

23. We use $J = E/\rho$, where E is the magnitude of the (uniform) electric field in the wire, J is the magnitude of the current density, and ρ is the resistivity of the material. The electric field is given by $E = V/L$, where V is the potential difference along the wire and L is the length of the wire. Thus $J = V/L\rho$ and

$$\rho = \frac{V}{LJ} = \frac{115 \text{ V}}{(10 \text{ m}) (1.4 \times 10^4 \text{ A/m}^2)} = 8.2 \times 10^{-4} \Omega \cdot \text{m} .$$