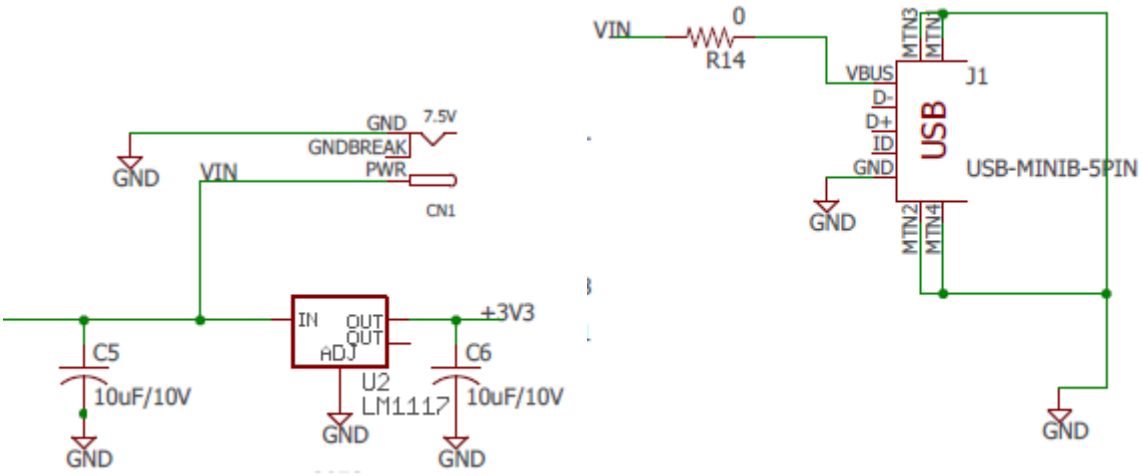
Background:

The PCB board is a Gateway device containing Atmel MCU, a RF69HCW Radio module 915MHz, an ESP8266 Wi-Fi module, button, LEDs, a non-inverted buffer and a relay (to turn-on/off the wi-fi module which consumes ~150mA). The total consume would be less than ~250mA, which is far below the 800mA max of the LPM1117 regulator.

This is the circuit for the regulator;



The PCB design is very simple and layout is 2-layers.

Capacitors:

Digikey # 399-3684-1-ND dfdf

Note: *This design is based on a previous design using a different radio module, but all the rest is exactly the same and it was ALWAYS working fine without any problem. Layout is almost identical except for some signal traces changes in the radio module.*

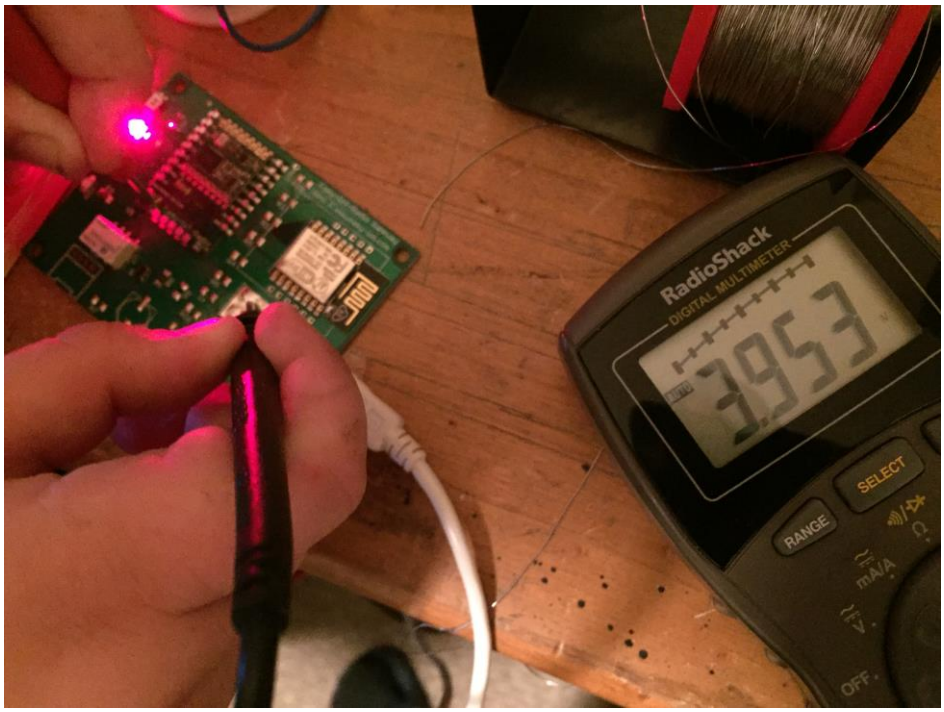
Issue description:

I assembled 4 boards with the new design, and when I check the voltage is always above 3.3V (some cases 3.6V, others 3.9 and even 4V).

