Silicon Diode Characteristics

Silicon Diode Characteristics

- **Lab objectives**
  - **Characterize I-V characteristics of pn rectifier diode and Zener diode**
  - **Characterize both forward and reverse biased diode characteristics**
  - **Become familiar with the actual diode characteristics of real diodes**

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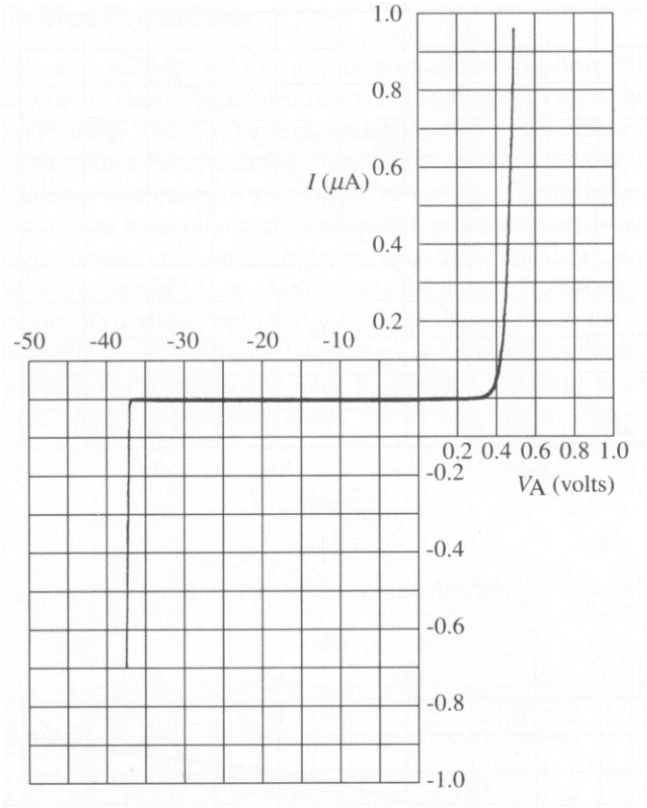
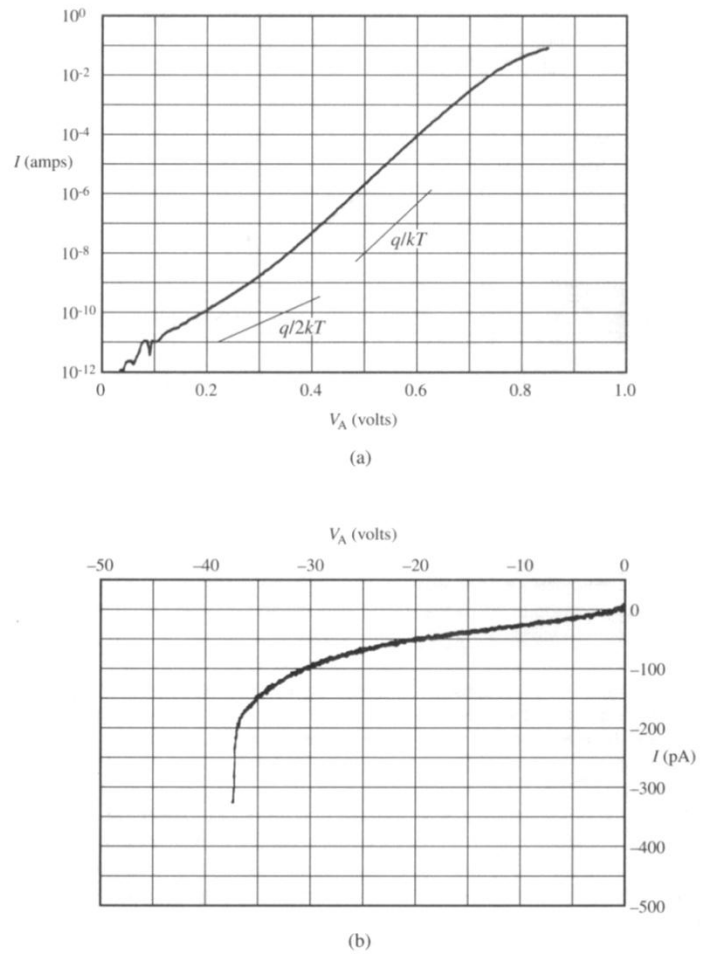
- **Diodes exhibit different behavior during forward voltage**
  - **Recombination controls behavior at lower voltages (n ~ 1.5 to 2.0)**
  - **Diffusion then controls behavior at intermediate voltages (n ~ 1.0)**
  - **Finally high-level injection controls behavior at high voltages (n ~ 2.0)**
  - **Ohmic effects eventually turn over diode characteristics at even higher voltages and extremely high currents**
- **Reverse bias also generates gradually increasing current at increasing reversed bias**
  - **Depletion width increases with increasing reversed bias**
  - **Increases generation current with increasing bias**

