

General-purpose grade capacitors

Applications

- Switch-mode power supplies in industrial and entertainment electronics

Features

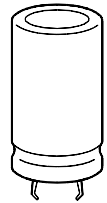
- Extremely miniaturized
- High ripple current capability
- Many different case sizes available for each capacitance value

Construction

- Charge-discharge proof, polar
- Aluminum case, fully insulated
- Snap-in solder pins to hold component in place on PC-board
- Minus pole marking on case surface
- Minus pole not insulated from case
- Overload protection (safety vent)

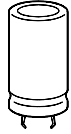
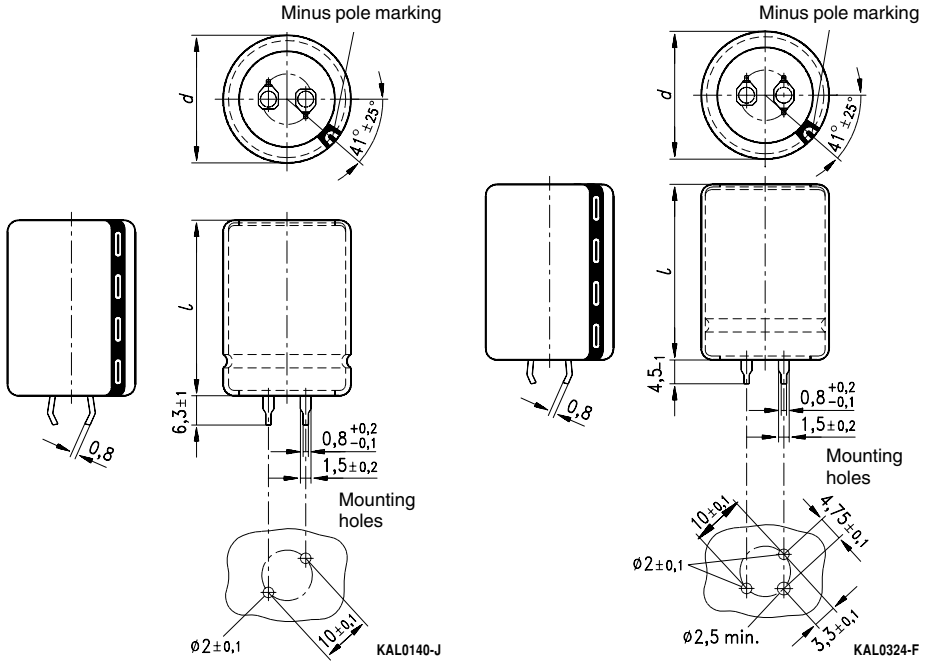
Terminals

- Standard version with 2 terminals
2 lengths available: 6,3 and 4,5 mm
- 3 terminals: length 4,5 mm
(terminal arrangement ensures correct insertion)




Specifications and characteristics in brief

| | | |
|--|---|--|
| Rated voltage U_R | 200 ... 450 VDC | |
| Surge voltage U_S | $1,15 \cdot U_R$ (for $U_R \leq 250$ VDC) $1,10 \cdot U_R$ (for $U_R \geq 400$ VDC) | |
| Rated capacitance C_R | 82 ... 2 200 μF | |
| Capacitance tolerance | $\pm 20\% \triangleq \text{M}$ | |
| Dissipation factor $\tan \delta$ (20 °C, 120 Hz) | $U_R \leq 250$ V: $\tan \delta \leq 0,15$ $U_R \geq 400$ V: $\tan \delta \leq 0,20$ | |
| Leakage current I_L (5 min, 20 °C) | $I_L \leq 0,3 \mu\text{A} \cdot \left(\frac{C_R}{\mu\text{F}} \cdot \frac{U_R}{\text{V}} \right)^{0,7} + 4 \mu\text{A}$ | |
| Self-inductance ESL | Approx. 20 nH | |
| Useful life 85 °C; U_R ; $I_{\sim\text{max}}$ 40 °C; U_R ; $1,15 \cdot I_{\sim\text{R}}$ | $> 2\,000$ h $> 100\,000$ h | Requirements: $\Delta C/C \leq \pm 30\%$ of initial value $\tan \delta \leq 3$ times initial specified limit $I_L \leq$ initial specified limit Failure percentage: $\leq 1\%$ Failure rate: ≤ 100 fit ($\leq 100 \cdot 10^{-9}/\text{h}$) (for definition "fit", refer to chapter "Quality", page 62) |
| Load life test 85 °C; U_R ; $I_{\sim\text{R}}$ | 2 000 h | Post test requirements: $\Delta C/C \leq \pm 20\%$ of initial value $\tan \delta \leq 2$ times initial specified limit $I_L \leq$ initial specified limit |
| Voltage endurance test 85 °C; U_R | 2 000 h | Post test requirements: $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1,3$ times initial specified limit $I_L \leq$ initial specified limit |
| Vibration resistance | To IEC 60068-2-6, test Fc: displacement amplitude 0,35 mm, frequency range 10 ... 55 Hz, acceleration max. 5 g, duration 3×2 h | |
| IEC climatic category | To IEC 60068-1: $U_R \leq 250$ VDC: 40/085/56 (– 40 °C/+ 85 °C/56 days damp heat test) $U_R \geq 400$ VDC: 25/085/56 (– 25 °C/+ 85 °C/56 days damp heat test) | |
| Detail specification | Similar to CECC 30301-806 | |
| Sectional specification | IEC 60384-4 | |


