

## Interference Suppression Film Capacitors MKP Radial Potted Type

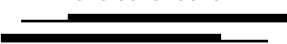

**FEATURES**

- Compliant with IEC 60384-14: AMD1 grade IA  
- THB: 40 °C / 93 % RH, 21 days at  $U_{RAC}$
- Supplied loose in box, taped on reel
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS  
COMPLIANT**
**APPLICATIONS**

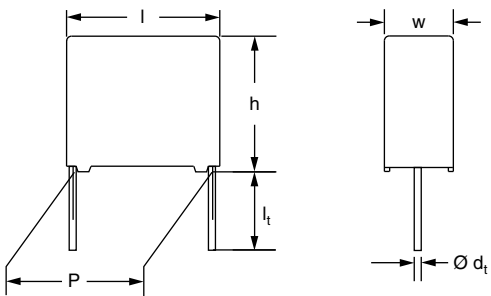
For standard across the line X2 applications

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

| QUICK REFERENCE DATA                            |                                                                                                                                                                                                |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacitance range (E12 series)                  | 0.001 $\mu$ F to 3.3 $\mu$ F (preferred values acc. to E6)                                                                                                                                     |
| Capacitance tolerance                           | $\pm 20$ %; $\pm 10$ %, $\pm 5$ %                                                                                                                                                              |
| Climatic testing class according to IEC 60068-1 | 55/110/56/B                                                                                                                                                                                    |
| Rated AC voltage                                | 310 $V_{AC}$ ; 50 Hz to 60 Hz                                                                                                                                                                  |
| Permissible DC voltage                          | 800 $V_{DC}$ at 85 °C, 630 $V_{DC}$ at 110 °C                                                                                                                                                  |
| Maximum application temperature                 | $C \leq 470$ nF: 110 °C (125 °C for less than 1000 h), $C > 470$ nF: 110 °C                                                                                                                    |
| Reference standards                             | IEC 60384-14:2013<br>IEC 60384-14:2013 / AMD1:2016<br>EN 60384-14:2013 + AMD1:2016<br>IEC 60065 requires pass. flamm. class B<br>UL 60384-14; CSA-E384-14, CQC                                 |
| Dielectric                                      | Polypropylene film                                                                                                                                                                             |
| Electrodes                                      | Metallized film                                                                                                                                                                                |
| Construction                                    | Mono construction<br>                                                                                      |
| Encapsulation                                   | Plastic case, epoxy resin sealed, flame retardant<br>UL-class 94 V-0                                                                                                                           |
| Leads                                           | Tinned wire                                                                                                                                                                                    |
| Marking                                         | C-value; tolerance; rated voltage; sub-class; manufacturer's type designation;<br>code for dielectric material, manufacturer location; manufacturer's logo;<br>year and week; safety approvals |

**Note**

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

| DIMENSIONS                                                                           |
|--------------------------------------------------------------------------------------|
|  |



**COMPOSITION OF CATALOG NUMBER**

| TYPE AND PITCHES |         |
|------------------|---------|
| 338 2            | 7.5 mm  |
|                  | 10.0 mm |
| X2               | 15.0 mm |
|                  | 22.5 mm |
|                  | 27.5 mm |

**CAPACITANCE**  
(numerically)

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

Example:  
104 = 10 x 10 = 100 nF

|         |     |    |    |   |
|---------|-----|----|----|---|
| BFC2    | 338 | 2X | XX | X |
| 2222(*) | 338 | 2X | XX | X |

(\*) Old ordering code

| TYPE                      | PACKAGING                 | STANDARD DIMENSIONS                                    | C-TOL.                    | PREFERRED TYPES        |
|---------------------------|---------------------------|--------------------------------------------------------|---------------------------|------------------------|
| MKP338 2 X2               | Loose in box              | Lead length 3.5 mm + 1 mm/- 0.5 mm; pitch ≤ 10.0 mm    | ± 20 %                    | BFC2 338 20            |
|                           |                           | Lead length 3.5 mm ± 0.3 mm; pitch ≥ 15.0 mm           |                           | BFC2 338 20            |
|                           |                           | Lead length 5.0 mm ± 1 mm                              |                           | BFC2 338 22            |
|                           |                           | Lead length 25.0 mm ± 2 mm                             |                           | BFC2 338 24            |
| Taped ammo <sup>(1)</sup> | Taped reel <sup>(1)</sup> | Pitch ≤ 15.0 mm; H = 18.5 mm; P <sub>0</sub> = 12.7 mm | ± 20 %<br>± 10 %<br>± 5 % | See tables for details |
|                           |                           | Pitch 22.5 mm; H = 18.5 mm; P <sub>0</sub> = 12.7 mm   |                           |                        |
| TYPE                      | PACKAGING                 | ALTERNATIVE PITCH SIZES AND TOLERANCES                 | C-TOL.                    | PREFERRED TYPES        |
| MKP338 2 X2               | Loose in box              | Packaging like 20 % and alternative pitch sizes        | ± 5 %<br>± 10 %<br>± 20 % | See tables for details |

**Notes**

- <sup>(1)</sup> Taped on reel and taped on ammo pitch = 27.5 mm is not available
- For detailed tape specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

| SPECIFIC REFERENCE DATA                                                                  |                                      |                         |
|------------------------------------------------------------------------------------------|--------------------------------------|-------------------------|
| DESCRIPTION                                                                              | VALUE                                |                         |
| Rated AC voltage (U <sub>RAC</sub> )                                                     | 310 V                                |                         |
| Permissible DC voltage (U <sub>RDC</sub> )                                               | 630 V                                |                         |
| Tangent of loss angle:                                                                   | at 1 kHz                             | at 10 kHz               |
| C ≤ 470 nF                                                                               | ≤ 10 x 10 <sup>-4</sup>              | ≤ 20 x 10 <sup>-4</sup> |
| 470 nF < C ≤ 1 μF                                                                        | ≤ 20 x 10 <sup>-4</sup>              | ≤ 70 x 10 <sup>-4</sup> |
| C > 1 μF                                                                                 | ≤ 30 x 10 <sup>-4</sup>              | -                       |
| Rated voltage pulse slope (dU/dt) <sub>R</sub> at 435 V <sub>DC</sub>                    |                                      |                         |
| Pitch = 7.5 mm                                                                           | 600 V/μs                             |                         |
| Pitch = 10 mm                                                                            | 600 V/μs                             |                         |
| Pitch = 15 mm and 7.5 mm (bent back)                                                     | 400 V/μs                             |                         |
| Pitch = 22.5 mm                                                                          | 150 V/μs                             |                         |
| Pitch = 27.5 mm                                                                          | 100 V/μs                             |                         |
| R between leads, for C ≤ 0.33 μF at 100 V; 1 min                                         | > 15 000 MΩ                          |                         |
| RC between leads, for C > 0.33 μF at 100 V; 1 min                                        | > 5000 s                             |                         |
| R between leads and case; 100 V; 1 min                                                   | > 30 000 MΩ                          |                         |
| Withstanding (DC) voltage (cut off current 10 mA) <sup>(1)</sup> ; rise time ≤ 1000 V/s: |                                      |                         |
| C ≤ 1 μF                                                                                 | 2200 V; 1 min                        |                         |
| C > 1 μF                                                                                 | 1800 V; 1 min                        |                         |
| Withstanding (AC) voltage between leads and case                                         | 2120 V; 1 min                        |                         |
| Max. application temperature for 0.001 μF ≤ C ≤ 0.47 μF                                  | 110 °C (125 °C for less than 1000 h) |                         |
| Max. application temperature for C > 0.47 μF                                             | 110 °C                               |                         |

