

EPCOS Product Brief 2015

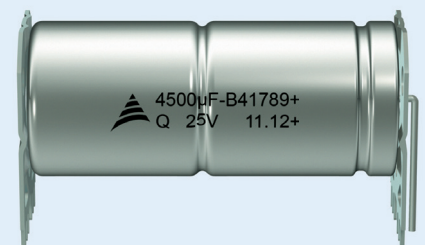
Aluminum Electrolytic Capacitors

Automotive Capacitor Designs for Applications in Harsh Environments

The newly designed EPCOS Axial-lead aluminum electrolytic capacitors are optimized to boost high energy efficiency in automotive electronics. These capacitors are distinguished by their high ripple current capability and their particularly rugged mechanical design for use in harsh environmental conditions.

Customer benefits

- High ripple current capability with low ESR at operating conditions
- Vibration resistance of up to 45 g
- Low thermal resistance
- Long useful life of up to 10 000 h at +125 °C
- RoHS compatible
- Whisker mitigation solutions available



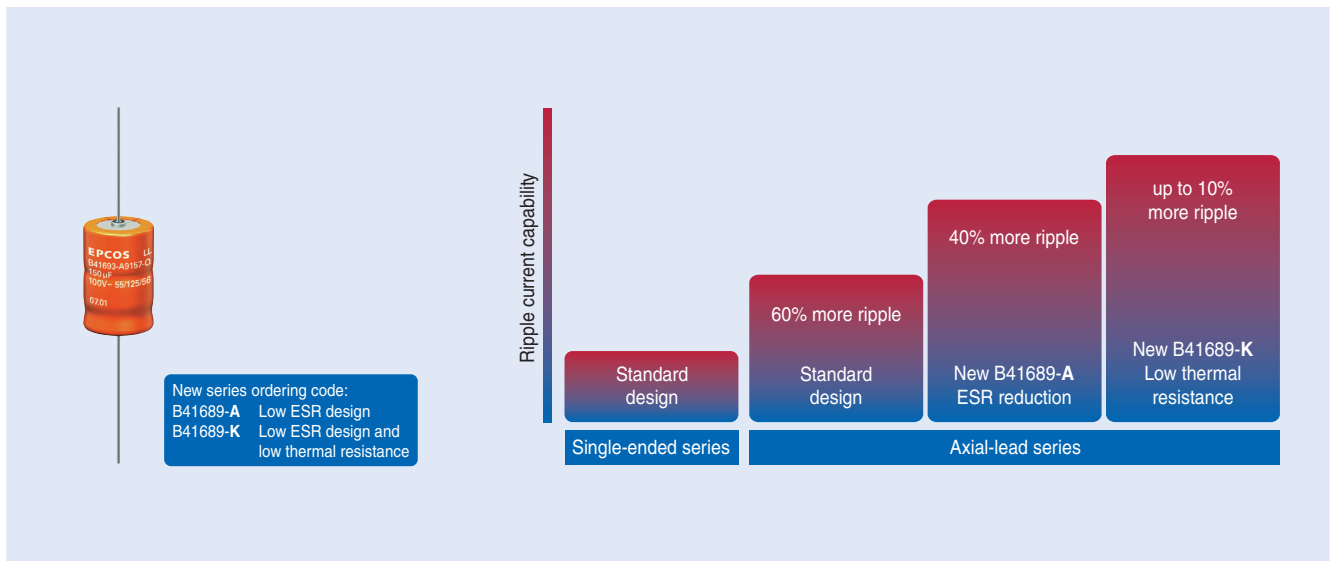
Axial-lead Capacitors

Electrical Performance

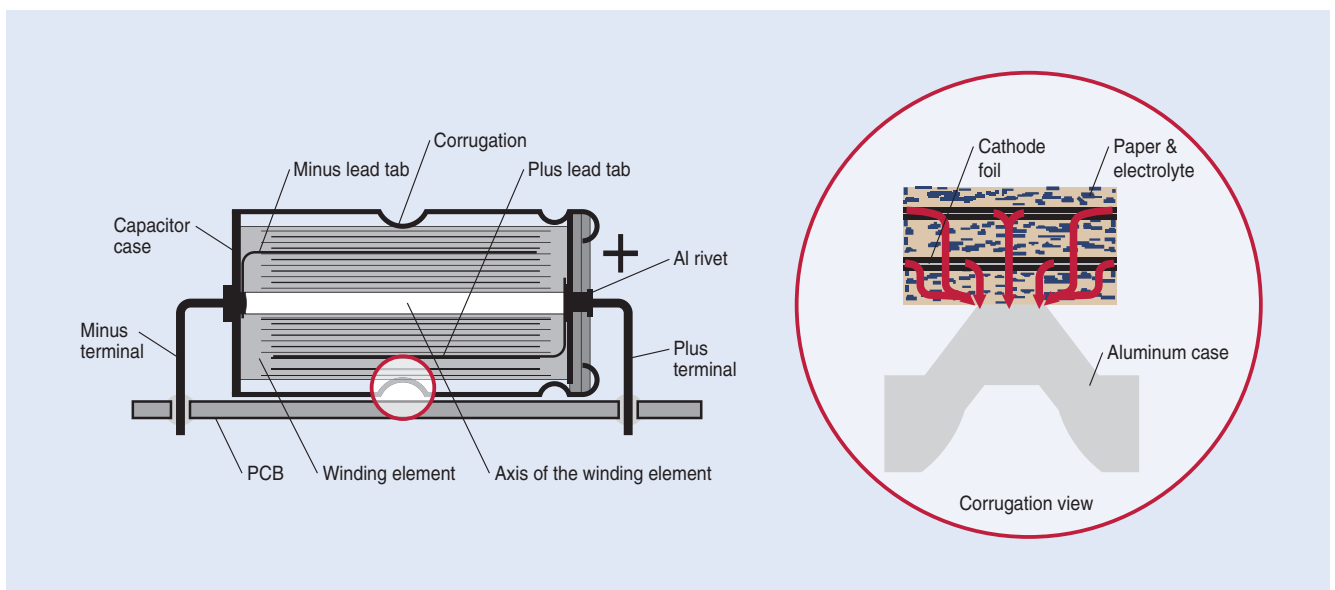
Increasing ripple current capability

The basic design of Axial-lead capacitors offers significant advantages over the standard Single-ended designs. The new EPCOS B41689-**A** series features special design technologies that enable a significant reduction of the electrical series resistance (ESR) of the capacitors.

Reduction of ESR results in a lower self-heating effect for a given ripple load. The B41689-**A** series features a ripple current capability more than two times higher compared to standard Single-ended designs with comparable dimensions.



