

THB Metallized Polypropylene DC-Link Film Capacitor

85 °C / 85 % RH 1000 h at U_{NDC} - Vishay Automotive Grade



LINKS TO ADDITIONAL RESOURCES



FEATURES

- High robustness under high humidity
- THB 85 °C, 85 % RH, 1000 h at rated U_{NDC}
- AEC-Q200 qualified, revision D at $T_{max.} = 85$ °C ($T_{max.} = 105$ °C available on request)
- High ripple current capability, low ESR, low ESL
- Mounting: radial
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

HALOGEN
FREE
GREEN
(5-2008)

APPLICATIONS

- Ideal for out-of-doors applications or in other harsh environments
- Renewable energies inverters
- UPS
- Battery chargers
- Motor drives

QUICK REFERENCE DATA

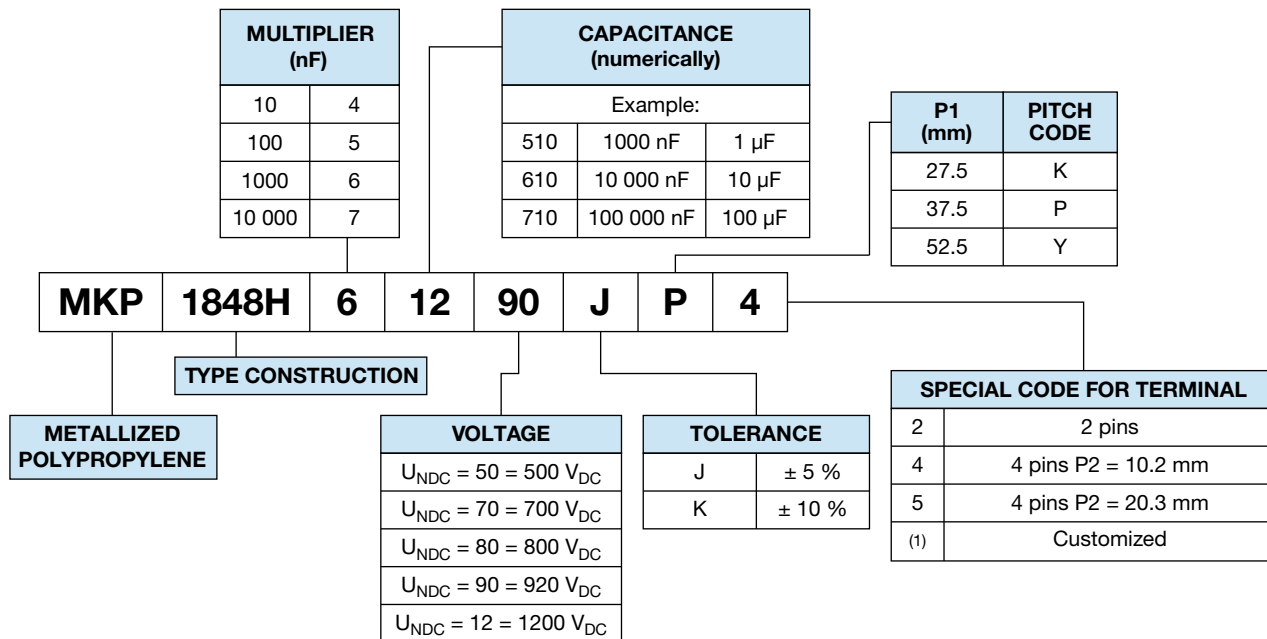
| | |
|--|---|
| Rated capacitance range | 1 µF to 80 µF |
| Capacitance tolerance | ± 5 %, ± 10 % |
| Climatic testing class | 40 / 085 / 56 |
| Rated temperature | 85 °C |
| Maximum permissible case temperature | 105 °C, observing voltage derating |
| Maximum applicable peak to peak ripple voltage | 0.2 x U_{NDC} |
| Reference standards | IEC 61071, IEC 60068 |
| Dielectric | Polypropylene film |
| Electrodes | Metallized dielectric capacitor |
| Construction | Mono construction |
| Encapsulation | Plastic case sealed with resin; flame retardant UL 94 V-0 |
| Terminals | Tinned wire |
| Self inductance (L_S) | < 1 nH per mm of lead spacing |
| Withstanding DC voltage between terminals ⁽¹⁾ | 1.5 U_{NDC} for 10 s, cut off current 10 mA, rise time ≤ 1000 V/s |
| Insulation resistance | RC between leads, after 1 min > 10 000 s, measuring voltage: 500 V |
| Life time expectancy ⁽²⁾ | Useful life time: > 100 000 h at U_{NDC} and 70 °C FIT: < 10 x 10 ⁻⁹ /h (10 per 10 ⁹ component h) at 0.5 x U_{NDC} , 40 °C |
| Marking | Manufacturer's name; C-value; tolerance; rated voltage; manufacturer's type designation; code for dielectric material, manufacturer location, year and week |

Notes

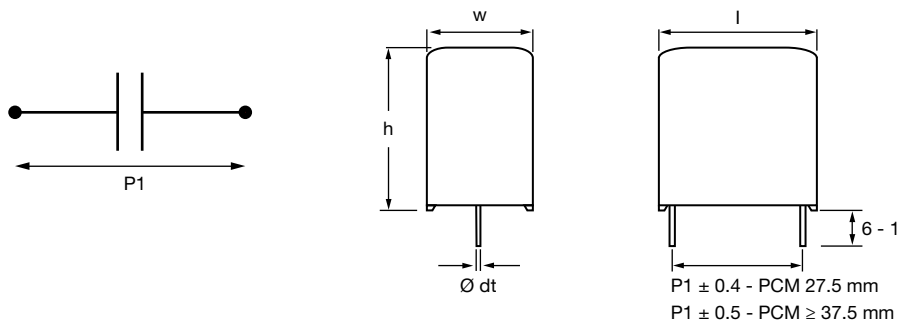
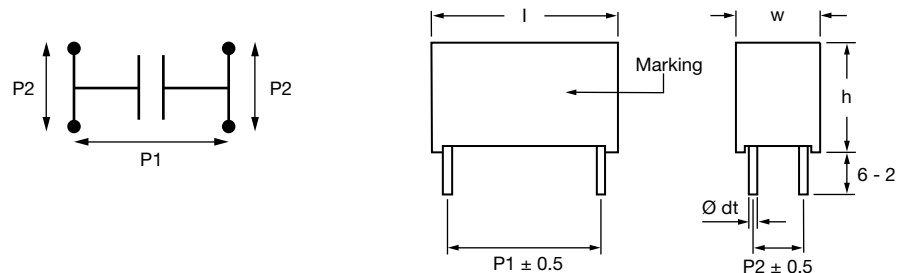
- For more detailed data and test requirements, contact dc-film@vishay.com
 - For general information like characteristics and definitions used for film capacitors follow the link: www.vishay.com/doc?28147
- ⁽¹⁾ See document "Voltage Proof Test for Metallized Film Capacitors" (www.vishay.com/doc?28169)
- ⁽²⁾ Statements about life time results from calculations which are based on internal tests. They have to be understood exclusively as estimations. Also due to external factors, the life time in the field application may deviate from the calculated life time

DC VOLTAGE RATINGS

| | | | | | |
|----------------------|-------|-------|-------|--------|--------|
| U_{NDC} at 85 °C | 500 V | 700 V | 800 V | 920 V | 1200 V |
| U_{OPDC} at 70 °C | 600 V | 800 V | 960 V | 1100 V | 1440 V |
| U_{OPDC} at 105 °C | 350 V | 450 V | 560 V | 650 V | 850 V |