Silicon Diode Characteristics





Linear (left) and semilogarithimic (right) plots of I-V characteristics of a commercially available Si pn junction diode.

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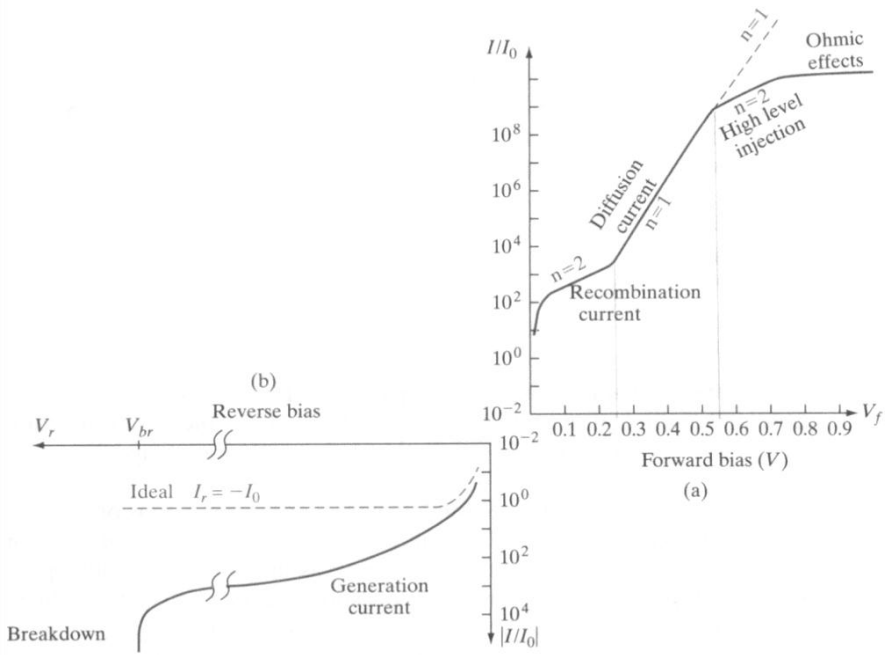

