# Miniature Aluminum Electrolytic Capacitors

NRE-L Series

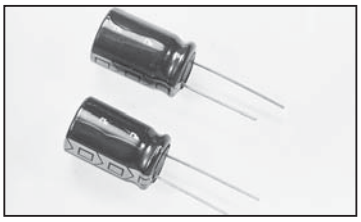
LOW PROFILE, RADIAL LEAD, POLARIZED

**FEATURES**

- LOW PROFILE APPLICATIONS
- HIGH STABILITY AND PERFORMANCE

**RoHS Compliant**
includes all homogeneous materials

*See Part Number System for Details



## CHARACTERISTICS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated Voltage Range | | 6.3 ~ 100Vdc | | | | | | | |
| Capacitance Range | | 22 ~ 4,700µF | | | | | | | |
| Operating Temperature Range | | -40 ~ +85°C | | | | | | | |
| Capacitance Tolerance | | ±20%(M) | | | | | | | |
| Max. Leakage Current @ +20°C | After 1 min. | 0.03CV or 4µA, whichever is greater | | | | | | | |
| | After 2 min. | 0.01CV or 3µA, whichever is greater | | | | | | | |
| Max. Tan δ @ 120Hz/+20°C | W.V. (Vdc) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
| | S.V. (Vdc) | 8 | 13 | 20 | 32 | 44 | 63 | 79 | 125 |
| | C ≤ 1,000µF | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 |
| | C = 2,200µF | 0.26 | 0.22 | 0.18 | 0.16 | - | - | - | - |
| | C = 3,300µF | 0.28 | 0.24 | - | - | - | - | - | - |
| | C = 4,700µF | 0.30 | 0.26 | - | - | - | - | - | - |
| Low Temperature Stability Inpedance Ratio @ 120Hz | Z-25°C/Z+20°C | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| | Z-40°C/Z+20°C | 10 | 8 | 6 | 4 | 3 | 3 | 3 | 3 |
| Load Life Test at Rated W.V. and +85°C 3,000 Hours | Capacitance Change | Within ±20% of initial measured value | | | | | | | |
| | Tan δ | Less than 200% of specified maximum value | | | | | | | |
| | Leakage Current | Less than specified maximum value | | | | | | | |

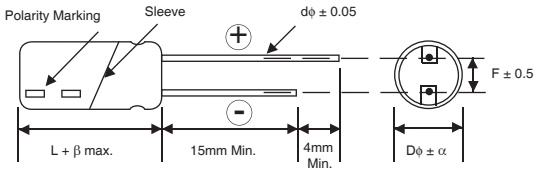
## STANDARD PRODUCT AND CASE SIZE TABLE D ϕ x L (mm)

| Cap (µF) | Code | Working Voltage (Vdc) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
| 22 | 220 | - | - | - | - | - | - | - | 10x9.5 |
| 100 | 101 | - | - | - | - | 10x9.5 | 10x9.5 | - | 16x16 |
| 220 | 221 | - | - | 10x9.5 | 10x9.5 | - | - | - | 18x21 |
| 330 | 331 | - | 10x9.5 | 10x9.5 | 10x12.5 | 12.5x16 | 16x16 | 16x16 | - |
| 470 | 471 | - | 10x9.5 | - | 12.5x16 | 16x16 | 16x16 | 16x21 | - |
| 1,000 | 102 | - | 12.5x16 | 12.5x16 | 16x16 | 18x21 | - | - | - |
| 2,200 | 222 | 16x16 | 16x16 | 16x16 | 16x21 | - | - | - | - |
| 3,300 | 332 | 18x21 | 18x21 | - | - | - | - | - | - |
| 4,700 | 472 | 18x21 | 18x21 | - | - | - | - | - | - |

## LEAD SPACING AND DIAMETER (mm)

| Case Dia. (Dϕ) | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| Lead Dia. (dϕ) | 0.6 | 0.6 | 0.8 | 0.8 |
| Lead Spacing (F) | 5.0 | 5.0 | 7.5 | 7.5 |
| Dim. α | 0.5 | 0.5 | 0.5 | 0.5 |
| dim. β | 1.5 | 1.5 | 2.0 | 2.0 |

## DIMENSIONS (mm)




Drawing is representative of parts as supplied in bulk or straight lead format, please see taping specification for details on taped format packaging.

