

## Metallized Polypropylene Film Capacitor Related Document: IEC 60384-16

**MAIN APPLICATIONS:**

High voltage, high current and high pulse operations, deflection circuits in TV sets (S-correction and fly-back tuning). Protection circuits in SMPS's. Snubber and electronic ballast circuits. Input and output filtering in SPS designs, storage, timing and integrating circuits.

**MARKING:**

Manufacturer's logo/type/C-value/rated voltage/tolerance/ date of manufacture

**DIELECTRIC:**

Polypropylene film

**ELECTRODES:**

Vacuum deposited aluminum

**COATING:**

Metal-foil-wrapped, insulated, epoxy resin sealed, flame retardant

**CONSTRUCTION:**

Extended double-sided metallized polyester film, internal series connection (630 to 2000 VDC), double-sided metallized polyester carrier film, (refer to general information)

**LEADS:**

Tinned wire

**IEC TEST CLASSIFICATION:**

55/100/56, according to IEC 60068

**OPERATING TEMPERATURE RANGE:**

- 55°C to + 100°C

**CAPACITANCE RANGE:**

1000pF to 4.7µF

**CAPACITANCE TOLERANCES:**

± 20% (M), ± 10% (K), ± 5% (J)

**RATED VOLTAGES (U<sub>R</sub>):**

160 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC, 1600 VDC, 2000 VDC

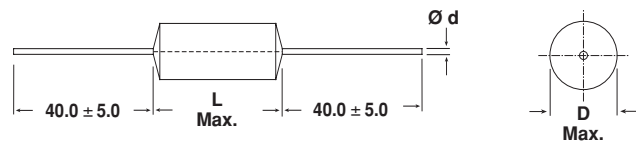
**PERMISSIBLE AC VOLTAGES (RMS) UP TO 60Hz:**

100 VAC, 160 VAC, 220 VAC, 400 VAC, 600 VAC, 650 VAC, 700 VAC

**TEST VOLTAGE (ELECTRODE/ELECTRODE):**

1.6 x U<sub>R</sub> for 2 s

Dimensions in millimeters



| D      | Ø d |
|--------|-----|
| ≤ 7.0  | 0.7 |
| < 16.0 | 0.8 |
| ≥ 16.0 | 1.0 |

**INSULATION RESISTANCE:**

Measured at 100 VDC after one minute

**For C ≤ 0.33µF:**

100,000 MΩ minimum value (150,000 MΩ typical value)

**TIME CONSTANT:**

Measured at 100 VDC after one minute

**For C > 0.33µF:**

30,000 s minimum value (50,000 s typical value)

**TEMPERATURE COEFFICIENT:**

-250 x 10<sup>-6</sup>/°C (typical value)

**CAPACITANCE DRIFT:**

Up to + 40°C, ± 0.5% for a period of two years

**DERATING FOR DC AND AC.**

**CATEGORY VOLTAGE U<sub>C</sub>:**

At + 85°C: U<sub>C</sub> = 1.0 U<sub>R</sub>

At + 100°C: U<sub>C</sub> = 0.7 U<sub>R</sub>

**SELF INDUCTANCE:**

~ 12 nH measured with 6mm long leads

**PULL TEST ON LEADS:**

≥ 20 N in direction of leads according to IEC 60068-2-21

**BEND TEST ON LEADS:**

2 bends through 90°C with half of the force used in pull test

**RELIABILITY:**

Operational life > 300,000 h

Failure rate < 10 FIT (40°C and 0.5 x U<sub>R</sub>)

For further details, please refer to the general information provided in this catalog.

**MAXIMUM PULSE RISE TIME**

| CAPACITOR LENGTH (mm) | Maximum pulse rise time d <sub>v</sub> /d <sub>t</sub> [V/µs] |         |         |         |          |          |          |  |
|-----------------------|---|---------|---------|---------|----------|----------|----------|--|
|                       | 160 VDC   | 250 VDC | 400 VDC | 630 VDC | 1000 VDC | 1600 VDC | 2000 VDC |  |
| 17                    | 900   | 1140    | 1840    | —       | —        | —        | —        |  |
| 22                    | 450   | 560     | 910     | 3430    | —        | —        | —        |  |
| 29                    | 260   | 320     | 520     | 2120    | 2800     | 3800     | 6200     |  |
| 34                    | 202   | 240     | 400     | 1524    | 2000     | 2680     | 4200     |  |
| 44                    | 140   | 170     | 280     | 980     | 1280     | 1690     | 2600     |  |

If the maximum pulse voltage is less than the rated voltage higher dv/dt values can be permitted.



