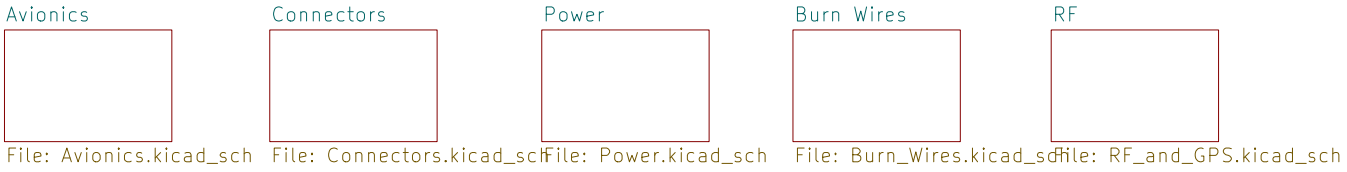
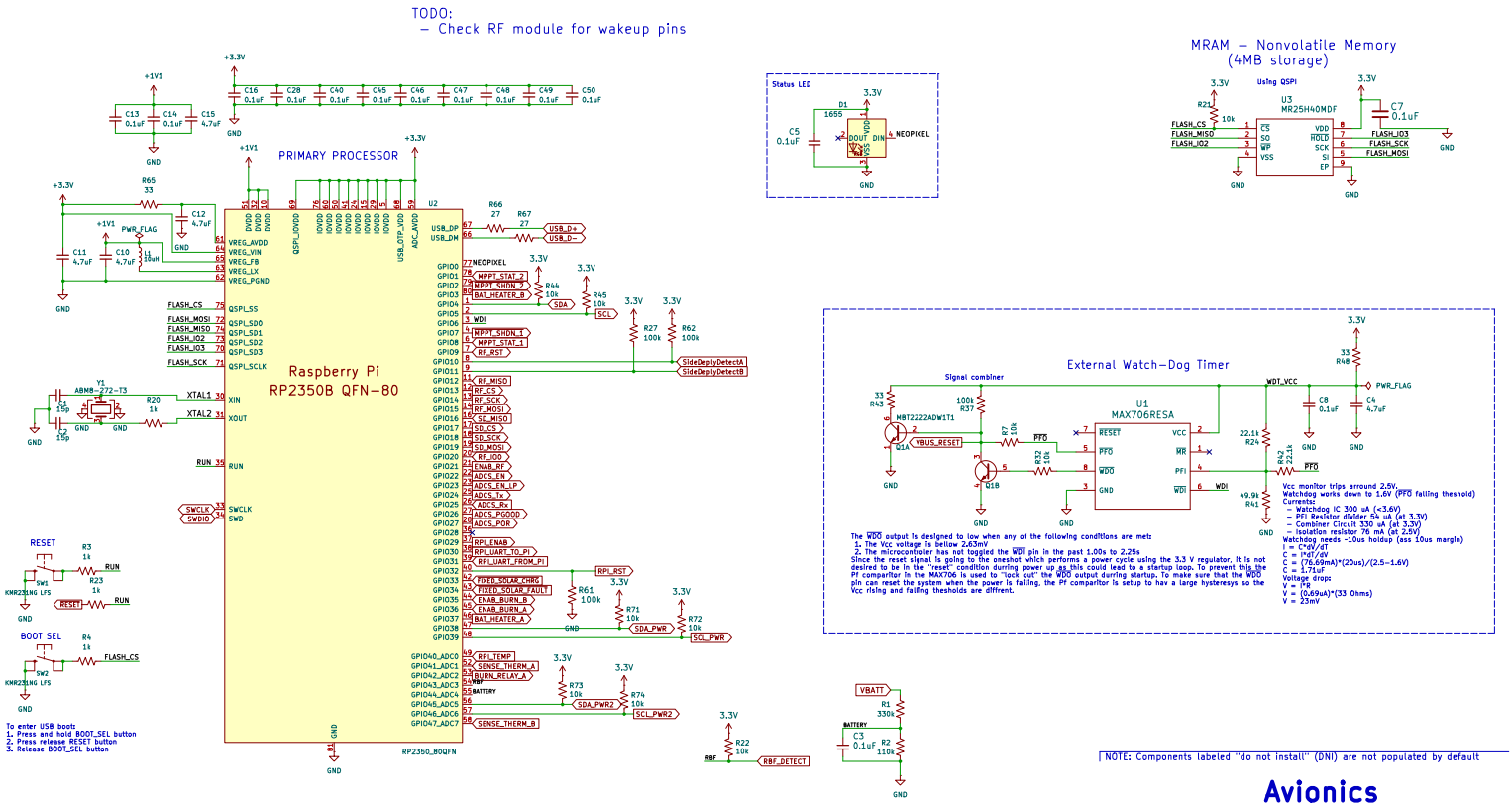
