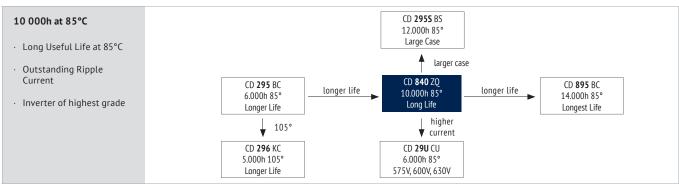




ALUMINUM ELECTROLYTIC CAPACITORS · SNAP-IN TYPE

CD 840 ZQ SERIES





#### ITEM **CHARACTERISTICS** Operating Temperature Range (°C) -40 ~ +85 The usage at lower temperatures 200 ~ 450 Voltage Range (V) than indicated may be possible. 68 ~ 2 200 Please contact the Jianghai Capacitance Range (µF) Europe sales office for approval. 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 Rated Voltage 200 ~ 450 (Impedance Ratio at 120Hz) Z <sub>-25°C</sub> / Z <sub>+20°C</sub> 4 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

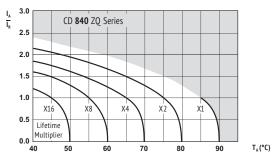
ITEM	USEFUL LIFE		LOAD LIFE	ENDURANCE TEST	SHELF LIFE		
Lifetime	10 000h > 100 000h		5 000h	5 000h	1 00	10h	
Leakage Current	Not more than s	pecified value	Not more than specified value	Not more than specified value	Not more than specified value		
Capacitance Change	Within ± 30% c	f initial value	Within ± 20% 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 200% of specified value	Not more than 200% of specified value	Not more than 150%	6 of specified value	
Condition: Applied Voltage Applied Current Applied Temperature	U <sub>R</sub> U <sub>R</sub> 1,5 x I <sub>R</sub> 85°C 40°C		U <sub>R</sub> R 85°C	U <sub>R</sub> I <sub>R</sub> = 0 85°C IEC 60384	U <sub>R</sub> = 0 I <sub>R</sub> = 0 85°C	After test: U <sub>R</sub> to be applied for 30 min > 24h before measurement	

## MULTIPLIER FOR RIPPLE CURRENT (FREQUENCY COEFFICIENT)

Rated Frequency Voltage (V)	50Hz	120Hz	300Hz	1kHz	10kHz	≥ 50 kHz
200 ~ 250	0,87	1,00	1,17	1,32	1,45	1,50
400 ~ 500	0,80	1,00	1,16	1,30	1,41	1,45

Multipliers for typical operating conditions.

# MULTIPLIER FOR LIFETIME (LIFETIME DIAGRAM)



 $I_A$  = actual ripple current at 120Hz,

I<sub>R</sub> = 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 seperate "Environmental Certificates" document or www.jianghai-europe.com