Dimensional drawings


Snap-in terminals, standard (length $6,3 \pm 1$ mm). Also available in a shorter version with a length of $4,5 - 1$ mm. For packing mode and ordering example see next page.

Snap-in capacitors are also available with 3 terminals (length $4,5 - 1$ mm).

For packing mode and ordering example see next page.

| Dimensions (mm) | | Approx. weight (g) | Packing units (pieces) |
|-----------------|-----------|--------------------|------------------------|
| $d + 1$ | $l \pm 2$ | | |
| 22 | 25 | 9 | 160 |
| 22 | 30 | 12 | 160 |
| 22 | 35 | 15 | 160 |
| 22 | 40 | 18 | 160 |
| 22 | 45 | 20 | 160 |
| 22 | 50 | 24 | 160 |
| 25 | 25 | 13 | 130 |
| 25 | 30 | 17 | 130 |
| 25 | 35 | 19 | 130 |
| 25 | 40 | 22 | 130 |
| 25 | 45 | 25 | 130 |
| 25 | 50 | 29 | 130 |

| Dimensions (mm) | | Approx. weight (g) | Packing units (pieces) |
|-----------------|-----------|--------------------|------------------------|
| $d + 1$ | $l \pm 2$ | | |
| 30 | 25 | 17 | 80 |
| 30 | 30 | 23 | 80 |
| 30 | 35 | 29 | 80 |
| 30 | 40 | 36 | 80 |
| 30 | 45 | 41 | 80 |
| 30 | 50 | 46 | 80 |
| 35 | 25 | 22 | 60 |
| 35 | 30 | 29 | 60 |
| 35 | 35 | 36 | 60 |
| 35 | 40 | 41 | 60 |
| 35 | 45 | 56 | 60 |
| 35 | 50 | 70 | 60 |



B43304

Miniaturized – 85 °C

Packing of snap-in capacitors



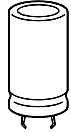
For ecological reasons the packing is pure cardboard. Components can be withdrawn (in full or in part) in the correct position for insertion.

Ordering codes

| Snap-in terminals Version | Identification in 3rd block of ordering code |
|---------------------------------|--|
| Standard terminals (6,3 ± 1) mm | M000 |
| Short terminals (4,5 –1) mm | M007 |
| 3 terminals (4,5 –1) mm | M002 |

Ordering example:

B43304A9107M007 } snap-in capacitor with short terminals
B43304A9107M002 } snap-in capacitor with 3 terminals

