

**“DISPOSITIVI ELETTRONICI”  
FACOLTÀ DI INGEGNERIA – UNIVERSITÀ DI PARMA**

**ILAB ASSIGNMENT #1  
P-N DIODE CHARACTERIZATION AND MODELING**

**MARCH 29, 2006**

- 1. Measure the diode's I-V curve between  $V_{AK} = -2$  V and  $V_{AK} = 0.7$  V.** Choose a VAR1 measurement step small enough to show a smooth curve but large enough not to make the measurement unnecessarily slow. Try different combinations of VAR1 mode (V or I) and sweep (linear or log) and choose the optimum set-up for either linear or semi-log I-V plots.
- 2. Measure the diode's I-V curve with finer resolution in specific portions of the range** (e.g., in the vicinity of  $V_{AK} = 0$ ).
- 3. Extract the values of the saturation current  $I_s$  and ideality factor  $n$  from the forward-bias I-V curve** (using the measured data and a spreadsheet).
- 4. Calculate the diode's I-V curve using the extracted values and compare the modeled I-V with the measured one.** What is the main reason for the discrepancy at large currents? How does the model match the measurement under reverse bias, and why is there a difference?
- 5. Add a series resistance  $R_s$  in series with the diode to improve the model, extract the optimum  $R_s$  value, and compare the improved model with the measurement.**

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