

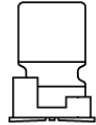


# **Aluminum electrolytic capacitors**

## Alu-X product lines

SMD capacitors

**Series/Type:**            **B41121**  
**Date:**                      August 2008

**General-purpose grade capacitors**

**Applications**

- For general-purpose applications in the entertainment industry

**Features**

- Miniaturized dimensions
- RoHS-compatible
- Load life of 1000 h at 105 °C

**Construction**

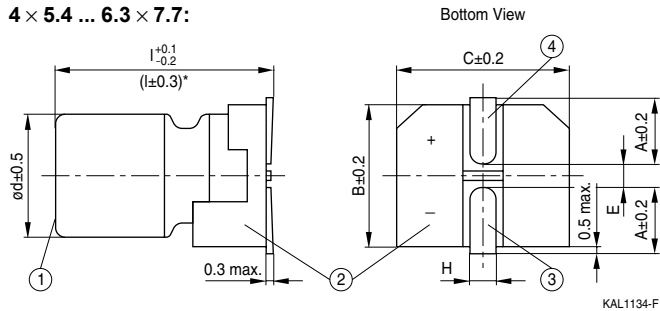
- Surface mounting device
- Minus pole marking on the case

**Delivery mode**

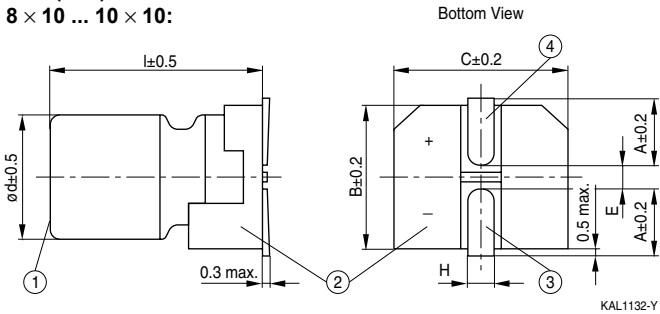
- Taped and reeled

**Specifications and characteristics in brief**

Rated voltage $V_R$	4 ... 50 V DC							
Operating temperature range	-40 °C ... +105 °C							
Rated capacitance $C_R$ (20 °C, 120 Hz)	0.1 ... 1000 $\mu$ F							
Capacitance tolerance	$\pm 20\% \triangleq M$							
Load life (105 °C, $V_R$ )	1000 h	Requirements: $\Delta C/C \leq \pm 20\%$ of initial value ( $\leq 16$ V: within $\pm 25\%$ of the initial value) $\tan \delta \leq 2$ times initial specified limit $I_{leak} \leq$ initial specified limit						
Leakage current $I_{leak}$ (20 °C, after 2 minutes)	$I_{leak} \leq 0.01 \mu A \cdot \left( \frac{C_R}{\mu F} \cdot \frac{V_R}{V} \right)$ or 3 $\mu A$ , whichever is greater							
Low temperature stability (impedance ratio) (120 Hz)	$V_R$ (V DC)	4	6.3	10	16	25	35	50
	$Z(-25 \text{ }^\circ\text{C})$	7	4	3	2	2	2	2
	$Z(+20 \text{ }^\circ\text{C})$							
	$Z(-40 \text{ }^\circ\text{C})$	15	8	6	4	4	3	3
	$Z(+20 \text{ }^\circ\text{C})$							
Shelf life	After storage for 1000 h at 105 °C, the capacitors shall meet the requirement of load life test after reforming process. After test: $V_R$ to be applied for 30 minutes, 24 to 48 hours before measurement.							
Frequency multiplier for rated ripple current	50 Hz	120 Hz	300 Hz	1 kHz				$\geq 10$ kHz
	0.70	1.00	1.17	1.36				1.50

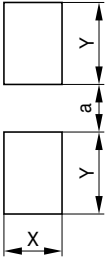
**Dimensional drawing**
**d × l (mm)**
**4 × 5.4 ... 6.3 × 7.7:**


