



## Metallized Polypropylene Film Capacitor AC Filtering Radial Type



### FEATURES

- High peak current capabilities
- Long lifetime
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### APPLICATIONS

- AC filtering
- UPS systems
- Renewable energy - grid interface
- Harmonic filter
- Welding equipment

### QUICK REFERENCE DATA

|                                                                       |                                                                                                                                                                                                          |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated capacitance range                                               | 1 µF to 70 µF                                                                                                                                                                                            |
| Capacitance tolerance                                                 | ± 5 % and 10 %                                                                                                                                                                                           |
| Maximum continuous AC voltage (50 Hz / 60 Hz) range, U <sub>NAC</sub> | 230 V <sub>AC</sub> , 250 V <sub>AC</sub> , 275 V <sub>AC</sub> , 310 V <sub>AC</sub> , 350 V <sub>AC</sub> , 440 V <sub>AC</sub>                                                                        |
| Climatic testing class                                                | 40/85/56                                                                                                                                                                                                 |
| Maximum application temperature                                       | 105 °C                                                                                                                                                                                                   |
| Maximum permissible case temperature                                  | 105 °C                                                                                                                                                                                                   |
| Reference standards                                                   | IEC 61071, IEC 60068                                                                                                                                                                                     |
| Dielectric                                                            | Polypropylene film                                                                                                                                                                                       |
| Electrodes                                                            | Metallized dielectric film                                                                                                                                                                               |
| Construction                                                          | Mono and internal serial construction                                                                                                                                                                    |
| Encapsulation                                                         | Plastic case sealed with resin; flame retardant                                                                                                                                                          |
| Terminals                                                             | Tinned wire                                                                                                                                                                                              |
| Self inductance (L <sub>s</sub> )                                     | < 1 nH per mm of lead spacing                                                                                                                                                                            |
| Withstanding DC voltage between terminals <sup>(1)</sup>              | 1.5 U <sub>NDC</sub> for 10 s, cut off current 10 mA, rise time ≤ 1000 V/s                                                                                                                               |
| Insulation resistance                                                 | RC between leads, after 1 min > 10 000 s<br>Measuring voltage: 500 V                                                                                                                                     |
| Life time expectancy <sup>(2)</sup>                                   | Useful lifetime: > 60 000 h at intended mains voltage <sup>(3)</sup><br>FIT: < 10 x 10 <sup>-9</sup> /h (10 per 10 <sup>9</sup> component hours) at 0.5 x U <sub>NAC</sub> , 40 °C                       |
| Marking                                                               | C-value; tolerance; rated voltage; code for dielectric material;<br>code for manufacturing origin; manufacturer's type designation;<br>manufacturer location, year and week; manufacturer's logo or name |

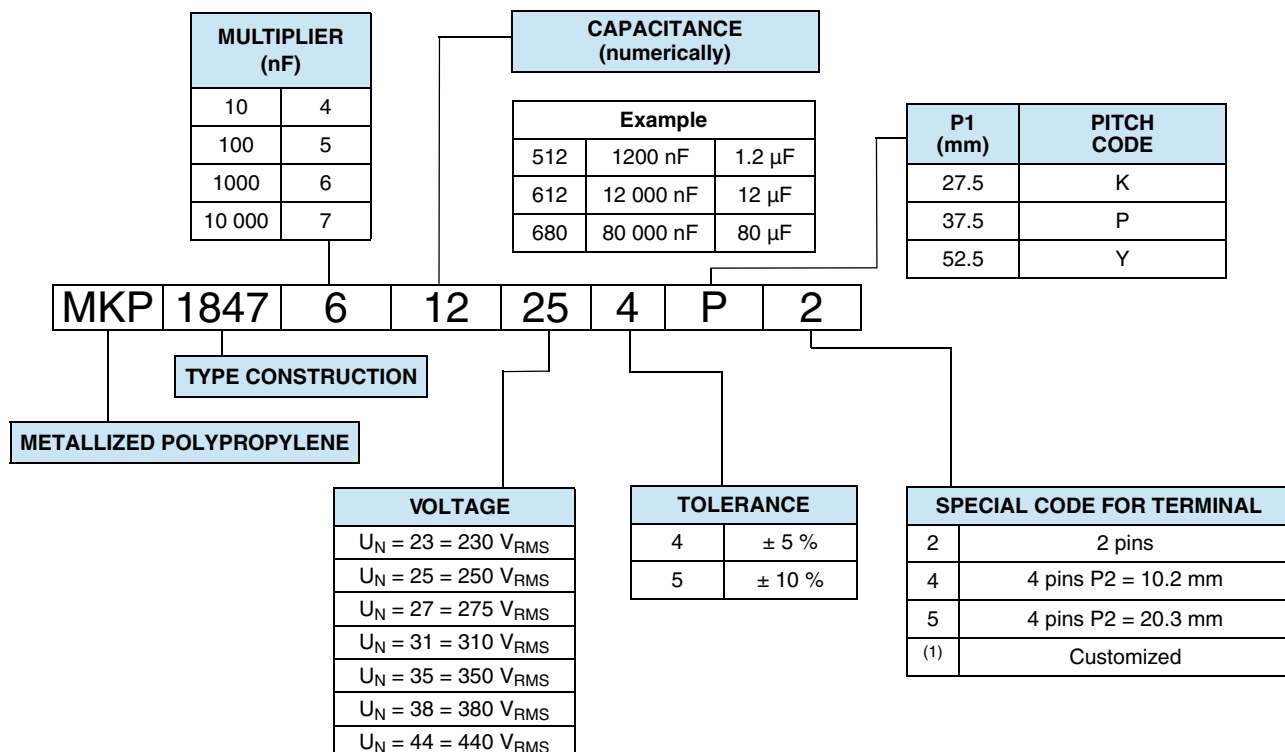
### Notes

- For more detailed data and test requirements, contact [dc-film@vishay.com](mailto:dc-film@vishay.com)
- For general information like characteristics and definitions used for film capacitors follow the link: [www.vishay.com/doc?28147](http://www.vishay.com/doc?28147)
- <sup>(1)</sup> See document "Voltage Proof Test for Metalized Capacitors" ([www.vishay.com/doc?28169](http://www.vishay.com/doc?28169))
- <sup>(2)</sup> Statements about life time are based on calculations which are based on internal tests. They have to be understood exclusively as estimations. Also due to external factors, the life time in the field application may deviate from the calculated life time
- <sup>(3)</sup> Intended operational continuous mains voltage: see [www.vishay.com/doc?28245](http://www.vishay.com/doc?28245)

### MAXIMUM AC VOLTAGE RATINGS (V<sub>RMS</sub>)

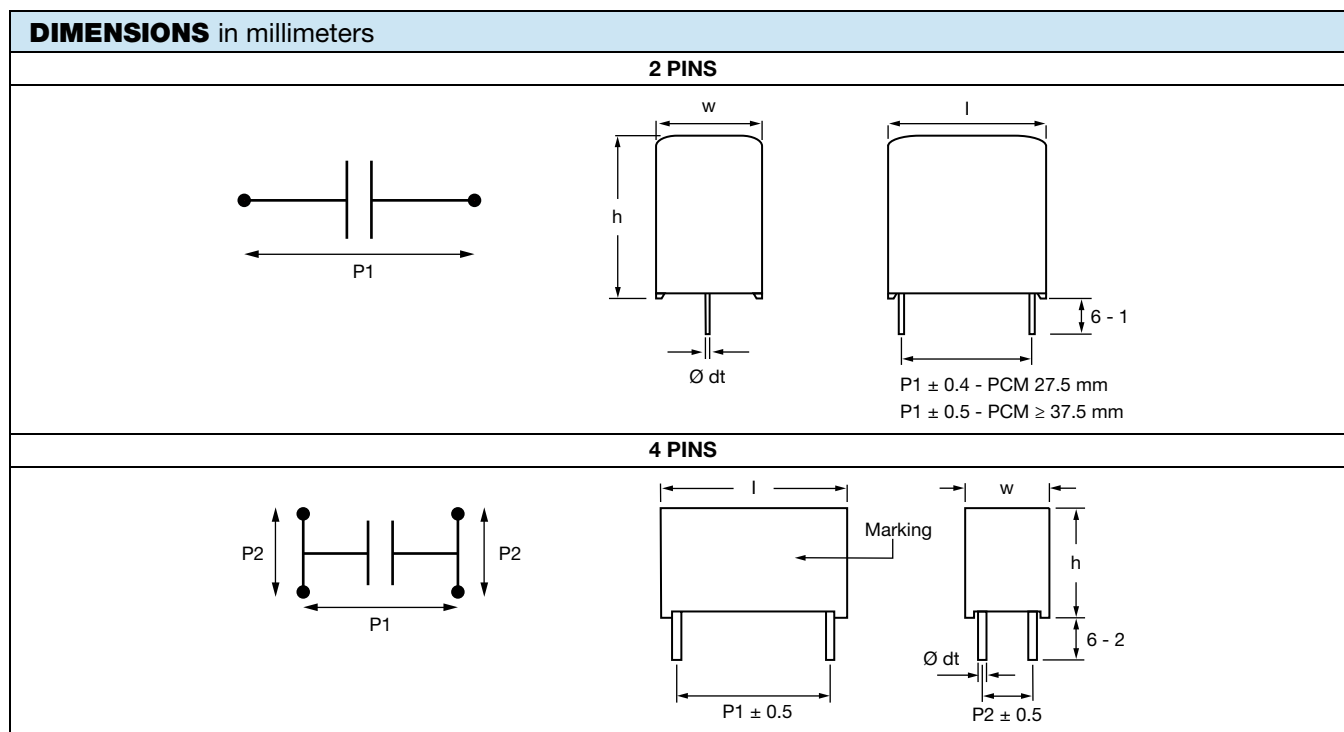
|                             |       |       |       |       |       |       |
|-----------------------------|-------|-------|-------|-------|-------|-------|
| U <sub>NAC</sub>            | 230 V | 250 V | 275 V | 310 V | 350 V | 440 V |
| U <sub>OPAC</sub> at 85 °C  | 230 V | 250 V | 275 V | 310 V | 350 V | 440 V |
| U <sub>OPAC</sub> at 105 °C | 160 V | 175 V | 190 V | 210 V | 240 V | 300 V |