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

## 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.



Rate   Parameter   Parameter	$\mathbf{U}_{\text{RDC}}$	$\mathbf{C}_{\mathrm{R}}$	ESR <sub>max</sub>	ESR	tan6	l <sub>leak</sub>	I <sub>RAC</sub>	Size	ORDER CODE
(V) (µF) (mO) (mO) (mO) (mO) (mO) (mO) (mO) (mO	Voltage)	Capaci-	Series	Series			Ripple	øD x L	◊◊ = pin style & length
			20°C	20°C			85°C		∆∆ = pin number
1900   191   40   40   41   42   42   42   42   42   42   42	(V)	(μ <b>F</b> )				(mA)		(mm)	Details: Page 4
190	200	330	603	423	0,15	0,7	1,59	25 x 25	ECS2DZQ331M◊◊ΔΔ2525
190		390			-				-
190	20								-
Section		470							
1		F ( 0							-
Record   R		360							-
293   205   0,15   1,4   2,58   35 x 25   ECSDZQGE81M00AA35255     243   170   0,15   1,5   2,92   25 x 45   ECSDZQGE1M00AA3545     243   170   0,15   1,5   3,22   35 x 30   ECSDZQGE1M00AA3530     199   140   0,15   1,5   3,32   25 x 50   ECSDZQG12M00AA3530     199   140   0,15   1,5   3,59   30 x 40   ECSDZQG12M00AA3535     1 200   166   117   0,15   1,5   4,17   30 x 45   ECSDZQG12M00AA3045     1 200   166   117   0,15   1,5   4,05   35 x 35   ECSDZQG12M00AA3045     1 500   133   93   0,15   1,5   4,05   35 x 35   ECSDZQG12M00AA3045     1 500   133   93   0,15   1,5   4,05   35 x 40   ECSDZQG12M00AA3540     1 800   111   78   0,15   1,5   5,10   35 x 45   ECSDZQG12M00AA3540     2 200   91   63   0,15   1,5   6,67   35 x 55   ECSDZQG12M00AA3540     2 200   91   63   0,15   1,5   6,67   35 x 55   ECSDZQG12M00AA3540     2 201   91   64   0,15   1,5   4,67   35 x 50   ECSDZQG12M00AA3540     2 201   91   63   0,15   1,5   6,67   35 x 55   ECSDZQG22M00A3545     2 202   91   63   0,15   1,5   6,17   35 x 55   ECSDZQG12M00AA3540     2 203   91   63   0,15   1,5   0,7   1,52   25 x 30   ECSZEZQG31M00AA3540     2 204   91   63   0,15   1,0   2,00   25 x 55   ECSZEZQG31M00AA3540     2 205   276   737   516   0,15   1,0   2,00   25 x 55   ECSZEZQG31M00AA3540     2 207   737   516   0,15   1,2   2,19   25 x 55   ECSZEZQG31M00AA3540     2 208   208   0,15   1,2   2,19   25 x 55   ECSZEZQG31M00AA3540     2 209   200   0,15   1,2   2,19   25 x 55   ECSZEZQG31M00AA3530     2 200   2		(00							-
S20		680							-
1000									
1000		820							
1 000									-
199		1 000							
1   200		1 000							-
1500		1 200	166	117	0,15	1,5	4,17	30 x 45	ECS2DZQ122M♦♦△△3045
1 500		1 200							_
1 800		1 500							-
2 200		1 800							
330		2 200	91	63	0,15	1,5	6,17	35 x 55	ECS2DZQ222M♦♦△△3555
330	250	270	737	516	0.15	0.7	1 5 2	25 x 25	FC\$2F70271M00AA2525
1000   199   140   0,15   1,5   3,04   35 × 35   ECSZEZQ121M00ΔΔ3555     1000   199   140   0,15   1,5   3,90   35 × 35   ECSZEZQ121M00ΔΔ3555     1000   111   78   0,15   1,5   3,90   35 × 35   ECSZEZQ121M00ΔΔ3555     1000   111   78   0,15   1,5   3,90   35 × 35   ECSZEZQ121M00ΔΔ3555     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ2525     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1990   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1790   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1790   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1790   1035   0,15   0,4   1,04   25 × 25   ECSZEZQ121M00ΔΔ3555     1000   1790   1035   0,15   0,7   1,58   3,54   35 × 35   ECSZEZQ121M00ΔΔ3555     1000									
100	2E	390							
470									
356   249   0,15   1,4   2,48   25 x 40   ECS2EZQ561M00ΔΔ2540     356   249   0,15   1,4   2,50   30 x 30   ECS2EZQ561M00ΔΔ3300     356   249   0,15   1,4   2,52   35 x 25   ECS2EZQ561M00ΔΔ3303     356   249   0,15   1,4   2,52   35 x 25   ECS2EZQ561M00ΔΔ3303     293   205   0,15   1,5   2,87   30 x 35   ECS2EZQ681M00ΔΔ3535     293   205   0,15   1,5   3,10   35 x 30   ECS2EZQ681M00ΔΔ3535     243   170   0,15   1,5   3,27   25 x 55   ECS2EZQ821M00ΔΔ3535     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M00ΔΔ3535     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M00ΔΔ3535     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M00ΔΔ3535     1000   199   140   0,15   1,5   3,96   30 x 45   ECS2EZQ821M00ΔΔ3535     1200   166   117   0,15   1,5   4,43   35 x 40   ECS2EZQ122M00ΔΔ3555     1200   166   117   0,15   1,5   5,25   35 x 50   ECS2EZQ122M00ΔΔ3555     1800   111   78   0,15   1,5   5,25   35 x 50   ECS2EZQ122M00ΔΔ3555     1800   111   78   0,15   1,5   5,89   35 x 55   ECS2EZQ122M00ΔΔ3555     1800   110   1990   1035   0,15   0,4   1,04   25 x 25   ECS2EZQ121M00ΔΔ3555     1800   110   658   863   0,15   0,5   1,19   25 x 30   ECS2EZQ121M00ΔΔ3555     1800   110   6575   0,15   0,6   1,39   30 x 25   ECS2EZQ112M00ΔΔ3553     1800   110   6575   0,15   0,7   1,58   25 x 40   ECS2EZQ1181M00ΔΔ3525     1800   1106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ1181M00ΔΔ3525     1800   110   6575   0,15   0,7   1,59   30 x 30   ECS2EZQ181M00ΔΔ3525     20   905   471   0,15   0,9   1,75   25 x 40   ECS2EZQ181M00ΔΔ3530     100   573   0,15   0,1   0,1   0,1   0,1   0,1   0,1   0,1   0,1   0,1   0,1     20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ121M00ΔΔ3530     20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ121M00ΔΔ3530     20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ211M00ΔΔ3530     20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ211M00ΔΔ3530     20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ211M00ΔΔ3530     20   905   471   0,15   0,9   1,75   35 x 35   ECS2EZQ2		470							
