

### FEATURES

- CYLINDRICAL V-CHIP CONTRUCTION
- LOW PROFILE, 4.6mm MAXIMUM HEIGHT
- DESIGNED FOR REFLOW SOLDERING

**RoHS  
Compliant**

includes all homogeneous materials



### CHARACTERISTICS

\*See Part Number System for Details

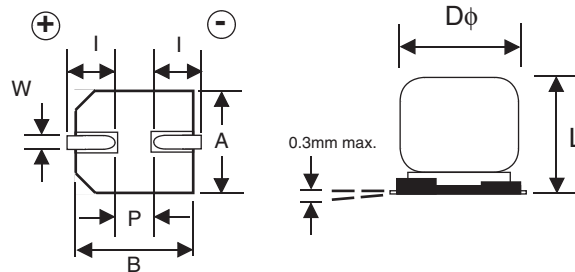
|                                                        |                                     |                                       |      |      |      |      |      |      |                                                                                     |
|--------------------------------------------------------|-------------------------------------|---------------------------------------|------|------|------|------|------|------|-------------------------------------------------------------------------------------|
| Rated Voltage Rating                                   | 4 ~ 50Vdc                           |                                       |      |      |      |      |      |      |  |
| Rated Capacitance Range                                | 0.1 ~ 220μF                         |                                       |      |      |      |      |      |      |                                                                                     |
| Operating Temperature Range                            | -40° ~ +85°C                        |                                       |      |      |      |      |      |      |                                                                                     |
| Capacitance Tolerance                                  | ±20%(M)                             |                                       |      |      |      |      |      |      |                                                                                     |
| Max. Leakage Current After 2 Minutes at 20°C           | 0.01CV or 3μA, whichever is greater |                                       |      |      |      |      |      |      |                                                                                     |
| Surge Voltage & Max. Tanδ                              | W.V. (Vdc)                          | 4                                     | 6.3  | 10   | 16   | 25   | 35   | 50   |                                                                                     |
|                                                        | S.V. (Vdc)                          | 5                                     | 8.0  | 13   | 20   | 32   | 44   | 63   |                                                                                     |
|                                                        | Tanδ @ 120Hz/20°C                   | 0.40                                  | 0.30 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 |                                                                                     |
| Low Temperature Stability<br>(Impedance Ratio @ 120Hz) | W.V. (Vdc)                          | 4                                     | 6.3  | 10   | 16   | 25   | 35   | 50   |                                                                                     |
|                                                        | Z-25°C/Z +20°C                      | 7                                     | 4    | 3    | 2    | 2    | 2    | 2    |                                                                                     |
|                                                        | Z-40°C/Z +20°C                      | 15                                    | 10   | 8    | 6    | 4    | 4    | 4    |                                                                                     |
| Load Life Test<br>at Rated W.V.<br>85°C 1,000 Hours    | Capacitance Change                  | Within ±25% of initial measured value |      |      |      |      |      |      |                                                                                     |
|                                                        | Tanδ                                | Less than 200% of specified value     |      |      |      |      |      |      |                                                                                     |
|                                                        | Leakage Current                     | Less than specified value             |      |      |      |      |      |      |                                                                                     |

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

| Cap.<br>(μF) | Working Voltage (Vdc) |         |         |         |         |         |         |
|--------------|-----------------------|---------|---------|---------|---------|---------|---------|
|              | 4                     | 6.3     | 10      | 16      | 25      | 35      | 50      |
| 0.1          | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 0.22         | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 0.33         | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 0.47         | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 1.0          | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 2.2          | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 3.3          | -                     | -       | -       | -       | -       | -       | 4x4.5   |
| 4.7          | -                     | -       | -       | -       | 4x4.5   | 4x4.5   | 5x4.5   |
| 10           | -                     | -       | -       | 4x4.5   | 5x4.5   | 5x4.5   | 6.3x4.5 |
| 22           | -                     | 4x4.5   | 5x4.5   | 5x4.5   | 6.3x4.5 | 6.3x4.5 | -       |
| 33           | 4x4.5                 | 5x4.5   | 5x4.5   | 6.3x4.5 | 6.3x4.5 | -       | -       |
| 47           | 4x4.5                 | 5x4.5   | 6.3x4.5 | 6.3x4.5 | -       | -       | -       |
| 100          | 5x4.5                 | 6.3x4.5 | 6.3x4.5 | -       | -       | -       | -       |
| 220          | 6.3x4.5               | -       | -       | -       | -       | -       | -       |

