General Purpose Thick Film Standard Power and High-Power Chip Resistor

Stackpole Electronics, Inc.

Resistive Product Solutions

Features:

- RMCF standard power ratings
- RMCP high power ratings
- Nickel barrier terminations standard
- Power derating from 100% at 70°C to zero at +155°C
- RoHS compliant, REACH compliant, and halogen free
- AEC-Q200 compliant (except 01005 and 0201 sizes)
- For ultra-high power, see <u>RMCP-UP Series</u> Thick Film Ultra High-Power Chip Resistor



Electrical Specifications - RMCF														
Type/Code	Power Rating (W)	Max. Working	Max. Overload	Max. Jumper Current	TCR (ppm/°C)									
	@ 70°C	Voltage (V) (1)	Voltage (V)	(A)										
RMCF01005	0.03	15	30	0.5	± 300									
					± 200									
RMCF0201	0.05	25	50	0.5	± 400									
141101 0201	0.00			0.0	± 200									
					± 200									
RMCF0402	0.063	50	100	1	± 100		0.1 - 0.499 0.5 - 0.976 1 - 9.76 10 - 1M							
					± 200	1.02M - 22.1M	1.1M - 22M							
					± 500	0.1 - 0	0.499							
					± 400	0.5 -	0.976							
RMCF0603	0.1	75	150	1	± 200	1 - 9.76	1 - 22M							
					± 100	10 - 1M	=							
					± 200	1.02M - 22.1M	-							
				± 200	0.1 - 9.76	0.1 - 22M								
RMCF0805	0.125	150	300	2	± 100	10 - 1M	-							
					± 200	1.02M - 22.1M	-							
					± 200	0.1 - 9.76	0.1 - 22M							
RMCF1206	0.25	200	400	400	400	400	400	400	400	400	2	± 100	10 - 1M	-
					± 200	1.02M - 22.1M	-							
					± 200	0.1 - (0.976							
RMCF1210	0.5	200	400	3	± 400	1 - 9.76								
					± 100									
					± 200	0.1 - (0.976							
				_	± 400	1 - 9	9.76							
RMCF2010	RMCF2010 0.75 200	200	400	3	± 200	-	10 - 10M							
					± 100	10 - 10M	-							
					± 200		0.976							
				_	± 400	1 - 9	9.76							
RMCF2512	1	200	400	3	± 200	-	10 - 10M							
					± 100	10 - 10M	-							

Notes: (1) Lesser of $\sqrt{(P^*R)}$ or maximum working voltage

(2) Contact Stackpole for higher or lower values

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Electrical Specifications - RMCP								
Type/Code	Power Rating (W)	Max. Working	Max. Overload	Max. Jumper Current	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance ⁽²⁾		
	@ 70°C	Voltage (V) (1)	Voltage (V)	(A)		1%, 5%		
RMCP0201	0.063	25	50	1	-200 / +400	1 - 9.76		
RIVICEUZUT	0.003	25	50	ı	± 200	10 - 10M		
RMCP0402	0.125	50	100	1.5	± 200	1 - 9.76		
KIVICP0402	0.125	50	100	1.5	± 100	10 - 10M		
RMCP0603	0.25	75	150	2	± 200	1 - 9.76		
KIVICF 0003	0.23	73	150 2	2	± 100	10 - 10M		
RMCP0805	0.33	150	300	2.5	± 200	1 - 9.76		
RIVICE 0003	0.55	130	300	2.5	± 100	10 - 10M		
RMCP1206	0.5	200	400	3.5	± 400	1 - 9.76		
TOWICH 1200	0.5	200	400	5.5	± 100	10 - 10M		
RMCP1210	0.66	200	400	5	± 400	1 - 9.76		
KIVICE 1210	0.00	200	400	3	± 100	10 - 10M		
RMCP2010	1	200	400	6	± 200	1 - 9.76		
INVIOR 2010	I	200	400	U	± 100	10 - 10M		
RMCP2512	2	250	500	7	± 200	1 - 9.76		
INVIOR 2012		250	300	,	± 100	10 - 10M		

Notes: (1) Lesser of $\sqrt{(P^*R)}$ or maximum working voltage

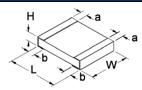
(2) Contact Stackpole for higher or lower values

