



## Film Capacitors

### Metallized Polypropylene Film Capacitors (MKP)

**Series/Type:** B32651 ... B32656

**Date:** August 2004

© EPCOS AG 2004. Reproduction, publication and dissemination of this data sheet, enclosures hereto and the information contained therein without EPCOS' prior express consent is prohibited.

Purchase orders are subject to the General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry recommended by the ZVEI (German Electrical and Electronic Manufacturers' Association), unless otherwise agreed.

## High pulse (wound)

### Typical applications

- TV (S-correction/flyback)
- Electronic ballasts

### Climatic

- Max. operating temperature: 105 °C
- Climatic category (IEC 60068-1): 55/100/56

### Construction

- Dielectric: polypropylene (PP)
- Wound capacitor technology with internal series connection for  $V_R \geq 1250$  VDC
- Plastic case (UL 94 V-0)
- Epoxy resin sealing

### Features

- High pulse strength
- High contact reliability
- Small dimensions

### Terminals

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

### Marking

Manufacturer's logo,  
lot number ( $\boxed{e} \leq 27.5$  mm), series number  
(e.g. 651),  
rated capacitance (coded), cap. tolerance (code letter),  
rated DC voltage  
(AC voltage for 1600 VDC/700 VAC and  
2000 VDC/1000 VAC),  
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



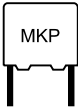
Dimensions in mm

| Lead spacing<br>$\boxed{e} \pm 0.4$ | Lead diameter<br>$d_1$ | Type   |
|-------------------------------------|------------------------|--------|
| 10                                  | 0.6                    | B32651 |
| 15                                  | 0.8                    | B32652 |
| 22.5                                | 0.8                    | B32653 |
| 27.5                                | 0.8                    | B32654 |
| 37.5                                | 1.0                    | B32656 |



# Overview of available types

| Lead spacing    | 10 mm  | 15 mm  |     |     |      |      |      |      |      |
|-----------------|--------|--------|-----|-----|------|------|------|------|------|
| Type            | B32651 | B32652 |     |     |      |      |      |      |      |
| Page            | 6      | 7      |     |     |      |      |      |      |      |
| $V_R$ (VDC)     | 1250   | 250    | 400 | 630 | 1000 | 1250 | 1600 | 1600 | 2000 |
| $V_{rms}$ (VAC) | 450    | 160    | 200 | 250 | 250  | 500  | 500  | 700  | 700  |
| $C_R$ (nF)      |        |        |     |     |      |      |      |      |      |
| 1.0             |        |        |     |     |      |      |      |      |      |
| 1.5             |        |        |     |     |      |      |      |      |      |
| 2.2             |        |        |     |     |      |      |      |      |      |
| 3.3             |        |        |     |     |      |      |      |      |      |
| 4.7             |        |        |     |     |      |      |      |      |      |
| 6.8             |        |        |     |     |      |      |      |      |      |
| 10              |        |        |     |     |      |      |      |      |      |
| 15              |        |        |     |     |      |      |      |      |      |
| 22              |        |        |     |     |      |      |      |      |      |
| 33              |        |        |     |     |      |      |      |      |      |
| 47              |        |        |     |     |      |      |      |      |      |
| 68              |        |        |     |     |      |      |      |      |      |
| 100             |        |        |     |     |      |      |      |      |      |
| 150             |        |        |     |     |      |      |      |      |      |
| 220             |        |        |     |     |      |      |      |      |      |
| 330             |        |        |     |     |      |      |      |      |      |
| 470             |        |        |     |     |      |      |      |      |      |
| 680             |        |        |     |     |      |      |      |      |      |

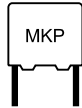


**B32651 ... B32656**

**High pulse (wound)**

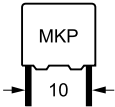
### Overview of available types

| Lead spacing    | 22.5 mm |     |     |      |      |      |      |      | 27.5 mm |     |     |      |      |      |      |  |
|-----------------|---------|-----|-----|------|------|------|------|------|---------|-----|-----|------|------|------|------|--|
| Type            | B32653  |     |     |      |      |      |      |      | B32654  |     |     |      |      |      |      |  |
| Page            | 9       |     |     |      |      |      |      |      | 11      |     |     |      |      |      |      |  |
| $V_R$ (VDC)     | 250     | 400 | 630 | 1000 | 1250 | 1600 | 2000 | 2000 | 250     | 400 | 630 | 1000 | 1250 | 1600 | 2000 |  |
| $V_{rms}$ (VAC) | 160     | 200 | 250 | 250  | 500  | 500  | 700  | 1000 | 160     | 200 | 250 | 250  | 500  | 500  | 700  |  |
| $C_R$ (nF)      |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 2.2             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 3.3             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 4.7             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 6.8             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 10              |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 15              |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 22              |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 33              |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 47              |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 68              |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 100             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 150             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 220             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 330             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 470             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 680             |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 1000            |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 1500            |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 2200            |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 3300            |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |
| 4700            |         |     |     |      |      |      |      |      |         |     |     |      |      |      |      |  |



## Overview of available types

|                 |         |      |      |      |      |
|-----------------|---------|------|------|------|------|
| Lead spacing    | 37.5 mm |      |      |      |      |
| Type            | B32656  |      |      |      |      |
| Page            | 12      |      |      |      |      |
| $V_R$ (VDC)     | 850     | 1000 | 1250 | 1600 | 2000 |
| $V_{rms}$ (VAC) | 450     | 500  | 500  | 600  | 700  |
| $C_R$ (nF)      |         |      |      |      |      |
| 100             |         |      |      |      |      |
| 150             |         |      |      |      |      |
| 220             |         |      |      |      |      |
| 330             |         |      |      |      |      |
| 470             |         |      |      |      |      |
| 680             |         |      |      |      |      |
| 1000            |         |      |      |      |      |


**B32651**
**High pulse (wound)**
**Ordering codes and packing units (lead spacing 10 mm)**

| $V_R$             | $V_{rms}$<br>$f \leq 1 \text{ kHz}$ | $C_R$ | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./unit | Reel<br>pcs./unit | Untaped<br>pcs./unit |
|-------------------|-------------------------------------|-------|------------------------------------------------|---------------------------------------------|---------------------------|-------------------|----------------------|
| VDC <sup>1)</sup> | VAC                                 | nF    |                                                |                                             |                           |                   |                      |
| 1250              | 450                                 | 2.2   | $4.0 \times 9.0 \times 13.0$                   | B32651A7222+***                             | 1000                      | 1700              | 1000                 |
|                   |                                     | 3.3   | $5.0 \times 11.0 \times 13.0$                  | B32651A7332+***                             | 830                       | 1300              | 1000                 |
|                   |                                     | 4.7   | $5.0 \times 11.0 \times 13.0$                  | B32651A7472+***                             | 830                       | 1300              | 1000                 |
|                   |                                     | 6.8   | $6.0 \times 12.0 \times 13.0$                  | B32651A7682+***                             | 680                       | 1100              | 1000                 |

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K =  $\pm 10\%$

J =  $\pm 5\%$

on request =  $\pm 3.5\%$

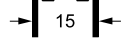
\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)

1) For pulse loads (pulse width  $\leq 1000 \mu s$ ), a peak voltage of  $1400 V_p$  can be permitted.



