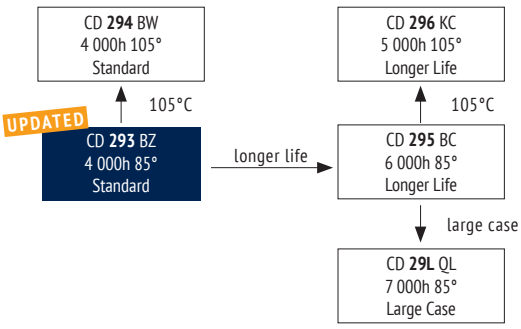
ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE

CD **293** BZ SERIES

4 000h at 85°C

· Standard 85°C



ITEM — CHARACTERISTICS

Operating Temperature Range (°C)	-40 ~ +85	-25 ~ +85
Voltage Range (V)	10 ~ 400	420 ~ 500
Capacitance Range (µF)	68 ~ 82 000	
Capacitance Tolerance (20°C, 120Hz)	± 20%	

The usage at lower temperatures than indicated may be possible. Please contact the Jianghai Europe sales office for approval.

Leakage Current	After 5 minutes at 20°C application of rated voltage, leakage current is not more than specified in table.

Stability at Low Temperature (Impedance Ratio at 120Hz)	Rated Voltage (V)	10	16~35	50~100	160~200	250~400	420~500
	$Z_{-25°C} / Z_{+20°C}$	5	4	3		4	
	$Z_{-40°C} / Z_{+20°C}$	18	15	10	6	8	-

Fast Charge-Discharge: **Please contact Jianghai for an appropriate choice of the capacitor or possible technical adaptions, esp. for applications like: Welding, Photoflash, Servo motors, X-Ray**

ITEM	USEFUL LIFE		LOAD LIFE	ENDURANCE TEST	SHELF LIFE	
Lifetime	4 000h	> 65 000h	2 000h	3 000h	1 000h	
Leakage Current	Not more than specified value		Not more than specified value	Not more than specified value	Not more than specified value	
Capacitance Change	Within ± 30% of initial value		Within ± 15% of initial value	Within ± 20% of initial value	Within ± 15% of initial value	
Dissipation Factor	Not more than 300% of specified value		Not more than 150% of specified value	Not more than 200% of specified value	Not more than 150% of specified value	
Condition: Applied Voltage Applied Current Applied Temperature	U_R I_R 85°C	U_R 1,2 x I_R 40°C	U_R I_R 85°C	U_R I_R = 0 85°C IEC 60384	U_R = 0 I_R = 0 85°C	After test: U_R to be applied for 30 min > 24h before measurement

MULTIPLIER FOR RIPPLE CURRENT (FREQUENCY COEFFICIENT)

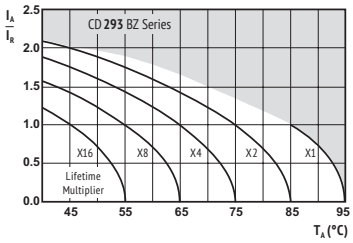
Rated Voltage (V) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz	100kHz
⩽ 50	0,88	1,00	1,07	1,15	1,15	1,15
63 ~ 100	0,80	1,00	1,17	1,32	1,45	1,50
⩾ 160	0,80	1,00	1,16	1,30	1,41	1,43

Multipliers for typical operating conditions.

Max. Current Snap-In Terminal: 15A. For more current use Lug-Terminals.

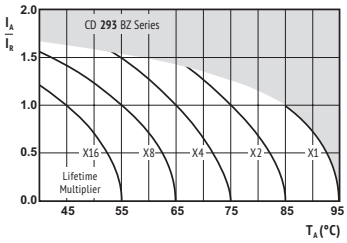
MULTIPLIER FOR LIFETIME (LIFETIME DIAGRAM)

U_R < 160V



I_A = actual ripple current at 120Hz,
I_R = rated ripple current at 120Hz, 85°C
Multiplier of Useful Life as a function of ambient temperature & ripple current load

U_R ⩾ 160V



I_A = actual ripple current at 120Hz,
I_R = rated ripple current at 120Hz, 85°C
Multiplier of Useful Life as a function of ambient temperature & ripple current load

ENVIRONMENTAL

The products are RoHS, WEEE and REACh compliant. The detailed version please see separate "Environmental Certificates" document or www.jianghai-europe.com

SAFETY FACTOR

This diagram includes a safety margin. In many cases the allowed current capability/ lifetime may be increased. For details and approvals please contact the Jianghai Europe sales office.

