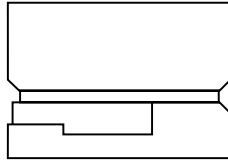


# Aluminum Capacitors



## FEATURES

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



Pb-free  
Available  
**RoHS\***  
COMPLIANT

## APPLICATIONS

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

QUICK REFERENCE DATA	
DESCRIPTION	VALUE
Nominal case sizes D × L (in mm)	4 x 5.8 to 10 x 10
Rated capacitance range, C <sub>R</sub>	0.1 to 470 μF
Tolerance on C <sub>R</sub>	± 20 %
Rated voltage range, U <sub>R</sub>	4 to 50 V
Category temperature range	- 40 to + 105 °C
Endurance test at upper category temperature	2000 hours
Lifetime at 105 °C and IR	2500 hours
Lifetime at 85 °C and IR	10 000 hours
Lifetime at 40 °C and IR	230 000 hours
Failure rate	≤ 50 [10 <sup>-9</sup> /h]
Based on sectional specification	IEC 60384-4 EN130300, LL grade
Climatic category IEC 60068	40/105/56

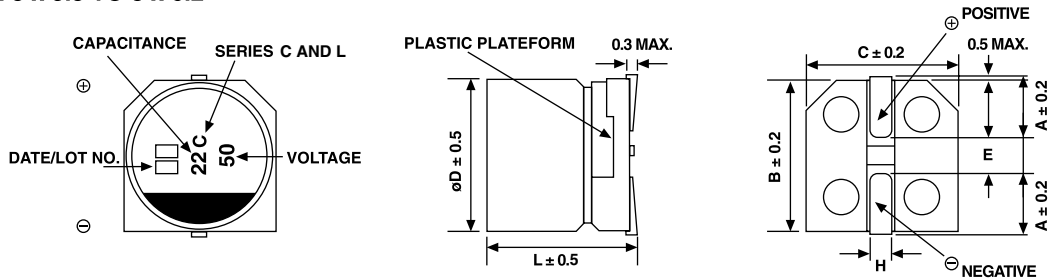
SELECTION CHART FOR C <sub>R</sub> , U <sub>R</sub> AND RELEVANT NOMINAL CASE SIZES (D × L in mm)							
C <sub>R</sub> (μF)	U <sub>R</sub> (V)						
	4	6.3	10	16	25	35	50
0.1	-	-	-	-	-	-	4 x 5.8
0.22	-	-	-	-	-	-	4 x 5.8
0.33	-	-	-	-	-	-	4 x 5.8
0.47	-	-	-	-	-	-	4 x 5.8
1.0	-	-	-	-	-	-	4 x 5.8
2.2	-	-	-	-	-	-	4 x 5.8
3.3	-	-	-	-	-	-	4 x 5.8
4.7	-	-	-	-	4 x 5.8	-	5 x 5.8
6.8	-	-	-	-	4 x 5.8	-	5 x 5.8
10	-	-	-	4 x 5.8	-	5 x 5.8	6.3 x 5.8
22	-	4 x 5.8	-	5 x 5.8	-	6.3 x 5.8	8 x 6.2
33	-	4 x 5.8	5 x 5.8	-	6.3 x 5.8	8 x 6.2	8 x 10
47	4 x 5.8	5 x 5.8	-	6.3 x 5.8	8 x 6.2	8 x 10	10 x 10
100	5 x 5.8	6.3 x 5.8	8 x 6.2	8 x 10	8 x 10	10 x 10	-
150	6.3 x 5.8	-	-	-	-	-	-
220	6.3 x 5.8	8 x 10	8 x 10	10 x 10	10 x 10	-	-
330	-	8 x 10	-	10 x 10	-	-	-
470	-	-	10 x 10	-	-	-	-

\* Pb containing terminations are not RoHS compliant, exemptions may apply

DIMENSIONS in millimeters									
CASE SIZE CODE	D	L	A, B	H	I	W	P	K	
AB	4	5.8	4.3	5.5 max	1.8	0.65 ± 0.1	1.0	0.35	- 0.20 to + 0.15
AC	5	5.8	5.3	6.5 max	2.2	0.65 ± 0.1	1.5	0.35	- 0.20 to + 0.15
AD	6.3	5.8	6.6	7.8 max	2.6	0.65 ± 0.1	1.8	0.35	- 0.20 to + 0.15
AE	8	6.2	8.3	9.5 max	3.4	0.65 ± 0.1	2.2	0.35	- 0.20 to + 0.15
AF	8	10	8.3	10.0 max	3.4	0.90 ± 0.2	3.1	0.70	± 0.2
AG	10	10	10.3	12.0 max	3.5	0.90 ± 0.2	4.6	0.70	± 0.2

