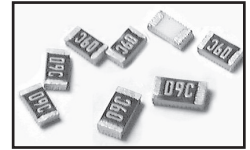


## FEATURES

- PRECISE TOLERANCE AND TEMPERATURE COEFFICIENT
- EIA STANDARD CASE SIZES (0201 ~ 2512)
- LOW NOISE, THIN FILM (NiCr) CONSTRUCTION
- REFLOW SOLDERABLE (Pb FREE TERMINATION FINISH)

**RoHS**  
**Compliant**  
includes all homogeneous materials

\*See Part Number System for Details



| Type  | EIA Size | Power Rating at 70°C | Max.*1 Working Voltage | Max.*2 Overload Voltage | Resistance Tolerance (Code)                                      | Temperature Coefficient (ppm/°C) | Resistance Range (Ω) | Resistance Values  |
|-------|----------|----------------------|------------------------|-------------------------|--|----------------------------------|----------------------|--------------------|
| NTR02 | 0201     | 1/32 (0.032)W        | 15V                    | 30V                     | ±0.5% (D), ±1.0% (F)   | ±25 (C)                          | 49.9 ~ 4.99KΩ        | E-24, E-96 & E-192 |
|       |          |                      |                        |                         | ±0.5% (D), ±1.0% (F)   | ±50 (D)                          | 49.9 ~ 33KΩ          |                    |
| NTR04 | 0402     | 1/16 (0.063)W        | 25V                    | 50V                     | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 49.9 ~ 4.99KΩ        |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A)   | ±5 (S)                           | 49.9 ~ 4.99KΩ        |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A)   | ±10 (B)                          | 49.9 ~ 12KΩ          |                    |
|       |          |                      |                        |                         | ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F)                         |                                  | 49.9 ~ 60.4KΩ        |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A)   | ±15 (N)                          | 49.9 ~ 12KΩ          |                    |
|       |          |                      |                        |                         | ±0.1% (B), 0.25 (C), ±0.5% (D), ±1% (F)                          | ±15 (N)                          | 49.9 ~ 69.8KΩ        |                    |
|       |          |                      |                        |                         | ±0.05% (A)   | ±25(C), ±50(D)                   | 49.9 ~ 12KΩ          |                    |
|       |          |                      |                        |                         | ±0.1% (B)  | ±25 (C)                          | 10 ~ 511KΩ           |                    |
|       |          |                      |                        |                         | ±0.25% (C), ±0.5% (D), ±1% (F)                                   | ±25 (C)                          | 4.7 ~ 511KΩ          |                    |
|       |          |                      |                        |                         | ±0.1% (B)  | ±50 (D)                          | 10 ~ 511KΩ           |                    |
|       |          |                      |                        |                         | ±0.25% (C)   | ±50 (D)                          | 4.7 ~ 511KΩ          |                    |
|       |          |                      |                        |                         | ±0.5% (D), ±1% (F)   | ±50 (D)                          | 4.7 ~ 511KΩ          |                    |
| NTR06 | 0603     | 1/16 (0.063)W        | 50V                    | 100V                    | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 15KΩ          |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±5 (S)                           | 24.9 ~ 15KΩ          |                    |
|       |          |                      |                        |                         | ±0.01% (T)   | ±10(B), ±15(N)                   | 24.9 ~ 100KΩ         |                    |
|       |          |                      |                        |                         | ±0.05% (A)   | ±10(B), ±15(N)                   | 4.7 ~ 332KΩ          |                    |
|       |          |                      |                        |                         | ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F)                         | ±10(B), ±15(N)                   | 4.7 ~ 511KΩ          |                    |
|       |          |                      |                        |                         | ±0.05% (A)   | ±25(C), ±50(D)                   | 4.7 ~ 332KΩ          |                    |
|       |          |                      |                        |                         | ±0.1% (B)  | ±25(C), ±50(D)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.25 (C), ±0.5 (D), ±1% (F)                                     | ±25(C), ±50(D)                   | 1.0 ~ 1MΩ            |                    |
| NTR10 | 0805     | 1/10 (0.10) W        | 100V                   | 200V                    | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 30KΩ          |                    |
|       |          |                      |                        |                         | ±0.01% (T)   | ±10(B), ±15(N)                   | 24.9 ~ 200KΩ         |                    |
|       |          |                      |                        |                         | ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F)             | ±10(B), ±15(N)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.05 (A)  | ±25(C), ±50(D)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.1% (B)  | ±25(C), ±50(D)                   | 4.7 ~ 2MΩ            |                    |
|       |          |                      |                        |                         | ±0.25 (C), ±0.5 (D), ±1% (F)                                     | ±25(C), ±50(D)                   | 1.0 ~ 2MΩ            |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 49.9KΩ        |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±5 (S)                           | 24.9 ~ 49.9KΩ        |                    |
| NTR12 | 1206     | 1/8 (0.125) W        | 150V                   | 300V                    | ±0.01% (T)   | ±10(B), ±15(N)                   | 24.9 ~ 499KΩ         |                    |
|       |          |                      |                        |                         | ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F)             | ±10(B), ±15(N)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.05% (A)   | ±25(C), ±50(D)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.1% (B)  | ±25(C), ±50(D)                   | 4.7 ~ 2.49MΩ         |                    |
|       |          |                      |                        |                         | ±0.25% (C), ±0.5% (D), ±1% (F)                                   | ±25(C), ±50(D)                   | 1.0 ~ 2.49MΩ         |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25 (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 49.9KΩ        |                    |