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (mΩ)	ESR_{typ} Equivalent Series Resistance 20°C 120Hz (mΩ)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (mA)	I_{RAC} Rated Ripple Current 85°C 120Hz (Arms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pin number Details: Page 5
10 (13) 1A	18 000	30	24	0,40	1,5	3,60	25x30	ECS1ABZ183M◊◊ΔΔ2530
	22 000	25	20	0,40	1,5	4,00	22x40	ECS1ABZ223M◊◊ΔΔ2240
		25	20	0,40	1,5	4,10	25x35	ECS1ABZ223M◊◊ΔΔ2535
	33 000	17	13	0,40	1,5	4,60	25x40	ECS1ABZ333M◊◊ΔΔ2540
		17	13	0,40	1,5	4,80	30x30	ECS1ABZ333M◊◊ΔΔ3030
	39 000	14	10,9	0,40	1,5	5,20	25x45	ECS1ABZ393M◊◊ΔΔ2545
		14	10,9	0,40	1,5	5,30	30x35	ECS1ABZ393M◊◊ΔΔ3035
	47 000	12	9,1	0,40	1,5	6,00	30x40	ECS1ABZ473M◊◊ΔΔ3040
		12	9,1	0,40	1,5	6,00	35x30	ECS1ABZ473M◊◊ΔΔ3530
	56 000	9,5	7,6	0,40	1,5	6,80	35x35	ECS1ABZ563M◊◊ΔΔ3535
	68 000	7,9	6,3	0,40	1,5	7,70	35x40	ECS1ABZ683M◊◊ΔΔ3540
	82 000	6,5	5,2	0,40	1,5	8,70	35x45	ECS1ABZ823M◊◊ΔΔ3545
16 (20) 1C	15 000	36	29	0,40	1,5	3,30	22x40	ECS1CBZ153M◊◊ΔΔ2240
		36	29	0,40	1,5	3,30	25x30	ECS1CBZ153M◊◊ΔΔ2530
	18 000	30	24	0,40	1,5	3,80	22x45	ECS1CBZ183M◊◊ΔΔ2245
		30	24	0,40	1,5	3,70	25x35	ECS1CBZ183M◊◊ΔΔ2535
	22 000	25	20	0,40	1,5	4,20	25x40	ECS1CBZ223M◊◊ΔΔ2540
		25	20	0,40	1,5	4,20	30x30	ECS1CBZ223M◊◊ΔΔ3030
	27 000	20	16	0,40	1,5	5,00	25x45	ECS1CBZ273M◊◊ΔΔ2545
		20	16	0,40	1,5	5,00	30x35	ECS1CBZ273M◊◊ΔΔ3035
	33 000	17	13	0,40	1,5	5,60	35x30	ECS1CBZ333M◊◊ΔΔ3530
	39 000	14	11	0,40	1,5	6,30	35x35	ECS1CBZ393M◊◊ΔΔ3535
	47 000	12	9,1	0,40	1,5	7,20	35x40	ECS1CBZ473M◊◊ΔΔ3540
	56 000	9,5	7,6	0,40	1,5	8,00	35x45	ECS1CBZ563M◊◊ΔΔ3545
25 (32) 1E	10 000	47	38	0,35	1,5	2,90	22x40	ECS1EBZ103M◊◊ΔΔ2240
		47	38	0,35	1,5	2,80	25x30	ECS1EBZ103M◊◊ΔΔ2530
	12 000	39	31	0,35	1,5	3,20	25x35	ECS1EBZ123M◊◊ΔΔ2535
		39	31	0,35	1,5	3,40	30x30	ECS1EBZ123M◊◊ΔΔ3030
	15 000	31	25	0,35	1,5	3,70	25x40	ECS1EBZ153M◊◊ΔΔ2540
		31	25	0,35	1,5	3,90	35x25	ECS1EBZ153M◊◊ΔΔ3525
	18 000	26	21	0,35	1,5	4,20	30x35	ECS1EBZ183M◊◊ΔΔ3035
		26	21	0,35	1,5	4,40	35x30	ECS1EBZ183M◊◊ΔΔ3530
	22 000	22	17	0,35	1,5	5,00	35x35	ECS1EBZ223M◊◊ΔΔ3535
	33 000	15	12	0,35	1,5	6,50	35x40	ECS1EBZ333M◊◊ΔΔ3540
	39 000	12	10	0,35	1,5	7,50	35x45	ECS1EBZ393M◊◊ΔΔ3545
	47 000	10	8	0,35	1,5	8,80	35x50	ECS1EBZ473M◊◊ΔΔ3550
35 (44) 1V	5 600	72	57	0,30	1,5	2,30	22x35	ECS1VBZ562M◊◊ΔΔ2235
		72	57	0,30	1,5	2,30	25x30	ECS1VBZ562M◊◊ΔΔ2530
	6 800	59	47	0,30	1,5	2,90	22x40	ECS1VBZ682M◊◊ΔΔ2240
		59	47	0,30	1,5	2,60	25x35	ECS1VBZ682M◊◊ΔΔ2535
	8 200	57	46	0,35	1,5	2,80	25x40	ECS1VBZ822M◊◊ΔΔ2540
		57	46	0,35	1,5	2,80	30x30	ECS1VBZ822M◊◊ΔΔ3030
	10 000	47	38	0,35	1,5	3,20	30x35	ECS1VBZ103M◊◊ΔΔ3035
	12 000	39	31	0,35	1,5	3,60	35x30	ECS1VBZ123M◊◊ΔΔ3530
	15 000	31	25	0,35	1,5	4,10	35x35	ECS1VBZ153M◊◊ΔΔ3535
	18 000	26	21	0,35	1,5	4,70	35x40	ECS1VBZ183M◊◊ΔΔ3540
	22 000	22	17	0,35	1,5	5,30	35x45	ECS1VBZ223M◊◊ΔΔ3545
	27 000	18	14	0,35	1,5	7,00	35x50	ECS1VBZ273M◊◊ΔΔ3550
50 (63) 1H	2 200	120	97	0,25	1,5	1,70	22x25	ECS1HBZ222M◊◊ΔΔ2225
	3 900	86	69	0,25	1,5	2,10	25x30	ECS1HBZ392M◊◊ΔΔ2530
	4 700	71	57	0,25	1,5	2,40	22x40	ECS1HBZ472M◊◊ΔΔ2240
		71	57	0,25	1,5	2,40	25x35	ECS1HBZ472M◊◊ΔΔ2535
	5 600	72	57	0,30	1,5	2,50	25x40	ECS1HBZ562M◊◊ΔΔ2540
		72	57	0,30	1,5	2,50	30x30	ECS1HBZ562M◊◊ΔΔ3030
	6 800	59	47	0,30	1,5	2,80	25x45	ECS1HBZ682M◊◊ΔΔ2545
		59	47	0,30	1,5	2,80	30x35	ECS1HBZ682M◊◊ΔΔ3035
	8 200	57	46	0,35	1,5	3,00	30x40	ECS1HBZ822M◊◊ΔΔ3040
		57	46	0,35	1,5	3,00	35x30	ECS1HBZ822M◊◊ΔΔ3530
	10 000	47	38	0,35	1,5	3,40	35x35	ECS1HBZ103M◊◊ΔΔ3535
	12 000	39	31	0,35	1,5	3,80	35x40	ECS1HBZ123M◊◊ΔΔ3540
	15 000	31	25	0,35	1,5	4,50	35x50	ECS1HBZ153M◊◊ΔΔ3550