W.V CODE								
V	4	6.3	10	16	25	35	50	
CODE	g	j	A	C	E	V	H	

CASE SIZE 3 x 5.3 TO 8 x 6.2



ELECTRICAL DATA	
SYMBOL	DESCRIPTION
$C_R$	Rated capacitance at 120 Hz
$U_R$	Rated voltage
$\tan \delta$	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 catagory temperature

Note

- Unless otherwise specified, all electrical values apply at  $T_{amb} = 20\text{ }^\circ\text{C}$ ,  $P = 86\text{ to }106\text{ kPa}$ ,  $RH = 45\text{ to }75\%$ .

ORDERING EXAMPLE

ECV 10  $\mu\text{F}$ / 35 V,  $\pm 20\%$

Size: 5 mm x 5.8 mm

Ordering Code: ECV00AC210FA0

The 14<sup>th</sup> place ( $\square$ ), not indicated in the following table, is an inter-company code.

\* RoHS/Lead (Pb)-free

If you need "RoHS" compliant parts please replace the 13th figure "0" of the Part Number through "R"

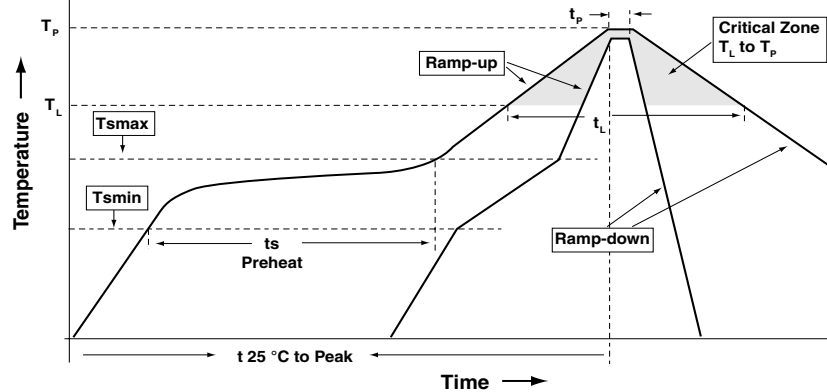
example: ECV00AB247AAR $\square$



<b>ELECTRICAL DATA AND ORDERING INFORMATION</b>						
$U_R$ (V)	$C_R$ 120 Hz ( $\mu$ F)	DIMENSIONS $D \times L$ (mm)	$TAN \delta$ 120 HZ	$R_{ESR}$ 120 Hz ( $\Omega$ )	$I_R$ 120 Hz/105 °C (mA)	CATALOG NUMBER PART NUMBER *
4	47	4.0 x 5.8	0.50	16.5	34	ECV00AB247AA0□
	100	5.0 x 5.8	0.50	7.0	61	ECV00AC310AA0□
	150	6.3 x 5.8	0.50	5.0	82	ECV00AD315AA0□
	220	6.3 x 5.8	0.50	3.5	82	ECV00AD322AA0□
6.3	22	4.0 x 5.8	0.30	19.0	26	ECV00AB222BA0□
	33	4.0 x 5.8	0.30	12.5	29	ECV00AB233BA0□
	47	5.0 x 5.8	0.30	9.0	46	ECV00AC247BA0□
	100	6.3 x 5.8	0.30	4.5	71	ECV00AD310BA0□
	220	8 x 10	0.35	2.5	150	ECV00AF322BA0□
	330	8 x 10	0.35	1.5	230	ECV00AF333BA0□
10	33	5.0 x 5.8	0.22	0.22	43	ECV00AC233CA0□
	100	8.0 x 6.2	0.26	4.0	110	ECV00AE310CA0□
	220	8.0 x 10	0.26	2.0	160	ECV00AF322CA0□
	470	10.0 x 10	0.26	0.9	270	ECV00AG347CA0□
16	10	4.0 x 5.8	0.16	25.0	28	ECV00AB210DA0□
	22	5.0 x 5.8	0.16	10.0	39	ECV00AC222DA0□
	47	6.3 x 5.8	0.16	5.0	70	ECV00AD247DA0□
	100	8.0 x 10	0.20	3.0	120	ECV00AF310DA0□
	220	10.0 x 10	0.20	1.5	210	ECV00AG322DA0□
	330	10.0 x 10	0.20	0.9	230	ECV00AG333DA0□
25	4.7	4.0 x 5.8	0.14	41.0	22	ECV00AB147EA0□
	6.8	4.0 x 5.8	0.14	28.0	25	ECV00AB168EA0□
	33	6.3 x 5.8	0.14	6.0	65	ECV00AD233EA0□
	47	8.0 x 6.2	0.16	5.0	91	ECV00AE247EA0□
	100	8.0 x 10	0.16	2.5	130	ECV00AF310EA0□
	220	10.0 x 10	0.16	1.1	190	ECV00AG322EA0□
35	10	5.0 x 5.8	0.12	16.5	28	ECV00AC210FA0□
	22	6.3 x 5.8	0.12	8.0	55	ECV00AD222FA0□
	33	8.0 x 6.2	0.14	6.0	84	ECV00AE233FA0□
