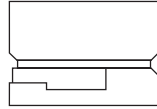


Aluminum Electrolytic Capacitors



QUICK REFERENCE DATA			
DESCRIPTION	VALUE		
Nominal Case size D × L (in mm)	4 × 5.3 to 10 × 10		
Rated capacitance range	0.1 to 1500 μF		
Capacitance tolerance	± 20 %		
Rated voltage range	4 to 50 V		
Category temperature range	- 40 to + 105 °C		
Endurance test at upper category temperature	1 000 hours		
Lifetime at 105°C and I _R	<table border="0"> <tr> <td>∅ ≤ 6.3 = 1 500 hours</td> <td>∅ ≥ 8 = 2 500 hours</td> </tr> </table>	∅ ≤ 6.3 = 1 500 hours	∅ ≥ 8 = 2 500 hours
∅ ≤ 6.3 = 1 500 hours	∅ ≥ 8 = 2 500 hours		
Lifetime at 85°C and I _R	<table border="0"> <tr> <td>∅ ≤ 6.3 = 6 000 hours</td> <td>∅ ≥ 8 = 10 000 hours</td> </tr> </table>	∅ ≤ 6.3 = 6 000 hours	∅ ≥ 8 = 10 000 hours
∅ ≤ 6.3 = 6 000 hours	∅ ≥ 8 = 10 000 hours		
Lifetime at 40°C and I _R	<table border="0"> <tr> <td>∅ ≤ 6.3 = 135 000 hours</td> <td>∅ ≥ 8 = 230 000 hours</td> </tr> </table>	∅ ≤ 6.3 = 135 000 hours	∅ ≥ 8 = 230 000 hours
∅ ≤ 6.3 = 135 000 hours	∅ ≥ 8 = 230 000 hours		
Sectional specification	IEC 384-4, CECC 30300		
Detail specifications			
Climatic category IEC 68 DIN 40040	40/105/56 GMF		
Failure rate	≤ 100 [10 ⁻⁹ / h]		

FEATURES

- Polarized aluminum electrolytic capacitors
- SMD Style
- Miniature dimension
- Extended temperature range: 105 °C
- Reflow soldering
- Packaging: blistertape on reel

APPLICATIONS

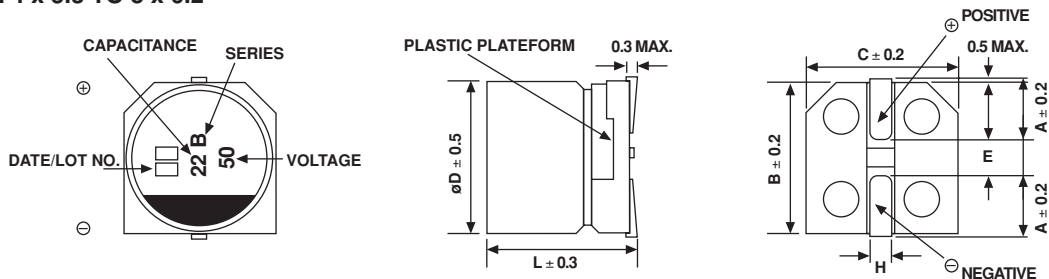
- Industrial electronics, automotive electronics, telecommunication systems
- Smoothing and filtering
- Miniature power supply units, dc-to-dc converters

DIMENSIONS AND RELEVANT NOMINAL CASE SIZES (D × L in mm)							
CAPACITANCE (μF)	RATED VOLTAGE (V)						
	4	6.3	10	16	25	35	50
0.1	-	-	-	-	-	-	4 × 5.3
0.22	-	-	-	-	-	-	4 × 5.3
0.33	-	-	-	-	-	-	4 × 5.3
0.47	-	-	-	-	-	-	4 × 5.3
0.68	-	-	-	-	-	-	4 × 5.3
1.0	-	-	-	-	-	-	4 × 5.3
1.5	-	-	-	-	-	-	4 × 5.3
2.2	-	-	-	-	-	-	4 × 5.3
3.3	-	-	-	-	-	-	4 × 5.3
4.7	-	-	-	-	-	4 × 5.3	5 × 5.3
6.8	-	-	-	-	-	-	-
10	-	-	-	4 × 5.3	5 × 5.3	5 × 5.3	6.3 × 5.3
15	-	-	-	-	-	-	-
22	-	4 × 5.3	5 × 5.3	5 × 5.3	6.3 × 5.3	6.3 × 5.3	6.3 × 5.8
	-	-	-	-	-	-	8 × 6.2