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (mΩ)	ESR_{typ} Equivalent Series Resistance 20°C 120Hz (mΩ)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (mA)	I_{RAC} Rated Ripple Current 85°C 120Hz (Arms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pin number Details: Page 5
63 (79) 1J	2 700	74	59	0,15	1,5	2,30	25x30	ECS1JBZ272M◊◊ΔΔ2530
	3 300	81	65	0,20	1,5	2,30	22x40	ECS1JBZ332M◊◊ΔΔ2240
		81	65	0,20	1,5	2,30	25x35	ECS1JBZ332M◊◊ΔΔ2535
	3 900	69	55	0,20	1,5	2,60	25x40	ECS1JBZ392M◊◊ΔΔ2540
		69	55	0,20	1,5	2,60	30x30	ECS1JBZ392M◊◊ΔΔ3030
	4 700	56	45	0,20	1,5	3,00	25x45	ECS1JBZ472M◊◊ΔΔ2545
		57	45	0,20	1,5	3,00	30x30	ECS1JBZ472M◊◊ΔΔ3030
	5 600	48	38	0,20	1,5	3,30	35x30	ECS1JBZ562M◊◊ΔΔ3530
	6 800	40	32	0,20	1,5	3,70	35x35	ECS1JBZ682M◊◊ΔΔ3535
	8 200	41	33	0,25	1,5	3,80	35x40	ECS1JBZ822M◊◊ΔΔ3540
	10 000	34	27	0,25	1,5	4,30	35x45	ECS1JBZ103M◊◊ΔΔ3545
	12 000	28	23	0,25	1,5	4,80	35x50	ECS1JBZ123M◊◊ΔΔ3550
80 (100) 1K	1 800	111	89	0,15	1,4	1,90	25x30	ECS1KBZ182M◊◊ΔΔ2530
	2 200	91	73	0,15	1,5	2,20	25x35	ECS1KBZ222M◊◊ΔΔ2535
		91	73	0,15	1,5	2,20	30x25	ECS1KBZ222M◊◊ΔΔ3025
	2 700	74	59	0,15	1,5	2,50	25x40	ECS1KBZ272M◊◊ΔΔ2540
		74	59	0,15	1,5	2,50	30x30	ECS1KBZ272M◊◊ΔΔ3030
	3 300	61	49	0,15	1,5	2,80	25x45	ECS1KBZ332M◊◊ΔΔ2545
		61	49	0,15	1,5	2,80	30x35	ECS1KBZ332M◊◊ΔΔ3035
	3 900	52	41	0,15	1,5	3,10	25x50	ECS1KBZ392M◊◊ΔΔ2550
		52	41	0,15	1,5	3,20	35x30	ECS1KBZ392M◊◊ΔΔ3530
	4 700	43	34	0,15	1,5	3,60	35x35	ECS1KBZ472M◊◊ΔΔ3535
	5 600	48	38	0,20	1,5	4,10	35x40	ECS1KBZ562M◊◊ΔΔ3540
	6 800	40	32	0,20	1,5	4,10	35x45	ECS1KBZ682M◊◊ΔΔ3545
	8 200	41	33	0,20	1,5	4,70	35x50	ECS1KBZ822M◊◊ΔΔ3550
	10 000	34	27	0,25	1,5	5,20	35x50	ECS1KBZ103M◊◊ΔΔ3550
	12 000	28	23	0,25	1,5	5,80	35x55	ECS1KBZ123M◊◊ΔΔ3555
100 (125) 2A	1 200	166	133	0,15	1,2	1,60	25x30	ECS2ABZ122M◊◊ΔΔ2530
	1 500	133	107	0,15	1,5	1,80	22x40	ECS2ABZ152M◊◊ΔΔ2240
		133	107	0,15	1,5	1,70	25x35	ECS2ABZ152M◊◊ΔΔ2535
	1 800	111	89	0,15	1,5	2,00	25x40	ECS2ABZ182M◊◊ΔΔ2540
		111	89	0,15	1,5	2,10	30x30	ECS2ABZ182M◊◊ΔΔ3030
	2 200	91	73	0,15	1,5	2,30	30x35	ECS2ABZ222M◊◊ΔΔ3035
		91	73	0,15	1,5	2,50	35x30	ECS2ABZ222M◊◊ΔΔ3530
	2 700	74	59	0,15	1,5	2,60	25x50	ECS2ABZ272M◊◊ΔΔ2550
		74	59	0,15	1,5	2,70	30x40	ECS2ABZ272M◊◊ΔΔ3040
	3 300	61	49	0,15	1,5	3,10	35x35	ECS2ABZ332M◊◊ΔΔ3535
	3 900	52	41	0,15	1,5	3,40	35x40	ECS2ABZ392M◊◊ΔΔ3540
	4 700	43	34	0,15	1,5	4,00	35x50	ECS2ABZ472M◊◊ΔΔ3550
160 (200) 2C	470	283	226	0,10	0,8	1,60	25x30	ECS2CBZ471M◊◊ΔΔ2530
	560	237	190	0,10	0,9	1,90	22x35	ECS2CBZ561M◊◊ΔΔ2235
		237	190	0,10	0,9	1,90	25x30	ECS2CBZ561M◊◊ΔΔ2530
	680	196	157	0,10	1,1	2,10	22x40	ECS2CBZ681M◊◊ΔΔ2240
		196	157	0,10	1,1	2,20	25x35	ECS2CBZ681M◊◊ΔΔ2535
	820	162	130	0,10	1,3	2,40	25x40	ECS2CBZ821M◊◊ΔΔ2540
		162	130	0,10	1,3	2,50	30x30	ECS2CBZ821M◊◊ΔΔ3030
	1 000	133	107	0,10	1,5	2,80	30x35	ECS2CBZ102M◊◊ΔΔ3035
		160	128	0,12	1,5	2,70	35x30	ECS2CBZ102M◊◊ΔΔ3530
	1 200	133	107	0,12	1,5	3,00	35x35	ECS2CBZ122M◊◊ΔΔ3535
	1 500	107	85	0,12	1,5	3,50	35x40	ECS2CBZ152M◊◊ΔΔ3540
	1 800	89	71	0,12	1,5	3,90	35x45	ECS2CBZ182M◊◊ΔΔ3545
	2 200	73	58	0,12	1,5	4,50	35x50	ECS2CBZ222M◊◊ΔΔ3550
180 (225) 2K	680	196	157	0,10	1,2	2,20	25x40	ECS2KBZ681M◊◊ΔΔ2540
		196	157	0,10	1,2	2,30	30x30	ECS2KBZ681M◊◊ΔΔ3030
	820	162	130	0,10	1,5	2,60	30x35	ECS2KBZ821M◊◊ΔΔ3035
		195	156	0,12	1,5	2,50	35x30	ECS2KBZ821M◊◊ΔΔ3530
	1 000	133	107	0,10	1,5	2,90	25x50	ECS2KBZ102M◊◊ΔΔ2550
		133	107	0,10	1,5	2,90	30x40	ECS2KBZ102M◊◊ΔΔ3040
	1 200	133	107	0,12	1,5	3,10	35x35	ECS2KBZ122M◊◊ΔΔ3535
	1 500	107	85	0,12	1,5	3,60	35x45	ECS2KBZ152M◊◊ΔΔ3545
	1 800	89	71	0,12	1,5	4,10	35x50	ECS2KBZ182M◊◊ΔΔ3550

