

## Features:

- Tolerance to  $\pm 0.05\%$
- Low TCR to  $\pm 10 \text{ ppm}/^\circ\text{C}$
- Inner terminations engineered to deter sulfur contamination
- AEC-Q200 compliant
- RoHS compliant, lead free and halogen free
- REACH compliant



## Applications:

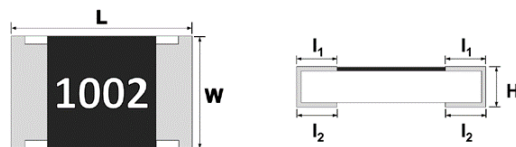
- Industrial electronics
- Communication devices
- Measuring instrument
- Converters

## Electrical Specifications

Type/Code	Power Rating (W) @ 70°C	Maximum Working Voltage (V) <sup>(1)</sup>	Maximum Overload Voltage (V)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance				
					±0.05%	±0.1%	±0.25%	±0.5%	±1%
RNCA0402	0.063	50	100	± 10	49.9 - 12K	10 - 68.1K			
				± 15		4.7 - 221K			
				± 25 ± 50					
RNCA0603	0.1	75	150	± 10	49.9 - 30.1K	10 - 332K			
				± 15		4.7 - 681K			
				± 25 ± 50					
RNCA0805	0.125	150	300	± 10	49.9 - 49.9K	10 - 681K			
				± 15		4.7 - 1M			
				± 25 ± 50					
RNCA1206	0.25	200	400	± 10	49.9 - 100K	10 - 1M			
				± 15		4.7 - 1.5M			
				± 25 ± 50					

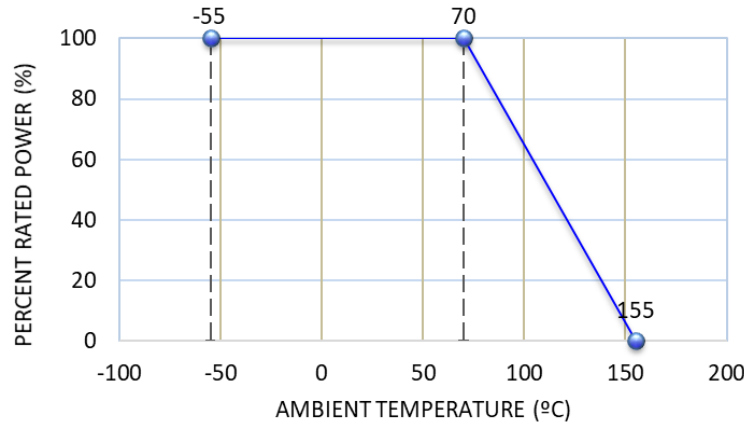
(1) Lesser of  $\sqrt{P \cdot R}$  or maximum working voltage.

## Mechanical Specifications



Type/Code	L Body Length	W Body Width	H Body Height	I <sub>1</sub> Top Termination	I <sub>2</sub> Bottom Termination	Unit
RNCA0402	0.039 ± 0.004 1.00 ± 0.10	0.020 ± 0.002 0.50 ± 0.05	0.012 ± 0.002 0.30 ± 0.05	0.008 ± 0.004 0.20 ± 0.10	0.008 ± 0.004 0.20 ± 0.10	inches mm
RNCA0603	0.063 ± 0.006 1.60 ± 0.15	0.031 ± 0.004 0.80 ± 0.10	0.018 ± 0.004 0.45 ± 0.10	0.012 ± 0.008 0.30 ± 0.20	0.012 ± 0.008 0.30 ± 0.20	inches mm
RNCA0805	0.079 ± 0.006 2.00 ± 0.15	0.049 ± 0.006 1.25 ± 0.15	0.022 ± 0.004 0.55 ± 0.10	0.014 ± 0.008 0.35 ± 0.20	0.016 ± 0.008 0.40 ± 0.20	inches mm
RNCA1206	0.120 ± 0.006 3.05 ± 0.15	0.063 ± 0.006 1.60 ± 0.15	0.022 ± 0.004 0.55 ± 0.10	0.018 ± 0.008 0.45 ± 0.20	0.020 ± 0.008 0.50 ± 0.20	inches mm

