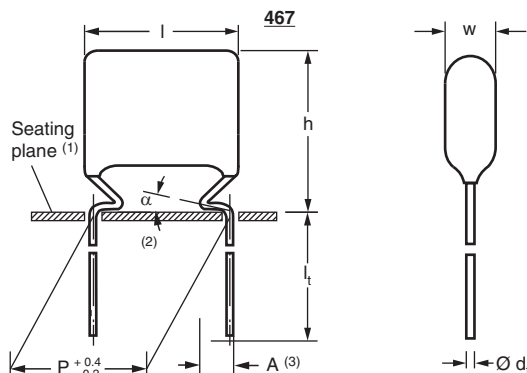
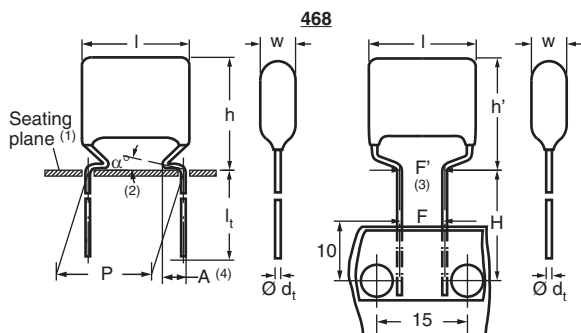


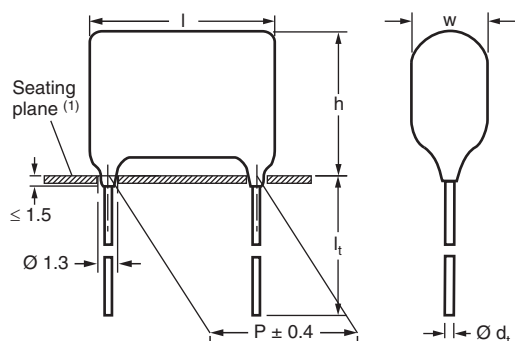
## DC Film Capacitors MKT Radial Lacquered Type


**Notes**

- (1) Hole Ø 1.0 mm for  $d_t = 0.6$  mm  
(2)  $0 \leq \alpha < 50^\circ$   
(3)  $A = 2.0 \text{ mm} \pm 0.5 \text{ mm}$


**Notes**

- (1) Hole Ø 1.0 mm for  $d_t = 0.8$  mm  
(2)  $0 \leq \alpha < 50^\circ$   
(3)  $|F - F'| < 0.3 \text{ mm}$   
 $F = 7.5 \text{ mm} + 0.6 \text{ mm} / - 0.1 \text{ mm}$   
(4)  $A = 2.5 \text{ mm} + 1.4 \text{ mm} / - 0.5 \text{ mm} \pm 0.3 \text{ mm}$

**469 Straight Leads**

**Note**

- (1) Hole Ø 1.0 for  $d_t = 0.6$  mm

**CONSTRUCTION**

Mono construction

**FEATURES**

- Available taped and loose in box
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

**APPLICATIONS**

Blocking and coupling, bypass and energy reservoir.

**REFERENCE STANDARDS**

IEC 60384-2

**MARKING**

C-value; tolerance; rated voltage; code for manufacturer;  
manufacturer's type; manufacturer's logo

**DIELECTRIC**

Polyester film

**ELECTRODES**

Metallized

**RATED (DC) VOLTAGE**

100 V, 250 V, 400 V, 630 V

**RATED (AC) VOLTAGE**

63 V, 160 V, 220 V, 250 V

**ENCAPSULATION**

Flame retardant epoxy material (UL-class 94 V-0)

**CLIMATIC TESTING CLASS ACCORDING TO IEC 60068-1**

55/105/56

**RATED TEMPERATURE**

85 °C

**CAPACITANCE RANGE (E12 SERIES)**

467: 0.001 µF to 1.0 µF

468: 0.039 µF to 10.0 µF

469: 0.001 µF to 1.0 µF

**CAPACITANCE TOLERANCE**

± 10 %, ± 5 %

**LEADS**

Tinned wire

**MAXIMUM APPLICATION TEMPERATURE**

105 °C

**DETAIL SPECIFICATION**

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



## COMPOSITION OF CATALOG NUMBER: 467

| TYPE AND PITCHES |         | CAPACITANCE<br>(numerically) |  | MULTIPLIER<br>(nF) |   |
|------------------|---------|------------------------------|--|--------------------|---|
| 467              | 10.0 mm |                              |  | 0.1                | 2 |
|                  |         |                              |  | 1                  | 3 |
|                  |         |                              |  | 10                 | 4 |
|                  |         |                              |  | 100                | 5 |

|          |     |    |    |   |
|----------|-----|----|----|---|
| BFC2     | 467 | XX | YY | Y |
| 2222 (*) | 467 | XX | YY | Y |

(\*) Old ordering number

Example:  
104 = 10 x 10 = 100 nF

| TYPE | PACKAGING         | LEAD CONFIGURATION                                              | PREFERRED TYPES |       |       |       |       |
|------|-------------------|-----------------------------------------------------------------|-----------------|-------|-------|-------|-------|
|      |                   |                                                                 | C-TOL.          | 100 V | 250 V | 400 V | 630 V |
| 467  | Loose in box      | Lead length<br>3.5 mm + 1.0 mm/- 0.5 mm                         | ± 10 %          | 04    | 16    | 28    | 40    |
|      |                   |                                                                 | ± 5 %           | 05    | 17    | 29    | 41    |
|      |                   | Lead length<br>19.0 mm ± 4.0 mm                                 | ± 10 %          | 51    | 53    | 55    | 57    |
|      |                   |                                                                 | ± 5 %           | 52    | 54    | 56    | 58    |
|      | Taped on reel (1) | H = 16.0 mm; P <sub>0</sub> = 12.7 mm<br>Reel diameter = 500 mm | ± 10 %          | 06    | 18    | 30    | 42    |
|      |                   |                                                                 | ± 5 %           | 07    | 19    | 31    | 43    |

## Note

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

## SPECIFIC REFERENCE DATA: 467

| DESCRIPTION                                                                          | VALUE                   |                          |                          |                     |
|--------------------------------------------------------------------------------------|-------------------------|--------------------------|--------------------------|---------------------|
| Tangent of loss angle:<br>C ≤ 0.1 μF<br>0.1 μF < C ≤ 0.47 μF<br>0.47 μF < C ≤ 1.0 μF | at 1 kHz                | at 10 kHz                | at 100 kHz               |                     |
|                                                                                      | ≤ 75 x 10 <sup>-4</sup> | ≤ 120 x 10 <sup>-4</sup> | ≤ 200 x 10 <sup>-4</sup> |                     |
|                                                                                      | ≤ 75 x 10 <sup>-4</sup> | ≤ 120 x 10 <sup>-4</sup> | ≤ 225 x 10 <sup>-4</sup> |                     |
|                                                                                      | ≤ 75 x 10 <sup>-4</sup> | ≤ 120 x 10 <sup>-4</sup> | -                        |                     |
| Rated voltage pulse slope (dU/dt) <sub>R</sub> at I <sub>max.</sub> = 12.5 mm        | 100 V <sub>DC</sub>     | 250 V <sub>DC</sub>      | 400 V <sub>DC</sub>      | 630 V <sub>DC</sub> |
|                                                                                      | 30 V/μs                 | 120 V/μs                 | 170 V/μs                 | 120 V/μs            |
| R between leads, for C ≤ 0.33 μF<br>at 100 V; 1 min<br>at 500 V; 1 min               | > 15 000 MΩ             | > 30 000 MΩ              | > 30 000 MΩ              | > 30 000 MΩ         |
| R between leads, for C > 0.33 μF<br>at 100 V; 1 min<br>at 500 V; 1 min               | > 5000 s                | > 10 000 s               | > 10 000 s               | > 10 000 s          |
| R between interconnecting leads and casing,<br>at 100 V; 1 min<br>at 500 V; 1 min    | > 30 000 MΩ             |                          |                          |                     |
| Withstanding (DC) voltage (cut off current 10 mA) (1);<br>rise time ≤ 1000 V/s       | 160 V; 1 min            | 400 V; 1 min             | 640 V; 1 min             | 1008 V; 1 min       |
| Withstanding (DC) voltage between leads and case                                     | 200 V; 1 min            | 500 V; 1 min             | 800 V; 1 min             | 1260 V; 1 min       |
| Maximum application temperature                                                      | 105 °C                  |                          |                          |                     |

## Note

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

 $U_{RDC} = 100\text{ V}$ ;  $U_{RAC} = 63\text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 467 XXYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|---------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   | C-VALUE |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 3.5 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 19.0 mm ± 4.0 mm |                   | H = 16.0 mm;<br>P <sub>0</sub> = 12.7 mm |                   |         |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |         |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       |         |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |         |
| 0.056                                                        | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 563     |
| 0.068                                                        |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 683     |
| 0.082                                                        |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 823     |
| 0.10                                                         |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 104     |
| 0.12                                                         | 4.3 x 14.3 x 12.5                                                               | 0.40                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 124     |
| 0.15                                                         | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 154     |
| 0.18                                                         | 4.2 x 14.2 x 12.5                                                               | 0.39                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 184     |
| 0.22                                                         | 4.5 x 14.6 x 12.5                                                               | 0.43                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1300)                          | 07...<br>(1300)   | 224     |
| 0.27                                                         | 4.2 x 14.2 x 12.5                                                               | 0.39                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 274     |
| 0.33                                                         | 4.6 x 14.6 x 12.5                                                               | 0.44                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1300)                          | 07...<br>(1300)   | 334     |
| 0.39                                                         | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 394     |
| 0.47                                                         | 4.2 x 14.2 x 12.5                                                               | 0.39                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1500)                          | 07...<br>(1500)   | 474     |
| 0.56                                                         | 4.6 x 14.6 x 12.5                                                               | 0.44                       | 04...<br>(2000)                                | 05...<br>(2000)   | 51...<br>(1500)                   | 52...<br>(1500)   | 06...<br>(1300)                          | 07...<br>(1300)   | 564     |
| 0.68                                                         | 5.0 x 15.0 x 12.5                                                               | 0.50                       | 04...<br>(1500)                                | 05...<br>(1500)   | 51...<br>(1250)                   | 52...<br>(1250)   | 06...<br>(1200)                          | 07...<br>(1200)   | 684     |
| 0.82                                                         | 5.5 x 15.5 x 12.5                                                               | 0.60                       | 04...<br>(1500)                                | 05...<br>(1500)   | 51...<br>(1000)                   | 52...<br>(1000)   | 06...<br>(1100)                          | 07...<br>(1100)   | 824     |
| 1.0                                                          | 6.0 x 16.0 x 12.5                                                               | 0.75                       | 04...<br>(1250)                                | 05...<br>(1250)   | 51...<br>(1000)                   | 52...<br>(1000)   | 06...<br>(1000)                          | 07...<br>(1000)   | 105     |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only


 $U_{RDC} = 250 \text{ V}; U_{RAC} = 160 \text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 467 XXYYY AND PACKAGING   |                   |                                   |                   |                                          |                   |         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|-----------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|---------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                  |                   |                                   |                   | REEL                                     |                   | C-VALUE |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 3.5 mm<br>+ 1.0 mm /- 0.5 mm |                   | l <sub>t</sub> = 19.0 mm ± 4.0 mm |                   | H = 16.0 mm;<br>P <sub>0</sub> = 12.7 mm |                   |         |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                            | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |         |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                   | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       |         |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                               |                   |                                   |                   |                                          |                   |         |
| 0.027                                                        | 4.2 x 14.2 x 12.5                                                               | 0.39                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 273     |
| 0.033                                                        | 4.6 x 14.6 x 12.5                                                               | 0.44                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1300)                          | 19...<br>(1300)   | 333     |
| 0.039                                                        | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 393     |
| 0.047                                                        | 4.1 x 14.1 x 12.5                                                               | 0.38                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 473     |
| 0.056                                                        | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 563     |
| 0.068                                                        | 4.1 x 14.1 x 12.5                                                               | 0.38                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 683     |
| 0.082                                                        | 4.4 x 14.4 x 12.5                                                               | 0.41                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 823     |
| 0.10                                                         | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 104     |
| 0.12                                                         | 4.3 x 14.3 x 12.5                                                               | 0.40                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1500)                   | 54...<br>(1500)   | 18...<br>(1500)                          | 19...<br>(1500)   | 124     |
| 0.15                                                         | 4.8 x 14.8 x 12.5                                                               | 0.48                       | 16...<br>(2000)                               | 17...<br>(2000)   | 53...<br>(1250)                   | 54...<br>(1250)   | 18...<br>(1300)                          | 19...<br>(1300)   | 154     |
| 0.18                                                         | 5.2 x 15.2 x 12.5                                                               | 0.52                       | 16...<br>(1500)                               | 17...<br>(1500)   | 53...<br>(1000)                   | 54...<br>(1000)   | 18...<br>(1200)                          | 19...<br>(1200)   | 184     |
| 0.22                                                         | 5.8 x 15.8 x 12.5                                                               | 0.67                       | 16...<br>(1500)                               | 17...<br>(1500)   | 53...<br>(1000)                   | 54...<br>(1000)   | 18...<br>(1100)                          | 19...<br>(1100)   | 224     |