**DISSIPATION FACTOR TAN  $\delta$**

| MEASURED AT    | $C \leq 0.1\mu\text{F}$ | $0.1\mu\text{F} < C \leq 1.0\mu\text{F}$ | $C > 1.0\mu\text{F}$ |
|----------------|-------------------------|--|----------------------|
| 1kHz           | $0.3 \times 10^{-3}$    | $0.3 \times 10^{-3}$                     | $0.3 \times 10^{-3}$ |
| 10kHz          | $0.4 \times 10^{-3}$    | $0.4 \times 10^{-3}$                     | —                    |
| 100kHz         | $1.5 \times 10^{-3}$    | —  | —                    |
| Maximum values |                         |  |                      |

| CAPACITANCE         | CAPACITANCE CODE | VOLTAGE CODE 16<br>160 VDC/<br>100 VAC |      | VOLTAGE CODE 25<br>250 VDC/<br>160 VAC |      | VOLTAGE CODE 40<br>400 VDC/<br>220 VAC |      | VOLTAGE CODE 63<br>630 VDC/<br>400 VAC |      |
|---------------------|------------------|--|------|--|------|--|------|--|------|
|                     |                  | D                                      | L    | D                                      | L    | D                                      | L    | D                                      | L    |
| 1000 pF             | - 210            | —                                      | —    | —                                      | —    | —                                      | —    | —                                      | —    |
| 1500 pF             | - 215            | —                                      | —    | —                                      | —    | —                                      | —    | —                                      | —    |
| 2200 pF             | - 222            | —                                      | —    | —                                      | —    | —                                      | —    | —                                      | —    |
| 3300 pF             | - 233            | —                                      | —    | —                                      | —    | —                                      | —    | —                                      | —    |
| 4700 pF             | - 247            | —                                      | —    | —                                      | —    | —                                      | —    | —                                      | —    |
| 6800 pF             | - 268            | —                                      | —    | —                                      | —    | —                                      | —    | —                                      | —    |
| 0.01 $\mu\text{F}$  | - 310            | —                                      | —    | —                                      | —    | 6.0                                    | 17.0 | 7.0                                    | 22.0 |
| 0.015 $\mu\text{F}$ | - 315            | —                                      | —    | —                                      | —    | 6.5                                    | 17.0 | 8.0                                    | 22.0 |
| 0.022 $\mu\text{F}$ | - 322            | —                                      | —    | 6.0                                    | 17.0 | 7.5                                    | 17.0 | 9.5                                    | 22.0 |
| 0.033 $\mu\text{F}$ | - 333            | 6.0                                    | 17.0 | 7.0                                    | 17.0 | 7.0                                    | 22.0 | 9.0                                    | 29.0 |
| 0.047 $\mu\text{F}$ | - 347            | 6.5                                    | 17.0 | 8.0                                    | 17.0 | 8.0                                    | 22.0 | 10.5                                   | 29.0 |
| 0.068 $\mu\text{F}$ | - 368            | 7.5                                    | 17.0 | 7.0                                    | 22.0 | 9.0                                    | 22.0 | 12.5                                   | 29.0 |
| 0.1 $\mu\text{F}$   | - 410            | 7.0                                    | 22.0 | 8.0                                    | 22.0 | 11.0                                   | 22.0 | 12.5                                   | 34.0 |
| 0.15 $\mu\text{F}$  | - 415            | 8.0                                    | 22.0 | 9.5                                    | 22.0 | 10.0                                   | 29.0 | 15.0                                   | 34.0 |
| 0.22 $\mu\text{F}$  | - 422            | 9.5                                    | 22.0 | 9.0                                    | 29.0 | 12.0                                   | 29.0 | 14.5                                   | 44.0 |
| 0.33 $\mu\text{F}$  | - 433            | 9.0                                    | 29.0 | 10.5                                   | 29.0 | 13.5                                   | 29.0 | 17.5                                   | 44.0 |
| 0.47 $\mu\text{F}$  | - 447            | 10.0                                   | 29.0 | 12.0                                   | 29.0 | 15.0                                   | 34.0 | 21.0                                   | 44.0 |
| 0.68 $\mu\text{F}$  | - 468            | 12.0                                   | 29.0 | 13.0                                   | 34.0 | 17.5                                   | 34.0 | 25.0                                   | 44.0 |
| 1.0 $\mu\text{F}$   | - 510            | 12.5                                   | 34.0 | 15.5                                   | 34.0 | 17.5                                   | 44.0 | —                                      | —    |
| 1.5 $\mu\text{F}$   | - 515            | 15.5                                   | 34.0 | 15.5                                   | 44.0 | 21.5                                   | 44.0 | —                                      | —    |
| 2.2 $\mu\text{F}$   | - 522            | 15.5                                   | 44.0 | 18.5                                   | 44.0 | 26.0                                   | 44.0 | —                                      | —    |
| 3.3 $\mu\text{F}$   | - 533            | 18.5                                   | 44.0 | 22.5                                   | 44.0 | —                                      | —    | —                                      | —    |
| 4.7 $\mu\text{F}$   | - 547            | 22.0                                   | 44.0 | —                                      | —    | —                                      | —    | —                                      | —    |