COMPOSITION OF CATALOG NUMBER

Note

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

DIMENSIONS in millimeters
2 PINS

4 PINS

Note

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



ELECTRICAL DATA AND ORDERING CODE

| U _{ND} C AT 85 °C (V) | CAP. (μF) | DIMENSION ⁽⁵⁾ (mm) | | | P1 (mm) | P2 (mm) | du/dt (V/μs) | I _{PEAK} (A) | I _{RMS} ⁽²⁾ (A) | | ESR ⁽³⁾ 10 kHz (mΩ) | | tan δ ⁽⁴⁾ 10 kHz < (x 10 ⁻⁴) | | ORDERING CODE ⁽¹⁾ |
|---|---|----------------------------------|------|------|------------|-------------|-----------------|--------------------------|--|-----------|--------------------------------------|-----------|---|-----------|------------------------------|
| | | w | h | l | | | | | 2 PINS | 4 PINS | 2 PINS | 4 PINS | 2 PINS | 4 PINS | |
| | | | | | | | | | | | | | | | |
| 500 | U _{OPDC} AT 70 °C = 600 V; U _{OPDC} AT 105 °C = 350 V | | | | | | | | | | | | | | |
| | 5 | 15.0 | 25.0 | 32.0 | 27.5 | - | 40 | 200 | 7.0 | - | 10.1 | - | 65 | - | MKP1848H55050+K2 |
| | 6 | 15.0 | 25.0 | 32.0 | 27.5 | - | 40 | 240 | 7.6 | - | 8.6 | - | 65 | - | MKP1848H56050+K2 |
| | 7 | 18.0 | 28.0 | 32.0 | 27.5 | - | 40 | 280 | 8.8 | - | 7.6 | - | 65 | - | MKP1848H57050+K2 |
| | 8 | 18.0 | 28.0 | 32.0 | 27.5 | - | 40 | 320 | 9.3 | - | 6.8 | - | 65 | - | MKP1848H58050+K2 |
| | 10 | 21.0 | 31.0 | 32.0 | 27.5 | - | 40 | 400 | 11.0 | - | 5.7 | - | 65 | - | MKP1848H61050+K2 |
| | 12 | 21.0 | 31.0 | 32.0 | 27.5 | - | 40 | 480 | 11.7 | - | 5.0 | - | 65 | - | MKP1848H61250+K2 |
| | 15 | 22.0 | 38.0 | 32.0 | 27.5 | - | 40 | 600 | 13.9 | - | 4.3 | - | 65 | - | MKP1848H61550+K2 |
| | 20 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 20 | 400 | 13.6 | 14.4 | 5.3 | 4.8 | 145 | 130 | MKP1848H62050+P* |
| | 22 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 20 | 440 | 14.1 | 14.8 | 5.0 | 4.5 | 145 | 130 | MKP1848H62250+P* |
| | 25 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 20 | 500 | 14.7 | 15.5 | 4.6 | 4.1 | 145 | 130 | MKP1848H62550+P* |
| | 30 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 20 | 600 | 18.1 | 19.1 | 4.1 | 3.7 | 145 | 130 | MKP1848H63050+P* |
| | 35 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 20 | 700 | 18.9 | 19.9 | 3.8 | 3.4 | 145 | 130 | MKP1848H63550+P* |
| | 40 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 20 | 800 | 19.6 | 20.7 | 3.5 | 3.2 | 145 | 130 | MKP1848H64050+P* |
| | 45 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 20 | 900 | 20.2 | 21.3 | 3.3 | 3.0 | 145 | 130 | MKP1848H64550+P* |
| | 50 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 10 | 500 | 20.9 | 22.0 | 3.9 | 3.5 | 250 | 225 | MKP1848H65050+Y* |
| | 55 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 10 | 550 | 21.2 | 22.3 | 3.8 | 3.4 | 250 | 225 | MKP1848H65550+Y* |
| | 60 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 10 | 600 | 21.4 | 22.5 | 3.7 | 3.3 | 250 | 225 | MKP1848H66050+Y* |
| | 65 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 10 | 650 | 21.6 | 22.7 | 3.6 | 3.3 | 250 | 225 | MKP1848H66550+Y* |
| | 70 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 10 | 700 | 23.5 | 24.8 | 3.6 | 3.2 | 250 | 225 | MKP1848H67050+Y* |
| | 75 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 10 | 750 | 23.6 | 24.9 | 3.5 | 3.2 | 250 | 225 | MKP1848H67550+Y* |
| | 80 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 10 | 800 | 23.8 | 25.1 | 3.5 | 3.2 | 250 | 225 | MKP1848H68050+Y* |
| 700 | U _{OPDC} AT 70 °C = 800 V; U _{OPDC} AT 105 °C = 450 V | | | | | | | | | | | | | | |
| | 4 | 15.0 | 25.0 | 32.0 | 27.5 | - | 50 | 200 | 7.0 | - | 10.0 | - | 55 | - | MKP1848H54070+K2 |
| | 5 | 18.0 | 28.0 | 32.0 | 27.5 | - | 50 | 250 | 8.4 | - | 8.2 | - | 55 | - | MKP1848H55070+K2 |
| | 6 | 18.0 | 28.0 | 32.0 | 27.5 | - | 50 | 300 | 9.1 | - | 7.0 | - | 55 | - | MKP1848H56070+K2 |
| | 7 | 21.0 | 31.0 | 32.0 | 27.5 | - | 50 | 350 | 10.6 | - | 6.2 | - | 55 | - | MKP1848H57070+K2 |
| | 8 | 21.0 | 31.0 | 32.0 | 27.5 | - | 50 | 400 | 11.1 | - | 5.6 | - | 55 | - | MKP1848H58070+K2 |
| | 10 | 22.0 | 38.0 | 32.0 | 27.5 | - | 50 | 500 | 13.3 | - | 4.7 | - | 55 | - | MKP1848H61070+K2 |
| | 12 | 22.0 | 38.0 | 32.0 | 27.5 | - | 50 | 600 | 14.2 | - | 4.1 | - | 55 | - | MKP1848H61270+K2 |
| | 15 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 25 | 375 | 14.6 | 15.3 | 4.7 | 4.2 | 100 | 90 | MKP1848H61570+P* |
| | 20 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 25 | 500 | 15.6 | 16.5 | 4.0 | 3.6 | 100 | 90 | MKP1848H62070+P* |
| | 22 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 25 | 550 | 18.7 | 19.7 | 3.9 | 3.5 | 100 | 90 | MKP1848H62270+P* |
| | 25 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 25 | 625 | 19.2 | 20.2 | 3.7 | 3.3 | 100 | 90 | MKP1848H62570+P* |
| | 30 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 25 | 750 | 19.9 | 21.0 | 3.4 | 3.1 | 100 | 90 | MKP1848H63070+P* |
| | 35 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 12 | 420 | 19.7 | 20.8 | 4.3 | 3.9 | 215 | 195 | MKP1848H63570+Y* |
| | 40 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 12 | 480 | 20.1 | 21.2 | 4.2 | 3.8 | 215 | 195 | MKP1848H64070+Y* |
| | 45 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 12 | 540 | 20.5 | 21.6 | 4.0 | 3.6 | 215 | 195 | MKP1848H64570+Y* |
| | 50 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 12 | 600 | 22.4 | 23.6 | 3.9 | 3.5 | 215 | 195 | MKP1848H65070+Y* |
| | 55 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 12 | 660 | 22.7 | 23.9 | 3.9 | 3.5 | 215 | 195 | MKP1848H65570+Y* |
| | 60 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 12 | 720 | 22.9 | 24.1 | 3.8 | 3.4 | 215 | 195 | MKP1848H66070+Y* |