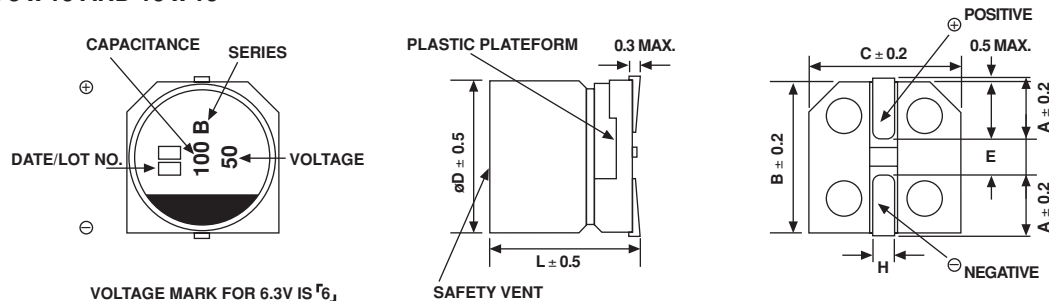
DIMENSIONS AND RELEVANT NOMINAL CASE SIZES (D × L in mm)							
CAPACITANCE (μF)	RATED VOLTAGE (V)						
	4	6.3	10	16	25	35	50
33	-	5 × 5.3	5 × 5.3	6.3 × 5.3	6.3 × 5.3	6.3 × 5.8	6.3 × 7.7
	-	-	-	-	-	8 × 6.2	-
47	-	5 × 5.3	6.3 × 5.3	6.3 × 5.3	6.3 × 5.8	6.3 × 5.8	6.3 × 7.7
	-	-	-	-	8 × 6.2	8 × 10	-
68	-	6.3 × 5.3	-	-	-	-	-
100	-	6.3 × 5.3	6.3 × 5.3	6.3 × 5.8	6.3 × 7.7	8 × 10	10 × 10
	-	-	-	8 × 10	8 × 10	10 × 10	-
150	-	6.3 × 5.8	6.3 × 5.8	6.3 × 7.7	8 × 10	8 × 10	10 × 10
	-	8 × 6.2	6.3 × 7.7	8 × 10	8 × 10	10 × 10	-
220	-	-	8 × 10	10 × 10	10 × 10	-	-
	-	-	-	-	-	-	-
330	6.3 × 7.7	8 × 10	8 × 10	8 × 10	10 × 10	-	-
470	8 × 10	8 × 10	8 × 10	10 × 10	10 × 10	-	-
680	8 × 10	8 × 10	10 × 10	-	-	-	-
1000	8 × 10	10 × 10	10 × 10	-	-	-	-
1500	10 × 10	-	-	-	-	-	-

CAPACITOR DIMENSIONS (in millimeters)							
CASE SIZE CODE	D	H	B	C	E	A	H
AB	4	5.3	4.3	4.3	1.0	1.9	0.5 ~ 0.8
AC	5	5.3	5.3	5.3	1.4	2.3	0.5 ~ 0.8
AD	6.3	5.3/5.8	6.6	6.6	2.2	2.4	0.5 ~ 0.8
BM	6.3	7.7	6.6	6.6	2.2	2.4	0.5 ~ 0.8
AE	8	6.2	8.3	8.3	2.3	3.3	0.5 ~ 0.8
AF	8	10	8.3	8.3	3.1	2.9	0.8 ~ 1.1
AG	10	10	10.3	10.3	4.5	3.2	0.8 ~ 1.1

CASE SIZE 4 x 5.3 TO 8 x 6.2



CASE SIZE 8 x 10 AND 10 x 10



**ELECTRICAL DATA AND ORDERING INFORMATION**

If not indicated otherwise the following test conditions apply to all electrical parameters: $T_a = 20\text{ }^\circ\text{C}$, $P = 80\text{ to }120\text{ kPa}$, $RH = 45\text{ to }75\%$.

SYMBOL	DESCRIPTION
C_R	Rated capacitance at 120 Hz
U_R	Rated voltage
$\text{Tan } \delta$	Max. dissipation factor at 120 Hz
R_{ESR}	Max. equivalent series resistance at 120 Hz
I_R	Rated alternating current at 120 Hz and upper category temperature

