

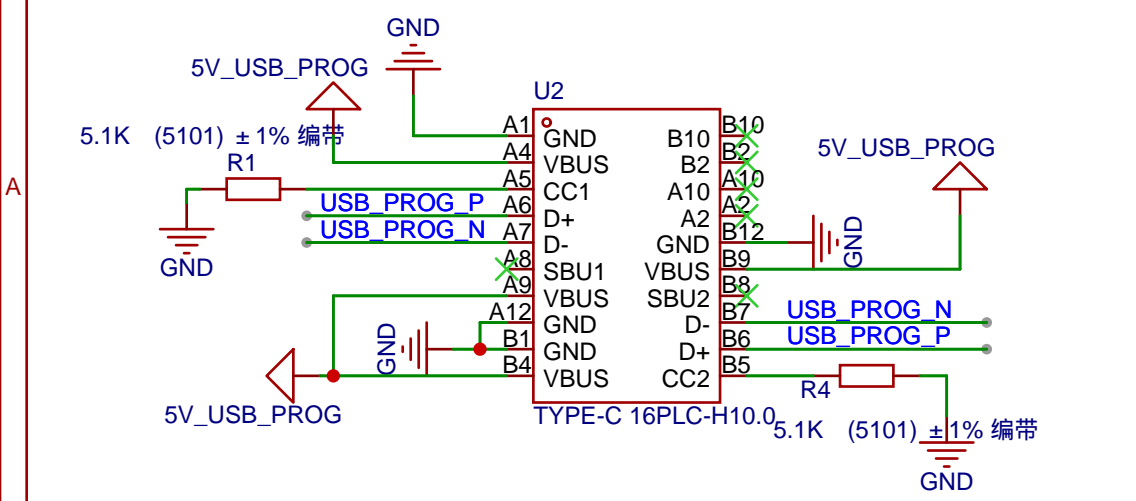
WARNING:

This revision has been manufactured and tested.

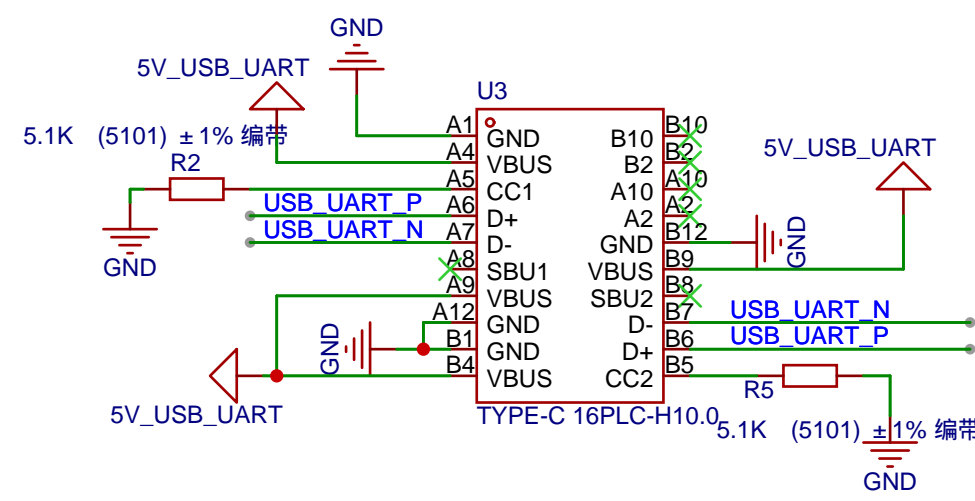
There were some minor bugs. The bugs are annotated in this version

Connectors

USB C Prog



USB C UART

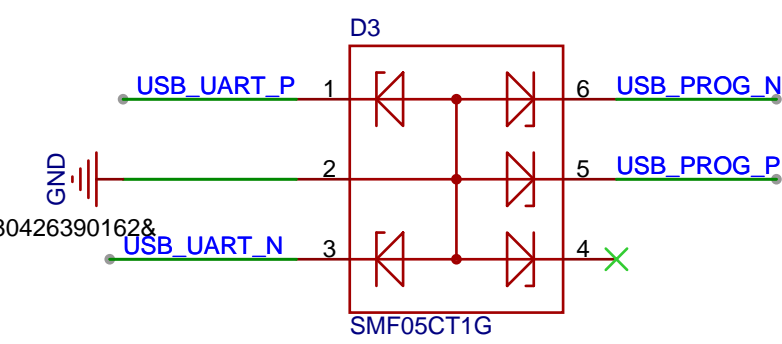
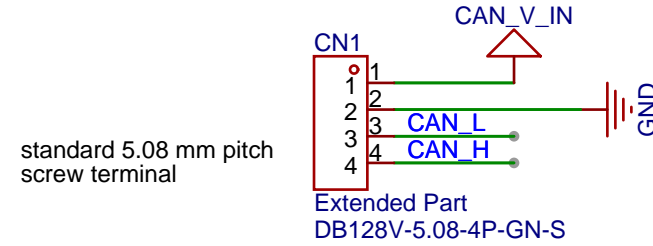


