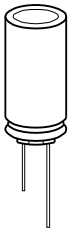
Aluminum electrolytic capacitors

Single-ended capacitors

Series/Type: **B41896**
Date: December 2006



Long-life grade capacitors

Applications
- Automotive applications
- Power supplies

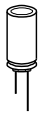
Features
- Wide temperature range up to 125 °C
- Extra long useful life
- High ripple current capability
- Compact design
- Low ESR

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

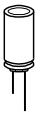
Terminal configurations and packing:
- Bulk
- Taped, Ammo pack
- Cut
- Kinked
- PAPR (protection against polarity reversal): crimped leads, J leads, bent leads

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	10 ... 63 V DC					
Surge voltage V_S	1.15 · V_R					
Rated capacitance C_R	1 ... 10000 µF					
Capacitance tolerance	±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.)	0.20	0.17	0.12	0.10	0.15
Leakage current I_{leak} (20 °C, 5 min)	$I_{leak}=0.01\,\mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V}\right)$ or 3 µA, whichever is greater					
Self-inductance ESL	Diameter (mm)	≤ 12.5	16	18		
	ESL (nH)	20	26	34		
Useful life 125 °C, V_R, $I_{AC,R}$	> 2500 h for d = 8 mm up to 50 V > 3500 h for d = 10 mm up to 50 V > 7000 h for d ≥ 12.5 mm up to 50 V			> 2000 h for d = 8 mm for 63 V > 3000 h for d = 10 mm for 63 V > 5000 h for d ≥ 12.5 mm for 63 V		
135 °C, V_R, 0.75 · $I_{AC,R}$	> 3000 h for d ≥ 12.5 mm up to 50 V					
Requirements	ΔC/C ≤ ±35% of initial value tan δ ≤ 3 times initial specified limit I_{leak} ≤ initial specified limit					
Voltage endurance test 125 °C, V_R	2500 h for d = 8 mm up to 50 V 3500 h for d = 10 mm up to 50 V 7000 h for d ≥ 12.5 mm up to 50 V			2000 h for d = 8 mm for 63 V 3000 h for d = 10 mm for 63 V 5000 h for d ≥ 12.5 mm for 63 V		
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: 55/125/56 (−55 °C/+125 °C/56 days damp heat test)					
Sectional specification	AEC-Q200, IEC 60384-4					



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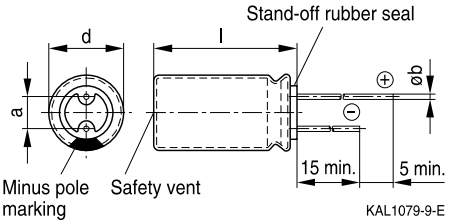
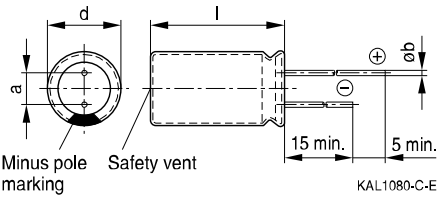
Extra long useful life – 125 °C

Dimensional drawings

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

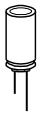


With flat rubber seal
Diameter (mm): 8



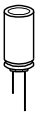
Dimensions and weights

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	30 +2.0	5.0	0.80 ±0.05	5.3
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)						
1.0					8 × 11.5	
2.2					8 × 11.5	
3.3					8 × 11.5	
4.7					8 × 11.5	
10					8 × 11.5	
12					8 × 11.5	
15					8 × 11.5	
18					8 × 11.5	
22					8 × 11.5	8 × 11.5
27					8 × 11.5	
33					8 × 11.5	8 × 11.5
39					8 × 11.5	
47					8 × 11.5	10 × 12.5
56					8 × 11.5	
68					8 × 11.5	10 × 16
82					8 × 11.5	
100		8 × 11.5	8 × 11.5	8 × 11.5 10 × 12.5	10 × 12.5	10 × 20
120		8 × 11.5	8 × 11.5	10 × 12.5	10 × 16	
150		8 × 11.5	8 × 11.5	10 × 16	10 × 16	12.5 × 20
180		8 × 11.5	8 × 11.5	10 × 16	10 × 20	12.5 × 20
220	8 × 11.5	8 × 11.5	10 × 12.5	10 × 16	10 × 20	12.5 × 25
270	8 × 11.5	10 × 12.5	10 × 12.5	10 × 20	12.5 × 20	12.5 × 25
330	8 × 11.5	10 × 12.5	10 × 16	10 × 20	12.5 × 20	12.5 × 25
390	10 × 12.5	10 × 12.5	10 × 16	12.5 × 20	12.5 × 25	12.5 × 30
470	10 × 12.5	10 × 16	10 × 20	12.5 × 20	12.5 × 25 16 × 20	16 × 25
560	10 × 16	10 × 16	10 × 20	12.5 × 25	16 × 20	16 × 31.5
680	10 × 16	10 × 16	10 × 20	12.5 × 25	16 × 25 18 × 20	16 × 31.5
820	10 × 20	10 × 20	12.5 × 20	16 × 20	16 × 31.5	18 × 31.5
1000	10 × 20	12.5 × 20	12.5 × 25 16 × 20	12.5 × 40 16 × 25 18 × 20	16 × 31.5	18 × 35



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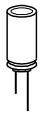
Extra long useful life – 125 °C

