Layout Notes for Connector Board

20 Pin Connector

Pin Layout

Per Miles + Andrew

```
GND
VBUSP (jumper to USB 5V or FTDI 5V)
VCC (3V3 rail on board, for JTAG)
USART_TX (FTDI)
USART_RX (FTDI)
SWDIO (JTAG)
SWCLK (JTAG)
RESET (JTAG)
SWD (Possibly? Probably not?)
Slave D+
Slave D-
Host D+
Host D-
SPARE0
SPARE1
SPARE2
SPARE3
SPARE4
```

Connectors put on prototype board

20 Pin fcc

JTAG 10 Pin

6 Pin Serial

Micro USB (Slave)

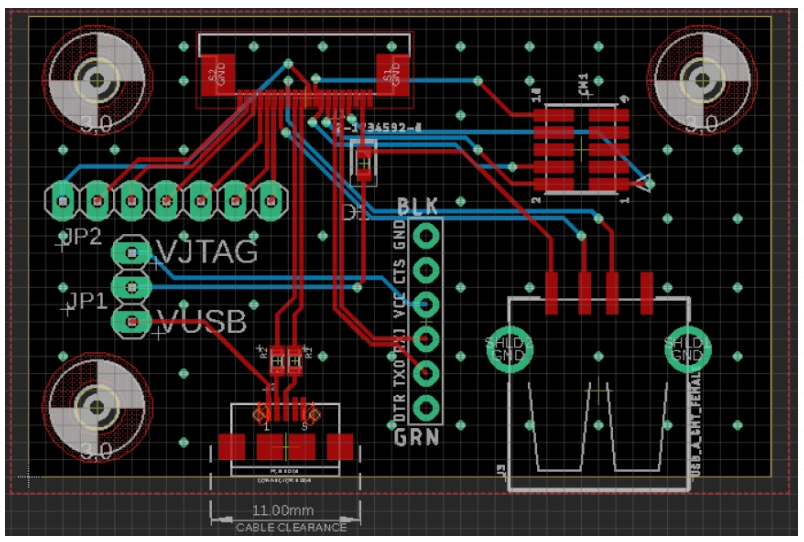
USB A (Host)

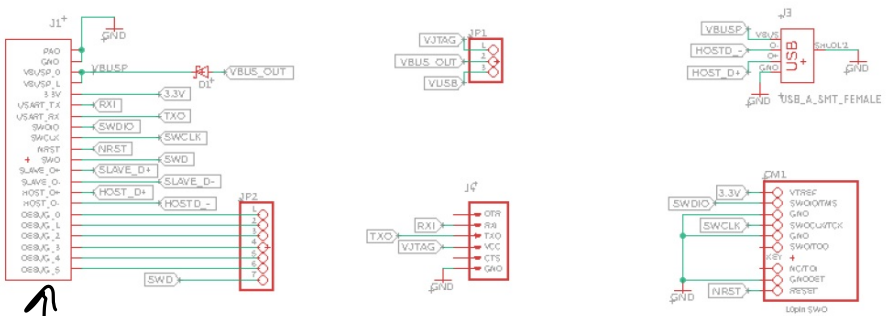
7 Pin (Debug Jumper)

Voltage Selector 3 Pin Jumper (VUSB or JTAG) Voltage Source

Connector Prototype Board Details

- 2 Layer Board
- trace width 3.048 mm (min)
- Git hub location
  oresat-proto-card/card-debug-board





