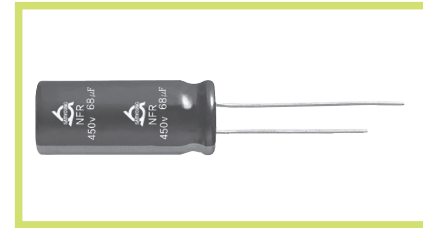
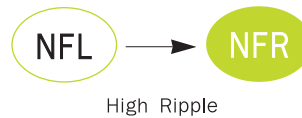


NFR Series

• 105°C 8,000~12,000Hrs assured.

- Non-solvent proof.
- High Ripple, Long Life.
- For Ballasts stabilizer and other long life required applications.
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics															
Rated Voltage Range	160 ~ 400 V _{DC}		420 ~ 500 V _{DC}													
Operating Temperature Range	-40 ~ + 105℃		-25 ~ + 105℃													
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)															
Leakage Current	<table><tr><td> C · V Time </td><td>After 1 minute</td><td colspan="2">After 5 minutes</td></tr><tr><td>≤ 1000</td><td>I = 0.1CV + 40</td><td colspan="2">I = 0.03CV + 15</td></tr><tr><td>> 1000</td><td>I = 0.04CV + 100</td><td colspan="2">I = 0.02CV + 25</td></tr></table> Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V_{DC}) (at 20℃)				C · V Time	After 1 minute	After 5 minutes		≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15		> 1000	I = 0.04CV + 100	I = 0.02CV + 25	
C · V Time	After 1 minute	After 5 minutes														
≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15														
> 1000	I = 0.04CV + 100	I = 0.02CV + 25														
Dissipation Factor(Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160 ~ 250</td><td colspan="2">350 ~ 500</td></tr><tr><td>Tanδ(Max.)</td><td>0.20</td><td colspan="2">0.24</td></tr></table> (at 20℃, 120Hz)				Rated Voltage(V _{DC})	160 ~ 250	350 ~ 500		Tanδ(Max.)	0.20	0.24					
Rated Voltage(V _{DC})	160 ~ 250	350 ~ 500														
Tanδ(Max.)	0.20	0.24														
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160 ~ 250</td><td>350 ~ 400</td><td>420 ~ 500</td></tr><tr><td>Z(- 25℃)/Z(20℃)</td><td>3</td><td>5</td><td>6</td></tr><tr><td>Z(- 40℃)/Z(20℃)</td><td>6</td><td>6</td><td>-</td></tr></table> (at 120Hz)				Rated Voltage(V _{DC})	160 ~ 250	350 ~ 400	420 ~ 500	Z(- 25℃)/Z(20℃)	3	5	6	Z(- 40℃)/Z(20℃)	6	6	-
Rated Voltage(V _{DC})	160 ~ 250	350 ~ 400	420 ~ 500													
Z(- 25℃)/Z(20℃)	3	5	6													
Z(- 40℃)/Z(20℃)	6	6	-													
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage with the rated ripple current is applied (the peak voltage shall not exceed the rated voltage) for 12,000 hours at 105℃. (where, 8,000 hours for ø8, 10,000 hours for ø10, ø8x50L) Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value															
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 500% of the initial specified value															
Others	Satisfied characteristics KS C IEC 60384-4															

DIMENSIONS OF NFR Series

Unit(mm)

Technical drawing of a capacitor showing side and end views. The side view labels include: Safety vent, Sleeve, $\phi D'$, L' , 15min., 4min., and $\phi D \pm 0.05$. The end view labels include: $\phi 10$, $\phi 12.5$, $\phi 20$, and $F \pm 0.5$.

Marking : DARK BROWN SLEEVE, SILVER INK

ϕD	8	10	12.5	16	18	20
ϕd	0.6	0.6	0.6	0.8	0.8	0.8
F	3.5	5.0	5.0	7.5	7.5	7.5
$\phi D'$	$\phi D + 0.5 \text{ max.}$					
L'	$L + 2.0 \text{ max.}$					
※ $\phi 8 \times 15 \sim 20L$, $L' \leq L + 1.5$						