ELECTRICAL DATA AND ORDERING CODE

| U _{ND} C AT 85 °C (V) | CAP. (μF) | DIMENSION ⁽⁵⁾ (mm) | | | P1 (mm) | P2 (mm) | du/dt (V/μs) | I _{PEAK} (A) | I _{RMS} ⁽²⁾ (A) | | ESR ⁽³⁾ 10 kHz (mΩ) | | tan δ ⁽⁴⁾ 10 kHz < (x 10 ⁻⁴) | | ORDERING CODE ⁽¹⁾ |
|---|--|----------------------------------|------|------|------------|-------------|-----------------|--------------------------|--|-----------|--------------------------------------|-----------|---|------------------|------------------------------|
| | | w | h | l | | | | | 2 PINS | 4 PINS | 2 PINS | 4 PINS | 2 PINS | 4 PINS | |
| | | | | | | | | | | | | | | | |
| 800 | U _{OPDC} AT 70 °C = 960 V; U _{OPDC} AT 105 °C = 560 V | | | | | | | | | | | | | | |
| | 3 | 15.0 | 25.0 | 32.0 | 27.5 | - | 60 | 180 | 6.3 | - | 12.3 | - | 50 | - | MKP1848H53080+K2 |
| | 4 | 18.0 | 28.0 | 32.0 | 27.5 | - | 60 | 240 | 7.7 | - | 9.8 | - | 50 | - | MKP1848H54080+K2 |
| | 5 | 21.0 | 31.0 | 32.0 | 27.5 | - | 60 | 300 | 9.1 | - | 8.4 | - | 50 | - | MKP1848H55080+K2 |
| | 6 | 21.0 | 31.0 | 32.0 | 27.5 | - | 60 | 360 | 9.7 | - | 7.4 | - | 50 | - | MKP1848H56080+K2 |
| | 7 | 21.0 | 31.0 | 32.0 | 27.5 | - | 60 | 420 | 10.1 | - | 6.7 | - | 50 | - | MKP1848H57080+K2 |
| | 8 | 22.0 | 38.0 | 32.0 | 27.5 | - | 60 | 480 | 11.6 | - | 6.2 | - | 50 | - | MKP1848H58080+K2 |
| | 10 | 22.0 | 38.0 | 32.0 | 27.5 | - | 60 | 600 | 12.3 | - | 5.4 | - | 50 | - | MKP1848H61080+K2 |
| | 12 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 30 | 360 | 11.8 | 12.5 | 7.1 | 6.4 | 100 | 90 | MKP1848H61280+P* |
| | 15 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 30 | 450 | 12.8 | 13.5 | 6.1 | 5.5 | 100 | 90 | MKP1848H61580+P* |
| | 20 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 30 | 600 | 16.3 | 17.2 | 5.1 | 4.6 | 100 | 90 | MKP1848H62080+P* |
| | 22 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 30 | 660 | 16.8 | 17.7 | 4.8 | 4.3 | 100 | 90 | MKP1848H62280+P* |
| | 25 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 30 | 750 | 17.4 | 18.3 | 4.5 | 4.0 | 100 | 90 | MKP1848H62580+P* |
| | 30 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 15 | 450 | 17.4 | 18.3 | 5.6 | 5.0 | 210 | 190 | MKP1848H63080+Y* |
| | 35 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 15 | 525 | 18.3 | 19.3 | 5.0 | 4.5 | 210 | 190 | MKP1848H63580+Y* |
| 40 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 15 | 600 | 20.7 | 21.8 | 4.6 | 4.2 | 210 | 190 | MKP1848H64080+Y* | |
| 45 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 15 | 675 | 21.5 | 22.7 | 4.3 | 3.9 | 210 | 190 | MKP1848H64580+Y* | |
| 50 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 15 | 750 | 22.2 | 23.4 | 4.0 | 3.6 | 210 | 190 | MKP1848H65080+Y* | |
| 920 | U _{OPDC} AT 70 °C = 1100 V; U _{OPDC} AT 105 °C = 650 V | | | | | | | | | | | | | | |
| | 2 | 15.0 | 25.0 | 32.0 | 27.5 | - | 65 | 130 | 5.7 | - | 15.2 | - | 40 | - | MKP1848H52090+K2 |
| | 3 | 18.0 | 28.0 | 32.0 | 27.5 | - | 65 | 195 | 7.4 | - | 10.8 | - | 40 | - | MKP1848H53090+K2 |
| | 4 | 18.0 | 28.0 | 32.0 | 27.5 | - | 65 | 260 | 8.3 | - | 8.5 | - | 40 | - | MKP1848H54090+K2 |
| | 5 | 21.0 | 31.0 | 32.0 | 27.5 | - | 65 | 325 | 9.8 | - | 7.2 | - | 40 | - | MKP1848H55090+K2 |
| | 6 | 22.0 | 38.0 | 32.0 | 27.5 | - | 65 | 390 | 11.5 | - | 6.3 | - | 40 | - | MKP1848H56090+K2 |
| | 7 | 22.0 | 38.0 | 32.0 | 27.5 | - | 65 | 455 | 12.1 | - | 5.6 | - | 40 | - | MKP1848H57090+K2 |
| | 8 | 22.0 | 38.0 | 32.0 | 27.5 | - | 65 | 520 | 12.6 | - | 5.2 | - | 40 | - | MKP1848H58090+K2 |
| | 10 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 35 | 350 | 11.8 | 12.4 | 7.2 | 6.4 | 90 | 80 | MKP1848H61090+P* |
| | 12 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 35 | 420 | 14.6 | 15.4 | 6.3 | 5.7 | 90 | 80 | MKP1848H61290+P* |
| | 15 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 35 | 525 | 15.7 | 16.5 | 5.5 | 4.9 | 90 | 80 | MKP1848H61590+P* |
| | 20 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 35 | 700 | 17.0 | 18.0 | 4.7 | 4.2 | 90 | 80 | MKP1848H62090+P* |
| | 22 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 18 | 396 | 16.3 | 17.2 | 6.4 | 5.7 | 150 | 135 | MKP1848H62290+Y* |
| | 25 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 18 | 450 | 17.2 | 18.2 | 5.7 | 5.1 | 150 | 135 | MKP1848H62590+Y* |
| | 30 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 18 | 540 | 18.5 | 19.5 | 4.9 | 4.4 | 150 | 135 | MKP1848H63090+Y* |
| 35 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 18 | 630 | 21.2 | 22.4 | 4.4 | 3.9 | 150 | 135 | MKP1848H63590+Y* | |
| 40 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 18 | 720 | 22.3 | 23.5 | 4.0 | 3.6 | 150 | 135 | MKP1848H64090+Y* | |
| 1200 | U _{OPDC} AT 70 °C = 1440 V; U _{OPDC} AT 105 °C = 850 V | | | | | | | | | | | | | | |
| | 1 | 15.0 | 25.0 | 32.0 | 27.5 | - | 85 | 85 | 4.5 | - | 24.8 | - | 35 | - | MKP1848H51012+K2 |
| | 2 | 18.0 | 28.0 | 32.0 | 27.5 | - | 85 | 170 | 6.5 | - | 13.7 | - | 35 | - | MKP1848H52012+K2 |
| | 3 | 21.0 | 31.0 | 32.0 | 27.5 | - | 85 | 255 | 8.3 | - | 10.0 | - | 35 | - | MKP1848H53012+K2 |
| | 4 | 22.0 | 38.0 | 32.0 | 27.5 | - | 85 | 340 | 10.0 | - | 8.2 | - | 35 | - | MKP1848H54012+K2 |
| | 5 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 40 | 200 | 9.8 | 10.4 | 10.3 | 9.2 | 55 | 50 | MKP1848H55012+P* |
| | 6 | 21.5 | 38.5 | 42.0 | 37.5 | 10.2 | 40 | 240 | 10.7 | 11.2 | 8.7 | 7.8 | 55 | 50 | MKP1848H56012+P* |
| | 7 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 40 | 280 | 13.3 | 14.0 | 7.6 | 6.9 | 55 | 50 | MKP1848H57012+P* |
| | 8 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 40 | 320 | 14.1 | 14.9 | 6.8 | 6.1 | 55 | 50 | MKP1848H58012+P* |
| | 10 | 30.0 | 45.0 | 42.0 | 37.5 | 10.2 / 20.3 | 40 | 400 | 15.5 | 16.3 | 5.6 | 5.1 | 55 | 50 | MKP1848H61012+P* |
| | 12 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 20 | 240 | 13.8 | 14.6 | 8.9 | 8.0 | 120 | 105 | MKP1848H61212+Y* |
| | 15 | 30.0 | 45.0 | 57.5 | 52.5 | 20.3 | 20 | 300 | 15.2 | 16.0 | 7.3 | 6.6 | 120 | 105 | MKP1848H61512+Y* |
| | 20 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 20 | 400 | 18.5 | 19.5 | 5.8 | 5.2 | 120 | 105 | MKP1848H62012+Y* |
| | 22 | 35.0 | 50.0 | 57.5 | 52.5 | 20.3 | 20 | 440 | 19.2 | 20.2 | 5.4 | 4.8 | 120 | 105 | MKP1848H62212+Y* |

Notes

- (1) Change the “*” symbol with special code for the terminals and “+” for tolerance
- (2) Maximum RMS current at 10 kHz, +85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, a typical ESR value at 10 kHz
- (3) Equivalent series resistance typical values at 10 kHz
- (4) Maximum tan δ values at 10 kHz
- (5) Standard dimensions, for maximum dimension please consult “Dimensions Tolerances”