For 2010 and 2512 case sizes see page 2



| Type  | EIA Size | Power Rating at 70°C | Max.*1 Working Voltage | Max.*2 Overload Voltage | Resistance Tolerance (Code)                                       | Temperature Coefficient (ppm/°C) | Resistance Range (Ω) | Resistance Values  |
|-------|----------|----------------------|------------------------|-------------------------|---|----------------------------------|----------------------|--------------------|
| NTR20 | 1210     | 1/4 (0.25) W         | 150V                   | 300V                    | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 49.9KΩ        | E-24, E-96 & E-192 |
|       |          |                      |                        |                         | ±0.01% (T)  | ±5 (S)                           | 24.9 ~ 49.9KΩ        |                    |
|       |          |                      |                        |                         | ±0.01% (T)  | ±10(B), ±15(N)                   | 24.9 ~ 499KΩ         |                    |
|       |          |                      |                        |                         | ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)             | ±10(B), ±15(N)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.05% (A)  | ±25(C), ±50(D)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.1% (B)   | ±25(C), ±50(D)                   | 4.7 ~ 2.49MΩ         |                    |
|       |          |                      |                        |                         | ±0.25% (C), ±0.5% (D), ±1% (F)                                    | ±25(C), ±50(D)                   | 1.0 ~ 2.49MΩ         |                    |
| NTR25 | 2010     | 1/4 (0.25) W         | 150V                   | 300V                    | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 100KΩ         |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F) | ±5 (S)                           | 24.9 ~ 100KΩ         |                    |
|       |          |                      |                        |                         | ±0.01% (T)  | ±10(B), ±15(N)                   | 24.9 ~ 499KΩ         |                    |
|       |          |                      |                        |                         | ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)             | ±10(B), ±15(N)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.05% (A)  | ±25(C), ±50(D)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.1% (B)   | ±25(C), ±50(D)                   | 4.7 ~ 3MΩ            |                    |
|       |          |                      |                        |                         | ±0.25% (C), ±0.5% (D), ±1% (F)                                    | ±25(C), ±50(D)                   | 1.0 ~ 3MΩ            |                    |
| NTR50 | 2512     | 1/2 (0.50) W         | 150V                   | 300V                    | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F) | ±2 (X), ±3 (O)                   | 24.9 ~ 100KΩ         |                    |
|       |          |                      |                        |                         | ±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F) | ±5 (S)                           | 24.9 ~ 100KΩ         |                    |
|       |          |                      |                        |                         | ±0.01% (T)  | ±10(B), ±15(N)                   | 24.9 ~ 499KΩ         |                    |
|       |          |                      |                        |                         | ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)             | ±10(B), ±15(N)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.05% (A)  | ±25(C), ±50(D)                   | 4.7 ~ 1MΩ            |                    |
|       |          |                      |                        |                         | ±0.1% (B)   | ±25(C), ±50(D)                   | 4.7 ~ 3MΩ            |                    |
|       |          |                      |                        |                         | ±0.25% (C), ±0.5% (D), ±1% (F)                                    | ±25(C), ±50(D)                   | 1.0 ~ 3MΩ            |                    |

