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ENGR460

Power Project Stepping Stone 4

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**Project Overview**

I will be constructing a wireless charger that uses a 5V Solar Panel and 5V Samsung Wireless charger to charge a lithium-ion battery. The charger will have a 5V booster converter and lip protection built alongside it. These are the 3 main components of the project circuit board:

Lithium Ion Battery Charger

LTC4052EMS8E

The LTC4052 takes the voltage from the solar panel and charges Lipo battery

<https://www.analog.com/media/en/technical-documentation/data-sheets/405242f.pdf>

5V Booster Converter

LTC3440EMS

LTC3440 converts the 3.7 voltage output of the lipo to 5V for the USB charger.

<https://www.analog.com/media/en/technical-documentation/data-sheets/3440fd.pdf>

Lipo Protection

S-8261 and DMG6968UDM

The two ICs add additional protection to conditions like overvolt, undervoltage, overcharge and overcurrent.

<https://www.ablic.com/en/doc/datasheet/battery_protection/S8261_E.pdf>

<https://www.diodes.com/assets/Datasheets/ds31758.pdf>

**Pre-Planning**

* Fill out the Academic Exception Form to campus so I can use the project lab to build my board
* Prepare workspace to test board when it is finished being assembled

**Initial Procedure**

* Confirm all parts have been delivered
* Examine PCB for any faults or defects from shipping or manufacture

**Assembly of PCB**

* Apply solder paste with stencil
* Pick and place the SMD parts
* Bake the PCB using the project labs oven
* Check ICs after baking in case of shorts or any potential unflowed solder
* Hand Solder through-hole parts
* Check for shorts using multimeter

**Testing of the Battery Charger**

A screenshot of a cell phone

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* Test that the solar panel is able to the charge the battery:
  + D1 and D2 LEDs will indicate that it’s charging
  + D1 (AC present) shows that power is present
  + D2 shows that charging is indeed taking place
* Test the output current: making sure it doesn’t exceed 750mA
* Test the thermal protection that is on the IC: circuit will turn off if the temperature exceeds 140 degrees Celsius.

**Testing of the Booster Converter**

A close up of a map

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* We want to verify the 5V output via testing point 2 (TP2)
* Test efficiency using the waveform graphs from Linear Technology

A screenshot of a cell phone

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**Testing of the Lipo Protection**

A close up of a map

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* Test for undervoltage as the charging IC comes with overcurrent protection
  + when battery voltage drops below 2.8V it should activate
* While there are no test points for DO and CO, we should test those spots for the power MOSFET bias.