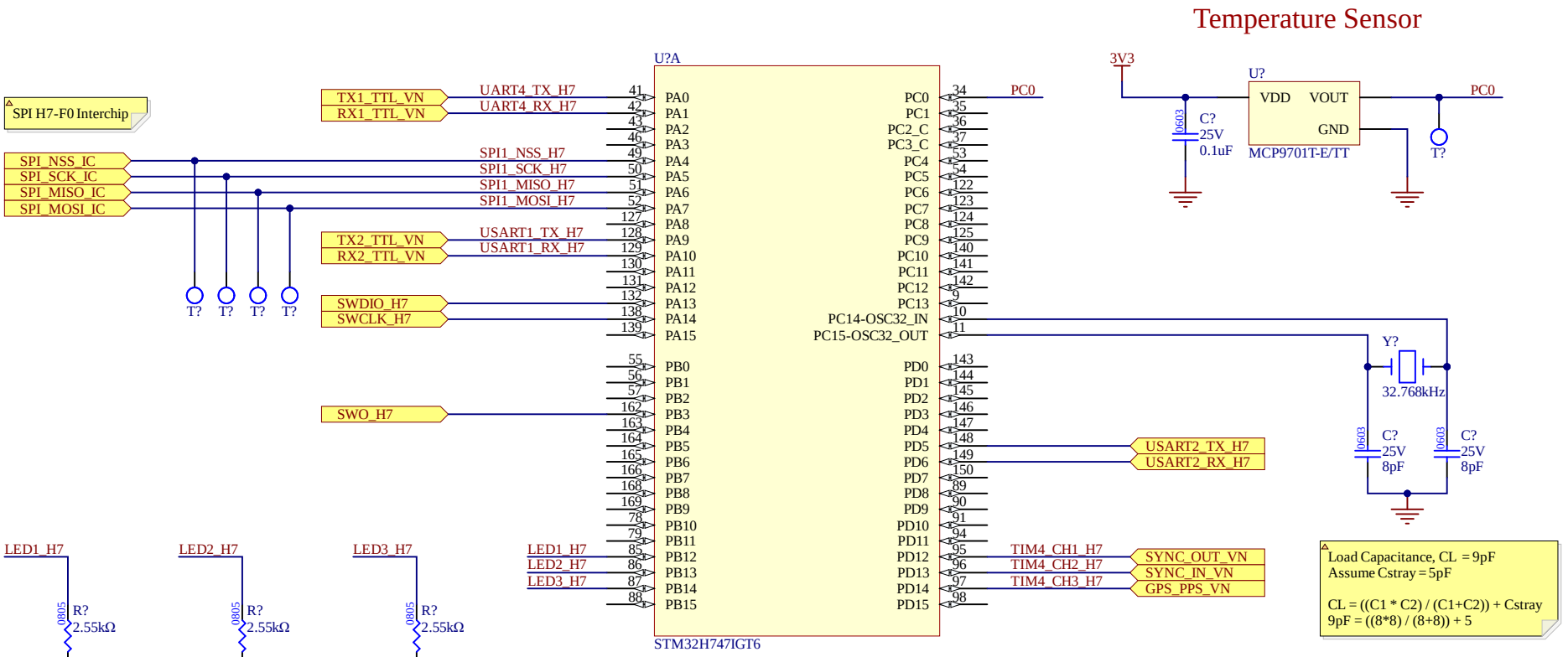
