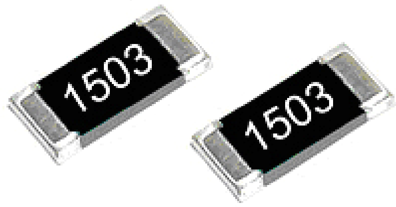
Features:

- Higher power ratings than standard thick film chips
- Absolute TCRs to ±100 ppm/°C
- Inner termination engineered to deter sulfur contamination
- Absolute Tolerances to 1%
- Completely lead free - RoHS compliant and halogen free
- Comparable in cost to standard thick film chip resistors



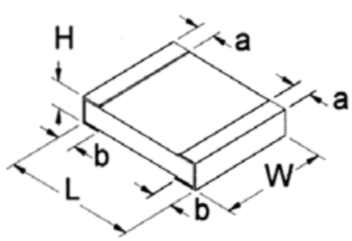
Electrical Specifications

Type / Code	Power Rating(1) (Watts) @ 70ºC	Maximum Working Voltage(2)	Maximum Overload Voltage	Resistance Temperature Coefficient	Ohmic Range (Ω) and Tolerance
					1%, 5%
RNCP0402	0.1W	50V	100V	±100 ppm/ºC	1 - 10K
RNCP0603	0.125W	150V	300V		1 - 47K
RNCP0805	0.25W	200V	400V		1 - 100K
RNCP1206	0.5W				

(1) Power rating for each package size is valid if ambient temp ≤80°C and terminal temp ≤105°C
(2) Lesser of √PR or maximum working voltage
Certain resistance values will require a high minimum order quantity. Contact Stackpole Customer Service for details.

Please refer to the High Power Resistor Application Note (page 5) for more information on designing and implementing high power resistor types.

Mechanical Specifications

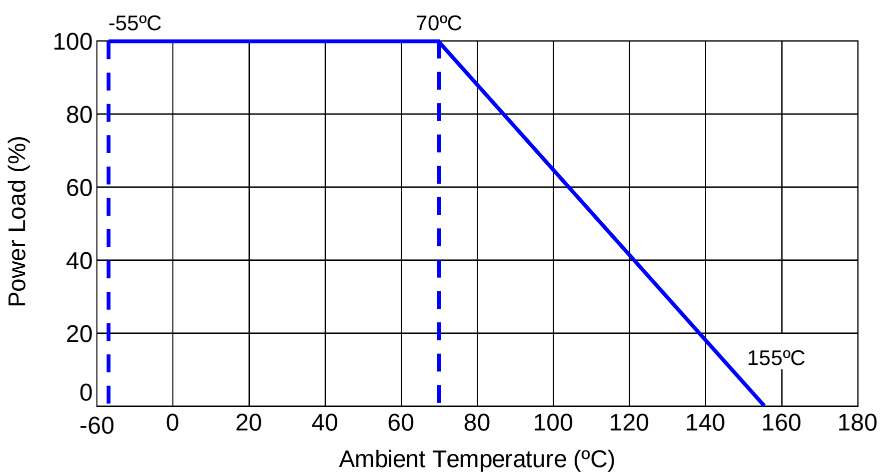


Type / Code	L Body Length	W Body Width	H Body Height	a Top Termination	b Bottom Termination	Unit
RNCP0402	0.039 ± 0.004 1.00 ± 0.10	0.020 ± 0.002 0.50 ± 0.05	0.012 ± 0.002 0.30 ± 0.05	0.010 ± 0.006 0.25 ± 0.15	0.012 ± 0.006 0.30 ± 0.15	inches mm
RNCP0603	0.059 ± 0.004 1.50 ± 0.10	0.031 ± 0.004 0.80 ± 0.10	0.016 ± 0.004 0.40 ± 0.10	0.012 ± 0.008 0.30 ± 0.20	0.016 ± 0.008 0.40 ± 0.20	inches mm
RNCP0805	0.079 ± 0.006 2.00 ± 0.15	0.049 ± 0.006 1.25 ± 0.15	0.020 ± 0.004 0.50 ± 0.10	0.016 ± 0.008 0.40 ± 0.20	0.024 ± 0.008 0.60 ± 0.20	inches mm
RNCP1206	0.122 ± 0.008 3.10 ± 0.20	0.059 ± 0.008 1.50 ± 0.20	0.020 ± 0.004 0.50 ± 0.10	0.020 ± 0.012 0.50 ± 0.30	0.028 ± 0.008 0.70 ± 0.20	inches mm