oresat-edge_connector.lbr

Changes / Suggestions

Done

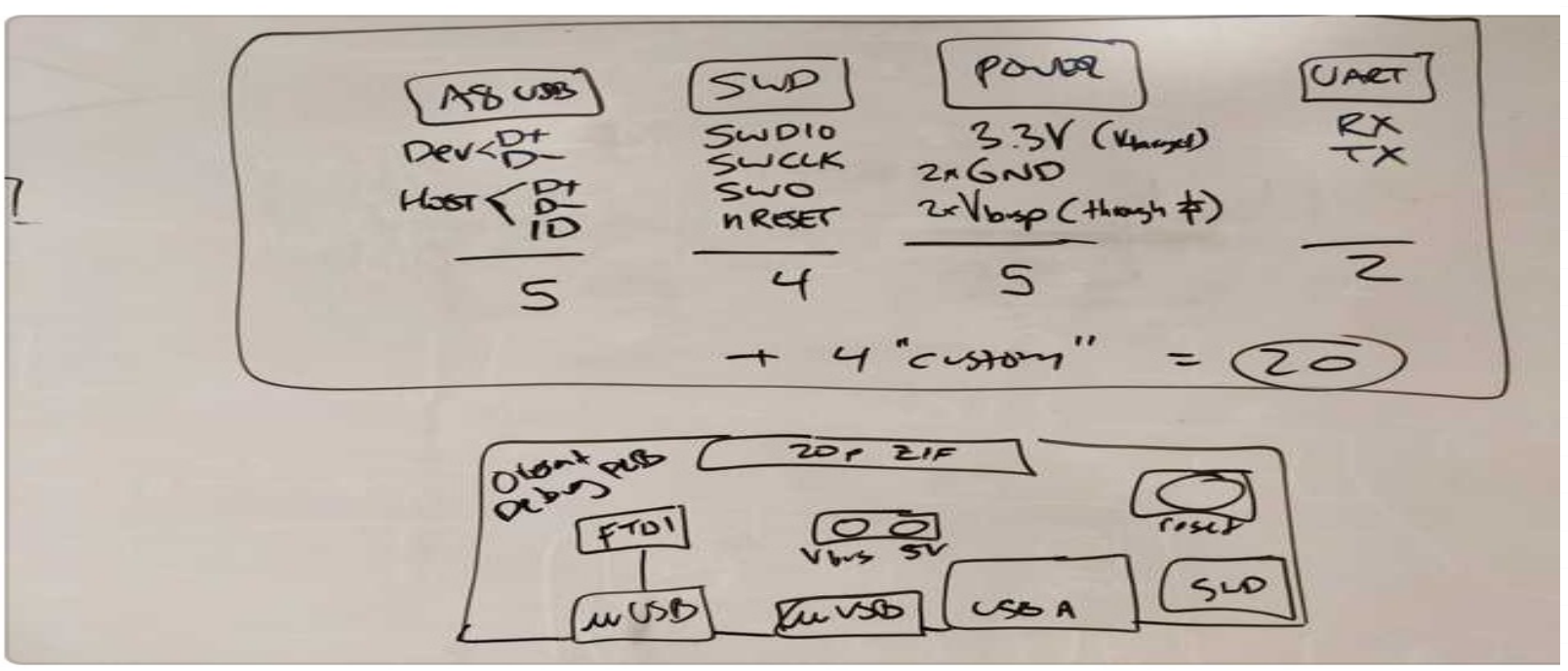
- Instead of a 6 pin FTDI cable which is $19 each, let's actually add another uUSB connector and an actual FTDI USB to serial converter, like an FT232R.
- Don't need the mounting holes. We won't be mounting these to anything.
- VJTAG should be called "VSER" or "~~VFTDI" or something~~g.
- The 5V for the USB Type A host is provided by the card, so you'll need to add a 5V line.
- Double up the ground line on the main connector (the PAD connector isn't actually connected to anything besides the physical pads).
- No such thing as "SWD". It's "SWO". And it should be connected to the JTAG connector's SWO.
- Go ahead and center the FFC connector on the board just because.
- Change to 2 layer OSH Park design rules.
- Don't need the resistors in the USB line.
- Put the part number of the required FFC cable on the schematic.

(edited)

And then just to confuse you, this board should go into the protocard repo, maybe in oresat-proto-card/card-debug-board

OreSat debug pinout proposal.

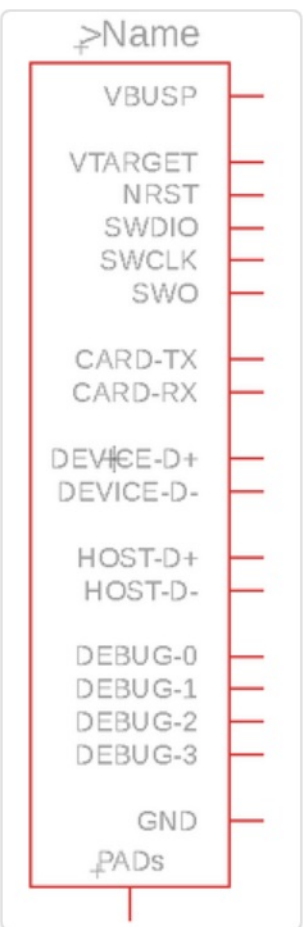
6054



Pins on top, breakout board on bottom.

