

## THB AC Filtering Metalized Polypropylene Film Capacitor Radial Type 85 °C / 85 % RH 1000 h at $U_{NAC}$



### FEATURES

- High robustness under high humidity
- THB 85 °C, 85 % RH, 1000 h at rated  $U_{NAC}$
- UL 810 (electrical pending)
- Segmented film
- 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

- Outdoor applications
- UPS systems
- Renewable energy
- AC harmonic filter
- Welding equipment

### QUICK REFERENCE DATA

|                                                                |                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated capacitance range                                        | 1 µF to 35 µF                                                                                                                                                                                                                                                                              |
| Capacitance tolerance                                          | ± 10 %, ± 5 %                                                                                                                                                                                                                                                                              |
| Maximum continuous AC voltage (50 Hz / 60 Hz) range, $U_{NAC}$ | 250 V <sub>AC</sub> , 310 V <sub>AC</sub> , 350 V <sub>AC</sub> , 480 V <sub>AC</sub>                                                                                                                                                                                                      |
| Climatic testing class                                         | 40 / 105 / 56 B                                                                                                                                                                                                                                                                            |
| Rated temperature                                              | 85 °C                                                                                                                                                                                                                                                                                      |
| Maximum permissible case temperature                           | 105 °C                                                                                                                                                                                                                                                                                     |
| Reference standards                                            | IEC 61071, IEC 60068, UL 810                                                                                                                                                                                                                                                               |
| Dielectric                                                     | Polypropylene film                                                                                                                                                                                                                                                                         |
| Electrodes                                                     | Metallized dielectric film                                                                                                                                                                                                                                                                 |
| Construction                                                   | <div> <div>Mono construction</div> <div>Series construction</div> </div> <div> <div>  </div> <div>  </div> </div> |
| Encapsulation                                                  | Plastic case sealed with resin; flame retardant                                                                                                                                                                                                                                            |
| Terminals                                                      | Tinned wire                                                                                                                                                                                                                                                                                |
| Self inductance ( $L_S$ )                                      | < 1 nH per mm of lead spacing                                                                                                                                                                                                                                                              |
| Withstanding DC voltage between terminals <sup>(1)</sup>       | 1.5 $U_{NDC}$ for 10 s, cut off current 10 mA, rise time ≤ 1000 V/s                                                                                                                                                                                                                        |
| Insulation resistance                                          | RC between leads, after 1 min > 10 000 s, measuring voltage: 500 V                                                                                                                                                                                                                         |
| Life time expectancy <sup>(2)</sup>                            | FIT: < 10 x 10 <sup>-9</sup> /h (10 per 10 <sup>9</sup> component hours) at 0.5 x $U_N$ , 40 °C                                                                                                                                                                                            |
| Marking                                                        | C-value, tolerance, rated voltage, code for dielectric material, code for manufacturing origin, manufacturer's type designation, manufacturer location, year and week, manufacturer's logo or name                                                                                         |

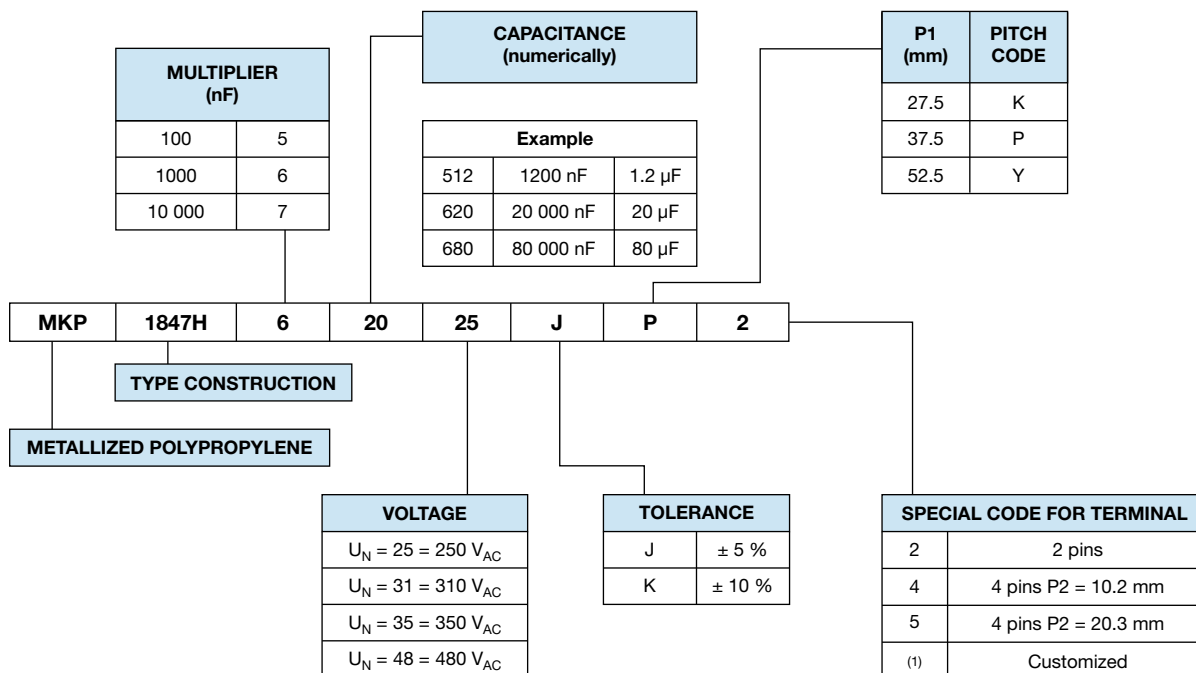
### Notes

- 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. See APPLICATION NOTES AND LIMITING CONDITIONS on page 10 for intended continuous mains voltage.

### MAXIMUM AC VOLTAGE RATINGS ( $V_{RMS}$ )

|                      |       |       |       |       |
|----------------------|-------|-------|-------|-------|
| $U_{NAC}$            | 250 V | 310 V | 350 V | 480 V |
| $U_{OPAC}$ at 85 °C  | 250 V | 310 V | 350 V | 480 V |
| $U_{OPAC}$ at 105 °C | 175 V | 210 V | 240 V | 330 V |

## COMPOSITION OF CATALOG NUMBER

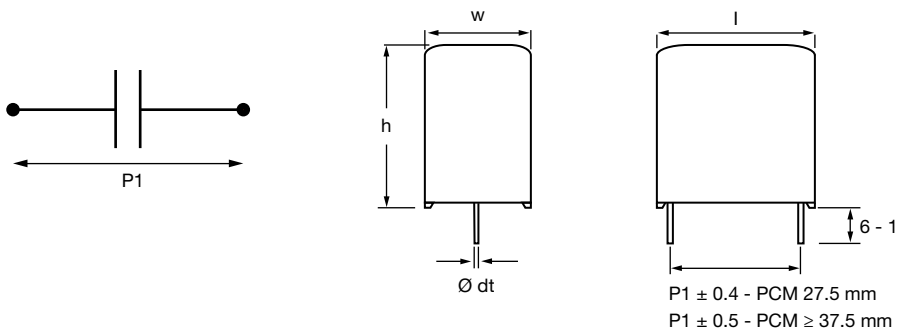


### Note

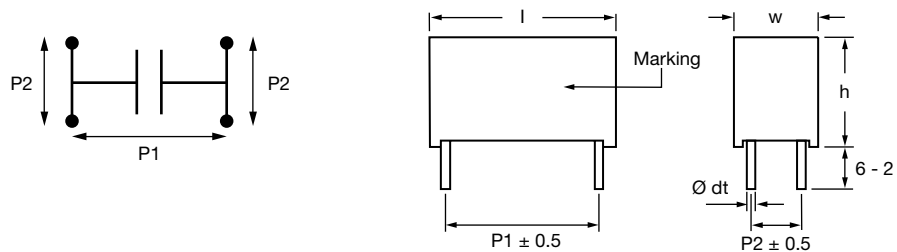
(1) Tabs terminals or customized terminals are available on request

