

Wirewound/Metal Film Resistors, Commercial Power, Radial Lead



FEATURES

- High power dissipation in small volume
- Very stable mounting
- Non-flammable
- High pulse load handling capabilities
- High heat and moisture resistance
- Various terminal styles



RoHS
COMPLIANT

Please reference the Vishay Dale closest equivalents: CPR, CPR High Volume or CPR Special Terminals (for CPR datasheet please visit our website: <http://www.vishay.com/doc?30219>, for CPR High Volume datasheet: <http://www.vishay.com/doc?30261> and for CPR Special Terminals datasheet: <http://www.vishay.com/doc?30257>).

Note:

- There may be slight differences between the Vishay Phoenix and the Vishay Dale crosses

TECHNOLOGY

RMW: The resistive element is a wire that is wound on a fiberglass core.

RMF: The resistive element is a metal film resistor consisting of a metal layer deposited over a high-grade ceramic rod.

The terminals are crimped to the resistive body to provide a good mechanical and electrical contact. To ensure a flexible assembling process, the resistors are offered in various terminals styles, such as long or short, one or two pins. The resistor body and lead ends are housed within a rectangular ceramic case which is non-flammable, will not melt even at high overloads and is resistant to most commonly used cleaning solvents, in accordance with IEC 60068-2-45.

STANDARD ELECTRICAL SPECIFICATIONS				
MODEL	POWER RATING $P_{70^{\circ}\text{C}}$ W	RESISTANCE RANGE ⁽¹⁾ Ω	TOLERANCE ⁽²⁾ %	E-SERIES Decade Values
RMW03	3	0.22 - 1.5	± 10	24
		1.6 - 3.9K	± 5	
RMF03		-	± 10	
	5	100 - 39K	± 5	
RMW05		0.47 - 1.5	± 10	
		1.6 - 4.7K	± 5	
RMF05		-	± 10	
	7	100 - 51K	± 5	
RMW07		0.47 - 1.5	± 10	
		1.6 - 7.5K	± 5	
RMF07		-	± 10	
	10	1K - 100K	± 5	
RMW10		0.47 - 1.5	± 10	
		1.6 - 10K	± 5	
RMF10		-	± 10	
	15	1K - 150K	± 5	
RMW15		1.0 - 2.0	± 10	
	20	2.2 - 10K	± 5	
RMW20		1.5 - 3.0	± 10	
		3.3 - 15K	± 5	

Notes:

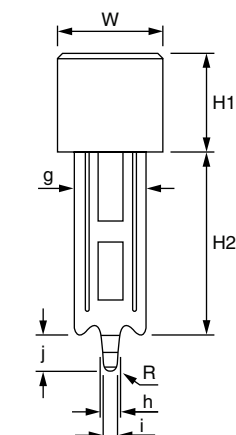
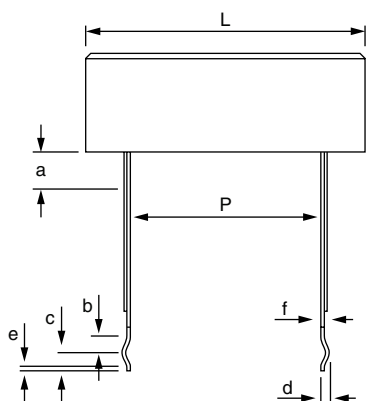
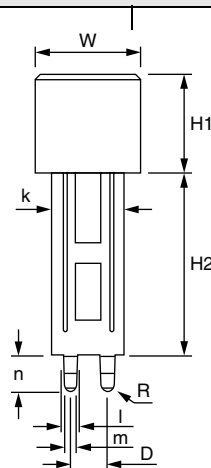
⁽¹⁾ Special resistance values available upon request