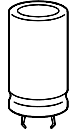

Overview of available types

| U_R (VDC) | 200 | 250 | 400 | 450 |
|-------------|--|--|--|--|
| C_R (μF) | Case dimensions $d \times l$ (mm) | | | |
| 82 | | | | 22 × 25 |
| 100 | | | 22 × 25 | 22 × 30 25 × 25 |
| 120 | | | 22 × 30 25 × 25 | 22 × 35 25 × 30 |
| 150 | | | 22 × 35 25 × 30 | 22 × 40 25 × 30 30 × 25 |
| 180 | | | 22 × 40 25 × 30 30 × 25 | 22 × 45 25 × 35 30 × 30 |
| 220 | | 22 × 25 | 22 × 45 25 × 35 30 × 30 | 22 × 50 25 × 40 30 × 30 35 × 25 |
| 270 | | 22 × 30 | 22 × 50 25 × 40 30 × 30 35 × 25 | 25 × 45 30 × 35 35 × 30 |
| 330 | 22 × 25 | 22 × 30 25 × 25 | 25 × 45 30 × 35 35 × 30 | 30 × 40 35 × 35 |
| 390 | 22 × 30 25 × 25 | 22 × 35 25 × 30 | 25 × 50 30 × 40 35 × 30 | 30 × 45 35 × 35 |
| 470 | 22 × 35 25 × 30 | 22 × 40 25 × 35 30 × 25 | 30 × 45 35 × 35 | 30 × 50 35 × 40 |
| 560 | 22 × 35 25 × 30 | 22 × 45 25 × 35 30 × 30 | 30 × 50 35 × 40 | 35 × 45 |
| 680 | 22 × 40 25 × 35 30 × 25 | 22 × 50 25 × 40 30 × 30 35 × 25 | 35 × 45 | |
| 820 | 22 × 45 25 × 40 30 × 30 35 × 25 | 25 × 45 30 × 35 35 × 30 | | |

**Overview of available types**

| U_R (VDC) | 200 | 250 | 400 | 450 |
|------------------|-----------------------------------|--------------------|-----|-----|
| C_R (μ F) | Case dimensions $d \times l$ (mm) | | | |
| 1 000 | 25 × 45 30 × 35 35 × 30 | 30 × 40 35 × 35 | | |
| 1 200 | 25 × 50 30 × 40 35 × 30 | 30 × 45 35 × 35 | | |
| 1 500 | 30 × 45 35 × 35 | 35 × 45 | | |
| 1 800 | 30 × 50 35 × 40 | 35 × 50 | | |
| 2 200 | 35 × 45 | | | |

The capacitance and voltage ratings listed above are available in different cases upon request.
Other voltage and capacitance ratings are also available upon request.


Technical data and ordering codes

| U_R | C_R | Case dimensions | ESR_{typ} | Z_{max} | I_{-max} | $I_{-R}^{1)}$ | Ordering code ²⁾ |
|-------|----------------------------|--------------------|-------------------------------|-------------------------------|----------------------|----------------------|-----------------------------|
| VDC | 100 Hz 20 °C μF | $d \times l$ mm | 100 Hz 20 °C m Ω | 10 kHz 20 °C m Ω | 100 Hz 40 °C A | 100 Hz 85 °C A | |
| 200 | 330 | 22 × 25 | 470 | 560 | 2,7 | 1,2 | B43304A2337M000 |
| | 390 | 22 × 30 | 400 | 480 | 3,1 | 1,4 | B43304A2397M000 |
| | 390 | 25 × 25 | 400 | 480 | 3,2 | 1,4 | B43304B2397M000 |
| | 470 | 22 × 35 | 330 | 400 | 3,6 | 1,6 | B43304A2477M000 |
| | 470 | 25 × 30 | 330 | 400 | 3,7 | 1,7 | B43304B2477M000 |
| | 560 | 22 × 35 | 280 | 330 | 4,0 | 1,8 | B43304A2567M000 |
| | 560 | 25 × 30 | 280 | 330 | 4,1 | 1,8 | B43304B2567M000 |
| | 680 | 22 × 40 | 230 | 280 | 4,6 | 2,1 | B43304A2687M000 |
| | 680 | 25 × 35 | 230 | 280 | 4,7 | 2,1 | B43304B2687M000 |
| | 680 | 30 × 25 | 230 | 280 | 4,6 | 2,1 | B43304C2687M000 |
| | 820 | 22 × 45 | 190 | 230 | 5,3 | 2,4 | B43304A2827M000 |
| | 820 | 25 × 40 | 190 | 230 | 5,5 | 2,5 | B43304B2827M000 |
| | 820 | 30 × 30 | 190 | 230 | 5,4 | 2,4 | B43304C2827M000 |
| | 820 | 35 × 25 | 190 | 230 | 5,6 | 2,6 | B43304D2827M000 |
| | 1 000 | 25 × 45 | 160 | 190 | 6,3 | 2,9 | B43304A2108M000 |
| | 1 000 | 30 × 35 | 160 | 190 | 6,2 | 2,8 | B43304B2108M000 |
| | 1 000 | 35 × 30 | 160 | 190 | 6,6 | 3,0 | B43304C2108M000 |
| | 1 200 | 25 × 50 | 130 | 160 | 7,2 | 3,3 | B43304A2128M000 |
| | 1 200 | 30 × 40 | 130 | 160 | 7,2 | 3,3 | B43304B2128M000 |
| | 1 200 | 35 × 30 | 130 | 160 | 7,2 | 3,3 | B43304C2128M000 |
| | 1 500 | 30 × 45 | 110 | 130 | 8,4 | 3,8 | B43304A2158M000 |
| | 1 500 | 35 × 35 | 110 | 130 | 8,5 | 3,9 | B43304B2158M000 |
| | 1 800 | 30 × 50 | 90 | 110 | 8,7 | 4,0 | B43304A2188M000 |
| | 1 800 | 35 × 40 | 90 | 110 | 8,9 | 4,0 | B43304B2188M000 |
| | 2 200 | 35 × 45 | 70 | 90 | 10,2 | 4,6 | B43304A2228M000 |

