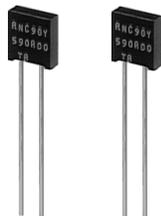


Bulk Metal® Foil Technology RNC90Y and RNC90Z (Z-Foil) to MIL-PRF-55182/9



INTRODUCTION

Vishay Military Established Reliability resistors are available in resistance values from 4.99 Ω through 121 k Ω and for tolerances from $\pm 0.005\%$ to $\pm 1.0\%$. The same resistors are also available as a non-qualified product for customers desiring higher or lower resistance values and the same or better performance capabilities. (See table 2) Both the qualified and the non-qualified version are manufactured on the same production line facilities and are subjected to the same process, lot control, conditioning, and GRP A (100%) screening. Qualified versions receive additional MIL Group B and C testing.

FEATURES

- QPL product with established reliability (ER): meets requirements of MIL-PRF-55182/9
- Load life stability: $\pm 0.005\%$ for 2000 h, 0.3 W at + 125 $^{\circ}\text{C}$
- Temperature coefficient of resistance (TCR): ± 2 ppm/ $^{\circ}\text{C}$ max. (- 55 $^{\circ}\text{C}$ to + 175 $^{\circ}\text{C}$)
- Resistance tolerance: to $\pm 0.005\%$
- Thermal EMF: < 0.1 $\mu\text{V}/^{\circ}\text{C}$
- Qualified resistance range: 4.99 Ω to 121 k Ω (RNC90Y)
30.1 Ω to 121 k Ω (RNC90Z)
- Specially conditioned non-QPL resistors available
See data sheet "Improved Performance Tested"
- Fast thermal stabilization
- Rise time: 1 ns without ringing
- Special coatings that provide a cushioning layer which isolates the resistive element from external stresses and moisture
- Electrostatic discharge (ESD) above 25 000 V
- Non inductive, non capacitive design
- Current noise < - 42 dB
- Prototype sample available from 72 h

TABLE 1 - SPECIFICATIONS COMPARISON

SPECIFICATION	RNC90Y (QUALIFIED) MIL-PRF-55182/9 CHARACTERISTIC Y LIMITS	RNC90Z (QUALIFIED) MIL-PRF-55182/9 CHARACTERISTIC Z LIMITS	S555 (NON-QUALIFIED) VISHAY PERFORMANCE LIMITS	Z555 (NON-QUALIFIED) VISHAY PERFORMANCE LIMITS
Temperature Coefficient of Resistance	± 5 ppm/ $^{\circ}\text{C}$ (- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$) ± 10 ppm/ $^{\circ}\text{C}$ (+ 125 $^{\circ}\text{C}$ to + 175 $^{\circ}\text{C}$)	± 2 ppm/ $^{\circ}\text{C}$ (- 55 $^{\circ}\text{C}$ to + 175 $^{\circ}\text{C}$)	± 5 ppm/ $^{\circ}\text{C}$ (- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$)	± 3 ppm/ $^{\circ}\text{C}$ ± 2.5 ppm/ $^{\circ}\text{C}$ ± 2 ppm/ $^{\circ}\text{C}$ (- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$)
Resistance Range	4.99 Ω to 121 k Ω	30.1 Ω to 121 k Ω	1 Ω to 150 k Ω	4.99 Ω to 25 Ω > 25 Ω to 80 Ω > 80 Ω
Failure Rate	Level R	Level R	Not specified	Not specified
Load-Life Stability 0.3 W at + 125 $^{\circ}\text{C}$ at 2000 h at 10 000 h	$\pm 0.05\%$ maximum ΔR $\pm 0.5\%$ maximum ΔR	$\pm 0.05\%$ maximum ΔR $\pm 0.5\%$ maximum ΔR	$\pm 0.015\%$ maximum ΔR^2 $\pm 0.05\%$ maximum ΔR^2	$\pm 0.015\%$ maximum ΔR^2 $\pm 0.05\%$ maximum ΔR^2
Current Noise	Not specified	Not specified	- 40 dB minimum	- 40 dB minimum
High-Frequency Operation Rise Time Inductance ³⁾ (L) Capacitance (C)	Not specified Not specified	Not specified Not specified	1.0 ns at 1 k Ω 0.1 μH maximum 0.08 μH typical 1.0 pF maximum 0.5 pF typical	1.0 ns at 1 k Ω 0.1 μH maximum 0.08 μH typical 1.0 pF maximum 0.5 pF typical
Voltage Coefficient	0.0005 %/V	0.0005 %/V	0.0001 %/V	0.0001 %/V
Working Voltage ⁴⁾	300 V maximum	300 V maximum	300 V maximum	300 V maximum
Thermal EMF ⁵⁾	Not specified	Not specified	0.1 $\mu\text{V}/^{\circ}\text{C}$ maximum 1 $\mu\text{V}/\text{W}$ maximum	0.1 $\mu\text{V}/^{\circ}\text{C}$ maximum 1 $\mu\text{V}/\text{W}$ maximum

