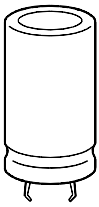
Long-life grade capacitors



KAL0274-A

Applications

- Switch-mode power supplies in industrial and entertainment electronics
- Frequency converters

Features

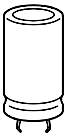
- Long useful life
- High reliability and high ripple current capability
- Low equivalent series resistance *ESR*
- High *CU* product, i.e. compact
- Different case sizes available for each capacitance value

Construction

- Charge-discharge proof, polar
- Aluminum case, fully insulated
- 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 (safety vent)

Terminals

- Standard version with 2 terminals
  2 lengths available: 6,3 and 4,5 mm
- 3 terminals: length 4,5 mm
  (terminal arrangement ensures correct insertion)

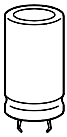


B43501

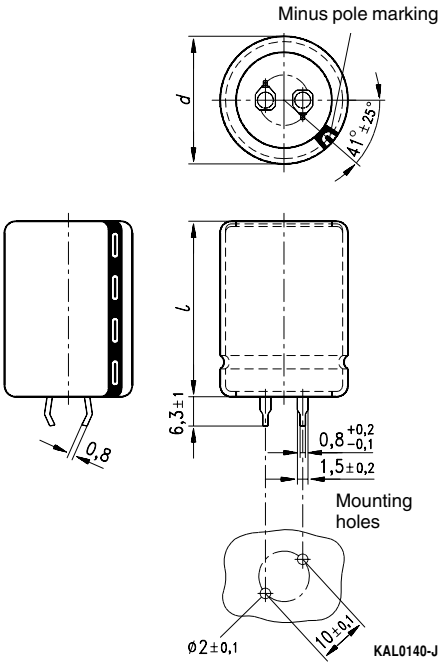
Long Life – 85 °C

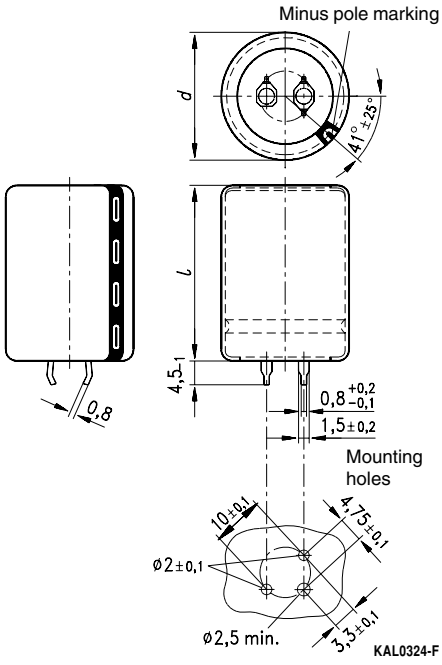
Specifications and characteristics in brief

Rated voltage U_R	160 … 450 VDC	
Surge voltage U_S	1,15 · U_R (for $U_R \leq$ 250 VDC) 1,10 · U_R (for $U_R \geq$ 385 VDC)	
Rated capacitance C_R	47 … 2 200 µF	
Capacitance tolerance	± 20 % ≙ M	
Leakage current I_L (5 min, 20 °C)	$I_L \leq 0{,}3\ \mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{U_R}{V}\right)^{0,7} + 4\ \mu A$	
Self-inductance L_{ESL}	Approx. 20 nH	
Useful life 85 °C; U_R; $I_{\sim R}$ 40 °C; U_R; 1,4 · $I_{\sim R}$	 > 10 000 h > 200 000 h	Requirements: $\Delta C/C$ ≤ ± 30 % of initial value *ESR* ≤ 3 times initial specified limit I_L ≤ initial specified limit Failure percentage: ≤ 1 % Failure rate: ≤ 50 fit (≤ 50 · 10^{-9}/h) (for definiton “fit”, refer to chapter *“Quality”*, page 62)
Voltage endurance test 85 °C; U_R	 5 000 h	Post test requirements: $\Delta C/C$ ≤ ± 10 % of initial value *ESR* ≤ 1,3 times initial specified limit I_L ≤ initial specified limit
Vibration resistance	To IEC 60068-2-6, test Fc: displacement amplitude 0,35 mm, frequency range 10 … 55 Hz, acceleration max. 5 *g*, duration 3 × 2 h	
IEC climatic category	To IEC 60068-1: $U_R \leq$ 400 VDC: 40/085/56 (– 40 °C/+ 85 °C/56 days damp heat test) $U_R \geq$ 420 VDC: 25/085/56 (– 25 °C/+ 85 °C/56 days damp heat test)	
Detail specification Sectional specification	Similar to CECC 30301-811 IEC 60384-4	



