

## SIKOREL®

### Applications

- For high-voltage applications in automotive

### Features

- High ripple current capability
- Long useful life
- High vibration resistance
- Shelf life up to 15 years

### Construction

- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Negative pole connected to case

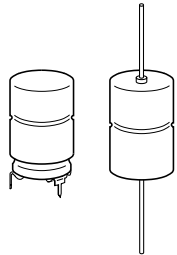
### Terminals

- Axial leads, welded to ensure perfect electrical contact
- Also available with soldering stars

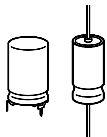
### Taping and packing

- Axial-lead capacitors will be delivered in pallet package.  
Capacitors with  $d \times l \leq 16 \times 30$  mm are also available taped on reel.
- Solder-star capacitors are packed in cardboard.

For details on taping and packing, refer to page 342.

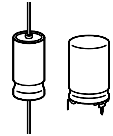


KAL0573-K


**Specifications and characteristics in brief**

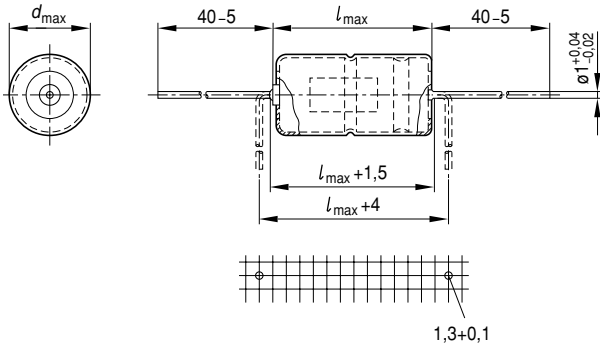
|                                         |                                                                                                                                    |                                                                  |                                  |        |         |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------|--------|---------|
| Rated voltage $U_R$                     | 160 and 250 VDC                                                                                                                    |                                                                  |                                  |        |         |
| Surge voltage $U_S$                     | $1,15 \cdot U_R$                                                                                                                   |                                                                  |                                  |        |         |
| Rated capacitance $C_R$                 | 22 ... 100 $\mu\text{F}$                                                                                                           |                                                                  |                                  |        |         |
| Capacitance tolerance                   | – 10/+ 30 % $\triangleq$ Q                                                                                                         |                                                                  |                                  |        |         |
| Leakage current $I_L$<br>(5 min, 20 °C) | $I_L \leq 0,006 \mu\text{A} \cdot \left( \frac{C_R}{\mu\text{F}} \cdot \frac{U_R}{\text{V}} \right) + 4 \mu\text{A}$               |                                                                  |                                  |        |         |
| Self-inductance $ESL^{1)}$              | Diameter $d$                                                                                                                       |                                                                  | 14 mm                            | 16 mm  | 18 mm   |
|                                         | Length $l$                                                                                                                         | Terminal                                                         | Approx. $ESL$ (nH)               |        |         |
|                                         | 25 mm                                                                                                                              | axial / solder star                                              | 22 / 6                           | 26 / 7 | — / —   |
|                                         | 30 mm                                                                                                                              | axial / solder star                                              | 24 / 7                           | 29 / 8 | 34 / 10 |
|                                         | 39 mm                                                                                                                              | axial / solder star                                              | — / —                            | 33 / 9 | 38 / 11 |
| Useful life                             |                                                                                                                                    | Requirements:                                                    |                                  |        |         |
| 125 °C; $U_R$ ; 0,5 $I_{\sim R}$        | > 1 000 h                                                                                                                          | $\Delta C/C$                                                     | $\leq \pm 30$ % of initial value |        |         |
| 105 °C; $U_R$ ; $I_{\sim R}$            | > 4 000 h                                                                                                                          | $ESR$                                                            | $\leq 3$ times initial limit     |        |         |
| 85 °C; $U_R$ ; $I_{\sim \text{max}}$    | > 4 000 h                                                                                                                          | $I_L$                                                            | $\leq$ initial specified limit   |        |         |
| 40 °C; $U_R$ ; 1,9 $\cdot I_{\sim R}$   | > 200 000 h                                                                                                                        | Failure percentage: $\leq 0,5$ %                                 |                                  |        |         |
|                                         |                                                                                                                                    | Failure rate: $\leq 10$ fit ( $\leq 10 \cdot 10^{-9}/\text{h}$ ) |                                  |        |         |
|                                         |                                                                                                                                    | (for definiton “fit”, refer to chapter “Quality”, page 62)       |                                  |        |         |
| Voltage endurance test                  |                                                                                                                                    | Post test requirements:                                          |                                  |        |         |
| 105 °C; $U_R$                           | 2 000 h                                                                                                                            | $\Delta C/C$                                                     | $\leq \pm 10$ % of initial value |        |         |
|                                         |                                                                                                                                    | $ESR$                                                            | $\leq 1,3$ % of specified limit  |        |         |
|                                         |                                                                                                                                    | $I_L$                                                            | $\leq$ initial specified limit   |        |         |
| Vibration resistance                    | To IEC 60068-2-6, test Fc:<br>displacement amplitude 1,5 mm, at 10 Hz to 2 kHz,<br>acceleration max. 20 g, duration $3 \times 2$ h |                                                                  |                                  |        |         |
| IEC climatic category                   | To IEC 60068-1:<br>40/125/56 (– 40 /+ 125 °C/56 days damp heat test)                                                               |                                                                  |                                  |        |         |
| Detail specification                    | Similar to CECC 30301-802                                                                                                          |                                                                  |                                  |        |         |
| Sectional specification                 | IEC 60384-4                                                                                                                        |                                                                  |                                  |        |         |

