

## Film Capacitors

### Metallized Polypropylene Film Capacitors (MKP)

**Series/Type:** B32671L ... B32672L

**Date:** December 2012

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**Typical applications**

- Electronic ballasts (resonant circuits)
- SMPS
- High-frequency AC loads
- Pulse circuits

**Climatic**

- Max. operating temperature: 125 °C
- Climatic category (IEC 60068-1): 55/110/56

**Construction**

- Dielectric: metallized polypropylene (PP)
- Wound capacitor technology
- Plastic case (UL 94 V-0)
- Epoxy resin sealing

**Features**

- Very high AC voltages for all frequency ranges
- Very small dimensions
- High peak voltage for short time periods
- High peak current
- High pulse withstand capability
- RoHS-compatible
- Halogen-free capacitors available on request

**Terminals**

- Parallel wire leads, lead-free tinned
- Special lead lengths available on request

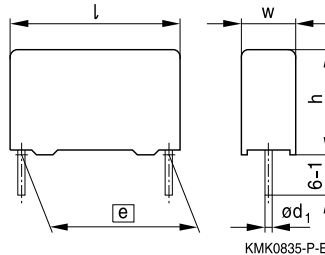
**Marking**

- Manufacturer's logo
- lot number, series number
- Rated capacitance (coded)
- Capacitance tolerance (code letter)
- Rated AC voltage
- Date of manufacture (coded)

**Delivery mode**

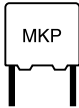
- Bulk (untaped)
- Taped (Ammo pack or reel)

For notes on taping, refer to chapter "Taping and packing".

**Dimensional drawing**


Dimensions in mm

| Lead spacing | Lead diameter | Type    |
|--------------|---------------|---------|
| $e \pm 0.4$  | $d_1$         |         |
| 10           | 0.6           | B32671L |
| 15           | 0.8           | B32672L |

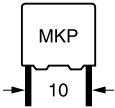


**B32671L ... B32672L**

**High V AC, high temperature (wound)**

**Overview of available types**

| Lead spacing     | 10 mm   |     |      |      |      |      | 15 mm   |     |     |      |      |      |      |      |
|------------------|---------|-----|------|------|------|------|---------|-----|-----|------|------|------|------|------|
| Type             | B32671L |     |      |      |      |      | B32672L |     |     |      |      |      |      |      |
| Page             | 4       |     |      |      |      |      | 6       |     |     |      |      |      |      |      |
| $V_{RMS}$ (V AC) | 200     | 250 | 250  | 500  | 600  | 700  | 160     | 200 | 250 | 250  | 500  | 600  | 700  | 900  |
| $V_R$ (V DC)     | 400     | 630 | 1000 | 1000 | 1600 | 2000 | 250     | 420 | 630 | 1000 | 1300 | 1600 | 2000 | 2000 |
| $C_R$ (nF)       |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 0.68             |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 1.0              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 1.2              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 1.5              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 2.2              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 2.7              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 3.3              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 3.9              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 4.7              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 5.6              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 6.2              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 6.8              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 8.2              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 10               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 12               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 15               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 22               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 33               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 47               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 56               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 68               |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 100              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 150              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 220              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 330              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 390              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 470              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 680              |         |     |      |      |      |      |         |     |     |      |      |      |      |      |
| 1000             |         |     |      |      |      |      |         |     |     |      |      |      |      |      |


**B32671L**
**High V AC, high temperature (wound)**
**Ordering codes and packing units (lead spacing 10 mm)**

| $V_{RMS}$<br>$f \leq 1$ kHz<br>V AC | $V_R$<br>V DC | $C_R$<br>nF | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./MOQ | Reel<br>pcs./<br>MOQ | Untaped<br>pcs./<br>MOQ |
|-------------------------------------|---------------|-------------|--|---|--------------------------|----------------------|-------------------------|
| 200                                 | 400           | 22          | 4.0 × 9.0 × 13.0                               | B32671L4223+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 33          | 4.0 × 9.0 × 13.0                               | B32671L4333+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 47          | 5.0 × 11.0 × 13.0                              | B32671L4473+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 68          | 5.0 × 11.0 × 13.0                              | B32671L4683+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 100         | 6.0 × 12.0 × 13.0                              | B32671L4104+***                             | 2720                     | 4400                 | 4000                    |
| 250                                 | 630           | 15          | 4.0 × 9.0 × 13.0                               | B32671L6153+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 22          | 5.0 × 11.0 × 13.0                              | B32671L6223+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 33          | 5.0 × 11.0 × 13.0                              | B32671L6333+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 47          | 6.0 × 12.0 × 13.0                              | B32671L6473+***                             | 2720                     | 4400                 | 4000                    |
|                                     |               | 56          | 6.0 × 12.0 × 13.0                              | B32671L6563+***                             | 2720                     | 4400                 | 4000                    |
| 250                                 | 1000          | 4.7         | 4.0 × 9.0 × 13.0                               | B32671L9472+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 6.8         | 4.0 × 9.0 × 13.0                               | B32671L9682+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 10          | 5.0 × 11.0 × 13.0                              | B32671L9103+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 15          | 5.0 × 11.0 × 13.0                              | B32671L9153+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 22          | 6.0 × 12.0 × 13.0                              | B32671L9223+***                             | 2720                     | 4400                 | 4000                    |
| 500                                 | 1000          | 3.3         | 4.0 × 9.0 × 13.0                               | B32671L0332+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 3.9         | 4.0 × 9.0 × 13.0                               | B32671L0392+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 4.7         | 4.0 × 9.0 × 13.0                               | B32671L0472+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 5.6         | 5.0 × 11.0 × 13.0                              | B32671L0562+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 6.2         | 5.0 × 11.0 × 13.0                              | B32671L0622+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 6.8         | 5.0 × 11.0 × 13.0                              | B32671L0682+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 8.2         | 6.0 × 12.0 × 13.0                              | B32671L0822+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 10          | 6.0 × 12.0 × 13.0                              | B32671L0103+***                             | 2720                     | 4400                 | 4000                    |
|                                     |               | 12          | 6.0 × 12.0 × 13.0                              | B32671L0123+***                             | 2720                     | 4400                 | 4000                    |

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series, intermediate capacitance values and closer tolerances on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K = ±10%

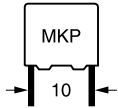
J = ±5%

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)


**Ordering codes and packing units (lead spacing 10 mm)**

| $V_{RMS}$<br>$f \leq 1$ kHz<br>V AC | $V_R$<br>V DC | $C_R$<br>nF | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./MOQ | Reel<br>pcs./<br>MOQ | Untaped<br>pcs./<br>MOQ |
|-------------------------------------|---------------|-------------|--|---|--------------------------|----------------------|-------------------------|
| 600                                 | 1600          | 1.2         | 4.0 × 9.0 × 13.0                               | B32671L1122+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 1.5         | 4.0 × 9.0 × 13.0                               | B32671L1152+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 2.2         | 5.0 × 11.0 × 13.0                              | B32671L1222+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 2.7         | 5.0 × 11.0 × 13.0                              | B32671L1272+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 3.3         | 6.0 × 12.0 × 13.0                              | B32671L1332+***                             | 2720                     | 4400                 | 4000                    |
|                                     |               | 3.9         | 6.0 × 12.0 × 13.0                              | B32671L1392+***                             | 2720                     | 4400                 | 4000                    |
|                                     |               | 4.7         | 6.0 × 12.0 × 13.0                              | B32671L1472+***                             | 2720                     | 4400                 | 4000                    |
| 700                                 | 2000          | 1.0         | 4.0 × 9.0 × 13.0                               | B32671L8102+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 1.2         | 4.0 × 9.0 × 13.0                               | B32671L8122+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 1.5         | 4.0 × 9.0 × 13.0                               | B32671L8152+***                             | 4000                     | 6800                 | 4000                    |
|                                     |               | 2.2         | 5.0 × 11.0 × 13.0                              | B32671L8222+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 2.7         | 5.0 × 11.0 × 13.0                              | B32671L8272+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 3.3         | 5.0 × 11.0 × 13.0                              | B32671L8332+***                             | 3320                     | 5200                 | 4000                    |
|                                     |               | 3.9         | 6.0 × 12.0 × 13.0                              | B32671L8392+***                             | 2720                     | 4400                 | 4000                    |
|                                     |               | 4.7         | 6.0 × 12.0 × 13.0                              | B32671L8472+***                             | 2720                     | 4400                 | 4000                    |

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series, intermediate capacitance values and closer tolerances on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K = ±10%

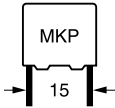
J = ±5%

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)