⁽²⁾ Other tolerances available upon request

TECHNICAL SPECIFICATIONS						
PARAMETER	UNIT	RMW	RMF03	RMF05	RMF07	RMF10
Limiting Voltage	V	$\sqrt{P_n \times R}$	750	1000	1200	1500
Insulation Voltage	V	> 2000				
Temperature Coefficient ⁽³⁾	ppm/°C	R < 10 Ω: 0 to 600; R ≥ 10 Ω: - 80 to + 140;	± 250			
Operating Temperature	°C	- 25 to + 155				
Short Time Overload	-	10 x rated power for 5 s				

Note:

⁽³⁾ Temperature Coefficient of ± 30 , 50 and 90 ppm/°C available on RMW upon request

**DIMENSIONS** in millimeters (inches)**TERMINAL STYLE 1
(SINGLE PIN)****TERMINAL STYLE 2
(DOUBLE PIN)**

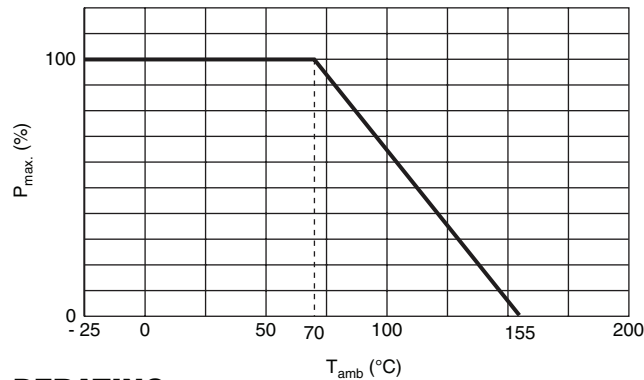
TYPE	L	W	H1	H2	D ⁽¹⁾	P
RMW03 RMF03	24.0 ± 1.0 (0.95 ± 0.04)	9.0 ± 1.0 (0.36 ± 0.04)	9.0 ± 1.0 (0.36 ± 0.04)			12.5 ± 1.0 (0.50 ± 0.04)
RMW05 RMF05	27.0 ± 1.0 (1.06 ± 0.04)	9.5 ± 1.0 (0.38 ± 0.04)	9.5 ± 1.0 (0.38 ± 0.04)	10.0 ± 1.5 (0.40 ± 0.06) or 25.0 ± 1.5 (0.98 ± 0.06)	3.5 ± 0.2 (0.14 ± 0.01) or 5.0 ± 0.2 (0.20 ± 0.01)	15.0 ± 1.0 (0.59 ± 0.04)
RMW07 RMF07	35.0 ± 1.0 (1.38 ± 0.04)					22.5 ± 1.0 (0.89 ± 0.04)
RMW10 RMF10	48.0 ± 1.0 (1.89 ± 0.04)					35.0 ± 1.0 (1.38 ± 0.04)
RMW15	48.0 ± 1.5 (1.89 ± 0.06)	12.5 ± 1.2 (0.49 ± 0.05)	12.5 ± 1.0 (0.49 ± 0.04)	15.0 ± 1.5 ⁽²⁾ (0.59 ± 0.06) or 30.0 ± 1.5 (1.18 ± 0.06)	5.0 ± 0.2 (0.20 ± 0.01)	32.5 ± 1.5 (1.28 ± 0.06)
RMW20	63.5 ± 1.5 (2.51 ± 0.06)					47.5 ± 1.5 (1.87 ± 0.06)

Notes:⁽¹⁾ Valid only for terminal style 2⁽²⁾ Available only terminal style 1**OTHER DIMENSIONS** in millimeters (inches)