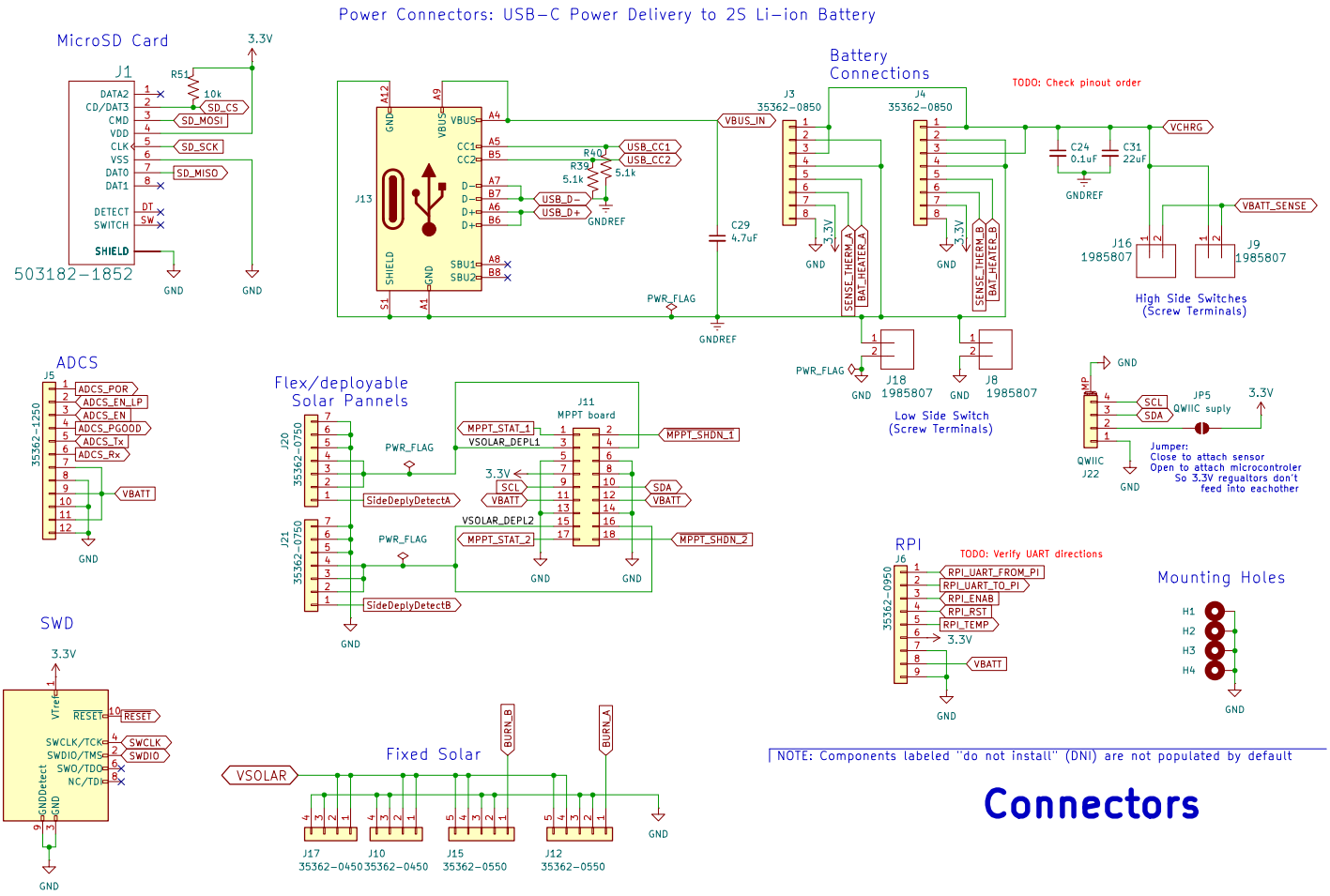