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (mΩ)	ESR_{typ} Equivalent Series Resistance 20°C 120Hz (mΩ)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (mA)	I_{RAC} Rated Ripple Current 85°C 120Hz (Arms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pin number Details: Page 5
200 (250) 2D	390	341	273	0,10	0,8	1,60	25x30	ECS2DBZ391M◊◊ΔΔ2530
	470	283	226	0,10	0,9	1,70	22x35	ECS2DBZ471M◊◊ΔΔ2235
		283	226	0,10	0,9	1,90	30x25	ECS2DBZ471M◊◊ΔΔ3025
	560	237	190	0,10	1,1	2,00	25x35	ECS2DBZ561M◊◊ΔΔ2535
		237	190	0,10	1,1	2,10	30x30	ECS2DBZ561M◊◊ΔΔ3030
	680	196	157	0,10	1,4	2,30	25x40	ECS2DBZ681M◊◊ΔΔ2540
		196	157	0,10	1,4	2,40	30x35	ECS2DBZ681M◊◊ΔΔ3035
	820	162	130	0,10	1,5	2,70	30x40	ECS2DBZ821M◊◊ΔΔ3040
		195	156	0,12	1,5	2,50	35x30	ECS2DBZ821M◊◊ΔΔ3530
	1 000	160	128	0,12	1,5	2,80	35x35	ECS2DBZ102M◊◊ΔΔ3535
	1 200	133	107	0,12	1,5	3,20	35x40	ECS2DBZ122M◊◊ΔΔ3540
	1 500	107	85	0,12	1,5	3,80	35x50	ECS2DBZ152M◊◊ΔΔ3550
250 (300) 2E	330	603	483	0,15	0,8	1,40	22x40	ECS2EBZ331M◊◊ΔΔ2240
		603	483	0,15	0,8	1,40	25x30	ECS2EBZ331M◊◊ΔΔ2530
	390	511	409	0,15	1,0	1,60	22x45	ECS2EBZ391M◊◊ΔΔ2245
		511	409	0,15	1,0	1,60	25x35	ECS2EBZ391M◊◊ΔΔ2535
	470	424	339	0,15	1,2	1,80	25x40	ECS2EBZ471M◊◊ΔΔ2540
		424	339	0,15	1,2	1,80	30x30	ECS2EBZ471M◊◊ΔΔ3030
	560	356	285	0,15	1,4	2,00	25x45	ECS2EBZ561M◊◊ΔΔ2545
		356	285	0,15	1,4	2,00	30x35	ECS2EBZ561M◊◊ΔΔ3035
	680	293	235	0,15	1,5	2,30	30x40	ECS2EBZ681M◊◊ΔΔ3040
		293	235	0,15	1,5	2,30	35x30	ECS2EBZ681M◊◊ΔΔ3530
	820	243	195	0,15	1,5	2,60	30x45	ECS2EBZ821M◊◊ΔΔ3045
		243	195	0,15	1,5	2,60	35x35	ECS2EBZ821M◊◊ΔΔ3535
	1 000	199	160	0,15	1,5	3,00	35x40	ECS2EBZ102M◊◊ΔΔ3540
	1 200	166	133	0,15	1,5	3,40	35x45	ECS2EBZ122M◊◊ΔΔ3545
315 (365) 2F	180	1106	885	0,15	0,6	0,96	25x30	ECS2FBZ181M◊◊ΔΔ2530
	220	905	724	0,15	0,7	1,10	22x40	ECS2FBZ221M◊◊ΔΔ2240
		905	724	0,15	0,7	1,10	25x35	ECS2FBZ221M◊◊ΔΔ2535
	270	737	590	0,15	0,9	1,20	22x45	ECS2FBZ271M◊◊ΔΔ2245
		737	590	0,15	0,9	1,30	25x40	ECS2FBZ271M◊◊ΔΔ2540
		737	590	0,15	0,9	1,30	30x30	ECS2FBZ271M◊◊ΔΔ3030
	330	603	483	0,15	1,0	1,40	25x45	ECS2FBZ331M◊◊ΔΔ2545
		603	483	0,15	1,0	1,40	30x35	ECS2FBZ331M◊◊ΔΔ3035
	390	511	409	0,15	1,2	1,60	30x40	ECS2FBZ391M◊◊ΔΔ3040
		511	409	0,15	1,2	1,60	35x30	ECS2FBZ391M◊◊ΔΔ3530
	470	424	339	0,15	1,5	1,80	30x45	ECS2FBZ471M◊◊ΔΔ3045
		424	339	0,15	1,5	1,80	35x35	ECS2FBZ471M◊◊ΔΔ3535
	560	356	285	0,15	1,5	2,00	30x50	ECS2FBZ561M◊◊ΔΔ3050
		356	285	0,15	1,5	2,00	35x40	ECS2FBZ561M◊◊ΔΔ3540
	680	293	235	0,15	1,5	2,30	35x45	ECS2FBZ681M◊◊ΔΔ3545
350 (400) 2V	150	1327	1062	0,15	0,5	0,94	25x30	ECS2VBZ151M◊◊ΔΔ2530
	180	1106	885	0,15	0,6	1,10	22x40	ECS2VBZ181M◊◊ΔΔ2240
		1106	885	0,15	0,6	1,10	30x25	ECS2VBZ181M◊◊ΔΔ3025
	220	905	724	0,15	0,8	1,20	25x35	ECS2VBZ221M◊◊ΔΔ2535
		905	724	0,15	0,8	1,20	30x30	ECS2VBZ221M◊◊ΔΔ3030
	270	737	590	0,15	0,9	1,40	25x45	ECS2VBZ271M◊◊ΔΔ2545
		737	590	0,15	0,9	1,40	30x35	ECS2VBZ271M◊◊ΔΔ3035
	330	603	483	0,15	1,2	1,60	25x50	ECS2VBZ331M◊◊ΔΔ2550
		603	483	0,15	1,2	1,60	35x30	ECS2VBZ331M◊◊ΔΔ3530
	390	511	409	0,15	1,4	1,70	30x40	ECS2VBZ391M◊◊ΔΔ3040
		511	409	0,15	1,4	1,80	35x35	ECS2VBZ391M◊◊ΔΔ3535
	470	424	339	0,15	1,5	2,00	30x45	ECS2VBZ471M◊◊ΔΔ3045
		424	339	0,15	1,5	2,00	35x40	ECS2VBZ471M◊◊ΔΔ3540
	560	356	285	0,15	1,5	2,30	35x45	ECS2VBZ561M◊◊ΔΔ3545
	680	293	235	0,15	1,5	2,60	35x50	ECS2VBZ681M◊◊ΔΔ3550
	820	243	195	0,15	1,5	2,80	35x60	ECS2VBZ821M◊◊ΔΔ3560
400 (450) 2G	150	1327	1062	0,15	0,6	0,89	25x30	ECS2GBZ151M◊◊ΔΔ2530
	180	1106	885	0,15	0,7	1,00	22x40	ECS2GBZ181M◊◊ΔΔ2240
		1106	885	0,15	0,7	1,00	25x30	ECS2GBZ181M◊◊ΔΔ2530
	220	905	724	0,15	0,9	1,10	22x45	ECS2GBZ221M◊◊ΔΔ2245
		905	724	0,15	0,9	1,20	25x40	ECS2GBZ221M◊◊ΔΔ2540
	270	737	590	0,15	1,1	1,30	25x45	ECS2GBZ271M◊◊ΔΔ2545
		737	590	0,15	1,1	1,50	30x30	ECS2GBZ271M◊◊ΔΔ3030

