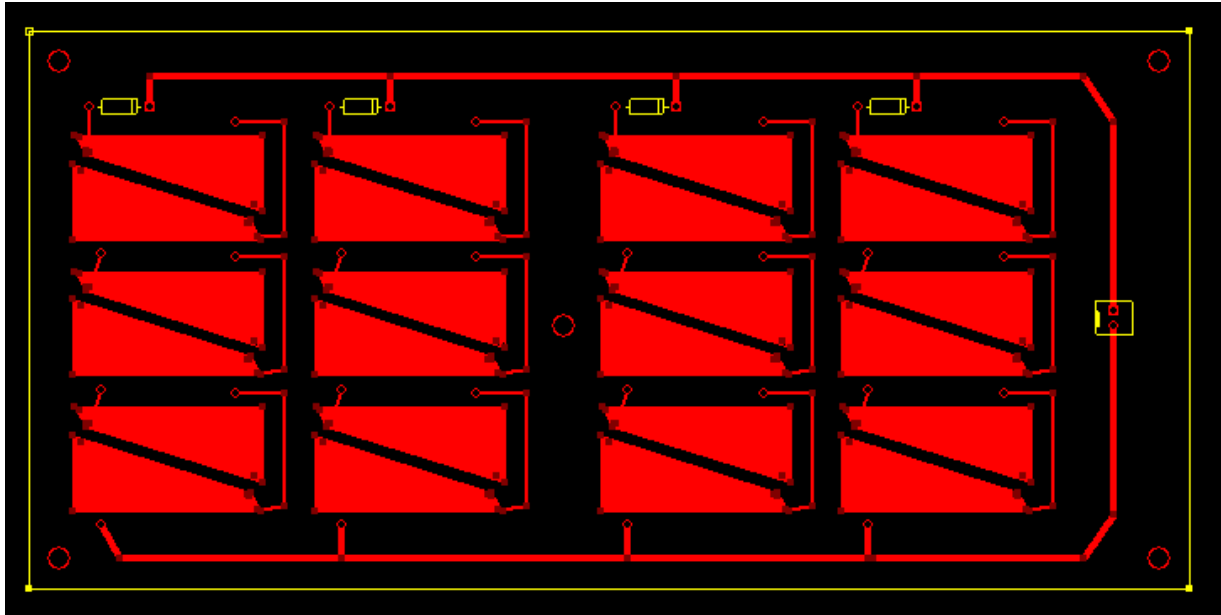
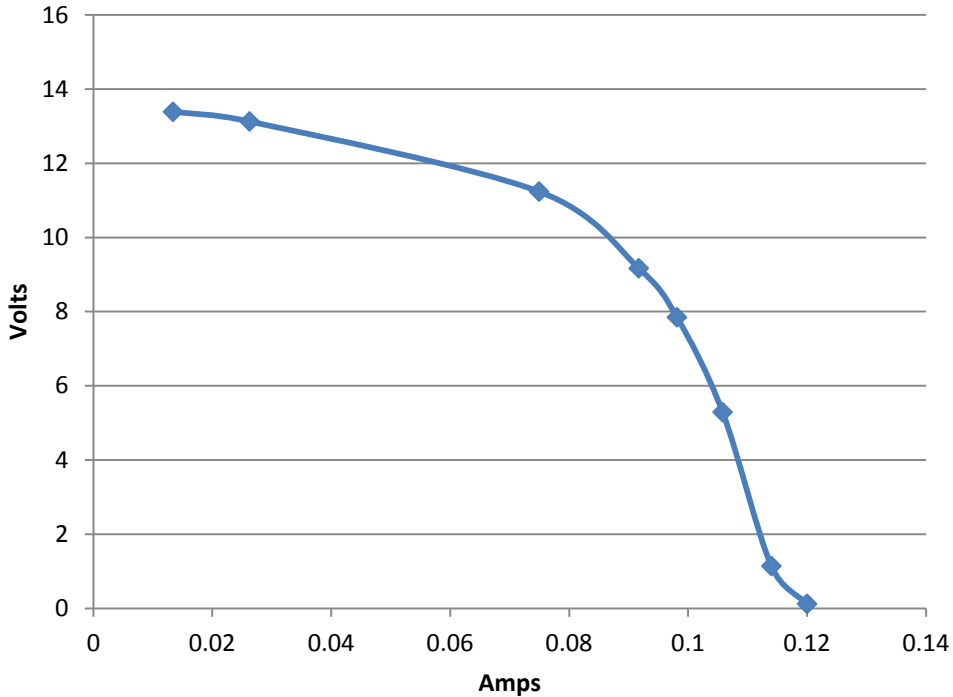
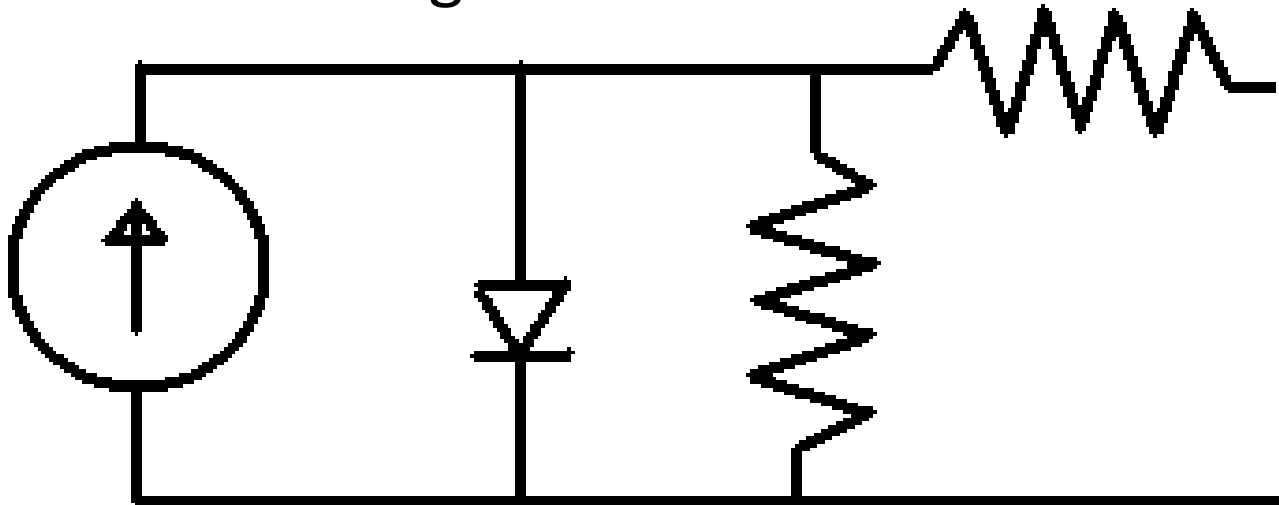