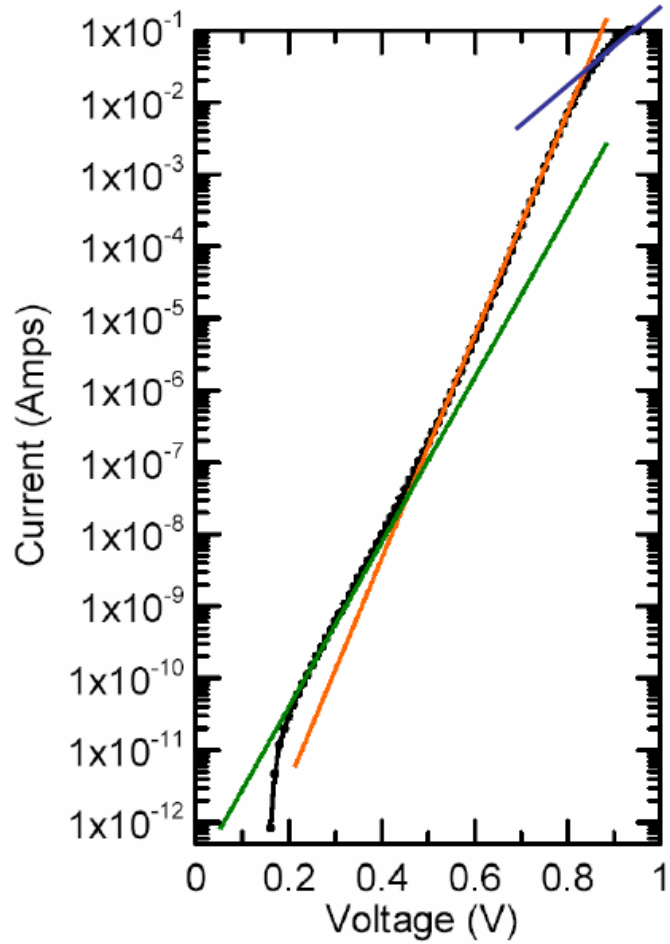

Forward and reversed biased semilogarithmic plots of a real diode showing various operating regimes (left) and semilogarithimic plot (right) of an I-V characteristic for a forward biased diode.