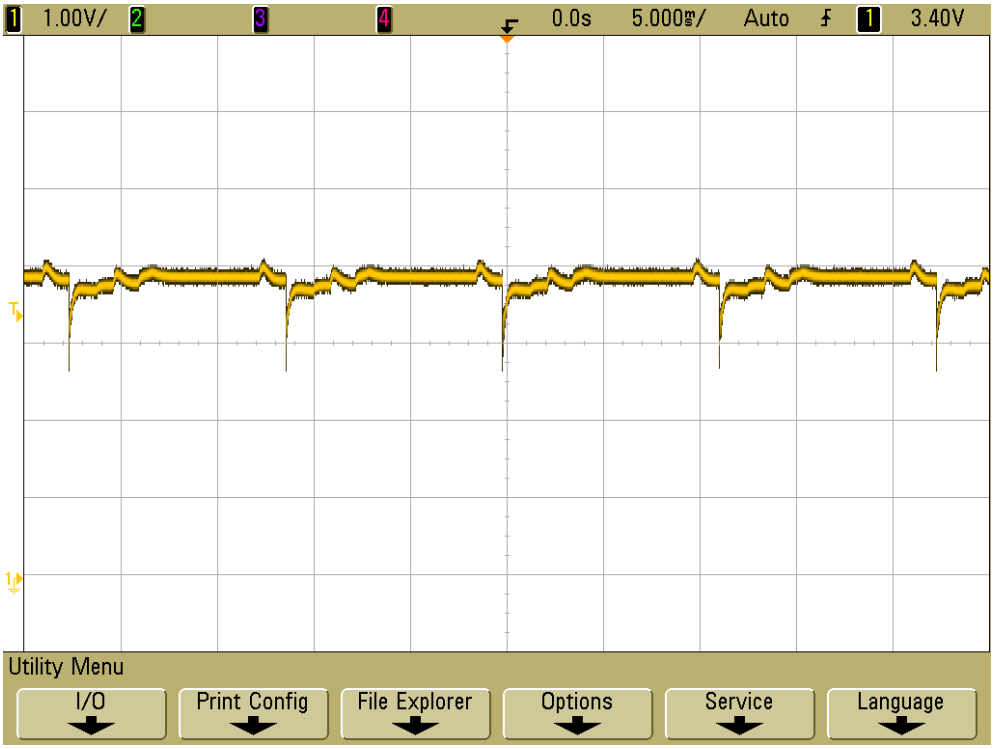
Using a scope I verified existence of ripple so I added external capacitors and the ripple disappeared, but the voltage is still high.

Measurements:

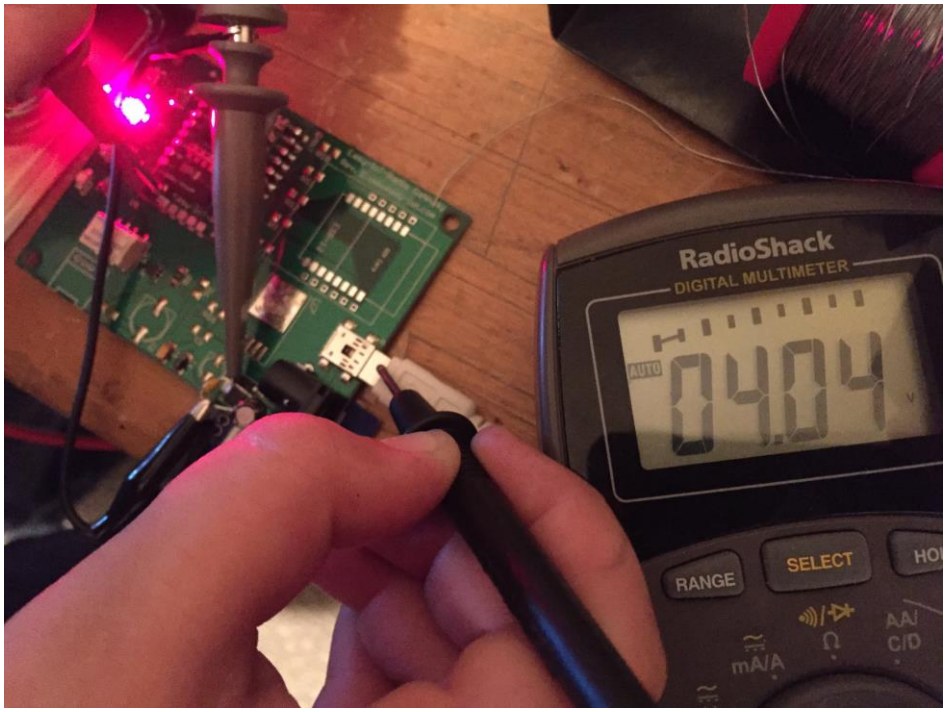
Board 1: This PCB contains the original capacitors (Tantalum 10uF/10V – ESR = 3.8 Ohm) Digikey # 399-3684-1-ND