The resistance value range for RMCP jumper is max. 0.02Ω

	3 - 1 -						
	Electrical Specifications - Jumper						
Type/Code	Jumper Rated Current (A)	Max Overload Current (A)*	Jumper Resistance Value (Ω)				
RMCF01005	0.5	1					
RMCF0201	0.5	1					
RMCF0402	1	3					
RMCF0603	1	5					
RMCF0805	2	10	0.05 max.				
RMCF1206	2	10					
RMCF1210	3	12					
RMCF2010	3	12					
RMCF2512	3	15					

^{* &}lt; 1 second and 1 time

Mechanical Specifications



Turno/Codo	Typical Unit	L	W	Н	а	b	Unit
Type/Code	Weight (mg)	Body Length	Body Width	Body Height	Top Termination	Bottom Termination	Unit
RMCF01005	0.07	0.016 ± 0.001	0.008 ± 0.001	0.005 ± 0.001	0.004 ± 0.001	0.004 ± 0.001	inches
KIVICI 01003	0.07	0.40 ± 0.02	0.20 ± 0.02	0.13 ± 0.02	0.10 ± 0.03	0.10 ± 0.03	mm
RMCF0201	0.16	0.024 ± 0.001	0.012 ± 0.001	0.009 ± 0.002	0.006 ± 0.002	0.006 ± 0.002	inches
RMCP0201	0.10	0.60 ± 0.03	0.30 ± 0.03	0.23 ± 0.05	0.15 ± 0.05	0.15 ± 0.05	mm
RMCF0402	0.57	0.039 ± 0.004	0.020 ± 0.002	0.012 ± 0.004	0.006 ± 0.004	0.010 ± 0.006	inches
RMCP0402	0.62	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.10	0.15 ± 0.10	0.25 ± 0.15	mm
RMCF0603	1.9	0.061 ± 0.006	0.031 ± 0.006	0.018 ± 0.006	0.012 ± 0.008	0.012 ± 0.008	inches
RMCP0603	2.0	1.55 ± 0.15	0.80 ± 0.15	0.45 ± 0.15	0.30 ± 0.20	0.30 ± 0.20	mm
RMCF0805	5.0	0.079 ± 0.008	0.049 ± 0.004	0.020 ± 0.006	0.014 ± 0.010	0.014 ± 0.010	inches
RMCP0805	4.4	2.00 ± 0.20	1.25 ± 0.10	0.50 ± 0.15	0.35 ± 0.25	0.35 ± 0.25	mm

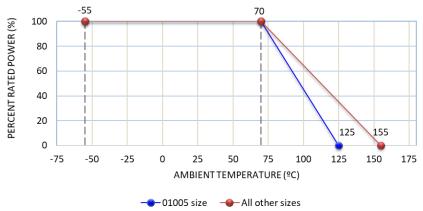
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	Mechanical Specifications (cont.)							
Turno/Codo	Typical Unit	L	W	Н	а	b	Unit	
Type/Code	Weight (mg)	Body Length	Body Width	Body Height	Top Termination	Bottom Termination	Offic	
RMCF1206	8.9	0.126 ± 0.010	0.063 ± 0.006	0.022 ± 0.006	0.020 ± 0.012	0.020 ± 0.012	inches	
RMCP1206	0.9	3.20 ± 0.25	1.60 ± 0.15	0.55 ± 0.15	0.50 ± 0.30	0.50 ± 0.30	mm	
RMCF1210	15.6	0.126 ± 0.010	0.098 ± 0.010	0.022 ± 0.006	0.020 ± 0.012	0.020 ± 0.012	inches	
RMCP1210	16.0	3.20 ± 0.25	2.50 ± 0.25	0.55 ± 0.15	0.50 ± 0.30	0.50 ± 0.30	mm	
RMCF2010	23.6	0.197 ± 0.008	0.098 ± 0.008	0.022 ± 0.006	0.024 ± 0.012	0.024 ± 0.014	inches	
RMCP2010	24.2	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.15	0.60 ± 0.30	0.60 ± 0.35	mm	
RMCF2512	40.0	0.248 ± 0.008	0.126 ± 0.010	0.022 ± 0.008	0.024 ± 0.012	0.024 ± 0.014	inches	
RMCP2512	39.4	6.30 ± 0.20	3.20 ± 0.25	0.55 ± 0.20	0.60 ± 0.30	0.60 ± 0.35	mm	

