



**CAPACITOR  
COMPETENCE**  
*since 1958*

ALUMINUM ELECTROLYTIC CAPACITORS

---

ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE

# CD 297 BB SERIES

**JIANGHAI EUROPE**  
Electronic Components GmbH

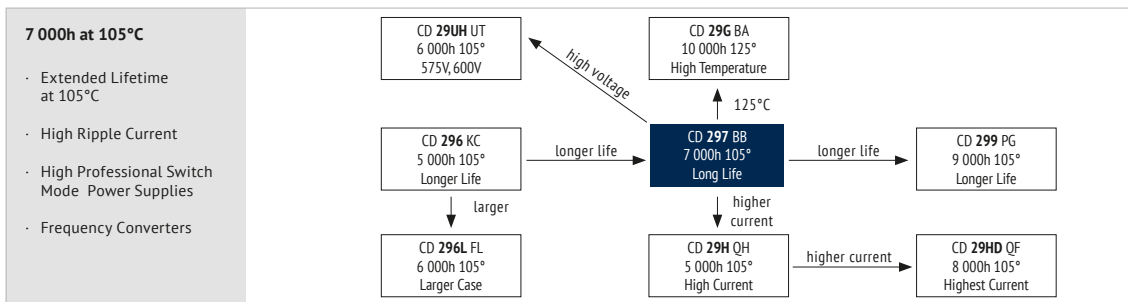


ENGINEERED SOLUTIONS

v2019.1

# CD 297 BB SERIES

## ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE



### ITEM CHARACTERISTICS

Operating Temperature Range (°C)	-40 ~ +105	-25 ~ +105		
Voltage Range (V)	10 ~ 100	160 ~ 550		
Capacitance Range (µF)	47 ~ 56 000			
Capacitance Tolerance (20°C, 120Hz)	± 20%			
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 ~ 100	160 ~ 250	315 ~ 550
	$Z_{-25°C} / Z_{+20°C}$	4	3	8
	$Z_{-40°C} / Z_{+20°C}$	15	-	-
Fast Charge-Discharge	Please contact Jianghai for an appropriate choice of the capacitor or possible technical adaptations, esp. for applications like: Welding, Photoflash, Servo motors, X-Ray			

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

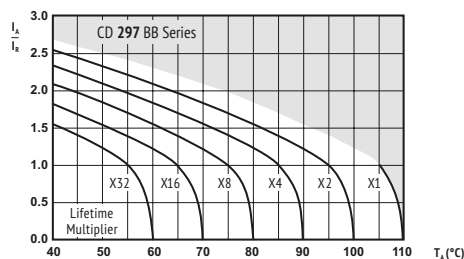
ITEM	USEFUL LIFE		LOAD LIFE	ENDURANCE TEST	SHELF LIFE	
Lifetime	7 000h	> 200 000h	5 000h	5 000h	1 000h	
Leakage Current	Not more than specified value		Not more than specified value	Not more than specified value	Not more than specified value	
Capacitance Change	Within ± 30% of initial value		Within ± 20% of initial value	Within ± 20% of initial value	Within ± 20% of initial value	
Dissipation Factor	Not more than 300% of specified value		Not more than 200% of specified value	Not more than 200% of specified value	Not more than 200% of specified value	
Condition: Applied Voltage Applied Current Applied Temperature	$U_R$ $I_R$ 105°C	$U_R$ $1,6 \times I_R$ 40°C	$U_R$ $I_R$ 105°C	$U_R$ $I_R = 0$ 105°C IEC 60384	$U_R = 0$ $I_R = 0$ 105°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	500Hz	1kHz	10kHz	≥ 40 kHz
10 ~ 100	0,90	1,00	1,10	1,15	1,15	1,15
160 ~ 250	0,80	1,00	1,20	1,30	1,45	1,50
≥ 315	0,80	1,00	1,20	1,30	1,42	1,45

Multipliers for typical operating conditions.

### MULTIPLIER FOR LIFETIME (LIFETIME DIAGRAM)



$I_A$  = actual ripple current at 120Hz,  
 $I_R$  = rated ripple current at 120Hz, 105°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](http://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.

## JIANGHAI EUROPE

Electronic Components GmbH



ENGINEERED SOLUTIONS

Customer specific adaptations needed? Please contact Jianghai Europe GmbH:  
TELEFON: +49 (0) 2151 652088-72 | E-MAIL: [INFO@JIANGHAI-EUROPE.COM](mailto:INFO@JIANGHAI-EUROPE.COM)

# CD 297 BB SERIES

## ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE

U <sub>DC</sub> (Surge Voltage) Code	C <sub>r</sub> (μF)	ESR <sub>max</sub> (mΩ)	ESR <sub>typ</sub> (mΩ)	tanδ 20°C 120Hz	I <sub>leak</sub> (mA)	I <sub>ripple</sub> (Amps)	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
10 (13) 1A	8200	89	62	0,55	0,8	1,36	22 x 25	ECS1ABB822M◇◇△△2225
	10000	73	51	0,55	1,0	1,65	22 x 30	ECS1ABB103M◇◇△△2230
	12000	61	43	0,55	1,2	1,85	22 x 35	ECS1ABB123M◇◇△△2235
		61	43	0,55	1,2	1,82	25 x 25	ECS1ABB123M◇◇△△2525
	15000	49	34	0,55	1,5	2,12	22 x 40	ECS1ABB153M◇◇△△2240
		49	34	0,55	1,5	2,11	25 x 30	ECS1ABB153M◇◇△△2530
	18000	49	34	0,55	1,5	2,14	30 x 25	ECS1ABB153M◇◇△△3025
		41	28	0,55	1,5	2,40	22 x 45	ECS1ABB183M◇◇△△2245
	22000	41	28	0,55	1,5	2,32	25 x 35	ECS1ABB183M◇◇△△2535
		34	23	0,55	1,5	2,59	25 x 40	ECS1ABB223M◇◇△△2540
	27000	34	23	0,55	1,5	2,73	30 x 30	ECS1ABB223M◇◇△△3030
		28	19	0,55	1,5	3,01	25 x 45	ECS1ABB273M◇◇△△2545
33000	33	23	0,55	1,5	3,13	30 x 35	ECS1ABB273M◇◇△△3035	
	28	19	0,55	1,5	3,05	35 x 30	ECS1ABB273M◇◇△△3530	
39000	23	16	0,55	1,5	3,43	25 x 50	ECS1ABB333M◇◇△△2550	
	23	16	0,55	1,5	3,53	30 x 40	ECS1ABB333M◇◇△△3040	
47000	23	16	0,55	1,5	3,49	35 x 35	ECS1ABB333M◇◇△△3535	
	19	13	0,55	1,5	3,78	30 x 45	ECS1ABB393M◇◇△△3045	
56000	19	13	0,55	1,5	3,96	35 x 40	ECS1ABB393M◇◇△△3540	
	16	11	0,55	1,5	4,58	30 x 50	ECS1ABB473M◇◇△△3050	
	16	11	0,55	1,5	4,60	35 x 45	ECS1ABB473M◇◇△△3545	
	14	9	0,55	1,5	5,06	35 x 50	ECS1ABB563M◇◇△△3550	

