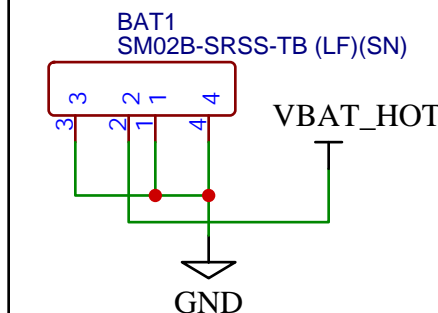
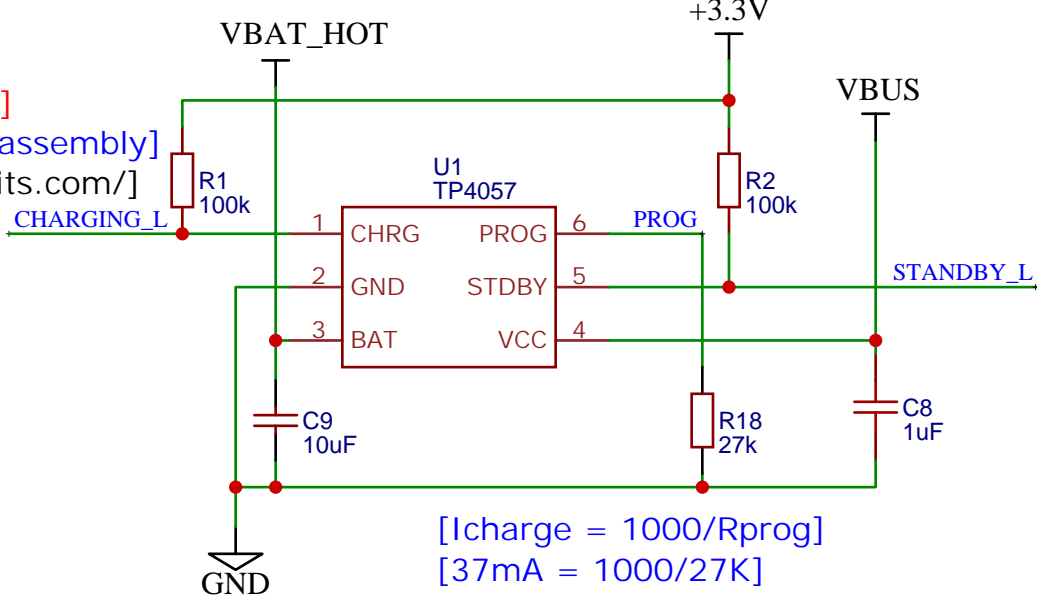


[JST Connector requires..]
[VREF/GND on pin 1 and V+ on pin 2]
[Battery plug just match PCB receptacle!!!]
[Will populate JST/BAT after primary-side assembly]
[Battery: P/N ASR00072, <https://tinycircuits.com/>]



[40mA 1C Lipo, LxWxH 23x10x4mm]



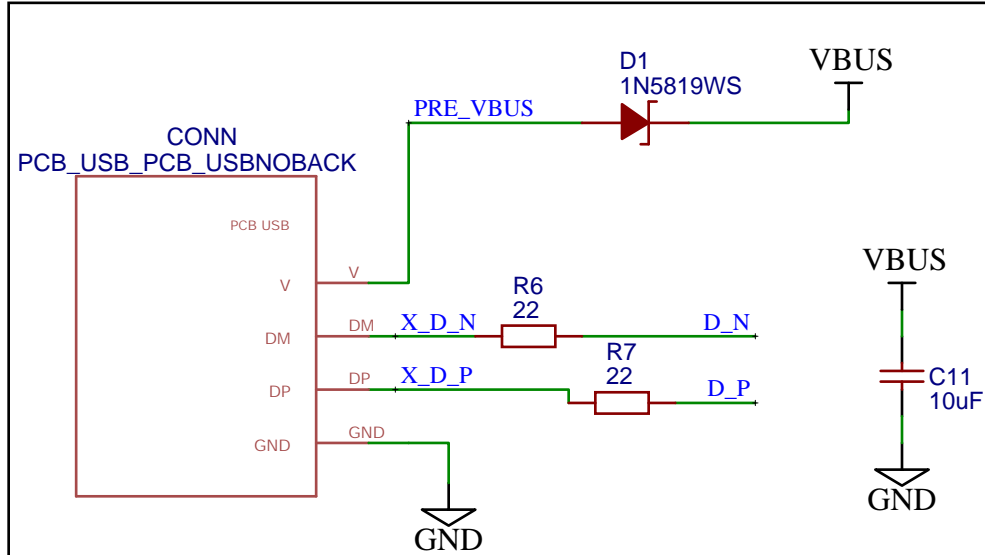
[Battery & Charger]

