

# DATA SHEET

O97 RLP 7  
**Aluminum electrolytic capacitors**  
**Radial Low Profile, 7 mm**

Product specification  
Supersedes data of January 1998  
File under BCcomponents, BC01

2000 Jan 18

# Aluminum electrolytic capacitors

## Radial Low Profile, 7 mm

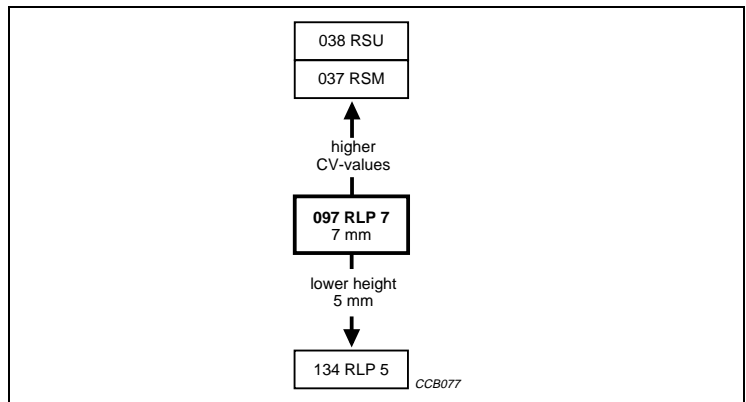
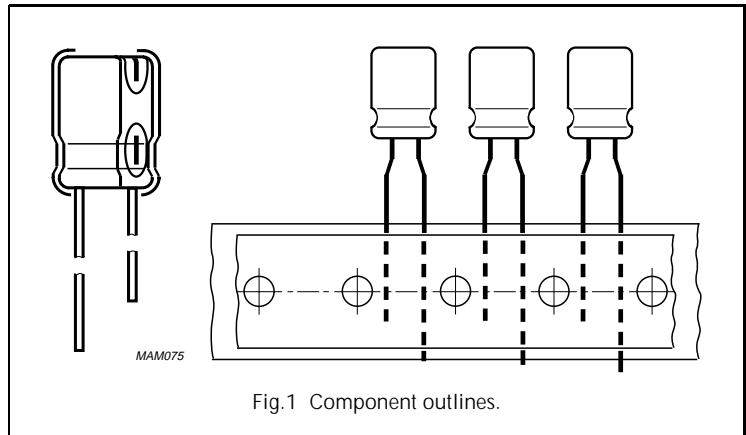
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### FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Radial leads, cylindrical aluminum case, insulated with a blue vinyl sleeve
- Charge and discharge proof
- Low profile, 7 mm height
- Miniaturized, high CV-product per unit volume.

### APPLICATIONS

- General purpose; industrial, automotive and audio-video
- Low surface demand on printed-circuit board
- Coupling, decoupling, smoothing, filtering and timing
- Portable and mobile equipment (small size, low mass), low profile equipment.



### QUICK REFERENCE DATA

DESCRIPTION	VALUE
Case sizes ( $\varnothing D_{nom} \times L_{nom}$ in mm)	4 × 7 to 6.3 × 7
Rated capacitance range, $C_R$	0.1 to 220 $\mu F$
Tolerance on $C_R$	$\pm 20\%$
Rated voltage, $U_R$	6.3 to 63 V
Category temperature range	-40 to +85 °C
Endurance test at 85 °C	1000 hours
Useful life at 85 °C	1500 hours
Useful life at 40 °C, $1.4 \times I_R$ applied	40000 hours
Shelf life at 0 V, 85 °C	500 hours
Based on sectional specification	IEC 60384-4/EN130300
Climatic category IEC 60068	40/085/56

# Aluminum electrolytic capacitors

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Selection chart for  $C_R$ ,  $U_R$  and relevant nominal case sizes ( $\varnothing D \times L$  in mm)

Preferred types in **bold**.