1) 120 Hz conversion factor of ripple current: $I_{-}(120\text{ Hz}) = 1,03 \cdot I_{-}(100\text{ Hz})$

2) Ordering code for standard terminals (6,3 mm).

To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 226.

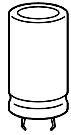

Technical data and ordering codes

| U_R | C_R | Case dimensions | ESR_{typ} | Z_{max} | $I_{~max}$ | $I_{~R}^{1)}$ | Ordering code ²⁾ |
|-------|----------------------------|--------------------|-------------------------------|-------------------------------|----------------------|----------------------|-----------------------------|
| VDC | 100 Hz 20 °C μF | $d \times l$ mm | 100 Hz 20 °C m Ω | 10 kHz 20 °C m Ω | 100 Hz 40 °C A | 100 Hz 85 °C A | |
| 250 | 220 | 22 × 25 | 700 | 840 | 2,2 | 1,0 | B43304E2227M000 |
| | 270 | 22 × 30 | 570 | 690 | 2,6 | 1,2 | B43304E2277M000 |
| | 330 | 22 × 30 | 470 | 560 | 2,9 | 1,3 | B43304E2337M000 |
| | 330 | 25 × 25 | 470 | 560 | 2,9 | 1,3 | B43304G2337M000 |
| | 390 | 22 × 35 | 400 | 480 | 3,3 | 1,5 | B43304E2397M000 |
| | 390 | 25 × 30 | 400 | 480 | 3,4 | 1,5 | B43304G2397M000 |
| | 470 | 22 × 40 | 330 | 400 | 3,8 | 1,7 | B43304E2477M000 |
| | 470 | 25 × 35 | 330 | 400 | 3,9 | 1,8 | B43304G2477M000 |
| | 470 | 30 × 25 | 330 | 400 | 3,8 | 1,7 | B43304H2477M000 |
| | 560 | 22 × 45 | 280 | 330 | 4,4 | 2,0 | B43304E2567M000 |
| | 560 | 25 × 35 | 280 | 330 | 4,3 | 1,9 | B43304G2567M000 |
| | 560 | 30 × 30 | 280 | 330 | 4,4 | 2,0 | B43304H2567M000 |
| | 680 | 22 × 50 | 230 | 280 | 5,0 | 2,3 | B43304E2687M000 |
| | 680 | 25 × 40 | 230 | 280 | 5,0 | 2,3 | B43304G2687M000 |
| | 680 | 30 × 30 | 230 | 280 | 4,9 | 2,2 | B43304H2687M000 |
| | 680 | 35 × 25 | 230 | 280 | 5,1 | 2,3 | B43304J2687M000 |
| | 820 | 25 × 45 | 190 | 230 | 5,7 | 2,6 | B43304E2827M000 |
| | 820 | 30 × 35 | 190 | 230 | 5,7 | 2,6 | B43304G2827M000 |
| | 820 | 35 × 30 | 190 | 230 | 6,0 | 2,7 | B43304H2827M000 |
| | 1 000 | 30 × 40 | 160 | 190 | 6,6 | 3,0 | B43304E2108M000 |
| | 1 000 | 35 × 35 | 160 | 190 | 6,9 | 3,1 | B43304G2108M000 |
| | 1 200 | 30 × 45 | 130 | 160 | 7,5 | 3,4 | B43304E2128M000 |
| | 1 200 | 35 × 35 | 130 | 160 | 7,6 | 3,4 | B43304G2128M000 |
| | 1 500 | 35 × 45 | 110 | 130 | 8,4 | 3,8 | B43304E2158M000 |
| | 1 800 | 35 × 50 | 90 | 110 | 9,6 | 4,4 | B43304E2188M000 |

