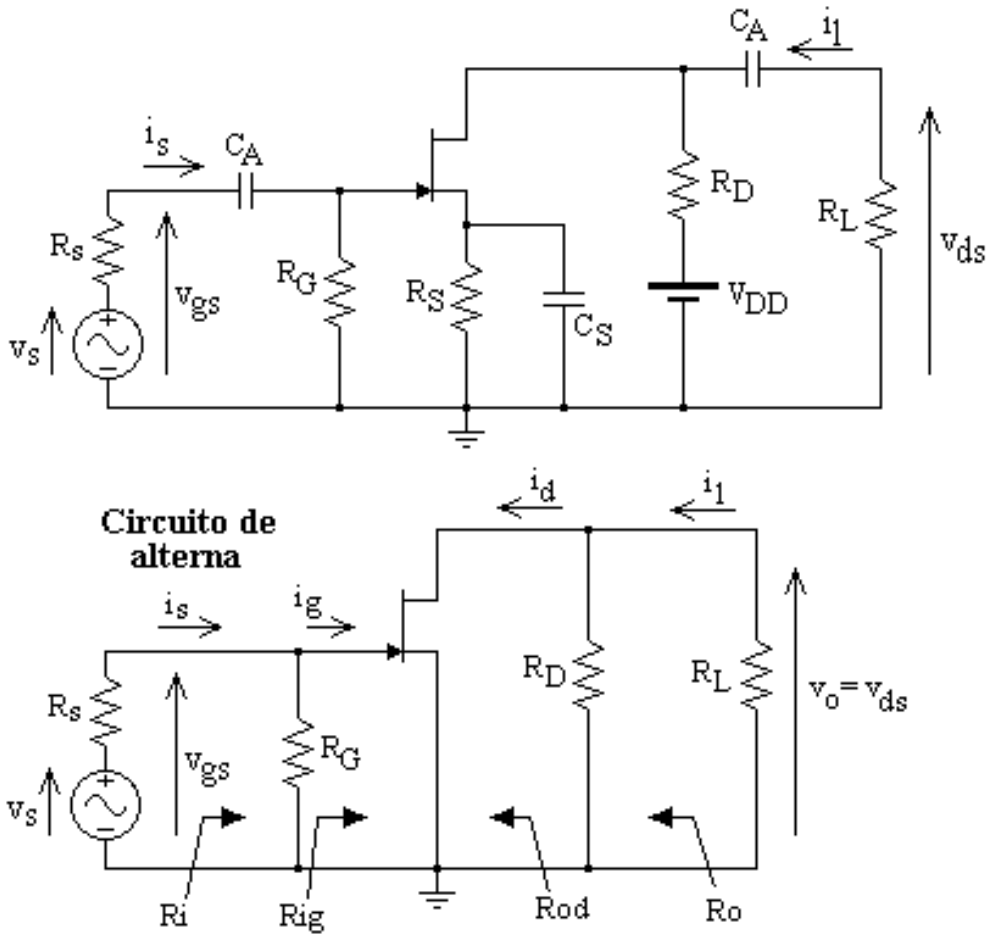
Configuraciones de un amplificador

Source común



$v_o = v_{ds} = -i_d(R_D // R_L)$

$v_i = v_{gs}$

$$A_v = \frac{v_{ds}}{v_{gs}} = -g_m \left(r_{ds} // R_D // R_L \right)$$

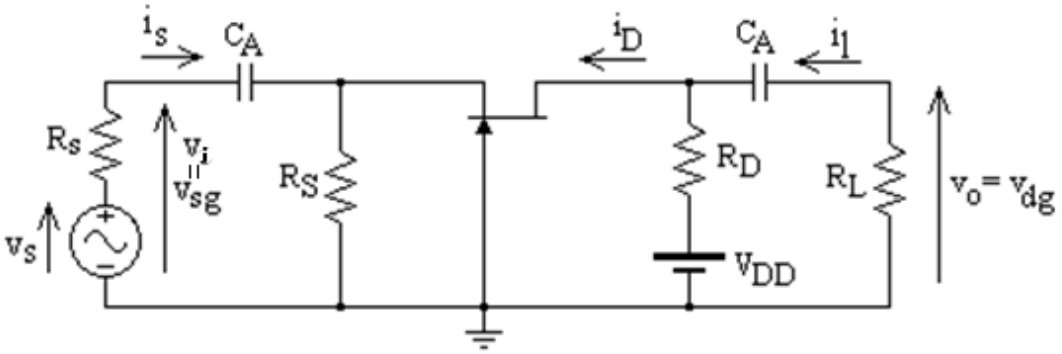
$$A_v = \frac{v_{ds}}{v_{gs}} = -g_m R_{Da}$$

$$R_{ig} = \frac{v_{gs}}{i_g} = r_{gs}$$

$$R_{od} = v_{dp}/i_{dp} = r_{ds}$$

