

Assembling the ECE 4760 Dev Board (Estimated Assembly time 45-75 mins)

Bill of Materials

C1	100nF
C2	100nF
C3	10uF
C4	1uF
C5	1uF
D1	LED
D2	1N4007 (SMT diode)
J1	ICSP header-plug
J2	Input Supply
J3	Power/DAC Outputs
J4	PIC GPIO 1
J5	PIC GPIO 2
J6	Port Expander PortY
J7	Port Expander PortZ
J8	DAC CS Jumper
J9	TFT CS Jumper
J10	PE CS Jumper
R1	10k
R2	330 Ohm
SW1	RESET
SW2	POWER
U1	PIC32MX250F128B
U2	MCP1702
U3	MCP4822
U4	MCP23S17
U5	TFT Display

Off board: 5v AC adapter (wall wart)

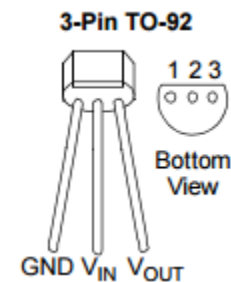
Note:

For ease of reference, we shall refer to the directions of the board with north being the edge of the board with the text "Sean Carroll, 2017" closest, south the edge with all GPIO pins, east with the power input, and west with U4.

As you are assembling the board, refer to the attached pictures for reference points.

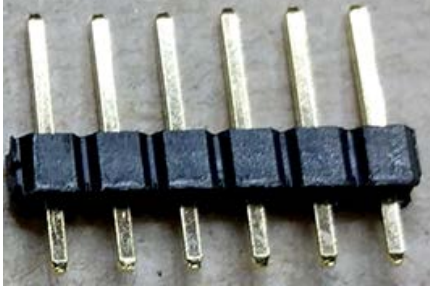
Recommended assembly procedure:

1. Solder the surface mount (SMT) parts onto the board. This includes: R1, R2, C1, C2, C3, C4, C5, D2. For D2, the thin white line on the top of the part indicates the cathode end of the diode, and should be placed such that the line is closest to the south edge nearest the power switch. (original text fixed 8/24/17)
2. Solder the toggle switch at SW2, orientation is not important. When this is done, when the switch is in the north position, the circuit is complete and the board is considered powered on. When in the south position, the circuit is broken, and the board is considered powered off.
3. Solder the 2.1 mm power input jack at J2, such that the power socket opening is directly facing the east edge of the board. Note: the through holes are much larger than the pins due to the peculiar shape of the pins. It will require much solder to make a solid connection all around the pin and the surrounding through hole.
4. Solder the MCP1702 into U2. Refer to the pinout diagram to the right. As a rule of thumb, when looking directly down on the board with the north edge at the top of your field of vision, the top of the MCP1702 device will resemble the letter 'D'.
5. STOP soldering for a moment and check the power circuit before continuing. With the toggle switch in the off position, connect a power supply to the power input jack using an appropriate plug. It is recommended to use a 5v AC adapter, but the circuit will theoretically operate with up to a 12v AC adapter. Move the switch to the on position. If anything begins to burn, smoke, or heat up dangerously, immediately switch off power and unplug the adapter. You will need to recheck your connections and orientations of the soldered devices. If nothing appears wrong, using a multimeter, check the voltage across the +3.3V through holes and the GND through holes on the south edge of the board on the east side. If you read a positive 3 volt difference, you may continue assembling the board after unplugging and powering off. If not, recheck your connections and orientations of the soldered devices after unplugging and powering off.
6. Take the button switch intended for SW1, and with a pair of pliers, gently straighten the leads, until the device easily fits in the SW1 through holes. Orientation is not important. Solder the device.
7. Solder the 28-pin PDIP socket in the U1 place for the PIC to eventually go into. Orientation of the socket is not important. There is often a dent or indent in the pin 1 end, and this should face the west side of the board.
8. Doing the opposite for the 6-pin header-plug into J1, solder it in place such that the longer side of the metal headers and the black spacers are on the top of the board, and the solder points



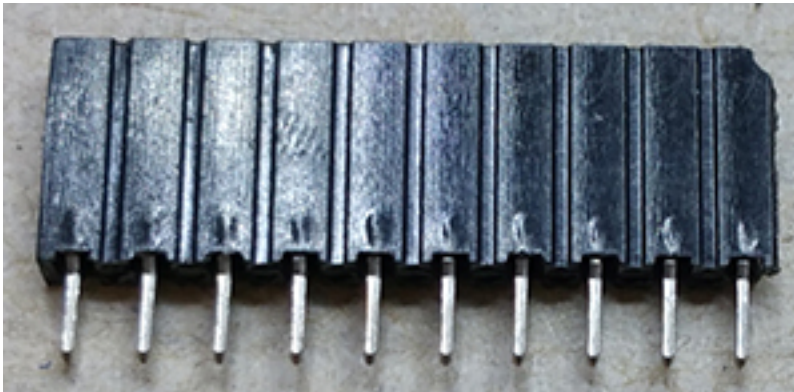
are on the bottom of the board. See pictures if further clarification is needed.

