

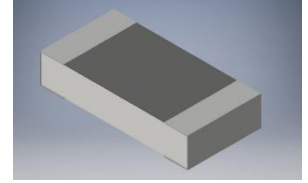
RMEA Series

Automotive Grade Anti-Sulfur Thick Film Chip Resistor
RoHS Compliant Without Exemption

Stackpole Electronics, Inc.
Resistive Product Solutions

Features:

- Inner terminations engineered to deter sulfur contamination
- Power derating from 100% at 70°C to zero at +155°C
- AEC-Q200 qualified
- RoHS compliant and lead free without exemption
- Halogen free
- REACH compliant



Electrical Specifications							
Type/Code	Power Rating (W) @ 70°C Jumper Rated Current	Max. Working Voltage (V)	Max. Overload Voltage (V)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance		
					0.5%	1%	5%
RMEA0402	0.063	50	100	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 1A	-	-	0 (<50 mΩ)			
RMEA0603	0.1	75	150	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 1A	-	-	0 (<50 mΩ)			
RMEA0805	0.125	150	300	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 2A	-	-	0 (<50 mΩ)			
RMEA1206	0.25	200	400	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 2A	-	-	0 (<50 mΩ)			
RMEA1210	0.33	200	400	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 2.5A	-	-	0 (<50 mΩ)			
RMEA2010	0.75	200	400	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 3.5A	-	-	0 (<50 mΩ)			
RMEA2512	1	250	500	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 4A	-	-	0 (<50 mΩ)			

Operating temperature range is -55°C to +155°C

Operating Voltage = $\sqrt{P \cdot R}$ or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage = $2.5 \cdot \sqrt{P \cdot R}$ or Max. Overload Voltage listed above, whichever is lower.

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Electrical Specifications – High Power

Type/Code	Power Rating (W) @ 70°C	Max. Working Voltage (V)	Max. Overload Voltage (V)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance		
					0.5%	1%	5%
RMEA0402_-HP	0.1	50	100	± 200	-	1 - 9.76	
				± 100		10 - 1M	
RMEA0603_-HP	0.25	75	150	± 200	-	1 - 9.76	
				± 100		10 - 1M	
RMEA0805_-HP	0.33	150	300	± 200	-	1 - 9.76	
				± 100		10 - 1M	
RMEA1206_-HP	0.5	200	400	± 200	-	1 - 9.76	
				± 100		10 - 1M	
RMEA1210_-HP	0.75	200	400	± 200	-	1 - 9.76	
				± 100		10 - 1M	
RMEA2010_-HP	1	200	400	± 200	-	1 - 9.76	
				± 100		10 - 1M	
RMEA2512_-HP	1.5	250	500	± 200	-	1 - 9.76	
				± 100		10 - 1M	

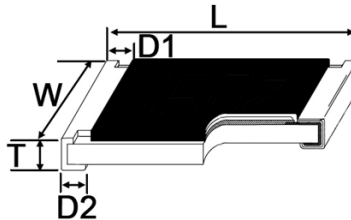
Operating temperature range is -55°C to +155°C.

Operating Voltage = $\sqrt{P \cdot R}$ or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage = $2.5 \cdot \sqrt{P \cdot R}$ or Max. Overload Voltage listed above, whichever is lower.

The power rating depends on the maximum temperature of the resistive element. Due to the power dissipation of the resistor, the temperature of the resistive element will rise depending on the condition of heat dissipation from PCB. The maximum power rating in application only applies if the temperature of the resistive element does not exceed 125°C.