Lower self-heating temperatures can also be achieved by reducing the internal thermal resistances. The newly developed thermal corrugation offers several thermal paths between the winding and the aluminum can. The advantage of this technology is that it reduces the thermal resistance of the capacitor and thus lowering the hot spot temperature. This further improves the performance of the capacitors. The ripple current capability of the EPCOS B41689-**K** series is increased by 10 percent in case of forced cooling. This design variant is also available on request for the other current series.



Axial-lead Capacitors

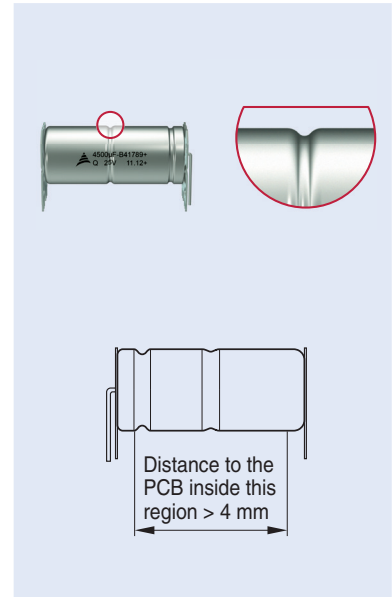
Mechanical Performance

Increased mechanical resistance of up to 45 g

High vibration strength has become one of the most important requirements for the use of aluminum electrolytic capacitors in automotive electronics. Intensive work on further innovations in the field of mechanical resistance have resulted in a special corrugation for Axial-lead capacitors that strengthens the internal stability of the winding element, so that it can withstand acceleration forces of up to 45 g. Special Axial-lead capacitor design is available upon request.

