

Changelog after Rev.B5:

Replace the 10-pin 0.05" pitch ARM debug connector by TagConnect and connect its pin #1 to +BATT instead of VDD.  
Make buttons' pads larger

Changelog after Rev.B4:

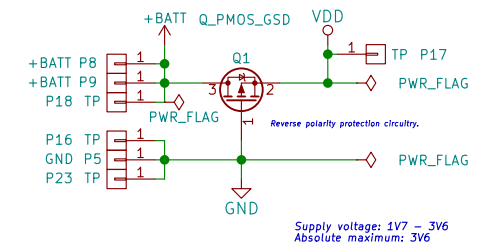
Remove C12 footprint connected to DEC2 (used only with WLCSP case)  
Add 12pF cap to P0.25 (Nordic Errata PAN #138)  
Optimize 0402 footprints  
Optimize also all the other footprints to have no mask clearances

# RuuviTag

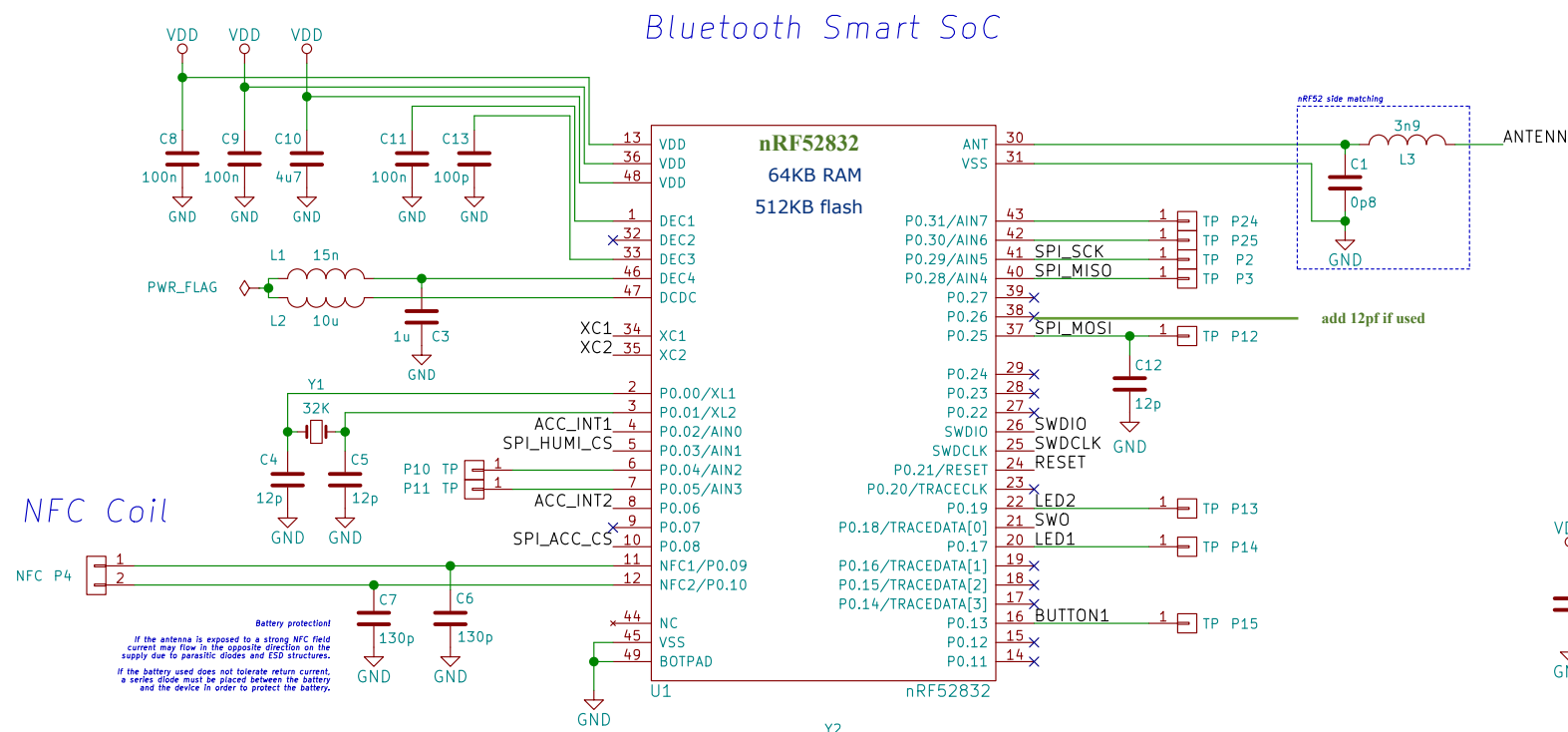
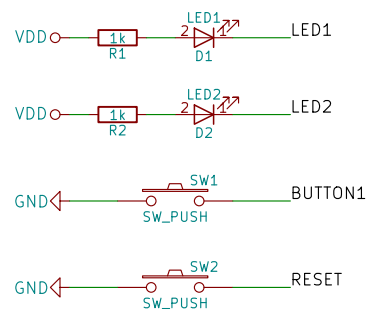
## Open-Source Sensor Beacon

