Aluminum electrolytic capacitors

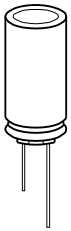
Single-ended capacitors

Series/Type: **B41888**

Date: December 2006

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Long-life grade capacitors
Very low impedance



Applications
- For use in switch-mode power supplies
- For professional industrial electronics, telecommunications and data processing equipment
- Automotive electronics

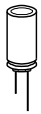
Features
- Extended useful life
- Very low impedance at high frequency
- High ripple current capability

Construction
- Radial leads
- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Minus pole marking on the insulating sleeve
- Case with safety vent

Delivery mode

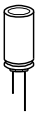
Terminal configurations and packing:
- Bulk
- Taped, Ammo pack
- Cut
- Kinked
- PAPR (protection against polarity reversal): crimped leads, J leads, bent leads

Refer to chapter "Single-ended capacitors − Taping, packing and lead configurations" for further details and ordering example.



Specifications and characteristics in brief

Rated voltage V_R Surge voltage V_S	10 ... 63 V DC 1.15 · V_R						
Rated capacitance C_R Capacitance tolerance	56 ... 12000 µF ±20% ≙ M						
Dissipation factor tan δ (20 °C, 120 Hz)	For capacitance higher than 1000 µF add 0.02 for every increase of 1000 µF.						
	V_R (V DC)	10	16	25	35	50	63
	tan δ (max.)	0.18	0.16	0.14	0.12	0.10	0.09
Leakage current I_{leak} (20 °C, 5 min)	$I_{leak} = 0.01\,\mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V}\right)$						
Self-inductance ESL	Diameter (mm)	≤12.5	16	18			
	ESL (nH)	20	26	34			
Useful life 105 °C, V_R, $I_{AC,R}$	> 5000 h for d = 8 mm > 7000 h for d = 10 mm > 10000 h for d ≥ 12.5 mm						
Requirements	ΔC/C ≤ ±40% of initial value tan δ ≤ 3 times initial specified limit I_{leak} ≤ initial specified limit						
Voltage endurance test 105 °C, V_R	5000 h for d = 8 mm 7000 h for d = 10 mm 10000 h for d ≥ 12.5 mm						
Post test requirements	ΔC/C ≤ ±30% of initial value tan δ ≤ 2 times initial specified limit I_{leak} ≤ initial specified limit						
Vibration resistance test	To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 … 2000 Hz, acceleration max. 20 *g*, duration 3 × 2 h. Capacitor rigidly clamped by the aluminum case.						
IEC climatic category	To IEC 60068-1: 55/105/56 (−55 °C/+105 °C/56 days damp heat test)						
Sectional specification	AEC-Q200, IEC 60384-4						

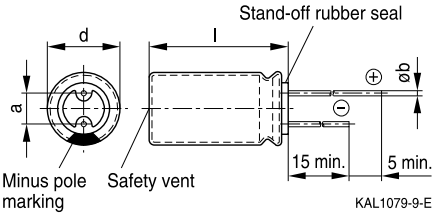


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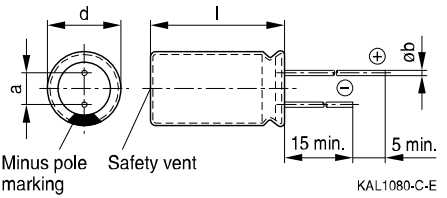
Extended useful life – 105 °C

Dimensional drawings

With stand-off rubber seal
Diameters (mm): 8, 10, 12.5, 16, 18

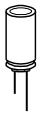


With flat rubber seal
Diameter (mm): 8



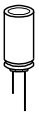
Dimensions and weights

Dimensions (mm)				Approx. weight
d +0.5	l	a ±0.5	b	g
8	11.5 +1.5	3.5	0.60 ±0.05	1.0
10	12.5 +1.0	5.0	0.60 ±0.05	1.6
10	16 +1.0	5.0	0.60 ±0.05	1.9
10	20 +2.0	5.0	0.60 ±0.05	2.6
12.5	20 +2.0	5.0	0.60 ±0.05	3.6
12.5	25 +2.0	5.0	0.60 ±0.05	4.5
12.5	40 +2.0	5.0	0.80 ±0.05	7.4
16	20 +2.0	7.5	0.80 ±0.05	5.5
16	25 +2.0	7.5	0.80 ±0.05	7.5
16	31.5 +2.0	7.5	0.80 ±0.05	7.8
18	20 +2.0	7.5	0.80 ±0.1	8.0
18	25 +2.0	7.5	0.80 ±0.1	9.0
18	31.5 +2.0	7.5	0.80 ±0.1	11.0
18	35 +2.0	7.5	0.80 ±0.1	13.0
18	40 +2.0	7.5	0.80 ±0.1	16.0



Overview of available types

V_R (V DC)	10	16	25	35	50	63
	Case dimensions d × l (mm)					
C_R (µF)						
56						8 × 11.5
82						10 × 12.5
100					8 × 11.5	
120						10 × 16
150				8 × 11.5	10 × 12.5	
180						10 × 20
220			8 × 11.5	10 × 12.5	10 × 16	
270					10 × 20	12.5 × 20
330		8 × 11.5	10 × 12.5	10 × 16		12.5 × 20
390						12.5 × 25
470	8 × 11.5	10 × 12.5	10 × 16	10 × 20	12.5 × 20	16 × 20
560					12.5 × 25	
680	10 × 12.5	10 × 16	10 × 20	12.5 × 20		12.5 × 40 16 × 25 18 × 20
820					16 × 20	16 × 31.5 18 × 25
1000	10 × 16	10 × 20	12.5 × 20	12.5 × 25	12.5 × 40 16 × 25 18 × 20	
1200	10 × 20			16 × 20	16 × 31.5 18 × 25	18 × 31.5
1500		12.5 × 20	12.5 × 25			18 × 35
1800			16 × 20	12.5 × 40 16 × 25 18 × 20	18 × 31.5	18 × 40
2200	12.5 × 20	12.5 × 25	18 × 20	16 × 31.5 18 × 25	18 × 35	
2700		16 × 20	12.5 × 40 16 × 25	18 × 31.5	18 × 40	
3300	12.5 × 25		16 × 31.5 18 × 25	18 × 35		
3900	16 × 20	12.5 × 40 16 × 25 18 × 20	18 × 31.5	18 × 40		



