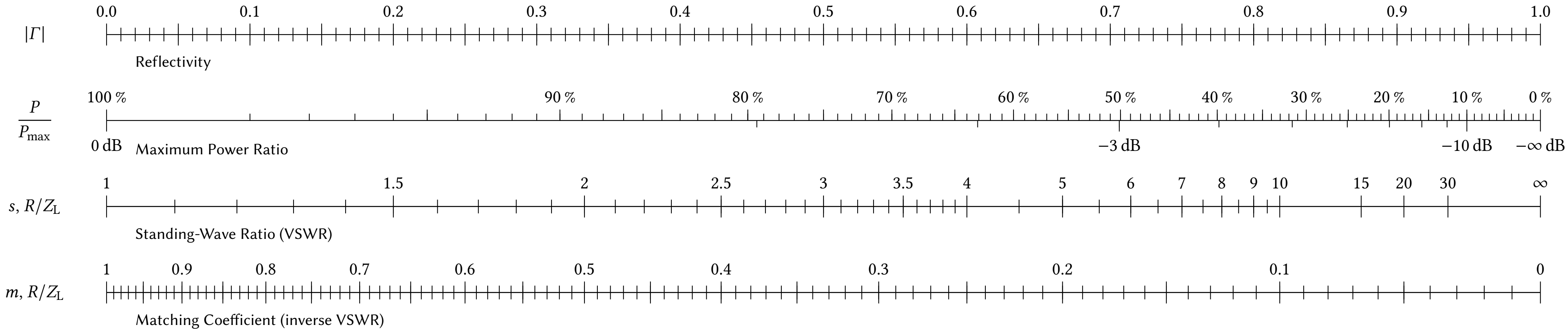
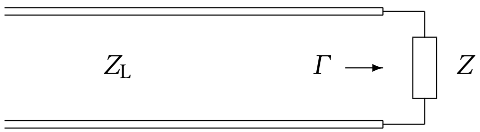


Description

These nomographs show several mismatch characteristics on one scale versus the linear scale of reflectivity $|\Gamma|$.

Consider an RF transmission line with characteristic impedance Z_L, which is terminated by the impedance Z.



The corresponding reflection coefficient is then calculated by

$$\Gamma = \frac{z-1}{z+1},$$

where $z = Z/Z_L$. For a real impedance $Z = R$ the reflectivity Γ is also real and therefore $\Gamma = |\Gamma|$.

In case of $\Gamma = 0$, that is $Z = Z_L$, maximum power P_{max} is transmitted to the load and none is reflected (matched load). For $\Gamma \neq 0$ the maximum power ratio is given by

$$\frac{P}{P_{max}} = 1 - |\Gamma|^2 .$$

The same in decibels (dB) is calculated by

$$\frac{P/P_{max}}{dB} = 10 \log(1 - |\Gamma|^2) .$$

Given some reflectivity $|\Gamma|$, the corresponding voltage standing wave ratio (VSWR) is

$$s = \frac{1+|\Gamma|}{1-|\Gamma|},$$

which also describes the ripple of voltage and current magnitudes along the line since

$$s = \frac{U_{max}}{U_{min}} = \frac{I_{max}}{I_{min}} .$$

The reciprocal of s is called the matching coefficient m, which is also known as the inverse VSWR. You can easily get sorted out in your mind that for real-valued $Z = R$, s equals normalized impedance R/Z_L if $R \geq Z_L$ and m equals normalized impedance R/Z_L if $R \leq Z_L$.

http://www.siart.de/lehre/reflection_loss.pdf