Performance Characteristics

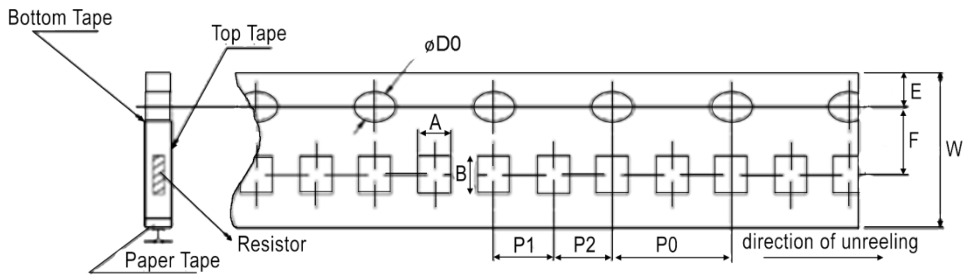
Test Items	Reference Standard	Condition of Test	Test Limits (ΔR)
Temperature Coefficient of Resistance	MIL-STD-202F Method 304; JIS-C5201-1-4.8	+25~ +125ºC	±100 ppm/ºC
Short Time Overload	MIL-R-55342D Paragraph 4.7.5; JIS-C5201-1-4.13	2.5 X rated voltage for 5 s.	F: ± (1% + 0.1Ω) J: ± (2% + 0.1Ω)
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000 h. @ T=125ºC. Unpowered. Measurement at 24 ± 2 hours after test conclusion.	F: ± (2% + 0.1Ω) J: ± (2% + 0.1Ω)
Temperature Cycling	JESD22 Method JA-104	1000 cycles (-55ºC to +125ºC) Measurement at 24 ± 2 hours after test conclusion	F: ± (0.5% + 0.05Ω) J: ± (1% + 0.1Ω) Remark: R≤10Ω: F/J: ± (1% + 0.1Ω)
Moisture Resistance	MIL-STD-202 Method 106	1000 h., T=24 hours/cycle Notes: Steps 7a & 7b not required. Unpowered.	F: ± (1% + 0.05Ω) J: ± (2% + 0.1Ω)
Biased Humidity	MIL-STD-202 Method 103	1000 h. 85ºC / 85% RH. Note: Specified conditions: 10% of operating power. Measurement at 24 ± 2 hours after test conclusion	F: ± (3% + 0.1Ω) J: ± (3% + 0.1Ω)
Operational Life	MIL-STD-202 Method 108	1000 h. TA=125ºC at rated power. Measurement at 24 ± 2 hours after test conclusion. Remark: Mounted quantity: Mounted 2 pc. on 1 PCB	F: ± (1% + 0.05Ω) J: ± (3% + 0.1Ω)
Resistance to Soldering Heat	MIL-STD-202 Method 210	Condition B: Immerse the specimens in an eutectic solder at 260 ± 5ºC for 10 ± 1s.	F: ± (0.5% + 0.05Ω) J: ± (1% + 0.1Ω)
Solderability	J-STD-002	245 ± 5ºC solder, 2 ± 0.5 s. dwell Solder: Sn96.5 / Ag3.0 / Cu0.5	>95% area covered with tin
Board Flex (Bending)	AEC-Q200-005	3mm deflection	F: ± (0.5% + 0.05Ω) J: ± (1% + 0.1Ω)
Terminal Strength (SMD)	AEC-Q200-006	Pressure X kgf a R0.5 pressure rod for 60 s. 0201: NA 0402: 0.5Kg 0805: 1.0Kg 0603: 0.5Kg 1206: 1.8Kg	F: ± (0.5% + 0.05Ω) J: ± (1% + 0.1Ω)

Power Derating Curve:

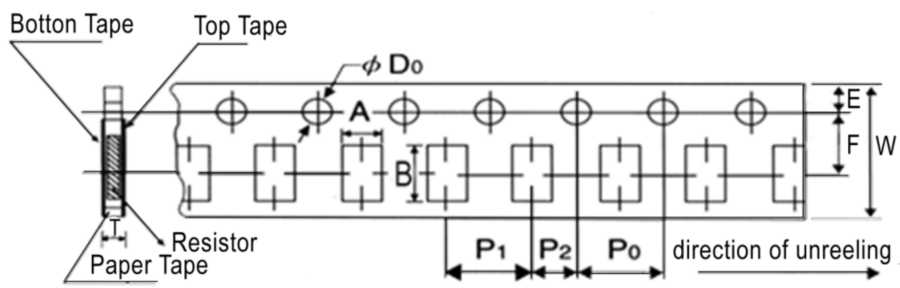


Packaging Specifications

RNCP0402
(2mm Pitch Paper)



