

# LF Series

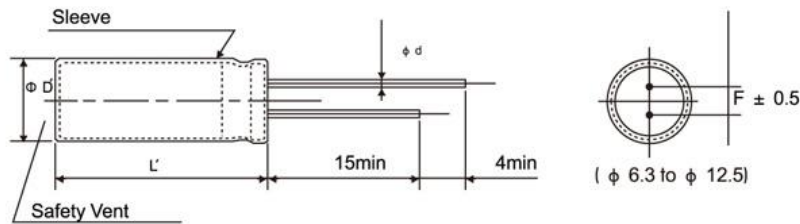
- Low impedance for high frequency
- Life time: +105 °C 2,000 to 4,000 hours
- Suitable for switching power, UPS, power sources etc
- RoHS Compliant



## ● SPECIFICATIONS

Items	Characteristics										
Category	-40 to +105 °C (6.3 to 100Vdc)										
Temperature Range											
Rated Voltage Range	6.3 to 100Vdc										
Capacitance Tolerance	± 20%(M) (at 20 °C 120Hz)										
Leakage Current	$1 \leq 0.01CV$ or $3 \mu A$ , whichever is greater Where, I:Max.leakage current( $\mu A$ ), C:Nominal capacitance ( $\mu F$ ) V:Rated voltage(V) (at 20 °C ,after 2minutes)										
Dissipation Factor (tan $\delta$ )	Rated voltage(Vdc)	6.3	10	16	25	35	50	63	100		
	tan $\delta$ (Max)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08		
	When nominal capacitance exceeds 1,000 $\mu F$ add 0.02 to the value above for each 1,000 $\mu F$ increase (at 20 °C 120Hz)										
Low Temperature Characteristics (Max.Impedance Ratio)	Rate Voltage(Vdc)	6.3	10	16	5	35	50	63	100		
	Z(-25 °C )/Z(+20 °C )	4	3	2							
	Z(-40 °C )/Z(+20 °C )	8	6	4	3						
Endurance	The following specification shall be satisfied when the capacitors are restored to 20 °C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105 °C										
	Capacitance Change	≤ ± 25% of the initial value							Case Dia	Life time(hours)	
	D.F. (tan $\delta$ )	≤ 200% of the initial specified value							Φ D=6.3	6.3-100WV	
	Leakage Current	≤ The initial specified value							Φ D=8&10	2000	
									Φ D ≥ 12.5	3000	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20 °C after exposing them for 1,000 hours at 105 °C without voltage applied										
	Capacitance Change	≤ ± 25% of the initial value									
	D.F. (tan $\delta$ )	≤ 200% of the initial specified value									
	Leakage current	≤ 200% The initial specified value									

## ● DIMENSIONS[mm]



Φ D	6.3	8	10	12.5
Φ d	0.5	0.5	0.6	0.6
F	2.5	3.5	5.0	5.0
Φ D'	Φ D+0.5max			
L'	L+2max			

## ● RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

CAP( $\mu F$ )	Freq ( Hz )			
	120	1k	10k	100k
CAP < 220	0.40	0.75	0.90	1.00
220 ≤ Cap < 680	0.60	0.85	0.94	1.00
680 ≤ Cap < 2200	0.60	0.87	0.95	1.00
2200 ≤ Cap < 4700	0.75	0.90	0.95	1.00
Cap ≥ 4700	0.85	0.95	0.98	1.00

The endurance of capacitors is shorted with internal heating produced by ripple current at the rate of halving the lifetime with every 5 °C rise. When long life performance is required in actual use, the rms ripple current has to be reduced

