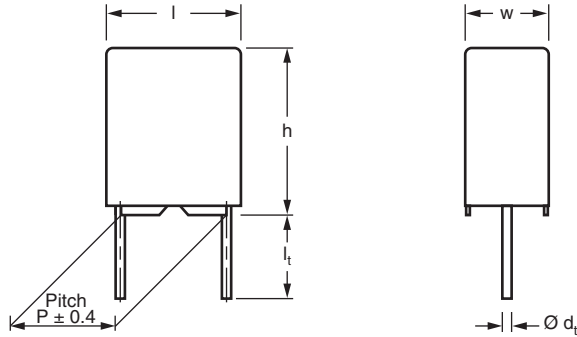


## Interference Suppression Film Capacitors MKT Radial Potted Type



Dimensions in mm

### 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)

### REFERENCE STANDARDS

IEC 60384-14 ed-3 and EN 60384-14  
"IEC 60065 pass. flamm. class C"  
UL 1283  
UL 1414  
CSA-E384-14

### MARKING

C-value; tolerance; rated voltage; sub-class; manufacturer's type; code for dielectric material; manufacturer location; manufacturer's logo; year and week; safety approvals

### DIELECTRIC

Polyester film

### ELECTRODES

Metallized

### CONSTRUCTION

Series construction



### RATED VOLTAGE

AC 310 V; 50 Hz to 60 Hz

### FEATURES

- 15 mm to 37.5 mm lead pitch
- AEC-Q200 qualified for  $C \leq 470$  nF
- Supplied loose in box, taped on reel
- Compliant to RoHS Directive 2002/95/EC

### PERMISSIBLE DC VOLTAGE

DC 800 V<sub>DC</sub> at 85 °C

DC 630 V<sub>DC</sub> at 110 °C

### ENCAPSULATION

Plastic case, epoxy resin sealed, flame retardant UL-class 94 V-0

### CLIMATIC TESTING CLASS ACC. TO IEC 60068-1

40/110/56/C

### CAPACITANCE RANGE (E12 SERIES)

E12 series 0.01 µF to 2.2 µF  
Preferred values acc. to E6

### CAPACITANCE TOLERANCE

± 10 %, ± 20 % (± 5 % on request)