U <sub>DC</sub> (Surge Voltage) Code	C <sub>r</sub> (μF)	ESR <sub>max</sub> (mΩ)	ESR <sub>typ</sub> (mΩ)	tanδ 20°C 120Hz	I <sub>leak</sub> (mA)	I <sub>ripple</sub> (Amps)	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
16 (20) 1C	5600	119	83	0,50	0,9	1,44	22 x 25	ECS1CBB562M◇◇△△2225
	6800	98	68	0,50	1,1	1,66	22 x 30	ECS1CBB682M◇◇△△2230
	8200	81	57	0,50	1,3	1,67	25 x 25	ECS1CBB822M◇◇△△2525
	10000	67	46	0,50	1,5	2,08	22 x 35	ECS1CBB103M◇◇△△2235
		67	46	0,50	1,5	2,07	25 x 30	ECS1CBB103M◇◇△△2530
	12000	56	39	0,50	1,5	2,36	22 x 40	ECS1CBB123M◇◇△△2240
		56	39	0,50	1,5	2,37	25 x 35	ECS1CBB123M◇◇△△2535
	15000	56	39	0,50	1,5	2,33	30 x 25	ECS1CBB123M◇◇△△3025
		45	31	0,50	1,5	2,69	22 x 45	ECS1CBB153M◇◇△△2245
	18000	45	31	0,50	1,5	2,72	25 x 40	ECS1CBB153M◇◇△△2540
		45	31	0,50	1,5	2,54	30 x 30	ECS1CBB153M◇◇△△3030
	22000	37	26	0,50	1,5	3,06	25 x 45	ECS1CBB183M◇◇△△2545
37		26	0,50	1,5	3,02	30 x 35	ECS1CBB183M◇◇△△3035	
27000	37	26	0,50	1,5	3,09	35 x 30	ECS1CBB183M◇◇△△3530	
	31	21	0,50	1,5	3,39	25 x 50	ECS1CBB223M◇◇△△2550	
33000	31	21	0,50	1,5	3,46	30 x 40	ECS1CBB223M◇◇△△3040	
	25	17	0,50	1,5	3,88	30 x 45	ECS1CBB273M◇◇△△3045	
39000	25	17	0,50	1,5	3,85	35 x 35	ECS1CBB273M◇◇△△3535	
	21	14	0,50	1,5	4,33	30 x 50	ECS1CBB333M◇◇△△3050	
47000	21	14	0,50	1,5	4,33	35 x 40	ECS1CBB333M◇◇△△3540	
	18	12	0,50	1,5	4,96	35 x 45	ECS1CBB393M◇◇△△3545	
	15	10	0,50	1,5	5,49	35 x 50	ECS1CBB473M◇◇△△3550	

U <sub>DC</sub> (Surge Voltage) Code	C <sub>r</sub> (μF)	ESR <sub>max</sub> (mΩ)	ESR <sub>typ</sub> (mΩ)	tanδ 20°C 120Hz	I <sub>leak</sub> (mA)	I <sub>ripple</sub> (Amps)	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
25 (32) 1E	3900	154	107	0,45	1,0	1,31	22 x 25	ECS1EBB392M◇◇△△2225
	4700	127	89	0,45	1,2	1,55	22 x 30	ECS1EBB472M◇◇△△2230
	5600	107	75	0,45	1,4	1,77	22 x 35	ECS1EBB562M◇◇△△2235
		107	75	0,45	1,4	1,76	25 x 25	ECS1EBB562M◇◇△△2525
	6800	88	62	0,45	1,5	2,02	22 x 40	ECS1EBB682M◇◇△△2240
		88	62	0,45	1,5	1,88	25 x 30	ECS1EBB682M◇◇△△2530
	8200	73	51	0,45	1,5	2,27	22 x 45	ECS1EBB822M◇◇△△2245
		73	51	0,45	1,5	2,18	25 x 35	ECS1EBB822M◇◇△△2535
	10000	73	51	0,45	1,5	2,19	30 x 25	ECS1EBB822M◇◇△△3025
		60	42	0,45	1,5	2,56	22 x 50	ECS1EBB103M◇◇△△2250
	12000	60	42	0,45	1,5	2,53	25 x 40	ECS1EBB103M◇◇△△2540
		60	42	0,45	1,5	2,38	30 x 30	ECS1EBB103M◇◇△△3030
15000	50	35	0,45	1,5	2,79	25 x 45	ECS1EBB123M◇◇△△2545	
	50	35	0,45	1,5	2,70	30 x 35	ECS1EBB123M◇◇△△3035	
18000	50	35	0,45	1,5	2,76	35 x 30	ECS1EBB123M◇◇△△3530	
	40	28	0,45	1,5	3,13	30 x 40	ECS1EBB153M◇◇△△3040	
22000	34	23	0,45	1,5	3,52	30 x 45	ECS1EBB183M◇◇△△3045	
	34	23	0,45	1,5	3,50	35 x 35	ECS1EBB183M◇◇△△3535	
27000	28	19	0,45	1,5	3,92	30 x 50	ECS1EBB223M◇◇△△3050	
	28	19	0,45	1,5	3,95	35 x 40	ECS1EBB223M◇◇△△3540	
	23	16	0,45	1,5	4,72	35 x 50	ECS1EBB273M◇◇△△3550	

U <sub>DC</sub> (Surge Voltage) Code	C <sub>r</sub> (μF)	ESR <sub>max</sub> (mΩ)	ESR <sub>typ</sub> (mΩ)	tanδ 20°C 120Hz	I <sub>leak</sub> (mA)	I <sub>ripple</sub> (Amps)	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
35 (44) 1V	2700	197	138	0,40	0,9	1,29	22 x 25	ECS1VBB272M◇◇△△2225
	3300	161	113	0,40	1,2	1,54	22 x 30	ECS1VBB332M◇◇△△2230
	3900	137	95	0,40	1,4	1,77	22 x 35	ECS1VBB392M◇◇△△2235
		137	95	0,40	1,4	1,75	25 x 25	ECS1VBB392M◇◇△△2525
	4700	113	79	0,40	1,5	2,01	22 x 40	ECS1VBB472M◇◇△△2240
		113	79	0,40	1,5	1,97	25 x 30	ECS1VBB472M◇◇△△2530
	5600	95	66	0,40	1,5	2,25	22 x 45	ECS1VBB562M◇◇△△2245
		95	66	0,40	1,5	2,18	25 x 35	ECS1VBB562M◇◇△△2535
	6800	95	66	0,40	1,5	2,08	30 x 25	ECS1VBB562M◇◇△△3025
		79	55	0,40	1,5	2,49	22 x 50	ECS1VBB682M◇◇△△2250
	8200	79	55	0,40	1,5	2,45	25 x 40	ECS1VBB682M◇◇△△2540
		79	55	0,40	1,5	2,28	30 x 30	ECS1VBB682M◇◇△△3030
10000	65	45	0,40	1,5	2,80	25 x 45	ECS1VBB822M◇◇△△2545	
	65	45	0,40	1,5	2,69	30 x 35	ECS1VBB822M◇◇△△3035	
12000	54	37	0,40	1,5	3,04	30 x 40	ECS1VBB103M◇◇△△3040	
	54	37	0,40	1,5	2,78	35 x 30	ECS1VBB103M◇◇△△3530	
15000	45	31	0,40	1,5	3,38	30 x 45	ECS1VBB123M◇◇△△3045	
	45	31	0,40	1,5	3,30	35 x 35	ECS1VBB123M◇◇△△3535	
18000	36	25	0,40	1,5	3,98	35 x 40	ECS1VBB153M◇◇△△3540	
	30	21	0,40	1,5	4,40	35 x 45	ECS1VBB183M◇◇△△3545	