# LF Series

**STANDARD RATINGS** (Impedance: at 20 °C 100kHz/ Ω max, Ripple current; mArms/105 °C 100kHz)

WV (V <sub>d</sub> )	Cap (μF)	Case Size φ D × L(mm)	tan δ	Impedance (Ω max)	Ripple current (mArms)
6.3(OJ)	180	6.3 × 11 8 × 9	0.22	0.25 0.33	340 300
	220	6.3 × 11 8 × 9	0.22	0.25 0.33	340 300
	270	6.3 × 11 8 × 9	0.22	0.25 0.33	340 300
	330	8 × 11 10 × 9	0.22	0.13 0.17	650 580
	470	8 × 11 10 × 9	0.22	0.13 0.17	650 580
	560	8 × 11 10 × 9	0.22	0.13 0.17	650 580
	680	8 × 11 10 × 9	0.22	0.13 0.17	650 580
	820	10 × 12	0.22	0.08	870
	1000	10 × 9 10 × 12	0.22	0.17 0.08	580 870
	1200	10 × 12	0.22	0.08	870
	1500	8 × 20 10 × 16	0.22	0.068 0.060	1050 1210
	1800	10 × 20	0.22	0.045	1400
	2200	10 × 20	0.24	0.045	1400
	2700	10 × 25 12.5 × 20	0.24	0.042 0.035	1650 1900
	3300	10 × 25 12.5 × 20	0.26	0.042 0.036	1860 1900
	3900	12.5 × 20	0.26	0.035	1900
4700	12.5 × 25	0.28	0.030	2130	
10(1A)	150	6.3 × 11 8 × 9	0.19	0.25 0.33	340 300
	180	6.3 × 11 8 × 9	0.19	0.25 0.33	340 300
	220	6.3 × 11 8 × 9	0.19	0.25 0.33	340 300
	270	8 × 9 10 × 9	0.19	0.33 0.17	300 580
	330	10 × 9	0.19	0.17	580
	470	10 × 9	0.19	0.17	580
	560	10 × 9	0.19	0.17	580
	680	10 × 9	0.19	0.17	580
	820	10 × 12	0.19	0.08	870
	1000	8 × 16 10 × 16	0.19	0.087 0.06	850 1210
	1200	10 × 20	0.19	0.045	1400
	1500	10 × 20	0.19	0.045	1400
	1800	10 × 20	0.19	0.045	1400
	2200	10 × 20	0.21	0.045	1400
	2700	10 × 25 12.5 × 20	0.21	0.042 0.035	1650 1900
	3300	12.5 × 25	0.23	0.030	2130
16(1C)	100	8 × 9	0.16	0.33	300
	120	8 × 9	0.16	0.33	300
	150	8 × 9 10 × 9	0.16	0.33	300 580
	180	8 × 9 10 × 9	0.16	0.33	300 580
	220	8 × 9 10 × 9	0.16	0.33	300 580
	270	10 × 9	0.16	0.17	580
	330	10 × 9	0.16	0.17	580
	470	10 × 9 10 × 12	0.16	0.17 0.08	580 870
	560	10 × 12	0.16	0.08	870
	680	8 × 16 10 × 12	0.16	0.087 0.08	850 870
	820	10 × 16	0.16	0.06	1210
	1000	10 × 16	0.16	0.06	1210
	1200	10 × 20	0.16	0.045	1400
	1500	10 × 20	0.16	0.045	1400
	1800	10 × 25 12.5 × 20	0.16	0.042 0.035	1650 1800
	2200	12.5 × 20	0.18	0.035	1900
2700	12.5 × 20	0.18	0.030	2130	

