NanoVNA Rev. 3.0 Mods.1.1

This document is intended to fix some nanoVNA issues present in version 3.0 and derivatives.
For better performance the nanoVNA firmware must be updated with a version having the Weston bridge driven by the clock generator U5 (Si5351A-B-GT) set to Zout=50ohm (not 200ohm) also for the fundamental 10kHz to 300MHz band.

WARNING!!! Do not try these modifications if you haven't any experience in SMD soldering. 0402 and 0603 chips are very small and usually intended for automated soldering. Having not experience could lead to damages to your instrument.

Referencing to the schematic at the end of this document, the modifications are as follows:

1) These components are needed to reduce the supply noise exposed by the clock generator in the odd harmonics bands above 300MHz.
   C9B = 4.7uF 0603 X7R capacitor
   C9C = 68uF Case B 6.3V tantalum capacitor
   Both mounted piggyback on the original C9 capacitor
   C10B = 4.7uF 0603 X7R capacitor
   Mounted piggyback on the original C10 capacitor
   C3B = 68uF Case B 6.3V tantalum capacitor
   Mounted scratching away the solder resist from the U3 input track close to the USB connector and the ground at the right of U5

2) These components change are needed to improve the reference mixer (U6) functionality and allow the Weston bridge to work correctly.
   R13 = 10uF 0603 X7R capacitor
   R9 = 120ohm 0603 1% resistor
   R22 = 68ohm 0603 1% resistor
   R23 = 0ohm 0603 shunt
   R24 = 120ohm 0603 1% resistor
   R25 = 22ohm
   C12 = 150ohm 0603 1% resistor

3) These components are needed to remove some dips due to the mixers supply filters which resonated.
   C40B = C42B = C44B = 100nF 0603 X7R capacitor
   All mounted piggyback on the respective original 100pF capacitor.

4) These components removal are needed to improve the odd harmonics functionality of the mixers.
   R29 = R30 = R31 = not populated, remove the resistors

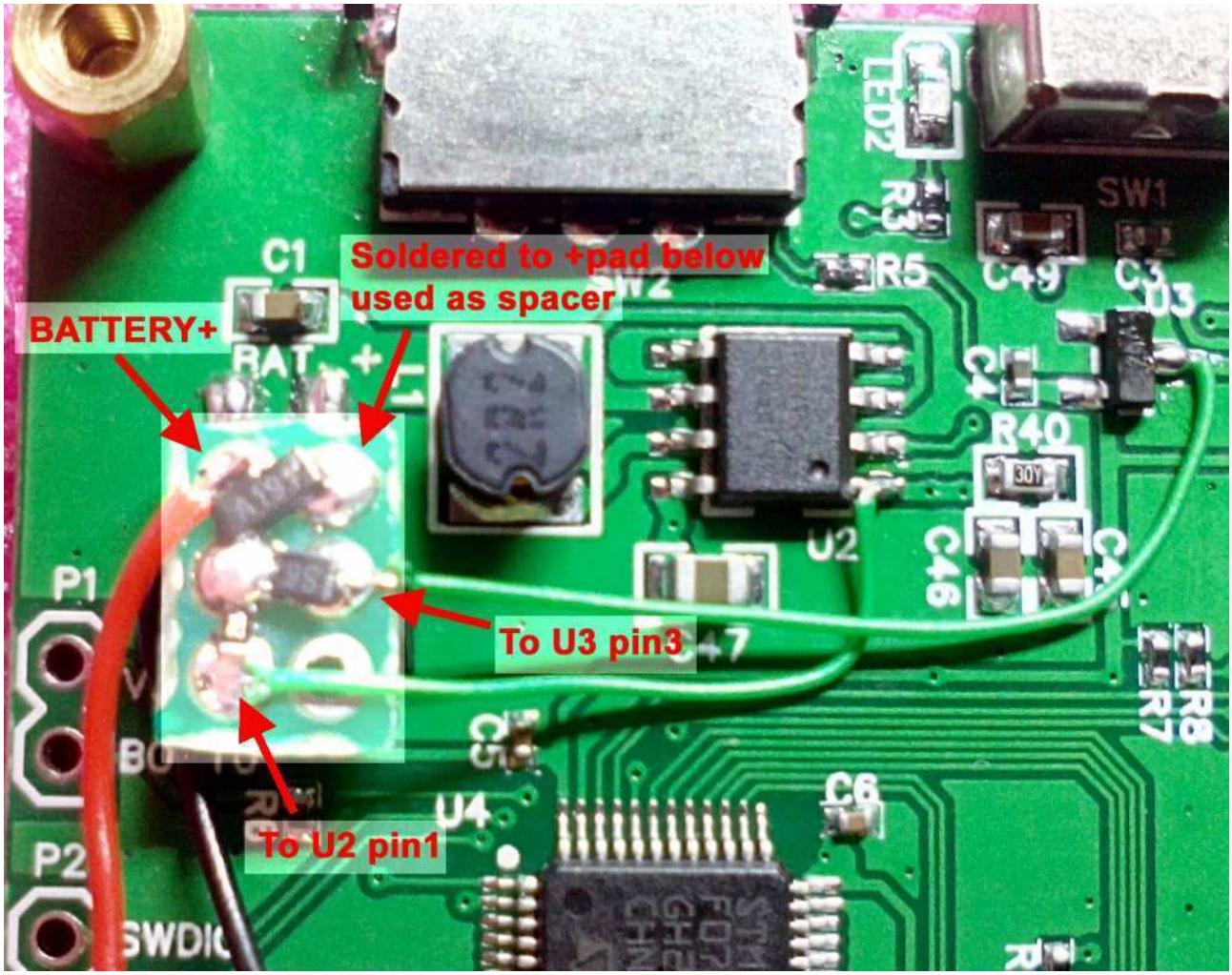
5) This fixes some bad behaviors of SW2.
   R5 = 1kohm