U <sub>DC</sub> (Surge Voltage) Code	C <sub>r</sub> (μF)	ESR <sub>max</sub> (mΩ)	ESR <sub>typ</sub> (mΩ)	tanδ 20°C 120Hz	I <sub>leak</sub> (mA)	I <sub>ripple</sub> (Amps)	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
50 (63) 1H	1500	310	217	0,35	0,8	1,21	22 x 25	ECS1HBB152M◇◇△△2225
	2200	212	148	0,35	1,1	1,52	22 x 30	ECS1HBB222M◇◇△△2230
	2700	212	148	0,35	1,1	1,46	25 x 25	ECS1HBB222M◇◇△△2525
		172	120	0,35	1,4	1,77	22 x 35	ECS1HBB272M◇◇△△2235
	3300	172	120	0,35	1,4	1,76	25 x 30	ECS1HBB272M◇◇△△2530
		141	99	0,35	1,5	2,02	22 x 40	ECS1HBB332M◇◇△△2240
	3900	141	99	0,35	1,5	1,92	30 x 25	ECS1HBB332M◇◇△△3025
		120	83	0,35	1,5	2,27	22 x 45	ECS1HBB392M◇◇△△2245
	4700	120	83	0,35	1,5	2,20	25 x 35	ECS1HBB392M◇◇△△2535
		120	83	0,35	1,5	2,19	30 x 30	ECS1HBB392M◇◇△△3030
	5600	99	69	0,35	1,5	2,43	25 x 40	ECS1HBB472M◇◇△△2540
		83	58	0,35	1,5	2,72	25 x 45	ECS1HBB562M◇◇△△2545
6800	83	58	0,35	1,5	2,58	30 x 35	ECS1HBB562M◇◇△△3035	
	69	48	0,35	1,5	3,01	30 x 40	ECS1HBB682M◇◇△△3040	
8200	69	48	0,35	1,5	2,91	35 x 35	ECS1HBB682M◇◇△△3535	
	57	40	0,35	1,5	3,63	30 x 50	ECS1HBB822M◇◇△△3050	
10000	57	40	0,35	1,5	3,36	35 x 40	ECS1HBB822M◇◇△△3540	
	47	33	0,35	1,5	3,79	35 x 45	ECS1HBB103M◇◇△△3545	
	39	27	0,35	1,5	4,06	35 x 50	ECS1HBB123M◇◇△△3550	

U <sub>DC</sub> (Surge Voltage) Code	C <sub>r</sub> (μF)	ESR <sub>max</sub> (mΩ)	ESR <sub>typ</sub> (mΩ)	tanδ 20°C 120Hz	I <sub>leak</sub> (mA)	I <sub>ripple</sub> (Amps)	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
63 (79) 1J	1000	398	279	0,30	0,6	1,10	22 x 25	ECS1JBB102M◇◇△△2225
	1500	266	186	0,30	0,9	1,41	22 x 30	ECS1JBB152M◇◇△△2230
	1800	266	186	0,30	0,9	1,38	25 x 25	ECS1JBB152M◇◇△△2525
		222	155	0,30	1,1	1,62	22 x 35	ECS1JBB182M◇◇△△2235
	2200	222	155	0,30	1,1	1,63	25 x 30	ECS1JBB182M◇◇△△2530
		181	127	0,30	1,4	1,85	22 x 40	ECS1JBB222M◇◇△△2240
	2700	181	127	0,30	1,4	1,80	30 x 25	ECS1JBB222M◇◇△△3025
		148	103	0,30	1,5	2,10	22 x 45	ECS1JBB272M◇◇△△2245
	3300	148	103	0,30	1,5	2,03	25 x 35	ECS1JBB272M◇◇△△2535
		148	103	0				

# CD 297 BB SERIES

## ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
<b>100 (125) 2A</b>	1000	266	186	0,20	1,0	1,56	22 x 40	ECS2ABB102M◇◇△△2240
		266	186	0,20	1,0	1,52	25 x 30	ECS2ABB102M◇◇△△2530
		266	186	0,20	1,0	1,47	30 x 25	ECS2ABB102M◇◇△△3025
	1200	222	155	0,20	1,2	1,76	22 x 45	ECS2ABB122M◇◇△△2245
		222	155	0,20	1,2	1,76	25 x 35	ECS2ABB122M◇◇△△2535
		222	155	0,20	1,2	1,76	30 x 30	ECS2ABB122M◇◇△△3030
	1500	177	124	0,20	1,5	2,00	22 x 50	ECS2ABB152M◇◇△△2250
		177	124	0,20	1,5	2,03	25 x 40	ECS2ABB152M◇◇△△2540
		148	103	0,20	1,5	2,29	25 x 45	ECS2ABB182M◇◇△△2545
	1800	148	103	0,20	1,5	2,19	30 x 35	ECS2ABB182M◇◇△△3035
		148	103	0,20	1,5	2,15	35 x 30	ECS2ABB182M◇◇△△3530
		121	84	0,20	1,5	2,52	30 x 40	ECS2ABB222M◇◇△△3040
	2200	121	84	0,20	1,5	2,48	35 x 35	ECS2ABB222M◇◇△△3535
		99	69	0,20	1,5	2,86	30 x 45	ECS2ABB272M◇◇△△3045
		99	69	0,20	1,5	2,87	35 x 40	ECS2ABB272M◇◇△△3540
	3300	81	56	0,20	1,5	3,25	35 x 45	ECS2ABB332M◇◇△△3545
	3900	69	48	0,20	1,5	3,56	35 x 50	ECS2ABB392M◇◇△△3550

