

**SIKOREL® 125, LL grade**

**Extremely high reliability and long useful life**

**Construction**

- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Negative pole connected to case
- Axial leads, welded to ensure perfect electrical contact

**Features**

- Extremely high reliability and long useful life
- Very wide temperature range
- Can be operated at temperatures of up to 145 °C<sup>1)</sup>
- Outstanding parametric stability
- High ripple current capability
- Shelf life up to 10 years (for B 41 684)

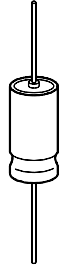
**Applications**

- High-reliability equipment in industrial and automotive electronics

**Tape packaging**

Capacitors with  $d \leq 16$  mm are also available on tape.

Refer to [page 420](#) for information on tapes and examples on how to order them.

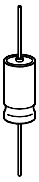


KAL0277-Z

**Specifications and characteristics in brief**

|                           | B 41 684 (SIKOREL)                             | B 43 684 (LL grade)  |
|---------------------------|--|--|
| Rated voltage $U_R$       | 10 ... 100 V-                                  | 160 ... 400 V-   |
| Surge voltage $U_S$       | $1,15 \cdot U_R$                               | $1,15 \cdot U_R$ (for $U_R \leq 250$ V-)<br>$1,10 \cdot U_R$ (for $U_R \geq 350$ V-) |
| Rated capacitance $C_R$   | 47 ... 4 700 $\mu$ F                           | 6,8 ... 220 $\mu$ F  |
| Capacitance tolerance     | - 10/+ 50 % $\triangleq$ T                     | - 10/+ 50 % $\triangleq$ T   |
| Useful life               |  |  |
| 40 °C, $U_R$              | > 200 000 h ( $3,5 \cdot I_{-R,125^\circ C}$ ) | > 200 000 h ( $3,2 \cdot I_{-R,125^\circ C}$ )                                       |
| 85 °C, $U_R$ ; $I_{-max}$ | > 15 000 h                                     | > 10 000 h   |
| 125 °C, $U_R$ ; $I_{-R}$  | > 3 000 h                                      | > 2 000 h  |
| Failure percentage        | $\leq 0,5$ %<br>(during useful life)           | $\leq 1$ %<br>(during useful life)   |
| Failure rate              | $\leq 10$ fit<br>( $\leq 10 \cdot 10^{-9}$ /h) | $\leq 20$ fit<br>( $\leq 20 \cdot 10^{-9}$ /h)                                       |

1) Operation at 145 °C and 0,6  $I_{-R, 125^\circ C}$  permissible for a total of 500 h.

