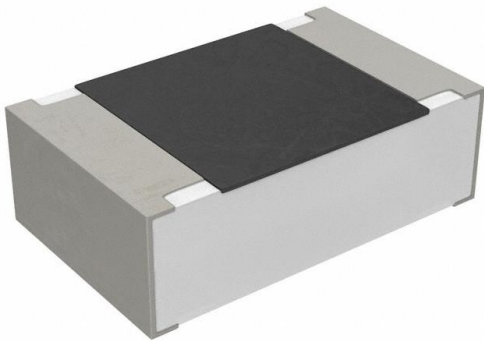


# RNCF0805DTE412R Datasheet

[www.digi-electronics.com](http://www.digi-electronics.com)



<https://www.DiGi-Electronics.com>

|                              |  |
|------------------------------|--|
| DiGi Electronics Part Number | RNCF0805DTE412R-DG   |
| Manufacturer                 | <a href="#">Stackpole Electronics Inc</a>  |
| Manufacturer Product Number  | RNCF0805DTE412R  |
| Description                  | RES SMD 412 OHM 0.5% 1/4W 0805   |
| Detailed Description         | 412 Ohms $\pm$ 0.5% 0.25W, 1/4W Chip Resistor 0805 (2012 Metric) Automotive AEC-Q200 Thin Film |

This model RNCF0805DTE412R is available at DiGi Electronics.

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## Purchase and inquiry

Manufacturer Product Number:

RNCF0805DTE412R

Series:

RNCF

Resistance:

412 Ohms

Power (Watts):

0.25W, 1/4W

Features:

Automotive AEC-Q200

Operating Temperature:

-55°C ~ 155°C

Supplier Device Package:

0805

Size / Dimension:

0.079" L x 0.049" W (2.00mm x 1.25mm)

Number of Terminations:

2

Base Product Number:

RNCF0805D

Manufacturer:

Stackpole Electronics Inc

Product Status:

Active

Tolerance:

±0.5%

Composition:

Thin Film

Temperature Coefficient:

±25ppm/°C

Package / Case:

0805 (2012 Metric)

Ratings:

AEC-Q200

Height - Seated (Max):

0.026" (0.65mm)

Failure Rate:

-

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8533.21.0030

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

# RNCF Series

## Precision Thin Film Chip Resistor

Stackpole Electronics, Inc.  
Resistive Product Solutions

### Features:

- Precision tolerances to  $\pm 0.01\%$
- TCR down to  $\pm 2 \text{ ppm}/^\circ\text{C}$
- Wide resistance value range
- RoHS compliant, REACH compliant, lead free, and halogen free
- AEC-Q200 compliant



### Electrical Specifications - Precision

| Type/Code | Power Rating <sup>(2)</sup><br>(W) @ 70°C | Maximum Working Voltage (V) <sup>(1)</sup> | Maximum Overload Voltage (V) | TCR<br>(ppm/°C) | Ohmic Range ( $\Omega$ ) and Tolerance |            |                          |       |            |    |  |
|-----------|---|--|------------------------------|-----------------|--|------------|--------------------------|-------|------------|----|--|
|           |   |  |                              |                 | 0.01%                                  | 0.05%      | 0.1%                     | 0.25% | 0.5%       | 1% |  |
| RNCF0201  | 0.05                                      | 15   | 30                           | $\pm 10$        | -                                      | 22 - 5K(*) |                          |       |            |    |  |
|           |   |  |                              | $\pm 15$        |  | 22 - 75K   |                          |       |            |    |  |
|           |   |  |                              | $\pm 25$        |  |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 50$        |  |            |                          |       |            |    |  |
| RNCF0402  | 0.063                                     | 50   | 100                          | $\pm 10$        | 12.1K - 20K                            |            | -                        |       |            |    |  |
|           |   |  |                              | $\pm 15$        | -                                      |            | 4.02 - 4.64, 261K - 511K |       |            |    |  |
|           |   |  |                              | $\pm 25$        | -                                      |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
|           | 0.1                                       | 50   | 100                          | $\pm 10$        | 49.9 - 12K                             |            | 49.9 - 100K              |       |            |    |  |
|           |   |  |                              | $\pm 15$        | -                                      |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 25$        | -                                      | 49.9 - 12K | 4.7 - 255K               |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
| RNCF0603  | 0.1                                       | 75   | 150                          | $\pm 10$        | 24.9 - 100K                            | 4.7 - 332K | 4.7 - 511K               |       |            |    |  |
|           |   |  |                              | $\pm 15$        | 24.9 - 100K                            | 4.7 - 9.88 | 1 - 9.76, 336K - 1M      |       |            |    |  |
|           |   |  |                              | $\pm 25$        | -                                      |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
|           | 0.166                                     | 100  | 150                          | $\pm 25$        | -                                      |            | 10 - 332K                |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
| RNCF0805  | 0.1                                       | 100  | 200                          | $\pm 10$        | -                                      |            | 517K - 1M                |       | -          |    |  |
|           |   |  |                              | $\pm 15$        | -                                      |            | 505K - 1M                |       | 1.02M - 2M |    |  |
|           |   |  |                              | $\pm 25$        | -                                      |            | -                        |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            | -                        |       |            |    |  |
|           | 0.125                                     | 150  | 300                          | $\pm 10$        | 24.9 - 200K                            | 4.7 - 511K | 4.7 - 1M                 |       |            |    |  |
|           |   |  |                              | $\pm 15$        | 24.9 - 200K                            | 4.7 - 9.88 | 1 - 9.76, 505K - 1M      |       |            |    |  |
|           |   |  |                              | $\pm 25$        | -                                      |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
|           | 0.25                                      | 150  | 300                          | $\pm 25$        | -                                      |            | 10 - 499K                |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
| RNCF1206  | 0.125                                     | 150  | 300                          | $\pm 10$        | -                                      |            | 1.02M - 1.5M             |       |            |    |  |
|           |   |  |                              | $\pm 15$        | -                                      |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 25$        | -                                      |            | 1.02M - 2.5M             |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
|           | 0.25                                      | 200  | 400                          | $\pm 10$        | 24.9 - 499K                            | 4.7 - 1M   |                          |       |            |    |  |
|           |   |  |                              | $\pm 15$        | 24.9 - 499K                            | 1 - 9.76   |                          |       |            |    |  |
|           |   |  |                              | $\pm 25$        | -                                      |            |                          |       |            |    |  |
|           |   |  |                              | $\pm 50$        | -                                      |            |                          |       |            |    |  |
| 0.33      | 200                                       | 400  | $\pm 25$                     | -               |  | 4.7 - 1M   |                          |       |            |    |  |
|           |   |  | $\pm 50$                     | -               |  |            |                          |       |            |    |  |