[To safely charge battery..]
[Select LIPO BAT with 1C >= 37mA]

[protection circuit on bat package]

[Icharge = 1000/Rprog]
[37mA = 1000/27K]

checked



[USB]

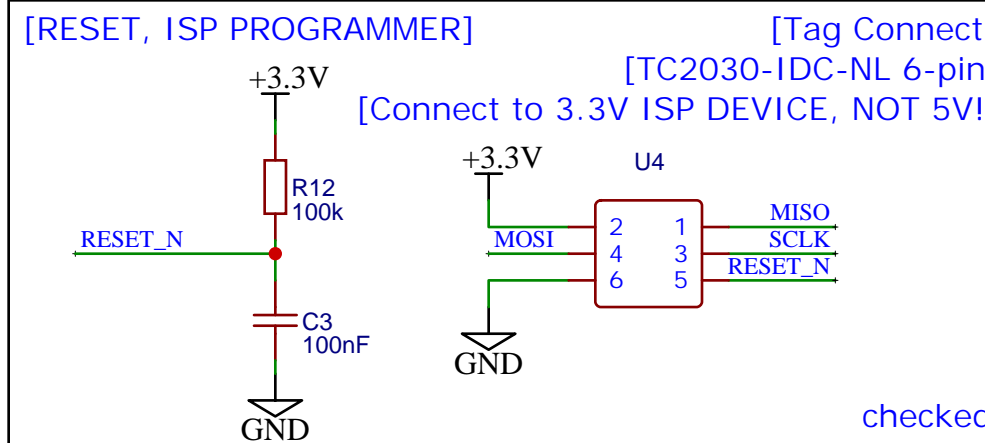
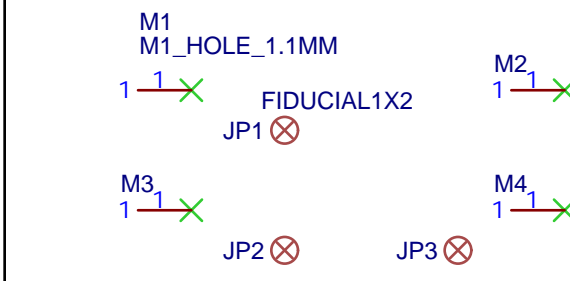
[Schottky Diode Reverse Polarity Protection]
[Temperature Rise Analysis]
[Iload (100mA) * VF (300mV) = 30mW]
[T = R JA * P = 80 °C/W * 0.03 W]
[T = 2.4 °C (~4.32 °F)]

[50 Ohm controlled impedance]

checked

[Mechanical]

checked



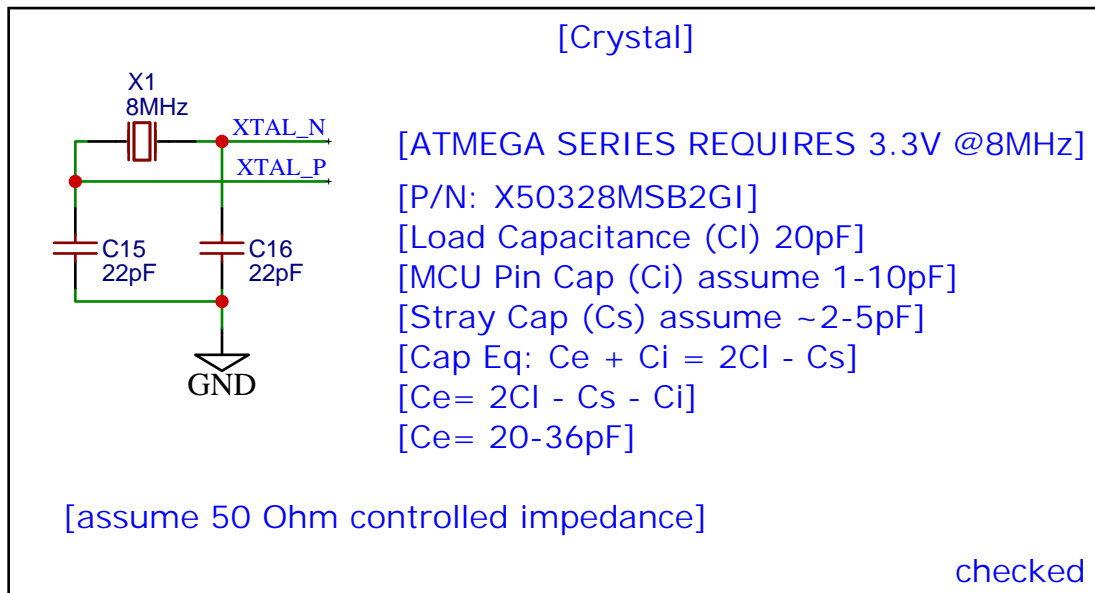
[RESET, ISP PROGRAMMER]

