

**ECE321 ELECTRONICS I**  
**FALL 2006**

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Lecture 9  
24<sup>th</sup> October, 2006



CHAPTER 4

MOS Field-Effect Transistors  
(MOSFETs)

4.3 DC Circuits (by examples: 7 exercises)

4.4 MOSFET Amplifier & Switch

4.5 Biasing

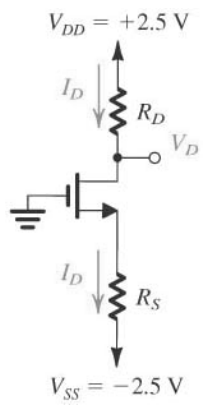


Figure 4.20 Circuit for Example 4.2.

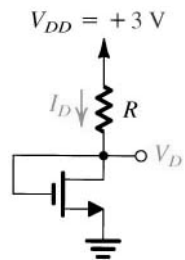


Figure 4.21 Circuit for Example 4.3.

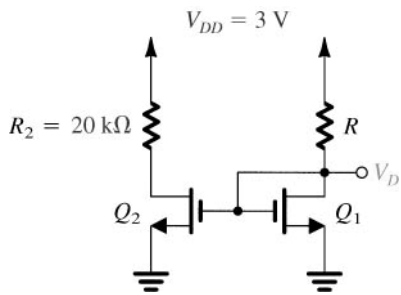


Figure E4.12

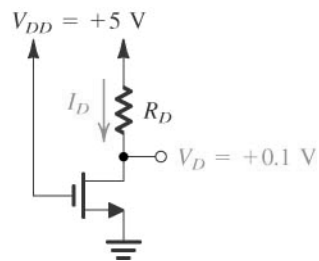


Figure 4.22 Circuit for Example 4.4.

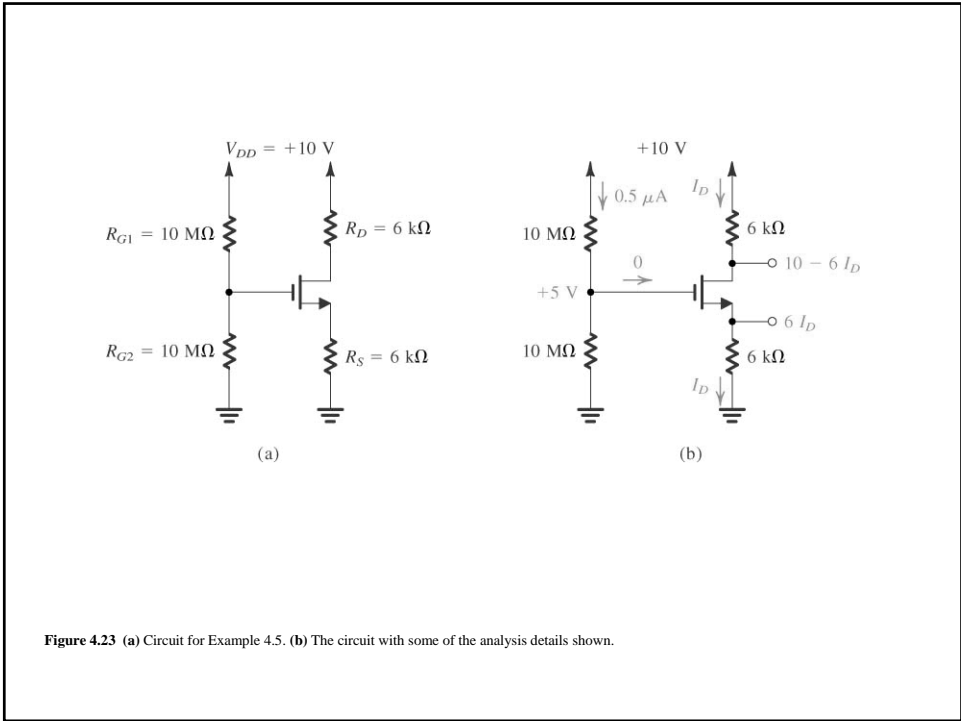


Figure 4.23 (a) Circuit for Example 4.5. (b) The circuit with some of the analysis details shown.

