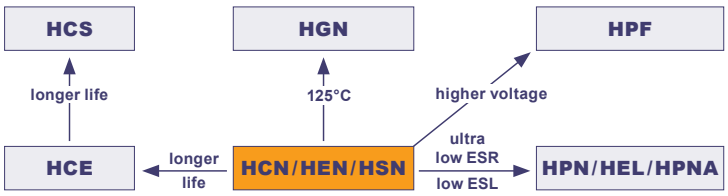
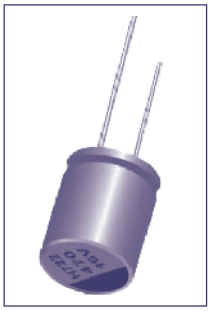
2000h, Standard 105°C

· Low ESR, high ripple current capability
· HEN/HSN enlarged ripple currents





Item	Characteristics		
Category Temperature Range (°C)	-55 ~ +105		
Rated Voltage Range (V_{DC})	2,5 ~ 35		
Capacitance Range (μF)	10 ~ 2700		
Capacitance Tolerance	± 20% (M)		(at 20°C, 120Hz)
Surge Voltage	Rated Voltage(V) x 1,15		
Dissipation Factor (tanδ)	Please see the attached ratings list		(at 20°C, 120Hz)
Leakage Current *1	Please see the attached ratings list		Rated voltage applied, after 2 minutes.
Equivalent Series Resistance (ESR)	Please see the attached ratings list		(at 20°C, 100kHz)
Temperature Characteristics (Max. Impedance Ratio)	Z(+105°C) / Z(+20°C) ≤1,25		(at 100kHz)
	Z(-55°C) / Z(+20°C) ≤1,25		
Life Time	105°C, 2000h Rated voltage applied	Δ C/C	≤±20% of the initial value
		DF (tanδ)	≤150% of the initial specified value
		ESR	≤150% of the initial specified value
		LC	≤The initial specified value
Damp heat (Steady state)	60°C, 90 to 95% RH 1000h No-applied voltage	Δ C/C	≤±20% of the initial value
		DF (tanδ)	≤150% of the initial specified value
		ESR	≤150% of the initial specified value
		LC	≤The initial specified value (after voltage processing)
Resistance to soldering heat	Wave method (260°C +/-5°C x 10s)	Δ C/C	≤±5% of the initial value
		DF (tanδ)	≤ The initial specified value
		ESR	≤ The initial specified value
		LC	≤ The initial specified value (after voltage processing)
*1 please see Handling Precautions and Chapter 4.1 of IEC 60384-26 :2011			

Radial

Multiplier for Ripple Current

Frequency Coefficient

Frequency *f*	120Hz≤ *f* <1kHz	1kHz≤ *f* <10kHz	10kHz≤ *f* <100kHz	100kHz≤ *f* ≤500kHz
Coefficient	0,05	0,3	0,7	1

Ratings for **HCN** Series (order code CN), **HEN** (order code EN), **HSN** (order code SN)