Header-plug:



9. Solder the 8-pin PDIP socket in the U3 place for the DAC to eventually go into. Orientation of the socket is not important. There is often a dent or indent in the pin 1 end, and this should face the west side of the board.
10. Solder the 28-pin PDIP socket in the U4 place for the Port Expander to eventually go into. Orientation of the socket is not important. There is often a dent or indent in the pin 1 end, and this should face the west side of the board.
11. Place the 10-pin header-socket into the through holes for the TFT Display (U5) to go through. The socket should be coming out of the top of the board. Verify that you know what the plug on the TFT display looks like, so that you choose the correct header-socket.

Header-socket:

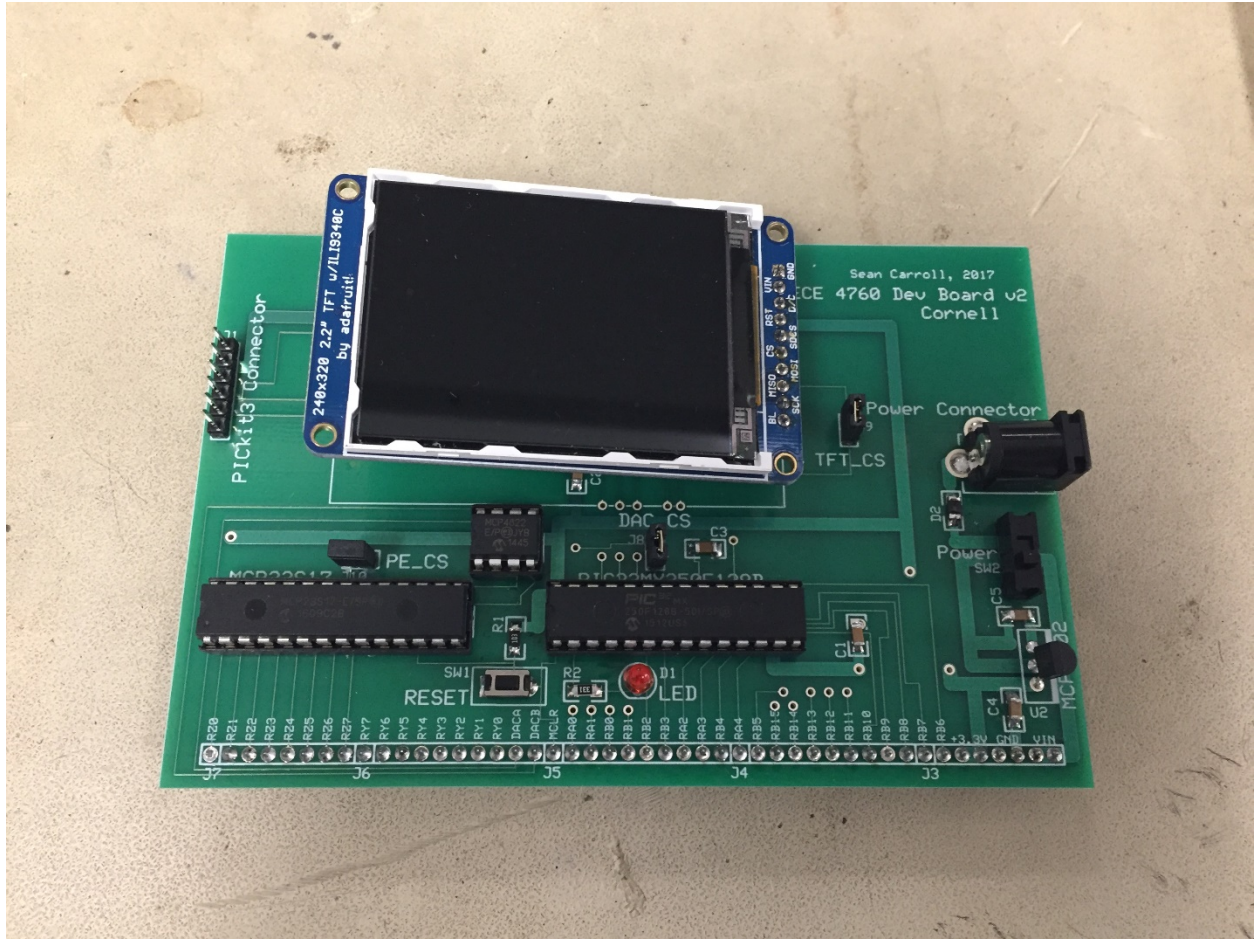


12. Place the 46-pin header-plug into the GPIO/power through holes, such that the shorter side of the metal enters the holes from the underside of the board, such that the black spacers are on the bottom of the board, with the longer metal side of the headers pointing out of the bottom of the board. Choose whether you want the header to connect above or below the board. Solder this header in place. See pictures if further clarification is needed.