**Note**

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



| ELECTRICAL DATA AND ORDERING CODE - PITCH 7.5 mm                                   |                   |                                 |                            |                                             |                                     |      |                                      |       |                                         |      |
|------------------------------------------------------------------------------------|-------------------|---------------------------------|----------------------------|---------------------------------------------|-------------------------------------|------|--------------------------------------|-------|-----------------------------------------|------|
| U <sub>RAC</sub><br>(V)                                                            | CAP.<br>(μF)      | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(2)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING |                                     |      |                                      |       |                                         |      |
|                                                                                    |                   |                                 |                            | LOOSE IN BOX                                |                                     |      |                                      |       | AMMOPACK <sup>(1)</sup>                 |      |
|                                                                                    |                   |                                 |                            | SHORT LEADS                                 |                                     |      | LONG LEADS                           |       | H = 18.5 mm<br>P <sub>0</sub> = 12.7 mm |      |
|                                                                                    |                   |                                 |                            | l <sub>t</sub> = 3.5 mm<br>+ 1 mm/- 0.5 mm  | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ  | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ   |                                         | SPQ  |
| <b>PITCH = 7.5 mm ± 0.4 mm; d<sub>t</sub> = 0.50 mm ± 0.05 mm; C-TOL. = ± 20 %</b> |                   |                                 |                            |                                             |                                     |      |                                      |       |                                         |      |
| 310                                                                                | 0.0010            | 4.0 x 9.0 x 10.0                | 0.4                        | 20102                                       | 22102                               | 1500 | 24102                                | 1000  | 26102                                   | 1250 |
|                                                                                    | 0.0012            |                                 |                            | 20122                                       | 22122                               |      | 24122                                |       | 26122                                   |      |
|                                                                                    | 0.0015            |                                 |                            | 20152                                       | 22152                               |      | 24152                                |       | 26152                                   |      |
|                                                                                    | 0.0018            |                                 |                            | 20182                                       | 22182                               |      | 24182                                |       | 26182                                   |      |
|                                                                                    | 0.0022            |                                 |                            | 20222                                       | 22222                               |      | 24222                                |       | 26222                                   |      |
|                                                                                    | 0.0027            |                                 |                            | 20272                                       | 22272                               |      | 24272                                |       | 26272                                   |      |
|                                                                                    | 0.0033            |                                 |                            | 20332                                       | 22332                               |      | 24332                                |       | 26332                                   |      |
|                                                                                    | 0.0039            |                                 |                            | 20392                                       | 22392                               |      | 24392                                |       | 26392                                   |      |
|                                                                                    | 0.0047            |                                 |                            | 20472                                       | 22472                               |      | 24472                                |       | 26472                                   |      |
|                                                                                    | 0.0056            |                                 |                            | 20562                                       | 22562                               |      | 24562                                |       | 26562                                   |      |
|                                                                                    | 0.0068            |                                 |                            | 20682                                       | 22682                               |      | 24682                                |       | 26682                                   |      |
|                                                                                    | 0.0082            |                                 |                            | 20822                                       | 22822                               |      | 24822                                |       | 26822                                   |      |
|                                                                                    | 0.010             |                                 |                            | 20103                                       | 22103                               |      | 24103                                |       | 26103                                   |      |
|                                                                                    | 0.012             |                                 |                            | 20123                                       | 22123                               |      | 24123                                |       | 26123                                   |      |
|                                                                                    | 0.015             |                                 |                            | 20153                                       | 22153                               |      | 24153                                |       | 26153                                   |      |
|                                                                                    | 0.018             |                                 |                            | 20183                                       | 22183                               |      | 24183                                |       | 26183                                   |      |
|                                                                                    | 0.022             | 20223                           | 22223                      | 24223                                       | 26223                               |      |                                      |       |                                         |      |
|                                                                                    | 0.027             | 20273                           | 22273                      | 24273                                       | 26273                               | 1000 | 1250                                 | 26273 | 1000                                    |      |
|                                                                                    | 0.033             | 20333                           | 22333                      | 24333                                       | 26333                               |      |                                      |       |                                         |      |
|                                                                                    | 0.039             | 5.0 x 10.5 x 10.0               | 0.6                        | 20393                                       | 22393                               | 750  | 24393                                | 1000  | 26393                                   | 750  |
| 0.047                                                                              | 20473             | 22473                           |                            | 24473                                       | 26473                               |      |                                      |       |                                         |      |
| <b>PITCH = 7.5 mm ± 0.4 mm; d<sub>t</sub> = 0.50 mm ± 0.05 mm; C-TOL. = ± 10 %</b> |                   |                                 |                            |                                             |                                     |      |                                      |       |                                         |      |
| 310                                                                                | 0.0010            | 4.0 x 9.0 x 10.0                | 0.4                        | 28101                                       | 28301                               | 1500 | 28501                                | 1000  | 28701                                   | 1250 |
|                                                                                    | 0.0012            |                                 |                            | 28102                                       | 28302                               |      | 28502                                |       | 28702                                   |      |
|                                                                                    | 0.0015            |                                 |                            | 28103                                       | 28303                               |      | 28503                                |       | 28703                                   |      |
|                                                                                    | 0.0018            |                                 |                            | 28104                                       | 28304                               |      | 28504                                |       | 28704                                   |      |
|                                                                                    | 0.0022            |                                 |                            | 28105                                       | 28305                               |      | 28505                                |       | 28705                                   |      |
|                                                                                    | 0.0027            |                                 |                            | 28106                                       | 28306                               |      | 28506                                |       | 28706                                   |      |
|                                                                                    | 0.0033            |                                 |                            | 28107                                       | 28307                               |      | 28507                                |       | 28707                                   |      |
|                                                                                    | 0.0039            |                                 |                            | 28108                                       | 28308                               |      | 28508                                |       | 28708                                   |      |
|                                                                                    | 0.0047            |                                 |                            | 28109                                       | 28309                               |      | 28509                                |       | 28709                                   |      |
|                                                                                    | 0.0056            |                                 |                            | 28111                                       | 28311                               |      | 28511                                |       | 28711                                   |      |
|                                                                                    | 0.0068            |                                 |                            | 28112                                       | 28312                               |      | 28512                                |       | 28712                                   |      |
|                                                                                    | 0.0082            |                                 |                            | 28113                                       | 28313                               |      | 28513                                |       | 28713                                   |      |
|                                                                                    | 0.010             |                                 |                            | 28114                                       | 28314                               |      | 28514                                |       | 28714                                   |      |
|                                                                                    | 0.012             |                                 |                            | 28115                                       | 28315                               |      | 28515                                |       | 28715                                   |      |
|                                                                                    | 0.015             |                                 |                            | 28116                                       | 28316                               |      | 28516                                |       | 28716                                   |      |
|                                                                                    | 0.018             |                                 |                            | 28117                                       | 28317                               |      | 28517                                |       | 28717                                   |      |
|                                                                                    | 0.022             | 28118                           | 28318                      | 28518                                       | 28718                               |      |                                      |       |                                         |      |
|                                                                                    | 0.027             | 28119                           | 28319                      | 28519                                       | 28719                               | 1000 | 1250                                 | 28719 | 1000                                    |      |
|                                                                                    | 0.033             | 28121                           | 28321                      | 28521                                       | 28721                               |      |                                      |       |                                         |      |
|                                                                                    | 0.039             | 5.0 x 10.5 x 10.0               | 0.6                        | 28122                                       | 28332                               | 750  | 28522                                | 1000  | 28722                                   | 750  |
| 0.047                                                                              | 6.0 x 11.5 x 10.0 | 28123                           |                            | 28323                                       | 28523                               |      | 28723                                |       |                                         |      |