Dimensional drawings





Snap-in terminals, standard (length 6,3 ± 1 mm). Also available in a shorter version with a length of 4,5 –1 mm. For packing mode and ordering example see next page.

Dimensions (mm)		Approx. weight (g)	Packing units (pieces)
d + 1	*l* ± 2		
22	25	9	160
22	30	12	160
22	35	15	160
22	40	18	160
25	25	13	130
25	30	17	130
25	35	19	130
25	40	22	130

Snap-in capacitors are also available with 3 terminals (length 4,5 –1 mm).
For packing mode and ordering example see next page.

Dimensions (mm)		Approx. weight (g)	Packing units (pieces)
d + 1	*l* ± 2		
30	25	17	80
30	30	23	80
30	35	29	80
30	40	36	80
30	45	41	80
30	50	47	80
35	35	36	60
35	40	41	60
35	45	57	60
35	50	72	60

Packing of snap-in capacitors

For ecological reasons the packing is pure cardboard. Components can be withdrawn (in full or in part) in the correct position for insertion.

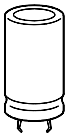
Ordering codes

Snap-in terminals Version	Identification in 3rd block of ordering code
Standard terminals (6,3 ± 1) mm	M000
Short terminals (4,5 –1) mm	M007
3 terminals (4,5 –1) mm	M002

Ordering example:

B43501A3107M007 } snap-in capacitor with short terminals

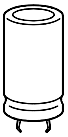
B43501A3107M002 } snap-in capacitor with 3 terminals



Overview of available types

U_R (VDC)	160	200	250	385	400	420	450
C_R (µF)	Case dimensions $d \times l$ (mm)						
47							22 × 25
68				22 × 25	22 × 25		22 × 30 25 × 25
100				22 × 30 25 × 25	22 × 30 25 × 25	22 × 30 25 × 25	22 × 40 25 × 30 30 × 25
120					22 × 35	25 × 30	
150			22 × 25	22 × 40 25 × 30	22 × 40 30 × 25	22 × 40 25 × 35	25 × 40 30 × 30
180					30 × 30	25 × 30 30 × 33	30 × 35
220	22 × 25	22 × 25	22 × 30 25 × 25	25 × 40 30 × 30	25 × 40 30 × 35	25 × 40 30 × 35	30 × 40
270					30 × 35	30 × 35 35 × 30	30 × 45
330	22 × 30	22 × 30 25 × 25	22 × 40 25 × 30	30 × 40	30 × 45	30 × 45 35 × 35	35 × 40
390					30 × 50	30 × 50	
470	22 × 35	22 × 40 30 × 25	25 × 40 30 × 30	35 × 40	35 × 45	35 × 45	35 × 50
560				35 × 45	35 × 50	35 × 50	
680	25 × 35	25 × 40 30 × 30	30 × 40				
1 000	30 × 35	30 × 40 35 × 35	35 × 40				
1 500	30 × 45	35 × 45					
2 200	35 × 50						

The capacitance and voltage ratings listed above are available in different cases upon request.
Other voltage and capacitance ratings are also available upon request.



