# Film Capacitors

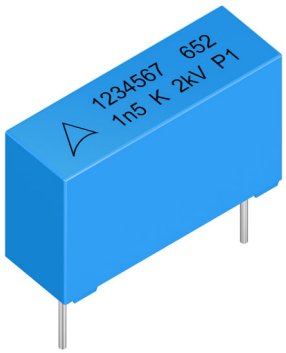
## Capacitors for Snubbering, Resonant Circuits, Power Factor Correction (PFC)

**Series/Type:** **B3265*A/G/J/T**

Date: May 2025

## Applications

- Electronic ballasts
- Switch-mode power supplies
- IGBT
- Snubbering




## Climatic

- Max. operating temperature: 110°C
- Climatic category (IEC 60068-1): 40/100/56

## Construction

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

## Features

- High pulse strength
- High contact reliability
- RoHS-compatible
- Very low inductance
- Halogen free capacitors available on request
- AEC-Q200 compliant

## Terminals

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

## Marking

Manufacturer's logo, lot number, series number (e.g. 651), rated capacitance (coded), capacitance tolerance (code letter), rated DC voltage (AC voltage for 1600 V / 700 V AC and 2000 V DC / 1000 V AC), date of manufacture (coded)

## Delivery mode

- Bulk (untaped)
- Taped (Ammo pack or reel)
- For notes on taping, refer to chapter "Taping and packing"

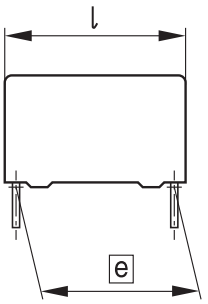
## Dimensional drawings

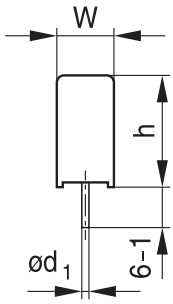
| Number of wires | Lead space e ±0.4 | Lead diameter $d_1$ ±0.05 | Type | Drawing |
|---|---|---|---|---|
| 2-pin | 10.0 | 0.6 | B32651 | A1 |
| 2-pin | 15.0 | 0.8 | B32652 | A1 |
| 2-pin | 22.5 | 0.8 | B32653 | A1 |
| 2-pin | 27.5 | 0.8 | B32654 | A1 |
| 2-pin | 37.5 | 1.0 | B32656A/J | A1 |
| 2-pin | 37.5 | 1.0 | B32656T | A2 |
| 4-pin | 37.5 | 1.2 | B32656G | B1 |
| 4-pin | 52.5 | 1.2 | B32658G | B1 |

(Dimensions in mm)

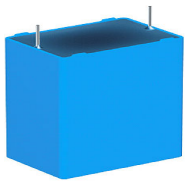
## Dimensions drawing 2-pin versions

### Drawing A1



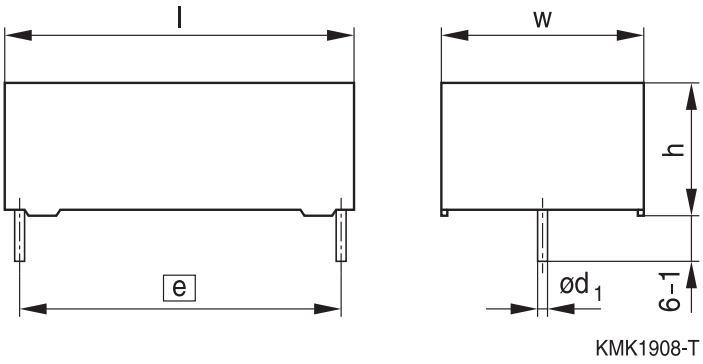

KMK0835-P-E

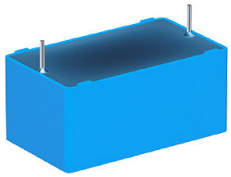


| | B32651 | B32652 | B32653 | B32654 | B32656A/J |
|---|---|---|---|---|---|
| Lead spacing e ±0.4 | 10.0 | 15.0 | 22.5 | 27.5 | 37.5 |
| Lead diameter $d_1$: | 0.6 | 0.8 | 0.8 | 0.8 | 1.0 |

(Dimensions in mm)

### Drawing A2 (low profile)



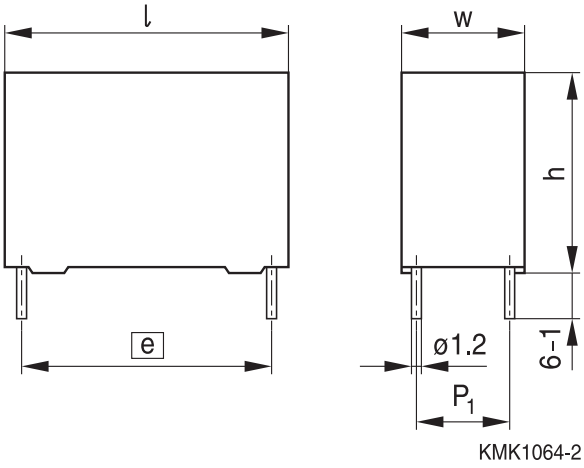



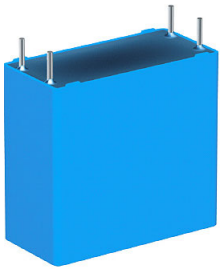
| | B32656T |
|---|---|
| Lead spacing e ±0.4 | 37.5 |
| Lead diameter $d_1$: | 1.0 |

(Dimensions in mm)

### Dimensions drawing 4-pin versions

### Drawing B1



| | B32656G | B32658G |
|---|---|---|
| Lead spacing e ±0.4 | 37.5 | 52.5 |
| Lead diameter $d_1$: | 1.2 | 1.2 |

(Dimensions in mm)

## Overview of available types

| Lead spacing | 10 mm |
|---|---|
| Type | B32651 |
| $V_R$ (V DC) | 1250 |
| $V_{RMS}$ (V AC) | 450 |
| $C_R$ (nF) | |
| 2.2 | |
| 3.3 | |
| 4.7 | |
| 6.8 | |

## Overview of available types

| Lead spacing | 15 mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | B32652 | | | | | | | |
| $V_R$ (V DC) | 250 | 400 | 630 | 1000 | 1250 | 1600 | 1600 | 2000 |
| $V_{RMS}$ (V AC) | 160 | 200 | 250 | 250 | 500 | 500 | 700 | 700 |
| $C_R$ (nF) | | | | | | | | |
| 1.0 | | | | | | | | |
| 1.5 | | | | | | | | |
| 2.2 | | | | | | | | |
| 3.3 | | | | | | | | |
| 4.7 | | | | | | | | |
| 5.6 | | | | | | | | |
| 6.8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 15 | | | | | | | | |
| 22 | | | | | | | | |
| 33 | | | | | | | | |
| 47 | | | | | | | | |
| 56 | | | | | | | | |
| 68 | | | | | | | | |
| 100 | | | | | | | | |
| 120 | | | | | | | | |
| 150 | | | | | | | | |
| 220 | | | | | | | | |
| 330 | | | | | | | | |
| 390 | | | | | | | | |
| 470 | | | | | | | | |
| 560 | | | | | | | | |
| 680 | | | | | | | | |
| 820 | | | | | | | | |
| 1000 | | | | | | | | |

## Overview of available types

| Lead spacing | 22.5 mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | B32653 | | | | | | | |
| $V_R$ (V DC) | 250 | 400 | 630 | 1000 | 1250 | 1600 | 2000 | 2000 |
| $V_{RMS}$ (V AC) | 160 | 200 | 250 | 250 | 500 | 500 | 700 | 1000 |
| $C_R$ (nF) | | | | | | | | |
| 2.2 | | | | | | | | |
| 3.3 | | | | | | | | |
| 4.7 | | | | | | | | |
| 6.8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 15 | | | | | | | | |
| 22 | | | | | | | | |
| 33 | | | | | | | | |
| 47 | | | | | | | | |
| 56 | | | | | | | | |
| 68 | | | | | | | | |
| 82 | | | | | | | | |
| 100 | | | | | | | | |
| 120 | | | | | | | | |
| 150 | | | | | | | | |
| 220 | | | | | | | | |
| 330 | | | | | | | | |
| 470 | | | | | | | | |
| 560 | | | | | | | | |
| 680 | | | | | | | | |
| 1000 | | | | | | | | |
| 1200 | | | | | | | | |
| 1500 | | | | | | | | |
| 2200 | | | | | | | | |
| 3300 | | | | | | | | |

## Overview of available types

| Lead spacing | 27.5 mm | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | B32654 | | | | | | |
| $V_R$ (V DC) | 250 | 400 | 630 | 1000 | 1250 | 1600 | 2000 |
| $V_{RMS}$ (V AC) | 160 | 200 | 250 | 250 | 500 | 500 | 700 |
| $C_R$ (nF) | | | | | | | |
| 22 | | | | | | | |
| 33 | | | | | | | |
| 47 | | | | | | | |
| 68 | | | | | | | |
| 82 | | | | | | | |
| 100 | | | | | | | |
| 150 | | | | | | | |
| 220 | | | | | | | |
| 330 | | | | | | | |
| 470 | | | | | | | |
| 560 | | | | | | | |
| 680 | | | | | | | |
| 820 | | | | | | | |
| 1000 | | | | | | | |
| 1200 | | | | | | | |
| 1500 | | | | | | | |
| 2200 | | | | | | | |
| 2700 | | | | | | | |
| 3300 | | | | | | | |
| 4700 | | | | | | | |
| 5600 | | | | | | | |
| 6800 | | | | | | | |
| 8200 | | | | | | | |

## Overview of available types

| Lead spacing | 37.5 mm | | | |
|---|---|---|---|---|
| Type | B32656 | | | |
| $V_R$ (V DC) | 250 | 400 | 630 | 750 |
| $V_{RMS}$ (V AC) | 160 | 200 | 250 | 350 |
| $C_R$ (nF) | | | | |
| 470 | | | | |
| 560 | | | | |
| 680 | | | | |
| 820 | | | | |
| 1000 | | | | |
| 1200 | | | | |
| 1500 | | | | |
| 1800 | | | | |
| 2000 | | | | |
| 2200 | | | | |
| 2500 | | | | |
| 2700 | | | | |
| 3000 | | | | |
| 3300 | | | | |
| 3500 | | | | |
| 4000 | | | | |
| 4700 | | | | |
| 5600 | | | | |
| 6800 | | | | |
| 7000 | | | | |
| 7500 | | | | |
| 8000 | | | | |
| 10000 | | | | |
| 12000 | | | | |
| 14000 | | | | |
| 15000 | | | | |
| 17000 | | | | |
| 20000 | | | | |
| 24000 | | | | |

## Overview of available types

| Lead spacing | 37.5 mm | | | | |
|---|---|---|---|---|---|
| Type | B32656 | | | | |
| $V_R$ (V DC) | 850 | 1000 | 1250 | 1600 | 2000 |
| $V_{RMS}$ (V AC) | 450 | 500 | 500 | 600 | 700 |
| $C_R$ (nF) | | | | | |
| 68 | | | | | |
| 100 | | | | | |
| 120 | | | | | |
| 150 | | | | | |
| 220 | | | | | |
| 270 | | | | | |
| 330 | | | | | |
| 390 | | | | | |
| 470 | | | | | |
| 560 | | | | | |
| 680 | | | | | |
| 820 | | | | | |
| 900 | | | | | |
| 1000 | | | | | |
| 1200 | | | | | |
| 1500 | | | | | |
| 1800 | | | | | |
| 2200 | | | | | |
| 2500 | | | | | |
| 2700 | | | | | |
| 3000 | | | | | |
| 3300 | | | | | |
| 3800 | | | | | |

## Overview of available types

| Lead spacing | 52.5 mm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Type | B32658 | | | | | | | | |
| $V_R$ (V DC) | 250 | 400 | 630 | 750 | 850 | 1000 | 1250 | 1600 | 2000 |
| $V_{RMS}$ (V AC) | 160 | 200 | 250 | 350 | 450 | 500 | 500 | 600 | 700 |
| $C_R$ (nF) | | | | | | | | | |
| 680 | | | | | | | | | |
| 820 | | | | | | | | | |
| 1000 | | | | | | | | | |
| 1200 | | | | | | | | | |
| 1500 | | | | | | | | | |
| 2000 | | | | | | | | | |
| 2200 | | | | | | | | | |
| 2700 | | | | | | | | | |
| 3300 | | | | | | | | | |
| 4500 | | | | | | | | | |
| 4700 | | | | | | | | | |
| 5600 | | | | | | | | | |
| 6000 | | | | | | | | | |
| 6800 | | | | | | | | | |
| 9000 | | | | | | | | | |
| 12000 | | | | | | | | | |
| 15000 | | | | | | | | | |
| 20000 | | | | | | | | | |
| 26000 | | | | | | | | | |
| 30000 | | | | | | | | | |
| 40000 | | | | | | | | | |

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

| $C_R$ [1] | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ [2] 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 1250 V DC [3]; $V_{RMS}$ (f ≤1 kHz) = 450 V AC | | | | | | | |
| 2.2 | B32651A7222+*** | 4.0 × 9.0 × 13.0 | 0.6 | 296.8 | 4000 | 6800 | 4000 |
| 3.3 | B32651A7332+*** | 5.0 × 11.0 × 13.0 | 0.8 | 198.5 | 3320 | 5200 | 4000 |
| 4.7 | B32651A7472+*** | 5.0 × 11.0 × 13.0 | 1.0 | 142.9 | 3320 | 5200 | 4000 |
| 6.8 | B32651A7682+*** | 6.0 × 12.0 × 13.0 | 1.4 | 97.3 | 2720 | 4400 | 4000 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
- J = ±5%
- K = ±10%

*** = Packaging code:
- 289 = Straight terminals, Ammo pack
- 189 = Straight terminals, Reel
- 000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
- 003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
- 004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$
3) For pulse loads (pulse width .1000 µs), a peak voltage of 1400 Up can be permitted

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 160 V AC | | | | | | | |
| 150 | B32652A3154+*** | 5.0 × 10.5 × 18.0 | 3.7 | 14.9 | 4680 | 5200 | 4000 |
| 220 | B32652A3224+*** | 6.0 × 11.0 × 18.0 | 4.7 | 10.5 | 3840 | 4400 | 4000 |
| 330 | B32652A3334+*** | 7.0 × 12.5 × 18.0 | 5.6 | 7.4 | 3320 | 3600 | 4000 |
| 470 | B32652A3474+*** | 8.5 × 14.5 × 18.0 | 6.7 | 5.6 | 2720 | 2800 | 2000 |
| 680 | B32652A3684+*** | 9.0 × 17.5 × 18.0 | 8.3 | 4.5 | 2560 | 2800 | 2000 |
| 820 | B32652A3824+*** | 11.0 × 18.5 × 18.0 | 9.5 | 4.0 | - | 2200 | 1200 |
| 1000 | B32652A3105+*** | 11.0 × 18.5 × 18.0 | 10.0 | 3.6 | - | 2200 | 1200 |
| $V_{R, DC}$ = 400 V DC ; $V_{RMS}$ (f ≤1 kHz) = 200 V AC | | | | | | | |
| 68 | B32652A4683+*** | 5.0 × 10.5 × 18.0 | 2.5 | 28.1 | 4680 | 5200 | 4000 |
| 100 | B32652A4104+*** | 5.0 × 10.5 × 18.0 | 3.0 | 19.3 | 4680 | 5200 | 4000 |
| 150 | B32652A4154+*** | 6.0 × 11.0 × 18.0 | 3.9 | 13.2 | 3840 | 4400 | 4000 |
| 220 | B32652A4224+*** | 7.0 × 12.5 × 18.0 | 5.0 | 9.4 | 3320 | 3600 | 4000 |
| 330 | B32652A4334+*** | 8.5 × 14.5 × 18.0 | 5.7 | 6.7 | 2720 | 2800 | 2000 |
| 470 | B32652A4474+*** | 9.0 × 17.5 × 18.0 | 7.2 | 5.3 | 2560 | 2800 | 2000 |
| 560 | B32652A4564+*** | 11.0 × 18.5 × 18.0 | 8.0 | 4.7 | - | 2200 | 1200 |
| 680 | B32652A4684+*** | 11.0 × 18.5 × 18.0 | 8.7 | 4.1 | - | 2200 | 1200 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 630V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | | |
| 33 | B32652A6333+*** | 5.0 × 10.5 × 18.0 | 2.0 | 50.0 | 4680 | 5200 | 4000 |
| 47 | B32652A6473+*** | 5.0 × 10.5 × 18.0 | 2.4 | 35.4 | 4680 | 5200 | 4000 |
| 68 | B32652A6683+*** | 6.0 × 11.0 × 18.0 | 3.0 | 24.8 | 3840 | 4400 | 4000 |
| 100 | B32652A6104+*** | 7.0 × 12.5 × 18.0 | 4.0 | 17.2 | 3320 | 3600 | 4000 |
| 150 | B32652A6154+*** | 8.5 × 14.5 × 18.0 | 5.3 | 12.0 | 2720 | 2800 | 2000 |
| 220 | B32652A6224+*** | 9.0 × 17.5 × 18.0 | 6.8 | 8.7 | 2560 | 2800 | 2000 |
| 330 | B32652A6334+*** | 11.0 × 18.5 × 18.0 | 8.0 | 6.3 | - | 2200 | 1200 |
| 390 | B32652A6394+*** | 11.0 × 18.5 × 18.0 | 8.5 | 6.1 | - | 2200 | 1200 |
| $V_{R, DC}$ = 1000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | | |
| 10 | B32652A0103+*** | 5.0 × 10.5 × 18.0 | 1.3 | 127.1 | 4680 | 5200 | 4000 |
| 15 | B32652A0153+*** | 5.0 × 10.5 × 18.0 | 1.6 | 85.0 | 4680 | 5200 | 4000 |
| 22 | B32652A0223+*** | 5.0 × 10.5 × 18.0 | 1.9 | 59.6 | 4680 | 5200 | 4000 |
| 33 | B32652A0333+*** | 6.0 × 11.0 × 18.0 | 2.5 | 39.1 | 3840 | 4400 | 4000 |
| 47 | B32652A0473+*** | 7.0 × 12.5 × 18.0 | 3.2 | 27.8 | 3320 | 3600 | 4000 |
| 68 | B32652A0683+*** | 8.5 × 14.5 × 18.0 | 4.2 | 19.7 | 2720 | 2800 | 2000 |
| 100 | B32652A0104+*** | 9.0 × 17.5 × 18.0 | 5.4 | 14.0 | 2560 | 2800 | 2000 |
| 120 | B32652A0124+*** | 11.0 × 18.5 × 18.0 | 6.3 | 12.0 | - | 2200 | 1200 |
| 150 | B32652A0154+*** | 11.0 × 18.5 × 18.0 | 7.0 | 9.8 | - | 2200 | 1200 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 1250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | | |
| 6.8 | B32652A7682+*** | 5.0 × 10.5 × 18.0 | 1.4 | 112.5 | 4680 | 5200 | 4000 |
| 10 | B32652A7103+*** | 6.0 × 11.0 × 18.0 | 1.8 | 76.8 | 3840 | 4400 | 4000 |
| 15 | B32652A7153+*** | 7.0 × 12.5 × 18.0 | 2.4 | 51.6 | 3320 | 3600 | 4000 |
| 22 | B32652A7223+*** | 8.5 × 14.5 × 18.0 | 3.2 | 35.6 | 2720 | 2800 | 2000 |
| 33 | B32652A7333+*** | 9.0 × 17.5 × 18.0 | 4.2 | 24.4 | 2560 | 2800 | 2000 |
| 47 | B32652A7473+*** | 11.0 × 18.5 × 18.0 | 5.4 | 17.6 | - | 2200 | 1200 |
| 56 | B32652A7563+*** | 11.0 × 18.5 × 18.0 | 5.7 | 15.0 | - | 2200 | 1200 |
| $V_{R, DC}$ = 1600 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | | |
| 3.3 | B32652A1332+*** | 5.0 × 10.5 × 18.0 | 0.9 | 206.6 | 4680 | 5200 | 4000 |
| 4.7 | B32652A1472+*** | 6.0 × 11.0 × 18.0 | 1.4 | 145.3 | 3840 | 4400 | 4000 |
| 6.8 | B32652A1682+*** | 7.0 × 12.5 × 18.0 | 1.7 | 100.8 | 3320 | 3600 | 4000 |
| 10 | B32652A1103+*** | 8.5 × 14.5 × 18.0 | 2.1 | 69.0 | 2720 | 2800 | 2000 |
| 15 | B32652A1153+*** | 9.0 × 17.5 × 18.0 | 2.8 | 46.6 | 2560 | 2800 | 2000 |
| 22 | B32652A1223+*** | 11.0 × 18.5 × 18.0 | 3.6 | 32.3 | - | 2200 | 1200 |

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Further E series and intermediate capacitance value on request.

### Composition of ordering code

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J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 1600 V DC ; $V_{RMS}$ (f ≤1 kHz) = 700 V AC | | | | | | | |
| 2.2 | B32652J1222+*** | 5.0 × 10.5 × 18.0 | 0.7 | 269.5 | 4680 | 5200 | 4000 |
| 3.3 | B32652J1332+*** | 6.0 × 11.0 × 18.0 | 1.1 | 179.9 | 3840 | 4400 | 4000 |
| 4.7 | B32652J1472+*** | 7.0 × 12.5 × 18.0 | 1.4 | 126.7 | 3320 | 3600 | 4000 |
| 6.8 | B32652J1682+*** | 8.5 × 14.5 × 18.0 | 1.8 | 88.0 | 2720 | 2800 | 2000 |
| 10 | B32652J1103+*** | 9.0 × 17.5 × 18.0 | 2.4 | 60.5 | 2560 | 2800 | 2000 |
| 12 | B32652J1123+*** | 9.0 × 17.5 × 18.0 | 2.6 | 50.6 | 2560 | 2800 | 2000 |
| 15 | B32652J1153+*** | 11.0 × 18.5 × 18.0 | 3.1 | 40.8 | - | 2200 | 1200 |
| $V_{R, DC}$ = 2000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 700 V AC | | | | | | | |
| 1.0 | B32652A2102+*** | 5.0 × 10.5 × 18.0 | 0.4 | 605.7 | 4680 | 5200 | 4000 |
| 1.5 | B32652A2152+*** | 6.0 × 11.0 × 18.0 | 0.7 | 404.1 | 3840 | 4400 | 4000 |
| 2.2 | B32652A2222+*** | 7.0 × 12.5 × 18.0 | 0.9 | 275.9 | 3320 | 3600 | 4000 |
| 3.3 | B32652A2332+*** | 8.5 × 14.5 × 18.0 | 1.2 | 184.4 | 2720 | 2800 | 2000 |
| 4.7 | B32652A2472+*** | 9.0 × 17.5 × 18.0 | 1.6 | 130.0 | 2560 | 2800 | 2000 |
| 5.6 | B32652A2562+*** | 9.0 × 17.5 × 18.0 | 1.7 | 111.3 | 2560 | 2800 | 2000 |
| 6.8 | B32652A2682+*** | 11.0 × 18.5 × 18.0 | 2.1 | 90.4 | - | 2200 | 1200 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 160 V AC | | | | | | | |
| 220 | B32653A3224+*** | 6.0 × 15.0 × 26.5 | 3.9 | 24.8 | 2720 | 2800 | 2880 |
| 330 | B32653A3334+*** | 6.0 × 15.0 × 26.5 | 4.8 | 16.9 | 2720 | 2800 | 2880 |
| 470 | B32653A3474+*** | 7.0 × 16.0 × 26.5 | 6.0 | 12.3 | 2320 | 2400 | 2520 |
| 680 | B32653A3684+*** | 8.5 × 16.5 × 26.5 | 7.4 | 8.9 | 1920 | 2000 | 2040 |
| 1000 | B32653A3105+*** | 10.5 × 16.5 × 26.5 | 8.0 | 6.5 | 1560 | 1600 | 2160 |
| 1200 | B32653A3125+*** | 10.5 × 18.5 × 26.5 | 8.8 | 5.8 | 1560 | 1600 | 2160 |
| 1500 | B32653A3155+*** | 11.0 × 20.5 × 26.5 | 10.0 | 5.1 | 1480 | 1400 | 2040 |
| 2200 | B32653A3225+*** | 14.5 × 29.5 × 26.5 | 11.0 | 4.7 | - | - | 1040 |
| 3300 | B32653A3335+*** | 14.5 × 29.5 × 26.5 | 13.0 | 3.9 | - | - | 1040 |
| $V_{R, DC}$ = 400 V DC ; $V_{RMS}$ (f ≤1 kHz) = 200 V AC | | | | | | | |
| 150 | B32653A4154+*** | 6.0 × 15.0 × 26.5 | 2.9 | 34.6 | 2720 | 2800 | 2880 |
| 220 | B32653A4224+*** | 6.0 × 15.0 × 26.5 | 3.5 | 30.7 | 2720 | 2800 | 2880 |
| 330 | B32653A4334+*** | 7.0 × 16.0 × 26.5 | 4.5 | 20.9 | 2320 | 2400 | 2520 |
| 470 | B32653A4474+*** | 8.5 × 16.5 × 26.5 | 5.3 | 15.1 | 1920 | 2000 | 2040 |
| 680 | B32653A4684+*** | 10.5 × 16.5 × 26.5 | 7.0 | 10.8 | 1560 | 1600 | 2160 |
| 1000 | B32653A4105+*** | 11.0 × 20.5 × 26.5 | 8.8 | 8.1 | 1480 | 1400 | 2040 |
| 1200 | B32653A4125+*** | 12.0 × 22.0 × 26.5 | 9.3 | 7.1 | - | - | 1800 |
| 1500 | B32653A4155+*** | 14.5 × 29.5 × 26.5 | 11.0 | 6.6 | - | - | 1040 |
| 2200 | B32653A4225+*** | 14.5 × 29.5 × 26.5 | 12.0 | 5.2 | - | - | 1040 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 630 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | | |
| 100 | B32653A6104+*** | 6.0 × 15.0 × 26.5 | 2.3 | 51.3 | 2720 | 2800 | 2880 |
| 150 | B32653A6154+*** | 6.0 × 15.0 × 26.5 | 3.3 | 34.6 | 2720 | 2800 | 2880 |
| 220 | B32653A6224+*** | 8.5 × 16.5 × 26.5 | 4.4 | 24.0 | 1920 | 2000 | 2040 |
| 330 | B32653A6334+*** | 10.5 × 16.5 × 26.5 | 5.6 | 16.5 | 1560 | 1600 | 2160 |
| 470 | B32653A6474+*** | 11.0 × 20.5 × 26.5 | 7.1 | 12.2 | 1480 | 1400 | 2040 |
| 560 | B32653A6564+*** | 11.0 × 20.5 × 26.5 | 7.7 | 10.5 | 1480 | 1400 | 2040 |
| 680 | B32653A6684+*** | 14.5 × 29.5 × 26.5 | 9.0 | 12.2 | - | - | 1040 |
| 1000 | B32653A6105+*** | 14.5 × 29.5 × 26.5 | 10.0 | 7.3 | - | - | 1040 |
| 1200 | B32653A6125+*** | 14.5 × 29.5 × 26.5 | 10.6 | 6.4 | - | - | 1040 |
| $V_{R, DC}$ = 1000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | | |
| 33 | B32653A0333+*** | 6.0 × 15.0 × 26.5 | 1.6 | 47.3 | 2720 | 2800 | 2880 |
| 47 | B32653A0473+*** | 6.0 × 15.0 × 26.5 | 2.0 | 95.3 | 2720 | 2800 | 2880 |
| 68 | B32653A0683+*** | 6.0 × 15.0 × 26.5 | 2.3 | 66.2 | 2720 | 2800 | 2880 |
| 100 | B32653A0104+*** | 8.5 × 16.5 × 26.5 | 3.2 | 45.5 | 1920 | 2000 | 2040 |
| 150 | B32653A0154+*** | 10.5 × 16.5 × 26.5 | 4.1 | 30.8 | 1560 | 1600 | 2160 |
| 220 | B32653A0224+*** | 11.0 × 20.5 × 26.5 | 5.3 | 21.7 | 1480 | 1400 | 2040 |
| 330 | B32653A0334+*** | 14.5 × 29.5 × 26.5 | 7.7 | 15.7 | - | - | 1040 |
| 470 | B32653A0474+*** | 14.5 × 29.5 × 26.5 | 9.0 | 11.7 | - | - | 1040 |
| 560 | B32653A0564+*** | 14.5 × 29.5 × 26.5 | 9.6 | 10.2 | - | - | 1040 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

## Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 1250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | | |
| 22 | B32653A7223+*** | 6.0 × 15.0 × 26.5 | 2.8 | 52.1 | 2720 | 2800 | 2880 |
| 33 | B32653A7333+*** | 6.0 × 15.0 × 26.5 | 3.4 | 35.1 | 2720 | 2800 | 2880 |
| 47 | B32653A7473+*** | 8.5 × 16.5 × 26.5 | 4.6 | 25.1 | 1920 | 2000 | 2040 |
| 68 | B32653A7683+*** | 10.5 × 16.5 × 26.5 | 5.7 | 17.7 | 1560 | 1600 | 2160 |
| 100 | B32653A7104+*** | 11.0 × 20.5 × 26.5 | 7.3 | 12.8 | 1480 | 1400 | 2040 |
| 120 | B32653A7124+*** | 12.0 × 22.0 × 26.5 | 8.3 | 11.0 | - | - | 1800 |
| 150 | B32653A7154+*** | 14.5 × 29.5 × 26.5 | 10.3 | 9.7 | - | - | 1040 |
| 220 | B32653A7224+*** | 14.5 × 29.5 × 26.5 | 12.0 | 7.4 | - | - | 1040 |
| $V_{R, DC}$ = 1600 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | | |
| 6.8 | B32653A1682+*** | 6.0 × 15.0 × 26.5 | 1.5 | 181.8 | 2720 | 2800 | 2880 |
| 10 | B32653A1103+*** | 6.0 × 15.0 × 26.5 | 1.8 | 124.0 | 2720 | 2800 | 2880 |
| 15 | B32653A1153+*** | 7.0 × 16.0 × 26.5 | 2.4 | 83.1 | 2320 | 2400 | 2520 |
| 22 | B32653A1223+*** | 8.5 × 16.5 × 26.5 | 3.0 | 57.1 | 1920 | 2000 | 2040 |
| 33 | B32653A1333+*** | 10.5 × 16.5 × 26.5 | 3.8 | 38.5 | 1560 | 1600 | 2160 |
| 47 | B32653A1473+*** | 11.0 × 20.5 × 26.5 | 5.0 | 27.7 | 1480 | 1400 | 2040 |
| 56 | B32653A1563+*** | 12.0 × 22.0 × 26.5 | 5.6 | 23.6 | - | - | 1800 |
| 68 | B32653A1683+*** | 14.5 × 29.5 × 26.5 | 7.1 | 20.3 | - | - | 1040 |
| 82 | B32653A1823+*** | 14.5 × 29.5 × 26.5 | 7.7 | 17.3 | - | - | 1040 |
| 100 | B32653A1104+*** | 14.5 × 29.5 × 26.5 | 8.4 | 14.6 | - | - | 1040 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