U_R Code	Rated Capacitance 20°C, 120Hz	ESR (max) 20°C, 100kHz	Rated Ripple Current 105°C, 100kHz	Dissipation Factor Tanδ (max) 20°C, 120Hz	Leakage Current (max) 20°C, 2 min	Size Ø D x L	Case Code	Series Code
(V)	(µF)	(mΩ)	(mArms)	(%)	(µA)	(mm)		
2,5 0E	390	20	3200	8	195	6,3 x 10	F10	CN
	680	10	5230	12	340	8 x 11,5	BAB	CN
		7	5700	8	340	8 x 11,5	BAB	EN
		5	6630	12	340	8 x 11,5	BAB	SN
	820	10	5230	12	410	8 x 11,5	BAB	CN
		7	6100	8	410	8 x 11,5	BAB	EN
		5	6630	12	410	8 x 11,5	BAB	SN
	1000	7	6100	8	500	8 x 11,5	BAB	EN
		6	6640	8	500	10 x 12,5	CAC	EN
	1200	8	5500	12	600	10 x 12,5	CAC	CN
		6	6640	8	600	10 x 12,5	CAC	EN
	1500	7	6100	8	750	8 x 11,5	BAB	EN
		8	5500	12	750	10 × 12,5	CAC	CN
		7	6100	8	750	10 x 12,5	CAC	EN
		5	7220	12	750	10 x 12,5	CAC	SN
	2700	7	6100	8	1350	10 x 12,5	CAC	EN
4 0G	270	20	3200	8	220	6,3 x 10	F10	CN
	390	20	3300	8	320	6,3 x 10	F10	CN
	560	10	5230	12	450	8 x 11,5	BAB	CN
		7	6100	8	450	8 x 11,5	BAB	EN
		5	6630	12	450	8 x 11,5	BAB	SN
	680	7	6100	8	550	8 x 11,5	BAB	EN
	820	7	6100	8	660	8 x 11,5	BAB	EN
		8	5500	12	660	10 x 12,5	CAC	CN
		6	6640	8	660	10 x 12,5	CAC	EN
		5	7220	12	660	10 x 12,5	CAC	SN
	1000	7	6100	8	800	8 x 11,5	BAB	EN
		8	5500	12	800	10 x 12,5	CAC	CN
		6	6640	8	800	10 x 12,5	CAC	EN
	1200	7	6100	8	960	8 x 11,5	BAB	EN
		8	5500	12	960	10 x 12,5	CAC	CN
		7	6100	8	960	10 x 12,5	CAC	EN
		5	7220	12	960	10 x 12,5	CAC	SN
	1800	7	6100	8	1440	10 x 12,5	CAC	EN
	2200	7	6100	8	1760	10 x 12,5	CAC	EN
6,3 0J	220	20	3200	8	280	6,3 x 10	F10	CN
	330	20	3300	8	420	6,3 x 10	F10	CN
		7	5700	8	420	8 x 11,5	BAB	EN
	390	12	4770	12	500	8 x 11,5	BAB	CN
		7	5700	8	495	8 x 11,5	BAB	EN
		5	6630	12	495	8 x 11,5	BAB	SN
	470	12	4770	12	595	8 x 11,5	BAB	CN
		7	5700	8	595	8 x 11,5	BAB	EN
	560	7	5700	8	710	8 x 11,5	BAB	EN
	680	7	5700	8	860	8 x 11,5	BAB	EN
		10	5500	12	645	10 x 12,5	CAC	CN
		7	6640	8	860	10 x 12,5	CAC	EN
		5	7220	12	860	10 x 12,5	CAC	SN
	820	7	5700	8	1040	8 x 11,5	BAB	EN
		10	5500	12	775	10 x 12,5	CAC	CN
		7	6640	8	1035	10 x 12,5	CAC	EN
		5	7220	12	1035	10 x 12,5	CAC	SN
	1000	7	5700	8	1260	8 x 11,5	BAB	EN
		10	5500	12	950	10 x 12,5	CAC	CN
		7	6100	8	1260	10 x 12,5	CAC	EN
	1500	10	5560	8	1890	10 x 12,5	CAC	EN