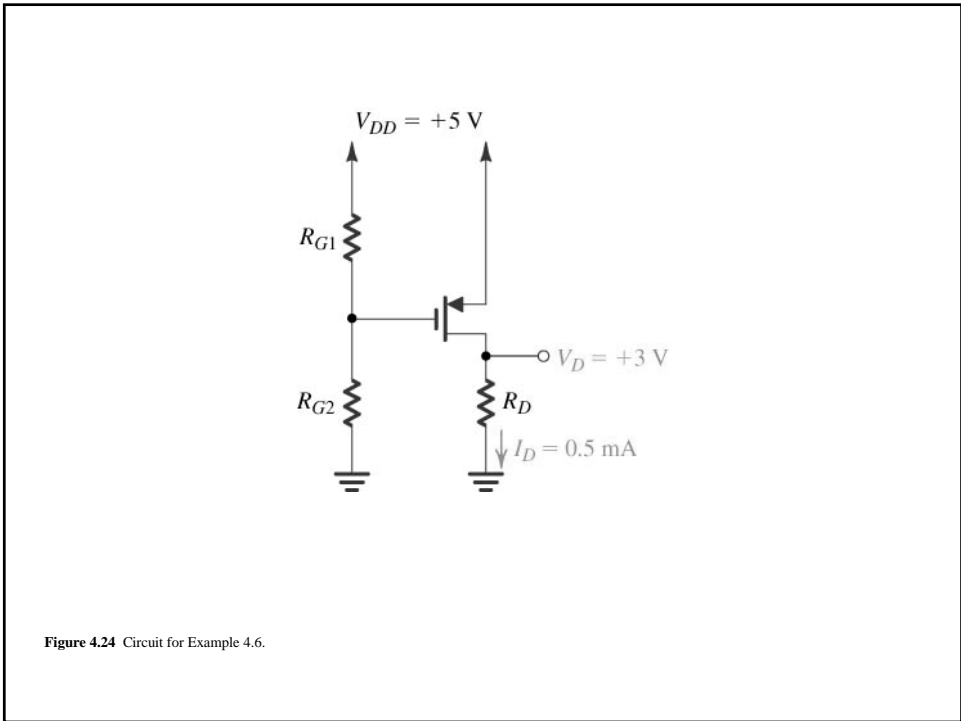


Figure 4.24 Circuit for Example 4.6.

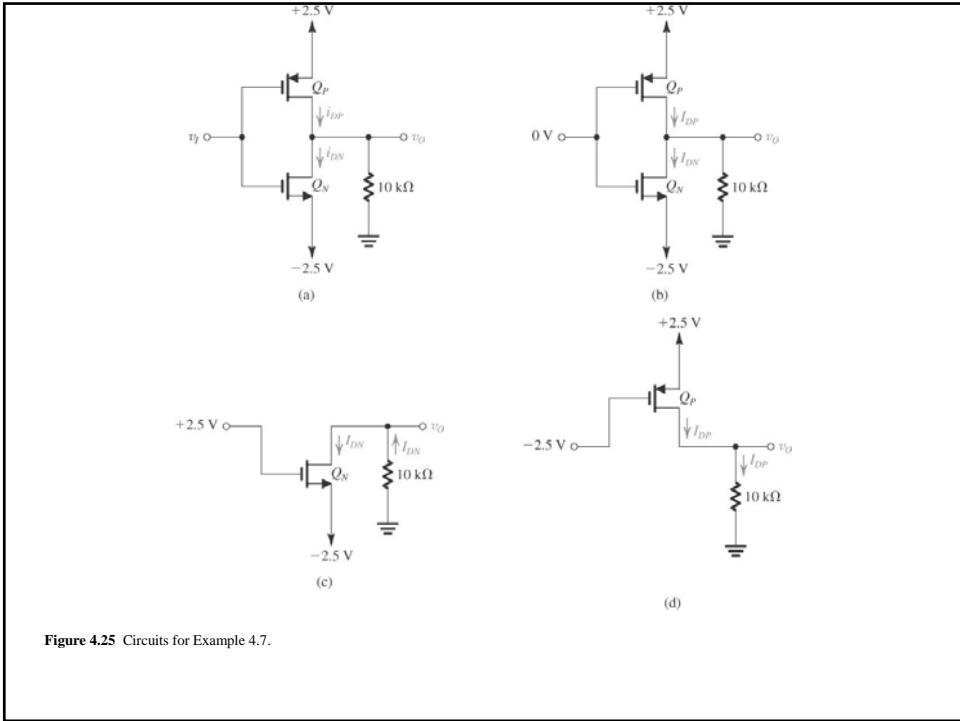


Figure 4.25 Circuits for Example 4.7.

