Features:

- WWS offers miniature size at higher power rating
- High performance for low cost
- High power to size ratio
- High temperature silicone coating
- MWW/NMWW – completely molded construction with welded terminations
- Complete welded terminations
- Tinned copper leads
- Available in non-inductive styles
- Tighter tolerances may be available for non-inductive styles - contact Stackpole with requirements
- Higher operating temperatures available
- “B” packaging code denotes bulk packaging - contact Stackpole for package quantities
- WW/NWW/WWS meet UL94V-0
- 100% RoHS compliant and lead free without exemption
- Halogen free
- REACH compliant

Electrical Specifications – WW, WWS, MWW

Type / Code	MIL-R-26 Ref.	Power Rating (Watts)		TCR (ppm/ºC)	Ohmic Range (Ω) and Tolerance (*)			
		@ 125°C	@ 70°C		0.1%	0.5%	1%	5%
WW12	-	0.4	0.5	< 1 Ω = ± 90 ppm/ºC 1 Ω to 10 Ω = ± 50 ppm/ºC > 10 Ω = ± 20 ppm/ºC	5 - 2 K	3 - 2 K		5 - 2 K
WW1	-	1	1.1		2 - 3 K			
WW1A	RW-70	1	1.3		1 - 5 K			
WW2	RW-69	1.5	2.1		1 - 10 K	0.5 - 10 K		
WWS2	-	2.5	2.6		1 - 10 K	0.5 - 10 K		
WW2A	-	2.5	2.6		1 - 10 K	0.5 - 10 K		
WW3	RW-79	3	3.2		1 - 22 K	0.5 - 22 K		
WWS3	-	3	3.2		3 - 10 K	1 - 10 K		
WW3A	-	3	3.4		1 - 30 K	0.5 - 30 K		
WW4	-	4	4.3		1 - 40 K	0.5 - 40 K		
WWS4	RW-79	4	4.3		1 - 22 K	0.5 - 22 K		
WW5	RW-67, RW-74	5	5.1		1 - 50 K	0.5 - 50 K		
WWS5	-	5	5.1		1 - 40 K	0.5 - 40 K		
WW7	-	6.5	7.2		1 - 70 K	0.5 - 70 K		
WWS7	RW-67, RW-74	6.5	7.2		1 - 50 K	0.5 - 50 K		
WW7B	-	7	7.7		1 - 70 K	0.5 - 70 K		
WW10	RW-78	10	11		1 - 100 K	0.5 - 100 K		
WWS10	-	10	11		1 - 70 K	0.5 - 70 K		
MWW1	RW-70	1	1.3		5 - 2 K			
MWW3	RW-79	3	3.2		3 - 20 K			
MWW5	RW-67, RW-74	5	5.5		2 - 40 K			
MWW10	RW-68, RW-74	10	11		2 - 80 K			

(*) Other resistance values available - contact Stackpole for details.

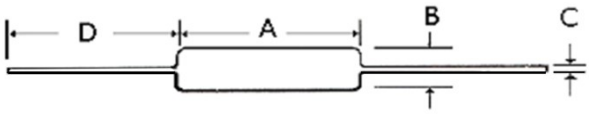
Max Voltage Rating = $\sqrt{P*R}$

Electrical Specifications – Non-Inductive Styles

Type / Code	MIL-R-26 Ref.	Power Rating (Watts) @ 125°C	Power Rating (Watts) @ 70°C	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance (*) 1% and 5%
NWW12	-	0.4	0.5	< 1 Ω = ± 90 ppm/°C 1 Ω to 10 Ω = ± 50 ppm/°C > 10 Ω = ± 20 ppm/°C	10 - 1 K
NWW1	-	1	1.1		2 - 1.5 K
NWW1A	RW-70	1	1.3		1 - 2.5 K
NWW2	RW-69	1.5	2.1		1 - 5 K
NWWS2	-	2.5	2.6		1 - 5 K
NWW2A	-	2.5	2.6		1 - 5 K
NWW3	RW-79	3	3.2		1 - 11 K
NWWS3	-	3	3.2		3 - 5 K
NWW3A	-	3	3.4		1 - 15 K
NWW4	-	4	4.3		1 - 20 K
NWWS4	RW-79	4	4.3		1 - 11 K
NWW5	RW-67, RW-74	5	5.1		1 - 25 K
NWWS5	-	5	5.1		1 - 20 K
NWW7	$\sqrt{P*R}$	6.5	7.2	< 1 Ω = ± 90 ppm/°C 1 Ω to 10 Ω = ± 50 ppm/°C > 10 Ω = ± 20 ppm/°C	1 - 35 K
NWWS7	RW-67, RW-74	6.5	7.2		1 - 25 K
NWW7B	-	7	7.7		1 - 35 K
NWW10	RW-78	10	11		1 - 50 K
NWWS10	-	10	11		1 - 35 K
NMWW1	RW-70	1	1.3		5 - 1 K
NMWW3	RW-79	3	3.2		3 - 10 K
NMWW5	RW-67, RW-74	5	5.5		2 - 20 K
NMWW10	RW-68, RW-74	10	11		2 - 40 K