\* Applies to 6.3 × 5.8 mm and 6.3 × 7.7 mm

**d × l (mm)**
**8 × 10 ... 10 × 10:**


①	Case
②	Terminal base board
③	Minus pole
④	Plus pole

Case dimensions d × l (mm)	4 × 5.4	5 × 5.4	6.3 × 5.4	6.3 × 5.8	6.3 × 7.7	8 × 10	10 × 10
A	1.8	2.1	2.4	2.4	2.4	2.9	3.2
B	4.3	5.3	6.6	6.6	6.6	8.3	10.3
C	4.3	5.3	6.6	6.6	6.6	8.3	10.3
E	1.0	1.3	2.2	2.2	2.2	3.1	4.5
H	0.5 ... 0.8					0.8 ... 1.1	

**Layout recommendation**


KAL1109-Z

$d \times l$ (mm)	X	Y	a
4.0 × 5.4	1.6	2.6	1.0
5.0 × 5.4	1.6	3.0	1.4
6.3 × 5.4	1.6	3.5	2.1
6.3 × 5.8	1.6	3.5	2.1
6.3 × 7.7	1.6	3.5	2.1
8.0 × 10.0	2.5	3.5	3.0
10.0 × 10.0	2.5	4.0	4.0

**Overview of available types**

V <sub>R</sub> (V DC)	4	6.3	10	16	25	35	50
	Case dimensions d × l (mm)						
C <sub>R</sub> (μF)							
0.1							4 × 5.4
0.22							4 × 5.4
0.33							4 × 5.4
0.47							4 × 5.4
1.0							4 × 5.4
2.2							4 × 5.4
3.3						4 × 5.4	4 × 5.4
4.7					4 × 5.4	4 × 5.4	5 × 5.4
10				4 × 5.4	5 × 5.4	5 × 5.4	6.3 × 5.4 6.3 × 5.8
22		4 × 5.4	5 × 5.4	5 × 5.4	6.3 × 5.4	6.3 × 5.4	6.3 × 7.7
33	4 × 5.4	5 × 5.4	5 × 5.4	6.3 × 5.4	6.3 × 5.4	6.3 × 5.4 6.3 × 5.8	6.3 × 7.7
47	4 × 5.4	5 × 5.4	6.3 × 5.4	6.3 × 5.4	6.3 × 5.4 6.3 × 5.8	6.3 × 7.7	6.3 × 7.7
100	5 × 5.4	6.3 × 5.4	6.3 × 5.4	6.3 × 5.4 6.3 × 5.8	6.3 × 7.7	8 × 10	8 × 10
150	6.3 × 5.4	6.3 × 5.4 6.3 × 5.8	6.3 × 5.4 6.3 × 5.8	6.3 × 7.7	8 × 10	8 × 10	10 × 10
220	6.3 × 5.4 6.3 × 5.8	6.3 × 7.7	6.3 × 7.7	6.3 × 7.7	8 × 10	10 × 10	
330	6.3 × 7.7	6.3 × 7.7	8 × 10	8 × 10	10 × 10		
470	6.3 × 7.7	8 × 10	8 × 10	8 × 10			
680	8 × 10	8 × 10	10 × 10	10 × 10			
1000	8 × 10	10 × 10					

