

$$a) \theta_c = 75^\circ \quad \theta_t = \arcsin\left(\frac{n_1}{n_2} \sin(\theta_c)\right) = 46,57^\circ$$

$$P_{TM} = P_{TE}$$

$$\vec{E}_{TM} = \vec{E}_{TE} = \vec{E}_0$$

$$P_i = P_{i,TE} + P_{i,TM} = \frac{\vec{E}_0^2 A}{2\eta} + \frac{\vec{E}_0^2 A}{2\eta} = \frac{\vec{E}_0^2 A}{\eta}$$

$$P_{r,TE} = \frac{\Gamma_{TE}^2 \cdot \vec{E}_0^2 A}{2\eta} = \frac{\Gamma_{TE}^2}{2} P_i; \quad P_{r,TM} = \frac{\Gamma_{TM}^2 \cdot \vec{E}_0^2 A}{2\eta} = \frac{\Gamma_{TM}^2}{2} P_i$$

$$P_r = P_{r,TE} + P_{r,TM} = \frac{P_i}{2} (\Gamma_{TE}^2 + \Gamma_{TM}^2)$$

$$R = 10 \log\left(\frac{P_r}{P_i}\right) = 10 \log\left(\frac{\frac{P_i}{2} (\Gamma_{TE}^2 + \Gamma_{TM}^2)}{P_i}\right) = 10 \log\left(\frac{\Gamma_{TE}^2 + \Gamma_{TM}^2}{2}\right)$$

$$\Gamma_{TM} = -0,5587$$

$$R = -6,748 \text{ dB}$$

$$\Gamma_{TE} = -0,3327$$

$$b) \text{ Fall 1: TM Filter: TM Anteil} = 0 \quad P_{r,TM} = 0 \quad R = 10 \log\left(\frac{P_r}{P_i}\right) = 10 \log\left(\frac{\Gamma_{TE}^2}{2}\right) \\ = -8,066 \text{ dB}$$

$$\text{Fall 2: TE Filter: TE Anteil} = 0 \quad P_{r,TE} = 0 \quad R = 10 \log\left(\frac{P_r}{P_i}\right) = 10 \log\left(\frac{\Gamma_{TM}^2}{2}\right) \\ = -12,57 \text{ dB}$$

$$\frac{\text{Photograf 1}}{\text{Photograf 2}} = -12,57 \text{ dB} - (-6,748 \text{ dB}) = -5,822 \text{ dB}$$