(*) Other resistance values available - contact Stackpole for details.
Max Voltage Rating = $\sqrt{P*R}$

Mechanical Specifications



Type / Code	A	B	C	D (Bulk) (1)	Unit
WW12 / NWW12	0.312 ± 0.062 7.92 ± 1.57	0.110 ± 0.031 2.79 ± 0.79	0.025 ± 0.002 0.64 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW1, WWS2 / NWW1, NWWS2	0.375 ± 0.062 9.53 ± 1.57	0.110 ± 0.031 2.79 ± 0.79	0.025 ± 0.002 0.64 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW1A / NWW1A	0.420 ± 0.062 10.67 ± 1.57	0.110 ± 0.031 2.79 ± 0.79	0.025 ± 0.002 0.64 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW2, WWS3 / NWW2, NWWS3	0.370 ± 0.062 9.40 ± 1.57	0.156 ± 0.031 3.96 ± 0.79	0.032 ± 0.002 0.81 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW2A / NWW2A	0.550 ± 0.062 13.97 ± 1.57	0.156 ± 0.031 3.96 ± 0.79	0.032 ± 0.002 0.81 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW3, WWS4 / NWW3, NWWS4	0.560 ± 0.062 14.22 ± 1.57	0.187 ± 0.031 4.75 ± 0.79	0.032 ± 0.002 0.81 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW3A / NWW3A	0.500 ± 0.062 12.70 ± 1.57	0.218 ± 0.031 5.54 ± 0.79	0.032 ± 0.002 0.81 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW4, WWS5 / NWW4, NWWS5	0.700 ± 0.062 17.78 ± 1.57	0.270 ± 0.031 6.86 ± 0.79	0.036 ± 0.002 0.91 ± 0.05	1.500 typ. 38.10 typ.	inches mm

