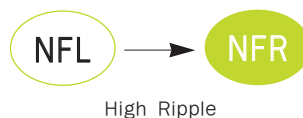


## NFR Series

• 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 <sub>DC</sub>	420~500 V <sub>DC</sub>												
Operating Temperature Range	-40~+105°C	-25~+105°C												
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)													
Leakage Current	<table border="1"> <thead> <tr> <th>C · V</th> <th>Time</th> <th>After 1 minute</th> <th>After 5 minutes</th> </tr> </thead> <tbody> <tr> <td>≤ 1000</td> <td></td> <td>I = 0.1CV + 40</td> <td>I = 0.03CV + 15</td> </tr> <tr> <td>&gt; 1000</td> <td></td> <td>I = 0.04CV + 100</td> <td>I = 0.02CV + 25</td> </tr> </tbody> </table> <p>Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V<sub>DC</sub>) (at 20°C)</p>		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 border="1"> <thead> <tr> <th>Rated Voltage(V<sub>DC</sub>)</th> <th>160~250</th> <th>350~500</th> </tr> </thead> <tbody> <tr> <td>Tanδ(Max.)</td> <td>0.20</td> <td>0.24</td> </tr> </tbody> </table> <p>(at 20°C, 120Hz)</p>		Rated Voltage(V <sub>DC</sub> )	160~250	350~500	Tanδ(Max.)	0.20	0.24						
Rated Voltage(V <sub>DC</sub> )	160~250	350~500												
Tanδ(Max.)	0.20	0.24												
Temperature Characteristics (Max. impedance ratio)	<table border="1"> <thead> <tr> <th>Rated Voltage(V<sub>DC</sub>)</th> <th>160~250</th> <th>350~400</th> <th>420~500</th> </tr> </thead> <tbody> <tr> <td>Z(-25°C)/Z(20°C)</td> <td>3</td> <td>5</td> <td>6</td> </tr> <tr> <td>Z(-40°C)/Z(20°C)</td> <td>6</td> <td>6</td> <td>-</td> </tr> </tbody> </table> <p>(at 120Hz)</p>		Rated Voltage(V <sub>DC</sub> )	160~250	350~400	420~500	Z(-25°C)/Z(20°C)	3	5	6	Z(-40°C)/Z(20°C)	6	6	-
Rated Voltage(V <sub>DC</sub> )	160~250	350~400	420~500											
Z(-25°C)/Z(20°C)	3	5	6											
Z(-40°C)/Z(20°C)	6	6	-											
Load Life	<p>The following specifications shall be satisfied when the capacitors are restored to 20°C 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°C. (where, 8,000 hours for ø8, 10,000 hours for ø10, ø8x50L)</p> <p>Capacitance change ≤ ±20% of the initial value                      Tanδ ≤ 200% of the initial specified value                      Leakage current ≤ The initial specified value</p>													
Shelf Life	<p>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. 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.</p> <p>Capacitance change ≤ ±20% of the initial value                      Tanδ ≤ 200% of the initial specified value                      Leakage current ≤ 500% of the initial specified value</p>													
Others	Satisfied characteristics KS C IEC 60384-4													

### DIMENSIONS OF NFR Series

Unit(mm)

Marking : DARK BROWN SLEEVE, SILVER INK

øD	8	10	12.5	16	18	20
ød	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
øD'	øD + 0.5 max.					
L'	L + 2.0 max.					

※ ø8 × 11.5~20L, L' ≤ L + 1.5

## RATINGS OF NFR Series

V <sub>dc</sub>		160		200	
$\mu F$	Items	$\varnothing D \times L$ (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	$\varnothing D \times L$ (mm)	Rated Ripple Current (mArms/105°C, 100kHz)
10		10 × 16	320	10 × 16	320
22		10 × 16	450	10 × 16	450
25		10 × 16	478	8 × 20	465
				10 × 16	478
27		10 × 16	500	10 × 16	500
33		10 × 16	600	10 × 20	650
39		10 × 16	613	10 × 20	670
47		10 × 20	750	12.5 × 20	850
56		10 × 20	788	12.5 × 25	1,013
68		10 × 20	900	10 × 33	1,200
		12.5 × 20	950	12.5 × 25	1,070
82		12.5 × 25	1,025	16 × 20	1,250
100		12.5 × 25	1,125	16 × 25	1,300
		16 × 20	1,125		
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 × 40	2,586
		18 × 31.5	2,446		
390		18 × 35.5	2,745		
470		18 × 40	3,064		

V <sub>dc</sub>		250		350	
$\mu F$	Items	$\varnothing D \times L$ (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	$\varnothing D \times L$ (mm)	Rated Ripple Current (mArms/105°C, 100kHz)
4.7		8 × 11.5	160		
6.8		8 × 11.5	180		
		10 × 12.5	250		
10		8 × 15	240	8 × 20	350
		10 × 16	350	10 × 16	330
22		10 × 16	470	12.5 × 20	650
		10 × 20	500		
33		12.5 × 16	613	10 × 33	700
				12.5 × 25	750
		12.5 × 20	688	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	18 × 25	1,400
		16 × 20	1,340		
100		16 × 25	1,400	18 × 31.5	1,550
		18 × 20	1,400		
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**

V <sub>DC</sub>		400		420	
μF	Items	∅ D × L (mm)	Rated Ripple Current (mA <sub>rms</sub> /105°C, 100kHz)	∅ D × L (mm)	Rated Ripple Current (mA <sub>rms</sub> /105°C, 100kHz)
1		8 × 11.5	60		
2.2		8 × 11.5	100		
3.3		8 × 11.5	130		
		10 × 12.5	150		
4.7		8 × 11.5	145		
		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 <sub>DC</sub>		450		500	
μF	Items	∅ D × L (mm)	Rated Ripple Current (mA <sub>rms</sub> /105°C, 100kHz)	∅ D × L (mm)	Rated Ripple Current (mA <sub>rms</sub> /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

Cap. (μF) \ Freq. (Hz)	120	1k	10k	50k	100k
1 ~ 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