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6	
<b>160 (200) 2C</b>	220	905	633	0,15	0,4	0,63	22 x 25	ECS2CBB221M◇◇△△2225	
	270	737	516	0,15	0,4	0,76	22 x 30	ECS2CBB271M◇◇△△2230	
	330	603	422	0,15	0,5	0,90	22 x 35	ECS2CBB331M◇◇△△2235	
		603	422	0,15	0,5	0,84	25 x 25	ECS2CBB331M◇◇△△2525	
	390	511	357	0,15	0,6	0,97	25 x 30	ECS2CBB391M◇◇△△2530	
		511	357	0,15	0,6	1,00	30 x 25	ECS2CBB391M◇◇△△3025	
	470	424	296	0,15	0,8	1,11	22 x 40	ECS2CBB471M◇◇△△2240	
		424	296	0,15	0,8	1,14	25 x 35	ECS2CBB471M◇◇△△2535	
	560	424	296	0,15	0,8	1,17	30 x 30	ECS2CBB471M◇◇△△3030	
		356	249	0,15	0,9	1,26	22 x 45	ECS2CBB561M◇◇△△2245	
	680	293	205	0,15	1,1	1,44	22 x 50	ECS2CBB681M◇◇△△2250	
		293	205	0,15	1,1	1,43	25 x 40	ECS2CBB681M◇◇△△2540	
	820	293	205	0,15	1,1	1,50	30 x 35	ECS2CBB681M◇◇△△3035	
		243	170	0,15	1,3	1,63	25 x 45	ECS2CBB821M◇◇△△2545	
	1000	243	170	0,15	1,3	1,66	30 x 40	ECS2CBB821M◇◇△△3040	
		243	170	0,15	1,3	1,63	35 x 30	ECS2CBB821M◇◇△△3530	
	1200	199	139	0,15	1,5	1,89	30 x 45	ECS2CBB102M◇◇△△3045	
		199	139	0,15	1,5	1,89	35 x 35	ECS2CBB102M◇◇△△3535	
	1500	166	116	0,15	1,5	2,16	30 x 50	ECS2CBB122M◇◇△△3050	
		166	116	0,15	1,5	2,23	35 x 40	ECS2CBB122M◇◇△△3540	
	1800	133	93	0,15	1,5	2,61	35 x 45	ECS2CBB152M◇◇△△3545	
		1800	111	77	0,15	1,5	2,97	35 x 50	ECS2CBB182M◇◇△△3550

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6	
<b>200 (250) 2D</b>	180	1106	774	0,15	0,4	0,57	22 x 25	ECS2DDB181M◇◇△△2225	
	220	905	633	0,15	0,4	0,70	22 x 30	ECS2DDB221M◇◇△△2230	
	270	737	516	0,15	0,5	0,83	22 x 35	ECS2DDB271M◇◇△△2235	
		737	516	0,15	0,5	0,76	25 x 25	ECS2DDB271M◇◇△△2525	
	330	603	422	0,15	0,7	0,96	22 x 40	ECS2DDB331M◇◇△△2240	
		603	422	0,15	0,7	0,90	25 x 30	ECS2DDB331M◇◇△△2530	
	390	511	357	0,15	0,8	1,06	25 x 35	ECS2DDB391M◇◇△△2535	
		511	357	0,15	0,8	1,02	30 x 25	ECS2DDB391M◇◇△△3025	
	470	424	296	0,15	0,9	1,17	22 x 45	ECS2DDB471M◇◇△△2245	
		424	296	0,15	0,9	1,22	25 x 40	ECS2DDB471M◇◇△△2540	
	560	424	296	0,15	0,9	1,17	30 x 30	ECS2DDB471M◇◇△△3030	
		356	249	0,15	1,1	1,39	25 x 45	ECS2DDB561M◇◇△△2545	
	680	356	249	0,15	1,1	1,38	30 x 35	ECS2DDB561M◇◇△△3035	
		293	205	0,15	1,4	1,58	25 x 50	ECS2DDB681M◇◇△△2550	
	820	293	205	0,15	1,4	1,61	30 x 40	ECS2DDB681M◇◇△△3040	
		293	205	0,15	1,4	1,49	35 x 30	ECS2DDB681M◇◇△△3530	
	1000	243	170	0,15	1,5	1,85	30 x 45	ECS2DDB821M◇◇△△3045	
		243	170	0,15	1,5	1,75	35 x 35	ECS2DDB821M◇◇△△3535	
	1200	199	139	0,15	1,5	2,11	30 x 50	ECS2DDB102M◇◇△△3050	
		199	139	0,15	1,5	2,07	35 x 40	ECS2DDB102M◇◇△△3540	
	1500	166	116	0,15	1,5	2,38	35 x 45	ECS2DDB122M◇◇△△3545	
		1500	133	93	0,15	1,5	2,76	35 x 50	ECS2DDB152M◇◇△△3550

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
<b>250 (300) 2E</b>	150	1327	929	0,15	0,4	0,52	22 x 25	ECS2EBB151M◇◇△△2225
	180	1106	774	0,15	0,5	0,64	22 x 30	ECS2EBB181M◇◇△△2230
	1106	774	0,15	0,5	0,62	25 x 25	ECS2EBB181M◇◇△△2525	
	220	905	633	0,15	0,6	0,76	22 x 35	ECS2EBB221M◇◇△△2235

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
<b>250 (300) 2E</b>	220	905	633	0,15	0,6	0,76	25 x 30	ECS2EBB221M◇◇△△2530
		737	516	0,15	0,7	0,88	22 x 40	ECS2EBB271M◇◇△△2240
		737	516	0,15	0,7	0,90	25 x 35	ECS2EBB271M◇◇△△2535
	270	737	516	0,15	0,7	0,85	30 x 25	ECS2EBB271M◇◇△△3025
		603	422	0,15	0,8	1,01	22 x 45	ECS2EBB331M◇◇△△2245
		603	422	0,15	0,8	1,00	30 x 30	ECS2EBB331M◇◇△△3030
	330	511	357	0,15	1,0	1,13	22 x 50	ECS2EBB391M◇◇△△2250
		511	357	0,15	1,0	1,13	25 x 40	ECS2EBB391M◇◇△△2540
		511	357	0,15	1,0	1,15	30 x 35	ECS2EBB391M◇◇△△3035
	390	424	296	0,15	1,2	1,29	25 x 45	ECS2EBB471M◇◇△△2545
		424	296	0,15	1,2	1,24	35 x 30	ECS2EBB471M◇◇△△3530
		356	249	0,15	1,4	1,45	25 x 50	ECS2EBB561M◇◇△△2550
	470	356	249	0,15	1,4	1,48	30 x 40	ECS2EBB561M◇◇△△3040
		356	249	0,15	1,4	1,49	35 x 35	ECS2EBB561M◇◇△△3535
		293	205	0,15	1,5	1,71	30 x 45	ECS2EBB681M◇◇△△3045
	560	293	205	0,15	1,5	1,74	35 x 40	ECS2EBB681M◇◇△△3540
		293	205	0,15	1,5	1,74	35 x 40	ECS2EBB681M◇◇△△3540
		293	205	0,15	1,5	1,74	35 x 40	ECS2EBB681M◇◇△△3540
680	820	243	170	0,15	1,5	1,94	30 x 50	ECS2EBB821M◇◇△△3050
	1000	199	139	0,15	1,5	2,20	35 x 45	ECS2EBB102M◇◇△△3545

