

## **Aluminum electrolytic capacitors**

Axial-lead and soldering star capacitors,  
high voltage, very high ripple current

**Series/Type:**            **B43693, B43793**

**Date:**                    February 2023

## Axial-lead and soldering star capacitors

### Applications

- Automotive electronics

### Features

- High voltage design
- Very high ripple current capability
- Useful life, 2500 h at up to 125 °C
- High vibration stability
- RoHS-compatible

### Construction

- Charge/discharge-proof, polar
- Negative pole connected to case
- Aluminum case with or without PET sleeve

### Terminals

- Axial leads, welded to capacitor case and cover disc
- Soldering star option for upright mounting on PCB or welding to busbar
- Alternative axial-lead design with double-sided plates for horizontal mounting available upon request

### Taping and packing

- Axial-lead capacitors will be delivered in pallet package  
Capacitors with  $d \times l \leq 16 \times 39$  mm are also available taped on reel
- Soldering star capacitors are packed in blister trays



**Specifications and characteristics in brief**

Rated voltage $V_R$	160 ... 250 V DC				
Surge voltage $V_S$	$1.15 \cdot V_R$				
Rated capacitance $C_R$	56 ... 470 $\mu\text{F}$				
Capacitance tolerance	-10/+30% $\triangleq$ Q				
Leakage current $I_{\text{leak}}$ (5 min, 20 °C)	$I_{\text{leak}} \leq 0.3 \mu\text{A} \cdot \left( \frac{C_R}{\mu\text{F}} \cdot \frac{V_R}{V} \right)^{0.7} + 4 \mu\text{A}$				
Self-inductance ESL <sup>1)</sup>	Diameter d (mm)	16	18	21	
	Terminals	Length l (mm)	Approx. ESL (nH)		
	Axial	25	26	30	–
		30	29	34	39
		35	31	36	41
		39	33	38	45
		49	–	–	50
	Soldering star	25	7	8	–
		30	8	10	11
		35	9	10.5	12
39		9	11	13	
49		–	–	14	
Useful life <sup>2)</sup> $T_A = 125 \text{ °C}; V_R; I_{AC,R}$ $T_C = 125 \text{ °C}; V_R; I_{AC,max}$ $T_A = 105 \text{ °C}; V_R; I_{AC,max}$ $T_C = 105 \text{ °C}; V_R; I_{AC,max}$	> 2500 h	Requirements: $I_{\Delta C}/C_I \leq 30\%$ of initial value			
	> 2500 h	ESR $\leq 3$ times initial specified limit <sup>3)</sup>			
	> 3500 h	$I_{\text{leak}} \leq$ initial specified limit			
	> 3500 h				
Voltage endurance test 125 °C; $V_R$	1500 h	Post test requirements:			
		$I_{\Delta C}/C_I \leq 10\%$ of initial value			
		ESR $\leq 1.3$ times initial specified limit <sup>3)</sup>			
Vibration resistance test	1500 h				
	To IEC 60068-2-6:2007, test Fc: Frequency range 10 Hz ... 2 kHz, displacement amplitude max. 1.5 mm, acceleration max. 20 g, duration 3 x 2 h. Capacitor rigidly clamped by the aluminum case e.g. using our standard fixture.				
IEC climatic category	To IEC 60068-1:2013: 40/125/56 (-40 °C/+125 °C/56 days damp heat test)				
Sectional specification <sup>4)</sup>	IEC 60384-4:2016				
Reference standard	AEC-Q200 REV D <sup>5)</sup>				

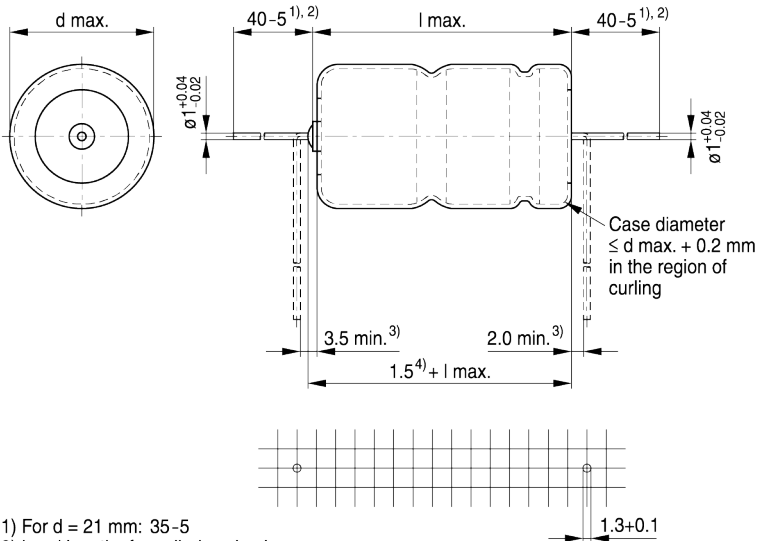
1) If optimum circuit design is used, the values are lower by 30%.