$$\Rightarrow R_o = R_D // R_{od} \cong R_D$$

Gate común:

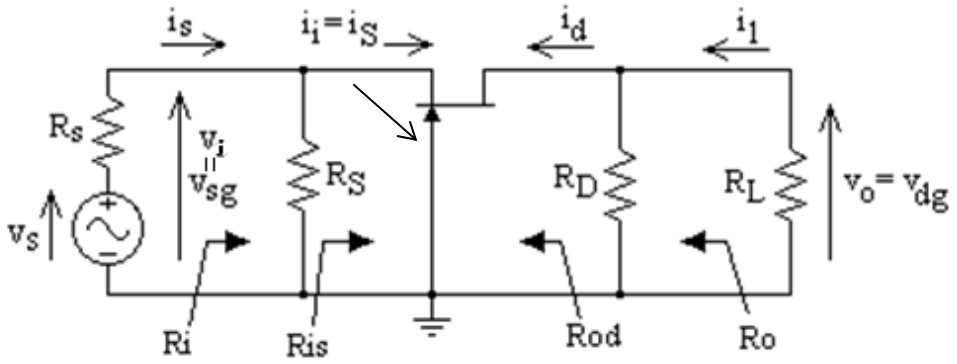


$v_o = v_{dg} = -i_d(R_D // R_L)$

$v_i = -v_{gs}$

$$A_v = \frac{v_{dg}}{v_{sg}} = g_m R_{Da}$$

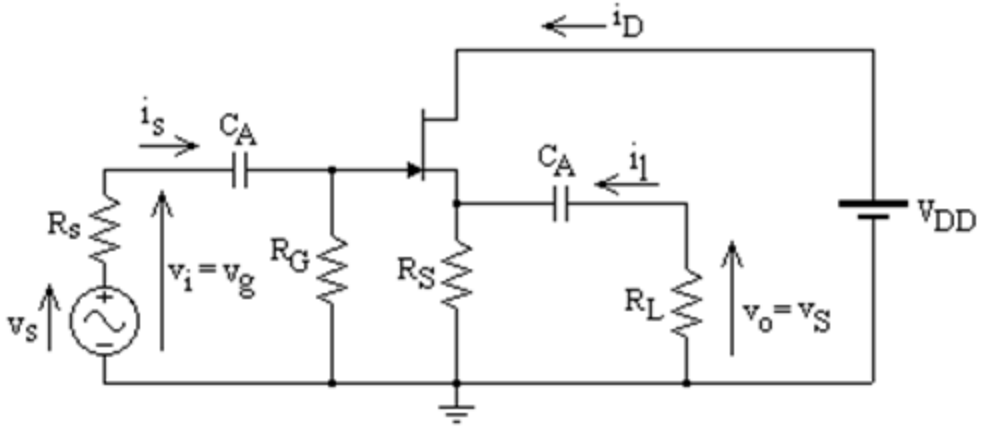
Circuito de alterna



$$R_{is} = \frac{v_{sg}}{i_s} = \frac{1}{g_m} = \frac{-v_{gs}}{-i_d}$$

$$R_{od} = v_{dp}/i_{dp} = r_{ds}(1 + g_m R_{Ss})$$

Drain común (seguidor):

