

Aluminum electrolytic capacitors

Axial-lead and soldering star capacitors,
very high ripple current – up to 150 °C

Series/Type: B41687, B41787

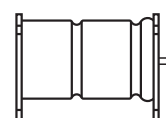
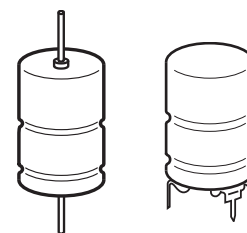
Date: May 2020

Applications

- Automotive electronics

Features

- Very high ripple current capability, optimized for heat-sink applications
- Vibration stability up to 60 g available upon request
- Useful life, 4000 h at up to 125 °C, 63 V DC
- Low ESR at high frequency
- SIKOREL design – storage for up to 15 years at a temperature of up to 35 °C
- RoHS-compatible



Construction

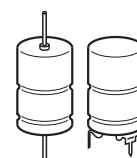
- Charge/discharge-proof, polar
- Aluminum case without PET sleeve
- Negative pole connected to case
- Version with PET sleeve available upon request

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

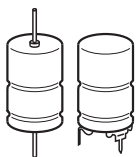
Rated voltage V_R	63 V DC				
Surge voltage V_S	$1.15 \cdot V_R$				
Rated capacitance C_R	360 ... 1800 μF				
Capacitance tolerance	$-10/+30\% \triangleq Q$				
Leakage current I_{leak} (5 min, 20 °C)	$I_{\text{leak}} \leq 0.006 \mu\text{A} \cdot \left(\frac{C_R}{\mu\text{F}} \cdot \frac{V_R}{V} \right) + 4 \mu\text{A}$				
Self-inductance ESL ¹⁾	Diameter d (mm)	16	18	21	
	Terminals	Length l (mm)	Approx. ESL (nH)		
	axial	25	26	30	–
		30	29	34	–
		35	31	36	–
		39	33	38	–
		49	–	–	–
	soldering star	25	7	8	–
		30	8	10	11
		35	9	10.5	12
39		9	11	13	
49		–	–	14	
Useful life ²⁾ $T_A = 125 \text{ °C}; V_R; I_{AC,R}$ $T_C = 125 \text{ °C}; V_R; I_{AC,max}$	$> 4000 \text{ h}$	Requirements:			
	$> 2000 \text{ h}$	$ \Delta C/C \leq 30\%$ of initial value $I_{\text{leak}} \leq$ initial specified limit $\text{ESR} \leq 3$ times initial specified limit ³⁾			
Voltage endurance test 125 °C; V_R	3000 h for $V_R = 63 \text{ V DC}$	Post test requirements:			
		$ \Delta C/C \leq 10\%$ of initial value $\text{ESR} \leq 1.3$ times initial specified limit ³⁾ $I_{\text{leak}} \leq$ initial specified limit			
Vibration resistance test	To IEC 60068-2-6, test Fc: Frequency range 10 Hz ... 2 kHz, displacement amplitude max. 1.5 mm, acceleration max. 20 g, duration $3 \times 2 \text{ h}$. Capacitor rigidly clamped by the aluminum case e.g. using our standard fixture.				
IEC climatic category	To IEC 60068-1: 55/125/56 (–55 °C/+125 °C/56 days damp heat test)				
Sectional specification	IEC 60384-4				
Reference standard	AEC-Q200 ⁴⁾				