New Solar Panel IV Curve

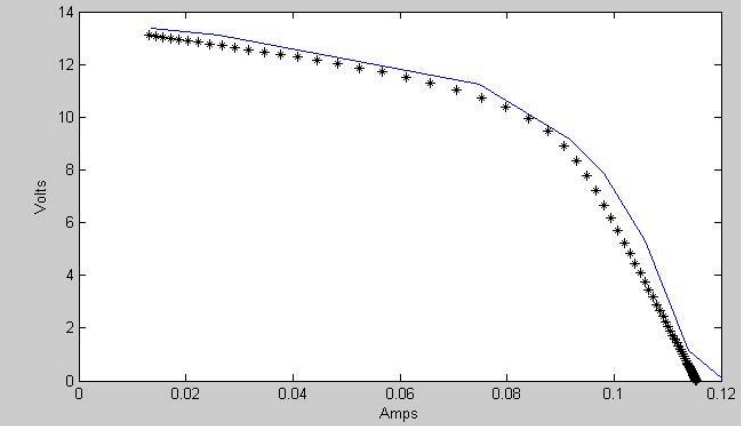
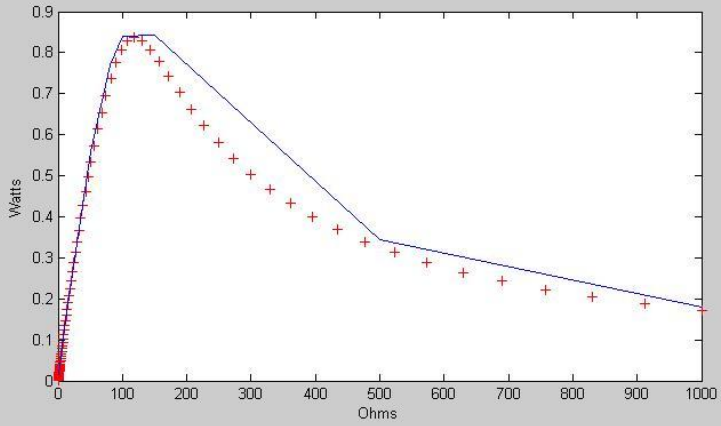
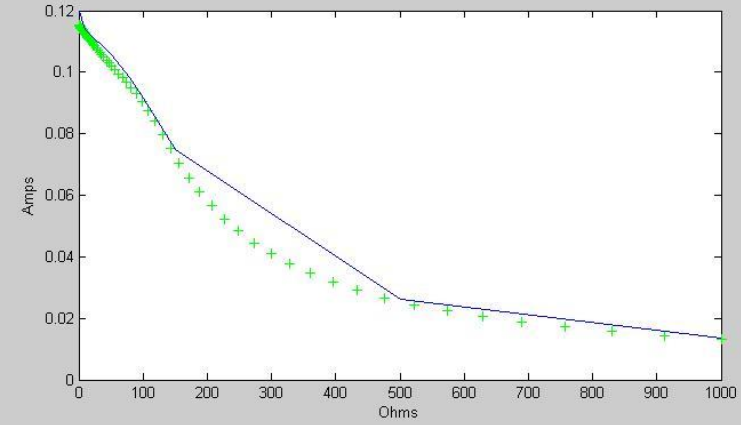
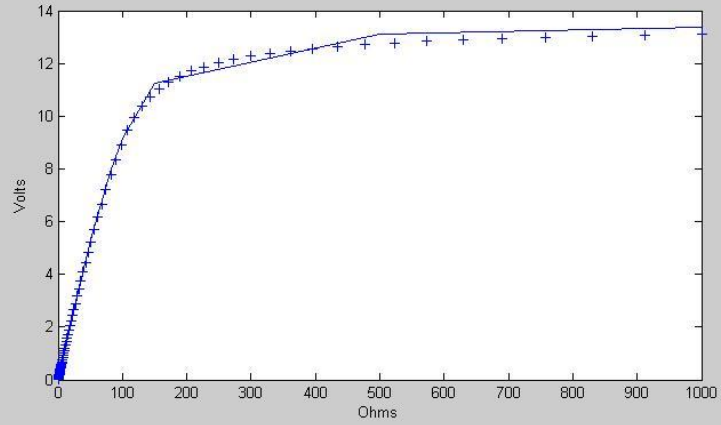
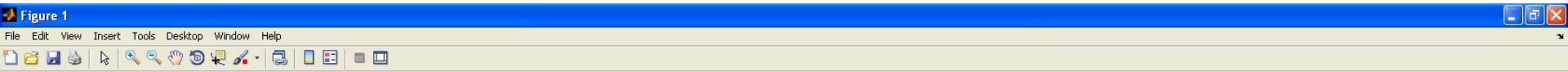


Solar Cell Model

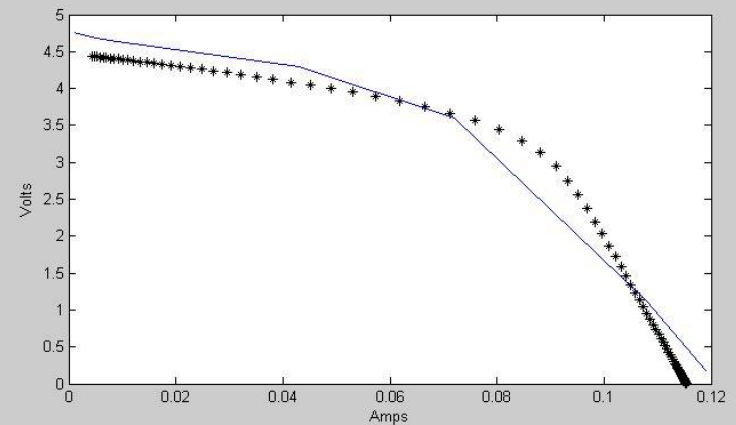
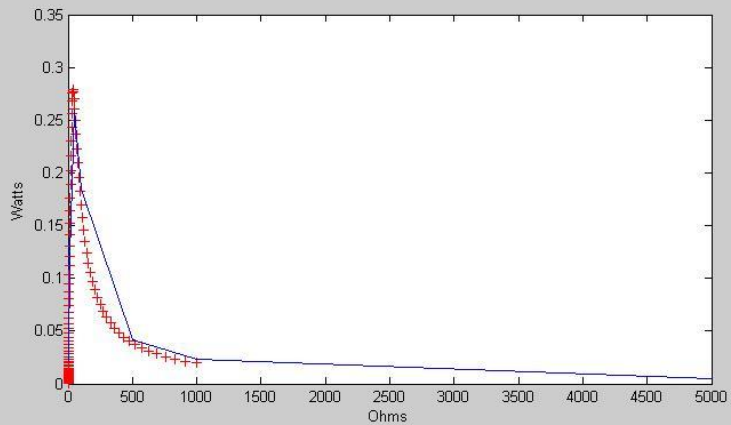
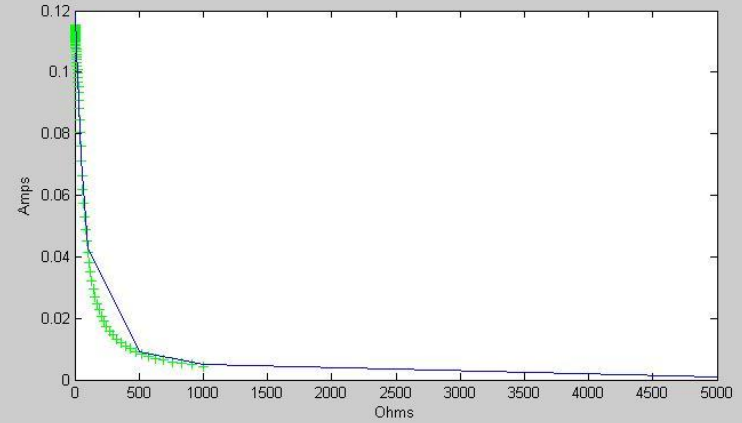
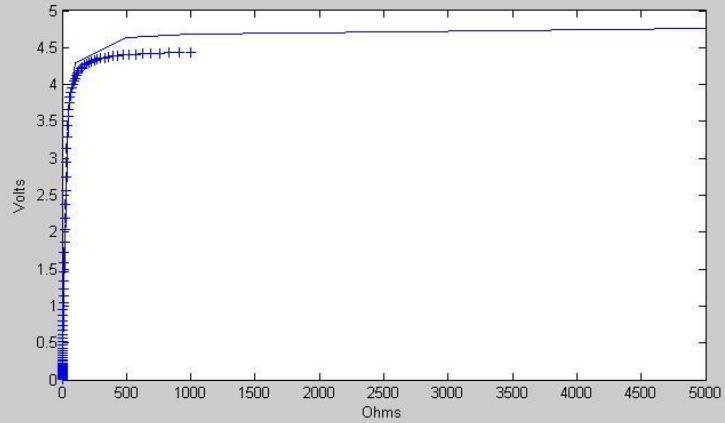
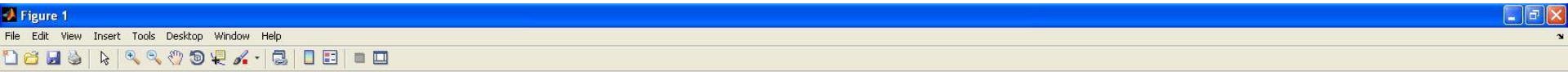
A single TASC cell:



