

**Features:**

- WWS offers miniature size at higher power rating
- High performance for low cost
- High power to size ratio
- High temperature silicone coating
- MWWW/NMWWW – 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
- RoHS compliant and halogen free



**Electrical Specifications – WW, WWS, MWWW**

Type / Code	MIL-R-26 Ref.	Power Rating (Watts)		TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance (*)			
		@ 125°C	@ 70°C		0.1%	0.5%	1%	5%
WW12	-	0.4	0.5	< 1 Ω = ± 90 ppm/°C 1 Ω to 10 Ω = ± 50 ppm/°C > 10 Ω = ± 20 ppm/°C	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		
MWWW1	RW-70	1	1.3		5 - 2 K			
MWWW3	RW-79	3	3.2		3 - 20 K			
MWWW5	RW-67, RW-74	5	5.5	2 - 40 K				
MWWW10	RW-68, RW-74	10	11	2 - 80 K				

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

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

**Electrical Specifications – Non-Inductive Styles**

Type / Code	MIL-R-26 Ref.	Power Rating (Watts)		TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance (*)	
		@ 125°C	@ 70°C		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	

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

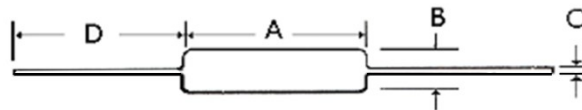
Max Voltage Rating =  $\sqrt{P \cdot R}$

**Electrical Specifications – Non-Inductive Styles (cont.)**

Type / Code	MIL-R-26 Ref.	Power Rating (Watts)		TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance <sup>(*)</sup>
		@ 125°C	@ 70°C		
NWW7	-	6.5	7.2	$< 1 \Omega = \pm 90 \text{ ppm/}^\circ\text{C}$ $1 \Omega \text{ to } 10 \Omega = \pm 50 \text{ ppm/}^\circ\text{C}$ $> 10 \Omega = \pm 20 \text{ ppm/}^\circ\text{C}$	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 =  $\sqrt{P \cdot R}$

