

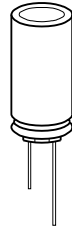


# Aluminum electrolytic capacitors

Single-ended capacitors

**Series/Type:** B41858  
**Date:** November 2008

### Long-life grade capacitors for professional applications



#### Applications

- For use in output circuits of switch-mode power supplies of compact design
- For professional industrial electronics, telecommunications and data processing equipment
- Automotive electronics

#### Features

- Low impedance at high frequency
- Low ESR
- High ripple current capability
- High reliability and long useful life
- RoHS-compatible

#### 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 ... 100 V DC							
Surge voltage $V_S$	$1.15 \cdot V_R$							
Rated capacitance $C_R$	22 ... 10000 $\mu\text{F}$							
Capacitance tolerance	$\pm 20\% \triangle M$							
Dissipation factor $\tan \delta$ (20 °C, 120 Hz)	For capacitance higher than 1000 $\mu\text{F}$ add 0.02 for every increase of 1000 $\mu\text{F}$ .							
	$V_R$ (V DC)	10	16	25	35	50	63	100
	$\tan \delta$ (max.)	0.19	0.16	0.14	0.12	0.10	0.10	0.08
Leakage current $I_{\text{leak}}$ (20 °C, 5 min)	$I_{\text{leak}} = 0.01 \mu\text{A} \cdot \left( \frac{C_R}{\mu\text{F}} \cdot \frac{V_R}{V} \right)$							
Self-inductance ESL	Diameter (mm)	8 ... 12.5		16		18		
	ESL (nH)	20		26		34		
Useful life 105 °C; $V_R$ ; $I_{\text{AC,R}}$ 105 °C; $V_R$ ; $I_{\text{AC,R}}$	<p>&gt; 3000 h for <math>d = 8</math> mm          &gt; 5000 h for <math>d \geq 10</math> mm</p>							
Requirements	<p><math>\Delta C/C \leq \pm 40\%</math> of initial value  <math>\tan \delta \leq 3</math> times initial specified limit  <math>I_{\text{leak}} \leq</math> initial specified limit</p>							
Voltage endurance test 105 °C; $V_R$	<p>3000 h for <math>d = 8</math> mm          5000 h for <math>d \geq 10</math> mm</p>							
Post test requirements	<p><math>\Delta C/C \leq \pm 30\%</math> of initial value  <math>\tan \delta \leq 2</math> times initial specified limit  <math>I_{\text{leak}} \leq</math> initial specified limit</p>							
Vibration resistance test	<p>To IEC 60068-2-6, test Fc:          Displacement amplitude 1.5 mm, frequency range 10 ... 2000 Hz,          acceleration max. 20 g, duration <math>3 \times 2</math> h.          Capacitor rigidly clamped by the aluminum case.</p>							
IEC climatic category	<p>To IEC 60068-1:          55/105/56 (–55 °C/+105 °C/56 days damp heat test)</p>							
Sectional specification	IEC 60384-4, AEC Q200							



**B41858**

**Low impedance – 105 °C**

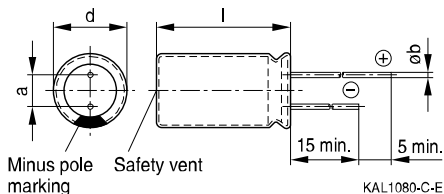
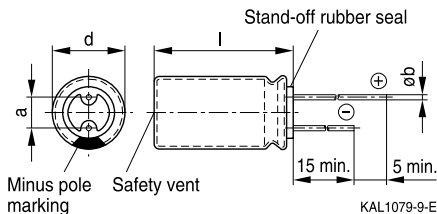
### Dimensional drawings

#### With stand-off rubber seal

Diameters (mm): 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
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
	Case dimensions $d \times l$ (mm)			
$C_R$ ( $\mu\text{F}$ )				
120				8 × 11.5
150				8 × 11.5
180			8 × 11.5	10 × 12.5
220			8 × 11.5	10 × 12.5
270		8 × 11.5	10 × 12.5	
330	8 × 11.5	8 × 11.5	10 × 12.5	10 × 16
390	8 × 11.5			
470	8 × 11.5	10 × 12.5	10 × 16	10 × 20
560	10 × 12.5	10 × 16	10 × 16	10 × 20
680	10 × 12.5	10 × 16		12.5 × 20
820	10 × 16	10 × 20	10 × 20	
1000	10 × 16	10 × 20	12.5 × 20	12.5 × 25 16 × 20
1200	10 × 16	10 × 20		16 × 20
1500	10 × 20	12.5 × 20	12.5 × 25	12.5 × 40 16 × 25
1800	10 × 20	12.5 × 25	16 × 20	16 × 25 18 × 20
2200	12.5 × 20	12.5 × 25	12.5 × 40 16 × 25 18 × 20	18 × 25
2700	12.5 × 25	16 × 20	16 × 31.5 18 × 20	18 × 31.5
3300	12.5 × 25 16 × 20	12.5 × 40 16 × 25	18 × 25	18 × 31.5
3900	12.5 × 40 16 × 20	16 × 31.5 18 × 20	18 × 31.5	18 × 35
4700	18 × 20	18 × 25	18 × 31.5	18 × 40
5600	12.5 × 40		18 × 35	
6800	16 × 31.5	18 × 31.5	18 × 40	
8200	18 × 31.5	18 × 35		
10000	18 × 35	18 × 40		


**B41858**
**Low impedance – 105 °C**

$V_R$ (V DC)	50	63	100
	Case dimensions $d \times l$ (mm)		
$C_R$ ( $\mu$ F)			
22			8 × 11.5
27			10 × 12.5
33			10 × 16
56			10 × 20
68			
82	8 × 11.5	10 × 12.5	
100	8 × 11.5	10 × 12.5	12.5 × 20
120	10 × 12.5	10 × 16	12.5 × 25
150	10 × 12.5	10 × 16	
180	10 × 16	10 × 20	12.5 × 30 16 × 20
220	10 × 16	10 × 20	16 × 25
270		12.5 × 20	12.5 × 40 18 × 20
330	10 × 20	12.5 × 20	18 × 25
390		12.5 × 25	18 × 31.5
470	12.5 × 20	12.5 × 25 16 × 20	18 × 35
560	12.5 × 25		18 × 35
680	12.5 × 30	12.5 × 40 16 × 25 18 × 20	18 × 40
820	12.5 × 40 16 × 20	16 × 31.5 18 × 25	
1000	16 × 31.5 18 × 20	16 × 31.5	
1200	18 × 20	18 × 31.5	
1500	18 × 25	18 × 35	
1800	18 × 31.5	18 × 40	
2200	18 × 35		
2700	18 × 40		

Other voltage and capacitance ratings are available upon request.