B43501

Long Life – 85 °C

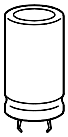
Technical data and ordering codes

U_R VDC	C_R 100 Hz 20 °C µF	Case dimensions $d \times l$ mm	ESR_{typ} 100 Hz 20 °C mΩ	ESR_{max} 100 Hz 20 °C mΩ	Z_{max} 10 kHz 20 °C mΩ	$I_{\sim max}$ 100 Hz 40 °C A	$I_{\sim R}$ [1] 100 Hz 85 °C A	Ordering code [2]
160	220	22 × 25	530	910	730	2,4	1,1	B43501A1227M000
	330	22 × 30	360	610	490	3,2	1,4	B43501A1337M000
	470	22 × 35	250	430	350	4,0	1,8	B43501A1477M000
	680	25 × 35	180	300	240	5,2	2,4	B43501A1687M000
	1 000	30 × 35	120	200	160	6,9	3,1	B43501A1108M000
	1 500	30 × 45	80	140	120	9,2	4,2	B43501A1158M000
	2 200	35 × 50	60	91	80	13	5,8	B43501A1228M000
200	220	22 × 25	380	610	490	2,4	1,1	B43501A2227M000
	330	22 × 30	260	410	330	3,2	1,4	B43501A2337M000
	330	25 × 25	260	410	330	3,2	1,5	B43501J2337M000
	470	22 × 40	180	290	240	4,2	1,9	B43501A2477M000
	470	30 × 25	180	290	350	4,2	1,9	B43501J2477M000
	680	25 × 40	130	200	160	5,5	2,5	B43501A2687M000
	680	30 × 30	130	200	160	5,4	2,4	B43501J2687M000
	1 000	30 × 40	83	140	120	7,2	3,3	B43501A2108M000
	1 000	35 × 35	83	140	120	7,6	3,5	B43501J2108M000
	1 500	35 × 45	56	90	80	10	4,6	B43501A2158M000
250	150	22 × 25	560	890	800	2,0	0,91	B43501B2157M000
	220	22 × 30	380	610	500	2,6	1,2	B43501B2227M000
	220	25 × 25	380	610	490	2,6	1,2	B43501K2227M000
	330	22 × 40	260	410	330	3,5	1,6	B43501B2337M000
	330	25 × 30	260	410	330	3,4	1,6	B43501K2337M000
	470	25 × 40	180	290	240	4,5	2,1	B43501B2477M000
	470	30 × 30	180	290	240	4,5	2,0	B43501K2477M000
	680	30 × 40	130	200	160	5,9	2,7	B43501B2687M000
	1 000	35 × 40	83	140	120	8,0	3,6	B43501B2108M000

Preferred types

1) 120 Hz conversion factor of ripple current: $I\sim$ (120 Hz) = 1,03 · $I\sim$ (100 Hz)

2) Ordering code for standard terminals (6,3 mm).
To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 238.

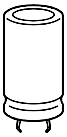


U_R VDC	C_R 100 Hz 20 °C µF	Case dimensions $d \times l$ mm	ESR_{typ} 100 Hz 20 °C mΩ	ESR_{max} 100 Hz 20 °C mΩ	Z_{max} 10 kHz 20 °C mΩ	$I_{\sim max}$ 100 Hz 40 °C A	$I_{\sim R}$[1] 100 Hz 85 °C A	Ordering code[2]
385	68	22 × 25	980	1960	1570	1,3	0,61	B43501A3686M000
	100	22 × 30	670	1330	1070	1,7	0,79	B43501A3107M000
	100	25 × 25	670	1330	1070	1,8	0,80	B43501B3107M000
	150	22 × 40	450	890	720	2,4	1,1	B43501A3157M000
	150	25 × 30	450	890	720	2,3	1,0	B43501B3157M000
	220	25 × 40	310	610	490	3,1	1,4	B43501A3227M000
	220	30 × 30	310	610	490	3,1	1,4	B43501B3227M000
	330	30 × 40	210	410	330	4,1	1,9	B43501A3337M000
	470	35 × 40	150	290	240	5,5	2,5	B43501A3477M000
	560	35 × 45	120	240	200	6,2	2,8	B43501A3567M000
400	68	22 × 25	980	1960	1570	1,3	0,61	B43501A9686M000
	100	22 × 30	670	1330	1070	1,7	0,79	B43501A9107M000
	100	25 × 25	670	1330	1070	1,8	0,80	B43501B9107M000
	120	22 × 35	560	1100	890	2,0	0,92	B43501A9127M000
	150	22 × 40	450	890	720	2,4	1,1	B43501A9157M000
	150	30 × 25	450	890	720	2,4	1,1	B43501B9157M000
	180	30 × 30	370	740	600	2,7	1,2	B43501A9187M000
	220	25 × 40	310	610	490	3,1	1,4	B43501A9227M000
	220	30 × 35	310	610	490	3,2	1,5	B43501B9227M000
	270	30 × 35	250	490	400	3,5	1,6	B43501A9277M000
	330	30 × 45	210	410	330	4,3	2,0	B43501A9337M000
	390	30 × 50	180	340	280	4,8	2,2	B43501A9397M000
	470	35 × 45	150	290	240	5,7	2,6	B43501A9477M000
	560	35 × 50	120	240	200	6,4	2,9	B43501A9567M000

