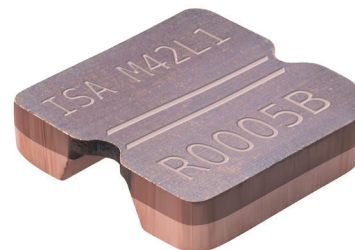


WAF (1213)

ISA-WELD® PRECISION RESISTOR



FEATURES

- Constant current up to 77 A (1 mOhm)
- 3.5 W power rating at 140 °C (1 mOhm)
- Two terminal configuration
- Excellent long-term stability
- High application temperature range -65 to +175 °C
- Max. solder temperature up to 350 °C / 30 sec
- AEC-Q200 qualified



APPLICATIONS

- Current sensor for power hybrid applications
- High current applications for the automotive market
- Frequency converters
- Power modules

Technical data ¹

Resistance values	mOhm	from 0.487 to 1
Tolerance	%	1 / 5
Temperature coefficient (20-60 °C)	ppm/K	0 ± 40 (MANGANIN®) 30 ± 40 (ZERANIN®)
Applicable temperature range	°C	-65 to +175
Power rating P_{140 °C}	W	up to 5
Power rating P_{70 °C}	W	up to 7
Internal heat resistance (<i>R_{thi}</i>)	K/W	from 7
Inductance	nH	<0.5
Stability (at rated power) deviation after 2000 h	%	<0.5 (<i>T_{max}</i> = 140 °C) <1.0 (<i>T_{max}</i> = 175 °C)

¹ For detailed information see table „Electrical specification“ on page 3

Ordering code

WAF - M - R001 - 1.0

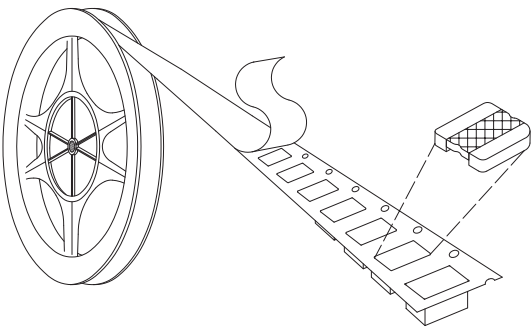
.....	Tolerance
.....	Resistance value [Ohm] / „R“ represents decimal point
.....	Material (MANGANIN®)
.....	Type

Recommended solder profile

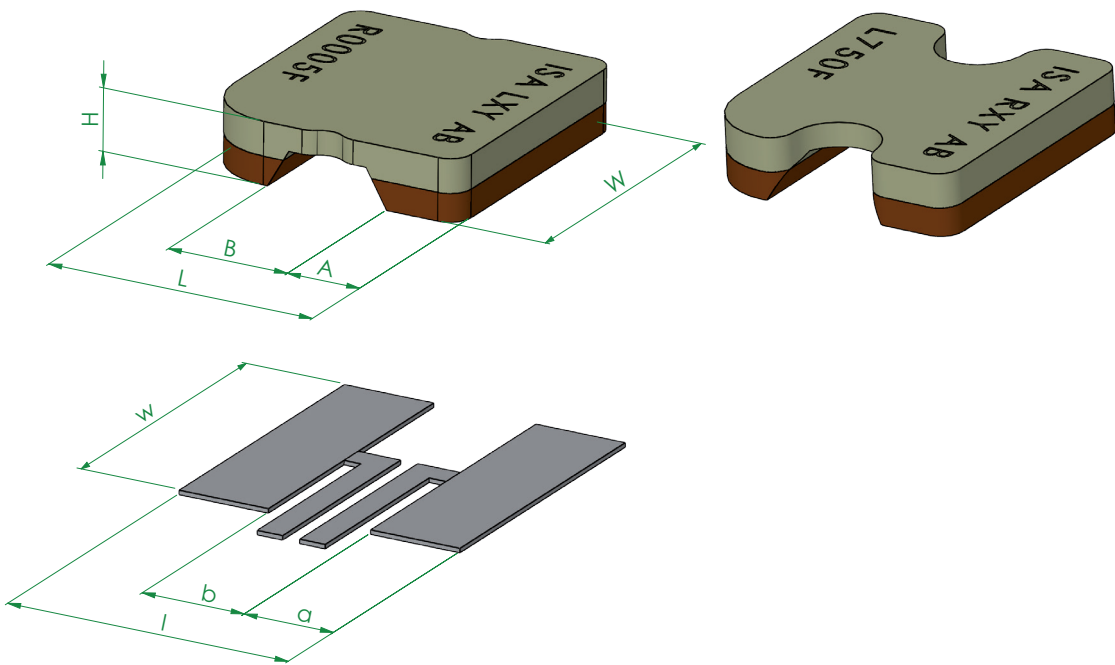
Reflow-, IR-soldering				
Temperature	°C	260	255	217
Time	sec	peak	40	90