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_{max} at 100 Hz, 20 °C

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

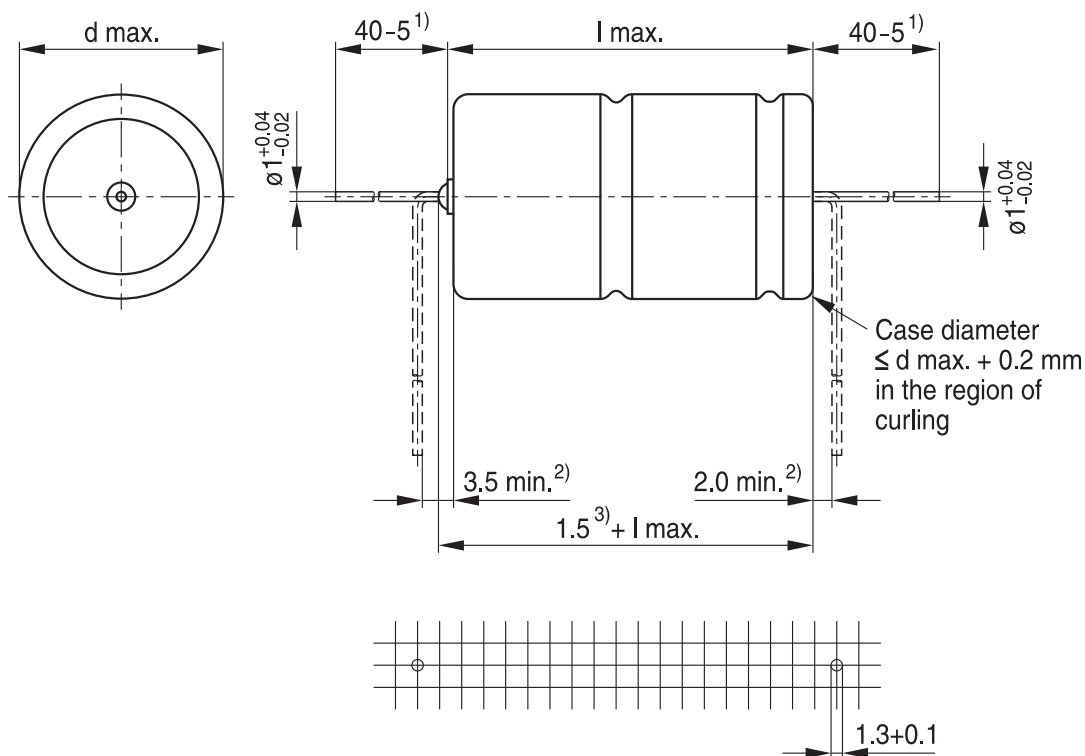


B41687, B41787

Very high ripple current – up to 150 °C

B41687, Axial-lead capacitors

Dimensional drawing

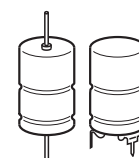


- 1) Lead lengths for pallet packaging
- 2) Minimum bending distance recommended per wire
- 3) Maximum length of welding projection