## PART NUMBERING SYSTEM

NRE-L 471 M 35V 16X16 TB F

- F — RoHS Compliant
- TB — Tape and Box*
- 16X16 — Size (DØ x L)
- 35V — Rated Voltage
- M — Tolerance Code
- 471 — Capacitance Code
- NRE-L — Series

*see taping specifications for details

## 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**

| Part Number | Cap. (µF) | W.V. (Vdc)) | Dissipation Factor +20°C/120Hz | Ripple Current Rating (mA) +85°C/120Hz | Max. ESR (Ω) +20°C/120Hz | Load Life Hours @ +85°C |
|---|---|---|---|---|---|---|
| NREL222M6.3V16x16F | 2,200 | 6.3 | 0.26 | 1030 | 0.20 | 3,000 |
| NREL332M6.3V18x21F | 3,300 | | 0.28 | 1330 | 0.14 | 3,000 |
| NREL472M6.3V18x21F | 4,700 | | 0.30 | 1630 | 0.11 | 3,000 |
| NREL331M10V10x9.5F | 330 | 10 | 0.20 | 290 | 1.01 | 3,000 |
| NREL471M10V10x9.5F | 470 | | 0.20 | 340 | 0.71 | 3,000 |
| NREL102M10V12.5x16F | 1,000 | | 0.20 | 680 | 0.33 | 3,000 |
| NREL222M10V16x16F | 2,200 | | 0.22 | 1120 | 0.17 | 3,000 |
| NREL332M10V18x21F | 3,300 | | 0;.24 | 1510 | 0.12 | 3,000 |
| NREL472M10V18x21F | 4,700 | | 0.26 | 1650 | 0.09 | 3,000 |
| NREL221M16V10x9.5F | 220 | 16 | 0.16 | 260 | 1.01 | 3,000 |
| NREL331M16V10x9.5F | 330 | | 0.16 | 320 | 0.80 | 3,000 |
| NREL102M16V12.5x16F | 1,000 | | 0.16 | 695 | 0.27 | 3,000 |
| NREL222M16V16x16F | 2,200 | | 0.18 | 1140 | 0.14 | 3,000 |
| NREL221M25V10x9.5F | 220 | 25 | 0.14 | 280 | 0.80 | 3,000 |
| NREL331M25V10x12.5F | 330 | | 0.14 | 390 | 0.70 | 3,000 |
| NREL471M25V12.5x16F | 470 | | 0.14 | 560 | 0.49 | 3,000 |
| NREL102M25V16x16F | 1,000 | | 0.14 | 730 | 0.23 | 3,000 |
| NREL222M25V16x21F | 2,200 | | 0.16 | 1250 | 0.12 | 3,000 |
| NREL101M25V10x9.5F | 100 | 35 | 0.12 | 200 | 1.99 | 3,000 |
| NREL331M35V12.5x16F | 330 | | 0.12 | 510 | 0.60 | 3,000 |
| NREL471M35V16x16F | 470 | | 0.12 | 710 | 0.42 | 3,000 |
| NREL102M35V18x21F | 1,000 | | 0.12 | 1190 | 0.20 | 3,000 |
| NREL101M50V10x9.5F | 100 | 50 | 0.10 | 220 | 1.66 | 3,000 |
| NREL331M50V16x16F | 330 | | 0.10 | 650 | 0.50 | 3,000 |
| NREL471M50V16x16F | 470 | | 0.10 | 725 | 0.35 | 3,000 |
| NREL331M63V16x16F | 330 | 63 | 0.09 | 560 | 0.68 | 3,000 |
| NREL471M63V16x21F | 470 | | 0.09 | 770 | 0.45 | 3,000 |
| NREL220M100V10x9.5F | 22 | 100 | 0.08 | 110 | 6.04 | 3,000 |
| NREL101M10016x16F | 100 | | 0.08 | 410 | 1.33 | 3,000 |
| NREL221M100V18x21F | 220 | | 0.08 | 720 | 0.60 | 3,000 |