WV (V <sub>d</sub> )	Cap (μF)	Case Size φ D × L(mm)	tan δ	Impedance (Ω max)	Ripple current (mArms)
25(1E)	82	6.3 × 11 8 × 9	0.14	0.25 0.33	340 300
	100	6.3 × 11 8 × 9	0.14	0.25 0.23	340 300
	120	8 × 11 10 × 9	0.14	0.13 0.17	650 580
	150	8 × 11 10 × 9	0.14	0.13 0.17	650 580
	180	8 × 11 10 × 9	0.14	0.13 0.17	650 580
	220	8 × 11 10 × 9	0.14	0.13 0.17	650 580
	270	10 × 9 10 × 12	0.14	0.17 0.08	580 870
	330	10 × 9 10 × 12	0.14	0.17 0.08	580 870
	470	8 × 16 10 × 12	0.14	0.087 0.080	840 870
	560	10 × 16	0.14	0.060	1210
	680	10 × 16	0.14	0.060	1210
	820	10 × 20	0.14	0.045	1400
	1000	10 × 20	0.14	0.045	1400
	1200	10 × 20	0.14	0.045	1400
	1500	10 × 25 12.5 × 20	0.14	0.042 0.035	1650 1900
	1800	12.5 × 25	0.14	0.030	2130
2200	12.5 × 25	0.16	0.030	2130	
35(1V)	47	6.3 × 11 8 × 9	0.12	0.25 0.33	340 300
	56	6.3 × 11 8 × 9	0.12	0.25 0.33	340 300
	68	6.3 × 11 8 × 9	0.12	0.25 0.33	340 300
	82	8 × 11 10 × 9	0.12	0.13 0.17	650 580
	100	8 × 11 10 × 9	0.12	0.13 0.17	650 580
	120	8 × 11 10 × 9	0.12	0.13 0.17	650 580
	150	8 × 11 10 × 9	0.12	0.13 0.17	650 580
	180	10 × 12	0.12	0.080	870
	220	8 × 11 10 × 9 8 × 16 10 × 12	0.12	0.13 0.17 0.087 0.080	650 580 840 870
	270	10 × 15	0.12	0.06	1210
	330	8 × 20 10 × 12 10 × 16	0.12	0.069 0.080 0.060	1000 870 1210
	470	10 × 16	0.12	0.060	1210
	560	10 × 20	0.12	0.045	1400
	680	10 × 20	0.12	0.045	1400
	820	10 × 25 12.5 × 20	0.12	0.042 0.035	1650 1900
	1000	12.5 × 20 12.5 × 25	0.12	0.035 0.030	1900 2130
50(1H)	33	6.3 × 11 8 × 9	0.10	0.30 0.40	295 260
	39	6.3 × 11 8 × 9	0.10	0.30 0.40	295 260
	47	6.3 × 11 8 × 9	0.10	0.30 0.40	295 260
	56	8 × 11 10 × 9	0.10	0.17 0.23	560 500
	68	8 × 11 10 × 9	0.10	0.17 0.23	560 500
	82	8 × 11 10 × 9	0.10	0.17 0.23	560 500
	100	10 × 12	0.10	0.12	760
	120	8 × 16 10 × 12	0.10	0.12 0.12	730 760
	150	10 × 16	0.10	0.084	1050
	180	8 × 20 10 × 16	0.10	0.090 0.084	1050
	220	10 × 16	0.10	0.084	1050
	270	10 × 25	0.10	0.055	1440
	330	12.5 × 20	0.10	0.045	1660
	470	12.5 × 25	0.10	0.034	1950
	580	12.5 × 25	0.10	0.034	1950

# LF Series

**STANDARD RATINGS** (Impedance: at 20 °C 100kHz/ Ω max, Ripple current; mArms/105 °C 100kHz)

WV (V <sub>d</sub> )	Cap (μF)	Case Size φ D × L(mm)	tan δ	Impedance (Ω max)	Ripple current (mArms)
63(1J)	22	6.3 × 11 8 × 9	0.09	0.95 1.24	120 100
	27	6.3 × 11 8 × 9	0.09	0.95 1.24	120 100
	33	6.3 × 11 8 × 9	0.09	0.95 1.24	120 100
	39	8 × 11 10 × 9	0.09	0.51 0.67	235 210
	47	8 × 11 10 × 9	0.09	0.51 0.67	235 210
	56	8 × 11 10 × 9	0.09	0.51 0.67	235 210
	68	8 × 11 10 × 9	0.09	0.51 0.67	235 210
	82	10 × 12	0.09	0.340	315
	100	8 × 16 10 × 12	0.09	0.350 0.340	300 315
	120	10 × 16	0.09	0.245	360
	150	8 × 20	0.09	0.265	360
	180	10 × 20	0.09	0.165	470
	220	10 × 20	0.09	0.165	470
	270	12.5 × 20	0.09	0.125	700
	330	12.5 × 20	0.09	0.125	700
	390	12.6 × 25	0.09	0.095	930

