

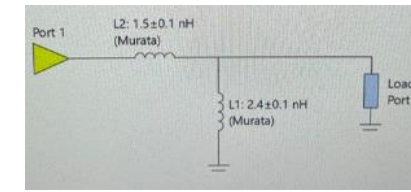


Radiantum

WIRELESS PERFORMANCE MATTERS

Extronics
P3265 – Antenna Design
01 Dec 2023

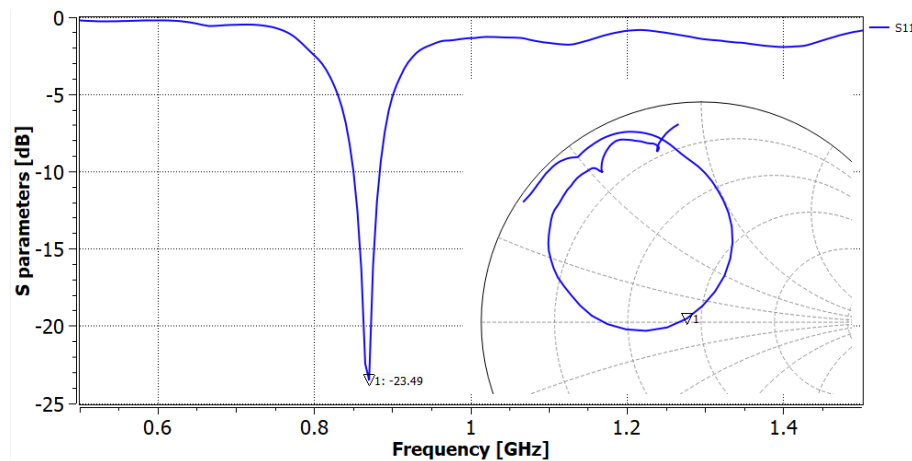
Antenna Matching and Measurement Results



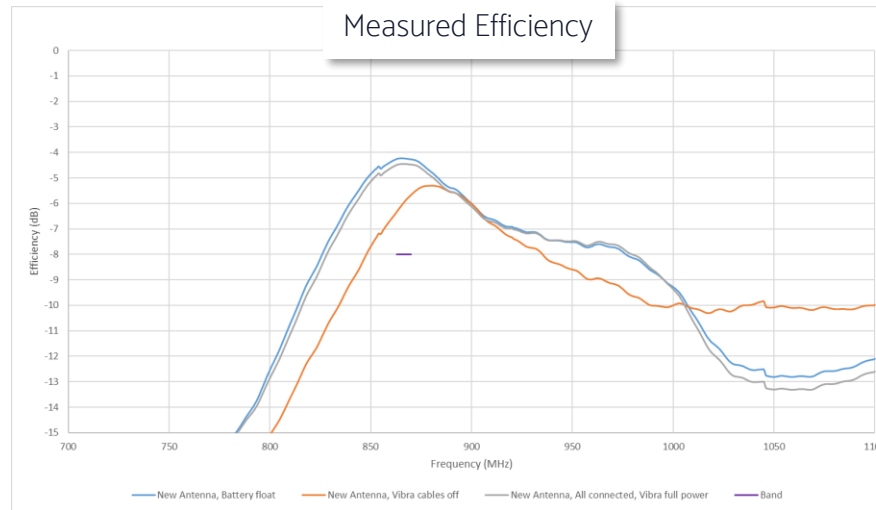
- Antenna raw impedance was measured from received new PCBAs
 - Design of matching network was done by initial circuit simulations ($L_2=1.5$ nH and $L_1=2.4$ nH) and fine tuning by hands on lab work using muRata LQW18 series wirewound inductors with final values $L_{200}=1.7$ nH and $C_{200}=3.0$ nH (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**