V_R (V DC)	10	16	25	35	50	63
	Case dimensions d × l (mm)					
C_R (µF)						
1200	12.5 × 20	12.5 × 20	12.5 × 25	16 × 25 18 × 20	18 × 31.5	18 × 40
1500	12.5 × 20	12.5 × 25	16 × 20	16 × 31.5	18 × 35	
1800	12.5 × 20	12.5 × 25	12.5 × 40 16 × 25 18 × 20	16 × 31.5	18 × 40	
2200	12.5 × 25	12.5 × 30 16 × 20	16 × 31.5 18 × 25	18 × 35		
2700	16 × 20	16 × 25 18 × 20	16 × 31.5	18 × 40		
3300	16 × 25	16 × 31.5	18 × 31.5			
3900	16 × 25 18 × 20	16 × 31.5	18 × 35			
4700	16 × 31.5	18 × 31.5	18 × 40			
5600	16 × 31.5	18 × 35				
6800	18 × 31.5	18 × 40				
8200	18 × 35					
10000	18 × 40					

Other voltage and capacitance ratings are available upon request.



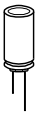
Technical data and ordering codes

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 125 °C mA	$I_{AC,max}$ 100 kHz 105 °C mA	Ordering code (composition see below)
V_R = 10 V DC								
220	8 × 11.5	5.170	1.148	0.646	0.573	340	442	B41896C3227M***
270	8 × 11.5	5.170	0.936	0.646	0.573	340	442	B41896C3277M***
330	8 × 11.5	5.170	0.766	0.646	0.573	340	442	B41896C3337M***
390	10 × 12.5	2.116	0.648	0.265	0.230	680	884	B41896C3397M***
470	10 × 12.5	2.116	0.538	0.265	0.230	680	884	B41896C3477M***
560	10 × 16	1.104	0.451	0.138	0.115	965	1255	B41896C3567M***
680	10 × 16	1.104	0.372	0.138	0.115	965	1255	B41896C3687M***
820	10 × 20	0.592	0.308	0.074	0.062	1205	1566	B41896C3827M***
1000	10 × 20	0.592	0.253	0.074	0.062	1205	1566	B41896C3108M***
1200	12.5 × 20	0.484	0.211	0.061	0.055	1820	2366	B41896C3128M***
1500	12.5 × 20	0.484	0.168	0.061	0.055	1820	2366	B41896C3158M***
1800	12.5 × 20	0.484	0.140	0.061	0.055	1820	2366	B41896C3188M***
2200	12.5 × 25	0.285	0.126	0.036	0.033	2280	2964	B41896C3228M***
2700	16 × 20	0.299	0.103	0.037	0.034	2280	2964	B41896C3278M***
3300	16 × 25	0.238	0.090	0.030	0.026	2860	3718	B41896C3338M***
3900	16 × 25	0.238	0.078	0.030	0.026	2860	3718	B41896C3398M***
3900	18 × 20	0.273	0.078	0.034	0.031	2490	3237	B41896D3398M***
4700	16 × 31.5	0.185	0.070	0.023	0.022	3160	4108	B41896C3478M***
5600	16 × 31.5	0.185	0.063	0.023	0.022	3160	4108	B41896C3568M***
6800	18 × 31.5	0.178	0.056	0.022	0.021	3500	4550	B41896C3688M***
8200	18 × 35	0.178	0.052	0.022	0.019	3840	4992	B41896C3828M***
10000	18 × 40	0.150	0.048	0.019	0.016	4230	5499	B41896C3109M***

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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Extra long useful life – 125 °C

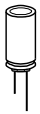
Technical data and ordering codes

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 125 °C mA	$I_{AC,max}$ 100 kHz 105 °C mA	Ordering code (composition see below)
V_R = 16 V DC								
100	8 × 11.5	5.170	2.147	0.646	0.573	340	442	B41896C4107M***
120	8 × 11.5	5.170	1.789	0.646	0.573	340	442	B41896C4127M***
150	8 × 11.5	5.170	1.432	0.646	0.573	340	442	B41896C4157M***
180	8 × 11.5	5.170	1.193	0.646	0.573	340	442	B41896C4187M***
220	8 × 11.5	5.170	0.976	0.646	0.573	340	442	B41896C4227M***
270	10 × 12.5	2.116	0.795	0.265	0.230	680	884	B41896C4277M***
330	10 × 12.5	2.116	0.651	0.265	0.230	680	884	B41896C4337M***
390	10 × 12.5	2.116	0.551	0.265	0.230	680	884	B41896C4397M***
470	10 × 16	1.104	0.457	0.138	0.115	965	1255	B41896C4477M***
560	10 × 16	1.104	0.383	0.138	0.115	965	1255	B41896C4567M***
680	10 × 16	1.104	0.316	0.138	0.115	965	1255	B41896C4687M***
820	10 × 20	0.592	0.262	0.074	0.062	1205	1566	B41896C4827M***
1000	12.5 × 20	0.484	0.215	0.061	0.055	1820	2366	B41896C4108M***
1200	12.5 × 20	0.484	0.179	0.061	0.055	1820	2366	B41896C4128M***
1500	12.5 × 25	0.285	0.143	0.036	0.033	2280	2964	B41896C4158M***
1800	12.5 × 25	0.285	0.119	0.036	0.033	2280	2964	B41896C4188M***
2200	12.5 × 30	0.238	0.109	0.030	0.026	2860	3718	B41896C4228M***
2200	16 × 20	0.299	0.109	0.037	0.034	2280	2964	B41896D4228M***
2700	16 × 25	0.238	0.089	0.030	0.026	2860	3718	B41896C4278M***
2700	18 × 20	0.273	0.089	0.034	0.031	2490	3237	B41896D4278M***
3300	16 × 31.5	0.185	0.080	0.023	0.022	3160	4108	B41896C4338M***
3900	16 × 31.5	0.185	0.068	0.023	0.022	3160	4108	B41896C4398M***
4700	18 × 31.5	0.178	0.060	0.022	0.021	3500	4550	B41896C4478M***
5600	18 × 35	0.178	0.056	0.022	0.019	3840	4992	B41896C4568M***
6800	18 × 40	0.150	0.050	0.019	0.016	4230	5499	B41896C4688M***