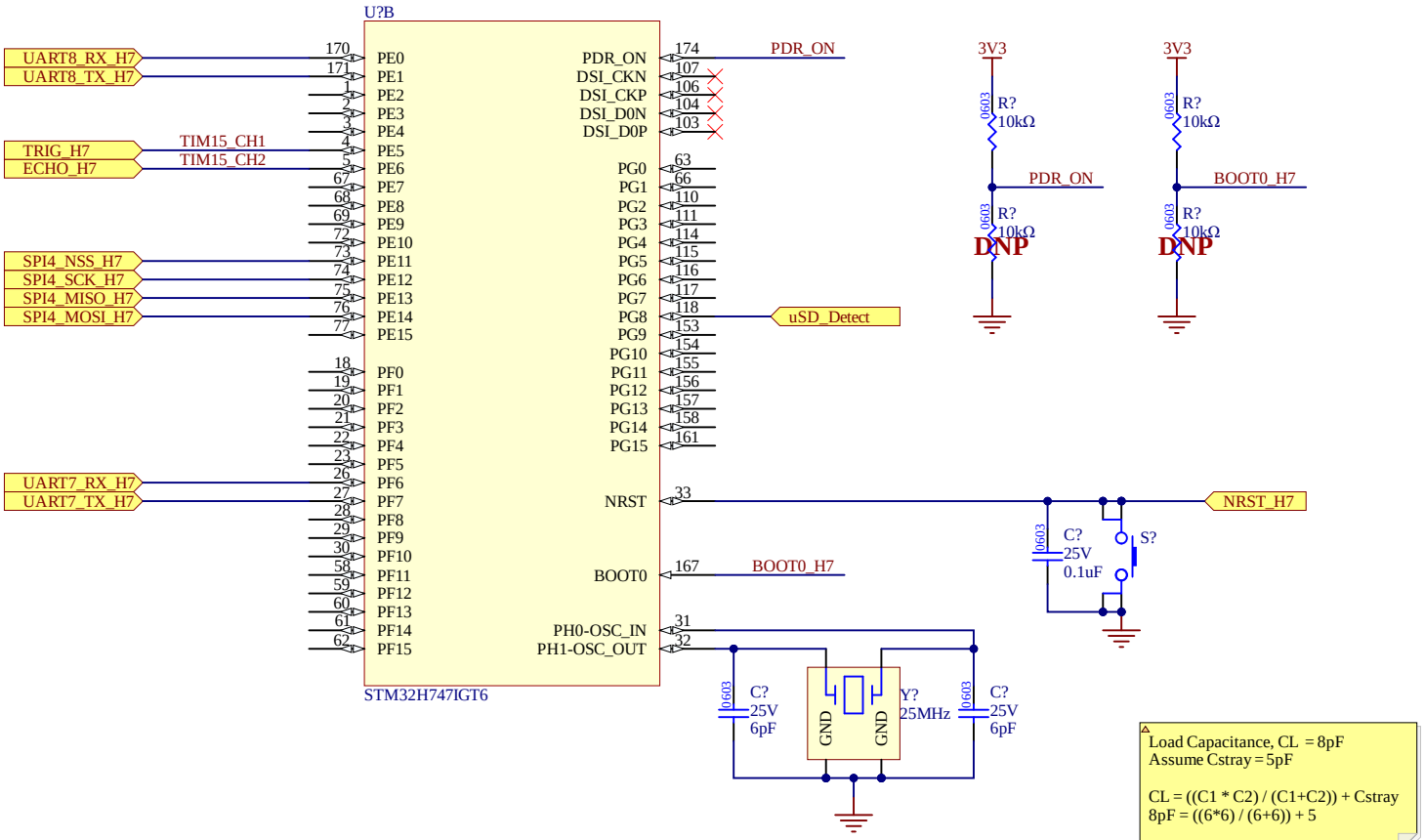
Zeropilot 2.0