**B32672L**
**High V AC, high temperature (wound)**
**Ordering codes and packing units (lead spacing 15 mm)**

| $V_{RMS}$<br>$f \leq 1$ kHz<br>V AC | $V_R$<br>V DC | $C_R$<br>nF | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./MOQ | Reel<br>pcs./<br>MOQ | Untaped<br>pcs./<br>MOQ |
|-------------------------------------|---------------|-------------|--|---|--------------------------|----------------------|-------------------------|
| 160                                 | 250           | 150         | 5.0 × 10.5 × 18.0                              | B32672L2154+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 220         | 6.0 × 11.0 × 18.0                              | B32672L2224+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 330         | 7.0 × 12.5 × 18.0                              | B32672L2334+***                             | 3320                     | 3600                 | 4000                    |
|                                     |               | 470         | 8.5 × 14.5 × 18.0                              | B32672L2474+***                             | 2720                     | 2800                 | 2000                    |
|                                     |               | 680         | 9.0 × 17.5 × 18.0                              | B32672L2684+***                             | 2560                     | 2800                 | 2000                    |
|                                     |               | 1000        | 11.0 × 18.5 × 18.0                             | B32672L2105+***                             | –                        | 2200                 | 1000                    |
| 200                                 | 420           | 68          | 5.0 × 10.5 × 18.0                              | B32672L4683+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 100         | 5.0 × 10.5 × 18.0                              | B32672L4104+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 150         | 6.0 × 11.0 × 18.0                              | B32672L4154+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 220         | 7.0 × 12.5 × 18.0                              | B32672L4224+***                             | 3320                     | 3600                 | 4000                    |
|                                     |               | 330         | 8.0 × 14.0 × 18.0                              | B32672L4334+***                             | 2920                     | 3000                 | 2000                    |
|                                     |               | 470         | 9.0 × 17.5 × 18.0                              | B32672L4474+***                             | 2560                     | 2800                 | 2000                    |
|                                     |               | 680         | 11.0 × 18.5 × 18.0                             | B32672L4684+***                             | –                        | 2200                 | 1000                    |
| 250                                 | 630           | 33          | 5.0 × 10.5 × 18.0                              | B32672L6333+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 47          | 5.0 × 10.5 × 18.0                              | B32672L6473+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 68          | 6.0 × 11.0 × 18.0                              | B32672L6683+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 100         | 7.0 × 12.5 × 18.0                              | B32672L6104+***                             | 3320                     | 3600                 | 4000                    |
|                                     |               | 150         | 8.5 × 14.5 × 18.0                              | B32672L6154+***                             | 2720                     | 2800                 | 2000                    |
|                                     |               | 220         | 9.0 × 17.5 × 18.0                              | B32672L6224+***                             | 2560                     | 2800                 | 2000                    |
|                                     |               | 390         | 11.0 × 18.5 × 18.0                             | B32672L6394J***                             | –                        | 2200                 | 1000                    |
| 250                                 | 1000          | 10          | 5.0 × 10.5 × 18.0                              | B32672L0103+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 15          | 5.0 × 10.5 × 18.0                              | B32672L0153+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 22          | 5.0 × 10.5 × 18.0                              | B32672L0223+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 33          | 6.0 × 11.0 × 18.0                              | B32672L0333+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 47          | 7.0 × 12.5 × 18.0                              | B32672L0473+***                             | 3320                     | 3600                 | 4000                    |
|                                     |               | 68          | 8.5 × 14.5 × 18.0                              | B32672L0683+***                             | 2720                     | 2800                 | 2000                    |
|                                     |               | 100         | 9.0 × 17.5 × 18.0                              | B32672L0104+***                             | 2560                     | 2800                 | 2000                    |
|                                     |               | 150         | 11.0 × 18.5 × 18.0                             | B32672L0154J***                             | –                        | 2200                 | 1000                    |

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series, intermediate capacitance values and closer tolerances on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K = ±10%

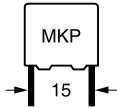
J = ±5%

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)

**B32672L**
**High V AC, high temperature (wound)**

**Ordering codes and packing units (lead spacing 15 mm)**

| $V_{RMS}$<br>$f \leq 1$ kHz<br>V AC | $V_R$<br>V DC | $C_R$<br>nF | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./MOQ | Reel<br>pcs./<br>MOQ | Untaped<br>pcs./<br>MOQ |
|-------------------------------------|---------------|-------------|--|---|--------------------------|----------------------|-------------------------|
| 500                                 | 1300          | 6.8         | 5.0 × 10.5 × 18.0                              | B32672L7682+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 10          | 5.0 × 10.5 × 18.0                              | B32672L7103+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 22          | 7.0 × 12.5 × 18.0                              | B32672L7223+***                             | 3320                     | 3600                 | 4000                    |
|                                     |               | 33          | 8.5 × 14.5 × 18.0                              | B32672L7333+***                             | 2720                     | 2800                 | 2000                    |
|                                     |               | 47          | 9.0 × 17.5 × 18.0                              | B32672L7473+***                             | 2560                     | 2800                 | 2000                    |
|                                     |               | 68          | 11.0 × 18.5 × 18.0                             | B32672L7683J***                             | –                        | 2200                 | 1000                    |
| 600                                 | 1600          | 6.2         | 5.0 × 10.5 × 18.0                              | B32672L1622+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 6.8         | 5.0 × 10.5 × 18.0                              | B32672L1682+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 8.2         | 6.0 × 11.0 × 18.0                              | B32672L1822+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 10          | 6.0 × 11.0 × 18.0                              | B32672L1103+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 12          | 6.0 × 12.0 × 18.0                              | B32672L1123+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 15          | 7.0 × 12.5 × 18.0                              | B32672L1153+***                             | 3320                     | 3600                 | 4000                    |
|                                     |               | 22          | 8.5 × 14.5 × 18.0                              | B32672L1223+***                             | 2720                     | 2800                 | 2000                    |
|                                     |               | 33          | 9.0 × 17.5 × 18.0                              | B32672L1333+***                             | 2560                     | 2800                 | 2000                    |
|                                     |               | 47          | 11.0 × 18.5 × 18.0                             | B32672L1473J***                             | –                        | 2200                 | 1000                    |
| 700                                 | 2000          | 1.0         | 5.0 × 10.5 × 18.0                              | B32672L8102+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 1.2         | 5.0 × 10.5 × 18.0                              | B32672L8122+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 1.5         | 5.0 × 10.5 × 18.0                              | B32672L8152+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 2.2         | 5.0 × 10.5 × 18.0                              | B32672L8222+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 2.7         | 5.0 × 10.5 × 18.0                              | B32672L8272+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 3.3         | 5.0 × 10.5 × 18.0                              | B32672L8332+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 3.9         | 5.0 × 10.5 × 18.0                              | B32672L8392+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 4.7         | 5.0 × 10.5 × 18.0                              | B32672L8472+***                             | 4680                     | 5200                 | 4000                    |
|                                     |               | 5.6         | 6.0 × 11.0 × 18.0                              | B32672L8562+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 6.2         | 6.0 × 11.0 × 18.0                              | B32672L8622+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 6.8         | 6.0 × 11.0 × 18.0                              | B32672L8682+***                             | 3840                     | 4400                 | 4000                    |
|                                     |               | 8.2         | 6.0 × 12.0 × 18.0                              | B32672L8822+***                             | 3840                     | 4400                 | 4000                    |

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series, intermediate capacitance values and closer tolerances on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K = ±10%

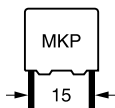
J = ±5%

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)