## COMPOSITION OF CATALOG NUMBER



### Note

(1) Tabs terminals or customized terminals are available on request



### Note

- $\varnothing dt \pm 10 \%$  of standard diameter specified



## ELECTRICAL DATA AND ORDERING CODE

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF)                                                                                                      | DIMENSION <sup>(2)</sup><br>(mm) |      |      | P1<br>(mm) | P2<br>(mm)  | dV/dt <sup>(3)</sup><br>(V/μs) | I <sub>PEAK</sub><br>(A) | I <sub>RMS</sub> <sup>(4)</sup><br>(A) |           | tan δ<br>1 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |           | tan δ<br>10 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |                 | ORDERING CODE <sup>(6)</sup> |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------|------------|-------------|--------------------------------|--------------------------|----------------------------------------|-----------|--------------------------------------------------|-----------|---------------------------------------------------|-----------------|------------------------------|
|                         |                                                                                                                                  | w                                | h    | l    |            |             |                                |                          | 2<br>PINS                              | 4<br>PINS | 2<br>PINS                                        | 4<br>PINS | 2<br>PINS                                         | 4<br>PINS       |                              |
| 230                     | U <sub>NDC</sub> = 450 V; U <sub>OPAC</sub> AT 85 °C = 230 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 160 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
|                         | 1                                                                                                                                | 9.0                              | 19.0 | 32.0 | 27.5       | -           | 45                             | 45                       | 2.5                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847510234K2              |
|                         | 2                                                                                                                                | 11.0                             | 21.0 | 32.0 | 27.5       | -           | 45                             | 90                       | 3.5                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847520234K2              |
|                         | 3                                                                                                                                | 13.0                             | 23.0 | 32.0 | 27.5       | -           | 45                             | 135                      | 5.0                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847530234K2              |
|                         | 4                                                                                                                                | 15.0                             | 25.0 | 32.0 | 27.5       | -           | 45                             | 180                      | 6.0                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847540234K2              |
|                         | 5                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 45                             | 225                      | 7.5                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847550234K2              |
|                         | 6                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 45                             | 270                      | 8.0                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847560234K2              |
|                         | 7                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 45                             | 315                      | 8.5                                    | -         | 5                                                | -         | 30                                                | -               | MKP1847570234K2              |
|                         | 8                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 45                             | 360                      | 10.0                                   | -         | 5                                                | -         | 30                                                | -               | MKP1847580234K2              |
|                         | 9                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 45                             | 405                      | 10.5                                   | -         | 5                                                | -         | 30                                                | -               | MKP1847590234K2              |
|                         | 10                                                                                                                               | 20.0                             | 35.0 | 32.0 | 27.5       | -           | 45                             | 450                      | 11.5                                   | -         | 5                                                | -         | 30                                                | -               | MKP1847610234K2              |
|                         | 10                                                                                                                               | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 20                             | 200                      | 8.0                                    | 9.0       | 10                                               | 8         | 75                                                | 70              | MKP1847610234P*              |
|                         | 12                                                                                                                               | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 20                             | 240                      | 9.0                                    | 10.0      | 10                                               | 8         | 75                                                | 70              | MKP1847612234P*              |
|                         | 15                                                                                                                               | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 20                             | 300                      | 11.0                                   | 12.0      | 10                                               | 8         | 75                                                | 70              | MKP1847615234P*              |
|                         | 20                                                                                                                               | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2        | 20                             | 400                      | 13.5                                   | 14.5      | 10                                               | 8         | 75                                                | 70              | MKP1847620234P*              |
|                         | 22                                                                                                                               | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2        | 20                             | 440                      | 14.0                                   | 15.5      | 10                                               | 8         | 75                                                | 70              | MKP1847622234P*              |
|                         | 25                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 20                             | 500                      | 16.0                                   | 17.5      | 10                                               | 8         | 75                                                | 70              | MKP1847625234P*              |
|                         | 30                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 20                             | 600                      | 17.5                                   | 19.0      | 10                                               | 8         | 75                                                | 70              | MKP1847630234P*              |
|                         | 30                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 10                             | 300                      | 13.5                                   | 15.0      | 20                                               | 17        | 150                                               | 135             | MKP1847630234Y*              |
|                         | 35                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 10                             | 350                      | 14.5                                   | 16.0      | 20                                               | 17        | 150                                               | 135             | MKP1847635234Y*              |
|                         | 40                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 10                             | 400                      | 16.5                                   | 18.0      | 20                                               | 17        | 150                                               | 135             | MKP1847640234Y*              |
| 45                      | 30.0                                                                                                                             | 45.0                             | 57.5 | 52.5 | 20.3       | 10          | 450                            | 17.5                     | 19.0                                   | 20        | 17                                               | 150       | 135                                               | MKP1847645234Y* |                              |
| 50                      | 35.0                                                                                                                             | 50.0                             | 57.5 | 52.5 | 20.3       | 10          | 500                            | 20.0                     | 21.5                                   | 20        | 17                                               | 150       | 135                                               | MKP1847650234Y* |                              |
| 55                      | 35.0                                                                                                                             | 50.0                             | 57.5 | 52.5 | 20.3       | 10          | 550                            | 21.0                     | 22.5                                   | 20        | 17                                               | 150       | 135                                               | MKP1847655234Y* |                              |
| 60                      | 35.0                                                                                                                             | 50.0                             | 57.5 | 52.5 | 20.3       | 10          | 600                            | 21.5                     | 23.5                                   | 20        | 17                                               | 150       | 135                                               | MKP1847660234Y* |                              |
| 65                      | 45.0                                                                                                                             | 45.0                             | 57.5 | 52.5 | 20.3       | 10          | 650                            | -                        | 25.5                                   | -         | 17                                               | -         | 135                                               | MKP1847665234Y5 |                              |
| 70                      | 45.0                                                                                                                             | 45.0                             | 57.5 | 52.5 | 20.3       | 10          | 700                            | -                        | 26.0                                   | -         | 17                                               | -         | 135                                               | MKP1847670235Y5 |                              |
| 250                     | U <sub>NDC</sub> = 500 V; U <sub>OPAC</sub> AT 85 °C = 250 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 175 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
|                         | 1                                                                                                                                | 9.0                              | 19.0 | 32.0 | 27.5       | -           | 50                             | 50                       | 2.5                                    | -         | 5                                                | -         | 25                                                | -               | MKP1847510254K2              |
|                         | 2                                                                                                                                | 11.0                             | 21.0 | 32.0 | 27.5       | -           | 50                             | 100                      | 4                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847520254K2              |
|                         | 3                                                                                                                                | 13.0                             | 23.0 | 32.0 | 27.5       | -           | 50                             | 150                      | 5                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847530254K2              |
|                         | 4                                                                                                                                | 15.0                             | 25.0 | 32.0 | 27.5       | -           | 50                             | 200                      | 6                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847540254K2              |
|                         | 5                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 50                             | 250                      | 7                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847550254K2              |
|                         | 6                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 50                             | 300                      | 6                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847560254K2              |
|                         | 7                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 50                             | 350                      | 8                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847570254K2              |
|                         | 8                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 50                             | 400                      | 9                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847580254K2              |
|                         | 9                                                                                                                                | 20.0                             | 35.0 | 32.0 | 27.5       | -           | 50                             | 450                      | 11                                     | -         | 5                                                | -         | 25                                                | -               | MKP1847590254K2              |
|                         | 5                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 125                      | 7                                      | 8         | 10                                               | 8         | 70                                                | 65              | MKP1847550254P*              |
|                         | 6                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 150                      | 7                                      | 8         | 10                                               | 8         | 70                                                | 65              | MKP1847560254P*              |
|                         | 7                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 175                      | 7                                      | 8         | 10                                               | 8         | 70                                                | 65              | MKP1847570254P*              |
|                         | 8                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 200                      | 8                                      | 9         | 10                                               | 8         | 70                                                | 65              | MKP1847580254P*              |
|                         | 9                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 225                      | 8                                      | 9         | 10                                               | 8         | 70                                                | 65              | MKP1847590254P*              |
|                         | 10                                                                                                                               | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 250                      | 9                                      | 10        | 10                                               | 8         | 70                                                | 65              | MKP1847610254P*              |
|                         | 12                                                                                                                               | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 25                             | 300                      | 10                                     | 11        | 10                                               | 8         | 70                                                | 65              | MKP1847612254P*              |
| 15                      | 21.5                                                                                                                             | 38.5                             | 42.0 | 37.5 | 10.2       | 25          | 375                            | 11                       | 12                                     | 10        | 8                                                | 70        | 65                                                | MKP1847615254P* |                              |



