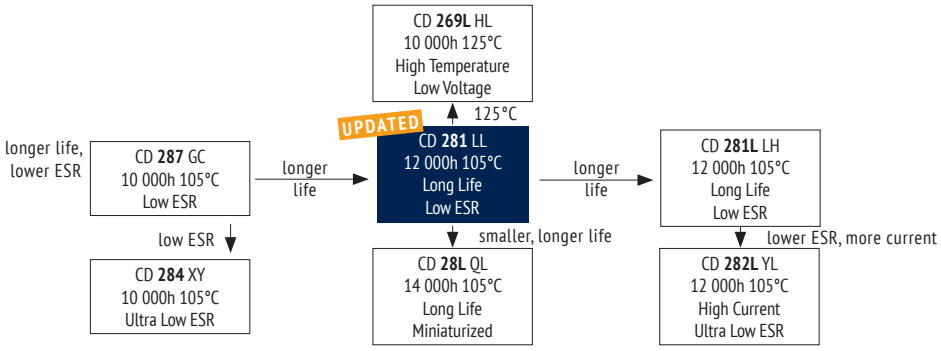
ALUMINUM ELECTROLYTIC CAPACITORS · RADIAL TYPE

CD **281** LL SERIES

3 000 - 12 000h at 105°C

- Longest Lifetime 105°C
- Low Impedance
- Power Supplies
- Smoothing, Buffering, Filtering



ITEM	CHARACTERISTICS
Operating Temperature Range (°C)	-55 ~ +105
Voltage Range (V)	6,3 ~ 100
Capacitance Range (µF)	0,47 ~ 15 000
Capacitance Tolerance (20°C, 120Hz)	± 20%
Leakage Current (µA)	After 2 minutes at 20°C application of rated voltage, leakage current is not more than specified in table.

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

Stability at Low Temperature (Impedance Ratio at 120Hz)	Rated Voltage (V)	6,3 ~ 100
	$Z_{-55°C} / Z_{+20°C}$	3

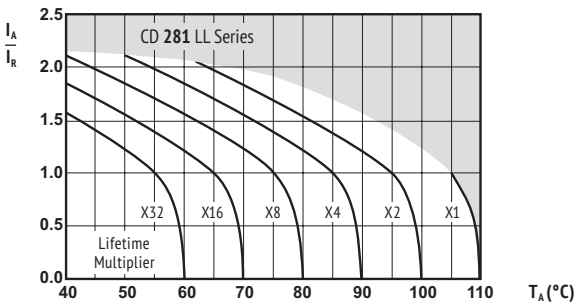
ITEM	USEFUL LIFE		LOAD LIFE	ENDURANCE TEST	SHELF LIFE	
Lifetime	Ø 5 : 3 000h Ø 6,3~8 : 5 000h Ø 10 : 7 000h Ø 12,5 : 10 000h Ø ≥ 16 : 12 000h	Ø ≥ 6,3 : > 250 000h	Ø 5 : 2 000h Ø 6,3~8 : 3 000h Ø 10 : 5 000h Ø 12,5 : 7 000h Ø ≥ 16 : 8 000h	Ø 5 : 3 000h Ø 6,3~8 : 4 000h Ø 10 : 6 000h Ø 12,5 : 8 000h Ø ≥ 16 : 10 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 1,4 x 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)

Capacitance (µF) \ Frequency	120Hz	1kHz	10kHz	100kHz
0,47 ~ 4,7	0,40	0,68	0,83	1,00
5,6 ~ 47	0,50	0,76	0,87	1,00
56 ~ 270	0,70	0,85	0,93	1,00
330 ~ 1 000	0,80	0,93	0,98	1,00
1 200 ~ 15 000	0,90	0,95	1,00	1,00

Multipliers for typical operating conditions.

MULTIPLIER FOR LIFETIME (LIFETIME DIAGRAM)



I_A = actual ripple current at 100kHz,
I_R = rated ripple current at 100kHz, 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 seperate "Environmental Certificates" document or www.jianghai-europe.com