| ELECTRICAL DATA AND ORDERING CODE - PITCH 7.5 mm                            |              |                                 |                            |                                                        |                                           |      |                                            |      |                                         |      |
|-----------------------------------------------------------------------------|--------------|---------------------------------|----------------------------|--------------------------------------------------------|-------------------------------------------|------|--------------------------------------------|------|-----------------------------------------|------|
| U <sub>RAC</sub><br>(V)                                                     | CAP.<br>(μF) | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(2)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING            |                                           |      |                                            |      |                                         |      |
|                                                                             |              |                                 |                            | LOOSE IN BOX                                           |                                           |      |                                            |      | AMMOPACK <sup>(1)</sup>                 |      |
|                                                                             |              |                                 |                            | SHORT LEADS                                            |                                           |      | LONG LEADS                                 |      | H = 18.5 mm<br>P <sub>0</sub> = 12.7 mm |      |
|                                                                             |              |                                 |                            | $l_t = 3.5 \text{ mm} + 1 \text{ mm}/- 0.5 \text{ mm}$ | $l_t = 5.0 \text{ mm} \pm 1.0 \text{ mm}$ | SPQ  | $l_t = 25.0 \text{ mm} \pm 2.0 \text{ mm}$ | SPQ  |                                         | SPQ  |
| PITCH = 7.5 mm ± 0.4 mm; d <sub>t</sub> = 0.50 mm ± 0.05 mm; C-TOL. = ± 5 % |              |                                 |                            |                                                        |                                           |      |                                            |      |                                         |      |
| 310                                                                         | 0.0010       | 4.0 x 9.0 x 10.0                | 0.4                        | 28201                                                  | 28401                                     | 1500 | 28601                                      | 1000 | 28801                                   | 1250 |
|                                                                             | 0.0012       |                                 |                            | 28202                                                  | 28402                                     |      | 28602                                      |      | 28802                                   |      |
|                                                                             | 0.0015       |                                 |                            | 28203                                                  | 28403                                     |      | 28603                                      |      | 28803                                   |      |
|                                                                             | 0.0018       |                                 |                            | 28204                                                  | 28404                                     |      | 28604                                      |      | 28804                                   |      |
|                                                                             | 0.0022       |                                 |                            | 28205                                                  | 28405                                     |      | 28605                                      |      | 28805                                   |      |
|                                                                             | 0.0027       |                                 |                            | 28206                                                  | 28406                                     |      | 28606                                      |      | 28806                                   |      |
|                                                                             | 0.0033       |                                 |                            | 28207                                                  | 28407                                     |      | 28607                                      |      | 28807                                   |      |
|                                                                             | 0.0039       |                                 |                            | 28208                                                  | 28408                                     |      | 28608                                      |      | 28808                                   |      |
|                                                                             | 0.0047       |                                 |                            | 28209                                                  | 28409                                     |      | 28609                                      |      | 28809                                   |      |
|                                                                             | 0.0056       |                                 |                            | 28211                                                  | 28411                                     |      | 28611                                      |      | 28811                                   |      |
|                                                                             | 0.0068       |                                 |                            | 28212                                                  | 28412                                     |      | 28612                                      |      | 28812                                   |      |
|                                                                             | 0.0082       |                                 |                            | 28213                                                  | 28413                                     |      | 28613                                      |      | 28813                                   |      |
|                                                                             | 0.010        |                                 |                            | 28214                                                  | 28414                                     |      | 28614                                      |      | 28814                                   |      |
|                                                                             | 0.012        |                                 |                            | 28215                                                  | 28415                                     |      | 28615                                      |      | 28815                                   |      |
|                                                                             | 0.015        |                                 |                            | 28216                                                  | 28416                                     |      | 28616                                      |      | 28816                                   |      |
|                                                                             | 0.018        |                                 |                            | 28217                                                  | 28417                                     |      | 28617                                      |      | 28817                                   |      |
|                                                                             | 0.022        |                                 |                            | 28218                                                  | 28418                                     |      | 28618                                      |      | 28818                                   |      |
|                                                                             | 0.027        |                                 |                            | 28219                                                  | 28419                                     | 1000 | 28619                                      | 1250 | 28819                                   | 1000 |
|                                                                             | 0.033        | 5.0 x 10.5 x 10.0               | 0.6                        | 28221                                                  | 28421                                     | 1000 | 28621                                      | 1250 | 28821                                   | 1000 |
|                                                                             | 0.039        |                                 |                            | 28222                                                  | 28422                                     | 750  | 28622                                      | 1000 | 28822                                   | 750  |
|                                                                             | 0.047        | 6.0 x 11.5 x 10.0               | 0.8                        | 28223                                                  | 28423                                     | 750  | 28623                                      | 1000 | 28823                                   | 750  |

Notes

• SPQ = Standard Packing Quantity

<sup>(1)</sup> H = In-tape height, P<sub>0</sub> = Sprocket hole distance; for detailed specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

<sup>(2)</sup> Weight for short lead product only

| ELECTRICAL DATA AND ORDERING CODE - PITCH 10 mm                               |              |                                 |                            |                                                        |                                           |      |                                            |      |                                         |     |
|-------------------------------------------------------------------------------|--------------|---------------------------------|----------------------------|--------------------------------------------------------|-------------------------------------------|------|--------------------------------------------|------|-----------------------------------------|-----|
| U <sub>RAC</sub><br>(V)                                                       | CAP.<br>(μF) | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(2)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING            |                                           |      |                                            |      |                                         |     |
|                                                                               |              |                                 |                            | LOOSE IN BOX                                           |                                           |      |                                            |      | AMMOPACK <sup>(1)</sup>                 |     |
|                                                                               |              |                                 |                            | SHORT LEADS                                            |                                           |      | LONG LEADS                                 |      | H = 18.5 mm<br>P <sub>0</sub> = 12.7 mm |     |
|                                                                               |              |                                 |                            | $l_t = 3.5 \text{ mm} + 1 \text{ mm}/- 0.5 \text{ mm}$ | $l_t = 5.0 \text{ mm} \pm 1.0 \text{ mm}$ | SPQ  | $l_t = 25.0 \text{ mm} \pm 2.0 \text{ mm}$ | SPQ  |                                         | SPQ |
| PITCH = 10.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 20 % |              |                                 |                            |                                                        |                                           |      |                                            |      |                                         |     |
| 310                                                                           | 0.0010       | 4.0 x 10.0 x 12.5               | 0.6                        | 21102                                                  | 23102                                     | 1000 | 25102                                      | 1250 | Not available                           |     |
|                                                                               | 0.0012       |                                 |                            | 21122                                                  | 23122                                     |      | 25122                                      |      |                                         |     |
|                                                                               | 0.0015       |                                 |                            | 21152                                                  | 23152                                     |      | 25152                                      |      |                                         |     |
|                                                                               | 0.0018       |                                 |                            | 21182                                                  | 23182                                     |      | 25182                                      |      |                                         |     |
|                                                                               | 0.0022       |                                 |                            | 21222                                                  | 23222                                     |      | 25222                                      |      |                                         |     |
|                                                                               | 0.0027       |                                 |                            | 21272                                                  | 23272                                     |      | 25272                                      |      |                                         |     |
|                                                                               | 0.0033       |                                 |                            | 21332                                                  | 23332                                     |      | 25332                                      |      |                                         |     |
|                                                                               | 0.0039       |                                 |                            | 21392                                                  | 23392                                     |      | 25392                                      |      |                                         |     |
|                                                                               | 0.0047       |                                 |                            | 21472                                                  | 23472                                     |      | 25472                                      |      |                                         |     |
|                                                                               | 0.0056       |                                 |                            | 21562                                                  | 23562                                     |      | 25562                                      |      |                                         |     |
|                                                                               |              |                                 |                            |                                                        |                                           |      |                                            |      |                                         |     |