## ELECTRICAL DATA AND ORDERING CODE

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF)                                                                                                      | DIMENSION <sup>(2)</sup><br>(mm) |      |      | P1<br>(mm) | P2<br>(mm)  | dV/dt <sup>(3)</sup><br>(V/μs) | I <sub>PEAK</sub><br>(A) | I <sub>RMS</sub> <sup>(4)</sup><br>(A) |           | tan δ<br>1 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |           | tan δ<br>10 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |                 | ORDERING CODE <sup>(6)</sup> |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------|------------|-------------|--------------------------------|--------------------------|----------------------------------------|-----------|--------------------------------------------------|-----------|---------------------------------------------------|-----------------|------------------------------|
|                         |                                                                                                                                  | w                                | h    | l    |            |             |                                |                          | 2<br>PINS                              | 4<br>PINS | 2<br>PINS                                        | 4<br>PINS | 2<br>PINS                                         | 4<br>PINS       |                              |
|                         |                                                                                                                                  |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
| 250                     | U <sub>NDC</sub> = 500 V; U <sub>OPAC</sub> AT 85 °C = 250 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 175 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
|                         | 20                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 25                             | 500                      | 10                                     | 11        | 10                                               | 8         | 70                                                | 65              | MKP1847620254P*              |
|                         | 22                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 25                             | 550                      | 15                                     | 16        | 10                                               | 8         | 70                                                | 65              | MKP1847622254P*              |
|                         | 25                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 25                             | 625                      | 16                                     | 17        | 10                                               | 8         | 70                                                | 65              | MKP1847625254P*              |
|                         | 15                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 12                             | 180                      | 12                                     | 13        | 16                                               | 14        | 135                                               | 125             | MKP1847615254Y*              |
|                         | 20                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 12                             | 240                      | 12                                     | 13        | 16                                               | 14        | 135                                               | 125             | MKP1847620254Y*              |
|                         | 22                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 12                             | 264                      | 12                                     | 13        | 16                                               | 14        | 135                                               | 125             | MKP1847622254Y*              |
|                         | 25                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 12                             | 300                      | 13                                     | 14        | 16                                               | 14        | 135                                               | 125             | MKP1847625254Y*              |
|                         | 30                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 12                             | 360                      | 15                                     | 16        | 16                                               | 14        | 135                                               | 125             | MKP1847630254Y*              |
|                         | 35                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 12                             | 420                      | 16                                     | 17        | 16                                               | 14        | 135                                               | 125             | MKP1847635254Y*              |
|                         | 40                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 12                             | 480                      | 19                                     | 20        | 16                                               | 14        | 135                                               | 125             | MKP1847640254Y*              |
|                         | 45                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 12                             | 540                      | 20                                     | 21        | 16                                               | 14        | 135                                               | 125             | MKP1847645254Y*              |
|                         | 50                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 12                             | 600                      | 21                                     | 22        | 16                                               | 14        | 135                                               | 125             | MKP1847650254Y*              |
|                         | 55                                                                                                                               | 45.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 12                             | 660                      | -                                      | 24        | -                                                | 14        | -                                                 | 125             | MKP1847655254Y5              |
| 60                      | 45.0                                                                                                                             | 45.0                             | 57.5 | 52.5 | 20.3       | 12          | 720                            | -                        | 25                                     | -         | 14                                               | -         | 125                                               | MKP1847660255Y5 |                              |
| 275                     | U <sub>NDC</sub> = 600 V; U <sub>OPAC</sub> AT 85 °C = 275 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 190 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
|                         | 1                                                                                                                                | 9.0                              | 19.0 | 32.0 | 27.5       | -           | 55                             | 55                       | 2.5                                    | -         | 5                                                | -         | 25                                                | -               | MKP1847510274K2              |
|                         | 2                                                                                                                                | 13.0                             | 23.0 | 32.0 | 27.5       | -           | 55                             | 110                      | 4.5                                    | -         | 5                                                | -         | 25                                                | -               | MKP1847520274K2              |
|                         | 3                                                                                                                                | 15.0                             | 25.0 | 32.0 | 27.5       | -           | 55                             | 165                      | 5.5                                    | -         | 5                                                | -         | 25                                                | -               | MKP1847530274K2              |
|                         | 4                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 55                             | 220                      | 7                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847540274K2              |
|                         | 5                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 55                             | 275                      | 8                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847550274K2              |
|                         | 6                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 55                             | 330                      | 7                                      | -         | 5                                                | -         | 25                                                | -               | MKP1847560274K2              |
|                         | 7                                                                                                                                | 20.0                             | 35.0 | 32.0 | 27.5       | -           | 55                             | 385                      | 10                                     | -         | 5                                                | -         | 25                                                | -               | MKP1847570274K2              |
|                         | 5                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 30                             | 150                      | 7                                      | 8         | 8                                                | 7         | 65                                                | 55              | MKP1847550274P*              |
|                         | 6                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 30                             | 180                      | 7                                      | 8         | 8                                                | 7         | 65                                                | 55              | MKP1847560274P*              |
|                         | 7                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 30                             | 210                      | 8                                      | 9         | 8                                                | 7         | 65                                                | 55              | MKP1847570274P*              |
|                         | 8                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 30                             | 240                      | 8                                      | 9         | 8                                                | 7         | 65                                                | 55              | MKP1847580274P*              |
|                         | 9                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 30                             | 270                      | 9                                      | 10        | 8                                                | 7         | 65                                                | 55              | MKP1847590274P*              |
|                         | 10                                                                                                                               | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 30                             | 300                      | 10                                     | 11        | 8                                                | 7         | 65                                                | 55              | MKP1847610274P*              |
|                         | 12                                                                                                                               | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 30                             | 360                      | 11                                     | 12        | 8                                                | 7         | 65                                                | 55              | MKP1847612274P*              |
|                         | 15                                                                                                                               | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2        | 30                             | 450                      | 13                                     | 14        | 8                                                | 7         | 65                                                | 55              | MKP1847615274P*              |
|                         | 20                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 30                             | 600                      | 16                                     | 17        | 8                                                | 7         | 65                                                | 55              | MKP1847620274P*              |
|                         | 15                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 13                             | 195                      | 11                                     | 12        | 15                                               | 12        | 125                                               | 105             | MKP1847615274Y*              |
|                         | 20                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 13                             | 260                      | 12                                     | 13        | 15                                               | 12        | 125                                               | 105             | MKP1847620274Y*              |
|                         | 22                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 13                             | 286                      | 13                                     | 14        | 15                                               | 12        | 125                                               | 105             | MKP1847622274Y*              |
|                         | 25                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 13                             | 325                      | 15                                     | 16        | 15                                               | 12        | 125                                               | 105             | MKP1847625274Y*              |
|                         | 30                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 13                             | 390                      | 16                                     | 17        | 15                                               | 12        | 125                                               | 105             | MKP1847630274Y*              |
|                         | 35                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 13                             | 455                      | 19                                     | 20        | 15                                               | 12        | 125                                               | 105             | MKP1847635274Y*              |
|                         | 40                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 13                             | 520                      | 20                                     | 21        | 15                                               | 12        | 125                                               | 105             | MKP1847640274Y*              |
|                         | 45                                                                                                                               | 45.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 13                             | 585                      | -                                      | 23        | -                                                | 12        | -                                                 | 105             | MKP1847645274Y5              |
| 50                      | 45.0                                                                                                                             | 45.0                             | 57.5 | 52.5 | 20.3       | 13          | 650                            | -                        | 24                                     | -         | 12                                               | -         | 105                                               | MKP1847650275Y5 |                              |



## ELECTRICAL DATA AND ORDERING CODE

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF)                                                                                                      | DIMENSION <sup>(2)</sup><br>(mm) |      |      | P1<br>(mm) | P2<br>(mm)  | dV/dt <sup>(3)</sup><br>(V/μs) | I <sub>PEAK</sub><br>(A) | I <sub>RMS</sub> <sup>(4)</sup><br>(A) |           | tan δ<br>1 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |           | tan δ<br>10 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |                 | ORDERING CODE <sup>(6)</sup> |  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------|------------|-------------|--------------------------------|--------------------------|----------------------------------------|-----------|--------------------------------------------------|-----------|---------------------------------------------------|-----------------|------------------------------|--|
|                         |                                                                                                                                  | w                                | h    | l    |            |             |                                |                          | 2<br>PINS                              | 4<br>PINS | 2<br>PINS                                        | 4<br>PINS | 2<br>PINS                                         | 4<br>PINS       |                              |  |
| 310                     | U <sub>NDC</sub> = 630 V; U <sub>OPAC</sub> AT 85 °C = 310 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 210 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |  |
|                         | 1                                                                                                                                | 11.0                             | 21.0 | 32.0 | 27.5       | -           | 68                             | 68                       | 3                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847510314K2              |  |
|                         | 2                                                                                                                                | 15.0                             | 25.0 | 32.0 | 27.5       | -           | 68                             | 136                      | 5                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847520314K2              |  |
|                         | 3                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 68                             | 204                      | 7                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847530314K2              |  |
|                         | 4                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 68                             | 272                      | 8                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847540314K2              |  |
|                         | 5                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 68                             | 340                      | 9                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847550314K2              |  |
|                         | 5                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 35                             | 175                      | 7                                      | 8         | 7                                                | 6         | 55                                                | 50              | MKP1847550314P*              |  |
|                         | 6                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 35                             | 210                      | 8                                      | 9         | 7                                                | 6         | 55                                                | 50              | MKP1847560314P*              |  |
|                         | 7                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 35                             | 245                      | 9                                      | 10        | 7                                                | 6         | 55                                                | 50              | MKP1847570314P*              |  |
|                         | 8                                                                                                                                | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 35                             | 280                      | 10                                     | 11        | 7                                                | 6         | 55                                                | 50              | MKP1847580314P*              |  |
|                         | 9                                                                                                                                | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 35                             | 315                      | 10                                     | 11        | 7                                                | 6         | 55                                                | 50              | MKP1847590314P*              |  |
|                         | 10                                                                                                                               | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 35                             | 350                      | 11                                     | 12        | 7                                                | 6         | 55                                                | 50              | MKP1847610315P*              |  |
|                         | 12                                                                                                                               | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2        | 35                             | 420                      | 12                                     | 13        | 7                                                | 6         | 55                                                | 50              | MKP1847612314P*              |  |
|                         | 15                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 35                             | 525                      | 15                                     | 16        | 7                                                | 6         | 55                                                | 50              | MKP1847615314P*              |  |
|                         | 10                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 15                             | 150                      | 10                                     | 11        | 12                                               | 10        | 105                                               | 90              | MKP1847610314Y*              |  |
|                         | 12                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 15                             | 180                      | 10                                     | 11        | 12                                               | 10        | 105                                               | 90              | MKP1847612314Y*              |  |
|                         | 15                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 15                             | 225                      | 12                                     | 13        | 12                                               | 10        | 105                                               | 90              | MKP1847615314Y*              |  |
|                         | 20                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 15                             | 300                      | 14                                     | 15        | 12                                               | 10        | 105                                               | 90              | MKP1847620314Y*              |  |
|                         | 22                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 15                             | 330                      | 16                                     | 17        | 12                                               | 10        | 105                                               | 90              | MKP1847622314Y*              |  |
|                         | 25                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 15                             | 375                      | 17                                     | 18        | 12                                               | 10        | 105                                               | 90              | MKP1847625314Y*              |  |
|                         | 30                                                                                                                               | 45.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 15                             | 450                      | -                                      | 21        | -                                                | 10        | -                                                 | 90              | MKP1847630314Y5              |  |
| 35                      | 45.0                                                                                                                             | 45.0                             | 57.5 | 52.5 | 20.3       | 15          | 525                            | -                        | 22                                     | -         | 10                                               | -         | 90                                                | MKP1847635314Y5 |                              |  |
| 350                     | U <sub>NDC</sub> = 700 V; U <sub>OPAC</sub> AT 85 °C = 350 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 240 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |  |
|                         | 1                                                                                                                                | 11.0                             | 21.0 | 32.0 | 27.5       | -           | 100                            | 100                      | 3                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847510354K2              |  |
|                         | 2                                                                                                                                | 15.0                             | 25.0 | 32.0 | 27.5       | -           | 100                            | 200                      | 5                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847520354K2              |  |
|                         | 3                                                                                                                                | 18.0                             | 28.0 | 32.0 | 27.5       | -           | 100                            | 300                      | 7                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847530354K2              |  |
|                         | 4                                                                                                                                | 21.0                             | 31.0 | 32.0 | 27.5       | -           | 100                            | 400                      | 9                                      | -         | 5                                                | -         | 20                                                | -               | MKP1847540354K2              |  |
|                         | 5                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 50                             | 250                      | 7                                      | 8         | 7                                                | 6         | 50                                                | 45              | MKP1847550354P*              |  |
|                         | 6                                                                                                                                | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 50                             | 300                      | 8                                      | 9         | 7                                                | 6         | 50                                                | 45              | MKP1847560354P*              |  |
|                         | 7                                                                                                                                | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 50                             | 350                      | 9                                      | 10        | 7                                                | 6         | 50                                                | 45              | MKP1847570354P*              |  |
|                         | 8                                                                                                                                | 21.5                             | 38.5 | 42.0 | 37.5       | 10.2        | 50                             | 400                      | 10                                     | 11        | 7                                                | 6         | 50                                                | 45              | MKP1847580354P*              |  |
|                         | 9                                                                                                                                | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2        | 50                             | 450                      | 11                                     | 12        | 7                                                | 6         | 50                                                | 45              | MKP1847590354P*              |  |
|                         | 10                                                                                                                               | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2        | 50                             | 500                      | 12                                     | 13        | 7                                                | 6         | 50                                                | 45              | MKP1847610354P*              |  |
|                         | 12                                                                                                                               | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 50                             | 600                      | 14                                     | 15        | 7                                                | 6         | 50                                                | 45              | MKP1847612354P*              |  |
|                         | 10                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 25                             | 250                      | 10                                     | 11        | 12                                               | 10        | 100                                               | 85              | MKP1847610354Y*              |  |
|                         | 12                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 25                             | 300                      | 11                                     | 12        | 12                                               | 10        | 100                                               | 85              | MKP1847612354Y*              |  |
|                         | 15                                                                                                                               | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 25                             | 375                      | 12                                     | 13        | 12                                               | 10        | 100                                               | 85              | MKP1847615354Y*              |  |
|                         | 20                                                                                                                               | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 25                             | 500                      | 15                                     | 16        | 12                                               | 10        | 100                                               | 85              | MKP1847620354Y*              |  |
|                         | 22                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 25                             | 550                      | 17                                     | 18        | 12                                               | 10        | 100                                               | 85              | MKP1847622354Y*              |  |
|                         | 25                                                                                                                               | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 25                             | 625                      | 18                                     | 19        | 12                                               | 10        | 100                                               | 85              | MKP1847625354Y*              |  |
|                         | 30                                                                                                                               | 45.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 25                             | 750                      | -                                      | 22        | -                                                | 10        | -                                                 | 85              | MKP1847630354Y5              |  |



