# Stackpole Electronics, Inc.

General Purpose Metal Oxide Resistor Resistive Product Solution

### Features:

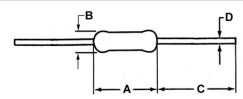
- Lower-cost alternative to carbon comps and wirewounds
- Coating meets UL 94V-0
- Meets solvent test of Mil Standard 202, Method 215
- Cut and formed product is available on select sizes contact Stackpole
- Higher or lower resistance values may be possible contact Stackpole
- Flameproof
- 100% RoHS compliant and lead free without exemption
- Halogen free
- REACH compliant



	Electrical Specifications							
Type/Code	Power Rating	Maximum Working	Maximum Overload	Dielectric Withstanding	TCR (ppm/°C)	Ohmic Range <sup>(2)</sup> (Ω) and Tolerance		
	(W) @ 70°C	Voltage (V) <sup>(1)</sup>	Voltage (V)	Voltage (V)		1%	2%	5%
RSF12	0.5	250	400	350	± 200	0.1 - 150K	0.1 - 75K	0.1 - 510K
RSF1	1	350	600	600	± 200	0.1 -	100K	0.1 - 510K
RSF2	2	350	600	600	± 200	0.1 -	120K	0.1 - 510K
RSF3	3	800	1000	750	± 200	0.1 - 470K	0.1 - 510K	0.1 - 510K
RSF5	5	1000	1000	750	± 200	0.1 - 470K	0.1 - 510K	0.1 - 510K
RSMF12	0.5	250	400	350	± 200	0.1 - 46.4K	0.1 - 47K	0.1 - 470K
RSMF1	1	350	600	500	± 200	0.1 -	75K	0.1 - 470K
RSMF2	2	350	600	500	± 200	0.1 -	100K	0.1 - 470K
RSMF3	3	500	800	600	± 200	0.1 - 118K	0.1 - 120K	0.1 - 470K
RSMF5	5	1000	1000	750	± 200	0.1 - 470K	0.1 - 510K	0.1 - 510K

- (1) Lesser of √P\*R or maximum working voltage
- (2) Contact Stackpole for resistance values outside the specified range