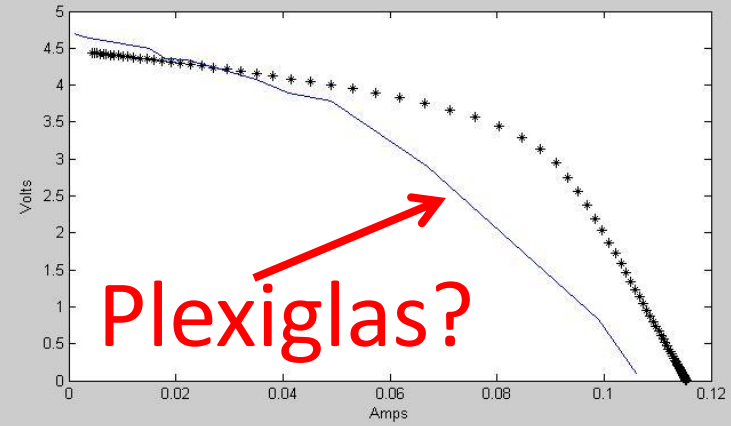
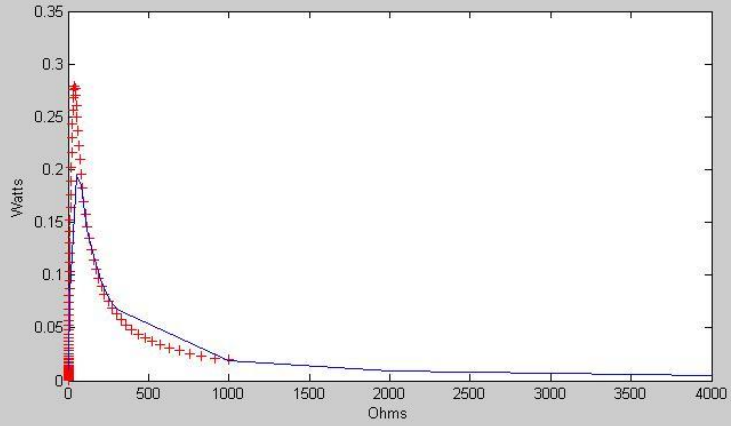
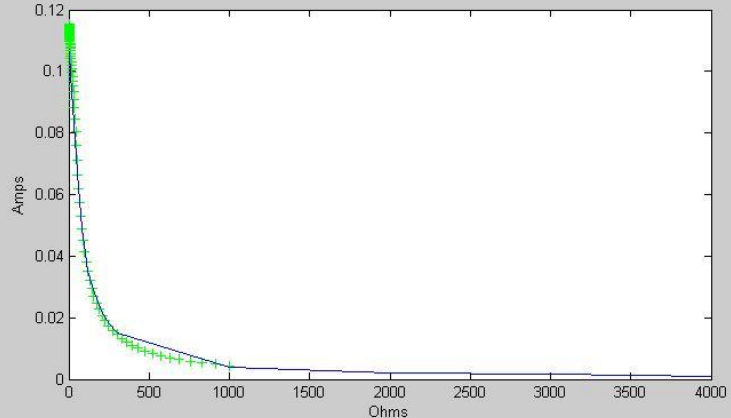
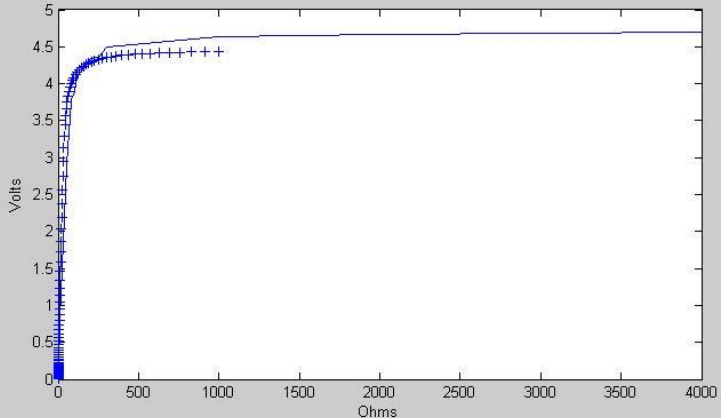
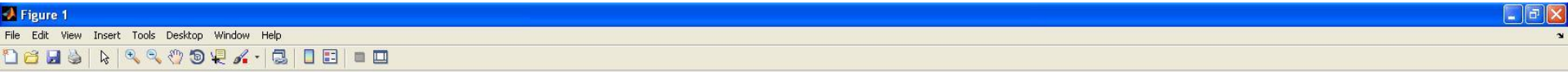
IV Curves: Real vs. Model (6x4)



