

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
- RoHS compliant, REACH compliant, halogen free, and lead free without exemption
- AEC-Q200 qualified



Electrical Specifications - Standard

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: 1 A			-	-		0 (<50mΩ)
RMEA0603	0.1	75	150	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 1 A			-	-		0 (<50mΩ)
RMEA0805	0.125	150	300	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 2 A			-	-		0 (<50mΩ)
RMEA1206	0.25	200	400	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 2 A			-	-		0 (<50mΩ)
RMEA1210	0.33	200	400	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 2.5 A			-	-		0 (<50mΩ)
RMEA2010	0.75	200	400	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 3.5 A			-	-		0 (<50mΩ)
RMEA2512	1	250	500	± 200	1 - 9.76		
				± 100	10 - 1M		
				± 200	1.02M - 10M		
	Jumper: 4 A			-	-		0 (<50mΩ)

Operating temperature range is -55 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.

RMEA Series

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

Stackpole Electronics, Inc.

Resistive Product Solutions

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		

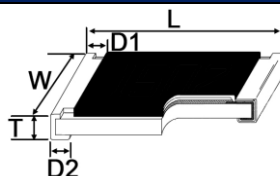
Operating temperature range is -55 to +155°C.

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	Typical Unit Weight (mg)	L	W	T	D1	D2	Unit
RMEA0402	0.62	0.039 ± 0.002 1.00 ± 0.05	0.020 ± 0.002 0.50 ± 0.05	0.014 ± 0.002 0.35 ± 0.05	0.008 ± 0.004 0.20 ± 0.10	0.008 ± 0.004 0.20 ± 0.10	inches mm
RMEA0603	2.0	0.063 ± 0.004 1.60 ± 0.10	0.031 ± 0.004 0.80 ± 0.10	0.018 ± 0.004 0.45 ± 0.10	0.012 ± 0.008 0.30 ± 0.20	0.012 ± 0.008 0.30 ± 0.20	inches mm
RMEA0805	4.4	0.079 ± 0.004 2.00 ± 0.10	0.049 ± 0.004 1.25 ± 0.10	0.020 ± 0.004 0.50 ± 0.10	0.014 ± 0.008 0.35 ± 0.20	0.016 ± 0.008 0.40 ± 0.20	inches mm
RMEA1206	8.9	0.122 ± 0.004 3.10 ± 0.10	0.061 ± 0.004 1.55 ± 0.10	0.022 ± 0.004 0.55 ± 0.10	0.020 ± 0.010 0.50 ± 0.25	0.020 ± 0.008 0.50 ± 0.20	inches mm
RMEA1210	15.9	0.122 ± 0.004 3.10 ± 0.10	0.102 ± 0.006 2.60 ± 0.15	0.022 ± 0.004 0.55 ± 0.10	0.020 ± 0.010 0.50 ± 0.25	0.020 ± 0.008 0.50 ± 0.20	inches mm
RMEA2010	24.2	0.197 ± 0.004 5.00 ± 0.10	0.098 ± 0.006 2.50 ± 0.15	0.022 ± 0.004 0.55 ± 0.10	0.024 ± 0.010 0.60 ± 0.25	0.020 ± 0.008 0.50 ± 0.20	inches mm
RMEA2512	39.4	0.250 ± 0.004 6.35 ± 0.10	0.122 ± 0.006 3.10 ± 0.15	0.022 ± 0.004 0.55 ± 0.10	0.024 ± 0.010 0.60 ± 0.25	0.020 ± 0.008 0.50 ± 0.20	inches mm