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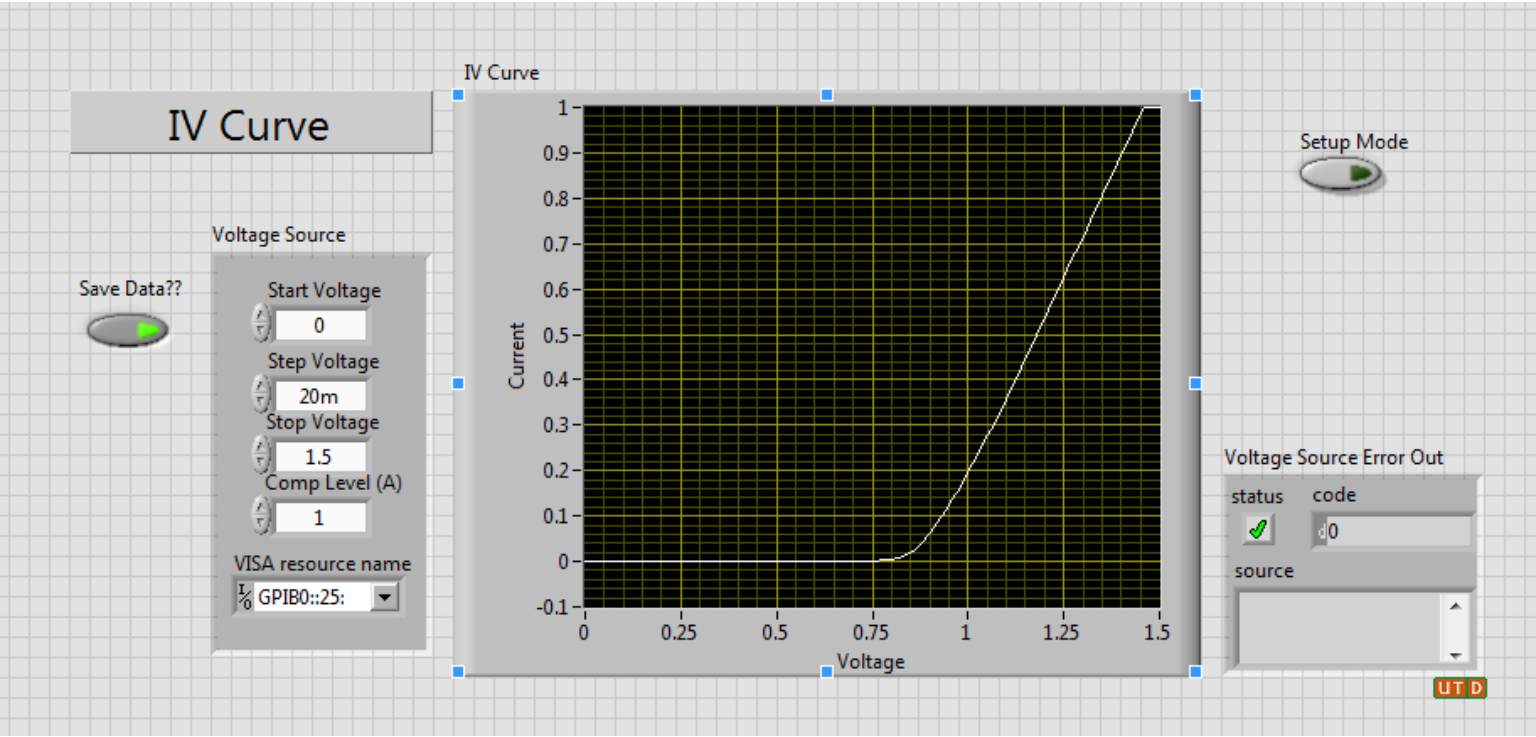
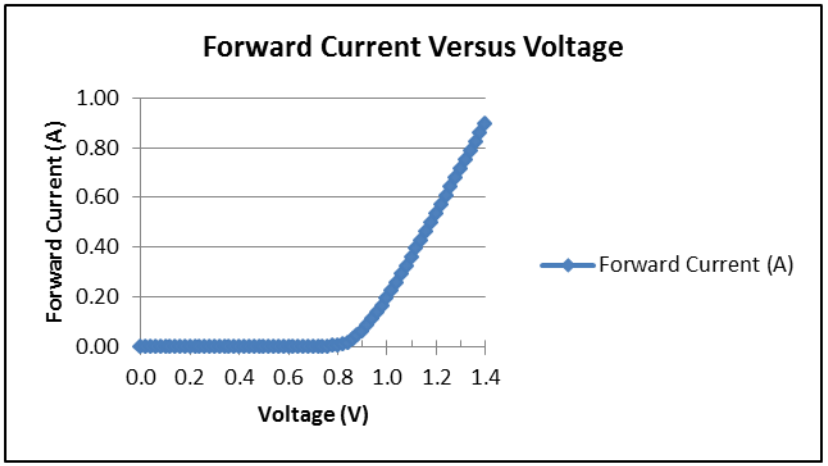
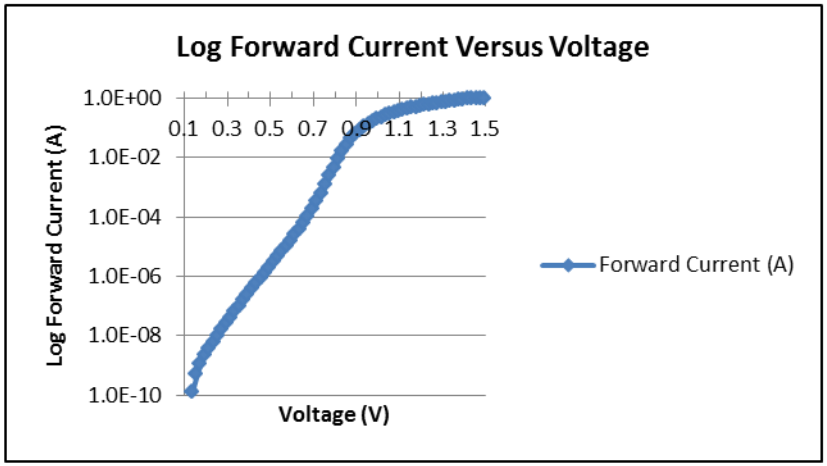
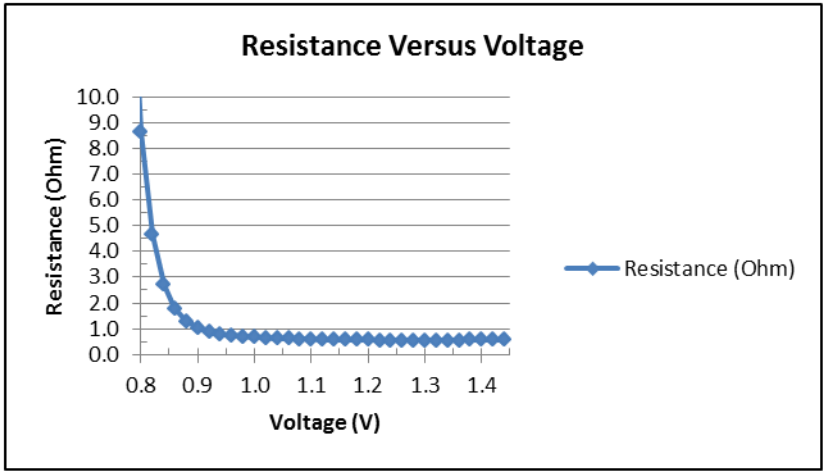