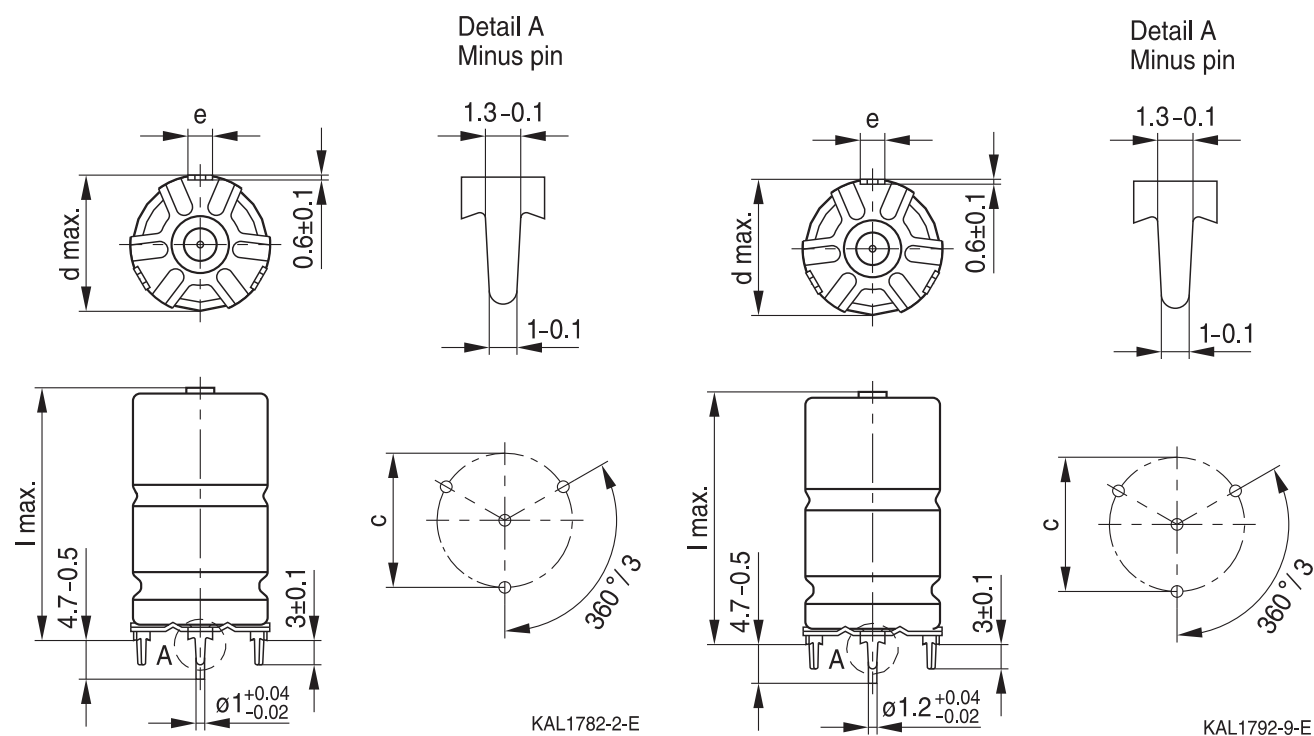
KAL1783-A-E

Dimensions, weights and packing units

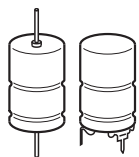
d × l mm	d _{max} × l _{max} mm	Approx. weight g	Packing units (pcs.)	
			Pallet	Reel
16 × 25	16.3 × 25.4	7.4	180	250
16 × 30	16.3 × 30.4	8.9	180	250
16 × 35	16.3 × 35.4	10.4	180	250
16 × 39	16.3 × 39.9	11.7	180	250
18 × 25	18.3 × 25.4	9.3	160	—
18 × 30	18.3 × 30.4	11.1	160	—
18 × 35	18.3 × 35.4	12.8	160	—
18 × 39	18.3 × 39.9	14.7	160	—


B41787, Soldering star capacitors
Dimensional drawings

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

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

Dimensions, weights and packing units

$d \times l$ mm	$d_{\max} \times l_{\max}$ mm	$c \pm 0.1$ mm	$e \pm 0.1$ mm	Approx. weight g	Packing units pcs.
16 × 25	17.5 × 27	16.5	3.0	7.9	300
16 × 30	17.5 × 32	16.5	3.0	9.4	300
16 × 35	17.5 × 37	16.5	3.0	10.9	200
16 × 39	17.5 × 41.5	16.5	3.0	12.2	200
18 × 25	19.5 × 27	18.5	3.0	9.9	300
18 × 30	19.5 × 32	18.5	3.0	11.8	300
18 × 35	19.5 × 37	18.5	3.0	13.2	200
18 × 39	19.5 × 41.5	18.5	3.0	15.4	200
21 × 30	22.5 × 32	21.5	3.5	17.5	468
21 × 35	22.5 × 37	21.5	3.5	18.3	324
21 × 39	22.5 × 41.5	21.5	3.5	21.0	324
21 × 49	22.5 × 51.5	21.5	3.5	26.0	264

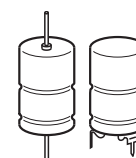


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Very high ripple current – up to 150 °C