RMW03, RMF03, RMW05, RMF05, RMW07, RMF07, RMW10 and RMF10				RMW15 and RMW 20			
a	5.0 ± 0.50 (0.200 ± 0.020)	h	1.5 ± 0.10 (0.060 ± 0.010)	a	5.0 ± 0.50 (0.200 ± 0.020)	h	3.0 ± 0.10 (0.120 ± 0.010)
b	1.5 ± 0.10 (0.060 ± 0.010)	i	1.4 ± 0.10 (0.060 ± 0.010)	b	1.5 ± 0.10 (0.060 ± 0.010)	i	4.5 ± 0.20 (0.180 ± 0.010)
c	1.8 ± 0.10 (0.070 ± 0.010)	j	4.5 ± 0.20 (0.180 ± 0.010)	c	1.8 ± 0.10 (0.070 ± 0.010)	j	2.7 ± 0.10 (0.110 ± 0.010)
d	1.0 ± 0.10 (0.040 ± 0.010)	k	7.3 ± 0.30 (0.290 ± 0.020)	d	1.0 ± 0.10 (0.040 ± 0.010)	k	10.3 ± 0.30 (0.410 ± 0.02)
e	0.8 ± 0.10 (0.031 ± 0.010)	l	1.5 ± 0.10 (0.060 ± 0.010)	e	0.8 ± 0.10 (0.032 ± 0.010)	l	2.0 ± 0.10 (0.080 ± 0.004)
f	0.5 ± 0.02 (0.020 ± 0.001)	m	1.4 ± 0.10 (0.060 ± 0.010)	f	0.5 ± 0.02 (0.020 ± 0.001)	m	1.5 ± 0.10 (0.060 ± 0.004)
g	7.3 ± 0.30 (0.290 ± 0.020)	n	4.5 ± 0.20 (0.180 ± 0.010)	g	10.3 ± 0.30 (0.410 ± 0.020)	n	4.5 ± 0.20 (0.180 ± 0.010)

ELECTRICAL CHARACTERISTICS

The power that the resistor can dissipate depends on the operating temperature.

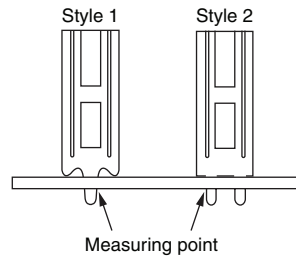


DERATING

Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient temperature (T_{amb})

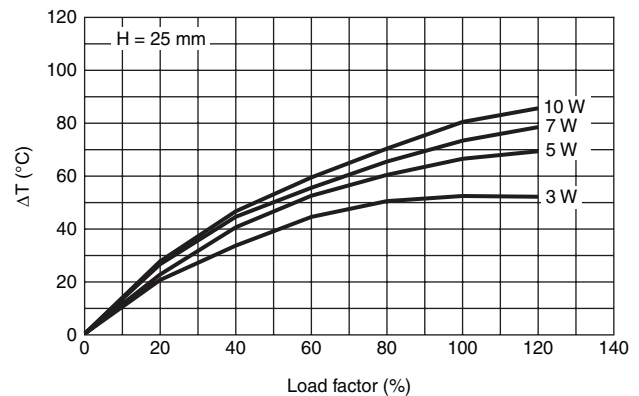
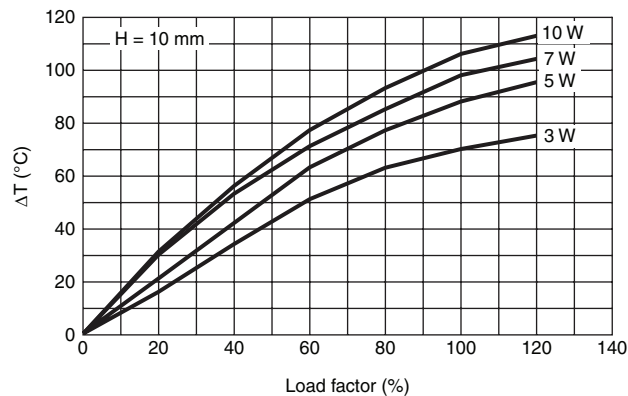
APPLICATION INFORMATION

The temperature rise of the terminal (solder spot) and the resistor body (hot spot) as a function of load for terminal styles 1 and 2.