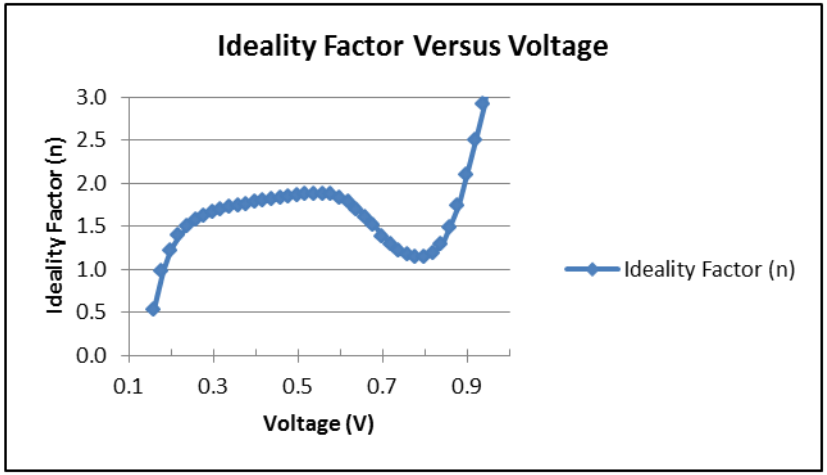
Forward biased test configuration for Zener diode.