Notes

1. Qualification and failure rate verification test data is maintained by Vishay Foil and is available upon request. Lot traceability and identification data is maintained by Vishay Foil for 7 years.
2. Load life ΔR Maximum can be reduced by 80 % through Enhanced Reliability Testing (ERT). Consult Vishay Applications Engineering for details.
3. Inductance (L) due mainly to the leads.
4. Not to exceed power rating of resistor.
5. $\mu\text{V}/^{\circ}\text{C}$ relates to EMF due to lead temperature differences and $\mu\text{V}/\text{W}$ due to power applied to the resistor.
6. 0.200" (5.08 mm) lead spacing available - specify RNC90T for RNC90Y, and RNC90S for RNC90Z.

FIGURE 1 - COMPARISON OF RNC90Y TO RNC90Z TEMPERATURE COEFFICIENT OF RESISTANCE

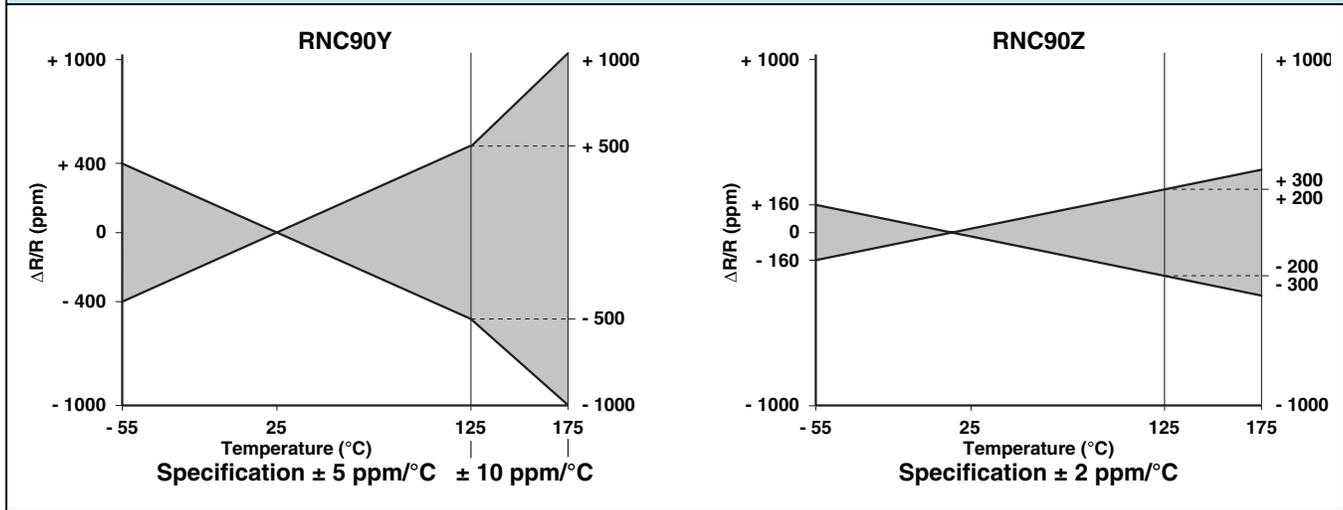


FIGURE 2 - TRIMMING TO VALUES
(Conceptual Illustration)