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

| $V_R$ | $V_{rms}$<br>$f \leq 1 \text{ kHz}$ | $C_R$ | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./unit | Reel<br>pcs./unit | Untaped<br>pcs./unit |
|-------|-------------------------------------|-------|------------------------------------------------|---------------------------------------------|---------------------------|-------------------|----------------------|
| VDC   | VAC                                 | nF    |                                                |                                             |                           |                   |                      |
| 250   | 160                                 | 150   | $5.0 \times 10.5 \times 18.0$                  | B32652A3154+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 220   | $6.0 \times 11.0 \times 18.0$                  | B32652A3224+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 330   | $7.0 \times 12.5 \times 18.0$                  | B32652A3334+***                             | 830                       | 900               | 1000                 |
|       |                                     | 470   | $8.5 \times 14.5 \times 18.0$                  | B32652A3474+***                             | 680                       | 700               | 500                  |
|       |                                     | 680   | $9.0 \times 17.5 \times 18.0$                  | B32652A3684+***                             | 640                       | 700               | 500                  |
| 400   | 200                                 | 68    | $5.0 \times 10.5 \times 18.0$                  | B32652A4683+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 100   | $5.0 \times 10.5 \times 18.0$                  | B32652A4104+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 150   | $6.0 \times 11.0 \times 18.0$                  | B32652A4154+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 220   | $7.0 \times 12.5 \times 18.0$                  | B32652A4224+***                             | 830                       | 900               | 1000                 |
|       |                                     | 330   | $8.5 \times 14.5 \times 18.0$                  | B32652A4334+***                             | 680                       | 700               | 500                  |
| 630   | 250                                 | 470   | $9.0 \times 17.5 \times 18.0$                  | B32652A4474+***                             | 640                       | 700               | 500                  |
|       |                                     | 33    | $5.0 \times 10.5 \times 18.0$                  | B32652A6333+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 47    | $5.0 \times 10.5 \times 18.0$                  | B32652A6473+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 68    | $6.0 \times 11.0 \times 18.0$                  | B32652A6683+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 100   | $7.0 \times 12.5 \times 18.0$                  | B32652A6104+***                             | 830                       | 900               | 1000                 |
| 1000  | 250                                 | 150   | $8.5 \times 14.5 \times 18.0$                  | B32652A6154+***                             | 680                       | 700               | 500                  |
|       |                                     | 220   | $9.0 \times 17.5 \times 18.0$                  | B32652A6224+***                             | 640                       | 700               | 500                  |
|       |                                     | 10    | $5.0 \times 10.5 \times 18.0$                  | B32652A0103+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 15    | $5.0 \times 10.5 \times 18.0$                  | B32652A0153+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 22    | $5.0 \times 10.5 \times 18.0$                  | B32652A0223+***                             | 1170                      | 1300              | 1000                 |
| 1250  | 500                                 | 33    | $6.0 \times 11.0 \times 18.0$                  | B32652A0333+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 47    | $7.0 \times 12.5 \times 18.0$                  | B32652A0473+***                             | 830                       | 900               | 1000                 |
|       |                                     | 68    | $8.5 \times 14.5 \times 18.0$                  | B32652A0683+***                             | 680                       | 700               | 500                  |
|       |                                     | 100   | $9.0 \times 17.5 \times 18.0$                  | B32652A0104+***                             | 640                       | 700               | 500                  |
|       |                                     | 6.8   | $5.0 \times 10.5 \times 18.0$                  | B32652A7682+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 10    | $6.0 \times 11.0 \times 18.0$                  | B32652A7103+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 15    | $7.0 \times 12.5 \times 18.0$                  | B32652A7153+***                             | 830                       | 900               | 1000                 |
|       |                                     | 22    | $8.5 \times 14.5 \times 18.0$                  | B32652A7223+***                             | 680                       | 700               | 500                  |
|       |                                     | 33    | $9.0 \times 17.5 \times 18.0$                  | B32652A7333+***                             | 640                       | 700               | 500                  |

Further E series and intermediate capacitance values on request.

### Composition of ordering code

+ = Capacitance tolerance code:

K =  $\pm 10\%$

J =  $\pm 5\%$

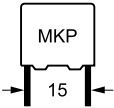
on request =  $\pm 3.5\%$

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)


**B32652**
**High pulse (wound)**
**Ordering codes and packing units (lead spacing 15 mm)**

| $V_R$ | $V_{rms}$<br>$f \leq 1 \text{ kHz}$ | $C_R$ | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./unit | Reel<br>pcs./unit | Untaped<br>pcs./unit |
|-------|-------------------------------------|-------|------------------------------------------------|---------------------------------------------|---------------------------|-------------------|----------------------|
| VDC   | VAC                                 | nF    |                                                |                                             |                           |                   |                      |
| 1600  | 500                                 | 3.3   | $5.0 \times 10.5 \times 18.0$                  | B32652A1332+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 4.7   | $6.0 \times 11.0 \times 18.0$                  | B32652A1472+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 6.8   | $7.0 \times 12.5 \times 18.0$                  | B32652A1682+***                             | 830                       | 900               | 1000                 |
|       |                                     | 10    | $8.5 \times 14.5 \times 18.0$                  | B32652A1103+***                             | 680                       | 700               | 500                  |
|       |                                     | 15    | $9.0 \times 17.5 \times 18.0$                  | B32652A1153+***                             | 640                       | 700               | 500                  |
| 1600  | 700                                 | 2.2   | $5.0 \times 10.5 \times 18.0$                  | B32652J1222+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 3.3   | $6.0 \times 11.0 \times 18.0$                  | B32652J1332+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 4.7   | $7.0 \times 12.5 \times 18.0$                  | B32652J1472+***                             | 830                       | 900               | 1000                 |
|       |                                     | 6.8   | $8.5 \times 14.5 \times 18.0$                  | B32652J1682+***                             | 680                       | 700               | 500                  |
|       |                                     | 10    | $9.0 \times 17.5 \times 18.0$                  | B32652J1103+***                             | 640                       | 700               | 500                  |
| 2000  | 700                                 | 1.0   | $5.0 \times 10.5 \times 18.0$                  | B32652A2102+***                             | 1170                      | 1300              | 1000                 |
|       |                                     | 1.5   | $6.0 \times 11.0 \times 18.0$                  | B32652A2152+***                             | 960                       | 1100              | 1000                 |
|       |                                     | 2.2   | $7.0 \times 12.5 \times 18.0$                  | B32652A2222+***                             | 830                       | 900               | 1000                 |
|       |                                     | 3.3   | $8.5 \times 14.5 \times 18.0$                  | B32652A2332+***                             | 680                       | 700               | 500                  |
|       |                                     | 4.7   | $9.0 \times 17.5 \times 18.0$                  | B32652A2472+***                             | 640                       | 700               | 500                  |

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K =  $\pm 10\%$

J =  $\pm 5\%$

on request =  $\pm 3.5\%$

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)

### Ordering codes and packing units (lead spacing 22.5 mm)

| $V_R$ | $V_{rms}$<br>$f \leq 1 \text{ kHz}$ | $C_R$ | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./unit | Reel<br>pcs./unit | Untaped<br>pcs./unit |
|-------|-------------------------------------|-------|------------------------------------------------|---------------------------------------------|---------------------------|-------------------|----------------------|
| VDC   | VAC                                 | nF    |                                                |                                             |                           |                   |                      |
| 250   | 160                                 | 220   | $6.0 \times 15.0 \times 26.5$                  | B32653A3224+***                             | 680                       | 700               | 720                  |
|       |                                     | 330   | $6.0 \times 15.0 \times 26.5$                  | B32653A3334+***                             | 680                       | 700               | 720                  |
|       |                                     | 470   | $7.0 \times 16.0 \times 26.5$                  | B32653A3474+***                             | 580                       | 600               | 630                  |
|       |                                     | 680   | $8.5 \times 16.5 \times 26.5$                  | B32653A3684+***                             | 480                       | 500               | 510                  |
|       |                                     | 1000  | $10.5 \times 16.5 \times 26.5$                 | B32653A3105+***                             | 390                       | 400               | 540                  |
| 400   | 200                                 | 150   | $6.0 \times 15.0 \times 26.5$                  | B32653A4154+***                             | 680                       | 700               | 720                  |
|       |                                     | 220   | $6.0 \times 15.0 \times 26.5$                  | B32653A4224+***                             | 680                       | 700               | 720                  |
|       |                                     | 330   | $7.0 \times 16.0 \times 26.5$                  | B32653A4334+***                             | 580                       | 600               | 630                  |
|       |                                     | 470   | $8.5 \times 16.5 \times 26.5$                  | B32653A4474+***                             | 480                       | 500               | 510                  |
|       |                                     | 680   | $10.5 \times 16.5 \times 26.5$                 | B32653A4684+***                             | 390                       | 400               | 540                  |
| 630   | 250                                 | 100   | $6.0 \times 15.0 \times 26.5$                  | B32653A6104+***                             | 680                       | 700               | 720                  |
|       |                                     | 150   | $6.0 \times 15.0 \times 26.5$                  | B32653A6154+***                             | 680                       | 700               | 720                  |
|       |                                     | 220   | $8.5 \times 16.5 \times 26.5$                  | B32653A6224+***                             | 480                       | 500               | 510                  |
|       |                                     | 330   | $10.5 \times 16.5 \times 26.5$                 | B32653A6334+***                             | 390                       | 400               | 540                  |
|       |                                     | 470   | $11.0 \times 20.5 \times 26.5$                 | B32653A6474+***                             | 370                       | 350               | 510                  |
| 1000  | 250                                 | 33    | $6.0 \times 15.0 \times 26.5$                  | B32653A0333+***                             | 680                       | 700               | 720                  |
|       |                                     | 47    | $6.0 \times 15.0 \times 26.5$                  | B32653A0473+***                             | 680                       | 700               | 720                  |
|       |                                     | 68    | $6.0 \times 15.0 \times 26.5$                  | B32653A0683+***                             | 680                       | 700               | 720                  |
|       |                                     | 100   | $8.5 \times 16.5 \times 26.5$                  | B32653A0104+***                             | 480                       | 500               | 510                  |
|       |                                     | 150   | $10.5 \times 16.5 \times 26.5$                 | B32653A0154+***                             | 390                       | 400               | 540                  |
| 1250  | 500                                 | 220   | $11.0 \times 20.5 \times 26.5$                 | B32653A0224+***                             | 370                       | 350               | 510                  |
|       |                                     | 22    | $6.0 \times 15.0 \times 26.5$                  | B32653A7223+***                             | 680                       | 700               | 720                  |
|       |                                     | 33    | $6.0 \times 15.0 \times 26.5$                  | B32653A7333+***                             | 680                       | 700               | 720                  |
|       |                                     | 47    | $8.5 \times 16.5 \times 26.5$                  | B32653A7473+***                             | 480                       | 500               | 510                  |
|       |                                     | 68    | $10.5 \times 16.5 \times 26.5$                 | B32653A7683+***                             | 390                       | 400               | 540                  |
| 1250  | 500                                 | 100   | $11.0 \times 20.5 \times 26.5$                 | B32653A7104+***                             | 370                       | 350               | 510                  |

