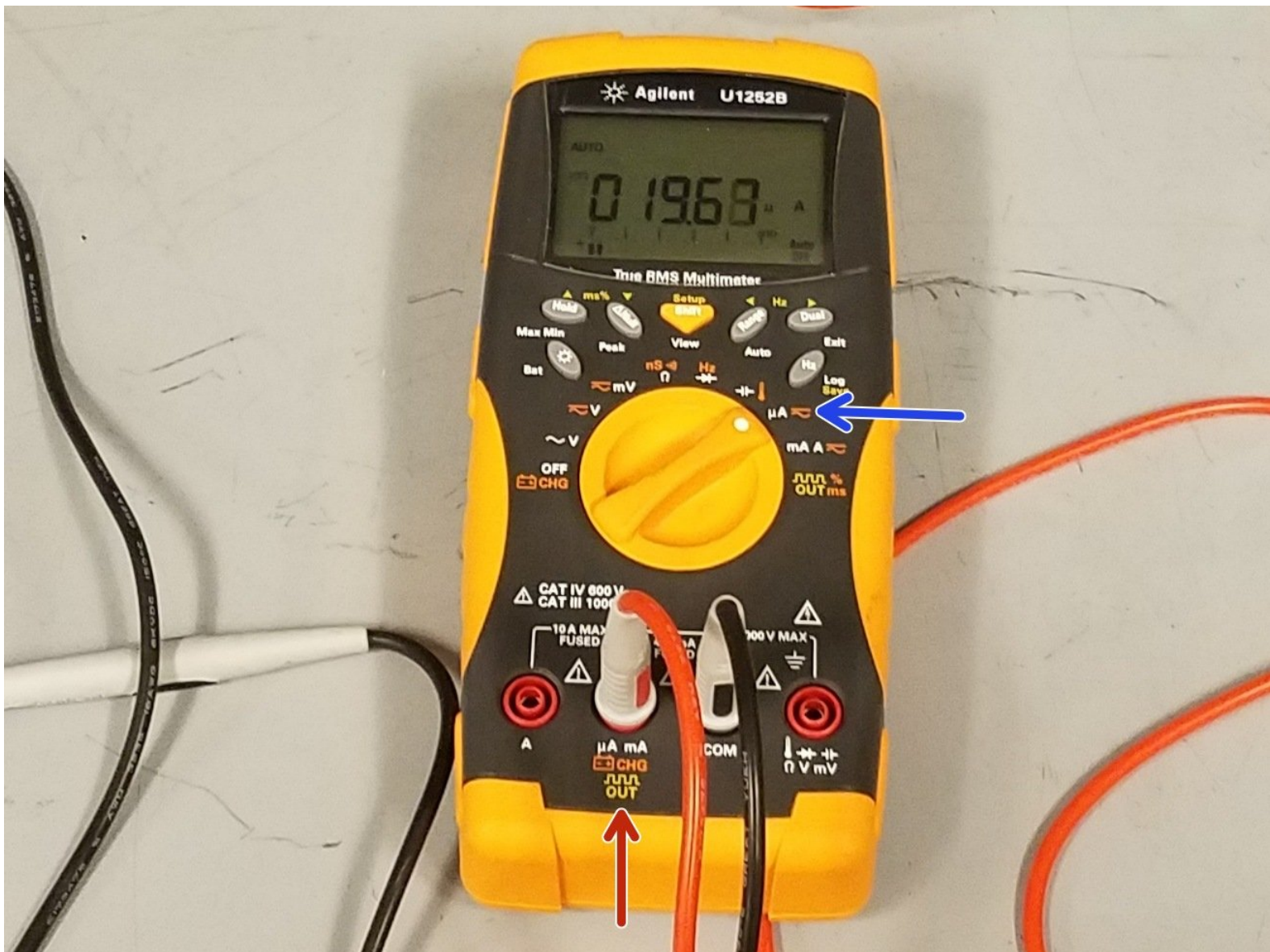




# Open-Storm Board Testing Procedure

Learn how to test the Open-Storm boards so they are ready for node install.

