

## DC Film Capacitors MKT Radial Potted Type



### FEATURES

- AEC-Q200 qualified (rev. D) for PCM 10.0 mm up to and including 22.5 mm (further customized components on request)
- High temperature capabilities, up to 150 °C
- Capacitance up to 560  $\mu$ F
- 4-pin version available under request for pitch  $\geq$  37.5 mm, under request
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### APPLICATIONS

- Automotive
- DC filtering
- Low voltage DC link (48 V bus)
- General purpose

**AUTOMOTIVE  
GRADE**  
Available



**RoHS  
COMPLIANT**  
**HALOGEN  
FREE**  
**GREEN**  
(5-2008)

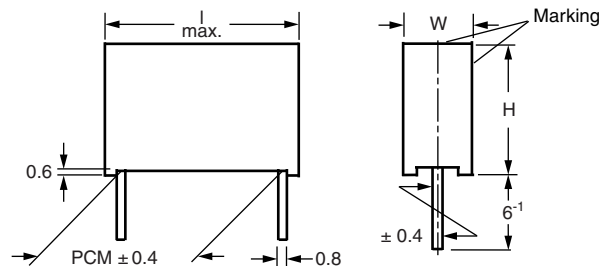
### QUICK REFERENCE DATA

|                                                 |                                                                                                                                                                                            |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacitance range                               | 1000 pF to 560 $\mu$ F                                                                                                                                                                     |
| Capacitance tolerance                           | $\pm 20 \%$ , $\pm 10 \%$ , $\pm 5 \%$                                                                                                                                                     |
| Climatic testing class according to IEC 60068-1 | 55/125/56                                                                                                                                                                                  |
| Maximum application temperature                 | 125 °C                                                                                                                                                                                     |
| Reference standards                             | IEC 60384-2                                                                                                                                                                                |
| Dielectric                                      | Polyester film                                                                                                                                                                             |
| Electrodes                                      | Metallized                                                                                                                                                                                 |
| Construction                                    | Mono construction<br>Series construction (630 V and 1000 V)                                                                                                                                |
| Encapsulation                                   | Plastic case, epoxy resin sealed, flame retardant UL-class 94 V-0                                                                                                                          |
| Leads                                           | Tinned wire                                                                                                                                                                                |
| Marking                                         | C-value; tolerance; rated voltage; code for dielectric material; code for manufacturing origin; manufacturer's type designation; manufacturer's logo or name; year and week of manufacture |
| Rated (DC) voltage                              | 63 V <sub>DC</sub> , 100 V <sub>DC</sub> , 160 V <sub>DC</sub> , 250 V <sub>DC</sub> , 400 V <sub>DC</sub> , 630 V <sub>DC</sub> , 1000 V <sub>DC</sub>                                    |
| Rated (AC) voltage                              | 40 V <sub>AC</sub> , 63 V <sub>AC</sub> , 160 V <sub>AC</sub> , 200 V <sub>AC</sub> , 220 V <sub>AC</sub>                                                                                  |
| Maximum operating temperature for limited time  | 150 °C at 0.3 U <sub>R</sub> for maximum 200 h (not applicable for pitch $\geq$ 37.5 mm)                                                                                                   |

### Note

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

### DIMENSIONS in millimeters



**COMPOSITION OF CATALOG NUMBER**

**Notes**

- For detailed tape specifications refer to packaging information [www.vishay.com/docs?28139](http://www.vishay.com/docs?28139) or end of catalog
- For PCM  $\geq 37.5$  mm, 4 pin versions are available under customer request

| SPECIFIC REFERENCE DATA                                                                           |                                                           |                     |                     |                                |                           |                           |                           |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------|---------------------|--------------------------------|---------------------------|---------------------------|---------------------------|
| DESCRIPTION                                                                                       |                                                           |                     |                     | VALUE                          |                           |                           |                           |
| Tangent of loss angle:                                                                            |                                                           |                     |                     | at 100 Hz                      | at 1 kHz                  | at 10 kHz                 | at 100 kHz                |
| $C \leq 0.1 \mu\text{F}$                                                                          |                                                           |                     |                     | -                              | $\leq 80 \times 10^{-4}$  | $\leq 150 \times 10^{-4}$ | $\leq 250 \times 10^{-4}$ |
| $0.1 \mu\text{F} < C \leq 1.0 \mu\text{F}$                                                        |                                                           |                     |                     | -                              | $\leq 80 \times 10^{-4}$  | $\leq 150 \times 10^{-4}$ | -                         |
| $1.0 \mu\text{F} < C \leq 10.0 \mu\text{F}$                                                       |                                                           |                     |                     | $\leq 35 \times 10^{-4}$       | $\leq 150 \times 10^{-4}$ | -                         | -                         |
| $10.0 \mu\text{F} < C \leq 100 \mu\text{F}$                                                       |                                                           |                     |                     | $\leq 50 \times 10^{-4}$       | $\leq 300 \times 10^{-4}$ | -                         | -                         |
| $C > 100 \mu\text{F}$                                                                             |                                                           |                     |                     | $\leq 70 \times 10^{-4}$       | -                         | -                         | -                         |
| PITCH (mm)                                                                                        | MAXIMUM PULSE RISE TIME (dU/dt) <sub>R</sub> [V/ $\mu$ s] |                     |                     |                                |                           |                           |                           |
|                                                                                                   | 63 V <sub>DC</sub>                                        | 100 V <sub>DC</sub> | 160 V <sub>DC</sub> | 250 V <sub>DC</sub>            | 400 V <sub>DC</sub>       | 630 V <sub>DC</sub>       | 1000 V <sub>DC</sub>      |
| 10                                                                                                | 12                                                        | 18                  | -                   | 36                             | 52                        | 70                        | 260                       |
| 15                                                                                                | 8                                                         | 10                  | -                   | 20                             | 32                        | 66                        | 130                       |
| 22.5                                                                                              | 5                                                         | 6                   | -                   | 12                             | 18                        | 38                        | 68                        |
| 27.5                                                                                              | 3                                                         | 5                   | 6                   | 8                              | 14                        | 28                        | 50                        |
| 37.5                                                                                              | 0.8                                                       | 1                   | 2                   | 3                              | -                         | -                         | -                         |
| 52.5                                                                                              | 0.2                                                       | 0.3                 | 0.4                 | 1                              | -                         | -                         | -                         |
| If the maximum pulse voltage is less than the rated voltage higher dU/dt values can be permitted. |                                                           |                     |                     |                                |                           |                           |                           |
| R between leads, for $C \leq 0.33 \mu\text{F}$ and $U_R \leq 100 \text{ V}$                       |                                                           |                     |                     | > 15 000 M $\Omega$            |                           |                           |                           |
| R between leads, for $C \leq 0.33 \mu\text{F}$ and $U_R > 100 \text{ V}$                          |                                                           |                     |                     | > 30 000 M $\Omega$            |                           |                           |                           |
| RC between leads, for $C > 0.33 \mu\text{F}$ and $U_R \leq 100 \text{ V}$                         |                                                           |                     |                     | > 5000 s                       |                           |                           |                           |
| RC between leads, for $C > 0.33 \mu\text{F}$ and $U_R > 100 \text{ V}$                            |                                                           |                     |                     | > 10 000 s                     |                           |                           |                           |
| R between leads and case, 100 V; (foil method)                                                    |                                                           |                     |                     | > 30 000 M $\Omega$            |                           |                           |                           |
| Withstanding (DC) voltage (cut off current 10 mA) <sup>(1)</sup> ; rise time < 1000 V/s           |                                                           |                     |                     | 1.6 x U <sub>RDC</sub> , 1 min |                           |                           |                           |
| Withstanding (DC) leads and case                                                                  |                                                           |                     |                     | 2 x U <sub>RDC</sub> , 1 min   |                           |                           |                           |
| Maximum application temperature                                                                   |                                                           |                     |                     | 125 °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         |              |                     |                 |                 |                                 |             |                                  |                                                            |
|-------------------------|--------------|---------------------|-----------------|-----------------|---------------------------------|-------------|----------------------------------|------------------------------------------------------------|
| U <sub>RDC</sub><br>(V) | CAP.<br>(μF) | CAPACITANCE<br>CODE | VOLTAGE<br>CODE | V <sub>AC</sub> | DIMENSIONS<br>w x h x l<br>(mm) | PCM<br>(mm) | d <sub>t</sub> ± 0.08 mm<br>(mm) | ORDERING CODE FOR 10 %<br>TOL./BULK PACKING <sup>(1)</sup> |
| 63                      | 0.22         | 422                 | 06              | 40              | 3.5 x 8.0 x 13.0                | 10.0        | 0.80                             | MKT1820422065                                              |
|                         | 0.33         | 433                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820433065                                              |
|                         | 0.47         | 447                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820447065                                              |
|                         | 0.68         | 468                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820468065                                              |
|                         | 1.0          | 510                 |                 |                 | 4.5 x 9.5 x 13.0                | 10.0        |                                  | MKT1820510065                                              |
|                         | 1.5          | 515                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820515065                                              |
|                         | 2.2          | 522                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820522065                                              |
|                         | 3.3          | 533                 |                 |                 | 9.0 x 15.5 x 13.0               | 10.0        |                                  | MKT1820533065M                                             |
|                         | 3.3          | 533                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820533065                                              |
|                         | 4.7          | 547                 |                 |                 | 9.0 x 15.5 x 13.0               | 10.0        |                                  | MKT1820547065M                                             |
|                         | 4.7          | 547                 |                 |                 | 7.5 x 13.5 x 18.0               | 15.0        |                                  | MKT1820547065                                              |
|                         | 6.8          | 568                 |                 |                 | 8.5 x 14.5 x 18.0               | 15.0        |                                  | MKT1820568065                                              |
|                         | 10.0         | 610                 |                 |                 | 8.5 x 17.5 x 18.0               | 15.0        |                                  | MKT1820610065                                              |
|                         | 15.0         | 615                 |                 |                 | 8.5 x 16.5 x 26.5               | 22.5        |                                  | MKT1820615065                                              |
|                         | 22.0         | 622                 |                 |                 | 10.5 x 18.5 x 26.5              | 22.5        |                                  | MKT1820622065M                                             |
|                         | 18.0         | 618                 |                 |                 | 9.0 x 19.0 x 32.0               | 27.5        |                                  | MKT1820618065                                              |
|                         | 22.0         | 622                 |                 |                 | 11.0 x 21.0 x 32.0              | 27.5        |                                  | MKT1820622065                                              |
|                         | 27.0         | 627                 |                 |                 | 11.0 x 21.0 x 32.0              | 27.5        |                                  | MKT1820627065                                              |
|                         | 33.0         | 633                 |                 |                 | 13.0 x 23.0 x 32.0              | 27.5        |                                  | MKT1820633065                                              |
|                         | 39.0         | 639                 |                 |                 | 13.0 x 23.0 x 32.0              | 27.5        |                                  | MKT1820639065                                              |
|                         | 47.0         | 647                 |                 |                 | 15.0 x 25.0 x 32.0              | 27.5        |                                  | MKT1820647065                                              |
|                         | 56.0         | 656                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820656065                                              |
|                         | 68.0         | 668                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820668065                                              |
|                         | 82.0         | 682                 |                 |                 | 21.0 x 31.0 x 32.0              | 27.5        |                                  | MKT1820682065                                              |
|                         | 100.0        | 710                 |                 |                 | 21.0 x 31.0 x 32.0              | 27.5        |                                  | MKT1820710065M                                             |
|                         | 100.0        | 710                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        | 1.0                              | MKT1820710065                                              |
|                         | 120.0        | 712                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820712065                                              |
|                         | 150.0        | 715                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820715065                                              |
|                         | 180.0        | 718                 |                 |                 | 21.5 x 38.5 x 43.0              | 37.5        |                                  | MKT1820718065                                              |
|                         | 220.0        | 722                 |                 |                 | 24.0 x 44.0 x 42.0              | 37.5        |                                  | MKT1820722065M                                             |
|                         | 270.0        | 727                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820727065M                                             |
|                         | 330.0        | 733                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820733065M                                             |
|                         | 220.0        | 722                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        | 1.2                              | MKT1820722065                                              |
|                         | 270.0        | 727                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820727065                                              |
|                         | 330.0        | 733                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820733065                                              |
|                         | 390.0        | 739                 |                 |                 | 30.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820739065                                              |
|                         | 470.0        | 747                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820747065                                              |
|                         | 560.0        | 756                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820756065                                              |