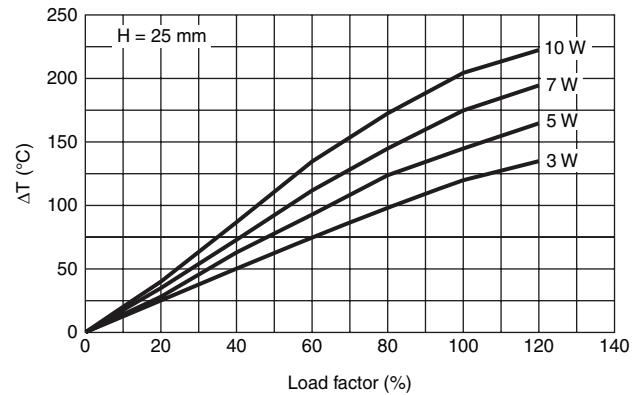
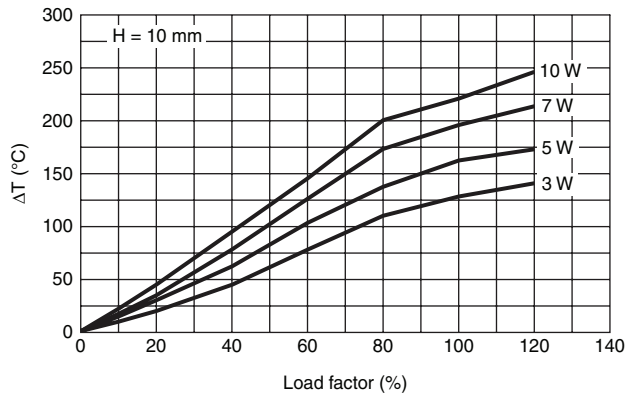
TERMINAL STYLE 1 (ONE PIN)

SOLDER SPOT



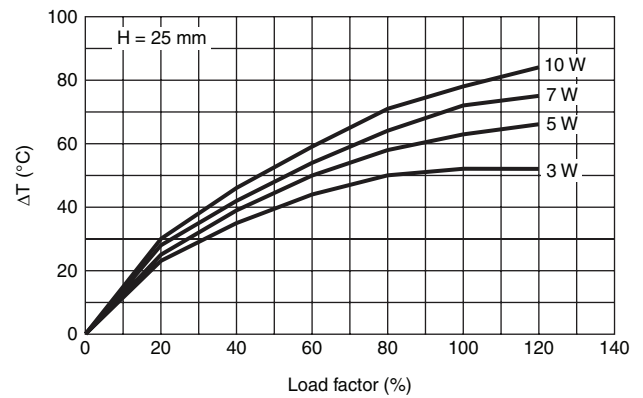
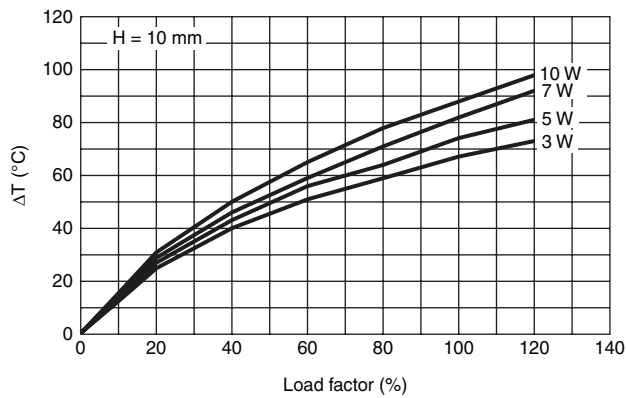