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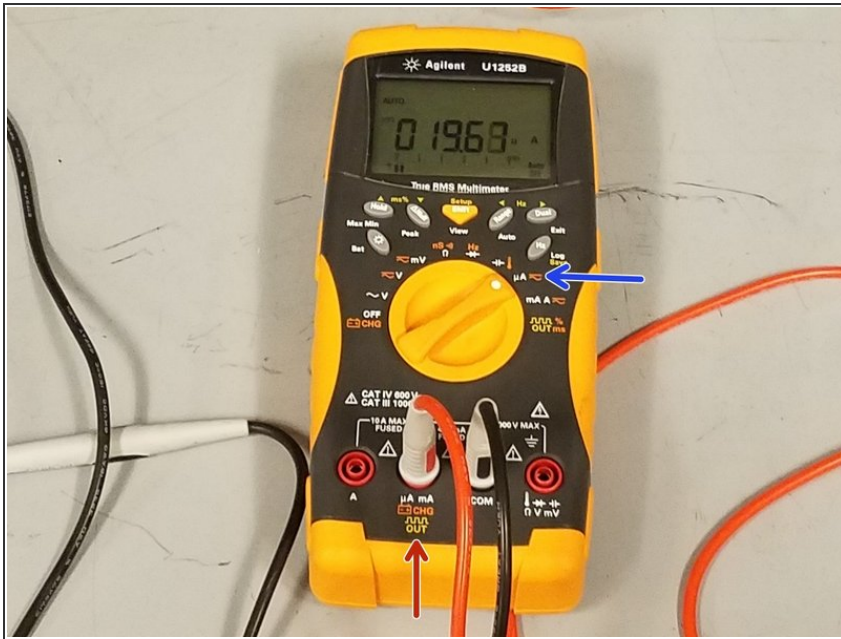


## INTRODUCTION

We have four items that we need to test:

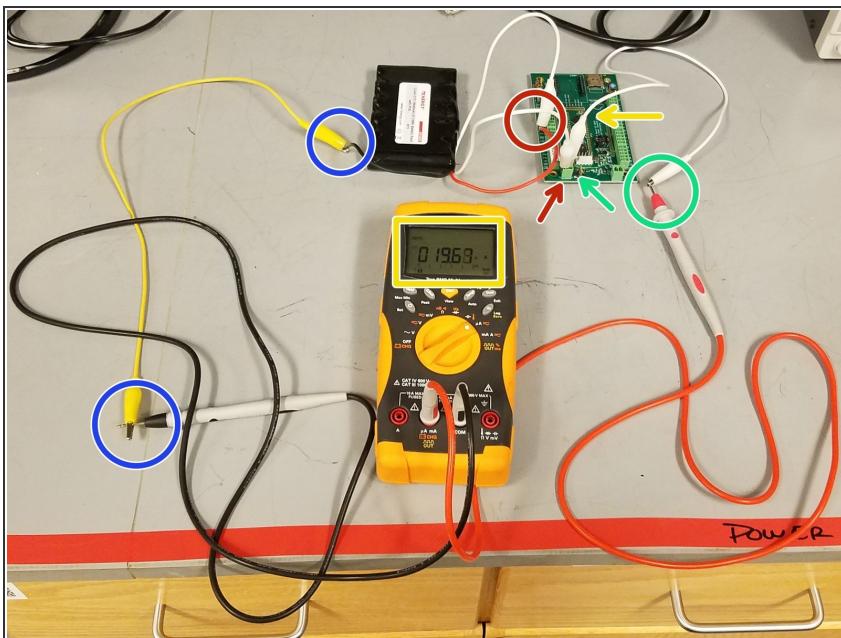
- A) the main integrated circuit (IC),
- B) a level shifter,
- C) solar charger,
- D) cellular modem.

## Step 1 — Test the main integrated circuit



- Program the board with the code `sleep_test_v2.cypri`.
- Set a multimeter to the uA setting.
- Make sure the probes are in the correct ports to measure amperage.