SAFETY FACTOR

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

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (Ω)	Z_{max} Max Impedance 20°C 100kHz (Ω)	Z_{max} Max Impedance -10°C 100kHz (Ω)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (µA)	I_{RAC} Rated Ripple Current 105°C 100kHz (mArms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pitch code Details: Page 8
6,3 (7,9) 0J	100	2,92	0,650	1,300	0,22	13	175	5 x 11,5	ECR0JLL101M◊◊ΔΔ0511
	150	1,95	0,460	0,920	0,22	19	235	5 x 15	ECR0JLL151M◊◊ΔΔ0515
	220	1,33	0,300	0,600	0,22	28	290	6,3 x 11,5	ECR0JLL221M◊◊ΔΔ0611
	330	0,885	0,300	0,600	0,22	42	290	6,3 x 11,5	ECR0JLL331M◊◊ΔΔ0611
		0,885	0,200	0,400	0,22	42	400	6,3 x 15	ECR0JLL331M◊◊ΔΔ0615
	470	0,621	0,170	0,340	0,22	60	488	8 x 11,5	ECR0JLL471M◊◊ΔΔ0811
	680	0,429	0,130	0,260	0,22	86	617	8 x 16	ECR0JLL681M◊◊ΔΔ0816
		0,429	0,120	0,240	0,22	86	613	10 x 12,5	ECR0JLL681M◊◊ΔΔ1012
	820	0,356	0,095	0,190	0,22	104	734	10 x 16	ECR0JLL821M◊◊ΔΔ1016
	1 000	0,292	0,095	0,190	0,22	126	800	8 x 20	ECR0JLL102M◊◊ΔΔ0820
	1 200	0,243	0,065	0,130	0,22	152	1010	10 x 20	ECR0JLL122M◊◊ΔΔ1020
		0,243	0,065	0,130	0,22	152	1010	12,5 x 15	ECR0JLL122M◊◊ΔΔ1215
	1 500	0,195	0,055	0,110	0,22	189	1190	10 x 25	ECR0JLL152M◊◊ΔΔ1025
	2 200	0,145	0,045	0,090	0,24	278	1440	10 x 30	ECR0JLL222M◊◊ΔΔ1030
		0,145	0,042	0,084	0,24	278	1400	12,5 x 20	ECR0JLL222M◊◊ΔΔ1220
	2 700	0,118	0,038	0,076	0,24	341	1690	12,5 x 25	ECR0JLL272M◊◊ΔΔ1225
		0,118	0,046	0,092	0,24	341	1310	16 x 15	ECR0JLL272M◊◊ΔΔ1615
	3 300	0,105	0,043	0,086	0,26	416	1460	18 x 15	ECR0JLL332M◊◊ΔΔ1815
	3 900	0,088	0,032	0,064	0,26	492	1950	12,5 x 30	ECR0JLL392M◊◊ΔΔ1230
	4 700	0,079	0,028	0,056	0,28	593	2220	12,5 x 35	ECR0JLL472M◊◊ΔΔ1235
		0,079	0,034	0,068	0,28	593	1660	16 x 20	ECR0JLL472M◊◊ΔΔ1620
	5 600	0,071	0,026	0,052	0,30	706	2390	12,5 x 40	ECR0JLL562M◊◊ΔΔ1240
		0,071	0,028	0,056	0,30	706	2070	16 x 25	ECR0JLL562M◊◊ΔΔ1625
		0,071	0,030	0,060	0,30	706	1850	18 x 20	ECR0JLL562M◊◊ΔΔ1820
	6 800	0,062	0,025	0,050	0,32	857	2350	16 x 31,5	ECR0JLL682M◊◊ΔΔ1631
		0,062	0,027	0,054	0,32	857	2120	18 x 25	ECR0JLL682M◊◊ΔΔ1825
	8 200	0,058	0,022	0,044	0,36	1034	2550	16 x 35,5	ECR0JLL822M◊◊ΔΔ1635
	10 000	0,053	0,023	0,046	0,40	1260	2410	18 x 31,5	ECR0JLL103M◊◊ΔΔ1831
	12 000	0,049	0,020	0,040	0,44	1512	2970	16 x 40	ECR0JLL123M◊◊ΔΔ1640
		0,049	0,020	0,040	0,44	1512	2680	18 x 35,5	ECR0JLL123M◊◊ΔΔ1835
	15 000	0,044	0,019	0,038	0,50	1890	3010	18 x 40 x	ECR0JLL153M◊◊ΔΔ1840
10 (13) 1A	82	3,08	0,650	1,30	0,19	17	175	5 x 11,5	ECR1ALL820M◊◊ΔΔ0511
	100	2,53	0,460	0,920	0,19	20	235	5 x 15	ECR1ALL101M◊◊ΔΔ0515
	180	1,41	0,300	0,600	0,19	36	290	6,3 x 11,5	ECR1ALL181M◊◊ΔΔ0611
	220	1,15	0,300	0,600	0,19	36	290	6,3 x 11,5	ECR1ALL221M◊◊ΔΔ0611
		1,15	0,200	0,400	0,19	44	400	6,3 x 15	ECR1ALL221M◊◊ΔΔ0615
	330	0,764	0,170	0,340	0,19	66	488	8 x 11,5	ECR1ALL331M◊◊ΔΔ0811
	470	0,536	0,170	0,340	0,19	94	488	8 x 11,5	ECR1ALL471M◊◊ΔΔ0811
		0,536	0,130	0,260	0,19	94	617	8 x 16	ECR1ALL471M◊◊ΔΔ0816
		0,536	0,120	0,240	0,19	94	613	10 x 12,5	ECR1ALL471M◊◊ΔΔ1012
	560	0,450	0,095	0,190	0,19	112	734	10 x 16	ECR1ALL561M◊◊ΔΔ1016
	680	0,371	0,095	0,190	0,19	136	800	8 x 20	ECR1ALL681M◊◊ΔΔ0820
	1 000	0,252	0,095	0,190	0,19	200	734	10 x 16	ECR1ALL102M◊◊ΔΔ1016
		0,252	0,065	0,130	0,19	200	1010	10 x 20	ECR1ALL102M◊◊ΔΔ1020
		0,252	0,065	0,130	0,19	200	1010	12,5 x 15	ECR1ALL102M◊◊ΔΔ1215
	1 200	0,210	0,055	0,110	0,19	240	1190	10 x 25	ECR1ALL122M◊◊ΔΔ1025
	1 500	0,168	0,045	0,090	0,19	300	1440	10 x 30	ECR1ALL152M◊◊ΔΔ1030
	1800	0,140	0,042	0,084	0,19	360	1400	12,5 x 20	ECR1ALL182M◊◊ΔΔ1220
		0,140	0,046	0,092	0,19	360	1310	16 x 15	ECR1ALL182M◊◊ΔΔ1615
	2 200	0,127	0,042	0,084	0,21	440	1400	12,5 x 20	ECR1ALL222M◊◊ΔΔ1220
		0,127	0,038	0,076	0,21	440	1690	12,5 x 25	ECR1ALL222M◊◊ΔΔ1225
		0,127	0,043	0,086	0,21	440	1460	18 x 15	ECR1ALL222M◊◊ΔΔ1815
	2 700	0,103	0,032	0,064	0,21	540	1950	12,5 x 30	ECR1ALL272M◊◊ΔΔ1230
	3 300	0,092	0,028	0,056	0,23	660	2220	12,5 x 35	ECR1ALL332M◊◊ΔΔ1235
		0,092	0,034	0,068	0,23	660	1660	16 x 20	ECR1ALL332M◊◊ΔΔ1620
	3 900	0,078	0,026	0,052	0,23	780	2390	12,5 x 40	ECR1ALL392M◊◊ΔΔ1240
		0,078	0,028	0,056	0,23	780	2070	16 x 25	ECR1ALL392M◊◊ΔΔ1625
		0,078	0,030	0,060	0,23	780	1850	18 x 20	ECR1ALL392M◊◊ΔΔ1820
	4 700	0,071	0,028	0,056	0,25	940	2070	16 x 25	ECR1ALL472M◊◊ΔΔ1625
		0,071	0,027	0,054	0,25	940	2120	18 x 25	ECR1ALL472M◊◊ΔΔ1825
	5 600	0,064	0,025	0,050	0,27	1120	2350	16 x 31,5	ECR1ALL562M◊◊ΔΔ1631
	6 800	0,057	0,022	0,044	0,29	1360	2550	16 x 35,5	ECR1ALL682M◊◊ΔΔ1635
		0,057	0,023	0,046	0,29	1360	2410	18 x 31,5	ECR1ALL682M◊◊ΔΔ1831
	8 200	0,053	0,020	0,040	0,33	1640	2970	16 x 40	ECR1ALL822M◊◊ΔΔ1640
		0,053	0,020	0,040	0,33	1640	2680	18 x 35,5	ECR1ALL822M◊◊ΔΔ1835
	10 000	0,049	0,019	0,038	0,37	2000	3010	18 x 40	ECR1ALL103M◊◊ΔΔ1840