2) Refer to chapter "General technical information, 5 Useful life" on how to interpret useful life.

3) ESR<sub>max</sub> at 100 Hz, 20 °C.

4) Refer to chapter "General technical information, 2 Standards and specifications" for further details.

5) Refer to chapter "General technical information, 2.3 AEC-Q200 standard" for further details.

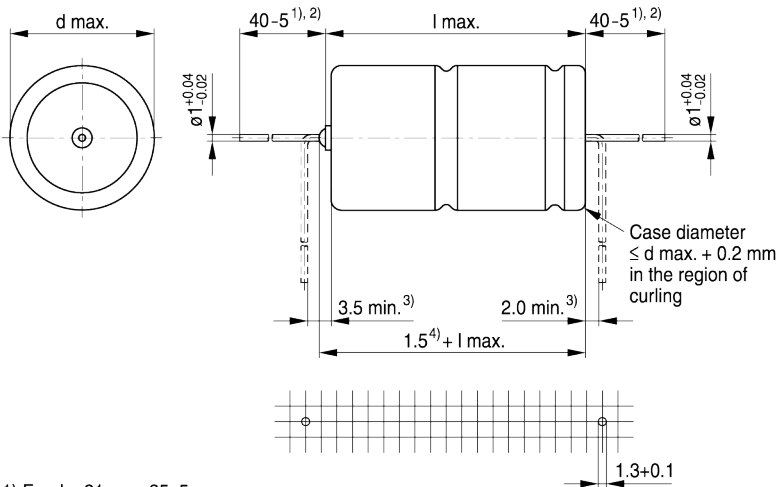
**B43693, Axial-lead capacitors, version with PET sleeve**
**Dimensional drawing**


- 1) For  $d = 21$  mm: 35-5
- 2) Lead lengths for pallet packaging
- 3) Minimum bending distance recommended per wire
- 4) Maximum length of welding projection

KAL1749-V-E

**Dimensions, weights and packing units**

d x l mm	d <sub>max</sub> x l <sub>max</sub> mm	Approx. weight g	Packing units (pcs.)	
			Pallet	Reel
16 x 25	16.5 x 25.5	7.4	180	250
16 x 30	16.5 x 30.5	8.9	180	250
16 x 35	16.5 x 35.5	10.4	180	250
16 x 39	16.5 x 40	11.7	180	250
18 x 25	18.5 x 25.5	9.3	160	—
18 x 30	18.5 x 30.5	11.1	160	—
18 x 35	18.5 x 35.5	12.8	160	—
18 x 39	18.5 x 40	14.7	160	—
21 x 30	21.5 x 30.5	16.5	140	—
21 x 35	21.5 x 35.5	17.0	140	—
21 x 39	21.5 x 40	20.0	140	—
21 x 49	21.5 x 50	25.0	110	—

**B43693, Axial-lead capacitors, version without sleeve**
**Dimensional drawing**


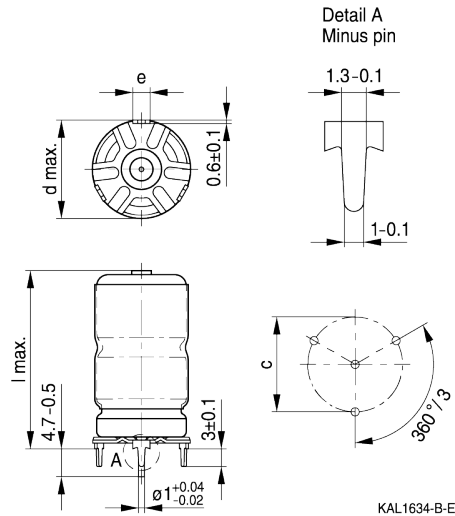
- 1) For  $d = 21$  mm: 35-5
- 2) Lead lengths for pallet packaging
- 3) Minimum bending distance recommended per wire
- 4) Maximum length of welding projection