356   249   0,15   1,4   2,52   35 x 25   ECS2EZQ561M ο ΔΔ3525     293   205   0,15   1,5   2,82   25 x 45   ECS2EZQ681M ο ΔΔ2545     293   205   0,15   1,5   2,87   30 x 35   ECS2EZQ681M ο ΔΔ3035     293   205   0,15   1,5   3,10   35 x 30   ECS2EZQ681M ο ΔΔ3035     243   170   0,15   1,5   3,27   25 x 55   ECS2EZQ821M ο ΔΔ3530     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M ο ΔΔ3535     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M ο ΔΔ3535     1 000   199   140   0,15   1,5   3,96   30 x 45   ECS2EZQ821M ο ΔΔ3535     1 200   166   117   0,15   1,5   4,58   30 x 55   ECS2EZQ102M ο ΔΔ3535     1 200   166   117   0,15   1,5   4,43   35 x 40   ECS2EZQ12M ο ΔΔ3554     1 500   133   94   0,15   1,5   5,25   35 x 50   ECS2EZQ12M ο ΔΔ3555     1 800   111   78   0,15   1,5   5,89   35 x 55   ECS2EZQ12M ο ΔΔ3555     1 800   111   78   0,15   1,5   5,89   35 x 55   ECS2EZQ121M ο ΔΔ3555     1 327   690   0,15   0,6   1,39   25 x 35   ECS2EZQ121M ο ΔΔ3535     1 327   690   0,15   0,6   1,39   25 x 35   ECS2EZQ121M ο ΔΔ3535     1 800   1106   575   0,15   0,7   1,58   25 x 40   ECS2EZQ121M ο ΔΔ3530     1 106   575   0,15   0,7   1,58   25 x 40   ECS2EZQ121M ο ΔΔ3530     1 200   905   471   0,15   0,9   1,75   25 x 40   ECS2EZQ121M ο ΔΔ3530     2 905   471   0,15   0,9   1,75   25 x 40   ECS2EZQ121M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ121M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3530     9 05   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ο ΔΔ3535     3 060   314   0,15   1,3   2,35   35 x 35   ECS2EZQ331M ο ΔΔ3535     3 060   314   0,15   1									
Record   100		560							-
680   293   205   0,15   1,5   2,87   30 x 35   ECS2EZQ681M ◊ ◊ Δ Δ 3035     293   205   0,15   1,5   3,10   35 x 30   ECS2EZQ681M ◊ ◊ Δ Δ 3530     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M ◊ ◊ Δ Δ 2555     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M ◊ ◊ Δ Δ 3040     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M ◊ ◊ Δ Δ 3040     243   170   0,15   1,5   3,96   30 x 45   ECS2EZQ821M ◊ ◊ Δ Δ 3045     1 000   199   140   0,15   1,5   3,96   30 x 45   ECS2EZQ102M ◊ ◊ Δ Δ 3535     1 200   166   117   0,15   1,5   4,48   30 x 55   ECS2EZQ102M ◊ ◊ Δ Δ 3555     1 500   133   94   0,15   1,5   5,25   35 x 50   ECS2EZQ12M ◊ ◊ Δ Δ 3550     1 800   111   78   0,15   1,5   5,89   35 x 55   ECS2EZQ12M ◊ ◊ Δ Δ 3555     1 800   111   78   0,15   1,5   5,89   35 x 55   ECS2EZQ12M ◊ ◊ Δ Δ 3555     1 201   1688   863   0,15   0,5   1,19   25 x 30   ECS2EZQ12M ◊ ◊ Δ Δ 3555     1 202   1658   863   0,15   0,6   1,39   30 x 25   ECS2EZQ112M ◊ ◊ Δ Δ 2530     1 801   1327   690   0,15   0,6   1,39   30 x 25   ECS2EZQ181M ◊ ◊ Δ Δ 2535     1 802   1106   575   0,15   0,7   1,58   25 x 40   ECS2EZQ181M ◊ ◊ Δ Δ 2535     1 803   1106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ181M ◊ ◊ Δ Δ 3030     1 800   106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ181M ◊ ◊ Δ Δ 3030     1 800   106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ181M ◊ ◊ Δ Δ 3030     1 800   106   575   0,15   0,7   1,60   35 x 25   ECS2EZQ181M ◊ ◊ Δ Δ 3030     2 20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ◊ ◊ Δ Δ 3030     2 20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ◊ ◊ Δ Δ 3030     2 20   905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M ◊ ◊ Δ Δ 3030     3 40   0,15   1,1   2,00   25 x 45   ECS2EZQ21M ◊ ◊ Δ Δ 3030     3 40   0,15   1,1   2,18   35 x 30   ECS2EZQ231M ◊ ◊ Δ Δ 3030     3 500   3 14   0,15   1,3   2,33   25 x 55   ECS2EZQ331M ◊ ◊ Δ Δ 355     3 500   603   314   0,15   1,3   2,55   30 x 45   ECS2EZQ331M ◊ Δ Δ 355     3 603   314   0,15   1,5   2,72   35 x 35   ECS2EZQ331M ◊ Δ Δ 355     3									
293   205   0,15   1,5   3,10   35 x 30   ECS2EZQ681M◊◊ΔΔ5550     243   170   0,15   1,5   3,27   25 x 55   ECS2EZQ821M◊◊ΔΔ2555     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M◊◊ΔΔ3040     243   170   0,15   1,5   3,47   30 x 40   ECS2EZQ821M◊◊ΔΔ3040     243   170   0,15   1,5   3,54   35 x 35   ECS2EZQ821M◊◊ΔΔ3045     1 000   199   140   0,15   1,5   3,96   30 x 45   ECS2EZQ102M◊◊ΔΔ3045     1 200   166   117   0,15   1,5   4,58   30 x 55   ECS2EZQ102M◊◊ΔΔ3055     1 200   166   117   0,15   1,5   4,43   35 x 40   ECS2EZQ12M◊◊ΔΔ3550     1 500   133   94   0,15   1,5   5,25   35 x 50   ECS2EZQ12M◊◊ΔΔ3555     1 800   111   78   0,15   1,5   5,89   35 x 55   ECS2EZQ12M◊◊ΔΔ2550     1 201   1658   863   0,15   0,5   1,19   25 x 30   ECS2EZQ12M◊◊ΔΔ2530     1 501   1327   690   0,15   0,6   1,39   25 x 35   ECS2EZQ112M◊◊ΔΔ2530     1 106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ118M◊◊ΔΔ2535     1 801   1106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ118M◊◊ΔΔ3500     1 106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ118M◊◊ΔΔ3530     1 106   575   0,15   0,7   1,59   30 x 30   ECS2EZQ121M◊◊ΔΔ3530     2 905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ121M◊◊ΔΔ3530     2 905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     2 905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     2 905   471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ221M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,76   30 x 30   ECS2EZQ21M◊◊ΔΔ3530     3 90   5471   0,15   0,9   1,75   3,78   30 x		680							
820			293	205				35 x 30	ECS2EZQ681M◊◊ΔΔ3530
243		020							
1 000		820							
1000		4 000			-				-
1 200		1 000	199	140		1,5		35 x 35	-
1500		1 200							-
1800		1 500							-
120									
120	400	100	1990	1075	Λ 1 <sup>E</sup>	0.4	1 04	75 v 75	EC\$2G70101M00002525
150									-