$C_R$ ( $\mu F$ )	$U_R$ (V)						
	6.3	10	16	25	35	50	63
0.10	–	–	–	–	–	–	4 × 7
0.22	–	–	–	–	–	–	4 × 7
0.47	–	–	–	–	–	–	4 × 7
1.0	–	–	–	–	–	–	<b>4 × 7</b>
2.2	–	–	–	–	–	–	<b>4 × 7</b>
3.3	–	–	–	–	–	<b>4 × 7</b>	5 × 7
4.7	–	–	–	–	<b>4 × 7</b>	<b>5 × 7</b>	<b>6.3 × 7</b>
10	–	–	<b>4 × 7</b>	–	<b>5 × 7</b>	6.3 × 7	6.3 × 7
22	4 × 7	–	<b>5 × 7</b>	–	<b>6.3 × 7</b>	6.3 × 7	–
33	–	5 × 7	–	<b>6.3 × 7</b>	6.3 × 7	–	–
47	5 × 7	–	<b>6.3 × 7</b>	6.3 × 7	–	–	–
100	–	<b>6.3 × 7</b>	6.3 × 7	–	–	–	–
220	6.3 × 7	–	–	–	–	–	–

### MARKING

The capacitors are marked (where possible) with the following information:

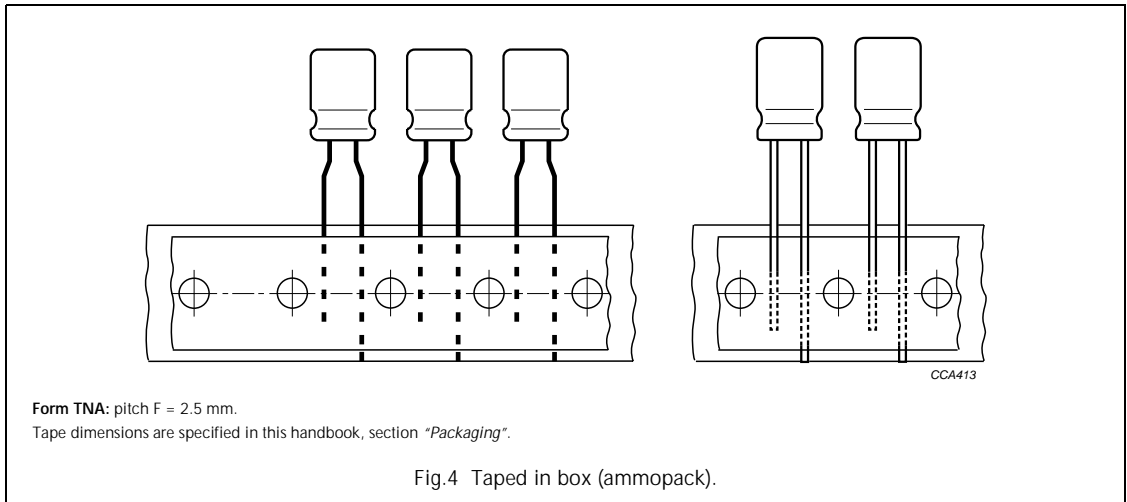
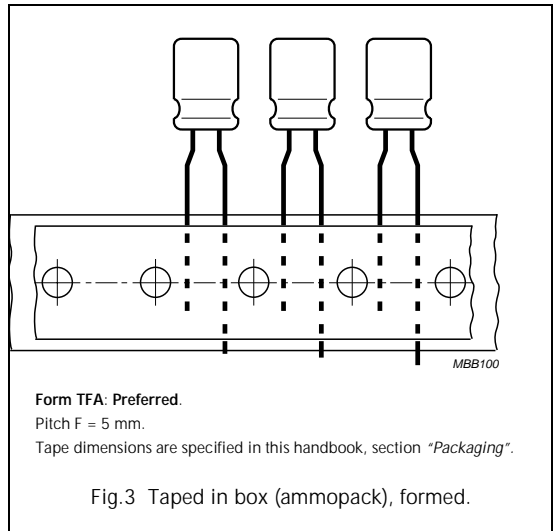
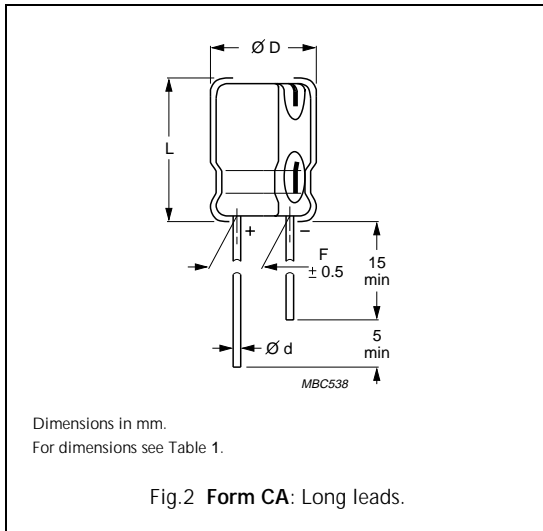
- Rated capacitance (in  $\mu F$ )
- Rated voltage (in V)
- Negative terminal identification
- Group number (097)
- Code indicating factory of origin
- Name of manufacturer
- Date code, in accordance with "IEC 60062".