U_R Code	Rated Capacitance 20°C, 120Hz	ESR (max) 20°C, 100kHz	Rated Ripple Current 105°C, 100kHz	Dissipation Factor Tanδ (max) 20°C, 120Hz	Leakage Current (max) 20°C, 2 min	Size Ø D x L	Case Code	Series Code
(V)	(µF)	(mΩ)	(mArms)	(%)	(µA)	(mm)		
10 1A	47	25	2900	8	95	6,3 x 10	F10	CN
	68	25	2900	8	136	6,3 x 10	F10	CN
	100	25	2900	8	200	6,3 x 10	F10	CN
	150	25	2900	8	300	6,3 x 10	F10	CN
	220	25	2900	12	440	6,3 x 10	F10	CN
		10	5500	12	330	10 x 12,5	CAC	CN
	270	14	4420	12	540	8 x 11,5	BAB	CN
		8	5650	8	540	8 x 11,5	BAB	EN
	330	14	4420	12	660	8 x 11,5	BAB	CN
	390	8	5650	8	780	8 x 11,5	BAB	EN
	470	8	5650	8	940	8 x 11,5	BAB	EN
		10	5500	12	705	10 x 12,5	CAC	CN
		7	6100	8	940	10 x 12,5	CAC	EN
	560	12	5300	12	840	10 x 12,5	CAC	CN
		7	6100	8	1120	10 x 12,5	CAC	EN
	680	7	6100	8	1360	10 x 12,5	CAC	EN
	1000	8	6100	8	2000	10 x 12,5	CAC	EN
16 1C	100	24	2900	8	320	6,3 x 10	F10	CN
		16	4360	12	320	8 x 11,5	BAB	CN
	150	16	4000	12	480	8 x 8	B08	CN
		16	4360	12	480	8 x 11,5	BAB	CN
		10	5500	12	360	10 x 12,5	CAC	CN
	180	16	4360	12	580	8 x 11,5	BAB	CN
		11	5100	8	580	8 x 11,5	BAB	EN
	220	16	4000	12	705	8 x 8	B08	CN
		16	4360	12	705	8 x 11,5	BAB	CN
	270	10	5100	8	865	8 x 11,5	BAB	EN
		14	5050	12	650	10 x 12,5	CAC	CN
	330	10	5100	8	1060	8 x 11,5	BAB	EN
		10	5500	8	1060	10 x 9	C09	EN
		14	5050	12	795	10 x 12,5	CAC	CN
		10	6100	8	1060	10 x 12,5	CAC	EN
	470	10	6100	8	1510	10 x 12,5	CAC	EN
20 1D	33	48	2200	6	135	6,3 x 10	F10	CN
	47	30	2800	12	190	8 x 8	B08	CN
	100	24	3320	12	400	8 x 11,5	BAB	CN
		20	4320	12	400	10 x 12,5	CAC	CN
	150	20	4320	12	600	10 x 12,5	CAC	CN
25 1E	10	50	2000	12	50	6,3 x 8	F08	CN
	15	48	2200	6	75	6,3 x 10	F10	CN
	22	30	2800	12	110	8 x 8	B08	CN
	33	24	3600	12	165	8 x 11,5	BAB	CN
	47	24	3320	12	235	8 x 11,5	BAB	CN
	56	20	3800	12	280	10 x 12,5	CAC	CN
	68	24	3320	12	340	8 x 11,5	BAB	CN
	100	20	4320	12	500	10 x 12,5	CAC	CN
35 1V	10	50	2300	12	175	8 x 8	B08	CN
	18	34	2830	12	315	8 x 11,5	BAB	CN
	33	30	3270	12	580	10 x 12,5	CAC	CN

Radial

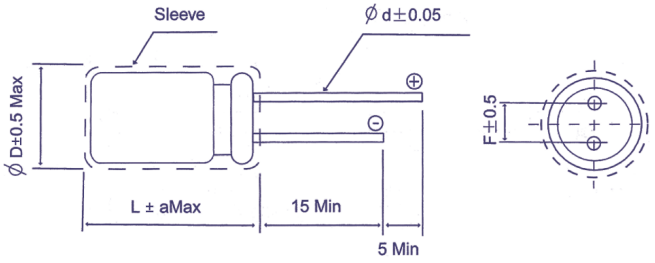
Customer products are available on request.

Part Number System **Polymer Capacitors**

PC	R	1V	VG	101	M	CAC	LL	50	P	E3	JExxxxx
Technology	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code (in µF)	Capacitance Tolerance	Size Code (øD x L)	Lead Form	Pitch	Material Code	for internal use	for Specials only
PC = Polymer Capacitor	SMD = V Radial = R	2,0V = 0D 2,5V = 0E 4V = 0G 6,3V = 0J 6,8V = 06 7,0V = 07 7,5V = 75 10V = 1A 12,0V = A1 12,5V = 1B 16V = 1C 20V = 1D 25V = 1E 28V = L1 32V = 1F 35V = 1V 40V = 1G 50V = 1H 63V = 1J 80V = 1K 100V = 2A 125V = 2B 160V = 2C 180V = 2K 200V = 2D	SMD: **HVC** = VC **HVF** = VF **HVG** = VG **HVS** = SV **HVX** = VX Radial: **HCN** = CN **HCE** = CE **HEN** = EN **HPN** = HN **HPNA** = NA **HGN** = GN **HEL** = EL **HSN** = SN **HCS** = CS **HPF** = PF	0,1 = 0R1 0,47 = R47 1,0 = 010 2,2 = 2R2 47 = 470 100 = 101 1000 = 102	**±20%** = M ±10% = K +30 / -10% = Q +20 / -0% = R ±15% = L +20 / -10% = V	SMD: D55 4,0 x 5,2 D60 4,0 x 5,7 E55 5,0 x 5,2 E60 5,0 x 5,7 F50 6,3 x 5,0 F55 6,3 x 5,2 F60 6,3 x 5,7 B70 8,0 x 6,7 B10 8,0 x 9,7 B11 8,0 x 11,0 B12 8,0 x 12,2 C80 10 x 7,7 C10 10 x 9,7 C12 10 x 12,2 Radial: D05 4,0 x 5,7 D07 4,0 x 7,0 E05 5,0 x 5,7 E07 5,0 x 7,0 F05 6,3 x 5,7 F06 6,3 x 6,7 F07 6,3 x 7,0 F08 6,3 x 8,0 F09 6,3 x 9,0 F10 6,3 x 10,0 B05 8,0 x 5,7 B06 8,0 x 6,7 B07 8,0 x 7,0 B08 8,0 x 8,0 B09 8,0 x 9,0 B10 8,0 x 10,0 B11 8,0 x 11,0 BAB 8,0 x 11,5 B12 8,0 x 12,0 BAC 8,0 x 12,5 B13 8,0 x 13,0 C08 10 x 8,0 C09 10 x 9,0 C10 10 x 10,0 C11 10 x 11,0 CAB 10 x 11,5 C12 10 x 12,0 CAC 10 x 12,5 C13 10 x 13,0	SMD: **Taped** = FV Radial: **Taped** = FF **Long Lead** = LL Cut 5,0mm = CB Cut 4,5mm = CC Cut 4,0mm = CD **Cut 3,5mm** = CE Cut 3,0mm = CF on request: alternative lead forms (Keyed polarity, axial, 90°-bended, other)	SMD: Standard - Radial: 2,0mm = 20 2,5mm = 25 3,5mm = 35 5,0mm = 50	SMD: W = Laminated P = Plastic Radial: - = Standard F = Flat Rubber S = Stand-Off		