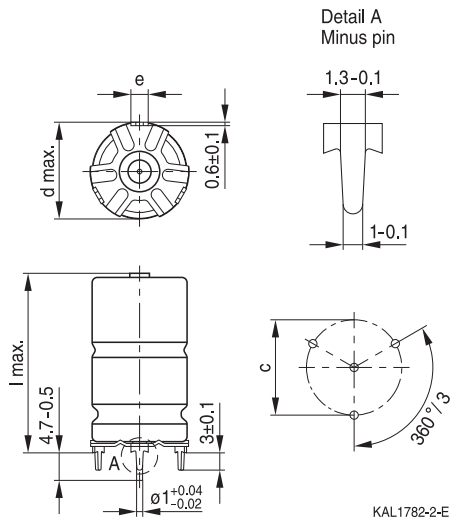
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**Dimensions, weights and packing units**

d x l mm	d <sub>max</sub> x l <sub>max</sub> mm	Approx. weight g	Packing units (pcs.)	
			Pallet	Reel
16 x 25	16.3 x 25.4	7.4	180	250
16 x 30	16.3 x 30.4	8.9	180	250
16 x 35	16.3 x 35.4	10.4	180	250
16 x 39	16.3 x 39.9	11.7	180	250
18 x 25	18.3 x 25.4	9.3	160	—
18 x 30	18.3 x 30.4	11.1	160	—
18 x 35	18.3 x 35.4	12.8	160	—
18 x 39	18.3 x 39.9	14.7	160	—
21 x 30	21.3 x 30.4	16.5	140	—
21 x 35	21.3 x 35.4	17.0	140	—
21 x 39	21.3 x 39.9	20.0	140	—
21 x 49	21.3 x 49.9	25.0	110	—

**B43793, Soldering star capacitors**
**Dimensional drawings  
version with PET sleeve**

 Mounting holes  $d = 16 \dots 21 \text{ mm}$ 

**version without sleeve**

 Mounting holes  $d = 16 \dots 21 \text{ mm}$ 

**Dimensions, weights and packing units**

d x l mm	d <sub>max</sub> x l <sub>max</sub> mm	c ±0.1 mm	e ±0.1 mm	Approx. weight g	Packing units pcs.
16 x 25	17.5 x 27	16.5	3.0	7.9	300
16 x 30	17.5 x 32	16.5	3.0	9.4	300
16 x 35	17.5 x 37	16.5	3.0	10.9	200
16 x 39	17.5 x 41.5	16.5	3.0	12.2	200
18 x 25	19.5 x 27	18.5	3.0	9.9	300
18 x 30	19.5 x 32	18.5	3.0	11.8	300
18 x 35	19.5 x 37	18.5	3.0	13.2	200
18 x 39	19.5 x 41.5	18.5	3.0	15.4	200
21 x 30	22.5 x 32	21.5	3.5	17.1	468
21 x 35	22.5 x 37	21.5	3.5	18.3	324
21 x 39	22.5 x 41.5	21.5	3.5	21.0	324
21 x 49	22.5 x 51.5	21.5	3.5	26.0	264

**Overview of available types**

Other voltage and capacitance ratings are available upon request.

$V_R$ (V DC)	160	200	250
	Case dimensions d x l (mm)		
$C_R$ ( $\mu$ F)			
56			16 x 25
75			16 x 30 18 x 25
82		16 x 25	
91	16 x 25		16 x 35
100			18 x 30
110		16 x 30 18 x 25	16 x 39
120	16 x 30		18 x 35
130	18 x 25	16 x 35	21 x 30
140			18 x 39
150		18 x 30	
160	16 x 35	16 x 39	
170	18 x 30		21 x 35
180	16 x 39	18 x 35	
200		21 x 30	21 x 39
220	18 x 35	18 x 39	
240	21 x 30	21 x 35	
250	18 x 39		
270			21 x 49
300	21 x 35	21 x 39	
360	21 x 39		
390		21 x 49	
470	21 x 49		

