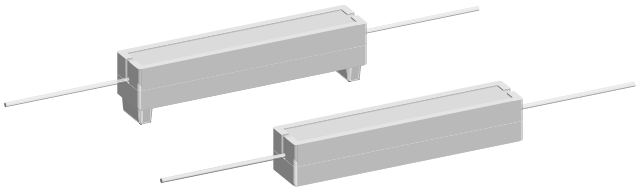
Wirewound/Metal Film Resistors, Commercial Power, Axial Lead



FEATURES

- High power dissipation in small volume
- Ideal for pulsing applications
- Completely welded construction
- Non-flammable
- High heat and moisture resistance
- Low inductance version available on request

Pb-free

e3

RoHS COMPLIANT

Please reference the Vishay Dale closest equivalents: CP, CP High Volume (for CP datasheet please visit our website: http://www.vishay.com/doc?30213 and for CP High Volume datasheet: http://www.vishay.com/doc?30113).

Note:

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

TECHNOLOGY

AMW: The resistor element is a resistive wire, which is wound on a ceramic rod.

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

For both AMW and AMF, tinned copper leads are connected to the caps by welding. The resistor body is housed in a rectangular ceramic case with a special, inorganic potting which is non-flammable, will not melt even at high overloads and is resistant to most commonly used cleaning solvents.

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	POWER RATING $P_{40\ °C}$ W	RESISTANCE RANGE (1) Ω	TOLERANCE (2) %	E-SERIES Decade Values
AMW03	3	0.1 - 2.0K	± 5	24
AMF03		100 - 39K		
AMW05	5	0.1 - 4.7K		
AMF05		100 - 51K		
AMW07	7	0.1 - 6.2K		
AMF07		100 - 51K		
AMW10	10	0.1 - 10K		
AMF10		1K - 100K		
AMW15	15 at 25 °C	0.1 - 10K		
AMW20	20 at 25 °C	0.1 - 15K		

Notes:

(1) Special resistance values available upon request

(2) Other tolerances available upon request

TECHNICAL SPECIFICATIONS

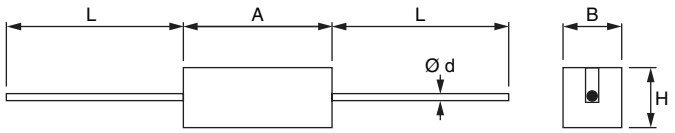
PARAMETER	UNIT	AMW	AMF03	AMF05	AMF07	AMF10
Limiting Voltage	V	$\sqrt{P \times R}$	750	1000	1200	1500
Insulation Voltage	V	> 2000				
Temperature Coefficient (3)	ppm/°C	R < 10 Ω: 0 to 600; R ≥ 10 Ω: - 100 to + 150;	± 250			
Operating Temperature	°C	- 55 to + 275				
Short Time Overload	-	5 x rated power for 5 s				

Note:

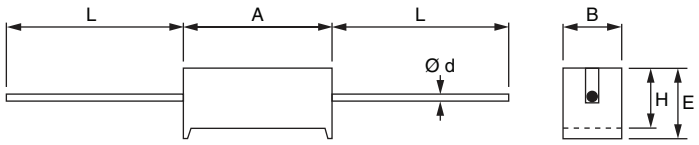
(3) Temperature Coefficient of ± 30, 50 or 90 ppm/°C available on AMW upon request

DIMENSIONS in millimeters (inches)