| ELECTRICAL DATA AND ORDERING CODE - PITCH 10 mm                                     |                                                                                     |                                 |                            |                                                          |                                           |       |                                            |       |                                         |                      |       |       |       |       |       |     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------|----------------------------|----------------------------------------------------------|-------------------------------------------|-------|--------------------------------------------|-------|-----------------------------------------|----------------------|-------|-------|-------|-------|-------|-----|
| U <sub>RAC</sub><br>(V)                                                             | CAP.<br>(µF)                                                                        | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(2)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING              |                                           |       |                                            |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     |                                 |                            | LOOSE IN BOX                                             |                                           |       |                                            |       | AMMOPACK <sup>(1)</sup>                 |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     |                                 |                            | SHORT LEADS                                              |                                           |       | LONG LEADS                                 |       | H = 18.5 mm<br>P <sub>0</sub> = 12.7 mm |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     |                                 |                            | $l_t = 3.5 \text{ mm} + 1 \text{ mm} / - 0.5 \text{ mm}$ | $l_t = 5.0 \text{ mm} \pm 1.0 \text{ mm}$ | SPQ   | $l_t = 25.0 \text{ mm} \pm 2.0 \text{ mm}$ | SPQ   |                                         | SPQ                  |       |       |       |       |       |     |
| <b>PITCH = 10.0 mm ± 0.4 mm; d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 20 %</b> |                                                                                     |                                 |                            |                                                          |                                           |       |                                            |       |                                         |                      |       |       |       |       |       |     |
| 310                                                                                 | 0.0068                                                                              | 4.0 x 10.0 x 12.5               | 0.6                        | 21682                                                    | 23682                                     | 1000  | 25682                                      | 1000  | Not available                           |                      |       |       |       |       |       |     |
|                                                                                     | 0.0082                                                                              |                                 |                            | 21822                                                    | 23822                                     |       | 25822                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.010                                                                               |                                 |                            | 21103                                                    | 23103                                     |       | 25103                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.012                                                                               |                                 |                            | 21123                                                    | 23123                                     |       | 25123                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.015                                                                               |                                 |                            | 21153                                                    | 23153                                     |       | 25153                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.018                                                                               |                                 |                            | 21183                                                    | 23183                                     |       | 25183                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.022                                                                               |                                 |                            | 21223                                                    | 23223                                     |       | 25223                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.027                                                                               |                                 |                            | 21273                                                    | 23273                                     |       | 25273                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.033                                                                               |                                 |                            | 21333                                                    | 23333                                     |       | 25333                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.039                                                                               |                                 |                            | 21393                                                    | 23393                                     |       | 25393                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.047                                                                               |                                 |                            | 21473                                                    | 23473                                     |       | 25473                                      |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 0.056                                                                               |                                 |                            | 5.0 x 11.0 x 12.5                                        | 0.82                                      |       | 20563                                      |       |                                         |                      | 22563 | 750   | 24563 | 750   | 27563 | 500 |
|                                                                                     | 0.068                                                                               |                                 |                            |                                                          |                                           |       | 20683                                      |       |                                         |                      | 22683 |       | 24683 |       | 27683 |     |
|                                                                                     | 0.082                                                                               | 6.0 x 12.0 x 12.5               | 1.1                        | 20823                                                    | 22823                                     | 750   | 24823                                      | 750   | 27823                                   | 500                  |       |       |       |       |       |     |
|                                                                                     | 0.10                                                                                |                                 |                            | 20104                                                    | 22104                                     |       | 24104                                      |       | 27104                                   |                      |       |       |       |       |       |     |
|                                                                                     | <b>PITCH = 10.0 mm ± 0.4 mm; d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 10 %</b> |                                 |                            |                                                          |                                           |       |                                            |       |                                         |                      |       |       |       |       |       |     |
|                                                                                     | 310                                                                                 | 0.0010                          | 4.0 x 10.0 x 12.5          | 0.6                                                      | 29194                                     | 29217 | 1000                                       | 29241 | 1250                                    | Not available<br>500 |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0012                          |                            |                                                          | 29195                                     | 29218 |                                            | 29242 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0015                          |                            |                                                          | 29196                                     | 29219 |                                            | 29243 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0018                          |                            |                                                          | 29197                                     | 29221 |                                            | 29244 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0022                          |                            |                                                          | 29198                                     | 29222 |                                            | 29245 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0027                          |                            |                                                          | 29199                                     | 29223 |                                            | 29246 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0033                          |                            |                                                          | 29201                                     | 29224 |                                            | 29247 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0039                          |                            |                                                          | 29202                                     | 29225 |                                            | 29248 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0047                          |                            |                                                          | 29203                                     | 29226 |                                            | 29249 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0056                          |                            |                                                          | 29204                                     | 29227 |                                            | 29251 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0068                          |                            |                                                          | 29205                                     | 29228 |                                            | 29252 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.0082                          |                            |                                                          | 29206                                     | 29229 |                                            | 29253 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.010                           |                            |                                                          | 29207                                     | 29231 |                                            | 29254 |                                         |                      |       |       |       |       |       |     |
|                                                                                     |                                                                                     | 0.012                           |                            |                                                          | 29208                                     | 29232 |                                            | 29255 |                                         |                      |       |       |       |       |       |     |
| 0.015                                                                               |                                                                                     | 29209                           |                            |                                                          | 29233                                     | 29256 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.018                                                                               |                                                                                     | 29211                           |                            |                                                          | 29234                                     | 29257 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.022                                                                               |                                                                                     | 29212                           |                            |                                                          | 29235                                     | 29258 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.027                                                                               |                                                                                     | 29213                           |                            |                                                          | 29236                                     | 29259 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.033                                                                               |                                                                                     | 29214                           |                            |                                                          | 29237                                     | 29261 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.039                                                                               |                                                                                     | 29215                           |                            |                                                          | 29238                                     | 29262 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.047                                                                               |                                                                                     | 29216                           |                            |                                                          | 29239                                     | 29263 |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.056                                                                               |                                                                                     | 5.0 x 11.0 x 12.5               |                            |                                                          | 0.82                                      | 28124 |                                            | 28324 | 750                                     |                      |       | 28524 | 750   | 28924 |       |     |
| 0.068                                                                               |                                                                                     |                                 |                            |                                                          |                                           | 28125 |                                            | 28325 |                                         |                      |       | 28525 |       | 28925 |       |     |
| 0.082                                                                               |                                                                                     | 6.0 x 12.0 x 12.5               |                            |                                                          | 1.1                                       | 28126 |                                            | 28326 | 750                                     |                      |       | 28526 | 750   | 28926 |       |     |
| <b>PITCH = 10.0 mm ± 0.4 mm; d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 5 %</b>  |                                                                                     |                                 |                            |                                                          |                                           |       |                                            |       |                                         |                      |       |       |       |       |       |     |
| 0.056                                                                               |                                                                                     | 5.0 x 11.0 x 12.5               |                            |                                                          | 0.82                                      | 28224 |                                            | 28424 | 750                                     |                      |       | 28624 | 750   | 28944 | 500   |     |
| 0.068                                                                               |                                                                                     | 6.0 x 12.0 x 12.5               |                            |                                                          | 1.1                                       | 28225 |                                            | 28425 | 750                                     |                      |       | 28625 | 750   | 28945 |       |     |
| 0.082                                                                               |                                                                                     |                                 | 28226                      | 28426                                                    |                                           | 28626 | 28946                                      |       |                                         |                      |       |       |       |       |       |     |

**Notes**

• SPQ = Standard Packing Quantity

<sup>(1)</sup> H = In-tape height, P<sub>0</sub> = Sprocket hole distance; for detailed specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