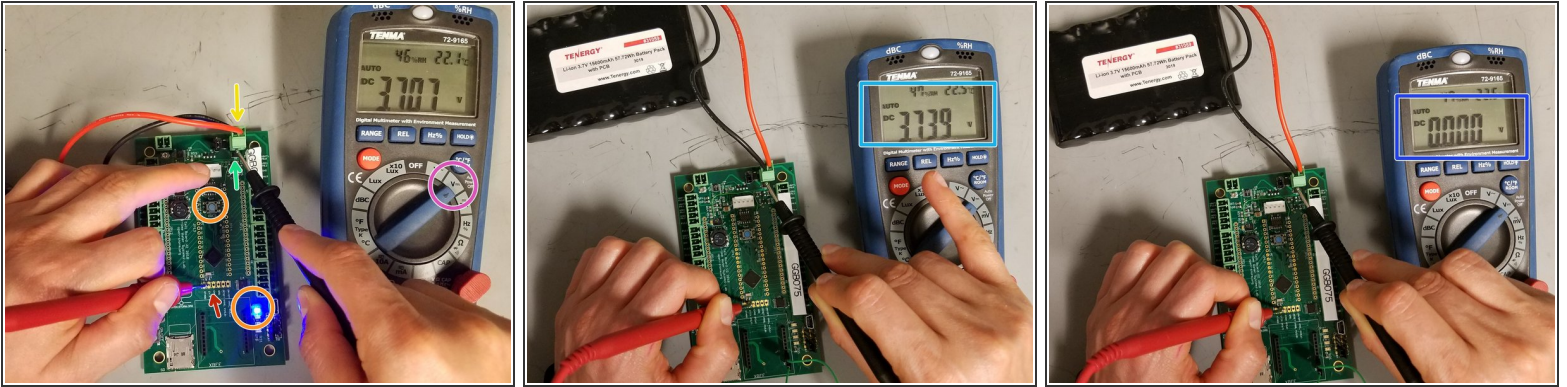
## Step 2 — Test the main integrated circuit



- Connect the red probe to the negative terminal of the board.
- Connect the black probe to the negative terminal of the battery.
- Connect the power terminal of the battery to the power terminal of the board.
- Using alligator clips make it easier to complete the circuit.
- Press the reset button on the board. You should see the reading on the multimeter go to 5 mA then to around 20  $\mu$ A.

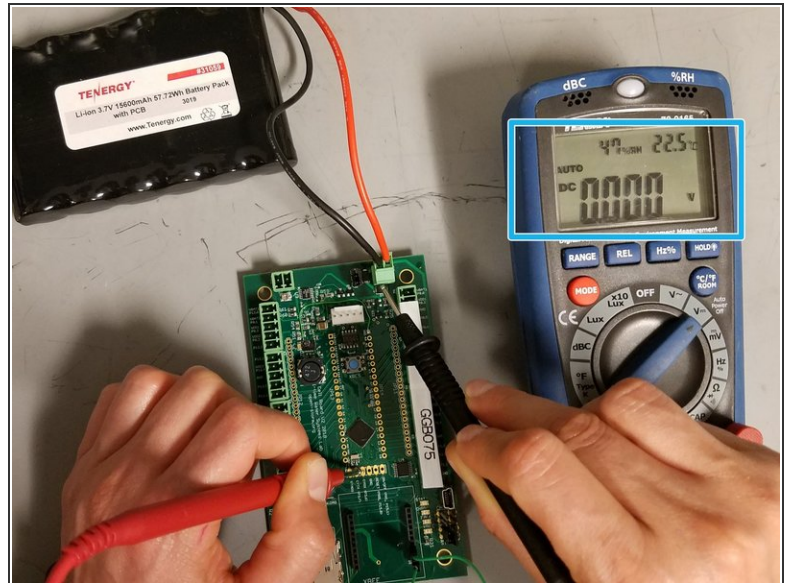
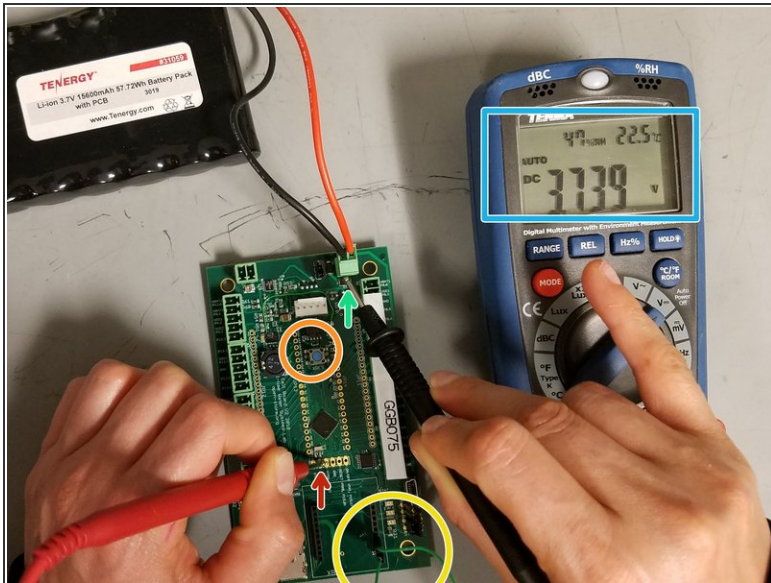