**Notes**

- SPQ = Standard Packing Quantity

<sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 400\text{ V}$ ;  $U_{RAC} = 220\text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 467 XYYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |                          |       |                 |                 |                 |                 |                 |                 |     |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|--------------------------|-------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   | C-VALUE                  |       |                 |                 |                 |                 |                 |                 |     |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 3.5 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 19.0 mm ± 4.0 mm |                   | H = 16.0 mm;<br>P <sub>0</sub> = 12.7 mm |                   |                          |       |                 |                 |                 |                 |                 |                 |     |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |                          |       |                 |                 |                 |                 |                 |                 |     |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       |                          | ..YYY |                 |                 |                 |                 |                 |                 |     |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |                          |       |                 |                 |                 |                 |                 |                 |     |
| 0.0010<br>0.0012<br>0.0015<br>0.0018                         | 4.5 x 14.5 x 12.5                                                               | 0.43                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1300)                          | 31...<br>(1300)   | 102<br>122<br>152<br>182 |       |                 |                 |                 |                 |                 |                 |     |
| 0.0022                                                       |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 4.0 x 14.0 x 12.5        | 0.37  | 28...<br>(2000) | 29...<br>(2000) | 55...<br>(1500) | 56...<br>(1500) | 30...<br>(1500) | 31...<br>(1500) | 222 |
| 0.0027                                                       |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 4.3 x 14.3 x 12.5        | 0.40  | 28...<br>(2000) | 29...<br>(2000) | 55...<br>(1500) | 56...<br>(1500) | 30...<br>(1500) | 31...<br>(1500) | 272 |
| 0.0033                                                       |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 4.6 x 14.6 x 12.5        | 0.44  | 28...<br>(2000) | 29...<br>(2000) | 55...<br>(1500) | 56...<br>(1500) | 30...<br>(1300) | 31...<br>(1300) | 332 |
| 0.0039                                                       | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 393                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.0047                                                       | 4.1 x 14.2 x 12.5                                                               | 0.38                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 472                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.0056                                                       | 4.6 x 14.6 x 12.5                                                               | 0.44                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1300)                          | 31...<br>(1300)   | 562                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.0068                                                       | 4.2 x 14.2 x 12.5                                                               | 0.39                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 682                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.0082                                                       | 4.6 x 14.6 x 12.5                                                               | 0.44                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1300)                          | 31...<br>(1300)   | 822                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.010                                                        | 4.1 x 14.1 x 12.5                                                               | 0.38                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 103                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.012                                                        | 4.5 x 14.5 x 12.5                                                               | 0.43                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1300)                          | 31...<br>(1300)   | 123                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.015                                                        | 4.1 x 14.1 x 12.5                                                               | 0.38                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 153                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.018                                                        | 4.5 x 14.5 x 12.5                                                               | 0.43                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1300)                          | 31...<br>(1300)   | 183                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.022                                                        | 4.0 x 14.0 x 12.5                                                               | 0.37                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 223                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.027                                                        | 4.2 x 14.2 x 12.5                                                               | 0.39                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 273                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.033                                                        | 4.6 x 14.7 x 12.5                                                               | 0.44                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1300)                          | 31...<br>(1300)   | 333                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.039                                                        | 5.0 x 14.9 x 12.5                                                               | 0.50                       | 28...<br>(1500)                                | 29...<br>(1500)   | 55...<br>(1250)                   | 56...<br>(1250)   | 30...<br>(1200)                          | 31...<br>(1200)   | 393                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.047                                                        | 4.1 x 14.1 x 12.5                                                               | 0.38                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 473                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.056                                                        | 4.4 x 14.4 x 12.5                                                               | 0.41                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1500)                   | 56...<br>(1500)   | 30...<br>(1500)                          | 31...<br>(1500)   | 563                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.068                                                        | 4.8 x 14.8 x 12.5                                                               | 0.48                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1250)                   | 56...<br>(1250)   | 30...<br>(1300)                          | 31...<br>(1300)   | 683                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.082                                                        | 5.4 x 15.3 x 12.5                                                               | 0.57                       | 28...<br>(1500)                                | 29...<br>(1500)   | 55...<br>(1000)                   | 56...<br>(1000)   | 30...<br>(1200)                          | 31...<br>(1200)   | 823                      |       |                 |                 |                 |                 |                 |                 |     |
| 0.10                                                         | 5.7 x 15.7 x 12.5                                                               | 0.64                       | 28...<br>(1500)                                | 29...<br>(1500)   | 55...<br>(1000)                   | 56...<br>(1000)   | 30...<br>(1100)                          | 31...<br>(1100)   | 104                      |       |                 |                 |                 |                 |                 |                 |     |

**Notes**

- SPQ = Standard Packing Quantity

<sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 630 \text{ V}$ ;  $U_{RAC} = 250 \text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 467 XYYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|---------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   | C-VALUE |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 3.5 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 19.0 mm ± 4.0 mm |                   | H = 16.0 mm;<br>P <sub>0</sub> = 12.7 mm |                   |         |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |         |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       | ..YYY   |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |         |
| 0.010                                                        | 4.1 x 14.1 x 12.5                                                               | 0.38                       | 40...<br>(2000)                                | 41...<br>(2000)   | 57...<br>(1500)                   | 58...<br>(1500)   | 42...<br>(1500)                          | 43...<br>(1500)   | 103     |
| 0.012                                                        | 4.5 x 14.5 x 12.5                                                               | 0.43                       | 40...<br>(2000)                                | 41...<br>(2000)   | 57...<br>(1500)                   | 58...<br>(1500)   | 42...<br>(1300)                          | 43...<br>(1300)   | 123     |
| 0.015                                                        | 4.9 x 14.9 x 12.5                                                               | 0.49                       | 40...<br>(2000)                                | 41...<br>(2000)   | 57...<br>(1250)                   | 58...<br>(1250)   | 42...<br>(1200)                          | 43...<br>(1200)   | 153     |
| 0.018                                                        | 5.4 x 15.4 x 12.5                                                               | 0.57                       | 40...<br>(1500)                                | 41...<br>(1500)   | 57...<br>(1000)                   | 58...<br>(1000)   | 42...<br>(1100)                          | 43...<br>(1100)   | 183     |
| 0.022                                                        | 4.8 x 14.8 x 12.5                                                               | 0.48                       | 40...<br>(2000)                                | 41...<br>(2000)   | 57...<br>(1250)                   | 58...<br>(1250)   | 42...<br>(1300)                          | 43...<br>(1300)   | 223     |
| 0.027                                                        | 5.3 x 15.3 x 12.5                                                               | 0.55                       | 40...<br>(2000)                                | 41...<br>(2000)   | 57...<br>(1000)                   | 58...<br>(1000)   | 42...<br>(1200)                          | 43...<br>(1200)   | 273     |
| 0.033                                                        | 5.9 x 15.9 x 12.5                                                               | 0.70                       | 40...<br>(1500)                                | 41...<br>(1500)   | 57...<br>(1000)                   | 58...<br>(1000)   | 42...<br>(1100)                          | 43...<br>(1100)   | 333     |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only



## COMPOSITION OF CATALOG NUMBER: 468

| TYPE AND PITCHES |                | CAPACITANCE<br>(numerically) |   | MULTIPLIER<br>(nF) |   |
|------------------|----------------|------------------------------|---|--------------------|---|
| 468              | 15.0 mm/7.5 mm |                              |   | 0.1                | 2 |
|                  | 15.0 mm        | 1                            | 3 |                    |   |
|                  | 22.5 mm        | 10                           | 4 |                    |   |
|                  | 27.5 mm        | 100                          | 5 |                    |   |

Example:  
104 = 10 x 10 = 100 nF

|          |     |    |    |   |
|----------|-----|----|----|---|
| BFC2     | 468 | XX | YY | Y |
| 2222 (*) | 468 | XX | YY | Y |

(\*) Old ordering number

| TYPE | PACKAGING                                   | LEAD CONFIGURATION                                                                                                                                 | PREFERRED TYPES                                        |       |       |       |       |
|------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------|-------|-------|-------|
|      |                                             |                                                                                                                                                    | C-TOL.                                                 | 100 V | 250 V | 400 V | 630 V |
| 468  | Loose in box                                | Lead length 3.5 mm + 1.0 mm/- 0.5 mm<br>(Pitch 10 mm and 15 mm)                                                                                    | ± 10 %                                                 | 04    | 16    | 28    | 40    |
|      |                                             |                                                                                                                                                    | ± 5 %                                                  | 05    | 17    | 29    | 41    |
|      |                                             | Long leads:<br>19.0 mm ± 4.0 mm for lead pitch = 15.0 mm<br>25.0 mm ± 4.0 mm for lead pitch = 22.5 mm<br>24.0 mm ± 4.0 mm for lead pitch = 27.5 mm | ± 10 %                                                 | 51    | 53    | 55    | 57    |
|      |                                             |                                                                                                                                                    | ± 5 %                                                  | 52    | 54    | 56    | 58    |
|      |                                             |                                                                                                                                                    | ± 10 %                                                 | 61    | 63    | 65    | 67    |
|      |                                             |                                                                                                                                                    | ± 5 %                                                  | 62    | 64    | 66    | 68    |
|      | Taped on reel <sup>(1)</sup><br>(bent back) | H = 16.0 mm; P <sub>0</sub> = 15.0 mm<br>Reel diameter = 500 mm <sup>(2)</sup>                                                                     | Dimensions of these code numbers stay between brackets |       |       |       |       |
|      |                                             |                                                                                                                                                    | ± 10 %                                                 | 06    | 18    | 30    | 42    |
|      | Taped on reel <sup>(1)</sup>                | H = 16.0 mm; P <sub>0</sub> = 12.7 mm<br>Reel diameter = 500 mm                                                                                    | ± 10 %                                                 | 07    | 19    | 31    | 43    |
|      |                                             |                                                                                                                                                    | ± 5 %                                                  | 07    | 19    | 31    | 43    |

## Notes

- (1) For detailed tape specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)  
 (2) Small reel diameter = 356 mm is available on request

## SPECIFIC REFERENCE DATA: 468

| DESCRIPTION                                                                                | VALUE                   |                          |                          |                     |
|--------------------------------------------------------------------------------------------|-------------------------|--------------------------|--------------------------|---------------------|
|                                                                                            | at 1 kHz                | at 10 kHz                | at 100 kHz               |                     |
| Tangent of loss angle:<br>C ≤ 0.1 μF                                                       | ≤ 75 x 10 <sup>-4</sup> | ≤ 120 x 10 <sup>-4</sup> | ≤ 200 x 10 <sup>-4</sup> |                     |
| 0.1 μF < C ≤ 0.47 μF                                                                       | ≤ 75 x 10 <sup>-4</sup> | ≤ 120 x 10 <sup>-4</sup> | ≤ 225 x 10 <sup>-4</sup> |                     |
| 0.47 μF < C ≤ 1.0 μF                                                                       | ≤ 75 x 10 <sup>-4</sup> | ≤ 150 x 10 <sup>-4</sup> | -                        |                     |
| Rated voltage pulse slope (dU/dt) <sub>R</sub> at                                          | 100 V <sub>DC</sub>     | 250 V <sub>DC</sub>      | 400 V <sub>DC</sub>      | 630 V <sub>DC</sub> |
| I <sub>max.</sub> = 12.5 mm                                                                | 30 V/μs                 | 120 V/μs                 | 170 V/μs                 | 120 V/μs            |
| I <sub>max.</sub> = 17.5 mm                                                                | 20 V/μs                 | 45 V/μs                  | 65 V/μs                  | 90 V/μs             |
| I <sub>max.</sub> = 26.0 mm                                                                | 10 V/μs                 | 20 V/μs                  | 30 V/μs                  | 35 V/μs             |
| I <sub>max.</sub> = 30.0 mm                                                                |                         | 15 V/μs                  | 25 V/μs                  | 30 V/μs             |
| R between leads, for C ≤ 0.33 μF<br>at 100 V; 1 min<br>at 500 V; 1 min                     | > 15 000 MΩ             | > 30 000 MΩ              | > 30 000 MΩ              | > 30 000 MΩ         |
| R between leads, for C > 0.33 μF<br>at 100 V; 1 min<br>at 500 V; 1 min                     | > 5000 s                | > 10 000 s               | > 10 000 s               | > 10 000 s          |
| R between interconnecting leads and casing,<br>at 100 V; 1 min<br>at 500 V; 1 min          | > 30 000 MΩ             | > 30 000 MΩ              | > 30 000 MΩ              | > 30 000 MΩ         |
| Withstanding (DC) voltage (cut off current 10 mA) <sup>(1)</sup> ;<br>rise time ≤ 1000 V/s | 160 V; 1 min            | 400 V; 1 min             | 640 V; 1 min             | 1008 V; 1 min       |
| Withstanding (DC) voltage between leads and case                                           | 200 V; 1 min            | 500 V; 1 min             | 800 V; 1 min             | 1260 V; 1 min       |
| Maximum application temperature                                                            | 105 °C                  |                          |                          |                     |