**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz 20 °C	$ESR_{max}$ 120 Hz 20 °C	$ESR_{max}$ 10 kHz 20 °C	$Z_{max}$ 100 kHz 20 °C	$I_{AC,R}$ 100 kHz 105 °C	$I_{AC,max}$ 100 kHz 85 °C	Ordering code (composition see below)
$\mu F$	d × l mm	$\Omega$	$\Omega$	$\Omega$	$\Omega$	mA	mA	
<b><math>V_R = 10 V DC</math></b>								
330	8 × 11.5	2.195	0.727	0.274	0.246	436	654	B41858C3337M***
390	8 × 11.5	2.195	0.615	0.274	0.246	436	654	B41858C3397M***
470	8 × 11.5	2.195	0.511	0.274	0.246	436	654	B41858C3477M***
560	10 × 12.5	1.035	0.429	0.129	0.113	746	1118	B41858C3567M***
680	10 × 12.5	1.035	0.353	0.129	0.113	746	1118	B41858C3687M***
820	10 × 16	0.946	0.293	0.118	0.105	846	1269	B41858C3827M***
1000	10 × 16	0.946	0.240	0.118	0.105	846	1269	B41858C3108M***
1200	10 × 16	0.944	0.199	0.118	0.105	846	1269	B41858C3128M***
1500	10 × 20	0.584	0.159	0.073	0.062	1202	1803	B41858C3158M***
1800	10 × 20	0.584	0.133	0.073	0.062	1202	1803	B41858C3188M***
2200	12.5 × 20	0.496	0.121	0.062	0.060	1396	2094	B41858C3228M***
2700	12.5 × 25	0.327	0.098	0.041	0.034	2028	3043	B41858C3278M***
3300	12.5 × 25	0.327	0.088	0.041	0.034	2028	3043	B41858C3338M***
3300	16 × 20	0.307	0.088	0.038	0.033	2146	3219	B41858D3338M***
3900	12.5 × 40	0.240	0.074	0.030	0.025	2858	4287	B41858C3398M***
3900	16 × 20	0.307	0.074	0.038	0.033	2146	3219	B41858D3398M***
4700	18 × 20	0.271	0.067	0.034	0.031	2381	3571	B41858C3478M***
5600	12.5 × 40	0.243	0.061	0.030	0.025	2858	4286	B41858C3568M***
6800	16 × 31.5	0.192	0.054	0.024	0.022	3122	4683	B41858C3688M***
8200	18 × 31.5	0.165	0.051	0.021	0.020	3539	5308	B41858C3828M***
10000	18 × 35	0.160	0.047	0.020	0.018	3864	5796	B41858C3109M***

**Composition of ordering code**

\*\*\* = Version

000 = for standard leads, bulk

001 = for kinked leads, bulk (from d × l = 10 × 20 mm to 18 × 40 mm, excluding 12.5 × 30/40 mm)

 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding d × l = 12.5 × 30/40 mm)

003 = for crimped leads, blister (from d × l = 16 × 20 mm to 18 × 40 mm)

004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm, excluding 12.5 × 30/40 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  $\varnothing$  16 and 18 mm)


**B41858**
**Low impedance – 105 °C**
**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz -40 °C	$ESR_{max}$ 120 Hz 20 °C	$ESR_{max}$ 10 kHz 20 °C	$Z_{max}$ 100 kHz 20 °C	$I_{AC,R}$ 100 kHz 105 °C	$I_{AC,max}$ 100 kHz 85 °C	Ordering code (composition see below)
$\mu F$	d × l mm	$\Omega$	$\Omega$	$\Omega$	$\Omega$	mA	mA	
<b><math>V_R = 16 V DC</math></b>								
270	8 × 11.5	2.192	0.748	0.274	0.246	436	654	B41858D4277M***
330	8 × 11.5	2.192	0.612	0.274	0.246	436	654	B41858D4337M***
470	10 × 12.5	1.035	0.430	0.129	0.113	746	1118	B41858C4477M***
560	10 × 16	0.944	0.360	0.118	0.105	846	1269	B41858C4567M***
680	10 × 16	0.946	0.297	0.118	0.105	846	1269	B41858C4687M***
820	10 × 20	0.584	0.243	0.073	0.062	1202	1803	B41858C4827M***
1000	10 × 20	0.584	0.202	0.073	0.062	1202	1803	B41858C4108M***
1200	10 × 20	0.584	0.168	0.073	0.062	1202	1803	B41858C4128M***
1500	12.5 × 20	0.496	0.135	0.062	0.060	1396	2094	B41858C4158M***
1800	12.5 × 25	0.327	0.112	0.041	0.034	2028	3043	B41858C4188M***
2200	12.5 × 25	0.327	0.103	0.041	0.034	2028	3043	B41858C4228M***
2700	16 × 20	0.307	0.084	0.038	0.033	2146	3219	B41858C4278M***
3300	12.5 × 40	0.243	0.077	0.030	0.025	2858	4286	B41858D4338M***
3300	16 × 25	0.251	0.077	0.031	0.029	2483	3724	B41858C4338M***
3900	16 × 31.5	0.192	0.065	0.024	0.022	3122	4683	B41858D4398M***
3900	18 × 20	0.271	0.065	0.034	0.031	2381	3571	B41858C4398M***
4700	18 × 25	0.217	0.059	0.027	0.024	2941	4412	B41858C4478M***
6800	18 × 31.5	0.165	0.048	0.021	0.020	3539	5308	B41858C4688M***
8200	18 × 35	0.160	0.046	0.020	0.018	3864	5796	B41858C4828M***
10000	18 × 40	0.125	0.043	0.016	0.015	4467	6700	B41858C4109M***

**Composition of ordering code**

\*\*\* = Version

000 = for standard leads, bulk

001 = for kinked leads, bulk (from d × l = 10 × 20 mm to 18 × 40 mm, excluding 12.5 × 30/40 mm)

 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding d × l = 12.5 × 30/40 mm)

003 = for crimped leads, blister (from d × l = 16 × 20 mm to 18 × 40 mm)

004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm, excluding 12.5 × 30/40 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  $\varnothing$  16 and 18 mm)