PACKAGING INFORMATION

| U _{NDC} AT 85 °C (V) | CAP. ⁽¹⁾ (μF) | DIMENSION (mm) | | | Ø dt (mm) | ORDERING CODE ⁽²⁾ | MASS (g) | SPQ ⁽³⁾ (pcs) |
|-------------------------------------|---|-------------------|------|------|------------------|------------------------------|-------------|-----------------------------|
| | | w | h | l | | | | |
| 500 | U _{OPDC} AT 70 °C = 600 V; U _{OPDC} AT 105 °C = 350 V | | | | | | | |
| | 5 | 15.0 | 25.0 | 32.0 | 0.8 | MKP1848H55050+K2 | 14.5 | 100 |
| | 6 | 15.0 | 25.0 | 32.0 | 0.8 | MKP1848H56050+K2 | 14.5 | 100 |
| | 7 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H57050+K2 | 20.5 | 80 |
| | 8 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H58050+K2 | 20.5 | 80 |
| | 10 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H61050+K2 | 27.5 | 56 |
| | 12 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H61250+K2 | 27 | 56 |
| | 15 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H61550+K2 | 34 | 56 |
| | 20 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H62050+P* | 42.5 | 91 |
| | 22 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H62250+P* | 42 | 91 |
| | 25 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H62550+P* | 41 | 91 |
| | 30 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H63050+P* | 70.5 | 63 |
| | 35 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H63550+P* | 73 | 63 |
| | 40 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H64050+P* | 70.5 | 63 |
| | 45 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H64550+P* | 69.5 | 63 |
| | 50 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H65050+Y* | 95.5 | 45 |
| | 55 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H65550+Y* | 94 | 45 |
| | 60 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H66050+Y* | 91.5 | 45 |
| | 65 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H66550+Y* | 89.5 | 45 |
| | 70 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H67050+Y* | 127 | 40 |
| 75 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H67550+Y* | 124.5 | 40 | |
| 80 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H68050+Y* | 120.5 | 40 | |
| 700 | U _{OPDC} AT 70 °C = 800 V; U _{OPDC} AT 105 °C = 450 V | | | | | | | |
| | 4 | 15.0 | 25.0 | 32.0 | 0.8 | MKP1848H54070+K2 | 14.5 | 100 |
| | 5 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H55070+K2 | 20.5 | 80 |
| | 6 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H56070+K2 | 20 | 80 |
| | 7 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H57070+K2 | 27 | 56 |
| | 8 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H58070+K2 | 26.5 | 56 |
| | 10 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H61070+K2 | 33.5 | 56 |
| | 12 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H61270+K2 | 33.5 | 56 |
| | 15 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H61570+P* | 42 | 91 |
| | 20 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H62070+P* | 39 | 91 |
| | 22 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H62270+P* | 71 | 63 |
| | 25 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H62570+P* | 69 | 63 |
| | 30 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H63070+P* | 70 | 63 |
| | 35 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H63570+Y* | 91.5 | 45 |
| | 40 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H64070+Y* | 93.5 | 45 |
| | 45 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H64570+Y* | 90 | 45 |
| | 50 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H65070+Y* | 119 | 40 |
| | 55 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H65570+Y* | 123 | 40 |
| | 60 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H66070+Y* | 120 | 40 |



PACKAGING INFORMATION

| U _{NDC} AT 85 °C (V) | CAP. ⁽¹⁾ (µF) | DIMENSION (mm) | | | Ø dt (mm) | ORDERING CODE ⁽²⁾ | MASS (g) | SPQ ⁽³⁾ (pcs) |
|-------------------------------------|--|-------------------|------|------|------------------|------------------------------|-------------|-----------------------------|
| | | w | h | l | | | | |
| 800 | U _{OPDC} AT 70 °C = 960 V; U _{OPDC} AT 105 °C = 560 V | | | | | | | |
| | 3 | 15.0 | 25.0 | 32.0 | 0.8 | MKP1848H53080+K2 | 14.5 | 100 |
| | 4 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H54080+K2 | 20.5 | 80 |
| | 5 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H55080+K2 | 26.5 | 56 |
| | 6 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H56080+K2 | 27 | 56 |
| | 7 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H57080+K2 | 26.5 | 56 |
| | 8 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H58080+K2 | 33 | 56 |
| | 10 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H61080+K2 | 33 | 56 |
| | 12 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H61280+P* | 42 | 91 |
| | 15 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H61580+P* | 40.5 | 91 |
| | 20 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H62080+P* | 69 | 63 |
| | 22 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H62280+P* | 71 | 63 |
| | 25 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H62580+P* | 69.5 | 63 |
| | 30 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H63080+Y* | 89 | 45 |
| | 35 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H63580+Y* | 91.5 | 45 |
| | 40 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H64080+Y* | 119 | 40 |
| 45 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H64580+Y* | 124 | 40 | |
| 50 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H65080+Y* | 119.5 | 40 | |
| 920 | U _{OPDC} AT 70 °C = 1100 V; U _{OPDC} AT 105 °C = 650 V | | | | | | | |
| | 2 | 15.0 | 25.0 | 32.0 | 0.8 | MKP1848H52090+K2 | 15 | 100 |
| | 3 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H53090+K2 | 20.5 | 80 |
| | 4 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H54090+K2 | 20 | 80 |
| | 5 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H55090+K2 | 27 | 56 |
| | 6 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H56090+K2 | 34.5 | 56 |
| | 7 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H57090+K2 | 34 | 56 |
| | 8 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H58090+K2 | 33.5 | 56 |
| | 10 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H61090+P* | 42 | 91 |
| | 12 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H61290+P* | 77 | 63 |
| | 15 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H61590+P* | 74 | 63 |
| | 20 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H62090+P* | 69.5 | 63 |
| | 22 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H62290+Y* | 98 | 45 |
| | 25 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H62590+Y* | 94 | 45 |
| | 30 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H63090+Y* | 89.5 | 45 |
| | 35 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H63590+Y* | 124 | 40 |
| 40 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H64090+Y* | 119.5 | 40 | |
| 1200 | U _{OPDC} AT 70 °C = 1440 V; U _{OPDC} AT 105 °C = 850 V | | | | | | | |
| | 1 | 15.0 | 25.0 | 32.0 | 0.8 | MKP1848H51012+K2 | 15 | 100 |
| | 2 | 18.0 | 28.0 | 32.0 | 0.8 | MKP1848H52012+K2 | 20 | 80 |
| | 3 | 21.0 | 31.0 | 32.0 | 0.8 | MKP1848H53012+K2 | 26.5 | 56 |
| | 4 | 22.0 | 38.0 | 32.0 | 0.8 | MKP1848H54012+K2 | 33.5 | 56 |
| | 5 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H55012+P* | 42.5 | 91 |
| | 6 | 21.5 | 38.5 | 42.0 | 1.0 | MKP1848H56012+P* | 41 | 91 |
| | 7 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H57012+P* | 76 | 63 |
| | 8 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H58012+P* | 74.5 | 63 |
| | 10 | 30.0 | 45.0 | 42.0 | 1.0 | MKP1848H61012+P* | 70.5 | 63 |
| | 12 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H61212+Y* | 97.5 | 45 |
| | 15 | 30.0 | 45.0 | 57.5 | 1.2 | MKP1848H61512+Y* | 92.5 | 45 |
| | 20 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H62012+Y* | 122.5 | 40 |
| | 22 | 35.0 | 50.0 | 57.5 | 1.2 | MKP1848H62212+Y* | 119.5 | 40 |

Notes

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

CONSTRUCTION DESCRIPTION

Low inductive wound cell elements of metallized polypropylene film, potted with resin in a flame retardant case.

