

Features:

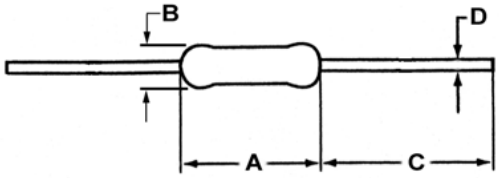
- Miniature metal film for tight size constraints
- Superior electrical, TCR performances
- Flameproof silicone coating is standard
- 1-watt part in 1/4-watt package
- 2-watt part in 1/2-watt package
- ½-watt part in 1/8-watt package
- 100% RoHS compliant and lead free without exemption
- Halogen free
- REACH compliant

Electrical Specifications

Type / Code	Power Rating (W) @ 70°C	Maximum Working Voltage (V)(1)	Maximum Overload Voltage (V)	TCR (ppm/ºC)	Ohmic Range (Ω) and Tolerance		
					0.5%	1%	5%
RNS12	0.5	400	600	± 100 ± 200	100 - 511K	10 - 1M	10 - 1M
RNS1	1	500	700	± 100 ± 200	100 - 511K	10 - 1M	10 - 1M
RNS2	2	600	800	± 100 ± 200	100 - 511K	10 - 1M	10 - 1M

(1) Rated voltage = $\sqrt{P*R}$ or Maximum Working Voltage, whichever is lower.

Mechanical Specifications



Type / Code	A Body Length	B Body Diameter	C Lead Length (Bulk)	D Lead Diameter	Unit
RNS12	0.126 ± 0.008 / -0 3.20 + 0.20 /-0	0.073 ± 0.008 1.85 ± 0.20	1.102 ± 0.118 28.00 ± 3.00	0.018 ± 0.002 0.45 ± 0.05	inches mm
RNS1	0.236 ± 0.012 6.00 ± 0.30	0.094 ± 0.008 2.40 ± 0.20	1.102 ± 0.118 28.00 ± 3.00	0.022 ± 0.002 0.55 ± 0.05	inches mm
RNS2	0.335 ± 0.020 8.50 ± 0.50	0.110 ± 0.012 2.80 ± 0.30	1.102 ± 0.118 28.00 ± 3.00	0.028 ± 0.002 0.70 ± 0.05	inches mm

Performance Characteristics

Item	Performance	Test Method
Temperature Coefficient of Resistance	± 50 ppm/ºC ± 100 ppm/ºC ± 200 ppm/ºC	Measure resistance (R0) at room temperature (t), after that, measure again the resistance (R) at 100ºC higher than room temperature $TCR = \frac{R - R_0}{R_0} X \frac{10^6}{(t + 100) - t}$ (ppm/ºC)
Voltage Proof	1. Change of Resistance ≤ ± (0.5% + 0.05 Ω)	Lay the resistor on the 90º angle metal V block and apply rated AC voltage for one minute.
Insulation Resistance	≥ 1000 Mohm	Lay the resistor on the 90º angle metal V block and apply 500 Vdc between V block and lead wire for a minute. The insulation resistance shall be measured while applying the voltage.

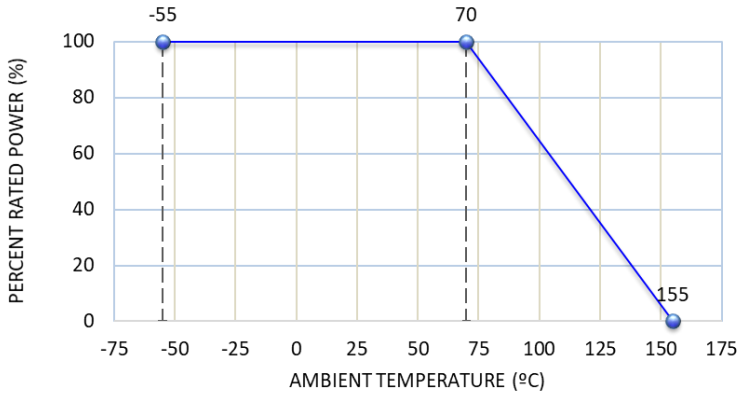
This specification may be changed at any time without prior notice.
Please confirm technical specifications before you order and/or use.