	Performance Characteristics							
Test	Test Specifications	Test Conditions (JIS-C 5202)						
	± (2% + 0.1Ω)	2.5 x rated voltage for 5 seconds						
Short Time Overload	Jumper: Max 0.05Ω after test	0201 = 1 A 0402 / 0603 = 2.5 A 0805 / 1206 / 1210 / 2010 / 2512 = 5 A						
Dielectric Withstanding Voltage	No flashover or breakdown	100 VAC, 1 minute						
Resistance to Soldering Heat	± 1%	260 ± 5°C, for 10 seconds ± 0.5 seconds (Solder Bath)						
Solderability	95% coverage, minimum	235 ± 5°C, for 2 seconds ± 0.5 seconds (Colophonium flux)						
Temperature Cycle	\pm (1% + 0.05Ω) Jumper (< 0.05Ω)	-65°C: 30 minutes 25°C: 2 to 3 minutes 155°C: 30 minutes 25°C: 2 to 3 minutes (5 Cycles)						
Load Life (Endurance)	1% and below: \pm (1% + 0.05Ω) 2% and 5%: \pm (3% + 0.1Ω) Value < 1Ω: \pm (3% + 0.1Ω) Jumper: Max 0.1Ω after test.	70 ± 2°C, RCWV or max. working voltage whichever is less for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF"						
Voltage Coefficient	± 100 (ppm/V)	1/10 rated voltage for 3 seconds max. then rated voltage for 3 seconds max.						
Robustness of Termination	± (1% + 0.05Ω)	Bend of 2 mm for 5 ± 1 seconds						
Resistance to Solvent	1%: \pm (0.5% + 0.05Ω) 5%: \pm (0.5% + 0.05Ω) Jumper: Max. 0.05Ω after test	The tested resistor should be immersed into isopropyl alcohol of 20 to 25°C for 60 seconds. Then the resitor is left in the room for 48 hours.						
Damp Heat with Load	1%: \pm (1% + 0.05Ω) 5%: \pm (2% + 0.05Ω) Values < 1Ω: \pm (3% + 0.1Ω) Jumper: Max. 0.1Ω after test	40 ± 2°C, 90%~95% R.H. RCWV or max. working voltage whichever is less for 1000 hours with 1.5 hours "ON" and 0.5 hours "OFF"						

Operating temperature range is -55 to +155°C for all sizes except for 01005 size Operating temperature range for 01005 is -55 to +125°C

Power Derating Curve:



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Repetitive Pulse Information

(This information is for reference only and is not guaranteed performance.)

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.

 $Vp = K\sqrt{PxRxT/t}$

 $Ip = K\sqrt{P/RxT/t}$

 $Pp = K^2 xPxT/t$

Where: Vp: Pulse limiting voltage (V)

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

P: Power rating (W)

R: Nominal resistance (ohm)
T: Repetitive period (sec)

t: Pulse duration (sec)

K: Coefficient by resistors type (refer to below matrix)

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

Note 1: If T > 10 \rightarrow T = 10 (sec), T/t > 1000 \rightarrow T/t = 1000

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

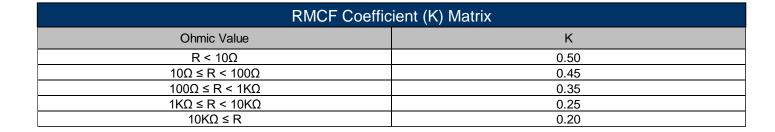
temperature is more than the rated temperature (70°C), please decrease power rating according to

"Power Derating Curve"

Note 5: Please assure sufficient margin for use period and conditions for "Pulse Limiting Voltage"

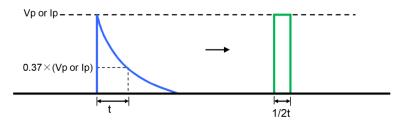
Note 6: If the pulse waveform is not square wave, please judge after transform the waveform into square wave

according to the "Waveform Transformation to Square Wave".