## Composition of ordering code

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J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 2000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 700 V AC | | | | | | | |
| 3.3 | B32653A2332+*** | 6.0 × 15.0 × 26.5 | 1.2 | 209.7 | 2720 | 2800 | 2880 |
| 4.7 | B32653A2472+*** | 6.0 × 15.0 × 26.5 | 1.6 | 150.7 | 2720 | 2800 | 2880 |
| 6.8 | B32653A2682+*** | 8.5 × 16.5 × 26.5 | 2.2 | 102.5 | 1920 | 2000 | 2040 |
| 10 | B32653A2103+*** | 10.5 × 16.5 × 26.5 | 2.8 | 70.1 | 1560 | 1600 | 2160 |
| 15 | B32653A2153+*** | 11.0 × 20.5 × 26.5 | 3.7 | 47.4 | 1480 | 1400 | 2040 |
| 22 | B32653A2223+*** | 14.5 × 29.5 × 26.5 | 5.4 | 33.5 | - | - | 1040 |
| 33 | B32653A2333+*** | 14.5 × 29.5 × 26.5 | 6.5 | 23.1 | - | - | 1040 |
| $V_{R, DC}$ = 2000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 1000 V AC | | | | | | | |
| 2.2 | B32653A8222+*** | 6.0 × 15.0 × 26.5 | 1.1 | 344.6 | 2720 | 2800 | 2880 |
| 3.3 | B32653A8332+*** | 6.0 × 15.0 × 26.5 | 1.2 | 229.8 | 2720 | 2800 | 2880 |
| 4.7 | B32653A8472+*** | 8.5 × 16.5 × 26.5 | 1.6 | 161.7 | 1920 | 2000 | 2040 |
| 6.8 | B32653A8682+*** | 10.5 × 16.5 × 26.5 | 2.0 | 112.1 | 1560 | 1600 | 2160 |
| 10 | B32653A8103+*** | 10.5 × 20.5 × 26.5 | 2.6 | 76.9 | 1560 | 1600 | 2160 |
| 12 | B32653A8123+*** | 12.0 × 22.0 × 26.5 | 3.0 | 64.5 | - | - | 1800 |
| 15 | B32653A8153+*** | 14.5 × 29.5 × 26.5 | 4.0 | 52.5 | - | - | 1040 |
| 22 | B32653A8223+*** | 14.5 × 29.5 × 26.5 | 4.7 | 36.5 | - | - | 1040 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 160 V AC | | | | | | | |
| 1500 | B32654A3155+*** | 11.0 × 21.0 × 31.5 | 7.4 | 6.9 | - | 1400 | 1280 |
| 2200 | B32654A3225+*** | 12.5 × 21.5 × 31.5 | 9.8 | 5.3 | - | 1200 | 1120 |
| 3300 | B32654A3335+*** | 15.0 × 24.5 × 31.5 | 10.8 | 4.4 | - | - | 960 |
| 4700 | B32654A3475+*** | 18.0 × 27.5 × 31.5 | 12.7 | 3.9 | - | - | 800 |
| 5600 | B32654A3565+*** | 19.0 × 30.0 × 31.5 | 13.6 | 3.8 | - | - | 720 |
| 6800 | B32654A3685+*** | 22.0 × 36.5 × 31.5 | 15.0 | 4.0 | - | - | 640 |
| 8200 | B32654A3825+*** | 22.0 × 36.5 × 31.5 | 16.0 | 3.8 | - | - | 640 |
| $V_{R, DC}$ = 400 V DC ; $V_{RMS}$ (f ≤1 kHz) = 200 V AC | | | | | | | |
| 1000 | B32654A4105+*** | 11.0 × 21.0 × 31.5 | 8.5 | 8.3 | - | 1400 | 1280 |
| 1500 | B32654A4155+*** | 12.5 × 21.5 × 31.5 | 9.0 | 6.1 | - | 1200 | 1120 |
| 2200 | B32654A4225+*** | 14.0 × 24.5 × 31.5 | 10.3 | 5.1 | - | 1000 | 1040 |
| 3300 | B32654A4335+*** | 19.0 × 30.0 × 31.5 | 11.3 | 4.4 | - | - | 720 |
| 4700 | B32654A4475+*** | 22.0 × 36.5 × 31.5 | 14.0 | 4.3 | - | - | 640 |
| 5600 | B32654A4565+*** | 22.0 × 36.5 × 31.5 | 15.4 | 4.0 | - | - | 640 |
| $V_{R, DC}$ = 630 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | | |
| 680 | B32654A6684+*** | 11.0 × 21.0 × 31.5 | 8.0 | 9.2 | - | 1400 | 1280 |
| 1000 | B32654A6105+*** | 13.5 × 23.0 × 31.5 | 10.0 | 6.9 | - | 1000 | 1040 |
| 1500 | B32654A6155+*** | 18.0 × 27.5 × 31.5 | 11.0 | 5.6 | - | - | 800 |
| 2200 | B32654A6225+*** | 18.0 × 33.0 × 31.5 | 12.0 | 4.9 | - | - | 800 |
| 2700 | B32654A6275+*** | 22.0 × 36.5 × 31.5 | 13.0 | 4.7 | - | - | 640 |
| 3300 | B32654A6335K*** | 22.0 × 36.5 × 31.5 | 14.0 | 4.4 | - | - | 640 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 1000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | | |
| 220 | B32654A0224+*** | 11.0 × 21.0 × 31.5 | 7.3 | 10.5 | - | 1400 | 1280 |
| 330 | B32654A0334+*** | 11.0 × 21.0 × 31.5 | 8.6 | 7.6 | - | 1400 | 1280 |
| 470 | B32654A0474+*** | 14.0 × 24.5 × 31.5 | 9.4 | 6.1 | - | 1000 | 1040 |
| 680 | B32654A0684+*** | 18.0 × 27.5 × 31.5 | 11.0 | 5.0 | - | - | 800 |
| 820 | B32654A0824+*** | 19.0 × 30.0 × 31.5 | 12.0 | 4.7 | - | - | 720 |
| 1000 | B32654A0105+*** | 21.0 × 31.0 × 31.5 | 14.0 | 4.3 | - | - | 720 |
| 1200 | B32654A0125+*** | 22.0 × 36.5 × 31.5 | 15.0 | 4.4 | - | - | 640 |
| 1500 | B32654A0155K*** | 22.0 × 36.5 × 31.5 | 15.5 | 4.2 | - | - | 640 |
| $V_{R, DC}$ = 1250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | | |
| 100 | B32654A7104+*** | 11.0 × 21.0 × 31.5 | 5.5 | 19.1 | - | 1400 | 1280 |
| 150 | B32654A7154+*** | 11.0 × 21.0 × 31.5 | 6.4 | 13.3 | - | 1400 | 1280 |
| 220 | B32654A7224+*** | 14.0 × 24.5 × 31.5 | 8.7 | 9.8 | - | 1000 | 1040 |
| 330 | B32654A7334+*** | 18.0 × 27.5 × 31.5 | 9.7 | 7.4 | - | - | 800 |
| 470 | B32654A7474+*** | 21.0 × 31.0 × 31.5 | 11.6 | 6.1 | - | - | 720 |
| 560 | B32654A7564+*** | 22.0 × 36.5 × 31.5 | 12.6 | 5.9 | - | - | 640 |
| 680 | B32654A7684+*** | 22.0 × 36.5 × 31.5 | 14.6 | 5.4 | - | - | 640 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

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

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Ammo pack | Reel | Untaped |
|---|---|---|---|---|---|---|---|
| nF | | mm | A | mΩ | pcs./MOQ | pcs./MOQ | pcs./MOQ |
| $V_{R, DC}$ = 1600 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | | |
| 47 | B32654A1473+*** | 11.0 × 21.0 × 31.5 | 4.6 | 38.7 | - | 1400 | 1280 |
| 68 | B32654A1683+*** | 11.0 × 21.0 × 31.5 | 5.5 | 27.3 | - | 1400 | 1280 |
| 100 | B32654A1104+*** | 14.0 × 24.5 × 31.5 | 7.3 | 19.3 | - | 1000 | 1040 |
| 150 | B32654A1154+*** | 18.0 × 27.5 × 31.5 | 9.5 | 13.8 | - | - | 800 |
| 220 | B32654A1224+*** | 21.0 × 31.0 × 31.5 | 12.0 | 10.3 | - | - | 720 |
| $V_{R, DC}$ = 2000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 700 V AC | | | | | | | |
| 22 | B32654A2223+*** | 11.0 × 21.0 × 31.5 | 4.6 | 46.1 | - | 1400 | 1280 |
| 33 | B32654A2333+*** | 13.5 × 23.0 × 31.5 | 4.6 | 31.4 | - | 1000 | 1040 |
| 47 | B32654A2473+*** | 18.0 × 27.5 × 31.5 | 6.4 | 22.9 | - | - | 800 |
| 68 | B32654A2683+*** | 19.0 × 30.0 × 31.5 | 7.8 | 16.7 | - | - | 720 |
| 82 | B32654A2823+*** | 22.0 × 36.5 × 31.5 | 9.3 | 14.7 | - | - | 640 |
| 100 | B32654A2104+*** | 22.0 × 36.5 × 31.5 | 10.0 | 12.6 | - | - | 640 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
289 = Straight terminals, Ammo pack
189 = Straight terminals, Reel
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

## Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ [1] | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ [2] 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 160 V AC | | | | | | |
| 2700 | B32656A3275+*** | 12.0 × 22.0 × 42.0 | - | 9.3 | 6.8 | 1620 |
| 3000 | B32656A3305+*** | 12.0 × 22.0 × 42.0 | - | 9.8 | 6.2 | 1620 |
| 3300 | B32656A3335+*** | 14.0 × 25.0 × 42.0 | - | 10.5 | 5.9 | 1380 |
| 4000 | B32656A3405+*** | 14.0 × 25.0 × 42.0 | - | 11.9 | 5.1 | 1380 |
| 4000 | B32656T3405+*** | 24.0 × 15.0 × 42.0 | - | 12.0 | 4.6 | 1040 |
| 4700 | B32656A3475+*** | 16.0 × 28.5 × 42.0 | - | 12.8 | 4.7 | 800 |
| 5600 | B32656A3565+*** | 16.0 × 28.5 × 42.0 | - | 14.0 | 4.2 | 800 |
| 5600 | B32656T3565+*** | 24.0 × 19.0 × 42.0 | - | 14.5 | 3.7 | 780 |
| 6800 | B32656A3685+*** | 18.0 × 32.5 × 42.0 | - | 14.5 | 3.9 | 720 |
| 8000 | B32656A3805+*** | 18.0 × 32.5 × 42.0 | - | 15.0 | 3.6 | 720 |
| 10000 | B32656G3106+*** | 20.0 × 39.5 × 42.0 | 10.2 | 15.5 | 2.2 | 640 |
| 10000 | B32656A3106+*** | 20.0 × 39.5 × 42.0 | - | 15.3 | 3.5 | 640 |
| 12000 | B32656G3126K*** | 20.0 × 39.5 × 42.0 | 10.2 | 19.7 | 2.0 | 640 |
| 12000 | B32656A3126K*** | 20.0 × 39.5 × 42.0 | - | 16.0 | 3.3 | 640 |
| 15000 | B32656G3156K*** | 28.0 × 37.0 × 42.0 | 10.2 | 23.4 | 1.8 | 440 |
| 15000 | B32656A3156K*** | 28.0 × 37.0 × 42.0 | - | 18.0 | 3.0 | 440 |
| 17000 | B32656G3176+*** | 28.0 × 42.5 × 42.0 | 10.2 | 24.8 | 1.6 | 440 |
| 17000 | B32656A3176+*** | 28.0 × 42.5 × 42.0 | - | 20.0 | 3.0 | 440 |
| 20000 | B32656G3206+*** | 30.0 × 45.0 × 42.0 | 20.3 | 27.0 | 1.6 | 400 |
| 20000 | B32656A3206+*** | 30.0 × 45.0 × 42.0 | - | 20.0 | 3.0 | 400 |
| 24000 | B32656G3246+*** | 33.0 × 48.0 × 42.0 | 20.3 | 29.5 | 1.5 | 180 |
| 24000 | B32656A3246+*** | 33.0 × 48.0 × 42.0 | - | 21.0 | 3.1 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

## Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 400 V DC ; $V_{RMS}$ (f ≤1 kHz) = 200 V AC | | | | | | |
| 2000 | B32656A4205+*** | 12.0 × 22.0 × 42.0 | - | 9.9 | 7.5 | 1620 |
| 2700 | B32656A4275+*** | 14.0 × 25.0 × 42.0 | - | 11.0 | 6.0 | 1380 |
| 2700 | B32656T4275+*** | 24.0 × 15.0 × 42.0 | - | 11.5 | 5.5 | 1040 |
| 3500 | B32656T4355+*** | 24.0 × 19.0 × 42.0 | - | 12.0 | 4.6 | 780 |
| 4000 | B32656A4405+*** | 16.0 × 28.5 × 42.0 | - | 12.5 | 4.6 | 800 |
| 5600 | B32656A4565+*** | 18.0 × 32.5 × 42.0 | - | 15.4 | 3.9 | 720 |
| 7500 | B32656G4755+*** | 20.0 × 39.5 × 42.0 | 10.2 | 20.0 | 2.4 | 640 |
| 7500 | B32656A4755+*** | 20.0 × 39.5 × 42.0 | - | 16.7 | 3.7 | 640 |
| 10000 | B32656G4106+*** | 28.0 × 37.0 × 42.0 | 10.2 | 22.0 | 1.9 | 440 |
| 10000 | B32656A4106+*** | 28.0 × 37.0 × 42.0 | - | 17.5 | 3.1 | 440 |
| 12000 | B32656G4126+*** | 28.0 × 42.5 × 42.0 | 10.2 | 23.5 | 1.8 | 440 |
| 12000 | B32656A4126+*** | 28.0 × 42.5 × 42.0 | - | 18.5 | 3.2 | 440 |
| 14000 | B32656G4146+*** | 30.0 × 45.0 × 42.0 | 20.3 | 25.5 | 1.7 | 400 |
| 14000 | B32656A4146+*** | 30.0 × 45.0 × 42.0 | - | 19.0 | 3.2 | 400 |
| 17000 | B32656G4176+*** | 33.0 × 48.0 × 42.0 | 20.3 | 28.5 | 1.6 | 180 |
| 17000 | B32656A4176+*** | 33.0 × 48.0 × 42.0 | - | 20.5 | 3.2 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 630 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | |
| 1000 | B32656A6105+*** | 12.0 × 22.0 × 42.0 | - | 9.5 | 10.9 | 1620 |
| 1500 | B32656A6155+*** | 14.0 × 25.0 × 42.0 | - | 10.0 | 7.8 | 1380 |
| 1500 | B32656T6155+*** | 24.0 × 15.0 × 42.0 | - | 11.0 | 7.3 | 1040 |
| 2200 | B32656T6225+*** | 24.0 × 19.0 × 42.0 | - | 13.6 | 5.4 | 780 |
| 2200 | B32656A6225+*** | 16.0 × 28.5 × 42.0 | - | 13.0 | 5.9 | 800 |
| 3000 | B32656A6305+*** | 18.0 × 32.5 × 42.0 | - | 14.0 | 4.9 | 720 |
| 4000 | B32656G6405+*** | 20.0 × 39.5 × 42.0 | 10.2 | 17.0 | 3.1 | 640 |
| 4000 | B32656A6405+*** | 20.0 × 39.5 × 42.0 | - | 15.0 | 4.4 | 640 |
| 5600 | B32656G6565+*** | 28.0 × 37.0 × 42.0 | 10.2 | 19.7 | 2.4 | 440 |
| 5600 | B32656A6565+*** | 28.0 × 37.0 × 42.0 | - | 16.4 | 3.6 | 440 |
| 7000 | B32656G6705K*** | 28.0 × 42.5 × 42.0 | 10.2 | 21.5 | 2.2 | 440 |
| 7000 | B32656A6705K*** | 28.0 × 42.5 × 42.0 | - | 17.3 | 3.6 | 440 |
| 8000 | B32656G6805+*** | 30.0 × 45.0 × 42.0 | 20.3 | 23.3 | 2.0 | 400 |
| 8000 | B32656A6805+*** | 30.0 × 45.0 × 42.0 | - | 18.5 | 3.5 | 400 |
| 10000 | B32656G6106K*** | 33.0 × 48.0 × 42.0 | 20.3 | 26.0 | 1.9 | 180 |
| 10000 | B32656A6106K*** | 33.0 × 48.0 × 42.0 | - | 19.7 | 3.4 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 750 V DC ; $V_{RMS}$ (f ≤1 kHz) = 350 V AC | | | | | | |
| 470 | B32656A5474+*** | 12.0 × 22.0 × 42.0 | - | 7.0 | 14.6 | 1620 |
| 560 | B32656A5564+*** | 12.0 × 22.0 × 42.0 | - | 7.6 | 12.4 | 1620 |
| 680 | B32656A5684+*** | 12.0 × 22.0 × 42.0 | - | 8.2 | 10.4 | 1620 |
| 820 | B32656A5824+*** | 14.0 × 25.0 × 42.0 | - | 9.8 | 9.0 | 1380 |
| 1000 | B32656A5105+*** | 16.0 × 28.5 × 42.0 | - | 12.0 | 7.8 | 800 |
| 1000 | B32656T5105K*** | 24.0 × 15.0 × 42.0 | - | 10.6 | 7.3 | 1040 |
| 1200 | B32656A5125+*** | 16.0 × 28.5 × 42.0 | - | 13.0 | 6.7 | 800 |
| 1200 | B32656T5125+*** | 24.0 × 19.0 × 42.0 | - | 12.5 | 6.2 | 780 |
| 1500 | B32656A5155+*** | 18.0 × 32.5 × 42.0 | - | 14.7 | 5.8 | 720 |
| 1800 | B32656A5185+*** | 18.0 × 32.5 × 42.0 | - | 16.0 | 5.1 | 720 |
| 2200 | B32656G5225+*** | 20.0 × 39.5 × 42.0 | 10.2 | 18.6 | 3.6 | 640 |
| 2200 | B32656A5225+*** | 20.0 × 39.5 × 42.0 | - | 17.5 | 4.8 | 640 |
| 2500 | B32656G5255+*** | 20.0 × 39.5 × 42.0 | 10.2 | 18.7 | 3.6 | 640 |
| 2500 | B32656A5255+*** | 20.0 × 39.5 × 42.0 | - | 17.8 | 4.5 | 640 |
| 2700 | B32656G5275+*** | 28.0 × 37.0 × 42.0 | 10.2 | 21.0 | 3.0 | 440 |
| 2700 | B32656A5275+*** | 28.0 × 37.0 × 42.0 | - | 19.0 | 4.2 | 440 |
| 3300 | B32656G5335+*** | 28.0 × 37.0 × 42.0 | 10.2 | 22.7 | 2.6 | 440 |
| 3300 | B32656A5335+*** | 28.0 × 37.0 × 42.0 | - | 20.0 | 3.8 | 440 |
| 4000 | B32656G5405+*** | 28.0 × 42.5 × 42.0 | 10.2 | 24.6 | 2.3 | 440 |
| 4000 | B32656A5405+*** | 28.0 × 42.5 × 42.0 | - | 20.5 | 3.7 | 440 |
| 4700 | B32656G5475+*** | 30.0 × 45.0 × 42.0 | 20.3 | 27.7 | 2.1 | 400 |
| 4700 | B32656A5475+*** | 30.0 × 45.0 × 42.0 | - | 21.9 | 3.6 | 400 |
| 5600 | B32656G5565+*** | 33.0 × 48.0 × 42.0 | 20.3 | 30.4 | 2.0 | 180 |
| 5600 | B32656A5565+*** | 33.0 × 48.0 × 42.0 | - | 23.5 | 3.5 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ [1] | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ [2] 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 850 V DC ; $V_{RMS}$ (f ≤1 kHz) = 450 V AC | | | | | | |
| 220 | B32656A8224+*** | 12.0 × 22.0 × 42.0 | - | 5.2 | 25.6 | 1620 |
| 330 | B32656A8334+*** | 12.0 × 22.0 × 42.0 | - | 6.3 | 17.4 | 1620 |
| 470 | B32656A8474+*** | 12.0 × 22.0 × 42.0 | - | 7.5 | 12.6 | 1620 |
| 680 | B32656A8684+*** | 16.0 × 28.5 × 42.0 | - | 10.0 | 9.3 | 800 |
| 680 | B32656T8684+*** | 24.0 × 15.0 × 42.0 | - | 9.6 | 8.8 | 1040 |
| 820 | B32656T8824+*** | 24.0 × 19.0 × 42.0 | - | 11.0 | 7.5 | 780 |
| 1000 | B32656A8105+*** | 18.0 × 32.5 × 42.0 | - | 11.6 | 7.0 | 720 |
| 1200 | B32656A8125+*** | 18.0 × 32.5 × 42.0 | - | 12.5 | 6.1 | 720 |
| 1500 | B32656G8155+*** | 20.0 × 39.5 × 42.0 | 10.2 | 15.4 | 4.3 | 640 |
| 1500 | B32656A8155+*** | 20.0 × 39.5 × 42.0 | - | 14.0 | 5.5 | 640 |
| 1800 | B32656G8185+*** | 20.0 × 39.5 × 42.0 | 10.2 | 16.7 | 3.7 | 640 |
| 1800 | B32656A8185+*** | 20.0 × 39.5 × 42.0 | - | 14.9 | 4.9 | 640 |
| 2200 | B32656G8225+*** | 28.0 × 37.0 × 42.0 | 10.2 | 19.7 | 3.1 | 440 |
| 2200 | B32656A8225+*** | 28.0 × 37.0 × 42.0 | - | 17.8 | 4.3 | 440 |
| 2500 | B32656G8255+*** | 28.0 × 42.5 × 42.0 | 10.2 | 20.4 | 2.9 | 440 |
| 2500 | B32656A8255+*** | 28.0 × 42.5 × 42.0 | - | 18.7 | 4.3 | 440 |
| 2700 | B32656G8275+*** | 30.0 × 45.0 × 42.0 | 20.3 | 21.6 | 2.8 | 400 |
| 2700 | B32656A8275+*** | 30.0 × 45.0 × 42.0 | - | 20.0 | 4.2 | 400 |
| 3000 | B32656G8305+*** | 30.0 × 45.0 × 42.0 | 20.3 | 22.7 | 2.6 | 400 |
| 3000 | B32656A8305+*** | 30.0 × 45.0 × 42.0 | - | 20.5 | 4.0 | 400 |
| 3300 | B32656G8335+*** | 33.0 × 48.0 × 42.0 | 20.3 | 23.0 | 2.5 | 180 |
| 3300 | B32656A8335+*** | 33.0 × 48.0 × 42.0 | - | 21.0 | 4.0 | 180 |
| 3800 | B32656G8385+*** | 33.0 × 48.0 × 42.0 | 20.3 | 24.4 | 2.2 | 180 |
| 3800 | B32656A8385+*** | 33.0 × 48.0 × 42.0 | - | 21.4 | 3.8 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 1000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | |
| 330 | B32656A0334+*** | 12.0 × 22.0 × 42.0 | - | 7.8 | 15.3 | 1620 |
| 470 | B32656A0474+*** | 14.0 × 25.0 × 42.0 | - | 9.0 | 11.2 | 1380 |
| 470 | B32656T0474+*** | 24.0 × 15.0 × 42.0 | - | 9.0 | 10.7 | 1040 |
| 680 | B32656T0684+*** | 24.0 × 19.0 × 42.0 | - | 9.6 | 8.1 | 780 |
| 680 | B32656A0684+*** | 16.0 × 28.5 × 42.0 | - | 9.5 | 8.5 | 800 |
| 1000 | B32656G0105+*** | 20.0 × 39.5 × 42.0 | 10.2 | 13.0 | 5.4 | 640 |
| 1000 | B32656A0105+*** | 20.0 × 39.5 × 42.0 | - | 12.2 | 6.6 | 640 |
| 1200 | B32656G0125+*** | 28.0 × 37.0 × 42.0 | 10.2 | 15.5 | 4.6 | 440 |
| 1200 | B32656A0125+*** | 28.0 × 37.0 × 42.0 | - | 12.6 | 5.7 | 440 |
| 1500 | B32656G0155+*** | 28.0 × 37.0 × 42.0 | 10.2 | 16.9 | 3.8 | 440 |
| 1500 | B32656A0155+*** | 28.0 × 37.0 × 42.0 | - | 13.5 | 5.0 | 440 |
| 2200 | B32656G0225+*** | 30.0 × 45.0 × 42.0 | 20.3 | 20.0 | 2.9 | 400 |
| 2200 | B32656A0225+*** | 30.0 × 45.0 × 42.0 | - | 16.0 | 4.4 | 400 |
| 2700 | B32656G0275M*** | 30.0 × 45.0 × 42.0 | 20.3 | 21.0 | 2.8 | 400 |
| 2700 | B32656A0275M*** | 30.0 × 45.0 × 42.0 | - | 17.5 | 4.3 | 400 |
| 2700 | B32656G0275+*** | 33.0 × 48.0 × 42.0 | 20.3 | 22.8 | 2.6 | 180 |
| 2700 | B32656A0275+*** | 33.0 × 48.0 × 42.0 | - | 17.5 | 4.1 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped
(standard standard lead length 6 –1 mm)
003 = Straight terminals, Untaped
(lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped
(lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 1250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | |
| 150 | B32656A7154+*** | 12.0 × 22.0 × 42.0 | - | 6.0 | 26.2 | 1620 |
| 220 | B32656A7224+*** | 14.0 × 25.0 × 42.0 | - | 7.8 | 18.4 | 1380 |
| 270 | B32656T7274+*** | 24.0 × 15.0 × 42.0 | - | 8.6 | 14.7 | 1040 |
| 330 | B32656A7334+*** | 16.0 × 28.5 × 42.0 | - | 9.9 | 12.8 | 800 |
| 390 | B32656T7394+*** | 24.0 × 19.0 × 42.0 | - | 10.0 | 10.6 | 780 |
| 470 | B32656A7474+*** | 18.0 × 32.5 × 42.0 | - | 12.3 | 9.6 | 720 |
| 680 | B32656G7684+*** | 20.0 × 39.5 × 42.0 | 10.2 | 15.0 | 6.2 | 640 |
| 680 | B32656A7684+*** | 20.0 × 39.5 × 42.0 | - | 14.0 | 7.5 | 640 |
| 820 | B32656G7824+*** | 28.0 × 37.0 × 42.0 | 10.2 | 17.0 | 5.2 | 440 |
| 820 | B32656A7824+*** | 28.0 × 37.0 × 42.0 | - | 15.6 | 6.4 | 440 |
| 1000 | B32656G7105+*** | 28.0 × 37.0 × 42.0 | 10.2 | 18.4 | 4.4 | 440 |
| 1000 | B32656A7105+*** | 28.0 × 37.0 × 42.0 | - | 16.7 | 5.6 | 440 |
| 1200 | B32656G7125+*** | 28.0 × 42.5 × 42.0 | 10.2 | 19.0 | 3.9 | 440 |
| 1200 | B32656A7125+*** | 28.0 × 42.5 × 42.0 | - | 17.0 | 5.2 | 440 |
| 1500 | B32656G7155+*** | 30.0 × 45.0 × 42.0 | 20.3 | 21.0 | 3.4 | 400 |
| 1500 | B32656A7155+*** | 30.0 × 45.0 × 42.0 | - | 18.0 | 4.8 | 400 |
| 1800 | B32656G7185K*** | 33.0 × 48.0 × 42.0 | 20.3 | 23.0 | 3.0 | 180 |
| 1800 | B32656A7185K*** | 33.0 × 48.0 × 42.0 | - | 19.0 | 4.6 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ [1] | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ [2] 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 1600V DC ; $V_{RMS}$ (f ≤1 kHz) = 600 V AC | | | | | | |
| 100 | B32656J1104+*** | 12.0 × 22.0 × 42.0 | - | 6.0 | 24.5 | 1620 |
| 150 | B32656J1154+*** | 14.0 × 25.0 × 42.0 | - | 7.6 | 16.9 | 1380 |
| 150 | B32656T1154+*** | 24.0 × 15.0 × 42.0 | - | 7.8 | 16.4 | 1040 |
| 220 | B32656J1224+*** | 16.0 × 28.5 × 42.0 | - | 9.5 | 12.4 | 800 |
| 220 | B32656T1224+*** | 24.0 × 19.0 × 42.0 | - | 9.8 | 12.1 | 780 |
| 330 | B32656G1334+*** | 20.0 × 39.5 × 42.0 | 10.2 | 11.0 | 7.8 | 640 |
| 330 | B32656J1334+*** | 20.0 × 39.5 × 42.0 | - | 10.4 | 9.0 | 640 |
| 470 | B32656G1474+*** | 28.0 × 37.0 × 42.0 | 10.2 | 13.4 | 5.6 | 440 |
| 470 | B32656J1474+*** | 28.0 × 37.0 × 42.0 | - | 12.3 | 6.8 | 440 |
| 560 | B32656G1564+*** | 28.0 × 37.0 × 42.0 | 10.2 | 14.3 | 4.8 | 440 |
| 560 | B32656J1564+*** | 28.0 × 37.0 × 42.0 | - | 13.0 | 6.0 | 440 |
| 680 | B32656G1684+*** | 28.0 × 42.5 × 42.0 | 10.2 | 16.6 | 4.4 | 440 |
| 680 | B32656J1684+*** | 28.0 × 42.5 × 42.0 | - | 15.0 | 5.8 | 440 |
| 820 | B32656G1824K*** | 30.0 × 45.0 × 42.0 | 20.3 | 18.7 | 3.9 | 400 |
| 820 | B32656J1824K*** | 30.0 × 45.0 × 42.0 | - | 16.4 | 5.3 | 400 |
| 900 | B32656G1904+*** | 33.0 × 48.0 × 42.0 | 20.3 | 21.0 | 3.6 | 180 |
| 900 | B32656J1904+*** | 33.0 × 48.0 × 42.0 | - | 18.8 | 5.2 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 37.5 mm)