### LEADS

Tinned wire

### MAXIMUM APPLICATION TEMPERATURE

110 °C

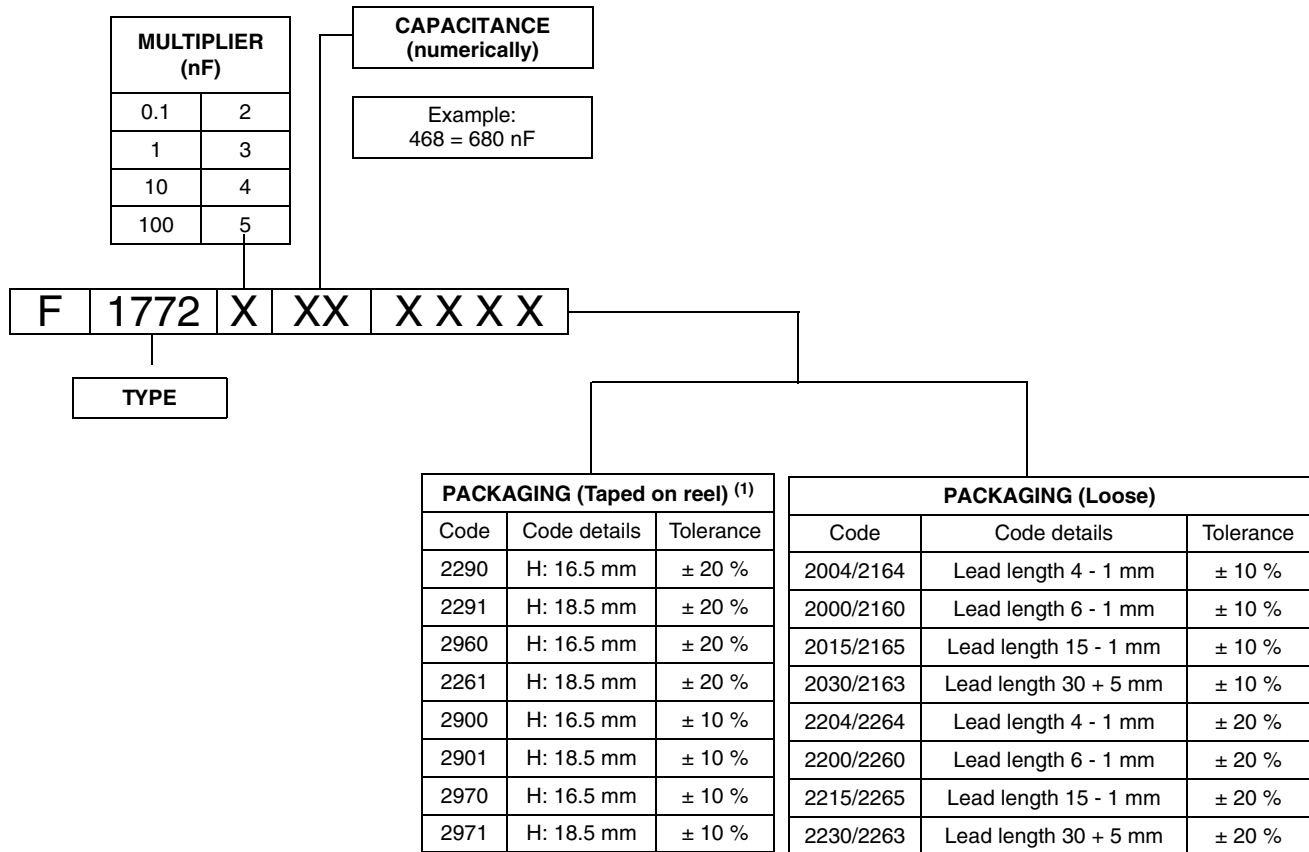
### DETAIL SPECIFICATION

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



**RoHS**  
COMPLIANT

## COMPOSITION OF CATALOG NUMBER



### Notes

- For detailed tape specifications refer to "Packaging Information" [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)
- (1) Taped on reel pitch  $\geq 27.5$  mm is not available

## 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 <sub>DC</sub>                             | 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) (1); 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

- (1) See "Voltage Proof Test for Metalized Film Capacitors": [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)



Interference Suppression Film Capacitors Vishay BCcomponents  
MKT Radial Potted Type