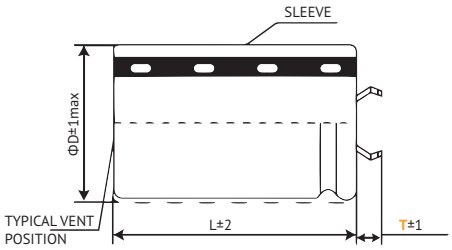
U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (mΩ)	ESR_{typ} Equivalent Series Resistance 20°C 120Hz (mΩ)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (mA)	I_{RAC} Rated Ripple Current 85°C 120Hz (Arms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pin number Details: Page 5
400 (450) 2G	330	603	483	0,15	1,3	1,60	22x50	ECS2GBZ331M◊◊ΔΔ2250
		603	483	0,15	1,3	1,60	25x45	ECS2GBZ331M◊◊ΔΔ2545
		603	483	0,15	1,3	1,70	30x35	ECS2GBZ331M◊◊ΔΔ3035
	390	511	409	0,15	1,5	1,80	25x45	ECS2GBZ391M◊◊ΔΔ2545
		511	409	0,15	1,5	1,90	30x40	ECS2GBZ391M◊◊ΔΔ3040
		511	409	0,15	1,5	1,80	35x30	ECS2GBZ391M◊◊ΔΔ3530
	470	424	339	0,15	1,5	2,10	35x35	ECS2GBZ471M◊◊ΔΔ3535
	560	356	285	0,15	1,5	2,30	35x40	ECS2GBZ561M◊◊ΔΔ3540
	680	293	235	0,15	1,5	2,70	35x45	ECS2GBZ681M◊◊ΔΔ3545
	820	243	194	0,15	1,5	3,10	35x50	ECS2GBZ821M◊◊ΔΔ3550
	1 000	133	107	0,15	1,5	3,70	35x60	ECS2GBZ102M◊◊ΔΔ3560
	1 200	166	89	0,15	1,5	4,20	40x60	ECS2GBZ122M◊◊ΔΔ4060
	1 500	133	71	0,15	1,5	5,00	40x70	ECS2GBZ152M◊◊ΔΔ4070
	1 800	111	59	0,15	1,5	5,80	40x80	ECS2GBZ182M◊◊ΔΔ4080
420 (470) 2X	120	1658	1327	0,15	0,5	0,82	25x30	ECS2XBZ121M◊◊ΔΔ2530
	150	1327	1062	0,15	0,6	0,96	25x30	ECS2XBZ151M◊◊ΔΔ2530
	180	1106	885	0,15	0,8	1,10	25x35	ECS2XBZ181M◊◊ΔΔ2535
		1106	885	0,15	0,8	1,20	30x30	ECS2XBZ181M◊◊ΔΔ3030
	220	905	724	0,15	0,9	1,20	25x40	ECS2XBZ221M◊◊ΔΔ2540
		905	724	0,15	0,9	1,30	30x30	ECS2XBZ221M◊◊ΔΔ3030
	270	737	590	0,15	1,1	1,30	25x45	ECS2XBZ271M◊◊ΔΔ2545
		737	590	0,15	1,1	1,40	30x35	ECS2XBZ271M◊◊ΔΔ3035
	330	603	483	0,15	1,4	1,70	30x40	ECS2XBZ331M◊◊ΔΔ3040
	390	511	409	0,15	1,5	1,80	30x45	ECS2XBZ391M◊◊ΔΔ3045
		511	409	0,15	1,5	1,90	35x35	ECS2XBZ391M◊◊ΔΔ3535
	470	424	339	0,15	1,5	2,00	30x45	ECS2XBZ471M◊◊ΔΔ3045
		424	339	0,15	1,5	2,20	35x40	ECS2XBZ471M◊◊ΔΔ3540
	560	356	285	0,15	1,5	2,40	35x45	ECS2XBZ561M◊◊ΔΔ3545
	680	293	235	0,15	1,5	2,80	35x50	ECS2XBZ681M◊◊ΔΔ3550
	820	243	194	0,15	1,5	3,20	35x60	ECS2XBZ821M◊◊ΔΔ3560
	1 000	199	107	0,15	1,5	4,00	40x60	ECS2XBZ102M◊◊ΔΔ4060
450 (500) 2W	120	1658	1327	0,15	0,5	0,83	25x30	ECS2WBZ121M◊◊ΔΔ2530
	150	1327	1062	0,15	0,7	0,95	22x45	ECS2WBZ151M◊◊ΔΔ2245
		1327	1062	0,15	0,7	0,95	25x35	ECS2WBZ151M◊◊ΔΔ2535
	180	1106	885	0,15	0,8	1,10	25x40	ECS2WBZ181M◊◊ΔΔ2540
		1106	885	0,15	0,8	1,10	30x30	ECS2WBZ181M◊◊ΔΔ3030
	220	905	724	0,15	1,0	1,20	22x50	ECS2WBZ221M◊◊ΔΔ2250
		905	724	0,15	1,0	1,20	25x40	ECS2WBZ221M◊◊ΔΔ2540
		905	724	0,15	1,0	1,20	30x30	ECS2WBZ221M◊◊ΔΔ3030
	270	737	590	0,15	1,2	1,40	30x30	ECS2WBZ271M◊◊ΔΔ3030
	330	603	480	0,15	1,5	1,60	30x40	ECS2WBZ331M◊◊ΔΔ3040
	390	511	409	0,15	1,5	1,70	30x40	ECS2WBZ391M◊◊ΔΔ3040
		511	409	0,15	1,5	1,80	35x35	ECS2WBZ391M◊◊ΔΔ3535
	470	424	339	0,15	1,5	2,10	30x45	ECS2WBZ471M◊◊ΔΔ3045
	560	356	285	0,15	1,5	2,30	35x45	ECS2WBZ561M◊◊ΔΔ3545
	680	293	235	0,15	1,5	2,70	35x50	ECS2WBZ681M◊◊ΔΔ3550
	820	243	194	0,15	1,5	3,20	35x60	ECS2WBZ821M◊◊ΔΔ3560
	1 000	133	107	0,15	1,5	4,20	35x70	ECS2WBZ102M◊◊ΔΔ3570
	1 200	166	89	0,15	1,5	4,40	40x70	ECS2WBZ122M◊◊ΔΔ4070
	1 500	133	71	0,15	1,5	5,20	40x80	ECS2WBZ152M◊◊ΔΔ4080
	1 800	111	59	0,15	1,5	6,30	40x100	ECS2WBZ182M◊◊ΔΔ40100
500 (550) 2H	100	1990	1592	0,15	0,5	0,75	25x30	ECS2HBZ101M◊◊ΔΔ2530
	120	1658	1327	0,15	0,6	0,83	25x30	ECS2HBZ121M◊◊ΔΔ2530
	150	1327	1062	0,15	0,8	0,95	30x30	ECS2HBZ151M◊◊ΔΔ3030
	180	1106	885	0,15	0,9	1,10	25x40	ECS2HBZ181M◊◊ΔΔ2540
		1106	885	0,15	0,9	1,10	30x30	ECS2HBZ181M◊◊ΔΔ3030
	220	905	724	0,15	1,1	1,30	25x45	ECS2HBZ221M◊◊ΔΔ2545
		905	724	0,15	1,1	1,30	30x35	ECS2HBZ221M◊◊ΔΔ3035
	270	737	590	0,15	1,4	1,50	30x40	ECS2HBZ271M◊◊ΔΔ3040
	330	603	483	0,15	1,5	1,60	35x35	ECS2HBZ331M◊◊ΔΔ3535
	390	511	409	0,15	1,5	1,90	35x40	ECS2HBZ391M◊◊ΔΔ3540
	470	424	339	0,15	1,5	2,20	35x45	ECS2HBZ471M◊◊ΔΔ3545
	560	356	285	0,15	1,5	2,40	35x50	ECS2HBZ561M◊◊ΔΔ3550
	680	293	235	0,15	1,5	2,70	35x50	ECS2HBZ681M◊◊ΔΔ3550

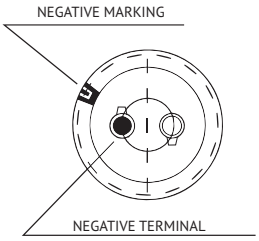
ORDER CODE SNAP-IN TYPE

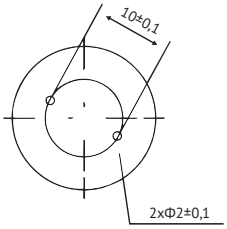
EC	S	2G	QC	221	M	T6	P2	2535	-	JExxxxx
Techno-logy	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code	Capacitance Tolerance	Terminal Style	Terminal / Pitch	Dimension (mm)	Material Code	for Specials only