6) This is needed to get a right battery charge state indication.
D2 = 1N4148W
Note that using the 1N4148 diode the battery indicator is right by default, but using another diode some firmware allow the adjustment for the voltage drop by means of the USB console.

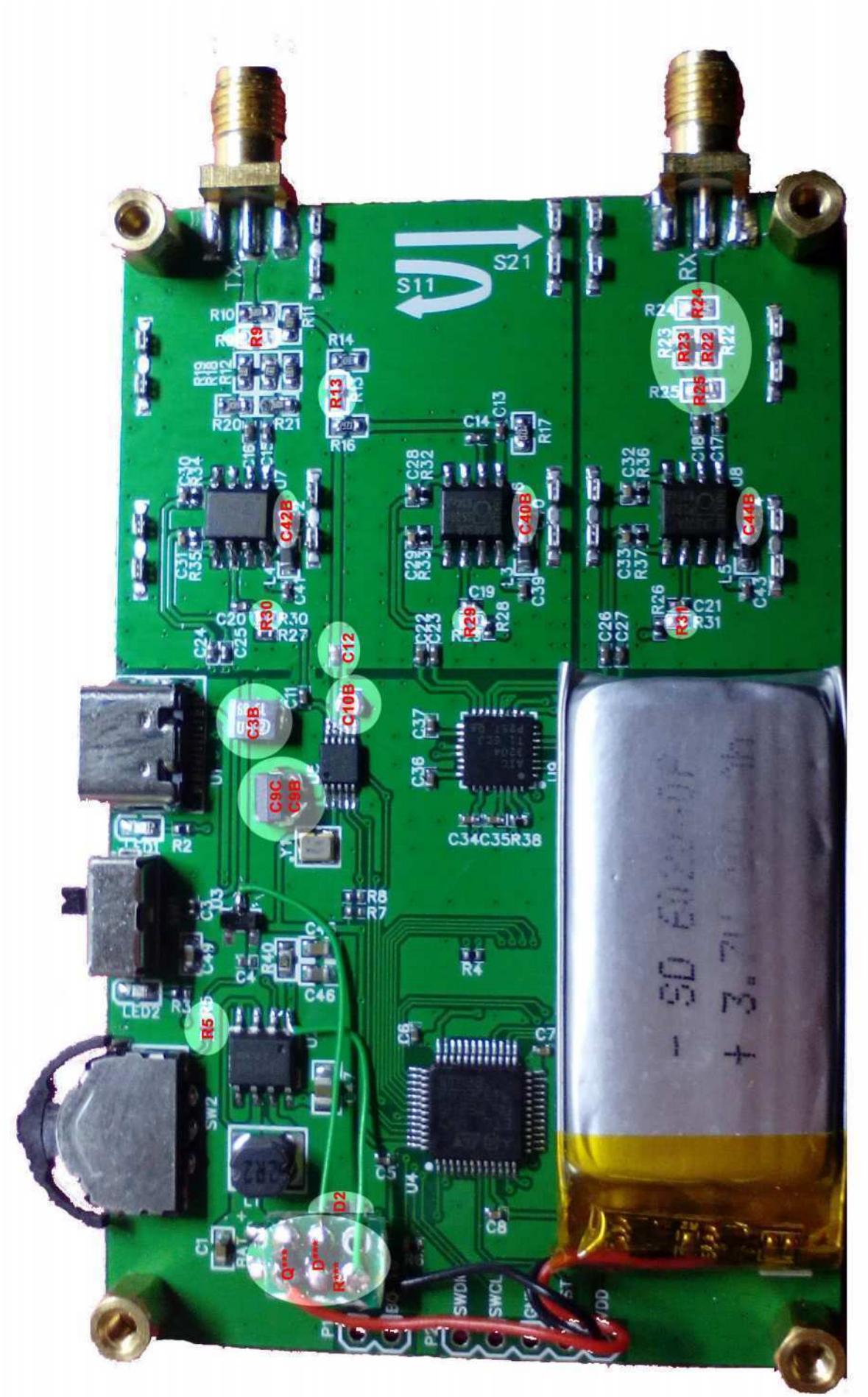
7) These components are soldered on a small prototype board that it is soldered to the nanoVNA PCB positive battery pad through a rigid 90° terminal which other than connect the P-MOSFET source terminal to the board positive battery input, it also keeps the small prototype board spaced about 1mm above the PCB. The battery positive red wire is soldered on the small prototype board, while the negative is left soldered to the nanoVNA board. The connection with U2 and U3 are executed via wire-wrap wires or other very thin and flexible wires.
Into the schematic these components are named with the *** suffix, they are needed to reduce the noise at higher frequency when the nanoVNA is connected to a PC.
R*** = 10kohm 0603 1% resistor
D*** = 1N4148W SOD123 diode
Q*** = AO3401 SOT23 P-MOSFET