Further C-values on request  
 $\text{pcm} = L + 3.5$

**RECOMMENDED PACKAGING**

| LETTER CODE | TYPE OF PACKAGING      | REEL DIAMETER (mm) | ORDERING CODE EXAMPLE |   |
|-------------|------------------------|--------------------|-----------------------|---|
| G           | AMMO                   | —                  | MKP 1845-310-135-G    | X |
| R           | REEL                   | 350                | MKP 1845-310-135-R    | X |
| —           | BULK<br>for L > 31.5mm | —                  | MKP 1845-410-135      | X |

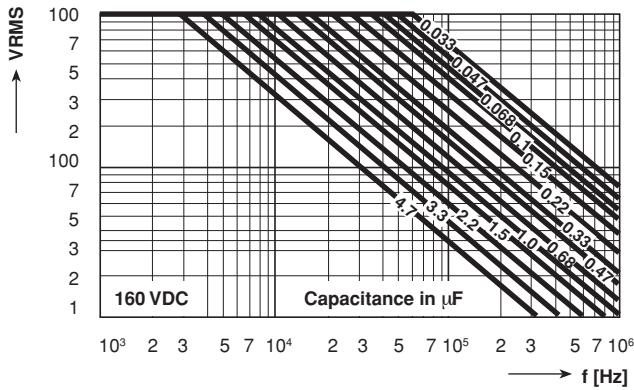


| CAPACITANCE | CAPACITANCE CODE | VOLTAGE CODE 10<br>1000 VDC/<br>600 VAC |      | VOLTAGE CODE 13<br>1600VDC/<br>650 VAC |      | VOLTAGE CODE 20<br>2000 VDC/<br>700 VAC |      |
|-------------|------------------|---|------|--|------|---|------|
|             |                  | D                                       | L    | D                                      | L    | D                                       | L    |
| 1000 pF     | - 210            | —                                       | —    | —                                      | —    | 6.5                                     | 29.0 |
| 1500 pF     | - 215            | —                                       | —    | —                                      | —    | 6.5                                     | 29.0 |
| 2200 pF     | - 222            | —                                       | —    | —                                      | —    | 6.5                                     | 29.0 |
| 3300 pF     | - 233            | —                                       | —    | —                                      | —    | 7.0                                     | 29.0 |
| 4700 pF     | - 247            | —                                       | —    | —                                      | —    | 8.0                                     | 29.0 |
| 6800 pF     | - 268            | —                                       | —    | —                                      | —    | 9.5                                     | 29.0 |
| 0.01 μF     | - 310            | 6.5                                     | 29.0 | 8.0                                    | 29.0 | 11.0                                    | 29.0 |
| 0.015 μF    | - 315            | 8.0                                     | 29.0 | 9.5                                    | 29.0 | 11.5                                    | 34.0 |
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| 0.15 μF     | - 415            | 15.0                                    | 44.0 | 18.5                                   | 44.0 | —                                       | —    |
| 0.22 μF     | - 422            | 18.0                                    | 44.0 | 22.0                                   | 44.0 | —                                       | —    |
| 0.33 μF     | - 433            | —                                       | —    | —                                      | —    | —                                       | —    |
| 0.47 μF     | - 447            | —                                       | —    | —                                      | —    | —                                       | —    |
| 0.68 μF     | - 468            | —                                       | —    | —                                      | —    | —                                       | —    |
| 1.0 μF      | - 510            | —                                       | —    | —                                      | —    | —                                       | —    |
| 1.5 μF      | - 515            | —                                       | —    | —                                      | —    | —                                       | —    |
| 2.2 μF      | - 522            | —                                       | —    | —                                      | —    | —                                       | —    |
| 3.3 μF      | - 533            | —                                       | —    | —                                      | —    | —                                       | —    |
| 4.7 μF      | - 547            | —                                       | —    | —                                      | —    | —                                       | —    |