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Extended useful life – 105 °C

V_R (V DC)	10	16	25	35	50	63
	Case dimensions d × l (mm)					
C_R (µF)						
4700	16 × 25	16 × 31.5 18 × 25	18 × 35			
5600	12.5 × 40 16 × 25 18 × 20	18 × 31.5	18 × 40			
6800	16 × 31.5 18 × 25					
8200	18 × 31.5	18 × 35				
10000	18 × 35	18 × 40				
12000	18 × 40					

Other voltage and capacitance ratings are available upon request.

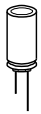
Technical data and ordering codes

C_R 120 Hz 20 °C µF	Case dimensions d × l mm	ESR_{max} 10 kHz −40 °C Ω	ESR_{max} 120 Hz 20 °C Ω	ESR_{max} 10 kHz 20 °C Ω	Z_{max} 100 kHz 20 °C Ω	$I_{AC,R}$ 100 kHz 105 °C mA	$I_{AC,max}$ 100 kHz 85 °C mA	Ordering code (composition see below)
V_R = 10 V DC								
470	8 × 11.5	1.630	0.484	0.204	0.183	690	966	B41888C3477M***
680	10 × 12.5	0.930	0.334	0.116	0.101	900	1260	B41888C3687M***
1000	10 × 16	0.516	0.227	0.064	0.059	1240	1736	B41888C3108M***
1200	10 × 20	0.403	0.189	0.050	0.046	1500	2100	B41888C3128M***
2200	12.5 × 20	0.307	0.115	0.038	0.035	2000	2800	B41888C3228M***
3300	12.5 × 25	0.237	0.084	0.030	0.027	2459	3442	B41888C3338M***
3900	16 × 20	0.233	0.071	0.029	0.026	2530	3542	B41888C3398M***
4700	16 × 25	0.190	0.065	0.024	0.022	2930	4102	B41888C3478M***
5600	12.5 × 40	0.149	0.059	0.019	0.017	3350	4690	B41888C3568M***
5600	16 × 25	0.190	0.059	0.024	0.022	2930	4102	B41888D3568M***
5600	18 × 20	0.226	0.059	0.028	0.025	3000	4200	B41888E3568M***
6800	16 × 31.5	0.154	0.052	0.019	0.017	3600	5040	B41888C3688M***

Composition of ordering code

*** = Version

- 000 = for standard leads, bulk
- 001 = for kinked leads, bulk (for ∅ ≥ 10 mm)
- 002 = for cut leads, bulk (for ∅ ≥ 10 mm)
- 003 = for crimped leads, blister (for ∅ ≥ 16 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm)
- 008 = for taped leads, Ammo pack, lead spacing F = 5.0 mm (from d × l = 8 × 11.5 mm to 12.5 × 25 mm)
- 009 = for taped leads, Ammo pack, lead spacing F = 7.5 mm (from d × l = 16 × 20 mm to 18 × 31.5 mm)
- 012 = for bent 90° leads, blister (for ∅ 16 and 18 mm)



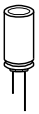
Technical data and ordering codes

C_R 120 Hz 20 °C µF	Case dimensions d × l mm	ESR_{max} 10 kHz −40 °C Ω	ESR_{max} 120 Hz 20 °C Ω	ESR_{max} 10 kHz 20 °C Ω	Z_{max} 100 kHz 20 °C Ω	$I_{AC,R}$ 100 kHz 105 °C mA	$I_{AC,max}$ 100 kHz 85 °C mA	Ordering code (composition see below)
V_R = 10 V DC								
6800	18 × 25	0.188	0.052	0.023	0.021	3396	4755	B41888D3688M***
8200	18 × 31.5	0.143	0.049	0.018	0.016	4247	5946	B41888C3828M***
10000	18 × 35	0.120	0.045	0.015	0.014	4300	6020	B41888C3109M***
12000	18 × 40	0.100	0.042	0.013	0.012	5327	7457	B41888C3129M***
V_R = 16 V DC								
330	8 × 11.5	1.630	0.612	0.204	0.183	690	966	B41888C4337M***
470	10 × 12.5	0.930	0.430	0.116	0.101	900	1260	B41888C4477M***
680	10 × 16	0.516	0.297	0.064	0.059	1240	1736	B41888C4687M***
1000	10 × 20	0.403	0.202	0.050	0.046	1500	2100	B41888C4108M***
1500	12.5 × 20	0.307	0.135	0.038	0.035	2000	2800	B41888C4158M***
2200	12.5 × 25	0.237	0.103	0.030	0.027	2459	3442	B41888C4228M***
2700	16 × 20	0.233	0.084	0.029	0.026	2530	3542	B41888C4278M***
3900	12.5 × 40	0.149	0.065	0.019	0.017	3350	4690	B41888C4398M***
3900	16 × 25	0.190	0.065	0.024	0.022	2930	4102	B41888D4398M***
3900	18 × 20	0.226	0.065	0.028	0.025	3000	4200	B41888E4398M***
4700	16 × 31.5	0.154	0.059	0.019	0.017	3600	5040	B41888C4478M***
4700	18 × 25	0.188	0.059	0.023	0.021	3200	4480	B41888D4478M***
5600	18 × 31.5	0.143	0.054	0.018	0.016	4247	5946	B41888C4568M***
8200	18 × 35	0.120	0.043	0.015	0.014	4300	6020	B41888C4828M***
10000	18 × 40	0.100	0.040	0.013	0.012	5327	7457	B41888C4109M***
V_R = 25 V DC								
220	8 × 11.5	1.630	0.804	0.204	0.183	690	966	B41888C5227M***
330	10 × 12.5	0.930	0.536	0.116	0.101	900	1260	B41888C5337M***
470	10 × 16	0.516	0.376	0.064	0.059	1240	1736	B41888C5477M***
680	10 × 20	0.403	0.260	0.050	0.046	1500	2100	B41888C5687M***
1000	12.5 × 20	0.307	0.177	0.038	0.035	2000	2800	B41888C5108M***
1500	12.5 × 25	0.237	0.118	0.030	0.027	2459	3442	B41888C5158M***
1800	16 × 20	0.233	0.098	0.029	0.026	2530	3542	B41888C5188M***
2200	18 × 20	0.226	0.090	0.028	0.025	3000	4200	B41888C5228M***