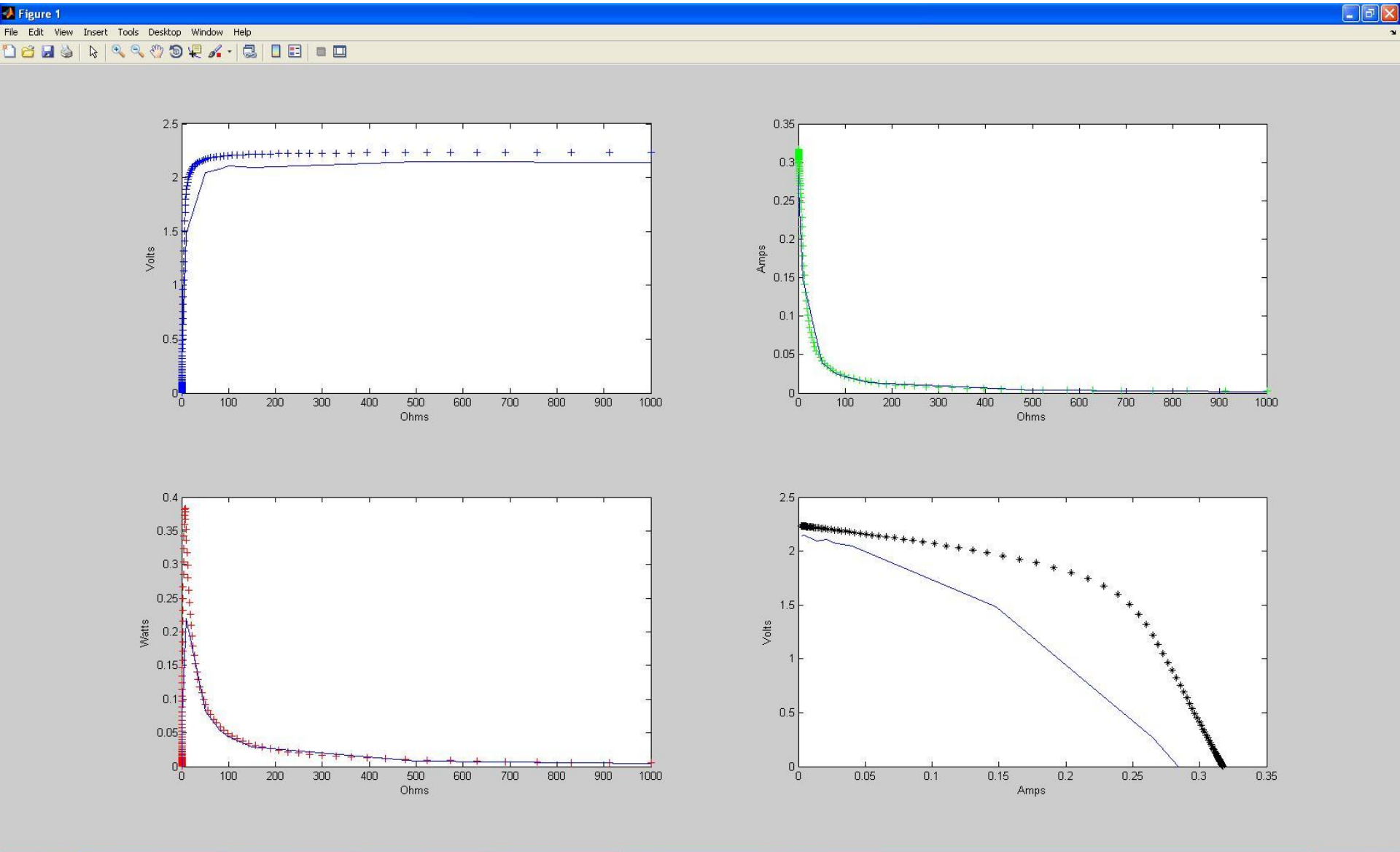
IV Curves: Real vs. Model (2x4)



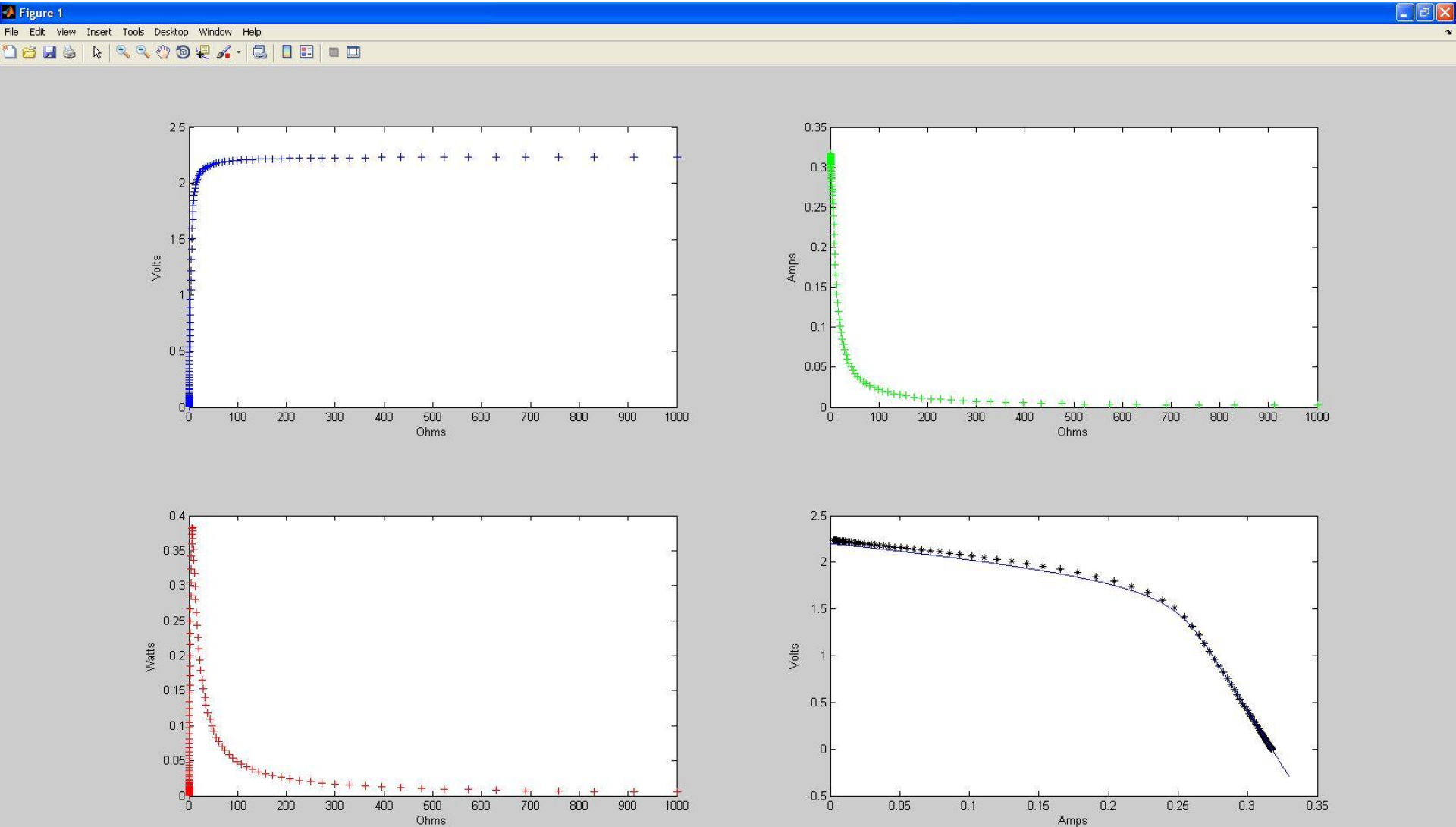
IV Curves: Real vs. Model (2x4)



