# Surface Mount Aluminum Electrolytic Capacitors NACK Series

## FEATURES

- CYLINDRICAL V-CHIP CONSTRUCTION FOR SURFACE MOUNTING
- VERY LOW IMPEDANCE **(Up to 60% lower than NACZ)**
- WIDE TEMPERATURE RANGE (-55 +105°C)
- REDUCED SIZE **(Up to 50% smaller than NACZ)**
- DESIGNED FOR AUTOMATIC MOUNTING AND REFLOW SOLDERING

## CHARACTERISTICS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated Voltage Range | 6.3 ~ 100Vdc | | | | | | | | | |
| Rated Capactance Range | 3.3 ~ 6,800µF | | | | | | | | | |
| Operating Temperature Range | -55°C ~ +105°C | | | | | | | | | |
| Capacitance Tolerance | ±20%(M) | | | | | | | | | |
| Maximum Leakage Current after 2 minutes @ 20°C | 0.01CV or 3µA, whichever is greater | | | | | | | | | |
| Maximum Tanδ @ 120Hz/20°C | W.V. (Vdc) | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
| | S.V. (Vdc) | | 8.0 | 13 | 20 | 32 | 44 | 63 | 79 | 100 | 125 |
| | All Case Sizes | C ≤ 1,000µF | 0.26 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.08 | 0.07 |
| | | C = 2,200µF | - | 0.21 | - | 0.16 | - | - | - | - | - |
| | | C = 3,300µF | 0.30 | - | 0.20 | 0.18 | - | - | - | - | - |
| | | C = 4,700µF | - | 0.25 | 0.22 | - | - | - | - | - | - |
| | | C = 6,800µF | 0.36 | 0.29 | - | - | - | - | - | - | - |
| Low Temperature Stability Impedance Ratio @ 120Hz | Z -25°C/Z +20°C | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | Z -40°C/Z +20°C | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Z -55°C/Z +20°C | | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| Load Life Test @ 105°C 4 ~ 10mm Dia. 2,000 Hours 12.5 ~ 18mm Dia. 5,000 Hours | Capacitance Change | | Within ±30% of initial measured value | | | | | | | | |
| | Tanδ | | Less than 200% of specified maximum value | | | | | | | | |
| | Leakage Current | | Less than specified maximum value | | | | | | | | |

**RoHS Compliant**
includes all homogeneous materials

*See Part Number System for Details

## MAXIMUM PERMISSIBLE RIPPLE CURRENT (mA rms AT 100KHz AND 105°C)

| Cap (µF) | Working Voltage (Vdc) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
| 3.3 | - | - | - | - | - | - | - | 25 | - |
| 4.7 | - | - | - | - | 90 | 60 | 50 | 40 | - |
| 10 | - | - | 90 | 90 | 90 | 85 | 80 | 60 | - |
| | | | | | 160 | 165 | | 60 | |
| 22 | 90 | 90 | 90 | 160 | 160 | 165 | 120 | 130 | 130 |
| | | | 160 | | | | 120 | | |
| 33 | - | 90 | - | 160 | 240 | 195 | 250 | 130 | 200 |
| | | 160 | | 240 | | 195 | | | |
| 47 | 90 | - | 160 | 240 | 240 | 195 | 250 | 200 | 500 |
| | 160 | | 240 | | | 195 | | | |
| 68 | - | - | 240 | 240 | 280 | - | 250 | 500 | 500 |
| 100 | 160 | - | 240 | 280 | 280 | 350 | 400 | 500 | 793 |
| | 240 | | | 300 | 600 | | | | |
| 150 | - | 240 | 280 | 600 | 600 | 670 | 800 | 500 | 793 |
| 220 | 240 | 160 | 280 | 600 | 600 | 670 | 800 | - | 917 |
| | | 300 | 300 | | | | | | |
| 330 | 280 | 600 | 600 | 600 | 850 | 900 | - | 793 | 917 |
| | 300 | | | | | | | | |
| 470 | 600 | 600 | 600 | 850 | 1100 | 1610 | 1410 | 917 | - |
| 680 | - | 600 | 850 | - | 1100 | 1610 | 1690 | - | - |
| 1000 | 600 | 850 | - | 1100 | 1800 | 1610 | - | - | - |
| 1500 | 850 | - | 1100 | - | 1800 | - | - | - | - |
| 2200 | - | 1100 | - | 1800 | - | - | - | - | - |
| 3300 | 1100 | - | 1800 | 2060 | - | - | - | - | - |
| 4700 | - | 1800 | 2060 | - | - | - | - | - | - |
| 6800 | 1800 | 2060 | - | - | - | - | - | - | - |

## RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

| Frequency | 60Hz | 120Hz | 1KHz | 10KHz | 100KHz |
|---|---|---|---|---|---|
| Correction Factor | 0.7 | 0.75 | 0.9 | 0.95 | 1.0 |

**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

**MAXIMUM IMPEDANCE**
**(Ω AT 100KHz AND 20°C)**

| Cap (µF) | Working Voltage (Vdc) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
| 3.3 | - | - | - | - | - | - | - | 5.0 | - |
| 4.7 | - | - | - | - | 1.35 | 2.9 | 3.0 | 3.0 | - |
| 10 | - | - | 1.35 | 1.35 | 1.35<br>0.70 | 1.52<br>0.88 | 1.5 | 2.4<br>2.4 | - |
| 22 | 1.35 | 1.35 | 1.35<br>0.70 | 0.70 | 0.70 | 0.88 | 1.2<br>1.2 | 1.3 | 1.3 |
| 33 | - | 1.35<br>0.70 | - | 0.70<br>0.36 | 0.36 | 0.68<br>0.68 | 0.65 | 1.3 | 0.7 |
| 47 | 1.35<br>0.70 | - | 0.70<br>0.36 | 0.36 | 0.36 | 0.68<br>0.68 | 0.65 | 0.7 | 0.32 |
| 68 | - | - | 0.36 | 0.36 | 0.34 | - | 0.65 | 0.32 | 0.32 |
| 100 | 0.70<br>0.36 | - | 0.36 | 0.34<br>0.26 | 0.34<br>0.16 | 0.34 | 0.35 | 0.32 | 0.17 |
| 150 | - | 0.36 | 0.34 | 0.16 | 0.16 | 0.18 | 0.16 | 0.32 | 0.17 |
| 220 | 0.36 | 0.34<br>0.26 | 0.34<br>0.26 | 0.16 | 0.16 | 0.18 | 0.16 | - | 0.153 |
| 330 | 0.34<br>0.26 | 0.16 | 0.16 | 0.16 | 0.08 | 0.12 | - | 0.17 | 0.153 |
| 470 | 0.16 | 0.16 | 0.16 | 0.08 | 0.06 | 0.073 | 0.082 | 0.153 | - |
| 680 | - | 0.16 | 0.08 | - | 0.06 | 0.073 | 0.08 | - | - |
| 1000 | 0.16 | 0.08 | - | 0.06 | 0.035 | 0.073 | - | - | - |
| 1500 | 0.08 | - | 0.06 | - | 0.035 | - | - | - | - |
| 2200 | - | 0.06 | - | 0.035 | - | - | - | - | - |
| 3300 | 0.06 | - | 0.035 | 0.033 | - | - | - | - | - |
| 4700 | - | 0.035 | 0.033 | - | - | - | - | - | - |
| 6800 | 0.035 | 0.033 | - | - | - | - | - | - | - |