<sup>(2)</sup> Weight for short lead product only



| ELECTRICAL DATA AND ORDERING CODE - PITCH 15 mm                                     |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
|-------------------------------------------------------------------------------------|-------------------|---------------------------------|----------------------------|---------------------------------------------|-------------------------------------|-------|--------------------------------------|-------|-----------------------------------------|-------|-------|-------|-------|
| U <sub>RAC</sub><br>(V)                                                             | CAP.<br>(μF)      | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(2)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING |                                     |       |                                      |       |                                         |       |       |       |       |
|                                                                                     |                   |                                 |                            | LOOSE IN BOX                                |                                     |       |                                      |       | AMMOPACK <sup>(1)</sup>                 |       |       |       |       |
|                                                                                     |                   |                                 |                            | SHORT LEADS                                 |                                     |       | LONG LEADS                           |       | H = 18.5 mm<br>P <sub>0</sub> = 12.7 mm |       |       |       |       |
|                                                                                     |                   |                                 |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm         | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ   | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ   |                                         | SPQ   |       |       |       |
| <b>PITCH = 15.0 mm ± 0.4 mm; d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 20 %</b> |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
| 0.010                                                                               |                   | 5.0 x 11.0 x 17.5               | 1.0                        | 29076                                       | 29096                               |       | 29116                                |       | 29141                                   | 1100  |       |       |       |
| 0.012                                                                               |                   |                                 |                            | 29077                                       | 29097                               |       | 29117                                |       | 29143                                   |       |       |       |       |
| 0.015                                                                               |                   |                                 |                            | 29078                                       | 29098                               |       | 29118                                |       | 29145                                   |       |       |       |       |
| 0.018                                                                               |                   |                                 |                            | 29079                                       | 29099                               |       | 29119                                |       | 29147                                   |       |       |       |       |
| 0.022                                                                               |                   |                                 |                            | 29081                                       | 29101                               |       | 29121                                |       | 29149                                   |       |       |       |       |
| 0.027                                                                               |                   |                                 |                            | 29082                                       | 29102                               |       | 29122                                |       | 29152                                   |       |       |       |       |
| 0.033                                                                               |                   |                                 |                            | 29083                                       | 29103                               | 1000  | 29123                                | 1000  | 29154                                   |       |       |       |       |
| 0.039                                                                               |                   |                                 |                            | 29084                                       | 29104                               |       | 29124                                |       | 29156                                   |       |       |       |       |
| 0.047                                                                               |                   |                                 |                            | 29085                                       | 29105                               |       | 29125                                |       | 29158                                   |       |       |       |       |
| 0.056                                                                               |                   |                                 |                            | 21563                                       | 23563                               |       | 25563                                |       | 29161                                   |       |       |       |       |
| 0.068                                                                               |                   |                                 |                            | 21683                                       | 23683                               |       | 25683                                |       | 29163                                   |       |       |       |       |
| 0.082                                                                               |                   |                                 |                            | 21823                                       | 23823                               |       | 25823                                |       | 29165                                   |       |       |       |       |
| 0.10                                                                                |                   |                                 |                            | 21104                                       | 23104                               |       | 25104                                |       | 29166                                   |       |       |       |       |
| 0.12                                                                                |                   |                                 |                            | 20124                                       | 22124                               |       | 24124                                |       | 27124                                   |       | 900   |       |       |
| 0.15                                                                                | 6.0 x 12.0 x 17.5 | 1.4                             | 20154                      | 22154                                       | 750                                 |       | 24154                                |       | 500                                     | 27154 | 800   |       |       |
| 0.18                                                                                |                   |                                 | 20184                      | 22184                                       |                                     |       | 24184                                |       |                                         |       |       |       |       |
| <b>PITCH = 15.0 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 %</b> |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
| 0.22                                                                                | 7.0 x 13.5 x 17.5 | 1.8                             | 20224                      | 22224                                       | 750                                 |       | 24224                                |       | 500                                     | 27224 | 650   |       |       |
| 0.27                                                                                | 8.5 x 15.0 x 17.5 | 2.4                             | 20274                      | 22274                                       | 750                                 |       | 24274                                |       | 500                                     | 27274 | 650   |       |       |
| 0.33                                                                                |                   |                                 | 20334                      | 22334                                       | 500                                 |       | 24334                                |       | 450                                     | 27334 | 600   |       |       |
| <b>PITCH = 15.0 mm ± 0.4 mm; d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 10 %</b> |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
| 0.010                                                                               |                   | 5.0 x 11.0 x 17.5               | 1.0                        | 29066                                       | 29086                               |       | 29106                                |       | 29139                                   | 1100  |       |       |       |
| 0.012                                                                               |                   |                                 |                            | 29067                                       | 29087                               |       | 29107                                |       | 29142                                   |       |       |       |       |
| 0.015                                                                               |                   |                                 |                            | 29068                                       | 29088                               |       | 29108                                |       | 29144                                   |       |       |       |       |
| 0.018                                                                               |                   |                                 |                            | 29069                                       | 29089                               |       | 29109                                |       | 29146                                   |       |       |       |       |
| 0.022                                                                               |                   |                                 |                            | 29071                                       | 29091                               |       | 29111                                |       | 29148                                   |       |       |       |       |
| 0.027                                                                               |                   |                                 |                            | 29072                                       | 29092                               |       | 29112                                |       | 29151                                   |       |       |       |       |
| 0.033                                                                               |                   |                                 |                            | 29073                                       | 29093                               | 1000  | 29113                                | 1000  | 29153                                   |       |       |       |       |
| 0.039                                                                               |                   |                                 |                            | 29074                                       | 29094                               |       | 29114                                |       | 29155                                   |       |       |       |       |
| 0.047                                                                               |                   |                                 |                            | 29075                                       | 29095                               |       | 29115                                |       | 29157                                   |       |       |       |       |
| 0.056                                                                               |                   |                                 |                            | 29126                                       | 29131                               |       | 29135                                |       | 29159                                   |       |       |       |       |
| 0.068                                                                               |                   |                                 |                            | 29127                                       | 29132                               |       | 29136                                |       | 29162                                   |       |       |       |       |
| 0.082                                                                               |                   |                                 |                            | 29128                                       | 29133                               |       | 29137                                |       | 29164                                   |       |       |       |       |
| 0.10                                                                                |                   |                                 |                            | 28127                                       | 28327                               |       | 1000                                 |       | 28527                                   |       | 1000  | 28927 | 900   |
| 0.12                                                                                | 6.0 x 12.0 x 17.5 |                                 |                            | 1.4                                         | 28128                               |       | 28328                                |       | 750                                     |       | 28528 | 500   | 28928 |
| 0.15                                                                                |                   | 28129                           | 28329                      |                                             | 28529                               |       |                                      |       |                                         |       |       |       |       |
| <b>PITCH = 15.0 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 %</b> |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
| 0.18                                                                                | 7.0 x 13.5 x 17.5 | 1.8                             | 28131                      | 28331                                       | 750                                 |       | 28531                                |       | 500                                     | 28931 | 650   |       |       |
| 0.22                                                                                |                   |                                 | 28132                      | 28332                                       |                                     |       | 28532                                |       |                                         |       |       |       |       |
| 0.27                                                                                | 8.5 x 15.0 x 17.5 | 2.4                             | 28133                      | 28333                                       | 500                                 |       | 28533                                |       | 450                                     | 28933 | 600   |       |       |
| 0.33                                                                                |                   |                                 | 29129                      | 29134                                       |                                     |       | 29138                                |       |                                         | 29167 |       |       |       |
| <b>PITCH = 15.0 mm ± 0.4 mm; d<sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 5 %</b>  |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
| 0.10                                                                                | 5.0 x 11.0 x 17.5 | 1.0                             | 28227                      | 28427                                       | 1000                                | 28627 | 1000                                 | 28947 | 900                                     |       |       |       |       |
| 0.12                                                                                | 6.0 x 12.0 x 17.5 | 1.4                             | 28228                      | 28428                                       | 750                                 | 28628 | 500                                  | 28948 | 800                                     |       |       |       |       |
| 0.15                                                                                |                   |                                 | 28229                      | 28429                                       |                                     | 28629 |                                      |       |                                         |       |       |       |       |
| <b>PITCH = 15.0 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 %</b>  |                   |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |       |       |
| 0.18                                                                                | 7.0 x 13.5 x 17.5 | 1.8                             | 28231                      | 28431                                       | 750                                 | 28631 | 500                                  | 28951 | 650                                     |       |       |       |       |
| 0.22                                                                                | 8.5 x 15.0 x 17.5 | 2.4                             | 28232                      | 28432                                       | 750                                 | 28632 | 500                                  | 28952 | 650                                     |       |       |       |       |
| 0.27                                                                                |                   |                                 | 28233                      | 28433                                       | 500                                 | 28633 | 450                                  | 28953 | 600                                     |       |       |       |       |

**Notes**

• SPQ = Standard Packing Quantity

<sup>(1)</sup> H = In-tape height, P<sub>0</sub> = Sprocket hole distance; for detailed specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

<sup>(2)</sup> Weight for short lead product only



| ELECTRICAL DATA AND ORDERING CODE - PITCH 22.5 mm                                   |                                                                                    |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |     |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------|----------------------------|---------------------------------------------|-------------------------------------|-------|--------------------------------------|-------|-----------------------------------------|-------|-------|-----|
| U <sub>RAC</sub><br>(V)                                                             | CAP.<br>(μF)                                                                       | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(2)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING |                                     |       |                                      |       |                                         |       |       |     |
|                                                                                     |                                                                                    |                                 |                            | LOOSE IN BOX                                |                                     |       |                                      |       | REEL (500 mm) <sup>(1)</sup>            |       |       |     |
|                                                                                     |                                                                                    |                                 |                            | SHORT LEADS                                 |                                     |       | LONG LEADS                           |       | H = 18.5 mm<br>P <sub>0</sub> = 12.7 mm |       |       |     |
|                                                                                     |                                                                                    |                                 |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm         | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ   | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ   |                                         | SPQ   |       |     |
| <b>PITCH = 22.5 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 %</b> |                                                                                    |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |     |
|                                                                                     | 0.12                                                                               | 6.0 x 15.5 x 26.0               | 2.4                        | 21124                                       | 23124                               | 300   | 25124                                | 250   | 29264                                   | 600   |       |     |
|                                                                                     | 0.15                                                                               |                                 |                            | 21154                                       | 23154                               |       | 25154                                |       | 29265                                   |       |       |     |
|                                                                                     | 0.18                                                                               |                                 |                            | 7.0 x 16.5 x 26.0                           | 2.9                                 | 21184 | 23184                                | 200   | 25184                                   | 250   | 29266 | 500 |
|                                                                                     | 0.22                                                                               |                                 |                            |                                             |                                     | 21224 | 23224                                |       | 25224                                   |       | 29267 |     |
|                                                                                     | 0.27                                                                               |                                 |                            |                                             |                                     | 21274 | 23274                                |       | 25274                                   |       | 29268 |     |
|                                                                                     | 0.33                                                                               |                                 |                            |                                             |                                     | 21334 | 23334                                |       | 25334                                   |       | 29269 |     |
|                                                                                     | 0.39                                                                               | 8.5 x 18.0 x 26.0               | 3.8                        | 20394                                       | 22394                               | 200   | 24394                                | 250   | 27394                                   | 450   |       |     |
|                                                                                     | 0.47                                                                               |                                 |                            | 20474                                       | 22474                               |       | 24474                                |       | 27474                                   |       |       |     |
|                                                                                     | 0.56                                                                               | 10.0 x 19.5 x 26.0              | 6.8                        | 20564                                       | 22564                               | 200   | 24564                                | 200   | 27564                                   | 350   |       |     |
|                                                                                     | 0.68                                                                               |                                 |                            | 20684                                       | 22684                               |       | 24684                                |       | 27684                                   |       |       |     |
|                                                                                     | 0.82                                                                               | 10.0 x 19.5 x 26.0              | 6.8                        | 20824                                       | 22824                               | 150   | 24824                                | 200   | 27824                                   | 300   |       |     |
|                                                                                     | 1.0                                                                                |                                 |                            | 20105                                       | 22105                               |       | 24105                                |       | 27105                                   |       |       |     |
| <b>PITCH = 22.5 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 %</b> |                                                                                    |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |     |
| 310                                                                                 | 0.12                                                                               | 6.0 x 15.5 x 26.0               | 2.4                        | 29169                                       | 29175                               | 300   | 29181                                | 250   | 29271                                   | 600   |       |     |
|                                                                                     | 0.15                                                                               |                                 |                            | 29171                                       | 29176                               |       | 29182                                |       | 29272                                   |       |       |     |
|                                                                                     | 0.18                                                                               |                                 |                            | 7.0 x 16.5 x 26.0                           | 2.9                                 | 29172 | 29177                                | 200   | 29183                                   | 250   | 29273 | 500 |
|                                                                                     | 0.22                                                                               |                                 |                            |                                             |                                     | 29173 | 29178                                |       | 29184                                   |       | 29274 |     |
|                                                                                     | 0.27                                                                               |                                 |                            |                                             |                                     | 29174 | 29179                                |       | 29185                                   |       | 29275 |     |
|                                                                                     | 0.33                                                                               |                                 |                            |                                             |                                     | 28134 | 28334                                |       | 28534                                   |       | 28934 |     |
|                                                                                     | 0.39                                                                               | 8.5 x 18.0 x 26.0               | 3.8                        | 28135                                       | 28335                               | 200   | 28535                                | 250   | 28935                                   | 450   |       |     |
|                                                                                     | 0.47                                                                               |                                 |                            | 28136                                       | 28336                               |       | 28536                                |       | 28936                                   |       |       |     |
|                                                                                     | 0.56                                                                               | 10.0 x 19.5 x 26.0              | 6.8                        | 28137                                       | 28337                               | 150   | 28537                                | 200   | 28937                                   | 350   |       |     |
|                                                                                     | 0.68                                                                               |                                 |                            | 28138                                       | 28338                               |       | 28538                                |       | 28938                                   |       |       |     |
|                                                                                     | 0.82                                                                               | 28139                           | 28339                      | 28539                                       | 28939                               |       |                                      |       |                                         |       |       |     |
|                                                                                     | <b>PITCH = 22.5 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 %</b> |                                 |                            |                                             |                                     |       |                                      |       |                                         |       |       |     |
|                                                                                     |                                                                                    | 0.33                            | 7.0 x 16.5 x 26.0          | 2.9                                         | 28234                               | 28434 | 200                                  | 28634 | 250                                     | 28954 | 450   |     |
|                                                                                     |                                                                                    | 0.39                            |                            |                                             | 28235                               | 28435 |                                      | 28635 |                                         | 28955 |       |     |
|                                                                                     | 0.47                                                                               | 8.5 x 18.0 x 26.0               | 3.8                        | 28236                                       | 28436                               | 200   | 28636                                | 200   | 28956                                   | 350   |       |     |
|                                                                                     | 0.56                                                                               |                                 |                            | 28237                                       | 28437                               |       | 28637                                |       | 28957                                   |       |       |     |
|                                                                                     | 0.68                                                                               | 10.0 x 19.5 x 26.0              | 6.8                        | 28238                                       | 28438                               | 150   | 28638                                | 200   | 28958                                   | 300   |       |     |
|                                                                                     | 0.82                                                                               | 12.0 x 22.0 x 26.0              | 7.8                        | 28239                                       | 28439                               | 150   | 28639                                | 200   | 28959                                   | 300   |       |     |