Technical Specification **Radial Type Polymer**

Dimensions for loose, long-lead type (bulk)
Order Code: LL

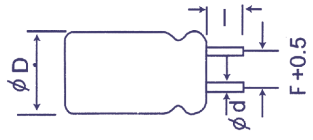


L	L < 7			L ≥ 7			
Ø D	5	6,3	8	5	6,3	8	10
F	2,0	2,5	3,5	2,0	2,5	3,5	5,0
Ø d	0,45			0,5		0,6	
a_{Max}	1,0			2,0			

in mm

Dimensions for loose, cut leads

Straight Lead

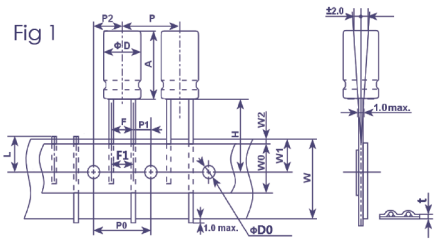


Code	CB	CC	CD	**CE**	CF
l	5,0±0,5	4,5±0,5	4,0±0,5	**3,5±0,5**	3,0±0,5

preferred in mm

Dimension for Ammopack Taping

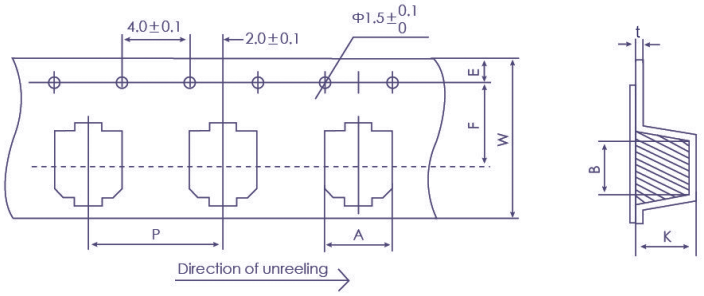
Fig 1



	ΦD	A	P	P0	P1	P2	F	F1	W	W0	W1	W2	H	L	ΦD0	t
	±0,5	±1,0	±1,0	±0,2	±0,5	±1,0	0,8/ -0,2	±1,0	±0,5	min	±0,5	max	0,75/ -0,5	max	±0,5	±0,3
Φ 5 x 5	5	5	12,7	12,7	5,35	6,35	2,0	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 5 x 7	5	7	12,7	12,7	5,35	6,35	2,0	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 5 x 8	5	8	12,7	12,7	5,35	6,35	2,0	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 5 x 9	5	9	12,7	12,7	5,35	6,35	2,0	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 5 x 10	5	10	12,7	12,7	5,35	6,35	2,0	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 6,3 x 5	6,3	5	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 6,3 x 8	6,3	8	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 6,3 x 10	6,3	10	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 6,3 x 11,5	6,3	11,5	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 8 x 6	8	6	12,7	12,7	4,6	6,35	3,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 8 x 6,7	8	6,7	12,7	12,7	4,6	6,35	3,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 8 x 8	8	8	12,7	12,7	4,6	6,35	3,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 8 x 11,5	8	11,5	12,7	12,7	4,6	6,35	3,5	3,5	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 10 x 7	10	7	12,7	12,7	3,85	6,35	5,0	5,0	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 10 x 9	10	9	12,7	12,7	3,85	6,35	5,0	5,0	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 10 x 10	10	10	12,7	12,7	3,85	6,35	5,0	5,0	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7
Φ 10 x 12,5	10	12,5	12,7	12,7	3,85	6,35	5,0	5,0	18,0	12,0	9,0	1,5	18,5	11,0	4,0	0,7

