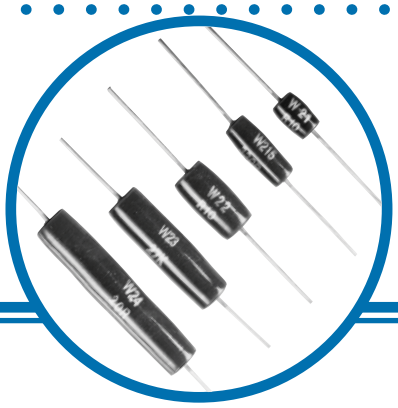
Vitreous Enamelled Wirewound Resistors

TT electronics

IRC Wire and Film Technologies Division

W20 Series

- Rugged all-welded construction
- High purity ceramic substrate
- Impervious lead-free vitreous enamel coating
- High stability and high reliability
- Suitable for harsh environments
- Overload charcteristics ideal for protection circuits
- Lead-free, RoHS-compliant construction



Specifications

Part Number	Power rating @25°C (Watts)	Resistance Range (Ohms)	Tolerance (±%)	TCR (±ppm/°C)	Limiting Element Voltage (Volts)	Thermal Impedance[1] (°C/watt)
W21	3.0	1 - 10K	1	Typical: <+75 Maximum: +200	100	88
		0.5 - 10K	2			
		0.1 - 10K	5			
W215	5.0	1 - 15K	1	Typical: <+75 Maximum: +200	160	58
		0.5 - 15K	2			
		0.1 - 15K	5			
W22	7.0	1 - 22K	1	Typical: <+75 Maximum: +200	200	44
		0.5 - 22K	2			
		0.1 - 22K	5			
W23	10.0	1 - 60K	1	Typical: <+75 Maximum: +200	500	29
		1 - 60K	2			
		0.15 - 60K	5			
W24	14.0	1 - 100K	1	Typical: <+75 Maximum: +200	750	22
		1 - 100K	2			
		0.15 - 100K	5			

Notes

[1] See temperature rise graph

Application Notes

The terminations should not be bent closer than 1.6mm from the body of the resistor, and the recommended bend radius is 1.2mm. Terminations are solderable to within 4mm from the resistor body.

When cold, vitreous enamel has excellent insulation resistance. In common with all insulation materials, the specific resistance of the enamel decreases with increased temperatures. Therefore, resistors operated at near-maximum temperature cannot be considered as insulated and should not be used in contact with any conductive material.

Care must be taken when determining clearance distance between the resistor body and printed circuit board or other components to ensure these are not overheated. Resistance is measured 6mm from the resistor body.

General Note
IRC reserves the right to make changes in product specification without notice or liability.
All information is subject to IRC's own data and is considered accurate at time of printing.

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Environmental Performance

Test		Maximum	Typical
Load at commercial rating: 1000 Hours at room temperature	ΔR%	5	4
Dry heat: 1000 hours at 200°C	ΔR%	2	1
Shelf life: 12 months at room temperature	ΔR%	0.03	0.02
Short term overload	ΔR%	1.0	0.2
Climatic	ΔR%	0.5	0.2
Long term damp heat	ΔR%	0.05	0.02
Temperature rapid change	ΔR%	0.5	0.2
Resistance to solder heat	ΔR%	0.25	0.03
Vibration and bump	ΔR%	0.25	0.05
Noise (in a decade of frequency)	μV/V	zero	zero
Insulation resistance	Ω	>0.1GΩ	>0.1GΩ
Dielectric withstanding voltage	V	500 min.	500 min.
Operating temperature range	°C	-55 to +200	

Construction

A high purity ceramic substrate is assembled with interference-fit end caps, to which are welded the termination wires. The resistive element is wound on the substrate and welded to the caps, and the vitreous enamel protective coating is then applied.

Terminations

Copper-clad steel wire, nickel-plated and solder-coated.