WARG	Waterloo Aerial Robotics Group 200 University Ave W Waterloo, Ontario, Canada N2L 3G1
PROJECT: Zeropilot 2.0.PrjPcb, [No Variations]	REVISION: 1
DOCUMENT: H7PartA.SchDoc	MODIFIED: 10/29/2021
ENGINEER: Kiran Surendran	REVIEWER: *
	SHEET 1 OF 4

*



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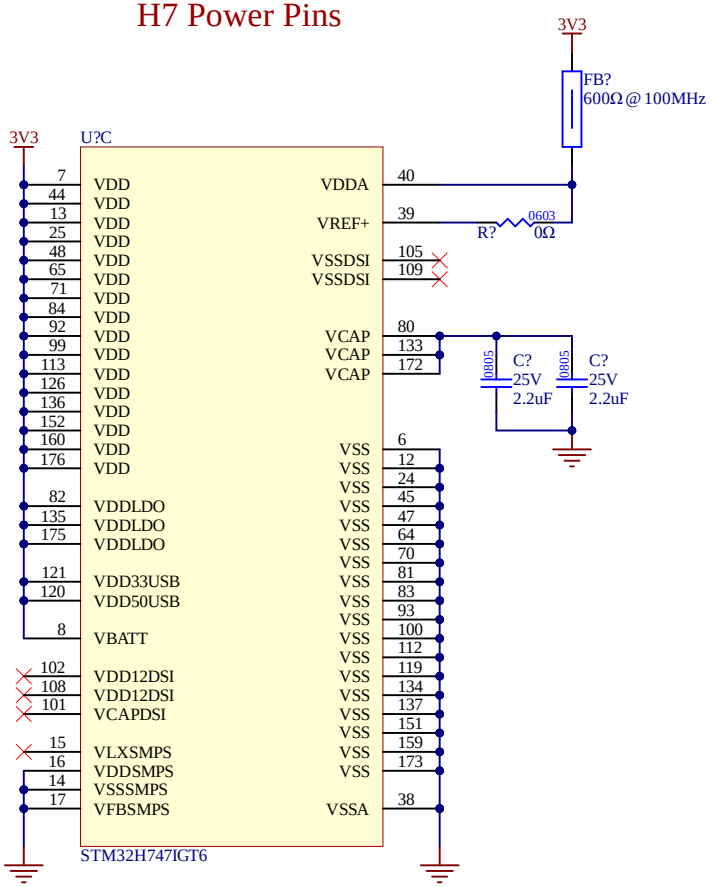
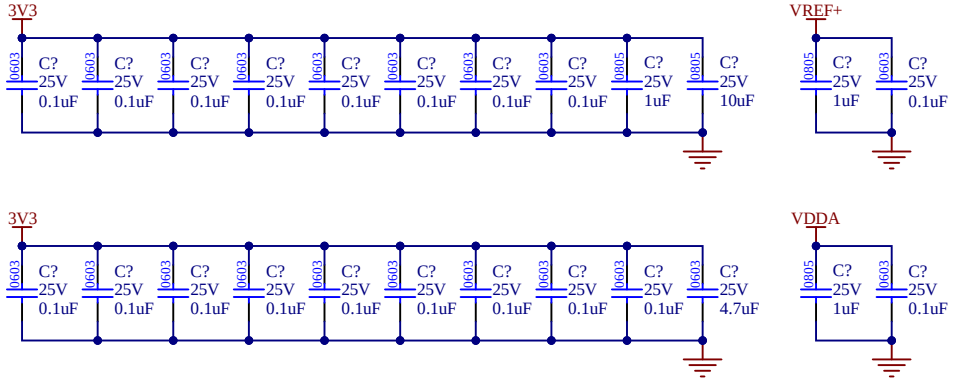
PROJECT	Zeropilot 2.0.PrjPcb, [No Variations]	REVISION	*
DOCUMENT	H7PartB.SchDoc	MODIFIED	10/29/2021
ENGINEER	Kiran Surendran	REVIEWER	*
		SHEET	2 OF 4

*

H7 Power Pins



H7 Bypass Capacitors



VDD Bypass: (0.1uF x 16) + (10uF x 1)
VDDLDO Bypass: 4.7uF x 1
VDDUSB Bypass: (0.1uF x 1) + (1uF x 1)
Should be placed as close as possible to each VDD pin.

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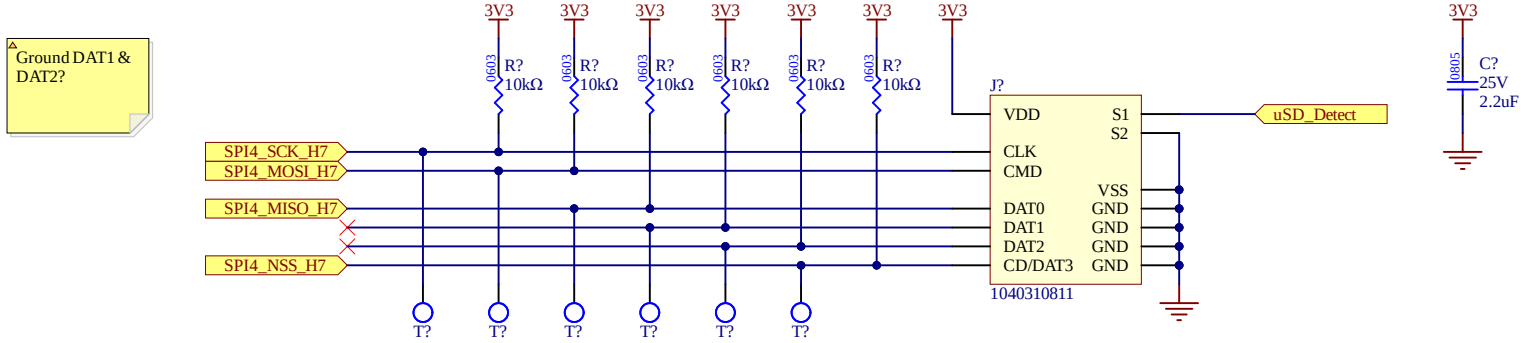
PROJECT: Zeropilot 2.0.PrjPcb, [No Variations]	REVISION: *
DOCUMENT: H7Power.SchDoc	MODIFIED: 10/31/2021
ENGINEER: Kiran Surendran	REVIEWER: *
	SHEET 3 OF 4

*

microSD Connector



WARG	Waterloo Aerial Robotics Group 200 University Ave W Waterloo, Ontario, Canada N2L 3G1	
PROJECT: Zeropilot 2.0.PrjPcb, [No Variations]		REVISION: *
DOCUMENT: microSD_Connector.SchDoc		MODIFIED: 10/29/2021
ENGINEER: Kiran Surendran	REVIEWER: *	SHEET 4 OF 4

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SPI_IC : Interchip to H7 (SPI1 of F0)
SPI2_F0 & I2C1_F0 & SPI1_NSS_F0 : Header

U?

STM32F030RCT6

Not using internal ADC so ignoring the requirement of providing VDDA first on startup.

Internal pull up resistor (40kohms) is present on F0.

HSE:
CL=((C1*C2)/(C1+C2))+Cstray
CL=10pF, Assume Cstray=5pF,
Assert C1=C2
10pF=((C1*C1)/(2C1))+5pF
C1=C2=10pF

LSE: 32.768kHz oscillator is specified in data sheet. Both capacitors are identical and according to the data sheet should be high quality external ceramic capacitors with 5 pF to 20 pF capcitance.

F0 Bypass Capacitors

Decoupling capacitor placement guide is found in the datasheet on page 42 of the datasheet.

F0 Debugging LEDs

2 Blue LEDs
Vin - Vfeedfwd = I x R
0.5mA=0.0005a target: 2.8V Fwd: 3V3 Vin: R ?
(3.3V)-(2.8V)=(0.0005A)xR
R=1000ohms=1kohms

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PROJECT: Zeropilot 2.0.PrjPcb, [No Variations]	REVISION: *
DOCUMENT: F0Chip.SchDoc	MODIFIED: 10/31/2021
ENGINEER: Daniel Puratich	REVIEWER: *
	SHEET * OF *