Mechanical Specifications



Type/Code	Weight (g) (1000 pcs)	L	W	T	D1	D2	Unit
RMEA0402	0.62	0.039 ± 0.002	0.020 ± 0.002	0.014 ± 0.002	0.008 ± 0.004	0.008 ± 0.004	inches
		1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.20 ± 0.10	mm
RMEA0603	2.04	0.063 ± 0.004	0.031 ± 0.004	0.018 ± 0.004	0.012 ± 0.008	0.012 ± 0.008	inches
		1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	mm
RMEA0805	4.36	0.079 ± 0.004	0.049 ± 0.004	0.020 ± 0.004	0.014 ± 0.008	0.016 ± 0.008	inches
		2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.20	mm
RMEA1206	8.9	0.122 ± 0.004	0.061 ± 0.004	0.022 ± 0.004	0.020 ± 0.010	0.020 ± 0.008	inches
		3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20	mm
RMEA1210	15.9	0.122 ± 0.004	0.102 ± 0.006	0.022 ± 0.004	0.020 ± 0.010	0.020 ± 0.008	inches
		3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20	mm
RMEA2010	24.2	0.197 ± 0.004	0.098 ± 0.006	0.022 ± 0.004	0.024 ± 0.010	0.020 ± 0.008	inches
		5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20	mm
RMEA2512	39.4	0.250 ± 0.004	0.122 ± 0.006	0.022 ± 0.004	0.024 ± 0.010	0.020 ± 0.008	inches
		6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20	mm

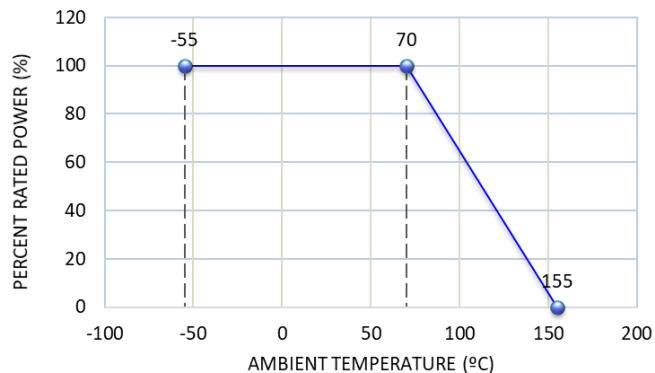
Performance Characteristics					
Test	Test Method	Procedure	Requirements		
			≤ ± 1%	± 5%	Jumper
Temperature Coefficient of Resistance (TCR)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25/-55°C and 25°C/+155°C, 25°C is the reference temperature	As per specification		
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. overload voltage whichever is less for 5 seconds.	±(1% + 0.05Ω)	±(2% + 0.05Ω)	< 50mΩ
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Max. Overload Voltage for 1 minute	≥ 10GΩ		
Operational Life	MIL-STD-202 Method 108	Condition D steady state TA = 125°C at derated power. Measurement at 24 ± 4 hours after test conclusion.	±(2% + 0.1Ω)	±(3% + 0.1Ω)	< 100mΩ
Biased Humidity	MIL-STD-202 Method 103	1000 hours 85°C/85% R.H. 10% of operating power	±(2% + 0.1Ω)	±(3% + 0.1Ω)	< 100mΩ
High Temperature Exposure	MIL-STD-202 Method 108	At +155°C for 1000 hours	±(1% + 0.05Ω)	±(1.5% + 0.1Ω)	< 50mΩ
Board Flex	AEC-Q200-005	Bending once for 60 seconds 2010, 2512 sizes: 2mm; other sizes: 3mm	±(1% + 0.05Ω)	±(1% + 0.05Ω)	< 50mΩ
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17 J-STD-002	245 ± 5°C for 3 seconds	> 95% coverage		
Resistance to Soldering Heat	MIL-STD-202 Method 210	260 ± 5°C for 10 seconds	±(0.5% + 0.05Ω)	±(1% + 0.05Ω)	< 50mΩ
Voltage Proof	JIS-C-5201-1 4.7 IEC-60115-1 4.7	1.42 times Max. Operating Voltage for 1 minute	No breakdown or flashover		
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260 ± 5°C for 30 seconds	Individual leaching area ≤ 5% Total leaching area ≤ 10%		
Temperature Cycling	JESD22 Method JA-104	-55°C to + 125°C, 1000 cycles	±(0.5% + 0.05Ω)	±(1.5% + 0.05Ω)	< 50mΩ
Mechanical Shock	MIL-STD-202 Method 213	Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.	±(0.25% + 0.05Ω)	±(1% + 0.05Ω)	< 50mΩ
Vibration	MIL-STD-202 Method 204	5 g's for 20 minutes, 12 cycles each of 3 orientations, 10-2000Hz	±(0.5% + 0.05Ω)	±(1% + 0.05Ω)	< 50mΩ
ESD	AEC-Q200-002	Human body model 0402/0603: 0.5KV; 0805 and above: 2KV	±(3% + 0.05Ω)		
Resistance to Solvents	MIL-STD-202 Method 215	Add aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.	No visible damage on appearance and marking		
Terminal Strength	AEC-Q200-006	Force of 1.8Kg for 60 seconds	No breakage		
Flammability	UL-94	V-0 or V-1 are acceptable. Electrical test not required	No ignition of the tissue paper or scorching or the pinewood board		
Sulfur Test	EIA-977 (Condition B)	105 ± 2°C, no power rating for 750 hours	Δ R ± 1%		<50mΩ