**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz –40 °C $\Omega$	$ESR_{max}$ 120 Hz 20 °C $\Omega$	$ESR_{max}$ 10 kHz 20 °C $\Omega$	$Z_{max}$ 100 kHz 20 °C $\Omega$	$I_{AC,R}$ 100 kHz 105 °C mA	$I_{AC,max}$ 100 kHz 85 °C mA	Ordering code (composition see below)
120 Hz 20 °C $\mu F$	$d \times l$ mm							
<b><math>V_R = 25</math> V DC</b>								
180	8 × 11.5	2.192	0.982	0.274	0.246	436	654	B41858D5187M***
220	8 × 11.5	2.192	0.803	0.274	0.246	436	654	B41858D5227M***
270	10 × 12.5	1.032	0.654	0.129	0.113	746	1119	B41858C5277M***
330	10 × 12.5	1.035	0.536	0.129	0.113	746	1118	B41858C5337M***
470	10 × 16	0.946	0.376	0.118	0.105	846	1269	B41858C5477M***
560	10 × 16	0.944	0.315	0.118	0.105	846	1269	B41858C5567M***
680	10 × 20	0.584	0.260	0.073	0.062	1202	1803	B41858C5687M***
820	10 × 20	0.584	0.216	0.073	0.062	1202	1803	B41858C5827M***
1000	12.5 × 20	0.496	0.177	0.062	0.060	1396	2094	B41858C5108M***
1500	12.5 × 25	0.327	0.118	0.041	0.034	2028	3043	B41858C5158M***
1800	16 × 20	0.307	0.098	0.038	0.033	2146	3219	B41858C5188M***
2200	12.5 × 40	0.243	0.092	0.030	0.025	2858	4286	B41858D5228M***
2200	16 × 25	0.251	0.092	0.031	0.029	2483	3724	B41858C5228M***
2200	18 × 20	0.248	0.091	0.031	0.031	2381	3572	B41858E5228M***
2700	16 × 31.5	0.192	0.075	0.024	0.022	3122	4683	B41858D5278M***
2700	18 × 20	0.271	0.075	0.034	0.031	2381	3571	B41858C5278M***
3300	18 × 25	0.217	0.069	0.027	0.024	2941	4412	B41858C5338M***
3900	18 × 31.5	0.165	0.058	0.021	0.020	3539	5308	B41858C5398M***
4700	18 × 31.5	0.168	0.053	0.021	0.020	3539	5309	B41858D5478M***
5600	18 × 35	0.160	0.049	0.020	0.018	3864	5796	B41858D5568M***
6800	18 × 40	0.128	0.044	0.016	0.015	4467	6701	B41858C5688M***

**Composition of ordering code**

\*\*\* = Version

000 = for standard leads, bulk

 001 = for kinked leads, bulk (from  $d \times l = 10 \times 20$  mm to  $18 \times 40$  mm, excluding  $12.5 \times 30/40$  mm)

 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding  $d \times l = 12.5 \times 30/40$  mm)

 003 = for crimped leads, blister (from  $d \times l = 16 \times 20$  mm to  $18 \times 40$  mm)

 004 = for J leads, blister (from  $d \times l = 10 \times 12.5$  mm to  $18 \times 35$  mm, excluding  $12.5 \times 30/40$  mm)

 008 = for taped leads, Ammo pack, lead spacing  $F = 5.0$  mm (from  $d \times l = 8 \times 11.5$  mm to  $12.5 \times 25$  mm)

 009 = for taped leads, Ammo pack, lead spacing  $F = 7.5$  mm (from  $d \times l = 16 \times 20$  mm to  $18 \times 31.5$  mm)

 012 = for bent 90° leads, blister (for  $\varnothing 16$  and 18 mm)


**B41858**
**Low impedance – 105 °C**
**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz -40 °C	$ESR_{max}$ 120 Hz 20 °C	$ESR_{max}$ 10 kHz 20 °C	$Z_{max}$ 100 kHz 20 °C	$I_{AC,R}$ 100 kHz 105 °C	$I_{AC,max}$ 100 kHz 85 °C	Ordering code (composition see below)
$\mu F$	d × l mm	$\Omega$	$\Omega$	$\Omega$	$\Omega$	mA	mA	
<b><math>V_R = 35</math> V DC</b>								
120	8 × 11.5	2.192	1.263	0.274	0.246	436	654	B41858D7127M***
150	8 × 11.5	2.192	1.010	0.274	0.246	436	654	B41858C7157M***
180	10 × 12.5	1.035	0.842	0.129	0.113	746	1118	B41858C7187M***
220	10 × 12.5	1.035	0.689	0.129	0.113	746	1118	B41858C7227M***
330	10 × 16	0.946	0.459	0.118	0.105	846	1269	B41858C7337M***
470	10 × 20	0.584	0.323	0.073	0.062	1202	1803	B41858C7477M***
560	10 × 20	0.584	0.271	0.073	0.062	1202	1803	B41858C7567M***
680	12.5 × 20	0.496	0.223	0.062	0.060	1396	2094	B41858C7687M***
1000	12.5 × 25	0.327	0.152	0.041	0.034	2028	3043	B41858C7108M***
1000	16 × 20	0.304	0.151	0.038	0.033	2146	3219	B41858D7108M***
1200	16 × 20	0.307	0.126	0.038	0.033	2146	3219	B41858C7128M***
1500	12.5 × 40	0.243	0.101	0.030	0.025	2858	4286	B41858D7158M***
1500	16 × 25	0.251	0.101	0.031	0.029	2483	3724	B41858C7158M***
1800	16 × 25	0.248	0.084	0.031	0.029	2483	3725	B41858E7188M***
1800	18 × 20	0.271	0.084	0.034	0.031	2381	3571	B41858C7188M***
2200	18 × 25	0.217	0.080	0.027	0.024	2941	4412	B41858C7228M***
2700	18 × 31.5	0.165	0.065	0.021	0.020	3539	5308	B41858C7278M***
3300	18 × 31.5	0.168	0.061	0.021	0.020	3539	5309	B41858D7338M***
3900	18 × 35	0.160	0.051	0.020	0.018	3864	5796	B41858C7398M***
4700	18 × 40	0.125	0.048	0.016	0.015	4467	6700	B41858C7478M***

**Composition of ordering code**

\*\*\* = Version

- 000 = for standard leads, bulk
- 001 = for kinked leads, bulk (from d × l = 10 × 20 mm to 18 × 40 mm, excluding 12.5 × 30/40 mm)
- 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding d × l = 12.5 × 30/40 mm)
- 003 = for crimped leads, blister (from d × l = 16 × 20 mm to 18 × 40 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm, excluding 12.5 × 30/40 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  $\varnothing$  16 and 18 mm)