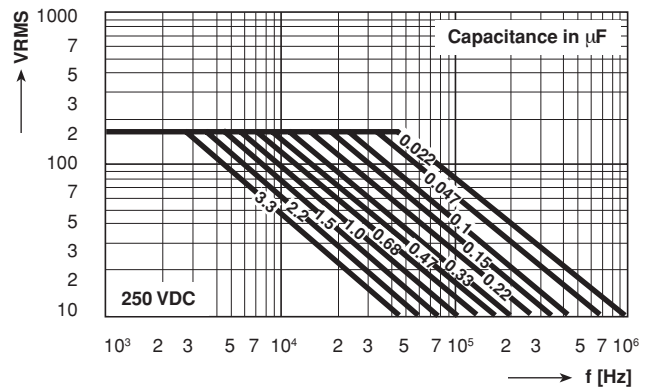
Further C-values on request  
 $pcm = L + 3.5$

## RECOMMENDED PACKAGING

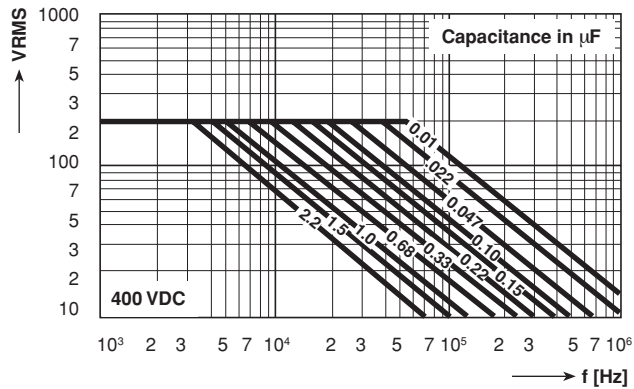
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|-------------|------------------------|--------------------|-----------------------|---|
| G           | AMMO                   | —                  | MKP 1845-310-135-G    | X |
| R           | REEL                   | 350                | MKP 1845-310-135-R    | X |
| —           | BULK<br>for L > 31.5mm | —                  | MKP 1845-410-135      | X |



