

Thick Film Chip Resistors

NRC Series

FEATURES

- EIA STANDARD SIZING 01005(1/32W), 0201(1/20W), 0402(1/16W), 0603(1/10W), 0805(1/8W), 1206(1/4W), 1210(1/3W), 2010(3/4W) AND 2512(1W)
- AEC-Q200 QUALIFIED (EXCEPT 01005 CASE SIZE)
- GLASS OVERCOAT ASSURES STRONG MECHANICAL CONSTRUCTION AND LONG LIFE, NICKEL BARRIER PREVENTS LEACHING
- BOTH FLOW SOLDER AND REFLOW SOLDERING ARE APPLICABLE
- ZERO OHM (JUMPER) CHIP AND TRIMMABLE TYPE ARE AVAILABLE *4

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 Value | Operating Temperature Range (°C) |
|----------|----------|----------------------|------------------------|-------------------------|-----------------------------|---|---------------------------|------------------|----------------------------------|
| NRC01 | 01005 | 1/32 (0.031) W | 15V | 30V | ±1% (F) | ±300 | 10 ~ 91 | E-24,E-96 | -55 ~ +125 |
| | | | | | ±1% (F) | ±200 | 100 ~ 1.62M | E-24,E-96 | |
| | | | | | ±5% (J) | +600/-200 | 1.0 ~ 9.1 | E-24 | |
| | | | | | ±5% (J) | ±300 | 10 ~ 91 | E-24 | |
| | | | | | ±5% (J) | ±200 | 100 ~ 10M | E-24 | |
| NRC02 | 0201 | 1/20 (0.05) W | 25V | 50V | ±1% (F) | +600/-200 | 1.0 ~ 9.76 | E-24,E-96 | -55 ~ +125 |
| | | | | | ±1% (F) | ±200 | 10 ~ 10M | E-24,E-96 | |
| | | | | | ±5% (J) | +600/-200 | 1.0 ~ 9.1 | E-24 | |
| | | | | | ±5% (J) | ±200 | 10 ~ 10M | E-12 | |
| NRC04 | 0402 | 1/16 (0.063) W | 50V | 100V | ±1% (F) | +500/-200 | 1.0 ~ 9.76 | E-24,E-96 | -55 ~ +155 |
| | | | | | ±1% (F) | ±100 | 10 ~ 1M | E-24,E-96 | |
| | | | | | ±1% (F) | ±300 | 1.02M ~ 10M | E-24,E-96 | |
| | | | | | ±5% (J) | ±200 | 10 ~ 1M | E-24 | |
| | | | | | ±5% (J) | ±350 | 1.0 ~ 9.1 & 1.1M ~ 10M *3 | E-24 | |
| NRC06 | 0603 | 1/10 (0.10) W | 50V | 100V | ±1% (F) | ±400 | 1.0 ~ 9.76 | E-24,E-96 | -55 ~ +155 |
| | | | | | ±1% (F) | ±100 | 33.2 ~ 1M | E-24,E-96 | |
| | | | | | ±1% (F) | ±200 | 10 ~ 32.4 & 1.1M ~ 10M *3 | E-24,E-96 | |
| | | | | | ±5% (J) | ±200 | 10 ~ 1M | E-24 | |
| | | | | | ±5% (J) | ±350 | 1.0 ~ 9.1 & 1.1M ~ 10M *3 | E-24 | |
| NRC10 | 0805 | 1/8 (0.125) W | 150V | 300V | ±1% (F) | ±400 | 1.0 ~ 9.76 | E-24,E-96 | -55 ~ +155 |
| | | | | | ±1% (F) | ±100 | 33.2 ~ 1M | E-24,E-96 | |
| | | | | | ±1% (F) | ±200 | 10 ~ 32.4 & 1.1M ~ 10M *3 | E-24,E-96 | |
| | | | | | ±5% (J) | ±200 | 10 ~ 1M | E-24 | |
| | | | | | ±5% (J) | ±350 | 1.0 ~ 9.1 & 1.1M ~ 10M *3 | E-24 | |
| NRC12 | 1206 | 1/4 (0.250) W | 200V | 400V | ±1% (F) | ±400 | 1.0 ~ 9.76 | E-24,E-96 | -55 ~ +155 |
| | | | | | ±1% (F) | ±100 | 33.2 ~ 1M | E-24,E-96 | |
| | | | | | ±1% (F) | ±200 | 10 ~ 32.4 & 1.1M ~ 10M *3 | E-24,E-96 | |
| | | | | | ±5% (J) | ±200 | 10 ~ 1M | E-24 | |
| | | | | | ±5% (J) | ±350 | 1.0 ~ 9.1 & 1.1M ~ 10M *3 | E-24 | |
| NRC25 | 1210 | 1/3 (0.33) W | 200V | 400V | ±1% (F) | ±100 | 10 ~ 1M | E-24,E-96 | -55 ~ +155 |
| | | | | | ±5% (J) | ±200 | | E-24 | |
| | | | | | ±5% (J) | ±350 | 1.0 ~ 9.1 & 1.1M ~ 10M *3 | E-24 | |
| NRC50 | 2010 | 3/4 (0.75) W | 200V | 400V | ±1% (F) | ±100 | 10 ~ 1M | E-24,E-96 | -55 ~ +155 |
| | | | | | ±5% (J) | ±250 | | E-24 | |
| | | | | | ±5% (J) | ±350 | 1.0 ~ 9.1 & 1.1M ~ 10M *3 | E-24 | |
| NRC100 | 2512 | 1W | 200V | 400V | ±1% (F) | ±100 | 10 ~ 1M | E-24,E-96 | -55 ~ +155 |
| | | | | | | ±250 | 2.0 ~ 9.76 *3 | | |
| | | | | | | ±350 | 1.0 ~ 1.96 *3 | | |
| | | | | | | ±250 | 10 ~ 1M | | |
| | | | | | | ±350 | 1.0 ~ 9.1 *3 | | |
| NRC01ZO | 01005 | Zero Ohm Jumper | | | | Rated Current 0.5A (0.05Ω max. DC Resistance) | | | -55 ~ +125 |
| NRC02ZO | 0201 | | | | | Rated Current 0.5A (0.05Ω max. DC Resistance) | | | |
| NRC04ZO | 0402 | | | | | Rated Current 1.0A (0.05Ω max. DC Resistance) | | | |
| NRC06ZO | 0603 | | | | | Rated Current 1.0A (0.05Ω max. DC Resistance) | | | |
| NRC10ZO | 0805 | | | | | Rated Current 2.0A (0.05Ω max. DC Resistance) | | | |
| NRC12ZO | 1206 | | | | | Rated Current 2.0A (0.05Ω max. DC Resistance) | | | |
| NRC25ZO | 1210 | | | | | Rated Current 2.0A (0.05Ω max. DC Resistance) | | | |
| NRC50ZO | 2010 | | | | | Rated Current 2.0A (0.05Ω max. DC Resistance) | | | |
| NRC100ZO | 2512 | | | | | Rated Current 2.0A (0.05Ω max. DC Resistance) | | | |