**Note**

<sup>(1)</sup> Please replace "5" by: "4" for 5 % tolerance or "6" for 20 % tolerance



| ELECTRICAL DATA         |              |                     |                 |                 |                                 |             |                                  |                                                            |
|-------------------------|--------------|---------------------|-----------------|-----------------|---------------------------------|-------------|----------------------------------|------------------------------------------------------------|
| U <sub>RDC</sub><br>(V) | CAP.<br>(μF) | CAPACITANCE<br>CODE | VOLTAGE<br>CODE | V <sub>AC</sub> | DIMENSIONS<br>w x h x l<br>(mm) | PCM<br>(mm) | d <sub>t</sub> ± 0.08 mm<br>(mm) | ORDERING CODE FOR 10 %<br>TOL./BULK PACKING <sup>(1)</sup> |
| 100                     | 0.068        | 368                 | 01              | 63              | 3.5 x 8.0 x 13.0                | 10.0        | 0.8                              | MKT1820368015                                              |
|                         | 0.10         | 410                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820410015                                              |
|                         | 0.15         | 415                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820415015                                              |
|                         | 0.22         | 422                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820422015                                              |
|                         | 0.33         | 433                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820433015                                              |
|                         | 0.47         | 447                 |                 |                 | 4.5 x 9.5 x 13.0                | 10.0        |                                  | MKT1820447015                                              |
|                         | 0.68         | 468                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820468015                                              |
|                         | 1.0          | 510                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820510015M                                             |
|                         | 1.0          | 510                 |                 |                 | 5.5 x 10.5 x 18.0               | 15.0        |                                  | MKT1820510015                                              |
|                         | 1.5          | 515                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820515015                                              |
|                         | 2.2          | 522                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820522015                                              |
|                         | 3.3          | 533                 |                 |                 | 8.5 x 14.5 x 18.0               | 15.0        |                                  | MKT1820533015                                              |
|                         | 4.7          | 547                 |                 |                 | 8.5 x 14.5 x 18.0               | 15.0        |                                  | MKT1820547015M                                             |
|                         | 4.7          | 547                 |                 |                 | 7.5 x 15.5 x 26.5               | 22.5        |                                  | MKT1820547015                                              |
|                         | 6.8          | 568                 |                 |                 | 8.5 x 16.5 x 26.5               | 22.5        |                                  | MKT1820568015                                              |
|                         | 10.0         | 610                 |                 |                 | 10.5 x 18.5 x 26.5              | 22.5        |                                  | MKT1820610015                                              |
|                         | 15.0         | 615                 |                 |                 | 10.5 x 18.5 x 26.5              | 22.5        |                                  | MKT1820615015M                                             |
|                         | 15.0         | 615                 |                 |                 | 11.0 x 21.0 x 32.0              | 27.5        |                                  | MKT1820615015                                              |
|                         | 18.0         | 618                 |                 |                 | 13.0 x 23.0 x 32.0              | 27.5        |                                  | MKT1820618015                                              |
|                         | 22.0         | 622                 |                 |                 | 13.0 x 23.0 x 32.0              | 27.5        |                                  | MKT1820622015                                              |
|                         | 27.0         | 627                 |                 |                 | 15.0 x 25.0 x 32.0              | 27.5        |                                  | MKT1820627015                                              |
|                         | 33.0         | 633                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820633015                                              |
|                         | 39.0         | 639                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820639015                                              |
|                         | 47.0         | 647                 |                 |                 | 21.0 x 31.0 x 32.0              | 27.5        |                                  | MKT1820647015                                              |
|                         | 56.0         | 656                 |                 |                 | 21.0 x 31.0 x 32.0              | 27.5        |                                  | MKT1820656015M                                             |
|                         | 56.0         | 656                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        | 1.0                              | MKT1820656015                                              |
|                         | 68.0         | 668                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820668015                                              |
|                         | 82.0         | 682                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820682015                                              |
|                         | 100.0        | 710                 |                 |                 | 21.5 x 38.5 x 43.0              | 37.5        |                                  | MKT1820710015                                              |
|                         | 120.0        | 712                 |                 |                 | 24.0 x 44.0 x 42.0              | 37.5        |                                  | MKT1820712015M                                             |
|                         | 150.0        | 715                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820715015M                                             |
|                         | 180.0        | 718                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820718015M                                             |
|                         | 120.0        | 712                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        | 1.2                              | MKT1820712015                                              |
|                         | 150.0        | 715                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820715015                                              |
|                         | 180.0        | 718                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820718015                                              |
|                         | 220.0        | 722                 |                 |                 | 30.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820722015                                              |
|                         | 270.0        | 727                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820727015                                              |
|                         | 330.0        | 733                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820733015                                              |