13. Place a 3mm LED on the board (your choice: red, green, or yellow). NOTE that the silk screen shows the flat side of the LED toward the south side of the board. *This is a silk screen error.* Flat side (cathode) of the LED should face north side.
14. For each of the jumpers (PE\_CS, TFT\_CS, and DAC\_CS on the board), place a 2-pin M-M header exactly as done for J1. These are the jumpers and the longer ends of the pins should be coming out of the top of the board.
15. Place the PIC32 into the eastern 28-pin PDIP socket, such that the notch on the device points toward the west edge of the board.
16. Place the MCP4822 into 8-pin the PDIP socket, such that the notch on the device points toward the west edge of the board.

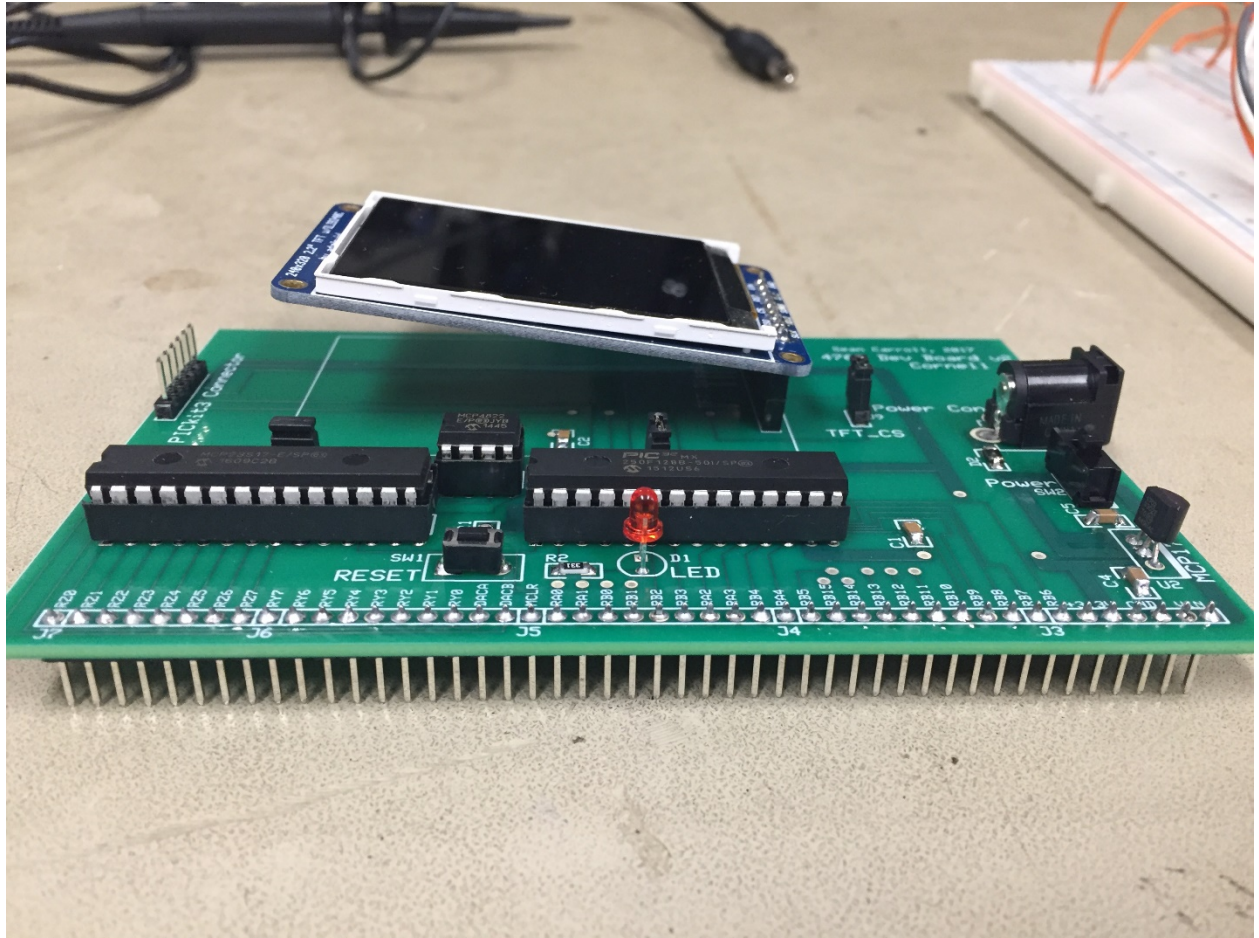
- Place the MCP23S17 into the western 28-pin PDIP socket, such that the notch on the device points toward the west edge of the board.
- Place the TFT into the header-socket, such that the pin edge of the screen is towards the east. See pictures for further clarification.
- Plug in the AC adapter, power on and begin testing.