**Notes**

• SPQ = Standard Packing Quantity

(1) H = In-tape height, P<sub>0</sub> = Sprocket hole distance; for detailed specifications refer to packaging information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

(2) Weight for short lead product only



| ELECTRICAL DATA AND ORDERING CODE - PITCH 27.5 mm                                   |                                                                                     |                                 |                            |                                             |                                     |       |                                      |       |     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------|----------------------------|---------------------------------------------|-------------------------------------|-------|--------------------------------------|-------|-----|
| U <sub>RAC</sub><br>(V)                                                             | CAP.<br>(μF)                                                                        | DIMENSIONS<br>w x h x l<br>(mm) | MASS<br>(g) <sup>(1)</sup> | CATALOG NUMBER BFC2 338 ..... AND PACKAGING |                                     |       |                                      |       |     |
|                                                                                     |                                                                                     |                                 |                            | LOOSE IN BOX                                |                                     |       |                                      |       |     |
|                                                                                     |                                                                                     |                                 |                            | SHORT LEADS                                 |                                     |       | LONG LEADS                           |       |     |
|                                                                                     |                                                                                     |                                 |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm         | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ   | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ   |     |
| <b>PITCH = 27.5 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 %</b> |                                                                                     |                                 |                            |                                             |                                     |       |                                      |       |     |
| 310                                                                                 | 0.39                                                                                | 9.0 x 19.0 x 31.5               | 5.5                        | 21394                                       | 23394                               | 100   | 25394                                | 150   |     |
|                                                                                     | 0.47                                                                                |                                 |                            | 21474                                       | 23474                               |       | 25474                                |       |     |
|                                                                                     | 0.56                                                                                |                                 |                            | 21564                                       | 23564                               |       | 25564                                |       |     |
|                                                                                     | 0.68                                                                                |                                 |                            | 21684                                       | 23684                               |       | 25684                                |       |     |
|                                                                                     | 0.82                                                                                |                                 |                            | 21824                                       | 23824                               |       | 25824                                |       |     |
|                                                                                     | 1.0                                                                                 | 11.0 x 21.0 x 31.0              | 7.4                        | 21105                                       | 23105                               | 100   | 25105                                | 125   |     |
|                                                                                     | 1.2                                                                                 |                                 |                            | 20125                                       | 22125                               |       | 24125                                |       |     |
|                                                                                     | 1.5                                                                                 | 13.0 x 23.0 x 31.0              | 9.2                        | 20155                                       | 22155                               | 100   | 24155                                | 100   |     |
|                                                                                     | 1.8                                                                                 |                                 |                            | 20185                                       | 22185                               |       | 24185                                |       |     |
|                                                                                     | 2.2                                                                                 | 15.0 x 25.0 x 31.5              | 12.3                       | 20225                                       | 22225                               | 50    | 24225                                | 75    |     |
|                                                                                     | 2.7                                                                                 | 18.0 x 28.0 x 31.5              | 16.1                       | 20275                                       | 22275                               |       | 24275                                |       |     |
|                                                                                     | 3.3                                                                                 |                                 |                            | 20335                                       | 22335                               | 24335 |                                      |       |     |
|                                                                                     | <b>PITCH = 27.5 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 %</b> |                                 |                            |                                             |                                     |       |                                      |       |     |
|                                                                                     | 310                                                                                 | 1.0                             | 11.0 x 21.0 x 31.0         | 7.4                                         | 28141                               | 28341 | 100                                  | 28541 | 125 |
|                                                                                     |                                                                                     | 1.2                             |                            |                                             | 28142                               | 28342 |                                      | 28542 |     |
| 1.5                                                                                 |                                                                                     | 13.0 x 23.0 x 31.0              | 9.2                        | 28143                                       | 28343                               | 28543 |                                      |       |     |
| 1.8                                                                                 |                                                                                     | 15.0 x 25.0 x 31.5              | 12.3                       | 28144                                       | 28344                               | 50    | 28544                                | 100   |     |
| 2.2                                                                                 |                                                                                     |                                 |                            | 28145                                       | 28345                               |       | 28545                                |       |     |
| 2.7                                                                                 |                                                                                     | 18.0 x 28.0 x 31.5              | 16.1                       | 28146                                       | 28346                               | 50    | 28546                                | 75    |     |
| <b>PITCH = 27.5 mm ± 0.4 mm; d<sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 %</b>  |                                                                                     |                                 |                            |                                             |                                     |       |                                      |       |     |
| 310                                                                                 |                                                                                     | 1.0                             | 11.0 x 21.0 x 31.0         | 7.4                                         | 28241                               | 28441 | 100                                  | 28641 | 125 |
|                                                                                     |                                                                                     | 1.2                             | 13.0 x 23.0 x 31.0         | 9.2                                         | 28242                               | 28442 | 100                                  | 28642 | 125 |
|                                                                                     |                                                                                     | 1.5                             |                            |                                             | 28243                               | 28443 |                                      | 28643 |     |
|                                                                                     | 1.8                                                                                 | 15.0 x 25.0 x 31.5              | 12.3                       | 28244                                       | 28444                               | 100   | 28644                                | 100   |     |
|                                                                                     | 2.2                                                                                 | 18.0 x 28.0 x 31.5              | 16.1                       | 28245                                       | 28445                               | 50    | 28645                                | 75    |     |
|                                                                                     | 2.7                                                                                 |                                 |                            | 28246                                       | 28446                               |       | 28646                                |       |     |

