MELF Resistors

WRM Series

Features:

- AEC-Q200 qualified
- High reliability
- Defined pulse handling capability
- Tolerances down to 0.1%
- TCR down to 5ppm/°C

All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

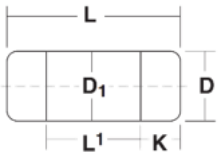
Electrical Data

		WRM0102	WRM0204	WRM0207
Power rating @70°C	W	0.2	0.25	0.4
Resistance range	ohms	1R0 – 1M0	R22 – 5M1	R22 – 4M7
Limiting element voltage	V	200		250
TCR	ppm/°C	15, 25, 50, 100	5, 10, 15, 25, 50, 100	15, 25, 50, 100
Resistance tolerance	%	0.1, 0.25, 0.5, 1, 5		
Standard values		E24 & E96		
Thermal impedance	°C/W	250	200	140
Ambient temperature range	°C	-55 to +155	-55 to +125	
Insulation resistance	ohms	$>10^{10}$		
Zero-ohm jumper current rating	A	2		4
Zero-ohm jumper maximum residual resistance	mΩ	15		

Physical Data

Dimensions in mm and weight in g

Type	L max	D max	D_1 max	K min	L_1 min	Wt. nom.
WRM0102	2.3	1.35	1.3	0.3	1.1	0.01
WRM0204	3.7	1.55	1.55	0.5	1.5	0.02
WRM0207	6.1	2.4	2.4	0.5	2.9	0.08



Construction

A metal film is deposited onto a high dissipation ceramic former to which tin plated terminating caps are fitted. The resistor is adjusted to value by a helical cut in the film and the body is protected by a lacquer coating.

Marking

Resistance values are colour coded with four bands, three indicating value and one indicating the multiplier. (Note this describes standard marking, but certain values may be supplied with the addition of a tolerance band following the multiplier.)

Terminations

Material Plated steel cap

Solderability The pure tin finish produces ageing free contacts on which low melting solders can be used. Dipped area shall be covered with a smooth and bright solder coating after 3 seconds immersion at 215°C.

Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuit boards.

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TCR and Tolerance Ranges

Type	TCR (±ppm/°C)	Tolerance (±%)				
		5	1	0.5	0.25	0.1
WRM0102	100	1R0-1M0				
	50			8R2 – 1M0		
	25		49R9 – 390K	49R9 – 200K	100R – 82K	
	15		100R – 56K			
WRM0204	100	R22 – R91				
	50		1R0 – 5M1	10R – 1M6	22R – 332K	43R – 332K
	25		4R7 – 500K	10R – 500K	22R – 402K	
	15			10R – 221K	22R – 221K	43R – 221K
	10[1]					
	5[1]				100R – 100K	
WRM0207	100	R22 – R91				
	50		1R0 – 4M7	10R – 1M6		
	25		10R – 1M0	10R – 680K	51R1 – 330K	100R – 100K
	15			51R1 – 10K		100R – 10K

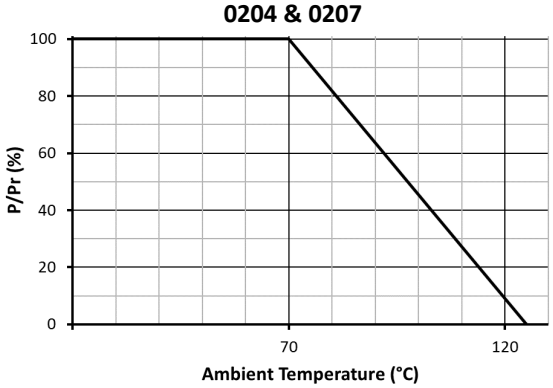
Notes: 1. The 5 & 10ppm/°C TCRs are specified over the temperature range -10 to +85°C.

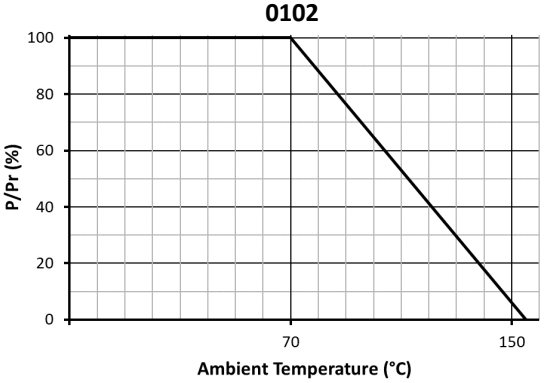
Performance Data

Test		±ΔR/R			
		0204 & 0207			0102
		75R – 100K	10R - <75R or >100K – 332K	<10R or >332K	All values
Short time overload		0.05% + R01	0.1% + R01	0.25% + R05	
Bending test					
Resistance to soldering heat					
Temperature rapid change					
Endurance (load life)	1000 hrs	0.15% + R05		0.3% + R05	0.5% + R05
	8000 hrs	0.3% + R05		0.6% + R05	1% + R05
	225,000 hrs	0.9% + R05		1.8% + R05	3% + R05
Climatic sequence		0.25% + R05	0.5% + R05	1% + R05	
Damp heat steady state					
Current noise		<0.05µV/V	<0.25µV/V	<3µV/V	
Solderability		>95% coverage			
Voltage coefficient		0 to -0.5ppm/V			
Voltage proof		No flashover or breakdown			

Notes: 1. Resistors to be mounted on a PC-board according to IEC 115-1, clause 4.27.1.
2. AEC-Q200 approval applies to all values up to and including 3M4 at TCRs above 5ppm/°C and to zero-ohm jumpers.