Performance Characteristics

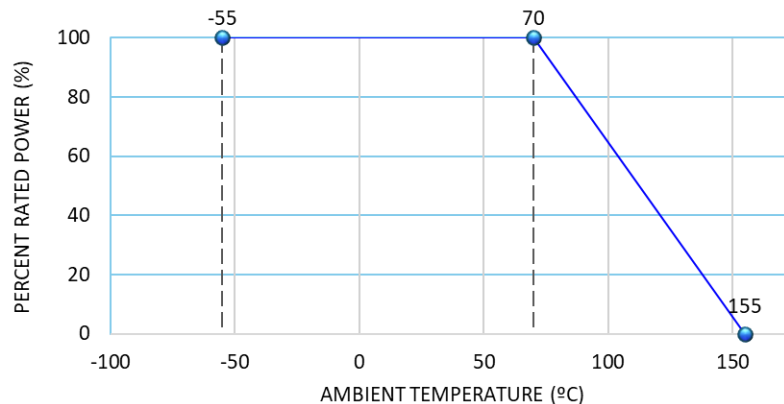
Test	Test Method	Procedure	Requirements		
			$\leq \pm 1\%$	$\pm 5\%$	Jumper
Temperature Coefficient of Resistance (TCR)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25/-55°C and 25°C/+155°C, 25°C is the reference temperature	As per specification		
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. overload voltage whichever is less for 5 seconds.	$\pm(1\% + 0.05\Omega)$	$\pm(2\% + 0.05\Omega)$	< 50mΩ
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Max. Overload Voltage for 1 minute	$\geq 10G\Omega$		
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.	$\pm(2\% + 0.1\Omega)$	$\pm(3\% + 0.1\Omega)$	< 100mΩ
Biased Humidity	MIL-STD-202 Method 103	1000 hours 85°C/85% R.H. 10% of operating power. ($\leq 100\text{ V}$)	$\pm(2\% + 0.1\Omega)$	$\pm(3\% + 0.1\Omega)$	< 100mΩ
High Temperature Exposure	MIL-STD-202 Method 108	At +155°C for 1000 hours	$\pm(1\% + 0.05\Omega)$	$\pm(1.5\% + 0.1\Omega)$	< 50mΩ
Board Flex	AEC-Q200-005	Bending once for 60 seconds 2010, 2512 sizes: 2mm; other sizes: 3mm	$\pm(1\% + 0.05\Omega)$	$\pm(1\% + 0.05\Omega)$	< 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	$\pm(0.5\% + 0.05\Omega)$	$\pm(1\% + 0.05\Omega)$	< 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 $\leq 5\%$ Total leaching area $\leq 10\%$		
Temperature Cycling	JESD22 Method JA-104	-55 to + 125°C, 1000 cycles	$\pm(0.5\% + 0.05\Omega)$	$\pm(1.5\% + 0.05\Omega)$	< 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.	$\pm(0.25\% + 0.05\Omega)$	$\pm(1\% + 0.05\Omega)$	< 50mΩ
Vibration	MIL-STD-202 Method 204	5 g for 20 minutes, 12 cycles each of 3 orientations, 10-2000 Hz	$\pm(0.5\% + 0.05\Omega)$	$\pm(1\% + 0.05\Omega)$	< 50mΩ
ESD	AEC-Q200-002	Human body model 0402/0603: 0.5 KV; 0805 and above: 2 KV	$\pm(3\% + 0.05\Omega)$		
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 1.8 Kg 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	$\Delta R \pm 1\%$		<50mΩ

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

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

Shelf life is 2 years from production date.

Power Derating Curve:



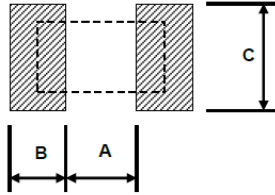
RMEA Series

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

Stackpole Electronics, Inc.

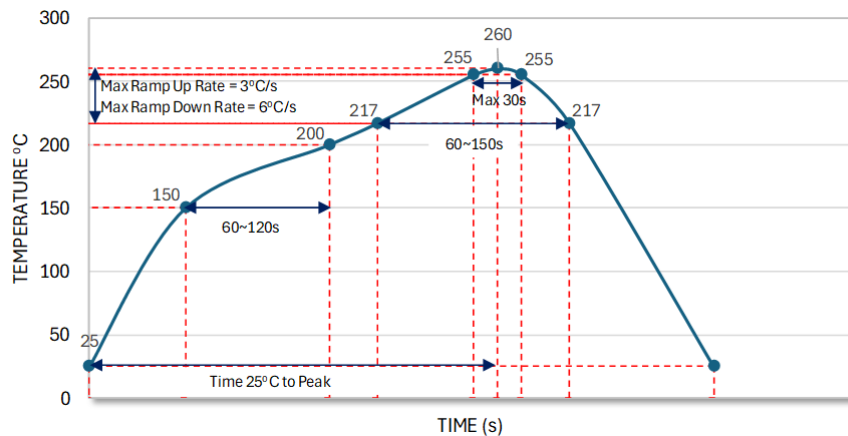
Resistive Product Solutions

Recommended Solder Pad



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

Recommended Resistor Reflow Profile



Reflow Profiles	
Profile Feature	Pb-Free Assembly
Preheat	
Min. Temperature (T _{min})	150°C
Max. Temperature (T _{max})	200°C
Preheating time (ts) 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 (tp) 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.