Preferred types

1) 120 Hz conversion factor of ripple current: $I\sim$ (120 Hz) = 1,03 · $I\sim$ (100 Hz)

2) Ordering code for standard terminals (6,3 mm).
To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 238.



EPCOS

B43501

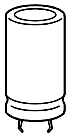
Long Life – 85 °C

U_R VDC	C_R 100 Hz 20 °C µF	Case dimensions $d \times l$ mm	ESR_{typ} 100 Hz 20 °C mΩ	ESR_{max} 100 Hz 20 °C mΩ	Z_{max} 10 kHz 20 °C mΩ	$I_{\sim max}$ 100 Hz 40 °C A	$I_{\sim R}$[1] 100 Hz 85 °C A	Ordering code[2]
420	100	22 × 30	1330	1990	1600	1,74	0,79	B43501A0107M000
	100	25 × 25	1330	1990	1600	1,77	0,80	B43501E0107M000
	120	22 × 30	1110	1660	1330	2,06	0,94	B43501A0127M000
	150	22 × 40	890	1330	1070	2,37	1,08	B43501A0157M000
	150	25 × 35	890	1330	1070	2,44	1,11	B43501E0157M000
	180	25 × 35	740	1110	890	2,67	1,21	B43501A0187M000
	180	30 × 30	740	1110	890	2,76	1,26	B43501E0187M000
	220	25 × 40	610	910	730	3,11	1,41	B43501A0227M000
	220	30 × 35	610	910	730	3,22	1,46	B43501E0227M000
	270	30 × 35	500	740	590	3,57	1,62	B43501A0277M000
	270	35 × 30	500	740	590	3,76	1,71	B43501E0277M000
	330	30 × 45	410	610	490	4,32	1,96	B43501A0337M000
	330	35 × 35	410	610	490	4,37	1,98	B43501E0337M000
	390	30 × 50	350	520	410	4,89	2,22	B43501A0397M000
	470	35 × 45	290	430	340	5,69	2,58	B43501A0477M000
	560	35 × 50	240	360	290	6,45	2,93	B43501A0567M000
450	47	22 × 25	2830	4240	3400	1,1	0,51	B43501A5476M000
	68	22 × 30	1960	2930	2350	1,4	0,65	B43501A5686M000
	68	25 × 25	1960	2930	2350	1,5	0,66	B43501B5686M000
	100	22 × 40	1330	1990	1600	1,9	0,88	B43501A5107M000
	100	25 × 30	1330	1990	1600	1,9	0,86	B43501B5107M000
	100	30 × 25	1330	1990	1600	1,9	0,90	B43501C5107M000
	150	25 × 40	890	1330	1070	2,6	1,2	B43501A5157M000
	150	30 × 30	890	1330	1070	2,5	1,1	B43501B5157M000
	180	30 × 35	750	1100	890	2,9	1,3	B43501A5187M000
	220	30 × 40	610	910	730	3,4	1,5	B43501A5227M000
	270	30 × 45	500	740	600	3,9	1,8	B43501A5277M000
	330	35 × 40	410	610	490	4,6	2,1	B43501A5337M000
	470	35 × 50	290	430	350	5,9	2,7	B43501A5477M000