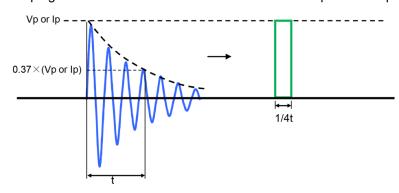


Waveform Transformation to Square Wave

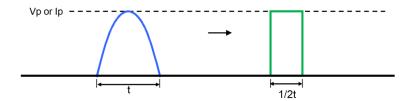
1. Discharge curve wave with time constant "t" → Square wave



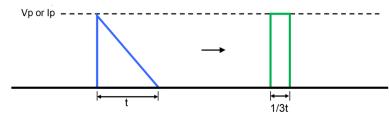
2. Damping oscillation wave with time constant of envelope "t" → Square wave



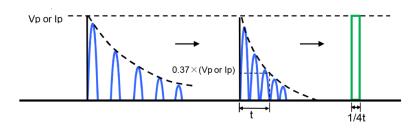
3. Half-wave rectification wave → Square wave



4. Triangular wave → Square wave



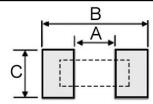
5. Special wave → Square wave



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Recommended Pad Layout



Type/Code	Α	В	С	Unit
RMCF01005	0.008	0.020	0.008	inches
RIVICEUTOUS	0.20	0.50	0.20	mm
RMCF0201	0.012	0.039	0.016	inches
RMCP0201	0.30	1.00	0.40	mm
RMCF0402	0.020	0.059	0.024	inches
RMCP0402	0.50	1.50	0.60	mm
RMCF0603	0.031	0.083	0.035	inches
RMCP0603	0.80	2.10	0.90	mm
RMCF0805	0.047	0.118	0.051	inches
RMCP0805	1.20	3.00	1.30	mm
RMCF1206	0.087	0.165	0.063	inches
RMCP1206	2.20	4.20	1.60	mm
RMCF1210	0.087	0.165	0.110	inches
RMCP1210	2.20	4.20	2.80	mm
RMCF2010	0.138	0.240	0.110	inches
RMCP2010	3.50	6.10	2.80	mm
RMCF2512	0.193	0.315	0.138	inches
RMCP2512	4.90	8.00	3.50	mm

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 is 3.

Wave Soldering							
Description	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				

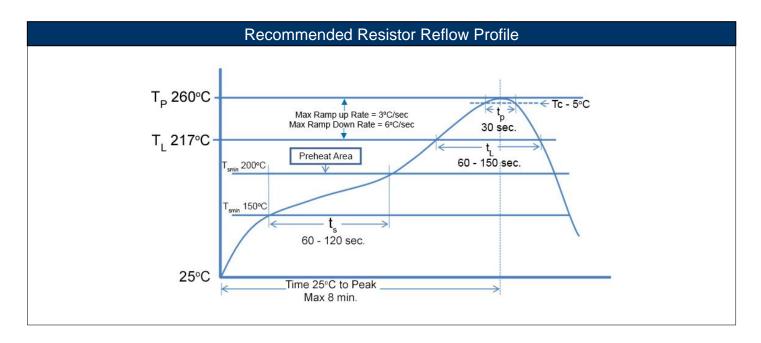
Temperature Diff. = Difference between final preheat stage and soldering stage.

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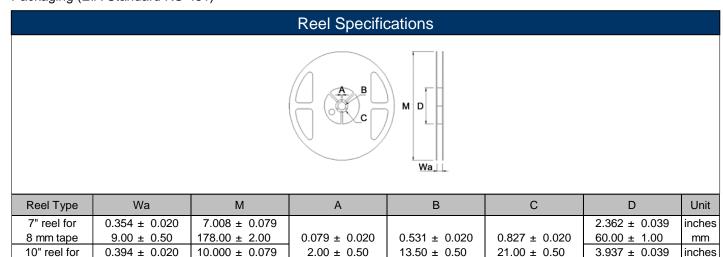
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	Convection IR Reflow						
Description	Maximum	Recommended	Minimum				
Ramp Up (°C/sec)	3°C/sec	2°C/sec	*				
Dwell Time > 217°C	150 seconds	90 seconds	60 seconds				
Solder Temp.	260°C	245°C	*				
Dwell Time at Max.	30 seconds	15 seconds	10 seconds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



Packaging (EIA Standard RS-481)