## Note

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



$U_{RDC} = 100 \text{ V}$ ;  $U_{RAC} = 63 \text{ V}$

| C<br>( $\mu$ F)                                             | DIMENSIONS<br>$w_{\text{max.}} \times h \text{ (h')}_{\text{max.}} \times l_{\text{max.}}$<br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 468 XXXYY AND PACKAGING |                        |                                 |                        |                                |                        |                               |                        |             |       |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------|------------------------|---------------------------------|------------------------|--------------------------------|------------------------|-------------------------------|------------------------|-------------|-------|
|                                                             |                                                                                                    |                            | LOOSE IN BOX                                |                        |                                 |                        | REEL<br>H = 16.0 mm            |                        |                               |                        | C-<br>VALUE |       |
|                                                             |                                                                                                    |                            |                                             |                        |                                 |                        | ORIGINAL PITCH                 |                        | BENT BACK PITCH               |                        |             |       |
|                                                             |                                                                                                    |                            | C-TOL. =<br>$\pm 10 \%$                     | C-TOL. =<br>$\pm 5 \%$ | C-TOL. =<br>$\pm 10 \%$         | C-TOL. =<br>$\pm 5 \%$ | C-TOL. =<br>$\pm 10 \%$        | C-TOL. =<br>$\pm 5 \%$ | C-TOL. =<br>$\pm 10 \%$       | C-TOL. =<br>$\pm 5 \%$ |             |       |
|                                                             |                                                                                                    |                            | XX<br>(SPQ)                                 | XX<br>(SPQ)            | XX<br>(SPQ)                     | XX<br>(SPQ)            | XX<br>(SPQ)                    | XX<br>(SPQ)            | XX<br>(SPQ)                   | XX<br>(SPQ)            |             | ..YYY |
| Pitch = 15.0 mm $\pm$ 0.4 mm; $d_t$ = 0.80 mm $\pm$ 0.08 mm |                                                                                                    |                            |                                             |                        |                                 |                        |                                |                        |                               |                        |             |       |
|                                                             |                                                                                                    |                            | $l_t$ = 3.5 mm<br>+ 1.0 mm / - 0.5 mm       |                        | $l_t$ = 19.0 mm<br>$\pm$ 4.0 mm |                        | P = 15 mm<br>$P_0$ = 12.7 mm   |                        | P = 7.5 mm<br>$P_0$ = 15.0 mm |                        |             |       |
| 1.2                                                         | 5.5 x 14.5 (16.0) x 17.5                                                                           | 0.90                       | 04...<br>(2000)                             | 05...<br>(2000)        | 51...<br>(1250)                 | 52...<br>(1250)        | 06...<br>(1100)                | 07...<br>(1100)        | 61...<br>(900)                | 62...<br>(900)         | 125         |       |
| 1.5                                                         | 6.0 x 15.0 (16.5) x 17.5                                                                           | 1.00                       | 04...<br>(2000)                             | 05...<br>(2000)        | 51...<br>(1250)                 | 52...<br>(1250)        | 06...<br>(1000)                | 07...<br>(1000)        | 61...<br>(800)                | 62...<br>(800)         | 155         |       |
| 1.8                                                         | 6.5 x 15.5 (17.0) x 17.5                                                                           | 1.15                       | 04...<br>(1500)                             | 05...<br>(1500)        | 51...<br>(1000)                 | 52...<br>(1000)        | 06...<br>(900)                 | 07...<br>(900)         | 61...<br>(750)                | 62...<br>(750)         | 185         |       |
| 2.2                                                         | 7.0 x 16.0 (17.5) x 17.5                                                                           | 1.25                       | 04...<br>(1250)                             | 05...<br>(1250)        | 51...<br>(1000)                 | 52...<br>(1000)        | 06...<br>(800)                 | 07...<br>(800)         | 61...<br>(700)                | 62...<br>(700)         | 225         |       |
| 2.7                                                         | 8.0 x 17.0 (18.5) x 17.5                                                                           | 1.50                       | 04...<br>(1000)                             | 05...<br>(1000)        | 51...<br>(1000)                 | 52...<br>(1000)        | 06...<br>(750)                 | 07...<br>(750)         | 61...<br>(600)                | 62...<br>(600)         | 275         |       |
| 3.3                                                         | 8.5 x 17.5 (19.0) x 17.5                                                                           | 1.70                       | 04...<br>(1000)                             | 05...<br>(1000)        | 51...<br>(1000)                 | 52...<br>(1000)        | 06...<br>(700)                 | 07...<br>(700)         | 61...<br>(550)                | 62...<br>(550)         | 335         |       |
| Pitch = 22.5 mm $\pm$ 0.4 mm; $d_t$ = 0.80 mm $\pm$ 0.08 mm |                                                                                                    |                            |                                             |                        |                                 |                        |                                |                        |                               |                        |             |       |
|                                                             |                                                                                                    |                            | $l_t$ = 3.5 mm $\pm$ 0.5 mm                 |                        | $l_t$ = 25.0 mm<br>$\pm$ 4.0 mm |                        | P = 22.5 mm<br>$P_0$ = 12.7 mm |                        | P = 7.5 mm<br>$P_0$ = 15.0 mm |                        |             |       |
| 3.9                                                         | 6.5 x 18.5 x 26.0                                                                                  | 2.1                        | 04...<br>(1000)                             | 05...<br>(1000)        | 51...<br>(750)                  | 52...<br>(750)         |                                |                        |                               |                        | 395         |       |
| 4.7                                                         | 7.0 x 19.5 x 26.0                                                                                  | 2.3                        | 04...<br>(900)                              | 05...<br>(900)         | 51...<br>(700)                  | 52...<br>(700)         |                                |                        |                               |                        | 475         |       |
| 5.6                                                         | 7.5 x 20.0 x 26.0                                                                                  | 2.5                        | 04...<br>(750)                              | 05...<br>(750)         | 51...<br>(600)                  | 52...<br>(600)         |                                |                        |                               |                        | 565         |       |
| 6.8                                                         | 8.5 x 21.5 x 26.0                                                                                  | 3.2                        | 04...<br>(750)                              | 05...<br>(750)         | 51...<br>(500)                  | 52...<br>(500)         |                                |                        |                               |                        | 685         |       |
| 8.2                                                         | 9.5 x 22.5 x 26.0                                                                                  | 3.4                        | 04...<br>(700)                              | 05...<br>(700)         | 51...<br>(500)                  | 52...<br>(500)         |                                |                        |                               |                        | 825         |       |
| 10.0                                                        | 10.5 x 23.5 x 26.0                                                                                 | 3.8                        | 04...<br>(500)                              | 05...<br>(500)         | 51...<br>(400)                  | 52...<br>(400)         |                                |                        |                               |                        | 106         |       |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 250 \text{ V}$ ;  $U_{RAC} = 160 \text{ V}$ 

| C<br>( $\mu$ F)                                                                             | DIMENSIONS<br>$w_{\text{max.}} \times h (h')_{\text{max.}} \times l_{\text{max.}}$<br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 468 XYYYY AND PACKAGING |                        |                                 |                        |                                         |                        |                                        |                        |                          |  |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------|------------------------|---------------------------------|------------------------|-----------------------------------------|------------------------|----------------------------------------|------------------------|--------------------------|--|
|                                                                                             |                                                                                            |                            | LOOSE IN BOX                                |                        |                                 |                        | REEL<br>H = 16.0 mm                     |                        |                                        |                        | C-<br>VALUE<br><br>..YYY |  |
|                                                                                             |                                                                                            |                            |                                             |                        |                                 |                        | ORIGINAL PITCH                          |                        | BENT BACK PITCH                        |                        |                          |  |
|                                                                                             |                                                                                            |                            | C-TOL. =<br>$\pm 10 \%$                     | C-TOL. =<br>$\pm 5 \%$ | C-TOL. =<br>$\pm 10 \%$         | C-TOL. =<br>$\pm 5 \%$ | C-TOL. =<br>$\pm 10 \%$                 | C-TOL. =<br>$\pm 5 \%$ | C-TOL. =<br>$\pm 10 \%$                | C-TOL. =<br>$\pm 5 \%$ |                          |  |
|                                                                                             |                                                                                            |                            | XX<br>(SPQ)                                 | XX<br>(SPQ)            | XX<br>(SPQ)                     | XX<br>(SPQ)            | XX<br>(SPQ)                             | XX<br>(SPQ)            | XX<br>(SPQ)                            | XX<br>(SPQ)            |                          |  |
| Pitch = 15.0 mm $\pm$ 0.4 mm; $d_t$ = 0.80 mm $\pm$ 0.08 mm                                 |                                                                                            |                            |                                             |                        |                                 |                        |                                         |                        |                                        |                        |                          |  |
|                                                                                             |                                                                                            |                            | $l_t$ = 3.5 mm<br>+ 1.0 mm/- 0.5 mm         |                        | $l_t$ = 19.0 mm<br>$\pm$ 4.0 mm |                        | P = 15 mm<br>P <sub>0</sub> = 12.7 mm   |                        | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                        |                          |  |
| 0.27                                                                                        | 5.0 x 14.0 (15.5) x 17.5                                                                   | 0.80                       | 16...<br>(2000)                             | 17...<br>(2000)        | 53...<br>(1250)                 | 54...<br>(1250)        | 18...<br>(1200)                         | 19...<br>(1200)        | 63...<br>(1000)                        | 64...<br>(1000)        | 274                      |  |
| 0.33                                                                                        | 5.5 x 14.5 (16.0) x 17.5                                                                   | 0.90                       | 16...<br>(2000)                             | 17...<br>(2000)        | 53...<br>(1250)                 | 54...<br>(1250)        | 18...<br>(1100)                         | 19...<br>(1100)        | 63...<br>(900)                         | 64...<br>(900)         | 334                      |  |
| 0.39                                                                                        | 6.0 x 15.0 (16.5) x 17.5                                                                   | 1.00                       | 16...<br>(2000)                             | 17...<br>(2000)        | 53...<br>(1250)                 | 54...<br>(1250)        | 18...<br>(1000)                         | 19...<br>(1000)        | 63...<br>(800)                         | 64...<br>(800)         | 394                      |  |
| 0.47                                                                                        | 6.5 x 15.5 (17.0) x 17.5                                                                   | 1.15                       | 16...<br>(1500)                             | 17...<br>(1500)        | 53...<br>(1000)                 | 54...<br>(1000)        | 18...<br>(900)                          | 19...<br>(900)         | 63...<br>(750)                         | 64...<br>(750)         | 474                      |  |
| 0.56                                                                                        | 7.5 x 16.5 (18.0) x 17.5                                                                   | 1.30                       | 16...<br>(1250)                             | 17...<br>(1250)        | 53...<br>(1000)                 | 54...<br>(1000)        | 18...<br>(800)                          | 19...<br>(800)         | 63...<br>(650)                         | 64...<br>(650)         | 564                      |  |
| 0.68                                                                                        | 8.0 x 17.0 (18.5) x 17.5                                                                   | 1.50                       | 16...<br>(1000)                             | 17...<br>(1000)        | 53...<br>(1000)                 | 54...<br>(1000)        | 18...<br>(750)                          | 19...<br>(750)         | 63...<br>(600)                         | 64...<br>(600)         | 684                      |  |
| 0.82                                                                                        | 8.5 x 17.5 (19.0) x 17.5                                                                   | 1.70                       | 16...<br>(1000)                             | 17...<br>(1000)        | 53...<br>(1000)                 | 54...<br>(1000)        | 18...<br>(700)                          | 19...<br>(700)         | 63...<br>(550)                         | 64...<br>(550)         | 824                      |  |
| 1.0                                                                                         | 8.0 x 20.0 (21.5) x 17.5                                                                   | 2.10                       | 16...<br>(1000)                             | 17...<br>(1000)        | 53...<br>(900)                  | 54...<br>(900)         | 18...<br>(750)                          | 19...<br>(750)         | 63...<br>(600)                         | 64...<br>(600)         | 105                      |  |
| Pitch = 22.5 mm $\pm$ 0.4 mm; $d_t$ = 0.80 mm $\pm$ 0.08 mm                                 |                                                                                            |                            |                                             |                        |                                 |                        |                                         |                        |                                        |                        |                          |  |
|                                                                                             |                                                                                            |                            | $l_t$ = 3.5 mm<br>$\pm$ 0.5 mm              |                        | $l_t$ = 25.0 mm<br>$\pm$ 4.0 mm |                        | P = 22.5 mm<br>P <sub>0</sub> = 12.7 mm |                        | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                        |                          |  |
| 1.2                                                                                         | 7.0 x 19.0 x 26.0                                                                          | 2.3                        | 16...<br>(1000)                             | 17...<br>(1000)        | 53...<br>(700)                  | 54...<br>(700)         | -                                       |                        | -                                      |                        | 125                      |  |
| 1.5                                                                                         | 8.0 x 21.0 x 26.0                                                                          | 2.8                        | 16...<br>(750)                              | 17...<br>(750)         | 53...<br>(500)                  | 54...<br>(500)         |                                         |                        |                                        |                        | 155                      |  |
| 1.8                                                                                         | 9.0 x 22.0 x 26.0                                                                          | 3.3                        | 16...<br>(750)                              | 17...<br>(750)         | 53...<br>(500)                  | 54...<br>(500)         |                                         |                        |                                        |                        | 185                      |  |
| 2.2                                                                                         | 9.8 x 23.0 x 26.0                                                                          | 3.4                        | 16...<br>(750)                              | 17...<br>(750)         | 53...<br>(450)                  | 54...<br>(450)         |                                         |                        |                                        |                        | 225                      |  |
| 2.7                                                                                         | 11.0 x 24.0 x 26.0                                                                         | 4.0                        | 16...<br>(500)                              | 17...<br>(500)         | 53...<br>(400)                  | 54...<br>(400)         |                                         |                        |                                        |                        | 275                      |  |
| 3.3                                                                                         | 12.5 x 25.5 x 26.0                                                                         | 4.5                        | 16...<br>(500)                              | 17...<br>(500)         | 53...<br>(300)                  | 54...<br>(300)         |                                         |                        |                                        |                        | 335                      |  |
| 3.9                                                                                         | 13.5 x 26.5 x 26.0                                                                         | 5.5                        | 16...<br>(400)                              | 17...<br>(400)         | 53...<br>(300)                  | 54...<br>(300)         |                                         |                        |                                        |                        | 395                      |  |
| 4.7                                                                                         | 14.9 x 28.0 x 26.0                                                                         | 6.3                        | 16...<br>(250)                              | 17...<br>(250)         | 53...<br>(250)                  | 54...<br>(250)         |                                         |                        |                                        |                        | 475                      |  |
| Pitch = 27.5 mm $\pm$ 0.4 mm; $d_t$ = 0.80 mm $\pm$ 0.08 mm; A = 2.5 mm + 1.4 mm / - 0.5 mm |                                                                                            |                            |                                             |                        |                                 |                        |                                         |                        |                                        |                        |                          |  |
|                                                                                             |                                                                                            |                            | $l_t$ = 3.5 mm $\pm$ 0.5 mm                 |                        | $l_t$ = 24.0 mm<br>$\pm$ 4.0 mm |                        | P = 27.5 mm<br>P <sub>0</sub> = 12.7 mm |                        | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                        |                          |  |
| 5.6                                                                                         | 15.0 x 28.0 x 30.0                                                                         | 7.5                        | 16...<br>(300)                              | 17...<br>(300)         | 53...<br>(200)                  | 54...<br>(200)         | -                                       |                        | -                                      |                        | 565                      |  |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 400\text{ V}$ ;  $U_{RAC} = 220\text{ V}$ 