(\*) Subject to higher MOQ.

(1) Lesser of  $\sqrt{P \cdot R}$  or maximum working voltage.

(2) For lower power ratings, contact Stackpole.

## Electrical Specifications - Precision (cont.)

| Type/Code | Power Rating <sup>(2)</sup><br>(W) @ 70°C | Maximum Working Voltage (V) <sup>(1)</sup> | Maximum Overload Voltage (V) | TCR<br>(ppm/°C) | Ohmic Range (Ω) and Tolerance |            |              |          |      |    |
|-----------|---|--|------------------------------|-----------------|-------------------------------|------------|--------------|----------|------|----|
|           |   |  |                              |                 | 0.01%                         | 0.05%      | 0.1%         | 0.25%    | 0.5% | 1% |
| RNCF1210  | 0.25                                      | 150  | 300                          | ±25             | -                             |            | 1.02M - 2.5M |          |      |    |
|           |   |  |                              | ±50             |                               |            |              |          |      |    |
|           | 0.33                                      | 200  | 400                          | ±10             | 24.9 - 499K                   | 4.7 - 1M   |              |          |      |    |
|           |   |  |                              | ±15             |                               |            |              |          |      |    |
|           |   |  |                              | ±25             | 24.9 - 499K                   | 1 - 1M     |              |          |      |    |
| ±50       |   |  |                              |                 |                               |            |              |          |      |    |
| RNCF2010  | 0.25                                      | 150  | 300                          | ±25             | -                             |            | 1.02M - 3M   |          |      |    |
|           |   |  |                              | ±50             |                               |            |              |          |      |    |
|           | 0.33                                      | 200  | 400                          | ±10             | 24.9 - 499K                   | 4.7 - 1M   |              |          |      |    |
|           |   |  |                              | ±15             |                               |            |              |          |      |    |
|           |   |  |                              | ±25             | 24.9 - 499K                   | 1 - 1M     |              |          |      |    |
| ±50       |   |  |                              |                 |                               |            |              |          |      |    |
| RNCF2512  | 0.5                                       | 150  | 300                          | ±10             | 2.05K - 499K                  | 2.05K - 1M |              |          |      |    |
|           |   |  |                              | ±15             |                               |            |              |          |      |    |
|           |   |  |                              | ±25             | -                             | 2.05K - 1M | 2.05K - 3M   |          |      |    |
|           |   |  |                              | ±50             |                               |            |              |          |      |    |
|           | 0.75                                      | 200  | 400                          | ±10             | 24.9 - 2K                     | 4.7 - 2K   | 4.7 - 2K     | 1 - 2K   |      |    |
|           |   |  |                              | ±15             |                               |            |              |          |      |    |
|           |   |  |                              | ±25             | 24.9 - 2K                     | 4.7 - 2K   | 101 - 2K     | 101 - 2K |      |    |
|           |   |  |                              | ±50             |                               |            |              |          |      |    |
|           | 1   | 200  | 400                          | ±25             | -                             |            | 4.7 - 100    | 1 - 100  |      |    |
| ±50       |   |  |                              |                 |                               |            |              |          |      |    |

(1) Lesser of  $\sqrt{P \cdot R}$  or maximum working voltage.

(2) For lower power ratings, contact Stackpole.

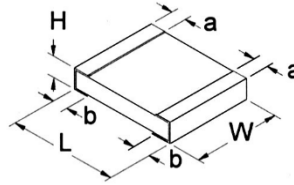
## Electrical Specifications - Ultra-Precision