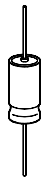


**B 41 684**

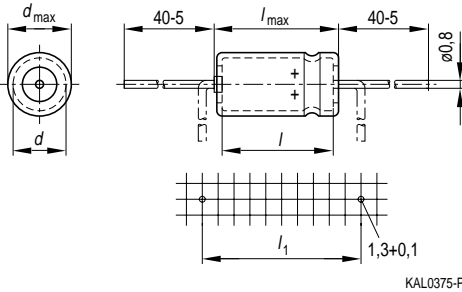
**B 43 684**

### Specifications and characteristics in brief

|   |   |                        |                                |       |       |
|---|---|------------------------|--------------------------------|-------|-------|
|   | B 41 684 (SIKOREL)  |                        | B 43 684 (LL grade)            |       |       |
| Voltage endurance test                      | 2 000 h, 125 °C<br>(at $U_R$ )  |                        | 2 000 h, 125 °C<br>(at $U_R$ ) |       |       |
| Leakage current $I_{lka}$<br>(5 min, 20 °C) | $I_{lka} \leq 0,3 \mu A \cdot \left( \frac{C_R}{\mu F} \cdot \frac{U_R}{V} \right)^{0,7} + 4 \mu A$   |                        |                                |       |       |
| Self-inductance $L_{ESL}$                   | Diam. $d$   | 12 mm                  | 14 mm                          | 16 mm | 18 mm |
|   | Length $l$  | Approx. $L_{ESL}$ (nH) |                                |       |       |
|   | 20 mm   | 29                     | –                              | –     | –     |
|   | 25 mm   | 32                     | 32                             | –     | –     |
|   | 30 mm   | 36                     | 35                             | 34    | –     |
|   | 39 mm   | –                      | –                              | 41    | 40    |
| IEC climatic category                       | in accordance with IEC 68–1<br>$\leq 100$ V–: 55/125/56 (–55 °C/+125 °C, 56 days damp heat test)<br>$\geq 160$ V–: 25/125/56 (–25 °C/+125 °C, 56 days damp heat test) |                        |                                |       |       |
| Detail specification                        | similar to CECC 30 301-802  |                        |                                |       |       |
| Sectional specification                     | IEC 384–4   |                        |                                |       |       |
| Vibration resistance                        | in accordance with IEC 68–2–6, test Fc:<br>displacement amplitude 0,75 mm, frequency range 10 ... 55 Hz,<br>acceleration max. 10 g, duration 3 × 2 h                  |                        |                                |       |       |



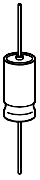
**Dimensional drawing**



| Dimensions (mm) |                            |                            | Approximate weight (g) |
|-----------------|----------------------------|----------------------------|------------------------|
| $d \times l$    | $d_{\max} \times l_{\max}$ | Minimum lead spacing $l_1$ |                        |
| 12 × 20         | 12,5 × 21                  | 25                         | 3,5                    |
| 12 × 25         | 12,5 × 25,5                | 29,5                       | 4,2                    |
| 12 × 30         | 12,5 × 30,5                | 34,5                       | 5,1                    |
| 14 × 25         | 14,5 × 25,5                | 34,5                       | 5,7                    |
| 14 × 30         | 14,5 × 30,5                | 34,5                       | 6,8                    |
| 16 × 30         | 16,5 × 30,5                | 34,5                       | 8,9                    |
| 16 × 39         | 16,5 × 40                  | 44                         | 11,7                   |
| 18 × 39         | 18,5 × 40                  | 44                         | 14,7                   |

**Packing units**

| Case dimensions<br>$d \times l$ (mm) | Bulk<br>PU (pcs.) | Reel packing<br>PU (pcs./reel) |
|--------------------------------------|-------------------|--------------------------------|
| 12 × 20                              | 750               | 450                            |
| 12 × 25                              | 700               | 450                            |
| 12 × 30                              | 600               | 450                            |
| 14 × 25                              | 500               | 350                            |
| 14 × 30                              | 400               | 350                            |
| 16 × 30                              | 350               | 250                            |
| 16 × 39                              | 300               | 250                            |
| 18 × 39                              | 250               | —                              |



**B 41 684**

**B 43 684**

**Overview of available types**

**Type B 41 684**

|            |                                   |         |         |         |         |         |
|------------|-----------------------------------|---------|---------|---------|---------|---------|
| $U_R$ (V-) | 10                                | 16      | 25      | 40      | 63      | 100     |
| $C_R$ (μF) | Case dimensions $d \times l$ (mm) |         |         |         |         |         |
| 47         |                                   |         |         |         |         | 12 × 20 |
| 100        |                                   |         |         |         | 12 × 20 | 12 × 30 |
| 150        |                                   |         |         | 12 × 20 |         |         |
| 220        |                                   |         | 12 × 20 | 12 × 25 | 14 × 30 | 16 × 30 |
| 330        |                                   | 12 × 20 |         |         |         | 18 × 39 |
| 470        | 12 × 20                           | 12 × 25 | 12 × 30 | 14 × 30 | 16 × 39 |         |
| 680        |                                   |         |         |         | 18 × 39 |         |
| 1 000      | 12 × 30                           | 14 × 30 | 16 × 30 | 16 × 39 |         |         |
| 2 200      | 16 × 30                           | 16 × 39 | 18 × 39 |         |         |         |
| 3 300      |                                   | 18 × 39 |         |         |         |         |
| 4 700      | 18 × 39                           |         |         |         |         |         |