**Note**

<sup>(1)</sup> Please replace "5" by: "4" for 5 % tolerance or "6" for 20 % tolerance



| ELECTRICAL DATA         |              |                     |                 |                 |                                 |             |                                  |                                                            |
|-------------------------|--------------|---------------------|-----------------|-----------------|---------------------------------|-------------|----------------------------------|------------------------------------------------------------|
| U <sub>RDC</sub><br>(V) | CAP.<br>(μF) | CAPACITANCE<br>CODE | VOLTAGE<br>CODE | V <sub>AC</sub> | DIMENSIONS<br>w x h x l<br>(mm) | PCM<br>(mm) | d <sub>t</sub> ± 0.08 mm<br>(mm) | ORDERING CODE FOR 10 %<br>TOL./BULK PACKING <sup>(1)</sup> |
| 160                     | 4.7          | 547                 | 16              | 63              | 9.0 x 19.0 x 32.0               | 27.5        | 0.8                              | MKT1820547165                                              |
|                         | 6.8          | 568                 |                 |                 | 11.0 x 21.0 x 32.0              | 27.5        |                                  | MKT1820568165                                              |
|                         | 10.0         | 610                 |                 |                 | 11.0 x 21.0 x 32.0              | 27.5        |                                  | MKT1820610165                                              |
|                         | 15.0         | 615                 |                 |                 | 13.0 x 23.0 x 32.0              | 27.5        |                                  | MKT1820615165                                              |
|                         | 18.0         | 618                 |                 |                 | 15.0 x 25.0 x 32.0              | 27.5        |                                  | MKT1820618165                                              |
|                         | 22.0         | 622                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820622165                                              |
|                         | 27.0         | 627                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820627165                                              |
|                         | 33.0         | 633                 |                 |                 | 31.0 x 31.0 x 32.0              | 27.5        |                                  | MKT1820633165M                                             |
|                         | 33.0         | 633                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        | 1.0                              | MKT1820633165                                              |
|                         | 39.0         | 639                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820639165                                              |
|                         | 47.0         | 647                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820647165                                              |
|                         | 56.0         | 656                 |                 |                 | 21.5 x 38.5 x 43.0              | 37.5        |                                  | MKT1820656165                                              |
|                         | 68.0         | 668                 |                 |                 | 21.5 x 38.5 x 43.0              | 37.5        |                                  | MKT1820668165                                              |
|                         | 82.0         | 682                 |                 |                 | 24.0 x 44.0 x 42.0              | 37.5        |                                  | MKT1820682165M                                             |
|                         | 100.0        | 710                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820710165M                                             |
|                         | 120.0        | 712                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820712165M                                             |
|                         | 82.0         | 682                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        | 1.2                              | MKT1820682165                                              |
|                         | 100.0        | 710                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820710165                                              |
|                         | 120.0        | 712                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820712165                                              |
|                         | 150.0        | 715                 |                 |                 | 30.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820715165                                              |
|                         | 180.0        | 718                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820718165                                              |
|                         | 220.0        | 722                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820722165                                              |
| 250                     | 0.022        | 322                 | 25              | 160             | 3.5 x 8.0 x 13.0                | 10.0        | 0.8                              | MKT1820322255                                              |
|                         | 0.033        | 333                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820333255                                              |
|                         | 0.047        | 347                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820347255                                              |
|                         | 0.068        | 368                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820368255                                              |
|                         | 0.10         | 410                 |                 |                 | 4.5 x 9.5 x 13.0                | 10.0        |                                  | MKT1820410255                                              |
|                         | 0.15         | 415                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820415255                                              |
|                         | 0.22         | 422                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820422255                                              |
|                         | 0.33         | 433                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820433255M                                             |
|                         | 0.33         | 433                 |                 |                 | 5.5 x 10.5 x 18.0               | 15.0        |                                  | MKT1820433255                                              |
|                         | 0.47         | 447                 |                 |                 | 9.0 x 15.5 x 13.0               | 10.0        |                                  | MKT1820447255M                                             |
|                         | 0.47         | 447                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820447255                                              |
|                         | 0.68         | 468                 |                 |                 | 7.5 x 13.5 x 18.0               | 15.0        |                                  | MKT1820468255                                              |
|                         | 1.0          | 510                 |                 |                 | 8.5 x 14.5 x 18.0               | 15.0        |                                  | MKT1820510255                                              |
|                         | 1.5          | 515                 |                 |                 | 10.5 x 17.5 x 18.0              | 15.0        |                                  | MKT1820515255M                                             |
|                         | 1.5          | 515                 |                 |                 | 8.5 x 16.5 x 26.5               | 22.5        |                                  | MKT1820515255                                              |
|                         | 2.2          | 522                 |                 |                 | 10.5 x 18.5 x 26.5              | 22.5        |                                  | MKT1820522255                                              |
|                         | 3.3          | 533                 |                 |                 | 12.5 x 20.0 x 26.5              | 22.5        |                                  | MKT1820533255                                              |

**Note**

<sup>(1)</sup> Please replace "5" by: "4" for 5 % tolerance or "6" for 20 % tolerance



| ELECTRICAL DATA         |              |                     |                 |                 |                                 |             |                                  |                                                            |
|-------------------------|--------------|---------------------|-----------------|-----------------|---------------------------------|-------------|----------------------------------|------------------------------------------------------------|
| U <sub>RDC</sub><br>(V) | CAP.<br>(μF) | CAPACITANCE<br>CODE | VOLTAGE<br>CODE | V <sub>AC</sub> | DIMENSIONS<br>w x h x l<br>(mm) | PCM<br>(mm) | d <sub>t</sub> ± 0.08 mm<br>(mm) | ORDERING CODE FOR 10 %<br>TOL./BULK PACKING <sup>(1)</sup> |
| 250                     | 4.7          | 547                 | 25              | 100             | 11.0 x 21.0 x 32.0              | 27.5        | 0.8                              | MKT1820547255                                              |
|                         | 6.8          | 568                 |                 |                 | 13.0 x 23.0 x 32.0              | 27.5        |                                  | MKT1820568255                                              |
|                         | 10.0         | 610                 |                 |                 | 15.0 x 25.0 x 32.0              | 27.5        |                                  | MKT1820610255                                              |
|                         | 15.0         | 615                 |                 |                 | 18.0 x 28.0 x 32.0              | 27.5        |                                  | MKT1820615255                                              |
|                         | 18.0         | 618                 |                 |                 | 21.0 x 31.0 x 32.0              | 27.5        |                                  | MKT1820618255M                                             |
|                         | 18.0         | 618                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        | 1.0                              | MKT1820618255                                              |
|                         | 22.0         | 622                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820622255                                              |
|                         | 27.0         | 627                 |                 |                 | 18.5 x 35.5 x 43.0              | 37.5        |                                  | MKT1820627255                                              |
|                         | 33.0         | 633                 |                 |                 | 21.5 x 38.5 x 43.0              | 37.5        |                                  | MKT1820633255                                              |
|                         | 39.0         | 639                 |                 |                 | 21.5 x 38.5 x 43.0              | 37.5        |                                  | MKT1820639255                                              |
|                         | 47.0         | 647                 |                 |                 | 24.0 x 44.0 x 42.0              | 37.5        |                                  | MKT1820647255                                              |
|                         | 56.0         | 656                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820656255                                              |
|                         | 68.0         | 668                 |                 |                 | 30.0 x 45.0 x 42.0              | 37.5        |                                  | MKT1820668255                                              |
|                         | 56.0         | 656                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        | 1.2                              | MKT1820656255M                                             |
|                         | 68.0         | 668                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820668255M                                             |
|                         | 82.0         | 682                 |                 |                 | 25.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820682255                                              |
|                         | 100.0        | 710                 |                 |                 | 30.0 x 45.0 x 57.5              | 52.5        |                                  | MKT1820710255                                              |
|                         | 120.0        | 712                 |                 |                 | 35.0 x 50.0 x 57.5              | 52.5        |                                  | MKT1820712255                                              |
| 400                     | 0.010        | 310                 | 40              | 200             | 3.5 x 8.0 x 13.0                | 10.0        | 0.8                              | MKT1820310405                                              |
|                         | 0.015        | 315                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820315405                                              |
|                         | 0.022        | 322                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820322405                                              |
|                         | 0.033        | 333                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820333405                                              |
|                         | 0.047        | 347                 |                 |                 | 4.5 x 9.5 x 13.0                | 10.0        |                                  | MKT1820347405                                              |
|                         | 0.068        | 368                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820368405                                              |
|                         | 0.10         | 410                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820410405                                              |
|                         | 0.15         | 415                 |                 |                 | 9.0 x 15.5 x 13.0               | 10.0        |                                  | MKT1820415405M                                             |
|                         | 0.15         | 415                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820415405                                              |
|                         | 0.22         | 422                 |                 |                 | 9.0 x 15.5 x 13.0               | 10.0        |                                  | MKT1820422405M                                             |
|                         | 0.22         | 422                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820422405                                              |
|                         | 0.33         | 433                 |                 |                 | 7.5 x 13.5 x 18.0               | 15.0        |                                  | MKT1820433405                                              |
|                         | 0.47         | 447                 |                 |                 | 8.5 x 17.5 x 18.0               | 15.0        |                                  | MKT1820447405                                              |
|                         | 0.68         | 468                 |                 |                 | 8.5 x 16.5 x 26.5               | 22.5        |                                  | MKT1820468405                                              |
|                         | 1.0          | 510                 |                 |                 | 10.5 x 18.5 x 26.5              | 22.5        |                                  | MKT1820510405                                              |
|                         | 1.5          | 515                 |                 |                 | 11.0 x 21.0 x 26.5              | 22.5        |                                  | MKT1820515405M                                             |
|                         | 1.5          | 515                 |                 |                 | 11.0 x 21.0 x 31.0              | 27.5        |                                  | MKT1820515405                                              |
|                         | 2.2          | 522                 |                 |                 | 13.5 x 23.5 x 31.5              | 27.5        |                                  | MKT1820522405                                              |
|                         | 3.3          | 533                 |                 |                 | 15 x 24.5 x 31.5                | 27.5        |                                  | MKT1820533405                                              |
|                         | 4.7          | 547                 |                 |                 | 18.0 x 28.0 x 31.5              | 27.5        |                                  | MKT1820547405                                              |