| Type/Code | Power Rating <sup>(2)</sup><br>(W) @ 70°C | Maximum Working Voltage (V) <sup>(1)</sup> | Maximum Overload Voltage (V) | TCR<br>(ppm/°C) | Ohmic Range (Ω) and Tolerance |       |      |       |      |    |
|-----------|---|--|------------------------------|-----------------|-------------------------------|-------|------|-------|------|----|
|           |   |  |                              |                 | 0.01%                         | 0.05% | 0.1% | 0.25% | 0.5% | 1% |
| RNCF0402  | 0.1                                       | 50   | 100                          | ±2              | 49.9 - 4.99K                  |       | -    |       |      |    |
|           |   |  |                              | ±5              | 49.9 - 20K                    |       |      |       |      |    |
| RNCF0603  | 0.1                                       | 75   | 150                          | ±2              | 24.9 - 15K                    |       | -    |       |      |    |
|           |   |  |                              | ±5              | 24.9 - 59K                    |       |      |       |      |    |
| RNCF0805  | 0.125                                     | 150  | 300                          | ±2              | 24.9 - 30K                    |       | -    |       |      |    |
|           |   |  |                              | ±5              | 24.9 - 150K                   |       |      |       |      |    |
| RNCF1206  | 0.25                                      | 200  | 400                          | ±2              | 24.9 - 49.9K                  |       | -    |       |      |    |
|           |   |  |                              | ±5              | 24.9 - 300K                   |       |      |       |      |    |
| RNCF1210  | 0.33                                      | 200  | 400                          | ±2              | 24.9 - 49.9K                  |       | -    |       |      |    |
|           |   |  |                              | ±5              | 24.9 - 300K                   |       |      |       |      |    |
| RNCF2010  | 0.25                                      | 150  | 300                          | ±2              | 51K - 100K                    |       | -    |       |      |    |
|           | 0.33                                      | 200  | 400                          | ±2              | 24.9 - 49.9K                  |       | -    |       |      |    |
| ±5        |   |  |                              | 24.9 - 300K     |                               |       |      |       |      |    |
| RNCF2512  | 0.5                                       | 150  | 300                          | ±2              | 24.9 - 100K                   |       | -    |       |      |    |
|           |   |  |                              | ±5              | 24.9 - 300K                   |       |      |       |      |    |

(1) Lesser of  $\sqrt{P \cdot R}$  or maximum working voltage.

(2) For lower power ratings, contact Stackpole.

**Mechanical Specifications**



| Type/Code | Weight (mg) (ref.) | L<br>Body Length | W<br>Body Width | H<br>Body Height | a<br>Top Termination | b<br>Bottom Termination | Unit   |
|-----------|--------------------|------------------|-----------------|------------------|----------------------|-------------------------|--------|
| RNCF0201  | 0.17               | 0.023 ± 0.003    | 0.011 ± 0.002   | 0.009 ± 0.002    | 0.005 ± 0.002        | 0.006 ± 0.002           | inches |
|           |                    | 0.58 ± 0.07      | 0.29 ± 0.06     | 0.23 ± 0.05      | 0.12 ± 0.05          | 0.15 ± 0.05             | mm     |
| RNCF0402  | 0.54               | 0.039 ± 0.002    | 0.020 ± 0.002   | 0.012 ± 0.002    | 0.008 ± 0.004        | 0.008 ± 0.004           | inches |
|           |                    | 1.00 ± 0.05      | 0.50 ± 0.05     | 0.30 ± 0.05      | 0.20 ± 0.10          | 0.20 ± 0.10             | mm     |
| RNCF0603  | 1.8                | 0.061 ± 0.004    | 0.031 ± 0.004   | 0.018 ± 0.004    | 0.012 ± 0.008        | 0.012 ± 0.008           | inches |
|           |                    | 1.55 ± 0.10      | 0.80 ± 0.10     | 0.45 ± 0.10      | 0.30 ± 0.20          | 0.30 ± 0.20             | mm     |
| RNCF0805  | 4.7                | 0.079 ± 0.006    | 0.049 ± 0.006   | 0.022 ± 0.004    | 0.012 ± 0.008        | 0.016 ± 0.008           | inches |
|           |                    | 2.00 ± 0.15      | 1.25 ± 0.15     | 0.55 ± 0.10      | 0.30 ± 0.20          | 0.40 ± 0.20             | mm     |
| RNCF1206  | 8.6                | 0.120 ± 0.006    | 0.061 ± 0.006   | 0.022 ± 0.004    | 0.017 ± 0.008        | 0.014 ± 0.010           | inches |
|           |                    | 3.05 ± 0.15      | 1.55 ± 0.15     | 0.55 ± 0.10      | 0.42 ± 0.20          | 0.35 ± 0.25             | mm     |
| RNCF1210  | 10.0               | 0.122 ± 0.006    | 0.094 ± 0.006   | 0.022 ± 0.004    | 0.016 ± 0.008        | 0.022 ± 0.010           | inches |
|           |                    | 3.10 ± 0.15      | 2.40 ± 0.15     | 0.55 ± 0.10      | 0.40 ± 0.20          | 0.55 ± 0.25             | mm     |
| RNCF2010  | 23.6               | 0.193 ± 0.006    | 0.094 ± 0.006   | 0.022 ± 0.004    | 0.024 ± 0.012        | 0.020 ± 0.010           | inches |
|           |                    | 4.90 ± 0.15      | 2.40 ± 0.15     | 0.55 ± 0.10      | 0.60 ± 0.30          | 0.50 ± 0.25             | mm     |
| RNCF2512  | 38.1               | 0.248 ± 0.006    | 0.122 ± 0.006   | 0.022 ± 0.004    | 0.024 ± 0.012        | 0.020 ± 0.010           | inches |
|           |                    | 6.30 ± 0.15      | 3.10 ± 0.15     | 0.55 ± 0.10      | 0.60 ± 0.30          | 0.50 ± 0.25             | mm     |

