Amplificador Ideal

- $BW = \infty$ ……………………. Ancho de banda infinito (Bandwidth)
- $D\% = 0\%$ …………………... Distorsión 0%
- $\eta\% = 100\%$ ………………... Rendimiento 100%

"La ganancia es independiente de las resistencias de generador y de carga"

Amplificador Ideal de Tensión

$$A_{vs} = \frac{V_o}{V_S} = \frac{V_o}{V_i} \frac{V_i}{V_S}$$
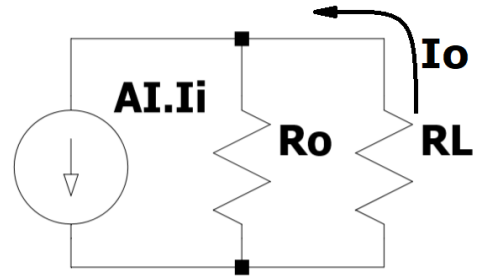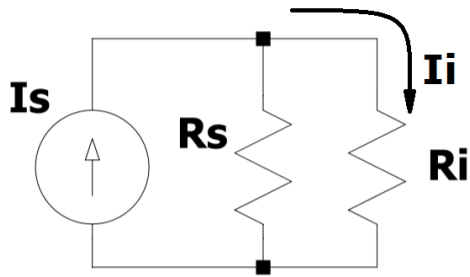
$$V_o = A_v \, Vi \, \frac{R_L}{R_L + R_o}$$

$$\frac{V_o}{V_i} = A_v \frac{R_L}{R_L + R_o}$$

$$V_i = V_S \frac{R_i}{R_i + R_S}$$

$$\therefore A_{vs} = A_v \frac{R_L}{R_L + R_o} \frac{R_i}{R_i + R_S}$$

Si queremos que sea ideal deben ser $R_o = \emptyset$ y $R_i = \infty \Rightarrow A_{vs} = A_V$

Amplificador Ideal de Corriente

$$A_{Is} = \frac{I_o}{I_s} = \frac{I_o}{I_i}\frac{I_i}{I_s}$$

$$I_o = A_I\, I_i\, \frac{R_o}{R_o + R_L}$$

$$\frac{I_o}{I_i} = A_I\, \frac{R_o}{R_o + R_L}$$

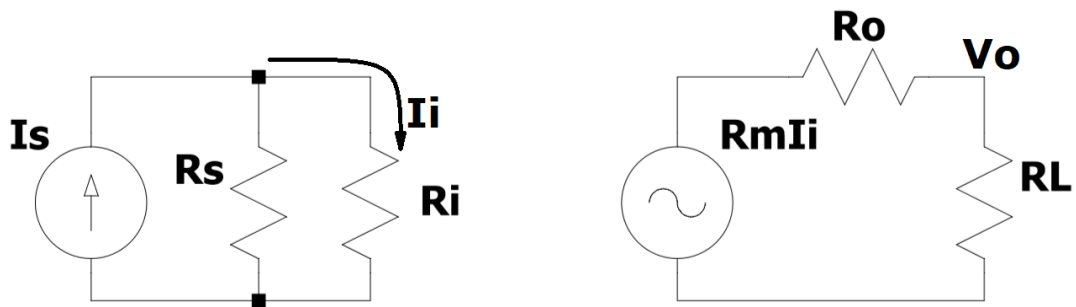$$I_i = I_s\, \frac{R_S}{R_S + R_i}$$

$$\frac{I_i}{I_s} = \frac{R_S}{R_S + R_i}$$

$$\therefore A_{Is} = A_I\, \frac{R_o}{R_o + R_L}\, \frac{R_S}{R_S + R_i}$$

Para ser ideal $R_o = \infty$ y $R_i = \emptyset$

Entonces $A_{Is} = A_I$

Amplificador Ideal de Transresistencia

$$R_{Ms} = \frac{V_o}{I_S} = \frac{V_o}{I_i}\frac{I_i}{I_S}$$

$$V_o = R_m I_i \frac{R_L}{R_L + R_o}$$

$$\frac{V_o}{I_i} = R_m \frac{R_L}{R_L + R_o}$$

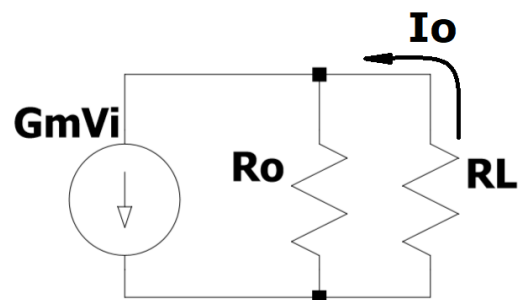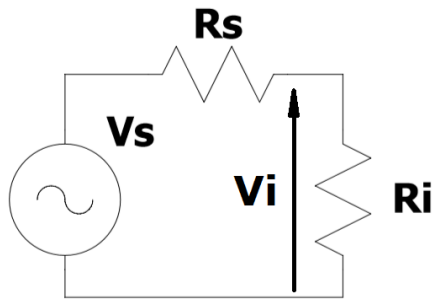$$I_i = I_s \frac{R_S}{R_S + R_i}$$

$$\frac{I_i}{I_S} = \frac{R_S}{R_S + R_i}$$

$$\therefore R_{Ms} = R_m \frac{R_L}{R_L + R_o} \frac{R_S}{R_S + R_i}$$

Para ser ideal $R_o = \emptyset$ y $R_i = \emptyset$

Entonces $R_{Ms} = R_m$

Amplificador Ideal de Transconductancia

$$G_{Ms} = \frac{I_o}{V_s} = \frac{I_o}{V_i} \frac{V_i}{V_s}$$

$$I_o = G_m V_i \frac{R_o}{R_o + R_L}$$

$$\frac{I_o}{V_i} = G_m \frac{R_o}{R_o + R_L}$$

$$V_i = V_s \frac{R_i}{R_i + R_s}$$

$$\frac{V_i}{V_s} = \frac{R_i}{R_i + R_s}$$

$$\therefore G_{Ms} = G_m \frac{R_o}{R_L + R_o} \frac{R_i}{R_i + R_s}$$

Para ser ideal $R_o = \infty$ y $R_i = \infty$

Entonces $G_{Ms} = G_m$

Resumiendo

Amp ideal	Ri	Ro
Tensión	∞	Ø
Corriente	Ø	∞
Transresistencia	Ø	Ø
Transconductancia	∞	∞

Unidades:

$$A_v = [\quad]$$

$$A_i = [\quad]$$

$$R_m = [\Omega]$$

$$G_m = [\mho]$$