| $C_R$ [1] | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ [2] 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 2000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 700 V AC | | | | | | |
| 68 | B32656J2683+*** | 12.0 × 22.0 × 42.0 | - | 5.7 | 36.7 | 1620 |
| 100 | B32656J2104+*** | 14.0 × 25.0 × 42.0 | - | 7.4 | 25.4 | 1380 |
| 100 | B32656T2104+*** | 24.0 × 15.0 × 42.0 | - | 7.4 | 25.4 | 1040 |
| 120 | B32656T2124+*** | 24.0 × 19.0 × 42.0 | - | 8.7 | 21.1 | 780 |
| 150 | B32656J2154+*** | 18.0 × 32.5 × 42.0 | - | 9.8 | 17.7 | 720 |
| 220 | B32656G2224+*** | 20.0 × 39.5 × 42.0 | 10.2 | 13.3 | 11.7 | 640 |
| 220 | B32656J2224+*** | 20.0 × 39.5 × 42.0 | - | 12.7 | 13.0 | 640 |
| 330 | B32656G2334+*** | 28.0 × 37.0 × 42.0 | 10.2 | 14.3 | 8.0 | 440 |
| 330 | B32656J2334+*** | 28.0 × 37.0 × 42.0 | - | 13.4 | 9.2 | 440 |
| 470 | B32656G2474+*** | 30.0 × 45.0 × 42.0 | 20.3 | 16.5 | 5.9 | 400 |
| 470 | B32656J2474+*** | 30.0 × 45.0 × 42.0 | - | 14.7 | 7.4 | 400 |
| 560 | B32656G2564+*** | 33.0 × 48.0 × 42.0 | 20.3 | 18.7 | 5.2 | 180 |
| 560 | B32656J2564+*** | 33.0 × 48.0 × 42.0 | - | 16.3 | 6.7 | 180 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 52.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 160 V AC | | | | | | |
| 30000 | B32658G3306+*** | 30.0 × 45.0 × 57.5 | 20.3 | 26.0 | 1.8 | 280 |
| 40000 | B32658G3406K*** | 35.0 × 50.0 × 57.5 | 20.3 | 30.0 | 1.7 | 108 |
| $V_{R, DC}$ = 400 V DC ; $V_{RMS}$ (f ≤1 kHz) = 200 V AC | | | | | | |
| 20000 | B32658G4206+*** | 30.0 × 45.0 × 57.5 | 20.3 | 26.0 | 2.0 | 280 |
| 26000 | B32658G4266+*** | 35.0 × 50.0 × 57.5 | 20.3 | 30.0 | 1.9 | 108 |
| $V_{R, DC}$ = 630 V DC ; $V_{RMS}$ (f ≤1 kHz) = 250 V AC | | | | | | |
| 12000 | B32658G6126K*** | 30.0 × 45.0 × 57.5 | 20.3 | 23.7 | 2.4 | 280 |
| 15000 | B32658G6156+*** | 35.0 × 50.0 × 57.5 | 20.3 | 27.7 | 2.1 | 108 |
| $V_{R, DC}$ = 750 V DC ; $V_{RMS}$ (f ≤1 kHz) = 350 V AC | | | | | | |
| 6800 | B32658G5685+*** | 30.0 × 45.0 × 57.5 | 20.3 | 22.0 | 2.6 | 280 |
| 9000 | B32658G5905+*** | 35.0 × 50.0 × 57.5 | 20.3 | 26.5 | 2.3 | 108 |
| $V_{R, DC}$ = 850 V DC ; $V_{RMS}$ (f ≤1 kHz) = 450 V AC | | | | | | |
| 4700 | B32658G8475+*** | 30.0 × 45.0 × 57.5 | 20.3 | 28.0 | 3.0 | 280 |
| 5600 | B32658G8565+*** | 35.0 × 50.0 × 57.5 | 20.3 | 31.5 | 2.7 | 108 |
| 6000 | B32658G8605+*** | 35.0 × 50.0 × 57.5 | 20.3 | 32.5 | 2.6 | 108 |
| $V_{R, DC}$ = 1000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | |
| 3300 | B32658G0335+*** | 30.0 × 45.0 × 57.5 | 20.3 | 23.0 | 3.5 | 280 |
| 4500 | B32658G0455+*** | 35.0 × 50.0 × 57.5 | 20.3 | 27.7 | 2.9 | 108 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

### Ordering codes and packing units (lead spacing 52.5 mm)

| $C_R$ 1) | Ordering code | Max. dimensions w × h × l | P1 | $I_{RMS}$ 2) 85 °C 100 kHz | $ESR_{Typ}$ 100 kHz | Untaped |
|---|---|---|---|---|---|---|
| nF | | mm | mm | A | mΩ | pcs./MOQ |
| $V_{R, DC}$ = 1250 V DC ; $V_{RMS}$ (f ≤1 kHz) = 500 V AC | | | | | | |
| 2000 | B32658G7205+*** | 30.0 × 45.0 × 57.5 | 20.3 | 23.0 | 3.4 | 280 |
| 2200 | B32658G7225+*** | 35.0 × 50.0 × 57.5 | 20.3 | 25.7 | 3.2 | 108 |
| 2700 | B32658G7275+*** | 35.0 × 50.0 × 57.5 | 20.3 | 28.0 | 2.8 | 108 |
| $V_{R, DC}$ = 1600 V DC ; $V_{RMS}$ (f ≤1 kHz) = 600 V AC | | | | | | |
| 1000 | B32658G1105+*** | 30.0 × 45.0 × 57.5 | 20.3 | 21.0 | 5.3 | 280 |
| 1200 | B32658G1125K*** | 30.0 × 45.0 × 57.5 | 20.3 | 22.5 | 5.3 | 280 |
| 1500 | B32658G1155+*** | 35.0 × 50.0 × 57.5 | 20.3 | 26.5 | 3.9 | 108 |
| $V_{R, DC}$ = 2000 V DC ; $V_{RMS}$ (f ≤1 kHz) = 700 V AC | | | | | | |
| 680 | B32658G2684+*** | 30.0 × 45.0 × 57.5 | 20.3 | 19.0 | 6.2 | 280 |
| 820 | B32658G2824+*** | 35.0 × 50.0 × 57.5 | 20.3 | 22.0 | 5.4 | 108 |
| 1000 | B32658G2105K*** | 35.0 × 50.0 × 57.5 | 20.3 | 24.5 | 4.7 | 108 |

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance value on request.

### Composition of ordering code

+ = Capacitance tolerance code:
J = ±5%
K = ±10%

*** = Packaging code:
000 = Straight terminals, Untaped (standard lead length 6 –1 mm)
003 = Straight terminals, Untaped (lead length 3.2 ±0.3 mm)
004 = Straight terminals, Untaped (lead length 4.0 ±0.3 mm)

1) Capacitance value measured at 1 kHz
2) Max. ripple current $I_{RMS}$ at 85 °C at 100 kHz for a $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$

## Technical data

Reference: IEC60384-16:2005 and AEC-Q200. All data given at T = 20 °C, unless otherwise specified.

| | | | | | |
|---|---|---|---|---|---|
| Rated temperature $T_R$ | 85 °C | | | | |
| Operation temperature range | At T > 85 °C derating for $V_{DC}$ should be 1.25% / °C | | | | |
| Max. operating temperature $T_{op,max}$ | +110 °C | | | | |
| Upper category temperature $T_{max}$ | +100 °C | | | | |
| Lower category temperature $T_{min}$ | –40 °C | | | | |
| Dissipation factor tan δ (in $10^{-3}$) at 20 °C (upper limit values) | at | ≤27 nF | 27 nF ≤ $C_R$ ≤0.1 µF | 0.1 µF≤ $C_R$ ≤ 1 µF | $C_R$ > 1 µF |
| | 1 kHz<br>10 kHz<br>100 kHz | 0.8<br>1.0<br>2.0 | 0.8<br>1.0<br>3.0 | 0.8<br>1.0<br>- | 0.8<br>-<br>- |
| Insulation resistance $R_{ins}$ or time constant $\tau = C_R \cdot R_{ins}$ at 20 °C, rel. humidity ≤ 65% (minimum as-delivered values) | $C_R$ ≤ 0.33 µF | | $C_R$ > 0.33 µF | | |
| | 100 GΩ | | 30000 s | | |
| DC test voltage | Between terminals: 1.6 · $V_R$ , 2 s | | | | |
| Biased humidity test | 56 days 60 °C / 95% relative humidity with $V_R$ | | | | |
| Limit values after humidity test | Capacitance change \|ΔC/C\| : | | | ≤ 10% | |
| | Dissipation factor change Δ tan δ | | | ≤ 0.005 (at 1 kHz) | |
| | Insulation resistance $R_{ins}$ or time constant $\tau = C_R \cdot R_{ins}$ | | | ≥ 50% of minimum specified limit | |
| Reliability<br>Failure rate λ<br>Service life $t_{SL}$ | 1 fit (≤1 • $10^{-9}$/h) at 0.5 • $V_R$ , 40 °C<br>200000 h at 1.0 • $V_R$ , 85 °C<br>For conversion to other operating conditions and temperatures, refer to chapter “Quality, 2 Reliability”. | | | | |
| Failure criteria<br>Total failure | Short circuit or open circuit | | | | |
| Failure due to variation of parameters | Capacitance change \|ΔC/C\| | | | > 10% | |
| | Dissipation factor tan δ | | | > 4 • upper limit values | |
| | Insulation resistance $R_{ins}$ or time constant τ | | | < 1500 MΩ ($C_R$ ≤ 0.33 µF)<br>< 500 s ($C_R$ ≥ 0.33 µF) | |

Note: 1000 hrs / 85 ºC / 85% relative humidity with $V_R$ available on request, based on special design.

### Pulse handling capability

"dV/dt" represents the maximum permissible voltage change per unit of time for non-sinusoidal voltage, expressed in V/us.
"k0" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V2/µs

Note:
The values of dV/dt and k0 provided below must not be exceeded in order to avoid damaging the capacitor.

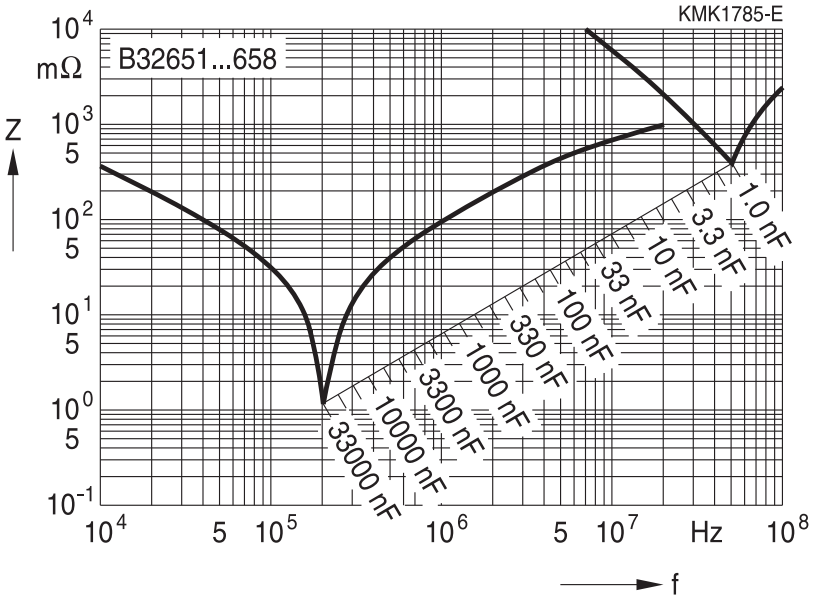
### dV/dt values

| Lead spacing | | 10 mm | 15 mm | 22.5 mm | 27.5 mm | 37.5 mm | 52.5 mm |
|---|---|---|---|---|---|---|---|
| $V_R$ V DC | $V_{RMS}$ V AC | dV/dt in V/µs | | | | | |
| 250 | 160 | - | 200 | 120 | 50 | 36 | 24 |
| 400 | 200 | - | 300 | 180 | 100 | 55 | 36 |
| 630 | 250 | - | 400 | 300 | 150 | 80 | 50 |
| 750 | 350 | - | - | - | - | 250 | 160 |
| 850 | 450 | - | - | - | - | 340 | 220 |
| 1000 | 250 | - | 975 | 600 | 300 | - | - |
| | 500 | - | - | - | - | 400 | 265 |
| 1250 | 450 | 4000 | - | - | - | - | - |
| | 500 | - | 1850 | 1150 | 600 | 500 | 350 |
| 1600 | 500 | - | 4500 | 2400 | 1000 | - | - |
| | 600 | - | - | - | - | 600 | 400 |
| | 700 | - | 5200 | - | - | - | - |
| 2000 | 700 | - | 8000 | 7000 | 2300 | 700 | 475 |
| | 1000 | - | - | 7500 | - | - | - |

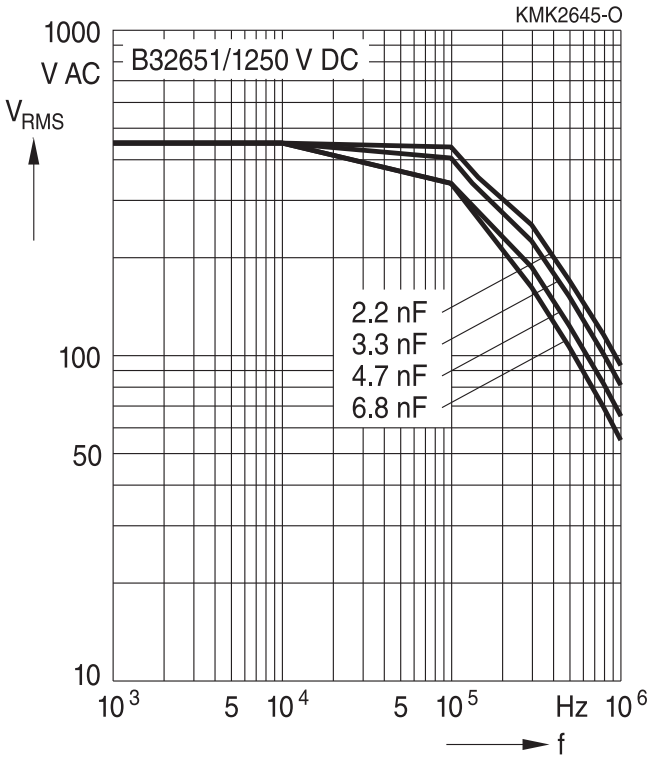
### $K_0$ values

| Lead spacing | | 10 mm | 15 mm | 22.5 mm | 27.5 mm | 37.5 mm | 52.5 mm |
|---|---|---|---|---|---|---|---|
| $V_R$ V DC | $V_{RMS}$ V AC | $K_0$ in $V^2/\mu s$ | | | | | |
| 250 | 160 | - | 100000 | 60000 | 25000 | 18000 | 12000 |
| 400 | 200 | - | 250000 | 200000 | 110000 | 44000 | 28800 |
| 630 | 250 | - | 500000 | 350000 | 250000 | 100800 | 63000 |
| 750 | 350 | - | - | - | - | 375000 | 240000 |
| 850 | 450 | - | - | - | - | 578000 | 374000 |
| 1000 | 250 | - | 3000000 | 1500000 | 1000000 | - | - |
| | 500 | - | - | - | - | 800000 | 530000 |
| 1250 | 450 | 25000000 | - | - | - | - | - |
| | 500 | - | 9000000 | 3750000 | 2000000 | 1250000 | 875000 |
| 1600 | 500 | - | 20000000 | 10000000 | 4000000 | - | - |
| | 600 | - | - | - | - | 1920000 | 1280000 |
| | 700 | - | 28000000 | - | - | - | - |
| 2000 | 700 | - | 60000000 | 40000000 | 15000000 | 2800000 | 1900000 |
| | 1000 | - | - | 50000000 | - | - | - |

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

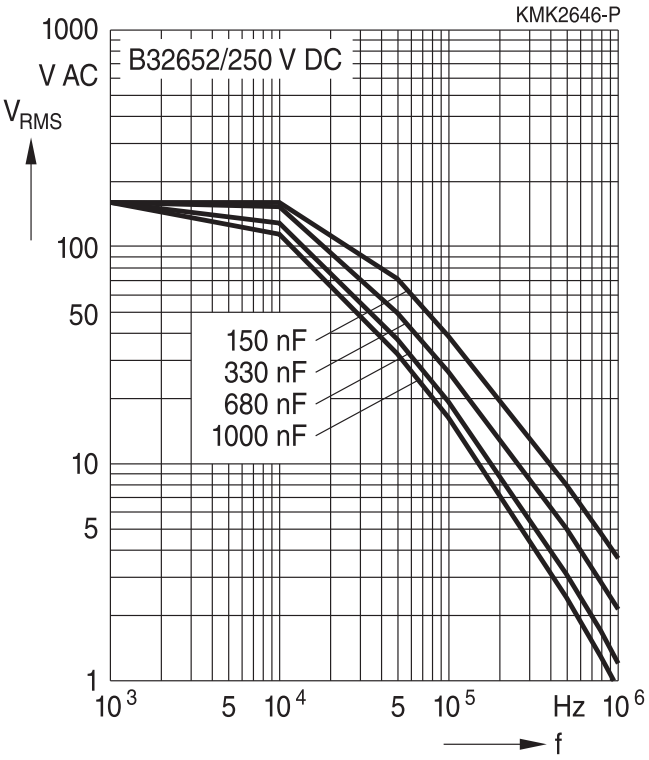


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ∆T ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 10 mm**
1250 V DC/450 V AC

