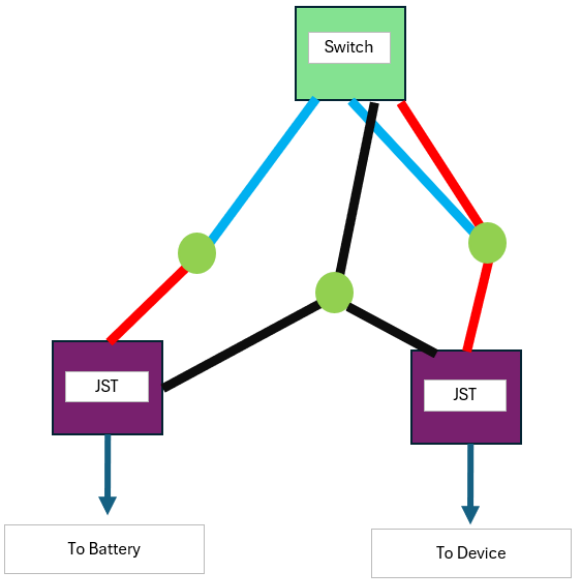
Required Material:

1. **Power Button:** I used one with an LED light in the switch, but a non lit version will also work (note my wiring diagram reflects the LED version)
    a. **LED:** https://www.amazon.com/dp/B091CVNW4C?ref=ppx_yo2ov_dt_b_fed_asin_title&th=1
    b. **Non LED:** https://www.amazon.com/dp/B09BKXT1J1?ref_=ppx_hzsearch_conn_dt_b_fed_asin_title_4&th=1
2. **3000 mAH battery:** https://www.amazon.com/dp/B0D7LLB53Z?ref=ppx_yo2ov_dt_b_fed_asin_title&th=1
3. **Acrylic Rods 1/8 inch** https://www.amazon.com/dp/B0B4JRXKHL?ref=ppx_yo2ov_dt_b_fed_asin_title&th=1
4. **USB-C Pass Through** https://www.amazon.com/dp/B08H5F9R8N?ref_=ppx_hzsearch_conn_dt_b_fed_asin_title_1
   *Preferred Option : https://www.aliexpress.us/item/3256804440339698
5. **Hot Glue & Hot Glue Gun**
6. **M2.5 * 4 * 4 Heat Inserts 6 Each with 19003 or 8 Each with 19007**
7. **M3* 4* 4.2 Heat Insert 9 Each**
8. **M2.5 x6 Screws**
9. **M3 x8 Screws**
10. **Heat Shrink Tubing (Various sizes)**
11. **Recommended: Gorilla Double-Sided Tape**
12. **Optional: JST Connections: I wire the switch to a JST, instead of directly to the battery. This allows for quicker battery changes. My wiring diagram shows this.**
13. **Tools and Other: Soldering Iron, Solder, Wires**
14. **Sand Paper 800 Grit**

Step 1: Wire the Switch

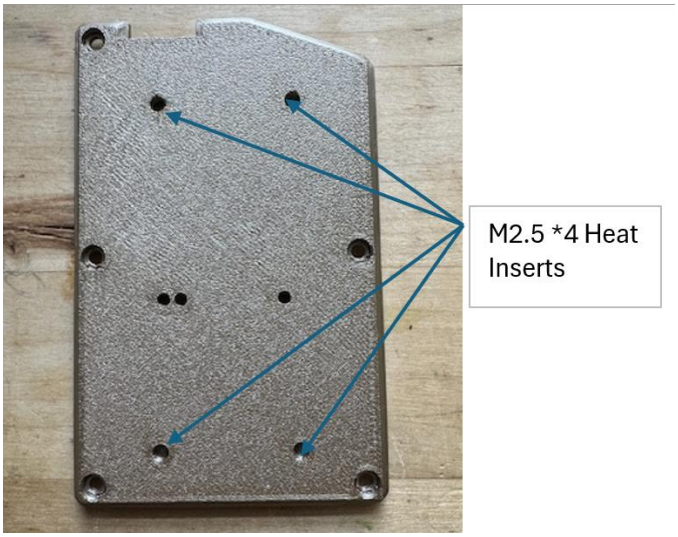
Switch Wiring Diagram

I wired the switch so the light is on when the power is on and plugged in and off when the power is off. I also use JST on both sides, which allows for easy and rapid battery changes.