| C<br>(μF)                                                                                    | DIMENSIONS<br>w <sub>max.</sub> x h (h') <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 468 XYYYY AND PACKAGING    |                   |                                      |                   |                                         |                   |                                        |                   |       | C-<br>VALUE |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|--------------------------------------|-------------------|-----------------------------------------|-------------------|----------------------------------------|-------------------|-------|-------------|
|                                                                                              |                                                                                      |                            | LOOSE IN BOX                                   |                   |                                      |                   | REEL<br>H = 16.0 mm                     |                   |                                        |                   | ..YYY |             |
|                                                                                              |                                                                                      |                            |                                                |                   |                                      |                   | ORIGINAL PITCH                          |                   | BENT BACK PITCH                        |                   |       |             |
|                                                                                              |                                                                                      |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                   | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                      | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                     | C-TOL. =<br>± 5 % |       |             |
|                                                                                              |                                                                                      |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                          | XX<br>(SPQ)       | XX<br>(SPQ)                             | XX<br>(SPQ)       | XX<br>(SPQ)                            | XX<br>(SPQ)       |       |             |
| Pitch = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm                                 |                                                                                      |                            |                                                |                   |                                      |                   |                                         |                   |                                        |                   |       |             |
|                                                                                              |                                                                                      |                            | l <sub>t</sub> = 3.5 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 19.0 mm<br>± 4.0 mm |                   | P = 15 mm<br>P <sub>0</sub> = 12.7 mm   |                   | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                   |       |             |
| 0.12                                                                                         | 5.0 x 14.0 (15.5) x 17.5                                                             | 0.80                       | 28...<br>(2000)                                | 29...<br>(2000)   | 55...<br>(1250)                      | 56...<br>(1250)   | 30...<br>(1200)                         | 31...<br>(1200)   | 65...<br>(1000)                        | 66...<br>(1000)   | 124   |             |
| 0.15                                                                                         | 5.8 x 15.0 (16.5) x 17.5                                                             | 0.95                       | 28...<br>(1750)                                | 29...<br>(1750)   | 55...<br>(1250)                      | 56...<br>(1250)   | 30...<br>(1100)                         | 31...<br>(1100)   | 65...<br>(850)                         | 66...<br>(850)    | 154   |             |
| 0.18                                                                                         | 6.5 x 15.5 (17.0) x 17.5                                                             | 1.15                       | 28...<br>(1500)                                | 29...<br>(1500)   | 55...<br>(1000)                      | 56...<br>(1000)   | 30...<br>(900)                          | 31...<br>(900)    | 65...<br>(750)                         | 66...<br>(750)    | 184   |             |
| 0.22                                                                                         | 7.0 x 16.0 (17.5) x 17.5                                                             | 1.25                       | 28...<br>(1500)                                | 29...<br>(1500)   | 55...<br>(1000)                      | 56...<br>(1000)   | 30...<br>(800)                          | 31...<br>(800)    | 65...<br>(700)                         | 66...<br>(700)    | 224   |             |
| 0.27                                                                                         | 7.4 x 16.5 (18.0) x 17.5                                                             | 1.28                       | 28...<br>(1250)                                | 29...<br>(1250)   | 55...<br>(1250)                      | 56...<br>(1250)   | 30...<br>(800)                          | 31...<br>(800)    | 65...<br>(650)                         | 66...<br>(650)    | 274   |             |
| 0.33                                                                                         | 8.5 x 17.5 (19.0) x 17.5                                                             | 1.70                       | 28...<br>(1000)                                | 29...<br>(1000)   | 55...<br>(1000)                      | 56...<br>(1000)   | 30...<br>(700)                          | 31...<br>(700)    | 65...<br>(550)                         | 66...<br>(550)    | 334   |             |
| 0.39                                                                                         | 7.4 x 19.5 (21.0) x 17.5                                                             | 2.00                       | 28...<br>(1000)                                | 29...<br>(1000)   | 55...<br>(1000)                      | 56...<br>(1000)   | 30...<br>(800)                          | 31...<br>(800)    | 65...<br>(650)                         | 66...<br>(650)    | 394   |             |
| 0.47                                                                                         | 8.4 x 20.5 (22.0) x 17.5                                                             | 2.10                       | 28...<br>(750)                                 | 29...<br>(750)    | 55...<br>(850)                       | 56...<br>(850)    | 30...<br>(700)                          | 31...<br>(700)    | 65...<br>(550)                         | 66...<br>(550)    | 474   |             |
| Pitch = 22.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm                                 |                                                                                      |                            |                                                |                   |                                      |                   |                                         |                   |                                        |                   |       |             |
|                                                                                              |                                                                                      |                            | l <sub>t</sub> = 3.5 mm ± 0.5 mm               |                   | l <sub>t</sub> = 25.0 mm<br>± 4.0 mm |                   | P = 22.5 mm<br>P <sub>0</sub> = 12.7 mm |                   | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                   |       |             |
| 0.56                                                                                         | 7.0 x 19.5 x 26.0                                                                    | 2.5                        | 28...<br>(1000)                                | 29...<br>(1000)   | 55...<br>(650)                       | 56...<br>(650)    | -                                       |                   | -                                      |                   | 564   |             |
| 0.68                                                                                         | 8.0 x 21.0 x 26.0                                                                    | 2.8                        | 28...<br>(750)                                 | 29...<br>(750)    | 55...<br>(500)                       | 56...<br>(500)    |                                         |                   |                                        |                   | 684   |             |
| 0.82                                                                                         | 9.0 x 22.0 x 26.0                                                                    | 3.3                        | 28...<br>(750)                                 | 29...<br>(750)    | 55...<br>(500)                       | 56...<br>(500)    |                                         |                   |                                        |                   | 824   |             |
| 1.0                                                                                          | 9.9 x 23.0 x 26.0                                                                    | 3.5                        | 28...<br>(750)                                 | 29...<br>(750)    | 55...<br>(450)                       | 56...<br>(450)    |                                         |                   |                                        |                   | 105   |             |
| 1.2                                                                                          | 11.0 x 24.0 x 26.0                                                                   | 4.0                        | 28...<br>(500)                                 | 29...<br>(500)    | 55...<br>(400)                       | 56...<br>(400)    |                                         |                   |                                        |                   | 125   |             |
| Pitch = 27.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; A = 2.5 mm + 1.4 mm / - 0.5 mm |                                                                                      |                            |                                                |                   |                                      |                   |                                         |                   |                                        |                   |       |             |
|                                                                                              |                                                                                      |                            | l <sub>t</sub> = 3.5 mm ± 0.5 mm               |                   | l <sub>t</sub> = 24.0 mm<br>± 4.0 mm |                   | P = 27.5 mm<br>P <sub>0</sub> = 12.7 mm |                   | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                   |       |             |
| 1.5                                                                                          | 11.5 x 24.5 x 30.0                                                                   | 5.8                        | 28...<br>(450)                                 | 29...<br>(450)    | 55...<br>(300)                       | 56...<br>(300)    | -                                       |                   | -                                      |                   | 155   |             |
| 1.8                                                                                          | 12.5 x 25.5 x 30.0                                                                   | 6.4                        | 28...<br>(350)                                 | 29...<br>(350)    | 55...<br>(250)                       | 56...<br>(250)    |                                         |                   |                                        |                   | 185   |             |
| 2.2                                                                                          | 14.0 x 27.0 x 30.0                                                                   | 7.3                        | 28...<br>(300)                                 | 29...<br>(300)    | 55...<br>(200)                       | 56...<br>(200)    |                                         |                   |                                        |                   | 225   |             |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 630 \text{ V}$ ;  $U_{RAC} = 250 \text{ V}$ 

| C<br>(μF)                                                                                    | DIMENSIONS<br>w <sub>max.</sub> x h (h') <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 468 XYYYY AND PACKAGING  |                   |                                      |                   |                                         |                   |                                        |                   |             |       |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------|----------------------------------------------|-------------------|--------------------------------------|-------------------|-----------------------------------------|-------------------|----------------------------------------|-------------------|-------------|-------|
|                                                                                              |                                                                                      |                            | LOOSE IN BOX                                 |                   |                                      |                   | REEL<br>H = 16.0 mm                     |                   |                                        |                   | C-<br>VALUE |       |
|                                                                                              |                                                                                      |                            |                                              |                   |                                      |                   | ORIGINAL PITCH                          |                   | BENT BACK PITCH                        |                   |             |       |
|                                                                                              |                                                                                      |                            | C-TOL. =<br>± 10 %                           | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                   | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                      | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                     | C-TOL. =<br>± 5 % |             |       |
|                                                                                              |                                                                                      |                            | XX<br>(SPQ)                                  | XX<br>(SPQ)       | XX<br>(SPQ)                          | XX<br>(SPQ)       | XX<br>(SPQ)                             | XX<br>(SPQ)       | XX<br>(SPQ)                            | XX<br>(SPQ)       |             | ..YYY |
| Pitch = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm                                 |                                                                                      |                            |                                              |                   |                                      |                   |                                         |                   |                                        |                   |             |       |
|                                                                                              |                                                                                      |                            | l <sub>t</sub> = 3.5 mm<br>+ 1.0 mm/- 0.5 mm |                   | l <sub>t</sub> = 19.0 mm<br>± 4.0 mm |                   | P = 15 mm<br>P <sub>0</sub> = 12.7 mm   |                   | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                   |             |       |
| 0.039                                                                                        | 5.0 x 14.0 (15.5) x 17.5                                                             | 0.80                       | 40...<br>(2000)                              | 41...<br>(2000)   | 57...<br>(1250)                      | 58...<br>(1250)   | 42...<br>(1200)                         | 43...<br>(1200)   | 67...<br>(1000)                        | 68...<br>(1000)   | 393         |       |
| 0.047                                                                                        | 5.5 x 14.5 (16.0) x 17.5                                                             | 0.90                       | 40...<br>(2000)                              | 41...<br>(2000)   | 57...<br>(1250)                      | 58...<br>(1250)   | 42...<br>(1100)                         | 43...<br>(1100)   | 67...<br>(900)                         | 68...<br>(900)    | 473         |       |
| 0.056                                                                                        | 5.9 x 15.0 (16.5) x 17.5                                                             | 0.95                       | 40...<br>(1750)                              | 41...<br>(1750)   | 57...<br>(1250)                      | 58...<br>(1250)   | 42...<br>(1000)                         | 43...<br>(1000)   | 67...<br>(850)                         | 68...<br>(850)    | 563         |       |
| 0.068                                                                                        | 6.5 x 16.0 (17.5) x 17.5                                                             | 1.15                       | 40...<br>(1500)                              | 41...<br>(1500)   | 57...<br>(1000)                      | 58...<br>(1000)   | 42...<br>(800)                          | 43...<br>(800)    | 67...<br>(750)                         | 68...<br>(750)    | 683         |       |
| 0.082                                                                                        | 7.3 x 16.5 (18.0) x 17.5                                                             | 1.27                       | 40...<br>(1500)                              | 41...<br>(1500)   | 57...<br>(1000)                      | 58...<br>(1000)   | 42...<br>(800)                          | 43...<br>(800)    | 67...<br>(650)                         | 68...<br>(650)    | 823         |       |
| 0.10                                                                                         | 7.9 x 17.0 (18.5) x 17.5                                                             | 1.48                       | 40...<br>(1250)                              | 41...<br>(1250)   | 57...<br>(1000)                      | 58...<br>(1000)   | 42...<br>(750)                          | 43...<br>(750)    | 67...<br>(600)                         | 68...<br>(600)    | 104         |       |
| 0.12                                                                                         | 7.5 x 19.5 (21.0) x 17.5                                                             | 2.00                       | 40...<br>(1250)                              | 41...<br>(1250)   | 57...<br>(1000)                      | 58...<br>(1000)   | 42...<br>(800)                          | 43...<br>(800)    | 67...<br>(650)                         | 68...<br>(650)    | 124         |       |
| 0.15                                                                                         | 8.5 x 20.5 (22.0) x 17.5                                                             | 2.20                       | 40...<br>(1000)                              | 41...<br>(1000)   | 57...<br>(850)                       | 58...<br>(850)    | 42...<br>(700)                          | 43...<br>(700)    | 67...<br>(550)                         | 68...<br>(550)    | 154         |       |
| Pitch = 22.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm                                 |                                                                                      |                            |                                              |                   |                                      |                   |                                         |                   |                                        |                   |             |       |
|                                                                                              |                                                                                      |                            | l <sub>t</sub> = 3.5 mm<br>± 0.5 mm          |                   | l <sub>t</sub> = 25.0 mm<br>± 4.0 mm |                   | P = 22.5 mm<br>P <sub>0</sub> = 12.7 mm |                   | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                   |             |       |
| 0.18                                                                                         | 7.5 x 19.5 x 26.0                                                                    | 2.5                        | 40...<br>(1000)                              | 41...<br>(1000)   | 57...<br>(650)                       | 58...<br>(650)    | -                                       |                   | -                                      |                   | 184         |       |
| 0.22                                                                                         | 8.0 x 21.0 x 26.0                                                                    | 2.8                        | 40...<br>(750)                               | 41...<br>(750)    | 57...<br>(500)                       | 58...<br>(500)    |                                         |                   |                                        |                   | 224         |       |
| 0.27                                                                                         | 9.0 x 22.0 x 26.0                                                                    | 3.3                        | 40...<br>(750)                               | 41...<br>(750)    | 57...<br>(500)                       | 58...<br>(500)    |                                         |                   |                                        |                   | 274         |       |
| 0.33                                                                                         | 10.0 x 23.0 x 26.0                                                                   | 3.5                        | 40...<br>(700)                               | 41...<br>(700)    | 57...<br>(450)                       | 58...<br>(450)    |                                         |                   |                                        |                   | 334         |       |
| 0.39                                                                                         | 11.5 x 24.0 x 26.0                                                                   | 4.2                        | 40...<br>(600)                               | 41...<br>(600)    | 57...<br>(400)                       | 58...<br>(400)    |                                         |                   |                                        |                   | 394         |       |
| 0.47                                                                                         | 12.5 x 25.5 x 26.0                                                                   | 4.5                        | 40...<br>(500)                               | 41...<br>(500)    | 57...<br>(300)                       | 58...<br>(300)    |                                         |                   |                                        |                   | 474         |       |
| 0.56                                                                                         | 13.5 x 26.6 x 26.0                                                                   | 5.5                        | 40...<br>(450)                               | 41...<br>(450)    | 57...<br>(300)                       | 58...<br>(300)    |                                         |                   |                                        |                   | 564         |       |
| 0.68                                                                                         | 15.0 x 28.0 x 26.0                                                                   | 6.5                        | 40...<br>(400)                               | 41...<br>(400)    | 57...<br>(250)                       | 58...<br>(250)    |                                         |                   |                                        |                   | 684         |       |
| Pitch = 27.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; A = 2.5 mm + 1.4 mm / - 0.5 mm |                                                                                      |                            |                                              |                   |                                      |                   |                                         |                   |                                        |                   |             |       |
|                                                                                              |                                                                                      |                            | l <sub>t</sub> = 3.5 mm<br>± 0.5 mm          |                   | l <sub>t</sub> = 24.0 mm<br>± 4.0 mm |                   | P = 27.5 mm<br>P <sub>0</sub> = 12.7 mm |                   | P = 7.5 mm<br>P <sub>0</sub> = 15.0 mm |                   |             |       |
| 0.82                                                                                         | 15.0 x 28.0 x 30.0                                                                   | 7.5                        | 40...<br>(300)                               | 41...<br>(300)    | 57...<br>(200)                       | 58...<br>(200)    | -                                       |                   | -                                      |                   | -           |       |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only