1) If optimum circuit design is used, the values are lower by 30 %.



## Dimensional drawings

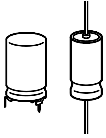
### Axial-lead capacitor



KAL0524-S

### Dimensions, weights and packing units

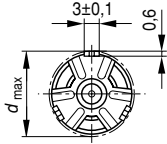
| $d \times l$<br>mm | $d_{\max} \times l_{\max}$<br>mm | Approx. weight<br>g | Packing units (pieces) |      |
|--------------------|----------------------------------|---------------------|------------------------|------|
|                    |                                  |                     | Pallet                 | Reel |
| 14 × 30            | 14,5 × 30,5                      | 6,8                 | 200                    | 350  |
| 16 × 30            | 16,5 × 30,5                      | 8,9                 | 180                    | 250  |
| 18 × 30            | 18,5 × 30,5                      | 11,1                | 160                    | —    |
| 18 × 39            | 18,5 × 40                        | 14,7                | 160                    | —    |



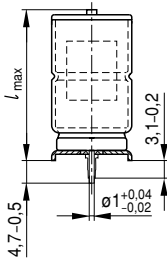
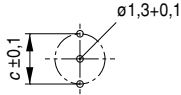
B43693 / B43793

High Voltage – 125 °C

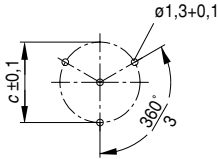
## Soldering star capacitors



Mounting holes  
 $d = 12 \text{ mm} \dots 14 \text{ mm}$



Mounting holes  
 $d = 16 \text{ mm} \dots 18 \text{ mm}$



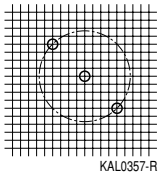
Soldering star is connected to the negative pole

KAL0525-1-E

The PC-board hole arrangement specified above is based on circular arcs.

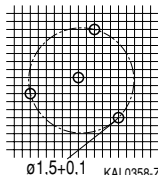
If, however, the mounting holes have to be matched to a standard drilling raster, a spacing of 1,27 mm ( $1/20''$ ) has proved to be sufficiently accurate if the following arrangements are used:

$d = 14 \text{ mm}$



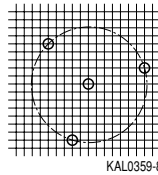
KAL0357-R

$d = 16 \text{ mm}$



1,5±0,1 KAL0358-Z

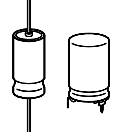
$d = 18 \text{ mm}$



KAL0359-B

## Dimensions, weights and packing units

| $d \times l$<br>mm | $d_{\max} \times l_{\max}$<br>mm | $c \pm 0,1$<br>mm | Approx. weight<br>g | Packing units<br>pieces |
|--------------------|----------------------------------|-------------------|---------------------|-------------------------|
| $14 \times 30$     | $15,5 \times 32$                 | 14,5              | 7,2                 | 480                     |
| $16 \times 30$     | $17,5 \times 32$                 | 16,5              | 9,4                 | 300                     |
| $18 \times 30$     | $19,5 \times 32$                 | 18,5              | 11,8                | 300                     |
| $18 \times 39$     | $19,5 \times 41,5$               | 18,5              | 15,4                | 200                     |



### Overview of available types

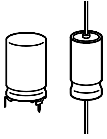
|             |                                   |         |
|-------------|-----------------------------------|---------|
| $U_R$ (VDC) | 160                               | 250     |
| $C_R$ (μF)  | Case dimensions $d \times l$ (mm) |         |
| 22          |                                   | 14 × 30 |
| 33          | 14 × 30                           |         |
| 47          | 16 × 30                           | 18 × 30 |
| 68          |                                   | 18 × 39 |
| 100         | 18 × 39                           |         |