*Notes on page 2



Thick Film Chip Resistors

NRC Series

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

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

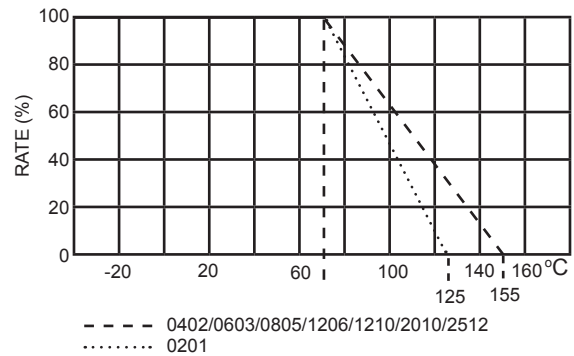
Note *2 - Maximum allowable Overload voltage is two times the Maximum Working Voltage (see Note *1 above).

Note *3 - Made to order. Contact NIC for leadtime.

Note *4 - Please contact NIC for availability of laser trimmable versions of 0805 and 1206 sizes parts.

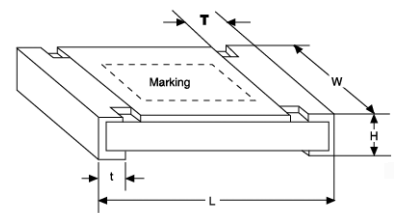
Note *5 - Please note, NIC's NRC series products are capable of meeting the following specifications: JIS-C 5202, EIAJ RC-2690, EIA575, EIA PDP-100, MIL-R-5542D and UL94V-0.

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

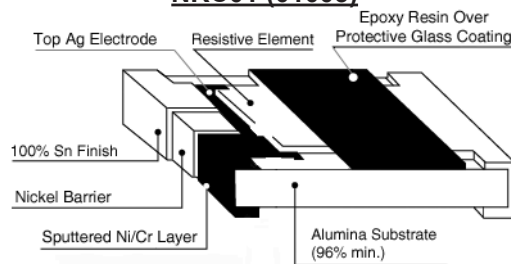


DIMENSIONS (mm)

| Type | Power Rating | EIA Size | L | W | H | T | t | |
|----------|--------------|----------|----------------|----------------|-------------|-------------|-------------|--|
| NRC01 | 1/32W | 01005 | 0.40 ± 0.02 | 0.20 ± 0.02 | 0.13 ± 0.02 | 0.10 ± 0.03 | 0.10 ± 0.03 | |
| NRC02 | 1/20W | 0201 | 0.6 ± 0.03 | 0.3 ± 0.03 | 0.25 ± 0.05 | 0.1 ± 0.05 | 0.15 ± 0.05 | |
| NRC04 | 1/16W | 0402 | 1.0 +0.1/-0.05 | 0.5 +0.1/-0.05 | 0.3 ± 0.05 | 0.2 ± 0.1 | 0.25 ± 0.1 | |
| NRC06 | 1/10W | 0603 | 1.6 ± 0.15 | 0.8 ± 0.15 | 0.45 ± 0.1 | 0.3 ± 0.15 | 0.3 ± 0.15 | |
| NRC10 | 1/8W | 0805 | 2.0 ± 0.20 | 1.25 ± 0.10 | 0.5 ± 0.10 | 0.35 ± 0.20 | 0.35 ± 0.15 | |
| NRC12 | 1/4W | 1206 | 3.1 ± 0.15 | 1.55 ± 0.15 | 0.55 ± 0.10 | 0.45 ± 0.20 | 0.35 ± 0.15 | |
| NRC25 | 1/3W | 1210 | 3.1 ± 0.15 | 2.50 ± 0.20 | 0.55 ± 0.10 | 0.50 ± 0.20 | 0.50 ± 0.25 | |
| NRC50 | 3/4W | 2010 | 5.0 ± 0.20 | 2.50 ± 0.15 | 0.60 ± 0.10 | 0.60 ± 0.20 | 0.50 ± 0.30 | |
| NRC100 | 1W | 2512 | 6.3 ± 0.20 | 3.20 ± 0.20 | 0.60 ± 0.10 | 0.70 ± 0.20 | 0.70 ± 0.30 | |
| NRC01ZO | JUMPER | 01005 | Same as NRC01 | | | | | |
| NRC02ZO | JUMPER | 0201 | Same as NRC02 | | | | | |
| NRC04ZO | JUMPER | 0402 | Same as NRC04 | | | | | |
| NRC06ZO | JUMPER | 0603 | Same as NRC06 | | | | | |
| NRC10ZO | JUMPER | 0805 | Same as NRC10 | | | | | |
| NRC12ZO | JUMPER | 1206 | Same as NRC12 | | | | | |
| NRC25ZO | JUMPER | 1210 | Same as NRC25 | | | | | |
| NRC50ZO | JUMPER | 2010 | Same as NRC50 | | | | | |
| NRC100ZO | JUMPER | 2512 | Same as NRC100 | | | | | |

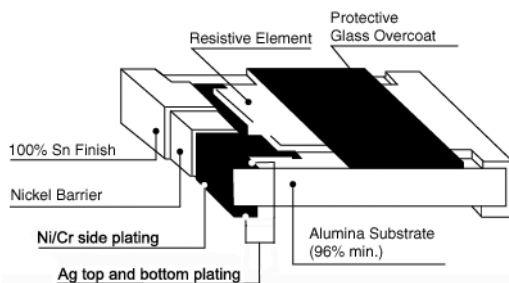


CONSTRUCTION NRC01 (01005)