in mm

Dimension for SMD Type and Dimensions for Taping

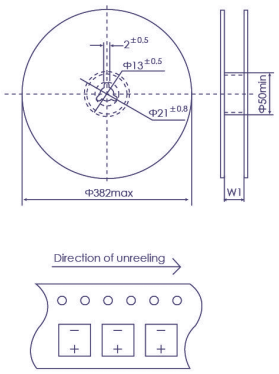


E = 1,75 ± 0,1 mm
T = 0,4 ± 0,1 mm

Dimension / Case Code	A	B	W	F	P	K
	±0,2	±0,2	±0,3	±0,1	±0,1	±0,2
F60	7,0	7,0	16,0	7,5	12,0	6,3
F80	7,0	7,0	16,0	7,5	12,0	8,2
F10	7,0	7,0	24,0	11,5	16,0	10,2
B70	8,7	8,7	24,0	11,5	12,0	7,3
B80	8,7	8,7	24,0	11,5	12,0	8,3
B10	8,7	8,7	24,0	11,5	16,0	10,2
B12	8,7	8,7	24,0	11,5	16,0	13,0
C80	10,7	10,7	24,0	11,5	16,0	8,3
C10	10,7	10,7	24,0	11,5	16,0	11,0
C12	10,7	10,7	24,0	11,5	16,0	13,0

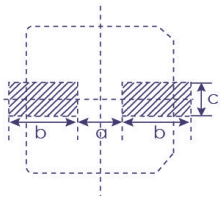
in mm

Real Dimensions



Case Code	Quantity (pcs/reel)	W1 (mm)
F60	1000	18
F80	900	18
F10	500	26
B70	1000	26
B80	900	26
B10	500	26
B12	400	26
C80	500	26
C10	500	26
C12	400	26

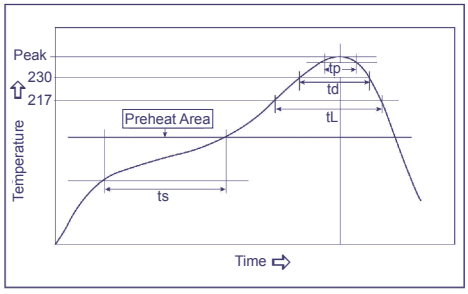
Recommended Soldering Pad



ΦD (code)	a	b	c
Φ6,3 (F)	1,9	3,5	1,6
Φ8 (B)	3,1	4,2	2,2
Φ10 (C)	4,5	4,4	2,2

in mm

Recommended Soldering Profile SMD



Voltage Range (Vdc)	Preheat	Time maintained above 217°C	Time maintained above 230°C	Peak Temperature
2,5 ~ 16V	150~180°C 60~120 seconds	50 seconds max.	40 seconds max.	260°C max.
20 ~ 200V	150~180°C 60~120 seconds	50 seconds max.	40 seconds max.	250°C max.

Only 1 reflow soldering cycle allowed. All temperatures are measured on the topside of the Al-can.

Jianghai Electrolytic Capacitors

Warning: JIANGHAI is not responsible for any extent of possible damages to persons or things, of any kind, caused by the improper application of and/or operating conditions harmful to electrolytic capacitors.
Misapplications which may cause failures include, but are not limited to: * Ripple current or peak current or voltage above specification, * Operating voltage above surge voltage specified, * Temperature exposure beyond specified operating temperature range.
Examples of harmful operating conditions comprise, but are not limited to: * unusual storage or transport temperatures, * excessive and/or rapid changes of ambient temperature or humidity, * heavy mechanical shock or vibration, * corrosive and abrasive particles in the ambient (cooling) air, * conducting dust in the ambient (cooling) air, * oil or water vapor or corrosive substances, * explosive gas or dust, * operation under extremely high or low ambient pressure conditions (below or above sea level), * superimposed radio frequency voltages, * radioactivity. In case of doubt about the impact of operating conditions on capacitor performance, please contact JIANGHAI.