### Case dimensions and ordering codes

| $U_R$<br>VDC | $C_R$<br>μF | Case dim.<br>$d \times l$<br>mm | Ordering code<br>Axial<br>pallet package | Axial<br>reel   | Soldering star  |
|--------------|-------------|---------------------------------|------------------------------------------|-----------------|-----------------|
| 160          | 33          | 14 × 30                         | B43693A1336Q007                          | B43693A1336Q009 | B43793A1336Q000 |
|              | 47          | 16 × 30                         | B43693A1476Q007                          | B43693A1476Q009 | B43793A1476Q000 |
|              | 100         | 18 × 39                         | B43693A1107Q007                          |                 | B43793A1107Q000 |
| 250          | 22          | 14 × 30                         | B43693A2226Q007                          | B43693A2226Q009 | B43793A2226Q000 |
|              | 47          | 18 × 30                         | B43693A2476Q007                          |                 | B43793A2476Q000 |
|              | 68          | 18 × 39                         | B43693A2686Q007                          |                 | B43793A2686Q000 |

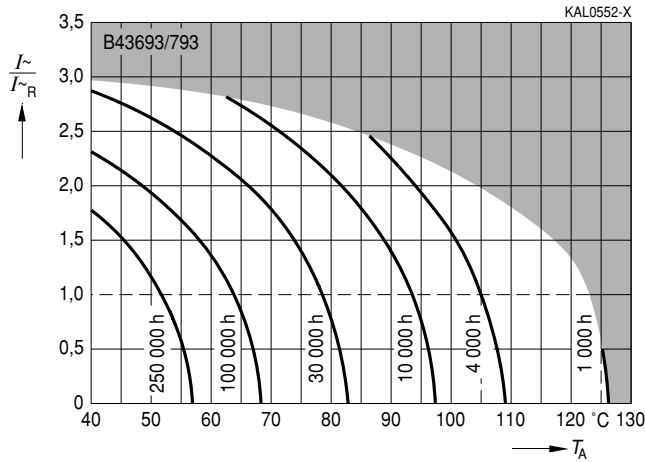
### Technical data

| $C_R$<br>100 Hz<br>20 °C<br>μF | $ESR_{typ}$<br>100 Hz<br>20 °C<br>mΩ | $ESR_{max}$<br>100 Hz<br>20 °C<br>mΩ | $ESR_{max}$<br>100 Hz<br>-40 °C<br>Ω | $ESR_{max}$<br>10 kHz<br>20 °C<br>mΩ | $Z_{max}$<br>100 kHz<br>20 °C<br>mΩ | $I_{~max}$<br>10 kHz<br>40 °C<br>A | $I_{~max}$<br>10 kHz<br>85 °C<br>A | $I_{~R}$<br>10 kHz<br>105 °C<br>A | $I_{~max}$<br>10 kHz<br>125 °C<br>A |
|--------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|
| 160 VDC                        |                                      |                                      |                                      |                                      |                                     |                                    |                                    |                                   |                                     |
| 33                             | 1,10                                 | 1,70                                 | 20,0                                 | 530                                  | 530                                 | 3,30                               | 2,75                               | 1,10                              | 0,55                                |
| 47                             | 0,75                                 | 1,20                                 | 14,0                                 | 370                                  | 360                                 | 4,15                               | 3,45                               | 1,40                              | 0,70                                |
| 100                            | 0,36                                 | 0,60                                 | 7,0                                  | 175                                  | 170                                 | 6,85                               | 5,80                               | 2,30                              | 1,15                                |
| 250 VDC                        |                                      |                                      |                                      |                                      |                                     |                                    |                                    |                                   |                                     |
| 22                             | 1,40                                 | 2,30                                 | 25,0                                 | 540                                  | 500                                 | 3,55                               | 2,95                               | 1,20                              | 0,60                                |
| 47                             | 0,65                                 | 1,10                                 | 12,0                                 | 250                                  | 230                                 | 5,20                               | 4,35                               | 1,75                              | 0,87                                |
| 68                             | 0,45                                 | 0,75                                 | 8,5                                  | 170                                  | 160                                 | 7,15                               | 6,00                               | 2,40                              | 1,20                                |



