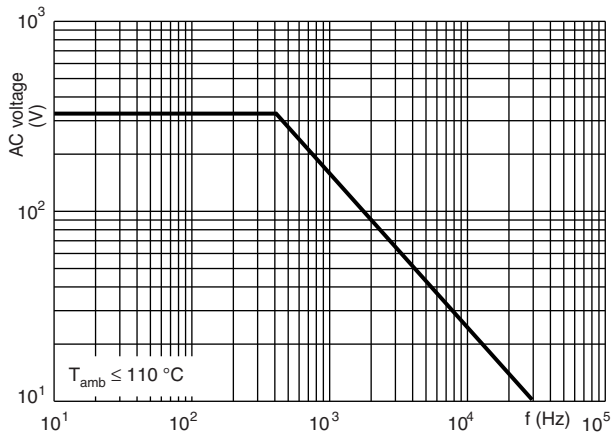
Impedance as a function of frequency (typical curve)



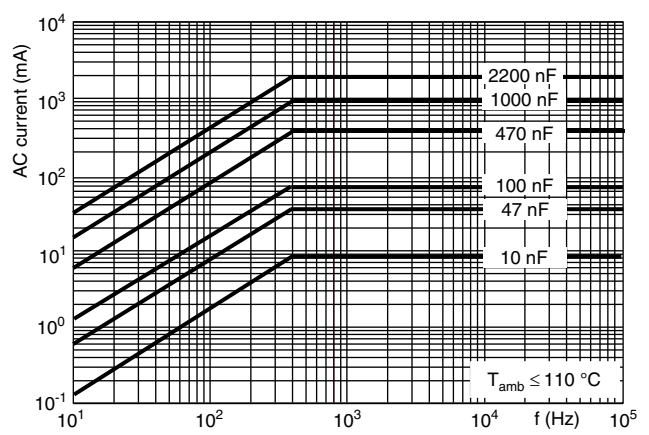
Tangent of loss angle as a function of frequency (typical curve)



Resonant frequency as a function of capacitance (typical curve)



Max. RMS voltage as a function of frequency



Max. RMS current as a function of frequency



Insulation resistance as a function of ambient temperature (typical curve)

### APPLICATION NOTES AND LIMITING CONDITIONS

- For X2 electromagnetic interference suppression where a higher stability grade is needed for **continuous across the line applications** (50 Hz/60 Hz) with a maximum mains voltage of 310 V<sub>AC</sub>.
- These capacitors are not intended for continuous pulse application. For these situations capacitors of the AC and pulse programs must be used.
- For series impedance applications we refer to application note: [www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)
- The maximum ambient temperature must not exceed 110 °C.
- Rated voltage pulse slope:  
If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 435 V<sub>DC</sub> and divided by the applied voltage.

### INSPECTION REQUIREMENTS

#### General Notes

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-14 ed 3 and Specific Reference Data”.

| GROUP C INSPECTION REQUIREMENTS                     |  |  |
|---|--|--|
| SUB-CLAUSE NUMBER AND TEST                          | CONDITIONS   | PERFORMANCE REQUIREMENTS                                     |
| <b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b> |  |  |
| 4.1 Dimensions (detail)                             |  | As specified in chapter “General Data” of this specification |
| Initial measurements                                | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz |  |
| 4.3 Robustness of terminations                      | Tensile: Load 10 N; 10 s<br>Bending: Load 5 N; 4 x 90°                                   | No visible damage  |
| 4.4 Resistance to soldering heat                    | No pre-drying<br>Method: 1A<br>Solder bath: 280 °C ± 5 °C<br>Duration: 10 s              |  |