Personal Safety: Electrical or mechanical misapplication of electrolytic capacitors may be hazardous. Personal injury or property damage may result from explosion of a capacitor or from the expulsion of electrolyte due to mechanical disruption or the release of a safety vent of a capacitor.
In case of injury or skin or eye exposure to electrolyte, immediately seek professional medical advice. Before using electrolytic capacitors in any application, please read these Handling Precautions, familiarizing thoroughly with the information contained herein. Please check before using any of our electrolytic capacitors if these components fulfill the requirements of your application and warnings and instructions for use are followed.

Warranty: The information contained in this catalogue does not form part of any quotation or contract, is believed to be accurate, reliable and up to date. Quality data are based on the statistical evaluations of a large quantity of parts and do not constitute a guarantee in a legal sense. However, agreement on these specifications does mean that the customer may claim for replacement of individual defective capacitors within the terms of delivery. We will not assume any liability beyond the replacement of defective components. This applies in particular to any consequential damage caused by component failure. Furthermore it must be taken into consideration that the figures stated for lifetime, failure rates and outlier percentages refer to the average production status and are therefore to be understood as mean values (statistic expectations) for a large number of delivery lots of identical capacitors. These figures are based on application experience and data obtained from preceding tests under normal conditions, or – for purpose of accelerated aging – more severe conditions. JIANGHAI reserves the right to change these specifications without prior notice. Any application information given is advisory and does not form part of any specification. The products are not primarily designed for use in life support applications, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. JIANGHAI customers using or selling these products for use in such applications without prior written consent of JIANGHAI do so at their own risk and agree fully to indemnify JIANGHAI for any damage resulting from such improper use or sale. This version of the catalogue supersedes all previous versions. Latest versions of datasheets can be found on our homepage: www.jianghai-europe.com
For more details on precautions and guidelines for aluminum electrolytic capacitors, please refer to CENELEC Technical Report CLC/TR 50454:2008 E, “Guide for the application of aluminum electrolytic capacitors”.

Polarity: Electrolytic capacitors are polar and shall never be used with incorrect polarity, as there is a possible danger of shorting or destruction.

Rated Voltage Ur: The Rated Voltage is marked on the capacitor and defined in the datasheets as Ur. This voltage should never be exceeded and is the maximum peak voltage including any ripple voltages allowed to avoid a shortening of the lifetime or damage of the capacitor. When a ripple current is applied to the capacitor, the sum of the peak ripple voltage and bias DC voltage shall never exceed the Rated Voltage. It might be necessary to lower the maximum allowed bias DC voltage, when certain ripple currents are applied to the capacitor.

Surge Voltage: Maximum Voltage, which may be applied to the capacitor for short periods of time: max. 1000 cycles of 30 sec. per 6 min., max. 5 pulses per hour. Capacitance drift +/- 15% max.

Reverse Voltage: Reverse voltages or voltages < 0 V are not allowed.

Recovery Voltage: After charging and discharging a capacitor there might still be a voltage between the terminals, which is built up internally due to dielectric absorption. Please take action that this load does not damage other devices or scare the workers during production (sparks possible).

Temperature Range: Use electrolytic capacitors only within the specified operating temperature range.

Over-Current: Currents exceeding the rated ripple currents should be avoided.

Ripple Current/Voltage: The combined value of DC voltage and peak AC voltage (due to ripple current) shall not exceed the rated voltage and shall never be < 0 V. Use of aluminum electrolytic capacitors under ripple current with wide amplitudes is equivalent to quick charge-discharge operation.

Rapid Charging/Discharging: Rapid Charging/Discharging generates severe heat and gas may be emitted which may lead to explosion. Consult JIANGHAI about specially designed capacitors suitable for such kind of applications. Example: Servo Drive Application

Balancing resistors: Balancing resistors should be utilized if capacitors are used in serial connection. Please choose low-tolerance resistors to limit voltage drift.

Charge-Discharge Proof: JIANGHAI capacitors are charge-discharge proof, which means that 10^6 switching cycles will cause capacitance reduction of less than 10%.

