



Aluminum electrolytic capacitors

Snap-in capacitors

Series/Type: B41303
Date: December 2006

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Snap-in capacitors

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Standard – 85 °C

General-purpose grade capacitors

Applications

- Switch-mode power supplies in industrial and entertainment electronics

Features

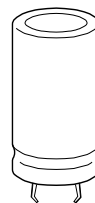
- High ripple current capability
- Different case sizes available for each capacitance value

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 by safety vent on the base

Terminals

- Standard version with 2 terminals,
2 lengths available: 6.3 and 4.5 mm
- 3 terminals to ensure correct insertion: length 4.5 mm





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Specifications and characteristics in brief

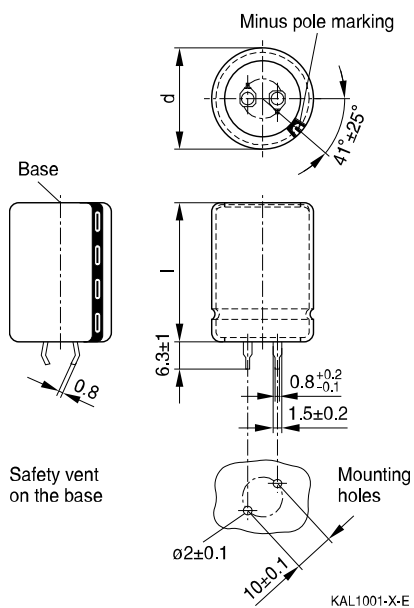
Rated voltage V_R	10 ... 100 V DC	
Surge voltage V_S	$1.15 \cdot V_R$	
Rated capacitance C_R	680 ... 47000 μ F	
Capacitance tolerance	$\pm 20\% \triangle M$	
Leakage current I_{leak} (5 min, 20 °C)	$I_{leak} \leq 0.3 \mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V} \right)^{0.7} + 4 \mu A$	
Self-inductance ESL	Approx. 20 nH	
Useful life	Requirements:	
85 °C, V_R , $I_{AC,R}$	> 2000 h	$\Delta C/C \leq \pm 45\%$ of initial value
40 °C, V_R , $1.25 \cdot I_{AC,R}$	> 100000 h	ESR ≤ 3 times initial specified limit
		$I_{leak} \leq$ initial specified limit
Voltage endurance test	Post test requirements:	
85 °C, V_R	2000 h	$\Delta C/C \leq \pm 15\%$ of initial value
		ESR ≤ 1.3 times initial specified limit
		$I_{leak} \leq$ initial specified limit
Vibration resistance test	To IEC 60068-2-6, test Fc: Displacement amplitude 0.35 mm, frequency range 10 Hz ... 55 Hz, acceleration max. 5 g, duration 3×2 h. Capacitor mounted by its body which is rigidly clamped to the work surface.	
IEC climatic category	To IEC 60068-1: 40/085/56 (–40 °C/+85 °C/56 days damp heat test)	
Detail specification	Similar to CECC 30301-806	
Sectional specification	IEC 60384-4	



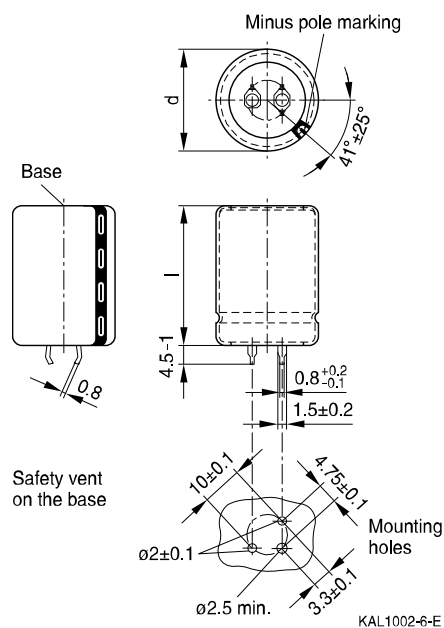
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Dimensional drawings



KAL1001-X-E



KAL1002-6-E

Snap-in terminals, 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.