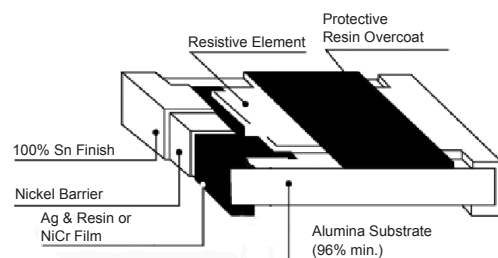


CONSTRUCTION

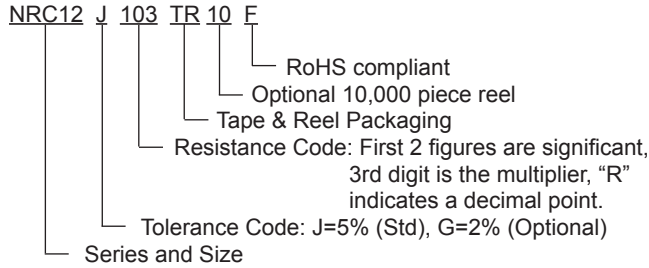
NRC02 ~ NRC12



NRC25 ~ NRC100

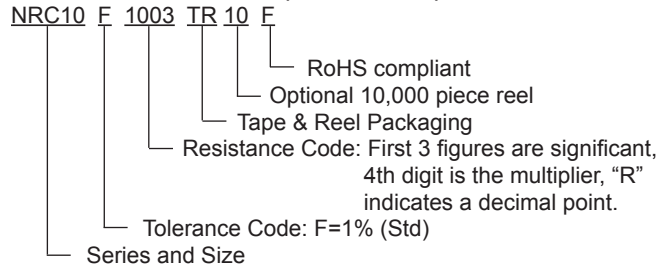


PART NUMBER SYSTEM (E-24 VALUES)



Examples of Resistance Code: 4R7 = 4.7 ohms 103 = 10K ohms
 100 = 10 ohms 104 = 100K ohms
 101 = 100 ohms 105 = 1 meg ohms
 102 = 1K ohms 106 = 10meg ohms

PART NUMBER SYSTEM (E-96 VALUES)



Examples of Resistance Code: 10R0 = 10 ohms 1004 = 1meg ohms
 47R5 = 47.5 ohms 1050 = 105 ohms
 1000 = 100 ohms 1501 = 1.5K ohms
 1001 = 1K ohms 1052 = 10.5K ohms
 1002 = 10K ohms 1153 = 115K ohms
 1003 = 100K ohms 1214 = 1.21meg ohms

Marking (No marking on 0201 and 0402 size).

1. For **E-12 & E-24** Series ($\pm 1\% = F$, $\pm 2\% = G$, $\pm 5\% = J$, (STD) Tolerance In 0603, 0805, 1206, 1210, 2010 and 2512 sizes:

3 DIGIT SYSTEM - First two digits are significant and third digit is multiplier, "R" indicates decimal on values under 10 ohms.

Examples: R10 = .10 ohms 1R0 = 1.0 ohms 102 = 1k ohms 470 = 47 ohms
 103 = 10k ohms 101 = 100 ohms 104 = 100k ohms 105 = 1 megohms

2. For **E-96** Series ($\pm 1\% - F$ Tolerance) in 0805, 1206 and 1210 sizes:

4 DIGIT SYSTEM - First 3 digits are significant and fourth digit is multiplier, "R" indicates decimal on values under 100 ohms.

Examples: 0R10 = .10 ohms 1R00 = 1.0 ohms 10R0 = 10 ohms 1003 = 100 kohms
 1000 = 100 ohms 1004 = 1 megohms 1001 = 1k ohms
 1052 = 10.5k ohms 1002 = 10k ohms 2213 = 221k ohms

3. For **E-96** Series ($\pm 1\% - F$ Tolerance) in 0603 size

3 DIGIT SYSTEM (Due to space restrictions)

STANDARD E-12, E-24, E-96 VALUES AND 0603 1% TOLERANCE RESISTANCE CODES

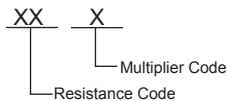
Note: 0603 1% resistor values that are exclusive to E-12 or E-24 (ex. 12K) are marked with the three character 5% tolerance code

