Thévenin Source Circuit with Body Effect

Figure 1(a) shows the MOSFET with a Thévenin source connected to its gate, the body lead connected to signal ground, and the external drain load represented by the resistor R_{td}. The Thévenin equivalent circuit seen looking into the source can be obtained from the Thévenin equivalent circuit seen looking into the BJT emitter by replacing $v_{e(oc)}$ with $v_{s(oc)}$, r_{ie} with r_{is}, v_{tb} with $v_{tg}/(1+\chi)$, R_{tb} with R_{tg}, R_{tc} with R_{td}, r'_e with r'_s, setting $\alpha = 1$, and setting $\beta = \infty$. The circuit is given in Fig. 1(b), where $v_{s(oc)}$ and r_{is} are given by

$$v_{s(oc)} = \frac{v_{tg}}{1+\chi}\frac{r_0}{r_0 + r'_s} \tag{1}$$

$$r_{is} = r'_s\frac{r_0 + R_{td}}{r_0 + r'_s} \tag{2}$$

The equations for the case where the body is connected to the source are obtained by setting $\chi = 0$.
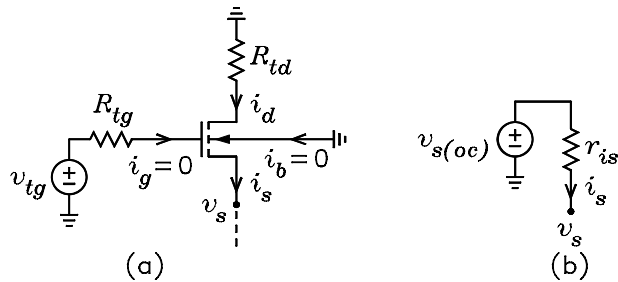

Figure 1: (a) MOSFET with Thévenin source connected to gate. (b) Thévenin source circuit.