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
<b>315 (365) 2F</b>	68	2926	1610	0,15	0,2	0,32	22 x 25	ECS2FBB680M◇◇△△2225
	82	2427	1334	0,15	0,3	0,38	22 x 30	ECS2FBB820M◇◇△△2230
	100	1990	1095	0,15	0,3	0,41	25 x 25	ECS2FBB101M◇◇△△2525
		1658	912	0,15	0,4	0,48	22 x 35	ECS2FBB121M◇◇△△2235
	120	1658	912	0,15	0,4	0,49	25 x 30	ECS2FBB121M◇◇△△2530
		1327	730	0,15	0,5	0,56	22 x 40	ECS2FBB151M◇◇△△2240
	150	1327	730	0,15	0,5	0,51	30 x 25	ECS2FBB151M◇◇△△3025
		1106	608	0,15	0,6	0,63	22 x 45	ECS2FBB181M◇◇△△2245
	180	1106	608	0,15	0,6	0,62	25 x 35	ECS2FBB181M◇◇△△2535
		1106	608	0,15	0,6	0,63	30 x 30	ECS2FBB181M◇◇△△3030
	220	905	498	0,15	0,7	0,72	22 x 50	ECS2FBB221M◇◇△△2250
		905	498	0,15	0,7	0,71	25 x 40	ECS2FBB221M◇◇△△2540
	270	905	498	0,15	0,7	0,74	30 x 35	ECS2FBB221M◇◇△△3035
		737	406	0,15	0,9	0,81	25 x 45	ECS2FBB271M◇◇△△2545
	330	737	406	0,15	0,9	0,85	30 x 40	ECS2FBB271M◇◇△△3040
		737	406	0,15	0,9	0,82	35 x 30	ECS2FBB271M◇◇△△3530
	390	603	332	0,15	1,0	0,92	25 x 50	ECS2FBB331M◇◇△△2550
		603	332	0,15	1,0	0,90	35 x 35	ECS2FBB331M◇◇△△3535
	470	511	281	0,15	1,2	1,04	30 x 45	ECS2FBB391M◇◇△△3045
		511	281	0,15	1,2	1,05	35 x 40	ECS2FBB391M◇◇△△3540
	560	424	233	0,15	1,5	1,18	35 x 45	ECS2FBB471M◇◇△△3050
		424	233	0,15	1,5	1,18	35 x 45	ECS2FBB471M◇◇△△3545

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C 120Hz	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
<b>350 (400) 2V</b>	68	2926	1610	0,15	0,2	0,34	22 x 25	ECS2VBB680M◇◇△△2225
	82	2427	1334	0,15	0,3	0,40	22 x 30	ECS2VBB820M◇◇△△2230
	100	1990	1095	0,15	0,4	0,47	25 x 25	ECS2VBB101M◇◇△△2525
		1658	912	0,15	0,4	0,52	22 x 35	ECS2VBB121M◇◇△△2235
	120	1658	912	0,15	0,4	0,53	25 x 30	ECS2VBB121M◇◇△△2530
		1658	912	0,15	0,4	0,53	30 x 25	ECS2VBB121M◇◇△△3025
	150							

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
400 (450) 2G	68	2926	1522	0,15	0,3	0,38	22 x 30	ECS2GBB680M◇◇△△2230
		82	2427	1262	0,15	0,3	0,41	25 x 25
	100	1990	1035	0,15	0,4	0,46	22 x 35	ECS2GBB101M◇◇△△2235
		1990	1035	0,15	0,4	0,48	25 x 30	ECS2GBB101M◇◇△△2530
	120	1990	1035	0,15	0,4	0,48	30 x 25	ECS2GBB101M◇◇△△3025
		1658	863	0,15	0,5	0,53	22 x 40	ECS2GBB121M◇◇△△2240
	150	1658	863	0,15	0,5	0,55	25 x 35	ECS2GBB121M◇◇△△2535
		1658	863	0,15	0,5	0,56	30 x 30	ECS2GBB121M◇◇△△3030
	180	1327	690	0,15	0,6	0,63	22 x 50	ECS2GBB151M◇◇△△2250
		1327	690	0,15	0,6	0,65	25 x 40	ECS2GBB151M◇◇△△2540
	220	1106	575	0,15	0,7	0,72	25 x 45	ECS2GBB181M◇◇△△2545
		1106	575	0,15	0,7	0,74	30 x 35	ECS2GBB181M◇◇△△3035
	270	905	471	0,15	0,9	0,79	25 x 50	ECS2GBB221M◇◇△△2550
		905	471	0,15	0,9	0,85	30 x 40	ECS2GBB221M◇◇△△3040
	330	905	471	0,15	0,9	0,89	35 x 30	ECS2GBB221M◇◇△△3530
		737	383	0,15	1,1	0,98	30 x 45	ECS2GBB271M◇◇△△3045
	390	737	383	0,15	1,1	0,96	35 x 35	ECS2GBB271M◇◇△△3535
		603	314	0,15	1,3	1,12	30 x 50	ECS2GBB331M◇◇△△3050
	470	603	314	0,15	1,3	1,12	35 x 40	ECS2GBB331M◇◇△△3540
		511	265	0,15	1,5	1,27	35 x 45	ECS2GBB391M◇◇△△3545
		470	424	0,15	1,5	1,33	35 x 50	ECS2GBB471M◇◇△△3550

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
450 (500) 2W	68	3901	1951	0,20	0,3	0,38	22 x 30	ECS2WBB680M◇◇△△2230
		82	3235	1618	0,20	0,4	0,44	22 x 35
	100	3235	1618	0,20	0,4	0,45	25 x 30	ECS2WBB820M◇◇△△2530
		3235	1618	0,20	0,4	0,46	30 x 25	ECS2WBB820M◇◇△△3025
	120	2653	1327	0,20	0,5	0,50	22 x 40	ECS2WBB101M◇◇△△2240
		2653	1327	0,20	0,5	0,52	25 x 35	ECS2WBB101M◇◇△△2535
	150	2211	1106	0,20	0,5	0,58	22 x 50	ECS2WBB121M◇◇△△2250
		2211	1106	0,20	0,5	0,58	25 x 40	ECS2WBB121M◇◇△△2540
	180	2211	1106	0,20	0,5	0,58	30 x 30	ECS2WBB121M◇◇△△3030
		1769	884	0,20	0,7	0,66	25 x 45	ECS2WBB151M◇◇△△2545
	220	1769	884	0,20	0,7	0,68	30 x 35	ECS2WBB151M◇◇△△3035
		1474	737	0,20	0,8	0,74	25 x 50	ECS2WBB181M◇◇△△2550
	270	1474	737	0,20	0,8	0,77	30 x 40	ECS2WBB181M◇◇△△3040
		1474	737	0,20	0,8	0,77	35 x 30	ECS2WBB181M◇◇△△3530
	330	1206	603	0,20	1,0	0,88	30 x 45	ECS2WBB221M◇◇△△3045
		1206	603	0,20	1,0	0,88	35 x 35	ECS2WBB221M◇◇△△3535
	390	983	491	0,20	1,2	0,99	30 x 50	ECS2WBB271M◇◇△△3050
		983	491	0,20	1,2	1,01	35 x 40	ECS2WBB271M◇◇△△3540
	470	804	402	0,20	1,5	1,15	35 x 45	ECS2WBB331M◇◇△△3545
		804	402	0,20	1,5	1,18	35 x 50	ECS2WBB391M◇◇△△3550
		565	282	0,20	1,5	1,50	35 x 55	ECS2WBB471M◇◇△△3555