**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz 20 °C	$ESR_{max}$ 120 Hz 20 °C	$ESR_{max}$ 10 kHz 20 °C	$Z_{max}$ 100 kHz 20 °C	$I_{AC,R}$ 100 kHz 105 °C	$I_{AC,max}$ 100 kHz 85 °C	Ordering code (composition see below)
$\mu F$	d × l mm	$\Omega$	$\Omega$	$\Omega$	$\Omega$	mA	mA	
<b><math>V_R = 50</math> V DC</b>								
82	8 × 11.5	5.168	1.540	0.646	0.573	340	510	B41858C6826M***
100	8 × 11.5	5.168	1.263	0.646	0.573	340	510	B41858C6107M***
120	10 × 12.5	2.984	1.053	0.373	0.336	555	833	B41858C6127M***
150	10 × 12.5	2.984	0.842	0.373	0.336	555	833	B41858C6157M***
180	10 × 16	1.400	0.702	0.175	0.160	778	1167	B41858C6187M***
220	10 × 16	1.400	0.574	0.175	0.160	778	1167	B41858C6227M***
330	10 × 20	1.000	0.383	0.125	0.118	1030	1545	B41858C6337M***
470	12.5 × 20	0.880	0.269	0.110	0.104	1300	1950	B41858C6477M***
560	12.5 × 25	0.712	0.226	0.089	0.082	1490	2235	B41858C6567M***
680	12.5 × 30	0.360	0.186	0.045	0.043	2140	3210	B41858C6687M***
820	12.5 × 40	0.269	0.154	0.034	0.032	2799	4199	B41858C6827M***
820	16 × 20	0.401	0.154	0.050	0.046	1820	2730	B41858D6827M***
1000	16 × 31.5	0.260	0.126	0.032	0.030	2653	3980	B41858C6108M***
1000	18 × 20	0.477	0.126	0.048	0.044	1997	2995	B41858D6108M***
1200	18 × 20	0.384	0.105	0.048	0.044	1997	2996	B41858C6128M***
1500	18 × 25	0.382	0.084	0.038	0.036	2417	3626	B41858C6158M***
1800	18 × 31.5	0.300	0.070	0.030	0.028	2989	4483	B41858C6188M***
2200	18 × 35	0.268	0.069	0.027	0.024	3320	4980	B41858C6228M***
2700	18 × 40	0.210	0.065	0.021	0.020	3871	5807	B41858C6278M***

**Composition of ordering code**

\*\*\* = Version

000 = for standard leads, bulk

001 = for kinked leads, bulk (from d × l = 10 × 20 mm to 18 × 40 mm, excluding 12.5 × 30/40 mm)

 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding d × l = 12.5 × 30/40 mm)

003 = for crimped leads, blister (from d × l = 16 × 20 mm to 18 × 40 mm)

004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm, excluding 12.5 × 30/40 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  $\varnothing$  16 and 18 mm)


**B41858**
**Low impedance – 105 °C**
**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz -40 °C	$ESR_{max}$ 120 Hz 20 °C	$ESR_{max}$ 10 kHz 20 °C	$Z_{max}$ 100 kHz 20 °C	$I_{AC,R}$ 100 kHz 105 °C	$I_{AC,max}$ 100 kHz 85 °C	Ordering code (composition see below)
$\mu F$	d × l mm	$\Omega$	$\Omega$	$\Omega$	$\Omega$	mA	mA	
<b><math>V_R = 63 V DC</math></b>								
56	8 × 11.5	5.413	2.256	0.541	0.488	310	464	B41858C8566M***
68	8 × 11.5	4.328	1.857	0.541	0.488	310	465	B41858C8686M***
82	10 × 12.5	5.766	1.540	0.577	0.500	354	531	B41858C8826M***
100	10 × 12.5	4.616	1.263	0.577	0.500	354	531	B41858C8107M***
120	10 × 16	3.075	1.053	0.308	0.279	519	779	B41858C8127M***
150	10 × 16	2.464	0.842	0.308	0.279	519	779	B41858C8157M***
180	10 × 20	1.986	0.702	0.199	0.180	705	1058	B41858C8187M***
220	10 × 20	1.592	0.574	0.199	0.180	705	1058	B41858C8227M***
270	12.5 × 20	1.688	0.468	0.169	0.153	876	1315	B41858C8277M***
330	12.5 × 20	1.688	0.383	0.169	0.153	876	1315	B41858C8337M***
390	12.5 × 25	1.236	0.324	0.124	0.112	1118	1676	B41858C8397M***
470	12.5 × 25	0.992	0.268	0.124	0.112	1118	1677	B41858E8477M***
470	16 × 20	1.037	0.269	0.104	0.094	1272	1907	B41858C8477M***
680	12.5 × 40	0.717	0.186	0.072	0.065	1785	2677	B41858C8687M***
680	16 × 25	0.772	0.186	0.077	0.070	1600	2400	B41858D8687M***
680	18 × 20	0.960	0.186	0.096	0.087	1427	2140	B41858E8687M***
820	16 × 31.5	0.541	0.154	0.054	0.049	2092	3138	B41858C8827M***
820	18 × 25	0.761	0.154	0.076	0.069	1735	2602	B41858D8827M***
1000	16 × 31.5	0.432	0.126	0.054	0.049	2092	3138	B41858C8108M***
1200	18 × 31.5	0.518	0.105	0.052	0.047	2294	3441	B41858C8128M***
1500	18 × 35	0.441	0.084	0.044	0.040	2592	3888	B41858C8158M***
1800	18 × 40	0.375	0.070	0.038	0.034	2967	4450	B41858C8188M***

**Composition of ordering code**

\*\*\* = Version

- 000 = for standard leads, bulk
- 001 = for kinked leads, bulk (from d × l = 10 × 20 mm to 18 × 40 mm, excluding 12.5 × 30/40 mm)
- 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding d × l = 12.5 × 30/40 mm)
- 003 = for crimped leads, blister (from d × l = 16 × 20 mm to 18 × 40 mm)
- 004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm, excluding 12.5 × 30/40 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  $\varnothing$  16 and 18 mm)