**Mechanical Specifications**



Type / Code	A	B	C	D (Bulk) <sup>(1)</sup>	Unit
WW12 / NWW12	0.312 ± 0.062	0.110 ± 0.031	0.025 ± 0.002	1.500 typ.	inches
	7.92 ± 1.57	2.79 ± 0.79	0.64 ± 0.05	38.10 typ.	mm
WW1, WWS2 / NWW1, NWWS2	0.375 ± 0.062	0.110 ± 0.031	0.025 ± 0.002	1.500 typ.	inches
	9.53 ± 1.57	2.79 ± 0.79	0.64 ± 0.05	38.10 typ.	mm
WW1A / NWW1A	0.420 ± 0.062	0.110 ± 0.031	0.025 ± 0.002	1.500 typ.	inches
	10.67 ± 1.57	2.79 ± 0.79	0.64 ± 0.05	38.10 typ.	mm
WW2, WWS3 / NWW2, NWWS3	0.370 ± 0.062	0.156 ± 0.031	0.032 ± 0.002	1.500 typ.	inches
	9.40 ± 1.57	3.96 ± 0.79	0.81 ± 0.05	38.10 typ.	mm
WW2A / NWW2A	0.550 ± 0.062	0.156 ± 0.031	0.032 ± 0.002	1.500 typ.	inches
	13.97 ± 1.57	3.96 ± 0.79	0.81 ± 0.05	38.10 typ.	mm
WW3, WWS4 / NWW3, NWWS4	0.560 ± 0.062	0.187 ± 0.031	0.032 ± 0.002	1.500 typ.	inches
	14.22 ± 1.57	4.75 ± 0.79	0.81 ± 0.05	38.10 typ.	mm
WW3A / NWW3A	0.500 ± 0.062	0.218 ± 0.031	0.032 ± 0.002	1.500 typ.	inches
	12.70 ± 1.57	5.54 ± 0.79	0.81 ± 0.05	38.10 typ.	mm
WW4, WWS5 / NWW4, NWWS5	0.700 ± 0.062	0.270 ± 0.031	0.036 ± 0.002	1.500 typ.	inches
	17.78 ± 1.57	6.86 ± 0.79	0.91 ± 0.05	38.10 typ.	mm
WW5, WWS7 / NWW5, NWWS7	0.875 ± 0.062	0.312 ± 0.031	0.036 ± 0.002	1.500 typ.	inches
	22.23 ± 1.57	7.92 ± 0.79	0.91 ± 0.05	38.10 typ.	mm
WW7 / NWW7	1.025 ± 0.062	0.312 ± 0.031	0.036 ± 0.002	1.500 typ.	inches
	26.04 ± 1.57	7.92 ± 0.79	0.91 ± 0.05	38.10 typ.	mm
WW7B, WWS10 / NWW7B, NWWS10	1.225 ± 0.062	0.312 ± 0.031	0.036 ± 0.002	1.500 typ.	inches
	31.12 ± 1.57	7.92 ± 0.79	0.91 ± 0.05	38.10 typ.	mm
WW10 / NWW10 <sup>(2)</sup>	1.780 ± 0.062	0.375 ± 0.031	0.040 ± 0.002	1.500 typ.	inches
	45.21 ± 1.57	9.53 ± 0.79	1.02 ± 0.05	38.10 typ.	mm
MWW1 / NMWW1	0.385 ± 0.062	0.135 ± 0.031	0.032 ± 0.002	1.500 typ.	inches
	9.78 ± 1.57	3.43 ± 0.79	0.81 ± 0.05	38.10 typ.	mm
MWW3 / NMWW3	0.560 ± 0.062	0.205 ± 0.031	0.032 ± 0.002	1.500 typ.	inches
	14.22 ± 1.57	5.21 ± 0.79	0.81 ± 0.05	38.10 typ.	mm
MWW5 / NMWW5	0.925 ± 0.062	0.330 ± 0.031	0.036 ± 0.002	1.500 typ.	inches
	23.50 ± 1.57	8.38 ± 0.79	0.91 ± 0.05	38.10 typ.	mm
MWW10 / NMWW10	1.965 ± 0.062	0.480 ± 0.031	0.040 ± 0.002	1.500 typ.	inches
	49.91 ± 1.57	12.19 ± 0.79	1.02 ± 0.05	38.10 typ.	mm

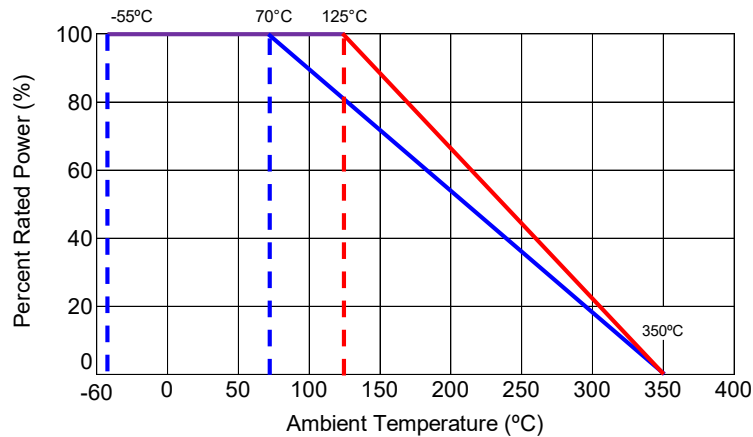
(1) See "Resistor Packaging Specification Document" for lead length dimension for tape and reel packaged product.

(2) Lead diameter (C) available in 0.036" / 0.91 mm.