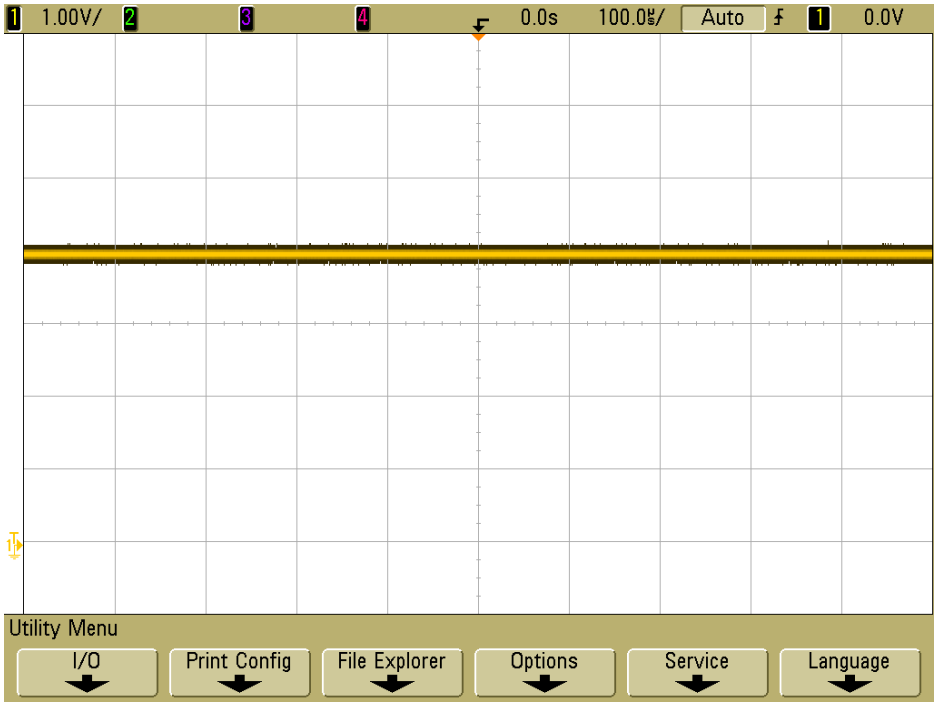
The voltage is 3.953V and it presents ripple;



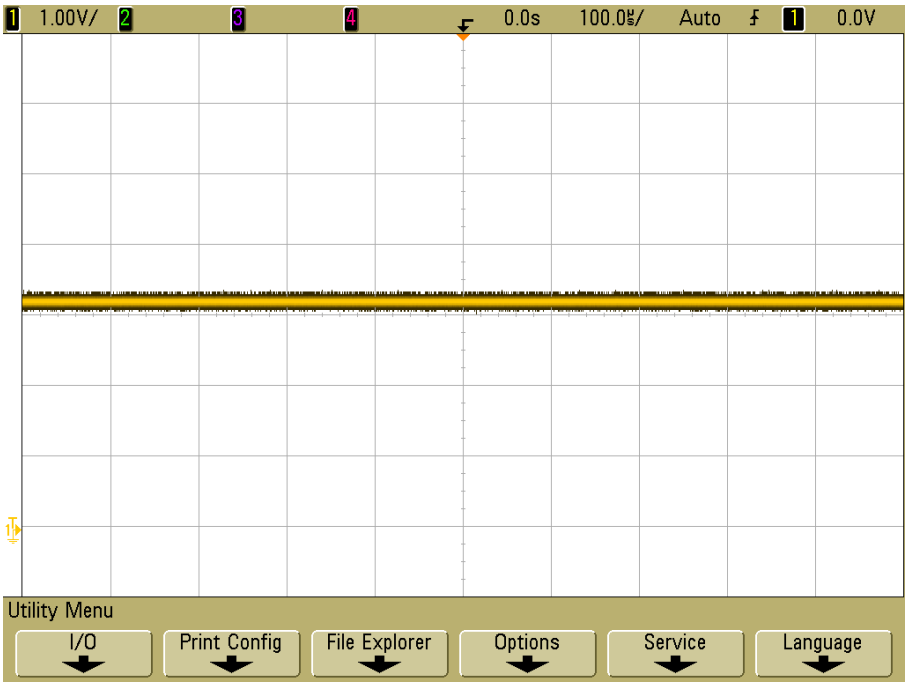
Board 2: in this board, I replaced the caps for a 22uF/10V ESR = 3 Ohm (Digikey # 478-1663-1-ND) for the LPM1117 input, and a 47uF/10V ESR = 2 Ohm (Digikey # 478-8223-1-ND) for the output. I also added a ceramic 0.1uF/50V cap to the output.