C-tol. = ± 10 %

| CAPACITANCE (µF)                         | PITCH (mm) | DIMENSIONS w x h x l MAX. (mm) | MASS <sup>(3)</sup> (g) | SPQ (pieces) SHORT LEAD | ORDERING CODE <sup>(1)(2)</sup> |
|--|------------|--------------------------------|-------------------------|-------------------------|---------------------------------|
| <b>d<sub>t</sub> = 0.60 mm ± 0.06 mm</b> |            |                                |                         |                         |                                 |
| 0.010                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177231020..                    |
| 0.012                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177231220..                    |
| 0.015                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177231520..                    |
| 0.018                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177231820..                    |
| 0.022                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177232220..                    |
| 0.027                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177232720..                    |
| 0.033                                    | 15         | 5.0 x 11.0 x 17.5              | 1.4                     | 750                     | F177233320..                    |
| 0.039                                    | 15         | 6.0 x 12.0 x 17.5              | 2.0                     | 500                     | F177233920..                    |
| 0.047                                    | 15         | 6.0 x 12.0 x 17.5              | 2.0                     | 500                     | F177234720..                    |
| 0.056                                    | 15         | 6.0 x 12.0 x 17.5              | 2.0                     | 500                     | F177235620..                    |
| <b>d<sub>t</sub> = 0.80 mm ± 0.08 mm</b> |            |                                |                         |                         |                                 |
| 0.068                                    | 15         | 7.0 x 13.5 x 17.5              | 2.4                     | 450                     | F177236820..                    |
| 0.082                                    | 15         | 8.5 x 15.0 x 17.5              | 2.7                     | 300                     | F177238220..                    |
| 0.10                                     | 15         | 8.5 x 15.0 x 17.5              | 2.7                     | 325                     | F177241020..                    |
| 0.12                                     | 15         | 8.5 x 15.0 x 17.5              | 2.7                     | 300                     | F177241220..                    |
| 0.15                                     | 15         | 8.5 x 15.0 x 17.5              | 2.7                     | 300                     | F1772415216.                    |
| 0.15                                     | 22.5       | 7.0 x 16.5 x 26.0              | 4.1                     | 235                     | F177241520..                    |
| 0.18                                     | 22.5       | 7.0 x 16.5 x 26.0              | 4.1                     | 235                     | F177241820..                    |
| 0.22                                     | 15         | 10.0 x 16.5 x 17.5             | 3.0                     | 235                     | F1772422216.                    |
| 0.22                                     | 22.5       | 8.5 x 18.0 x 26.0              | 4.6                     | 200                     | F177242220..                    |
| 0.27                                     | 22.5       | 10.0 x 19.5 x 26.0             | 6.7                     | 170                     | F177242720..                    |
| 0.33                                     | 15         | 13.5 x 22.5 x 18.0             | 5.5                     | 185                     | F1772433216.                    |
| 0.33                                     | 22.5       | 10.0 x 19.5 x 26.0             | 6.7                     | 170                     | F177243320..                    |
| 0.39                                     | 27.5       | 11.0 x 21.0 x 31.0             | 9.1                     | 125                     | F177243920..                    |
| 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                     | F177244720..                    |
| 0.56                                     | 27.5       | 11.0 x 21.0 x 31.0             | 9.1                     | 125                     | F177245620..                    |
| 0.68                                     | 22.5       | 15.5 x 26.5 x 26.5             | 13.5                    | 110                     | F1772468216.                    |
| 0.68                                     | 27.5       | 13.0 x 23.0 x 31.0             | 12.9                    | 110                     | F177246820..                    |
| 0.82                                     | 27.5       | 13.0 x 23.0 x 31.0             | 12.9                    | 110                     | F177248220..                    |
| 1.0                                      | 22.5       | 15.5 x 26.5 x 26.5             | 13.5                    | 110                     | F1772510216.                    |
| 1.0                                      | 27.5       | 15.0 x 25.0 x 31.5             | 15.0                    | 100                     | F177251020..                    |
| 1.2                                      | 37.5       | 14.5 x 24.5 x 41.5             | 18.9                    | 80                      | F177251220..                    |
| 1.5                                      | 27.5       | 18.0 x 28.0 x 31.0             | 19.0                    | 85                      | F1772515216.                    |
| 1.5                                      | 37.5       | 15.5 x 28.5 x 41.5             | 24.0                    | 70                      | F177251520..                    |
| 1.8                                      | 37.5       | 15.5 x 28.5 x 41.5             | 24.0                    | 70                      | F177251820..                    |
| 2.2                                      | 27.5       | 21.0 x 31.0 x 31.0             | 28.0                    | 70                      | F1772522216.                    |
| 2.2                                      | 37.5       | 18.0 x 32.5 x 41.5             | 31.6                    | 60                      | F177252220..                    |

Notes

- (1) These capacitors can be delivered on continuous tape and reel.  
The ordering code is:  
F1772-...-2900 at H = 16.5 mm  
F1772-...-2901 at H = 18.5 mm  
F1772-...-2970 at H = 16.5 mm  
F1772-...-2971 at H = 18.5 mm
- (2) Further information about packaging quantities with different lead length and/or taped versions, see document "Packaging Quantities" [www.vishay.com/doc?27608](http://www.vishay.com/doc?27608)
- (3) Weight for short lead product only
  - SPQ = Standard Packing Quantity
  - For detailed tape specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

