

DATA SHEET

134 RLP 5

**Aluminum electrolytic capacitors
Radial Low Profile, 5 mm**

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

2000 Jan 18

Aluminum electrolytic capacitors

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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
- Very low profile, 5 mm height
- Extremely miniaturized.

APPLICATIONS

- General purpose, industrial, automotive and audio-video
- Coupling, decoupling, smoothing, filtering and timing
- High mounting density
- Portable and mobile equipment (very small size and very low mass), low profile equipment.

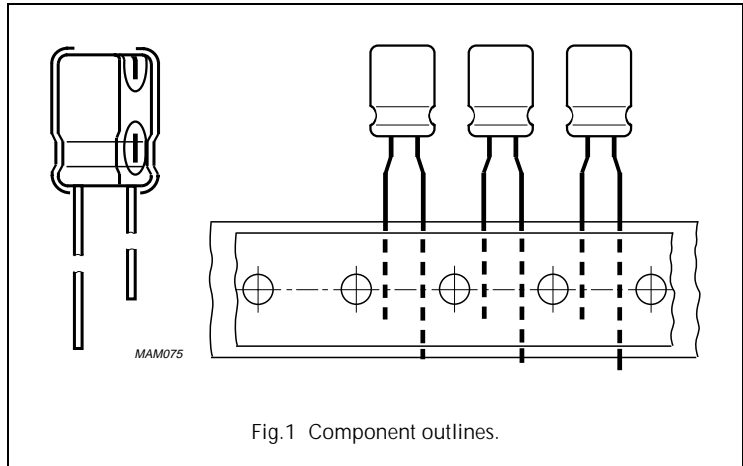
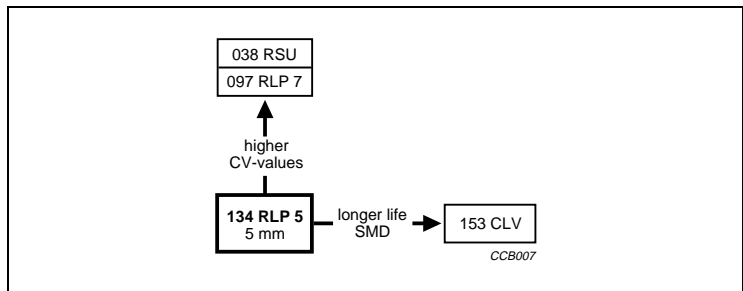


Fig.1 Component outlines.



QUICK REFERENCE DATA

DESCRIPTION	VALUE
Case sizes ($\varnothing D_{nom} \times L_{nom}$ in mm)	3 × 5 to 6.3 × 5
Rated capacitance range, C_R	1.0 to 100 μF
Tolerance on C_R	$\pm 20\%$
Rated voltage range, U_R	6.3 to 50 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

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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 (μF)	$U_R(\text{V})$					
	6.3	10	16	25	35	50
1.0	–	–	–	–	–	3 × 5
2.2	–	–	–	–	3 × 5	3.5 × 5
3.3	–	–	–	3 × 5	–	4 × 5
4.7	–	–	–	3.5 × 5	4 × 5	5 × 5
10	–	–	3.5 × 5	–	5 × 5	6.3 × 5
22	4 × 5	–	5 × 5	–	6.3 × 5	–
33	–	5 × 5	–	6.3 × 5	–	–
47	5 × 5	–	6.3 × 5	–	–	–
100	6.3 × 5	–	–	–	–	–

MARKING

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

- Rated capacitance (in μF)
- Rated voltage (in V)
- Negative terminal identification
- Group number (134)
- 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

