RNV Series

High Voltage Anti-moisture Metal Film Resistor

Stackpole Electronics, Inc.
Resistive Product Solutions

Features:

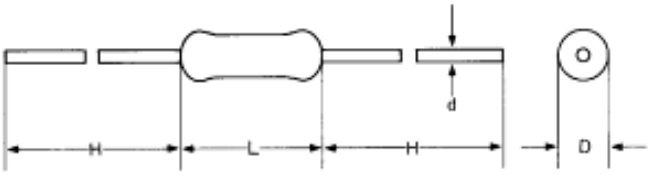
- High voltage surge handling per IEC 60065.14.1, up to 7KV
- High tolerance to prolonged exposure to temperature and humidity stress
- Ideal for applications requiring high stability, reliability and voltage handling; including power inverters, AC adapters and switching power supplies
- RoHS compliant, lead free and halogen free

Electrical Specifications

Type / Code	Power Rating (W) @ 70ºC	Maximum Working Voltage (V)(1)	Maximum Overload Voltage (V)	TCR (ppm/ºC)	Ohmic Range (Ω) and Tolerance
					1% and 5%
RNV14	0.25	1600 (DC), 1150 (RMS)	3200 (DC), 2300 (RMS)	± 100	100K - 6.8M
				± 200	100K - 15M

Note: (1) Lesser of $\sqrt{P*R}$ or maximum working voltage

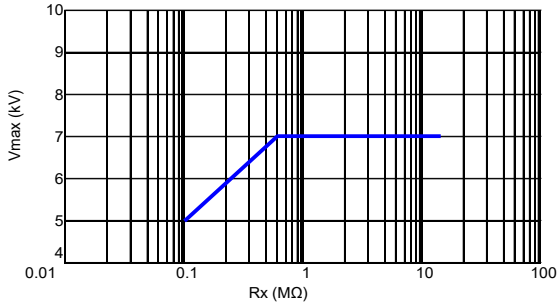
Mechanical Specifications



Type / Code	L	D	d	H	Unit
RNV14	0.236 ± 0.012 6.00 ± 0.30	0.094 ± 0.008 2.40 ± 0.20	0.022 ± 0.002 0.55 ± 0.05	1.102 ± 0.079 28.00 ± 2.00	inches mm

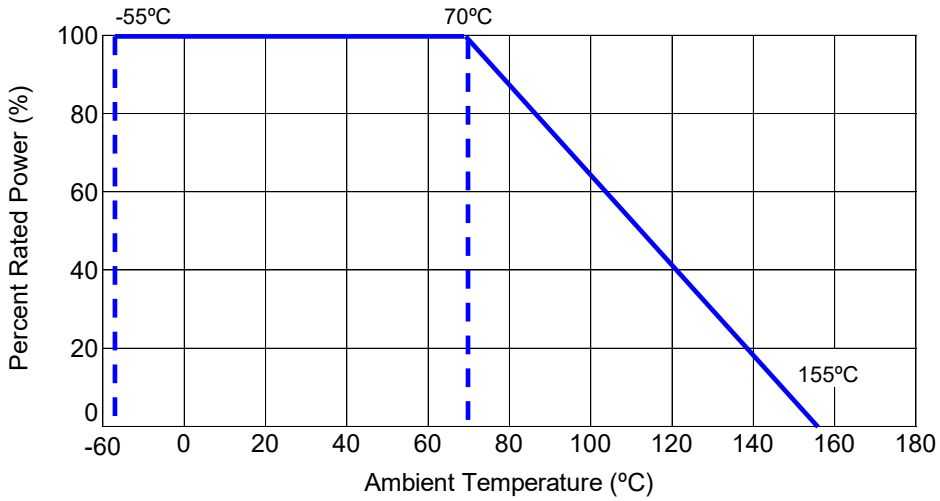
Performance Characteristics

Item	Performance	Test Method
Solvent Resistance	No serious scratches on the insulating surface	Resistor was dipped into solvent for 5 ± 0.5 minutes
Temperature Coefficient Resistance (TCR)	±100 ppm/ºC (100K - 6.8M) ±200 ppm/ºC (100K - 15M)	Measured resistance (R0 ohm) at room temperature (tºC) then measured again at 100ºC higher than room temperature ppm/ºC = (R - R0)/R0 X 106/{(T + 100) -t}
Overload (short time)	Resistance variation within ±(1% + 0.05 Ω)	Applied DC voltage 2.5 times rated voltage or max. overload voltage whichever is lower for 5 seconds ON, 45 seconds OFF. Repeated cycle 10 times. Maximum Overload voltage is not more than 2 x Max Working Voltage.
Voltage Proof	Resistance variation within ±(0.5% + 0.05 Ω)	Resistor was clamped in the through of a 90ºC metallic V-block and was tested at provided AC potential voltage for 1 minute. Test voltage: max overload voltage. Test voltage: 500V (AC)
Vibration	Resistance variation within ±(0.5% + 0.05 Ω)	Applied 1.5 mm amplitude vibration to two directions, perpendicular to each other, for 6 hours each. Total 12 hours. Vibrating frequency is 10HZ - 2000HZ - 10HZ cycle in 20 minutes. Repeat cycle.
Insulation Resistance	104MΩ or more	Resistor was clamped in the through of a 90ºC metallic V-block at DC 100V for 1 minute.
Robustness of Terminations	Resistance variation within ±(0.5% + 0.05 Ω) and no mechanical damage	Tensile test: The body of the part is fixed. The tensile force was applied gradually up to 10 N. Twist test: Terminal lead was rotated 360º of the original axis of the bent terminal, alternating direction for 3 rotations.
Resistance to Soldering Heat	No mechanical and electrical deterioration	Resistance to wave soldering condition: Temperature/Time-Profile in accordance to the CECC00802. Max Temperature/Time: 260ºC, 10 seconds
Solderability	More than 95% of the lead surface was covered by new solder after the leads were dipped in the solder	Dipped the lead into a solder bath (temperature 245ºC ± 5ºC) up to 4 ± 0.8 mm from the resistor body and held for 5 ± 0.5 seconds.