# F1772-2 310 V-X2



## Vishay BCcomponents Interference Suppression Film Capacitors MKT Radial Potted Type

C-tol. = ± 20 %

| CAPACITANCE<br>(µF)                      | PITCH<br>(mm) | DIMENSIONS<br>w x h x l<br>MAX. (mm) | MASS<br>(g) | SPQ<br>(pieces)<br>SHORT LEAD | ORDERING<br>CODE <sup>(1)(2)</sup> |
|--|---------------|--------------------------------------|-------------|-------------------------------|------------------------------------|
| <b>d<sub>t</sub> = 0.60 mm ± 0.06 mm</b> |               |                                      |             |                               |                                    |
| 0.01                                     | 15            | 5.0 x 11.0 x 17.5                    | 1.4         | 750                           | F177231022..                       |
| 0.015                                    | 15            | 5.0 x 11.0 x 17.5                    | 1.4         | 750                           | F177231522..                       |
| 0.022                                    | 15            | 5.0 x 11.0 x 17.5                    | 1.4         | 750                           | F177232222..                       |
| 0.033                                    | 15            | 5.0 x 11.0 x 17.5                    | 1.4         | 750                           | F177233322..                       |
| 0.047                                    | 15            | 5.0 x 11.0 x 17.5                    | 1.4         | 750                           | F177234722..                       |
| 0.068                                    | 15            | 6.0 x 12.0 x 17.5                    | 2.0         | 600                           | F177236822..                       |
| 0.10                                     | 15            | 6.0 x 12.0 x 17.5                    | 2.0         | 600                           | F177241022..                       |
| <b>d<sub>t</sub> = 0.80 mm ± 0.08 mm</b> |               |                                      |             |                               |                                    |
| 0.15                                     | 15            | 8.5 x 15.0 x 17.5                    | 2.7         | 325                           | F1772415226..                      |
| 0.15                                     | 22.5          | 6.0 x 15.5 x 26.0                    | 3.3         | 260                           | F177241522...                      |
| 0.22                                     | 15            | 10.0 x 16.5 x 17.5                   | 4.5         | 300                           | F1772422226..                      |
| 0.22                                     | 22.5          | 7.0 x 16.5 x 26.0                    | 4.1         | 235                           | F177242222...                      |
| 0.33                                     | 15            | 13.5 x 22.5 x 18.0                   | 5.5         | 185                           | F1772433226..                      |
| 0.33                                     | 22.5          | 8.5 x 18.0 x 26.0                    | 5.3         | 190                           | F177243322..                       |
| 0.47                                     | 22.5          | 10.0 x 19.5 x 26.0                   | 6.7         | 170                           | F1772447226..                      |
| 0.47                                     | 27.5          | 9.0 x 19.0 x 31.5                    | 6.8         | 160                           | F177244722..                       |
| 0.68                                     | 22.5          | 12.0 x 22.0 x 26.0                   | 13.4        | 110                           | F1772468226..                      |
| 0.68                                     | 27.5          | 11.0 x 21.0 x 31.0                   | 12.9        | 125                           | F177246822..                       |
| 1.0                                      | 22.5          | 15.5 x 26.5 x 26.5                   | 13.5        | 110                           | F1772510226..                      |
| 1.0                                      | 27.5          | 15.0 x 25.0 x 31.5                   | 15.0        | 100                           | F177251022..                       |
| 1.5                                      | 27.5          | 18.0 x 28.0 x 31.5                   | 19.0        | 85                            | F1772515226..                      |
| 1.5                                      | 37.5          | 14.5 x 24.5 x 41.5                   | 18.9        | 80                            | F177251522..                       |
| 2.2                                      | 27.5          | 21.0 x 31.0 x 31.0                   | 28.0        | 70                            | F1772522226..                      |
| 2.2                                      | 37.5          | 15.5 x 28.5 x 41.5                   | 24.0        | 70                            | F177252222..                       |

### Notes

(1) These capacitors can be delivered on continuous tape and reel

The ordering code is:

F 1772-...-2290 at H = 16.5 mm

F 1772-...-2291 at H = 18.5 mm

F 1772-...-2960 at H = 16.5 mm

F 1772-...-2961 at H = 18.5 mm

(2) Further information about packing quantities with different lead length and/or taped versions, see document "Packing Quantities"

[www.vishay.com/docs?27608](http://www.vishay.com/docs?27608)