## Power Derating Curve:



Performance Characteristics			
Test	Test Method	Test Specifications	Test Condition
Temperature Coefficient of Resistance (TCR)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	Refer to Electrical Specification table	At 25 / -55°C and 25°C / +125°C, 25°C is the reference temperature
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	$\pm (0.3\% + 0.05\Omega)$	2.5 times RCWV or max. overload voltage whichever is less for 5 seconds
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	>95% coverage No visual damage	260 $\pm$ 5°C for 30 seconds
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	$\pm (0.3\% + 0.05\Omega)$ No visual damage	260 $\pm$ 5°C for 10 seconds
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	$\geq 10 \text{ G}\Omega$	Apply 100VDC for 1 minute
Temperature Cycling	JESD22 Method JA-104	$\pm (0.3\% + 0.05\Omega)$ No visual damage	1000 cycles (-55°C to +125°C). Measurement at 24 $\pm$ 4 hours after test conclusion. 30 minutes maximum dwell time at each temperature extreme.
Resistance to Solvent	MIL-STD-202 Method 215	$\pm (0.3\% + 0.05\Omega)$ No visual damage	Add aqueous wash chemical - OKEM clean or equivalent
Biased Humidity	MIL-STD-202 Method 103	$\pm (0.3\% + 0.05\Omega)$	1000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24 $\pm$ 4 hours after test conclusion.
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	$\pm (0.5\% + 0.05\Omega)$	1000 hours at T=155°C. Unpowered. Measurement at 24 $\pm$ 4 hours after test conclusion.
Operation Life	MIL-STD-202 Method 108	$\pm (0.3\% + 0.05\Omega)$	Condition D Steady State TA = 125°C at derated power. Measurement at 24 $\pm$ 4 hours after test conclusion.
External Visual	MIL-STD-883 Method 2009	-	Electrical test not required Inspect device construction, marking and workmanship.
Mechanical Shock	MIL-STD-202 Method 213	$\pm (0.3\% + 0.05\Omega)$	Test 1/2 sine pulse, peak value: 100 g, normal duration: 6 ms. Velocity change: 12.3 ft/sec. 10 shocks in each direction, total of 30 shocks

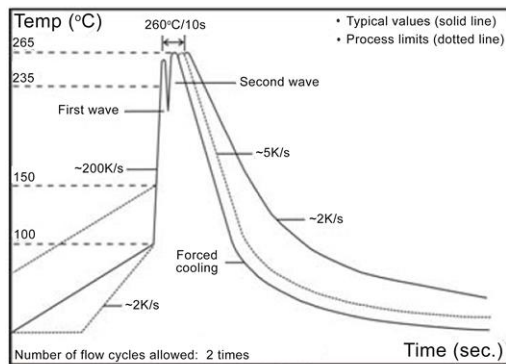
## Performance Characteristics (cont.)

Test	Test Method	Test Specifications	Test Condition
Vibration	MIL-STD-202 Method 204	$\pm (0.3\% + 0.05\Omega)$	5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: test from 10 - 2000 H
ESD	AEC-Q200-002 or ISO/DIS 10605	$\pm (0.3\% + 0.05\Omega)$	Human body model 0402: 400V, 0603: 1000V 0805: 1500V, 1206: 2000V
Solderability	J-STD-002	$\pm (0.3\% + 0.05\Omega)$	(1) 4 hours 155°C dry heat (2) 245 $\pm$ 5°C 3 seconds
Terminal Strength (SMD)	AEC Q200-006	No breakage	Pressurizing force for 60 seconds 0402 / 0603: 8N 0805 / 1206: 17.7N
Board Flex	AEC Q200-005	$\pm (0.3\% + 0.05\Omega)$	Bending once for 60 seconds. 3mm
Sulfur Test (FoS)	ASTM B809-95 ANSI/EIA-977	$\pm (1\% + 0.05\Omega)$	105 $\pm$ 2°C, no power rating for 1000 hours

Operating temperature range is -55°C to +155°C

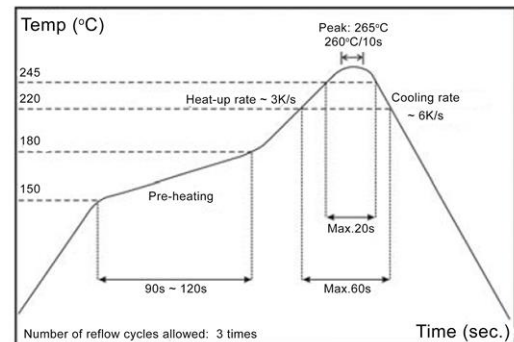
## Soldering Condition

Wave solder temperature condition:



Wave Soldering (Flow Soldering)

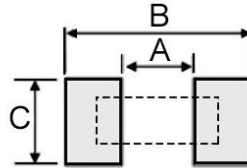
Solder reflow temperature condition:



IR Reflow Soldering

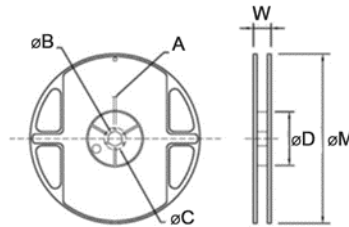
- Rework temperature (hot air equipment): 350°C, 3 ~ 5 seconds
- Recommended reflow methods:
  - IR, vapor phase oven, hot air oven. If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

