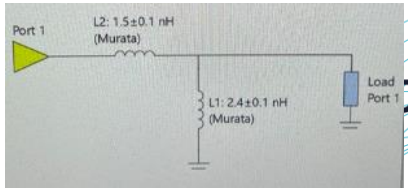
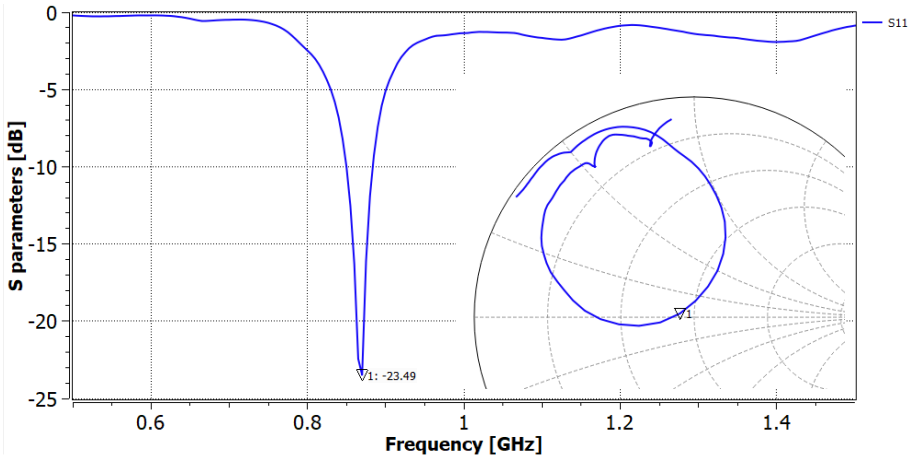
Extronics
P3265 – Antenna Design
01 Dec 2023

Antenna Matching and Measurement Results

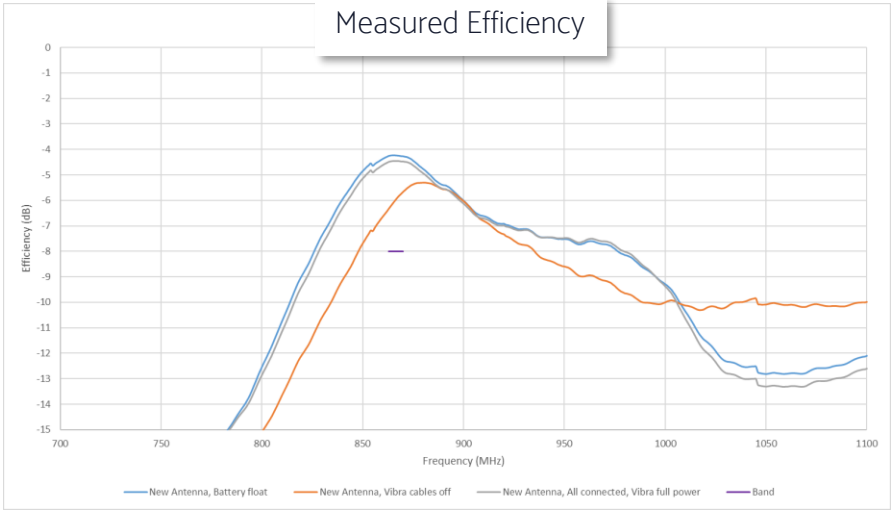


- Antenna raw impedance was measured from received new PCBAs
  - Design of matching network was done by initial circuit simulations (L2=1.5 nH and L1=2.4 nH) and fine tuning by hands on lab work using muRata LQW18 series wirewound inductors with final values **L200=1.7 nH** and **C200=3.0 nH (C203 not populated)**
  - Few undesired resonances appear but not falling on band of interest (868 MHz)
- Antenna efficiency and radiation pattern was measured in anechoic chamber
  - Antenna **efficiency is -4.5 dB** with all parts connected
  - Antenna radiation pattern is essentially omnidirectional as assumed and peak **gain is -2.1 dBi**