**B32672L**
**High V AC, high temperature (wound)**
**Ordering codes and packing units (lead spacing 15 mm)**

| $V_{RMS}$<br>$f \leq 1$ kHz<br>V AC | $V_R$<br>V DC      | $C_R$<br>nF     | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./MOQ | Reel<br>pcs./<br>MOQ | Untaped<br>pcs./<br>MOQ |
|-------------------------------------|--------------------|-----------------|--|---|--------------------------|----------------------|-------------------------|
| 700                                 | 2000               | 10              | 7.0 × 12.5 × 18.0                              | B32672L8103+***                             | 3320                     | 3600                 | 4000                    |
|                                     |                    | 12              | 8.5 × 14.5 × 18.0                              | B32672L8123+***                             | 2720                     | 2800                 | 2000                    |
|                                     |                    | 15              | 8.5 × 14.5 × 18.0                              | B32672L8153+***                             | 2720                     | 2800                 | 2000                    |
|                                     |                    | 22              | 9.0 × 17.5 × 18.0                              | B32672L8223+***                             | 2560                     | 2800                 | 2000                    |
|                                     |                    | 33              | 11.0 × 18.5 × 18.0                             | B32672L8333J***                             | –                        | 2200                 | 1000                    |
| 900                                 | 2000               | 0.68            | 5.0 × 10.5 × 18.0                              | B32672L9681+***                             | 4680                     | 5200                 | 4000                    |
|                                     |                    | 1.0             | 5.0 × 10.5 × 18.0                              | B32672L9102+***                             | 4680                     | 5200                 | 4000                    |
|                                     |                    | 1.2             | 6.0 × 11.0 × 18.0                              | B32672L9122J***                             | 3840                     | 4400                 | 4000                    |
|                                     |                    | 1.5             | 6.0 × 11.0 × 18.0                              | B32672L9152+***                             | 3840                     | 4400                 | 4000                    |
|                                     |                    | 2.2             | 7.0 × 12.5 × 18.0                              | B32672L9222+***                             | 3320                     | 3600                 | 4000                    |
|                                     |                    | 2.7             | 8.0 × 14.5 × 18.0                              | B32672L9272J***                             | 2920                     | 3000                 | 2000                    |
|                                     |                    | 3.3             | 8.5 × 14.5 × 18.0                              | B32672L9332+***                             | 2720                     | 2800                 | 2000                    |
|                                     |                    | 3.9             | 9.0 × 17.5 × 18.0                              | B32672L9392J***                             | 2560                     | 2800                 | 2000                    |
|                                     |                    | 4.7             | 9.0 × 17.5 × 18.0                              | B32672L9472+***                             | 2560                     | 2800                 | 2000                    |
|                                     |                    | 5.6             | 11.0 × 18.5 × 18.0                             | B32672L9562+***                             | –                        | 2200                 | 1000                    |
|                                     |                    | 6.2             | 11.0 × 18.5 × 18.0                             | B32672L9622J***                             | –                        | 2200                 | 1000                    |
| 6.8                                 | 11.0 × 18.5 × 18.0 | B32672L9682K*** | –  | 2200  | 1000                     |                      |                         |

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series, intermediate capacitance values and closer tolerances on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K = ±10%

J = ±5%

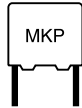
\*\*\* = Packaging code:

289 = Ammo pack

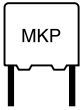
189 = Reel

000 = Untaped (lead length 6 – 1 mm)




**B32671L ... B32672L**
**High V AC, high temperature (wound)**
**Technical data**

|   |  |  |                                     |  |               |
|---|--|--|-------------------------------------|--|---------------|
| Operating temperature range   | Max. operating temperature $T_{op,max}$  | +125 °C  |                                     |  |               |
|   | Upper category temperature $T_{max}$   | +110 °C  |                                     |  |               |
|   | Lower category temperature $T_{min}$   | -55 °C   |                                     |  |               |
|   | Rated temperature $T_R$  | +85 °C   |                                     |  |               |
| Dissipation factor $\tan \delta$ (in $10^{-3}$ )<br>at 20 °C<br>(upper limit values)                    | at   | $\leq 27$ nF   | $27$ nF $< C_R \leq 0.1$ $\mu$ F    | $0.1$ $\mu$ F $< C_R \leq 1$ $\mu$ F   | $> 1$ $\mu$ F |
|   | 1 kHz  | 0.8  | 0.8                                 | 0.8  | 0.8           |
|   | 10 kHz   | 1.0  | 1.0                                 | 1.0  | —             |
|   | 100 kHz  | 2.0  | 3.0                                 | —  | —             |
| Insulation resistance $R_{ins}$<br>at 20 °C, rel. humidity $\leq 65\%$<br>(minimum as-delivered values) | $> 100$ G $\Omega$ ( $C_R \leq 0.33$ $\mu$ F)<br>$< 30000$ s ( $C_R > 0.33$ $\mu$ F)                         |  |                                     |  |               |
| DC test voltage   | $1.6 \cdot V_R$ , 2 s  |  |                                     |  |               |
| Category voltage $V_C$<br>(continuous operation with $V_{DC}$<br>or $V_{AC}$ at $f \leq 1$ kHz)         | $T_A$ (°C)   | DC voltage derating  |                                     | AC voltage derating  |               |
|   | $T_A \leq 85$<br>$85 < T_A \leq 110$   | $V_C = V_R$<br>$V_C = V_R \cdot (165 - T_A)/80$                          |                                     | $V_{C,RMS} = V_{RMS}$<br>$V_{C,RMS} = V_{RMS} \cdot (165 - T_A)/80$                |               |
| Operating voltage $V_{op}$ for<br>short operating periods<br>( $V_{DC}$ or $V_{AC}$ at $f \leq 1$ kHz)  | $T_A$ (°C)   | DC voltage (max. hours)  |                                     | AC voltage (max. hours)  |               |
|   | $T_A \leq 100$<br>$100 < T_A \leq 125$   | $V_{op} = 1.25 \cdot V_C$ (2000 h)<br>$V_{op} = 1.25 \cdot V_C$ (1000 h) |                                     | $V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)<br>$V_{op} = 1.0 \cdot V_{C,RMS}$ (1000 h) |               |
| Damp heat test  | 56 days/40 °C/93% relative humidity  |  |                                     |  |               |
| Limit values after damp<br>heat test  | Capacitance change $ \Delta C/C $  |  | $\leq 2\%$                          |  |               |
|   | Dissipation factor change $\Delta \tan \delta$   |  | $\leq 1.0 \cdot 10^{-3}$ (at 1 kHz) |  |               |
|   | Insulation resistance $R_{ins}$  |  | $\geq 50$ G $\Omega$                |  |               |
| Reliability:  |  |  |                                     |  |               |
| Failure rate $\lambda$  | 1 fit ( $\leq 1 \cdot 10^{-9}$ /h) at $0.5 \cdot V_R$ , 40 °C  |  |                                     |  |               |
| Service life $t_{SL}$   | 200 000 h at $1.0 \cdot V_R$ , 85 °C   |  |                                     |  |               |
|   | For conversion to other operating conditions and temperatures,<br>refer to chapter "Quality, 2 Reliability". |  |                                     |  |               |
| Failure criteria:   |  |  |                                     |  |               |
| Total failure   | Short circuit or open circuit  |  |                                     |  |               |
| Failure due to variation<br>of parameters   | Capacitance change $ \Delta C/C $  |  | $> 10\%$                            |  |               |
|   | Dissipation factor $\tan \delta$   |  | $> 4 \cdot$ upper limit values      |  |               |
|   | Insulation resistance $R_{ins}$  |  | $< 1500$ M $\Omega$                 |  |               |



**B32671L ... B32672L**

**High V AC, high temperature (wound)**

### Pulse handling capability

"dV/dt" represents the maximum permissible voltage change per unit of time for non-sinusoidal voltages, expressed in V/μs.

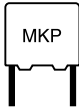
"k<sub>0</sub>" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V<sup>2</sup>/μs.

*Note:*

*The values of dV/dt and k<sub>0</sub> provided below must not be exceeded in order to avoid damaging the capacitor.*

### dV/dt values

|                         |               |     |      |      |      |       |
|-------------------------|---------------|-----|------|------|------|-------|
| Lead spacing            | 10 mm         |     |      |      |      |       |
| Type                    | B32671L       |     |      |      |      |       |
| V <sub>RMS</sub> (V AC) | 200           | 250 |      | 500  | 600  | 700   |
| V <sub>R</sub> (V DC)   | 400           | 630 | 1000 | 1000 | 1600 | 2000  |
| C <sub>R</sub> (nF)     | dV/dt in V/μs |     |      |      |      |       |
| 1.0                     | –             | –   | –    | –    | –    | 11000 |
| 1.2                     | –             | –   | –    | –    | 6000 | 10000 |
| 1.5                     | –             | –   | –    | –    | 5600 | 9500  |
| 2.2                     | –             | –   | –    | –    | 5200 | 9000  |
| 2.7                     | –             | –   | –    | –    | 5000 | 8600  |
| 3.3                     | –             | –   | –    | 4700 | 4700 | 8500  |
| 3.9                     | –             | –   | –    | 4300 | 4500 | 8200  |
| 4.7                     | –             | –   | 810  | 3800 | 4000 | 8000  |
| 5.6                     | –             | –   | –    | 3400 | –    | –     |
| 6.2                     | –             | –   | –    | 3200 | –    | –     |
| 6.8                     | –             | –   | 810  | 3100 | –    | –     |
| 8.2                     | –             | –   | –    | 2700 | –    | –     |
| 10                      | –             | –   | 810  | 2500 | –    | –     |
| 12                      | –             | –   | –    | 2300 | –    | –     |
| 15                      | –             | 540 | 810  | –    | –    | –     |
| 22                      | 400           | 540 | 810  | –    | –    | –     |
| 33                      | 400           | 540 | –    | –    | –    | –     |
| 47                      | 400           | 540 | –    | –    | –    | –     |
| 56                      | –             | 540 | –    | –    | –    | –     |
| 68                      | 400           | –   | –    | –    | –    | –     |
| 100                     | 400           | –   | –    | –    | –    | –     |


