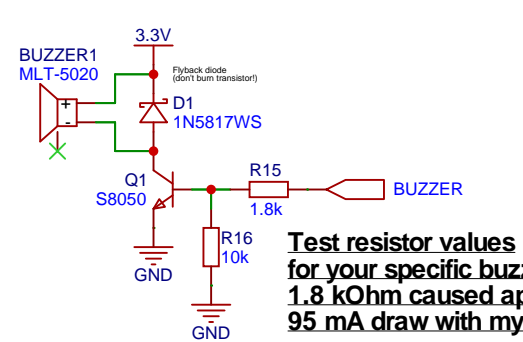
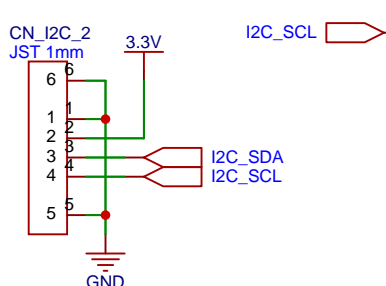
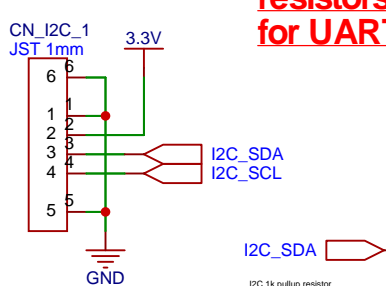
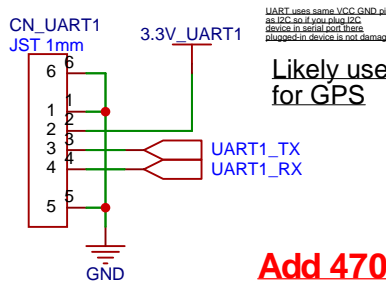
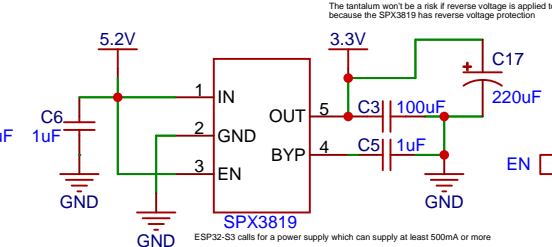


Can add extra external electrolytic caps using 5.2V and GND pads, and 3.3V and GND pads



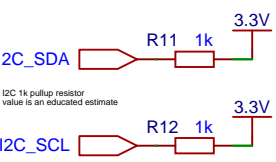
**TODO: use DC-DC converter for 3.3V rail**  
**Use TI IC TLV62569DBV**

**Do not input external 3.3V or you'd compete with the regulator**

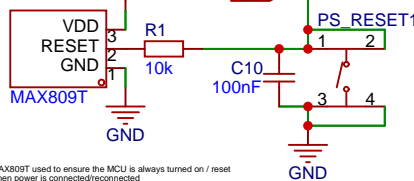
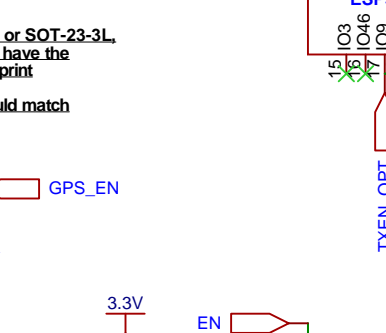
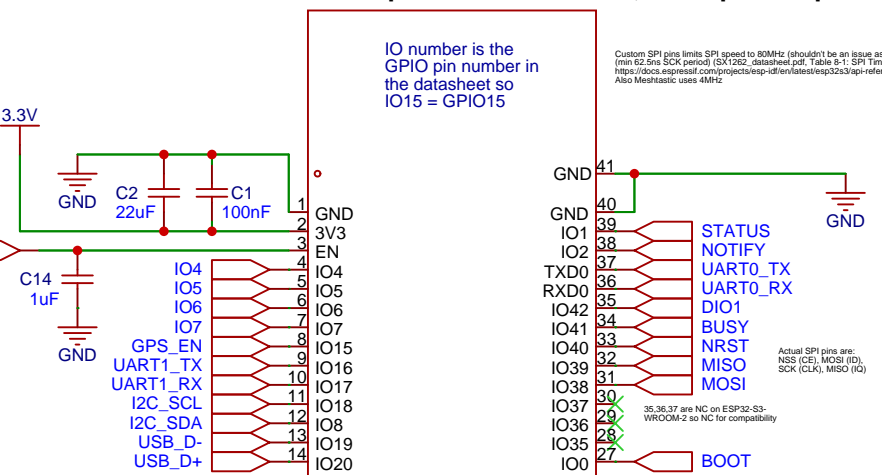


