

## 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 amended by (EU) 2015/863 (RoHS3)

## Electrical Data

		WRM 0102	WRM 0204	WRM 0207
Power rating @70°C	watts	0.2	0.25	0.4
Resistance Range	ohms	1R0- 1M0	R22-5M1	R22- 4M7
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 <sup>10</sup>	
Zero ohm jumper current rating	amps		2	4
Zero ohm jumper maximum residual resistance	mΩ		15	

## Physical Data

Dimensions (mm) & weight (g)							
Type	L max	D max	D <sup>1</sup> max	K min	L <sup>1</sup> 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 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 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.

### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

## TCR and Tolerance Range

Type Reference	TCR	Tolerance				
		5%	1.0%	0.5%	0.25%	0.1%
WRM0102	±100ppm	1R0- 1M0	1R0- 1M0	-	-	-
	±50ppm	1R0- 1M0	1R0- 1M0	8R2- 1M0	-	-
	±25ppm	-	49R9- 390K	49R9- 200K	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
WRM0207	±5ppm	-	-	-	100R- 100K	100R- 100K
	±100ppm	R22- R91	-	-	-	-
	±50ppm	-	1R- 4M7	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	Δ R/R				
	0204 and 0207			0102	
	75R - 100K	10R - <75R & >100K - 332K	<10R & >332K	All values	
Short time overload*	≤0.05% + 0.01Ω	≤0.1% + 0.01Ω	≤0.25% + 0.05Ω	≤0.25% + 0.05Ω	
Bending test*	≤0.05% + 0.01Ω	≤0.1% + 0.01Ω	≤0.25% + 0.05Ω	≤0.25% + 0.05Ω	
Resistance to soldering heat	≤0.05% + 0.01Ω	≤0.1% + 0.01Ω	≤0.25% + 0.05Ω	≤0.25% + 0.05Ω	
Temperature rapid change	≤0.05% + 0.01Ω	≤0.1% + 0.01Ω	≤0.25% + 0.05Ω	≤0.25% + 0.05Ω	
Endurance*					
Load life					
	1000h	≤0.15% + 0.05Ω	≤0.15% + 0.05Ω	≤0.3% + 0.05Ω	≤0.5% + 0.05Ω
	8000h	≤0.3% + 0.05Ω	≤0.3% + 0.05Ω	≤0.6% + 0.05Ω	≤1.0% + 0.05Ω
	225,000h	≤0.9% + 0.05Ω	≤0.9% + 0.05Ω	≤1.8% + 0.05Ω	≤3.0% + 0.05Ω
Climatic sequence*	≤0.25% + 0.05Ω	≤0.5% + 0.05Ω	≤1.0% + 0.05Ω	≤1.0% + 0.05Ω	
Damp heat steady state*	≤0.25% + 0.05Ω	≤0.5% + 0.05Ω	≤1.0% + 0.05Ω	≤1.0% + 0.05Ω	
Current noise	<0.05μV/V	<0.25μV/V	<3μV/V	<3μV/V	
Solderability	>95% coverage				
Voltage coefficient	0 to -0.5ppm/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.

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## 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)

**Example: WRM0204-R000I** (WRM0204, zero ohm jumper, Pb-free)



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	R000 = Jumper	D = ±0.5%	0204	3000 / 7" reel <sup>1</sup>
	D = ±25ppm/°C		F = ±1%	0207	1500 / 7" reel
	C = ±50ppm/°C		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

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