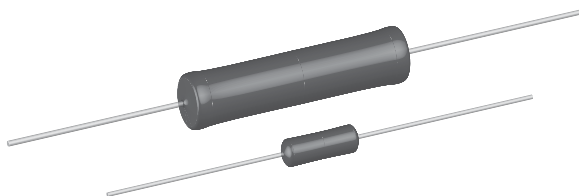


# Wirewound Resistors, Military/Established Reliability, MIL-PRF-39007 Qualified, Type RWR, Up to S Level, Axial Lead



## DESIGN SUPPORT TOOLS

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## FEATURES

- High temperature silicone coated
- Complete welded construction
- Qualified to MIL-PRF-39007
- Available in non-inductive styles (type N) with Ayrton-Perry winding for lowest reactive components
- “S” level failure rate available

## Note

- “Terminal Wire and Winding” type “W” and “Z” are not listed below but are available upon request. Please reference MIL-PRF-39007 QPL for approved “failure rate” and “resistance tolerance/ranges”

## STANDARD ELECTRICAL SPECIFICATIONS

| MILITARY MODEL | VISHAY REFERENCE MODEL | POWER RATING<br>$P_{25^{\circ}\text{C}}$ W | RESISTANCE RANGE $\Omega$<br>$\pm 0.1\%$ | RESISTANCE RANGE $\Omega$<br>$\pm 0.5\%, \pm 1\%$ | WEIGHT<br>(typical) g |
|----------------|------------------------|--------------------------------------------|------------------------------------------|---------------------------------------------------|-----------------------|
| RWR81S         | EGS-1-80               | 1                                          | 0.499 to 1K                              | 0.1 to 1K                                         | 0.21                  |
| RWR81N         | EGN-1-80               | 1                                          | 0.499 to 499                             | 0.1 to 499                                        | 0.21                  |
| RWR82S         | EGS-2                  | 1.5                                        | 0.499 to 1.3K                            | 0.1 to 1.3K                                       | 0.23                  |
| RWR82N         | EGN-2                  | 1.5                                        | 0.499 to 649                             | 0.1 to 649                                        | 0.23                  |
| RWR80S         | EGS-3-80               | 2                                          | 0.499 to 3.16K                           | 0.1 to 3.16K                                      | 0.34                  |
| RWR80N         | EGN-3-80               | 2                                          | 0.499 to 1.58K                           | 0.1 to 1.58K                                      | 0.34                  |
| RWR71S         | ESS-2A                 | 2                                          | 0.499 to 12.1K                           | 0.1 to 12.1K                                      | 0.90                  |
| RWR71N         | ESN-2A                 | 2                                          | 0.499 to 6.04K                           | 0.1 to 6.04K                                      | 0.90                  |
| RWR89S         | ESS-2B                 | 3                                          | 0.499 to 4.12K                           | 0.1 to 4.12K                                      | 0.70                  |
| RWR89N         | ESN-2B                 | 3                                          | 0.499 to 2.05K                           | 0.1 to 2.05K                                      | 0.70                  |
| RWR74S         | ESS-5                  | 5                                          | 0.499 to 12.1K                           | 0.1 to 12.1K                                      | 4.2                   |
| RWR74N         | ESN-5                  | 5                                          | 0.499 to 6.04K                           | 0.1 to 6.04K                                      | 4.2                   |
| RWR84S         | EGS-10-80              | 7                                          | 0.499 to 12.4K                           | 0.1 to 12.4K                                      | 3.6                   |
| RWR84N         | EGN-10-80              | 7                                          | 0.499 to 6.19K                           | 0.1 to 6.19K                                      | 3.6                   |
| RWR78S         | ESS-10                 | 10                                         | 0.499 to 39.2K                           | 0.1 to 39.2K                                      | 9.0                   |
| RWR78N         | ESN-10                 | 10                                         | 0.499 to 19.6K                           | 0.1 to 19.6K                                      | 9.0                   |

