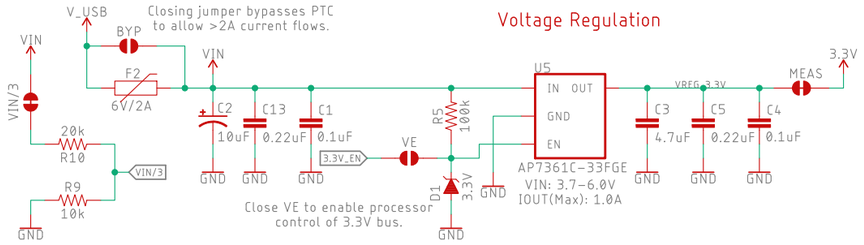
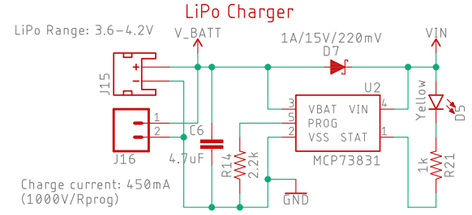
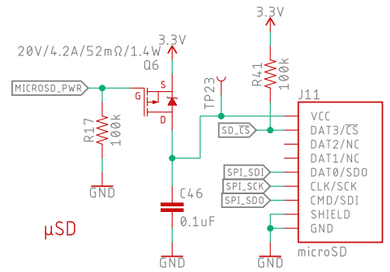
Voltage Regulation



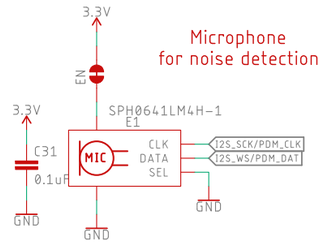
LiPo Charger



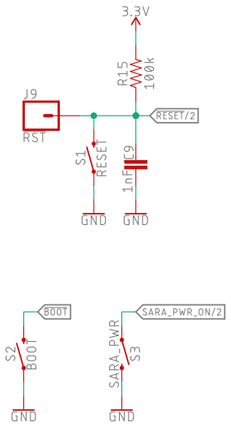
µSD



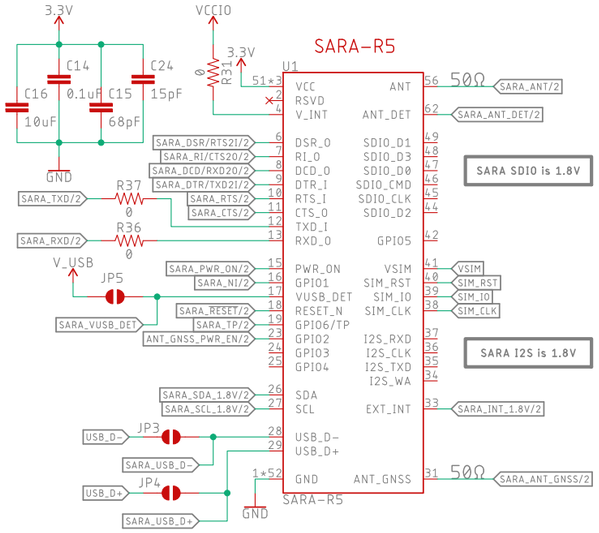
Microphone for noise detection



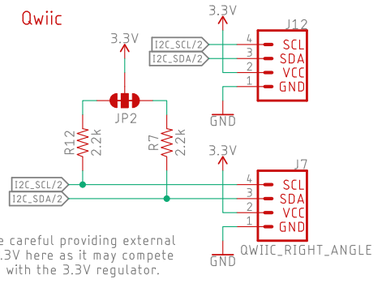
Switches



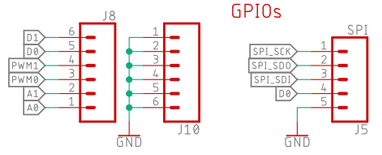
SARA-R5



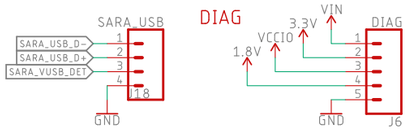
Qwiic



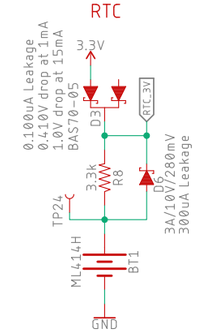
GPIOs



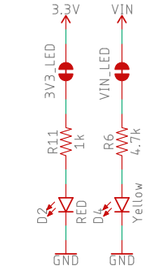
DIAG



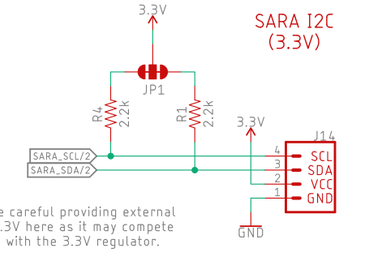
RTC



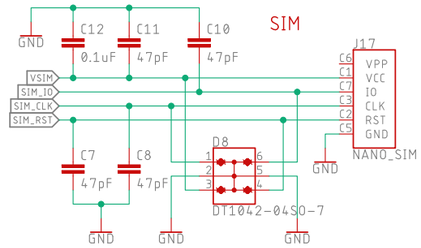
LEDs



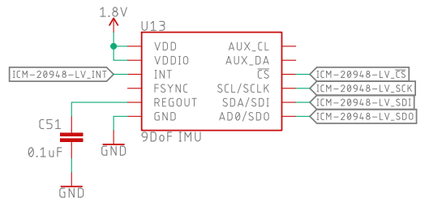
SARA I2C (3.3V)