NOTE: The PICKit 3 programmer goes on the board with the lighted side facing north. See appendix for pictures.

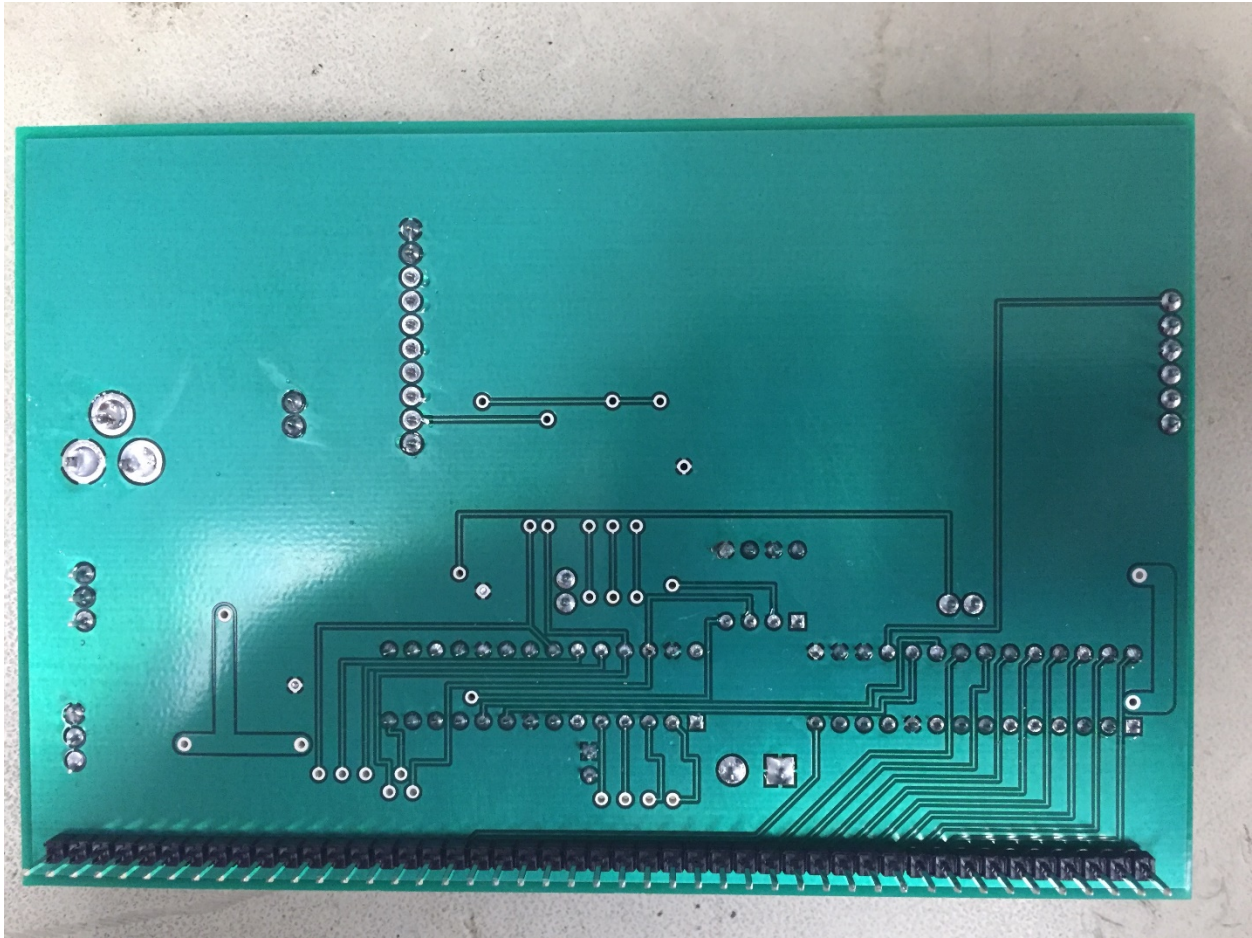