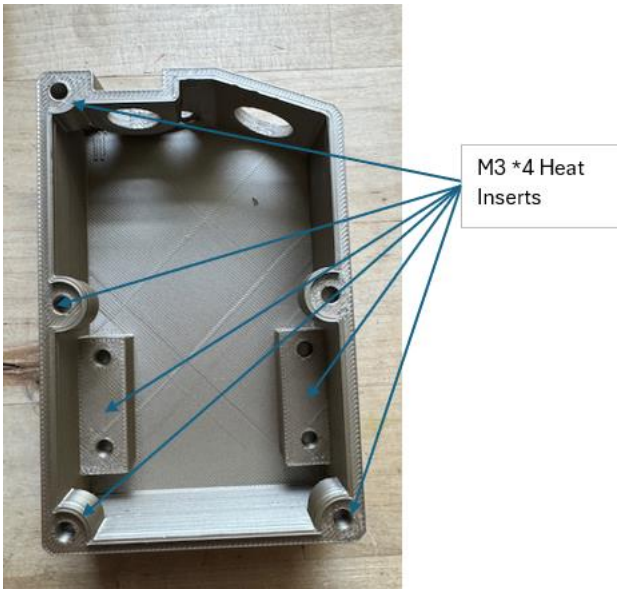


Step 2: Heat Inserts

Top: Insert 4 M2.5 Heat Inserts into the mount holes



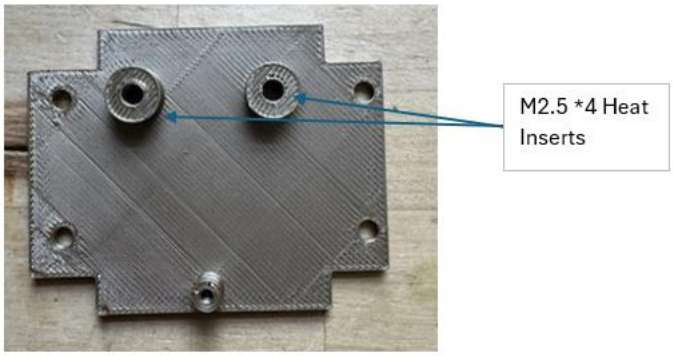
Body: Insert 9 M3 Heat Inserts into the lower body



Board Mount: For RAK19003 Install 2 M2.5 heat inserts into the board. For RAK19007 Install 4 M2.5 heat inserts into mount points.

Note that on the 19003 board, the smaller mount point does not use a heat insert. Screw directly into the mount point.

Tip: If you are using the 19007 board, use low heat and go slow pressing the heat inserts in. The mount posts are thinner on the part due to size constraints.



Step 3: Initial Assembly

Assemble the antennas into the main body first. Next, install the power button and, finally, the USB-C passthrough.

Next, install the battery. Use the double-sided tape to keep the battery in place.

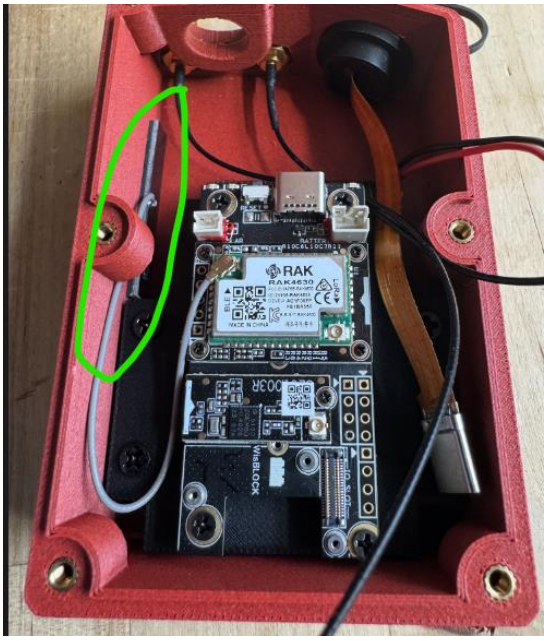
Install the GPS SMA connectors on the board before mounting (if using 19003)

Next, mount the RAK board to the mounting plate, then using the 2.5 x 6 screws.