Note \*1 - Maximum allowable continuous Working Voltage for all resistors is the lower of the two values:  
 "Maximum Working Voltage" as specified above  
 or

$$\sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$$

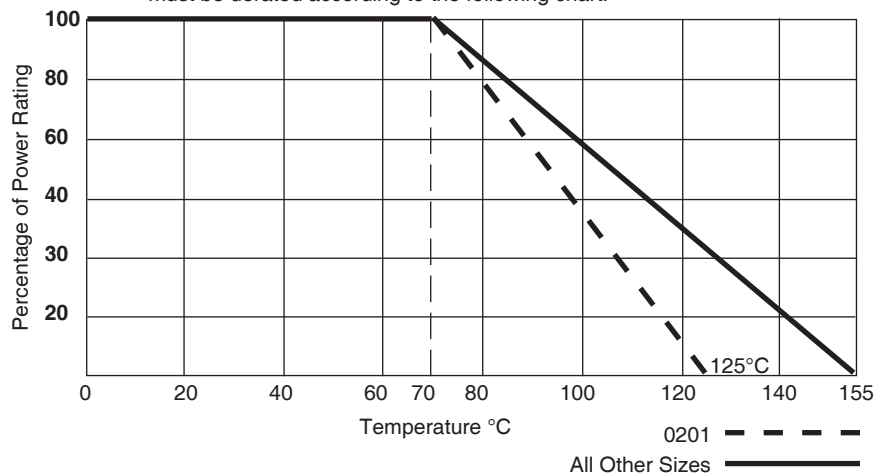
Note \*2 - Maximum Overload Voltage for all resistors is the lower of the two values:  
 "Maximum Overload Voltage" as specified above  
 or

$$2 \times \sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$$

### TYPICAL NOISE CHARACTERISTICS

| Resistance Value (Ω) | Case Size |        |        |
|----------------------|-----------|--------|--------|
|                      | 0603      | 0805   | 1206   |
| 1 ~ 9                | -95dB     | -95dB  | -95dB  |
| 10 ~ 49              | -85dB     | -85dB  | -85dB  |
| 50 ~ 99              | -85dB     | -85dB  | -85dB  |
| 100 ~ 4.99K          | -100dB    | -100dB | -105dB |
| 5K ~ 19.9K           | -100dB    | -100dB | -100dB |
| 20K ~ 1M             | -90dB     | -100dB | -100dB |