**Likely used for GPS**

**Add 470 Ohm series resistors for protection? for UART1?**

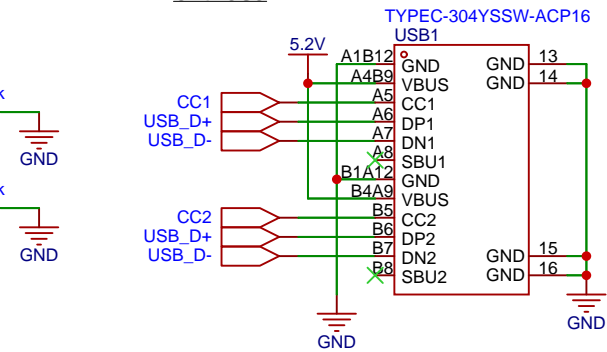


**Can use PCB antenna or '-U' clip-on antenna version, same pad footprint**



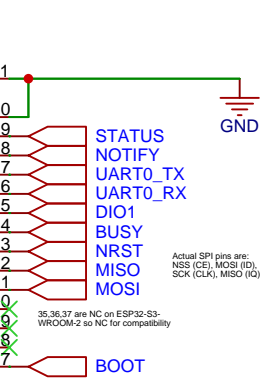
**Leave enough space under buttons to comfortably press with fingers from below in the orientation the board is held**

**TODO?: Add ESD protection for USB?**  
**20/22pF/47pF caps for data lines?**  
**22/27 Ohm series resistors for data lines?**  
**Official ESP32-S3 Dev board has none of these**



**Add something like TPUSBLC6-2P6**

Custom SPI pins limits SPI speed to 80MHz (shouldn't be an issue as for example the SX1262 is max 16MHz (min 62.5ns SCK period) (SX1262\_datasheet.pdf, Table 6-1: SPI Timing Requirements, t3))  
https://docs.espressif.com/projects/esp-idf/en/latest/esp32s3/api-reference/peripherals/spi\_master.html#gpio-matrix-and-io-mux  
Also Meitronic uses 4MHz



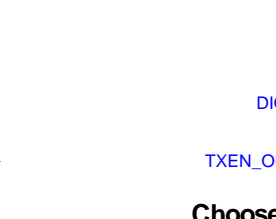
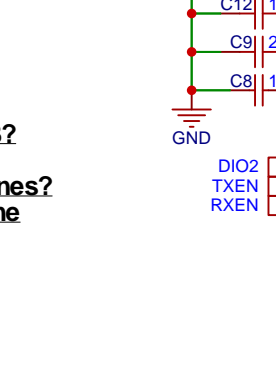
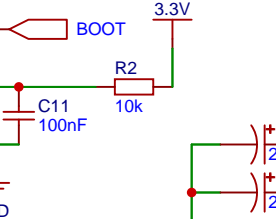
45 is strapping pin. Pulled low, but only has an effect on ESP32-S3-WROOM-1 as unlike -2 the eFuses are not set forcing SPI voltage to 1.8V, so it can be used on the -2 but for compatibility it will be NC (to not interfere with its internal pull down) as it controls the voltage on -1 if (permanent) eFuse is not set.

