

RNCF0603BTE412R Datasheet

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DiGi Electronics Part Number	RNCF0603BTE412R-DG
Manufacturer	Stackpole Electronics Inc
Manufacturer Product Number	RNCF0603BTE412R
Description	RES SMD 412 OHM 0.1% 1/6W 0603
Detailed Description	412 Ohms \pm 0.1% 0.167W, 1/6W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thin Film

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Manufacturer Product Number:

RNCF0603BTE412R

Series:

RNCF

Resistance:

412 Ohms

Power (Watts):

0.167W, 1/6W

Features:

Automotive AEC-Q200

Operating Temperature:

-55°C ~ 155°C

Supplier Device Package:

0603

Size / Dimension:

0.061" L x 0.031" W (1.55mm x 0.80mm)

Number of Terminations:

2

Base Product Number:

RNCF0603B

Manufacturer:

Stackpole Electronics Inc

Product Status:

Active

Tolerance:

±0.1%

Composition:

Thin Film

Temperature Coefficient:

±25ppm/°C

Package / Case:

0603 (1608 Metric)

Ratings:

AEC-Q200

Height - Seated (Max):

0.022" (0.55mm)

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 ± 0.01%
- TCR down to ± 2 ppm/°C
- Wide resistance value range
- RoHS compliant, REACH compliant, lead free, and halogen free
- AEC-Q200 compliant



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

(*) 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 ⁽²⁾ (W) @ 70°C	Maximum Working Voltage (V) ⁽¹⁾	Maximum Overload Voltage (V)	TCR (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	-		1.02M - 2.5M			
	0.33	200	400	±10	24.9 - 499K	4.7 - 1M				
				±15	24.9 - 499K	1 - 1M				
RNCF2010	0.25	150	300	±25	-		1.02M - 3M			
				±50	-		1.02M - 3M			
	0.33	200	400	±10	24.9 - 499K	4.7 - 1M				
				±15	24.9 - 499K	1 - 1M				
RNCF2512	0.5	150	300	±10	2.05K - 499K	2.05K - 1M				
				±15	2.05K - 499K	2.05K - 1M				
				±25	-	2.05K - 1M	2.05K - 3M			
				±50	-	2.05K - 1M	2.05K - 3M			
	0.75	200	400	±10	24.9 - 2K	4.7 - 2K	4.7 - 2K	1 - 2K		
				±15	24.9 - 2K	4.7 - 2K	101 - 2K	101 - 2K		
				±25	24.9 - 2K	4.7 - 2K	101 - 2K	101 - 2K		
				±50	24.9 - 2K	4.7 - 2K	101 - 2K	101 - 2K		
1	200	400	±25	-		4.7 - 100	1 - 100			
			±50	-		4.7 - 100	1 - 100			

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

(2) For lower power ratings, contact Stackpole.

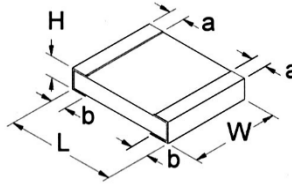
Electrical Specifications - Ultra-Precision

Type/Code	Power Rating ⁽²⁾ (W) @ 70°C	Maximum Working Voltage (V) ⁽¹⁾	Maximum Overload Voltage (V)	TCR (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		-			
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 Body Length	W Body Width	H Body Height	a Top Termination	b 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 _{DC} 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. 2010 and 2512 sizes: 2 mm 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%		

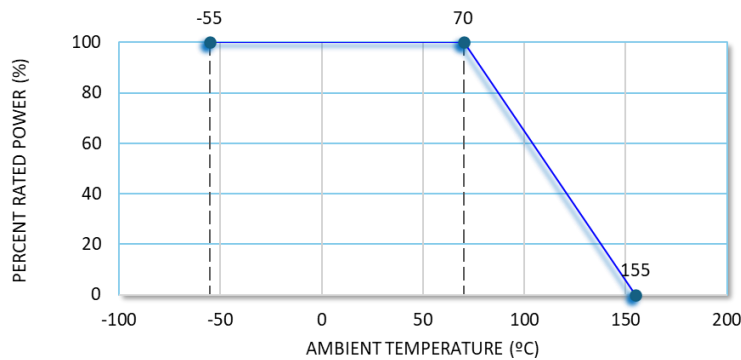
Performance Characteristics (cont.)			
Dielectric Withstand Voltage	MIL-STD-202 Method 301	by type	Max. overload voltage for 1 minute
High Temperature Exposure	MIL-STD-202 Method 108	$\Delta R \pm 0.5\%$	+155°C for 1000 hours
Temperature Cycling	JESD22 Method JA-104	$\Delta R \pm 0.2\%$ for 0402~2512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

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

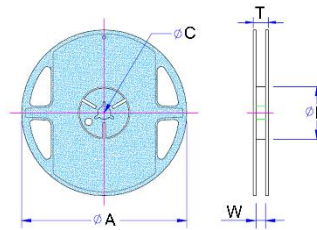
Recommended storage conditions is 60 to 82°F. Humidity < 80% R.H.