**Note**

<sup>(1)</sup> Please replace "5" by: "4" for 5 % tolerance or "6" for 20 % tolerance



| ELECTRICAL DATA         |              |                     |                 |                 |                                 |             |                                  |                                                            |
|-------------------------|--------------|---------------------|-----------------|-----------------|---------------------------------|-------------|----------------------------------|------------------------------------------------------------|
| U <sub>RDC</sub><br>(V) | CAP.<br>(μF) | CAPACITANCE<br>CODE | VOLTAGE<br>CODE | V <sub>AC</sub> | DIMENSIONS<br>w x h x l<br>(mm) | PCM<br>(mm) | d <sub>t</sub> ± 0.08 mm<br>(mm) | ORDERING CODE FOR 10 %<br>TOL./BULK PACKING <sup>(1)</sup> |
| 630                     | 0.0010       | 210                 | 63              | 220             | 3.5 x 8.0 x 13.0                | 10.0        | 0.80                             | MKT1820210635                                              |
|                         | 0.0015       | 215                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820215635                                              |
|                         | 0.0022       | 222                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820222635                                              |
|                         | 0.0033       | 233                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820233635                                              |
|                         | 0.0047       | 247                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820247635                                              |
|                         | 0.0068       | 268                 |                 |                 | 3.5 x 8.0 x 13.0                | 10.0        |                                  | MKT1820268635                                              |
|                         | 0.010        | 310                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820310635                                              |
|                         | 0.015        | 315                 |                 |                 | 4.5 x 9.5 x 13.0                | 10.0        |                                  | MKT1820315635                                              |
|                         | 0.022        | 322                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820322635                                              |
|                         | 0.033        | 333                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820333635M                                             |
|                         | 0.033        | 333                 |                 |                 | 5.5 x 10.5 x 18.0               | 15.0        |                                  | MKT1820333635                                              |
|                         | 0.047        | 347                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820347635M                                             |
|                         | 0.047        | 347                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820347635                                              |
|                         | 0.068        | 368                 |                 |                 | 7.5 x 13.5 x 18.0               | 15.0        |                                  | MKT1820368635                                              |
|                         | 0.10         | 410                 |                 |                 | 7.5 x 13.5 x 18.0               | 15.0        |                                  | MKT1820410635M                                             |
|                         | 0.10         | 410                 |                 |                 | 6.5 x 14.5 x 26.5               | 22.5        |                                  | MKT1820410635                                              |
|                         | 0.15         | 415                 |                 |                 | 7.5 x 15.5 x 26.5               | 22.5        |                                  | MKT1820415635                                              |
|                         | 0.22         | 422                 |                 |                 | 8.5 x 16.5 x 26.5               | 22.5        |                                  | MKT1820422635                                              |
|                         | 0.33         | 433                 |                 |                 | 11.0 x 21.0 x 31.0              | 27.5        |                                  | MKT1820433635                                              |
|                         | 0.47         | 447                 |                 |                 | 11.0 x 21.0 x 31.0              | 27.5        |                                  | MKT1820447635                                              |
|                         | 0.68         | 468                 |                 |                 | 13.5 x 23.5 x 31.5              | 27.5        |                                  | MKT1820468635                                              |
|                         | 1.0          | 510                 |                 |                 | 15.0 x 24.5 x 31.5              | 27.5        |                                  | MKT1820510635                                              |
|                         | 1.5          | 515                 |                 |                 | 18.0 x 28.0 x 31.5              | 27.5        |                                  | MKT1820515635                                              |
| 1000                    | 0.0010       | 210                 | 10              | 220             | 4.0 x 9.0 x 13.0                | 10.0        | 0.80                             | MKT1820210105                                              |
|                         | 0.0015       | 215                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820215105                                              |
|                         | 0.0022       | 222                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820222105                                              |
|                         | 0.0033       | 233                 |                 |                 | 4.0 x 9.0 x 13.0                | 10.0        |                                  | MKT1820233105                                              |
|                         | 0.0047       | 247                 |                 |                 | 5.5 x 10.5 x 13.0               | 10.0        |                                  | MKT1820247105                                              |
|                         | 0.0068       | 268                 |                 |                 | 6.5 x 11.5 x 13.0               | 10.0        |                                  | MKT1820268105                                              |
|                         | 0.010        | 310                 |                 |                 | 5.5 x 10.5 x 18.0               | 15.0        |                                  | MKT1820310105                                              |
|                         | 0.015        | 315                 |                 |                 | 6.5 x 12.5 x 18.0               | 15.0        |                                  | MKT1820315105                                              |
|                         | 0.022        | 322                 |                 |                 | 7.5 x 13.5 x 18.0               | 15.0        |                                  | MKT1820322105                                              |
|                         | 0.033        | 333                 |                 |                 | 8.5 x 14.5 x 18.0               | 15.0        |                                  | MKT1820333105M                                             |
|                         | 0.033        | 333                 |                 |                 | 6.5 x 14.5 x 26.5               | 22.5        |                                  | MKT1820333105                                              |
|                         | 0.047        | 347                 |                 |                 | 7.5 x 15.5 x 26.5               | 22.5        |                                  | MKT1820347105                                              |
|                         | 0.068        | 368                 |                 |                 | 8.5 x 16.5 x 26.5               | 22.5        |                                  | MKT1820368105                                              |
|                         | 0.10         | 410                 |                 |                 | 10.5 x 18.5 x 26.5              | 22.5        |                                  | MKT1820410105                                              |
|                         | 0.15         | 415                 |                 |                 | 11.0 x 21.0 x 31.0              | 27.5        |                                  | MKT1820415105                                              |
|                         | 0.22         | 422                 |                 |                 | 13.5 x 23.5 x 31.5              | 27.5        |                                  | MKT1820422105                                              |
|                         | 0.33         | 433                 |                 |                 | 16.5 x 29.5 x 31.5              | 27.5        |                                  | MKT1820433105                                              |
|                         | 0.47         | 447                 |                 |                 | 20.0 x 35.0 x 31.5              | 27.5        |                                  | MKT1820447105                                              |