	47	8.0 x 10	0.14	4.5	98	ECV00AF247FA0□
	100	10.0 x 10	0.14	2.0	160	ECV00AG310FA0□
50	0.1	4.0 x 5.8	0.12	1900	1	ECV00AB010HA0□
	0.22	4.0 x 5.8	0.12	800	2	ECV00AB022HA0□
	0.33	4.0 x 5.8	0.12	550	3	ECV00AB033HA0□
	0.47	4.0 x 5.8	0.12	400	5	ECV00AB047HA0□
	1.0	4.0 x 5.8	0.12	180	10	ECV00AB110HA0□
	2.2	4.0 x 5.8	0.12	80.0	16	ECV00AB122HA0□
	3.3	4.0 x 5.8	0.12	55.0	16	ECV00AB133HA0□
	4.7	5.0 x 5.8	0.12	40.0	23	ECV00AC147HA0□
	6.8	5.0 x 5.8	0.12	27.0	23	ECV00AC168HA0□
	10	6.3 x 5.8	0.12	19.0	35	ECV00AD210HA0□
	22	8.0 x 6.2	0.12	8.5	70	ECV00AE222HA0□
	33	8.0 x 10	0.12	5.5	91	ECV00AF233HA0□
	47	10.0 x 10	0.12	4.0	100	ECV00AG247HA0□

**REFLOW SOLDERING CONDITIONS FOR SMD ALUMINUM ELECTROLYTIC CAPACITORS**

Lead (Pb)-free / RoHS



Profile Feature	Lead (Pb)-free / RoHS	
	4 ~ 6.3 φ	8 ~ 10 φ
Average Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )	3 °C/second max.	
Preheat - Temperature Min (T <sub>s</sub> min.) - Temperature Max (T <sub>s</sub> max.) - Time (T <sub>s</sub> min. to T <sub>s</sub> max.)	150 °C 200 °C 60 ~ 150 seconds	
T <sub>s</sub> max. to T <sub>L</sub> - Ramp-up Rate	3 °C/second max.	
Time maintained above: - Temperature (T <sub>L</sub> ) - Time (T <sub>L</sub> )	217 °C 60 ~ 90 seconds	
Peak/Classification Temperature (T <sub>P</sub> )	250 °C ± 5 °C	
Time within 5 °C of actual Peak Temperature (T <sub>P</sub> )	10 seconds	5 seconds
Ramp-down Rate	3 °C/second max.	
Time 25 °C to Peak Temperature	8 minutes max.	

RESISTANCE TO SOLDERING HEAT	
Leakage current	less than specified value
Capacitance value	within ± 10 % of initial value
Tan δ	less than specified value

**LOW TEMPERATURE CHARACTERISTICS**

IMPEDANCE RATIO Z <sub>9T2</sub> / Z (T <sub>1</sub> ) AT 120HZ							
T1/T2	RATED VOLTAGE (V)						
	4	6.3	10	16	25	35	50
- 25 °C/ + 20 °C	7	4	3	2	2	2	2
- 40 °C/ + 20 °C	15	8	6	4	4	3	3

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

**LEAKAGE CURRENT**

Formula for calculation of the maximum leakage current for acceptance tests I<sub>L</sub>:

(Test conditions: U<sub>R</sub>, 20 °C, 2 resp. 1 minute)

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

$$I_{L5} [\mu A] < 0.01 \cdot C_R [\mu F] \cdot U_R [V] \text{ or } 3 \mu A \text{ whichever is greater (after 2 minutes)}$$



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