CAN Bus / PWR In

External power supply (laying out for 5V-30V)

USB 2 data TVS protection

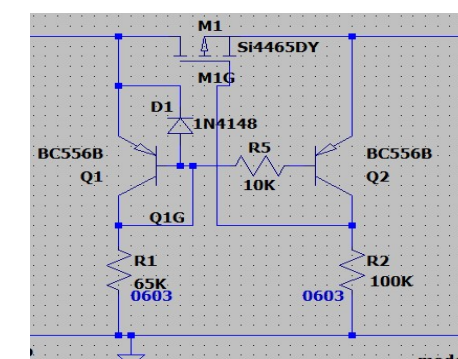
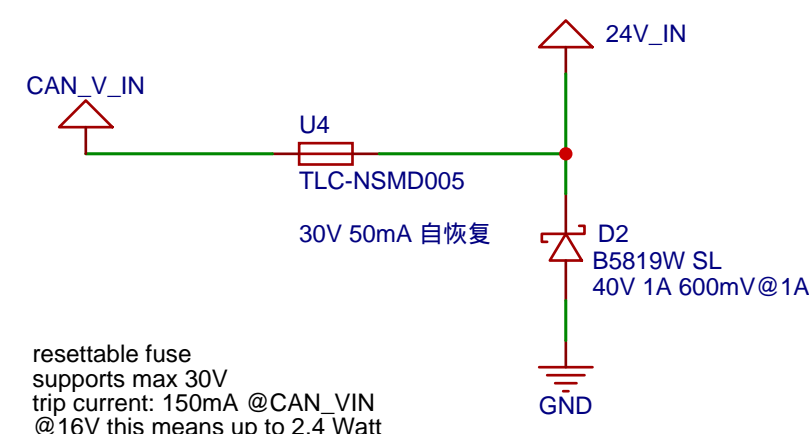
<https://www.ti.com/lit/an/svaf82a/svaf82a.pdf?ts=16804263901628>



Power Supply

CAN Bus

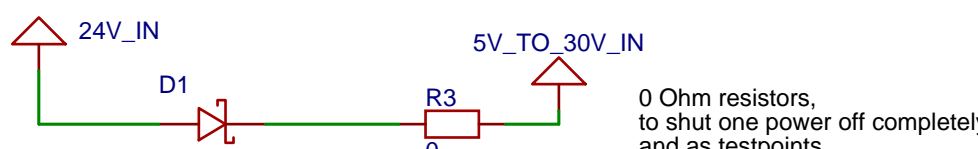
reverse polarity & short protection



Power multiplexing: CAN OR USB OR USB

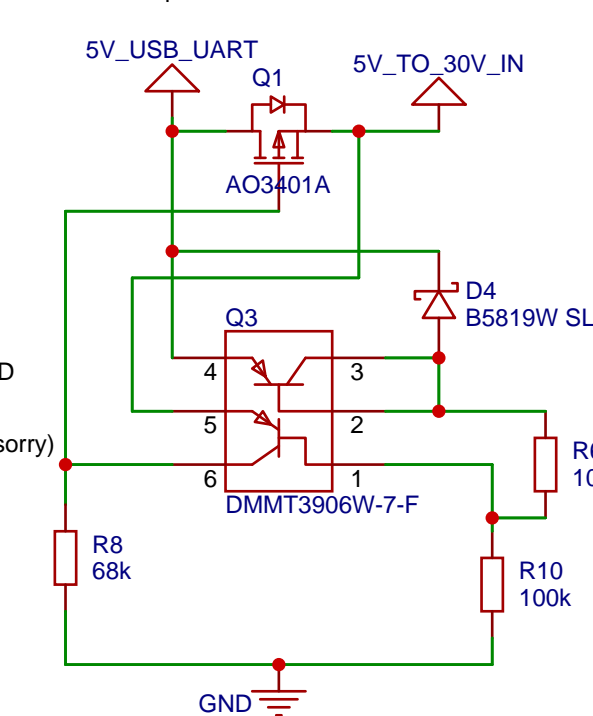
CAN Bus reverse current protection.