**dV/dt values**

|                         |               |     |     |      |      |      |       |       |
|-------------------------|---------------|-----|-----|------|------|------|-------|-------|
| Lead spacing            | 15 mm         |     |     |      |      |      |       |       |
| Type                    | B32672L       |     |     |      |      |      |       |       |
| V <sub>RMS</sub> (V AC) | 160           | 200 | 250 |      | 500  | 600  | 700   | 900   |
| V <sub>R</sub> (V DC)   | 250           | 420 | 630 | 1000 | 1300 | 1600 | 2000  | 2000  |
| C <sub>R</sub> (nF)     | dV/dt in V/μs |     |     |      |      |      |       |       |
| 0.68                    | –             | –   | –   | –    | –    | –    | –     | 15000 |
| 1.0                     | –             | –   | –   | –    | –    | –    | 10000 | 15000 |
| 1.2                     | –             | –   | –   | –    | –    | –    | 9400  | 14100 |
| 1.5                     | –             | –   | –   | –    | –    | –    | 9000  | 13500 |
| 2.2                     | –             | –   | –   | –    | –    | –    | 7500  | 11000 |
| 2.7                     | –             | –   | –   | –    | –    | –    | 7100  | 10600 |
| 3.3                     | –             | –   | –   | –    | –    | –    | 6800  | 10000 |
| 3.9                     | –             | –   | –   | –    | –    | –    | 6000  | 9000  |
| 4.7                     | –             | –   | –   | –    | –    | –    | 5500  | 8200  |
| 5.6                     | –             | –   | –   | –    | –    | –    | 5000  | 7500  |
| 6.2                     | –             | –   | –   | –    | –    | 3600 | 4700  | 7000  |
| 6.8                     | –             | –   | –   | –    | 1000 | 3500 | 4500  | 6700  |
| 8.2                     | –             | –   | –   | –    | –    | 3100 | 4200  | –     |
| 10                      | –             | –   | –   | 445  | 1000 | 2800 | 3900  | –     |
| 12                      | –             | –   | –   | –    | –    | 2600 | 3600  | –     |
| 15                      | –             | –   | –   | 445  | –    | 2300 | 3300  | –     |
| 22                      | –             | –   | –   | 445  | 1000 | 2000 | 2900  | –     |
| 33                      | –             | –   | 300 | 445  | 1000 | 1700 | 2300  | –     |
| 47                      | –             | –   | 300 | 445  | 1000 | 1400 | –     | –     |
| 56                      | –             | –   | –   | –    | –    | –    | –     | –     |
| 68                      | –             | 200 | 300 | 445  | 1000 | –    | –     | –     |
| 100                     | –             | 200 | 300 | 445  | –    | –    | –     | –     |
| 150                     | 170           | 200 | 300 | 445  | –    | –    | –     | –     |
| 220                     | 170           | 200 | 300 | –    | –    | –    | –     | –     |
| 330                     | 170           | 200 | –   | –    | –    | –    | –     | –     |
| 390                     | –             | –   | 300 | –    | –    | –    | –     | –     |
| 470                     | 170           | 200 | –   | –    | –    | –    | –     | –     |
| 680                     | 170           | 200 | –   | –    | –    | –    | –     | –     |
| 1000                    | 170           | –   | –   | –    | –    | –    | –     | –     |

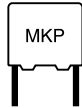


**B32671L ... B32672L**

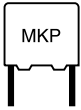
**High V AC, high temperature (wound)**

**k<sub>0</sub> values**

|                         |                                      |        |        |         |          |          |
|-------------------------|--------------------------------------|--------|--------|---------|----------|----------|
| Lead spacing            | 10 mm                                |        |        |         |          |          |
| Type                    | B32671L                              |        |        |         |          |          |
| V <sub>RMS</sub> (V AC) | 200                                  | 250    |        | 500     | 600      | 700      |
| V <sub>R</sub> (V DC)   | 400                                  | 630    | 1000   | 1000    | 1600     | 2000     |
| C <sub>R</sub> (nF)     | k <sub>0</sub> in V <sup>2</sup> /μs |        |        |         |          |          |
| 1.0                     | –                                    | –      | –      | –       | –        | 25000000 |
| 1.2                     | –                                    | –      | –      | –       | 14400000 | 23000000 |
| 1.5                     | –                                    | –      | –      | –       | 14000000 | 22500000 |
| 2.2                     | –                                    | –      | –      | –       | 13800000 | 22000000 |
| 2.7                     | –                                    | –      | –      | –       | 13600000 | 21500000 |
| 3.3                     | –                                    | –      | –      | 9400000 | 13300000 | 21000000 |
| 3.9                     | –                                    | –      | –      | 8600000 | 13100000 | 20900000 |
| 4.7                     | –                                    | –      | 400000 | 8200000 | 12000000 | 20800000 |
| 5.6                     | –                                    | –      | –      | 7600000 | –        | –        |
| 6.2                     | –                                    | –      | –      | 6800000 | –        | –        |
| 6.8                     | –                                    | –      | 400000 | 6200000 | –        | –        |
| 8.2                     | –                                    | –      | –      | 5400000 | –        | –        |
| 10                      | –                                    | –      | 400000 | 5000000 | –        | –        |
| 12                      | –                                    | –      | –      | 4600000 | –        | –        |
| 15                      | –                                    | 200000 | 400000 | –       | –        | –        |
| 22                      | 150000                               | 200000 | 400000 | –       | –        | –        |
| 33                      | 150000                               | 200000 | –      | –       | –        | –        |
| 47                      | 150000                               | 200000 | –      | –       | –        | –        |
| 56                      | –                                    | 200000 | –      | –       | –        | –        |
| 68                      | 150000                               | –      | –      | –       | –        | –        |
| 100                     | 150000                               | –      | –      | –       | –        | –        |


 **$k_0$  values**

|                  |                      |        |        |         |         |          |          |          |
|------------------|----------------------|--------|--------|---------|---------|----------|----------|----------|
| Lead spacing     | 15 mm                |        |        |         |         |          |          |          |
| Type             | B32672L              |        |        |         |         |          |          |          |
| $V_{RMS}$ (V AC) | 160                  | 200    | 250    |         | 500     | 600      | 700      | 900      |
| $V_R$ (V DC)     | 250                  | 420    | 630    | 1000    | 1300    | 1600     | 2000     | 2000     |
| $C_R$ (nF)       | $k_0$ in $V^2/\mu s$ |        |        |         |         |          |          |          |
| 0.68             | –                    | –      | –      | –       | –       | –        | –        | 3000000  |
| 1.0              | –                    | –      | –      | –       | –       | –        | 20300000 | 3000000  |
| 1.2              | –                    | –      | –      | –       | –       | –        | 19600000 | 29400000 |
| 1.5              | –                    | –      | –      | –       | –       | –        | 19200000 | 28000000 |
| 2.2              | –                    | –      | –      | –       | –       | –        | 18600000 | 27500000 |
| 2.7              | –                    | –      | –      | –       | –       | –        | 18200000 | 27300000 |
| 3.3              | –                    | –      | –      | –       | –       | –        | 18000000 | 27000000 |
| 3.9              | –                    | –      | –      | –       | –       | –        | 16800000 | 25200000 |
| 4.7              | –                    | –      | –      | –       | –       | –        | 15800000 | 23500000 |
| 5.6              | –                    | –      | –      | –       | –       | –        | 13100000 | 19500000 |
| 6.2              | –                    | –      | –      | –       | –       | 11520000 | 12700000 | 19000000 |
| 6.8              | –                    | –      | –      | –       | 3000000 | 11200000 | 12300000 | 18400000 |
| 8.2              | –                    | –      | –      | –       | –       | 9920000  | 11800000 | –        |
| 10               | –                    | –      | –      | 1000000 | 3000000 | 8960000  | 11100000 | –        |
| 12               | –                    | –      | –      | –       | –       | 8320000  | 10600000 | –        |
| 15               | –                    | –      | –      | 1000000 | –       | 7360000  | 10400000 | –        |
| 22               | –                    | –      | –      | 1000000 | 3000000 | 6400000  | 9300000  | –        |
| 33               | –                    | –      | 500000 | 1000000 | 3000000 | 5440000  | 9000000  | –        |
| 47               | –                    | –      | 500000 | 1000000 | 3000000 | 4480000  | –        | –        |
| 56               | –                    | –      | –      | –       | –       | –        | –        | –        |
| 68               | –                    | 120000 | 500000 | 1000000 | 3000000 | –        | –        | –        |
| 100              | –                    | 120000 | 500000 | 1000000 | –       | –        | –        | –        |
| 150              | 100000               | 120000 | 500000 | 1000000 | –       | –        | –        | –        |
| 220              | 100000               | 120000 | 500000 | –       | –       | –        | –        | –        |
| 330              | 100000               | 120000 | –      | –       | –       | –        | –        | –        |
| 390              | –                    | –      | 500000 | –       | –       | –        | –        | –        |
| 470              | 100000               | 120000 | –      | –       | –       | –        | –        | –        |
| 680              | 100000               | –      | –      | –       | –       | –        | –        | –        |
| 1000             | 100000               | –      | –      | –       | –       | –        | –        | –        |