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 125 °C mA	$I_{AC,max}$ 100 kHz 105 °C mA	Ordering code (composition see below)
V_R = 25 V DC								
100	8 × 11.5	5.170	2.147	0.646	0.573	340	442	B41896C5107M***
120	8 × 11.5	5.170	1.789	0.646	0.573	340	442	B41896C5127M***
150	8 × 11.5	5.170	1.432	0.646	0.573	340	442	B41896C5157M***
180	8 × 11.5	5.170	1.193	0.646	0.573	340	442	B41896C5187M***
220	10 × 12.5	2.116	0.976	0.265	0.230	680	884	B41896C5227M***
270	10 × 12.5	2.116	0.795	0.265	0.230	680	884	B41896C5277M***
330	10 × 16	1.104	0.651	0.138	0.115	965	1255	B41896C5337M***
390	10 × 16	1.104	0.551	0.138	0.115	965	1255	B41896C5397M***
470	10 × 20	0.592	0.457	0.074	0.062	1205	1566	B41896C5477M***
560	10 × 20	0.592	0.383	0.074	0.062	1205	1566	B41896C5567M***
680	10 × 20	0.592	0.316	0.074	0.062	1205	1566	B41896C5687M***
820	12.5 × 20	0.484	0.262	0.061	0.055	1820	2366	B41896C5827M***
1000	12.5 × 25	0.285	0.215	0.036	0.033	2280	2964	B41896C5108M***
1000	16 × 20	0.299	0.215	0.037	0.034	2280	2964	B41896D5108M***
1200	12.5 × 25	0.285	0.179	0.036	0.033	2280	2964	B41896C5128M***
1500	16 × 20	0.299	0.143	0.037	0.034	2280	2964	B41896D5158M***
1800	12.5 × 40	0.181	0.119	0.023	0.021	3340	4342	B41896C5188M***
1800	16 × 25	0.238	0.119	0.030	0.026	2860	3718	B41896D5188M***
1800	18 × 20	0.273	0.119	0.034	0.031	2490	3237	B41896E5188M***
2200	16 × 31.5	0.185	0.109	0.023	0.022	3160	4108	B41896C5228M***
2200	18 × 25	0.229	0.109	0.029	0.025	3010	3913	B41896D5228M***
2700	16 × 31.5	0.185	0.089	0.023	0.022	3160	4108	B41896C5278M***
3300	18 × 31.5	0.178	0.080	0.022	0.021	3500	4550	B41896C5338M***
3900	18 × 35	0.178	0.068	0.022	0.019	3840	4992	B41896C5398M***
4700	18 × 40	0.150	0.060	0.019	0.016	4230	5499	B41896C5478M***

Composition of ordering code

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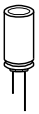
- 001 = for kinked leads, bulk (for ∅ ≥ 10 mm)
- 002 = for cut leads, bulk (for ∅ ≥ 10 mm)
- 003 = for crimped leads, blister (for ∅ ≥ 16 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm)
- 008 = for taped leads, Ammo pack, lead spacing F = 5.0 mm (from d × l = 8 × 11.5 mm to 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)



B41896

Extra long useful life – 125 °C

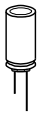
Technical data and ordering codes

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 125 °C mA	$I_{AC,max}$ 100 kHz 105 °C mA	Ordering code (composition see below)
V_R = 35 V DC								
100	8 × 11.5	5.170	1.516	0.646	0.573	340	442	B41896C7107M***
100	10 × 12.5	2.116	1.516	0.265	0.230	680	884	B41896D7107M***
120	10 × 12.5	2.116	1.263	0.265	0.230	680	884	B41896C7127M***
150	10 × 16	1.104	1.011	0.138	0.115	965	1255	B41896C7157M***
180	10 × 16	1.104	0.842	0.138	0.115	965	1255	B41896C7187M***
220	10 × 16	1.104	0.689	0.138	0.115	965	1255	B41896C7227M***
270	10 × 20	0.592	0.561	0.074	0.062	1205	1566	B41896C7277M***
330	10 × 20	0.592	0.459	0.074	0.062	1205	1566	B41896C7337M***
390	12.5 × 20	0.484	0.389	0.061	0.055	1820	2366	B41896C7397M***
470	12.5 × 20	0.484	0.323	0.061	0.055	1820	2366	B41896C7477M***
560	12.5 × 25	0.285	0.271	0.036	0.033	2280	2964	B41896C7567M***
680	12.5 × 25	0.285	0.223	0.036	0.033	2280	2964	B41896C7687M***
820	16 × 20	0.299	0.185	0.037	0.034	2280	2964	B41896C7827M***
1000	12.5 × 40	0.181	0.152	0.023	0.021	3340	4342	B41896C7108M***
1000	16 × 25	0.238	0.152	0.030	0.026	2860	3718	B41896D7108M***
1000	18 × 20	0.273	0.152	0.034	0.031	2490	3237	B41896E7108M***
1200	16 × 25	0.238	0.126	0.030	0.026	2860	3718	B41896C7128M***
1200	18 × 20	0.273	0.126	0.034	0.031	2490	3237	B41896D7128M***
1500	16 × 31.5	0.185	0.101	0.023	0.022	3160	4108	B41896C7158M***
1800	16 × 31.5	0.185	0.084	0.023	0.022	3160	4108	B41896C7188M***
2200	18 × 35	0.178	0.080	0.022	0.019	3840	4992	B41896C7228M***
2700	18 × 40	0.150	0.065	0.019	0.016	4230	5499	B41896C7278M***