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6
500 (550) 2H	47	5644	2823	0,20	0,2	0,41	22 x 30	ECS2HBB470M◇◇△△2230
		56	4737	2370	0,20	0,3	0,47	22 x 30
	68	3901	1951	0,20	0,3	0,54	22 x 35	ECS2HBB680M◇◇△△2235
		3901	1951	0,20	0,3	0,54	25 x 30	ECS2HBB680M◇◇△△2530
	82	3235	1618	0,20	0,4	0,62	22 x 40	ECS2HBB820M◇◇△△2240
		3235	1618	0,20	0,4	0,62	25 x 35	ECS2HBB820M◇◇△△2535
	100	2653	1327	0,20	0,5	0,67	22 x 45	ECS2HBB101M◇◇△△2245
		2653	1327	0,20	0,5	0,67	25 x 40	ECS2HBB101M◇◇△△2540
	120	2653	1327	0,20	0,5	0,67	30 x 30	ECS2HBB101M◇◇△△3030
		2211	1106	0,20	0,6	0,77	22 x 50	ECS2HBB121M◇◇△△2250
	150	2211	1106	0,20	0,6	0,74	25 x 40	ECS2HBB121M◇◇△△2540
		2211	1106	0,20	0,6	0,77	30 x 35	ECS2HBB121M◇◇△△3035
	180	2211	1106	0,20	0,6	0,80	35 x 30	ECS2HBB121M◇◇△△3530
		1769	885	0,20	0,8	0,82	25 x 45	ECS2HBB151M◇◇△△2545
	220	1769	885	0,20	0,8	0,85	30 x 40	ECS2HBB151M◇◇△△3040
		1769	885	0,20	0,8	0,67	35 x 30	ECS2HBB151M◇◇△△3530
	270	1769	885	0,20	0,8	0,85	35 x 35	ECS2HBB151M◇◇△△3535
		1474	737	0,20	0,9	0,98	25 x 50	ECS2HBB181M◇◇△△2550
	330	1474	737	0,20	0,9	1,01	30 x 45	ECS2HBB181M◇◇△△3045
		1206	603	0,20	1,1	1,12	30 x 50	ECS2HBB221M◇◇△△3050
	390	1206	603	0,20	1,1	0,94	35 x 35	ECS2HBB221M◇◇△△3535
		1206	603	0,20	1,1	1,12	35 x 40	ECS2HBB221M◇◇△△3540
	470	983	492	0,20	1,4	1,25	30 x 50	ECS2HBB271M◇◇△△3050
		983	492	0,20	1,4	1,25	35 x 40	ECS2HBB271M◇◇△△3540

U <sub>RDC</sub> (Surge Voltage) Code	C <sub>R</sub> Rated Capacitance	ESR <sub>max</sub> Equivalent Series Resistance 20°C 120Hz	ESR <sub>typ</sub> Equivalent Series Resistance 20°C 120Hz	tanδ Dissipation Factor 20°C	I <sub>leak</sub> Leakage Current	I <sub>RAC</sub> Rated Ripple Current 105°C 120Hz	Size øD x L (mm)	ORDER CODE ◇◇ = pin style & length △△ = pin number Details: Page 6	
500 (550) 2H	330	804	402	0,20	1,5	1,36	35 x 45	ECS2HBB331M◇◇△△3545	
		390	681	340	0,20	1,5	1,54	35 x 50	ECS2HBB391M◇◇△△3550
	470	565	282	0,20	1,5	1,69	35 x 60	ECS2HBB471M◇◇△△3560	
550 (600) 2Y	150	1769	885	0,20	0,8	0,92	30 x 40	ECS2YBB151M◇◇△△3040	
		180	1474	737	0,20	1,0	1,03	30 x 50	ECS2YBB181M◇◇△△3050
	220	1474	737	0,20	1,0	1,03	35 x 35	ECS2YBB181M◇◇△△3535	
		1206	603	0,20	1,2	1,15	30 x 55	ECS2YBB221M◇◇△△3055	
	270	1206	603	0,20	1,2	1,15	35 x 40	ECS2YBB221M◇◇△△3540	
		983	492	0,20	1,5	1,30	35 x 45	ECS2YBB271M◇◇△△3545	
	330	804	402	0,20	1,5	1,48	35 x 50	ECS2YBB331M◇◇△△3550	
		390	681	340	0,20	1,5	1,65	35 x 60	ECS2YBB391M◇◇△△3560
	470	565	282	0,20	1,5	1,92	35 x 70	ECS2YBB471M◇◇△△3570	
		560	473	237	0,20	1,5	2,05	35 x 80	ECS2YBB561M◇◇△△3580
		560	473	237	0,20	1,5	2,05	40 x 70	ECS2YBB561M◇◇△△4070

**ORDER CODE SNAP-IN TYPE**

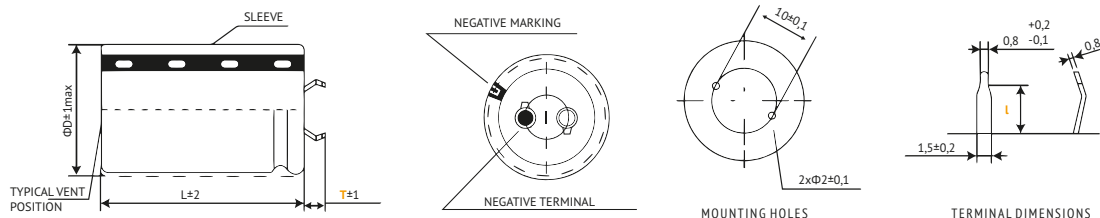
EC	S	2G	QC	221	M	T6	P2	2535	-	JExxxx
Technology	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code	Capacitance Tolerance	Terminal Style	Terminal / Pitch	Dimension (mm)	Material Code	for Specials only
EC Electrolytic Capacitor	Snap-In S	6,3V OJ	CD 293 BZ	0,1 OR1	±20% M	4,0mm Pin Length T/L4	<b>2 Pin P2</b>	22x40 2240	Standard -	
		10V 1A	CD 294 BW	0,47 R47	±10% K	<b>6,3mm Pin Length T/L6</b>	3 Pin P3	30x45 3045	PVC V	
		16V 1C	CD 295 BC	1,0 O10	+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  ■ = preferred	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					
		40V 1G	CD 297 BB	10 000 103						
		50V 1H	CD 299 PG							
		63V 1J	CD 29C QC							
		80V 1K	CD 29D HR							
		100V 2A	CD 29G BA							
		125V 2B	CD 29H QH							
		160V 2C	CD 29HD QF							
		180V 2K	CD 29L QL							
		200V 2D	CD 29U CU							
		250V 2E	CD 29UH UT							
		385V 2J	CD 840 ZQ							
		400V 2G	CD 891 ZJ							
		415V 2P	CD 892 ZL							
		420V 2X	CD 895 ZK							
		450V 2W								
		500V 2H								
		550V 2Y								
		575V 2Z								
		600V 2S								
		630V 1J								



