D2 a) Parallelschaltung → Admittanzen

$$G_p = \frac{1}{R_p} = 0{,}0267\ \frac{1}{\Omega}$$

$$Y_C = j\omega C = j2\pi f \cdot C = j0{,}0267\ \frac{1}{\Omega}$$

Normierung: aus $\frac{R_p}{Z_0}$ wird $G_p \cdot Z_0$

$$G_p \cdot Z_0 = 2\ \frac{1}{\Omega}$$

$$Y_C \cdot Z_0 = j\,2\ \frac{1}{\Omega}$$

$$Y = 2 + j\,2\ \frac{1}{\Omega}$$

Drehwinkel: $\frac{l}{\lambda}$

$$v = \lambda \cdot f \rightarrow \lambda = \frac{v}{f} = \frac{v_0}{f} = \frac{3 \cdot 10^8\ \frac{m}{s}}{500 \cdot 10^6\ \frac{1}{s}} = 0{,}6m$$

$$\frac{l}{\lambda} = \frac{0{,}1056\,m}{0{,}6\,m} = 0{,}176$$

Aus Smith Chart abgelesen:

$|r_E| \hat{=} 4{,}9cm \rightarrow |r_E| = 0{,}625$

$\varphi_E \approx 82°$

Eingansimpedanz:

$Re\{0{,}5\}$ $Im\{1\}$ $\rightarrow \frac{Z_E}{Z_0} = 0{,}5 + 1j$

$\rightarrow Z_E = 37{,}5\Omega + j\,75\Omega$

(D2) b) $\lambda = \frac{v}{f} = \frac{v_0}{f \cdot \sqrt{\varepsilon_r}} = \frac{3 \cdot 10^8 \frac{m}{s}}{500 \cdot 10^6 \frac{1}{s} \cdot \sqrt{2{,}25}} = 0{,}4\,m$

für kurzgeschl. Leitung gilt:

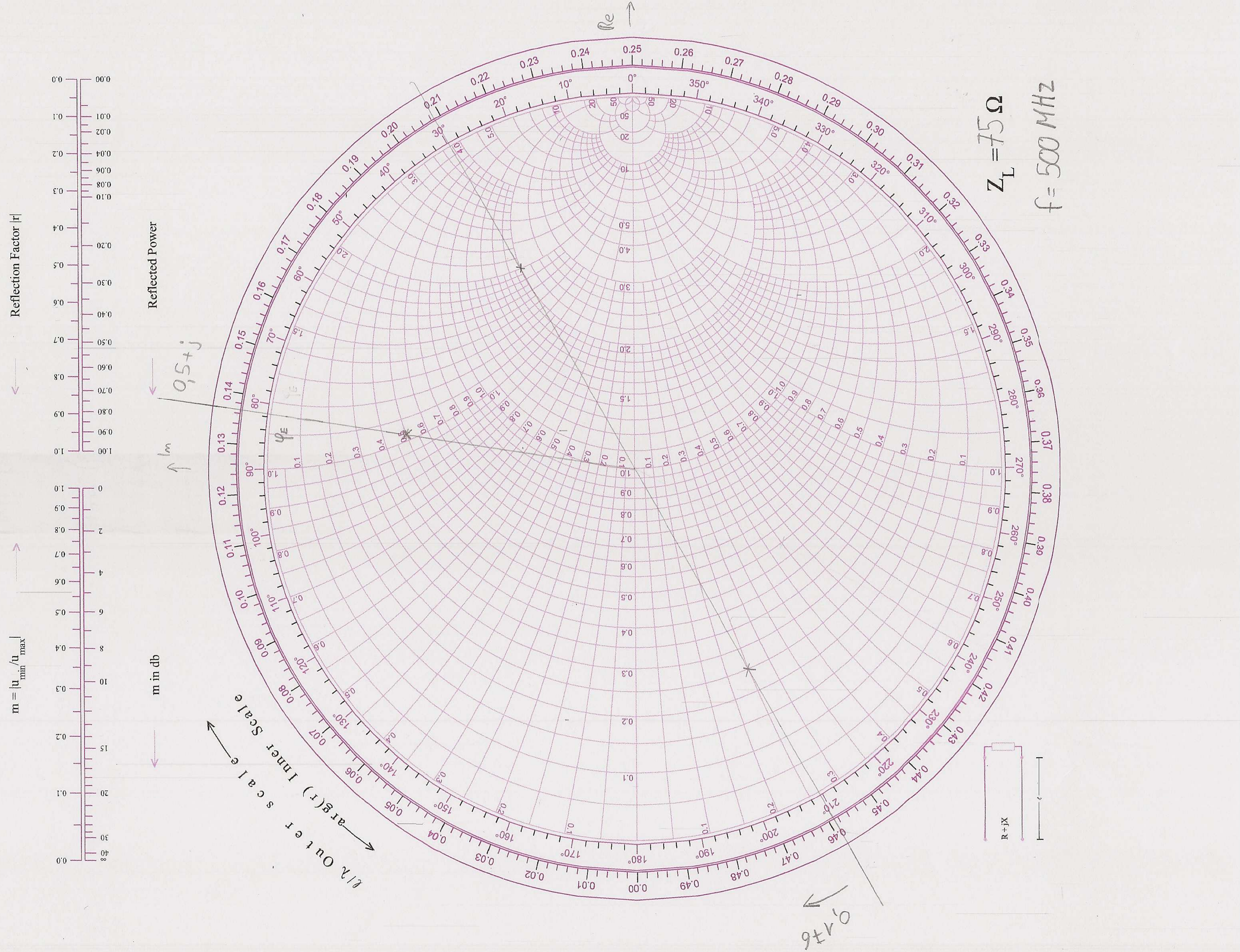
$$\underline{Z}_E = j \cdot Z_0 \cdot \tan\left(2\pi \cdot \frac{l}{\lambda}\right)$$

$$= j \cdot 50\,\Omega \cdot \tan\left(2\pi \frac{12{,}96 \cdot 10^{-2}\,m}{0{,}4\,m}\right)$$

$$= j \cdot 50\,\Omega \cdot -2$$

$$= -j\,100\,\Omega \rightarrow \text{Blindelement kapazitiv}$$

$$C = \frac{1}{2\pi f\, Z_E} = \frac{1}{2\pi \cdot 500 \cdot 10^6\,Hz \cdot 100\,\Omega} = 3{,}18\,pF$$



Reflection Factor |r|
Reflected Power
m = |u_min/u_max|
m in db
l/λ Outer scale
arg(r) Inner Scale
Z_L = 75 Ω
f = 500 MHz
0,5+j
0,476
Re
Im
R + jX