**Type B 43 684**

|            |                                   |         |         |         |
|------------|-----------------------------------|---------|---------|---------|
| $U_R$ (V-) | 160                               | 250     | 350     | 400     |
| $C_R$ (μF) | Case dimensions $d \times l$ (mm) |         |         |         |
| 6,8        |                                   |         |         | 12 × 20 |
| 10         |                                   |         | 12 × 20 | 12 × 25 |
| 15         |                                   | 12 × 20 |         |         |
| 22         | 12 × 20                           | 12 × 25 | 14 × 30 | 14 × 30 |
| 33         | 12 × 25                           | 12 × 30 | 16 × 30 | 16 × 30 |
| 47         | 12 × 30                           | 14 × 30 | 16 × 39 | 16 × 39 |
| 68         |                                   |         | 18 × 39 | 18 × 39 |
| 100        | 14 × 30                           | 16 × 39 |         |         |
| 150        |                                   | 18 × 39 |         |         |
| 220        | 18 × 39                           |         |         |         |

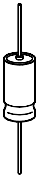
The above capacitance and voltage ratings are available in different cases upon request. Other capacitance and voltage ratings are also available upon request.



**Technical data and ordering codes**

| $U_R$          | $C_R$ | Case dimensions<br>$d \times l$<br>mm | $R_{ESR, max}$<br>100 Hz<br>20 °C<br>mΩ | $Z_{max}$<br>20 kHz<br>20 °C<br>mΩ | $I_{~max}$<br>100 Hz<br>40 °C<br>A | $I_{~max}$<br>100 Hz<br>85 °C<br>A | $I_{~R}$<br>100 Hz<br>125 °C<br>A | Ordering code <sup>1)</sup><br><br>Short code |
|----------------|-------|---------------------------------------|---|------------------------------------|------------------------------------|------------------------------------|-----------------------------------|---|
| <b>B41684-</b> |       |                                       |   |                                    |                                    |                                    |                                   |   |
| 10             | 470   | 12 × 20                               | 650                                     | 570                                | 1,9                                | 1,4                                | 0,50                              | -A3477-T                                      |
|                | 1 000 | 12 × 30                               | 310                                     | 270                                | 3,2                                | 2,4                                | 0,85                              | -A3108-T                                      |
|                | 2 200 | 16 × 30                               | 150                                     | 130                                | 5,3                                | 3,9                                | 1,4                               | -A3228-T                                      |
|                | 4 700 | 18 × 39                               | 75                                      | 65                                 | 8,7                                | 6,4                                | 2,3                               | -A3478-T                                      |
| 16             | 330   | 12 × 20                               | 650                                     | 540                                | 1,7                                | 1,3                                | 0,45                              | -A4337-T                                      |
|                | 470   | 12 × 25                               | 460                                     | 380                                | 2,3                                | 1,7                                | 0,60                              | -A4477-T                                      |
|                | 1 000 | 14 × 30                               | 220                                     | 180                                | 4,0                                | 2,9                                | 1,1                               | -A4108-T                                      |
|                | 2 200 | 16 × 39                               | 105                                     | 90                                 | 6,8                                | 5,0                                | 1,8                               | -A4228-T                                      |
|                | 3 300 | 18 × 39                               | 75                                      | 65                                 | 8,4                                | 6,2                                | 2,2                               | -A4338-T                                      |
