

# 20 Series



## Vitreous Enamel Conformal Axial Terminal Wirewound, 5% Tolerance Std.



The 20 Series axial terminal resistors are both durable and economical. They have all the electrical attributes of the more expensive 90 Series resistors, including all-welded construction.

They offer the durability of a lead free conformal vitreous enamel coating and are ideal for computer, communications and industrial applications in which cost, quality, and reliability are key considerations.

### FEATURES

- Rugged vitreous enamel coating withstands high humidity and temperature cycling.
- Durable construction, recommended for industrial applications where reliability is paramount.
- All-welded construction.
- Flame resistant lead free vitreous enamel coating.
- RoHS compliant; Add "E" suffix to part number to specify.

### SERIES SPECIFICATIONS

| Series | Wattage | Ohms     | Max. Voltage* |
|--------|---------|----------|---------------|
| 21     | 1       | 1.0-3.0K | 75            |
| 22     | 2       | 1.0-3.0K | 65            |
| 23     | 3       | 0.1-10K  | 135           |
| 25     | 5       | 0.1-28K  | 330           |
| 27     | 7       | 0.1-25K  | 450           |
| 20     | 10      | 0.1-100K | 720           |

12.5 watt size available on special order

\*Maximum Voltage is based on Ohm's Law  $[V=\sqrt{P \cdot R}]$  as limited by the resistance value of specified product

### CHARACTERISTICS

|                                |  |
|--------------------------------|--|
| <b>Coating</b>                 | Conformal lead free vitreous enamel  |
| <b>Core</b>                    | Ceramic.   |
| <b>Terminals</b>               | Solder-coated axial. RoHS solder composition is 96% Sn, 3.5% Ag, 0.5% Cu                                   |
| <b>Derating</b>                | Linearly from 100% @ +25°C to 0% @ +350°C  |
| <b>Tolerance</b>               | ±5% standard; other tolerances available   |
| <b>Power rating</b>            | Based on 25°C free air rating (other wattages available)   |
| <b>Overload</b>                | Under 7 watts: 5 times rated wattage for 5 seconds; 7 watts and over: 10 times rated wattage for 5 seconds |
| <b>Temperature coefficient</b> | 1 to 9.99 ohms: ±50 ppm/°C; 10 ohms and over: ±30 ppm/°C   |

### DIMENSIONS

(in./mm max.)



| Series | Wattage | Length* (max.) | Diam.* (max.) | Lead ga. |
|--------|---------|----------------|---------------|----------|
| 21     | 1       | 0.421 / 10.7   | 0.156 / 4.0   | 24       |
| 22     | 2       | 0.421 / 10.7   | 0.219 / 5.6   | 20       |
| 23     | 3       | 0.515 / 13.1   | 0.220 / 5.6   | 20       |
| 25     | 5       | 1.015 / 25.8   | 0.276 / 7.0   | 20       |
| 27     | 7       | 1.265 / 32.1   | 0.394 / 10.0  | 20       |
| 20     | 10      | 1.859 / 47.2   | 0.394 / 10.0  | 20       |

\*For units below 1Ω, add 15% to body diameter, 10% to body length.

(continued)

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## Vitreous Enamel Conformal Axial Terminal Wirewound, 5% Tolerance Std.

