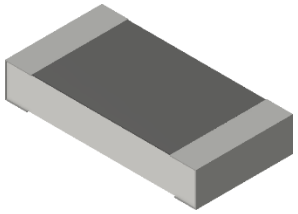
RNAN Series

Thin Film Precision High Power Aluminum Nitride Substrate Chip Resistor

Stackpole Electronics, Inc.
Resistive Product Solutions

Features:

- Thin film technology on aluminum nitride substrate
- High power ratings
- High precision
- RoHS compliant, REACH compliant, lead free, and halogen free

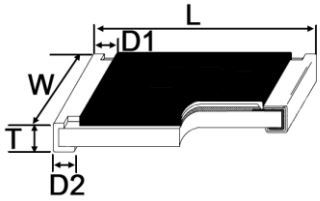


Electrical Specifications

Type/Code	Power Rating (W) @ 70ºC(1)	Max. Working Voltage (V) (2)	Max. Overload Voltage (V)	TCR (ppm/ºC)	Ohmic Range (Ω) and Tolerance
					0.1%, 0.25%, 0.5%, 1%
RNAN0603	0.5	75	150	± 25	50 - 30.1K
				± 50	
RNAN0805	1	100	200	± 25	50 - 30.1K
				± 50	
RNAN1206	2	100	200	± 25	50 - 30.1K
				± 50	
RNAN2512	6	100	200	± 25	50 - 30.1K
				± 50	

Note: (1) Dependent on component mounting by user
(2) RCWV (Rated Continuous working voltage) = √(P*R) or Max. Operating voltage whichever is lower

Mechanical Specifications

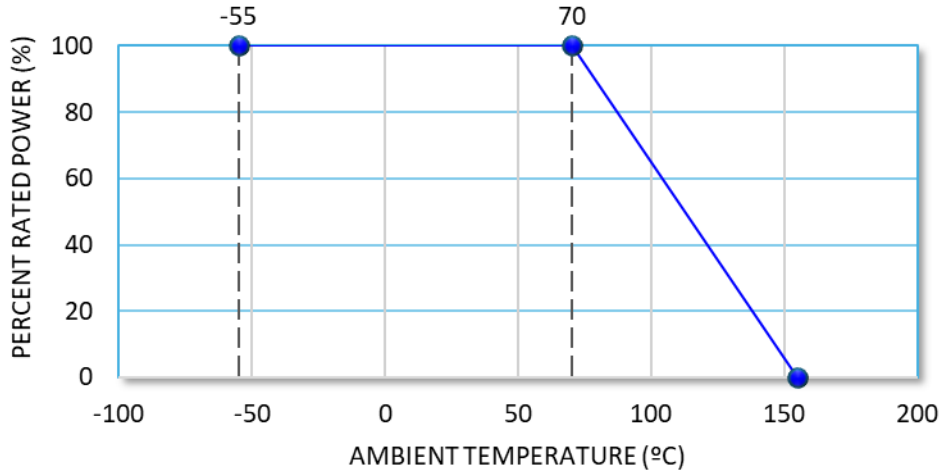


Type/Code	Typical Unit Weight (mg)	L Body Length	W Body Width	T Body Height	D1 Top Termination	D2 Bottom Termination	Unit
RNAN0603	1.7	0.061 ± 0.004 1.55 ± 0.10	0.031 ± 0.004 0.80 ± 0.10	0.017 ± 0.006 0.43 ± 0.15	0.012 ± 0.006 0.30 ± 0.15	0.020 ± 0.008 0.50 ± 0.20	inches mm
RNAN0805	4.0	0.079 ± 0.006 2.00 ± 0.15	0.049 ± 0.006 1.25 ± 0.15	0.017 ± 0.006 0.43 ± 0.15	0.014 ± 0.006 0.35 ± 0.15	0.024 ± 0.008 0.60 ± 0.20	inches mm
RNAN1206	11.0	0.120 ± 0.008 3.05 ± 0.20	0.061 ± 0.008 1.55 ± 0.20	0.017 ± 0.006 0.43 ± 0.15	0.020 ± 0.006 0.50 ± 0.15	0.047 ± 0.008 1.20 ± 0.20	inches mm
RNAN2512	42.3	0.248 ± 0.008 6.30 ± 0.20	0.122 ± 0.008 3.10 ± 0.20	0.017 ± 0.006 0.43 ± 0.15	0.028 ± 0.010 0.70 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	inches mm