| 25             | 220   | 12 × 20                               | 700                                     | 550                                | 1,5                                | 1,1                                | 0,40                              | -A5227-T                                      |
|                | 470   | 12 × 30                               | 330                                     | 260                                | 2,9                                | 2,1                                | 0,75                              | -A5477-T                                      |
|                | 1 000 | 16 × 30                               | 160                                     | 130                                | 4,6                                | 3,4                                | 1,2                               | -A5108-T                                      |
|                | 2 200 | 18 × 39                               | 80                                      | 65                                 | 8,0                                | 5,9                                | 2,1                               | -A5228-T                                      |
| 40             | 150   | 12 × 20                               | 730                                     | 510                                | 1,5                                | 1,1                                | 0,40                              | -A7157-T                                      |
|                | 220   | 12 × 25                               | 500                                     | 350                                | 2,1                                | 1,5                                | 0,55                              | -A7227-T                                      |
|                | 470   | 14 × 30                               | 240                                     | 170                                | 3,4                                | 2,5                                | 0,90                              | -A7477-T                                      |
|                | 1 000 | 16 × 39                               | 115                                     | 80                                 | 6,1                                | 4,5                                | 1,6                               | -A7108-T                                      |
| 63             | 100   | 12 × 20                               | 830                                     | 570                                | 1,3                                | 1,0                                | 0,35                              | -A8107-T                                      |
|                | 220   | 14 × 30                               | 360                                     | 260                                | 2,7                                | 2,0                                | 0,70                              | -A8227-T                                      |
|                | 470   | 16 × 39                               | 170                                     | 125                                | 4,6                                | 3,4                                | 1,2                               | -A8477-T                                      |
|                | 680   | 18 × 39                               | 125                                     | 90                                 | 6,5                                | 4,8                                | 1,7                               | -A8687-T                                      |
| 100            | 47    | 12 × 20                               | 1750                                    | 1200                               | 0,90                               | 0,60                               | 0,23                              | -A9476-T                                      |
|                | 100   | 12 × 30                               | 900                                     | 650                                | 1,6                                | 1,1                                | 0,41                              | -A9107-T                                      |
|                | 220   | 16 × 30                               | 430                                     | 310                                | 2,5                                | 1,8                                | 0,65                              | -A9227-T                                      |
|                | 330   | 18 × 39                               | 250                                     | 180                                | 4,2                                | 3,1                                | 1,1                               | -A9337-T                                      |

