

**Long-life grade capacitors for telecommunications
and automotive electronics**

Applications

- High-reliability equipment in industrial and automotive electronics
- High-temperature environments

Features

- High reliability and long useful life
- High ripple current capability
- Wide temperature range up to 125 °C

Construction

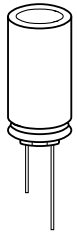
- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Minus pole marking on the insulating sleeve
- Stand off rubber seal
- Case with safety vent

Delivery mode

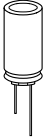
Special terminal configurations and packing:

- Bulk
- Taped, Ammo pack
- Cut
- Kinked
- PAPR (protection against polarity reversal)

Refer to page 503 for further details and ordering example.



KAL0707-F

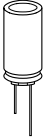
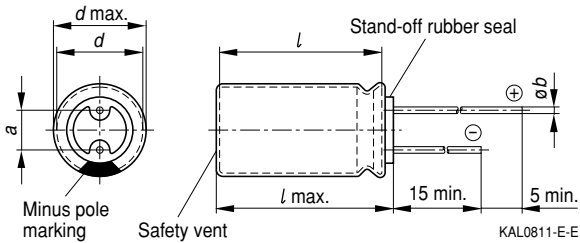


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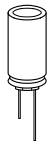
125 °C

Specifications and characteristics in brief

| | | |
|---|--|--|
| Rated voltage U_R | 10 ... 63 VDC | |
| Surge voltage U_S | $1,15 \cdot U_R$ | |
| Rated capacitance C_R | 0,47 ... 4 700 μ F | |
| Capacitance tolerance | $\pm 20 \% \triangleq M$ | |
| Useful life 125 °C; U_R ; I_{-R} 85 °C; U_R ; I_{-R} 40 °C; U_R ; I_{-R} | > 2 000 h > 40 000 h > 500 000 h | Requirements: $\Delta C/C \leq \pm 35 \%$ of initial value $\tan \delta \leq 3$ times initial specified limit $I_L \leq$ initial specified limit Failure percentage: $\leq 1 \%$ Failure rate: ≤ 40 fit ($\leq 40 \cdot 10^{-9}/h$) (for definition "fit", refer to chapter "Quality", page 62) |
| Voltage endurance test 125 °C; U_R | 2 000 h | Post test requirements: $\Delta C/C \leq \pm 30 \%$ of initial value $\tan \delta \leq 2$ times initial specified limit $I_L \leq$ initial specified limit |
| Vibration resistance | To IEC 60068-2-6, test Fc: displacement amplitude 0,75 mm, frequency range 10 ... 2000 Hz, acceleration max. 10 g, duration 3×2 h | |
| IEC climatic category | To IEC 60068-1: 55/125/56 (– 55 °C/+ 125 °C/56 days damp heat test) | |
| Sectional specification | IEC 60384-4 | |

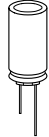

Dimensional drawing

Dimensions and weights

| Dimensions (mm) | | | | Approx. weight |
|-----------------|----------------------------|-------------|-------------|----------------|
| $d \times l$ | $d_{\max} \times l_{\max}$ | $a \pm 0,5$ | b | g |
| 8 × 11 | 8,5 × 12 | 3,5 | 0,60 ± 0,05 | 1,0 |
| 10 × 12,5 | 10,5 × 13,5 | 5,0 | 0,60 ± 0,05 | 1,6 |
| 10 × 16 | 10,5 × 17 | 5,0 | 0,60 ± 0,05 | 1,9 |
| 10 × 20 | 10,5 × 22 | 5,0 | 0,60 ± 0,05 | 2,6 |
| 12,5 × 25 | 13 × 27 | 5,0 | 0,60 ± 0,05 | 4,5 |
| 16 × 25 | 16,5 × 27 | 7,5 | 0,80 ± 0,05 | 7,5 |
| 16 × 31,5 | 16,5 × 33,5 | 7,5 | 0,80 ± 0,05 | 7,8 |
| 18 × 31,5 | 18,5 × 32,5 | 7,5 | 0,80 ± 0,1 | 11 |
| 18 × 35 | 18,5 × 36 | 7,5 | 0,80 ± 0,1 | 13 |
| 18 × 40 | 18,5 × 41 | 7,5 | 0,80 ± 0,1 | 16 |
| 20 × 35 | 20,5 × 37 | 10 | 0,80 ± 0,1 | 18 |
| 20 × 40 | 20,5 × 42 | 10 | 0,80 ± 0,1 | 20 |


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125 °C
Overview of available types

