Small-Signal Resistance Calculations – Page 1 of 7

Note: “no-signal” nodes include *pure* DC and Ground nodes.

1.




2.




3.




Note: Equations 4 – 8 apply for NMOS *and* PMOS.

4.





5.




Not affected by body effect.

6.




With body effect: *gm* becomes *gm*(1+**)

7.




With body effect: *gm*1 becomes *gm*1(1+**)

8.






With body effect: *gm* becomes *gm*(1+**)

Note-1: Equations 9 – 14 apply for NPN *and* PNP.
Note-2: At low frequency the BJT base-spreading resistance *rx* is neglected.

9.




10.






11.





12.




If there is a resistor *rb* in series with the base of the BJT, replace *r* by (*r*+*rb*).

13.





14.






If there is a resistor *rb* in series with the base of the BJT, replace *r* by (*r*+*rb*).