

Electronics Resistors and Resistance

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Resistors and Measuring Resistance

Resistance can only reliably be measured when a resistor is *not* part of a circuit.

If this can't be done, then the power to the circuit must be turned off.

Current and voltage must be measured with power applied to the circuit

Resistors in Circuit Diagrams

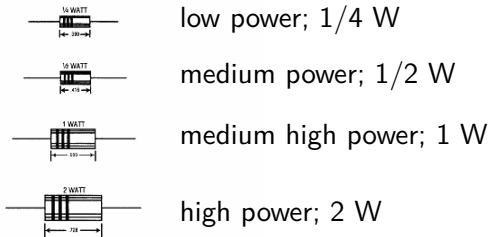
Resistor symbols



North American



European



Higher power resistors are bigger so they can dissipate more heat.



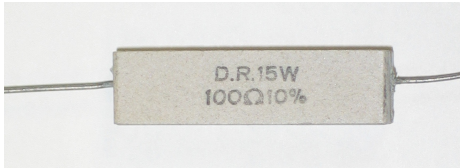
“Normal” (i.e. $1/4$ W) resistor



1/2 W resistor



One kind of high power resistor (fins)



The wattage is indicated on this resistor.



High power hollow resistor



High power hollow resistor (end view)

- Always measure resistance by ohmmeter when the power is off *but never when the power is on.*
- *Determine resistance* based on ohm's law using the voltage across the resistor and the current passing through it.
- **The most reliable measurement will be with the resistor removed from any circuit.**

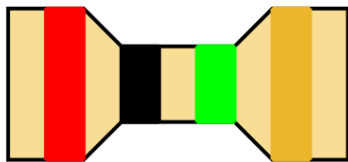
Resistor Colour Codes

Colour codes

- allow resistors to be identified visually
- are international

Colour Codes

- Better (Black - 0)
- Be (Brown - 1)
- Right (Red - 2)
- Or (Orange - 3)
- Your (Yellow - 4)
- Great (Green - 5)
- Big (Blue - 6)
- Venture (Violet - 7)
- Goes (Grey - 8)
- Wrong (White - 9)



- First 2 bands give prefix; eg. 20 (Red Black)
- Third band gives multiplier; eg. 5 (Green)
- Fourth band gives tolerance; eg. 5% (Gold)
- Result $20 \times 10^5 \pm 5\%$



- First 3 bands give prefix; eg. 205 (Red Black Green)
- Fourth band gives multiplier; eg. 0 (Black)
- Fifth band gives tolerance; eg. 1% (Brown)
- Result $205 \times 10^0 \pm 1\%$

3 or 4 Band Tolerance Colour Codes

- Gold - 5%
- Silver - 10%
- No band - 20%

5 or 6 Band Tolerance Colour Codes

- Black NA
- Brown 1%
- Red 2%
- Orange 3%
- Yellow 4%
- Green 0.5%
- Blue 0.25%
- Violet 0.1%
- Grey 0.05%
- **White** NA