[Tag Connect]

[TC2030-IDC-NL 6-pin]

[Connect to 3.3V ISP DEVICE, NOT 5V!]

checked

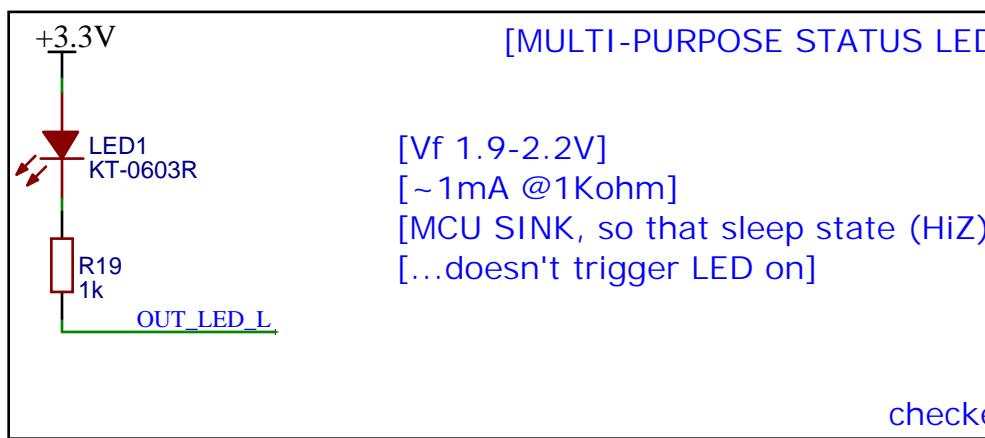


[Crystal]

[ATMEGA SERIES REQUIRES 3.3V @8MHz]

[P/N: X50328MSB2GI]
[Load Capacitance (Ci) 20pF]
[MCU Pin Cap (Ci) assume 1-10pF]
[Stray Cap (Cs) assume ~2-5pF]
[Cap Eq: Ce + Ci = 2Ci - Cs]
[Ce= 2Ci - Cs - Ci]
[Ce= 20-36pF]