Performance Characteristics		
Test	Test Condition	Test Specification
Moisture Resistance	1000 hours, 95% R.H., 40°C	1% max
Load Life	1000 hours, cycled power 1.5 hours ON, 0.5 hours OFF, 25°C	1%
Temperature Cycling	5 cycles, -55°C 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: -55°C to +350°C

**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 “\*”.

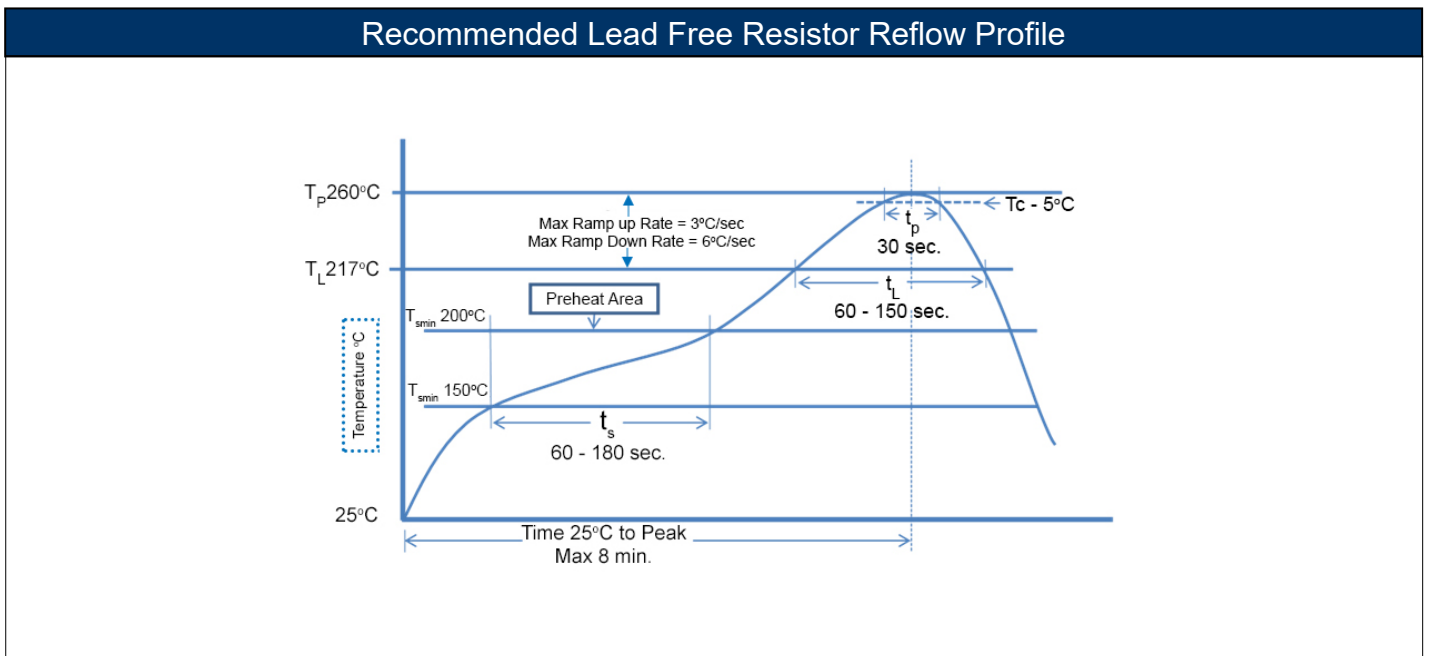
**100% Matte Tin / RoHS Compliant Terminations**

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	*



### Lead-Tape Specifications

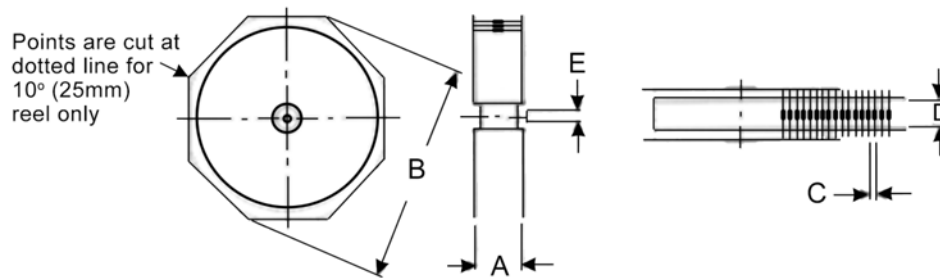
Type / Code	A max <sup>(1)</sup>	B max	C	D <sup>(2)</sup>	Tape	Unit
WW12	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW1, WWS2 NWW1, NWS2	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WW1A, NWW1A	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

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.