0.7V voltage drop is negligible here. Simply using a diode for backcurrent protection



Voltage drop by a diode is not okay here (5V (USB) - 0.7V (diode) < 4.75V required by DC-DC converter)
Creating an ideal diode, inspired by <https://electronics.stackexchange.com/a/524772> and <https://www.electro-tech-online.com/articles/simple-inexpensive-ideal-diode-mostel-circuits.817/>

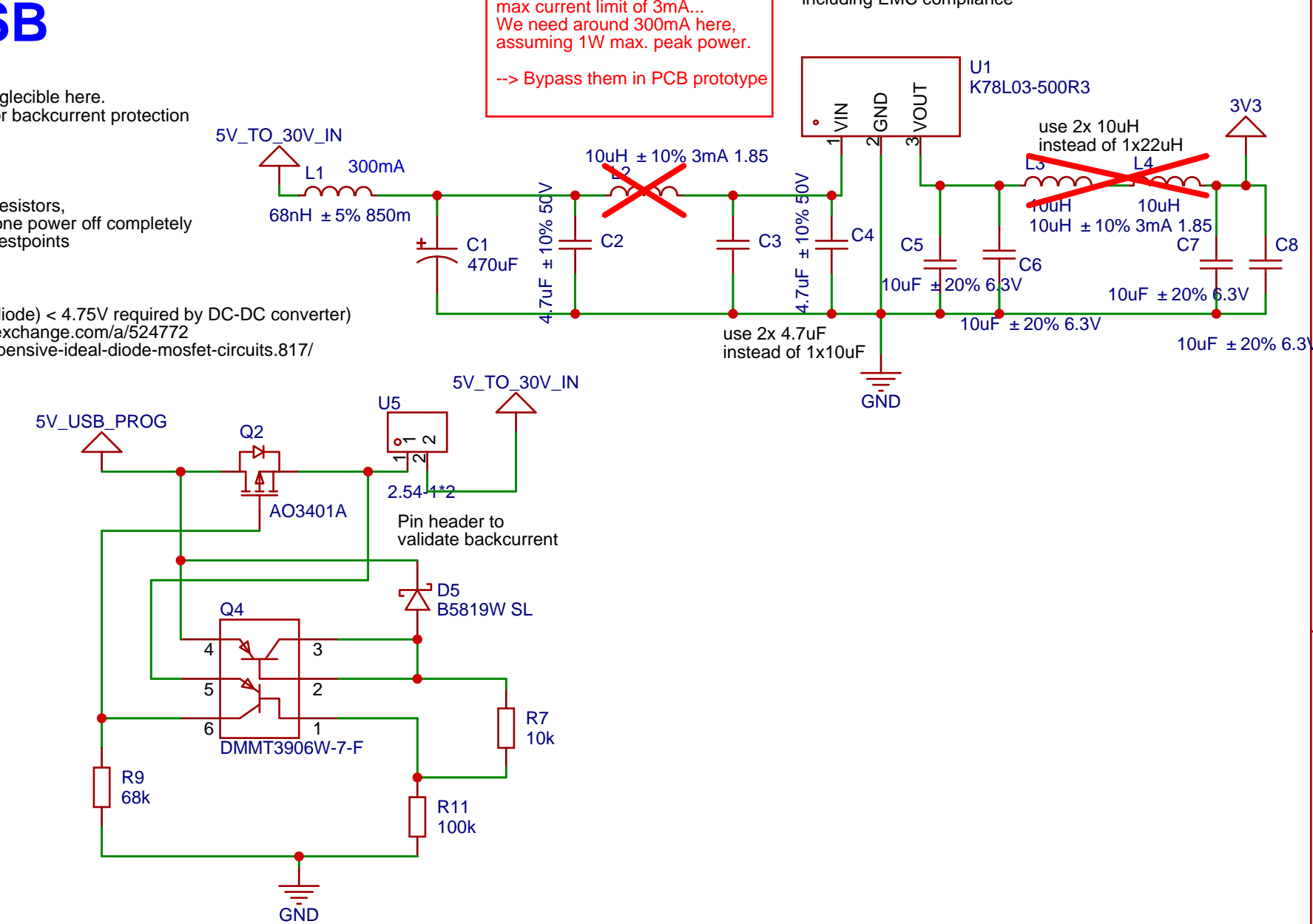
see LTspice simulation files



4.75V-36V to 3V3

These Inductors have a max current limit of 3mA... We need around 300mA here, assuming 1W max. peak power. --> Bypass them in PCB prototype