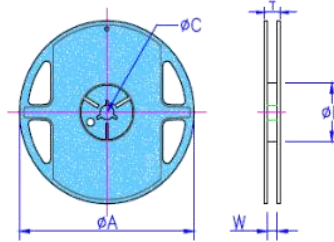
RMEA Series

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

Stackpole Electronics, Inc.

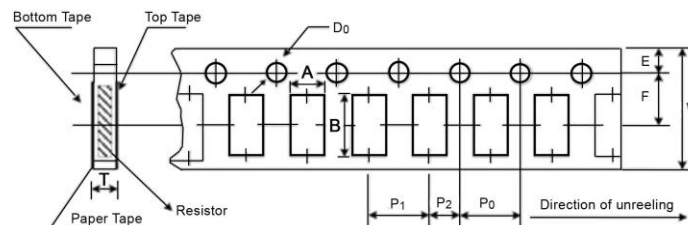
Resistive Product Solutions

Reel 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 +1.00 /-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	7 inches	7.028 ± 0.059 178.50 ± 1.50	2.362 +0.039/-0 60.00 +1.00 /-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
RMEA2010 RMEA2512	12 mm	7 inches	7.028 ± 0.059 178.50 ± 1.50	2.362 +0.039/-0 60.00 +1.00 /-0	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



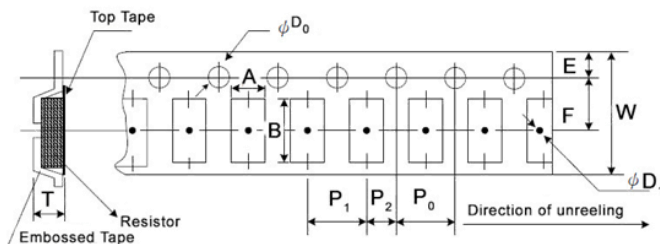
Size	A	B	W	E	F	Unit
RMEA0402	0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMEA0603	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50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

RMEA Series

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

Stackpole Electronics, Inc.
Resistive Product Solutions

Taping Specifications - Plastic Tape



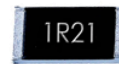
Size	A	B	W	E	F	T	Unit
RMEA2010	0.110 ± 0.004 2.80 ± 0.10	0.213 ± 0.008 5.40 ± 0.20	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.047 +0 1.2 +0	inches mm
RMEA2512	0.138 ± 0.004 3.50 ± 0.10	0.264 ± 0.004 6.70 ± 0.10	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	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	

Part Marking Specifications

E96 and E24 Values for 0805-2512 (0.5% and 1% tolerances)

The nominal resistance is marked on the surface of the overcoating with the use of **four character markings**.

1. Values <100Ω will use "R" as the decimal holder.



1.21Ω



100Ω

E24 Values (5% tolerance)

The nominal resistance is marked on the surface of the overcoating with the use of **three character markings**.

1. Values between 1Ω and 9.1Ω will use "R" as the decimal holder.



1Ω

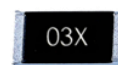


1.2 KΩ

E96 Values for 0603 size (1% tolerances)

A two character 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 from "Y" - "F" represents a specific multiplier.



10.5Ω

Alpha Character = Multiplier		Chip Marking = Value	
Y = 0.1	C = 1000	01Y = 10.0 x 0.1 = 1Ω	
X = 1	D = 10000	01B = 10.0 x 100 = 1KΩ	
A = 10	E = 100000	25C = 17.8 x 1000 = 17.8KΩ	
B = 100	F = 1000000	01F = 10.0 x 100000 = 10MΩ	

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

Note: 0402 resistors are not marked.

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

RMEA Series

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

Stackpole Electronics, Inc.

Resistive Product Solutions

“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. 1 ohm = 1R00 10 ohm = 10R0 100 Kohm = 100K 1 Mohm = 1M00 Zero ohm jumper = 0R00		Code	Description	
RMEA	Automotive Grade Anti-Sulfur	0402	0.063	0.1	D	0.5%	E96, E24	T	7" Reel Paper Tape	0402	10000			(blank)	Standard	
		0603	0.1	0.25	F	1%	E24		7" Reel Plastic Tape	0603, 0805	5000	-HP	High Power			
		0805	0.125	0.33	J	5%	E24			1206, 1210	4000					
		1206	0.25	0.5	Z		Jumper			2010, 2512						
		1210	0.33	0.75												
		2010	0.75	1												
		2512	1	1.5												

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