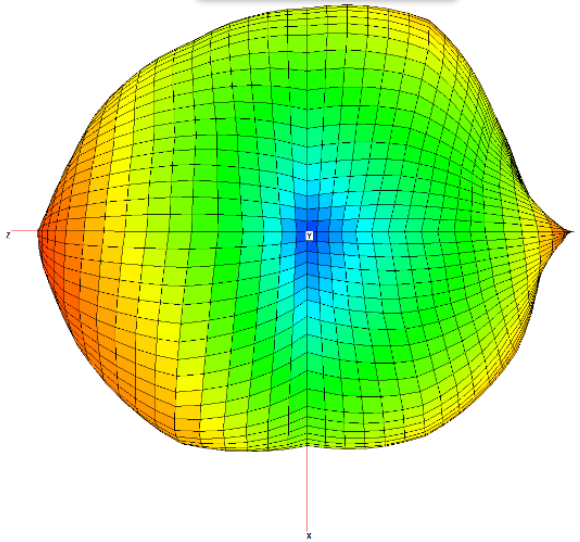
Impedance Matching



Measured Efficiency

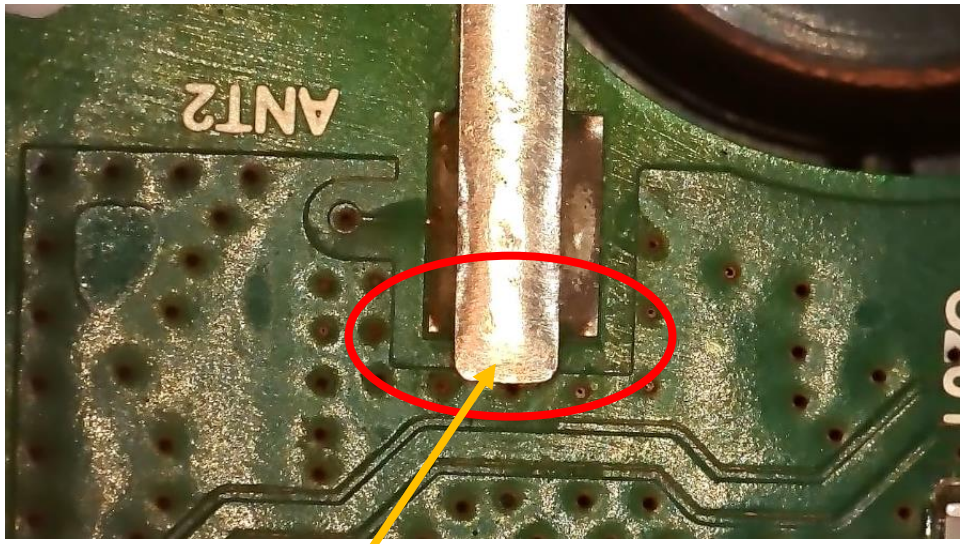


Radiation pattern



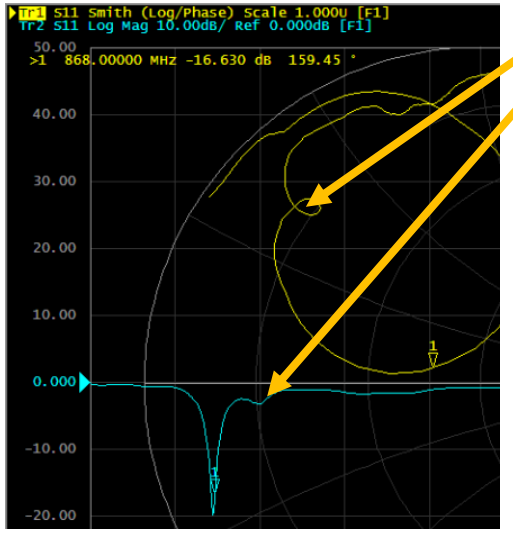
Notes on the Design

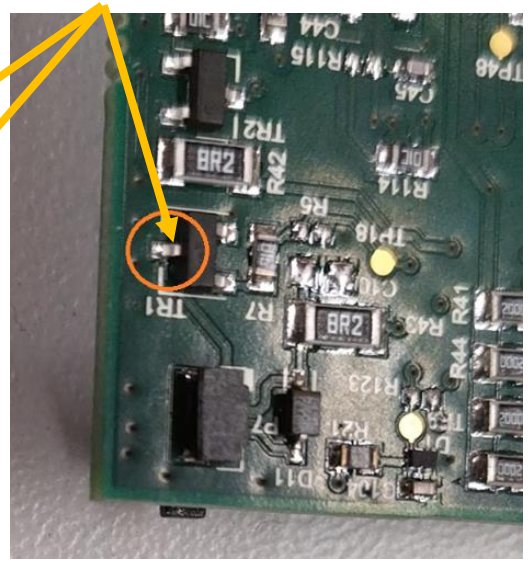
- Antenna radiator leg extends over the feed pad possibly causing some stray capacitance negatively affecting antenna efficiency and bandwidth
  - Recommended to cut the leg shorter and pay attention to both tolerances of the part itself and assembly
- Various items incl. battery wire connector, GPS antenna & its cable and vibra are not optimally located but do not seemingly cause larger issues but may contribute to lower efficiency compared to simulations with somewhat idealistic model
  - It is always recommended to have loose wires as close as possible to the PCBA to capacitively couple them to the main ground plane
  - Note: vibra was on all the time when battery connected