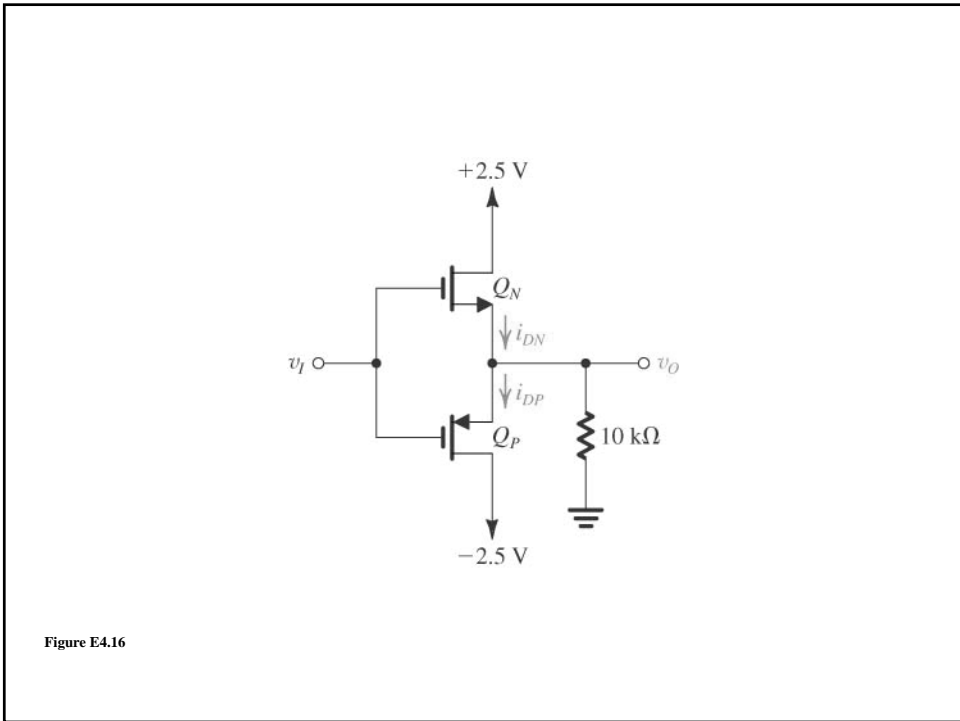


Figure E4.16

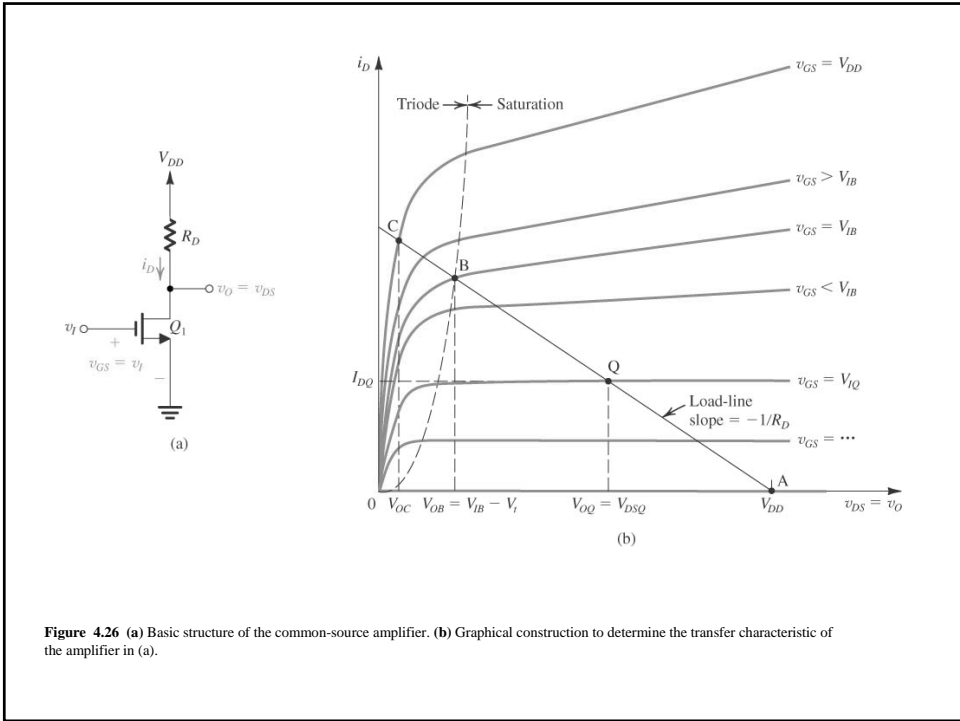


Figure 4.26 (a) Basic structure of the common-source amplifier. (b) Graphical construction to determine the transfer characteristic of the amplifier in (a).