1) To obtain the required ordering code, prefix the type number to the short code. E. g.: B41684-A3477-T



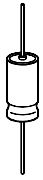
**B 41 684**

**B 43 684**

**Technical data and ordering codes**

| $U_R$          | $C_R$ | Case dimensions<br>$d \times l$<br>mm | $R_{ESR, \max}$<br>100 Hz<br>20 °C<br>mΩ | $Z_{\max}$<br>20 kHz<br>20 °C<br>mΩ | $I_{\sim \max}$<br>100 Hz<br>40 °C<br>A | $I_{\sim \max}$<br>100 Hz<br>85 °C<br>A | $I_{\sim R}$<br>100 Hz<br>125 °C<br>A | Ordering code <sup>1)</sup><br><br>Short code |
|----------------|-------|---------------------------------------|--|-------------------------------------|---|---|---------------------------------------|---|
| <b>B43684-</b> |       |                                       |  |                                     |   |   |                                       |   |
| 160            | 22    | 12 × 20                               | 9200                                     | 7600                                | 0,60                                    | 0,40                                    | 0,15                                  | -A1226-T                                      |
|                | 33    | 12 × 25                               | 6200                                     | 5100                                | 0,80                                    | 0,60                                    | 0,20                                  | -A1336-T                                      |
|                | 47    | 12 × 30                               | 4400                                     | 3500                                | 1,0                                     | 0,70                                    | 0,26                                  | -A1476-T                                      |
|                | 100   | 14 × 30                               | 2400                                     | 2000                                | 1,5                                     | 1,1                                     | 0,40                                  | -A1107-T                                      |
|                | 220   | 18 × 39                               | 1000                                     | 800                                 | 3,0                                     | 2,2                                     | 0,79                                  | -A1227-T                                      |
| 250            | 15    | 12 × 20                               | 11000                                    | 8500                                | 0,50                                    | 0,40                                    | 0,13                                  | -A2156-T                                      |
|                | 22    | 12 × 25                               | 7300                                     | 5700                                | 0,60                                    | 0,50                                    | 0,17                                  | -A2226-T                                      |
|                | 33    | 12 × 30                               | 5000                                     | 3900                                | 0,80                                    | 0,60                                    | 0,22                                  | -A2336-T                                      |
|                | 47    | 14 × 30                               | 3500                                     | 2700                                | 1,1                                     | 0,80                                    | 0,29                                  | -A2476-T                                      |
|                | 100   | 16 × 39                               | 1600                                     | 1300                                | 2,0                                     | 1,5                                     | 0,53                                  | -A2107-T                                      |
|                | 150   | 18 × 39                               | 1100                                     | 880                                 | 2,6                                     | 1,9                                     | 0,68                                  | -A2157-T                                      |
| 350            | 10    | 12 × 20                               | 12500                                    | 9500                                | 0,40                                    | 0,30                                    | 0,11                                  | -A4106-T                                      |
|                | 22    | 14 × 30                               | 5600                                     | 4000                                | 0,80                                    | 0,60                                    | 0,21                                  | -A4226-T                                      |
|                | 33    | 16 × 30                               | 3800                                     | 2700                                | 1,0                                     | 0,80                                    | 0,27                                  | -A4336-T                                      |
|                | 47    | 16 × 39                               | 2600                                     | 1900                                | 1,4                                     | 1,0                                     | 0,37                                  | -A4476-T                                      |
|                | 68    | 18 × 39                               | 1800                                     | 1300                                | 1,7                                     | 1,3                                     | 0,45                                  | -A4686-T                                      |
|                | 400   | 6,8                                   | 12 × 20                                  | 16500                               | 12000                                   | 0,30                                    | 0,30                                  | 0,09  |
| 10             |       | 12 × 25                               | 11500                                    | 8200                                | 0,50                                    | 0,30                                    | 0,12                                  | -A9106-T                                      |
| 22             |       | 14 × 30                               | 5200                                     | 3700                                | 0,80                                    | 0,60                                    | 0,21                                  | -A9226-T                                      |
| 33             |       | 16 × 30                               | 3500                                     | 2500                                | 1,0                                     | 0,80                                    | 0,27                                  | -A9336-T                                      |
| 47             |       | 16 × 39                               | 2400                                     | 1700                                | 1,4                                     | 1,1                                     | 0,38                                  | -A9476-T                                      |
| 68             |       | 18 × 39                               | 1700                                     | 1200                                | 1,8                                     | 1,3                                     | 0,48                                  | -A9686-T                                      |

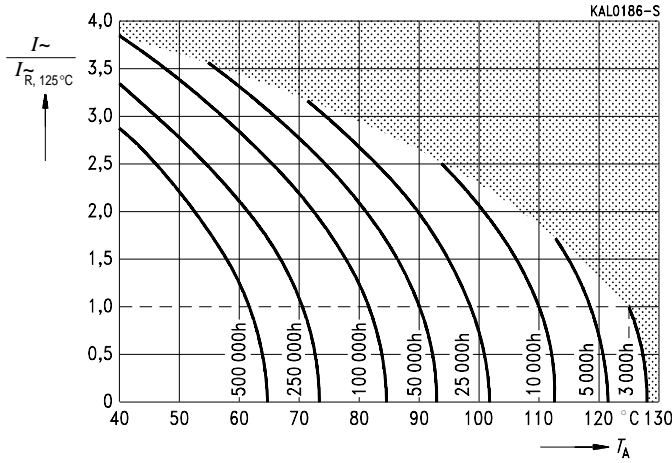
1) To obtain the required ordering code, prefix the type number to the short code. E. g.: B43684-A1226-T