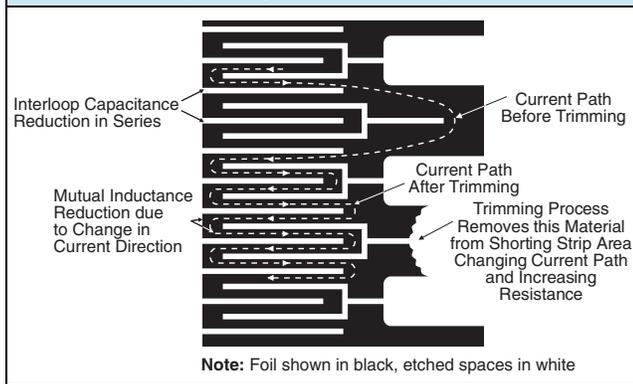


FIGURE 3 - POWER DERATING CURVE

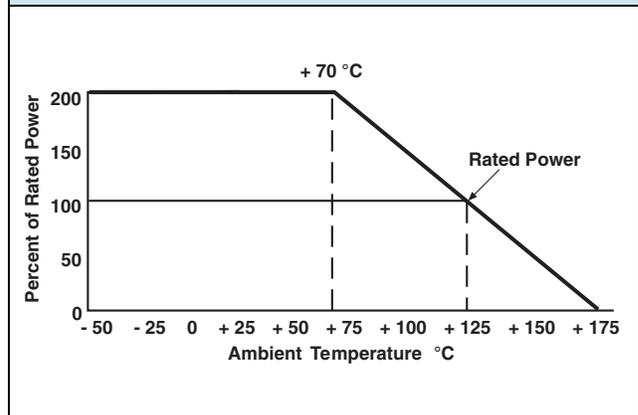


FIGURE 4 - IMPRINTING AND DIMENSIONS

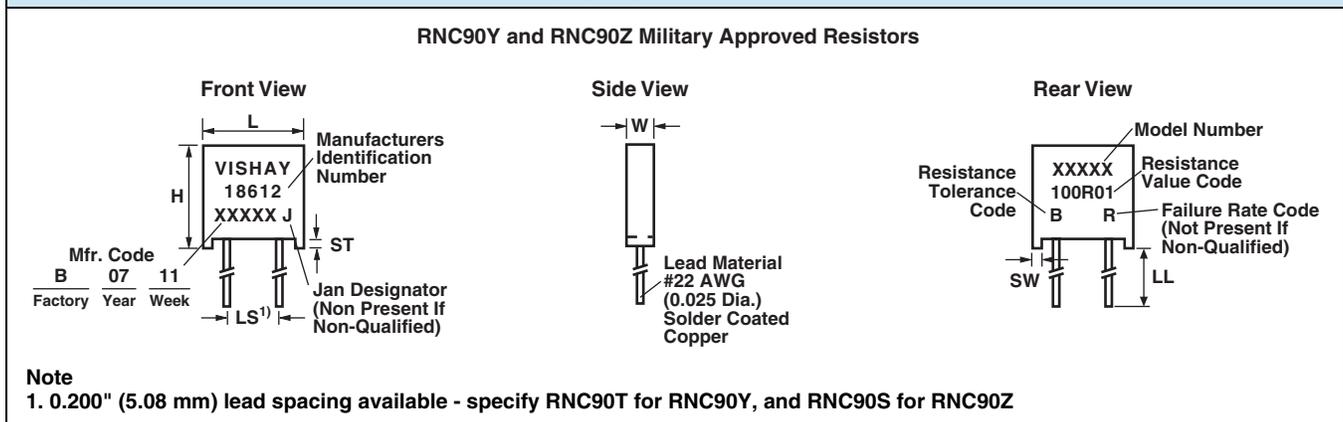


TABLE 2 - MODEL SELECTION

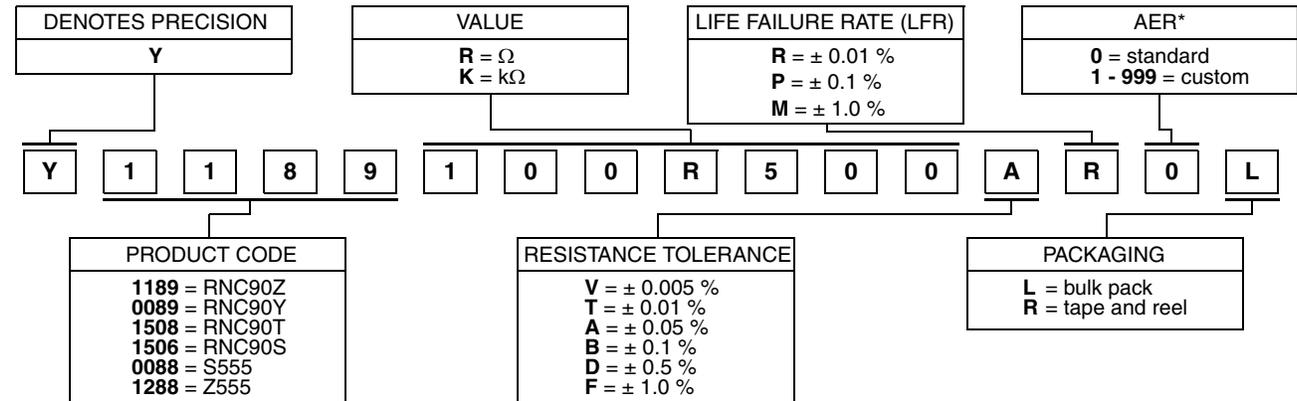
MODEL NUMBER	RESISTANCE RANGE (Ω)	STANDARD RESISTANCE TOLERANCE		FAILURE RATE	AMBIENT POWER RATING		AVERAGE WEIGHT (g)	DIMENSIONS	
		TIGHTEST %	LOOSEST %		at + 70 °C	at + 125 °C		INCHES	mm
RNC90Y	30.1 to 121K 16.2 to 30.0 4.99 to 16.0	± 0.005 ± 0.05 ± 0.1	± 1.0 ± 1.0 ± 1.0	M, P, R (See Table 3)	0.6 W	0.3 W	0.6	W: 0.105 ± 0.010 L: 0.300 ± 0.010 H: 0.326 ± 0.010 ST: 0.015 ± 0.005 SW: 0.040 ± 0.005 LL: 1.000 ± 0.125 LS: 0.150 ± 0.005	2.67 ± 0.25 7.62 ± 0.25 8.28 ± 0.25 0.38 ± 0.13 1.02 ± 0.13 25.4 ± 3.18 3.81 ± 0.13
RNC90Z	30.1 to 121K	± 0.005	± 1.0		0.6 W	0.3 W			
S555 (NON QPL)	30.1 to 121K	± 0.005	± 1.0	-	0.6 W	0.3 W	0.6		
	20 to < 30.1	± 0.01	± 1.0						
	5 to < 20	± 0.05	± 1.0						
	2 to < 5	± 0.1	± 1.0						
1 to < 2	± 0.5	± 1.0							
	> 121K to 150K	± 0.005	± 1.0	-	0.4 W	0.2 W	0.6		
Z555 (NON QPL)	30.1 to 121K	± 0.005	± 1.0	-	0.6 W	0.3 W	0.6		
	20 to < 30.1	± 0.01	± 1.0						
	4.99 to < 20R	± 0.05	± 1.0						