Further E series and intermediate capacitance values on request.

### Composition of ordering code

+ = Capacitance tolerance code:

K =  $\pm 10\%$

J =  $\pm 5\%$

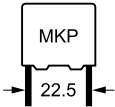
on request =  $\pm 3.5\%$

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)


**B32653**
**High pulse (wound)**
**Ordering codes and packing units (lead spacing 22.5 mm)**

| $V_R$ | $V_{rms}$<br>$f \leq 1 \text{ kHz}$ | $C_R$ | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./unit | Reel<br>pcs./unit | Untaped<br>pcs./unit |
|-------|-------------------------------------|-------|------------------------------------------------|---------------------------------------------|---------------------------|-------------------|----------------------|
| VDC   | VAC                                 | nF    |                                                |                                             |                           |                   |                      |
| 1600  | 500                                 | 6.8   | $6.0 \times 15.0 \times 26.5$                  | B32653A1682+***                             | 680                       | 700               | 720                  |
|       |                                     | 10    | $6.0 \times 15.0 \times 26.5$                  | B32653A1103+***                             | 680                       | 700               | 720                  |
|       |                                     | 15    | $7.0 \times 16.0 \times 26.5$                  | B32653A1153+***                             | 580                       | 600               | 630                  |
|       |                                     | 22    | $8.5 \times 16.5 \times 26.5$                  | B32653A1223+***                             | 480                       | 500               | 510                  |
|       |                                     | 33    | $10.5 \times 16.5 \times 26.5$                 | B32653A1333+***                             | 390                       | 400               | 540                  |
|       |                                     | 47    | $11.0 \times 20.5 \times 26.5$                 | B32653A1473+***                             | 370                       | 350               | 510                  |
| 2000  | 700                                 | 3.3   | $6.0 \times 15.0 \times 26.5$                  | B32653A2332+***                             | 680                       | 700               | 720                  |
|       |                                     | 4.7   | $6.0 \times 15.0 \times 26.5$                  | B32653A2472+***                             | 680                       | 700               | 720                  |
|       |                                     | 6.8   | $8.5 \times 16.5 \times 26.5$                  | B32653A2682+***                             | 480                       | 500               | 510                  |
|       |                                     | 10    | $10.5 \times 16.5 \times 26.5$                 | B32653A2103+***                             | 390                       | 400               | 540                  |
|       |                                     | 15    | $11.0 \times 20.5 \times 26.5$                 | B32653A2153+***                             | 370                       | 350               | 510                  |
| 2000  | 1000                                | 2.2   | $6.0 \times 15.0 \times 26.5$                  | B32653A8222+***                             | 680                       | 700               | 720                  |
|       |                                     | 3.3   | $6.0 \times 15.0 \times 26.5$                  | B32653A8332+***                             | 680                       | 700               | 720                  |
|       |                                     | 4.7   | $8.5 \times 16.5 \times 26.5$                  | B32653A8472+***                             | 480                       | 500               | 510                  |
|       |                                     | 6.8   | $10.5 \times 16.5 \times 26.5$                 | B32653A8682+***                             | 390                       | 400               | 540                  |
|       |                                     | 10    | $10.5 \times 20.5 \times 26.5$                 | B32653A8103+***                             | 390                       | 400               | 540                  |

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K =  $\pm 10\%$

J =  $\pm 5\%$

on request =  $\pm 3.5\%$

\*\*\* = Packaging code:

289 = Ammo pack

189 = Reel

000 = Untaped (lead length 6 – 1 mm)

**Ordering codes and packing units (lead spacing 27.5 mm)**

| $V_R$ | $V_{rms}$<br>$f \leq 1$ kHz<br>VAC | $C_R$<br>nF | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Ammo<br>pack<br>pcs./unit | Reel<br>pcs./unit | Untaped<br>pcs./unit |
|-------|------------------------------------|-------------|------------------------------------------------|---------------------------------------------|---------------------------|-------------------|----------------------|
| 250   | 160                                | 1500        | $11.0 \times 21.0 \times 31.5$                 | B32654A3155+***                             | —                         | 350               | 320                  |
|       |                                    | 2200        | $12.5 \times 21.5 \times 31.5$                 | B32654A3225+***                             | —                         | 300               | 280                  |
|       |                                    | 3300        | $15.0 \times 24.5 \times 31.5$                 | B32654A3335+000                             | —                         | —                 | 240                  |
|       |                                    | 4700        | $18.0 \times 27.5 \times 31.5$                 | B32654A3475+000                             | —                         | —                 | 200                  |
| 400   | 200                                | 1000        | $11.0 \times 21.0 \times 31.5$                 | B32654A4105+***                             | —                         | 350               | 320                  |
|       |                                    | 1500        | $12.5 \times 21.5 \times 31.5$                 | B32654A4155+***                             | —                         | 300               | 280                  |
|       |                                    | 2200        | $14.0 \times 24.5 \times 31.5$                 | B32654A4225+000                             | —                         | —                 | 260                  |
|       |                                    | 3300        | $19.0 \times 30.0 \times 31.5$                 | B32654A4335+000                             | —                         | —                 | 180                  |
| 630   | 250                                | 680         | $11.0 \times 21.0 \times 31.5$                 | B32654A6684+***                             | —                         | 350               | 320                  |
|       |                                    | 1000        | $13.5 \times 23.0 \times 31.5$                 | B32654A6105+***                             | —                         | 250               | 260                  |
|       |                                    | 1500        | $18.0 \times 27.5 \times 31.5$                 | B32654A6155+000                             | —                         | —                 | 200                  |
| 1000  | 250                                | 220         | $11.0 \times 21.0 \times 31.5$                 | B32654A0224+***                             | —                         | 350               | 320                  |
|       |                                    | 330         | $11.0 \times 21.0 \times 31.5$                 | B32654A0334+***                             | —                         | 350               | 320                  |
|       |                                    | 470         | $14.0 \times 24.5 \times 31.5$                 | B32654A0474+000                             | —                         | —                 | 260                  |
|       |                                    | 680         | $18.0 \times 27.5 \times 31.5$                 | B32654A0684+000                             | —                         | —                 | 200                  |
| 1250  | 500                                | 100         | $11.0 \times 21.0 \times 31.5$                 | B32654A7104+***                             | —                         | 350               | 320                  |
|       |                                    | 150         | $11.0 \times 21.0 \times 31.5$                 | B32654A7154+***                             | —                         | 350               | 320                  |
|       |                                    | 220         | $14.0 \times 24.5 \times 31.5$                 | B32654A7224+000                             | —                         | —                 | 260                  |
|       |                                    | 330         | $18.0 \times 27.5 \times 31.5$                 | B32654A7334+000                             | —                         | —                 | 200                  |
| 1600  | 500                                | 47          | $11.0 \times 21.0 \times 31.5$                 | B32654A1473+***                             | —                         | 350               | 320                  |
|       |                                    | 68          | $11.0 \times 21.0 \times 31.5$                 | B32654A1683+***                             | —                         | 350               | 320                  |
|       |                                    | 100         | $14.0 \times 24.5 \times 31.5$                 | B32654A1104+000                             | —                         | —                 | 260                  |
|       |                                    | 150         | $18.0 \times 27.5 \times 31.5$                 | B32654A1154+000                             | —                         | —                 | 200                  |
| 2000  | 700                                | 22          | $11.0 \times 21.0 \times 31.5$                 | B32654A2223+***                             | —                         | 350               | 320                  |
|       |                                    | 33          | $13.5 \times 23.0 \times 31.5$                 | B32654A2333+***                             | —                         | 250               | 260                  |
|       |                                    | 47          | $18.0 \times 27.5 \times 31.5$                 | B32654A2473+000                             | —                         | —                 | 200                  |
|       |                                    | 68          | $19.0 \times 30.0 \times 31.5$                 | B32654A2683+000                             | —                         | —                 | 180                  |