**Note**

<sup>(1)</sup> Please replace "5" by: "4" for 5 % tolerance or "6" for 20 % tolerance

| RECOMMENDED PACKAGING |                   |                 |                              |                        |          |          |                    |                    |
|-----------------------|-------------------|-----------------|------------------------------|------------------------|----------|----------|--------------------|--------------------|
| PACKAGING CODE        | TYPE OF PACKAGING | HEIGHT (H) (mm) | REEL DIAMETER/ BOX SIZE (mm) | ORDERING CODE EXAMPLES | PITCH 10 | PITCH 15 | PITCH 22.5 TO 27.5 | PITCH 37.5 TO 52.5 |
| G                     | Ammo              | 18.5            | 55 x 210 x 340               | MKT1820410405G         | x        | x        | -                  | -                  |
| W                     | Reel              | 18.5            | 350                          | MKT1820410405W         | x        | x        | -                  | -                  |
| V                     | Reel              | 18.5            | 500                          | MKT1820422635V         | -        | x        | x                  | -                  |
| G                     | Ammo              | 18.5            | 60 x 360 x 510               | MKT1820422635G         | -        | -        | x                  | -                  |
| -                     | Bulk              | -               | -                            | MKT1820515405          | x        | x        | x                  | x                  |

| EXAMPLE OF ORDERING CODE |                  |              |                               |                |
|--------------------------|------------------|--------------|-------------------------------|----------------|
| TYPE                     | CAPACITANCE CODE | VOLTAGE CODE | TOLERANCE CODE <sup>(1)</sup> | PACKAGING CODE |
| MKT1820                  | 410              | 06           | 5                             | G              |

## MOUNTING

### Normal Use

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

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

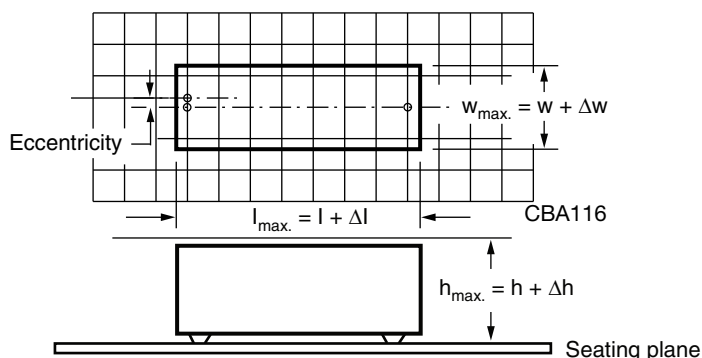
- For pitches  $\leq 15$  mm the capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

### Space Requirements on Printed-Circuit Board

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

- For products with pitch  $\leq 15$  mm,  $\Delta w = \Delta l = 0.3$  mm;  $\Delta h = 0.1$  mm
- For products with  $15$  mm  $<$  pitch  $\leq 27.5$  mm,  $\Delta w = \Delta l = 0.5$  mm;  $\Delta h = 0.1$  mm
- For products with  $27.5$  mm  $<$  pitch  $\leq 52.5$  mm,  $\Delta w = \Delta l = 0.5$  mm;  $\Delta h = 0.5$  mm

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



## SOLDERING CONDITIONS

For general soldering conditions and wave soldering profile, we refer to the application note:

“Soldering Guidelines for Film Capacitors”: [www.vishay.com/doc?28171](http://www.vishay.com/doc?28171)

### Storage Temperature

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

### Ratings and Characteristics Reference Conditions

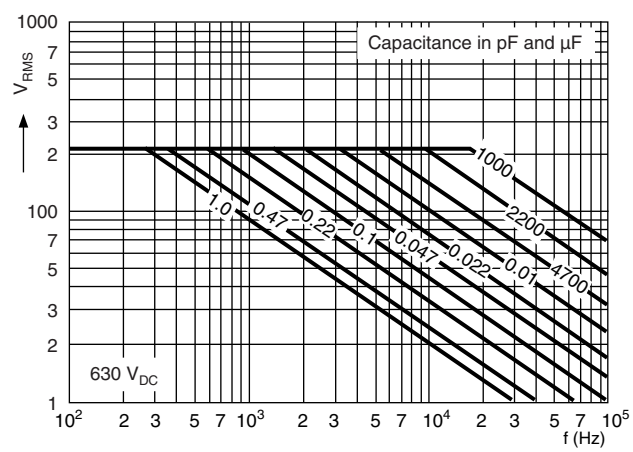
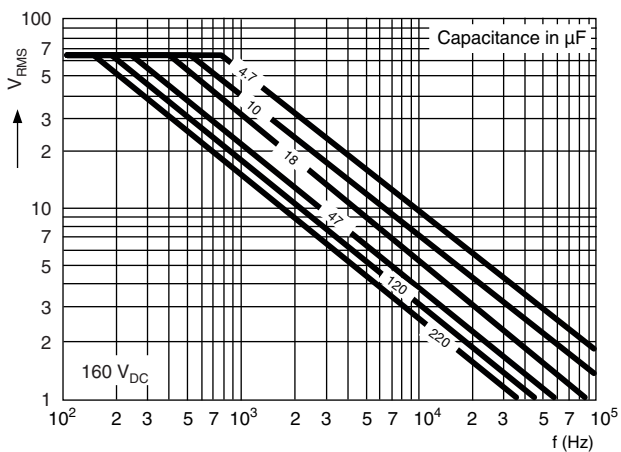
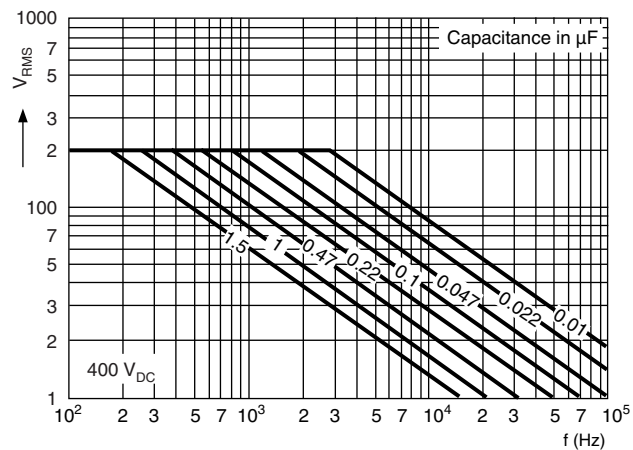
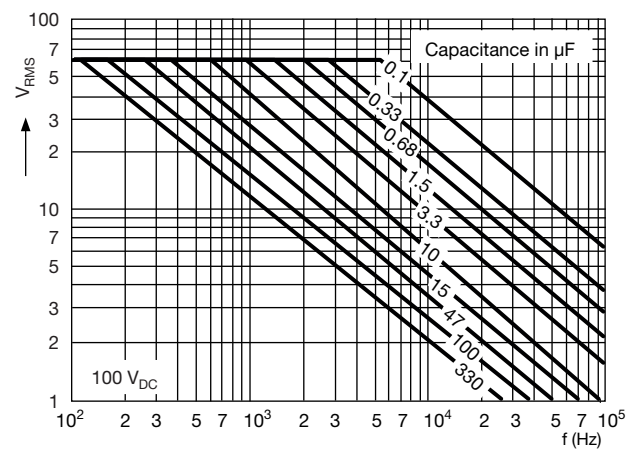
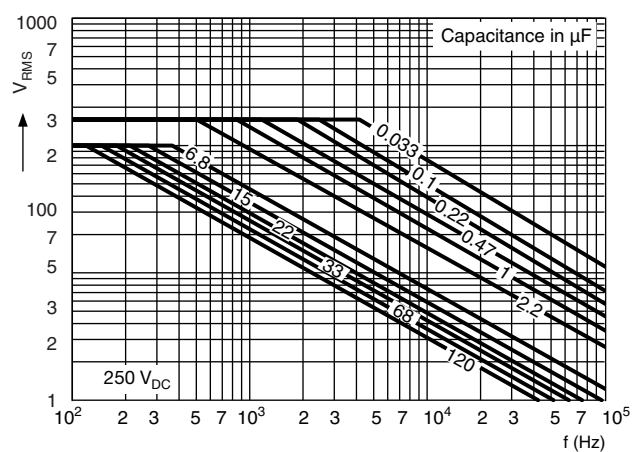
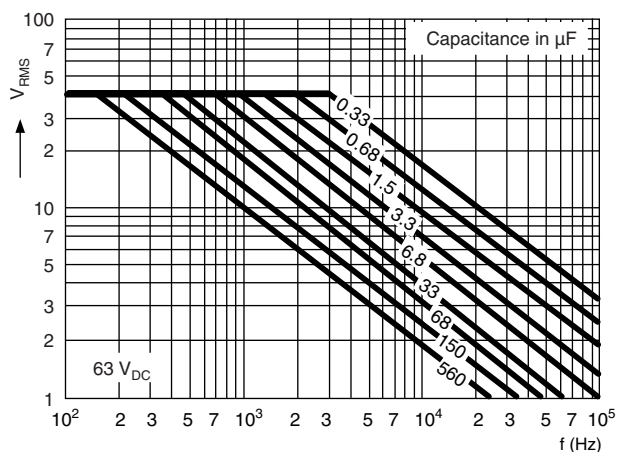
Unless otherwise specified, all electrical values apply to an ambient free temperature of  $23$  °C  $\pm 1$  °C, an atmospheric pressure of 86 kPa to 106 kPa and a relative humidity of 50 %  $\pm 2$  %.