**Notes**

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



| APPROVALS                                                                                                                                                                                                                                                                                                                                                            |                     |                |                       |                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------|-----------------------|------------------------------------------------------------------------|
| SAFETY APPROVALS X2                                                                                                                                                                                                                                                                                                                                                  | VOLTAGE             | VALUE          | FILE NUMBERS          | LINKS                                                                  |
| EN 60384-14 (ENEC)<br>(= IEC 60384-14 ed-4 (2013))                                                                                                                                                                                                                                                                                                                   | 310 V <sub>AC</sub> | 1 nF to 3.3 μF | ENEC16/FI/21/01054/A2 | <a href="http://www.vishay.com/doc?28179">www.vishay.com/doc?28179</a> |
| UL 60384-14                                                                                                                                                                                                                                                                                                                                                          | 310 V <sub>AC</sub> | 1 nF to 3.3 μF | E354331               | <a href="http://www.vishay.com/doc?28184">www.vishay.com/doc?28184</a> |
| CSA-E384-14                                                                                                                                                                                                                                                                                                                                                          | 310 V <sub>AC</sub> | 1 nF to 3.3 μF | E354331               |                                                                        |
| CQC                                                                                                                                                                                                                                                                                                                                                                  | 310 V <sub>AC</sub> | 1 nF to 3.3 μF | CQC07001018685 (F)    | <a href="http://www.vishay.com/doc?28227">www.vishay.com/doc?28227</a> |
|                                                                                                                                                                                                                                                                                                                                                                      |                     |                | CQC07001021279 (L)    | <a href="http://www.vishay.com/doc?28228">www.vishay.com/doc?28228</a> |
| CB-test certificate                                                                                                                                                                                                                                                                                                                                                  | 310 V <sub>AC</sub> | 1 nF to 3.3 μF | FI-39827/A1           | <a href="http://www.vishay.com/doc?28175">www.vishay.com/doc?28175</a> |
| The ENEC-approval together with the CB-certificate replace all national marks of the following countries (they have already signed the ENEC-agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Slovenian; Spain; Sweden; Switzerland; and United Kingdom. |                     |                |                       |                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                      |                     |                |                       |                                                                        |

## MOUNTING

### Normal Use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoleers 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 stand-off pips are in good contact with the printed-circuit board:

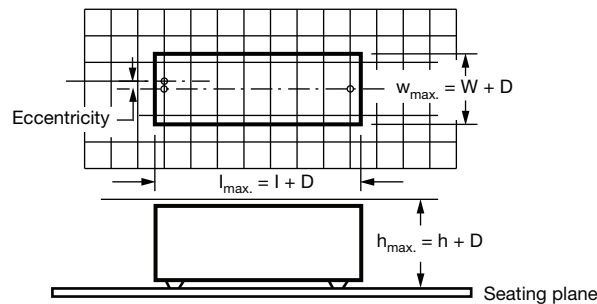
- For pitches  $\leq 15$  mm capacitors shall be mechanically fixed by the leads
- For longer pitches the capacitors shall be mounted in the same way and the body clamped

### Space Requirements on Printed Circuit Board

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

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

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



## 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)

### Storage Temperature

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

### Ratings and Characteristics Reference Conditions

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

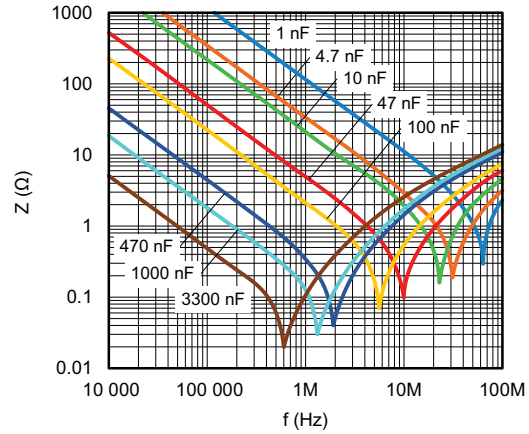
For reference testing, a conditioning period shall be applied over  $96$  h  $\pm 4$  h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



CHARACTERISTICS



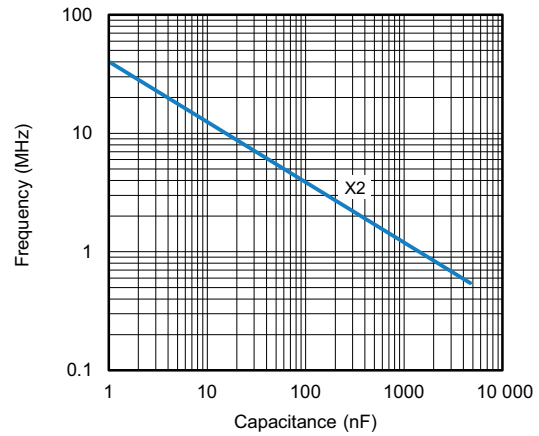
Capacitance as a function of ambient temperature (typical curve)



Impedance as a function of frequency (typical curve)



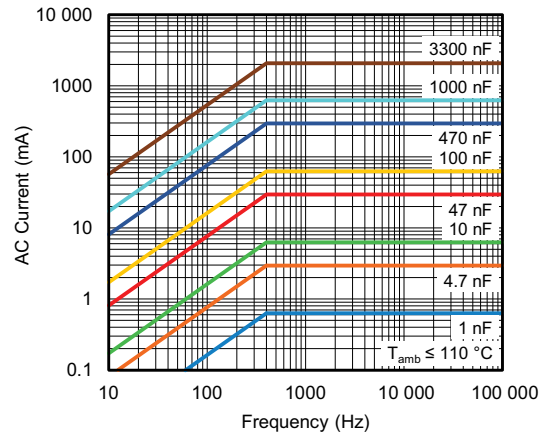
Tangent of loss angle as a function of frequency (typical curve)



Resonant frequency as a function of capacitance (typical curve)



Max. RMS voltage as a function of frequency (typical curve)



Max. RMS current as a function of frequency (typical curve)



Insulation resistance as a function of ambient temperature

### APPLICATION NOTES

- For X2 electromagnetic interference suppression in **standard across the line applications** (50 Hz / 60 Hz) with a maximum mains voltage of 310 V<sub>AC</sub>
- For series impedance applications we refer to application note [www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)
- 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: [rfi@vishay.com](mailto:rfi@vishay.com)
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse programs must be used
- The maximum ambient temperature must not exceed 105 °C (125 °C for less than 1000 h) for C ≤ 470 nF and 110 °C for C > 470 nF
- Rated voltage pulse slope:  
if the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 435 V<sub>DC</sub> and divided by the applied voltage

### INSPECTION REQUIREMENTS

#### General Notes

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, IEC Publication IEC 60384-14 ed-4 (2013) 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 |
| Initial measurements                                | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz |                                                               |
| 4.3 Robustness of terminations                      | Tensile: Load 10 N; 10 s<br>Bending: Load 5 N; 4 x 90°                                   | No visible damage                                             |
| 4.4 Resistance to soldering heat                    | No pre-drying<br>Method: 1A<br>Solder bath: 280 °C ± 5 °C<br>Duration: 10 s              |                                                               |