### Mechanical Specifications

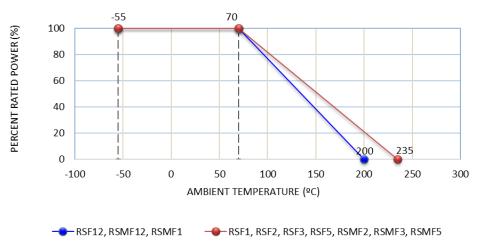


Tuno/Codo	A	В	С	D	Lead-Tape	Unit
Type/Code	Body Length	Body Diameter	Lead Length (Bulk)	Lead Diameter	Specification	Unit
RSF12	$0.35 \pm 0.04$	$0.13 \pm 0.03$	1.10 ± 0.12	$0.03 \pm 0.003$	0.250	inches
KOFIZ	9.00 ± 1.00	$3.20 \pm 0.80$	$28.00 \pm 3.00$	$0.70 \pm 0.08$	6.35	mm
RSF1	$0.43 \pm 0.06$	$0.18 \pm 0.04$	1.10 ± 0.20	$0.03 \pm 0.002$	0.250	inches
KOFI	11.00 ± 1.50	4.50 ± 1.00	$28.00 \pm 5.00$	$0.80 \pm 0.05$	6.35	mm
RSF2	0.59 ± 0.06	$0.22 \pm 0.04$	1.18 ± 0.20	$0.03 \pm 0.004$	0.250	inches
NOF2	15.00 ± 1.50	5.50 ± 1.00	$30.00 \pm 5.00$	$0.75 \pm 0.10$	6.35	mm
RSF3	$0.69 \pm 0.04$	$0.24 \pm 0.02$	1.38 ± 0.12	$0.03 \pm 0.002$	0.250	inches
Koro	17.50 ± 1.00	$6.00 \pm 0.50$	$35.00 \pm 3.00$	$0.80 \pm 0.05$	6.35	mm
RSF5	0.96 ± 0.04	$0.31 \pm 0.02$	1.38 ± 0.12	$0.03 \pm 0.002$	0.250	inches
Koro	24.50 ± 1.00	$8.00 \pm 0.50$	$35.00 \pm 3.00$	$0.80 \pm 0.05$	6.35	mm
RSMF12	$0.24 \pm 0.03$	$0.09 \pm 0.01$	1.10 ± 0.12	$0.02 \pm 0.003$	0.250	inches
NOWII 12	$6.00 \pm 0.80$	$2.30 \pm 0.30$	$28.00 \pm 3.00$	$0.55 \pm 0.07$	6.35	mm
RSMF1	$0.35 \pm 0.04$	$0.13 \pm 0.03$	1.10 ± 0.12	$0.03 \pm 0.003$	0.250	inches
KOWII I	9.00 ± 1.00	$3.20 \pm 0.80$	$28.00 \pm 3.00$	$0.70 \pm 0.08$	6.35	mm
RSMF2	$0.43 \pm 0.06$	$0.18 \pm 0.04$	1.18 ± 0.20	$0.03 \pm 0.002$	0.250	inches
KOWII Z	11.00 ± 1.50	4.50 ± 1.00	$30.00 \pm 5.00$	$0.80 \pm 0.05$	6.35	mm
RSMF3	0.59 ± 0.06	$0.22 \pm 0.04$	1.18 ± 0.20	$0.03 \pm 0.004$	0.250	inches
NOIVIFO	15.00 ± 1.50	5.50 ± 1.00	$30.00 \pm 5.00$	$0.75 \pm 0.10$	6.35	mm
RSMF5	$0.69 \pm 0.04$	$0.24 \pm 0.02$	1.38 ± 0.08	$0.03 \pm 0.002$	0.250	inches
KOWII J	17.50 ± 1.00	$6.00 \pm 0.50$	35.00 ± 2.00	$0.80 \pm 0.05$	6.35	mm

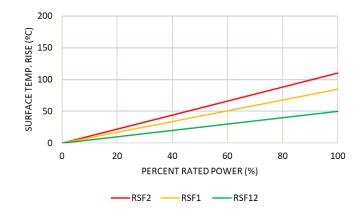
Performance Characteristics						
Test	Test Method	Test Specification	Typical Results			
Insulation Resistance	JIS C5201-1, IEC60115-1, 4.6	≥ 1G Ω	≥ 1G Ω			
Voltage Proof	JIS C5201-1, IEC60115-1, 4.7	$\leq$ ± (0.5% + 0.05 $\Omega$ ) No mechanical damage	< ± 0.25%			
Short Time Overload	JIS C5201-1, IEC60115-1, 4.13	$\leq \pm (0.75\% + 0.05 \Omega)$	< ± 0.1%			
Resistance to Solder Heat	JIS C5201-1, IEC60115-1, 4.18	$\leq \pm (2.0\% + 0.05 \Omega)$	< ± 1.0%			
Endurance at 70°C	JIS C5201-1, IEC60115-1, 4.25.1	≤± (5.0% + 0.05 Ω)	< ± 2.0%			
Robustness of Terminations	JIS C5201-1, IEC60115-1, 4.16	$\leq \pm (1.0\% + 0.05 \Omega)$	< ± 0.10%			
Damp Heat (Steady state)	JIS C5201-1, IEC60115-1, 4.24	≤± (5% + 0.05 Ω)	< ± 1.5%			
Rapid Change of Temperature	JIS C5201-1, IEC60115-1, 4.19	≤± (1% + 0.05 Ω)	$< \pm 0.2\%$			
Resistance to Solvents	JIS C5201-1, IEC60115-1, 4.29	No damage to component or removal of marking	Pass			
Intermittent Overload	JIS C5201-1, IEC60115-1, 4.39	≤± (2% + 0.05 Ω)	$< \pm 0.3\%$			
Accidental Overload (Flame resistance)	JIS C5201-1, IEC60115-1, 4.26	No flaming of gauze	Pass			