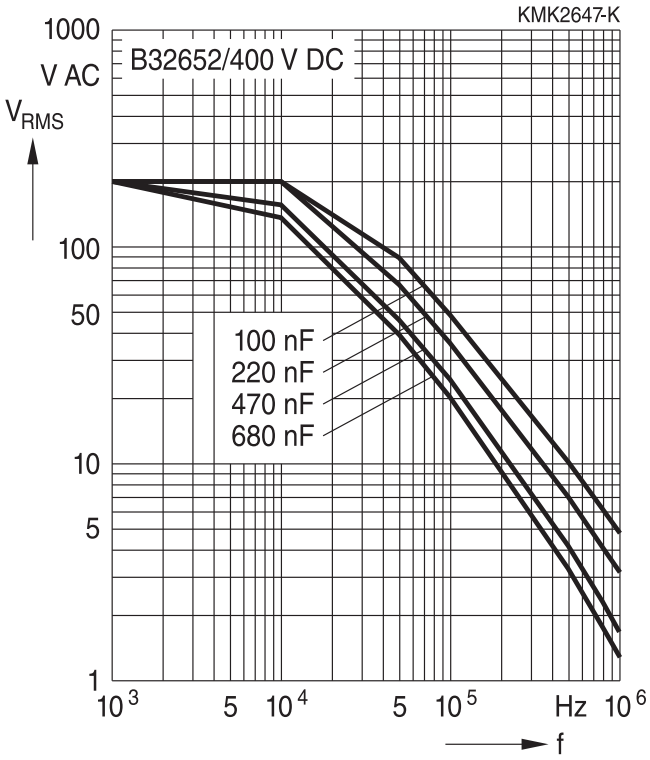


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 15 mm**

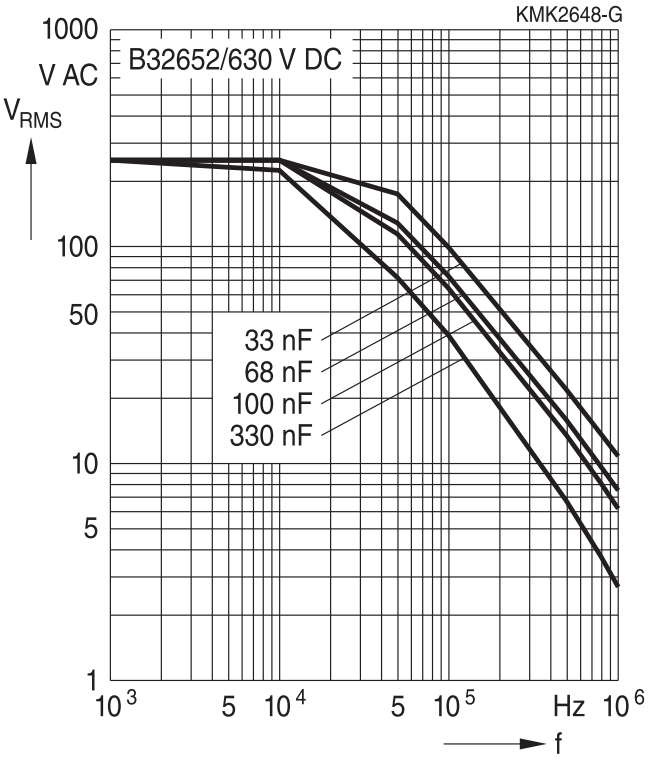
250 V DC/160 V AC



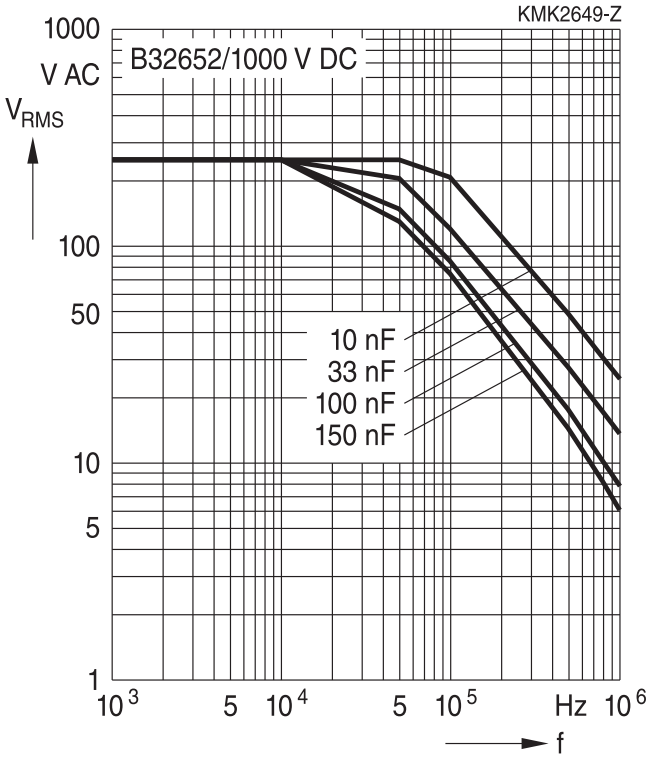

400 V DC/200 V AC




630 V DC/250 V AC

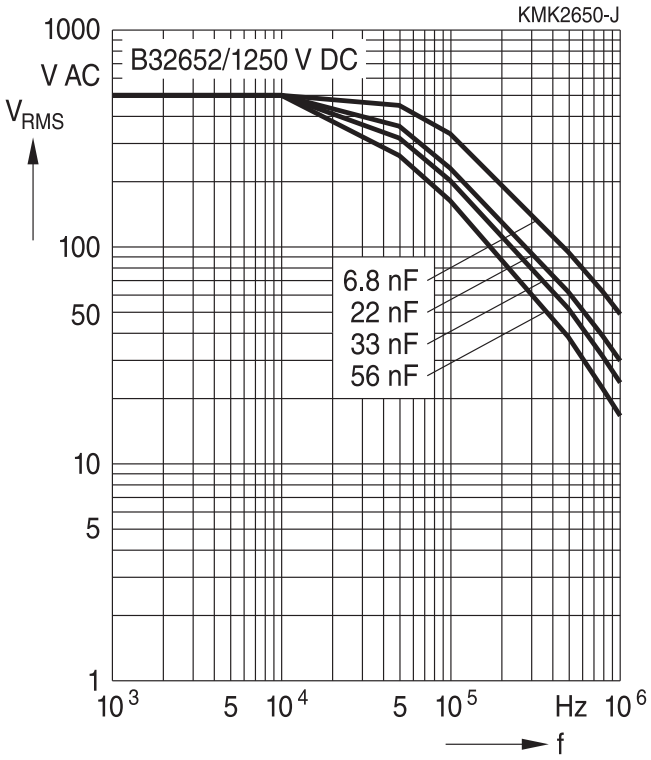



1000 V DC/250 V AC

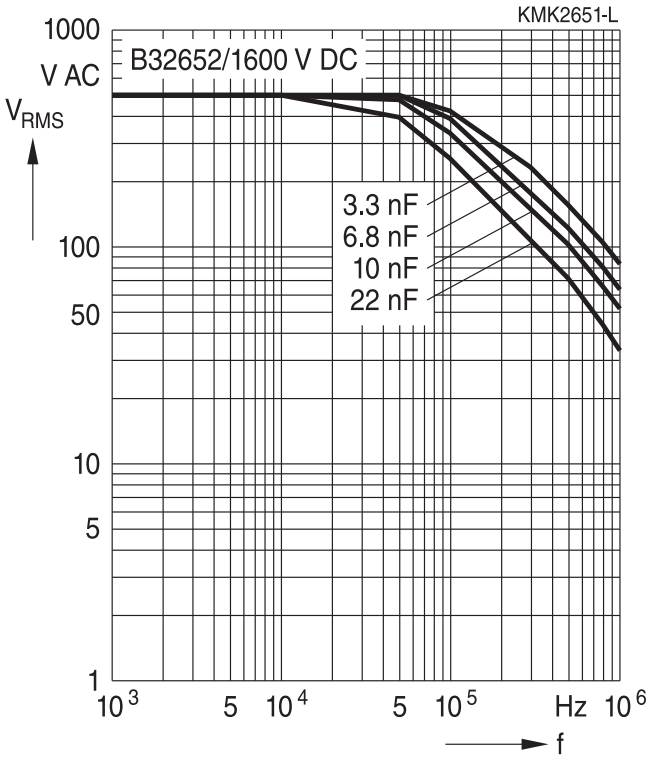


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 15 mm**

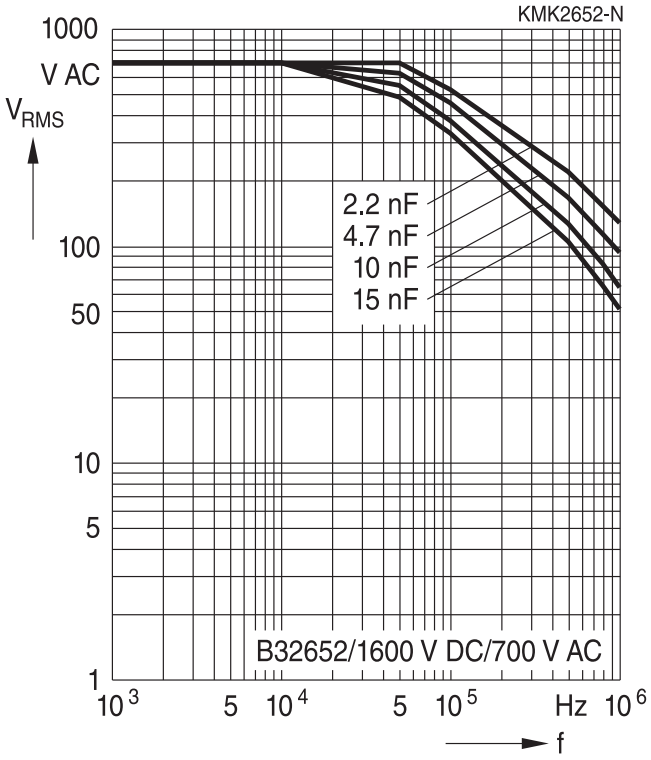
1250 V DC/500 V AC



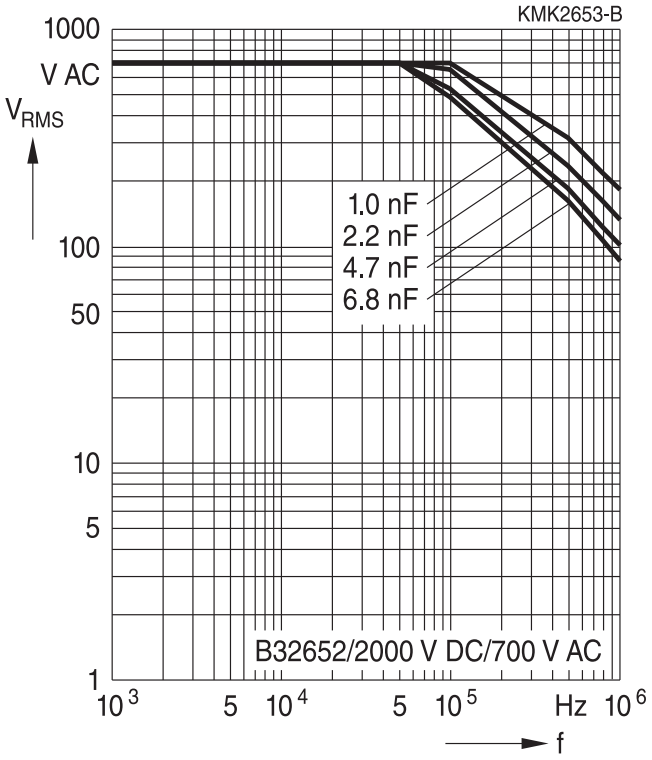

1600 V DC/500 V AC




1600 V DC/700 V AC

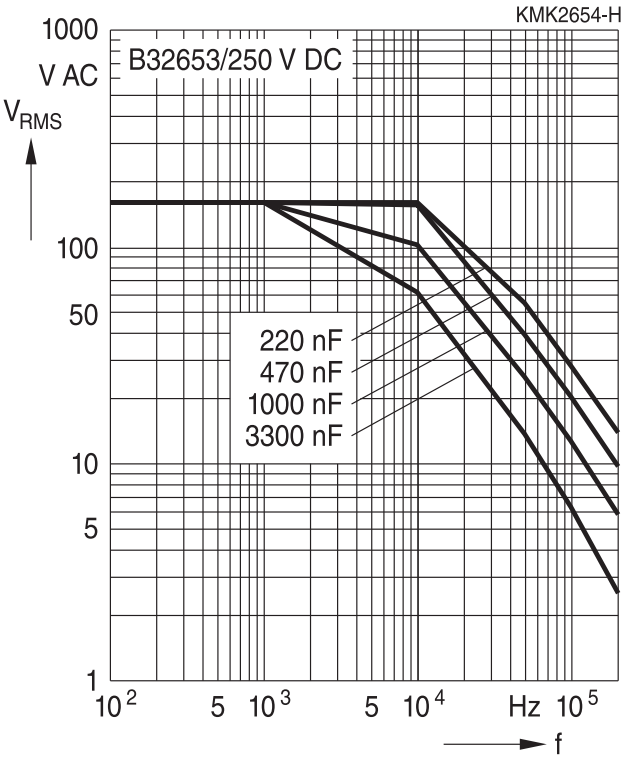



2000 V DC/700 V AC

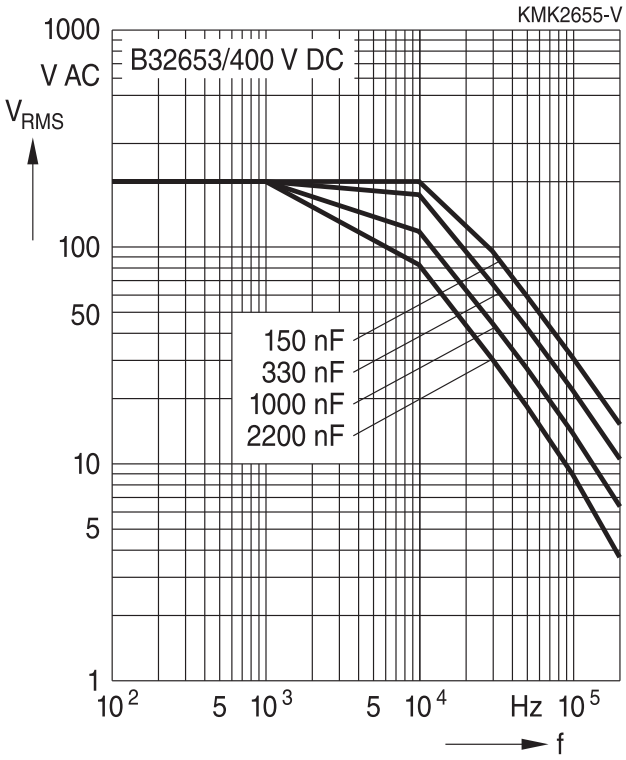


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 22.5 mm**

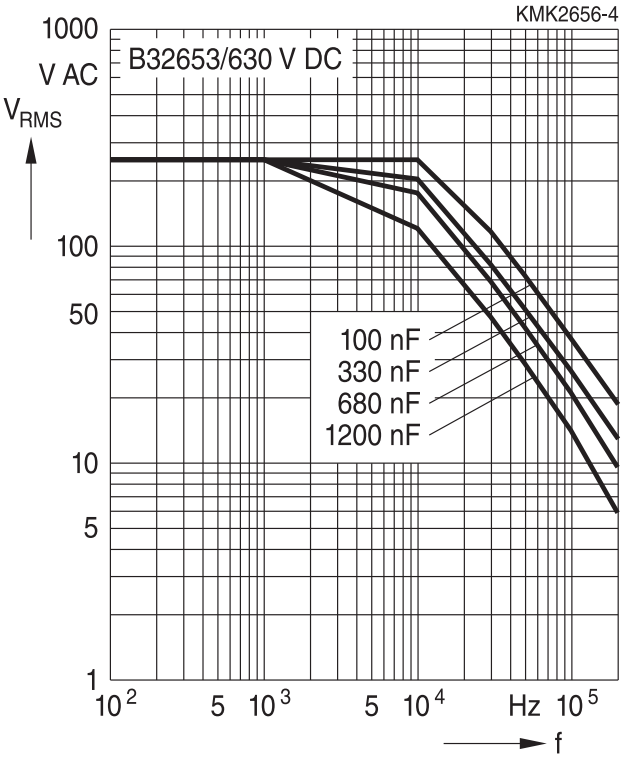
250 V DC/160 V AC



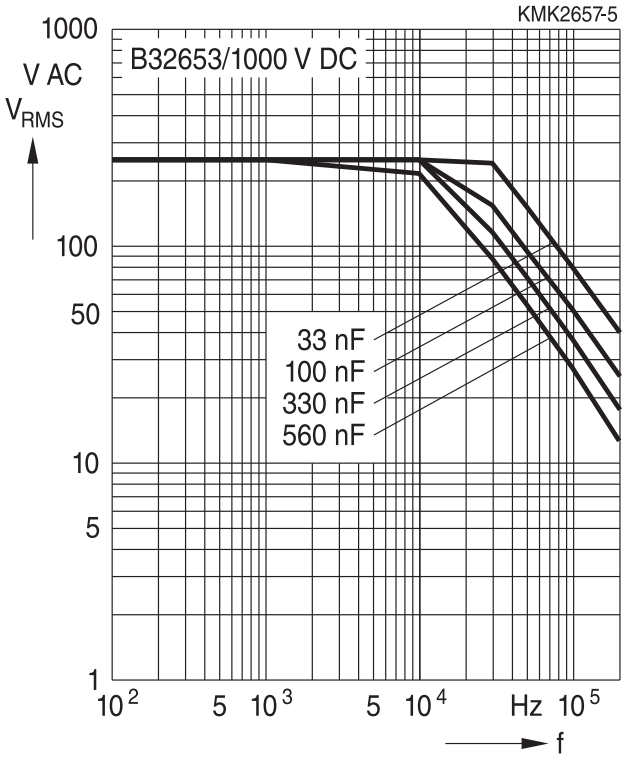

400 V DC/200 V AC




630 V DC/250 V AC

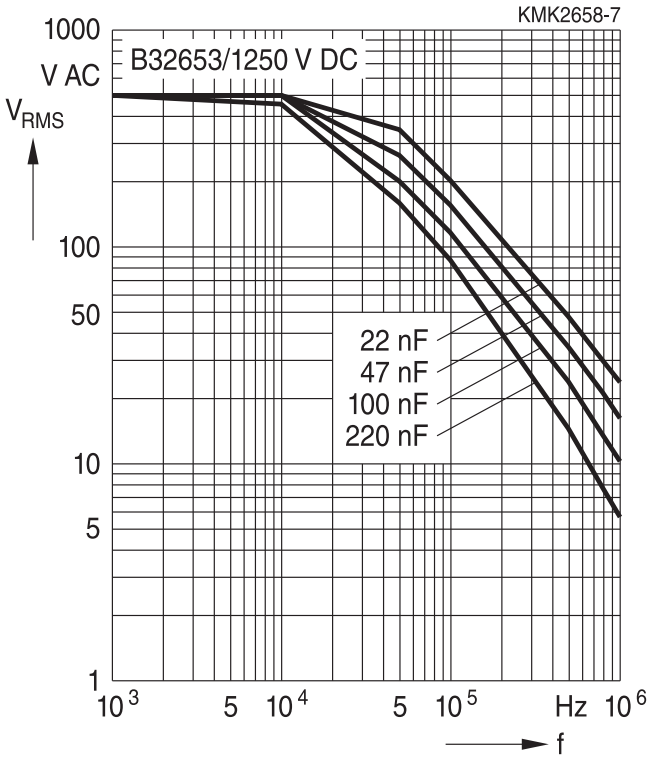



1000 V DC/250 V AC

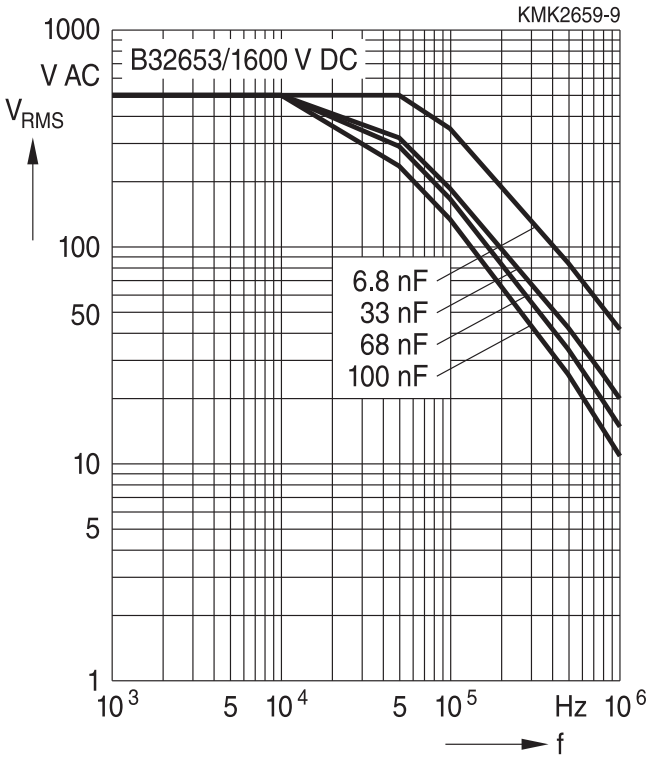


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 22.5 mm**

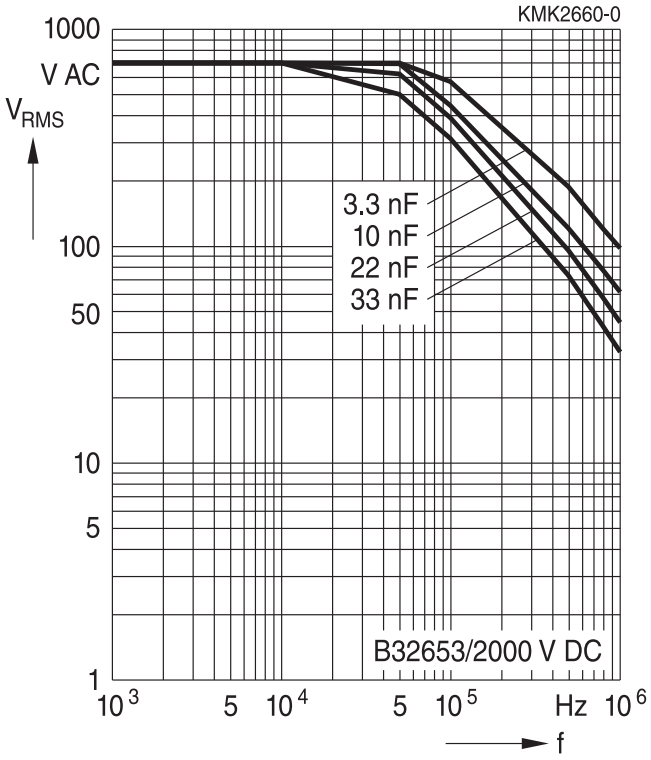
1250 V DC/500 V AC



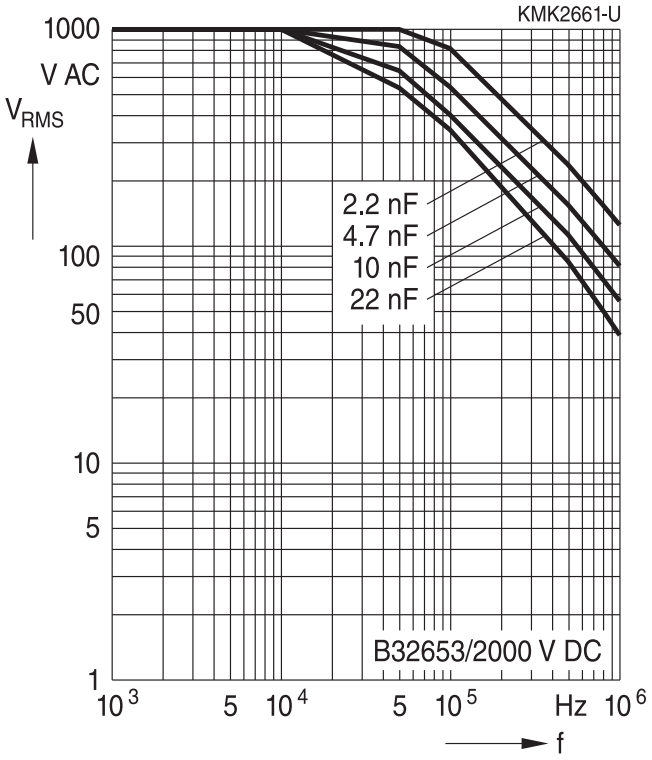

1600 V DC/500 V AC




2000 V DC/700 V AC

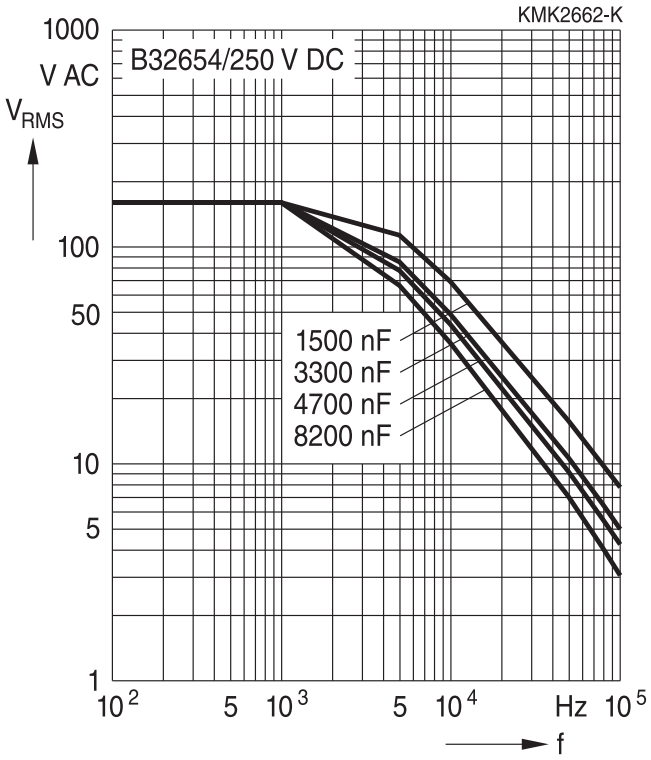



2000 V DC/1000 V AC

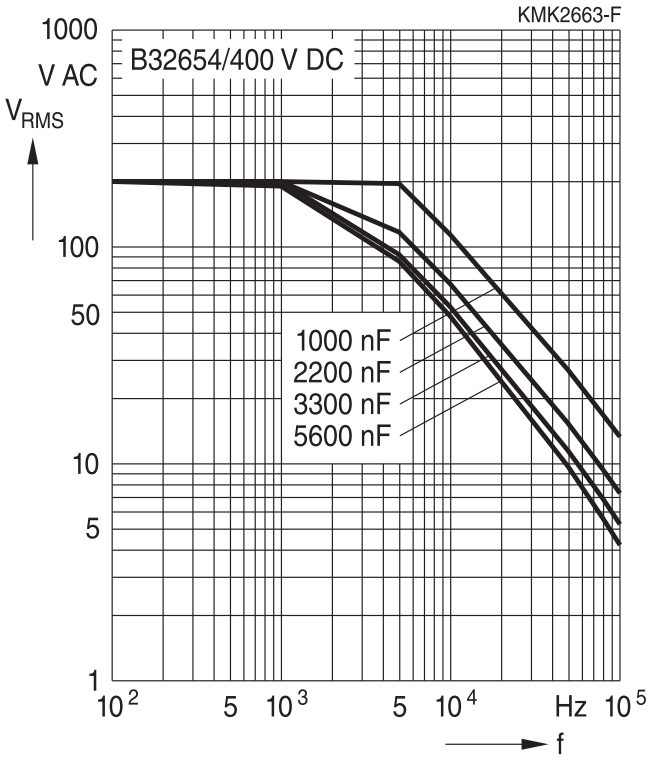


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 27.5 mm**

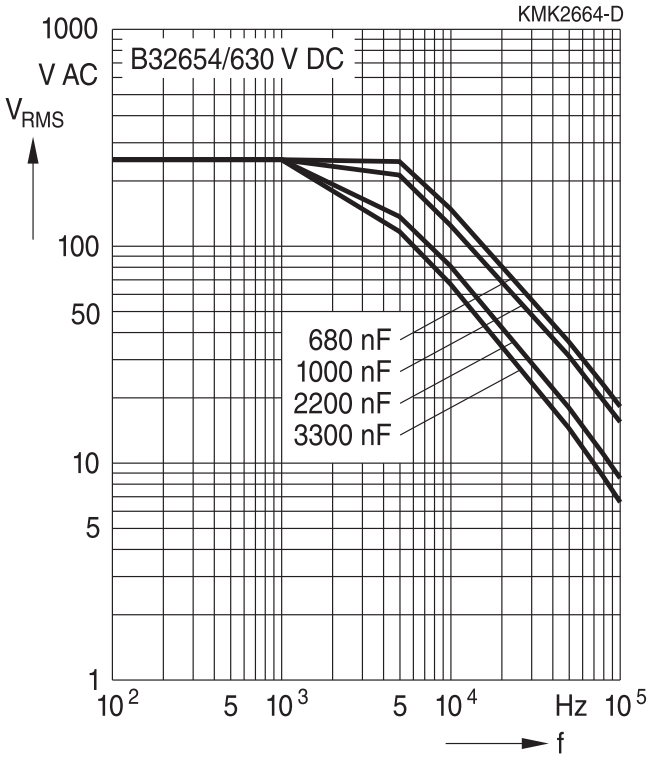
250 V DC/160 V AC



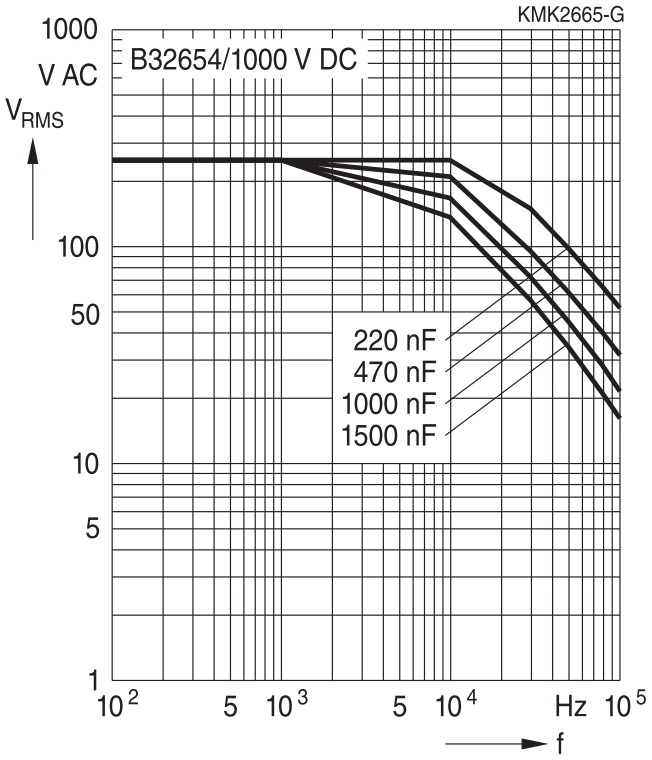

400 V DC/200 V AC




630 V DC/250 V AC

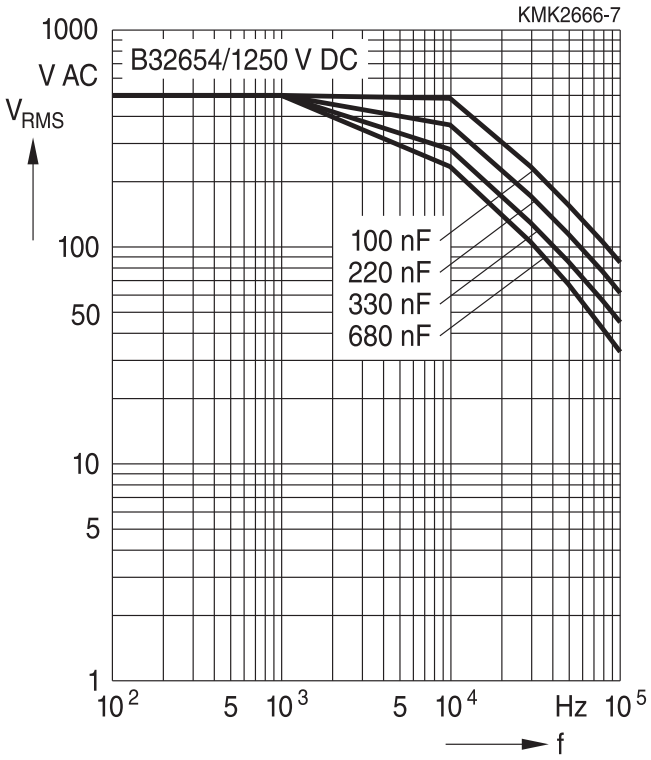



1000 V DC/250 V AC

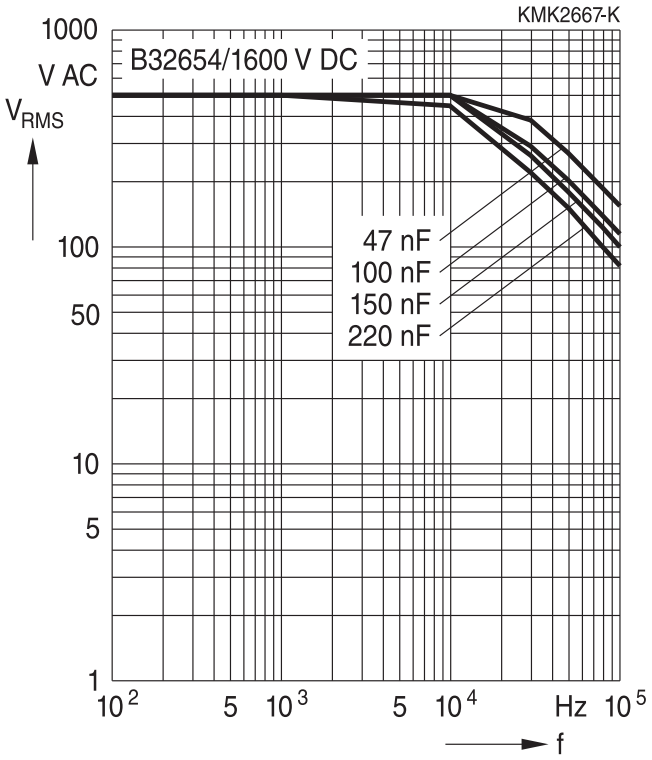


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 27.5 mm**

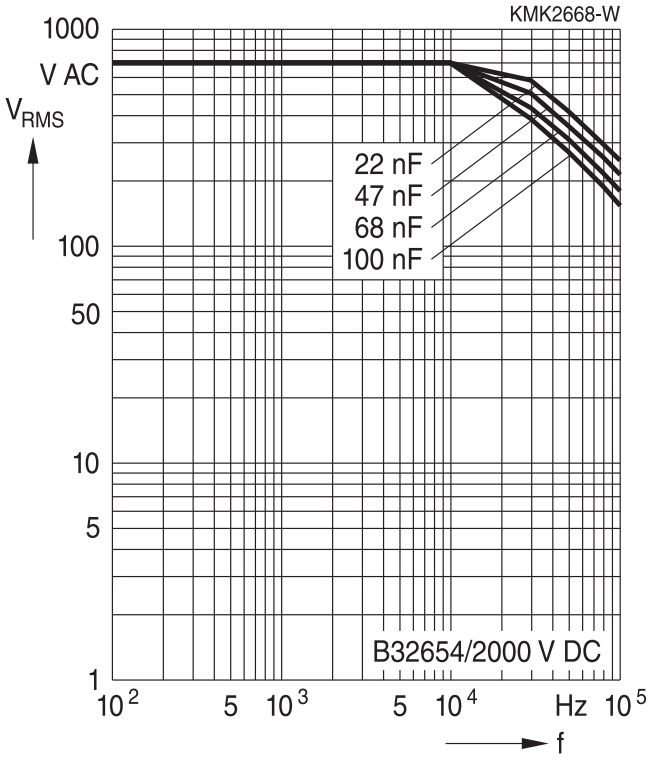
1250 V DC/500 V AC




1600 V DC/500 V AC