# CD 297 BB SERIES

## ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE

### 2 PIN TYPE: T6P2 / T4P2 STANDARD

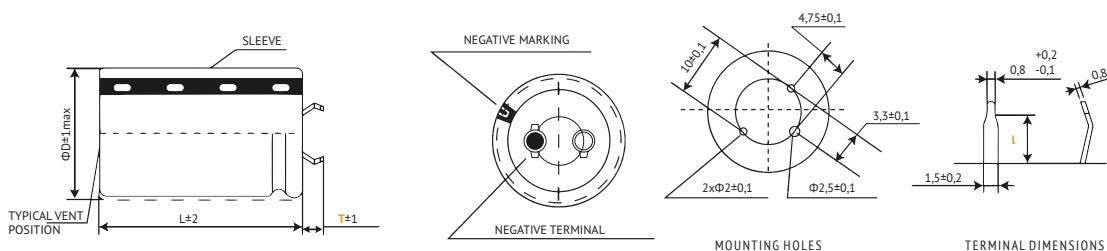


Standard Version: Self-Lock Terminal. Other terminal types and styles on request.  
For diameter  $\Phi D \geq 45$  mm the safety vent is typically placed at the side of the housing.

Terminal	T6 (preferred)	T4
Pin Length <b>T</b>	6,3 mm	4,0 mm
Pin Detail <b>L</b>	3,5 mm	2,5 mm

in mm

### 3 PIN TYPE: T4P3

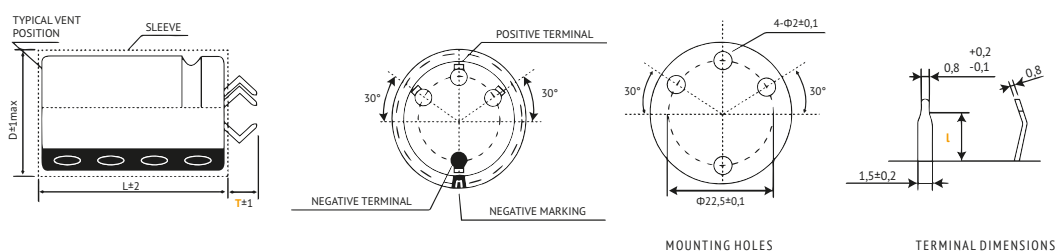


For diameter  $\Phi D \geq 45$  mm the safety vent is typically placed at the side of the housing.

Terminal	T6	T4
Pin Length <b>T</b>	-	4,0 mm
Pin Detail <b>L</b>	-	2,5 mm

in mm

### 4 PIN TYPE: T6P4/T4P4 STANDARD

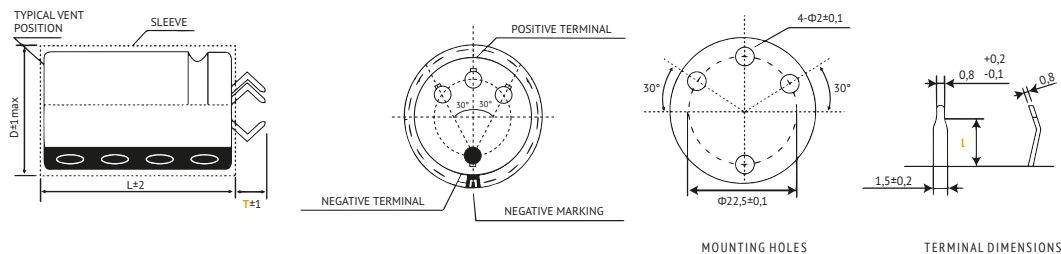


Standard Version: Non-Lock-Terminal. Other terminal types and styles on request.  
For  $\Phi D \geq 30$  mm only.  
For diameter  $\Phi D \geq 45$  mm the safety vent is typically placed at the side of the housing.

Terminal	T6 (preferred)	T4
Pin Length <b>T</b>	6,3 mm	4,0 mm
Pin Detail <b>L</b>	3,5 mm	2,5 mm

in mm

**4 PIN TYPE: L6P4/L4P4 SELF-LOCK TERMINAL**

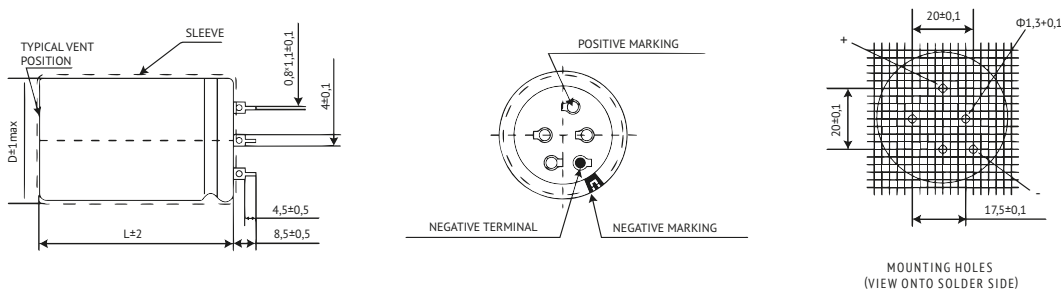


For  $\phi D \geq 30\text{mm}$  only. Other terminal types and styles on request.  
For diameter  $\phi D \geq 45\text{mm}$  the safety vent is typically placed at the side of the housing.

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

in mm

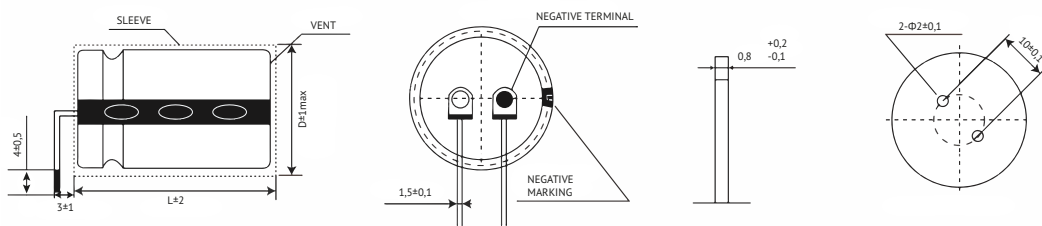
**5 PIN TYPE: S4P5 SOLDERING PIN**



For  $\phi D \geq 30\text{mm}$  only.  
For diameter  $\phi D \geq 45\text{mm}$  the safety vent is typically placed at the side of the housing.

in mm

**EXAMPLE: AXIAL MOUNTING**



For  $\phi D \geq 25\text{mm}$  only.  
Available also for high vibration usage.

in mm

Other Terminal Styles on request.

