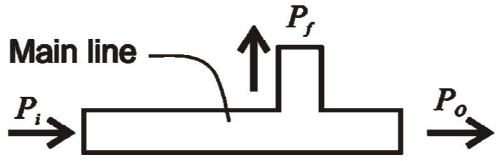
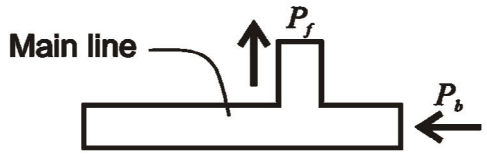
Directional Couplers

Forward



$$\textit{Coupling}\quad C = 10\log_{10}\frac{P_f}{P_i}$$ Typical values: 3, 6, 10, 20, 50 dB

Backward

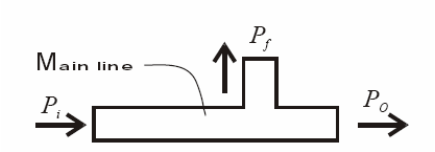


$$\textit{Directivity}\quad D = 10\log_{10}\frac{P_f}{P_b}$$ Typical values: 50 dB and higher

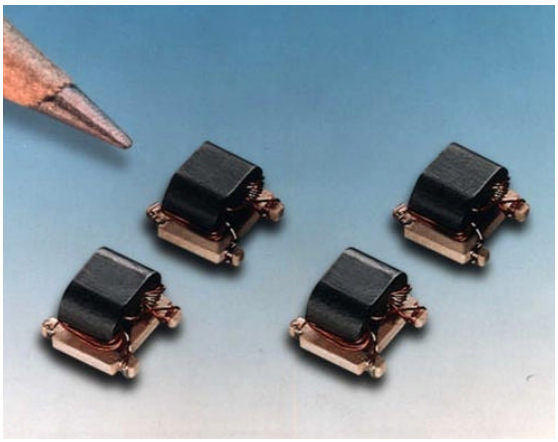
Talking Points

Passive
Frequency dependence
Insertion loss
Isolation
Measurement, tap off signal for STALO

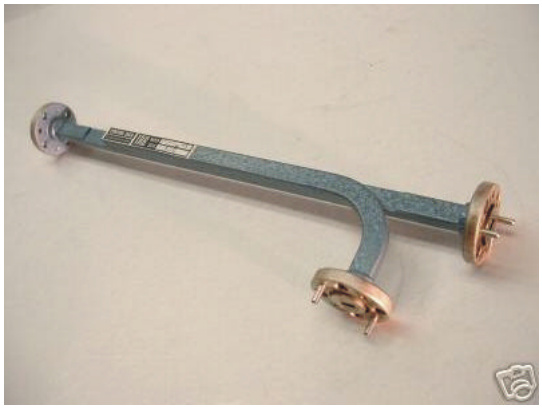
Question. The coupling C of the directional coupler below is 40 dB, and the incident power is 10 kW. What is the power at the forward (coupled port) and what is the power at the mainline port?



Solution. A coupling C = 40 dB is equal to a ratio of 10^4. Even though the sign is positive, it is implied that this ratio is an attenuation. This was pointed out in class. Thus, of the 10 kW = 10^4 W flowing into the coupler, $10^4/10^4$ = 1 W flows out P_f. The rest (10^4 – 1 = 9,999 W) flows out P_o. (4 points total)




Mini-Circuits
15542
OUT
CPL
ZFDC-20-50
0 0023
IN




Bi-directional coupler
C = 15 dB
In
fo = 1.83 GHz
Out
Fwd
Rev
FZUP 2002