1) 120 Hz conversion factor of ripple current: $I_{~}(120 \text{ Hz}) = 1,03 \cdot I_{~}(100 \text{ Hz})$

2) Ordering code for standard terminals (6,3 mm).

To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 226.


Technical data and ordering codes

| U_R | C_R | Case dimensions | ESR_{typ} | Z_{max} | I_{-max} | $I_{-R}^{1)}$ | Ordering code ²⁾ |
|-------|----------------------------|--------------------|-------------------------------|-------------------------------|----------------------|----------------------|-----------------------------|
| VDC | 100 Hz 20 °C μF | $d \times l$ mm | 100 Hz 20 °C m Ω | 10 kHz 20 °C m Ω | 100 Hz 40 °C A | 100 Hz 85 °C A | |
| 400 | 100 | 22 × 25 | 1 630 | 1 960 | 1,5 | 0,67 | B43304A9107M000 |
| | 120 | 22 × 30 | 1 360 | 1 630 | 1,7 | 0,79 | B43304A9127M000 |
| | 120 | 25 × 25 | 1 360 | 1 630 | 1,8 | 0,80 | B43304B9127M000 |
| | 150 | 22 × 35 | 1 090 | 1 310 | 2,0 | 0,93 | B43304A9157M000 |
| | 150 | 25 × 30 | 1 090 | 1 310 | 2,1 | 0,95 | B43304B9157M000 |
| | 180 | 22 × 40 | 910 | 1 090 | 2,4 | 1,1 | B43304A9187M000 |
| | 180 | 25 × 30 | 910 | 1 090 | 2,3 | 1,0 | B43304B9187M000 |
| | 180 | 30 × 25 | 910 | 1 090 | 2,4 | 1,1 | B43304C9187M000 |
| | 220 | 22 × 45 | 740 | 890 | 2,7 | 1,2 | B43304A9227M000 |
| | 220 | 25 × 35 | 740 | 890 | 2,7 | 1,2 | B43304B9227M000 |
| | 220 | 30 × 30 | 740 | 890 | 2,8 | 1,3 | B43304C9227M000 |
| | 270 | 22 × 50 | 610 | 730 | 3,2 | 1,4 | B43304A9277M000 |
| | 270 | 25 × 40 | 610 | 730 | 3,1 | 1,4 | B43304B9277M000 |
| | 270 | 30 × 30 | 610 | 730 | 3,1 | 1,4 | B43304C9277M000 |
| | 270 | 35 × 25 | 610 | 730 | 3,2 | 1,5 | B43304D9277M000 |
| | 330 | 25 × 45 | 500 | 600 | 3,6 | 1,6 | B43304A9337M000 |
| | 330 | 30 × 35 | 500 | 600 | 3,6 | 1,6 | B43304B9337M000 |
| | 330 | 35 × 30 | 500 | 600 | 3,8 | 1,7 | B43304C9337M000 |
| | 390 | 25 × 50 | 420 | 510 | 4,1 | 1,9 | B43304A9397M000 |
| | 390 | 30 × 40 | 420 | 510 | 4,1 | 1,9 | B43304B9397M000 |
| | 390 | 35 × 30 | 420 | 510 | 4,1 | 1,9 | B43304C9397M000 |
| | 470 | 30 × 45 | 350 | 420 | 4,7 | 2,1 | B43304A9477M000 |
| | 470 | 35 × 35 | 350 | 420 | 4,7 | 2,2 | B43304B9477M000 |
| | 560 | 30 × 50 | 300 | 350 | 5,3 | 2,4 | B43304A9567M000 |
| | 560 | 35 × 40 | 300 | 350 | 5,4 | 2,5 | B43304B9567M000 |
| | 680 | 35 × 45 | 240 | 290 | 6,2 | 2,8 | B43304A9687M000 |