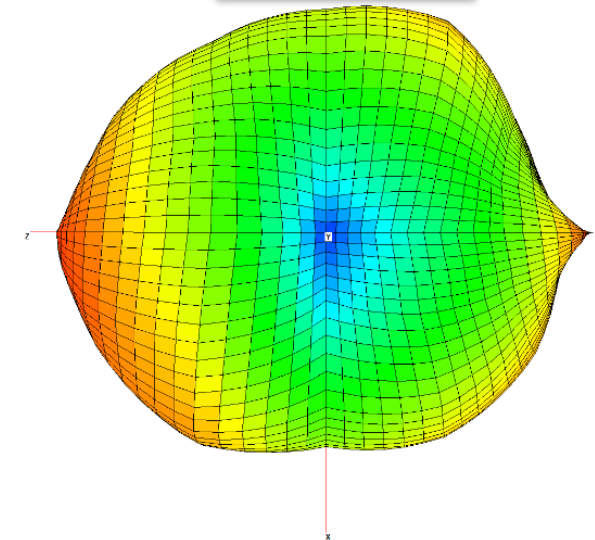
Impedance Matching



Measured Efficiency

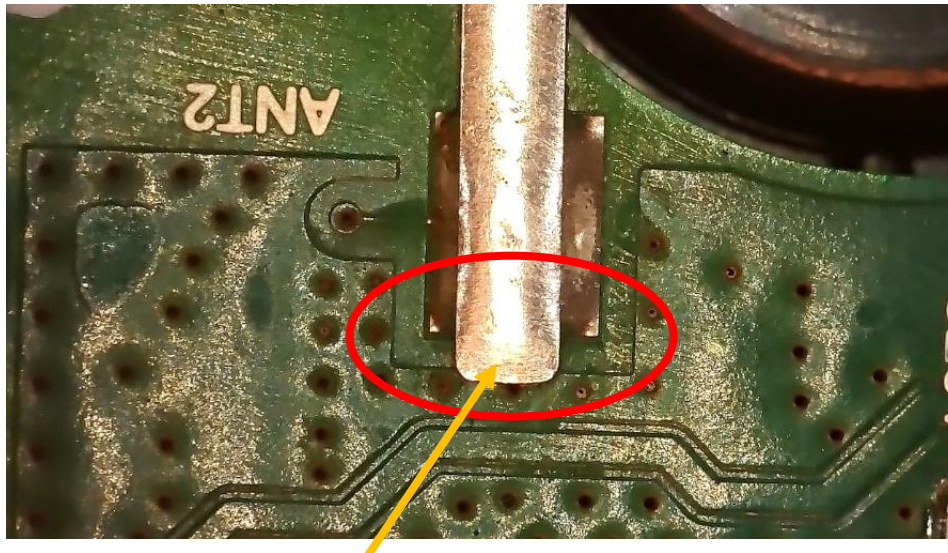


Radiation pattern

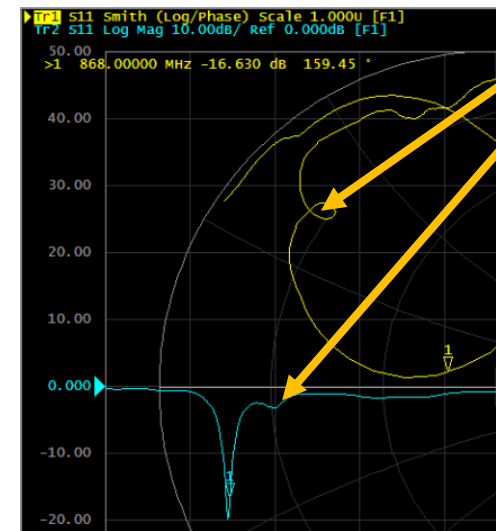


Notes on the Design

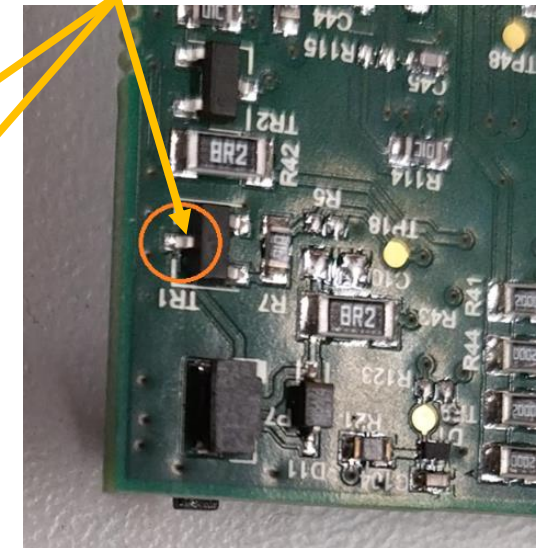
- Antenna radiator leg extends over the feed pad possibly causing some stray capacitance negatively affecting antenna efficiency and bandwidth
 - Recommended to cut the leg shorter and pay attention to both tolerances of the part itself and assembly
- Various items incl. battery wire connector, GPS antenna & 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