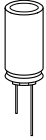
| U_R (VDC) | 10 | 16 | 25 | 35 | 50 | 63 |
|------------------|-----------------------------------|----------------------|----------------------|----------------------|----------------------|-----------|
| C_R (μ F) | Case dimensions $d \times l$ (mm) | | | | | |
| 0,47 | | | | | 8 × 11 | |
| 1,0 | | | | | 8 × 11 | |
| 2,2 | | | | | 8 × 11 | |
| 3,3 | | | | | 8 × 11 | |
| 4,7 | | | | | 8 × 11 | |
| 10 | | | | | 8 × 11 | |
| 22 | | | | 10 × 12,5 | 10 × 16 | |
| 33 | | | 10 × 12,5 | 10 × 12,5 | 10 × 16 | |
| 47 | | 8 × 11 | 10 × 12,5 | 10 × 16 | 10 × 16 10 × 20 | 10 × 20 |
| 100 | 10 × 12,5 | 10 × 16 | 10 × 16 10 × 20 | 10 × 16 12,5 × 25 | 10 × 20 12,5 × 25 | 12,5 × 25 |
| 220 | 10 × 12,5 10 × 20 | 10 × 20 12,5 × 25 | 10 × 20 12,5 × 25 | 10 × 20 16 × 25 | 12,5 × 25 | 12,5 × 25 |
| 330 | 10 × 16 12,5 × 25 | 10 × 20 12,5 × 25 | 10 × 20 16 × 25 | 12,5 × 25 | 16 × 25 | 16 × 25 |
| 470 | 10 × 16 12,5 × 25 | 10 × 20 16 × 25 | 12,5 × 25 | 12,5 × 25 | 16 × 25 | 16 × 25 |
| 1 000 | 10 × 20 | 12,5 × 25 | 16 × 25 | 16 × 31,5 | 18 × 31,5 | 18 × 31,5 |
| 2 200 | 16 × 25 | 16 × 31,5 | 18 × 31,5 | 18 × 40 | | |
| 3 300 | 16 × 31,5 | 18 × 31,5 | 18 × 40 | 20 × 40 | | |
| 4 700 | 18 × 31,5 | 18 × 35 | 20 × 35 | | | |

Other voltage and capacitance ratings are also available upon request.


Technical data and ordering codes

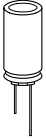
| U_R | C_R 120 Hz 20 °C μF | Case dimensions $d \times l$ mm | I_L 5 min 20 °C μA | $\tan \delta_{\max}$ 120 Hz 20 °C | ESR_{\max} 120 Hz 20 °C Ω | $I_{\sim R}$ 120 Hz 125 °C mA | Ordering code ¹⁾ |
|-------|---|--|--|---|---|--|-----------------------------|
| 10 | 100 | 10 × 12,5 | 10 | 0,20 | 3,3 | 130 | B41866A3107M00* |
| | 220 | 10 × 12,5 | 22 | 0,20 | 1,5 | 180 | B41866F3227M00* |
| | 220 | 10 × 20 | 22 | 0,20 | 1,5 | 240 | B41866A3227M00* |
| | 330 | 10 × 16 | 33 | 0,20 | 1,0 | 260 | B41866F3337M00* |
| | 330 | 12,5 × 25 | 33 | 0,20 | 1,0 | 290 | B41866A3337M00* |
| | 470 | 10 × 16 | 47 | 0,20 | 0,71 | 275 | B41866F3477M00* |
| | 470 | 12,5 × 25 | 47 | 0,20 | 0,71 | 380 | B41866A3477M00* |
| | 1 000 | 10 × 20 | 100 | 0,20 | 0,33 | 460 | B41866F3108M00* |
| | 2 200 | 16 × 25 | 220 | 0,22 | 0,17 | 900 | B41866F3228M00* |
| | 3 300 | 16 × 31,5 | 330 | 0,24 | 0,12 | 1150 | B41866F3338M00* |
| 4 700 | 18 × 31,5 | 470 | 0,26 | 0,09 | 1280 | B41866F3478M00* | |
| 16 | 47 | 8 × 11 | 7,5 | 0,17 | 6,0 | 90 | B41866A4476M00* |
| | 100 | 10 × 16 | 16 | 0,17 | 2,8 | 165 | B41866A4107M00* |
| | 220 | 10 × 20 | 35 | 0,17 | 1,3 | 250 | B41866F4227M00* |
| | 220 | 12,5 × 25 | 35 | 0,17 | 1,3 | 290 | B41866A4227M00* |
| | 330 | 10 × 20 | 53 | 0,17 | 0,85 | 275 | B41866F4337M00* |
| | 330 | 12,5 × 25 | 53 | 0,17 | 0,85 | 385 | B41866A4337M00* |
| | 470 | 10 × 20 | 75 | 0,17 | 0,60 | 300 | B41866F4477M00* |
| | 470 | 16 × 25 | 75 | 0,17 | 0,60 | 480 | B41866A4477M00* |
| | 1 000 | 12,5 × 25 | 160 | 0,17 | 0,28 | 640 | B41866F4108M00* |
| | 2 200 | 16 × 31,5 | 352 | 0,19 | 0,14 | 1100 | B41866F4228M00* |
| | 3 300 | 18 × 31,5 | 528 | 0,21 | 0,11 | 1250 | B41866F4338M00* |
| | 4 700 | 18 × 35 | 752 | 0,23 | 0,08 | 1550 | B41866F4478M00* |
| 25 | 33 | 10 × 12,5 | 8,3 | 0,17 | 8,5 | 90 | B41866A5336M00* |
| | 47 | 10 × 12,5 | 12 | 0,17 | 6,0 | 110 | B41866A5476M00* |
| | 100 | 10 × 16 | 25 | 0,17 | 2,8 | 190 | B41866F5107M00* |
| | 100 | 10 × 20 | 25 | 0,17 | 2,8 | 210 | B41866A5107M00* |
| | 220 | 10 × 20 | 55 | 0,17 | 1,3 | 250 | B41866F5227M00* |
| | 220 | 12,5 × 25 | 55 | 0,17 | 1,3 | 360 | B41866A5227M00* |
| | 330 | 10 × 20 | 83 | 0,17 | 0,85 | 275 | B41866F5337M00* |
| | 330 | 16 × 25 | 83 | 0,17 | 0,85 | 450 | B41866A5337M00* |
| | 470 | 12,5 × 25 | 118 | 0,17 | 0,60 | 440 | B41866F5477M00* |
| | 1 000 | 16 × 25 | 250 | 0,17 | 0,28 | 850 | B41866F5108M00* |
| | 2 200 | 18 × 31,5 | 550 | 0,19 | 0,14 | 1260 | B41866F5228M00* |
| | 3 300 | 18 × 40 | 825 | 0,21 | 0,11 | 1450 | B41866F5338M00* |
| | 4 700 | 20 × 35 | 1175 | 0,23 | 0,08 | 2300 | B41866F5478M00* |