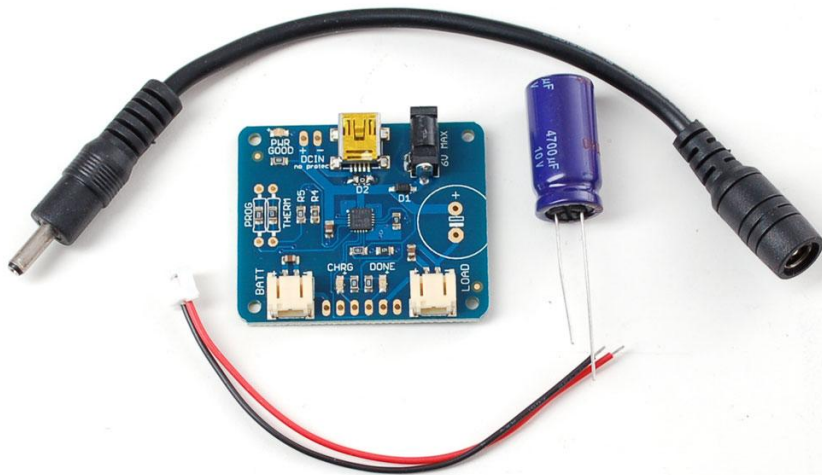
IV Curves: Real vs. Model (1x11)



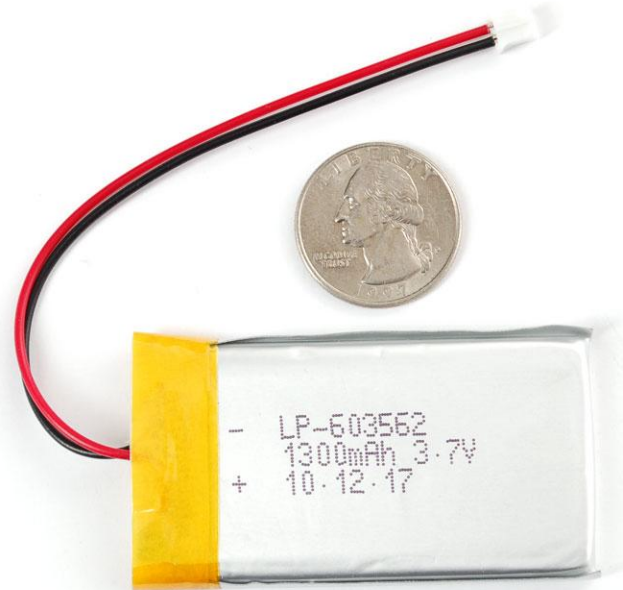
IV Curves: LTspice vs. Matlab (1x11)