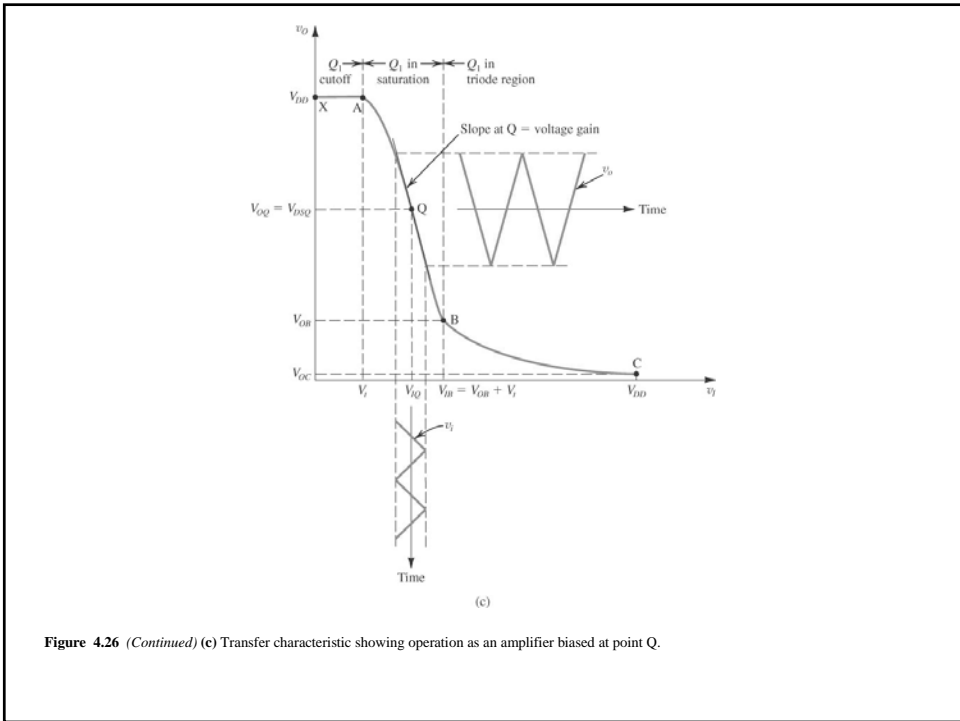
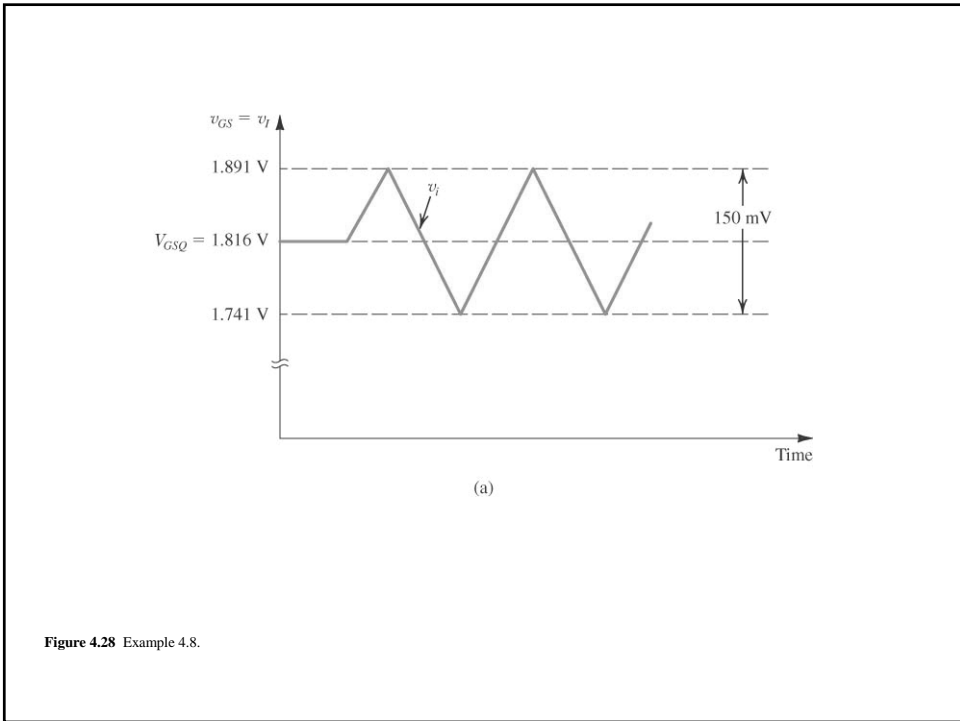
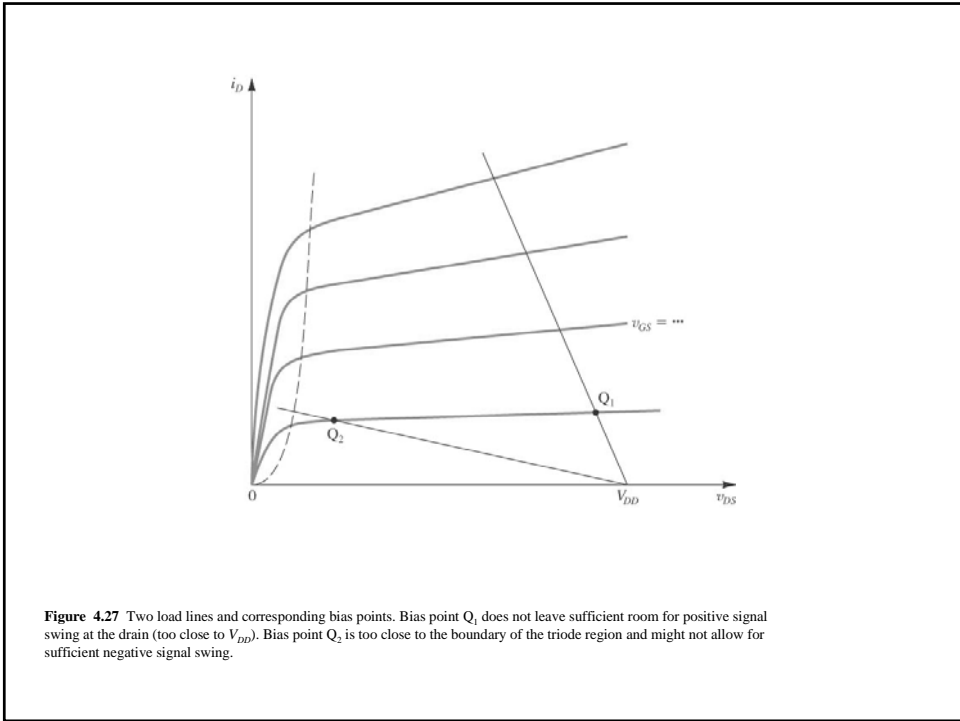


Figure 4.26 (Continued) (c) Transfer characteristic showing operation as an amplifier biased at point Q.



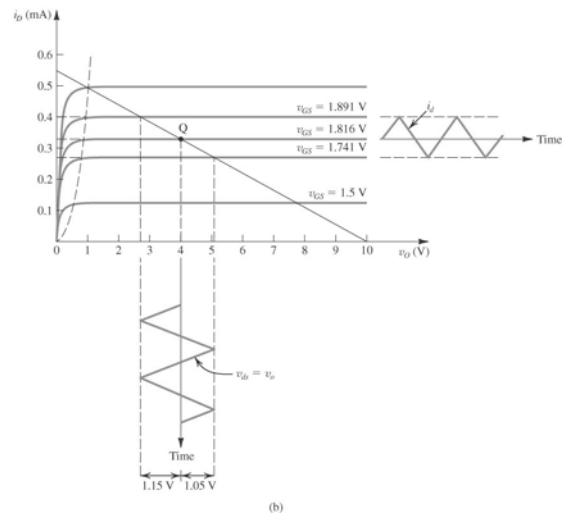


Figure 4.28 (Continued)

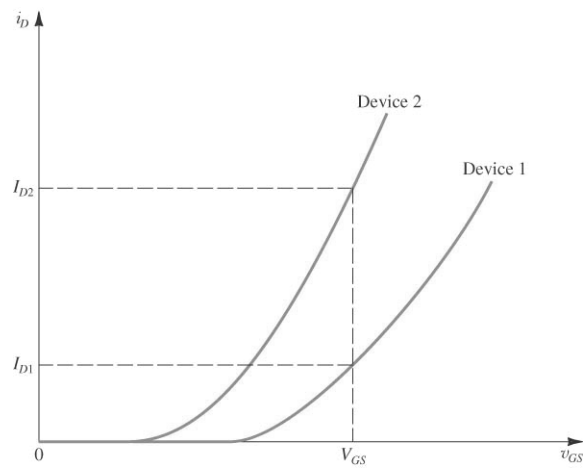
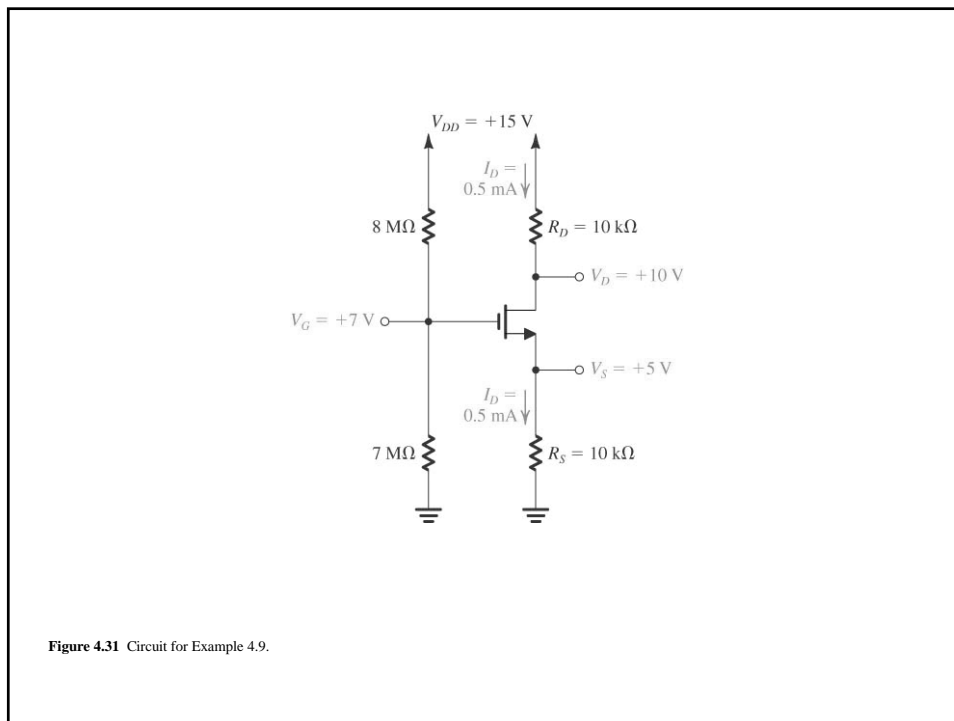
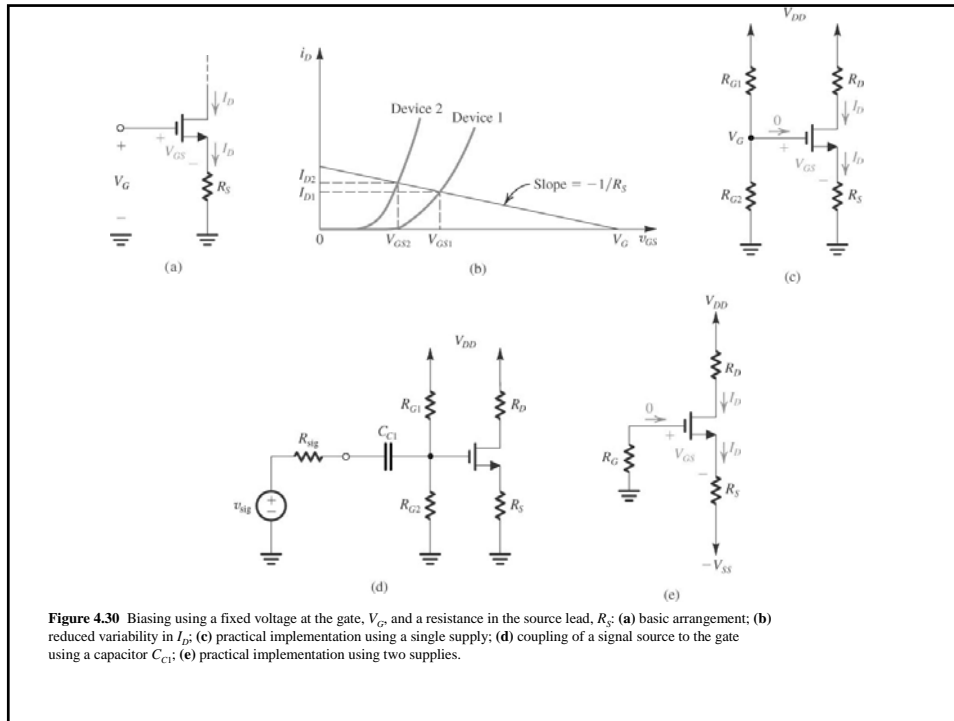