**Case dimensions and ordering codes**

$C_R$ 100 Hz 20 °C $\mu\text{F}$	Case dimensions d x l mm	Ordering code Axial pallet	Ordering code Axial reel	Ordering code Soldering star
<b><math>V_R = 160 \text{ V DC}</math></b>				
91	16 x 25	B43693G1916Q0*1	B43693G1916Q0*3	B43793G1916Q0*1
120	16 x 30	B43693G1127Q0*1	B43693G1127Q0*3	B43793G1127Q0*1
130	18 x 25	B43693G1137Q0*1		B43793G1137Q0*1
160	16 x 35	B43693G1167Q0*1	B43693G1167Q0*3	B43793G1167Q0*1
170	18 x 30	B43693G1177Q0*1		B43793G1177Q0*1
180	16 x 39	B43693G1187Q0*1		B43793G1187Q0*1
220	18 x 35	B43693G1227Q0*1		B43793G1227Q0*1
240	21 x 30	B43693G1247Q0*1		B43793G1247Q0*1
250	18 x 39	B43693G1257Q0*1		B43793G1257Q0*1
300	21 x 35	B43693G1307Q0*1		B43793G1307Q0*1
360	21 x 39	B43693G1367Q0*1		B43793G1367Q0*1
470	21 x 49	B43693G1477Q0*1		B43793G1477Q0*1
<b><math>V_R = 200 \text{ V DC}</math></b>				
82	16 x 25	B43693G2826Q0*1	B43693G2826Q0*3	B43793G2826Q0*1
110	16 x 30	B43693G2117Q0*1	B43693G2117Q0*3	B43793G2117Q0*1
110	18 x 25	B43693H2117Q0*1		B43793H2117Q0*1
130	16 x 35	B43693G2137Q0*1	B43693G2137Q0*3	B43793G2137Q0*1
150	18 x 30	B43693G2157Q0*1		B43793G2157Q0*1
160	16 x 39	B43693G2167Q0*1		B43793G2167Q0*1
180	18 x 35	B43693G2187Q0*1		B43793G2187Q0*1
200	21 x 30	B43693G2207Q0*1		B43793G2207Q0*1
220	18 x 39	B43693G2227Q0*1		B43793G2227Q0*1
240	21 x 35	B43693G2247Q0*1		B43793G2247Q0*1
300	21 x 39	B43693G2307Q0*1		B43793G2307Q0*1
390	21 x 49	B43693G2397Q0*1		B43793G2397Q0*1

**Composition of ordering code**

- \* = sleeve option
- 0 = with sleeve
- 1 = without sleeve



**Case dimensions and ordering codes**

$C_R$ 100 Hz 20 °C $\mu\text{F}$	Case dimensions d x l mm	Ordering code Axial pallet	Ordering code Axial reel	Ordering code Soldering star
$V_R = 250 \text{ V DC}$				
56	16 x 25	B43693J2566Q0*1	B43693J2566Q0*3	B43793J2566Q0*1
75	16 x 30	B43693J2756Q0*1	B43693J2756Q0*3	B43793J2756Q0*1
75	18 x 25	B43693K2756Q0*1		B43793K2756Q0*1
91	16 x 35	B43693J2916Q0*1	B43693J2916Q0*3	B43793J2916Q0*1
100	18 x 30	B43693J2107Q0*1		B43793J2107Q0*1
110	16 x 39	B43693J2117Q0*1		B43793J2117Q0*1
120	18 x 35	B43693J2127Q0*1		B43793J2127Q0*1
130	21 x 30	B43693J2137Q0*1		B43793J2137Q0*1
140	18 x 39	B43693J2147Q0*1		B43793J2147Q0*1
170	21 x 35	B43693J2177Q0*1		B43793J2177Q0*1
200	21 x 39	B43693J2207Q0*1		B43793J2207Q0*1
270	21 x 49	B43693J2277Q0*1		B43793J2277Q0*1

