

# ALUMINUM ELECTROLYTIC CAPACITORS



## ES Series

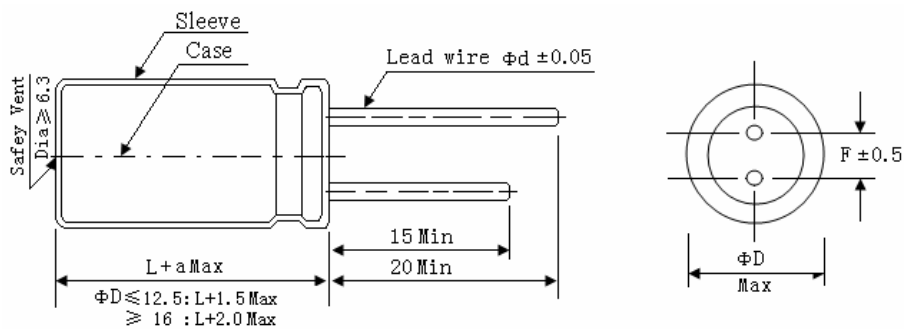
Suitable for use in high ripple current capability.  
Miniaturized, Low E.S.R. and low impedance



### SPECIFICATIONS

Item	Performance Characteristics																		
Category Temperature Range	-40 ~ +105°C																		
Working Voltage Range	6.3 ~ 100Vdc																		
Capacitance Range	4.7 ~ 10,000 µF																		
Capacitance Tolerance	±20% (at 25°C and 120Hz)																		
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>tanδ(Max)</td> <td>0.15</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> <td>0.07</td> </tr> </tbody> </table>	Rated Voltage (V)	6.3	10	16	25	35	50	63	100	tanδ(Max)	0.15	0.14	0.12	0.10	0.10	0.08	0.08	0.07
	Rated Voltage (V)	6.3	10	16	25	35	50	63	100										
tanδ(Max)	0.15	0.14	0.12	0.10	0.10	0.08	0.08	0.07											
The above values should be increased by 0.02 for every additional 1000µF																			
Leakage Current	I=0.01CV or 3 µA, whichever is greater. I : Leakage current (µA) C : Rated capacitance (µF) V : Rated voltage (V) Impress the rated voltage for 2 minutes.																		
Endurance	The following requirements shall be satisfied when the capacitor are restored to 25°C after the rated voltage applied for 2,000 hours at 105°C. <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±20% of the initial value	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ specified value												
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Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 500 hours at 105°C without voltage applied. <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ 200% of the specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±20% of the initial value	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ 200% of the specified value												
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Leakage current	≒ 200% of the specified value																		
Others	Conforms to JIS-C-5101-4 (1998), characteristic W.																		

### DIMENSIONS (mm)



ΦD	5	6.3	8	10	12.5 L < 35	12.5 L ≥ 35	16	18
ΦD	ΦD +0.5 Max						ΦD +1.0 Max	
Φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0		7.5	7.5

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Case size & Permissible rated ripple current:

Nominal Capacitance (uF)	6.3V			10V			16V		
	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)
100	5×11	1.780	120	5×11	1.480	155	6.3×11	1.280	200
220	6.3×11	0.880	252	6.3×11	0.580	300	8×12	0.460	550
330	6.3×11	0.450	280	8×12	0.380	550	8×12	0.280	580
470	8×12	0.140	550	8×12	0.140	600	8×16	0.090	730
560	8×12	0.130	580	8×16	0.120	700	8×20	0.080	810
680	8×12	0.120	600	8×16	0.110	730	10×16	0.064	1050
820	8×16	0.090	730	8×20	0.080	1000	10×20	0.044	1100
1000	8×16	0.085	780	8×20	0.065	1080	10×20	0.039	1250
1000	10×13	0.084	785	10×16	0.064	1055	10×25	0.039	1280
1200	8×16	0.085	790	10×20	0.044	1250	10×25	0.038	1450
1500	8×20	0.080	810	10×20	0.039	1450	10×30	0.034	1600
1500	10×16	0.055	1060	10×25	0.038	1460	12.5×20	0.034	1600
2200	10×20	0.043	1250	10×30	0.038	1460	12.5×25	0.028	2000
2700	10×25	0.039	1600	12.5×20	0.037	1650	12.5×30	0.028	2100
3300	12.5×20	0.038	1660	12.5×25	0.028	2000	12.5×35	0.024	2220
3900	12.5×20	0.037	1670	12.5×25	0.027	2060	12.5×40	0.023	2350
4700	12.5×25	0.033	1700	12.5×30	0.024	2200	16×32	0.019	2550
5600	12.5×30	0.029	1750	12.5×35	0.023	2300	16×36	0.019	2680
6800	12.5×35	0.024	2000	16×32	0.019	2550	16×40	0.019	2800
8200	16×32	0.019	2350	16×36	0.019	2800	18×36	0.018	3000
10000	16×36	0.019	2550	16×40	0.018	3000	18×40	0.017	3150