HOT SPOT

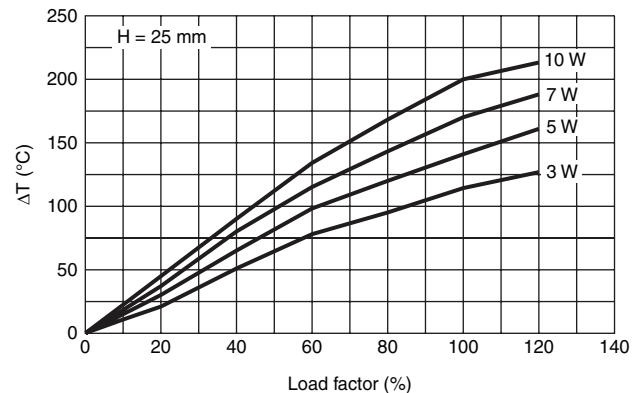
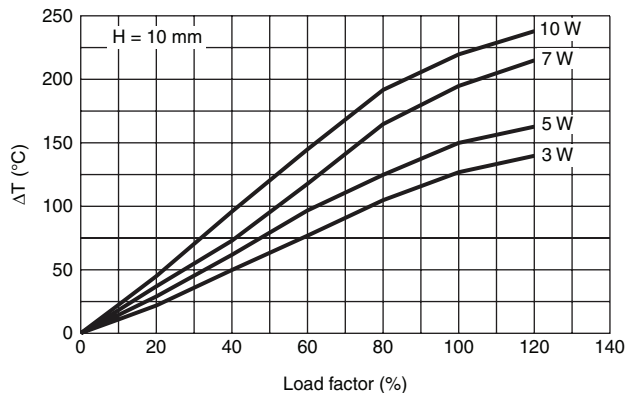


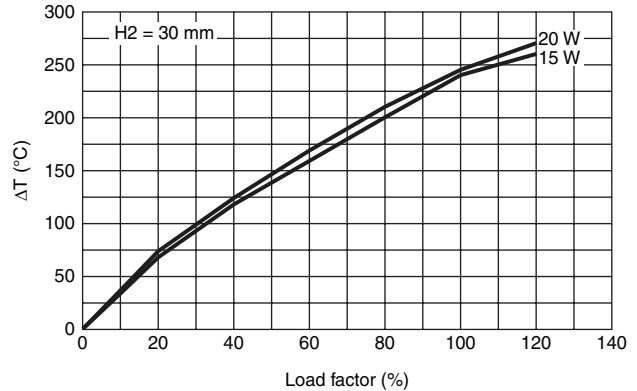
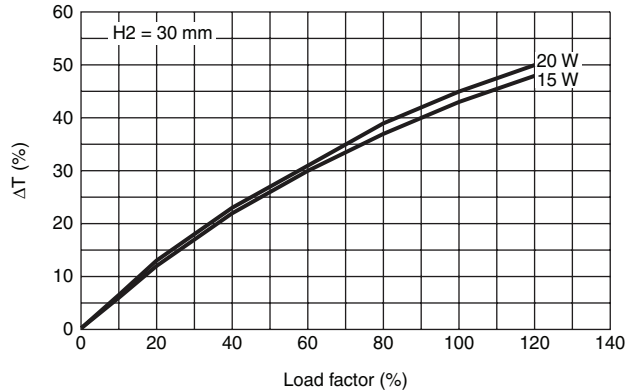
TERMINAL STYLE 2 (TWO PINS)

SOLDER SPOT



HOT SPOT



RESISTOR TYPE: 15 W, 20 W STYLE 1 AND STYLE 2**SOLDER SPOT and HOT SPOT****Notes:**

Application information available on request:

- Pulse load behavior
- High frequency behavior (self inductance)
- Pulse loading capabilities

MARKING

The resistor is marked with the resistor type designation. The nominal resistance, the tolerance on the resistance, the rated dissipation at $T_{amb} = 70\text{ }^{\circ}\text{C}$ and the production date (week and year), are printed in black on the resistor body. For values up to $910\text{ }\Omega$ the R is used as a decimal point. For values of $1000\text{ }\Omega$ or higher the letter K is used as a decimal point.