Techno-logy	Terminal Type		Rated Voltage Code		Series Code		Capacitance Code		Capacitance Tolerance		Terminal Style		Terminal / Pitch		Dimension (mm)		Material Code	
EC = Electrolytric Capacitor	Snap-In	**S**	6,3V	**0J**	CD 293	**BZ**	0,1	**0R1**	**±20%**	**M**	4,0mm Pin Length	**T/L4**	**2 Pin**	**P2**	22x40	**2240**	Standard	**-**
			10V	**1A**	CD 294	**BW**	0,47	**R47**	±10%	**K**	**6,3mm Pin Length**	**T/L6**	3 Pin	**P3**	30x45	**3045**	PVC	**V**
			16V	**1C**	CD 295	**BC**	1,0	**010**	+30/-10%	**Q**	Soldering Pin	**S4**	4 Pin	**P4**	35x80	**3580**	PET	**E**
			20V	**1D**	CD 295S	**BS**	2,2	**2R2**	+20/-0%	**R**	on request: alternative pin types		5 Pin	**P5**	45x100	**45100**		
			25V	**1E**	CD 296	**KC**	100	**101**	±15%	**L**			6 Pin	**P6**	50x105	**50105**		
			35V	**1V**	CD 296L	**FL**	1 000	**102**	+20/-10%	**V**	**= preferred**							
			40V	**1G**	CD 297	**BB**	10 000	**103**										
			50V	**1H**	CD 299	**PG**												
			63V	**1J**	CD 29C	**QC**												
			80V	**1K**	CD 29CS	**DS**												
			100V	**2A**	CD 29H	**QH**												
			125V	**2B**	CD 29HD	**QF**												
			160V	**2C**	CD 29L	**QL**												
			180V	**2K**	CD 29U	**CU**												
			200V	**2D**	CD 29UH	**UT**												
			250V	**2E**	CD 840	**ZQ**												
			315V	**2F**	CD 891	**ZJ**												
			350V	**2V**	CD 892	**ZL**												
			385V	**2J**	CD 895	**ZK**												
			400V	**2G**														
			415V	**2P**														
			420V	**2X**														
			450V	**2W**														
			500V	**2H**														
			550V	**2Y**														
			575V	**2Z**														
			600V	**2S**														
			630V	**J2**														

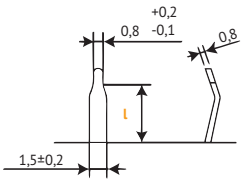
2 PIN TYPE: T6P2 / T4P2 STANDARD







MOUNTING HOLES



TERMINAL DIMENSIONS

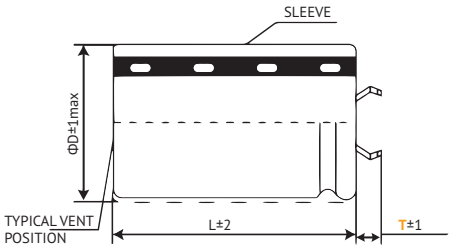
Standard Version: Self-Lock Terminal. Other terminal types and styles on request.
For diameter øD ⩾ 45mm the safety vent is typically placed at the side of the housing.

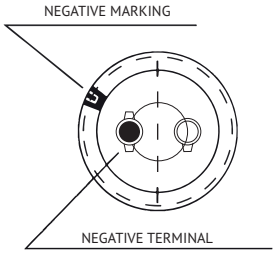
Terminal	T6 (preferred)	T4
Pin Length T	6,3 mm	4,0 mm
Pin Detail l	3,5 mm	2,5 mm

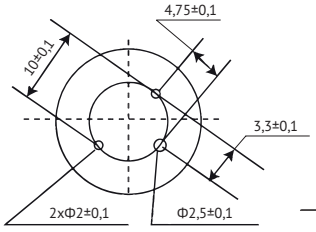
Max. Current Snap-In Terminal: 15A
For more current please ask for Lug-Terminals.

in mm

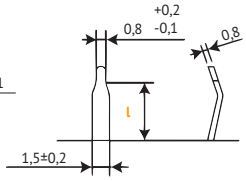
3 PIN TYPE: T4P3







MOUNTING HOLES



TERMINAL DIMENSIONS

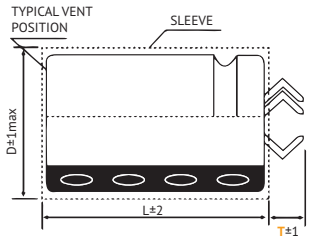
For diameter øD ⩾ 45mm the safety vent is typically placed at the side of the housing.

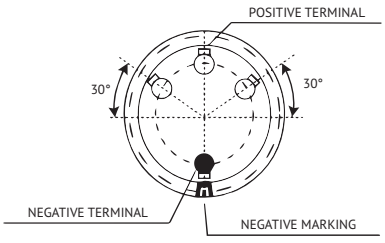
Terminal	T6	T4
Pin Length T	-	4,0 mm
Pin Detail l	-	2,5 mm

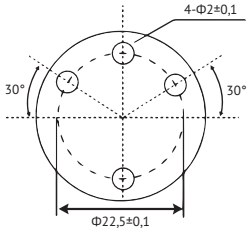
Max. Current Snap-In Terminal: 15A
For more current please ask for Lug-Terminals.

in mm

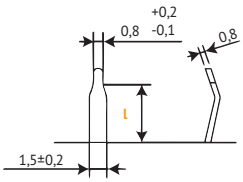
4 PIN TYPE: T6P4/T4P4 STANDARD







MOUNTING HOLES



TERMINAL DIMENSIONS

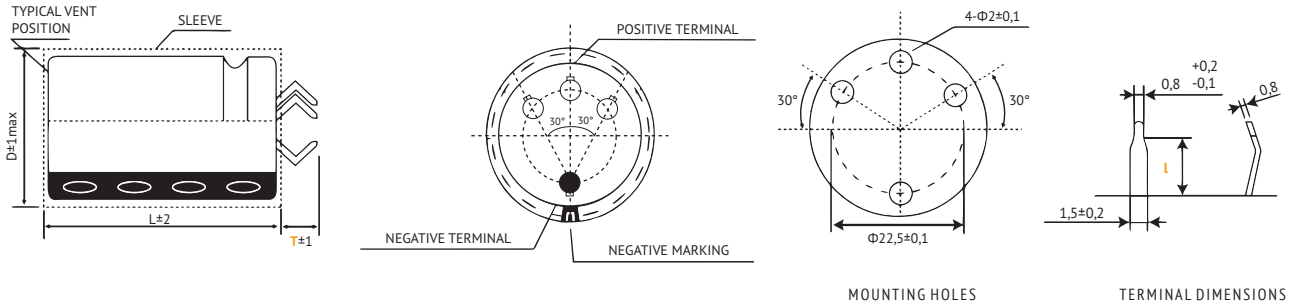
Standard Version: Non-Lock-Terminal. Other terminal types and styles on request.
For øD ⩾ 30mm only.
For diameter øD ⩾ 45mm the safety vent is typically placed at the side of the housing.