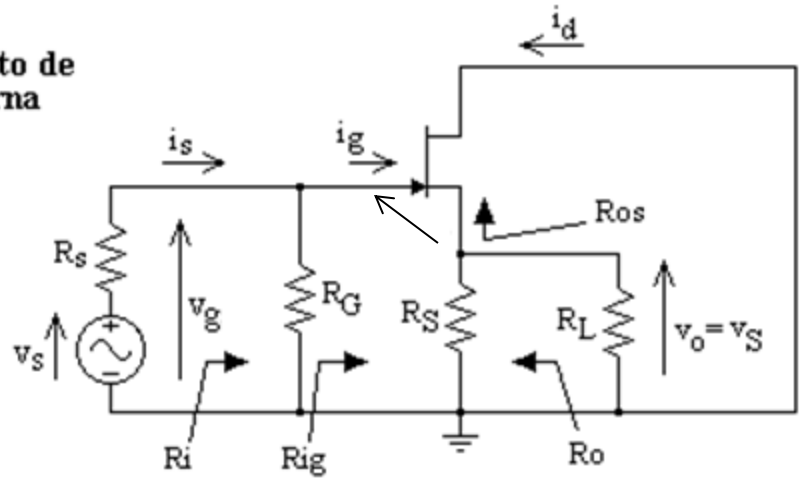


$$v_o = v_s = i_d\,(R_S // R_L)$$

$$v_i = v_{gs} + i_d\,(R_S // R_L)$$

$$A_v = \frac{v_S}{v_g} = \frac{\beta_{FET} R_{Sa}}{r_{gs} + \beta_{FET} R_{Sa}} = \frac{g_m R_{Sa}}{1 + g_m R_{Sa}}$$

Circuito de alterna



$$R_{os} = \frac{1}{g_m} + \frac{R_s // R_G}{\beta_{FET}} \cong \frac{1}{g_m}$$

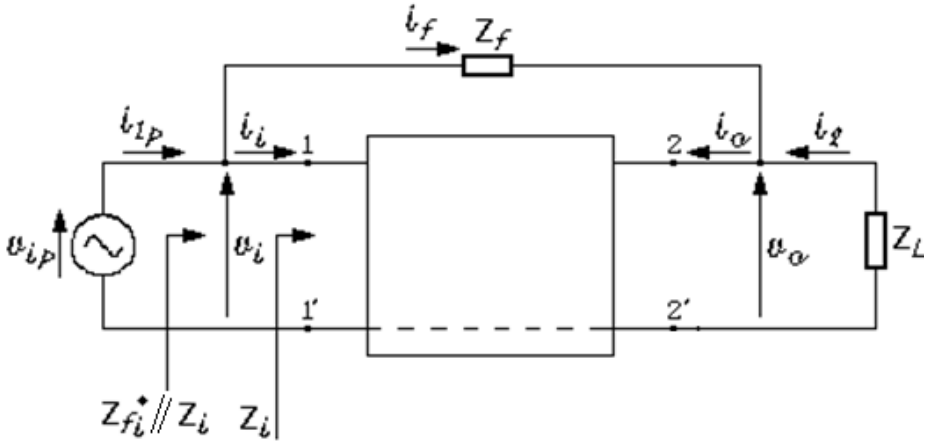
$$R_{ig} = \frac{v_g}{i_g} = r_{gs} + \beta_{FET}(R_S // R_L) = r_{gs} + g_m r_{gs} R_{Sa} = r_{gs}(1 + g_m R_{Sa})$$

Resumiendo:

	Av	*Ri*	*Ro*
SC	<< -1	↑↑	↑
GC	>> 1	↓↓	↑
DC	< 1	↑↑	↓↓

¿Cómo responden en frecuencia? (análisis cualitativo)

Recordando la reflexión por relación de v:

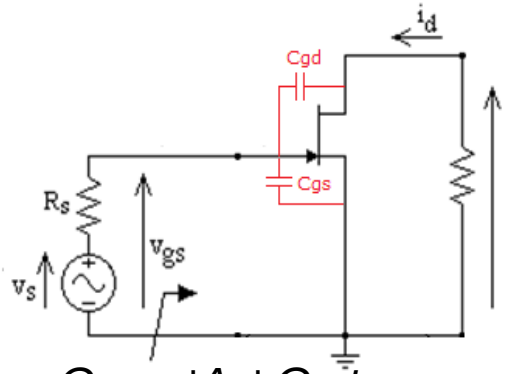


Con Av << - 1

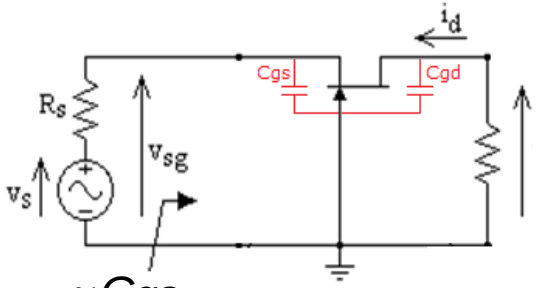
Si Zf → C → Zf ≅ 1 / jω C \|Av\|*

Con Av ≅ 1

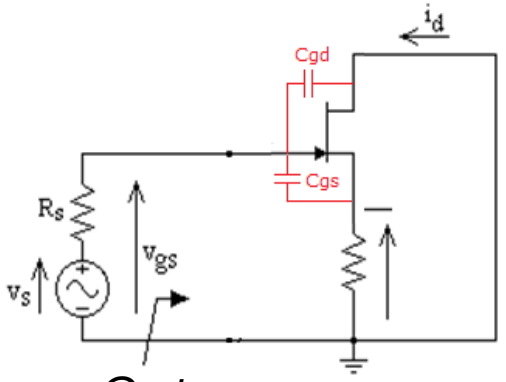
Zf → ∝*



≅ Cgs + \|Av\| Cgd



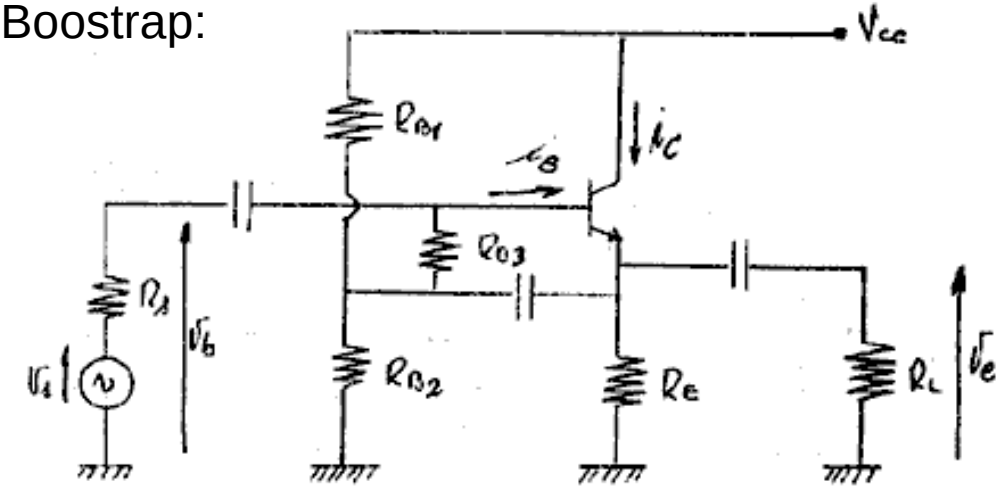
≅ Cgs



≅ Cgd

→ el ***SC*** es el tendrá menor ancho de banda

El Boostrap:



$$v_b \cong v_e \Rightarrow i_p \cong 0$$