## Step 3 — Test the main integrated circuit



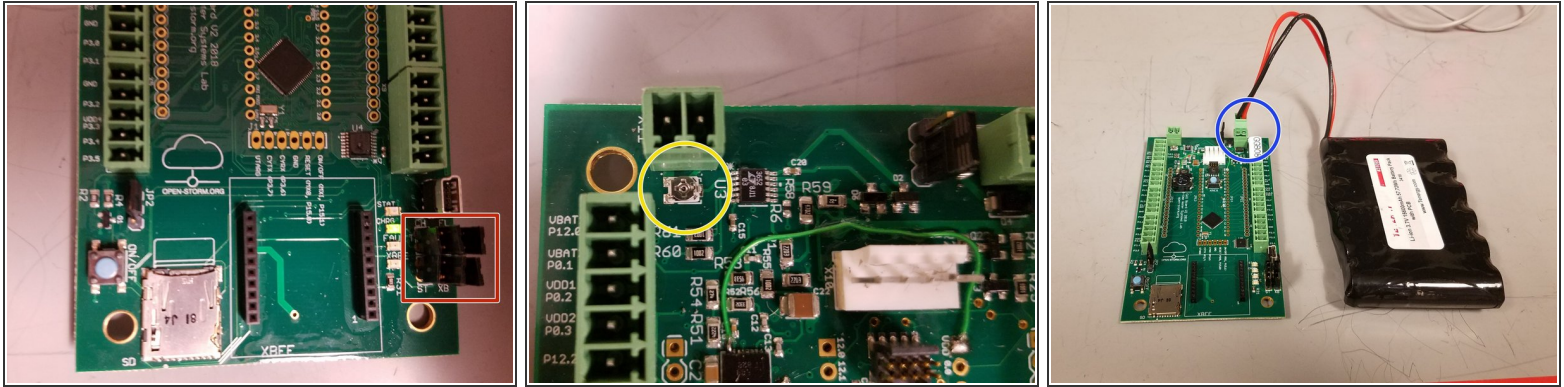
- Now plug the battery as you normally would into the board.
- Change the multimeter to the DC voltage setting.
- Put the black probe on a negative terminal of the board.
- Put the red probe on p3.7.
- ⓘ There's a few places to check p3.7. A smaller diameter pad closer to the chip and then one of the bigger pads in part of the group of six pads closer to the cell module.
- Press the reset button on the board. You should also see a blue LED when you reset the board, it quickly turns on then off).
- The TX pin (p3.7) must toggle from logic high (means the voltage should equal the battery voltage).
- To logic low (meaning the voltage should read 0).

## Step 4 — Test the level shifter



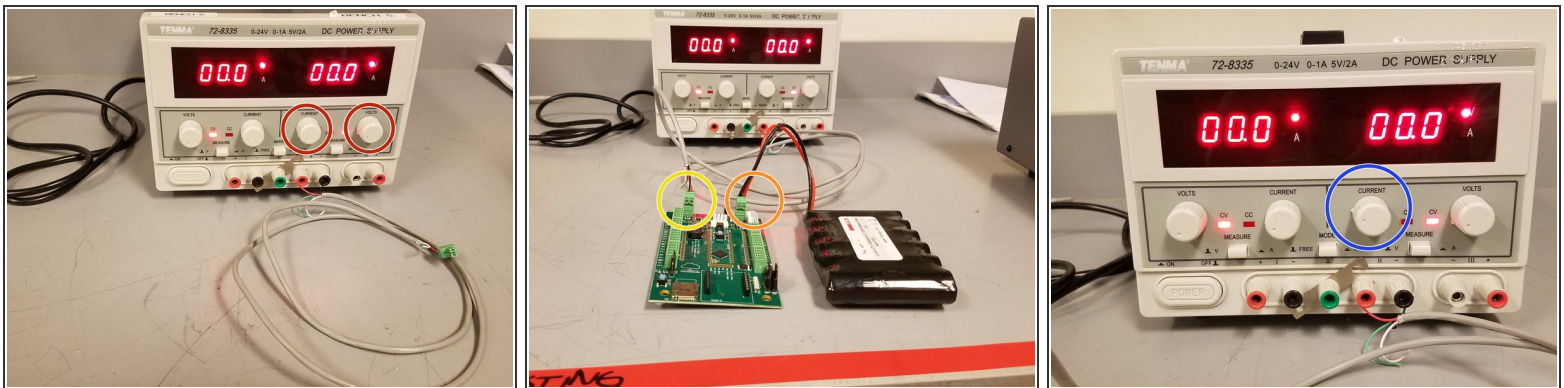
- Just a male-male jumper wire to connect the XBEE pins 2 and 3.
- Put the black probe on a negative terminal of the board.
- Put the red probe on p3.6.
- Press the reset button on the board. You should also see a blue LED when you reset the board, it quickly turns on then off).
- The TX pin (p3.6) must toggle from logic high (means the voltage should equal the battery voltage).
- To logic low (meaning the voltage should read 0).

## Step 5 — Test the solar charger



- Put all the appropriate jumpers on the Open-Storm board.
- On the board, turn the small screw clockwise all the way until it stops. Then turn it back a quarter turn. This is what controls at what voltage the solar charger activates.
- Plug in a battery that is not fully charged into the battery input terminal on the Open-Storm board.

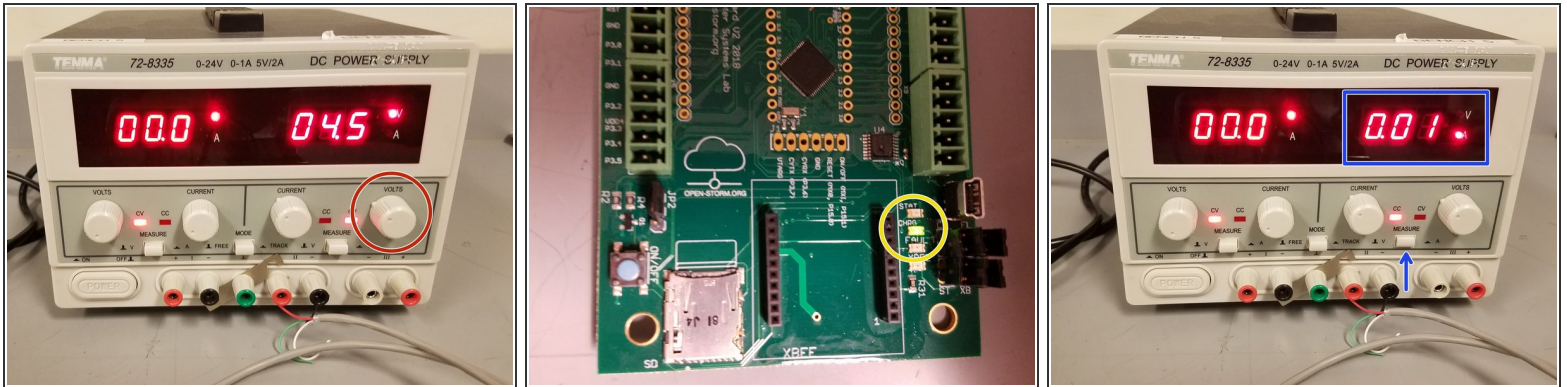
## Step 6 — Test the solar charger



- On the DC power supply, set both knobs to 0, for both current and voltage.
- Connect a battery. Use a battery that is discharged to a voltage below 4.2 volts DC
- Connect the power supply to the solar panel charging input terminal on the Open-Storm board.
- Turn the current knob to about 60 degrees.