**Technical data and ordering codes**

$V_R$	$C_R$ 120 Hz 20 °C	Case dimensions $d \times l$ mm	$\tan \delta_{\max}$ 120 Hz 20 °C	$I_{AC,R}$ 120 Hz 105 °C mA	Ordering code
V DC 4	33	4 × 5.4	0.35	18	B41121A1336M000
	47	4 × 5.4	0.35	23	B41121A1476M000
	100	5 × 5.4	0.35	42	B41121A1107M000
	150	6.3 × 5.4	0.35	61	B41121A1157M000
	220	6.3 × 5.4	0.35	68	B41121A1227M000
	220	6.3 × 5.8	0.35	70	B41121B1227M000
	330	6.3 × 7.7	0.35	73	B41121A1337M000
	470	6.3 × 7.7	0.35	105	B41121A1477M000
	680	8 × 10	0.35	210	B41121A1687M000
	1000	8 × 10	0.35	260	B41121A1108M000
6.3	22	4 × 5.4	0.26	22	B41121A2226M000
	33	5 × 5.4	0.26	27	B41121A2336M000
	47	5 × 5.4	0.26	33	B41121A2476M000
	100	6.3 × 5.4	0.26	50	B41121A2107M000
	150	6.3 × 5.4	0.26	55	B41121A2157M000
	150	6.3 × 5.8	0.26	56	B41121B2157M000
	220	6.3 × 7.7	0.26	105	B41121A2227M000
	330	6.3 × 7.7	0.26	105	B41121A2337M000
	470	8 × 10	0.26	170	B41121A2477M000
	680	8 × 10	0.26	210	B41121A2687M000
	1000	10 × 10	0.26	230	B41121A2108M000
	10	22	5 × 5.4	0.20	25
33		5 × 5.4	0.20	30	B41121A3336M000
47		6.3 × 5.4	0.20	41	B41121A3476M000
100		6.3 × 5.4	0.20	53	B41121A3107M000
150		6.3 × 5.4	0.20	62	B41121A3157M000
150		6.3 × 5.8	0.20	64	B41121B3157M000
220		6.3 × 7.7	0.20	105	B41121A3227M000
330		8 × 10	0.20	175	B41121A3337M000
470		8 × 10	0.20	210	B41121A3477M000
680		10 × 10	0.20	310	B41121A3687M000
16	10	4 × 5.4	0.16	18	B41121A4106M000
	22	5 × 5.4	0.16	27	B41121A4226M000
	33	6.3 × 5.4	0.16	40	B41121A4336M000
	47	6.3 × 5.4	0.16	48	B41121A4476M000
	100	6.3 × 5.4	0.16	60	B41121A4107M000
	100	6.3 × 5.8	0.16	62	B41121B4107M000
	150	6.3 × 7.7	0.16	95	B41121A4157M000
	220	6.3 × 7.7	0.16	105	B41121A4227M000
	330	8 × 10	0.16	195	B41121A4337M000
	470	8 × 10	0.16	310	B41121A4477M000
	680	10 × 10	0.16	350	B41121A4687M000

**Technical data and ordering codes**

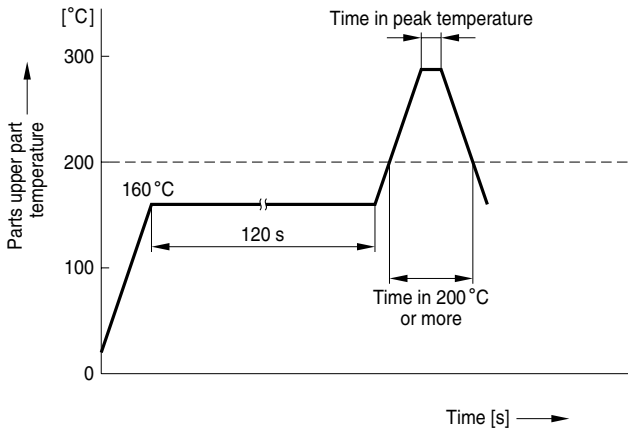
$V_R$	$C_R$ 120 Hz 20 °C	Case dimensions $d \times l$ mm	$\tan \delta_{\max}$ 120 Hz 20 °C	$I_{AC,R}$ 120 Hz 105 °C mA	Ordering code	
V DC 25	4.7	4 × 5.4	0.14	13	B41121A5475M000	
	10	5 × 5.4	0.14	20	B41121A5106M000	
	22	6.3 × 5.4	0.14	36	B41121A5226M000	
	33	6.3 × 5.4	0.14	44	B41121A5336M000	
	47	6.3 × 5.4	0.14	48	B41121A5476M000	
	47	6.3 × 5.8	0.14	49	B41121B5476M000	
	100	6.3 × 7.7	0.14	91	B41121A5107M000	
	150	8 × 10	0.14	140	B41121A5157M000	
	220	8 × 10	0.14	175	B41121A5227M000	
	330	10 × 10	0.14	220	B41121A5337M000	
35	3.3	4 × 5.4	0.12	13	B41121A7335M000	
	4.7	4 × 5.4	0.12	14	B41121A7475M000	
	10	5 × 5.4	0.12	21	B41121A7106M000	
	22	6.3 × 5.4	0.12	38	B41121A7226M000	
	33	6.3 × 5.4	0.12	42	B41121A7336M000	
	33	6.3 × 5.8	0.12	43	B41121B7336M000	
	47	6.3 × 7.7	0.12	49	B41121A7476M000	
	100	8 × 10	0.12	155	B41121A7107M000	
	150	8 × 10	0.12	155	B41121A7157M000	
		220	10 × 10	0.12	300	B41121A7227M000
	50	0.1	4 × 5.4	0.12	0.7	B41121A6104M000
0.22		4 × 5.4	0.12	1.6	B41121A6224M000	
0.33		4 × 5.4	0.12	2.5	B41121A6334M000	
0.47		4 × 5.4	0.12	3.5	B41121A6474M000	
1.0		4 × 5.4	0.12	7	B41121A6105M000	
2.2		4 × 5.4	0.12	11	B41121A6225M000	
3.3		4 × 5.4	0.12	13	B41121A6335M000	
4.7		5 × 5.4	0.12	16	B41121A6475M000	
10		6.3 × 5.4	0.12	24	B41121A6106M000	
10		6.3 × 5.8	0.12	24	B41121B6106M000	
22		6.3 × 7.7	0.12	51	B41121A6226M000	
33		6.3 × 7.7	0.12	60	B41121A6336M000	
47		6.3 × 7.7	0.12	63	B41121A6476M000	
100		8 × 10	0.12	155	B41121A6107M000	
150		10 × 10	0.12	300	B41121A6157M000	