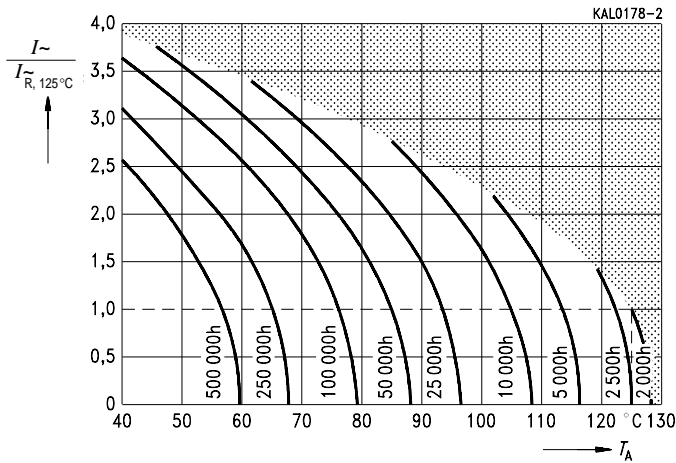
**Useful life**

versus ambient temperature  $T_A$  under ripple current operating conditions <sup>1)</sup>

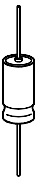
$U_R = 10 \dots 100 \text{ V-}$



$U_R = 160 \dots 400 \text{ V-}$



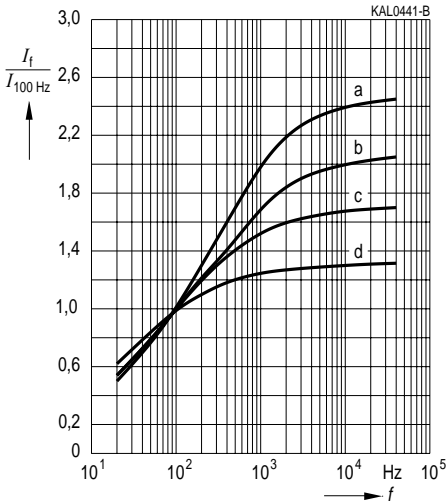
<sup>1)</sup> Refer to [page 34](#) for an explanation on how to interpret the useful life graphs.



**B 41 684**  
**B 43 684**

**Permissible ripple current  $I_r$**   
 versus frequency  $f$

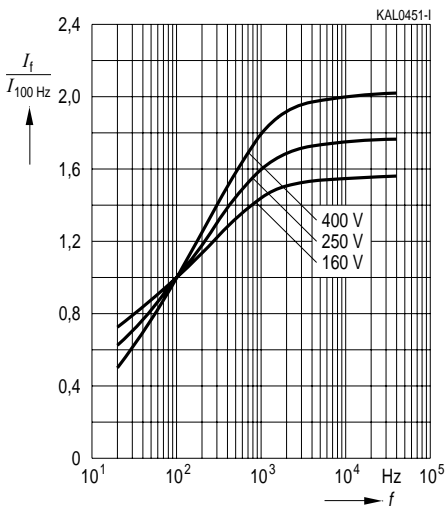
$U_R \leq 100 \text{ V}$ —



| Diam. $d$ | 12 mm | 14 mm | 16 mm | 18 mm |
|-----------|-------|-------|-------|-------|
| 10 V      | d     | d     | d     | d     |
| 16 V      | c     | d     | d     | d     |
| 25 V      | c     | c     | d     | d     |
| 40 V      | b     | b     | c     | c     |
| 63 V      | a     | a     | b     | b     |
| 100 V     | c     | c     | c     | c     |