Overview of available types

V_R (V DC)	63
	Case dimensions $d \times l$ (mm)
C_R (μF)	
360	16 × 25
470	18 × 25
510	16 × 30
620	16 × 35 18 × 30
750	16 × 39
820	18 × 35
910	18 × 39 21 × 30
1100	21 × 35
1300	21 × 39
1800	21 × 49


Case dimensions and ordering codes

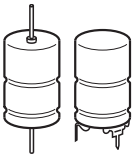
C_R 100 Hz 20 °C μF	Case dimensions $d \times l$ mm	Ordering code Axial pallet	Ordering code Axial reel	Ordering code Soldering star
$V_R = 63 \text{ V DC}$				
360	16 × 25	B41687A8367Q001	B41687A8367Q003	B41787A8367Q001
470	18 × 25	B41687A8477Q001		B41787A8477Q001
510	16 × 30	B41687A8517Q001	B41687A8517Q003	B41787A8517Q001
620	16 × 35	B41687A8627Q001	B41687A8627Q003	B41787A8627Q001
620	18 × 30	B41687B8627Q001		B41787B8627Q001
750	16 × 39	B41687A8757Q001	B41687A8757Q003	B41787A8757Q001
820	18 × 35	B41687A8827Q001		B41787A8827Q001
910	18 × 39	B41687A8917Q001		B41787A8917Q001
910	21 × 30			B41787B8917Q001
1100	21 × 35			B41787A8118Q001
1300	21 × 39			B41787A8138Q001
1800	21 × 49			B41787A8188Q001

Technical data

C_R 100 Hz 20 °C μF	Case dimensions $d \times l$ mm	ESR_{max} 100 Hz 20 °C m Ω	ESR_{max} 100 Hz –40 °C m Ω	ESR_{max} 10 kHz 20 °C m Ω	$I_{\text{AC,R}}$ 10 kHz T_A 125 °C A	$I_{\text{AC,max}}^{1) 2)}$ 10 kHz T_C 125 °C A
$V_R = 63 \text{ V DC}$						
360	16 × 25	173	652	43	3.3	11.8
470	18 × 25	132	499	33	4.1	14.9
510	16 × 30	124	461	33	4.2	13.9
620	16 × 35	102	379	26	5.0	15.7
620	18 × 30	100	379	25	5.1	17.7
750	16 × 39	84	314	23	5.6	17.1
820	18 × 35	76	287	20	6.2	19.9
910	18 × 39	69	258	18	6.9	21.6
910	21 × 30	71	259	19	6.0	23.6
1100	21 × 35	58	215	16	7.0	26.3
1300	21 × 39	50	182	14	8.0	28.4
1800	21 × 49	36	132	11	10.0	32.2

1) Maximum ripple current at 125 °C 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.