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

K =  $\pm 10\%$

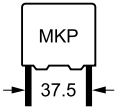
J =  $\pm 5\%$

on request =  $\pm 3.5\%$

\*\*\* = Packaging code:

189 = Reel

000 = Untaped (lead length 6 – 1 mm)


**B32656**
**High pulse (wound)**
**Ordering codes and packing units (lead spacing 37.5 mm)**

| $V_R$ | $V_{rms}$<br>$f \leq 1 \text{ kHz}$ | $C_R$ | Max. dimensions<br>$w \times h \times l$<br>mm | Ordering code<br>(composition see<br>below) | Untaped<br>pcs./unit |
|-------|-------------------------------------|-------|------------------------------------------------|---------------------------------------------|----------------------|
| VDC   | VAC                                 | nF    |                                                |                                             |                      |
| 850   | 450                                 | 220   | $12.0 \times 22.0 \times 42.0$                 | B32656A8224+000                             | 72                   |
|       |                                     | 330   | $12.0 \times 22.0 \times 42.0$                 | B32656A8334+000                             | 72                   |
|       |                                     | 470   | $12.0 \times 22.0 \times 42.0$                 | B32656A8474+000                             | 72                   |
|       |                                     | 680   | $16.0 \times 28.5 \times 42.0$                 | B32656A8684+000                             | 48                   |
|       |                                     | 1000  | $18.0 \times 32.5 \times 42.0$                 | B32656A8105+000                             | 32                   |
| 1000  | 500                                 | 470   | $14.0 \times 25.0 \times 42.0$                 | B32656A0474+000                             | 56                   |
|       |                                     | 680   | $16.0 \times 28.5 \times 42.0$                 | B32656A0684+000                             | 48                   |
|       |                                     | 1000  | $20.0 \times 39.5 \times 42.0$                 | B32656A0105+000                             | 32                   |
| 1250  | 500                                 | 220   | $14.0 \times 25.0 \times 42.0$                 | B32656A7224+000                             | 56                   |
|       |                                     | 330   | $16.0 \times 28.5 \times 42.0$                 | B32656A7334+000                             | 48                   |
|       |                                     | 470   | $18.0 \times 32.5 \times 42.0$                 | B32656A7474+000                             | 48                   |
|       |                                     | 680   | $20.0 \times 39.5 \times 42.0$                 | B32656A7684+000                             | 32                   |
| 1600  | 600                                 | 100   | $12.0 \times 22.0 \times 42.0$                 | B32656J1104+000                             | 72                   |
|       |                                     | 150   | $14.0 \times 25.0 \times 42.0$                 | B32656J1154+000                             | 56                   |
|       |                                     | 220   | $16.0 \times 28.5 \times 42.0$                 | B32656J1224+000                             | 48                   |
| 2000  | 700                                 | 100   | $14.0 \times 25.0 \times 42.0$                 | B32656J2104+000                             | 56                   |
|       |                                     | 150   | $18.0 \times 32.5 \times 42.0$                 | B32656J2154+000                             | 48                   |
|       |                                     | 220   | $20.0 \times 39.5 \times 42.0$                 | B32656J2224+000                             | 32                   |

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

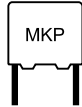
K =  $\pm 10\%$

J =  $\pm 5\%$

on request =  $\pm 3.5\%$

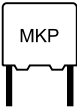
Packaging code:

000 = Untaped (lead length 6 – 1 mm)



## Technical data

|                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                 |                                                            |                              |                                                                 |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------|-----------------------------------------------------------------|-------|
| Operating temperature range                                                                                                                                        | Max. operating temperature T <sub>op,max</sub> +105 °C<br>Upper category temperature T <sub>max</sub> +100 °C<br>Lower category temperature T <sub>min</sub> −55 °C<br>Rated temperature T <sub>R</sub> +85 °C                                                                                                                  |                                                            |                              |                                                                 |       |
| Dissipation factor tan δ (in 10 <sup>−3</sup> )<br>at 20 °C<br>(upper limit values)                                                                                | at                                                                                                                                                                                                                                                                                                                              | ≤27 nF                                                     | 27 nF<C <sub>R</sub> ≤0.1 μF | 0.1 μF<C <sub>R</sub> ≤1 μF                                     | >1 μF |
|                                                                                                                                                                    | 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 <sub>ins</sub><br>or time constant τ = C <sub>R</sub> · R <sub>ins</sub><br>at 20 °C, rel. humidity ≤ 65%<br>(minimum as-delivered values) | C <sub>R</sub> ≤ 0.33 μF                                                                                                                                                                                                                                                                                                        |                                                            | C <sub>R</sub> > 0.33 μF     |                                                                 |       |
|                                                                                                                                                                    | 100 GΩ                                                                                                                                                                                                                                                                                                                          |                                                            | 30000 s                      |                                                                 |       |
| DC test voltage                                                                                                                                                    | 1.6 · V <sub>R</sub> , 2 s                                                                                                                                                                                                                                                                                                      |                                                            |                              |                                                                 |       |
| Category voltage V <sub>C</sub><br>(continuous operation with V <sub>DC</sub><br>or V <sub>AC</sub> at f ≤ 1 kHz)                                                  | T <sub>A</sub> (°C)                                                                                                                                                                                                                                                                                                             | DC voltage derating                                        |                              | AC voltage derating                                             |       |
|                                                                                                                                                                    | T <sub>A</sub> ≤ 85                                                                                                                                                                                                                                                                                                             | V <sub>C</sub> = V <sub>R</sub>                            |                              | V <sub>C,rms</sub> = V <sub>rms</sub>                           |       |
|                                                                                                                                                                    | 85<T <sub>A</sub> ≤100                                                                                                                                                                                                                                                                                                          | V <sub>C</sub> = V <sub>R</sub> · (165−T <sub>A</sub> )/80 |                              | V <sub>C,rms</sub> =V <sub>rms</sub> · (165−T <sub>A</sub> )/80 |       |
| Operating voltage V <sub>op</sub> for<br>short operating periods<br>(V <sub>DC</sub> or V <sub>AC</sub> at f ≤ 1 kHz)                                              | T <sub>A</sub> (°C)                                                                                                                                                                                                                                                                                                             | DC voltage (max. hours)                                    |                              | AC voltage (max. hours)                                         |       |
|                                                                                                                                                                    | T <sub>A</sub> ≤ 85                                                                                                                                                                                                                                                                                                             | V <sub>op</sub> = 1.25 · V <sub>C</sub> (2000 h)           |                              | V <sub>op</sub> = 1.0 · V <sub>C,rms</sub> (2000 h)             |       |
|                                                                                                                                                                    | 85<T <sub>A</sub> ≤100                                                                                                                                                                                                                                                                                                          | V <sub>op</sub> = 1.25 · V <sub>C</sub> (2000 h)           |                              | V <sub>op</sub> = 1.0 · V <sub>C,rms</sub> (2000 h)             |       |
| Damp heat test<br>Limit values after damp<br>heat test                                                                                                             | 56 days/40 °C/93% relative humidity<br>Capacitance change  ΔC/C  ≤ 3%<br>Dissipation factor change Δ tan δ ≤ 0.5 · 10 <sup>−3</sup> (at 1 kHz)<br>≤ 1.0 · 10 <sup>−3</sup> (at 10 kHz)<br>Insulation resistance R <sub>ins</sub> ≥ 50% of minimum<br>or time constant τ = C <sub>R</sub> · R <sub>ins</sub> as-delivered values |                                                            |                              |                                                                 |       |
| Reliability:<br>Failure rate λ<br>Service life t <sub>SL</sub>                                                                                                     | 1 fit (≤ 1 · 10 <sup>−9</sup> /h) at 0.5 · V <sub>R</sub> , 40 °C<br>200 000 h at 1.0 · V <sub>R</sub> , 40 °C<br>For conversion to other operating conditions and temperatures,<br>refer to chapter "Quality assurance", page .                                                                                                |                                                            |                              |                                                                 |       |
| Failure criteria:<br>Total failure<br>Failure due to variation<br>of parameters                                                                                    | Short circuit or open circuit<br>Capacitance change  ΔC/C  > 10%<br>Dissipation factor tan δ > 4 · upper limit value<br>Insulation resistance R <sub>ins</sub> < 1500 MΩ (C <sub>R</sub> ≤0.33 μF)<br>or time constant τ = C <sub>R</sub> · R <sub>ins</sub> < 500 s (C <sub>R</sub> >0.33 μF)                                  |                                                            |                              |                                                                 |       |



B32651 ... B32656

High pulse (wound)

### Pulse handling capability

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

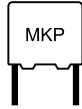
"k<sub>0</sub>" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V<sup>2</sup>/μs.