ORDERING EXAMPLE

ECB 10 μF / 25 V, $\pm 20\%$

Size: 5 mm \times 5.3 mm

Ordering Code: ECB00AC210EA0

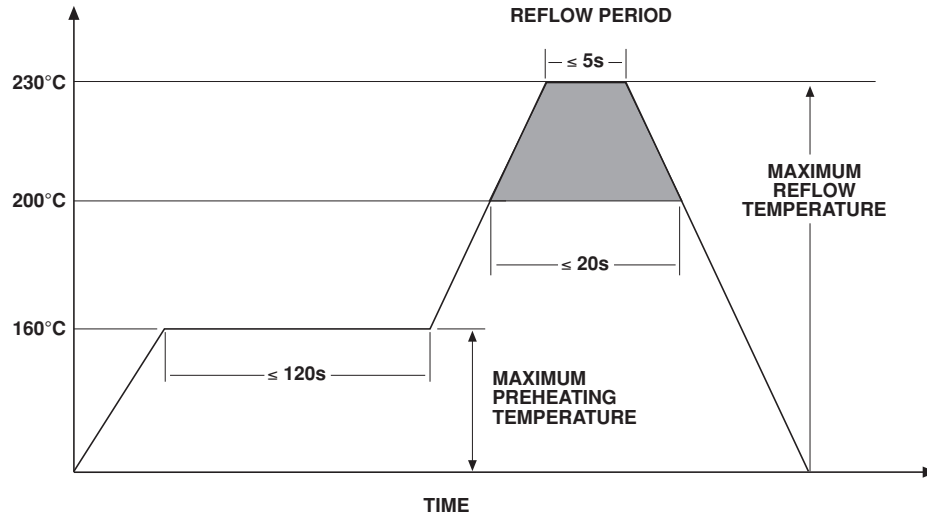
ELECTRICAL DATA AND ORDERING INFORMATION

U_R (V)	C_R 120 Hz (μF)	DIMENSIONS D \times L (mm)	$\text{Tan } \delta$ 120 Hz	R_{ESR} 120 Hz (Ω)	I_R 120 Hz/85 $^\circ\text{C}$ (mA)	ORDERING CODE □ INTER COMPANY CODE
4	330	6.3 \times 7.7	0.38	1.6	80	ECB00BM333AA0□
	470	8 \times 10	0.38	1.1	150	ECB00AF347AA0□
	680	8 \times 10	0.38	0.8	190	ECB00AF368AA0□
	1000	8 \times 10	0.38	0.6	230	ECB00AF410AA0□
	1500	10 \times 10	0.38	0.4	350	ECB00AG415AA0□
6.3	22	4 \times 5.3	0.27	16.6	22	ECB00AB222BA0□
	33	5 \times 5.3	0.27	11.1	31	ECB00AC233BA0□
	47	5 \times 5.3	0.27	7.8	36	ECB00AC247BA0□
	68	6.3 \times 5.3	0.27	5.4	45	ECB00AD268BA0□
	100	6.3 \times 5.3	0.27	3.7	50	ECB00AD310BA0□
	150	6.3 \times 5.8	0.27	2.5	65	ECB00AD315BA0□
	220	8 \times 6.2	0.27	1.7	86	ECB00AE322BA0□
	330	8 \times 10	0.27	1.2	105	ECB00AF333BA0□
	470	8 \times 10	0.27	0.8	200	ECB00AF347BA0□
	680	8 \times 10	0.27	0.6	250	ECB00AF368BA0□
	1000	10 \times 10	0.27	0.4	350	ECB00AG410BA0□
10	22	5 \times 5.3	0.23	14.2	27	ECB00AC222CA0□
	33	5 \times 5.3	0.23	9.5	33	ECB00AC233CA0□
	47	6.3 \times 5.3	0.23	6.7	46	ECB00AD247CA0□
	100	6.3 \times 5.3	0.23	3.2	64	ECB00AD310CA0□
	150	6.3 \times 5.8	0.23	2.1	85	ECB00AD315CA0□
	220	6.3 \times 7.7	0.23	1.5	105	ECB00BM322CA0□
	220	8 \times 10	0.23	1.5	115	ECB00AF322CA0□
	330	8 \times 10	0.23	1.0	130	ECB00AF333CA0□
	470	8 \times 10	0.23	0.7	210	ECB00AF347CA0□
	680	10 \times 10	0.23	0.5	265	ECB00AG368CA0□
	1000	10 \times 10	0.23	0.4	360	ECB00AG410CA0□
16	10	4 \times 5.3	0.19	26	17	ECB00AB210DA0□
	22	5 \times 5.3	0.19	11.7	30	ECB00AC222DA0□
	33	6.3 \times 5.3	0.19	7.8	43	ECB00AD233DA0□
	47	6.3 \times 5.3	0.19	5.5	51	ECB00AD247DA0□
	100	6.3 \times 5.8	0.19	2.6	64	ECB00AD310DA0□
	100	8 \times 10	0.19	2.6	80	ECB00AF310DA0□