including EMC compliance

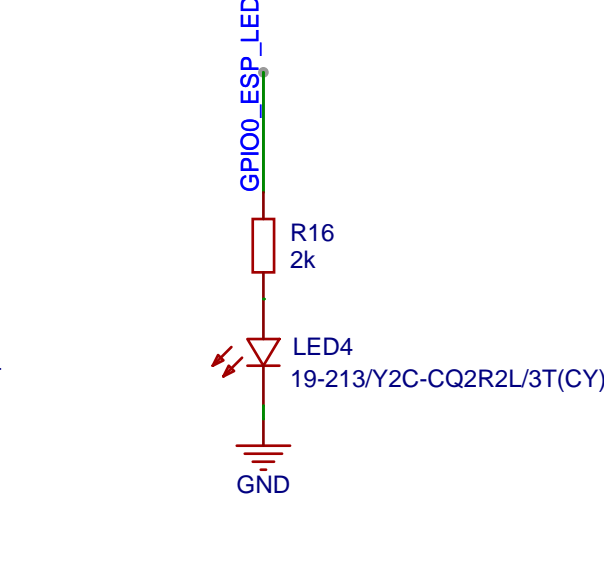
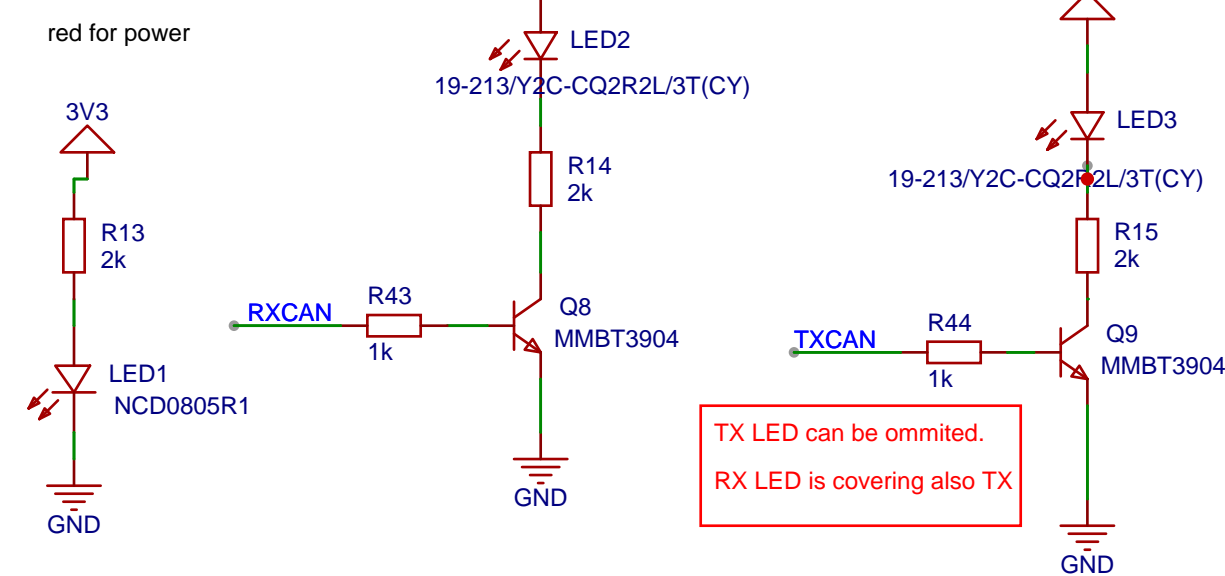


LED

RX CAN LED is logical '1', if the bus is IDLE
--> Change circuit to drive the LED active low (just blink, if there is ongoing communication)

yellow for RX, TX and ESP alive indicator

Alive LED "LED4" should be driven via transistor. This way it could interfere with the RTS / DRT circuit (but it works in practise!)



ESP32 C3 as System on Module

Chip Enable Press to disable device

Boot option

SW2 TS-1187A-B-A-B

SW1 TS-1187A-B-A-B

ESP32-C3-WROOM-02-N4

Hardware design guidelines: 2.6 UART

You need to connect a 499 resistor to the IOTXD line to suppress the 90 MHz harmonics. Using 510Ohm basic part

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