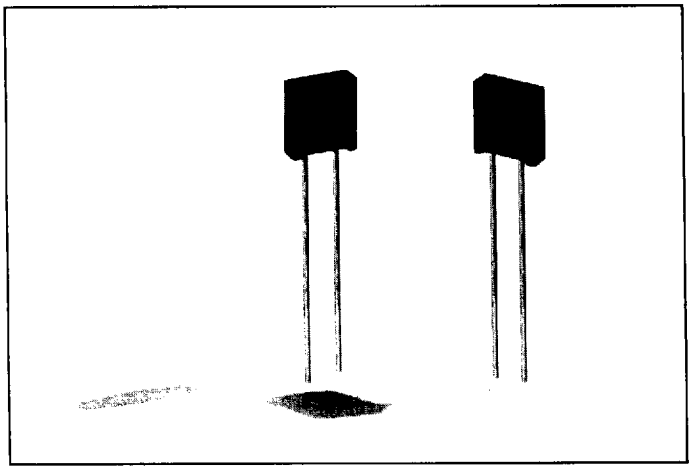
VISHAY RESISTORS

MILITARY ESTABLISHED RELIABILITY

RNC90Y to MIL-R-55182/9 and M122/1 to MIL-R-122



Vishay Military Established Reliability resistors are available in resistance values from 4.99 Ω through 121K Ω 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 basic QPL testing requirements.

FEATURES

- QPL product with established reliability.
- Best Load Life Stability: ±0.05% ΔR for 2,000 hrs. @ +125°C
- Best TCR: ±2.5 ppm/°C (–55°C to +125°C)
- Best Shelf Life: 0.0025% (25 ppm) for 3 years
- Best Thermal EMF: 0.05 µV/°C
- Qualified Resistance Range: 4.99 Ω to 121K Ω
- Resistance Tolerance: to ±0.005%
- Specially conditioned non-QPL resistors available. See Improved Performance Tested (IPT) data (Page 29).

TABLE 1 - SPECIFICATIONS COMPARISON

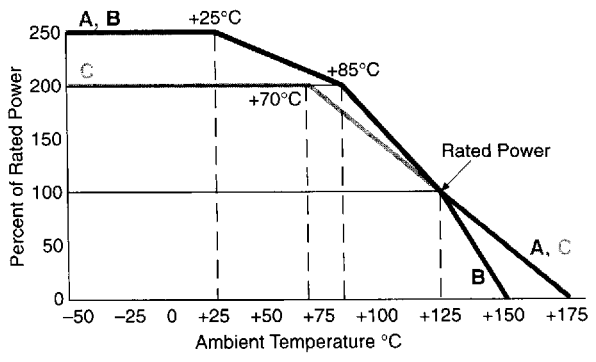
	MIL-R-55182/9 Char. Y Limits RNC90Y	MIL-R-122 Char. A Limits M122/1
Temperature Coefficient of Resistance —	±5 ppm/°C (–55°C to +125°C) ±10 ppm/°C (+125°C to +175°C)	±2.5 ppm/°C (–55°C to +125°C) ±3.5 ppm/°C (+125°C to +150°C) ±4.5 ppm/°C (+150°C to +175°C)
QPL Range	4.99 to 49.9K R level 50K to 121K P level	25.5 Ω to 50K P level
Load-Life Stability [1] at 2,000 Hours 0.3 W @ +125°C 0.6 W @ +85°C 0.75 W @ +25°C at 10,000 Hrs @ +125°C	 ±0.05% Maximum Δ R —— —— ±0.5% Maximum Δ R	 ±0.05% Maximum Δ R ±0.05% Maximum Δ R ±0.05% Maximum Δ R ±0.2% Maximum Δ R
Current Noise	(not specified)	–32 dB Minimum
High-Frequency Operation Rise-Decay Time Inductance [2] (L) Capacitance (C) Reactance	 Not Specified Not Specified Not Specified Not Specified	 Not Specified Not Specified Not Specified ≤10%
Voltage Coefficient	0.0005%/V	0.0001%/V
Working Voltage [3]	300 Volts Maximum	300 Volts Maximum
Thermal EMF [4]	Not Specified	1 µV/°C
Shelf Life	Not Specified	0.005%

FIGURE 1 - POWER DERATING CURVE

VISHAY is qualified to the following MIL-R-122 slash sheets:
/01 0.3 W @ +125°C. See Derating Curve A.
/03 0.3 W @ +125°C. See Derating Curve B.
/10 0.15 W @ +125°C. See Derating Curve B.

VISHAY is also qualified to MIL-R-55182/9. See Curve C.

VISHAY IPT (Improved Performance Testing) meets Curve A.



Notes:
1. Load life ΔR Max can be reduced by 80% through a burn-in procedure.
2. Inductance (L) due mainly to the leads.
3. Not to exceed power rating of resistor.
4. µV/°C relates to EMF due to lead temperature differences and µV/watt due to power applied to the resistor.