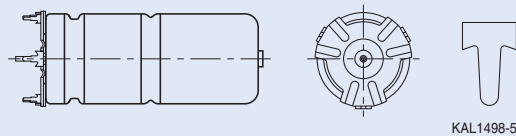
Historically, alternative materials, such as adhesives, resins, or additionally soldered metal brackets, are often used for the fixation of capacitors onto the circuit board. All these measures are usually time- and cost-intensive.

Using Axial-lead capacitors as the basis, special mechanical constructions were developed to improve the external mechanical stability of the capacitor. The Axial-lead design with double-sided plates for horizontal mounting on the circuit board enables a vibration resistance of up to 45 g, even when the component is only soldered to the circuit board without any further external fixation. In addition, the plates hold the capacitor 4 mm from the circuit board so that this space is available for the mounting of other devices. Furthermore the component offers a protection against polarity reversal (PAPR).



Mechanical configurations overview

Soldering star design

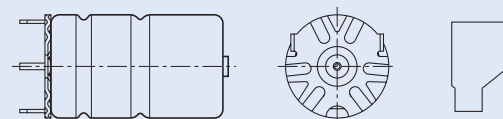


KAL1498-5

Axial-lead design with single-sided plate for welding



Design available upon request



KAL1499-D

Axial-lead design with double-sided plates



Design available upon request

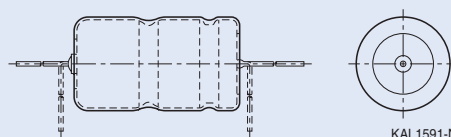


KAL1501-T

Axial lead



Design available in dimension 18 x 20 mm upon request



KAL1591-N

New Axial-lead Capacitor Series

Top Class Electrical Performance



Axial-lead series B41689/B41789												
C_R 120 Hz 20 °C µF	Case dim. d × l mm	ESR_{max} 100 Hz 20 °C Ω	ESR_{max} 100 Hz -40 °C Ω	ESR_{max} 10 kHz 20 °C Ω	Z_{max} 100 kHz 20 °C Ω	$I_{AC,R}$ 10 kHz 125 °C A	$I_{AC,max}^{1)}$ 10 kHz 125 °C A	$I_{AC,max}$ 10 kHz 125 °C A	$I_{AC,max}$ 10 kHz 150 °C A	Ordering Code Axial pallet	Ordering Code Axial reel	Ordering Code Soldering Star
$V_R = 25 V DC$												
1000	16 × 25	0.098	0.565	0.053	0.050	3.6	10.1	6.0	1.8	B41689K5108Q001	B41689K5108Q003	B41789K5108Q001
1200	18 × 25	0.080	0.470	0.043	0.041	4.4	12.2	7.2	2.2	B41689K5128Q001		B41789K5128Q001
1300	16 × 30	0.075	0.435	0.041	0.039	4.5	12.5	7.4	2.2	B41689K5138Q001	B41689K5138Q003	B41789K5138Q001
1500	16 × 35	0.065	0.377	0.035	0.034	5.2	14.6	8.6	2.6	B41689K5158Q001		B41789K5158Q001
1700	18 × 30	0.057	0.332	0.031	0.029	5.5	15.5	9.1	2.8	B41689K5178Q001		B41789K5178Q001
1800	16 × 39	0.055	0.314	0.030	0.028	5.9	16.6	9.8	3.0	B41689K5188Q001		B41789K5188Q001