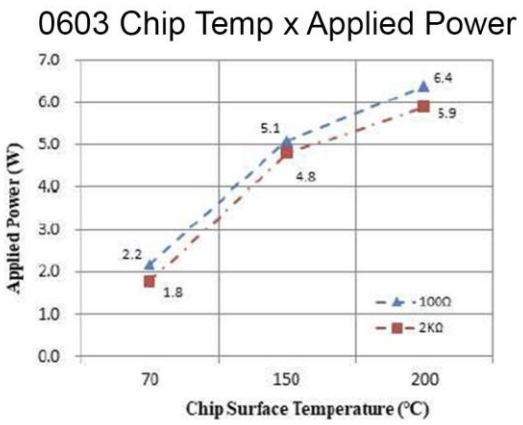
Performance Characteristics		
Test	Test Specifications	Test Method
Temperature Coefficient of Resistance (TCR)	As per specification	MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	ΔR ± 0.5%	Actual power handling capability is limited by the end user mounting process. As with any high power chip resistor, the ability to remove the heat is critical to the overall performance of the device.
Insulation resistance	>9999 MΩ	MIL-STD-202 Method 302 Apply 100 V_{DC} for 1 minute
Endurance	ΔR ± 1%	MIL-STD-202 Method 108 70 ± 2°C, RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF"
Damp Heat with Load	ΔR ± 0.4%	MIL-STD-202 Method 103 40 ± 2°C, 90~95% R.H. RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF"
Solderability	95% min. coverage	MIL-STD-202 Method 208 245 ± 5°C for 3 seconds
Resistance to Soldering Heat	ΔR ± 0.2%	MIL-STD-202 Method 210 260 ± 5°C for 10 seconds
Low Temperature Operation	ΔR ± 0.2%	JIS-C-5201-1 4.36 1 hour, -65°C, followed by 45 minutes of RCWV
High Temperature Exposure	ΔR ± 0.2%	MIL-STD-202 Method 108 at +155°C for 1000 hours
Thermal Shock	ΔR ± 0.2%	MIL-STD-202F Method 107 -55°C ~ 150°C, 100 cycles

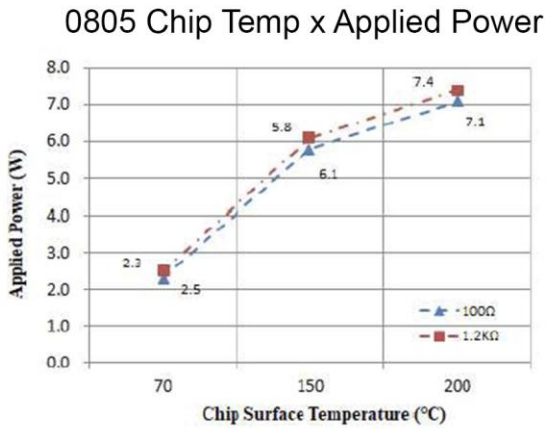
Operating temperature range is -55 to +155°C

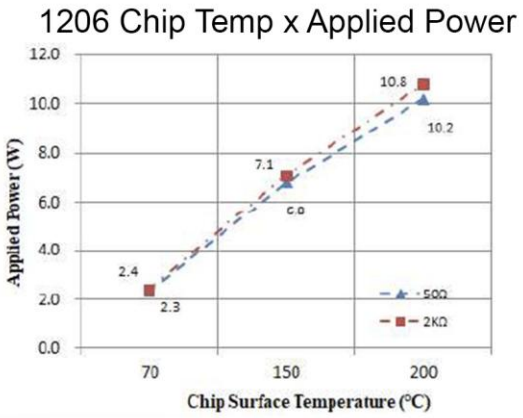
Power Derating Curve:

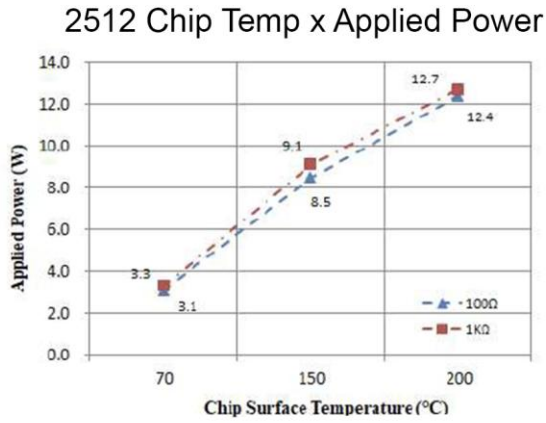


Chip Temperature vs. Applied Power

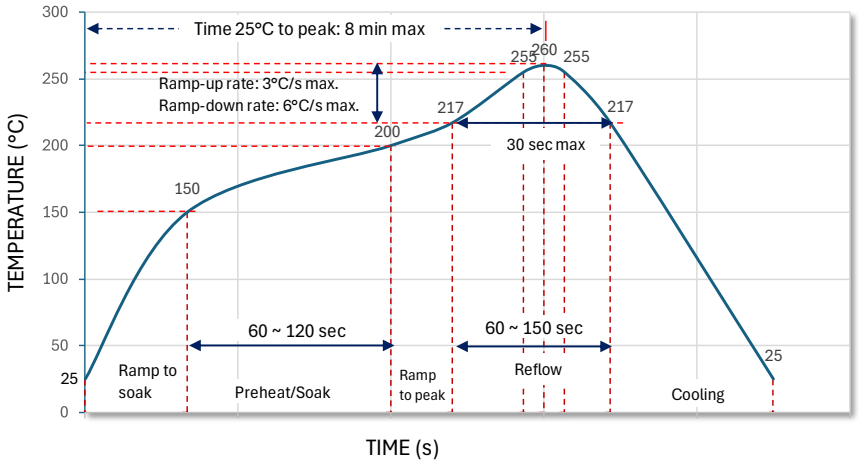




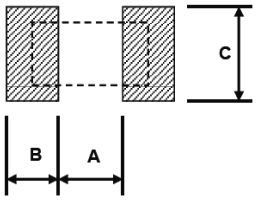




Recommended Resistor Reflow Profile

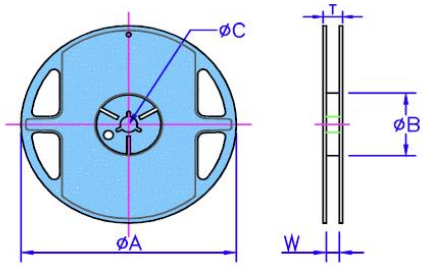


Recommended Solder Pad



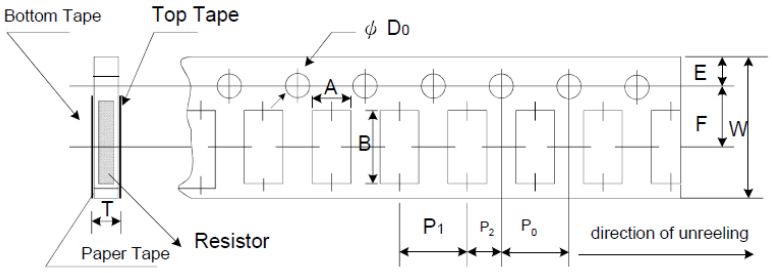
Type/Code	A	B	C	Unit
RNAN0603	0.015 0.37	0.039 0.99	0.034 ± 0.004 0.86 ± 0.10	inches mm
RNAN0805	0.020 0.50	0.043 1.08	0.052 ± 0.004 1.32 ± 0.10	inches mm
RNAN1206	0.024 0.60	0.075 1.90	0.071 ± 0.004 1.80 ± 0.10	inches mm
RNAN2512	0.109 2.77	0.091 2.31	0.126 ± 0.008 3.20 ± 0.20	inches mm