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

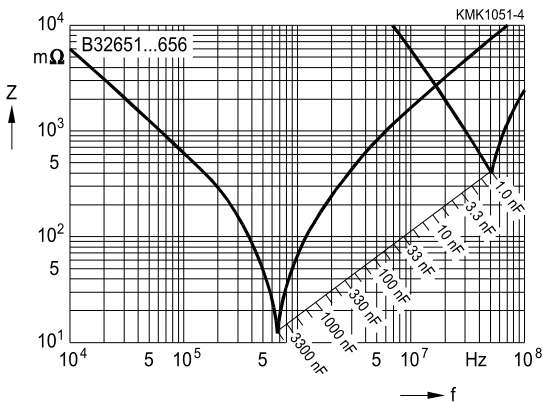
| Lead spacing          |                         | 10 mm         | 15 mm | 22.5 mm | 27.5 mm | 37.5 mm |
|-----------------------|-------------------------|---------------|-------|---------|---------|---------|
| V <sub>R</sub><br>VDC | V <sub>rms</sub><br>VAC | dV/dt in V/μs |       |         |         |         |
| 250                   | 160                     | —             | 200   | 120     | 50      | —       |
| 400                   | 200                     | —             | 300   | 180     | 100     | —       |
| 630                   | 250                     | —             | 400   | 300     | 150     | —       |
| 850                   | 450                     | —             | —     | —       | —       | 90      |
| 1000                  | 250                     | —             | 975   | 600     | 300     | —       |
|                       | 500                     | —             | —     | —       | —       | 100     |
| 1250                  | 450                     | 4000          | —     | —       | —       | —       |
|                       | 500                     | —             | 1850  | 1150    | 600     | 140     |
| 1600                  | 500                     | —             | 4500  | 2400    | 1000    | —       |
|                       | 600                     | —             | —     | —       | —       | 210     |
|                       | 700                     | —             | 5200  | —       | —       | —       |
| 2000                  | 700                     | —             | 8000  | 7000    | 2300    | 200     |
|                       | 1000                    | —             | —     | 7500    | —       | —       |

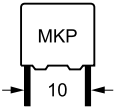


### $k_0$ values

| Lead spacing |                  | 10 mm                | 15 mm      | 22.5 mm    | 27.5 mm    | 37.5 mm |
|--------------|------------------|----------------------|------------|------------|------------|---------|
| $V_R$<br>VDC | $V_{rms}$<br>VAC | $k_0$ in $V^2/\mu s$ |            |            |            |         |
| 250          | 160              | —                    | 10 000     | 60 000     | 25 000     | —       |
| 400          | 200              | —                    | 250 000    | 200 000    | 110 000    | —       |
| 630          | 250              | —                    | 500 000    | 350 000    | 250 000    | —       |
| 850          | 450              | —                    | —          | —          | —          | 153 000 |
| 1000         | 250              | —                    | 3 000 000  | 1 500 000  | 1 000 000  | —       |
|              | 500              | —                    | —          | —          | —          | 180 000 |
| 1250         | 450              | 25 000 000           | —          | —          | —          | —       |
|              | 500              | —                    | 9 000 000  | 3 750 000  | 2 000 000  | 350 000 |
| 1600         | 500              | —                    | 20 000 000 | 10 000 000 | 4 000 000  | —       |
|              | 600              | —                    | —          | —          | —          | 672 000 |
|              | 700              | —                    | 28 000 000 | —          | —          | —       |
| 2000         | 700              | —                    | 60 000 000 | 40 000 000 | 15 000 000 | 800 000 |
|              | 1000             | —                    | —          | 50 000 000 | —          | —       |

### Impedance $Z$ versus frequency $f$ (typical values)





**B32651**

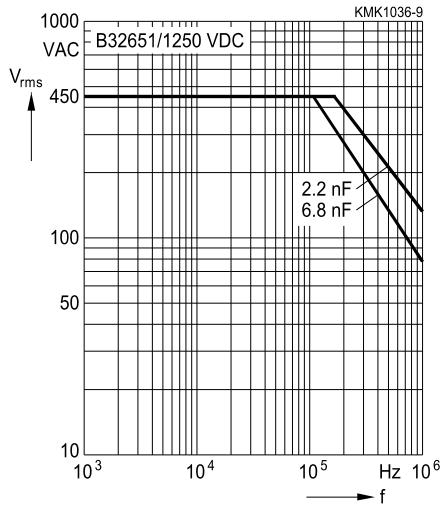
**High pulse (wound)**

**Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )**

For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 10 mm**

1250 VDC/450 VAC

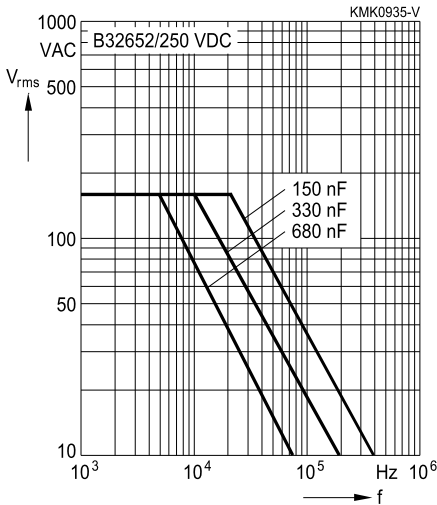


Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )

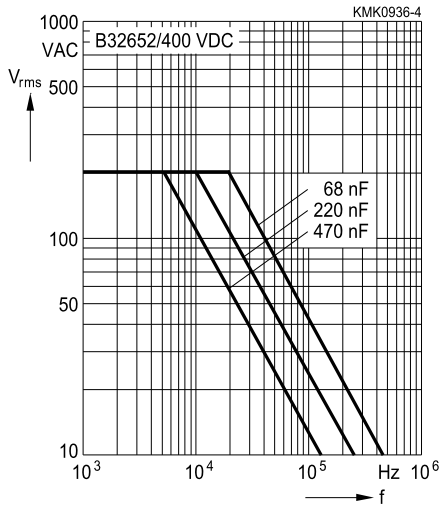
For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