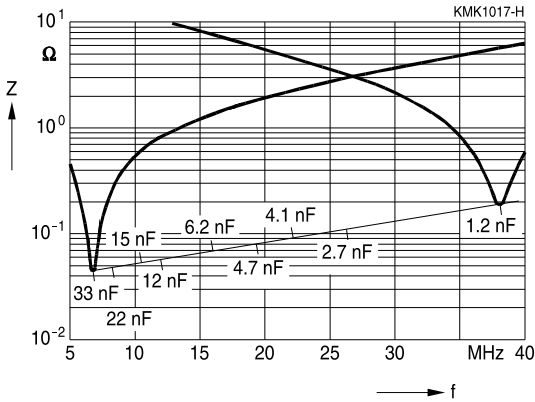


**B32671L ... B32672L**

**High V AC, high temperature (wound)**

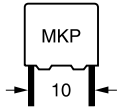
**Impedance Z versus frequency f**

(typical values)



B32671L

High V AC, high temperature (wound)

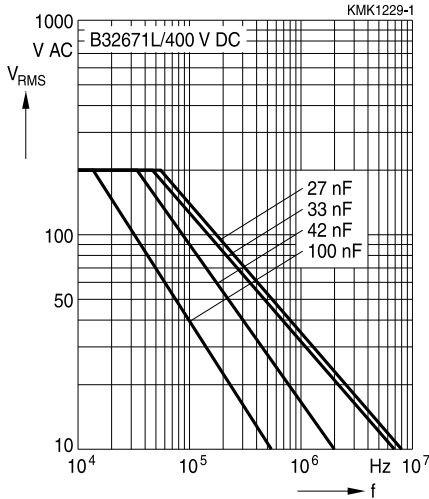


**Permissible AC voltage  $V_{RMS}$  versus frequency  $f$  (for sinusoidal waveforms  $T_A \leq 100\text{ }^\circ\text{C}$ )**

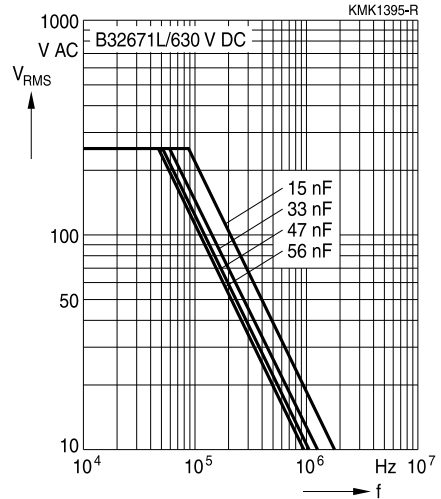
For  $T_A > 100\text{ }^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 10 mm**

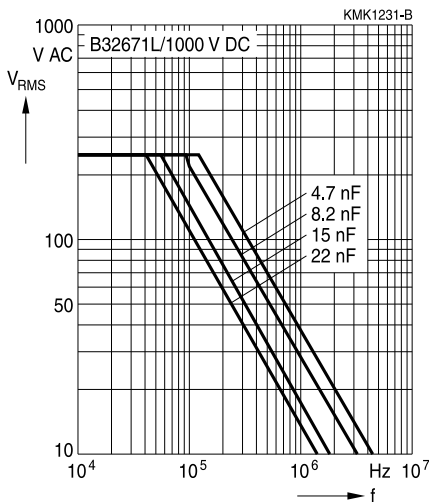
400 V DC/200 V AC



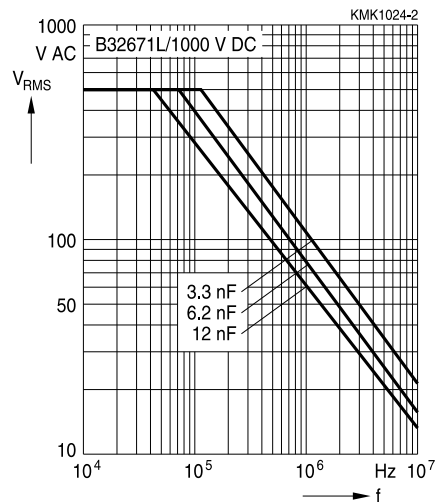
630 V DC/250 V AC

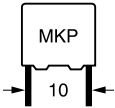


1000 V DC/250 V AC



1000 V DC/500 V AC



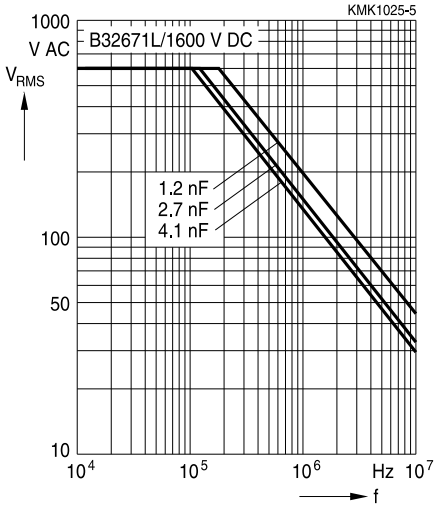


**B32671L**  
**High V AC, high temperature (wound)**

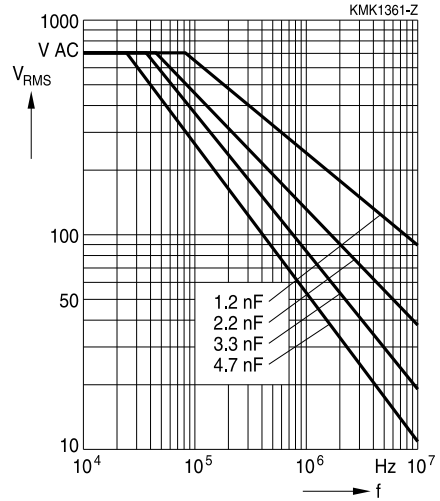
**Permissible AC voltage  $V_{RMS}$  versus frequency  $f$  (for sinusoidal waveforms  $T_A \leq 100\text{ }^\circ\text{C}$ )**  
 For  $T_A > 100\text{ }^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 10 mm**

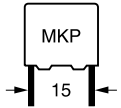
1600 V DC/600 V AC



2000 V DC/700 V AC



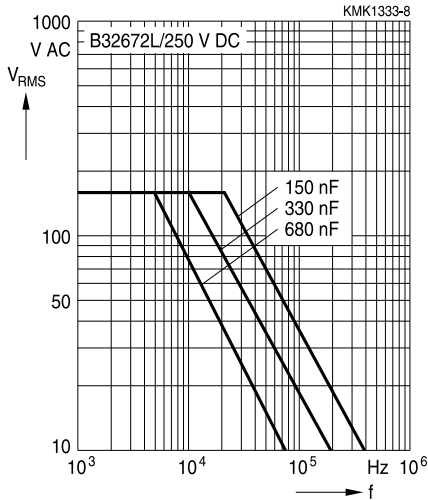




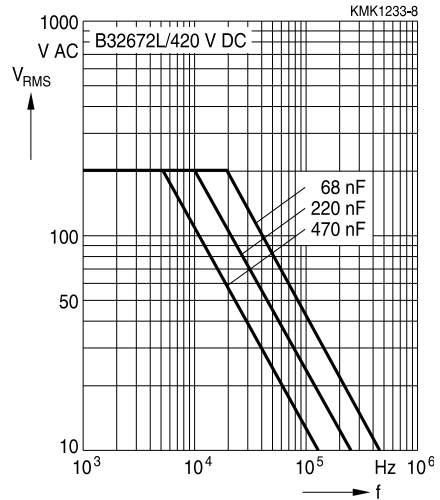
Permissible AC voltage  $V_{RMS}$  versus frequency  $f$  (for sinusoidal waveforms  $T_A \leq 100\text{ }^\circ\text{C}$ )  
 For  $T_A > 100\text{ }^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