Here's the pinout, which is supposed to (1) let the USB be high speed still and (2) not mind too much when the FFC cable shorts between pins, as it does sometimes.

```
01 - VBUSP
02 - VBUSP
03 - GND
04 - DEV-D+
05 - DEV-D-
06 - GND
07 - HOST-D+
08 - HOST-D-
09 - GND
10 - NRESET
11 - VTARGET
12 - STM-RX
13 - STM-TX
14 - SWDIO
15 - SWCLK
16 - SWO
17 - DEBUG-0
18 - DEBUG-1
19 - DEBUG-2
20 - DEBUG-3
```



↑ oresat-edge_connector.lbr

Miles Simpson 11:26 AM

This was in the C3 capstone chat:

```
Instead of a 6 pin FTDI cable which is $19 each, let's actually add another uUSB connector and an actual FTDI USB to serial converter, like an FT232R.
```

Nah, I would suggest the crossover from the FTDI perspective if we broke out the UART as well. So like this:

```
[FT232R_TX-->BREAKOUT_UART_RX-->CONNECTOR_RX]-->CABLE_RX-->[CONNECTOR_RX-->MCU_RX]
[FT232R_RX-->BREAKOUT_UART_TX-->CONNECTOR_TX]-->CABLE_TX-->[CONNECTOR_TX-->MCU_TX]
```

I put `[ ]` around the breakout and card side of things to group them

`BREAKOUT_UART_*X` being a pinout if we want those

My point was to ensure the connector symbol in the card schematics was just a straight through connection

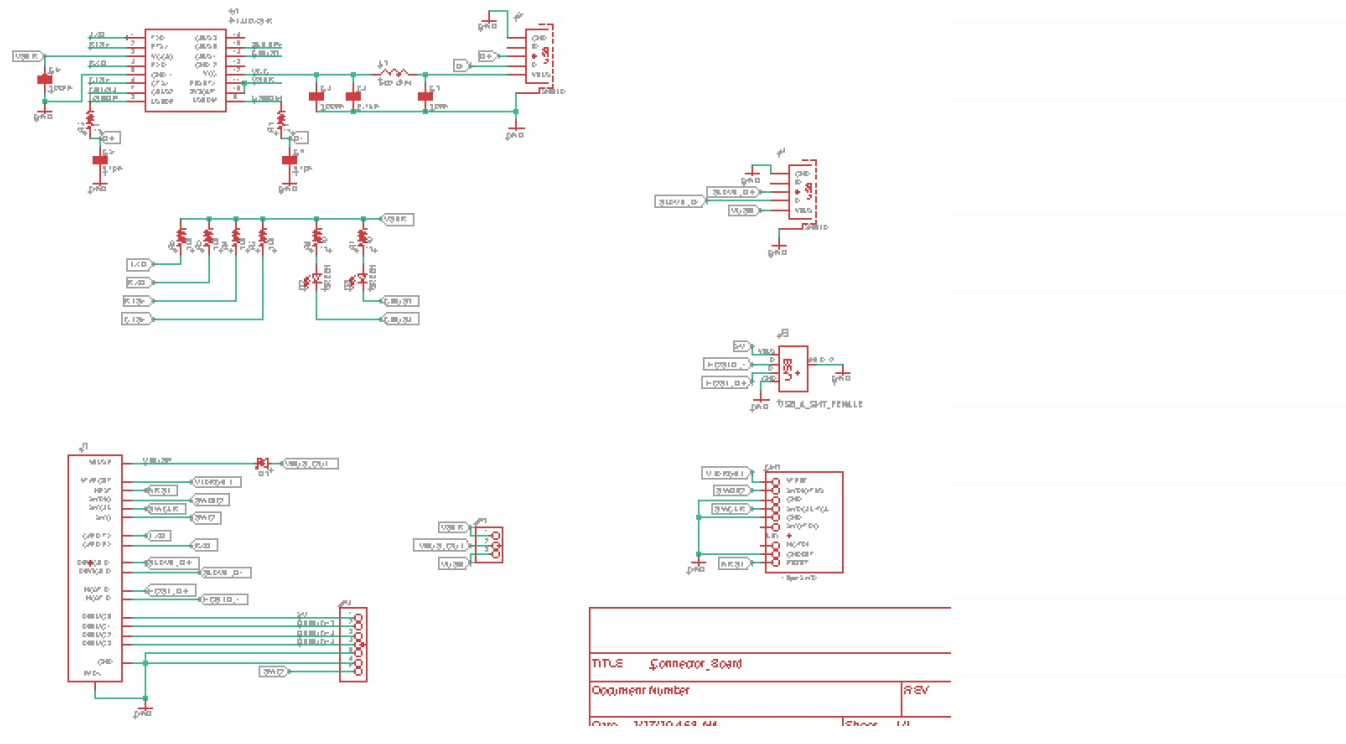
The idea being to present TX and RX as they were on the connector coming off a card

