WFM



Vishay Dale

Power Metal Plate[™] Current Sense Resistors, Low Value (10 m Ω to 500 m Ω), Surface-Mount, High Power



LINKS TO ADDITIONAL RESOURCES

30 3D Models



FEATURES

- 2010 and 2512 size package
- · Ideal for all types of current sensing and pulse applications including switching and linear power supplies, instruments, power amplifiers, shunts, power inverters, and battery management



• Proprietary processing technique produces low resistance values (10 m Ω to 500 m Ω)

COMPLIANT HALOGEN FREE GREEN <u>(5-2008)</u>

RoHS

- · Solid metal manganese-copper and nickelchromium-aluminum alloy resistive element with low TCR (< 20 ppm/°C)
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 gualified ⁽¹⁾
- PATENT(S): <u>www.vishay.com/patents</u>
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Note

(1) Flame retardance test may not be applicable to some resistor technologies

STANDARD ELECTRICAL SPECIFICATIONS							
GLOBAL MODEL	SIZE	POWER RATING ⁽¹⁾ W	TOLERANCE %	$\begin{array}{c} \textbf{RESISTANCE VALUE RANGE}\\ \Omega \end{array}$	WEIGHT (typical) g/1000 pieces		
WFMA2010	2010	3.0 at 70 °C	± 1.0	0.010 to 0.0329	32		
WFMA2010	2010	2.0 at 110 °C	± 1.0	0.010 to 0.0329	32		
WFMB2010	2010	3.0 at 70 °C	± 1.0	0.033 to 0.500	32		
WFMB2010	2010	2.0 at 110 °C	± 1.0	0.033 to 0.500	32		
WFMA2512	2512	4.0 at 70 °C	± 1.0	0.010 to 0.0329	41		
WFMA2512	2512	3.0 at 95 °C	± 1.0	0.010 to 0.0329	41		
WFMB2512	2512	4.0 at 70 °C	± 1.0	0.033 to 0.500	41		
WFMB2512	2512	3.0 at 95 °C	± 1.0	0.033 to 0.500	41		

Note

⁽¹⁾ Terminal temperature



Notes

⁽¹⁾ Resistance values available according to WSL decade values (<u>www.vishay.com/doc?30117</u>)

Packaging code: EB (lead (Pb)-free) is a non-standard packaging code designating 1000 piece reels. This non-standard packaging code is identical to our standard EA (lead (Pb)-free), except that it has a package quantity of 1000 pieces

(3) Follow link for customization capabilities: www.vishay.com/doc?48614

PATENT(S): www.vishay.com/patents

This Vishay product is protected by one or more United States and international patents.

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TECHNICAL SPECIFICATIONS						
DADAMETED	UNIT	MODEL	RESISTOR CHARACTERISTICS			
FARAMETER			2010	2512		
Temperature coefficient (20 °C to 60 °C) (element only) ⁽¹⁾	ppm/°C	All	< 20			
Operating temperature range	°C	All	-65 to +170			
Maximum working voltage ⁽³⁾	V	All	(P x R) ^{1/2}			
Maximum terminal temperature	°C	All	110 95			
Temperature coefficient	nnm/°C	WFMA	± 110	± 110		
(including terminals) ⁽²⁾		WFMB	± 50	± 50		
Temperature coefficient	nnm/°C	WFMA	± 30	± 40		
(including terminals) ⁽²⁾	ppin/ C	WFMB	± 20	± 20		

Notes

- ⁽¹⁾ Element TCR only applies to the alloy used for the resistor element
- ⁽²⁾ Component TCR total TCR that includes the TCR effects of the resistor element and the copper terminal
- ⁽³⁾ Maximum working voltage the WFM is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive

DIMENSIONS





CONSTRUCTION OUTLINE⁽¹⁾

Notes

- 3D models available: www.vishay.com/doc?30401
- Surface mount solder profile recommendations: <u>www.vishay.com/doc?31052</u>
- ⁽¹⁾ For construction advantages and performance details refer to "Did You Know?": <u>www.vishay.com/doc?48567</u>