Lead spacing 15 mm

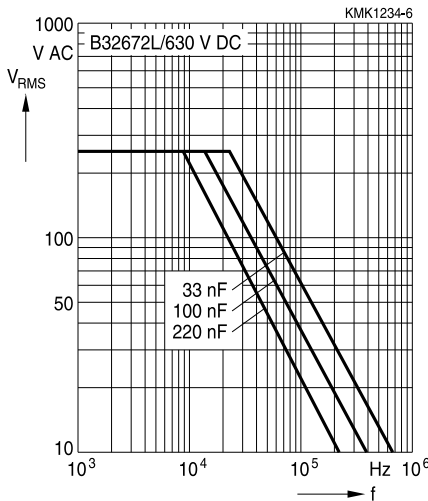
250 V DC/160 V AC



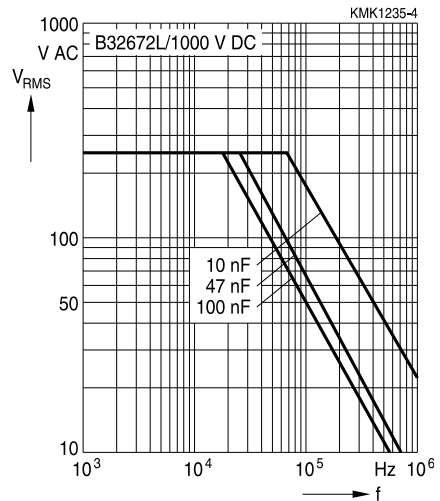
420 V DC/200 V AC

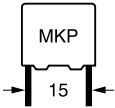


630 V DC/250 V AC



1000 V DC/250 V AC





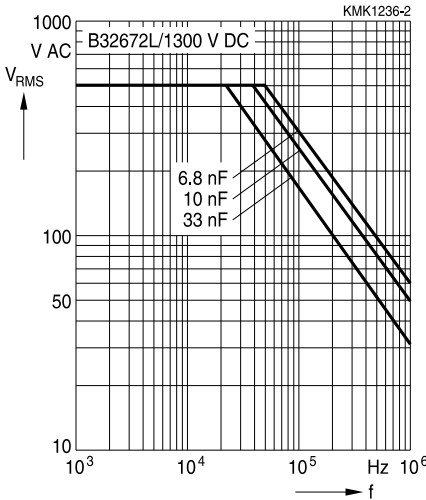
**B32672L**

**High V AC, high temperature (wound)**

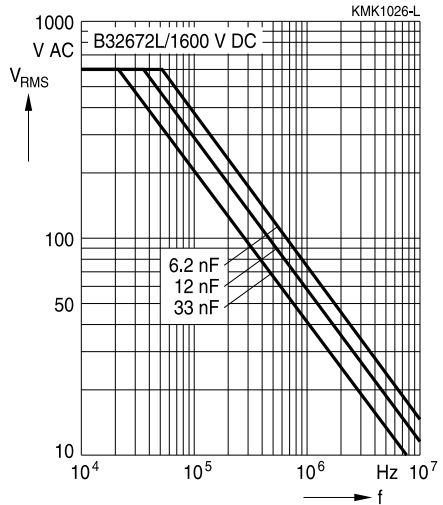
**Permissible AC voltage  $V_{RMS}$  versus frequency  $f$  (for sinusoidal waveforms  $T_A \leq 100\text{ }^\circ\text{C}$ )**  
 For  $T_A > 100\text{ }^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 15 mm**

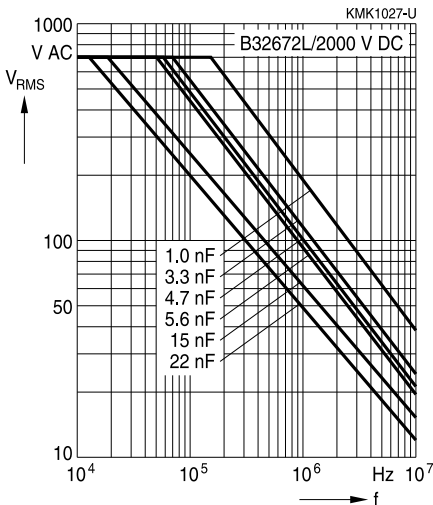
**1300 V DC/500 V AC**



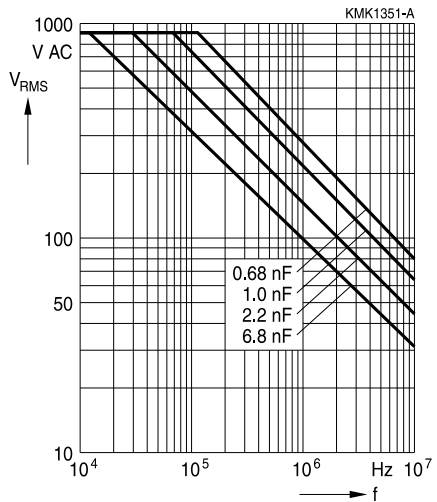
**1600 V DC/600 V AC**

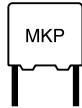


**2000 V DC/700 V AC**



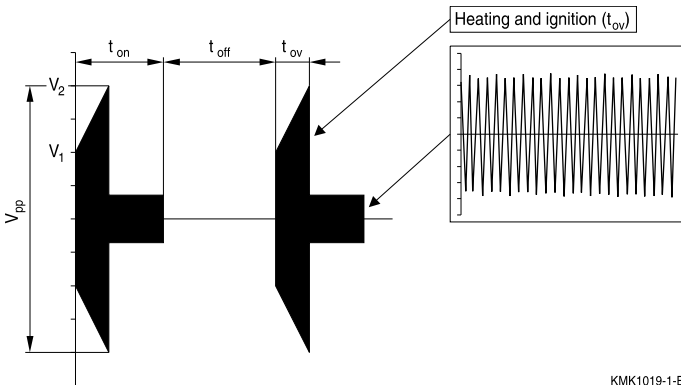
**2000 V DC/900 V AC**





**Operation at overvoltages during heating and ignition of lamps ( $T_A \leq 40^\circ C$ )**

In lighting applications, the capacitors can be subjected to overvoltages during the heating and ignition periods. An overvoltage occurs when the operation voltage exceeds the permissible AC voltage at the resonant frequency  $f_r$ .



KMK1019-1-E

For a repetitive application of on/off switching pulses (as for example in the life tests applied by electronic ballast manufacturers), limits have to be imposed on the time periods under overvoltage and on the duty cycle, in order to keep the capacitance value within the required margins:

- The overvoltage time  $t_{OV}$  should be less than 1 sec.
- The maximum duty cycle of the overvoltage is given by

$$\frac{t_{OV}}{t_{on} + t_{off}} \leq \left( \frac{V_{RMS}}{V_{RMS.OV}} \right)^2 \cdot 0.5$$

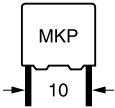
where  $V_{RMS.OV}$  is the RMS voltage during period  $t_{OV}$

$$V_{rms.OV} = \sqrt{\frac{V_1^2 + V_1 \cdot V_2 + V_2^2}{6}}$$

and  $V_{RMS}$  is the permissible AC voltage for continuous operation at the resonant frequency  $f_r$  (given by the "permissible AC voltage versus frequency  $f$ " graphics in the previous pages).

- The drift of capacitance depends on the  $V_{pp}$  attained, and the total time under overvoltage, which is calculated in hours as follows:  
 $(N_i \cdot t_{OV}) / 3600$   
 where  $N_i$  is the number of overvoltage impulses and  $t_{OV}$  is expressed in seconds.

The maximum drift of capacitance as a function of both parameters is provided graphically in the following pages.