RCWV (Rated Continuous Working Voltage) = $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

Storage temperature is 15~28 °C; Humidity < 80% R.H.

Shelf life is 2 years from production date.

Power Derating Curve:

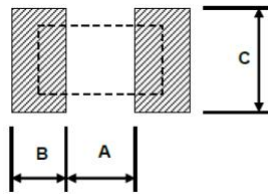


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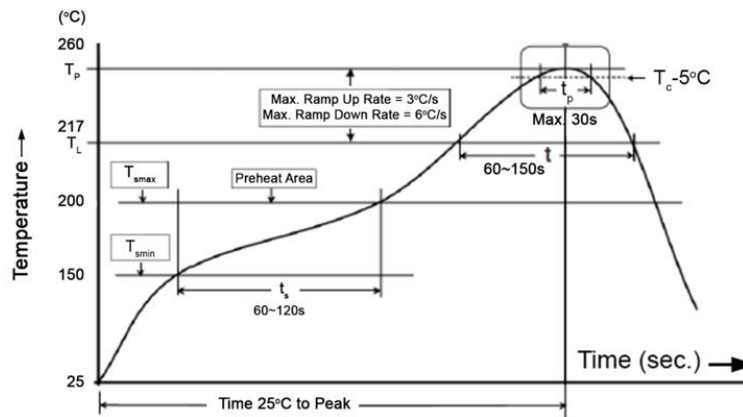
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Recommended Pad Layout



Size	A	B	C	Unit
RMEA0402	0.020	0.018	0.024	inches
	0.50	0.45	0.60	mm
RMEA0603	0.035	0.024	0.035	inches
	0.90	0.60	0.90	mm
RMEA0805	0.047	0.028	0.051	inches
	1.20	0.70	1.30	mm
RMEA1206	0.079	0.035	0.063	inches
	2.00	0.90	1.60	mm
RMEA1210	0.079	0.035	0.110	inches
	2.00	0.90	2.80	mm
RMEA2010	0.150	0.035	0.110	inches
	3.80	0.90	2.80	mm
RMEA2512	0.193	0.063	0.138	inches
	4.90	1.60	3.50	mm

Recommended Solder Profile



Reflow Profiles

Profile Feature	Pb-Free Assembly
Preheat	
Min. Temperature (T _{min})	150°C
Max. Temperature (T _{max})	200°C
Preheating time (t _s) from T _{min} to T _{max}	60-120 seconds
Ramp-up rate (T _L to T _p)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) maintained above T _L	60-150 seconds
Min. Peak Temperature	235°C
Max. Peak Temperature (T _p max)	260°C
Time (t _p) within 5°C of the specified classification temperature (T _c)	30 seconds max.
Ramp-down rate (T _p to T _L)	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