## DIMENSIONS in millimeters

### 2 PINS



### 4 PINS



### Note

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



## ELECTRICAL DATA AND ORDERING CODE

| U <sub>NAC</sub><br>(V) | CAP.<br>(μF)                                                                                                                                       | DIMENSION<br>(mm) |      |      | P1<br>(mm) | P2<br>(mm)  | (dU/dt) <sub>R</sub> <sup>(1)</sup><br>(V/μs) | I <sub>PEAK</sub><br>(A) | I <sub>RMS</sub> <sup>(2)</sup><br>(A) |           | ESR <sup>(3)</sup><br>10 kHz<br>(mΩ) |           | tan δ <sup>(4)</sup><br>10 kHz<br>< (x 10 <sup>-4</sup> ) |                  | ORDERING CODE <sup>(5)</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>OPAC</sub> AT 85 °C = 250 V <sub>AC</sub> ; U <sub>OPAC</sub> AT 105 °C = 175 V <sub>AC</sub> ; C-TOL. = ± 10 % (U <sub>NDC</sub> = 500 V)  |                   |      |      |            |             |                                               |                          |                                        |           |                                      |           |                                                           |                  |                              |
|                         | 1                                                                                                                                                  | 15.0              | 25.0 | 32.0 | 27.5       | -           | 50                                            | 50                       | 3                                      | -         | 29.5                                 | -         | 30                                                        | -                | MKP1847H51025+K2             |
|                         | 2                                                                                                                                                  | 15.0              | 25.0 | 32.0 | 27.5       | -           | 50                                            | 100                      | 4.5                                    | -         | 15                                   | -         | 30                                                        | -                | MKP1847H52025+K2             |
|                         | 3                                                                                                                                                  | 18.0              | 28.0 | 32.0 | 27.5       | -           | 50                                            | 150                      | 6.5                                    | -         | 10                                   | -         | 30                                                        | -                | MKP1847H53025+K2             |
|                         | 4                                                                                                                                                  | 21.0              | 31.0 | 32.0 | 27.5       | -           | 50                                            | 200                      | 8                                      | -         | 7.5                                  | -         | 30                                                        | -                | MKP1847H54025+K2             |
|                         | 5                                                                                                                                                  | 21.0              | 31.0 | 32.0 | 27.5       | -           | 50                                            | 250                      | 9                                      | -         | 6                                    | -         | 30                                                        | -                | MKP1847H55025+K2             |
|                         | 6                                                                                                                                                  | 22.0              | 38.0 | 32.0 | 27.5       | -           | 50                                            | 300                      | 10.5                                   | -         | 5                                    | -         | 30                                                        | -                | MKP1847H56025+K2             |
|                         | 7                                                                                                                                                  | 22.0              | 38.0 | 32.0 | 27.5       | -           | 50                                            | 350                      | 11.5                                   | -         | 4.5                                  | -         | 30                                                        | -                | MKP1847H57025+K2             |
|                         | 8                                                                                                                                                  | 22.0              | 38.0 | 32.0 | 27.5       | -           | 50                                            | 400                      | 12                                     | -         | 4                                    | -         | 30                                                        | -                | MKP1847H58025+K2             |
|                         | 10                                                                                                                                                 | 21.5              | 38.5 | 42.0 | 37.5       | 10.2        | 25                                            | 250                      | 9.5                                    | 11        | 7.5                                  | 6.5       | 70                                                        | 65               | MKP1847H61025+P*             |
|                         | 12                                                                                                                                                 | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 25                                            | 300                      | 12.5                                   | 13.5      | 6                                    | 5.5       | 70                                                        | 65               | MKP1847H61225+P*             |
|                         | 15                                                                                                                                                 | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 25                                            | 375                      | 14                                     | 15        | 5                                    | 4.5       | 70                                                        | 65               | MKP1847H61525+P*             |
|                         | 20                                                                                                                                                 | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 25                                            | 500                      | 16                                     | 17.5      | 3.5                                  | 3         | 70                                                        | 65               | MKP1847H62025+P*             |
|                         | 22                                                                                                                                                 | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 12                                            | 264                      | 13                                     | 14.5      | 7                                    | 6         | 135                                                       | 120              | MKP1847H62225+Y*             |
|                         | 25                                                                                                                                                 | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 12                                            | 300                      | 14                                     | 15.5      | 6                                    | 5.5       | 135                                                       | 120              | MKP1847H62525+Y*             |
|                         | 30                                                                                                                                                 | 35.0              | 50.0 | 57.5 | 52.5       | 20.3        | 12                                            | 360                      | 16.5                                   | 18        | 5                                    | 4.5       | 135                                                       | 120              | MKP1847H63025+Y*             |
| 35                      | 35.0                                                                                                                                               | 50.0              | 57.5 | 52.5 | 20.3       | 12          | 420                                           | 18                       | 19.5                                   | 4.5       | 3.5                                  | 135       | 120                                                       | MKP1847H63525+Y* |                              |
| 310                     | U <sub>OPAC</sub> AT 85 °C = 310 V <sub>AC</sub> ; U <sub>OPAC</sub> AT 105 °C = 210 V <sub>AC</sub> ; C-TOL. = ± 10 % (U <sub>NDC</sub> = 630 V)  |                   |      |      |            |             |                                               |                          |                                        |           |                                      |           |                                                           |                  |                              |
|                         | 1                                                                                                                                                  | 15.0              | 25.0 | 32.0 | 27.5       | -           | 65                                            | 65                       | 4                                      | -         | 19                                   | -         | 25                                                        | -                | MKP1847H51031+K2             |
|                         | 2                                                                                                                                                  | 18.0              | 28.0 | 32.0 | 27.5       | -           | 65                                            | 130                      | 6.5                                    | -         | 9.5                                  | -         | 25                                                        | -                | MKP1847H52031+K2             |
|                         | 3                                                                                                                                                  | 21.0              | 31.0 | 32.0 | 27.5       | -           | 65                                            | 195                      | 8.5                                    | -         | 6.5                                  | -         | 25                                                        | -                | MKP1847H53031+K2             |
|                         | 4                                                                                                                                                  | 22.0              | 38.0 | 32.0 | 27.5       | -           | 65                                            | 260                      | 11                                     | -         | 5                                    | -         | 25                                                        | -                | MKP1847H54031+K2             |
|                         | 5                                                                                                                                                  | 21.5              | 38.5 | 42.0 | 37.5       | 10.2        | 35                                            | 175                      | 9                                      | 10        | 8.5                                  | 7.5       | 50                                                        | 45               | MKP1847H55031+P*             |
|                         | 6                                                                                                                                                  | 21.5              | 38.5 | 42.0 | 37.5       | 10.2        | 35                                            | 210                      | 10                                     | 11        | 7                                    | 6         | 50                                                        | 45               | MKP1847H56031+P*             |
|                         | 7                                                                                                                                                  | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 35                                            | 245                      | 12.5                                   | 14        | 6                                    | 5.5       | 50                                                        | 45               | MKP1847H57031+P*             |