**Composition of ordering code**

- \* = sleeve option
- 0 = with sleeve
- 1 = without sleeve

**Technical data**

$C_R$	Case dimensions	$ESR_{max}$ 100 Hz 20 °C $\mu F$	$ESR_{max}$ 100 Hz -40 °C $\Omega$	$ESR_{max}$ 10 kHz 20 °C $m\Omega$	$I_{AC,max}$ <sup>1) 2)</sup> 10 kHz $T_C$ 105 °C A
<b><math>V_R = 160</math> V DC</b>					
91	16 x 25	925	26.8	402	7.1
120	16 x 30	702	20.4	306	8.4
130	18 x 25	642	18.8	277	9.3
160	16 x 35	528	15.3	231	9.6
170	18 x 30	505	14.9	218	11.1
180	16 x 39	469	13.6	205	10.5
220	18 x 35	398	11.6	171	12.5
240	21 x 30	352	10.2	153	15.0
250	18 x 39	342	10.0	148	13.6
300	21 x 35	282	8.1	123	17.1
360	21 x 39	235	6.8	103	18.5
470	21 x 49	181	5.2	79	21.6

$C_R$	Case dimensions	$I_{AC,max}$ , with sleeve 10 kHz $T_A$ 105 °C A	$I_{AC,max}$ , without sleeve 10 kHz $T_A$ 105 °C A	$I_{AC,max}$ <sup>1) 2)</sup> 10 kHz $T_C$ 125 °C A	$I_{AC,R}$ , with sleeve 10 kHz $T_A$ 125 °C A	$I_{AC,R}$ , without sleeve 10 kHz $T_A$ 125 °C A
<b><math>V_R = 160</math> V DC</b>						
91	16 x 25	3.3	3.0	4.8	2.2	2.0
120	16 x 30	4.1	3.7	5.7	2.8	2.5
130	18 x 25	4.2	3.7	6.3	2.8	2.5
160	16 x 35	4.8	4.3	6.5	3.3	2.9
170	18 x 30	5.2	4.6	7.5	3.5	3.1
180	16 x 39	5.5	4.9	7.2	3.7	3.3
220	18 x 35	6.1	5.4	8.5	4.1	3.7
240	21 x 30	6.7	6.0	10.2	4.6	4.1
250	18 x 39	6.8	6.1	9.2	4.6	4.2
300	21 x 35	7.9	7.1	11.7	5.4	4.8
360	21 x 39	8.9	7.9	12.6	6.0	5.4
470	21 x 49	11.0	9.9	14.7	7.5	6.7

1) Maximum ripple current at capacitor case temperature  $T_C$  (measurement at aluminum case surface), when mounted to a heat sink. Further details available upon request.

2) To achieve the maximum listed current, special care must be taken in the connection of the capacitor to the circuit as it depends on user assembly.

**Technical data**

$C_R$	Case dimensions	$ESR_{max}$ 100 Hz 20 °C $\mu F$	$ESR_{max}$ 100 Hz -40 °C $\Omega$	$ESR_{max}$ 10 kHz 20 °C $m\Omega$	$I_{AC,max}$ <sup>1) 2)</sup> 10 kHz $T_C$ 105 °C A
<b><math>V_R = 200</math> V DC</b>					
82	16 x 25	959	25.8	387	7.1
110	16 x 30	716	19.2	289	8.4
110	18 x 25	708	19.2	282	9.3
130	16 x 35	605	16.3	244	9.6
150	18 x 30	520	14.1	208	11.1
160	16 x 39	493	13.2	200	10.5
180	18 x 35	434	11.8	173	12.5
200	21 x 30	393	10.6	159	14.9
220	18 x 39	355	9.6	142	13.6
240	21 x 35	328	8.8	132	17.1
300	21 x 39	263	7.0	107	18.4
390	21 x 49	203	5.4	82	21.5

