Power Metal Plate™ Current Sense Resistors, Low Value (10 mΩ to 500 mΩ), Surface-Mount, High Power

LINKS TO ADDITIONAL RESOURCES

3D Models | Did You Know? | Videos | Infographics

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 mΩ to 500 mΩ)
- Solid metal manganese-copper and nickel-chromium-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)
- Sulfur resistance by construction that is unaffected by high sulfur environments
- AEC-Q200 qualified (1)
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

Note

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

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING (1) W	TOLERANCE %	RESISTANCE VALUE RANGE Ω	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

GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WFMB2512R5000FEA

W	F	M	B	2	5	1	2	R	5	0	0	0	F	E	A		

GLOBAL MODEL (3 digits)	ELEMENT MATERIAL (1 digit)	CASE SIZE (4 digits)	RESISTANCE VALUE (1) (5 digits)	TOLERANCE CODE (1 digit)	PACKAGING CODE (2) (2 digits)	SPECIAL (3) (2 digits)
WFM	**A** = CuMn **B** = NiCrAl	**2010** **2512**	**R** = decimal **R0100** = 0.01 Ω	**F** = ± 1.0 % **J** = ± 5.0 %	**EA** = lead (Pb)-free, tape / reel	Dash numbers **1** thru **99** as applicable

Notes

(1) Power Metal Plate™ marking (www.vishay.com/doc?30327); WSL decade values (www.vishay.com/doc?30117)

(2) 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.

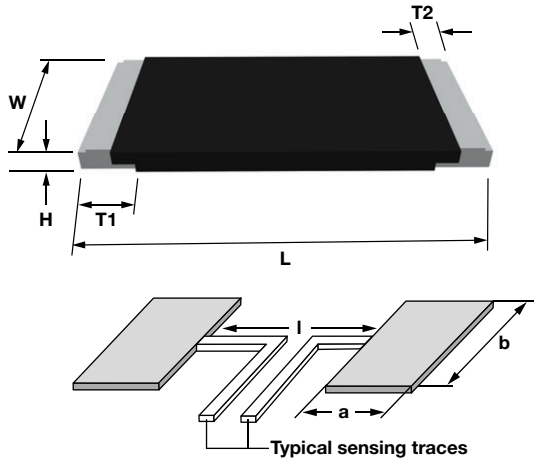
TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	MODEL	RESISTOR CHARACTERISTICS	
			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	$(P \times R)^{1/2}$	
Maximum terminal temperature	°C	All	110	95
Temperature coefficient (-55 °C to +150 °C) (including terminals) (2)	ppm/°C	WFMA	± 110	± 110
		WFMB	± 50	± 50
Temperature coefficient (20 °C to 60 °C) (including terminals) (2)	ppm/°C	WFMA	± 30	± 40
		WFMB	± 20	± 20

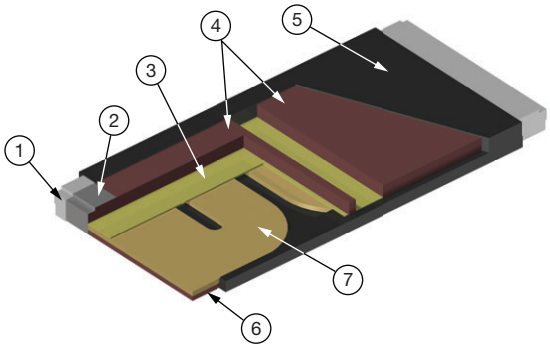
Notes

(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)



1 Sn plating
2 Ni plating
3 Adhesive
4 Cu heat spreaders
5 Overcoat
6 Cu plating
7 Resistive element

Notes

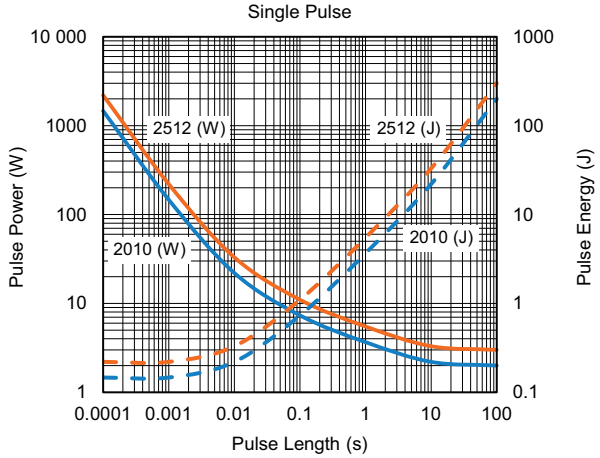
- 3D models available: www.vishay.com/doc?30401
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

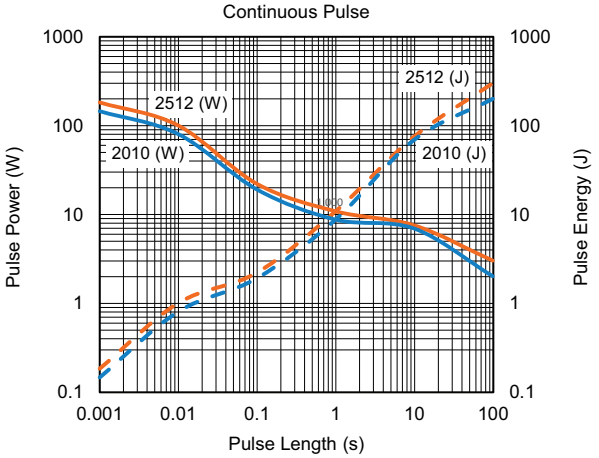
(1) For construction advantages and performance details refer to “Did You Know?”: www.vishay.com/doc?48567

CASE SIZE	RESISTANCE RANGE (mΩ)	DIMENSIONS in inches (millimeters)					SOLDER PAD DIMENSIONS in inches (millimeters)		
		L	W	H	T1	T2	a	b	l
2010	10 to 500	0.200 ± 0.008 (5.08 ± 0.20)	0.100 ± 0.008 (2.54 ± 0.20)	0.020 ± 0.006 (0.50 ± 0.15)	0.028 ± 0.008 (0.70 ± 0.20)	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)	0.020 ± 0.006 (0.50 ± 0.15)	0.035 ± 0.008 (0.90 ± 0.20)	0.020 ± 0.008 (0.50 ± 0.20)	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

PULSE ENERGY AND POWER VS. TIME

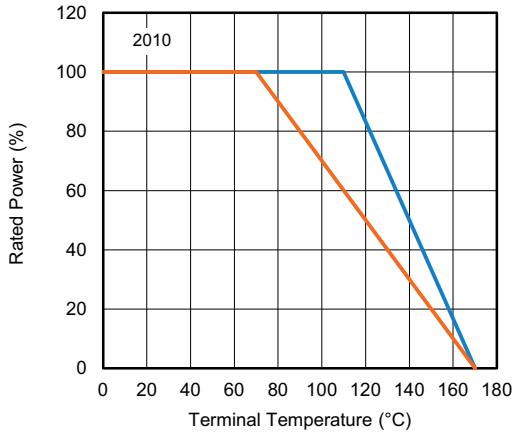


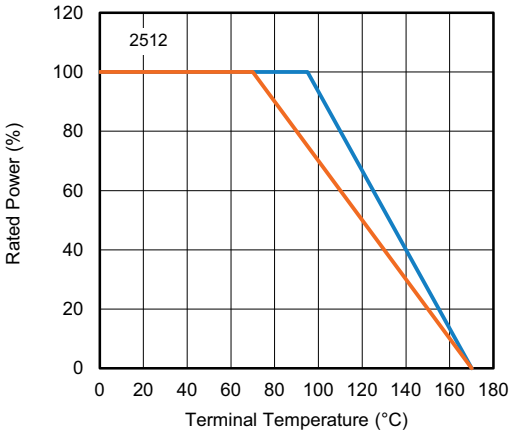


Notes

- Data is valid for 33 mΩ. 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				
TEST	CONDITIONS OF TEST	TEST LIMITS	TYPICAL PERFORMANCE (1)	
			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 *g*'s for 6 ms, 5 pulses	± 0.2 %	± 0.5 %	± 0.5 %
Vibration	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	± 0.2 %	± 0.5 %	± 0.5 %
Load life	2000 h at maximum terminal temperature at rated power	± 0.7 %	-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

PACKAGING				
MODEL	REEL			
	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 www.vishay.com/doc?20051

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