• SPQ = Standard Packing Quantity

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

### APPROVALS

| SAFETY APPROVALS X2                         | VOLTAGE             | VALUE            | FILE NUMBERS  |
|---|---------------------|------------------|---------------|
| EN 60384-14 (ENEC)<br>(= IEC 60384-14 ed 3) | 310 V <sub>AC</sub> | 0.01 - 2.2 µF X2 | 40005079      |
| UL 1414                                     | 250 V <sub>AC</sub> | 0.01 - 1.0 µF X2 | E 100682      |
| UL 1283                                     | 250 V <sub>AC</sub> | 0.01 - 2.2 µF X2 | E 76297       |
| CSA-E 384-14                                | 310 V <sub>AC</sub> | 0.01 - 2.2 µF X2 | 2127723       |
| CB TEST-CERTIFICATE                         | 310 V <sub>AC</sub> | 0.01 - 2.2 µF X2 | DE 1-40110/A1 |

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".

### 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:

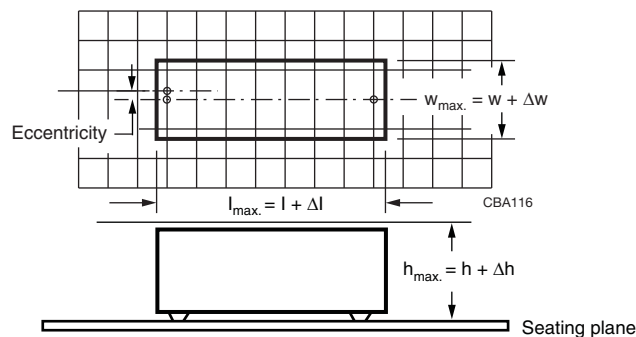
- For pitches  $\leq 15$  mm capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

### 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

- Storage temperature:  $T_{stg} = -25$  °C to  $+40$  °C with RH maximum 80 % without condensation

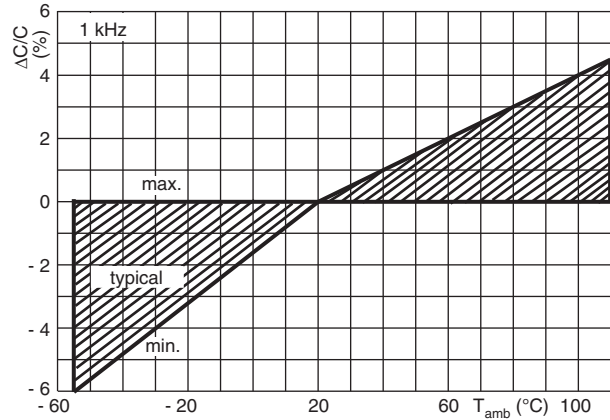
### Ratings and Characteristics Reference Conditions

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  $50$  %  $\pm 2$  %.

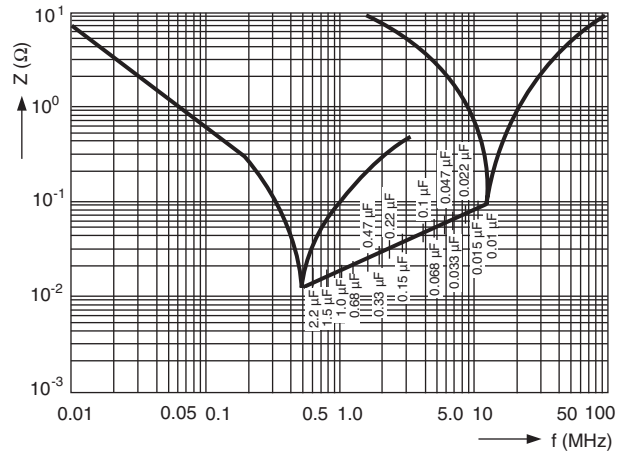
For reference testing, a conditioning period shall be applied over  $96$  h  $\pm 4$  h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.