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NFR Series

V _{DC}	160		200	
μF Items	$\varnothing D \times L (mm)$	Rated Ripple Current (mA _{rms} /105°C, 100kHz)	$\varnothing D \times L (mm)$	Rated Ripple Current (mA _{rms} /105°C, 100kHz)
10	10 × 16	320	10 × 16	320
22	10 × 16	450	10 × 16	450
25	10 × 16	478	8 × 20	465
27	10 × 16	500	10 × 16	478
33	10 × 16	600	10 × 20	500
39	10 × 16	613	10 × 20	650
47	10 × 20	750	10 × 20	670
56	10 × 20	788	12.5 × 20	850
68	10 × 20	900	12.5 × 25	1,013
	12.5 × 20	950	10 × 33	1,200
82	12.5 × 25	1,025	12.5 × 25	1,070
			16 × 20	1,250
100	12.5 × 25	1,125		
	16 × 20	1,125	16 × 25	1,300
120	16 × 25	1,339	16 × 25	1,339
150	16 × 25	1,510	16 × 25	1,510
220	16 × 31.5	1,933	18 × 31.5	2,030
	18 × 25	1,870		
270	16 × 35.5	2,189	18 × 35.5	2,300
330	16 × 40	2,516		
	18 × 31.5	2,446	18 × 40	2,586
390	18 × 35.5	2,745		
470	18 × 40	3,064		

V _{DC}	250		350	
μF Items	$\varnothing D \times L (mm)$	Rated Ripple Current (mA _{rms} /105°C, 100kHz)	$\varnothing D \times L (mm)$	Rated Ripple Current (mA _{rms} /105°C, 100kHz)
6.8	10 × 12.5	250		
10	8 × 15	240	8 × 20	350
	10 × 16	350	10 × 16	330
22	10 × 16	470		
	10 × 20	500	12.5 × 20	650
33	12.5 × 16	613	10 × 33	700
	12.5 × 20	688	12.5 × 25	750
			16 × 20	750
47	8 × 50	875	10 × 50	950
	12.5 × 20	850	16 × 20	950
68	10 × 40	1,125	16 × 31.5	1,300
	12.5 × 25	1,070	18 × 25	1,300
82	12.5 × 30	1,340		
	16 × 20	1,340	18 × 25	1,400
100	16 × 25	1,400		
	18 × 20	1,400	18 × 31.5	1,550
120	18 × 20	1,450		
150	18 × 25	1,740		
180	12.5 × 50	1,910		
	18 × 31.5	1,960		
220	18 × 31.5	2,040		

RATINGS OF NFR Series

Vdc	400		420	
Items μF	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)
3.3	10 × 12.5	150		
4.7	10 × 12.5	170		
6.8	8 × 15	180		
	10 × 16	280		
10	8 × 20	350	10 × 20	360
	10 × 16	350		
15	10 × 20	410	12.5 × 20	450
	12.5 × 16	410		
22	10 × 25	500	12.5 × 25	580
	12.5 × 20	550	16 × 20	725
33	12.5 × 25	780	12.5 × 30	750
	16 × 20	800	16 × 25	920
47	16 × 25	980	12.5 × 40	920
	18 × 20	980	16 × 25	980
56			18 × 20	950
68	18 × 25	1,350	18 × 25	1,100
82	18 × 31.5	1,500	18 × 31.5	1,300
100	18 × 35.5	1,650	18 × 35.5	1,400
120	18 × 40	1,850	18 × 35.5	1,600
			18 × 40	1,750
150	18 × 45	1,900		
180	18 × 45	2,000		

V _{DC}	450		500	
Items μF	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)
4.7	8 × 20	220		
	10 × 16	220		
6.8	10 × 16	250		
	10 × 20	280		
10	10 × 20	360	12.5 × 20	440
15	10 × 20	400	12.5 × 25	500
	12.5 × 20	450	16 × 20	500
22	12.5 × 25	580	12.5 × 30	600
	16 × 20	725	16 × 25	600
18 × 20			600	
33	12.5 × 30	750	16 × 31.5	700
	16 × 25	920	18 × 25	700
40			12.5 × 50	860
47	10 × 50	900	18 × 31.5	880
	12.5 × 40	920		
	16 × 25	980		
60			12.5 × 60	1,180
68	18 × 25	1,100	18 × 35.5	1,200
82	18 × 31.5	1,300	18 × 40	1,300
100	18 × 35.5	1,400	18 × 45	1,500
			20 × 40	1,500
120	18 × 40	1,650		
150	18 × 45	1,800		
	20 × 40	1,800		

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Freq.(Hz) Cap.(μF)	120	1k	10k	50k	100k
3.3~15	0.35	0.65	0.90	0.95	1.00
22~82	0.40	0.70	0.90	0.95	1.00
100~470	0.45	0.75	0.90	0.95	1.00