**Technical data and ordering codes**

$C_R$	Case dimensions	$ESR_{max}$ 10 kHz 20 °C	$ESR_{max}$ 120 Hz 20 °C	$ESR_{max}$ 10 kHz 20 °C	$Z_{max}$ 100 kHz 20 °C	$I_{AC,R}$ 100 kHz 105 °C	$I_{AC,max}$ 100 kHz 85 °C	Ordering code (composition see below)
$\mu F$	d × l mm	$\Omega$	$\Omega$	$\Omega$	$\Omega$	mA	mA	
<b><math>V_R = 100 V DC</math></b>								
22	8 × 11.5	12.219	4.593	1.222	1.114	205	307	B41858C9226M***
27	10 × 12.5	9.813	3.743	0.981	0.883	266	400	B41858C9276M***
33	10 × 16	6.542	3.062	0.654	0.589	357	536	B41858C9336M***
56	10 × 20	4.606	1.804	0.461	0.423	460	691	B41858C9566M***
100	12.5 × 20	3.048	1.011	0.305	0.281	647	971	B41858C9107M***
120	12.5 × 25	2.038	0.842	0.204	0.188	864	1296	B41858C9127M***
180	12.5 × 30	1.732	0.561	0.173	0.159	1009	1514	B41858C9187M***
180	16 × 20	1.313	0.561	0.131	0.122	1119	1678	B41858D9187M***
220	16 × 25	0.985	0.459	0.099	0.091	1402	2103	B41858C9227M***
270	12.5 × 40	1.314	0.374	0.131	0.121	1309	1963	B41858C9277M***
270	18 × 20	1.260	0.374	0.126	0.119	1220	1830	B41858D9277M***
330	16 × 31.5	0.973	0.306	0.097	0.090	1546	2319	B41858C9337M***
330	18 × 25	1.008	0.306	0.101	0.095	1477	2215	B41858D9337M***
390	18 × 31.5	0.720	0.259	0.072	0.068	1907	2861	B41858C9397M***
470	18 × 35	0.679	0.215	0.068	0.063	2061	3092	B41858C9477M***
560	18 × 35	0.679	0.180	0.068	0.063	2061	3092	B41858C9567M***
680	18 × 40	0.438	0.149	0.044	0.042	2683	4025	B41858C9687M***

**Composition of ordering code**

\*\*\* = Version

000 = for standard leads, bulk

001 = for kinked leads, bulk (from d × l = 10 × 20 mm to 18 × 40 mm, excluding 12.5 × 30/40 mm)

 002 = for cut leads, bulk (for  $\varnothing \geq 10$  mm, excluding d × l = 12.5 × 30/40 mm)

003 = for crimped leads, blister (from d × l = 16 × 20 mm to 18 × 40 mm)

004 = for J leads, blister (from d × l = 10 × 12.5 mm to 18 × 35 mm, excluding 12.5 × 30/40 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  $\varnothing$  16 and 18 mm)



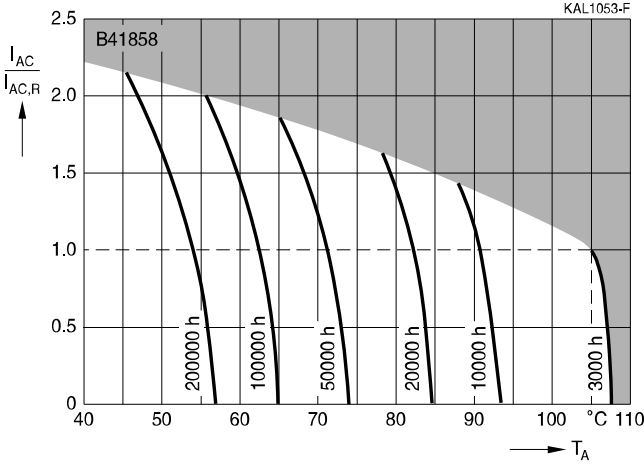
**B41858**

**Low impedance – 105 °C**

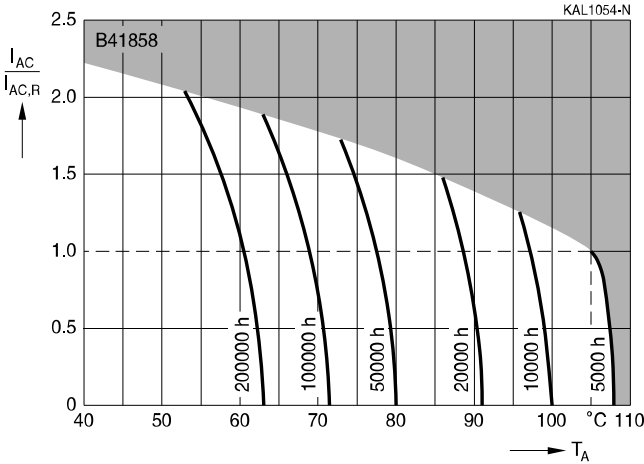
**Useful life**

depending on ambient temperature  $T_A$  under ripple current operating conditions<sup>1)</sup>

$d = 8 \text{ mm}$



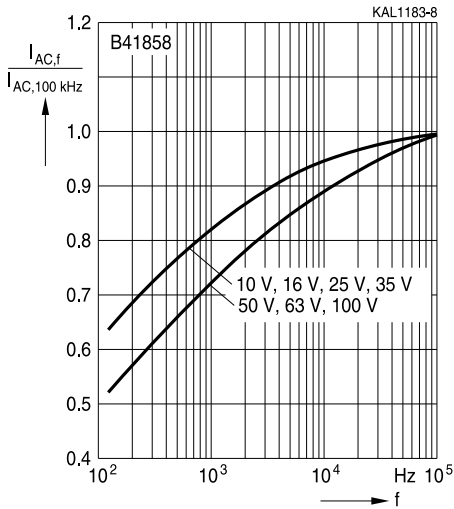
$d \geq 10 \text{ mm}$



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



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





**B41858**

**Low impedance – 105 °C**

## 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 ( $\varnothing d = 5 \dots 6.3$  mm)

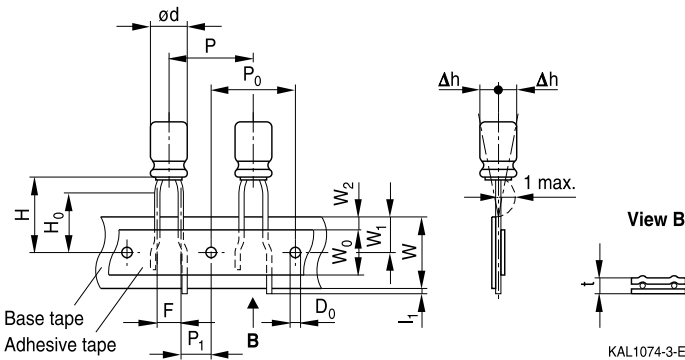
Lead spacing  $F = 3.5$  mm ( $\varnothing d = 8$  mm)

Lead spacing  $F = 5.0$  mm (from  $d \times l = 10 \times 12.5$  mm to  $12.5 \times 30$  mm)

Lead spacing  $F = 7.5$  mm ( $\varnothing d = 16 \dots 18$  mm).