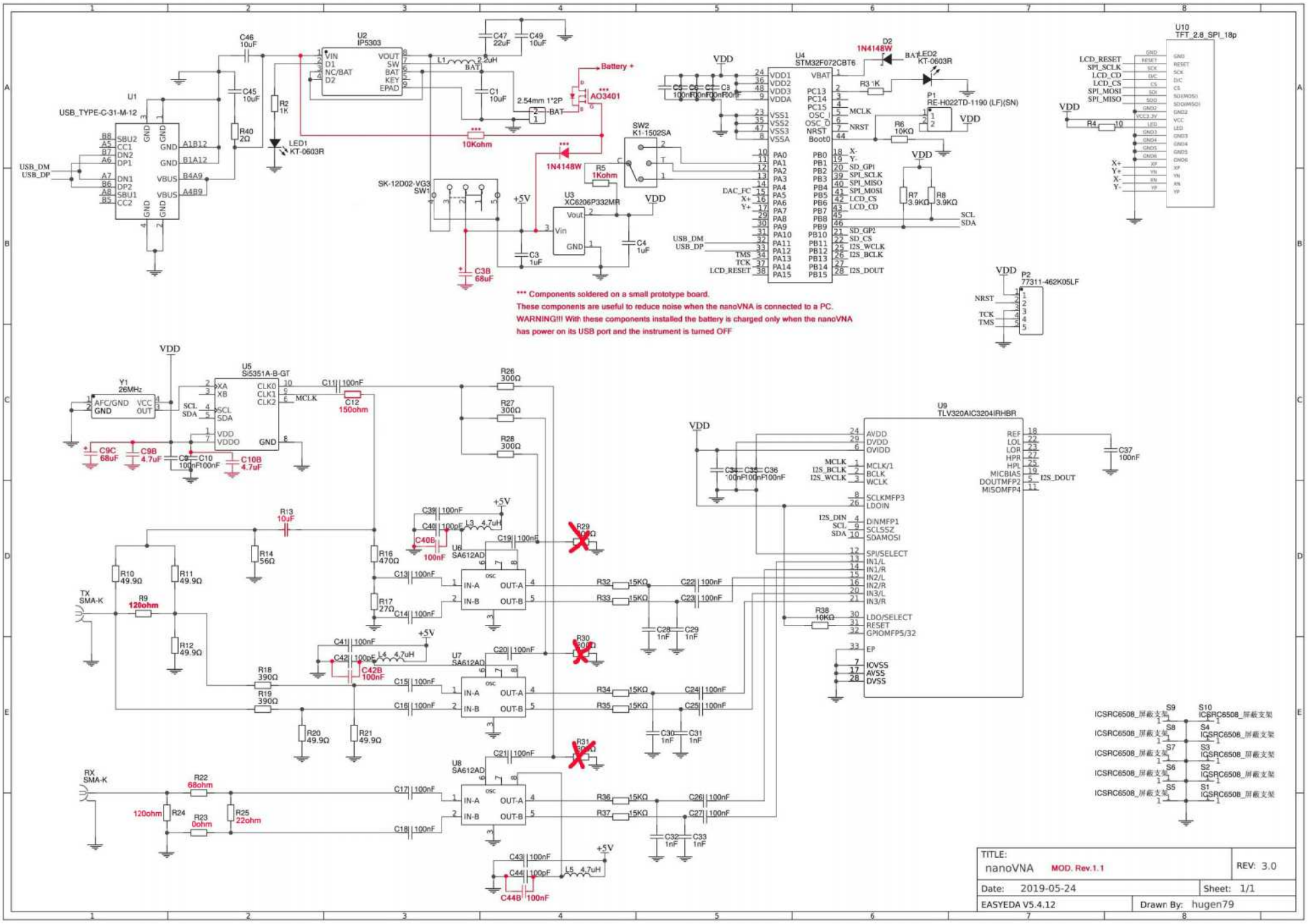
WARNING!!! With these components installed the battery is charged only when the nanoVNA has power applied to its USB port and the instrument is turned OFF.
When the nanoVNA is turned on the battery IS NOT CHARGING, this despite the USB port was connected to a charger.

Detail of the small prototype board.



Highlights of the modifications




*** Components soldered on a small prototype board.
These components are useful to reduce noise when the nanoVNA is connected to a PC.
WARNING!!! With these components installed the battery is charged only when the nanoVNA has power on its USB port and the instrument is turned OFF
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