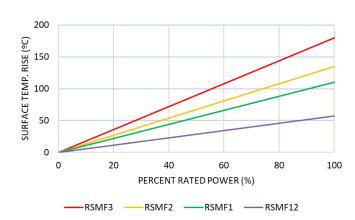
Operating temperature range is -55°C to +200°C (RSF12, RSMF12, RSMF1) -55°C to +235°C (all others)

# Power Derating Curve:



### Surface Temperature Rise:





### Repetitive Pulse Information:

If repetitive pulses are applied to resistors, pulse wave form must be less than "pulse limiting voltage", "pulse limiting current" or "pulse limiting wattage" calculated by the formula below.

$$Vp = K\sqrt{P \times R \times T/t}$$

$$Ip = K\sqrt{P/R \times T/t}$$

$$Pp = K^2 x P x T/t$$



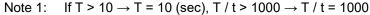
lp: Pulse limiting current (A)
Pp: Pulse limiting wattage (W)

Pp: Pulse limiting wat P: Power rating (W)

R: Nominal resistance (ohm)T: Repetitive period (sec)t: Pulse duration (sec)

K: Coefficient: 0.8

[Vr: Rated Voltage (V), Ir: Rated Current (A)]



Note 2: If T > 10 and T / t > 1000, "Pulse Limiting power (Single pulse) is applied

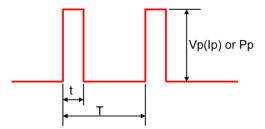
Note 3: If Vp < Vr (Ip < Ir or Pp < P), Vr (Ir, P) is Vp (Ip, Pp)

Note 4: Pulse limiting voltage (current, wattage) is applied at less than rated ambient temperature. If ambient temperature is more than the rated temperature (70 °C), decrease power rating according to "Power Derating Curve"

Note 5: Assure sufficient margin for use period and conditions for "pulse limiting voltage"

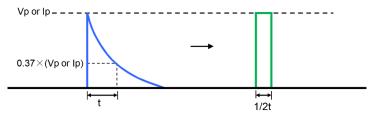
Note 6: If the pulse waveform is not square wave, judge after transform the waveform into square

wave according to the "Waveform Transformation to Square Wave".

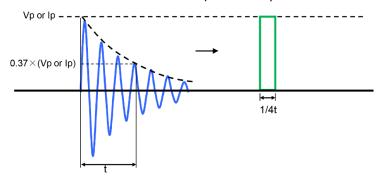


### Waveform Transformation to Square Wave

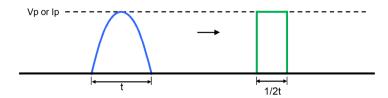
1. Discharge curve wave with time constant "t" → Square wave



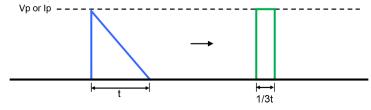
2. Damping oscillation wave with time constant of envelope "t" → Square wave



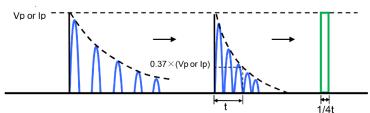
3. Half-wave rectification wave → Square wave



4. Triangular wave → Square wave



5. Special wave → Square wave



### Recommended Solder Profile

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 "\*".

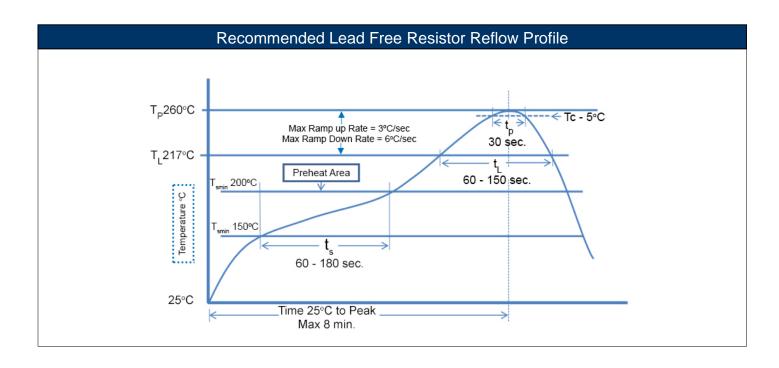
### 100% Matte Tin / RoHS Compliant Terminations