WV (V <sub>d</sub> )	Cap (μF)	Case Size φ D × L(mm)	tan δ	Impedance (Ω max)	Ripple current (mArms)
100(2A)	15	6.3 × 11 8 × 9	0.08	0.95 1.24	120 100
	27	8 × 11 10 × 9	0.08	0.51 0.67	235 210
	39	8 × 16	0.08	0.36	300
	47	10 × 12	0.08	0.34	315
	56	8 × 20	0.08	0.265	360
	68	10 × 16	0.08	0.245	360
	82	10 × 20	0.08	0.165	470
	100	10 × 20	0.08	0.165	470
	120	12.5 × 20	0.08	0.125	700
	180	12.5 × 25	0.08	0.095	930
	220	12.5 × 25	0.08	0.095	930



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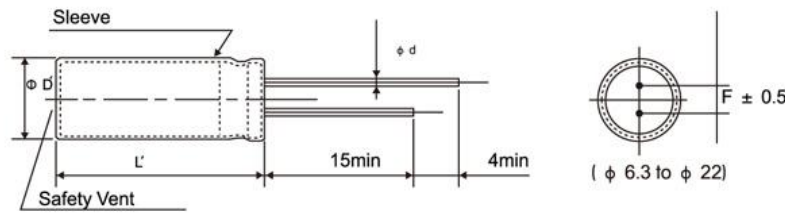
- High frequency, low impedance
- Endurance; +105 °C 2,000 ~ 3,000 hours
- RoHS Compliant



## ● SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	-25 to +105 °C (160V-450Vdc)							
Rated Voltage Range	160 to 450Vdc							
Capacitance Tolerance	± 20%(M) (at20 °C 120Hz)							
Leakage Current	$1 \leq 0.02CV$ or $10 \mu A$ , whichever is greater Where, I:Max.leakage current( $\mu A$ ), C:Nominal capacitance ( $\mu F$ ) V:Rated voltage(V) (at20 °C ,after 2minutes)							
Dissipation Factor (tan $\delta$ )	Rated voltage(Vdc)	160	200	250	350	400	450	(at20 °C 120Hz)
	tan $\delta$ (Max)	0.12	0.12	0.12	0.15	0.15	0.20	
Low Temperature Characteristics (Max.Impedance Ratio)	Rate Voltage(Vdc)	160	200	250	350	400	450	(at120Hz)
	Z[-25 °C ]/Z(+20 °C )	3	5			6		
	Z[-40 °C ]/Z(+20 °C )	4	7			-		
Endurance	The following specification shall be satisfied when the capacitors are restored to 20 °C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105 °C							
	Capacitance Change	$\leq \pm 20\%$ of the initial value					Case Dia	Life time(hours)
	D.F. (tan $\delta$ )	$\leq 200\%$ of the initial specified value					$\Phi D \leq 8$	2000
	Leakage Current	$\leq$ The initial specified value					$\Phi D \geq 10$	3000
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20 °C after exposing them for 1,000 hours at 105 °C without voltage applied							
	Capacitance Change	$\leq \pm 20\%$ of the initial value						
	D.F. (tan $\delta$ )	$\leq 200\%$ of the initial specified value						
	Leakage Current	$\leq 200\%$ The initial specified value						

## ● DIMENSIONS[mm]



Φ D	6.3	8	10	12.5	16	18	22
Φ d	0.5	0.5	0.6	0.6	0.8	0.8	0.8
F	2.5	3.5	5.0	5.0	7.5	7.5	10.0
Φ D'	Φ D+0.5max						
L'	L+2max						

## ● RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

CAP(μF)	Freq ( Hz )			
	120	1k	10k	100k
CAP < 18	0.59	0.85	0.97	1.00
18 ≤ Cap. < 100	0.62	0.89	0.97	1.00
Cap ≥ 100	0.72	0.90	0.98	1.00

The endurance of capacitors is shorted with internal heating produced by ripple current at the rate of halving the lifetime with every 5 °C rise,When long life performance is required in actual use,the rms ripple current has to be reduced