ruuvi.com

### Power Source



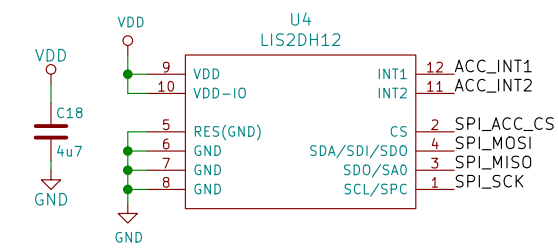
### LEDs & Buttons



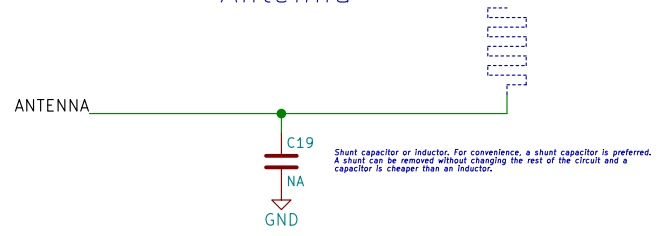
### NFC Coil

Battery protection!  
If the antenna is exposed to a strong NFC field current may flow in the opposite direction on the supply due to parasitic diodes and ESD structures.  
If the battery used does not tolerate return current, a series diode must be placed between the battery and the device in order to protect the battery.

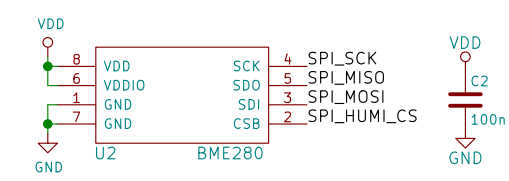
### Accelerometer



### Antenna



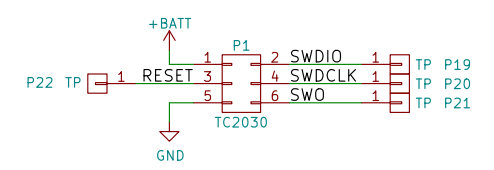
### Pressure + Humidity + Temperature



Bosch BME280 = Pressure + humidity + temperature (2.5mm x 2.5mm x 1mm)  
Average current consumption (1Hz data refresh rate):  
2.8 µA @ 1 Hz (P, T)  
2.8 µA @ 1 Hz (P, T)  
2.8 µA @ 1 Hz (H, P, T)  
Average current consumption in sleep mode 0.1 µA

Nordic Semiconductor's 1/4 wavelength monopole antenna design guide states:  
When implementing the monopole as a trace on the PCB, the length of the trace should be extended somewhat to allow for some fine-tuning of the antenna to resonance at 2.45GHz. If the size of available ground plane is approaching the ideal size and the antenna trace is uniformly surrounded by the FR4 substrate, then the length of the trace should be extended by about 30%. If the ground plane size is considerably smaller than the ideal size and/or much of the antenna trace is routed close to the edge of the PCB, then the length of the antenna trace should be extended by about 30%.  
Theoretical length:  $L = 92\text{mm} / 4 = 23\text{mm}$  →  $23\text{mm} * 1.3 = 30\text{mm}$ .  
There are the following two methods to tune an antenna:  
• If the physical dimensions of the antenna can be altered, for example, with a PCB antenna, adjusting the length will be one part of the tuning. Another part is to add a component, inductor, or capacitor, to pull the antenna impedance towards the 50 ohm center point.  
• If the antenna cannot be altered physically, more external components must be used to tune the antenna. These external components are called matching networks.  
• If it is not possible to get the impedance exactly 50 ohm by adjusting the length of the antenna, a component must be used to pull the impedance to the 50 ohm point. It is preferable to use a shunt capacitor since a capacitor is cheaper than an inductor and because a shunt component can be removed without any impact.  
For more info, check Nordic Semiconductor's White Paper about antenna tuning: Google "nRF52832 Antenna Tuning"

### Debug Port



P6 FIDUCIAL  
P7 FIDUCIAL

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File: ruuviitag_revb6.sch		
<b>Title: RuuviTag</b>		
Size: A3	Date: 2017-XX-XX	Rev: B6
KiCad E.D.A. kicad 4.0.7	Id: 1/1	