1900	20 × 29	0.052	0.297	0.028	0.027	5.7	16.0	9.5	2.9	B41689K5198Q001		
2200	18 × 39	0.044	0.257	0.024	0.023	7.2	20.1	11.8	3.6	B41689K5228Q001		B41789K5228Q001
3300	21 × 39	0.031	0.172	0.017	0.016	8.3	23.2	13.6	4.1	B41689K5338Q001		B41789K5338Q001
4500	21 × 49	0.023	0.126	0.013	0.012	10.4	29.2	17.2	5.2	B41689K5458Q001		B41789K5458Q001
$V_R = 40 V DC$												
560	16 × 25	0.129	0.587	0.053	0.050	3.6	10.1	6.0	1.8	B41689K7567Q001	B41689K7567Q003	B41789K7567Q001
680	18 × 25	0.105	0.483	0.043	0.041	4.4	12.3	7.2	2.2	B41689K7687Q001		B41789K7687Q001
720	16 × 30	0.100	0.457	0.042	0.039	4.5	12.5	7.4	2.2	B41689K7727Q001	B41689K7727Q003	B41789K7727Q001
820	16 × 35	0.088	0.401	0.036	0.034	5.2	14.5	8.6	2.6	B41689K7827Q001		B41789K7827Q001
900	18 × 30	0.080	0.365	0.033	0.031	5.4	15.2	9.0	2.7	B41689K7907Q001		B41789K7907Q001
1000	16 × 39	0.073	0.329	0.030	0.029	5.9	16.6	9.8	3.0	B41689K7108Q001		B41789K7108Q001
1200	20 × 29	0.061	0.274	0.026	0.024	5.9	16.5	9.7	2.9	B41689K7128Q001		
1400	18 × 39	0.052	0.235	0.022	0.020	7.4	20.8	12.2	3.7	B41689K7148Q001		B41789K7148Q001
2000	21 × 39	0.038	0.165	0.016	0.016	8.4	23.4	13.8	4.2	B41689K7208Q001		B41789K7208Q001
2700	21 × 49	0.028	0.123	0.012	0.012	10.5	29.5	17.4	5.3	B41689K7278Q001		B41789K7278Q001
$V_R = 63 V DC$												
270	16 × 25	0.218	0.777	0.066	0.063	3.3	9.2	5.4	1.6	B41689K8277Q001	B41689K8277Q003	B41789K8277Q001
330	16 × 30	0.178	0.636	0.054	0.051	4.0	11.2	6.6	2.0	B41689K8337Q001	B41689K8337Q003	B41789K8337Q001
390	18 × 25	0.160	0.602	0.054	0.051	3.7	10.4	6.1	1.9	B41689K8397Q001		B41789K8397Q001
470	16 × 35	0.131	0.498	0.043	0.041	4.8	13.4	7.9	2.4	B41689K8477Q001		B41789K8477Q001
560	18 × 30	0.113	0.420	0.039	0.037	4.7	13.1	7.7	2.3	B41689K8567Q001		B41789K8567Q001
590	16 × 39	0.105	0.397	0.035	0.033	5.5	15.5	9.1	2.8	B41689K8597Q001		B41789K8597Q001
600	20 × 29	0.099	0.350	0.031	0.029	5.4	15.2	9.0	2.7	B41689K8607Q001		
820	18 × 39	0.078	0.287	0.027	0.026	6.3	17.6	10.4	3.1	B41689K8827Q001		B41789K8827Q001
1000	21 × 39	0.061	0.211	0.019	0.018	7.8	21.8	12.9	3.9	B41689K8108Q001		B41789K8108Q001
1300	21 × 49	0.047	0.162	0.015	0.014	9.8	27.4	16.2	4.9	B41689K8138Q001		B41789K8138Q001

¹⁾ Maximum ripple current at 125 °C capacitor case temperature T_C (measured at aluminum case surface), when mounted to a heat sink. Further details available upon request.

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