Terminal	T6 (preferred)	T4
Pin Length T	6,3 mm	4,0 mm
Pin Detail l	3,5 mm	2,5 mm

Max. Current Snap-In Terminal: 15A
For more current please ask for Lug-Terminals.

in mm

4 PIN TYPE: L6P4/L4P4 SELF-LOCK TERMINAL



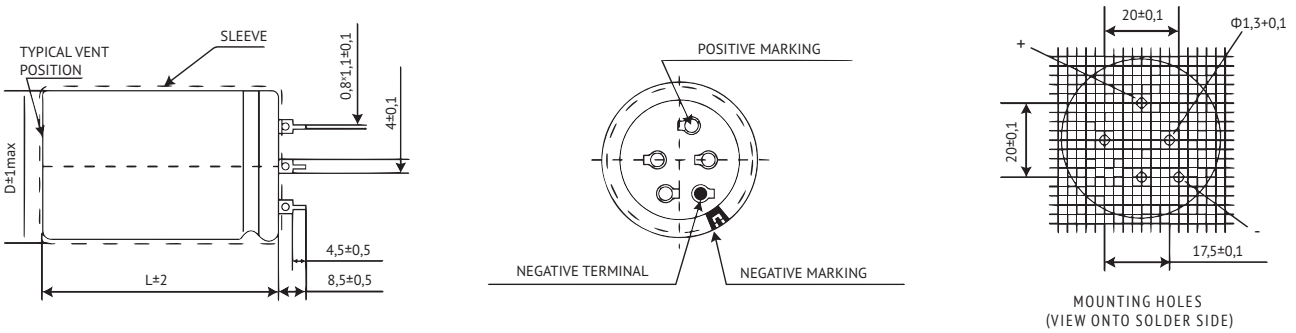
For øD ⩾ 30mm only. Other terminal types and styles on request.
For diameter øD ⩾ 45mm the safety vent is typically placed at the side of the housing.

Terminal	T6 (preferred)	T4
Pin Length T	6,3 mm	4,0 mm
Pin Detail l	3,5 mm	2,5 mm

Max. Current Snap-In Terminal: 15A
For more current please ask for Lug-Terminals.

in mm

5 PIN TYPE: S4P5 SOLDERING PIN

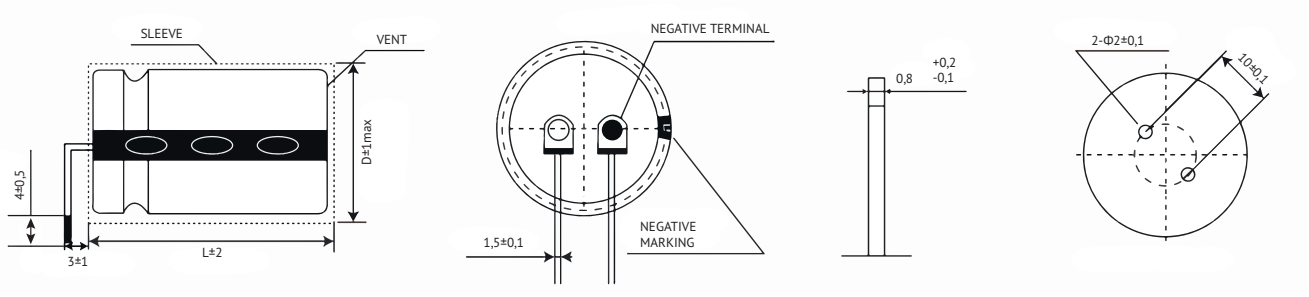


For øD ⩾ 30mm only.
For diameter øD ⩾ 45mm the safety vent is typically placed at the side of the housing.

Max. Current Snap-In Terminal: 15A
For more current please ask for Lug-Terminals.

in mm

EXAMPLE: AXIAL MOUNTING



For øD ⩾ 25mm only.
Available also for high vibration usage.

Max. Current Snap-In Terminal: 15A
For more current please ask for Lug-Terminals.

in mm

Other Terminal Styles on request.

WARNING

JIANGHAI is not liable for any extent of possible injuries or 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 outside the 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 that 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 U_R

The rated voltage is marked on the capacitor and defined in the datasheets as U_R. 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 < 0V are not allowed.

RECOVERY VOLTAGE

Electric potential between the positive and negative terminal may exist as a result of dielectric absorption. Please take action that this load does not damage other devices or scare workers during the production process (sparks possible). If needed please discharge the capacitor through a 1kΩ resistor.

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 < 0V. Use of aluminum electrolytic capacitors under ripple current with wide amplitudes is equivalent to rapid charge-discharge operation. Never exceed a ripple voltage of $70V_{peak\text{-}peak}$ without additional approval of Jianghai.

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 U_R.

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.

Shelf Life: Definition of time with acceptable drift of capacitor parameters after storage at upper category temperature without load.

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 – the same holds 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 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 a 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 retardant agents containing halogens must be avoided. Avoid exposing to direct sunshine, ozone, ultraviolet rays and x-ray radiation. Air Pressure: Max. 150kPa, min. 8kPa. For usage >2000m altitude above sea level current deratings might be necessary. 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: $U_R \leq$ 100VDC, 1kΩ: $U_R >$ 100VDC).

SOLDERING

Soldering conditions (temperature, times) should be within specified conditions, especially for SMT 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.

GLUEING, CLEANING AND COATING

Do not use fixing agents or cleaning substances containing halogens. Do not use coating and moulding components that completely seal the capacitor from the environment. Also, never use solvents containing: halogenated hydrocarbons, alkali, petroleum, trichloroethylene/-ethane, xylene, acetones, trichlorotrifluoroethane, tetrachloroethylene, methylenechloride, chloroform, acetates, ketones, esters, chlorides and bromides.

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. 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.

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.

DISPOSAL

Scrapped capacitors are classified as scrapped metal. For disposal they are handled as controllable industrial waste because of the nature of the contents (electrolyte). Most of the material is aluminum and cannot be completely burned.

Jianghai Europe Electronic Components GmbH
VERSION 9/2024

To estimate the Lifetime of a non-solid Aluminum Electrolytic Capacitor from Jianghai, the following formulas can be utilized. The Lifetime depends mainly on the ambient temperature, the ripple current and, within certain limits, the operating voltage applied. Other parameters may also affect the Lifetime. Moreover, L_0 can be interpreted in many different ways, which has a fundamental influence on the numerical result. Jianghai offers a high transparency by publishing the different typical definitions of Lifetimes in each datasheet. Lifetime estimations are approximations by nature. Please let JIANGHAI EUROPE confirm any result before using it. The formulas given here do not constitute part of a contract nor of a specification. The formulas do not cover additional aging effects of certain electrolytic systems or other chemical effects. Also the dimensions of the components may have an effect. Forced cooling or other additional cooling-methods have a strong impact on the Lifetime and are not covered by the formulas as defined. For the estimation and interpretation of Lifetime, a close collaboration with JIANGHAI EUROPE is strongly advised.