Lifetime: There are many different lifetime definitions known without any true standard definition. Take special care when capacitors are compared that the capacitors fulfill the needed requirements. JIANGHAI publishes all conditions to be as transparent as possible. In the case of lifetime tests with additional ripple currents, the bias DC voltage must be reduced, so that the sum of bias DC voltage and the peak of the ripple voltage does not exceed the Rated Voltage Ur.

- **Load Life:** Period of time, during which the technical parameters of all capacitors stay within the given limits. JIANGHAI defines this without allowing for outliers.
- **Useful Life:** defined like load life, but a given percentage of components may be outside the defined limits. Useful life data are usually calculated within a confidence level of 60%. See further details in specifications and data sheets. Outlier percentage: ≤ 1%.
- **Endurance Test:** IEC 60384-4 defines the acceptable drift criteria of electrical parameters after the endurance tests (continuous voltage test).
- **Shelf Life:** Definition of time with acceptable drift of capacitor parameters after storage at upper category temperature without load. JIS-C-5102-1994

Vibration and mechanical stress: Capacitors are sensitive to vibration and mechanical forces applied on the leads. Do not use capacitors, which have been dropped onto a rigid surface.

Insulation: If any defect of the sleeve is visible, the component should not be used – same for any kind of visible damage. A capacitor should be electrically isolated from the following parts: Aluminum case, cathode lead wire, anode lead wire and circuit pattern, and auxiliary terminal of snap-in type. The PVC sleeve is not recognized as an isolator and therefore the standard capacitor should not be used in a place where insulation function is needed. Please contact JIANGHAI if higher grade of insulation is required.

Environmental Conditions:
- Avoid direct contact with water, salt solution, oil, dewing conditions
- Halogens generally, especially fumigation treatment with bromides and flame retardent agents containing halogens must be avoided.
- Avoid exposing to direct sunshine, ozone, ultraviolet rays and x-ray radiation.
- Air Pressure: Max. 150kPa, min. 8kPa.
- No heavy air pressure changes are allowed.
- Do not use or store in an environment containing any hazardous gas (e.g., hydrogen sulphide, sulphurous acid, nitrous acid, chlorine, ammonia, bromine, methyl bromide, other halogens) or acidic or alkaline solutions.

Storage:
- Temperature 5 to 35°C, Relative Humidity below 75%.
- Electrolytic capacitors may accumulate charge naturally during storage. In this case discharge through a 1kOhm resistor before use (Recovery Voltage).
- Leakage current may be increased after long storage time. In this case the capacitor should be subjected to the rated voltage treatment through a 1kOhm resistor before use for 1 hour, then it should be discharged through a resistor of about 1 Ohm/Volt.
- Storage times above 1 year should be avoided or rated voltage treatment may be necessary.
- In accordance to IEC 60384-4 electrolytic capacitors are subject to a reforming process before acceptance testing. Rated voltage is applied via a series resistance (100Ω: Ur ≤ 100VDC, 1kΩ: Ur > 100VDC).

Soldering: Soldering conditions (temperature, times) should be within specified conditions, especially for SMD components. Avoid high soldering temperatures as this may reduce lifetime or damage the capacitor. Do never dip the capacitor body into molten solder. Flux should not be adhered to the capacitor’s body but only to its terminals. For details and different methods please contact us.

Cleaning and Coating: Do not use fixing agents or cleaning substances containing halogens and the epoxy resin coating materials. Also never use solvents containing: Halogenated hydrocarbons, alkali, petroleum, trichloroethylene/-ethane, xylene, acetones, trichlorotrifluoroethane, tetrachloroethylene, methylenechloride, chloroform, acetates, ketones, esters, chlorides and bromides. In case of questions see detailed instructions.

Mounting: Other devices, which are mounted near the capacitor, should not touch the capacitor. Additional heat coming from other components near the capacitor may reduce the lifetime of the capacitor. Do never bend or twist the capacitor after soldering to avoid stress on the leads. Radial capacitors are not protected against mechanical forces on the leads. Forces on the pins might damage the capacitor. No printed circuit board tracks are allowed between the lead pads of the capacitor. Screw Terminal capacitors should only be mounted in an upright position.

Transport: Avoid fumigation and spraying insecticides (especially with bromides) in the import or export procedures which can cause corrosion. This applies also to the finished devices.

Maintenance: Periodical inspection should be carried out for the capacitor: visual inspection to check pressure relief open or leakage of electrolyte, electrical characteristics as leakage current, capacitance, and dissipation factor.