Composition of ordering code

*** = Version

- 000 = for standard leads, bulk
- 001 = for kinked leads, bulk (for ∅ ≥ 10 mm)
- 002 = for cut leads, bulk (for ∅ ≥ 10 mm)
- 003 = for crimped leads, blister (for ∅ ≥ 16 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm)
- 008 = for taped leads, Ammo pack, lead spacing F = 5.0 mm (from d × l = 8 × 11.5 mm to 12.5 × 25 mm)
- 009 = for taped leads, Ammo pack, lead spacing F = 7.5 mm (from d × l = 16 × 20 mm to 18 × 31.5 mm)
- 012 = for bent 90° leads, blister (for ∅ 16 and 18 mm)



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Extended useful life – 105 °C

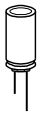
Technical data and ordering codes

C_R 120 Hz 20 °C µF	Case dimensions d × l mm	ESR_{max} 10 kHz −40 °C Ω	ESR_{max} 120 Hz 20 °C Ω	ESR_{max} 10 kHz 20 °C Ω	Z_{max} 100 kHz 20 °C Ω	$I_{AC,R}$ 100 kHz 105 °C mA	$I_{AC,max}$ 100 kHz 85 °C mA	Ordering code (composition see below)
V_R = 25 V DC								
2700	12.5 × 40	0.149	0.075	0.019	0.017	3350	4690	B41888C5278M***
2700	16 × 25	0.190	0.075	0.024	0.022	2930	4102	B41888D5278M***
3300	16 × 31.5	0.154	0.069	0.019	0.017	3600	5040	B41888C5338M***
3300	18 × 25	0.188	0.069	0.023	0.021	3200	4480	B41888D5338M***
3900	18 × 31.5	0.143	0.058	0.018	0.016	4247	5946	B41888C5398M***
4700	18 × 35	0.120	0.054	0.015	0.014	4300	6020	B41888C5478M***
5600	18 × 40	0.100	0.050	0.013	0.012	5327	7457	B41888C5568M***
V_R = 35 V DC								
150	8 × 11.5	1.630	1.011	0.204	0.183	690	966	B41888C7157M***
220	10 × 12.5	0.930	0.689	0.116	0.101	900	1260	B41888C7227M***
330	10 × 16	0.516	0.459	0.064	0.059	1240	1736	B41888C7337M***
470	10 × 20	0.403	0.323	0.050	0.046	1500	2100	B41888C7477M***
680	12.5 × 20	0.307	0.223	0.038	0.035	2000	2800	B41888C7687M***
1000	12.5 × 25	0.237	0.152	0.030	0.027	2459	3442	B41888C7108M***
1200	16 × 20	0.233	0.126	0.029	0.026	2530	3542	B41888C7128M***
1800	12.5 × 40	0.149	0.084	0.019	0.017	3350	4690	B41888C7188M***
1800	16 × 25	0.190	0.084	0.024	0.022	2930	4102	B41888D7188M***
1800	18 × 20	0.226	0.084	0.028	0.025	3000	4200	B41888E7188M***
2200	16 × 31.5	0.154	0.080	0.019	0.017	3600	5040	B41888C7228M***
2200	18 × 25	0.188	0.080	0.023	0.021	3200	4480	B41888D7228M***
2700	18 × 31.5	0.143	0.065	0.018	0.016	4247	5946	B41888C7278M***
3300	18 × 35	0.120	0.060	0.015	0.014	4300	6020	B41888C7338M***
3900	18 × 40	0.100	0.052	0.013	0.012	5327	7457	B41888C7398M***
V_R = 50 V DC								
100	8 × 11.5	4.920	1.263	0.615	0.540	500	700	B41888C6107M***
150	10 × 12.5	1.820	0.842	0.228	0.203	600	840	B41888C6157M***
220	10 × 16	1.030	0.574	0.129	0.115	1050	1470	B41888C6227M***
270	10 × 20	0.672	0.468	0.084	0.075	1180	1652	B41888C6277M***
470	12.5 × 20	0.518	0.269	0.065	0.060	1800	2520	B41888C6477M***

Composition of ordering code

*** = Version

- 000 = for standard leads, bulk
- 001 = for kinked leads, bulk (for ∅ ≥ 10 mm)
- 002 = for cut leads, bulk (for ∅ ≥ 10 mm)
- 003 = for crimped leads, blister (for ∅ ≥ 16 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm)
- 008 = for taped leads, Ammo pack, lead spacing F = 5.0 mm (from d × l = 8 × 11.5 mm to 12.5 × 25 mm)
- 009 = for taped leads, Ammo pack, lead spacing F = 7.5 mm (from d × l = 16 × 20 mm to 18 × 31.5 mm)
- 012 = for bent 90° leads, blister (for ∅ 16 and 18 mm)



