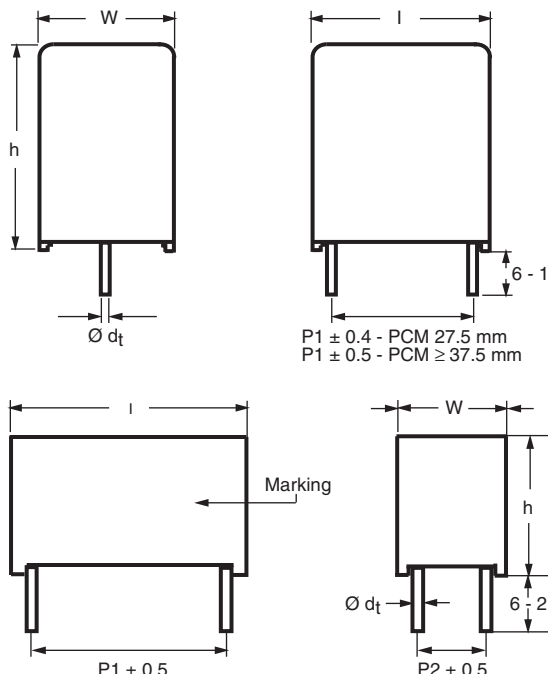


## Metallized Polypropylene Film Capacitors DC Capacitor MKP Type



Dimensions in millimeters  
 $\varnothing d_t \pm 10\%$  of standard diameter specified

### APPLICATIONS

High performance DC filtering applications

### REFERENCE STANDARDS

IEC 61071  
 IEC 60068

### MARKING

C-value; tolerance; rated voltage; code for dielectric material; code for manufacturing origin; manufacturer's type designation; manufacturer's logo; year and week of manufacture

### DIELECTRIC

Polypropylene film

### ELECTRODES

Metallized dielectric capacitor

### CONSTRUCTION

Mono construction

### ENCAPSULATION

Plastic case, sealed with resin  
 Flame retardant

### TERMINALS

Tinned wires

### FEATURES

- Compliant to RoHS Directive 2002/95/EC
- AEC-Q200 qualified

### RATED CAPACITANCE

1  $\mu$ F to 400  $\mu$ F

### CAPACITANCE TOLERANCE

$\pm 5\%$

### DC VOLTAGE RATING

|                      |       |       |       |        |        |        |
|----------------------|-------|-------|-------|--------|--------|--------|
| $U_{NDC}$ at 85 °C   | 450 V | 700 V | 800 V | 900 V  | 1100 V | 1200 V |
| $U_{OPDC}$ at 70 °C  | 500 V | 800 V | 900 V | 1100 V | 1350 V | 1500 V |
| $U_{OPDC}$ at 105 °C | 300 V | 500 V | 570 V | 650 V  | 800 V  | 850 V  |

### INSULATION RESISTANCE

RC between leads, after 1 min > 10 000 s  
 For  $U_{NDC} \leq 500$  V measuring voltage 100 V  
 For  $U_{NDC} > 500$  V measuring voltage 500 V

### SELF INDUCTANCE ( $L_s$ )

< 1 nH per mm of lead spacing

### WITHSTANDING DC VOLTAGE BETWEEN TERMINALS

1.5  $U_{NDC}$  for 10 s, cut off current 10 mA, rise time  $\leq 1000$  V/s  
 See document "Voltage Proof Test for Metallized Film Capacitors" [www.vishay.com/doc?28169](http://www.vishay.com/doc?28169)

### MAXIMUM APPLICABLE PEAK TO PEAK RIPPLE VOLTAGE

0.2 x  $U_{NDC}$

### CLIMATIC TESTING CLASS

40/105/56

### RATED TEMPERATURE

85 °C

### MAXIMUM PERMISSIBLE CASE TEMPERATURE

105 °C, observing voltage derating

### LIFE TIME EXPECTANCY

Useful life time: > 100 000 h at  $U_{NDC}$  and 70 °C  
 FIT: <  $10 \times 10^{-9}/h$  (10 per  $10^9$  component h) at 0.5 x  $U_{NDC}$ ; 40 °C

### DETAIL SPECIFICATION

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

### GENERAL INFORMATION

Characteristics and definitions used for film capacitors:  
[www.vishay.com/docs/28147/intro.pdf](http://www.vishay.com/docs/28147/intro.pdf)



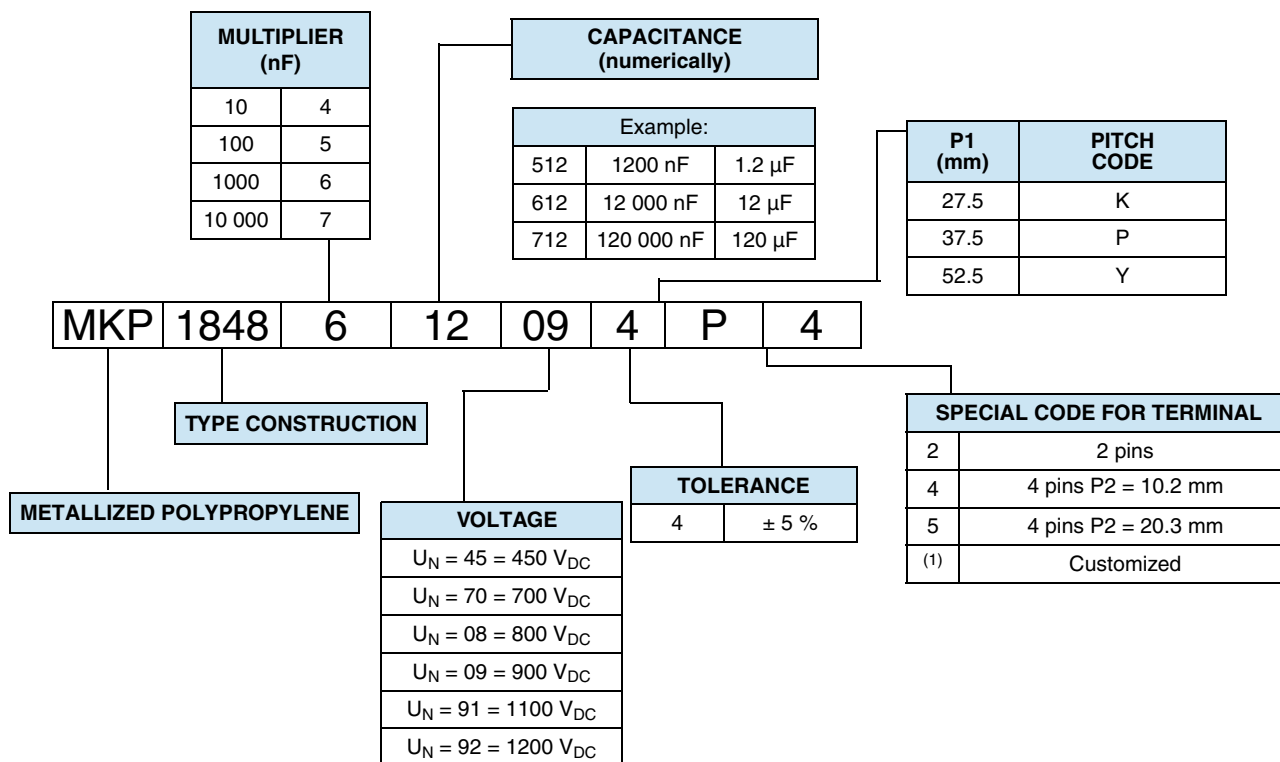
# MKP 1848 DC-Link

Vishay Roederstein

Metallized Polypropylene Film Capacitors  
DC Capacitor MKP Type



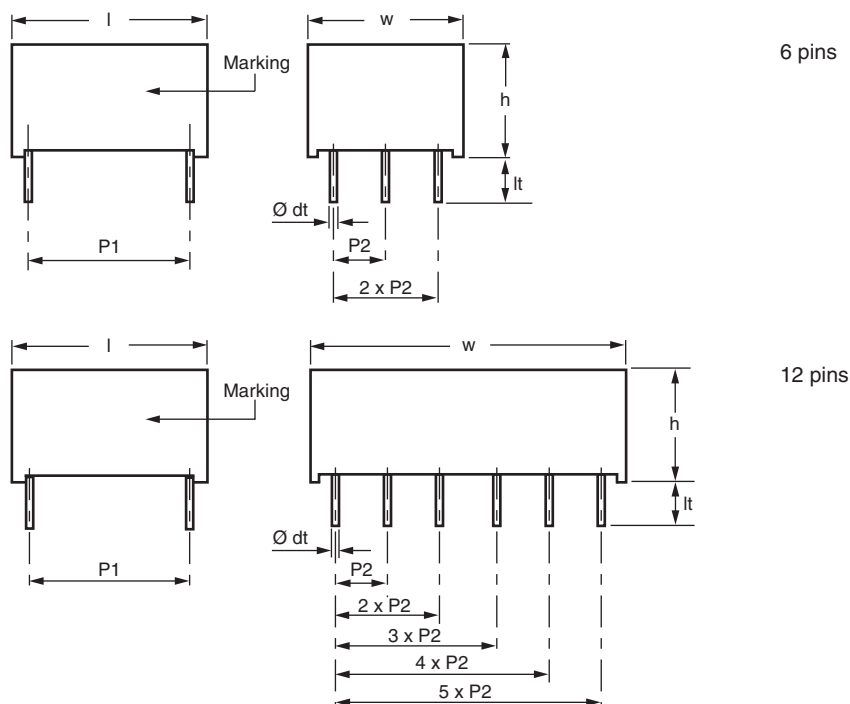
## COMPOSITION OF CATALOG NUMBER



### Note

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

## MULTIPLE PINS CAPACITORS



Metallized Polypropylene Film Capacitors  
DC Capacitor MKP Type

Vishay Roederstein

SPECIFIC REFERENCE DATA 450 V<sub>DC</sub>U<sub>NDC</sub> at 85 °C = 450 V, U<sub>OPDC</sub> at 70 °C = 500 V, U<sub>OPDC</sub> at 105 °C = 300 V