### Lead spacing 2.5 mm ( $\varnothing d = 5 \dots 6.3$ mm)

Last 3 digits of ordering code: 007



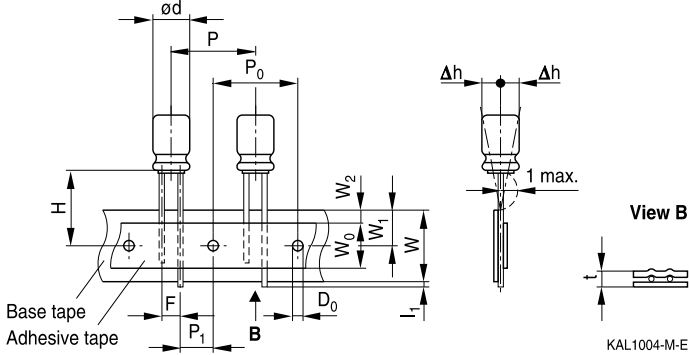
### Dimensions in mm

$\varnothing d$	F	H	W	$W_0$	$W_1$	$W_2$	$H_0$	P	$P_0$	$P_1$	$L_1$	t	$\Delta h$	$D_0$
5	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
6.3														
Tolerance	+0.8 -0.2	$\pm 0.75$	$\pm 0.5$	min.	$\pm 0.5$	max.	$\pm 0.5$	$\pm 1.0$	$\pm 0.2$	$\pm 0.5$	max.	$\pm 0.2$	max.	$\pm 0.2$

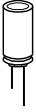



**Lead spacing 3.5 mm ( $\varnothing d = 8$  mm)**

Last 3 digits of ordering code: 006


**Dimensions in mm**

$\varnothing d$	F	H	W	$W_0$	$W_1$	$W_2$	P	$P_0$	$P_1$	$l_1$	t	$\Delta h$	$D_0$
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 -0.2	$\pm 1.0$	$\pm 0.5$	min.	$\pm 0.5$	max.	$\pm 1.0$	$\pm 0.2$	$\pm 0.5$	max.	$\pm 0.2$	max.	$\pm 0.2$

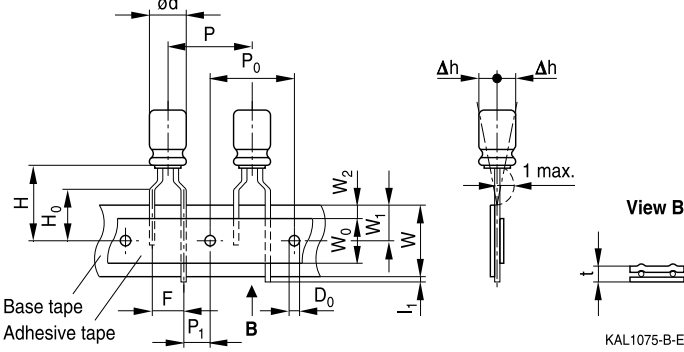


**B41858**

**Low impedance – 105 °C**

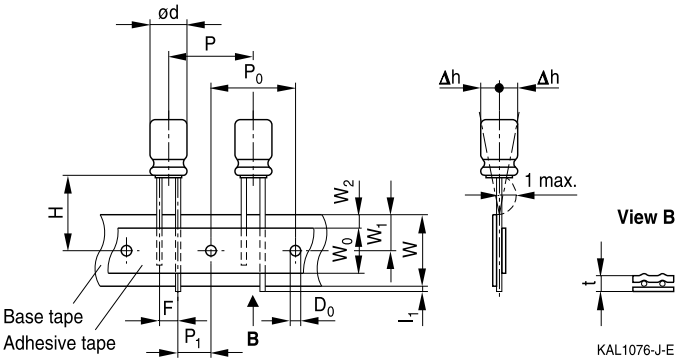
**Lead spacing 5.0 mm (∅ d = 5 ... 8 mm)**

Last 3 digits of ordering code: 008



**Lead spacing 5.0 mm (from d × l = 10 × 12.5 mm to 12.5 × 30 mm)**

Last 3 digits of ordering code: 008

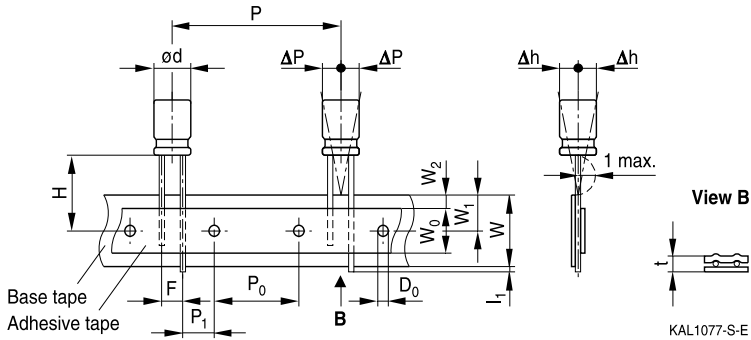


**Dimensions in mm**

∅ d	F	H	W	W <sub>0</sub>	W <sub>1</sub>	W <sub>2</sub>	H <sub>0</sub>	P	P <sub>0</sub>	P <sub>1</sub>	l <sub>1</sub>	t	Δh	D <sub>0</sub>
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		20.0					16.0	12.7	12.7	3.85				
8	5.0	19.0	18.0	12.5	9.0	1.5	–	12.7	12.7	3.85	1.0	0.7	1.0	4.0
10		19.0					–	15.0	15.0	5.0				
12.5		19.0					–	15.0	15.0	5.0				
Tolerance	+0.8 –0.2	±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**