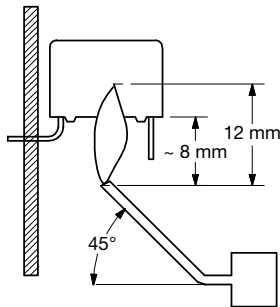
| GROUP C INSPECTION REQUIREMENTS                     |                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                          | CONDITIONS                                                                                                                                                                                                                  | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                                                                                 |
| <b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b> |                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |
| 4.19 Component solvent resistance                   | Isopropylalcohol at room temperature<br>Method: 2<br>Immersion time: 5 min ± 0.5 min<br>Recovery time:<br>Min. 1 h, max. 2 h                                                                                                |                                                                                                                                                                                                                                                                                                                                          |
| 4.4.2 Final measurements                            | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance                                                                                                                             | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured initially<br><br>Increase of $\tan \delta$ :<br>$\leq 0.008$ for: $C \leq 1 \mu F$ or<br>$\leq 0.005$ for: $C > 1 \mu F$<br>Compared to values measured initially<br><br>As specified in section "Insulation resistance" of this specification |
| <b>SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1</b> |                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |
| Initial measurements                                | Capacitance<br>Tangent of loss angle:<br>For $C \leq 1 \mu F$ at 10 kHz<br>For $C > 1 \mu F$ at 1 kHz                                                                                                                       |                                                                                                                                                                                                                                                                                                                                          |
| 4.20 Solvent resistance of the marking              | Isopropylalcohol at room temperature<br>Method: 1<br>Rubbing material: Cotton wool<br>Immersion time: 5 min ± 0.5 min                                                                                                       | No visible damage<br>Legible marking                                                                                                                                                                                                                                                                                                     |
| 4.6 Rapid change of temperature                     | $\theta A = -55\text{ }^\circ C$<br>$\theta B = +110\text{ }^\circ C$<br>5 cycles<br>Duration $t = 30$ min                                                                                                                  |                                                                                                                                                                                                                                                                                                                                          |
| 4.6.1 Inspection                                    | Visual examination                                                                                                                                                                                                          | No visible damage                                                                                                                                                                                                                                                                                                                        |
| 4.7 Vibration (see note 3.1)                        | Mounting: 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 |                                                                                                                                                                                                                                                                                                                                          |
| 4.7.2 Final inspection                              | Visual examination                                                                                                                                                                                                          | No visible damage                                                                                                                                                                                                                                                                                                                        |
| 4.9 Shock (see note 3)                              | Mounting: See section "Mounting" for more information<br>Pulse shape: Half sine<br>Acceleration: 490 m/s <sup>2</sup><br>Duration of pulse: 11 ms                                                                           |                                                                                                                                                                                                                                                                                                                                          |
| 4.9.2 Final measurements                            | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance                                                                                                                             | No visible damage<br><br>$ \Delta C/C  \leq 5\%$ of the value measured initially<br><br>Increase of $\tan \delta$ :<br>$\leq 0.008$ for: $C \leq 1 \mu F$ or<br>$\leq 0.005$ for: $C > 1 \mu F$<br>Compared to values measured initially<br><br>As specified in section "Insulation resistance" of this specification                    |



| <b>GROUP C INSPECTION REQUIREMENTS</b>                                                 |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SUB-CLAUSE NUMBER AND TEST</b>                                                      | <b>CONDITIONS</b>                                                                                                                                                         | <b>PERFORMANCE REQUIREMENTS</b>                                                                                                                                                                                                                                                                                                                                                                            |
| <b>SUB-GROUP C1<br/>COMBINED SAMPLE OF<br/>SPECIMENS OF SUB-GROUPS<br/>C1A AND C1B</b> |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11 Climatic sequence                                                                 |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11.1 Initial measurements                                                            | Capacitance<br>Measured in 4.4.2 and 4.9.2<br>Tangent of loss angle:<br>Measured initially in C1A and C1B                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11.2 Dry heat                                                                        | Temperature: 110 °C                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11.3 Damp heat cyclic<br>Test Db<br>First cycle                                      | Duration: 16 h                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11.4 Cold                                                                            | Temperature: - 55 °C                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11.5 Damp heat cyclic<br>Test Db<br>Remaining cycles                                 | Duration: 2 h                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.11.6 Final measurements                                                              | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Voltage proof<br>1350 V <sub>DC</sub> ; 1 min between terminations<br><br>Insulation resistance | 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 $\delta$ :<br>$\leq 0.008$ for: C $\leq 1$ $\mu$ F or<br>$\leq 0.005$ for: C > 1 $\mu$ F<br>Compared to values measured in 4.11.1.<br><br>No permanent breakdown or flash-over<br><br>$\geq 50\%$ of values specified in section "Insulation resistance" of this specification |
| <b>SUB-GROUP C2</b>                                                                    |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.12 Damp heat steady state                                                            | 56 days; 40 °C; 90 % to 95 % RH<br>no load                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.12.1 Initial measurements                                                            | Capacitance<br>Tangent of loss angle: at 1 kHz                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4.12.3 Final measurements                                                              | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Voltage proof<br>1350 V <sub>DC</sub> ; 1 min between term.<br><br>Insulation resistance        | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.12.1.<br><br>Increase of tan $\delta$ :<br>$\leq 0.008$ for: C $\leq 1$ $\mu$ F or<br>$\leq 0.005$ for: C > 1 $\mu$ F<br>Compared to values measured in 4.12.1.<br><br>No permanent breakdown or flash-over<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |



| GROUP C INSPECTION REQUIREMENTS |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST      | CONDITIONS                                                                                                                                                                                                                               | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                                                                                                         |
| <b>SUB-GROUP C3</b>             |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                  |
| 4.13.1 Initial measurements     | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                  |
| 4.13 Impulse voltage            | 3 successive impulses, full wave, peak voltage:<br>X2: 2.5 kV for C ≤ 1 μF<br>X2: 2.5 kV/√C for C > 1 μF<br>Max. 24 pulses                                                                                                               | No selfhealing breakdowns or flashover                                                                                                                                                                                                                                                                                                                           |
| 4.14 Endurance                  | Duration: 1000 h<br>1.25 x U <sub>RAC</sub> at 110 °C<br>Once in every hour the voltage is increased to 1000 V <sub>RMS</sub> for 0.1 s via resistor of 47 Ω ± 5 %                                                                       |                                                                                                                                                                                                                                                                                                                                                                  |
| 4.14.7 Final measurements       | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Voltage proof<br>1350 V <sub>DC</sub> ; 1 min between terminations.<br>2120 V <sub>AC</sub> ; 1 min between terminations and case<br><br>Insulation resistance | No visible damage<br>Legible marking<br><br> ΔC/C  ≤ 10 % compared to values measured in 4.13.1.<br><br>Increase of tan δ:<br>≤ 0.008 for: C ≤ 1 μF or<br>≤ 0.005 for: C > 1 μF<br>Compared to values measured in 4.13.1.<br><br>No permanent breakdown or flash-over<br><br>≥ 50 % of values specified in section "Insulation resistance" of this specification |
| <b>SUB-GROUP C4</b>             |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                  |
| 4.15 Charge and discharge       | 10 000 cycles<br>Charge to 435 V <sub>DC</sub><br>Discharge resistance:<br>$R = \frac{435 V_{DC}}{1.25 \times C (dU/dt)}$                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                  |
| 4.15.1 Initial measurements     | Capacitance<br>Tangent of loss angle:<br>For C ≤ 1 μF at 10 kHz<br>For C > 1 μF at 1 kHz                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                  |
| 4.15.3 Final measurements       | Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance                                                                                                                                                                    | ΔC/C  ≤ 10 % compared to values measured in 4.15.1.<br><br>Increase of tan δ:<br>≤ 0.008 for: C ≤ 1 μF or<br>≤ 0.005 for: C > 1 μF<br>Compared to values measured in 4.15.1.<br><br>≥ 50 % of values specified in section "Insulation Resistance" of this specification                                                                                          |

| <b>GROUP C INSPECTION REQUIREMENTS</b>  |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SUB-CLAUSE NUMBER AND TEST</b>       | <b>CONDITIONS</b>                                                                                                                                                                                                                                                                                                                        | <b>PERFORMANCE REQUIREMENTS</b>                                                                                                                                                                                                                                                                                   |
| <b>SUB-GROUP C5</b>                     |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                   |
| 4.16 Radio frequency characteristic     | Resonance frequency                                                                                                                                                                                                                                                                                                                      | $\geq 0.9$ times the value as specified in section "Resonant frequency" of this specification                                                                                                                                                                                                                     |
| <b>SUB-GROUP C6</b>                     |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                   |
| 4.17 Passive flammability<br>Class B    | Bore of gas jet: $\varnothing 0.5$ mm<br>Fuel: Butane<br>Test duration for actual volume V in mm <sup>3</sup> :<br>$V \leq 250$ : 10 s<br>$250 < V \leq 500$ : 20 s<br>$500 < V \leq 1750$ : 30 s<br>$V > 1750$ : 60 s<br>One flame application<br><br> | After removing test flame from capacitor, the capacitor must not continue to burn for more than 10 s. No burning particle must drop from the sample.                                                                                                                                                              |
| <b>SUB-GROUP C7</b>                     |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                   |
| 4.18 Active flammability                | 20 cycles of 2.5 kV discharges on the test capacitor connected to $U_{RAC}$                                                                                                                                                                                                                                                              | The cheese cloth around the capacitors shall not burn with a flame.<br>No electrical measurements are required.                                                                                                                                                                                                   |
| <b>SUB-GROUP ADD1</b>                   |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                   |
| A.1 Damp heat steady state with voltage | RH: 40 %; temp.: 93 °C, voltage: 310 V <sub>AC</sub><br>Duration: 21 days                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                   |
| A.1.1 Initial measurements              | Capacitance<br>Tangent of loss angle: at 10 kHz                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                   |
| A.1.2 Final measurements                | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance                                                                                                                                                                                                                                          | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 10\%$ of the value with initial measurement A.1.1<br><br>Increase of $\tan \delta \leq 0.024$<br>Compared to values with initial measurement A.1.1<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |



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