### ORDERING INFORMATION

#### Standard part numbers

| Ohmic value | Part No.<br>Prefix<br>Suffix | Wattage |   |   |   |   |    | Ohmic value | Part No.<br>Prefix<br>Suffix | Wattage |   |   |   |   |    | Ohmic value | Part No.<br>Prefix<br>Suffix | Wattage |   |   |   |   |    |
|-------------|------------------------------|---------|---|---|---|---|----|-------------|------------------------------|---------|---|---|---|---|----|-------------|------------------------------|---------|---|---|---|---|----|
|             |                              | 1       | 2 | 3 | 5 | 7 | 10 |             |                              | 1       | 2 | 3 | 5 | 7 | 10 |             |                              | 1       | 2 | 3 | 5 | 7 | 10 |
| 0.10        | R10                          |         |   | ✓ | ✓ |   | ✓  | 62          | 62R                          | ✦       | ✦ | ✓ | ✓ | ✦ | ✓  | 1,800       | 1K8                          | ✓       | ✓ | ✓ | ✦ | ✦ | ✦  |
| 0.13        | R13                          |         |   | ✓ | ✓ |   | ✓  | 68          | 68R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 2,000       | 2K0                          | ✦       | ✓ | ✓ | ✓ | ✦ | ✓  |
| 0.15        | R15                          |         |   | ✓ | ✓ |   | ✓  | 75          | 75R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 2,200       | 2K2                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  |
| 0.20        | R20                          |         |   | ✓ | ✓ |   | ✓  | 82          | 82R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 2,500       | 2K5                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  |
| 0.25        | R25                          |         |   | ✓ | ✓ |   | ✓  | 100         | 100                          | ✓       | ✦ | ✓ | ✓ | ✓ | ✓  | 2,700       | 2K7                          | ✓       | ✓ | ✓ | ✦ | ✦ | ✓  |
| 0.30        | R30                          |         |   | ✓ | ✓ |   | ✓  | 120         | 120                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 3,000       | 3K0                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  |
| 0.33        | R33                          |         |   | ✓ | ✓ |   | ✓  | 125         | 125                          | ✦       | ✦ | ✓ | ✓ | ✓ | ✓  | 3,300       | 3K3                          |         |   |   |   | ✦ | ✓  |
| 0.50        | R50                          |         |   | ✓ | ✓ |   | ✓  | 150         | 150                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 3,500       | 3K5                          |         |   |   |   | ✦ | ✓  |
| 0.75        | R75                          |         |   | ✓ | ✓ |   | ✓  | 180         | 180                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 3,900       | 3K9                          |         |   |   |   | ✦ | ✓  |
| 1           | 1R0                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 200         | 200                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 4,000       | 4K0                          |         |   |   |   | ✦ | ✓  |
| 1.5         | 1R5                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 220         | 220                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 4,500       | 4K5                          |         |   |   |   | ✦ | ✓  |
| 2           | 2R0                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✦  | 225         | 225                          | ✦       | ✦ | ✦ | ✦ | ✦ | ✓  | 4,700       | 4K7                          |         |   |   |   | ✦ | ✓  |
| 2.2         | 2R2                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 250         | 250                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 5,000       | 5K0                          |         |   |   |   | ✦ | ✓  |
| 3           | 3R0                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 270         | 270                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 6,000       | 6K0                          |         |   |   |   | ✦ | ✓  |
| 4           | 4R0                          | ✓       | ✦ | ✓ | ✓ | ✓ | ✓  | 300         | 300                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 6,800       | 6K8                          |         |   |   |   | ✦ | ✓  |
| 5           | 5R0                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 330         | 330                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 7,000       | 7K0                          |         |   |   |   | ✦ | ✓  |
| 7.5         | 7R5                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 350         | 350                          | ✦       | ✓ | ✦ | ✓ | ✦ | ✓  | 7,500       | 7K5                          |         |   |   |   | ✦ | ✓  |
| 10          | 10R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 390         | 390                          | ✓       | ✦ | ✦ | ✦ | ✦ | ✓  | 8,000       | 8K0                          |         |   |   |   | ✦ | ✓  |
| 12          | 12R                          | ✦       | ✦ | ✓ | ✓ | ✦ | ✓  | 400         | 400                          | ✦       | ✦ | ✓ | ✓ | ✦ | ✓  | 9,000       | 9K0                          |         |   |   |   | ✦ | ✓  |
| 15          | 15R                          | ✓       | ✦ | ✓ | ✦ | ✓ | ✓  | 450         | 450                          | ✦       | ✦ | ✦ | ✓ | ✦ | ✓  | 10,000      | 10K                          |         |   |   |   | ✦ | ✓  |
| 18          | 18R                          | ✓       | ✦ | ✓ | ✓ | ✦ | ✓  | 470         | 470                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 12,000      | 12K                          |         |   |   |   | ✦ | ✓  |
| 20          | 20R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 500         | 500                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 13,000      | 13K                          |         |   |   |   | ✦ | ✓  |
| 22          | 22R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 560         | 560                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 15,000      | 15K                          |         |   |   |   | ✦ | ✓  |
| 25          | 25R                          | ✦       | ✓ | ✓ | ✓ | ✦ | ✓  | 600         | 600                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 17,000      | 17K                          |         |   |   |   | ✦ | ✓  |
| 27          | 27R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 680         | 680                          | ✓       | ✦ | ✓ | ✓ | ✦ | ✓  | 20,000      | 20K                          |         |   |   |   | ✦ | ✓  |
| 30          | 30R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 750         | 750                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 22,000      | 22K                          |         |   |   |   | ✦ | ✓  |
| 33          | 33R                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 800         | 800                          | ✓       | ✦ | ✓ | ✓ | ✦ | ✓  | 25,000      | 25K                          |         |   |   |   | ✦ | ✓  |
| 35          | 35R                          | ✦       | ✦ | ✦ | ✦ | ✦ | ✓  | 820         | 820                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 30,000      | 30K                          |         |   |   |   | ✦ | ✓  |
| 39          | 39R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 900         | 900                          | ✦       | ✓ | ✓ | ✓ | ✦ | ✓  | 33,000      | 33K                          |         |   |   |   | ✦ | ✓  |
| 40          | 40R                          | ✓       | ✦ | ✓ | ✓ | ✦ | ✓  | 1,000       | 1K0                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 35,000      | 35K                          |         |   |   |   | ✦ | ✓  |
| 47          | 47R                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 1,100       | 1K1                          | ✦       | ✦ | ✓ | ✓ | ✦ | ✓  | 40,000      | 40K                          |         |   |   |   | ✓ | ✓  |
| 50          | 50R                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  | 1,200       | 1K2                          | ✓       | ✓ | ✓ | ✓ | ✦ | ✓  | 50,000      | 50K                          |         |   |   |   | ✓ | ✓  |
| 56          | 56R                          | ✦       | ✓ | ✓ | ✓ | ✦ | ✓  | 1,500       | 1K5                          | ✓       | ✓ | ✓ | ✓ | ✓ | ✓  |             |                              |         |   |   |   | ✓ | ✓  |

✓ = Standard values

✦ = Non-standard values subject to minimum handling charge per item

Shaded values involve very fine resistance wire and should not be used in critical applications without burn-in and/or thermal cycling.