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 (pcs.)
d +1	l ±2		
22	30	12	160
22	35	15	160
25	25	13	130
25	30	17	130
25	35	19	130
25	40	22	130

Dimensions (mm)		Approx weight (g)	Packing units (pcs.)
d +1	l ±2		
30	30	23	80
30	35	29	80
30	45	41	80
30	50	46	80



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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 for terminal styles

Snap-in capacitors Terminal versions	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 examples:

B41303A3109M007 } snap-in capacitor with short terminals
B41303A3109M002 } snap-in capacitor with 3 terminals



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Overview of available types

V _R (V DC)	10	16	25	40	63	100
	Case dimensions d × l (mm)					
C _R (μF)						
680						22 × 30 25 × 25
1000						22 × 35 25 × 30
1500					22 × 30 25 × 25	25 × 35 30 × 30
2200					22 × 35 25 × 30	30 × 35
3300				22 × 30 25 × 25	25 × 35 30 × 30	30 × 45
4700			22 × 30 25 × 25	22 × 35 25 × 30	30 × 35	
6800		22 × 30 25 × 25	22 × 35 25 × 30	25 × 40 30 × 30	30 × 45	
10000	22 × 30 25 × 25	22 × 35 25 × 30	25 × 35 30 × 30	30 × 35		
15000	22 × 35 25 × 30	25 × 40 30 × 30	30 × 35	30 × 50		
22000	25 × 40 30 × 30	30 × 35	30 × 45			
33000	30 × 35	30 × 45				
47000	30 × 45					

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



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Technical data and ordering codes

C _R 100 Hz 20 °C μF	Case dimensions d × l mm	ESR _{typ} 100 Hz 20 °C mΩ	ESR _{max} 100 Hz 20 °C mΩ	Z _{max} 10 kHz 20 °C mΩ	I _{AC,max} 100 Hz 60 °C A	I _{AC,R} ¹⁾ 100 Hz 85 °C A	Ordering code (composition see below)
V _R = 10 V DC							
10000	22 × 30	44	66	59	3.9	1.8	B41303A3109M00*
10000	25 × 25	44	66	59	3.9	1.8	B41303J3109M00*
15000	22 × 35	36	54	49	4.7	2.2	B41303B3159M00*
15000	25 × 30	36	54	49	4.7	2.2	B41303J3159M00*
22000	25 × 40	31	46	43	5.6	2.6	B41303A3229M00*
22000	30 × 30	31	46	43	5.6	2.6	B41303J3229M00*
33000	30 × 35	27	41	39	6.0	2.8	B41303B3339M00*
47000	30 × 45	25	38	36	6.9	3.2	B41303B3479M00*
V _R = 16 V DC							
6800	22 × 30	47	71	59	3.9	1.8	B41303A4688M00*
6800	25 × 25	47	71	59	3.9	1.8	B41303J4688M00*
10000	22 × 35	39	58	52	4.3	2.0	B41303B4109M00*
10000	25 × 30	39	58	52	4.3	2.0	B41303J4109M00*
15000	25 × 40	33	49	45	5.4	2.5	B41303A4159M00*
15000	30 × 30	33	49	45	5.4	2.5	B41303J4159M00*
22000	30 × 35	29	43	40	6.0	2.8	B41303B4229M00*
33000	30 × 45	26	39	37	6.7	3.1	B41303B4339M00*
V _R = 25 V DC							
4700	22 × 30	51	77	67	3.7	1.7	B41303A5478M00*
4700	25 × 25	51	77	67	3.7	1.7	B41303J5478M00*
6800	22 × 35	41	62	56	4.1	1.9	B41303B5688M00*
6800	25 × 30	41	62	56	4.1	1.9	B41303J5688M00*
10000	25 × 35	35	52	48	4.9	2.3	B41303B5109M00*
10000	30 × 30	35	52	48	4.9	2.3	B41303J5109M00*
15000	30 × 35	30	45	42	5.8	2.7	B41303B5159M00*
22000	30 × 45	27	40	38	6.7	3.1	B41303B5229M00*

Composition of ordering code

* = Terminal style

0 = snap-in standard terminals (6.3 ± 1) mm

2 = snap-in 3 terminals (4.5 – 1) mm

7 = snap-in short terminals (4.5 – 1) mm

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



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Technical data and ordering codes