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

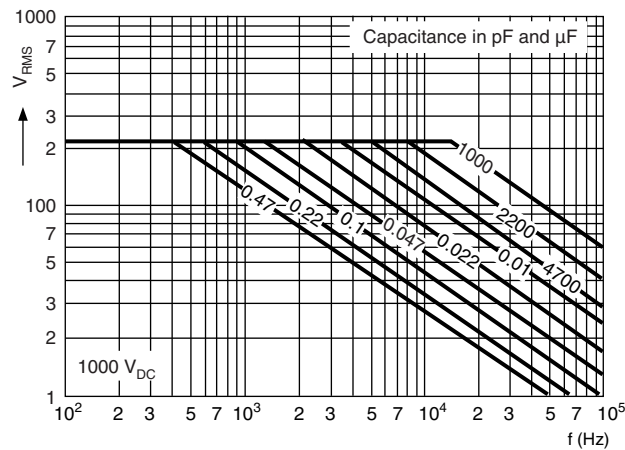
PERMISSIBLE AC VOLTAGE VS. FREQUENCY AT  $T_{amb} \leq 85^\circ\text{C}$



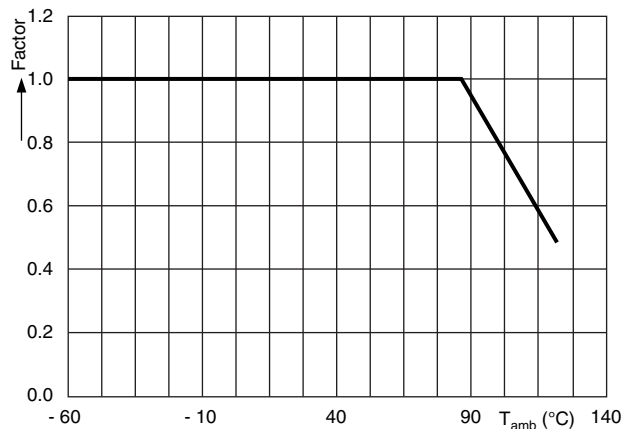


## CHARACTERISTICS

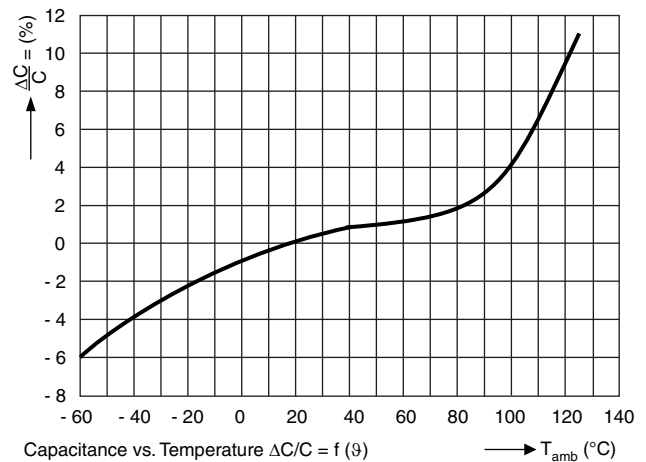
PERMISSIBLE AC VOLTAGE VS. FREQUENCY AT  $T_{amb} \leq 85^\circ\text{C}$



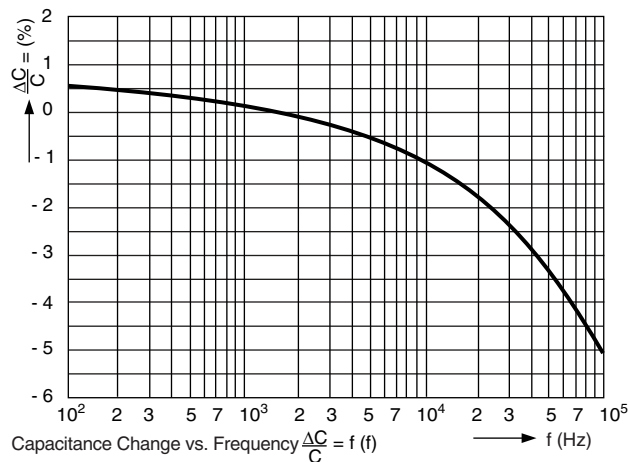
## CHARACTERISTICS



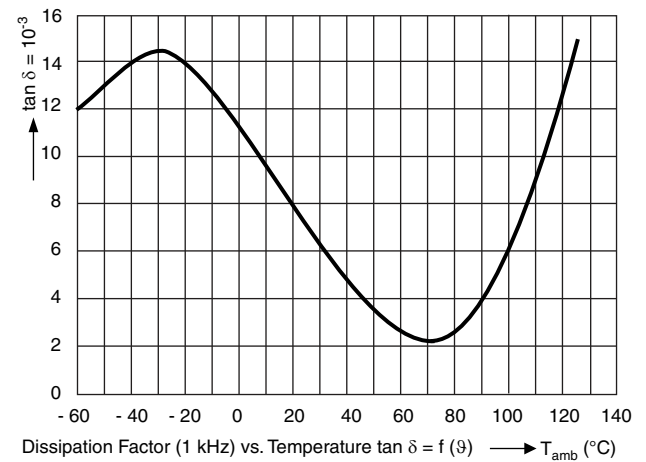
Nominal voltage (AC and DC) as a function of temperature



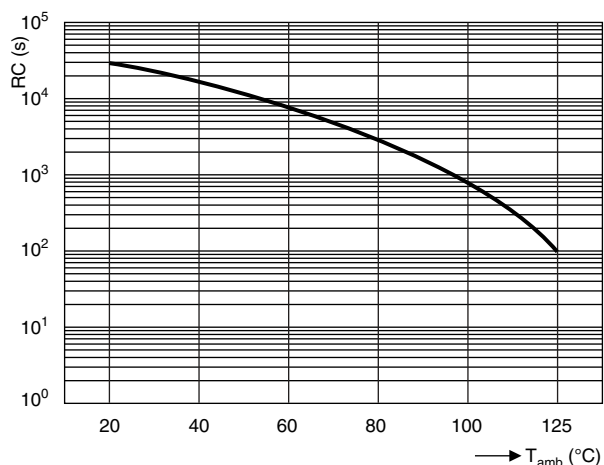
Capacitance as a function of temperature (typical curve)



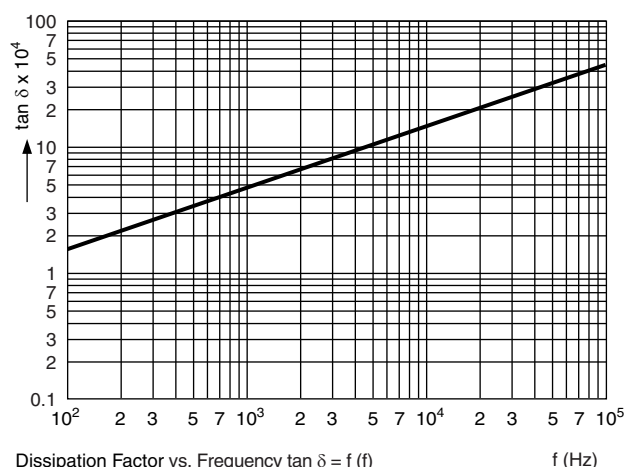
Capacitance as a function of frequency (typical curve)