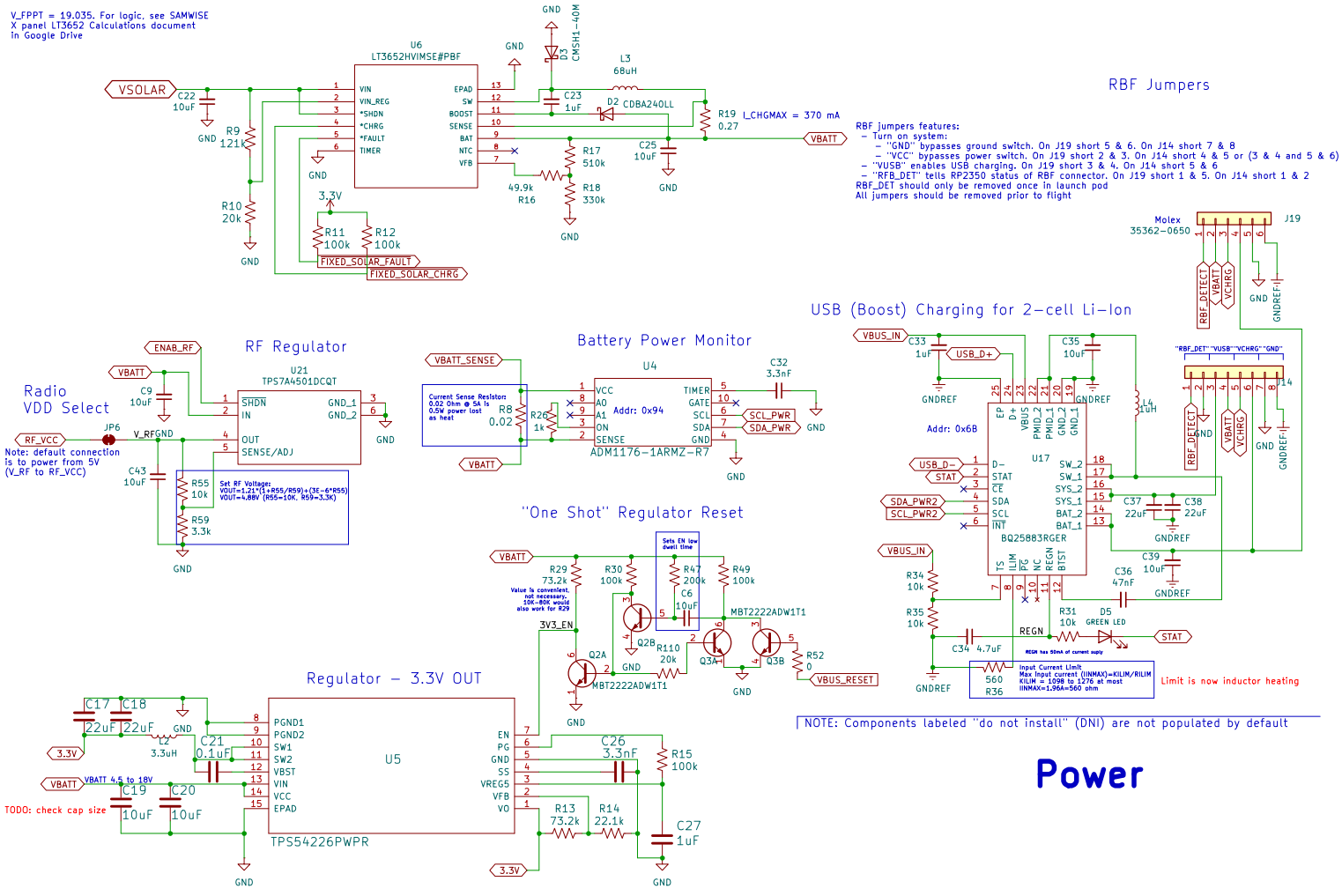
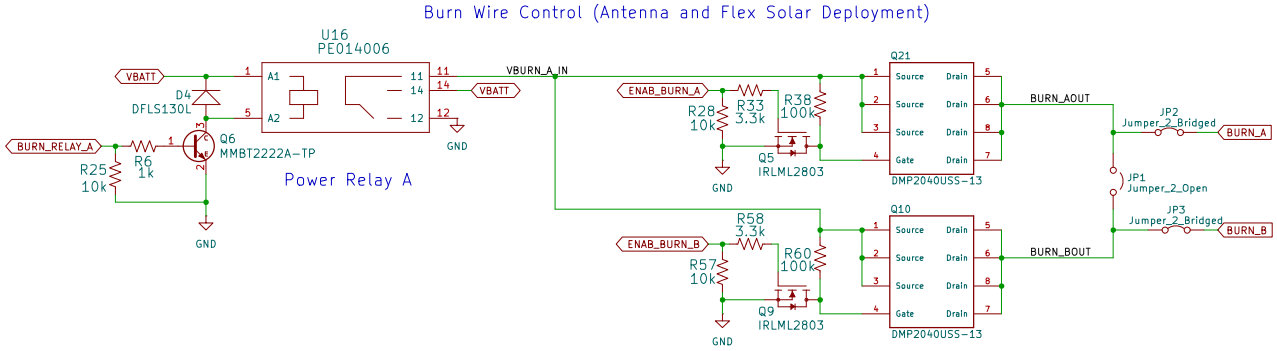

