Small-Signal Voltage Gain Calculations – Page 1 of 3

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

1. Common-Source (NMOS and PMOS) / Common-Emitter (NPN and PNP)



If *RS* = 0 (transistor source/emitter terminal is at signal ground):  


With *RS*, but *neglecting* *ro*:   
For MOSFET, with *RS* and *ro*:   


With body effect (MOSFET only), the gain becomes:  


2. Common-Gate (NMOS and PMOS) / Common-Base (NPN and PNP)





  
  
With body effect (MOSFET only), *gm* becomes *gm*(1+**).

3. Common-Drain (NMOS and PMOS) / Common-Collector (NPN and PNP)





MOSFET with body effect:  
*RPL* becomes *RS* // *ro* // (1/*gmb*).