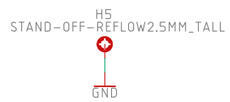
SIM



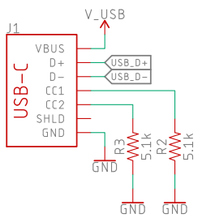
ICM-20948 IMU



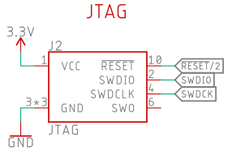
H5



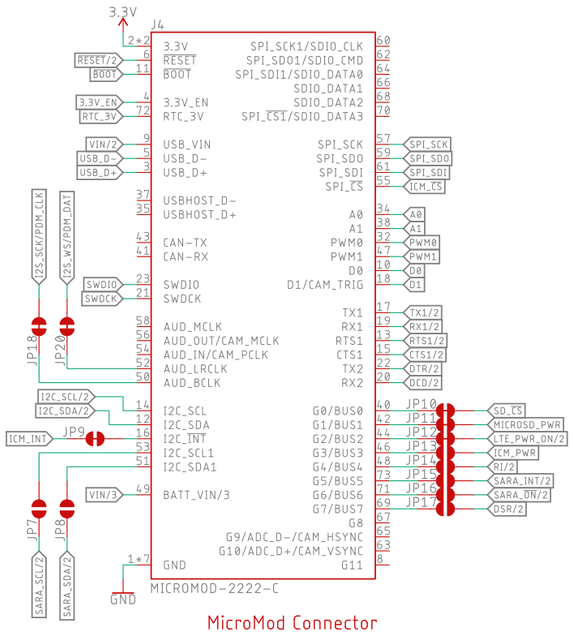
USB



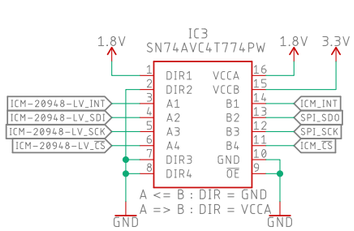
JTAG

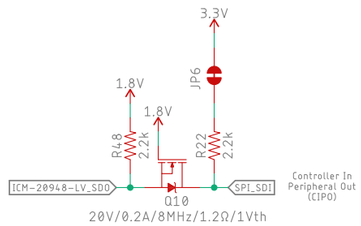


MicroMod Connector

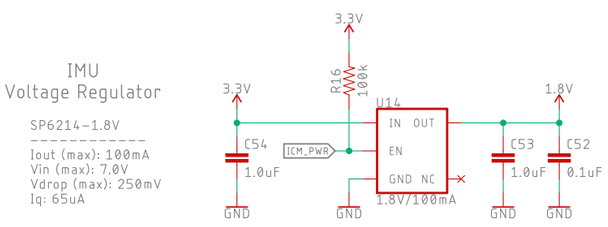


IMU Level Shifting





IMU Voltage Regulator



Special Instructions

TITLE: MicroMod_Asset_Tracker

Design by: Paul Clark

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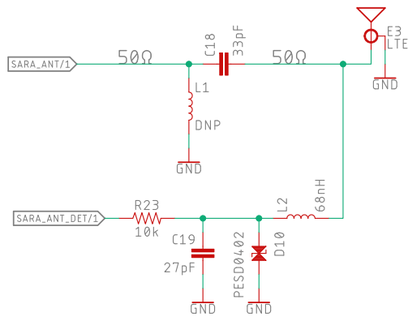
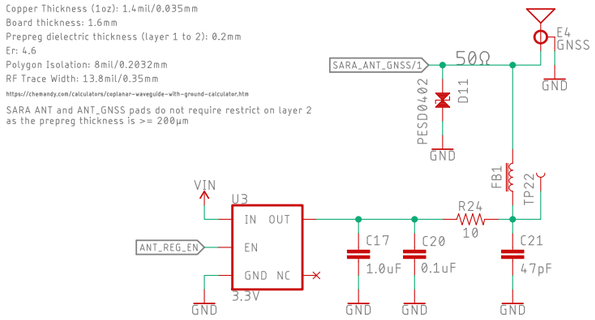


LTE Antenna

Microstrip Calculation:
Copper Thickness (1oz): 1.4mil/0.035mm
Board thickness: 1.6mm
Prepreg dielectric thickness (layer 1 to 2): 0.2mm
Er: 4.6
Polygon Isolation: 8mil/0.2032mm
RF Trace Width: 13.8mil/0.35mm
https://chemandy.com/calculators/coplanar-waveguide-with-ground-calculator.htm