| GROUP C INSPECTION REQUIREMENTS                     |  |  |
|---|--|--|
| SUB-CLAUSE NUMBER AND TEST                          | CONDITIONS   | PERFORMANCE REQUIREMENTS   |
| <b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b> |  |  |
| 4.19 Component solvent resistance                   | Isopropylalcohol at room temperature<br>Method: 2<br>Immersion time: 5 min ± 0.5 min<br>Recovery time: Min. 1 h, max. 2 h  |  |
| 4.4.2 Final measurements                            | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance  | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured initially<br><br>Increase of $\tan \delta$<br>$\leq 0.008$ for: $C \leq 1 \mu F$ or<br>$\leq 0.005$ for: $C > 1 \mu F$<br>Compared to values measured initially<br><br>As specified in section "Insulation Resistance" of this specification |
| <b>SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1</b> |  |  |
| Initial measurements                                | Capacitance<br>Tangent of loss angle:<br>For $C \leq 1 \mu F$ at 10 kHz<br>For $C > 1 \mu F$ at 1 kHz  |  |
| 4.20 Solvent resistance of the marking              | Isopropylalcohol at room temperature<br>Method: 1<br>Rubbing material: Cotton wool<br>Immersion time: 5 min ± 0.5 min  | No visible damage<br>Legible marking   |
| 4.6 Rapid change of temperature                     | $\theta A = -40^\circ C$<br>$\theta B = +110^\circ C$<br>5 cycles<br>Duration $t = 30$ min   |  |
| 4.6.1 Inspection                                    | Visual examination   | No visible damage  |
| 4.7 Vibration                                       | Mounting:<br>See section "Mounting" of this specification<br>Procedure B4<br>Frequency range: 10 Hz to 55 Hz<br>Amplitude: 0.75 mm or<br>Acceleration $98 \text{ m/s}^2$<br>(whichever is less severe)<br>Total duration 6 h |  |
| 4.7.2 Final inspection                              | Visual examination   | No visible damage  |
| 4.9 Shock   | Mounting:<br>See section "Mounting" for more information<br>Pulse shape: Half sine<br>Acceleration: $490 \text{ m/s}^2$<br>Duration of pulse: 11 ms  |  |
| 4.9.2 Final measurements                            | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance  | No visible damage<br><br>$ \Delta C/C  \leq 5\%$ of the value measured initially<br><br>Increase of $\tan \delta$<br>$\leq 0.008$ for: $C \leq 1 \mu F$ or<br>$\leq 0.005$ for: $C > 1 \mu F$<br>Compared to values measured initially<br><br>As specified in section "Specific Reference" of this specification                       |





| GROUP C INSPECTION REQUIREMENTS  |   |  |
|--|---|--|
| SUB-CLAUSE NUMBER AND TEST   | CONDITIONS  | PERFORMANCE REQUIREMENTS   |
| <b>SUB-GROUP C1 COMBINED SAMPLE OF SPECIMENS OF SUB-GROUPS C1A AND C1B</b> |   |  |
| 4.11 Climatic sequence   | Capacitance   |  |
| 4.11.1 Initial measurements  | Measured in 4.4.2 and 4.9.2<br>Tangent of loss angle<br>Measured initially in C1A and C1B |  |
| 4.11.2 Dry heat  | Temperature: 110 °C<br>Duration: 16 h   |  |
| 4.11.3 Damp heat cyclic<br>Test Db, first cycle                            |   |  |
| 4.11.4 Cold  | Temperature: -40 °C<br>Duration: 2 h  |  |
| 4.11.5 Damp heat cyclic<br>Test Db, remaining cycles                       |   |  |
| 4.11.6 Final measurements  | Visual examination  | No visible damage<br>Legible marking   |
|  | Capacitance   | $ \Delta C/C  \leq 5\%$ of the value measured in 4.11.1  |
|  | Tangent of loss angle   | Increase of $\tan \delta$<br>$\leq 0.008$ for: $C \leq 1 \mu\text{F}$ or<br>$\leq 0.005$ for: $C > 1 \mu\text{F}$<br>Compared to values measured in 4.11.1 |
|  | Voltage proof<br>1350 V <sub>DC</sub> 1 min between terminations                          | No permanent breakdown or flash-over   |
|  | Insulation resistance   | $\geq 50\%$ of values specified in section<br>"Insulation Resistance" of this specification  |
| <b>SUB-GROUP C2</b>  |   |  |
| 4.12 Damp heat steady state  | 56 days, 40 °C, 90 % to 95 % RH<br>No load  |  |
| 4.12.1 Initial measurements  | Capacitance<br>Tangent of loss angle: 1 kHz   |  |
| 4.12.3 Final measurements  | Visual examination  | No visible damage<br>Legible marking   |
|  | Capacitance   | $ \Delta C/C  \leq 5\%$ of the value measured in 4.12.1  |
|  | Tangent of loss angle   | Increase of $\tan \delta$<br>$\leq 0.008$ for: $C \leq 1 \mu\text{F}$ or<br>$\leq 0.005$ for: $C > 1 \mu\text{F}$<br>Compared to values measured in 4.12.1 |
|  | Voltage proof<br>1350 V <sub>DC</sub> ; 1 min between terminations                        | No permanent breakdown or flash-over   |
|  | Insulation resistance   | $\geq 50\%$ of values specified in section<br>"Insulation Resistance" of this specification  |