10" reel for

8 mm tape

 2.00 ± 0.50

 13.50 ± 0.50

 21.00 ± 0.50

 100.00 ± 1.00

inches

mm

 0.394 ± 0.020

 10.00 ± 0.50

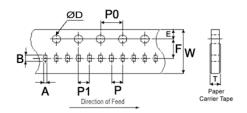
254.00 ± 2.00

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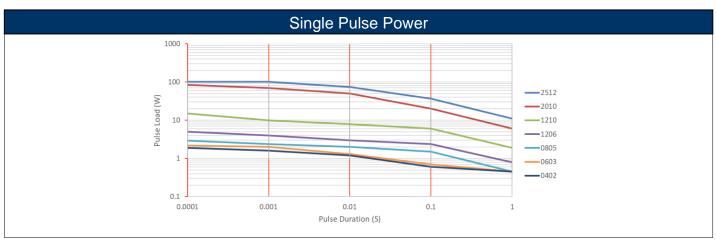
Packaging Specifications - Paper Tape (sizes 01005 - 1210)



Type/Code	Nominal Typical Full Reel Weight (g)	Tape Width	А	В	W	E	Unit
RMCF01005	127.3		0.009 ± 0.002 0.24 ± 0.05	0.018 ± 0.004 0.45 ± 0.10			inches mm
RMCF0201 RMCP0201	97.2		0.016 ± 0.006 0.40 ± 0.15	0.028 ± 0.006 0.70 ± 0.15			inches mm
RMCF0402 RMCP0402	94.5		0.028 ± 0.006 0.70 ± 0.15	0.047 ± 0.006 1.20 ± 0.15			inches mm
RMCF0603 RMCP0603	118.3	0.315 8.00	0.041 ± 0.008 1.05 ± 0.20	0.071 ± 0.008 1.80 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	inches mm
RMCF0805 RMCP0805	139.2		0.063 ± 0.010 1.60 ± 0.25	0.093 ± 0.010 2.35 ± 0.25			inches mm
RMCF1206 RMCP1206	151.4		0.077 ± 0.010 1.95 ± 0.25	0.140 ± 0.010 3.55 ± 0.25			inches mm
RMCF1210 RMCP1210	175.7		0.110 ± 0.010 2.80 ± 0.25	0.138 ± 0.008 3.50 ± 0.20			inches mm
Type/Code	F	Т	Р	P0	P1	DØ	Unit
RMCF01005		0.016 ± 0.004 0.40 ± 0.10					inches mm
RMCF0201		0.015 ± 0.006	0.079 ± 0.004				inches
RMCP0201		0.38 ± 0.15	2.00 ± 0.10				mm
RMCF0402		0.016 ± 0.008					inches
RMCP0402 RMCF0603	0.138 ± 0.002	0.40 ± 0.20 0.024 ± 0.004		0.157 ± 0.004	0.079 ± 0.004	0.059 +0.004/-0	mm
RMCP0603	3.50 ± 0.002	0.60 ± 0.10		4.00 ± 0.10	2.00 ± 0.10	1.50 +0.10/-0	mm
RMCF0805	3.00 2 0.00	5.00 2 5.10		2 0.10	2.00 2 0.10		inches
RMCP0805							mm
RMCF1206		0.030 ± 0.004	0.157 ± 0.004				inches
RMCP1206		0.75 ± 0.10	4.00 ± 0.10				mm
RMCF1210							inches
RMCP1210							mm

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Packaging Specifications – Plastic Tape (sizes 2010 and 2512) Ε Direction of Feed Nominal Typical Type/Code Tape Width Α В Е F Unit Full Reel Weight (g) RMCF2010 0.110 ± 0.008 0.217 ± 0.012 inches 183.1 **RMCP2010** 0.472 2.80 ± 0.20 5.50 ± 0.30 0.472 ± 0.008 0.069 ± 0.004 0.217 ± 0.002 mm RMCF2512 12.00 0.134 ± 0.008 0.264 ± 0.008 12.00 ± 0.20 1.75 ± 0.10 5.50 ± 0.05 inches 255.3 RMCP2512 3.40 ± 0.20 6.70 ± 0.20 mm Type/Code G Н ØD ØD1 T1 Ρ Unit RMCF2010 RMCP2010 0.157 ± 0.004 0.079 ± 0.002 0.009 ± 0.004 0.059 +0.004/-0 0.059 ± 0.004 0.035 ± 0.008 0.157 ± 0.004 inches RMCF2512 4.00 + 0.10 2.00 ± 0.05 0.23 ± 0.10 1.50 +0.10/-0 1.50 ± 0.10 0.90 ± 0.20 4.00 ± 0.10 mm RMCP2512