**Lead-Tape Specifications (cont.)**



Type / Code	A max <sup>(1)</sup>	B max	C	D <sup>(2)</sup>	Tape	Unit
WW2, WWS3	2.880	11.000	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
NWW2, NWS3	73.15	279.40	5.00 ± 0.50	52.40 ± 2.00	6.35	mm
WW2A, NWW2A	2.880	11.000	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
	73.15	279.40	5.00 ± 0.50	52.40 ± 2.00	6.35	mm
WW3, WWS4	2.880	11.000	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
NWW3, NWS4	73.15	279.40	5.00 ± 0.50	52.40 ± 2.00	6.35	mm
WW3A, NWW3A	2.880	11.000	0.394 ± 0.020	2.063 ± 0.079	0.250	inches
	73.15	279.40	10.00 ± 0.50	52.40 ± 2.00	6.35	mm
WW4, WWS5	2.880	11.000	0.394 ± 0.020	2.500 ± 0.079	0.250	inches
NWW4, NWS5	73.15	279.40	10.00 ± 0.50	63.50 ± 2.00	6.35	mm
WW5, WWS7	3.740	11.000	0.394 ± 0.020	2.874 ± 0.079	0.250	inches
NWW5, NWS7	95.00	279.40	10.00 ± 0.50	73.00 ± 2.00	6.35	mm
WW7, NWW7	3.740	11.000	0.394 ± 0.020	2.874 ± 0.079	0.250	inches
	95.00	279.40	10.00 ± 0.50	73.00 ± 2.00	6.35	mm
WW7B, WWS10	3.740	11.000	0.394 ± 0.020	2.874 ± 0.079	0.250	inches
NWW7B, NWS10	95.00	279.40	10.00 ± 0.50	73.00 ± 2.00	6.35	mm
WW10, NWW10	5.100	11.000	0.394 ± 0.020	4.375 ± 0.079	0.250	inches
	129.54	279.40	10.00 ± 0.50	111.13 ± 2.00	6.35	mm
MWW1, NMWW1	3.311	13.504	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
	84.10	343.00	5.00 ± 0.50	52.40 ± 2.00	6.35	mm
MWW3, NMWW3	3.484	13.504	0.394 ± 0.020	2.063 ± 0.079	0.250	inches
	88.50	343.00	10.00 ± 0.50	52.40 ± 2.00	6.35	mm
MWW5, NMWW5	3.850	13.504	0.394 ± 0.020	2.874 ± 0.079	0.250	inches
	97.80	343.00	10.00 ± 0.50	73.00 ± 2.00	6.35	mm
MWW10, NMWW10	4.764	13.504	0.600 ± 0.020	4.375 ± 0.079	0.250	inches
	121.00	343.00	15.24 ± 0.50	111.13 ± 2.00	6.35	mm

Dimension "E": This is a non-critical dimension that does not have a tolerance in the standard.