Adafruit Charger and Li-ion battery

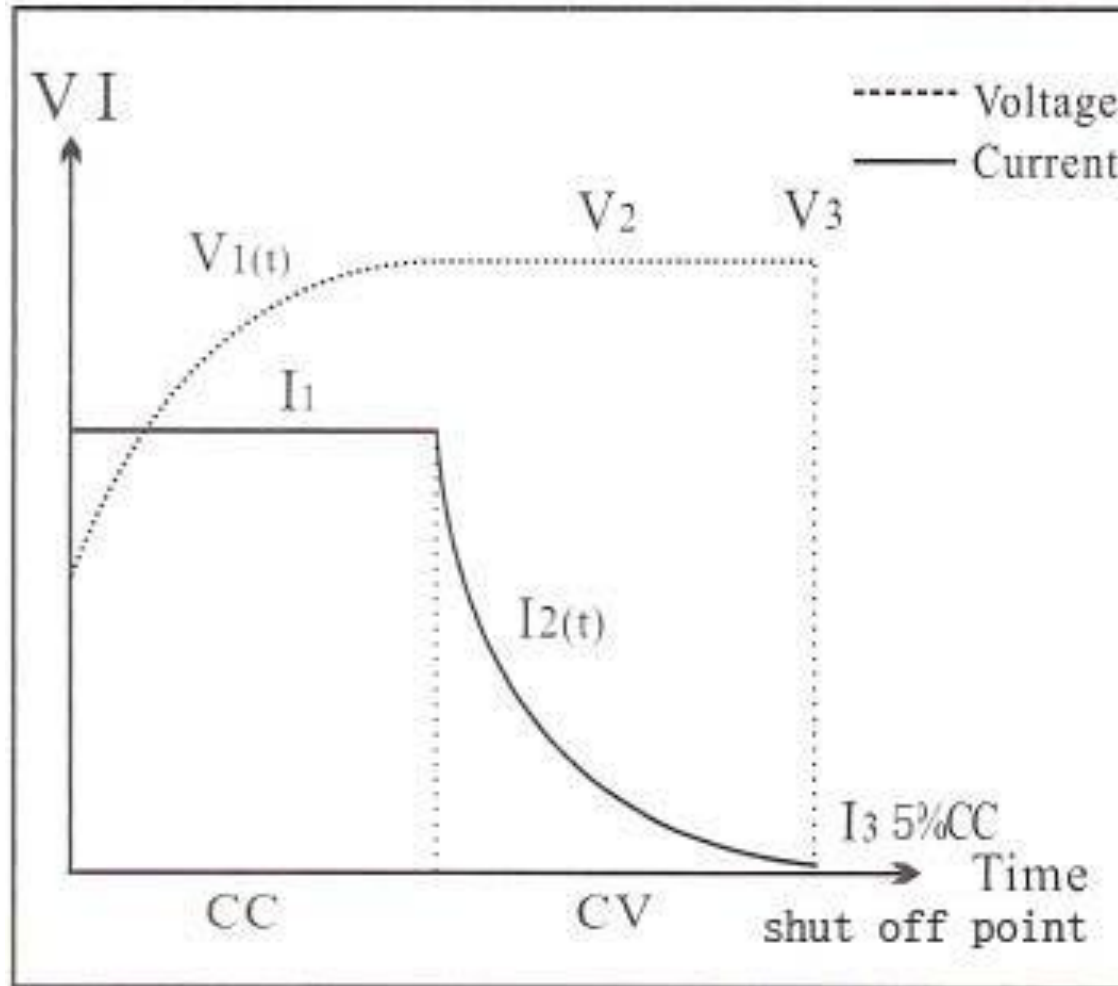


http://www.adafruit.com/index.php?main_page=popup_image&pID=390



http://www.adafruit.com/index.php?main_page=popup_image&pID=258

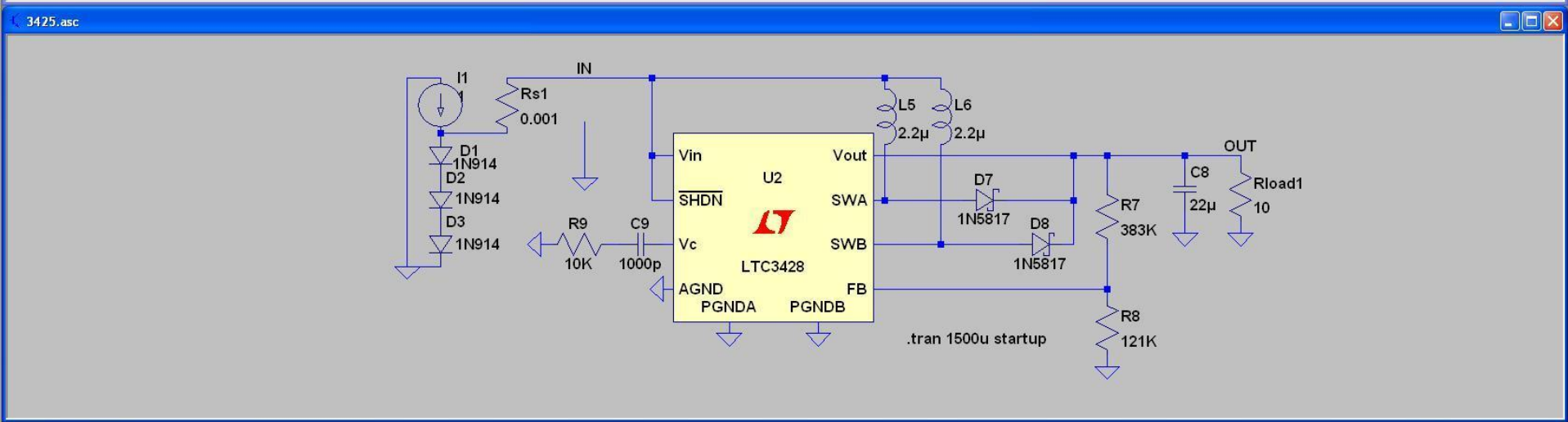
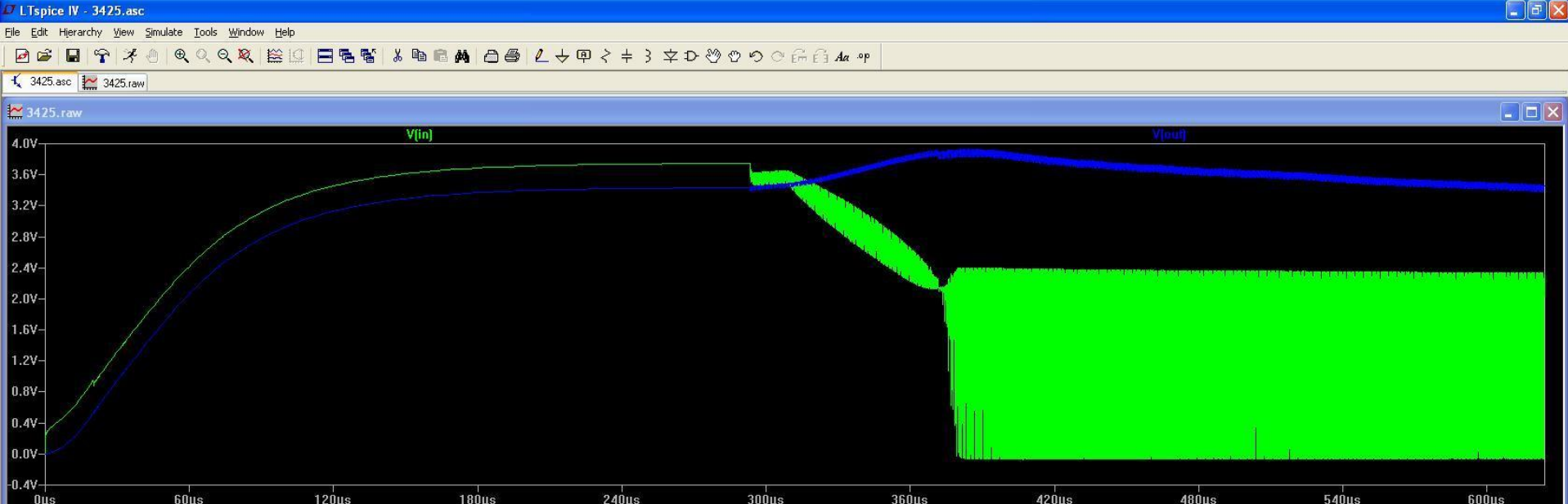
Li-ion charging curve