|                         | 8                                                                                                                                                  | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 35                                            | 280                      | 13.5                                   | 14.5      | 5                                    | 4.5       | 50                                                        | 45               | MKP1847H58031+P*             |
|                         | 10                                                                                                                                                 | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 35                                            | 350                      | 15                                     | 16.5      | 4                                    | 3.5       | 50                                                        | 45               | MKP1847H61031+P*             |
|                         | 12                                                                                                                                                 | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 15                                            | 180                      | 13                                     | 14.5      | 7                                    | 6         | 100                                                       | 85               | MKP1847H61231+Y*             |
|                         | 15                                                                                                                                                 | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 15                                            | 225                      | 14.5                                   | 16        | 5.5                                  | 5         | 100                                                       | 85               | MKP1847H61531+Y*             |
|                         | 20                                                                                                                                                 | 35.0              | 50.0 | 57.5 | 52.5       | 20.3        | 15                                            | 300                      | 18                                     | 19.5      | 4                                    | 3.5       | 100                                                       | 85               | MKP1847H62031+Y*             |
| 22                      | 35.0                                                                                                                                               | 50.0              | 57.5 | 52.5 | 20.3       | 15          | 330                                           | 19                       | 20.5                                   | 4         | 3.5                                  | 100       | 85                                                        | MKP1847H62231+Y* |                              |
| 350                     | U <sub>OPAC</sub> AT 85 °C = 350 V <sub>AC</sub> ; U <sub>OPAC</sub> AT 105 °C = 240 V <sub>AC</sub> ; C-TOL. = ± 10 % (U <sub>NDC</sub> = 700 V)  |                   |      |      |            |             |                                               |                          |                                        |           |                                      |           |                                                           |                  |                              |
|                         | 1                                                                                                                                                  | 15.0              | 25.0 | 32.0 | 27.5       | -           | 80                                            | 80                       | 4.5                                    | -         | 20.5                                 | -         | 20                                                        | -                | MKP1847H51035+K2             |
|                         | 2                                                                                                                                                  | 18.0              | 28.0 | 32.0 | 27.5       | -           | 80                                            | 160                      | 7                                      | -         | 10.5                                 | -         | 20                                                        | -                | MKP1847H52035+K2             |
|                         | 3                                                                                                                                                  | 21.0              | 31.0 | 32.0 | 27.5       | -           | 80                                            | 240                      | 9                                      | -         | 7                                    | -         | 20                                                        | -                | MKP1847H53035+K2             |
|                         | 4                                                                                                                                                  | 22.0              | 38.0 | 32.0 | 27.5       | -           | 80                                            | 320                      | 11.5                                   | -         | 5.5                                  | -         | 20                                                        | -                | MKP1847H54035+K2             |
|                         | 5                                                                                                                                                  | 21.5              | 38.5 | 42.0 | 37.5       | 10.2        | 50                                            | 250                      | 10.5                                   | 11        | 7.5                                  | 7.5       | 40                                                        | 35               | MKP1847H55035+P*             |
|                         | 6                                                                                                                                                  | 21.5              | 38.5 | 42.0 | 37.5       | 10.2        | 50                                            | 300                      | 11.5                                   | 12.5      | 6.5                                  | 6         | 40                                                        | 35               | MKP1847H56035+P*             |
|                         | 7                                                                                                                                                  | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 50                                            | 350                      | 14                                     | 15        | 6                                    | 5.5       | 40                                                        | 35               | MKP1847H57035+P*             |
|                         | 8                                                                                                                                                  | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 50                                            | 400                      | 15.5                                   | 16.5      | 5                                    | 4.5       | 40                                                        | 35               | MKP1847H58035+P*             |
|                         | 10                                                                                                                                                 | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 50                                            | 500                      | 17                                     | 19        | 4                                    | 3.5       | 40                                                        | 35               | MKP1847H61035+P*             |
|                         | 12                                                                                                                                                 | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 25                                            | 300                      | 15.5                                   | 16        | 6                                    | 6         | 80                                                        | 70               | MKP1847H61235+Y*             |
|                         | 15                                                                                                                                                 | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 25                                            | 375                      | 17                                     | 18.5      | 5                                    | 4.5       | 80                                                        | 70               | MKP1847H61535+Y*             |
|                         | 20                                                                                                                                                 | 35.0              | 50.0 | 57.5 | 52.5       | 20.3        | 25                                            | 500                      | 21                                     | 23        | 4                                    | 3.5       | 80                                                        | 70               | MKP1847H62035+Y*             |
| 22                      | 35.0                                                                                                                                               | 50.0              | 57.5 | 52.5 | 20.3       | 25          | 550                                           | 22.5                     | 24.5                                   | 3.5       | 3                                    | 80        | 70                                                        | MKP1847H62235+Y* |                              |
| 480                     | U <sub>OPAC</sub> AT 85 °C = 480 V <sub>AC</sub> ; U <sub>OPAC</sub> AT 105 °C = 330 V <sub>AC</sub> ; C-TOL. = ± 10 % (U <sub>NDC</sub> = 1000 V) |                   |      |      |            |             |                                               |                          |                                        |           |                                      |           |                                                           |                  |                              |
|                         | 2                                                                                                                                                  | 21.5              | 38.5 | 42.0 | 37.5       | 10.2        | 80                                            | 160                      | 9                                      | 10        | 9.5                                  | 9         | 20                                                        | 15               | MKP1847H52048+P*             |
|                         | 3                                                                                                                                                  | 30.0              | 45.0 | 42.0 | 37.5       | 10.2 / 20.3 | 80                                            | 240                      | 13.5                                   | 14        | 6.5                                  | 6         | 20                                                        | 15               | MKP1847H53048+P*             |
|                         | 4                                                                                                                                                  | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 80                                            | 320                      | 12.5                                   | 13        | 9                                    | 8         | 40                                                        | 35               | MKP1847H54048+Y*             |
|                         | 5                                                                                                                                                  | 30.0              | 45.0 | 57.5 | 52.5       | 20.3        | 35                                            | 175                      | 14.0                                   | 14.5      | 7.5                                  | 6.5       | 40                                                        | 35               | MKP1847H55048+Y*             |
|                         | 6                                                                                                                                                  | 35.0              | 50.0 | 57.5 | 52.5       | 20.3        | 35                                            | 210                      | 16.5                                   | 17.5      | 6.5                                  | 6         | 40                                                        | 35               | MKP1847H56048+Y*             |
|                         | 7                                                                                                                                                  | 35.0              | 50.0 | 57.5 | 52.5       | 20.3        | 35                                            | 245                      | 18.0                                   | 18.5      | 5.5                                  | 5         | 40                                                        | 35               | MKP1847H57048+Y*             |