## ELECTRICAL DATA AND ORDERING CODE

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF)                                                                                                       | DIMENSION <sup>(2)</sup><br>(mm) |      |      | P1<br>(mm) | P2<br>(mm)  | dV/dt <sup>(3)</sup><br>(V/μs) | I <sub>PEAK</sub><br>(A) | I <sub>RMS</sub> <sup>(4)</sup><br>(A) |           | tan δ<br>1 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |           | tan δ<br>10 kHz<br>( $< 10^{-4}$ ) <sup>(5)</sup> |                 | ORDERING CODE <sup>(6)</sup> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------|------------|-------------|--------------------------------|--------------------------|----------------------------------------|-----------|--------------------------------------------------|-----------|---------------------------------------------------|-----------------|------------------------------|
|                         |                                                                                                                                   | w                                | h    | l    |            |             |                                |                          | 2<br>PINS                              | 4<br>PINS | 2<br>PINS                                        | 4<br>PINS | 2<br>PINS                                         | 4<br>PINS       |                              |
|                         |                                                                                                                                   |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
| 440                     | U <sub>NDC</sub> = 1000 V; U <sub>OPAC</sub> AT 85 °C = 440 V <sub>RMS</sub> ; U <sub>OPAC</sub> AT 105 °C = 300 V <sub>RMS</sub> |                                  |      |      |            |             |                                |                          |                                        |           |                                                  |           |                                                   |                 |                              |
|                         | 1.0                                                                                                                               | 15.7                             | 28.5 | 41.5 | 37.5       | 10.2        | 80                             | 80                       | 5                                      | -         | 7                                                | -         | 25                                                | -               | MKP1847510444P*              |
|                         | 1.5                                                                                                                               | 18.5                             | 35.5 | 43.0 | 37.5       | 10.2        | 80                             | 120                      | 7                                      | -         | 7                                                | -         | 25                                                | -               | MKP1847515444P*              |
|                         | 2.0                                                                                                                               | 21.5                             | 38.5 | 43.0 | 37.5       | 10.2        | 80                             | 160                      | 9                                      | 10        | 7                                                | 6         | 25                                                | 20              | MKP1847520444P*              |
|                         | 2.2                                                                                                                               | 21.5                             | 38.5 | 43.0 | 37.5       | 10.2        | 80                             | 176                      | 9                                      | 10        | 7                                                | 6         | 25                                                | 20              | MKP1847522444P*              |
|                         | 3                                                                                                                                 | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2 / 20.3 | 80                             | 240                      | 12                                     | 13        | 7                                                | 6         | 25                                                | 20              | MKP1847530444P*              |
|                         | 3.3                                                                                                                               | 24.0                             | 44.0 | 42.0 | 37.5       | 10.2 / 20.3 | 80                             | 264                      | 12                                     | 13        | 7                                                | 6         | 25                                                | 20              | MKP1847533444P*              |
|                         | 4                                                                                                                                 | 30.0                             | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 80                             | 320                      | 14                                     | 15        | 7                                                | 6         | 25                                                | 20              | MKP1847540444P*              |
|                         | 5                                                                                                                                 | 30.0                             | 57.0 | 42.0 | 37.5       | 20.3        | 80                             | 400                      | 17                                     | 18        | 7                                                | 6         | 25                                                | 20              | MKP1847550444P*              |
|                         | 5                                                                                                                                 | 25.0                             | 45.0 | 57.5 | 52.5       | 10.2        | 35                             | 175                      | 13                                     | 14        | 12                                               | 10        | 50                                                | 40              | MKP1847550444Y*              |
|                         | 6                                                                                                                                 | 30.0                             | 45.0 | 57.5 | 52.5       | 20.3        | 35                             | 210                      | 14                                     | 15        | 12                                               | 10        | 50                                                | 40              | MKP1847560444Y*              |
|                         | 7                                                                                                                                 | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 35                             | 245                      | 17                                     | 18        | 12                                               | 10        | 50                                                | 40              | MKP1847570444Y*              |
|                         | 8                                                                                                                                 | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 35                             | 280                      | 18                                     | 19        | 12                                               | 10        | 50                                                | 40              | MKP1847580444Y*              |
|                         | 9                                                                                                                                 | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 35                             | 315                      | 19                                     | 20        | 12                                               | 10        | 50                                                | 40              | MKP1847590444Y*              |
|                         | 10                                                                                                                                | 35.0                             | 50.0 | 57.5 | 52.5       | 20.3        | 35                             | 350                      | 20                                     | 21        | 12                                               | 10        | 50                                                | 40              | MKP1847610444Y*              |
| 12                      | 45.0                                                                                                                              | 45.0                             | 57.5 | 52.5 | 20.3       | 35          | 420                            | -                        | 24                                     | -         | 10                                               | -         | 40                                                | MKP1847612444Y* |                              |

## Notes

- (1) Intermediate capacitance values available on request  
 (2) Standard dimension. For tolerances see chapter "Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances"  
 (3) Rated voltage pulse slope (dU/dt) R at voltage U<sub>NDC</sub>  
 (4) Maximum RMS current at 10 kHz, +85 °C, capacitance tolerance specified  
 (5) The ESR (Equivalent Series Resistance) can be calculated as  $\tan \delta (f) / (2 \times \pi \times f \times C)$   
 (6) Change the \* symbol with special code for the terminals

## PACKAGING INFORMATION

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF) | Ø dt | ORDERING CODE <sup>(2)</sup> | MASS<br>(g) | SPQ <sup>(3)</sup><br>(pcs) |
|-------------------------|-----------------------------|------|------------------------------|-------------|-----------------------------|
| 230                     | 1                           | 0.8  | MKP1847510234K2              | 6           | 160                         |
|                         | 2                           | 0.8  | MKP1847520234K2              | 9           | 130                         |
|                         | 3                           | 0.8  | MKP1847530234K2              | 11          | 115                         |
|                         | 4                           | 0.8  | MKP1847540234K2              | 12          | 100                         |
|                         | 5                           | 0.8  | MKP1847550234K2              | 17          | 80                          |
|                         | 6                           | 0.8  | MKP1847560234K2              | 16          | 80                          |
|                         | 7                           | 0.8  | MKP1847570234K2              | 15          | 80                          |
|                         | 8                           | 0.8  | MKP1847580234K2              | 22          | 65                          |
|                         | 9                           | 0.8  | MKP1847590234K2              | 21          | 65                          |
|                         | 10                          | 0.8  | MKP1847610234K2              | 21          | 70                          |
|                         | 10                          | 1.0  | MKP1847610234P*              | 32          | 105                         |
|                         | 12                          | 1.0  | MKP1847612234P*              | 30          | 105                         |
|                         | 15                          | 1.0  | MKP1847615234P*              | 37          | 91                          |
|                         | 20                          | 1.0  | MKP1847620234P*              | 48          | 77                          |
|                         | 22                          | 1.0  | MKP1847622234P*              | 45          | 77                          |
|                         | 25                          | 1.0  | MKP1847625234P*              | 62          | 63                          |
|                         | 30                          | 1.0  | MKP1847630234P*              | 56          | 63                          |
|                         | 30                          | 1.2  | MKP1847630234Y*              | 69          | 55                          |
|                         | 35                          | 1.2  | MKP1847635234Y*              | 65          | 55                          |
|                         | 40                          | 1.2  | MKP1847640234Y*              | 91          | 45                          |
|                         | 45                          | 1.2  | MKP1847645234Y*              | 86          | 45                          |
|                         | 50                          | 1.2  | MKP1847650234Y*              | 107         | 40                          |
|                         | 55                          | 1.2  | MKP1847655234Y*              | 101         | 40                          |
|                         | 60                          | 1.2  | MKP1847660234Y*              | 96          | 40                          |
|                         | 65                          | 1.2  | MKP1847665234Y5              | 121         | 30                          |
|                         | 70                          | 1.2  | MKP1847670235Y5              | 120         | 30                          |