Silicon Diode Characteristics



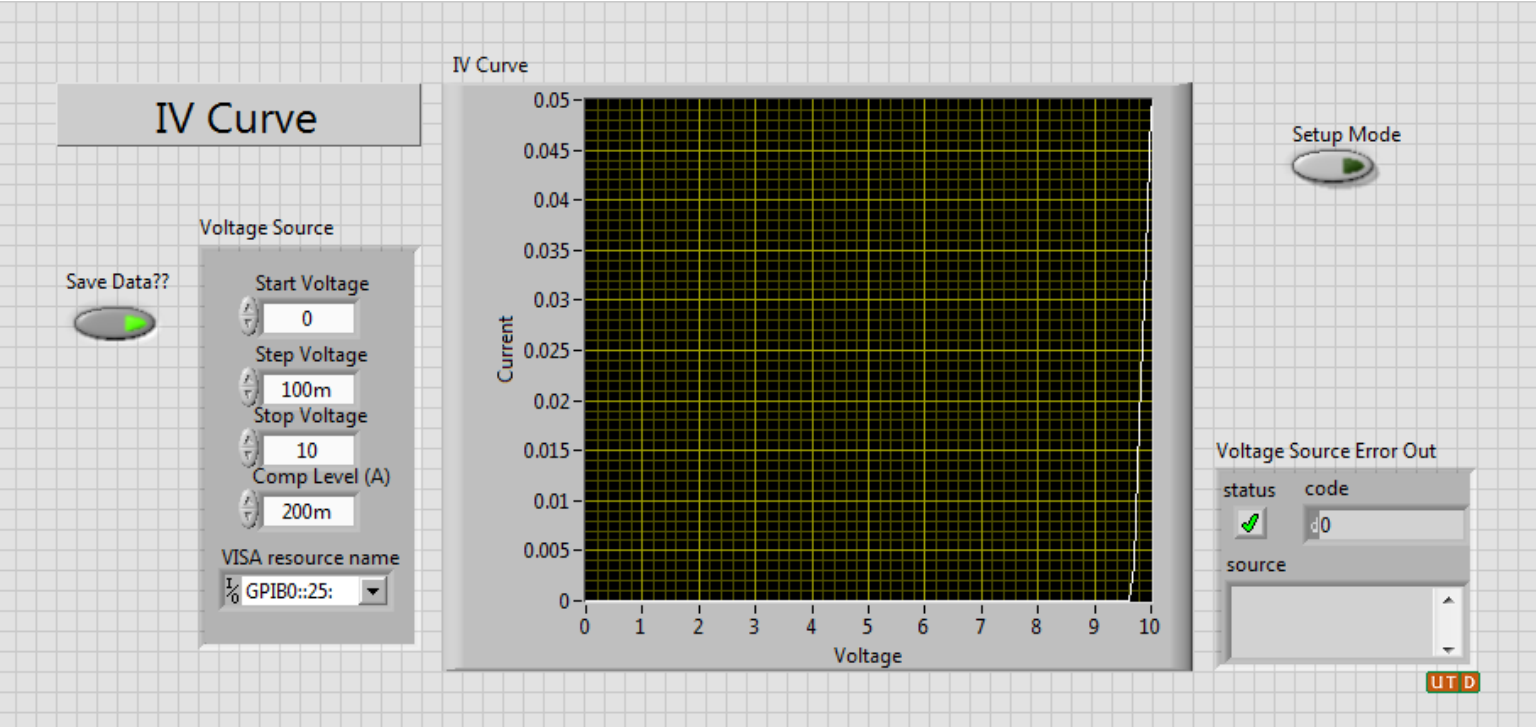






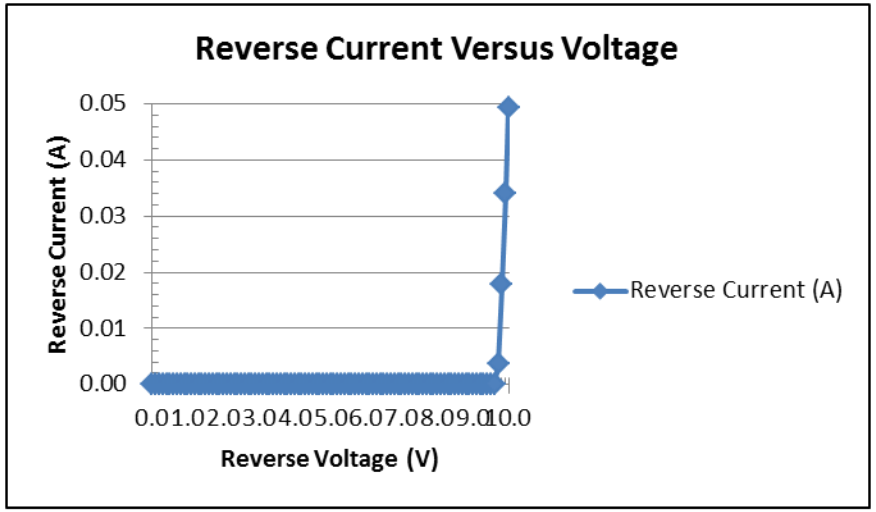
Forward I-V characteristics and ideality factors and resistances for Zener diode.

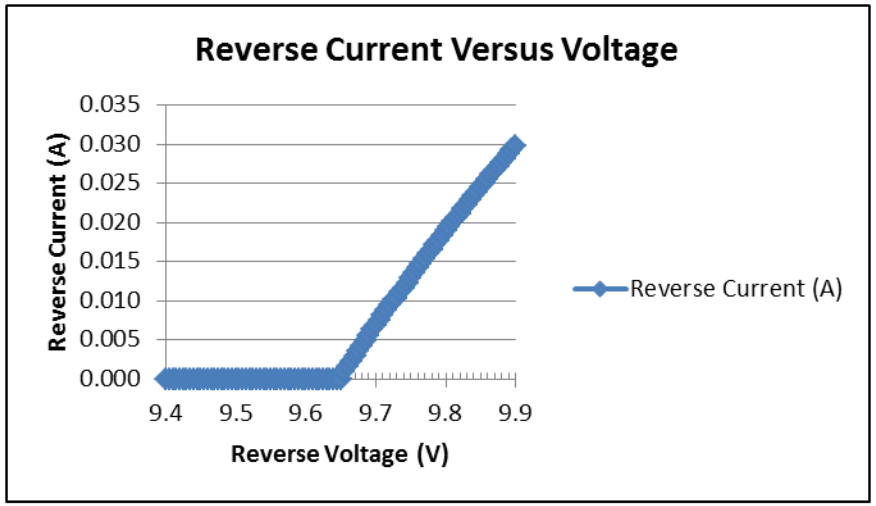
Silicon Diode Characteristics



Reverse biased test configuration for Zener diode.

Silicon Diode Characteristics





Reverse bias diode characteristics for Zener diode.