**Power Derating Curve:** For operation above 70°C, power rating must be derated according to the following chart:



## ENVIRONMENTAL CHARACTERISTICS

| Item  | Specification                     |                       | Typical       |         |         | Test Method*  |
|---|-----------------------------------|-----------------------|---------------|---------|---------|---|
|   | Tol.<br>≤ 0.05%                   | Tol.<br>> 0.05%       | Tol. > 0.05%  |         |         |   |
|   |                                   |                       | 0402          | 0603    | 0805    |   |
| Standard Temperature Range: -55°C ~ +155°C (power derating above +70°C) |                                   |                       |               |         |         |   |
| Temperature Coefficient of Resistance                                   | As specified                      | As specified          | -             | -       | -       | +25/-55/+25/+125/+25  |
| Short Time Overload   | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.2\%$  | -0.001%       | -0.002% | -0.005% | RCWV x 2.5 or Max Overloading Voltage for 5 Seconds   |
| Dielectric Withstanding Voltage   | As specified                      |                       | 265V          | 298V    | 415V    | MIL-STD-202F Method 301<br>Apply Max. Overload Voltage for 1 minute   |
| Insulation Resistance   | >1000M $\Omega$                   |                       | >10G $\Omega$ |         |         | MIL-STD-202F Method 302<br>Apply 100Vdc for 1 minute  |
| Thermal Shock (N/A 0201 Size)   | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.25\%$ | 0.001%        | -0.02%  | 0.002%  | MIL-STD-202F Method 107G<br>-55°C ~ +150°C, 100 cycles  |
| Load Life   | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.2\%$  | no change     |         |         | MIL-STD-202F Method 108A<br>RCWV +70°C, 1.5 hours ON, 0.5 hours OFF<br>Total time 1,000 ~ 1,048 hours               |
|   | >7K $\Omega$ $\Delta R \pm 0.5\%$ |                       | 0.02%         | 0.03%   | 0.06%   |   |
| Humidity (Steady State)   | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.3\%$  | 0.003%        | 0.005%  | 0.007%  | MIL-STD-202F Method 103B<br>+40°C, 90% ~ 95% RH, RCWV 1.5 hours ON, 0.5 hours OFF<br>Total time 1,000 ~ 1,048 hours |
| Resistance to Dry Heat (N/A 0201 Size)                                  | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.5\%$  | 0.07%         | 0.02%   | 0.025%  | MIL-STD-202 Method 108<br>+125°C, 1000 hours  |
| Low Temperature Operation (N/A 0201 Size)                               | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.2\%$  | 0.006%        | 0.008%  | 0.001%  | JIS-C-502-7.1<br>1 hour @ -65°C followed by 45 minutes of RCWV  |
| Bending Strength  | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.2\%$  | 0.001%        | -0.010% | 0.002%  | JIS-C-5202-6.1.4<br>Bending Amplitude 3mm for 10 seconds  |
| Solderability   | 95% Minimum Coverage              |                       | >95%          |         |         | MIL-STD-202F Method 208H<br>245°C $\pm 5^\circ\text{C}$ , 5 $\pm 0.5$ seconds                                       |
| Resistance to Soldering Heat  | $\Delta R \pm 0.05\%$             | $\Delta R \pm 0.2\%$  | 0.001%        | -0.02%  | 0.006%  | MIL-STD-202F Method 210E<br>260°C $\pm 5^\circ\text{C}$ for 10 $\pm 1$ seconds                                      |