Preferred types

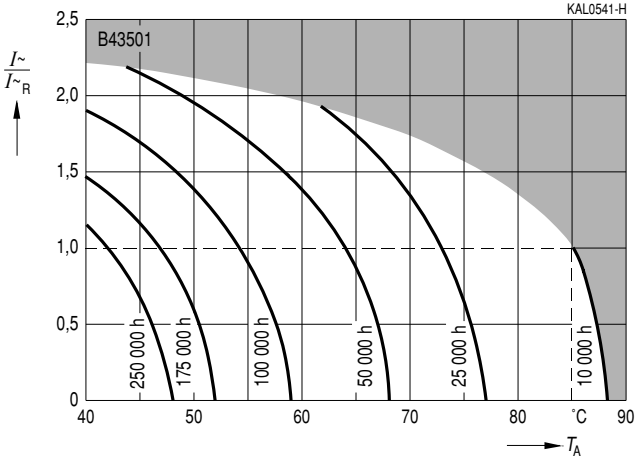
1) 120 Hz conversion factor of ripple current: $I\sim$ (120 Hz) = 1,03 · $I\sim$ (100 Hz)

2) Ordering code for standard terminals (6,3 mm).
To determine the ordering code for short terminals (4,5 mm) and 3 terminals (4,5 mm) see page 238.



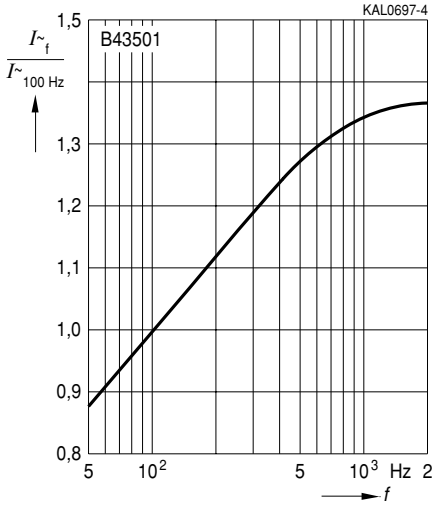
Useful life

depending on ambient temperature T_A under ripple current operating conditions[1)]

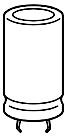


Frequency factor of permissible ripple current *I*~

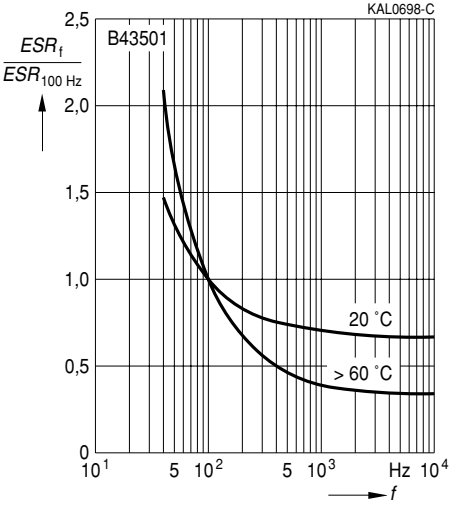
versus frequency *f*



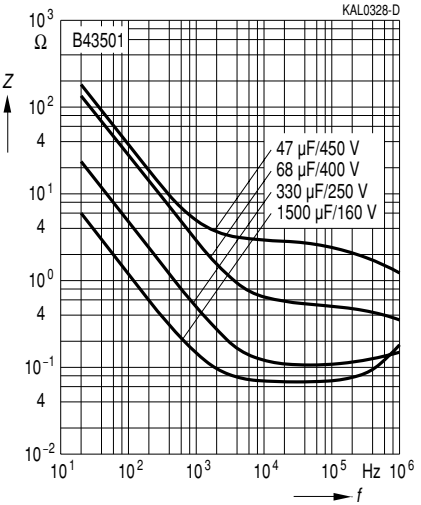
1) Refer to page 40 for an explanation on how to interpret the useful life graphs.



Frequency characteristics of *ESR*
Typical behavior



Impedance *Z*
versus frequency *f*
Typical behavior at 20 °C



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