**Solar Charger Project: Build Planner**

Following this build planner will decrease the probability of frying components in the circuit board, thus increasing chances of a successful, working project.

PREP-STAGE

* Prepare outline for report
  + Should include procedure for testing
  + Documentation of test results
  + Include dates
  + Include pictures, screenshots of simulations
* Prepare toaster oven for soldering
  + Test with a board with a few extra resistors or something to make sure that it will get hot enough and doesn’t get too hot.

STAGE 1 – Construction of Board

* Document Parts

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| --- | --- | --- | --- | --- |
| **Part** | **Quantity** | **Theoretical Value** | **Actual Value** | **Notes** |
| RES SMD 10K OHM 1% 1/8W 0805 | 2 | 10kΩ |  |  |
| RES 2 OHM 5% 1/4W 0805 | 1 | 2Ω |  |  |
| RES 10 OHM 1% 1/4W 0805 | 1 | 10Ω |  |  |
| RES 30.1K OHM 1% 1/8W 0805 | 1 | 30.1kΩ |  |  |
| RES SMD 5.23K OHM 1% 1/8W 0805 | 1 | 5.23kΩ |  |  |
| RES SMD 300K OHM 0.5% 1/10W 0805 | 1 | 300kΩ |  |  |
| RES 100K OHM 1% 1/8W 0805 | 1 | 100kΩ |  |  |
| IC SYNC SW-MODE BAT CHRGR 16VQFN | 2 | -- |  |  |
| LED RED DIFFUSED 0805 SMD | 1 | -- |  |  |
| LED YELLOW DIFFUSED 0805 SMD | 1 | -- |  |  |
| CAP CER 10UF 10V X5R 0805 | 2 | 10uF |  |  |
| CAP CER 4.7UF 10V X5R 0805 | 1 | 4.7uF |  |  |
| CAP CER 0.1UF 50V Y5V 0805 | 2 | 0.1uF |  |  |
| CAP CER 22PF 50V C0G/NP0 0805 | 2 | 22pF |  |  |
| RES 0.08 OHM 1% 1W 2010 | 1 | 0.08Ω |  |  |
| CAP CER 2.2UF 16V Y5V 0805 | 2 | 2.2uF |  |  |
| DIODE SCHOTTKY 40V 1A DO214AC | 1 | -- |  |  |
| MOSFET 2N-CH 40V 8A 8SOIC | 1 | -- |  |  |
| MOSFET N-CH 60V 0.115A SOT-23 | 1 | -- |  |  |
| SCHOTTKY DIODE SOT23 | 1 | -- |  |  |
| CONN QC TAB 0.250 SOLDER | 4 | -- |  |  |
| DIODE SCHOTTKY 40V 5A SOD128 | 1 | -- |  |  |
| RES 499K OHM 0.1% 1/8W 0805 | 1 | 499kΩ |  |  |
| RES SMD 76.8K OHM 1% 1/8W 0805 | 1 | 76.8kΩ |  |  |
| FIXED INDUCTOR 22UH 1.3A 130MOHM | 1 | 22uH |  |  |
| PCB | 5 | -- |  |  |

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| **List of Extra Parts** |
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* Examine PCB board for visible shorts – compare to Kicad schematic, and PCB design
* Examine Solder Paste Stencil for cut errors
* Apply solder paste
* Place SMD components
* Place in toaster oven and watch the magic happen!
  + Look for the solder paste to draw together on the pads and appear shiny
  + Should only take a few minutes
* Solder on remaining through hole components and correct pieces that did not set properly
* Examine all solder joints for good connections (use magnifying glass) and check for misconnections via multimeter if unsure
* Attach connectors that enable connection to the solar panel and lipo battery
* Double check that the solar panel still outputs 11 volts
* **Check for power shorts**!
  + Make GND and PGND are NOT shorted together. If they are, NO BUENO. Proceed to a lot of trouble shooting and looking at schematics. Then use exacto knife and extra wire as necessary to fix connection.
    - GND – **TP 7,8**
    - PGND – **TP 13,14**
  + Make sure VCC pin on Texas Instruments IC is NOT shorted to any GND or PGND.
* Triple check that MOSFETS are in correct orientation, and diodes are in correct orientation.
* Look into possible installation of a fuse at the output to battery to monitor current (I created larger sized vias in the correct place where I can install the fuse and cut the trace)
* Hook the board up to a constant voltage source first (diligent discovery analyzer), send constant voltage of 11V into board
  + Monitor input voltage at **TP 5** and **TP 6** to the VCC pin make sure that it is between -0.3V and 33V (so it doesn’t fry the IC – because that would be very bad)
  + Look at MPPSET – **TP2**. Make sure that it is set to 1.2V
  + Verify the battery is charging at 8.4V, with a current less than 1 A (hopefully 0.5A) **TP1**
  + Check Battery charge to see if it’s charging.
    - Monitor how fast it takes to charge the 2S lipo.
* If everything checks out with the 11V constant voltage, then proceed to replace that input voltage with the solar panel. –check all the same criteria as above
  + Document how long it takes to charge the battery with the panel
  + Compare the rate of charge with that of the constant voltage source
    - Consider – do I need to have an input current source in addition to voltage source? Check with Dr. Frohne and classmates.
* Use other test points to monitor all the inputs and outputs of the texas instruments IC to double check for consistency with the data sheet.
* If it doesn’t work, read through data sheet again carefully. Note voltage maximums and minimums, current maximums and minimums, and temperature maximums. Check for burnt out components (as this will give a clue to where the issue occurred) and replace if possible.

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| **Notes on Testing Process** |
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