Example:

PHX	RMW07	7 W
2R2	5 %	221

ORDERING CODE NUMBER

The ordering code is indicating the product type, terminal type/length and the ohmic value.

2 3 0 6 2 5 X X X X X

PRODUCT TYPE	CODE	TYPE OF TERMINAL	CODE	TERMINAL LENGTH	CODE	OHMIC VALUE	RESISTANCE DECADE	LAST DIGIT
RMW03	0	Style 1	1	10.0 mm ⁽¹⁾ (0.40")	1		0.22 Ω - 0.91 Ω	7
RMW05	1	Style 2					1 Ω - 9.1 Ω	8
RMW07	2	pitch 5.0 mm (0.20")	2	25.0 mm ⁽²⁾ (0.98")	2		10 Ω - 91 Ω	9
RMW10	3						100 Ω - 910 Ω	1
RMW15	4	Style 2					1 k Ω - 9.1 k Ω	2
RMW20	5	pitch 3.5 mm (0.14")	5				10 k Ω - 91 k Ω	3
RMF03	6						100 k Ω - 150 k Ω	4
RMF05	7							
RMF07	8							
RMF10	9							

Notes:⁽¹⁾ RMW15/RMW20 15.0 mm (0.59") (only for terminal style 1)⁽²⁾ RMW15/RMW20 30.0 mm (1.18")**Example:** RMW05 with terminal style 1 and terminal length of 10 mm, 47 Ω , 5 % is **230625111479**

**NAFTA ORDERING CODE NUMBER**

The resistor have on ordering code with 16 or 17 digits, first 5 digits for product type and the subsequent digits indicate the resistance value, tolerance and terminal style.

R M W 0 5 W 4 7 R 0 0 J 1 0 S 1 x

PRODUCT TYPES	POWER	CODE	VALUE	5 DIGITS	TOL.	CODE	TERMINAL STYLES FOR 3 W UP TO 10 W	CODE	TERMINAL STYLES FOR 15 W UP TO 20 W	CODE	TERMINAL STYLE 2 ONLY	CODE
RMW or RMF	3 W	03W	1 Ω	1R000	10 %	K	Terminal height 10 mm (0.394") one pin	10S1	Terminal height 15 mm (0.59") one pin	15S1	3.5 mm (0.138")	P
	5 W	05W	10 Ω	10R00	5 %	J	Terminal height 10 mm (0.394") two pins	10S2	Terminal height 15 mm (0.59") two pins	15S2		
	7 W	07W	100 Ω	100R0			Terminal height 25 mm (0.984") one pin	25S1	Terminal height 30 mm (1.18") one pin	30S1		
	10 W	10W	1 k Ω	1K000			Terminal height 25 mm (0.984") two pins	25S2	Terminal height 30 mm (1.18") two pins	30S2		
	15 W	15W	10 k Ω	10K00								
	20 W	20W	100 k Ω	100K0								

NAFTA ORDERING INFORMATION

PRODUCT	TOLERANCE	NAFTA ORDERING CODE	PACKAGING	QUANTITY (pieces)
RMW03	$\pm 5 \%$, $\pm 10 \%$	RMW03Wxxxxxx10S1	BOX	500
		RMW03Wxxxxxx25S1		
		RMW03Wxxxxxx10S2		
		RMW03Wxxxxxx25S2		
		RMW03Wxxxxxx10S2P		
		RMW03Wxxxxxx25S2P		
RMF03	$\pm 5 \%$	RMF03Wxxxxxx10S1	BOX	500
		RMF03Wxxxxxx25S1		
		RMF03Wxxxxxx10S2		
		RMF03Wxxxxxx25S2		
		RMF03Wxxxxxx10S2P		
		RMF03Wxxxxxx25S2P		
RMW05	$\pm 5 \%$, $\pm 10 \%$	RMW05Wxxxxxx10S1	BOX	500
		RMW05Wxxxxxx25S1		
		RMW05Wxxxxxx10S2		
		RMW05Wxxxxxx25S2		
		RMW05Wxxxxxx10S2P		
		RMW05Wxxxxxx25S2P		