Technical data and ordering codes

C_R 120 Hz 20 °C µF	Case dimensions d × l mm	ESR_{max} 10 kHz −40 °C Ω	ESR_{max} 120 Hz 20 °C Ω	ESR_{max} 10 kHz 20 °C Ω	Z_{max} 100 kHz 20 °C Ω	$I_{AC,R}$ 100 kHz 105 °C mA	$I_{AC,max}$ 100 kHz 85 °C mA	Ordering code (composition see below)
V_R = 50 V DC								
560	12.5 × 25	0.344	0.226	0.043	0.040	2024	2834	B41888C6567M***
820	16 × 20	0.410	0.154	0.051	0.046	1957	2740	B41888C6827M***
1000	12.5 × 40	0.216	0.126	0.027	0.025	2920	4088	B41888C6108M***
1000	16 × 25	0.283	0.126	0.035	0.032	2700	3780	B41888D6108M***
1000	18 × 20	0.283	0.126	0.035	0.032	2541	3558	B41888E6108M***
1200	16 × 31.5	0.221	0.105	0.028	0.025	3010	4214	B41888C6128M***
1200	18 × 25	0.275	0.105	0.034	0.031	2795	3914	B41888D6128M***
1800	18 × 31.5	0.204	0.070	0.025	0.023	3542	4959	B41888C6188M***
2200	18 × 35	0.177	0.069	0.022	0.020	3800	5320	B41888C6228M***
2700	18 × 40	0.159	0.056	0.020	0.018	4000	5600	B41888C6278M***
V_R = 63 V DC								
56	8 × 11.5	5.413	2.030	0.541	0.488	283	396	B41888C8566M***
82	10 × 12.5	5.766	1.386	0.577	0.500	323	453	B41888C8826M***
120	10 × 16	3.075	0.947	0.308	0.279	474	664	B41888C8127M***
180	10 × 20	1.986	0.632	0.199	0.180	644	901	B41888C8187M***
270	12.5 × 20	1.688	0.421	0.169	0.153	800	1120	B41888C8277M***
330	12.5 × 20	1.688	0.344	0.169	0.153	800	1120	B41888C8337M***
390	12.5 × 25	1.236	0.291	0.124	0.112	1020	1428	B41888C8397M***
470	16 × 20	1.037	0.242	0.104	0.094	1161	1625	B41888C8477M***
680	12.5 × 40	0.717	0.167	0.072	0.065	1629	2281	B41888C8687M***
680	16 × 25	0.772	0.167	0.077	0.070	1460	2045	B41888D8687M***
680	18 × 20	0.960	0.167	0.096	0.087	1302	1823	B41888E8687M***
820	16 × 31.5	0.541	0.139	0.054	0.049	1910	2674	B41888C8827M***
820	18 × 25	0.761	0.139	0.076	0.069	1584	2217	B41888D8827M***
1200	18 × 31.5	0.518	0.095	0.052	0.047	2094	2932	B41888C8128M***
1500	18 × 35	0.441	0.076	0.044	0.040	2366	3313	B41888C8158M***
1800	18 × 40	0.375	0.063	0.038	0.034	2708	3792	B41888C8188M***

Composition of ordering code

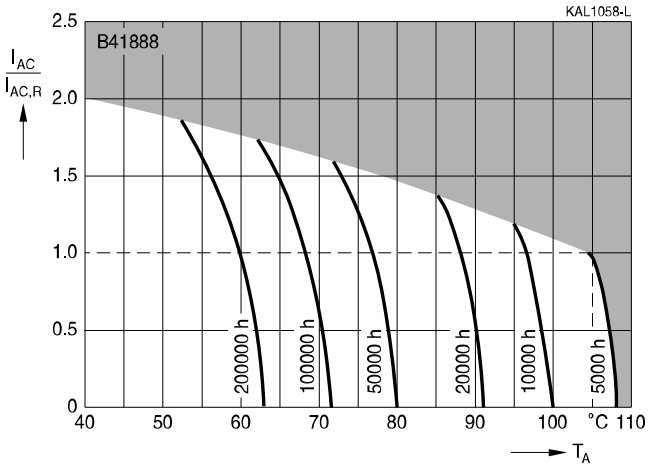
*** = Version

- 000 = for standard leads, bulk
- 001 = for kinked leads, bulk (for ∅ ≥ 10 mm)
- 002 = for cut leads, bulk (for ∅ ≥ 10 mm)
- 003 = for crimped leads, blister (for ∅ ≥ 16 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm)
- 008 = for taped leads, Ammo pack, lead spacing F = 5.0 mm (from d × l = 8 × 11.5 mm to 12.5 × 25 mm)
- 009 = for taped leads, Ammo pack, lead spacing F = 7.5 mm (from d × l = 16 × 20 mm to 18 × 31.5 mm)
- 012 = for bent 90° leads, blister (for ∅ 16 and 18 mm)