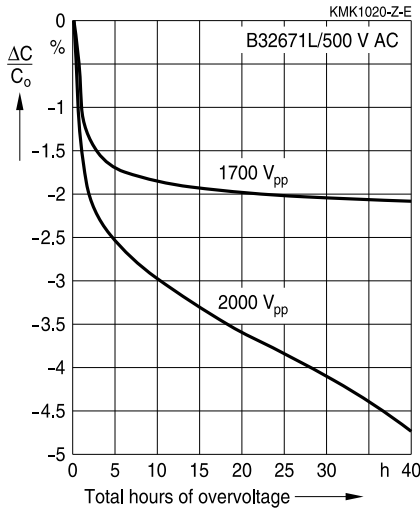
**B32671L**

**High V AC, high temperature (wound)**

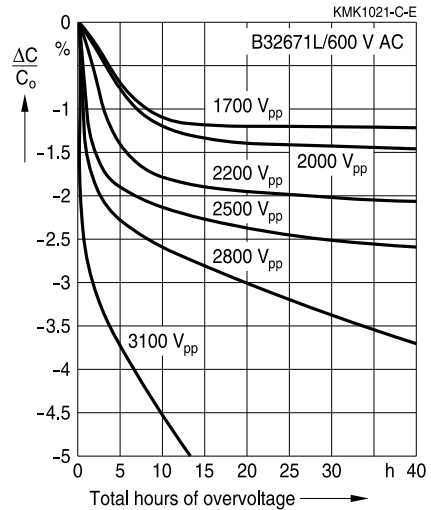
**Estimation of the maximum drift of capacitance value in function of the number of total hours overvoltage**

**Lead spacing 10 mm**

500 V AC/1000 V DC

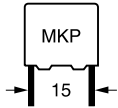


600 V AC/1600 V DC



B32672L

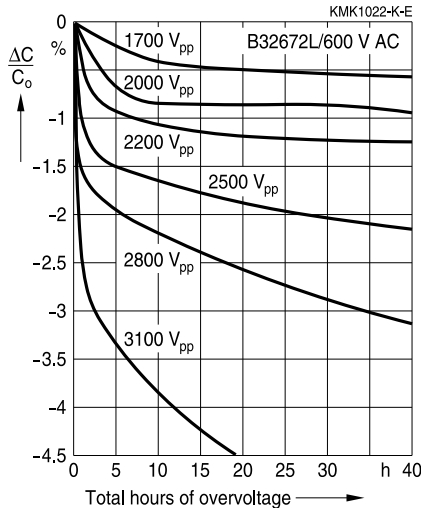
High V AC, high temperature (wound)



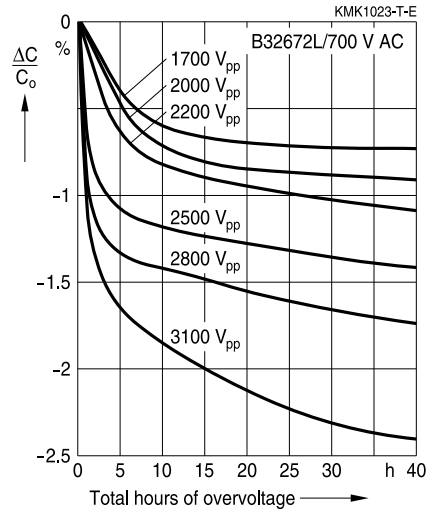
**Estimation of the maximum drift of capacitance value in function of the number of total hours overvoltage**

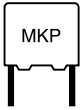
**Lead spacing 15 mm**

600 V AC/1600 V DC



700 V AC/2000 V DC





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**High V AC, high temperature (wound)**

## Mounting guidelines

### 1 Soldering

#### 1.1 Solderability of leads

The solderability of terminal leads is tested to IEC 60068-2-20, test Ta, method 1.

Before a solderability test is carried out, terminals are subjected to accelerated ageing (to IEC 60068-2-2, test Ba: 4 h exposure to dry heat at 155 °C). Since the ageing temperature is far higher than the upper category temperature of the capacitors, the terminal wires should be cut off from the capacitor before the ageing procedure to prevent the solderability being impaired by the products of any capacitor decomposition that might occur.

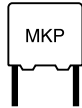
|                         |   |
|-------------------------|---|
| Solder bath temperature | 235 ±5 °C   |
| Soldering time          | 2.0 ±0.5 s  |
| Immersion depth         | 2.0 +0/-0.5 mm from capacitor body or seating plane             |
| Evaluation criteria:    |   |
| Visual inspection       | Wetting of wire surface by new solder ≥90%, free-flowing solder |

#### 1.2 Resistance to soldering heat

Resistance to soldering heat is tested to IEC 60068-2-20, test Tb, method 1A.

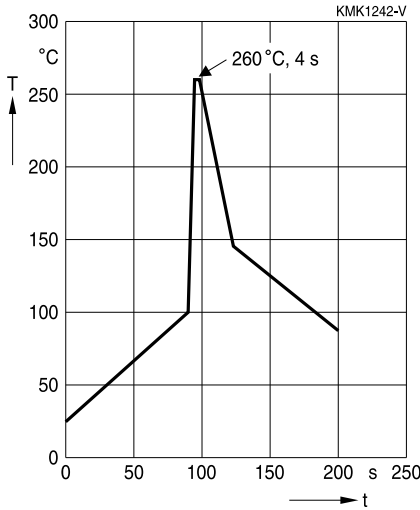
Conditions:

| Series   | Solder bath temperature | Soldering time   |
|--|-------------------------|--|
| MKT boxed (except 2.5 × 6.5 × 7.2 mm)<br>coated<br>uncoated (lead spacing > 10 mm) | 260 ±5 °C               | 10 ±1 s  |
| MFP<br>MKP (lead spacing > 7.5 mm)   |                         |  |
| MKT boxed (case 2.5 × 6.5 × 7.2 mm)  |                         | 5 ±1 s   |
| MKP (lead spacing ≤ 7.5 mm)  |                         | < 4 s  |
| MKT uncoated (lead spacing ≤ 10 mm)<br>insulated (B32559)                          |                         | recommended soldering profile for MKT uncoated (lead spacing ≤ 10 mm) and insulated (B32559) |



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High V AC, high temperature (wound)



|                      |   |
|----------------------|---|
| Immersion depth      | 2.0 +0/−0.5 mm from capacitor body or seating plane                                 |
| Shield               | Heat-absorbing board, (1.5 ±0.5) mm thick, between capacitor body and liquid solder |
| Evaluation criteria: |   |
| Visual inspection    | No visible damage   |
| $\Delta C/C_0$       | 2% for MKT/MKP/MFP<br>5% for EMI suppression capacitors                             |
| $\tan \delta$        | As specified in sectional specification   |



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**High V AC, high temperature (wound)**

### 1.3 General notes on soldering

Permissible heat exposure loads on film capacitors are primarily characterized by the upper category temperature  $T_{max}$ . Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus change irreversibly a capacitor's electrical characteristics. For short exposures (as in practical soldering processes) the heat load (and thus the possible effects on a capacitor) will also depend on other factors like:

- Pre-heating temperature and time
- Forced cooling immediately after soldering
- Terminal characteristics:
  - diameter, length, thermal resistance, special configurations (e.g. crimping)
- Height of capacitor above solder bath
- Shadowing by neighboring components
- Additional heating due to heat dissipation by neighboring components
- Use of solder-resist coatings

The overheating associated with some of these factors can usually be reduced by suitable countermeasures. For example, if a pre-heating step cannot be avoided, an additional or reinforced cooling process may possibly have to be included.

EPCOS recommends the following conditions:

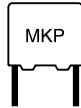
- Pre-heating with a maximum temperature of 110 °C
- Temperature inside the capacitor should not exceed the following limits:
  - MKP/MFP 110 °C
  - MKT 160 °C
- When SMD components are used together with leaded ones, the leaded film capacitors should not pass into the SMD adhesive curing oven. The leaded components should be assembled after the SMD curing step.
- Leaded film capacitors are not suitable for reflow soldering.

#### Uncoated capacitors

For uncoated MKT capacitors with lead spacings  $\leq 10$  mm (B32560/B32561) the following measures are recommended:

- pre-heating to not more than 110 °C in the preheater phase
- rapid cooling after soldering



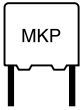


### Cautions and warnings

- Do not exceed the upper category temperature (UCT).
- Do not apply any mechanical stress to the capacitor terminals.
- Avoid any compressive, tensile or flexural stress.
- Do not move the capacitor after it has been soldered to the PC board.
- Do not pick up the PC board by the soldered capacitor.
- Do not place the capacitor on a PC board whose PTH hole spacing differs from the specified lead spacing.
- Do not exceed the specified time or temperature limits during soldering.
- Avoid external energy inputs, such as fire or electricity.
- Avoid overload of the capacitors.

The table below summarizes the safety instructions that must always be observed. A detailed description can be found in the relevant sections of the chapters "General technical information" and "Mounting guidelines".