Figure 4.29 The use of fixed bias (constant  $V_{GS}$ ) can result in a large variability in the value of  $I_D$ . Devices 1 and 2 represent extremes among units of the same type.





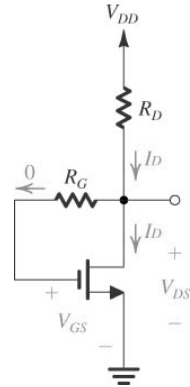


Figure 4.32 Biasing the MOSFET using a large drain-to-gate feedback resistance,  $R_G$ .

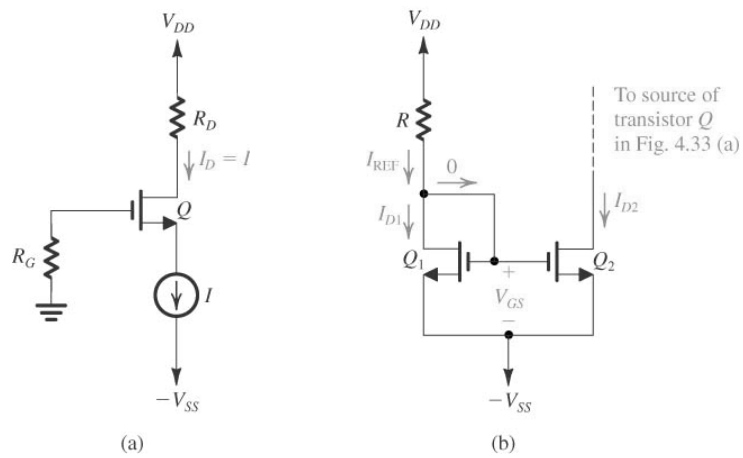


Figure 4.33 (a) Biasing the MOSFET using a constant-current source  $I$ . (b) Implementation of the constant-current source  $I$  using a current mirror.