Tape and reel information

Specification	DIN EN 60286-3			
Tape width	mm	12		
Parts per reel	pcs	5000		



Mechanical dimensions and pcb-layout proposal (Reflow-soldering) [mm]



type:	L	W	H	A	B
WAF-Z-R000487-1.0	3.1 ±0.2	3.3 ±0.2	0.7 +0.2/-0.1	0.85 ±0.2	1.4 ±0.2
WAF-Z-R0005-1.0	3.1 ±0.2	3.3 ±0.2	0.7 +0.2/-0.1	0.85 ±0.2	1.4 ±0.2
WAF-Z-L750-1.0	3.1 ±0.2	3.3 ±0.2	0.7 +0.2/-0.1	0.85 ±0.2	1.4 ±0.2
WAF-M-R001-1.0	3.1 ±0.2	3.3 ±0.2	0.7 +0.2/-0.1	0.85 ±0.2	1.4 ±0.2
WAF-M-L991-1.0	3.1 ±0.2	3.3 ±0.2	0.7 +0.2/-0.1	0.85 ±0.2	1.4 ±0.2

solder pad type:	l	w	a	b
WAF	3.4	3.6	1.05	1.3

Electrical specification

Type	Material	Value [mΩ]	R_{thi} [K/W]	TCR [ppm/K]	$P_{70^{\circ}\text{C}^*}$ [W]	$P_{140^{\circ}\text{C}}$ [W]	Note
WAF-Z-R000487	ZERANIN®	0.487	7	30 ± 40	7	5	
WAF-Z-R0005	ZERANIN®	0.5	7	30 ± 40	7	5	
WAF-Z-L750	ZERANIN®	0.75	10	30 ± 40	7	3.5	C-samples available
WAF-M-L991	MANGANIN®	0.991	10	0 ± 40	6	3.5	
WAF-M-R001	MANGANIN®	1.0	10	0 ± 40	6	3.5	

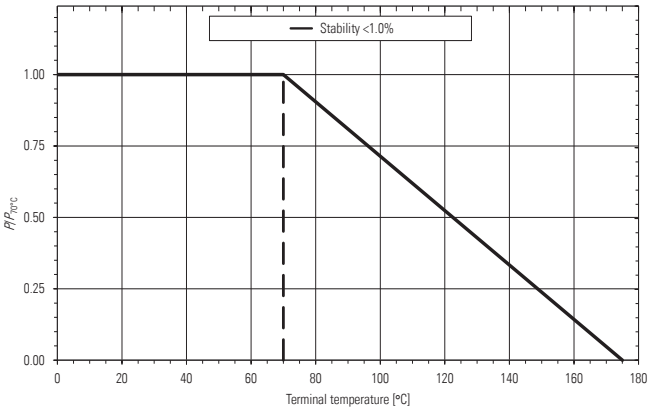
*Recommended max. power (limited by thermal conditions of the assembly)

Note

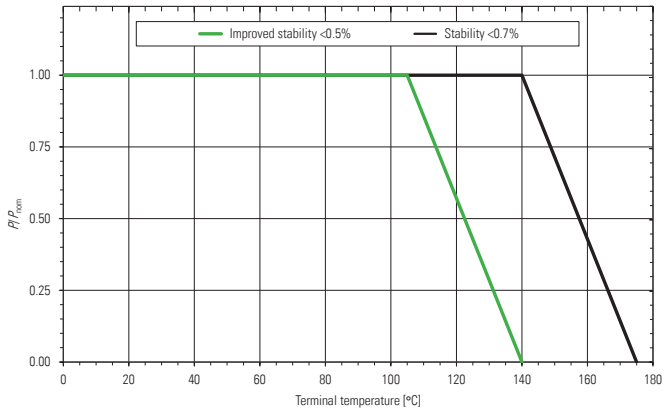
For calculation of the maximum derating terminal temperature (T_K) the following formula can be used: $T_K = T_{max.} - (R_{thi} \times P)$.

Example for WAF-Z-R0005: $T_K = 175^{\circ}\text{C} - (7\text{ K/W} \times 7\text{ W}) = 126^{\circ}\text{C}$.

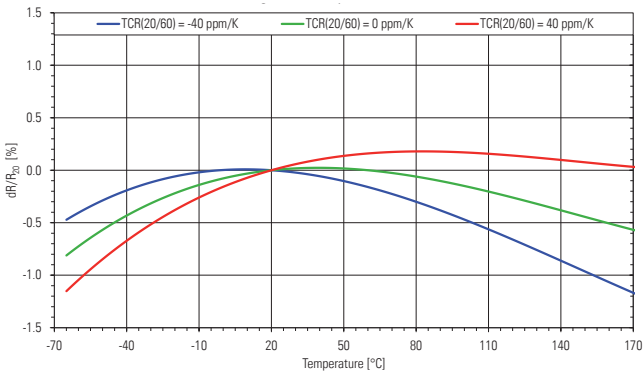
Power derating curve at 70 °C. (see table)