**Permissible ripple current  $I_r$**   
 versus frequency  $f$

$U_R \geq 160 \text{ V}$ —



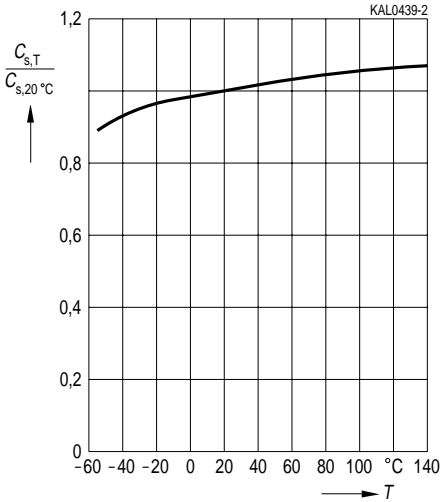




**Series capacitance  $C_s$  at  $f = 100$  Hz**  
versus temperature  $T$

Typical behavior

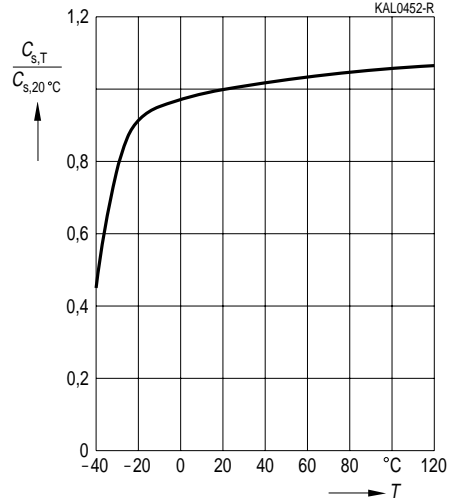
$U_R \leq 100$  V-



**Series capacitance  $C_s$  at  $f = 100$  Hz**  
versus temperature  $T$

Typical behavior

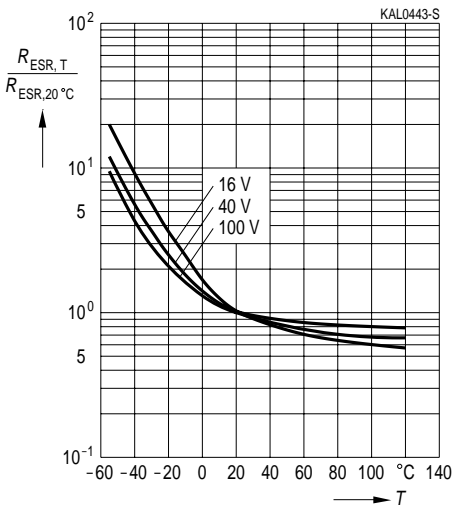
$U_R \geq 160$  V-



**Equivalent series resistance  $R_{ESR}$**   
at  $f = 100$  Hz versus temperature  $T$

Typical behavior

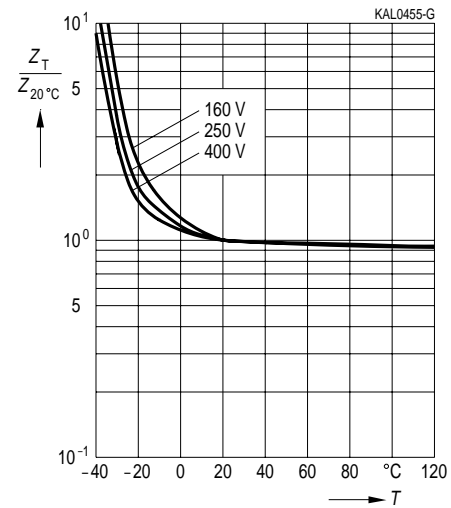
$U_R \leq 100$  V-

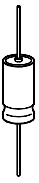


**Impedance  $Z$  at  $f = 100$  Hz**  
versus temperature  $T$

Typical behavior

$U_R \geq 160$  V-



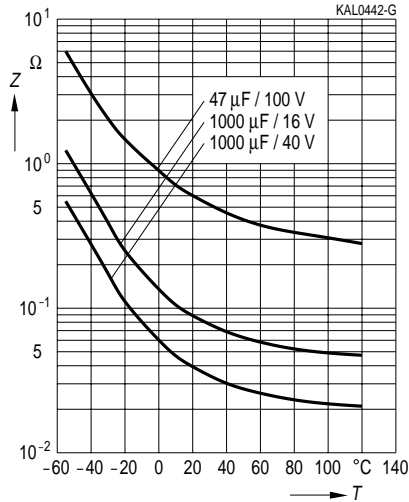


**B 41 684**  
**B 43 684**

**Impedance  $Z$  at  $f = 20$  kHz**  
 versus temperature  $T$