Lead spacing 15 mm

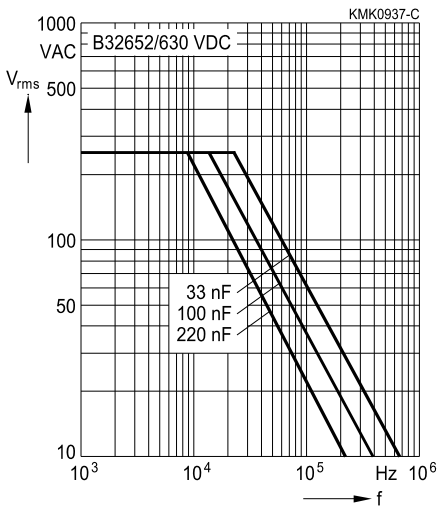
250 VDC/160 VAC



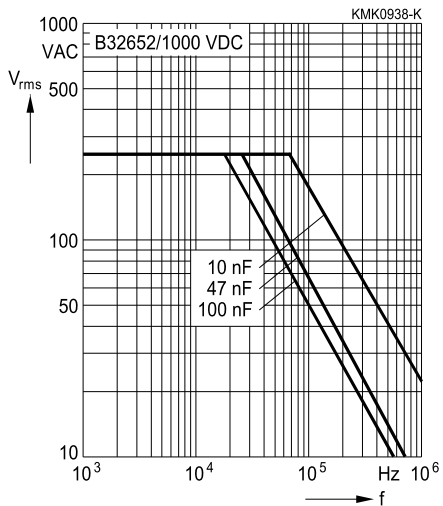
400 VDC/200 VAC

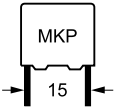


630 VDC/250 VAC



1000 VDC/250 VAC





**B32652**

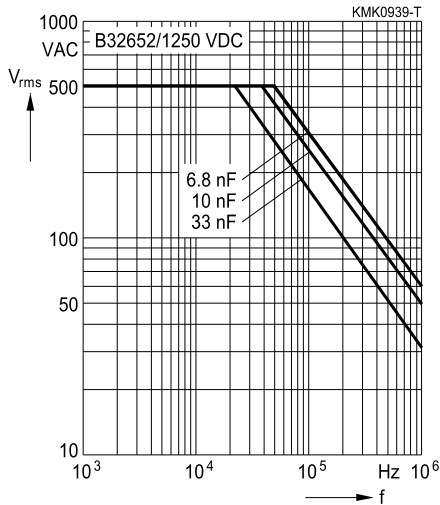
**High pulse (wound)**

**Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ \text{C}$ )**

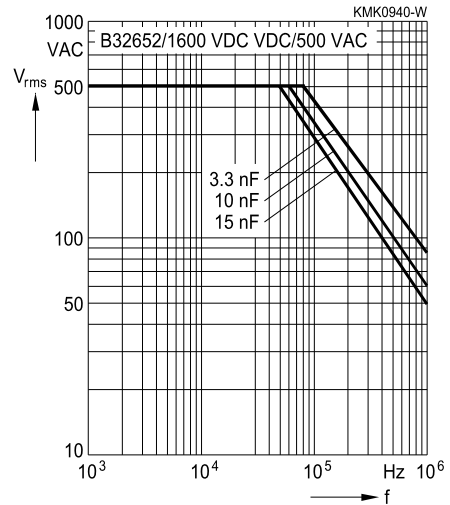
For  $T_A > 90^\circ \text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 15 mm**

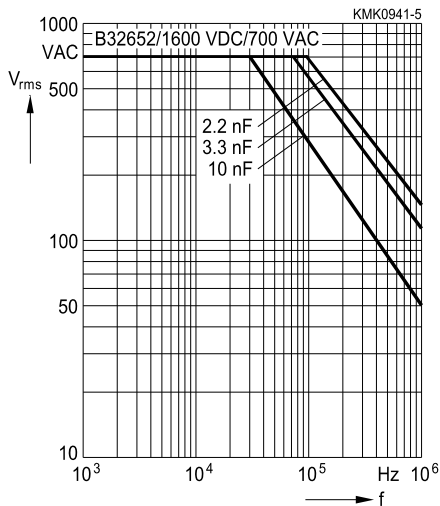
**1250 VDC/500 VAC**



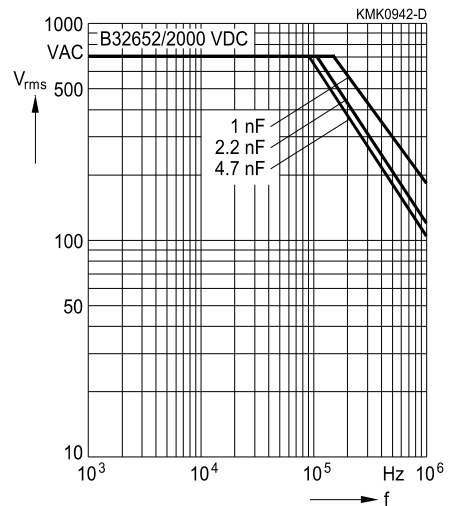
**1600 VDC/500 VAC**



**1600 VDC/700 VAC**



**2000 VDC/700 VAC**

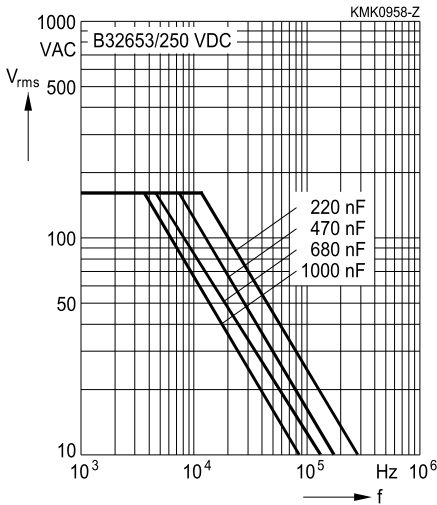


Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )

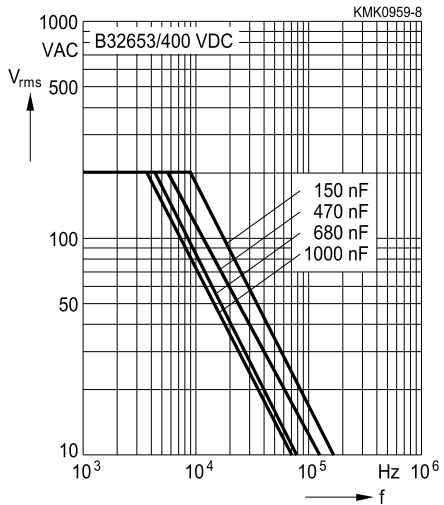
For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

Lead spacing 22.5 mm

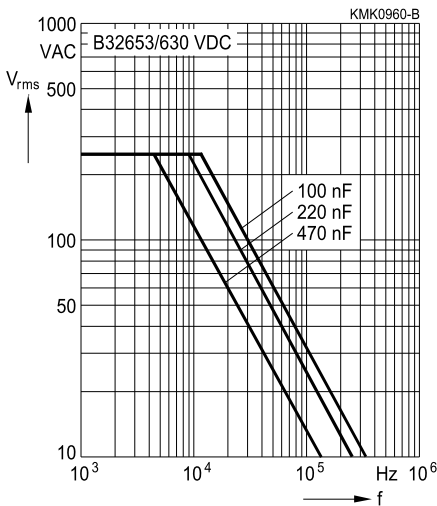
250 VDC/160 VAC



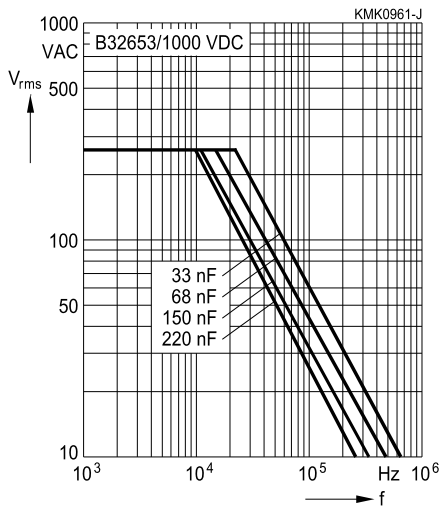
400 VDC/200 VAC

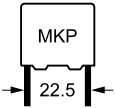


630 VDC/250 VAC



1000 VDC/250 VAC





**B32653**

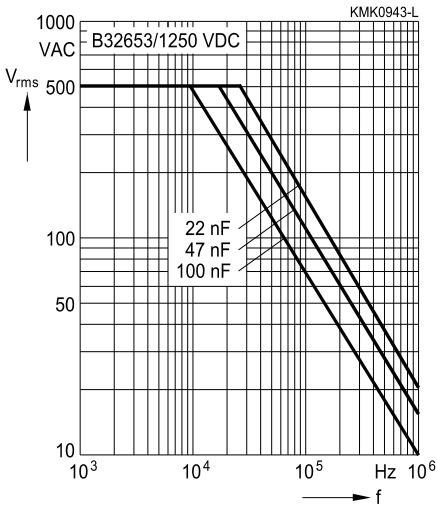
**High pulse (wound)**

**Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )**

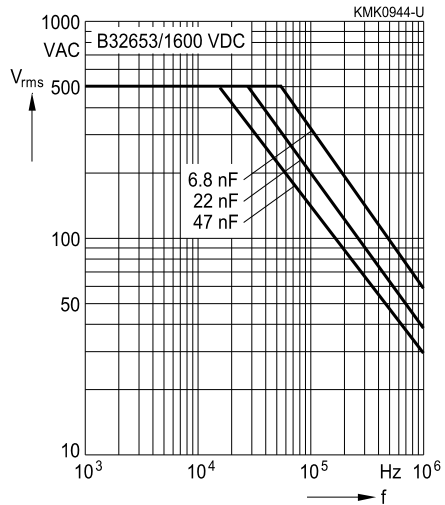
For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 22.5 mm**