Performance Characteristics (cont.)		
Item	Performance	Test Method
Rapid Change of Temperature	Resistance variation within ±(0.5% + 0.05Ω)	Test: -55ºC for 30 minutes, 25ºC for 30 seconds, 155ºC for 30 minutes, 25ºC for 30 seconds. Resistance changed after continuous 5 cycles.
Damp Heat	Resistance variation within ±(1.5% + 0.05Ω)	Temperature 40ºC ± 2ºC, relative humidity 90 ~ 95%, inside bath for 1.5 hour and shut voltage 0.5 hour. Repeated cycle for 1,000 hours. Room temperature for 1 hour after test, then measured
Endurance at 70ºC	Resistance variation within ±(1.5% + 0.05Ω)	In constant temperature chamber 70ºC ± 2ºC, applied rated DC voltage for 1.5 hour and shut voltage for 0.5 hour. Cycle repeated for 1000 hours.
Cold Resistance	Resistance variation within ±(1.5% + 0.05Ω)	Resistor was put into a bath at fixed temp of -55ºC ± 3ºC for 2 hours. After measured, left at room temp for 1 hour, then measured again.
Heat Resistance	Resistance variation within ±(1.5% + 0.05Ω)	Resistor was put into a bath at fixed temp of 155ºC ± 3ºC for 16 hours. After measured, left at room temp for 1 hour, then measured again.
High Voltage Surge Test	Resistance variation within ±(1% + 0.05Ω)	In accordance with IEC60065.14.1, 50 discharges from a 1nF capacitor charged to Vmax; Figure 2. 12 discharges/minute 

Operating temperature range is -55ºC to +155ºC

Power Derating Curve:



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

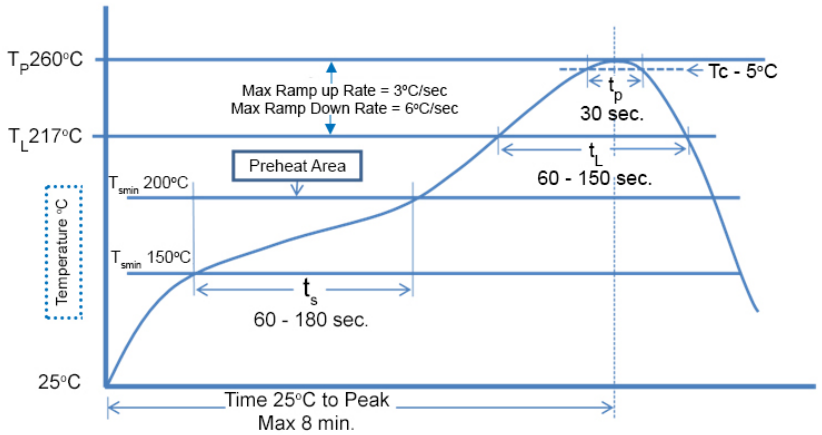
Soldering iron recommended temperatures: 330°C to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

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

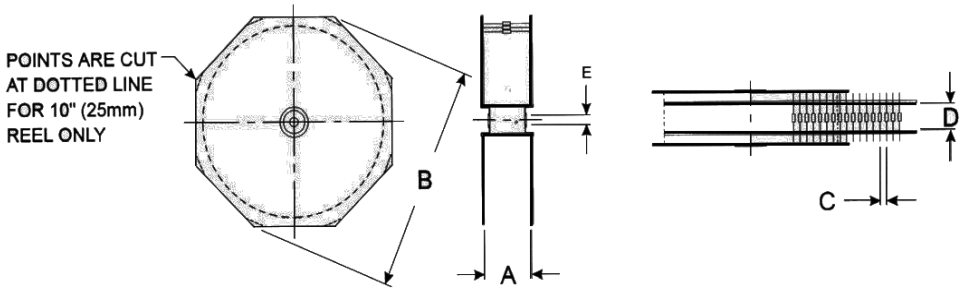
Temperature Diff. = Defference between final preheat stage and soldering stage.

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



Packaging Specifications



Type / Code	A max. (1)	B max.	C	D (2)	Tape	Unit
RNV14	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.35	inches mm

Dimension "E": This is a non-critical dimension that does not have a tolerance in the standard.
Range of diameters is from 0.547" (13.9 mm) to 1.5" (38.1 mm)

(1) Reference value only. The "A" dimension shall be governed by the overall length of the taped component. The distance between flanges shall be 0.59" (1.5 mm) to 0.315" (8 mm) greater than the overall component.

(2) The given dimension "D" expresses the standard width spacing. A 26 mm narrow spacing is available as option "N" packaging code.

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)
RNV	High Voltage Anti-Moisture Metal Film Resistor	Axial	YES	100% Matte Sn over Ni	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.

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	12
R	**N**	**V**	**1**	**4**	**F**	**T**	**L**	**1**	**0**	**0**	**K**

Product Series

Code	Description
RNV	High Voltage Metal Film

Power Rating

Size	W
14	0.25

Tolerance

Code	Tol
F	1%
J	5%

Packaging

Code	Description	Size	Quantity
A	Tape Box (52mm)	14	2000
T	Tape and Reel		5000

TCR

Code	ppm
D	100
L	200

Resistance Value

Four characters with the multiplier used as the decimal holder.

100 Kohm = 100K
1 Mohm = 1M00
15 Mohm = 15M0