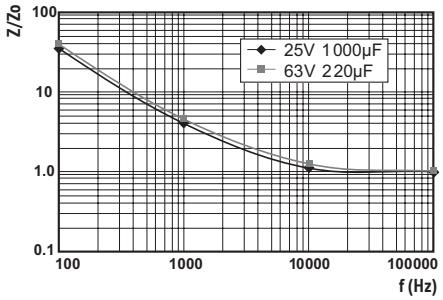
U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (Ω)	Z_{max} Max Impedance 20°C 100kHz (Ω)	Z_{max} Max Impedance -10°C 100kHz (Ω)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (µA)	I_{RAC} Rated Ripple Current 105°C 100kHz (mArms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pitch code Details: Page 8
16 (20) 1C	47	4,52	0,650	1,30	0,16	15	140	5 x 11,5	ECR1CLL470M◊◊ΔΔ0511
	56	3,80	0,650	1,30	0,16	18	175	5 x 11,5	ECR1CLL560M◊◊ΔΔ0511
	82	2,59	0,460	0,920	0,16	27	235	5 x 15	ECR1CLL820M◊◊ΔΔ0515
	100	2,13	0,650	1,300	0,16	32	175	5 x 11,5	ECR1CLL101M◊◊ΔΔ0511
	120	1,77	0,300	0,600	0,16	39	290	6,3 x 11,5	ECR1CLL121M◊◊ΔΔ0611
	180	1,18	0,200	0,400	0,16	58	400	6,3 x 15	ECR1CLL181M◊◊ΔΔ0615
	220	1,16	0,300	0,600	0,16	71	290	6,3 x 11,5	ECR1CLL221M◊◊ΔΔ0611
		1,16	0,280	0,560	0,16	71	380	8 x 11,5	ECR1CLL221M◊◊ΔΔ0811
	270	0,786	0,170	0,340	0,16	87	501	8 x 11,5	ECR1CLL271M◊◊ΔΔ0811
	330	0,772	0,170	0,340	0,16	106	501	8 x 11,5	ECR1CLL331M◊◊ΔΔ0811
		0,643	0,130	0,260	0,16	106	575	8 x 16	ECR1CLL331M◊◊ΔΔ0816
		0,643	0,120	0,240	0,16	106	625	10 x 12,5	ECR1CLL331M◊◊ΔΔ1012
	390	0,544	0,095	0,190	0,16	125	795	10 x 16	ECR1CLL391M◊◊ΔΔ1016
	470	0,452	0,130	0,260	0,16	151	575	8 x 16	ECR1CLL471M◊◊ΔΔ0816
		0,452	0,095	0,190	0,16	151	760	8 x 20	ECR1CLL471M◊◊ΔΔ0820
	680	0,312	0,065	0,130	0,16	218	1010	10 x 20	ECR1CLL681M◊◊ΔΔ1020
		0,312	0,065	0,130	0,16	218	1010	12,5 x 15	ECR1CLL681M◊◊ΔΔ1215
	820	0,259	0,055	0,110	0,16	263	1190	10 x 25	ECR1CLL821M◊◊ΔΔ1025
	1 000	0,212	0,065	0,130	0,16	320	1010	10 x 20	ECR1CLL102M◊◊ΔΔ1020
	1 200	0,177	0,045	0,090	0,16	384	1430	10 x 30	ECR1CLL122M◊◊ΔΔ1030
		0,177	0,042	0,084	0,16	384	1400	12,5 x 20	ECR1CLL122M◊◊ΔΔ1220
	1 500	0,142	0,038	0,076	0,16	480	1690	12,5 x 25	ECR1CLL152M◊◊ΔΔ1225
		0,142	0,046	0,092	0,16	480	1340	16 x 15	ECR1CLL152M◊◊ΔΔ1615
		0,142	0,043	0,086	0,16	480	1490	18 x 15	ECR1CLL152M◊◊ΔΔ1815
	2 200	0,109	0,038	0,076	0,18	704	1690	12,5 x 25	ECR1CLL222M◊◊ΔΔ1225
		0,109	0,032	0,064	0,18	704	1950	12,5 x 30	ECR1CLL222M◊◊ΔΔ1230
		0,109	0,034	0,068	0,18	704	1730	16 x 20	ECR1CLL222M◊◊ΔΔ1620
	2 700	0,088	0,028	0,056	0,18	864	2200	12,5 x 35	ECR1CLL272M◊◊ΔΔ1235
		0,088	0,028	0,056	0,18	864	2070	16 x 25	ECR1CLL272M◊◊ΔΔ1625
		0,088	0,030	0,060	0,18	864	1870	18 x 20	ECR1CLL272M◊◊ΔΔ1820
	3 300	0,080	0,026	0,052	0,20	1056	2390	12,5 x 40	ECR1CLL332M◊◊ΔΔ1240
	3 900	0,068	0,025	0,050	0,20	1248	2350	16 x 31,5	ECR1CLL392M◊◊ΔΔ1631
		0,068	0,027	0,054	0,20	1248	2160	18 x 25	ECR1CLL392M◊◊ΔΔ1825
	4 700	0,062	0,022	0,044	0,22	1504	2550	16 x 35,5	ECR1CLL472M◊◊ΔΔ1635
		0,062	0,023	0,046	0,22	1504	2450	18 x 31,5	ECR1CLL472M◊◊ΔΔ1831
	5 600	0,057	0,020	0,040	0,24	1792	2900	16 x 40	ECR1CLL562M◊◊ΔΔ1640
	6 800	0,051	0,020	0,040	0,26	2176	2730	18 x 35,5	ECR1CLL682M◊◊ΔΔ1835
	8 200	0,049	0,019	0,038	0,30	2624	3060	18 x 40	ECR1CLL822M◊◊ΔΔ1840
25 (32) 1E	39	4,77	0,650	1,30	0,14	20	175	5 x 11,5	ECR1ELL390M◊◊ΔΔ0511
	47	3,96	0,650	1,30	0,14	24	175	5 x 11,5	ECR1ELL470M◊◊ΔΔ0511
	56	3,32	0,460	0,920	0,14	28	235	5 x 15	ECR1ELL560M◊◊ΔΔ0515
	82	2,27	0,300	0,600	0,14	41	290	6,3 x 11,5	ECR1ELL820M◊◊ΔΔ0611
	100	1,86	0,300	0,600	0,14	50	290	6,3 x 11,5	ECR1ELL101M◊◊ΔΔ0611
	120	1,55	0,200	0,400	0,14	60	400	6,3 x 15	ECR1ELL121M◊◊ΔΔ0615
	180	1,04	0,170	0,340	0,14	90	503	8 x 11,5	ECR1ELL181M◊◊ΔΔ0811
	220	0,844	0,170	0,340	0,14	110	503	8 x 11,5	ECR1ELL221M◊◊ΔΔ0811
		0,844	0,130	0,260	0,14	110	575	8 x 16	ECR1ELL221M◊◊ΔΔ0816
		0,844	0,120	0,240	0,14	110	629	10 x 12,5	ECR1ELL221M◊◊ΔΔ1012
	270	0,688	0,095	0,190	0,14	135	795	10 x 16	ECR1ELL271M◊◊ΔΔ1016
	330	0,563	0,095	0,190	0,14	165	751	8 x 20	ECR1ELL331M◊◊ΔΔ0820
		0,563	0,120	0,240	0,14	165	629	10 x 12,5	ECR1ELL331M◊◊ΔΔ1012
	470	0,395	0,095	0,190	0,14	235	751	8 x 20	ECR1ELL471M◊◊ΔΔ0820
		0,395	0,120	0,240	0,14	235	760	10 x 12,5	ECR1ELL471M◊◊ΔΔ1012
		0,395	0,065	0,130	0,14	235	1010	10 x 20	ECR1ELL471M◊◊ΔΔ1020
		0,395	0,065	0,130	0,14	235	1010	12,5 x 15	ECR1ELL471M◊◊ΔΔ1215
	560	0,332	0,055	0,110	0,14	280	1190	10 x 25	ECR1ELL561M◊◊ΔΔ1025
	820	0,227	0,045	0,090	0,14	410	1440	10 x 30	ECR1ELL821M◊◊ΔΔ1030
		0,227	0,042	0,084	0,14	410	1400	12,5 x 20	ECR1ELL821M◊◊ΔΔ1220
		0,227	0,046	0,092	0,14	410	1360	16 x 15	ECR1ELL821M◊◊ΔΔ1615
	1 000	0,186	0,042	0,084	0,14	500	1400	12,5 x 20	ECR1ELL102M◊◊ΔΔ1220
		0,186	0,038	0,076	0,14	500	1690	12,5 x 25	ECR1ELL102M◊◊ΔΔ1225
	1 200	0,155	0,043	0,086	0,14	600	1500	18 x 15	ECR1ELL122M◊◊ΔΔ1815
	1 500	0,124	0,032	0,064	0,14	750	1950	12,5 x 30	ECR1ELL152M◊◊ΔΔ1230
		0,124	0,034	0,068	0,14	750	1730	16 x 20	ECR1ELL152M◊◊ΔΔ1620
	1 800	0,103	0,028	0,056	0,14	900	2200	12,5 x 35	ECR1ELL182M◊◊ΔΔ1235
		0,103	0,028	0,056	0,14	900	2070	16 x 25	ECR1ELL182M◊◊ΔΔ1625
		0,103	0,030	0,060	0,14	900	1890	18 x 20	ECR1ELL182M◊◊ΔΔ1820

