

Vishay BCcomponents

Aluminum Capacitors Radial Low Profile, 7 mm





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 μF to 220 μF				
Tolerance on C _R	± 20 %				
Rated voltage, U _R	6.3 V to 63 V				
Category temperature range	- 40 °C 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

- Useful life: 1500 h at 85 °C
- Low profile, 7 mm height
- Miniaturized, high CV-product per unit volume
- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Radial leads, cylindrical aluminum case, insulated with a blue sleeve
- Charge and discharge proof
- Material categorization: For definitions of compliance please see <u>www.vishav.com/doc?99912</u>

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)

SELECTIO	SELECTION CHART FOR C _R , U _R , AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)								
C _R	U _R (V)								
(μF)	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**

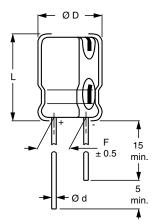


Fig. 2 - Form CA: Long leads

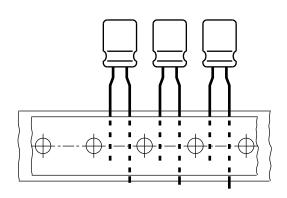


Fig. 3 - **Form TFA:** Taped in box (ammopack), formed leads, pitch F = 5 mm

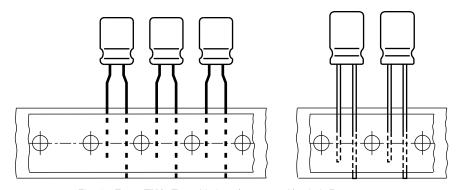


Fig. 4 - Form TNA: Taped in box (ammopack), pitch F = 2.5 mm

DIMENSIONS in millimeters AND PACKAGING QUANTITIES									
NOMINAL CASE SIZE	CASE	Ød	Ø D		F	PACI	KAGING QUANT	ITIES	
ØDxL	CODE	Øu	Ø D _{max.}	∟ _{max} .	•	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

• For detailed tape dimensions please see www.vishay.com/doc?28360



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ELECTRICAL DATA					
SYMBOL	DESCRIPTION				
C _R	Rated capacitance at 120 Hz, tolerance ± 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				

ORDERING EXAMPLE

Electrolytic capacitor 097 series 100 μ F/16 V; \pm 20 %

Nominal case size: Ø 6.3 mm x 7 mm; form TFA

Ordering code: MAL209735101E6 Former 12NC: 2222 097 35101

Note

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

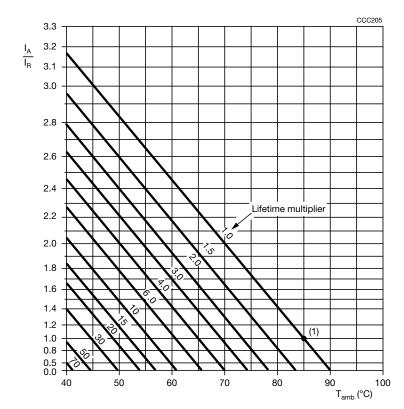
ELI	ELECTRICAL DATA AND ORDERING INFORMATION													
							ORDERING CODE MAL2097							
U _R (V)	C _R 120 Hz	NOMINAL CASE SIZE Ø D x L	I _R 120 Hz 85 °C	I _{L2} 2 min	120 Hz			100 kHz	BULK LONG LE		TA	APED AM	IMOPACK	
(-,	(μF)	(mm)	(mA)	(µA)	120112	(Ω)	FORM CA	F (mm)	FORM TFA	F (mm)	FORM TNA	F (mm)		
	22	4 x 7	31	3	0.24	8.4	53229E6	1.5	33229E6	5.0	73229E6	2.5		
6.3	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		
10	100	6.3 x 7	80	10	0.20	2.2	54101E6	2.5	34101E6	5.0	74101E6	2.5		
	10	4 x 7	25	3	0.16	10.0	55109E6	1.5	35109E6	5.0	75109E6	2.5		
16	22	5 x 7	39	4	0.16	5.0	55229E6	2.0	35229E6	5.0	75229E6	2.5		
10	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		
23	47	6.3 x 7	65	12	0.14	1.9	56479E6	2.5	36479E6	5.0	76479E6	2.5		
	4.7	4 x 7	20	3	0.12	10.0	50478E6	1.5	30478E6	5.0	70478E6	2.5		
35	10	5 x 7	30	4	0.12	5.6	50109E6	2.0	30109E6	5.0	70109E6	2.5		
33	22	6.3 x 7	47	8	0.12	3.0	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		
	3.3	4 x 7	18	3	0.10	14.0	51338E6	1.5	31338E6	5.0	71338E6	2.5		
50	4.7	5 x 7	23	3	0.10	10.0	51478E6	2.0	31478E6	5.0	71478E6	2.5		
50	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		
	0.10	4 x 7	1.3	3	0.08	170.0	58107E6	1.5	38107E6	5.0	78107E6	2.5		
	0.22	4 x 7	2.9	3	0.08	110.0	58227E6	1.5	38227E6	5.0	78227E6	2.5		
	0.47	4 x 7	7.9	3	0.08	66.0	58477E6	1.5	38477E6	5.0	78477E6	2.5		
60	1.0	4 x 7	11	3	0.08	36.0	58108E6	1.5	38108E6	5.0	78108E6	2.5		
63	2.2	4 x 7	17	3	0.08	19.0	58228E6	1.5	38228E6	5.0	78228E6	2.5		
	3.3	5 x 7	21	3	0.08	14.0	58338E6	2.0	38338E6	5.0	78338E6	2.5		
	4.7	6.3 x 7	26	3	0.08	10.0	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		



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ADDITIONAL ELECTRICAL DATA						
PARAMETER	CONDITIONS	VALUE				
Voltage						
Surge voltage		U _s ≤ 1.15 x U _R				
Reverse voltage		U _{rev} ≤ 1 V				
Current						
Leakage current	After 2 min at U _R	$I_{L2} \le 0.01 \ C_R \ x \ U_R \ or \ 3 \ \mu A$ (whichever is greater)				
Resistance						
Equivalent series resistance (ESR)	Calculated from tan $\delta_{\text{max.}}$ and C_{R} (see Table 2)	ESR = $\tan \delta/2 \pi f C_R$				

RIPPLE CURRENT AND USEFUL LIFE



 I_A = Actual ripple current at 120 Hz I_B = Rated ripple current at 120 Hz, 85 °C

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			

 $^{^{(1)}}$ Useful life at 85 °C and $\rm I_{R}$ applied: 1500 h



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Table 2

TEST PROCEDURES AND REQUIREMENTS					
TEST		PROCEDURE	REQUIREMENTS		
NAME OF TEST	REFERENCE	(quick reference)	TIE GOTTE WENT		
Endurance	IEC 60384-4/ EN 130300, subclause 4.13	T _{amb} = 85 °C, U _R applied; 1000 h	Δ C/C: ± 20 % tan δ ≤ 2 x spec. limit I_{L2} ≤ spec. limit		
Useful life	CECC 30301, subclause 1.8.1	T _{amb} = 85 °C, U _R and I _R applied; 1500 h	$\begin{array}{l} \Delta C/C\colon \pm 50~\%\\ \tan\delta \le 3~x~\text{spec. limit}\\ Z\le 3~x~\text{spec. limit}\\ I_{L2}\le \text{spec. limit}\\ \text{no short or open circuit}\\ \text{total failure percentage:} \le 3~\% \end{array}$		
Shelf life (storage at high temperature)	IEC 60384-4/ EN 130300, subclause 4.17	T _{amb} = 85 °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 $I_{L2} \le \text{spec. limit}$		



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