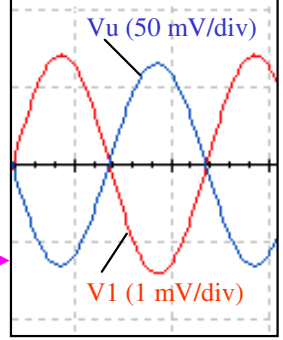
Calcolo risposta in f di un EC

(9')

$$V_{uo} = -h_{fe} i_b \left(\frac{1}{h_{oe}} // R_C // R_{load}\right) \cong -100 \bullet i_b \bullet 0{,}5k$$

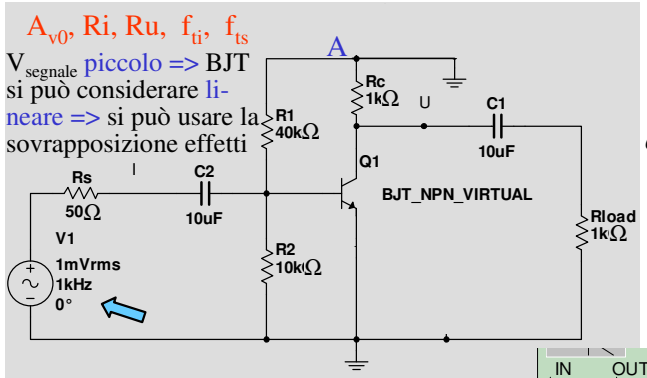
$$i_b = \frac{V_I}{h_{ie}} = \frac{1}{h_{ie}} \frac{V1}{(R_S + R1 // R2 // h_{ie})} (R1 // R2 // h_{ie}) \cong \frac{V1}{1k}$$

$$V_{uo} = -100 \bullet i_b \bullet 0{,}5k = -100 \frac{V1}{1k} 0{,}5k = -50V1$$



A_{v0}, Ri, Ru, f_{ti}, f_{ts}

$V_{segnale}$ piccolo => BJT si può considerare lineare => si può usare la sovrapposizione effetti



hie = 1kΩ, hfe = 100 1/hoe =20kΩ Cbe=100pF Cbc=5pF

$$C^* = C_{be} // C_{bc} = 100 + 5 = 105\,pF$$

$$R_{vistaDaC^*} = 900 // (100 + 50) = 129\Omega$$

$$\omega_p = \frac{1}{R_{vistaDaC^*} C^*} = \frac{1}{129 * 105\,p} = 74 Mrad/s$$

$$f_p = \frac{\omega_p}{2\pi} = 11.8MHz$$

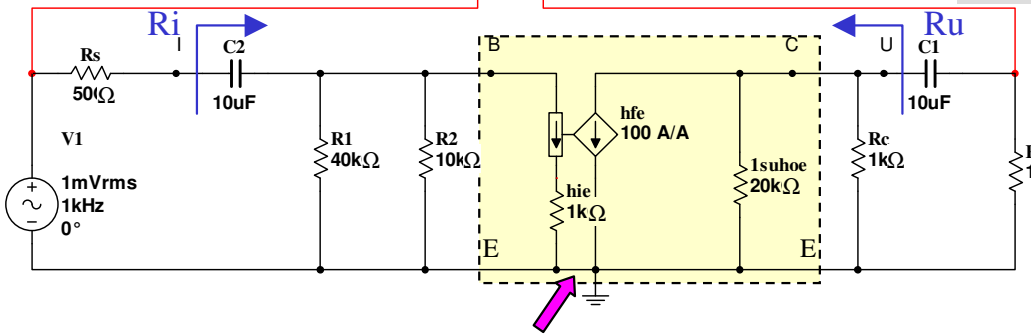
$$|A_{VO}|_{indB} = 20Log\,50 = 34dB$$

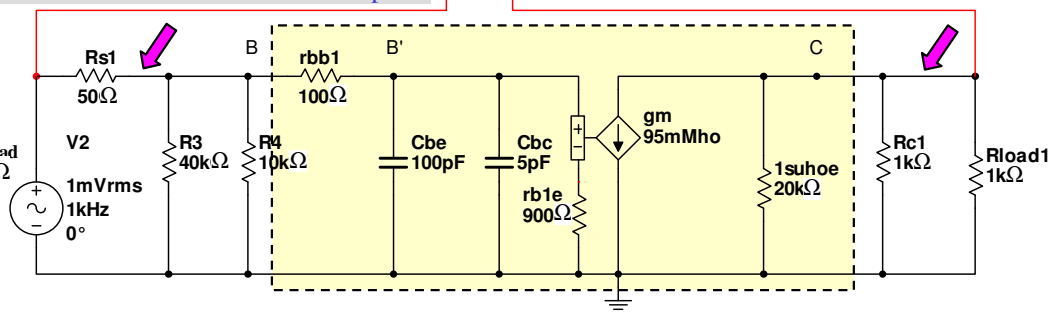
$$R_i = R_1 // R_2 // h_{ie} \cong h_{ie} = 1k\Omega$$