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

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

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

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

DIMENSIONS TOLERANCES

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

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

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

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

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

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

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

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

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

SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

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

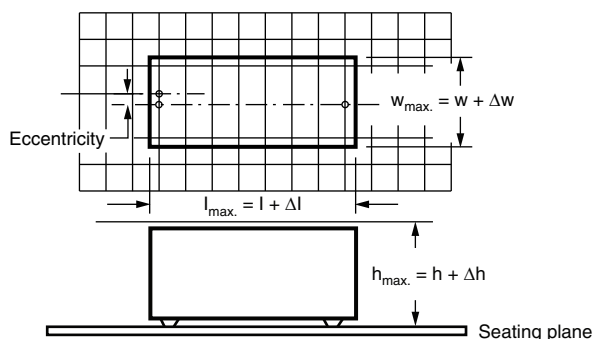
For 2 pins:

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

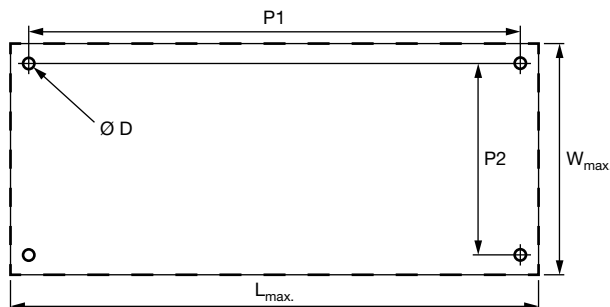
- For products with pitch $\leq 27.5 \text{ mm}$, $\Delta w = \Delta l = \Delta h = 0.7 \text{ mm}$
- For products with pitch $= 37.5 \text{ mm}$, $\Delta w = \Delta l = \Delta h = 0.7 \text{ mm}$
- For products with pitch $= 52.5 \text{ mm}$, $\Delta w = \Delta l = \Delta h = 1.0 \text{ mm}$

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

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



For 4 pins:





| P1 (mm) | L _{max.} (mm) | W _{max.} (mm) | Ø D (mm) | Δh (mm) |
|---------|------------------------|------------------------|----------|---------|
| 37.5 | l + 1.5 | w + 1.8 | 1.5 | h + 0.7 |
| 52.5 | l + 1.8 | w + 2.0 | 1.7 | h + 0.7 |

SOLDERING CONDITIONS

For general soldering conditions and wave soldering profile we refer to the document "Soldering Conditions Vishay Film Capacitors": www.vishay.com/doc?28171

STORAGE TEMPERATURE

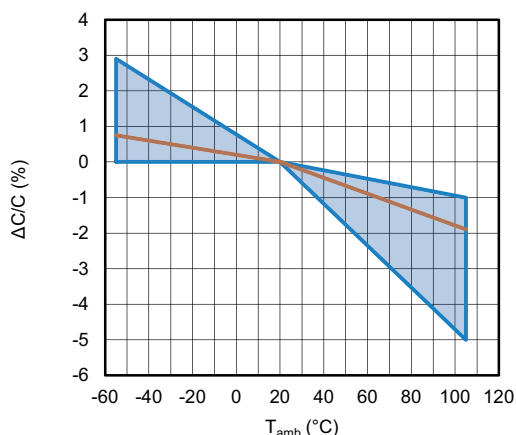
T_{stg} = -25 °C to +35 °C with RH maximum 75 % without condensation.

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

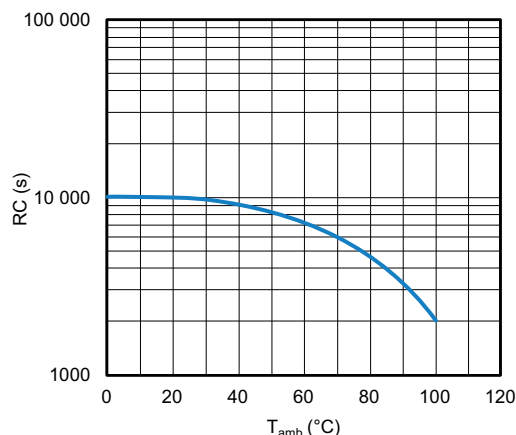
Unless otherwise specified, all electrical values apply to an ambient temperature of 23 °C ± 1 °C, an atmospheric pressure of 86 kPa to 106 kPa, and a relative humidity of 50 % ± 2 %.

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

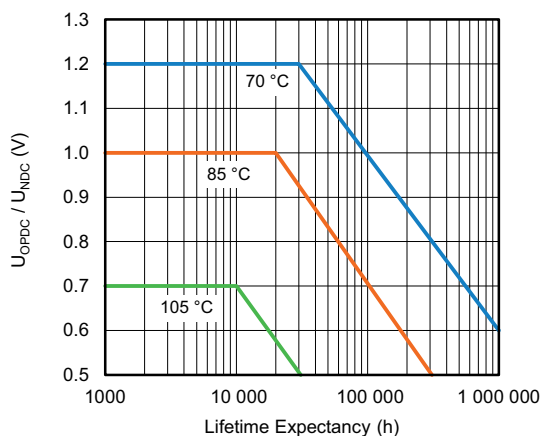
CHARACTERISTICS



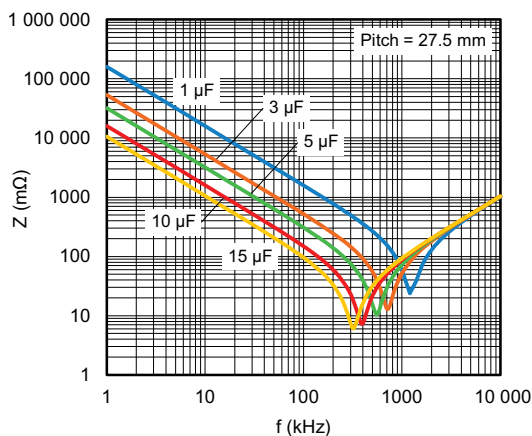
Capacitance as a function of ambient temperature (typical)



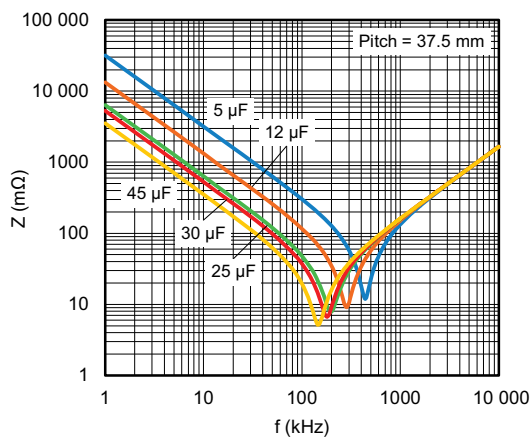
Insulation resistance as a function of ambient temperature (typical)



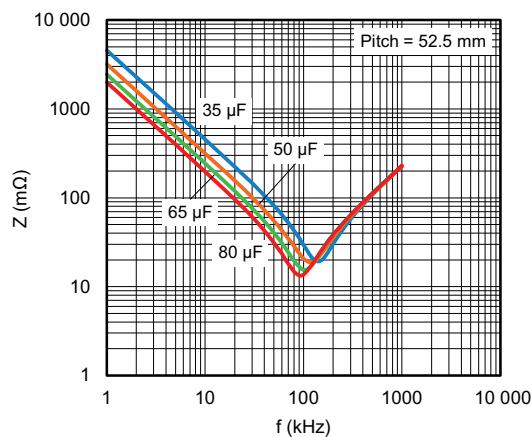
Lifetime expectancy by case temperature (typical)



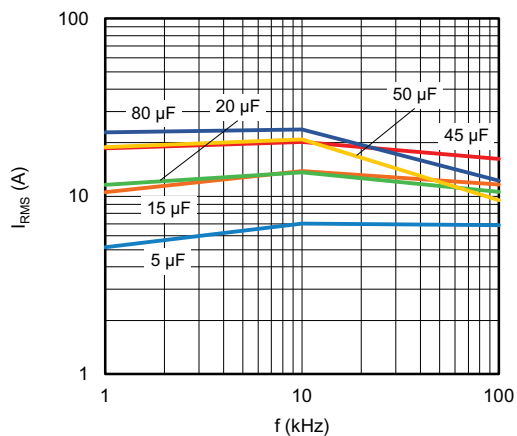
Impedance as a function of frequency (typical)