## Recommended Land Pattern



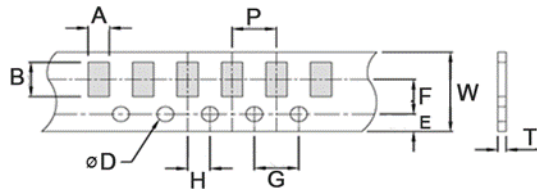
Type/Code	A	B	C	Unit
RNCA0402	0.020 0.50	0.063 1.60	0.028 0.70	inches mm
RNCA0603	0.031 0.80	0.094 2.40	0.039 1.00	inches mm
RNCA0805	0.051 1.30	0.114 2.90	0.055 1.40	inches mm
RNCA1206	0.087 2.20	0.165 4.20	0.067 1.70	inches mm

## Reel Specifications



Type/Code	ØA	ØB	ØC	ØD	W	ØM	Unit
All sizes	0.079 ± 0.020 2.00 ± 0.50	0.531 ± 0.039 13.50 ± 1.00	0.827 ± 0.039 21.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.453 ± 0.079 11.50 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	inches mm

## Packaging Specifications – Paper Tape

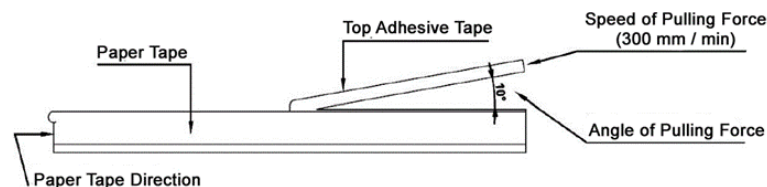


Type/Code	A	B	W	E	F	Unit
RNCA0402	0.028 ± 0.004 0.70 ± 0.10	0.047 ± 0.004 1.20 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNCA0603	0.041 ± 0.008 1.05 ± 0.20	0.071 ± 0.008 1.80 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNCA0805	0.061 ± 0.008 1.55 ± 0.20	0.091 ± 0.008 2.30 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNCA1206	0.075 ± 0.008 1.90 ± 0.20	0.138 ± 0.008 3.50 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm

## Packaging Specifications – Paper Tape (cont.)

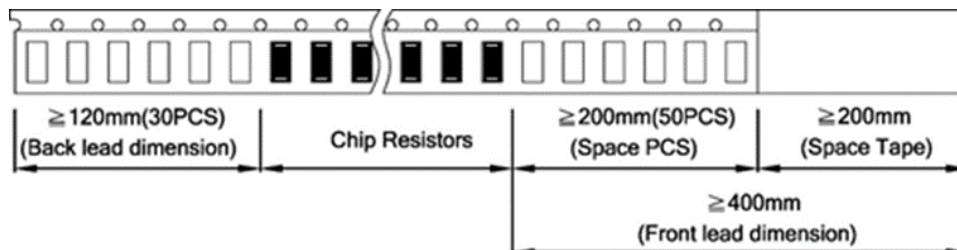
Type/Code	G	H	T	ØD	P	Unit
RNCA0402	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.018 ± 0.004 0.45 ± 0.10	0.059 +0.004 / -0 1.50 +0.1 / -0	0.079 ± 0.004 2.00 ± 0.10	inches mm
RNCA0603	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.024 ± 0.004 0.60 ± 0.10	0.059 +0.004 / -0 1.50 +0.1 / -0	0.157 ± 0.004 4.00 ± 0.10	inches mm
RNCA0805	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.030 ± 0.004 0.75 ± 0.10	0.059 +0.004 / -0 1.50 +0.1 / -0	0.157 ± 0.004 4.00 ± 0.10	inches mm
RNCA1206	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.030 ± 0.004 0.75 ± 0.10	0.059 +0.004 / -0 1.50 +0.1 / -0	0.157 ± 0.004 4.00 ± 0.10	inches mm

## Peel Force of Top Cover Tape



- (1) The peel speed shall be about 300mm/min ± 5%
- (2) The peel force of top cover tape shall be between 8gf to 60gf

## Front and Back Lead Dimensions



## 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.

## "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. 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	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R	N	C	A	1	2	0	6	B	T	S	1	0	K	0
Product Series		Size		Tolerance		Packaging				TCR		Resistance Value		
Code	Description	Size	W	Code	Tol.	Code	Description	Size	Quantity	Code	ppm	Four characters with the multiplier used as the decimal holder.  10 ohm = 10R0 12 Kohm = 12K0 1.5 Mohm = 1M50		
RNCA	Automotive Grade Anti-sulfur Thin Film	0402	0.063	A	0.05%	T	Paper Tape	0402	10000	T	10			
		0603	0.1	B	0.1%			0603, 0805, 1206	5000	S	15			
		0805	0.125	C	0.25%					E	25			
		1206	0.25	D	0.5%					C	25			
				F	1%									