1327   690   0,15   0,6   1,39   30 x 25   ECSZGZQ181M0◊ΔΔ3025     1106   575   0,15   0,7   1,58   25 x 40   ECSZGZQ181M0◊ΔΔ2540     1106   575   0,15   0,7   1,59   30 x 30   ECSZGZQ181M0◊ΔΔ3030     1106   575   0,15   0,7   1,60   35 x 25   ECSZGZQ181M0◊ΔΔ3525     905   471   0,15   0,9   1,75   25 x 40   ECSZGZQ221M◊◊ΔΔ35030     905   471   0,15   0,9   1,76   30 x 30   ECSZGZQ221M◊◊ΔΔ3030     905   471   0,15   0,9   1,76   30 x 30   ECSZGZQ221M◊◊ΔΔ3030     905   471   0,15   0,9   1,76   30 x 30   ECSZGZQ221M◊◊ΔΔ3535     737   384   0,15   1,1   2,00   25 x 45   ECSZGZQ221M◊◊ΔΔ3535     737   384   0,15   1,1   2,03   30 x 35   ECSZGZQ271M◊◊ΔΔ3535     737   384   0,15   1,1   2,18   35 x 30   ECSZGZQ271M◊◊ΔΔ3530     603   314   0,15   1,3   2,33   25 x 55   ECSZGZQ371M◊◊ΔΔ3535     603   314   0,15   1,3   2,51   35 x 35   ECSZGZQ331M◊◊ΔΔ3045     603   314   0,15   1,3   2,51   35 x 35   ECSZGZQ331M◊◊ΔΔ3045     603   314   0,15   1,5   2,78   30 x 45   ECSZGZQ391M◊◊ΔΔ3045     511   266   0,15   1,5   2,78   30 x 45   ECSZGZQ391M◊◊ΔΔ3055     424   221   0,15   1,5   3,14   30 x 50   ECSZGZQ471M◊◊ΔΔ3550     424   221   0,15   1,5   3,19   35 x 45   ECSZGZQ561M◊◊ΔΔ3550     560   356   185   0,15   1,5   3,58   35 x 50   ECSZGZQ561M◊◊ΔΔ3550									
180		130							
1106   575   0,15   0,7   1,60   35 x 25   ECS2GZQ181M◊◊ΔΔ3525     905   471   0,15   0,9   1,75   25 x 40   ECS2GZQ221M◊◊ΔΔ2540     905   471   0,15   0,9   1,76   30 x 30   ECS2GZQ221M◊◊ΔΔ33030     905   471   0,15   0,9   1,97   35 x 30   ECS2GZQ221M◊◊ΔΔ3530     737   384   0,15   1,1   2,00   25 x 45   ECS2GZQ271M◊◊ΔΔ2545     270   737   384   0,15   1,1   2,03   30 x 35   ECS2GZQ271M◊◊ΔΔ3530     737   384   0,15   1,1   2,18   35 x 30   ECS2GZQ271M◊◊ΔΔ3530     603   314   0,15   1,3   2,33   25 x 55   ECS2GZQ271M◊◊ΔΔ3530     603   314   0,15   1,3   2,33   25 x 55   ECS2GZQ331M◊◊ΔΔ2555     330   603   314   0,15   1,3   2,55   30 x 45   ECS2GZQ331M◊◊ΔΔ3045     603   314   0,15   1,3   2,51   35 x 35   ECS2GZQ331M◊◊ΔΔ3535     390   511   266   0,15   1,5   2,78   30 x 45   ECS2GZQ391M◊◊ΔΔ3045     511   266   0,15   1,5   2,72   35 x 35   ECS2GZQ391M◊◊ΔΔ3535     470   424   221   0,15   1,5   3,14   30 x 50   ECS2GZQ471M◊◊ΔΔ3550     560   356   185   0,15   1,5   3,58   35 x 50   ECS2GZQ561M◊◊ΔΔ3550		100							
905 471 0,15 0,9 1,76 30 x 30 ECS2GZQ221M◊◊ΔΔ2540 905 471 0,15 0,9 1,76 30 x 30 ECS2GZQ221M◊◊ΔΔ3030 905 471 0,15 0,9 1,97 35 x 30 ECS2GZQ221M◊◊ΔΔ3530  737 384 0,15 1,1 2,00 25 x 45 ECS2GZQ271M◊◊ΔΔ3550 737 384 0,15 1,1 2,03 30 x 35 ECS2GZQ271M◊◊ΔΔ3530 737 384 0,15 1,1 2,18 35 x 30 ECS2GZQ271M◊◊ΔΔ3530 603 314 0,15 1,3 2,33 25 x 55 ECS2GZQ271M◊◊ΔΔ3530 603 314 0,15 1,3 2,33 25 x 55 ECS2GZQ331M◊◊ΔΔ2555 330 603 314 0,15 1,3 2,55 30 x 45 ECS2GZQ331M◊◊ΔΔ3045 603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3535  390 511 266 0,15 1,5 2,78 30 x 45 ECS2GZQ391M◊◊ΔΔ3535  390 511 266 0,15 1,5 2,78 30 x 45 ECS2GZQ391M◊◊ΔΔ3535  470 424 221 0,15 1,5 3,14 30 x 50 ECS2GZQ471M◊◊ΔΔ3550  560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3555		100							
905 471 0,15 0,9 1,97 35 x 30 ECS2GZQ221M◊◊ΔΔ3530  737 384 0,15 1,1 2,00 25 x 45 ECS2GZQ271M◊◊ΔΔ2545  737 384 0,15 1,1 2,03 30 x 35 ECS2GZQ271M◊◊ΔΔ3035  737 384 0,15 1,1 2,18 35 x 30 ECS2GZQ271M◊◊ΔΔ3530  603 314 0,15 1,3 2,33 25 x 55 ECS2GZQ331M◊◊ΔΔ2555  330 603 314 0,15 1,3 2,55 30 x 45 ECS2GZQ331M◊◊ΔΔ3045  603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3045  603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3535  390 511 266 0,15 1,5 2,78 30 x 45 ECS2GZQ391M◊◊ΔΔ3045  511 266 0,15 1,5 2,72 35 x 35 ECS2GZQ391M◊◊ΔΔ3535  470 424 221 0,15 1,5 3,14 30 x 50 ECS2GZQ471M◊◊ΔΔ3550  560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3550									
737 384 0,15 1,1 2,00 25 x 45 ECS2GZQ271M◊◊ΔΔ2545  737 384 0,15 1,1 2,03 30 x 35 ECS2GZQ271M◊◊ΔΔ3035  737 384 0,15 1,1 2,18 35 x 30 ECS2GZQ271M◊◊ΔΔ3530  603 314 0,15 1,3 2,33 25 x 55 ECS2GZQ331M◊◊ΔΔ2555  330 603 314 0,15 1,3 2,55 30 x 45 ECS2GZQ331M◊◊ΔΔ3045  603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3045  603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3045  603 314 0,15 1,5 2,78 30 x 45 ECS2GZQ331M◊◊ΔΔ3045  511 266 0,15 1,5 2,78 30 x 45 ECS2GZQ391M◊◊ΔΔ3045  511 266 0,15 1,5 2,72 35 x 35 ECS2GZQ391M◊◊ΔΔ3535  470 424 221 0,15 1,5 3,14 30 x 50 ECS2GZQ471M◊◊ΔΔ3050  424 221 0,15 1,5 3,19 35 x 45 ECS2GZQ471M◊◊ΔΔ3555  560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3550		220							
270									
737 384 0,15 1,1 2,18 35 x 30 ECS2GZQ271M◊◊ΔΔ3530 603 314 0,15 1,3 2,33 25 x 55 ECS2GZQ331M◊◊ΔΔ2555 603 314 0,15 1,3 2,55 30 x 45 ECS2GZQ331M◊◊ΔΔ3045 603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3535 390 511 266 0,15 1,5 2,78 30 x 45 ECS2GZQ391M◊◊ΔΔ3045 511 266 0,15 1,5 2,72 35 x 35 ECS2GZQ391M◊◊ΔΔ3045 511 266 0,15 1,5 2,72 35 x 35 ECS2GZQ391M◊◊ΔΔ3535 470 424 221 0,15 1,5 3,14 30 x 50 ECS2GZQ471M◊◊ΔΔ3050 424 221 0,15 1,5 3,19 35 x 45 ECS2GZQ471M◊◊ΔΔ3555 560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3550		270							
330 603 314 0,15 1,3 2,55 30 x 45 ECS2GZQ331M◊◊ΔΔ3045 603 314 0,15 1,3 2,51 35 x 35 ECS2GZQ331M◊◊ΔΔ3535 390 511 266 0,15 1,5 2,78 30 x 45 ECS2GZQ391M◊◊ΔΔ3045 511 266 0,15 1,5 2,72 35 x 35 ECS2GZQ391M◊◊ΔΔ3535 470 424 221 0,15 1,5 3,14 30 x 50 ECS2GZQ471M◊◊ΔΔ3050 424 221 0,15 1,5 3,19 35 x 45 ECS2GZQ471M◊◊ΔΔ3545 560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3550			737	384		1,1			ECS2GZQ271M♦♦△△3530
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		770							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		550							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		700							
424 221 0,15 1,5 3,19 35 x 45 ECS2GZQ471M◊◊ΔΔ3545 560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3550		370							
560 356 185 0,15 1,5 3,58 35 x 50 ECS2GZQ561M◊◊ΔΔ3550		470							
		560							