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)



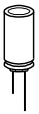
Technical data and ordering codes

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 125 °C mA	$I_{AC,max}$ 100 kHz 105 °C mA	Ordering code (composition see below)
V_R = 50 V DC								
1	8 × 11.5	6.396	126.313	0.800	0.702	35	46	B41896C6105M***
2.2	8 × 11.5	6.396	57.415	0.800	0.702	50	65	B41896C6225M***
3.3	8 × 11.5	6.396	38.277	0.800	0.702	70	91	B41896C6335M***
4.7	8 × 11.5	6.396	26.875	0.800	0.702	100	130	B41896C6475M***
10	8 × 11.5	6.396	12.631	0.800	0.702	200	260	B41896C6106M***
12	8 × 11.5	6.396	10.526	0.800	0.702	200	260	B41896C6126M***
15	8 × 11.5	6.396	8.421	0.800	0.702	200	260	B41896C6156M***
18	8 × 11.5	6.396	7.017	0.800	0.702	200	260	B41896C6186M***
22	8 × 11.5	6.396	5.742	0.800	0.702	260	338	B41896C6226M***
27	8 × 11.5	6.396	4.678	0.800	0.702	260	338	B41896C6276M***
33	8 × 11.5	4.920	3.828	0.615	0.540	300	390	B41896C6336M***
39	8 × 11.5	4.129	3.239	0.516	0.453	300	390	B41896C6396M***
47	8 × 11.5	3.466	2.688	0.433	0.380	440	572	B41896C6476M***
56	8 × 11.5	2.909	2.256	0.364	0.319	440	572	B41896C6566M***
68	8 × 11.5	2.441	1.858	0.305	0.268	440	572	B41896C6686M***
82	8 × 11.5	2.049	1.540	0.256	0.225	440	572	B41896C6826M***
100	10 × 12.5	1.820	1.263	0.228	0.203	680	884	B41896C6107M***
120	10 × 16	1.104	1.053	0.138	0.115	965	1255	B41896C6127M***
150	10 × 16	1.104	0.842	0.138	0.115	965	1255	B41896C6157M***
180	10 × 20	0.592	0.702	0.074	0.062	1205	1566	B41896C6187M***
220	10 × 20	0.592	0.574	0.074	0.062	1205	1566	B41896C6227M***
270	12.5 × 20	0.484	0.468	0.061	0.055	1820	2366	B41896C6277M***
330	12.5 × 20	0.484	0.383	0.061	0.055	1820	2366	B41896C6337M***
390	12.5 × 25	0.285	0.324	0.036	0.033	2280	2964	B41896C6397M***
470	12.5 × 25	0.269	0.069	0.036	0.033	2280	2964	B41896C6477M***
470	16 × 20	0.299	0.269	0.037	0.034	2280	2964	B41896D6477M***

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)



B41896

Extra long useful life – 125 °C

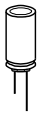
Technical data and ordering codes

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 125 °C mA	$I_{AC,max}$ 100 kHz 105 °C mA	Ordering code (composition see below)
V_R = 50 V DC								
560	16 × 20	0.299	0.226	0.037	0.034	2280	2964	B41896C6567M***
680	16 × 25	0.238	0.186	0.030	0.026	2860	3718	B41896C6687M***
680	18 × 20	0.273	0.186	0.034	0.031	2490	3237	B41896D6687M***
820	16 × 31.5	0.185	0.154	0.023	0.022	3160	4108	B41896C6827M***
1000	16 × 31.5	0.185	0.100	0.023	0.022	3160	4108	B41896C6108M***
1200	18 × 31.5	0.178	0.095	0.022	0.021	3500	4550	B41896C6128M***
1500	18 × 35	0.178	0.084	0.022	0.019	3840	4992	B41896C6158M***
1800	18 × 40	0.150	0.070	0.019	0.016	4230	5499	B41896C6188M***
V_R = 63 V DC								
22	8 × 11.5	24.600	8.612	2.460	2.160	147	191	B41896C8226M***
33	8 × 11.5	24.600	5.742	2.460	2.160	147	191	B41896C8336M***
47	10 × 12.5	7.963	4.031	0.796	0.711	297	386	B41896C8476M***
68	10 × 16	5.097	2.786	0.510	0.435	416	540	B41896C8686M***
100	10 × 20	3.434	1.895	0.343	0.325	525	682	B41896C8107M***
150	12.5 × 20	2.522	1.263	0.252	0.243	695	903	B41896C8157M***
180	12.5 × 20	2.522	1.053	0.252	0.243	695	903	B41896C8187M***
220	12.5 × 25	1.671	0.861	0.167	0.155	950	1236	B41896C8227M***
270	12.5 × 25	1.671	0.702	0.167	0.155	950	1236	B41896C8277M***
330	12.5 × 25	1.671	0.574	0.167	0.155	950	1236	B41896C8337M***
390	12.5 × 30	1.422	0.486	0.142	0.134	1103	1433	B41896C8397M***
470	16 × 25	1.522	0.403	0.152	0.143	1120	1455	B41896C8477M***
560	16 × 31.5	1.219	0.338	0.122	0.109	1403	1824	B41896C8567M***
680	16 × 31.5	1.341	0.279	0.134	0.120	1338	1739	B41896C8687M***
820	18 × 31.5	1.108	0.231	0.111	0.099	1581	2055	B41896C8827M***
1000	18 × 35	0.936	0.189	0.094	0.085	1775	2307	B41896C8108M***
1200	18 × 40	0.840	0.158	0.084	0.080	1936	2516	B41896C8128M***

