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

INTRODUCTION

Military Established Reliability resistors from Vishay Foil Resistors are available in resistance values from 4.99 Ω through 121 kΩ and for tolerances from ± 0.005 % to ± 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: ± 0.005 % for 2000 h, 0.3 W at + 125 °C
- Temperature coefficient of resistance (TCR): ± 2 ppm/°C max. (- 55 °C to + 175 °C)
- Resistance tolerance: to ± 0.005 %
- Thermal EMF: < 0.1 µV/°C
- Qualified resistance range: 4.99 Ω to 121 kΩ (RNC90Y)
30.1 Ω to 121 kΩ (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) VFR PERFORMANCE LIMITS	Z555 (NON-QUALIFIED) VFR PERFORMANCE LIMITS
Temperature Coefficient of Resistance	± 5 ppm/°C (- 55 °C to + 125 °C) ± 10 ppm/°C (+ 125 °C to + 175 °C)	± 2 ppm/°C (- 55 °C to + 175 °C)	± 5 ppm/°C (- 55 °C to + 125 °C)	± 3 ppm/°C ± 2.5 ppm/°C ± 2 ppm/°C (- 55 °C to + 125 °C)
Resistance Range	4.99 Ω to 121 kΩ	30.1 Ω to 121 kΩ	1 Ω to 150 kΩ	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 °C at 2000 h at 10 000 h	 ± 0.05 % maximum ΔR ± 0.5 % maximum ΔR	 ± 0.05 % maximum ΔR ± 0.5 % maximum ΔR	 ± 0.015 % maximum ΔR[2)] ± 0.05 % maximum ΔR[2)]	 ± 0.015 % maximum ΔR[2)] ± 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 Not specified Not specified	 1.0 ns at 1 kΩ 0.1 µH maximum 0.08 µH typical 1.0 pF maximum 0.5 pF typical	 1.0 ns at 1 kΩ 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 µV/°C maximum 1 µV/W maximum	0.1 µV/°C maximum 1 µV/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 our Applications Engineering for details.
3. Inductance (L) due mainly to the leads.
4. Not to exceed power rating of resistor.
5. µV/°C relates to EMF due to lead temperature differences and µV/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

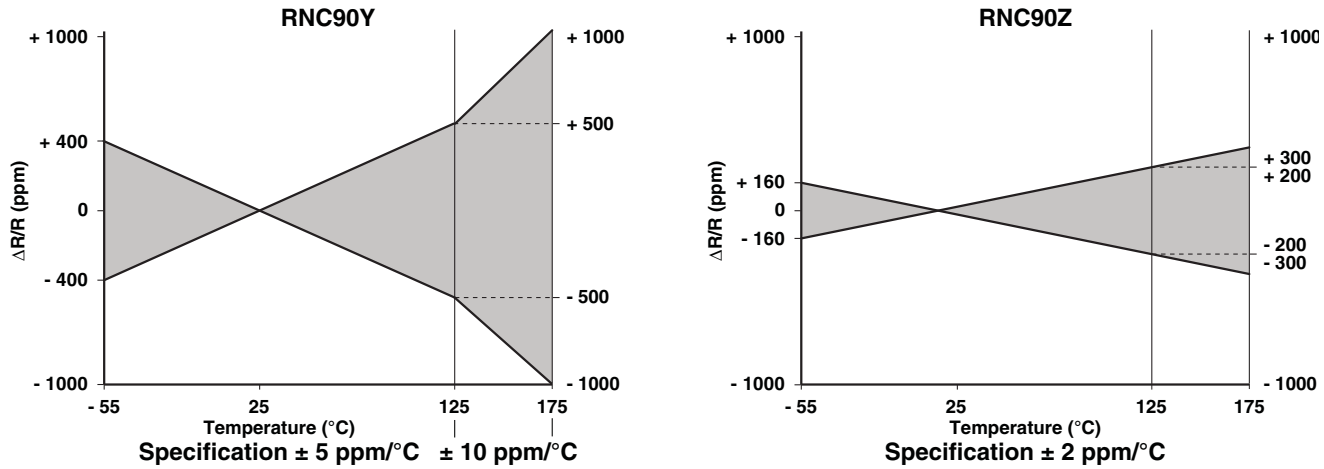
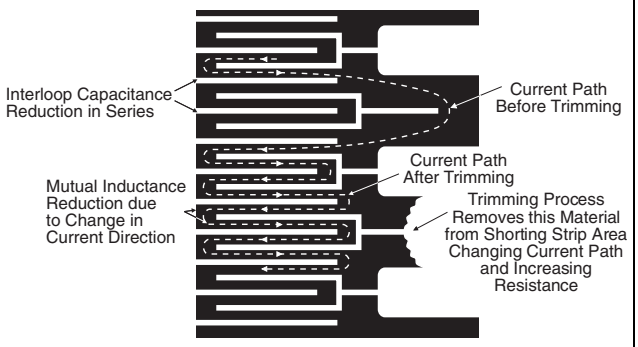


FIGURE 2 - TRIMMING TO VALUES

(Conceptual Illustration)