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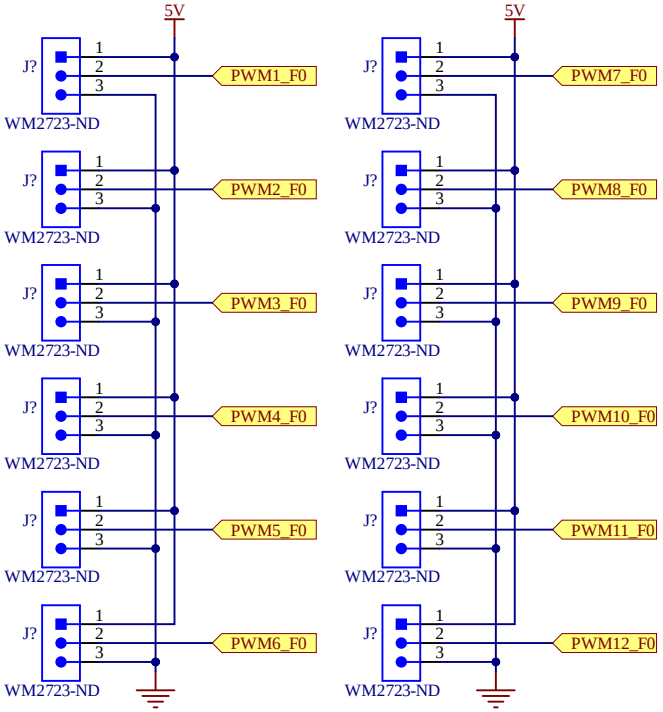
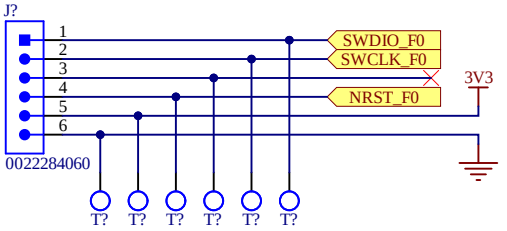
PWM Connectors

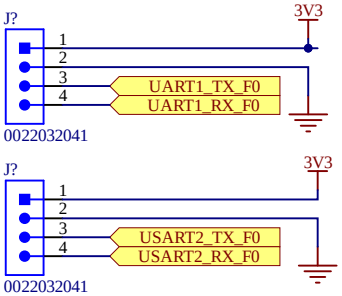


SWD/SWO Connector

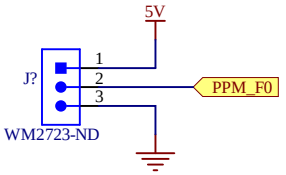


F0 doesn't have a SWO pin. Keeping it a 6 pin to be the same as the H7 SWD/SWO Connector

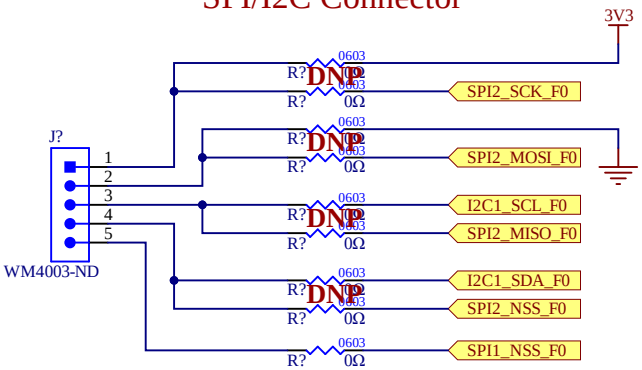
UART Connectors



PPM Connector



SPI/I2C Connector



F0 SPI2 / I2C1 header can be switched between the two by soldering or unsoldering the 0ohm resistors. Do not place both at the same time as this will cause a short!
Unsure if the last chip select needs a 0ohm resistor tho we can discuss during design review.