Avionics
File: Avionics.kicad_sch
Connectors
File: Connectors.kicad_sch
Power
File: Power.kicad_sch
Burn Wires
File: Burn_Wires.kicad_sch
RF
File: RF_and_GPS.kicad_sch

PyCubed


TODO:
– Check RF module for wakeup pins
PRIMARY PROCESSOR
Raspberry Pi
RP2350B QFN-80
RP2350_80QFN
Status LED
MRAM – Nonvolatile Memory
(4MB storage)
Using QSPI
U3
MR25H40MDF
External Watch-Dog Timer
Signal combiner
U1
MAX706RESA
MBT2222ADW1T1
RESET
BOOT SEL
To enter USB boots
1. Press and hold BOOT_SEL button
2. Press release RESET button
3. Release BOOT_SEL button
The WDO output is designed to low when any of the following conditions are met:
1. The Vcc voltage is bellow 2.63mV
2. The microcontroler has not toggled the WDI pin in the past 1.00s to 2.25s
Since the reset signal is going to the oneshot which performs a power cycle using the 3.3 V regulator, it is not desired to be in the "reset" condition durring power up as this could lead to a startup loop. To prevent this the Pf comparitor in the MAX706 is used to "lock out" the WDO output durring startup. To make sure that the WDO pin can reset the system when the power is failing, the Pf comparitor is setup to hav a large hysteresys so the Vcc rising and failing thesholds are diffrent.
Vcc monitor trips arround 2.5V.
Watchdog works down to 1.6V (PFO failing theshold)
Currents:
– Watchdog IC 300 uA (<3.6V)
– PFI Resistor divider 54 uA (at 3.3V)
– Combiner Circuit 330 uA (at 3.3V)
– Isolation resistor 76 mA (at 2.5V)
Watchdog needs ~10us holdup (ass 10us margin)
I = C*dV/dT
C = I*dT/dV
C = (76.69mA)*(20us)/(2.5–1.6V)
C = 1.71uF
Voltage drops:
V = I*R
V = (0.69uA)*(33 Ohms)
V = 23mV
NOTE: Components labeled "do not install" (DNI) are not populated by default
Avionics

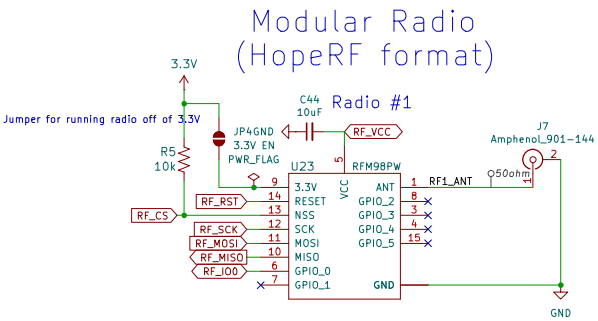

Power Connectors: USB-C Power Delivery to 2S Li-ion Battery
MicroSD Card
J1
503182-1852
Battery Connections
TODO: Check pinout order
J3
35362-0850
J4
35362-0850
J13
C29
4.7uF
C24
0.1uF
C31
22uF
J16
1985807
J9
1985807
High Side Switches
(Screw Terminals)
J18
1985807
J8
1985807
Low Side Switch
(Screw Terminals)
ADCS
J5
35362-1250
Flex/deployable
Solar Pannels
J11
MPPT board
J20
35362-0750
J21
35362-0750
JP5
QWIIC suply
QWIIC
J22
Jumper:
Close to attach sensor
Open to attach microcontroler
So 3.3V regualtors don't
feed into eachother
SWD
J2
RPI
J6
35362-0950
TODO: Verify UART directions
Mounting Holes
H1
H2
H3
H4
Fixed Solar
J17
35362-0450
J10
35362-0450
J15
35362-0550
J12
35362-0550
NOTE: Components labeled "do not install" (DNI) are not populated by default
Connectors