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (Ω)	Z_{max} Max Impedance 20°C 100kHz (Ω)	Z_{max} Max Impedance -10°C 100kHz (Ω)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (µA)	I_{RAC} Rated Ripple Current 105°C 100kHz (mArms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pitch code Details: Page 8
25 (32) 1E	2 200	0,097	0,028	0,056	0,16	1100	2200	12,5 x 35	ECR1ELL222M◊◊ΔΔ1235
		0,097	0,026	0,052	0,16	1100	2390	12,5 x 40	ECR1ELL222M◊◊ΔΔ1240
	2 700	0,079	0,025	0,050	0,16	1350	2350	16 x 31,5	ECR1ELL272M◊◊ΔΔ1631
		0,079	0,027	0,054	0,16	1350	2180	18 x 25	ECR1ELL272M◊◊ΔΔ1825
	3300	0,072	0,022	0,044	0,18	1650	2550	16 x 35,5	ECR1ELL332M◊◊ΔΔ1635
		0,072	0,023	0,046	0,18	1650	2470	18 x 31,5	ECR1ELL332M◊◊ΔΔ1831
	3900	0,061	0,020	0,040	0,18	1950	2900	16 x 40	ECR1ELL392M◊◊ΔΔ1640
		0,061	0,020	0,040	0,18	1950	2740	18 x 35,5	ECR1ELL392M◊◊ΔΔ1835
	4700	0,056	0,019	0,038	0,20	2350	3070	18 x 40	ECR1ELL472M◊◊ΔΔ1840
35 (44) 1V	27	5,90	0,650	1,30	0,12	19	175	5 x 11,5	ECR1VLL270M◊◊ΔΔ0511
	39	4,09	0,460	0,920	0,12	28	235	5 x 15	ECR1VLL390M◊◊ΔΔ0515
	47	3,39	0,650	1,300	0,12	33	175	5 x 11,5	ECR1VLL470M◊◊ΔΔ0511
	56	2,85	0,300	0,600	0,12	40	290	6,3 x 11,5	ECR1VLL560M◊◊ΔΔ0611
	82	1,95	0,200	0,400	0,12	58	400	6,3 x 15	ECR1VLL820M◊◊ΔΔ0615
	100	1,60	0,200	0,400	0,12	70	420	8 x 11,5	ECR1VLL101M◊◊ΔΔ0811
	120	1,33	0,170	0,340	0,12	84	501	8 x 11,5	ECR1VLL121M◊◊ΔΔ0811
	150	1,07	0,120	0,240	0,12	105	625	10 x 12,5	ECR1VLL151M◊◊ΔΔ1012
	180	0,885	0,130	0,260	0,12	126	575	8 x 16	ECR1VLL181M◊◊ΔΔ0816
		0,885	0,095	0,190	0,12	126	795	10 x 16	ECR1VLL181M◊◊ΔΔ1016
	220	0,724	0,130	0,260	0,12	154	575	8 x 16	ECR1VLL221M◊◊ΔΔ0816
		0,724	0,095	0,190	0,12	154	760	8 x 20	ECR1VLL221M◊◊ΔΔ0820
	330	0,483	0,095	0,190	0,12	231	795	10 x 16	ECR1VLL331M◊◊ΔΔ1016
		0,483	0,065	0,130	0,12	231	1010	10 x 20	ECR1VLL331M◊◊ΔΔ1020
		0,483	0,065	0,130	0,12	231	1010	12,5 x 15	ECR1VLL331M◊◊ΔΔ1215
	390	0,408	0,055	0,110	0,12	273	1190	10 x 25	ECR1VLL391M◊◊ΔΔ1025
	470	0,339	0,065	0,130	0,12	329	1010	10 x 20	ECR1VLL471M◊◊ΔΔ1020
	560	0,284	0,045	0,090	0,12	392	1450	10 x 30	ECR1VLL561M◊◊ΔΔ1030
		0,284	0,042	0,084	0,12	392	1400	12,5 x 20	ECR1VLL561M◊◊ΔΔ1220
		0,284	0,046	0,092	0,12	392	1360	16 x 15	ECR1VLL561M◊◊ΔΔ1615
	680	0,234	0,038	0,076	0,12	476	1690	12,5 x 25	ECR1VLL681M◊◊ΔΔ1225
		0,234	0,043	0,086	0,12	476	1520	18 x 15	ECR1VLL681M◊◊ΔΔ1815
	1 000	0,159	0,042	0,084	0,12	700	1500	12,5 x 20	ECR1VLL102M◊◊ΔΔ1220
		0,159	0,038	0,076	0,12	700	1690	12,5 x 25	ECR1VLL102M◊◊ΔΔ1225
		0,159	0,032	0,064	0,12	700	1950	12,5 x 30	ECR1VLL102M◊◊ΔΔ1230
		0,159	0,034	0,068	0,12	700	1730	16 x 20	ECR1VLL102M◊◊ΔΔ1620
	1 200	0,133	0,028	0,056	0,12	840	2200	12,5 x 35	ECR1VLL122M◊◊ΔΔ1235
		0,133	0,028	0,056	0,12	840	2070	16 x 25	ECR1VLL122M◊◊ΔΔ1625
		0,133	0,030	0,060	0,12	840	1900	18 x 20	ECR1VLL122M◊◊ΔΔ1820
	1 500	0,106	0,026	0,052	0,12	1050	2390	12,5 x 40	ECR1VLL152M◊◊ΔΔ1240
	1 800	0,088	0,025	0,050	0,12	1260	2350	16 x 31,5	ECR1VLL182M◊◊ΔΔ1631
		0,088	0,027	0,054	0,12	1260	2200	18 x 25	ECR1VLL182M◊◊ΔΔ1825
	2 200	0,084	0,022	0,044	0,14	1540	2550	16 x 35,5	ECR1VLL222M◊◊ΔΔ1635
		0,084	0,023	0,046	0,14	1540	2490	18 x 31,5	ECR1VLL222M◊◊ΔΔ1831
	2 700	0,069	0,020	0,040	0,14	1890	2900	16 x 40	ECR1VLL272M◊◊ΔΔ1640
		0,069	0,020	0,040	0,14	1890	2770	18 x 35,5	ECR1VLL272M◊◊ΔΔ1835
	3 300	0,064	0,019	0,038	0,16	2310	3110	18 x 40	ECR1VLL332M◊◊ΔΔ1840
50 (63) 1H	0,47	283	3,90	7,80	0,10	3	22	5 x 11,5	ECR1HLLR47M◊◊ΔΔ0511
	1,0	133	3,50	7,00	0,10	3	36	5 x 11,5	ECR1HLL010M◊◊ΔΔ0511
	2,2	60,4	3,00	6,00	0,10	3	54	5 x 11,5	ECR1HLL2R2M◊◊ΔΔ0511
	3,3	40,3	2,60	5,20	0,10	4	63	5 x 11,5	ECR1HLL3R3M◊◊ΔΔ0511
	4,7	28,3	2,20	4,40	0,10	5	75	5 x 11,5	ECR1HLL4R7M◊◊ΔΔ0511
	10	13,3	1,40	2,80	0,10	10	110	5 x 11,5	ECR1HLL100M◊◊ΔΔ0511
	18	7,38	0,950	1,90	0,10	18	120	5 x 11,5	ECR1HLL180M◊◊ΔΔ0511
	27	4,92	0,550	1,10	0,10	27	135	5 x 15	ECR1HLL270M◊◊ΔΔ0515
	39	3,41	0,360	0,720	0,10	39	148	6,3 x 11,5	ECR1HLL390M◊◊ΔΔ0611
	56	2,37	0,280	0,560	0,10	56	153	6,3 x 15	ECR1HLL560M◊◊ΔΔ0615
	68	1,951	0,200	0,400	0,10	68	360	8 x 11,5	ECR1HLL680M◊◊ΔΔ0811
	82	1,618	0,180	0,360	0,10	82	460	8 x 16	ECR1HLL820M◊◊ΔΔ0816
		1,618	0,180	0,360	0,10	82	443	10 x 12,5	ECR1HLL820M◊◊ΔΔ1012
	100	1,327	0,150	0,300	0,10	100	553	10 x 16	ECR1HLL101M◊◊ΔΔ1016
	120	1,106	0,130	0,260	0,10	120	670	8 x 20	ECR1HLL121M◊◊ΔΔ0820
	180	0,737	0,095	0,190	0,10	180	676	10 x 20	ECR1HLL181M◊◊ΔΔ1020
		0,737	0,105	0,210	0,10	180	745	12,5 x 15	ECR1HLL181M◊◊ΔΔ1215
	220	0,603	0,080	0,160	0,10	220	876	10 x 25	ECR1HLL221M◊◊ΔΔ1025