**COMPOSITION OF CATALOG NUMBER: 469**

| TYPE AND PITCHES |         |
|------------------|---------|
| 469              | 10.0 mm |

| CAPACITANCE<br>(numerically) |
|------------------------------|
|------------------------------|

| MULTIPLIER<br>(nF) |   |
|--------------------|---|
| 0.1                | 2 |
| 1                  | 3 |
| 10                 | 4 |
| 100                | 5 |

Example:  
104 = 10 x 10 = 100 nF

|          |     |    |    |   |
|----------|-----|----|----|---|
| BFC2     | 469 | XX | YY | Y |
| 2222 (*) | 469 | XX | YY | Y |

(\*) Old ordering number

| TYPE | PACKAGING                    | LEAD CONFIGURATION                                              | PREFERRED TYPES |       |       |       |       |
|------|------------------------------|-----------------------------------------------------------------|-----------------|-------|-------|-------|-------|
|      |                              |                                                                 | C-TOL.          | 100 V | 250 V | 400 V | 630 V |
| 469  | Loose in box                 | Lead length<br>4.0 mm + 1.0 mm/- 0.5 mm                         | ± 10 %          | 25    | 45    | 55    | 65    |
|      |                              |                                                                 | ± 5 %           | 26    | 46    | 56    | 66    |
|      |                              | Lead length<br>22.0 mm ± 4.0 mm                                 | ± 10 %          | 21    | 41    | 51    | 61    |
|      |                              |                                                                 | ± 5 %           | 22    | 42    | 52    | 62    |
|      | Taped on reel <sup>(1)</sup> | H = 18.5 mm; P <sub>0</sub> = 12.7 mm<br>Reel diameter = 500 mm | ± 10 %          | 28    | 48    | 58    | 68    |
|      |                              |                                                                 | ± 5 %           | 29    | 49    | 59    | 69    |

**Note**

<sup>(1)</sup> For detailed tape specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

**SPECIFIC REFERENCE DATA: 469**

| DESCRIPTION                                                                                | VALUE                   |                     |                          |                          |
|--------------------------------------------------------------------------------------------|-------------------------|---------------------|--------------------------|--------------------------|
| Tangent of loss angle:<br>C ≤ 0.1 μF<br>0.1 μF < C ≤ 0.47 μF<br>0.47 μF < C ≤ 1.0 μF       | at 1 kHz                |                     | at 10 kHz                | at 100 kHz               |
|                                                                                            | ≤ 75 x 10 <sup>-4</sup> |                     | ≤ 120 x 10 <sup>-4</sup> | ≤ 200 x 10 <sup>-4</sup> |
|                                                                                            | ≤ 75 x 10 <sup>-4</sup> |                     | ≤ 120 x 10 <sup>-4</sup> | ≤ 225 x 10 <sup>-4</sup> |
|                                                                                            | ≤ 75 x 10 <sup>-4</sup> |                     | ≤ 120 x 10 <sup>-4</sup> | -                        |
| Rated voltage pulse slope (dU/dt) <sub>R</sub> at I <sub>max</sub> = 12.5 mm               | 100 V <sub>DC</sub>     | 250 V <sub>DC</sub> | 400 V <sub>DC</sub>      | 630 V <sub>DC</sub>      |
|                                                                                            | 30 V/μs                 | 120 V/μs            | 170 V/μs                 | 120 V/μs                 |
| R between leads, for C ≤ 0.33 μF<br>at 100 V; 1 min<br>at 500 V; 1 min                     | > 15 000 MΩ             | > 30 000 MΩ         | > 30 000 MΩ              | > 30 000 MΩ              |
| R between leads, for C > 0.33 μF<br>at 100 V; 1 min<br>at 500 V; 1 min                     | > 5000 s                | > 10 000 s          | > 10 000 s               | > 10 000 s               |
| R between interconnecting leads and casing,<br>at 100 V; 1 min<br>at 500 V; 1 min          | > 30 000 MΩ             | > 30 000 MΩ         | > 30 000 MΩ              | > 30 000 MΩ              |
| Withstanding (DC) voltage (cut off current 10 mA) <sup>(1)</sup> ;<br>rise time ≤ 1000 V/s | 160 V; 1 min            | 400 V; 1 min        | 640 V; 1 min             | 1008 V; 1 min            |
| Withstanding (DC) voltage between leads and case                                           | 200 V; 1 min            | 500 V; 1 min        | 840 V; 1 min             | 1260 V; 1 min            |
| Maximum application temperature                                                            | 105 °C                  |                     |                          |                          |

**Note**

<sup>(1)</sup> See "Voltage Proof Test for Metallized Film Capacitors": [www.vishay.com/doc?28169](http://www.vishay.com/doc?28169)

 $U_{RDC} = 100 \text{ V}$ ;  $U_{RAC} = 63 \text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 469 XXYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|---------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   | C-VALUE |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 4.0 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 22.0 mm ± 4.0 mm |                   | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm |                   |         |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |         |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       |         |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |         |
| 0.056                                                        | 4.0 x 11.0 x 12.5                                                               | 0.35                       |                                                |                   |                                   |                   |                                          |                   | 563     |
| 0.068                                                        |                                                                                 |                            | 25...                                          | 26...             | 21...                             | 22...             | 28...                                    | 29...             | 683     |
| 0.082                                                        |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            | 823     |
| 0.10                                                         |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   | 104     |
| 0.12                                                         | 4.3 x 11.3 x 12.5                                                               | 0.38                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1500)                          | 29...<br>(1500)   | 124     |
| 0.15                                                         | 3.9 x 10.9 x 12.5                                                               | 0.34                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1500)                          | 29...<br>(1500)   | 154     |
| 0.18                                                         | 4.2 x 11.2 x 12.5                                                               | 0.37                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1500)                          | 29...<br>(1500)   | 184     |
| 0.22                                                         | 4.5 x 11.5 x 12.5                                                               | 0.40                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1300)                          | 29...<br>(1300)   | 224     |
| 0.27                                                         | 4.2 x 11.2 x 12.5                                                               | 0.37                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1500)                          | 29...<br>(1500)   | 274     |
| 0.33                                                         | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1300)                          | 29...<br>(1300)   | 334     |
| 0.39                                                         | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1500)                          | 29...<br>(1500)   | 394     |
| 0.47                                                         | 4.2 x 11.2 x 12.5                                                               | 0.37                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1500)                          | 29...<br>(1500)   | 474     |
| 0.56                                                         | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 25...<br>(2000)                                | 26...<br>(2000)   | 21...<br>(1500)                   | 22...<br>(1500)   | 28...<br>(1300)                          | 29...<br>(1300)   | 564     |
| 0.68                                                         | 5.0 x 12.0 x 12.5                                                               | 0.44                       | 25...<br>(1500)                                | 26...<br>(1500)   | 21...<br>(1250)                   | 22...<br>(1250)   | 28...<br>(1200)                          | 29...<br>(1200)   | 684     |
| 0.82                                                         | 5.5 x 12.5 x 12.5                                                               | 0.47                       | 25...<br>(1500)                                | 26...<br>(1500)   | 21...<br>(1000)                   | 22...<br>(1000)   | 28...<br>(1100)                          | 29...<br>(1100)   | 824     |
| 1.0                                                          | 6.0 x 13.0 x 12.5                                                               | 0.55                       | 25...<br>(1250)                                | 26...<br>(1250)   | 21...<br>(1000)                   | 22...<br>(1000)   | 28...<br>(1000)                          | 29...<br>(1000)   | 105     |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only


 $U_{RDC} = 250 \text{ V}; U_{RAC} = 160 \text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 469 XXYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|---------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   | C-VALUE |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 4.0 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 22.0 mm ± 4.0 mm |                   | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm |                   |         |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |         |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       | ..YYY   |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |         |
| 0.027                                                        | 4.2 x 11.2 x 12.5                                                               | 0.37                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 273     |
| 0.033                                                        | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1300)                          | 49...<br>(1300)   | 333     |
| 0.039                                                        | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 393     |
| 0.047                                                        | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 473     |
| 0.056                                                        | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 563     |
| 0.068                                                        | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 683     |
| 0.082                                                        | 4.4 x 11.4 x 12.5                                                               | 0.39                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 823     |
| 0.10                                                         | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 104     |
| 0.12                                                         | 4.3 x 11.3 x 12.5                                                               | 0.38                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1500)                   | 42...<br>(1500)   | 48...<br>(1500)                          | 49...<br>(1500)   | 124     |
| 0.15                                                         | 4.8 x 11.8 x 12.5                                                               | 0.42                       | 45...<br>(2000)                                | 46...<br>(2000)   | 41...<br>(1250)                   | 42...<br>(1250)   | 48...<br>(1300)                          | 49...<br>(1300)   | 154     |
| 0.18                                                         | 5.2 x 12.2 x 12.5                                                               | 0.45                       | 45...<br>(1500)                                | 46...<br>(1500)   | 41...<br>(1000)                   | 42...<br>(1000)   | 48...<br>(1200)                          | 49...<br>(1200)   | 184     |
| 0.22                                                         | 5.8 x 12.8 x 12.5                                                               | 0.50                       | 45...<br>(1500)                                | 46...<br>(1500)   | 41...<br>(1000)                   | 42...<br>(1000)   | 48...<br>(1100)                          | 49...<br>(1100)   | 224     |

**Notes**

- SPQ = Standard Packing Quantity

<sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 400\text{ V}$ ;  $U_{RAC} = 220\text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 469 XYYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |     | C-VALUE<br><br>..YYY |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|-----|----------------------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   |     |                      |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 4.0 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 22.0 mm ± 4.0 mm |                   | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm |                   |     |                      |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |     |                      |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       |     |                      |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |     |                      |
| 0.0010<br>0.0012<br>0.0015<br>0.0018                         | 4.5 x 11.5 x 12.5                                                               | 0.40                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 102 |                      |
| (2000)                                                       |                                                                                 |                            | (2000)                                         | (1500)            | (1500)                            | (1300)            | (1300)                                   | 122               |     |                      |
|                                                              |                                                                                 |                            |                                                |                   |                                   |                   |                                          | 152               |     |                      |
|                                                              |                                                                                 |                            |                                                |                   |                                   |                   |                                          | 182               |     |                      |
| 0.0022                                                       | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 222 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.0027                                                       | 4.3 x 11.3 x 12.5                                                               | 0.38                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 272 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.0033                                                       | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 332 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1300)                                   | (1300)            |     |                      |
| 0.0039                                                       | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 392 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.0047                                                       | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 472 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.0056                                                       | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 562 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1300)                                   | (1300)            |     |                      |
| 0.0068                                                       | 4.2 x 11.2 x 12.5                                                               | 0.37                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 682 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.0082                                                       | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 822 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1300)                                   | (1300)            |     |                      |
| 0.010                                                        | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 103 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.012                                                        | 4.5 x 11.5 x 12.5                                                               | 0.40                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 123 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1300)                                   | (1300)            |     |                      |
| 0.015                                                        | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 153 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.018                                                        | 4.5 x 11.5 x 12.5                                                               | 0.40                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 183 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1300)                                   | (1300)            |     |                      |
| 0.022                                                        | 4.0 x 11.0 x 12.5                                                               | 0.35                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 223 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.027                                                        | 4.2 x 11.2 x 12.5                                                               | 0.37                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 273 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.033                                                        | 4.6 x 11.6 x 12.5                                                               | 0.41                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 333 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1300)                                   | (1300)            |     |                      |
| 0.039                                                        | 5.0 x 12.0 x 12.5                                                               | 0.44                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 393 |                      |
|                                                              |                                                                                 |                            | (1500)                                         | (1500)            | (1250)                            | (1250)            | (1200)                                   | (1200)            |     |                      |
| 0.047                                                        | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 473 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.056                                                        | 4.4 x 11.4 x 12.5                                                               | 0.39                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 563 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1500)                            | (1500)            | (1500)                                   | (1500)            |     |                      |
| 0.068                                                        | 4.8 x 11.8 x 12.5                                                               | 0.42                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 683 |                      |
|                                                              |                                                                                 |                            | (2000)                                         | (2000)            | (1250)                            | (1250)            | (1300)                                   | (1300)            |     |                      |
| 0.082                                                        | 5.4 x 12.4 x 12.5                                                               | 0.46                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 823 |                      |
|                                                              |                                                                                 |                            | (1500)                                         | (1500)            | (1000)                            | (1000)            | (1200)                                   | (1200)            |     |                      |
| 0.10                                                         | 5.7 x 12.7 x 12.5                                                               | 0.48                       | 55...                                          | 56...             | 51...                             | 52...             | 58...                                    | 59...             | 104 |                      |
|                                                              |                                                                                 |                            | (1500)                                         | (1500)            | (1000)                            | (1000)            | (1100)                                   | (1100)            |     |                      |