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FIGURE 2 - STANDARD MILITARY PRESENTATION OF RESISTANCE TEMPERATURE CHARACTERISTIC

±2.5 ppm/°C: MIL-R-122, Characteristic A
±5.0 ppm/°C: MIL-R-55182/9, Characteristic Y

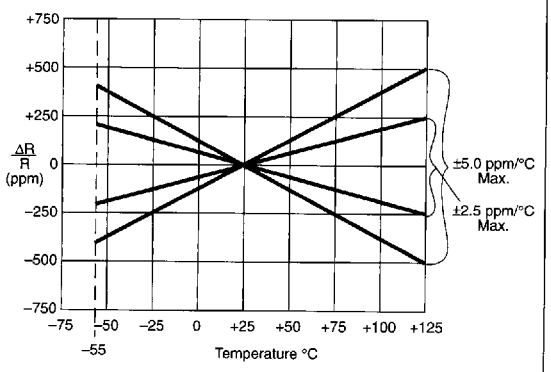
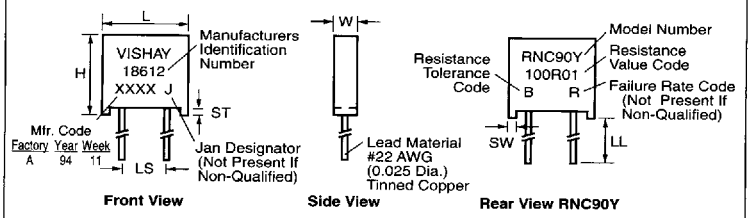


FIGURE 3 - IMPRINTING AND DIMENSIONS

RNC90Y Military Approved Resistors



M122/1 Military Approved Resistors

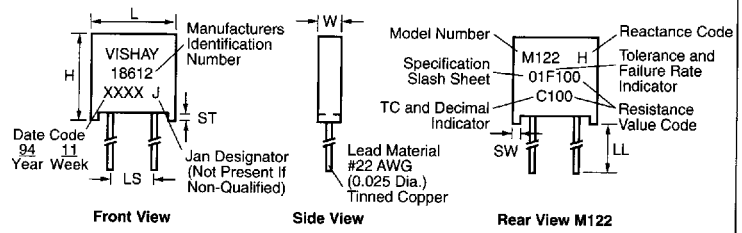


TABLE 2 - MODEL SELECTION

Model Number	Resistance Range (Ω)	Standard Resistance Tolerance		Failure Rate	Ambient Power Rating		Average Weight In Grams	Dimensions	
		Tightest %	Loosest %		@ +70°C	@ +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	See Table 5	See Figure 2	See Figure 2	0.6		
S555	30.1 to 121K 25 to <30.1 5 to <25 2 to <5 1 to <2	±0.005 ±0.01 ±0.05 ±0.1 ±0.5	±1.0 ±1.0 ±1.0 ±1.0 ±1.0	——	0.6 W	0.3 W	0.6		
	>121K to 150K	±0.005	±1.0	——	0.4 W	0.2 W	0.6		
M122/1, /3, /10	100 to 50K 25.5 to 99.9	±0.005 ±0.05	±1.0 ±1.0	See Table 3 Part 2	@ +85°C	@ +125°C	0.6		
					0.6 W /1	0.3 W			
S22-1	25.5 to 100K 5 to <25.5 2 to <5 1 to <2	±0.005 ±0.05 ±0.1 ±0.5	±1.0 ±1.0 ±1.0 ±1.0	——	0.6 W /3 0.3 W /10	0.3 W 0.15 W			

W: 0.105 ±0.010 — 2.67 ±0.25
L: 0.300 ±0.010 — 7.62 ±0.25
H: 0.326 ±0.010 — 8.28 ±0.25
ST: 0.015 ±0.005 — 0.381 ±0.13
SW: 0.040 ±0.005 — 1.02 ±0.13
LL: 1.000 ±0.125 — 25.4 ±3.18
LS: 0.150 ±0.005 — 3.81 ±0.13

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VISHAY RESISTORS

MILITARY ESTABLISHED RELIABILITY

RNC90Y to MIL-R-55182/9 and M122/1 to MIL-R-122

TABLE 3 - PART NUMBERING SYSTEM FOR M122/1

Description: Resistor, 10500 ohms, ±0.005%, failure rate "P". Application frequency: to 1MHz. Power Rating: 0.3 Watts @ +125°C

M122	H	01	B	10D5000
Military Specification	Reactance Code	Specification Sheet	Resistance Tolerance and Failure Rate	Resistance Value, Decimal/Multiplier Locator, Temperature Characteristic
MIL-R-122 Note: MIL-R-122/01 is an acceptable substitution for MIL-R-55182/9.	Vishay is qualified to Reactance Code C, D, E, H, J and K. (See Part 1 below.) Note: Characteristic "H" is the performance equivalent to the RNC90Y of MIL-R-55182/9.	Vishay is qualified to the following slash sheets: /01 Available TCR characteristics are A, B and C. (Power curve A applies.) /03 Available TCR characteristics are E and F. (Power curve B applies.) /10 Available TCR characteristics are A, B and C. (Power curve B applies.) Note: All 3 slash sheets are the same form factor.	Use the code letter from the table below for the desired combination of Failure Rate and Tolerance.	This 7 digit alphanumeric code incorporates a letter which indicates both RTC and Resistance Value. To determine the correct letter to use: First, from Part 3 below, find the RTC Code for the desired Resistance Temperatue Characteristic. Then, with the RTC code, consult Part 4 to find the correct letter to use to complete the Military Part Number.