## PART NUMBER SYSTEM

NACK 101 M 50V 8x10.5 TR 13 WT F

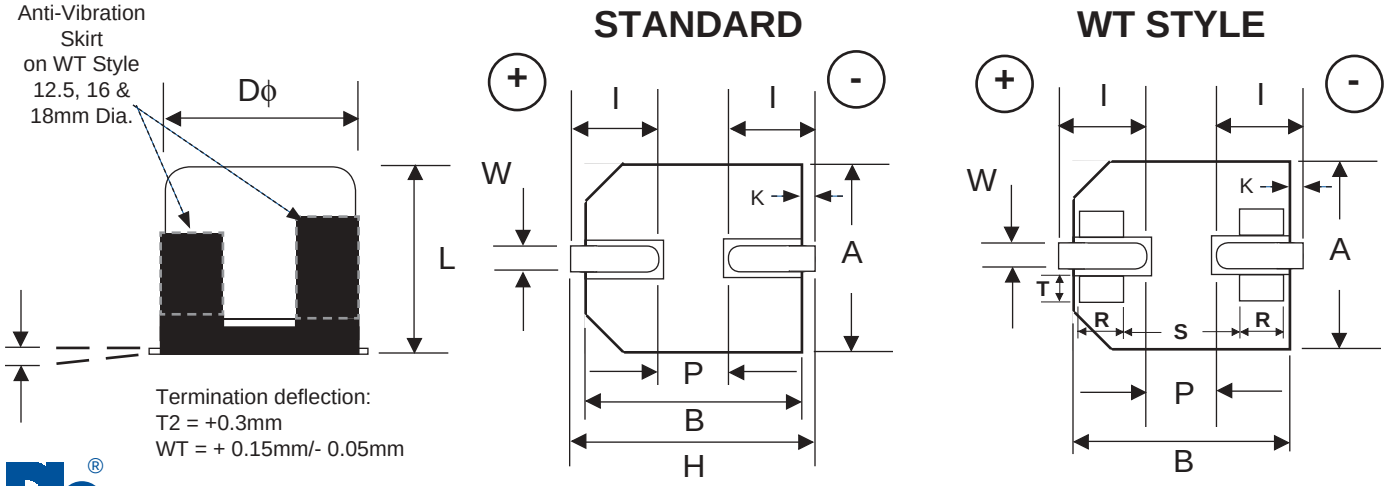
- F — RoHS Compliant (97% Sn/3% Bi for 4 ~ 10mm Dia.) (100% Sn for 12.5 ~ 18mm Dia.)
- WT — Optional Wide Terminations (12.5 ~ 18mm Dia.)
- 13 — 330mm (13") Reel
- TR — Tape & Reel
- 8x10.5 — Size in mm
- 50V — Working Voltage
- M — Tolerance Code M=20%
- 101 — Capacitance Code in µF, first 2 digits are significant. Third digit is no. of zeros, "R" indicates decimal for values under 10µF
- NACK — Series

# Surface Mount Aluminum Electrolytic Capacitors NACK Series

## STANDARD PRODUCT AND CASE SIZE Dϕ xL (mm)

| Cap (µF) | Code | Working Voltage (Vdc) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
| 3.3 | 3R3 | - | - | - | - | - | - | - | 5x6.1 | - |
| 4.7 | 4R7 | - | - | - | - | 4x6.1 | 4x6.1 | 5x6.1 | 6.3x6.1 | - |
| 10 | 100 | - | - | 4x6.1 | 4x6.1 | 4x6.1<br>5x6.1 | 5x6.1<br>6.3x6.1 | 6.3x6.1 | 6.3x8<br>8x6.5 | - |
| 22 | 220 | 4x6.1 | 4x6.1 | 4x6.1<br>5x6.1 | 5x6.1 | 5x6.1 | 6.3x6.1 | 6.3x8<br>8x6.5 | 8x10.5 | 8x10.5 |
| 33 | 330 | - | 4x6.1<br>5x6.1 | - | 5x6.1<br>6.3x6.1 | 6.3x1 | 6.3x8<br>8x6.5 | 8x10.5 | 8x10.5 | 10x10.5 |
| 47 | 470 | 4x6.1<br>5x6.1 | - | 5x6.1<br>6.3x6.1 | 6.3x6.1 | 6.3x6.1 | 6.3x8<br>8x6.5 | 8x10.5 | 10x10.5 | 12.5x14 |
| 68 | 680 | - | - | 6.3x6.1 | 6.3x6.1 | 6.3x8 | - | 8x10.5 | 12.5x14 | 12.5x14 |
| 100 | 101 | 5x6.1<br>6.3x6.1 | - | 6.3x6.1 | 6.3x8<br>8x6.5 | 6.3x8<br>8x10.5 | 8x10.5 | 10x10.5 | 12.5x14 | 16x17 |
| 150 | 151 | - | 6.3x6.1 | 6.3x8 | 8x10.5 | 8x10.5 | 10x10.5 | 12.5x14 | 12.5x14 | 16x17 |
| 220 | 221 | 6.3x6.1 | 6.3x8<br>8x6.5 | 6.3x8<br>8x6.5 | 8x10.5 | 8x10.5 | 10x10.5 | 12.5x14 | - | 18x17 |
| 330 | 331 | 6.3x8<br>8x6.5 | 8x10.5 | 8x10.5 | 8x10.5 | 10x10.5 | 12.5x14 | - | 16x17 | 18x17 |
| 470 | 471 | 8x10.5 | 8x10.5 | 8x10.5 | 10x10.5 | 12.5x14 | 16x17 | 16x17 | 18x17 | - |
| 680 | 681 | - | 8x10.5 | 10x10.5 | - | 12.5x14 | 16x17 | 18x17 | - | - |
| 1000 | 102 | 8x10.5 | 10x10.5 | - | 12.5x14 | 16x17 | 16x17 | - | - | - |
| 1500 | 152 | 10x10.5 | - | 12.5x14 | - | 16x17 | - | - | - | - |
| 2200 | 222 | - | 12.5x14 | - | 16x17 | - | - | - | - | - |
| 3300 | 332 | 12.5x14 | - | 16x17 | 18x17 | - | - | - | - | - |
| 4700 | 472 | - | 16x17 | 18x17 | - | - | - | - | - | - |
| 6800 | 682 | 16x17 | 18x17 | - | - | - | - | - | - | - |