\*0201 testing per IEC 60115 - 1



## STANDARD E-24, E-96 AND E-192 VALUES AND 0603 RESISTANCE CODES

| E-24  |      | E-96  |      |       |      |       |      |       |      | E-192* |       |       |       |       |  |
|-------|------|-------|------|-------|------|-------|------|-------|------|--------|-------|-------|-------|-------|--|
| Value | Code | Value | Code | Value | Code | Value | Code | Value | Code | Value  | Value | Value | Value | Value |  |
| 100   | 01   | 100   | 02   | 105   | 03   | 107   | 04   | 100   | 147  | 215    | 316   | 464   | 681   |       |  |
| 110   | 05   | 113   | 06   | 115   | 07   | 118   | 08   | 101   | 149  | 218    | 320   | 470   | 690   |       |  |
| 120   | 09   | 124   | 10   | 127   | 11   | 130   | 12   | 102   | 150  | 221    | 324   | 475   | 698   |       |  |
| 130   | 13   | 137   | 14   | 140   | 15   | 143   | 16   | 104   | 152  | 223    | 328   | 481   | 706   |       |  |
| 150   | 17   | 150   | 18   | 154   | 19   | 158   | 20   | 105   | 154  | 226    | 332   | 487   | 715   |       |  |
| 160   | 21   | 165   | 22   | 169   | 23   | 174   | 24   | 106   | 156  | 229    | 336   | 493   | 723   |       |  |
| 180   | 25   | 182   | 26   | 187   | 27   | 191   | 28   | 107   | 158  | 232    | 340   | 499   | 732   |       |  |
| 200   | 29   | 200   | 30   | 205   | 31   | 210   | 32   | 109   | 160  | 234    | 344   | 505   | 741   |       |  |
| 220   | 33   | 221   | 34   | 226   | 35   | 232   | 36   | 110   | 162  | 237    | 348   | 511   | 750   |       |  |
| 240   | 37   | 243   | 38   | 249   | 39   | 255   | 40   | 111   | 164  | 240    | 352   | 517   | 759   |       |  |
| 270   | 41   | 267   | 42   | 274   | 43   | 280   | 44   | 113   | 165  | 243    | 357   | 523   | 768   |       |  |
| 300   | 45   | 294   | 46   | 301   | 47   | 309   | 48   | 114   | 167  | 246    | 361   | 530   | 777   |       |  |
| 330   | 49   | 324   | 50   | 332   | 51   | 340   | 52   | 115   | 169  | 249    | 365   | 536   | 787   |       |  |
| 360   | 53   | 357   | 54   | 365   | 55   | 374   | 56   | 117   | 172  | 252    | 370   | 542   | 796   |       |  |
| 390   | 57   | 392   | 58   | 402   | 59   | 412   | 60   | 118   | 174  | 255    | 374   | 549   | 806   |       |  |
| 430   | 61   | 432   | 62   | 442   | 63   | 453   | 64   | 120   | 176  | 258    | 379   | 556   | 816   |       |  |
| 470   | 65   | 475   | 66   | 487   | 67   | 499   | 68   | 121   | 178  | 261    | 383   | 562   | 825   |       |  |
| 510   | 69   | 523   | 70   | 536   | 71   | 549   | 72   | 123   | 180  | 264    | 388   | 569   | 835   |       |  |
| 560   | 73   | 576   | 74   | 590   | 75   | 604   | 76   | 124   | 182  | 267    | 392   | 576   | 845   |       |  |
| 620   | 77   | 634   | 78   | 649   | 79   | 665   | 80   | 126   | 184  | 271    | 397   | 583   | 856   |       |  |
| 680   | 81   | 698   | 82   | 715   | 83   | 732   | 84   | 127   | 187  | 274    | 402   | 590   | 866   |       |  |
| 750   | 85   | 768   | 86   | 787   | 87   | 806   | 88   | 129   | 189  | 270    | 407   | 597   | 876   |       |  |
| 820   | 89   | 845   | 90   | 866   | 91   | 887   | 92   | 130   | 191  | 280    | 412   | 604   | 887   |       |  |
| 910   | 93   | 931   | 94   | 953   | 95   | 976   | 96   | 132   | 193  | 284    | 417   | 612   | 898   |       |  |
|       |      |       |      |       |      |       |      | 133   | 196  | 287    | 422   | 619   | 909   |       |  |
|       |      |       |      |       |      |       |      | 135   | 198  | 291    | 427   | 626   | 920   |       |  |
|       |      |       |      |       |      |       |      | 137   | 200  | 294    | 432   | 634   | 931   |       |  |
|       |      |       |      |       |      |       |      | 138   | 203  | 298    | 437   | 642   | 942   |       |  |
|       |      |       |      |       |      |       |      | 140   | 205  | 301    | 442   | 649   | 953   |       |  |
|       |      |       |      |       |      |       |      | 142   | 208  | 305    | 448   | 657   | 965   |       |  |
|       |      |       |      |       |      |       |      | 143   | 210  | 309    | 453   | 665   | 976   |       |  |
|       |      |       |      |       |      |       |      | 145   | 213  | 312    | 459   | 673   | 988   |       |  |

\* Special E192 resistance values are supported on all case sizes of NTR series. Please review your E192 value requirements with NIC, as special terms apply, and E192 values are supplied without component resistance value marking.

