

Aluminum Capacitors Radial Low Profile, 7 mm

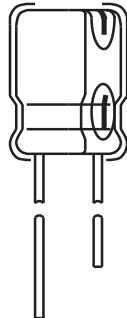


Fig.1 Component outline



QUICK REFERENCE DATA

DESCRIPTION	VALUE
Nominal case sizes (Ø D x L in mm)	4 x 7 to 6.3 x 7
Rated capacitance range, C _R	0.1 to 220 µF
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	1000 h
Useful life at 85 °C	1500 h
Useful life at 40 °C, 1.4 x I _R applied	40 000 h
Shelf life at 0 V, 85 °C	500 h
Based on sectional specification	IEC 60384-4/EN 130300
Climatic category IEC 60068	40/085/56

FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Radial leads, cylindrical aluminum case, insulated with a blue sleeve
- Charge and discharge proof
- Low profile, 7 mm height
- Miniaturized, high CV-product per unit volume
- Compliant to RoHS Directive 2002/95/EC


**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 µF)
- 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)

SELECTION CHART FOR C_R, U_R AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)

C _R (µF)	U _R (V)						
	6.3	10	16	25	35	50	63
0.10	-	-	-	-	-	-	4 x 7
0.22	-	-	-	-	-	-	4 x 7
0.47	-	-	-	-	-	-	4 x 7
1.0	-	-	-	-	-	-	4 x 7
2.2	-	-	-	-	-	-	4 x 7
3.3	-	-	-	-	-	4 x 7	5 x 7
4.7	-	-	-	-	4 x 7	5 x 7	6.3 x 7
10	-	-	4 x 7	-	5 x 7	6.3 x 7	6.3 x 7
22	4 x 7	-	5 x 7	-	6.3 x 7	6.3 x 7	-
33	-	5 x 7	-	6.3 x 7	6.3 x 7	-	-
47	5 x 7	-	6.3 x 7	6.3 x 7	-	-	-
100	-	6.3 x 7	6.3 x 7	-	-	-	-
220	6.3 x 7	-	-	-	-	-	-