## Notes

- (1) Rated voltage pulse slope (dU/dt)<sub>R</sub> at voltage U<sub>NDC</sub>  
(2) Maximum RMS current at 10 kHz, +85 °C, capacitance tolerance specified  
(3) Equivalent series resistance typical values at f = 10 kHz  
(4) Maximum tan δ values  
(5) Change the "\*" symbol with special code for the terminals and "+" for tolerance



## PACKAGING INFORMATION

| U <sub>NAC</sub><br>(V) | U <sub>NDC</sub><br>(V) | CAP. <sup>(1)</sup><br>(μF) | DIMENSION (mm) |      |      | Ø dt<br>(mm) | ORDERING CODE <sup>(2)</sup> | MASS<br>(g) | SPQ <sup>(3)</sup><br>(pcs) |
|-------------------------|-------------------------|-----------------------------|----------------|------|------|--------------|------------------------------|-------------|-----------------------------|
|                         |                         |                             | w              | h    | l    |              |                              |             |                             |
| 250                     | 500                     | 1                           | 15.0           | 25.0 | 32.0 | 0.8          | MKP1847H51025+K2             | 11          | 100                         |
|                         |                         | 2                           | 15.0           | 25.0 | 32.0 | 0.8          | MKP1847H52025+K2             | 14          | 100                         |
|                         |                         | 3                           | 18.0           | 28.0 | 32.0 | 0.8          | MKP1847H53025+K2             | 18          | 80                          |
|                         |                         | 4                           | 21.0           | 31.0 | 32.0 | 0.8          | MKP1847H54025+K2             | 23          | 65                          |
|                         |                         | 5                           | 21.0           | 31.0 | 32.0 | 0.8          | MKP1847H55025+K2             | 21          | 65                          |
|                         |                         | 6                           | 22.0           | 38.0 | 32.0 | 0.8          | MKP1847H56025+K2             | 24          | 60                          |
|                         |                         | 7                           | 22.0           | 38.0 | 32.0 | 0.8          | MKP1847H57025+K2             | 23          | 60                          |
|                         |                         | 8                           | 22.0           | 38.0 | 32.0 | 0.8          | MKP1847H58025+K2             | 22          | 60                          |
|                         |                         | 10                          | 21.5           | 38.5 | 42.0 | 1.0          | MKP1847H61025+P*             | 35          | 91                          |
|                         |                         | 12                          | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H61225+P*             | 68          | 63                          |
|                         |                         | 15                          | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H61525+P*             | 64          | 63                          |
|                         |                         | 20                          | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H62025+P*             | 56          | 63                          |
|                         |                         | 22                          | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H62225+Y*             | 73          | 45                          |
|                         |                         | 25                          | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H62525+Y*             | 69          | 45                          |
|                         |                         | 30                          | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H63025+Y*             | 95          | 40                          |
|                         |                         | 35                          | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H63525+Y*             | 86          | 40                          |
| 310                     | 630                     | 1                           | 15.0           | 25.0 | 32.0 | 0.8          | MKP1847H51031+K2             | 10          | 100                         |
|                         |                         | 2                           | 18.0           | 28.0 | 32.0 | 0.8          | MKP1847H52031+K2             | 17          | 80                          |
|                         |                         | 3                           | 21.0           | 31.0 | 32.0 | 0.8          | MKP1847H53031+K2             | 21          | 65                          |
|                         |                         | 4                           | 22.0           | 38.0 | 32.0 | 0.8          | MKP1847H54031+K2             | 24          | 60                          |
|                         |                         | 5                           | 21.5           | 38.5 | 42.0 | 1.0          | MKP1847H55031+P*             | 38          | 91                          |
|                         |                         | 6                           | 21.5           | 38.5 | 42.0 | 1.0          | MKP1847H56031+P*             | 36          | 91                          |
|                         |                         | 7                           | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H57031+P*             | 70          | 63                          |
|                         |                         | 8                           | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H58031+P*             | 67          | 63                          |
|                         |                         | 10                          | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H61031+P*             | 62          | 63                          |
|                         |                         | 12                          | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H61231+Y*             | 77          | 45                          |
|                         |                         | 15                          | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H61531+Y*             | 70          | 45                          |
|                         |                         | 20                          | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H62031+Y*             | 90          | 40                          |
|                         |                         | 22                          | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H62231+Y*             | 86          | 40                          |
| 350                     | 700                     | 1                           | 15.0           | 25.0 | 32.0 | 0.8          | MKP1847H51035+K2             | 16          | 100                         |
|                         |                         | 2                           | 18.0           | 28.0 | 32.0 | 0.8          | MKP1847H52035+K2             | 22          | 80                          |
|                         |                         | 3                           | 21.0           | 31.0 | 32.0 | 0.8          | MKP1847H53035+K2             | 28          | 65                          |
|                         |                         | 4                           | 22.0           | 38.0 | 32.0 | 0.8          | MKP1847H54035+K2             | 34          | 60                          |
|                         |                         | 5                           | 21.5           | 38.5 | 42.0 | 1.0          | MKP1847H55035+P*             | 51          | 91                          |
|                         |                         | 6                           | 21.5           | 38.5 | 42.0 | 1.0          | MKP1847H56035+P*             | 49          | 91                          |
|                         |                         | 7                           | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H57035+P*             | 83          | 63                          |
|                         |                         | 8                           | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H58035+P*             | 81          | 63                          |
|                         |                         | 10                          | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H61035+P*             | 77          | 63                          |
|                         |                         | 12                          | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H61235+Y*             | 121         | 45                          |
|                         |                         | 15                          | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H61535+Y*             | 119         | 45                          |
|                         |                         | 20                          | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H62035+Y*             | 150         | 40                          |
| 480                     | 1000                    | 2                           | 21.5           | 38.5 | 42.0 | 1.0          | MKP1847H52048+P*             | 49          | 91                          |
|                         |                         | 3                           | 30.0           | 45.0 | 42.0 | 1.0          | MKP1847H53048+P*             | 77          | 63                          |
|                         |                         | 4                           | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H54048+Y*             | 121         | 45                          |
|                         |                         | 5                           | 30.0           | 45.0 | 57.5 | 1.2          | MKP1847H55048+Y*             | 119         | 45                          |
|                         |                         | 6                           | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H56048+Y*             | 152         | 40                          |
|                         |                         | 7                           | 35.0           | 50.0 | 57.5 | 1.2          | MKP1847H57048+Y*             | 147         | 40                          |

## Notes

- (1) Intermediate capacitance values available on request  
 (2) Change the "\*" symbol with special code for the terminals and "+" for tolerance  
 (3) SPQ = Standard Packing Quantity

| APPROVALS                                                                         |                           |               |                  |                                                                        |
|-----------------------------------------------------------------------------------|---------------------------|---------------|------------------|------------------------------------------------------------------------|
| SAFETY APPROVALS                                                                  | VOLTAGE                   | VALUE         | FILE NUMBERS     | LINKS                                                                  |
| UL 810 construction                                                               | Up to 480 V <sub>AC</sub> | 1 µF to 35 µF | 20170525-E490196 | <a href="http://www.vishay.com/doc?26086">www.vishay.com/doc?26086</a> |
|  |                           |               |                  |                                                                        |

## CONSTRUCTION DESCRIPTION

Low inductive wound cell elements of metallized polypropylene film, 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.

## DIMENSIONS TOLERANCES

For the maximum product dimensions for length ( $l_{max.}$ ), width ( $w_{max.}$ ) and height ( $h_{max.}$ ) use the following tolerances:

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

$$\text{Pitch} = 27.5 \text{ mm}, \Delta w = \Delta l = \Delta h = 0.7 \text{ mm}$$

$$\text{Pitch} = 37.5 \text{ mm}, \Delta w = \Delta l = \Delta h = 0.7 \text{ mm}$$

$$\text{Pitch} = 52.5 \text{ mm}, \Delta w = \Delta l = \Delta h = 1.0 \text{ mm}$$

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

$$\text{Pitch} = 27.5 \text{ mm}, \Delta w = \Delta l = \Delta h = 1.0 \text{ mm}$$

$$\text{Pitch} = 37.5 \text{ mm}, \Delta w = \Delta l = \Delta h = 1.0 \text{ mm}$$

$$\text{Pitch} = 52.5 \text{ mm}, \Delta w = \Delta l = \Delta h = 1.5 \text{ mm}$$

## SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

For product height with seating plane as given by "IEC 60717" as reference.

