# Non-Polar Aluminum Electrolytic Capacitors

NNR Series

RADIAL LEADS NON-POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS

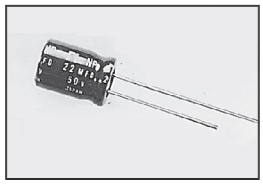
## FEATURES

- DESIGNED FOR APPLICATIONS WITH REVERSIBLE POLARITY
- LOW AC VOLTAGE CAN BE SUPERIMPOSED WITHIN THE LIMITED RIPPLE CURRENT

**RoHS Compliant**

**includes all homogeneous materials**

*See Part Number System for Details



## CHARACTERISTICS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated Voltage Range | 10 ~ 100Vdc | | | | | | |
| Capacitance Range | 0.47 ~ 1,000µF | | | | | | |
| Operating Temperature Range | -40 ~ +85°C | | | | | | |
| Capacitance Tolerance | ±10% (K), ±20%(M) | | | | | | |
| Max. Leakage Current After 5 minutes At +20°C | 0.03CV +8µA | | | | | | |
| Surge Voltage & Max. Tan δ @ 120Hz/+20°C | W.V. (Vdc) | 10 | 16 | 25 | 35 | 50 | 100 |
| | S.V. (Vdc) | 13 | 20 | 32 | 44 | 63 | 125 |
| | Tan δ | 0.20 | 0.18 | 0.14 | 0.13 | 0.09 | 0.10 |
| Low Temperature Stability (Impedance Ratio @ 120Hz) | Z-25°C/Z+20°C | 3 | 2 | 2 | 2 | 2 | 2 |
| | Z-40°C/Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 |
| Load Life Test at Rated W.V. & +85°C 2,000 Hours (Polarity Shall Be Reversed Every 250 Hours | Capacitance Change | | Within ±25% of initial measured value | | | | |
| | Tan δ | | Less than 200% of specified maximum value | | | | |
| | Leakage Current | | Less than specified maximum value | | | | |

## MAXIMUM PERMISSIBLE RIPPLE CURRENT (mA rms AT 120HZ AND 85°C)

| Cap. (µF) | Working Voltage (Vdc) | | | | | |
|---|---|---|---|---|---|---|
| | 10 | 16 | 25 | 35 | 50 | 100 |
| 0.47 | - | - | - | - | 5.0 | 8.0 |
| 1.0 | - | - | - | - | 10 | 15 |
| 2.2 | - | - | - | - | 20 | 25 |
| 3.3 | - | - | - | - | 28 | 30 |
| 4.7 | - | - | 25 | 30 | 38 | 46 |
| 10 | - | 28 | 40 | 45 | 50 | 70 |
| 22 | 38 | 50 | 60 | 75 | 90 | 120 |
| 33 | 58 | 60 | 80 | 90 | 110 | 170 |
| 47 | 70 | 85 | 90 | 125 | 135 | 200 |
| 100 | 125 | 165 | 180 | 200 | 250 | - |
| 220 | 225 | 260 | 320 | 350 | 410 | - |
| 330 | 295 | 360 | 425 | 440 | - | - |
| 470 | 390 | 420 | 540 | 585 | - | - |
| 1000 | 620 | 740 | - | - | - | - |

## MAXIMUM ESR (Ω AT 120HZ AND 20°C)

| Cap. (µF) | Working Voltage (Vdc) | | | | | |
|---|---|---|---|---|---|---|
| | 10 | 16 | 25 | 35 | 50 | 100 |
| 0.47 | - | - | - | - | 458.79 | 317.62 |
| 1.0 | - | - | - | - | 215.63 | 149.28 |
| 2.2 | - | - | - | - | 98.01 | 67.86 |
| 3.3 | - | - | - | - | 65.34 | 45.24 |
| 4.7 | - | - | 56.47 | 49.41 | 45.88 | 31.76 |
| 10 | - | 29.86 | 26.54 | 23.22 | 21.56 | 14.93 |
| 22 | 15.08 | 13.57 | 12.06 | 10.56 | 9.80 | 6.79 |
| 33 | 10.05 | 9.05 | 8.04 | 7.04 | 6.53 | 4.52 |
| 47 | 7.06 | 6.35 | 5.65 | 4.94 | 4.59 | 3.18 |
| 100 | 3.32 | 2.99 | 2.65 | 2.32 | 2.16 | - |
| 220 | 1.51 | 1.36 | 1.21 | 1.06 | 0.98 | - |
| 330 | 1.01 | 0.90 | 0.80 | 0.70 | - | - |
| 470 | 0.71 | 0.64 | 0.56 | 0.49 | - | - |
| 1000 | 0.33 | 0.30 | - | - | - | - |

## STANDARD PRODUCTS AND CASE SIZE TABLE D φ x L (mm)

| Cap. (µF) | Working Voltage (Vdc) | | | | | |
|---|---|---|---|---|---|---|
| | 10 | 16 | 25 | 35 | 50 | 100 |
| 0.47 | - | - | - | - | 5x11 | 5x11 |
| 1.0 | - | - | - | - | 5x11 | 5x11 |
| 2.2 | - | - | - | - | 5x11 | 5x11 |
| 3.3 | - | - | - | - | 5x11 | 6.3x11 |
| 4.7 | - | - | 5x11 | 5x11 | 5x11 | 6.3x11 |
| 10 | - | 5x11 | 5x11 | 5x11 | 6.3x11 | 8x12.5 |
| 22 | 5x11 | 5x11 | 5x11 | 6.3x11 | 8x11.5 | 10x16 |
| 33 | 5x11 | 5x11 | 6.3x11 | 6.3x11 | 8x11.5 | 10x20 |
| 47 | 5x11 | 6.3x11 | 6.3x11 | 8x11.5 | 10x12.5 | 12.5x25 |
| 100 | 6.3x11 | 8x11.5 | 8x12.5 | 10x12.5 | 10x20 | - |
| 220 | 8x12.5 | 10x12.5 | 10x16 | 10x20 | 12.5x25 | - |
| 330 | 10x12.5 | 10x16 | 10x20 | 12.5x25 | - | - |
| 470 | 10x16 | 10x20 | 12.5x20 | 12.5x25 | - | - |
| 1000 | 12.5x20 | 12.5x25 | - | - | - | - |

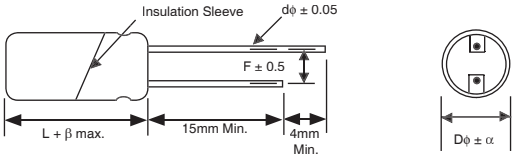
## PART NUMBERING SYSTEM

NNR 101 M 25V 8X11 F

- F — RoHS Compliant
- 8X11 — Case Size (Dφ x L)
- 25V — Working Voltage (Vdc)
- M — Tolerance Code (M=20%)
- 101 — Cap. Code: First 2 characters significant, Third character is multiplier
- NNR — Series

## LEAD SPACING AND DIAMETER (mm)

| Case Dia. (Dφ) | 5 | 6.3 | 8 | 10 | 12.5 |
|---|---|---|---|---|---|
| Lead Dia. (dφ) | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 |
| Lead Space (F) | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 |
| Dim. α | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Dim. β | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |




**PRECAUTIONS**

Please review the notes on correct use, safety and precautions found on **pages T10 & T11** of NIC's **Electrolytic Capacitor catalog**.
Also found at **www.niccomp.com/precautions**
If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: **tpmg@niccomp.com**