

Removed OLD Cellular Antenna Data

3.2.2 ISM

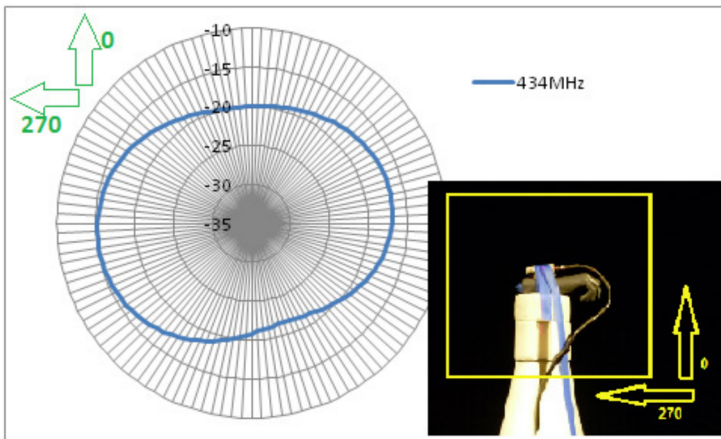


Figure 24 – Phi=0°

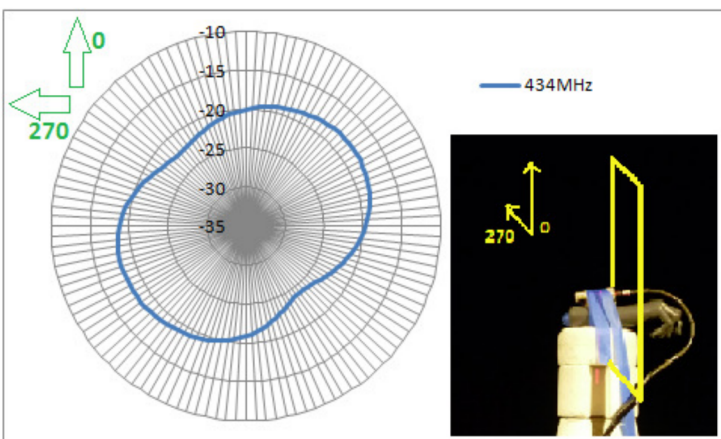


Figure 25 – Phi=90°

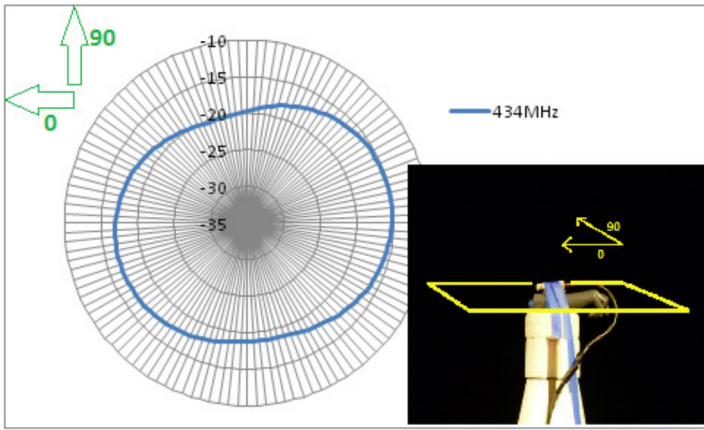


Figure 26 – Theta=90°

The SAM has little to no impact on the ISM antenna radiation pattern. The average gain of the ISM antenna is approximately -15dBi.

3.3 Antenna Efficiency

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3.3.2 ISM

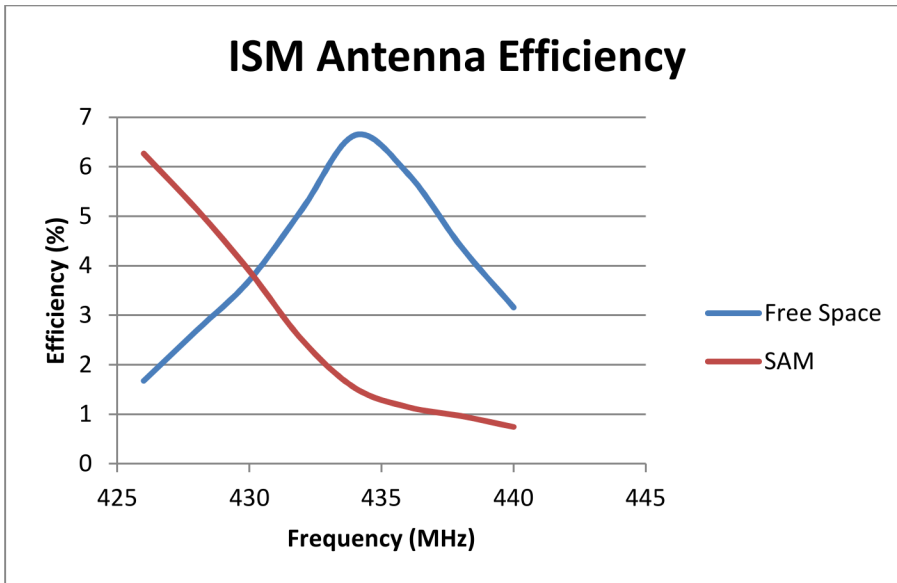


Figure 28 – ISM antenna efficiency

The SAM is loading the resonant frequency of ISM antenna more than expected, shifting it lower by ~10MHz. The final antenna integration shall be tuned on frequency with production PCBs, electronics, battery, plastic enclosure and near human tissue.

4 Device Integration Measurements

The antennas were integrated into an alpha device with all PCBs, plastics and battery. Each antenna was tuned to its respective frequency bands. Return loss and antenna coupling were measured. The antennas were sent to a 3rd party antenna range (Satimo) to perform far-field radiation and antenna efficiency measurements in free space and with the device on a SAM hand.

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Figure 30 – Cellular antenna matching network

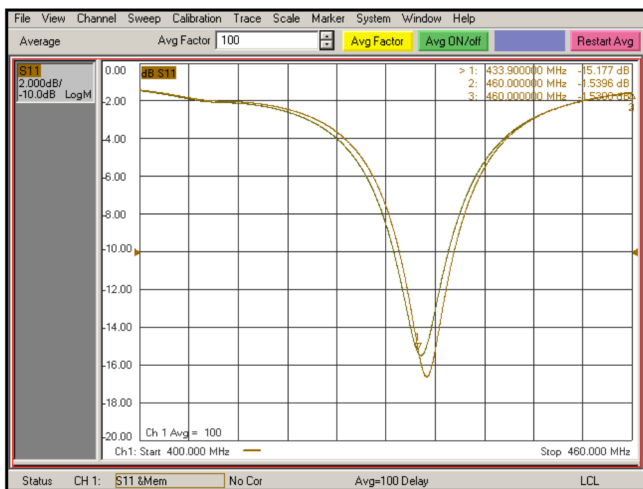


Figure 31 – ISM antenna return loss

The ISM antenna return loss plot includes free space and on-body measurements. The presence of meat has a loading effect on the ISM antenna which reduces the resonant frequency slightly. The return loss at 433.92MHz is -15dB. No matching components were used.

4.2 Isolation

The isolation between the cellular, ISM and GPS antennas was measured. The off-the-shelf GPS antenna used is an 18mm x 18mm x 4mm patch, part number GP.1575.18.4.A.02 from Taoglas.