Nominal Capacitance (uF)	25V			35V			50V		
	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)
47	5×11	0.880	150	6.3×11	0.760	250	6.3×11	0.640	300
68	6.3×11	0.660	200	8×12	0.560	300	8×12	0.480	450
100	6.3×11	0.430	250	8×12	0.380	450	8×16	0.220	550
150	8×12	0.140	500	8×12	0.120	555	8×20	0.180	780
220	8×12	0.120	730	8×16	0.100	600	10×16	0.100	1050
330	8×16	0.090	750	10×20	0.068	1050	10×20	0.072	1300
470	10×16	0.064	1050	10×20	0.046	1300	12.5×20	0.060	1400
560	10×20	0.065	1100	10×25	0.039	1350	12.5×25	0.058	1480
680	10×20	0.039	1110	10×30	0.038	1400	12.5×25	0.050	1550
820	10×20	0.039	1250	12.5×20	0.034	1550	12.5×35	0.040	1700
1000	12.5×20	0.038	1450	12.5×25	0.029	1700	12.5×35	0.039	1900
1200	12.5×25	0.033	1600	12.5×30	0.028	1900	16×32	0.025	2100
1500	12.5×25	0.030	1950	12.5×35	0.024	2100	16×36	0.025	2550
2200	12.5×35	0.024	2200	16×32	0.021	2500	18×36	0.025	2800
2700	12.5×40	0.024	2300	16×36	0.020	2600			
3300	16×32	0.019	2550	16×40	0.019	2800			
3900	16×36	0.019	2650	18×40	0.015	3000			
4700	18×36	0.019	2800	18×40	0.014	3300			

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Case size & Permissible rated ripple current:

Nominal Capacitance (uF)	63V			100V		
	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case Size DΦ×L (mm)	Max. Impd @25°C 100kHz (Ω)	Max. Rated ripple current @105°C 100kHz (mA rms)
4.7	5×11	2.5	55	5×11	2.5	65
10	5×11	2.3	110	6.3×11	2.2	115
22	6.3×11	2.1	140	8×12	0.53	305
33	6.3×11	1.2	205	8×16	0.52	400
47	8×12	0.56	305	10×16	0.35	500
68	8×16	0.52	350	10×20	0.19	715
82	8×20	0.48	380	10×20	0.19	735
100	8×20	0.43	420	12.5×20	0.18	810
150	10×16	0.31	550	12.5×25	0.14	1005
220	10×20	0.21	580	16×25	0.085	1410
330	12.5×20	0.16	890	16×32	0.065	1580
470	12.5×25	0.12	1320	16×36	0.052	1700
560	12.5×30	0.11	1365	16×40	0.048	1810
680	16×25	0.065	1400	18×36	0.045	1900
820	16×32	0.057	1490	18×40	0.043	2100
1000	16×32	0.054	1620			
1200	16×36	0.047	1790			
1500	18×36	0.040	2000			
2200	18×40	0.038	2150			

### RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Vdc	Cap.(uF)	Frequency (Hz)				
		50/60	120	1K	10K	100K
6.3 ~ 100	4.7 ~ 68	---	0.17	0.65	0.85	1.00
	82 ~ 220	0.30	0.50	0.80	0.90	1.00
	330 ~ 820	0.57	0.71	0.90	0.95	1.00
	1000 ~ 10000	0.75	0.87	0.98	1.00	1.00