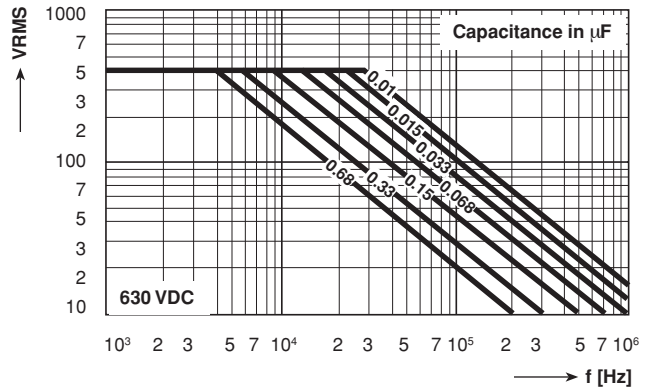
Permissible AC Voltage versus Frequency



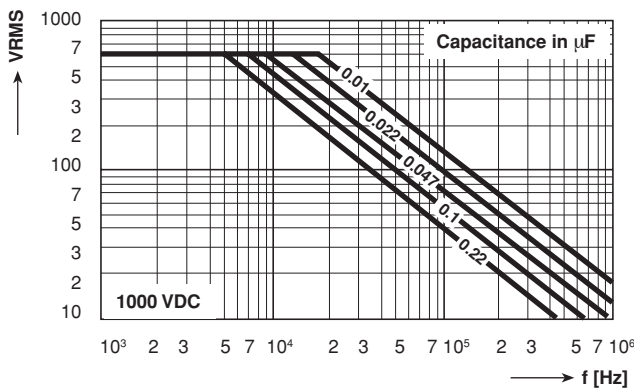
Permissible AC Voltage versus Frequency



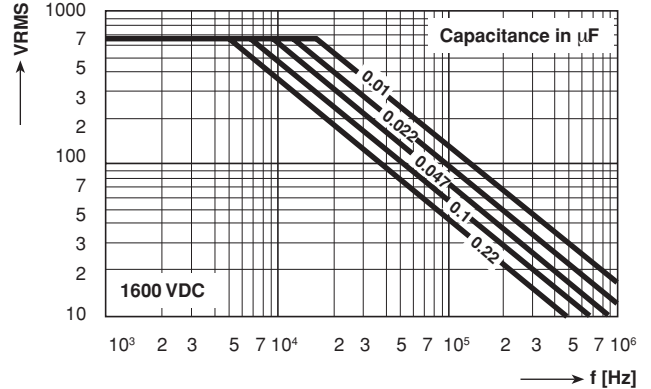
Permissible AC Voltage versus Frequency



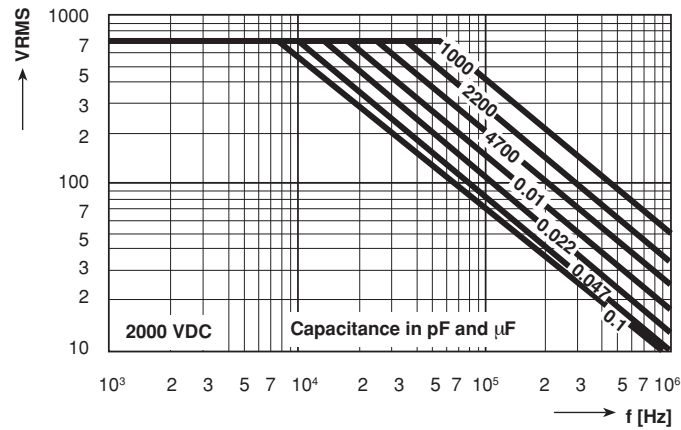
Permissible AC Voltage versus Frequency



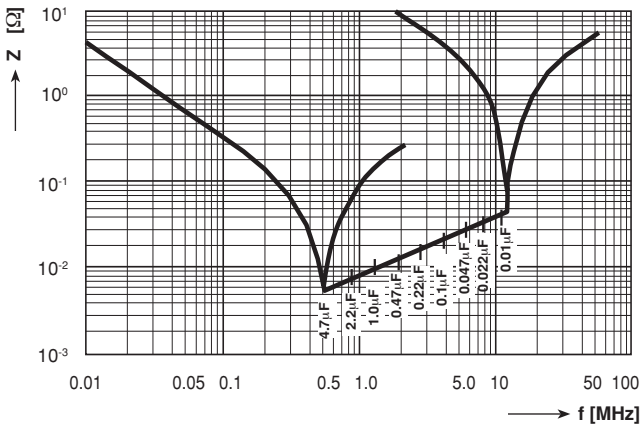
Permissible AC Voltage versus Frequency



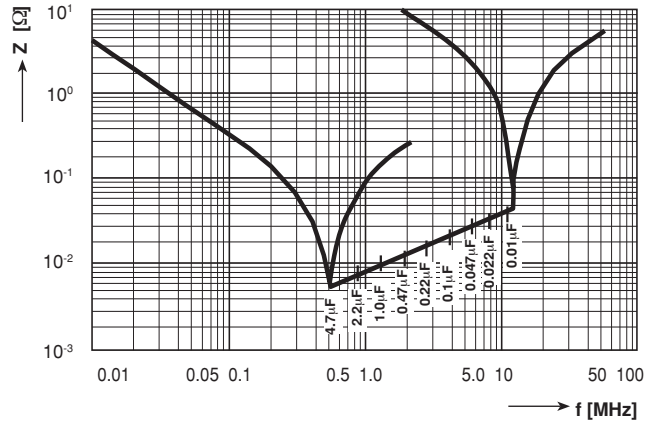
Permissible AC Voltage versus Frequency



Permissible AC Voltage versus Frequency



Impedance versus Frequency  $Z = f(f)$   
(Lead length 6.0mm) 160 VDC to 630 VDC



Impedance versus Frequency  $Z = f(f)$   
(Lead length 6.0mm) 1000 VDC to 2000 VDC