FLAT VERSION



STAND-OFF VERSION

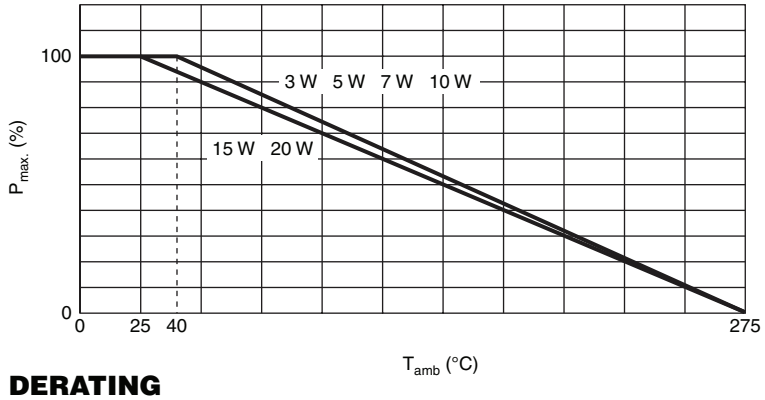


TYPE	A	H	B	E	Ød	L (1)
AMW03 AMF03	22.2 ± 1.5 (0.87 ± 0.06)	8.0 ± 1.0 (0.32 ± 0.04)	8.0 ± 1.0 (0.32 ± 0.04)	9.5 ± 1.0 (0.374 ± 0.04)	0.80 ± 0.03 (0.031 ± 0.001)	28.0 ± 2.5 (1.11 ± 0.098)
AMW05 AMF05	22.2 ± 1.5 (0.87 ± 0.06)	9.5 ± 1.0 (0.37 ± 0.04)	9.5 ± 1.0 (0.37 ± 0.04)	11 ± 1.0 (0.433 ± 0.04)		
AMW07 AMF07	35 ± 1.5 (1.38 ± 0.059)	9.5 ± 1.0 (0.37 ± 0.04)	9.5 ± 1.0 (0.37 ± 0.04)	11.9 ± 1.0 (0.469 ± 0.04)		
AMW10 AMF10	48 ± 2 (1.89 ± 0.079)	9.5 ± 1.0 (0.37 ± 0.04)	9.5 ± 1.0 (0.37 ± 0.04)	11.9 ± 1.0 (0.469 ± 0.04)		
AMW15	48 ± 2 (1.89 ± 0.079)	12.5 ± 1.0 (0.49 ± 0.04)	12.5 ± 1.0 (0.49 ± 0.04)	15.9 ± 1.0 (0.626 ± 0.04)		
AMW20	63.5 ± 2 (2.5 ± 0.079)	12.5 ± 1.0 (0.49 ± 0.04)	12.5 ± 1.0 (0.49 ± 0.04)	15.9 ± 1.0 (0.626 ± 0.04)		

Note:
(1) Long leads (38.1 mm) available on request

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 ambient temperature (T_{amb})

Notes:
Application information available on request:
- Pulse load behavior
- High frequency behavior (self inductance)
- Hot spot and solder spot curves

MARKING

The resistor is marked with the resistor type, the rated power, the nominal resistance value (R for values Ω and K for values kΩ), the tolerance and the production date (week and year) in red on the resistor body.

Example: AMW07 - 5.1 kΩ - 5 % - year 200**2** - week 12

Example:

PHX	AMW07	212
5K1	5 %	7 W

ORDERING INFORMATION

PRODUCT	TOLERANCE	ORDERING CODE	VERSION	LEAD Ø in millimeters (inches)	PACKAGING	QUANTITY (pieces)
AMW03	± 5 %	2306 350 13xxx	FLAT	0.80 (0.031)	BOX	250
		2306 350 23xxx	STAND-OFF			
AMF03		2306 356 13xxx	FLAT			
		2306 356 23xxx	STAND-OFF			
AMW05		2306 351 13xxx	FLAT			
		2306 351 23xxx	STAND-OFF			
AMF05		2306 357 13xxx	FLAT			
		2306 357 23xxx	STAND-OFF			
AMW07		2306 352 13xxx	FLAT			
		2306 352 23xxx	STAND-OFF			
AMF07		2306 358 13xxx	FLAT			
		2306 358 23xxx	STAND-OFF			
AMW10		2306 353 13xxx	FLAT			
		2306 353 23xxx	STAND-OFF			
AMF10		2306 359 13xxx	FLAT			
		2306 359 23xxx	STAND-OFF			
AMW15		2306 354 13xxx	FLAT			100
		2306 354 23xxx	STAND-OFF			
AMW20		2306 355 13xxx	FLAT			
		2306 355 23xxx	STAND-OFF			

Last Digit of Ordering Code

RESISTANCE DECADE	LAST DIGIT
0.1 - 0.91 Ω	7
1 - 9.1 Ω	8
10 - 91 Ω	9
100 - 910 Ω	1
1 - 9.1 kΩ	2
10 - 91 kΩ	3
100 - 910 kΩ	4

The resistors have 12 digit ordering code starting with 2306. The next 5 digits indicate the resistor type and packaging, see table ORDERING INFORMATION.
The last 3 digits indicate the resistance value:
- The first 2 digits of these last 3 indicate the actual resistance value
- The last digit indicates the resistance decade in accordance with table “Last Digit of Ordering Code”

Example:
AMW05, 47 Ω, ± 5 %, flat case, box of 250 pieces is **230635113479**

NAFTA ORDERING INFORMATION

PRODUCT	TOLERANCE	NAFTA ORDERING CODE	VERSION	LEAD Ø in millimeters (inches)	PACKAGING	QUANTITY (pieces)
AMW03	± 5 %	AMW03WxxxxxJ	FLAT	0.80 (0.031)	BOX	250
		AMW03WxxxxxJSO	STAND-OFF			
AMF03		AMF03WxxxxxJ	FLAT			
		AMF03WxxxxxJSO	STAND-OFF			
AMW05		AMW05WxxxxxJ	FLAT			
		AMW05WxxxxxJSO	STAND-OFF			
AMF05		AMF05WxxxxxJ	FLAT			
		AMF05WxxxxxJSO	STAND-OFF			
AMW07		AMW07WxxxxxJ	FLAT			
		AMW07WxxxxxJSO	STAND-OFF			
AMF07		AMF07WxxxxxJ	FLAT			
		AMF07WxxxxxJSO	STAND-OFF			
AMW10		AMW10WxxxxxJ	FLAT			
		AMW10WxxxxxJSO	STAND-OFF			
AMF10		AMF10WxxxxxJ	FLAT			
		AMF10WxxxxxJSO	STAND-OFF			
AMW15		AMW15WxxxxxJ	FLAT			100
		AMW15WxxxxxJSO	STAND-OFF			
AMW20		AMW20WxxxxxJ	FLAT			
		AMW20WxxxxxJSO	STAND-OFF			