1) * = "0" for bulk version. For taping versions, other lead configurations and packing information see page 503.



| U_R | C_R 120 Hz 20 °C μF | Case dimensions $d \times l$ mm | I_L 5 min 20 °C μA | $\tan \delta_{\max}$ 120 Hz 20 °C | ESR_{\max} 120 Hz 20 °C Ω | I_{-R} 120 Hz 125 °C mA | Ordering code 1) |
|-------|--------------------------------|--|-------------------------------|---|--------------------------------------|------------------------------------|------------------|
| 35 | 22 | 10 × 12,5 | 7,7 | 0,12 | 9,0 | 80 | B41866A7226M00* |
| | 33 | 10 × 12,5 | 12 | 0,12 | 6,0 | 95 | B41866A7336M00* |
| | 47 | 10 × 16 | 16 | 0,12 | 4,2 | 140 | B41866A7476M00* |
| | 100 | 10 × 16 | 35 | 0,12 | 2,0 | 190 | B41866F7107M00* |
| | 100 | 12,5 × 25 | 35 | 0,12 | 2,0 | 210 | B41866A7107M00* |
| | 220 | 10 × 20 | 77 | 0,12 | 0,90 | 250 | B41866K7227M00* |
| | 220 | 16 × 25 | 77 | 0,12 | 0,90 | 390 | B41866A7227M00* |
| | 330 | 12,5 × 25 | 116 | 0,12 | 0,60 | 370 | B41866F7337M00* |
| | 470 | 12,5 × 25 | 165 | 0,12 | 0,42 | 440 | B41866F7477M00* |
| | 1 000 | 16 × 31,5 | 350 | 0,12 | 0,20 | 830 | B41866F7108M00* |
| | 2 200 | 18 × 40 | 770 | 0,14 | 0,11 | 1350 | B41866F7228M00* |
| | 3 300 | 20 × 40 | 1155 | 0,16 | 0,08 | 2500 | B41866F7338M00* |
| | 50 | 0,47 | 8 × 11 | 4,0 | 0,10 | 353 | 2 |
| 1,0 | | 8 × 11 | 4,0 | 0,10 | 166 | 7 | B41866A6105M00* |
| 2,2 | | 8 × 11 | 4,0 | 0,10 | 75 | 14 | B41866A6225M00* |
| 3,3 | | 8 × 11 | 4,0 | 0,10 | 50 | 23 | B41866A6335M00* |
| 4,7 | | 8 × 11 | 4,0 | 0,10 | 35 | 30 | B41866A6475M00* |
| 10 | | 8 × 11 | 5,0 | 0,10 | 17 | 48 | B41866A6106M00* |
| 22 | | 10 × 16 | 11 | 0,10 | 7,5 | 83 | B41866A6226M00* |
| 33 | | 10 × 16 | 17 | 0,10 | 5,0 | 100 | B41866A6336M00* |
| 47 | | 10 × 16 | 24 | 0,10 | 3,5 | 140 | B41866F6476M00* |
| 47 | | 10 × 20 | 24 | 0,10 | 3,5 | 145 | B41866A6476M00* |
| 100 | | 10 × 20 | 50 | 0,10 | 1,7 | 200 | B41866F6107M00* |
| 100 | | 12,5 × 25 | 50 | 0,10 | 1,7 | 275 | B41866A6107M00* |
| 220 | | 12,5 × 25 | 110 | 0,10 | 0,75 | 350 | B41866F6227M00* |
| 330 | | 16 × 25 | 165 | 0,10 | 0,50 | 490 | B41866F6337M00* |
| 470 | | 16 × 25 | 235 | 0,10 | 0,35 | 520 | B41866F6477M00* |
| 1 000 | 18 × 31,5 | 500 | 0,10 | 0,17 | 890 | B41866F6108M00* | |
| 63 | 47 | 10 × 20 | 24 | 0,10 | 3,5 | 155 | B41866A8476M00* |
| | 100 | 12,5 × 25 | 50 | 0,10 | 1,7 | 290 | B41866A8107M00* |
| | 220 | 12,5 × 25 | 110 | 0,10 | 0,75 | 380 | B41866A8227M00* |
| | 330 | 16 × 25 | 165 | 0,10 | 0,50 | 530 | B41866A8337M00* |
| | 470 | 16 × 25 | 235 | 0,10 | 0,35 | 700 | B41866A8477M00* |
| | 1 000 | 18 × 31,5 | 500 | 0,10 | 0,17 | 890 | B41866A8108M00* |