1) 120 Hz conversion factor of ripple current: $I_{-}(120 \text{ Hz}) = 1,03 \cdot I_{-}(100 \text{ Hz})$

2) Ordering code for standard terminals (6,3 mm).

To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 226.

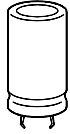

Technical data and ordering codes

| U_R | C_R | Case dimensions | ESR_{typ} | Z_{max} | $I_{~max}$ | $I_{~R}^{1)}$ | Ordering code ²⁾ |
|-------|----------------------------|--------------------|-------------------------------|-------------------------------|----------------------|----------------------|-----------------------------|
| VDC | 100 Hz 20 °C μF | $d \times l$ mm | 100 Hz 20 °C m Ω | 10 kHz 20 °C m Ω | 100 Hz 40 °C A | 100 Hz 85 °C A | |
| 450 | 82 | 22 × 25 | 1 990 | 2 390 | 1,3 | 0,61 | B43304A5826M000 |
| | 100 | 22 × 30 | 1 630 | 1 960 | 1,6 | 0,72 | B43304A5107M000 |
| | 100 | 25 × 25 | 1 630 | 1 960 | 1,6 | 0,73 | B43304B5107M000 |
| | 120 | 22 × 35 | 1 360 | 1 630 | 1,8 | 0,83 | B43304A5127M000 |
| | 120 | 25 × 30 | 1 360 | 1 630 | 1,9 | 0,85 | B43304B5127M000 |
| | 150 | 22 × 40 | 1 090 | 1 310 | 2,2 | 0,98 | B43304A5157M000 |
| | 150 | 25 × 30 | 1 090 | 1 310 | 2,1 | 0,95 | B43304B5157M000 |
| | 150 | 30 × 25 | 1 090 | 1 310 | 2,2 | 0,98 | B43304C5157M000 |
| | 180 | 22 × 45 | 910 | 1 090 | 2,5 | 1,1 | B43304A5187M000 |
| | 180 | 25 × 35 | 910 | 1 090 | 2,4 | 1,1 | B43304B5187M000 |
| | 180 | 30 × 30 | 910 | 1 090 | 2,5 | 1,1 | B43304C5187M000 |
| | 220 | 22 × 50 | 740 | 890 | 2,9 | 1,3 | B43304A5227M000 |
| | 220 | 25 × 40 | 740 | 890 | 2,8 | 1,3 | B43304B5227M000 |
| | 220 | 30 × 30 | 740 | 890 | 2,8 | 1,3 | B43304C5227M000 |
| | 220 | 35 × 25 | 740 | 890 | 2,9 | 1,3 | B43304D5227M000 |
| | 270 | 25 × 45 | 610 | 730 | 3,3 | 1,5 | B43304A5277M000 |
| | 270 | 30 × 35 | 610 | 730 | 3,2 | 1,5 | B43304B5277M000 |
| | 270 | 35 × 30 | 610 | 730 | 3,4 | 1,6 | B43304C5277M000 |
| | 330 | 30 × 40 | 500 | 600 | 3,8 | 1,7 | B43304A5337M000 |
| | 330 | 35 × 35 | 500 | 600 | 4,0 | 1,8 | B43304B5337M000 |
| | 390 | 30 × 45 | 420 | 510 | 4,3 | 1,9 | B43304A5397M000 |
| | 390 | 35 × 35 | 420 | 510 | 4,3 | 2,0 | B43304B5397M000 |
| | 470 | 30 × 50 | 350 | 420 | 4,9 | 2,2 | B43304A5477M000 |
| | 470 | 35 × 40 | 350 | 420 | 5,0 | 2,3 | B43304B5477M000 |
| | 560 | 35 × 45 | 300 | 350 | 5,6 | 2,6 | B43304A5567M000 |

1) 120 Hz conversion factor of ripple current: $I_{~}(120 \text{ Hz}) = 1,03 \cdot I_{~}(100 \text{ Hz})$

2) Ordering code for standard terminals (6,3 mm).

