Vitreous Enamelled Wirewound Resistors

W20 Series

- **High stability and reliability**
- **High purity ceramic substrate**
- **High power dissipation for size**
- **Suitable for harsh environments**
- **Rugged all-welded construction**
- **Impervious lead free vitreous enamel coating**
- **Overload characteristics ideal for protection circuits**

Electrical Data

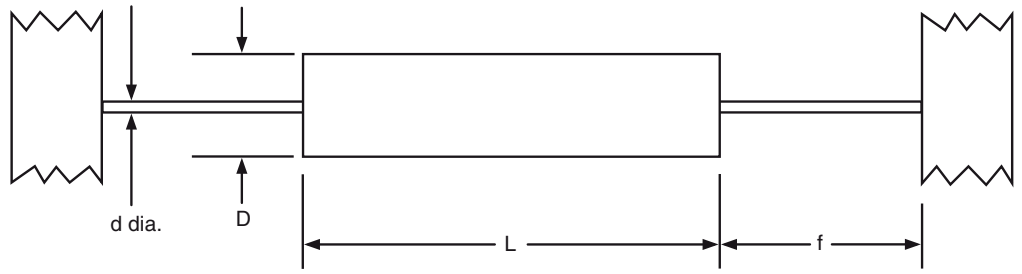
IRC Type	Power Rating @ 25°C (watts)	Resistance Range (ohms)	Tolerance (±%)	TCR (-55°C to 200°C) (±ppm/°C)	Limiting Element Voltage (volts)	Thermal Impedance* (°C/watt)	Operating Temperature Range (°C)
W21	3.0	1 - 10K	1	Typical: <+75 Maximum: +200	100	88	-55 to 350
		0.5 - 10K	2				
		0.1 - 10K	5				
W215	5.0	1 - 15K	1	Typical: <+75 Maximum: +200	160	58	-55 to 350
		0.5 - 15K	2				
		0.1 - 15K	5				
W22	7.0	1 - 20K	1	Typical: <+75 Maximum: +200	200	44	-55 to 350
		0.5 - 20K	2				
		0.1 - 20K	5				
W23	10.0	1 - 60K	1	Typical: <+75 Maximum: +200	500	29	-55 to 350
		1 - 60K	2				
		0.15 - 60K	5				
W24	14.0	1 - 100K	1	Typical: <+75 Maximum: +200	750	22	-55 to 350
		1 - 100K	2				
		0.2 - 100K	5				

*See temperature rise graph

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.

Physical Data



Dimensions (mm) and Weight (g)					
IRC Type	**L max**	**D max**	**f min**	**d nom**	**Wt. nom**
W21	12.7	5.6	22.75	0.8	1
W215	22.0	7.0	23.1	0.8	2
W22	22.2	8.0	23.1	0.8	2
W23	38.0	8.0	---	0.8	3.5
W24	53.5	8.0	---	0.8	5

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; the vitreous enamel protective coating is then applied.

TERMINATIONS

Material: Copper clad steel wire, nickel plated and solder-coated.
Length: W23's and W24's are not supplied on tape. Minimum length is 30mm.

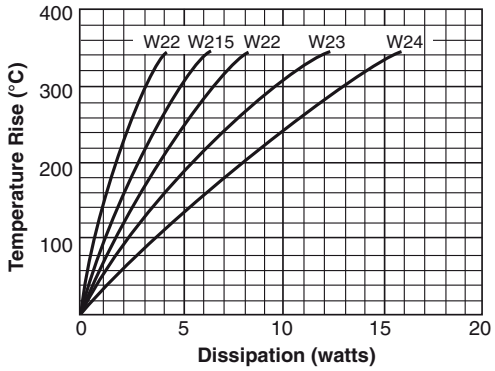
MARKING

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



Environmental Data

Test		Actual Performance	
		Maximum	Typical
Load at Commercial Rating: 1000 Hours @ room temperature	ΔR%	5	3.5
Dry Heat: 1000 hours @ 200°C	ΔR%	2	1
Shelf Life: 12 months at room temperature	ΔR%	0.03	0.02
Short Term Overload	ΔR%	.47	0.1
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
Robustness	ΔR%	0.4	0.05
Insulation Resistance	ohms	>1 G ohm	>1 G ohm
Voltage Proof	volts	500 min	500 min

APPLICATION NOTES

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

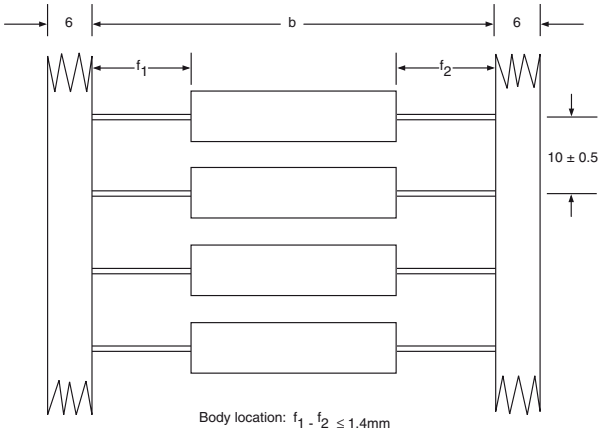
When cold, vitreous enamel has excellent insulation resistance. In common with all insulations the specific resistance of the enamel decreases with increase in temperature. Therefore, resistors operated at near maximum temperature cannot be classed as insulated and should not be used in contact with any conducting 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.

Packaging

For W21, W215, and W22 resistors the standard method of packaging is taped in ammo packs. Alternatives available by special request are:

- Taped and reeled
- Loose packed in boxes (minimum lead length 30mm). W23's and W24's are available only as loose packed in boxes.



Type	A
W21	63 ± 2
W215	73 ± 2
W22	73 ± 2

Standard Quantities Per Package

Type	Code	W21	W215	W22	W23	W24
Ammo Pack	A	1000	600	500	---	---
Reel	R	1000	800	700	---	---
Small Box	SB	200	100	100	50	25
Large Box	LB	800	500	300	---	---

Ordering Data

Specify type, reference, etc. as indicated in this example of W21, 0.1KΩ, 5%, taped and ammo packed.

Sample Part No. W21 | 9K1 | J | LF | A

IRC Type

Value

Tolerance Code
J = 5%, G = 2%, F = 1%

RoHS Indicator
LF indicates RoHS compliance

Packaging Details