Composition of ordering code

*** = Version

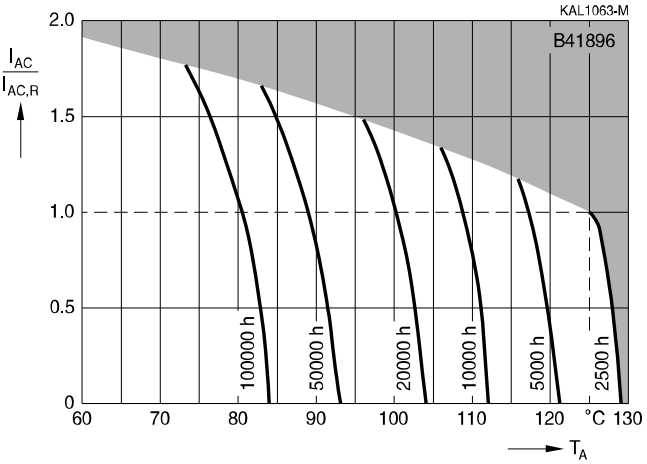
000 = for standard leads, bulk
001 = for kinked leads, bulk (for ∅ ≥ 10 mm)
002 = for cut leads, bulk (for ∅ ≥ 10 mm)
003 = for crimped leads, blister (for ∅ ≥ 16 mm)
004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm)
008 = for taped leads, Ammo pack, lead spacing F = 5.0 mm (from d × 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)



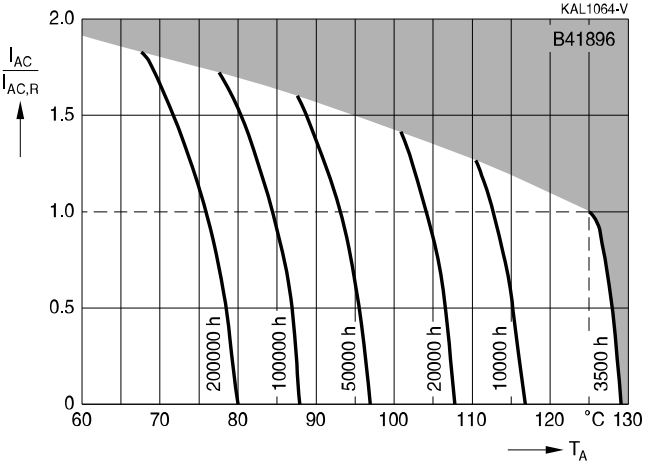
Useful life

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

$V_R \leq 50$ V, d = 8 mm



$V_R \leq 50$ V, d = 10 mm

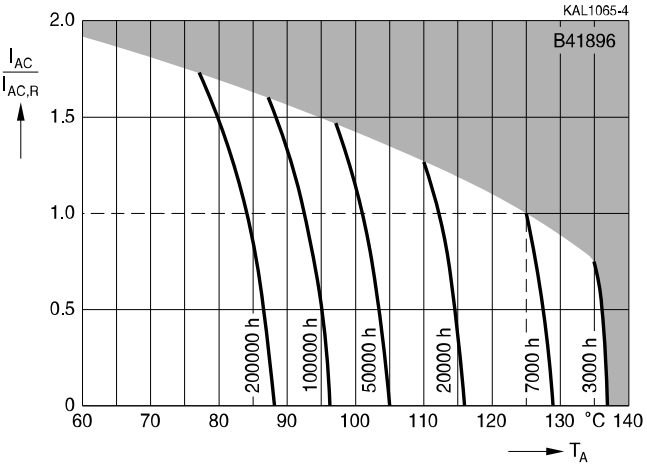


1) Refer to chapter "General technical information, 5.3 Calculation of useful life" for an explanation on how to interpret the useful life graphs.