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (Ω)	Z_{max} Max Impedance 20°C 100kHz (Ω)	Z_{max} Max Impedance -10°C 100kHz (Ω)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (µA)	I_{RAC} Rated Ripple Current 105°C 100kHz (mArms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pitch code Details: Page 8
50 (63) 1H	330	0,402	0,065	0,130	0,10	330	1010	10 x 30	ECR1HLL331M◊◊ΔΔ1030
		0,402	0,070	0,140	0,10	330	979	12,5 x 20	ECR1HLL331M◊◊ΔΔ1220
		0,402	0,075	0,150	0,10	330	982	16 x 15	ECR1HLL331M◊◊ΔΔ1615
	470	0,282	0,054	0,108	0,10	470	1180	12,5 x 25	ECR1HLL471M◊◊ΔΔ1225
		0,282	0,058	0,116	0,10	470	1180	18 x 15	ECR1HLL471M◊◊ΔΔ1815
	560	0,237	0,050	0,100	0,10	560	1310	12,5 x 30	ECR1HLL561M◊◊ΔΔ1230
	680	0,195	0,046	0,092	0,10	680	1470	12,5 x 35	ECR1HLL681M◊◊ΔΔ1235
		0,195	0,050	0,100	0,10	680	1210	16 x 20	ECR1HLL681M◊◊ΔΔ1620
	820	0,162	0,044	0,088	0,10	820	1590	12,5 x 40	ECR1HLL821M◊◊ΔΔ1240
		0,162	0,048	0,096	0,10	820	1490	16 x 25	ECR1HLL821M◊◊ΔΔ1625
		0,162	0,046	0,092	0,10	820	1450	18 x 20	ECR1HLL821M◊◊ΔΔ1820
	1 000	0,133	0,040	0,080	0,10	1000	1890	16 x 31,5	ECR1HLL102M◊◊ΔΔ1631
		0,133	0,040	0,080	0,10	1000	1720	18 x 25	ECR1HLL102M◊◊ΔΔ1825
	1 200	0,111	0,032	0,064	0,10	1200	2140	16 x 35,5	ECR1HLL122M◊◊ΔΔ1635
	1 500	0,088	0,026	0,052	0,10	1500	2410	16 x 40	ECR1HLL152M◊◊ΔΔ1640
		0,088	0,026	0,052	0,10	1500	1970	18 x 31,5	ECR1HLL152M◊◊ΔΔ1831
	1 800	0,074	0,025	0,050	0,10	1800	2310	18 x 35,5	ECR1HLL182M◊◊ΔΔ1835
	2 200	0,072	0,024	0,048	0,12	2200	2530	18 x 40	ECR1HLL222M◊◊ΔΔ1840
63 (79) 1J	12	9,952	1,20	3,60	0,09	16	120	5 x 11,5	ECR1JLL120M◊◊ΔΔ0511
	18	6,635	0,850	2,60	0,09	23	135	5 x 15	ECR1JLL180M◊◊ΔΔ0515
	27	4,423	0,550	1,70	0,09	34	148	6,3 x 11,5	ECR1JLL270M◊◊ΔΔ0611
	39	3,062	0,380	1,10	0,09	50	153	6,3 x 15	ECR1JLL390M◊◊ΔΔ0615
	47	2,541	0,320	0,960	0,09	60	360	8 x 11,5	ECR1JLL470M◊◊ΔΔ0811
	56	2,133	0,230	0,690	0,09	71	448	10 x 12,5	ECR1JLL560M◊◊ΔΔ1012
	68	1,756	0,240	0,720	0,09	86	469	8 x 16	ECR1JLL680M◊◊ΔΔ0816
		1,756	0,170	0,510	0,09	86	553	10 x 16	ECR1JLL680M◊◊ΔΔ1016
	82	1,456	0,170	0,510	0,09	104	682	8 x 20	ECR1JLL820M◊◊ΔΔ0820
	120	0,995	0,120	0,360	0,09	152	676	10 x 20	ECR1JLL121M◊◊ΔΔ1020
	150	0,796	0,100	0,300	0,09	189	876	10 x 25	ECR1JLL151M◊◊ΔΔ1025
		0,796	0,110	0,330	0,09	189	745	12,5 x 15	ECR1JLL151M◊◊ΔΔ1215
	180	0,663	0,085	0,260	0,09	227	1020	10 x 30	ECR1JLL181M◊◊ΔΔ1030
	220	0,543	0,075	0,230	0,09	278	979	12,5 x 20	ECR1JLL221M◊◊ΔΔ1220
		0,543	0,080	0,240	0,09	278	928	16 x 15	ECR1JLL221M◊◊ΔΔ1615
	270	0,442	0,065	0,200	0,09	341	1180	12,5 x 25	ECR1JLL271M◊◊ΔΔ1225
	330	0,362	0,065	0,200	0,09	416	1200	18 x 15	ECR1JLL331M◊◊ΔΔ1815
	390	0,306	0,055	0,170	0,09	492	1310	12,5 x 30	ECR1JLL391M◊◊ΔΔ1230
		0,306	0,057	0,170	0,09	492	1210	16 x 20	ECR1JLL391M◊◊ΔΔ1620
	470	0,254	0,048	0,140	0,09	593	1470	12,5 x 35	ECR1JLL471M◊◊ΔΔ1235
		0,254	0,052	0,160	0,09	593	1490	16 x 25	ECR1JLL471M◊◊ΔΔ1625
		0,254	0,058	0,170	0,09	593	1460	18 x 20	ECR1JLL471M◊◊ΔΔ1820
	560	0,213	0,042	0,130	0,09	706	1590	12,5 x 40	ECR1JLL561M◊◊ΔΔ1240
	680	0,176	0,042	0,130	0,09	857	1890	16 x 31,5	ECR1JLL681M◊◊ΔΔ1631
		0,176	0,050	0,150	0,09	857	1740	18 x 25	ECR1JLL681M◊◊ΔΔ1825
	820	0,146	0,036	0,110	0,09	1034	2140	16 x 35,5	ECR1JLL821M◊◊ΔΔ1635
		0,146	0,042	0,130	0,09	1034	1990	18 x 31,5	ECR1JLL821M◊◊ΔΔ1831
	1 000	0,119	0,032	0,096	0,09	1260	2410	16 x 40	ECR1JLL102M◊◊ΔΔ1640
		0,119	0,035	0,110	0,09	1260	2340	18 x 35,5	ECR1JLL102M◊◊ΔΔ1835
	1 200	0,100	0,032	0,096	0,09	1512	2560	18 x 40	ECR1JLL122M◊◊ΔΔ1840
100 (125) 2A	5,6	19,0	1,90	7,60	0,08	12	57	5 x 11,5	ECR2ALL5R6M◊◊ΔΔ0511
	8,2	13,0	1,30	5,20	0,08	17	74	5 x 15	ECR2ALL8R2M◊◊ΔΔ0515
	12	8,85	1,10	4,40	0,08	24	78	6,3 x 11,5	ECR2ALL120M◊◊ΔΔ0611
	18	5,90	0,620	2,50	0,08	36	85	6,3 x 15	ECR2ALL180M◊◊ΔΔ0615
	22	4,83	0,530	2,10	0,08	44	275	8 x 11,5	ECR2ALL220M◊◊ΔΔ0811
	27	3,94	0,470	1,90	0,08	54	319	10 x 12,5	ECR2ALL270M◊◊ΔΔ1012
	33	3,22	0,350	1,40	0,08	66	360	8 x 16	ECR2ALL330M◊◊ΔΔ0816
		3,22	0,320	1,30	0,08	66	424	10 x 16	ECR2ALL330M◊◊ΔΔ1016
	39	2,73	0,270	1,10	0,08	78	490	8 x 20	ECR2ALL390M◊◊ΔΔ0820
	56	1,90	0,250	1,00	0,08	112	499	10 x 20	ECR2ALL560M◊◊ΔΔ1020
	68	1,57	0,180	0,720	0,08	136	634	10 x 25	ECR2ALL680M◊◊ΔΔ1025
		1,57	0,200	0,800	0,08	136	613	12,5 x 15	ECR2ALL680M◊◊ΔΔ1215
	100	1,07	0,150	0,600	0,08	200	739	10 x 30	ECR2ALL101M◊◊ΔΔ1030
		1,07	0,130	0,520	0,08	200	805	12,5 x 20	ECR2ALL101M◊◊ΔΔ1220
	120	0,885	0,110	0,440	0,08	240	857	12,5 x 25	ECR2ALL121M◊◊ΔΔ1225
		0,885	0,130	0,500	0,08	240	706	16 x 15	ECR2ALL121M◊◊ΔΔ1615
	150	0,708	0,120	0,480	0,08	300	871	18 x 15	ECR2ALL151M◊◊ΔΔ1815
	180	0,590	0,090	0,360	0,08	360	1120	12,5 x 30	ECR2ALL181M◊◊ΔΔ1230
		0,590	0,110	0,440	0,08	360	916	16 x 20	ECR2ALL181M◊◊ΔΔ1620

