

Problem 9.7 An antenna with a pattern solid angle of 1.5 (sr) radiates 60 W of power. At a range of 1 km, what is the maximum power density radiated by the antenna?

Solution: From Eq. (9.23), $D = 4\pi/\Omega_p$, and from Eq. (9.24), $D = 4\pi R^2 S_{\max}/P_{\text{rad}}$. Combining these two equations gives

$$S_{\max} = \frac{P_{\text{rad}}}{\Omega_p R^2} = \frac{60}{1.5 \times (10^3)^2} = 4 \times 10^{-5} \quad (\text{W/m}^2).$$