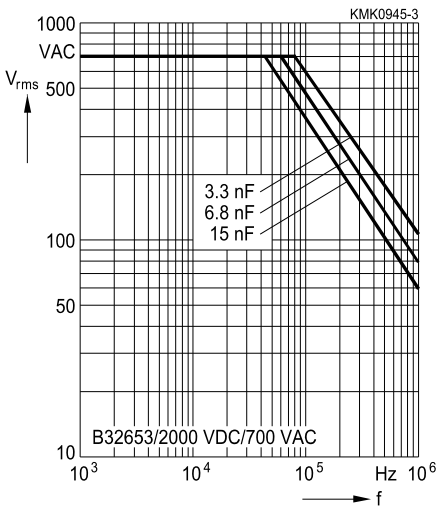
**1250 VDC/500 VAC**



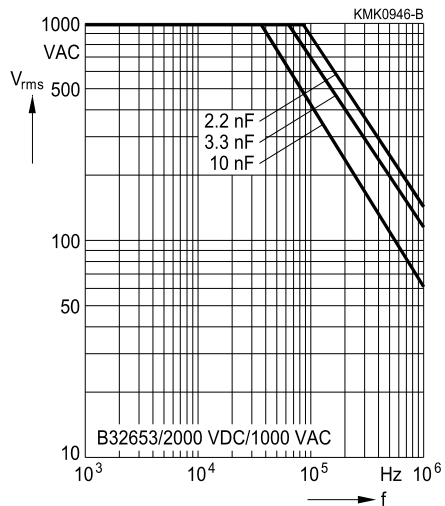
**1600 VDC/500 VAC**



**2000 VDC/700 VAC**



**2000 VDC/1000 VAC**

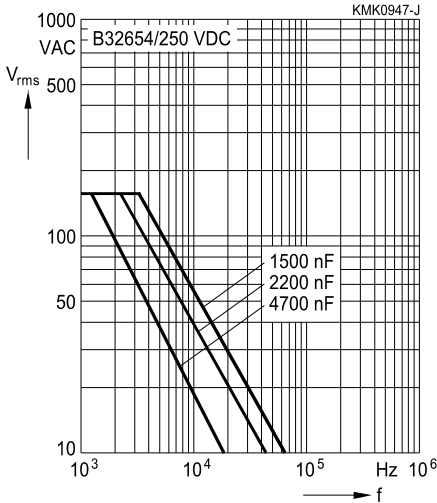


Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )

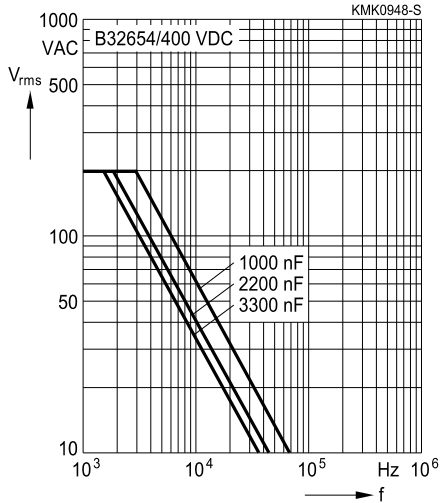
For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

Lead spacing 27.5 mm

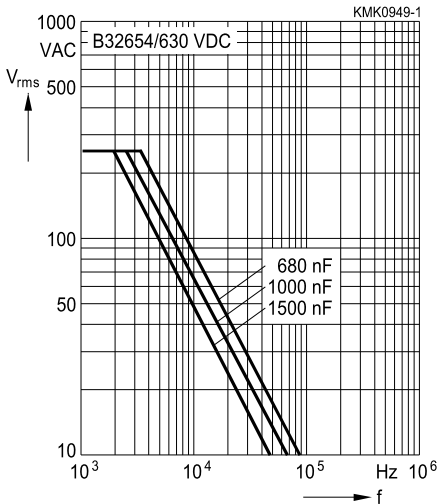
250 VDC/160 VAC



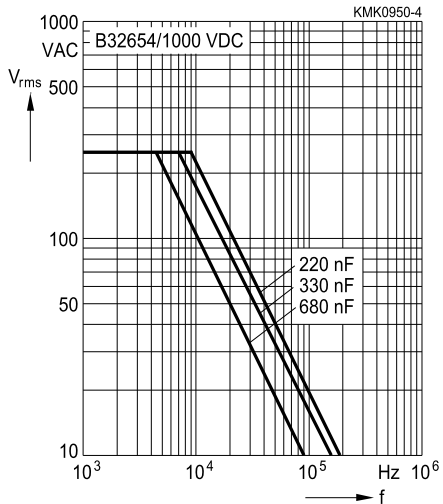
400 VDC/200 VAC

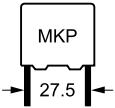


630 VDC/250 VAC



1000 VDC/250 VAC





**B32654**

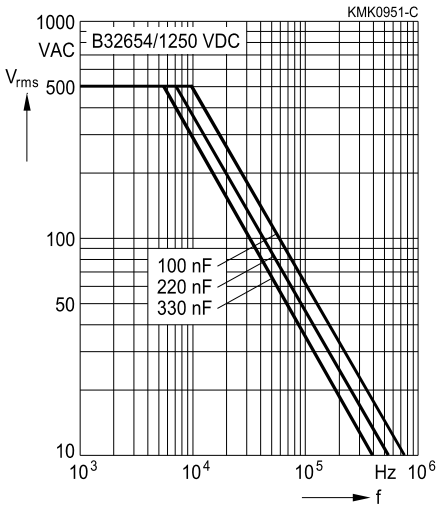
**High pulse (wound)**

**Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )**

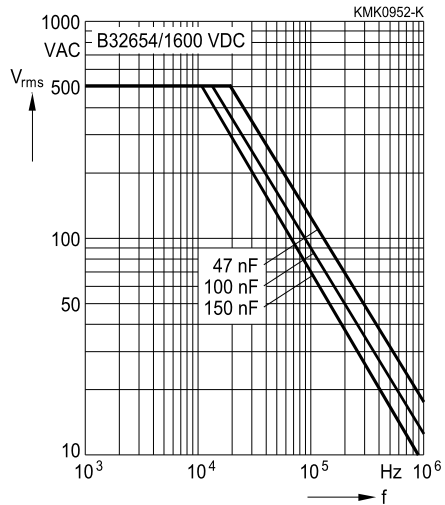
For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 27.5 mm**

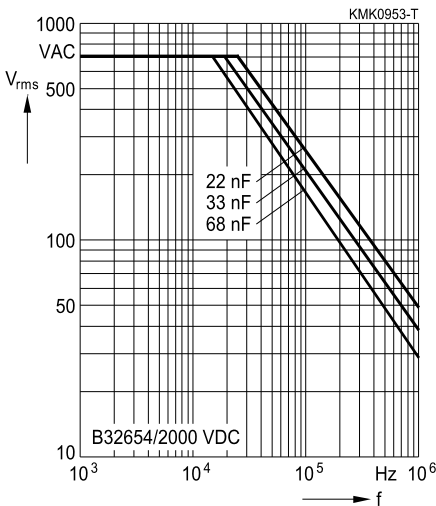
**1250 VDC/500 VAC**



**1600 VDC/500 VAC**



**2000 VDC/700 VAC**

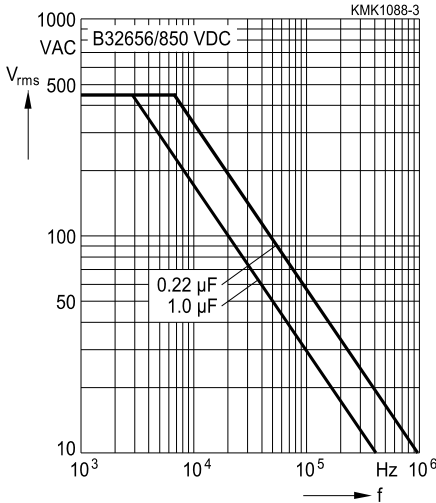


Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )

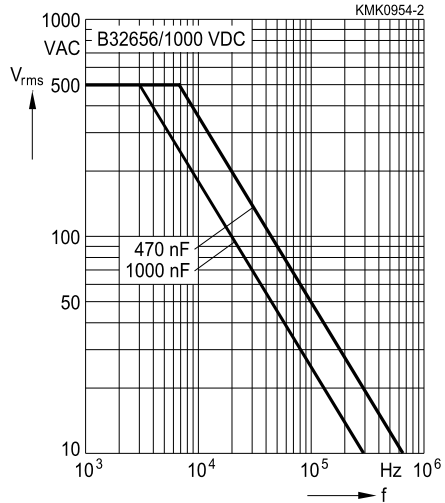
For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