$C_R$	Case dimensions	$I_{AC,max}$ , with sleeve 10 kHz $T_A$ 105 °C A	$I_{AC,max}$ , without sleeve 10 kHz $T_A$ 105 °C A	$I_{AC,max}$ <sup>1) 2)</sup> 10 kHz $T_C$ 125 °C A	$I_{AC,R}$ , with sleeve 10 kHz $T_A$ 125 °C A	$I_{AC,R}$ , without sleeve 10 kHz $T_A$ 125 °C A
<b><math>V_R = 200</math> V DC</b>						
82	16 x 25	3.3	3.0	4.8	2.2	2.0
110	16 x 30	4.1	3.7	5.7	2.8	2.5
110	18 x 25	4.2	3.7	6.3	2.8	2.5
130	16 x 35	4.8	4.3	6.5	3.3	2.9
150	18 x 30	5.2	4.6	7.5	3.5	3.1
160	16 x 39	5.5	4.9	7.2	3.7	3.3
180	18 x 35	6.1	5.4	8.5	4.1	3.7
200	21 x 30	6.7	6.0	10.1	4.5	4.0
220	18 x 39	6.8	6.1	9.2	4.6	4.2
240	21 x 35	7.9	7.1	11.6	5.4	4.8
300	21 x 39	8.8	7.9	12.6	6.0	5.4
390	21 x 49	11.0	9.9	14.6	7.5	6.7

1) Maximum ripple current at capacitor case temperature  $T_C$  (measurement at aluminum case surface), when mounted to a heat sink. Further details available upon request.

2) To achieve the maximum listed current, special care must be taken in the connection of the capacitor to the circuit as it depends on user assembly.

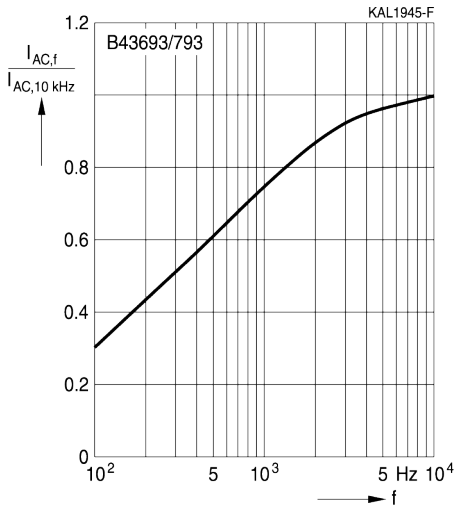
**Technical data**

$C_R$	Case dimensions	$ESR_{max}$ 100 Hz 20 °C $\mu F$	$ESR_{max}$ 100 Hz 20 °C m $\Omega$	$ESR_{max}$ 100 Hz -40 °C $\Omega$	$ESR_{max}$ 10 kHz 20 °C m $\Omega$	$I_{AC,max}$ <sup>1) 2)</sup> 10 kHz T <sub>C</sub> 105 °C A
<b><math>V_R = 250</math> V DC</b>						
56	16 x 25	1218	24.9		370	7.1
75	16 x 30	912	18.6		278	8.5
75	18 x 25	866	17.8		260	9.3
91	16 x 35	754	15.4		230	9.6
100	18 x 30	678	13.9		204	11.1
110	16 x 39	622	12.7		190	10.6
120	18 x 35	564	11.6		169	12.5
130	21 x 30	503	10.3		153	14.9
140	18 x 39	481	10.0		145	13.6
170	21 x 35	397	8.1		122	17.1
200	21 x 39	343	7.0		105	18.5
270	21 x 49	256	5.2		78	21.5

$C_R$	Case dimensions	$I_{AC,max}$ , with sleeve 10 kHz T <sub>A</sub> 105 °C A	$I_{AC,max}$ , without sleeve 10 kHz T <sub>A</sub> 105 °C A	$I_{AC,max}$ <sup>1) 2)</sup> 10 kHz T <sub>C</sub> 125 °C A	$I_{AC,R}$ , with sleeve 10 kHz T <sub>A</sub> 125 °C A	$I_{AC,R}$ , without sleeve 10 kHz T <sub>A</sub> 125 °C A
<b><math>V_R = 250</math> V DC</b>						
56	16 x 25	3.4	3.0	4.8	2.3	2.0
75	16 x 30	4.1	3.7	5.8	2.8	2.5
75	18 x 25	4.2	3.7	6.3	2.8	2.5
91	16 x 35	4.9	4.4	6.6	3.3	3.0
100	18 x 30	5.2	4.6	7.5	3.5	3.1
110	16 x 39	5.5	4.9	7.2	3.7	3.4
120	18 x 35	6.1	5.4	8.5	4.1	3.7
130	21 x 30	6.7	6.0	10.2	4.5	4.1
140	18 x 39	6.8	6.1	9.2	4.6	4.2
170	21 x 35	7.9	7.1	11.6	5.4	4.8
200	21 x 39	8.9	7.9	12.6	6.0	5.4
270	21 x 49	11.0	9.9	14.7	7.5	6.7

1) Maximum ripple current at capacitor case temperature T<sub>C</sub> (measurement at aluminum case surface), when mounted to a heat sink. Further details available upon request.