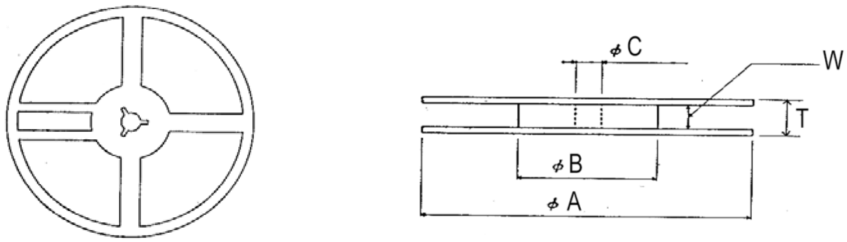
RNCP0603, 0805, 1206
(4mm Pitch Paper)



Type / Code	Paper Tape Pitch	A	B	W	E	F	Unit
RNCP0402	0.079 2.00	0.028 ± 0.002 0.70 ± 0.05	0.047 ± 0.002 1.20 ± 0.05	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
RNCP0603	0.157 4.00	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 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
RNCP0805	0.157 4.00	0.063 ± 0.006 1.60 0.15	0.094 ± 0.008 2.40 ± 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
RNCP1206	0.157 4.00	0.079 ± 0.006 2.00 ± 0.15	0.142 ± 0.008 3.60 ± 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

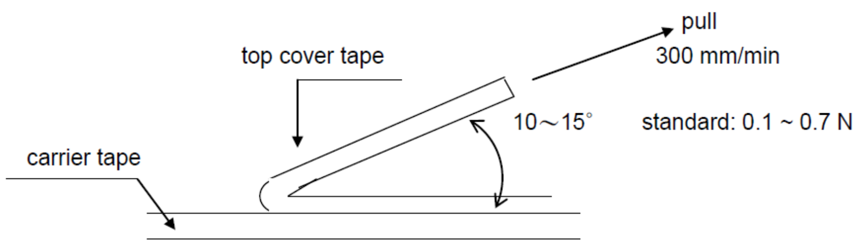
Type / Code	P1	P2	P0	D0(ø)	T	Unit
RNCP0402	0.079 ± 0.004 2.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.018 ± 0.004 0.45 ± 0.10	inches mm
RNCP0603	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.025 ± 0.004 0.64 ± 0.10	inches mm
RNCP0805	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.84 ± 0.10	inches mm
RNCP1206	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.84 ± 0.10	inches mm

Reel Specifications



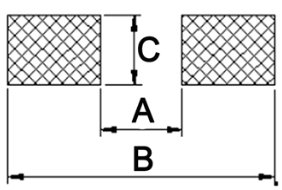
Type / Code	ØA	ØB	Øc	W	T	Unit
RNCP	7.008 ± 0.079 178.00 ± 2.00	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.039 13.00 ± 1.00	0.354 ± 0.039 9.00 ± 1.00	0.453 ± 0.039 11.50 ± 1.00	inches mm

Peel-off Force Specifications



Peel-off force of paper and blister tape is in accordance with "JIS-C5202", that is, 0.1 to 0.7N at a peel-off speed of 300 mm/minute.