$\varnothing d$	F	H	W	$W_0$	$W_1$	$W_2$	P	$P_0$	$P_1$	$I_1$	t	$\Delta P$	$\Delta h$	$D_0$
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	$\pm 0.8$	$-0.5$ $+0.75$	$\pm 0.5$	min.	$\pm 0.5$	max.	$\pm 1.0$	$\pm 0.2$	$\pm 0.5$	max.	$\pm 0.2$	$\pm 1.0$	$\pm 1.0$	$\pm 0.2$

 \*) Available only for case dimensions  $18 \times 20$ ,  $18 \times 25$  and  $18 \times 31.5$  mm

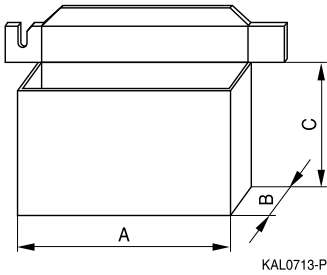


**B41858**

**Low impedance – 105 °C**

**Packing units and box dimensions**

**Ammo pack**



Case size d × l mm	Dimensions (mm)			Packing units pcs.
	A <sub>max</sub>	B <sub>max</sub>	C <sub>max</sub>	
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
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



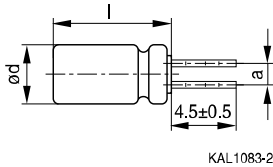
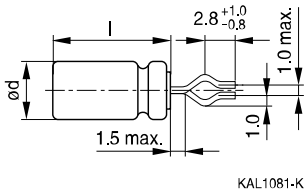
**Kinked or cut leads**

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

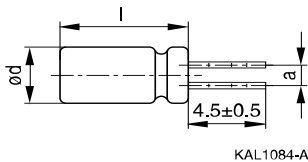
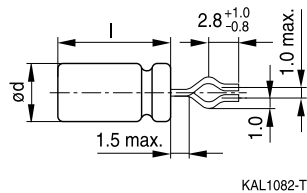
**Kinked leads**

Last 3 digits of ordering code: 001

**With stand-off rubber seal**



**With flat rubber seal**



Case size d × l (mm)	Dimensions (mm) a ±0.5
10 × 20	5.0
12.5 × 20	5.0
12.5 × 25	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



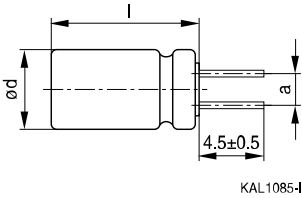
**B41858**

**Low impedance – 105 °C**

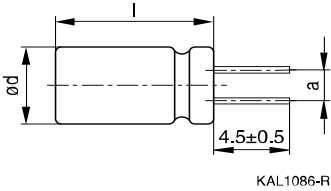
**Cut leads**

Last 3 digits of ordering code: 002

**With stand-off rubber seal**



**With flat rubber seal**



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
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 × 30	10.0
20 × 35	10.0
20 × 40	10.0
22 × 30	10.0
22 × 35	10.0
22 × 40	10.0



### PAPR leads (Protection Against Polarity Reversal)

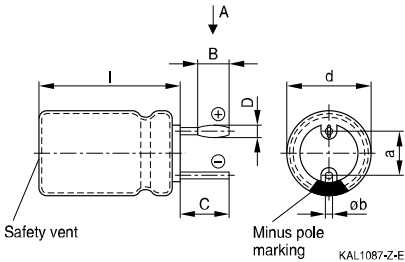
These lead configurations ensure correct placement of the capacitor on the PCB with regard to polarity. PAPR leads are available for diameters from 10 mm up to 20 mm.

There are three configurations available: Crimped leads, J leads, bent 90° leads

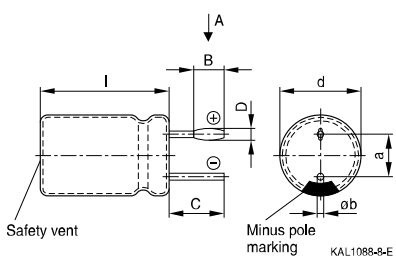
#### Crimped leads

Last 3 digits of ordering code: 003

#### With stand-off rubber seal

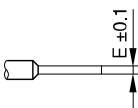


#### With flat rubber seal

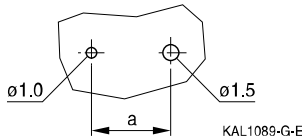


#### Suggestion for PCB hole diameter

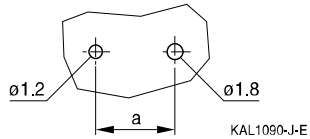
##### View A



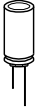
Suggestion for PCB hole diameter,  
wire ø0.8 mm



Suggestion for PCB hole diameter,  
wire ø1.0 mm



Case size d × l (mm)	Dimensions (mm)					
	B ±0.2	C ±0.5	D ±0.1	E ±0.1	a ±0.5	Øb
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 × 30	1.5	3.0	1.6	0.3	10.0	1.0 ±0.1
20 × 35	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

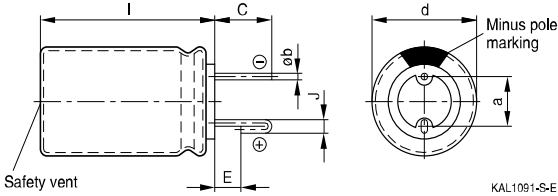


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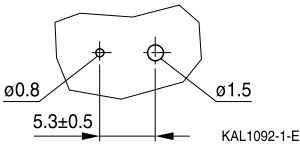
**J leads**

Last 3 digits of ordering code: 004

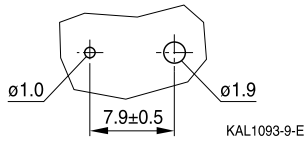


**Suggestion for PCB hole diameter**

Suggestion for PCB hole diameter,  
wire  $\varnothing 0.6$  mm



Suggestion for PCB hole diameter,  
wire  $\varnothing 0.8$  mm

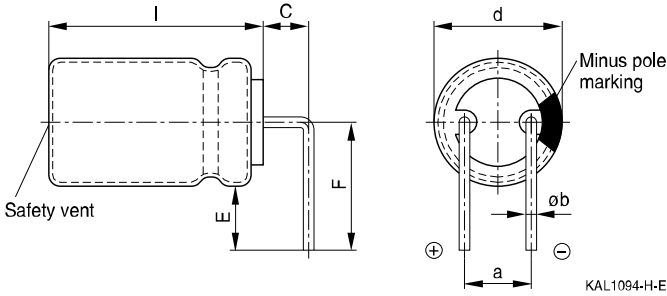


Case size d × l (mm)	Dimensions (mm)				
	C ±0.5	E ±0.5	J ±0.2	a ±0.5	∅b
10 × 12.5	3.2	0.7	1.2	5.0	0.6 ±0.05
10 × 16	3.2	0.7	1.2	5.0	0.6 ±0.05
10 × 20	3.2	0.7	1.2	5.0	0.6 ±0.05
12.5 × 20	3.2	0.7	1.2	5.0	0.6 ±0.05
12.5 × 25	3.2	0.7	1.2	5.0	0.6 ±0.05
16 × 20	3.5	0.7	1.6	7.5	0.8 ±0.05
16 × 25	3.5	0.7	1.6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

