Resistors

MELF Resistors

WRM Series

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

All parts are Pb-free and comply with EU Directive 2011/65/EU (RoHS2)

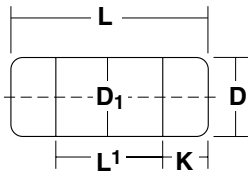
Electrical Data

		WRM 0102	WRM 0204	WRM 0207
Power rating at 70°C	watts	0.2	0.25	0.4
Resistance range	ohms	8R2 - 1M0	R22 – 5M1	R22 – 10M
Limiting element voltage	volts	200	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	k/W	250	200	140
Ambient temperature range	°C	-55 to +155	-55 to +125	
Insulation resistance	ohms	$>10^{10}$		
Zero ohm jumper current rating	amps	2		4
Zero ohm jumper maximum residual resistance	mΩ	15		

Physical Data

Dimensions (mm) and weight (g)

Type	L max	D max	D[1] max	K min	L[1] min	Weight
WRM 0102	2.3	1.35	1.3	0.3	1.1	0.01
WRM 0204	3.7	1.55	1.55	0.5	1.5	0.02
WRM 0207	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 teminating 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 still 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.

TCR and Tolerance Range

Type Reference	TCR	Tolerance				
		5%	**1.0%**	**0.5%**	**0.25%**	**0.1%**
WRM0102	±100ppm	10R - 1M0	10R - 1M0	-	-	-
	±50ppm	10R - 1M0	10R - 1M0	8R2 - 1M0	-	-
	±25ppm	-	100R - 82K	100R - 100K	100R - 82K	100R - 82K
	±15ppm	-	100R - 56K	100R - 56K	100R - 56K	100R - 56K
WRM0204	±100ppm	R22 – R91	-	-	-	-
	±50ppm	-	1R – 5M1	10R – 1M6	22R – 332K	43R – 332K
	±25ppm	-	4R7 – 500K	10R – 500K	22R – 402K	43R – 332K
	±15ppm	-	-	10R – 221K	22R – 221K	43R – 221K
	±10ppm	-	-	-	22R – 221K	43R – 221K
	±05ppm	-	-	-	100R – 100K	100R – 100K
WRM0207	±100ppm	R22 – R91	-	-	-	-
	±50ppm	-	1R-10M	10R - 1M6	-	-
	±25ppm	-	10R - 1M	10R – 680K	51R1 - 330K	100R - 100K
	±15ppm	-	-	51R1 - 10K	51R1 - 10K	100R - 10K

* TC 10ppm & 5ppm is specified over the temperature range -10°C to +85°C.