**Performance Characteristics**

| Test   | Test Method             | Test Specification                     |                    | Test Condition  |
|--|-------------------------|--|--------------------|---|
|  |                         | Tol. ≤ 0.05%                           | Tol. > 0.05%       |   |
| Temperature coefficient of Resistance (T.C.R.) | MIL-STD-202 Method 304  | As specified.                          |                    | +25 / -55 / +25 / +125 / +25°C  |
| Short Time Overload                            | JIS-C-5201-1 4.13       | ΔR ± 0.05%                             | ΔR ± 0.1%          | RCWV * 2.5 or Max. overload voltage whichever is lower for 5 seconds                |
|  |                         | ΔR ± 0.5% for 0201 > 0.1%              | ΔR ± 0.2% for 0201 |   |
| Insulation Resistance                          | MIL-STD-202 Method 302  | > 9999MΩ                               |                    | Apply 100 V <sub>DC</sub> for 1 minute  |
| Endurance                                      | MIL-STD-202 Method 108A | ΔR ± 0.05%                             | ΔR ± 0.2%          | 70 ± 2°C, RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF"                |
|  |                         | ΔR ± 0.5% for high power rating        |                    |   |
|  |                         | 0201: ΔR ± 0.5%                        |                    |   |
| Damp Heat with Load                            | MIL-STD-202 Method 103B | ΔR ± 0.05%                             | ΔR ± 0.3%          | 40 ± 2°C, 90 ~ 95% R.H. RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF"  |
|  |                         | ΔR ± 0.5% for high power rating & 0201 |                    |   |
| Bending Strength                               | JIS-C-5201-1 4.33       | ΔR ± 0.05%                             | ΔR ± 0.1%          | Bending amplitude for 10 seconds.<br>2010 and 2512 sizes: 2 mm<br>Other sizes: 3 mm |
|  |                         | ΔR ± 0.5% for 0201 > 0.1%              |                    |   |
| Solderability                                  | MIL-STD-202 Method 208H | 95% min. coverage                      |                    | 245 ± 5°C for 3 seconds   |
| Resistance to Soldering Heat                   | MIL-STD-202 Method 210E | ΔR ± 0.05%                             | ΔR ± 0.1%          | 260 ± 5°C for 10 seconds  |
|  |                         | ΔR ± 0.5% for 0201 > 0.1%              |                    |   |

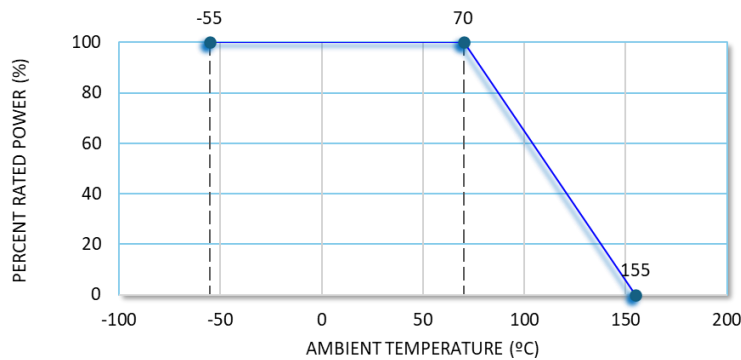
| Performance Characteristics (cont.) |                        |   |   |
|-------------------------------------|------------------------|---|---|
| Dielectric Withstand Voltage        | MIL-STD-202 Method 301 | by type   | Max. overload voltage for 1 minute  |
| High Temperature Exposure           | MIL-STD-202 Method 108 | $\Delta R \pm 0.5\%$  | +155°C for 1000 hours   |
| Temperature Cycling                 | JESD22 Method JA-104   | $\Delta R \pm 0.2\%$ for 0402~2512<br>$\Delta R \pm 0.5\%$ for 0201 | -55 to +125°C, 1000 cycles  |
| ESD                                 | AEC-Q200-002           | $\Delta R \pm 0.5\%$ (0201 excluded)                                | Human body model<br>0402, 0603: 200 V<br>0805, 1206: 1000 V<br>1210, 2010, 2512: 2000 V |

RCWV (Rated Continuous Working Voltage) =  $\sqrt{P \cdot R}$  or Max. Operating Voltage, whichever is lower

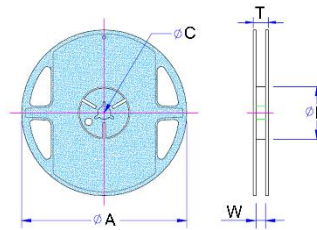
Recommended storage conditions is 60 to 82°F. Humidity < 80% R.H.

Operating temperature range is -55 to +155°C

**Power Derating Curve:**



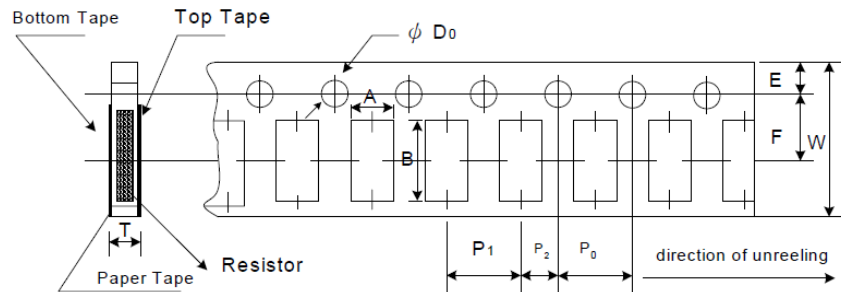
**Reel Specifications**



| Type/Code | A             | B             | C             | W             | T             | Unit   |
|-----------|---------------|---------------|---------------|---------------|---------------|--------|
| RNCF0201  | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.039 | 0.453 ± 0.039 | inches |
|           | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 9.50 ± 1.00   | 11.50 ± 1.00  | mm     |
| RNCF0402  | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.039 | 0.453 ± 0.039 | inches |
|           | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 9.50 ± 1.00   | 11.50 ± 1.00  | mm     |
| RNCF0603  | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.039 | 0.453 ± 0.039 | inches |
|           | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 9.50 ± 1.00   | 11.50 ± 1.00  | mm     |
| RNCF0805  | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.039 | 0.453 ± 0.039 | inches |
|           | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 9.50 ± 1.00   | 11.50 ± 1.00  | mm     |
| RNCF1206  | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.039 | 0.453 ± 0.039 | inches |
|           | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 9.50 ± 1.00   | 11.50 ± 1.00  | mm     |
| RNCF1210  | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.039 | 0.453 ± 0.039 | inches |
|           | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 9.50 ± 1.00   | 11.50 ± 1.00  | mm     |