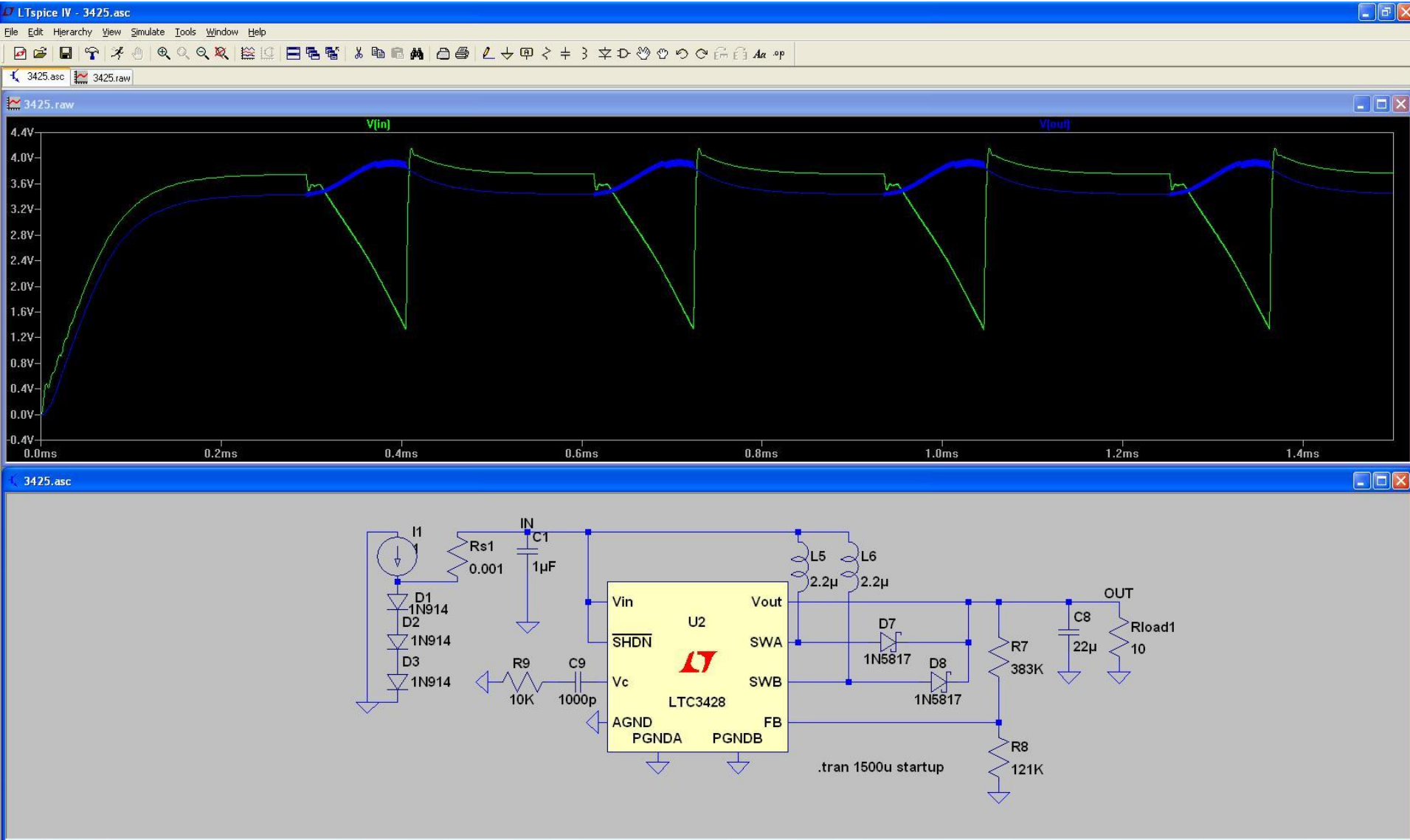
Charge Controller Modes

- Not charging – $P_{\text{solar}} < P_{\text{solar, min}}$
- Low voltage disconnect – $V_{\text{bat}} < V_{\text{min}}$
- Constant current – $P_{\text{solar}} > P_{\text{bat}}$ & $V_{\text{bat}} < V_{\text{charged}}$
- Constant voltage – $P_{\text{solar}} > P_{\text{bat}}$ & $V_{\text{bat}} \approx V_{\text{charged}}$
- Maximum Power Point Tracking (MPPT) – $P_{\text{solar}} < P_{\text{max, bat}}$