Part 1 - Reactance Code

Vishay is qualified to Reactance Code C, D, E, H, J and K.

Frequency					
≤10K Hz		≤1 MHz		≤100 MHz	
Code	Limits	Code	Limits	Code	Limits
A	≤1	F	≤1	L	≤1
B	≤3	G	≤3	M	≤3
C	≤10	H	≤10	N	≤10
D	≤30	J	≤30	P	≤30
E	uncontrolled	K	uncontrolled	S	uncontrolled

Maximum percentage change in the initial impedence at zero hertz (nominal resistance) due to all reactive components, for all frequencies, up to and including the frequency specified.

Part 2 - Resistance Tolerance & Failure Rate

Tolerance	Failure Rate		
	M 1%/1000 hrs.	P 0.1%/1000 hrs.	R 0.01%/1000 hrs.
±0.005%	A	B	
±0.01%	E	F	
±0.05%	I	J	Not Available
±0.1%	M	N	
±0.5%	Q	R	
±1.0%	U	V	

Example: 'F' = "P" Failure Rate, 0.01% Tolerance.

Note: Resistance values for 0.5% and 1.0% tolerances must be in accordance with standard decade tables. Resistance values for 0.1% and tighter may be as required.

Part 3 - TCR Characteristics (referenced to +25°C)

RTC Code			Temperature −55°C to +125°C	TCR in ppm/°C 175	150	125	65	−15	−55
	A	±2.5	MAX	4.5	3.5	2.5	2.5	2.5	2.5
			MIN	-4.5	-3.5	-2.5	-2.5	-2.5	-2.5
	B	±5	MAX	7	6	5	5	5	5
			MIN	-7	-6	-5	-5	-5	-5
	C	±10	MAX	15	12	10	10	10	10
			MIN	-15	-12	-10	-10	-10	-10
	E	±5	MAX	7	6	5	2.5	2.5	5
			MIN	-7	-6	-5	-2.5	-2.5	-5
	F	±10	MAX	15	12	10	5	5	10
			MIN	-15	-12	-10	-5	-5	-10

Part 4 - Resistance Value, Decimal/Multiplier Locator, Temperature Characteristic

RTC Code	Resistance	
	Less Than 1K Ohm *	1K Ohm or Greater †
A	C	D
B	E	F
C	G	H
E	L	M

* For values under 1K ohm this letter is used as a decimal point and a multiplier of X1. Example: 45.5 Ω = 45C5000

† For values of 1K ohm and greater this letter is used as a decimal point and a multiplier of X1000. Example: 10500Ω = 10D5000

VISHAY RESISTORS

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TABLE 4 - HOW TO ORDER RNC90Y SERIES PARTS

Please specify Vishay RNC90Y Series Resistors as follows: (See Figure 1 and Table 2 for further details.)

Example:

RNC90Y	100R01	B [1]	R [2]
Model No.	Resistance Value	Tolerance Code	Life Failure Rate Code

Resistance Value, in ohms, is expressed by a series of 6 characters, 5 of which represent significant digits while the 6th is a dual purpose letter that designates both the multiplier and the location of the decimal point.

For Military approved resistors with improved performance testing a unique 3XXXXX part number will be assigned.

Resistance Range	Letter Designator	Multiplier Factor	Example
1 Ω to <1K Ω	R	x 1	100R01 = 100.01 Ω
1K Ω to 121K Ω	K	x 10^3	15K231 = 15.231 Ω

[1] STANDARD RESISTANCE TOLERANCE AND SYMBOLS FOR RNC90Y AND S555

Tolerance	Symbol
±0.005%	V
±0.01%	T
±0.05%	A
±0.1%	B
±0.5% *	D
±1.0% *	F

** ±0.5% and ±1.0% resistors available only in standard values per MIL-R-55182*

[2] LIFE FAILURE RATE

Resistance Value Range	Failure Rate†
4.99 ohms to 16.0 ohms	M, P, R
16.2 ohms to 30.0 ohms	M, P, R
30.1 ohms to 49.9K ohms	M, P, R
50K ohms to 121K ohms	M, P *

** "R" level anticipated soon. Call factory to confirm.*

† Failure rate code:

LFR	Symbol
1.0%	M
0.1%	P
0.01%	R

TABLE 5 - HOW TO ORDER M122 SERIES PARTS

Please specify Vishay M122 series resistors as follows: (For specific information, refer to Table 3.)

Example:

M122	H	01	A	100C000
Model No.	Reactance Code	Slash Sheet	Resistance Tolerance and Failure Rate	Resistance Value, Decimal/Multiplier Locator, Temperature Characteristic

CAGE #18612

"Commercial and Government Entity"
Formerly "FSCM".

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