47, 48 are 1.8V on ESP32-S3-WROOM-2 (due to ESP32-S3R8V) so NC for compatibility even though it's 3.3V on -1

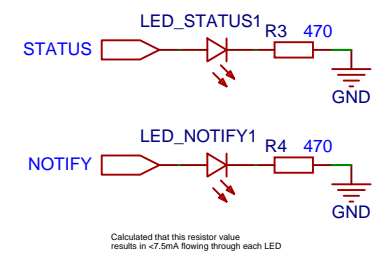
When GPIO0 (BOOT) is low, if 46 is high it's an invalid combination so NC it to be safe (3.3.1 Chip Boot Mode Control) also 46 INTERNALLY PULLED DOWN

set eFuse correctly and don't use GPIO0 for controlling mode (3.3.4 JTAG Signal Source Control) (should be fine by default as the 3 eFuses are 0 so GPIO0 is ignored)

Table 6-1: BOOT is internally pulled up but in testing the value is too high, approx. 2.5 MOhms so we need to pull it up some more

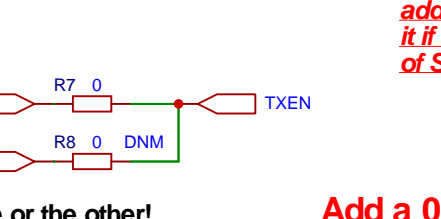
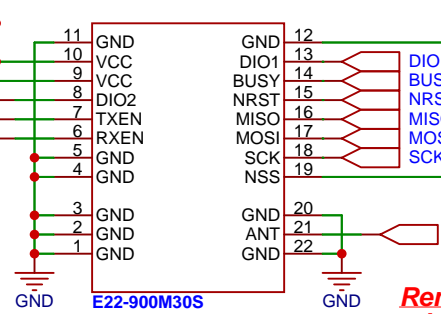


**Choose one or the other!**  
**See ALL available options in variant.h**

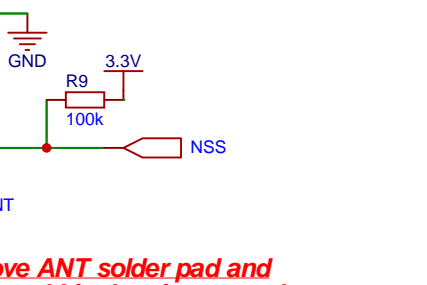
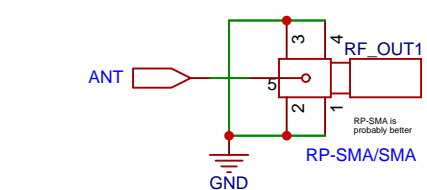
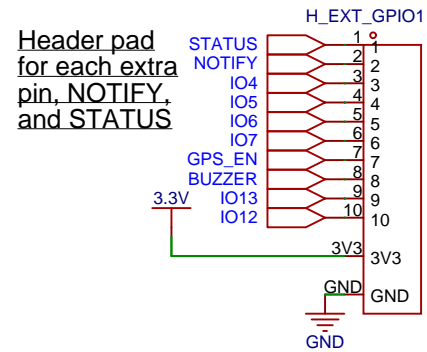
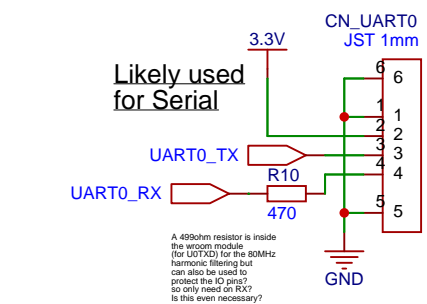


Calculated that this resistor value results in <7.5mA flowing through each LED

**Best to put respective decoupling capacitors right next to power pads**



**Choose one or the other!**  
**See ALL available options in variant.h**



**Remove ANT solder pad and add a prohibited region around it if using stamp hole instead of SMA to connect antenna**

**Add a 0 Ohm DNM link between DIO2 and an unused GPIO pin?**