Note

- S555 and Z555 units are manufactured on the same production line facilities and are subjected to all the same process and lot control requirements imposed on RNC90Y (Z) version, as well as all of the special screening, environmental conditioning and documentation stipulations outlined in MIL-PRF 55182/9

TABLE 3 - GLOBAL PART NUMBER INFORMATION

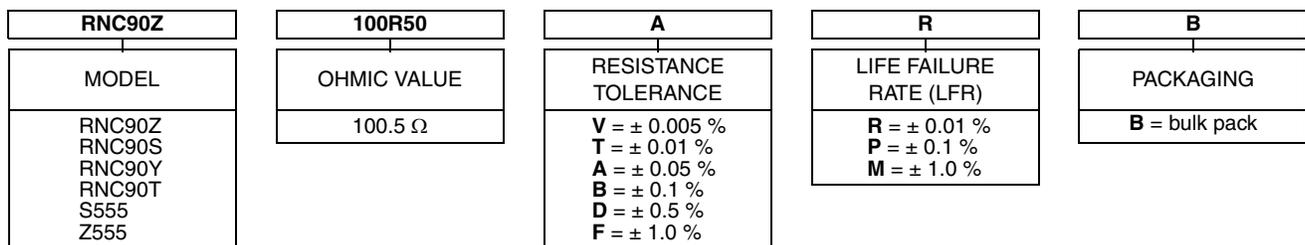
NEW GLOBAL PART NUMBER: Y1189100R500AR0L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1189 100R500 A R 0 L:

TYPE: RNC90Z
 VALUE: 100.5 Ω
 ABSOLUTE TOLERANCE: ± 0.05 %
 LIFE FAILURE RATE (LFR): ± 0.01 %
 AER: standard
 PACKAGING: bulk pack

HISTORICAL PART NUMBER: RNC90Z 100R50 A R B (will continue to be used)



Note

- * For non-standard requests, please contact application engineering.

CAGE #18612

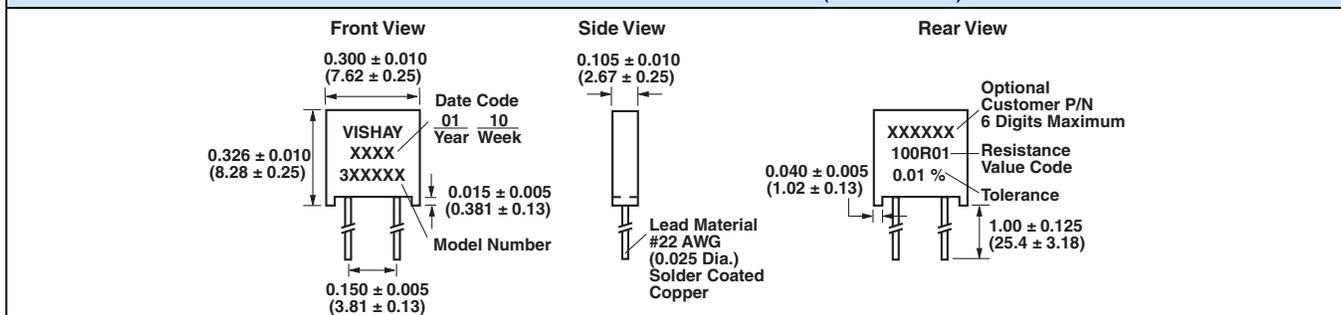
“Commercial and Government Entity”
Formerly “FSCM”

The response of military and non military grade resistors to environmental stresses can be made better by “Improved Performance Testing” (IPT). The IPT part will see burn-in and cycling that removes the “knee” from the normal drift of non IPT parts. (See Table 4 for the improvement to expect in military parts when calling for Vishay recommended screening). Users should be aware that IPT testing renders the part non QPL and so a 3XXXXX part number will be assigned by Vishay. Consult Applications Engineering for details and ordering advice.