| CAP.<br>(9) | DIMENSIONS<br>(mm) (5) |      |      | P1   | P2            | Ø dt | dV/dt  | I <sub>PEAK</sub> | I <sub>RMS</sub><br>(A) (2) |        | ESR<br>(mΩ) (3) |        | tan δ<br>1 kHz<br>< (10 <sup>-4</sup> ) (4) |        | tan δ<br>10 kHz<br>< (10 <sup>-4</sup> ) (4) |        | MASS | SPQ<br>(6) | PART NUMBER (1)     |
|-------------|------------------------|------|------|------|---------------|------|--------|-------------------|-----------------------------|--------|-----------------|--------|---------------------------------------------|--------|----------------------------------------------|--------|------|------------|---------------------|
|             |                        |      |      |      |               |      |        |                   |                             |        |                 |        |                                             |        |                                              |        |      |            |                     |
| (μF)        | w                      | h    | l    | (mm) | (mm)          | (mm) | (V/μs) | (A)               | 2 pins                      | 4 pins | 2 pins          | 4 pins | 2 pins                                      | 4 pins | 2 pins                                       | 4 pins | (g)  | (pcs)      |                     |
| 1           | 9.0                    | 19.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 75                | 2.5                         | -      | 54              | -      | 10                                          | -      | 85                                           | -      | 6.0  | 160        | MKP1848510454K2     |
| 2           | 9.0                    | 19.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 150               | 3                           | -      | 34.5            | -      | 10                                          | -      | 85                                           | -      | 5.5  | 160        | MKP1848520454K2     |
| 3           | 11.0                   | 21.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 225               | 4                           | -      | 23.0            | -      | 10                                          | -      | 85                                           | -      | 8.5  | 130        | MKP1848530454K2     |
| 4           | 11.0                   | 21.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 300               | 4                           | -      | 20.5            | -      | 10                                          | -      | 85                                           | -      | 8.5  | 130        | MKP1848540454K2     |
| 5           | 13.0                   | 23.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 375               | 5                           | -      | 16.5            | -      | 10                                          | -      | 85                                           | -      | 10.5 | 115        | MKP1848550454K2     |
| 6           | 15.0                   | 25.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 450               | 6                           | -      | 13.5            | -      | 10                                          | -      | 85                                           | -      | 12.5 | 100        | MKP1848560454K2     |
| 7           | 15.0                   | 25.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 525               | 6.5                         | -      | 11.5            | -      | 10                                          | -      | 85                                           | -      | 11.5 | 100        | MKP1848570454K2     |
| 8           | 18.0                   | 28.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 600               | 8.5                         | -      | 8.5             | -      | 10                                          | -      | 85                                           | -      | 15.0 | 80         | MKP1848580454K2     |
| 9           | 18.0                   | 28.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 675               | 8.5                         | -      | 9.0             | -      | 10                                          | -      | 85                                           | -      | 16.0 | 80         | MKP1848590454K2     |
| 10          | 18.0                   | 28.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 750               | 9                           | -      | 8.0             | -      | 10                                          | -      | 85                                           | -      | 15.0 | 80         | MKP1848610454K2     |
| 12          | 21.0                   | 31.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 900               | 10                          | -      | 7.0             | -      | 10                                          | -      | 85                                           | -      | 21.5 | 65         | MKP1848612454K2     |
| 15          | 20.0                   | 35.0 | 32.0 | 27.5 | -             | 0.8  | 75     | 1125              | 11.5                        | -      | 6.0             | -      | 10                                          | -      | 85                                           | -      | 20.0 | 70         | MKP1848615454K2     |
| 10          | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 400               | 7.5                         | 8      | 13.5            | 12.0   | 18                                          | 16     | 160                                          | 140    | 34   | 105        | MKP1848610454P*     |
| 12          | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 480               | 8                           | 8.5    | 11.5            | 10.0   | 18                                          | 16     | 160                                          | 140    | 32   | 105        | MKP1848612454P*     |
| 15          | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 600               | 9                           | 10     | 9.0             | 8.0    | 18                                          | 16     | 160                                          | 140    | 30   | 105        | MKP1848615454P*     |
| 20          | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 800               | 11                          | 12     | 7.0             | 6.0    | 18                                          | 16     | 160                                          | 140    | 36   | 91         | MKP1848620454P*     |
| 22          | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 880               | 11                          | 11.5   | 7.5             | 6.5    | 18                                          | 16     | 160                                          | 140    | 38   | 91         | MKP1848622454P*     |
| 25          | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 1000              | 11.5                        | 12.5   | 6.5             | 5.5    | 18                                          | 16     | 160                                          | 140    | 36   | 91         | MKP1848625454P*     |
| 30          | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 40     | 1200              | 13.5                        | 15     | 5.5             | 4.5    | 18                                          | 16     | 160                                          | 140    | 48   | 77         | MKP1848630454P*     |
| 35          | 30.0                   | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 40     | 1400              | 17                          | 18.5   | 4.0             | 3.5    | 18                                          | 16     | 160                                          | 140    | 57   | 63         | MKP1848635454P*     |
| 40          | 30.0                   | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 40     | 1600              | 17                          | 18.5   | 4.0             | 3.5    | 18                                          | 16     | 160                                          | 140    | 60   | 63         | MKP1848640454P*     |
| 40          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 20     | 800               | 13                          | 13.5   | 6.5             | 6.0    | 35                                          | 30     | 310                                          | 280    | 66   | 55         | MKP1848640454Y*     |
| 45          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 20     | 900               | 12.5                        | 13.5   | 7.0             | 6.0    | 35                                          | 30     | 310                                          | 280    | 70   | 55         | MKP1848645454Y*     |
| 50          | 30.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1000              | 15                          | 15.5   | 5.5             | 5.0    | 35                                          | 30     | 310                                          | 280    | 88   | 45         | MKP1848650454Y*     |
| 55          | 30.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1100              | 15                          | 15.5   | 5.5             | 5.0    | 35                                          | 30     | 310                                          | 280    | 96   | 45         | MKP1848655454Y*     |
| 60          | 30.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1200              | 15.5                        | 16.5   | 5.0             | 4.5    | 35                                          | 30     | 310                                          | 280    | 91   | 45         | MKP1848660454Y*     |
| 65          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1300              | 19                          | 20.5   | 4.0             | 3.5    | 35                                          | 30     | 310                                          | 280    | 100  | 40         | MKP1848665454Y*     |
| 70          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1400              | 18                          | 19     | 4.5             | 4.0    | 35                                          | 30     | 310                                          | 280    | 112  | 40         | MKP1848670454Y*     |
| 75          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1500              | 19                          | 20.5   | 4.0             | 3.5    | 35                                          | 30     | 310                                          | 280    | 108  | 40         | MKP1848675454Y*     |
| 80          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1600              | 19                          | 20.5   | 4.0             | 3.5    | 35                                          | 30     | 310                                          | 280    | 102  | 40         | MKP1848680454Y*     |
| 90          | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1800              | -                           | 21.5   | -               | 3.0    | -                                           | 30     | -                                            | 280    | 127  | 30         | MKP1848690454Y5     |
| 95          | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1900              | -                           | 21.5   | -               | 3.0    | -                                           | 30     | -                                            | 280    | 124  | 30         | MKP1848695454Y5     |
| 100         | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 2000              | -                           | 23.5   | -               | 2.5    | -                                           | 30     | -                                            | 280    | 120  | 30         | MKP1848710454Y5     |
| 200 (10)    | 70.0                   | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 2000              | -                           | 30.5   | -               | 2.0    | -                                           | 35     | -                                            | 310    | 266  | 20         | MKP1848720454Y5 (7) |
| 400 (10)    | 130                    | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10     | 4000              | -                           | 50.5   | -               | 1.5    | -                                           | 35     | -                                            | 380    | 490  | 10         | MKP1848740454Y5 (8) |

## Notes

- (1) Change the \* symbol with special code for the terminals
- (2) Maximum RMS current at 10 kHz, + 85 °C, Δt = + 15 °C, cap. tol. ≤ ± 5 %
- (3) Equivalent series resistance typical values at 10 kHz
- (4) Maximum tan δ values
- (5) Standard dimension
- (6) SPQ = Standard Packing Quantity
- (7) 6 pins
- (8) 12 pins
- (9) Intermediate capacitance values available on request.
- (10) Under release

**SPECIFIC REFERENCE DATA 700 V<sub>DC</sub>**
U<sub>NDC</sub> at 85 °C = 700 V, U<sub>OPDC</sub> at 70 °C = 800 V, U<sub>OPDC</sub> at 105 °C = 500 V