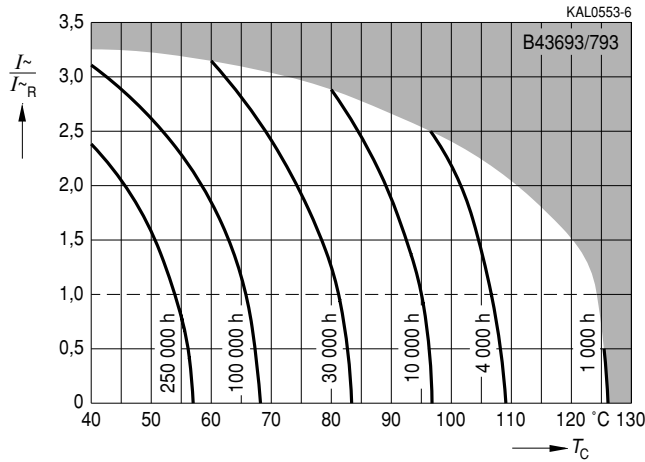
### Useful life

depending on ambient temperature  $T_A$  under ripple current operating conditions at  $U_R$ <sup>1)</sup>

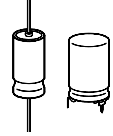


### Useful life

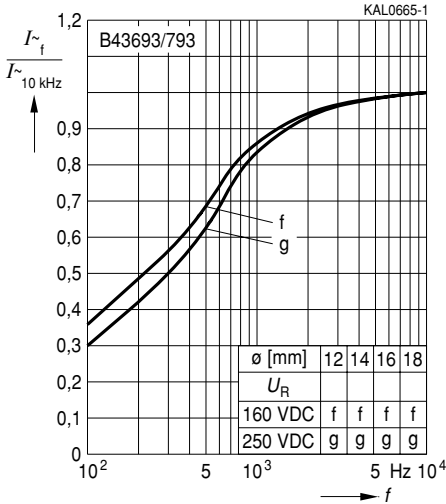
depending on case temperature  $T_C$  under ripple current operating conditions at  $U_R$ <sup>1)</sup>



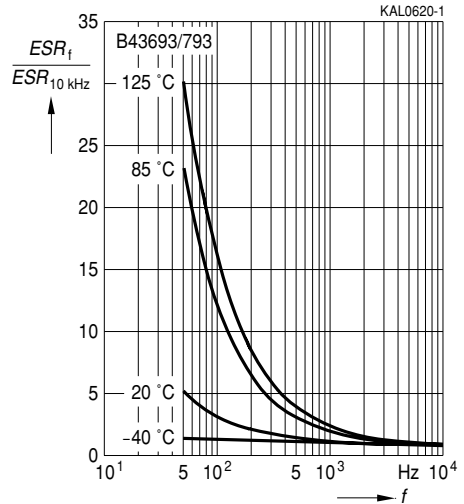
1) Refer to page 40 for an explanation on how to interpret the useful life graphs.



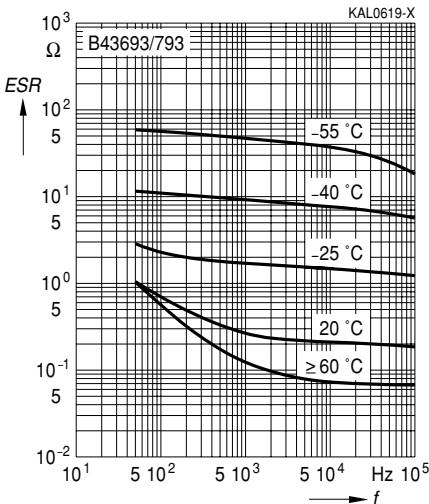
### Frequency factor of permissible ripple current $I_{\sim}$ versus frequency $f$



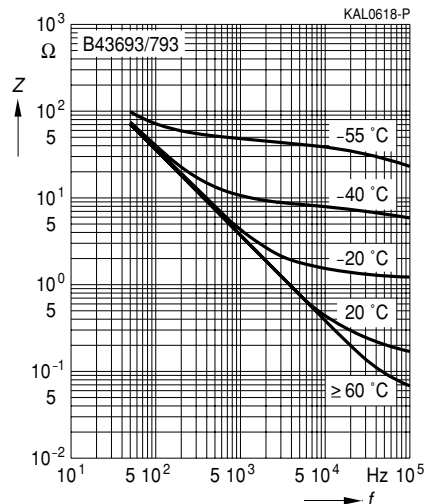
### Frequency characteristics of ESR at different temperatures typical behavior



### Equivalent series resistance ESR versus frequency $f$ at different temperatures Typical behavior for 47 $\mu$ F/250 V



### Impedance Z versus frequency $f$ at different temperatures Typical behavior for 47 $\mu$ F/250 V



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