## DIMENSIONS (mm)

Denotes New Value

| Case Size | Dϕ ±0.5 | L max. | A, B ±0.2 | H max. | I ±0.3 | P ±0.3 | W | K | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 x 6.1 | 4.0 | 6.1 | 4.3 | 5.5 | 1.8 | 1.0 | 0.65 ± 0.1 | 0.35 ± 0.2 | - | - | - |
| 5 x 6.1 | 5.0 | 6.1 | 5.3 | 6.5 | 2.2 | 1.5 | 0.65 ± 0.1 | 0.35 ± 0.2 | - | - | - |
| 6.3 6.1 | 6.3 | 6.1 | 6.6 | 7.8 | 2.6 | 1.8 | 0.65 ± 0.1 | 0.35 ± 0.2 | - | - | - |
| 6.3 x 8 | 6.3 | 8.0 | 6.6 | 7.8 | 2.6 | 1.8 | 0.65 ± 0.1 | 0.35 ± 0.2 | - | - | - |
| 8 x 6.5 | 8.0 | 6.5 | 8.3 | 9.5 | 3.4 | 2.2 | 0.65 ± 0.1 | 0.35 ± 0.2 | - | - | - |
| 8 x 10.5 | 8.0 | 10.5 | 8.3 | 10.0 | 3.4 | 3.1 | 0.9 ± 0.2 | 0.7 ± 0.2 | - | - | - |
| 10 x 10.5 | 10.0 | 10.5 | 10.3 | 12.0 | 3.5 | 4.6 | 0.9 ± 0.2 | 0.7 ± 0.2 | - | - | - |
| 12.5 x 14T2 | 12.5 | 14.0 | 13.5 | 15.0 | 4.7 | 4.4 | 0.9 ± 0.3 | 0.7 ± 0.3 | - | - | - |
| 12.5 x 14WT | 12.5 | 14.0 | 13.5 | 15.0 | 4.7 | 4.4 | 1.2 ± 0.3 | 0.7 ± 0.3 | 2.2 ± 0.2 | 7.1 ± 0.2 | 2.4 ± 0.2 |
| 16 x 17T2 | 16.0 | 17.5 | 17.0 | 19.0 | 5.5 | 6.7 | 1.2 ± 0.3 | 0.7 ± 0.3 | - | - | - |
| 16 x 17WT | 16.0 | 17.5 | 17.0 | 19.0 | 5.5 | 6.7 | 1.4 ± 0.3 | 0.7 ± 0.3 | 3.0 ± 0.2 | 9.0 ± 0.2 | 1.9 ± 0.2 |
| 18 x 17T2 | 18.0 | 17.5 | 19.0 | 21.0 | 6.7 | 6.7 | 1.2 ± 0.2 | 0.7 ± 0.3 | - | - | - |
| 18 x 17WT | 18.0 | 17.5 | 19.0 | 21.0 | 6.7 | 6.7 | 1.4 ± 0.2 | 0.7 ± 0.3 | 3.0 ± 0.2 | 11.0 ± 0.2 | 1.9 ± 0.2 |