| Reel Specifications (cont.) |               |               |               |               |               |        |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|--------|
| RNCF2010                    | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.531 ± 0.039 | 0.610 ± 0.039 | inches |
|                             | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 13.50 ± 1.00  | 15.50 ± 1.00  | mm     |
| RNCF2512                    | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.531 ± 0.039 | 0.610 ± 0.039 | inches |
|                             | 178.00 ± 1.00 | 60.00 ± 1.00  | 13.50 ± 0.70  | 13.50 ± 1.00  | 15.50 ± 1.00  | mm     |

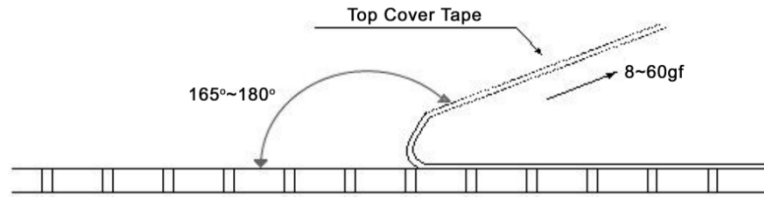
**Packaging Specifications - Paper Tape**



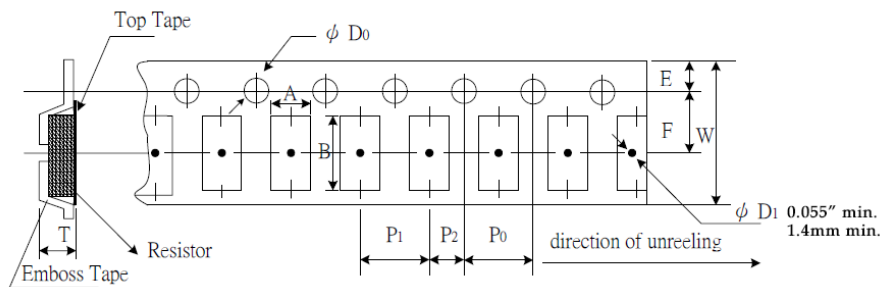
| Type/Code | A             | B             | W             | E             | F             | Unit   |
|-----------|---------------|---------------|---------------|---------------|---------------|--------|
| RNCF0201  | 0.016 ± 0.002 | 0.028 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.002 | 0.138 ± 0.002 | inches |
|           | 0.40 ± 0.05   | 0.70 ± 0.05   | 8.00 ± 0.10   | 1.75 ± 0.05   | 3.50 ± 0.05   | mm     |
| RNCF0402  | 0.028 ± 0.002 | 0.046 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.002 | 0.138 ± 0.002 | inches |
|           | 0.70 ± 0.05   | 1.16 ± 0.05   | 8.00 ± 0.10   | 1.75 ± 0.05   | 3.50 ± 0.05   | mm     |
| RNCF0603  | 0.043 ± 0.002 | 0.075 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.002 | 0.138 ± 0.002 | inches |
|           | 1.10 ± 0.05   | 1.90 ± 0.05   | 8.00 ± 0.10   | 1.75 ± 0.05   | 3.50 ± 0.05   | mm     |
| RNCF0805  | 0.063 ± 0.002 | 0.093 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.020 | 0.138 ± 0.002 | inches |
|           | 1.60 ± 0.05   | 2.37 ± 0.05   | 8.00 ± 0.10   | 1.75 ± 0.50   | 3.50 ± 0.05   | mm     |
| RNCF1206  | 0.079 ± 0.002 | 0.140 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.002 | 0.138 ± 0.002 | inches |
|           | 2.00 ± 0.05   | 3.55 ± 0.05   | 8.00 ± 0.10   | 1.75 ± 0.05   | 3.50 ± 0.05   | mm     |
| RNCF1210  | 0.108 ± 0.002 | 0.134 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.002 | 0.138 ± 0.002 | inches |
|           | 2.75 ± 0.05   | 3.40 ± 0.05   | 8.00 ± 0.10   | 1.75 ± 0.05   | 3.50 ± 0.05   | mm     |
| Type/Code | P0            | P1            | P2            | D0            | T             | Unit   |
| RNCF0201  | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.079 ± 0.002 | 0.061 ± 0.001 | 0.017 ± 0.001 | inches |
|           | 4.00 ± 0.10   | 2.00 ± 0.05   | 2.00 ± 0.05   | 1.55 ± 0.03   | 0.42 ± 0.02   | mm     |
| RNCF0402  | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.079 ± 0.002 | 0.061 ± 0.002 | 0.016 ± 0.001 | inches |
|           | 4.00 ± 0.10   | 2.00 ± 0.05   | 2.00 ± 0.05   | 1.55 ± 0.05   | 0.40 ± 0.03   | mm     |
| RNCF0603  | 0.157 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.061 ± 0.002 | 0.024 ± 0.001 | inches |
|           | 4.00 ± 0.10   | 4.00 ± 0.10   | 2.00 ± 0.05   | 1.55 ± 0.05   | 0.60 ± 0.03   | mm     |
| RNCF0805  | 0.157 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.061 ± 0.002 | 0.030 ± 0.002 | inches |
|           | 4.00 ± 0.10   | 4.00 ± 0.10   | 2.00 ± 0.05   | 1.55 ± 0.05   | 0.75 ± 0.05   | mm     |
| RNCF1206  | 0.157 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.061 ± 0.002 | 0.030 ± 0.002 | inches |
|           | 4.00 ± 0.10   | 4.00 ± 0.10   | 2.00 ± 0.05   | 1.55 ± 0.05   | 0.75 ± 0.05   | mm     |
| RNCF1210  | 0.157 ± 0.002 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.063 ± 0.004 | 0.030 ± 0.002 | inches |
|           | 4.00 ± 0.05   | 4.00 ± 0.10   | 2.00 ± 0.05   | 1.60 ± 0.10   | 0.75 ± 0.05   | mm     |