$\mathbf{U}_{\mathtt{RDC}}$	C <sub>R</sub>	ESR	ESR <sub>typ</sub>	tan6	l <sub>leak</sub>	RAC	Size	ORDER CODE
(Surge Voltage) Code	Rated Capaci- tance	Series	Equivalent Series Resistance 20°C 120Hz	Dissipation Factor 20°C 120Hz		Rated Ripple Current 85°C 120Hz	øD x L	♦♦ = pin style & length △△ = pin number
(V)	(μF)	(mΩ)	(mΩ)		(mA)	(Arms)	(mm)	Details: Page 4
450	68	3901	1951	0,20	0,3	0,80	25 x 25	ECS2WZQ680M◊◊ΔΔ2525
(500)	82	3235	1618	0,20	0,4	0,92	25 x 30	ECS2WZQ820M◊◊ΔΔ2530
2W	100	2653	1327	0,20	0,5	1,01	25 x 30	ECS2WZQ101M◊◊ΔΔ2530
	100	2653	1327	0,20	0,5	1,05	30 x 25	ECS2WZQ101M◊◊ΔΔ3025
	120	2211	1106	0,20	0,5	1,16	25 x 35	ECS2WZQ121M◊◊ΔΔ2535
	120	2211	1106	0,20	0,5	1,21	30 x 30	ECS2WZQ121M◊◊ΔΔ3030
		1769	885	0,20	0,7	1,29	25 x 35	ECS2WZQ151M◊◊ΔΔ2535
	150	1769	885	0,20	0,7	1,35	30 x 30	ECS2WZQ151M◊◊ΔΔ3030
		1769	885	0,20	0,7	1,36	35 x 25	ECS2WZQ151M◊◊ΔΔ3525
		1474	737	0,20	0,8	1,51	25 x 45	ECS2WZQ181M◊◊ΔΔ2545
	180	1474	737	0,20	0,8	1,54	30 x 35	ECS2WZQ181M◊◊ΔΔ3035
		1474	737	0,20	0,8	1,69	35 x 30	ECS2WZQ181M◊◊ΔΔ3530
		1206	603	0,20	1,0	1,72	25 x 50	ECS2WZQ221M♦♦△△2550
	220	1206	603	0,20	1,0	1,92	30 x 40	ECS2WZQ221M◊◊ΔΔ3040
		1206	603	0,20	1,0	1,87	35 x 30	ECS2WZQ221M◊◊ΔΔ3530
		983	492	0,20	1,2	1,96	25 x 55	ECS2WZQ271M◊◊ΔΔ2555
	270	983	492	0,20	1,2	2,12	30 x 40	ECS2WZQ271M◊◊ΔΔ3040
		983	492	0,20	1,2	2,16	35 x 35	ECS2WZQ271M◊◊ΔΔ3535
	330	804	402	0,20	1,5	2,49	30 x 50	ECS2WZQ331M◊◊ΔΔ3050
	330	804	402	0,20	1,5	2,47	35 x 40	ECS2WZQ331M◊◊ΔΔ3540
	390	681	341	0,20	1,5	2,78	30 x 55	ECS2WZQ391M◊◊ΔΔ3055
	370	681	341	0,20	1,5	2,77	35 x 45	ECS2WZQ391M◊◊ΔΔ3545
	470	565	283	0,20	1,5	3,15	35 x 50	ECS2WZQ471M◊◊ΔΔ3550
	560	474	238	0,20	1,5	3,50	35 x 55	ECS2WZQ561M◊◊ΔΔ3555





