

## Aluminum Capacitors Radial Low Profile, 7 mm

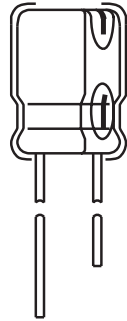
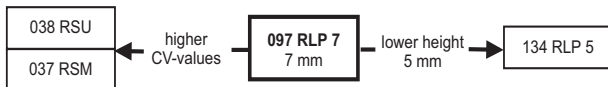


Fig.1 Component outline.



### 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
- Lead (Pb)-free versions are RoHS compliant

### 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

### MARKING

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

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

### QUICK REFERENCE DATA

DESCRIPTION	VALUE
Nominal case sizes ( $\varnothing D \times L$ in mm)	4 × 7 to 6.3 × 7
Rated capacitance range, $C_R$	0.1 to 220 $\mu\text{F}$
Tolerance on $C_R$	± 20 %
Rated voltage, $U_R$	6.3 to 63 V
Category temperature range	– 40 to + 85 °C
Endurance test at 85 °C	1 000 hours
Useful life at 85 °C	1 500 hours
Useful life at 40 °C, $1.4 \times I_R$ applied	40 000 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

### SELECTION CHART FOR $C_R$ , $U_R$ AND RELEVANT NOMINAL CASE SIZES ( $\varnothing D \times L$ in mm)

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

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

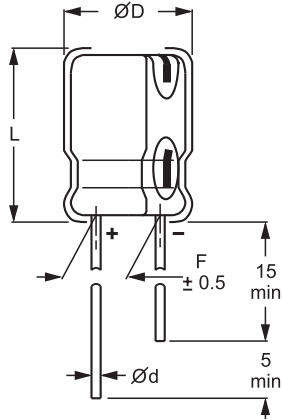
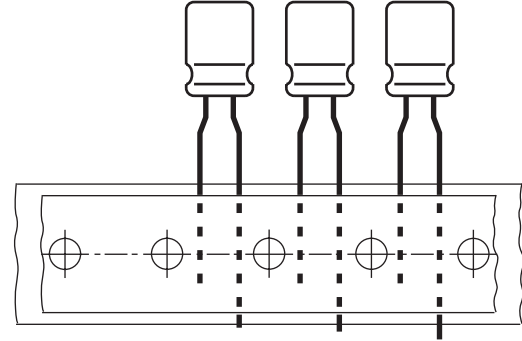
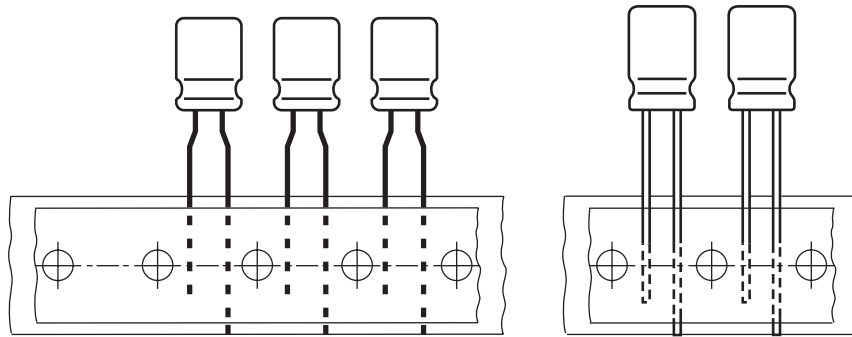
**DIMENSIONS** in millimeters, **AND AVAILABLE FORMS**

 Fig.2 **Form CA:** Long leads.

 Fig.3 **Form TFA:**  
 Taped in box (ammopack), formed leads, pitch F = 5 mm

 Fig.4 **Form TNA:** Taped in box (ammopack), pitch F = 2.5 mm

Table 1

<b>DIMENSIONS</b> in millimeters <b>AND PACKAGING QUANTITIES</b>								
NOMINAL CASE SIZE ØD × L	CASE CODE	Ød	ØD <sub>max</sub>	L <sub>max</sub>	F	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

**Note**

- Detailed tape dimensions see section 'PACKAGING'.

ELECTRICAL DATA	
SYMBOL	DESCRIPTION
$C_R$	rated capacitance at 120 Hz, tolerance $\pm 20\%$
$I_R$	rated RMS ripple current at 120 Hz, 85 °C
$I_{L2}$	max. leakage current after 2 minutes at $U_R$
$\tan \delta$	max. dissipation factor at 120 Hz
Z	max. impedance at 100 kHz

**Note**

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

**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

Catalog number: 2222 097 35101.

\* To ensure delivery of lead (Pb)-free parts during the transition period, please contact your Vishay sales agent.