### CHARACTERISTICS

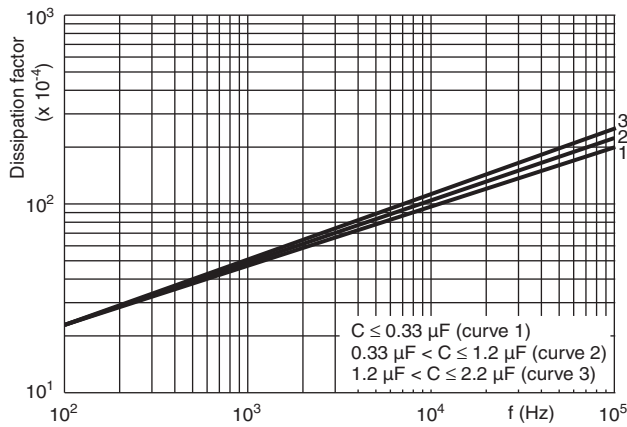
Capacitance as a function of ambient temperature (typical curve)



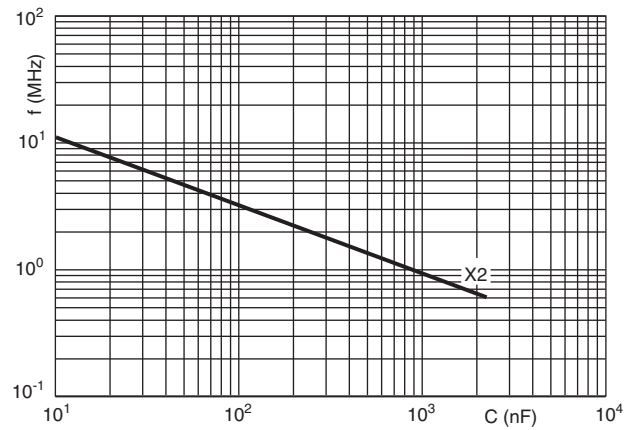
Impedance as a function of frequency (typical curve)



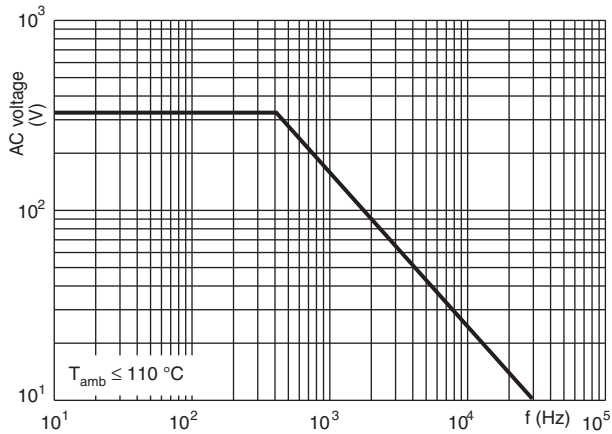
Tangent of loss angle as a function of frequency (typical curve)



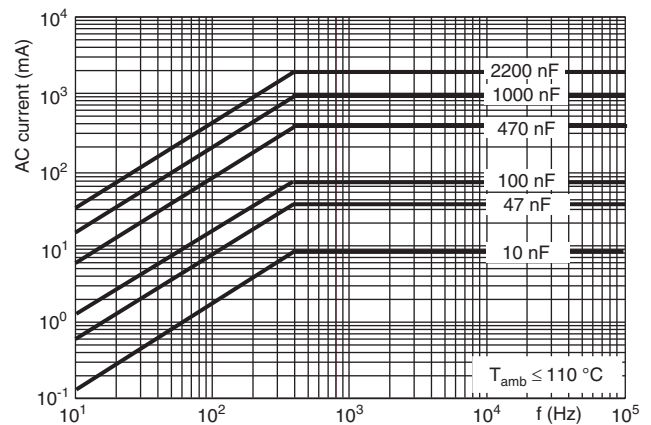
Resonant frequency as a function of capacitance (typical curve)



