

Issues with original Atmoscan 1.0

The original design had a few residual issues:

1. The board would not boot when the radiation board is disconnected, unless the input line is pulled low
2. Copper ground plane is present in the PCB v1 behind the ESP12 antenna, making the antenna radiation pattern non omnidirectional
3. The system could not be turned off the system via software. Gracefully handling the low battery situation was not possible
4. A white screen issue that sometimes appears when battery was almost depleted.
After extensive investigation, this issue was tracked down to the CO2 sensor that draws significant current spikes from the 5V line every 5 seconds. When the battery is low, these are sufficient to affect even the 3.3V regulator.



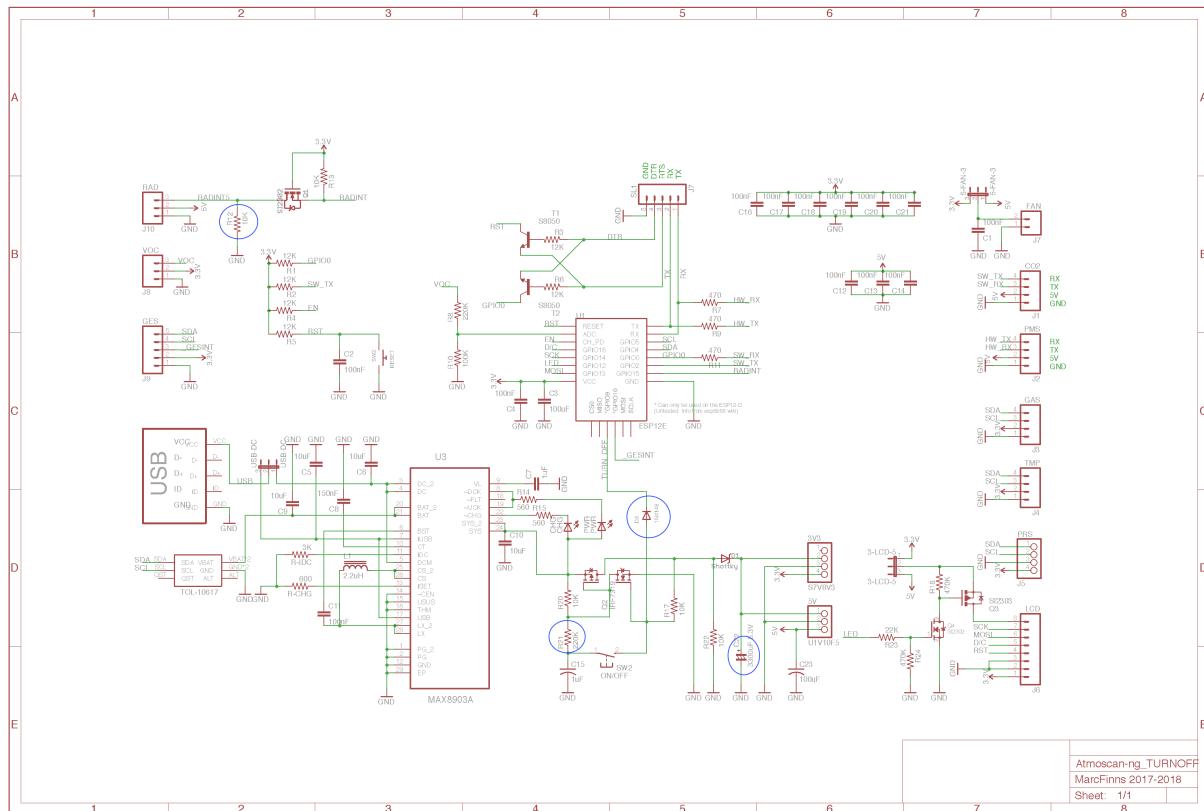
Modifications in version 2

Four minor mods have been made to the original schematics to address the previous issues:

1. A diode is added to trigger the switch off via GPIO
2. A large capacitor (3300uF, 6.3V) is added on the unregulated voltage line
3. A resistor changes value (R21 100k → 220k)
4. A pull-down resistor to allow boot without radiation sensor
5. Ground plane is selectively removed in the antenna area

It has to be remarked that Atmoscan seems to be the only project that uses all ESP8266, even the ones that normally cannot be used. Specifically, mod 3 uses GPIO9. Lowering this pin via software makes the FLASH unreachable hence freezes the processor, thus it cannot be normally used. However, in this specific case the pin is used to turn Atmoscan off. This has to happen exactly once, hence GPIO9 can be used for it.

In the following schematic the mods are highlighted.



How to apply the mods to PCB V1

Mods 1/2/3 can easily be applied to PCB v1. The following pictures show how to. Starting from Software v2.3, the ability to switch off via gesture and on battery low is implemented.

