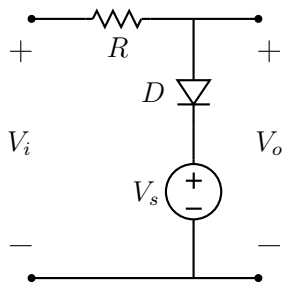
ee101_diode_clipper_1.sqproj



In the shunt clipper circuit shown in the figure, V_s is a DC voltage. The diode conducts if $V_i > V_s + V_{\text{on}}$, where $V_{\text{on}} \approx 0.7\,V$ for a silicon diode. In this case, the output voltage is constant, $V_o = V_s + V_{\text{on}}$. For $V_i < V_s + V_{\text{on}}$, the diode does not conduct, there is no voltage drop across R, and $V_o = V_i$.

The V_o versus V_i characteristic for this circuit can be obtained by

(a) applying a DC voltage at the input, varying it from V_{start} to V_{end}, and plotting V_o versus V_i, or

(b) applying a periodic input voltage (say, a sinusoidal or triangular voltage), simulating for one cycle, and then plotting $V_o(t)$ versus $V_i(t)$.

Exercise Set

1. For $-5\,V < V_i < +5\,V$, sketch V_o versus V_i for $R = 1\,\text{k}\Omega$ and $V_s = +2,\ 0,\ -2\,V$. Verify your result by simulation in each case.

2. Sketch $V_o(t)$ for the three cases in (1) if $V_i(t)$ is a triangular voltage going from $-5\,V$ to $+5\,V$, with frequency $f = 100\,\text{Hz}$. Verify by simulation.