Note: Foil shown in black, etched spaces in white

FIGURE 3 - POWER DERATING CURVE

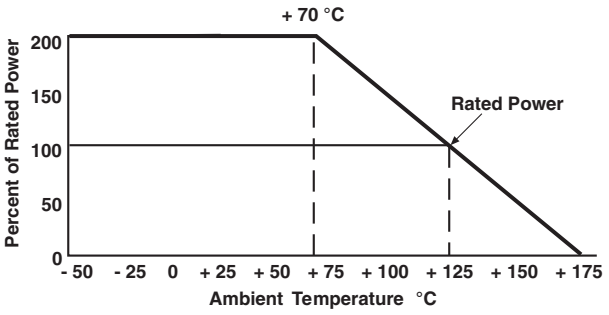
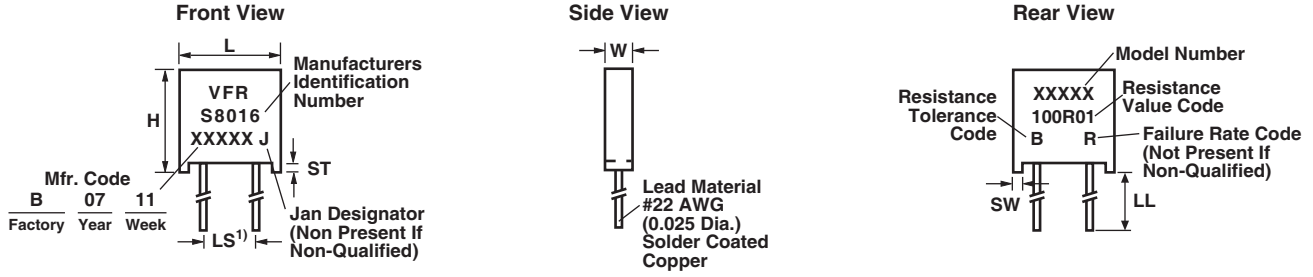


FIGURE 4 - IMPRINTING AND DIMENSIONS

RNC90Y and RNC90Z Military Approved Resistors



Note

1. 0.200" (5.08 mm) lead spacing available - specify RNC90T for RNC90Y, and RNC90S for RNC90Z

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	± 0.005	± 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
	16.2 to 30.0	± 0.05	± 1.0						
	4.99 to 16.0	± 0.1	± 1.0						
RNC90Z	30.1 to 121K	± 0.005	± 1.0		0.6 W	0.3 W	0.6		
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)

DENOTES PRECISION	VALUE	LIFE FAILURE RATE (LFR)(1)	AER(2)
Y	**R** = Ω **K** = kΩ	**R** = ± 0.01 % **P** = ± 0.1 % **M** = ± 1.0 %	**0** = standard **1 - 999** = custom

Y	1	1	8	9	1	0	0	R	5	0	0	A	R	0	L

PRODUCT CODE	RESISTANCE TOLERANCE	PACKAGING
1189 = RNC90Z **0089** = RNC90Y **1508** = RNC90T **1506** = RNC90S **0088** = S555 **1288** = Z555	**V** = ± 0.005 % **T** = ± 0.01 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**L** = bulk pack **R** = tape and reel

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)

RNC90Z	100R50	A	R	B
MODEL	OHMIC VALUE	RESISTANCE TOLERANCE	LIFE FAILURE RATE (LFR)(1)	PACKAGING
RNC90Z RNC90S RNC90Y RNC90T S555 Z555	100.5 Ω	**V** = ± 0.005 % **T** = ± 0.01 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**R** = ± 0.01 % **P** = ± 0.1 % **M** = ± 1.0 %	**B** = bulk pack

Note

(1) Applicable only for QPL part. For S555 and Z555 please assign "0" instead.

(2) For non-standard requests, please contact application engineering.

CAGE #S8016

"Commercial and Government Entity"

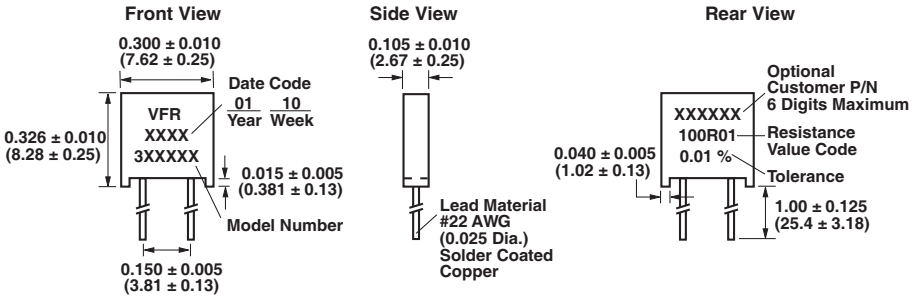
Formerly "FSCM"

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 VFR recommended screening). Users should be aware that IPT testing renders the part non QPL and so a 3XXXXX part number will be assigned by VFR. 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 FOIL RESISTORS 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	< 0.00001 %/V
		-	(5 ppm/V)	(< 0.1 ppm/V)
	Thermal EMF	-	-	0.1 µV/°C

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



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