#### Appendix: Pictures



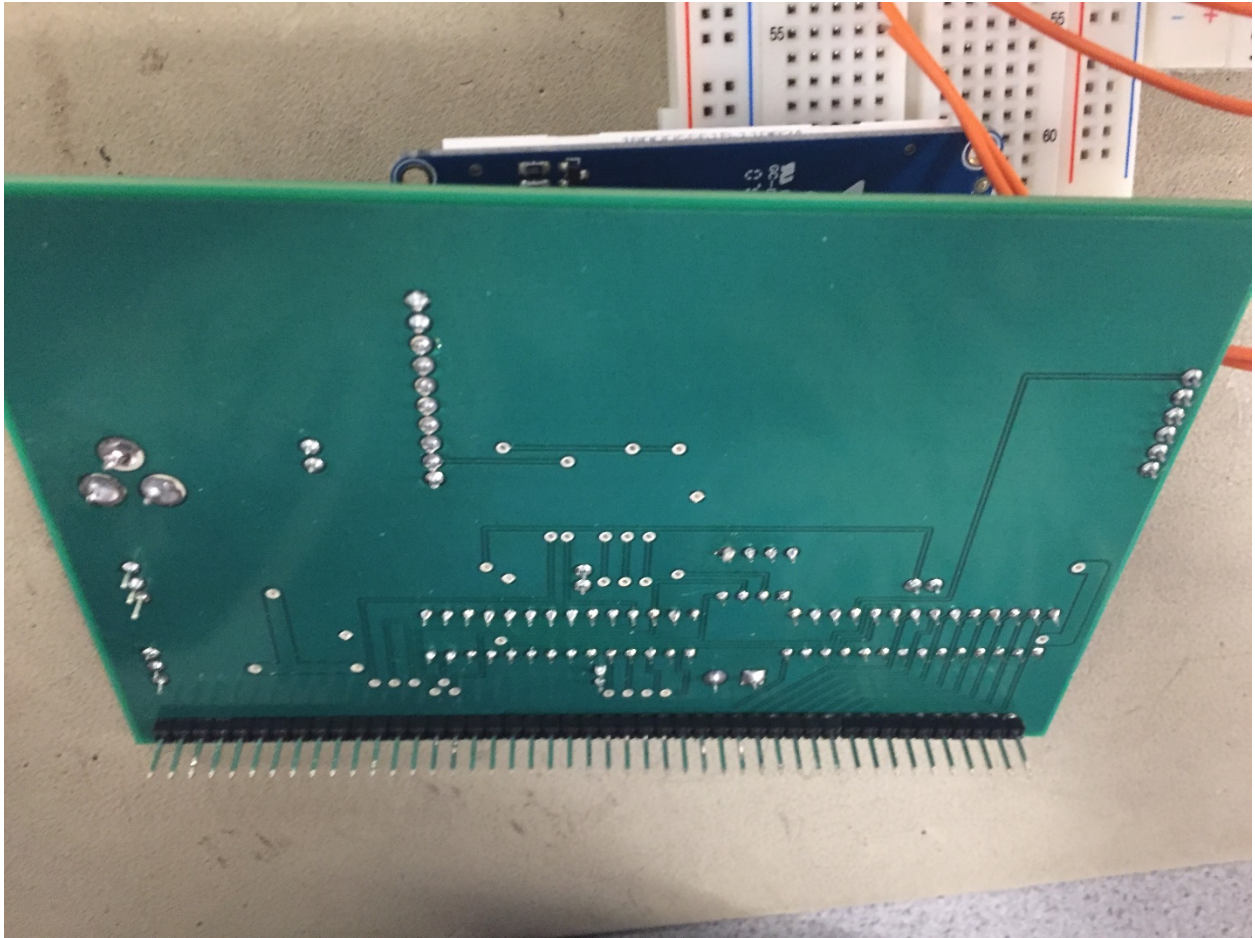
- Top view. North edge is the top of this picture.