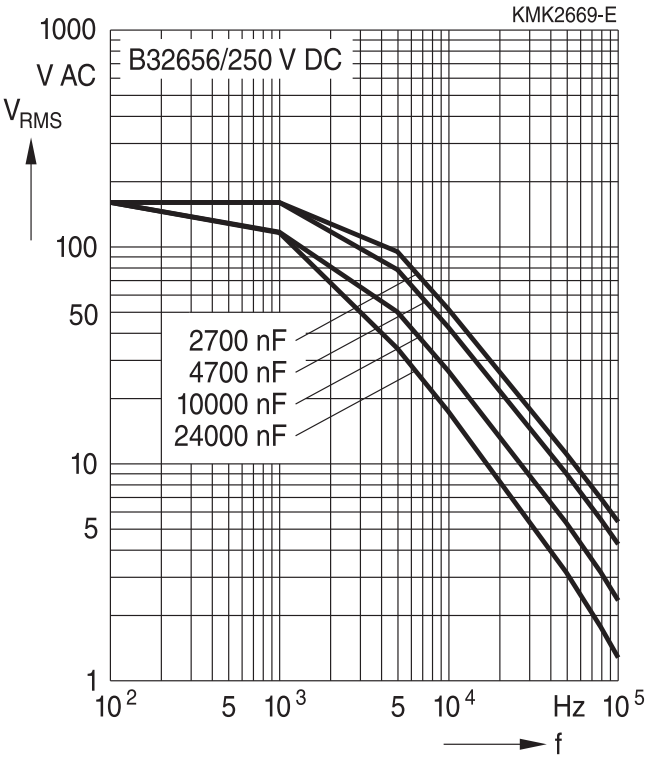



2000 V DC/700 V AC

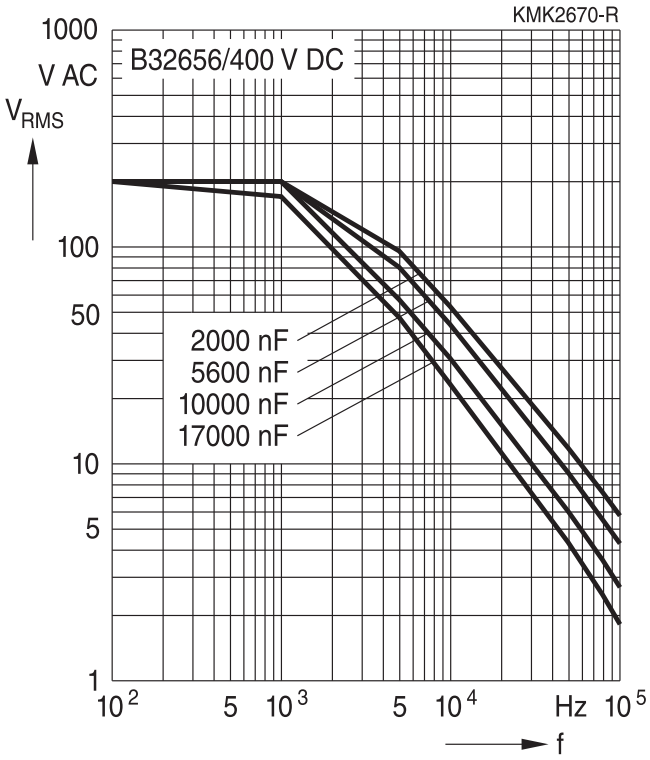


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 37.5 mm**

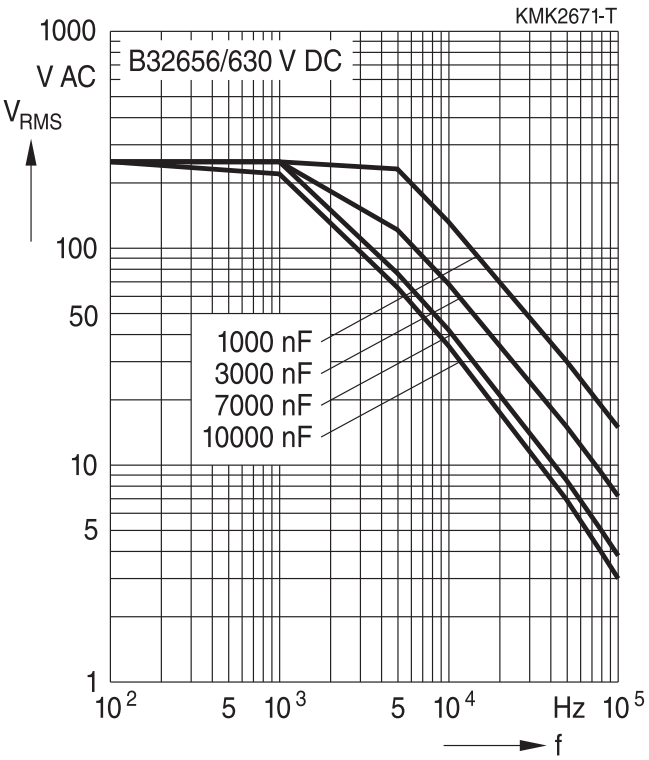
250 V DC/160 V AC



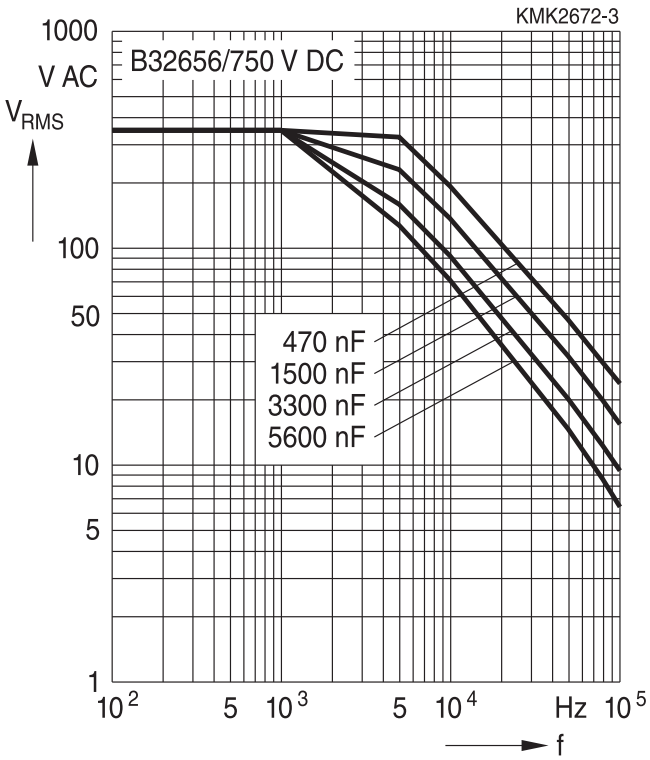

400 V DC/200 V AC




630 V DC/250 V AC

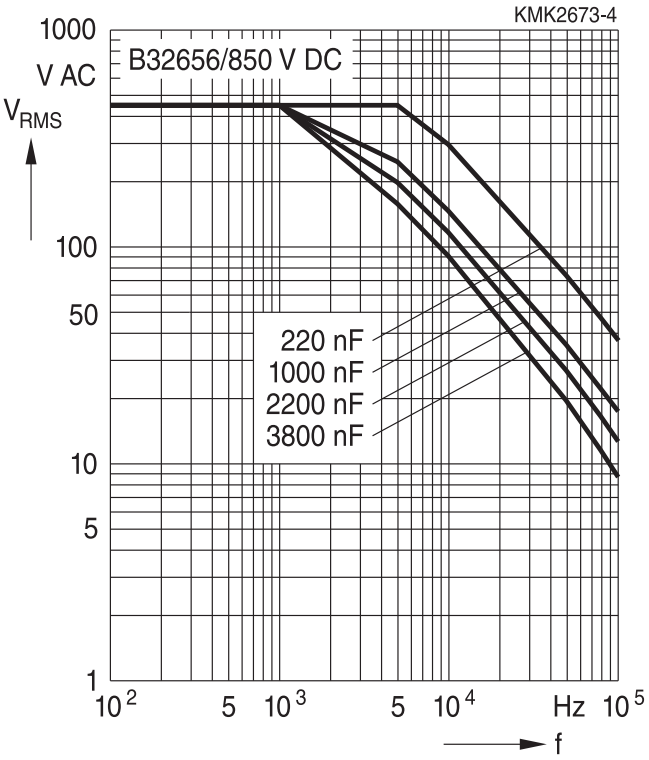



750 V DC/350 V AC

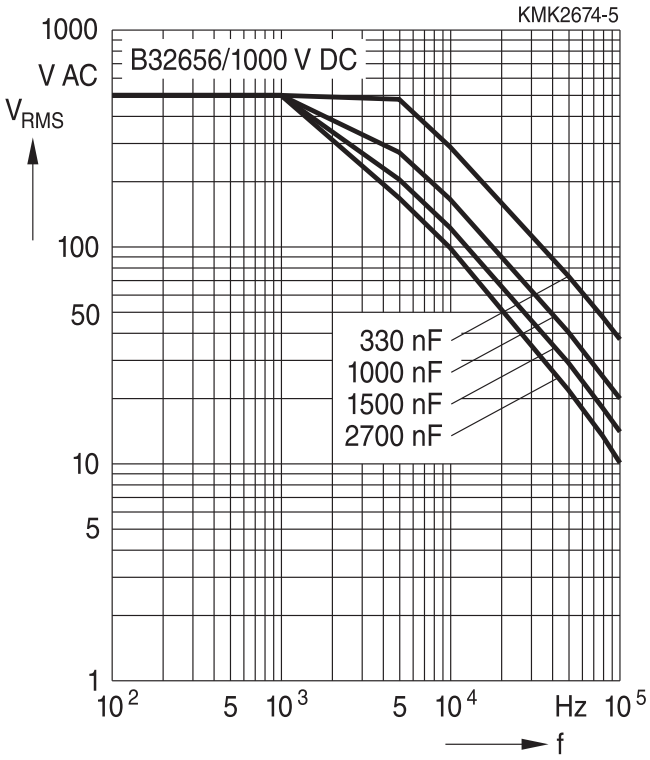


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 37.5 mm**

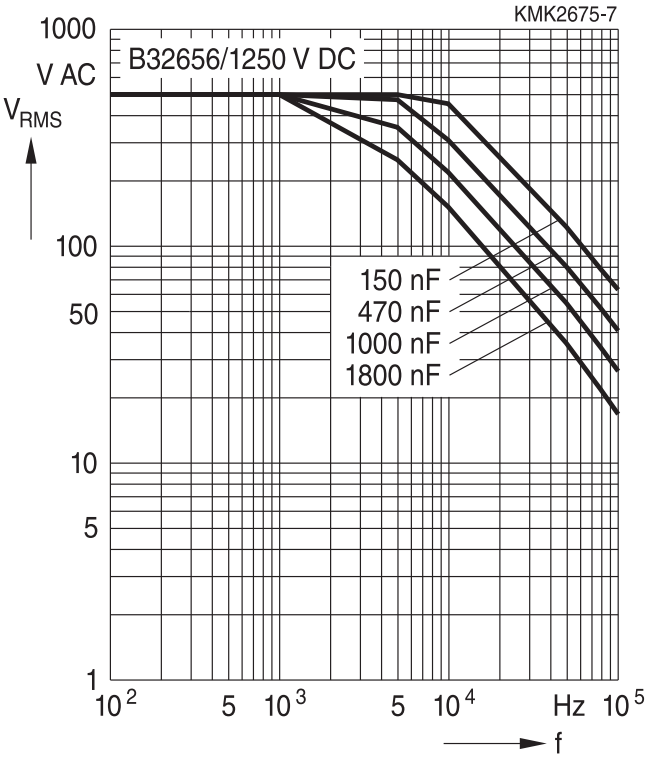
850 V DC/450 V AC



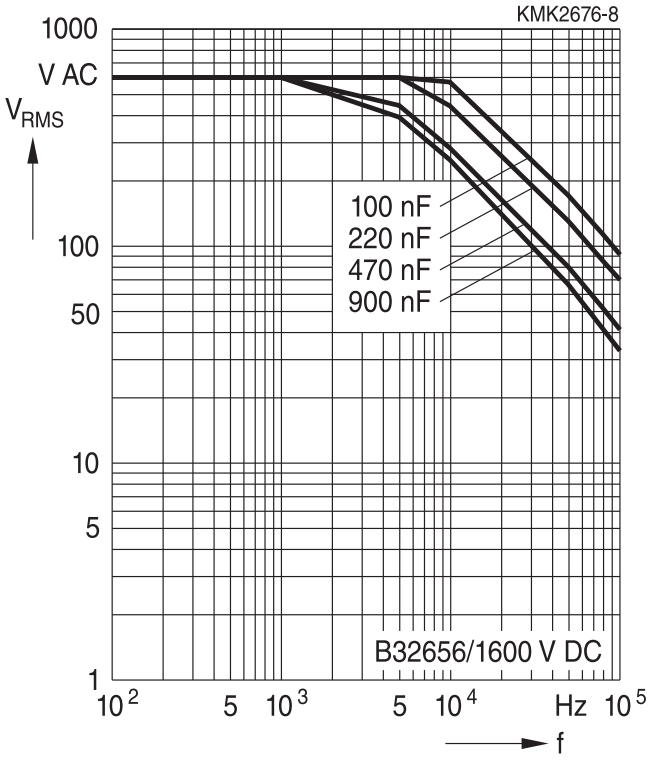

1000 V DC/500 V AC




1250 V DC/450 V AC

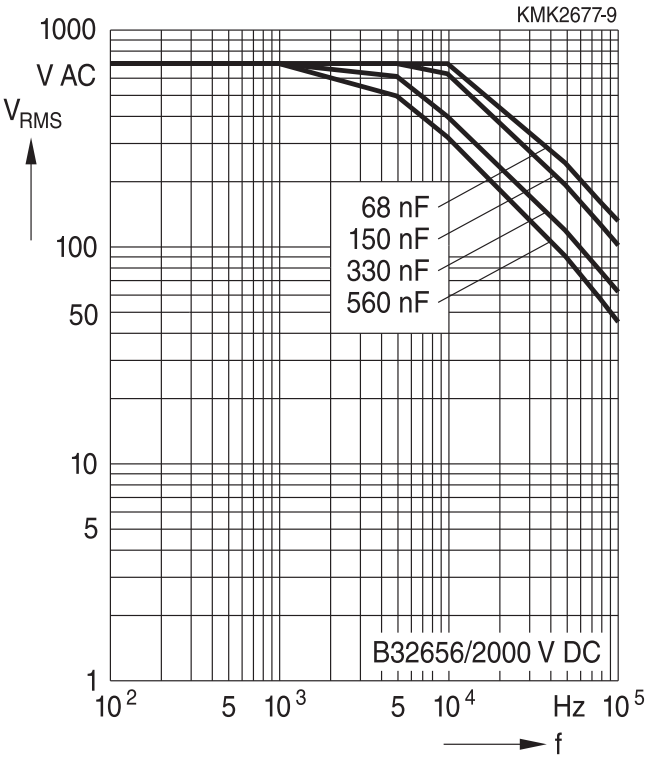



1600 V DC/500 V AC



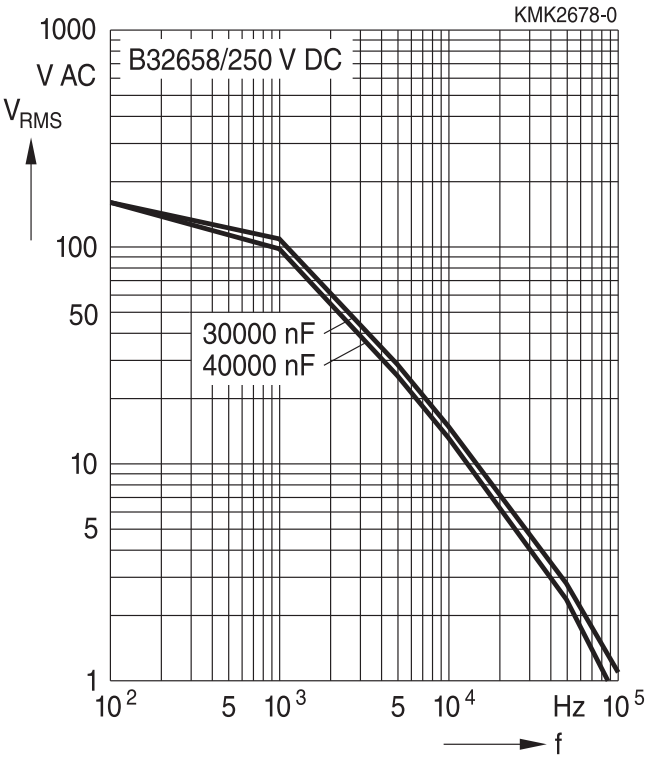
**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 37.5 mm**

2000 V DC/700 V AC

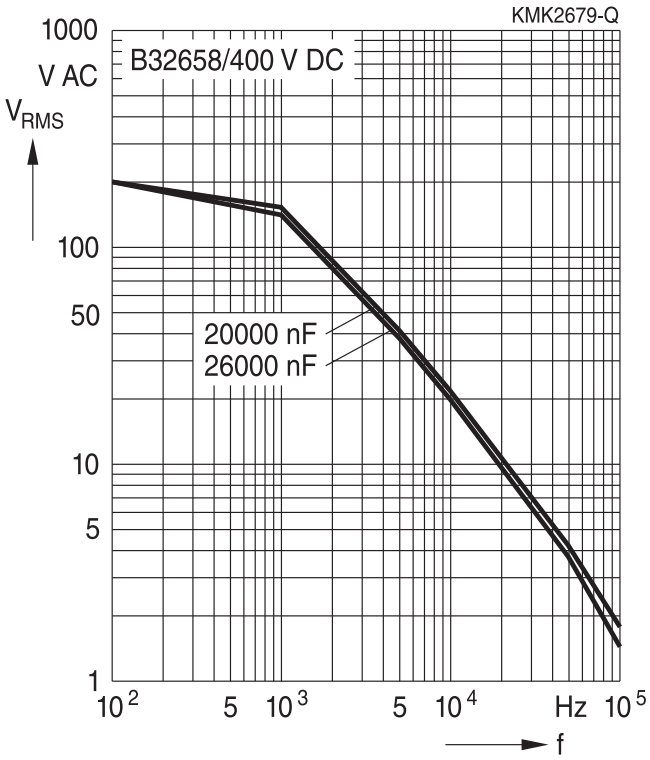


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 52.5 mm**

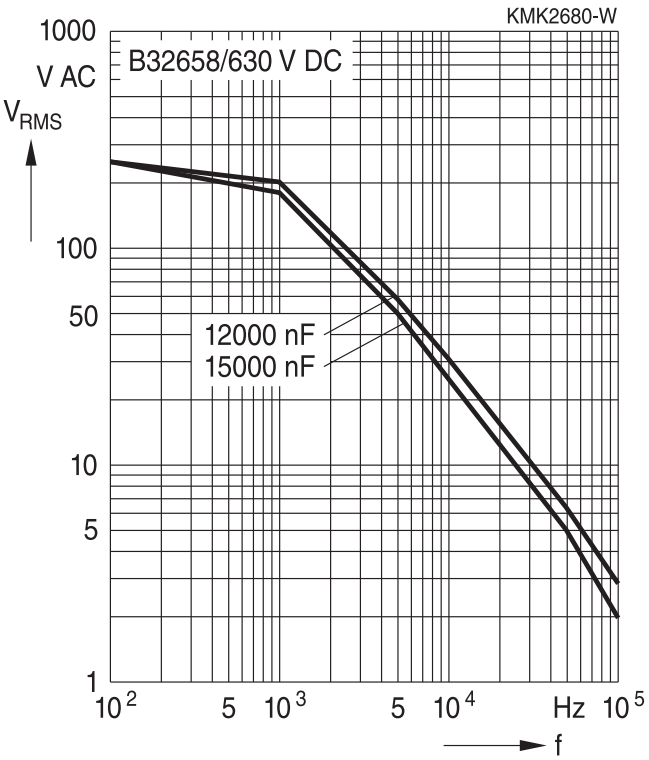
250 V DC/160 V AC



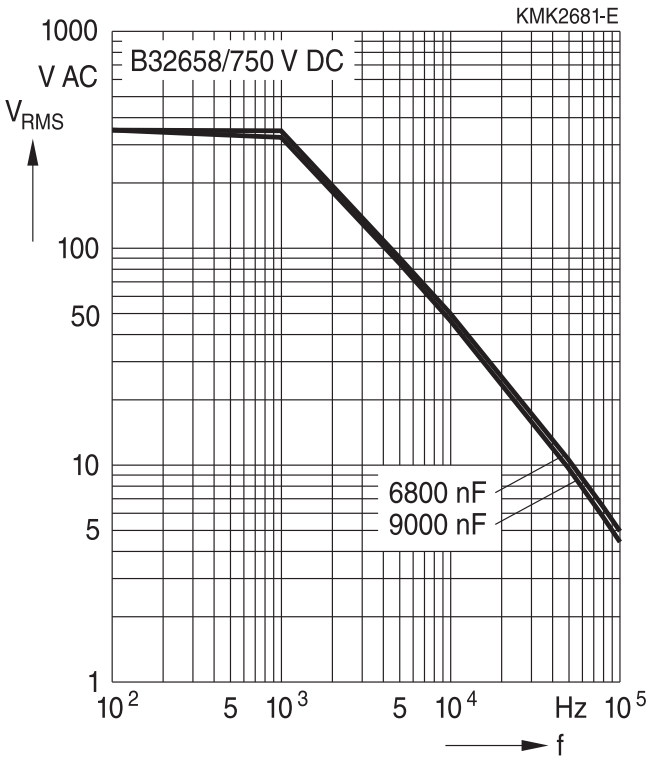

400 V DC/200 V AC




630 V DC/250 V AC

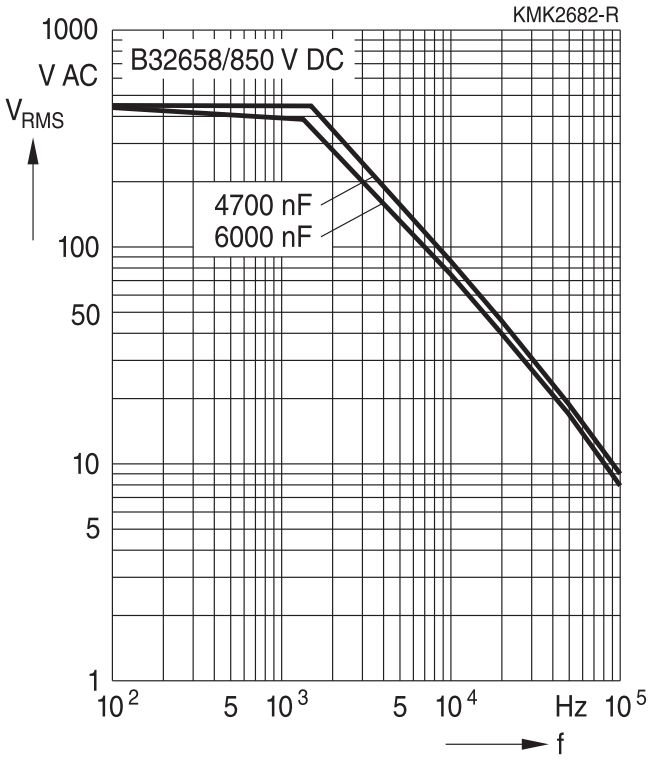



750 V DC/350 V AC

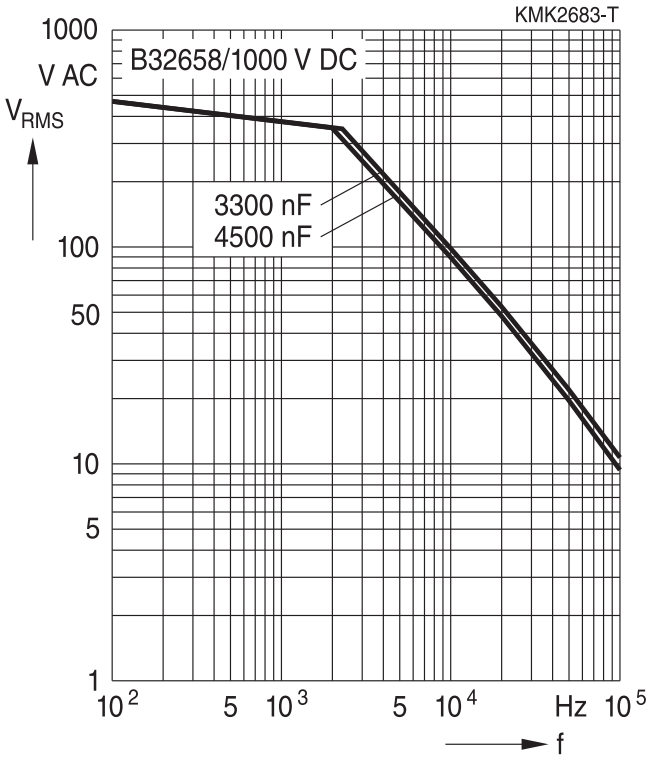


**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 52.5 mm**

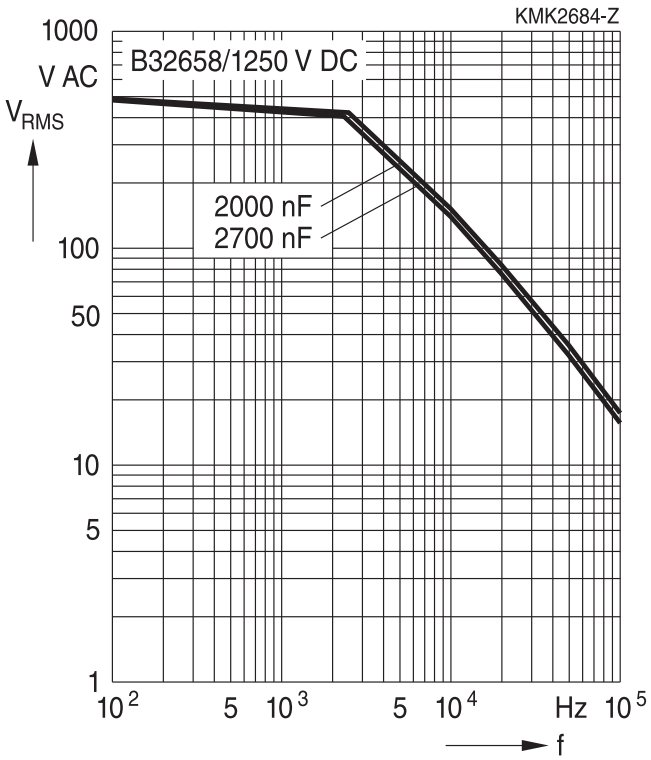
850 V DC/450 V AC



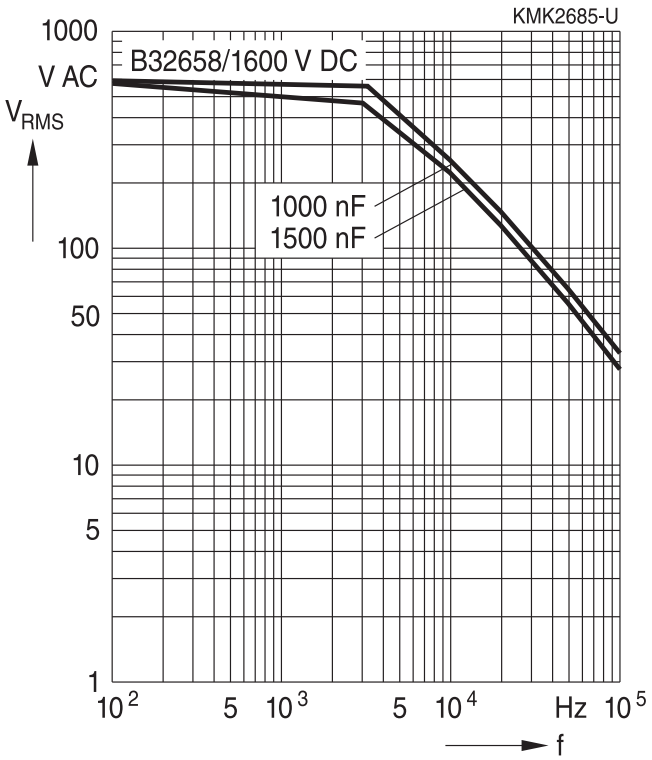

1000 V DC/500 V AC




1250 V DC/500 V AC

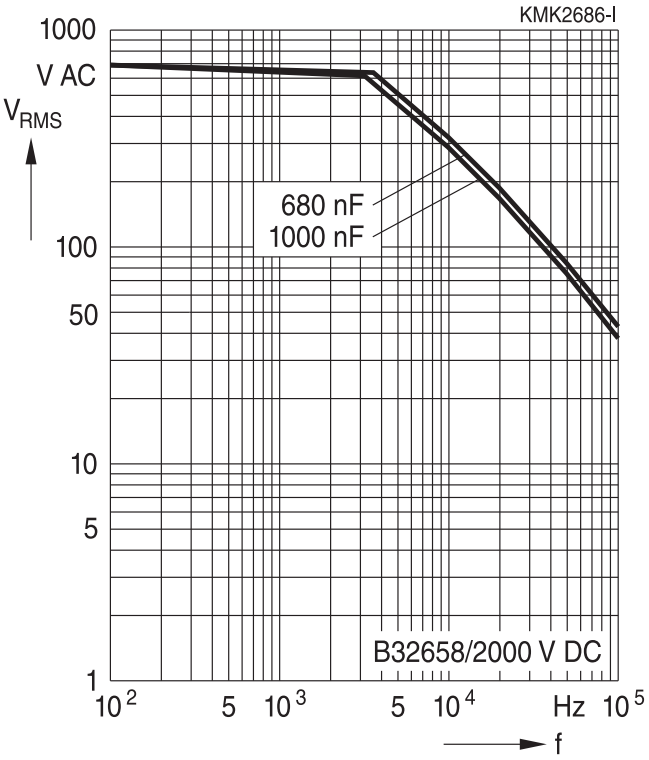



1600 V DC/600 V AC



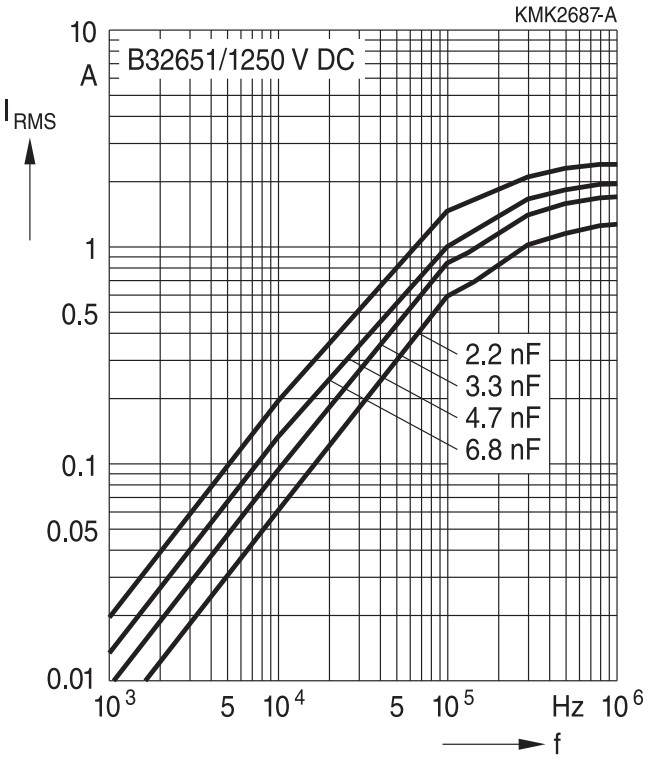
**Permissible AC voltage $V_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $ΔESR_{typ}$ ≤ ±5%)**
**Lead spacing 52.5 mm**

2000 V DC/700 V AC



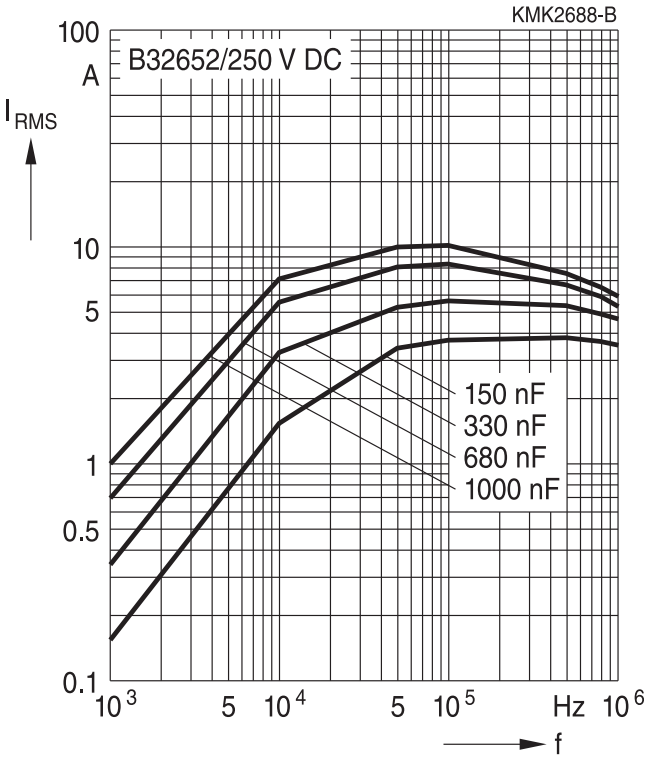
**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 10 mm**