To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 226.

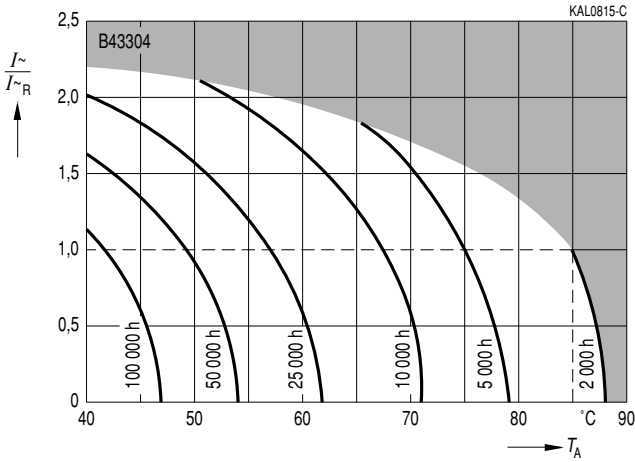


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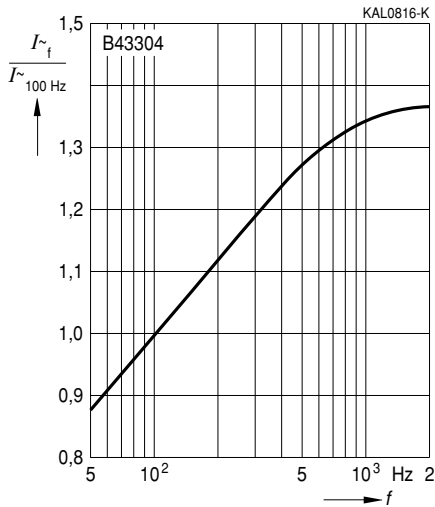
Miniaturized – 85 °C

Useful life

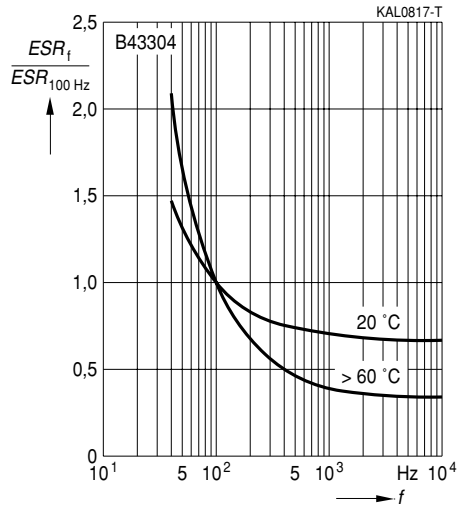
depending on ambient temperature T_A under ripple current operating conditions¹⁾



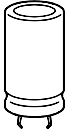
Frequency factor of permissible ripple current I_{\sim} versus frequency f



Frequency characteristics of ESR
Typical behavior



1) Refer to page 40 for an explanation on how to interpret the useful life graphs.



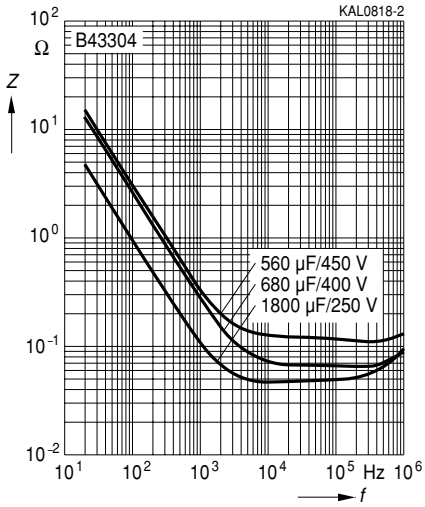
B43304

Miniaturized – 85 °C

Impedance Z

versus frequency f

Typical behavior at 20 °C



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