NAFTA ORDERING INFORMATION				
PRODUCT	TOLERANCE	NAFTA ORDERING CODE	PACKAGING	QUANTITY (pieces)
RMF05	$\pm 5 \%$	RMF05Wxxxxxx10S1	BOX	500
		RMF05Wxxxxxx25S1		
		RMF05Wxxxxxx10S2		
		RMF05Wxxxxxx25S2		
		RMF05Wxxxxxx10S2P		
		RMF05Wxxxxxx25S2P		
RMW07	$\pm 5 \%, \pm 10 \%$	RMW07Wxxxxxx10S1		
		RMW07Wxxxxxx25S1		
		RMW07Wxxxxxx10S2		
		RMW07Wxxxxxx25S2		
		RMW07Wxxxxxx10S2P		
		RMW07Wxxxxxx25S2P		
RMF07	$\pm 5 \%$	RMF07Wxxxxxx10S1		
		RMF07Wxxxxxx25S1		
		RMF07Wxxxxxx10S2		
		RMF07Wxxxxxx25S2		
		RMF07Wxxxxxx10S2P		
		RMF07Wxxxxxx25S2P		
RMW10	$\pm 5 \%, \pm 10 \%$	RMW10Wxxxxxx10S1	BOX	400
		RMW10Wxxxxxx25S1		
		RMW10Wxxxxxx10S2		
		RMW10Wxxxxxx25S2		
		RMW10Wxxxxxx10S2P		
		RMW10Wxxxxxx25S2P		
RMF10	$\pm 5 \%$	RMF10Wxxxxxx10S1		
		RMF10Wxxxxxx25S1		
		RMF10Wxxxxxx10S2		
		RMF10Wxxxxxx25S2		
		RMF10Wxxxxxx10S2P		
		RMF10Wxxxxxx25S2P		
RMW15	$\pm 5 \%, \pm 10 \%$	RMW15Wxxxxxx15S1		300
		RMW15Wxxxxxx30S1		
		RMW15Wxxxxxx30S2		
RMW20	$\pm 5 \%, \pm 10 \%$	RMW20Wxxxxxx15S1		50
		RMW20Wxxxxxx30S1		
		RMW20Wxxxxxx30S2		

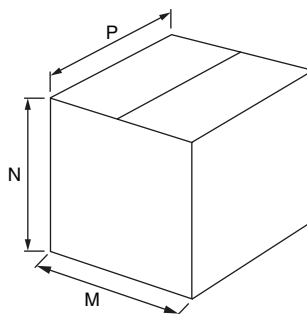
Composition of Ohmic Value

VALUE	5 DIGITS
1 Ω	1R000
10 Ω	10R00
100 Ω	100R0
1 k Ω	1K000
10 k Ω	10K00
100 k Ω	100K0

The ohmic value in the NAFTA ordering code (see table NAFTA ORDERING INFORMATION) is represented by the “xxxxx” in the middle of the above ordering code. The table “Composition of Ohmic Value” gives some examples on how to use these 5 digits.

Example:

RMW05, 47 Ω , 5 %, terminal 10 mm, one pin is
RMW05W47R00J10S1

**PACKAGING** in millimeters (inches)

PRODUCT TYPE	P	M	N	QUANTITY (pieces)	MASS per 100 Units (g)			
					10 mm lead	25 mm lead	15 mm lead	30 mm lead
RMW03	310 (12.2)	200 (7.9)	190 (7.5)	500	700	750	-	-
RMF03					800	850	-	-
RMW05					700	750	-	-
RMF05					800	850	-	-
RMW07	300 (11.8)	250 (9.9)	215 (8.5)	400	800	900	-	-
RMF07					900	950	-	-
RMW10					1100	1150	-	-
RMF10					1200	1250	-	-
RMW15	334 (13.2)	140 (5.5)	59 (2.4)	50	-	-	1900	2000
RMW20		250 (9.9)			-	-	2400	2500