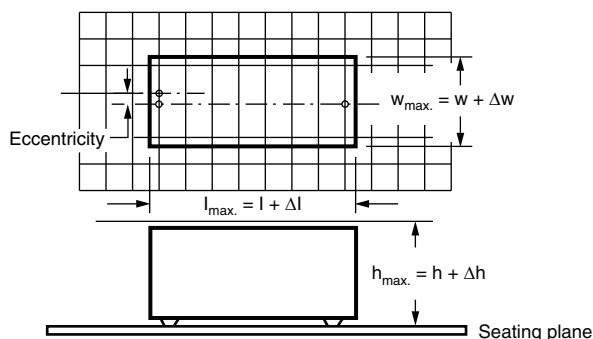
### For 2 pins:

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

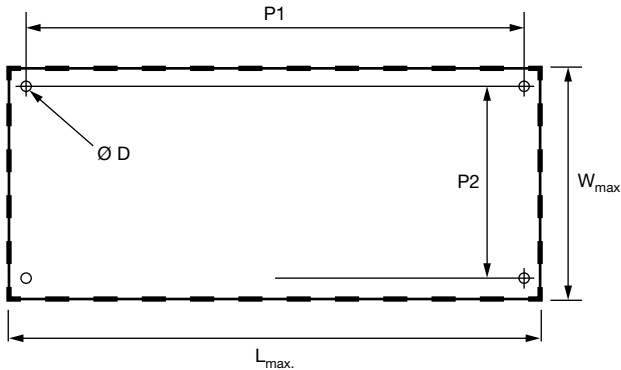
- For products with pitch  $\leq 27.5$  mm,  $\Delta w = \Delta l = \Delta h = 0.7$  mm
- For products with pitch = 37.5 mm,  $\Delta w = \Delta l = \Delta h = 0.7$  mm
- For products with pitch = 52.5 mm,  $\Delta w = \Delta l = \Delta h = 1.0$  mm

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

The maximum length and width of film capacitors is shown in the figure:



For 4 pins:

| DIMENSIONS in millimeters                                                          |                   |                   |     |         |
|------------------------------------------------------------------------------------|-------------------|-------------------|-----|---------|
|  |                   |                   |     |         |
| P1                                                                                 | L <sub>max.</sub> | W <sub>max.</sub> | Ø D | H       |
| 37.5                                                                               | l + 1.5           | w + 1.8           | 1.5 | h + 0.7 |
| 52.5                                                                               | l + 1.8           | w + 2.0           | 1.7 | h + 1.0 |

## 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<sub>stg</sub> = -25 °C to +35 °C with relative humidity of maximum 75 % without condensation

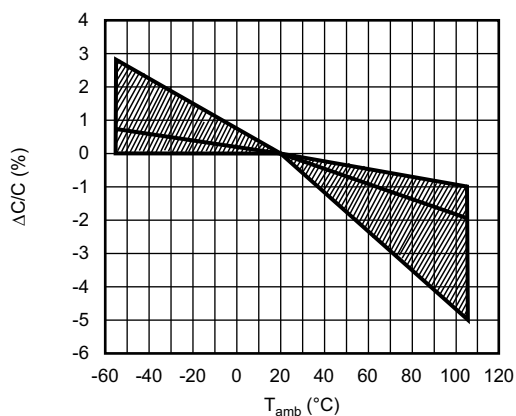
## RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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

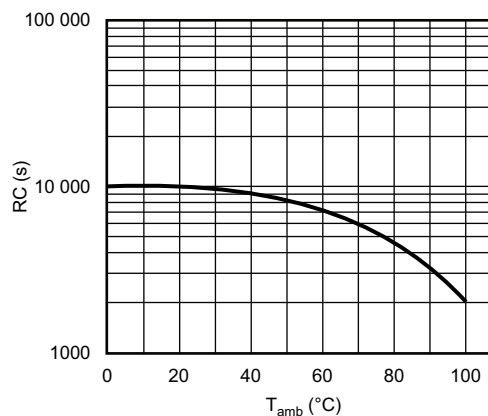
For reference testing, a conditioning period shall be applied over 96 h ± 4 h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



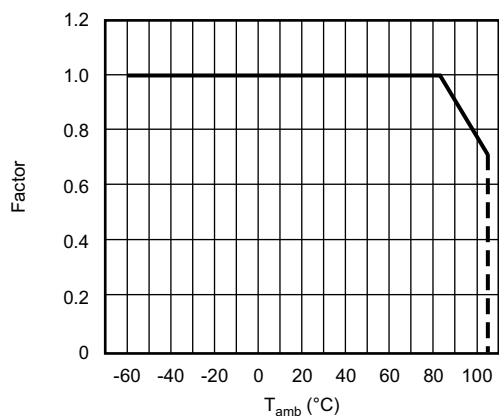
## CHARACTERISTICS



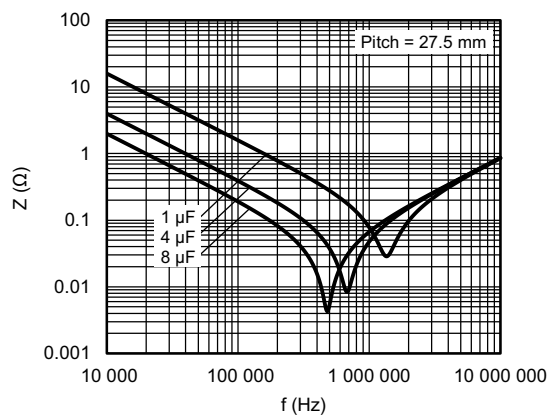
Capacitance as a function of ambient temperature (typical)



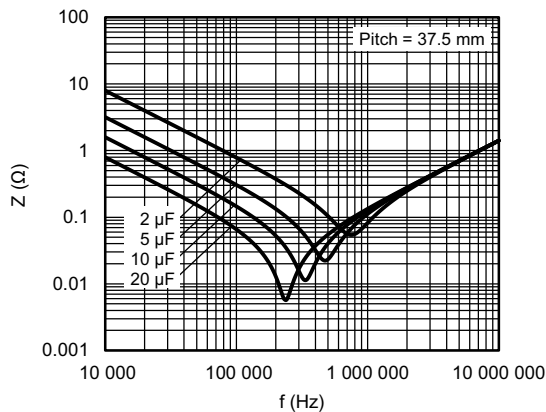
Insulation resistance as a function of ambient temperature (typical)



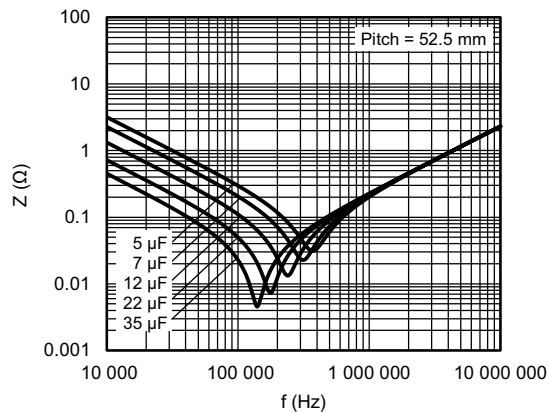
RMS voltage in function of temperature



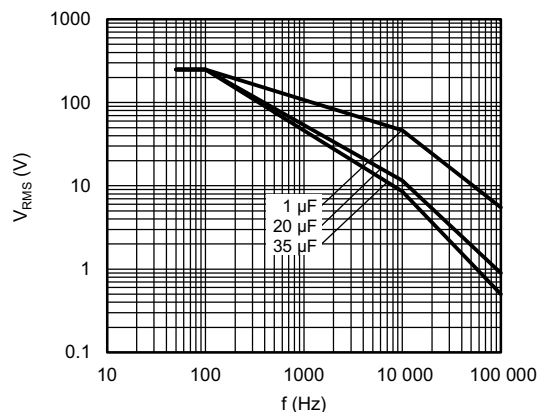
Impedance vs. Frequency (typical)