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**MECHANICAL DATA, AVAILABLE FORMS AND PACKAGING QUANTITIES**



**Table 1** Physical dimensions and packaging quantities; see Figs 2, 3 and 4

NOMINAL CASE SIZE ØD × L (mm)	CASE CODE	Ød (mm)	ØD <sub>max</sub> (mm)	L <sub>max</sub> (mm)	F (mm)	PACKAGING QUANTITIES		
						FORM CA	FORM TFA	FORM TNA
4 × 7	71	0.45	4.5	8	1.5 ± 0.5	2000	2000	2000
5 × 7	72	0.45	5.5	8	2.0 ± 0.5	1000	2000	2000
6.3 × 7	73	0.45	6.8	8	2.5 ± 0.5	1000	2000	2000

# Aluminum electrolytic capacitors Radial Low Profile, 7 mm

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### Ordering example

Electrolytic capacitor 097 series

100  $\mu\text{F}/16\text{ V}$ ;  $\pm 20\%$

Nominal case size:  $\varnothing 6.3 \times 7\text{ mm}$ ; Form TFA

Catalogue number: 2222 097 35101.

### ELECTRICAL DATA AND ORDERING INFORMATION

Unless otherwise specified, all electrical values in Table 2 apply at  $T_{\text{amb}} = 20\text{ }^{\circ}\text{C}$ ,  $P = 86$  to  $106\text{ kPa}$ ,  $\text{RH} = 45$  to  $75\%$ .

SYMBOL	DESCRIPTION
$C_R$	rated capacitance at 120 Hz, tolerance $\pm 20\%$
$I_R$	rated RMS ripple current at 120 Hz, $85\text{ }^{\circ}\text{C}$
$I_{L2}$	max. leakage current after 2 minutes at $U_R$
$\text{Tan } \delta$	max. dissipation factor at 120 Hz
ESR	equivalent series resistance at 120 Hz (calculated from $\text{tan } \delta_{\text{max}}$ and $C_R$ )
Z	max. impedance at 10 kHz and 100 kHz

**Table 2** Electrical data and ordering information; preferred types in **bold**

$U_R$ (V)	$C_R$ 120 H z ( $\mu\text{F}$ )	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	$I_R$ 120 Hz $85\text{ }^{\circ}\text{C}$ (mA)	$I_{L2}$ 2 min ( $\mu\text{A}$ )	$\text{Tan } \delta$ 120 H z	ESR 120 H z ( $\Omega$ )	Z 10 kHz ( $\Omega$ )	Z 100 kHz ( $\Omega$ )	CATALOGUE NUMBER 2222 ... ..					
										BULK LONG LEADS		TAPED AMMOPACK			
										FORM CA	F (mm)	FORM TFA	F (mm)	FORM TNA	F (mm)
6.3	22	$4 \times 7$	71	31	3	0.24	14	9.6	8.4	097 53229	1.5	097 33229	5.0	097 73229	2.5
	47	$5 \times 7$	72	47	3	0.24	6.8	5	4.6	097 53479	2.0	097 33479	5.0	097 73479	2.5
	220	$6.3 \times 7$	74	90	14	0.24	1.4	2	1.8	097 53221	2.5	097 33221	5.0	097 73221	2.5
10	33	$5 \times 7$	72	43	4	0.20	8.0	4	3.7	097 54339	2.0	097 34339	5.0	097 74339	2.5
	<b>100</b>	<b><math>6.3 \times 7</math></b>	<b>73</b>	80	10	0.20	2.7	2.3	2.2	<b>097 54101</b>	2.5	<b>097 34101</b>	5.0	<b>097 74101</b>	2.5
16	<b>10</b>	$4 \times 7$	<b>71</b>	25	3	0.16	21	11	10	<b>097 55109</b>	1.5	<b>097 35109</b>	5.0	<b>097 75109</b>	2.5
	22	$5 \times 7$	72	39	4	0.16	9.6	6	5	<b>097 55229</b>	2.0	<b>097 35229</b>	5.0	<b>097 75229</b>	2.5
	47	$6.3 \times 7$	73	59	8	0.16	4.5	4	3.5	<b>097 55479</b>	2.5	<b>097 35479</b>	5.0	<b>097 75479</b>	2.5
	<b>100</b>	$6.3 \times 7$	<b>74</b>	90	16	0.16	2.1	3	2.5	<b>097 55101</b>	2.5	<b>097 35101</b>	5.0	<b>097 75101</b>	2.5
25	33	$6.3 \times 7$	73	53	9	0.14	5.6	3.3	2.6	<b>097 56339</b>	2.5	<b>097 36339</b>	5.0	<b>097 76339</b>	2.5
	47	$6.3 \times 7$	74	65	12	0.14	4.0	2.5	1.9	<b>097 56479</b>	2.5	<b>097 36479</b>	5.0	<b>097 76479</b>	2.5

# Aluminum electrolytic capacitors

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U <sub>R</sub> (V)	C <sub>R</sub> 120 H z (μF)	NOMINAL CASE SIZE ØD × L (mm)	CASE CODE	I <sub>R</sub> 120 Hz 85 °C (mA)	I <sub>L2</sub> 2 min (μA)	Tan δ 120 H z	ESR 120 H z (Ω)	Z 10 kHz (Ω)	Z 100 kHz (Ω)	CATALOGUE NUMBER 2222 ... ..					
										BULK LONG LEADS		TAPED AMMOPACK			
										FORM CA	F (mm)	FORM TFA	F (mm)	FORM TNA	F (mm)
35	4.7	4 × 7	71	20	3	0.12	34	12	10	097 50478	1.5	097 30478	5.0	097 70478	2.5
	10	5 × 7	72	30	4	0.12	16	6.5	5.6	097 50109	2.0	097 30109	5.0	097 70109	2.5
	22	6.3 × 7	73	47	8	0.12	7.2	3.3	3	097 50229	2.5	097 30229	5.0	097 70229	2.5
	33	6.3 × 7	74	60	12	0.12	4.8	2.9	2.6	097 50339	2.5	097 30339	5.0	097 70339	2.5
50	3.3	4 × 7	71	18	3	0.10	40	16	14	097 51338	1.5	097 31338	5.0	097 71338	2.5
	4.7	5 × 7	72	23	3	0.10	28	12	10	097 51478	2.0	097 31478	5.0	097 71478	2.5
	10	6.3 × 7	73	34	5	0.10	13	6.2	5.5	097 51109	2.5	097 31109	5.0	097 71109	2.5
	22	6.3 × 7	74	53	11	0.10	6.0	3.2	2.9	097 51229	2.5	097 31229	5.0	097 71229	2.5
63	0.10	4 × 7	71	1.3	3	0.08	1100	238	170	097 58107	1.5	097 38107	5.0	097 78107	2.5
	0.22	4 × 7	71	2.9	3	0.08	480	138	110	097 58227	1.5	097 38227	5.0	097 78227	2.5
	0.47	4 × 7	71	7.9	3	0.08	230	88	66	097 58477	1.5	097 38477	5.0	097 78477	2.5
	1	4 × 7	71	11	3	0.08	110	42	36	097 58108	1.5	097 38108	5.0	097 78108	2.5
	2.2	4 × 7	71	17	3	0.08	48	22	19	097 58228	1.5	097 38228	5.0	097 78228	2.5
	3.3	5 × 7	72	21	3	0.08	32	16	14	097 58338	2.0	097 38338	5.0	097 78338	2.5
	4.7	6.3 × 7	73	26	3	0.08	23	12	10	097 58478	2.5	097 38478	5.0	097 78478	2.5
	10	6.3 × 7	74	40	7	0.08	11	6.2	5.5	097 58109	2.5	097 38109	5.0	097 78109	2.5

