OLED Watch Assembly Guide

The watch was designed in Altium Designer, so if you want any modifications you will require it. Otherwise you should be able to build the device with just the schematic, gerbers, and bill-of-materials (BOM)

Keep in mind I have a Revision 3 planned, so keep an eye out on my page for future updates. I plan to fix all the issues with the current Revision 2 design, and use some more common parts.

Downloads

First, download all the required files:

http://jared.geek.nz/oshw-oled-watch/files/OLED-Watch-Schematics.pdf
http://jared.geek.nz/oshw-oled-watch/files/OLED-Watch-PCB.pdf
http://jared.geek.nz/oshw-oled-watch/files/OLED-Watch-BOM.xlsx
http://jared.geek.nz/oshw-oled-watch/files/OLED-Watch-Rev2-Gerbers.zip

Altium sources are available here if desired:

http://jared.geek.nz/oshw-oled-watch/files/OLED-Watch-Rev2-Altium.zip

You can use the provided Gerbers for ordering the PCB, or order directly from OSHPark using this link:

https://oshpark.com/shared_projects/cXvq9TpQ

You get 3 boards and it costs around $10 or so.

Required Tools

The device can be assembled completely by hand, provided you have some basic SMD gear. At a minimum you will need:

- Cheap temperature-controlled soldering iron, with a fine tip
- Cheap hot-air reflow station – It doesn't need to be fancy, you just need temperature-controlled hot-air with a small nozzle. You can find one from SparkFun
- Thin solder - I prefer leaded, it is easier to use
- Flux - I prefer gel-type in a syringe. Flux is very important and makes your life a lot easier!
- Tweezers

Additionally the following items are helpful:

- Solder wick (for removing solder bridges)

- Thermocouple temperature probe, makes reflow a bit safer and easier since you can track the PCB's temperature.

Bill of Materials

This part can take a bit of effort, parts can be ordered from multiple places, but my preference is Farnell/Element14. Follow the notes in the BOM.xlsx file and order the required components. Make sure you order passive resistors and capacitors, since they're not directly listed on the BOM.

I have estimated the total cost to be around $100, excluding the PCB and tools required.

If you want to save money, you can find a cheaper version of the OLED display on AliExpress:

http://www.aliexpress.com/item/2pcs-1-5-inch-color-OLED-Display-screen-with-128x128-Resolution-SPI-Parallel-Interface-SSD1351-Controller/1461252182.html

The buttons can only be obtained through DealExtreme, but I plan on fixing this in Revision 3:

http://www.dx.com/p/td-15ea-tact-switches-50-piece-pack-122524

You can also order handy SMD resistor/capacitor packs off DealExtreme, which I highly recommend:

http://www.dx.com/s/smd+0603

Bug Fixes (Revision 2)

You must apply these bug fixes:

- CE pin should be pulled low by default, to enable charging if battery is flat.
  FIX: R19 is located near a GND pad (C4). Re-orient and use thin wire to connect to GND.
- ISET2 should be pulled high, the OLED draws JUST more than 100mA.
  FIX: R26 is located near VCC (BTN/R24/R22). Re-orient and connect to VCC
- VDD should be set to 3.1V, not 2.5V, since the PIC requires a minimum of 3.1V for USB to function correctly. Change R18 to 121K 1% resistor.
- EPWR should be grounded with a 1Mohm resistor, or it may not power up.
- Resistor on ISET1 (R27) was set too low, battery would never charge. Change to 1Kohm.

OLED:

- Screen connector needs to be plugged in reverse. Make sure you get a connector with conductors on the bottom edge (or both edges). Alternatively solder the OLED directly to the PCB (gives you a bit more headroom if you're trying to stuff it into a tight case)
- Power diode's footprint was too small. It's easy enough to bodge in.
- The OLED controller chip on the flex cable should be covered with epoxy to strengthen it, I have broken two displays so far by flexing that cable too much!

Case

I was going to 3D print a case for the watch, but I stumbled across [the following product] on DealExtreme. It was originally ment to be used with an iPod Nano, but by pure luck the dimensions fit my PCB and screen almost perfectly!

Unfortunately since the OLED is now on the wrong side of the PCB, I had to remove the back of the case with a bench grinder so that the PCB and battery would fit. You can see a closeup of how it all fits together below: