Aluminum electrolytic capacitors

Large-size capacitors

Series/Type: **B43508**

Date: December 2016

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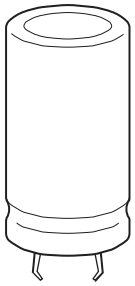
Long-life grade capacitors



Application

- On-board chargers

Features

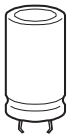
- Extremely high CV product, compact
- High reliability
- High ripple current capability
- Capacitors pass the needle flame test according to IEC 60695-11-5 for all flame exposure times up to 120 s
- RoHS-compatible

Construction

- Charge/discharge-proof, polar
- Aluminum case, fully insulated with PET
- Up to 40 *g* vibration stability version available upon request
- Snap-in solder pins to hold component in place on PC-board
- Minus pole marking on case surface
- Minus pole not insulated from case
- Overload protection by safety vent on the base

Terminals

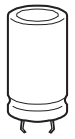
- 3 terminals to ensure correct insertion: length 4.5 mm
- Version with wired terminals, weldable and solderable, available upon request



Specifications and characteristics in brief

Rated voltage V_R Surge voltage V_S	450 V DC $1.10 \cdot V_R$	
Rated capacitance C_R Capacitance tolerance	120 ... 680 µF ±20% ≙ M	
Dissipation factor tan δ (20 °C, 120 Hz)	tan δ ≤ 0.20	
Leakage current I_{leak} (5 min, 20 °C)	$I_{leak} \leq 0.3\ \mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V}\right)^{0.7} + 4\ \mu A$	
Self-inductance ESL	Approx. 20 nH	
Useful life[1)] 105 °C; V_R; $I_{AC,R}$ 85 °C; V_R; $I_{AC,\,max}$ 40 °C; V_R; $1.9 \cdot I_{AC,R}$	 > 3000 h > 6500 h > 200000 h	Requirements: |ΔC/C| ≤ 20% of initial value tan δ ≤ 2 times initial specified limit I_{leak} ≤ initial specified limit
Voltage endurance test 105 °C; V_R	2000 h	Post test requirements: |ΔC/C| ≤ 10% of initial value tan δ ≤ 1.3 times initial specified limit I_{leak} ≤ initial specified limit
Vibration resistance test	To AEC-Q200 MIL-STD-202, methode 204: Frequency range 10 Hz ... 2 kHz, displacement amplitude max. 0.75 mm, acceleration max. 5 *g*, duration 3 × 4 h. Capacitor mounted by its body which is rigidly clamped to the work surface.	
Characteristics at low temperature	Max. impedance ratio at 100 Hz	$Z_{-25\,°C} / Z_{20\,°C}$: 7 $Z_{-40\,°C} / Z_{20\,°C}$: 13
IEC climatic category	To IEC 60068-1: 25/105/56 (−25 °C/+105 °C/56 days damp heat test) The capacitors can be operated in the temperature range of −40 °C to +105 °C but the impedance at −40 °C must be taken into consideration.	
Detail specification Sectional specification	Similar to CECC 30301-809 IEC 60384-4, AEC-Q200	

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



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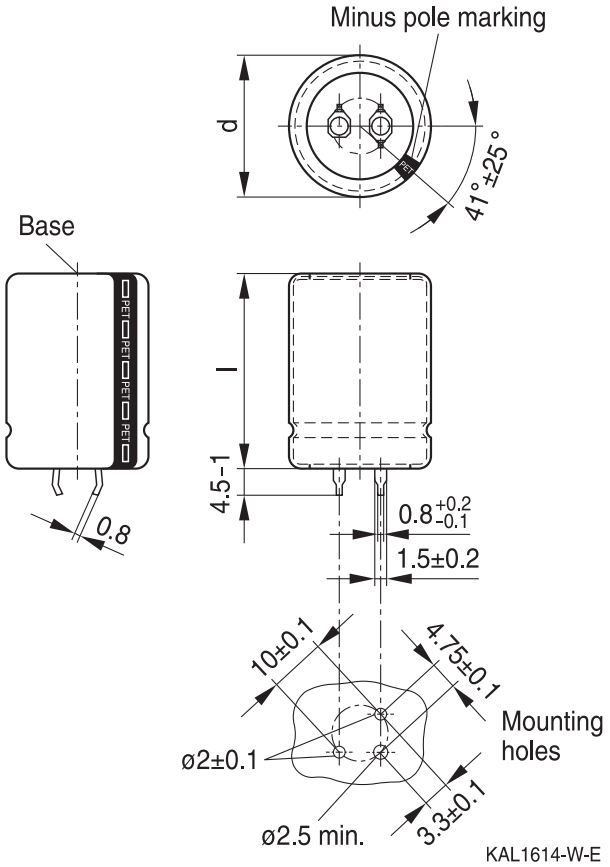
Compact – 105 °C

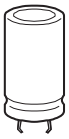
Dimensional drawing

Large-size capacitor, snap-in version with PET insulation



Dimensions (mm)		Approx.	Packing
d +1	l ±2	weight(g)	units (pcs.)
25	30	17	130
25	35	19	130
25	40	22	130
25	50	29	130
25	55	32	130
30	30	23	80
30	35	29	80
30	40	36	80
30	45	41	80
30	55	53	80
35	35	36	60
35	40	41	60
35	45	56	60
35	55	81	60

Large-size capacitors, snap-in versions are available with 3 terminals (length (4.5 –1) mm). PET insulation is marked with "PET" on the sleeve. Safety vent on the base.



Packing example of large-size capacitors, snap-in version

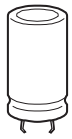
For ecological reasons the packing is pure cardboard.

Ordering codes for terminal styles and insulation features

Identification in 3rd block of ordering code	
Large-size capacitors	
Terminal version	PET insulation
3 terminals 4.5 mm	M062

Ordering example:

B43508B5127M062 } Large-size capacitor, snap-in version with 3 terminals and PET insulation



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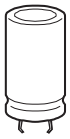
Compact – 105 °C

Technical data and ordering codes

C_R 100 Hz 20 °C µF	Case dimensions d × l mm	ESR_{typ} 100 Hz 20 °C mΩ	Z_{max} 10 kHz 20 °C mΩ	$I_{AC,max}$ 100 Hz 60 °C A	$I_{AC,max}$ 100 Hz 85 °C A	$I_{AC,R}$ [1] 100 Hz 105 °C A	Ordering code (composition see below)
V_R = 450 V DC							
120	25 × 30	1020	1440	2.08	1.55	0.77	B43508B5127M062
150	25 × 30	820	1150	2.33	1.74	0.86	B43508B5157M062
180	25 × 35	680	960	2.64	1.97	0.97	B43508B5187M062
180	30 × 30	680	960	2.73	2.04	1.01	B43508C5187M062
220	25 × 40	560	790	3.01	2.25	1.11	B43508B5227M062
220	30 × 30	560	790	3.02	2.26	1.11	B43508C5227M062
270	25 × 50	460	640	3.51	2.63	1.30	B43508A5277M062
270	30 × 35	460	640	3.47	2.59	1.28	B43508B5277M062
330	25 × 55	370	530	3.97	2.97	1.47	B43508A5337M062
330	30 × 40	370	530	4.21	3.15	1.56	B43508B5337M062
330	35 × 35	370	530	4.06	3.04	1.50	B43508C5337M062
390	30 × 45	320	450	4.71	3.52	1.74	B43508A5397M062
390	35 × 35	320	450	4.42	3.30	1.63	B43508B5397M062
470	30 × 55	260	370	5.42	4.05	2.00	B43508A5477M062
470	35 × 40	260	370	5.00	3.74	1.85	B43508B5477M062
560	35 × 45	220	310	5.62	4.20	2.08	B43508A5567M062
680	35 × 55	180	260	6.50	4.86	2.40	B43508A5687M062

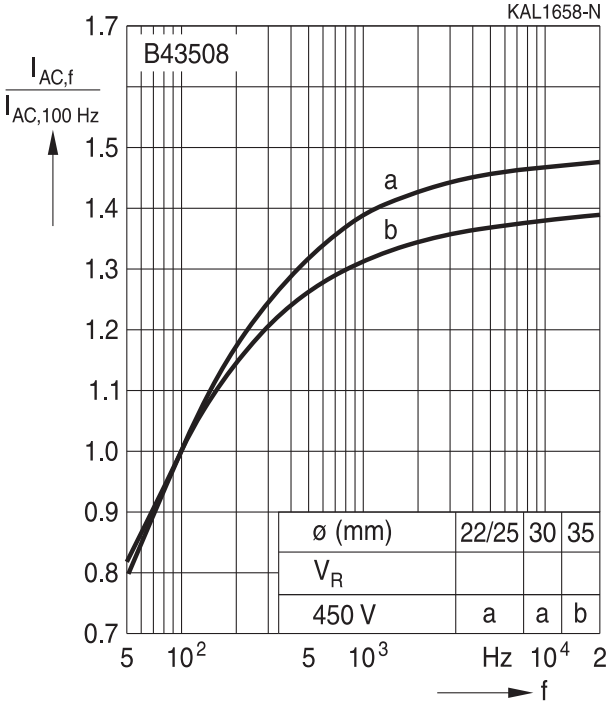
1) 120-Hz conversion factor of ripple current: I_{AC} (120 Hz) = 1.03 · I_{AC} (100 Hz)



Useful life[1)]

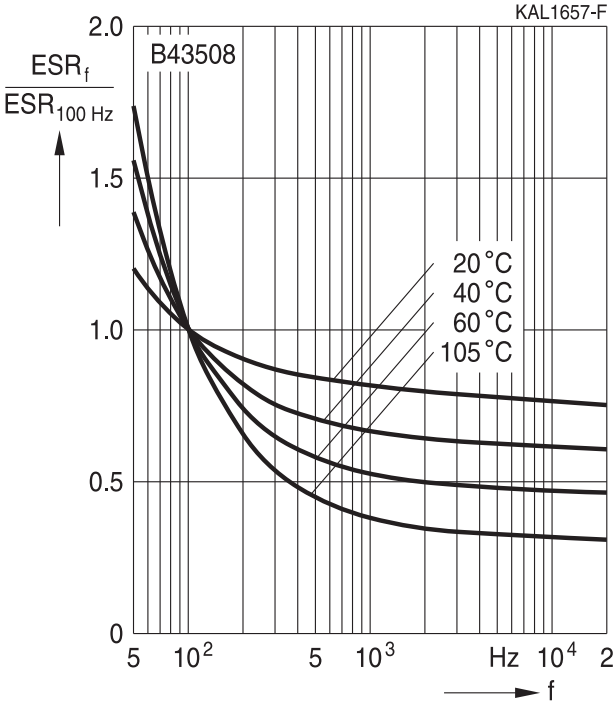
The useful life graph is available upon request.

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



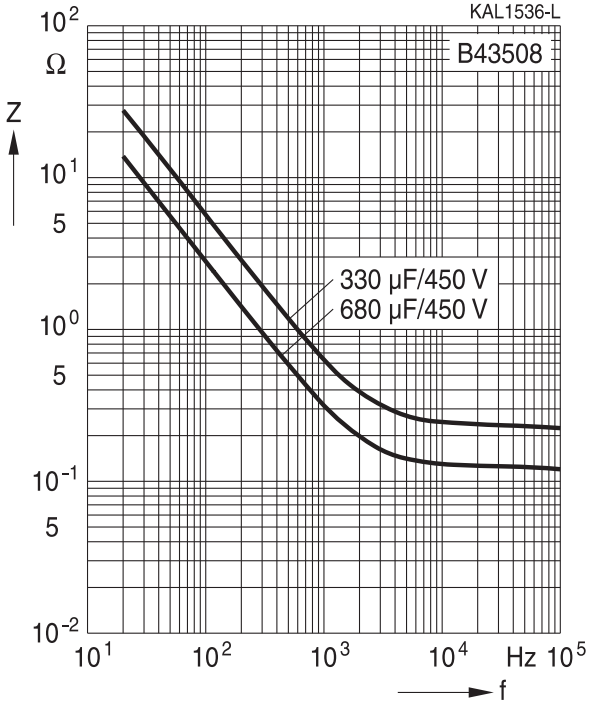
Frequency characteristics of ESR

Typical behavior

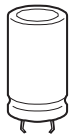


Impedance Z versus frequency f

Typical behavior at 20 °C



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



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Compact – 105 °C

Cautions and warnings

Personal safety

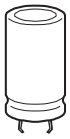
The electrolytes used by EPCOS have been optimized both with a view to the intended application and with regard to health and environmental compatibility. They do not contain any solvents that are detrimental to health, e.g. dimethyl formamide (DMF) or dimethyl acetamide (DMAC).
Furthermore, some of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

As far as possible, EPCOS does 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 EPCOS aluminum electrolytic capacitors are continuously adapted in compliance with the EPCOS 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 the EPCOS 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 all of our electrolytes upon request.

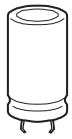
Nevertheless, the following rules should be observed when handling aluminum electrolytic capacitors: No electrolyte should come into contact with eyes or skin. If electrolyte does come into contact with the skin, wash the affected areas immediately with running water. If the eyes are affected, rinse 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 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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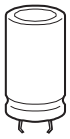
Topic	Safety information	Reference chapter "General technical information"
Active flammability	Avoid overload of the capacitors.	8.2 "Active flammability"
Maintenance	Make periodic inspections of the capacitors. Before the inspection, make sure that the power supply is turned off and carefully discharge 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"

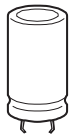
Display of ordering codes for EPCOS products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of EPCOS, 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.epcos.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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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 δ	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 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). 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.**
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.

Important notes

8. The trade names EPCOS, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoFuse, WindCap 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.

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