### Peel Force of Top Cover Tape

The peel speed shall be about 300 mm/minute  $\pm$  5%  
The peel force of top cover tape shall be between 8 to 60 gf



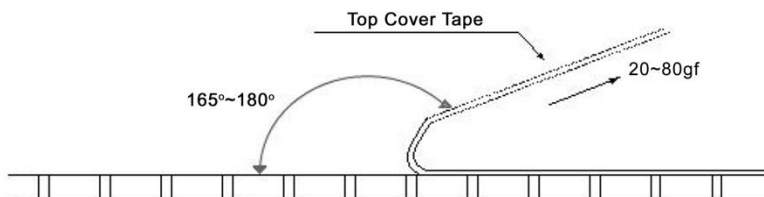
### Packaging Specifications - Plastic Tape



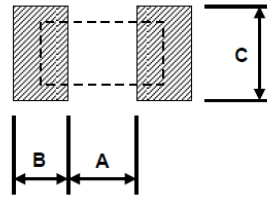
| Type/Code | A                 | B                 | W                 | E                 | F                 | Unit   |
|-----------|-------------------|-------------------|-------------------|-------------------|-------------------|--------|
| RNCF2010  | 0.112 $\pm$ 0.004 | 0.215 $\pm$ 0.004 | 0.472 $\pm$ 0.004 | 0.069 $\pm$ 0.004 | 0.217 $\pm$ 0.002 | inches |
|           | 2.85 $\pm$ 0.10   | 5.45 $\pm$ 0.10   | 12.00 $\pm$ 0.10  | 1.75 $\pm$ 0.10   | 5.50 $\pm$ 0.05   | mm     |
| RNCF2512  | 0.134 $\pm$ 0.004 | 0.262 $\pm$ 0.004 | 0.472 $\pm$ 0.004 | 0.069 $\pm$ 0.004 | 0.217 $\pm$ 0.002 | inches |
|           | 3.40 $\pm$ 0.10   | 6.65 $\pm$ 0.10   | 12.00 $\pm$ 0.10  | 1.75 $\pm$ 0.10   | 5.50 $\pm$ 0.05   | mm     |
| Type/Code | P0                | P1                | P2                | D0                | T                 | Unit   |
| RNCF2010  | 0.157 $\pm$ 0.002 | 0.157 $\pm$ 0.004 | 0.079 $\pm$ 0.002 | 0.059 $\pm$ 0.004 | 0.039 $\pm$ 0.008 | inches |
|           | 4.00 $\pm$ 0.05   | 4.00 $\pm$ 0.10   | 2.00 $\pm$ 0.05   | 1.50 $\pm$ 0.10   | 1.00 $\pm$ 0.20   | mm     |
| RNCF2512  | 0.157 $\pm$ 0.002 | 0.157 $\pm$ 0.004 | 0.079 $\pm$ 0.002 | 0.059 $\pm$ 0.004 | 0.039 $\pm$ 0.008 | inches |
|           | 4.00 $\pm$ 0.05   | 4.00 $\pm$ 0.10   | 2.00 $\pm$ 0.05   | 1.50 $\pm$ 0.10   | 1.00 $\pm$ 0.20   | mm     |

### Peel Force of Top Cover Tape

The peel speed shall be about 300 mm/minute  $\pm$  5%  
The peel force of top cover tape shall be between 20 to 80 gf



**Recommended Pad Layout**



| Type/Code | A     | B     | C             | Unit   |
|-----------|-------|-------|---------------|--------|
| RNCF0201  | 0.010 | 0.012 | 0.016 ± 0.008 | inches |
|           | 0.25  | 0.30  | 0.40 ± 0.20   | mm     |
| RNCF0402  | 0.020 | 0.020 | 0.024 ± 0.008 | inches |
|           | 0.50  | 0.50  | 0.60 ± 0.20   | mm     |
| RNCF0603  | 0.031 | 0.039 | 0.035 ± 0.008 | inches |
|           | 0.80  | 1.00  | 0.90 ± 0.20   | mm     |
| RNCF0805  | 0.039 | 0.039 | 0.053 ± 0.008 | inches |
|           | 1.00  | 1.00  | 1.35 ± 0.20   | mm     |
| RNCF1206  | 0.079 | 0.045 | 0.067 ± 0.008 | inches |
|           | 2.00  | 1.15  | 1.70 ± 0.20   | mm     |
| RNCF1210  | 0.079 | 0.045 | 0.098 ± 0.008 | inches |
|           | 2.00  | 1.15  | 2.50 ± 0.20   | mm     |
| RNCF2010  | 0.142 | 0.055 | 0.098 ± 0.008 | inches |
|           | 3.60  | 1.40  | 2.50 ± 0.20   | mm     |
| RNCF2512  | 0.193 | 0.063 | 0.122 ± 0.008 | inches |
|           | 4.90  | 1.60  | 3.10 ± 0.20   | mm     |

**Recommended Solder Profile**

This information is intended as a reference for solder profiles for Stackpole resistive components. These profiles should be compatible with most soldering processes. These are only recommendations. Actual numbers will depend on board density, geometry, packages used, etc., especially those cells labeled with “\*\*”.