| GROUP C INSPECTION REQUIREMENTS |   |  |
|---------------------------------|---|--|
| SUB-CLAUSE NUMBER AND TEST      | CONDITIONS  | PERFORMANCE REQUIREMENTS   |
| <b>SUB-GROUP C3</b>             |   |  |
| 4.13.1 Initial measurements     | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz  |  |
| 4.13 Impulse voltage            | 3 successive impulses, full wave, peak voltage:<br>X2: 2.5 kV for C ≤ 1 μF<br>X2: 2.5 kV/√C for C > 1 μF<br>Max. 24 pulses  | No self healing breakdowns or flash-over   |
| 4.14 Endurance                  | Duration: 1000 h<br>1.25 x U <sub>RAC</sub> at 110 °C<br>Once in every hour the voltage is increased to 1000 V (RMS) for 0.1 s via resistor of 47 Ω ± 5 %   |  |
| 4.14.7 Final measurements       | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Voltage proof<br>1350 V <sub>DC</sub> ; 1 min between terminations<br>2120 V <sub>AC</sub> ; 1 min between terminations and case<br><br>Insulation resistance | No visible damage<br>Legible marking<br><br> ΔC/C  ≤ 5 % compared to values measured in 4.13.1<br><br>Increase of tan δ<br>≤ 0.008 for: C ≤ 1 μF or<br>≤ 0.005 for: C > 1 μF<br>Compared to values measured in 4.13.1<br><br>No permanent breakdown or flash-over<br><br>≥ 50 % of values specified in section "Insulation Resistance" of this specification |
| <b>SUB-GROUP C4</b>             |   |  |
| 4.15 Charge and discharge       | 10 000 cycles<br>Charged to 435 V <sub>DC</sub><br>Discharge resistance:<br>$R = \frac{435 V_{DC}}{1.5 \times C(dU/dt)}$  |  |
| 4.15.1 Initial measurements     | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz  |  |
| 4.13.3 Final measurements       | Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance   | ΔC/C  ≤ 10 % compared to values measured in 4.15.1<br><br>Increase of tan δ<br>≤ 0.008 for: C ≤ 1 μF or<br>≤ 0.005 for: C > 1 μF<br>Compared to values measured in 4.15.1<br><br>≥ 50 % of values specified in section "Insulation Resistance" of this specification   |

| <b>GROUP C INSPECTION REQUIREMENTS</b> |  |  |
|--|--|--|
| <b>SUB-CLAUSE NUMBER AND TEST</b>      | <b>CONDITIONS</b>  | <b>PERFORMANCE REQUIREMENTS</b>  |
| <b>SUB-GROUP C5</b>                    |  |  |
| 4.16 Radio frequency characteristic    | Resonance frequency  | $\geq 0.9$ times the value as specified in section "Resonant Frequency" of this specification.   |
| <b>SUB-GROUP C6</b>                    |  |  |
| 4.17 Passive flammability<br>Class C   | Bore of gas jet: $\varnothing 0.5$ mm<br>Fuel: Butane<br>Test duration for actual volume $V$ in mm <sup>3</sup> :<br>$V \leq 250$ : 5 s<br>$250 < V \leq 500$ : 10 s<br>$500 < V \leq 1750$ : 20 s<br>$V > 1750$ : 30 s<br>One flame application<br> | After removing test flame from capacitor, the capacitor must not continue to burn for more than 30 s. No burning particle must drop from the sample. |
| <b>SUB-GROUP C7</b>                    |  |  |
| 4.18 Active flammability               | 20 cycles of 2.5 kV discharges on the test capacitor connected to $U_{RAC}$ .  | The cheese cloth around the capacitors shall not burn with a flame.<br>No electrical measurements are required.                                      |



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## JONHON

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ВЧ соединители, коаксиальные кабели,  
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