## PACKAGING INFORMATION

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF) | Ø dt | ORDERING CODE <sup>(2)</sup> | MASS<br>(g) | SPQ <sup>(3)</sup><br>(pcs) |
|-------------------------|-----------------------------|------|------------------------------|-------------|-----------------------------|
| 250                     | 1                           | 0.8  | MKP1847510254K2              | 6           | 160                         |
|                         | 2                           | 0.8  | MKP1847520254K2              | 9           | 130                         |
|                         | 3                           | 0.8  | MKP1847530254K2              | 10          | 115                         |
|                         | 4                           | 0.8  | MKP1847540254K2              | 12          | 100                         |
|                         | 5                           | 0.8  | MKP1847550254K2              | 16          | 80                          |
|                         | 6                           | 0.8  | MKP1847560254K2              | 15          | 80                          |
|                         | 7                           | 0.8  | MKP1847570254K2              | 22          | 65                          |
|                         | 8                           | 0.8  | MKP1847580254K2              | 21          | 65                          |
|                         | 9                           | 0.8  | MKP1847590254K2              | 20          | 70                          |
|                         | 5                           | 1.0  | MKP1847550254P*              | 36          | 105                         |
|                         | 6                           | 1.0  | MKP1847560254P*              | 35          | 105                         |
|                         | 7                           | 1.0  | MKP1847570254P*              | 34          | 105                         |
|                         | 8                           | 1.0  | MKP1847580254P*              | 32          | 105                         |
|                         | 9                           | 1.0  | MKP1847590254P*              | 31          | 105                         |
|                         | 10                          | 1.0  | MKP1847610254P*              | 30          | 105                         |
|                         | 12                          | 1.0  | MKP1847612254P*              | 27          | 105                         |
|                         | 15                          | 1.0  | MKP1847615254P*              | 34          | 91                          |
|                         | 20                          | 1.0  | MKP1847620254P*              | 63          | 63                          |
|                         | 22                          | 1.0  | MKP1847622254P*              | 61          | 63                          |
|                         | 25                          | 1.0  | MKP1847625254P*              | 57          | 63                          |
|                         | 15                          | 1.2  | MKP1847615254Y*              | 83          | 55                          |
|                         | 20                          | 1.2  | MKP1847620254Y*              | 77          | 55                          |
|                         | 22                          | 1.2  | MKP1847622254Y*              | 75          | 55                          |
|                         | 25                          | 1.2  | MKP1847625254Y*              | 71          | 55                          |
|                         | 30                          | 1.2  | MKP1847630254Y*              | 97          | 45                          |
|                         | 35                          | 1.2  | MKP1847635254Y*              | 91          | 45                          |
|                         | 40                          | 1.2  | MKP1847640254Y*              | 111         | 40                          |
|                         | 45                          | 1.2  | MKP1847645254Y*              | 105         | 40                          |
|                         | 50                          | 1.2  | MKP1847650254Y*              | 98          | 40                          |
|                         | 55                          | 1.2  | MKP1847655254Y5              | 123         | 30                          |
|                         | 60                          | 1.2  | MKP1847660255Y5              | 120         | 30                          |
| 275                     | 1                           | 0.8  | MKP1847510274K2              | 6           | 160                         |
|                         | 2                           | 0.8  | MKP1847520274K2              | 11          | 115                         |
|                         | 3                           | 0.8  | MKP1847530274K2              | 12          | 100                         |
|                         | 4                           | 0.8  | MKP1847540274K2              | 16          | 80                          |
|                         | 5                           | 0.8  | MKP1847550274K2              | 22          | 65                          |
|                         | 6                           | 0.8  | MKP1847560274K2              | 21          | 65                          |
|                         | 7                           | 0.8  | MKP1847570274K2              | 20          | 70                          |
|                         | 5                           | 1.0  | MKP1847550274P*              | 34          | 105                         |
|                         | 6                           | 1.0  | MKP1847560274P*              | 33          | 105                         |
|                         | 7                           | 1.0  | MKP1847570274P*              | 31          | 105                         |
|                         | 8                           | 1.0  | MKP1847580274P*              | 30          | 105                         |
|                         | 9                           | 1.0  | MKP1847590274P*              | 28          | 105                         |
|                         | 10                          | 1.0  | MKP1847610274P*              | 37          | 91                          |
|                         | 12                          | 1.0  | MKP1847612274P*              | 34          | 91                          |
|                         | 15                          | 1.0  | MKP1847615274P*              | 45          | 77                          |
|                         | 20                          | 1.0  | MKP1847620274P*              | 56          | 63                          |
|                         | 15                          | 1.2  | MKP1847615274Y*              | 78          | 55                          |
|                         | 20                          | 1.2  | MKP1847620274Y*              | 70          | 55                          |
|                         | 22                          | 1.2  | MKP1847622274Y*              | 67          | 55                          |
|                         | 25                          | 1.2  | MKP1847625274Y*              | 95          | 45                          |
|                         | 30                          | 1.2  | MKP1847630274Y*              | 86          | 45                          |
|                         | 35                          | 1.2  | MKP1847635274Y*              | 106         | 40                          |
|                         | 40                          | 1.2  | MKP1847640274Y*              | 96          | 40                          |
|                         | 45                          | 1.2  | MKP1847645274Y5              | 186         | 30                          |
|                         | 50                          | 1.2  | MKP1847650275Y5              | 186         | 30                          |





## PACKAGING INFORMATION

| U <sub>NAC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF) | Ø dt | ORDERING CODE <sup>(2)</sup> | MASS<br>(g) | SPQ <sup>(3)</sup><br>(pcs) |
|-------------------------|-----------------------------|------|------------------------------|-------------|-----------------------------|
| 310                     | 1.0                         | 0.8  | MKP1847510314K2              | 9           | 130                         |
|                         | 2.0                         | 0.8  | MKP1847520314K2              | 12          | 100                         |
|                         | 3.0                         | 0.8  | MKP1847530314K2              | 16          | 80                          |
|                         | 4.0                         | 0.8  | MKP1847540314K2              | 22          | 65                          |
|                         | 5.0                         | 0.8  | MKP1847550314K2              | 20          | 65                          |
|                         | 5.0                         | 1.0  | MKP1847550314P*              | 32          | 105                         |
|                         | 6.0                         | 1.0  | MKP1847560314P*              | 30          | 105                         |
|                         | 7.0                         | 1.0  | MKP1847570314P*              | 28          | 105                         |
|                         | 8.0                         | 1.0  | MKP1847580314P*              | 37          | 91                          |
|                         | 9.0                         | 1.0  | MKP1847590314P*              | 35          | 91                          |
|                         | 10                          | 1.0  | MKP1847610315P*              | 34          | 91                          |
|                         | 12                          | 1.0  | MKP1847612314P*              | 44          | 77                          |
|                         | 15                          | 1.0  | MKP1847615314P*              | 58          | 63                          |
|                         | 10                          | 1.2  | MKP1847610314Y*              | 81          | 55                          |
|                         | 12                          | 1.2  | MKP1847612314Y*              | 77          | 55                          |
|                         | 15                          | 1.2  | MKP1847615314Y*              | 71          | 55                          |
|                         | 20                          | 1.2  | MKP1847620314Y*              | 93          | 45                          |
|                         | 22                          | 1.2  | MKP1847622314Y*              | 117         | 40                          |
|                         | 25                          | 1.2  | MKP1847625314Y*              | 111         | 40                          |
|                         | 30                          | 1.2  | MKP1847630314Y5              | 187         | 30                          |
| 350                     | 35                          | 1.2  | MKP1847635314Y5              | 187         | 30                          |
|                         | 1.0                         | 0.8  | MKP1847510354K2              | 9           | 130                         |
|                         | 2.0                         | 0.8  | MKP1847520354K2              | 12          | 100                         |
|                         | 3.0                         | 0.8  | MKP1847530354K2              | 15          | 80                          |
|                         | 4.0                         | 0.8  | MKP1847540354K2              | 21          | 65                          |
|                         | 5.0                         | 1.0  | MKP1847550354P*              | 30          | 105                         |
|                         | 6.0                         | 1.0  | MKP1847560354P*              | 28          | 105                         |
|                         | 7.0                         | 1.0  | MKP1847570354P*              | 37          | 91                          |
|                         | 8.0                         | 1.0  | MKP1847580354P*              | 34          | 91                          |
|                         | 9.0                         | 1.0  | MKP1847590354P*              | 48          | 77                          |
|                         | 10                          | 1.0  | MKP1847610354P*              | 45          | 77                          |
|                         | 12                          | 1.0  | MKP1847612354P*              | 60          | 63                          |
|                         | 10                          | 1.2  | MKP1847610354Y*              | 78          | 55                          |
|                         | 12                          | 1.2  | MKP1847612354Y*              | 74          | 55                          |
|                         | 15                          | 1.2  | MKP1847615354Y*              | 67          | 55                          |
|                         | 20                          | 1.2  | MKP1847620354Y*              | 87          | 45                          |
|                         | 22                          | 1.2  | MKP1847622354Y*              | 111         | 40                          |
|                         | 25                          | 1.2  | MKP1847625354Y*              | 102         | 40                          |
|                         | 30                          | 1.2  | MKP1847630354Y5              | 187         | 30                          |
| 440                     | 1.0                         | 1.0  | MKP1847510444P*              | 27          | 70                          |
|                         | 1.5                         | 1.0  | MKP1847515444P*              | 42          | 105                         |
|                         | 2.0                         | 1.0  | MKP1847520444P*              | 52          | 91                          |
|                         | 2.2                         | 1.0  | MKP1847522444P*              | 52          | 91                          |
|                         | 3.0                         | 1.0  | MKP1847530444P*              | 61          | 77                          |
|                         | 3.3                         | 1.0  | MKP1847533444P*              | 58          | 77                          |
|                         | 4.0                         | 1.0  | MKP1847540444P*              | 74          | 63                          |
|                         | 5.0                         | 1.0  | MKP1847550444P*              | 83          | 63                          |
|                         | 5.0                         | 1.2  | MKP1847550444Y*              | 100         | 55                          |
|                         | 6.0                         | 1.2  | MKP1847560444Y*              | 135         | 45                          |
|                         | 7.0                         | 1.2  | MKP1847570444Y*              | 155         | 40                          |
|                         | 8.0                         | 1.2  | MKP1847580444Y*              | 152         | 40                          |
|                         | 9.0                         | 1.2  | MKP1847590444Y*              | 145         | 40                          |
|                         | 10                          | 1.2  | MKP1847610445Y*              | 140         | 40                          |
|                         | 12                          | 1.2  | MKP1847612445Y5              | 180         | 30                          |

## Notes

(1) Intermediate capacitance values available on request

(2) Change the \* symbols with special code for terminals

(3) SPQ = Standard Packing Quantity





## CONSTRUCTION

Low inductive wound cell elements of metallized polypropylene film. Pattern film for pitch  $\geq 37.5$  mm and standard foil for pitch 27.5 mm, potted with resin in a flame retardant case.