The voltage is also high. However, there is no ripple;

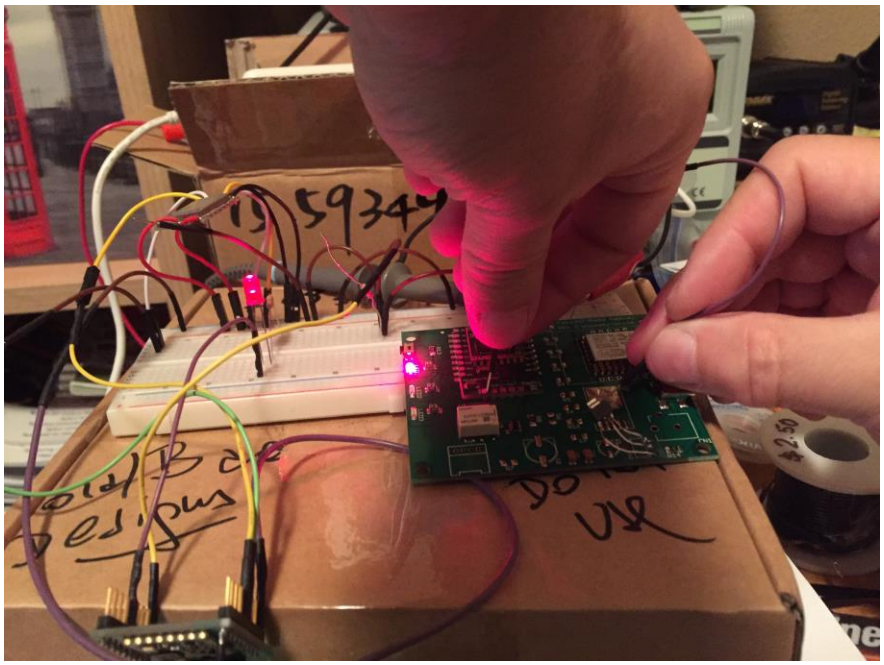


Breadboard: I then decided to assembly the same circuit in a breadboard, where I used normal aluminum 10uF/16V caps for both input and output, and as it can be seen below, the voltage is 3.3V.

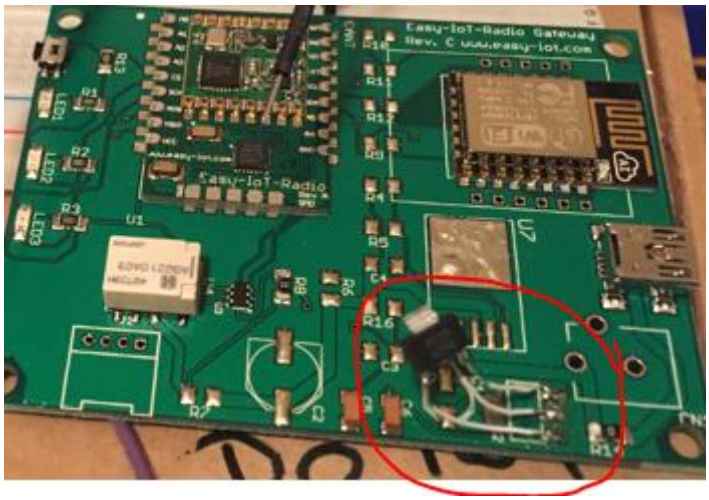


Other tests:

I used the breadboard to also supply the PCB boards with the issue, so basically connecting wires (3.3V and gnd.) from the breadboard to the PCB, and everything works fine. Checking the voltage is 3.3V (so the PCB board doesn't affect the regulator circuit in the breadboard….)



Final test: Since everything indicated that failure happened when regulator is soldered to the PCB board, I decided to solder wires to the regulator (as it's in the breadboard) and connected to the PCB;



But the voltage is still high….

Last comments:

I decided to disconnect the 10uF/16V cap in the LPM1117 output from the breadboard (to see if then it fails…) but it continued working at 3.3V!!!

In the PCB boards, I also tried adding a small resistor (330 Ohm) in the LPM1117 output (in case the caps ESR is too low) but this didn't help.