Max. RMS voltage as a function of frequency

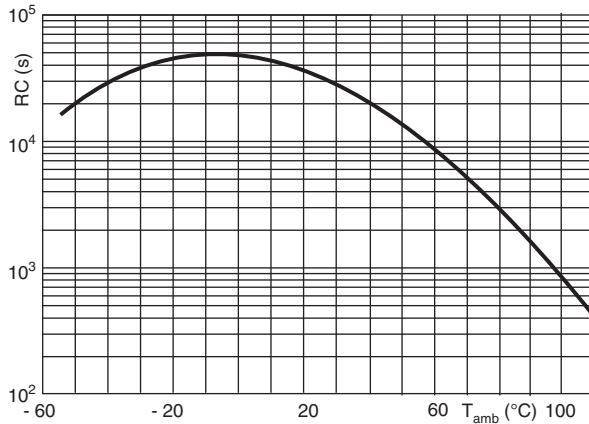


Max. RMS current as a function of frequency





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)<br><br>Initial measurements | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz | As specified in chapter “General Data” of this specification |
| 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              |  |

Vishay BCcomponents Interference Suppression Film Capacitors  
MKT Radial Potted Type

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

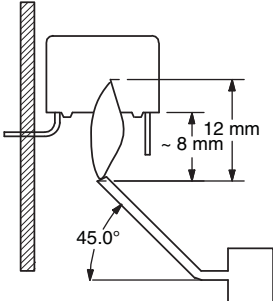


Interference Suppression Film Capacitors Vishay BCcomponents  
MKT Radial Potted Type

| 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<br>4.11.1 Initial measurements<br>4.11.2 Dry heat<br>4.11.3 Damp heat cyclic Test Db, first cycle<br>4.11.4 Cold<br>4.11.5 Damp heat cyclic Test Db, remaining cycles<br>4.11.6 Final measurements | Capacitance<br>Measured in 4.4.2 and 4.9.2<br>Tangent of loss angle<br>Measured initially in C1A and C1B<br>Temperature: 110 °C<br>Duration: 16 h<br>Temperature: - 40 °C<br>Duration: 2 h<br>Visual examination<br>Capacitance<br>Tangent of loss angle<br>Voltage proof<br>1350 V <sub>DC</sub> 1 min between terminations<br>Insulation resistance | No visible damage<br>Legible marking<br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.11.1<br>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<br>No permanent breakdown or flash-over<br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |
| <b>SUB-GROUP C2</b>   |   |   |
| 4.12 Damp heat steady state<br>4.12.1 Initial measurements<br>4.12.3 Final measurements   | 56 days, 40 °C, 90 % to 95 % RH<br>No load<br>Capacitance<br>Tangent of loss angle: 1 kHz<br>Visual examination<br>Capacitance<br>Tangent of loss angle<br>Voltage proof<br>1350 V <sub>DC</sub> ; 1 min between terminations<br>Insulation resistance  | No visible damage<br>Legible marking<br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.12.1<br>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<br>No permanent breakdown or flash-over<br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |
| <b>SUB-GROUP C3</b>   |   |   |
| 4.13.1 Initial measurements<br>4.13 Impulse voltage   | Capacitance<br>Tangent of loss angle:<br>For $C \leq 1 \mu\text{F}$ at 10 kHz<br>For $C > 1 \mu\text{F}$ at 1 kHz<br>3 successive impulses, full wave, peak voltage:<br>X2: 2.5 kV for $C \leq 1 \mu\text{F}$<br>X2: 2.5 kV/ $\sqrt{C}$ for $C > 1 \mu\text{F}$<br>Max. 24 pulses   | No self healing breakdowns or flash-over  |

Vishay BCcomponents Interference Suppression Film Capacitors  
MKT Radial Potted Type

| SUB-CLAUSE NUMBER AND TEST          | CONDITIONS  | PERFORMANCE REQUIREMENTS   |
|-------------------------------------|---|--|
| <b>SUB-GROUP C3</b>                 |   |  |
| 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>SUB-GROUP C5</b>                 |   |  |
| 4.16 Radio frequency characteristic | Resonance frequency   | ≥ 0.9 times the value as specified in section "Resonant Frequency" of this specification.  |

| SUB-CLAUSE NUMBER AND TEST           | CONDITIONS  | PERFORMANCE REQUIREMENTS  |
|--------------------------------------|---|---|
| <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 <sub>RAC</sub>  | The cheese cloth around the capacitors shall not burn with a flame<br>No electrical measurements are required                                       |



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