**100% Matte Tin / RoHS Compliant Terminations**

Soldering iron recommended temperatures: 330 to 350°C with minimum duration.  
Maximum number of reflow cycles is 3.

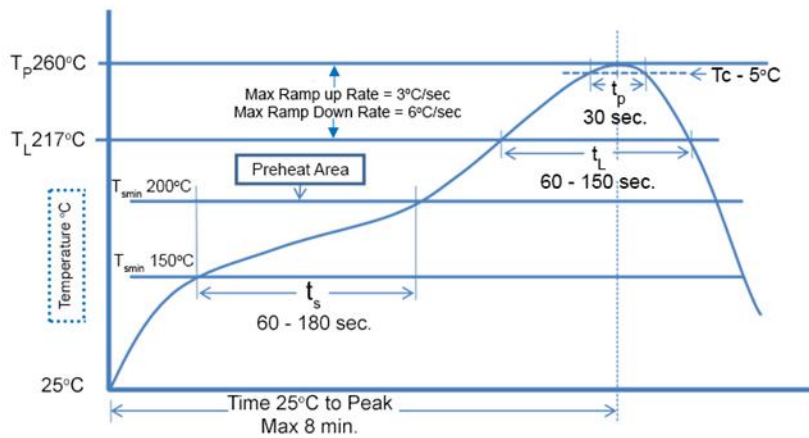
**Wave Soldering**

| Description       | Maximum    | Recommended | Minimum    |
|-------------------|------------|-------------|------------|
| Preheat Time      | 80 seconds | 70 seconds  | 60 seconds |
| Temperature Diff. | 140°C      | 120°C       | 100°C      |
| Solder Temp.      | 260°C      | 250°C       | 240°C      |
| Dwell Time at Max | 10 seconds | 5 seconds   | *          |
| Ramp DN (°C/sec)  | N/A        | N/A         | N/A        |

Temperature Diff. = Difference between final preheat stage and soldering stage.

| Convection IR Reflow |             |             |            |
|----------------------|-------------|-------------|------------|
| Description          | Maximum     | Recommended | Minimum    |
| Ramp Up (°C/sec)     | 3°C/sec     | 2°C/sec     | *          |
| Dwell Time > 217°C   | 150 seconds | 90 seconds  | 60 seconds |
| Solder Temp.         | 260°C       | 245°C       | *          |
| Dwell Time at Max.   | 30 seconds  | 15 seconds  | 10 seconds |
| Ramp DN (°C/sec)     | 6°C/sec     | 3°C/sec     | *          |

**Recommended Resistor Reflow Profile**

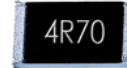


| Profile Feature   | Pb-Free Assembly |
|---|------------------|
| Preheat:  |                  |
| Min. temperature (Tsmmin)   | 150°C            |
| Max. temperature (Tsmmax)   | 200°C            |
| Preheating time (ts) from Tsmmin to Tsmmax                            | 60 - 120 seconds |
| Ramp-up rate (TL to TP)   | 3°C/second max   |
| Liquidous temperature (TL)  | 217°C            |
| Time (tL) maintained above TL   | 60 - 150 seconds |
| Min. peak temperature (Tp min)  | 235°C            |
| Max. peak temperature (Tp max)  | 260°C            |
| Time (tp) within 5°C of the specified classification temperature (Tc) | 30 seconds max.  |
| Ramp-down rate (TL to TP)   | 6°C/second max.  |
| Time 25°C to peak temperature   | 8 minutes max.   |

**Part Marking**

**E96 and E24 Values 0805-2512**

The nominal resistance is marked on the surface of the overcoating with the use of **four character markings**. Values below 100Ω will use "R" as the decimal holder.



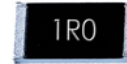
4.7 Ω



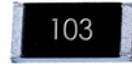
1.21 KΩ

**E24 Values 0603**

The nominal resistance is marked on the surface of the overcoating with the use of **three character markings**. Values below 10Ω will use "R" as the decimal holder.



1 Ω



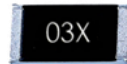
10 KΩ

**E96 Values for 0603**

A two character number is assigned to each standard R-Value (E96) as shown in the chart below.

This is followed by one alpha character which is used as a multiplier.

Each letter from "Y" - "F" represents a specific multiplier.



10.5 Ω

| Alpha Character = Multiplier |             |
|------------------------------|-------------|
| Y = 0.1                      | C = 1000    |
| X = 1                        | D = 10000   |
| A = 10                       | E = 100000  |
| B = 100                      | F = 1000000 |

| Chip Marking | Value                 |
|--------------|-----------------------|
| 01B =        | 10.0 x 100 = 1 KΩ     |
| 25C =        | 17.8 x 1000 = 17.8 KΩ |
| 93D =        | 90.9 x 10000 = 909 KΩ |