# LF Series

## STANDARD RATINGS

WV (V <sub>dc</sub> )	Cap (μF)	Case Size φ D × L(mm)	tan δ	Ripple current (mA <sub>rms</sub> /105 °C, 100kHz)
160(2C)	2.2	6.3 × 11	0.12	54
	3.3	6.3 × 11	0.12	70
	4.7	8 × 12	0.12	82
	10	10 × 12	0.12	142
	22	10 × 16	0.12	206
	33	10 × 20	0.12	265
	47	12.5 × 20	0.12	332
	100	12.5 × 25	0.12	546
	220	16 × 30	0.12	822
200(2D)	1	5 × 11	0.12	34
	2.2	6.3 × 11	0.12	52
	3.3	6.3 × 11	0.12	70
	4.7	8 × 12	0.12	82
	10	10 × 12	0.12	144
	22	10 × 16	0.12	206
	22	10 × 20	0.12	215
	33	10 × 20	0.12	288
	33	12.5 × 20	0.12	330
	47	12.5 × 20	0.12	366
	56	12.5 × 25	0.12	430
	68	12.5 × 25	0.12	488
	82	10 × 30	0.12	518
	100	16 × 25	0.12	720
	120	16 × 25	0.12	745
	150	18 × 25	0.12	845
	180	12.5 × 35	0.12	882
	220	18 × 30	0.12	960
250(2E)	0.47	6.3 × 11	0.12	35
	1	6.3 × 11	0.12	40
	2.2	6.3 × 11	0.12	52
	3.3	8 × 12	0.12	72
	4.7	8 × 12	0.12	84
	10	10 × 12	0.12	144
	22	10 × 20	0.12	220
	33	12.5 × 20	0.12	335
	47	12.5 × 25	0.12	382
	56	12.5 × 25	0.12	426
	82	16 × 25	0.12	575
	100	16 × 30	0.12	740
	220	18 × 35	0.12	1010
	330	18 × 45	0.12	1100
	470	22 × 45	0.12	1200
350(2V)	0.47	6.3 × 11	0.15	35
	1	6.3 × 11	0.15	40
	2.2	8 × 12	0.15	54
	3.3	8 × 12	0.15	74
	3.3	10 × 12	0.15	80
	4.7	10 × 16	0.15	104
	10	10 × 16	0.15	170
	22	12.5 × 25	0.15	285
	33	16 × 25	0.15	330
47	16 × 30	0.15	480	

WV (V <sub>dc</sub> )	Cap (μF)	Case Size φ D × L(mm)	tan δ	Ripple current (mA <sub>rms</sub> /105 °C, 100kHz)	
400(2G)	1	8 × 12	0.15	40	
	2.2	8 × 12	0.15	62	
	3.3	8 × 12	0.15	85	
	3.3	10 × 12	0.15	90	
	4.7	10 × 12	0.15	106	
	10	10 × 16	0.15	175	
	10	10 × 20	0.15	200	
	22	12.5 × 20	0.15	300	
	27	10 × 30	0.15	385	
	33	10 × 35	0.15	450	
	33	16 × 20	0.15	440	
	39	10 × 40	0.15	490	
	47	12.5 × 30	0.15	595	
	47	16 × 25	0.15	584	
	56	10 × 45	0.15	655	
	56	12.5 × 35	0.15	650	
	68	12.5 × 40	0.15	815	
	68	16 × 30	0.15	780	
	82	12.5 × 40	0.15	850	
	82	18 × 30	0.15	835	
450(2W)	100	12.5 × 50	0.15	890	
	100	18 × 30	0.15	870	
	120	22 × 31	0.15	895	
	150	12.5 × 60	0.15	950	
	150	22 × 31	0.15	940	
	450(2W)	1	8 × 12	0.20	40
		2.2	10 × 12	0.20	65
		3.3	10 × 16	0.20	92
		4.7	10 × 20	0.20	108
		10	12.5 × 20	0.20	160
		18	10 × 30	0.20	200
		22	16 × 20	0.20	305
		27	10 × 30	0.20	385
		33	10 × 35	0.20	460
		33	16 × 25	0.20	455
39		10 × 40	0.20	500	
47		10 × 45	0.20	635	
47		12.5 × 30	0.20	630	
47		18 × 25	0.20	620	
56		12.5 × 35	0.20	705	
56		18 × 25	0.20	695	
68		12.5 × 40	0.20	750	
68		18 × 30	0.20	730	
82		12.5 × 45	0.20	800	
82		18 × 30	0.20	770	
100	18 × 35	0.20	860		
120	18 × 40	0.20	1050		
150	22 × 40	0.20	1260		
220	22 × 46	0.20	1430		

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