**Notes**

- SPQ = Standard Packing Quantity

<sup>(1)</sup> Net weight for short lead product only

 $U_{RDC} = 630 \text{ V}$ ;  $U_{RAC} = 250 \text{ V}$ 

| C<br>(μF)                                                    | DIMENSIONS<br>w <sub>max.</sub> x h <sub>max.</sub> x l <sub>max.</sub><br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 469 XYYYY AND PACKAGING    |                   |                                   |                   |                                          |                   |         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------|------------------------------------------------|-------------------|-----------------------------------|-------------------|------------------------------------------|-------------------|---------|
|                                                              |                                                                                 |                            | LOOSE IN BOX                                   |                   |                                   |                   | REEL                                     |                   | C-VALUE |
|                                                              |                                                                                 |                            | l <sub>t</sub> = 4.0 mm<br>+ 1.0 mm / - 0.5 mm |                   | l <sub>t</sub> = 22.0 mm ± 4.0 mm |                   | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm |                   |         |
|                                                              |                                                                                 |                            | C-TOL. =<br>± 10 %                             | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                | C-TOL. =<br>± 5 % | C-TOL. =<br>± 10 %                       | C-TOL. =<br>± 5 % |         |
|                                                              |                                                                                 |                            | XX<br>(SPQ)                                    | XX<br>(SPQ)       | XX<br>(SPQ)                       | XX<br>(SPQ)       | XX<br>(SPQ)                              | XX<br>(SPQ)       |         |
| Pitch = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm |                                                                                 |                            |                                                |                   |                                   |                   |                                          |                   |         |
| 0.010                                                        | 4.1 x 11.1 x 12.5                                                               | 0.36                       | 65...<br>(2000)                                | 66...<br>(2000)   | 61...<br>(1500)                   | 62...<br>(1500)   | 68...<br>(1500)                          | 69...<br>(1500)   | 103     |
| 0.012                                                        | 4.5 x 11.5 x 12.5                                                               | 0.40                       | 65...<br>(2000)                                | 66...<br>(2000)   | 61...<br>(1500)                   | 62...<br>(1500)   | 68...<br>(1300)                          | 69...<br>(1300)   | 123     |
| 0.015                                                        | 4.9 x 11.9 x 12.5                                                               | 0.43                       | 65...<br>(2000)                                | 66...<br>(2000)   | 61...<br>(1250)                   | 62...<br>(1250)   | 68...<br>(1200)                          | 69...<br>(1200)   | 153     |
| 0.018                                                        | 5.4 x 12.4 x 12.5                                                               | 0.46                       | 65...<br>(1500)                                | 66...<br>(1500)   | 61...<br>(1000)                   | 62...<br>(1000)   | 68...<br>(1100)                          | 69...<br>(1100)   | 183     |
| 0.022                                                        | 4.8 x 11.8 x 12.5                                                               | 0.42                       | 65...<br>(2000)                                | 66...<br>(2000)   | 61...<br>(1250)                   | 62...<br>(1250)   | 68...<br>(1300)                          | 69...<br>(1300)   | 223     |
| 0.027                                                        | 5.3 x 12.3 x 12.5                                                               | 0.46                       | 65...<br>(2000)                                | 66...<br>(2000)   | 61...<br>(1000)                   | 62...<br>(1000)   | 68...<br>(1200)                          | 69...<br>(1200)   | 273     |
| 0.033                                                        | 5.9 x 12.9 x 12.5                                                               | 0.52                       | 65...<br>(1500)                                | 66...<br>(1500)   | 61...<br>(1000)                   | 62...<br>(1000)   | 68...<br>(1100)                          | 69...<br>(1100)   | 333     |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Net weight for short lead product only

**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 the underside and the kinks are in good contact with the printed-circuit board.

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

**Storage Temperature**

$T_{\text{stg}} = -25 \text{ }^{\circ}\text{C}$  to  $+35 \text{ }^{\circ}\text{C}$  with RH maximum 75 % without condensation

**SOLDERING**

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)

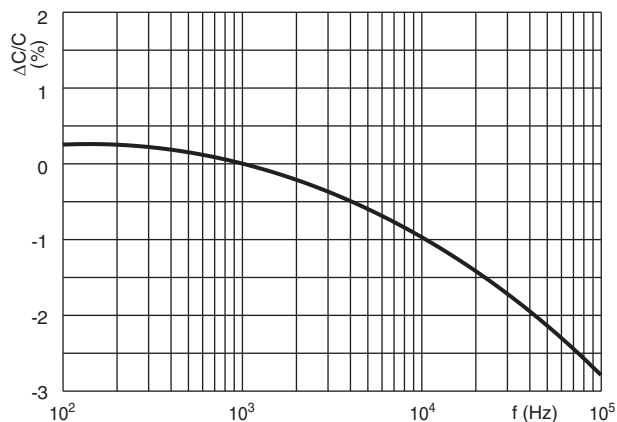
**Ratings and Characteristics Reference Conditions**

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

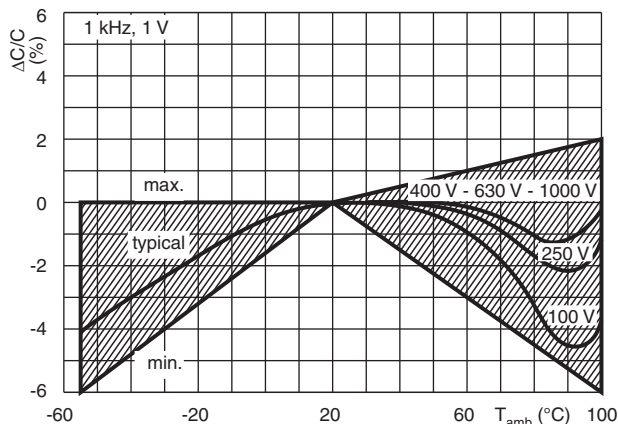
For reference testing, a conditioning period shall be applied over  $96 \text{ h} \pm 4 \text{ h}$  by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



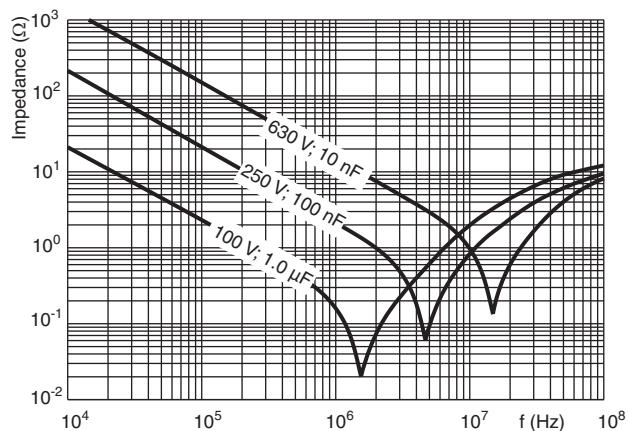
## CHARACTERISTICS



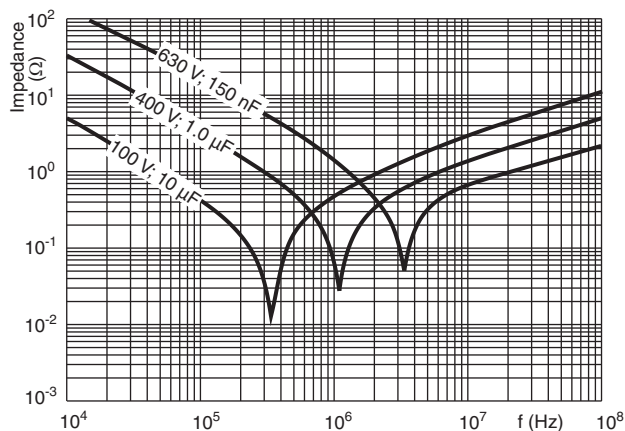
Capacitance as a function of frequency  
(typical curve)



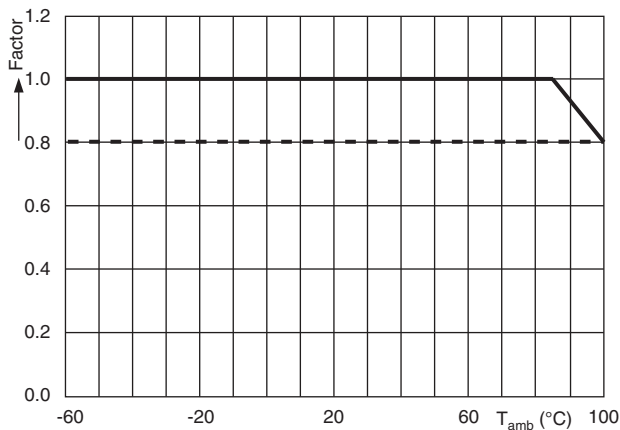
Capacitance as a function of ambient temperature  
(typical curve)



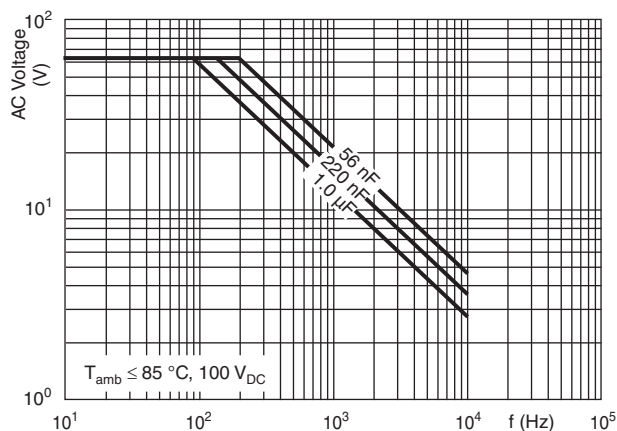
467, 469 - Impedance as a function of frequency  
(typical curve)



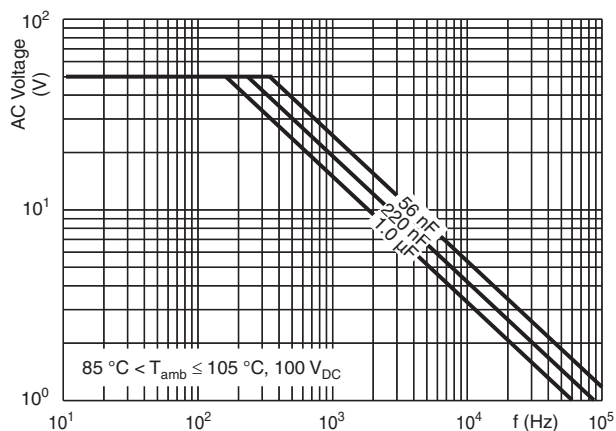
468 - Impedance as a function of frequency  
(typical curve)



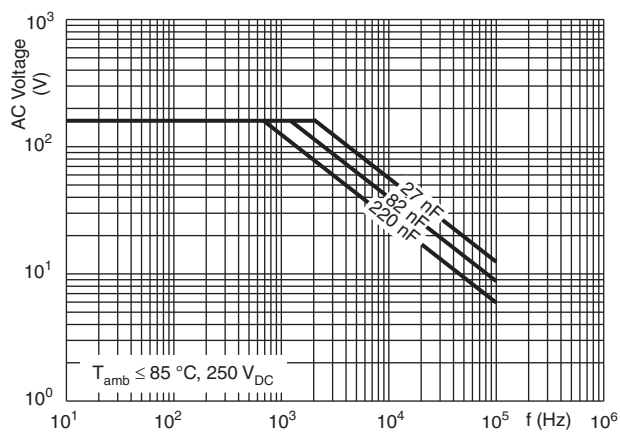
Max. DC and AC voltage as a function of temperature



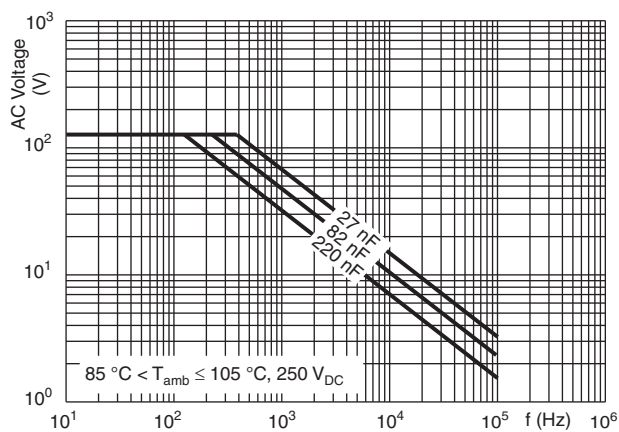
467, 469 - Max. RMS voltage as a function of frequency



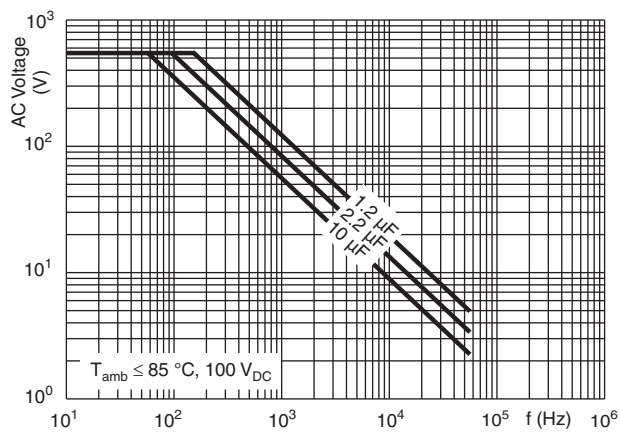
467, 469 - Max. RMS voltage as a function of frequency



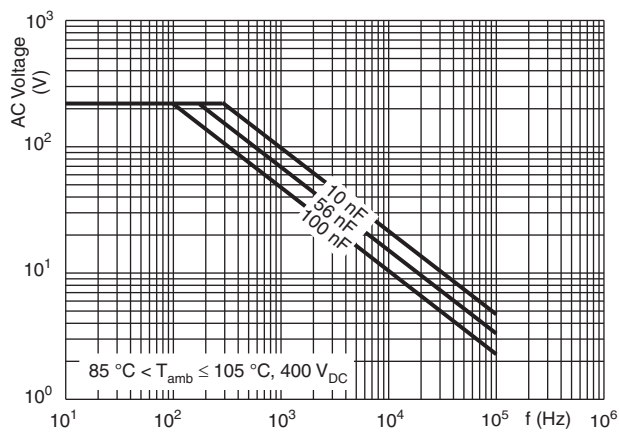
467, 469 - Max. RMS voltage as a function of frequency