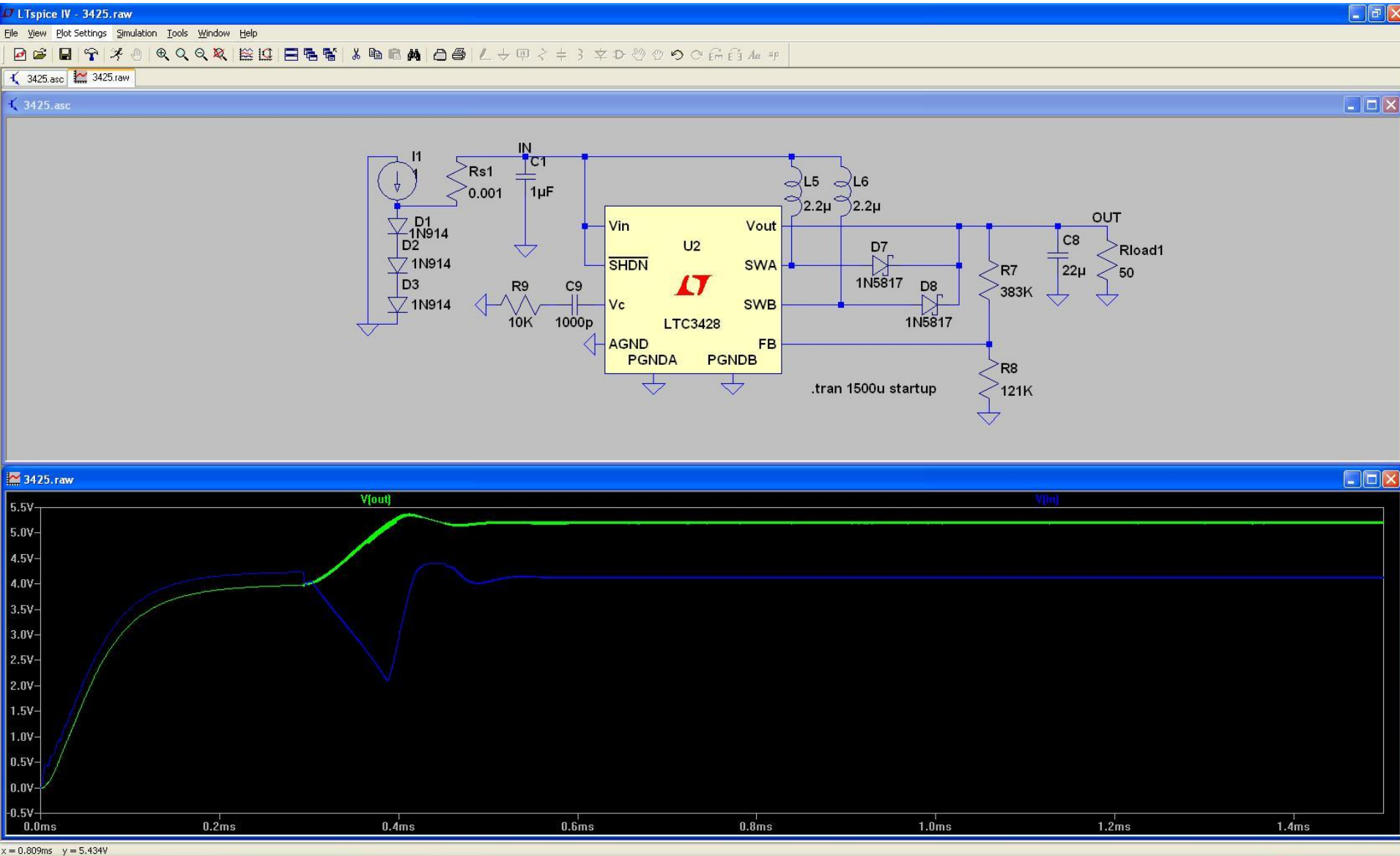
Solar Panel & DC/DC converter



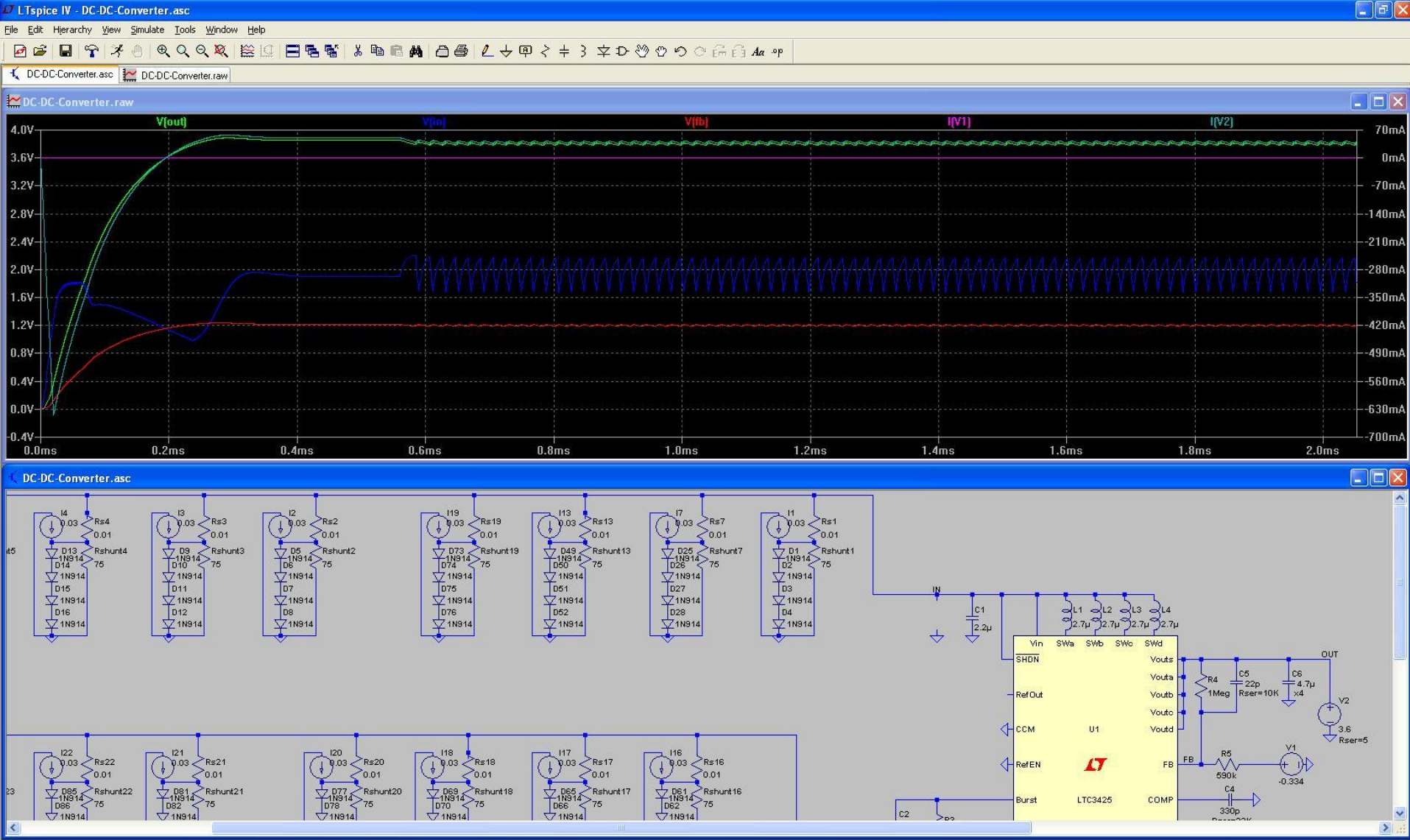
Add a capacitor



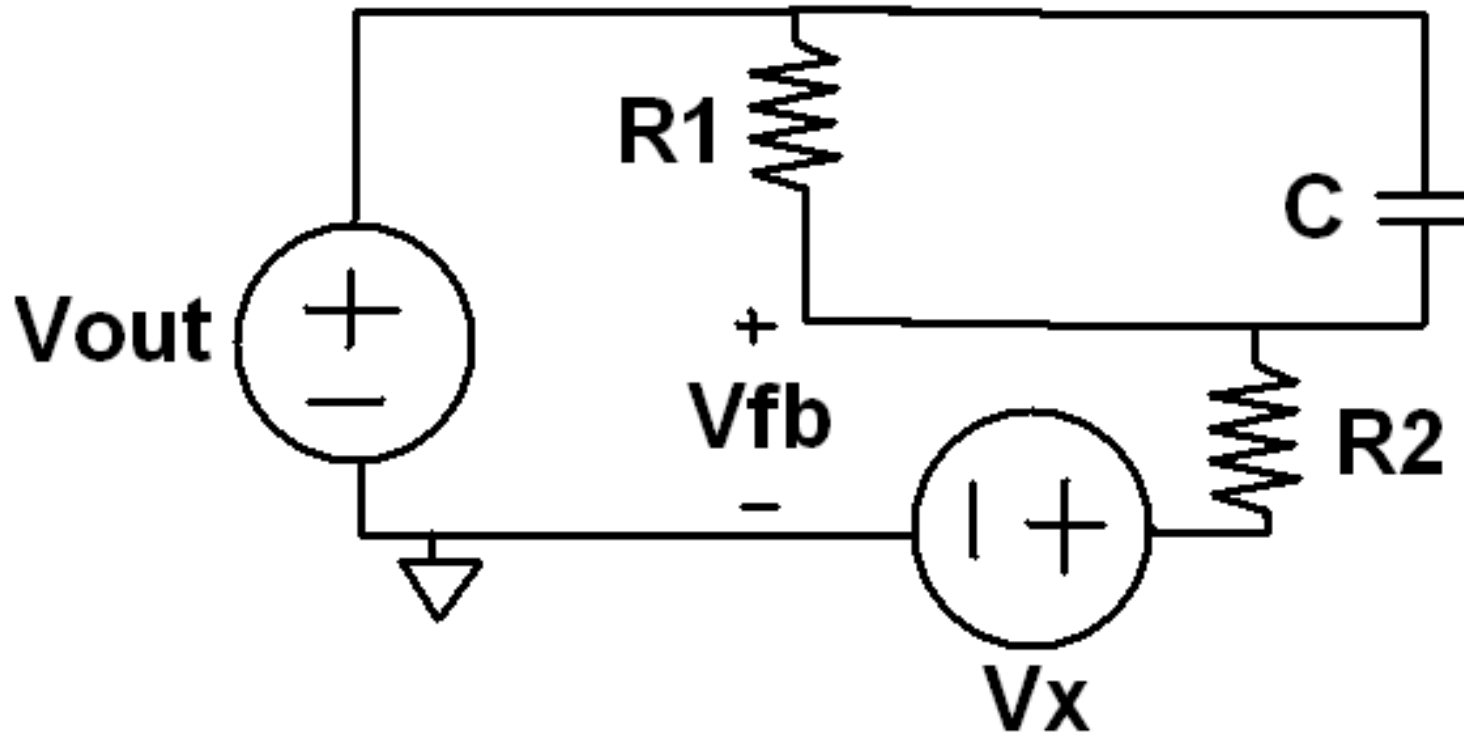
$$P_{\text{solar}} > V_{\text{out}}^2 / R_{\text{load}}$$



Charging a battery



Controlling converter output



$$V_{out} = V_{fb,target} \frac{R1+R2}{R2} - V_x$$

Digital to analog converter