The data provided are for reference only. They are typical performance for this product but are not guaranteed. The actual pulse handling of each individual resistor may vary depending on a variety of factors including resistance tolerance and resistance value. Stackpole Electronics, Inc. assumes no liability for the use of this information. Customers should validate the performance of these products in their applications. Contact Stackpole marketing to discuss specific pulse application requirements.

Temperature Measurement of Resistor Surface

Description: The resistor surface generated temperature variation after applied rated voltage. Products and power:

Size	0201	0402	0603	0805	1206	1210	2010	2512
R-V	15K	40.2K	57.6K	180K	182K	100K	100K	75K
Rated Power (W)	1/20	1/16	1/10	1/8	1/4	1/2	3/4	1
Max Rated Voltage (V)	25	50	75	150	200	200	200	200

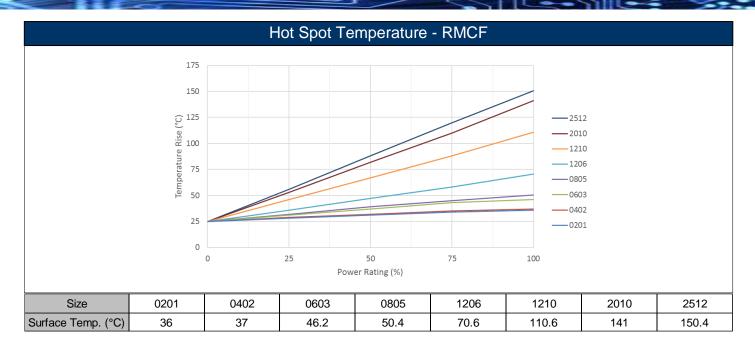
Test method: Measure component surface temperature directly after the temperature stabilizes.

Test result: As per table below:

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The thermal resistance of the RMCP will be similar to the RMCF. For example, the RMCF2512 and the RMCP2512 will have similar surface temperatures at 1W; the RMCP is designed to withstand higher temperatures associated with high power levels.

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General Purpose Thick Film Standard Power and High-Power Chip Resistor

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Part Marking Instructions

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

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

1R21 1000

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

1.21Ω 100Ω

E24 Values for 0805-2512 (5% tolerance, ≤ 0.91Ω)

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



1. Values \leq 0.91 Ω will use "R" as the decimal holder.

 0.68Ω

E24 Values for 0805-2512 (5% tolerance, $\geq 1\Omega$)

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

E24 Values for 0603 (5% tolerance)

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



100

1. Values between 0.1Ω and 9.1Ω will use "R" as the decimal holder.

Values ≥10Ω will use no decimal holder.

0.68Ω 10Ω

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.



Alpha Character = Multiplier			
Y = 0.1	C = 1000		
X = 1	D = 10000		
A = 10	E = 100000		
B = 100	F = 1000000		

	Chip Marking	Value			
	01B =	10.0 x 100 = 1 KΩ			
		17.8 x 1000 = 17.8 KΩ			
	93D =	90.9 x10000 = 909 KΩ			

10.5Ω

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: 01005, 0201, and 0402 sizes are unmarked.

General Purpose Thick Film Standard Power and High-Power Chip Resistor

Stackpole Electronics, Inc.

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)			
RMCF	General Purpose Thick Film Standard Power Chip Resistor	SMD	YES ⁽¹⁾	100% Matte Sn over Ni	Jan-04 (Japan) Jan-05 (Taiwan, China)	04/01 05/01			
RMCP	General Purpose Thick Film High-Power Chip Resistor	SMD	YES ⁽¹⁾	100% Matte Sn over Ni	Always	Always			

Note (1): RoHS Compliant by means of exemption 7c-I.

"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.

12 www.seielect.com marketing@seielect.com This specification may be changed at any time without prior notice. Please confirm technical specifications before use.

General Purpose Thick Film Standard Power and High-Power Chip Resistor

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