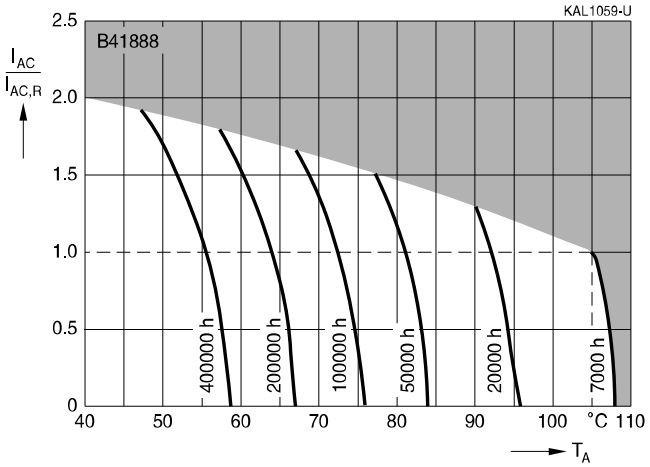
Useful life

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

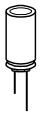
d = 8 mm



d = 10 mm



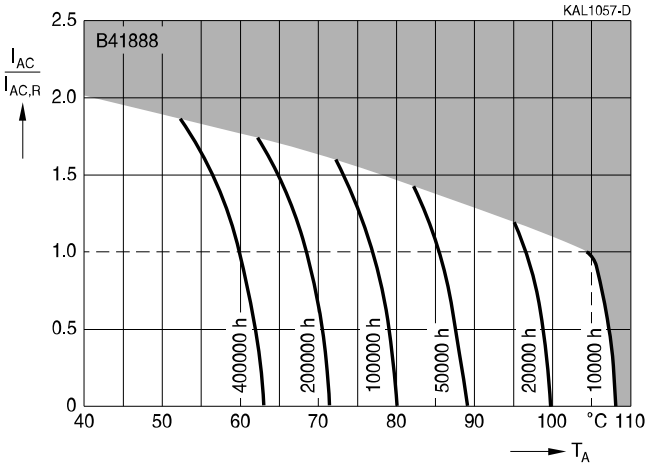
1) Refer to chapter "General technical information, 5.3 Calculation of useful life" for an explanation on how to interpret the useful life graphs.



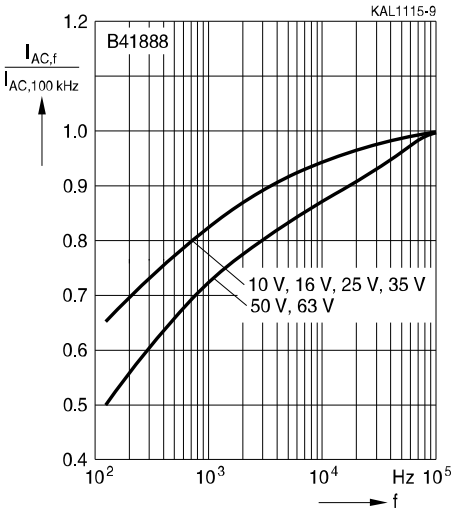
Useful life

depending on ambient temperature T_A under ripple current operating conditions[2)]

d = ≥ 12.5 mm



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



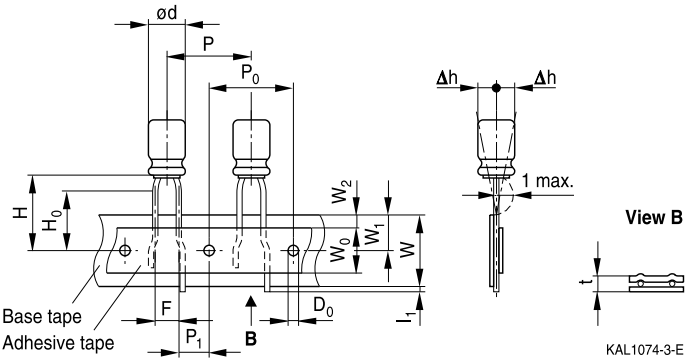
2) Refer to chapter "General technical information, 5.3 Calculation of useful life" for an explanation on how to interpret the useful life graphs.

Taping, packing and lead configurations

Taping

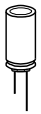
Single-ended capacitors are available taped in Ammo pack from diameter 5 to 18 mm as follows:
Lead spacing F = 2.5 mm (∅ d = 5 … 6.3 mm)
Lead spacing F = 3.5 mm (∅ d = 8 mm)
Lead spacing F = 5.0 mm (∅ d = 5 … 12.5 mm)
Lead spacing F = 7.5 mm (∅ d = 16 ... 18 mm).

Lead spacing 2.5 mm (∅ d = 5 ... 6.3 mm)
Last 3 digits of ordering code: 007



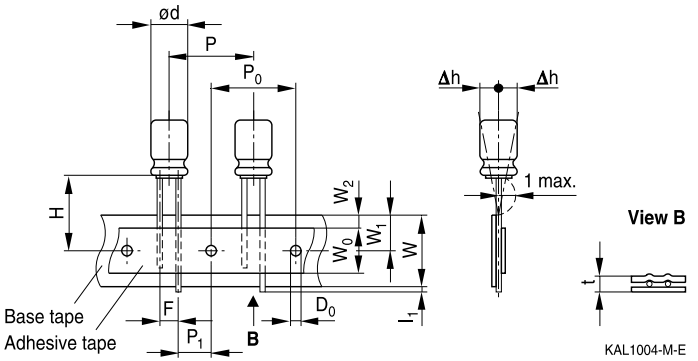
Dimensions in mm

∅ d	F	H	W	W_0	W_1	W_2	H_0	P	P_0	P_1	l_1	t	Δh	D_0
5 6.3	2.5	18.5	18.0	5.5	9.0	1.5	16.0	12.7	12.7	5.1	1.0	0.7	1.0	4.0
Tolerance	+0.8 −02	±0.75	±0.5	min.	±0.5	max.	±0.5	±1.0	±0.2	±0.5	max.	±0.2	max.	±0.2



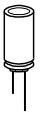
Lead spacing 3.5 mm (∅ d = 8 mm)

Last 3 digits of ordering code: 006



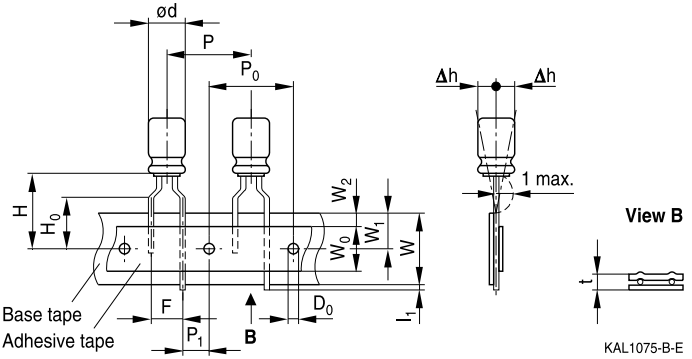
Dimensions in mm

∅ d	F	H	W	W_0	W_1	W_2	P	P_0	P_1	l_1	t	Δh	D_0
8	3.5	18.5	18.0	12.5	9.0	1.5	12.7	12.7	4.6	1.0	0.7	1.0	4.0
Tolerance	+0.8 −02	1.0	±0.5	min.	±0.5	max.	±1.0	±0.2	±0.5	max.	±0.2	max.	±0.2