## Soldering

### Recommended conditions

For reflow, use thermal conduction systems such as infrared radiation (IR) or hot blast. Vapor heat transfer systems (VPS) are not recommended.

- Observe proper soldering conditions (temperature, time, etc.).
- Do not exceed the specified limits.
- Temperature measuring method: Measure temperature in assuming quantitative production, by sticking the thermo-couple to the capacitor upper part with epoxy adhesives.
- Consult use for additional reflow restrictions.

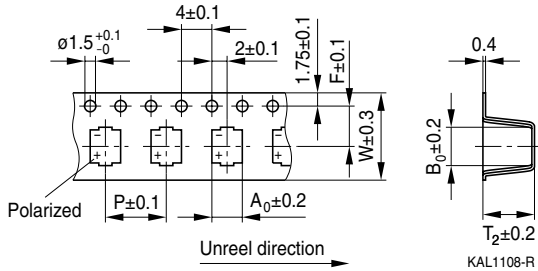


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### Lead-free reflow

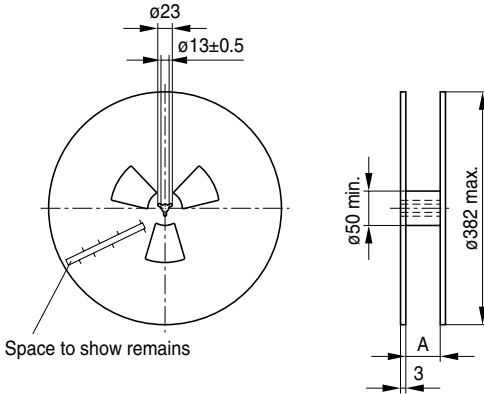
d (mm)	4 ... 6.3	8 ... 10
Peak temperature	250 °C	235 °C
Time in peak temperature	5 s	5 s
Time in 200 °C or more	60 s	60 s
Time of reflow	1 time	1 time



**Taping of SMD capacitors**


Case dimensions $d \times l$ (mm)	4 × 5.4	4 × 5.8	5 × 5.4	5 × 5.8	6.3 × 5.4
W	12.0	12.0	12.0	12.0	16.0
P	8.0	8.0	12.0	12.0	12.0
F	5.5	5.5	5.5	5.5	7.5
$A_0$	5.0	5.0	6.0	6.0	7.0
$B_0$	5.0	5.0	6.0	6.0	7.0
$T_2$	5.8	6.3	5.8	6.3	5.8