# LIFETIME ESTIMATION

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.

## STRUCTURAL 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 10 K rule of Arrhenius. It is possible to estimate the Lifetime by rule of thumb: When the operational temperature is reduced by 10 K, the Lifetime will double. The formula for  $K_T$  in detail is:

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

WHERE:

- $T_0$  Rated Temperature
- $T_A$  Ambient Temperature

## $K_R$ 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)
- $\Delta T_0$  Core Temperature Rise of the capacitor (typically 3,5 ~ 5 K for  $T_0 = 105^\circ\text{C}$  and 3,5 ~ 10K for  $T_0 = 85^\circ\text{C}$ , see databook value)
- $K_i$  Basis, typically defined as  
 $T_0 = 105^\circ\text{C}$   $I_A > I_R$ :  $K_i=4$   
 $I_A \leq I_R$ :  $K_i=2$   
 $T_0 = 85^\circ\text{C}$   $K_i=2$

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

>>



# LIFETIME ESTIMATION

## K<sub>V</sub> VOLTAGE FACTOR

For Radial Electrolytic Capacitors, this part of the formula has no impact (K<sub>V</sub> = 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<sub>A</sub> Actual Operating Voltage  
U<sub>R</sub> Rated Voltage

FOR:

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

$$K_V = 3,59$$

FOR:

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

$$K_V = 1$$

FOR:

Radial Capacitors or U<sub>R</sub> ≤ 160V

$$K_V = 1$$

## FREQUENCY CORRECTION FACTORS:

If the actual Ripple Currents are not given at the same frequency like I<sub>0</sub>, correction factors need to be applied.

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

## JIANGHAI ELECTROLYTIC CAPACITOR LIFETIME ESTIMATION

### FORMULA (incl. Safety Factors):

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

WITH TYPICAL VALUES:

$$T_0 = 105^\circ\text{C} \quad I_A > I_R : K_i = 4$$

$$I_A \leq I_R : K_i = 2$$

$$T_0 = 85^\circ\text{C} \quad K_i = 2$$

Δ T<sub>0</sub> = 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<sub>R</sub> ≤ 160V, Radial and

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

# HANDLING PRECAUTIONS

## 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](http://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.

## 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 106 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. >>

## JIANGHAI EUROPE

Electronic Components GmbH



ENGINEERED SOLUTIONS

Customer specific adaptations needed? Please contact Jianghai Europe GmbH:  
 TELEFON: +49 (0) 2151 652088-72 | E-MAIL: [INFO@JIANGHAI-EUROPE.COM](mailto:INFO@JIANGHAI-EUROPE.COM)

11/13  
 v2019.1

# HANDLING PRECAUTIONS

**Useful life:** Defined like load life, but with a larger range of parameter change.

**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 – 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. 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:  $U_R \leq 100V_{DC}$ , 1kΩ:  $U_R > 100V_{DC}$ ).

## 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.

## 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. 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.

## 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

## JIANGHAI EUROPE

Electronic Components GmbH



ENGINEERED SOLUTIONS

Customer specific adaptations needed? Please contact Jianghai Europe GmbH:  
 TELEFON: +49 (0) 2151 652088-72 | E-MAIL: [INFO@JIANGHAI-EUROPE.COM](mailto:INFO@JIANGHAI-EUROPE.COM)

12/13  
 v2019.1

## ABOUT US: CAPACITORS FROM JIANGHAI

JIANGHAI EUROPE ELECTRONIC COMPONENTS GMBH IS THE EUROPEAN SALES ORGANIZATION OF NANTONG JIANGHAI CAPACITOR CO., LTD., NANTONG (CHINA). SINCE 2004, SALES, MARKETING, TECHNICAL SUPPORT, CUSTOMER SERVICE TEAM AND WAREHOUSE OF JIANGHAI EUROPE ELECTRONIC COMPONENTS GMBH ARE LOCATED IN KREFELD AND KEMPEN (GERMANY).

### » ELECTROLYTIC CAPACITORS

Jianghai has grown since its foundation in 1958 to become the largest Chinese manufacturer of aluminum capacitors generating revenues of more than 450 million USD in 2018. While Jianghai started in the beginning with the production of specialty chemicals (e.g., electrolyte solutions), it entered the production of aluminum electrolytic capacitors already in 1970.

### » INTEGRATION OF PREMATERIAL

More recently, Jianghai extended its production range by integrating high and low voltage anode foil etching and forming facilities. All factories are located in mainland China: the most important ones are in Nantong (north to Shanghai), in Inner Mongolia, and in XiAn area. Jianghai is well prepared for further expansion due to its successful entrance to the stock market in summer 2010.

### » FILM CAPACITORS

Jianghai's product range comprises aluminum electrolytic capacitors in screw terminal, snap-in and radial leaded styles. In 2012, the product portfolio was complemented by a range of power film capacitors. For this new business unit, Jianghai also follows the strategy of vertical integration and thus the production will extend from the preparation of the plastic film to the assembly of the finished goods. The product portfolio of DC-Link and Snubber capacitors has been enlarged in the year 2016 by AC-film capacitors. Highly automated production facilities ensure the efficient mass production of film capacitor modules. Driven by the thriving electric vehicle market in China, Jianghai has attained a leading position for the supply of these customer specific components.

### » POLYMER CAPACITORS

The year 2013 was marked by a major breakthrough in R&D for polymer aluminum electrolytic capacitors: the voltage proof for these ultra-low ESR products was pushed out to as much as 200V, enabling the utilization of these advanced capacitors in more applications, e.g. in white goods, industrial automation, telecom infrastructure, power supplies, and LED ballasts.

### » CAPACITOR COMPETENCE CENTER

Global presence of experienced sales and technical marketing experts at offices in Europe, Asia and the Americas ensure the local support of our customers based on sound know-how in all project phases. In 2014 Jianghai Europe has established an additional service for its customers in Europe: Experts for capacitors are awaiting telephone calls or emails at the CCCenter as a kind of hotline for all kind of technical requests.

### » CUSTOMIZED PRODUCTS

Jianghai's particular strength as a volume manufacturer is to offer customized products. Jianghai focuses on the demanding professional industrial segment with many power electronics applications. Research and development in collaboration with several specialized university institutes as well as the access to all vital pre-materials enable Jianghai to create engineered, customized solutions to fit smoothly into a specific application.

Jianghai is continuously improving processes, thereby enhancing the quality of its products and services. The list of certificates awarded to Jianghai reflects its level of achievement. In the year 2013, the Jianghai Europe sales office has become certified according to ISO9001 and ISO14001.

### » CONTACT

Jianghai Europe Electronic Components GmbH

Phone +49 (21 51) 65 20 88 – 0

Fax +49 (21 51) 65 20 88 – 88

E-Mail [info@jianghai-europe.com](mailto:info@jianghai-europe.com)

URL [www.jianghai-europe.com](http://www.jianghai-europe.com)