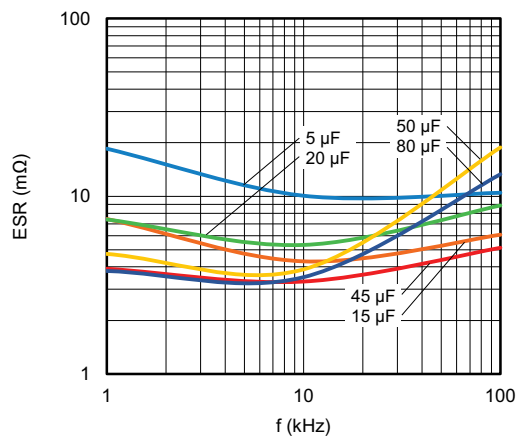
Impedance as a function of frequency
(typical)



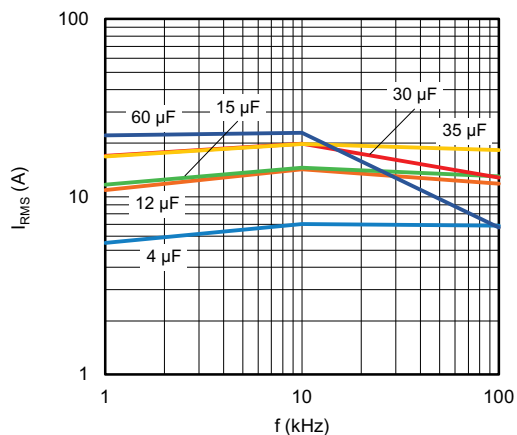
Impedance as a function of frequency
(typical)



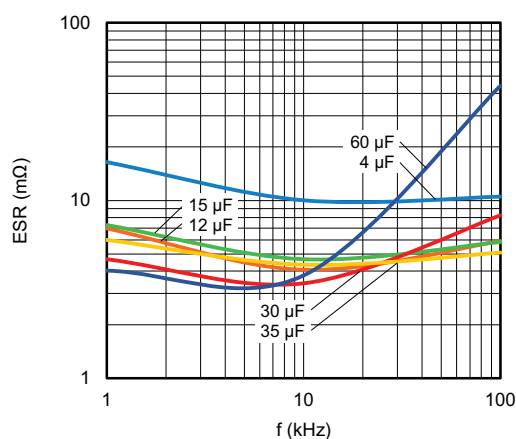
Maximum I_{RMS} current as function of frequency (500 V_{DC}),
based $T_A + 85^\circ C$, $\Delta t = +15^\circ C$, capacitance tolerance $\pm 5\%$,
(typical curve)



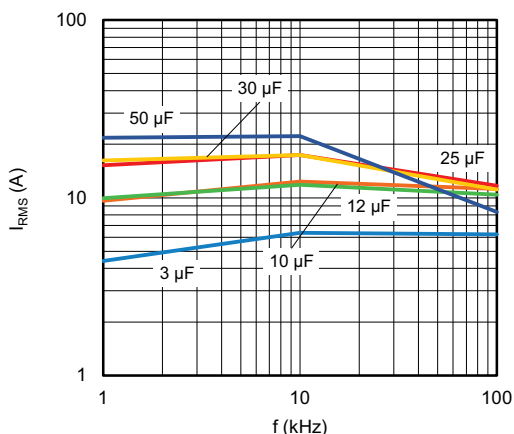
ESR as function of frequency (500 V_{DC})
(typical curve)



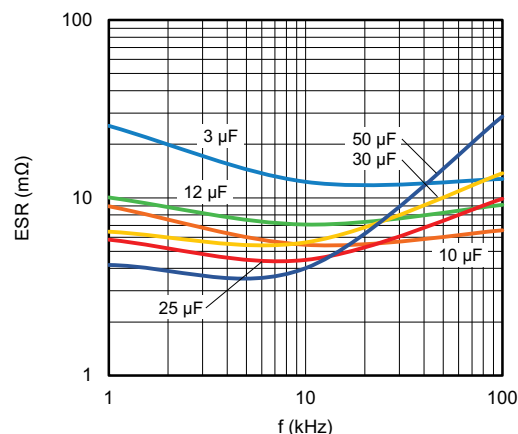
Maximum I_{RMS} current as function of frequency (700 V_{DC}),
based $T_A + 85^\circ C$, $\Delta t = +15^\circ C$, capacitance tolerance $\pm 5\%$,
(typical curve)



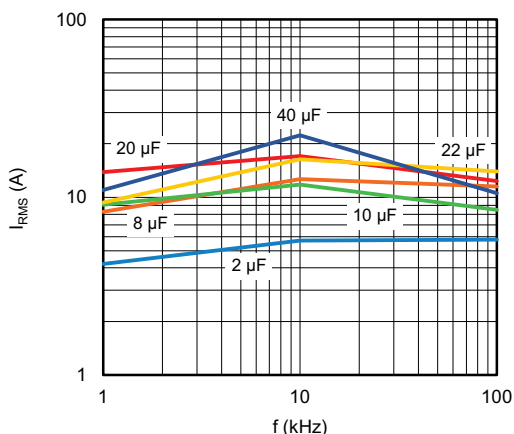
ESR as function of frequency (700 V_{DC})
(typical curve)



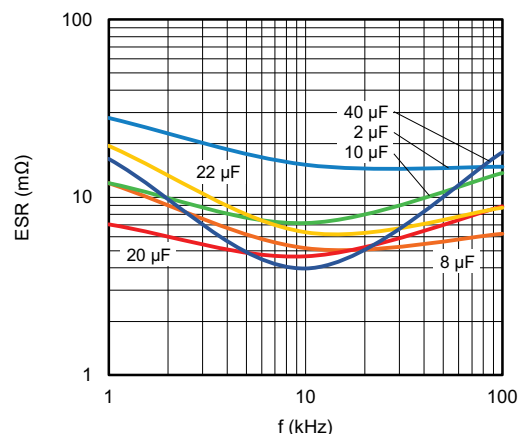
Maximum I_{RMS} current as function of frequency (800 V_{DC}), based $T_A + 85^\circ C$, $\Delta t = +15^\circ C$, capacitance tolerance $\pm 5\%$, (typical curve)



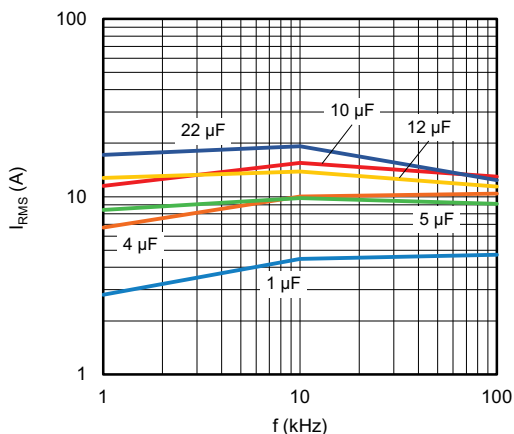
ESR as function of frequency (800 V_{DC}) (typical curve)



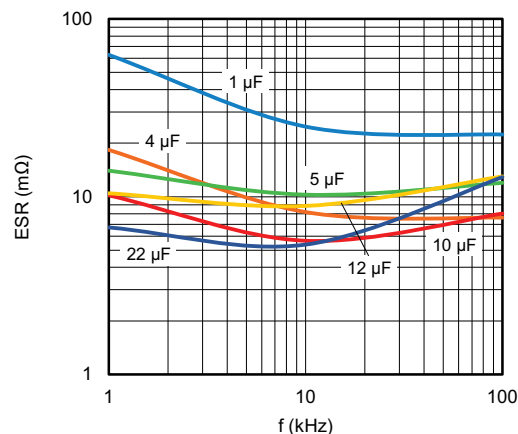
Maximum I_{RMS} current as function of frequency (920 V_{DC}), based $T_A + 85^\circ C$, $\Delta t = +15^\circ C$, capacitance tolerance $\pm 5\%$, (typical curve)