1250 V DC/450 V AC

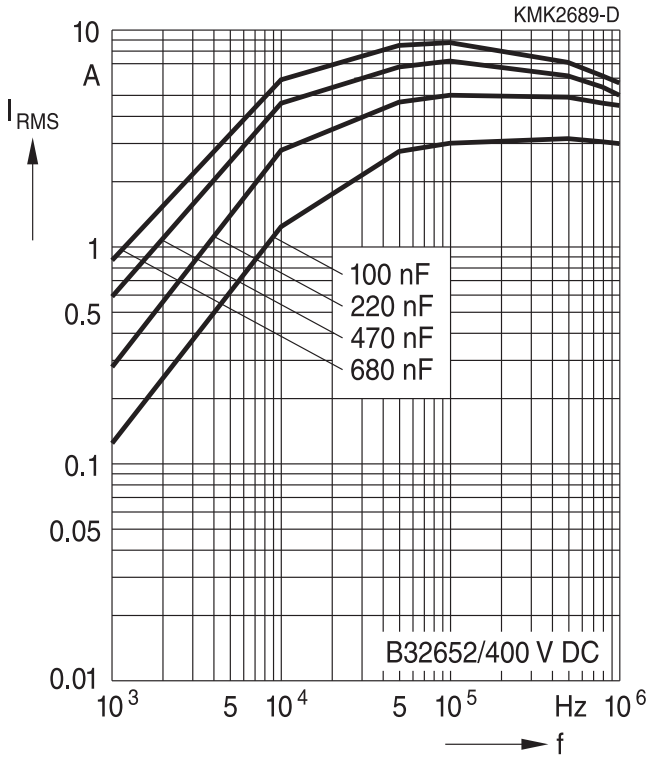


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 15 mm**

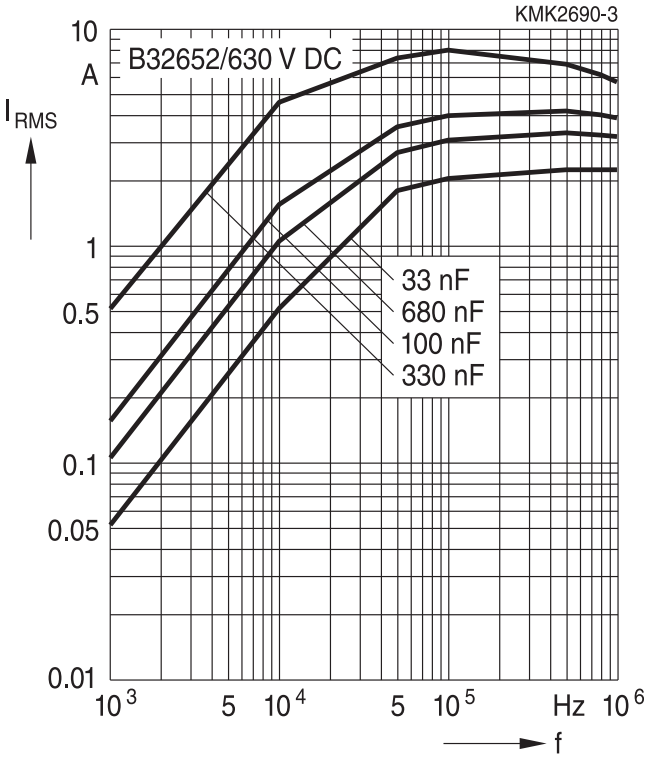
250 V DC/160 V AC



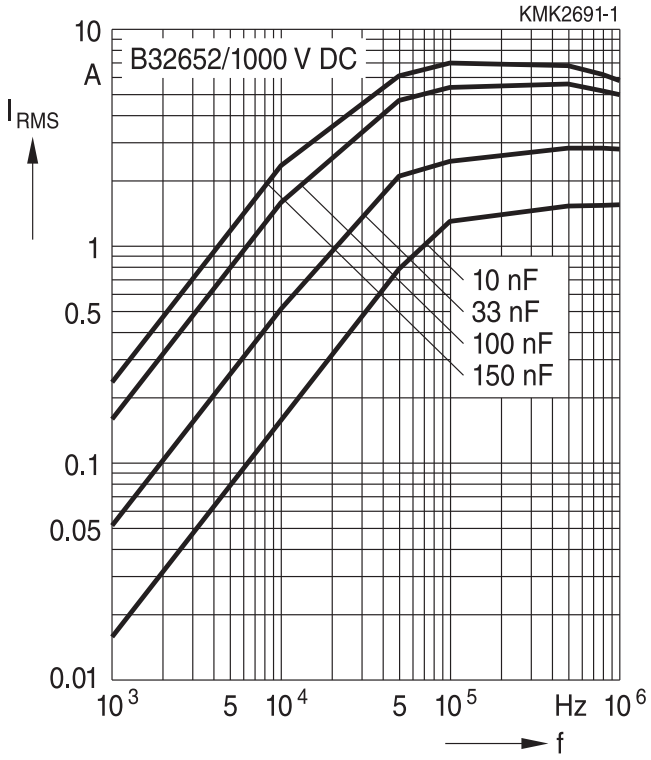

400 V DC/200 V AC




630 V DC/250 V AC

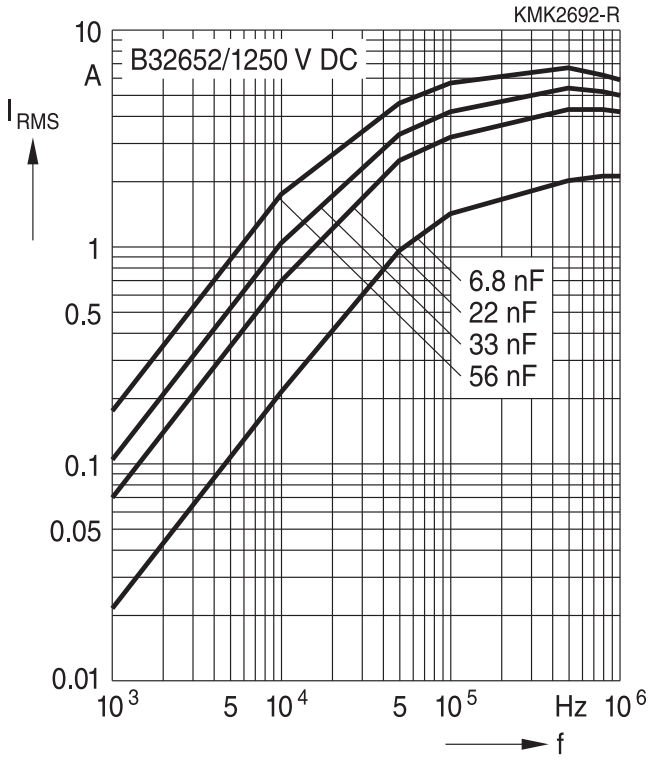



1000 V DC/250 V AC

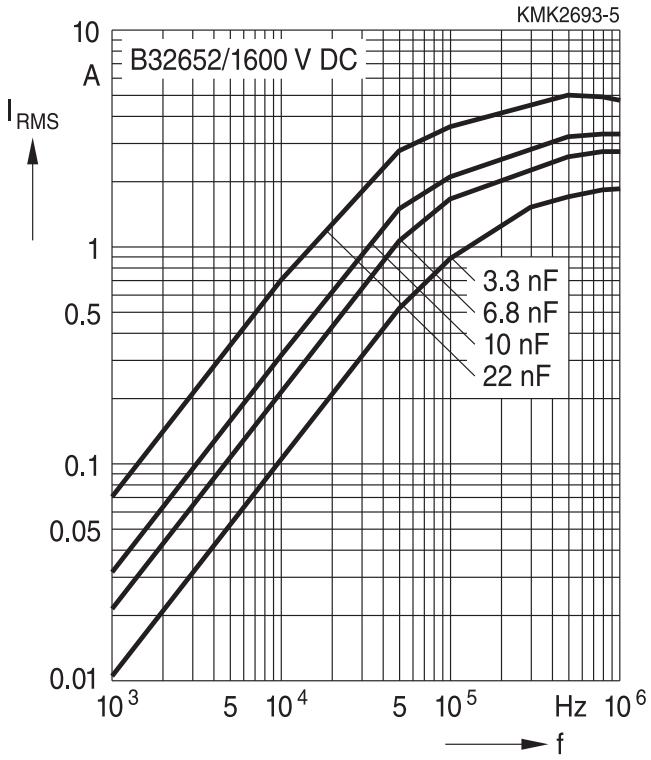


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 15 mm**

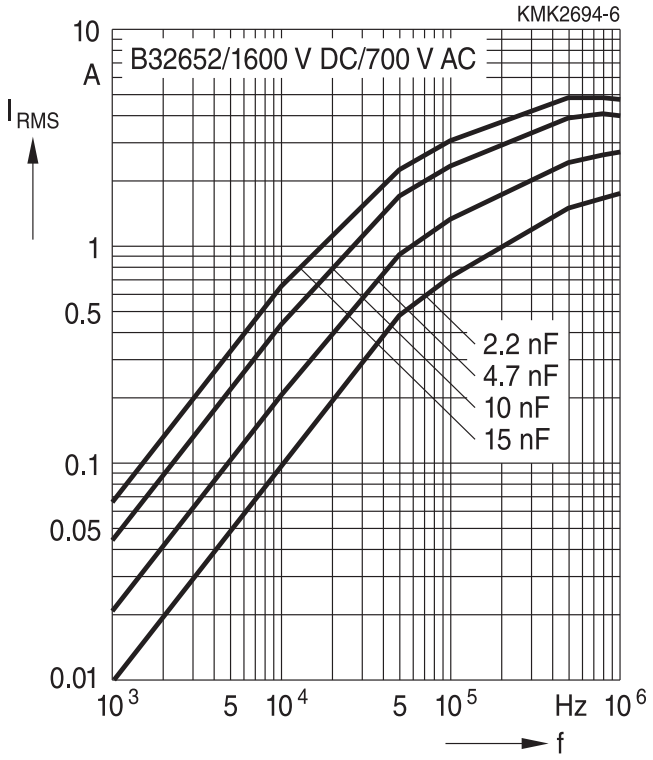
1250 V DC/500 V AC



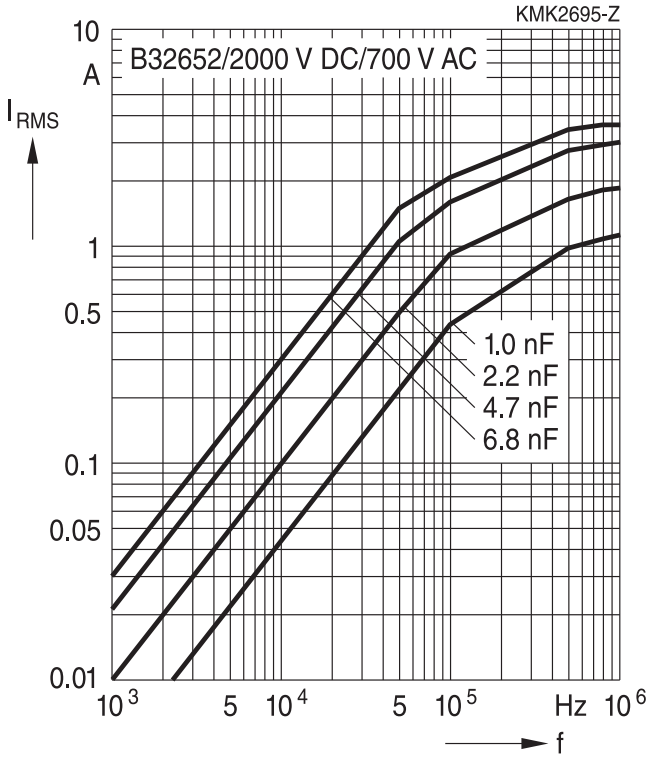

1600 V DC/500 V AC




1600 V DC/700 V AC

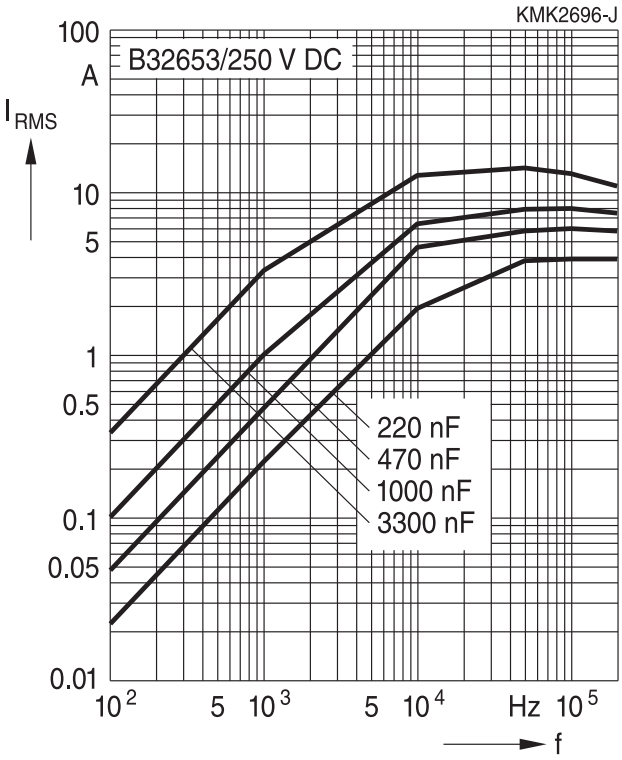



2000 V DC/700 V AC

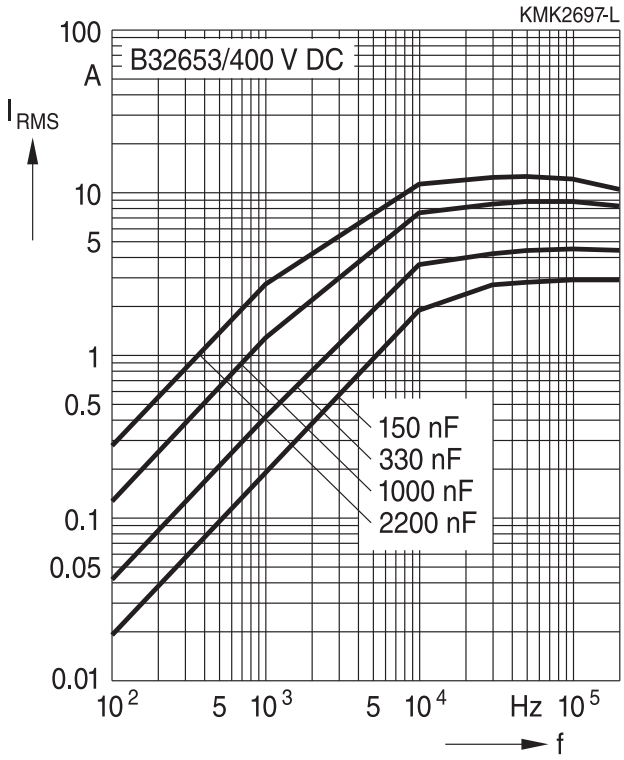


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 22.5 mm**

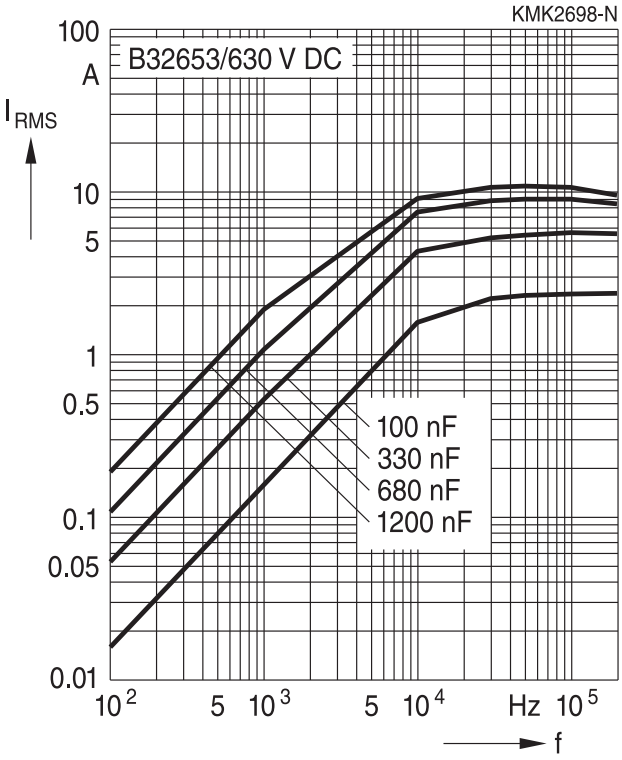
250 V DC/160 V AC



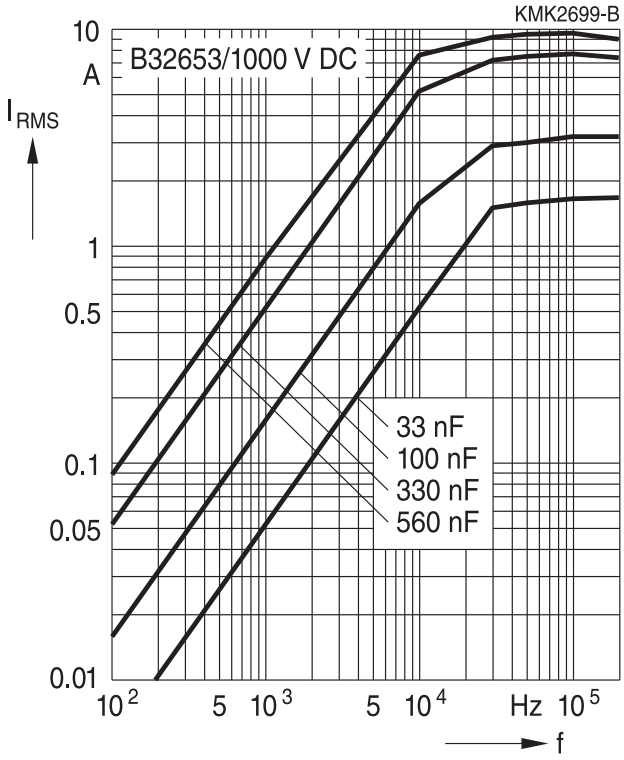

400 V DC/200 V AC




630 V DC/250 V AC

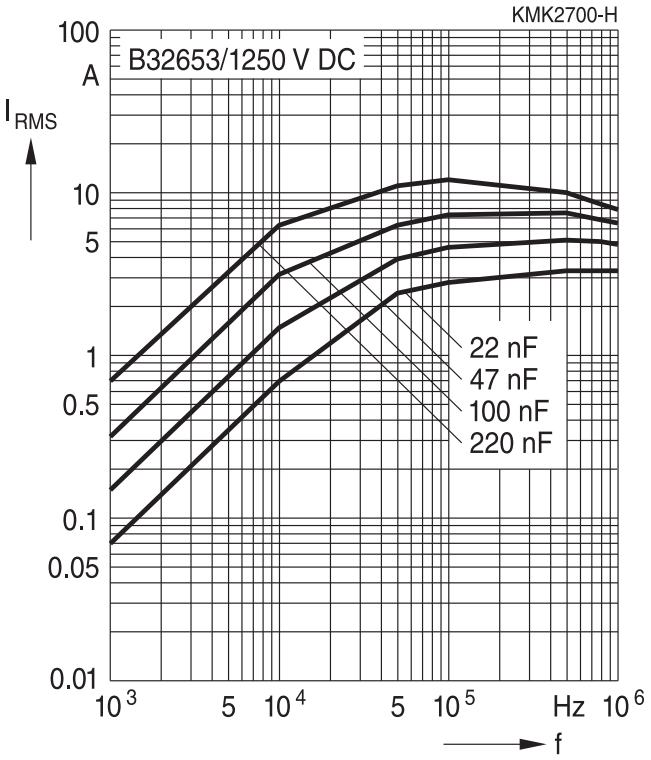



1000 V DC/250 V AC

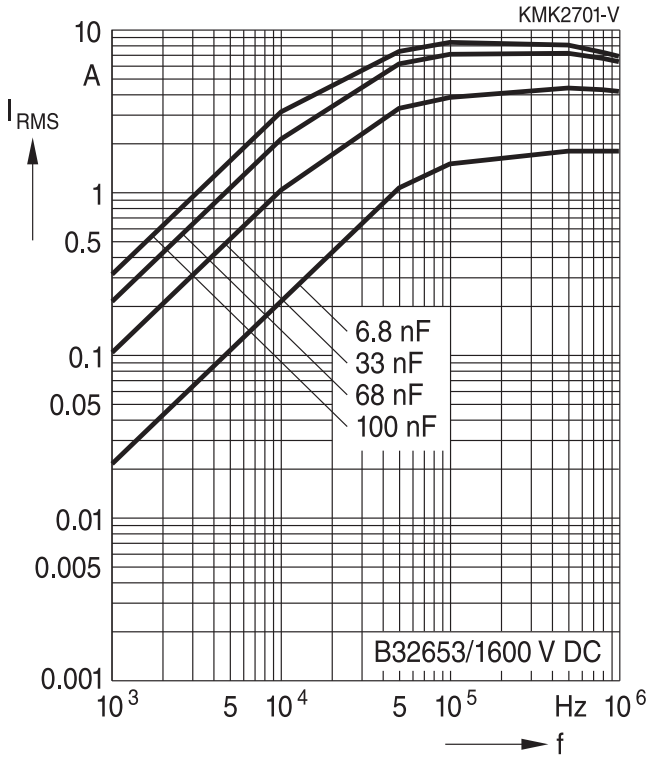


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating ΔT ≤20 °C when $ΔESR_{typ}$ ≤ ±5%)**
**Lead spacing 22.5 mm**