Operating temperature range is -55 to +155°C

Power Derating Curve:



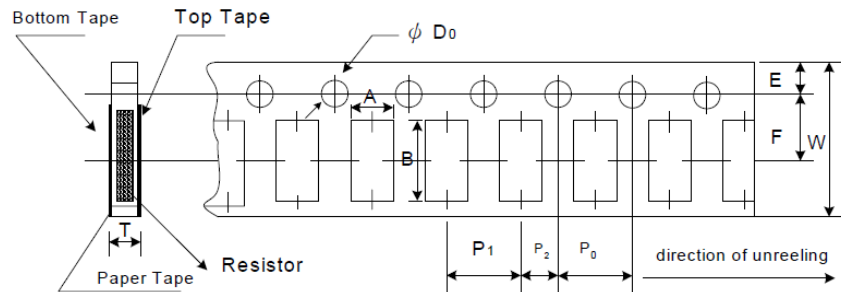
Reel Specifications



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

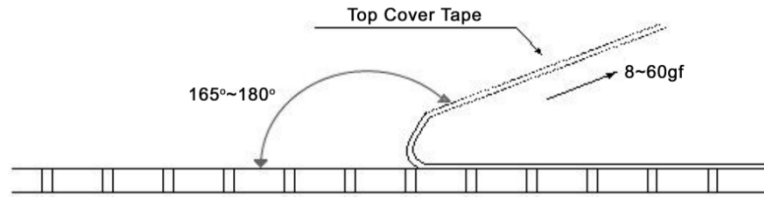
Packaging Specifications - Paper Tape



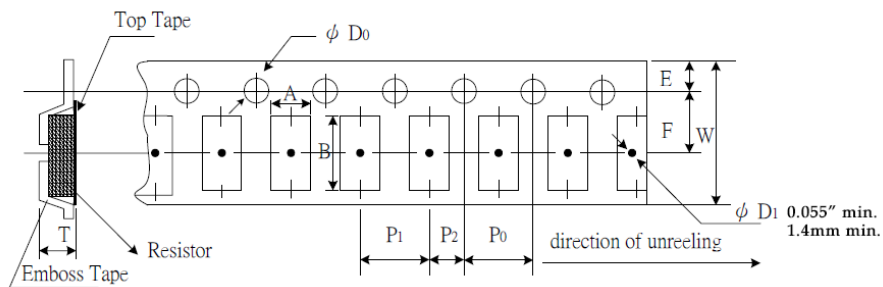
Type/Code	A	B	W	E	F	Unit
RNCF0201	0.016 ± 0.002	0.028 ± 0.002	0.315 ± 0.004	0.069 ± 0.002	0.138 ± 0.002	inches
	0.40 ± 0.05	0.70 ± 0.05	8.00 ± 0.10	1.75 ± 0.05	3.50 ± 0.05	mm
RNCF0402	0.028 ± 0.002	0.046 ± 0.002	0.315 ± 0.004	0.069 ± 0.002	0.138 ± 0.002	inches
	0.70 ± 0.05	1.16 ± 0.05	8.00 ± 0.10	1.75 ± 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 ± 5%
The peel force of top cover tape shall be between 8 to 60 gf



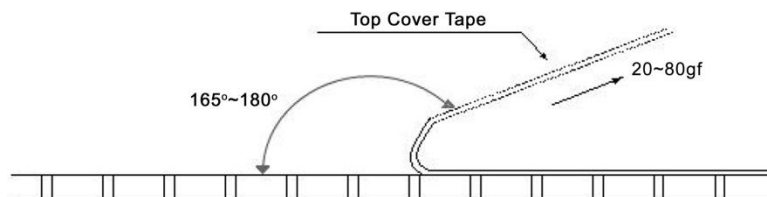
Packaging Specifications - Plastic Tape



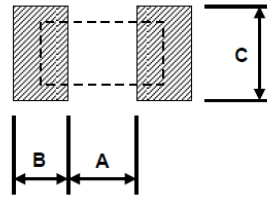
Type/Code	A	B	W	E	F	Unit
RNCF2010	0.112 ± 0.004	0.215 ± 0.004	0.472 ± 0.004	0.069 ± 0.004	0.217 ± 0.002	inches
	2.85 ± 0.10	5.45 ± 0.10	12.00 ± 0.10	1.75 ± 0.10	5.50 ± 0.05	mm
RNCF2512	0.134 ± 0.004	0.262 ± 0.004	0.472 ± 0.004	0.069 ± 0.004	0.217 ± 0.002	inches
	3.40 ± 0.10	6.65 ± 0.10	12.00 ± 0.10	1.75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