### MULTIPLIER CODE

| Code       | A               | B, b            | C               | D, d            | E               | F               | G               | H               | X                | Y                | Z                |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |



## PART MARKING

- No marking on 0402 case size.
- Marking for 0603 case size:  
 E-24 values and E-96 values:  $\pm 1\%$  (F),  $\pm 0.5\%$  (D),  $\pm 0.25\%$  (C),  $\pm 0.1\%$  (B) tolerances  
 E-192 values:  $\pm 0.1\%$  (B) tolerance (No Marking)

### CODING FORMULA



Example:  $10.2k\Omega = \frac{102}{02} \times \frac{10^2}{C} \Omega = 02C$   
 $33.2 \Omega = \frac{332}{51} \times \frac{10^{-1}}{X} = 51X$

### MARKING EXAMPLES

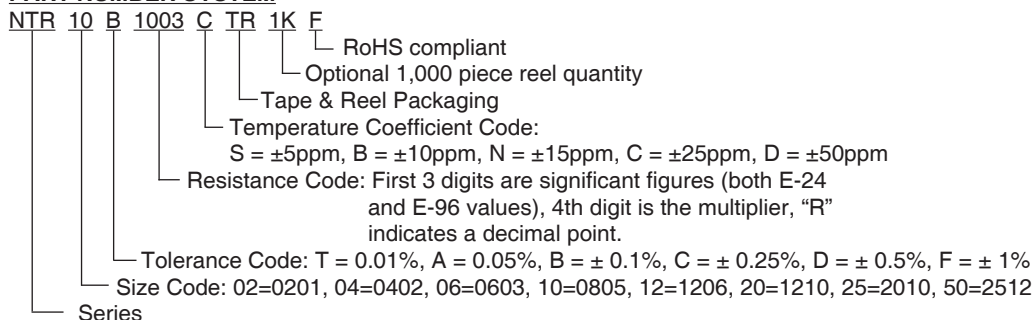
$10\Omega = 01X$   
 $7.5k\Omega = 85B$   
 $150k\Omega = 18D$   
 $1 \text{ Meg}\Omega = 01E$

- Marking for 0805, 1206, 2010 and 2512 case sizes:  
 E-24 and E-96 values -  $\pm 1\%$ (F),  $\pm 0.5\%$ (D),  $\pm 0.25\%$ (C),  $\pm 0.1\%$  (B) tolerances  
 E-192 values:  $\pm 0.1\%$  (B) tolerance (No Marking)

4 DIGIT MARKING SYSTEM - First 3 digits are the significant figures, the 4th digit is the multiplier. "R"= decimal point.

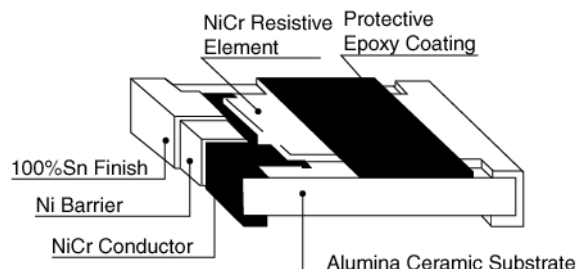
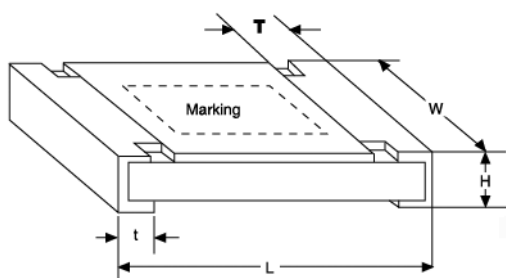
Examples: 0R10 = 0.10 ohms, 1R00 = 1.0 ohms, 22R1=22.1 ohms, 3320= 332 ohms, 4751=4.75K ohms, 1132=11.3K ohms, 6493=649K ohms