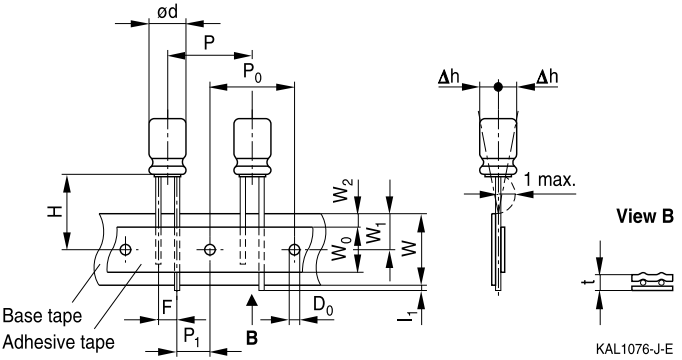
Lead spacing 5.0 mm (∅ d = 5 ... 8 mm)

Last 3 digits of ordering code: 008



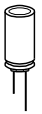
Lead spacing 5.0 mm (∅ d = 10 ... 12.5 mm)

Last 3 digits of ordering code: 008



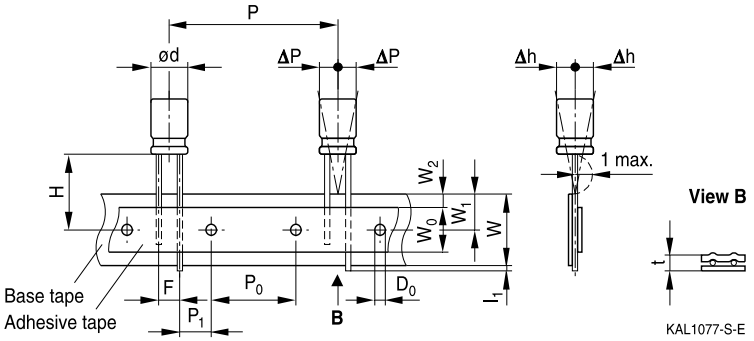
Dimensions in mm

∅ d	F	H	W	W_0	W_1	W_2	H_0	P	P_0	P_1	l_1	t	Δh	D_0
5	5.0	18.5	18.0	5.5	9.0	1.5	16.0	12.7	12.7	3.85	1.0	0.7	1.0	4.0
6.3														
8	5.0	20.0	18.0	12.5	9.0	1.5	16.0	12.7	12.7	3.85	1.0	0.7	1.0	4.0
10		19.0					–	12.7	12.7	3.85				
12.5		19.0					–	15.0	15.0	5.0				
Tolerance	+0.8 −02	±0.75	±0.5	min.	±0.5	max.	±0.5	±1.0	±0.2	±0.5	max.	±0.2	max.	±0.2



Lead spacing 7.5 mm (∅ d = 16 ...18 mm)

Last 3 digits of ordering code: 009



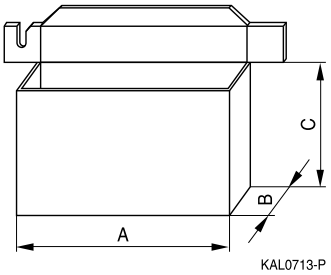
Dimensions in mm

∅ d	F	H	W	W_0	W_1	W_2	P	P_0	P_1	l_1	t	ΔP	Δh	D_0
16 18 *)	7.5	18.5	18.0	12.5	9.0	1.5	30.0	15.0	3.75	1.0	0.7	0	0	4.0
Tolerance	±0.8	−0.5 +0.75	±0.5	min.	±0.5	max.	±1.0	±0.2	±0.5	max.	±0.2	±1.0	±1.0	±0.2

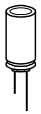
*) Available only for case dimensions 18 × 20, 18 × 25 and 18 × 31.5 mm

Packing units and box dimensions

Ammo pack



Case size d × l	Dimensions (mm)			Packing units
mm	A_{max}	B_{max}	C_{max}	pcs.
5 × 11	345	55	240	2000
6.3 × 11	345	55	290	2000
8 × 11.5	345	55	240	1000
10 × 12.5	345	55	280	750
10 × 16	345	60	200	500
10 × 20	345	60	200	500
12.5 × 20	345	65	280	500
12.5 × 25	345	65	280	500
12.5 × 25	345	65	280	500
12.5 × 30	345	65	275	500
16 × 20	315	65	275	300
16 × 25	315	65	275	300
16 × 31.5	315	65	275	300
18 × 20	315	65	275	250
18 × 25	315	65	275	250
18 × 31.5	315	65	275	250



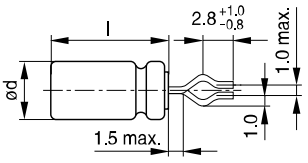
Kinked or cut leads

Single-ended capacitors are available with kinked or cut leads. Other lead configurations also available upon request.

