

The spacecraft will have a half-wave dipole mounted on the positive Z face. It will operate at 437.505 MHz for use with a Lithium-1 radio for tracking, telemetry and control of the spacecraft. Due to the fact that the spacecraft body is completely conductive the antenna has a slightly higher gain of 2.85 dBi. A FEKO model of the craft and simulation results are included.

The spacecraft will beacon throughout its lifetime and will downlink when over the State College ground station. The transmitter responsible for these emissions is the Astronautical Development Lithium-1 radio. The peak output power is 1 W. The peak ERP of the emission is 1.17532 W.

An additional antenna and transmitter were included in the satellite hardware. However, they will not be used. A relay on the antenna board defaults the antennas to the communications configuration described above, where the shorter dipole is connected to the Lithium-1 Radio transmitting at 437.505 MHz and the longer dipole is connected to a 50 Ohm load. This relay will keep the antennas in this configuration when it is in its default low state or whenever it loses power. The relay will not ever be pulled high, so the longer dipole will not be used. There are additional enables in place that will also be kept low to ensure that the Lithium-1 radio is the only transmitter at all times.

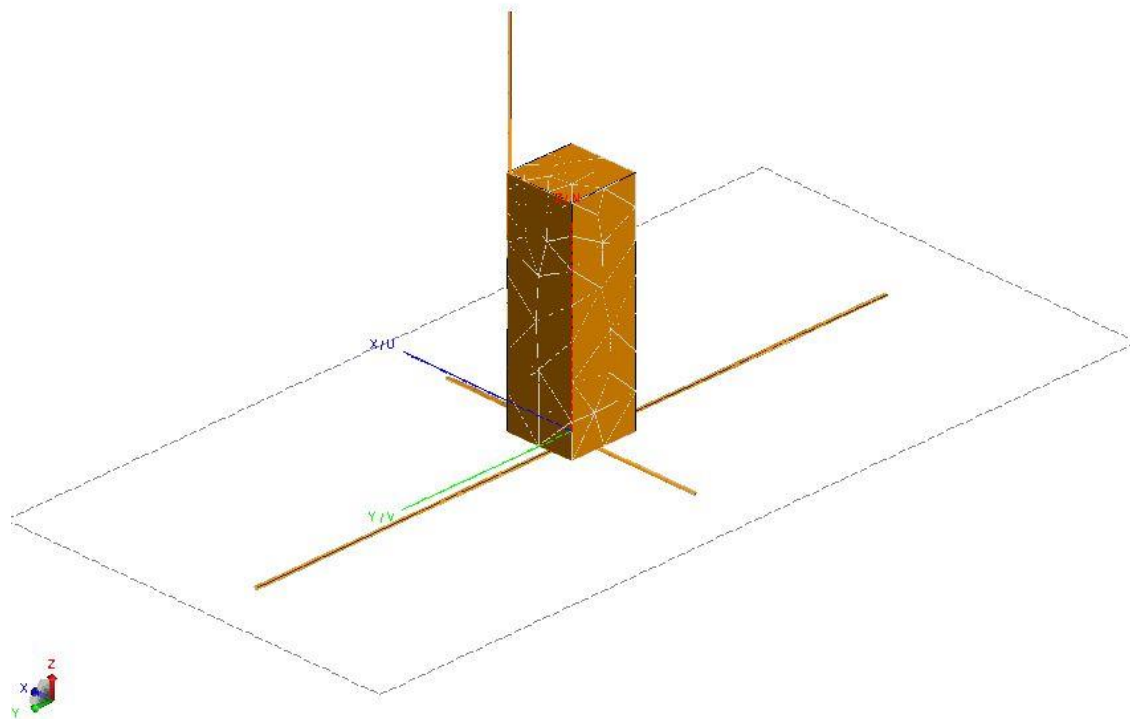


Figure 1: Spacecraft model with antennas and boom

Far field

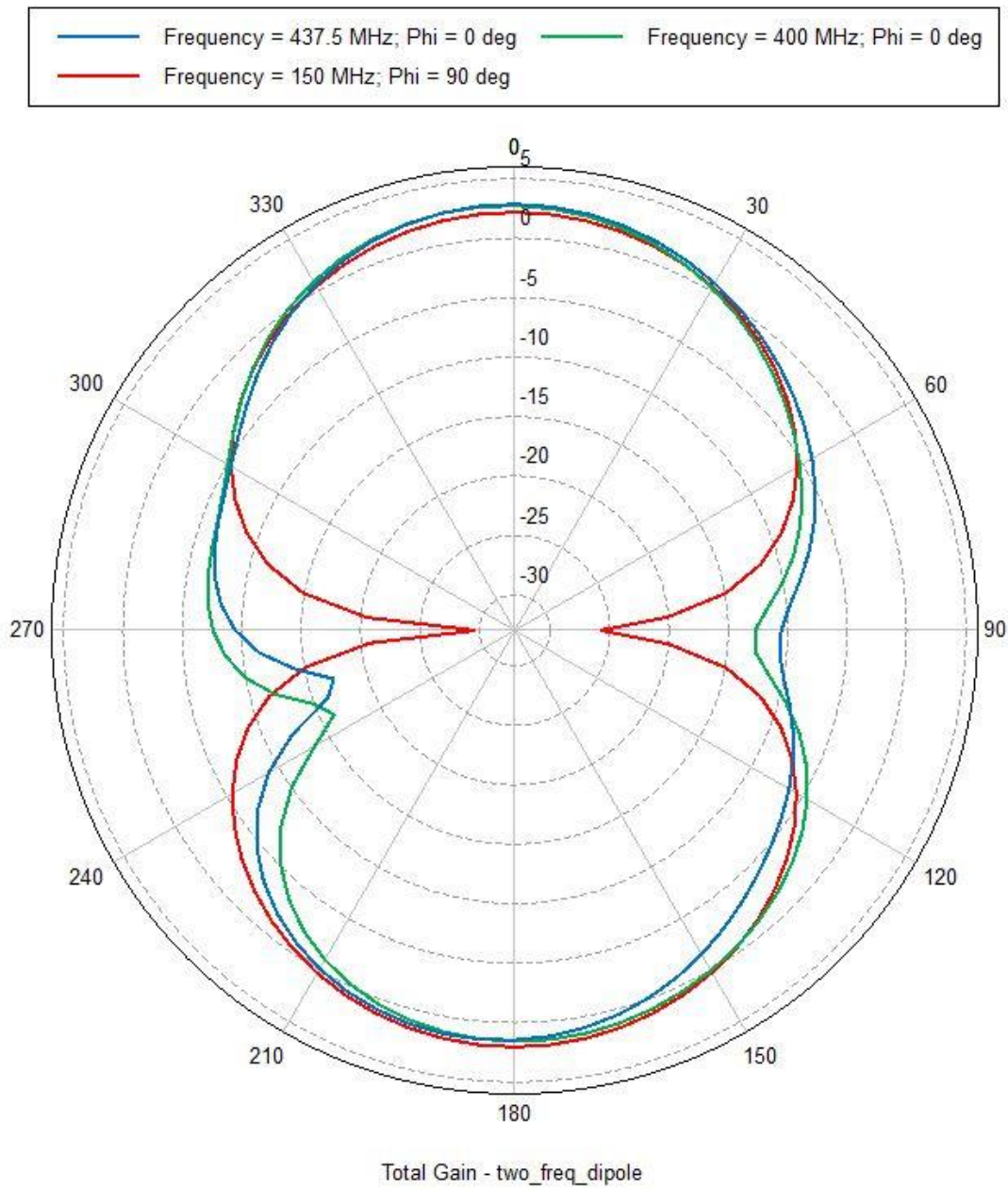


Figure 2: Far field $\Phi = 0$ cut for spacecraft antennas

Far field

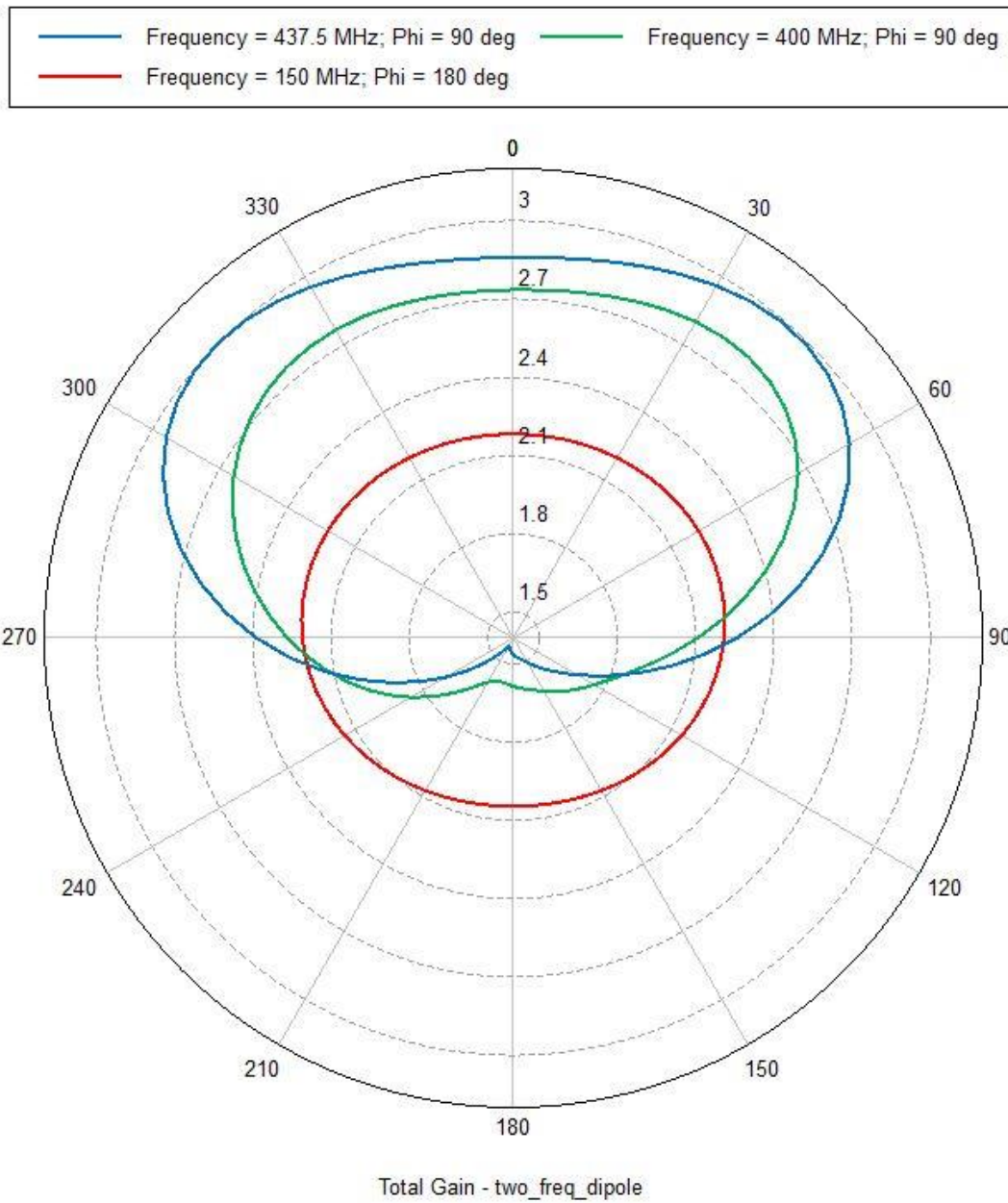


Figure 3: Far field Phi = 90 cut for spacecraft antennas