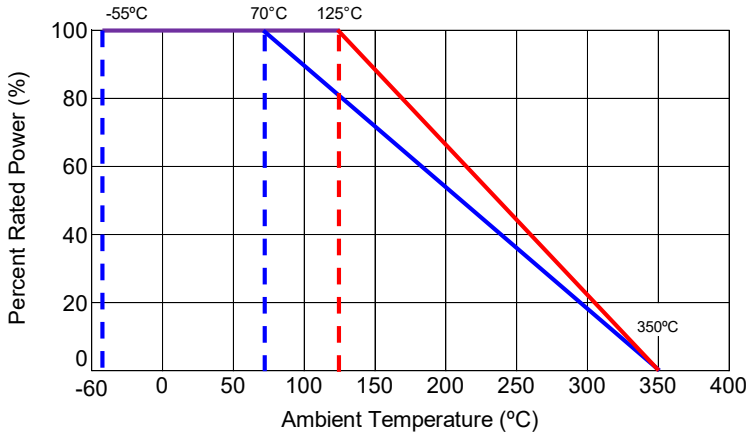
Mechanical Specifications (cont.)					
Type / Code	A	B	C	D (Bulk) (1)	Unit
WW5, WWS7 / NWW5, NWWS7	0.875 ± 0.062 22.23 ± 1.57	0.312 ± 0.031 7.92 ± 0.79	0.036 ± 0.002 0.91 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW7 / NWW7	1.025 ± 0.062 26.04 ± 1.57	0.312 ± 0.031 7.92 ± 0.79	0.036 ± 0.002 0.91 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW7B, WWS10 / NWW7B, NWWS10	1.225 ± 0.062 31.12 ± 1.57	0.312 ± 0.031 7.92 ± 0.79	0.036 ± 0.002 0.91 ± 0.05	1.500 typ. 38.10 typ.	inches mm
WW10 / NWW10 (2)	1.780 ± 0.062 45.21 ± 1.57	0.375 ± 0.031 9.53 ± 0.79	0.040 ± 0.002 1.02 ± 0.05	1.500 typ. 38.10 typ.	inches mm
MWW1 / NMWW1	0.385 ± 0.062 9.78 ± 1.57	0.135 ± 0.031 3.43 ± 0.79	0.032 ± 0.002 0.81 ± 0.05	1.500 typ. 38.10 typ.	inches mm
MWW3 / NMWW3	0.560 ± 0.062 14.22 ± 1.57	0.205 ± 0.031 5.21 ± 0.79	0.032 ± 0.002 0.81 ± 0.05	1.500 typ. 38.10 typ.	inches mm
MWW5 / NMWW5	0.925 ± 0.062 23.50 ± 1.57	0.330 ± 0.031 8.38 ± 0.79	0.036 ± 0.002 0.91 ± 0.05	1.500 typ. 38.10 typ.	inches mm
MWW10 / NMWW10	1.965 ± 0.062 49.91 ± 1.57	0.480 ± 0.031 12.19 ± 0.79	0.040 ± 0.002 1.02 ± 0.05	1.500 typ. 38.10 typ.	inches mm

(1) See "Resistor Packaging Specification Document" for lead length dimension for tape and reel packaged product.

Performance Characteristics		
Test	Test Condition	Test Specification
Moisture Resistance	1000 hours, 95% R.H., 40ºC	1% max
Load Life	1000 hours, cycled power 1.5 hours ON, 0.5 hours OFF, 25ºC	1%
Temperature Cycling	5 cycles, -55ºC to 200°C	0.5%
Short Time Overload	5 times rated power for 5 seconds	1%
Dielectric Withstand Voltage	Resistor leads are grounded and high potential probe is touched to the resistor body	500V for (N)WW12, 1, 1A and 2S. 1000V for all others

Operating Temperature Range: -55ºC to +350ºC

Power Derating Curve:



Recommended Solder Profiles

This information is intended as a reference for solder profiles for Stackpole resistive components. These profiles should be compatible with most soldering processes. These are only recommendations. Actual numbers will depend on board density, geometry, packages used, etc., especially those cells labeled with "*".

100% Matte Tin / RoHS Compliant Terminations

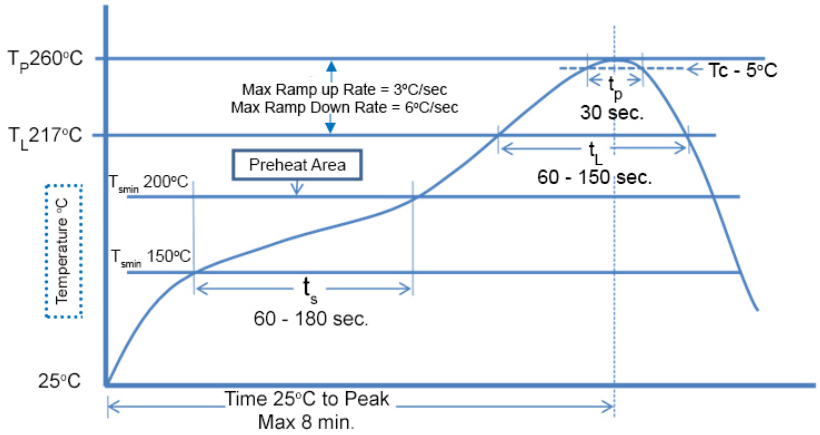
Soldering iron recommended temperatures: 330°C to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

Wave Soldering			
Description	Maximum	Recommended	Minimum
Preheat Time	80 seconds	70 seconds	60 seconds
Temperature Diff.	140°C	120°C	100°C
Solder Temp.	260°C	250°C	240°C
Dwell Time at Max.	10 seconds	5 seconds	*
Ramp DN (°C/sec)	N/A	N/A	N/A