### PART NUMBER SYSTEM



## DIMENSIONS (mm)

| Type  | Power Rating | EIA Size | L           | W           | H           | T           | t           |
|-------|--------------|----------|-------------|-------------|-------------|-------------|-------------|
| NTR02 | 1/32W        | 0201     | 0.58 ± 0.05 | 0.29 ± 0.05 | 0.23 ± 0.03 | 0.12 ± 0.05 | 0.15 ± 0.05 |
| NTR04 | 1/16W        | 0402     | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.30 ± 0.05 | 0.20 ± 0.10 | 0.20 ± 0.10 |
| NTR06 | 1/16W        | 0603     | 1.55 ± 0.10 | 0.80 ± 0.10 | 0.45 ± 0.10 | 0.30 ± 0.20 | 0.30 ± 0.20 |
| NTR10 | 1/10W        | 0805     | 2.00 ± 0.15 | 1.25 ± 0.15 | 0.55 ± 0.10 | 0.30 ± 0.20 | 0.40 ± 0.25 |
| NTR12 | 1/8W         | 1206     | 3.05 ± 0.10 | 1.55 ± 0.10 | 0.55 ± 0.10 | 0.42 ± 0.20 | 0.35 ± 0.25 |
| NTR20 | 1/4W         | 1210     | 3.10 ± 0.15 | 2.40 ± 0.15 | 0.55 ± 0.10 | 0.40 ± 0.20 | 0.55 ± 0.25 |
| NTR25 | 1/4W         | 2010     | 4.90 ± 0.15 | 2.40 ± 0.15 | 0.55 ± 0.10 | 0.60 ± 0.30 | 0.50 ± 0.25 |
| NTR50 | 1/2W         | 2512     | 6.30 ± 0.15 | 3.10 ± 0.15 | 0.55 ± 0.10 | 0.60 ± 0.30 | 0.50 ± 0.25 |



## TAPING SPECIFICATIONS

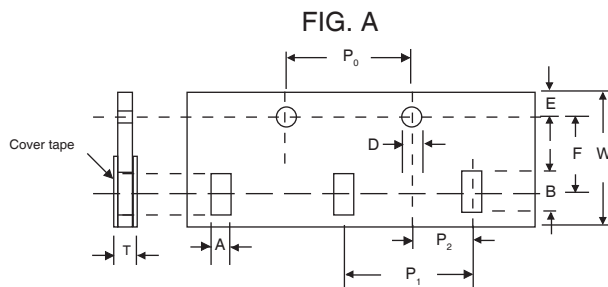
### (1) Availability

| Type  | Power Rating | EIA Size | Carrier Tape |          |            | Qty per Reel (pcs) |          |
|-------|--------------|----------|--------------|----------|------------|--------------------|----------|
|       |              |          | Fig.         | Material | Width (mm) | Standard           | Optional |
| NTR02 | 1/32W        | 0201     | A            | Paper    | 8          | 10,000             | 1,000    |
| NTR04 | 1/16W        | 0402     | A            |          |            | 10,000             | 1,000    |
| NTR06 | 1/16W        | 0603     | A            |          |            | 5,000              | 1,000    |
| NTR10 | 1/10W        | 0805     | A            |          |            |                    |          |
| NTR12 | 1/8W         | 1206     | A            |          |            |                    |          |
| NTR20 | 1/4W         | 1210     | A            |          |            | Plastic            | 12       |
| NTR25 | 1/4W         | 2010     | B            |          |            |                    |          |
| NTR50 | 1/2W         | 2512     | B            |          |            |                    |          |