Radiator leg should not overlap the gap

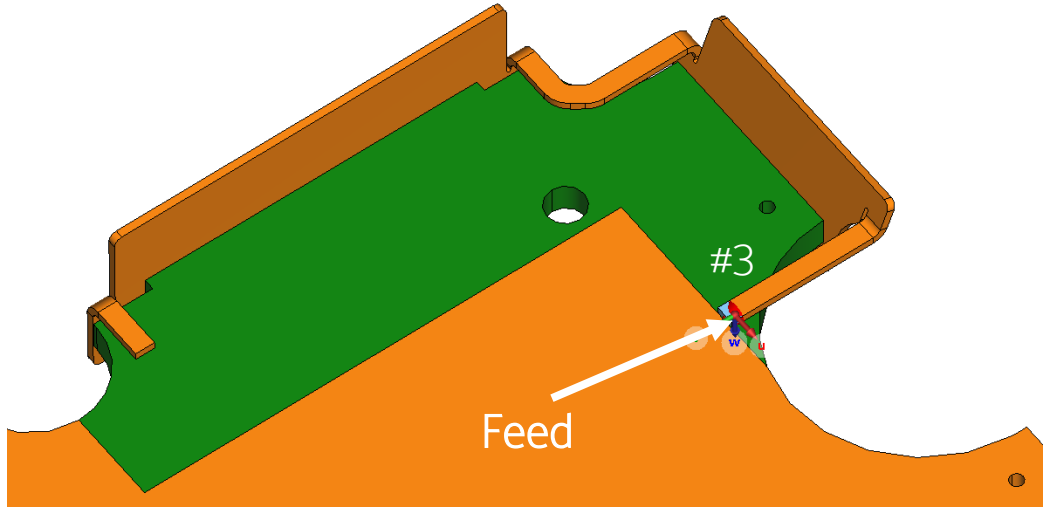
Disconnecting transistor leg helped with undesired resonance in impedance



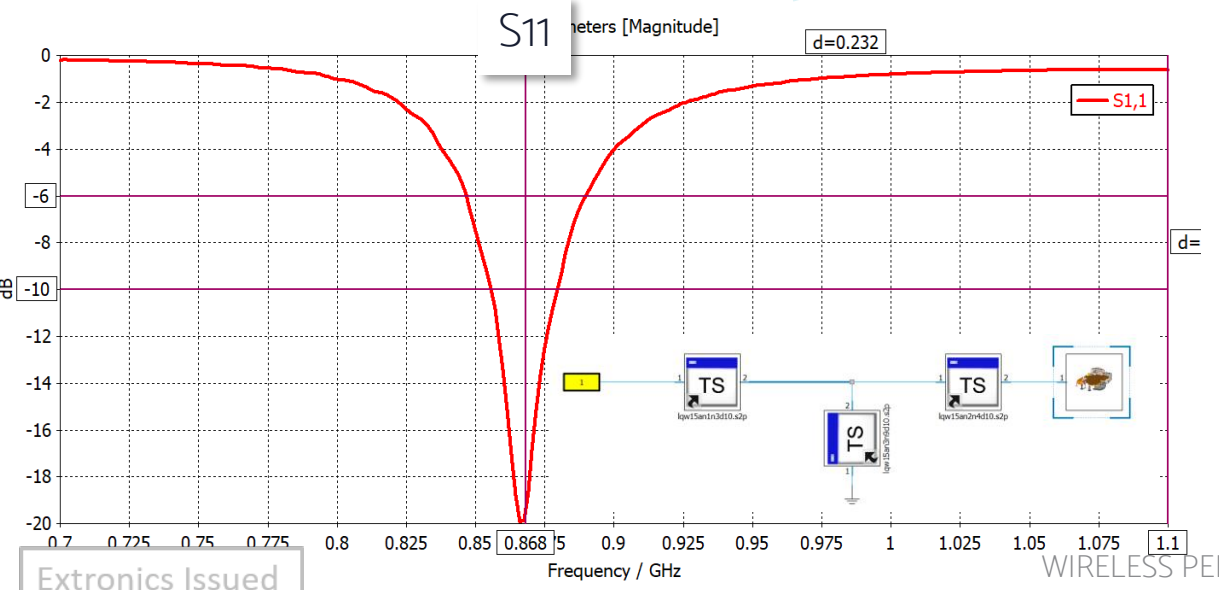


Antenna Design – Simulated Results as in July 21st

- Feed #3 (side of PCB) provides potential of -1.3 dB impedance matched antenna efficiency



S11



Efficiency