Electrolyte and Separator paper: Electrolyte and separator paper used in Aluminum Capacitors may be flammable. Also electrolyte is electrically conductive. Therefore in case electrolyte gets in contact with PC board it may cause corrosion of circuit pattern or cause short circuit between patterns, and may lead to smoke generation or ignition in worst case.

Caution during Use of Capacitors: Do not touch the terminals of capacitors. Keep the capacitor free from conductive solution, such as acids, alkali and so on. Ensure that the operating environment of the equipment into which the capacitor has been built is within the specified conditions mentioned in the catalogue or specification sheets.

Safety Vent: The safety vent needs some free space to open properly. Allow for free headroom of at least 2mm for diameter ≤16mm, more than 3mm for diameter 18-35mm, more than 5mm for case diameter 40mm and larger.

Emergency Actions: When the pressure relief vent is open and some gas blows out from the capacitor, please turn the main switch of the equipment off or pull out the plug from the power outlet immediately. During safety vent operation, extremely hot gas (>100°C) may blow out of the capacitors. Do not stand close to the capacitors. In case of eye contact, rinse the open eye(s) with clean water immediately. In case of ingestion, gargle with water immediately, do not swallow. Do not touch electrolyte but wash skin with soap and water in case of skin contact.

Definition of electrical parameters: Separate documents as application notes, equivalent circuit diagrams and so on are available on request.

Packaging: Please refer to the data book for details. Further information is available on request.

Jianghai Europe Electronic Components GmbH

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Introduction

Aluminum solid electrolyte capacitors with conductive polymer are wound aluminum electrolytic capacitors that use a polythiophene electrolytic system. The conductive polymer yields extremely low ESR-values that allow for very high ripple currents at high frequencies. Typically, these types of capacitors are used in smoothing circuits of DC-DC converters and in high-frequency applications. Polymer Capacitors from Jianghai has been enlarged to voltages up to 200V, which allows the usage in many power supply applications too.

Lifetime

The lifetime of a polymer capacitor can be estimated by:

$$L = L_O \cdot 10^{\frac{T_o - T}{20}}$$

L_o = Lifetime at 105°C or 125°C
T_o = 105°C or 125°C
T = Ambient temperature

Comparison of Solid Polymer Capacitors and Liquid Electrolytic Capacitors

Besides the excellent lifetime performance, the temperature characteristics of polymer capacitors allow for a usage in a wide range of ambient temperatures. Temperatures in the range from -55°C to 105°C lead merely to capacitance changes from 10 …15%, while the ESR remains almost constant. Especially the stability of its low ESR-values makes the polymer capacitor attractive for smoothing circuits or for decoupling functions. Compared to tantalum electrolytic capacitors, polymer capacitors offer a more reliable solution with a similar functionality.

Handling Precautions

Please see “General Handling Precautions” at page 138.
Additional requirements for aluminum solid electrolyte capacitors with conductive polymer:

1) Polymer Capacitors cannot be used:
   - in circuits with frequent and/or rapid charging and discharging function,
   - in time-constant or coupling circuits,
   - in high impedance circuits or applications, where the leakage current affects the circuit operation,
   - after heavy thermal stress during soldering as the capacitance and leakage current may change,
   - under mechanical stress. Avoid mechanical vibration and shock.
   - in applications with heavy discharges / negative transients higher than 20% of Ur.
2) Ripple currents above the specified rating must be avoided as they may damage the capacitor.
3) Never apply any reverse voltages or voltages above the rated voltages.
4) Serial connections shall be avoided to prevent possible overvoltage conditions.
5) When parallel connections between polymer capacitors are planned, please take proper current balancing into account.
6) Use a protection circuit when the inrush current exceeds 10A.
7) Always consider the safety when designing circuits. Plan for worst case failures such as short circuits and open circuits.
8) Laminated capacitors need to be handled like non-isolated components. Please take care of a completely separation of the lead wires and the case of the capacitor.
9) Please follow the soldering recommendations and restrictions for Polymer capacitors. In case of any questions please contact Jianghai Europe.
10) Leakage Currents might increase as consequence of longer storage, critical soldering processes, overload conditions, heavy charging/discharging, mechanical stress.

Without written consent by Jianghai, Polymer capacitors should not be used in highly reliable or life sustaining applications such as: medical equipment, aviation/aerospace equipment, automotive and nuclear applications and others, where a capacitor failure may have a major impact.