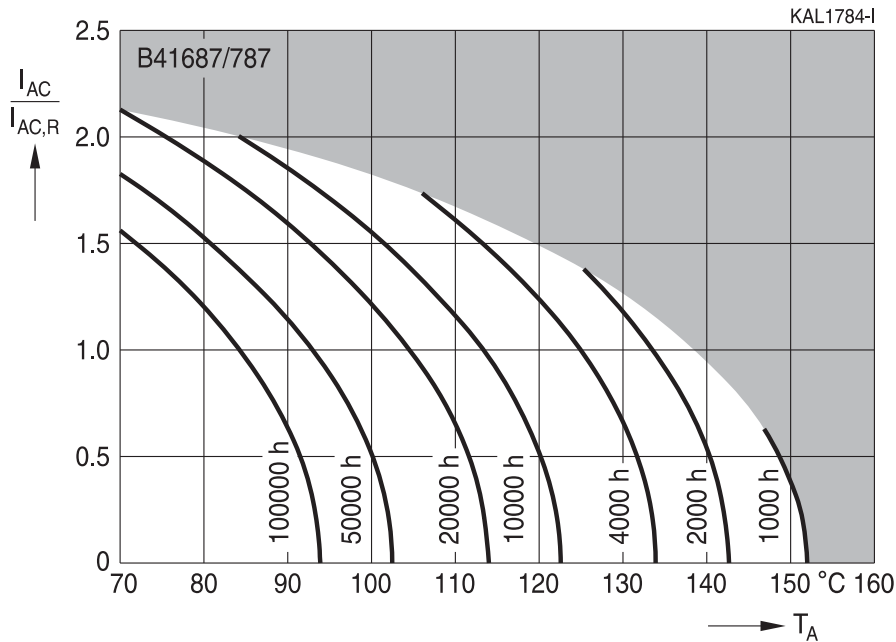


B41687, B41787

Very high ripple current – up to 150 °C

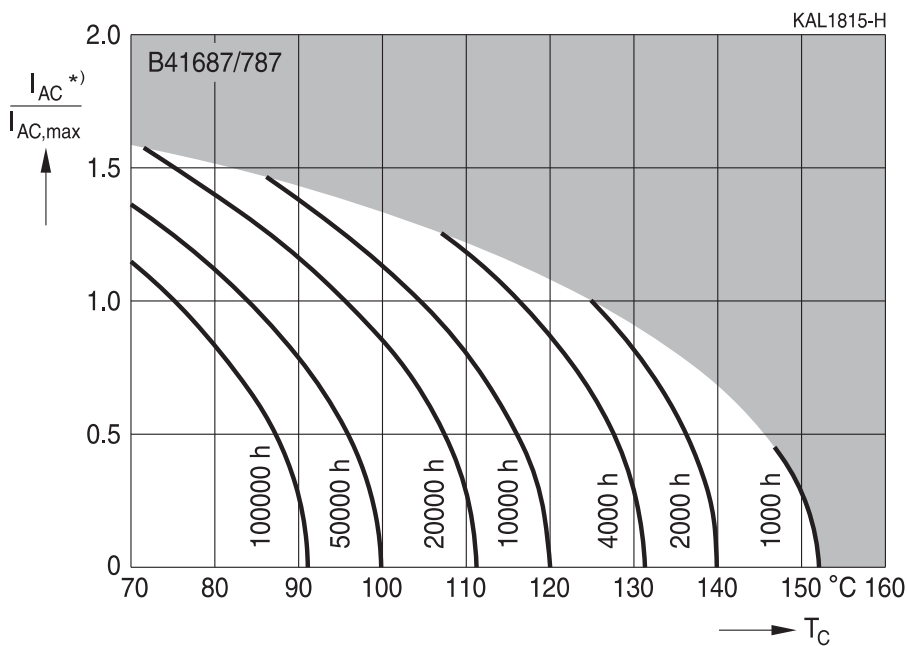
Useful life¹⁾

depending on ambient temperature T_A under ripple current operating conditions at V_R



Useful life¹⁾

depending on case temperature T_C under ripple current operating conditions at V_R

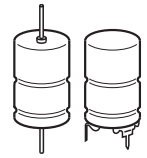


^{*)} Maximum ripple current I_{AC} under continuous operation is limited to 35 A.

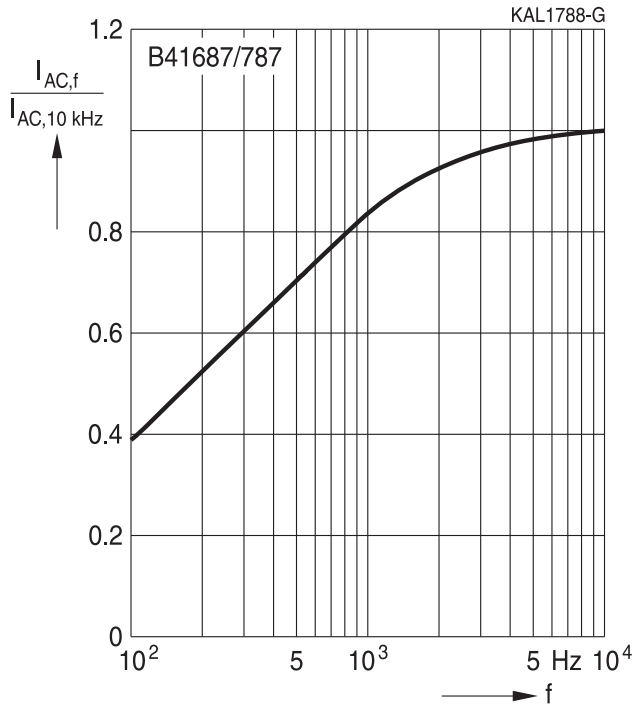
1) Refer to chapter "General technical information, 5 Useful life" on how to interpret useful life.