| CAP.<br>( <sup>9</sup> ) | DIMENSIONS<br>(mm) ( <sup>5</sup> ) |      |      | P1   | P2        | Ø dt | dV/dt  | I <sub>PEAK</sub> | I <sub>RMS</sub><br>(A) ( <sup>2</sup> ) |           | ESR<br>(mΩ) ( <sup>3</sup> ) |           | tan δ<br>1 kHz<br>< (10 <sup>-4</sup> ) ( <sup>4</sup> ) |           | tan δ<br>10 kHz<br>< (10 <sup>-4</sup> ) ( <sup>4</sup> ) |           | MASS | SPQ<br>( <sup>5</sup> ) | PART NUMBER ( <sup>1</sup> )     |
|--------------------------|-------------------------------------|------|------|------|-----------|------|--------|-------------------|------------------------------------------|-----------|------------------------------|-----------|----------------------------------------------------------|-----------|-----------------------------------------------------------|-----------|------|-------------------------|----------------------------------|
|                          |                                     |      |      |      |           |      |        |                   |                                          |           |                              |           |                                                          |           |                                                           |           |      |                         |                                  |
| (μF)                     | w                                   | h    | l    | (mm) | (mm)      | (mm) | (V/μs) | (A)               | 2<br>pins                                | 4<br>pins | 2<br>pins                    | 4<br>pins | 2<br>pins                                                | 4<br>pins | 2<br>pins                                                 | 4<br>pins | (g)  | (pcs)                   |                                  |
| 1                        | 9.0                                 | 19.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 75                | 2.5                                      | -         | 54.0                         | -         | 8.0                                                      | -         | 68                                                        | -         | 6.0  | 160                     | MKP1848510704K2                  |
| 2                        | 9.0                                 | 19.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 150               | 3                                        | -         | 34.5                         | -         | 8.0                                                      | -         | 68                                                        | -         | 5.5  | 160                     | MKP1848520704K2                  |
| 3                        | 11.0                                | 21.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 225               | 4                                        | -         | 23.0                         | -         | 8.0                                                      | -         | 68                                                        | -         | 8.5  | 130                     | MKP1848530704K2                  |
| 4                        | 13.0                                | 23.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 300               | 5                                        | -         | 17.0                         | -         | 8.0                                                      | -         | 68                                                        | -         | 10.5 | 115                     | MKP1848540704K2                  |
| 5                        | 15.0                                | 25.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 375               | 6                                        | -         | 14.0                         | -         | 8.0                                                      | -         | 68                                                        | -         | 12   | 100                     | MKP1848550704K2                  |
| 6                        | 18.0                                | 28.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 450               | 7.5                                      | -         | 11.5                         | -         | 8.0                                                      | -         | 68                                                        | -         | 17   | 80                      | MKP1848560704K2                  |
| 7                        | 18.0                                | 28.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 525               | 8                                        | -         | 10.0                         | -         | 8.0                                                      | -         | 68                                                        | -         | 16   | 80                      | MKP1848570704K2                  |
| 8                        | 18.0                                | 28.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 600               | 8.5                                      | -         | 8.5                          | -         | 8.0                                                      | -         | 68                                                        | -         | 15   | 80                      | MKP1848580704K2                  |
| 9                        | 21.0                                | 31.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 675               | 10                                       | -         | 7.5                          | -         | 8.0                                                      | -         | 68                                                        | -         | 22   | 65                      | MKP1848590704K2                  |
| 10                       | 21.0                                | 31.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 750               | 10                                       | -         | 7.0                          | -         | 8.0                                                      | -         | 68                                                        | -         | 21   | 65                      | MKP1848610704K2                  |
| 12                       | 20.0                                | 35.0 | 32.0 | 27.5 | -         | 0.8  | 75     | 900               | 11.5                                     | -         | 6.0                          | -         | 8.0                                                      | -         | 68                                                        | -         | 20   | 70                      | MKP1848612704K2                  |
| 10                       | 18.5                                | 35.5 | 43.0 | 37.5 | 10.2      | 1.0  | 40     | 400               | 7.5                                      | 8         | 13.5                         | 12.0      | 15                                                       | 13        | 135                                                       | 120       | 34   | 105                     | MKP1848610704P*                  |
| 12                       | 18.5                                | 35.5 | 43.0 | 37.5 | 10.2      | 1.0  | 40     | 480               | 8                                        | 8.5       | 11.5                         | 10.0      | 15                                                       | 13        | 135                                                       | 120       | 32   | 105                     | MKP1848612704P*                  |
| 15                       | 18.5                                | 35.5 | 43.0 | 37.5 | 10.2      | 1.0  | 40     | 600               | 9                                        | 10        | 9.0                          | 8.0       | 15                                                       | 13        | 135                                                       | 120       | 30   | 105                     | MKP1848615704P*                  |
| 20                       | 21.5                                | 38.5 | 43.0 | 37.5 | 10.2      | 1.0  | 40     | 800               | 11                                       | 12        | 7.0                          | 6.0       | 15                                                       | 13        | 135                                                       | 120       | 36   | 91                      | MKP1848620704P*                  |
| 22                       | 24.0                                | 44.0 | 42.0 | 37.5 | 10.2      | 1.0  | 40     | 880               | 13                                       | 13.5      | 6.0                          | 5.5       | 15                                                       | 13        | 135                                                       | 120       | 49   | 77                      | MKP1848622704P*                  |
| 25                       | 24.0                                | 44.0 | 42.0 | 37.5 | 10.2      | 1.0  | 40     | 1000              | 13.5                                     | 14.5      | 5.5                          | 5.0       | 15                                                       | 13        | 135                                                       | 120       | 47   | 77                      | MKP1848625704P*                  |
| 30                       | 30.0                                | 45.0 | 42.0 | 37.5 | 10.2/20.3 | 1.0  | 40     | 1200              | 16                                       | 17        | 4.5                          | 4.0       | 15                                                       | 13        | 135                                                       | 120       | 62   | 63                      | MKP1848630704P*                  |
| 35                       | 30.0                                | 45.0 | 42.0 | 37.5 | 10.2/20.3 | 1.0  | 40     | 1400              | 17                                       | 18.5      | 4.0                          | 3.5       | 15                                                       | 13        | 135                                                       | 120       | 55   | 63                      | MKP1848635704P*                  |
| 30                       | 25.0                                | 45.0 | 57.5 | 52.5 | 10.2      | 1.2  | 20     | 600               | 11                                       | 12        | 9.0                          | 8.0       | 30                                                       | 25        | 270                                                       | 240       | 76   | 55                      | MKP1848630704Y*                  |
| 35                       | 25.0                                | 45.0 | 57.5 | 52.5 | 10.2      | 1.2  | 20     | 700               | 12                                       | 12.5      | 7.5                          | 7.0       | 30                                                       | 25        | 270                                                       | 240       | 71   | 55                      | MKP1848635704Y*                  |
| 40                       | 25.0                                | 45.0 | 57.5 | 52.5 | 10.2      | 1.2  | 20     | 800               | 13                                       | 13.5      | 6.5                          | 6.0       | 30                                                       | 25        | 270                                                       | 240       | 66   | 55                      | MKP1848640704Y*                  |
| 45                       | 30.0                                | 45.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 900               | 14.5                                     | 15        | 6.0                          | 5.5       | 30                                                       | 25        | 270                                                       | 240       | 95   | 45                      | MKP1848645704Y*                  |
| 50                       | 30.0                                | 45.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1000              | 15                                       | 15.5      | 5.5                          | 5.0       | 30                                                       | 25        | 270                                                       | 240       | 88   | 45                      | MKP1848650704Y*                  |
| 55                       | 35.0                                | 50.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1100              | 17                                       | 18        | 5.0                          | 4.5       | 30                                                       | 25        | 270                                                       | 240       | 112  | 40                      | MKP1848655704Y*                  |
| 60                       | 35.0                                | 50.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1200              | 18                                       | 19        | 4.5                          | 4.0       | 30                                                       | 25        | 270                                                       | 240       | 107  | 40                      | MKP1848660704Y*                  |
| 65                       | 35.0                                | 50.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1300              | 19                                       | 20.5      | 4.0                          | 3.5       | 30                                                       | 25        | 270                                                       | 240       | 100  | 40                      | MKP1848665704Y*                  |
| 70                       | 45.0                                | 45.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1400              | -                                        | 20        | -                            | 3.5       | -                                                        | 25        | -                                                         | 240       | 128  | 30                      | MKP1848670704Y5                  |
| 75                       | 45.0                                | 45.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1500              | -                                        | 21.5      | -                            | 3.0       | -                                                        | 25        | -                                                         | 240       | 123  | 30                      | MKP1848675704Y5                  |
| 80                       | 45.0                                | 45.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 1600              | -                                        | 21.5      | -                            | 3.0       | -                                                        | 25        | -                                                         | 240       | 119  | 30                      | MKP1848680704Y5                  |
| 160 ( <sup>10</sup> )    | 70.0                                | 65.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 3200              | -                                        | 30.5      | -                            | 2.5       | -                                                        | 28        | -                                                         | 280       | 264  | 20                      | MKP1848716704Y5 ( <sup>7</sup> ) |
| 320 ( <sup>10</sup> )    | 130.0                               | 65.0 | 57.5 | 52.5 | 20.3      | 1.2  | 20     | 6400              | -                                        | 54        | -                            | 1.3       | -                                                        | 28        | -                                                         | 280       | 359  | 10                      | MKP1848732704Y5 ( <sup>8</sup> ) |

**Notes**

- (1) Change the \* symbol with special code for the terminals
- (2) Maximum RMS current at 10 kHz, + 85 °C, Δt = + 15 °C, cap. tol. ≤ ± 5 %
- (3) Equivalent series resistance typical values at 10 kHz
- (4) Maximum tan δ values
- (5) Standard dimension
- (6) SPQ = Standard Packing Quantity
- (7) 6 pins
- (8) 12 pins
- (9) Intermediate capacitance values available on request.
- (10) Under release

**SPECIFIC REFERENCE DATA 800 V<sub>DC</sub>**U<sub>NDC</sub> at 85 °C = 800 V, U<sub>OPDC</sub> at 70 °C = 900 V, U<sub>OPDC</sub> at 105 °C = 570 V