Typical behavior

$U_R \leq 100$  V-

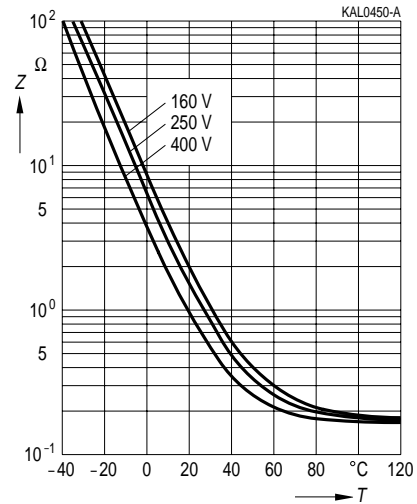


**Impedance  $Z$  at  $f = 20$  kHz**

versus temperature  $T$  for  $47 \mu\text{F}$

Typical behavior

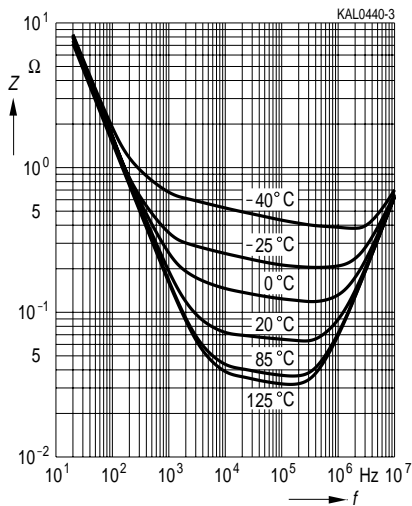
$U_R \geq 160$  V-



**Impedance  $Z$**   
 versus frequency  $f$

and temperature  $T$  for  $1000 \mu\text{F}/25$  V-

Typical behavior

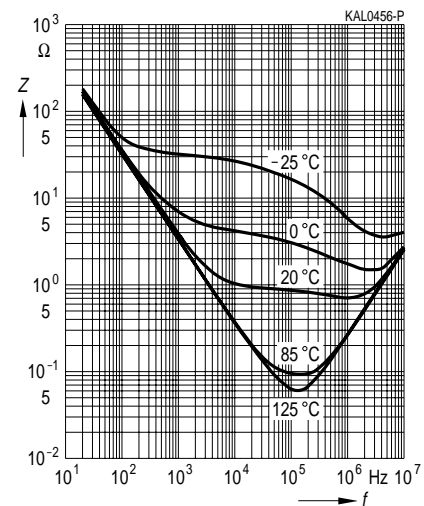


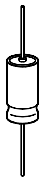
**Impedance  $Z$**

versus frequency  $f$

and temperature  $T$  for  $47 \mu\text{F}/400$  V-

Typical behavior



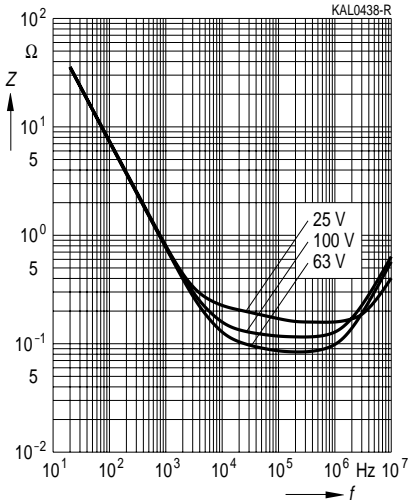


**Impedance  $Z$**

versus frequency  $f$  for 220  $\mu\text{F}$

Typical values at 20 °C

$U_R \leq 100 \text{ V-}$



**Impedance  $Z$**

versus frequency  $f$  for 47  $\mu\text{F}$

Typical values at 20 °C

$U_R \leq 160 \text{ V-}$

