

BJT

zona normale: $V_{BC} < 0$ saturazione: $V_{BC} > 0$

$$g_m = \frac{I_C}{V_T} \quad r_\pi = \frac{\beta}{g_m} \quad r_o \approx \frac{V_A}{I_C}$$

Generatore a specchio $I_0 = \frac{I_R(\beta)}{\beta+2}$

Carico sull'emettitore $A_V = \frac{R_{LOAD}(\beta+1)}{R_B+r_\pi+(1+\beta)R_{LOAD}}$

$$R_i = R_B+r_\pi+(1+\beta)R_{LOAD} \quad R_o = R_E \parallel \left(\frac{r_\pi+R_B}{1+\beta} \right)$$

Carico sul collettore $A_V = \frac{-R_{LOAD}\beta}{R_B+r_\pi+(1+\beta)R_E}$

$$R_i = R_B+r_\pi+(1+\beta)R_E \quad R_o = R_C \parallel r_o \left(1 + \frac{\beta R_E}{r_\pi+R_B+R_E+R_{O2}} \right)$$

Ingresso nell'emettitore $A_V = \frac{R_{LOAD}\beta}{R_B+r_\pi} \quad A_V = \frac{R_C+g_m R_C r_o}{R_C+r_o}$

$$R_i = \frac{r_\pi+R_B}{1+\beta} \quad R_o = R_C \parallel r_o \left(1 + \frac{\beta R_E \parallel R_{O2}}{r_\pi+R_B+R_E \parallel R_{O2}} \right)$$

FET (JFET / MOSFET)

Funzionamento per $V_{GS} > V_{TN}$ $V_{SG} > V_{TP}$

$$r_o = \frac{1}{\lambda I_D} \quad I_D = K_n (V_{GS} - V_{TN})^2 \quad g_m = 2\sqrt{K_n I_D} \quad I_D = I_{DSS} \left(1 - \frac{V_{GS}}{V_P} \right)^2 \quad g_m = 2 \frac{\sqrt{I_{DSS} I_D}}{|V_P|}$$

Resistenza di Source $R_{SO} = \frac{r_d+R_D}{1+r_d g_m}$

Resistenza di Drain $R_{DR} = r_d(1+g_m R_S) + R_S$

Carico sul Source $A_V = \frac{R_S g_m r_d}{R_S r_d g_m + R_S + R_D + r_d}$

$$R_i = \infty \quad R_o = R_S \parallel \frac{r_d+R_D}{1+r_d g_m}$$

Carico sul Drain $A_V = \frac{-R_D g_m r_d}{R_S r_d g_m + R_S + R_D + r_d}$

$$R_i = \infty \quad R_o = R_D \parallel (r_d(1+g_m R_S) + R_S)$$

Ingresso nel Source $A_V = \frac{R_D(1+g_m r_d)}{r_d+R_D}$

$$R_i = \frac{R_{GEN} + r_d(1+g_m R_{GEN}) + R_D}{1+g_m r_d} \quad R_o = R_D \parallel (r_d(1+g_m R_S \parallel R_{O2}) + R_S \parallel R_{O2})$$