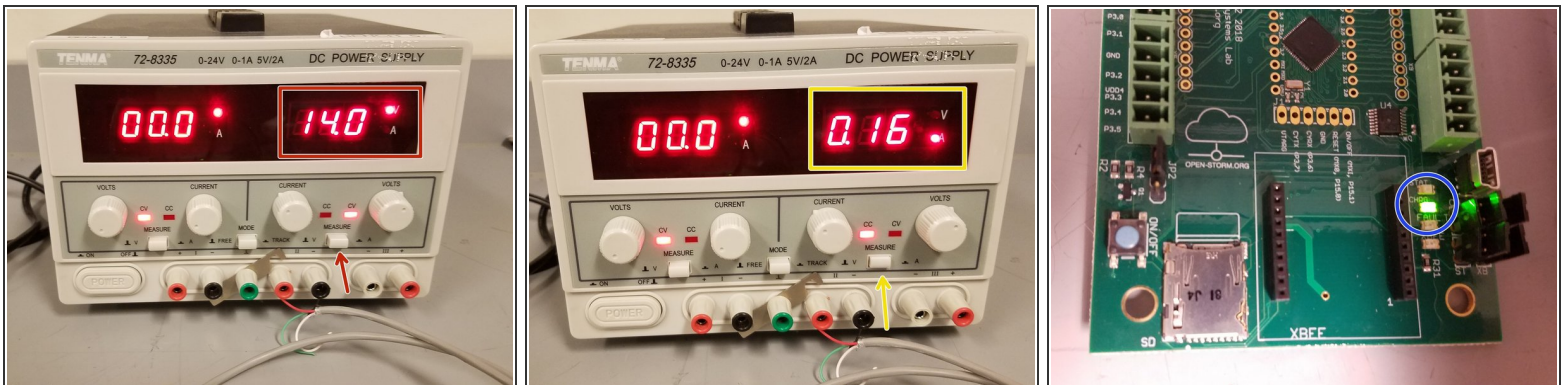


## Step 7 — Test the solar charger



- Slowly sweep the voltage knob to 4.5V.
- You should see a light green LED on the Open-Storm board.
- Turn the switch to see amperage on the display. It should read about 0A.

## Step 8 — Test the solar charger



- Turn the display back to voltage. And continue turning the voltage knob to 14V.
- Switch the display and you should see 0.15A.
- The green light on the board should be brighter.