2) To achieve the maximum listed current, special care must be taken in the connection of the capacitor to the circuit as it depends on user assembly.

**Frequency factor of permissible ripple current  $I_{AC}$  versus frequency  $f$** 

**Useful life<sup>1)</sup>**

Calculations of useful life are performed on request, based on operational conditions stated by the customer.

1) Refer to chapter "General technical information, 5 Useful life" on how to interpret useful life.

## Cautions and warnings

### Personal safety

The electrolytes used have been optimized both with a view to the intended application and with regard to health and environmental compatibility. They do not contain any solvents that are detrimental to health, e.g. dimethyl formamide (DMF) or dimethyl acetamide (DMAC). Furthermore, some of the high-voltage electrolytes used are self-extinguishing.

As far as possible, we do not use any dangerous chemicals or compounds to produce operating electrolytes, although in exceptional cases, such materials must be used in order to achieve specific physical and electrical properties because no alternative materials are currently known.

We do, however, restrict the amount of dangerous materials used in our products to an absolute minimum.

Materials and chemicals used in our aluminum electrolytic capacitors are continuously adapted in compliance with the TDK Electronics Corporate Environmental Policy and the latest EU regulations and guidelines such as RoHS, REACH/SVHC, GADSL, and ELV.

MDS (Material Data Sheets) are available on our website for all types listed in the data book.

MDS for customer specific capacitors are available upon request.

MSDS (Material Safety Data Sheets) are available for our electrolytes upon request.

Nevertheless, the following rules should be observed when handling aluminum electrolytic capacitors: No electrolyte should come into contact with eyes or skin. If electrolyte does come into contact with the skin, wash the affected areas immediately with running water. If the eyes are affected, rinse them for 10 minutes with plenty of water. If symptoms persist, seek medical treatment. Avoid inhaling electrolyte vapor or mists. Workplaces and other affected areas should be well ventilated. Clothing that has been contaminated by electrolyte must be changed and rinsed in water.

**Product safety**

The table below summarizes the safety instructions that must be observed without fail. A detailed description can be found in the relevant sections of separate file chapter "General technical information".

Topic	Safety information	Reference chapter "General technical information"
Polarity	Make sure that polar capacitors are connected with the right polarity.	1 "Basic construction of aluminum electrolytic capacitors"
Reverse voltage	Voltages of opposite polarity should be prevented by connecting a diode.	3.1.6 "Reverse voltage"
Mounting position of capacitors with screw or multi-pin terminals	Multi-pin capacitors with pressure relief vent on the can base must not be mounted with terminals facing up unless otherwise specified.	11.1 "Mounting positions of capacitors with screw or multi-pin terminals"
Robustness of terminals	The following maximum tightening torques must not be exceeded when connecting screw terminals: M5: 2.5 Nm M6: 4.0 Nm	11.2 "Mounting torques"
Mounting of single-ended capacitors	The internal structure of single-ended capacitors might be damaged if excessive force is applied to the lead wires. Avoid any compressive, tensile or flexural stress. Do not move the capacitor after soldering to PC board. Do not pick up the PC board by the soldered capacitor. Do not insert the capacitor on the PC board with a hole space different to the lead space specified.	11.3 "Mounting considerations for single-ended capacitors"
Soldering	Do not exceed the specified time or temperature limits during soldering.	11.5 "Soldering"
Soldering, cleaning agents	Do not allow halogenated hydrocarbons to come into contact with aluminum electrolytic capacitors.	11.6 "Cleaning agents"
Upper category temperature	Do not exceed the upper category temperature.	7.2 "Maximum permissible operating temperature"
Passive flammability	Avoid external energy, e.g. fire.	8.1 "Passive flammability"