Note if using the 19003 mount plate the use the RAK provided screws for the single mount point at the bottom of the board.

Once the board is mounted, mount the plate to the body using the M3 screws.

Add the Bluetooth antenna, and stick it to the side of the body.



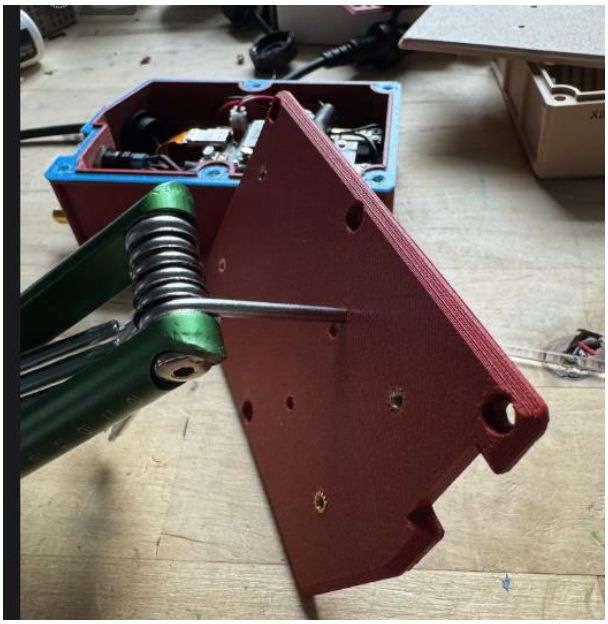
Connect the LORA Antenna and USB-C Power Supply, battery & switch connection.

Finally, place the TPU gasket onto the top lip. The device should look like this.

Step 4: Installing the Light Rods

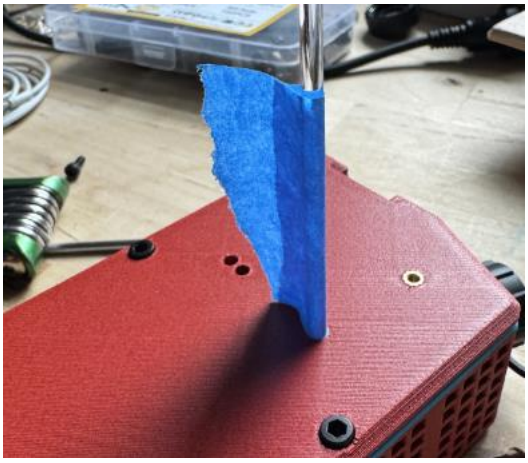
With the completed bottom, it's time for final assembly.

First, test the Acrylic Rod fitment. I have found these rods to be fairly variable, and between that and the tolerance of the printer, it is often very, very tight. On some devices, I need to expand the holes. I use a small screwdriver, noted below.



Once the rod fits (it should be a very tight fit) install the top onto the bottom and tighten down with M3 screws.

Insert the rod into one of the light holes and gently push until it just touches the board. Mark the cut point. It should be around 11.5 mm. I mark the cut spot with bule tape.



At this point, I cut the rod and made 3 matching smaller rods. I used a hacksaw to cut about ½ inch halfway through the rod, then I brake it.

Next, sand the rough edges using 800 grit sandpaper until each end of the rod is smooth. Insert the rods into the holes and press until flush with the top. If they don't fit perfectly, remove them and continue sanding.

Final product should look like this.

To finish the light rods, remove the top (keep the rods in place) flip it and hot glue the back side of the rods in place.

Note: I like to put heat shrink around the rods, but this is not necessary; I just think it looks cleaner.

THAT'S IT! All done. Put the top back on, put the antennas on, charge it up and go!