checked



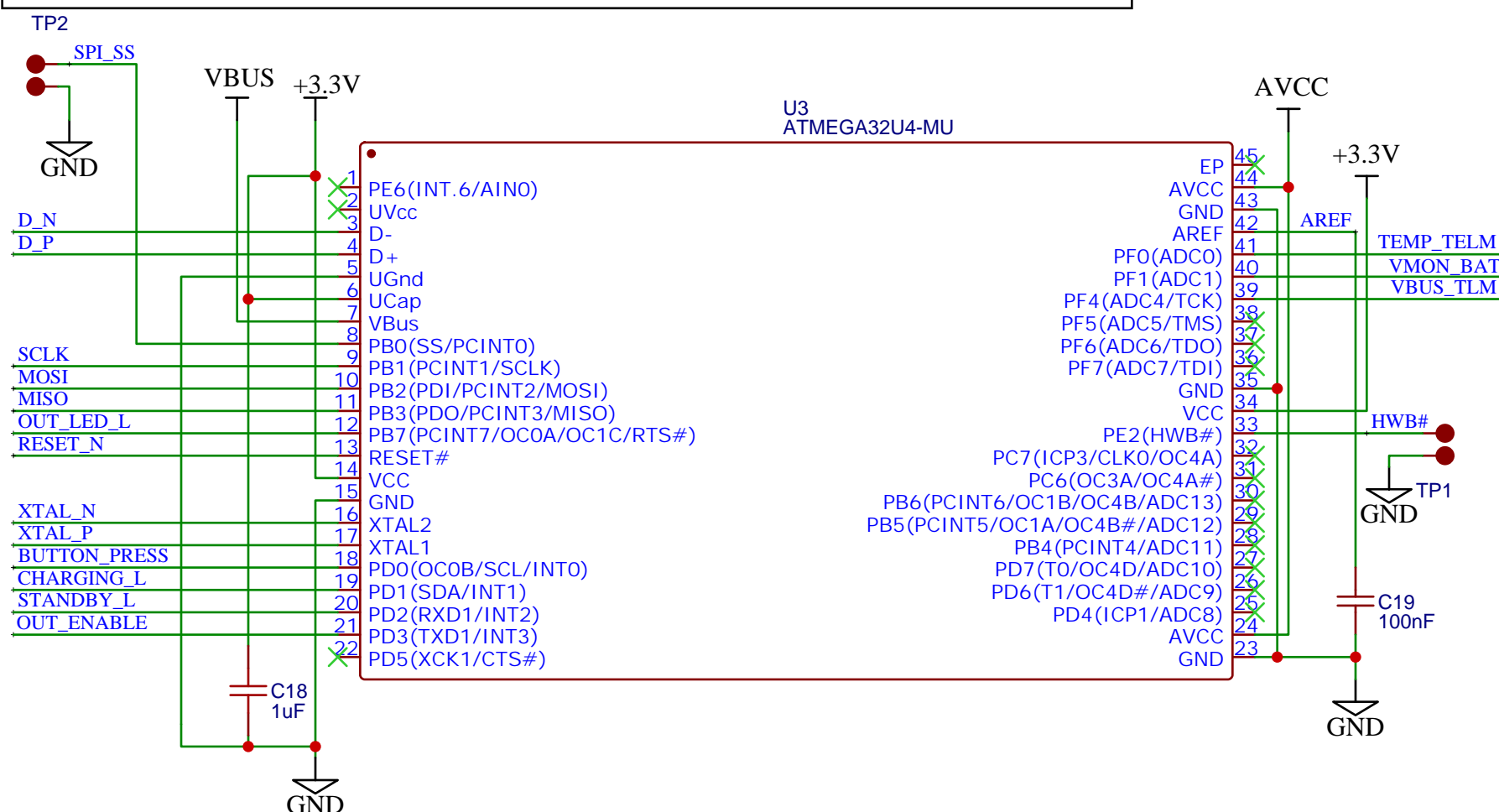
[MULTI-PURPOSE STATUS LED]

[Vf 1.9-2.2V]
[~1mA @1kOhm]
[MCU SINK, so that sleep state (HiZ)]
[...doesn't trigger LED on]

checked

[See ATMEGA32U4 D/S Fig 21-6]
[UVCC is NC when using self-powered 3.3V]
[As well as UCAP tied to 3.3V]
[place 0.1uF near each power pin]
[Bank PF only for ADC/Analog, no digital for noise reduction]
[Bank PD are all outputs]
[AVCC & VCC are +3.3V]
[VBUS is 5V]
[*_L implies active low]
[MCU PIN 45 EP (Exposed Pad), should not be connected to GND (heatsucker)]
[PCINT7 is PWM, use for LED]
[Unsure if HWB# is necessary, broke out to TP]

[MCU]



[DECOUPLING CAPS & FILTERING]

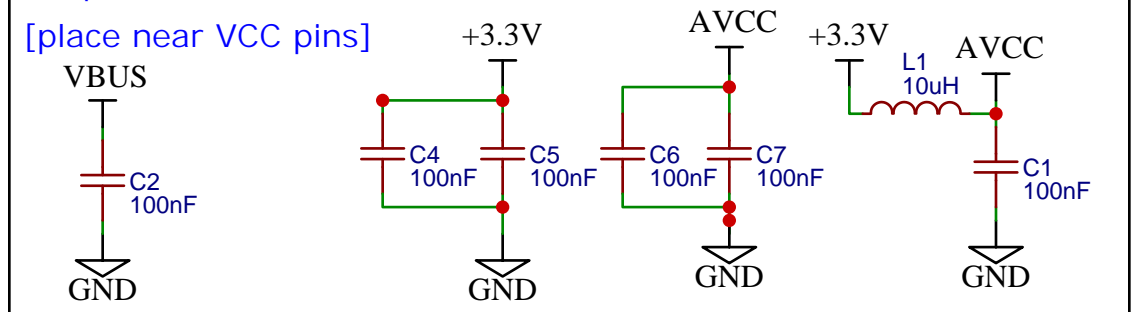
[LC filter (10uH) operates 15mA Max]

checked

[ICC max < 6mA active]

Keep AVCC to GND under 1.5mA to be safe, ICC MAX <15mA/2]

[place near VCC pins]



[Analog Telemetry]

[max power draw, +3.3/(~10.8K)]