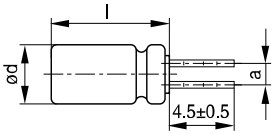
Kinked leads

Last 3 digits of ordering code: 001

With stand-off rubber seal

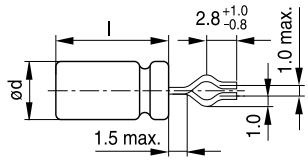


KAL1081-K

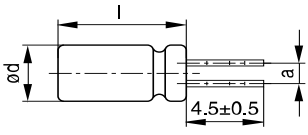


KAL1083-2

With flat rubber seal

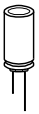


KAL1082-T



KAL1084-A

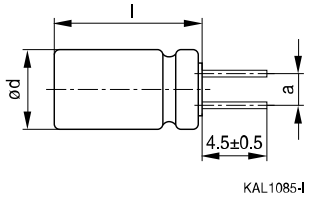
Case size d × l (mm)	Dimensions (mm) a ±0.5
10 × 20	5.0
12.5 × 20	5.0
12.5 × 25	5.0
12.5 × 30	5.0
12.5 × 35	5.0
12.5 × 40	5.0
16 × 20	7.5
16 × 25	7.5
16 × 31.5	7.5
18 × 20	7.5
18 × 25	7.5
18 × 31.5	7.5
18 × 35	7.5
18 × 40	7.5
20 × 20	10.0
20 × 25	10.0
20 × 40	10.0
22 × 30	10.0
22 × 35	10.0
22 × 40	10.0



Cut leads

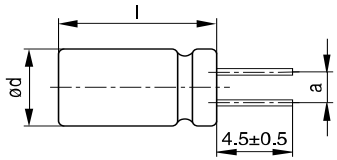
Last 3 digits of ordering code: 002

With stand-off rubber seal



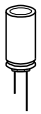
KAL1085-I

With flat rubber seal



KAL1086-R

Case size d × l (mm)	Dimensions (mm) a ±0.5
10 × 12.5	5.0
10 × 16	5.0
10 × 20	5.0
12.5 × 20	5.0
12.5 × 25	5.0
12.5 × 30	5.0
12.5 × 35	5.0
12.5 × 40	5.0
16 × 20	7.5
16 × 25	7.5
16 × 31.5	7.5
18 × 20	7.5
18 × 25	7.5
18 × 31.5	7.5
18 × 35	7.5
18 × 40	7.5
20 × 20	10.0
20 × 25	10.0
20 × 40	10.0



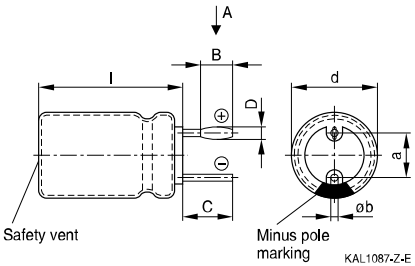
PAPR leads (Protection Against Polarity Reversal)

These lead configurations ensure correct placement of the capacitor on the PCB with regard to polarity. PAPR leads are available for diameters from 10 mm up to 20 mm.
There are three configurations available: Crimped leads, J leads, bent 90° leads

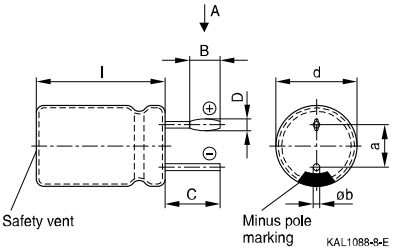
Crimped leads

Last 3 digits of ordering code: 003

With stand-off rubber seal

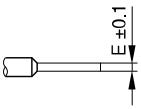


With flat rubber seal

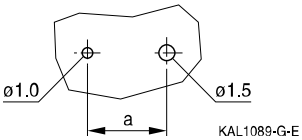


Suggestion for PCB hole diameter

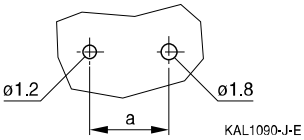
View A



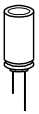
Suggestion for PCB hole diameter, wire ø0.8 mm



Suggestion for PCB hole diameter, wire ø1.0 mm

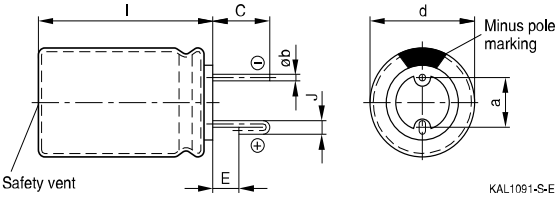


Case size	Dimensions (mm)					
d × l (mm)	B ±0.2	C ±0.5	D ±0.1	E ±0.1	a ±0.5	∅b
16 × 20	1.5	3.0	1.3	0.3	7.5	0.8 ±0.05
16 × 25	1.5	3.0	1.3	0.3	7.5	0.8 ±0.05
16 × 31.5	1.5	3.0	1.3	0.3	7.5	0.8 ±0.05
18 × 20	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
18 × 25	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
18 × 31.5	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
18 × 35	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
18 × 40	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
20 × 20	1.5	3.0	1.6	0.3	10.0	1.0 ±0.1
20 × 25	1.5	3.0	1.6	0.3	10.0	1.0 ±0.1
20 × 40	1.5	3.0	1.6	0.3	10.0	1.0 ±0.1



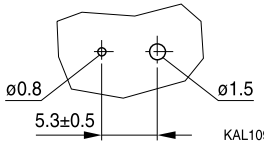
J leads

Last 3 digits of ordering code: 004

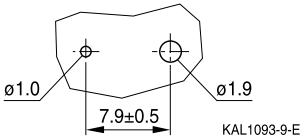


Suggestion for PCB hole diameter

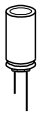
Suggestion for PCB hole diameter, wire ø0.6 mm



