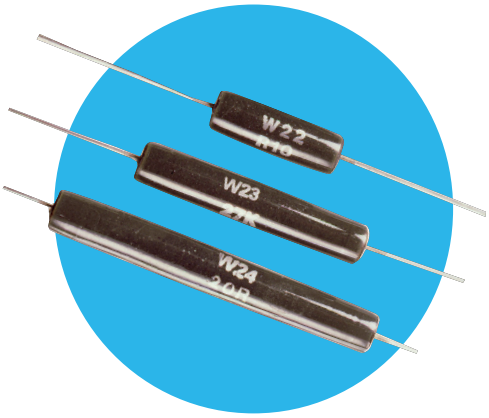
Resistors

Vitreous Enamelled Wirewound Resistors



W20 Series

- CECC approved
- Suitable for harsh environments
- Impervious lead free vitreous enamel coating
- Overload characteristics ideal for protection circuits
- High stability and reliability
- High power dissipation for size

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

Electrical Data

Commercial			W21	W215	W22	W23	W24
Power rating at 25°C		watts	3.0	5.0	7.0	10.5	14.0
Resistance range at	1% tolerance	ohms	1R to 10K	1R to 15K	1R to 22K	1R to 60K	1R to 100K
	2% tolerance	ohms	0R5 to 10K	0R5 to 15K	0R5 to 22K	1R to 60K	1R to 100K
	5% tolerance	ohms	0R1 to 10K	0R1 to 15K	0R1 to 22K	0R15 to 60K	0R2 to 100K
TCR (-55° to 200°C)		ppm/°C	Typically: <+-75			Maximum: +-200	

BS CECC 40-201-002 Requirements		Style	JB	HB	KB	LB	MB
Power rating at 25°C		watts	2.9	5.0	7.0	10.5	14.0
Power rating at 70°C		watts	2.5	4.3	6.0	9.0	12.0
Resistance range at	1% tolerance	ohms	1R to 10K	1R to 15K	1R to 20K	1R to 56K	1R to 100K
	2% tolerance	ohms	0R5 to 10K	0R5 to 15K	0R5 to 20K	1R to 56K	1R to 100K
	5% tolerance	ohms	0R1 to 10K	0R1 to 15K	0R1 to 20K	0R15 to 56K	0R2 to 100K
TCR (-55° to 200°C)		ppm/°C	≥5 ohms < 10 ohms: ±400			≥10 ohms: ±200	

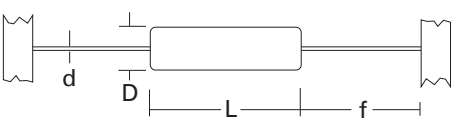
This table indicates the CECC specification requirements, and these are met or exceeded by the corresponding W20 series products

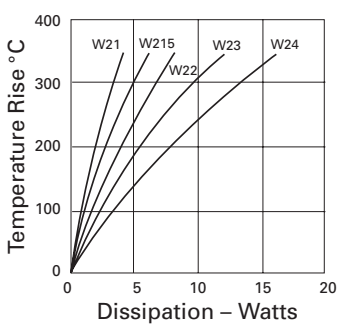
Applicable to commercial and approved ranges							
Limiting element voltage		volts	100	160	200	500	750
Standard values			E24 preferred. Other values to special order				
Thermal impedance		°C/watt	88	58	44	29	22
Ambient temperature range		°C	-55 to 200				

Physical Data

Dimensions (mm) and Weight (g)

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	22.0	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.
Strength The terminations meet the requirements of IEC 68.2.21.
Solderability The terminations meet the requirements of IEC 115-1,– Clause 4.17.3.2.
Length W23's and W24's are not supplied on tape. Minimum lead length is 30 mm.

Marking

The resistors are legend marked with type reference, resistance value and tolerance. Values are marked in accordance with IEC 62.

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.

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Solvent Resistance

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

Flammability

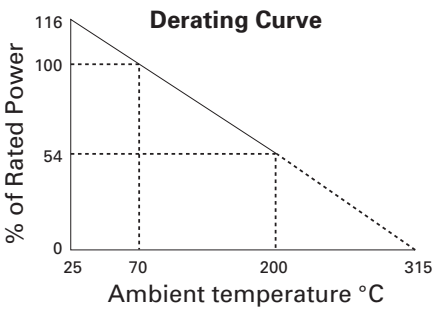
All materials used in the construction of W20 series resistors are inorganic and inherently non-burning.

Performance Data

		CECC 40201-002	Actual Performance	
		Requirements	Maximum	Typical
Load at commercial rating: 1000 hrs at 25°C	ΔR%		5	3.5
Load at CECC rating: 1000 hours at 25°C	ΔR%	5	5	3.5
Dry heat: 1000 hours at 200°C	ΔR%	5	2	1
Shelf life: 12 months at room temperature	ΔR%	not specified	0.03	0.02
Derating		see derating curve		
Short term overload	ΔR%	1	1.0	0.2
Climatic	ΔR%	5	0.5	0.2
Climatic category	ΔR%	55/200/56		
Long term damp heat	ΔR%	5	0.05	0.02
Temperature rapid change	ΔR%	1	0.5	0.2
Resistance to solder heat	ΔR%	1	0.25	0.03
Vibration and bump	ΔR%	1	0.25	0.05
Noise (in decade of frequency)	μv/v	not specified	zero	zero
Robustness	ΔR%	1	0.4	0.05
Insulation resistance	ohms	not specified	> 1G ohm	> 1G ohm
Voltage Proof	volts	not specified	500 min	500 min
Pulse handling	Data available at: https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/ApplicationNotes/Wirewound-Pulse-Overload-Resistors.pdf			

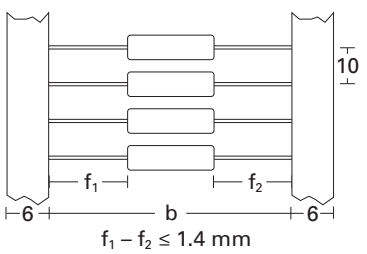
Application Notes

The termination should not be bent closer than 1.6mm from the body, and the recommended minimum bend radius is 1.2mm. The terminations are solderable to within 4mm from the body. When cold, vitreous enamel has excellent insulation resistance. In common with all insulants 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 the printed circuit board or other components to ensure these are not over heated. Resistance is measured 6mm from body.



Packaging

For W21 and W215 the standard method of packaging is taped in Ammo Packs. For W22 the standard method of packaging is taped and reeled. W23's and W24's are available only as loose packed in boxes.



Type	b
W21	63±2
W215	73±2
W22	73±2

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Ordering Procedure

Example: W22-3K3JI (W22, 3.3 kilohms ±5%, Pb-free)

W	2	2	-	3	K	3	J	I
1				2			3	4

1 Type	2 Value	3 Tolerance	4 Packing & Termination Finish	
W21	E24 = 3/4 characters	F = ±1%	I = Standard packing & Pb-free	
W215	R = ohms	G = ±2%	PB = Standard packing & SnPb	
W22	K = kilohms	J = ±5%	W21, W215	1000/box
W23			W22	700/reel
W24			W23, W24	50/box

For CECC released product state on order the CECC number and style. Example: **W22-3K3JI CECC40201-002 KB**

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