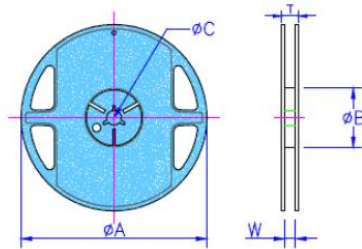
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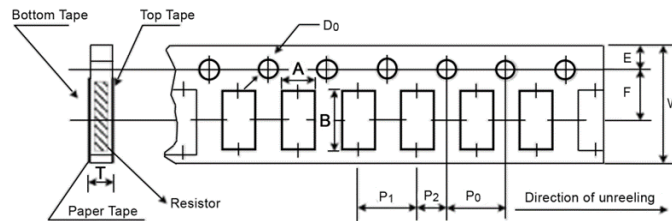
Resistive Product Solutions

Packaging Specifications



Type	Tape Width	Reel Ø	ØA	ØB	ØC	W	T	Unit
RMEA0402	8 mm	7 inches	7.028 ± 0.059 178.50 ± 1.50	2.362 +0.039/-0 60.00 +1 -/0	0.512 ± 0.008 13.00 ± 0.20	0.354 ± 0.020 9.00 ± 0.50	0.492 ± 0.020 12.50 ± 0.50	inches mm
RMEA0603 RMEA0805 RMEA1206 RMEA1210	8 mm				0.512 ± 0.008 13.00 ± 0.20	0.354 ± 0.020 9.00 ± 0.50	0.492 ± 0.020 12.50 ± 0.50	inches mm
RMEA2010 RMEA2512	12 mm				0.512 ± 0.020 13.00 ± 0.50	0.512 ± 0.020 13.00 ± 0.50	0.610 ± 0.020 15.50 ± 0.50	inches mm

Taping Specifications – Paper Tape



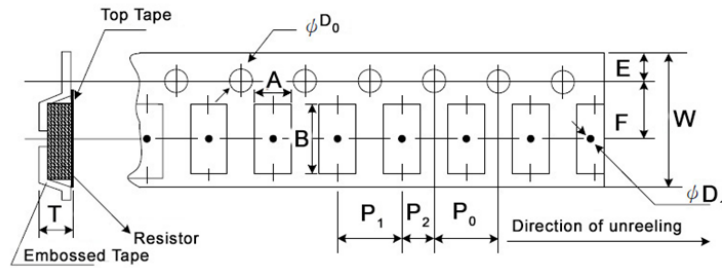
Size	A	B	W	E	F	Unit
RMEA0402	0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMEA0603	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 0.10				inches mm
RMEA0805	0.063 ± 0.004 1.60 ± 0.10	0.094 ± 0.008 2.40 ± 0.20				inches mm
RMEA1206	0.075 ± 0.004 1.90 ± 0.10	0.138 ± 0.008 3.50 ± 0.20				inches mm
RMEA1210	0.114 ± 0.004 2.90 ± 0.10	0.138 ± 0.008 3.50 ± 0.20				inches mm
Size	P0	P1	P2	ØD	T	Unit
RMEA0402	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.059 +0.004/-0 1.50 +0.10/-0	0.018 ± 0.004 0.45 ± 0.10	inches mm
RMEA0603		0.157 ± 0.002 4.00 ± 0.05			0.028 ± 0.004 0.70 ± 0.10	inches mm
RMEA0805					0.033 ± 0.004 0.85 ± 0.10	inches mm
RMEA1206					0.033 ± 0.004 0.85 ± 0.10	inches mm
RMEA1210					0.033 ± 0.004 0.85 ± 0.10	inches mm

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Taping Specifications – Plastic Tape



Size	A	B	W	E	F	T	Unit
RMEA2010	0.110 ± 0.004 2.80 ± 0.10	0.213 ± 0.008 5.40 ± 0.20	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.047 +0 1.2 +0	inches mm
RMEA2512	0.138 ± 0.004 3.50 ± 0.10	0.264 ± 0.004 6.70 ± 0.10	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.047 +0 1.2 +0	inches mm
Size	P0	P1	P2	ØD0	ØD1	Unit	
RMEA2010	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 +0.004/-0 1.50 +0.10/-0	0.059 +0.01/-0 1.50 +0.25/-0	inches mm	
RMEA2512	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 +0.004/-0 1.50 +0.10/-0	0.059 +0.01/-0 1.50 +0.25/-0	inches mm	

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Part Marking Instructions



1% Marking
The nominal resistance is marked on the surface of the overcoating with the use of 4 digit markings. 0201 and 0402 are not marked.