| CAP.<br>(9)         | DIMENSIONS<br>(mm) <sup>(5)</sup> |      |      | P1   | P2            | Ø dt | dU/dt | I <sub>PEAK</sub> | I <sub>RMS</sub><br>(A) <sup>(2)</sup> |      | ESR<br>(mΩ) <sup>(3)</sup> |      | tan δ<br>1 kHz<br>< (10 <sup>-4</sup> ) <sup>(4)</sup> |     | tan δ<br>10 kHz<br>< (10 <sup>-4</sup> ) <sup>(4)</sup> |        | MASS | SPQ<br>(5) | PART NUMBER (1)                |
|---------------------|-----------------------------------|------|------|------|---------------|------|-------|-------------------|----------------------------------------|------|----------------------------|------|--------------------------------------------------------|-----|---------------------------------------------------------|--------|------|------------|--------------------------------|
|                     | (µF)                              | w    | h    |      |               |      |       |                   | l                                      | (mm) | (mm)                       | (mm) | (V/µs)                                                 | (A) | 2 pins                                                  | 4 pins |      |            |                                |
| 1                   | 9.0                               | 19.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 75                | 2                                      | -    | 62.5                       | -    | 7.0                                                    | -   | 60                                                      | -      | 6.5  | 160        | MKP1848510084K2                |
| 2                   | 11.0                              | 21.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 150               | 3.5                                    | -    | 31.0                       | -    | 7.0                                                    | -   | 60                                                      | -      | 9.0  | 130        | MKP1848520084K2                |
| 3                   | 13.0                              | 23.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 225               | 4.5                                    | -    | 21.0                       | -    | 7.0                                                    | -   | 60                                                      | -      | 11   | 115        | MKP1848530084K2                |
| 4                   | 15.0                              | 25.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 300               | 5.5                                    | -    | 15.5                       | -    | 7.0                                                    | -   | 60                                                      | -      | 12   | 100        | MKP1848540084K2                |
| 5                   | 18.0                              | 28.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 375               | 7                                      | -    | 12.5                       | -    | 7.0                                                    | -   | 60                                                      | -      | 17   | 80         | MKP1848550084K2                |
| 6                   | 18.0                              | 28.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 450               | 7.5                                    | -    | 10.5                       | -    | 7.0                                                    | -   | 60                                                      | -      | 16   | 80         | MKP1848560084K2                |
| 7                   | 21.0                              | 31.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 525               | 9                                      | -    | 9.0                        | -    | 7.0                                                    | -   | 60                                                      | -      | 23   | 65         | MKP1848570084K2                |
| 8                   | 21.0                              | 31.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 600               | 9.5                                    | -    | 8.0                        | -    | 7.0                                                    | -   | 60                                                      | -      | 21   | 65         | MKP1848580084K2                |
| 9                   | 20.0                              | 35.0 | 32.0 | 27.5 | -             | 0.8  | 75    | 675               | 10                                     | -    | 8.0                        | -    | 7.0                                                    | -   | 60                                                      | -      | 21   | 70         | MKP1848590084K2                |
| 10                  | 18.5                              | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40    | 400               | 8                                      | 8.5  | 12.5                       | 11.0 | 14                                                     | 12  | 122                                                     | 110    | 32   | 105        | MKP1848610084P*                |
| 12                  | 18.5                              | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40    | 480               | 8.5                                    | 9    | 10.5                       | 9.0  | 14                                                     | 12  | 122                                                     | 110    | 30   | 105        | MKP1848612084P*                |
| 15                  | 21.5                              | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40    | 600               | 10                                     | 11   | 8.5                        | 7.5  | 14                                                     | 12  | 122                                                     | 110    | 37   | 91         | MKP1848615084P*                |
| 20                  | 24.0                              | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 40    | 800               | 13 pins                                | 13.5 | 6.0                        | 5.5  | 14                                                     | 12  | 122                                                     | 110    | 47   | 77         | MKP1848620084P*                |
| 22                  | 30.0                              | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 40    | 880               | 14.5                                   | 15.5 | 5.5                        | 5.0  | 14                                                     | 12  | 122                                                     | 110    | 65   | 63         | MKP1848622084P*                |
| 25                  | 30.0                              | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 40    | 1000              | 15.5                                   | 16   | 5.0                        | 4.5  | 14                                                     | 12  | 122                                                     | 110    | 61   | 63         | MKP1848625084P*                |
| 30                  | 25.0                              | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 10    | 300               | 12                                     | 12   | 8.0                        | 7.5  | 25                                                     | 22  | 240                                                     | 215    | 69   | 55         | MKP1848630084Y*                |
| 35                  | 30.0                              | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 350               | 13                                     | 14.5 | 7.0                        | 6.0  | 25                                                     | 22  | 240                                                     | 215    | 97   | 45         | MKP1848635084Y*                |
| 40                  | 30.0                              | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 400               | 14.5                                   | 15   | 6.0                        | 5.5  | 25                                                     | 22  | 240                                                     | 215    | 91   | 45         | MKP1848640084Y*                |
| 45                  | 35.0                              | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 450               | 16                                     | 17   | 5.5                        | 5.0  | 25                                                     | 22  | 240                                                     | 215    | 112  | 40         | MKP1848645084Y*                |
| 50                  | 35.0                              | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 500               | 17                                     | 18   | 5.0                        | 4.5  | 25                                                     | 22  | 240                                                     | 215    | 104  | 40         | MKP1848650084Y*                |
| 55                  | 45.0                              | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 550               | -                                      | 18.5 | -                          | 4.0  | -                                                      | 22  | -                                                       | 215    | 131  | 30         | MKP1848655084Y5                |
| 60                  | 45.0                              | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 600               | -                                      | 20   | -                          | 3.5  | -                                                      | 22  | -                                                       | 215    | 125  | 30         | MKP1848660084Y5                |
| 120 <sup>(10)</sup> | 70.0                              | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 1600              | -                                      | 27   | -                          | 3.2  | -                                                      | 22  | -                                                       | 215    | 276  | 20         | MKP1848712084Y5 <sup>(7)</sup> |
| 240 <sup>(10)</sup> | 130.0                             | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 10    | 3200              | -                                      | 48.5 | -                          | 1.6  | -                                                      | 22  | -                                                       | 215    | 393  | 10         | MKP1848724084Y5 <sup>(8)</sup> |

**Notes**

- (1) Change the \* symbol with special code for the terminals  
(2) Maximum RMS current at 10 kHz, + 85 °C, Δt = + 15 °C, cap. tol. ≤ ± 5 %  
(3) Equivalent series resistance typical values at 10 kHz  
(4) Maximum tan δ values  
(5) Standard dimension  
(6) SPQ = Standard Packing Quantity  
(7) 6 pins  
(8) 12 pins  
(9) Intermediate capacitance values available on request.  
(10) Under release

**SPECIFIC REFERENCE DATA 900 V<sub>DC</sub>**
U<sub>NDC</sub> at 85 °C = 900 V, U<sub>OPDC</sub> at 70 °C = 1100 V, U<sub>OPDC</sub> at 105 °C = 650 V

| CAP.<br>(9) | DIMENSIONS<br>(mm) (5) |      |      | P1   | P2            | Ø dt | dV/dt  | I <sub>PEAK</sub> | I <sub>RMS</sub><br>(A) (2) |        | ESR<br>(mΩ) (3) |        | tan δ<br>1 kHz<br>< (10 <sup>-4</sup> ) (4) |        | tan δ<br>10 kHz<br>< (10 <sup>-4</sup> ) (4) |        | MASS | SPQ<br>(5) | PART NUMBER (1)     |
|-------------|------------------------|------|------|------|---------------|------|--------|-------------------|-----------------------------|--------|-----------------|--------|---------------------------------------------|--------|----------------------------------------------|--------|------|------------|---------------------|
|             |                        |      |      |      |               |      |        |                   |                             |        |                 |        |                                             |        |                                              |        |      |            |                     |
| (μF)        | w                      | h    | l    | (mm) | (mm)          | (mm) | (V/μs) | (A)               | 2 pins                      | 4 pins | 2 pins          | 4 pins | 2 pins                                      | 4 pins | 2 pins                                       | 4 pins | (g)  | (pcs)      |                     |
| 1           | 9.0                    | 19.0 | 32.0 | 27.5 | -             | 0.8  | 40     | 40                | 2                           | -      | 63.0            | -      | 7.0                                         | -      | 50                                           | -      | 6.0  | 160        | MKP1848510094K2     |
| 2           | 13.0                   | 23.0 | 32.0 | 27.5 | -             | 0.8  | 80     | 160               | 3.5                         | -      | 32.0            | -      | 7.0                                         | -      | 50                                           | -      | 11.0 | 115        | MKP1848520094K2     |
| 3           | 15.0                   | 25.0 | 32.0 | 27.5 | -             | 0.8  | 80     | 240               | 5                           | -      | 21.0            | -      | 7.0                                         | -      | 50                                           | -      | 12.0 | 100        | MKP1848530094K2     |
| 4           | 18.0                   | 28.0 | 32.0 | 27.5 | -             | 0.8  | 80     | 320               | 6                           | -      | 16.0            | -      | 7.0                                         | -      | 50                                           | -      | 16.5 | 80         | MKP1848540094K2     |
| 5           | 21.0                   | 31.0 | 32.0 | 27.5 | -             | 0.8  | 80     | 400               | 7.5                         | -      | 13.0            | -      | 7.0                                         | -      | 50                                           | -      | 22.5 | 65         | MKP1848550094K2     |
| 6           | 21.0                   | 31.0 | 32.0 | 27.5 | -             | 0.8  | 80     | 480               | 8.5                         | -      | 10.0            | -      | 7.0                                         | -      | 50                                           | -      | 21.0 | 65         | MKP1848560094K2     |
| 7           | 20.0                   | 35.0 | 32.0 | 27.5 | -             | 0.8  | 80     | 560               | 9                           | -      | 9.0             | -      | 7.0                                         | -      | 50                                           | -      | 21.0 | 70         | MKP1848570094K2     |
| 5           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 20     | 100               | 6                           | 6.5    | 21.0            | 19.0   | 12                                          | 10     | 100                                          | 90     | 32   | 105        | MKP1848550094P*     |
| 6           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 240               | 6.5                         | 7      | 18.0            | 16.0   | 12                                          | 10     | 100                                          | 90     | 30   | 105        | MKP1848560094P*     |
| 7           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 280               | 6.5                         | 7      | 18.0            | 16.0   | 12                                          | 10     | 100                                          | 90     | 33   | 105        | MKP1848570094P*     |
| 8           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 320               | 7                           | 7.5    | 16.0            | 14.0   | 12                                          | 10     | 100                                          | 90     | 31   | 105        | MKP1848580094P*     |
| 9           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 360               | 7.5                         | 8      | 14.0            | 12.0   | 12                                          | 10     | 100                                          | 90     | 30   | 105        | MKP1848590094P*     |
| 10          | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 400               | 8.5                         | 9      | 12.0            | 11.0   | 12                                          | 10     | 100                                          | 90     | 39   | 91         | MKP1848610094P*     |
| 12          | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 40     | 480               | 9.5                         | 10     | 10.0            | 9.0    | 12                                          | 10     | 100                                          | 90     | 36   | 91         | MKP1848612094P*     |
| 15          | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 40     | 600               | 11                          | 12     | 8.0             | 7.0    | 12                                          | 10     | 100                                          | 90     | 47   | 77         | MKP1848615094P*     |
| 16          | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 40     | 640               | 11                          | 12     | 8.0             | 7.0    | 12                                          | 10     | 100                                          | 90     | 45   | 77         | MKP1848616094P*     |
| 20          | 30.0                   | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 40     | 800               | 14                          | 15.5   | 6.0             | 5.0    | 12                                          | 10     | 100                                          | 90     | 57   | 63         | MKP1848620094P*     |
| 15          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 20     | 300               | 9                           | 9.5    | 14.0            | 12.0   | 25                                          | 20     | 200                                          | 185    | 70   | 55         | MKP1848615094Y*     |
| 20          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 20     | 400               | 9.5                         | 10     | 12.0            | 11.0   | 25                                          | 20     | 200                                          | 185    | 73   | 55         | MKP1848620094Y*     |
| 22          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 20     | 440               | 10                          | 10.5   | 11.0            | 10.0   | 25                                          | 20     | 200                                          | 185    | 70   | 55         | MKP1848622094Y*     |
| 25          | 30.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 500               | 11                          | 11.5   | 10.0            | 9.0    | 25                                          | 20     | 200                                          | 185    | 98   | 45         | MKP1848625094Y*     |
| 30          | 30.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 600               | 12.5                        | 13     | 8.0             | 7.0    | 25                                          | 20     | 200                                          | 185    | 89   | 45         | MKP1848630094Y*     |
| 35          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 700               | 14.5                        | 15.5   | 7.0             | 6.0    | 25                                          | 20     | 200                                          | 185    | 109  | 40         | MKP1848635094Y*     |
| 40          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 800               | 15.5                        | 17     | 6.0             | 5.0    | 25                                          | 20     | 200                                          | 185    | 99   | 40         | MKP1848640094Y*     |
| 45          | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 900               | -                           | 16.5   | -               | 5.0    | -                                           | 20     | -                                            | 185    | 124  | 30         | MKP1848645094Y5     |
| 50          | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 1000              | -                           | 18.5   | -               | 4.0    | -                                           | 20     | -                                            | 185    | 117  | 30         | MKP1848650094Y5     |
| 100 (10)    | 70.0                   | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 2000              | -                           | 26.5   | -               | 3.3    | -                                           | 22     | -                                            | 205    | 259  | 20         | MKP1848710094Y5 (7) |
| 200 (10)    | 130.0                  | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 20     | 4000              | -                           | 48.5   | -               | 1.6    | -                                           | 22     | -                                            | 205    | 608  | 10         | MKP1848720094Y5 (8) |