STRUCTUAL FORMULA

$$L = L_0 \cdot K_T \cdot K_R \cdot K_V$$

WHERE:

- L Total Lifetime
- L_0 Lifetime under Nominal Load at Upper Category Temperature (see catalogue)
- K_T Temperature Factor
- K_R Ripple Current Factor
- K_V Voltage Factor

K_T TEMPERATURE FACTOR

Aluminum Electrolytic Capacitors follow roughly the 10K rule of Arrhenius. It is possible to estimate the Lifetime by rule of thumb: When the operational temperature is reduced by 10K, the Lifetime will double. The formula for $\mathbf{K_T}$ in detail is:

$$K_T = 2^{\frac{T_0 - T_A}{10K}}$$

WHERE:

- T_0 Rated Temperature
- T_A Ambient Temperature

FREQUENCY CORRECTION FACTORS:

If the actual Ripple Currents are not given at the same frequency like I_0, correction factors need to be applied.

$$I_A = \sqrt{\left(\frac{I_{f1}}{F_{f1}}\right)^2 + \left(\frac{I_{f2}}{F_{f2}}\right)^2 + \ldots \left(\frac{I_{fn}}{F_{fn}}\right)^2}$$

K_R RIPPLE CURRENT FACTOR

To estimate the influence of ripple current on lifetime, Jianghai uses a safety factor K_i. Under certain conditions this value can be set to K_i=2, which is prolonging the lifetime. Please contact Jianghai Europe for details and approval.

$$K_R = K_i^{A\frac{\Delta T_0}{10K}}$$

WITH:

$$A = 1 - \left(\frac{I_A}{I_R}\right)^2$$

WHERE:

- I_A Actual Rated Ripple Current
- I_R Ripple Current at Upper Category Temperature (databook value)
- ΔT_0 Core Temperature Rise of the capacitor (typically 3,5 ~ 5K for T_0 = 105°C and 3,5 ~ 10K for T_0= 85°C, see databook value)
- K_i Basis, typically defined as

T_0 = 105°C	$I_A > I_R$:	K_i = 4
	$I_A \leq I_R$:	K_i = 2
T_0 = 85°C		K_i = 2

Remark: Safety Factor K_i may be set as K_i=2 under certain defined conditions. Please contact Jianghai Europe for approval.

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K_V VOLTAGE FACTOR

For Radial and SMT Electrolytic Capacitors, this part of the formula has no impact (K_V = 1). But for some bigger capacitors like Snap-In and Screw-Terminal types with rated voltages above 160V, the operating voltage will affect their Lifetime. It is expressed as follows:

FOR:

$$0{,}6 \leq \frac{U_A}{U_R} \leq 1$$

$$K_V = \left(\frac{U_A}{U_R}\right)^{-2{,}5}$$

WHERE:

U_A Actual Operating Voltage

U_R Rated Voltage

FOR:

$$0 < \frac{U_A}{U_R} < 0{,}6$$

$$K_V = 3{,}59$$

FOR:

$$\frac{U_A}{U_R} > 1 \; not\ allowed$$

$$K_V = 1$$

FOR: Radial and SMT Capacitors or $U_R \leqslant 160V$

$$K_V = 1$$

JIANGHAI ELECTROLYTIC CAPACITOR LIFETIME ESTIMATION FORMULA (incl. Safety Factors):

$$L = L_0 \cdot 2^{\frac{T_0 - T_A}{10K}} \cdot K_i^{\left[1 - \left(\frac{I_A}{I_R}\right)^2\right] \cdot \frac{\Delta T_0}{10K}} \cdot \underbrace{\left(\frac{U_A}{U_R}\right)^{-n}}_{K_V}$$

WITH TYPICAL VALUES:

T_0 = 105°C	$I_A > I_R$:	K_i=4
	$I_A \leqslant I_R$:	K_i=2
T_0 = 85°C		K_i=2

ΔT_0= depending on the series: 3,5~10K, see databook value

$$0{,}6 \leq \frac{U_A}{U_R} \leq 1 \rightarrow n = 2{,}5$$

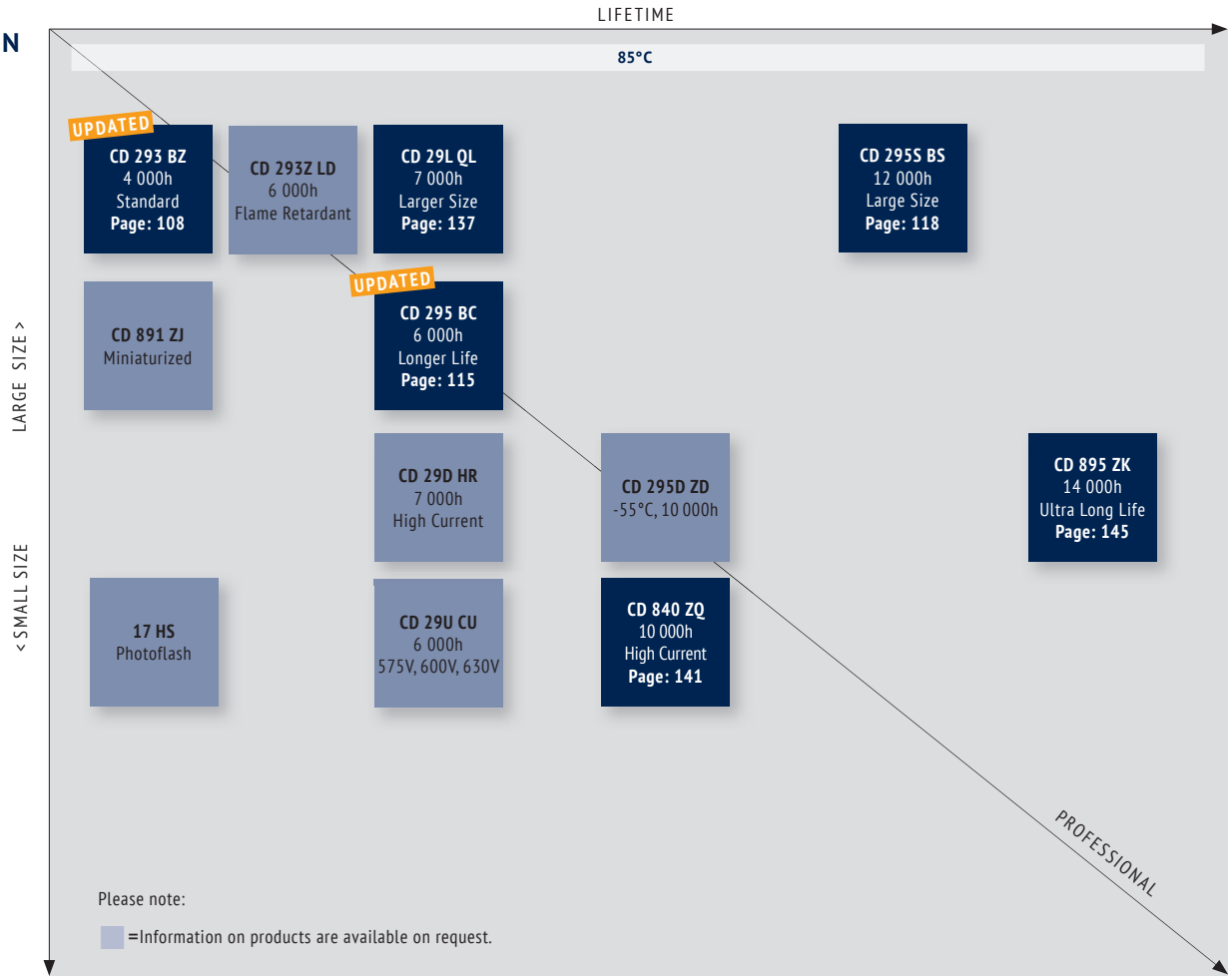
$$0 < \frac{U_A}{U_R} < 0{,}6 \rightarrow K_V = \left(\frac{U_A}{U_R}\right)^{-n} = 3{,}59$$

For $U_R \leqslant 160V$, Radial and SMT

$$\frac{U_A}{U_R} > 1 \rightarrow K_V = 1$$

OUR SNAP-IN IN RELATION TO ONE ANOTHER

SNAP-IN 85°C



SNAP-IN 105°C/ 125°C

