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
J1 ICSP HEADER
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, D1. For D1, 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 north edge.
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 female 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 M-M header 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.
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 F-M header into the through holes for the TFT Display (U5) to go through. The female ends should be coming out of the top of the board.

12. Place the 46-pin M-M header 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. Solder this header in place by soldering the top of the board. See pictures if further clarification is needed.

13. 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.

14. 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.

15. Place the MCP4822 into 8-pin the PDIP socket, such that the notch on the device points toward the west edge of the board.

16. 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.

17. Place the TFT into the female header row, such that the pin edge of the screen is towards the east. See pictures for further clarification.

18. 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
1. 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.