Peel Force of Top Cover Tape

The peel speed shall be about 300 mm/minute ± 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

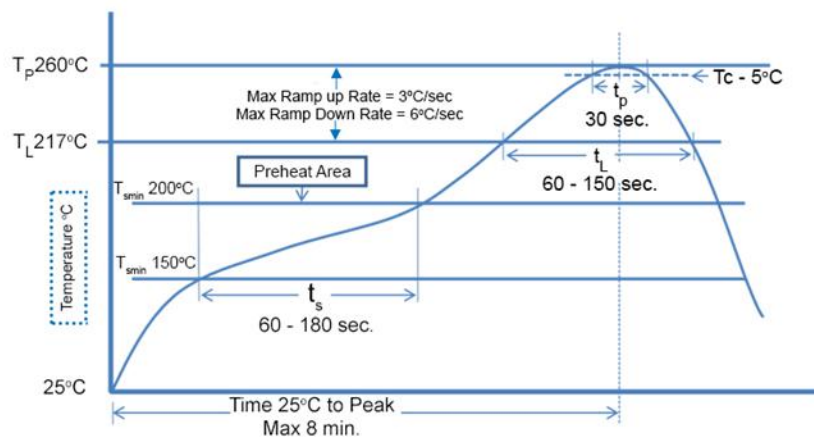
Description	Maximum	Recommended	Minimum
Preheat Time	80 seconds	70 seconds	60 seconds
Temperature Diff.	140°C	120°C	100°C
Solder Temp.	260°C	250°C	240°C
Dwell Time at Max	10 seconds	5 seconds	*
Ramp DN (°C/sec)	N/A	N/A	N/A

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

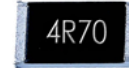


Profile Feature	Pb-Free Assembly
Preheat:	
Min. temperature (T_{smin})	150°C
Max. temperature (T_{smax})	200°C
Preheating time (t_s) from T_{smin} to T_{smax}	60 - 120 seconds
Ramp-up rate (T_L to T_P)	3°C/second max
Liquidous temperature (T_L)	217°C
Time (t_L) maintained above T_L	60 - 150 seconds
Min. peak temperature (T_p min)	235°C
Max. peak temperature (T_p max)	260°C
Time (t_p) within 5°C of the specified classification temperature (T_c)	30 seconds max.
Ramp-down rate (T_L to T_P)	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

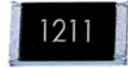
Part Marking

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



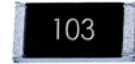
1.21 KΩ

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



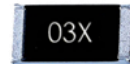
10 KΩ

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.

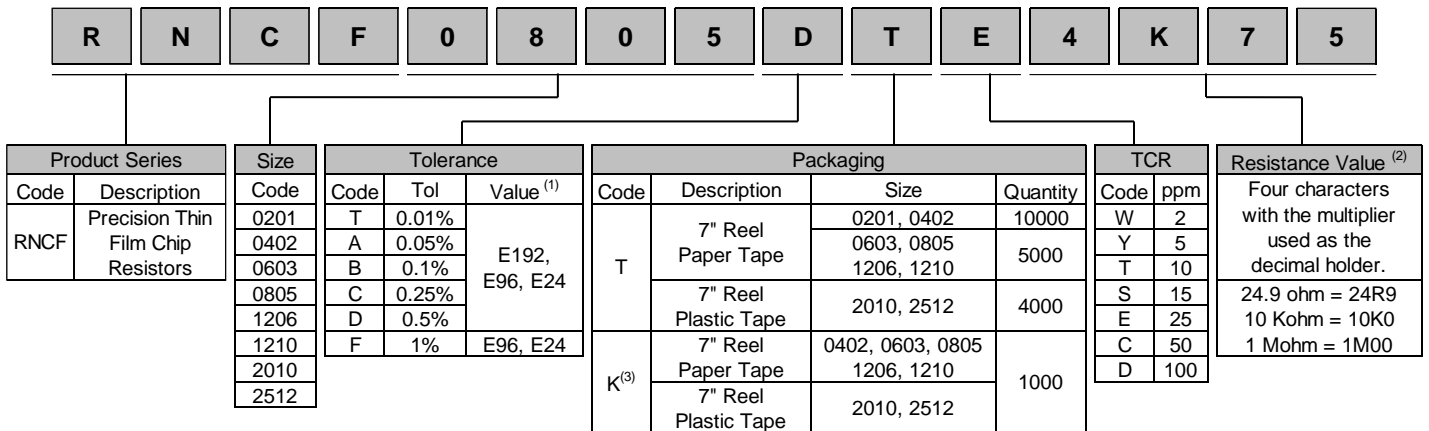
Compliance to "REACH"

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



(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

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