

Link Budget Calculation

Received power (dBm) = Transmitted power (dBm) + gains (dB) - losses (dB)

$$d = 100\text{ft} = 33.33\text{m}$$

$$\lambda = 1.90\text{E-}01\text{m}$$

$$\text{Free Space Path Loss} = -10 \times \log_{10} [(4\pi d/\lambda)^2] = -66\text{dB}$$

$$T_{\text{power}} = -130\text{dB}$$

$$G_{\text{receivingantenna}} = 3\text{dB}$$

$$L_{\text{cable}} = -12\text{dB}$$

$$G_{\text{transmittingantenna}} = 33\text{dB}$$

$$\text{ERP} = T_{\text{power}} + G_{\text{receivingantenna}} - L_{\text{cable}} + G_{\text{transmittingantenna}} - \text{Free Space Path Loss} = -130 + 3 - 12 + 33 - 66 = -172\text{dB}$$

$$\text{dB to Watts} \quad \text{dB} = 10\log(W/1 \times 10^{-3}) \Rightarrow W = \log^{-1}(\text{dB}/10)$$

$$W = \log^{-1}(-172/10) * 1 \times 10^{-3} = 6.3095734448\text{e-}21\text{W} = 6.309\text{zW}$$