Temperature Derating





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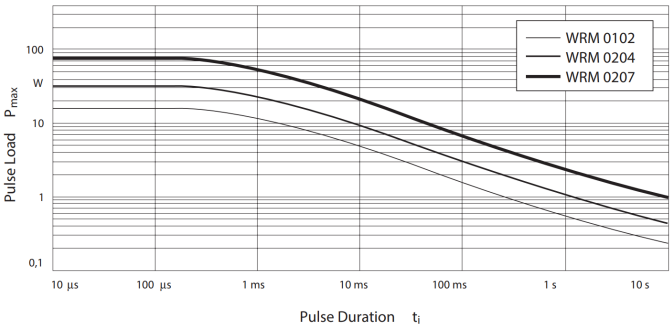
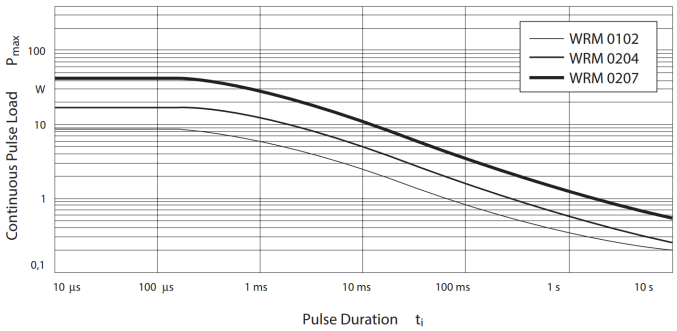
Pulse & Surge Performance

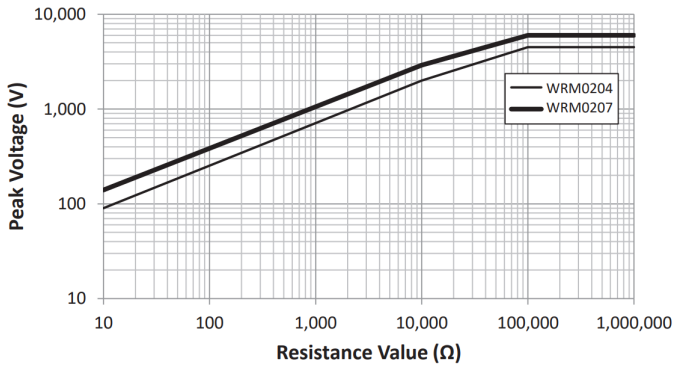
Single Pulse (mean power << rated power)



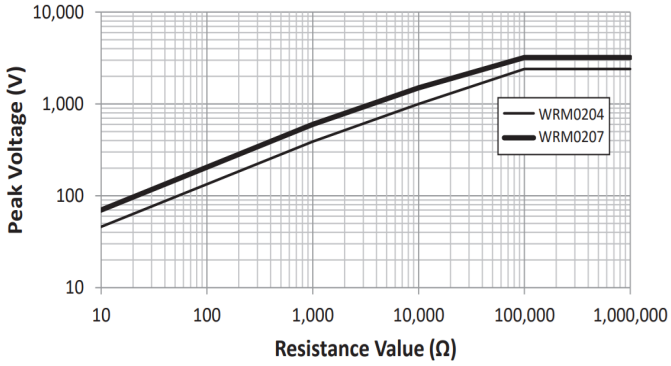
Continuous Pulses (mean power = rated power)



1.2/50µs Lightning Surge



10/700µs Lightning Surge



Packaging

WRM0102 and WRM0204 resistors are supplied in 8mm plastic tape on 7” reels. WRM0207 resistors are supplied in 12mm plastic tape on 7” reels. Packing complies with the requirements of IEC286-3.

Ordering Procedure

Examples: WRM0204C-1K0FI (0204, 50ppm/°C, 1 kilohm ±1%, Pb-free)
WRM0207-R000T2 (0207, zero-ohm jumper, Pb-free)

W	R	M	0	2	0	4	C	-	1	K	0		F	I	
1							2		3				4	5	

1	2	3	4	5		
Type	TCR	Value	Tolerance	Packing		
WRM0102	V = ±5ppm/°C	E24/E96 3/4 characters R = ohms K = kilohms M = megohms	B = ±0.1%	I	0102	3000 / 7” reel
WRM0204	T = ±10ppm/°C		C = ±0.25%		0204	3000 / 7” reel[1]
WRM0207	Y = ±15ppm/°C		D = ±0.5%	T2[2]	0207	2000 / 7” reel
	D = ±25ppm/°C		F = ±1%			
	C = ±50ppm/°C		J = ±5%			
	Z = ±100ppm/°C	R000 = Jumper	Omit for Jumper			
	Omit for Jumper					

Notes: 1 - High precision parts may be supplied on 1000-piece reels – please enquire.
2 - Legacy part numbers used packing code “I” for WRM0207, which indicated 1500 / 7” reel.