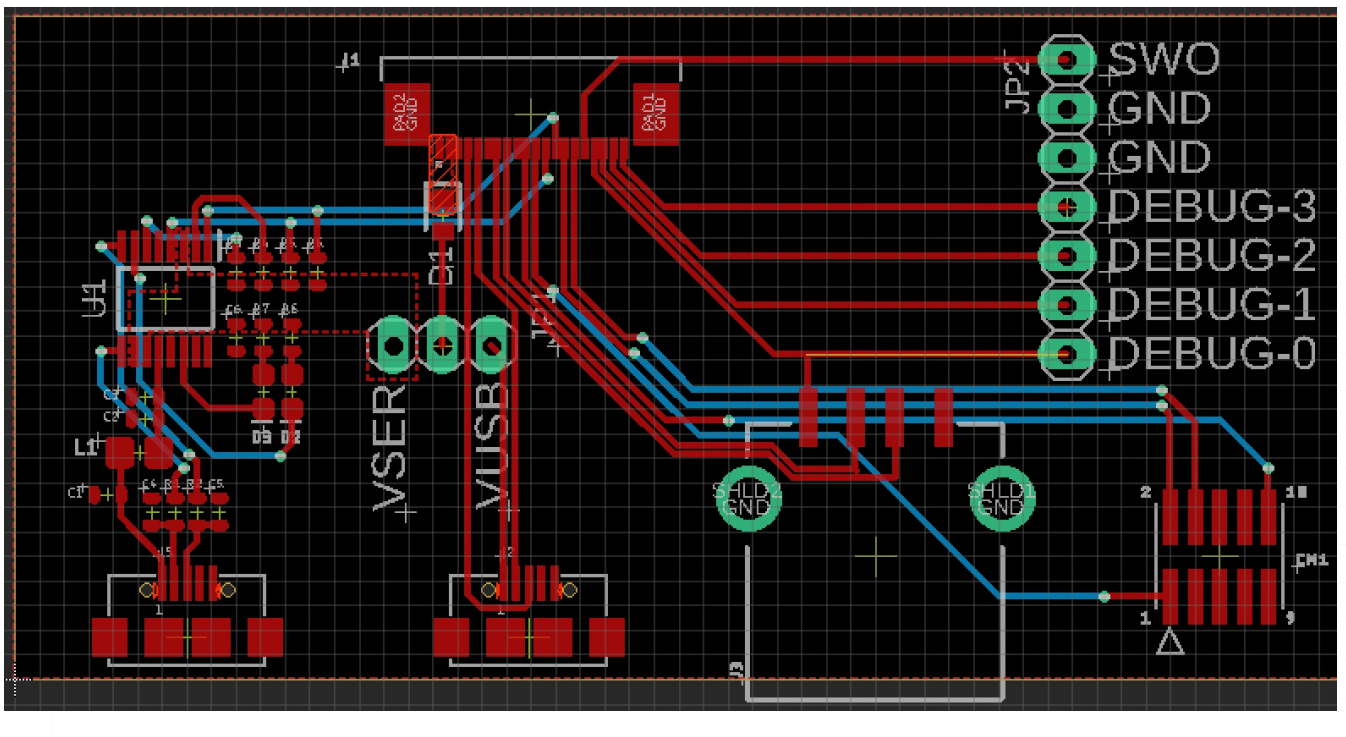
Making the card a black box, and you know that TX on the black box is TX, and RX on the black box is RX

FTDI USB to Serial converter Suggestions

	Part Name	Reference	Mouser Part	Unit Price
X	FT232R	- Andrew Greenburg	895-FT232RL	$4.50
X	pl2303-hx	- Russell Senior	595-TUSB3410VF	$6.74
X	CH340	- Oliver R	CH340	N/A
X	CP2102	- Oliver R	CP2102	Obsolete
✓	FT230XS-R	- Marc C	895-FT230XS-R	$2.04
X	FT231XS-R	- Marc C	895-FT231XS-R	$2.04

Changes Made





Changes / Fix Made

- route the USB D- D+, as
- differential pair (mostly length matched)
- route SWO to SWD (not to breakout)
- Add Jumper select for HOST5V / DEBUG-0
- Add P-Channel MOSFET to Power from USB via

Power Choices	Jumper
1) USB Slave	VUSB to VBUS_OUT
2) USB UART (USB)	VUSB to VBUS_OUT
3) USB UART (UART)	VSER to VBUS_OUT

- Made Power traces wider
- 20 Conductor 0.5 mm pitch FFC Molex 15166-0209
- Clear DRC + ERC Errors