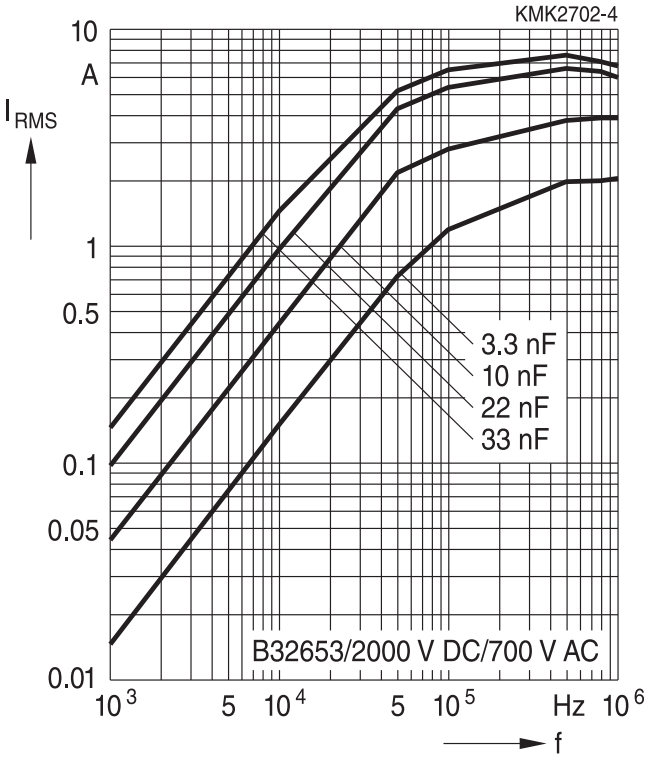
1250 V DC/500 V AC



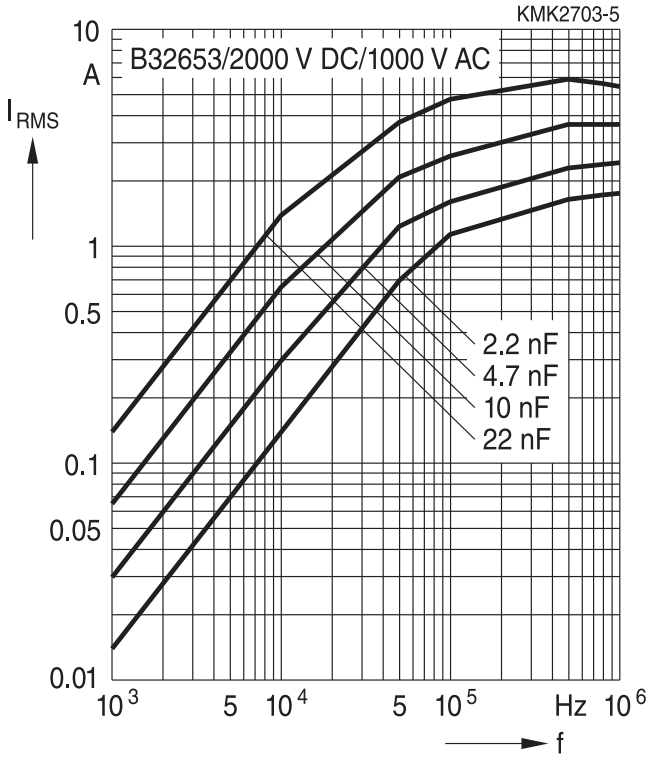

1600 V DC/500 V AC




2000 V DC/700 V AC

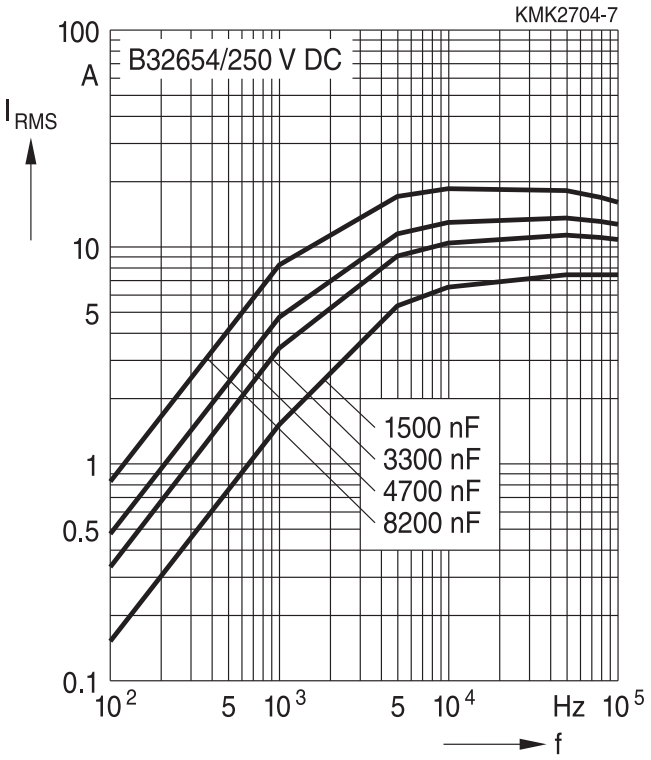



2000 V DC/1000 V AC

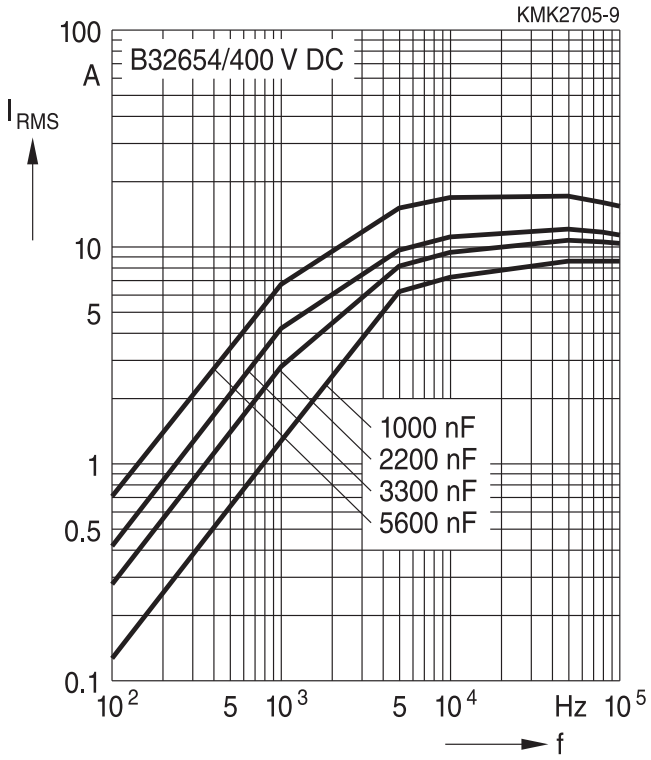


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 27.5 mm**

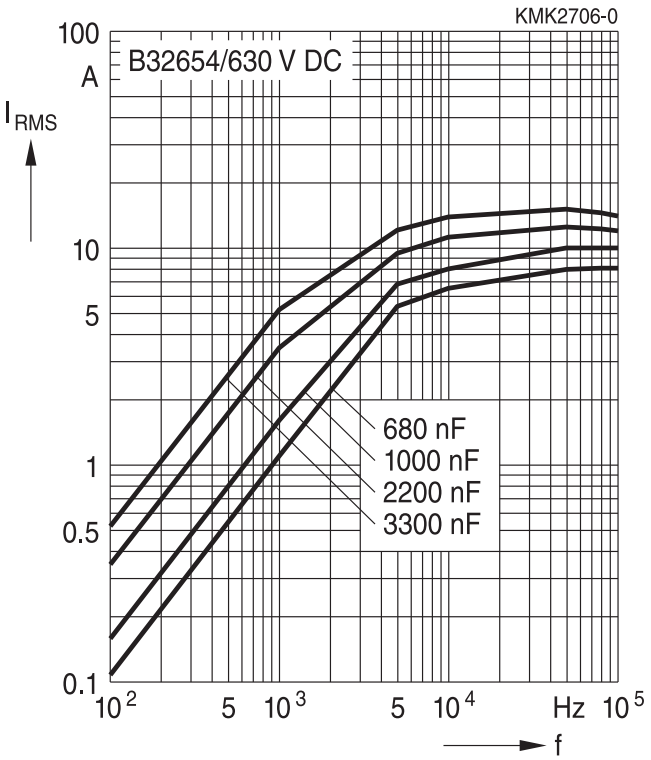
250 V DC/160 V AC



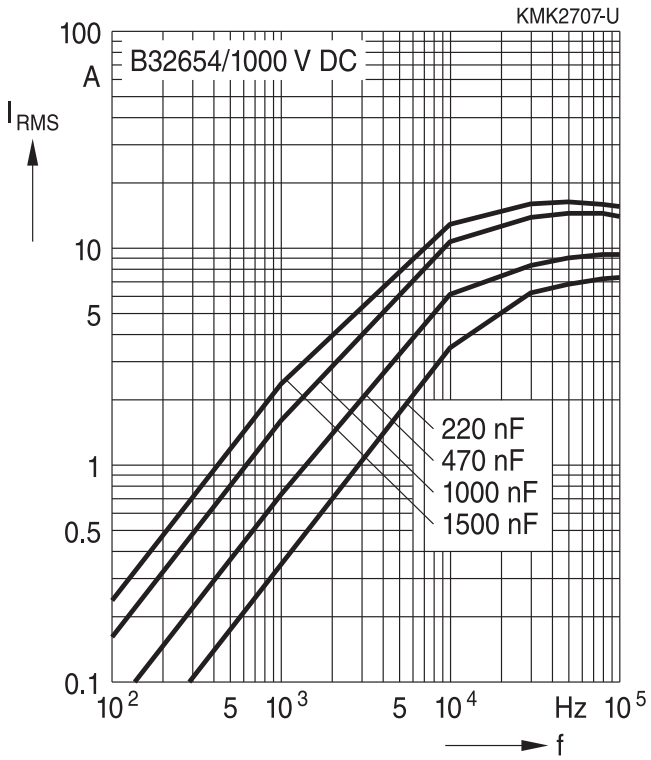

400 V DC/200 V AC




630 V DC/250 V AC

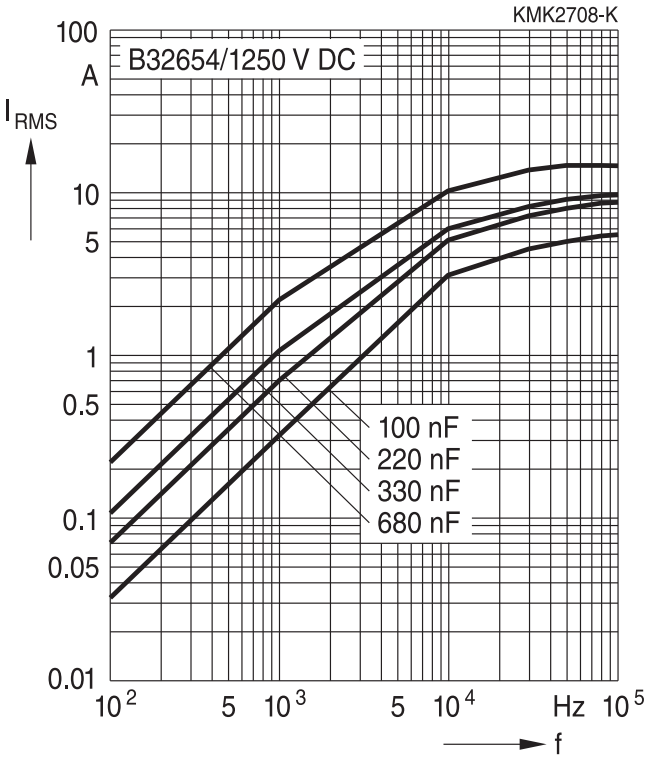



1000 V DC/250 V AC

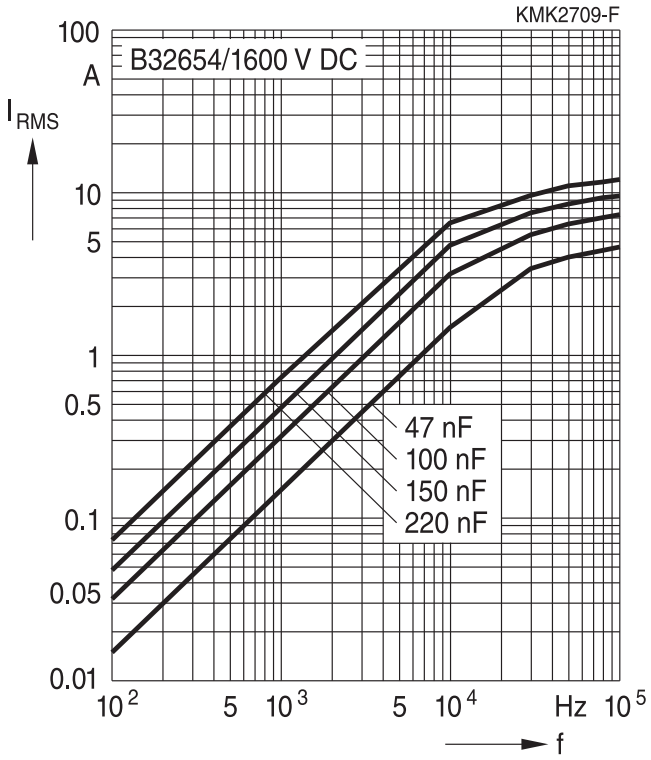


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 27.5 mm**

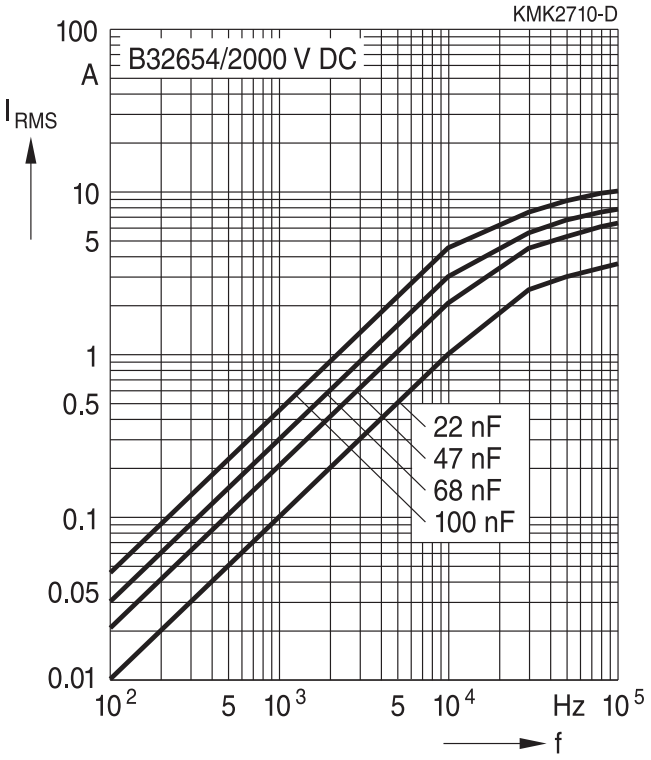
1250 V DC/500 V AC




1600 V DC/500 V AC

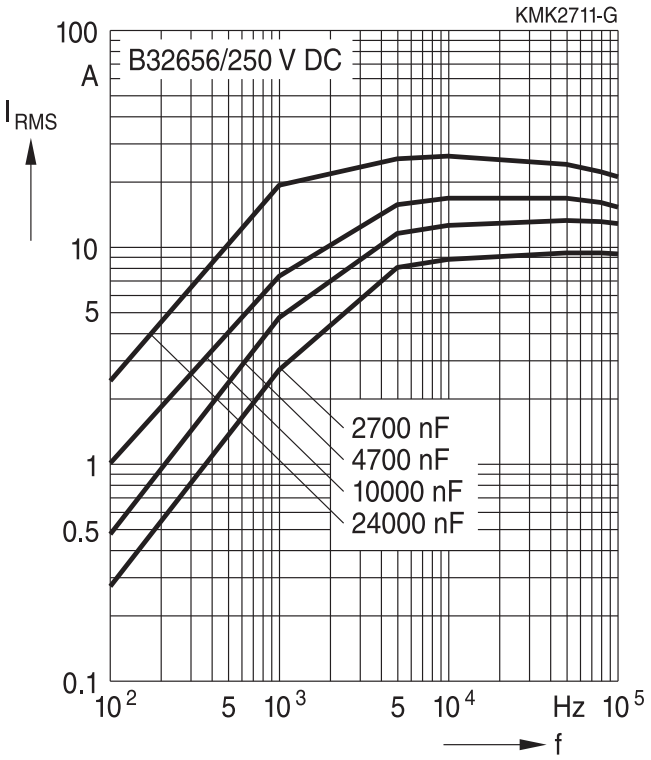



2000 V DC/700 V AC

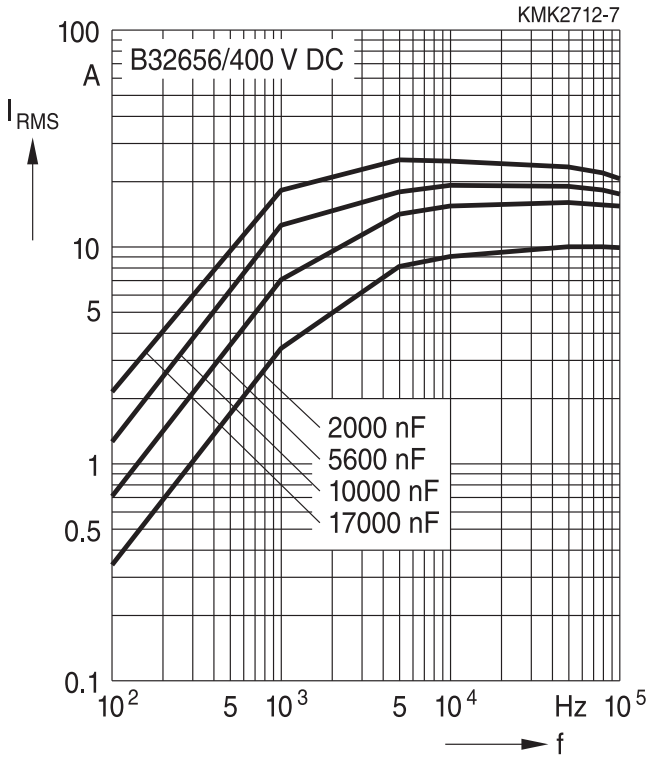


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 37.5 mm**

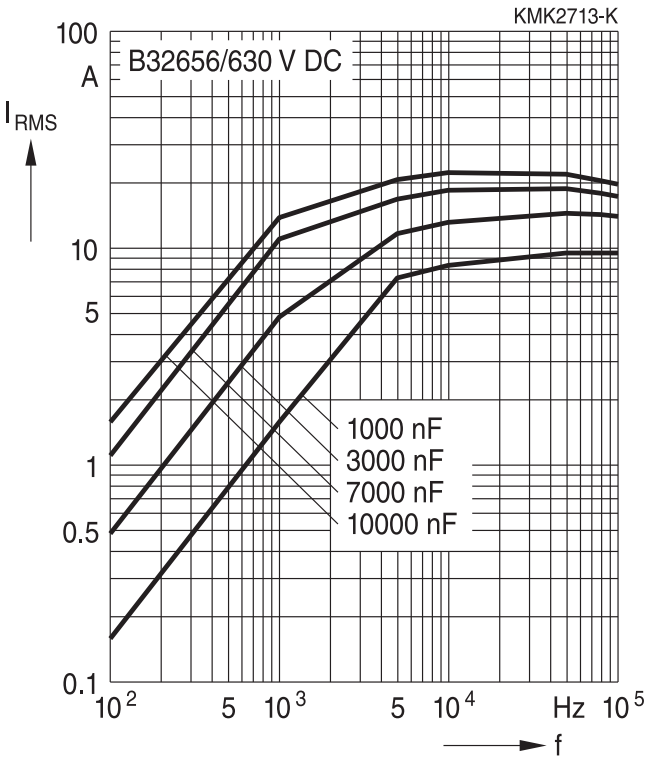
250 V DC/160 V AC



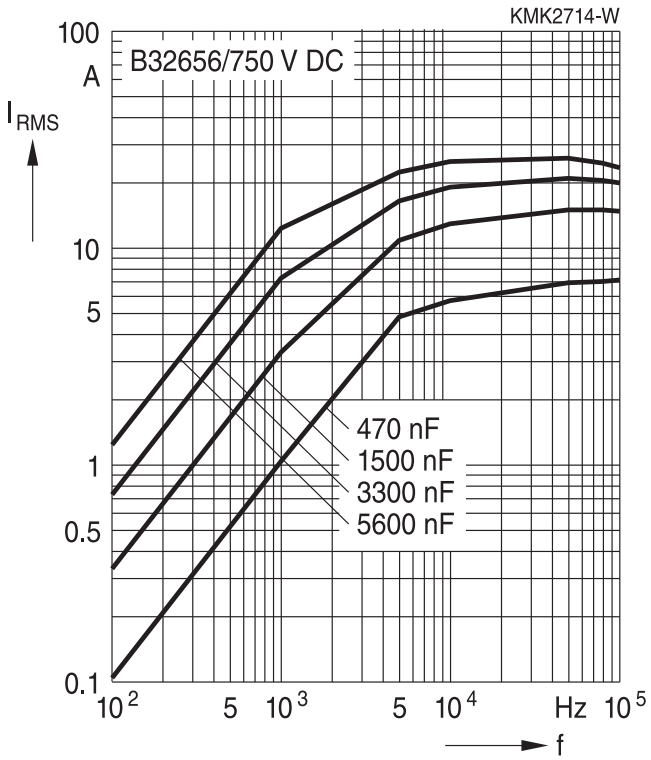

400 V DC/200 V AC




630 V DC/250 V AC

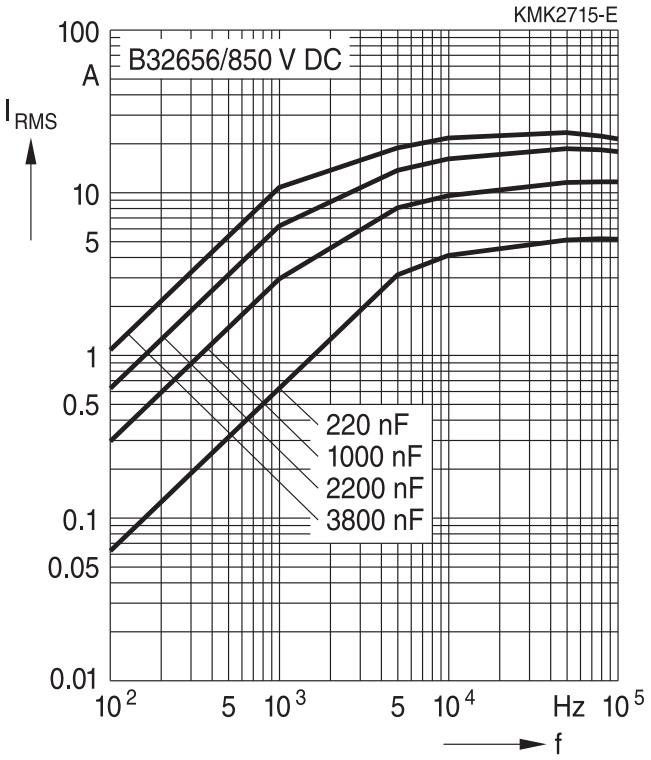



750 V DC/350 V AC

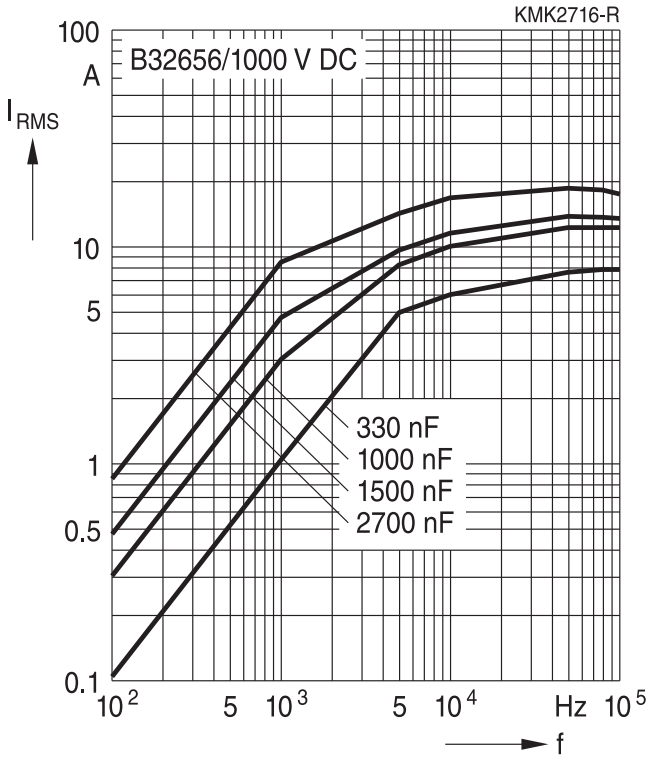


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 37.5 mm**

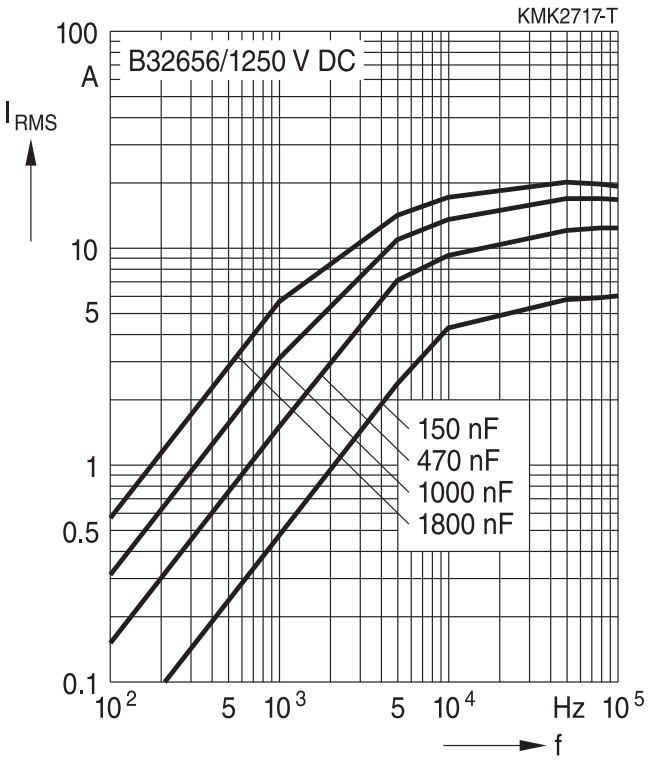
850 V DC/450 V AC



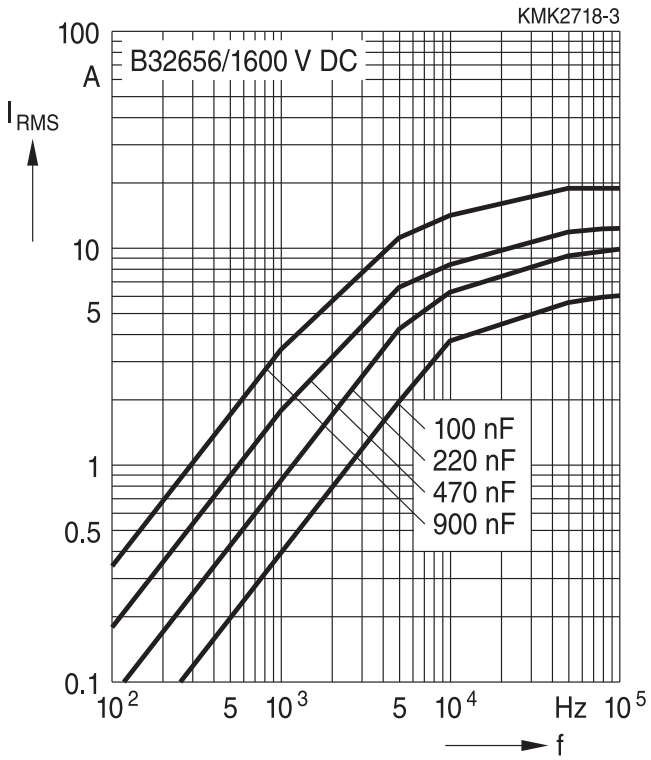

1000 V DC/500 V AC




1250 V DC/500 V AC

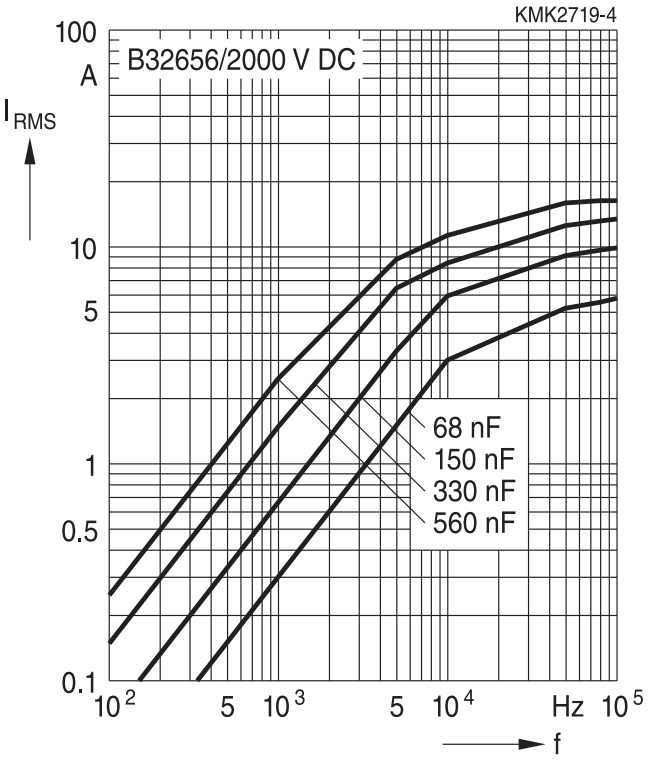



1600 V DC/600 V AC



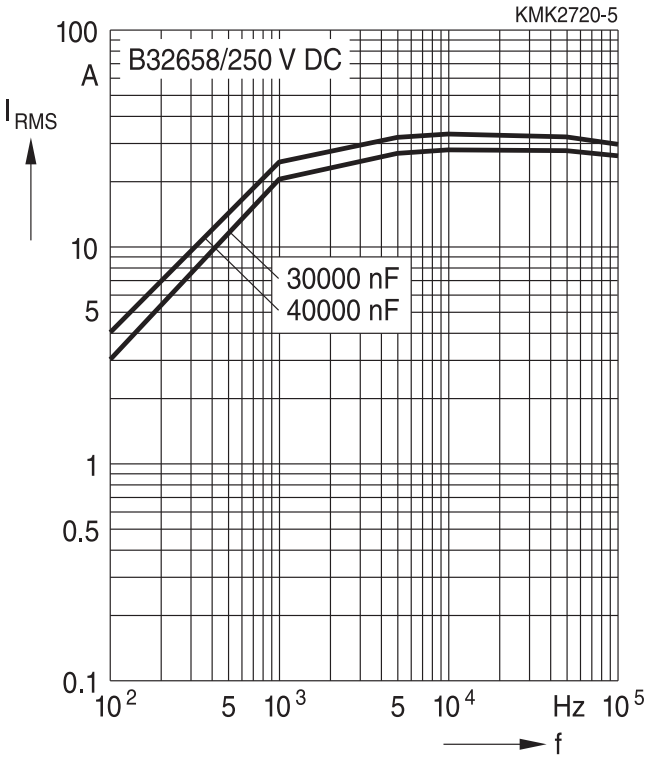
**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 37.5 mm**

2000 V DC/700 V AC

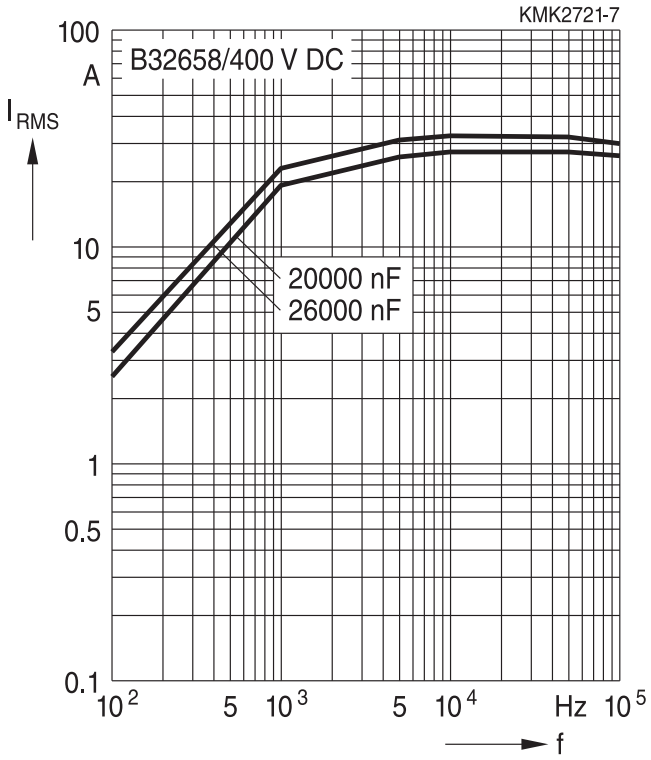


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 52.5 mm**

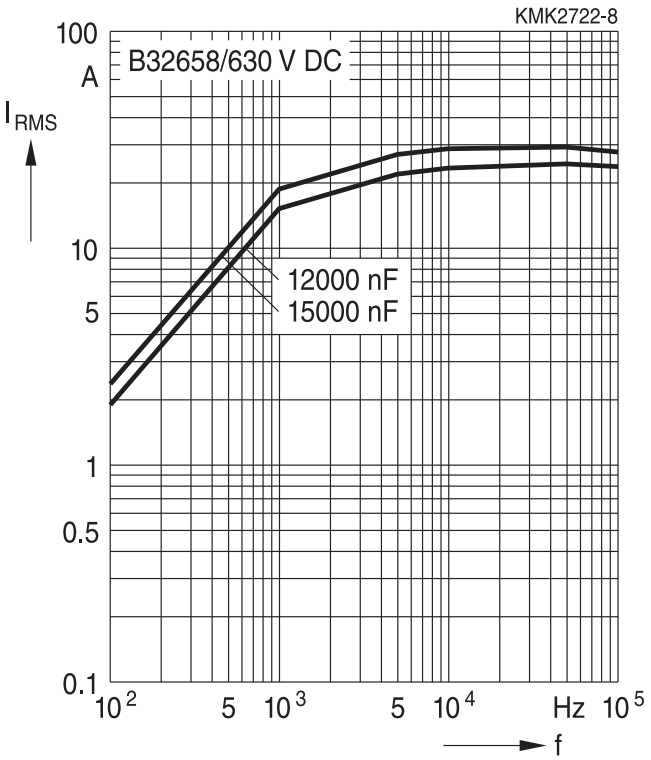
250 V DC/160 V AC



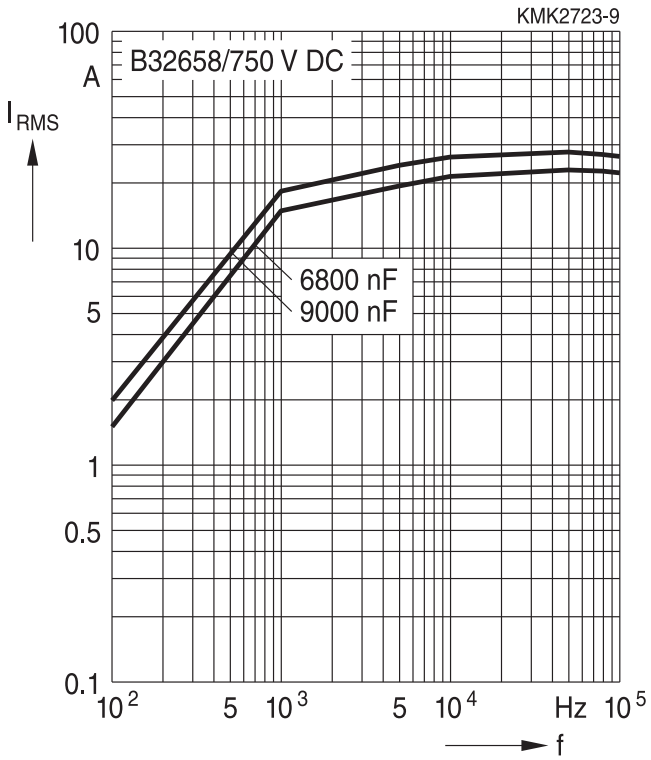

400 V DC/200 V AC




630 V DC/250 V AC

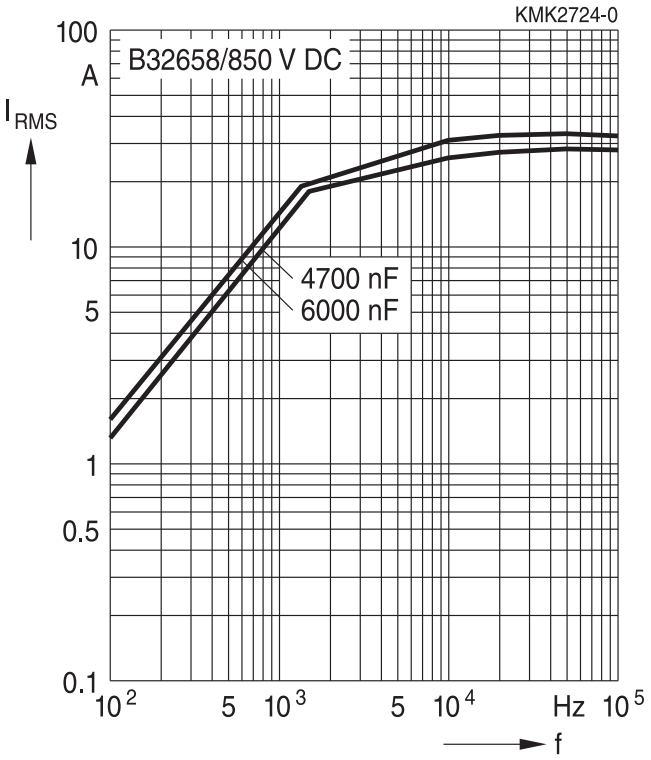



750 V DC/350 V AC

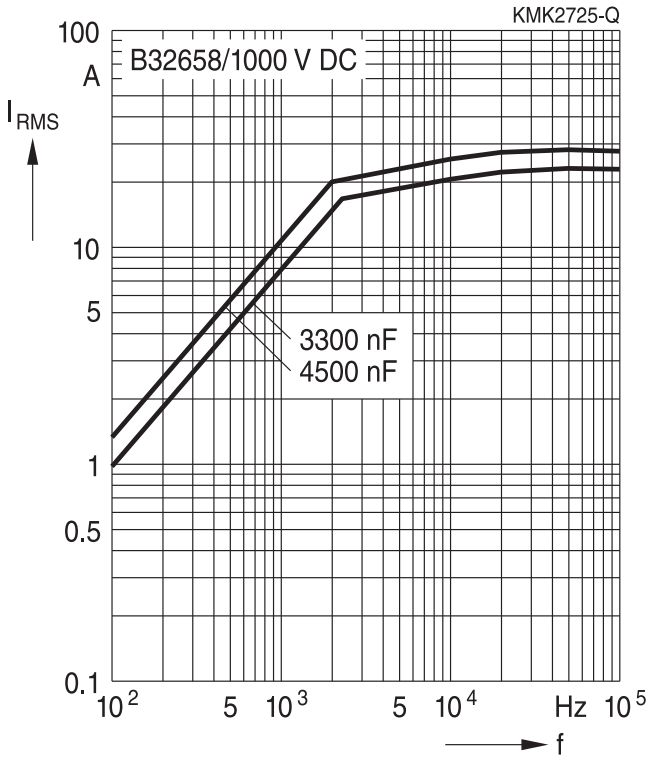


**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A \leq 85$ °C, self-heating $\Delta T \leq 20$ °C when $\Delta ESR_{typ} \leq \pm 5\%$)**
**Lead spacing 52.5 mm**