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

The capacitor unit is designed for mounting on a printed circuit board.

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

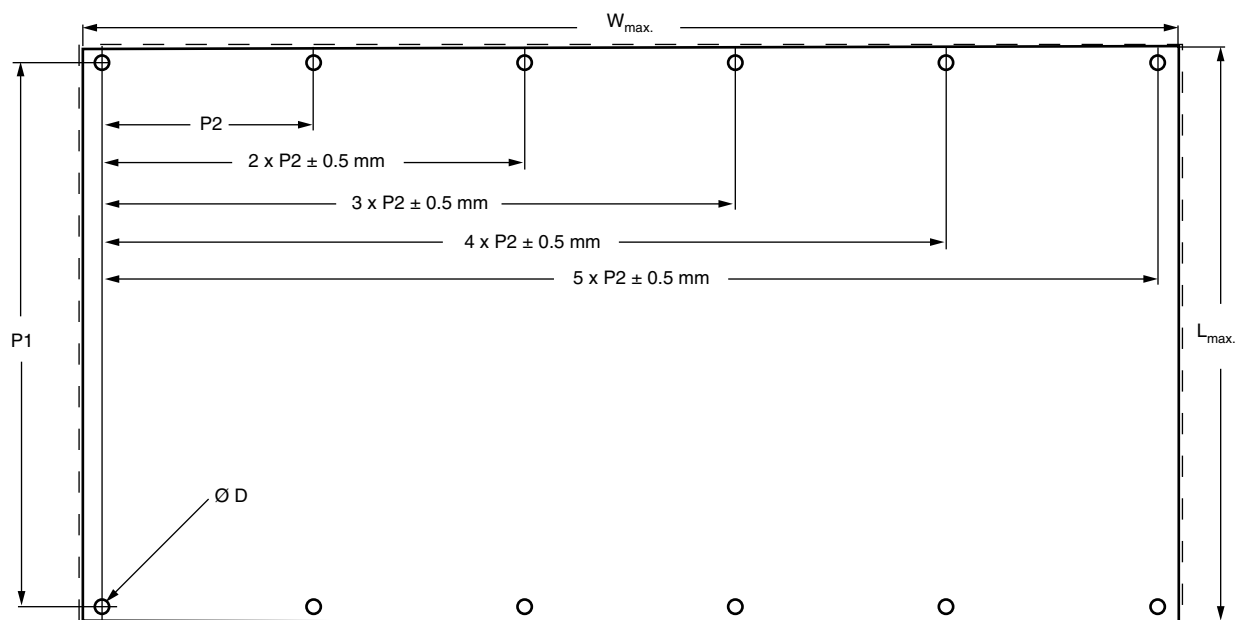
The capacitors shall be mechanically fixed by the leads and the body clamped.

### Space Requirements on Printed-Circuit Board and Dimension Tolerances

For the maximum product dimensions and maximum space requirements for length ( $l_{max.}$ ), width ( $w_{max.}$ ) following tolerances must be taken in account in the envelopment of the components as shown in the drawings below:

$$L_{max.} = l + \Delta l$$

$$W_{max.} = w + \Delta w$$



| P1 (mm) | $\Delta L$ (mm) | $\Delta W$ (mm) | $\varnothing D$ (mm) | $\Delta h$ (mm) |
|---------|-----------------|-----------------|----------------------|-----------------|
| 27.5    | 2               | 1.6             | 1.2                  | 0.2             |
| 37.5    | 3               | 2.0             | 1.5                  | 0.5             |
| 52.5    | 4               | 2.4             | 1.7                  | 0.5             |

For the maximum height  $h_{max.}$ , a  $\Delta h$  of 0.5 mm must be taken in account on the height dimension  $h$ .

For the minimum product dimensions for length ( $l_{min.}$ ), width ( $w_{min.}$ ) and height ( $h_{min.}$ ) following tolerances of the components are valid:

$$l_{min.} = l - \Delta l, w_{min.} = w - \Delta w \text{ and } h_{min.} = h - \Delta h$$

For products with pitch = 27.5 mm,  $\Delta l = 1.0$  mm and  $\Delta w = \Delta h = 0.5$  mm

For products with pitch = 37.5 mm,  $\Delta l = 1.0$  mm and  $\Delta w = \Delta h = 1.0$  mm

For products with pitch = 52.5 mm,  $\Delta l = 1.5$  mm and  $\Delta w = \Delta h = 1.0$  mm

## SOLDERING CONDITIONS

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

"Characteristics and Definitions used for Film Capacitors": [www.vishay.com/doc?26033](http://www.vishay.com/doc?26033)

### Storage Temperature

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

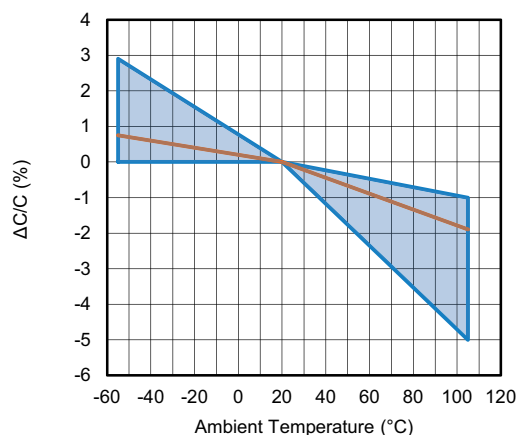
### Ratings and Characteristics Reference Conditions

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

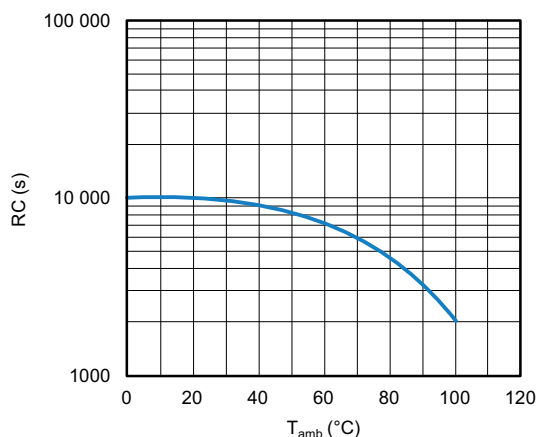
For reference testing, a conditioning period shall be applied over  $96$  h  $\pm 4$  h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



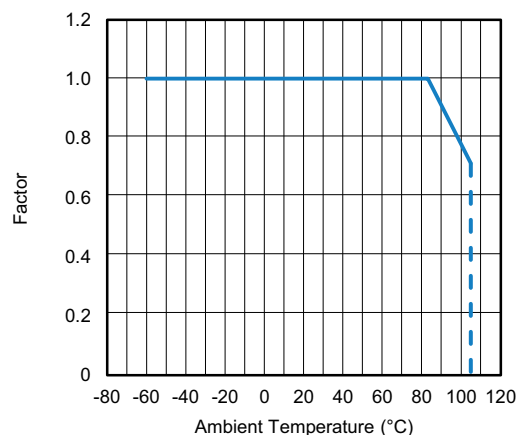
## CHARACTERISTICS



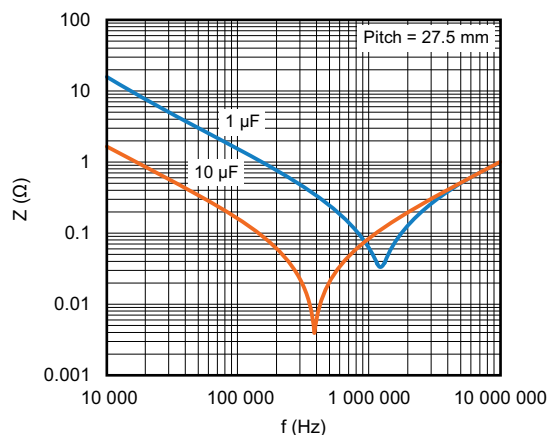
Capacitance as a function of ambient temperature (typical curve)



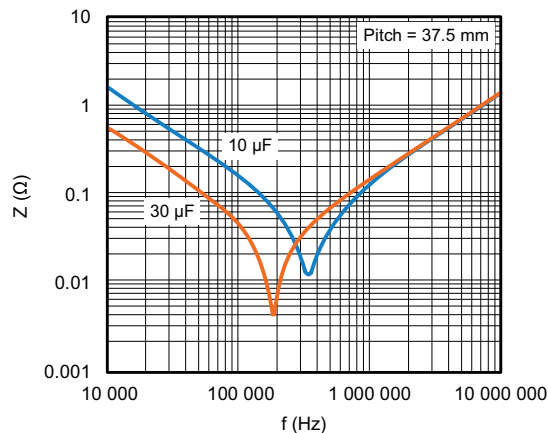
Insulation resistance as a function of ambient temperature (typical curve)



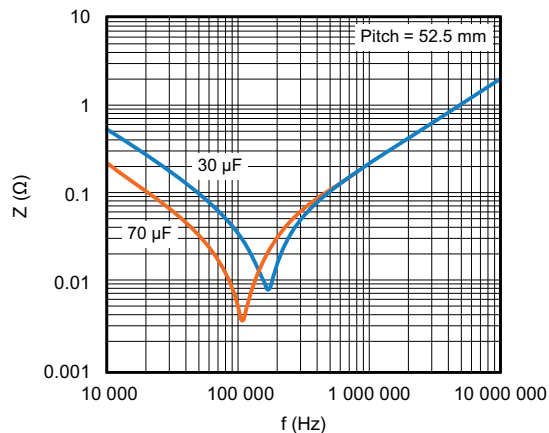
RMS voltage in function of temperature



Impedance vs. frequency (typical curve)



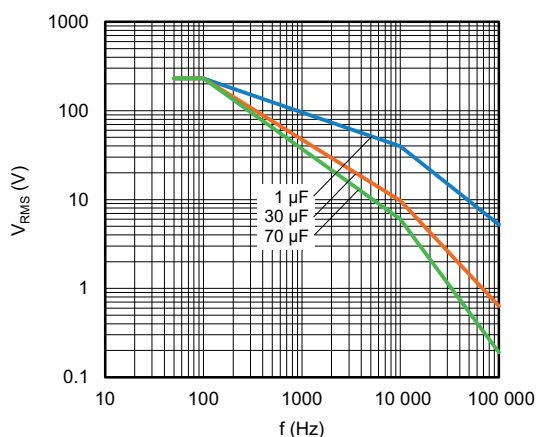
Impedance vs. frequency (typical curve)