U_{RDC} (Surge Voltage) Code (V)	C_R Rated Capacitance (µF)	ESR_{max} Equivalent Series Resistance 20°C 120Hz (Ω)	Z_{max} Max Impedance 20°C 100kHz (Ω)	Z_{max} Max Impedance -10°C 100kHz (Ω)	tanδ Dissipation Factor 20°C 120Hz	I_{leak} Leakage Current (µA)	I_{RAC} Rated Ripple Current 105°C 100kHz (mArms)	Size øD x L (mm)	ORDER CODE ◊◊ = pin style & length ΔΔ = pitch code Details: Page 8
100 (125) 2A	220	0,483	0,075	0,300	0,08	440	1240	12,5 x 35	ECR2ALL221M◊◊ΔΔ1235
		0,483	0,081	0,320	0,08	440	1290	16 x 25	ECR2ALL221M◊◊ΔΔ1625
	270	0,393	0,060	0,240	0,08	540	1330	12,5 x 40	ECR2ALL271M◊◊ΔΔ1240
		0,393	0,085	0,340	0,08	540	1170	18 x 20	ECR2ALL271M◊◊ΔΔ1820
	330	0,322	0,059	0,230	0,08	660	1630	16 x 31,5	ECR2ALL331M◊◊ΔΔ1631
		0,322	0,071	0,280	0,08	660	1500	18 x 25	ECR2ALL331M◊◊ΔΔ1825
	390	0,272	0,052	0,210	0,08	780	1750	16 x 35,5	ECR2ALL391M◊◊ΔΔ1635
		0,272	0,058	0,230	0,08	780	1630	18 x 31,5	ECR2ALL391M◊◊ΔΔ1831
	470	0,226	0,045	0,180	0,08	940	1920	16 x 40	ECR2ALL471M◊◊ΔΔ1640
	560	0,190	0,054	0,220	0,08	1120	1920	18 x 35,5	ECR2ALL561M◊◊ΔΔ1835
	680	0,156	0,041	0,160	0,08	1360	2100	18 x 40	ECR2ALL681M◊◊ΔΔ1840

IMPEDANCE RATIO

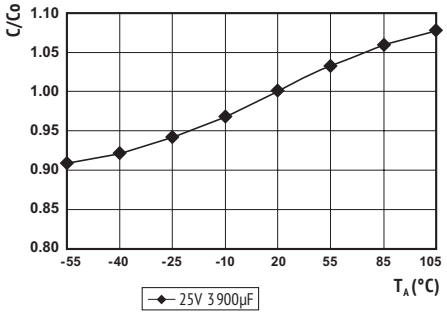


Z = actual impedance of each frequency at 20°C

Zo = Impedance at 100kHz, 20°C

Impedance Ratio as a function of frequency

CAPACITANCE RATIO



C = actual capacitance of each temperature at 100Hz,

Co = Capacitance at 20°C, 100Hz

Capacitance Ratio as a function of temperature (typical curve)

ORDER CODE FOR RADIAL CAPACITORS

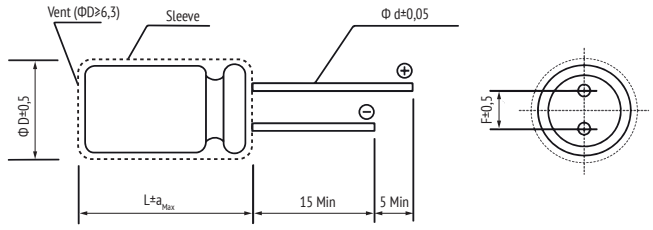
EC	R	2G	QX	221	M	LL	50	1012	-	-	JExxxxx
Techno-logy	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code	Capacitance Tolerance	Terminal Style	Terminal / Pitch	Dimension (mm)	Material Code	Rubber Type	for Specials only
EC Electrolytric Capacitor	Radial **R**	6,3V **0J** 10V **1A** 16V **1C** 20V **1D** 25V **1E** 35V **1V** 40V **1G** 50V **1H** 63V **1J** 80V **1K** 100V **2A** 125V **2B** 160V **2C** 180V **2K** 200V **2D** 250V **2E** 350V **2V** 385V **2J** 400V **2G** 415V **2P** 420V **2X** 450V **2W** 500V **2H** 550V **2Y** 575V **2Z** 600V **2S** 630V **J2**	CD 110 **PT** CD 11GL **GL** CD 261L **DE** CD 261X **QX** CD 263 **BK** CD 264 **KH** CD 266 **FK** CD 26H **XH** CD 26HS **XS** CD 269L **HL** CD 281 **LL** CD 281L **LH** CD 282L **YL** CD 282X **EQ** CD 284 **XY** CD 284L **LY** CD 285 **HY** CD 287 **GC** CD 28L **QL**	0,1 **0R1** 0,47 **R47** 1,0 **010** 2,2 **2R2** 100 **101** 1 000 **102** 10 000 **103**	**±20% M** ±10% **K** +30 / -10% **Q** +20 / -0% **R** ±15% **L** +20 / -10% **V** ■ **= preferred**	Taped **FF** Long Lead **LL** Cut 5,0mm **CB** Cut 4,5mm **CC** Cut 4,0mm **CD** Cut 3,5mm **CE** Cut 3,0mm **CF**	2,0mm **20** 2,5mm **25** 3,5mm **35** 5,0mm **50** 7,5mm **75** 10,0mm **10** 12,5mm **12**	4x7 **0407** 5x11,5 **0511** 10x20 **1020** 12,5x25 **1225**	Standard **-** PVC **V** PET **E**	Standard **-** Flat Rubber **F** Stand-Off **S**	

On request:
Alternative lead forms
(keyed polarity, 90° bended, others)

Packaging:
Taped: ammopack
Long lead & cut: bulk

DIMENSIONS FOR LOOSE, LONG-LEAD TYPE (BULK)

· ORDER CODE: LL



L	L ≤ 7					L ≥ 11									
Ø D	3	4	5	6,3	8	5	6,3	8	10	12,5	16	18	20	22	25
F	1,0	1,5	2,0	2,5	3,5	2,0	2,5	3,5	5,0		7,5		10,0		12,5
Ø d	0,4	0,45				0,5		0,6			0,8			1,0	
a_{Max}	1,0					2,0							2,5		