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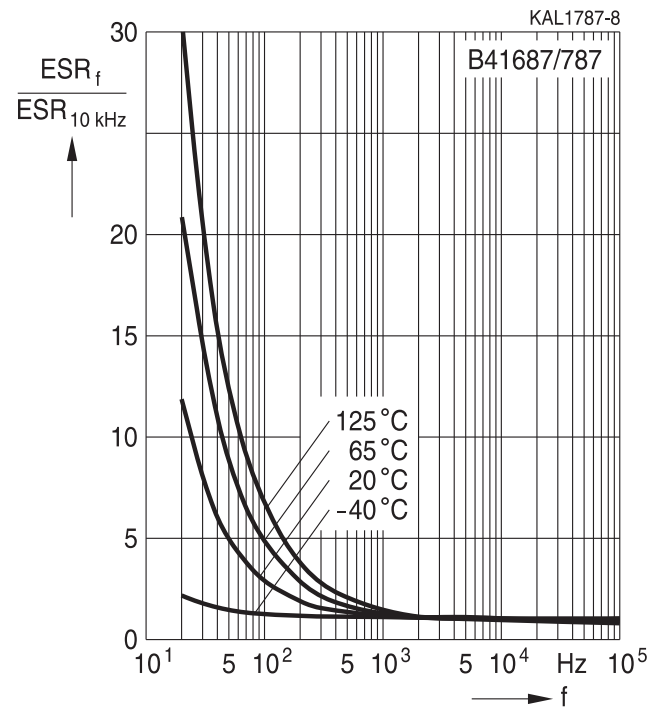
Very high ripple current – up to 150 °C