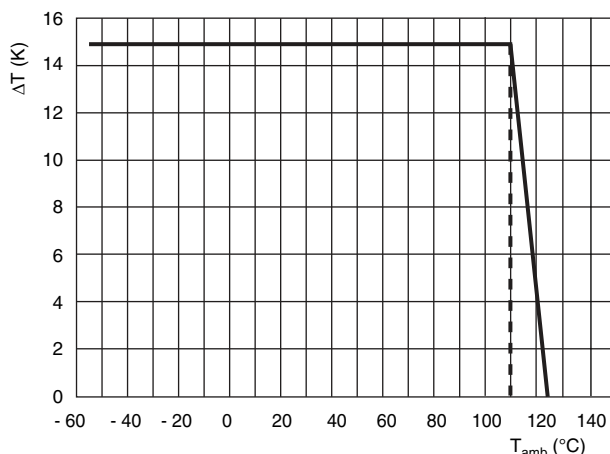
Dissipation factor as a function of temperature (typical curve)



Insulation resistance as a function of temperature  
(typical curve)



Dissipation Factor vs. Frequency  $\tan \delta = f(f)$   
Dissipation factor as a function of frequency  
(typical curve)



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

| <b>HEAT CONDUCTIVITY (G) AS A FUNCTION OF CAPACITOR BODY THICKNESS IN mW/°C</b> |                                  |                      |                      |                      |                      |                      |
|---------------------------------------------------------------------------------|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <b>W<sub>max.</sub><br/>(mm)</b>                                                | <b>HEAT CONDUCTIVITY (mW/°C)</b> |                      |                      |                      |                      |                      |
|                                                                                 | <b>PITCH 10.0 mm</b>             | <b>PITCH 15.0 mm</b> | <b>PITCH 22.5 mm</b> | <b>PITCH 27.5 mm</b> | <b>PITCH 37.5 mm</b> | <b>PITCH 52.5 mm</b> |
| 3.5                                                                             | 5.0                              | -                    | -                    | -                    | -                    | -                    |
| 4.0                                                                             | 6.0                              | -                    | -                    | -                    | -                    | -                    |
| 4.5                                                                             | 7.0                              | -                    | -                    | -                    | -                    | -                    |
| 5.5                                                                             | 8.0                              | 10.0                 | -                    | -                    | -                    | -                    |
| 6.5                                                                             | 10.0                             | 13.0                 | 20.0                 | -                    | -                    | -                    |
| 7.5                                                                             | -                                | 15.0                 | 22.0                 | -                    | -                    | -                    |
| 8.5                                                                             | -                                | 16.0                 | 24.0                 | -                    | -                    | -                    |
| 9.0                                                                             | -                                | -                    | -                    | 32.0                 | -                    | -                    |
| 10.5                                                                            | -                                | -                    | 30.0                 | -                    | -                    | -                    |
| 11.0                                                                            | -                                | -                    | -                    | 38.0                 | -                    | -                    |
| 11.5                                                                            | -                                | -                    | -                    | 38.0                 | -                    | -                    |
| 12.5                                                                            | -                                | -                    | 34.0                 | -                    | -                    | -                    |
| 13.0                                                                            | -                                | -                    | -                    | 45.0                 | -                    | -                    |
| 13.5                                                                            | -                                | -                    | -                    | 45.0                 | -                    | -                    |
| 15.0                                                                            | -                                | -                    | -                    | 50.0                 | -                    | -                    |
| 16.5                                                                            | -                                | -                    | -                    | 58.0                 | -                    | -                    |
| 18.0                                                                            | -                                | -                    | -                    | 60.0                 | -                    | -                    |
| 18.5                                                                            | -                                | -                    | -                    | -                    | 90.0                 | -                    |
| 20.0                                                                            | -                                | -                    | -                    | 73.0                 | -                    | -                    |
| 21.0                                                                            | -                                | -                    | -                    | 70.0                 | -                    | -                    |
| 21.5                                                                            | -                                | -                    | -                    | -                    | 102.0                | -                    |
| 24.0                                                                            | -                                | -                    | -                    | -                    | 118.0                | -                    |
| 25.0                                                                            | -                                | -                    | -                    | -                    | -                    | 155.0                |
| 30.0                                                                            | -                                | -                    | -                    | -                    | 135.0                | 170.0                |
| 35.0                                                                            | -                                | -                    | -                    | -                    | -                    | 200.0                |

## POWER DISSIPATION AND MAXIMUM COMPONENT TEMPERATURE RISE

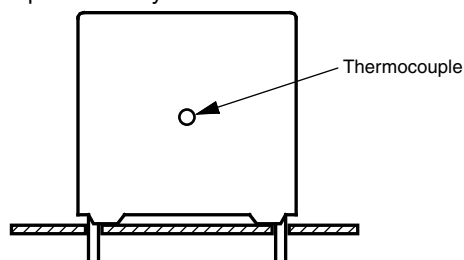
The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The component temperature rise ( $\Delta T$ ) can be measured or calculated by  $\Delta T = P/G$ :

- $\Delta T$  = component temperature rise (°C) with a maximum of 15 °C
- P = power dissipation of the component (mW)
- G = heat conductivity of the component (mW/°C)

## MEASURING THE COMPONENT TEMPERATURE

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



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

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

To avoid thermal radiation or convection, the capacitor must be tested in a closed area from air circulation.

**APPLICATION NOTE AND LIMITING CONDITIONS**

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

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

1. The peak voltage ( $U_P$ ) shall not be greater than the rated DC voltage ( $U_{RDC}$ )
2. The peak-to-peak voltage ( $U_{P-P}$ ) shall not be greater than the maximum ( $U_{P-P}$ ) to avoid the ionization inception level
3. The voltage peak slope ( $dU/dt$ ) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by  $U_{RDC}$  and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

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

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits (see graph "Max. allowed component temperature rise").
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in the table: "Heat conductivity"
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that the following conditions are fulfilled in any case (spikes and surge voltages from the mains included).
7. For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact [dc-film@vishay.com](mailto:dc-film@vishay.com).

**VOLTAGE CONDITIONS FOR 6 ABOVE**

| ALLOWED VOLTAGES                             | $T_{amb} \leq 85\text{ °C}$ | $85\text{ °C} < T_{amb} \leq 100\text{ °C}$ | $100\text{ °C} < T_{amb} \leq 125\text{ °C}$ |
|----------------------------------------------|-----------------------------|---------------------------------------------|----------------------------------------------|
| Maximum continuous RMS voltage               | $U_{RAC}$                   | $0.8 \times U_{RAC}$                        | $0.5 \times U_{RAC}$                         |
| Maximum temperature RMS-overvoltage (< 24 h) | $1.25 \times U_{RAC}$       | $U_{RAC}$                                   | $0.6 \times U_{RAC}$                         |
| Maximum peak voltage ( $V_{O-P}$ ) (< 2 s)   | $1.6 \times U_{RDC}$        | $1.3 \times U_{RDC}$                        | $0.5 \times U_{RDC}$                         |

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

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-2 and Specific Reference Data”.