Solder Land Pattern

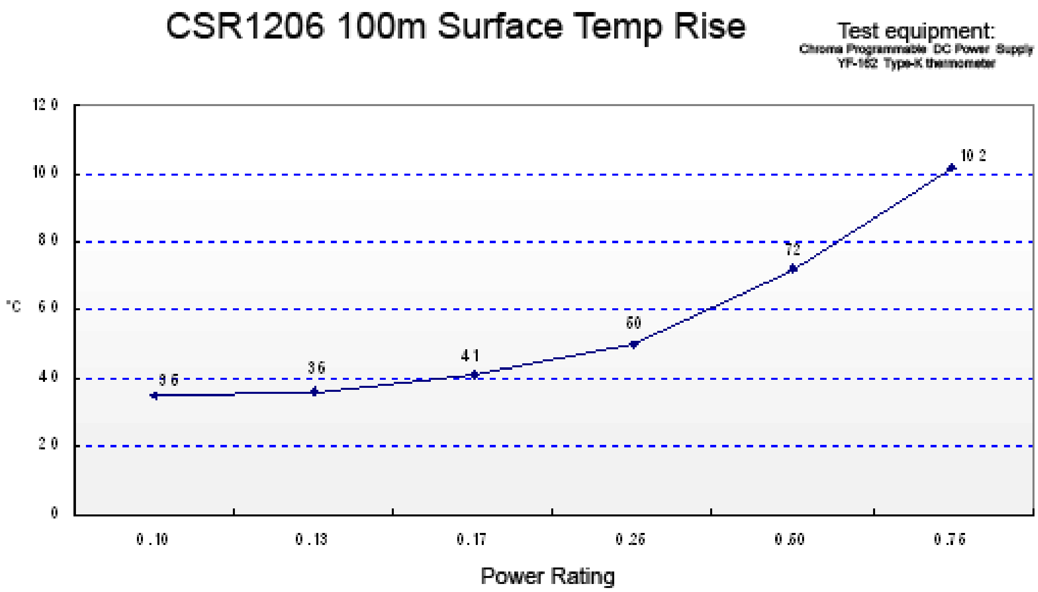


Type / Code	A	B	C	Unit
0402	0.016 0.40	0.059 1.50	0.024 0.60	inches mm
0603	0.026 0.65	0.083 2.10	0.035 0.90	inches mm
0805	0.039 1.00	0.118 3.00	0.051 1.30	inches mm
1206	0.079 2.00	0.165 4.20	0.063 1.60	inches mm

High Power Chip Resistors and Thermal Management

Stackpole has developed several surface mount resistor series in addition to our current sense resistors, which have had higher power ratings than standard resistor chips. This has caused some uncertainty and even confusion by users as to how to reliably use these resistors at the higher power ratings in their designs.

The data sheets for the RHC, RMCP, RNCP, CSR, CSRN, CSRF, CSS, and CSSH state that the rated power assumes an ambient temperature of no more than 100°C for the CSS / CSSH series and 70°C for all other high power resistor series. In addition, IPC and UL best practices dictate that the combined temperature on any resistor due to power dissipated and ambient air shall be no more than 105°C. At first glance this wouldn't seem too difficult, however the graph below shows typical heat rise for the CSR ½ 100 milliohm at full rated power. The heat rise for the RMCP and RNCP would be similar. The RHC with its unique materials, design, and processes would have less heat rise and therefore would be easier to implement for any given customer.



The 102°C heat rise shown here would indicate there will be additional thermal reduction techniques needed to keep this part under 105°C total hot spot temperature if this part is to be used at 0.75 watts of power. However, this same part at the usual power rating for this size would have a heat rise of around 72°C. This additional heat rise may be dealt with using wider conductor traces, larger solder pads and land patterns under the solder mask, heavier copper in the conductors, via through PCB, air movement, and heat sinks, among many other techniques. Because of the variety of methods customers can use to lower the effective heat rise of the circuit, resistor manufacturers simply specify power ratings with the limitations on ambient air temperature and total hot spot temperatures and leave the details of how to best accomplish this to the design engineers. Design guidelines for products in various market segments can vary widely so it would be unnecessarily constraining for a resistor manufacturer to recommend the use of any of these methods over another.

Note: The final resistance value can be affected by the board layout and assembly process, especially the size of the mounting pads and the amount of solder used. This is especially notable for resistance values ≤ 50mΩ. This should be taken into account when designing.

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 2). 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.

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)
RNCP	High Power Anti-Sulfur Thin Film Chip Resistor	SMD	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	13	14	15
R	N	C	P	0	6	0	3	F	T	D	4	K	7	5

Product Series (digits 1–4)

RNCP	High Power Anti-Sulfur Thin Film

Size / Power (digits 5–8)

Size	Power
0402	0.1W
0603	0.125W
0805	0.25W
1206	0.5W

Tolerance (digit 9)

Code	Tol	Value
F	1%	E96, E24
J	5%	E24

Packaging (digit 10)

Code	Description	Size	Quantity
T	7" Reel - Paper Tape	0402	10,000
		0603, 0805, 1206	5,000

TCR (digit 11)

Code	ppm
D	100

Resistance Value (digits 12–15)

Four characters with the multiplier used as the decimal holder.

1 ohm = 1R00
47 Kohm = 47K0
100 Kohm = 100K

Certain resistance values will require a high minimum order quantity. Contact Stackpole Customer Service for details.