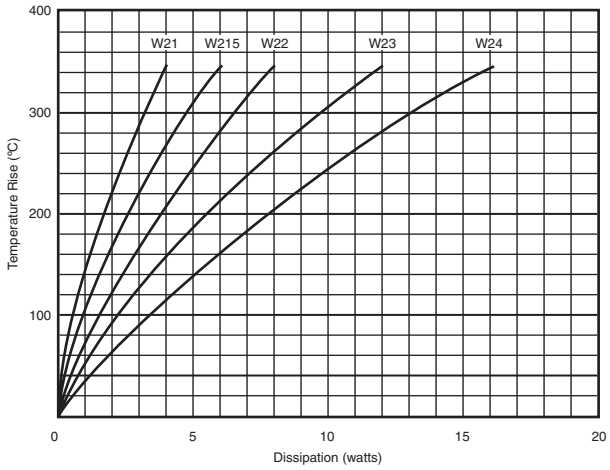
Marking

The resistors are legend-marked with type reference, resistance value and tolerance.

Solvent resistance

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

Temperature Rise Curve



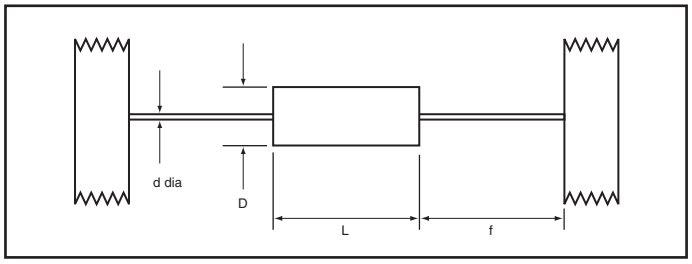
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Dimensions (mm)

Type	L (max.)	D (max.)	f (min)	ød (nom.)	Weight (g)
W21	12.7	5.6	22.75	0.8	1.0
W215	22.0	7.0	23.1	0.8	2.0
W22	22.2	8.0	23.1	0.8	2.0
W23	38.0	8.0	30*	0.8	3.5
W24	53.5	8.0	30*	0.8	5.0



Notes

[1] * W23 and W24 Series resistors are supplied loose-packed in boxes.

Ordering Information

Specify type, resistance, tolerance and packaging. This example is for a W21, 9000Ω, 5%, taped and ammo-packed.

All W20 Series resistors are RoHS-compliant.

Sample Part No. W21 9001 J A

IRC Style
W20

Resistance Value
(≥100Ω - First 3 significant digits plus 4th digit multiplier)
Example:
100Ω = 1000;
1000Ω = 1001;
150KΩ = 1503.
(>100Ω - "R" is used to designate decimal)
Example:
51Ω = 51R0,
1Ω = 1R00;
0.25Ω = R250

Tolerance
F = ±1%,
G = ±2%,
J = ±5%

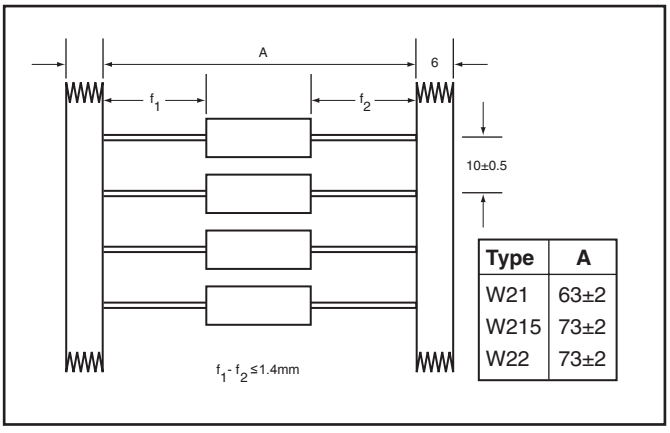
Packaging
(A = ammo; R= reel; B = box)

Packaging

W21 and W215 resistors are taped and packaged in ammo packs; W22 resistors are on tape-and-reel; W23 and W24 resistors are loose-packed in boxes.

Standard quantities per package

Type	Pack-aging Code	W21	W215	W22	W23	W24
Ammo pack	A	1000	750	-	-	-
Reel	R	-	-	700	-	-
Box	B	-	-	-	50	25



Type	A
W21	63±2
W215	73±2
W22	73±2

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