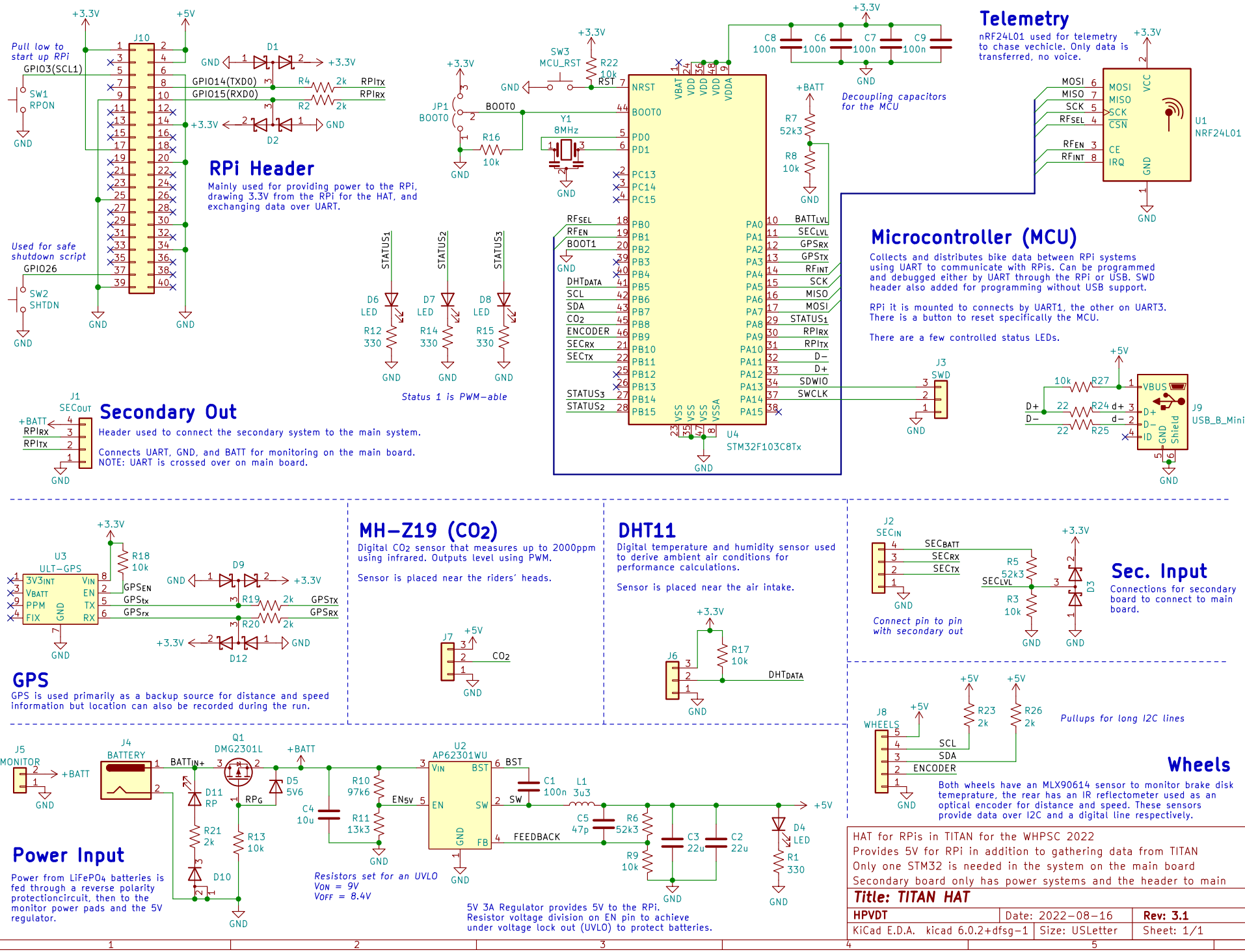
RPi Header
Mainly used for providing power to the RPi, drawing 3.3V from the RPi for the HAT, and exchanging data over UART.
Pull low to start up RPi
GPIO3(SCL1)
GPIO14(TXD0)
GPIO15(RXD0)
Used for safe shutdown script
GPIO26
Secondary Out
Header used to connect the secondary system to the main system.
Connects UART, GND, and BATT for monitoring on the main board.
NOTE: UART is crossed over on main board.
Status 1 is PWM-able
Decoupling capacitors for the MCU
Telemetry
nRF24L01 used for telemetry to chase vechicle. Only data is transferred, no voice.
Microcontroller (MCU)
Collects and distributes bike data between RPi systems using UART to communicate with RPis. Can be programmed and debugged either by UART through the RPi or USB. SWD header also added for programming without USB support.
RPi it is mounted to connects by UART1, the other on UART3.
There is a button to reset specifically the MCU.
There are a few controlled status LEDs.
STM32F103C8Tx
GPS
GPS is used primarily as a backup source for distance and speed information but location can also be recorded during the run.
MH-Z19 (CO2)
Digital CO2 sensor that measures up to 2000ppm using infrared. Outputs level using PWM.
Sensor is placed near the riders' heads.
DHT11
Digital temperature and humidity sensor used to derive ambient air conditions for performance calculations.
Sensor is placed near the air intake.
Sec. Input
Connections for secondary board to connect to main board.
Connect pin to pin with secondary out
Wheels
Pullups for long I2C lines
Both wheels have an MLX90614 sensor to monitor brake disk temeprature, the rear has an IR reflectometer used as an optical encoder for distance and speed. These sensors provide data over I2C and a digital line respectively.
Power Input
Power from LiFePO4 batteries is fed through a reverse polarity protectioncircuit, then to the monitor power pads and the 5V regulator.
Resistors set for an UVLO
VON = 9V
VOFF = 8.4V
5V 3A Regulator provides 5V to the RPi.
Resistor voltage division on EN pin to achieve under voltage lock out (UVLO) to protect batteries.
HAT for RPis in TITAN for the WHPSC 2022
Provides 5V for RPi in addition to gathering data from TITAN
Only one STM32 is needed in the system on the main board
Secondary board only has power systems and the header to main
Title: TITAN HAT
HPVDT
Date: 2022-08-16
Rev: 3.1
KiCad E.D.A. kicad 6.0.2+dfsg-1
Size: USLetter
Sheet: 1/1