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			

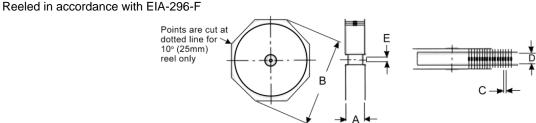
Temperature Diff. = Defference between final preheat stage and soldering stage.

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	*		



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# Reel Packaging Specifications

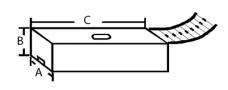


Type/Code	A max <sup>(1)</sup>	B max	С	D <sup>(2)</sup>	Tape	Unit
RSF12	2.736	13.504	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
K3F12	69.50	343.00	$5.00 \pm 0.50$	$52.40 \pm 2.00$	6.35	mm
RSF1	2.815	13.504	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
KSFT	71.50	343.00	$5.00 \pm 0.50$	$52.40 \pm 2.00$	6.35	mm
RSF2	3.524	13.504	$0.394 \pm 0.020$	2.500 ± 0.079	0.250	inches
RSF2	89.50	343.00	10.00 ± 0.50	$63.50 \pm 2.00$	6.35	mm
RSF3	3.740	12.008	$0.394 \pm 0.020$	2.874 ± 0.079	0.250	inches
K3F3	95.00	305.00	10.00 ± 0.50	$73.00 \pm 2.00$	6.35	mm
RSF5	4.331	12.008	$0.394 \pm 0.020$	$3.465 \pm 0.079$	0.250	inches
K3F3	110.00	305.00	$10.00 \pm 0.50$	88.00 ± 2.00	6.35	mm
Type/Code	A max <sup>(1)</sup>	B max	С	D <sup>(2)</sup>	Tape	Unit
21	A max <sup>(1)</sup> 2.618	B max 13.504	C 0.197 ± 0.020	D <sup>(2)</sup> 2.063 ± 0.079	Tape 0.250	Unit inches
Type/Code RSMF12			-	_	•	
RSMF12	2.618	13.504	0.197 ± 0.020	2.063 ± 0.079	0.250	inches
21	2.618 66.50	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
RSMF12	2.618 66.50 2.736	13.504 343.00 13.504	0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020	2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079	0.250 6.35 0.250	inches mm inches
RSMF12	2.618 66.50 2.736 69.50	13.504 343.00 13.504 343.00	0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079 52.40 ± 2.00	0.250 6.35 0.250 6.35	inches mm inches mm
RSMF12 RSMF1 RSMF2	2.618 66.50 2.736 69.50 2.815	13.504 343.00 13.504 343.00 13.504	0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020	2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079	0.250 6.35 0.250 6.35 0.250	inches mm inches mm inches
RSMF12 RSMF1	2.618 66.50 2.736 69.50 2.815 71.50	13.504 343.00 13.504 343.00 13.504 343.00	0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079 52.40 ± 2.00	0.250 6.35 0.250 6.35 0.250 6.35	inches mm inches mm inches mm
RSMF12 RSMF1 RSMF2	2.618 66.50 2.736 69.50 2.815 71.50 3.524	13.504 343.00 13.504 343.00 13.504 343.00 13.504	0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020 5.00 ± 0.50 0.197 ± 0.020 5.00 ± 0.50 0.394 ± 0.020	2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079 52.40 ± 2.00 2.063 ± 0.079 52.40 ± 2.00 2.500 ± 0.079	0.250 6.35 0.250 6.35 0.250 6.35 0.250	inches mm inches mm inches mm inches

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 26 mm narrow spacing is available as option "N" packaging code.

