

## **DISCONTINUED PRODUCT NOTICE**

PRODUCTS: **AXIAL** LEADED ELECTROLYTIC CAPACITORS



NIC PRODUCT SERIES: **NAE, NAE-WT, NASA, NASS & NNA**

EFFECTIVE: APRIL 1st, 2002

LAST-TIME BUY:

ORDERS FROM EXISTING AXIAL LEADED PRODUCTS CUSTOMERS WILL BE ACCEPTED  
UNTIL JULY 1<sup>st</sup>, 2002

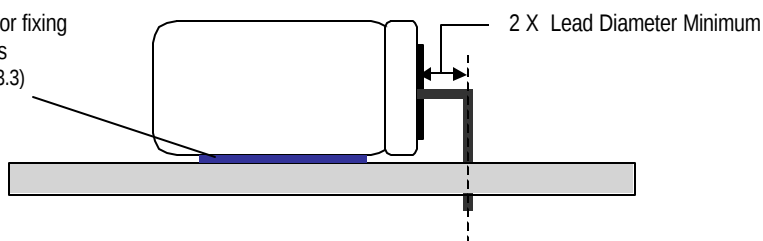
LAST DELIVERY: NOT BEYOND OCTOBER 1<sup>st</sup>, 2002

TERMS: ALL ORDERS WILL BE NON CANCELABLE / NON RETURNABLE

### **REPLACEMENTS – ALTERNATES:**

- FOR LOW PROFILE APPLICATIONS SUGGEST USE OF RADIAL LEADED VERSION  
MOUNTED HORIZONTALLY  
+ SEE DRAWING BELOW

Adhesive suggested for fixing  
large size components  
(Ref IPC-CM-770 20.1.3.3)



- SUGGEST UPGRADE TO SURFACE MOUNT (SMT) VERSION  
+ AVAILABLE IN HIGH VOLTAGES (UP TO 450VDC)  
+ AVAILABLE IN HIGH CAPACITANCE (UP TO 6800µF)



### AXIAL LEADS, POLARIZED, WIDE TEMPERATURE RANGE

#### FEATURES

- 105°C EXTENDED OPERATING TEMPERATURE
- HIGH TEMPERATURE STABILITY
- NEW REDUCED SIZES IN DEVELOPMENT
- MINIMUM ORDERS REQUIRED

#### CHARACTERISTICS

|                                                      |               |                                      |                                           |      |      |      |      |      |      |      |  |
|------------------------------------------------------|---------------|--------------------------------------|-------------------------------------------|------|------|------|------|------|------|------|--|
| Rated Voltage Range                                  |               | 6.3 ~ 100 VDC                        |                                           |      |      |      |      |      |      |      |  |
| Capacitance Range                                    |               | 0.47 ~ 10,000μF                      |                                           |      |      |      |      |      |      |      |  |
| Operating Temperature Range                          |               | -40 ~ +105°C                         |                                           |      |      |      |      |      |      |      |  |
| Capacitance Tolerance                                |               | ± 20%                                |                                           |      |      |      |      |      |      |      |  |
| Max. Leakage Current @ (20°C)                        | After 1 min.  | 0.03CV or 4μA , whichever if greater |                                           |      |      |      |      |      |      |      |  |
|                                                      | After 2 min.  | 0.01CV or 3μA , whichever if 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                          | 0.22                                      | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 |  |
|                                                      |               | C = 1,500μF                          | 0.23                                      | 0.20 | 0.17 | 0.15 | 0.13 | 0.11 | 0.11 | 0.09 |  |
|                                                      |               | C = 2,200μF                          | 0.24                                      | 0.21 | 0.18 | 0.16 | 0.14 | 0.12 | 0.12 | 0.10 |  |
|                                                      |               | C = 3,300μF                          | 0.26                                      | 0.23 | 0.20 | 0.18 | 0.16 | 0.14 | 0.14 |      |  |
|                                                      |               | C = 4,700μF                          | 0.28                                      | 0.25 | 0.22 | 0.20 | 0.18 | 0.16 | 0.16 |      |  |
|                                                      |               | C = 6,800μF                          | 0.32                                      | 0.29 | 0.26 | 0.24 | 0.22 | 0.20 |      |      |  |
|                                                      |               | C = 10,000μF                         | 0.40                                      | 0.37 | 0.34 | 0.32 | 0.30 |      |      |      |  |
| Low Temperature Stability<br>Impedance Ratio @ 120Hz | Z-25°C/Z+20°C | D < 10 Ø m/m                         | 4                                         | 3    | 2    | 2    | 2    | 2    | 2    | 2    |  |
|                                                      |               | D ≥ 13 Ø m/m                         | 6                                         | 4    | 3    | 2    | 2    | 2    | 2    | 2    |  |
|                                                      | Z-40°C/Z+20°C | D < 10 Ø m/m                         | 8                                         | 6    | 4    | 4    | 3    | 3    | 3    | 3    |  |
|                                                      |               | D ≥ 13 Ø m/m                         | 10                                        | 8    | 6    | 4    | 4    | 4    | 4    | 4    |  |
| Load Life Test at Rated W.V.<br>105°C 1,000 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         |      |      |      |      |      |      |      |  |
| Shelf Life Test<br>105°C 1,000 Hours<br>No Load      |               | Capacitance Change                   | Within ±20% of initial measured value     |      |      |      |      |      |      |      |  |
|                                                      |               | Tan δ                                | Less than 200% of specified maximum value |      |      |      |      |      |      |      |  |
|                                                      |               | Leakage Current                      | Less than specified maximum value         |      |      |      |      |      |      |      |  |