**Notes**

- (1) Change the \* symbol with special code for the terminals  
(2) Maximum RMS current at 10 kHz, + 85 °C, Δt = + 15 °C, cap. tol. ≤ ± 5 %  
(3) Equivalent series resistance typical values at 10 kHz  
(4) Maximum tan δ values  
(5) Standard dimension  
(6) SPQ = Standard Packing Quantity  
(7) 6 pins  
(8) 12 pins  
(9) Intermediate capacitance values available on request.  
(10) Under release

**SPECIFIC REFERENCE DATA 1100 V<sub>DC</sub>**U<sub>NDC</sub> at 85 °C = 1100 V, U<sub>OPDC</sub> at 70 °C = 1350 V, U<sub>OPDC</sub> at 105 °C = 800 V

| CAP.<br>(9) | DIMENSIONS<br>(mm) (5) |      |      | P1   | P2            | Ø dt | dV/dt | I <sub>PEAK</sub> | I <sub>RMS</sub><br>(A) (2) |        | ESR<br>(mΩ) (3) |        | tan δ<br>1 kHz<br>< (10 <sup>-4</sup> ) (4) |        | tan δ<br>10 kHz<br>< (10 <sup>-4</sup> ) (4) |        | MASS<br>(g) | SPQ<br>(5) | PART NUMBER (1)     |
|-------------|------------------------|------|------|------|---------------|------|-------|-------------------|-----------------------------|--------|-----------------|--------|---------------------------------------------|--------|----------------------------------------------|--------|-------------|------------|---------------------|
|             | (µF)                   | w    | h    |      |               |      |       |                   | 2 pins                      | 4 pins | 2 pins          | 4 pins | 2 pins                                      | 4 pins | 2 pins                                       | 4 pins |             |            |                     |
| 1           | 11.0                   | 21.0 | 32.0 | 27.5 | -             | 0.8  | 95    | 95                | 3                           | -      | 45.5            | -      | 6.0                                         | -      | 45                                           | -      | 9.0         | 130        | MKP1848510914K2     |
| 2           | 15.0                   | 25.0 | 32.0 | 27.5 | -             | 0.8  | 95    | 190               | 4.5                         | -      | 23.0            | -      | 6.0                                         | -      | 45                                           | -      | 12.0        | 100        | MKP1848520914K2     |
| 3           | 18.0                   | 28.0 | 32.0 | 27.5 | -             | 0.8  | 95    | 285               | 6                           | -      | 15.5            | -      | 6.0                                         | -      | 45                                           | -      | 16.0        | 80         | MKP1848530914K2     |
| 4           | 21.0                   | 31.0 | 32.0 | 27.5 | -             | 0.8  | 95    | 380               | 8                           | -      | 11.5            | -      | 6.0                                         | -      | 45                                           | -      | 21.5        | 65         | MKP1848540914K2     |
| 5           | 20.0                   | 35.0 | 32.0 | 27.5 | -             | 0.8  | 95    | 475               | 9                           | -      | 9.5             | -      | 6.0                                         | -      | 45                                           | -      | 21.5        | 65         | MKP1848550914K2     |
| 5           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 45    | 225               | 6.5                         | 7      | 18.0            | 16.0   | 10                                          | 8.5    | 90                                           | 80     | 33          | 105        | MKP1848550914P*     |
| 6           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 45    | 270               | 7                           | 7.5    | 15.0            | 13.5   | 10                                          | 8.5    | 90                                           | 80     | 30          | 105        | MKP1848560914P*     |
| 7           | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 45    | 315               | 8                           | 8.5    | 13.0            | 11.5   | 10                                          | 8.5    | 90                                           | 80     | 39          | 91         | MKP1848570914P*     |
| 8           | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 45    | 360               | 9                           | 9.5    | 11.0            | 10.0   | 10                                          | 8.5    | 90                                           | 80     | 37          | 91         | MKP1848580914P*     |
| 9           | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 45    | 405               | 10                          | 10.5   | 10.0            | 9.0    | 10                                          | 8.5    | 90                                           | 80     | 50          | 77         | MKP1848590914P*     |
| 10          | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 45    | 450               | 10.5                        | 11     | 9.0             | 8.0    | 10                                          | 8.5    | 90                                           | 80     | 48          | 77         | MKP1848610914P*     |
| 12          | 30.0                   | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 45    | 540               | 12.5                        | 13.5   | 7.5             | 6.5    | 10                                          | 8.5    | 90                                           | 80     | 63          | 63         | MKP1848612914P*     |
| 10          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 23    | 230               | 8                           | 8.5    | 18.0            | 16.0   | 20                                          | 17     | 175                                          | 155    | 81          | 55         | MKP1848610914Y*     |
| 12          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 23    | 276               | 8.5                         | 9      | 15.0            | 13.0   | 20                                          | 17     | 175                                          | 155    | 77          | 55         | MKP1848612914Y*     |
| 15          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 23    | 345               | 9.5                         | 10.5   | 12.0            | 10.5   | 20                                          | 17     | 175                                          | 155    | 70          | 55         | MKP1848615914Y*     |
| 20          | 30.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 460               | 11.5                        | 12.5   | 9.0             | 8.0    | 20                                          | 17     | 175                                          | 155    | 91          | 45         | MKP1848620914Y*     |
| 22          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 506               | 13.5                        | 14.5   | 8.0             | 7.0    | 20                                          | 17     | 175                                          | 155    | 115         | 40         | MKP1848622914Y*     |
| 25          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 575               | 14.5                        | 15     | 7.0             | 6.5    | 20                                          | 17     | 175                                          | 155    | 108         | 40         | MKP1848625914Y*     |
| 30          | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 690               | -                           | 16.5   | -               | 5.0    | -                                           | 17     | -                                            | 155    | 126         | 30         | MKP1848630914Y5     |
| 60 (10)     | 70.0                   | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 1380              | -                           | 40     | -               | 2.5    | -                                           | 18     | -                                            | 180    | 256         | 20         | MKP1848660914Y5 (7) |
| 70 (10)     | 70.0                   | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 1610              | -                           | 34.5   | -               | 2.0    | -                                           | 18     | -                                            | 180    | 257         | 20         | MKP1848670914Y5 (7) |
| 120 (10)    | 130.0                  | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 2760              | -                           | 39.5   | -               | 2.4    | -                                           | 18     | -                                            | 180    | 606         | 10         | MKP1848712914Y5 (8) |
| 140 (10)    | 130.0                  | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 23    | 3220              | -                           | 43.5   | -               | 2      | -                                           | 18     | -                                            | 180    | 608         | 10         | MKP1848714914Y5 (8) |

**Notes**

- (1) Change the \* symbol with special code for the terminals  
(2) Maximum RMS current at 10 kHz, + 85 °C, Δt = + 15 °C, cap. tol. ≤ ± 5 %  
(3) Equivalent series resistance typical values at 10 kHz  
(4) Maximum tan δ values  
(5) Standard dimension  
(6) SPQ = Standard Packing Quantity  
(7) 6 pins  
(8) 12 pins  
(9) Intermediate capacitance values available on request.  
(10) Under release