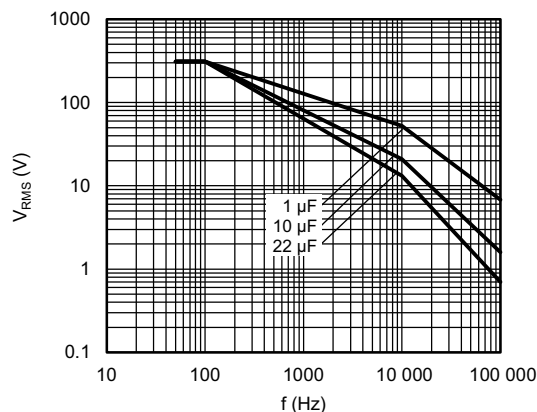
Impedance vs. Frequency (typical)



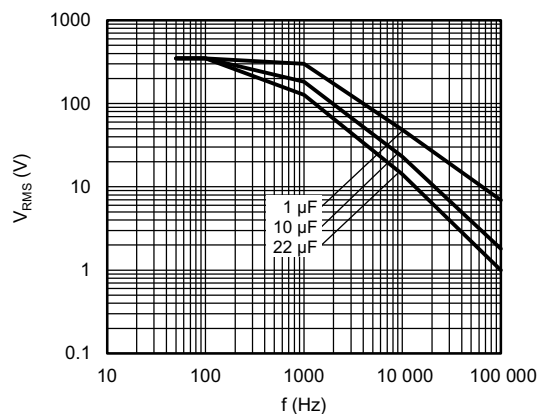
Impedance vs. Frequency (typical)



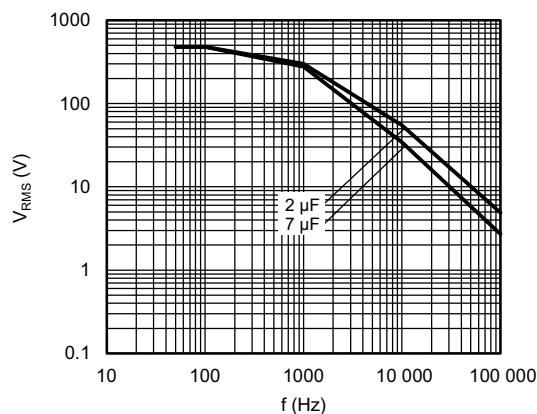
Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ C$ ;  $U_n = 250 V_{AC}$



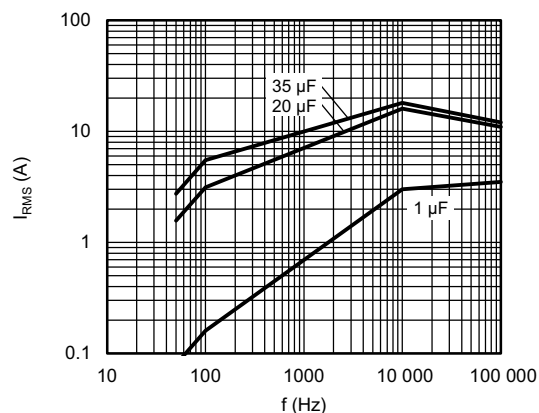
Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ C$ ;  $U_n = 310 V_{AC}$



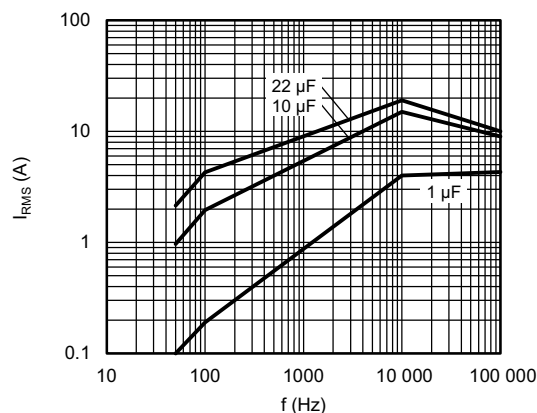
Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ C$ ;  $U_n = 350 V_{AC}$



Maximum RMS voltage as function of frequency  
 $T_{amb} \leq 85^\circ C$ ;  $U_n = 480 V_{AC}$

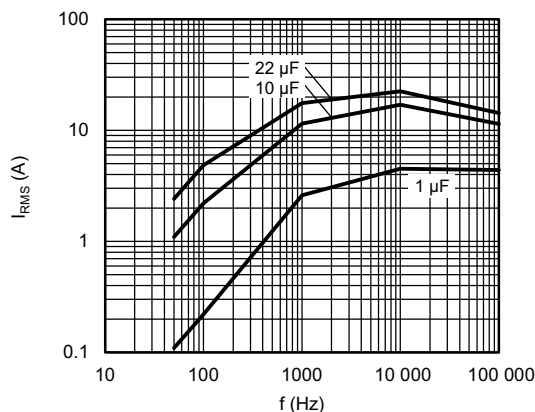


Maximum RMS current as function of frequency  
 $T_{amb} \leq 85^\circ C$ ;  $U_n = 250 V_{AC}$

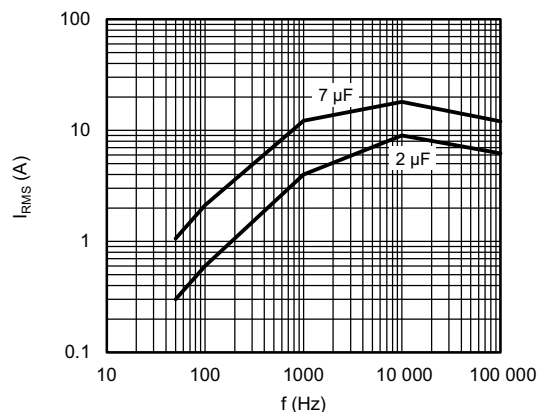


Maximum RMS current as function of frequency  
 $T_{amb} \leq 85^\circ C$ ;  $U_n = 310 V_{AC}$





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



Maximum RMS current as function of frequency  
 $T_{amb} \leq 85^{\circ}\text{C}$ ;  $U_n = 480\text{ V}_{AC}$

| HEAT CONDUCTIVITY |      |      |                              |
|-------------------|------|------|------------------------------|
| DIMENSION (mm)    |      |      | HEAT CONDUCTIVITY<br>(mW/°C) |
| w                 | h    | l    |                              |
| 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                           |
| 22.0              | 38.0 | 32.0 | 41                           |
| 21.5              | 38.5 | 42.0 | 52                           |
| 30.0              | 45.0 | 42.0 | 70                           |
| 30.0              | 45.0 | 57.5 | 86                           |
| 35.0              | 50.0 | 57.5 | 100                          |

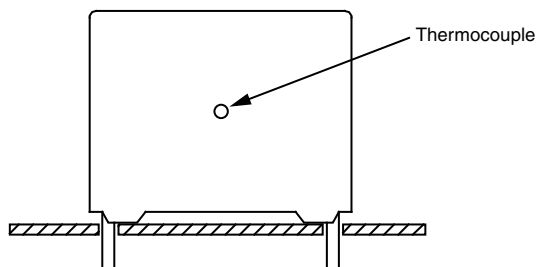
## POWER DISSIPATION AND MAXIMUM COMPONENT TEMPERATURE RISE

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 ( $^{\circ}\text{C}$ ) with a maximum of  $15^{\circ}\text{C}$
- $P$  = power dissipation of the component (mW)
- $G$  = heat conductivity of the component (mW/ $^{\circ}\text{C}$ )

## MEASURING THE COMPONENT TEMPERATURE



The case temperature is measured in unloaded condition ( $T_{amb}$ ) and 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 NOTES 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:

1. The peak voltage ( $U_{p+}$ ) shall not be greater than  $\sqrt{2} \times U_{RMS}$
2. The peak-to-peak ripple voltage ( $U_{pp}$ ) shall not be greater than  $2 \times \sqrt{2} \times U_{RMS}$  (for  $U_{RMS}$  consult graph "Maximum RMS Voltage as Function of Frequency")
3. 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.