## Ammo Packaging Specifications



Type/Code	Size	A	В	С	Unit
RSF	2	3.346 ± 0.079	$3.543 \pm 0.118$		inches
Roi		85.00 ± 2.00	$90.00 \pm 3.00$		mm
RSF	1	$2.953 \pm 0.079$	$2.756 \pm 0.118$		inches
Koi	'	$75.00 \pm 2.00$	$70.00 \pm 3.00$		mm
RSMF	3	3.346 ± 0.079	3.543 ± 0.118	10.039 ± 0.197	inches
KOWI	3	85.00 ± 2.00	$90.00 \pm 3.00$	$255.00 \pm 5.00$	mm
RSMF	2	2.953 ± 0.079	2.756 ± 0.118		inches
KSIVIF		$75.00 \pm 2.00$	$70.00 \pm 3.00$		mm
RSMF	1	2.953 ± 0.079	2.756 ± 0.118		inches
KSIVIF		75.00 ± 2.00	$70.00 \pm 3.00$		mm

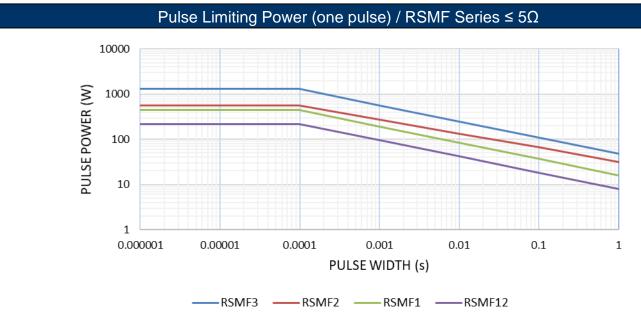
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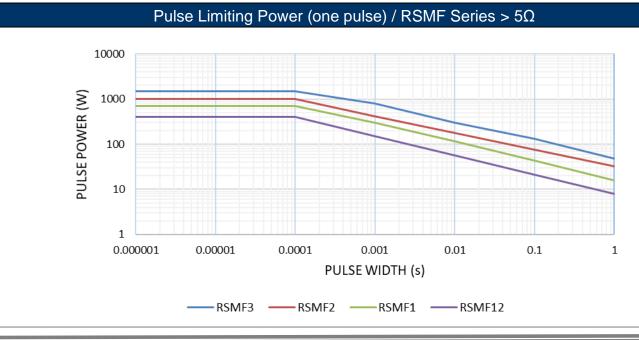
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Symbol	Description	PRSM12 PRSF1 / PRSM2		
ØD	Body diameter	0.157 max.	0.217 max.	
Øb	Body diameter	4.00 max.	5.50 max.	
A	Body length	0.394 max.	0.492 max.	
^	Body length	10.00 max.	12.50 max.	
AO	Mounting height	0.571 max.	0.709 max.	
7.0	Wodriting height	14.50 max.	18.00 max.	
Ød	Lead diameter	$0.028 \pm 0.004$	$0.028 \pm 0.004$	
24	Edda diamotor	0.70 ± 0.10	0.70 ± 0.10	
Р	Component pitch	0.500 =		
·	Component piton	12.70 :		
P0	Feed hole pitch		± 0.012	
. 0	. eed nee phon	12.70 :		
P1	Feed hole center to lead	0.152 ± 0.020		
		3.85 ± 0.50		
P2	Feed hole center to body	0.250 ± 0.016		
		6.35 ± 0.40		
F	Lead-lead distance	0.200 +0.24 / -0.008 5.08 +0.60 / -0.20		
		5.08	+0.60 / -0.20	
Alpha	Performing angle	45° max		
A la	Company and all summant	0.000 :	± 0.079	
Δh	Component alignment	0.00 :	± 2.00	
٨α	Component alignment	0.000 :	± 0.118	
Δg	Component alignment	0.00 :	± 3.00	
W	Tape width	0.709 +0.039 / -0.031		
VV	rape width	18.00 +1.00 / -0.80		
Wo	Hold down tape width	0.492 min.		
VVO	i loid down tape width	12.50 min.		
W1	Hole position	0.354 ± 0.020		
VV 1	riolo position		± 0.50	
W2	Hold down tape position		+0 / -0.059	
***2	Tiola do IIII tapo position	2.00 +0 / -1.50		