TABLE 4 - IMPROVED PERFORMANCE TESTING (NON-QPL APPROVED) VS. QPL

TEST GROUP	TEST	RNC90Y MIL-PRF-55182/9		VISHAY IMPROVED PERFORMANCE TESTING (IPT) LIMITS
		METHOD PARAGRAPH	LIMITS	
I	Power Conditioning	not done	-	± 0.0025 %
	Thermal Shock and	4.8.2	-	± 0.0025 %
	Overload Combined	4.8.3	± 0.05 %	± 0.0025 %
II	Resistance Temperature Characteristic	4.8.9	± 5 ppm/°C	< ± 2 ppm/°C (- 55 °C to + 125 °C) (Can be sorted for tighter tracking)
	Low Temperature Storage	4.8.23	± 0.05 %	± 0.0025 %
	Low Temperature Operation	4.8.10	± 0.05 %	± 0.0025 %
	Terminal Strength	4.8.11	± 0.02 %	± 0.001 %
III	DWV	4.8.12	± 0.02 %	± 0.001 %
	Insulation Resistance	4.8.13	10 ⁴ MΩ	> 10 ⁴ MΩ
	Resistance to Soldering Heat	4.8.14	± 0.02 %	± 0.001 %
	Moisture Resistance	4.8.15	± 0.05 %	± 0.015 %
IV	Shock	4.8.16	± 0.01 %	± 0.0025 %
	Vibration	4.8.17	± 0.02 %	± 0.0025 %
V	Load Life at + 125 °C; 2000 h	4.8.18	± 0.05 %	± 0.005 % (50 ppm)
	Load Life at + 125 °C; 10 000 h	4.8.18	± 0.5 %	± 0.015 % (150 ppm)
V (a)	+ 85 °C Power Rating	-	-	± 0.005 % (50 ppm)
	+ 70 °C Power Rating	4.8.18	± 0.05 %	± 0.005 % (50 ppm)
V (b)	+ 25 °C Power Rating	-	-	± 0.005 % (50 ppm)
VI	Storage Life	-	-	± 0.0025 %
VII	High Temperature Exposure	4.8.19	± 0.5 %	± 0.005 %
VIII	Max. Allowance Reactance	-	-	< 1 %
	Current Noise	-	-	< - 42 dB
	Voltage Coefficient	4.8.20	0.0005 %/V (5 ppm/V)	< 0.00001 %/V (< 0.1 ppm/V)
		-	-	
	Thermal EMF	-	-	0.1 μV/°C

FIGURE 5 - IPT IMPRINTING AND DIMENSIONS in inches (millimeters)



Disclaimer

All product specifications and data are subject to change without notice.

Vishay Precision Group, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay Precision Group"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay Precision Group disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay Precision Group's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay Precision Group.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay Precision Group products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay Precision Group for any damages arising or resulting from such use or sale. Please contact authorized Vishay Precision Group personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.

Disclaimer

ALL PRODUCTS, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Vishay Precision Group, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay Precision Group"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

The product specifications do not expand or otherwise modify Vishay Precision Group's terms and conditions of purchase, including but not limited to, the warranty expressed therein.

Vishay Precision Group makes no warranty, representation or guarantee other than as set forth in the terms and conditions of purchase. **To the maximum extent permitted by applicable law, Vishay Precision Group disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.**

Information provided in datasheets and/or specifications may vary from actual results in different applications and performance may vary over time. Statements regarding the suitability of products for certain types of applications are based on Vishay Precision Group's knowledge of typical requirements that are often placed on Vishay Precision Group products. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

No license, express, implied, or otherwise, to any intellectual property rights is granted by this document, or by any conduct of Vishay Precision Group.

The products shown herein are not designed for use in life-saving or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay Precision Group products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay Precision Group for any damages arising or resulting from such use or sale. Please contact authorized Vishay Precision Group personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.