DIMENSIONS in millimeters, **AND AVAILABLE FORMS**

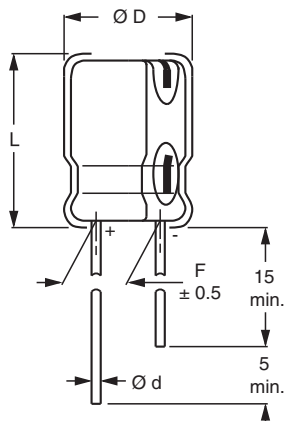


Fig.2 Form CA: Long leads

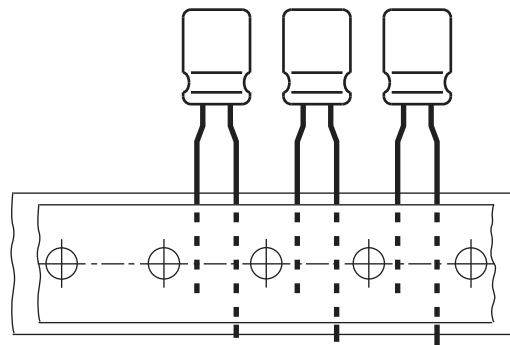


Fig.3 Form TFA:
Taped in box (ammopack), formed leads, pitch F = 5 mm

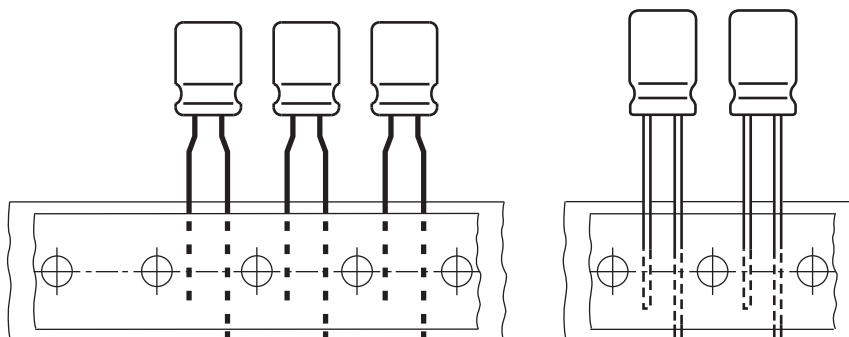


Fig.4 Form TNA: Taped in box (ammopack), pitch F = 2.5 mm

DIMENSIONS in millimeters AND PACKAGING QUANTITIES								
NOMINAL CASE SIZE Ø D x L	CASE CODE	Ø d	Ø D _{max.}	L _{max.}	F	PACKAGING QUANTITIES		
						FORM CA	FORM TFA	FORM TNA
4 x 7	71	0.45	4.5	8	1.5 ± 0.5	2000	2000	2000
5 x 7	72	0.45	5.5	8	2.0 ± 0.5	1000	2000	2000
6.3 x 7	73	0.45	6.8	8	2.5 ± 0.5	1000	2000	2000

Note
Detailed tape dimensions see section 'PACKAGING'.

Aluminum Capacitors
 Radial Low Profile, 7 mm

Vishay BCcomponents

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 min at U_R
$\tan \delta$	max. dissipation factor at 120 Hz
Z	max. impedance at 100 kHz