Topic	Safety information	Reference chapter "General technical information"
Active flammability	Avoid overload of the capacitors.	8.2 "Active flammability"
Maintenance	Make periodic inspections of the capacitors. Before the inspection, make sure that the power supply is turned off and carefully discharge the capacitors. Do not apply excessive mechanical stress to the capacitor terminals when mounting.	10 "Maintenance"
Storage	Do not store capacitors at high temperatures or high humidity. Capacitors should be stored at +5 to +35 °C and a relative humidity of $\leq 75\%$ .	7.3 "Shelf life and storage conditions"
		Reference chapter "Capacitors with screw terminals"
Breakdown strength of insulating sleeves	Do not damage the insulating sleeve, especially when ring clips are used for mounting.	"Screw terminals – accessories"

### 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](http://www.tdk-electronics.tdk.com/orderingcodes).



**Symbols and terms**

Symbol	English	German
C	Capacitance	Kapazität
$C_R$	Rated capacitance	Nennkapazität
$C_S$	Series capacitance	Serienkapazität
$C_{S,T}$	Series capacitance at temperature T	Serienkapazität bei Temperatur T
$C_f$	Capacitance at frequency f	Kapazität bei Frequenz f
d	Case diameter, nominal dimension	Gehäusedurchmesser, Nennmaß
$d_{max}$	Maximum case diameter	Maximaler Gehäusedurchmesser
ESL	Self-inductance	Eigeninduktivität
ESR	Equivalent series resistance	Ersatzserienwiderstand
$ESR_f$	Equivalent series resistance at frequency f	Ersatzserienwiderstand bei Frequenz f
$ESR_T$	Equivalent series resistance at temperature T	Ersatzserienwiderstand bei Temperatur T
f	Frequency	Frequenz
I	Current	Strom
$I_{AC}$	Alternating current (ripple current)	Wechselstrom
$I_{AC,RMS}$	Root-mean-square value of alternating current	Wechselstrom, Effektivwert
$I_{AC,f}$	Ripple current at frequency f	Wechselstrom bei Frequenz f
$I_{AC,max}$	Maximum permissible ripple current	Maximal zulässiger Wechselstrom
$I_{AC,R}$	Rated ripple current	Nennwechselstrom
$I_{leak}$	Leakage current	Reststrom
$I_{leak,op}$	Operating leakage current	Betriebsreststrom
l	Case length, nominal dimension	Gehäuselänge, Nennmaß
$l_{max}$	Maximum case length (without terminals and mounting stud)	Maximale Gehäuselänge (ohne Anschlüsse und Gewindebolzen)
R	Resistance	Widerstand
$R_{ins}$	Insulation resistance	Isolationswiderstand
$R_{symm}$	Balancing resistance	Symmetrierwiderstand
T	Temperature	Temperatur
$\Delta T$	Temperature difference	Temperaturdifferenz
$T_A$	Ambient temperature	Umgebungstemperatur
$T_B$	Capacitor base temperature	Temperatur des Gehäusebodens
$T_C$	Case temperature	Gehäusetemperatur
t	Time	Zeit
$\Delta t$	Period	Zeitraum
$t_b$	Service life (operating hours)	Brauchbarkeitsdauer (Betriebszeit)
V	Voltage	Spannung
$V_F$	Forming voltage	Formierspannung
$V_{op}$	Operating voltage	Betriebsspannung
$V_R$	Rated voltage, DC voltage	Nennspannung, Gleichspannung
$V_S$	Surge voltage	Spitzenspannung
$X_C$	Capacitive reactance	Kapazitiver Blindwiderstand

Symbol	English	German
$X_L$	Inductive reactance	Induktiver Blindwiderstand
$Z$	Impedance	Scheinwiderstand
$Z_T$	Impedance at temperature T	Scheinwiderstand bei Temperatur T
$\tan \delta$	Dissipation factor	Verlustfaktor
$\lambda$	Failure rate	Ausfallrate
$\epsilon_0$	Absolute permittivity	Elektrische Feldkonstante
$\epsilon_r$	Relative permittivity	Dielektrizitätszahl
$\omega$	Angular frequency; $2 \cdot \pi \cdot f$	Kreisfrequenz; $2 \cdot \pi \cdot f$

**Note:**

All dimensions are given in mm.

## Important notes

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](http://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**.

## Important notes

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, ExoCore, FilterCap, FormFit, InsuGate, LeaXield, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, 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](http://www.tdk-electronics.tdk.com/trademarks).

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