C _R 100 Hz 20 °C μF	Case dimensions d × l mm	ESR _{typ} 100 Hz 20 °C mΩ	ESR _{max} 100 Hz 20 °C mΩ	Z _{max} 10 kHz 20 °C mΩ	I _{AC,max} 100 Hz 60 °C A	I _{AC,R} ²⁾ 100 Hz 85 °C A	Ordering code (composition see below)
V_R = 40 V DC							
3300	22 × 30	51	77	71	3.7	1.7	B41303A7338M00*
3300	25 × 25	51	77	71	3.7	1.7	B41303J7338M00*
4700	22 × 35	44	66	59	4.1	1.9	B41303B7478M00*
4700	25 × 30	44	66	59	4.1	1.9	B41303J7478M00*
6800	25 × 40	37	55	50	5.2	2.4	B41303A7688M00*
6800	30 × 30	37	55	50	5.2	2.4	B41303J7688M00*
10000	30 × 35	31	47	44	5.6	2.6	B41303B7109M00*
15000	30 × 50	27	41	39	7.1	3.3	B41303A7159M00*
V_R = 63 V DC							
1500	22 × 30	80	120	100	3.0	1.4	B41303A8158M00*
1500	25 × 25	80	120	100	3.0	1.4	B41303J8158M00*
2200	22 × 35	59	89	77	3.4	1.6	B41303B8228M00*
2200	25 × 30	59	89	77	3.4	1.6	B41303J8228M00*
3300	25 × 35	46	69	62	4.3	2.0	B41303B8338M00*
3300	30 × 30	46	69	62	4.3	2.0	B41303J8338M00*
4700	30 × 35	39	58	52	5.2	2.4	B41303B8478M00*
6800	30 × 45	33	49	45	6.0	2.8	B41303B8688M00*
V_R = 100 V DC							
680	22 × 30	120	180	150	2.4	1.1	B41303A9687M00*
680	25 × 25	120	180	150	2.4	1.1	B41303J9687M00*
1000	22 × 35	87	130	110	2.8	1.3	B41303B9108M00*
1000	25 × 30	87	130	110	2.8	1.3	B41303J9108M00*
1500	25 × 35	65	97	83	3.7	1.7	B41303B9158M00*
1500	30 × 30	65	97	83	3.7	1.7	B41303J9158M00*
2200	30 × 35	50	75	66	4.5	2.1	B41303B9228M00*
3300	30 × 45	40	60	54	5.4	2.5	B41303B9338M00*

Composition of ordering code

* = Terminal style

0 = snap-in standard terminals (6.3 ±1) mm

2 = snap-in 3 terminals (4.5 –1) mm

7 = snap-in short terminals (4.5 –1) mm

2) 120-Hz conversion factor of ripple current: I_{AC} (120 Hz) = 1.03 · I_{AC} (100 Hz)



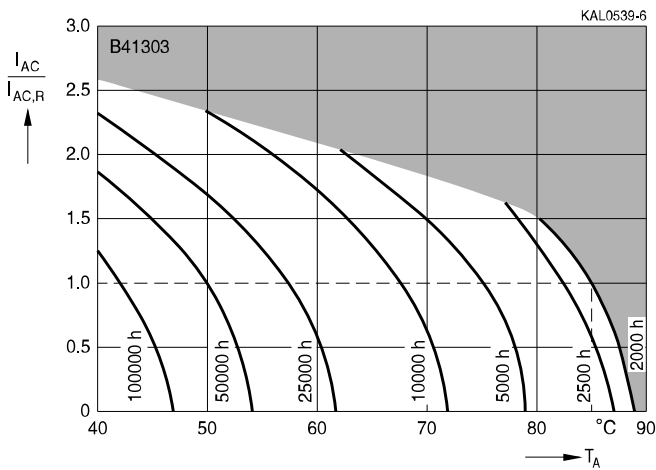
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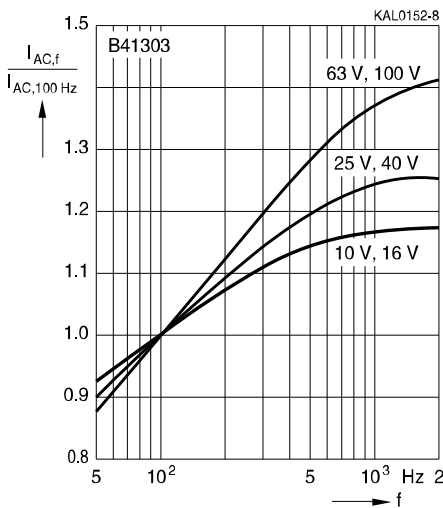