**SPECIFIC REFERENCE DATA 1200 V<sub>DC</sub>**
U<sub>NDC</sub> at 85 °C = 1200 V, U<sub>OPDC</sub> at 70 °C = 1500 V, U<sub>OPDC</sub> at 105 °C = 850 V

| CAP.<br>(9) | DIMENSIONS<br>(mm) (5) |      |      | P1   | P2            | Ø dt | dV/dt | I <sub>PEAK</sub> | I <sub>RMS</sub><br>(A) (2) |        | ESR<br>(mΩ) (3) |        | tan δ<br>1 kHz<br>< (10 <sup>-4</sup> ) (4) |        | tan δ<br>10 kHz<br>< (10 <sup>-4</sup> ) (4) |        | MASS | SPQ<br>(5) | PART NUMBER (1)     |
|-------------|------------------------|------|------|------|---------------|------|-------|-------------------|-----------------------------|--------|-----------------|--------|---------------------------------------------|--------|----------------------------------------------|--------|------|------------|---------------------|
|             | (µF)                   | w    | h    |      |               |      |       |                   | 2 pins                      | 4 pins | 2 pins          | 4 pins | 2 pins                                      | 4 pins | 2 pins                                       | 4 pins |      |            |                     |
| 1           | 11.0                   | 21.0 | 32.0 | 27.5 | -             | 0.8  | 100   | 100               | 3                           | -      | 43.0            | -      | 6.0                                         | -      | 40                                           | -      | 9.0  | 130        | MKP1848510924K2     |
| 2           | 15.0                   | 25.0 | 32.0 | 27.5 | -             | 0.8  | 100   | 200               | 5                           | -      | 21.5            | -      | 6.0                                         | -      | 40                                           | -      | 11.5 | 100        | MKP1848520924K2     |
| 3           | 18.0                   | 28.0 | 32.0 | 27.5 | -             | 0.8  | 100   | 300               | 6.5                         | -      | 14.5            | -      | 6.0                                         | -      | 40                                           | -      | 15.0 | 80         | MKP1848530924K2     |
| 4           | 21.0                   | 31.0 | 32.0 | 27.5 | -             | 0.8  | 100   | 400               | 8                           | -      | 11.0            | -      | 6.0                                         | -      | 40                                           | -      | 20.0 | 65         | MKP1848540924K2     |
| 5           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 48    | 240               | 6.5                         | 7      | 17.0            | 15.0   | 10                                          | 8.5    | 80                                           | 70     | 31   | 105        | MKP1848550924P*     |
| 6           | 18.5                   | 35.5 | 43.0 | 37.5 | 10.2          | 1.0  | 48    | 288               | 7.5                         | 8      | 14.0            | 12.5   | 10                                          | 8.5    | 80                                           | 70     | 29   | 105        | MKP1848560924P*     |
| 7           | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 48    | 336               | 8.5                         | 9      | 12.0            | 11.0   | 10                                          | 8.5    | 80                                           | 70     | 37   | 91         | MKP1848570924P*     |
| 8           | 21.5                   | 38.5 | 43.0 | 37.5 | 10.2          | 1.0  | 48    | 384               | 9                           | 9.5    | 10.5            | 9.5    | 10                                          | 8.5    | 80                                           | 70     | 35   | 91         | MKP1848580924P*     |
| 9           | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 48    | 432               | 10.5                        | 11     | 9.5             | 8.5    | 10                                          | 8.5    | 80                                           | 70     | 48   | 77         | MKP1848590924P*     |
| 10          | 24.0                   | 44.0 | 42.0 | 37.5 | 10.2          | 1.0  | 48    | 480               | 11                          | 11.5   | 8.5             | 7.5    | 10                                          | 8.5    | 80                                           | 70     | 45   | 77         | MKP1848610924P*     |
| 12          | 30.0                   | 45.0 | 42.0 | 37.5 | 10.2/<br>20.3 | 1.0  | 48    | 576               | 13                          | 13.5   | 7.0             | 6.5    | 10                                          | 8.5    | 80                                           | 70     | 60   | 63         | MKP1848612924P*     |
| 10          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 24    | 240               | 8                           | 8.5    | 17.0            | 15.0   | 18                                          | 16     | 165                                          | 150    | 79   | 55         | MKP1848610924Y*     |
| 12          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 24    | 288               | 9                           | 9.5    | 14.0            | 12.5   | 18                                          | 16     | 165                                          | 150    | 74   | 55         | MKP1848612924Y*     |
| 15          | 25.0                   | 45.0 | 57.5 | 52.5 | 10.2          | 1.2  | 24    | 360               | 10                          | 10.5   | 11.0            | 10.0   | 18                                          | 16     | 165                                          | 150    | 67   | 55         | MKP1848615924Y*     |
| 20          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 24    | 480               | 13                          | 14     | 8.5             | 7.5    | 18                                          | 16     | 165                                          | 150    | 115  | 40         | MKP1848620924Y*     |
| 22          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 24    | 528               | 14                          | 14.5   | 7.5             | 7.0    | 18                                          | 16     | 165                                          | 150    | 109  | 40         | MKP1848622924Y*     |
| 25          | 35.0                   | 50.0 | 57.5 | 52.5 | 20.3          | 1.2  | 24    | 600               | 15                          | 15.5   | 6.5             | 6.0    | 18                                          | 16     | 165                                          | 150    | 100  | 40         | MKP1848625924Y*     |
| 30          | 45.0                   | 45.0 | 57.5 | 52.5 | 20.3          | 1.2  | 24    | 720               | -                           | 16.5   | -               | 5.0    | -                                           | 16     | -                                            | 150    | 119  | 30         | MKP1848630924Y5     |
| 60 (10)     | 70.0                   | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 24    | 1440              | -                           | 23     | -               | 4.5    | -                                           | 17     | -                                            | 170    | 264  | 20         | MKP1848660924Y5 (7) |
| 120 (10)    | 130.0                  | 65.0 | 57.5 | 52.5 | 20.3          | 1.2  | 24    | 2280              | -                           | 40.5   | -               | 2.3    | -                                           | 17     | -                                            | 170    | 612  | 10         | MKP1848712924Y5 (8) |

**Notes**

- (1) Change the \* symbol with special code for the terminals  
(2) Maximum RMS current at 10 kHz, + 85 °C, Δt = + 15 °C, cap. tol. ≤ ± 5 %  
(3) Equivalent series resistance typical values at 10 kHz  
(4) Maximum tan δ values  
(5) Standard dimension  
(6) SPQ = Standard Packing Quantity  
(7) 6 pins  
(8) 12 pins  
(9) Intermediate capacitance values available on request.  
(10) Under release



## 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.

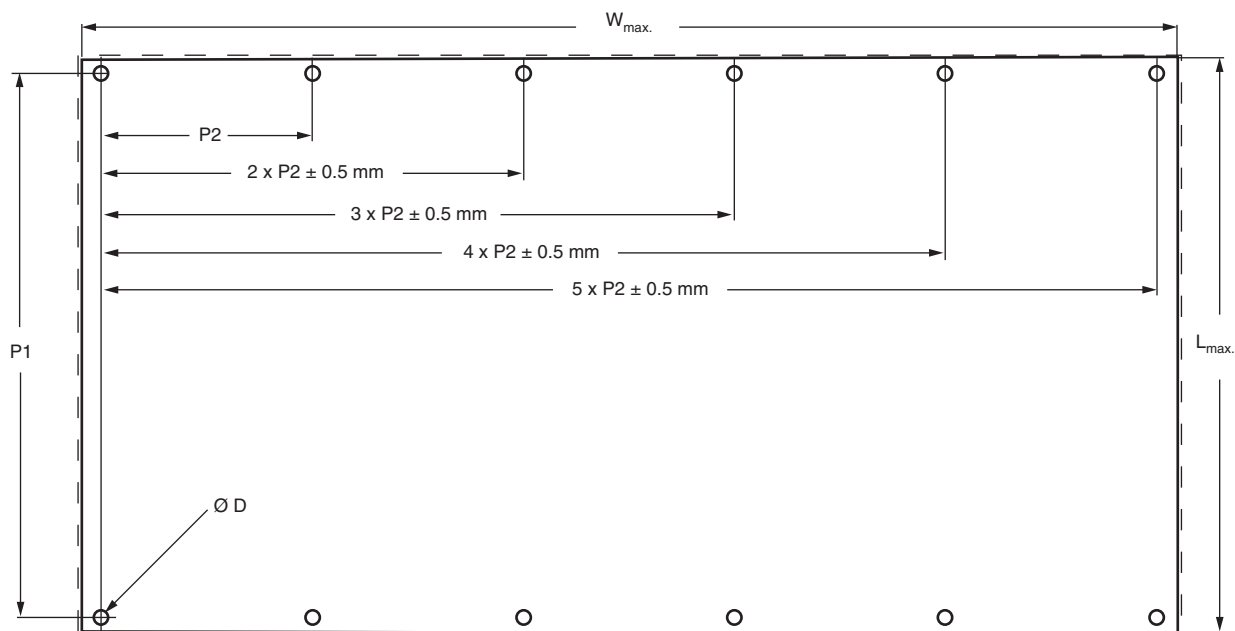
In order to withstand vibration and shock tests, it must be insured that the stand-off pips are in good contact with the printed circuit board.

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

### Space Requirements on Printed-Circuit Board

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

- Product height with seating plane as given by "IEC 60717" as reference:



| P1 (mm) | L <sub>max.</sub> (mm) | W <sub>max.</sub> (mm) | Ø D (mm) | H (mm)  |
|---------|------------------------|------------------------|----------|---------|
| 27.5    | l + 1.6                | w + 2.0                | 1.2      | h + 0.2 |
| 37.5    | l + 2.0                | w + 3.0                | 1.5      | h + 0.5 |
| 52.5    | l + 2.4                | w + 4.0                | 1.7      | h + 0.5 |

## SOLDERING CONDITIONS

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

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

### Storage Temperature

- Storage temperature: T<sub>stg</sub> = - 25 °C to + 40 °C with RH maximum 80 % without condensation.

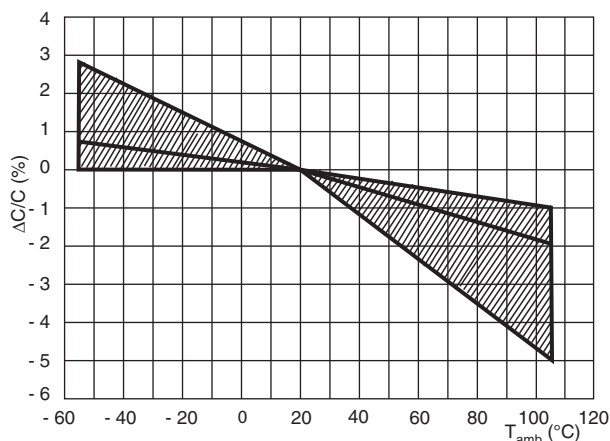
### Ratings and Characteristics Reference Conditions

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 %.