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

T is the pulse duration

4. The maximum component surface temperature must be lower than 105 °C and maximum temperature rise between case and free air ambient shall be lower than 15 °C.
5. 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**

| SUB-CLAUSE NUMBER AND TEST                                 | CONDITIONS                                                                                                                                                                                           |                                        | PERFORMANCE REQUIREMENTS                                                                 |                  |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------|------------------|
| ROUTINE TEST - FINAL INSPECTION                            |                                                                                                                                                                                                      |                                        |                                                                                          |                  |
| 5.14.2-1<br>External inspection, visual examination        | 1 kHz at room temperature<br><br>10 kHz at room temperature<br><br>1.5 x U <sub>NDC</sub> at T <sub>amb</sub><br>Duration: 2 s<br><br>Measuring voltage 500 V at room temperature<br>Duration: 1 min |                                        | Legible marking as specified                                                             |                  |
| 5.14.2-2<br>Dimensions                                     |                                                                                                                                                                                                      |                                        | See specification drawing                                                                |                  |
| 5.3-1<br>Capacitance                                       |                                                                                                                                                                                                      |                                        | See specific reference data                                                              |                  |
| 5.3-2<br>tan δ                                             |                                                                                                                                                                                                      |                                        | See specific reference data                                                              |                  |
| 5.5.1-2<br>Voltage test between terminals                  |                                                                                                                                                                                                      |                                        | No visible damage or puncture<br>No flashover                                            |                  |
| 5.7<br>Insulation resistance                               |                                                                                                                                                                                                      |                                        | See specific reference data                                                              |                  |
| TYPE TESTS                                                 |                                                                                                                                                                                                      |                                        |                                                                                          |                  |
| 5.14.2<br>External inspection                              | Check for finish, marking, and overall dimensions                                                                                                                                                    |                                        | Legible marking and finish as specified<br>Dimensions: see specification drawing         |                  |
| 5.14.0<br>Initial measurements                             | Capacitance at 1 kHz<br>tan δ at 10 kHz                                                                                                                                                              |                                        |                                                                                          |                  |
| 5.14.1-1/4<br>Robustness of terminations<br>IEC 60068-2-21 | Tensile U <sub>a1</sub>                                                                                                                                                                              |                                        |                                                                                          |                  |
|                                                            | Wire diameter                                                                                                                                                                                        | Section                                |                                                                                          | Load             |
|                                                            | d ≤ 0.80 mm                                                                                                                                                                                          | S ≤ 0.5 mm <sup>2</sup>                |                                                                                          | 10 N<br>(± 10 %) |
|                                                            | d ≤ 1.25 mm                                                                                                                                                                                          | S ≤ 1.2 mm <sup>2</sup>                |                                                                                          | 20 N<br>(± 10 %) |
|                                                            | Duration: 10 s ± 1 s                                                                                                                                                                                 |                                        |                                                                                          |                  |
|                                                            | Bending, U <sub>b</sub> method 1                                                                                                                                                                     |                                        |                                                                                          |                  |
|                                                            | Wire diameter                                                                                                                                                                                        | Section modulus                        |                                                                                          | Load             |
|                                                            | d ≤ 0.80 mm                                                                                                                                                                                          | Z <sub>x</sub> ≤ 0.05 mm <sup>3</sup>  |                                                                                          | 5 N<br>(10 %)    |
|                                                            | d ≤ 1.25 mm                                                                                                                                                                                          | Z <sub>x</sub> ≤ 0.019 mm <sup>3</sup> |                                                                                          | 10 N<br>(± 10 %) |
|                                                            | 4 x 90°, duration: 2 s to 3 s/bend                                                                                                                                                                   |                                        |                                                                                          |                  |
|                                                            | No pre-drying, method 1A<br>Solder bath: 280 °C ± 5 °C<br>Duration: 10 s ± 1 s                                                                                                                       |                                        |                                                                                          |                  |
|                                                            | Capacitance<br>tan δ                                                                                                                                                                                 |                                        |                                                                                          |                  |
|                                                            | 5.14.1-6<br>Resistance to soldering heat<br>IEC 60068-2-20                                                                                                                                           |                                        |                                                                                          |                  |
|                                                            | 5.14.4<br>Final measurements                                                                                                                                                                         |                                        |                                                                                          |                  |
|                                                            |                                                                                                                                                                                                      |                                        | ΔC/C  ≤ 0.5 %<br>Increase of tan δ ≤ 0.0050<br>compared to the values measured in 5.14.0 |                  |



| INSPECTION REQUIREMENTS                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                                                                                                                                           | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                          |
| 5.14.0<br>Initial measurements<br><br>5.14.3-1<br>Vibration<br>IEC 60068-2-6<br><br>5.14.3-2<br>Shock or impact<br>IEC 60068-2-6<br><br>5.14.4<br>Final measurements | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>Insulation resistance<br><br>10 Hz to 55 Hz; $a = \pm 0.35$ mm or<br>acceleration 98 m/s <sup>2</sup><br>Test duration: 10 frequency cycles<br>(3 axes offset from each other by 90°)<br>1 octave/min<br><br>Visual examination<br><br>Pulse shape: half sine<br>Acceleration: 490 m/s <sup>2</sup><br>Duration of pulse: 11 ms<br><br>Visual examination<br><br>Capacitance<br>tan $\delta$<br><br>Insulation resistance | No visible damage<br><br><br><br><br><br><br><br><br><br>No visible damage<br><br>$ \Delta C/C  \leq 0.5\%$<br>Increase of tan $\delta \leq 0.0050$<br>compared to the values measured in 5.14.0<br>Insulation resistance $\geq 50\%$ of specified values                         |
| 5.5.3-1<br>Initial measurements<br><br>5.5.3-2<br>DC voltage test between terminals<br><br>5.5.3-3<br>Final measurements                                             | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>Insulation resistance<br><br>1.5 x U <sub>NDC</sub> at T <sub>amb</sub><br>Duration: 10 s<br><br>Capacitance<br>tan $\delta$<br>Insulation resistance                                                                                                                                                                                                                                                                     | $ \Delta C/C  \leq 0.5\%$<br>Increase of tan $\delta \leq 0.0050$<br>Insulation resistance $\geq 50\%$ of specified values                                                                                                                                                        |
| 5.9-1<br>Initial measurements<br><br>5.9-2<br>Surge discharge test<br><br>5.9-2<br>DC voltage test between terminals<br><br>5.9-3<br>Final measurements              | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>Insulation resistance<br><br>1.1 x U <sub>NDC</sub><br>Number of discharges: 5<br>Time lapse: every 2 min (10 min total)<br><br>Within 5 min after the surge<br>discharge test<br>Duration: 10 s<br>1.5 x U <sub>NDC</sub> at T <sub>amb</sub><br><br>Capacitance<br>tan $\delta$<br><br>Insulation resistance                                                                                                            | $ \Delta C/C  \leq 1.0\%$<br>tan $\delta \leq 1.2 \times \text{initial tan } \delta + 0.0001$<br>compared to the values measured in 5.9-1<br>Insulation resistance $\geq 50\%$ of specified values                                                                                |
| 5.11-1<br>Initial measurements<br><br>5.11-2<br>Self healing test<br><br>5.11-3<br>Final measurements                                                                | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>Insulation resistance<br><br>1.5 x U <sub>NDC</sub> , duration: 10 s<br>Increase the voltage at 100 V/s till<br>5 clearings occur or until voltage reach<br>max. of 2.5 x U <sub>NDC</sub> for a duration of 10 s<br><br>Capacitance<br>tan $\delta$<br><br>Insulation resistance                                                                                                                                         | Number of clearings $\leq 5$<br>Clearing = voltage drop of 5 %<br><br><br><br>$ \Delta C/C  \leq 0.5\%$<br>tan $\delta \leq 1.2 \times \text{initial tan } \delta + 0.0001$<br>compared to the values measured in 5.11-1<br>Insulation resistance $\geq 50\%$ of specified values |