## Note

- RWR82S and RWR82N: Core consists of beryllium oxide ceramic

## GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: **RWR74S49R9FSB12**

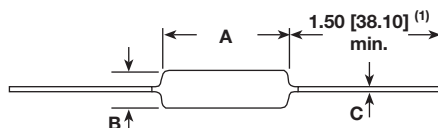
| MIL TYPE<br>(5 digits)                                                                                                       | TERMINAL WIRE AND WINDING<br>(1 digit)                                                                                                                                         | RESISTANCE VALUE<br>(4 digits)                                                                                                                          | TOLERANCE CODE<br>(1 digit)                                                | FAILURE RATE<br>(1 digit)                                                                                   | PACKAGING CODE<br>(3 digits)                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>RWR71</b><br><b>RWR74</b><br><b>RWR78</b><br><b>RWR80</b><br><b>RWR81</b><br><b>RWR82</b><br><b>RWR84</b><br><b>RWR89</b> | <b>S</b> = solderable, inductive<br><b>N</b> = solderable, non-inductive<br><b>W</b> = weldable, inductive <sup>(1)</sup><br><b>Z</b> = weldable, non-inductive <sup>(1)</sup> | 3 digit significant figure,<br>followed by a multiplier<br><br><b>49R9</b> = 49.9 $\Omega$<br><b>1000</b> = 100 $\Omega$<br><b>1001</b> = 1000 $\Omega$ | <b>B</b> = $\pm 0.1\%$<br><b>D</b> = $\pm 0.5\%$<br><b>F</b> = $\pm 1.0\%$ | <b>M</b> = 1.0 %/1000 h<br><b>P</b> = 0.1 %/1000 h<br><b>R</b> = 0.01 %/1000 h<br><b>S</b> = 0.001 %/1000 h | <b>B12</b> = bulk pack<br><b>S70</b> = tape/reel<br>(smaller than 5 W)<br><b>S73</b> = tape/reel<br>(500 pieces)<br><b>BSL</b> <sup>(2)</sup> = bulk pack,<br>single lot date code<br><b>RSL</b> <sup>(2)</sup> = tape/reel,<br>single lot date code |

## Notes

- (1) Note that “W” and “Z” are not listed above but are available, see MIL-PRF-39007 QPL for available resistance values
- (2) Maximum order sizes apply for single lot date code package codes, please see table below

**MAXIMUM ORDER SIZE FOR SINGLE LOT DATE CODE PACKAGE CODES**

| MODEL | MAXIMUM ORDER SIZE (PIECES) |
|-------|-----------------------------|
| RWR81 | 1000                        |
| RWR82 | 1000                        |
| RWR80 | 1000                        |
| RWR71 | 500                         |
| RWR89 | 1000                        |
| RWR74 | 500                         |
| RWR84 | 300                         |
| RWR78 | 300                         |

**DIMENSIONS** in inches [millimeters]


| MILITARY MODEL | DIMENSIONS in inches [millimeters] |                                              |                                |
|----------------|------------------------------------|----------------------------------------------|--------------------------------|
|                | A                                  | B                                            | C                              |
| RWR81          | 0.250 ± 0.031 [6.35 ± 0.787]       | 0.085 ± 0.020 [2.16 ± 0.508]                 | 0.020 ± 0.0015 [0.508 ± 0.038] |
| RWR82          | 0.312 ± 0.016 [7.92 ± 0.406]       | 0.078 + 0.016 - 0.031 [1.98 + 0.406 - 0.787] | 0.020 ± 0.0015 [0.508 ± 0.038] |
| RWR80          | 0.406 ± 0.031 [10.31 ± 0.787]      | 0.094 ± 0.031 [2.39 ± 0.787]                 | 0.020 ± 0.0015 [0.508 ± 0.038] |
| RWR71          | 0.812 ± 0.062 [20.62 ± 1.58]       | 0.187 ± 0.031 [4.75 ± 0.787]                 | 0.032 ± 0.002 [0.813 ± 0.051]  |
| RWR89          | 0.560 ± 0.062 [14.22 ± 1.58]       | 0.187 ± 0.031 [4.75 ± 0.787]                 | 0.032 ± 0.002 [0.813 ± 0.051]  |
| RWR74          | 0.875 ± 0.062 [22.23 ± 1.58]       | 0.312 ± 0.031 [7.92 ± 0.787]                 | 0.040 ± 0.002 [1.02 ± 0.051]   |
| RWR84          | 0.875 ± 0.062 [22.23 ± 1.58]       | 0.312 ± 0.031 [7.92 ± 0.787]                 | 0.040 ± 0.002 [1.02 ± 0.051]   |
| RWR78          | 1.780 ± 0.062 [45.21 ± 1.58]       | 0.375 ± 0.031 [9.525 ± 0.787]                | 0.040 ± 0.002 [1.02 ± 0.051]   |