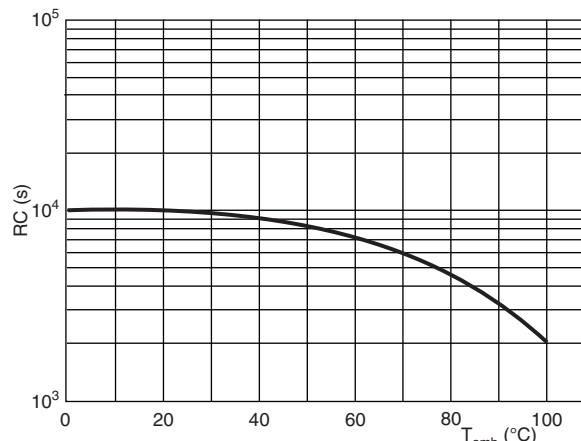
For reference testing, a conditioning period shall be applied over 96 h ± 4 h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.

## CHARACTERISTICS

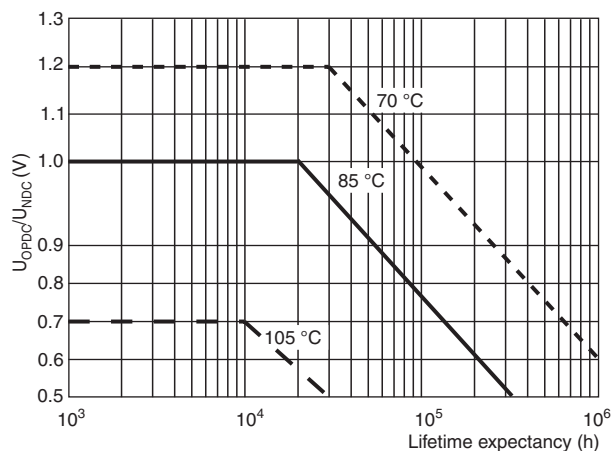
Capacitance (typical curve)



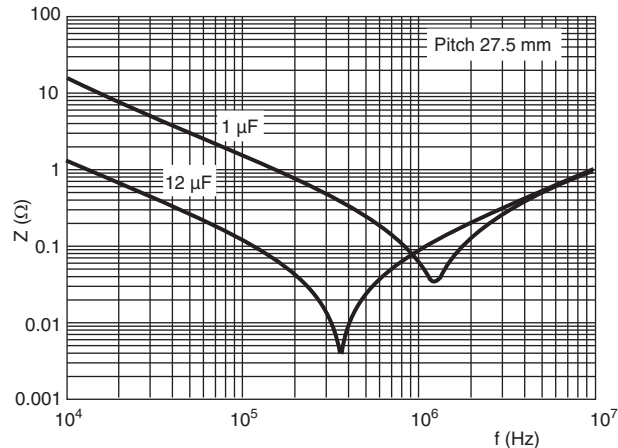
Insulation resistance (typical curve)



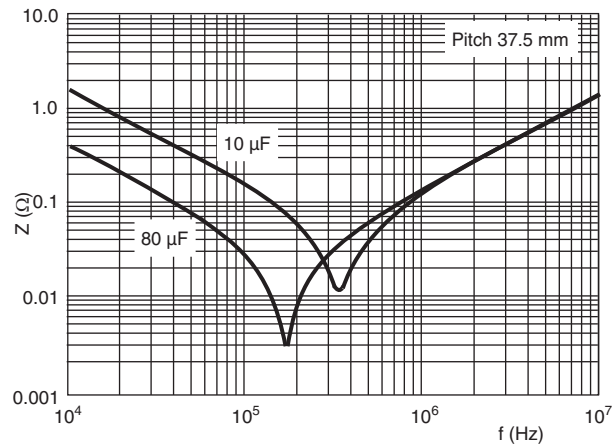
Lifetime expectancy (typical curve)



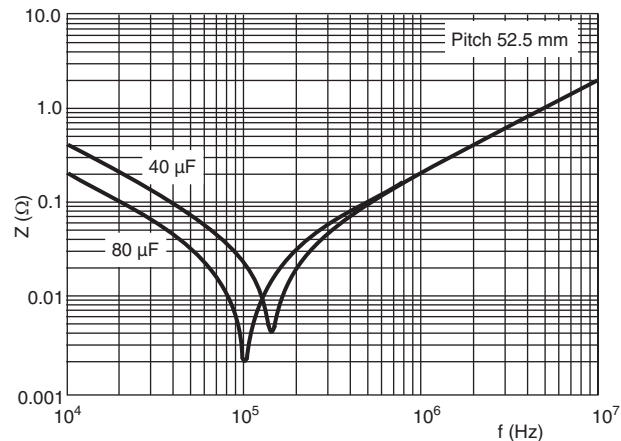
Impedance vs. frequency (typical curve)



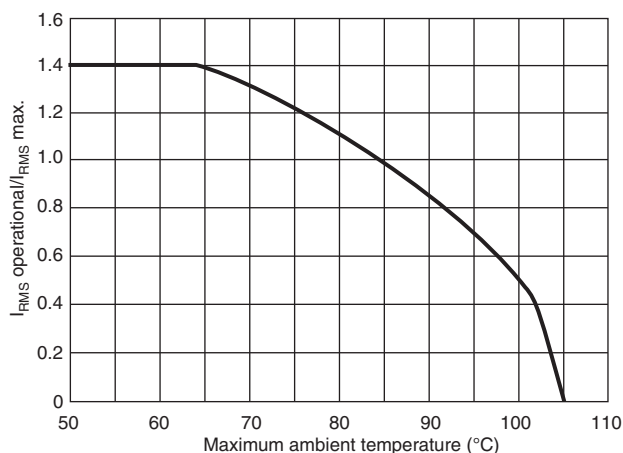
Impedance vs. frequency (typical curve)



Impedance vs. frequency (typical curve)



Maximum  $I_{RMS}$  current in function of the ambient temperature



### HEAT CONDUCTIVITY

| DIMENSIONS (mm) |      |      | HEAT CONDUCTIVITY (mW/°C) |
|-----------------|------|------|---------------------------|
| w               | h    | l    |                           |
| 9.0             | 19.0 | 32.0 | 24                        |
| 11.0            | 21.0 | 32.0 | 28                        |
| 13.0            | 23.0 | 32.0 | 32                        |
| 15.0            | 25.0 | 32.0 | 36                        |
| 18.0            | 28.0 | 32.0 | 44                        |
| 21.0            | 31.0 | 32.0 | 51                        |
| 21.0            | 35.0 | 32.0 | 56                        |
| 18.5            | 35.5 | 43.0 | 54                        |
| 21.5            | 38.5 | 43.0 | 61                        |
| 24.0            | 44.0 | 42.0 | 70                        |
| 30.0            | 45.0 | 42.0 | 81                        |
| 25.0            | 45.0 | 57.5 | 77                        |
| 30.0            | 45.0 | 57.5 | 85                        |
| 35.0            | 50.0 | 57.5 | 100                       |
| 45.0            | 45.0 | 57.5 | 94                        |
| 70.0            | 65.0 | 57.5 | 152                       |
| 130.0           | 65.0 | 57.5 | 243                       |

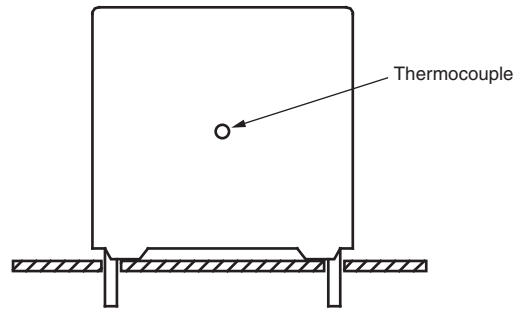
### Power Dissipation and Maximum Component Temperature Rise

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  $\Delta T = P/G$ :

- $\Delta T = T_C - T_{amb}$  = case temperature rise (°C) with a maximum of 15 °C at rated temperature.
- $P = I_{RMS}^2 \times ESR$  = power dissipation of the component (mW)
- $G$  = heat conductivity of the component (mW/°C)

## MEASURING THE COMPONENT TEMPERATURE



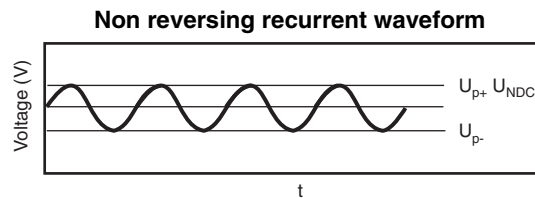
The case temperature is measured in unloaded ( $T_{amb}$ ) and maximum loaded condition ( $T_C$ ). To avoid thermal radiation or convection, the capacitor must be tested in a closed area from air circulation.

## APPLICATION NOTE AND LIMITING CONDITIONS

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

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

- The continuous peak voltage ( $U_{P+}$ ) shall not exceed the rated DC voltage rating ( $U_{NDC}$ )
- The peak-to-peak ripple voltage ( $U_{PP}$ ) shall not be greater than  $0.2 \times (U_{NDC})$



- For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: [dc-film@vishay.com](mailto:dc-film@vishay.com)
- The voltage peak slope ( $dU/dt$ ) shall not exceed the pulse slope at the DC voltage rating. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by  $U_{NDC}$  and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

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

T is the pulse duration



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Vishay Roederstein

The capacitor unit may be subjected to the following surge without any significant reduction of lifetime expectancy

| REPETITIVE SURGE VOLTAGE | MAXIMUM DURATION PER DAY |
|--------------------------|--------------------------|
| 1.1 x U <sub>NDC</sub>   | 30 % on load duration    |
| 1.15 x U <sub>NDC</sub>  | 30 min                   |
| 1.2 x U <sub>NDC</sub>   | 5 min                    |
| 1.3 x U <sub>NDC</sub>   | 1 min                    |
| 1.5 x U <sub>NDC</sub>   | 110 ms                   |