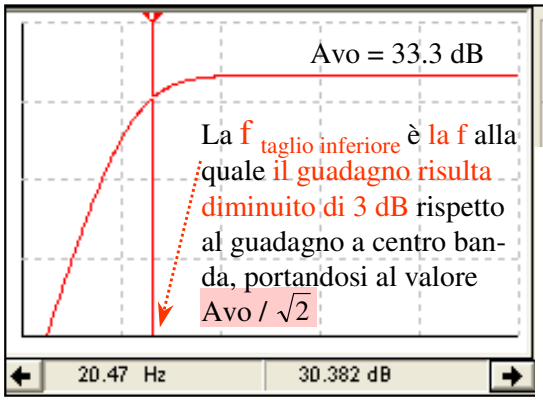
XBP1

$$R_u = R_C // \frac{1}{h_{oe}} \cong R_C = 1k\Omega$$

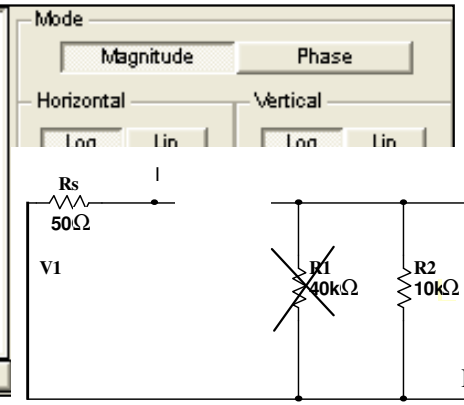
$$\frac{1}{f_s^2} = \frac{1}{f_1^2} + \frac{1}{f_2^2}$$

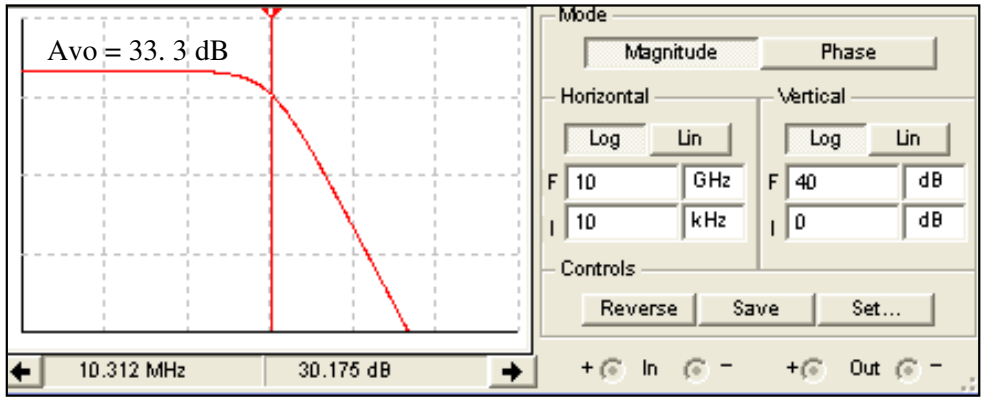


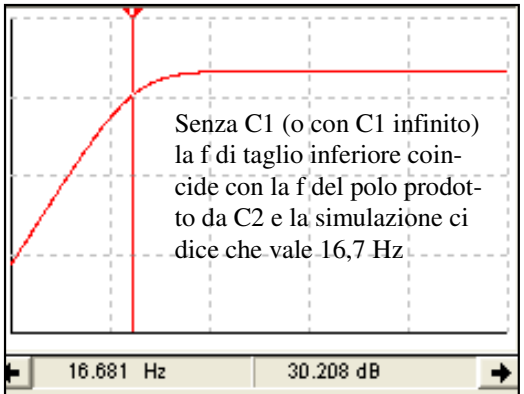




La $f_{\text{taglio inferiore}}$ è la f alla quale il guadagno risulta diminuito di 3 dB rispetto al guadagno a centro banda, portandosi al valore Avo / $\sqrt{2}$







Senza C1 (o con C1 infinito) la f di taglio inferiore coincide con la f del polo prodotto da C2 e la simulazione ci dice che vale 16,7 Hz

$$R_{vistaDaC2} = 50 + (1k // 10k) = 959\Omega$$

$$\omega_{polo\_C2} = \frac{1}{R_{vistaDaC2} C2} = 104 rad/s$$

$$f_{polo\_C2} = \frac{\omega_{C2}}{2\pi} = 17Hz$$

$$R_{vistaDaC1} = 1k + 1k = 2k\Omega$$

$$\omega_{polo\_C1} = \frac{1}{R_{vistaDaC1} C1} = 50 rad/s$$

$$f_{polo\_C1} = \frac{\omega_{C1}}{2\pi} = 8Hz$$

$$f_{taglio\_i}^2 = f_{polo1}^2 + f_{polo2}^2$$

$$f_{tagli\_i} = \sqrt{f_{p\_C1}^2 + f_{p\_C2}^2} = 19Hz$$