Case dimensions $d \times l$ (mm)	6.3 × 5.8	6.3 × 7.7	8 × 6.2	8 × 10	10 × 10
W	16.0	16.0	16.0	24.0	24.0
P	12.0	12.0	12.0	16.0	16.0
F	7.5	7.5	7.5	11.5	11.5
$A_0$	7.0	7.0	8.7	8.7	10.7
$B_0$	7.0	7.0	8.7	8.7	10.7
$T_2$	6.3	8.2	6.8	11.0	11.0

**Reel packing**


KAL1110-3

Capacitor dimensions $d \times l$ (mm)	Quantity per reel pcs.
$4 \times l$	2000 pcs.
$5 \times l, 6.3 \times l, 8 \times 6.2$	1000 pcs.
$8 \times 10, 10 \times l$	500 pcs.

$d \times l$ (mm)	$4 \times l, 5 \times l$	$6.3 \times l, 8 \times 6.2$	$8 \times 10, 10 \times l$
A	14	18	26

## Cautions and warnings

### General

Also see "Important notes" on page 13.

- 1 Aluminum electrolytic capacitors have a bi-polar structure. This is marked on the body of the capacitor. A capacitor must not be mounted with reversed polarity. The application of an AC or reverse voltage may cause a short circuit or damage the capacitor. Bi-polar capacitors must not be used in AC applications, where the polarity may be reversed in the circuits or is unknown.
- 2 The DC voltage applied to the capacitor terminal must not exceed its rated operating voltage, as this will result in a rapid increase of the leakage current and may damage the capacitor. It is recommended to operate the capacitor at 70–80% of its rated voltage to optimize its service life.
- 3 The ripple current applied to the capacitor must be within the permitted range. An excessive ripple current leads to impaired electrical properties and may damage the capacitor. Note that the sum of the peak values of the ripple voltage and the DC operating voltage must not exceed the rated DC voltage.
- 4 Capacitors must be used within their permitted range of operating temperature. Operation at room temperature optimizes their service life.
- 5 Capacitors with case diameter  $\geq 8$  mm are equipped with a safety vent. In capacitors fitted with a lead or soldering lug, the safety vent is usually located at the base of the case. It needs sufficient space around it to operate optimally. The following dimensions are recommended: for case diameter  $d = 8$  to 16 mm, more than 2 mm; for  $d = 18$  to 35 mm, more than 3 mm; and for  $d = 42$  mm or more, more than 5 mm.
- 6 Capacitors should not be mounted with the safety vent face down on the board. Do not locate any wire or copper trace near the safety vent. Do not reverse the voltage, as this may result in excess pressure and the leakage of electrolyte.
- 7 Gas is released through the safety vent when the pressure inside the capacitor is too high. A gaseous liquid around the safety vent does not indicate a leakage of electrolyte.
- 8 The capacitor should be stored under conditions of normal temperature and in a non-acid, non-alkali environment of normal humidity. Exposure to high temperatures, for example under direct sunlight, will reduce its operating life. If the capacitor is stored in an environment containing acids or alkalis, the solderability of the leads may be affected.
- 9 The leakage current of an aluminum electrolytic capacitor may increase after a long period of storage. After such storage, the capacitor must be aged by applying the rated operating voltage for 6–8 hours before use.
- 10 Manual soldering:
  - a Soldering must be performed within the specified conditions.  
Bit temperature: 350 °C; application time of soldering iron: 3 seconds.
  - b Ensure that the soldering iron does not touch any part of the capacitor body.

## Cautions and warnings

- 11 Do not apply excessive force to the leads and terminals. Do not move the capacitor after soldering it onto the PC board and do not carry the PC board by gripping the capacitor. Observe the following rules to prevent undue stress to the capacitor:
  - a Do not tilt or bend the capacitor after soldering.
  - b Ensure that the terminal spacing matches the corresponding hole spacing on the PC board.
- 12 The aluminum case is not insulated from the cathode. Do not place a conductor under the aluminum capacitors on the PC board as this may cause a short circuit. The case and top of capacitors used in switched mode power supplies have a high-voltage-resistant heat shrink sleeve to ensure safe usage.
- 13 The leads of capacitors with a case diameter exceeding 14 mm cannot be used for fixing.

## 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.
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