## General Notes

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

| SUB-CLAUSE NUMBER AND TEST                           | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                  | PERFORMANCE REQUIREMENTS                                                                                    |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>ROUTINE TEST-FINAL INSPECTION</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                             |
| 5.14.2.1 External inspection, visual examination     |                                                                                                                                                                                                                                                                                                                                                                                                             | Legible marking as specified                                                                                |
| 5.14.2.2 Dimensions                                  |                                                                                                                                                                                                                                                                                                                                                                                                             | See specification drawing                                                                                   |
| 5.3.1 Capacitance                                    | 1 kHz at room temperature                                                                                                                                                                                                                                                                                                                                                                                   | See specific reference data                                                                                 |
| 5.3.2 $\tan \delta$                                  | 1 kHz at room temperature<br>10 kHz at room temperature                                                                                                                                                                                                                                                                                                                                                     | See specific reference data                                                                                 |
| 5.5.1.2 Voltage test between terminal                | 1.5 x $U_{NDC}$ at $T_{amb}$<br>Duration 10 s                                                                                                                                                                                                                                                                                                                                                               | No visible damage or puncture<br>No flashover                                                               |
| 5.7 Insulation resistance                            | $U_{NDC} \leq 500$ V measuring voltage 100 V at room temperature<br>$U_{NDC} > 500$ V measuring voltage 500 V at room temperature<br>Duration 1 min                                                                                                                                                                                                                                                         | See specific reference data                                                                                 |
| <b>TYPE TESTS</b>                                    |                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                             |
| 5.14.2 External inspection                           | Check for finish, marking and overall dimensions                                                                                                                                                                                                                                                                                                                                                            | Legible marking and finish as specified                                                                     |
| 5.14.0 Initial measurements                          | Capacitance at 1 kHz<br>$\tan \delta$ at 10 kHz                                                                                                                                                                                                                                                                                                                                                             | Dimensions: see specific drawing                                                                            |
| 5.14.1.1.4 Robustness of terminations IEC 60068-2-21 | Tensile $U_{a1}$<br>Wire diameter      section      load<br>$\leq 0.8$ mm $\leq 0.5$ mm <sup>2</sup> 10 N<br>$\leq 1.25$ mm $\leq 1.2$ mm <sup>2</sup> 20 N<br>Duration 10 s $\pm$ 1 s<br><br>Bending $U_b$ method 1<br>Wire diameter      section      load<br>$\leq 0.8$ mm $\leq 0.05$ mm <sup>3</sup> 10 N<br>$\leq 1.25$ mm $\leq 0.019$ mm <sup>3</sup> 20 N<br>4 x 90 °,<br>Duration 2 s to 3 s/bend |                                                                                                             |
| 5.14.1.6 Resistance to soldering heat IEC 60068-2-20 | No predrying, Method 1A<br>Solder bath: 260 °C<br>Duration 10 s $\pm$ 1 s                                                                                                                                                                                                                                                                                                                                   |                                                                                                             |
| 5.14.4 Final measurements                            | Capacitance<br>$\tan \delta$                                                                                                                                                                                                                                                                                                                                                                                | $ \Delta C/C  \leq 0.5$ %<br>Increase of $\tan \delta \leq 0.0050$<br>Compared to values measured in 5.14.0 |

| SUB-CLAUSE NUMBER AND TEST                                                                                                                               | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                 | PERFORMANCE REQUIREMENTS                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.14.0 Initial measurements<br><br>5.14.3.1 Vibration<br>IEC 60068-2-6<br><br>5.14.3.2 Shock or impact<br>IEC 60068-2-6<br><br>5.14.4 Final measurements | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br><br>10 Hz to 55 Hz: amplitude $\pm 0.35$ mm or<br>acceleration $98 \text{ m/s}^2$<br><br>Test duration: 10 frequency cycles, 3 axes<br>offset from each other by $90^\circ$<br>1 octave/min<br>Visual examination<br><br>Pulse shape: half sine<br>Acceleration: $490 \text{ m/s}^2$<br>Duration t of pulse: 11 ms<br>Visual examination | No visible damage<br><br>No visible damage<br><br>$ \Delta C/C  \leq 0.5 \%$<br>Increase of tan $\delta \leq 0.0050$<br>Compared to values measured in 5.14.0 |
| 5.5.3.1 Initial measurements<br><br>5.5.3.2 Voltage test between terminal<br><br>5.5.3.3 Final measurements                                              | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br>R insulation<br><br>$1.5 \times U_{\text{NDC}}$ at $T_{\text{amb}}$<br>Duration 60 s<br><br>Capacitance<br>tan $\delta$<br>R insulation                                                                                                                                                                                                  | $ \Delta C/C  \leq 0.5 \%$<br>Increase of tan $\delta \leq 1.2$ initial tan $\delta + 0.0001$<br>R insulation $\geq 50 \%$ of specified values                |
| 5.9.1 Initial measurements<br><br>5.9.2 Surge discharge test<br><br>5.9.3 Voltage test between terminal<br><br>5.9.3 Final measurements                  | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br><br>$1.1 \times U_{\text{NDC}}$<br>Number of discharges: 5<br>Time lapse: every 2 min (10 min total)<br><br>Within 5 min after the surge discharge test<br>Duration 60 s<br>$1.5 \times U_{\text{NDC}}$ at $T_{\text{amb}}$<br><br>Capacitance<br>tan $\delta$ at 10 kHz                                                                 | $ \Delta C/C  \leq 1.0 \%$<br>tan $\delta \leq 1.2$ initial tan $\delta + 0.0001$<br>Compared to values measured in 5.9.1                                     |
| 5.11.1 Initial measurements<br><br>5.11.2 Self healing test<br><br><br><br>5.11.3 Final measurements                                                     | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br><br>$1.5 \times U_{\text{NDC}}$<br>Duration 10 s<br>Number of clearings $\leq 5$<br>Clearing = voltage drop of 5 %<br>increase the voltage at 100 V/s till 5<br>clearings occur<br>with a max. of $2.5 \times U_{\text{NDC}}$<br>for a duration of 10 s<br><br>Capacitance<br>tan $\delta$                                               | $ \Delta C/C  \leq 0.5 \%$<br>tan $\delta \leq 1.2 \times$ initial tan $\delta + 0.0001$<br>Compared to values measured in 5.11.1                             |
| 5.13.0 Initial measurements<br><br>5.13.1 Change of temperature acc. to<br>IEC 60068-2-14<br><br>5.13.2 Damp heat steady state<br>Acc. to IEC 60068-2-78 | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br><br>Test Nb<br>$T_{\text{max.}} = 85^\circ \text{C}$<br>$T_{\text{min.}} = -40^\circ \text{C}$<br>Transition time: 1 h, equivalent to $1^\circ \text{C/min}$<br><br>Test Ca<br>$T_{\text{max.}} = 40 \pm 2^\circ \text{C}$<br>RH = $93 \pm 3 \%$<br>Duration 56 days                                                                     |                                                                                                                                                               |



| SUB-CLAUSE NUMBER AND TEST                                                                                                                                                     | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PERFORMANCE REQUIREMENTS                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.5.3.2 Voltage test between terminal<br><br>5.13.3 Final measurements                                                                                                         | 1.5 x $U_{NDC}$ at ambient temperature<br>Duration 60 s<br><br>Visual examination<br><br>Capacitance<br>tan $\delta$ at 1 $U_{RMS}$ 10 kHz                                                                                                                                                                                                                                                                                                                             | No puncturing or flashover<br>Self healing punctures are permitted<br>$ \Delta C/C  \leq 2.0 \%$<br>Increase of tan $\delta \leq 0.0150$<br>Compared to values measured in 5.13.0      |
| 5.10.0 Initial measurements<br><br>5.10.1 Thermal stability test under overload conditions<br><br><br><br><br><br>5.10.2 Final measurements                                    | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br><br>Natural cooling $T_{amb} \pm 5^\circ C$<br>$1.21 \times P_{max.} = (U_2/2) \times W_2 \times C \times \tan \delta =$<br>$121 \times (I_{max.}^2 / W_2 \times c) \times \tan \delta_2$ with $W_2 = 2 \times p \times f_2$ for $I_{max.}$ (see specific reference data)<br>$f_2 = 10$ kHz<br>Duration 48 h<br><br>Measure the temperature every 1.5 h during the last 6 h<br>Capacitance<br>tan $\delta$ at 10 kHz | <br><br><br><br><br><br>temperature rise $< 1^\circ C$<br>$ \Delta C/C  \leq 2 \%$<br>Increase of tan $\delta \leq 1.2 \times \text{initial } \delta + 0.0150$                         |
| 5.12 Resonance frequency measurement                                                                                                                                           | Impedance analyser at $T_{amb}$                                                                                                                                                                                                                                                                                                                                                                                                                                        | $< 0.9$ times the value as specified in typical curve "Resonant frequency" of this specification                                                                                       |
| 5.10.0 Initial measurements<br><br>5.15.1 Endurance test between terminals<br><br><br><br><br><br><br><br><br><br>5.15.2 Final measurements                                    | Capacitance at 1 kHz<br>tan $\delta$ at 10 kHz<br><br>Sequence<br>1.4 x $U_{NDC}$ at $T_{max.} = 85^\circ C$<br>1.4 x $U_{OPDC}$ at $105^\circ C$<br>Duration 250 h<br>1000 x discharge at 1.4 x I (maximum repetitive peak current in continuous operation)<br>1.4 x $U_{NDC}$ at $T_{max.} = 85^\circ C$<br>1.4 x $U_{OPDC}$ at $105^\circ C$<br>Duration 250 h<br>Capacitance<br>tan $\delta$                                                                       | <br><br><br><br><br><br><br><br><br><br>$ \Delta C/C  \leq 3 \%$<br>Increase of tan $\delta \leq 0.0150$<br>Compared to values measured in 5.15.0                                      |
| 5.16.3.0 Initial measurements<br><br>5.16.3.1 Destruction test sequence<br>High DC voltage test<br><br><br><br><br>High AC voltage test<br><br><br>5.16.3.2 Final measurements | Capacitance at 1 kHz<br>at $T_{max.} = 85^\circ C$<br>Product enveloped with chees cloth 3 x $U_{NDC}$ or DC voltage<br>Until repetitive product healings occur<br>Duration = 15 min<br><br>$AC_{RMS} \text{ voltage} = U_{NDC} \times 2 \sqrt{2}$<br>with minimum of 250 $V_{AC}$<br>Duration = 5 min<br>Repeat destruction sequence 3 x<br>Visual examination                                                                                                        | <br><br><br><br><br><br><br><br><br><br>Audible healings or check healings with oscilloscope<br><br><br><br><br><br>No puncturing or flashover<br>Self healing punctures are permitted |





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