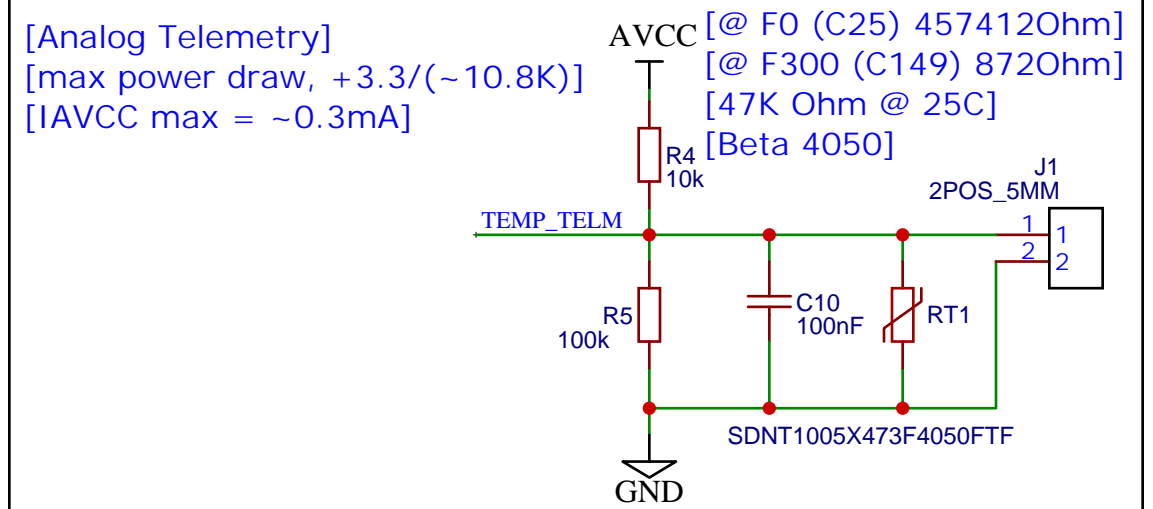
[IAVCC max = ~0.3mA]

[AVCC @ F0 (C25) 457412Ohm]

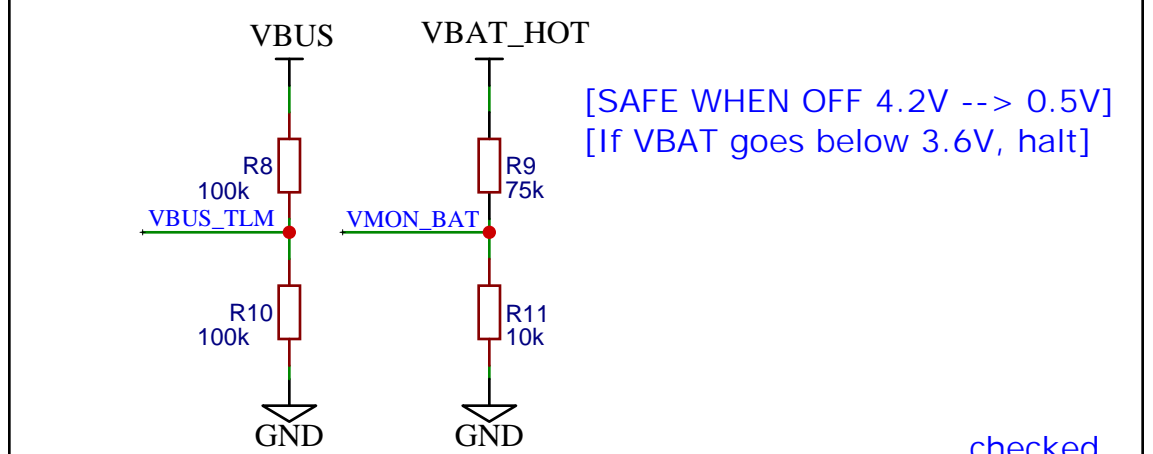
[@ F300 (C149) 8720Ohm]

[47K Ohm @ 25C]

[Beta 4050]



[Use VBUS TLM to recalibrate 3.3V]



[SAFE WHEN OFF 4.2V --> 0.5V]
[If VBAT goes below 3.6V, halt]

checked

[Power Circuitry]

[PFET VGS -(0.5-1.3V)]

[VREG_IN could 1-of-2 options]

[...VBUS - Vf = TYP 4.4V]

[...VBAT_HOT - Vf = 2.9-3.9V]

[where Vf is ~300mV]

[10K PU for SLEEP MODE]

[Vf 0.715 @1mA]