Performance Characteristics (cont.)		
Item	Performance	Test Method
Solvent Resistance	There shall be no damage on the insulating surface.	Soak in a Isopropyl alcohol for 5 minutes. After drying up for 5 minutes, stress of 5 N is added with absorbent cotton and it does by five round trips at the rate of one round trip a second.
Overload (Short Time)	Change of Resistance ≤ ± (1% + 0.05 Ω)	Apply 2.5 times rated voltage or max. overload voltage whichever is lower for 5 seconds and leave in room temperature for one hour after test.
Robustness of Termination	Change of Resistance ≤ ± (0.2% + 0.05 Ω)	Tensile: The body of the resistor is fixed, a static load is added in the direction of drawing out of the terminal, and it maintains it for 10 ± 1 seconds. Tensile strength: 10 N Bend: Component body shall be fixed so that terminals are perpendicular to the floor. A static load specified below shall be applied to the terminal acting in a direction away from the body. The body of piezoelectric oscillator shall then be inclined through an angle of 90º in the vertical plane and then returned to its initial position in 2 or 3 seconds then the body shall be inclined to the reversed direction through an angle 90º and then returned to its initial position in 2 or 3 seconds. Bending strength: 5 N
Resistance to Soldering Heat	Change of Resistance ≤ ± (0.3% + 0.05 Ω)	Dip the lead into a solder bath having a temperature of 260ºC ± 5ºC up to 1.5 ± 0.5 mm from the body of the resistors and hold it for 10 ± 0.5 seconds and leave in room temperature for one hour after test.
Solderability	More than 95% of the surface of the lead shall be covered by new solder.	Dip the lead into a solder bath having a temperature of 245 ± 5ºC up to 1.5 ± 0.5 mm from the body of the resistors and hold it form 5 ± 0.5 seconds.
Rapid Change of Temperature	Change of Resistance ≤ ± (1% + 0.05 Ω)	The resistor shall be subjected to 5 continuous cycles, each as show in the table below: 1 – Minimum Operating Temperature – 30 min. 2 – Standard Atmospheric Condition – ≤ 30 sec. 3 – Max Operating Temperature – 30 min. 4 – Standard Atmospheric Condition – ≤ 30 sec.
Vibration	Change of Resistance ≤ ± (0.5% + 0.05 Ω)	Apply 1.5 mm amplitude vibration to three directions perpendicular to each other 2 hours each, total 6 hours. Vibrating frequency is 10 Hz - 55 Hz - 10 Hz cycle in 1 minute sweeping and repeat cycle.
Damp Heat, Steady State	Change of Resistance ≤ ± (3% + 0.05 Ω)	In the chamber having temp. 40 ± 2ºC and relative humidity 93 ± 3%, apply one percent of the rated power, 1.5 hour ON, 0.5 hour OFF for 1000 hours and leave in room temperature for one hour after test.
Endurance at 70ºC	Change of Resistance ≤ ± (3% + 0.05 Ω)	At 70 ± 2ºC, apply rated DC voltage 1.5 hour ON, 0.5 hour OFF for 1000 hours and leave in room temperature for one hour after test.

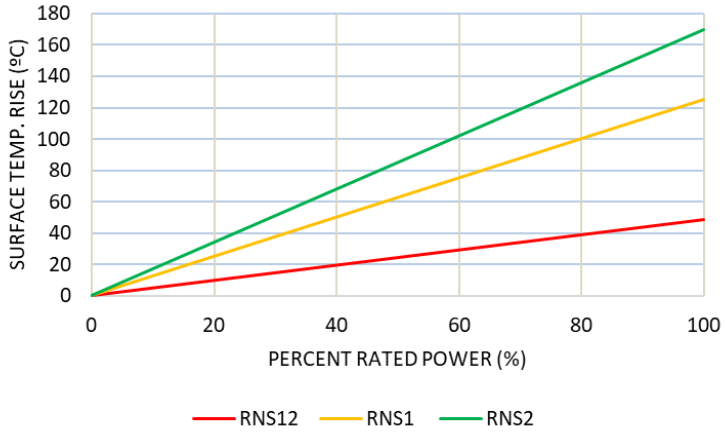
Operating temperature range is -55°C to +155°C

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Power Derating Curve:



Heat Rise:



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°C to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

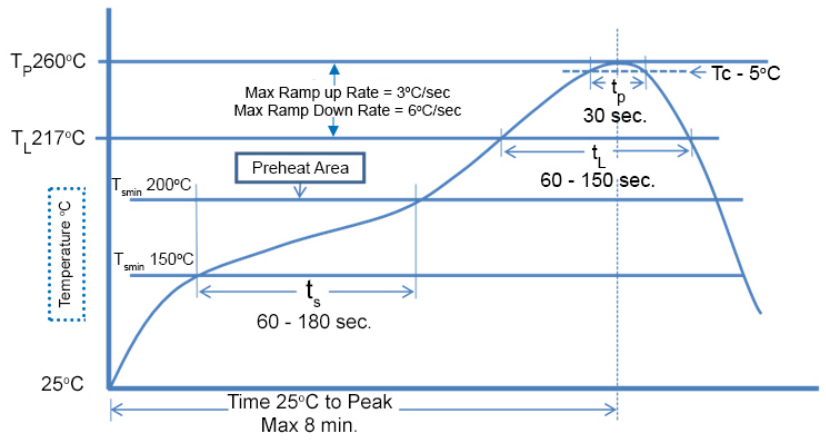
Wave Soldering			
Description	Maximum	Recommended	Minimum
Preheat Time	80 seconds	70 seconds	60 seconds
Temperature Diff.	140°C	120°C	100°C
Solder Temp.	260°C	250°C	240°C
Dwell Time at Max.	10 seconds	5 seconds	*
Ramp DN (°C/sec)	N/A	N/A	N/A

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

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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 Lead Free Resistor Reflow Profile



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)
RNS	Ultra-Miniature Metal Film Resistor	Axial	YES	100% Matte Sn	Always	Always

"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.

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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	2	3	4	5	6	7	8	9	10	11
R	**N**	**S**	**1**	**F**	**T**	**D**	**4**	**K**	**7**	**5**

Product Series	
RNS	Ultra Mini

Power Rating	
Size	W
12	0.5
1	1
2	2

Tolerance		
Code	Tol	Value
D	0.5%	E96
F	1%	E96, E24
J	5%	E24

Packaging			
Code	Description	Size	Quantity
T	Tape and Reel	RNS12, RNS1	5000
		RNS2	2500
A	Ammo	RNS12	5000
		RNS1, RNS2	2000
B	Bulk	RNS12, RNS1, RNS2	1000

TCR	
Code	ppm
D	100
L	200

Resistance Value
Four characters with the multiplier used as the decimal holder.
100 ohms = 100R 10.2 Kohm = 10K2 1 Mohm = 1M00

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