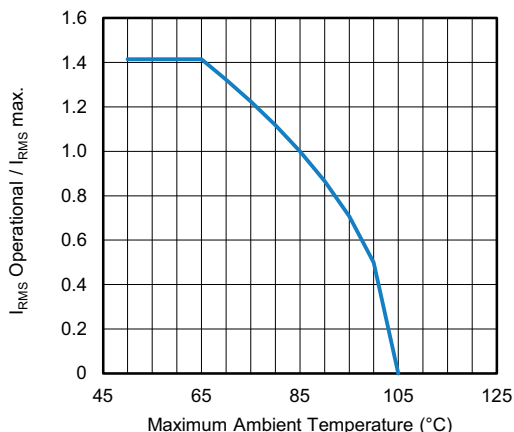
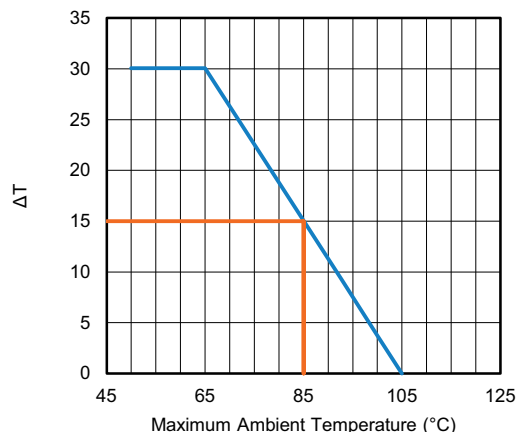
ESR as function of frequency (920 V_{DC}) (typical curve)



Maximum I_{RMS} current as function of frequency (1200 V_{DC}), based $T_A + 85^\circ C$, $\Delta t = +15^\circ C$, capacitance tolerance $\pm 5\%$, (typical curve)



ESR as function of frequency (1200 V_{DC}) (typical curve)


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

Maximum allowed component temperature rise (ΔT) as a function of ambient temperature (T_{amb})

HEAT CONDUCTIVITY

| DIMENSIONS (mm) | | | HEAT CONDUCTIVITY (mW/°C) |
|-----------------|------|------|------------------------------|
| w | h | l | |
| 15.0 | 25.0 | 32.0 | 33 |
| 18.0 | 28.0 | 32.0 | 39 |
| 21.0 | 31.0 | 32.0 | 46 |
| 22.0 | 38.0 | 32.0 | 55 |
| 21.5 | 38.5 | 42.0 | 66 |
| 30.0 | 45.0 | 42.0 | 90 |
| 30.0 | 45.0 | 57.5 | 113 |
| 35.0 | 50.0 | 57.5 | 132 |

POWER DISSIPATION AND MAXIMUM COMPONENT TEMPERATURE RISE

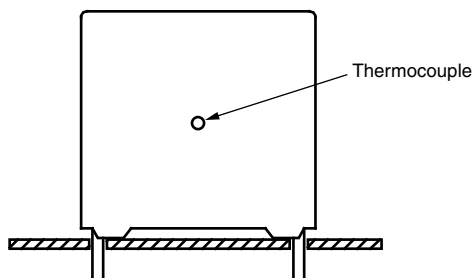
The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according type detail specification www.vishay.com/doc?28147

The component temperature rise (ΔT) can be measured (see section “Measuring the Component Temperature” for more details) 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 condition (T_{amb}) and loaded condition (T_C).

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

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

APPLICATION NOTES AND LIMITING CONDITIONS

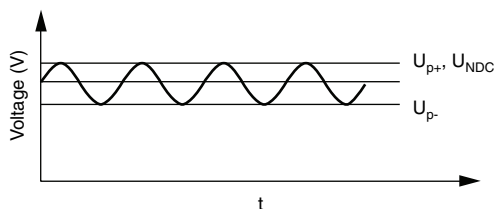
These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection.

These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

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

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

Non reversing recurrent waveform



3. 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
4. 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

| MAXIMUM REPETITIVE PEAK VOLTAGES | |
|----------------------------------|--------------------------|
| REPETITIVE SURGE VOLTAGE | MAXIMUM DURATION PER DAY |
| $1.1 \times U_{NDC}$ | 30 % on load duration |
| $1.15 \times U_{NDC}$ | 30 min |
| $1.2 \times U_{NDC}$ | 5 min |
| $1.3 \times U_{NDC}$ | 1 min |
| $1.5 \times U_{NDC}$ | 110 ms |

Note

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



| TEST CONDITIONS AND REQUIREMENTS ACCORDING IEC 61071 | | | | | |
|--|--|--|--|---------------|--|
| SUB-CLAUSE NUMBER AND TEST | | CONDITIONS | | | PERFORMANCE REQUIREMENTS |
| ROUTINE TEST - FINAL INSPECTION | | | | | |
| 5.14.2-1 | External inspection, visual examination | 1 kHz at room temperature | | | Legible marking as specified |
| 5.14.2-2 | Dimensions | | | | See specification drawing |
| 5.3-1 | Capacitance | | | | See specific reference data |
| 5.3-2 | tan δ | | | | See specific reference data |
| 5.5.1-2 | DC voltage test between terminals | 1.5 x U _{NDC} at T _{amb} Duration: 10 s | | | No visible damage or puncture No flashover |
| 5.7 | Insulation resistance | Measuring voltage 500 V at room temperature Duration: 1 min | | | See specific reference data |
| TYPE TESTS | | | | | |
| 5.14.2 | External inspection | Check for finish, marking, and overall dimensions | | | Legible marking and finish as specified Dimensions: see specific drawing |
| 5.14.0 | Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz | | | |
| 5.14.1-1/4 | Robustness of terminations IEC 60068-2-21 | Tensile U _{a1} : duration: 10 s ± 1 s | | | |
| | | Wire diameter | Section | Load | |
| | | d ≤ 0.80 mm | S ≤ 0.5 mm ² | 10 N (± 10 %) | |
| | | d ≤ 1.25 mm | S ≤ 1.2 mm ² | 20 N (± 10 %) | |
| | | Bending, U _b method 1: 4 x 90 °, duration 2 s to 3 s/bend | | | |
| | | Wire diameter | Section | Load | |
| | | d ≤ 0.80 mm | Z _x ≤ 0.050 mm ³ | 5 N (± 10 %) | |
| | | d ≤ 1.25 mm | Z _x ≤ 0.019 mm ³ | 10 N (± 10 %) | |
| 5.14.1-6 | Resistance to soldering heat IEC 60068-2-20 | No predrying, method 1A Solder bath: 280 °C ± 5 °C Duration: 10 s ± 1 s | | | |
| 5.14.4 | Final measurements | Capacitance tan δ | | | ΔC/C ≤ 0.5 % Increase of tan δ ≤ 0.0050 Compared to values measured in 5.14.0 |
| 5.14.0 | Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz | | | No visible damage |
| 5.14.3-1 | Vibration IEC 60068-2-6 | 10 Hz to 55 Hz: amplitude ± 0.35 mm or acceleration 98 m/s ² Test duration: 10 frequency cycles (3 axes offset from each other by 90°) 1 octave/min Visual examination | | | |
| 5.14.3-2 | Shock or impact IEC 60068-2-6 | Pulse shape: half sine Acceleration: 490 m/s ² Duration of pulse: 11 ms | | | |
| 5.14.4 | Final measurements | Visual examination Capacitance tan δ | | | |
| | | No visible damage ΔC/C ≤ 0.5 % Increase of tan δ ≤ 0.0050 Compared to values measured in 5.14.0 | | | |