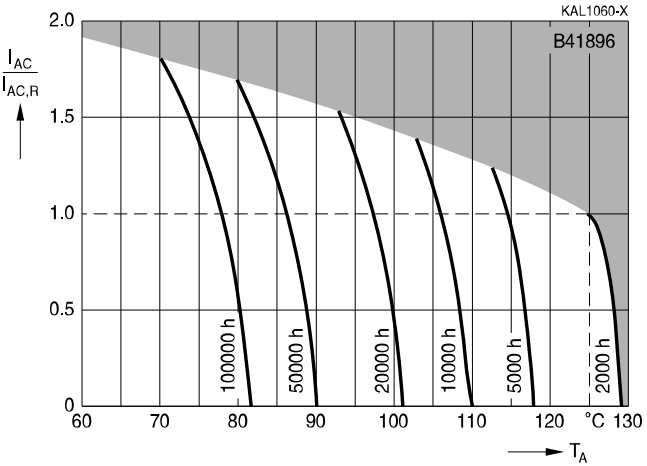
Useful life

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

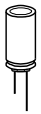
$V_R \leq 50$ V, d ≥ 12.5 mm



V_R = 63 V, d = 8 mm



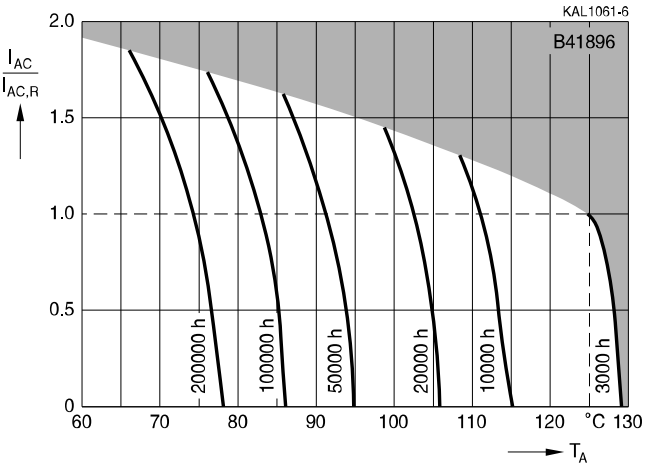
2) Refer to chapter "General technical information, 5.3 Calculation of useful life" for an explanation on how to interpret the useful life graphs.



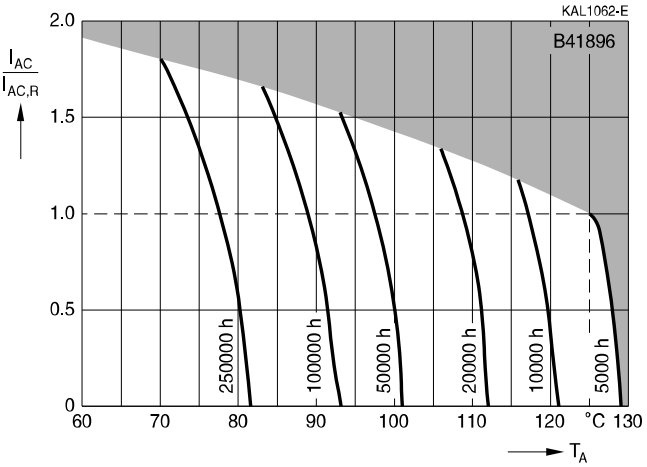
Useful life

depending on ambient temperature T_A under ripple current operating conditions[3)]

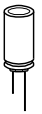
V_R = 63 V, d = 10 mm



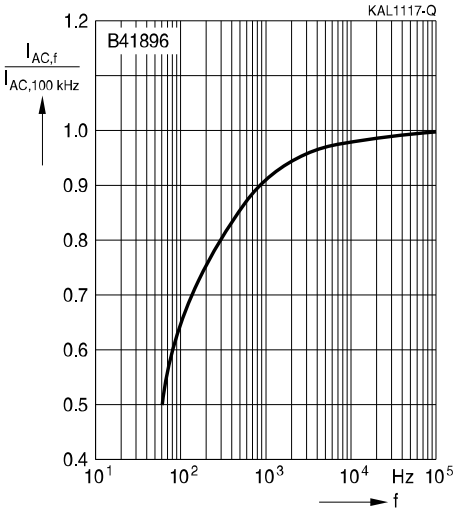
V_R = 63 V, d ≥ 12.5

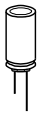


3) Refer to chapter "General technical information, 5.3 Calculation of useful life" for an explanation on how to interpret the useful life graphs.



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



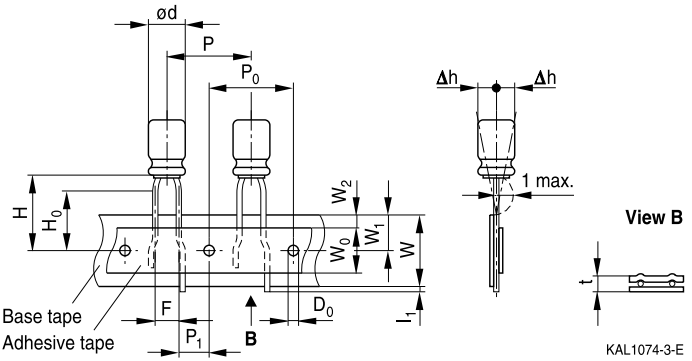


Taping, packing and lead configurations

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

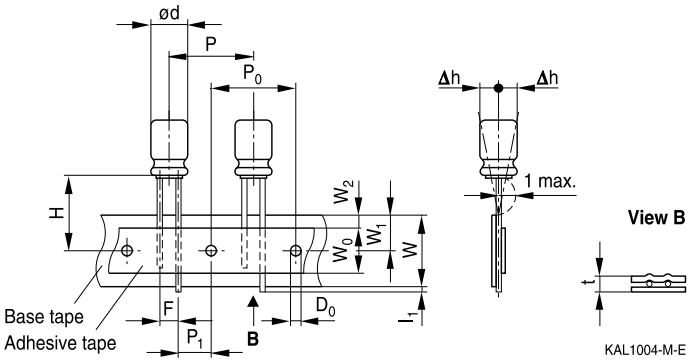


Dimensions in mm

∅ 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

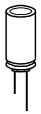
Lead spacing 3.5 mm (∅ d = 8 mm)