CASE	RESISTANCE RANGE	DIMENSIONS in inches (millimeters)					SOLDER PAD DIMENSIONS in inches (millimeters)		
SIZE	(m Ω)	L	w	Н	T1	T2	а	b	I
2010	10 to 500	0.200 ± 0.008 (5.08 ± 0.20)	0.100 ± 0.008 (2.54 ± 0.20)	$\begin{array}{c} 0.020 \pm 0.006 \\ (0.50 \pm 0.15) \end{array}$	$\begin{array}{c} 0.028 \pm 0.008 \\ (0.70 \pm 0.20) \end{array}$	0.016 ± 0.006 (0.40 ± 0.15)	0.049 (1.25)	0.118 (3.00)	0.138 (3.50)
2512	10 to 500	0.250 ± 0.012 (6.35 ± 0.30)	0.125 ± 0.008 (3.18 ± 0.20)	$\begin{array}{c} 0.020 \pm 0.006 \\ (0.50 \pm 0.15) \end{array}$	$\begin{array}{c} 0.035 \pm 0.008 \\ (0.90 \pm 0.20) \end{array}$	$\begin{array}{c} 0.020 \pm 0.008 \\ (0.50 \pm 0.20) \end{array}$	0.061 (1.55)	0.142 (3.60)	0.173 (4.40)

PRODUCT	RESISTANCE RANGE (Ω)	THERMAL RESISTANCE (°C/W)	ALLOY
WFMA2010	0.01 to 0.0329	< 30	Mn-Cu
WFMB2010	0.033 to 0.5	< 55	Ni-Cr
WFMA2512	0.01 to 0.0329	< 25	Mn-Cu
WFMB2512	0.033 to 0.5	< 40	Ni-Cr

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PULSE ENERGY AND POWER VS. TIME



Notes

- Data is valid for 33 m Ω . Other resistance values require separate testing
- Continuous pulse chart is tested using a square wave pulse of 10 % duty cycle, not exceeding 0.5 % resistance change

DERATING - TERMINAL TEMPERATURE





PERFORMANCE						
теет			TYPICAL PERFORMANCE ⁽¹⁾			
1231	CONDITIONS OF TEST	TEST LIMITS	CuMn	NiCr		
Thermal shock	-55 °C to +150 °C, 2000 cycles, 15 min at each extreme	± 0.5 %	-0.3 %	+0.15 %		
Low temperature storage	-65 °C for 24 h	± 0.1 %	± 0.5 %	+0.05 %		
High temperature exposure	2000 h at +170 °C	± 1.0 %	-0.18 %	+0.15 %		
Bias humidity	+85 °C, 85 % RH, 10 % power, 1000 h	± 0.5 %	+0.1 %	+0.05 %		
Mechanical shock	100 <i>g</i> 's for 6 ms, 5 pulses	± 0.2 %	± 0.5 %	± 0.5 %		
Vibration	n Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 l		± 0.5 %	± 0.5 %		
Load life	2000 h at maximum terminal temperature at rated power		-0.1 %	+0.1 %		
Resistance to solder heat	+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	± 0.3 %	+0.15 %	± 0.5 %		
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7b not required	± 0.3 %	+0.1 %	+0.05 %		

Note

⁽¹⁾ Typical performance is based on summary statistics from qualification data. Performance may vary based on application operating conditions

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PACKAGING

MODEL	REEL						
MODEL	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE			
WFMA2010	12 mm / embossed plastic	178 mm / 7"	4000	EA			
WFMB2010	12 mm / embossed plastic	178 mm / 7"	4000	EA			
WFMA2512	12 mm / embossed plastic	178 mm / 7"	2000	EA			
WFMB2512	12 mm / embossed plastic	178 mm / 7"	2000	EA			

Notes

• Embossed carrier tape per EIA-481

Additional packaging details at <u>www.vishay.com/doc?20051</u>



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