ELECTRICAL DATA AND ORDERING INFORMATION						
U_R (V)	C_R 120 Hz (μF)	DIMENSIONS D × L (mm)	Tan δ 120 Hz	R_{ESR} 120 Hz (Ω)	I_R 120 Hz/85 °C (mA)	ORDERING CODE □INTER COMPANY CODE
16	150	6.3 × 7.7	0.19	1.8	90	ECB00BM315DA0□
	220	8 × 10	0.19	1.2	120	ECB00AF322DA0□
	220	10 × 10	0.19	1.2	200	ECB00AG322DA0□
	330	8 × 10	0.19	0.8	210	ECB00AF333DA0□
	470	10 × 10	0.19	0.6	280	ECB00AG347DA0□
25	10	5 × 5.3	0.15	21	23	ECB00AC210EA0□
	22	6.3 × 5.3	0.15	9.3	39	ECB00AD222EA0□
	33	6.3 × 5.3	0.15	6.2	48	ECB00AD233EA0□
	47	6.3 × 5.8	0.15	4.4	59	ECB00AD247EA0□
	47	8 × 6.2	0.15	4.4	65	ECB00AE247EA0□
	100	6.3 × 7.7	0.15	2.0	91	ECB00BM310EA0□
	100	8 × 10	0.15	2.0	100	ECB00AF310EA0□
	150	8 × 10	0.15	1.4	120	ECB00AF315EA0□
	220	8 × 10	0.15	1.0	150	ECB00AF322EA0□
	220	10 × 10	0.15	1.0	210	ECB00AG322EA0□
	330	10 × 10	0.15	0.7	300	ECB00AG333EA0□
	470	10 × 10	0.15	0.5	350	ECB00AG347EA0□
35	4.7	4 × 5.3	0.13	38	14	ECB00AB147FA0□
	10	5 × 5.3	0.13	18	24	ECB00AC210FA0□
	22	6.3 × 5.3	0.13	8	42	ECB00AD222FA0□
	33	6.3 × 5.8	0.13	5.4	52	ECB00AD233FA0□
	33	8 × 6.2	0.13	5.4	65	ECB00AE233FA0□
	47	6.3 × 5.8	0.13	3.8	63	ECB00AD247FA0□
	47	8 × 10	0.13	3.8	90	ECB00AF247FA0□
	100	8 × 10	0.13	1.8	120	ECB00AF310FA0□
	100	10 × 10	0.13	1.8	140	ECB00AG310FA0□
	150	8 × 10	0.13	1.2	150	ECB00AF315FA0□
	220	10 × 10	0.13	0.8	260	ECB00AG322FA0□
	50	0.1	4 × 5.3	0.11	1500	2.3
0.22		4 × 5.3	0.11	676	3.4	ECB00AB022HA0□
0.33		4 × 5.3	0.11	451	4.1	ECB00AB033HA0□
0.47		4 × 5.3	0.11	317	4.9	ECB00AB047HA0□
0.68		4 × 5.3	0.11	219	5.5	ECB00AB068HA0□
1.0		4 × 5.3	0.11	149	7.2	ECB00AB110HA0□
1.5		4 × 5.3	0.11	100	8.5	ECB00AB115HA0□
2.2		4 × 5.3	0.11	68	10	ECB00AB122HA0□
3.3		4 × 5.3	0.11	46	13	ECB00AB133HA0□
4.7		5 × 5.3	0.11	32	18	ECB00AC147HA0□
10		6.3 × 5.3	0.11	15	31	ECB00AD210HA0□
22		6.3 × 5.8	0.11	6.8	45	ECB00AD222HA0□
22		8 × 6.2	0.11	6.8	60	ECB00AE222HA0□
33		6.3 × 7.7	0.11	4.5	60	ECB00BM233HA0□
47		6.3 × 7.7	0.11	3.2	63	ECB00BM247HA0□
100		10 × 10	0.11	1.5	160	ECB00AG310HA0□
150		10 × 10	0.11	1.0	190	ECB00AG315HA0□

PERMISSIBLE TEMPERATURES FOR REFLOW SOLDERING



RESISTANCE TO SOLDERING HEAT	
Leakage current	less than specified value
Capacitance value	within $\pm 15\%$ of initial value
Tan δ	less than specified value

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE RATIO Z(T2) / Z(T1) AT 120 HZ							
T1/T2	RATED VOLTAGE (V)						
	4	6.3	10	16	25	35	50
- 25 °C/+ 20 °C	6	3	3	2	2	2	2
- 40 °C/+ 20 °C	12	8	5	4	3	3	3

ENDURANCE TEST (rated voltage/1000 hours/105 °C)	
Leakage current	less than specified value
Capacitance value	within $\pm 25\%$ of initial value
Tan δ	less than 200 % of specified value

LEAKAGE CURRENT

Formula for calculation of the maximum leakage current.

(Test conditions: U_R , 20 °C , 2 resp. 1 minute)

$$I_{L1} [\mu A] < 0.03 \cdot C_R [\mu F] \cdot U_R [V] \text{ (after 1 minute)}$$

$$I_{L2} [\mu A] < 0.01 \cdot C_R [\mu F] \cdot U_R [V] \text{ or } 3 \mu A \text{ whichever is greater (after 2 minutes)}$$