1) * = "0" for bulk version. For taping versions, other lead configurations and packing information see page 503.



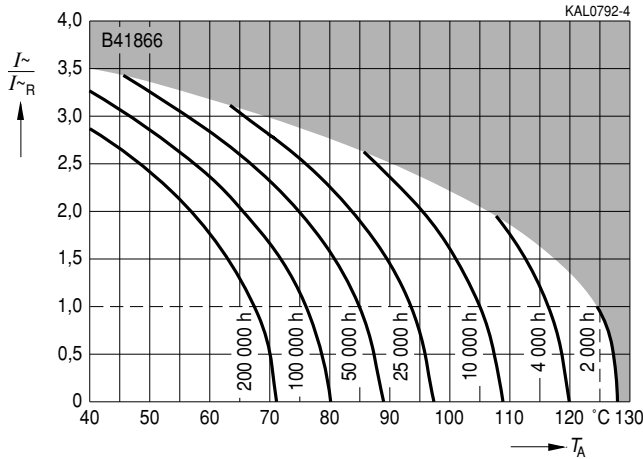
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125 °C

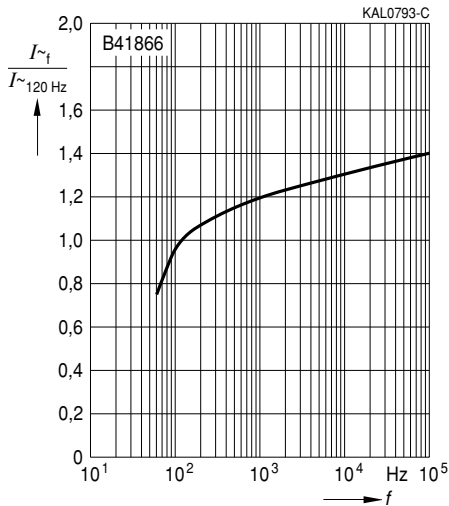
Useful life

depending on ambient temperature T_A under ripple current operating conditions¹⁾

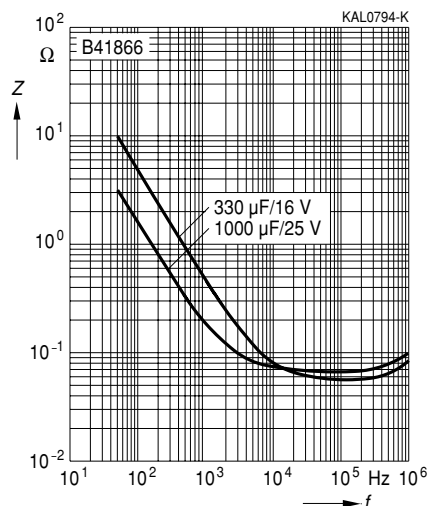
$U_R = 10 \dots 50$ VDC



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



Impedance Z versus frequency f
Typical behavior at 20 °C



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

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