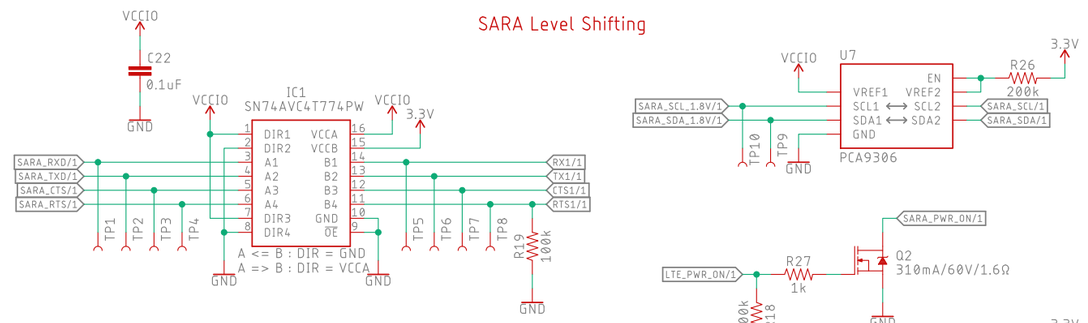
SARA ANT and ANT_GNSS pads do not require restrict on layer 2 as the prepreg thickness is >= 200µm



GNSS Antenna

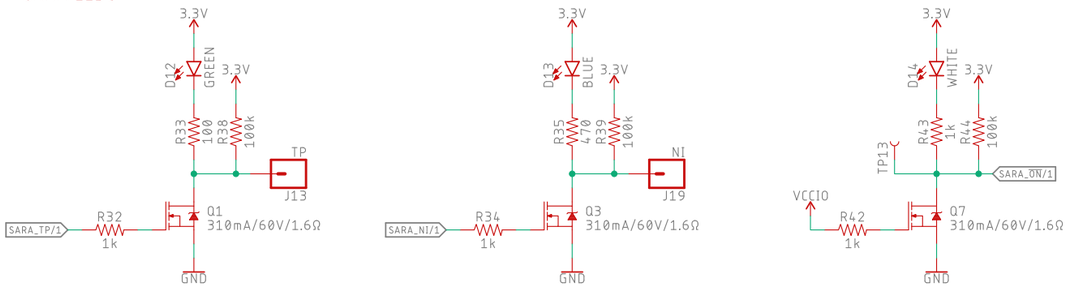
AP2112K-3.3V
3.3V @ 600mA
Iq = 50µA

SARA Level Shifting

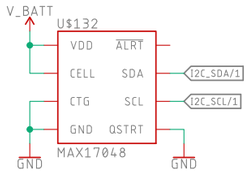


Change jumper to reverse the direction of DSR for 2 UART communication

SARA LEDs

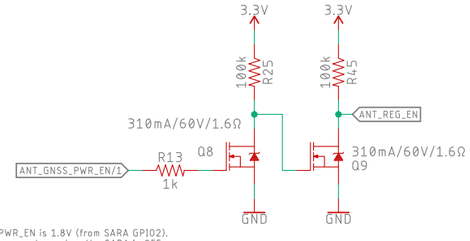


Battery Fuel Gauge



I2C Address = 0x36

GNSS Active Antenna Power Enable



ANT_GNSS_PWR_EN is 1.8V (from SARA GPIO2).
To minimise power draw when the SARA is OFF,
ANT_REG_EN needs to be low when ANT_GNSS_PWR_EN is low.

SARA-R5 VCC Design Notes:

VCC: Min. 3.3V Typ. 3.8V Max. 4.4V
VCC Extended: Min. 3.0V Max. 4.5V

Worst case:
Maximum current draw during Tx: 395mA
Estimated current for other components: 100mA
Total maximum current draw: ~500mA
AP7361C-33 drop out voltage: ~170mV at: 500mA output current; Vout = 3.3V; 25°C
D7 LSM115J Schottky diode forward voltage: ~210mV at: 500mA; 25°C
AP7361C 3.3V output will start to fall when the battery voltage falls below 3.68V at 500mA
For a typical 2000mAh LiPo battery discharging at 500mA (0.25C), we would expect 3.68V to be reached when the battery is approximately 50% discharged.

Typical:
Typical current draw during Tx/Rx: 195mA at 23dBm
Estimated current for other components: 100mA
Total typical current draw: ~300mA
AP7361C-33 drop out voltage: ~100mV at: 300mA output current; Vout = 3.3V; 25°C
D7 LSM115J Schottky diode forward voltage: ~180mV at: 300mA; 25°C
AP7361C 3.3V output will start to fall when the battery voltage falls below 3.58V at 300mA
For a typical 2000mAH LiPo battery discharging at 300mA (0.15C), we would expect 3.58V to be reached when the battery is approximately 90% discharged.

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Design by: Paul Clark	REV: v11
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