Table 2

ELECTRICAL DATA AND ORDERING INFORMATION												
$U_R$ (V)	$C_R$ 120 Hz ( $\mu\text{F}$ )	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	$I_R$ 120 Hz 85 °C (mA)	$I_{L2}$ 2 min ( $\mu\text{A}$ )	$\tan \delta$ 120 Hz	Z 100 kHz ( $\Omega$ )	CATALOG NUMBER 2222 097 .....					
							BULK LONG LEADS		TAPED AMMOPACK			
							FORM CA	F (mm)	FORM TFA	F (mm)	FORM TNA	F (mm)
6.3	22	4 × 7	31	3	0.24	8.4	53229	1.5	33229	5.0	73229	2.5
	47	5 × 7	47	3	0.24	4.6	53479	2.0	33479	5.0	73479	2.5
	220	6.3 × 7	90	14	0.24	1.8	53221	2.5	33221	5.0	73221	2.5
10	33	5 × 7	43	4	0.20	3.7	54339	2.0	34339	5.0	74339	2.5
	100	6.3 × 7	80	10	0.20	2.2	54101	2.5	34101	5.0	74101	2.5
16	10	4 × 7	25	3	0.16	10	55109	1.5	35109	5.0	75109	2.5
	22	5 × 7	39	4	0.16	5	55229	2.0	35229	5.0	75229	2.5
	47	6.3 × 7	59	8	0.16	3.5	55479	2.5	35479	5.0	75479	2.5
	100	6.3 × 7	90	16	0.16	2.5	55101	2.5	35101	5.0	75101	2.5
25	33	6.3 × 7	53	9	0.14	2.6	56339	2.5	36339	5.0	76339	2.5
	47	6.3 × 7	65	12	0.14	1.9	56479	2.5	36479	5.0	76479	2.5
35	4.7	4 × 7	20	3	0.12	10	50478	1.5	30478	5.0	70478	2.5
	10	5 × 7	30	4	0.12	5.6	50109	2.0	30109	5.0	70109	2.5
	22	6.3 × 7	47	8	0.12	3	50229	2.5	30229	5.0	70229	2.5
	33	6.3 × 7	60	12	0.12	2.6	50339	2.5	30339	5.0	70339	2.5
50	3.3	4 × 7	18	3	0.10	14	51338	1.5	31338	5.0	71338	2.5
	4.7	5 × 7	23	3	0.10	10	51478	2.0	31478	5.0	71478	2.5
	10	6.3 × 7	34	5	0.10	5.5	51109	2.5	31109	5.0	71109	2.5
	22	6.3 × 7	53	11	0.10	2.9	51229	2.5	31229	5.0	71229	2.5
63	0.10	4 × 7	1.3	3	0.08	170	58107	1.5	38107	5.0	78107	2.5
	0.22	4 × 7	2.9	3	0.08	110	58227	1.5	38227	5.0	78227	2.5
	0.47	4 × 7	7.9	3	0.08	66	58477	1.5	38477	5.0	78477	2.5
	1	4 × 7	11	3	0.08	36	58108	1.5	38108	5.0	78108	2.5
	2.2	4 × 7	17	3	0.08	19	58228	1.5	38228	5.0	78228	2.5
	3.3	5 × 7	21	3	0.08	14	58338	2.0	38338	5.0	78338	2.5
	4.7	6.3 × 7	26	3	0.08	10	58478	2.5	38478	5.0	78478	2.5
	10	6.3 × 7	40	7	0.08	5.5	58109	2.5	38109	5.0	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 $U_R$	$I_{L2} \leq 0.01 C_R \times U_R$ or $3 \mu A$ (whichever is greater)
<b>Resistance</b>		
Equivalent series resistance (ESR)	calculated from $\tan \delta_{max}$ and $C_R$ (see Table 2)	$ESR = \tan \delta / 2\pi f C_R$

**RIPPLE CURRENT AND USEFUL LIFE**

Table 3

MULTIPLIER OF RIPPLE CURRENT ( $I_R$ ) (AS A FUNCTION OF FREQUENCY)	
FREQUENCY (Hz)	$I_R$ MULTIPLIER
50	0.60
120	1.00
400	1.20
800	1.30
$\geq 2000$	1.40

$I_A$  = 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.

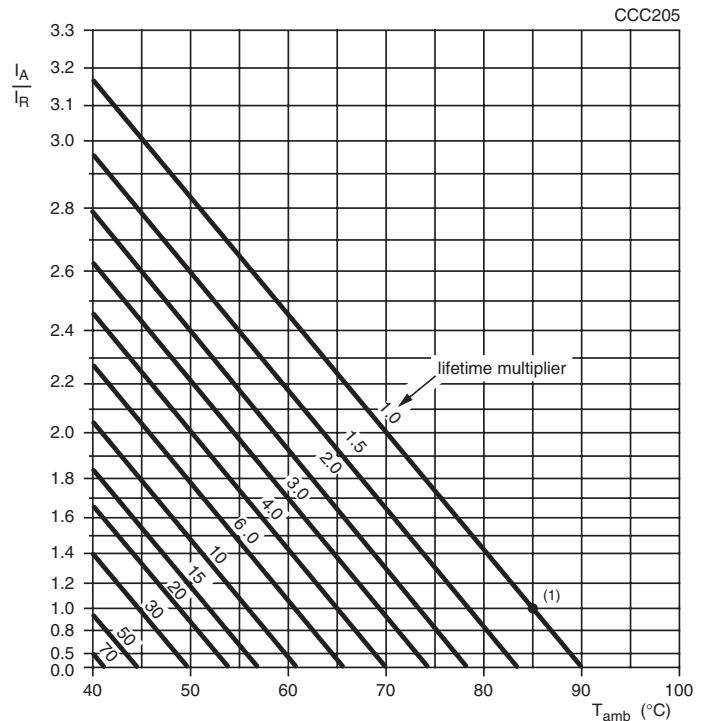


Fig.5 Multiplier of useful life as a function of ambient temperature and ripple current load.

Table 4

TEST PROCEDURES AND REQUIREMENTS.			
TEST.		PROCEDURE (quick reference).	REQUIREMENTS
NAME OF TEST.	REFERENCE.		
Endurance.	IEC 60384-4/ EN130300, subclause 4.13.	$T_{amb} = 85 \text{ }^\circ\text{C}$ , $U_R$ 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.	$T_{amb} = 85 \text{ }^\circ\text{C}$ , $U_R$ 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.	$T_{amb} = 85 \text{ }^\circ\text{C}$ ; 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 $I_{L2} \leq \text{spec. limit}$



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