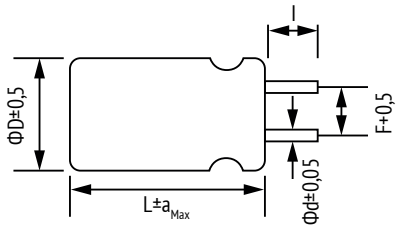
For diameter 20 pitch 7,5 or 10.

in mm

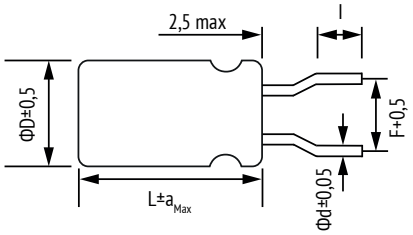
DIMENSIONS FOR LOOSE, SHORT CUT LEADS (BULK)

· ORDER CODE: CC (CB, CD, CE, CF)

STRAIGHT LEAD



BENDED LEAD



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

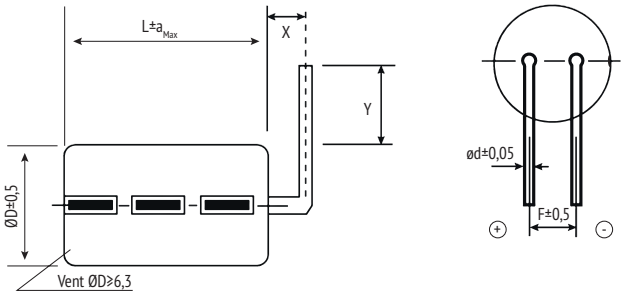
= preferred

in mm

EXAMPLE OF ALTERNATIVE BENDINGS

· ORDER CODE: WS

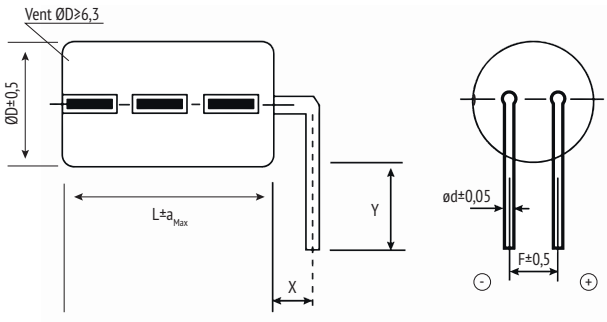
90° LEADS UP
Diameter ≥ 10mm



X: 3,0±0,5
Y: 3,7±0,3

· ORDER CODE: WX

90° LEADS DOWN
Diameter ≥ 10mm



X: 3,0±0,5
Y: 3,7±0,3

DIMENSIONS FOR AMMOPACK TAPING FOR ELECTROLYTIC CAPACITORS

· ORDER CODE: FF (FD)

Fig 1

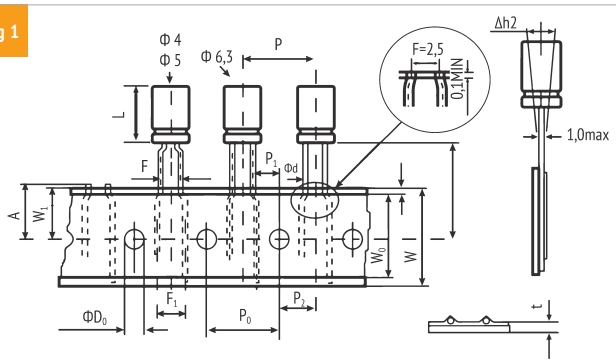


Fig 2

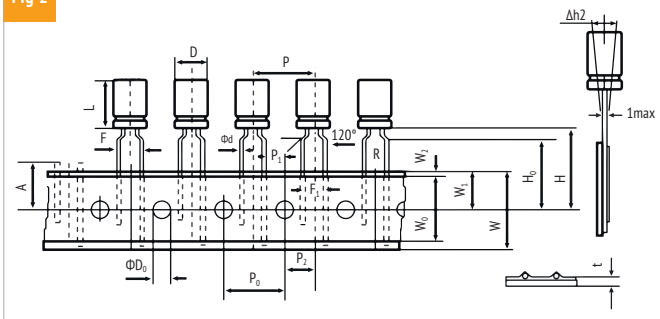


Fig 3a

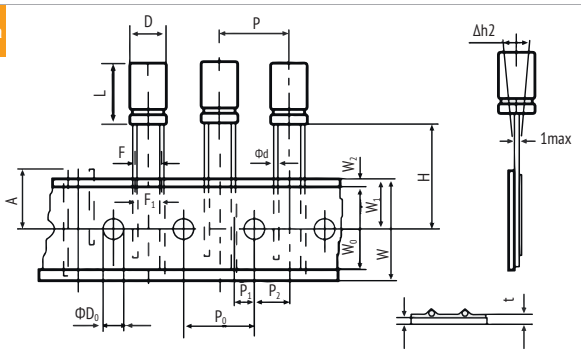


Fig 3b

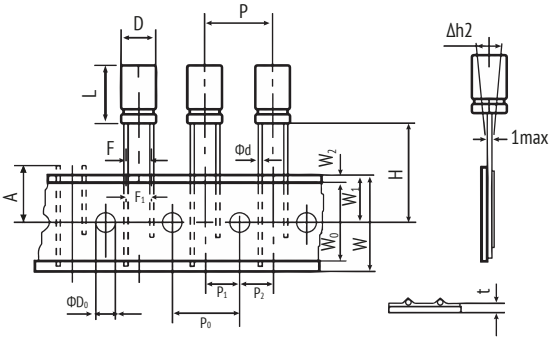
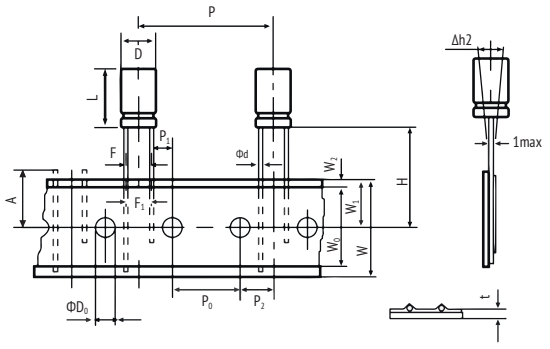


Fig 4



OTHER TAPING STYLES AVAILABLE ON REQUEST.

ITEM	D	L	Ød	P	P_0	P_1	P_2	F	F_1	W	W_0	W_1	W_2	H	H_0	A	$ØD_0$	$Δh_2$	t	Fig.	Taping Code
Tol.	± 0,5	± 2,0	± 0,05	± 1,0	± 0,2	± 0,5	± 1,0	+ 0,8 - 0,2	± 1,0	± 0,5	min	± 0,5	max	+ 0,75 - 0,5	± 0,5	max	± 0,5	max	± 0,2		
Nominal	4	7	0,45	12,7	12,7	5,1	6,35	2,5	3,5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5					17,5	16,0					2	FF
	5	7	0,45	12,7	12,7	5,1	6,35	2,5	3,5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5					17,5	16,0					2	FF
		11,5~15	0,5	12,7	12,7	5,1	6,35	2,5	3,5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5						16,0					2	FF
	6,3	7	0,45	12,7	12,7	5,1	6,35	2,5	3,5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5					17,5	16,0					2	FF
		11,5~15	0,5	12,7	12,7	5,1	6,35	2,5	3,5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5						16,0					2	FF
	8	11,5~20	0,6	12,7	12,7	4,6	6,35	3,5	3,5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	3a	FF
						3,85		5	5					20,0	16,0					2	FF
	10	12,5~36	0,6	12,7	12,7	3,85	6,35	5	5	18,0	10,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	3b	FF
	12,5	15~36	0,6	15	15	5,0	7,5	5	5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	3b	FF
				25,4	12,7	3,85	6,35													4	FD
	16	15~31,5	0,8	30	15	3,75	7,5	7,5	7,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	4	FD
	18	15~25,5	0,8	30	15	3,75	7,5	7,5	7,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	4	FD
	Other taping styles available on request																				

in mm

WARNING

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

PERSONAL SAFETY

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

WARRANTY

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

POLARITY

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

RATED VOLTAGE U_R

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

SURGE VOLTAGE

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

REVERSE VOLTAGE

Reverse voltages or voltages < 0V are not allowed.