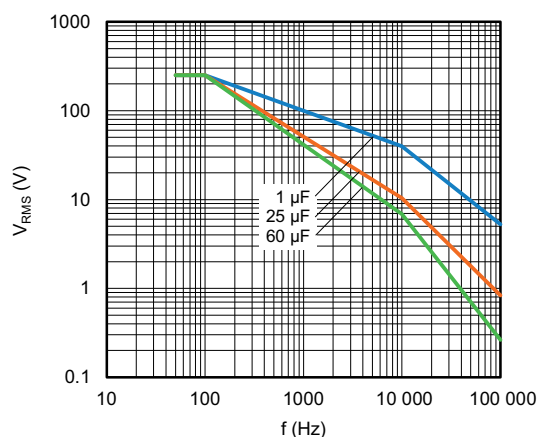
Impedance vs. frequency (typical curve)



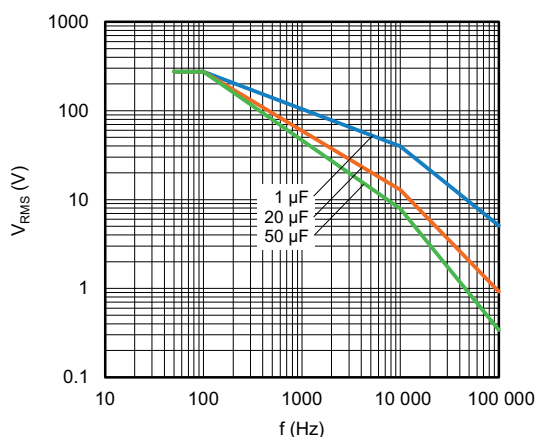
## CHARACTERISTICS



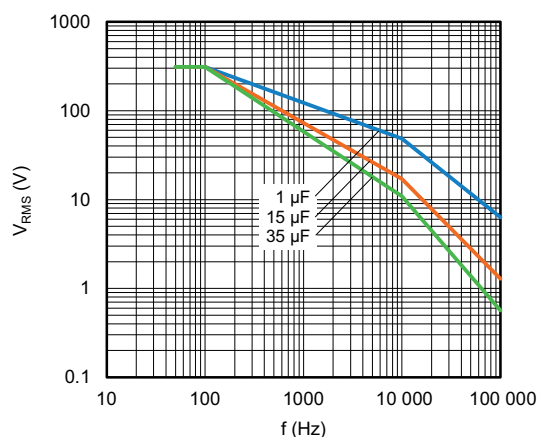
Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ\text{C}$ ;  $U_n = 230\text{ V}_{AC}$



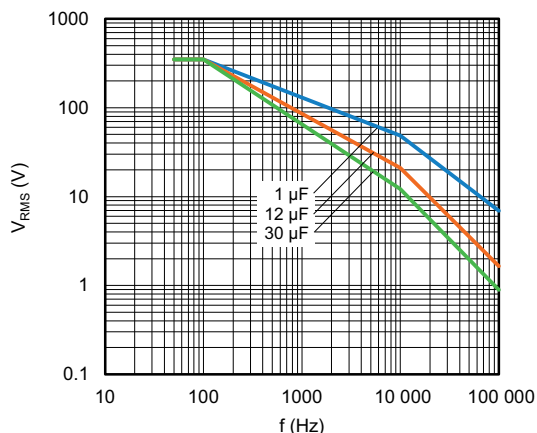
Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ\text{C}$ ;  $U_n = 250\text{ V}_{AC}$



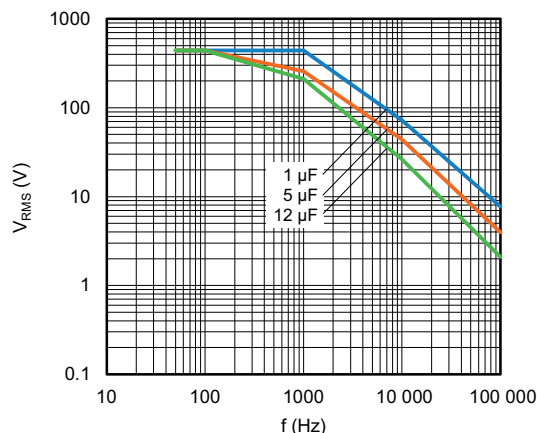
Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ\text{C}$ ;  $U_n = 275\text{ V}_{AC}$



Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ\text{C}$ ;  $U_n = 310\text{ V}_{AC}$



Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ\text{C}$ ;  $U_n = 350\text{ V}_{AC}$



Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ\text{C}$ ;  $U_n = 440\text{ V}_{AC}$



| HEAT CONDUCTIVITY |      |      |                           |               |               |
|-------------------|------|------|---------------------------|---------------|---------------|
| DIMENSIONS (mm)   |      |      | HEAT CONDUCTIVITY (mW/°C) |               |               |
| w                 | h    | l    | PITCH 27.5 mm             | PITCH 37.5 mm | PITCH 52.5 mm |
| 9.0               | 19.0 | 32.0 | 16                        | -             | -             |
| 11.0              | 21.0 | 32.0 | 19                        | -             | -             |
| 13.0              | 23.0 | 32.0 | 22                        | -             | -             |
| 15.0              | 25.0 | 32.0 | 25                        | -             | -             |
| 18.0              | 28.0 | 32.0 | 30                        | -             | -             |
| 21.0              | 31.0 | 32.0 | 35                        | -             | -             |
| 18.5              | 35.5 | 43.0 | -                         | 45            | -             |
| 21.5              | 38.5 | 42.0 | -                         | 51            | -             |
| 24.0              | 44.0 | 42.0 | -                         | 59            | -             |
| 30.0              | 45.0 | 42.0 | -                         | 68            | -             |
| 25.0              | 45.0 | 57.5 | -                         | -             | 77            |
| 30.0              | 45.0 | 57.5 | -                         | -             | 85            |
| 35.0              | 50.0 | 57.5 | -                         | -             | 100           |
| 45.0              | 45.0 | 57.5 | -                         | -             | 108           |

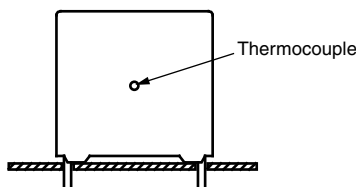
### Power Dissipation and Maximum Component Temperature Rise

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



The case 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. 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:

- The peak voltage ( $U_{P+}$ ) shall not be greater than  $\sqrt{2} \times U_{RMS}$
- The peak-to-peak ripple voltage ( $U_{PP}$ ) shall not be greater than  $2 \times \sqrt{2} \times U_{RMS}$  (for  $U_{RMS}$  consult above graph: Maximum RMS Voltage as Function of Frequency)
- The voltage pulse slope ( $dU/dt$ ) shall not exceed the rated pulse slope at the DC voltage rating.

If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by  $U_{NDC}$  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

- The maximum component surface temperature must be lower than 105 °C and maximum temperature rise between case and free air ambient shall be lower than 15 °C.
- For continuous operation, 24 hours per day for several years, please refer to application note: [www.vishay.com/doc?28245](http://www.vishay.com/doc?28245)

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

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 61071”.

| SUB-CLAUSE NUMBER AND TEST      |                                                | CONDITIONS                                                                                                                                                                                                                                                                 |                                        | PERFORMANCE REQUIREMENTS                                                    |               |
|---------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------|---------------|
| ROUTINE TEST - FINAL INSPECTION |                                                |                                                                                                                                                                                                                                                                            |                                        |                                                                             |               |
| 5.14.2.1                        | External inspection, visual examination        | 1 kHz at room temperature<br><br>1 kHz at room temperature<br>10 kHz at room temperature<br><br>1.5 x U <sub>NDC</sub> at T <sub>amb</sub><br>Duration 10 s<br><br>2200 V <sub>AC</sub> (50 Hz), 60 s<br><br>Measuring voltage 500 V at room temperature<br>Duration 1 min |                                        | Legible marking as specified                                                |               |
| 5.14.2.2                        | Dimensions                                     |                                                                                                                                                                                                                                                                            |                                        | See specification drawing                                                   |               |
| 5.3.1                           | Capacitance                                    |                                                                                                                                                                                                                                                                            |                                        | See specific reference data                                                 |               |
| 5.3.2                           | tan δ                                          |                                                                                                                                                                                                                                                                            |                                        | See specific reference data                                                 |               |
| 5.5.1.2                         | DC voltage test between terminals              |                                                                                                                                                                                                                                                                            |                                        | No visible damage or puncture<br>No flashover                               |               |
| 5.6.1                           | Voltage test between terminals and case        |                                                                                                                                                                                                                                                                            |                                        | No visible damage or puncture<br>No flashover                               |               |
| 5.7                             | Insulation resistance                          |                                                                                                                                                                                                                                                                            |                                        | See specific reference data                                                 |               |
| TYPE TESTS                      |                                                |                                                                                                                                                                                                                                                                            |                                        |                                                                             |               |
| 5.14.2                          | External inspection                            | Check for finish, marking, and overall dimensions                                                                                                                                                                                                                          |                                        | Legible marking and finish as specified<br>Dimensions: see specific drawing |               |
| 5.14.0                          | Initial measurements                           | Capacitance at 1 kHz<br>tan δ at 10 kHz                                                                                                                                                                                                                                    |                                        |                                                                             |               |
| 5.14.1.1.4                      | Robustness of terminations<br>IEC 60068-2-21   | Tensile Ua1: duration 10 s ± 1 s                                                                                                                                                                                                                                           |                                        |                                                                             |               |
|                                 |                                                | Wire diameter                                                                                                                                                                                                                                                              | Section                                |                                                                             | Load          |
|                                 |                                                | d ≤ 0.80 mm                                                                                                                                                                                                                                                                | S ≤ 0.5 mm <sup>2</sup>                |                                                                             | 10 N (± 10 %) |
|                                 |                                                | d ≤ 1.25 mm                                                                                                                                                                                                                                                                | S ≤ 1.2 mm <sup>2</sup>                |                                                                             | 20 N (± 10 %) |
|                                 |                                                | Bending Ub method 1: 4 x 90 °,<br>duration 2 s to 3 s/bend                                                                                                                                                                                                                 |                                        |                                                                             |               |
|                                 |                                                | Wire diameter                                                                                                                                                                                                                                                              | Section modules                        |                                                                             | Load          |
|                                 |                                                | d ≤ 0.80 mm                                                                                                                                                                                                                                                                | Z <sub>x</sub> ≤ 0.050 mm <sup>3</sup> |                                                                             | 5 N (± 10 %)  |
|                                 |                                                | d ≤ 1.25 mm                                                                                                                                                                                                                                                                | Z <sub>x</sub> ≤ 0.019 mm <sup>3</sup> |                                                                             | 10 N (± 10 %) |
| 5.14.1.6                        | Resistance to soldering heat<br>IEC 60068-2-20 | No predrying, method 1A<br>Solder bath: 280 °C ± 5 °C<br>Duration 10 s ± 1 s                                                                                                                                                                                               |                                        |                                                                             |               |
| 5.14.4                          | Final measurements                             | Capacitance<br>tan δ                                                                                                                                                                                                                                                       |                                        |                                                                             |               |
| 5.14.0                          | Initial measurements                           | Capacitance at 1 kHz<br>tan δ at 10 kHz                                                                                                                                                                                                                                    |                                        |                                                                             |               |
| 5.14.3.1                        | Vibration<br>IEC 60068-2-6                     | f = 10 Hz to 55 Hz; amplitude ± 0.35 mm or<br>acceleration 98 m/s <sup>2</sup><br><br>Test duration: 10 frequency cycles,<br>3 axes offset from each other by 90°<br>1 octave/min<br>Visual examination                                                                    |                                        |                                                                             |               |
|                                 |                                                |                                                                                                                                                                                                                                                                            |                                        | No visible damage                                                           |               |



