Highlights of *Fundamentals of Microelectronics*

Jaeho Lee

March 17, 2022

1 Introduction to Microelectronics

Voltage Gain

Voltage gain A_v in a voltage amplifier:

$$A_v = \frac{v_{\text{out}}}{v_{\text{in}}}. \tag{1}$$

Expressed in decibels (dB):

$$A_v|_{\text{dB}} = 20 \log \frac{v_{\text{out}}}{v_{\text{in}}}. \tag{2}$$

Kirchoff's Laws

The Kirchoff Current Law (KCL). The sum of all currents flowing *into* a node is zero:

$$\sum_j I_j = 0. \tag{3}$$

The Kirchoff Voltage Law (KVL). The sum of voltage drops around any closed loop in a circuit is zero:

$$\sum_j V_j = 0. \tag{4}$$

Thevenin and Norton Equivalents

Thevenin's theorem. A linear one-port network can be replaced with a voltage source in series with an impedance. The *equivalent voltage* v_{Thev} can be calculated by leaving the port open; The *equivalent impedance* Z_{Thev} can be determined by setting all independent voltage and current sources to zero.

Norton's theorem. A linear one-port network can be replaced with a current source in parallel with an impedance. The *equivalent current* i_{Nor} can be obtained by shorting the port; The *equivalent impedance* Z_{Nor} can be determined by setting all independent voltage and current sources to zero.

Note that $Z_{\text{Thev}} = Z_{\text{Nor}}$.

2 Basic Physics of Semiconductors

Lorem Ipsum

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.