Useful life

depending on ambient temperature T_A under ripple current operating conditions¹⁾

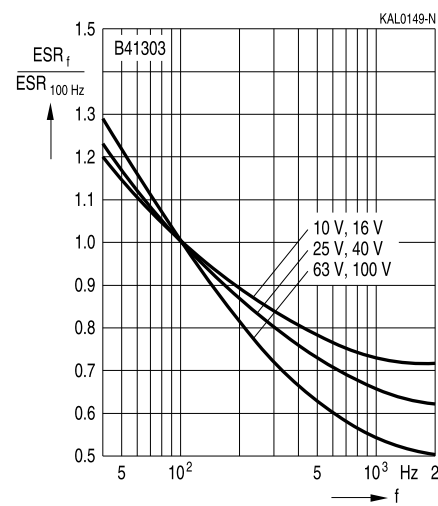


Frequency factor of permissible ripple current I_{AC} versus frequency f



Frequency characteristics of ESR

Typical behavior



¹⁾ Refer to chapter "General technical information, 5.3 Calculation of useful life" for an explanation on how to interpret the useful life graphs.

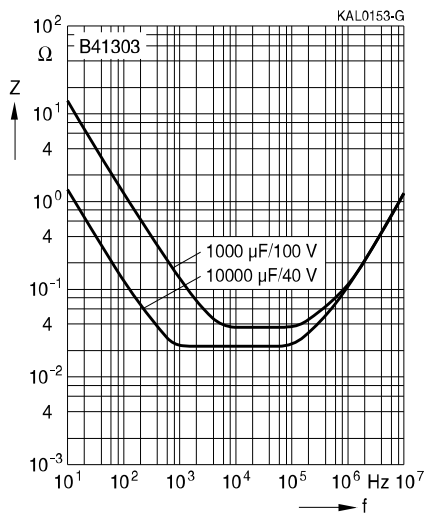


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Impedance Z versus frequency f

Typical behavior at 20 °C



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Cautions and warnings

Personal safety

The electrolytes used by EPCOS have not only been optimized with a view to the intended application, but also 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, part of the high-voltage electrolytes used by EPCOS are self-extinguishing. They contain flame-retarding substances which will quickly extinguish any flame that may have been ignited.

As far as possible, EPCOS does not use any dangerous chemicals or compounds to produce operating electrolytes. However, in exceptional cases, such materials must be used in order to achieve specific physical and electrical properties because no safe substitute materials are currently known. However, the amount of dangerous materials used in our products has been limited to an absolute minimum. Nevertheless, the following rules should be observed when handling Al electrolytic capacitors:

- Any escaping electrolyte should not come into contact with eyes or skin.
- If electrolyte does come into contact with the skin, wash the affected parts 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 breathing in 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.



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Product safety

The table below summarize 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 polarity classes should be prevented by connecting a diode.	3.1.6 "Reverse voltage"
Upper category temperature	Do not exceed the upper category temperatur.	7.2 "Maximum permissible operating temperature"
Maintenance	Make periodic inspections of the capacitors. Before the inspection, make sure that the power supply is turned off and carefully discharge the electricity of the capacitors. Do not apply any mechanical stress to the capacitor terminals.	10 "Maintenance"
Mounting position of screw terminal capacitors	Do not mount the capacitor with the terminals (safety vent) upside down.	11.1. "Mounting positions of capacitors with screw terminals"
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"
Robustness of terminals	The following maximum tightening torques must not be exceeded when connecting screw terminals: M5: 2 Nm M6: 2.5 Nm	11.3 "Mounting torques"
Soldering	Do not exceed the specified time or temperature limits during soldering.	11.5 "Soldering"



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Topic	Safety information	Reference Chapter "General technical information"
Soldering, cleaning agents	Do not allow halogenated hydrocarbons to come into contact with aluminum electrolytic capacitors.	11.6 "Cleaning agents"
Passive flammability	Avoid external energy, such as fire or electricity.	8.1 "Passive flammability"
Active flammability	Avoid overload of the capacitors.	8.2 "Active flammability"
		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"



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, EPCOS is 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 an EPCOS 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 passive 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 a passive 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 a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
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