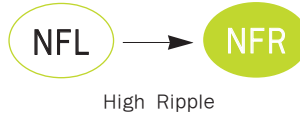


NFR Series

• 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°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>> 1000</td> <td></td> <td>I = 0.04CV + 100</td> <td>I = 0.02CV + 25</td> </tr> </tbody> </table> | | 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 | | | | | | | | | | | |
| Where, I:Max. Leakage current(µA) C:Nominal capacitance(µF) V:Rated voltage(V _{DC}) (at 20°C) | | | | | | | | | | | | | | |
| Dissipation Factor(Tanδ) | Rated Voltage(V _{DC}) | 160~250 | 350~500 | | | | | | | | | | | |
| | Tanδ(Max.) | 0.20 | 0.24 | | | | | | | | | | | |
| | | (at 20°C, 120Hz) | | | | | | | | | | | | |
| Temperature Characteristics (Max. Impedance ratio) | Rated Voltage(V _{DC}) | 160~250 | 350~400 | 420~500 | | | | | | | | | | |
| | Z(-25°C)/Z(20°C) | 3 | 5 | 6 | | | | | | | | | | |
| | Z(-40°C)/Z(20°C) | 6 | 6 | - | | | | | | | | | | |
| | | (at 120Hz) | | | | | | | | | | | | |
| 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 _{DC} | | 160 | | 200 | |
|-----------------|-------|-------------------------------|---|-------------------------------|---|
| μF | 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 _{DC} | | 250 | | 350 | |
|-----------------|-------|-------------------------------|---|-------------------------------|---|
| μF | 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

| Vdc | | 400 | | 420 | |
|---------|-------|------------------------|---|------------------------|---|
| μF | Items | $\phi D \times L$ (mm) | Rated Ripple Current (mA _{rms} /105°C, 100kHz) | $\phi D \times L$ (mm) | Rated Ripple Current (mA _{rms} /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 | | | 1,850 | 18 × 35.5 | 1,600 |
| | | | | 18 × 40 | 1,750 |
| 150 | | 18 × 45 | 1,900 | | |
| 180 | | 18 × 45 | 2,000 | | |

| Vdc | | 450 | | 500 | |
|---------|-------|------------------------|---|------------------------|---|
| μF | Items | $\phi D \times L$ (mm) | Rated Ripple Current (mA _{rms} /105°C, 100kHz) | $\phi D \times L$ (mm) | Rated Ripple Current (mA _{rms} /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 |
| 33 | | | | 18 × 20 | 600 |
| | | 12.5 × 30 | 750 | 16 × 31.5 | 700 |
| 40 | | 16 × 25 | 920 | 18 × 25 | 700 |
| | | | | 12.5 × 50 | 860 |
| 47 | | 10 × 50 | 900 | | |
| | | 12.5 × 40 | 920 | 18 × 31.5 | 880 |
| 60 | | 16 × 25 | 980 | | |
| 68 | | 18 × 25 | 1,100 | 12.5 × 60 | 1,180 |
| 82 | | 18 × 31.5 | 1,300 | 18 × 35.5 | 1,200 |
| 100 | | | | 18 × 40 | 1,300 |
| | | 18 × 35.5 | 1,400 | 18 × 45 | 1,500 |
| 120 | | | | 20 × 40 | 1,500 |
| | | 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 |