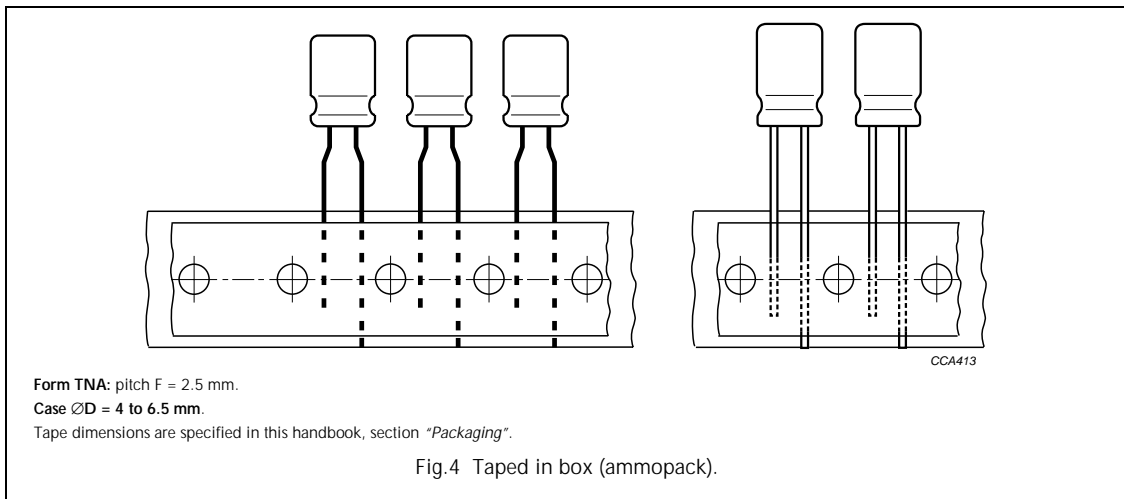
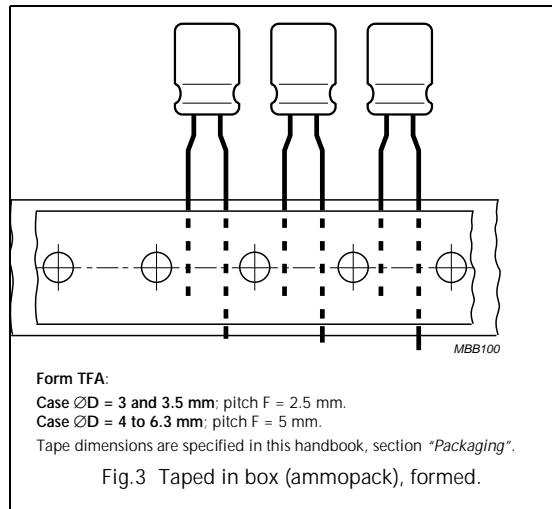
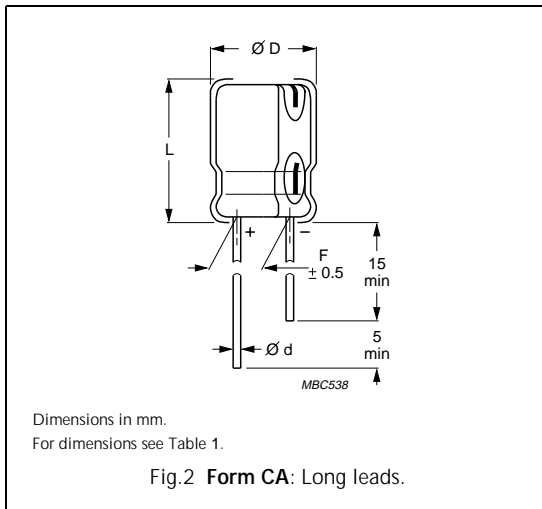


Table 1 Physical dimensions and packaging quantities; see Figs 2, 3 and 4

NOMINAL CASE SIZE ØD × L (mm)	CASE CODE	Ød (mm)	ØD _{max} (mm)	L _{max} (mm)	F (mm)	PACKAGING QUANTITIES		
						FORM CA	FORM TFA	FORM TNA
3 × 5	51	0.40	3.5	6.0	1.0 ± 0.3	3000	3000	–
3.5 × 5	52	0.40	4.0	6.0	1.0 ± 0.3	3000	3000	–
4 × 5	53	0.45	4.5	6.0	1.5 ± 0.5	2000	2000	2000
5 × 5	54	0.45	5.5	6.0	2.0 ± 0.5	2000	2000	2000
6.3 × 5	55	0.45	6.8	6.0	2.5 ± 0.5	2000	2000	2000

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Ordering example

Electrolytic capacitor 134 series

22 $\mu\text{F}/16\text{ V}; \pm 20\%$

Nominal case size: $\varnothing 5 \times 5\text{ mm}$; Form TFA

Catalogue number: 2222 134 35229.