Reel Specifications



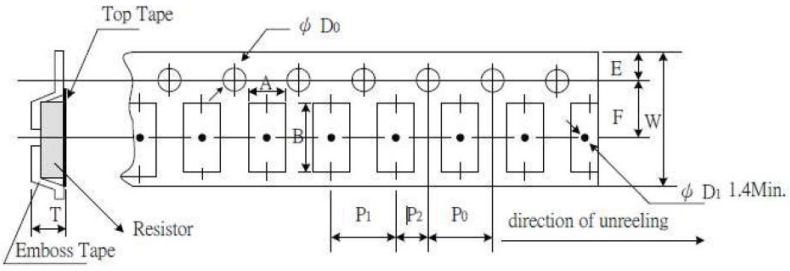
Type/Code	Packaging Quantity		A	B	C	W	T	Unit
RNAN0603	Paper Tape	5000 pc	7.008 ± 0.039 178.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.531 ± 0.028 13.50 ± 0.70	0.374 ± 0.039 9.50 ± 1.00	0.453 ± 0.039 11.50 ± 1.00	inches mm
RNAN0805	Paper Tape	5000 pc	7.008 ± 0.039 178.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.531 ± 0.028 13.50 ± 0.70	0.374 ± 0.039 9.50 ± 1.00	0.453 ± 0.039 11.50 ± 1.00	inches mm
RNAN1206	Paper Tape	5000 pc	7.008 ± 0.039 178.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.531 ± 0.028 13.50 ± 0.70	0.374 ± 0.039 9.50 ± 1.00	0.453 ± 0.039 11.50 ± 1.00	inches mm
RNAN2512	Plastic Tape	4000 pc	7.008 ± 0.039 178.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.531 ± 0.028 13.50 ± 0.70	0.531 ± 0.039 13.50 ± 1.00	0.610 ± 0.039 15.50 ± 1.00	inches mm

Taping Specifications - Paper Tape



Type/Code	A	B	W	E	F	Unit
RNAN0603	0.043 ± 0.002 1.10 ± 0.05	0.075 ± 0.002 1.90 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNAN0805	0.063 ± 0.002 1.60 ± 0.05	0.093 ± 0.002 2.37 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNAN1206	0.079 ± 0.002 2.00 ± 0.05	0.140 ± 0.002 3.55 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
Type/Code	P0	P1	P2	D0	T	
RNAN0603	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.024 ± 0.001 0.60 ± 0.03	inches mm
RNAN0805	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.030 ± 0.002 0.75 ± 0.05	inches mm
RNAN1206	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.030 ± 0.002 0.75 ± 0.05	inches mm

Taping Specifications - Plastic Tape

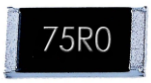


Type/Code	A	B	W	E	F	Unit
RNAN2512	0.134 ± 0.004 3.40 ± 0.10	0.262 ± 0.004 6.65 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
	P0	P1	P2	D0	T	
	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.039 ± 0.008 1.00 ± 0.20	inches mm

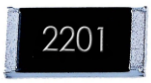
Part Marking Specifications

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 100 Ω will use "R" as the decimal holder.



75Ω

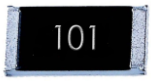


2.2KΩ

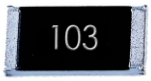
E24 Values 0603

The nominal resistance is marked on the surface of the overcoating with the use of **three character markings.**

E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91



100Ω



10KΩ

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.

Alpha Character = Multiplier	
X = 1	B = 100
A = 10	C = 1000

Chip Marking	Value
85X	75 x 1 = 75Ω
68B	49.9 x 100 = 4.99K
47C	30.1 x 1000 = 30.1K

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

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
RNAN	Thin Film Precision High Power Aluminum Nitride Substrate Chip Resistor	SMD	YES	100% Matte Sn over Ni

"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	A	N	0	6	0	3	F	T	C	7	5	R	0

Product Series

Code
RNAN

Size

Size	W
0603	0.5
0805	1
1206	2
2512	6

Tolerance

Code	Tol	Value
B	0.1%	E96, E24
C	0.25%	
D	0.5%	
F	1%	

Packaging

Code	Description	Size	Quantity
T	Paper Tape	0603, 0805 1206	5000
	Plastic Tape	2512	4000
K	Paper Tape	0603, 0805 1206	1000
	Plastic Tape	2512	

TCR

Code	ppm/°C
E	25
C	50

Resistance Value

Four characters with the multiplier used as the decimal holder.
75 ohm = 75R0 100 ohm = 100R 30 Kohm = 30K0