# ORDER CODE SNAP-IN TYPE

EC	S	20	;	QC		22	1	М		Т6		P2		25	35			JExxxxx
Techno- logy	Terminal Type	Rate Volta Cod	ige	Series Code		Capaci Cod		Capacita Toleran		Terminal Style		Termin Pitc		Dime (m	nsion m)	Materi Code		for Specials only
EC =	Snap-In S	6,3V	0J	CD 293	BZ	0,1	OR1	±20%	М	4,0mm Pin Length	T/L4	2 Pin	P2	22x40	2240	Standard	-	
Electrolytric Capacitor		10V	1A	CD 294	BW	0,47	R47	±10%	K	6,3mm Pin Length	T/L6	3 Pin	Р3	30x45	3045	PVC	٧	
	1	16V	10	CD 295	ВС	1,0	010	+30/-10%	Q	Soldering Pin	<b>S4</b>	4 Pin	P4	35x80	3580	PET	E	
		20V	1D	CD 295S	BS	2,2	2R2	+20/-0%	R	on request:		5 Pin	Р5	45x100	45100			
		25V	1E	CD 296	КС	100	101	±15%	L	alternative pin type	es	6 Pin	P6	50x105	50105			
		35V	1V	CD 296L	FL	1 000	102	+20/-10%	٧	= preferred								
		40V	1 <b>G</b>	CD 297	ВВ	10 000	103											
		50V	1H	CD 299	PG													
		63V	1J	CD 29C	QC													
		80V	1K	CD 29D	HR													
		100V	2A	CD 29H	QН													
		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	2 X															
		450V	2W															
		500V	2H															
		550V	2Y															
		575V	2Z															
		600V	25															
		630V	J2															