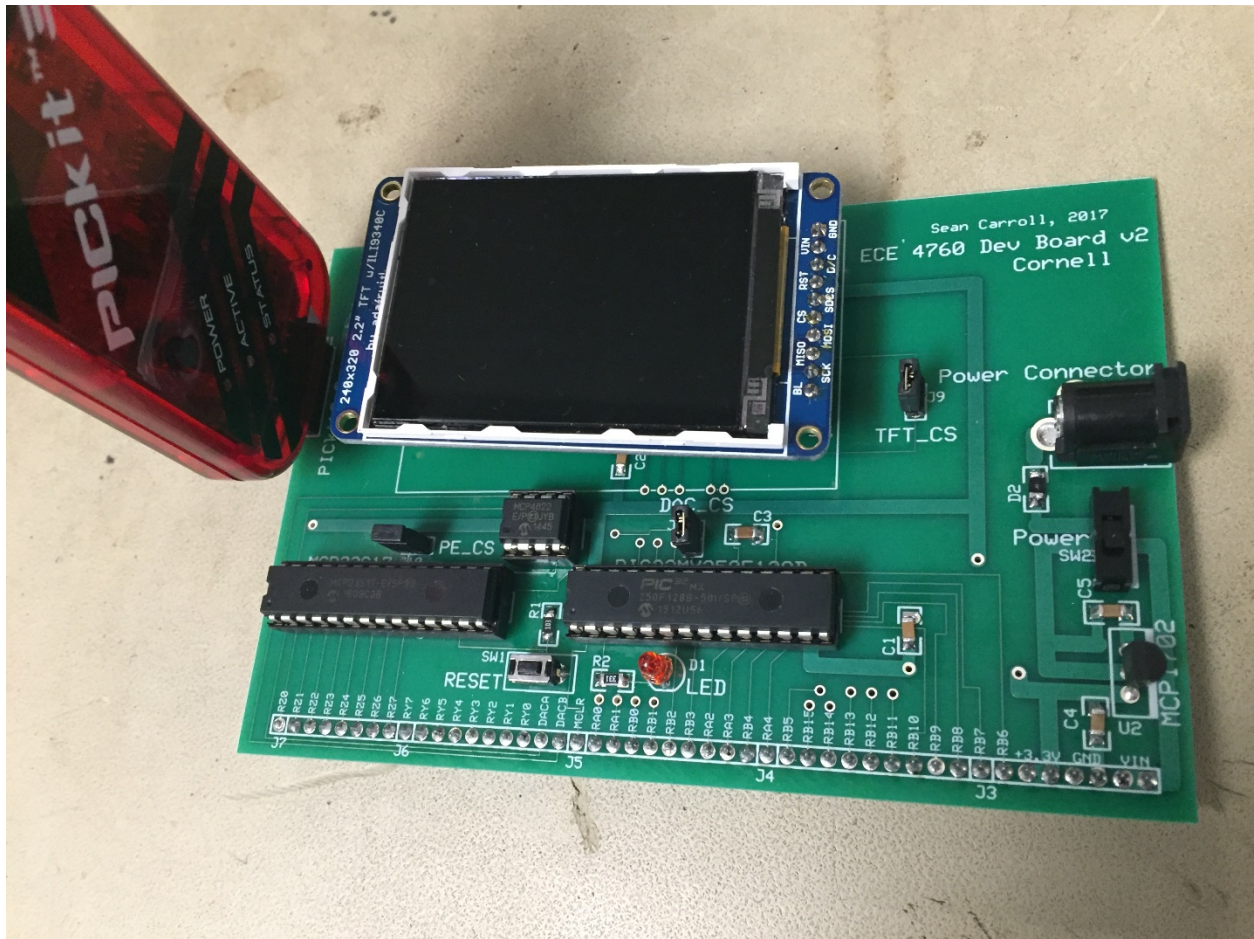
2. Side view from south edge.



3. Bottom view. North edge is top, south edge is bottom, east edge is left, west edge is right



4. Same bottom view as 3, different angle.



5. Board with PICkit attached.