#### Additional electrical data

DESCRIPTION	CONDITIONS	VALUE
<b>Voltage</b>		
Surge voltage		$U_s \leq 1.15 \times U_R$
Reverse voltage		$U_{rev} \leq 1 V$
<b>Current</b>		
Leakage current	after 2 minutes at U <sub>R</sub>	$I_{L2} \leq 0.01C_R \times U_R$ or 3 μA (whichever is greater)

# Aluminum electrolytic capacitors

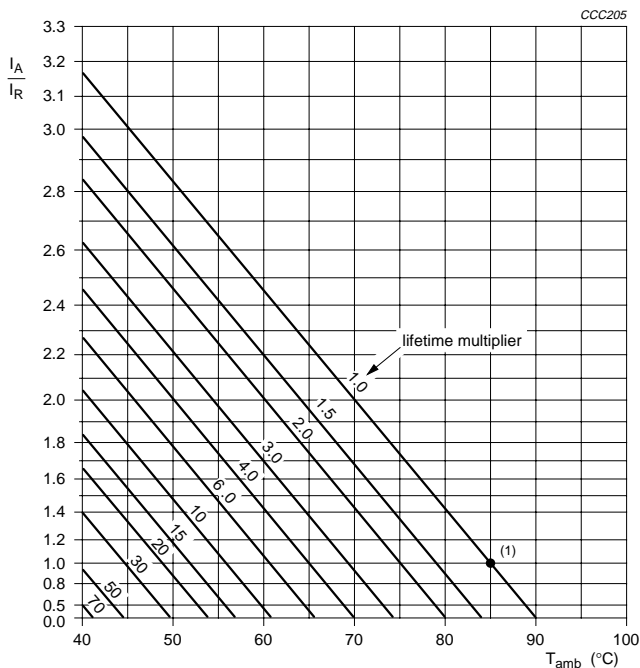
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### RIPPLE CURRENT AND USEFUL LIFE

**Table 3** Multiplier of ripple current ( $I_R$ ) as a function of frequency

FREQUENCY (Hz)	$I_R$ MULTIPLIER
50	0.6
120	1.0
400	1.2
800	1.3
≥2000	1.4



$I_A$  = actual ripple current at 120 Hz.

$I_R$  = rated ripple current at 120 Hz, 85 °C.

(1) Useful life at 85 °C and  $I_R$  applied: 1500 hours.

Fig.5 Multiplier of useful life as a function of ambient temperature and ripple current load.

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### SPECIFIC TESTS AND REQUIREMENTS

General tests and requirements are specified in this handbook, section "Tests and Requirements".

**Table 4** Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4/ EN130300, subclause 4.13	$T_{amb} = 85\text{ °C}$ , $U_R$ applied; 1000 hours	$\Delta C/C: \pm 20\%$ $\tan \delta \leq 2 \times \text{spec. limit}$ $I_{L2} \leq \text{spec. limit}$
Useful life	CECC 30301, subclause 1.8.1	$T_{amb} = 85\text{ °C}$ , $U_R$ and $I_R$ applied; 1500 hours	$\Delta C/C: \pm 50\%$ $\tan \delta \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L2} \leq \text{spec. limit}$ no short or open circuit total failure percentage: $\leq 3\%$
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300, subclause 4.17	$T_{amb} = 85\text{ °C}$ ; no voltage applied; 500 hours  after test: $U_R$ to be applied for 30 minutes, 24 to 48 hours before measurement	$\Delta C/C$ , $\tan \delta$ , $Z$ : for requirements see 'Endurance test' above $I_{L2} \leq \text{spec. limit}$