| SUB-CLAUSE NUMBER AND TEST                              | CONDITIONS                                                                                                                                                                           | PERFORMANCE REQUIREMENTS                                                                                                          |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>TYPE TESTS</b>                                       |                                                                                                                                                                                      |                                                                                                                                   |
| 5.14.3.2 Shock or impact<br>IEC 60068-2-6               | Pulse shape: half sine<br>Acceleration: 490 m/s <sup>2</sup><br>Duration of pulse: 11 ms<br>Visual examination                                                                       | No visible damage                                                                                                                 |
| 5.14.4 Final measurements                               | Capacitance<br>tan $\delta$                                                                                                                                                          | $ \Delta C/C  \leq 0.5 \%$<br>Increase of tan $\delta \leq 0.0050$<br>Compared to values measured in 5.14.0                       |
| 5.5.3.1 Initial measurements                            | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>R insulation                                                                                                                       | $ \Delta C/C  \leq 0.5 \%$<br>Increase of tan $\delta \leq 0.0050$<br>R insulation $\geq 50 \%$ of specified values               |
| 5.5.3.2 DC voltage test<br>between terminals            | $1.5 \times U_{NDC}$ at $T_{amb}$<br>Duration 10 s                                                                                                                                   |                                                                                                                                   |
| 5.5.3.3 Final measurements                              | Capacitance<br>tan $\delta$<br>R insulation                                                                                                                                          |                                                                                                                                   |
| 5.9.1 Initial measurements                              | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz                                                                                                                                       | $ \Delta C/C  \leq 1.0 \%$<br>tan $\delta \leq 1.2 \times$ initial tan $\delta + 0.0001$<br>Compared to values measured in 5.9.1  |
| 5.9.2 Surge discharge test                              | $1.1 \times U_{NDC}$<br>Number of discharges: 5<br>Time lapse: every 2 min (10 min total)                                                                                            |                                                                                                                                   |
| 5.9.3 DC voltage test<br>between terminals              | Within 5 min after the surge discharge test<br>$1.5 \times U_{NDC}$ at $T_{amb}$ , duration 10 s                                                                                     |                                                                                                                                   |
| 5.9.4 Final measurements                                | Capacitance<br>tan $\delta$ at 10 kHz                                                                                                                                                |                                                                                                                                   |
| 5.11.1 Initial measurements                             | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz                                                                                                                                       | $ \Delta C/C  \leq 0.5 \%$<br>tan $\delta \leq 1.2 \times$ initial tan $\delta + 0.0001$<br>Compared to values measured in 5.11.1 |
| 5.11.2 Self healing test                                | $1.5 \times U_{NDC}$ , duration 10 s<br>Increase the voltage at 100 V/s till 5 clearings<br>occur or until voltage reach max. of $2.5 \times U_{NDC}$ ,<br>for a duration of 10 s    |                                                                                                                                   |
| 5.11.3 Final measurements                               | Capacitance<br>tan $\delta$                                                                                                                                                          |                                                                                                                                   |
| 5.13.0 Initial measurements                             | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz                                                                                                                                       | $ \Delta C/C  \leq 2.0 \%$<br>Increase of tan $\delta \leq 0.0150$<br>Compared to values measured in 5.13.0                       |
| 5.13.1 Change of temperature acc. to<br>IEC 60068-2-14  | Test Nb<br>$T_{max.} = 85 \text{ }^{\circ}\text{C}$<br>$T_{min.} = -40 \text{ }^{\circ}\text{C}$<br>Transition time: 1 h, equivalent to $1 \text{ }^{\circ}\text{C/min}$<br>5 cycles |                                                                                                                                   |
| 5.13.2 Damp heat steady state<br>acc. to IEC 60068-2-78 | Test Ca<br>$T = 40 \text{ }^{\circ}\text{C} \pm 2 \text{ }^{\circ}\text{C}$<br>RH = $93 \% \pm 3 \%$<br>Duration 56 days                                                             |                                                                                                                                   |
| 5.5.3.2 DC voltage test<br>between terminals            | $1.5 \times U_{NDC}$ at ambient temperature<br>Duration 10 s                                                                                                                         |                                                                                                                                   |
| 5.13.3 Final measurements                               | Visual examination<br><br>Capacitance<br>tan $\delta$ at 10 kHz                                                                                                                      | No puncturing or flashover<br>Self healing punctures are permitted                                                                |



| SUB-CLAUSE NUMBER AND TEST |                                                       | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                           | PERFORMANCE REQUIREMENTS                                                                                   |
|----------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>TYPE TESTS</b>          |                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                            |
| 5.10.0                     | Initial measurements                                  | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                            |
| 5.10.1                     | Thermal stability test under overload conditions      | Natural cooling $T_{amb} \pm 5^\circ\text{C}$<br>$1.21 \times P_{max.} = (U^2/2) \times w_2 \times C \times \tan \delta_2 =$<br>$1.21 \times (I_{RMS}^2/w_2 \times C) \times \tan \delta_2$ with<br>$w_2 = 2 \times \pi \times f_2$<br><br>for $I = I_{RMS}$ (see specific reference data)<br>$f_2 = 10\text{ kHz}$<br><br>Duration 48 h<br><br>Measure the temperature every 1.5 h during the last 6 hours                                          | Temperature rise $< 1^\circ\text{C}$                                                                       |
| 5.10.2                     | Final measurements                                    | Capacitance<br>tan $\delta$ at 10 kHz                                                                                                                                                                                                                                                                                                                                                                                                                | $ \Delta C/C  \leq 2.0\%$<br>Increase of tan $\delta \leq 0.0150$                                          |
| 5.12                       | Resonance frequency measurement                       | Impedance analyzer at $T_{amb}$                                                                                                                                                                                                                                                                                                                                                                                                                      | $> 0.9$ times the value as specified in typical curve "Resonant frequency" of this specification           |
| 5.15.0                     | Initial measurements                                  | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                            |
| 5.15.1                     | Endurance test between terminals                      | Sequence<br>$1.25 \times U_{NAC}$ at $T_{max.} = 85^\circ\text{C}$<br>$1.25 \times U_{OPAC}$ at $105^\circ\text{C}$ at $T_{max.} = 105^\circ\text{C}$<br>Duration 500 h<br><br>1000 x discharge at $1.4 \times \hat{i}$ (maximum repetitive peak current in continuous operation)<br><br>$1.25 \times U_{NAC}$ at $T_{max.} = 85^\circ\text{C}$<br>$1.25 \times U_{OPAC}$ at $105^\circ\text{C}$ at $T_{max.} = 105^\circ\text{C}$<br>Duration 500 h |                                                                                                            |
| 5.15.2                     | Final measurements                                    | Capacitance<br>tan $\delta$                                                                                                                                                                                                                                                                                                                                                                                                                          | $ \Delta C/C  \leq 3.0\%$<br>Increase of tan $\delta \leq 0.0150$<br>Compared to values measured in 5.15.0 |
| 5.16.3.0A                  | Initial measurements                                  | Capacitance at 1 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                            |
| 5.16.3.1.A                 | Destruction test sequence for <u>non-segment film</u> | The capacitors must be put in an oven at $T_{max.} = 85^\circ\text{C}$ product enveloped with cheese cloth                                                                                                                                                                                                                                                                                                                                           |                                                                                                            |
|                            | High DC voltage test                                  | $3 \times U_{NDC}$ or DC voltage until repetitive product healings occur<br>Duration 15 min                                                                                                                                                                                                                                                                                                                                                          | Audible healings or check healings with oscilloscope                                                       |
|                            | High AC voltage test                                  | $AC_{RMS}$ voltage = $1 \times U_{NAC}$ , with minimum of $250\text{ V}_{AC}$<br>Duration 5 min<br>Repeat destruction sequence 3 x                                                                                                                                                                                                                                                                                                                   |                                                                                                            |
| 5.16.3.2.A                 | Final measurements                                    | Visual examination                                                                                                                                                                                                                                                                                                                                                                                                                                   | No puncturing, flashover or burning of the cheese cloth.<br>Self-healing punctures are permitted           |





| SUB-CLAUSE NUMBER AND TEST                                   | CONDITIONS                                                                                                                                                                               | PERFORMANCE REQUIREMENTS                                                                      |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>TYPE TESTS</b>                                            |                                                                                                                                                                                          |                                                                                               |
| 5.16.3.0.B Initial measurements                              | Capacitance at 1 kHz                                                                                                                                                                     | DC power supply capable of obtaining the desired breakdown voltage                            |
| 5.16.3.1.B Destruction test sequence for <u>segment film</u> | The capacitors must be put in an oven at $T_{max.} = 105\text{ °C}/2\text{ h}$ and cooled down<br>Product enveloped with cheese cloth                                                    |                                                                                               |
| High DC voltage test (limited to 200 mA)                     | $3 \times U_{NDC}$ with minimum 2000 V <sub>DC</sub><br>Duration 1 min<br><br>Discharge the capacitor<br>Duration 1 min                                                                  |                                                                                               |
| High AC voltage test                                         | $AC_{RMS}$ voltage = $1 \times U_{NAC}$<br>Duration 15 s<br><br>The above sequence shall be repeated until the test sample capacitance loss 5 % of its initial measurement in 5.16.3.0.B |                                                                                               |
| 5.16.3.2.B Final measurements                                | Visual examination                                                                                                                                                                       | No burning of the cheese cloth.<br>The dielectric must withstand the test sequence conducted. |



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