### DIMENSIONS (mm)

| Case Size | Dφ±0.5 | L±0.1 | A/B±0.2 | I ± 0.2 | W         | P±0.2 |
|-----------|--------|-------|---------|---------|-----------|-------|
| 4x4.5     | 4.0    | 4.5   | 4.3     | 1.8     | 0.5 ~ 0.8 | 1.0   |
| 5x4.5     | 5.0    | 4.5   | 5.3     | 2.1     | 0.5 ~ 0.8 | 1.4   |
| 6.3x4.5   | 6.3    | 4.5   | 6.6     | 2.5     | 0.5 ~ 0.8 | 2.2   |



### PART NUMBER SYSTEM

NACP 470 M 16V 6.3x4.5 TR 13 F

Series

Capacitance Code in μF, first 2 digits are significant  
Third digit is no. of zeros, "R" indicates decimal for values under 10μF

Tolerance Code M=20%

Working Voltage

Size in mm

Tape & Reel

RoHS Compliant  
97% Sn (min.), 3% Bi (max.)  
330mm (13") Reel

### 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](http://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](mailto:tpmg@niccomp.com)



## STANDARD VALUES, CASE SIZES AND SPECIFICATIONS

| NIC Part Number          | Cap. (μF) | W.V. (Vdc) | Dissipation Factor (Tan δ) | Max. Ripple Current (mA) +85°C/120Hz | Max. ESR (Ω) +20°C/120Hz | Load Life Hours @ +85°C |
|--------------------------|-----------|------------|----------------------------|--------------------------------------|--------------------------|-------------------------|
| NACP330M4V4X4.5TR13F     | 33        | 4          | 0.40                       | 28                                   | 20.1                     | 1,000                   |
| NACP470M4V4X4.5TR13F     | 47        |            | 0.40                       | 33                                   | 14.1                     | 1,000                   |
| NACP101M4V5X4.5TR13F     | 100       |            | 0.40                       | 56                                   | 6.6                      | 1,000                   |
| NACP221M4V6.3X4.5TR13F   | 220       |            | 0.40                       | 98                                   | 3.0                      | 1,000                   |
| NACP220M6.3V4X4.5TR13F   | 22        | 6.3        | 0.30                       | 28                                   | 22.6                     | 1,000                   |
| NACP330M6.3V5X4.5TR13F   | 33        |            | 0.30                       | 37                                   | 15.1                     | 1,000                   |
| NACP470M6.3V5X4.5TR13F   | 47        |            | 0.30                       | 45                                   | 10.6                     | 1,000                   |
| NACP101M6.3V6.3X4.5TR13F | 100       |            | 0.30                       | 70                                   | 5.0                      | 1,000                   |
| NACP220M10V5X4.5TR13F    | 22        | 10         | 0.24                       | 33                                   | 18.1                     | 1,000                   |
| NACP330M10V5X4.5TR13F    | 33        |            | 0.24                       | 41                                   | 12.6                     | 1,000                   |
| NACP470M10V6.3X4.5TR13F  | 47        |            | 0.24                       | 53                                   | 8.5                      | 1,000                   |
| NACP101M10V6.3X4.5TR13F  | 100       |            | 0.24                       | 74                                   | 3.98                     | 1,000                   |
| NACP100M16V4X4.5TR13F    | 10        | 16         | 0.20                       | 23                                   | 33.2                     | 1,000                   |
| NACP220M16V5X4.5TR13F    | 22        |            | 0.20                       | 37                                   | 15.1                     | 1,000                   |
| NACP330M16V6.3X4.5TR13F  | 33        |            | 0.20                       | 51                                   | 10.1                     | 1,000                   |
| NACP470M16V6.3X4.5TR13F  | 47        |            | 0.20                       | 61                                   | 7.1                      | 1,000                   |
| NACP47M25V4X4.5TR13F     | 4.7       | 25         | 0.16                       | 17                                   | 56.5                     | 1,000                   |
| NACP100M25V5X4.5TR13F    | 10        |            | 0.16                       | 27                                   | 26.5                     | 1,000                   |
| NACP220M25V6.3X4.5TR13F  | 22        |            | 0.16                       | 47                                   | 12.1                     | 1,000                   |
| NACP330M25V6.3X4.5TR13F  | 33        |            | 0.16                       | 57                                   | 8.1                      | 1,000                   |
| NACP47M35V4X4.5TR13F     | 4.7       | 35         | 0.14                       | 18                                   | 49.4                     | 1,000                   |
| NACP100M35V5X4.5TR13F    | 10        |            | 0.14                       | 29                                   | 23.2                     | 1,000                   |
| NACP220M35V6.3X4.5TR13F  | 22        |            | 0.14                       | 49                                   | 10.8                     | 1,000                   |
| NACPR10M50V4X4.5TR13F    | 0.1       | 50         | 0.12                       | 1.0                                  | 1990                     | 1,000                   |
| NACPR22M50V4X4.5TR13F    | 0.22      |            | 0.12                       | 2.0                                  | 905                      | 1,000                   |
| NACPR33M50V4X4.5TR13F    | 0.33      |            | 0.12                       | 2.8                                  | 603                      | 1,000                   |
| NACPR47M50V4X4.5TR13F    | 0.47      |            | 0.12                       | 4.0                                  | 423                      | 1,000                   |
| NACP1R0M50V4X4.5TR13F    | 1.0       |            | 0.12                       | 8.4                                  | 199                      | 1,000                   |
| NACP2R2M50V4X4.5TR13F    | 2.2       |            | 0.12                       | 14                                   | 90.5                     | 1,000                   |
| NACP3R3M50V4X4.5TR13F    | 3.3       |            | 0.12                       | 17                                   | 60.3                     | 1,000                   |
| NACP4R7M35V5X4.5TR13F    | 4.7       |            | 0.12                       | 21                                   | 42.3                     | 1,000                   |
| NACP100M35V6.3X4.5TR13F  | 10        |            | 0.12                       | 33                                   | 19.0                     | 1,000                   |

## RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

| Cap. (μF)  | Frequency   |              |                |         |
|------------|-------------|--------------|----------------|---------|
|            | 10< f ≤1KHz | 1K< f ≤10KHz | 10K< f ≤100KHz | ≥100KHz |
| 0.47 ~ 4.7 | 1.0         | 1.3          | 1.5            | 2.0     |
| 10 ~ 33    | 1.0         | 1.2          | 1.3            | 1.45    |
| 47 ~ 220   | 1.0         | 1.1          | 1.2            | 1.3     |

CARRIER TAPE

| Case Size | A ±0.5 | B ±0.2 | C ±0.3 | D ±0.1 | P ±0.1 | T ±0.2 |
|-----------|--------|--------|--------|--------|--------|--------|
| 4 x 4.5   | 4.7    | 4.7    | 12.0   | 5.5    | 8.0    | 5.1    |
| 5 x 4.5   | 5.7    | 5.7    | 12.0   | 5.5    | 12.0   | 5.1    |
| 6.3 x 4.5 | 7.0    | 7.0    | 16.0   | 7.5    | 12.0   | 5.1    |

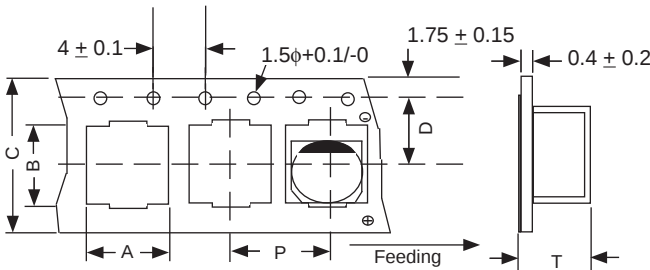
TR13 330mm (13") REEL  
TR15 380mm (15") REEL

| Case Size | W ±1.0 | Quantity Per Reel |                 |
|-----------|--------|-------------------|-----------------|
|           |        | 13" Reel (Std)    | 15" Reel (Opt.) |
| 4 x 4.5   | 14.0   | 1,500 pcs         | 2,000 pcs       |
| 5 x 4.5   | 14.0   | 1,000 pcs         | 1,000 pcs       |
| 6.3 x 4.5 | 18.0   | 1,000 pcs         | 1,000 pcs       |

TAPING SPECIFICATIONS (mm)

- 1. Both Leader and Trailer tape: Minimum 40mm (1.57") empty carrier tape pockets.
- 2. Leader tape: Approximately 20cm of cover tape at leader.
- 3. Connection: Maximum 3 connections (slices) per reel.

CARRIER



REEL