| TEST CONDITIONS AND REQUIREMENTS ACCORDING IEC 61071 | | |
|--|---|--|
| SUB-CLAUSE NUMBER AND TEST | CONDITIONS | PERFORMANCE REQUIREMENTS |
| TYPE TESTS | | |
| 5.5.3-1 Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance | |
| 5.5.3-2 DC voltage test between terminals | $1.5 \times U_{NDC}$ at T_{amb} Duration: 60 s | |
| 5.5.3-3 Final measurements | Capacitance tan δ Insulation resistance | $ \Delta C/C \leq 0.5 \%$ Increase of tan $\delta \leq 0.0050$ IR $\geq 50 \%$ of specified values |
| 5.9-1 Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance | |
| 5.9-2 Surge discharge test | $1.1 \times U_{NDC}$ Number of discharges: 5 Time lapse: every 2 min (10 min total) | |
| 5.9-2 DC voltage test between terminals | Within 5 min after the surge discharge test $1.5 \times U_{NDC}$ at T_{amb} Duration: 60 s | |
| 5.9-3 Final measurements | Capacitance tan δ Insulation resistance | $ \Delta C/C \leq 1.0 \%$ tan $\delta \leq 1.2 \times \text{initial tan } \delta + 0.0001$ Compared to values measured in 5.9-1 IR $\geq 50 \%$ of specified values |
| 5.11-1 Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance | |
| 5.11-2 Self healing test | $1.5 \times U_{NDC}$ Duration: 10 s increase the voltage at 100 V/s till 5 clearings occur or until voltage reach max. of $2.5 \times U_{NDC}$ for a duration of 10 s | Number of clearings ≤ 5 Clearing = voltage drop of 5 % |
| 5.11-3 Final measurements | Capacitance tan δ Insulation resistance | $ \Delta C/C \leq 0.5 \%$ tan $\delta \leq 1.2 \times \text{initial tan } \delta + 0.0001$ Compared to values measured in 5.11.1 IR $\geq 50 \%$ of specified values |
| 5.13-0 Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance | |
| 5.13-1 Change of temperature acc. to IEC 60068-2-14 | Test Nb $T_{max.} = 85^\circ\text{C}$ $T_{min.} = -40^\circ\text{C}$ Transition time: 1 h, equivalent to 1°C/min 5 cycles | |
| 5.13.2 Damp heat steady state acc. to IEC 60068-2-78 | Test Ca $T = 40^\circ\text{C} \pm 2^\circ\text{C}$ RH = $93\% \pm 3\%$ Duration: 56 days | |
| 5.5.3-2 DC voltage test between terminals | $1.5 \times U_{NDC}$ at ambient temperature Duration: 60 s | |
| 5.13.3 Final measurements | Visual examination Capacitance tan δ Insulation resistance | No puncturing or flashover Self healing punctures are permitted $ \Delta C/C \leq 2.0 \%$ Increase of tan $\delta \leq 0.0150$ Compared to values measured in 5.13-0 IR $\geq 50 \%$ of specified values |



| TEST CONDITIONS AND REQUIREMENTS ACCORDING IEC 61071 | | |
|---|---|---|
| SUB-CLAUSE NUMBER AND TEST | CONDITIONS | PERFORMANCE REQUIREMENTS |
| TYPE TESTS | | |
| 5.13A-0 Initial measurements | Capacitance at 1 kHz tan δ at 1 kHz Insulation resistance | $ \Delta C/C < 10\%$ Increase of tan $\delta \leq 0.0100$ Compared to values measured in 5.13A.0 IR $\geq 50\%$ of specified values |
| 5.13A.2 Accelerate damp heat steady state with load | T = 85 °C RH = 85 % at U _{NDC} Duration 1000 h | |
| 5.13.3 Final measurements | Capacitance at 1 kHz tan δ at 1 kHz Insulation resistance | |
| 5.10-0 Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance | Temperature rise < 1 °C $ \Delta C/C \leq 2\%$ Increase of tan $\delta \leq 0.0150$ IR $\geq 50\%$ of specified values |
| 5.10-1 Thermal stability test under overload conditions | Natural cooling T _{amb} \pm 5 °C $1.21 \times P_{max.} = 1.21 \times (I_{RMS}^2/w \times C) \times \tan \delta(f)$ with $w = 2 \times \pi \times f$ for I _{RMS} see specific reference data f = 10 kHz Duration: 48 h | |
| 5.10-2 Final measurements | Measure the temperature every 1.5 h during the last 6 h Capacitance tan δ at 10 kHz Insulation resistance | |
| 5.12 Resonance frequency measurement | Impedance analyzer at T _{amb} | > 0.9 times the value as specified in typical curve "Resonant frequency" of this specification |
| 5.15-0 Initial measurements | Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance | $ \Delta C/C \leq 3\%$ Increase of tan $\delta \leq 0.0150$ Compared to values measured in 5.15-0 IR $\geq 50\%$ of specified values |
| 5.15-1 Endurance test between terminals | Sequence 1.3 x U _{NDC} at 85 °C 1.3 x U _{OPDC} at 105 °C Duration: 500 h 1000 x discharge at 1.4 x \hat{I} (maximum peak current) 1.3 x U _{NDC} at 85 °C 1.3 x U _{OPDC} at 105 °C Duration: 500 h | |
| 5.15-2 Final measurements | Capacitance tan δ Insulation resistance | |
| 5.16.3-0 Initial measurements | Capacitance at 1 kHz | Audible healings or check healings with oscilloscope No puncturing, flashover or burning of the cheese cloth Self healing punctures are permitted |
| 5.16.3-1 Destruction test sequence for non-segmented film | The capacitors must be put in an oven at T _{max.} = 85 °C, product enveloped with cheese cloth | |
| High DC voltage test | 3 x U _{NDC} or DC voltage until repetitive product healings occur, duration: 15 min | |
| High AC voltage test | AC _{RMS} voltage = U _{NDC} /2 $\sqrt{2}$ with min. 250 V _{AC} Duration: 5 min Repeat destruction sequence 3 x | |
| 5.16.3-2 Final measurements | Visual examination | |



| TEST CONDITIONS AND REQUIREMENTS ACCORDING AEC-Q200 REVISION D | | | | |
|--|--------------------------------------|-------------------------|---|---|
| NO. | TEST NAME | REFERENCE | TEST CONDITIONS | PERFORMANCE REQUIREMENTS |
| 1 | Pre- and post-stress electrical test | Spec. | - | - |
| 3 | High temperature exposure (storage) | MIL-STD 202 method 108 | 85 °C; unpowered 250 h / 500 h / 1000 h | $ \Delta C/C \leq 3 \%$ Increase of $\tan \delta$ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value |
| 4 | Temperature cycling | JESD22 method JA-104 | 1000 cycles: -40 °C / +85 °C 30 min. dwell time at each temperature extreme Transition time < 1 min. | $ \Delta C/C \leq 2 \%$ Increase of $\tan \delta$ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value |
| 6 | Moisture resistance | MIL-STD 202 method 106 | 10 cycles at 24 h/cycle unpowered | $ \Delta C/C \leq 2 \%$ Increase of $\tan \delta$ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value |
| 7 | Biased humidity | MIL-STD 202 method 103 | 40 °C; 93 % RH; U_{RDC} 250 h / 500 h / 1000 h | $ \Delta C/C \leq 2 \%$ Increase of $\tan \delta$ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value |
| 8 | Operational life | MIL-STD 202 method 108 | $T_{amb} = 85 \text{ °C}$; $1.25 \times U_{RDC}$ 250 h / 500 h / 1000 h | $ \Delta C/C \leq 3 \%$ Increase of $\tan \delta$ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value |
| 9 | External visual | MIL-STD 883 method 2009 | Device construction, marking, and workmanship | Device construction and workmanship; legible marking |
| 10 | Physical dimension | JESD22 method JB-100 | Spec. | Datasheet |
| 11 | Terminal strength (lead) | MIL-STD 202 method 211 | Test lead device lead integrity only. - A (pull-test): 44.1 N (10 s) - C (wire-lead bend test): 227 g (3 x 3 s) | No visual damage |
| 12 | Resistance to solvents | MIL-STD 202 method 215 | Also aqueous chemical - OKEM clean or equivalent. Do not use banned solvents. | No visual damage Legible marking |
| 13 | Mechanical shock | MIL-STD 202 method 213 | 100 g's; 6 ms half-sine; 3.75 m/s | No visual damage |
| 14 | Vibration | MIL-STD 202 method 204 | 5 g's for 20 min; 12 cycles x 3 directions 10 Hz to 2000 Hz | No visual damage |
| 15 | Resistance to soldering heat | MIL-STD 202 method 210 | 280 °C; 10 s solder within 1.5 mm of device body | $ \Delta C/C \leq 0.5 \%$ Increase of $\tan \delta$ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value |
| 17 | ESD | - | - | - |
| 18 | Solderability | J-STD-002 | Leaded: method A at 235 °C, category 3 (245 °C / 3 s) | Good tinning as evidence by free flowing of the solder with wetting of terminations > 95 % |
| 19 | Electrical characterization | - | - | - |
| 20 | Flammability | UL-94 IEC 60384-1 | One flame application Class B | V-0 or V-1 are acceptable. Class B or C acc. IEC is also acceptable |

Note

Measurement conditions at 23 °C:

- Capacitance at 1 kHz
- $\tan \delta$ 10 kHz (additional 1 kHz and ESR 10 kHz)
- Insulation resistance 500 V, 1 min after full charge
- Dimensions w x h x l



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.