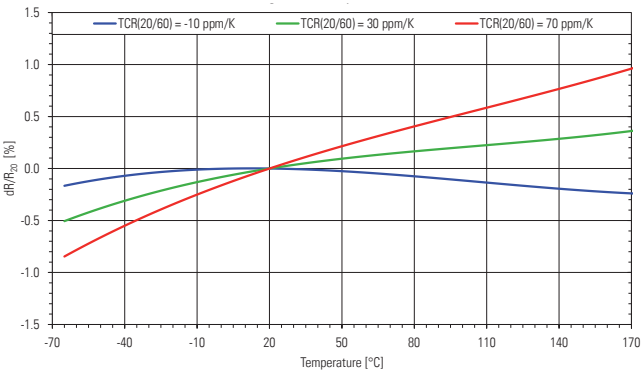
Power derating curve: 105 °C / 140 °C



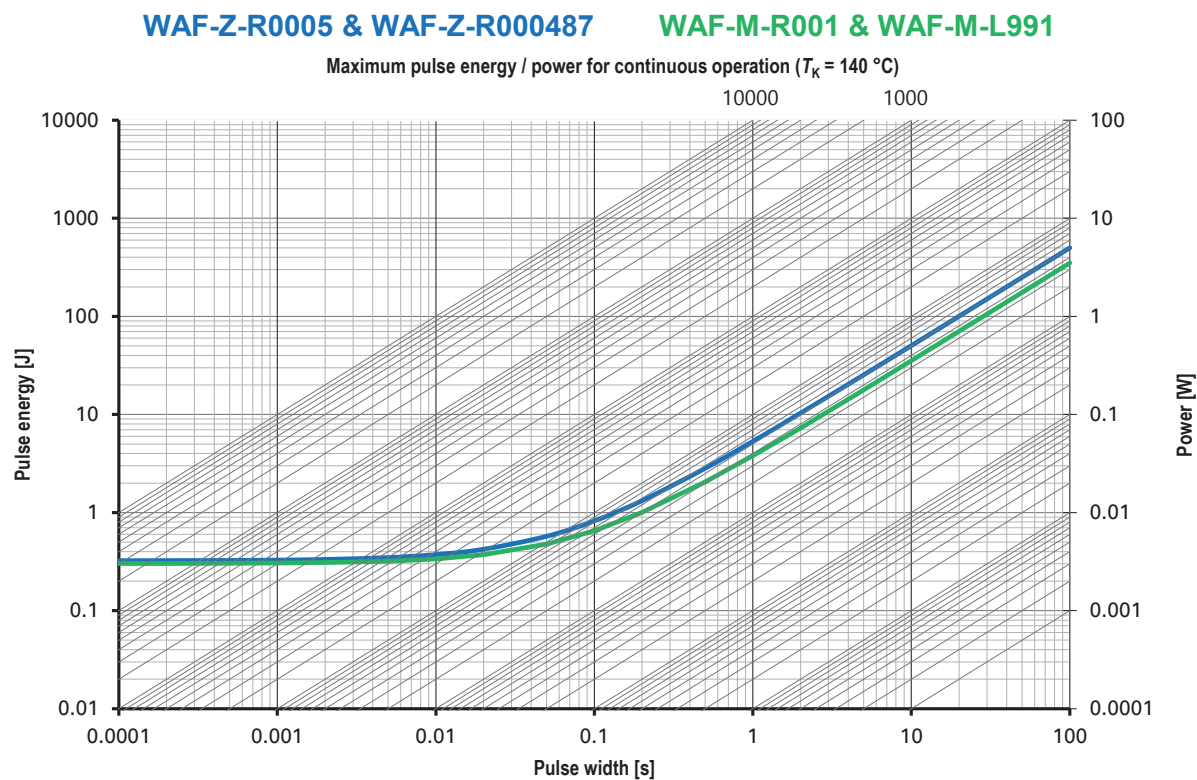
Temperature dependence of the electrical resistance of MANGANIN® resistors



Temperature dependence of the electrical resistance of ZERANIN® resistors



Maximum pulse energy respectively pulse power for permanent operation



Specification

Parameters	Test conditions	Specified values
Temperature Cycling	2000 cycles (-65 °C to +170 °C)	±1.0 %
Low Temperature Storage and Operation	-65 °C for 250 h	±0.1 %
Moisture Resistance	MIL-STD-202 method 106	±0.2 %
Mechanical Shock	100 g, 6 ms half sine	±0.2 %
Vibration, High Frequency	10 g, 10-2000 Hz	±0.2 %
Operational Life	2000 h, T_K max at rated power	±1.0 %, $T_K = 140\text{ °C}$ (in covered condition)
High Temperature Exposure	2000 h / 175 °C	±1.0 % (in covered condition)
Bias Humidity	+85 °C, 85 r.F., 1000 h	±0.5 %

Disclaimer // All products, product specifications and data are subject to change without notice. The product specifications do not expand or otherwise modify Isabellenhütte's terms and conditions of sale, including but not limited to, the warranty expressed therein. Isabellenhütte makes no warranty, representation or guarantee other than as set forth in its terms and conditions of sale. Information provided in datasheets and/or specifications may vary from actual results in different applications. Any statements made by Isabellenhütte regarding the suitability of products for certain types of applications are based on its knowledge of typical requirements that are often placed on its products. 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 the application intended. No license, express or implied, or otherwise, to any intellectual property rights is granted by this document. Any and all liability arising out of the application or use of any product shall be as set forth in Isabellenhütte's terms and conditions of sale.