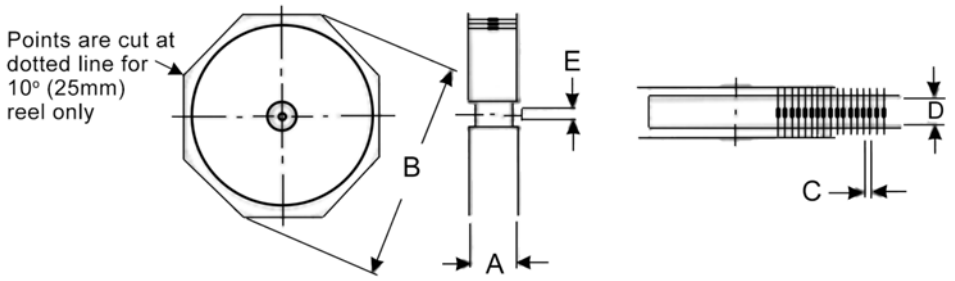
Temperature Diff. = Defference between final preheat stage and soldering stage.

Convection IR Reflow			
Description	Maximum	Recommended	Minimum
Ramp Up (°C/sec)	3°C/sec	2°C/sec	*
Dwell Time > 217°C	150 seconds	90 seconds	60 seconds
Solder Temp.	260°C	245°C	*
Dwell Time at Max.	30 seconds	15 seconds	10 seconds
Ramp DN (°C/sec)	6°C/sec	3°C/sec	*

Recommended Lead Free Resistor Reflow Profile



Packaging Specifications



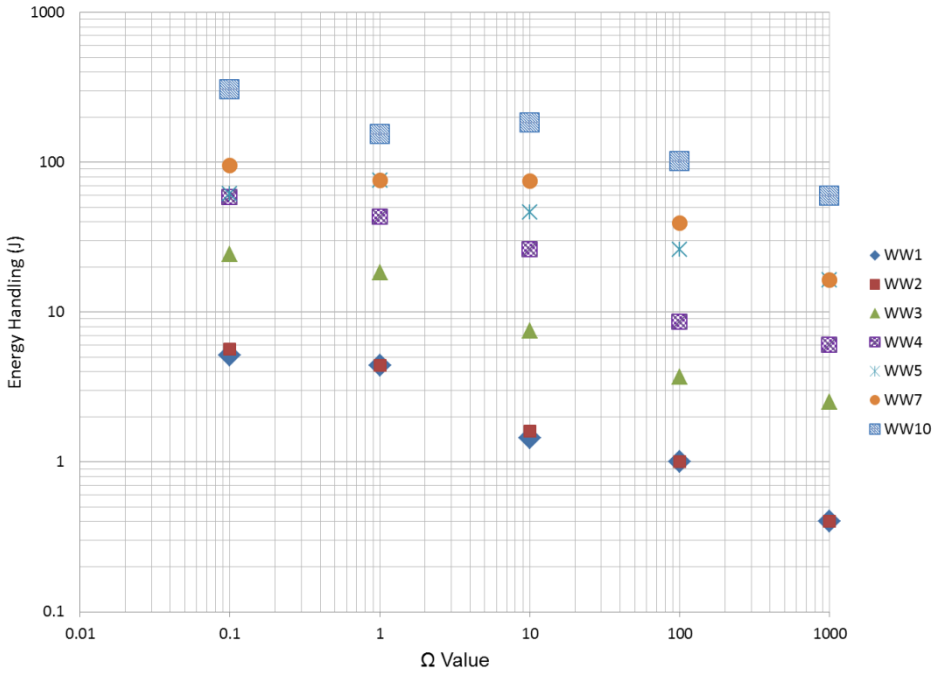
Type / Code	A max(1)	B max	C	D(2)	Tape	Unit
WW12	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW1, WWS2 NWW1, NWWS2	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW1A, NWW1A	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW2, WWS3 NWW2, NWWS3	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW2A, NWW2A	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW3, WWS4 NWW3, NWWS4	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW3A, NWW3A	2.880 73.15	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW4, WWS5 NWW4, NWWS5	2.880 73.15	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.500 ± 0.079 63.50 ± 2.00	0.250 6.35	inches mm
WW5, WWS7 NWW5, NWWS7	3.740 95.00	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
WW7, NWW7	3.740 95.00	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
WW7B, WWS10 NWW7B, NWWS10	3.740 95.00	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
WW10, NWW10	5.100 129.54	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	4.375 ± 0.079 111.13 ± 2.00	0.250 6.35	inches mm
MWW1, NMWW1	3.311 84.10	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
MWW3, NMWW3	3.484 88.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
MWW5, NMWW5	3.850 97.80	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
MWW10, NMWW10	4.764 121.00	13.504 343.00	0.600 ± 0.020 15.24 ± 0.50	4.375 ± 0.079 111.13 ± 2.00	0.250 6.35	inches mm