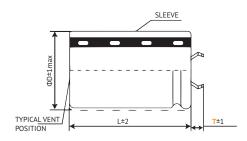


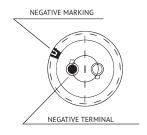
# SNAP-IN TYPE: TECHNICAL SPECIFICATIONS

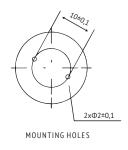


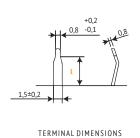
# 2 PIN TYPE: T6P2 / T4P2 STANDARD

Jianghai









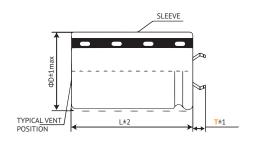
Standard Version: Self-Lock Terminal. Other terminal types and styles on request. For diameter  $\emptyset D \geqslant 45$ mm the safety vent is typically placed at the side of the housing.

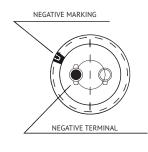
Terminal	T6 (preferred)	T4
Pin Length T	6,3 mm	4,0 mm
Pin Detail L	3,5 mm	2,5 mm

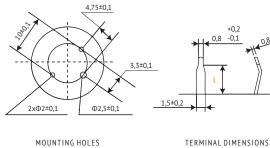
Max. Current Snap-In Terminal: 15A For more current please ask for Lug-Terminals.

in mm

## 3 PIN TYPE: T4P3







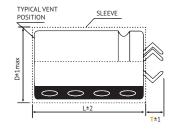
For diameter  $\emptyset D \ge 45 mm$  the safety vent is typically placed at the side of the housing.

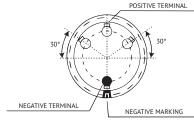
Terminal	Т6	T4			
Pin Length T	-	4,0 mm			
Pin Detail L	-	2,5 mm			

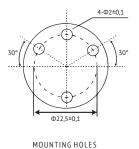
Max. Current Snap-In Terminal: 15A For more current please ask for Lug-Terminals.

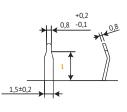
in mm

# 4 PIN TYPE: T6P4/T4P4 STANDARD









equest.

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TERMINAL DIMENSIONS

Standard Version: Non-Lock-Terminal. Other terminal types and styles on request. For  $\varpi D \geqslant 30 \text{mm}$  only.

For diameter  $\phi D \ge 45$ mm 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



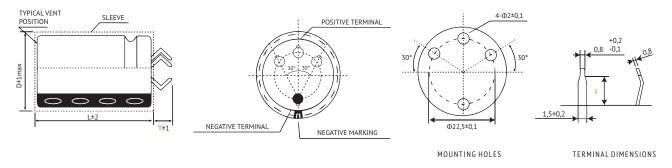
in mm







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



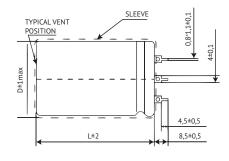
For  $\emptyset D \geqslant 30$ mm only. Other terminal types and styles on request. For diameter  $\emptyset D \geqslant 45$ mm the safety vent is typically placed at the side of the housing.

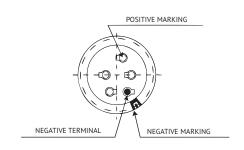
Terminal	T6 (preferred)	T4
Pin Length T	6,3 mm	4,0 mm
Pin Detail L	3,5 mm	2,5 mm

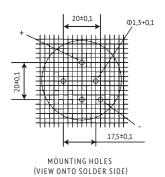
Max. Current Snap-In Terminal: 15A For more current please ask for Lug-Terminals.

in mm

# 5 PIN TYPE: S4P5 SOLDERING PIN





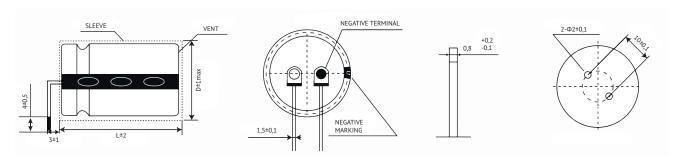


For  $\emptyset D \geqslant 30$  mm only. For diameter  $\emptyset D \geqslant 45$  mm the safety vent is typically placed at the side of the housing.

