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*).