Last 3 digits of ordering code: 006



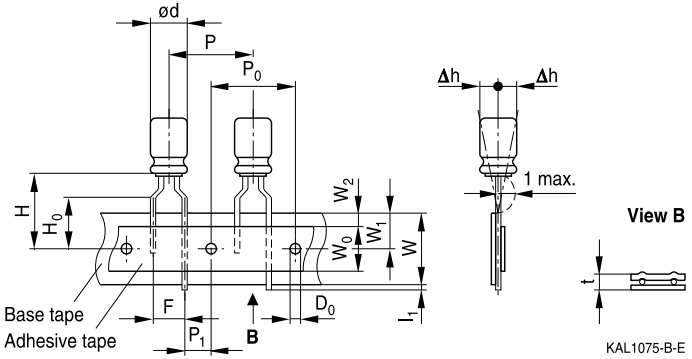
Dimensions in mm

∅ 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



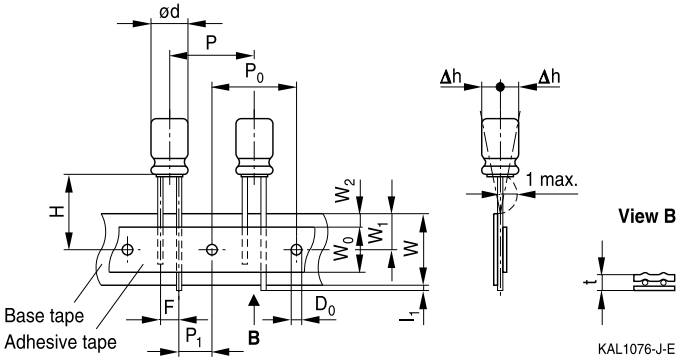
Lead spacing 5.0 mm (∅ d = 5 ... 8 mm)

Last 3 digits of ordering code: 008



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

Last 3 digits of ordering code: 008

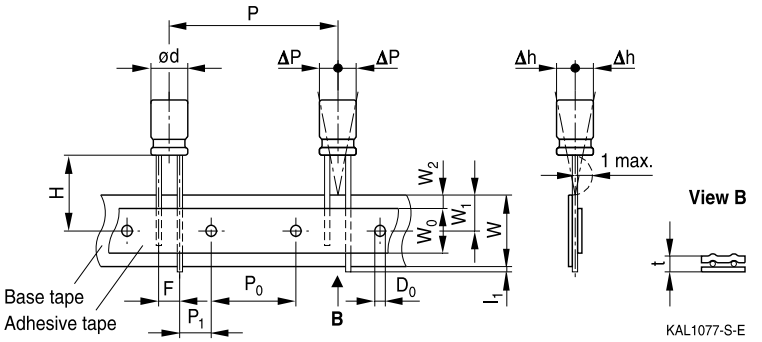


Dimensions in mm

∅ 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)

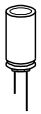
Last 3 digits of ordering code: 009



Dimensions in mm

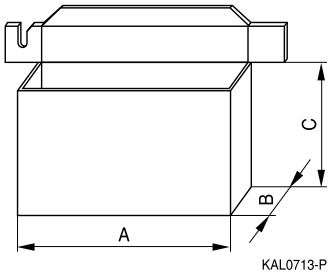
∅ d	F	H	W	W_0	W_1	W_2	P	P_0	P_1	l_1	t	ΔP	Δh	D_0
16	7.5	18.5	18.0	12.5	9.0	1.5	30.0	15.0	3.75	1.0	0.7	0	0	4.0
18 *)														
Tolerance	±0.8	−0.5 +0.75	±0.5	min.	±0.5	max.	±1.0	±0.2	±0.5	max.	±0.2	±1.0	±1.0	±0.2

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

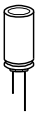


Packing units and box dimensions

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



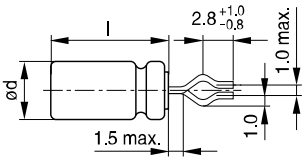
Kinked or cut leads

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

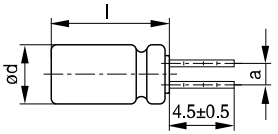
Kinked leads

Last 3 digits of ordering code: 001

With stand-off rubber seal

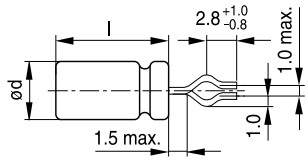


KAL1081-K

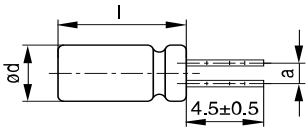


KAL1083-2

With flat rubber seal

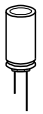


KAL1082-T



KAL1084-A

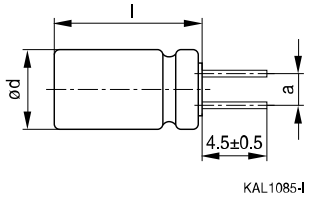
Case size d × l (mm)	Dimensions (mm) a ±0.5
10 × 20	5.0
12.5 × 20	5.0
12.5 × 25	5.0
12.5 × 30	5.0
12.5 × 35	5.0
12.5 × 40	5.0
16 × 20	7.5
16 × 25	7.5
16 × 31.5	7.5
18 × 20	7.5
18 × 25	7.5
18 × 31.5	7.5
18 × 35	7.5
18 × 40	7.5
20 × 20	10.0
20 × 25	10.0
20 × 40	10.0
22 × 30	10.0
22 × 35	10.0
22 × 40	10.0