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

in mm

# EXAMPLE: AXIAL MOUNTING



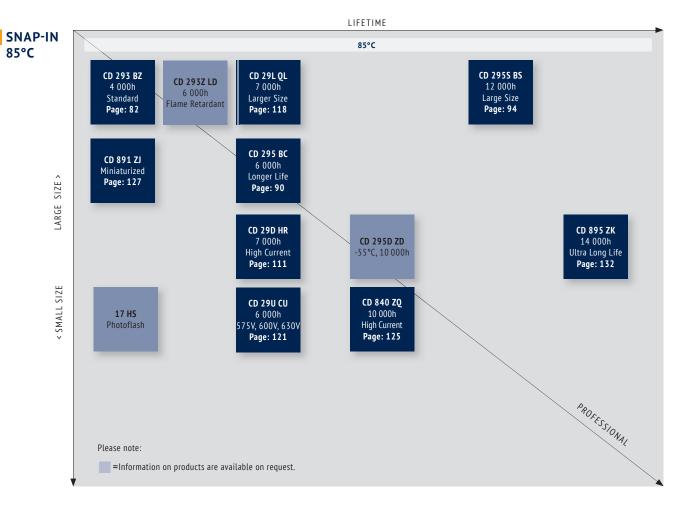
For  $\emptyset D \geqslant 25$ mm only. Available also for high vibration usage.

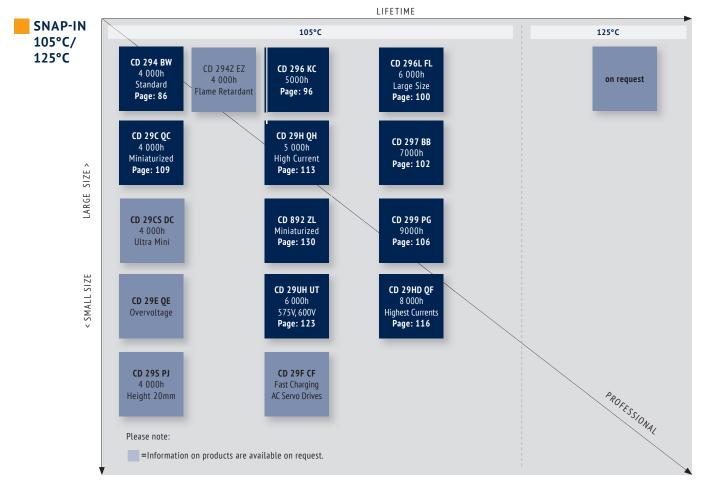
Max. Current Snap-In Terminal: 15A For more current please ask for Lug-Terminals.

 $in \ mm \\$ 

Other Terminal Styles on request.







## LIFETIME ESTIMATION OF ALUMINUM ELECTROLYTIC CAPACITORS FROM JIANGHAI

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, Lo 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:

Total Lifetime

Lifetime under Nominal Load at Upper Category Temperature (see catalogue)

K<sub>+</sub> Temperature Factor

Ripple Current Factor

K<sub>v</sub> Voltage Factor

# **K**<sub>+</sub> 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  $\mathbf{K}_{\mathsf{T}}$  in detail is:

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

WHERE:

T<sub>o</sub> Rated Temperature

T, Ambient Temperature

## **K**<sub>∞</sub> RIPPLE CURRENT FACTOR

To estimate the influence of ripple current on lifetime, Jianghai uses a safety factor K<sub>i</sub>. Under certain conditions this value can be set to K = 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:

Actual Rated Ripple Current

Ripple Current at Upper Category Temperature (databook value)

ΔT<sub>o</sub> Core Temperature Rise of the capacitor (typically  $3.5 \sim 5 \text{ K for T}_0 = 105^{\circ}\text{C}$ and  $3.5 \sim 10 \text{K}$  for  $T_0 = 85 \,^{\circ}\text{C}$ , see databook value)

Basis, typically defined as

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



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

## **K**<sub>v</sub> **VOLTAGE FACTOR**

For Radial 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:

$$0.6 \le \frac{U_A}{U_B} \le 1$$

$$K_V = \left(\frac{U_A}{U_R}\right)^{-2.5}$$

WHERE:

U, Actual Operating Voltage

U<sub>D</sub> 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 Capacitors or U<sub>p</sub> ≤ 160V

$$K_V = 1$$

## **FREQUENCY CORRECTION FACTORS:**

If the actual Ripple Currents are not given at the same frequency like  $I_{\alpha}$ , 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):

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

WITH TYPICAL VALUES:

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

 $\Delta T_0$ = 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<sub>D</sub> ≤ 160V, Radial and

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

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# HANDLING PRECAUTIONS FOR ALUMINUM ELECTROLYTIC CAPACITORS FROM JIANGHAI

#### 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.jianghaieurope.com. For more details on precautions and guidelines for aluminum electrolytic capacitors, please refer to CENELEC Technical Report CLC/TR 50454:2008 E, "Guide for the application of aluminum electrolytic capacitors".

## POLARITY

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

## RATED VOLTAGE UR

The rated voltage is marked on the capacitor and defined in the datasheets as  $U_R$ . 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  $\pm$ 1-15% max.

## REVERSE VOLTAGE

Reverse voltages or voltages < 0V are not allowed.







# HANDLING PRECAUTIONS ...

#### 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  $1k\Omega$  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 10° 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  $U_{\rm P}$ .

**Load life:** Period of time, during which the technical parameters of all capacitors stay within the given limits. JIANGHAI defines this without allowing for outliers.

Useful life: Defined like load life, but with a lager 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.

## 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 (100Q:  $U_R \le 100VDC$ ,  $1kQ: U_R > 100VDC$ ).

#### SOLDERING

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

#### **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 VERSION 10/2021