| E-12 | | E-24 | | E-96 | | | | | | | |
|-------|--|-------|--|-------|------|-------|------|-------|------|-------|------|
| Value | | Value | | Value | Code | Value | Code | Value | Code | Value | Code |
| 10 | | 100 | | 100 | 01 | 102 | 02 | 105 | 03 | 107 | 04 |
| 12 | | 110 | | 110 | 05 | 113 | 06 | 115 | 07 | 118 | 08 |
| 15 | | 120 | | 121 | 09 | 124 | 10 | 127 | 11 | 130 | 12 |
| 18 | | 130 | | 133 | 13 | 137 | 14 | 140 | 15 | 143 | 16 |
| 22 | | 150 | | 147 | 17 | 150 | 18 | 154 | 19 | 158 | 20 |
| 27 | | 160 | | 162 | 21 | 165 | 22 | 169 | 23 | 174 | 24 |
| 33 | | 180 | | 178 | 25 | 182 | 26 | 187 | 27 | 191 | 28 |
| 39 | | 200 | | 196 | 29 | 200 | 30 | 205 | 31 | 210 | 32 |
| 47 | | 220 | | 215 | 33 | 221 | 34 | 226 | 35 | 232 | 36 |
| 56 | | 240 | | 237 | 37 | 243 | 38 | 249 | 39 | 255 | 40 |
| 68 | | 270 | | 261 | 41 | 267 | 42 | 274 | 43 | 280 | 44 |
| 82 | | 300 | | 287 | 45 | 294 | 46 | 301 | 47 | 309 | 48 |
| | | 330 | | 316 | 49 | 324 | 50 | 332 | 51 | 340 | 52 |
| | | 360 | | 348 | 53 | 357 | 54 | 365 | 55 | 374 | 56 |
| | | 390 | | 383 | 57 | 392 | 58 | 402 | 59 | 412 | 60 |
| | | 430 | | 422 | 61 | 432 | 62 | 442 | 63 | 453 | 64 |
| | | 470 | | 464 | 65 | 475 | 66 | 487 | 67 | 499 | 68 |
| | | 510 | | 511 | 69 | 523 | 70 | 536 | 71 | 549 | 72 |
| | | 560 | | 562 | 73 | 576 | 74 | 590 | 75 | 604 | 76 |
| | | 620 | | 619 | 77 | 634 | 78 | 649 | 79 | 665 | 80 |
| | | 680 | | 681 | 81 | 698 | 82 | 715 | 83 | 732 | 84 |
| | | 750 | | 750 | 85 | 768 | 86 | 787 | 87 | 806 | 88 |
| | | 820 | | 825 | 89 | 845 | 90 | 866 | 91 | 887 | 92 |
| | | 910 | | 909 | 93 | 931 | 94 | 953 | 95 | 976 | 96 |

MULTIPLIER CODE

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

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

10Ω = 01X
 7.5kΩ = 85B or 85b
 150kΩ = 18D or 18d
 1 MegΩ = 01E

0603 1% E-12/E-24 Values

160Ω = 161
 12KΩ = 123
 8.2MΩ = 825

TAPING SPECIFICATIONS

(1) Availability

| Type | Power Rating | EIA Size | Carrier Tape | | | Qty per 7" Reel | Qty per 10" Reel |
|---------|--------------|----------|--------------|----------|------------|-----------------|------------------|
| | | | Fig. | Material | Width (mm) | | |
| NRC01 | 1/32W | 01005 | A | Paper | 8 | 20,000 | N/A |
| NRC02 | 1/20W | 0201 | A | Paper | 8 | 10,000 | N/A |
| NRC04 | 1/16W | 0402 | A | Paper | 8 | 10,000 | 20,000 |
| NRC06 | 1/10W | 0603 | A | Paper | 8 | 5,000 | 10,000 |
| NRC10 | 1/8W | 0805 | A | Paper | 8 | 5,000 | 10,000 |
| NRC12 | 1/4W | 1206 | A | Paper | 8 | 5,000 | 10,000 |
| NRC25 | 1/3W | 1210 | A | Paper | 8 | 5,000 | N/A |
| NRC04ZO | Jumper | 0402 | A | Paper | 8 | 10,000 | N/A |
| NRC06ZO | Jumper | 0603 | A | Paper | 8 | 5,000 | 10,000 |
| NRC10ZO | Jumper | 0805 | A | Paper | 8 | 5,000 | 10,000 |
| NRC12ZO | Jumper | 1206 | A | Paper | 8 | 5,000 | 10,000 |
| NRC25ZO | Jumper | 1210 | A | Paper | 8 | 5,000 | N/A |