Cut leads

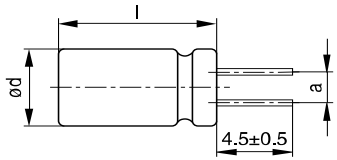
Last 3 digits of ordering code: 002

With stand-off rubber seal



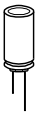
KAL1085-I

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



B41896

Extra long useful life – 125 °C

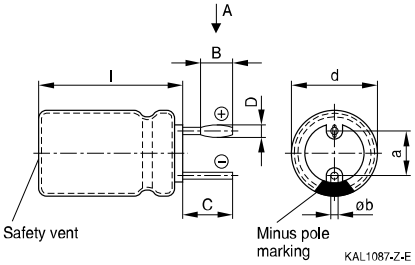
PAPR leads (Protection Against Polarity Reversal)

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

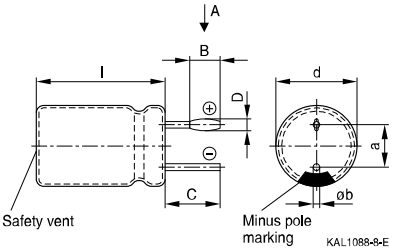
Crimped leads

Last 3 digits of ordering code: 003

With stand-off rubber seal

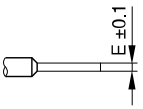


With flat rubber seal

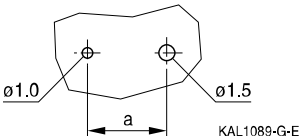


Suggestion for PCB hole diameter

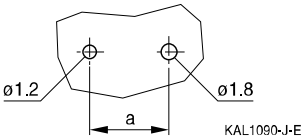
View A



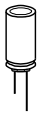
Suggestion for PCB hole diameter, wire ø0.8 mm



Suggestion for PCB hole diameter, wire ø1.0 mm

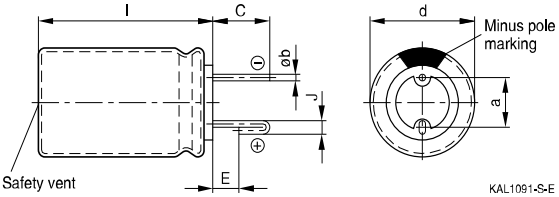


Case size	Dimensions (mm)					
d × l (mm)	B ±0.2	C ±0.5	D ±0.1	E ±0.1	a ±0.5	∅b
16 × 20	1.5	3.0	1.3	0.3	7.5	0.8 ±0.05
16 × 25	1.5	3.0	1.3	0.3	7.5	0.8 ±0.05
16 × 31.5	1.5	3.0	1.3	0.3	7.5	0.8 ±0.05
18 × 20	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
18 × 25	1.5	3.0	1.3	0.3	7.5	0.8 ±0.1
18 × 31.5	1.5	3.0	1.3	0.3	7.5	0.8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



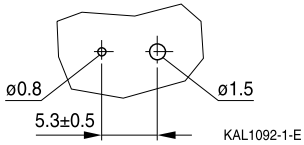
J leads

Last 3 digits of ordering code: 004

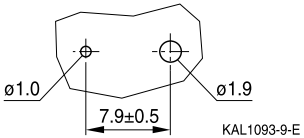


Suggestion for PCB hole diameter

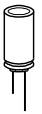
Suggestion for PCB hole diameter, wire ø0.6 mm



Suggestion for PCB hole diameter, wire ø0.8 mm

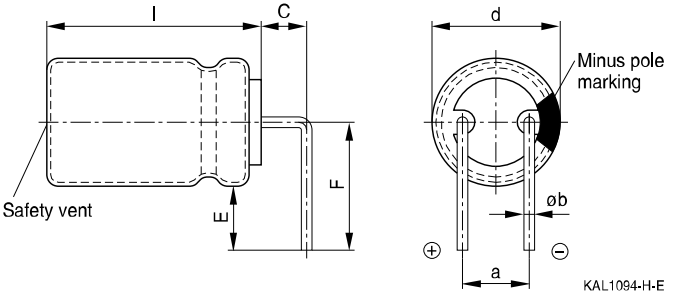


Case size	Dimensions (mm)				
d × l (mm)	C ±0.5	E ±0.5	J ±0.2	a ±0.5	∅b
10 × 12.5	3.2	0.7	1.2	5.0	0.6 ±0.05
10 × 16	3.2	0.7	1.2	5.0	0.6 ±0.05
10 × 20	3.2	0.7	1.2	5.0	0.6 ±0.05
12.5 × 20	3.2	0.7	1.2	5.0	0.6 ±0.05
12.5 × 25	3.2	0.7	1.2	5.0	0.6 ±0.05
16 × 20	3.5	0.7	1.6	7.5	0.8 ±0.05
16 × 25	3.5	0.7	1.6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



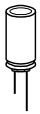
Bent 90° leads for horizontal mounting pinning

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

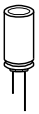
Bent leads for diameter 12.5 mm available upon request.



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



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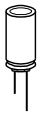
Extra long useful life – 125 °C

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					



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.

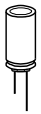
As far as possible, EPCOS does not use any dangerous chemicals or compounds to produce operating electrolytes. However, in exceptional cases, such materials must be used in order to achieve specific physical and electrical properties because no safe substitute materials are currently known. However, 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"



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)**.
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