V_FPPT = 19.035. For logic, see SAMWISE
X panel LT3652 Calculations document
In Google Drive
U6
LT3652HVIMSE#PBF
VSOLAR
C22 10uF
R9 121k
R10 20k
VIN
VIN_REG
*SHDN
*CHRG
*FAULT
TIMER
EPAD
SW
BOOST
SENSE
BAT
NTC
VFB
D3 CMSH1-40M
L3 68uH
C23 1uF
D2 CDBA240LL
R19 0.27
I_CHGMAX = 370 mA
VBATT
C25 10uF
R17 510k
49.9k R16
R18 330k
3.3V
R11 100k
R12 100k
FIXED_SOLAR_FAULT
FIXED_SOLAR_CHRG
GND
RBF Jumpers
RBF jumpers features:
– Turn on system:
– "GND" bypasses ground switch. On J19 short 5 & 6. On J14 short 7 & 8
– "VCC" bypasses power switch. On J19 short 2 & 3. On J14 short 4 & 5 or (3 & 4 and 5 & 6)
– "VUSB" enables USB charging. On J19 short 3 & 4. On J14 short 5 & 6
– "RFB_DET" tells RP2350 status of RBF connector. On J19 short 1 & 5. On J14 short 1 & 2
RBF_DET should only be removed once in launch pod
All jumpers should be removed prior to flight
Molex
35362-0650
J19
RBF_DETECT
VBATT
VCHRG
GNDREF
USB (Boost) Charging for 2–cell Li–Ion
VBUS_IN
C33 1uF
USB_D+
USB_D–
STAT
SDA_PWR2
SCL_PWR2
C35 10uF
L4 1uH
U17
BQ25883RGER
C37 22uF
C38 22uF
C39 10uF
C36 47nF
R34 10k
R35 10k
R31 10k
D5 GREEN LED
REGN
C34 4.7uF
560 R36
Input Current Limit
Max Input current (IINMAX)=KILIM/RILIM
KILIM = 1098 to 1276 at most
IINMAX=1.96A=560 ohm
REGN has 50mA of current supply
Limit is now inductor heating
J14
"RBF_DET" "VUSB" "VCHRG" "GND"
RF Regulator
Radio
VDD Select
ENAB_RF
VBATT
C9 10uF
U21
TPS7A4501DCQT
SHDN
IN
GND_1
GND_2
OUT
SENSE/ADJ
RF_VCC
JP6
V_RF
C43 10uF
R55 10k
R59 3.3k
Set RF Voltage:
VOUT=1.21*(1+R55/R59)+(3E-6*R55)
VOUT=4.88V (R55=10K, R59=3.3K)
Note: default connection
is to power from 5V
(V_RF to RF_VCC)
Battery Power Monitor
VBATT_SENSE
Current Sense Resistor:
0.02 Ohm @ 5A is
0.5W power lost
as heat
R8 0.02
R26 1k
U4
ADM1176–1ARMZ–R7
Addr: 0x94
VCC
A0
A1
ON
SENSE
TIMER
GATE
SCL
SDA
C32 3.3nF
SCL_PWR
SDA_PWR
"One Shot" Regulator Reset
Sets EN low dwell time
R29 73.2k
Value is convenient, not necessary. 10K–80K would also work for R29
R30 100k
R47 200k
R49 100k
C6 10uF
Q2B
Q2A
MBT2222ADW1T1
R110 20k
Q3A
Q3B
R52 0
VBUS_RESET
3V3_EN
Regulator – 3.3V OUT
C17 22uF
C18 22uF
L2 3.3uH
C21 0.1uF
C19 10uF
C20 10uF
VBATT 4.5 to 18V
TODO: check cap size
U5
TPS54226PWPR
PGND1
PGND2
SW1
SW2
VBST
VIN
VCC
EPAD
EN
PG
SS
VREG5
VFB
VO
C26 3.3nF
R15 100k
R13 73.2k
R14 22.1k
C27 1uF
NOTE: Components labeled "do not install" (DNI) are not populated by default
Power



NOTE: Components labeled "do not install" (DNI) are not populated by default

Burn Wires



NOTE: Components labeled "do not install" (DNI) are not populated by default

Radio, GPS, Payloads