Dimension "E": This is a non-critical dimension that does not have a tolerance in the standard.
Range of diameters is from 0.547 inches (13.90 mm) to 1.500 inches (38.10 mm).

(1) Reference value only. The "A" dimension shall be governed by the overall length of the taped component.
The distance between flanges shall be 0.059 inches (1.50 mm) to 0.315 (8.00 mm) greater than the overall component.

(2) The given dimension "D" expresses the standard width spacing. A 26mm narrow spacing is available as option "N" packaging code.

Energy Handling Capability:
(Typical performance - for reference only.)



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 3). 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 as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

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)
MWW	General Purpose and Precision Leaded Wirewound Resistor - Molded	Axial	YES	100% Matte Sn	Jan-06	06/01
NWW	General Purpose and Precision Leaded Wirewound Resistor - Conformal Coated - Non-Inductive	Axial	YES	100% Matte Sn	Jan-06	06/01
WW	General Purpose and Precision Leaded Wirewound Resistor - Conformal Coated - Non-Inductive	Axial	YES	100% Matte Sn	Jan-06	06/01

"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
W	W	1	F	T	1	K	0	0

Product Series	
Code	Description
WW	Standard
WWS	Mini
MWW	Molded
NWW	Non-Inductive
NWWS	Mini Non-Inductive
NMWW	Non-Inductive Molded

Type / Code	Power Rating (W)	
	@ 125ºC	@ 70ºC
WW12 / NWW12	0.4	0.5
WW1 / NWW1	1	1.1
WW1A / NWW1A	1	1.3
WW2 / NWW2	1.5	2.1
WWS2 / NWWS2	2.5	2.6
WW2A / NWW2A	2.5	2.6
WW3 / NWW3	3	3.2
WWS3 / NWWS3	3	3.2
WW3A / NWW3A	3	3.4
WW4 / NWW4	4	4.3
WWS4 / NWWS4	4	4.3
WW5 / NWW5	5	5.1
WWS5 / NWWS5	5	5.1
WW7 / NWW7	6.5	7.2
WWS7 / NWWS7	6.5	7.2
WW7B / NWW7B	7	7.7
WW10 / NWW10	10	11.0
WWS10 / NWWS10	10	11.0
MWW1 / NMWW1	1	1.3
MWW3 / NMWW3	3	3.2
MWW5 / NMWW5	5	5.5
MWW10 / NMWW10	10	11.0

Tolerance	
Code	Tol
B	0.1%
D	0.5%
F	1%
J	5%

Packaging			
Code	Description	Size	Qty
T	11" Tape and Reel	WW12 / NWW12 WW1 / NWW1 WWS2 / NWWS2 WW1A / NWW1A MWW1 / NMWW1	2500
		WW2 / NWW2 WWS3 / NWWS3 WW2A / NWW2A WW3 / NWW3 WWS4 / NWWS4 MWW3 / NMWW3	2000
		WW3A / NWW3A WW4 / NWW4 WWS5 / NWWS5 WW5 / NWW5 WWS7 / NWWS7 WW7 / NWW7 WW7B / NWW7B WWS10 / NWWS10 MWW5 / NMWW5	500
		WW10 / NWW10 MWW10 / NMWW10	250
B	Bulk	Contact Stackpole for package quantities.	

Resistance Value
Four characters with the multiplier used as the decimal holder.
0.5 ohm = R500 1 ohm = 1R00 10 Kohm = 10K0