**Note:** Capacitors shall conform to JIS-C-5141, unless otherwise specified here.

### MAXIMUM PERMISSIBLE RIPPLE CURRENT (mA rms) AT 105°C AND 120Hz

| Cap. (μF) | Code | Working Voltage (Vdc) |      |      |      |      |      |      |      |  |
|-----------|------|-----------------------|------|------|------|------|------|------|------|--|
|           |      | 6.3                   | 10   | 16   | 25   | 35   | 50   | 63   | 100  |  |
| 0.47      |      |                       |      |      |      |      | 5    |      | 7    |  |
| 1.0       |      |                       |      |      |      |      | 7    |      | 10   |  |
| 2.2       |      |                       |      |      |      |      | 11   |      | 16   |  |
| 3.3       |      |                       |      |      |      |      | 14   |      | 22   |  |
| 4.7       |      |                       |      |      |      |      | 17   | 18   | 26   |  |
| 10        |      |                       |      |      |      |      | 30   | 36   | 49   |  |
| 22        |      |                       |      |      | 43   | 47   | 51   | 68   | 72   |  |
| 33        |      |                       |      | 44   | 53   | 57   | 68   | 83   | 89   |  |
| 47        |      |                       | 48   | 59   | 64   | 86   | 95   | 100  | 117  |  |
| 100       |      | 74                    | 80   | 109  | 117  | 126  | 152  | 161  | 211  |  |
| 220       |      | 119                   | 149  | 162  | 191  | 206  | 259  | 295  | 387  |  |
| 330       |      | 169                   | 182  | 199  | 268  | 290  | 343  | 413  | 511  |  |
| 470       |      | 202                   | 240  | 261  | 320  | 374  | 468  | 533  | 657  |  |
| 1,000     |      | 373                   | 401  | 473  | 576  | 674  | 796  | 904  | 1246 |  |
| 1,500     |      | 494                   | 606  | 660  | 764  | 959  | 1188 | 1252 | 1591 |  |
| 2,200     |      | 653                   | 698  | 816  | 866  | 1216 | 1408 | 1576 |      |  |
| 3,300     |      | 768                   | 884  | 1102 | 1313 | 1493 | 1711 | 1851 |      |  |
| 4,700     |      | 1031                  | 1176 | 1418 | 1594 | 1877 | 1991 |      |      |  |
| 6,800     |      | 1251                  | 1485 | 1682 | 1876 | 2043 |      |      |      |  |
| 10,000    |      | 1534                  | 1710 | 1912 | 1970 |      |      |      |      |  |

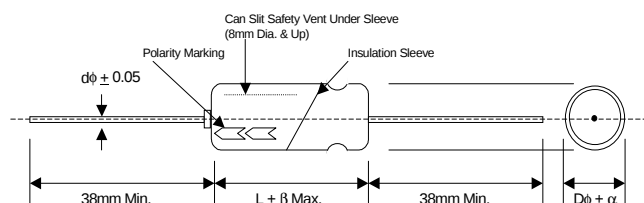
### RIPPLE CURRENT CORRECTION FACTOR

#### 1. Temperature Factor

| Ambient Temperature (°C) | ≤60  | +70  | +85  | +105 |
|--------------------------|------|------|------|------|
| Correction Rate          | 2.00 | 1.85 | 1.60 | 1.00 |