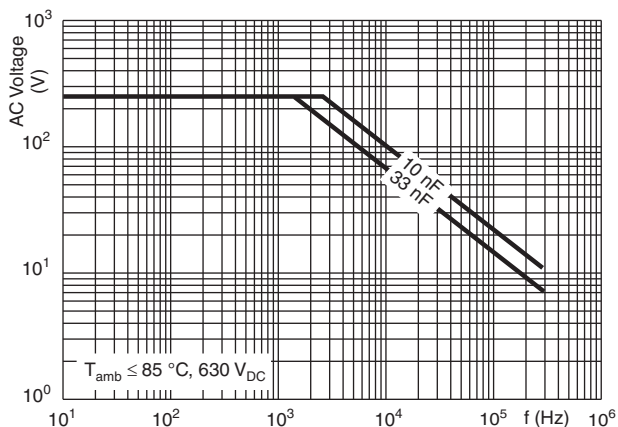
467, 469 - Max. RMS voltage as a function of frequency



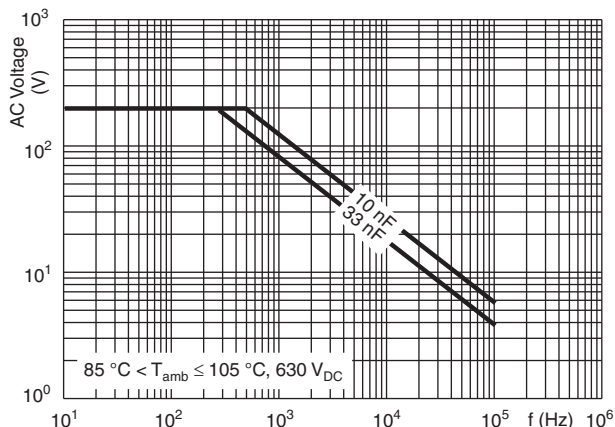
467, 469 - Max. RMS voltage as a function of frequency



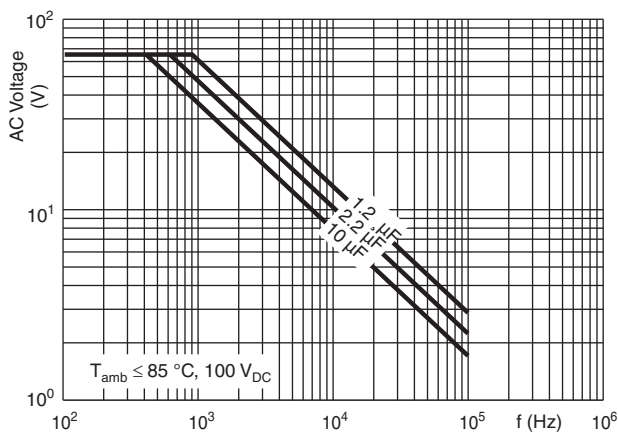
467, 469 - Max. RMS voltage as a function of frequency



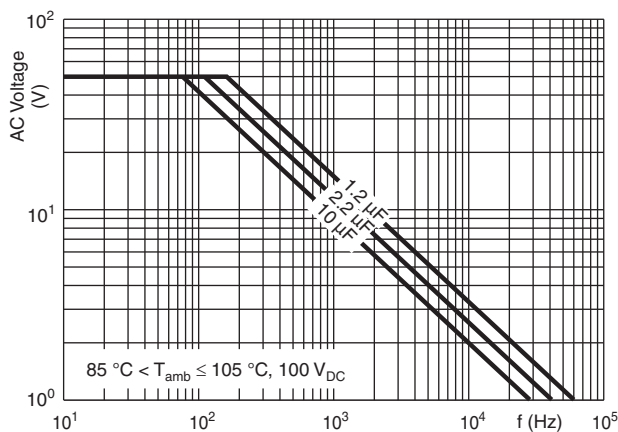
467, 469 - Max. RMS voltage as a function of frequency



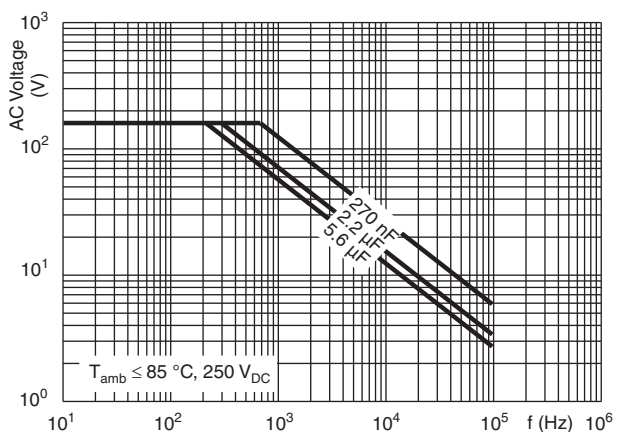
467, 469 - Max. RMS voltage as a function of frequency



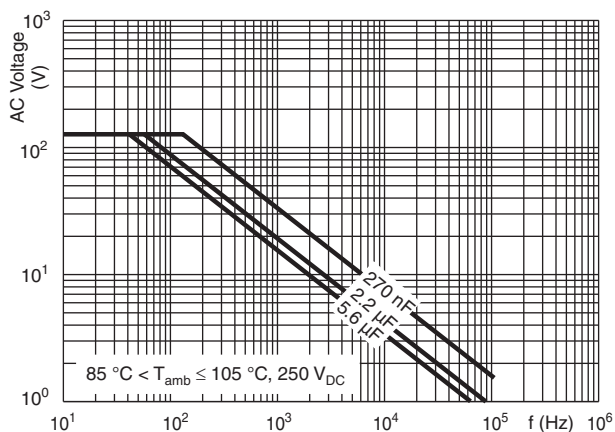
468 - Max. RMS voltage as a function of frequency



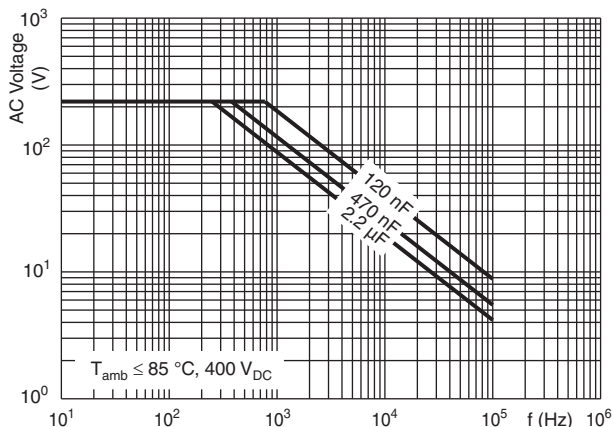
468 - Max. RMS voltage as a function of frequency



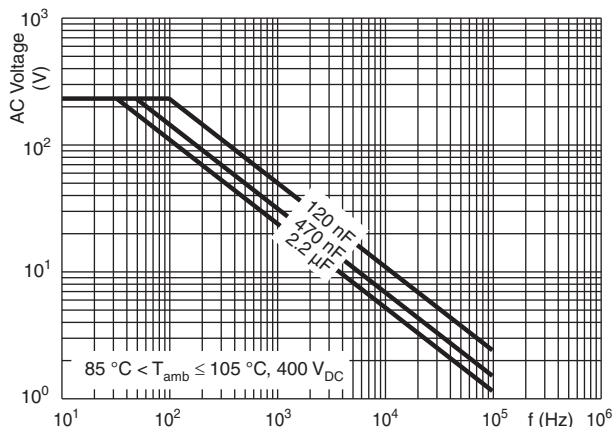
468 - Max. RMS voltage as a function of frequency



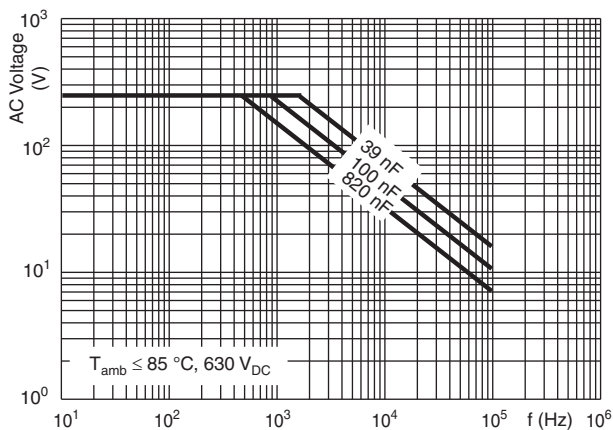
468 - Max. RMS voltage as a function of frequency



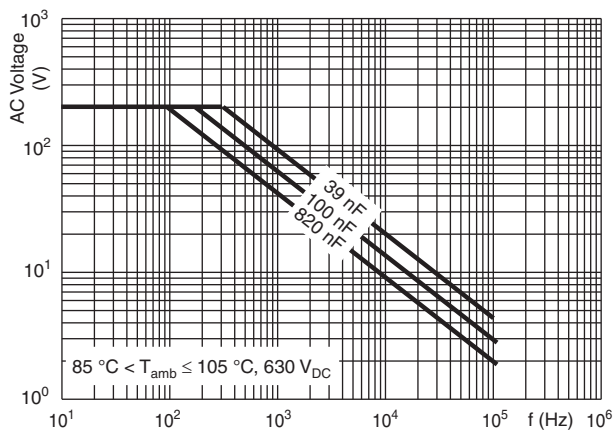
468 - Max. RMS voltage as a function of frequency



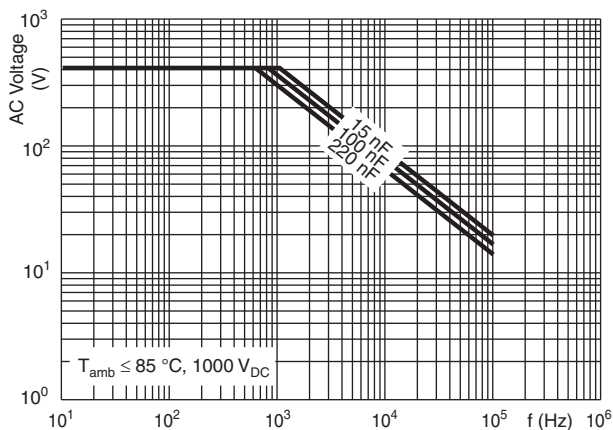
468 - Max. RMS voltage as a function of frequency



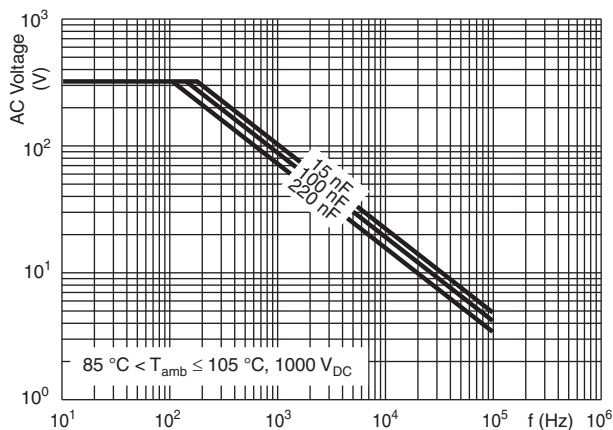
468 - Max. RMS voltage as a function of frequency



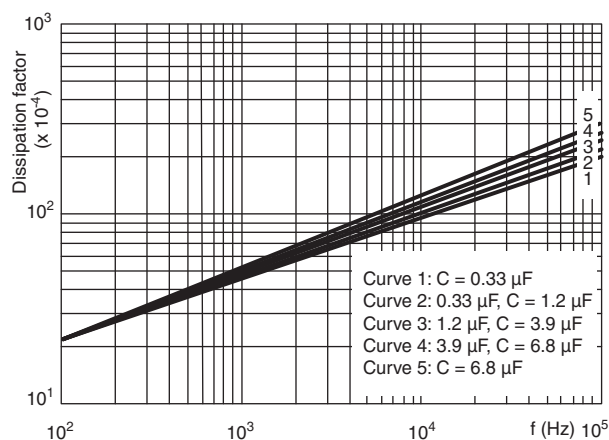
468 - Max. RMS voltage as a function of frequency



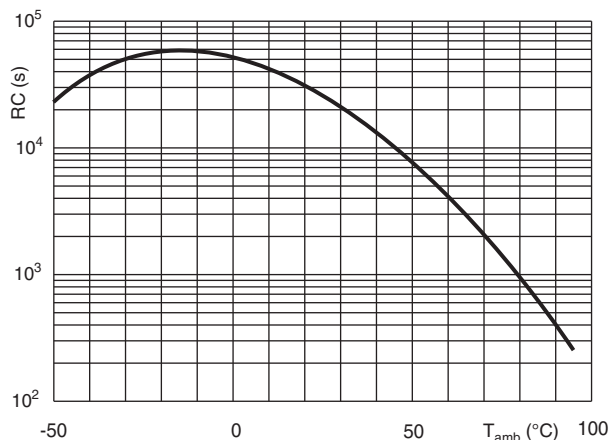
468 - Max. RMS voltage as a function of frequency



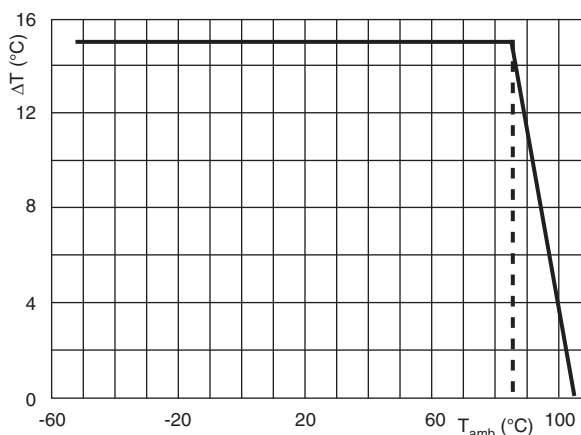
468 - Max. RMS voltage as a function of frequency



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



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



Maximum allowed component temperature rise ( $\Delta T$ )  
as a function of the ambient temperature ( $T_{amb}$ )