Note

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

ORDERING EXAMPLE

Electrolytic capacitor 097 series

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

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

Ordering Code: MAL209735101E6

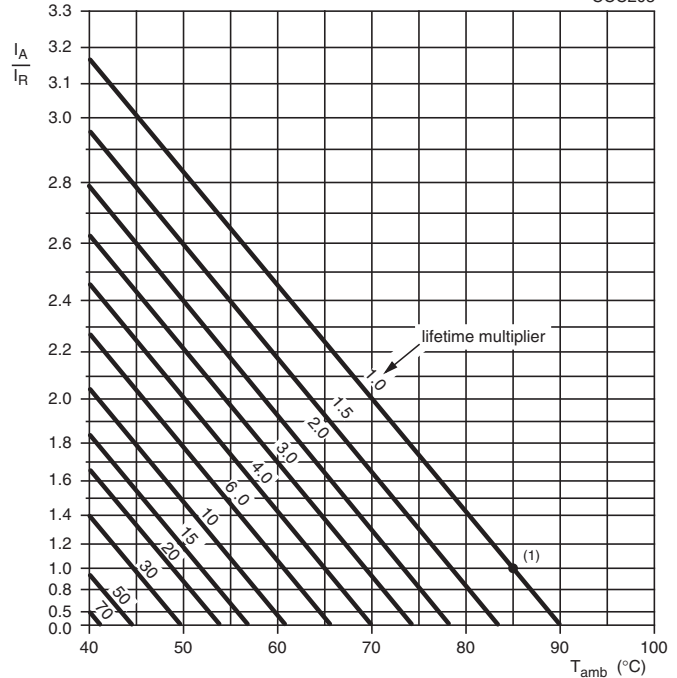
Former 12NC: 2222 097 35101

ELECTRICAL DATA AND ORDERING INFORMATION												
U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	I_R 120 Hz 85 °C (mA)	I_{L2} 2 min (μA)	$\tan \delta$ 120 Hz	Z 100 kHz (Ω)	ORDERING CODE MAL2097.....					
							BULK LONG LEADS		TAPED AMMOPACK			
							FORM CA	F (mm)	FORM TFA	F (mm)	FORM TNA	F (mm)
6.3	22	4 x 7	31	3	0.24	8.4	53229E6	1.5	33229E6	5.0	73229E6	2.5
	47	5 x 7	47	3	0.24	4.6	53479E6	2.0	33479E6	5.0	73479E6	2.5
	220	6.3 x 7	90	14	0.24	1.8	53221E6	2.5	33221E6	5.0	73221E6	2.5
10	33	5 x 7	43	4	0.20	3.7	54339E6	2.0	34339E6	5.0	74339E6	2.5
	100	6.3 x 7	80	10	0.20	2.2	54101E6	2.5	34101E6	5.0	74101E6	2.5
16	10	4 x 7	25	3	0.16	10	55109E6	1.5	35109E6	5.0	75109E6	2.5
	22	5 x 7	39	4	0.16	5	55229E6	2.0	35229E6	5.0	75229E6	2.5
	47	6.3 x 7	59	8	0.16	3.5	55479E6	2.5	35479E6	5.0	75479E6	2.5
	100	6.3 x 7	90	16	0.16	2.5	55101E6	2.5	35101E6	5.0	75101E6	2.5
25	33	6.3 x 7	53	9	0.14	2.6	56339E6	2.5	36339E6	5.0	76339E6	2.5
	47	6.3 x 7	65	12	0.14	1.9	56479E6	2.5	36479E6	5.0	76479E6	2.5
35	4.7	4 x 7	20	3	0.12	10	50478E6	1.5	30478E6	5.0	70478E6	2.5
	10	5 x 7	30	4	0.12	5.6	50109E6	2.0	30109E6	5.0	70109E6	2.5
	22	6.3 x 7	47	8	0.12	3	50229E6	2.5	30229E6	5.0	70229E6	2.5
	33	6.3 x 7	60	12	0.12	2.6	50339E6	2.5	30339E6	5.0	70339E6	2.5
50	3.3	4 x 7	18	3	0.10	14	51338E6	1.5	31338E6	5.0	71338E6	2.5
	4.7	5 x 7	23	3	0.10	10	51478E6	2.0	31478E6	5.0	71478E6	2.5
	10	6.3 x 7	34	5	0.10	5.5	51109E6	2.5	31109E6	5.0	71109E6	2.5
	22	6.3 x 7	53	11	0.10	2.9	51229E6	2.5	31229E6	5.0	71229E6	2.5
63	0.10	4 x 7	1.3	3	0.08	170	58107E6	1.5	38107E6	5.0	78107E6	2.5
	0.22	4 x 7	2.9	3	0.08	110	58227E6	1.5	38227E6	5.0	78227E6	2.5
	0.47	4 x 7	7.9	3	0.08	66	58477E6	1.5	38477E6	5.0	78477E6	2.5
	1	4 x 7	11	3	0.08	36	58108E6	1.5	38108E6	5.0	78108E6	2.5
	2.2	4 x 7	17	3	0.08	19	58228E6	1.5	38228E6	5.0	78228E6	2.5
	3.3	5 x 7	21	3	0.08	14	58338E6	2.0	38338E6	5.0	78338E6	2.5
	4.7	6.3 x 7	26	3	0.08	10	58478E6	2.5	38478E6	5.0	78478E6	2.5
10	6.3 x 7	40	7	0.08	5.5	58109E6	2.5	38109E6	5.0	78109E6	2.5	

ADDITIONAL ELECTRICAL DATA		
PARAMETER	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 min at U_R	$I_{L2} \leq 0.01 C_R \times U_R$ or $3\ \mu\text{A}$ (whichever is greater)
Resistance		
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

CCC205



I_A = actual ripple current at 120Hz
 I_R = rated ripple current at 120 Hz, 85 °C
 (1) useful life at 85 °C and I_R applied: 1500 h

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

Table 1

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
≥ 2000	1.40

Table 2

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 h	$\Delta C/C: \pm 20\%$ $\tan \delta \leq 2 \times \text{spec. limit}$ $I_{L2} \leq \text{spec. limit}$
Useful life	CECC 30301, subclause 1.8.1	$T_{amb} = 85\text{ }^\circ\text{C}$, U_R and I_R applied; 1500 h	$\Delta C/C: \pm 50\%$ $\tan \delta \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L2} \leq \text{spec. limit}$ 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 h after test: U_R to be applied for 30 min, 24 h to 48 h before measurement	$\Delta C/C$, $\tan \delta$, Z : for requirements see 'Endurance test' above $I_{L2} \leq \text{spec. limit}$



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.