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

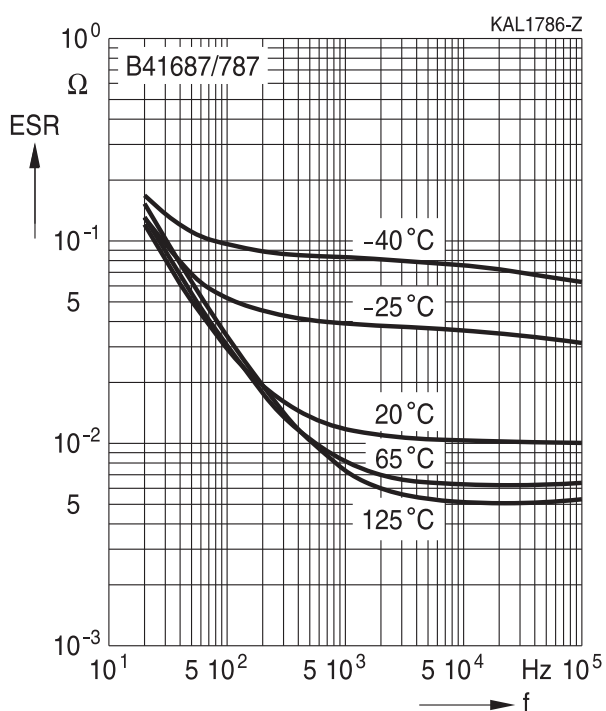


**Frequency characteristics of ESR
Typical behavior**



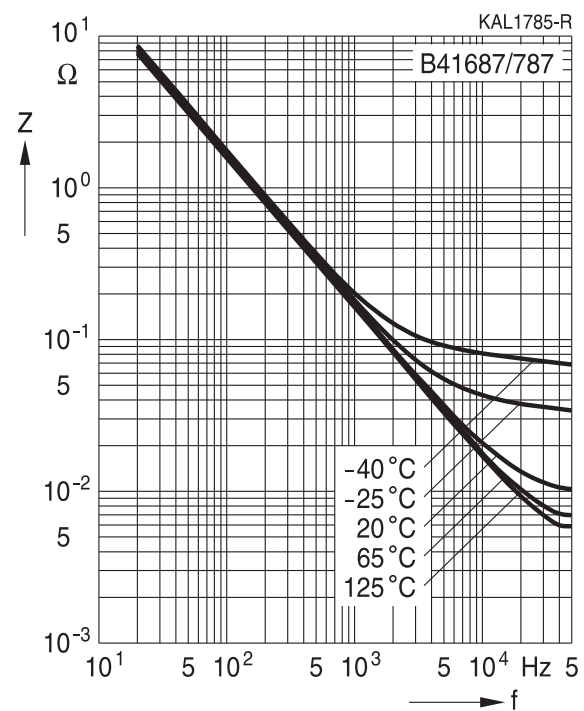
Equivalent series resistance ESR versus frequency f

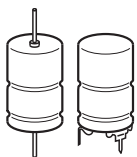
Typical behavior for 910 μ F/63 V



Impedance Z versus frequency f

Typical behavior for 910 μ F/63 V





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Very high ripple current – up to 150 °C

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.

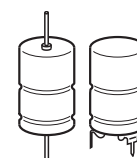
As far as possible, we do not use any dangerous chemicals or compounds to produce operating electrolytes, although in exceptional cases, such materials must be used in order to achieve specific physical and electrical properties because no alternative materials are currently known. We do, however, restrict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

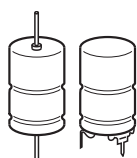
Nevertheless, the following rules should be observed when handling aluminum electrolytic capacitors: No electrolyte should come into contact with eyes or skin. If electrolyte does come into contact with the skin, wash the affected areas immediately with running water. If the eyes are affected, rinse 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 screw-terminal capacitors	Screw terminal capacitors must not be mounted with terminals facing down unless otherwise specified.	11.1. "Mounting positions of capacitors with screw 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	11.3 "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.	11.4 "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"



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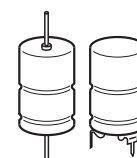
Very high ripple current – up to 150 °C

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 ≤ 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"

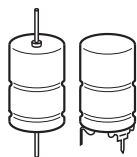
Display of ordering codes for TDK Electronics products

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.


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
ΔT	Temperature difference	Temperaturdifferenz
T_A	Ambient temperature	Umgebungstemperatur
T_C	Case temperature	Gehäusetemperatur
T_B	Capacitor base temperature	Temperatur des Gehäusebodens
t	Time	Zeit
Δt	Period	Zeitraum
t_b	Service life (operating hours)	Brauchbarkeitsdauer (Betriebszeit)



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Very high ripple current – up to 150 °C

Symbol	English	German
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
X_L	Inductive reactance	Induktiver Blindwiderstand
Z	Impedance	Scheinwiderstand
Z_T	Impedance at temperature T	Scheinwiderstand bei Temperatur T
$\tan \delta$	Dissipation factor	Verlustfaktor
λ	Failure rate	Ausfallrate
ϵ_0	Absolute permittivity	Elektrische Feldkonstante
ϵ_r	Relative permittivity	Dielektrizitätszahl
ω	Angular velocity; $2 \cdot \pi \cdot f$	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 lifesaving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.tdk-electronics.tdk.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to our General Terms and Conditions of Supply**.

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.
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