### (2) PAPER TAPE DIMENSIONS (mm)

FIG. A

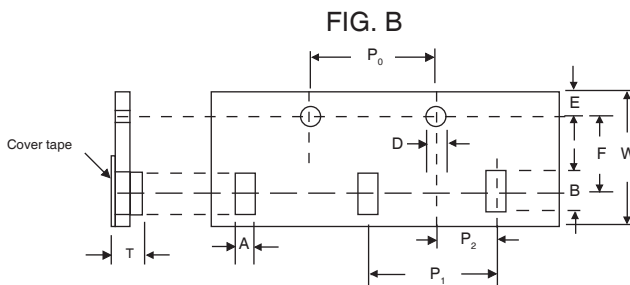
| Type  | EIA Size | A           | B           | D           | E           | F           | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | W         | T           |
|-------|----------|-------------|-------------|-------------|-------------|-------------|----------------|----------------|----------------|-----------|-------------|
| NTR02 | 0201     | 0.40 ± 0.05 | 0.70 ± 0.05 | 1.55 ± 0.05 | 1.75 ± 0.05 | 3.50 ± 0.05 | 4.0 ± 0.10     | 2.0 ± 0.05     | 2.0 ± 0.05     | 8.0 ± 0.1 | 0.42 ± 0.02 |
| NTR04 | 0402     | 0.70 ± 0.05 | 1.16 ± 0.05 |             |             |             |                | 0.40 ± 0.03    |                |           |             |
| NTR06 | 0603     | 1.10 ± 0.05 | 1.90 ± 0.05 |             |             |             |                | 0.60 ± 0.03    |                |           |             |
| NTR10 | 0805     | 1.60 ± 0.05 | 2.37 ± 0.05 |             |             |             |                | 0.75 ± 0.05    |                |           |             |
| NTR12 | 1206     | 2.00 ± 0.05 | 3.55 ± 0.05 | 1.60 ± 0.10 |             |             |                |                |                |           |             |
| NTR20 | 1210     | 2.75 ± 0.05 | 3.40 ± 0.05 |             |             |             |                |                |                |           |             |



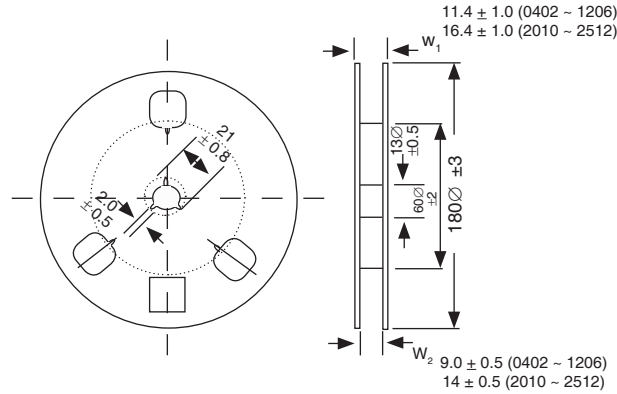
### (3) PLASTIC EMBOSSED TAPE DIMENSIONS (mm)

FIG. B

| Type  | EIA Size | A           | B           | D           | E           | F           | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | W          | T          |
|-------|----------|-------------|-------------|-------------|-------------|-------------|----------------|----------------|----------------|------------|------------|
| NTR25 | 2010     | 2.85 ± 0.10 | 5.45 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.05 | 4.0 ± 0.10     | 4.0 ± 0.05     | 2.0 ± 0.05     | 12.0 ± 0.1 | 1.0 ± 0.20 |
| NTR50 | 2512     | 3.40 ± 0.10 | 6.65 ± 0.10 |             |             |             |                |                |                |            |            |

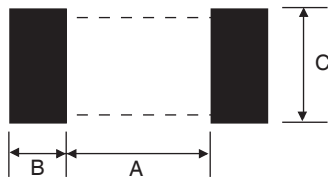


## REEL DIMENSIONS (mm)



## LAND PATTERN DIMENSIONS (mm)

| Type  | EIA Size | A    | B    | C          |
|-------|----------|------|------|------------|
| NTR02 | 0201     | 0.25 | 0.30 | 0.40 ± 0.2 |
| NTR04 | 0402     | 0.50 | 0.50 | 0.60 ± 0.2 |
| NTR06 | 0603     | 0.80 | 1.00 | 0.90 ± 0.2 |
| NTR10 | 0805     | 1.00 | 1.00 | 1.35 ± 0.2 |
| NTR12 | 1206     | 2.00 | 1.15 | 1.70 ± 0.2 |
| NTR20 | 1210     | 2.00 | 1.15 | 2.50 ± 0.2 |
| NTR25 | 2010     | 3.60 | 1.40 | 2.50 ± 0.2 |
| NTR50 | 2512     | 4.90 | 1.60 | 3.10 ± 0.2 |



## PEAK REFLOW SOLDERING CONDITIONS