Suggestion for PCB hole diameter, wire ø0.8 mm

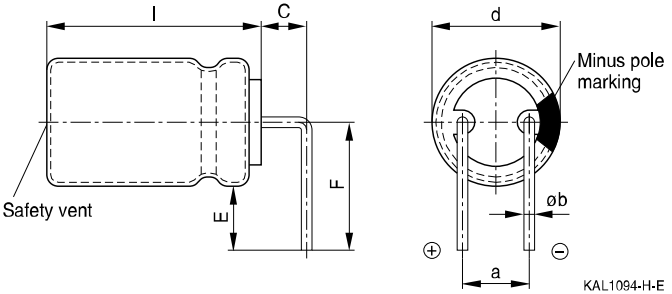


Case size	Dimensions (mm)				
d × l (mm)	C ±0.5	E ±0.5	J ±0.2	a ±0.5	∅b
10 × 12.5	3.2	0.7	1.2	5.0	0.6 ±0.05
10 × 16	3.2	0.7	1.2	5.0	0.6 ±0.05
10 × 20	3.2	0.7	1.2	5.0	0.6 ±0.05
12.5 × 20	3.2	0.7	1.2	5.0	0.6 ±0.05
12.5 × 25	3.2	0.7	1.2	5.0	0.6 ±0.05
16 × 20	3.5	0.7	1.6	7.5	0.8 ±0.05
16 × 25	3.5	0.7	1.6	7.5	0.8 ±0.05
16 × 31.5	3.5	0.7	1.6	7.5	0.8 ±0.05
18 × 20	3.5	0.7	1.6	7.5	0.8 ±0.1
18 × 25	3.5	0.7	1.6	7.5	0.8 ±0.1
18 × 31.5	3.5	0.7	1.6	7.5	0.8 ±0.1
18 × 35	3.5	0.7	1.6	7.5	0.8 ±0.1



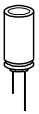
Bent 90° leads for horizontal mounting pinning

Last 3 digits of ordering code: 012



Case size	Dimensions (mm)				
d × l (mm)	C ±0.5	E ±0.5	F ±0.5	a ±0.5	∅b
16 × 20	4.0	4.0	12.0	7.5	0.8 ±0.05
16 × 25	4.0	4.0	12.0	7.5	0.8 ±0.05
16 × 31.5	4.0	4.0	12.0	7.5	0.8 ±0.05
18 × 20	4.0	4.0	13.0	7.5	0.8 ±0.1
18 × 25	4.0	4.0	13.0	7.5	0.8 ±0.1
18 × 31.5	4.0	4.0	13.0	7.5	0.8 ±0.1
18 × 35	4.0	4.0	13.0	7.5	0.8 ±0.1
18 × 40	4.0	4.0	13.0	7.5	0.8 ±0.1

Bent leads for diameter 12.5 mm available upon request.



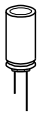
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Overview of packing units and code numbers for case sizes 5 × 11 ... 16 × 31.5

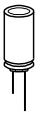
							PAPR	
Case size d × l	Standard, bulk	Taped, Ammo pack			Kinked leads, bulk	Cut leads, bulk	Crimped leads	J leads	Bent 90° leads, blister
mm	pcs.	pcs.			pcs.	pcs.	pcs.	pcs.	pcs.
5 × 11	2000	2000			–	–	–	–	
6.3 × 11	2500	2000			–	–	–	–	
8 × 11.5	1000	1000			–	–	–	–	
10 × 12.5	1000	750			–	1000	–	675	
10 × 16	100	500			–	1000	–	675	
10 × 20	500	500			500	500	–	500	
12.5 × 20	350	500			350	350	–	300	1)
12.5 × 25	250	500			500	500	–	225	1)
12.5 × 30	200	500			175	175	–	180	1)
12.5 × 35	175	-			175	175	–	150	1)
12.5 × 40	175	-			175	175	–	150	1)
16 × 20	250	300			200	200	200	200	120
16 × 25	250	300			200	200	200	200	120
16 × 31.5	200	300			250	250	344	344	120
The last three digits of the complete ordering code state the lead configuration	**000**	Code	F (mm)	d (mm)	**001**	**002**	**003**	**004**	**012**
		006	3.5	8					
		007	2.5	5...6.3					
		008	5	5...12.5					
		009	7.5	16...18					

1) Available upon request



Overview of packing units and code numbers for case sizes 18 × 20 ... 25 × 40

						PAPR		
Case size d × l	Stan-dard, bulk	Taped, Ammo pack			Kinked leads, bulk	Cut leads, bulk	Crimped leads	J leads	Bent 90° leads, blister
mm	pcs.	pcs.			pcs.	pcs.	pcs.	pcs.	pcs.
18 × 20	175	250			175	175	200	200	120
18 × 25	150	250			150	150	200	200	120
18 × 31.5	100	250			100	100	150	150	120
18 × 35	100	–			100	100	150	150	150
18 × 40	125	–			100	100	120	–	72
20 × 20	125	–			125	125	200	–	–
20 × 25	125	–			125	125	200	–	–
20 × 30	100	–			100	100	120	–	–
20 × 35	100	–			100	100	120	–	–
20 × 40	100	–			100	100	120	–	–
22 × 30	80	–			100	100	–	–	–
22 × 35	80	–			100	100	–	–	–
22 × 40	80	–			100	100	–	–	–
25 × 40	40	–			100	–	–	–	–
The last three digits of the complete ordering code state the lead configuration	**000**	Code	F (mm)	d (mm)	**001**	**002**	**003**	**004**	**012**
		007	2.5	4...6.3					
		008	5	6.3...12.5					
		009	7.5	16...18					



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Cautions and warnings

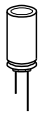
Personal safety

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:

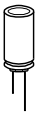
- Any escaping electrolyte should not come into contact with eyes or skin.
- If electrolyte does come into contact with the skin, wash the affected parts immediately with running water. If the eyes are affected, rinse them for 10 minutes with plenty of water. If symptoms persist, seek medical treatment.
- 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.



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**.
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.epcos.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.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, EPCOS-JONES, BAOKE, Alu-X, CeraDiode, CSSP, MLSC, PhaseCap, PhaseMod, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMID, SIOV, SIP5D, SIP5K, UltraCap, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.