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ENGINEER: Daniel Puratich / REVIEWER: *	SHEET * OF *

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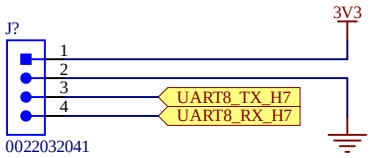
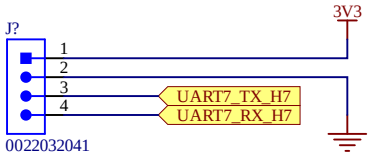
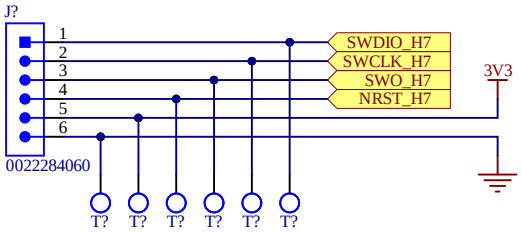
UART Connectors

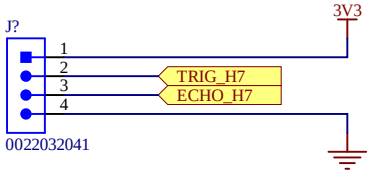




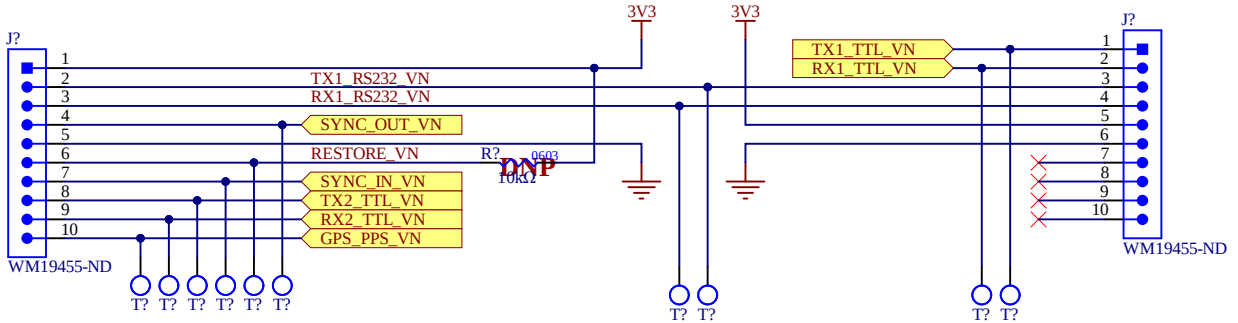
SWD/SWO Connector



Ultrasonic Connector



VN-300 Connector



All VN inputs from VN-300 connect to the H7 microcontroller in H7PartA.SchDoc. TX1/RX1 are optional as the breakout board is also optional. Primary communication will take place over TX2/RX2. VN-300 communication is all asynchronous.

RESTORE_VN details:
- If high at reset, the device will restore to factory default state.
- Internally held low with 10k resistor.

MAX3232 Connector

Header to send the RS-232 lines to https://www.sparkfun.com/products/11189 aka a MAX3232 breakout board for conversion into TTL. In our case the board only performs a bit flip thought it is capable of voltage scaling as well.