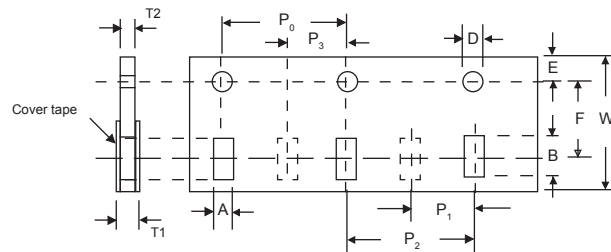


(2) PAPER TAPE DIMENSIONS (mm)

FIG. A

| Type | EIA Size | A | B | D | E | F | P ₀ | P ₁ | P ₂ | P ₃ | T ₁ | T ₂ | W |
|--------|----------|--------------|-------------|--------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|
| NRC01* | 01005 | 0.25 ± 0.05 | 0.45 ± 0.05 | 1.5 + 0.1 | 1.75 ± 0.1 | 3.5 ± 0.05 | 4.0 ± 0.1 | 2.0 ± 0.05 | N/A | 2.0 ± 0.05 | 0.39 max. | 0.31 ± 0.03 | 8.0 ± 0.2 |
| NRC02* | 0201 | 0.41 ± 0.1 | 0.71 ± 0.1 | | | | | 2.0 ± 0.1 | | 2.0 ± 0.1 | 1.0 max. | 0.5 max. | |
| NRC04* | 0402 | 0.65 ± 0.1 | 1.15 ± 0.1 | | | | | 2.0 ± 0.05 | | 2.0 ± 0.05 | | | |
| NRC06* | 0603 | 1.135 ± 0.05 | 1.95 ± 0.05 | | | | | N/A | 4.0 ± 0.05 | 4.0 ± 0.05 | 1.1 max. | 1.0 max. | |
| NRC10* | 0805 | 1.65 ± 0.2 | 2.4 ± 0.2 | | | | | | | | 1.4 max. | | |
| NRC12* | 1206 | 2.0 ± 0.2 | 3.6 ± 0.2 | | | | | | | | | | |
| NRC25* | 1210 | 2.85 ± 0.2 | 3.50 ± 0.2 | | | | | | | | | | |

* Same for JUMPER (ZO) types.

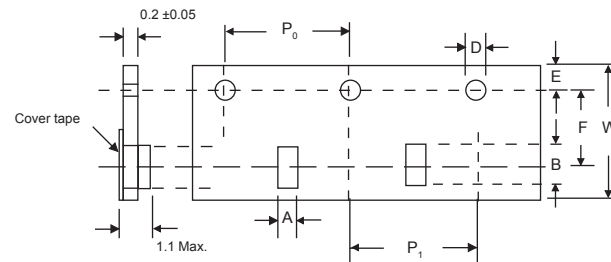


(3) EMBOSSED PLASTIC TAPE SPECIFICATION

FIG. B.

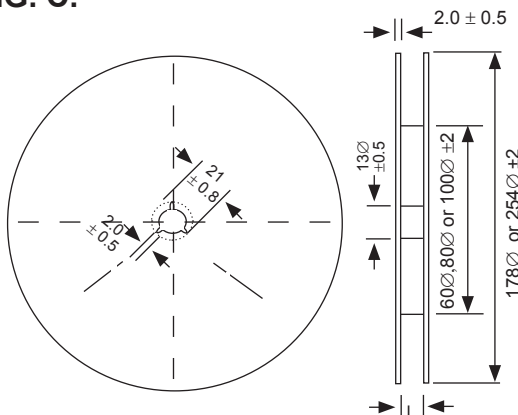
| Type | EIA Size | A | B | D | E | F | P ₀ | P ₁ | W | Qty per 7" Reel |
|---------|----------|-----------|-----------|-------------|------------|-------------|----------------|----------------|-------------|-----------------|
| NRC50* | 2010 | 2.9 ± 0.1 | 5.4 ± 0.1 | 1.50 ± 0.10 | 1.5 ± 0.10 | 5.65 ± 0.05 | 4.0 ± 0.10 | 4.0 ± 0.05 | 12.0 ± 0.10 | 4,000 |
| NRC100* | 2512 | 3.6 ± 0.1 | 6.9 ± 0.1 | | | | | | | 4,000 |

* Same for JUMPER (ZO) types.



(4) REEL SPECIFICATIONS

FIG. C.