| INSPECTION REQUIREMENTS                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                                                                                                                                                                                                                                    | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                                                           |
| 5.13-0<br>Initial measurements<br><br>5.13-1<br>Change of temperature according to IEC 60068-2-14<br><br>5.13-2<br>Damp heat steady state according to IEC 60068-2-78<br><br>5.5.3-2<br>DC voltage test between terminals<br><br>5.13-3<br>Final measurements | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>Insulation resistance<br><br>Test Nb<br>$T_{max.} = +105\text{ }^{\circ}\text{C}$<br>$T_{min.} = -40\text{ }^{\circ}\text{C}$<br>Transition time: 1 h, equivalent to $1\text{ }^{\circ}\text{C/min.}$ 5 cycles<br><br>Test Ca<br>$T = 40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$<br>$RH = 93\text{ \%} \pm 3\text{ \%}$<br>Duration: 56 days<br><br>$1.5 \times U_{NDC}$ at ambient temperature<br>Duration: 10 s<br><br>Visual examination<br><br>Capacitance<br>tan $\delta$<br><br>Insulation resistance | No puncturing or flashover<br>Self healing punctures are permitted<br><br>$ \Delta C/C  \leq 2.0\text{ \%}$<br>Increase of tan $\delta \leq 0.0150$<br>compared to the values measured in 5.13-0<br>Insulation resistance $\geq 50\text{ \%}$ of specified values                  |
| 5.13A-0<br>Initial measurements<br><br>5.13A.2<br>Damp heat steady state with load<br><br>5.13.3<br>Final measurements                                                                                                                                        | Capacitance at 1 kHz<br>tan $\delta$ at 1 kHz<br>Insulation resistance<br><br>$T = 85\text{ }^{\circ}\text{C}$<br>$RH = 85\text{ \%}$ at $U_N$<br>Duration: 1000 h<br><br>Capacitance at 1 kHz<br>tan $\delta$<br><br>Insulation resistance                                                                                                                                                                                                                                                                                                                                  | $ \Delta C/C  < 10\text{ \%}$<br>Increase of tan $\delta$ :<br>$\leq 0.008$ for: $C \leq 10\text{ }\mu\text{F}$ or<br>$\leq 0.005$ for: $C > 10\text{ }\mu\text{F}$<br>Compared to the values measured in 5.13A-0<br>Insulation resistance $\geq 50\text{ \%}$ of specified values |
| 5.10-0<br>Initial measurements<br><br>5.10-1<br>Thermal stability test under overload conditions<br><br>5.10-2<br>Final measurements                                                                                                                          | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>Insulation resistance<br><br>Natural cooling $T_{amb} \pm 5\text{ }^{\circ}\text{C}$<br>$1.21 \times P_{max.} = 1.21 \times (I_{RMS}^2/w \times C) \times \tan \delta(f)$<br>with $w = 2 \times \pi \times f$<br>For $I_{RMS}$ see specific reference data<br>$f = 10\text{ kHz}$<br>Duration: 48 h<br><br>Measure the temperature every 1.5 h during the last 6 h<br><br>Capacitance<br>tan $\delta$ at 10 kHz<br>Insulation resistance                                                                                   | Temperature rise $< 1\text{ }^{\circ}\text{C}$<br><br>$ \Delta C/C  \leq 2.0\text{ \%}$<br>Increase of tan $\delta \leq 0.0150$<br>Insulation resistance $\geq 50\text{ \%}$ of specified values                                                                                   |



| INSPECTION REQUIREMENTS                                  |                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                           |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                               | CONDITIONS                                                                                                                                                                                                                                                                                                                                                  | PERFORMANCE REQUIREMENTS                                                                                                                                                  |
| 5.12<br>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<br>Initial measurements                           | Capacitance at 1 kHz<br>$\tan \delta$ at 10 kHz<br>Insulation resistance                                                                                                                                                                                                                                                                                    |                                                                                                                                                                           |
| 5.15-1<br>Endurance test between terminals               | Sequence:<br>1.25 x ( $U_{RMS}$ at 85 °C) at $T_{max.} = 85$ °C<br>1.25 x ( $U_{OPAC}$ at 105 °C) at $T_{max.} = 105$ °C<br>Duration: 500 h<br><br>1000 x discharge at $1.4 \times \hat{I}$<br>(maximum peak current)<br><br>1.25 x ( $U_{RMS}$ at 85 °C) at $T_{max.} = 85$ °C<br>1.25 x ( $U_{OPAC}$ at 105 °C) at $T_{max.} = 105$ °C<br>Duration: 500 h |                                                                                                                                                                           |
| 5.15-2<br>Final measurement                              | Capacitance<br>$\tan \delta$<br><br>Insulation resistance                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                           |
| 5.16.3-0<br>Initial measurements                         | Capacitance at 1 kHz                                                                                                                                                                                                                                                                                                                                        | DC power supply capable of obtaining the desired breakdown voltage<br><br>No burning of the cheese cloth<br><br>The dielectric must withstand the test sequence conducted |
| 5.16.3-1<br>Destruction test sequence for segmented film | The capacitors must be put in an oven at $T_{max.} = 105$ °C/2 h and cooled down<br>Product enveloped with cheese cloth                                                                                                                                                                                                                                     |                                                                                                                                                                           |
| High DC voltage test (limited to 200 mA)                 | 3 x $U_{NDC}$ with minimum 2000 $V_{DC}$ ,<br>duration = 1 min<br>Discharge the capacitor, duration = 1 min                                                                                                                                                                                                                                                 |                                                                                                                                                                           |
| High AC voltage test                                     | $AC_{RMS}$ voltage = 1 x $U_N$ , duration = 15 s<br><br>The above sequence shall be repeated until the test sample capacitance loss 10 % of its initial measurement in 5.16.3B-0                                                                                                                                                                            |                                                                                                                                                                           |
| 5.16.3-2<br>Final measurements                           | Visual examination<br>Capacitance at 1 kHz                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                           |

**Note**

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



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