

Spektrale Rauschleistungsdichte $\eta_0 = kT = 10 \log \left(1,38 \cdot 10^{-23} \frac{Ws}{k} \cdot 273K \right) = -204 \text{ dB} / \text{Hz}$
 $\hat{=} -174 \text{ dBm} / \text{Hz}$

Rauschzahl $N_0' = \eta_0' + B' \hat{=} N_0 = \eta_0 \cdot B$

Wellenlänge $\lambda = \frac{c}{f}$

Eff. Ant. wirkläche $A_{\text{eff}} = \frac{\lambda^2 G}{4\pi}$

$c = 3 \cdot 10^8$
 $kT \begin{cases} -174 \text{ dBm} / \text{Hz} \\ -204 \text{ dBW} / \text{Hz} \end{cases}$

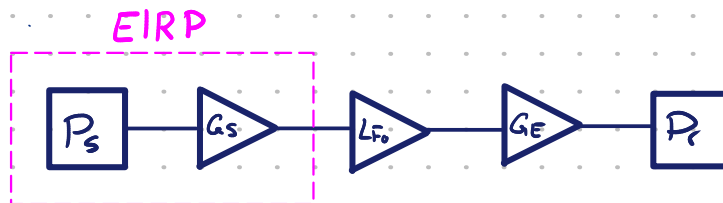
Freifeld dämpfung $\left(\frac{4\pi d}{\lambda} \right)^2$

Bandbreite $B = 1/T$

Feldstärke $E = \sqrt{R_{fs} \frac{\text{EIRP}}{4\pi d^2}}$ $R_{fs} = \sqrt{\mu_0 / \epsilon_0} = 377$ [shift][7][32] ϵ_0
[shift][7][33] μ_0

EIRP $\text{EIRP}' = P_s' + G_s - D_s$

$P_e' = \overset{\text{F}}{N_0'} + (kT)' + B' + \text{SNR}'$



Streuparameter

Anpassung $s_{ii} = 0 \quad (r_I = r_A^*)$

Reziprozität $s_{ij} = s_{ji} \quad \text{mit } i \neq j$

Symmetrie $s_{ii} = s_{jj} \quad \& \quad s_{ij} = s_{ji}$

Rückwirkungsfrei $s_{ij} = 0 \quad \& \quad s_{ji} \neq 0$

Verlustlosigkeit
(Passivität) $\underline{S}^T \cdot \underline{S}^* = \underline{E}$

$$\begin{pmatrix} s_{11} & s_{21} \\ s_{12} & s_{22} \end{pmatrix} \cdot \begin{pmatrix} s_{11}^* & s_{12}^* \\ s_{21}^* & s_{22}^* \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$\underline{S}^T \qquad \underline{S}^* \qquad \underline{E}$

		s_{11}^*	s_{21}^*
		s_{21}^*	s_{22}^*
s_{11}	s_{21}
s_{12}	s_{22}

$$\begin{aligned} \underline{s}_{11} \cdot \underline{s}_{11}^* + \underline{s}_{21} \cdot \underline{s}_{21}^* &= 1 \\ |\underline{s}_{11}|^2 + |\underline{s}_{21}|^2 &= 1 \\ \underline{s}_{11} \cdot \underline{s}_{12}^* + \underline{s}_{21} \cdot \underline{s}_{22}^* &= 0 \\ \underline{s}_{12} \cdot \underline{s}_{11}^* + \underline{s}_{22} \cdot \underline{s}_{21}^* &= 0 \\ \underline{s}_{12} \cdot \underline{s}_{12}^* + \underline{s}_{22} \cdot \underline{s}_{22}^* &= 1 \end{aligned}$$

$$s_{ii} = \frac{Z_{Ei} - Z_{Li}}{Z_{Ei} + Z_{Li}} \quad s_{ji} = \frac{2U_j}{U_{0i}} \sqrt{\frac{Z_{Li}}{Z_{Lj}}}$$