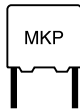
| Topic                   | Safety information  | Reference chapter<br>"General technical<br>information" |
|-------------------------|---|---|
| Storage conditions      | Make sure that capacitors are stored within the specified range of time, temperature and humidity conditions.   | 4.5<br>"Storage conditions"                             |
| Flammability            | Avoid external energy, such as fire or electricity (passive flammability), avoid overload of the capacitors (active flammability) and consider the flammability of materials.   | 5.3<br>"Flammability"                                   |
| Resistance to vibration | Do not exceed the tested ability to withstand vibration. The capacitors are tested to IEC 60068-2-6.<br>EPCOS offers film capacitors specially designed for operation under more severe vibration regimes such as those found in automotive applications. Consult our catalog "Film Capacitors for Automotive Electronics". | 5.2<br>"Resistance to vibration"                        |



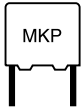
**B32671L ... B32672L**

**High V AC, high temperature (wound)**

| Topic  | Safety information  | Reference chapter<br>"Mounting guidelines"         |
|--|---|--|
| Soldering                                      | Do not exceed the specified time or temperature limits during soldering.  | 1 "Soldering"                                      |
| Cleaning                                       | Use only suitable solvents for cleaning capacitors.   | 2 "Cleaning"                                       |
| Embedding of capacitors in finished assemblies | When embedding finished circuit assemblies in plastic resins, chemical and thermal influences must be taken into account.<br>Caution: Consult us first, if you also wish to embed other uncoated component types! | 3 "Embedding of capacitors in finished assemblies" |


**Symbols and terms**

| Symbol               | English   | German  |
|----------------------|---|---|
| $\alpha$             | Heat transfer coefficient   | Wärmeübergangszahl  |
| $\alpha_C$           | Temperature coefficient of capacitance                                    | Temperaturkoeffizient der Kapazität   |
| A                    | Capacitor surface area  | Kondensatoroberfläche   |
| $\beta_C$            | Humidity coefficient of capacitance                                       | Feuchtekoeffizient der Kapazität  |
| C                    | Capacitance   | Kapazität   |
| $C_R$                | Rated capacitance   | Nennkapazität   |
| $\Delta C$           | Absolute capacitance change   | Absolute Kapazitätsänderung   |
| $\Delta C/C$         | Relative capacitance change (relative deviation of actual value)          | Relative Kapazitätsänderung (relative Abweichung vom Ist-Wert)                  |
| $\Delta C/C_R$       | Capacitance tolerance (relative deviation from rated capacitance)         | Kapazitätstoleranz (relative Abweichung vom Nennwert)                           |
| dt                   | Time differential   | Differentielle Zeit   |
| $\Delta t$           | Time interval   | Zeitintervall   |
| $\Delta T$           | Absolute temperature change (self-heating)                                | Absolute Temperaturänderung (Selbsterwärmung)                                   |
| $\Delta \tan \delta$ | Absolute change of dissipation factor                                     | Absolute Änderung des Verlustfaktors  |
| $\Delta V$           | Absolute voltage change   | Absolute Spannungsänderung  |
| dV/dt                | Time differential of voltage function (rate of voltage rise)              | Differentielle Spannungsänderung (Spannungsflankensteilheit)                    |
| $\Delta V/\Delta t$  | Voltage change per time interval  | Spannungsänderung pro Zeitintervall   |
| E                    | Activation energy for diffusion   | Aktivierungsenergie zur Diffusion   |
| ESL                  | Self-inductance   | Eigeninduktivität   |
| ESR                  | Equivalent series resistance  | Ersatz-Serienwiderstand   |
| f                    | Frequency   | Frequenz  |
| $f_1$                | Frequency limit for reducing permissible AC voltage due to thermal limits | Grenzfrequenz für thermisch bedingte Reduzierung der zulässigen Wechselspannung |
| $f_2$                | Frequency limit for reducing permissible AC voltage due to current limit  | Grenzfrequenz für strombedingte Reduzierung der zulässigen Wechselspannung      |
| $f_r$                | Resonant frequency  | Resonanzfrequenz  |
| $F_D$                | Thermal acceleration factor for diffusion                                 | Therm. Beschleunigungsfaktor zur Diffusion                                      |
| $F_T$                | Derating factor   | Deratingfaktor  |
| i                    | Current (peak)  | Stromspitze   |
| $I_C$                | Category current (max. continuous current)                                | Kategoriestrom (max. Dauerstrom)  |



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**High V AC, high temperature (wound)**

| Symbol           | English  | German  |
|------------------|--|---|
| $I_{RMS}$        | (Sinusoidal) alternating current, root-mean-square value | (Sinusförmiger) Wechselstrom                      |
| $i_z$            | Capacitance drift  | Inkonstanz der Kapazität                          |
| $k_0$            | Pulse characteristic                                     | Impuls Kennwert                                   |
| $L_S$            | Series inductance  | Serieninduktivität                                |
| $\lambda$        | Failure rate   | Ausfallrate                                       |
| $\lambda_0$      | Constant failure rate during useful service life         | Konstante Ausfallrate in der Nutzungsphase        |
| $\lambda_{test}$ | Failure rate, determined by tests                        | Experimentell ermittelte Ausfallrate              |
| $P_{diss}$       | Dissipated power   | Abgegebene Verlustleistung                        |
| $P_{gen}$        | Generated power  | Erzeugte Verlustleistung                          |
| $Q$              | Heat energy  | Wärmeenergie                                      |
| $\rho$           | Density of water vapor in air                            | Dichte von Wasserdampf in Luft                    |
| $R$              | Universal molar constant for gases                       | Allg. Molarkonstante für Gas                      |
| $R$              | Ohmic resistance of discharge circuit                    | Ohmscher Widerstand des Entladekreises            |
| $R_i$            | Internal resistance                                      | Innenwiderstand                                   |
| $R_{ins}$        | Insulation resistance                                    | Isolationswiderstand                              |
| $R_P$            | Parallel resistance                                      | Parallelwiderstand                                |
| $R_S$            | Series resistance  | Serienwiderstand                                  |
| $S$              | severity (humidity test)                                 | Schärfegrad (Feuchtest)                           |
| $t$              | Time   | Zeit  |
| $T$              | Temperature  | Temperatur  |
| $\tau$           | Time constant  | Zeitkonstante                                     |
| $\tan \delta$    | Dissipation factor                                       | Verlustfaktor                                     |
| $\tan \delta_D$  | Dielectric component of dissipation factor               | Dielektrischer Anteil des Verlustfaktors          |
| $\tan \delta_P$  | Parallel component of dissipation factor                 | Parallelanteil des Verlustfaktors                 |
| $\tan \delta_S$  | Series component of dissipation factor                   | Serienanteil des Verlustfaktors                   |
| $T_A$            | Ambient temperature                                      | Umgebungstemperatur                               |
| $T_{max}$        | Upper category temperature                               | Obere Kategorietemperatur                         |
| $T_{min}$        | Lower category temperature                               | Untere Kategorietemperatur                        |
| $t_{OL}$         | Operating life at operating temperature and voltage      | Betriebszeit bei Betriebstemperatur und -spannung |
| $T_{op}$         | Operating temperature                                    | Betriebstemperatur                                |
| $T_R$            | Rated temperature  | Nenntemperatur                                    |
| $T_{ref}$        | Reference temperature                                    | Referenztemperatur                                |
| $t_{SL}$         | Reference service life                                   | Referenz-Lebensdauer                              |
| $V_{AC}$         | AC voltage   | Wechselspannung                                   |

| Symbol      | English   | German                                      |
|-------------|---|---|
| $V_C$       | Category voltage  | Kategoriespannung                           |
| $V_{C,RMS}$ | Category AC voltage   | (Sinusförmige)<br>Kategorie-Wechselspannung |
| $V_{CD}$    | Corona-discharge onset voltage                              | Teilentlade-Einsatzspannung                 |
| $V_{ch}$    | Charging voltage  | Ladespannung                                |
| $V_{DC}$    | DC voltage  | Gleichspannung                              |
| $V_{FB}$    | Fly-back capacitor voltage                                  | Spannung (Flyback)                          |
| $V_i$       | Input voltage   | Eingangsspannung                            |
| $V_o$       | Output voltage  | Ausgangssspannung                           |
| $V_{op}$    | Operating voltage   | Betriebsspannung                            |
| $V_p$       | Peak pulse voltage  | Impuls-Spitzenspannung                      |
| $V_{pp}$    | Peak-to-peak voltage Impedance                              | Spannungshub                                |
| $V_R$       | Rated voltage   | Nennspannung                                |
| $\hat{V}_R$ | Amplitude of rated AC voltage                               | Amplitude der Nenn-Wechselspannung          |
| $V_{RMS}$   | (Sinusoidal) alternating voltage,<br>root-mean-square value | (Sinusförmige) Wechselspannung              |
| $V_{SC}$    | S-correction voltage  | Spannung bei Anwendung "S-correction"       |
| $V_{sn}$    | Snubber capacitor voltage                                   | Spannung bei Anwendung<br>"Beschaltung"     |
| $Z$         | Impedance   | Scheinwiderstand                            |
| $e$         | Lead spacing  | Rastermaß                                   |

## Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or lifesaving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
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