Performance Data

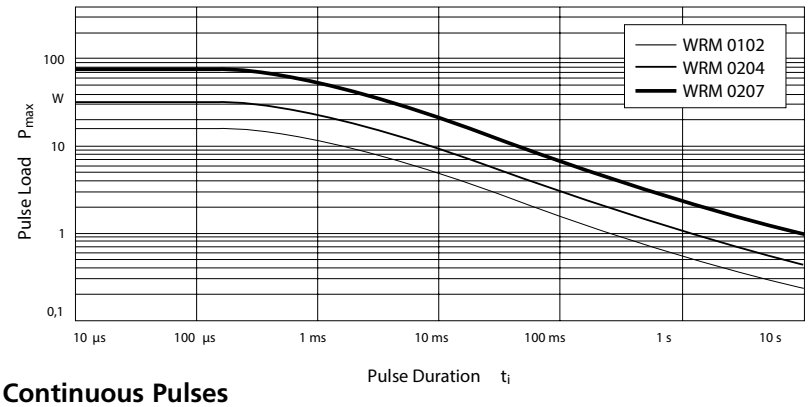
Test		**Results Δ R/R ±**		
		0204 & 0207: 75R - 100K	0204 & 0207: 10R - <75R & >100K - 332K	0102: 40R - 1M0, 0204 & 0207: R22 - <10R & >332K - 10M
Short time overload*		≤ 0.05% + 0.01 Ω	≤ 0.1% + 0.01 Ω	≤ 0.25% + 0.05 Ω
Bending test*		≤ 0.05% + 0.01 Ω	≤ 0.1% + 0.01 Ω	≤ 0.25% + 0.05 Ω
Resistance to soldering heat		≤ 0.05% + 0.01 Ω	≤ 0.1% + 0.01 Ω	≤ 0.25% + 0.05 Ω
Temperature rapid change		≤ 0.05% + 0.01 Ω	≤ 0.1% + 0.01 Ω	≤ 0.25% + 0.05 Ω
Endurance*				
Load life	1000h	≤ 0.25% + 0.05 Ω	≤ 0.25% + 0.05 Ω	≤ 0.5% + 0.05 Ω
	8000 h	≤ 0.5% + 0.05 Ω	≤ 0.5% + 0.05 Ω	≤ 1.0% + 0.05 Ω
Climatic sequence*		≤ 0.25% + 0.05 Ω	≤ 0.5% + 0.05 Ω	≤ 1.0% + 0.05 Ω
Damp heat steady state*		≤ 0.25% + 0.05 Ω	≤ 0.5% + 0.05 Ω	≤ 1.0% + 0.05 Ω
Current noise		< 0.05 µV/V	< 0.25 µV/V	< 3 µV/V
Solderability		Dipped area shall be covered with a smooth and bright solder coating of at least 96%		
Voltage coefficient		< 0.5 . 10^6/V		
Voltage proof		No flashover or breakdown		

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

WRM Series

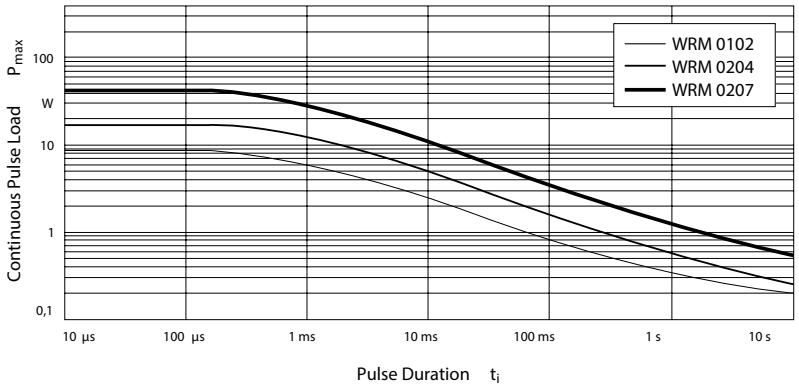
Single Pulse

Maximum Pulse Load



Continuous Pulses

Maximum Pulse Load



Packaging

The WRM 0102 and 0204 resistors are supplied reeled on 8mm blister tape.
WRM 0207 resistors are supplied on 12mm blister tape.

Packaging complies with the requirements of IEC 286-3.

Ordering Procedure

Example: WRM0204C-1K0FI (WRM0204, 50ppm/°C, 1 kilohm ±1%, Pb-free)
WRM0204-R000I (WRM0204, zero ohm jumper, Pb-free)

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

1 Type	2 TCR	3 Value	4 Tolerance	5 Packing	
WRM0102	V = ±5ppm/°C	3/4 characters R = ohms K = kilohms M = megohms	B = ±0.1%	I = Standard	
WRM0204	T = ±10ppm/°C		C = ±0.25%	0102	3000 / 7" reel
WRM0207	Y = ±15ppm/°C		D = ±0.5%	0204	3000 / 7" reel[1]
	D = ±25ppm/°C		F = ±1%	0207	1500 / 7" reel
	C = ±50ppm/°C	R000 = Jumper	J = ±5%		
	Z = ±100ppm/°C		Omit for Jumper		
	Omit for Jumper				

Note 1: High precision parts may be supplied on 1000 piece reels – please enquire