| <b>GROUP C INSPECTION REQUIREMENTS</b>              |                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SUB-CLAUSE NUMBER AND TEST</b>                   | <b>CONDITIONS</b>                                                                                                                                                                                                            | <b>PERFORMANCE REQUIREMENTS</b>                                                                                                                                                                                                                                                                                    |
| <b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b> |                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                    |
| 4.1 Dimensions (detail)                             |                                                                                                                                                                                                                              | As specified in chapter “General Data” of this specification                                                                                                                                                                                                                                                       |
| 4.3.1 Initial measurements                          | Capacitance<br>Tangent of loss angle:<br>for $C \leq 1 \mu\text{F}$ at 10 kHz<br>for $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>for $C \geq 100 \mu\text{F}$ at 100 Hz                                                |                                                                                                                                                                                                                                                                                                                    |
| 4.3 Robustness of terminations                      | Tensile and bending                                                                                                                                                                                                          | No visible damage                                                                                                                                                                                                                                                                                                  |
| 4.4 Resistance to soldering heat                    | Method: 1A<br>Solder bath: $280 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$<br>Duration: 10 s                                                                                                                   |                                                                                                                                                                                                                                                                                                                    |
| 4.14 Component solvent resistance                   | Isopropylalcohol at room temperature<br>Method: 2<br>Immersion time: 5 min $\pm$ 0.5 min<br>Recovery time: min. 1 h, max. 2 h                                                                                                |                                                                                                                                                                                                                                                                                                                    |
| 4.4.2 Final measurements                            | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle                                                                                                                                                           | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 2 \%$ of the value measured initially<br><br>Increase of $\tan \delta$ :<br>$\leq 0.003$ for $C \leq 1 \mu\text{F}$ or<br>$\leq 0.002$ for $C > 1 \mu\text{F}$<br>$\leq 0.004$ for $C \geq 100 \mu\text{F}$<br>Compared to values measured in 4.3.1 |
| <b>SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1</b> |                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                    |
| 4.6.1 Initial measurements                          | Capacitance<br>Tangent of loss angle:<br>for $C \leq 1 \mu\text{F}$ at 10 kHz<br>for $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>for $C \geq 100 \mu\text{F}$ at 100 Hz                                                |                                                                                                                                                                                                                                                                                                                    |
| 4.6 Rapid change of temperature                     | $\theta A = -55 \text{ }^{\circ}\text{C}$<br>$\theta B = +125 \text{ }^{\circ}\text{C}$<br>5 cycles<br>Duration $t = 30 \text{ min}$<br>Visual examination                                                                   | No visible damage<br>Legible marking                                                                                                                                                                                                                                                                               |
| 4.7 Vibration                                       | Mounting:<br>see section “Mounting” of this specification<br>Procedure B4<br>Frequency range: 10 Hz to 55 Hz<br>Amplitude: 0.75 mm or<br>Acceleration $98 \text{ m/s}^2$<br>(whichever is less severe)<br>Total duration 6 h |                                                                                                                                                                                                                                                                                                                    |
| 4.7.2 Final inspection                              | Visual examination                                                                                                                                                                                                           | No visible damage                                                                                                                                                                                                                                                                                                  |
| 4.9 Shock                                           | Mounting:<br>see section “Mounting” for more information<br>Pulse shape: half sine<br>Acceleration: $490 \text{ m/s}^2$<br>Duration of pulse: 11 ms                                                                          |                                                                                                                                                                                                                                                                                                                    |



| GROUP C INSPECTION REQUIREMENTS                                            |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                                                 | CONDITIONS                                                                                                                                                                                                                                                                                                                      | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1</b>                        |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.9.3 Final measurements                                                   | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br>For $C \leq 1 \mu\text{F}$ at 10 kHz<br>For $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>For $C \geq 100 \mu\text{F}$ at 100 Hz<br><br>Insulation resistance                                                                                         | No visible damage<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.6.1<br><br>Increase of $\tan \delta$ :<br>$\leq 0.003$ for $C \leq 1 \mu\text{F}$ or<br>$\leq 0.002$ for $C > 1 \mu\text{F}$<br>$\leq 0.004$ for $C \geq 100 \mu\text{F}$<br>Compared to values measured in 4.6.1<br><br>As specified in section "Insulation Resistance" of this specification                                                                                          |
| <b>SUB-GROUP C1 COMBINED SAMPLE OF SPECIMENS OF SUB-GROUPS C1A AND C1B</b> |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.10 Climatic sequence                                                     |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.10.2 Dry heat                                                            | Temperature: +125 °C<br>Duration: 16 h                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.10.3 Damp heat cyclic<br>Test Db, first cycle                            |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.10.4 Cold                                                                | Temperature: -55 °C<br>Duration: 2 h                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.10.6 Damp heat cyclic<br>Test Db, remaining cycles                       |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.10.6.2 Final measurements                                                | Voltage proof = $U_{RDC}$ for 1 min within 15 min after removal from testchamber<br><br>Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br>For $C \leq 1 \mu\text{F}$ at 10 kHz<br>For $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>For $C \geq 100 \mu\text{F}$ at 100 Hz<br><br>Insulation resistance | No breakdown or flashover<br><br>No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.4.2 or 4.9.3<br><br>Increase of $\tan \delta$ :<br>$\leq 0.005$ for $C \leq 1 \mu\text{F}$ or<br>$\leq 0.003$ for $C > 1 \mu\text{F}$<br>$\leq 0.004$ for $C \geq 100 \mu\text{F}$<br>Compared to values measured in 4.3.1 or 4.6.1<br><br>$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification |
| <b>SUB-GROUP C2</b>                                                        |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.11 Damp heat steady state                                                | 56 days; 40 °C; 90 % to 95 % RH                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.11.1 Initial measurements                                                | Capacitance<br><br>Tangent of loss angle<br>For $C \leq 1 \mu\text{F}$ at 10 kHz<br>For $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>For $C \geq 100 \mu\text{F}$ at 100 Hz                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4.11.3 Final measurements                                                  | Voltage proof = $U_{RDC}$ for 1 min within 15 min after removal from testchamber<br><br>Visual examination                                                                                                                                                                                                                      | No breakdown or flashover<br><br>No visible damage<br>Legible marking                                                                                                                                                                                                                                                                                                                                                                                               |



| GROUP C INSPECTION REQUIREMENTS |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST      | CONDITIONS                                                                                                                                                                                                                              | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>SUB-GROUP C2</b>             |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.11.3 Final measurements       | Capacitance<br><br>Tangent of loss angle<br>For $C \leq 1 \mu\text{F}$ at 10 kHz<br>For $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>For $C \geq 100 \mu\text{F}$ at 100 Hz<br><br>Insulation resistance                           | $ \Delta C/C  \leq 5\%$ of the value measured in 4.11.1.<br><br>Increase of $\tan \delta$<br>$\leq 0.005$ for $C \leq 1 \mu\text{F}$ or<br>$\leq 0.003$ for $C > 1 \mu\text{F}$<br>$\leq 0.004$ for $C \geq 100 \mu\text{F}$<br>Compared to values measured in 4.11.1<br><br>$\geq 50\%$ of values specified in section<br>"Insulation Resistance" of this specification                                                                         |
| <b>SUB-GROUP C3</b>             |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.12 Endurance                  | Duration: 2000 h<br>1.25 x $U_{\text{RDC}}$ at 85 °C<br>1.0 x $U_{\text{RDC}}$ at 100 °C<br>0.6 x $U_{\text{RDC}}$ at 125 °C<br>Duration: 200 h<br>0.3 x $U_{\text{RDC}}$ at 150 °C<br>(not applicable for pitch $\geq 37.5$ mm)        |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.12.1 Initial measurements     | Capacitance<br>Tangent of loss angle:<br>for $C \leq 1 \mu\text{F}$ at 10 kHz<br>for $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>for $C \geq 100 \mu\text{F}$ at 100 Hz                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.12.5 Final measurements       | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br>For $C \leq 1 \mu\text{F}$ at 10 kHz<br>For $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>For $C \geq 100 \mu\text{F}$ at 100 Hz<br><br>Insulation resistance | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ compared to values measured<br>in 4.12.1<br><br>Increase of $\tan \delta$ :<br>$\leq 0.003$ for $C \leq 1 \mu\text{F}$ or<br>$\leq 0.002$ for $1 \mu\text{F} < C < 100 \mu\text{F}$<br>$\leq 0.004$ for $C \geq 100 \mu\text{F}$<br>Compared to values measured in 4.12.1<br><br>$\geq 50\%$ of values specified in section<br>"Insulation Resistance" of this specification |
| <b>SUB-GROUP C4</b>             |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.13 Charge and discharge       | 10 000 cycles<br>Charged to $U_{\text{RDC}}$<br>Discharge resistance:<br>$R = \frac{U_R}{C \times K \times (dU/dt)_R}$ K = 5 for pitch $\leq 27.5$ mm<br>K = 1.5 for pitch 37.5 mm/52.5 mm                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.13.1 Initial measurements     | Capacitance<br><br>Tangent of loss angle:<br>for $C \leq 1 \mu\text{F}$ at 10 kHz<br>for $1 \mu\text{F} < C < 100 \mu\text{F}$ at 1 kHz<br>for $C \geq 100 \mu\text{F}$ at 100 Hz                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.13.3 Final measurements       | Capacitance<br><br>Tangent of loss angle:<br><br>Insulation resistance                                                                                                                                                                  | $ \Delta C/C  \leq 3\%$ compared to values measured<br>in 4.13.1<br><br>Increase of $\tan \delta$ :<br>$\leq 0.003$ for $C \leq 1 \mu\text{F}$ or<br>$\leq 0.002$ for $C > 1 \mu\text{F}$<br>$\leq 0.004$ for $C \geq 100 \mu\text{F}$<br>Compared to values measured in 4.13.1<br><br>$\geq 50\%$ of values specified in section<br>"Insulation Resistance" of this specification                                                               |



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- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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