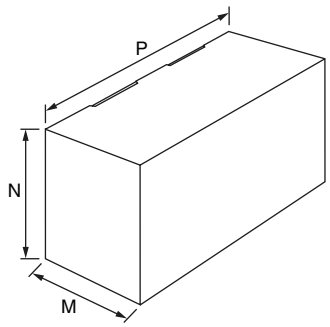
Examples of the Ohmic Value

Value	5 DIGITS
1 Ω	1R000
10 Ω	10R00
100 Ω	100R0
1 kΩ	1K000
10 kΩ	10K00
100 kΩ	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 "Examples of the Ohmic Value" gives some examples on how to use these 5 digits.

Example:
AMW03, 47 Ω, ± 5 %, flat case, box of 250 pieces is **230635113479**

PACKAGING in millimeters (inches)



PRODUCT	VERSION	P	M	N	QUANTITY (pieces)
AMW03 AMF03	FLAT	227 (8.94)	92 (3.62)	100 (3.94)	250
	STAND-OFF	227 (8.94)	92 (3.62)	-	
AMW05 AMF05	FLAT	256 (10.08)	92 (3.62)	105 (4.13)	
	STAND-OFF	256 (10.08)	92 (3.62)	-	
AMW07 AMF07	FLAT	256 (10.08)	105 (4.13)	105 (4.13)	
	STAND-OFF	256 (10.08)	105 (4.13)	-	
AMW10 AMF10	FLAT	256 (10.08)	118 (4.65)	105 (4.13)	
	STAND-OFF	256 (10.08)	118 (4.65)	-	
AMW15	FLAT	264 (10.39)	119 (4.69)	72 (2.83)	100
	STAND-OFF	264 (10.39)	119 (4.69)	-	
AMW20	FLAT	264 (10.39)	135 (5.32)	72 (2.83)	
	STAND-OFF	264 (10.39)	135 (5.32)	-	

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance to the schedule of IEC publications 60115-1, category 65/275/56 (rated temperature range - 65 °C to + 275 °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 method specified.

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 MΩ
4.7		Voltage proof on insulation	1000 V_{RMS} during 1 min; V-block method	No breakdown or flashover
4.8		Temperature coefficient	Between - 55 °C at + 275 °C AMW R < 10 Ω R ≥ 10 Ω AMF	 0 to 600 ppm/°C; - 100 to 150 ppm/°C ± 250 ppm/°C
4.13		Short time overload	Dissipation 5 x Pn; 5 s, $V_{max.}$ for: AMF03 ≤ 1500 V AMF05 ≤ 2000 V AMF07 ≤ 2500 V AMF10 ≤ 3000 V	$\Delta R/R_{max.}$ ± 4 % + 0.05 Ω
4.16	21(U)	Robustness of terminations:		No visible damage $\Delta R/R_{max.}$ ± 2 % + 0.05 Ω
4.16.2	21(Ua1)	Tensile all samples	Load 10 N; 10 s	
4.16.3	21(Ub)	Bending half number of samples	Load 5 N; 4 x 90°	
4.16.4	21(Uc)	Tension other half of samples	3 x 360° in opposite directions	
4.17	20(Ta)	Solderability (after aging)	16 h at 155 °C; leads immersed in flux 600, leads immersed 2 mm for 2 ± 0.5 s in a solder bath at 235 ± 5 °C	Good tinning; no damage $\Delta R/R_{max.}$ ± 0.5 % + 0.05 Ω
4.18	20(Tb)	Resistance to soldering heat	Thermal shock: 3 s, 350 °C; 6 mm from body	$\Delta R/R_{max.}$ ± 4 % + 0.05 Ω
4.19	14(Na)	Rapid change of temperature	30 min at - 55 °C and 30 min + 275 °C; 5 cycles	No visual damage $\Delta R/R_{max.}$ ± 5 % + 0.05 Ω
4.23		Climatic sequence:		$\Delta R/R_{max.}$ ± 3 % + 0.05 Ω
4.23.2	2(Ba)	Dry heat	16 h, 275 °C	
4.23.3	30(Db)	Damp heat (accelerated) 1st cycle	24 h, 25 °C to 55 °C; 90 to 100 % RH	
4.23.4	1(Aa)	Cold	2 h, - 65 °C	
4.23.6	30 (Db)	Damp heat (accelerated) remaining cycles	6 days; 55 °C; 90 to 98 % RH	
4.24	3 (Ca)	Damp heat (steady state)	56 days; 40 °C; 90 to 95 % RH; loaded with 0.01 Pn	$\Delta R/R_{max.}$ ± 3 % + 0.05 Ω
4.25.1		Endurance (at 40 °C)	1000 h loaded with Pn or $V_{max.}$; 1.5 h ON and 0.5 h OFF	No damage $\Delta R/R_{max.}$ ± 5 % + 0.1 Ω

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