## Step 9 — Test the cellular modem

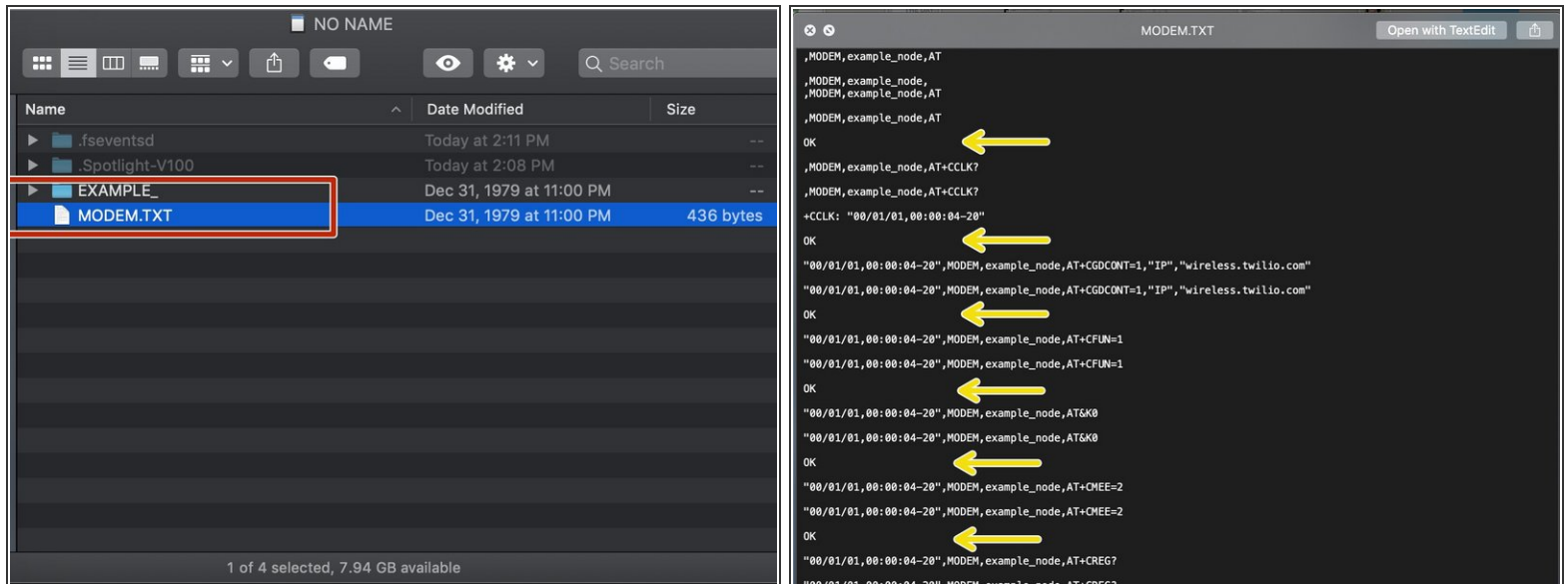


 Ensure you are using an activated SIM and working cell module.

- Plug in a micro SD card, an activated cellular modem, antenna, and a battery.
- Connect the programmer to the computer and then to the board. Then program the Open-Storm board with the perfect-cell program.
- Let it run the perfect-cell code for at least 3 minutes. Then disconnect the programmer and then the battery from the board.
- Remove the SD card, plug into an SD reader.
- Plug the SD reader into the computer.

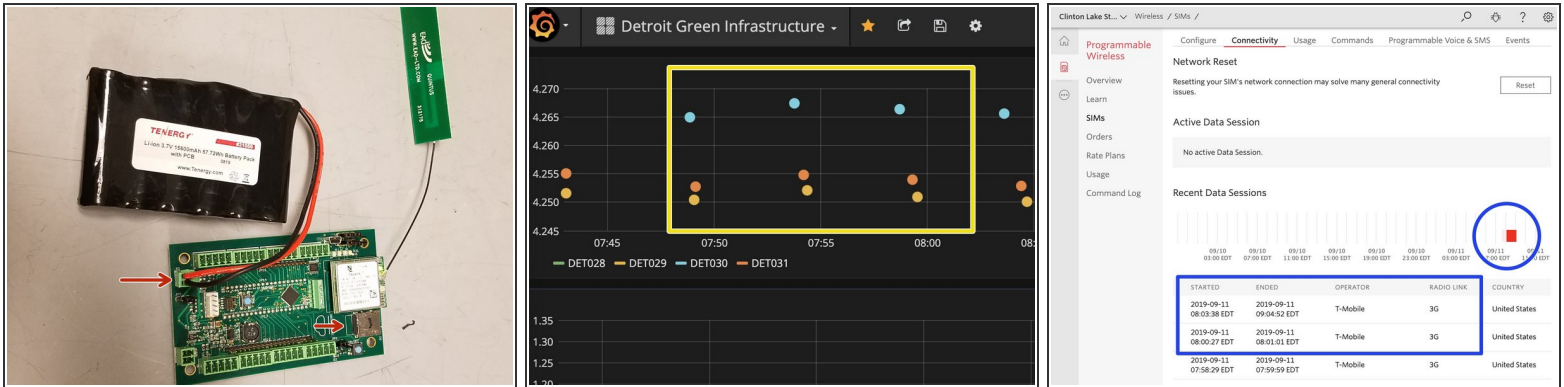


## Step 10 — Test the cellular modem



- You should see a file labeled Modem.txt. Open it.
- Confirm the board is writing to the SD card.
  - "OK" indicates a response from the cell module.

## Step 11 — Test the cellular modem



- Reinsert the micro SD card into the Open-Storm board. Reconnect the battery.
  - Take the board/battery to an area that has a good cellular signal. Check to make sure we are receiving data on our database (e.g. battery voltage).
  - Confirm cellular activity on the provider (Twilio) network.
- i** If a board passes all of these tests, it is ready to be installed in a node!