RECOVERY VOLTAGE

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

TEMPERATURE RANGE

Use electrolytic capacitors only within the specified operating temperature range.

OVER-CURRENT

Currents exceeding the rated ripple currents should be avoided.

RIPPLE CURRENT/VOLTAGE

The combined value of DC voltage and peak AC voltage (due to ripple current) shall not exceed the rated voltage and shall never be < 0V. Use of aluminum electrolytic capacitors under ripple current with wide amplitudes is equivalent to rapid charge-discharge operation. Never exceed a ripple voltage of $70V_{peak\text{-}peak}$ without additional approval of Jianghai.

RAPID CHARGING/DISCHARGING

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

BALANCING RESISTORS

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

CHARGE-DISCHARGE PROOF

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

LIFETIME

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

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

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

VIBRATION AND MECHANICAL STRESS

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

INSULATION

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

ENVIRONMENTAL CONDITIONS

Avoid direct contact with water, salt solution, oil, dewing conditions. Halogens generally, especially fumigation treatment with bromides and flame retardant agents containing halogens must be avoided. Avoid exposing to direct sunshine, ozone, ultraviolet rays and x-ray radiation. Air Pressure: Max. 150kPa, min. 8kPa. For usage >2000m altitude above sea level current deratings might be necessary. No heavy air pressure changes are allowed. Do not use or store in an environment containing any hazardous gas (e.g., hydrogen sulphide, sulphurous acid, nitrous acid, chlorine, ammonia, bromine, methyl bromide, other halogens) or acidic or alkaline solutions.

STORAGE

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

SOLDERING

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

GLUEING, CLEANING AND COATING

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

MOUNTING

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

TRANSPORT

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

MAINTENANCE

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

ELECTROLYTE AND SEPARATOR PAPER

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

CAUTION DURING USE OF CAPACITORS

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

SAFETY VENT

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

EMERGENCY ACTIONS

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

DEFINITION OF ELECTRICAL PARAMETERS

Separate documents as application notes, equivalent circuit diagrams and so on are available on request.

PACKAGING

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

DISPOSAL

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

Jianghai Europe Electronic Components GmbH
VERSION 9/2024

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

STRUCTUAL FORMULA

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

WHERE:

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

K_T TEMPERATURE FACTOR

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

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

WHERE:

- T_0 Rated Temperature
- T_A Ambient Temperature

FREQUENCY CORRECTION FACTORS:

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

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

K_R RIPPLE CURRENT FACTOR

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

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

WITH:

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

WHERE:

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

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

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

>>

K_V VOLTAGE FACTOR

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

FOR:

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

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

WHERE:

U_A Actual Operating Voltage

U_R Rated Voltage

FOR:

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

$$K_V = 3{,}59$$

FOR:

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

$$K_V = 1$$

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

$$K_V = 1$$

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

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

WITH TYPICAL VALUES:

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

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

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

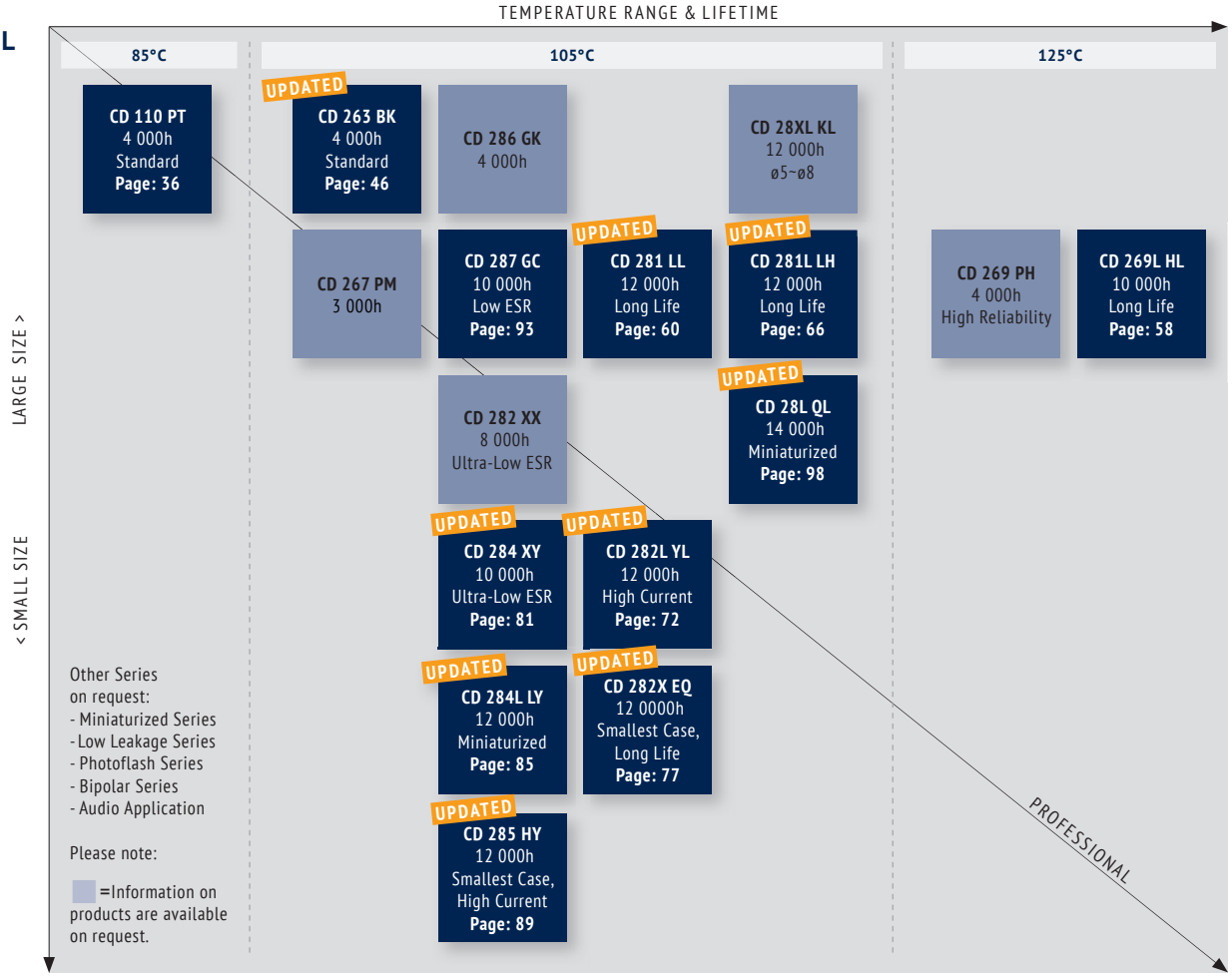
$$0 < \frac{U_A}{U_R} < 0{,}6 \rightarrow K_V = \left(\frac{U_A}{U_R}\right)^{-n} = 3{,}59$$

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

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

OUR RADIALS IN RELATION TO ONE ANOTHER

RADIAL 6,3V ~ 100V



RADIAL 160V ~ 550V