Resistive Product Solutions

Packaging Specifications – Pana-Sert (cont.)						
Symbol	Description	PRSM12 PRSF1 / PRSM2				
Н	Distance to tape center	0.748 ± 0.039 19.00 ± 1.00				
HO	Lead wire clinch height	0.630 ± 0.020 16.00 ± 0.50				
I	Lead wire portrait	0.039 max. 1.00 max.				
ØD0	Feed hole diamenter	0.157 ± 0.008 4.00 ± 0.20				
i	Total tape thickness	0.028 max. 0.70 max.				
L	Length of shipped lead 0.433 max. 11.00 max.					





# Stackpole Electronics, Inc.

General Purpose Metal Oxide Resistor

Resistive Product Solutions

### **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)			
RSF	General Purpose Metal Oxide Leaded Resistor	Axial	YES	99.3/0.7 Sn/Cu 100% Matte Sn	Apr-05 (Japan) Jan-04 (Taiwan, China)	05/14 04/01			
RSMF	Mini-Metal Oxide Leaded Resistor	Axial	YES	99.3/0.7 Sn/Cu 100% Matte Sn	Apr-05 (Japan) Jan-04 (Taiwan, China)	05/14 04/01			

### "Conflict Metals" Commitment

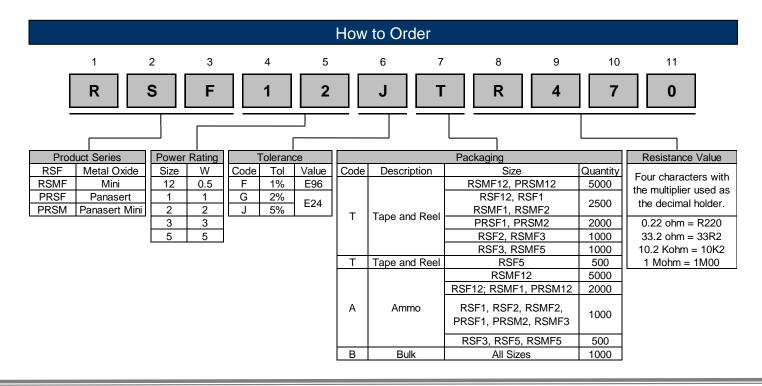
We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the Eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely 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.



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# **Mouser Electronics**

**Authorized Distributor** 

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

### SEI Stackpole:

 RSMF2JTR100
 RSF1JA1R00
 RSF1JT10K0
 RSMF3JTR100
 RSF1JA1K00
 RSF1JA6K80
 RSF2JT130K

 RSMF5JT390R
 RSMF5JT240R
 RSF1FTR475
 RSF1JA470R
 RSMF5JB16R0
 RSF2JA150R-C3
 RSF2JA6R20-C3

 RSMF2JTR470
 RSF1JT1K00
 PRSM2JT27K0
 PRSM2JT51R0
 RSF2JT300K
 RSMF2JA10K0
 RSMF2JA220R

 RSMF2JA2K70
 RSMF1JA100R
 PRSM2JT16K0
 RSMF1JB12K0
 RSMF1JT10R0
 RSF2JA47R0

 RSMF1JA270R
 RSF1JA2K70
 RSMF1JT100R
 RSMF1JA20R0
 RSF1JA91K0
 RSMF12JA47R0

 RSMF1GTR100
 RSMF2JA22R0
 RSMF2JT100R
 RSF1JA100R
 RSF1JA16R0
 RSMF1JF1680
 RSMF12JA47R0

 RSMF1JA180R
 RSF5JT1K20
 RSF5JT2K00
 RSF5JT39K0
 RSF5JT5K60
 RSMF1JETR330
 RSMF12JT20R0

 RSMF12JT2K40
 RSMF12JT43K0
 RSMF12JT470R
 RSMF12JT82K0
 RSMF1FB300R
 RSMF1JB160R
 RSMF1JB160R