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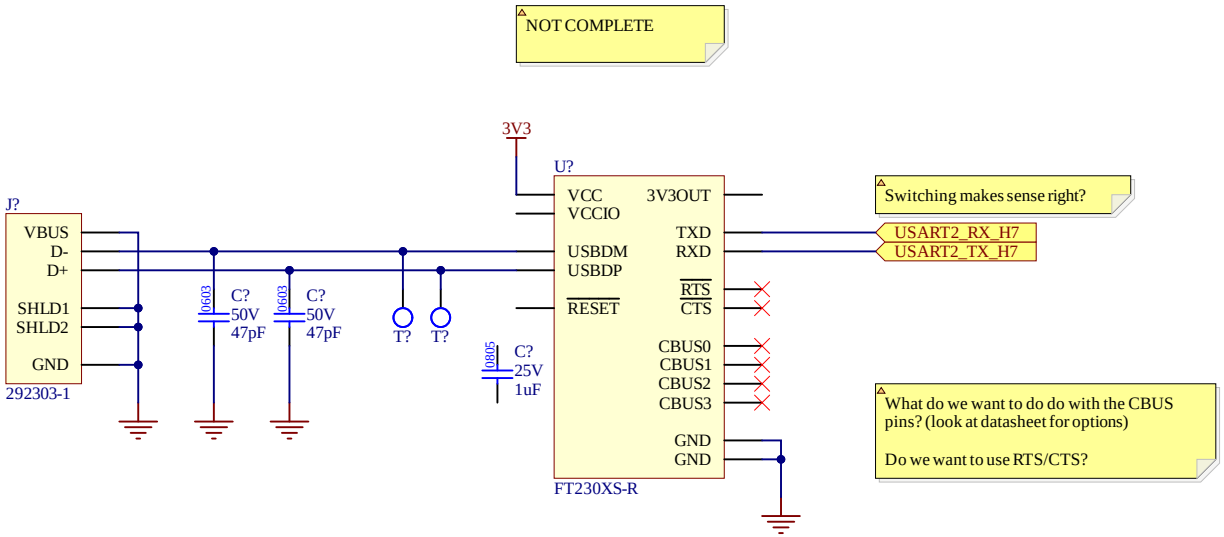
ENGINEER: Kiran Surendran / REVIEWER: *	SHEET * OF *

Jetson USB



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PROJECT: Zeropilot 2.0.PrjPcb, [No Variations]	REVISION: *
DOCUMENT: H7USB.SchDoc	MODIFIED: 10/31/2021
ENGINEER: Kiran Surendran / REVIEWER: *	SHEET * OF *

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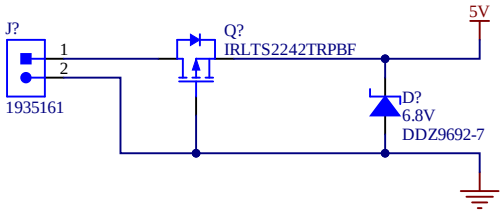
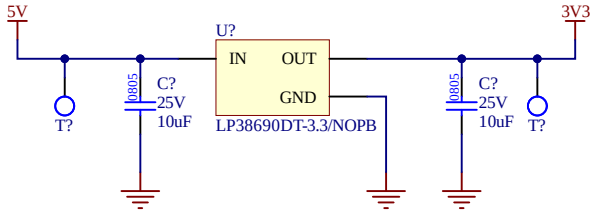
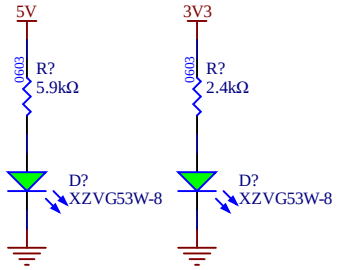
BMS Connector



5V to 3.3V LDO @ 1A Max



Power LEDs



Target current is 0.5mA (value from mentor)
Vin - Vfeedforward = I x R
Vin=5V (from LDO), Vfeedforward=2.1V (typical of LED), I=0.5mA=0.0005A (desired)
(5V)-(2.1V)=(0.0005A)x(R)
R=5800ohms=5.8kohms
Went with 5.9kohms for stock purposes.

Power LED is green.
Target current is 0.5mA (value from mentor)
Vin - Vfeedforward = I x R
Vin=3V3 (from LDO), Vfeedforward=2.1V (typical of LED), I=0.5mA=0.0005A (desired)
(3.3V)-(2.1V)=(0.0005A)x(R)
R=2400ohms=2.4kohms
Resistor can be swapped later if LED is too bright or too dim.

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PROJECT: Zeropilot 2.0.PrjPcb, [No Variations]	REVISION: *
DOCUMENT: LDO.SchDoc	MODIFIED: 10/29/2021
ENGINEER: * / REVIEWER: *	SHEET * OF *