Lead spacing 37.5 mm

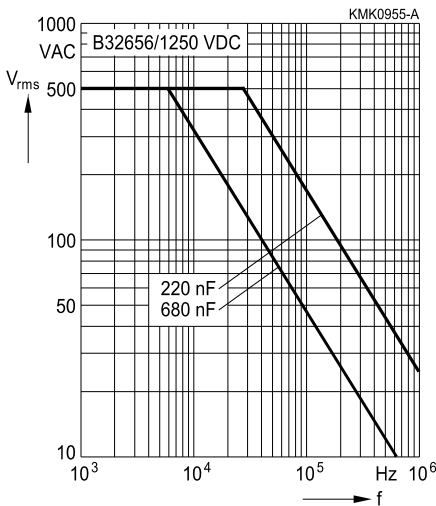
850 VDC/450 VAC



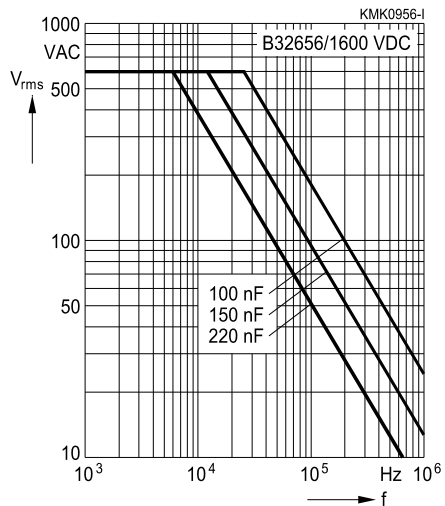
1000 VDC/500 VAC

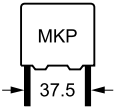


1250 VDC/500 VAC



1600 VDC/600 VAC





**B32656**

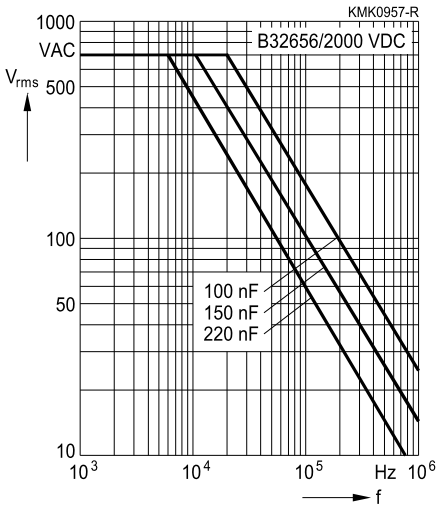
**High pulse (wound)**

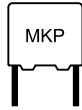
**Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )**

For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**Lead spacing 37.5 mm**

**2000 VDC/700 VAC**

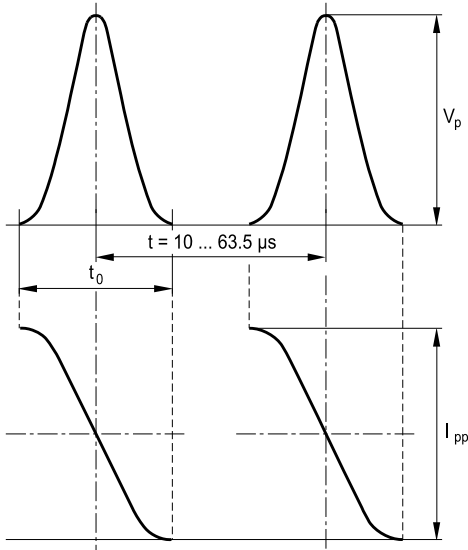




## Flyback application

### Permissible voltage and current / waveform

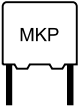
Permissible current  $I_{pp}$  versus frequency  $f$  for a duty cycle of 20% ( $t_0/t = 0.2$ ):



KMK0720-5

Approximation formular for duty cycle higher than 20%:

$$I'_{pp} = I_{pp} \cdot \sqrt{\frac{t_0^3}{t'^3}}$$



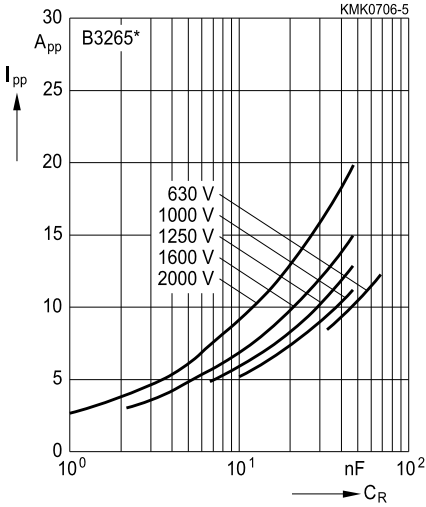
B32651 ... B32656

High pulse (wound)

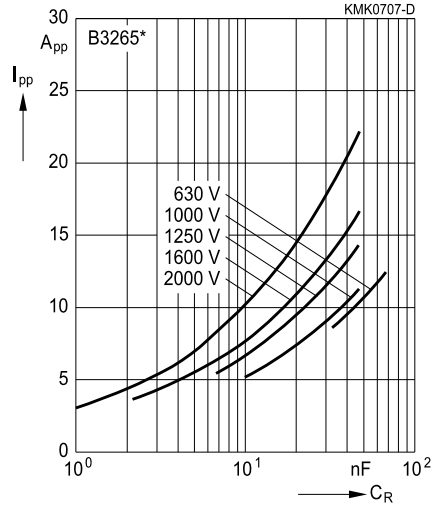
## Flyback application

Permissible current  $I_{pp}$  versus rated capacitance  $C_R$

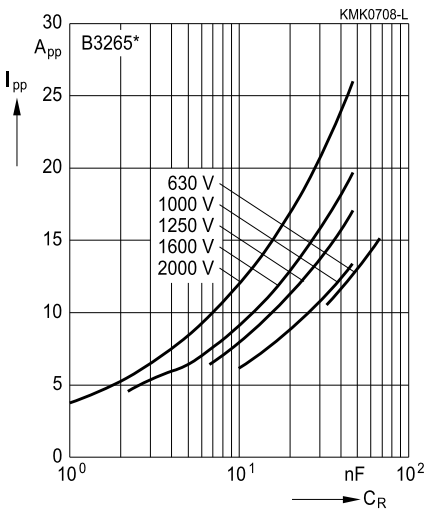
Frequency = 15.75 kHz

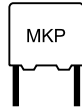


Frequency = 31.5 kHz



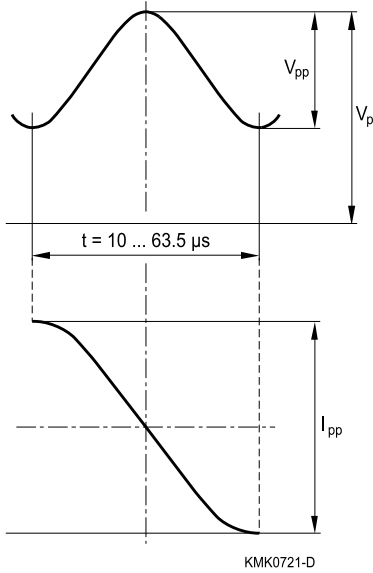
Frequency = 95 kHz

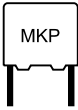




# S-correction application

## Permissible voltage and current / waveform





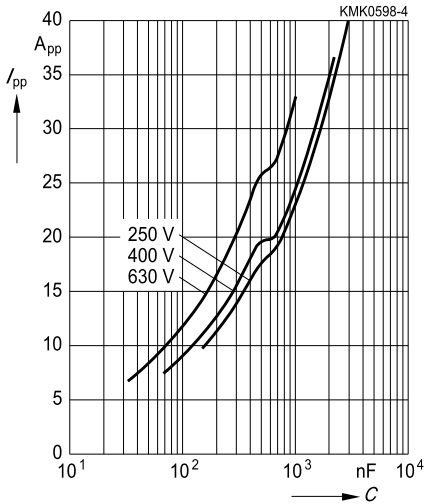
B32651 ... B32656

High pulse (wound)

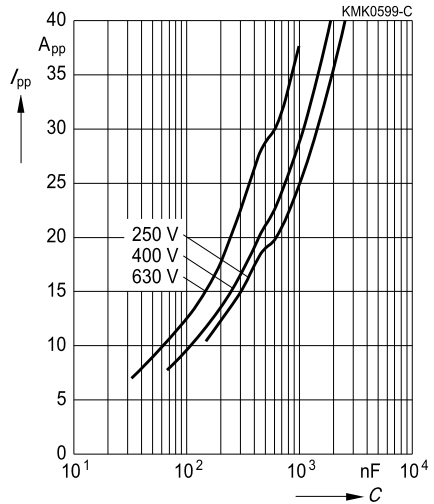
### S-correction application

Permissible current  $I_{pp}$  versus rated capacitance  $C_R$

Frequency = 15.75 kHz



Frequency = 31.75 kHz



Frequency = 95 kHz