Case size d × l  mm	Standard, bulk pcs.	Taped, Ammo pack pcs.		Kinked leads, bulk pcs.	Cut leads, bulk pcs.	PAPR			
						Crimped leads, blister pcs.	J leads, blister pcs.	Bent 90° leads, blister pcs.	
5 × 11	2000	2000		–	–	–	–		
6.3 × 11	2500	2000		–	–	–	–		
8 × 11.5	1000	1000		–	–	–	–		
10 × 12.5	1000	750		–	1000	–	675		
10 × 16	1000	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	–		–	–	–	–		
12.5 × 35	175	–		–	–	–	–		
12.5 × 40	175	–		–	–	–	–		
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	<b>000</b>	<b>Code</b>	<b>F (mm)</b>	<b>d (mm)</b>	<b>001</b>	<b>002</b>	<b>003</b>	<b>004</b>	<b>012</b>
		<b>006</b>	3.5	8					
		<b>007</b>	2.5	5...6.3					
		<b>008</b>	5	5...12.5					
		<b>009</b>	7.5	16...18					

1) Available upon request


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

					<b>PAPR</b>				
Case size d × l	Standard, bulk	Taped, Ammo pack			Kinked leads, bulk	Cut leads, bulk	Crimped leads, blister	J leads, blister	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	200	–	–	
20 × 25	125	–		–	125	200	–	–	
20 × 30	100	–		–	100	120	–	–	
20 × 35	100	–		–	100	120	–	–	
20 × 40	100	–		–	100	120	–	–	
22 × 30	80	–		–	100	–	–	–	
22 × 35	80	–		–	100	–	–	–	
22 × 40	80	–		–	100	–	–	–	
25 × 40	40	–		–	–	–	–	–	
The last three digits of the complete ordering code state the lead configuration	<b>000</b>	Code	F (mm)	d (mm)	<b>001</b>	<b>002</b>	<b>003</b>	<b>004</b>	<b>012</b>
		<b>007</b>	2.5	4...6.3					
		<b>008</b>	5	6.3...12.5					
		<b>009</b>	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"


**Symbols and terms**

Symbol	English	German
C	Capacitance	Kapazität
$C_R$	Rated capacitance	Nennkapazität
$C_S$	Series capacitance	Serienkapazität
$C_{S,T}$	Series capacitance at temperature T	Serienkapazität bei Temperatur T
$C_f$	Capacitance at frequency f	Kapazität bei Frequenz f
d	Case diameter, nominal dimension	Gehäusedurchmesser, Nennmaß
$d_{max}$	Maximum case diameter	Maximaler Gehäusedurchmesser
ESL	Self-inductance	Eigeninduktivität
ESR	Equivalent series resistance	Ersatzserienwiderstand
$ESR_f$	Equivalent series resistance at frequency f	Ersatzserienwiderstand bei Frequenz f
$ESR_T$	Equivalent series resistance at temperature T	Ersatzserienwiderstand bei Temperatur T
f	Frequency	Frequenz
I	Current	Strom
$I_{AC}$	Alternating current (ripple current)	Wechselstrom
$I_{AC,rms}$	Root-mean-square value of alternating current	Wechselstrom, Effektivwert
$I_{AC,f}$	Ripple current at frequency f	Wechselstrom bei Frequenz f
$I_{AC,max}$	Maximum permissible ripple current	Maximal zulässiger Wechselstrom
$I_{AC,R}$	Rated ripple current	Nennwechselstrom
$I_{AC,R} (B)$	Rated ripple current for base cooling	Nennwechselstromstrom für Bodenkühlung
$I_{leak}$	Leakage current	Ableitstrom
$I_{leak,op}$	Operating leakage current	Ableitstrom bei Betrieb
l	Case length, nominal dimension	Gehäuselänge, Nennmaß
$l_{max}$	Maximum case length (without terminals and mounting stud)	Maximale Gehäuselänge (ohne Anschlüsse und Gewindebolzen)
R	Resistance	Widerstand
$R_{ins}$	Insulation resistance	Isolationswiderstand
$R_{symm}$	Balancing resistance	Symmetrierwiderstand
T	Temperature	Temperatur
$\Delta T$	Temperature difference	Temperaturdifferenz
$T_A$	Ambient temperature	Umgebungstemperatur
$T_C$	Case temperature	Gehäusetemperatur
$T_B$	Capacitor base temperature	Temperatur des Becherbodens
t	Time	Zeit
$\Delta t$	Period	Zeitraum
$t_b$	Service life (operating hours)	Brauchbarkeitsdauer (Betriebszeit)


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Symbol	English	German
V	Voltage	Spannung
V <sub>F</sub>	Forming voltage	Formierspannung
V <sub>op</sub>	Operating voltage	Betriebsspannung
V <sub>R</sub>	Rated voltage, DC voltage	Nennspannung, Gleichspannung
V <sub>S</sub>	Surge voltage	Spitzenspannung
X <sub>C</sub>	Capacitive reactance	Kapazitiver Blindwiderstand
X <sub>L</sub>	Inductive reactance	Induktiver Blindwiderstand
Z	Impedance	Scheinwiderstand
Z <sub>T</sub>	Impedance at temperature T	Scheinwiderstand bei Temperatur T
tan δ	Dissipation factor	Verlustfaktor
λ	Failure rate	Ausfallrate
ε <sub>0</sub>	Absolute permittivity	Elektrische Feldkonstante
ε <sub>r</sub>	Relative permittivity	Dielektrizitätszahl
ω	Angular velocity; 2 · π · f	Kreisfrequenz; 2 · π · f

**Notes**

All dimensions are given in mm.



## 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 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 an electronic component could endanger human life or health (e.g. in accident prevention or lifesaving 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 an 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](http://www.epcos.com/material)). Should you have any more detailed questions, please contact our sales offices.
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