#### 2. Frequency Factor

| Frequency (Hz) | 50   | 120  | 300  | 1K   | 10K~ |
|----------------|------|------|------|------|------|
| 0.47 ~ 3.3μF   | 0.60 | 1.00 | 1.25 | 1.65 | 1.90 |
| 4.7 ~ 33μF     | 0.70 | 1.00 | 1.20 | 1.40 | 1.50 |
| 47 ~ 1000μF    | 0.75 | 1.00 | 1.10 | 1.15 | 1.20 |
| 1500 ~ 10000μF | 0.80 | 1.00 | 1.02 | 1.03 | 1.04 |



SLEEVE COLOR: DARK BROWN

### DIMENSIONS (mm)

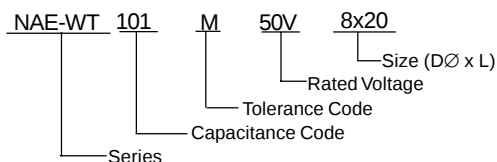
| Case Dia. (DØ) | 5-10 | 12.5 | 16-18 | 22  |
|----------------|------|------|-------|-----|
| Lead Dia. (dØ) | 0.6  | 0.8  | 0.8   | 0.8 |
| Dim. α         | 0.5  | 0.5  | 0.5   | 1.0 |
| Dim. β         | 1.0  | 1.0  | 2.0   | 2.0 |

### STANDARD PRODUCTS AND CASE SIZE TABLE: Dφ x L (mm)

| Cap. (μF) | Code | Working Voltage (Vdc) |        |        |        |        |        |        |             |
|-----------|------|-----------------------|--------|--------|--------|--------|--------|--------|-------------|
|           |      | 6.3                   | 10     | 16     | 25     | 35     | 50     | 63     | 100         |
| 0.47      | R47  |                       |        |        |        |        |        |        | 5x13        |
| 1.0       | 1R0  |                       |        |        |        |        |        |        | 5x13        |
| 2.2       | 2R2  |                       |        |        |        |        |        |        | 6.3x13      |
| 3.3       | 3R3  |                       |        |        |        |        |        | 5x13   | 6.3x13      |
| 4.7       | 4R7  |                       |        |        |        |        | 5x13   | 6.3x13 | 6.3x16      |
| 10        | 100  |                       |        |        |        | 5x13   | 6.3x13 | 6.3x16 | 8x16        |
| 22        | 220  |                       |        | 5x13   | 6.3x13 | 6.3x13 | 6.3x13 | 8x16   | 8x16        |
| 33        | 330  |                       |        | 5x13   | 6.3x13 | 6.3x13 | 6.3x16 | 8x16   | 8x20        |
| 47        | 470  |                       | 6.3x13 | 6.3x13 | 6.3x13 | 8x16   | 8x16   | 8x16   | 10x20       |
| 100       | 101  |                       | 6.3x13 | 8x16   | 8x16   | 8x16   | 8x20   | 8x20   | 10x25       |
| 220       | 221  |                       | 8x16   | 8x16   | 8x16   | 8x20   | 10x20  | 10x25  | 13x25       |
| 330       | 331  |                       | 8x16   | 8x16   | 8x20   | 10x20  | 10x25  | 13x25  | 16x26       |
| 470       | 471  |                       | 8x16   | 8x20   | 10x20  | 10x25  | 13x25  | 13x25  | 16x40       |
| 1000      | 102  |                       | 10x20  | 10x25  | 13x25  | 13x31  | 16x26  | 16x31  | 18x50/18x40 |
| 1500      | 152  | 10x25                 | 10x25  | 13x25  | 13x31  | 16x31  | 16x40  | 16x40  | 22x50       |
| 2200      | 222  | 13x25                 | 13x25  | 13x31  | 16x26  | 16x31  | 18x40  | 18x50  |             |
| 3300      | 332  | 13x25                 | 13x30  | 16x26  | 16x31  | 16x40  | 18x50  | 22x50  |             |
| 4700      | 472  | 13x31                 | 16x26  | 16x31  | 16x40  | 18x50  | 22x50  |        |             |
| 6800      | 682  | 16x31                 | 16x31  | 16x40  | 18x50  | 22x50  |        |        |             |
| 10,000    | 103  | 16x40                 | 16x40  | 18x50  | 22x50  |        |        |        |             |

### PART NUMBERING SYSTEM

MINIMUM ORDERS REQUIRED



See page 8 for complete part numbering system.