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the schedule of IEC publications 60115-1, category 25/155/56 (rated temperature range - 25 °C to + 155 °C; damp heat, long term, 56 days and along the lines of IEC publications 60068-2); "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmosphere conditions according to IEC 60068-1 subclause 5.3, unless otherwise specified. In some instances deviations from IEC applications were necessary for our specified method.

PERFORMANCE

IEC 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.6.1.1	-	Insulation resistance	500 V _{DC} during 1 min; V-block method	$R_{ins \min}$. 100 M Ω
4.7	-	Voltage proof on insulation	1000 V _{RMS} during 1 min; V-block method	No damage $\Delta R/R_{max}$. $\pm 0.5\%$ + 0.05 Ω
4.8	-	Temperature coefficient	Between - 25 °C and + 155 °C RMW $R < 10\ \Omega$ $R \geq 10\ \Omega$ RMF	0 to 600 ppm/°C - 80 to + 140 ppm/°C ± 250 ppm/°C

PERFORMANCE				
IEC 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.13	-	Short time overload	Room temperature P = 10 x P _n ; 5 s, V _{max} for: RMF03 ≤ 1500 V RMF05 ≤ 2000 V RMF07 ≤ 2500 V RMF10 ≤ 3000 V	$\Delta R/R_{\max.} \pm 2 \% + 0.1 \Omega$
4.15	-	Robustness of resistor body	Load 200 ± 10 N	No damage $\Delta R/R_{\max.} \pm 0.5 \% + 0.05 \Omega$
4.16	21(U)	Robustness of terminations:		No damage
4.16.2	21(Ua1)	Tensile all samples	Load 45 N; 10 s	
4.17	20(Ta)	Solderability (after aging)	16 h at 155 °C; leads immersed in flux 600, 2 ± 0.5 s in a solder bath at 235 ± 5 °C	Good tinning (≥ 95 % covered) no visible damage
4.18	20(Tb)	Resistance to soldering heat	Thermal shock: 3 s, 350 °C	$\Delta R/R_{\max.} \pm 1 \% + 0.05 \Omega$
4.19	14(Na)	Rapid change of temperature	30 min at - 25 °C and 30 min + 155 °C; 5 cycles	No visual damage $\Delta R/R_{\max.} \pm 1 \% + 0.05 \Omega$
4.22	6(Fc)	Vibration	Frequency 10 a 55 Hz, displacement 0.75 mm or acceleration 10 g, three directions; total 6 h (3 x 2 h)	No damage $\Delta R/R_{\max.} \pm 1 \% + 0.05 \Omega$
4.23	2(Ba) 30(Db) 1(Aa) 30 (Db)	Climatic sequence:		
4.23.2		Dry heat	16 h, + 155 °C	
4.23.3		Damp heat (accelerated) 1st cycle	24 h; 25 °C to 55 °C; 90 to 100 % RH	$\Delta R/R_{\max.} \pm 1 \% + 0.05 \Omega$
4.23.4		Cold	2 h; - 25 °C	
4.23.6		Damp heat (accelerated) remaining cycles	5 days; 25 °C to 55 °C; 90 to 100 % RH	
4.24	3 (Ca)	Damp heat (steady state)	56 days; 40 °C; 90 to 95 % RH; loaded with 0.01 P _n	$\Delta R/R_{\max.} \pm 3 \% + 0.1 \Omega$
4.25.1	-	Endurance (at 70 °C)	1000 h load with P _n ; 1.5 h ON and 0.5 h OFF	$\Delta R/R_{\max.} \pm 5 \% + 0.1 \Omega$



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.