**Note**

(1) On some standard reel pack methods, the leads may be trimmed to a shorter length than shown

**TECHNICAL SPECIFICATIONS**

| PARAMETER                       | UNIT            | RWR RESISTOR CHARACTERISTICS                                                                         |
|---------------------------------|-----------------|------------------------------------------------------------------------------------------------------|
| Dielectric Withstanding Voltage | V <sub>AC</sub> | 500 minimum for 2 W and smaller, 1000 minimum for 3 W and larger                                     |
| Short Time Overload             | -               | 5x rated power for 5 s for 3 W size and smaller,<br>10x rated power for 5 s for 5 W size and greater |
| Maximum Working Voltage         | V               | (P × R) <sup>1/2</sup>                                                                               |
| Insulation Resistance           | .               | 1000 MΩ minimum dry, 100 MΩ minimum after moisture test                                              |
| Terminal Strength               | lb              | 5 minimum for 2 W and smaller, 10 minimum for 3 W and larger                                         |
| Solderability                   | -               | Meets requirements of ANSI J-STD-002                                                                 |
| Operating Temperature Range     | °C              | -55 to +250                                                                                          |

**RESISTANCE TEMPERATURE COEFFICIENT**

| TEMPERATURE COEFFICIENT (ppm/°C) | RWR71                | RWR74                | RWR78                | RWR80                | RWR81                | RWR82                | RWR84                | RWR89                |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                  | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) | RESISTANCE RANGE (Ω) |
| +650 max.                        | 0.1 to 0.499         | 0.1 to 0.499         | 0.1 to 0.499         | 0.1 to 0.499         | 0.1 to 0.499         | 0.1 to 0.499         | 0.1 to 0.499         | 0.1 to 0.499         |
| +400 max.                        | 0.505 to 1.0         | 0.505 to 1.0         | 0.505 to 1.0         | 0.505 to 1.0         | 0.505 to 1.0         | 0.505 to 1.0         | 0.505 to 1.0         | 0.505 to 1.0         |
| ± 50                             | 1.01 to 10           | 1.01 to 10           | 1.01 to 10           | 1.01 to 10           | 1.01 to 10           | 1.01 to 10           | 1.01 to 10           | 1.01 to 10           |
| ± 30                             | 10.1 to 73.2         | 10.1 to 158          | 10.1 to 453          | -                    | -                    | -                    | 10.1 to 158          | 10.1 to 42.2         |
| ± 20                             | 74.1 and above       | 160 and above        | 459 and above        | 10.1 and above       | 10.1 and above       | 10.1 and above       | 160 and above        | 42.7 and above       |

**MATERIAL SPECIFICATIONS**

**Element:** copper-nickel alloy or nickel-chrome alloy, depending on resistance value

**Core:** ceramic, beryllium oxide <sup>(1)</sup>, steatite or alumina, depending on power requirement

**Coating:** special high temperature silicone

**Terminal and Winding:** the terminal and the winding are identified by a letter symbol in the military type designation.