### HEAT CONDUCTIVITY (G) AS A FUNCTION OF (ORIGINAL) PITCH AND CAPACITOR BODY THICKNESS IN mW/°C

| $W_{max.}$<br>(mm) | HEAT CONDUCTIVITY (mW/°C) |               |               |               |
|--------------------|---------------------------|---------------|---------------|---------------|
|                    | PITCH 10 mm               | PITCH 15.5 mm | PITCH 22.5 mm | PITCH 27.5 mm |
| 4.0                | 4.0                       | 5.0           | -             | -             |
| 4.5                | 4.5                       | 6.0           | -             | -             |
| 5.0                | 5.0                       | 6.0           | 12.0          | 13.0          |
| 5.5                | 6.0                       | 6.5           | 13.0          | 15.0          |
| 6.0                | 6.0                       | 6.5           | 13.0          | 15.0          |
| 6.5                | 6.5                       | 8.0           | 15.0          | 17.0          |
| 7.0                | -                         | 8.0           | 15.0          | 17.0          |
| 7.5                | -                         | 9.0           | 17.0          | 18.0          |
| 8.0                | -                         | 9.0           | 17.0          | 20.0          |
| 8.5                | -                         | 11.0          | 18.0          | 20.0          |
| 9.0                | -                         | 11.0          | 18.0          | 22.0          |
| 9.5                | -                         | 12.0          | 20.0          | 22.0          |
| 10.0               | -                         | 12.0          | 20.0          | 23.0          |
| 10.5               | -                         | -             | 22.0          | 25.0          |
| 11.0               | -                         | -             | -             | 25.0          |
| 11.5               | -                         | -             | -             | 27.0          |

| $W_{max.}$<br>(mm) | HEAT CONDUCTIVITY (mW/°C) |               |               |               |
|--------------------|---------------------------|---------------|---------------|---------------|
|                    | PITCH 10 mm               | PITCH 15.5 mm | PITCH 22.5 mm | PITCH 27.5 mm |
| 12.0               | -                         | -             | -             | 27.0          |
| 12.5               | -                         | -             | -             | 30.0          |
| 13.0               | -                         | -             | -             | 30.0          |
| 13.5               | -                         | -             | -             | 30.0          |
| 14.0               | -                         | -             | -             | 30.0          |
| 14.5               | -                         | -             | -             | 33.0          |
| 15.0               | -                         | -             | -             | 33.0          |
| 15.5               | -                         | -             | -             | 37.0          |
| 16.0               | -                         | -             | -             | 37.0          |

## POWER DISSIPATION AND MAXIMUM COMPONENT TEMPERATURE RISE

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free ambient temperature.

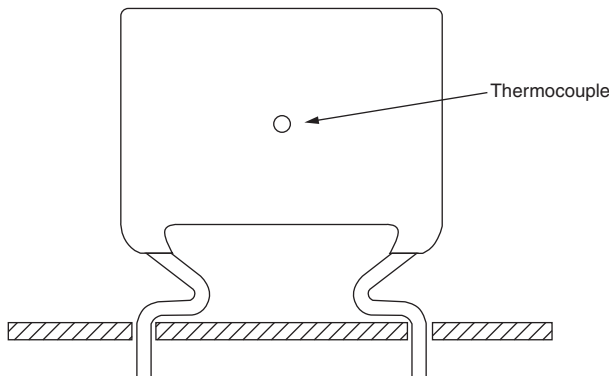
The power dissipation can be calculated according type detail specification "HQN-384-01/101: Technical Information Film Capacitors".

The component temperature rise ( $\Delta T$ ) can be measured (see section "Measuring the component temperature" for more details) or calculated by  $\Delta T = P/G$ :

- $\Delta T$  = component temperature rise (°C)
- $P$  = power dissipation of the component (mW)
- $G$  = heat conductivity of the component (mW/°C)

## MEASURING THE COMPONENT TEMPERATURE

A thermocouple must be attached to the capacitor body as in:



The temperature is measured in unloaded ( $T_{amb}$ ) and maximum loaded condition ( $T_C$ ).

The temperature rise is given by  $\Delta T = T_C - T_{amb}$ .

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

## APPLICATION NOTE AND LIMITING CONDITIONS

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: [dc-film@vishay.com](mailto:dc-film@vishay.com)

To select the capacitor for a certain application, the following conditions must be checked:

1. The peak voltage ( $U_P$ ) shall not be greater than the rated DC voltage ( $U_{RDC}$ )
2. The peak-to-peak voltage ( $U_{P-P}$ ) shall not be greater than  $2\sqrt{2} \times U_{RAC}$  to avoid the ionization inception level

3. The voltage pulse slope ( $dU/dt$ ) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by  $U_{RDC}$  and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left( \frac{dU}{dt} \right)^2 \times dt < U_{RDC} \times \left( \frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3 % per K shall be applied.

4. The maximum component surface temperature rise must be lower than the limits (see graph "Max. allowed component temperature rise").
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in the table: "Heat Conductivity"
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that the following conditions are fulfilled in any case (spikes and surge voltages from the mains included).

#### VOLTAGE CONDITIONS FOR 6 ABOVE

| ALLOWED VOLTAGES                             | $T_{amb} \leq 85\text{ °C}$ | $85\text{ °C} < T_{amb} \leq 105\text{ °C}$ |
|----------------------------------------------|-----------------------------|---------------------------------------------|
| Maximum continuous RMS voltage               | $U_{RAC}$                   | $0.8 \times U_{RAC}$                        |
| Maximum temperature RMS-overvoltage (< 24 h) | $1.25 \times U_{RAC}$       | $U_{RAC}$                                   |
| Maximum peak voltage ( $V_{O-P}$ ) (< 2 s)   | $1.6 \times U_{RAC}$        | $1.3 \times U_{RAC}$                        |

#### Example

C = 330 nF - 100 V used for the voltage signal shown in next drawing.

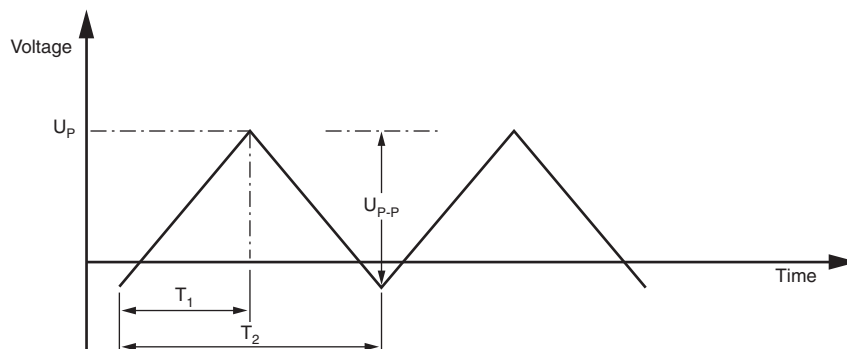
$U_{P-P} = 80\text{ V}$ ;  $U_P = 70\text{ V}$ ;  $T_1 = 0.5\text{ ms}$ ;  $T_2 = 1\text{ ms}$

The ambient temperature is 35 °C

Checking conditions:

1. The peak voltage  $U_P = 70\text{ V}$  is lower than  $100\text{ V}_{DC}$
2. The peak-to-peak voltage  $80\text{ V}$  is lower than  $2\sqrt{2} \times 63\text{ V}_{AC} = 178\text{ V}_{P-P}$
3. The voltage pulse slope ( $dU/dt$ ) =  $80\text{ V}/500\text{ }\mu\text{s} = 0.16\text{ V}/\mu\text{s}$   
This is lower than  $20\text{ V}/\mu\text{s}$  (see specific reference data for each version)
4. The dissipated power is 60 mW as calculated with fourier terms  
The temperature rise for  $W_{max.} = 8.5\text{ mm}$  and pitch = 15 mm will be  $60\text{ mW}/11\text{ mW}/\text{°C} = 5.5\text{ °C}$   
This is lower than 15 °C temperature rise at 35 °C, according figure "Max. allowed component temperature rise"
5. Not applicable
6. Not applicable

#### Voltage Signal



**INSPECTION REQUIREMENTS****General Notes**

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-2 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 chapters “General Data” of this specification                                                                                                                                                                                                                                                                                                 |
| 4.3.1 Initial measurements                          | Capacitance<br>Tangent of loss angle:<br>for $C \leq 470$ nF at 100 kHz or<br>for $C > 470$ nF at 10 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                    | Method: 1A<br>Solder bath: 280 °C ± 5 °C<br>Duration: 10 s                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                               |
| 4.14 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                                                                                                                                                                                  | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 2$ % of the value measured initially<br><br>Increase of $\tan \delta$<br>$\leq 0.005$ for: $C \leq 100$ nF or<br>$\leq 0.010$ for: $100$ nF < $C \leq 220$ nF or<br>$\leq 0.015$ for: $220$ nF < $C \leq 470$ nF and<br>$\leq 0.003$ for: $C > 470$ nF<br>Compared to values measured in 4.3.1 |
| <b>SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1</b> |                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                               |
| 4.6.1 Initial measurements                          | Capacitance<br>Tangent of loss angle:<br>for $C \leq 470$ nF at 100 kHz or<br>for $C > 470$ nF at 10 kHz                                                                                                                                            | No visible damage                                                                                                                                                                                                                                                                                                                                             |
| 4.6 Rapid change of temperature                     | $\theta A = -55$ °C<br>$\theta B = +100$ °C<br>5 cycles<br>Duration $t = 30$ min                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                               |
| 4.7 Vibration                                       | Visual examination<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 | No visible damage                                                                                                                                                                                                                                                                                                                                             |
| 4.7.2 Final inspection                              | Visual examination                                                                                                                                                                                                                                  | No visible damage                                                                                                                                                                                                                                                                                                                                             |



| SUB-CLAUSE NUMBER AND TEST                                                 | CONDITIONS                                                                                                                                                                                   | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.9 Shock                                                                  | Mounting:<br>see section "Mounting" of this specification<br>Pulse shape: half sine<br>Acceleration: 490 m/s <sup>2</sup><br>Duration of pulse: 11 ms                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.9.3 Final measurements                                                   | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br><br>Insulation resistance                                                                                          | No visible damage<br><br>$ \Delta C/C  \leq 3\%$ of the value measured in 4.6.1<br><br>Increase of $\tan \delta$<br>$\leq 0.005$ for: $C \leq 100$ nF or<br>$\leq 0.010$ for: $100$ nF $< C \leq 220$ nF or<br>$\leq 0.015$ for: $220$ nF $< C \leq 470$ nF and<br>$\leq 0.003$ for: $C > 470$ nF<br>Compared to values measured in 4.6.1<br><br>As specified in section "Insulation Resistance" of this specification                                                                                           |
| <b>SUB-GROUP C1 COMBINED SAMPLE OF SPECIMENS OF SUB-GROUPS C1A AND C1B</b> |                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.10 Climatic sequence                                                     |                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.10.2 Dry heat                                                            | Temperature: +105 °C<br>Duration: 16 h                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.10.3 Damp heat cyclic<br>Test Db, first cycle                            |                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.10.4 Cold                                                                | Temperature: -55 °C<br>Duration: 2 h                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.10.6 Damp heat cyclic<br>Test Db, remaining cycles                       |                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.10.6.2 Final measurements                                                | Voltage proof = $U_{RDC}$ for 1 min within 15 min after removal from test chamber<br><br>Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br><br>Insulation resistance | No breakdown or flash-over<br><br>No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.4.2 or 4.9.3<br><br>Increase of $\tan \delta$<br>$\leq 0.007$ for: $C \leq 100$ nF or<br>$\leq 0.010$ for: $100$ nF $< C \leq 220$ nF or<br>$\leq 0.015$ for: $220$ nF $< C \leq 470$ nF and<br>$\leq 0.005$ for: $C > 470$ nF<br>Compared to values measured in 4.3.1 or 4.6.1<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |



| SUB-CLAUSe NUMBER AND TEST  | CONDITIONS                                                                                                                                                                               | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SUB-GROUP C2</b>         |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.11 Damp heat steady state | 56 days, 40 °C, 90 % to 95 % RH                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.11.1 Initial measurements | Capacitance<br>Tangent of loss angle at 1 kHz                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.11.3 Final measurements   | Voltage proof = $U_{RDC}$ for 1 min within 15 min after removal from test chamber<br><br>Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance | No breakdown or flash-over<br><br>No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.11.1.<br><br>Increase of $\tan \delta \leq 0.005$<br>Compared to values measured in 4.11.1<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification                                                                                                                                          |
| <b>SUB-GROUP C3</b>         |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.12 Endurance              | Duration: 2000 h<br>$1.25 \times U_{RDC}$ at 85 °C<br>$1.0 \times U_{RDC}$ at 105 °C                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.12.1 Initial measurements | Capacitance<br>Tangent of loss angle:<br>for $C \leq 470$ nF at 100 kHz or<br>for $C > 470$ nF at 10 kHz                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.12.5 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\%$ compared to values measured in 4.12.1<br><br>Increase of $\tan \delta$<br>$\leq 0.005$ for: $C \leq 100$ nF or<br>$\leq 0.010$ for: $100$ nF $< C \leq 220$ nF or<br>$\leq 0.015$ for: $220$ nF $< C \leq 470$ nF and<br>$\leq 0.003$ for: $C > 470$ nF<br>Compared to values measured in 4.12.1<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |
| <b>SUB-GROUP C4</b>         |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.13 Charge and discharge   | 10 000 cycles<br>Charged to $U_{RDC}$<br>Discharge resistance:<br>$R = \frac{U_R}{C \times 2.5 \times (dU/dt)_R}$                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.13.1 Initial measurements | Capacitance<br>Tangent of loss angle:<br>for $C \leq 470$ nF at 100 kHz or<br>for $C > 470$ nF at 10 kHz                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4.13.3 Final measurements   | Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance                                                                                                                    | $ \Delta C/C  \leq 3\%$ compared to values measured in 4.13.1<br><br>Increase of $\tan \delta$<br>$\leq 0.005$ for: $C \leq 100$ nF or<br>$\leq 0.010$ for: $100$ nF $< C \leq 220$ nF or<br>$\leq 0.015$ for: $220$ nF $< C \leq 470$ nF and<br>$\leq 0.003$ for: $C > 470$ nF<br>Compared to values measured in 4.13.1<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification                                             |



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