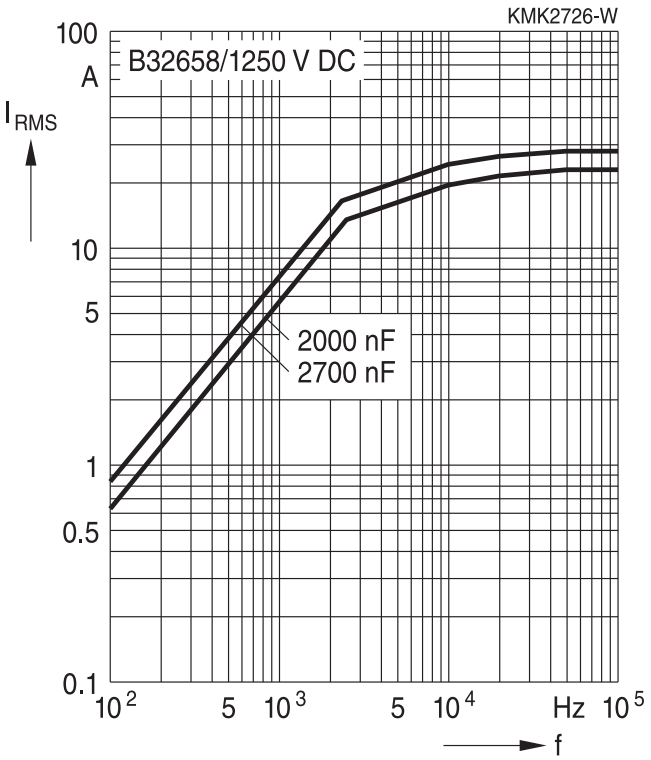
850 V DC/450 V AC



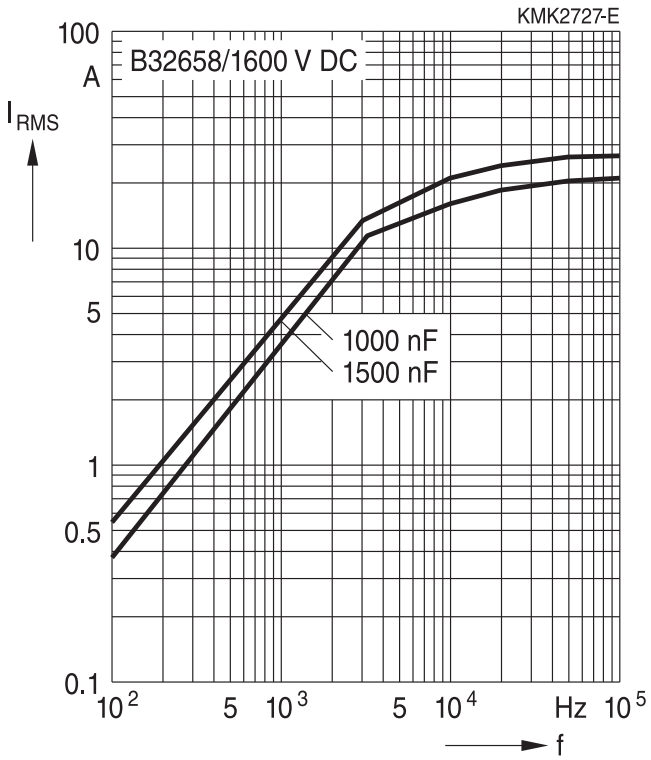

1000 V DC/500 V AC




1250 V DC/500 V AC

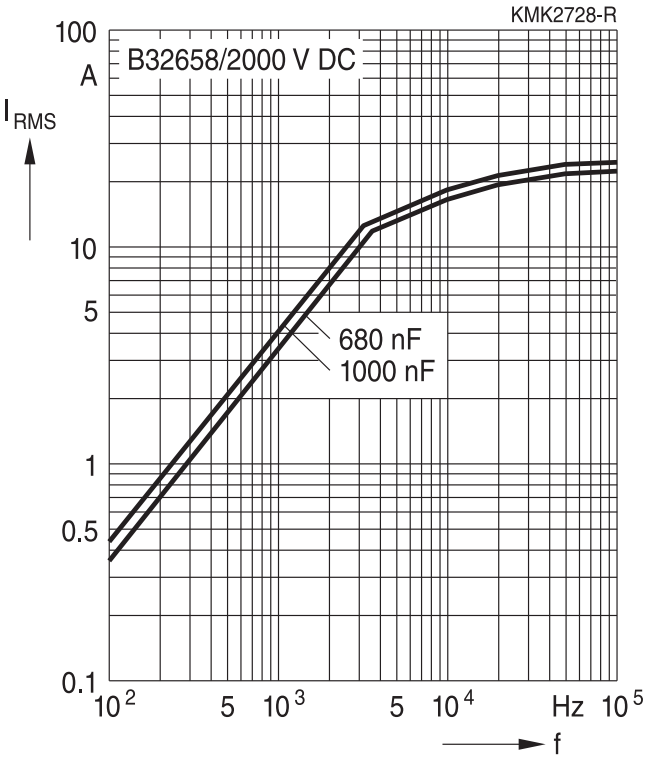



1600 V DC/600 V AC



**Permissible current $I_{RMS}$ versus frequency f (for sinusoidal waveforms, ambient temperature $T_A$ ≤85 °C, self-heating $\Delta T$ ≤20 °C when $\Delta ESR_{typ}$ ≤ ±5%)**
**Lead spacing 52.5 mm**

2000 V DC/700 V AC

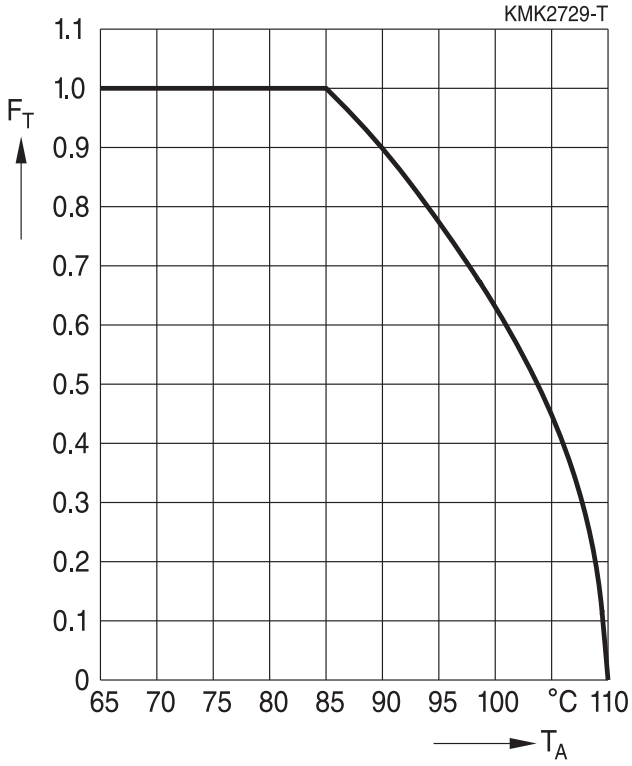


### Maximum AC voltage ($V_{RMS}$), current ($I_{RMS}$) versus frequency and temperature for $T_A$ > 85 °C

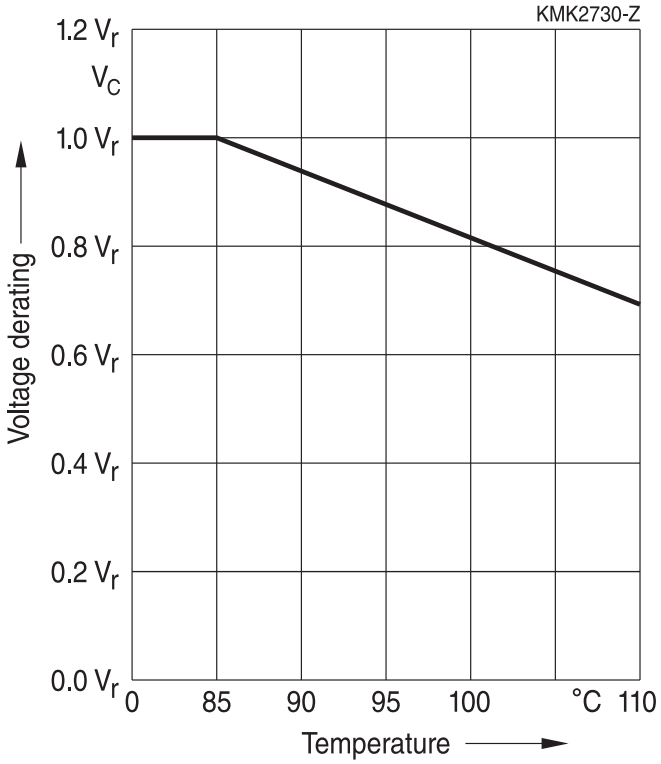
The graphs described in the previous section for the permissible AC voltage ($V_{RMS}$) or current ($I_{RMS}$) versus frequency are given for a maximum ambient temperature $T_A \leq 85$ °C. In case of higher ambient temperatures ($T_A$), the self-heating ($\Delta T$) of the component must be reduced to avoid that temperature of the component ($T_{op} = T_A + \Delta T$) reaches values above maximum operating temperature.
The factor $F_T$ shall be applied in the following way:
Maximum $I_{RMS}$ as function of the ambient temperature:

$I_{RMS}(T_A) = I_{RMS,T_A \leq 85\,°C} \cdot F_T(T_A)$
$V_{RMS}(T_A) = V_{RMS,T_A \leq 85\,°C} \cdot F_T(T_A)$

And $F_T$ is given by the following curve:



### Maximum permissible continuous DC voltage vs. temperature T



## Testing and Standards

| Test description | Reference | Test conditions | Performance requirements |
|---|---|---|---|
| Electrical parameters | IEC 60384-16 | Capacitance: 1 kHz, 1.0 V;<br>Loss factor: 1 kHz, 1.0 V; 100 kHz, 1.0 V;<br>Voltage proof: 1.6 $V_R$, 1 min;<br>Insulation Resistance:<br>$V_R \geq 500$ V ,1 min<br>$V_R < 100$ V ,1 min | No visible damage<br>Within specified limits |
| Robustness of terminations | IEC 60068-2-21:2006 | Tensile strength (test Ua1)<br>Wire diameter: Tensile force<br>$0.5 < d_1 \leq 0.8$ mm: 10 N<br>$0.8 < d_1 \leq 1.25$ mm: 20 N | Capacitance and tan within tan $\delta$ specified limits |
| Resistance to soldering heat | IEC 60068-2-20:2008, test Tb, method 1A | Solder bath temperature at 260 ±5 °C, immersion for 10 ±1 seconds | $\lvert\Delta C/C_0\rvert \leq 2\%$<br>$\lvert\Delta \tan \delta\rvert \leq 0.002$<br>$R_{ins} \geq 50\%$ of initial limit |
| Rapid change of temperature | IEC 60384-16:2005 | $T_A$ = lower category temperature<br>$T_B$ = upper category temperature<br>Five cycles, duration t = 30 min | No visible damage<br>Capacitance and tan within tan $\delta$ specified limits |
| Vibration | IEC 60384-16:2005 | Test $F_C$: vibration sinusoidal<br>Displacement: 0.75 mm<br>Accleration: 98 $m/s^2$<br>Frequency: 10 Hz ... 500 Hz<br>Test duration: 3 orthogonal axes, 2 hours each axe | No visible damage |
| Bump | IEC 60384-16:2005 | Test Eb: Total 4000 bumps with 390 $m/s^2$ mounted on PCB<br>Duration: 6 ms | No visible damage<br>$\lvert\Delta C/C_0\rvert \leq 3\%$<br>$\lvert\Delta \tan \delta\rvert \leq 0.002$<br>$R_{ins} \geq 50\%$ of initial limit |
| Climatic Sequence | IEC 60384-16:2005 | Dry heat Tb / 16 h<br>Damp heat cyclic, 1st cycle<br>+55 °C / 24 h / 95% ... 100% RH<br>Cold Ta / 2 h<br>Damp heat cyclic, 5 cycles<br>+55 °C / 24 h / 95% ... 100% RH | No visible damage<br>$\lvert\Delta C/C_0\rvert \leq 2\%$<br>$\lvert\Delta \tan \delta\rvert \leq 0.002$<br>$R_{ins} \geq 50\%$ of initial limit |
| Biased humidity | AEC-Q200 | 60 °C / 95% RH / $V_R$/56 days | No visible damage<br>$\lvert\Delta C/C_0\rvert \leq 10\%$<br>$\lvert\Delta \tan \delta\rvert \leq 0.005$ (1 kHz)<br>$R_{ins} \geq 50\%$ of initial limit |

| Test description | Reference | Test conditions | Performance requirements |
|---|---|---|---|
| Endurance A | IEC 60384-16:2005 | 85 °C / 1.25 $V_R$ / 2000 hours | No visible damage<br>$\|\Delta C/C_0\| \leq 5\%$<br>$\|\Delta \tan \delta\| \leq 0.002$ (1 kHz)<br>$R_{ins} \geq 50\%$ of initial limit |
| Endurance B | IEC 60384-16:2005 | 110 °C / 1.25 $V_{CR}$ / 1000 hours | No visible damage<br>$\|\Delta C/C_0\| \leq 10\%$<br>$\|\Delta \tan \delta\| \leq 0.004$ (1 kHz)<br>$R_{ins} \geq 50\%$ of initial limit |
| Endurance C | IEC 60384-16:2005 | 85 °C / 1.0 $V_{RMS}$ / 2000 hours | No visible damage<br>$\|\Delta C/C_0\| \leq 10\%$<br>$\|\Delta \tan \delta\| \leq 0.002$ (1 kHz)<br>$R_{ins} \geq 50\%$ of initial limit |
| Endurance D | IEC 60384-16:2005 | 110 °C / 1.0 $V_{CRMS}$ / 1000 hours | No visible damage<br>$\|\Delta C/C_0\| \leq 10\%$<br>$\|\Delta \tan \delta\| \leq 0.004$ (1 kHz)<br>$R_{ins} \geq 50\%$ of initial limit |

### Effect of humidity on capacitance stability

Long contact of a film capacitor with humidity can produce irreversible effects. Direct contact with liquid water or excess exposure to high ambient humidity or dew will eventually remove the film metallization and thus destroy the capacitor. Plastic boxed capacitors must be properly tested in the final application at the worst expected conditions of temperature and humidity in order to check if any parameter drift may provoke a circuit malfunction.

In case of penetration of humidity through the film, the layer of Zinc can be degraded, specially under AC operation (change of polarity), accelerated by the temperature, provoking an increment of the serial resistance of the electrode and eventually a reduction of the capacitance value. For DC operation, the parameter drift is much less.

Plastic boxes and resins cannot protect 100% against humidity. Metal enclosures, resin potting or coatings or similar measures by customers in their applications will offer additional protection against humidity penetration.

## Soldering

### Solderability of leads

The solderability of terminal leads is tested to IEC 60068-2-20:2008, test Ta, method 1.

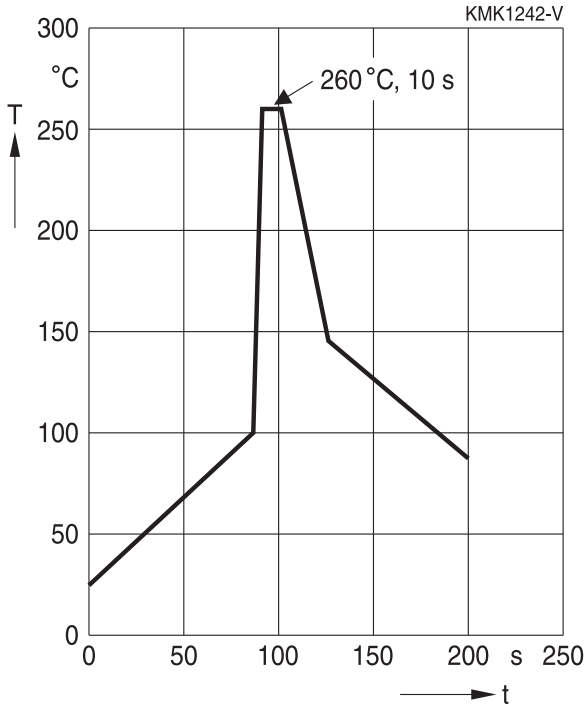
Before a solderability test is carried out, terminals are subjected to accelerated ageing (to IEC 60068-2-2:2007, test Ba: 4 h exposure to dry heat at 155 °C). Since the ageing temperature is far higher than the upper category temperature of the capacitors, the terminal wires should be cut off from the 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:<br>Visual inspection | <br>Wetting of wire surface by new solder ≥95%, free-flowing solder |

### Resistance to soldering heat

Resistance to soldering heat is tested to IEC 60068-2-20:2008, test Tb, method 1.
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 | <br>(lead spacing >7.5 mm) | | |
| MKT | boxed (case 2.5 × 6.5 × 7.2 mm) | | 5 ±1 s |
| MKP<br>MKT | (lead spacing ≤7.5 mm)<br>uncoated (lead spacing ≤10 mm)<br>insulated (B32559) | | <4 s recommended soldering profile for MKT uncoated (lead spacing ≤ 10 mm) and insulated (B32559) |




| | |
|---|---|
| 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 |

**General notes on soldering**

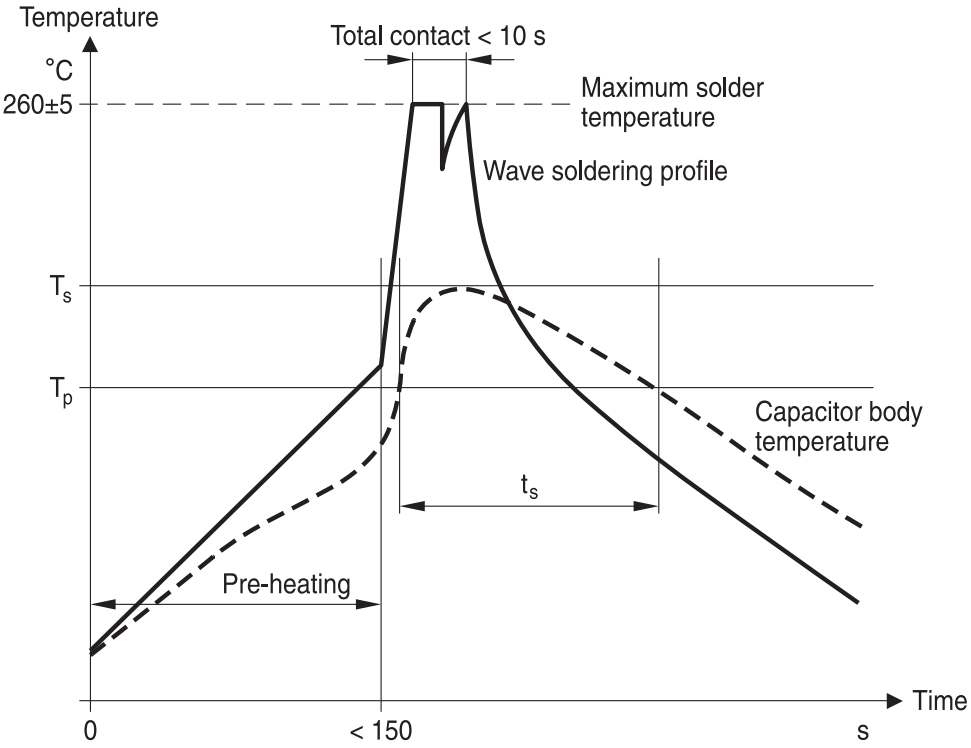
Permissible heat exposure loads on film capacitors are primarily characterized by the upper category temperature $T_{max}$. Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus change irreversibly a capacitor's electrical characteristics. 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.

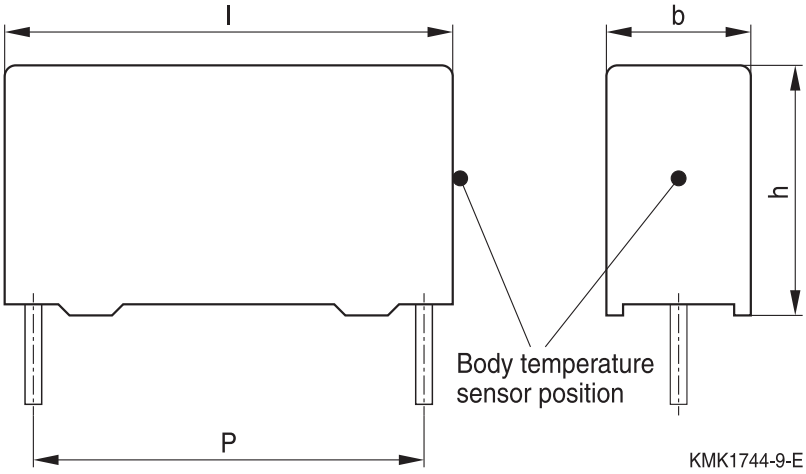
### TDK Recommendations

As a reference, the recommended wave soldering profile for our film capacitors is as follows:




$T_s$: Capacitor body maximum temperature at wave soldering
$T_p$: Capacitor body maximum temperature at pre-heating

KMK1745-A-E




Body temperature should follow the description below:

- MKP capacitor
  During pre-heating: $T_p \leq 110$ °C
  During soldering: $T_s \leq 120$ °C, $t_s \leq 45$ s
- MKT capacitor
  During pre-heating: $T_p \leq 125$ °C
  During soldering: $T_s \leq 160$ °C, $t_s \leq 45$ s

When SMD components are used together with leaded ones, the 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.
In order to ensure proper conditions for manual or selective soldering, the body temperature of the capacitor ($T_s$) must be ≤120 °C.
One recommended condition for manual soldering is that the tip of the soldering iron should be < 360 °C and the soldering contact time should be no longer than 3 seconds.
For uncoated MKT capacitors with lead spacings ≤ 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

### Cleaning

To determine whether the following solvents, often used to remove flux residues and other substances, are suitable for the capacitors described, refer to the table below:

| Type | Ethanol, isopropanol, n-propanol | n-propanol-water mixtures, water with surface tension-reducing tensides (neutral) |
|---|---|---|
| MKT (uncoated) | Suitable | Unsuitable |
| MKT, MKP, MFP (coated/boxed) | | Suitable |

Even when suitable solvents are used, a reversible change of the electrical characteristics may occur in uncoated capacitors immediately after they are washed. Thus it is always recommended to dry the components (e.g. 4 h at 70 °C) before they are subjected to subsequent electrical testing.

**Caution:**

Consult us first if you wish to use new solvents!

### Embedding of capacitors in finished assemblies

In many applications, finished circuit assemblies are embedded in plastic resins. In this case, both chemical and thermal influences of the embedding ("potting") and curing processes must be taken into account.
Our experience has shown that the following potting materials can be recommended: non-flexible epoxy resins with acid-anhydride hardeners; chemically inert, non-conducting fillers; maximum curing temperature of 100°C.

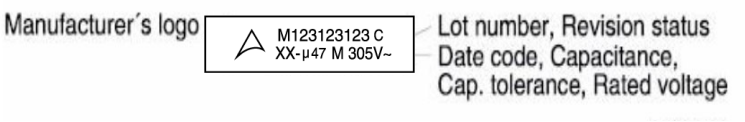
**Caution:**

Consult us first if you wish to embed uncoated types!

## Marking

### Capacitor markings

Depending on the capacitor size, the markings are positioned either on the side and/or the top of the component. The coded forms specified in IEC 60062:2004 are used to indicate the rated capacitance, capacitance tolerance and date of manufacture.
The lot number (production batch number) ensures unique identification of a particular capacitor and allows, together with the date of manufacture, exact assignment to the process data of the entire production run (traceability).
If the capacitor is not wide enough for the entire marking, the information in the marking will be split between the top and side. In this case, the following partial information will be found on the top:




### Codes for rated capacitance

| Rated capacitance | To IEC 60062 | Short code |
|---|---|---|
| 100 pF | 100p | n1 |
| 150 pF | 150p | n15 |
| 1.0 nF | 1n0 | 1n |
| 1.5 nF | 1n5 | |
| 10 nF | 10n | |
| 100 nF | 100n | µ1 |
| 150 nF | 150n | µ15 |
| 1.0 µF | 1µ0 | 1µ |
| 1.5 µF | 1µ5 | |
| 10 µF | 10µ | |
| 15 µF | 15µ | |

### Codes for capacitance tolerance

| Capacitance tolerance | Code letter | Remark |
|---|---|---|
| | A | Capacitance tolerances for which no code letter is defined can be indicated by an A.<br>The meaning of code A must then be mutually specified in other documentation. |
| ±2.5% | H | |
| ±5% | J | |
| ±10% | K | |
| ±20% | M | |

### Codes for date of manufacture (to IEC 60062:2004)

| Code for year | | | | Code for month | | | |
|---|---|---|---|---|---|---|---|
| Year | Code letter | Year | Code letter | Month | Code numeral | Month | Code numeral/letter |
| 2023 | R | 2029 | X | January | 1 | July | 7 |
| 2024 | S | 2030 | A | February | 2 | August | 8 |
| 2025 | T | 2031 | B | March | 3 | September | 9 |
| 2026 | U | 2032 | C | April | 4 | October | O |
| 2027 | V | 2033 | D | May | 5 | November | N |
| 2028 | W | 2034 | E | June | 6 | December | D |

E.g.: R5 2023 May

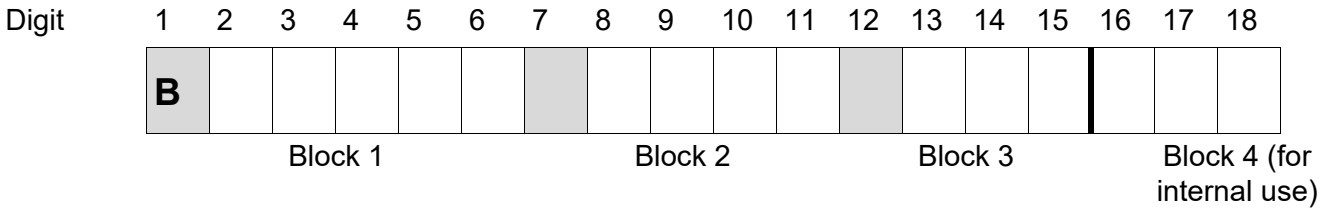
### Marking types

The capacitors may have either an ink-jet marking or a laser marking. The main advantage of laser marking is that it cannot be removed by solvents, which ensures the reliable identification of the capacitor. Moreover, because the laser marking process reduces the amount of chemicals used, it is an environmentally friendly marking solution.

### Ordering code system

A component and the packing in which it is to be delivered are defined by the ordering code, which has 15 digits (plus 3 additional digits for internal use). For all capacitors the ordering codes are explicitly stated (together with the corresponding tolerance and/or packing variants) in the data sheets.
Should there be any doubt about the coding system, however, then it is better to order the capacitor using a plain text description (i.e. without a code).

### Basic structure of the ordering code:




| Digit | Meaning |
|---|---|
| 1 | B = Passive components |
| 2,3 | 32 = Metallized film capacitors, EMI suppression capacitors<br>81 = EMI suppression capacitors |
| 4 ... 6 | Type (block 1 is termed the "type number") |
| 7 | Revision status |
| 8 | Rated DC voltage, coded (not for EMI suppression capacitors) |
| 9 ... 11 | Rated capacitance (coding method for value in pF)<br>Examples: |
| | Digit 9 10 11<br>1 5 4 K = 15 • $10^4$ pF = 150 nF<br>B 3 2 6 4 2 H 6 |
| 12 | Code letter for capacitance tolerance |
| 13 ... 15 | Codes for lead and taping parameters (refer to respective data sheet) |
| 16 ... 18 | Internal use |

### Display of ordering codes for TDK Electronics products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications, on the company website, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products**. Detailed information can be found on the Internet under www.tdk-electronics.tdk.com/orderingcodes.

### 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.
- Consult us if application is with severe temperature and humidity condition.
- There are no serviceable or repairable parts inside the capacitor. Opening the capacitor or any attempts to open or repair the capacitor will void the warranty and liability of TDK Electronics.
- Please note that the standards referred to in this publication may have been revised in the meantime.

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 "General technical information" |
|---|---|---|
| Storage conditions | Make sure that capacitors are stored within the specified range of time, temperature and humidity conditions. | 4.5 "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 "Flammability" |
| Resistance to vibration | Do not exceed the tested ability to withstand vibration.<br>The capacitors are tested to IEC 60068-2-6:2007.<br>TDK Electronics 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 "Resistance to vibration" |
| 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" |

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### Correlation of data sheet values and modelling tool outputs

Data sheet values and results of design tools may deviate as they have not been derived in the same context.
While data sheets show individual parameter statements without considering a possible dependency to other parameters. Tools model a complete given scenario as input and processed inside the tool.
Furthermore as we constantly strive to improve our models, the results of tools can change over time and be a non-binding indication only.

## 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) |
| $I_{RMS}$ | (Sinusoidal) alternating current, root-mean-square value | (Sinusförmiger) Wechselstrom |
| $i_z$ | Capacitance drift | Inkonstanz der Kapazität |
| $k_0$ | Pulse characteristic | Impulskennwert |
| $L_S$ | Series inductance | Serieninduktivität |
| $\lambda$ | Failure rate | Ausfallrate |

| Symbol | English | German |
|---|---|---|
| $\lambda_0$ | 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 (Feuchtetest) |
| 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 Verlfustfaktors |
| tan $\delta_S$ | Series component of dissipation factor | Serienanteil des Verlustfaktors |
| $T_A$ | Temperature of the air surrounding the component | Temperatur der Luft, die das Bauteil umgibt |
| $T_{max}$ | 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, $T_A + \Delta T$ | Beriebstemperatur, $T_A + \Delta T$ |
| $T_R$ | Rated temperature | Nenntemperatur |
| $T_{ref}$ | Reference temperature | Referenztemperatur |
| $t_{SL}$ | Reference service life | Referenz-Lebensdauer |
| $V_{AC}$ | AC voltage | Wechselspannung |
| $V_C$ | Category voltage | Kategoriespannung |
| $V_{C,RMS}$ | Category AC voltage | (Sinusförmige) 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 |

| Symbol | English | German |
|---|---|---|
| $V_o$ | Output voltage | Ausgangsspannung |
| $V_{op}$ | 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, root-mean-square value | (Sinusförmige) Wechselspannung |
| $V_{SC}$ | S-correction voltage | Spannung bei Anwendung "S-correction" |
| $V_{sn}$ | Snubber capacitor voltage | Spannung bei Anwendung "Beschaltung" |
| Z | Impedance | Scheinwiderstand |
| e | Lead spacing | Rastermaß |

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 we are 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 a 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 life-saving 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.

3 **The warnings, cautions and product-specific notes must be observed**.

4 In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.tdk-electronics.tdk.com/material). Should you have any more detailed questions, please contact our sales offices.

5 We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.
We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

6 Unless otherwise agreed in individual contracts, **all orders are subject to our General Terms and Conditions of Supply**.

7 **Our manufacturing sites serving the automotive business apply the IATF 16949 standard**. The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements (“CSR”) TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System**. For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.

8 The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, FilterCap, FormFit, InsuGate, LeaXield, MediPlas, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PiezoBrush, PlasmaBrush, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SurfIND, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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