1. Leader tape : Approximately 250 m/m (160mm for 0201 case size) leader shall be provided at each end of the tape.

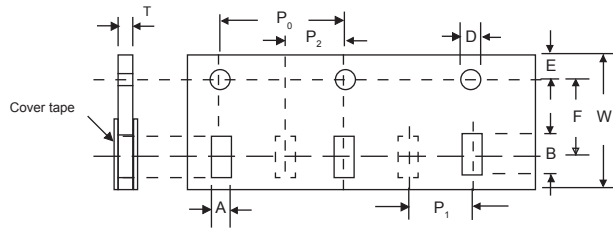
2. Accumulative tolerance of feeding hole and chip pocket shall not exceed 0.2mm over 10 pitches.

| Type | EIA Size | L (mm) |
|---------|----------|------------|
| NRC01* | 01005 | 9.0 ± 0.3 |
| NRC02* | 0201 | 10.0 ± 1.5 |
| NRC04* | 0402 | 10.0 ± 1.5 |
| NRC06* | 0603 | 10.0 ± 1.5 |
| NRC10* | 0805 | 10.0 ± 1.5 |
| NRC12* | 1206 | 10.0 ± 1.5 |
| NRC25 | 1210 | 10.0 ± 1.5 |
| NRC50 | 2010 | 13.5 ± 1.5 |
| NRC100* | 2512 | 13.5 ± 1.5 |

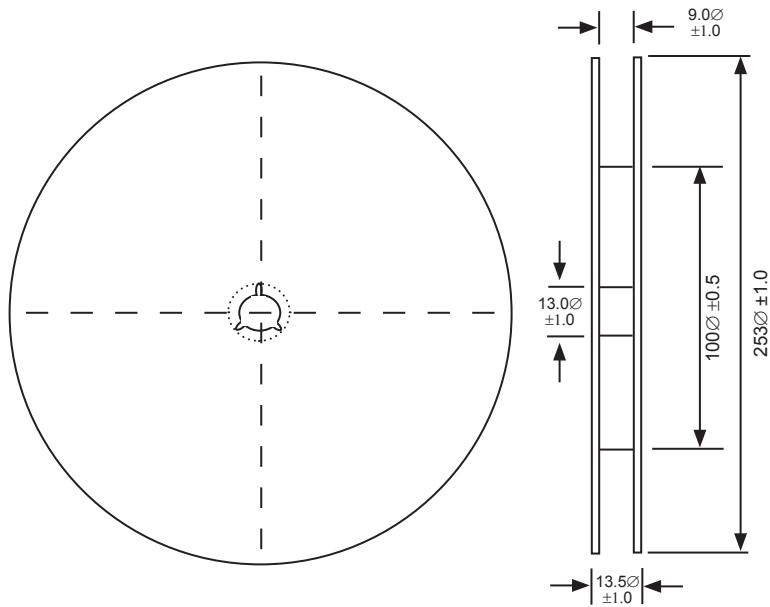
* Same for JUMPER (ZO) types.

PAPER CARRIER DIMENSIONS (mm)

| Type | EIA Size | A | B | D | E | F | P ₀ | P ₁ | P ₂ | T | W | Quantity/Reel |
|-------|----------|---------|----------|------------|----------|----------|----------------|----------------|----------------|----------|---------|---------------|
| NRC04 | 0402 | 0.7±0.5 | 1.2±0.05 | 1.5+0.1/-0 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 2.0±0.05 | 0.45±0.1 | 8.0±0.2 | 30,000 pieces |



REEL DIMENSIONS (mm)



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[NCSR250F4M50DTRGF](#) [2176089-1](#) [2176090-4](#) [2176091-3](#) [CMB02070X3000GB200](#) [CPA2512Q6R80FS-T10](#) [4-1625868-7](#) [5-1625868-9](#) [5-18022-5](#) [ERA-3EEB2671V](#) [CFR0W4J0220A2P](#) [P1206Y1804FNTA](#) [CPA2512E68R0FS-T10](#) [CPA2512Q4R70FS-T10](#) [8-2176091-9](#) [2-2176091-0](#) [NCSR150FR003DTRT3F](#) [NTR06B5832CTRF](#) [NCSR200JR002DTRF](#) [RSJ372NL](#) [NRC-S12F4751TRF](#) [8-1625868-1](#) [1-2176092-4](#) [4-2176093-9](#) [2176091-9](#) [RT1220P-101-M](#) [PLTU0805U1003LST5](#) [PLTU0603U2001LST5](#) [PLTU0805U1001LST5](#) [PLTU0603U4702LST5](#)
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