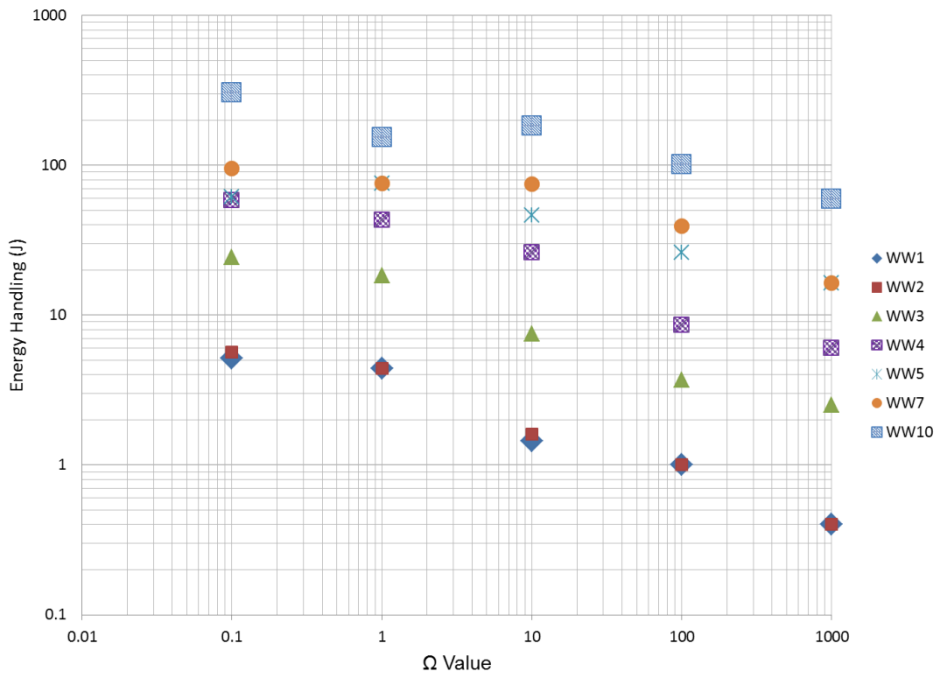
Range of diameters is from 0.547 inches (13.90 mm) to 1.500 inches (38.10 mm).

(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.

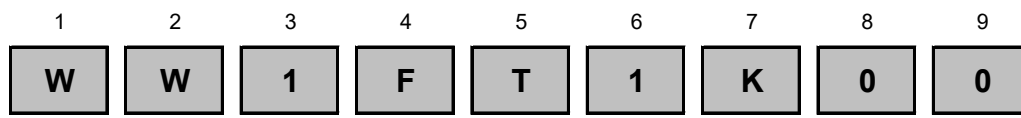
**Compliance to “REACH”**

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**



Product Series		Type / Code	Power Rating (W)		Tolerance		Packaging			Resistance Value						
Code	Description		@ 125°C	@ 70°C	Code	Tol	Code	Description	Quantity							
WW	Standard	WW12 / NWW12	0.4	0.5	B	0.1%	T	11" Tape and Reel	2500	Four characters with the multiplier used as the decimal holder. 0.5 ohm = R500 1 ohm = 1R00 10 Kohm = 10K0						
WWS	Mini	WW1 / NWW1	1	1.1	D	0.5%										
MWW	Molded	WW1A / NWW1A	1	1.3	F	1%										
NWW	Non-Inductive	WW2 / NWW2	1.5	2.1	J	5%										
NWWWS	Mini	WWS2 / NWWWS2	2.5	2.6							2000					
	Non-Inductive	WW2A / NWW2A	2.5	2.6												
NMWW	Non-Inductive Molded	WW3 / NWW3	3	3.2										500		
		WWS3 / NWWWS3	3	3.2												
		WW3A / NWW3A	3	3.4												
		WW4 / NWW4	4	4.3												
		WWS4 / NWWWS4	4	4.3												
		WW5 / NWW5	5	5.1												
		WWS5 / NWWWS5	5	5.1												
		WW7 / NWW7	6.5	7.2												
		WWS7 / NWWWS7	6.5	7.2												
		WW7B / NWW7B	7	7.7												
WW10 / NWW10	10	11.0			250											
WWS10 / NWWWS10	10	11.0														
MWW1 / NMWW1	1	1.3														
MWW3 / NMWW3	3	3.2														
MWW5 / NMWW5	5	5.5														
MWW10 / NMWW10	10	11.0														
B	Bulk	Contact Stackpole for package quantities.														