ELECTRICAL DATA AND ORDERING INFORMATION

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

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 (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 120 Hz $85\text{ }^\circ\text{C}$ (mA)	I_{L2} 2 min (μA)	$\text{Tan } \delta$ 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)
6.3	22	4×5	53	23	3	0.24	14	12	11	134 53229	1.5	134 33229	5.0	134 73229	2.5
	47	5×5	54	38	3	0.24	6.8	6.7	5.2	134 53479	2.0	134 33479	5.0	134 73479	2.5
	100	6.3×5	55	60	7	0.24	3.2	4.4	3.4	134 53101	2.5	134 33101	5.0	134 73101	2.5
10	33	5×5	54	35	4	0.20	8.0	7.7	6.0	134 54339	2.0	134 34339	5.0	134 74339	2.5
16	10	3.5×5	52	17	3	0.16	21	18	17	134 55109	1.0	134 35109	2.5	–	–
	22	5×5	54	32	4	0.16	9.6	8.0	6.4	134 55229	2.0	134 35229	5.0	134 75229	2.5
	47	6.3×5	55	50	8	0.16	4.5	5.2	4.2	134 55479	2.5	134 35479	5.0	134 75479	2.5
25	3.3	3×5	51	9.5	3	0.14	56	29	24	134 56338	1.0	134 36338	2.5	–	–
	4.7	3.5×5	52	12	3	0.14	40	22	19	134 56478	1.0	134 36478	2.5	–	–
	33	6.3×5	55	45	9	0.14	5.6	6.0	4.6	134 56339	2.5	134 36339	5.0	134 76339	2.5

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U _R (V)	C _R 120 H z (μF)	NOMINAL CASE SIZE ØD × L (mm)	CASE CODE	I _R 120 Hz 85 °C (mA)	I _{L2} 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	2.2	3 × 5	51	8.3	3	0.12	72	48	41	134 50228	1.0	134 30228	2.5	–	–
	4.7	4 × 5	53	15	3	0.12	34	31	27	134 50478	1.5	134 30478	5.0	134 70478	2.5
	10	5 × 5	54	25	4	0.12	16	21	17	134 50109	2.0	134 30109	5.0	134 70109	2.5
	22	6.3 × 5	55	40	8	0.12	7.2	13	11	134 50229	2.5	134 30229	5.0	134 70229	2.5
50	1.0	3 × 5	51	6.2	3	0.10	130	70	50	134 51108	1.0	134 31108	2.5	–	–
	2.2	3.5 × 5	52	10	3	0.10	60	44	33	134 51228	1.0	134 31228	2.5	–	–
	3.3	4 × 5	53	14	3	0.10	40	36	25	134 51338	1.5	134 31338	5.0	134 71338	2.5
	4.7	5 × 5	54	19	3	0.10	28	29	22	134 51478	2.0	134 31478	5.0	134 71478	2.5
	10	6.3 × 5	55	29	5	0.10	13	19	14	134 51109	2.5	134 31109	5.0	134 71109	2.5

Additional electrical data

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

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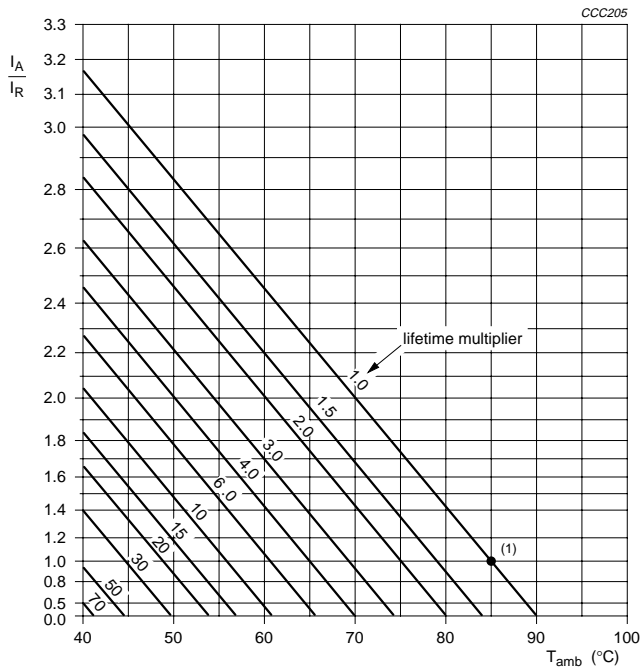
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RIPPLE CURRENT AND USEFUL LIFE

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 $I_{L2} \leq \text{spec. limit}$