**E96**

| #  | R-Value | #  | R-Value | #  | R-Value | #  | R-Value | #  | R-Value | #  | R-Value |
|----|---------|----|---------|----|---------|----|---------|----|---------|----|---------|
| 01 | 10.0    | 17 | 14.7    | 33 | 21.5    | 49 | 31.6    | 65 | 46.4    | 81 | 68.1    |
| 02 | 10.2    | 18 | 15.0    | 34 | 22.1    | 50 | 32.4    | 66 | 47.5    | 82 | 69.8    |
| 03 | 10.5    | 19 | 15.4    | 35 | 22.6    | 51 | 33.2    | 67 | 48.7    | 83 | 71.5    |
| 04 | 10.7    | 20 | 15.8    | 36 | 23.2    | 52 | 34.0    | 68 | 49.9    | 84 | 73.2    |
| 05 | 11.0    | 21 | 16.2    | 37 | 23.7    | 53 | 34.8    | 69 | 51.1    | 85 | 75.0    |
| 06 | 11.3    | 22 | 16.5    | 38 | 24.3    | 54 | 35.7    | 70 | 52.3    | 86 | 76.8    |
| 07 | 11.5    | 23 | 16.9    | 39 | 24.9    | 55 | 36.5    | 71 | 53.6    | 87 | 78.7    |
| 08 | 11.8    | 24 | 17.4    | 40 | 25.5    | 56 | 37.4    | 72 | 54.9    | 88 | 80.6    |
| 09 | 12.1    | 25 | 17.8    | 41 | 26.1    | 57 | 38.3    | 73 | 56.2    | 89 | 82.5    |
| 10 | 12.4    | 26 | 18.2    | 42 | 26.7    | 58 | 39.2    | 74 | 57.6    | 90 | 84.5    |
| 11 | 12.7    | 27 | 18.7    | 43 | 27.4    | 59 | 40.2    | 75 | 59.0    | 91 | 86.6    |
| 12 | 13.0    | 28 | 19.1    | 44 | 28.0    | 60 | 41.2    | 76 | 60.4    | 92 | 88.7    |
| 13 | 13.3    | 29 | 19.6    | 45 | 28.7    | 61 | 42.2    | 77 | 61.9    | 93 | 90.9    |
| 14 | 13.7    | 30 | 20.0    | 46 | 29.4    | 62 | 43.2    | 78 | 63.4    | 94 | 93.1    |
| 15 | 14.0    | 31 | 20.5    | 47 | 30.1    | 63 | 44.2    | 79 | 64.9    | 95 | 95.3    |
| 16 | 14.3    | 32 | 21.0    | 48 | 30.9    | 64 | 45.3    | 80 | 66.5    | 96 | 97.6    |

Note: 0201 and 0402 resistors are not marked. E192 values that are not shared E96 or E24 values are not marked.

## RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

| RoHS Compliance Status  |   |                            |                                |                                   |  |                                       |
|-------------------------|---|----------------------------|--------------------------------|-----------------------------------|--|---------------------------------------|
| Standard Product Series | Description                                     | Package / Termination Type | Standard Series RoHS Compliant | Lead-Free Termination Composition | Lead-Free Mfg. Effective Date (Std Product Series) | Lead-Free Effective Date Code (YY/WW) |
| RNCF                    | Precision Thin Film Surface Mount Chip Resistor | SMD                        | YES                            | 100% Matte Sn over Ni             | May-04   | 04/18                                 |

## "Conflict Metals" Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

## Compliance to "REACH"

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, "The Registration, Evaluation, Authorization and Restriction of Chemicals", otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

## Environmental Policy

It is the policy of Stackpole Electronics, Inc. (SEI) to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.

## How to Order

| R N C F 0 8 0 5 D T E 4 K 7 5 |                                    |      |           |       |                      |                  |                    |                  |          |      |     |   |  |
|-------------------------------|------------------------------------|------|-----------|-------|----------------------|------------------|--------------------|------------------|----------|------|-----|---|--|
| Product Series                |                                    | Size | Tolerance |       |                      | Packaging        |                    |                  |          | TCR  |     | Resistance Value <sup>(2)</sup>   |  |
| Code                          | Description                        | Code | Code      | Tol   | Value <sup>(1)</sup> | Code             | Description        | Size             | Quantity | Code | ppm | Four characters with the multiplier used as the decimal holder.<br>24.9 ohm = 24R9<br>10 Kohm = 10K0<br>1 Mohm = 1M00 |  |
| RNCF                          | Precision Thin Film Chip Resistors | 0201 | T         | 0.01% | E192, E96, E24       | T                | 7" Reel Paper Tape | 0201, 0402       | 10000    | W    | 2   |   |  |
|                               |                                    | 0402 | A         | 0.05% |                      |                  |                    | 0603, 0805       | 5000     | Y    | 5   |   |  |
|                               |                                    | 0603 | B         | 0.1%  |                      |                  | 1206, 1210         | 4000             | T        | 10   |     |   |  |
|                               |                                    | 0805 | C         | 0.25% |                      |                  | 2010, 2512         |                  | S        | 15   |     |   |  |
|                               |                                    | 1206 | D         | 0.5%  | E96, E24             | K <sup>(3)</sup> | 7" Reel Paper Tape | 0402, 0603, 0805 | 1000     | E    | 25  |   |  |
|                               |                                    | 1210 | F         | 1%    |                      |                  |                    | 1206, 1210       |          | C    | 50  |   |  |
|                               |                                    | 2010 |           |       |                      |                  | 2010, 2512         | D                | 100      |      |     |   |  |
|                               |                                    | 2512 |           |       |                      |                  |                    |                  |          |      |     |   |  |

(1) E192 values may be subject to higher MOQ

(2) Values below 10 ohm and above 1 Mohm may be subject to higher MOQ

(3) MOQ for K packaging is 5000 pieces

## OUR CERTIFICATE

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