5% Marking
The nominal resistance is marked on the surface of the overcoating with the use of 3 digit markings. 0201 and 0402 are not marked.

For shared E24/E96 values, 1% tolerance product may be marked with three-digit marking instead of the standard four-digit marking for all other E96 values. All E24 values available in 1% tolerance are also marked with three-digit marking.

Marking Instructions for 0603 1% Chip Resistors (per EIA-J)

A two-digit number is assigned to each standard R-Value (E96) as shown in the chart below. This is followed by one alpha character which is used as a multiplier. Each letter represents a specific multiplier as follows:

Z = 0.01	A = 10	D = 10,000
Y = 0.1	B = 100	E = 100,000
X = 1	C = 1,000	F = 1,000,000

EXAMPLE:

Chip Marking	Explanation	Value
01B	01 means 10.0 and B = 100	10.0 x 100 = 1 Kohm
25C	25 means 17.8 and C = 1,000	17.8 x 1,000 = 17.8 Kohm
93D	93 means 90.9 and D = 10,000	90.9 x 10,000 = 909 Kohm

E96											
#	R-Value	#	R-Value	#	R-Value	#	R-Value	#	R-Value	#	R-Value
01	10.0	17	14.7	33	21.5	49	31.6	65	46.4	81	68.1
02	10.2	18	15.0	34	22.1	50	32.4	66	47.5	82	69.8
03	10.5	19	15.4	35	22.6	51	33.2	67	48.7	83	71.5
04	10.7	20	15.8	36	23.2	52	34.0	68	49.9	84	73.2
05	11.0	21	16.2	37	23.7	53	34.8	69	51.1	85	75.0
06	11.3	22	16.5	38	24.3	54	35.7	70	52.3	86	76.8
07	11.5	23	16.9	39	24.9	55	36.5	71	53.6	87	78.7
08	11.8	24	17.4	40	25.5	56	37.4	72	54.9	88	80.6
09	12.1	25	17.8	41	26.1	57	38.3	73	56.2	89	82.5
10	12.4	26	18.2	42	26.7	58	39.2	74	57.6	90	84.5
11	12.7	27	18.7	43	27.4	59	40.2	75	59.0	91	86.6
12	13.0	28	19.1	44	28.0	60	41.2	76	60.4	92	88.7
13	13.3	29	19.6	45	28.7	61	42.2	77	61.9	93	90.9
14	13.7	30	20.0	46	29.4	62	43.2	78	63.4	94	93.1
15	14.0	31	20.5	47	30.1	63	44.2	79	64.9	95	95.3
16	14.3	32	21.0	48	30.9	64	45.3	80	66.5	96	97.6

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)
RMEA	Automotive Grade Anti-Sulfur Chip Resistor	SMD	YES	100% Matte Sn over Ni	Always	Always

"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

R	M	E	A	1	2	0	6	F	T	1	0	K	0	-	H	P
Product Series		Size and Power(W)			Tolerance			Packaging (*)				Resistance Value		Special		
Code	Description	Size	Std	-HP	Code	Tol	Value	Code	Description	Size	Quantity	Four characters with the multiplier used as the decimal holder.		Code	Description	
RMEA	Automotive Grade Anti-Sulfur	0402	0.063	0.1	D	0.5%	E96, E24	T	7" Reel Paper Tape	0402	10000	1 ohm = 1R00	(blank)	Standard		
		0603	0.1	0.25	F	1%	E24		7" Reel Plastic Tape	0603, 0805	5000	10 ohm = 10R0	-HP	High Power		
		0805	0.125	0.33	J	5%	E24			1206, 1210	4000	100 Kohm = 100K				
		1206	0.25	0.5	Z		Jumper			2010, 2512		1 Mohm = 1M00				
		1210	0.33	0.75								Zero ohm jumper = 0R00				
		2010	0.75	1												
		2512	1	1.5												

(*) Larger reel sizes may be available. Contact Stackpole Electronics.