Military symbol:

**S** = solderable, inductively wound

**W** = weldable, inductively wound

**N** = solderable, non-inductively wound

**Z** = weldable, non-inductively wound

**Terminals:** solderable - Tinned Copperweld®

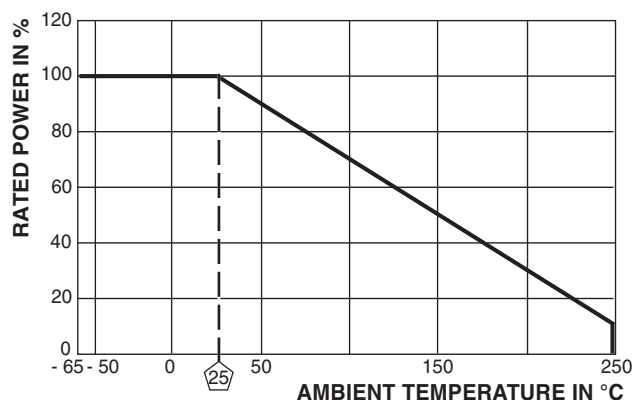
Weldable - bare nickel per MIL-STD-1276, Type N-1

**End Caps:** stainless steel

**Part Marking:** source code, JAN, military PIN, date/lot code

**Note**

<sup>(1)</sup> RWR82S and RWR82N: Core consists of beryllium oxide ceramic

**DERATING**

| PERFORMANCE                     |                                                                                                                              |                                                       |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| TEST                            | CONDITIONS OF TEST                                                                                                           | TEST LIMITS                                           |
| Thermal Shock                   | MIL-STD-202, method 107                                                                                                      | $\pm (0.2 \% + 0.005 \Omega) \Delta R$                |
| Short Time Overload             | 5x rated power (RWR71, RWR80, RWR81, RWR89, RWR82),<br>10 x rated power (RWR74, RWR78, RWR84) for 5 s                        | $\pm (0.2 \% + 0.005 \Omega) \Delta R$                |
| Dielectric Withstanding Voltage | 500 V <sub>RMS</sub> (RWR80, RWR81, RWR82),<br>1000 V <sub>RMS</sub> (RWR71, RWR74, RWR78, RWR84, RWR89), 1 min duration     | $\pm (0.1 \% + 0.005 \Omega) \Delta R$                |
| Low Temperature Storage         | -55 °C for 24 h                                                                                                              | $\pm (0.1 \% + 0.005 \Omega) \Delta R$                |
| High Temperature Exposure       | 250 °C for 2000 h                                                                                                            | $\pm (1.0 \% + 0.005 \Omega) \Delta R$ <sup>(1)</sup> |
| Moisture Resistance             | MIL-STD-202, method 106                                                                                                      | $\pm (0.2 \% + 0.005 \Omega) \Delta R$                |
| Shock, Specified Pulse          | MIL-STD-202, method 213, condition I                                                                                         | $\pm (0.1 \% + 0.005 \Omega) \Delta R$                |
| Vibration, High Frequency       | MIL-STD-202, method 204, condition D                                                                                         | $\pm (0.1 \% + 0.005 \Omega) \Delta R$                |
| Load Life                       | 2000 h at rated power, +25 °C, 1.5 h "ON", 0.5 h "OFF"                                                                       | $\pm (0.5 \% + 0.005 \Omega) \Delta R$                |
| Extended Life                   | 10 000 h at rated power, +25 °C, 1.5 h "ON", 0.5 h "OFF"                                                                     | $\pm (1.0 \% + 0.005 \Omega) \Delta R$                |
| Terminal Strength               | MIL-STD-202, method 211, condition A and C<br>5 pound (RWR80, RWR81, RWR82),<br>10 pound (RWR71, RWR74, RWR78, RWR84, RWR89) | $\pm (0.1 \% + 0.005 \Omega) \Delta R$                |

**Note**

<sup>(1)</sup> For resistance values above 100  $\Omega$ , test limit is  $\pm 1.0 \%$



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